

英飞凌

32 位

微控制器

TC38x

32 位单片机 AD/AE版

32位单片机

数据手册

V 1.2, 2021-03

微控制器

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## Revision History

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## 1 特征描述

TC38x产品系列具有以下特点：

- 具有四个CPU核心的高性能微控制器
- 四个 32 位超标量 TriCore CPU (TC1.6.2P)，每个都具有以下特点：
  - 卓越的实时性能
  - 强大的位处理能力
  - 完全集成的 DSP 功能
  - 乘法累加单元能够实现每个周期2次MAC运算
  - 全流水线浮点单元( FPU )
  - 全温度范围内运行速度高达 300 MHz
  - 高达 240/96 KB 的数据暂存器 RAM (DSRP)
  - 高达 64 KB 的指令暂存器 RAM (PSPR)
  - 高达 64 KB 的数据 RAM (DLMU)
  - 32 KB 指令高速缓存 (ICACHE)
  - 16 KB 数据缓存 (DCACHE)
- 最多支持两个 TC1.6.2P 的锁步核
- 多个片上存储器
  - 所有嵌入式 NVM 和 SRAM 均受到 ECC 保护
  - 高达 10 MB 的程序闪存 (PFLASH)
  - 高达 512 KB 数据闪存式存储器 (DFLASH 0) 可用于 EEPROM 仿真
  - 128 KB 存储器 (LMU)
  - 引导只读存储器 (BROM)
- 具有安全数据传输的 128 通道 DMA 控制器
- 先进的中断系统 (ECC保护)
- 高性能片上总线结构
  - 64 位交叉互连总线 (SRI)可提供总线主控器、CPU 和内存之间快速并行访问
  - 用于片上外设和功能单元的 32 位系统外设总线 (SPB)
  - SRI 至 SPB 总线桥 (SFI 桥)
- 某些型号可选配硬件安全模块 (HSM)
- 处理安全监测警报的安全管理单元 (SMU)
- 具有 ECC、内存初始化和 MBIST 功能 (MTU) 的内存测试单元
- 用于检查数字 I/O 的硬件 I/O 监视器 (IOM)
- 多功能片上外设单元
  - 24 个异步/同步串行通道 (ASCLIN)，支持硬件 LIN (V1.3、V2.0、V2.1 和 J2602)，速率高达 50 MBaud
  - 5 个队列 SPI 接口通道 (QSPI)，具有主从功能，速率高达 50 Mbit/s
  - 1 个高速串行链路 (HSSL)，用于处理器间串行通讯，速度高达 320 Mbit/s
  - 3 个串行微秒总线接口 (MSC)，用于将串行端口扩展到外部电源设备
  - 3 个 MCMCAN 模块，每个模块带有 4 个 CAN 节点，可通过 FIFO 缓冲实现高效数据处理
  - 25 个单边半字节传输 (SENT) 通道，用于连接传感器
  - 2 个 FlexRay™模块，带 2 个通道 (E-Ray)，支持 V2.1

## 特征描述

- 一个通用定时器模块 (GTM)，提供一组强大的数字信号滤波和定时器功能，以实现自主和复杂的输入/输出管理
- 1个捕获/比较 6 模块（两个内核：CCU60 和 CCU61）
- 1个通用定时器单元（GPT12）
- 4 个通道外设传感器接口符合V1.3（PSI5）
- 1 个带串行 PHY 的外围传感器接口 (PSI5-S)
- 2 个符合 V2.1 的集成电路总线接口 (I2C)
- 1 个 IEEE802.3以太网 MAC (ETH)，带有 RMII 和 MII 接口 (ETH)
- 多功能逐次逼近型 ADC (VADC)
  - 16 个独立 ADC 内核集群
  - 输入电压范围为 0 V 至 5.5V（ADC 电源）
- Delta-Sigma ADC (DSADC)
  - 10 个通道
- 数字可编程 I/O 端口
- 支持OCDS Level 1 片上调试（CPU、DMA、片上总线）
- 多核调试、实时跟踪和校准
- 四/五线JTAG (IEEE 1149.1) 或 DAP (器件访问端口) 接口
- 电源管理系统和片上调节器
- 带有系统 PLL 和外设 PLL 的时钟生成单元
- 嵌入式电压调节器
- 符合 AEC-Q100 的汽车应用要求（仅适用于相应销售代码的交付发布后）
- ISO 26262 安全要素，不依赖于上下文，安全要求高达 ASIL D（仅适用于 IFX 发布的“安全包发布说明”中列出的销售代码）

## 订购信息

英飞凌微控制器的订购代码提供了特定产品的准确参考。此订购代码标识：

- 衍生物本身，即其功能集、温度范围和电源电压
- 封装和供应类型

**表 1-1 平台特点概述**

| Feature          |                           | TC38x                          |
|------------------|---------------------------|--------------------------------|
| CPUs             | Type                      | TC1.6.2                        |
|                  | Cores / Checker Cores     | 4 / 2                          |
|                  | Max. Freq.                | 300 MHz                        |
| Cache per CPU    | Program                   | 32 KB                          |
|                  | Data                      | 16 KB                          |
| SRAM per CPU     | PSPR                      | 64 KB                          |
|                  | DSPR                      | 240 KB for CPU0,1 / 96 KB else |
|                  | DLMU                      | 64 KB                          |
| SRAM global      | LMU                       | 128 KB                         |
|                  | DAM                       | 64 KB                          |
| Extension Memory | TCM                       | - MB                           |
|                  | XCM                       | - MB                           |
|                  | XTM                       | - KB                           |
| Program Flash    | Size                      | 10 MB                          |
|                  | Banks                     | 3 x 3 MB, 1 x 1 MB             |
| Data Flash       | Size (single-ended)       | 512 KB (DF0) + 128 KB (DF1)    |
| DMA              | Channels                  | 128                            |
| CONVCTRL         | Modules                   | 1                              |
| EVADC            | Primary Groups/Channels   | 8 / 64                         |
|                  | Secondary Groups/Channels | 4 / 64                         |
|                  | Fast Compare Channels     | 4                              |
| EDSADC           | Channels                  | 10                             |

表 1-1 平台特点概述 (续)

| Feature                     |                            | TC38x                      |
|-----------------------------|----------------------------|----------------------------|
| GTM                         | Clusters                   | 9 (5 @ 200MHz, 4 @ 100MHz) |
|                             | TIM (8 ch)                 | 7                          |
|                             | TOM (16 ch)                | 5                          |
|                             | ATOM (8 ch)                | 9                          |
|                             | MCS (8 ch)                 | 7                          |
|                             | CMU / ICM                  | 1 / 1                      |
|                             | PSM                        | 2                          |
|                             | TBU channels <sup>1)</sup> | 4 (TBU0-3)                 |
|                             | SPE                        | 4                          |
|                             | CMP / MON                  | 1 / 1                      |
|                             | BRC / DPLL                 | 1 / 1                      |
|                             | CDTM modules               | 6                          |
|                             | DTM modules                | 20 (8 on TOM, 12 on ATOM)  |
| Timer                       | GPT12                      | 1                          |
|                             | CCU6                       | 1                          |
| STM                         | Modules                    | 4                          |
| FlexRay                     | Modules                    | 2                          |
|                             | Channels                   | 2                          |
| CAN                         | Modules                    | 3                          |
|                             | Nodes                      | 3 x 4                      |
|                             | of which support TT-CAN    | 1                          |
| QSPI                        | Modules                    | 5                          |
|                             | HSCI Channels              | -                          |
| ASCLIN                      | Modules                    | 24                         |
| I2C                         | Interfaces                 | 2                          |
| SENT                        | Channels                   | 25                         |
| PSI5                        | Modules                    | 4                          |
| PSI5-S                      | Modules                    | 1                          |
| HSSL                        | Channels                   | 1                          |
| MSC                         | Channels                   | 3                          |
| SDMMC                       | eMMC/SD Interface          | 0                          |
| Ethernet (10/100Mbit/1Gbit) | Modules                    | 1                          |
| FCE                         | Modules                    | 1                          |
| Safety Support              | SMU                        | yes                        |
|                             | IOM                        | yes                        |
| SPU                         | Modules                    | -                          |
| RIF                         | Modules                    | -                          |
| HSPDM                       | Modules                    | -                          |

表 1-1 平台特点概述 (续)

| Feature              |               | TC38x                        |
|----------------------|---------------|------------------------------|
| Security             | HSM+          | 1                            |
| Debug                | OCDS          | yes                          |
|                      | MCDS          | no                           |
|                      | miniMCDS      | yes                          |
|                      | miniMCDS TRAM | 8 KB                         |
|                      | AGBT          | No                           |
| Low Power Features   | Standby RAM   | 2                            |
|                      | SCR           | yes                          |
| Packages             | Type          | FBGA-516 / LFBGA-292         |
| I/O                  | Type          | 5 V CMOS / 3.3 V CMOS / LVDS |
| T <sub>ambient</sub> | Range         | -40 ... +150°C               |

1) TBU3 具有作为角度时钟的特殊用途。

## 2 引脚定义和功能

下图显示了封装版本的逻辑符号：

- BGA516 (图 2-1)
- BGA292 (图 2-2)

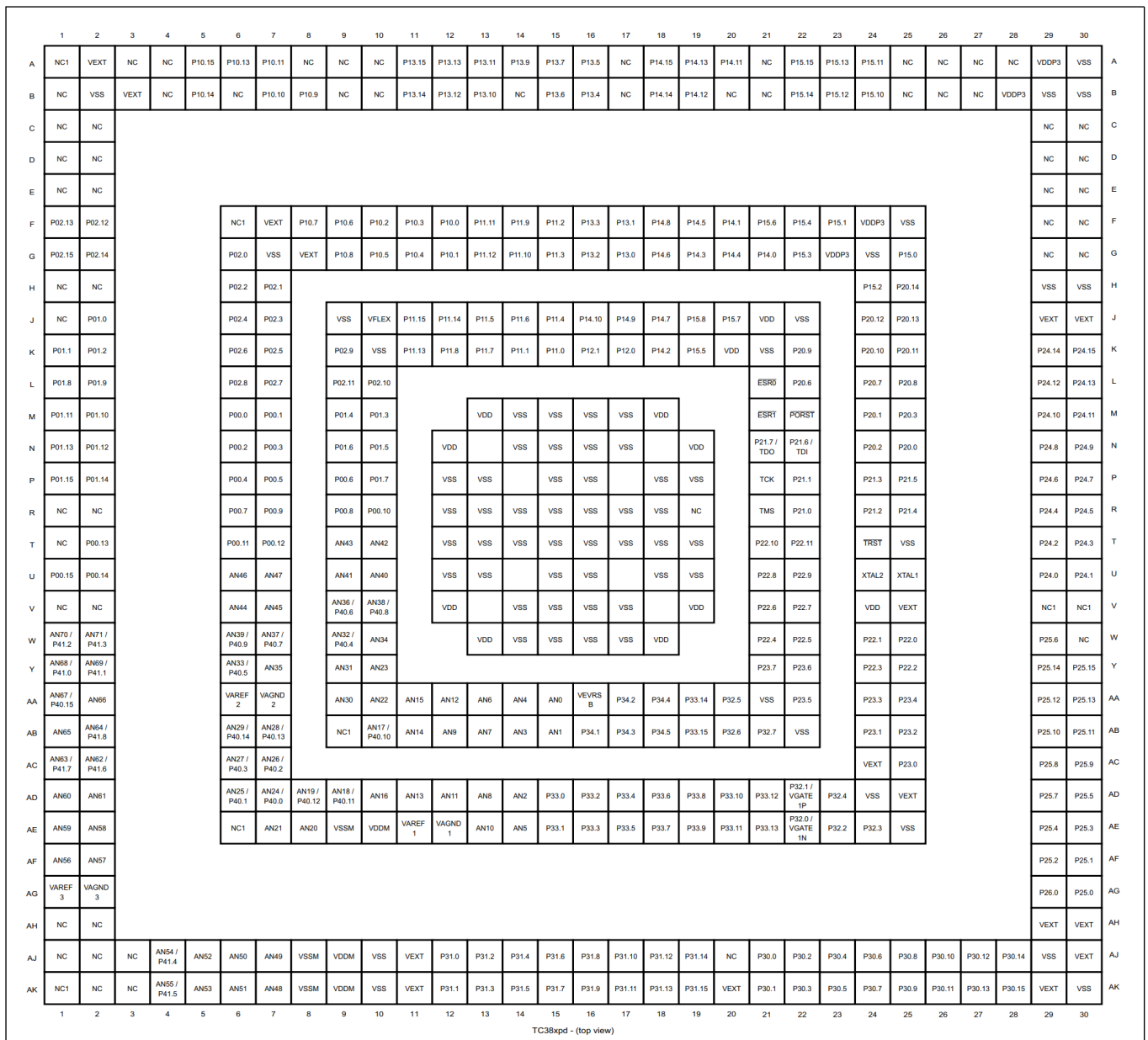


图 2-1 封装变体 BGA516 的逻辑符号

|   | 1                | 2                | 3                | 4                | 5                | 6          | 7          | 8      | 9      | 10    | 11         | 12    | 13    | 14     | 15     | 16             | 17                     | 18    | 19     | 20     |   |
|---|------------------|------------------|------------------|------------------|------------------|------------|------------|--------|--------|-------|------------|-------|-------|--------|--------|----------------|------------------------|-------|--------|--------|---|
| A | NC1              | VEXT             | P10.7            | P10.6            | P10.2            | P10.3      | P10.0      | P11.11 | P11.9  | P11.2 | P13.3      | P13.1 | P14.8 | P14.5  | P14.1  | P15.6          | P15.4                  | P15.1 | VDDP3  | VSS    | A |
| B | P02.0            | VSS              | VEXT             | P10.8            | P10.5            | P10.4      | P10.1      | P11.12 | P11.10 | P11.3 | P13.2      | P13.0 | P14.6 | P14.3  | P14.4  | P14.0          | P15.3                  | VDDP3 | VSS    | P15.0  | B |
| C | P02.2            | P02.1            |                  |                  |                  |            |            |        |        |       |            |       |       |        |        |                |                        |       | P15.2  | P20.14 | C |
| D | P02.4            | P02.3            |                  | VSS              | VFLEX            | P11.15     | P11.14     | P11.5  | P11.6  | P11.4 | P14.10     | P14.9 | P14.7 | P15.8  | P15.7  | VDD            | VSS                    |       | P20.12 | P20.13 | D |
| E | P02.6            | P02.5            |                  | P02.9            | VSS              | P11.13     | P11.8      | P11.7  | P11.1  | P11.0 | P12.1      | P12.0 | P14.2 | P15.5  | VDD    | VSS            | P20.9                  |       | P20.10 | P20.11 | E |
| F | P02.8            | P02.7            |                  | P02.11           | P02.10           |            |            |        |        |       |            |       |       |        |        | ESR0           | P20.6                  |       | P20.7  | P20.8  | F |
| G | P00.0            | P00.1            |                  | P01.4            | P01.3            |            |            | VDD    | VSS    | VSS   | VSS        | VSS   | VDD   |        |        | ESR1           | FORST                  |       | P20.1  | P20.3  | G |
| H | P00.2            | P00.3            |                  | P01.6            | P01.5            |            | VDD        |        | VSS    | VSS   | VSS        | VSS   |       | VDD    |        | P21.7 /<br>TDO | P21.6 /<br>TDI         |       | P20.2  | P20.0  | H |
| J | P00.4            | P00.5            |                  | P00.6            | P01.7            |            | VSS        | VSS    |        | VSS   | VSS        |       | VSS   | VSS    |        | TCK            | P21.1                  |       | P21.3  | P21.5  | J |
| K | P00.7            | P00.9            |                  | P00.8            | P00.10           |            | VSS        | VSS    | VSS    | VSS   | VSS        | VSS   | VSS   | NC     |        | TMS            | P21.0                  |       | P21.2  | P21.4  | K |
| L | P00.11           | P00.12           |                  | AN43             | AN42             |            | VSS        | VSS    | VSS    | VSS   | VSS        | VSS   | VSS   | VSS    |        | P22.10         | P22.11                 |       | TRST   | VSS    | L |
| M | AN46             | AN47             |                  | AN41             | AN40             |            | VSS        | VSS    |        | VSS   | VSS        |       | VSS   | VSS    |        | P22.8          | P22.9                  |       | XTAL2  | XTAL1  | M |
| N | AN44             | AN45             |                  | AN36 /<br>P40.6  | AN38 /<br>P40.8  |            | VDD        |        | VSS    | VSS   | VSS        | VSS   |       | VDD    |        | P22.6          | P22.7                  |       | VDD    | VEXT   | N |
| P | AN39 /<br>P40.9  | AN37 /<br>P40.7  |                  | AN32 /<br>P40.4  | AN34             |            | VDD        | VSS    | VSS    | VSS   | VSS        | VDD   |       |        |        | P22.4          | P22.5                  |       | P22.1  | P22.0  | P |
| R | AN33 /<br>P40.5  | AN35             |                  | AN31             | AN23             |            |            |        |        |       |            |       |       |        |        | P23.7          | P23.6                  |       | P22.3  | P22.2  | R |
| T | VAREF<br>2       | VAGND<br>2       |                  | AN30             | AN22             | AN15       | AN12       | AN6    | AN4    | AN0   | VEVRS<br>B | P34.2 | P34.4 | P33.14 | P32.5  | VSS            | P23.5                  |       | P23.3  | P23.4  | T |
| U | AN29 /<br>P40.14 | AN28 /<br>P40.13 |                  | NC1              | AN17 /<br>P40.10 | AN14       | AN9        | AN7    | AN3    | AN1   | P34.1      | P34.3 | P34.5 | P33.15 | P32.6  | P32.7          | VSS                    |       | P23.1  | P23.2  | U |
| V | AN27 /<br>P40.3  | AN26 /<br>P40.2  |                  |                  |                  |            |            |        |        |       |            |       |       |        |        |                |                        |       | VEXT   | P23.0  | V |
| W | AN25 /<br>P40.1  | AN24 /<br>P40.0  | AN19 /<br>P40.12 | AN18 /<br>P40.11 | AN16             | AN13       | AN11       | AN8    | AN2    | P33.0 | P33.2      | P33.4 | P33.6 | P33.8  | P33.10 | P33.12         | P32.1 /<br>VGATE<br>1P | P32.4 | VSS    | VEXT   | W |
| Y | NC1              | AN21             | AN20             | VSSM             | VDDM             | VAREF<br>1 | VAGND<br>1 | AN10   | AN5    | P33.1 | P33.3      | P33.5 | P33.7 | P33.9  | P33.11 | P33.13         | P32.0 /<br>VGATE<br>1N | P32.2 | P32.3  | VSS    | Y |

TC38xpd - (top view)

图 2-2 封装变体 BGA292 的逻辑符号

## 2.1 BGA516 封装变体引脚配置

表 2-1 端口 P00 功能

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| M6   | P00.0           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN4_10 |       |                                 | Mux input channel 4 of TIM module 5 |
|      | GTM_TIM3_IN0_1  |       |                                 | Mux input channel 0 of TIM module 3 |
|      | GTM_TIM2_IN0_1  |       |                                 | Mux input channel 0 of TIM module 2 |
|      | CCU61_CTRAPA    |       |                                 | Trap input capture                  |
|      | CCU60_T12HRE    |       |                                 | External timer start 12             |
|      | MSC0_INJ0       |       |                                 | Injection signal from port          |
|      | GETH_MDIOA      |       |                                 | MDIO Input                          |
|      | P00.0           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT9       | O1    |                                 | GTM muxed output                    |
|      | IOM_REF0_9      |       |                                 | Reference input 0                   |
|      | ASCLIN3_ASCLK   | O2    |                                 | Shift clock output                  |
|      | ASCLIN3_ATX     | O3    |                                 | Transmit output                     |
|      | IOM_MON2_15     |       |                                 | Monitor input 2                     |
|      | IOM_REF2_15     |       |                                 | Reference input 2                   |
|      | —               | O4    |                                 | Reserved                            |
|      | CAN10_TXD       | O5    |                                 | CAN transmit output node 0          |
|      | —               | O6    |                                 | Reserved                            |
|      | CCU60_COUT63    | O7    |                                 | T13 PWM channel 63                  |
|      | IOM_MON1_6      |       |                                 | Monitor input 1                     |
|      | IOM_REF1_0      |       |                                 | Reference input 1                   |
|      | GETH_MDIO       | O     |                                 | MDIO Output                         |

表 2-1 端口 P00 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                               |
|------|-----------------|-------|---------------------------------|----------------------------------------|
| M7   | P00.1           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                  |
|      | GTM_TIM5_IN5_11 |       |                                 | Mux input channel 5 of TIM module 5    |
|      | GTM_TIM3_IN1_1  |       |                                 | Mux input channel 1 of TIM module 3    |
|      | GTM_TIM2_IN1_1  |       |                                 | Mux input channel 1 of TIM module 2    |
|      | CCU60_CC60INB   |       |                                 | T12 capture input 60                   |
|      | ASCLIN3_ARXE    |       |                                 | Receive input                          |
|      | EDSADC_DSCIN5A  |       |                                 | Modulator clock input, channel 5       |
|      | CAN10_RXDA      |       |                                 | CAN receive input node 0               |
|      | PSI5_RX0A       |       |                                 | RXD inputs (receive data) channel 0    |
|      | CCU61_CC60INA   |       |                                 | T12 capture input 60                   |
|      | SENT_SENT0B     |       |                                 | Receive input channel 0                |
|      | EDSADC_DSCIN7B  |       |                                 | Modulator clock input, channel 7       |
|      | EVADC_G9CH11    | AI    |                                 | Analog input channel 11, group 9       |
|      | EDSADC_EDS5NA   |       |                                 | Negative analog input channel 5, pin A |
|      | P00.1           | O0    |                                 | General-purpose output                 |
|      | GTM_TOUT10      | O1    |                                 | GTM muxed output                       |
|      | IOM_REF0_10     |       |                                 | Reference input 0                      |
|      | ASCLIN3_ATX     | O2    |                                 | Transmit output                        |
|      | IOM_MON2_15     |       |                                 | Monitor input 2                        |
|      | IOM_REF2_15     |       |                                 | Reference input 2                      |
|      | —               | O3    |                                 | Reserved                               |
|      | EDSADC_DSCOUT5  | O4    |                                 | Modulator clock output                 |
|      | EDSADC_DSCOUT7  | O5    |                                 | Modulator clock output                 |
|      | SENT_SPC0       | O6    |                                 | Transmit output                        |
|      | CCU61_CC60      | O7    |                                 | T12 PWM channel 60                     |
|      | IOM_MON1_8      |       |                                 | Monitor input 1                        |
|      | IOM_REF1_13     |       |                                 | Reference input 1                      |

表 2-1 端口 P00 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                      | Function                               |
|------|-----------------|-------|----------------------------------|----------------------------------------|
| N6   | P00.2           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES1 | General-purpose input                  |
|      | GTM_TIM5_IN6_11 |       |                                  | Mux input channel 6 of TIM module 5    |
|      | GTM_TIM3_IN1_2  |       |                                  | Mux input channel 1 of TIM module 3    |
|      | GTM_TIM2_IN1_2  |       |                                  | Mux input channel 1 of TIM module 2    |
|      | EDSADC_DSDIN7B  |       |                                  | Digital datastream input, channel 7    |
|      | EDSADC_DSDIN5A  |       |                                  | Digital datastream input, channel 5    |
|      | SENT_SENT1B     |       |                                  | Receive input channel 1                |
|      | EVADC_G9CH10    | AI    |                                  | Analog input channel 10, group 9       |
|      | EDSADC_EDS5PA   |       |                                  | Positive analog input channel 5, pin A |
|      | P00.2           | O0    |                                  | General-purpose output                 |
|      | GTM_TOUT11      | O1    |                                  | GTM muxed output                       |
|      | IOM_REF0_11     |       |                                  | Reference input 0                      |
|      | ASCLIN3_ASCLK   | O2    |                                  | Shift clock output                     |
|      | CAN21_TXD       | O3    |                                  | CAN transmit output node 1             |
|      | PSI5_TX0        | O4    |                                  | TXD outputs (send data)                |
|      | IOM_MON1_14     |       |                                  | Monitor input 1                        |
|      | IOM_REF1_14     |       |                                  | Reference input 1                      |
|      | CAN03_TXD       | O5    |                                  | CAN transmit output node 3             |
|      | IOM_MON2_8      |       |                                  | Monitor input 2                        |
|      | IOM_REF2_8      |       |                                  | Reference input 2                      |
|      | QSPI3_SLSO4     | O6    |                                  | Master slave select output             |
|      | CCU61_COUT60    | O7    |                                  | T12 PWM channel 60                     |
|      | IOM_MON1_11     |       |                                  | Monitor input 1                        |
|      | IOM_REF1_10     |       |                                  | Reference input 1                      |

表 2-1 端口 P00 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                      | Function                               |
|------|-----------------|-------|----------------------------------|----------------------------------------|
| N7   | P00.3           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES1 | General-purpose input                  |
|      | GTM_TIM5_IN7_10 |       |                                  | Mux input channel 7 of TIM module 5    |
|      | GTM_TIM3_IN2_1  |       |                                  | Mux input channel 2 of TIM module 3    |
|      | GTM_TIM2_IN2_1  |       |                                  | Mux input channel 2 of TIM module 2    |
|      | CCU60_CC61INB   |       |                                  | T12 capture input 61                   |
|      | EDSADC_DSCIN3A  |       |                                  | Modulator clock input, channel 3       |
|      | EDSADC_ITR5F    |       |                                  | Trigger/Gate input, channel 5          |
|      | PSI5_RX1A       |       |                                  | RXD inputs (receive data) channel 1    |
|      | CAN03_RXDA      |       |                                  | CAN receive input node 3               |
|      | CAN21_RXDA      |       |                                  | CAN receive input node 1               |
|      | PSI5S_RXA       |       |                                  | RX data input                          |
|      | SENT_SENT2B     |       |                                  | Receive input channel 2                |
|      | CCU61_CC61INA   |       |                                  | T12 capture input 61                   |
|      | ASCLIN12_ARXA   |       |                                  | Receive input                          |
|      | EVADC_G9CH9     | AI    |                                  | Analog input channel 9, group 9        |
|      | EDSADC_EDS5NB   |       |                                  | Negative analog input channel 5, pin B |
|      | P00.3           | O0    |                                  | General-purpose output                 |
|      | GTM_TOUT12      | O1    |                                  | GTM muxed output                       |
|      | IOM_REF0_12     |       |                                  | Reference input 0                      |
|      | ASCLIN3_ASLSO   | O2    |                                  | Slave select signal output             |
|      | ASCLIN12_ATX    | O3    |                                  | Transmit output                        |
|      | EDSADC_DSCOUT3  | O4    |                                  | Modulator clock output                 |
|      | —               | O5    |                                  | Reserved                               |
|      | SENT_SPC2       | O6    |                                  | Transmit output                        |
|      | CCU61_CC61      | O7    |                                  | T12 PWM channel 61                     |
|      | IOM_MON1_9      |       |                                  | Monitor input 1                        |
|      | IOM_REF1_12     |       |                                  | Reference input 1                      |

表 2-1 端口 P00 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                      | Function                                                    |
|------|----------------|-------|----------------------------------|-------------------------------------------------------------|
| P6   | P00.4          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES1 | General-purpose input                                       |
|      | GTM_TIM6_IN4_1 |       |                                  | Mux input channel 4 of TIM module 6                         |
|      | GTM_TIM3_IN3_1 |       |                                  | Mux input channel 3 of TIM module 3                         |
|      | GTM_TIM2_IN3_1 |       |                                  | Mux input channel 3 of TIM module 2                         |
|      | SCU_E_REQ2_2   |       |                                  | ERU Channel 2 inputs 0 to 5 (0 is the LSB and 5 is the MSB) |
|      | SENT_SENT3B    |       |                                  | Receive input channel 3                                     |
|      | EDSADC_DSDIN3A |       |                                  | Digital datastream input, channel 3                         |
|      | EDSADC_SGNA    |       |                                  | Carrier sign signal input                                   |
|      | ASCLIN10_ARXA  |       |                                  | Receive input                                               |
|      | GTM_DTMA5_0    |       |                                  | CDTM5_DTM4                                                  |
|      | GTM_DTMT3_0    |       |                                  | CDTM3_DTM0                                                  |
|      | EVADC_G9CH8    | AI    |                                  | Analog input channel 8, group 9                             |
|      | EDSADC_EDS5PB  |       |                                  | Positive analog input channel 5, pin B                      |
|      | P00.4          | O0    |                                  | General-purpose output                                      |
|      | GTM_TOUT13     | O1    |                                  | GTM muxed output                                            |
|      | IOM_REF0_13    |       |                                  | Reference input 0                                           |
|      | PSI5S_TX       | O2    |                                  | TX data output                                              |
|      | CAN11_TXD      | O3    |                                  | CAN transmit output node 1                                  |
|      | PSI5_TX1       | O4    |                                  | TXD outputs (send data)                                     |
|      | IOM_MON1_15    |       |                                  | Monitor input 1                                             |
|      | —              | O5    |                                  | Reserved                                                    |
|      | SENT_SPC3      | O6    |                                  | Transmit output                                             |
|      | CCU61_COUT61   | O7    |                                  | T12 PWM channel 61                                          |
|      | IOM_MON1_12    |       |                                  | Monitor input 1                                             |
|      | IOM_REF1_9     |       |                                  | Reference input 1                                           |

表 2-1 端口 P00 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                      | Function                            |
|------|-----------------|-------|----------------------------------|-------------------------------------|
| P7   | P00.5           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES1 | General-purpose input               |
|      | GTM_TIM3_IN4_1  |       |                                  | Mux input channel 4 of TIM module 3 |
|      | GTM_TIM3_IN0_11 |       |                                  | Mux input channel 0 of TIM module 3 |
|      | GTM_TIM2_IN4_1  |       |                                  | Mux input channel 4 of TIM module 2 |
|      | CCU60_CC62INB   |       |                                  | T12 capture input 62                |
|      | EDSADC_DSCIN2A  |       |                                  | Modulator clock input, channel 2    |
|      | PSI5_RX2A       |       |                                  | RXD inputs (receive data) channel 2 |
|      | CCU61_CC62INA   |       |                                  | T12 capture input 62                |
|      | SENT_SENT4B     |       |                                  | Receive input channel 4             |
|      | CAN11_RXDB      |       |                                  | CAN receive input node 1            |
|      | ASCLIN12_ARXB   |       |                                  | Receive input                       |
|      | GTM_DTMT1_1     |       |                                  | CDTM1_DTM0                          |
|      | EVADC_G9CH7     | AI    |                                  | Analog input channel 7, group 9     |
|      | P00.5           | O0    |                                  | General-purpose output              |
|      | GTM_TOUT14      | O1    |                                  | GTM muxed output                    |
|      | IOM_REF0_14     |       |                                  | Reference input 0                   |
|      | EDSADC_CGPWMN   | O2    |                                  | Negative carrier generator output   |
|      | QSPI3_SLSO3     | O3    |                                  | Master slave select output          |
|      | EDSADC_DSCOUT2  | O4    |                                  | Modulator clock output              |
|      | EVADC_FC0BFLOUT | O5    |                                  | Boundary flag output, FC channel 0  |
|      | SENT_SPC4       | O6    |                                  | Transmit output                     |
|      | CCU61_CC62      | O7    |                                  | T12 PWM channel 62                  |
|      | IOM_MON1_10     |       |                                  | Monitor input 1                     |
|      | IOM_REF1_11     |       |                                  | Reference input 1                   |

表 2-1 端口 P00 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                      | Function                                           |
|------|-----------------|-------|----------------------------------|----------------------------------------------------|
| P9   | P00.6           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES1 | General-purpose input                              |
|      | GTM_TIM3_IN5_1  |       |                                  | Mux input channel 5 of TIM module 3                |
|      | GTM_TIM3_IN1_14 |       |                                  | Mux input channel 1 of TIM module 3                |
|      | GTM_TIM2_IN5_1  |       |                                  | Mux input channel 5 of TIM module 2                |
|      | EDSADC_ITR4F    |       |                                  | Trigger/Gate input, channel 4                      |
|      | EDSADC_DSDIN2A  |       |                                  | Digital datastream input, channel 2                |
|      | SENT_SENT5B     |       |                                  | Receive input channel 5                            |
|      | ASCLIN5_ARXA    |       |                                  | Receive input                                      |
|      | GTM_DTMT3_1     |       |                                  | CDTM3_DTM0                                         |
|      | EVADC_G9CH6     | AI    |                                  | Analog input channel 6, group 9                    |
|      | P00.6           | O0    |                                  | General-purpose output                             |
|      | GTM_TOUT15      | O1    |                                  | GTM muxed output                                   |
|      | IOM_REF0_15     |       |                                  | Reference input 0                                  |
|      | EDSADC_CGPWMP   | O2    |                                  | Positive carrier generator output                  |
|      | —               | O3    |                                  | Reserved                                           |
|      | PSI5_TX2        | O4    |                                  | TXD outputs (send data)                            |
|      | IOM_REF1_15     |       |                                  | Reference input 1                                  |
|      | EVADC_EMUX10    | O5    |                                  | Control of external analog multiplexer interface 1 |
|      | SENT_SPC5       | O6    |                                  | Transmit output                                    |
|      | CCU61_COUT62    | O7    |                                  | T12 PWM channel 62                                 |
|      | IOM_MON1_13     |       |                                  | Monitor input 1                                    |
|      | IOM_REF1_8      |       |                                  | Reference input 1                                  |

表 2-1 端口 P00 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                                        | Function                               |
|------|-----------------|-------|----------------------------------------------------|----------------------------------------|
| R6   | P00.7           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES1                   | General-purpose input                  |
|      | GTM_TIM3_IN6_1  |       |                                                    | Mux input channel 6 of TIM module 3    |
|      | GTM_TIM3_IN2_11 |       |                                                    | Mux input channel 2 of TIM module 3    |
|      | GTM_TIM2_IN6_1  |       |                                                    | Mux input channel 6 of TIM module 2    |
|      | CCU61_CC60INC   |       |                                                    | T12 capture input 60                   |
|      | SENT_SENT6B     |       |                                                    | Receive input channel 6                |
|      | EDSADC_DSCIN4A  |       |                                                    | Modulator clock input, channel 4       |
|      | GPT120_T2INA    |       |                                                    | Trigger/gate input of timer T2         |
|      | CCU61_CCPOS0A   |       |                                                    | Hall capture input 0                   |
|      | CCU60_T12HRB    |       |                                                    | External timer start 12                |
|      | GTM_DTMT0_2     |       |                                                    | CDTM0_DTM0                             |
|      | EVADC_G9CH5     | AI    |                                                    | Analog input channel 5, group 9        |
|      | EDSADC_EDS4NA   |       |                                                    | Negative analog input channel 4, pin A |
|      | P00.7           | O0    | General-purpose output                             |                                        |
|      | GTM_TOUT16      | O1    | GTM muxed output                                   |                                        |
|      | ASCLIN5_ATX     | O2    | Transmit output                                    |                                        |
|      | EVADC_FC2BFLOUT | O3    | Boundary flag output, FC channel 2                 |                                        |
|      | EDSADC_DSCOUT4  | O4    | Modulator clock output                             |                                        |
|      | EVADC_EMUX11    | O5    | Control of external analog multiplexer interface 1 |                                        |
|      | SENT_SPC6       | O6    | Transmit output                                    |                                        |
|      | CCU61_CC60      | O7    | T12 PWM channel 60                                 |                                        |
|      | IOM_MON1_8      |       | Monitor input 1                                    |                                        |
|      | IOM_REF1_13     |       | Reference input 1                                  |                                        |

表 2-1 端口 P00 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                      | Function                                           |
|------|-----------------|-------|----------------------------------|----------------------------------------------------|
| R9   | P00.8           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES1 | General-purpose input                              |
|      | GTM_TIM3_IN7_1  |       |                                  | Mux input channel 7 of TIM module 3                |
|      | GTM_TIM3_IN3_11 |       |                                  | Mux input channel 3 of TIM module 3                |
|      | GTM_TIM2_IN7_1  |       |                                  | Mux input channel 7 of TIM module 2                |
|      | CCU61_CC61INC   |       |                                  | T12 capture input 61                               |
|      | SENT_SENT7B     |       |                                  | Receive input channel 7                            |
|      | EDSADC_DSDIN4A  |       |                                  | Digital datastream input, channel 4                |
|      | GPT120_T2EUDA   |       |                                  | Count direction control input of timer T2          |
|      | CCU61_CCPOS1A   |       |                                  | Hall capture input 1                               |
|      | CCU60_T13HRB    |       |                                  | External timer start 13                            |
|      | ASCLIN10_ARXB   |       |                                  | Receive input                                      |
|      | EVADC_G9CH4     | AI    |                                  | Analog input channel 4, group 9                    |
|      | EDSADC_EDS4PA   |       |                                  | Positive analog input channel 4, pin A             |
|      | P00.8           | O0    |                                  | General-purpose output                             |
|      | GTM_TOUT17      | O1    |                                  | GTM muxed output                                   |
|      | QSPI3_SLSO6     | O2    |                                  | Master slave select output                         |
|      | ASCLIN10_ATX    | O3    |                                  | Transmit output                                    |
|      | —               | O4    |                                  | Reserved                                           |
|      | EVADC_EMUX12    | O5    |                                  | Control of external analog multiplexer interface 1 |
|      | SENT_SPC7       | O6    |                                  | Transmit output                                    |
|      | CCU61_CC61      | O7    |                                  | T12 PWM channel 61                                 |
|      | IOM_MON1_9      |       |                                  | Monitor input 1                                    |
|      | IOM_REF1_12     |       |                                  | Reference input 1                                  |

表 2-1 端口 P00 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                      | Function                                  |
|------|----------------|-------|----------------------------------|-------------------------------------------|
| R7   | P00.9          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES1 | General-purpose input                     |
|      | GTM_TIM4_IN0_7 |       |                                  | Mux input channel 0 of TIM module 4       |
|      | GTM_TIM1_IN0_1 |       |                                  | Mux input channel 0 of TIM module 1       |
|      | GTM_TIM0_IN0_1 |       |                                  | Mux input channel 0 of TIM module 0       |
|      | CCU61_CC62INC  |       |                                  | T12 capture input 62                      |
|      | SENT_SENT8B    |       |                                  | Receive input channel 8                   |
|      | CCU61_CCPOS2A  |       |                                  | Hall capture input 2                      |
|      | EDSADC_DSCIN1A |       |                                  | Modulator clock input, channel 1          |
|      | EDSADC_ITR3F   |       |                                  | Trigger/Gate input, channel 3             |
|      | GPT120_T4EUDA  |       |                                  | Count direction control input of timer T4 |
|      | CCU60_T13HRC   |       |                                  | External timer start 13                   |
|      | CCU60_T12HRC   |       |                                  | External timer start 12                   |
|      | ASCLIN13_ARXA  |       |                                  | Receive input                             |
|      | EVADC_G9CH3    | AI    |                                  | Analog input channel 3, group 9           |
|      | EDSADC_EDS4NB  |       |                                  | Negative analog input channel 4, pin B    |
|      | P00.9          | O0    |                                  | General-purpose output                    |
|      | GTM_TOUT18     | O1    |                                  | GTM muxed output                          |
|      | QSPI3_SLSO7    | O2    |                                  | Master slave select output                |
|      | ASCLIN3_ARTS   | O3    |                                  | Ready to send output                      |
|      | EDSADC_DSCOUT1 | O4    |                                  | Modulator clock output                    |
|      | ASCLIN4_ATX    | O5    |                                  | Transmit output                           |
|      | SENT_SPC8      | O6    |                                  | Transmit output                           |
|      | CCU61_CC62     | O7    |                                  | T12 PWM channel 62                        |
|      | IOM_MON1_10    |       |                                  | Monitor input 1                           |
|      | IOM_REF1_11    |       |                                  | Reference input 1                         |

## 引脚定义和功能 BGA516 封装变体 引脚配置

表 2-1 端口 P00 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                      | Function                               |
|------|-----------------|-------|----------------------------------|----------------------------------------|
| R10  | P00.10          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES1 | General-purpose input                  |
|      | GTM_TIM4_IN1_11 |       |                                  | Mux input channel 1 of TIM module 4    |
|      | GTM_TIM1_IN1_1  |       |                                  | Mux input channel 1 of TIM module 1    |
|      | GTM_TIM0_IN1_1  |       |                                  | Mux input channel 1 of TIM module 0    |
|      | SENT_SENT9B     |       |                                  | Receive input channel 9                |
|      | EDSADC_DSDIN1A  |       |                                  | Digital datastream input, channel 1    |
|      | EVADC_G9CH2     | AI    |                                  | Analog input channel 2, group 9        |
|      | EDSADC_EDS4PB   |       |                                  | Positive analog input channel 4, pin B |
|      | P00.10          | O0    |                                  | General-purpose output                 |
|      | GTM_TOUT19      | O1    |                                  | GTM muxed output                       |
|      | ASCLIN4_ASCLK   | O2    |                                  | Shift clock output                     |
|      | ASCLIN13_ATX    | O3    |                                  | Transmit output                        |
|      | —               | O4    |                                  | Reserved                               |
|      | —               | O5    |                                  | Reserved                               |
|      | SENT_SPC9       | O6    |                                  | Transmit output                        |
|      | CCU61_COUT63    | O7    |                                  | T13 PWM channel 63                     |
|      | IOM_MON1_7      |       |                                  | Monitor input 1                        |
|      | IOM_REF1_7      |       |                                  | Reference input 1                      |
| T6   | P00.11          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES1 | General-purpose input                  |
|      | GTM_TIM4_IN2_11 |       |                                  | Mux input channel 2 of TIM module 4    |
|      | GTM_TIM1_IN2_1  |       |                                  | Mux input channel 2 of TIM module 1    |
|      | GTM_TIM0_IN2_1  |       |                                  | Mux input channel 2 of TIM module 0    |
|      | CCU60_CTRAPA    |       |                                  | Trap input capture                     |
|      | EDSADC_DSCIN0A  |       |                                  | Modulator clock input, channel 0       |
|      | CCU61_T12HRE    |       |                                  | External timer start 12                |
|      | SENT_SENT10B    |       |                                  | Receive input channel 10               |
|      | ASCLIN13_ARXB   |       |                                  | Receive input                          |
|      | EVADC_G9CH1     | AI    |                                  | Analog input channel 1, group 9        |
|      | EVADC_FC3CH0    |       |                                  | Analog input FC channel 3              |
|      | P00.11          | O0    |                                  | General-purpose output                 |
|      | GTM_TOUT20      | O1    |                                  | GTM muxed output                       |
|      | ASCLIN4_ASLSO   | O2    |                                  | Slave select signal output             |
|      | ASCLIN13_ATX    | O3    |                                  | Transmit output                        |
|      | EDSADC_DSCOUT0  | O4    |                                  | Modulator clock output                 |
|      | —               | O5    |                                  | Reserved                               |
|      | —               | O6    |                                  | Reserved                               |
|      | —               | O7    |                                  | Reserved                               |

表 2-1 端口 P00 功能 (续)

| Ball | Symbol          | Ctrl.                     | Buffer Type                      | Function                            |
|------|-----------------|---------------------------|----------------------------------|-------------------------------------|
| T7   | P00.12          | I                         | SLOW /<br>PU1 /<br>VEXT /<br>ES1 | General-purpose input               |
|      | GTM_TIM4_IN3_11 |                           |                                  | Mux input channel 3 of TIM module 4 |
|      | GTM_TIM1_IN3_1  |                           |                                  | Mux input channel 3 of TIM module 1 |
|      | GTM_TIM0_IN3_1  |                           |                                  | Mux input channel 3 of TIM module 0 |
|      | ASCLIN3_ACTSA   |                           |                                  | Clear to send input                 |
|      | EDSADC_DSDIN0A  |                           |                                  | Digital datastream input, channel 0 |
|      | ASCLIN4_ARXA    |                           |                                  | Receive input                       |
|      | SENT_SENT11B    |                           |                                  | Receive input channel 11            |
|      | EVADC_G9CH0     |                           |                                  | AI                                  |
|      | EVADC_FC2CH0    | Analog input FC channel 2 |                                  |                                     |
|      | P00.12          | O0                        |                                  | General-purpose output              |
|      | GTM_TOUT21      | O1                        |                                  | GTM muxed output                    |
|      | —               | O2                        |                                  | Reserved                            |
|      | —               | O3                        |                                  | Reserved                            |
|      | —               | O4                        |                                  | Reserved                            |
|      | —               | O5                        |                                  | Reserved                            |
|      | —               | O6                        |                                  | Reserved                            |
|      | CCU61_COUT63    | O7                        |                                  | T13 PWM channel 63                  |
|      | IOM_MON1_7      |                           |                                  | Monitor input 1                     |
|      | IOM_REF1_7      |                           |                                  | Reference input 1                   |
| T2   | P00.13          | I                         | FAST /<br>PU1 /<br>VEXT /<br>ES  | General-purpose input               |
|      | GTM_TIM6_IN5_2  |                           |                                  | Mux input channel 5 of TIM module 6 |
|      | GTM_TIM5_IN0_1  |                           |                                  | Mux input channel 0 of TIM module 5 |
|      | GTM_TIM4_IN0_1  |                           |                                  | Mux input channel 0 of TIM module 4 |
|      | EDSADC_DSDIN6A  |                           |                                  | Digital datastream input, channel 6 |
|      | P00.13          | O0                        |                                  | General-purpose output              |
|      | GTM_TOUT167     | O1                        |                                  | GTM muxed output                    |
|      | —               | O2                        |                                  | Reserved                            |
|      | —               | O3                        |                                  | Reserved                            |
|      | CCU_EXTCLK1     | O4                        |                                  | External Clock 1                    |
|      | —               | O5                        |                                  | Reserved                            |
|      | —               | O6                        |                                  | Reserved                            |
|      | —               | O7                        |                                  | Reserved                            |

表 2-1 端口 P00 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| U2   | P00.14         | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN6_2 |       |                                 | Mux input channel 6 of TIM module 6 |
|      | GTM_TIM5_IN7_1 |       |                                 | Mux input channel 7 of TIM module 5 |
|      | GTM_TIM4_IN7_1 |       |                                 | Mux input channel 7 of TIM module 4 |
|      | EDSADC_DSCIN6A |       |                                 | Modulator clock input, channel 6    |
|      | P00.14         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT166    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | EDSADC_DSCOUT6 | O4    |                                 | Modulator clock output              |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
| U1   | P00.15         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN7_2 |       |                                 | Mux input channel 7 of TIM module 6 |
|      | GTM_TIM5_IN1_1 |       |                                 | Mux input channel 1 of TIM module 5 |
|      | GTM_TIM4_IN1_1 |       |                                 | Mux input channel 1 of TIM module 4 |
|      | EDSADC_ITR6F   |       |                                 | Trigger/Gate input, channel 6       |
|      | P00.15         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT168    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | CCU_EXTCLK0    | O4    |                                 | External Clock 0                    |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |

表 2-2 端口 P01 功能

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| J2   | P01.0           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN4_1  |       |                                 | Mux input channel 4 of TIM module 5 |
|      | GTM_TIM4_IN4_1  |       |                                 | Mux input channel 4 of TIM module 4 |
|      | GTM_TIM2_IN6_13 |       |                                 | Mux input channel 6 of TIM module 2 |
|      | CAN21_RXDE      |       |                                 | CAN receive input node 1            |
|      | EDSADC_ITR6E    |       |                                 | Trigger/Gate input, channel 6       |
|      | CAN03_RXDF      |       |                                 | CAN receive input node 3            |
|      | ASCLIN6_ARXB    |       |                                 | Receive input                       |
|      | P01.0           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT155     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
| K1   | P01.1           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN1_2  |       |                                 | Mux input channel 1 of TIM module 5 |
|      | GTM_TIM4_IN1_2  |       |                                 | Mux input channel 1 of TIM module 4 |
|      | EDSADC_ITR8E    |       |                                 | Trigger/Gate input, channel 8       |
|      | ERAY1_RXDA1     |       |                                 | Receive Channel A1                  |
|      | SENT_SENT15B    |       |                                 | Receive input channel 15            |
|      | P01.1           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT159     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | ASCLIN6_ATX     | O4    |                                 | Transmit output                     |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |

表 2-2 端口 P01 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| K2   | P01.2           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN5_1  |       |                                 | Mux input channel 5 of TIM module 5 |
|      | GTM_TIM4_IN5_1  |       |                                 | Mux input channel 5 of TIM module 4 |
|      | EDSADC_DSCIN7A  |       |                                 | Modulator clock input, channel 7    |
|      | P01.2           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT156     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | CAN03_TXD       | O3    |                                 | CAN transmit output node 3          |
|      | IOM_MON2_8      |       |                                 | Monitor input 2                     |
|      | IOM_REF2_8      |       |                                 | Reference input 2                   |
|      | —               | O4    |                                 | Reserved                            |
|      | CAN21_TXD       | O5    |                                 | CAN transmit output node 1          |
|      | EDSADC_DSCOUT7  | O6    |                                 | Modulator clock output              |
|      | —               | O7    |                                 | Reserved                            |
| M10  | P01.3           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN5_2  |       |                                 | Mux input channel 5 of TIM module 4 |
|      | GTM_TIM2_IN0_14 |       |                                 | Mux input channel 0 of TIM module 2 |
|      | GTM_TIM0_IN5_8  |       |                                 | Mux input channel 5 of TIM module 0 |
|      | QSPI3_SLSIB     |       |                                 | Slave select input                  |
|      | EDSADC_ITR7F    |       |                                 | Trigger/Gate input, channel 7       |
|      | EVADC_G9CH14    | AI    |                                 | Analog input channel 14, group 9    |
|      | P01.3           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT111     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | QSPI3_SLSO9     | O4    |                                 | Master slave select output          |
|      | CAN01_TXD       | O5    |                                 | CAN transmit output node 1          |
|      | IOM_MON2_6      |       |                                 | Monitor input 2                     |
|      | IOM_REF2_6      |       |                                 | Reference input 2                   |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |

## 引脚定义和功能 BGA516 封装变体 引脚配置

表 2-2 端口 P01 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| M9   | P01.4           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN6_2  |       |                                 | Mux input channel 6 of TIM module 4 |
|      | GTM_TIM2_IN1_14 |       |                                 | Mux input channel 1 of TIM module 2 |
|      | GTM_TIM0_IN6_8  |       |                                 | Mux input channel 6 of TIM module 0 |
|      | CAN01_RXDC      |       |                                 | CAN receive input node 1            |
|      | EDSADC_ITR7E    |       |                                 | Trigger/Gate input, channel 7       |
|      | EVADC_G9CH13    | AI    |                                 | Analog input channel 13, group 9    |
|      | P01.4           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT112     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | ASCLIN9_ASLSO   | O3    |                                 | Slave select signal output          |
|      | QSPI3_SLSO10    | O4    |                                 | Master slave select output          |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
| N10  | P01.5           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN3_2  |       |                                 | Mux input channel 3 of TIM module 5 |
|      | GTM_TIM2_IN3_7  |       |                                 | Mux input channel 3 of TIM module 2 |
|      | GTM_TIM2_IN2_7  |       |                                 | Mux input channel 2 of TIM module 2 |
|      | QSPI3_MRSTC     |       |                                 | Master SPI data input               |
|      | EDSADC_DSCIN8A  |       |                                 | Modulator clock input, channel 8    |
|      | ASCLIN9_ARXA    |       |                                 | Receive input                       |
|      | EVADC_G9CH12    | AI    |                                 | Analog input channel 12, group 9    |
|      | P01.5           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT113     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | QSPI3_MRST      | O4    |                                 | Slave SPI data output               |
|      | IOM_MON2_3      |       |                                 | Monitor input 2                     |
|      | IOM_REF2_3      |       |                                 | Reference input 2                   |
|      | —               | O5    |                                 | Reserved                            |
|      | EDSADC_DSCOUT8  | O6    |                                 | Modulator clock output              |
|      | —               | O7    |                                 | Reserved                            |

表 2-2 端口 P01 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| N9   | P01.6          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN6_2 |       |                                 | Mux input channel 6 of TIM module 5 |
|      | GTM_TIM5_IN5_3 |       |                                 | Mux input channel 5 of TIM module 5 |
|      | GTM_TIM2_IN5_7 |       |                                 | Mux input channel 5 of TIM module 2 |
|      | QSPI3_MTSRC    |       |                                 | Slave SPI data input                |
|      | EDSADC_DSDIN8A |       |                                 | Digital datastream input, channel 8 |
|      | P01.6          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT114    | O1    |                                 | GTM muxed output                    |
|      | ASCLIN12_ATX   | O2    |                                 | Transmit output                     |
|      | ASCLIN9_ASCLK  | O3    |                                 | Shift clock output                  |
|      | QSPI3_MTSR     | O4    |                                 | Master SPI data output              |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
| P10  | P01.7          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN7_2 |       |                                 | Mux input channel 7 of TIM module 5 |
|      | GTM_TIM2_IN7_7 |       |                                 | Mux input channel 7 of TIM module 2 |
|      | QSPI3_SCLKC    |       |                                 | Slave SPI clock inputs              |
|      | EDSADC_ITR8F   |       |                                 | Trigger/Gate input, channel 8       |
|      | ASCLIN9_ARXB   |       |                                 | Receive input                       |
|      | P01.7          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT115    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | ASCLIN9_ATX    | O3    |                                 | Transmit output                     |
|      | QSPI3_SCLK     | O4    |                                 | Master SPI clock output             |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |

表 2-2 端口 P01 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| L1   | P01.8           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN4_2  |       |                                 | Mux input channel 4 of TIM module 5 |
|      | GTM_TIM5_IN0_10 |       |                                 | Mux input channel 0 of TIM module 5 |
|      | GTM_TIM4_IN4_2  |       |                                 | Mux input channel 4 of TIM module 4 |
|      | CAN00_RXDF      |       |                                 | CAN receive input node 0            |
|      | ERAY1_RXDB1     |       |                                 | Receive Channel B1                  |
|      | EDSADC_DSDIN9A  |       |                                 | Digital datastream input, channel 9 |
|      | SENT_SENT17B    |       |                                 | Receive input channel 17            |
|      | ASCLIN0_ARXC    |       |                                 | Receive input                       |
|      | CAN20_RXDE      |       |                                 | CAN receive input node 0            |
|      | ASCLIN7_ARXB    |       |                                 | Receive input                       |
|      | P01.8           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT162     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
| L2   | P01.9           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN2_1  |       |                                 | Mux input channel 2 of TIM module 5 |
|      | GTM_TIM5_IN1_11 |       |                                 | Mux input channel 1 of TIM module 5 |
|      | GTM_TIM4_IN2_1  |       |                                 | Mux input channel 2 of TIM module 4 |
|      | EDSADC_DSCIN9A  |       |                                 | Modulator clock input, channel 9    |
|      | SENT_SENT16B    |       |                                 | Receive input channel 16            |
|      | P01.9           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT160     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN7_ATX     | O2    |                                 | Transmit output                     |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | EDSADC_DSCOUT9  | O6    |                                 | Modulator clock output              |
|      | —               | O7    |                                 | Reserved                            |

表 2-2 端口 P01 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| M2   | P01.10          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN5_2  |       |                                 | Mux input channel 5 of TIM module 5 |
|      | GTM_TIM5_IN2_9  |       |                                 | Mux input channel 2 of TIM module 5 |
|      | GTM_TIM4_IN5_3  |       |                                 | Mux input channel 5 of TIM module 4 |
|      | EDSADC_ITR9F    |       |                                 | Trigger/Gate input, channel 9       |
|      | SENT_SENT18B    |       |                                 | Receive input channel 18            |
|      | GTM_DTMT3_2     |       |                                 | CDTM3_DTM0                          |
|      | P01.10          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT163     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN7_ASCLK   | O2    |                                 | Shift clock output                  |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
| M1   | P01.11          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN7_3  |       |                                 | Mux input channel 7 of TIM module 5 |
|      | GTM_TIM5_IN3_11 |       |                                 | Mux input channel 3 of TIM module 5 |
|      | GTM_TIM4_IN7_2  |       |                                 | Mux input channel 7 of TIM module 4 |
|      | EDSADC_ITR9E    |       |                                 | Trigger/Gate input, channel 9       |
|      | SENT_SENT19B    |       |                                 | Receive input channel 19            |
|      | GTM_DTMA5_1     |       |                                 | CDTM5_DTM4                          |
|      | P01.11          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT165     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN7_ASLSO   | O2    |                                 | Slave select signal output          |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |

表 2-2 端口 P01 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| N2   | P01.12         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN0_3 |       |                                 | Mux input channel 0 of TIM module 6 |
|      | GTM_TIM5_IN0_2 |       |                                 | Mux input channel 0 of TIM module 5 |
|      | GTM_TIM4_IN0_2 |       |                                 | Mux input channel 0 of TIM module 4 |
|      | P01.12         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT158    | O1    |                                 | GTM muxed output                    |
|      | ASCLIN7_ATX    | O2    |                                 | Transmit output                     |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | ERAY1_TXDA     | O6    |                                 | Transmit Channel A                  |
|      | —              | O7    |                                 | Reserved                            |
| N1   | P01.13         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN1_3 |       |                                 | Mux input channel 1 of TIM module 6 |
|      | GTM_TIM5_IN3_1 |       |                                 | Mux input channel 3 of TIM module 5 |
|      | GTM_TIM4_IN3_1 |       |                                 | Mux input channel 3 of TIM module 4 |
|      | P01.13         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT161    | O1    |                                 | GTM muxed output                    |
|      | ASCLIN0_ATX    | O2    |                                 | Transmit output                     |
|      | IOM_MON2_12    |       |                                 | Monitor input 2                     |
|      | IOM_REF2_12    |       |                                 | Reference input 2                   |
|      | —              |       |                                 | O3                                  |
|      | CAN00_TXD      | O4    |                                 | CAN transmit output node 0          |
|      | IOM_MON2_5     |       |                                 | Monitor input 2                     |
|      | IOM_REF2_5     |       |                                 | Reference input 2                   |
|      | CAN20_TXD      | O5    |                                 | CAN transmit output node 0          |
|      | ERAY1_TXDB     | O6    |                                 | Transmit Channel B                  |
|      | —              | O7    |                                 | Reserved                            |

表 2-2 端口 P01 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| P2   | P01.14         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN2_3 |       |                                 | Mux input channel 2 of TIM module 6 |
|      | GTM_TIM5_IN6_3 |       |                                 | Mux input channel 6 of TIM module 5 |
|      | GTM_TIM4_IN6_3 |       |                                 | Mux input channel 6 of TIM module 4 |
|      | P01.14         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT164    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | ERAY1_TXENA    | O6    |                                 | Transmit Enable Channel A           |
|      | —              | O7    |                                 | Reserved                            |
| P1   | P01.15         | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN3_3 |       |                                 | Mux input channel 3 of TIM module 6 |
|      | GTM_TIM5_IN6_1 |       |                                 | Mux input channel 6 of TIM module 5 |
|      | GTM_TIM4_IN6_1 |       |                                 | Mux input channel 6 of TIM module 4 |
|      | EDSADC_DSDIN7A |       |                                 | Digital datastream input, channel 7 |
|      | P01.15         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT157    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |

表 2-3 端口 P02 功能

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                                                    |
|------|----------------|-------|---------------------------------|-------------------------------------------------------------|
| G6   | P02.0          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM1_IN0_2 |       |                                 | Mux input channel 0 of TIM module 1                         |
|      | GTM_TIM0_IN0_2 |       |                                 | Mux input channel 0 of TIM module 0                         |
|      | CCU61_CC60INB  |       |                                 | T12 capture input 60                                        |
|      | ASCLIN2_ARXG   |       |                                 | Receive input                                               |
|      | CCU60_CC60INA  |       |                                 | T12 capture input 60                                        |
|      | SCU_E_REQ3_2   |       |                                 | ERU Channel 3 inputs 0 to 5 (0 is the LSB and 5 is the MSB) |
|      | GTM_DTMA0_0    |       |                                 | CDTM0_DTM4                                                  |
|      | P02.0          | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT0      | O1    |                                 | GTM muxed output                                            |
|      | IOM_REF0_0     |       |                                 | Reference input 0                                           |
|      | ASCLIN2_ATX    | O2    |                                 | Transmit output                                             |
|      | IOM_MON2_14    |       |                                 | Monitor input 2                                             |
|      | IOM_REF2_14    |       |                                 | Reference input 2                                           |
|      | QSPI3_SLSO1    | O3    |                                 | Master slave select output                                  |
|      | EDSADC_CGPWMN  | O4    |                                 | Negative carrier generator output                           |
|      | CAN00_TXD      | O5    |                                 | CAN transmit output node 0                                  |
|      | IOM_MON2_5     |       |                                 | Monitor input 2                                             |
|      | IOM_REF2_5     |       |                                 | Reference input 2                                           |
|      | ERAY0_TXDA     | O6    |                                 | Transmit Channel A                                          |
|      | CCU60_CC60     | O7    |                                 | T12 PWM channel 60                                          |
|      | IOM_MON1_2     |       |                                 | Monitor input 1                                             |
|      | IOM_REF1_6     |       |                                 | Reference input 1                                           |

表 2-3 端口 P02 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                                                    |
|------|----------------|-------|---------------------------------|-------------------------------------------------------------|
| H7   | P02.1          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM1_IN1_2 |       |                                 | Mux input channel 1 of TIM module 1                         |
|      | GTM_TIM0_IN1_2 |       |                                 | Mux input channel 1 of TIM module 0                         |
|      | ERAY0_RXDA2    |       |                                 | Receive Channel A2                                          |
|      | ASCLIN2_ARXB   |       |                                 | Receive input                                               |
|      | CAN00_RXDA     |       |                                 | CAN receive input node 0                                    |
|      | SCU_E_REQ2_1   |       |                                 | ERU Channel 2 inputs 0 to 5 (0 is the LSB and 5 is the MSB) |
|      | P02.1          | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT1      | O1    |                                 | GTM muxed output                                            |
|      | IOM_REF0_1     |       |                                 | Reference input 0                                           |
|      | QSPI4_SLSO7    | O2    |                                 | Master slave select output                                  |
|      | QSPI3_SLSO2    | O3    |                                 | Master slave select output                                  |
|      | EDSADC_CGPWMP  | O4    |                                 | Positive carrier generator output                           |
|      | —              | O5    |                                 | Reserved                                                    |
|      | —              | O6    |                                 | Reserved                                                    |
|      | CCU60_COUT60   | O7    |                                 | T12 PWM channel 60                                          |
|      | IOM_MON1_3     |       |                                 | Monitor input 1                                             |
|      | IOM_REF1_3     |       |                                 | Reference input 1                                           |

表 2-3 端口 P02 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| H6   | P02.2          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM1_IN2_2 |       |                                 | Mux input channel 2 of TIM module 1 |
|      | GTM_TIM0_IN2_2 |       |                                 | Mux input channel 2 of TIM module 0 |
|      | CCU61_CC61INB  |       |                                 | T12 capture input 61                |
|      | CCU60_CC61INA  |       |                                 | T12 capture input 61                |
|      | SENT_SENT14B   |       |                                 | Receive input channel 14            |
|      | P02.2          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT2      | O1    |                                 | GTM muxed output                    |
|      | IOM_REF0_2     |       |                                 | Reference input 0                   |
|      | ASCLIN1_ATX    | O2    |                                 | Transmit output                     |
|      | IOM_MON2_13    |       |                                 | Monitor input 2                     |
|      | IOM_REF2_13    |       |                                 | Reference input 2                   |
|      | QSPI3_SLSO3    | O3    |                                 | Master slave select output          |
|      | PSI5_TX0       | O4    |                                 | TXD outputs (send data)             |
|      | IOM_MON1_14    |       |                                 | Monitor input 1                     |
|      | IOM_REF1_14    |       |                                 | Reference input 1                   |
|      | CAN02_TXD      | O5    |                                 | CAN transmit output node 2          |
|      | IOM_MON2_7     |       |                                 | Monitor input 2                     |
|      | IOM_REF2_7     |       |                                 | Reference input 2                   |
|      | ERAY0_TXDB     | O6    |                                 | Transmit Channel B                  |
|      | CCU60_CC61     | O7    |                                 | T12 PWM channel 61                  |
|      | IOM_MON1_1     |       |                                 | Monitor input 1                     |
|      | IOM_REF1_5     |       |                                 | Reference input 1                   |

表 2-3 端口 P02 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| J7   | P02.3          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM1_IN3_2 |       |                                 | Mux input channel 3 of TIM module 1 |
|      | GTM_TIM0_IN3_2 |       |                                 | Mux input channel 3 of TIM module 0 |
|      | EDSADC_DSCIN5B |       |                                 | Modulator clock input, channel 5    |
|      | ERAY0_RXDB2    |       |                                 | Receive Channel B2                  |
|      | CAN02_RXDB     |       |                                 | CAN receive input node 2            |
|      | ASCLIN1_ARXG   |       |                                 | Receive input                       |
|      | MSC1_SDI1      |       |                                 | Upstream assynchronous input signal |
|      | PSI5_RX0B      |       |                                 | RXD inputs (receive data) channel 0 |
|      | SENT_SENT13B   |       |                                 | Receive input channel 13            |
|      | P02.3          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT3      | O1    |                                 | GTM muxed output                    |
|      | IOM_REF0_3     |       |                                 | Reference input 0                   |
|      | ASCLIN2_ASLSO  | O2    |                                 | Slave select signal output          |
|      | QSPI3_SLSO4    | O3    |                                 | Master slave select output          |
|      | EDSADC_DSCOUT5 | O4    |                                 | Modulator clock output              |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | CCU60_COUT61   | O7    |                                 | T12 PWM channel 61                  |
|      | IOM_MON1_4     |       |                                 | Monitor input 1                     |
|      | IOM_REF1_2     |       |                                 | Reference input 1                   |

表 2-3 端口 P02 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                                                                  |
|------|----------------|-------|---------------------------------|---------------------------------------------------------------------------|
| J6   | P02.4          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                                     |
|      | GTM_TIM1_IN4_1 |       |                                 | Mux input channel 4 of TIM module 1                                       |
|      | GTM_TIM0_IN4_1 |       |                                 | Mux input channel 4 of TIM module 0                                       |
|      | CCU61_CC62INB  |       |                                 | T12 capture input 62                                                      |
|      | EDSADC_DSDIN5B |       |                                 | Digital datastream input, channel 5                                       |
|      | QSPI3_SLSIA    |       |                                 | Slave select input                                                        |
|      | CCU60_CC62INA  |       |                                 | T12 capture input 62                                                      |
|      | I2C0_SDAA      |       |                                 | Serial Data Input 0                                                       |
|      | CAN11_RXDA     |       |                                 | CAN receive input node 1                                                  |
|      | CAN0_ECTT1     |       |                                 | External CAN time trigger input                                           |
|      | SENT_SENT12B   |       |                                 | Receive input channel 12                                                  |
|      | P02.4          | O0    |                                 | General-purpose output                                                    |
|      | GTM_TOUT4      | O1    |                                 | GTM muxed output                                                          |
|      | IOM_REF0_4     |       |                                 | Reference input 0                                                         |
|      | ASCLIN2_ASCLK  | O2    |                                 | Shift clock output                                                        |
|      | QSPI3_SLSO0    | O3    |                                 | Master slave select output                                                |
|      | PSI5S_CLK      | O4    |                                 | PSI5S CLK is a clock that can be used on a pin to drive the external PHY. |
|      | I2C0_SDA       | O5    |                                 | Serial Data Output                                                        |
|      | ERAY0_TXENA    | O6    |                                 | Transmit Enable Channel A                                                 |
|      | CCU60_CC62     | O7    |                                 | T12 PWM channel 62                                                        |
|      | IOM_MON1_0     |       |                                 | Monitor input 1                                                           |
|      | IOM_REF1_4     |       |                                 | Reference input 1                                                         |

表 2-3 端口 P02 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| K7   | P02.5          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM1_IN5_1 |       |                                 | Mux input channel 5 of TIM module 1 |
|      | GTM_TIM0_IN5_1 |       |                                 | Mux input channel 5 of TIM module 0 |
|      | EDSADC_DSCIN4B |       |                                 | Modulator clock input, channel 4    |
|      | I2C0_SCLA      |       |                                 | Serial Clock Input 0                |
|      | PSI5_RX1B      |       |                                 | RXD inputs (receive data) channel 1 |
|      | PSI5S_RXB      |       |                                 | RX data input                       |
|      | QSPI3_MRSTA    |       |                                 | Master SPI data input               |
|      | SENT_SENT3C    |       |                                 | Receive input channel 3             |
|      | CAN0_ECTT2     |       |                                 | External CAN time trigger input     |
|      | P02.5          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT5      | O1    |                                 | GTM muxed output                    |
|      | IOM_REF0_5     |       |                                 | Reference input 0                   |
|      | CAN11_TXD      | O2    |                                 | CAN transmit output node 1          |
|      | QSPI3_MRST     | O3    |                                 | Slave SPI data output               |
|      | IOM_MON2_3     |       |                                 | Monitor input 2                     |
|      | IOM_REF2_3     |       |                                 | Reference input 2                   |
|      | EDSADC_DSCOUT4 | O4    |                                 | Modulator clock output              |
|      | I2C0_SCL       | O5    |                                 | Serial Clock Output                 |
|      | ERAY0_TXENB    | O6    |                                 | Transmit Enable Channel B           |
|      | CCU60_COUT62   | O7    |                                 | T12 PWM channel 62                  |
|      | IOM_MON1_5     |       |                                 | Monitor input 1                     |
|      | IOM_REF1_1     |       |                                 | Reference input 1                   |

表 2-3 端口 P02 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                                           |
|------|-----------------|-------|---------------------------------|----------------------------------------------------|
| K6   | P02.6           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                              |
|      | GTM_TIM3_IN0_10 |       |                                 | Mux input channel 0 of TIM module 3                |
|      | GTM_TIM1_IN6_1  |       |                                 | Mux input channel 6 of TIM module 1                |
|      | GTM_TIM0_IN6_1  |       |                                 | Mux input channel 6 of TIM module 0                |
|      | CCU60_CC60INC   |       |                                 | T12 capture input 60                               |
|      | SENT_SENT2C     |       |                                 | Receive input channel 2                            |
|      | EDSADC_DSDIN4B  |       |                                 | Digital datastream input, channel 4                |
|      | EDSADC_ITR5E    |       |                                 | Trigger/Gate input, channel 5                      |
|      | GPT120_T3INA    |       |                                 | Trigger/gate input of core timer T3                |
|      | CCU60_CCPOS0A   |       |                                 | Hall capture input 0                               |
|      | CCU61_T12HRB    |       |                                 | External timer start 12                            |
|      | QSPI3_MTSRA     |       |                                 | Slave SPI data input                               |
|      | P02.6           | O0    |                                 | General-purpose output                             |
|      | GTM_TOUT6       | O1    |                                 | GTM muxed output                                   |
|      | IOM_REF0_6      |       |                                 | Reference input 0                                  |
|      | PSI5S_TX        | O2    |                                 | TX data output                                     |
|      | QSPI3_MTSR      | O3    |                                 | Master SPI data output                             |
|      | PSI5_TX1        | O4    |                                 | TXD outputs (send data)                            |
|      | IOM_MON1_15     |       |                                 | Monitor input 1                                    |
|      | EVADC_EMUX00    | O5    |                                 | Control of external analog multiplexer interface 0 |
|      | —               | O6    |                                 | Reserved                                           |
|      | CCU60_CC60      | O7    |                                 | T12 PWM channel 60                                 |
|      | IOM_MON1_2      |       |                                 | Monitor input 1                                    |
|      | IOM_REF1_6      |       |                                 | Reference input 1                                  |

表 2-3 端口 P02 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                                        | Function                                       |
|------|-----------------|-------|----------------------------------------------------|------------------------------------------------|
| L7   | P02.7           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES                    | General-purpose input                          |
|      | GTM_TIM3_IN1_10 |       |                                                    | Mux input channel 1 of TIM module 3            |
|      | GTM_TIM1_IN7_1  |       |                                                    | Mux input channel 7 of TIM module 1            |
|      | GTM_TIM0_IN7_1  |       |                                                    | Mux input channel 7 of TIM module 0            |
|      | CCU60_CC61INC   |       |                                                    | T12 capture input 61                           |
|      | SENT_SENT1C     |       |                                                    | Receive input channel 1                        |
|      | EDSADC_DSCIN3B  |       |                                                    | Modulator clock input, channel 3               |
|      | EDSADC_ITR4E    |       |                                                    | Trigger/Gate input, channel 4                  |
|      | GPT120_T3EUDA   |       |                                                    | Count direction control input of core timer T3 |
|      | PSI5_RX2B       |       |                                                    | RXD inputs (receive data) channel 2            |
|      | CCU60_CCPOS1A   |       |                                                    | Hall capture input 1                           |
|      | QSPI3_SCLKA     |       |                                                    | Slave SPI clock inputs                         |
|      | CCU61_T13HRB    |       |                                                    | External timer start 13                        |
|      | P02.7           | O0    | General-purpose output                             |                                                |
|      | GTM_TOUT7       | O1    | GTM muxed output                                   |                                                |
|      | IOM_REF0_7      |       | Reference input 0                                  |                                                |
|      | —               |       | Reserved                                           |                                                |
|      | QSPI3_SCLK      | O3    | Master SPI clock output                            |                                                |
|      | EDSADC_DSCOUT3  | O4    | Modulator clock output                             |                                                |
|      | EVADC_EMUX01    | O5    | Control of external analog multiplexer interface 0 |                                                |
|      | SENT_SPC1       | O6    | Transmit output                                    |                                                |
|      | CCU60_CC61      | O7    | T12 PWM channel 61                                 |                                                |
|      | IOM_MON1_1      |       | Monitor input 1                                    |                                                |
|      | IOM_REF1_5      |       | Reference input 1                                  |                                                |

表 2-3 端口 P02 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                                        | Function                            |
|------|-----------------|-------|----------------------------------------------------|-------------------------------------|
| L6   | P02.8           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES                    | General-purpose input               |
|      | GTM_TIM3_IN2_10 |       |                                                    | Mux input channel 2 of TIM module 3 |
|      | GTM_TIM3_IN0_2  |       |                                                    | Mux input channel 0 of TIM module 3 |
|      | GTM_TIM2_IN0_2  |       |                                                    | Mux input channel 0 of TIM module 2 |
|      | CCU60_CC62INC   |       |                                                    | T12 capture input 62                |
|      | SENT_SENT0C     |       |                                                    | Receive input channel 0             |
|      | CCU60_CCPOS2A   |       |                                                    | Hall capture input 2                |
|      | EDSADC_DSDIN3B  |       |                                                    | Digital datastream input, channel 3 |
|      | EDSADC_ITR3E    |       |                                                    | Trigger/Gate input, channel 3       |
|      | GPT120_T4INA    |       |                                                    | Trigger/gate input of timer T4      |
|      | CCU61_T12HRC    |       |                                                    | External timer start 12             |
|      | CCU61_T13HRC    |       |                                                    | External timer start 13             |
|      | GTM_DTMA0_1     |       |                                                    | CDTM0_DTM4                          |
|      | P02.8           |       |                                                    | O0                                  |
|      | GTM_TOUT8       | O1    | GTM muxed output                                   |                                     |
|      | IOM_REF0_8      |       | Reference input 0                                  |                                     |
|      | QSPI3_SLSO5     | O2    | Master slave select output                         |                                     |
|      | ASCLIN8_ASCLK   | O3    | Shift clock output                                 |                                     |
|      | PSI5_TX2        | O4    | TXD outputs (send data)                            |                                     |
|      | IOM_REF1_15     |       | Reference input 1                                  |                                     |
|      | EVADC_EMUX02    | O5    | Control of external analog multiplexer interface 0 |                                     |
|      | GETH_MDC        | O6    | MDIO clock                                         |                                     |
|      | CCU60_CC62      | O7    | T12 PWM channel 62                                 |                                     |
|      | IOM_MON1_0      |       | Monitor input 1                                    |                                     |
|      | IOM_REF1_4      |       | Reference input 1                                  |                                     |

表 2-3 端口 P02 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| K9   | P02.9           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN2_2  |       |                                 | Mux input channel 2 of TIM module 4 |
|      | GTM_TIM3_IN3_10 |       |                                 | Mux input channel 3 of TIM module 3 |
|      | GTM_TIM0_IN2_10 |       |                                 | Mux input channel 2 of TIM module 0 |
|      | SENT_SENT20B    |       |                                 | Receive input channel 20            |
|      | ASCLIN8_ARXA    |       |                                 | Receive input                       |
|      | P02.9           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT116     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN2_ATX     | O2    |                                 | Transmit output                     |
|      | IOM_MON2_14     |       |                                 | Monitor input 2                     |
|      | IOM_REF2_14     |       |                                 | Reference input 2                   |
|      | ASCLIN8_ATX     | O3    |                                 | Transmit output                     |
|      | —               | O4    |                                 | Reserved                            |
|      | CAN01_TXD       | O5    |                                 | CAN transmit output node 1          |
|      | IOM_MON2_6      |       |                                 | Monitor input 2                     |
|      | IOM_REF2_6      |       |                                 | Reference input 2                   |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
| L10  | P02.10          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN3_2  |       |                                 | Mux input channel 3 of TIM module 4 |
|      | GTM_TIM3_IN4_11 |       |                                 | Mux input channel 4 of TIM module 3 |
|      | GTM_TIM0_IN3_10 |       |                                 | Mux input channel 3 of TIM module 0 |
|      | ASCLIN2_ARXC    |       |                                 | Receive input                       |
|      | CAN01_RXDE      |       |                                 | CAN receive input node 1            |
|      | SENT_SENT21B    |       |                                 | Receive input channel 21            |
|      | ASCLIN8_ARXB    |       |                                 | Receive input                       |
|      | P02.10          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT117     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |

表 2-3 端口 P02 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| L9   | P02.11          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN4_3  |       |                                 | Mux input channel 4 of TIM module 4 |
|      | GTM_TIM3_IN5_12 |       |                                 | Mux input channel 5 of TIM module 3 |
|      | GTM_TIM0_IN7_7  |       |                                 | Mux input channel 7 of TIM module 0 |
|      | SENT_SENT22B    |       |                                 | Receive input channel 22            |
|      | EVADC_G9CH15    | AI    |                                 | Analog input channel 15, group 9    |
|      | P02.11          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT118     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | ASCLIN8_ASLSO   | O3    |                                 | Slave select signal output          |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
| F2   | P02.12          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN0_3  |       |                                 | Mux input channel 0 of TIM module 5 |
|      | GTM_TIM4_IN0_3  |       |                                 | Mux input channel 0 of TIM module 4 |
|      | GTM_TIM3_IN6_12 |       |                                 | Mux input channel 6 of TIM module 3 |
|      | SENT_SENT23B    |       |                                 | Receive input channel 23            |
|      | P02.12          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT151     | O1    |                                 | GTM muxed output                    |
|      | QSPI3_SLSO5     | O2    |                                 | Master slave select output          |
|      | QSPI4_SLSO4     | O3    |                                 | Master slave select output          |
|      | ASCLIN6_ASLSO   | O4    |                                 | Slave select signal output          |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |

表 2-3 端口 P02 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| F1   | P02.13          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN2_2  |       |                                 | Mux input channel 2 of TIM module 5 |
|      | GTM_TIM4_IN2_3  |       |                                 | Mux input channel 2 of TIM module 4 |
|      | GTM_TIM3_IN7_11 |       |                                 | Mux input channel 7 of TIM module 3 |
|      | SENT_SENT24B    |       |                                 | Receive input channel 24            |
|      | P02.13          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT153     | O1    |                                 | GTM muxed output                    |
|      | QSPI3_SLSO7     | O2    |                                 | Master slave select output          |
|      | QSPI4_SLSO6     | O3    |                                 | Master slave select output          |
|      | CAN00_TXD       | O4    |                                 | CAN transmit output node 0          |
|      | IOM_MON2_5      |       |                                 | Monitor input 2                     |
|      | IOM_REF2_5      |       |                                 | Reference input 2                   |
|      | CAN20_TXD       | O5    |                                 | CAN transmit output node 0          |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
| G2   | P02.14          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN3_3  |       |                                 | Mux input channel 3 of TIM module 5 |
|      | GTM_TIM4_IN3_3  |       |                                 | Mux input channel 3 of TIM module 4 |
|      | GTM_TIM2_IN4_14 |       |                                 | Mux input channel 4 of TIM module 2 |
|      | CAN20_RXDD      |       |                                 | CAN receive input node 0            |
|      | CAN00_RXDH      |       |                                 | CAN receive input node 0            |
|      | P02.14          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT154     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN6_ASCLK   | O2    |                                 | Shift clock output                  |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |

表 2-3 端口 P02 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| G1   | P02.15          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN1_3  |       |                                 | Mux input channel 1 of TIM module 5 |
|      | GTM_TIM4_IN1_3  |       |                                 | Mux input channel 1 of TIM module 4 |
|      | GTM_TIM2_IN5_14 |       |                                 | Mux input channel 5 of TIM module 2 |
|      | P02.15          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT152     | O1    |                                 | GTM muxed output                    |
|      | QSPI3_SLSO6     | O2    |                                 | Master slave select output          |
|      | QSPI4_SLSO5     | O3    |                                 | Master slave select output          |
|      | ASCLIN6_ATX     | O4    |                                 | Transmit output                     |
|      | —               | O5    |                                 | Reserved                            |
|      | ERAY1_TXENB     | O6    |                                 | Transmit Enable Channel B           |
|      | —               | O7    |                                 | Reserved                            |

表 2-4 端口 P10 功能

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                                       |
|------|-----------------|-------|---------------------------------|------------------------------------------------|
| F12  | P10.0           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                          |
|      | GTM_TIM4_IN0_12 |       |                                 | Mux input channel 0 of TIM module 4            |
|      | GTM_TIM1_IN4_2  |       |                                 | Mux input channel 4 of TIM module 1            |
|      | GTM_TIM0_IN4_2  |       |                                 | Mux input channel 4 of TIM module 0            |
|      | GPT120_T6EUIDB  |       |                                 | Count direction control input of core timer T6 |
|      | ASCLIN11_ARXA   |       |                                 | Receive input                                  |
|      | GETH_RXERC      |       |                                 | Receive Error MII                              |
|      | GTM_DTMA5_2     |       |                                 | CDTM5_DTM4                                     |
|      | P10.0           | O0    |                                 | General-purpose output                         |
|      | GTM_TOUT102     | O1    |                                 | GTM muxed output                               |
|      | ASCLIN11_ATX    | O2    |                                 | Transmit output                                |
|      | QSPI1_SLSO10    | O3    |                                 | Master slave select output                     |
|      | —               | O4    |                                 | Reserved                                       |
|      | —               | O5    |                                 | Reserved                                       |
|      | ASCLIN22_ATX    | O6    |                                 | Transmit output                                |
|      | —               | O7    |                                 | Reserved                                       |

表 2-4 端口 P10 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                                                    |
|------|-----------------|-------|---------------------------------|-------------------------------------------------------------|
| G12  | P10.1           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM4_IN4_12 |       |                                 | Mux input channel 4 of TIM module 4                         |
|      | GTM_TIM1_IN1_3  |       |                                 | Mux input channel 1 of TIM module 1                         |
|      | GTM_TIM0_IN1_3  |       |                                 | Mux input channel 1 of TIM module 0                         |
|      | GPT120_T5EUDB   |       |                                 | Count direction control input of timer T5                   |
|      | QSPI1_MRSTA     |       |                                 | Master SPI data input                                       |
|      | GTM_DTMT0_1     |       |                                 | CDTM0_DTM0                                                  |
|      | P10.1           | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT103     | O1    |                                 | GTM muxed output                                            |
|      | QSPI1_MTSR      | O2    |                                 | Master SPI data output                                      |
|      | QSPI1_MRST      | O3    |                                 | Slave SPI data output                                       |
|      | IOM_MON2_1      |       |                                 | Monitor input 2                                             |
|      | IOM_REF2_1      |       |                                 | Reference input 2                                           |
|      | MSC0_EN1        | O4    |                                 | Chip Select                                                 |
|      | EVADC_FC1BFLOUT | O5    |                                 | Boundary flag output, FC channel 1                          |
|      | —               | O6    |                                 | Reserved                                                    |
|      | —               | O7    |                                 | Reserved                                                    |
| F10  | P10.2           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM4_IN5_12 |       |                                 | Mux input channel 5 of TIM module 4                         |
|      | GTM_TIM1_IN2_3  |       |                                 | Mux input channel 2 of TIM module 1                         |
|      | GTM_TIM0_IN2_3  |       |                                 | Mux input channel 2 of TIM module 0                         |
|      | CAN02_RXDE      |       |                                 | CAN receive input node 2                                    |
|      | MSC0_SDI1       |       |                                 | Upstream asynchronous input signal                          |
|      | QSPI1_SCLKA     |       |                                 | Slave SPI clock inputs                                      |
|      | GPT120_T6INB    |       |                                 | Trigger/gate input of core timer T6                         |
|      | SCU_E_REQ2_0    |       |                                 | ERU Channel 2 inputs 0 to 5 (0 is the LSB and 5 is the MSB) |
|      | GTM_DTMT2_2     |       |                                 | CDTM2_DTM0                                                  |
|      | P10.2           | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT104     | O1    |                                 | GTM muxed output                                            |
|      | IOM_MON2_9      | O2    |                                 | Monitor input 2                                             |
|      | —               |       |                                 | Reserved                                                    |
|      | QSPI1_SCLK      |       |                                 | Master SPI clock output                                     |
|      | MSC0_EN0        | O4    |                                 | Chip Select                                                 |
|      | EVADC_FC3BFLOUT | O5    |                                 | Boundary flag output, FC channel 3                          |
|      | —               | O6    |                                 | Reserved                                                    |
|      | —               | O7    |                                 | Reserved                                                    |

表 2-4 端口 P10 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                                                    |
|------|-----------------|-------|---------------------------------|-------------------------------------------------------------|
| F11  | P10.3           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM4_IN6_10 |       |                                 | Mux input channel 6 of TIM module 4                         |
|      | GTM_TIM1_IN3_3  |       |                                 | Mux input channel 3 of TIM module 1                         |
|      | GTM_TIM0_IN3_3  |       |                                 | Mux input channel 3 of TIM module 0                         |
|      | QSPI1_MTSRA     |       |                                 | Slave SPI data input                                        |
|      | SCU_E_REQ3_0    |       |                                 | ERU Channel 3 inputs 0 to 5 (0 is the LSB and 5 is the MSB) |
|      | GPT120_T5INB    |       |                                 | Trigger/gate input of timer T5                              |
|      | P10.3           | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT105     | O1    |                                 | GTM muxed output                                            |
|      | IOM_MON2_10     |       |                                 | Monitor input 2                                             |
|      | —               | O2    |                                 | Reserved                                                    |
|      | QSPI1_MTSR      | O3    |                                 | Master SPI data output                                      |
|      | MSC0_EN0        | O4    |                                 | Chip Select                                                 |
|      | —               | O5    |                                 | Reserved                                                    |
|      | CAN02_TXD       | O6    |                                 | CAN transmit output node 2                                  |
|      | IOM_MON2_7      |       |                                 | Monitor input 2                                             |
|      | IOM_REF2_7      |       |                                 | Reference input 2                                           |
|      | —               | O7    |                                 | Reserved                                                    |
| G11  | P10.4           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM4_IN7_3  |       |                                 | Mux input channel 7 of TIM module 4                         |
|      | GTM_TIM1_IN6_2  |       |                                 | Mux input channel 6 of TIM module 1                         |
|      | GTM_TIM0_IN6_2  |       |                                 | Mux input channel 6 of TIM module 0                         |
|      | QSPI1_MTSRC     |       |                                 | Slave SPI data input                                        |
|      | CCU60_CCPOS0C   |       |                                 | Hall capture input 0                                        |
|      | GPT120_T3INB    |       |                                 | Trigger/gate input of core timer T3                         |
|      | ASCLIN11_ARXB   |       |                                 | Receive input                                               |
|      | ASCLIN22_ARXA   |       |                                 | Receive input                                               |
|      | P10.4           | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT106     | O1    |                                 | GTM muxed output                                            |
|      | IOM_MON2_11     |       |                                 | Monitor input 2                                             |
|      | ASCLIN22_ATX    | O2    |                                 | Transmit output                                             |
|      | QSPI1_SLSO8     | O3    |                                 | Master slave select output                                  |
|      | QSPI1_MTSR      | O4    |                                 | Master SPI data output                                      |
|      | MSC0_EN0        | O5    |                                 | Chip Select                                                 |
|      | —               | O6    |                                 | Reserved                                                    |
|      | —               | O7    |                                 | Reserved                                                    |

表 2-4 端口 P10 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                                                          |
|------|-----------------|-------|---------------------------------|-------------------------------------------------------------------|
| G10  | P10.5           | I     | SLOW /<br>PU2 /<br>VEXT /<br>ES | General-purpose input                                             |
|      | GTM_TIM4_IN3_13 |       |                                 | Mux input channel 3 of TIM module 4                               |
|      | GTM_TIM1_IN2_4  |       |                                 | Mux input channel 2 of TIM module 1                               |
|      | GTM_TIM0_IN2_4  |       |                                 | Mux input channel 2 of TIM module 0                               |
|      | PMS_HWC4IN      |       |                                 | HWCFG4 pin input                                                  |
|      | CAN20_RXDA      |       |                                 | CAN receive input node 0                                          |
|      | MSC0_INJ1       |       |                                 | Injection signal from port                                        |
|      | ASCLIN2_ARXB    |       |                                 | Receive input                                                     |
|      | P10.5           | O0    |                                 | General-purpose output                                            |
|      | GTM_TOUT107     | O1    |                                 | GTM muxed output                                                  |
|      | IOM_REF2_9      |       |                                 | Reference input 2                                                 |
|      | ASCLIN2_ATX     | O2    |                                 | Transmit output                                                   |
|      | IOM_MON2_14     |       |                                 | Monitor input 2                                                   |
|      | IOM_REF2_14     |       |                                 | Reference input 2                                                 |
|      | QSPI3_SLSO8     | O3    |                                 | Master slave select output                                        |
|      | QSPI1_SLSO9     | O4    |                                 | Master slave select output                                        |
|      | GPT120_T6OUT    | O5    |                                 | External output for overflow/underflow detection of core timer T6 |
|      | ASCLIN2_ASLSO   | O6    |                                 | Slave select signal output                                        |
|      | PSI5_TX3        | O7    |                                 | TXD outputs (send data)                                           |

表 2-4 端口 P10 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                                                          |
|------|-----------------|-------|---------------------------------|-------------------------------------------------------------------|
| F9   | P10.6           | I     | SLOW /<br>PU2 /<br>VEXT /<br>ES | General-purpose input                                             |
|      | GTM_TIM4_IN2_13 |       |                                 | Mux input channel 2 of TIM module 4                               |
|      | GTM_TIM1_IN3_4  |       |                                 | Mux input channel 3 of TIM module 1                               |
|      | GTM_TIM0_IN3_4  |       |                                 | Mux input channel 3 of TIM module 0                               |
|      | PSI5_RX3C       |       |                                 | RXD inputs (receive data) channel 3                               |
|      | ASCLIN2_ARXD    |       |                                 | Receive input                                                     |
|      | QSPI3_MTSRB     |       |                                 | Slave SPI data input                                              |
|      | PMS_HWCFG5IN    |       |                                 | HWCFG5 pin input                                                  |
|      | ASCLIN23_ARXA   |       |                                 | Receive input                                                     |
|      | P10.6           | O0    |                                 | General-purpose output                                            |
|      | GTM_TOUT108     | O1    |                                 | GTM muxed output                                                  |
|      | IOM_REF2_10     |       |                                 | Reference input 2                                                 |
|      | ASCLIN2_ASCLK   | O2    |                                 | Shift clock output                                                |
|      | QSPI3_MTSR      | O3    |                                 | Master SPI data output                                            |
|      | GPT120_T3OUT    | O4    |                                 | External output for overflow/underflow detection of core timer T3 |
|      | CAN20_TXD       | O5    |                                 | CAN transmit output node 0                                        |
|      | QSPI1_MRST      | O6    |                                 | Slave SPI data output                                             |
|      | IOM_MON2_1      |       |                                 | Monitor input 2                                                   |
|      | IOM_REF2_1      |       |                                 | Reference input 2                                                 |
|      | —               | O7    |                                 | Reserved                                                          |

表 2-4 端口 P10 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                                                    |
|------|----------------|-------|---------------------------------|-------------------------------------------------------------|
| F8   | P10.7          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM1_IN0_3 |       |                                 | Mux input channel 0 of TIM module 1                         |
|      | GTM_TIM0_IN0_3 |       |                                 | Mux input channel 0 of TIM module 0                         |
|      | GPT120_T3EUIDB |       |                                 | Count direction control input of core timer T3              |
|      | ASCLIN2_ACTSA  |       |                                 | Clear to send input                                         |
|      | QSPI3_MRSTB    |       |                                 | Master SPI data input                                       |
|      | SCU_E_REQ0_2   |       |                                 | ERU Channel 0 inputs 0 to 5 (0 is the LSB and 5 is the MSB) |
|      | CCU60_CCPOS1C  |       |                                 | Hall capture input 1                                        |
|      | ASCLIN23_ARXB  |       |                                 | Receive input                                               |
|      | P10.7          | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT109    | O1    |                                 | GTM muxed output                                            |
|      | IOM_REF2_11    |       |                                 | Reference input 2                                           |
|      | ASCLIN23_ATX   | O2    |                                 | Transmit output                                             |
|      | QSPI3_MRST     | O3    |                                 | Slave SPI data output                                       |
|      | IOM_MON2_3     |       |                                 | Monitor input 2                                             |
|      | IOM_REF2_3     |       |                                 | Reference input 2                                           |
|      | —              | O4    |                                 | Reserved                                                    |
|      | CAN20_TXD      | O5    |                                 | CAN transmit output node 0                                  |
|      | CAN12_TXD      | O6    |                                 | CAN transmit output node 2                                  |
|      | —              | O7    |                                 | Reserved                                                    |

表 2-4 端口 P10 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                                                    |
|------|-----------------|-------|---------------------------------|-------------------------------------------------------------|
| G9   | P10.8           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM4_IN0_13 |       |                                 | Mux input channel 0 of TIM module 4                         |
|      | GTM_TIM1_IN5_2  |       |                                 | Mux input channel 5 of TIM module 1                         |
|      | GTM_TIM0_IN5_2  |       |                                 | Mux input channel 5 of TIM module 0                         |
|      | CAN12_RXDB      |       |                                 | CAN receive input node 2                                    |
|      | GPT120_T4INB    |       |                                 | Trigger/gate input of timer T4                              |
|      | QSPI3_SCLKB     |       |                                 | Slave SPI clock inputs                                      |
|      | SCU_E_REQ1_2    |       |                                 | ERU Channel 1 inputs 0 to 5 (0 is the LSB and 5 is the MSB) |
|      | CCU60_CCPOS2C   |       |                                 | Hall capture input 2                                        |
|      | CAN20_RXDB      |       |                                 | CAN receive input node 0                                    |
|      | P10.8           | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT110     | O1    |                                 | GTM muxed output                                            |
|      | ASCLIN2_ARTS    | O2    |                                 | Ready to send output                                        |
|      | QSPI3_SCLK      | O3    |                                 | Master SPI clock output                                     |
|      | ASCLIN23_ATX    | O4    |                                 | Transmit output                                             |
|      | —               | O5    |                                 | Reserved                                                    |
|      | —               | O6    |                                 | Reserved                                                    |
|      | —               | O7    |                                 | Reserved                                                    |
| B8   | P10.9           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM6_IN0_5  |       |                                 | Mux input channel 0 of TIM module 6                         |
|      | GTM_TIM4_IN1_4  |       |                                 | Mux input channel 1 of TIM module 4                         |
|      | GTM_TIM0_IN1_10 |       |                                 | Mux input channel 1 of TIM module 0                         |
|      | SENT_SENT15C    |       |                                 | Receive input channel 15                                    |
|      | ASCLIN6_ARXD    |       |                                 | Receive input                                               |
|      | P10.9           | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT265     | O1    |                                 | GTM muxed output                                            |
|      | —               | O2    |                                 | Reserved                                                    |
|      | —               | O3    |                                 | Reserved                                                    |
|      | —               | O4    |                                 | Reserved                                                    |
|      | —               | O5    |                                 | Reserved                                                    |
|      | —               | O6    |                                 | Reserved                                                    |
|      | —               | O7    |                                 | Reserved                                                    |

表 2-4 端口 P10 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| B7   | P10.10          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN1_5  |       |                                 | Mux input channel 1 of TIM module 6 |
|      | GTM_TIM4_IN2_4  |       |                                 | Mux input channel 2 of TIM module 4 |
|      | GTM_TIM0_IN2_11 |       |                                 | Mux input channel 2 of TIM module 0 |
|      | SENT_SENT16C    |       |                                 | Receive input channel 16            |
|      | P10.10          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT266     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN6_ATX     | O2    |                                 | Transmit output                     |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
|      | —               |       |                                 |                                     |
| A7   | P10.11          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN2_5  |       |                                 | Mux input channel 2 of TIM module 6 |
|      | GTM_TIM4_IN5_4  |       |                                 | Mux input channel 5 of TIM module 4 |
|      | GTM_TIM0_IN5_9  |       |                                 | Mux input channel 5 of TIM module 0 |
|      | SENT_SENT19C    |       |                                 | Receive input channel 19            |
|      | P10.11          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT269     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN6_ASCLK   | O2    |                                 | Shift clock output                  |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
|      | —               |       |                                 |                                     |

表 2-4 端口 P10 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| A6   | P10.13          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN3_5  |       |                                 | Mux input channel 3 of TIM module 6 |
|      | GTM_TIM4_IN4_4  |       |                                 | Mux input channel 4 of TIM module 4 |
|      | GTM_TIM0_IN4_9  |       |                                 | Mux input channel 4 of TIM module 0 |
|      | SENT_SENT18C    |       |                                 | Receive input channel 18            |
|      | P10.13          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT268     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN6_ASLSO   | O2    |                                 | Slave select signal output          |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
| B5   | P10.14          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN3_4  |       |                                 | Mux input channel 3 of TIM module 4 |
|      | GTM_TIM0_IN3_11 |       |                                 | Mux input channel 3 of TIM module 0 |
|      | SENT_SENT17C    |       |                                 | Receive input channel 17            |
|      | P10.14          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT267     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
| A5   | P10.15          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN6_4  |       |                                 | Mux input channel 6 of TIM module 4 |
|      | GTM_TIM0_IN6_9  |       |                                 | Mux input channel 6 of TIM module 0 |
|      | P10.15          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT270     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |

表 2-5 端口 P11 的功能

| Ball | Symbol         | Ctrl. | Buffer Type                       | Function                            |
|------|----------------|-------|-----------------------------------|-------------------------------------|
| K15  | P11.0          | I     | RFAST /<br>PU1 /<br>VFLEX /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN0_4 |       |                                   | Mux input channel 0 of TIM module 4 |
|      | GTM_TIM2_IN0_7 |       |                                   | Mux input channel 0 of TIM module 2 |
|      | ASCLIN3_ARXB   |       |                                   | Receive input                       |
|      | GTM_DTMA2_1    |       |                                   | CDTM2_DTM4                          |
|      | P11.0          | O0    |                                   | General-purpose output              |
|      | GTM_TOUT119    | O1    |                                   | GTM muxed output                    |
|      | ASCLIN3_ATX    | O2    |                                   | Transmit output                     |
|      | IOM_MON2_15    |       |                                   | Monitor input 2                     |
|      | IOM_REF2_15    |       |                                   | Reference input 2                   |
|      | —              | O3    |                                   | Reserved                            |
|      | —              | O4    |                                   | Reserved                            |
|      | CAN11_TXD      | O5    |                                   | CAN transmit output node 1          |
|      | GETH_TXD3      | O6    |                                   | Transmit Data                       |
|      | —              | O7    |                                   | Reserved                            |
| K14  | P11.1          | I     | RFAST /<br>PU1 /<br>VFLEX /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN1_5 |       |                                   | Mux input channel 1 of TIM module 4 |
|      | GTM_TIM2_IN1_6 |       |                                   | Mux input channel 1 of TIM module 2 |
|      | P11.1          | O0    |                                   | General-purpose output              |
|      | GTM_TOUT120    | O1    |                                   | GTM muxed output                    |
|      | ASCLIN3_ASCLK  | O2    |                                   | Shift clock output                  |
|      | ASCLIN3_ATX    | O3    |                                   | Transmit output                     |
|      | IOM_MON2_15    |       |                                   | Monitor input 2                     |
|      | IOM_REF2_15    |       |                                   | Reference input 2                   |
|      | —              | O4    |                                   | Reserved                            |
|      | CAN12_TXD      | O5    |                                   | CAN transmit output node 2          |
|      | GETH_TXD2      | O6    |                                   | Transmit Data                       |
|      | —              | O7    |                                   | Reserved                            |

表 2-5 端口 P11 的功能 (续)

| Ball           | Symbol         | Ctrl.                               | Buffer Type                       | Function                            |
|----------------|----------------|-------------------------------------|-----------------------------------|-------------------------------------|
| F15            | P11.2          | I                                   | RFAST /<br>PU1 /<br>VFLEX /<br>ES | General-purpose input               |
|                | GTM_TIM3_IN1_3 |                                     |                                   | Mux input channel 1 of TIM module 3 |
|                | GTM_TIM2_IN1_3 |                                     |                                   | Mux input channel 1 of TIM module 2 |
|                | P11.2          | O0                                  |                                   | General-purpose output              |
|                | GTM_TOUT95     | O1                                  |                                   | GTM muxed output                    |
|                | —              | O2                                  |                                   | Reserved                            |
|                | QSPI0_SLSO5    | O3                                  |                                   | Master slave select output          |
|                | QSPI1_SLSO5    | O4                                  |                                   | Master slave select output          |
|                | MSC0_EN1       | O5                                  |                                   | Chip Select                         |
|                | GETH_TXD1      | O6                                  |                                   | Transmit Data                       |
|                | CCU60_COUT63   | O7                                  |                                   | T13 PWM channel 63                  |
|                | IOM_MON1_6     |                                     |                                   | Monitor input 1                     |
|                | IOM_REF1_0     |                                     |                                   | Reference input 1                   |
|                | G15            | P11.3                               |                                   | I                                   |
| GTM_TIM3_IN2_2 |                | Mux input channel 2 of TIM module 3 |                                   |                                     |
| GTM_TIM2_IN2_2 |                | Mux input channel 2 of TIM module 2 |                                   |                                     |
| MSC0_SDI3      |                | Upstream assynchronous input signal |                                   |                                     |
| QSPI1_MRSTB    |                | Master SPI data input               |                                   |                                     |
| P11.3          |                | O0                                  | General-purpose output            |                                     |
| GTM_TOUT96     |                | O1                                  | GTM muxed output                  |                                     |
| —              |                | O2                                  | Reserved                          |                                     |
| QSPI1_MRST     |                | O3                                  | Slave SPI data output             |                                     |
| IOM_MON2_1     |                |                                     | Monitor input 2                   |                                     |
| IOM_REF2_1     |                |                                     | Reference input 2                 |                                     |
| ERAY0_TXDA     |                | O4                                  | Transmit Channel A                |                                     |
| —              |                | O5                                  | Reserved                          |                                     |
| GETH_TXD0      |                | O6                                  | Transmit Data                     |                                     |
| CCU60_COUT62   |                | O7                                  | T12 PWM channel 62                |                                     |
| IOM_MON1_5     |                |                                     | Monitor input 1                   |                                     |
| IOM_REF1_1     |                |                                     | Reference input 1                 |                                     |

表 2-5 端口 P11 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                                        | Function                                                         |
|------|----------------|-------|----------------------------------------------------|------------------------------------------------------------------|
| J15  | P11.4          | I     | RFAST /<br>PU1 /<br>VFLEX /<br>ES                  | General-purpose input                                            |
|      | GTM_TIM4_IN2_5 |       |                                                    | Mux input channel 2 of TIM module 4                              |
|      | GTM_TIM2_IN2_6 |       |                                                    | Mux input channel 2 of TIM module 2                              |
|      | GETH_RXCLKB    |       |                                                    | Receive Clock MII                                                |
|      | P11.4          | O0    |                                                    | General-purpose output                                           |
|      | GTM_TOUT121    | O1    |                                                    | GTM muxed output                                                 |
|      | ASCLIN3_ASCLK  | O2    |                                                    | Shift clock output                                               |
|      | —              | O3    |                                                    | Reserved                                                         |
|      | —              | O4    |                                                    | Reserved                                                         |
|      | CAN13_TXD      | O5    |                                                    | CAN transmit output node 3                                       |
|      | GETH_TXER      | O6    |                                                    | Transmit Error MII                                               |
|      | GETH_TXCLK     | O7    |                                                    | Transmit Clock Output for RGMII                                  |
| J13  | P11.5          | I     | SLOW /<br>RGMII_In<br>put / PU1<br>/ VFLEX /<br>ES | General-purpose input                                            |
|      | GTM_TIM4_IN3_5 |       |                                                    | Mux input channel 3 of TIM module 4                              |
|      | GTM_TIM2_IN3_8 |       |                                                    | Mux input channel 3 of TIM module 2                              |
|      | GETH_TXCLKA    |       |                                                    | Transmit Clock Input for MII                                     |
|      | GETH_GREFCLK   |       |                                                    | Gigabit Reference Clock input for RGMII (125 MHz high precision) |
|      | P11.5          | O0    |                                                    | General-purpose output                                           |
|      | GTM_TOUT122    | O1    |                                                    | GTM muxed output                                                 |
|      | —              | O2    |                                                    | Reserved                                                         |
|      | —              | O3    |                                                    | Reserved                                                         |
|      | —              | O4    |                                                    | Reserved                                                         |
|      | CAN20_TXD      | O5    |                                                    | CAN transmit output node 0                                       |
|      | —              | O6    |                                                    | Reserved                                                         |
|      | —              | O7    |                                                    | Reserved                                                         |

表 2-5 端口 P11 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                                        | Function                                                |  |
|------|----------------|-------|----------------------------------------------------|---------------------------------------------------------|--|
| J14  | P11.6          | I     | RFAST /<br>PU1 /<br>VFLEX /<br>ES                  | General-purpose input                                   |  |
|      | GTM_TIM3_IN3_2 |       |                                                    | Mux input channel 3 of TIM module 3                     |  |
|      | GTM_TIM2_IN3_2 |       |                                                    | Mux input channel 3 of TIM module 2                     |  |
|      | QSPI1_SCLKB    |       |                                                    | Slave SPI clock inputs                                  |  |
|      | P11.6          | O0    |                                                    | General-purpose output                                  |  |
|      | GTM_TOUT97     | O1    |                                                    | GTM muxed output                                        |  |
|      | ERAY0_TXENB    | O2    |                                                    | Transmit Enable Channel B                               |  |
|      | QSPI1_SCLK     | O3    |                                                    | Master SPI clock output                                 |  |
|      | ERAY0_TXENA    | O4    |                                                    | Transmit Enable Channel A                               |  |
|      | MSC0_FCLP      | O5    |                                                    | Shift-clock direct part of the differential signal      |  |
|      | GETH_TXEN      | O6    |                                                    | Transmit Enable MII and RMII                            |  |
|      | GETH_TCTL      |       |                                                    | Transmit Control for RGMII                              |  |
|      | CCU60_COUT61   | O7    |                                                    | T12 PWM channel 61                                      |  |
|      | IOM_MON1_4     |       |                                                    | Monitor input 1                                         |  |
|      | IOM_REF1_2     |       |                                                    | Reference input 1                                       |  |
| K13  | P11.7          | I     | SLOW /<br>RGMII_In<br>put / PU1<br>/ VFLEX /<br>ES | General-purpose input                                   |  |
|      | GTM_TIM4_IN4_5 |       |                                                    | Mux input channel 4 of TIM module 4                     |  |
|      | GTM_TIM2_IN4_7 |       |                                                    | Mux input channel 4 of TIM module 2                     |  |
|      | GETH_RXD3A     |       |                                                    | Receive Data 3 MII and RGMII (RGMII can use RXD3A only) |  |
|      | CAN11_RXDD     | O0    |                                                    | CAN receive input node 1                                |  |
|      | P11.7          |       |                                                    | General-purpose output                                  |  |
|      | GTM_TOUT123    |       |                                                    | GTM muxed output                                        |  |
|      | —              |       |                                                    | Reserved                                                |  |
|      | —              |       |                                                    | Reserved                                                |  |
|      | —              |       |                                                    | Reserved                                                |  |
|      | —              |       |                                                    | Reserved                                                |  |
|      | —              |       |                                                    | Reserved                                                |  |
|      | —              |       |                                                    | Reserved                                                |  |
|      | —              |       |                                                    | Reserved                                                |  |
|      | —              | O7    |                                                    | Reserved                                                |  |

表 2-5 端口 P11 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                            | Function                                                      |
|------|----------------|-------|----------------------------------------|---------------------------------------------------------------|
| K12  | P11.8          | I     | SLOW / RGMII_In put / PU1 / VFLEX / ES | General-purpose input                                         |
|      | GTM_TIM4_IN5_5 |       |                                        | Mux input channel 5 of TIM module 4                           |
|      | GTM_TIM2_IN5_8 |       |                                        | Mux input channel 5 of TIM module 2                           |
|      | GETH_RXD2A     |       |                                        | Receive Data 2 MII and RGMII (RGMII can use RXD2A only)       |
|      | CAN12_RXDD     |       |                                        | CAN receive input node 2                                      |
|      | P11.8          | O0    |                                        | General-purpose output                                        |
|      | GTM_TOUT124    | O1    |                                        | GTM muxed output                                              |
|      | —              | O2    |                                        | Reserved                                                      |
|      | —              | O3    |                                        | Reserved                                                      |
|      | —              | O4    |                                        | Reserved                                                      |
|      | —              | O5    |                                        | Reserved                                                      |
|      | —              | O6    |                                        | Reserved                                                      |
|      | —              | O7    |                                        | Reserved                                                      |
| F14  | P11.9          | I     | FAST / RGMII_In put / PU1 / VFLEX / ES | General-purpose input                                         |
|      | GTM_TIM3_IN4_2 |       |                                        | Mux input channel 4 of TIM module 3                           |
|      | GTM_TIM2_IN4_2 |       |                                        | Mux input channel 4 of TIM module 2                           |
|      | QSPI1_MTSRB    |       |                                        | Slave SPI data input                                          |
|      | ERAY0_RXDA1    |       |                                        | Receive Channel A1                                            |
|      | GETH_RXD1A     |       |                                        | Receive Data 1 MII, RMII and RGMII (RGMII can use RXD1A only) |
|      | P11.9          | O0    |                                        | General-purpose output                                        |
|      | GTM_TOUT98     | O1    |                                        | GTM muxed output                                              |
|      | —              | O2    |                                        | Reserved                                                      |
|      | QSPI1_MTSR     | O3    |                                        | Master SPI data output                                        |
|      | —              | O4    |                                        | Reserved                                                      |
|      | MSC0_SOP       | O5    |                                        | Data output - direct part of the differential signal          |
|      | —              | O6    |                                        | Reserved                                                      |
|      | CCU60_COUT60   | O7    |                                        | T12 PWM channel 60                                            |
|      | IOM_MON1_3     |       |                                        | Monitor input 1                                               |
|      | IOM_REF1_3     |       |                                        | Reference input 1                                             |

表 2-5 端口 P11 的功能 (续)

| Ball       | Symbol            | Ctrl.              | Buffer Type                            | Function                                                      |
|------------|-------------------|--------------------|----------------------------------------|---------------------------------------------------------------|
| G14        | P11.10            | I                  | FAST / RGMII_In put / PU1 / VFLEX / ES | General-purpose input                                         |
|            | GTM_TIM3_IN5_2    |                    |                                        | Mux input channel 5 of TIM module 3                           |
|            | GTM_TIM2_IN5_2    |                    |                                        | Mux input channel 5 of TIM module 2                           |
|            | GTM_TIM2_IN0_9    |                    |                                        | Mux input channel 0 of TIM module 2                           |
|            | CAN03_RXDD        |                    |                                        | CAN receive input node 3                                      |
|            | ERAY0_RXDB1       |                    |                                        | Receive Channel B1                                            |
|            | ASCLIN1_ARXE      |                    |                                        | Receive input                                                 |
|            | SCU_E_REQ6_3      |                    |                                        | ERU Channel 6 inputs 0 to 5 (0 is the LSB and 5 is the MSB)   |
|            |                   |                    |                                        |                                                               |
|            | MSC0_SDI0         |                    |                                        | Upstream assynchronous input signal                           |
|            | GETH_RXD0A        |                    |                                        | Receive Data 0 MII, RMII and RGMII (RGMII can use RXD0A only) |
|            | QSPI1_SLSIA       | Slave select input |                                        |                                                               |
|            | P11.10            | O0                 |                                        | General-purpose output                                        |
|            | GTM_TOUT99        | O1                 |                                        | GTM muxed output                                              |
|            | —                 | O2                 |                                        | Reserved                                                      |
|            | QSPI0_SLSO3       | O3                 |                                        | Master slave select output                                    |
|            | QSPI1_SLSO3       | O4                 |                                        | Master slave select output                                    |
|            | —                 | O5                 |                                        | Reserved                                                      |
|            | —                 | O6                 |                                        | Reserved                                                      |
|            | CCU60_CC62        | O7                 |                                        | T12 PWM channel 62                                            |
|            | IOM_MON1_0        |                    |                                        | Monitor input 1                                               |
| IOM_REF1_4 | Reference input 1 |                    |                                        |                                                               |

表 2-5 端口 P11 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                            | Function                                         |
|------|-----------------|-------|----------------------------------------|--------------------------------------------------|
| F13  | P11.11          | I     | FAST / RGMII_In put / PU1 / VFLEX / ES | General-purpose input                            |
|      | GTM_TIM3_IN6_2  |       |                                        | Mux input channel 6 of TIM module 3              |
|      | GTM_TIM3_IN0_14 |       |                                        | Mux input channel 0 of TIM module 3              |
|      | GTM_TIM2_IN6_2  |       |                                        | Mux input channel 6 of TIM module 2              |
|      | GETH_CRSDVA     |       |                                        | Carrier Sense / Data Valid combi-signal for RMII |
|      | GETH_RXDVA      |       |                                        | Receive Data Valid MII                           |
|      | GETH_CRSB       |       |                                        | Carrier Sense MII                                |
|      | GETH_RCTLA      |       |                                        | Receive Control for RGMII                        |
|      | P11.11          | O0    |                                        | General-purpose output                           |
|      | GTM_TOUT100     | O1    |                                        | GTM muxed output                                 |
|      | —               | O2    |                                        | Reserved                                         |
|      | QSPI0_SLSO4     | O3    |                                        | Master slave select output                       |
|      | QSPI1_SLSO4     | O4    |                                        | Master slave select output                       |
|      | MSC0_EN0        | O5    |                                        | Chip Select                                      |
|      | ERAY0_TXENB     | O6    |                                        | Transmit Enable Channel B                        |
|      | CCU60_CC61      | O7    |                                        | T12 PWM channel 61                               |
|      | IOM_MON1_1      |       |                                        | Monitor input 1                                  |
|      | IOM_REF1_5      |       |                                        | Reference input 1                                |
| G13  | P11.12          | I     | FAST / RGMII_In put / PU1 / VFLEX / ES | General-purpose input                            |
|      | GTM_TIM3_IN7_2  |       |                                        | Mux input channel 7 of TIM module 3              |
|      | GTM_TIM2_IN7_2  |       |                                        | Mux input channel 7 of TIM module 2              |
|      | GETH_REFCLKA    |       |                                        | Reference Clock input for RMII (50 MHz)          |
|      | GETH_TXCLKB     |       |                                        | Transmit Clock Input for MII                     |
|      | GETH_RXCLKA     |       |                                        | Receive Clock MII                                |
|      | P11.12          | O0    |                                        | General-purpose output                           |
|      | GTM_TOUT101     | O1    |                                        | GTM muxed output                                 |
|      | ASCLIN1_ATX     | O2    |                                        | Transmit output                                  |
|      | IOM_MON2_13     |       |                                        | Monitor input 2                                  |
|      | IOM_REF2_13     |       |                                        | Reference input 2                                |
|      | GTM_CLK2        | O3    |                                        | CGM generated clock                              |
|      | ERAY0_TXDB      | O4    |                                        | Transmit Channel B                               |
|      | CAN03_TXD       | O5    |                                        | CAN transmit output node 3                       |
|      | IOM_MON2_8      |       |                                        | Monitor input 2                                  |
|      | IOM_REF2_8      |       |                                        | Reference input 2                                |
|      | CCU_EXTCLK1     | O6    |                                        | External Clock 1                                 |
|      | CCU60_CC60      | O7    |                                        | T12 PWM channel 60                               |
|      | IOM_MON1_2      |       |                                        | Monitor input 1                                  |
|      | IOM_REF1_6      |       |                                        | Reference input 1                                |

表 2-5 端口 P11 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                      | Function                                         |
|------|----------------|-------|----------------------------------|--------------------------------------------------|
| K11  | P11.13         | I     | SLOW /<br>PU1 /<br>VFLEX /<br>ES | General-purpose input                            |
|      | GTM_TIM4_IN6_5 |       |                                  | Mux input channel 6 of TIM module 4              |
|      | GTM_TIM2_IN6_7 |       |                                  | Mux input channel 6 of TIM module 2              |
|      | GETH_RXERA     |       |                                  | Receive Error MII                                |
|      | I2C1_SDAA      |       |                                  | Serial Data Input 0                              |
|      | CAN13_RXDD     |       |                                  | CAN receive input node 3                         |
|      | P11.13         | O0    |                                  | General-purpose output                           |
|      | GTM_TOUT125    | O1    |                                  | GTM muxed output                                 |
|      | —              | O2    |                                  | Reserved                                         |
|      | —              | O3    |                                  | Reserved                                         |
|      | —              | O4    |                                  | Reserved                                         |
|      | —              | O5    |                                  | Reserved                                         |
|      | I2C1_SDA       | O6    |                                  | Serial Data Output                               |
|      | —              | O7    |                                  | Reserved                                         |
| J12  | P11.14         | I     | SLOW /<br>PU1 /<br>VFLEX /<br>ES | General-purpose input                            |
|      | GTM_TIM4_IN7_4 |       |                                  | Mux input channel 7 of TIM module 4              |
|      | GTM_TIM2_IN7_8 |       |                                  | Mux input channel 7 of TIM module 2              |
|      | GETH_CRSDVB    |       |                                  | Carrier Sense / Data Valid combi-signal for RMII |
|      | GETH_RXDVB     |       |                                  | Receive Data Valid MII                           |
|      | GETH_CRSA      |       |                                  | Carrier Sense MII                                |
|      | I2C1_SCLA      |       |                                  | Serial Clock Input 0                             |
|      | CAN20_RXDF     |       |                                  | CAN receive input node 0                         |
|      | P11.14         | O0    |                                  | General-purpose output                           |
|      | GTM_TOUT126    | O1    |                                  | GTM muxed output                                 |
|      | —              | O2    |                                  | Reserved                                         |
|      | —              | O3    |                                  | Reserved                                         |
|      | —              | O4    |                                  | Reserved                                         |
|      | —              | O5    |                                  | Reserved                                         |
|      | I2C1_SCL       | O6    |                                  | Serial Clock Output                              |
|      | —              | O7    |                                  | Reserved                                         |

表 2-5 端口 P11 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                      | Function                            |
|------|----------------|-------|----------------------------------|-------------------------------------|
| J11  | P11.15         | I     | SLOW /<br>PU1 /<br>VFLEX /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN7_5 |       |                                  | Mux input channel 7 of TIM module 4 |
|      | GTM_TIM0_IN7_8 |       |                                  | Mux input channel 7 of TIM module 0 |
|      | GETH_COLA      |       |                                  | Collision MII                       |
|      | P11.15         | O0    |                                  | General-purpose output              |
|      | GTM_TOUT127    | O1    |                                  | GTM muxed output                    |
|      | —              | O2    |                                  | Reserved                            |
|      | —              | O3    |                                  | Reserved                            |
|      | —              | O4    |                                  | Reserved                            |
|      | —              | O5    |                                  | Reserved                            |
|      | —              | O6    |                                  | Reserved                            |
|      | —              | O7    |                                  | Reserved                            |

表 2-6 端口 P12 功能

| Ball | Symbol         | Ctrl. | Buffer Type                      | Function                            |
|------|----------------|-------|----------------------------------|-------------------------------------|
| K17  | P12.0          | I     | SLOW /<br>PU1 /<br>VFLEX /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN0_5 |       |                                  | Mux input channel 0 of TIM module 4 |
|      | GTM_TIM3_IN0_7 |       |                                  | Mux input channel 0 of TIM module 3 |
|      | CAN00_RXDC     |       |                                  | CAN receive input node 0            |
|      | GETH_RXCLKC    |       |                                  | Receive Clock MII                   |
|      | GTM_DTMA4_0    |       |                                  | CDTM4_DTM4                          |
|      | P12.0          | O0    |                                  | General-purpose output              |
|      | GTM_TOUT128    | O1    |                                  | GTM muxed output                    |
|      | —              | O2    |                                  | Reserved                            |
|      | —              | O3    |                                  | Reserved                            |
|      | —              | O4    |                                  | Reserved                            |
|      | —              | O5    |                                  | Reserved                            |
|      | GETH_MDC       | O6    |                                  | MDIO clock                          |
|      | —              | O7    |                                  | Reserved                            |

表 2-6 端口 P12 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                      | Function                            |
|------|----------------|-------|----------------------------------|-------------------------------------|
| K16  | P12.1          | I     | SLOW /<br>PU1 /<br>VFLEX /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN1_6 |       |                                  | Mux input channel 1 of TIM module 4 |
|      | GTM_TIM3_IN1_6 |       |                                  | Mux input channel 1 of TIM module 3 |
|      | GETH_MDIOC     |       |                                  | MDIO Input                          |
|      | P12.1          | O0    |                                  | General-purpose output              |
|      | GTM_TOUT129    | O1    |                                  | GTM muxed output                    |
|      | ASCLIN3_ASLSO  | O2    |                                  | Slave select signal output          |
|      | —              | O3    |                                  | Reserved                            |
|      | —              | O4    |                                  | Reserved                            |
|      | CAN00_TXD      | O5    |                                  | CAN transmit output node 0          |
|      | IOM_MON2_5     |       |                                  | Monitor input 2                     |
|      | IOM_REF2_5     |       |                                  | Reference input 2                   |
|      | —              | O6    |                                  | Reserved                            |
|      | —              | O7    |                                  | Reserved                            |
|      | GETH_MDIO      | O     |                                  | MDIO Output                         |

表 2-7 端口 P13 的功能

| Ball | Symbol         | Ctrl. | Buffer Type                                | Function                                             |
|------|----------------|-------|--------------------------------------------|------------------------------------------------------|
| G17  | P13.0          | I     | LVDS_TX<br>/ FAST /<br>PU1 / VEXT<br>/ ES6 | General-purpose input                                |
|      | GTM_TIM3_IN5_3 |       |                                            | Mux input channel 5 of TIM module 3                  |
|      | GTM_TIM2_IN5_3 |       |                                            | Mux input channel 5 of TIM module 2                  |
|      | ASCLIN10_ARXC  |       |                                            | Receive input                                        |
|      | ASCLIN21_ARXA  |       |                                            | Receive input                                        |
|      | P13.0          | O0    |                                            | General-purpose output                               |
|      | GTM_TOUT91     | O1    |                                            | GTM muxed output                                     |
|      | ASCLIN10_ATX   | O2    |                                            | Transmit output                                      |
|      | QSPI2_SCLKN    | O3    |                                            | Master SPI clock output (LVDS N line)                |
|      | MSC0_EN1       | O4    |                                            | Chip Select                                          |
|      | MSC0_FCLN      | O5    |                                            | Shift-clock inverted part of the differential signal |
|      | —              | O6    |                                            | Reserved                                             |
|      | CAN10_TXD      | O7    |                                            | CAN transmit output node 0                           |

表 2-7 端口 P13 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                                | Function                                                        |
|------|----------------|-------|--------------------------------------------|-----------------------------------------------------------------|
| F17  | P13.1          | I     | LVDS_TX<br>/ FAST /<br>PU1 / VEXT<br>/ ES6 | General-purpose input                                           |
|      | GTM_TIM3_IN6_3 |       |                                            | Mux input channel 6 of TIM module 3                             |
|      | GTM_TIM2_IN6_3 |       |                                            | Mux input channel 6 of TIM module 2                             |
|      | I2C0_SCLB      |       |                                            | Serial Clock Input 1                                            |
|      | CAN10_RXDD     |       |                                            | CAN receive input node 0                                        |
|      | ASCLIN10_ARXD  |       |                                            | Receive input                                                   |
|      | P13.1          | O0    |                                            | General-purpose output                                          |
|      | GTM_TOUT92     | O1    |                                            | GTM muxed output                                                |
|      | —              | O2    |                                            | Reserved                                                        |
|      | QSPI2_SCLKP    | O3    |                                            | Master SPI clock output (LVDS P line)                           |
|      | —              | O4    |                                            | Reserved                                                        |
|      | MSC0_FCLP      | O5    |                                            | Shift-clock direct part of the differential signal              |
|      | I2C0_SCL       | O6    |                                            | Serial Clock Output                                             |
|      | —              | O7    |                                            | Reserved                                                        |
| G16  | P13.2          | I     | LVDS_TX<br>/ FAST /<br>PU1 / VEXT<br>/ ES6 | General-purpose input                                           |
|      | GTM_TIM3_IN7_3 |       |                                            | Mux input channel 7 of TIM module 3                             |
|      | GTM_TIM2_IN7_3 |       |                                            | Mux input channel 7 of TIM module 2                             |
|      | GPT120_CAPINA  |       |                                            | Trigger input to capture value of timer T5 into CAPREL register |
|      | I2C0_SDAB      |       |                                            | Serial Data Input 1                                             |
|      | P13.2          | O0    |                                            | General-purpose output                                          |
|      | GTM_TOUT93     | O1    |                                            | GTM muxed output                                                |
|      | ASCLIN10_ASCLK | O2    |                                            | Shift clock output                                              |
|      | QSPI2_MTSRN    | O3    |                                            | Master SPI data output (LVDS N line)                            |
|      | MSC0_FCLP      | O4    |                                            | Shift-clock direct part of the differential signal              |
|      | MSC0_SON       | O5    |                                            | Data output - inverted part of the differential signal          |
|      | I2C0_SDA       | O6    |                                            | Serial Data Output                                              |
|      | ASCLIN21_ATX   | O7    |                                            | Transmit output                                                 |

表 2-7 端口 P13 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                                | Function                                             |
|------|----------------|-------|--------------------------------------------|------------------------------------------------------|
| F16  | P13.3          | I     | LVDS_TX<br>/ FAST /<br>PU1 / VEXT<br>/ ES6 | General-purpose input                                |
|      | GTM_TIM3_IN0_3 |       |                                            | Mux input channel 0 of TIM module 3                  |
|      | GTM_TIM2_IN0_3 |       |                                            | Mux input channel 0 of TIM module 2                  |
|      | ASCLIN21_ARXB  |       |                                            | Receive input                                        |
|      | P13.3          | O0    |                                            | General-purpose output                               |
|      | GTM_TOUT94     | O1    |                                            | GTM muxed output                                     |
|      | ASCLIN10_ASLSO | O2    |                                            | Slave select signal output                           |
|      | QSPI2_MTSRP    | O3    |                                            | Master SPI data output (LVDS P line)                 |
|      | —              | O4    |                                            | Reserved                                             |
|      | MSC0_SOP       | O5    |                                            | Data output - direct part of the differential signal |
|      | ASCLIN21_ATX   | O6    |                                            | Transmit output                                      |
|      | —              | O7    |                                            | Reserved                                             |
| B16  | P13.4          | I     | LVDS_TX<br>/ FAST /<br>PU1 / VEXT<br>/ ES6 | General-purpose input                                |
|      | GTM_TIM6_IN0_4 |       |                                            | Mux input channel 0 of TIM module 6                  |
|      | GTM_TIM5_IN3_4 |       |                                            | Mux input channel 3 of TIM module 5                  |
|      | GTM_TIM3_IN3_8 |       |                                            | Mux input channel 3 of TIM module 3                  |
|      | P13.4          | O0    |                                            | General-purpose output                               |
|      | GTM_TOUT253    | O1    |                                            | GTM muxed output                                     |
|      | —              | O2    |                                            | Reserved                                             |
|      | —              | O3    |                                            | Reserved                                             |
|      | MSC2_EN0       | O4    |                                            | Chip Select                                          |
|      | MSC2_FCLN      | O5    |                                            | Shift-clock inverted part of the differential signal |
|      | —              | O6    |                                            | Reserved                                             |
|      | CAN23_TXD      | O7    |                                            | CAN transmit output node 3                           |
| A16  | P13.5          | I     | LVDS_TX<br>/ FAST /<br>PU1 / VEXT<br>/ ES6 | General-purpose input                                |
|      | GTM_TIM6_IN1_4 |       |                                            | Mux input channel 1 of TIM module 6                  |
|      | GTM_TIM5_IN4_4 |       |                                            | Mux input channel 4 of TIM module 5                  |
|      | GTM_TIM3_IN4_9 |       |                                            | Mux input channel 4 of TIM module 3                  |
|      | CAN23_RXDD     |       |                                            | CAN receive input node 3                             |
|      | P13.5          | O0    |                                            | General-purpose output                               |
|      | GTM_TOUT254    | O1    |                                            | GTM muxed output                                     |
|      | —              | O2    |                                            | Reserved                                             |
|      | —              | O3    |                                            | Reserved                                             |
|      | —              | O4    |                                            | Reserved                                             |
|      | MSC2_FCLP      | O5    |                                            | Shift-clock direct part of the differential signal   |
|      | —              | O6    |                                            | Reserved                                             |
|      | —              | O7    |                                            | Reserved                                             |

表 2-7 端口 P13 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                                | Function                                               |
|------|-----------------|-------|--------------------------------------------|--------------------------------------------------------|
| B15  | P13.6           | I     | LVDS_TX<br>/ FAST /<br>PU1 / VEXT<br>/ ES6 | General-purpose input                                  |
|      | GTM_TIM6_IN2_4  |       |                                            | Mux input channel 2 of TIM module 6                    |
|      | GTM_TIM5_IN5_4  |       |                                            | Mux input channel 5 of TIM module 5                    |
|      | GTM_TIM3_IN5_10 |       |                                            | Mux input channel 5 of TIM module 3                    |
|      | P13.6           | O0    |                                            | General-purpose output                                 |
|      | GTM_TOUT255     | O1    |                                            | GTM muxed output                                       |
|      | —               | O2    |                                            | Reserved                                               |
|      | —               | O3    |                                            | Reserved                                               |
|      | —               | O4    |                                            | Reserved                                               |
|      | MSC2_SON        | O5    |                                            | Data output - inverted part of the differential signal |
|      | —               | O6    |                                            | Reserved                                               |
|      | —               | O7    |                                            | Reserved                                               |
| A15  | P13.7           | I     | LVDS_TX<br>/ FAST /<br>PU1 / VEXT<br>/ ES6 | General-purpose input                                  |
|      | GTM_TIM6_IN3_4  |       |                                            | Mux input channel 3 of TIM module 6                    |
|      | GTM_TIM5_IN6_4  |       |                                            | Mux input channel 6 of TIM module 5                    |
|      | GTM_TIM3_IN6_10 |       |                                            | Mux input channel 6 of TIM module 3                    |
|      | P13.7           | O0    |                                            | General-purpose output                                 |
|      | GTM_TOUT256     | O1    |                                            | GTM muxed output                                       |
|      | —               | O2    |                                            | Reserved                                               |
|      | —               | O3    |                                            | Reserved                                               |
|      | —               | O4    |                                            | Reserved                                               |
|      | MSC2_SOP        | O5    |                                            | Data output - direct part of the differential signal   |
|      | —               | O6    |                                            | Reserved                                               |
|      | —               | O7    |                                            | Reserved                                               |

表 2-7 端口 P13 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| A14  | P13.9           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN4_4  |       |                                 | Mux input channel 4 of TIM module 6 |
|      | GTM_TIM4_IN7_6  |       |                                 | Mux input channel 7 of TIM module 4 |
|      | GTM_TIM2_IN7_12 |       |                                 | Mux input channel 7 of TIM module 2 |
|      | I2C1_SCLB       |       |                                 | Serial Clock Input 1                |
|      | P13.9           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT248     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN3_ATX     | O2    |                                 | Transmit output                     |
|      | IOM_MON2_15     |       |                                 | Monitor input 2                     |
|      | IOM_REF2_15     |       |                                 | Reference input 2                   |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | CAN21_TXD       | O5    |                                 | CAN transmit output node 1          |
|      | I2C1_SCL        | O6    |                                 | Serial Clock Output                 |
|      | —               | O7    |                                 | Reserved                            |
| B13  | P13.10          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN5_4  |       |                                 | Mux input channel 5 of TIM module 6 |
|      | GTM_TIM5_IN1_5  |       |                                 | Mux input channel 1 of TIM module 5 |
|      | GTM_TIM3_IN1_8  |       |                                 | Mux input channel 1 of TIM module 3 |
|      | PSI5_RX3A       |       |                                 | RXD inputs (receive data) channel 3 |
|      | P13.10          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT251     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN0_ATX     | O2    |                                 | Transmit output                     |
|      | IOM_MON2_12     |       |                                 | Monitor input 2                     |
|      | IOM_REF2_12     |       |                                 | Reference input 2                   |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |

表 2-7 端口 P13 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| A13  | P13.11          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN6_4  |       |                                 | Mux input channel 6 of TIM module 6 |
|      | GTM_TIM5_IN0_9  |       |                                 | Mux input channel 0 of TIM module 5 |
|      | GTM_TIM3_IN0_9  |       |                                 | Mux input channel 0 of TIM module 3 |
|      | ASCLIN0_ARXE    |       |                                 | Receive input                       |
|      | ASCLIN7_ARXD    |       |                                 | Receive input                       |
|      | P13.11          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT250     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | PSI5_TX3        | O4    |                                 | TXD outputs (send data)             |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
| B12  | P13.12          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN7_4  |       |                                 | Mux input channel 7 of TIM module 6 |
|      | GTM_TIM4_IN0_6  |       |                                 | Mux input channel 0 of TIM module 4 |
|      | GTM_TIM0_IN0_11 |       |                                 | Mux input channel 0 of TIM module 0 |
|      | ASCLIN3_ARXH    |       |                                 | Receive input                       |
|      | I2C1_SDAB       |       |                                 | Serial Data Input 1                 |
|      | CAN21_RXDB      |       |                                 | CAN receive input node 1            |
|      | P13.12          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT249     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN7_ATX     | O2    |                                 | Transmit output                     |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | I2C1_SDA        | O6    |                                 | Serial Data Output                  |
|      | —               | O7    |                                 | Reserved                            |

表 2-7 端口 P13 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| A12  | P13.13         | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN5_5 |       |                                 | Mux input channel 5 of TIM module 5 |
|      | GTM_TIM3_IN5_9 |       |                                 | Mux input channel 5 of TIM module 3 |
|      | MSC2_INJ0      |       |                                 | Injection signal from port          |
|      | PSI5_RX3B      |       |                                 | RXD inputs (receive data) channel 3 |
|      | P13.13         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT262    | O1    |                                 | GTM muxed output                    |
|      | ASCLIN7_ASCLK  | O2    |                                 | Shift clock output                  |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
| B11  | P13.14         | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN2_4 |       |                                 | Mux input channel 2 of TIM module 5 |
|      | GTM_TIM3_IN2_7 |       |                                 | Mux input channel 2 of TIM module 3 |
|      | P13.14         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT252    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
| A11  | P13.15         | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN7_4 |       |                                 | Mux input channel 7 of TIM module 5 |
|      | GTM_TIM3_IN7_9 |       |                                 | Mux input channel 7 of TIM module 3 |
|      | P13.15         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT264    | O1    |                                 | GTM muxed output                    |
|      | ASCLIN7_ASLSO  | O2    |                                 | Slave select signal output          |
|      | —              | O3    |                                 | Reserved                            |
|      | PSI5_TX3       | O4    |                                 | TXD outputs (send data)             |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |

表 2-8 端口 P14 功能

| Ball | Symbol         | Ctrl. | Buffer Type                      | Function                            |
|------|----------------|-------|----------------------------------|-------------------------------------|
| G21  | P14.0          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES2 | General-purpose input               |
|      | GTM_TIM1_IN3_5 |       |                                  | Mux input channel 3 of TIM module 1 |
|      | GTM_TIM0_IN3_5 |       |                                  | Mux input channel 3 of TIM module 0 |
|      | SENT_SENT17D   |       |                                  | Receive input channel 17            |
|      | P14.0          | O0    |                                  | General-purpose output              |
|      | GTM_TOUT80     | O1    |                                  | GTM muxed output                    |
|      | ASCLIN0_ATX    | O2    |                                  | Transmit output                     |
|      | IOM_MON2_12    |       |                                  | Monitor input 2                     |
|      | IOM_REF2_12    |       |                                  | Reference input 2                   |
|      | ERAY0_TXDA     | O3    |                                  | Transmit Channel A                  |
|      | ERAY0_TXDB     | O4    |                                  | Transmit Channel B                  |
|      | CAN01_TXD      | O5    |                                  | CAN transmit output node 1          |
|      | IOM_MON2_6     |       |                                  | Monitor input 2                     |
|      | IOM_REF2_6     |       |                                  | Reference input 2                   |
|      | ASCLIN0_ASCLK  | O6    |                                  | Shift clock output                  |
|      | CCU60_COUT62   | O7    |                                  | T12 PWM channel 62                  |
|      | IOM_MON1_5     |       |                                  | Monitor input 1                     |
|      | IOM_REF1_1     |       |                                  | Reference input 1                   |

表 2-8 端口 P14 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                      | Function                                                    |
|------|----------------|-------|----------------------------------|-------------------------------------------------------------|
| F20  | P14.1          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES2 | General-purpose input                                       |
|      | GTM_TIM1_IN4_3 |       |                                  | Mux input channel 4 of TIM module 1                         |
|      | GTM_TIM0_IN4_3 |       |                                  | Mux input channel 4 of TIM module 0                         |
|      | ERAY0_RXDA3    |       |                                  | Receive Channel A3                                          |
|      | ASCLIN0_ARXA   |       |                                  | Receive input                                               |
|      | SENT_SENT18D   |       |                                  | Receive input channel 18                                    |
|      | ERAY0_RXDB3    |       |                                  | Receive Channel B3                                          |
|      | CAN01_RXDB     |       |                                  | CAN receive input node 1                                    |
|      | SCU_E_REQ3_1   |       |                                  | ERU Channel 3 inputs 0 to 5 (0 is the LSB and 5 is the MSB) |
|      | PMS_PINAWKP    |       |                                  | PINA ( P14.1) pin input                                     |
|      | P14.1          | O0    |                                  | General-purpose output                                      |
|      | GTM_TOUT81     | O1    |                                  | GTM muxed output                                            |
|      | ASCLIN0_ATX    | O2    |                                  | Transmit output                                             |
|      | IOM_MON2_12    |       |                                  | Monitor input 2                                             |
|      | IOM_REF2_12    |       |                                  | Reference input 2                                           |
|      | —              | O3    |                                  | Reserved                                                    |
|      | —              | O4    |                                  | Reserved                                                    |
|      | —              | O5    |                                  | Reserved                                                    |
|      | —              | O6    |                                  | Reserved                                                    |
|      | CCU60_COUT63   | O7    |                                  | T13 PWM channel 63                                          |
|      | IOM_MON1_6     |       |                                  | Monitor input 1                                             |
|      | IOM_REF1_0     |       |                                  | Reference input 1                                           |
| K18  | P14.2          | I     | SLOW /<br>PU2 /<br>VEXT /<br>ES  | General-purpose input                                       |
|      | GTM_TIM1_IN5_3 |       |                                  | Mux input channel 5 of TIM module 1                         |
|      | GTM_TIM0_IN5_3 |       |                                  | Mux input channel 5 of TIM module 0                         |
|      | PMS_HWCFG2IN   |       |                                  | HWCFG2 pin input                                            |
|      | P14.2          | O0    |                                  | General-purpose output                                      |
|      | GTM_TOUT82     | O1    |                                  | GTM muxed output                                            |
|      | ASCLIN2_ATX    | O2    |                                  | Transmit output                                             |
|      | IOM_MON2_14    |       |                                  | Monitor input 2                                             |
|      | IOM_REF2_14    |       |                                  | Reference input 2                                           |
|      | QSPI2_SLSO1    | O3    |                                  | Master slave select output                                  |
|      | —              | O4    |                                  | Reserved                                                    |
|      | —              | O5    |                                  | Reserved                                                    |
|      | ASCLIN2_ASCLK  | O6    |                                  | Shift clock output                                          |
|      | —              | O7    |                                  | Reserved                                                    |

表 2-8 端口 P14 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                                                    |
|------|----------------|-------|---------------------------------|-------------------------------------------------------------|
| G19  | P14.3          | I     | SLOW /<br>PU2 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM1_IN6_3 |       |                                 | Mux input channel 6 of TIM module 1                         |
|      | GTM_TIM0_IN6_3 |       |                                 | Mux input channel 6 of TIM module 0                         |
|      | PMS_HWCFG3IN   |       |                                 | HWCFG3 pin input                                            |
|      | ASCLIN2_ARXA   |       |                                 | Receive input                                               |
|      | MSC0_SDI2      |       |                                 | Upstream assynchronous input signal                         |
|      | SCU_E_REQ1_0   |       |                                 | ERU Channel 1 inputs 0 to 5 (0 is the LSB and 5 is the MSB) |
|      | P14.3          | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT83     | O1    |                                 | GTM muxed output                                            |
|      | ASCLIN2_ATX    | O2    |                                 | Transmit output                                             |
|      | IOM_MON2_14    |       |                                 | Monitor input 2                                             |
|      | IOM_REF2_14    |       |                                 | Reference input 2                                           |
|      | QSPI2_SLSO3    | O3    |                                 | Master slave select output                                  |
|      | ASCLIN1_ASLSO  | O4    |                                 | Slave select signal output                                  |
|      | ASCLIN3_ASLSO  | O5    |                                 | Slave select signal output                                  |
|      | —              | O6    |                                 | Reserved                                                    |
|      | —              | O7    |                                 | Reserved                                                    |
| G20  | P14.4          | I     | SLOW /<br>PU2 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM1_IN7_2 |       |                                 | Mux input channel 7 of TIM module 1                         |
|      | GTM_TIM0_IN7_2 |       |                                 | Mux input channel 7 of TIM module 0                         |
|      | PMS_HWCFG6IN   |       |                                 | HWCFG6 pin input                                            |
|      | GTM_DTMT0_0    |       |                                 | CDTM0_DTM0                                                  |
|      | P14.4          | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT84     | O1    |                                 | GTM muxed output                                            |
|      | —              | O2    |                                 | Reserved                                                    |
|      | —              | O3    |                                 | Reserved                                                    |
|      | —              | O4    |                                 | Reserved                                                    |
|      | —              | O5    |                                 | Reserved                                                    |
|      | GETH_PPS       | O6    |                                 | Pulse Per Second                                            |
|      | —              | O7    |                                 | Reserved                                                    |

表 2-8 端口 P14 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| F19  | P14.5          | I     | FAST /<br>PU2 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM1_IN0_4 |       |                                 | Mux input channel 0 of TIM module 1 |
|      | GTM_TIM0_IN0_4 |       |                                 | Mux input channel 0 of TIM module 0 |
|      | PMS_HWCFG1IN   |       |                                 | HWCFG1 pin input                    |
|      | GTM_DTMA2_0    |       |                                 | CDTM2_DTM4                          |
|      | P14.5          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT85     | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | ERAY0_TXDB     | O6    |                                 | Transmit Channel B                  |
|      | ERAY1_TXDB     | O7    |                                 | Transmit Channel B                  |
| G18  | P14.6          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM1_IN1_4 |       |                                 | Mux input channel 1 of TIM module 1 |
|      | GTM_TIM0_IN1_4 |       |                                 | Mux input channel 1 of TIM module 0 |
|      | P14.6          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT86     | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | QSPI2_SLSO2    | O3    |                                 | Master slave select output          |
|      | CAN13_TXD      | O4    |                                 | CAN transmit output node 3          |
|      | —              | O5    |                                 | Reserved                            |
|      | ERAY0_TXENB    | O6    |                                 | Transmit Enable Channel B           |
|      | ERAY1_TXENB    | O7    |                                 | Transmit Enable Channel B           |

表 2-8 端口 P14 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| J18  | P14.7           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN7_10 |       |                                 | Mux input channel 7 of TIM module 4 |
|      | GTM_TIM1_IN0_5  |       |                                 | Mux input channel 0 of TIM module 1 |
|      | GTM_TIM0_IN0_5  |       |                                 | Mux input channel 0 of TIM module 0 |
|      | ERAY0_RXDB0     |       |                                 | Receive Channel B0                  |
|      | ERAY1_RXDB0     |       |                                 | Receive Channel B0                  |
|      | CAN10_RXDB      |       |                                 | CAN receive input node 0            |
|      | CAN13_RXDA      |       |                                 | CAN receive input node 3            |
|      | ASCLIN9_ARXC    |       |                                 | Receive input                       |
|      | ASCLIN20_ARXA   |       |                                 | Receive input                       |
|      | P14.7           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT87      | O1    |                                 | GTM muxed output                    |
|      | ASCLIN0_ARTS    | O2    |                                 | Ready to send output                |
|      | QSPI2_SLSO4     | O3    |                                 | Master slave select output          |
|      | ASCLIN9_ATX     | O4    |                                 | Transmit output                     |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | ASCLIN20_ATX    | O7    |                                 | Transmit output                     |
| F18  | P14.8           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM3_IN2_3  |       |                                 | Mux input channel 2 of TIM module 3 |
|      | GTM_TIM2_IN2_3  |       |                                 | Mux input channel 2 of TIM module 2 |
|      | ERAY0_RXDA0     |       |                                 | Receive Channel A0                  |
|      | CAN02_RXDD      |       |                                 | CAN receive input node 2            |
|      | ASCLIN1_ARXD    |       |                                 | Receive input                       |
|      | ERAY1_RXDA0     |       |                                 | Receive Channel A0                  |
|      | P14.8           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT88      | O1    |                                 | GTM muxed output                    |
|      | ASCLIN5_ASLSO   | O2    |                                 | Slave select signal output          |
|      | ASCLIN7_ASLSO   | O3    |                                 | Slave select signal output          |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | ASCLIN20_ATX    | O7    |                                 | Transmit output                     |

表 2-8 端口 P14 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                                | Function                            |
|------|----------------|-------|--------------------------------------------|-------------------------------------|
| J17  | P14.9          | I     | LVDS_R X<br>/ FAST /<br>PU1 /<br>VEXT / ES | General-purpose input               |
|      | GTM_TIM3_IN3_3 |       |                                            | Mux input channel 3 of TIM module 3 |
|      | GTM_TIM2_IN3_3 |       |                                            | Mux input channel 3 of TIM module 2 |
|      | ASCLIN0_ACTSA  |       |                                            | Clear to send input                 |
|      | QSPI2_MRSTFN   |       |                                            | Master SPI data input (LVDS N line) |
|      | ASCLIN9_ARXD   |       |                                            | Receive input                       |
|      | ASCLIN20_ARXB  |       |                                            | Receive input                       |
|      | P14.9          | O0    |                                            | General-purpose output              |
|      | GTM_TOUT89     | O1    |                                            | GTM muxed output                    |
|      | CAN23_TXD      | O2    |                                            | CAN transmit output node 3          |
|      | MSC0_EN1       | O3    |                                            | Chip Select                         |
|      | CAN10_TXD      | O4    |                                            | CAN transmit output node 0          |
|      | ERAY0_TXENB    | O5    |                                            | Transmit Enable Channel B           |
|      | ERAY0_TXENA    | O6    |                                            | Transmit Enable Channel A           |
|      | ERAY1_TXENA    | O7    |                                            | Transmit Enable Channel A           |
| J16  | P14.10         | I     | LVDS_R X<br>/ FAST /<br>PU1 /<br>VEXT / ES | General-purpose input               |
|      | GTM_TIM3_IN4_3 |       |                                            | Mux input channel 4 of TIM module 3 |
|      | GTM_TIM2_IN4_3 |       |                                            | Mux input channel 4 of TIM module 2 |
|      | CAN23_RXDA     |       |                                            | CAN receive input node 3            |
|      | QSPI2_MRSTFP   |       |                                            | Master SPI data input (LVDS P line) |
|      | P14.10         | O0    |                                            | General-purpose output              |
|      | GTM_TOUT90     | O1    |                                            | GTM muxed output                    |
|      | —              | O2    |                                            | Reserved                            |
|      | MSC0_EN0       | O3    |                                            | Chip Select                         |
|      | ASCLIN1_ATX    | O4    |                                            | Transmit output                     |
|      | IOM_MON2_13    |       |                                            | Monitor input 2                     |
|      | IOM_REF2_13    |       |                                            | Reference input 2                   |
|      | CAN02_TXD      | O5    |                                            | CAN transmit output node 2          |
|      | IOM_MON2_7     |       |                                            | Monitor input 2                     |
|      | IOM_REF2_7     |       |                                            | Reference input 2                   |
|      | ERAY0_TXDA     | O6    |                                            | Transmit Channel A                  |
|      | ERAY1_TXDA     | O7    |                                            | Transmit Channel A                  |

表 2-8 端口 P14 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                                             |
|------|----------------|-------|---------------------------------|------------------------------------------------------|
| A20  | P14.11         | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                |
|      | GTM_TIM5_IN1_4 |       |                                 | Mux input channel 1 of TIM module 5                  |
|      | GTM_TIM3_IN1_9 |       |                                 | Mux input channel 1 of TIM module 3                  |
|      | MSC2_SDI1      |       |                                 | Upstream asynchronous input signal                   |
|      | P14.11         | O0    |                                 | General-purpose output                               |
|      | GTM_TOUT258    | O1    |                                 | GTM muxed output                                     |
|      | —              | O2    |                                 | Reserved                                             |
|      | —              | O3    |                                 | Reserved                                             |
|      | MSC2_EN2       | O4    |                                 | Chip Select                                          |
|      | MSC2_SOP       | O5    |                                 | Data output - direct part of the differential signal |
|      | —              | O6    |                                 | Reserved                                             |
|      | —              | O7    |                                 | Reserved                                             |
| B19  | P14.12         | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                |
|      | GTM_TIM6_IN4_3 |       |                                 | Mux input channel 4 of TIM module 6                  |
|      | GTM_TIM5_IN4_5 |       |                                 | Mux input channel 4 of TIM module 5                  |
|      | GTM_TIM3_IN4_8 |       |                                 | Mux input channel 4 of TIM module 3                  |
|      | MSC2_SDI0      |       |                                 | Upstream asynchronous input signal                   |
|      | P14.12         | O0    |                                 | General-purpose output                               |
|      | GTM_TOUT261    | O1    |                                 | GTM muxed output                                     |
|      | ASCLIN5_ASCLK  | O2    |                                 | Shift clock output                                   |
|      | ASCLIN7_ASCLK  | O3    |                                 | Shift clock output                                   |
|      | —              | O4    |                                 | Reserved                                             |
|      | —              | O5    |                                 | Reserved                                             |
|      | —              | O6    |                                 | Reserved                                             |
|      | —              | O7    |                                 | Reserved                                             |
| A19  | P14.13         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                |
|      | GTM_TIM6_IN5_3 |       |                                 | Mux input channel 5 of TIM module 6                  |
|      | GTM_TIM5_IN3_5 |       |                                 | Mux input channel 3 of TIM module 5                  |
|      | GTM_TIM3_IN3_6 |       |                                 | Mux input channel 3 of TIM module 3                  |
|      | P14.13         | O0    |                                 | General-purpose output                               |
|      | GTM_TOUT260    | O1    |                                 | GTM muxed output                                     |
|      | —              | O2    |                                 | Reserved                                             |
|      | —              | O3    |                                 | Reserved                                             |
|      | MSC2_EN1       | O4    |                                 | Chip Select                                          |
|      | CAN22_TXD      | O5    |                                 | CAN transmit output node 2                           |
|      | —              | O6    |                                 | Reserved                                             |
|      | —              | O7    |                                 | Reserved                                             |

表 2-8 端口 P14 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| B18  | P14.14         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN6_3 |       |                                 | Mux input channel 6 of TIM module 6 |
|      | GTM_TIM5_IN2_3 |       |                                 | Mux input channel 2 of TIM module 5 |
|      | GTM_TIM3_IN2_8 |       |                                 | Mux input channel 2 of TIM module 3 |
|      | CAN22_RXDD     |       |                                 | CAN receive input node 2            |
|      | P14.14         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT259    | O1    |                                 | GTM muxed output                    |
|      | ASCLIN5_ATX    | O2    |                                 | Transmit output                     |
|      | ASCLIN7_ATX    | O3    |                                 | Transmit output                     |
|      | MSC2_EN0       | O4    |                                 | Chip Select                         |
|      | CAN23_TXD      | O5    |                                 | CAN transmit output node 3          |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
| A18  | P14.15         | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN7_3 |       |                                 | Mux input channel 7 of TIM module 6 |
|      | GTM_TIM5_IN6_5 |       |                                 | Mux input channel 6 of TIM module 5 |
|      | GTM_TIM3_IN6_9 |       |                                 | Mux input channel 6 of TIM module 3 |
|      | MSC2_INJ1      |       |                                 | Injection signal from port          |
|      | ASCLIN5_ARXD   |       |                                 | Receive input                       |
|      | ASCLIN7_ARXA   |       |                                 | Receive input                       |
|      | CAN23_RXDC     |       |                                 | CAN receive input node 3            |
|      | P14.15         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT263    | O1    |                                 | GTM muxed output                    |
|      | ASCLIN1_ATX    | O2    |                                 | Transmit output                     |
|      | IOM_MON2_13    |       |                                 | Monitor input 2                     |
|      | IOM_REF2_13    |       |                                 | Reference input 2                   |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |

表 2-9 端口 P15 功能

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                                                    |
|------|----------------|-------|---------------------------------|-------------------------------------------------------------|
| G25  | P15.0          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM3_IN3_4 |       |                                 | Mux input channel 3 of TIM module 3                         |
|      | GTM_TIM2_IN3_4 |       |                                 | Mux input channel 3 of TIM module 2                         |
|      | P15.0          | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT71     | O1    |                                 | GTM muxed output                                            |
|      | ASCLIN1_ATX    | O2    |                                 | Transmit output                                             |
|      | IOM_MON2_13    |       |                                 | Monitor input 2                                             |
|      | IOM_REF2_13    |       |                                 | Reference input 2                                           |
|      | QSPI0_SLSO13   | O3    |                                 | Master slave select output                                  |
|      | —              | O4    |                                 | Reserved                                                    |
|      | CAN02_TXD      | O5    |                                 | CAN transmit output node 2                                  |
|      | IOM_MON2_7     |       |                                 | Monitor input 2                                             |
|      | IOM_REF2_7     |       |                                 | Reference input 2                                           |
|      | ASCLIN1_ASCLK  | O6    |                                 | Shift clock output                                          |
|      | —              | O7    |                                 | Reserved                                                    |
| F23  | P15.1          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM3_IN4_4 |       |                                 | Mux input channel 4 of TIM module 3                         |
|      | GTM_TIM2_IN4_4 |       |                                 | Mux input channel 4 of TIM module 2                         |
|      | CAN02_RXDA     |       |                                 | CAN receive input node 2                                    |
|      | ASCLIN1_ARXA   |       |                                 | Receive input                                               |
|      | QSPI2_SLSIB    |       |                                 | Slave select input                                          |
|      | SCU_E_REQ7_2   |       |                                 | ERU Channel 7 inputs 0 to 5 (0 is the LSB and 5 is the MSB) |
|      | P15.1          | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT72     | O1    |                                 | GTM muxed output                                            |
|      | ASCLIN1_ATX    | O2    |                                 | Transmit output                                             |
|      | IOM_MON2_13    |       |                                 | Monitor input 2                                             |
|      | IOM_REF2_13    |       |                                 | Reference input 2                                           |
|      | QSPI2_SLSO5    | O3    |                                 | Master slave select output                                  |
|      | —              | O4    |                                 | Reserved                                                    |
|      | —              | O5    |                                 | Reserved                                                    |
|      | —              | O6    |                                 | Reserved                                                    |
|      | —              | O7    |                                 | Reserved                                                    |

表 2-9 端口 P15 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| H24  | P15.2          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM3_IN5_4 |       |                                 | Mux input channel 5 of TIM module 3 |
|      | GTM_TIM2_IN5_4 |       |                                 | Mux input channel 5 of TIM module 2 |
|      | QSPI2_SLSIA    |       |                                 | Slave select input                  |
|      | SENT_SENT10D   |       |                                 | Receive input channel 10            |
|      | QSPI2_MRSTE    |       |                                 | Master SPI data input               |
|      | P15.2          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT73     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN0_ATX    | O2    |                                 | Transmit output                     |
|      | IOM_MON2_12    |       |                                 | Monitor input 2                     |
|      | IOM_REF2_12    |       |                                 | Reference input 2                   |
|      | QSPI2_SLSO0    | O3    |                                 | Master slave select output          |
|      | —              | O4    |                                 | Reserved                            |
|      | CAN01_TXD      | O5    |                                 | CAN transmit output node 1          |
|      | IOM_MON2_6     |       |                                 | Monitor input 2                     |
|      | IOM_REF2_6     |       |                                 | Reference input 2                   |
|      | ASCLIN0_ASCLK  | O6    |                                 | Shift clock output                  |
|      | —              | O7    |                                 | Reserved                            |
| G22  | P15.3          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM3_IN6_4 |       |                                 | Mux input channel 6 of TIM module 3 |
|      | GTM_TIM2_IN6_4 |       |                                 | Mux input channel 6 of TIM module 2 |
|      | CAN01_RXDA     |       |                                 | CAN receive input node 1            |
|      | ASCLIN0_ARXB   |       |                                 | Receive input                       |
|      | QSPI2_SCLKA    |       |                                 | Slave SPI clock inputs              |
|      | P15.3          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT74     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN0_ATX    | O2    |                                 | Transmit output                     |
|      | IOM_MON2_12    |       |                                 | Monitor input 2                     |
|      | IOM_REF2_12    |       |                                 | Reference input 2                   |
|      | QSPI2_SCLK     | O3    |                                 | Master SPI clock output             |
|      | —              | O4    |                                 | Reserved                            |
|      | MSC0_EN1       | O5    |                                 | Chip Select                         |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |

表 2-9 端口 P15 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                                                    |
|------|----------------|-------|---------------------------------|-------------------------------------------------------------|
| F22  | P15.4          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM3_IN7_4 |       |                                 | Mux input channel 7 of TIM module 3                         |
|      | GTM_TIM2_IN7_4 |       |                                 | Mux input channel 7 of TIM module 2                         |
|      | I2C0_SCLC      |       |                                 | Serial Clock Input 2                                        |
|      | QSPI2_MRSTA    |       |                                 | Master SPI data input                                       |
|      | SCU_E_REQ0_0   |       |                                 | ERU Channel 0 inputs 0 to 5 (0 is the LSB and 5 is the MSB) |
|      | SENT_SENT11D   |       |                                 | Receive input channel 11                                    |
|      | P15.4          | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT75     | O1    |                                 | GTM muxed output                                            |
|      | ASCLIN1_ATX    | O2    |                                 | Transmit output                                             |
|      | IOM_MON2_13    |       |                                 | Monitor input 2                                             |
|      | IOM_REF2_13    |       |                                 | Reference input 2                                           |
|      | QSPI2_MRST     | O3    |                                 | Slave SPI data output                                       |
|      | IOM_MON2_2     |       |                                 | Monitor input 2                                             |
|      | IOM_REF2_2     |       |                                 | Reference input 2                                           |
|      | ASCLIN19_ATX   | O4    |                                 | Transmit output                                             |
|      | —              | O5    |                                 | Reserved                                                    |
|      | I2C0_SCL       | O6    |                                 | Serial Clock Output                                         |
|      | CCU60_CC62     | O7    |                                 | T12 PWM channel 62                                          |
|      | IOM_MON1_0     |       |                                 | Monitor input 1                                             |
|      | IOM_REF1_4     |       |                                 | Reference input 1                                           |

## 引脚定义和功能 BGA516 封装变体 引脚配置

表 2-9 端口 P15 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                                                    |
|------|-----------------|-------|---------------------------------|-------------------------------------------------------------|
| K19  | P15.5           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM3_IN0_4  |       |                                 | Mux input channel 0 of TIM module 3                         |
|      | GTM_TIM2_IN0_4  |       |                                 | Mux input channel 0 of TIM module 2                         |
|      | ASCLIN1_ARXB    |       |                                 | Receive input                                               |
|      | I2C0_SDAC       |       |                                 | Serial Data Input 2                                         |
|      | QSPI2_MTSRA     |       |                                 | Slave SPI data input                                        |
|      | SCU_E_REQ4_3    |       |                                 | ERU Channel 4 inputs 0 to 5 (0 is the LSB and 5 is the MSB) |
|      | P15.5           | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT76      | O1    |                                 | GTM muxed output                                            |
|      | ASCLIN1_ATX     | O2    |                                 | Transmit output                                             |
|      | IOM_MON2_13     |       |                                 | Monitor input 2                                             |
|      | IOM_REF2_13     |       |                                 | Reference input 2                                           |
|      | QSPI2_MTSR      | O3    |                                 | Master SPI data output                                      |
|      | —               | O4    |                                 | Reserved                                                    |
|      | MSC0_EN0        | O5    |                                 | Chip Select                                                 |
|      | I2C0_SDA        | O6    |                                 | Serial Data Output                                          |
|      | CCU60_CC61      | O7    |                                 | T12 PWM channel 61                                          |
|      | IOM_MON1_1      |       |                                 | Monitor input 1                                             |
|      | IOM_REF1_5      |       |                                 | Reference input 1                                           |
| F21  | P15.6           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM2_IN2_14 |       |                                 | Mux input channel 2 of TIM module 2                         |
|      | GTM_TIM1_IN0_6  |       |                                 | Mux input channel 0 of TIM module 1                         |
|      | GTM_TIM0_IN0_6  |       |                                 | Mux input channel 0 of TIM module 0                         |
|      | QSPI2_MTSRB     |       |                                 | Slave SPI data input                                        |
|      | ASCLIN19_ARXA   |       |                                 | Receive input                                               |
|      | P15.6           | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT77      | O1    |                                 | GTM muxed output                                            |
|      | ASCLIN3_ATX     | O2    |                                 | Transmit output                                             |
|      | IOM_MON2_15     |       |                                 | Monitor input 2                                             |
|      | IOM_REF2_15     |       |                                 | Reference input 2                                           |
|      | QSPI2_MTSR      | O3    |                                 | Master SPI data output                                      |
|      | —               | O4    |                                 | Reserved                                                    |
|      | QSPI2_SCLK      | O5    |                                 | Master SPI clock output                                     |
|      | ASCLIN3_ASCLK   | O6    |                                 | Shift clock output                                          |
|      | CCU60_CC60      | O7    |                                 | T12 PWM channel 60                                          |
|      | IOM_MON1_2      |       |                                 | Monitor input 1                                             |
|      | IOM_REF1_6      |       |                                 | Reference input 1                                           |

表 2-9 端口 P15 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                                                    |
|------|----------------|-------|---------------------------------|-------------------------------------------------------------|
| J20  | P15.7          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM1_IN1_5 |       |                                 | Mux input channel 1 of TIM module 1                         |
|      | GTM_TIM0_IN1_5 |       |                                 | Mux input channel 1 of TIM module 0                         |
|      | ASCLIN3_ARXA   |       |                                 | Receive input                                               |
|      | QSPI2_MRSTB    |       |                                 | Master SPI data input                                       |
|      | ASCLIN19_ARXB  |       |                                 | Receive input                                               |
|      | P15.7          | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT78     | O1    |                                 | GTM muxed output                                            |
|      | ASCLIN3_ATX    | O2    |                                 | Transmit output                                             |
|      | IOM_MON2_15    |       |                                 | Monitor input 2                                             |
|      | IOM_REF2_15    |       |                                 | Reference input 2                                           |
|      | QSPI2_MRST     | O3    |                                 | Slave SPI data output                                       |
|      | IOM_MON2_2     |       |                                 | Monitor input 2                                             |
|      | IOM_REF2_2     |       |                                 | Reference input 2                                           |
|      | ASCLIN19_ATX   | O4    |                                 | Transmit output                                             |
|      | —              | O5    |                                 | Reserved                                                    |
|      | —              | O6    |                                 | Reserved                                                    |
|      | CCU60_COUT60   | O7    |                                 | T12 PWM channel 60                                          |
|      | IOM_MON1_3     |       |                                 | Monitor input 1                                             |
|      | IOM_REF1_3     |       |                                 | Reference input 1                                           |
| J19  | P15.8          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM1_IN2_5 |       |                                 | Mux input channel 2 of TIM module 1                         |
|      | GTM_TIM0_IN2_5 |       |                                 | Mux input channel 2 of TIM module 0                         |
|      | QSPI2_SCLKB    |       |                                 | Slave SPI clock inputs                                      |
|      | SCU_E_REQ5_0   |       |                                 | ERU Channel 5 inputs 0 to 5 (0 is the LSB and 5 is the MSB) |
|      | P15.8          | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT79     | O1    |                                 | GTM muxed output                                            |
|      | —              | O2    |                                 | Reserved                                                    |
|      | QSPI2_SCLK     | O3    |                                 | Master SPI clock output                                     |
|      | —              | O4    |                                 | Reserved                                                    |
|      | —              | O5    |                                 | Reserved                                                    |
|      | ASCLIN3_ASCLK  | O6    |                                 | Shift clock output                                          |
|      | CCU60_COUT61   | O7    |                                 | T12 PWM channel 61                                          |
|      | IOM_MON1_4     |       |                                 | Monitor input 1                                             |
|      | IOM_REF1_2     |       |                                 | Reference input 1                                           |

表 2-9 端口 P15 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                      | Function                            |
|------|----------------|-------|----------------------------------|-------------------------------------|
| B24  | P15.10         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES6 | General-purpose input               |
|      | GTM_TIM4_IN1_7 |       |                                  | Mux input channel 1 of TIM module 4 |
|      | GTM_TIM2_IN1_8 |       |                                  | Mux input channel 1 of TIM module 2 |
|      | P15.10         | O0    |                                  | General-purpose output              |
|      | GTM_TOUT242    | O1    |                                  | GTM muxed output                    |
|      | —              | O2    |                                  | Reserved                            |
|      | —              | O3    |                                  | Reserved                            |
|      | —              | O4    |                                  | Reserved                            |
|      | —              | O5    |                                  | Reserved                            |
|      | —              | O6    |                                  | Reserved                            |
|      | —              | O7    |                                  | Reserved                            |
| A24  | P15.11         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES6 | General-purpose input               |
|      | GTM_TIM4_IN2_6 |       |                                  | Mux input channel 2 of TIM module 4 |
|      | GTM_TIM2_IN2_8 |       |                                  | Mux input channel 2 of TIM module 2 |
|      | P15.11         | O0    |                                  | General-purpose output              |
|      | GTM_TOUT243    | O1    |                                  | GTM muxed output                    |
|      | —              | O2    |                                  | Reserved                            |
|      | —              | O3    |                                  | Reserved                            |
|      | —              | O4    |                                  | Reserved                            |
|      | —              | O5    |                                  | Reserved                            |
|      | —              | O6    |                                  | Reserved                            |
|      | —              | O7    |                                  | Reserved                            |
| B23  | P15.12         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES6 | General-purpose input               |
|      | GTM_TIM4_IN3_6 |       |                                  | Mux input channel 3 of TIM module 4 |
|      | GTM_TIM2_IN3_6 |       |                                  | Mux input channel 3 of TIM module 2 |
|      | P15.12         | O0    |                                  | General-purpose output              |
|      | GTM_TOUT244    | O1    |                                  | GTM muxed output                    |
|      | —              | O2    |                                  | Reserved                            |
|      | —              | O3    |                                  | Reserved                            |
|      | —              | O4    |                                  | Reserved                            |
|      | —              | O5    |                                  | Reserved                            |
|      | —              | O6    |                                  | Reserved                            |
|      | —              | O7    |                                  | Reserved                            |

表 2-9 端口 P15 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                      | Function                            |
|------|-----------------|-------|----------------------------------|-------------------------------------|
| A23  | P15.13          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES6 | General-purpose input               |
|      | GTM_TIM4_IN4_6  |       |                                  | Mux input channel 4 of TIM module 4 |
|      | GTM_TIM2_IN4_9  |       |                                  | Mux input channel 4 of TIM module 2 |
|      | P15.13          | O0    |                                  | General-purpose output              |
|      | GTM_TOUT245     | O1    |                                  | GTM muxed output                    |
|      | —               | O2    |                                  | Reserved                            |
|      | —               | O3    |                                  | Reserved                            |
|      | —               | O4    |                                  | Reserved                            |
|      | —               | O5    |                                  | Reserved                            |
|      | —               | O6    |                                  | Reserved                            |
|      | —               | O7    |                                  | Reserved                            |
| B22  | P15.14          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES  | General-purpose input               |
|      | GTM_TIM4_IN5_6  |       |                                  | Mux input channel 5 of TIM module 4 |
|      | GTM_TIM2_IN5_12 |       |                                  | Mux input channel 5 of TIM module 2 |
|      | P15.14          | O0    |                                  | General-purpose output              |
|      | GTM_TOUT246     | O1    |                                  | GTM muxed output                    |
|      | —               | O2    |                                  | Reserved                            |
|      | —               | O3    |                                  | Reserved                            |
|      | —               | O4    |                                  | Reserved                            |
|      | —               | O5    |                                  | Reserved                            |
|      | —               | O6    |                                  | Reserved                            |
|      | —               | O7    |                                  | Reserved                            |
| A22  | P15.15          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES  | General-purpose input               |
|      | GTM_TIM4_IN6_6  |       |                                  | Mux input channel 6 of TIM module 4 |
|      | GTM_TIM2_IN6_9  |       |                                  | Mux input channel 6 of TIM module 2 |
|      | P15.15          | O0    |                                  | General-purpose output              |
|      | GTM_TOUT247     | O1    |                                  | GTM muxed output                    |
|      | —               | O2    |                                  | Reserved                            |
|      | —               | O3    |                                  | Reserved                            |
|      | —               | O4    |                                  | Reserved                            |
|      | —               | O5    |                                  | Reserved                            |
|      | —               | O6    |                                  | Reserved                            |
|      | —               | O7    |                                  | Reserved                            |

表 2-10 端口 P20 功能

| Ball     | Symbol           | Ctrl.          | Buffer Type                     | Function                                                    |
|----------|------------------|----------------|---------------------------------|-------------------------------------------------------------|
| N25      | P20.0            | I              | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|          | GTM_TIM1_IN6_7   |                |                                 | Mux input channel 6 of TIM module 1                         |
|          | GTM_TIM1_IN4_9   |                |                                 | Mux input channel 4 of TIM module 1                         |
|          | GTM_TIM0_IN6_7   |                |                                 | Mux input channel 6 of TIM module 0                         |
|          | CAN03_RXDC       |                |                                 | CAN receive input node 3                                    |
|          | CCU_PAD_SYSCLK   |                |                                 | Sysclk input                                                |
|          | CAN21_RXDC       |                |                                 | CAN receive input node 1                                    |
|          | CBS_TGI0         |                |                                 | Trigger input                                               |
|          | SCU_E_REQ6_0     |                |                                 | ERU Channel 6 inputs 0 to 5 (0 is the LSB and 5 is the MSB) |
|          | GPT120_T6EUDA    |                |                                 | Count direction control input of core timer T6              |
|          | P20.0            | O0             |                                 | General-purpose output                                      |
|          | GTM_TOUT59       | O1             |                                 | GTM muxed output                                            |
|          | ASCLIN3_ATX      | O2             |                                 | Transmit output                                             |
|          | IOM_MON2_15      |                |                                 | Monitor input 2                                             |
|          | IOM_REF2_15      |                |                                 | Reference input 2                                           |
|          | ASCLIN3_ASCLK    | O3             |                                 | Shift clock output                                          |
|          | —                | O4             |                                 | Reserved                                                    |
|          | HSCT0_SYSCLK_OUT | O5             |                                 | sys clock output                                            |
|          | —                | O6             |                                 | Reserved                                                    |
|          | —                | O7             |                                 | Reserved                                                    |
| CBS_TGO0 | O                | Trigger output |                                 |                                                             |
| M24      | P20.1            | I              | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|          | GTM_TIM4_IN4_11  |                |                                 | Mux input channel 4 of TIM module 4                         |
|          | GTM_TIM3_IN3_5   |                |                                 | Mux input channel 3 of TIM module 3                         |
|          | GTM_TIM2_IN3_5   |                |                                 | Mux input channel 3 of TIM module 2                         |
|          | CBS_TGI1         |                |                                 | Trigger input                                               |
|          | GTM_DTMA1_1      |                |                                 | CDTM1_DTM4                                                  |
|          | P20.1            | O0             |                                 | General-purpose output                                      |
|          | GTM_TOUT60       | O1             |                                 | GTM muxed output                                            |
|          | —                | O2             |                                 | Reserved                                                    |
|          | —                | O3             |                                 | Reserved                                                    |
|          | —                | O4             |                                 | Reserved                                                    |
|          | —                | O5             |                                 | Reserved                                                    |
|          | —                | O6             |                                 | Reserved                                                    |
|          | —                | O7             |                                 | Reserved                                                    |
|          | CBS_TGO1         | O              |                                 | Trigger output                                              |

表 2-10 端口 P20 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type            | Function                                                                                          |
|------|-----------------|-------|------------------------|---------------------------------------------------------------------------------------------------|
| N24  | P20.2           | I     | S / PU / VEXT          | <b>General-purpose input</b><br>This pin is latched at power on reset release to enter test mode. |
|      | TESTMODE        |       |                        | <b>Testmode Enable Input</b>                                                                      |
| M25  | P20.3           | I     | SLOW / PU1 / VEXT / ES | <b>General-purpose input</b>                                                                      |
|      | GTM_TIM4_IN5_11 |       |                        | <b>Mux input channel 5 of TIM module 4</b>                                                        |
|      | GTM_TIM3_IN4_5  |       |                        | <b>Mux input channel 4 of TIM module 3</b>                                                        |
|      | GTM_TIM2_IN4_5  |       |                        | <b>Mux input channel 4 of TIM module 2</b>                                                        |
|      | ASCLIN3_ARXC    |       |                        | <b>Receive input</b>                                                                              |
|      | GPT120_T6INA    |       |                        | <b>Trigger/gate input of core timer T6</b>                                                        |
|      | P20.3           | O0    |                        | <b>General-purpose output</b>                                                                     |
|      | GTM_TOUT61      | O1    |                        | <b>GTM muxed output</b>                                                                           |
|      | ASCLIN3_ATX     | O2    |                        | <b>Transmit output</b>                                                                            |
|      | IOM_MON2_15     |       |                        | <b>Monitor input 2</b>                                                                            |
|      | IOM_REF2_15     |       |                        | <b>Reference input 2</b>                                                                          |
|      | QSPI0_SLSO9     | O3    |                        | <b>Master slave select output</b>                                                                 |
|      | QSPI2_SLSO9     | O4    |                        | <b>Master slave select output</b>                                                                 |
|      | CAN03_TXD       | O5    |                        | <b>CAN transmit output node 3</b>                                                                 |
|      | IOM_MON2_8      |       |                        | <b>Monitor input 2</b>                                                                            |
|      | IOM_REF2_8      |       |                        | <b>Reference input 2</b>                                                                          |
|      | CAN21_TXD       | O6    |                        | <b>CAN transmit output node 1</b>                                                                 |
|      | —               | O7    |                        | <b>Reserved</b>                                                                                   |
| L22  | P20.6           | I     | SLOW / PU1 / VEXT / ES | <b>General-purpose input</b>                                                                      |
|      | GTM_TIM6_IN0_1  |       |                        | <b>Mux input channel 0 of TIM module 6</b>                                                        |
|      | GTM_TIM3_IN6_5  |       |                        | <b>Mux input channel 6 of TIM module 3</b>                                                        |
|      | GTM_TIM2_IN6_5  |       |                        | <b>Mux input channel 6 of TIM module 2</b>                                                        |
|      | CAN12_RXDA      |       |                        | <b>CAN receive input node 2</b>                                                                   |
|      | ASCLIN9_ARXE    |       |                        | <b>Receive input</b>                                                                              |
|      | P20.6           | O0    |                        | <b>General-purpose output</b>                                                                     |
|      | GTM_TOUT62      | O1    |                        | <b>GTM muxed output</b>                                                                           |
|      | ASCLIN1_ARTS    | O2    |                        | <b>Ready to send output</b>                                                                       |
|      | QSPI0_SLSO8     | O3    |                        | <b>Master slave select output</b>                                                                 |
|      | QSPI2_SLSO8     | O4    |                        | <b>Master slave select output</b>                                                                 |
|      | —               | O5    |                        | <b>Reserved</b>                                                                                   |
|      | —               | O6    |                        | <b>Reserved</b>                                                                                   |
|      | —               | O7    |                        | <b>Reserved</b>                                                                                   |

表 2-10 端口 P20 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| L24  | P20.7          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM3_IN7_5 |       |                                 | Mux input channel 7 of TIM module 3 |
|      | GTM_TIM2_IN7_5 |       |                                 | Mux input channel 7 of TIM module 2 |
|      | GTM_TIM1_IN5_8 |       |                                 | Mux input channel 5 of TIM module 1 |
|      | GTM_TIM6_IN1_1 |       |                                 | Mux input channel 1 of TIM module 6 |
|      | CAN00_RXDB     |       |                                 | CAN receive input node 0            |
|      | ASCLIN1_ACTSA  |       |                                 | Clear to send input                 |
|      | ASCLIN9_ARXF   |       |                                 | Receive input                       |
|      | P20.7          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT63     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN9_ATX    | O2    |                                 | Transmit output                     |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | CAN12_TXD      | O5    |                                 | CAN transmit output node 2          |
|      | —              | O6    |                                 | Reserved                            |
|      | CCU61_COUT63   | O7    |                                 | T13 PWM channel 63                  |
|      | IOM_MON1_7     |       |                                 | Monitor input 1                     |
|      | IOM_REF1_7     |       |                                 | Reference input 1                   |
| L25  | P20.8          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN2_1 |       |                                 | Mux input channel 2 of TIM module 6 |
|      | GTM_TIM1_IN7_3 |       |                                 | Mux input channel 7 of TIM module 1 |
|      | GTM_TIM0_IN7_3 |       |                                 | Mux input channel 7 of TIM module 0 |
|      | P20.8          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT64     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN1_ASLSO  | O2    |                                 | Slave select signal output          |
|      | QSPI0_SLSO0    | O3    |                                 | Master slave select output          |
|      | QSPI1_SLSO0    | O4    |                                 | Master slave select output          |
|      | CAN00_TXD      | O5    |                                 | CAN transmit output node 0          |
|      | IOM_MON2_5     |       |                                 | Monitor input 2                     |
|      | IOM_REF2_5     |       |                                 | Reference input 2                   |
|      | —              | O6    |                                 | Reserved                            |
|      | CCU61_CC60     | O7    |                                 | T12 PWM channel 60                  |
|      | IOM_MON1_8     |       |                                 | Monitor input 1                     |
|      | IOM_REF1_13    |       |                                 | Reference input 1                   |

表 2-10 端口 P20 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                                                    |
|------|----------------|-------|---------------------------------|-------------------------------------------------------------|
| K22  | P20.9          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM6_IN3_1 |       |                                 | Mux input channel 3 of TIM module 6                         |
|      | GTM_TIM3_IN5_5 |       |                                 | Mux input channel 5 of TIM module 3                         |
|      | GTM_TIM2_IN5_5 |       |                                 | Mux input channel 5 of TIM module 2                         |
|      | CAN03_RXDE     |       |                                 | CAN receive input node 3                                    |
|      | ASCLIN1_ARXC   |       |                                 | Receive input                                               |
|      | QSPI0_SLSIB    |       |                                 | Slave select input                                          |
|      | SCU_E_REQ7_0   |       |                                 | ERU Channel 7 inputs 0 to 5 (0 is the LSB and 5 is the MSB) |
|      | P20.9          | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT65     | O1    |                                 | GTM muxed output                                            |
|      | —              | O2    |                                 | Reserved                                                    |
|      | QSPI0_SLSO1    | O3    |                                 | Master slave select output                                  |
|      | QSPI1_SLSO1    | O4    |                                 | Master slave select output                                  |
|      | —              | O5    |                                 | Reserved                                                    |
|      | —              | O6    |                                 | Reserved                                                    |
|      | CCU61_CC61     | O7    |                                 | T12 PWM channel 61                                          |
|      | IOM_MON1_9     |       |                                 | Monitor input 1                                             |
|      | IOM_REF1_12    |       |                                 | Reference input 1                                           |
| K24  | P20.10         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM3_IN6_6 |       |                                 | Mux input channel 6 of TIM module 3                         |
|      | GTM_TIM2_IN6_6 |       |                                 | Mux input channel 6 of TIM module 2                         |
|      | P20.10         | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT66     | O1    |                                 | GTM muxed output                                            |
|      | ASCLIN1_ATX    | O2    |                                 | Transmit output                                             |
|      | IOM_MON2_13    |       |                                 | Monitor input 2                                             |
|      | IOM_REF2_13    |       |                                 | Reference input 2                                           |
|      | QSPI0_SLSO6    | O3    |                                 | Master slave select output                                  |
|      | QSPI2_SLSO7    | O4    |                                 | Master slave select output                                  |
|      | CAN03_TXD      | O5    |                                 | CAN transmit output node 3                                  |
|      | IOM_MON2_8     |       |                                 | Monitor input 2                                             |
|      | IOM_REF2_8     |       |                                 | Reference input 2                                           |
|      | ASCLIN1_ASCLK  | O6    |                                 | Shift clock output                                          |
|      | CCU61_CC62     | O7    |                                 | T12 PWM channel 62                                          |
|      | IOM_MON1_10    |       |                                 | Monitor input 1                                             |
|      | IOM_REF1_11    |       |                                 | Reference input 1                                           |

表 2-10 端口 P20 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| K25  | P20.11         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM3_IN7_6 |       |                                 | Mux input channel 7 of TIM module 3 |
|      | GTM_TIM2_IN7_6 |       |                                 | Mux input channel 7 of TIM module 2 |
|      | QSPI0_SCLKA    |       |                                 | Slave SPI clock inputs              |
|      | P20.11         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT67     | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | QSPI0_SCLK     | O3    |                                 | Master SPI clock output             |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | CCU61_COUT60   | O7    |                                 | T12 PWM channel 60                  |
|      | IOM_MON1_11    |       |                                 | Monitor input 1                     |
|      | IOM_REF1_10    |       |                                 | Reference input 1                   |
| J24  | P20.12         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM3_IN0_5 |       |                                 | Mux input channel 0 of TIM module 3 |
|      | GTM_TIM2_IN0_5 |       |                                 | Mux input channel 0 of TIM module 2 |
|      | QSPI0_MRSTA    |       |                                 | Master SPI data input               |
|      | IOM_PIN_13     |       |                                 | GPIO pad input to FPC               |
|      | P20.12         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT68     | O1    |                                 | GTM muxed output                    |
|      | IOM_MON0_13    |       |                                 | Monitor input 0                     |
|      | —              | O2    |                                 | Reserved                            |
|      | QSPI0_MRST     | O3    |                                 | Slave SPI data output               |
|      | IOM_MON2_0     |       |                                 | Monitor input 2                     |
|      | IOM_REF2_0     |       |                                 | Reference input 2                   |
|      | QSPI0_MTSR     | O4    |                                 | Master SPI data output              |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | CCU61_COUT61   | O7    |                                 | T12 PWM channel 61                  |
|      | IOM_MON1_12    |       |                                 | Monitor input 1                     |
|      | IOM_REF1_9     |       |                                 | Reference input 1                   |

表 2-10 端口 P20 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| J25  | P20.13         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM3_IN1_4 |       |                                 | Mux input channel 1 of TIM module 3 |
|      | GTM_TIM2_IN1_4 |       |                                 | Mux input channel 1 of TIM module 2 |
|      | QSPI0_SLSIA    |       |                                 | Slave select input                  |
|      | IOM_PIN_14     |       |                                 | GPIO pad input to FPC               |
|      | P20.13         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT69     | O1    |                                 | GTM muxed output                    |
|      | IOM_MON0_14    |       |                                 | Monitor input 0                     |
|      | —              | O2    |                                 | Reserved                            |
|      | QSPI0_SLSO2    | O3    |                                 | Master slave select output          |
|      | QSPI1_SLSO2    | O4    |                                 | Master slave select output          |
|      | QSPI0_SCLK     | O5    |                                 | Master SPI clock output             |
|      | —              | O6    |                                 | Reserved                            |
|      | CCU61_COUT62   | O7    |                                 | T12 PWM channel 62                  |
|      | IOM_MON1_13    |       |                                 | Monitor input 1                     |
|      | IOM_REF1_8     |       |                                 | Reference input 1                   |
| H25  | P20.14         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM3_IN2_4 |       |                                 | Mux input channel 2 of TIM module 3 |
|      | GTM_TIM2_IN2_4 |       |                                 | Mux input channel 2 of TIM module 2 |
|      | QSPI0_MTSRA    |       |                                 | Slave SPI data input                |
|      | IOM_PIN_15     |       |                                 | GPIO pad input to FPC               |
|      | P20.14         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT70     | O1    |                                 | GTM muxed output                    |
|      | IOM_MON0_15    |       |                                 | Monitor input 0                     |
|      | —              | O2    |                                 | Reserved                            |
|      | QSPI0_MTSR     | O3    |                                 | Master SPI data output              |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |

表 2-11 端口 P21 的功能

| Ball | Symbol          | Ctrl. | Buffer Type                               | Function                            |
|------|-----------------|-------|-------------------------------------------|-------------------------------------|
| R22  | P21.0           | I     | LVDS_RX<br>/ FAST /<br>PU1 /<br>VEXT / ES | General-purpose input               |
|      | GTM_TIM4_IN0_11 |       |                                           | Mux input channel 0 of TIM module 4 |
|      | GTM_TIM3_IN4_6  |       |                                           | Mux input channel 4 of TIM module 3 |
|      | GTM_TIM2_IN4_6  |       |                                           | Mux input channel 4 of TIM module 2 |
|      | QSPI4_MRSTDN    |       |                                           | Master SPI data input (LVDS N line) |
|      | DMU_FDEST       |       |                                           | Enter destructive debug mode        |
|      | ASCLIN11_ARXC   |       |                                           | Receive input                       |
|      | ASCLIN17_ARXB   |       |                                           | Receive input                       |
|      | P21.0           | O0    |                                           | General-purpose output              |
|      | GTM_TOUT51      | O1    |                                           | GTM muxed output                    |
|      | ASCLIN11_ATX    | O2    |                                           | Transmit output                     |
|      | —               | O3    |                                           | Reserved                            |
|      | —               | O4    |                                           | Reserved                            |
|      | —               | O5    |                                           | Reserved                            |
|      | —               | O6    |                                           | Reserved                            |
|      | —               | O7    |                                           | Reserved                            |
|      | HSM_HSM1        | O     |                                           | Pin Output Value                    |
| P22  | P21.1           | I     | LVDS_RX<br>/ FAST /<br>PU1 /<br>VEXT / ES | General-purpose input               |
|      | GTM_TIM4_IN1_13 |       |                                           | Mux input channel 1 of TIM module 4 |
|      | GTM_TIM3_IN5_6  |       |                                           | Mux input channel 5 of TIM module 3 |
|      | GTM_TIM2_IN5_6  |       |                                           | Mux input channel 5 of TIM module 2 |
|      | QSPI4_MRSTDP    |       |                                           | Master SPI data input (LVDS P line) |
|      | ASCLIN11_ARXD   |       |                                           | Receive input                       |
|      | ASCLIN18_ARXA   |       |                                           | Receive input                       |
|      | GTM_DTMA4_1     |       |                                           | CDTM4_DTM4                          |
|      | P21.1           | O0    |                                           | General-purpose output              |
|      | GTM_TOUT52      | O1    |                                           | GTM muxed output                    |
|      | —               | O2    |                                           | Reserved                            |
|      | —               | O3    |                                           | Reserved                            |
|      | —               | O4    |                                           | Reserved                            |
|      | —               | O5    |                                           | Reserved                            |
|      | —               | O6    |                                           | Reserved                            |
|      | —               | O7    |                                           | Reserved                            |
|      | HSM_HSM2        | O     |                                           | Pin Output Value                    |

## 引脚定义和功能 BGA516 封装变体 引脚配置

表 2-11 端口 P21 的功能 (续)

| Ball | Symbol              | Ctrl. | Buffer Type                      | Function                                 |
|------|---------------------|-------|----------------------------------|------------------------------------------|
| R24  | P21.2               | I     | LVDS_RX / FAST / PU1 / VEXT / ES | General-purpose input                    |
|      | GTM_TIM5_IN4_11     |       |                                  | Mux input channel 4 of TIM module 5      |
|      | GTM_TIM1_IN0_7      |       |                                  | Mux input channel 0 of TIM module 1      |
|      | GTM_TIM0_IN0_7      |       |                                  | Mux input channel 0 of TIM module 0      |
|      | QSPI2_MRSTCN        |       |                                  | Master SPI data input (LVDS N line)      |
|      | SCU_EMGSTOP_POR T_B |       |                                  | Emergency stop Port Pin B input request  |
|      | ASCLIN3_ARXGN       |       |                                  | Differential Receive input (low active)  |
|      | HSCT0_RXDN          |       |                                  | Rx data                                  |
|      | QSPI4_MRSTCN        |       |                                  | Master SPI data input (LVDS N line)      |
|      | ASCLIN11_ARXE       |       |                                  | Receive input                            |
|      | GTM_DTMA1_0         |       |                                  | CDTM1_DTM4                               |
|      | P21.2               | O0    |                                  | General-purpose output                   |
|      | GTM_TOUT53          | O1    |                                  | GTM muxed output                         |
|      | ASCLIN3_ASLSO       | O2    |                                  | Slave select signal output               |
|      | —                   | O3    |                                  | Reserved                                 |
|      | —                   | O4    |                                  | Reserved                                 |
|      | GETH_MDC            | O5    |                                  | MDIO clock                               |
|      | —                   | O6    |                                  | Reserved                                 |
|      | —                   | O7    |                                  | Reserved                                 |
| P24  | P21.3               | I     | LVDS_RX / FAST / PU1 / VEXT / ES | General-purpose input                    |
|      | GTM_TIM5_IN5_12     |       |                                  | Mux input channel 5 of TIM module 5      |
|      | GTM_TIM1_IN1_6      |       |                                  | Mux input channel 1 of TIM module 1      |
|      | GTM_TIM0_IN1_6      |       |                                  | Mux input channel 1 of TIM module 0      |
|      | QSPI2_MRSTCP        |       |                                  | Master SPI data input (LVDS P line)      |
|      | ASCLIN3_ARXGP       |       |                                  | Differential Receive input (high active) |
|      | GETH_MDIOD          |       |                                  | MDIO Input                               |
|      | HSCT0_RXDP          |       |                                  | Rx data                                  |
|      | QSPI4_MRSTCP        |       |                                  | Master SPI data input (LVDS P line)      |
|      | P21.3               | O0    |                                  | General-purpose output                   |
|      | GTM_TOUT54          | O1    |                                  | GTM muxed output                         |
|      | ASCLIN11_ASCLK      | O2    |                                  | Shift clock output                       |
|      | ASCLIN18_ATX        | O3    |                                  | Transmit output                          |
|      | —                   | O4    |                                  | Reserved                                 |
|      | —                   | O5    |                                  | Reserved                                 |
|      | —                   | O6    |                                  | Reserved                                 |
|      | —                   | O7    |                                  | Reserved                                 |
|      | GETH_MDIO           | O     |                                  | MDIO Output                              |

表 2-11 端口 P21 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                                | Function                            |
|------|-----------------|-------|--------------------------------------------|-------------------------------------|
| R25  | P21.4           | I     | LVDS_TX<br>/ FAST /<br>PU1 / VEXT<br>/ ES6 | General-purpose input               |
|      | GTM_TIM5_IN6_12 |       |                                            | Mux input channel 6 of TIM module 5 |
|      | GTM_TIM1_IN2_6  |       |                                            | Mux input channel 2 of TIM module 1 |
|      | GTM_TIM0_IN2_6  |       |                                            | Mux input channel 2 of TIM module 0 |
|      | ASCLIN18_ARXB   |       |                                            | Receive input                       |
|      | P21.4           | O0    |                                            | General-purpose output              |
|      | GTM_TOUT55      | O1    |                                            | GTM muxed output                    |
|      | ASCLIN11_ASLSO  | O2    |                                            | Slave select signal output          |
|      | ASCLIN18_ATX    | O3    |                                            | Transmit output                     |
|      | —               | O4    |                                            | Reserved                            |
|      | —               | O5    |                                            | Reserved                            |
|      | —               | O6    |                                            | Reserved                            |
|      | —               | O7    |                                            | Reserved                            |
|      | HSCT0_TXDN      | 0     |                                            | Tx data                             |
| P25  | P21.5           | I     | LVDS_TX<br>/ FAST /<br>PU1 / VEXT<br>/ ES6 | General-purpose input               |
|      | GTM_TIM5_IN7_11 |       |                                            | Mux input channel 7 of TIM module 5 |
|      | GTM_TIM1_IN3_6  |       |                                            | Mux input channel 3 of TIM module 1 |
|      | GTM_TIM0_IN3_6  |       |                                            | Mux input channel 3 of TIM module 0 |
|      | ASCLIN11_ARXF   |       |                                            | Receive input                       |
|      | P21.5           | O0    |                                            | General-purpose output              |
|      | GTM_TOUT56      | O1    |                                            | GTM muxed output                    |
|      | ASCLIN3_ASCLK   | O2    |                                            | Shift clock output                  |
|      | ASCLIN11_ATX    | O3    |                                            | Transmit output                     |
|      | —               | O4    |                                            | Reserved                            |
|      | —               | O5    |                                            | Reserved                            |
|      | —               | O6    |                                            | Reserved                            |
|      | —               | O7    |                                            | Reserved                            |
|      | HSCT0_TXDP      | 0     |                                            | Tx data                             |

表 2-11 端口 P21 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                           | Function                                                                                                                                                             |
|------|-----------------|-------|---------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| N22  | P21.6/TDI       | I     | FAST / PD<br>/ PU2<br>/ VEXT /<br>ES3 | <b>General-purpose input</b><br>PD during Reset and in DAP/DAPE or JTAG mode. After Reset release and when not in DAP/DAPE or JTAG mode: PU. In Standby mode: HighZ. |
|      | GTM_TIM4_IN2_12 |       |                                       | <b>Mux input channel 2 of TIM module 4</b>                                                                                                                           |
|      | GTM_TIM1_IN4_8  |       |                                       | <b>Mux input channel 4 of TIM module 1</b>                                                                                                                           |
|      | GTM_TIM0_IN4_8  |       |                                       | <b>Mux input channel 4 of TIM module 0</b>                                                                                                                           |
|      | GPT120_T5EUDA   |       |                                       | <b>Count direction control input of timer T5</b>                                                                                                                     |
|      | ASCLIN3_ARXF    |       |                                       | <b>Receive input</b>                                                                                                                                                 |
|      | CBS_TGI2        |       |                                       | <b>Trigger input</b>                                                                                                                                                 |
|      | TDI             |       |                                       | <b>JTAG Module Data Input</b>                                                                                                                                        |
|      | P21.6           | O0    |                                       | <b>General-purpose output</b>                                                                                                                                        |
|      | GTM_TOUT57      | O1    |                                       | <b>GTM muxed output</b>                                                                                                                                              |
|      | ASCLIN3_ASLSO   | O2    |                                       | <b>Slave select signal output</b>                                                                                                                                    |
|      | —               | O3    |                                       | <b>Reserved</b>                                                                                                                                                      |
|      | —               | O4    |                                       | <b>Reserved</b>                                                                                                                                                      |
|      | —               | O5    |                                       | <b>Reserved</b>                                                                                                                                                      |
|      | —               | O6    |                                       | <b>Reserved</b>                                                                                                                                                      |
|      | GPT120_T3OUT    | O7    |                                       | <b>External output for overflow/underflow detection of core timer T3</b>                                                                                             |
|      | CBS_TGO2        | O     |                                       | <b>Trigger output</b>                                                                                                                                                |
|      | DAP3            | I/O   |                                       | <b>DAP: DAP3 Data I/O</b>                                                                                                                                            |

## 引脚定义和功能 BGA516 封装变体 引脚配置

表 2-11 端口 P21 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                      | Function                                                          |
|------|-----------------|-------|----------------------------------|-------------------------------------------------------------------|
| N21  | P21.7/TDO       | I     | FAST /<br>PU2 /<br>VEXT /<br>ES4 | General-purpose input                                             |
|      | GTM_TIM4_IN3_12 |       |                                  | Mux input channel 3 of TIM module 4                               |
|      | GTM_TIM1_IN5_7  |       |                                  | Mux input channel 5 of TIM module 1                               |
|      | GTM_TIM0_IN5_7  |       |                                  | Mux input channel 5 of TIM module 0                               |
|      | GPT120_T5INA    |       |                                  | Trigger/gate input of timer T5                                    |
|      | CBS_TGI3        |       |                                  | Trigger input                                                     |
|      | GETH_RXERB      |       |                                  | Receive Error MII                                                 |
|      | P21.7           | O0    |                                  | General-purpose output                                            |
|      | GTM_TOUT58      | O1    |                                  | GTM muxed output                                                  |
|      | ASCLIN3_ATX     | O2    |                                  | Transmit output                                                   |
|      | IOM_MON2_15     |       |                                  | Monitor input 2                                                   |
|      | IOM_REF2_15     |       |                                  | Reference input 2                                                 |
|      | ASCLIN3_ASCLK   | O3    |                                  | Shift clock output                                                |
|      | —               | O4    |                                  | Reserved                                                          |
|      | —               | O5    |                                  | Reserved                                                          |
|      | —               | O6    |                                  | Reserved                                                          |
|      | GPT120_T6OUT    | O7    |                                  | External output for overflow/underflow detection of core timer T6 |
|      | CBS_TGO3        | O     |                                  | Trigger output                                                    |
|      | DAP2            | I/O   |                                  | DAP: DAP2 Data I/O                                                |
|      | TDO             | O     |                                  | JTAG Module Data Output                                           |

表 2-12 端口 P22 的功能

| Ball | Symbol         | Ctrl. | Buffer Type                                | Function                                             |
|------|----------------|-------|--------------------------------------------|------------------------------------------------------|
| W25  | P22.0          | I     | LVDS_TX<br>/ FAST /<br>PU1 / VEXT<br>/ ES6 | General-purpose input                                |
|      | GTM_TIM1_IN1_7 |       |                                            | Mux input channel 1 of TIM module 1                  |
|      | GTM_TIM0_IN1_7 |       |                                            | Mux input channel 1 of TIM module 0                  |
|      | QSPI4_MTSRB    |       |                                            | Slave SPI data input                                 |
|      | ASCLIN6_ARXE   |       |                                            | Receive input                                        |
|      | P22.0          | O0    |                                            | General-purpose output                               |
|      | GTM_TOUT47     | O1    |                                            | GTM muxed output                                     |
|      | ASCLIN3_ATXN   | O2    |                                            | Differential Transmit output (low active)            |
|      | QSPI4_MTSR     | O3    |                                            | Master SPI data output                               |
|      | QSPI4_SCLKN    | O4    |                                            | Master SPI clock output (LVDS N line)                |
|      | MSC1_FCLN      | O5    |                                            | Shift-clock inverted part of the differential signal |
|      | —              | O6    |                                            | Reserved                                             |
|      | ASCLIN6_ATX    | O7    |                                            | Transmit output                                      |

表 2-12 端口 P22 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                                | Function                                               |
|------|----------------|-------|--------------------------------------------|--------------------------------------------------------|
| W24  | P22.1          | I     | LVDS_TX<br>/ FAST /<br>PU1 / VEXT<br>/ ES6 | General-purpose input                                  |
|      | GTM_TIM1_IN0_8 |       |                                            | Mux input channel 0 of TIM module 1                    |
|      | GTM_TIM0_IN0_8 |       |                                            | Mux input channel 0 of TIM module 0                    |
|      | QSPI4_MRSTB    |       |                                            | Master SPI data input                                  |
|      | ASCLIN7_ARXE   |       |                                            | Receive input                                          |
|      | P22.1          | O0    |                                            | General-purpose output                                 |
|      | GTM_TOUT48     | O1    |                                            | GTM muxed output                                       |
|      | ASCLIN3_ATXP   | O2    |                                            | Differential Transmit output (high active)             |
|      | QSPI4_MRST     | O3    |                                            | Slave SPI data output                                  |
|      | IOM_MON2_4     |       |                                            | Monitor input 2                                        |
|      | IOM_REF2_4     |       |                                            | Reference input 2                                      |
|      | QSPI4_SCLKP    | O4    |                                            | Master SPI clock output (LVDS P line)                  |
|      | MSC1_FCLP      | O5    |                                            | Shift-clock direct part of the differential signal     |
|      | —              | O6    |                                            | Reserved                                               |
|      | ASCLIN7_ATX    | O7    |                                            | Transmit output                                        |
| Y25  | P22.2          | I     | LVDS_TX<br>/ FAST /<br>PU1 / VEXT<br>/ ES6 | General-purpose input                                  |
|      | GTM_TIM1_IN3_7 |       |                                            | Mux input channel 3 of TIM module 1                    |
|      | GTM_TIM0_IN3_7 |       |                                            | Mux input channel 3 of TIM module 0                    |
|      | QSPI4_SLSIB    |       |                                            | Slave select input                                     |
|      | P22.2          | O0    |                                            | General-purpose output                                 |
|      | GTM_TOUT49     | O1    |                                            | GTM muxed output                                       |
|      | ASCLIN5_ATX    | O2    |                                            | Transmit output                                        |
|      | QSPI4_SLSO3    | O3    |                                            | Master slave select output                             |
|      | QSPI4_MTSRN    | O4    |                                            | Master SPI data output (LVDS N line)                   |
|      | MSC1_SON       | O5    |                                            | Data output - inverted part of the differential signal |
|      | —              | O6    |                                            | Reserved                                               |
|      | —              | O7    |                                            | Reserved                                               |

表 2-12 端口 P22 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                       | Function                                             |
|------|----------------|-------|-----------------------------------|------------------------------------------------------|
| Y24  | P22.3          | I     | LVDS_TX / FAST / PU1 / VEXT / ES6 | General-purpose input                                |
|      | GTM_TIM1_IN4_4 |       |                                   | Mux input channel 4 of TIM module 1                  |
|      | GTM_TIM0_IN4_4 |       |                                   | Mux input channel 4 of TIM module 0                  |
|      | QSPI4_SCLKB    |       |                                   | Slave SPI clock inputs                               |
|      | ASCLIN5_ARXC   |       |                                   | Receive input                                        |
|      | P22.3          | O0    |                                   | General-purpose output                               |
|      | GTM_TOUT50     | O1    |                                   | GTM muxed output                                     |
|      | —              | O2    |                                   | Reserved                                             |
|      | QSPI4_SCLK     | O3    |                                   | Master SPI clock output                              |
|      | QSPI4_MTSRP    | O4    |                                   | Master SPI data output (LVDS P line)                 |
|      | MSC1_SOP       | O5    |                                   | Data output - direct part of the differential signal |
|      | —              | O6    |                                   | Reserved                                             |
|      | —              | O7    |                                   | Reserved                                             |
| W21  | P22.4          | I     | SLOW / PU1 / VEXT / ES            | General-purpose input                                |
|      | GTM_TIM3_IN0_8 |       |                                   | Mux input channel 0 of TIM module 3                  |
|      | ASCLIN7_ARXF   |       |                                   | Receive input                                        |
|      | GTM_DTMA3_0    |       |                                   | CDTM3_DTM4                                           |
|      | P22.4          | O0    |                                   | General-purpose output                               |
|      | GTM_TOUT130    | O1    |                                   | GTM muxed output                                     |
|      | ASCLIN4_ASLSO  | O2    |                                   | Slave select signal output                           |
|      | —              | O3    |                                   | Reserved                                             |
|      | QSPI0_SLSO12   | O4    |                                   | Master slave select output                           |
|      | —              | O5    |                                   | Reserved                                             |
|      | CAN13_TXD      | O6    |                                   | CAN transmit output node 3                           |
|      | —              | O7    |                                   | Reserved                                             |
| W22  | P22.5          | I     | SLOW / PU1 / VEXT / ES            | General-purpose input                                |
|      | GTM_TIM3_IN1_7 |       |                                   | Mux input channel 1 of TIM module 3                  |
|      | QSPI0_MTSRC    |       |                                   | Slave SPI data input                                 |
|      | CAN13_RXDC     |       |                                   | CAN receive input node 3                             |
|      | P22.5          | O0    |                                   | General-purpose output                               |
|      | GTM_TOUT131    | O1    |                                   | GTM muxed output                                     |
|      | ASCLIN4_ATX    | O2    |                                   | Transmit output                                      |
|      | —              | O3    |                                   | Reserved                                             |
|      | QSPI0_MTSR     | O4    |                                   | Master SPI data output                               |
|      | —              | O5    |                                   | Reserved                                             |
|      | —              | O6    |                                   | Reserved                                             |
|      | —              | O7    |                                   | Reserved                                             |

表 2-12 端口 P22 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| V21  | P22.6           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM3_IN2_6  |       |                                 | Mux input channel 2 of TIM module 3 |
|      | GTM_TIM2_IN6_14 |       |                                 | Mux input channel 6 of TIM module 2 |
|      | QSPI0_MRSTC     |       |                                 | Master SPI data input               |
|      | ASCLIN4_ARXC    |       |                                 | Receive input                       |
|      | P22.6           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT132     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | QSPI0_MRST      | O4    |                                 | Slave SPI data output               |
|      | IOM_MON2_0      |       |                                 | Monitor input 2                     |
|      | IOM_REF2_0      |       |                                 | Reference input 2                   |
|      | CAN21_TXD       | O5    |                                 | CAN transmit output node 1          |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
| V22  | P22.7           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM3_IN3_7  |       |                                 | Mux input channel 3 of TIM module 3 |
|      | QSPI0_SCLKC     |       |                                 | Slave SPI clock inputs              |
|      | CAN21_RXDF      |       |                                 | CAN receive input node 1            |
|      | P22.7           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT133     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN4_ASCLK   | O2    |                                 | Shift clock output                  |
|      | ASCLIN17_ATX    | O3    |                                 | Transmit output                     |
|      | QSPI0_SCLK      | O4    |                                 | Master SPI clock output             |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |

表 2-12 端口 P22 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| U21  | P22.8           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN0_4  |       |                                 | Mux input channel 0 of TIM module 5 |
|      | GTM_TIM3_IN4_7  |       |                                 | Mux input channel 4 of TIM module 3 |
|      | QSPI0_SCLKB     |       |                                 | Slave SPI clock inputs              |
|      | P22.8           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT134     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN5_ASCLK   | O2    |                                 | Shift clock output                  |
|      | —               | O3    |                                 | Reserved                            |
|      | QSPI0_SCLK      | O4    |                                 | Master SPI clock output             |
|      | CAN22_TXD       | O5    |                                 | CAN transmit output node 2          |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
| U22  | P22.9           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN1_10 |       |                                 | Mux input channel 1 of TIM module 5 |
|      | GTM_TIM3_IN5_7  |       |                                 | Mux input channel 5 of TIM module 3 |
|      | QSPI0_MRSTB     |       |                                 | Master SPI data input               |
|      | ASCLIN4_ARXD    |       |                                 | Receive input                       |
|      | CAN22_RXDE      |       |                                 | CAN receive input node 2            |
|      | GTM_DTMA3_1     |       |                                 | CDTM3_DTM4                          |
|      | P22.9           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT135     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | QSPI0_MRST      | O4    |                                 | Slave SPI data output               |
|      | IOM_MON2_0      |       |                                 | Monitor input 2                     |
|      | IOM_REF2_0      |       |                                 | Reference input 2                   |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |

表 2-12 端口 P22 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| T21  | P22.10          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN2_8  |       |                                 | Mux input channel 2 of TIM module 5 |
|      | GTM_TIM3_IN6_7  |       |                                 | Mux input channel 6 of TIM module 3 |
|      | QSPI0_MTSRB     |       |                                 | Slave SPI data input                |
|      | P22.10          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT136     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN4_ATX     | O2    |                                 | Transmit output                     |
|      | —               | O3    |                                 | Reserved                            |
|      | QSPI0_MTSR      | O4    |                                 | Master SPI data output              |
|      | CAN23_TXD       | O5    |                                 | CAN transmit output node 3          |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
| T22  | P22.11          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN3_10 |       |                                 | Mux input channel 3 of TIM module 5 |
|      | GTM_TIM3_IN7_7  |       |                                 | Mux input channel 7 of TIM module 3 |
|      | CAN23_RXDE      |       |                                 | CAN receive input node 3            |
|      | ASCLIN17_ARXA   |       |                                 | Receive input                       |
|      | P22.11          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT137     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN4_ASLSO   | O2    |                                 | Slave select signal output          |
|      | ASCLIN17_ATX    | O3    |                                 | Transmit output                     |
|      | QSPI0_SLSO10    | O4    |                                 | Master slave select output          |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |

表 2-13 端口 P23 的功能

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| AC25 | P23.0          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN7_1 |       |                                 | Mux input channel 7 of TIM module 6 |
|      | GTM_TIM1_IN5_4 |       |                                 | Mux input channel 5 of TIM module 1 |
|      | GTM_TIM0_IN5_4 |       |                                 | Mux input channel 5 of TIM module 0 |
|      | CAN10_RXDC     |       |                                 | CAN receive input node 0            |
|      | P23.0          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT41     | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
| AB24 | P23.1          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN6_1 |       |                                 | Mux input channel 6 of TIM module 6 |
|      | GTM_TIM1_IN6_4 |       |                                 | Mux input channel 6 of TIM module 1 |
|      | GTM_TIM0_IN6_4 |       |                                 | Mux input channel 6 of TIM module 0 |
|      | MSC1_SDI0      |       |                                 | Upstream asynchronous input signal  |
|      | ASCLIN6_ARXF   |       |                                 | Receive input                       |
|      | P23.1          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT42     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN1_ARTS   | O2    |                                 | Ready to send output                |
|      | QSPI4_SLSO6    | O3    |                                 | Master slave select output          |
|      | GTM_CLK0       | O4    |                                 | CGM generated clock                 |
|      | CAN10_TXD      | O5    |                                 | CAN transmit output node 0          |
|      | CCU_EXTCLK0    | O6    |                                 | External Clock 0                    |
|      | ASCLIN6_ASCLK  | O7    |                                 | Shift clock output                  |

表 2-13 端口 P23 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| AB25 | P23.2          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN5_1 |       |                                 | Mux input channel 5 of TIM module 6 |
|      | GTM_TIM1_IN6_5 |       |                                 | Mux input channel 6 of TIM module 1 |
|      | GTM_TIM0_IN6_5 |       |                                 | Mux input channel 6 of TIM module 0 |
|      | ASCLIN7_ARXC   |       |                                 | Receive input                       |
|      | P23.2          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT43     | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | CAN23_TXD      | O4    |                                 | CAN transmit output node 3          |
|      | CAN12_TXD      | O5    |                                 | CAN transmit output node 2          |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
| AA24 | P23.3          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN4_2 |       |                                 | Mux input channel 4 of TIM module 6 |
|      | GTM_TIM1_IN7_4 |       |                                 | Mux input channel 7 of TIM module 1 |
|      | GTM_TIM0_IN7_4 |       |                                 | Mux input channel 7 of TIM module 0 |
|      | MSC1_INJ0      |       |                                 | Injection signal from port          |
|      | ASCLIN6_ARXA   |       |                                 | Receive input                       |
|      | CAN12_RXDC     |       |                                 | CAN receive input node 2            |
|      | CAN23_RXDB     |       |                                 | CAN receive input node 3            |
|      | P23.3          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT44     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN7_ATX    | O2    |                                 | Transmit output                     |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |

## 引脚定义和功能 BGA516 封装变体 引脚配置

表 2-13 端口 P23 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| AA25 | P23.4           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN3_2  |       |                                 | Mux input channel 3 of TIM module 6 |
|      | GTM_TIM1_IN7_5  |       |                                 | Mux input channel 7 of TIM module 1 |
|      | GTM_TIM0_IN7_5  |       |                                 | Mux input channel 7 of TIM module 0 |
|      | P23.4           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT45      | O1    |                                 | GTM muxed output                    |
|      | ASCLIN6_ASLSO   | O2    |                                 | Slave select signal output          |
|      | QSPI4_SLSO5     | O3    |                                 | Master slave select output          |
|      | —               | O4    |                                 | Reserved                            |
|      | MSC1_EN0        | O5    |                                 | Chip Select                         |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
| AA22 | P23.5           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN2_2  |       |                                 | Mux input channel 2 of TIM module 6 |
|      | GTM_TIM1_IN2_7  |       |                                 | Mux input channel 2 of TIM module 1 |
|      | GTM_TIM0_IN2_7  |       |                                 | Mux input channel 2 of TIM module 0 |
|      | ASCLIN16_ARXA   |       |                                 | Receive input                       |
|      | P23.5           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT46      | O1    |                                 | GTM muxed output                    |
|      | ASCLIN6_ATX     | O2    |                                 | Transmit output                     |
|      | QSPI4_SLSO4     | O3    |                                 | Master slave select output          |
|      | —               | O4    |                                 | Reserved                            |
|      | MSC1_EN1        | O5    |                                 | Chip Select                         |
|      | CAN22_TXD       | O6    |                                 | CAN transmit output node 2          |
|      | —               | O7    |                                 | Reserved                            |
| Y22  | P23.6           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN1_2  |       |                                 | Mux input channel 1 of TIM module 6 |
|      | GTM_TIM4_IN2_7  |       |                                 | Mux input channel 2 of TIM module 4 |
|      | GTM_TIM1_IN2_10 |       |                                 | Mux input channel 2 of TIM module 1 |
|      | CAN22_RXDC      |       |                                 | CAN receive input node 2            |
|      | P23.6           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT138     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN16_ATX    | O2    |                                 | Transmit output                     |
|      | —               | O3    |                                 | Reserved                            |
|      | QSPI0_SLSO11    | O4    |                                 | Master slave select output          |
|      | CAN11_TXD       | O5    |                                 | CAN transmit output node 1          |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |

表 2-13 端口 P23 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| Y21  | P23.7           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN0_2  |       |                                 | Mux input channel 0 of TIM module 6 |
|      | GTM_TIM4_IN3_7  |       |                                 | Mux input channel 3 of TIM module 4 |
|      | GTM_TIM1_IN3_10 |       |                                 | Mux input channel 3 of TIM module 1 |
|      | CAN11_RXDC      |       |                                 | CAN receive input node 1            |
|      | ASCLIN16_ARXB   |       |                                 | Receive input                       |
|      | P23.7           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT139     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN16_ATX    | O2    |                                 | Transmit output                     |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |

表 2-14 端口 P24 功能

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| U29  | P24.0          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN0_6 |       |                                 | Mux input channel 0 of TIM module 6 |
|      | GTM_TIM4_IN0_8 |       |                                 | Mux input channel 0 of TIM module 4 |
|      | P24.0          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT222    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |

表 2-14 端口 P24 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| U30  | P24.1          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN1_6 |       |                                 | Mux input channel 1 of TIM module 6 |
|      | GTM_TIM4_IN1_8 |       |                                 | Mux input channel 1 of TIM module 4 |
|      | P24.1          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT223    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
| T29  | P24.2          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN2_6 |       |                                 | Mux input channel 2 of TIM module 6 |
|      | GTM_TIM4_IN2_8 |       |                                 | Mux input channel 2 of TIM module 4 |
|      | P24.2          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT224    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
| T30  | P24.3          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN3_6 |       |                                 | Mux input channel 3 of TIM module 6 |
|      | GTM_TIM4_IN3_8 |       |                                 | Mux input channel 3 of TIM module 4 |
|      | P24.3          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT225    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |

表 2-14 端口 P24 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| R29  | P24.4          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN4_5 |       |                                 | Mux input channel 4 of TIM module 6 |
|      | GTM_TIM4_IN4_7 |       |                                 | Mux input channel 4 of TIM module 4 |
|      | P24.4          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT226    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
| R30  | P24.5          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN5_5 |       |                                 | Mux input channel 5 of TIM module 6 |
|      | GTM_TIM4_IN5_7 |       |                                 | Mux input channel 5 of TIM module 4 |
|      | P24.5          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT227    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
| P29  | P24.6          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN6_5 |       |                                 | Mux input channel 6 of TIM module 6 |
|      | GTM_TIM4_IN6_7 |       |                                 | Mux input channel 6 of TIM module 4 |
|      | P24.6          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT228    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |

表 2-14 端口 P24 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| P30  | P24.7          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN7_5 |       |                                 | Mux input channel 7 of TIM module 6 |
|      | GTM_TIM4_IN7_7 |       |                                 | Mux input channel 7 of TIM module 4 |
|      | P24.7          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT229    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
| N29  | P24.8          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN0_5 |       |                                 | Mux input channel 0 of TIM module 5 |
|      | P24.8          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT230    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
| N30  | P24.9          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN1_6 |       |                                 | Mux input channel 1 of TIM module 5 |
|      | P24.9          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT231    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |

表 2-14 端口 P24 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| M29  | P24.10         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN2_5 |       |                                 | Mux input channel 2 of TIM module 5 |
|      | P24.10         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT232    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
| M30  | P24.11         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN3_6 |       |                                 | Mux input channel 3 of TIM module 5 |
|      | P24.11         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT233    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
| L29  | P24.12         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN4_6 |       |                                 | Mux input channel 4 of TIM module 5 |
|      | P24.12         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT234    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |

表 2-14 端口 P24 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| L30  | P24.13         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN5_6 |       |                                 | Mux input channel 5 of TIM module 5 |
|      | P24.13         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT235    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
| K29  | P24.14         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN6_6 |       |                                 | Mux input channel 6 of TIM module 5 |
|      | P24.14         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT236    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
| K30  | P24.15         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN7_5 |       |                                 | Mux input channel 7 of TIM module 5 |
|      | P24.15         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT237    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |

表 2-15 端口 P25 功能

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| AG30 | P25.0           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN0_7  |       |                                 | Mux input channel 0 of TIM module 6 |
|      | GTM_TIM3_IN0_12 |       |                                 | Mux input channel 0 of TIM module 3 |
|      | P25.0           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT206     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
| AF30 | P25.1           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN1_7  |       |                                 | Mux input channel 1 of TIM module 6 |
|      | GTM_TIM3_IN1_11 |       |                                 | Mux input channel 1 of TIM module 3 |
|      | P25.1           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT207     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
| AF29 | P25.2           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN2_7  |       |                                 | Mux input channel 2 of TIM module 6 |
|      | GTM_TIM3_IN2_9  |       |                                 | Mux input channel 2 of TIM module 3 |
|      | P25.2           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT208     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |

表 2-15 端口 P25 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| AE30 | P25.3           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN3_7  |       |                                 | Mux input channel 3 of TIM module 6 |
|      | GTM_TIM3_IN3_9  |       |                                 | Mux input channel 3 of TIM module 3 |
|      | P25.3           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT209     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
| AE29 | P25.4           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN4_6  |       |                                 | Mux input channel 4 of TIM module 6 |
|      | GTM_TIM3_IN4_10 |       |                                 | Mux input channel 4 of TIM module 3 |
|      | P25.4           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT210     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
| AD30 | P25.5           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN5_6  |       |                                 | Mux input channel 5 of TIM module 6 |
|      | GTM_TIM3_IN5_11 |       |                                 | Mux input channel 5 of TIM module 3 |
|      | P25.5           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT211     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |

表 2-15 端口 P25 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| W29  | P25.6           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN6_6  |       |                                 | Mux input channel 6 of TIM module 6 |
|      | GTM_TIM3_IN6_14 |       |                                 | Mux input channel 6 of TIM module 3 |
|      | P25.6           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT212     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
| AD29 | P25.7           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN7_6  |       |                                 | Mux input channel 7 of TIM module 6 |
|      | GTM_TIM3_IN7_10 |       |                                 | Mux input channel 7 of TIM module 3 |
|      | P25.7           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT213     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
| AC29 | P25.8           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN0_9  |       |                                 | Mux input channel 0 of TIM module 4 |
|      | P25.8           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT214     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |

表 2-15 端口 P25 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| AC30 | P25.9          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN1_9 |       |                                 | Mux input channel 1 of TIM module 4 |
|      | P25.9          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT215    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
| AB29 | P25.10         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN2_9 |       |                                 | Mux input channel 2 of TIM module 4 |
|      | P25.10         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT216    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
| AB30 | P25.11         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN3_9 |       |                                 | Mux input channel 3 of TIM module 4 |
|      | P25.11         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT217    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |

## 引脚定义和功能 BGA516 封装变体 引脚配置

表 2-15 端口 P25 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| AA29 | P25.12         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN4_8 |       |                                 | Mux input channel 4 of TIM module 4 |
|      | P25.12         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT218    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
| AA30 | P25.13         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN5_8 |       |                                 | Mux input channel 5 of TIM module 4 |
|      | P25.13         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT219    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
| Y29  | P25.14         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN6_8 |       |                                 | Mux input channel 6 of TIM module 4 |
|      | P25.14         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT220    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |

表 2-15 端口 P25 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| Y30  | P25.15         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN7_8 |       |                                 | Mux input channel 7 of TIM module 4 |
|      | P25.15         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT221    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |

表 2-16 端口 P26 功能

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| AG29 | P26.0           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN6_9  |       |                                 | Mux input channel 6 of TIM module 6 |
|      | GTM_TIM3_IN6_11 |       |                                 | Mux input channel 6 of TIM module 3 |
|      | P26.0           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT212     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |

表 2-17 端口 P30 功能

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| AJ21 | P30.0           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN0_10 |       |                                 | Mux input channel 0 of TIM module 4 |
|      | P30.0           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT190     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
| AK21 | P30.1           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN1_10 |       |                                 | Mux input channel 1 of TIM module 4 |
|      | P30.1           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT191     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
| AJ22 | P30.2           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN2_10 |       |                                 | Mux input channel 2 of TIM module 4 |
|      | P30.2           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT192     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |

表 2-17 端口 P30 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| AK22 | P30.3           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN3_10 |       |                                 | Mux input channel 3 of TIM module 4 |
|      | P30.3           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT193     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
| AJ23 | P30.4           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN4_9  |       |                                 | Mux input channel 4 of TIM module 4 |
|      | P30.4           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT194     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
| AK23 | P30.5           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN5_9  |       |                                 | Mux input channel 5 of TIM module 4 |
|      | P30.5           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT195     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |

表 2-17 端口 P30 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| AJ24 | P30.6          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN6_9 |       |                                 | Mux input channel 6 of TIM module 4 |
|      | P30.6          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT196    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
| AK24 | P30.7          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN7_9 |       |                                 | Mux input channel 7 of TIM module 4 |
|      | P30.7          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT197    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
| AJ25 | P30.8          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN0_8 |       |                                 | Mux input channel 0 of TIM module 6 |
|      | GTM_TIM5_IN0_6 |       |                                 | Mux input channel 0 of TIM module 5 |
|      | P30.8          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT198    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |

表 2-17 端口 P30 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| AK25 | P30.9          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN1_8 |       |                                 | Mux input channel 1 of TIM module 6 |
|      | GTM_TIM5_IN1_7 |       |                                 | Mux input channel 1 of TIM module 5 |
|      | P30.9          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT199    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
| AJ26 | P30.10         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN2_8 |       |                                 | Mux input channel 2 of TIM module 6 |
|      | GTM_TIM5_IN2_6 |       |                                 | Mux input channel 2 of TIM module 5 |
|      | P30.10         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT200    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
| AK26 | P30.11         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN3_8 |       |                                 | Mux input channel 3 of TIM module 6 |
|      | GTM_TIM5_IN3_7 |       |                                 | Mux input channel 3 of TIM module 5 |
|      | P30.11         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT201    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |

表 2-17 端口 P30 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| AJ27 | P30.12         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN4_7 |       |                                 | Mux input channel 4 of TIM module 6 |
|      | GTM_TIM5_IN4_7 |       |                                 | Mux input channel 4 of TIM module 5 |
|      | P30.12         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT202    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
| AK27 | P30.13         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN5_7 |       |                                 | Mux input channel 5 of TIM module 6 |
|      | GTM_TIM5_IN5_7 |       |                                 | Mux input channel 5 of TIM module 5 |
|      | P30.13         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT203    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
| AJ28 | P30.14         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN6_7 |       |                                 | Mux input channel 6 of TIM module 6 |
|      | GTM_TIM5_IN6_7 |       |                                 | Mux input channel 6 of TIM module 5 |
|      | P30.14         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT204    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |

表 2-17 端口 P30 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| AK28 | P30.15         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN7_7 |       |                                 | Mux input channel 7 of TIM module 6 |
|      | GTM_TIM5_IN7_6 |       |                                 | Mux input channel 7 of TIM module 5 |
|      | P30.15         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT205    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |

表 2-18 端口 P31 功能

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| AJ12 | P31.0           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM2_IN0_13 |       |                                 | Mux input channel 0 of TIM module 2 |
|      | P31.0           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT174     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
| AK12 | P31.1           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM2_IN1_9  |       |                                 | Mux input channel 1 of TIM module 2 |
|      | P31.1           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT175     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |

表 2-18 端口 P31 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| AJ13 | P31.2           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM2_IN2_9  |       |                                 | Mux input channel 2 of TIM module 2 |
|      | P31.2           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT176     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
| AK13 | P31.3           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM2_IN3_14 |       |                                 | Mux input channel 3 of TIM module 2 |
|      | P31.3           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT177     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
| AJ14 | P31.4           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM2_IN4_12 |       |                                 | Mux input channel 4 of TIM module 2 |
|      | P31.4           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT178     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |

表 2-18 端口 P31 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| AK14 | P31.5           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM2_IN5_13 |       |                                 | Mux input channel 5 of TIM module 2 |
|      | P31.5           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT179     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
| AJ15 | P31.6           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM2_IN6_12 |       |                                 | Mux input channel 6 of TIM module 2 |
|      | P31.6           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT180     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
| AK15 | P31.7           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM2_IN7_14 |       |                                 | Mux input channel 7 of TIM module 2 |
|      | P31.7           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT181     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |

表 2-18 端口 P31 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| AJ16 | P31.8          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN0_9 |       |                                 | Mux input channel 0 of TIM module 6 |
|      | GTM_TIM5_IN0_7 |       |                                 | Mux input channel 0 of TIM module 5 |
|      | SENT_SENT20C   |       |                                 | Receive input channel 20            |
|      | P31.8          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT182    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
| AK16 | P31.9          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN1_9 |       |                                 | Mux input channel 1 of TIM module 6 |
|      | GTM_TIM5_IN1_8 |       |                                 | Mux input channel 1 of TIM module 5 |
|      | SENT_SENT21C   |       |                                 | Receive input channel 21            |
|      | P31.9          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT183    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
| AJ17 | P31.10         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN2_9 |       |                                 | Mux input channel 2 of TIM module 6 |
|      | GTM_TIM5_IN2_7 |       |                                 | Mux input channel 2 of TIM module 5 |
|      | SENT_SENT22C   |       |                                 | Receive input channel 22            |
|      | P31.10         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT184    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |

表 2-18 端口 P31 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| AK17 | P31.11         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN3_9 |       |                                 | Mux input channel 3 of TIM module 6 |
|      | GTM_TIM5_IN3_8 |       |                                 | Mux input channel 3 of TIM module 5 |
|      | SENT_SENT23C   |       |                                 | Receive input channel 23            |
|      | P31.11         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT185    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
| AJ18 | P31.12         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN4_8 |       |                                 | Mux input channel 4 of TIM module 6 |
|      | GTM_TIM5_IN4_8 |       |                                 | Mux input channel 4 of TIM module 5 |
|      | SENT_SENT24C   |       |                                 | Receive input channel 24            |
|      | P31.12         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT186    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
| AK18 | P31.13         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN5_8 |       |                                 | Mux input channel 5 of TIM module 6 |
|      | GTM_TIM5_IN5_8 |       |                                 | Mux input channel 5 of TIM module 5 |
|      | P31.13         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT187    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |

表 2-18 端口 P31 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| AJ19 | P31.14         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN6_8 |       |                                 | Mux input channel 6 of TIM module 6 |
|      | GTM_TIM5_IN6_8 |       |                                 | Mux input channel 6 of TIM module 5 |
|      | P31.14         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT188    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
| AK19 | P31.15         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN7_8 |       |                                 | Mux input channel 7 of TIM module 6 |
|      | GTM_TIM5_IN7_7 |       |                                 | Mux input channel 7 of TIM module 5 |
|      | P31.15         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT189    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |

表 2-19 端口 P32 功能

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                                                                                                     |
|------|-----------------|-------|---------------------------------|--------------------------------------------------------------------------------------------------------------|
| AE22 | P32.0           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | <b>General-purpose input</b><br>P32.0 / SMPS mode: analog output. External Pass Device gate control for EVRC |
|      | GTM_TIM3_IN2_5  |       |                                 | <b>Mux input channel 2 of TIM module 3</b>                                                                   |
|      | GTM_TIM2_IN2_5  |       |                                 | <b>Mux input channel 2 of TIM module 2</b>                                                                   |
|      | P32.0           | O0    |                                 | <b>General-purpose output</b>                                                                                |
|      | GTM_TOUT36      | O1    |                                 | <b>GTM muxed output</b>                                                                                      |
|      | —               | O2    |                                 | <b>Reserved</b>                                                                                              |
|      | —               | O3    |                                 | <b>Reserved</b>                                                                                              |
|      | —               | O4    |                                 | <b>Reserved</b>                                                                                              |
|      | —               | O5    |                                 | <b>Reserved</b>                                                                                              |
|      | —               | O6    |                                 | <b>Reserved</b>                                                                                              |
|      | —               | O7    |                                 | <b>Reserved</b>                                                                                              |
| AD22 | P32.1           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | <b>General-purpose input</b><br>P32.1 / External Pass Device gate control for EVRC                           |
|      | GTM_TIM3_IN3_15 |       |                                 | <b>Mux input channel 3 of TIM module 3</b>                                                                   |
|      | P32.1           | O0    |                                 | <b>General-purpose output</b>                                                                                |
|      | GTM_TOUT37      | O1    |                                 | <b>GTM muxed output</b>                                                                                      |
|      | —               | O2    |                                 | <b>Reserved</b>                                                                                              |
|      | —               | O3    |                                 | <b>Reserved</b>                                                                                              |
|      | —               | O4    |                                 | <b>Reserved</b>                                                                                              |
|      | —               | O5    |                                 | <b>Reserved</b>                                                                                              |
|      | —               | O6    |                                 | <b>Reserved</b>                                                                                              |
|      | —               | O7    |                                 | <b>Reserved</b>                                                                                              |

表 2-19 端口 P32 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| AE23 | P32.2          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM1_IN3_8 |       |                                 | Mux input channel 3 of TIM module 1 |
|      | GTM_TIM0_IN3_8 |       |                                 | Mux input channel 3 of TIM module 0 |
|      | CAN03_RXDB     |       |                                 | CAN receive input node 3            |
|      | ASCLIN3_ARXD   |       |                                 | Receive input                       |
|      | CAN21_RXDD     |       |                                 | CAN receive input node 1            |
|      | P32.2          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT38     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN3_ATX    | O2    |                                 | Transmit output                     |
|      | IOM_MON2_15    |       |                                 | Monitor input 2                     |
|      | IOM_REF2_15    |       |                                 | Reference input 2                   |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | PMS_DCDCSYNCO  | O6    |                                 | DC-DC synchronization output        |
|      | —              | O7    |                                 | Reserved                            |
| AE24 | P32.3          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM1_IN4_5 |       |                                 | Mux input channel 4 of TIM module 1 |
|      | GTM_TIM0_IN4_5 |       |                                 | Mux input channel 4 of TIM module 0 |
|      | P32.3          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT39     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN3_ATX    | O2    |                                 | Transmit output                     |
|      | IOM_MON2_15    |       |                                 | Monitor input 2                     |
|      | IOM_REF2_15    |       |                                 | Reference input 2                   |
|      | —              | O3    |                                 | Reserved                            |
|      | ASCLIN3_ASCLK  | O4    |                                 | Shift clock output                  |
|      | CAN03_TXD      | O5    |                                 | CAN transmit output node 3          |
|      | IOM_MON2_8     |       |                                 | Monitor input 2                     |
|      | IOM_REF2_8     |       |                                 | Reference input 2                   |
|      | CAN21_TXD      | O6    |                                 | CAN transmit output node 1          |
|      | —              | O7    |                                 | Reserved                            |

表 2-19 端口 P32 功能 (续)

| Ball | Symbol          | Ctrl.    | Buffer Type                     | Function                            |
|------|-----------------|----------|---------------------------------|-------------------------------------|
| AD23 | P32.4           | I        | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM1_IN5_5  |          |                                 | Mux input channel 5 of TIM module 1 |
|      | GTM_TIM0_IN5_5  |          |                                 | Mux input channel 5 of TIM module 0 |
|      | ASCLIN1_ACTSB   |          |                                 | Clear to send input                 |
|      | MSC1_SDI2       |          |                                 | Upstream assynchronous input signal |
|      | ASCLIN15_ARXA   |          |                                 | Receive input                       |
|      | P32.4           | O0       |                                 | General-purpose output              |
|      | GTM_TOUT40      | O1       |                                 | GTM muxed output                    |
|      | PMS_DCDCSYNCO   | O2       |                                 | DC-DC synchronization output        |
|      | —               | O3       |                                 | Reserved                            |
|      | GTM_CLK1        | O4       |                                 | CGM generated clock                 |
|      | MSC1_EN0        | O5       |                                 | Chip Select                         |
|      | CCU_EXTCLK1     | O6       |                                 | External Clock 1                    |
|      | CCU60_COUT63    | O7       |                                 | T13 PWM channel 63                  |
|      | IOM_MON1_6      |          |                                 | Monitor input 1                     |
|      | IOM_REF1_0      |          |                                 | Reference input 1                   |
| AA20 | P32.5           | I        | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN5_9  |          |                                 | Mux input channel 5 of TIM module 5 |
|      | GTM_TIM4_IN1_14 |          |                                 | Mux input channel 1 of TIM module 4 |
|      | GTM_TIM3_IN5_8  |          |                                 | Mux input channel 5 of TIM module 3 |
|      | SENT_SENT10C    |          |                                 | Receive input channel 10            |
|      | P32.5           | O0       |                                 | General-purpose output              |
|      | GTM_TOUT140     | O1       |                                 | GTM muxed output                    |
|      | ASCLIN2_ATX     | O2       |                                 | Transmit output                     |
|      | IOM_MON2_14     |          |                                 | Monitor input 2                     |
|      | IOM_REF2_14     |          |                                 | Reference input 2                   |
|      | —               | O3       |                                 | Reserved                            |
|      | —               | O4       |                                 | Reserved                            |
|      | —               | O5       |                                 | Reserved                            |
|      | CAN02_TXD       | O6       |                                 | CAN transmit output node 2          |
|      | IOM_MON2_7      |          |                                 | Monitor input 2                     |
|      | IOM_REF2_7      |          |                                 | Reference input 2                   |
| —    | O7              | Reserved |                                 |                                     |

## 引脚定义和功能 BGA516 封装变体 引脚配置

表 2-19 端口 P32 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| AB20 | P32.6           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN6_9  |       |                                 | Mux input channel 6 of TIM module 5 |
|      | GTM_TIM4_IN4_15 |       |                                 | Mux input channel 4 of TIM module 4 |
|      | GTM_TIM3_IN6_8  |       |                                 | Mux input channel 6 of TIM module 3 |
|      | CAN02_RXDC      |       |                                 | CAN receive input node 2            |
|      | CBS_TGI4        |       |                                 | Trigger input                       |
|      | ASCLIN2_ARXF    |       |                                 | Receive input                       |
|      | ASCLIN6_ARXC    |       |                                 | Receive input                       |
|      | SENT_SENT11C    |       |                                 | Receive input channel 11            |
|      | P32.6           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT141     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | QSPI2_SLSO12    | O4    |                                 | Master slave select output          |
|      | CAN22_TXD       | O5    |                                 | CAN transmit output node 2          |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
|      | CBS_TGO4        | O     |                                 | Trigger output                      |
| AB21 | P32.7           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN7_8  |       |                                 | Mux input channel 7 of TIM module 5 |
|      | GTM_TIM4_IN0_15 |       |                                 | Mux input channel 0 of TIM module 4 |
|      | GTM_TIM3_IN7_8  |       |                                 | Mux input channel 7 of TIM module 3 |
|      | CBS_TGI5        |       |                                 | Trigger input                       |
|      | CAN22_RXDB      |       |                                 | CAN receive input node 2            |
|      | SENT_SENT12C    |       |                                 | Receive input channel 12            |
|      | ASCLIN15_ARXB   |       |                                 | Receive input                       |
|      | P32.7           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT142     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN6_ATX     | O2    |                                 | Transmit output                     |
|      | —               | O3    |                                 | Reserved                            |
|      | ASCLIN15_ATX    | O4    |                                 | Transmit output                     |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
|      | CBS_TGO5        | O     |                                 | Trigger output                      |

表 2-20 端口 P33 功能

| Ball | Symbol          | Ctrl. | Buffer Type                        | Function                             |
|------|-----------------|-------|------------------------------------|--------------------------------------|
| AD15 | P33.0           | I     | SLOW /<br>PU1 /<br>VEVRSB<br>/ ES5 | General-purpose input                |
|      | GTM_TIM3_IN0_13 |       |                                    | Mux input channel 0 of TIM module 3  |
|      | GTM_TIM1_IN4_6  |       |                                    | Mux input channel 4 of TIM module 1  |
|      | GTM_TIM0_IN4_6  |       |                                    | Mux input channel 4 of TIM module 0  |
|      | EDSADC_ITR0E    |       |                                    | Trigger/Gate input, channel 0        |
|      | SENT_SENT13C    |       |                                    | Receive input channel 13             |
|      | IOM_PIN_0       |       |                                    | GPIO pad input to FPC                |
|      | GTM_DTMT1_2     |       |                                    | CDTM1_DTM0                           |
|      | EVADC_G10CH7    | AI    |                                    | Analog input channel 7, group 10     |
|      | P33.0           | O0    |                                    | General-purpose output               |
|      | GTM_TOUT22      | O1    |                                    | GTM muxed output                     |
|      | IOM_MON0_0      |       |                                    | Monitor input 0                      |
|      | IOM_GTM_0       |       |                                    | GTM-provided inputs to EXOR combiner |
|      | ASCLIN5_ATX     | O2    |                                    | Transmit output                      |
|      | —               | O3    |                                    | Reserved                             |
|      | ASCLIN15_ATX    | O4    |                                    | Transmit output                      |
|      | —               | O5    |                                    | Reserved                             |
|      | EVADC_FC2BFLOUT | O6    |                                    | Boundary flag output, FC channel 2   |
|      | —               | O7    |                                    | Reserved                             |

表 2-20 端口 P33 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                       | Function                                           |
|------|-----------------|-------|-----------------------------------|----------------------------------------------------|
| AE15 | P33.1           | I     | SLOW /<br>PU1 /<br>VEVRB<br>/ ES5 | General-purpose input                              |
|      | GTM_TIM3_IN1_15 |       |                                   | Mux input channel 1 of TIM module 3                |
|      | GTM_TIM1_IN5_6  |       |                                   | Mux input channel 5 of TIM module 1                |
|      | GTM_TIM0_IN5_6  |       |                                   | Mux input channel 5 of TIM module 0                |
|      | EDSADC_ITR1E    |       |                                   | Trigger/Gate input, channel 1                      |
|      | PSI5_RX0C       |       |                                   | RXD inputs (receive data) channel 0                |
|      | EDSADC_DSCIN2B  |       |                                   | Modulator clock input, channel 2                   |
|      | SENT_SENT9C     |       |                                   | Receive input channel 9                            |
|      | ASCLIN8_ARXC    |       |                                   | Receive input                                      |
|      | IOM_PIN_1       |       |                                   | GPIO pad input to FPC                              |
|      | EVADC_G10CH6    | AI    |                                   | Analog input channel 6, group 10                   |
|      | P33.1           | O0    |                                   | General-purpose output                             |
|      | GTM_TOUT23      | O1    |                                   | GTM muxed output                                   |
|      | IOM_MON0_1      |       |                                   | Monitor input 0                                    |
|      | IOM_GTM_1       |       |                                   | GTM-provided inputs to EXOR combiner               |
|      | ASCLIN3_ASLSO   | O2    |                                   | Slave select signal output                         |
|      | QSPI2_SCLK      | O3    |                                   | Master SPI clock output                            |
|      | EDSADC_DSCOUT2  | O4    |                                   | Modulator clock output                             |
|      | EVADC_EMUX02    | O5    |                                   | Control of external analog multiplexer interface 0 |
|      | —               | O6    |                                   | Reserved                                           |
|      | —               | O7    |                                   | Reserved                                           |

表 2-20 端口 P33 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                       | Function                                           |
|------|-----------------|-------|-----------------------------------|----------------------------------------------------|
| AD16 | P33.2           | I     | SLOW /<br>PU1 /<br>VEVRB<br>/ ES5 | General-purpose input                              |
|      | GTM_TIM3_IN2_14 |       |                                   | Mux input channel 2 of TIM module 3                |
|      | GTM_TIM1_IN6_6  |       |                                   | Mux input channel 6 of TIM module 1                |
|      | GTM_TIM0_IN6_6  |       |                                   | Mux input channel 6 of TIM module 0                |
|      | EDSADC_ITR2E    |       |                                   | Trigger/Gate input, channel 2                      |
|      | SENT_SENT8C     |       |                                   | Receive input channel 8                            |
|      | EDSADC_DSDIN2B  |       |                                   | Digital datastream input, channel 2                |
|      | IOM_PIN_2       |       |                                   | GPIO pad input to FPC                              |
|      | EVADC_G10CH5    | AI    |                                   | Analog input channel 5, group 10                   |
|      | P33.2           | O0    |                                   | General-purpose output                             |
|      | GTM_TOUT24      | O1    |                                   | GTM muxed output                                   |
|      | IOM_MON0_2      |       |                                   | Monitor input 0                                    |
|      | IOM_GTM_2       |       |                                   | GTM-provided inputs to EXOR combiner               |
|      | ASCLIN3_ASCLK   | O2    |                                   | Shift clock output                                 |
|      | QSPI2_SLSO10    | O3    |                                   | Master slave select output                         |
|      | PSI5_TX0        | O4    |                                   | TXD outputs (send data)                            |
|      | IOM_MON1_14     |       |                                   | Monitor input 1                                    |
|      | IOM_REF1_14     |       |                                   | Reference input 1                                  |
|      | EVADC_EMUX01    | O5    |                                   | Control of external analog multiplexer interface 0 |
|      | EVADC_FC3BFLOUT | O6    |                                   | Boundary flag output, FC channel 3                 |
|      | ASCLIN14_ATX    | O7    |                                   | Transmit output                                    |

表 2-20 端口 P33 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                       | Function                                           |
|------|-----------------|-------|-----------------------------------|----------------------------------------------------|
| AE16 | P33.3           | I     | SLOW /<br>PU1 /<br>VEVRB<br>/ ES5 | General-purpose input                              |
|      | GTM_TIM3_IN3_12 |       |                                   | Mux input channel 3 of TIM module 3                |
|      | GTM_TIM1_IN7_6  |       |                                   | Mux input channel 7 of TIM module 1                |
|      | GTM_TIM0_IN7_6  |       |                                   | Mux input channel 7 of TIM module 0                |
|      | PSI5_RX1C       |       |                                   | RXD inputs (receive data) channel 1                |
|      | SENT_SENT7C     |       |                                   | Receive input channel 7                            |
|      | EDSADC_DSCIN1B  |       |                                   | Modulator clock input, channel 1                   |
|      | ASCLIN14_ARXA   |       |                                   | Receive input                                      |
|      | IOM_PIN_3       |       |                                   | GPIO pad input to FPC                              |
|      | EVADC_G10CH4    | AI    |                                   | Analog input channel 4, group 10                   |
|      | P33.3           | O0    |                                   | General-purpose output                             |
|      | GTM_TOUT25      | O1    |                                   | GTM muxed output                                   |
|      | IOM_MON0_3      |       |                                   | Monitor input 0                                    |
|      | IOM_GTM_3       |       |                                   | GTM-provided inputs to EXOR combiner               |
|      | ASCLIN5_ASCLK   | O2    |                                   | Shift clock output                                 |
|      | QSPI4_SLSO2     | O3    |                                   | Master slave select output                         |
|      | EDSADC_DSCOUT1  | O4    |                                   | Modulator clock output                             |
|      | EVADC_EMUX00    | O5    |                                   | Control of external analog multiplexer interface 0 |
|      | —               | O6    |                                   | Reserved                                           |
|      | ASCLIN14_ATX    | O7    |                                   | Transmit output                                    |

表 2-20 端口 P33 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                        | Function                                           |
|------|-----------------|-------|------------------------------------|----------------------------------------------------|
| AD17 | P33.4           | I     | SLOW /<br>PU1 /<br>VEVRSB<br>/ ES5 | General-purpose input                              |
|      | GTM_TIM4_IN4_10 |       |                                    | Mux input channel 4 of TIM module 4                |
|      | GTM_TIM1_IN0_10 |       |                                    | Mux input channel 0 of TIM module 1                |
|      | GTM_TIM0_IN0_10 |       |                                    | Mux input channel 0 of TIM module 0                |
|      | EDSADC_ITR0F    |       |                                    | Trigger/Gate input, channel 0                      |
|      | SENT_SENT6C     |       |                                    | Receive input channel 6                            |
|      | EDSADC_DSDIN1B  |       |                                    | Digital datastream input, channel 1                |
|      | CCU61_CTRAPC    |       |                                    | Trap input capture                                 |
|      | ASCLIN5_ARXB    |       |                                    | Receive input                                      |
|      | ASCLIN14_ARXB   |       |                                    | Receive input                                      |
|      | IOM_PIN_4       |       |                                    | GPIO pad input to FPC                              |
|      | GTM_DTMT2_0     |       |                                    | CDTM2_DTM0                                         |
|      | EVADC_G10CH3    | AI    |                                    | Analog input channel 3, group 10                   |
|      | P33.4           | O0    |                                    | General-purpose output                             |
|      | GTM_TOUT26      | O1    |                                    | GTM muxed output                                   |
|      | IOM_MON0_4      |       |                                    | Monitor input 0                                    |
|      | IOM_GTM_4       |       |                                    | GTM-provided inputs to EXOR combiner               |
|      | ASCLIN2_ARTS    | O2    |                                    | Ready to send output                               |
|      | QSPI2_SLSO12    | O3    |                                    | Master slave select output                         |
|      | PSI5_TX1        | O4    |                                    | TXD outputs (send data)                            |
|      | IOM_MON1_15     |       |                                    | Monitor input 1                                    |
|      | EVADC_EMUX12    | O5    |                                    | Control of external analog multiplexer interface 1 |
|      | EVADC_FC0BFLOUT | O6    |                                    | Boundary flag output, FC channel 0                 |
|      | CAN13_TXD       | O7    |                                    | CAN transmit output node 3                         |

表 2-20 端口 P33 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                                        | Function                                  |
|------|-----------------|-------|----------------------------------------------------|-------------------------------------------|
| AE17 | P33.5           | I     | SLOW /<br>PU1 /<br>VEVRSB<br>/ ES5                 | General-purpose input                     |
|      | GTM_TIM4_IN5_10 |       |                                                    | Mux input channel 5 of TIM module 4       |
|      | GTM_TIM1_IN1_8  |       |                                                    | Mux input channel 1 of TIM module 1       |
|      | GTM_TIM0_IN1_8  |       |                                                    | Mux input channel 1 of TIM module 0       |
|      | EDSADC_DSCIN0B  |       |                                                    | Modulator clock input, channel 0          |
|      | EDSADC_ITR1F    |       |                                                    | Trigger/Gate input, channel 1             |
|      | GPT120_T4EUIDB  |       |                                                    | Count direction control input of timer T4 |
|      | PSI5S_RXC       |       |                                                    | RX data input                             |
|      | ASCLIN2_ACTSB   |       |                                                    | Clear to send input                       |
|      | CCU61_CCPOS2C   |       |                                                    | Hall capture input 2                      |
|      | PSI5_RX2C       |       |                                                    | RXD inputs (receive data) channel 2       |
|      | SENT_SENT5C     |       |                                                    | Receive input channel 5                   |
|      | CAN13_RXDB      |       |                                                    | CAN receive input node 3                  |
|      | IOM_PIN_5       |       |                                                    | GPIO pad input to FPC                     |
|      | EVADC_G10CH2    | AI    |                                                    | Analog input channel 2, group 10          |
|      | P33.5           | O0    | General-purpose output                             |                                           |
|      | GTM_TOUT27      | O1    | GTM muxed output                                   |                                           |
|      | IOM_MON0_5      |       | Monitor input 0                                    |                                           |
|      | IOM_GTM_5       |       | GTM-provided inputs to EXOR combiner               |                                           |
|      | QSPI0_SLSO7     | O2    | Master slave select output                         |                                           |
|      | QSPI1_SLSO7     | O3    | Master slave select output                         |                                           |
|      | EDSADC_DSCOUT0  | O4    | Modulator clock output                             |                                           |
|      | EVADC_EMUX11    | O5    | Control of external analog multiplexer interface 1 |                                           |
|      | EVADC_FC2BFLOUT | O6    | Boundary flag output, FC channel 2                 |                                           |
|      | ASCLIN5_ASLSO   | O7    | Slave select signal output                         |                                           |

表 2-20 端口 P33 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                        | Function                                           |
|------|-----------------|-------|------------------------------------|----------------------------------------------------|
| AD18 | P33.6           | I     | SLOW /<br>PU1 /<br>VEVRSB<br>/ ES5 | General-purpose input                              |
|      | GTM_TIM1_IN2_9  |       |                                    | Mux input channel 2 of TIM module 1                |
|      | GTM_TIM0_IN2_9  |       |                                    | Mux input channel 2 of TIM module 0                |
|      | EDSADC_ITR2F    |       |                                    | Trigger/Gate input, channel 2                      |
|      | GPT120_T2EUDB   |       |                                    | Count direction control input of timer T2          |
|      | SENT_SENT4C     |       |                                    | Receive input channel 4                            |
|      | CCU61_CCPOS1C   |       |                                    | Hall capture input 1                               |
|      | EDSADC_DSDIN0B  |       |                                    | Digital datastream input, channel 0                |
|      | ASCLIN8_ARXD    |       |                                    | Receive input                                      |
|      | IOM_PIN_6       |       |                                    | GPIO pad input to FPC                              |
|      | GTM_DTMT2_1     |       |                                    | CDTM2_DTM0                                         |
|      | EVADC_G10CH1    | AI    |                                    | Analog input channel 1, group 10                   |
|      | P33.6           | O0    |                                    | General-purpose output                             |
|      | GTM_TOUT28      | O1    |                                    | GTM muxed output                                   |
|      | IOM_MON0_6      |       |                                    | Monitor input 0                                    |
|      | IOM_GTM_6       |       |                                    | GTM-provided inputs to EXOR combiner               |
|      | ASCLIN2_ASLSO   | O2    |                                    | Slave select signal output                         |
|      | QSPI2_SLSO11    | O3    |                                    | Master slave select output                         |
|      | PSI5_TX2        | O4    |                                    | TXD outputs (send data)                            |
|      | IOM_REF1_15     |       |                                    | Reference input 1                                  |
|      | EVADC_EMUX10    | O5    |                                    | Control of external analog multiplexer interface 1 |
|      | EVADC_FC1BFLOUT | O6    |                                    | Boundary flag output, FC channel 1                 |
|      | PSI5S_TX        | O7    |                                    | TX data output                                     |

表 2-20 端口 P33 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                        | Function                                                    |
|------|-----------------|-------|------------------------------------|-------------------------------------------------------------|
| AE18 | P33.7           | I     | SLOW /<br>PU1 /<br>VEVRSB<br>/ ES5 | General-purpose input                                       |
|      | GTM_TIM1_IN3_9  |       |                                    | Mux input channel 3 of TIM module 1                         |
|      | GTM_TIM0_IN3_9  |       |                                    | Mux input channel 3 of TIM module 0                         |
|      | CAN00_RXDE      |       |                                    | CAN receive input node 0                                    |
|      | GPT120_T2INB    |       |                                    | Trigger/gate input of timer T2                              |
|      | CCU61_CCPOS0C   |       |                                    | Hall capture input 0                                        |
|      | SCU_E_REQ4_0    |       |                                    | ERU Channel 4 inputs 0 to 5 (0 is the LSB and 5 is the MSB) |
|      | SENT_SENT14C    |       |                                    | Receive input channel 14                                    |
|      | IOM_PIN_7       |       |                                    | GPIO pad input to FPC                                       |
|      | EVADC_G10CH0    | AI    |                                    | Analog input channel 0, group 10                            |
|      | P33.7           | O0    |                                    | General-purpose output                                      |
|      | GTM_TOUT29      | O1    |                                    | GTM muxed output                                            |
|      | IOM_MON0_7      |       |                                    | Monitor input 0                                             |
|      | IOM_GTM_7       |       |                                    | GTM-provided inputs to EXOR combiner                        |
|      | ASCLIN2_ASCLK   | O2    |                                    | Shift clock output                                          |
|      | QSPI4_SLSO7     | O3    |                                    | Master slave select output                                  |
|      | ASCLIN8_ATX     | O4    |                                    | Transmit output                                             |
|      | —               | O5    |                                    | Reserved                                                    |
|      | EVADC_FC3BFLOUT | O6    |                                    | Boundary flag output, FC channel 3                          |
|      | —               | O7    |                                    | Reserved                                                    |

表 2-20 端口 P33 的功能 (续)

| Ball | Symbol                 | Ctrl. | Buffer Type                 | Function                                         |
|------|------------------------|-------|-----------------------------|--------------------------------------------------|
| AD19 | P33.8                  | I     | FAST /<br>HighZ /<br>VEVRSB | General-purpose input                            |
|      | GTM_TIM1_IN4_7         |       |                             | Mux input channel 4 of TIM module 1              |
|      | GTM_TIM0_IN4_7         |       |                             | Mux input channel 4 of TIM module 0              |
|      | ASCLIN2_ARXE           |       |                             | Receive input                                    |
|      | SCU_EMGSTOP_POR<br>T_A |       |                             | Emergency stop Port Pin A input request          |
|      | IOM_PIN_8              |       |                             | GPIO pad input to FPC                            |
|      | P33.8                  | O0    |                             | General-purpose output                           |
|      | GTM_TOUT30             | O1    |                             | GTM muxed output                                 |
|      | IOM_MON0_8             |       |                             | Monitor input 0                                  |
|      | ASCLIN2_ATX            |       |                             | Transmit output                                  |
|      | IOM_MON2_14            | O2    |                             | Monitor input 2                                  |
|      | IOM_REF2_14            |       |                             | Reference input 2                                |
|      | QSPI4_SLSO2            |       |                             | Master slave select output                       |
|      | —                      | O4    |                             | Reserved                                         |
|      | CAN00_TXD              | O5    |                             | CAN transmit output node 0                       |
|      | IOM_MON2_5             |       |                             | Monitor input 2                                  |
|      | IOM_REF2_5             |       |                             | Reference input 2                                |
|      | —                      | O6    |                             | Reserved                                         |
|      | CCU61_COUT62           | O7    |                             | T12 PWM channel 62                               |
|      | IOM_MON1_13            |       |                             | Monitor input 1                                  |
|      | IOM_REF1_8             |       |                             | Reference input 1                                |
|      | SMU_FSP0               | O     |                             | FSP[1..0] Output Signals - Generated by SMU_core |

表 2-20 端口 P33 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                        | Function                            |
|------|----------------|-------|------------------------------------|-------------------------------------|
| AE19 | P33.9          | I     | SLOW /<br>PU1 /<br>VEVRSB<br>/ ES5 | General-purpose input               |
|      | GTM_TIM1_IN1_9 |       |                                    | Mux input channel 1 of TIM module 1 |
|      | GTM_TIM0_IN1_9 |       |                                    | Mux input channel 1 of TIM module 0 |
|      | IOM_PIN_9      |       |                                    | GPIO pad input to FPC               |
|      | P33.9          | O0    |                                    | General-purpose output              |
|      | GTM_TOUT31     | O1    |                                    | GTM muxed output                    |
|      | IOM_MON0_9     |       |                                    | Monitor input 0                     |
|      | ASCLIN2_ATX    |       |                                    | Transmit output                     |
|      | IOM_MON2_14    | O2    |                                    | Monitor input 2                     |
|      | IOM_REF2_14    |       |                                    | Reference input 2                   |
|      | QSPI4_SLSO1    |       |                                    | Master slave select output          |
|      | ASCLIN2_ASCLK  | O3    |                                    | Shift clock output                  |
|      | CAN01_TXD      | O4    |                                    | CAN transmit output node 1          |
|      | IOM_MON2_6     |       |                                    | Monitor input 2                     |
|      | IOM_REF2_6     |       |                                    | Reference input 2                   |
|      | ASCLIN0_ATX    | O5    |                                    | Transmit output                     |
|      | IOM_MON2_12    |       |                                    | Monitor input 2                     |
|      | IOM_REF2_12    |       |                                    | Reference input 2                   |
|      | CCU61_CC62     | O6    |                                    | T12 PWM channel 62                  |
|      | IOM_MON1_10    |       |                                    | Monitor input 1                     |
|      | IOM_REF1_11    |       |                                    | Reference input 1                   |

表 2-20 端口 P33 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                        | Function                                                                  |
|------|-----------------|-------|------------------------------------|---------------------------------------------------------------------------|
| AD20 | P33.10          | I     | FAST /<br>PU1 /<br>VEVRSB<br>/ ES5 | General-purpose input                                                     |
|      | GTM_TIM4_IN4_14 |       |                                    | Mux input channel 4 of TIM module 4                                       |
|      | GTM_TIM1_IN0_9  |       |                                    | Mux input channel 0 of TIM module 1                                       |
|      | GTM_TIM0_IN0_9  |       |                                    | Mux input channel 0 of TIM module 0                                       |
|      | QSPI4_SLSIA     |       |                                    | Slave select input                                                        |
|      | CAN01_RXDD      |       |                                    | CAN receive input node 1                                                  |
|      | ASCLIN0_ARXD    |       |                                    | Receive input                                                             |
|      | IOM_PIN_10      |       |                                    | GPIO pad input to FPC                                                     |
|      | P33.10          | O0    |                                    | General-purpose output                                                    |
|      | GTM_TOUT32      | O1    |                                    | GTM muxed output                                                          |
|      | IOM_MON0_10     |       |                                    | Monitor input 0                                                           |
|      | QSPI1_SLSO6     | O2    |                                    | Master slave select output                                                |
|      | QSPI4_SLSO0     | O3    |                                    | Master slave select output                                                |
|      | ASCLIN1_ASLSO   | O4    |                                    | Slave select signal output                                                |
|      | PSI5S_CLK       | O5    |                                    | PSI5S CLK is a clock that can be used on a pin to drive the external PHY. |
|      | —               | O6    |                                    | Reserved                                                                  |
|      | CCU61_COUT61    | O7    |                                    | T12 PWM channel 61                                                        |
|      | IOM_MON1_12     |       |                                    | Monitor input 1                                                           |
|      | IOM_REF1_9      |       |                                    | Reference input 1                                                         |
|      | SMU_FSP1        | O     |                                    | FSP[1..0] Output Signals - Generated by SMU_core                          |
| AE20 | P33.11          | I     | FAST /<br>PU1 /<br>VEVRSB<br>/ ES5 | General-purpose input                                                     |
|      | GTM_TIM1_IN2_8  |       |                                    | Mux input channel 2 of TIM module 1                                       |
|      | GTM_TIM0_IN2_8  |       |                                    | Mux input channel 2 of TIM module 0                                       |
|      | QSPI4_SCLKA     |       |                                    | Slave SPI clock inputs                                                    |
|      | IOM_PIN_11      |       |                                    | GPIO pad input to FPC                                                     |
|      | P33.11          | O0    |                                    | General-purpose output                                                    |
|      | GTM_TOUT33      | O1    |                                    | GTM muxed output                                                          |
|      | IOM_MON0_11     |       |                                    | Monitor input 0                                                           |
|      | ASCLIN1_ASCLK   | O2    |                                    | Shift clock output                                                        |
|      | QSPI4_SCLK      | O3    |                                    | Master SPI clock output                                                   |
|      | —               | O4    |                                    | Reserved                                                                  |
|      | —               | O5    |                                    | Reserved                                                                  |
|      | EDSADC_CGPWMN   | O6    |                                    | Negative carrier generator output                                         |
|      | CCU61_CC61      | O7    |                                    | T12 PWM channel 61                                                        |
|      | IOM_MON1_9      |       |                                    | Monitor input 1                                                           |
|      | IOM_REF1_12     |       |                                    | Reference input 1                                                         |

表 2-20 端口 P33 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                        | Function                            |
|------|----------------|-------|------------------------------------|-------------------------------------|
| AD21 | P33.12         | I     | FAST /<br>PU1 /<br>VEVRSB<br>/ ES5 | General-purpose input               |
|      | GTM_TIM3_IN0_6 |       |                                    | Mux input channel 0 of TIM module 3 |
|      | GTM_TIM2_IN0_6 |       |                                    | Mux input channel 0 of TIM module 2 |
|      | QSPI4_MTSRA    |       |                                    | Slave SPI data input                |
|      | CAN00_RXDD     |       |                                    | CAN receive input node 0            |
|      | PMS_PINBWKP    |       |                                    | PINB (P33.12) pin input             |
|      | IOM_PIN_12     |       |                                    | GPIO pad input to FPC               |
|      | P33.12         | O0    |                                    | General-purpose output              |
|      | GTM_TOUT34     | O1    |                                    | GTM muxed output                    |
|      | IOM_MON0_12    |       |                                    | Monitor input 0                     |
|      | ASCLIN1_ATX    | O2    |                                    | Transmit output                     |
|      | IOM_MON2_13    |       |                                    | Monitor input 2                     |
|      | IOM_REF2_13    |       |                                    | Reference input 2                   |
|      | QSPI4_MTSR     | O3    |                                    | Master SPI data output              |
|      | ASCLIN1_ASCLK  | O4    |                                    | Shift clock output                  |
|      | CAN22_TXD      | O5    |                                    | CAN transmit output node 2          |
|      | EDSADC_CGPWMP  | O6    |                                    | Positive carrier generator output   |
|      | CCU61_COUT60   | O7    |                                    | T12 PWM channel 60                  |
|      | IOM_MON1_11    |       |                                    | Monitor input 1                     |
|      | IOM_REF1_10    |       |                                    | Reference input 1                   |

表 2-20 端口 P33 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                        | Function                            |
|------|----------------|-------|------------------------------------|-------------------------------------|
| AE21 | P33.13         | I     | FAST /<br>PU1 /<br>VEVRSB<br>/ ES5 | General-purpose input               |
|      | GTM_TIM3_IN1_5 |       |                                    | Mux input channel 1 of TIM module 3 |
|      | GTM_TIM2_IN1_5 |       |                                    | Mux input channel 1 of TIM module 2 |
|      | ASCLIN1_ARXF   |       |                                    | Receive input                       |
|      | EDSADC_SGNB    |       |                                    | Carrier sign signal input           |
|      | QSPI4_MRSTA    |       |                                    | Master SPI data input               |
|      | MSC1_INJ1      |       |                                    | Injection signal from port          |
|      | CAN22_RXDA     |       |                                    | CAN receive input node 2            |
|      | P33.13         | O0    |                                    | General-purpose output              |
|      | GTM_TOUT35     | O1    |                                    | GTM muxed output                    |
|      | ASCLIN1_ATX    | O2    |                                    | Transmit output                     |
|      | IOM_MON2_13    |       |                                    | Monitor input 2                     |
|      | IOM_REF2_13    |       |                                    | Reference input 2                   |
|      | QSPI4_MRST     | O3    |                                    | Slave SPI data output               |
|      | IOM_MON2_4     |       |                                    | Monitor input 2                     |
|      | IOM_REF2_4     |       |                                    | Reference input 2                   |
|      | QSPI2_SLSO6    | O4    |                                    | Master slave select output          |
|      | CAN00_TXD      | O5    |                                    | CAN transmit output node 0          |
|      | IOM_MON2_5     |       |                                    | Monitor input 2                     |
|      | IOM_REF2_5     |       |                                    | Reference input 2                   |
|      | —              | O6    |                                    | Reserved                            |
|      | CCU61_CC60     | O7    |                                    | T12 PWM channel 60                  |
|      | IOM_MON1_8     |       |                                    | Monitor input 1                     |
|      | IOM_REF1_13    |       |                                    | Reference input 1                   |

表 2-20 端口 P33 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                         | Function                            |
|------|-----------------|-------|-------------------------------------|-------------------------------------|
| AA19 | P33.14          | I     | FAST /<br>PU1 /<br>VEVR SB<br>/ ES5 | General-purpose input               |
|      | GTM_TIM5_IN0_8  |       |                                     | Mux input channel 0 of TIM module 5 |
|      | GTM_TIM4_IN5_14 |       |                                     | Mux input channel 5 of TIM module 4 |
|      | GTM_TIM2_IN0_8  |       |                                     | Mux input channel 0 of TIM module 2 |
|      | QSPI2_SCLKD     |       |                                     | Slave SPI clock inputs              |
|      | CBS_TGI6        |       |                                     | Trigger input                       |
|      | P33.14          | O0    |                                     | General-purpose output              |
|      | GTM_TOUT143     | O1    |                                     | GTM muxed output                    |
|      | —               | O2    |                                     | Reserved                            |
|      | QSPI2_SCLK      | O3    |                                     | Master SPI clock output             |
|      | —               | O4    |                                     | Reserved                            |
|      | —               | O5    |                                     | Reserved                            |
|      | —               | O6    |                                     | Reserved                            |
|      | CCU60_CC62      | O7    |                                     | T12 PWM channel 62                  |
|      | IOM_MON1_0      |       |                                     | Monitor input 1                     |
|      | IOM_REF1_4      |       |                                     | Reference input 1                   |
| AB19 | CBS_TGO6        | O     | SLOW /<br>PU1 /<br>VEVR SB<br>/ ES5 | Trigger output                      |
|      | P33.15          | I     |                                     | General-purpose input               |
|      | GTM_TIM5_IN1_9  |       |                                     | Mux input channel 1 of TIM module 5 |
|      | GTM_TIM4_IN6_12 |       |                                     | Mux input channel 6 of TIM module 4 |
|      | GTM_TIM2_IN1_7  |       |                                     | Mux input channel 1 of TIM module 2 |
|      | CBS_TGI7        |       |                                     | Trigger input                       |
|      | P33.15          | O0    |                                     | General-purpose output              |
|      | GTM_TOUT144     | O1    |                                     | GTM muxed output                    |
|      | —               | O2    |                                     | Reserved                            |
|      | QSPI2_SLSO11    | O3    |                                     | Master slave select output          |
|      | —               | O4    |                                     | Reserved                            |
|      | —               | O5    |                                     | Reserved                            |
|      | —               | O6    |                                     | Reserved                            |
|      | CCU60_COUT62    | O7    |                                     | T12 PWM channel 62                  |
|      | IOM_MON1_5      |       |                                     | Monitor input 1                     |
|      | IOM_REF1_1      |       |                                     | Reference input 1                   |
|      | CBS_TGO7        | O     |                                     | Trigger output                      |

表 2-21 端口 P34 功能

| Ball | Symbol          | Ctrl. | Buffer Type                        | Function                            |
|------|-----------------|-------|------------------------------------|-------------------------------------|
| AB16 | P34.1           | I     | SLOW /<br>PU1 /<br>VEVRSB<br>/ ES5 | General-purpose input               |
|      | GTM_TIM5_IN3_9  |       |                                    | Mux input channel 3 of TIM module 5 |
|      | GTM_TIM3_IN4_12 |       |                                    | Mux input channel 4 of TIM module 3 |
|      | GTM_TIM2_IN3_9  |       |                                    | Mux input channel 3 of TIM module 2 |
|      | EVADC_G10CH11   | AI    |                                    | Analog input channel 11, group 10   |
|      | P34.1           | O0    |                                    | General-purpose output              |
|      | GTM_TOUT146     | O1    |                                    | GTM muxed output                    |
|      | ASCLIN4_ATX     | O2    |                                    | Transmit output                     |
|      | —               | O3    |                                    | Reserved                            |
|      | CAN00_TXD       | O4    |                                    | CAN transmit output node 0          |
|      | IOM_MON2_5      |       |                                    | Monitor input 2                     |
|      | IOM_REF2_5      |       |                                    | Reference input 2                   |
|      | CAN20_TXD       | O5    |                                    | CAN transmit output node 0          |
|      | —               | O6    |                                    | Reserved                            |
|      | CCU60_COUT63    | O7    |                                    | T13 PWM channel 63                  |
|      | IOM_MON1_6      |       |                                    | Monitor input 1                     |
|      | IOM_REF1_0      |       |                                    | Reference input 1                   |
| AA17 | P34.2           | I     | SLOW /<br>PU1 /<br>VEVRSB<br>/ ES  | General-purpose input               |
|      | GTM_TIM5_IN4_9  |       |                                    | Mux input channel 4 of TIM module 5 |
|      | GTM_TIM3_IN5_13 |       |                                    | Mux input channel 5 of TIM module 3 |
|      | GTM_TIM2_IN4_8  |       |                                    | Mux input channel 4 of TIM module 2 |
|      | ASCLIN4_ARXB    |       |                                    | Receive input                       |
|      | CAN00_RXDG      |       |                                    | CAN receive input node 0            |
|      | CAN20_RXDC      |       |                                    | CAN receive input node 0            |
|      | EVADC_G10CH10   | AI    |                                    | Analog input channel 10, group 10   |
|      | P34.2           | O0    |                                    | General-purpose output              |
|      | GTM_TOUT147     | O1    |                                    | GTM muxed output                    |
|      | —               | O2    |                                    | Reserved                            |
|      | —               | O3    |                                    | Reserved                            |
|      | —               | O4    |                                    | Reserved                            |
|      | —               | O5    |                                    | Reserved                            |
|      | —               | O6    |                                    | Reserved                            |
|      | CCU60_CC60      | O7    |                                    | T12 PWM channel 60                  |
|      | IOM_MON1_2      |       |                                    | Monitor input 1                     |
|      | IOM_REF1_6      |       |                                    | Reference input 1                   |

表 2-21 端口 P34 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                       | Function                            |
|------|-----------------|-------|-----------------------------------|-------------------------------------|
| AB17 | P34.3           | I     | SLOW /<br>PU1 /<br>VEVRSB<br>/ ES | General-purpose input               |
|      | GTM_TIM5_IN5_10 |       |                                   | Mux input channel 5 of TIM module 5 |
|      | GTM_TIM3_IN6_13 |       |                                   | Mux input channel 6 of TIM module 3 |
|      | GTM_TIM2_IN5_9  |       |                                   | Mux input channel 5 of TIM module 2 |
|      | EVADC_G10CH9    | AI    |                                   | Analog input channel 9, group 10    |
|      | P34.3           | O0    |                                   | General-purpose output              |
|      | GTM_TOUT148     | O1    |                                   | GTM muxed output                    |
|      | ASCLIN4_ASCLK   | O2    |                                   | Shift clock output                  |
|      | —               | O3    |                                   | Reserved                            |
|      | QSPI2_SLSO10    | O4    |                                   | Master slave select output          |
|      | —               | O5    |                                   | Reserved                            |
|      | —               | O6    |                                   | Reserved                            |
|      | CCU60_COUT60    | O7    |                                   | T12 PWM channel 60                  |
|      | IOM_MON1_3      |       |                                   | Monitor input 1                     |
|      | IOM_REF1_3      |       |                                   | Reference input 1                   |
| AA18 | P34.4           | I     | SLOW /<br>PU1 /<br>VEVRSB<br>/ ES | General-purpose input               |
|      | GTM_TIM5_IN6_10 |       |                                   | Mux input channel 6 of TIM module 5 |
|      | GTM_TIM3_IN7_12 |       |                                   | Mux input channel 7 of TIM module 3 |
|      | GTM_TIM2_IN6_8  |       |                                   | Mux input channel 6 of TIM module 2 |
|      | QSPI2_MRSTD     |       |                                   | Master SPI data input               |
|      | EVADC_G10CH8    | AI    |                                   | Analog input channel 8, group 10    |
|      | P34.4           | O0    |                                   | General-purpose output              |
|      | GTM_TOUT149     | O1    |                                   | GTM muxed output                    |
|      | ASCLIN4_ASLSO   | O2    |                                   | Slave select signal output          |
|      | —               | O3    |                                   | Reserved                            |
|      | QSPI2_MRST      | O4    |                                   | Slave SPI data output               |
|      | IOM_MON2_2      |       |                                   | Monitor input 2                     |
|      | IOM_REF2_2      |       |                                   | Reference input 2                   |
|      | —               | O5    |                                   | Reserved                            |
|      | —               |       |                                   | Reserved                            |
|      | CCU60_CC61      | O7    |                                   | T12 PWM channel 61                  |
|      | IOM_MON1_1      |       |                                   | Monitor input 1                     |
|      | IOM_REF1_5      |       |                                   | Reference input 1                   |

## 引脚定义和功能 BGA516 封装变体 引脚配置

表 2-21 端口 P34 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                       | Function                            |
|------|-----------------|-------|-----------------------------------|-------------------------------------|
| AB18 | P34.5           | I     | FAST /<br>PU1 /<br>VEVRSB<br>/ ES | General-purpose input               |
|      | GTM_TIM5_IN7_9  |       |                                   | Mux input channel 7 of TIM module 5 |
|      | GTM_TIM4_IN7_12 |       |                                   | Mux input channel 7 of TIM module 4 |
|      | GTM_TIM2_IN7_9  |       |                                   | Mux input channel 7 of TIM module 2 |
|      | QSPI2_MTSRD     |       |                                   | Slave SPI data input                |
|      | ASCLIN8_ARXE    |       |                                   | Receive input                       |
|      | P34.5           | O0    |                                   | General-purpose output              |
|      | GTM_TOUT150     | O1    |                                   | GTM muxed output                    |
|      | ASCLIN8_ATX     | O2    |                                   | Transmit output                     |
|      | —               | O3    |                                   | Reserved                            |
|      | QSPI2_MTSR      | O4    |                                   | Master SPI data output              |
|      | —               | O5    |                                   | Reserved                            |
|      | —               | O6    |                                   | Reserved                            |
|      | CCU60_COUT61    | O7    |                                   | T12 PWM channel 61                  |
|      | IOM_MON1_4      |       |                                   | Monitor input 1                     |
|      | IOM_REF1_2      |       |                                   | Reference input 1                   |

表 2-22 模拟输入

| Ball | Symbol        | Ctrl. | Buffer Type         | Function                               |
|------|---------------|-------|---------------------|----------------------------------------|
| AA15 | AN0           | I     | D / HighZ<br>/ VDDM | Analog Input 0                         |
|      | EVADC_G0CH0   |       |                     | Analog input channel 0, group 0        |
|      | EDSADC_EDS3PA |       |                     | Positive analog input channel 3, pin A |
| AB15 | AN1           | I     | D / HighZ<br>/ VDDM | Analog Input 1                         |
|      | EVADC_G0CH1   |       |                     | Analog input channel 1, group 0        |
|      | EDSADC_EDS3NA |       |                     | Negative analog input channel 3, pin A |
| AD14 | AN2           | I     | D / HighZ<br>/ VDDM | Analog Input 2                         |
|      | EVADC_G0CH2   |       |                     | Analog input channel 2, group 0        |
|      | EDSADC_EDS0PA |       |                     | Positive analog input channel 0, pin A |
| AB14 | AN3           | I     | D / HighZ<br>/ VDDM | Analog Input 3                         |
|      | EVADC_G0CH3   |       |                     | Analog input channel 3, group 0        |
|      | EDSADC_EDS0NA |       |                     | Negative analog input channel 0, pin A |
| AA14 | AN4           | I     | D / HighZ<br>/ VDDM | Analog Input 4                         |
|      | EVADC_G11CH0  |       |                     | Analog input channel 0, group 11       |
|      | EVADC_G0CH4   |       |                     | Analog input channel 4, group 0        |
| AE14 | AN5           | I     | D / HighZ<br>/ VDDM | Analog Input 5                         |
|      | EVADC_G11CH1  |       |                     | Analog input channel 1, group 11       |
|      | EVADC_G0CH5   |       |                     | Analog input channel 5, group 0        |

表 2-22 模拟输入 (续)

| Ball | Symbol        | Ctrl. | Buffer Type      | Function                               |
|------|---------------|-------|------------------|----------------------------------------|
| AA13 | AN6           | I     | D / HighZ / VDDM | Analog Input 6                         |
|      | EVADC_G11CH2  |       |                  | Analog input channel 2, group 11       |
|      | EVADC_G0CH6   |       |                  | Analog input channel 6, group 0        |
| AB13 | AN7           | I     | D / HighZ / VDDM | Analog Input 7                         |
|      | EVADC_G11CH3  |       |                  | Analog input channel 3, group 11       |
|      | EVADC_G0CH7   |       |                  | Analog input channel 7, group 0        |
| AD13 | AN8           | I     | D / HighZ / VDDM | Analog Input 8                         |
|      | EVADC_G11CH4  |       |                  | Analog input channel 4, group 11       |
|      | EVADC_G1CH0   |       |                  | Analog input channel 0, group 1        |
| AB12 | AN9           | I     | D / HighZ / VDDM | Analog Input 9                         |
|      | EVADC_G11CH5  |       |                  | Analog input channel 5, group 11       |
|      | EVADC_G1CH1   |       |                  | Analog input channel 1, group 1        |
| AE13 | AN10          | I     | D / HighZ / VDDM | Analog Input 10                        |
|      | EVADC_G11CH6  |       |                  | Analog input channel 6, group 11       |
|      | EVADC_G1CH2   |       |                  | Analog input channel 2, group 1        |
| AD12 | AN11          | I     | D / HighZ / VDDM | Analog Input 11                        |
|      | EVADC_G11CH7  |       |                  | Analog input channel 7, group 11       |
|      | EVADC_G1CH3   |       |                  | Analog input channel 3, group 1        |
| AA12 | AN12          | I     | D / HighZ / VDDM | Analog Input 12                        |
|      | EVADC_G1CH4   |       |                  | Analog input channel 4, group 1        |
|      | EDSADC_EDS0PB |       |                  | Positive analog input channel 0, pin B |
| AD11 | AN13          | I     | D / HighZ / VDDM | Analog Input 13                        |
|      | EVADC_G1CH5   |       |                  | Analog input channel 5, group 1        |
|      | EDSADC_EDS0NB |       |                  | Negative analog input channel 0, pin B |
| AB11 | AN14          | I     | D / HighZ / VDDM | Analog Input 14                        |
|      | EVADC_G1CH6   |       |                  | Analog input channel 6, group 1        |
|      | EDSADC_EDS3PB |       |                  | Positive analog input channel 3, pin B |
| AA11 | AN15          | I     | D / HighZ / VDDM | Analog Input 15                        |
|      | EVADC_G1CH7   |       |                  | Analog input channel 7, group 1        |
|      | EDSADC_EDS3NB |       |                  | Negative analog input channel 3, pin N |
| AD10 | AN16          | I     | D / HighZ / VDDM | Analog Input 16                        |
|      | EVADC_G2CH0   |       |                  | Analog input channel 0, group 2        |
|      | EVADC_FC0CH0  |       |                  | Analog input FC channel 0              |
| AB10 | AN17/P40.10   | I     | S / HighZ / VDDM | Analog Input 17                        |
|      | SENT_SENT10A  |       |                  | Receive input channel 10               |
|      | EVADC_G2CH1   |       |                  | Analog input channel 1, group 2        |
|      | EVADC_FC1CH0  |       |                  | Analog input FC channel 1              |

## 引脚定义和功能 BGA516 封装变体 引脚配置

表 2-22 模拟输入 (续)

| Ball | Symbol        | Ctrl. | Buffer Type      | Function                               |
|------|---------------|-------|------------------|----------------------------------------|
| AD9  | AN18/P40.11   | I     | S / HighZ / VDDM | Analog Input 18                        |
|      | SENT_SENT11A  |       |                  | Receive input channel 11               |
|      | EVADC_G11CH8  |       |                  | Analog input channel 8, group 11       |
|      | EVADC_G2CH2   |       |                  | Analog input channel 2, group 2        |
| AD8  | AN19/P40.12   | I     | S / HighZ / VDDM | Analog Input 19                        |
|      | SENT_SENT12A  |       |                  | Receive input channel 12               |
|      | EVADC_G11CH9  |       |                  | Analog input channel 9, group 11       |
|      | EVADC_G2CH3   |       |                  | Analog input channel 3, group 2        |
| AE8  | AN20          | I     | D / HighZ / VDDM | Analog Input 20                        |
|      | EVADC_G2CH4   |       |                  | Analog input channel 4, group 2        |
|      | EDSADC_EDS2PA |       |                  | Positive analog input channel 2, pin A |
| AE7  | AN21          | I     | D / HighZ / VDDM | Analog Input 21                        |
|      | EVADC_G2CH5   |       |                  | Analog input channel 5, group 2        |
|      | EDSADC_EDS2NA |       |                  | Negative analog input channel 2, pin A |
| AA10 | AN22          | I     | D / HighZ / VDDM | Analog Input 22                        |
|      | EVADC_G2CH6   |       |                  | Analog input channel 6, group 2        |
| Y10  | AN23          | I     | D / HighZ / VDDM | Analog Input 23                        |
|      | EVADC_G2CH7   |       |                  | Analog input channel 7, group 2        |
| AD7  | AN24/P40.0    | I     | S / HighZ / VDDM | Analog Input 24                        |
|      | SENT_SENT0A   |       |                  | Receive input channel 0                |
|      | EVADC_G3CH0   |       |                  | Analog input channel 0, group 3        |
|      | CCU60_CCPOS0D |       |                  | Hall capture input 0                   |
|      | EDSADC_EDS2PB |       |                  | Positive analog input channel 2, pin B |
| AD6  | AN25/P40.1    | I     | S / HighZ / VDDM | Analog Input 25                        |
|      | SENT_SENT1A   |       |                  | Receive input channel 1                |
|      | EVADC_G3CH1   |       |                  | Analog input channel 1, group 3        |
|      | CCU60_CCPOS1B |       |                  | Hall capture input 1                   |
|      | EDSADC_EDS2NB |       |                  | Negative analog input channel 2, pin B |
| AC7  | AN26/P40.2    | I     | S / HighZ / VDDM | Analog Input 26                        |
|      | SENT_SENT2A   |       |                  | Receive input channel 2                |
|      | EVADC_G3CH2   |       |                  | Analog input channel 2, group 3        |
|      | CCU60_CCPOS1D |       |                  | Hall capture input 1                   |
|      | EVADC_G11CH10 |       |                  | Analog input channel 10, group 11      |
| AC6  | AN27/P40.3    | I     | S / HighZ / VDDM | Analog Input 27                        |
|      | SENT_SENT3A   |       |                  | Receive input channel 3                |
|      | EVADC_G3CH3   |       |                  | Analog input channel 3, group 3        |
|      | CCU60_CCPOS2B |       |                  | Hall capture input 2                   |
|      | EVADC_G11CH11 |       |                  | Analog input channel 11, group 11      |

表 2-22 模拟输入 (续)

| Ball | Symbol        | Ctrl. | Buffer Type      | Function                               |
|------|---------------|-------|------------------|----------------------------------------|
| AB7  | AN28/P40.13   | I     | S / HighZ / VDDM | Analog Input 28                        |
|      | SENT_SENT13A  |       |                  | Receive input channel 13               |
|      | EVADC_G3CH4   |       |                  | Analog input channel 4, group 3        |
|      | EVADC_G4CH4   |       |                  | Analog input channel 4, group 4        |
| AB6  | AN29/P40.14   | I     | S / HighZ / VDDM | Analog Input 29                        |
|      | SENT_SENT14A  |       |                  | Receive input channel 14               |
|      | EVADC_G3CH5   |       |                  | Analog input channel 5, group 3        |
|      | EVADC_G4CH5   |       |                  | Analog input channel 5, group 4        |
| AA9  | AN30          | I     | D / HighZ / VDDM | Analog Input 30                        |
|      | EVADC_G3CH6   |       |                  | Analog input channel 6, group 3        |
|      | EVADC_G4CH6   |       |                  | Analog input channel 6, group 4        |
| Y9   | AN31          | I     | D / HighZ / VDDM | Analog Input 31                        |
|      | EVADC_G3CH7   |       |                  | Analog input channel 7, group 3        |
|      | EVADC_G4CH7   |       |                  | Analog input channel 7, group 4        |
| W9   | AN32/P40.4    | I     | S / HighZ / VDDM | Analog Input 32                        |
|      | SENT_SENT4A   |       |                  | Receive input channel 4                |
|      | EVADC_G8CH0   |       |                  | Analog input channel 0, group 8        |
|      | CCU60_CCPOS2D |       |                  | Hall capture input 2                   |
|      | EVADC_G11CH12 |       |                  | Analog input channel 12, group 11      |
| Y6   | AN33/P40.5    | I     | S / HighZ / VDDM | Analog Input 33                        |
|      | SENT_SENT5A   |       |                  | Receive input channel 5                |
|      | EVADC_G8CH1   |       |                  | Analog input channel 1, group 8        |
|      | CCU61_CCPOS0D |       |                  | Hall capture input 0                   |
|      | EVADC_G11CH13 |       |                  | Analog input channel 13, group 11      |
| W10  | AN34          | I     | D / HighZ / VDDM | Analog Input 34                        |
|      | EVADC_G8CH2   |       |                  | Analog input channel 2, group 8        |
|      | EVADC_G11CH14 |       |                  | Analog input channel 14, group 11      |
| Y7   | AN35          | I     | D / HighZ / VDDM | Analog Input 35                        |
|      | EVADC_G8CH3   |       |                  | Analog input channel 3, group 8        |
|      | EVADC_G11CH15 |       |                  | Analog input channel 15, group 11      |
| V9   | AN36/P40.6    | I     | S / HighZ / VDDM | Analog Input 36                        |
|      | SENT_SENT6A   |       |                  | Receive input channel 6                |
|      | EVADC_G8CH4   |       |                  | Analog input channel 4, group 8        |
|      | CCU61_CCPOS1B |       |                  | Hall capture input 1                   |
|      | EDSADC_EDS1PA |       |                  | Positive analog input channel 1, pin A |

表 2-22 模拟输入 (续)

| Ball | Symbol        | Ctrl. | Buffer Type      | Function                               |
|------|---------------|-------|------------------|----------------------------------------|
| W7   | AN37/P40.7    | I     | S / HighZ / VDDM | Analog Input 37                        |
|      | SENT_SENT7A   |       |                  | Receive input channel 7                |
|      | EVADC_G8CH5   |       |                  | Analog input channel 5, group 8        |
|      | CCU61_CCPOS1D |       |                  | Hall capture input 1                   |
|      | EDSADC_EDS1NA |       |                  | Negative analog input channel 1, pin A |
| V10  | AN38/P40.8    | I     | S / HighZ / VDDM | Analog Input 38                        |
|      | SENT_SENT8A   |       |                  | Receive input channel 8                |
|      | EVADC_G8CH6   |       |                  | Analog input channel 6, group 8        |
|      | CCU61_CCPOS2B |       |                  | Hall capture input 2                   |
|      | EDSADC_EDS1PB |       |                  | Positive analog input channel 1, pin B |
| W6   | AN39/P40.9    | I     | S / HighZ / VDDM | Analog Input 39                        |
|      | SENT_SENT9A   |       |                  | Receive input channel 9                |
|      | EVADC_G8CH7   |       |                  | Analog input channel 7, group 8        |
|      | CCU61_CCPOS2D |       |                  | Hall capture input 2                   |
|      | EDSADC_EDS1NB |       |                  | Negative analog input channel 1, pin B |
| U10  | AN40          | I     | D / HighZ / VDDM | Analog Input 40                        |
|      | EVADC_G8CH8   |       |                  | Analog input channel 8, group 8        |
|      | EVADC_G4CH0   |       |                  | Analog input channel 0, group 4        |
| U9   | AN41          | I     | D / HighZ / VDDM | Analog Input 41                        |
|      | EVADC_G8CH9   |       |                  | Analog input channel 9, group 8        |
|      | EVADC_G4CH1   |       |                  | Analog input channel 1, group 4        |
| T10  | AN42          | I     | D / HighZ / VDDM | Analog Input 42                        |
|      | EVADC_G8CH10  |       |                  | Analog input channel 10, group 8       |
|      | EVADC_G4CH2   |       |                  | Analog input channel 2, group 4        |
| T9   | AN43          | I     | D / HighZ / VDDM | Analog Input 43                        |
|      | EVADC_G8CH11  |       |                  | Analog input channel 11, group 8       |
|      | EVADC_G4CH3   |       |                  | Analog input channel 3, group 4        |
| V6   | AN44          | I     | D / HighZ / VDDM | Analog Input 44                        |
|      | EVADC_G8CH12  |       |                  | Analog input channel 12, group 8       |
|      | EDSADC_EDS1PC |       |                  | Positive analog input channel 1, pin C |
| V7   | AN45          | I     | D / HighZ / VDDM | Analog Input 45                        |
|      | EVADC_G8CH13  |       |                  | Analog input channel 13, group 8       |
|      | EDSADC_EDS1NC |       |                  | Negative analog input channel 1, pin C |
| U6   | AN46          | I     | D / HighZ / VDDM | Analog Input 46                        |
|      | EVADC_G8CH14  |       |                  | Analog input channel 14, group 8       |
|      | EDSADC_EDS1PD |       |                  | Positive analog input channel 1, pin D |

表 2-22 模拟输入 (续)

| Ball | Symbol        | Ctrl. | Buffer Type      | Function                               |
|------|---------------|-------|------------------|----------------------------------------|
| U7   | AN47          | I     | D / HighZ / VDDM | Analog Input 47                        |
|      | EVADC_G8CH15  |       |                  | Analog input channel 15, group 8       |
|      | EDSADC_EDS1ND |       |                  | Negative analog input channel 1, pin D |
| AK7  | AN48          | I     | D / HighZ / VDDM | Analog Input 48                        |
|      | EVADC_G5CH0   |       |                  | Analog input channel 0, group 5        |
| AJ7  | AN49          | I     | D / HighZ / VDDM | Analog Input 49                        |
|      | EVADC_G5CH1   |       |                  | Analog input channel 1, group 5        |
| AJ6  | AN50          | I     | D / HighZ / VDDM | Analog Input 50                        |
|      | EVADC_G5CH2   |       |                  | Analog input channel 2, group 5        |
|      | EDSADC_EDS9PA |       |                  | Positive analog input channel 9, pin A |
| AK6  | AN51          | I     | D / HighZ / VDDM | Analog Input 51                        |
|      | EVADC_G5CH3   |       |                  | Analog input channel 3, group 5        |
|      | EDSADC_EDS9NA |       |                  | Negative analog input channel 9, pin A |
| AJ5  | AN52          | I     | D / HighZ / VDDM | Analog Input 52                        |
|      | EVADC_G5CH4   |       |                  | Analog input channel 4, group 5        |
|      | EDSADC_EDS6PA |       |                  | Positive analog input channel 6, pin A |
| AK5  | AN53          | I     | D / HighZ / VDDM | Analog Input 53                        |
|      | EVADC_G5CH5   |       |                  | Analog input channel 5, group 5        |
|      | EDSADC_EDS6NA |       |                  | Negative analog input channel 6, pin A |
| AJ4  | AN54/P41.4    | I     | S / HighZ / VDDM | Analog Input 54                        |
|      | SENT_SENT20A  |       |                  | Receive input channel 20               |
|      | EVADC_G5CH6   |       |                  | Analog input channel 6, group 5        |
|      | EDSADC_EDS6PB |       |                  | Positive analog input channel 6, pin B |
| AK4  | AN55/P41.5    | I     | S / HighZ / VDDM | Analog Input 55                        |
|      | SENT_SENT21A  |       |                  | Receive input channel 21               |
|      | EVADC_G5CH7   |       |                  | Analog input channel 7, group 5        |
|      | EDSADC_EDS6NB |       |                  | Negative analog input channel 6, pin B |
| AF1  | AN56          | I     | D / HighZ / VDDM | Analog Input 56                        |
|      | EVADC_G6CH0   |       |                  | Analog input channel 0, group 6        |
| AF2  | AN57          | I     | D / HighZ / VDDM | Analog Input 57                        |
|      | EVADC_G6CH1   |       |                  | Analog input channel 1, group 6        |
| AE2  | AN58          | I     | D / HighZ / VDDM | Analog Input 58                        |
|      | EVADC_G6CH2   |       |                  | Analog input channel 2, group 6        |
| AE1  | AN59          | I     | D / HighZ / VDDM | Analog Input 59                        |
|      | EVADC_G6CH3   |       |                  | Analog input channel 3, group 6        |
| AD1  | AN60          | I     | D / HighZ / VDDM | Analog Input 60                        |
|      | EVADC_G6CH4   |       |                  | Analog input channel 4, group 6        |
|      | EDSADC_EDS7PA |       |                  | Positive analog input channel 7, pin A |

表 2-22 模拟输入 (续)

| Ball | Symbol        | Ctrl. | Buffer Type      | Function                                      |
|------|---------------|-------|------------------|-----------------------------------------------|
| AD2  | AN61          | I     | D / HighZ / VDDM | <b>Analog Input 61</b>                        |
|      | EVADC_G6CH5   |       |                  | <b>Analog input channel 5, group 6</b>        |
|      | EDSADC_EDS7NA |       |                  | <b>Negative analog input channel 7, pin A</b> |
| AC2  | AN62/P41.6    | I     | S / HighZ / VDDM | <b>Analog Input 62</b>                        |
|      | SENT_SENT22A  |       |                  | <b>Receive input channel 22</b>               |
|      | EVADC_G6CH6   |       |                  | <b>Analog input channel 6, group 6</b>        |
|      | EDSADC_EDS7PB |       |                  | <b>Positive analog input channel 7, pin B</b> |
| AC1  | AN63/P41.7    | I     | S / HighZ / VDDM | <b>Analog Input 63</b>                        |
|      | SENT_SENT23A  |       |                  | <b>Receive input channel 23</b>               |
|      | EVADC_G6CH7   |       |                  | <b>Analog input channel 7, group 6</b>        |
|      | EDSADC_EDS7NB |       |                  | <b>Negative analog input channel 7, pin B</b> |
| AB2  | AN64/P41.8    | I     | S / HighZ / VDDM | <b>Analog Input 64</b>                        |
|      | SENT_SENT24A  |       |                  | <b>Receive input channel 24</b>               |
|      | EVADC_G7CH0   |       |                  | <b>Analog input channel 0, group 7</b>        |
| AB1  | AN65          | I     | D / HighZ / VDDM | <b>Analog Input 65</b>                        |
|      | EVADC_G7CH1   |       |                  | <b>Analog input channel 1, group 7</b>        |
| AA2  | AN66          | I     | D / HighZ / VDDM | <b>Analog Input 66</b>                        |
|      | EVADC_G7CH2   |       |                  | <b>Analog input channel 2, group 7</b>        |
| AA1  | AN67/P40.15   | I     | S / HighZ / VDDM | <b>Analog Input 67</b>                        |
|      | SENT_SENT15A  |       |                  | <b>Receive input channel 15</b>               |
|      | EVADC_G7CH3   |       |                  | <b>Analog input channel 3, group 7</b>        |
| Y1   | AN68/P41.0    | I     | S / HighZ / VDDM | <b>Analog Input 68</b>                        |
|      | SENT_SENT16A  |       |                  | <b>Receive input channel 16</b>               |
|      | EVADC_G7CH4   |       |                  | <b>Analog input channel 4, group 7</b>        |
|      | EDSADC_EDS8PA |       |                  | <b>Positive analog input channel 8, pin A</b> |
| Y2   | AN69/P41.1    | I     | S / HighZ / VDDM | <b>Analog Input 69</b>                        |
|      | SENT_SENT17A  |       |                  | <b>Receive input channel 17</b>               |
|      | EVADC_G7CH5   |       |                  | <b>Analog input channel 5, group 7</b>        |
|      | EDSADC_EDS8NA |       |                  | <b>Negative analog input channel 8, pin A</b> |
| W1   | AN70/P41.2    | I     | S / HighZ / VDDM | <b>Analog Input 70</b>                        |
|      | SENT_SENT18A  |       |                  | <b>Receive input channel 18</b>               |
|      | EVADC_G7CH6   |       |                  | <b>Analog input channel 6, group 7</b>        |
|      | EDSADC_EDS9PB |       |                  | <b>Positive analog input channel 9, pin B</b> |
| W2   | AN71/P41.3    | I     | S / HighZ / VDDM | <b>Analog Input 71</b>                        |
|      | SENT_SENT19A  |       |                  | <b>Receive input channel 19</b>               |
|      | EVADC_G7CH7   |       |                  | <b>Analog input channel 7, group 7</b>        |
|      | EDSADC_EDS9NB |       |                  | <b>Negative analog input channel 9, pin B</b> |

## 引脚定义和功能 BGA516 封装变体 引脚配置

注意：端口引脚P32.0和P32.1是双向引脚，具有以下两个功能：

1. 如果将这些引脚用作标准GPIO，则可以使用P32.0和P32.1引脚配置表中定义的功能。
2. 如果引脚用作外部MOSFET的预驱动器（内部DCDC情况），P32.0和P32.1将充当名为VGATE1N和VGATE1P的模拟IO。

表 2-23 系统 I/O

| Ball | Symbol      | Ctrl. | Buffer Type             | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------|-------------|-------|-------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| M21  | ESR1        | I/O   | FAST /<br>PU1 /<br>VEXT | <b>ESR1 Port Pin input - can be used to trigger a reset or an NMI</b><br>ESR1: External System Request Reset 1. Default NMI function. See also SCU chapter for details. Default after power-on can be different. See also SCU chapter 'Reset Control Unit' and SCU_IOCRR register description.<br>PMS_EVRWUP: EVR Wakeup Pin                                                                                                                                                                                                 |
|      | PMS_ESR1WKP | I     |                         | <b>ESR1 pin input</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| L21  | ESR0        | I/O   | FAST /<br>OD /<br>VEXT  | <b>ESR0 Port Pin input - can be used to trigger a reset or an NMI</b><br>ESR0: External System Request Reset 0. Default configuration during and after reset is open-drain driver. The driver drives low during power-on reset. This is valid additionally after deactivation of PORST_N until the internal reset phase has finished. See also SCU chapter for details. Default after power-on can be different. See also SCU chapter 'Reset Control Unit' and SCU_IOCRR register description.<br>PMS_EVRWUP: EVR Wakeup Pin |
|      | PMS_ESR0WKP | I     |                         | <b>ESR0 pin input</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| AD22 | VGATE1P     | O     | —                       | <b>DCDC P ch. MOSFET gate driver output</b><br>P32.1 / External Pass Device gate control for EVRC                                                                                                                                                                                                                                                                                                                                                                                                                            |
| AE22 | VGATE1N     | O     | —                       | <b>DCDC N ch. MOSFET gate driver output</b><br>P32.0 / SMPS mode: analog output. External Pass Device gate control for EVRC                                                                                                                                                                                                                                                                                                                                                                                                  |
| U25  | XTAL1       | I     | XTAL /<br>VEXT          | <b>XTAL pad1</b><br>XTAL1. Main Oscillator/PLL/Clock Generator Input.                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| U24  | XTAL2       | O     | XTAL /<br>VEXT          | <b>XTAL pad2</b><br>XTAL2. Main Oscillator/PLL/Clock Generator OUTPUT                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| T24  | TRST        | I     | FAST /<br>PU2 /<br>VEXT | <b>JTAG Module Reset/Enable Input</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| P21  | TCK         | I     | FAST /<br>PD2 /<br>VEXT | <b>JTAG Module Clock Input</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                               |
|      | DAP0        | I     |                         | <b>DAP: DAP0 Clock Input</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                 |

表 2-23 系统 I/O (续)

| Ball | Symbol | Ctrl. | Buffer Type             | Function                                                                              |
|------|--------|-------|-------------------------|---------------------------------------------------------------------------------------|
| R21  | TMS    | I     | FAST /                  | <b>JTAG Module State Machine Control Input</b>                                        |
|      | DAP1   | I/O   | PD2 /<br>VEXT           | <b>DAP: DAP1 Data I/O</b>                                                             |
| M22  | PORST  | I/O   | PORST /<br>PD /<br>VEXT | <b>PORST pin</b><br>Power On Reset Input. Additional strong PD in case of power fail. |

表 2-24 供电

| Ball                                                                                                                                    | Symbol | Ctrl. | Buffer Type | Function                                                   |
|-----------------------------------------------------------------------------------------------------------------------------------------|--------|-------|-------------|------------------------------------------------------------|
| N19, V19,<br>M18, W18,<br>W13, V12,<br>J21, K20,<br>N12, M13                                                                            | VDD    | I     | —           | <b>Digital Core Power Supply (1.25V)</b>                   |
| AJ30, AH29,<br>AD25, AC24,<br>G8, F7, B3,<br>A2, J29, J30,<br>AH30, AK29,<br>AK20, AJ11,<br>AK11                                        | VEXT   | I     | —           | <b>External Power Supply (5V / 3.3V)</b>                   |
| J10                                                                                                                                     | VFLEX  | I     | —           | <b>Digital Power Supply for Flex Port Pads (5V / 3.3V)</b> |
| AE10, AJ9,<br>AK9                                                                                                                       | VDDM   | I     | —           | <b>ADC Analog Power Supply (5V / 3.3V)</b>                 |
| A29, B28,<br>F24, G23                                                                                                                   | VDDP3  | I     | —           | <b>Flash Power Supply (3.3V)</b>                           |
| AK30, AJ29,<br>AE25, AD24,<br>AB22, AA21,<br>K10, J9, G7,<br>B2, A30,<br>B30, B29,<br>F25, G24,<br>J22, K21,<br>H30, H29,<br>AJ10, AK10 | VSS    | I     | —           | <b>Digital Ground</b>                                      |
| AE9, AJ8,<br>AK8                                                                                                                        | VSSM   | I     | —           | <b>Analog Ground for VDDM</b>                              |

表 2-24 供电 (续)

| Ball                                                                                                                                                                                                                                                                                 | Symbol | Ctrl. | Buffer Type | Function                                   |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-------|-------------|--------------------------------------------|
| P19, U19,<br>P18, R18,<br>T18, U18,<br>M15, M16,<br>M17, N17,<br>R17, T17,<br>V17, W17,<br>N16, P16,<br>R16, T16,<br>U16, V16,<br>N15, P15,<br>R15, T15,<br>U15, V15,<br>M14, N14,<br>R14, T14,<br>V14, W14,<br>P13, R13,<br>T13, U13,<br>P12, U12,<br>T19, W15,<br>W16, R12,<br>T12 | VSS    | I     | —           | <b>Digital Ground</b>                      |
| T25                                                                                                                                                                                                                                                                                  | VSS    | I     | —           | <b>Oscillator Ground, VSS(OSC)</b>         |
| AE11                                                                                                                                                                                                                                                                                 | VAREF1 | I     | —           | <b>Positive Analog Reference Voltage 1</b> |
| AE12                                                                                                                                                                                                                                                                                 | VAGND1 | I     | —           | <b>Negative Analog Reference Voltage 1</b> |
| AA6                                                                                                                                                                                                                                                                                  | VAREF2 | I     | —           | <b>Positive Analog Reference Voltage 2</b> |
| AA7                                                                                                                                                                                                                                                                                  | VAGND2 | I     | —           | <b>Negative Analog Reference Voltage 2</b> |

## 引脚定义和功能 BGA516 封装变体 引脚配置

表 2-24 供电 (续)

| Ball                                                                                                                                                                                                                                                                                                                                           | Symbol | Ctrl. | Buffer Type | Function                                                                                                       |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-------|-------------|----------------------------------------------------------------------------------------------------------------|
| C30, D30,<br>E30, F30,<br>G30, W30,<br>C29, D29,<br>E29, F29,<br>G29, A28,<br>A27, B27,<br>A26, B26,<br>A25, A21,<br>AJ20, B21,<br>B20, A17,<br>B17, A10,<br>B10, A9, B9,<br>A8, A4, B4,<br>A3, AJ3,<br>AK3, C2, D2,<br>E2, H2, R2,<br>AH2, AJ2,<br>AK2, B1, C1,<br>D1, E1, H1,<br>J1, R1, T1,<br>AH1, AJ1,<br>B6, B14,<br>B25, V1, V2,<br>R19 | NC     | I     | —           | <b>Not connected. These pins are reserved for future extensions and shall not be connected externally</b>      |
| AB9, F6,<br>AE6, A1,<br>AK1, V30,<br>V29                                                                                                                                                                                                                                                                                                       | NC1    | I     | —           | <b>Not connected. These pins are not connected on package level and will not be used for future extensions</b> |
| AA16                                                                                                                                                                                                                                                                                                                                           | VEVRSB | I     | —           | <b>Standby Power Supply (5V / 3.3V) for the Standby SRAM</b>                                                   |
| V24                                                                                                                                                                                                                                                                                                                                            | VDD    | I     | —           | <b>Digital Power Supply for Oscillator (1.25V), VDD(OSC)</b>                                                   |
| V25                                                                                                                                                                                                                                                                                                                                            | VEXT   | I     | —           | <b>Digital Power Supply for Oscillator (shall be supplied with same level as used for VEXT), VEXT(OSC)</b>     |
| AG1                                                                                                                                                                                                                                                                                                                                            | VAREF3 | I     | —           | <b>Positive Analog Reference Voltage 3</b>                                                                     |
| AG2                                                                                                                                                                                                                                                                                                                                            | VAGND3 | I     | —           | <b>Negative Analog Reference Voltage 3</b>                                                                     |

## 2.2 BGA292 封装变体引脚配置

表 2-25 端口 P00 功能

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| G1   | P00.0           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN4_10 |       |                                 | Mux input channel 4 of TIM module 5 |
|      | GTM_TIM3_IN0_1  |       |                                 | Mux input channel 0 of TIM module 3 |
|      | GTM_TIM2_IN0_1  |       |                                 | Mux input channel 0 of TIM module 2 |
|      | CCU61_CTRAPA    |       |                                 | Trap input capture                  |
|      | CCU60_T12HRE    |       |                                 | External timer start 12             |
|      | MSC0_INJ0       |       |                                 | Injection signal from port          |
|      | GETH_MDIOA      |       |                                 | MDIO Input                          |
|      | P00.0           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT9       | O1    |                                 | GTM muxed output                    |
|      | IOM_REF0_9      |       |                                 | Reference input 0                   |
|      | ASCLIN3_ASCLK   | O2    |                                 | Shift clock output                  |
|      | ASCLIN3_ATX     | O3    |                                 | Transmit output                     |
|      | IOM_MON2_15     |       |                                 | Monitor input 2                     |
|      | IOM_REF2_15     |       |                                 | Reference input 2                   |
|      | —               | O4    |                                 | Reserved                            |
|      | CAN10_TXD       | O5    |                                 | CAN transmit output node 0          |
|      | —               | O6    |                                 | Reserved                            |
|      | CCU60_COUT63    | O7    |                                 | T13 PWM channel 63                  |
|      | IOM_MON1_6      |       |                                 | Monitor input 1                     |
|      | IOM_REF1_0      |       |                                 | Reference input 1                   |
|      | GETH_MDIO       | O     |                                 | MDIO Output                         |

表 2-25 端口 P00 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                               |
|------|-----------------|-------|---------------------------------|----------------------------------------|
| G2   | P00.1           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                  |
|      | GTM_TIM5_IN5_11 |       |                                 | Mux input channel 5 of TIM module 5    |
|      | GTM_TIM3_IN1_1  |       |                                 | Mux input channel 1 of TIM module 3    |
|      | GTM_TIM2_IN1_1  |       |                                 | Mux input channel 1 of TIM module 2    |
|      | CCU60_CC60INB   |       |                                 | T12 capture input 60                   |
|      | ASCLIN3_ARXE    |       |                                 | Receive input                          |
|      | EDSADC_DSCIN5A  |       |                                 | Modulator clock input, channel 5       |
|      | CAN10_RXDA      |       |                                 | CAN receive input node 0               |
|      | PSI5_RX0A       |       |                                 | RXD inputs (receive data) channel 0    |
|      | CCU61_CC60INA   |       |                                 | T12 capture input 60                   |
|      | SENT_SENT0B     |       |                                 | Receive input channel 0                |
|      | EDSADC_DSCIN7B  |       |                                 | Modulator clock input, channel 7       |
|      | EVADC_G9CH11    | AI    |                                 | Analog input channel 11, group 9       |
|      | EDSADC_EDS5NA   |       |                                 | Negative analog input channel 5, pin A |
|      | P00.1           | O0    |                                 | General-purpose output                 |
|      | GTM_TOUT10      | O1    |                                 | GTM muxed output                       |
|      | IOM_REF0_10     |       |                                 | Reference input 0                      |
|      | ASCLIN3_ATX     | O2    |                                 | Transmit output                        |
|      | IOM_MON2_15     |       |                                 | Monitor input 2                        |
|      | IOM_REF2_15     |       |                                 | Reference input 2                      |
|      | —               | O3    |                                 | Reserved                               |
|      | EDSADC_DSCOUT5  | O4    |                                 | Modulator clock output                 |
|      | EDSADC_DSCOUT7  | O5    |                                 | Modulator clock output                 |
|      | SENT_SPC0       | O6    |                                 | Transmit output                        |
|      | CCU61_CC60      | O7    |                                 | T12 PWM channel 60                     |
|      | IOM_MON1_8      |       |                                 | Monitor input 1                        |
|      | IOM_REF1_13     |       |                                 | Reference input 1                      |

表 2-25 端口 P00 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                      | Function                               |
|------|-----------------|-------|----------------------------------|----------------------------------------|
| H1   | P00.2           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES1 | General-purpose input                  |
|      | GTM_TIM5_IN6_11 |       |                                  | Mux input channel 6 of TIM module 5    |
|      | GTM_TIM3_IN1_2  |       |                                  | Mux input channel 1 of TIM module 3    |
|      | GTM_TIM2_IN1_2  |       |                                  | Mux input channel 1 of TIM module 2    |
|      | EDSADC_DSDIN7B  |       |                                  | Digital datastream input, channel 7    |
|      | EDSADC_DSDIN5A  |       |                                  | Digital datastream input, channel 5    |
|      | SENT_SENT1B     |       |                                  | Receive input channel 1                |
|      | EVADC_G9CH10    | AI    |                                  | Analog input channel 10, group 9       |
|      | EDSADC_EDS5PA   |       |                                  | Positive analog input channel 5, pin A |
|      | P00.2           | O0    |                                  | General-purpose output                 |
|      | GTM_TOUT11      | O1    |                                  | GTM muxed output                       |
|      | IOM_REF0_11     |       |                                  | Reference input 0                      |
|      | ASCLIN3_ASCLK   | O2    |                                  | Shift clock output                     |
|      | CAN21_TXD       | O3    |                                  | CAN transmit output node 1             |
|      | PSI5_TX0        | O4    |                                  | TXD outputs (send data)                |
|      | IOM_MON1_14     |       |                                  | Monitor input 1                        |
|      | IOM_REF1_14     |       |                                  | Reference input 1                      |
|      | CAN03_TXD       | O5    |                                  | CAN transmit output node 3             |
|      | IOM_MON2_8      |       |                                  | Monitor input 2                        |
|      | IOM_REF2_8      |       |                                  | Reference input 2                      |
|      | QSPI3_SLSO4     | O6    |                                  | Master slave select output             |
|      | CCU61_COUT60    | O7    |                                  | T12 PWM channel 60                     |
|      | IOM_MON1_11     |       |                                  | Monitor input 1                        |
|      | IOM_REF1_10     |       |                                  | Reference input 1                      |

表 2-25 端口 P00 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                      | Function                               |
|------|-----------------|-------|----------------------------------|----------------------------------------|
| H2   | P00.3           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES1 | General-purpose input                  |
|      | GTM_TIM5_IN7_10 |       |                                  | Mux input channel 7 of TIM module 5    |
|      | GTM_TIM3_IN2_1  |       |                                  | Mux input channel 2 of TIM module 3    |
|      | GTM_TIM2_IN2_1  |       |                                  | Mux input channel 2 of TIM module 2    |
|      | CCU60_CC61INB   |       |                                  | T12 capture input 61                   |
|      | EDSADC_DSCIN3A  |       |                                  | Modulator clock input, channel 3       |
|      | EDSADC_ITR5F    |       |                                  | Trigger/Gate input, channel 5          |
|      | PSI5_RX1A       |       |                                  | RXD inputs (receive data) channel 1    |
|      | CAN03_RXDA      |       |                                  | CAN receive input node 3               |
|      | CAN21_RXDA      |       |                                  | CAN receive input node 1               |
|      | PSI5S_RXA       |       |                                  | RX data input                          |
|      | SENT_SENT2B     |       |                                  | Receive input channel 2                |
|      | CCU61_CC61INA   |       |                                  | T12 capture input 61                   |
|      | ASCLIN12_ARXA   |       |                                  | Receive input                          |
|      | EVADC_G9CH9     | AI    |                                  | Analog input channel 9, group 9        |
|      | EDSADC_EDS5NB   |       |                                  | Negative analog input channel 5, pin B |
|      | P00.3           | O0    |                                  | General-purpose output                 |
|      | GTM_TOUT12      | O1    |                                  | GTM muxed output                       |
|      | IOM_REF0_12     |       |                                  | Reference input 0                      |
|      | ASCLIN3_ASLSO   | O2    |                                  | Slave select signal output             |
|      | ASCLIN12_ATX    | O3    |                                  | Transmit output                        |
|      | EDSADC_DSCOUT3  | O4    |                                  | Modulator clock output                 |
|      | —               | O5    |                                  | Reserved                               |
|      | SENT_SPC2       | O6    |                                  | Transmit output                        |
|      | CCU61_CC61      | O7    |                                  | T12 PWM channel 61                     |
|      | IOM_MON1_9      |       |                                  | Monitor input 1                        |
|      | IOM_REF1_12     |       |                                  | Reference input 1                      |

表 2-25 端口 P00 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                      | Function                                                    |
|------|----------------|-------|----------------------------------|-------------------------------------------------------------|
| J1   | P00.4          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES1 | General-purpose input                                       |
|      | GTM_TIM6_IN4_1 |       |                                  | Mux input channel 4 of TIM module 6                         |
|      | GTM_TIM3_IN3_1 |       |                                  | Mux input channel 3 of TIM module 3                         |
|      | GTM_TIM2_IN3_1 |       |                                  | Mux input channel 3 of TIM module 2                         |
|      | SCU_E_REQ2_2   |       |                                  | ERU Channel 2 inputs 0 to 5 (0 is the LSB and 5 is the MSB) |
|      | SENT_SENT3B    |       |                                  | Receive input channel 3                                     |
|      | EDSADC_DSDIN3A |       |                                  | Digital datastream input, channel 3                         |
|      | EDSADC_SGNA    |       |                                  | Carrier sign signal input                                   |
|      | ASCLIN10_ARXA  |       |                                  | Receive input                                               |
|      | GTM_DTMA5_0    |       |                                  | CDTM5_DTM4                                                  |
|      | GTM_DTMT3_0    |       |                                  | CDTM3_DTM0                                                  |
|      | EVADC_G9CH8    | AI    |                                  | Analog input channel 8, group 9                             |
|      | EDSADC_EDS5PB  |       |                                  | Positive analog input channel 5, pin B                      |
|      | P00.4          | O0    |                                  | General-purpose output                                      |
|      | GTM_TOUT13     | O1    |                                  | GTM muxed output                                            |
|      | IOM_REF0_13    |       |                                  | Reference input 0                                           |
|      | PSI5S_TX       | O2    |                                  | TX data output                                              |
|      | CAN11_TXD      | O3    |                                  | CAN transmit output node 1                                  |
|      | PSI5_TX1       | O4    |                                  | TXD outputs (send data)                                     |
|      | IOM_MON1_15    |       |                                  | Monitor input 1                                             |
|      | —              | O5    |                                  | Reserved                                                    |
|      | SENT_SPC3      | O6    |                                  | Transmit output                                             |
|      | CCU61_COUT61   | O7    |                                  | T12 PWM channel 61                                          |
|      | IOM_MON1_12    |       |                                  | Monitor input 1                                             |
|      | IOM_REF1_9     |       |                                  | Reference input 1                                           |

表 2-25 端口 P00 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                      | Function                            |
|------|-----------------|-------|----------------------------------|-------------------------------------|
| J2   | P00.5           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES1 | General-purpose input               |
|      | GTM_TIM3_IN4_1  |       |                                  | Mux input channel 4 of TIM module 3 |
|      | GTM_TIM3_IN0_11 |       |                                  | Mux input channel 0 of TIM module 3 |
|      | GTM_TIM2_IN4_1  |       |                                  | Mux input channel 4 of TIM module 2 |
|      | CCU60_CC62INB   |       |                                  | T12 capture input 62                |
|      | EDSADC_DSCIN2A  |       |                                  | Modulator clock input, channel 2    |
|      | PSI5_RX2A       |       |                                  | RXD inputs (receive data) channel 2 |
|      | CCU61_CC62INA   |       |                                  | T12 capture input 62                |
|      | SENT_SENT4B     |       |                                  | Receive input channel 4             |
|      | CAN11_RXDB      |       |                                  | CAN receive input node 1            |
|      | ASCLIN12_ARXB   |       |                                  | Receive input                       |
|      | GTM_DTMT1_1     |       |                                  | CDTM1_DTM0                          |
|      | EVADC_G9CH7     | AI    |                                  | Analog input channel 7, group 9     |
|      | P00.5           | O0    |                                  | General-purpose output              |
|      | GTM_TOUT14      | O1    |                                  | GTM muxed output                    |
|      | IOM_REF0_14     |       |                                  | Reference input 0                   |
|      | EDSADC_CGPWMN   | O2    |                                  | Negative carrier generator output   |
|      | QSPI3_SLSO3     | O3    |                                  | Master slave select output          |
|      | EDSADC_DSCOUT2  | O4    |                                  | Modulator clock output              |
|      | EVADC_FC0BFLOUT | O5    |                                  | Boundary flag output, FC channel 0  |
|      | SENT_SPC4       | O6    |                                  | Transmit output                     |
|      | CCU61_CC62      | O7    |                                  | T12 PWM channel 62                  |
|      | IOM_MON1_10     |       |                                  | Monitor input 1                     |
|      | IOM_REF1_11     |       |                                  | Reference input 1                   |

表 2-25 端口 P00 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                      | Function                                           |
|------|-----------------|-------|----------------------------------|----------------------------------------------------|
| J4   | P00.6           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES1 | General-purpose input                              |
|      | GTM_TIM3_IN5_1  |       |                                  | Mux input channel 5 of TIM module 3                |
|      | GTM_TIM3_IN1_14 |       |                                  | Mux input channel 1 of TIM module 3                |
|      | GTM_TIM2_IN5_1  |       |                                  | Mux input channel 5 of TIM module 2                |
|      | EDSADC_ITR4F    |       |                                  | Trigger/Gate input, channel 4                      |
|      | EDSADC_DSDIN2A  |       |                                  | Digital datastream input, channel 2                |
|      | SENT_SENT5B     |       |                                  | Receive input channel 5                            |
|      | ASCLIN5_ARXA    |       |                                  | Receive input                                      |
|      | GTM_DTMT3_1     |       |                                  | CDTM3_DTM0                                         |
|      | EVADC_G9CH6     | AI    |                                  | Analog input channel 6, group 9                    |
|      | P00.6           | O0    |                                  | General-purpose output                             |
|      | GTM_TOUT15      | O1    |                                  | GTM muxed output                                   |
|      | IOM_REF0_15     |       |                                  | Reference input 0                                  |
|      | EDSADC_CGPWMP   | O2    |                                  | Positive carrier generator output                  |
|      | —               | O3    |                                  | Reserved                                           |
|      | PSI5_TX2        | O4    |                                  | TXD outputs (send data)                            |
|      | IOM_REF1_15     |       |                                  | Reference input 1                                  |
|      | EVADC_EMUX10    | O5    |                                  | Control of external analog multiplexer interface 1 |
|      | SENT_SPC5       | O6    |                                  | Transmit output                                    |
|      | CCU61_COUT62    | O7    |                                  | T12 PWM channel 62                                 |
|      | IOM_MON1_13     |       |                                  | Monitor input 1                                    |
|      | IOM_REF1_8      |       |                                  | Reference input 1                                  |

表 2-25 端口 P00 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                                        | Function                               |
|------|-----------------|-------|----------------------------------------------------|----------------------------------------|
| K1   | P00.7           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES1                   | General-purpose input                  |
|      | GTM_TIM3_IN6_1  |       |                                                    | Mux input channel 6 of TIM module 3    |
|      | GTM_TIM3_IN2_11 |       |                                                    | Mux input channel 2 of TIM module 3    |
|      | GTM_TIM2_IN6_1  |       |                                                    | Mux input channel 6 of TIM module 2    |
|      | CCU61_CC60INC   |       |                                                    | T12 capture input 60                   |
|      | SENT_SENT6B     |       |                                                    | Receive input channel 6                |
|      | EDSADC_DSCIN4A  |       |                                                    | Modulator clock input, channel 4       |
|      | GPT120_T2INA    |       |                                                    | Trigger/gate input of timer T2         |
|      | CCU61_CCPOS0A   |       |                                                    | Hall capture input 0                   |
|      | CCU60_T12HRB    |       |                                                    | External timer start 12                |
|      | GTM_DTMT0_2     |       |                                                    | CDTM0_DTM0                             |
|      | EVADC_G9CH5     | AI    |                                                    | Analog input channel 5, group 9        |
|      | EDSADC_EDS4NA   |       |                                                    | Negative analog input channel 4, pin A |
|      | P00.7           | O0    | General-purpose output                             |                                        |
|      | GTM_TOUT16      | O1    | GTM muxed output                                   |                                        |
|      | ASCLIN5_ATX     | O2    | Transmit output                                    |                                        |
|      | EVADC_FC2BFLOUT | O3    | Boundary flag output, FC channel 2                 |                                        |
|      | EDSADC_DSCOUT4  | O4    | Modulator clock output                             |                                        |
|      | EVADC_EMUX11    | O5    | Control of external analog multiplexer interface 1 |                                        |
|      | SENT_SPC6       | O6    | Transmit output                                    |                                        |
|      | CCU61_CC60      | O7    | T12 PWM channel 60                                 |                                        |
|      | IOM_MON1_8      |       | Monitor input 1                                    |                                        |
|      | IOM_REF1_13     |       | Reference input 1                                  |                                        |

表 2-25 端口 P00 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                                        | Function                                  |
|------|-----------------|-------|----------------------------------------------------|-------------------------------------------|
| K4   | P00.8           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES1                   | General-purpose input                     |
|      | GTM_TIM3_IN7_1  |       |                                                    | Mux input channel 7 of TIM module 3       |
|      | GTM_TIM3_IN3_11 |       |                                                    | Mux input channel 3 of TIM module 3       |
|      | GTM_TIM2_IN7_1  |       |                                                    | Mux input channel 7 of TIM module 2       |
|      | CCU61_CC61INC   |       |                                                    | T12 capture input 61                      |
|      | SENT_SENT7B     |       |                                                    | Receive input channel 7                   |
|      | EDSADC_DSDIN4A  |       |                                                    | Digital datastream input, channel 4       |
|      | GPT120_T2EUDA   |       |                                                    | Count direction control input of timer T2 |
|      | CCU61_CCPOS1A   |       |                                                    | Hall capture input 1                      |
|      | CCU60_T13HRB    |       |                                                    | External timer start 13                   |
|      | ASCLIN10_ARXB   |       |                                                    | Receive input                             |
|      | EVADC_G9CH4     | AI    |                                                    | Analog input channel 4, group 9           |
|      | EDSADC_EDS4PA   |       |                                                    | Positive analog input channel 4, pin A    |
|      | P00.8           | O0    | General-purpose output                             |                                           |
|      | GTM_TOUT17      | O1    | GTM muxed output                                   |                                           |
|      | QSPI3_SLSO6     | O2    | Master slave select output                         |                                           |
|      | ASCLIN10_ATX    | O3    | Transmit output                                    |                                           |
|      | —               | O4    | Reserved                                           |                                           |
|      | EVADC_EMUX12    | O5    | Control of external analog multiplexer interface 1 |                                           |
|      | SENT_SPC7       | O6    | Transmit output                                    |                                           |
|      | CCU61_CC61      | O7    | T12 PWM channel 61                                 |                                           |
|      | IOM_MON1_9      |       | Monitor input 1                                    |                                           |
|      | IOM_REF1_12     |       | Reference input 1                                  |                                           |

表 2-25 端口 P00 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                      | Function                                  |
|------|----------------|-------|----------------------------------|-------------------------------------------|
| K2   | P00.9          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES1 | General-purpose input                     |
|      | GTM_TIM4_IN0_7 |       |                                  | Mux input channel 0 of TIM module 4       |
|      | GTM_TIM1_IN0_1 |       |                                  | Mux input channel 0 of TIM module 1       |
|      | GTM_TIM0_IN0_1 |       |                                  | Mux input channel 0 of TIM module 0       |
|      | CCU61_CC62INC  |       |                                  | T12 capture input 62                      |
|      | SENT_SENT8B    |       |                                  | Receive input channel 8                   |
|      | CCU61_CCPOS2A  |       |                                  | Hall capture input 2                      |
|      | EDSADC_DSCIN1A |       |                                  | Modulator clock input, channel 1          |
|      | EDSADC_ITR3F   |       |                                  | Trigger/Gate input, channel 3             |
|      | GPT120_T4EUDA  |       |                                  | Count direction control input of timer T4 |
|      | CCU60_T13HRC   |       |                                  | External timer start 13                   |
|      | CCU60_T12HRC   |       |                                  | External timer start 12                   |
|      | ASCLIN13_ARXA  |       |                                  | Receive input                             |
|      | EVADC_G9CH3    | AI    |                                  | Analog input channel 3, group 9           |
|      | EDSADC_EDS4NB  |       |                                  | Negative analog input channel 4, pin B    |
|      | P00.9          | O0    |                                  | General-purpose output                    |
|      | GTM_TOUT18     | O1    |                                  | GTM muxed output                          |
|      | QSPI3_SLSO7    | O2    |                                  | Master slave select output                |
|      | ASCLIN3_ARTS   | O3    |                                  | Ready to send output                      |
|      | EDSADC_DSCOUT1 | O4    |                                  | Modulator clock output                    |
|      | ASCLIN4_ATX    | O5    |                                  | Transmit output                           |
|      | SENT_SPC8      | O6    |                                  | Transmit output                           |
|      | CCU61_CC62     | O7    |                                  | T12 PWM channel 62                        |
|      | IOM_MON1_10    |       |                                  | Monitor input 1                           |
|      | IOM_REF1_11    |       |                                  | Reference input 1                         |

表 2-25 端口 P00 功能 (续)

| Ball | Symbol          | Ctrl.                                  | Buffer Type                      | Function                            |
|------|-----------------|----------------------------------------|----------------------------------|-------------------------------------|
| K5   | P00.10          | I                                      | SLOW /<br>PU1 /<br>VEXT /<br>ES1 | General-purpose input               |
|      | GTM_TIM4_IN1_11 |                                        |                                  | Mux input channel 1 of TIM module 4 |
|      | GTM_TIM1_IN1_1  |                                        |                                  | Mux input channel 1 of TIM module 1 |
|      | GTM_TIM0_IN1_1  |                                        |                                  | Mux input channel 1 of TIM module 0 |
|      | SENT_SENT9B     |                                        |                                  | Receive input channel 9             |
|      | EDSADC_DSDIN1A  |                                        |                                  | Digital datastream input, channel 1 |
|      | EVADC_G9CH2     | AI                                     |                                  | Analog input channel 2, group 9     |
|      | EDSADC_EDS4PB   | Positive analog input channel 4, pin B |                                  |                                     |
|      | P00.10          | O0                                     |                                  | General-purpose output              |
|      | GTM_TOUT19      | O1                                     |                                  | GTM muxed output                    |
|      | ASCLIN4_ASCLK   | O2                                     |                                  | Shift clock output                  |
|      | ASCLIN13_ATX    | O3                                     |                                  | Transmit output                     |
|      | —               | O4                                     |                                  | Reserved                            |
|      | —               | O5                                     |                                  | Reserved                            |
|      | SENT_SPC9       | O6                                     |                                  | Transmit output                     |
|      | CCU61_COUT63    | O7                                     |                                  | T13 PWM channel 63                  |
|      | IOM_MON1_7      |                                        |                                  | Monitor input 1                     |
|      | IOM_REF1_7      |                                        |                                  | Reference input 1                   |
| L1   | P00.11          | I                                      | SLOW /<br>PU1 /<br>VEXT /<br>ES1 | General-purpose input               |
|      | GTM_TIM4_IN2_11 |                                        |                                  | Mux input channel 2 of TIM module 4 |
|      | GTM_TIM1_IN2_1  |                                        |                                  | Mux input channel 2 of TIM module 1 |
|      | GTM_TIM0_IN2_1  |                                        |                                  | Mux input channel 2 of TIM module 0 |
|      | CCU60_CTRAPA    |                                        |                                  | Trap input capture                  |
|      | EDSADC_DSCIN0A  |                                        |                                  | Modulator clock input, channel 0    |
|      | CCU61_T12HRE    |                                        |                                  | External timer start 12             |
|      | SENT_SENT10B    |                                        |                                  | Receive input channel 10            |
|      | ASCLIN13_ARXB   |                                        |                                  | Receive input                       |
|      | EVADC_G9CH1     | AI                                     |                                  | Analog input channel 1, group 9     |
|      | EVADC_FC3CH0    |                                        |                                  | Analog input FC channel 3           |
|      | P00.11          | O0                                     |                                  | General-purpose output              |
|      | GTM_TOUT20      | O1                                     |                                  | GTM muxed output                    |
|      | ASCLIN4_ASLSO   | O2                                     |                                  | Slave select signal output          |
|      | ASCLIN13_ATX    | O3                                     |                                  | Transmit output                     |
|      | EDSADC_DSCOUT0  | O4                                     |                                  | Modulator clock output              |
|      | —               | O5                                     |                                  | Reserved                            |
|      | —               | O6                                     |                                  | Reserved                            |
|      | —               | O7                                     |                                  | Reserved                            |

表 2-25 端口 P00 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                      | Function                            |
|------|-----------------|-------|----------------------------------|-------------------------------------|
| L2   | P00.12          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES1 | General-purpose input               |
|      | GTM_TIM4_IN3_11 |       |                                  | Mux input channel 3 of TIM module 4 |
|      | GTM_TIM1_IN3_1  |       |                                  | Mux input channel 3 of TIM module 1 |
|      | GTM_TIM0_IN3_1  |       |                                  | Mux input channel 3 of TIM module 0 |
|      | ASCLIN3_ACTSA   |       |                                  | Clear to send input                 |
|      | EDSADC_DSDIN0A  |       |                                  | Digital datastream input, channel 0 |
|      | ASCLIN4_ARXA    |       |                                  | Receive input                       |
|      | SENT_SENT11B    |       |                                  | Receive input channel 11            |
|      | EVADC_G9CH0     | AI    |                                  | Analog input channel 0, group 9     |
|      | EVADC_FC2CH0    |       |                                  | Analog input FC channel 2           |
|      | P00.12          | O0    |                                  | General-purpose output              |
|      | GTM_TOUT21      | O1    |                                  | GTM muxed output                    |
|      | —               | O2    |                                  | Reserved                            |
|      | —               | O3    |                                  | Reserved                            |
|      | —               | O4    |                                  | Reserved                            |
|      | —               | O5    |                                  | Reserved                            |
|      | —               | O6    |                                  | Reserved                            |
|      | CCU61_COUT63    | O7    |                                  | T13 PWM channel 63                  |
|      | IOM_MON1_7      |       |                                  | Monitor input 1                     |
|      | IOM_REF1_7      |       |                                  | Reference input 1                   |

表 2-26 端口 P01 功能

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| G5   | P01.3           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN5_2  |       |                                 | Mux input channel 5 of TIM module 4 |
|      | GTM_TIM2_IN0_14 |       |                                 | Mux input channel 0 of TIM module 2 |
|      | GTM_TIM0_IN5_8  |       |                                 | Mux input channel 5 of TIM module 0 |
|      | QSPI3_SLSIB     |       |                                 | Slave select input                  |
|      | EDSADC_ITR7F    |       |                                 | Trigger/Gate input, channel 7       |
|      | EVADC_G9CH14    | AI    |                                 | Analog input channel 14, group 9    |
|      | P01.3           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT111     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | QSPI3_SLSO9     | O4    |                                 | Master slave select output          |
|      | CAN01_TXD       | O5    |                                 | CAN transmit output node 1          |
|      | IOM_MON2_6      |       |                                 | Monitor input 2                     |
|      | IOM_REF2_6      |       |                                 | Reference input 2                   |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
| G4   | P01.4           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN6_2  |       |                                 | Mux input channel 6 of TIM module 4 |
|      | GTM_TIM2_IN1_14 |       |                                 | Mux input channel 1 of TIM module 2 |
|      | GTM_TIM0_IN6_8  |       |                                 | Mux input channel 6 of TIM module 0 |
|      | CAN01_RXDC      |       |                                 | CAN receive input node 1            |
|      | EDSADC_ITR7E    |       |                                 | Trigger/Gate input, channel 7       |
|      | EVADC_G9CH13    | AI    |                                 | Analog input channel 13, group 9    |
|      | P01.4           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT112     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | ASCLIN9_ASLSO   | O3    |                                 | Slave select signal output          |
|      | QSPI3_SLSO10    | O4    |                                 | Master slave select output          |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |

表 2-26 端口 P01 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| H5   | P01.5          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN3_2 |       |                                 | Mux input channel 3 of TIM module 5 |
|      | GTM_TIM2_IN3_7 |       |                                 | Mux input channel 3 of TIM module 2 |
|      | GTM_TIM2_IN2_7 |       |                                 | Mux input channel 2 of TIM module 2 |
|      | QSPI3_MRSTC    |       |                                 | Master SPI data input               |
|      | EDSADC_DSCIN8A |       |                                 | Modulator clock input, channel 8    |
|      | ASCLIN9_ARXA   |       |                                 | Receive input                       |
|      | EVADC_G9CH12   | AI    |                                 | Analog input channel 12, group 9    |
|      | P01.5          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT113    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | QSPI3_MRST     | O4    |                                 | Slave SPI data output               |
|      | IOM_MON2_3     |       |                                 | Monitor input 2                     |
|      | IOM_REF2_3     |       |                                 | Reference input 2                   |
|      | —              | O5    |                                 | Reserved                            |
|      | EDSADC_DSCOUT8 | O6    |                                 | Modulator clock output              |
|      | —              | O7    |                                 | Reserved                            |
| H4   | P01.6          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN6_2 |       |                                 | Mux input channel 6 of TIM module 5 |
|      | GTM_TIM5_IN5_3 |       |                                 | Mux input channel 5 of TIM module 5 |
|      | GTM_TIM2_IN5_7 |       |                                 | Mux input channel 5 of TIM module 2 |
|      | QSPI3_MTSRC    |       |                                 | Slave SPI data input                |
|      | EDSADC_DSDIN8A |       |                                 | Digital datastream input, channel 8 |
|      | P01.6          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT114    | O1    |                                 | GTM muxed output                    |
|      | ASCLIN12_ATX   | O2    |                                 | Transmit output                     |
|      | ASCLIN9_ASCLK  | O3    |                                 | Shift clock output                  |
|      | QSPI3_MTSR     | O4    |                                 | Master SPI data output              |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |

表 2-26 端口 P01 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| J5   | P01.7          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN7_2 |       |                                 | Mux input channel 7 of TIM module 5 |
|      | GTM_TIM2_IN7_7 |       |                                 | Mux input channel 7 of TIM module 2 |
|      | QSPI3_SCLKC    |       |                                 | Slave SPI clock inputs              |
|      | EDSADC_ITR8F   |       |                                 | Trigger/Gate input, channel 8       |
|      | ASCLIN9_ARXB   |       |                                 | Receive input                       |
|      | P01.7          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT115    | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | ASCLIN9_ATX    | O3    |                                 | Transmit output                     |
|      | QSPI3_SCLK     | O4    |                                 | Master SPI clock output             |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |

表 2-27 端口 P02 功能

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                                                    |
|------|----------------|-------|---------------------------------|-------------------------------------------------------------|
| B1   | P02.0          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM1_IN0_2 |       |                                 | Mux input channel 0 of TIM module 1                         |
|      | GTM_TIM0_IN0_2 |       |                                 | Mux input channel 0 of TIM module 0                         |
|      | CCU61_CC60INB  |       |                                 | T12 capture input 60                                        |
|      | ASCLIN2_ARXG   |       |                                 | Receive input                                               |
|      | CCU60_CC60INA  |       |                                 | T12 capture input 60                                        |
|      | SCU_E_REQ3_2   |       |                                 | ERU Channel 3 inputs 0 to 5 (0 is the LSB and 5 is the MSB) |
|      | GTM_DTMA0_0    |       |                                 | CDTM0_DTM4                                                  |
|      | P02.0          | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT0      | O1    |                                 | GTM muxed output                                            |
|      | IOM_REF0_0     |       |                                 | Reference input 0                                           |
|      | ASCLIN2_ATX    | O2    |                                 | Transmit output                                             |
|      | IOM_MON2_14    |       |                                 | Monitor input 2                                             |
|      | IOM_REF2_14    |       |                                 | Reference input 2                                           |
|      | QSPI3_SLSO1    | O3    |                                 | Master slave select output                                  |
|      | EDSADC_CGPWMN  | O4    |                                 | Negative carrier generator output                           |
|      | CAN00_TXD      | O5    |                                 | CAN transmit output node 0                                  |
|      | IOM_MON2_5     |       |                                 | Monitor input 2                                             |
|      | IOM_REF2_5     |       |                                 | Reference input 2                                           |
|      | ERAY0_TXDA     | O6    |                                 | Transmit Channel A                                          |
|      | CCU60_CC60     | O7    |                                 | T12 PWM channel 60                                          |
|      | IOM_MON1_2     |       |                                 | Monitor input 1                                             |
|      | IOM_REF1_6     |       |                                 | Reference input 1                                           |

表 2-27 端口 P02 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                                                    |
|------|----------------|-------|---------------------------------|-------------------------------------------------------------|
| C2   | P02.1          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM1_IN1_2 |       |                                 | Mux input channel 1 of TIM module 1                         |
|      | GTM_TIM0_IN1_2 |       |                                 | Mux input channel 1 of TIM module 0                         |
|      | ERAY0_RXDA2    |       |                                 | Receive Channel A2                                          |
|      | ASCLIN2_ARXB   |       |                                 | Receive input                                               |
|      | CAN00_RXDA     |       |                                 | CAN receive input node 0                                    |
|      | SCU_E_REQ2_1   |       |                                 | ERU Channel 2 inputs 0 to 5 (0 is the LSB and 5 is the MSB) |
|      | P02.1          | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT1      | O1    |                                 | GTM muxed output                                            |
|      | IOM_REF0_1     |       |                                 | Reference input 0                                           |
|      | QSPI4_SLSO7    | O2    |                                 | Master slave select output                                  |
|      | QSPI3_SLSO2    | O3    |                                 | Master slave select output                                  |
|      | EDSADC_CGPWMP  | O4    |                                 | Positive carrier generator output                           |
|      | —              | O5    |                                 | Reserved                                                    |
|      | —              | O6    |                                 | Reserved                                                    |
|      | CCU60_COUT60   | O7    |                                 | T12 PWM channel 60                                          |
|      | IOM_MON1_3     |       |                                 | Monitor input 1                                             |
|      | IOM_REF1_3     |       |                                 | Reference input 1                                           |

表 2-27 端口 P02 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| C1   | P02.2          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM1_IN2_2 |       |                                 | Mux input channel 2 of TIM module 1 |
|      | GTM_TIM0_IN2_2 |       |                                 | Mux input channel 2 of TIM module 0 |
|      | CCU61_CC61INB  |       |                                 | T12 capture input 61                |
|      | CCU60_CC61INA  |       |                                 | T12 capture input 61                |
|      | SENT_SENT14B   |       |                                 | Receive input channel 14            |
|      | P02.2          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT2      | O1    |                                 | GTM muxed output                    |
|      | IOM_REF0_2     |       |                                 | Reference input 0                   |
|      | ASCLIN1_ATX    | O2    |                                 | Transmit output                     |
|      | IOM_MON2_13    |       |                                 | Monitor input 2                     |
|      | IOM_REF2_13    |       |                                 | Reference input 2                   |
|      | QSPI3_SLSO3    | O3    |                                 | Master slave select output          |
|      | PSI5_TX0       | O4    |                                 | TXD outputs (send data)             |
|      | IOM_MON1_14    |       |                                 | Monitor input 1                     |
|      | IOM_REF1_14    |       |                                 | Reference input 1                   |
|      | CAN02_TXD      | O5    |                                 | CAN transmit output node 2          |
|      | IOM_MON2_7     |       |                                 | Monitor input 2                     |
|      | IOM_REF2_7     |       |                                 | Reference input 2                   |
|      | ERAY0_TXDB     | O6    |                                 | Transmit Channel B                  |
|      | CCU60_CC61     | O7    |                                 | T12 PWM channel 61                  |
|      | IOM_MON1_1     |       |                                 | Monitor input 1                     |
|      | IOM_REF1_5     |       |                                 | Reference input 1                   |

表 2-27 端口 P02 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| D2   | P02.3          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM1_IN3_2 |       |                                 | Mux input channel 3 of TIM module 1 |
|      | GTM_TIM0_IN3_2 |       |                                 | Mux input channel 3 of TIM module 0 |
|      | EDSADC_DSCIN5B |       |                                 | Modulator clock input, channel 5    |
|      | ERAY0_RXDB2    |       |                                 | Receive Channel B2                  |
|      | CAN02_RXDB     |       |                                 | CAN receive input node 2            |
|      | ASCLIN1_ARXG   |       |                                 | Receive input                       |
|      | MSC1_SDI1      |       |                                 | Upstream assynchronous input signal |
|      | PSI5_RX0B      |       |                                 | RXD inputs (receive data) channel 0 |
|      | SENT_SENT13B   |       |                                 | Receive input channel 13            |
|      | P02.3          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT3      | O1    |                                 | GTM muxed output                    |
|      | IOM_REF0_3     |       |                                 | Reference input 0                   |
|      | ASCLIN2_ASLSO  | O2    |                                 | Slave select signal output          |
|      | QSPI3_SLSO4    | O3    |                                 | Master slave select output          |
|      | EDSADC_DSCOUT5 | O4    |                                 | Modulator clock output              |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | CCU60_COUT61   | O7    |                                 | T12 PWM channel 61                  |
|      | IOM_MON1_4     |       |                                 | Monitor input 1                     |
|      | IOM_REF1_2     |       |                                 | Reference input 1                   |

表 2-27 端口 P02 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                                                                  |
|------|----------------|-------|---------------------------------|---------------------------------------------------------------------------|
| D1   | P02.4          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                                     |
|      | GTM_TIM1_IN4_1 |       |                                 | Mux input channel 4 of TIM module 1                                       |
|      | GTM_TIM0_IN4_1 |       |                                 | Mux input channel 4 of TIM module 0                                       |
|      | CCU61_CC62INB  |       |                                 | T12 capture input 62                                                      |
|      | EDSADC_DSDIN5B |       |                                 | Digital datastream input, channel 5                                       |
|      | QSPI3_SLSIA    |       |                                 | Slave select input                                                        |
|      | CCU60_CC62INA  |       |                                 | T12 capture input 62                                                      |
|      | I2C0_SDAA      |       |                                 | Serial Data Input 0                                                       |
|      | CAN11_RXDA     |       |                                 | CAN receive input node 1                                                  |
|      | CAN0_ECTT1     |       |                                 | External CAN time trigger input                                           |
|      | SENT_SENT12B   |       |                                 | Receive input channel 12                                                  |
|      | P02.4          | O0    |                                 | General-purpose output                                                    |
|      | GTM_TOUT4      | O1    |                                 | GTM muxed output                                                          |
|      | IOM_REF0_4     |       |                                 | Reference input 0                                                         |
|      | ASCLIN2_ASCLK  | O2    |                                 | Shift clock output                                                        |
|      | QSPI3_SLSO0    | O3    |                                 | Master slave select output                                                |
|      | PSI5S_CLK      | O4    |                                 | PSI5S CLK is a clock that can be used on a pin to drive the external PHY. |
|      | I2C0_SDA       | O5    |                                 | Serial Data Output                                                        |
|      | ERAY0_TXENA    | O6    |                                 | Transmit Enable Channel A                                                 |
|      | CCU60_CC62     | O7    |                                 | T12 PWM channel 62                                                        |
|      | IOM_MON1_0     |       |                                 | Monitor input 1                                                           |
|      | IOM_REF1_4     |       |                                 | Reference input 1                                                         |

表 2-27 端口 P02 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| E2   | P02.5          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM1_IN5_1 |       |                                 | Mux input channel 5 of TIM module 1 |
|      | GTM_TIM0_IN5_1 |       |                                 | Mux input channel 5 of TIM module 0 |
|      | EDSADC_DSCIN4B |       |                                 | Modulator clock input, channel 4    |
|      | I2C0_SCLA      |       |                                 | Serial Clock Input 0                |
|      | PSI5_RX1B      |       |                                 | RXD inputs (receive data) channel 1 |
|      | PSI5S_RXB      |       |                                 | RX data input                       |
|      | QSPI3_MRSTA    |       |                                 | Master SPI data input               |
|      | SENT_SENT3C    |       |                                 | Receive input channel 3             |
|      | CAN0_ECTT2     |       |                                 | External CAN time trigger input     |
|      | P02.5          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT5      | O1    |                                 | GTM muxed output                    |
|      | IOM_REF0_5     |       |                                 | Reference input 0                   |
|      | CAN11_TXD      | O2    |                                 | CAN transmit output node 1          |
|      | QSPI3_MRST     | O3    |                                 | Slave SPI data output               |
|      | IOM_MON2_3     |       |                                 | Monitor input 2                     |
|      | IOM_REF2_3     |       |                                 | Reference input 2                   |
|      | EDSADC_DSCOUT4 | O4    |                                 | Modulator clock output              |
|      | I2C0_SCL       | O5    |                                 | Serial Clock Output                 |
|      | ERAY0_TXENB    | O6    |                                 | Transmit Enable Channel B           |
|      | CCU60_COUT62   | O7    |                                 | T12 PWM channel 62                  |
|      | IOM_MON1_5     |       |                                 | Monitor input 1                     |
|      | IOM_REF1_1     |       |                                 | Reference input 1                   |

表 2-27 端口 P02 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                                           |
|------|-----------------|-------|---------------------------------|----------------------------------------------------|
| E1   | P02.6           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                              |
|      | GTM_TIM3_IN0_10 |       |                                 | Mux input channel 0 of TIM module 3                |
|      | GTM_TIM1_IN6_1  |       |                                 | Mux input channel 6 of TIM module 1                |
|      | GTM_TIM0_IN6_1  |       |                                 | Mux input channel 6 of TIM module 0                |
|      | CCU60_CC60INC   |       |                                 | T12 capture input 60                               |
|      | SENT_SENT2C     |       |                                 | Receive input channel 2                            |
|      | EDSADC_DSDIN4B  |       |                                 | Digital datastream input, channel 4                |
|      | EDSADC_ITR5E    |       |                                 | Trigger/Gate input, channel 5                      |
|      | GPT120_T3INA    |       |                                 | Trigger/gate input of core timer T3                |
|      | CCU60_CCPOS0A   |       |                                 | Hall capture input 0                               |
|      | CCU61_T12HRB    |       |                                 | External timer start 12                            |
|      | QSPI3_MTSRA     |       |                                 | Slave SPI data input                               |
|      | P02.6           | O0    |                                 | General-purpose output                             |
|      | GTM_TOUT6       | O1    |                                 | GTM muxed output                                   |
|      | IOM_REF0_6      |       |                                 | Reference input 0                                  |
|      | PSI5S_TX        | O2    |                                 | TX data output                                     |
|      | QSPI3_MTSR      | O3    |                                 | Master SPI data output                             |
|      | PSI5_TX1        | O4    |                                 | TXD outputs (send data)                            |
|      | IOM_MON1_15     |       |                                 | Monitor input 1                                    |
|      | EVADC_EMUX00    | O5    |                                 | Control of external analog multiplexer interface 0 |
|      | —               | O6    |                                 | Reserved                                           |
|      | CCU60_CC60      | O7    |                                 | T12 PWM channel 60                                 |
|      | IOM_MON1_2      |       |                                 | Monitor input 1                                    |
|      | IOM_REF1_6      |       |                                 | Reference input 1                                  |

表 2-27 端口 P02 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                                        | Function                                       |
|------|-----------------|-------|----------------------------------------------------|------------------------------------------------|
| F2   | P02.7           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES                    | General-purpose input                          |
|      | GTM_TIM3_IN1_10 |       |                                                    | Mux input channel 1 of TIM module 3            |
|      | GTM_TIM1_IN7_1  |       |                                                    | Mux input channel 7 of TIM module 1            |
|      | GTM_TIM0_IN7_1  |       |                                                    | Mux input channel 7 of TIM module 0            |
|      | CCU60_CC61INC   |       |                                                    | T12 capture input 61                           |
|      | SENT_SENT1C     |       |                                                    | Receive input channel 1                        |
|      | EDSADC_DSCIN3B  |       |                                                    | Modulator clock input, channel 3               |
|      | EDSADC_ITR4E    |       |                                                    | Trigger/Gate input, channel 4                  |
|      | GPT120_T3EUDA   |       |                                                    | Count direction control input of core timer T3 |
|      | PSI5_RX2B       |       |                                                    | RXD inputs (receive data) channel 2            |
|      | CCU60_CCPOS1A   |       |                                                    | Hall capture input 1                           |
|      | QSPI3_SCLKA     |       |                                                    | Slave SPI clock inputs                         |
|      | CCU61_T13HRB    |       |                                                    | External timer start 13                        |
|      | P02.7           | O0    | General-purpose output                             |                                                |
|      | GTM_TOUT7       | O1    | GTM muxed output                                   |                                                |
|      | IOM_REF0_7      |       | Reference input 0                                  |                                                |
|      | —               |       | Reserved                                           |                                                |
|      | QSPI3_SCLK      | O3    | Master SPI clock output                            |                                                |
|      | EDSADC_DSCOUT3  | O4    | Modulator clock output                             |                                                |
|      | EVADC_EMUX01    | O5    | Control of external analog multiplexer interface 0 |                                                |
|      | SENT_SPC1       | O6    | Transmit output                                    |                                                |
|      | CCU60_CC61      | O7    | T12 PWM channel 61                                 |                                                |
|      | IOM_MON1_1      |       | Monitor input 1                                    |                                                |
|      | IOM_REF1_5      |       | Reference input 1                                  |                                                |

表 2-27 端口 P02 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                                        | Function                            |
|------|-----------------|-------|----------------------------------------------------|-------------------------------------|
| F1   | P02.8           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES                    | General-purpose input               |
|      | GTM_TIM3_IN2_10 |       |                                                    | Mux input channel 2 of TIM module 3 |
|      | GTM_TIM3_IN0_2  |       |                                                    | Mux input channel 0 of TIM module 3 |
|      | GTM_TIM2_IN0_2  |       |                                                    | Mux input channel 0 of TIM module 2 |
|      | CCU60_CC62INC   |       |                                                    | T12 capture input 62                |
|      | SENT_SENT0C     |       |                                                    | Receive input channel 0             |
|      | CCU60_CCPOS2A   |       |                                                    | Hall capture input 2                |
|      | EDSADC_DSDIN3B  |       |                                                    | Digital datastream input, channel 3 |
|      | EDSADC_ITR3E    |       |                                                    | Trigger/Gate input, channel 3       |
|      | GPT120_T4INA    |       |                                                    | Trigger/gate input of timer T4      |
|      | CCU61_T12HRC    |       |                                                    | External timer start 12             |
|      | CCU61_T13HRC    |       |                                                    | External timer start 13             |
|      | GTM_DTMA0_1     |       |                                                    | CDTM0_DTM4                          |
|      | P02.8           |       |                                                    | O0                                  |
|      | GTM_TOUT8       | O1    | GTM muxed output                                   |                                     |
|      | IOM_REF0_8      |       | Reference input 0                                  |                                     |
|      | QSPI3_SLSO5     | O2    | Master slave select output                         |                                     |
|      | ASCLIN8_ASCLK   | O3    | Shift clock output                                 |                                     |
|      | PSI5_TX2        | O4    | TXD outputs (send data)                            |                                     |
|      | IOM_REF1_15     |       | Reference input 1                                  |                                     |
|      | EVADC_EMUX02    | O5    | Control of external analog multiplexer interface 0 |                                     |
|      | GETH_MDC        | O6    | MDIO clock                                         |                                     |
|      | CCU60_CC62      | O7    | T12 PWM channel 62                                 |                                     |
|      | IOM_MON1_0      |       | Monitor input 1                                    |                                     |
|      | IOM_REF1_4      |       | Reference input 1                                  |                                     |

表 2-27 端口 P02 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| E4   | P02.9           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN2_2  |       |                                 | Mux input channel 2 of TIM module 4 |
|      | GTM_TIM3_IN3_10 |       |                                 | Mux input channel 3 of TIM module 3 |
|      | GTM_TIM0_IN2_10 |       |                                 | Mux input channel 2 of TIM module 0 |
|      | SENT_SENT20B    |       |                                 | Receive input channel 20            |
|      | ASCLIN8_ARXA    |       |                                 | Receive input                       |
|      | P02.9           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT116     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN2_ATX     | O2    |                                 | Transmit output                     |
|      | IOM_MON2_14     |       |                                 | Monitor input 2                     |
|      | IOM_REF2_14     |       |                                 | Reference input 2                   |
|      | ASCLIN8_ATX     | O3    |                                 | Transmit output                     |
|      | —               | O4    |                                 | Reserved                            |
|      | CAN01_TXD       | O5    |                                 | CAN transmit output node 1          |
|      | IOM_MON2_6      |       |                                 | Monitor input 2                     |
|      | IOM_REF2_6      |       |                                 | Reference input 2                   |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
| F5   | P02.10          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN3_2  |       |                                 | Mux input channel 3 of TIM module 4 |
|      | GTM_TIM3_IN4_11 |       |                                 | Mux input channel 4 of TIM module 3 |
|      | GTM_TIM0_IN3_10 |       |                                 | Mux input channel 3 of TIM module 0 |
|      | ASCLIN2_ARXC    |       |                                 | Receive input                       |
|      | CAN01_RXDE      |       |                                 | CAN receive input node 1            |
|      | SENT_SENT21B    |       |                                 | Receive input channel 21            |
|      | ASCLIN8_ARXB    |       |                                 | Receive input                       |
|      | P02.10          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT117     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |

表 2-27 端口 P02 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| F4   | P02.11          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN4_3  |       |                                 | Mux input channel 4 of TIM module 4 |
|      | GTM_TIM3_IN5_12 |       |                                 | Mux input channel 5 of TIM module 3 |
|      | GTM_TIM0_IN7_7  |       |                                 | Mux input channel 7 of TIM module 0 |
|      | SENT_SENT22B    |       |                                 | Receive input channel 22            |
|      | EVADC_G9CH15    | AI    |                                 | Analog input channel 15, group 9    |
|      | P02.11          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT118     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | ASCLIN8_ASLSO   | O3    |                                 | Slave select signal output          |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |

表 2-28 端口 P10 功能

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                                       |
|------|-----------------|-------|---------------------------------|------------------------------------------------|
| A7   | P10.0           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                          |
|      | GTM_TIM4_IN0_12 |       |                                 | Mux input channel 0 of TIM module 4            |
|      | GTM_TIM1_IN4_2  |       |                                 | Mux input channel 4 of TIM module 1            |
|      | GTM_TIM0_IN4_2  |       |                                 | Mux input channel 4 of TIM module 0            |
|      | GPT120_T6EUDB   |       |                                 | Count direction control input of core timer T6 |
|      | ASCLIN11_ARXA   |       |                                 | Receive input                                  |
|      | GETH_RXERC      |       |                                 | Receive Error MII                              |
|      | GTM_DTMA5_2     |       |                                 | CDTM5_DTM4                                     |
|      | P10.0           | O0    |                                 | General-purpose output                         |
|      | GTM_TOUT102     | O1    |                                 | GTM muxed output                               |
|      | ASCLIN11_ATX    | O2    |                                 | Transmit output                                |
|      | QSPI1_SLSO10    | O3    |                                 | Master slave select output                     |
|      | —               | O4    |                                 | Reserved                                       |
|      | —               | O5    |                                 | Reserved                                       |
|      | ASCLIN22_ATX    | O6    |                                 | Transmit output                                |
|      | —               | O7    |                                 | Reserved                                       |

表 2-28 端口 P10 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                                                    |
|------|-----------------|-------|---------------------------------|-------------------------------------------------------------|
| B7   | P10.1           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM4_IN4_12 |       |                                 | Mux input channel 4 of TIM module 4                         |
|      | GTM_TIM1_IN1_3  |       |                                 | Mux input channel 1 of TIM module 1                         |
|      | GTM_TIM0_IN1_3  |       |                                 | Mux input channel 1 of TIM module 0                         |
|      | GPT120_T5EUIDB  |       |                                 | Count direction control input of timer T5                   |
|      | QSPI1_MRSTA     |       |                                 | Master SPI data input                                       |
|      | GTM_DTMT0_1     |       |                                 | CDTM0_DTM0                                                  |
|      | P10.1           | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT103     | O1    |                                 | GTM muxed output                                            |
|      | QSPI1_MTSR      | O2    |                                 | Master SPI data output                                      |
|      | QSPI1_MRST      | O3    |                                 | Slave SPI data output                                       |
|      | IOM_MON2_1      |       |                                 | Monitor input 2                                             |
|      | IOM_REF2_1      |       |                                 | Reference input 2                                           |
|      | MSC0_EN1        | O4    |                                 | Chip Select                                                 |
|      | EVADC_FC1BFLOUT | O5    |                                 | Boundary flag output, FC channel 1                          |
|      | —               | O6    |                                 | Reserved                                                    |
|      | —               | O7    |                                 | Reserved                                                    |
| A5   | P10.2           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM4_IN5_12 |       |                                 | Mux input channel 5 of TIM module 4                         |
|      | GTM_TIM1_IN2_3  |       |                                 | Mux input channel 2 of TIM module 1                         |
|      | GTM_TIM0_IN2_3  |       |                                 | Mux input channel 2 of TIM module 0                         |
|      | CAN02_RXDE      |       |                                 | CAN receive input node 2                                    |
|      | MSC0_SDI1       |       |                                 | Upstream assynchronous input signal                         |
|      | QSPI1_SCLKA     |       |                                 | Slave SPI clock inputs                                      |
|      | GPT120_T6INB    |       |                                 | Trigger/gate input of core timer T6                         |
|      | SCU_E_REQ2_0    |       |                                 | ERU Channel 2 inputs 0 to 5 (0 is the LSB and 5 is the MSB) |
|      | GTM_DTMT2_2     |       |                                 | CDTM2_DTM0                                                  |
|      | P10.2           | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT104     | O1    |                                 | GTM muxed output                                            |
|      | IOM_MON2_9      |       |                                 | Monitor input 2                                             |
|      | —               | O2    |                                 | Reserved                                                    |
|      | QSPI1_SCLK      | O3    |                                 | Master SPI clock output                                     |
|      | MSC0_EN0        | O4    |                                 | Chip Select                                                 |
|      | EVADC_FC3BFLOUT | O5    |                                 | Boundary flag output, FC channel 3                          |
|      | —               | O6    |                                 | Reserved                                                    |
|      | —               | O7    |                                 | Reserved                                                    |

表 2-28 端口 P10 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                                                    |
|------|-----------------|-------|---------------------------------|-------------------------------------------------------------|
| A6   | P10.3           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM4_IN6_10 |       |                                 | Mux input channel 6 of TIM module 4                         |
|      | GTM_TIM1_IN3_3  |       |                                 | Mux input channel 3 of TIM module 1                         |
|      | GTM_TIM0_IN3_3  |       |                                 | Mux input channel 3 of TIM module 0                         |
|      | QSPI1_MTSRA     |       |                                 | Slave SPI data input                                        |
|      | SCU_E_REQ3_0    |       |                                 | ERU Channel 3 inputs 0 to 5 (0 is the LSB and 5 is the MSB) |
|      | GPT120_T5INB    |       |                                 | Trigger/gate input of timer T5                              |
|      | P10.3           | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT105     | O1    |                                 | GTM muxed output                                            |
|      | IOM_MON2_10     |       |                                 | Monitor input 2                                             |
|      | —               | O2    |                                 | Reserved                                                    |
|      | QSPI1_MTSR      | O3    |                                 | Master SPI data output                                      |
|      | MSC0_EN0        | O4    |                                 | Chip Select                                                 |
|      | —               | O5    |                                 | Reserved                                                    |
|      | CAN02_TXD       | O6    |                                 | CAN transmit output node 2                                  |
|      | IOM_MON2_7      |       |                                 | Monitor input 2                                             |
|      | IOM_REF2_7      |       |                                 | Reference input 2                                           |
|      | —               | O7    |                                 | Reserved                                                    |
| B6   | P10.4           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM4_IN7_3  |       |                                 | Mux input channel 7 of TIM module 4                         |
|      | GTM_TIM1_IN6_2  |       |                                 | Mux input channel 6 of TIM module 1                         |
|      | GTM_TIM0_IN6_2  |       |                                 | Mux input channel 6 of TIM module 0                         |
|      | QSPI1_MTSRC     |       |                                 | Slave SPI data input                                        |
|      | CCU60_CCPOS0C   |       |                                 | Hall capture input 0                                        |
|      | GPT120_T3INB    |       |                                 | Trigger/gate input of core timer T3                         |
|      | ASCLIN11_ARXB   |       |                                 | Receive input                                               |
|      | ASCLIN22_ARXA   |       |                                 | Receive input                                               |
|      | P10.4           | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT106     | O1    |                                 | GTM muxed output                                            |
|      | IOM_MON2_11     |       |                                 | Monitor input 2                                             |
|      | ASCLIN22_ATX    | O2    |                                 | Transmit output                                             |
|      | QSPI1_SLSO8     | O3    |                                 | Master slave select output                                  |
|      | QSPI1_MTSR      | O4    |                                 | Master SPI data output                                      |
|      | MSC0_EN0        | O5    |                                 | Chip Select                                                 |
|      | —               | O6    |                                 | Reserved                                                    |
|      | —               | O7    |                                 | Reserved                                                    |

表 2-28 端口 P10 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                                                          |
|------|-----------------|-------|---------------------------------|-------------------------------------------------------------------|
| B5   | P10.5           | I     | SLOW /<br>PU2 /<br>VEXT /<br>ES | General-purpose input                                             |
|      | GTM_TIM4_IN3_13 |       |                                 | Mux input channel 3 of TIM module 4                               |
|      | GTM_TIM1_IN2_4  |       |                                 | Mux input channel 2 of TIM module 1                               |
|      | GTM_TIM0_IN2_4  |       |                                 | Mux input channel 2 of TIM module 0                               |
|      | PMS_HWCFG4IN    |       |                                 | HWCFG4 pin input                                                  |
|      | CAN20_RXDA      |       |                                 | CAN receive input node 0                                          |
|      | MSC0_INJ1       |       |                                 | Injection signal from port                                        |
|      | ASCLIN2_ARXB    |       |                                 | Receive input                                                     |
|      | P10.5           | O0    |                                 | General-purpose output                                            |
|      | GTM_TOUT107     | O1    |                                 | GTM muxed output                                                  |
|      | IOM_REF2_9      |       |                                 | Reference input 2                                                 |
|      | ASCLIN2_ATX     | O2    |                                 | Transmit output                                                   |
|      | IOM_MON2_14     |       |                                 | Monitor input 2                                                   |
|      | IOM_REF2_14     |       |                                 | Reference input 2                                                 |
|      | QSPI3_SLSO8     | O3    |                                 | Master slave select output                                        |
|      | QSPI1_SLSO9     | O4    |                                 | Master slave select output                                        |
|      | GPT120_T6OUT    | O5    |                                 | External output for overflow/underflow detection of core timer T6 |
|      | ASCLIN2_ASLSO   | O6    |                                 | Slave select signal output                                        |
|      | PSI5_TX3        | O7    |                                 | TXD outputs (send data)                                           |

表 2-28 端口 P10 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                                                          |
|------|-----------------|-------|---------------------------------|-------------------------------------------------------------------|
| A4   | P10.6           | I     | SLOW /<br>PU2 /<br>VEXT /<br>ES | General-purpose input                                             |
|      | GTM_TIM4_IN2_13 |       |                                 | Mux input channel 2 of TIM module 4                               |
|      | GTM_TIM1_IN3_4  |       |                                 | Mux input channel 3 of TIM module 1                               |
|      | GTM_TIM0_IN3_4  |       |                                 | Mux input channel 3 of TIM module 0                               |
|      | PSI5_RX3C       |       |                                 | RXD inputs (receive data) channel 3                               |
|      | ASCLIN2_ARXD    |       |                                 | Receive input                                                     |
|      | QSPI3_MTSRB     |       |                                 | Slave SPI data input                                              |
|      | PMS_HWCFG5IN    |       |                                 | HWCFG5 pin input                                                  |
|      | ASCLIN23_ARXA   |       |                                 | Receive input                                                     |
|      | P10.6           | O0    |                                 | General-purpose output                                            |
|      | GTM_TOUT108     | O1    |                                 | GTM muxed output                                                  |
|      | IOM_REF2_10     |       |                                 | Reference input 2                                                 |
|      | ASCLIN2_ASCLK   | O2    |                                 | Shift clock output                                                |
|      | QSPI3_MTSR      | O3    |                                 | Master SPI data output                                            |
|      | GPT120_T3OUT    | O4    |                                 | External output for overflow/underflow detection of core timer T3 |
|      | CAN20_TXD       | O5    |                                 | CAN transmit output node 0                                        |
|      | QSPI1_MRST      | O6    |                                 | Slave SPI data output                                             |
|      | IOM_MON2_1      |       |                                 | Monitor input 2                                                   |
|      | IOM_REF2_1      |       |                                 | Reference input 2                                                 |
|      | —               | O7    |                                 | Reserved                                                          |

表 2-28 端口 P10 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                                                    |
|------|----------------|-------|---------------------------------|-------------------------------------------------------------|
| A3   | P10.7          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM1_IN0_3 |       |                                 | Mux input channel 0 of TIM module 1                         |
|      | GTM_TIM0_IN0_3 |       |                                 | Mux input channel 0 of TIM module 0                         |
|      | GPT120_T3EUIDB |       |                                 | Count direction control input of core timer T3              |
|      | ASCLIN2_ACTSA  |       |                                 | Clear to send input                                         |
|      | QSPI3_MRSTB    |       |                                 | Master SPI data input                                       |
|      | SCU_E_REQ0_2   |       |                                 | ERU Channel 0 inputs 0 to 5 (0 is the LSB and 5 is the MSB) |
|      | CCU60_CCPOS1C  |       |                                 | Hall capture input 1                                        |
|      | ASCLIN23_ARXB  |       |                                 | Receive input                                               |
|      | P10.7          | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT109    | O1    |                                 | GTM muxed output                                            |
|      | IOM_REF2_11    |       |                                 | Reference input 2                                           |
|      | ASCLIN23_ATX   | O2    |                                 | Transmit output                                             |
|      | QSPI3_MRST     | O3    |                                 | Slave SPI data output                                       |
|      | IOM_MON2_3     |       |                                 | Monitor input 2                                             |
|      | IOM_REF2_3     |       |                                 | Reference input 2                                           |
|      | —              | O4    |                                 | Reserved                                                    |
|      | CAN20_TXD      | O5    |                                 | CAN transmit output node 0                                  |
|      | CAN12_TXD      | O6    |                                 | CAN transmit output node 2                                  |
|      | —              | O7    |                                 | Reserved                                                    |

表 2-28 端口 P10 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                                                    |
|------|-----------------|-------|---------------------------------|-------------------------------------------------------------|
| B4   | P10.8           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM4_IN0_13 |       |                                 | Mux input channel 0 of TIM module 4                         |
|      | GTM_TIM1_IN5_2  |       |                                 | Mux input channel 5 of TIM module 1                         |
|      | GTM_TIM0_IN5_2  |       |                                 | Mux input channel 5 of TIM module 0                         |
|      | CAN12_RXDB      |       |                                 | CAN receive input node 2                                    |
|      | GPT120_T4INB    |       |                                 | Trigger/gate input of timer T4                              |
|      | QSPI3_SCLKB     |       |                                 | Slave SPI clock inputs                                      |
|      | SCU_E_REQ1_2    |       |                                 | ERU Channel 1 inputs 0 to 5 (0 is the LSB and 5 is the MSB) |
|      | CCU60_CCPOS2C   |       |                                 | Hall capture input 2                                        |
|      | CAN20_RXDB      |       |                                 | CAN receive input node 0                                    |
|      | P10.8           | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT110     | O1    |                                 | GTM muxed output                                            |
|      | ASCLIN2_ARTS    | O2    |                                 | Ready to send output                                        |
|      | QSPI3_SCLK      | O3    |                                 | Master SPI clock output                                     |
|      | ASCLIN23_ATX    | O4    |                                 | Transmit output                                             |
|      | —               | O5    |                                 | Reserved                                                    |
|      | —               | O6    |                                 | Reserved                                                    |
|      | —               | O7    |                                 | Reserved                                                    |

表 2-29 端口 P11 的功能

| Ball | Symbol         | Ctrl. | Buffer Type                       | Function                            |
|------|----------------|-------|-----------------------------------|-------------------------------------|
| E10  | P11.0          | I     | RFAST /<br>PU1 /<br>VFLEX /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN0_4 |       |                                   | Mux input channel 0 of TIM module 4 |
|      | GTM_TIM2_IN0_7 |       |                                   | Mux input channel 0 of TIM module 2 |
|      | ASCLIN3_ARXB   |       |                                   | Receive input                       |
|      | GTM_DTMA2_1    |       |                                   | CDTM2_DTM4                          |
|      | P11.0          | O0    |                                   | General-purpose output              |
|      | GTM_TOUT119    | O1    |                                   | GTM muxed output                    |
|      | ASCLIN3_ATX    | O2    |                                   | Transmit output                     |
|      | IOM_MON2_15    |       |                                   | Monitor input 2                     |
|      | IOM_REF2_15    |       |                                   | Reference input 2                   |
|      | —              | O3    |                                   | Reserved                            |
|      | —              | O4    |                                   | Reserved                            |
|      | CAN11_TXD      | O5    |                                   | CAN transmit output node 1          |
|      | GETH_TXD3      | O6    |                                   | Transmit Data                       |
|      | —              | O7    |                                   | Reserved                            |

表 2-29 端口 P11 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                       | Function                            |
|------|----------------|-------|-----------------------------------|-------------------------------------|
| E9   | P11.1          | I     | RFAST /<br>PU1 /<br>VFLEX /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN1_5 |       |                                   | Mux input channel 1 of TIM module 4 |
|      | GTM_TIM2_IN1_6 |       |                                   | Mux input channel 1 of TIM module 2 |
|      | P11.1          | O0    |                                   | General-purpose output              |
|      | GTM_TOUT120    | O1    |                                   | GTM muxed output                    |
|      | ASCLIN3_ASCLK  | O2    |                                   | Shift clock output                  |
|      | ASCLIN3_ATX    | O3    |                                   | Transmit output                     |
|      | IOM_MON2_15    |       |                                   | Monitor input 2                     |
|      | IOM_REF2_15    |       |                                   | Reference input 2                   |
|      | —              | O4    |                                   | Reserved                            |
|      | CAN12_TXD      | O5    |                                   | CAN transmit output node 2          |
|      | GETH_TXD2      | O6    |                                   | Transmit Data                       |
|      | —              | O7    |                                   | Reserved                            |
| A10  | P11.2          | I     | RFAST /<br>PU1 /<br>VFLEX /<br>ES | General-purpose input               |
|      | GTM_TIM3_IN1_3 |       |                                   | Mux input channel 1 of TIM module 3 |
|      | GTM_TIM2_IN1_3 |       |                                   | Mux input channel 1 of TIM module 2 |
|      | P11.2          | O0    |                                   | General-purpose output              |
|      | GTM_TOUT95     | O1    |                                   | GTM muxed output                    |
|      | —              | O2    |                                   | Reserved                            |
|      | QSPI0_SLSO5    | O3    |                                   | Master slave select output          |
|      | QSPI1_SLSO5    | O4    |                                   | Master slave select output          |
|      | MSC0_EN1       | O5    |                                   | Chip Select                         |
|      | GETH_TXD1      | O6    |                                   | Transmit Data                       |
|      | CCU60_COUT63   | O7    |                                   | T13 PWM channel 63                  |
|      | IOM_MON1_6     |       |                                   | Monitor input 1                     |
|      | IOM_REF1_0     |       |                                   | Reference input 1                   |

表 2-29 端口 P11 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                       | Function                            |
|------|----------------|-------|-----------------------------------|-------------------------------------|
| B10  | P11.3          | I     | RFAST /<br>PU1 /<br>VFLEX /<br>ES | General-purpose input               |
|      | GTM_TIM3_IN2_2 |       |                                   | Mux input channel 2 of TIM module 3 |
|      | GTM_TIM2_IN2_2 |       |                                   | Mux input channel 2 of TIM module 2 |
|      | MSC0_SDI3      |       |                                   | Upstream assynchronous input signal |
|      | QSPI1_MRSTB    |       |                                   | Master SPI data input               |
|      | P11.3          | O0    |                                   | General-purpose output              |
|      | GTM_TOUT96     | O1    |                                   | GTM muxed output                    |
|      | —              | O2    |                                   | Reserved                            |
|      | QSPI1_MRST     | O3    |                                   | Slave SPI data output               |
|      | IOM_MON2_1     |       |                                   | Monitor input 2                     |
|      | IOM_REF2_1     |       |                                   | Reference input 2                   |
|      | ERAY0_TXDA     | O4    |                                   | Transmit Channel A                  |
|      | —              | O5    |                                   | Reserved                            |
|      | GETH_TXD0      | O6    |                                   | Transmit Data                       |
|      | CCU60_COUT62   | O7    |                                   | T12 PWM channel 62                  |
|      | IOM_MON1_5     |       |                                   | Monitor input 1                     |
|      | IOM_REF1_1     |       |                                   | Reference input 1                   |
| D10  | P11.4          | I     | RFAST /<br>PU1 /<br>VFLEX /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN2_5 |       |                                   | Mux input channel 2 of TIM module 4 |
|      | GTM_TIM2_IN2_6 |       |                                   | Mux input channel 2 of TIM module 2 |
|      | GETH_RXCLKB    |       |                                   | Receive Clock MII                   |
|      | P11.4          | O0    |                                   | General-purpose output              |
|      | GTM_TOUT121    | O1    |                                   | GTM muxed output                    |
|      | ASCLIN3_ASCLK  | O2    |                                   | Shift clock output                  |
|      | —              | O3    |                                   | Reserved                            |
|      | —              | O4    |                                   | Reserved                            |
|      | CAN13_TXD      | O5    |                                   | CAN transmit output node 3          |
|      | GETH_TXER      | O6    |                                   | Transmit Error MII                  |
|      | GETH_TXCLK     | O7    |                                   | Transmit Clock Output for RGMII     |

表 2-29 端口 P11 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                            | Function                                                         |
|------|----------------|-------|----------------------------------------|------------------------------------------------------------------|
| D8   | P11.5          | I     | SLOW / RGMII_In put / PU1 / VFLEX / ES | General-purpose input                                            |
|      | GTM_TIM4_IN3_5 |       |                                        | Mux input channel 3 of TIM module 4                              |
|      | GTM_TIM2_IN3_8 |       |                                        | Mux input channel 3 of TIM module 2                              |
|      | GETH_TXCLKA    |       |                                        | Transmit Clock Input for MII                                     |
|      | GETH_GREFCLK   |       |                                        | Gigabit Reference Clock input for RGMII (125 MHz high precision) |
|      | P11.5          | O0    |                                        | General-purpose output                                           |
|      | GTM_TOUT122    | O1    |                                        | GTM muxed output                                                 |
|      | —              | O2    |                                        | Reserved                                                         |
|      | —              | O3    |                                        | Reserved                                                         |
|      | —              | O4    |                                        | Reserved                                                         |
|      | CAN20_TXD      | O5    |                                        | CAN transmit output node 0                                       |
|      | —              | O6    |                                        | Reserved                                                         |
|      | —              | O7    |                                        | Reserved                                                         |
| D9   | P11.6          | I     | RFAST / PU1 / VFLEX / ES               | General-purpose input                                            |
|      | GTM_TIM3_IN3_2 |       |                                        | Mux input channel 3 of TIM module 3                              |
|      | GTM_TIM2_IN3_2 |       |                                        | Mux input channel 3 of TIM module 2                              |
|      | QSPI1_SCLKB    |       |                                        | Slave SPI clock inputs                                           |
|      | P11.6          | O0    |                                        | General-purpose output                                           |
|      | GTM_TOUT97     | O1    |                                        | GTM muxed output                                                 |
|      | ERAY0_TXENB    | O2    |                                        | Transmit Enable Channel B                                        |
|      | QSPI1_SCLK     | O3    |                                        | Master SPI clock output                                          |
|      | ERAY0_TXENA    | O4    |                                        | Transmit Enable Channel A                                        |
|      | MSC0_FCLP      | O5    |                                        | Shift-clock direct part of the differential signal               |
|      | GETH_TXEN      | O6    |                                        | Transmit Enable MII and RMII                                     |
|      | GETH_TCTL      |       |                                        | Transmit Control for RGMII                                       |
|      | CCU60_COUT61   | O7    |                                        | T12 PWM channel 61                                               |
|      | IOM_MON1_4     |       |                                        | Monitor input 1                                                  |
|      | IOM_REF1_2     |       |                                        | Reference input 1                                                |

表 2-29 端口 P11 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                                        | Function                                                |
|------|----------------|-------|----------------------------------------------------|---------------------------------------------------------|
| E8   | P11.7          | I     | SLOW /<br>RGMII_In<br>put / PU1<br>/ VFLEX /<br>ES | General-purpose input                                   |
|      | GTM_TIM4_IN4_5 |       |                                                    | Mux input channel 4 of TIM module 4                     |
|      | GTM_TIM2_IN4_7 |       |                                                    | Mux input channel 4 of TIM module 2                     |
|      | GETH_RXD3A     |       |                                                    | Receive Data 3 MII and RGMII (RGMII can use RXD3A only) |
|      | CAN11_RXDD     |       |                                                    | CAN receive input node 1                                |
|      | P11.7          | O0    |                                                    | General-purpose output                                  |
|      | GTM_TOUT123    | O1    |                                                    | GTM muxed output                                        |
|      | —              | O2    |                                                    | Reserved                                                |
|      | —              | O3    |                                                    | Reserved                                                |
|      | —              | O4    |                                                    | Reserved                                                |
|      | —              | O5    |                                                    | Reserved                                                |
|      | —              | O6    |                                                    | Reserved                                                |
|      | —              | O7    |                                                    | Reserved                                                |
| E7   | P11.8          | I     | SLOW /<br>RGMII_In<br>put / PU1<br>/ VFLEX /<br>ES | General-purpose input                                   |
|      | GTM_TIM4_IN5_5 |       |                                                    | Mux input channel 5 of TIM module 4                     |
|      | GTM_TIM2_IN5_8 |       |                                                    | Mux input channel 5 of TIM module 2                     |
|      | GETH_RXD2A     |       |                                                    | Receive Data 2 MII and RGMII (RGMII can use RXD2A only) |
|      | CAN12_RXDD     |       |                                                    | CAN receive input node 2                                |
|      | P11.8          | O0    |                                                    | General-purpose output                                  |
|      | GTM_TOUT124    | O1    |                                                    | GTM muxed output                                        |
|      | —              | O2    |                                                    | Reserved                                                |
|      | —              | O3    |                                                    | Reserved                                                |
|      | —              | O4    |                                                    | Reserved                                                |
|      | —              | O5    |                                                    | Reserved                                                |
|      | —              | O6    |                                                    | Reserved                                                |
|      | —              | O7    |                                                    | Reserved                                                |

表 2-29 端口 P11 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                            | Function                                                      |
|------|----------------|-------|----------------------------------------|---------------------------------------------------------------|
| A9   | P11.9          | I     | FAST / RGMII_In put / PU1 / VFLEX / ES | General-purpose input                                         |
|      | GTM_TIM3_IN4_2 |       |                                        | Mux input channel 4 of TIM module 3                           |
|      | GTM_TIM2_IN4_2 |       |                                        | Mux input channel 4 of TIM module 2                           |
|      | QSPI1_MTSRB    |       |                                        | Slave SPI data input                                          |
|      | ERAY0_RXDA1    |       |                                        | Receive Channel A1                                            |
|      | GETH_RXD1A     |       |                                        | Receive Data 1 MII, RMII and RGMII (RGMII can use RXD1A only) |
|      | P11.9          | O0    |                                        | General-purpose output                                        |
|      | GTM_TOUT98     | O1    |                                        | GTM muxed output                                              |
|      | —              | O2    |                                        | Reserved                                                      |
|      | QSPI1_MTSR     | O3    |                                        | Master SPI data output                                        |
|      | —              | O4    |                                        | Reserved                                                      |
|      | MSC0_SOP       | O5    |                                        | Data output - direct part of the differential signal          |
|      | —              | O6    |                                        | Reserved                                                      |
|      | CCU60_COUT60   | O7    |                                        | T12 PWM channel 60                                            |
|      | IOM_MON1_3     |       |                                        | Monitor input 1                                               |
|      | IOM_REF1_3     |       |                                        | Reference input 1                                             |

表 2-29 端口 P11 的功能 (续)

| Ball       | Symbol            | Ctrl.              | Buffer Type                           | Function                                                      |
|------------|-------------------|--------------------|---------------------------------------|---------------------------------------------------------------|
| B9         | P11.10            | I                  | FAST / RGMII_Input / PU1 / VFLEX / ES | General-purpose input                                         |
|            | GTM_TIM3_IN5_2    |                    |                                       | Mux input channel 5 of TIM module 3                           |
|            | GTM_TIM2_IN5_2    |                    |                                       | Mux input channel 5 of TIM module 2                           |
|            | GTM_TIM2_IN0_9    |                    |                                       | Mux input channel 0 of TIM module 2                           |
|            | CAN03_RXDD        |                    |                                       | CAN receive input node 3                                      |
|            | ERAY0_RXDB1       |                    |                                       | Receive Channel B1                                            |
|            | ASCLIN1_ARXE      |                    |                                       | Receive input                                                 |
|            | SCU_E_REQ6_3      |                    |                                       | ERU Channel 6 inputs 0 to 5 (0 is the LSB and 5 is the MSB)   |
|            |                   |                    |                                       |                                                               |
|            | MSC0_SDI0         |                    |                                       | Upstream assynchronous input signal                           |
|            | GETH_RXD0A        |                    |                                       | Receive Data 0 MII, RMII and RGMII (RGMII can use RXD0A only) |
|            | QSPI1_SLSIA       | Slave select input |                                       |                                                               |
|            | P11.10            | O0                 |                                       | General-purpose output                                        |
|            | GTM_TOUT99        | O1                 |                                       | GTM muxed output                                              |
|            | —                 | O2                 |                                       | Reserved                                                      |
|            | QSPI0_SLSO3       | O3                 |                                       | Master slave select output                                    |
|            | QSPI1_SLSO3       | O4                 |                                       | Master slave select output                                    |
|            | —                 | O5                 |                                       | Reserved                                                      |
|            | —                 | O6                 |                                       | Reserved                                                      |
|            | CCU60_CC62        | O7                 |                                       | T12 PWM channel 62                                            |
|            | IOM_MON1_0        |                    |                                       | Monitor input 1                                               |
| IOM_REF1_4 | Reference input 1 |                    |                                       |                                                               |

表 2-29 端口 P11 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                            | Function                                         |
|------|-----------------|-------|----------------------------------------|--------------------------------------------------|
| A8   | P11.11          | I     | FAST / RGMII_In put / PU1 / VFLEX / ES | General-purpose input                            |
|      | GTM_TIM3_IN6_2  |       |                                        | Mux input channel 6 of TIM module 3              |
|      | GTM_TIM3_IN0_14 |       |                                        | Mux input channel 0 of TIM module 3              |
|      | GTM_TIM2_IN6_2  |       |                                        | Mux input channel 6 of TIM module 2              |
|      | GETH_CRSDVA     |       |                                        | Carrier Sense / Data Valid combi-signal for RMII |
|      | GETH_RXDVA      |       |                                        | Receive Data Valid MII                           |
|      | GETH_CRSB       |       |                                        | Carrier Sense MII                                |
|      | GETH_RCTLA      |       |                                        | Receive Control for RGMII                        |
|      | P11.11          | O0    |                                        | General-purpose output                           |
|      | GTM_TOUT100     | O1    |                                        | GTM muxed output                                 |
|      | —               | O2    |                                        | Reserved                                         |
|      | QSPI0_SLSO4     | O3    |                                        | Master slave select output                       |
|      | QSPI1_SLSO4     | O4    |                                        | Master slave select output                       |
|      | MSC0_EN0        | O5    |                                        | Chip Select                                      |
|      | ERAY0_TXENB     | O6    |                                        | Transmit Enable Channel B                        |
|      | CCU60_CC61      | O7    |                                        | T12 PWM channel 61                               |
|      | IOM_MON1_1      |       |                                        | Monitor input 1                                  |
|      | IOM_REF1_5      |       |                                        | Reference input 1                                |
| B8   | P11.12          | I     | FAST / RGMII_In put / PU1 / VFLEX / ES | General-purpose input                            |
|      | GTM_TIM3_IN7_2  |       |                                        | Mux input channel 7 of TIM module 3              |
|      | GTM_TIM2_IN7_2  |       |                                        | Mux input channel 7 of TIM module 2              |
|      | GETH_REFCLKA    |       |                                        | Reference Clock input for RMII (50 MHz)          |
|      | GETH_TXCLKB     |       |                                        | Transmit Clock Input for MII                     |
|      | GETH_RXCLKA     |       |                                        | Receive Clock MII                                |
|      | P11.12          | O0    |                                        | General-purpose output                           |
|      | GTM_TOUT101     | O1    |                                        | GTM muxed output                                 |
|      | ASCLIN1_ATX     | O2    |                                        | Transmit output                                  |
|      | IOM_MON2_13     |       |                                        | Monitor input 2                                  |
|      | IOM_REF2_13     |       |                                        | Reference input 2                                |
|      | GTM_CLK2        | O3    |                                        | CGM generated clock                              |
|      | ERAY0_TXDB      | O4    |                                        | Transmit Channel B                               |
|      | CAN03_TXD       | O5    |                                        | CAN transmit output node 3                       |
|      | IOM_MON2_8      |       |                                        | Monitor input 2                                  |
|      | IOM_REF2_8      |       |                                        | Reference input 2                                |
|      | CCU_EXTCLK1     | O6    |                                        | External Clock 1                                 |
|      | CCU60_CC60      | O7    |                                        | T12 PWM channel 60                               |
|      | IOM_MON1_2      |       |                                        | Monitor input 1                                  |
|      | IOM_REF1_6      |       |                                        | Reference input 1                                |

表 2-29 端口 P11 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                      | Function                                         |
|------|----------------|-------|----------------------------------|--------------------------------------------------|
| E6   | P11.13         | I     | SLOW /<br>PU1 /<br>VFLEX /<br>ES | General-purpose input                            |
|      | GTM_TIM4_IN6_5 |       |                                  | Mux input channel 6 of TIM module 4              |
|      | GTM_TIM2_IN6_7 |       |                                  | Mux input channel 6 of TIM module 2              |
|      | GETH_RXERA     |       |                                  | Receive Error MII                                |
|      | I2C1_SDAA      |       |                                  | Serial Data Input 0                              |
|      | CAN13_RXDD     |       |                                  | CAN receive input node 3                         |
|      | P11.13         | O0    |                                  | General-purpose output                           |
|      | GTM_TOUT125    | O1    |                                  | GTM muxed output                                 |
|      | —              | O2    |                                  | Reserved                                         |
|      | —              | O3    |                                  | Reserved                                         |
|      | —              | O4    |                                  | Reserved                                         |
|      | —              | O5    |                                  | Reserved                                         |
|      | I2C1_SDA       | O6    |                                  | Serial Data Output                               |
|      | —              | O7    |                                  | Reserved                                         |
| D7   | P11.14         | I     | SLOW /<br>PU1 /<br>VFLEX /<br>ES | General-purpose input                            |
|      | GTM_TIM4_IN7_4 |       |                                  | Mux input channel 7 of TIM module 4              |
|      | GTM_TIM2_IN7_8 |       |                                  | Mux input channel 7 of TIM module 2              |
|      | GETH_CRSDVB    |       |                                  | Carrier Sense / Data Valid combi-signal for RMII |
|      | GETH_RXDVB     |       |                                  | Receive Data Valid MII                           |
|      | GETH_CRSA      |       |                                  | Carrier Sense MII                                |
|      | I2C1_SCLA      |       |                                  | Serial Clock Input 0                             |
|      | CAN20_RXDF     |       |                                  | CAN receive input node 0                         |
|      | P11.14         | O0    |                                  | General-purpose output                           |
|      | GTM_TOUT126    | O1    |                                  | GTM muxed output                                 |
|      | —              | O2    |                                  | Reserved                                         |
|      | —              | O3    |                                  | Reserved                                         |
|      | —              | O4    |                                  | Reserved                                         |
|      | —              | O5    |                                  | Reserved                                         |
|      | I2C1_SCL       | O6    |                                  | Serial Clock Output                              |
|      | —              | O7    |                                  | Reserved                                         |

表 2-29 端口 P11 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                      | Function                            |
|------|----------------|-------|----------------------------------|-------------------------------------|
| D6   | P11.15         | I     | SLOW /<br>PU1 /<br>VFLEX /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN7_5 |       |                                  | Mux input channel 7 of TIM module 4 |
|      | GTM_TIM0_IN7_8 |       |                                  | Mux input channel 7 of TIM module 0 |
|      | GETH_COLA      |       |                                  | Collision MII                       |
|      | P11.15         | O0    |                                  | General-purpose output              |
|      | GTM_TOUT127    | O1    |                                  | GTM muxed output                    |
|      | —              | O2    |                                  | Reserved                            |
|      | —              | O3    |                                  | Reserved                            |
|      | —              | O4    |                                  | Reserved                            |
|      | —              | O5    |                                  | Reserved                            |
|      | —              | O6    |                                  | Reserved                            |
|      | —              | O7    |                                  | Reserved                            |

表 2-30 端口 P12 功能

| Ball | Symbol         | Ctrl. | Buffer Type                      | Function                            |
|------|----------------|-------|----------------------------------|-------------------------------------|
| E12  | P12.0          | I     | SLOW /<br>PU1 /<br>VFLEX /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN0_5 |       |                                  | Mux input channel 0 of TIM module 4 |
|      | GTM_TIM3_IN0_7 |       |                                  | Mux input channel 0 of TIM module 3 |
|      | CAN00_RXDC     |       |                                  | CAN receive input node 0            |
|      | GETH_RXCLKC    |       |                                  | Receive Clock MII                   |
|      | GTM_DTMA4_0    |       |                                  | CDTM4_DTM4                          |
|      | P12.0          | O0    |                                  | General-purpose output              |
|      | GTM_TOUT128    | O1    |                                  | GTM muxed output                    |
|      | —              | O2    |                                  | Reserved                            |
|      | —              | O3    |                                  | Reserved                            |
|      | —              | O4    |                                  | Reserved                            |
|      | —              | O5    |                                  | Reserved                            |
|      | GETH_MDC       | O6    |                                  | MDIO clock                          |
|      | —              | O7    |                                  | Reserved                            |

表 2-30 端口 P12 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                      | Function                            |
|------|----------------|-------|----------------------------------|-------------------------------------|
| E11  | P12.1          | I     | SLOW /<br>PU1 /<br>VFLEX /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN1_6 |       |                                  | Mux input channel 1 of TIM module 4 |
|      | GTM_TIM3_IN1_6 |       |                                  | Mux input channel 1 of TIM module 3 |
|      | GETH_MDIOC     |       |                                  | MDIO Input                          |
|      | P12.1          | O0    |                                  | General-purpose output              |
|      | GTM_TOUT129    | O1    |                                  | GTM muxed output                    |
|      | ASCLIN3_ASLSO  | O2    |                                  | Slave select signal output          |
|      | —              | O3    |                                  | Reserved                            |
|      | —              | O4    |                                  | Reserved                            |
|      | CAN00_TXD      | O5    |                                  | CAN transmit output node 0          |
|      | IOM_MON2_5     |       |                                  | Monitor input 2                     |
|      | IOM_REF2_5     |       |                                  | Reference input 2                   |
|      | —              | O6    |                                  | Reserved                            |
|      | —              | O7    |                                  | Reserved                            |
|      | GETH_MDIO      | O     |                                  | MDIO Output                         |

表 2-31 端口 P13 功能

| Ball | Symbol         | Ctrl. | Buffer Type                                | Function                                             |
|------|----------------|-------|--------------------------------------------|------------------------------------------------------|
| B12  | P13.0          | I     | LVDS_TX<br>/ FAST /<br>PU1 / VEXT<br>/ ES6 | General-purpose input                                |
|      | GTM_TIM3_IN5_3 |       |                                            | Mux input channel 5 of TIM module 3                  |
|      | GTM_TIM2_IN5_3 |       |                                            | Mux input channel 5 of TIM module 2                  |
|      | ASCLIN10_ARXC  |       |                                            | Receive input                                        |
|      | ASCLIN21_ARXA  |       |                                            | Receive input                                        |
|      | P13.0          | O0    |                                            | General-purpose output                               |
|      | GTM_TOUT91     | O1    |                                            | GTM muxed output                                     |
|      | ASCLIN10_ATX   | O2    |                                            | Transmit output                                      |
|      | QSPI2_SCLKN    | O3    |                                            | Master SPI clock output (LVDS N line)                |
|      | MSC0_EN1       | O4    |                                            | Chip Select                                          |
|      | MSC0_FCLN      | O5    |                                            | Shift-clock inverted part of the differential signal |
|      | —              | O6    |                                            | Reserved                                             |
|      | CAN10_TXD      | O7    |                                            | CAN transmit output node 0                           |

表 2-31 端口 P13 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                                | Function                                                        |
|------|----------------|-------|--------------------------------------------|-----------------------------------------------------------------|
| A12  | P13.1          | I     | LVDS_TX<br>/ FAST /<br>PU1 / VEXT<br>/ ES6 | General-purpose input                                           |
|      | GTM_TIM3_IN6_3 |       |                                            | Mux input channel 6 of TIM module 3                             |
|      | GTM_TIM2_IN6_3 |       |                                            | Mux input channel 6 of TIM module 2                             |
|      | I2C0_SCLB      |       |                                            | Serial Clock Input 1                                            |
|      | CAN10_RXDD     |       |                                            | CAN receive input node 0                                        |
|      | ASCLIN10_ARXD  |       |                                            | Receive input                                                   |
|      | P13.1          | O0    |                                            | General-purpose output                                          |
|      | GTM_TOUT92     | O1    |                                            | GTM muxed output                                                |
|      | —              | O2    |                                            | Reserved                                                        |
|      | QSPI2_SCLKP    | O3    |                                            | Master SPI clock output (LVDS P line)                           |
|      | —              | O4    |                                            | Reserved                                                        |
|      | MSC0_FCLP      | O5    |                                            | Shift-clock direct part of the differential signal              |
|      | I2C0_SCL       | O6    |                                            | Serial Clock Output                                             |
|      | —              | O7    |                                            | Reserved                                                        |
| B11  | P13.2          | I     | LVDS_TX<br>/ FAST /<br>PU1 / VEXT<br>/ ES6 | General-purpose input                                           |
|      | GTM_TIM3_IN7_3 |       |                                            | Mux input channel 7 of TIM module 3                             |
|      | GTM_TIM2_IN7_3 |       |                                            | Mux input channel 7 of TIM module 2                             |
|      | GPT120_CAPINA  |       |                                            | Trigger input to capture value of timer T5 into CAPREL register |
|      | I2C0_SDAB      |       |                                            | Serial Data Input 1                                             |
|      | P13.2          | O0    |                                            | General-purpose output                                          |
|      | GTM_TOUT93     | O1    |                                            | GTM muxed output                                                |
|      | ASCLIN10_ASCLK | O2    |                                            | Shift clock output                                              |
|      | QSPI2_MTSRN    | O3    |                                            | Master SPI data output (LVDS N line)                            |
|      | MSC0_FCLP      | O4    |                                            | Shift-clock direct part of the differential signal              |
|      | MSC0_SON       | O5    |                                            | Data output - inverted part of the differential signal          |
|      | I2C0_SDA       | O6    |                                            | Serial Data Output                                              |
|      | ASCLIN21_ATX   | O7    |                                            | Transmit output                                                 |

表 2-31 端口 P13 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                                | Function                                             |
|------|----------------|-------|--------------------------------------------|------------------------------------------------------|
| A11  | P13.3          | I     | LVDS_TX<br>/ FAST /<br>PU1 / VEXT<br>/ ES6 | General-purpose input                                |
|      | GTM_TIM3_IN0_3 |       |                                            | Mux input channel 0 of TIM module 3                  |
|      | GTM_TIM2_IN0_3 |       |                                            | Mux input channel 0 of TIM module 2                  |
|      | ASCLIN21_ARXB  |       |                                            | Receive input                                        |
|      | P13.3          | O0    |                                            | General-purpose output                               |
|      | GTM_TOUT94     | O1    |                                            | GTM muxed output                                     |
|      | ASCLIN10_ASLSO | O2    |                                            | Slave select signal output                           |
|      | QSPI2_MTSRP    | O3    |                                            | Master SPI data output (LVDS P line)                 |
|      | —              | O4    |                                            | Reserved                                             |
|      | MSC0_SOP       | O5    |                                            | Data output - direct part of the differential signal |
|      | ASCLIN21_ATX   | O6    |                                            | Transmit output                                      |
|      | —              | O7    |                                            | Reserved                                             |

表 2-32 端口 P14 功能

| Ball | Symbol         | Ctrl. | Buffer Type                      | Function                            |
|------|----------------|-------|----------------------------------|-------------------------------------|
| B16  | P14.0          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES2 | General-purpose input               |
|      | GTM_TIM1_IN3_5 |       |                                  | Mux input channel 3 of TIM module 1 |
|      | GTM_TIM0_IN3_5 |       |                                  | Mux input channel 3 of TIM module 0 |
|      | SENT_SENT17D   |       |                                  | Receive input channel 17            |
|      | P14.0          | O0    |                                  | General-purpose output              |
|      | GTM_TOUT80     | O1    |                                  | GTM muxed output                    |
|      | ASCLIN0_ATX    | O2    |                                  | Transmit output                     |
|      | IOM_MON2_12    |       |                                  | Monitor input 2                     |
|      | IOM_REF2_12    |       |                                  | Reference input 2                   |
|      | ERAY0_TXDA     |       |                                  | Transmit Channel A                  |
|      | ERAY0_TXDB     | O4    |                                  | Transmit Channel B                  |
|      | CAN01_TXD      | O5    |                                  | CAN transmit output node 1          |
|      | IOM_MON2_6     |       |                                  | Monitor input 2                     |
|      | IOM_REF2_6     |       |                                  | Reference input 2                   |
|      | ASCLIN0_ASCLK  |       |                                  | O6                                  |
|      | CCU60_COUT62   | O7    |                                  | T12 PWM channel 62                  |
|      | IOM_MON1_5     |       |                                  | Monitor input 1                     |
|      | IOM_REF1_1     |       |                                  | Reference input 1                   |

表 2-32 端口 P14 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                      | Function                                                    |
|------|----------------|-------|----------------------------------|-------------------------------------------------------------|
| A15  | P14.1          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES2 | General-purpose input                                       |
|      | GTM_TIM1_IN4_3 |       |                                  | Mux input channel 4 of TIM module 1                         |
|      | GTM_TIM0_IN4_3 |       |                                  | Mux input channel 4 of TIM module 0                         |
|      | ERAY0_RXDA3    |       |                                  | Receive Channel A3                                          |
|      | ASCLIN0_ARXA   |       |                                  | Receive input                                               |
|      | SENT_SENT18D   |       |                                  | Receive input channel 18                                    |
|      | ERAY0_RXDB3    |       |                                  | Receive Channel B3                                          |
|      | CAN01_RXDB     |       |                                  | CAN receive input node 1                                    |
|      | SCU_E_REQ3_1   |       |                                  | ERU Channel 3 inputs 0 to 5 (0 is the LSB and 5 is the MSB) |
|      | PMS_PINAWKP    |       |                                  | PINA ( P14.1) pin input                                     |
|      | P14.1          | O0    |                                  | General-purpose output                                      |
|      | GTM_TOUT81     | O1    |                                  | GTM muxed output                                            |
|      | ASCLIN0_ATX    | O2    |                                  | Transmit output                                             |
|      | IOM_MON2_12    |       |                                  | Monitor input 2                                             |
|      | IOM_REF2_12    |       |                                  | Reference input 2                                           |
|      | —              | O3    |                                  | Reserved                                                    |
|      | —              | O4    |                                  | Reserved                                                    |
|      | —              | O5    |                                  | Reserved                                                    |
|      | —              | O6    |                                  | Reserved                                                    |
|      | CCU60_COUT63   | O7    |                                  | T13 PWM channel 63                                          |
|      | IOM_MON1_6     |       |                                  | Monitor input 1                                             |
|      | IOM_REF1_0     |       |                                  | Reference input 1                                           |
| E13  | P14.2          | I     | SLOW /<br>PU2 /<br>VEXT /<br>ES  | General-purpose input                                       |
|      | GTM_TIM1_IN5_3 |       |                                  | Mux input channel 5 of TIM module 1                         |
|      | GTM_TIM0_IN5_3 |       |                                  | Mux input channel 5 of TIM module 0                         |
|      | PMS_HWCFG2IN   |       |                                  | HWCFG2 pin input                                            |
|      | P14.2          | O0    |                                  | General-purpose output                                      |
|      | GTM_TOUT82     | O1    |                                  | GTM muxed output                                            |
|      | ASCLIN2_ATX    | O2    |                                  | Transmit output                                             |
|      | IOM_MON2_14    |       |                                  | Monitor input 2                                             |
|      | IOM_REF2_14    |       |                                  | Reference input 2                                           |
|      | QSPI2_SLSO1    | O3    |                                  | Master slave select output                                  |
|      | —              | O4    |                                  | Reserved                                                    |
|      | —              | O5    |                                  | Reserved                                                    |
|      | ASCLIN2_ASCLK  | O6    |                                  | Shift clock output                                          |
|      | —              | O7    |                                  | Reserved                                                    |

表 2-32 端口 P14 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                                                    |
|------|----------------|-------|---------------------------------|-------------------------------------------------------------|
| B14  | P14.3          | I     | SLOW /<br>PU2 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM1_IN6_3 |       |                                 | Mux input channel 6 of TIM module 1                         |
|      | GTM_TIM0_IN6_3 |       |                                 | Mux input channel 6 of TIM module 0                         |
|      | PMS_HWCFG3IN   |       |                                 | HWCFG3 pin input                                            |
|      | ASCLIN2_ARXA   |       |                                 | Receive input                                               |
|      | MSC0_SDI2      |       |                                 | Upstream assynchronous input signal                         |
|      | SCU_E_REQ1_0   |       |                                 | ERU Channel 1 inputs 0 to 5 (0 is the LSB and 5 is the MSB) |
|      | P14.3          | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT83     | O1    |                                 | GTM muxed output                                            |
|      | ASCLIN2_ATX    | O2    |                                 | Transmit output                                             |
|      | IOM_MON2_14    |       |                                 | Monitor input 2                                             |
|      | IOM_REF2_14    |       |                                 | Reference input 2                                           |
|      | QSPI2_SLSO3    | O3    |                                 | Master slave select output                                  |
|      | ASCLIN1_ASLSO  | O4    |                                 | Slave select signal output                                  |
|      | ASCLIN3_ASLSO  | O5    |                                 | Slave select signal output                                  |
|      | —              | O6    |                                 | Reserved                                                    |
|      | —              | O7    |                                 | Reserved                                                    |
| B15  | P14.4          | I     | SLOW /<br>PU2 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM1_IN7_2 |       |                                 | Mux input channel 7 of TIM module 1                         |
|      | GTM_TIM0_IN7_2 |       |                                 | Mux input channel 7 of TIM module 0                         |
|      | PMS_HWCFG6IN   |       |                                 | HWCFG6 pin input                                            |
|      | GTM_DTMT0_0    |       |                                 | CDTM0_DTM0                                                  |
|      | P14.4          | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT84     | O1    |                                 | GTM muxed output                                            |
|      | —              | O2    |                                 | Reserved                                                    |
|      | —              | O3    |                                 | Reserved                                                    |
|      | —              | O4    |                                 | Reserved                                                    |
|      | —              | O5    |                                 | Reserved                                                    |
|      | GETH_PPS       | O6    |                                 | Pulse Per Second                                            |
|      | —              | O7    |                                 | Reserved                                                    |

表 2-32 端口 P14 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| A14  | P14.5          | I     | FAST /<br>PU2 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM1_IN0_4 |       |                                 | Mux input channel 0 of TIM module 1 |
|      | GTM_TIM0_IN0_4 |       |                                 | Mux input channel 0 of TIM module 0 |
|      | PMS_HWCFG1IN   |       |                                 | HWCFG1 pin input                    |
|      | GTM_DTMA2_0    |       |                                 | CDTM2_DTM4                          |
|      | P14.5          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT85     | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | ERAY0_TXDB     | O6    |                                 | Transmit Channel B                  |
|      | ERAY1_TXDB     | O7    |                                 | Transmit Channel B                  |
| B13  | P14.6          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM1_IN1_4 |       |                                 | Mux input channel 1 of TIM module 1 |
|      | GTM_TIM0_IN1_4 |       |                                 | Mux input channel 1 of TIM module 0 |
|      | P14.6          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT86     | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | QSPI2_SLSO2    | O3    |                                 | Master slave select output          |
|      | CAN13_TXD      | O4    |                                 | CAN transmit output node 3          |
|      | —              | O5    |                                 | Reserved                            |
|      | ERAY0_TXENB    | O6    |                                 | Transmit Enable Channel B           |
|      | ERAY1_TXENB    | O7    |                                 | Transmit Enable Channel B           |

表 2-32 端口 P14 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| D13  | P14.7           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM4_IN7_10 |       |                                 | Mux input channel 7 of TIM module 4 |
|      | GTM_TIM1_IN0_5  |       |                                 | Mux input channel 0 of TIM module 1 |
|      | GTM_TIM0_IN0_5  |       |                                 | Mux input channel 0 of TIM module 0 |
|      | ERAY0_RXDB0     |       |                                 | Receive Channel B0                  |
|      | ERAY1_RXDB0     |       |                                 | Receive Channel B0                  |
|      | CAN10_RXDB      |       |                                 | CAN receive input node 0            |
|      | CAN13_RXDA      |       |                                 | CAN receive input node 3            |
|      | ASCLIN9_ARXC    |       |                                 | Receive input                       |
|      | ASCLIN20_ARXA   |       |                                 | Receive input                       |
|      | P14.7           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT87      | O1    |                                 | GTM muxed output                    |
|      | ASCLIN0_ARTS    | O2    |                                 | Ready to send output                |
|      | QSPI2_SLSO4     | O3    |                                 | Master slave select output          |
|      | ASCLIN9_ATX     | O4    |                                 | Transmit output                     |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | ASCLIN20_ATX    | O7    |                                 | Transmit output                     |
| A13  | P14.8           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM3_IN2_3  |       |                                 | Mux input channel 2 of TIM module 3 |
|      | GTM_TIM2_IN2_3  |       |                                 | Mux input channel 2 of TIM module 2 |
|      | ERAY0_RXDA0     |       |                                 | Receive Channel A0                  |
|      | CAN02_RXDD      |       |                                 | CAN receive input node 2            |
|      | ASCLIN1_ARXD    |       |                                 | Receive input                       |
|      | ERAY1_RXDA0     |       |                                 | Receive Channel A0                  |
|      | P14.8           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT88      | O1    |                                 | GTM muxed output                    |
|      | ASCLIN5_ASLSO   | O2    |                                 | Slave select signal output          |
|      | ASCLIN7_ASLSO   | O3    |                                 | Slave select signal output          |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | ASCLIN20_ATX    | O7    |                                 | Transmit output                     |

表 2-32 端口 P14 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                               | Function                            |
|------|----------------|-------|-------------------------------------------|-------------------------------------|
| D12  | P14.9          | I     | LVDS_RX<br>/ FAST /<br>PU1 /<br>VEXT / ES | General-purpose input               |
|      | GTM_TIM3_IN3_3 |       |                                           | Mux input channel 3 of TIM module 3 |
|      | GTM_TIM2_IN3_3 |       |                                           | Mux input channel 3 of TIM module 2 |
|      | ASCLIN0_ACTSA  |       |                                           | Clear to send input                 |
|      | QSPI2_MRSTFN   |       |                                           | Master SPI data input (LVDS N line) |
|      | ASCLIN9_ARXD   |       |                                           | Receive input                       |
|      | ASCLIN20_ARXB  |       |                                           | Receive input                       |
|      | P14.9          | O0    |                                           | General-purpose output              |
|      | GTM_TOUT89     | O1    |                                           | GTM muxed output                    |
|      | CAN23_TXD      | O2    |                                           | CAN transmit output node 3          |
|      | MSC0_EN1       | O3    |                                           | Chip Select                         |
|      | CAN10_TXD      | O4    |                                           | CAN transmit output node 0          |
|      | ERAY0_TXENB    | O5    |                                           | Transmit Enable Channel B           |
|      | ERAY0_TXENA    | O6    |                                           | Transmit Enable Channel A           |
|      | ERAY1_TXENA    | O7    |                                           | Transmit Enable Channel A           |
| D11  | P14.10         | I     | LVDS_RX<br>/ FAST /<br>PU1 /<br>VEXT / ES | General-purpose input               |
|      | GTM_TIM3_IN4_3 |       |                                           | Mux input channel 4 of TIM module 3 |
|      | GTM_TIM2_IN4_3 |       |                                           | Mux input channel 4 of TIM module 2 |
|      | CAN23_RXDA     |       |                                           | CAN receive input node 3            |
|      | QSPI2_MRSTFP   |       |                                           | Master SPI data input (LVDS P line) |
|      | P14.10         | O0    |                                           | General-purpose output              |
|      | GTM_TOUT90     | O1    |                                           | GTM muxed output                    |
|      | —              | O2    |                                           | Reserved                            |
|      | MSC0_EN0       | O3    |                                           | Chip Select                         |
|      | ASCLIN1_ATX    | O4    |                                           | Transmit output                     |
|      | IOM_MON2_13    |       |                                           | Monitor input 2                     |
|      | IOM_REF2_13    |       |                                           | Reference input 2                   |
|      | CAN02_TXD      | O5    |                                           | CAN transmit output node 2          |
|      | IOM_MON2_7     |       |                                           | Monitor input 2                     |
|      | IOM_REF2_7     |       |                                           | Reference input 2                   |
|      | ERAY0_TXDA     | O6    |                                           | Transmit Channel A                  |
|      | ERAY1_TXDA     | O7    |                                           | Transmit Channel A                  |

表 2-33 端口 P15 功能

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                                                    |
|------|----------------|-------|---------------------------------|-------------------------------------------------------------|
| B20  | P15.0          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM3_IN3_4 |       |                                 | Mux input channel 3 of TIM module 3                         |
|      | GTM_TIM2_IN3_4 |       |                                 | Mux input channel 3 of TIM module 2                         |
|      | P15.0          | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT71     | O1    |                                 | GTM muxed output                                            |
|      | ASCLIN1_ATX    | O2    |                                 | Transmit output                                             |
|      | IOM_MON2_13    |       |                                 | Monitor input 2                                             |
|      | IOM_REF2_13    |       |                                 | Reference input 2                                           |
|      | QSPI0_SLSO13   | O3    |                                 | Master slave select output                                  |
|      | —              | O4    |                                 | Reserved                                                    |
|      | CAN02_TXD      | O5    |                                 | CAN transmit output node 2                                  |
|      | IOM_MON2_7     |       |                                 | Monitor input 2                                             |
|      | IOM_REF2_7     |       |                                 | Reference input 2                                           |
|      | ASCLIN1_ASCLK  | O6    |                                 | Shift clock output                                          |
|      | —              | O7    |                                 | Reserved                                                    |
| A18  | P15.1          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM3_IN4_4 |       |                                 | Mux input channel 4 of TIM module 3                         |
|      | GTM_TIM2_IN4_4 |       |                                 | Mux input channel 4 of TIM module 2                         |
|      | CAN02_RXDA     |       |                                 | CAN receive input node 2                                    |
|      | ASCLIN1_ARXA   |       |                                 | Receive input                                               |
|      | QSPI2_SLSIB    |       |                                 | Slave select input                                          |
|      | SCU_E_REQ7_2   |       |                                 | ERU Channel 7 inputs 0 to 5 (0 is the LSB and 5 is the MSB) |
|      | P15.1          | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT72     | O1    |                                 | GTM muxed output                                            |
|      | ASCLIN1_ATX    | O2    |                                 | Transmit output                                             |
|      | IOM_MON2_13    |       |                                 | Monitor input 2                                             |
|      | IOM_REF2_13    |       |                                 | Reference input 2                                           |
|      | QSPI2_SLSO5    | O3    |                                 | Master slave select output                                  |
|      | —              | O4    |                                 | Reserved                                                    |
|      | —              | O5    |                                 | Reserved                                                    |
|      | —              | O6    |                                 | Reserved                                                    |
|      | —              | O7    |                                 | Reserved                                                    |

表 2-33 端口 P15 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| C19  | P15.2          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM3_IN5_4 |       |                                 | Mux input channel 5 of TIM module 3 |
|      | GTM_TIM2_IN5_4 |       |                                 | Mux input channel 5 of TIM module 2 |
|      | QSPI2_SLSIA    |       |                                 | Slave select input                  |
|      | SENT_SENT10D   |       |                                 | Receive input channel 10            |
|      | QSPI2_MRSTE    |       |                                 | Master SPI data input               |
|      | P15.2          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT73     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN0_ATX    | O2    |                                 | Transmit output                     |
|      | IOM_MON2_12    |       |                                 | Monitor input 2                     |
|      | IOM_REF2_12    |       |                                 | Reference input 2                   |
|      | QSPI2_SLSO0    | O3    |                                 | Master slave select output          |
|      | —              | O4    |                                 | Reserved                            |
|      | CAN01_TXD      | O5    |                                 | CAN transmit output node 1          |
|      | IOM_MON2_6     |       |                                 | Monitor input 2                     |
|      | IOM_REF2_6     |       |                                 | Reference input 2                   |
|      | ASCLIN0_ASCLK  | O6    |                                 | Shift clock output                  |
|      | —              | O7    |                                 | Reserved                            |
| B17  | P15.3          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM3_IN6_4 |       |                                 | Mux input channel 6 of TIM module 3 |
|      | GTM_TIM2_IN6_4 |       |                                 | Mux input channel 6 of TIM module 2 |
|      | CAN01_RXDA     |       |                                 | CAN receive input node 1            |
|      | ASCLIN0_ARXB   |       |                                 | Receive input                       |
|      | QSPI2_SCLKA    |       |                                 | Slave SPI clock inputs              |
|      | P15.3          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT74     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN0_ATX    | O2    |                                 | Transmit output                     |
|      | IOM_MON2_12    |       |                                 | Monitor input 2                     |
|      | IOM_REF2_12    |       |                                 | Reference input 2                   |
|      | QSPI2_SCLK     | O3    |                                 | Master SPI clock output             |
|      | —              | O4    |                                 | Reserved                            |
|      | MSC0_EN1       | O5    |                                 | Chip Select                         |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |

表 2-33 端口 P15 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                                                    |
|------|----------------|-------|---------------------------------|-------------------------------------------------------------|
| A17  | P15.4          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM3_IN7_4 |       |                                 | Mux input channel 7 of TIM module 3                         |
|      | GTM_TIM2_IN7_4 |       |                                 | Mux input channel 7 of TIM module 2                         |
|      | I2C0_SCLC      |       |                                 | Serial Clock Input 2                                        |
|      | QSPI2_MRSTA    |       |                                 | Master SPI data input                                       |
|      | SCU_E_REQ0_0   |       |                                 | ERU Channel 0 inputs 0 to 5 (0 is the LSB and 5 is the MSB) |
|      | SENT_SENT11D   |       |                                 | Receive input channel 11                                    |
|      | P15.4          | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT75     | O1    |                                 | GTM muxed output                                            |
|      | ASCLIN1_ATX    | O2    |                                 | Transmit output                                             |
|      | IOM_MON2_13    |       |                                 | Monitor input 2                                             |
|      | IOM_REF2_13    |       |                                 | Reference input 2                                           |
|      | QSPI2_MRST     | O3    |                                 | Slave SPI data output                                       |
|      | IOM_MON2_2     |       |                                 | Monitor input 2                                             |
|      | IOM_REF2_2     |       |                                 | Reference input 2                                           |
|      | ASCLIN19_ATX   | O4    |                                 | Transmit output                                             |
|      | —              | O5    |                                 | Reserved                                                    |
|      | I2C0_SCL       | O6    |                                 | Serial Clock Output                                         |
|      | CCU60_CC62     | O7    |                                 | T12 PWM channel 62                                          |
|      | IOM_MON1_0     |       |                                 | Monitor input 1                                             |
|      | IOM_REF1_4     |       |                                 | Reference input 1                                           |

## 引脚定义和功能 BGA292 封装变体 引脚配置

表 2-33 端口 P15 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                                                    |
|------|-----------------|-------|---------------------------------|-------------------------------------------------------------|
| E14  | P15.5           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM3_IN0_4  |       |                                 | Mux input channel 0 of TIM module 3                         |
|      | GTM_TIM2_IN0_4  |       |                                 | Mux input channel 0 of TIM module 2                         |
|      | ASCLIN1_ARXB    |       |                                 | Receive input                                               |
|      | I2C0_SDAC       |       |                                 | Serial Data Input 2                                         |
|      | QSPI2_MTSRA     |       |                                 | Slave SPI data input                                        |
|      | SCU_E_REQ4_3    |       |                                 | ERU Channel 4 inputs 0 to 5 (0 is the LSB and 5 is the MSB) |
|      | P15.5           | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT76      | O1    |                                 | GTM muxed output                                            |
|      | ASCLIN1_ATX     | O2    |                                 | Transmit output                                             |
|      | IOM_MON2_13     |       |                                 | Monitor input 2                                             |
|      | IOM_REF2_13     |       |                                 | Reference input 2                                           |
|      | QSPI2_MTSR      | O3    |                                 | Master SPI data output                                      |
|      | —               | O4    |                                 | Reserved                                                    |
|      | MSC0_EN0        | O5    |                                 | Chip Select                                                 |
|      | I2C0_SDA        | O6    |                                 | Serial Data Output                                          |
|      | CCU60_CC61      | O7    |                                 | T12 PWM channel 61                                          |
|      | IOM_MON1_1      |       |                                 | Monitor input 1                                             |
|      | IOM_REF1_5      |       |                                 | Reference input 1                                           |
| A16  | P15.6           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM2_IN2_14 |       |                                 | Mux input channel 2 of TIM module 2                         |
|      | GTM_TIM1_IN0_6  |       |                                 | Mux input channel 0 of TIM module 1                         |
|      | GTM_TIM0_IN0_6  |       |                                 | Mux input channel 0 of TIM module 0                         |
|      | QSPI2_MTSRB     |       |                                 | Slave SPI data input                                        |
|      | ASCLIN19_ARXA   |       |                                 | Receive input                                               |
|      | P15.6           | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT77      | O1    |                                 | GTM muxed output                                            |
|      | ASCLIN3_ATX     | O2    |                                 | Transmit output                                             |
|      | IOM_MON2_15     |       |                                 | Monitor input 2                                             |
|      | IOM_REF2_15     |       |                                 | Reference input 2                                           |
|      | QSPI2_MTSR      | O3    |                                 | Master SPI data output                                      |
|      | —               | O4    |                                 | Reserved                                                    |
|      | QSPI2_SCLK      | O5    |                                 | Master SPI clock output                                     |
|      | ASCLIN3_ASCLK   | O6    |                                 | Shift clock output                                          |
|      | CCU60_CC60      | O7    |                                 | T12 PWM channel 60                                          |
|      | IOM_MON1_2      |       |                                 | Monitor input 1                                             |
|      | IOM_REF1_6      |       |                                 | Reference input 1                                           |

表 2-33 端口 P15 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                                                    |
|------|----------------|-------|---------------------------------|-------------------------------------------------------------|
| D15  | P15.7          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM1_IN1_5 |       |                                 | Mux input channel 1 of TIM module 1                         |
|      | GTM_TIM0_IN1_5 |       |                                 | Mux input channel 1 of TIM module 0                         |
|      | ASCLIN3_ARXA   |       |                                 | Receive input                                               |
|      | QSPI2_MRSTB    |       |                                 | Master SPI data input                                       |
|      | ASCLIN19_ARXB  |       |                                 | Receive input                                               |
|      | P15.7          | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT78     | O1    |                                 | GTM muxed output                                            |
|      | ASCLIN3_ATX    | O2    |                                 | Transmit output                                             |
|      | IOM_MON2_15    |       |                                 | Monitor input 2                                             |
|      | IOM_REF2_15    |       |                                 | Reference input 2                                           |
|      | QSPI2_MRST     | O3    |                                 | Slave SPI data output                                       |
|      | IOM_MON2_2     |       |                                 | Monitor input 2                                             |
|      | IOM_REF2_2     |       |                                 | Reference input 2                                           |
|      | ASCLIN19_ATX   | O4    |                                 | Transmit output                                             |
|      | —              | O5    |                                 | Reserved                                                    |
|      | —              | O6    |                                 | Reserved                                                    |
|      | CCU60_COUT60   | O7    |                                 | T12 PWM channel 60                                          |
|      | IOM_MON1_3     |       |                                 | Monitor input 1                                             |
|      | IOM_REF1_3     |       |                                 | Reference input 1                                           |
| D14  | P15.8          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM1_IN2_5 |       |                                 | Mux input channel 2 of TIM module 1                         |
|      | GTM_TIM0_IN2_5 |       |                                 | Mux input channel 2 of TIM module 0                         |
|      | QSPI2_SCLKB    |       |                                 | Slave SPI clock inputs                                      |
|      | SCU_E_REQ5_0   |       |                                 | ERU Channel 5 inputs 0 to 5 (0 is the LSB and 5 is the MSB) |
|      | P15.8          | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT79     | O1    |                                 | GTM muxed output                                            |
|      | —              | O2    |                                 | Reserved                                                    |
|      | QSPI2_SCLK     | O3    |                                 | Master SPI clock output                                     |
|      | —              | O4    |                                 | Reserved                                                    |
|      | —              | O5    |                                 | Reserved                                                    |
|      | ASCLIN3_ASCLK  | O6    |                                 | Shift clock output                                          |
|      | CCU60_COUT61   | O7    |                                 | T12 PWM channel 61                                          |
|      | IOM_MON1_4     |       |                                 | Monitor input 1                                             |
|      | IOM_REF1_2     |       |                                 | Reference input 1                                           |

表 2-34 端口 P20 功能

| Ball     | Symbol           | Ctrl.          | Buffer Type                     | Function                                                    |
|----------|------------------|----------------|---------------------------------|-------------------------------------------------------------|
| H20      | P20.0            | I              | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|          | GTM_TIM1_IN6_7   |                |                                 | Mux input channel 6 of TIM module 1                         |
|          | GTM_TIM1_IN4_9   |                |                                 | Mux input channel 4 of TIM module 1                         |
|          | GTM_TIM0_IN6_7   |                |                                 | Mux input channel 6 of TIM module 0                         |
|          | CAN03_RXDC       |                |                                 | CAN receive input node 3                                    |
|          | CCU_PAD_SYSCLK   |                |                                 | Sysclk input                                                |
|          | CAN21_RXDC       |                |                                 | CAN receive input node 1                                    |
|          | CBS_TGI0         |                |                                 | Trigger input                                               |
|          | SCU_E_REQ6_0     |                |                                 | ERU Channel 6 inputs 0 to 5 (0 is the LSB and 5 is the MSB) |
|          | GPT120_T6EUDA    |                |                                 | Count direction control input of core timer T6              |
|          | P20.0            | O0             |                                 | General-purpose output                                      |
|          | GTM_TOUT59       | O1             |                                 | GTM muxed output                                            |
|          | ASCLIN3_ATX      | O2             |                                 | Transmit output                                             |
|          | IOM_MON2_15      |                |                                 | Monitor input 2                                             |
|          | IOM_REF2_15      |                |                                 | Reference input 2                                           |
|          | ASCLIN3_ASCLK    | O3             |                                 | Shift clock output                                          |
|          | —                | O4             |                                 | Reserved                                                    |
|          | HSCT0_SYSCLK_OUT | O5             |                                 | sys clock output                                            |
|          | —                | O6             |                                 | Reserved                                                    |
|          | —                | O7             |                                 | Reserved                                                    |
| CBS_TGO0 | O                | Trigger output |                                 |                                                             |
| G19      | P20.1            | I              | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|          | GTM_TIM4_IN4_11  |                |                                 | Mux input channel 4 of TIM module 4                         |
|          | GTM_TIM3_IN3_5   |                |                                 | Mux input channel 3 of TIM module 3                         |
|          | GTM_TIM2_IN3_5   |                |                                 | Mux input channel 3 of TIM module 2                         |
|          | CBS_TGI1         |                |                                 | Trigger input                                               |
|          | GTM_DTMA1_1      |                |                                 | CDTM1_DTM4                                                  |
|          | P20.1            | O0             |                                 | General-purpose output                                      |
|          | GTM_TOUT60       | O1             |                                 | GTM muxed output                                            |
|          | —                | O2             |                                 | Reserved                                                    |
|          | —                | O3             |                                 | Reserved                                                    |
|          | —                | O4             |                                 | Reserved                                                    |
|          | —                | O5             |                                 | Reserved                                                    |
|          | —                | O6             |                                 | Reserved                                                    |
|          | —                | O7             |                                 | Reserved                                                    |
|          | CBS_TGO1         | O              |                                 | Trigger output                                              |

表 2-34 端口 P20 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                       | Function                                                                                          |
|------|-----------------|-------|-----------------------------------|---------------------------------------------------------------------------------------------------|
| H19  | P20.2           | I     | S / PU / VEXT                     | <b>General-purpose input</b><br>This pin is latched at power on reset release to enter test mode. |
|      | TESTMODE        |       |                                   | <b>Testmode Enable Input</b>                                                                      |
| G20  | P20.3           | I     | SLOW / PU1 / VEXT / ES            | <b>General-purpose input</b>                                                                      |
|      | GTM_TIM4_IN5_11 |       |                                   | <b>Mux input channel 5 of TIM module 4</b>                                                        |
|      | GTM_TIM3_IN4_5  |       |                                   | <b>Mux input channel 4 of TIM module 3</b>                                                        |
|      | GTM_TIM2_IN4_5  |       |                                   | <b>Mux input channel 4 of TIM module 2</b>                                                        |
|      | ASCLIN3_ARXC    |       |                                   | <b>Receive input</b>                                                                              |
|      | GPT120_T6INA    |       |                                   | <b>Trigger/gate input of core timer T6</b>                                                        |
|      | P20.3           | O0    | <b>General-purpose output</b>     |                                                                                                   |
|      | GTM_TOUT61      | O1    | <b>GTM muxed output</b>           |                                                                                                   |
|      | ASCLIN3_ATX     | O2    | <b>Transmit output</b>            |                                                                                                   |
|      | IOM_MON2_15     |       | <b>Monitor input 2</b>            |                                                                                                   |
|      | IOM_REF2_15     |       | <b>Reference input 2</b>          |                                                                                                   |
|      | QSPI0_SLSO9     | O3    | <b>Master slave select output</b> |                                                                                                   |
|      | QSPI2_SLSO9     | O4    | <b>Master slave select output</b> |                                                                                                   |
|      | CAN03_TXD       | O5    | <b>CAN transmit output node 3</b> |                                                                                                   |
|      | IOM_MON2_8      |       | <b>Monitor input 2</b>            |                                                                                                   |
|      | IOM_REF2_8      |       | <b>Reference input 2</b>          |                                                                                                   |
|      | CAN21_TXD       | O6    | <b>CAN transmit output node 1</b> |                                                                                                   |
|      | —               | O7    | <b>Reserved</b>                   |                                                                                                   |
| F17  | P20.6           | I     | SLOW / PU1 / VEXT / ES            | <b>General-purpose input</b>                                                                      |
|      | GTM_TIM6_IN0_1  |       |                                   | <b>Mux input channel 0 of TIM module 6</b>                                                        |
|      | GTM_TIM3_IN6_5  |       |                                   | <b>Mux input channel 6 of TIM module 3</b>                                                        |
|      | GTM_TIM2_IN6_5  |       |                                   | <b>Mux input channel 6 of TIM module 2</b>                                                        |
|      | CAN12_RXDA      |       |                                   | <b>CAN receive input node 2</b>                                                                   |
|      | ASCLIN9_ARXE    |       |                                   | <b>Receive input</b>                                                                              |
|      | P20.6           | O0    | <b>General-purpose output</b>     |                                                                                                   |
|      | GTM_TOUT62      | O1    | <b>GTM muxed output</b>           |                                                                                                   |
|      | ASCLIN1_ARTS    | O2    | <b>Ready to send output</b>       |                                                                                                   |
|      | QSPI0_SLSO8     | O3    | <b>Master slave select output</b> |                                                                                                   |
|      | QSPI2_SLSO8     | O4    | <b>Master slave select output</b> |                                                                                                   |
|      | —               | O5    | <b>Reserved</b>                   |                                                                                                   |
|      | —               | O6    | <b>Reserved</b>                   |                                                                                                   |
|      | —               | O7    | <b>Reserved</b>                   |                                                                                                   |

表 2-34 端口 P20 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| F19  | P20.7          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM3_IN7_5 |       |                                 | Mux input channel 7 of TIM module 3 |
|      | GTM_TIM2_IN7_5 |       |                                 | Mux input channel 7 of TIM module 2 |
|      | GTM_TIM1_IN5_8 |       |                                 | Mux input channel 5 of TIM module 1 |
|      | GTM_TIM6_IN1_1 |       |                                 | Mux input channel 1 of TIM module 6 |
|      | CAN00_RXDB     |       |                                 | CAN receive input node 0            |
|      | ASCLIN1_ACTSA  |       |                                 | Clear to send input                 |
|      | ASCLIN9_ARXF   |       |                                 | Receive input                       |
|      | P20.7          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT63     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN9_ATX    | O2    |                                 | Transmit output                     |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | CAN12_TXD      | O5    |                                 | CAN transmit output node 2          |
|      | —              | O6    |                                 | Reserved                            |
|      | CCU61_COUT63   | O7    |                                 | T13 PWM channel 63                  |
|      | IOM_MON1_7     |       |                                 | Monitor input 1                     |
|      | IOM_REF1_7     |       |                                 | Reference input 1                   |
| F20  | P20.8          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN2_1 |       |                                 | Mux input channel 2 of TIM module 6 |
|      | GTM_TIM1_IN7_3 |       |                                 | Mux input channel 7 of TIM module 1 |
|      | GTM_TIM0_IN7_3 |       |                                 | Mux input channel 7 of TIM module 0 |
|      | P20.8          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT64     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN1_ASLSO  | O2    |                                 | Slave select signal output          |
|      | QSPI0_SLSO0    | O3    |                                 | Master slave select output          |
|      | QSPI1_SLSO0    | O4    |                                 | Master slave select output          |
|      | CAN00_TXD      | O5    |                                 | CAN transmit output node 0          |
|      | IOM_MON2_5     |       |                                 | Monitor input 2                     |
|      | IOM_REF2_5     |       |                                 | Reference input 2                   |
|      | —              | O6    |                                 | Reserved                            |
|      | CCU61_CC60     | O7    |                                 | T12 PWM channel 60                  |
|      | IOM_MON1_8     |       |                                 | Monitor input 1                     |
|      | IOM_REF1_13    |       |                                 | Reference input 1                   |

表 2-34 端口 P20 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                                                    |
|------|----------------|-------|---------------------------------|-------------------------------------------------------------|
| E17  | P20.9          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM6_IN3_1 |       |                                 | Mux input channel 3 of TIM module 6                         |
|      | GTM_TIM3_IN5_5 |       |                                 | Mux input channel 5 of TIM module 3                         |
|      | GTM_TIM2_IN5_5 |       |                                 | Mux input channel 5 of TIM module 2                         |
|      | CAN03_RXDE     |       |                                 | CAN receive input node 3                                    |
|      | ASCLIN1_ARXC   |       |                                 | Receive input                                               |
|      | QSPI0_SLSIB    |       |                                 | Slave select input                                          |
|      | SCU_E_REQ7_0   |       |                                 | ERU Channel 7 inputs 0 to 5 (0 is the LSB and 5 is the MSB) |
|      | P20.9          | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT65     | O1    |                                 | GTM muxed output                                            |
|      | —              | O2    |                                 | Reserved                                                    |
|      | QSPI0_SLSO1    | O3    |                                 | Master slave select output                                  |
|      | QSPI1_SLSO1    | O4    |                                 | Master slave select output                                  |
|      | —              | O5    |                                 | Reserved                                                    |
|      | —              | O6    |                                 | Reserved                                                    |
|      | CCU61_CC61     | O7    |                                 | T12 PWM channel 61                                          |
|      | IOM_MON1_9     |       |                                 | Monitor input 1                                             |
|      | IOM_REF1_12    |       |                                 | Reference input 1                                           |
| E19  | P20.10         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input                                       |
|      | GTM_TIM3_IN6_6 |       |                                 | Mux input channel 6 of TIM module 3                         |
|      | GTM_TIM2_IN6_6 |       |                                 | Mux input channel 6 of TIM module 2                         |
|      | P20.10         | O0    |                                 | General-purpose output                                      |
|      | GTM_TOUT66     | O1    |                                 | GTM muxed output                                            |
|      | ASCLIN1_ATX    | O2    |                                 | Transmit output                                             |
|      | IOM_MON2_13    |       |                                 | Monitor input 2                                             |
|      | IOM_REF2_13    |       |                                 | Reference input 2                                           |
|      | QSPI0_SLSO6    | O3    |                                 | Master slave select output                                  |
|      | QSPI2_SLSO7    | O4    |                                 | Master slave select output                                  |
|      | CAN03_TXD      | O5    |                                 | CAN transmit output node 3                                  |
|      | IOM_MON2_8     |       |                                 | Monitor input 2                                             |
|      | IOM_REF2_8     |       |                                 | Reference input 2                                           |
|      | ASCLIN1_ASCLK  | O6    |                                 | Shift clock output                                          |
|      | CCU61_CC62     | O7    |                                 | T12 PWM channel 62                                          |
|      | IOM_MON1_10    |       |                                 | Monitor input 1                                             |
|      | IOM_REF1_11    |       |                                 | Reference input 1                                           |

表 2-34 端口 P20 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| E20  | P20.11         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM3_IN7_6 |       |                                 | Mux input channel 7 of TIM module 3 |
|      | GTM_TIM2_IN7_6 |       |                                 | Mux input channel 7 of TIM module 2 |
|      | QSPI0_SCLKA    |       |                                 | Slave SPI clock inputs              |
|      | P20.11         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT67     | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | QSPI0_SCLK     | O3    |                                 | Master SPI clock output             |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | CCU61_COUT60   | O7    |                                 | T12 PWM channel 60                  |
|      | IOM_MON1_11    |       |                                 | Monitor input 1                     |
|      | IOM_REF1_10    |       |                                 | Reference input 1                   |
| D19  | P20.12         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM3_IN0_5 |       |                                 | Mux input channel 0 of TIM module 3 |
|      | GTM_TIM2_IN0_5 |       |                                 | Mux input channel 0 of TIM module 2 |
|      | QSPI0_MRSTA    |       |                                 | Master SPI data input               |
|      | IOM_PIN_13     |       |                                 | GPIO pad input to FPC               |
|      | P20.12         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT68     | O1    |                                 | GTM muxed output                    |
|      | IOM_MON0_13    |       |                                 | Monitor input 0                     |
|      | —              | O2    |                                 | Reserved                            |
|      | QSPI0_MRST     | O3    |                                 | Slave SPI data output               |
|      | IOM_MON2_0     |       |                                 | Monitor input 2                     |
|      | IOM_REF2_0     |       |                                 | Reference input 2                   |
|      | QSPI0_MTSR     | O4    |                                 | Master SPI data output              |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | CCU61_COUT61   | O7    |                                 | T12 PWM channel 61                  |
|      | IOM_MON1_12    |       |                                 | Monitor input 1                     |
|      | IOM_REF1_9     |       |                                 | Reference input 1                   |

表 2-34 端口 P20 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| D20  | P20.13         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM3_IN1_4 |       |                                 | Mux input channel 1 of TIM module 3 |
|      | GTM_TIM2_IN1_4 |       |                                 | Mux input channel 1 of TIM module 2 |
|      | QSPI0_SLSIA    |       |                                 | Slave select input                  |
|      | IOM_PIN_14     |       |                                 | GPIO pad input to FPC               |
|      | P20.13         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT69     | O1    |                                 | GTM muxed output                    |
|      | IOM_MON0_14    |       |                                 | Monitor input 0                     |
|      | —              | O2    |                                 | Reserved                            |
|      | QSPI0_SLSO2    | O3    |                                 | Master slave select output          |
|      | QSPI1_SLSO2    | O4    |                                 | Master slave select output          |
|      | QSPI0_SCLK     | O5    |                                 | Master SPI clock output             |
|      | —              | O6    |                                 | Reserved                            |
|      | CCU61_COUT62   | O7    |                                 | T12 PWM channel 62                  |
|      | IOM_MON1_13    |       |                                 | Monitor input 1                     |
|      | IOM_REF1_8     |       |                                 | Reference input 1                   |
| C20  | P20.14         | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM3_IN2_4 |       |                                 | Mux input channel 2 of TIM module 3 |
|      | GTM_TIM2_IN2_4 |       |                                 | Mux input channel 2 of TIM module 2 |
|      | QSPI0_MTSRA    |       |                                 | Slave SPI data input                |
|      | IOM_PIN_15     |       |                                 | GPIO pad input to FPC               |
|      | P20.14         | O0    |                                 | General-purpose output              |
|      | GTM_TOUT70     | O1    |                                 | GTM muxed output                    |
|      | IOM_MON0_15    |       |                                 | Monitor input 0                     |
|      | —              | O2    |                                 | Reserved                            |
|      | QSPI0_MTSR     | O3    |                                 | Master SPI data output              |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |

表 2-35 端口 P21 功能

| Ball | Symbol          | Ctrl. | Buffer Type                               | Function                            |
|------|-----------------|-------|-------------------------------------------|-------------------------------------|
| K17  | P21.0           | I     | LVDS_RX<br>/ FAST /<br>PU1 /<br>VEXT / ES | General-purpose input               |
|      | GTM_TIM4_IN0_11 |       |                                           | Mux input channel 0 of TIM module 4 |
|      | GTM_TIM3_IN4_6  |       |                                           | Mux input channel 4 of TIM module 3 |
|      | GTM_TIM2_IN4_6  |       |                                           | Mux input channel 4 of TIM module 2 |
|      | QSPI4_MRSTDN    |       |                                           | Master SPI data input (LVDS N line) |
|      | DMU_FDEST       |       |                                           | Enter destructive debug mode        |
|      | ASCLIN11_ARXC   |       |                                           | Receive input                       |
|      | ASCLIN17_ARXB   |       |                                           | Receive input                       |
|      | P21.0           | O0    |                                           | General-purpose output              |
|      | GTM_TOUT51      | O1    |                                           | GTM muxed output                    |
|      | ASCLIN11_ATX    | O2    |                                           | Transmit output                     |
|      | —               | O3    |                                           | Reserved                            |
|      | —               | O4    |                                           | Reserved                            |
|      | —               | O5    |                                           | Reserved                            |
|      | —               | O6    |                                           | Reserved                            |
|      | —               | O7    |                                           | Reserved                            |
|      | HSM_HSM1        | O     |                                           | Pin Output Value                    |
| J17  | P21.1           | I     | LVDS_RX<br>/ FAST /<br>PU1 /<br>VEXT / ES | General-purpose input               |
|      | GTM_TIM4_IN1_13 |       |                                           | Mux input channel 1 of TIM module 4 |
|      | GTM_TIM3_IN5_6  |       |                                           | Mux input channel 5 of TIM module 3 |
|      | GTM_TIM2_IN5_6  |       |                                           | Mux input channel 5 of TIM module 2 |
|      | QSPI4_MRSTDP    |       |                                           | Master SPI data input (LVDS P line) |
|      | ASCLIN11_ARXD   |       |                                           | Receive input                       |
|      | ASCLIN18_ARXA   |       |                                           | Receive input                       |
|      | GTM_DTMA4_1     |       |                                           | CDTM4_DTM4                          |
|      | P21.1           | O0    |                                           | General-purpose output              |
|      | GTM_TOUT52      | O1    |                                           | GTM muxed output                    |
|      | —               | O2    |                                           | Reserved                            |
|      | —               | O3    |                                           | Reserved                            |
|      | —               | O4    |                                           | Reserved                            |
|      | —               | O5    |                                           | Reserved                            |
|      | —               | O6    |                                           | Reserved                            |
|      | —               | O7    |                                           | Reserved                            |
|      | HSM_HSM2        | O     |                                           | Pin Output Value                    |

表 2-35 端口 P21 的功能 (续)

| Ball | Symbol                 | Ctrl. | Buffer Type                               | Function                                 |
|------|------------------------|-------|-------------------------------------------|------------------------------------------|
| K19  | P21.2                  | I     | LVDS_RX<br>/ FAST /<br>PU1 /<br>VEXT / ES | General-purpose input                    |
|      | GTM_TIM5_IN4_11        |       |                                           | Mux input channel 4 of TIM module 5      |
|      | GTM_TIM1_IN0_7         |       |                                           | Mux input channel 0 of TIM module 1      |
|      | GTM_TIM0_IN0_7         |       |                                           | Mux input channel 0 of TIM module 0      |
|      | QSPI2_MRSTCN           |       |                                           | Master SPI data input (LVDS N line)      |
|      | SCU_EMGSTOP_POR<br>T_B |       |                                           | Emergency stop Port Pin B input request  |
|      | ASCLIN3_ARXGN          |       |                                           | Differential Receive input (low active)  |
|      | HSCT0_RXDN             |       |                                           | Rx data                                  |
|      | QSPI4_MRSTCN           |       |                                           | Master SPI data input (LVDS N line)      |
|      | ASCLIN11_ARXE          |       |                                           | Receive input                            |
|      | GTM_DTMA1_0            |       |                                           | CDTM1_DTM4                               |
|      | P21.2                  | O0    |                                           | General-purpose output                   |
|      | GTM_TOUT53             | O1    |                                           | GTM muxed output                         |
|      | ASCLIN3_ASLSO          | O2    |                                           | Slave select signal output               |
|      | —                      | O3    |                                           | Reserved                                 |
|      | —                      | O4    |                                           | Reserved                                 |
|      | GETH_MDC               | O5    |                                           | MDIO clock                               |
|      | —                      | O6    |                                           | Reserved                                 |
|      | —                      | O7    |                                           | Reserved                                 |
| J19  | P21.3                  | I     | LVDS_RX<br>/ FAST /<br>PU1 /<br>VEXT / ES | General-purpose input                    |
|      | GTM_TIM5_IN5_12        |       |                                           | Mux input channel 5 of TIM module 5      |
|      | GTM_TIM1_IN1_6         |       |                                           | Mux input channel 1 of TIM module 1      |
|      | GTM_TIM0_IN1_6         |       |                                           | Mux input channel 1 of TIM module 0      |
|      | QSPI2_MRSTCP           |       |                                           | Master SPI data input (LVDS P line)      |
|      | ASCLIN3_ARXGP          |       |                                           | Differential Receive input (high active) |
|      | GETH_MDIOD             |       |                                           | MDIO Input                               |
|      | HSCT0_RXDP             |       |                                           | Rx data                                  |
|      | QSPI4_MRSTCP           |       |                                           | Master SPI data input (LVDS P line)      |
|      | P21.3                  | O0    |                                           | General-purpose output                   |
|      | GTM_TOUT54             | O1    |                                           | GTM muxed output                         |
|      | ASCLIN11_ASCLK         | O2    |                                           | Shift clock output                       |
|      | ASCLIN18_ATX           | O3    |                                           | Transmit output                          |
|      | —                      | O4    |                                           | Reserved                                 |
|      | —                      | O5    |                                           | Reserved                                 |
|      | —                      | O6    |                                           | Reserved                                 |
|      | —                      | O7    |                                           | Reserved                                 |
|      | GETH_MDIO              | O     |                                           | MDIO Output                              |

表 2-35 端口 P21 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                                | Function                            |
|------|-----------------|-------|--------------------------------------------|-------------------------------------|
| K20  | P21.4           | I     | LVDS_TX<br>/ FAST /<br>PU1 / VEXT<br>/ ES6 | General-purpose input               |
|      | GTM_TIM5_IN6_12 |       |                                            | Mux input channel 6 of TIM module 5 |
|      | GTM_TIM1_IN2_6  |       |                                            | Mux input channel 2 of TIM module 1 |
|      | GTM_TIM0_IN2_6  |       |                                            | Mux input channel 2 of TIM module 0 |
|      | ASCLIN18_ARXB   |       |                                            | Receive input                       |
|      | P21.4           | O0    |                                            | General-purpose output              |
|      | GTM_TOUT55      | O1    |                                            | GTM muxed output                    |
|      | ASCLIN11_ASLSO  | O2    |                                            | Slave select signal output          |
|      | ASCLIN18_ATX    | O3    |                                            | Transmit output                     |
|      | —               | O4    |                                            | Reserved                            |
|      | —               | O5    |                                            | Reserved                            |
|      | —               | O6    |                                            | Reserved                            |
|      | —               | O7    |                                            | Reserved                            |
|      | HSCT0_TXDN      | O     |                                            | Tx data                             |
| J20  | P21.5           | I     | LVDS_TX<br>/ FAST /<br>PU1 / VEXT<br>/ ES6 | General-purpose input               |
|      | GTM_TIM5_IN7_11 |       |                                            | Mux input channel 7 of TIM module 5 |
|      | GTM_TIM1_IN3_6  |       |                                            | Mux input channel 3 of TIM module 1 |
|      | GTM_TIM0_IN3_6  |       |                                            | Mux input channel 3 of TIM module 0 |
|      | ASCLIN11_ARXF   |       |                                            | Receive input                       |
|      | P21.5           | O0    |                                            | General-purpose output              |
|      | GTM_TOUT56      | O1    |                                            | GTM muxed output                    |
|      | ASCLIN3_ASCLK   | O2    |                                            | Shift clock output                  |
|      | ASCLIN11_ATX    | O3    |                                            | Transmit output                     |
|      | —               | O4    |                                            | Reserved                            |
|      | —               | O5    |                                            | Reserved                            |
|      | —               | O6    |                                            | Reserved                            |
|      | —               | O7    |                                            | Reserved                            |
|      | HSCT0_TXDP      | O     |                                            | Tx data                             |

表 2-35 端口 P21 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                  | Function                                                                                                                                                             |
|------|-----------------|-------|------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| H17  | P21.6/TDI       | I     | FAST / PD / PU2 / VEXT / ES3 | <b>General-purpose input</b><br>PD during Reset and in DAP/DAPE or JTAG mode. After Reset release and when not in DAP/DAPE or JTAG mode: PU. In Standby mode: HighZ. |
|      | GTM_TIM4_IN2_12 |       |                              | <b>Mux input channel 2 of TIM module 4</b>                                                                                                                           |
|      | GTM_TIM1_IN4_8  |       |                              | <b>Mux input channel 4 of TIM module 1</b>                                                                                                                           |
|      | GTM_TIM0_IN4_8  |       |                              | <b>Mux input channel 4 of TIM module 0</b>                                                                                                                           |
|      | GPT120_T5EUDA   |       |                              | <b>Count direction control input of timer T5</b>                                                                                                                     |
|      | ASCLIN3_ARXF    |       |                              | <b>Receive input</b>                                                                                                                                                 |
|      | CBS_TGI2        |       |                              | <b>Trigger input</b>                                                                                                                                                 |
|      | TDI             |       |                              | <b>JTAG Module Data Input</b>                                                                                                                                        |
|      | P21.6           | O0    |                              | <b>General-purpose output</b>                                                                                                                                        |
|      | GTM_TOUT57      | O1    |                              | <b>GTM muxed output</b>                                                                                                                                              |
|      | ASCLIN3_ASLSO   | O2    |                              | <b>Slave select signal output</b>                                                                                                                                    |
|      | —               | O3    |                              | <b>Reserved</b>                                                                                                                                                      |
|      | —               | O4    |                              | <b>Reserved</b>                                                                                                                                                      |
|      | —               | O5    |                              | <b>Reserved</b>                                                                                                                                                      |
|      | —               | O6    |                              | <b>Reserved</b>                                                                                                                                                      |
|      | GPT120_T3OUT    | O7    |                              | <b>External output for overflow/underflow detection of core timer T3</b>                                                                                             |
|      | CBS_TGO2        | O     |                              | <b>Trigger output</b>                                                                                                                                                |
|      | DAP3            | I/O   |                              | <b>DAP: DAP3 Data I/O</b>                                                                                                                                            |

表 2-35 端口 P21 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                      | Function                                                          |
|------|-----------------|-------|----------------------------------|-------------------------------------------------------------------|
| H16  | P21.7/TDO       | I     | FAST /<br>PU2 /<br>VEXT /<br>ES4 | General-purpose input                                             |
|      | GTM_TIM4_IN3_12 |       |                                  | Mux input channel 3 of TIM module 4                               |
|      | GTM_TIM1_IN5_7  |       |                                  | Mux input channel 5 of TIM module 1                               |
|      | GTM_TIM0_IN5_7  |       |                                  | Mux input channel 5 of TIM module 0                               |
|      | GPT120_T5INA    |       |                                  | Trigger/gate input of timer T5                                    |
|      | CBS_TGI3        |       |                                  | Trigger input                                                     |
|      | GETH_RXERB      |       |                                  | Receive Error MII                                                 |
|      | P21.7           | O0    |                                  | General-purpose output                                            |
|      | GTM_TOUT58      | O1    |                                  | GTM muxed output                                                  |
|      | ASCLIN3_ATX     | O2    |                                  | Transmit output                                                   |
|      | IOM_MON2_15     |       |                                  | Monitor input 2                                                   |
|      | IOM_REF2_15     |       |                                  | Reference input 2                                                 |
|      | ASCLIN3_ASCLK   | O3    |                                  | Shift clock output                                                |
|      | —               | O4    |                                  | Reserved                                                          |
|      | —               | O5    |                                  | Reserved                                                          |
|      | —               | O6    |                                  | Reserved                                                          |
|      | GPT120_T6OUT    | O7    |                                  | External output for overflow/underflow detection of core timer T6 |
|      | CBS_TGO3        | O     |                                  | Trigger output                                                    |
|      | DAP2            | I/O   |                                  | DAP: DAP2 Data I/O                                                |
|      | TDO             | O     |                                  | JTAG Module Data Output                                           |

表 2-36 端口 P22 功能

| Ball | Symbol         | Ctrl. | Buffer Type                                | Function                                             |
|------|----------------|-------|--------------------------------------------|------------------------------------------------------|
| P20  | P22.0          | I     | LVDS_TX<br>/ FAST /<br>PU1 / VEXT<br>/ ES6 | General-purpose input                                |
|      | GTM_TIM1_IN1_7 |       |                                            | Mux input channel 1 of TIM module 1                  |
|      | GTM_TIM0_IN1_7 |       |                                            | Mux input channel 1 of TIM module 0                  |
|      | QSPI4_MTSRB    |       |                                            | Slave SPI data input                                 |
|      | ASCLIN6_ARXE   |       |                                            | Receive input                                        |
|      | P22.0          | O0    |                                            | General-purpose output                               |
|      | GTM_TOUT47     | O1    |                                            | GTM muxed output                                     |
|      | ASCLIN3_ATXN   | O2    |                                            | Differential Transmit output (low active)            |
|      | QSPI4_MTSR     | O3    |                                            | Master SPI data output                               |
|      | QSPI4_SCLKN    | O4    |                                            | Master SPI clock output (LVDS N line)                |
|      | MSC1_FCLN      | O5    |                                            | Shift-clock inverted part of the differential signal |
|      | —              | O6    |                                            | Reserved                                             |
|      | ASCLIN6_ATX    | O7    |                                            | Transmit output                                      |

表 2-36 端口 P22 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                                | Function                                               |
|------|----------------|-------|--------------------------------------------|--------------------------------------------------------|
| P19  | P22.1          | I     | LVDS_TX<br>/ FAST /<br>PU1 / VEXT<br>/ ES6 | General-purpose input                                  |
|      | GTM_TIM1_IN0_8 |       |                                            | Mux input channel 0 of TIM module 1                    |
|      | GTM_TIM0_IN0_8 |       |                                            | Mux input channel 0 of TIM module 0                    |
|      | QSPI4_MRSTB    |       |                                            | Master SPI data input                                  |
|      | ASCLIN7_ARXE   |       |                                            | Receive input                                          |
|      | P22.1          | O0    |                                            | General-purpose output                                 |
|      | GTM_TOUT48     | O1    |                                            | GTM muxed output                                       |
|      | ASCLIN3_ATXP   | O2    |                                            | Differential Transmit output (high active)             |
|      | QSPI4_MRST     | O3    |                                            | Slave SPI data output                                  |
|      | IOM_MON2_4     |       |                                            | Monitor input 2                                        |
|      | IOM_REF2_4     |       |                                            | Reference input 2                                      |
|      | QSPI4_SCLKP    | O4    |                                            | Master SPI clock output (LVDS P line)                  |
|      | MSC1_FCLP      | O5    |                                            | Shift-clock direct part of the differential signal     |
|      | —              | O6    |                                            | Reserved                                               |
|      | ASCLIN7_ATX    | O7    |                                            | Transmit output                                        |
| R20  | P22.2          | I     | LVDS_TX<br>/ FAST /<br>PU1 / VEXT<br>/ ES6 | General-purpose input                                  |
|      | GTM_TIM1_IN3_7 |       |                                            | Mux input channel 3 of TIM module 1                    |
|      | GTM_TIM0_IN3_7 |       |                                            | Mux input channel 3 of TIM module 0                    |
|      | QSPI4_SLSIB    |       |                                            | Slave select input                                     |
|      | P22.2          | O0    |                                            | General-purpose output                                 |
|      | GTM_TOUT49     | O1    |                                            | GTM muxed output                                       |
|      | ASCLIN5_ATX    | O2    |                                            | Transmit output                                        |
|      | QSPI4_SLSO3    | O3    |                                            | Master slave select output                             |
|      | QSPI4_MTSRN    | O4    |                                            | Master SPI data output (LVDS N line)                   |
|      | MSC1_SON       | O5    |                                            | Data output - inverted part of the differential signal |
|      | —              | O6    |                                            | Reserved                                               |
|      | —              | O7    |                                            | Reserved                                               |

表 2-36 端口 P22 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                                | Function                                             |
|------|----------------|-------|--------------------------------------------|------------------------------------------------------|
| R19  | P22.3          | I     | LVDS_TX<br>/ FAST /<br>PU1 / VEXT<br>/ ES6 | General-purpose input                                |
|      | GTM_TIM1_IN4_4 |       |                                            | Mux input channel 4 of TIM module 1                  |
|      | GTM_TIM0_IN4_4 |       |                                            | Mux input channel 4 of TIM module 0                  |
|      | QSPI4_SCLKB    |       |                                            | Slave SPI clock inputs                               |
|      | ASCLIN5_ARXC   |       |                                            | Receive input                                        |
|      | P22.3          | O0    |                                            | General-purpose output                               |
|      | GTM_TOUT50     | O1    |                                            | GTM muxed output                                     |
|      | —              | O2    |                                            | Reserved                                             |
|      | QSPI4_SCLK     | O3    |                                            | Master SPI clock output                              |
|      | QSPI4_MTSRP    | O4    |                                            | Master SPI data output (LVDS P line)                 |
|      | MSC1_SOP       | O5    |                                            | Data output - direct part of the differential signal |
|      | —              | O6    |                                            | Reserved                                             |
|      | —              | O7    |                                            | Reserved                                             |
| P16  | P22.4          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES            | General-purpose input                                |
|      | GTM_TIM3_IN0_8 |       |                                            | Mux input channel 0 of TIM module 3                  |
|      | ASCLIN7_ARXF   |       |                                            | Receive input                                        |
|      | GTM_DTMA3_0    |       |                                            | CDTM3_DTM4                                           |
|      | P22.4          | O0    |                                            | General-purpose output                               |
|      | GTM_TOUT130    | O1    |                                            | GTM muxed output                                     |
|      | ASCLIN4_ASLSO  | O2    |                                            | Slave select signal output                           |
|      | —              | O3    |                                            | Reserved                                             |
|      | QSPI0_SLSO12   | O4    |                                            | Master slave select output                           |
|      | —              | O5    |                                            | Reserved                                             |
|      | CAN13_TXD      | O6    |                                            | CAN transmit output node 3                           |
|      | —              | O7    |                                            | Reserved                                             |
| P17  | P22.5          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES            | General-purpose input                                |
|      | GTM_TIM3_IN1_7 |       |                                            | Mux input channel 1 of TIM module 3                  |
|      | QSPI0_MTSRC    |       |                                            | Slave SPI data input                                 |
|      | CAN13_RXDC     |       |                                            | CAN receive input node 3                             |
|      | P22.5          | O0    |                                            | General-purpose output                               |
|      | GTM_TOUT131    | O1    |                                            | GTM muxed output                                     |
|      | ASCLIN4_ATX    | O2    |                                            | Transmit output                                      |
|      | —              | O3    |                                            | Reserved                                             |
|      | QSPI0_MTSR     | O4    |                                            | Master SPI data output                               |
|      | —              | O5    |                                            | Reserved                                             |
|      | —              | O6    |                                            | Reserved                                             |
|      | —              | O7    |                                            | Reserved                                             |

表 2-36 端口 P22 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| N16  | P22.6           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM3_IN2_6  |       |                                 | Mux input channel 2 of TIM module 3 |
|      | GTM_TIM2_IN6_14 |       |                                 | Mux input channel 6 of TIM module 2 |
|      | QSPI0_MRSTC     |       |                                 | Master SPI data input               |
|      | ASCLIN4_ARXC    |       |                                 | Receive input                       |
|      | P22.6           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT132     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | QSPI0_MRST      | O4    |                                 | Slave SPI data output               |
|      | IOM_MON2_0      |       |                                 | Monitor input 2                     |
|      | IOM_REF2_0      |       |                                 | Reference input 2                   |
|      | CAN21_TXD       | O5    |                                 | CAN transmit output node 1          |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
| N17  | P22.7           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM3_IN3_7  |       |                                 | Mux input channel 3 of TIM module 3 |
|      | QSPI0_SCLKC     |       |                                 | Slave SPI clock inputs              |
|      | CAN21_RXDF      |       |                                 | CAN receive input node 1            |
|      | P22.7           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT133     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN4_ASCLK   | O2    |                                 | Shift clock output                  |
|      | ASCLIN17_ATX    | O3    |                                 | Transmit output                     |
|      | QSPI0_SCLK      | O4    |                                 | Master SPI clock output             |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |

表 2-36 端口 P22 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| M16  | P22.8           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN0_4  |       |                                 | Mux input channel 0 of TIM module 5 |
|      | GTM_TIM3_IN4_7  |       |                                 | Mux input channel 4 of TIM module 3 |
|      | QSPI0_SCLKB     |       |                                 | Slave SPI clock inputs              |
|      | P22.8           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT134     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN5_ASCLK   | O2    |                                 | Shift clock output                  |
|      | —               | O3    |                                 | Reserved                            |
|      | QSPI0_SCLK      | O4    |                                 | Master SPI clock output             |
|      | CAN22_TXD       | O5    |                                 | CAN transmit output node 2          |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
| M17  | P22.9           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN1_10 |       |                                 | Mux input channel 1 of TIM module 5 |
|      | GTM_TIM3_IN5_7  |       |                                 | Mux input channel 5 of TIM module 3 |
|      | QSPI0_MRSTB     |       |                                 | Master SPI data input               |
|      | ASCLIN4_ARXD    |       |                                 | Receive input                       |
|      | CAN22_RXDE      |       |                                 | CAN receive input node 2            |
|      | GTM_DTMA3_1     |       |                                 | CDTM3_DTM4                          |
|      | P22.9           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT135     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | QSPI0_MRST      | O4    |                                 | Slave SPI data output               |
|      | IOM_MON2_0      |       |                                 | Monitor input 2                     |
|      | IOM_REF2_0      |       |                                 | Reference input 2                   |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |

表 2-36 端口 P22 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| L16  | P22.10          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN2_8  |       |                                 | Mux input channel 2 of TIM module 5 |
|      | GTM_TIM3_IN6_7  |       |                                 | Mux input channel 6 of TIM module 3 |
|      | QSPI0_MTSRB     |       |                                 | Slave SPI data input                |
|      | P22.10          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT136     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN4_ATX     | O2    |                                 | Transmit output                     |
|      | —               | O3    |                                 | Reserved                            |
|      | QSPI0_MTSR      | O4    |                                 | Master SPI data output              |
|      | CAN23_TXD       | O5    |                                 | CAN transmit output node 3          |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
| L17  | P22.11          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN3_10 |       |                                 | Mux input channel 3 of TIM module 5 |
|      | GTM_TIM3_IN7_7  |       |                                 | Mux input channel 7 of TIM module 3 |
|      | CAN23_RXDE      |       |                                 | CAN receive input node 3            |
|      | ASCLIN17_ARXA   |       |                                 | Receive input                       |
|      | P22.11          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT137     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN4_ASLSO   | O2    |                                 | Slave select signal output          |
|      | ASCLIN17_ATX    | O3    |                                 | Transmit output                     |
|      | QSPI0_SLSO10    | O4    |                                 | Master slave select output          |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |

表 2-37 端口 P23 功能

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| V20  | P23.0          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN7_1 |       |                                 | Mux input channel 7 of TIM module 6 |
|      | GTM_TIM1_IN5_4 |       |                                 | Mux input channel 5 of TIM module 1 |
|      | GTM_TIM0_IN5_4 |       |                                 | Mux input channel 5 of TIM module 0 |
|      | CAN10_RXDC     |       |                                 | CAN receive input node 0            |
|      | P23.0          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT41     | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
| U19  | P23.1          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN6_1 |       |                                 | Mux input channel 6 of TIM module 6 |
|      | GTM_TIM1_IN6_4 |       |                                 | Mux input channel 6 of TIM module 1 |
|      | GTM_TIM0_IN6_4 |       |                                 | Mux input channel 6 of TIM module 0 |
|      | MSC1_SDIO      |       |                                 | Upstream asynchronous input signal  |
|      | ASCLIN6_ARXF   |       |                                 | Receive input                       |
|      | P23.1          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT42     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN1_ARTS   | O2    |                                 | Ready to send output                |
|      | QSPI4_SLSO6    | O3    |                                 | Master slave select output          |
|      | GTM_CLK0       | O4    |                                 | CGM generated clock                 |
|      | CAN10_TXD      | O5    |                                 | CAN transmit output node 0          |
|      | CCU_EXTCLK0    | O6    |                                 | External Clock 0                    |
|      | ASCLIN6_ASCLK  | O7    |                                 | Shift clock output                  |

表 2-37 端口 P23 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| U20  | P23.2          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN5_1 |       |                                 | Mux input channel 5 of TIM module 6 |
|      | GTM_TIM1_IN6_5 |       |                                 | Mux input channel 6 of TIM module 1 |
|      | GTM_TIM0_IN6_5 |       |                                 | Mux input channel 6 of TIM module 0 |
|      | ASCLIN7_ARXC   |       |                                 | Receive input                       |
|      | P23.2          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT43     | O1    |                                 | GTM muxed output                    |
|      | —              | O2    |                                 | Reserved                            |
|      | —              | O3    |                                 | Reserved                            |
|      | CAN23_TXD      | O4    |                                 | CAN transmit output node 3          |
|      | CAN12_TXD      | O5    |                                 | CAN transmit output node 2          |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |
| T19  | P23.3          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN4_2 |       |                                 | Mux input channel 4 of TIM module 6 |
|      | GTM_TIM1_IN7_4 |       |                                 | Mux input channel 7 of TIM module 1 |
|      | GTM_TIM0_IN7_4 |       |                                 | Mux input channel 7 of TIM module 0 |
|      | MSC1_INJ0      |       |                                 | Injection signal from port          |
|      | ASCLIN6_ARXA   |       |                                 | Receive input                       |
|      | CAN12_RXDC     |       |                                 | CAN receive input node 2            |
|      | CAN23_RXDB     |       |                                 | CAN receive input node 3            |
|      | P23.3          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT44     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN7_ATX    | O2    |                                 | Transmit output                     |
|      | —              | O3    |                                 | Reserved                            |
|      | —              | O4    |                                 | Reserved                            |
|      | —              | O5    |                                 | Reserved                            |
|      | —              | O6    |                                 | Reserved                            |
|      | —              | O7    |                                 | Reserved                            |

表 2-37 端口 P23 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| T20  | P23.4           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN3_2  |       |                                 | Mux input channel 3 of TIM module 6 |
|      | GTM_TIM1_IN7_5  |       |                                 | Mux input channel 7 of TIM module 1 |
|      | GTM_TIM0_IN7_5  |       |                                 | Mux input channel 7 of TIM module 0 |
|      | P23.4           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT45      | O1    |                                 | GTM muxed output                    |
|      | ASCLIN6_ASLSO   | O2    |                                 | Slave select signal output          |
|      | QSPI4_SLSO5     | O3    |                                 | Master slave select output          |
|      | —               | O4    |                                 | Reserved                            |
|      | MSC1_EN0        | O5    |                                 | Chip Select                         |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
| T17  | P23.5           | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN2_2  |       |                                 | Mux input channel 2 of TIM module 6 |
|      | GTM_TIM1_IN2_7  |       |                                 | Mux input channel 2 of TIM module 1 |
|      | GTM_TIM0_IN2_7  |       |                                 | Mux input channel 2 of TIM module 0 |
|      | ASCLIN16_ARXA   |       |                                 | Receive input                       |
|      | P23.5           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT46      | O1    |                                 | GTM muxed output                    |
|      | ASCLIN6_ATX     | O2    |                                 | Transmit output                     |
|      | QSPI4_SLSO4     | O3    |                                 | Master slave select output          |
|      | —               | O4    |                                 | Reserved                            |
|      | MSC1_EN1        | O5    |                                 | Chip Select                         |
|      | CAN22_TXD       | O6    |                                 | CAN transmit output node 2          |
|      | —               | O7    |                                 | Reserved                            |
| R17  | P23.6           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM6_IN1_2  |       |                                 | Mux input channel 1 of TIM module 6 |
|      | GTM_TIM4_IN2_7  |       |                                 | Mux input channel 2 of TIM module 4 |
|      | GTM_TIM1_IN2_10 |       |                                 | Mux input channel 2 of TIM module 1 |
|      | CAN22_RXDC      |       |                                 | CAN receive input node 2            |
|      | P23.6           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT138     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN16_ATX    | O2    |                                 | Transmit output                     |
|      | —               | O3    |                                 | Reserved                            |
|      | QSPI0_SLSO11    | O4    |                                 | Master slave select output          |
|      | CAN11_TXD       | O5    |                                 | CAN transmit output node 1          |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |

表 2-37 端口 P23 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                                   |
|------|-----------------|-------|---------------------------------|--------------------------------------------|
| R16  | P23.7           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | <b>General-purpose input</b>               |
|      | GTM_TIM6_IN0_2  |       |                                 | <b>Mux input channel 0 of TIM module 6</b> |
|      | GTM_TIM4_IN3_7  |       |                                 | <b>Mux input channel 3 of TIM module 4</b> |
|      | GTM_TIM1_IN3_10 |       |                                 | <b>Mux input channel 3 of TIM module 1</b> |
|      | CAN11_RXDC      |       |                                 | <b>CAN receive input node 1</b>            |
|      | ASCLIN16_ARXB   |       |                                 | <b>Receive input</b>                       |
|      | P23.7           | O0    |                                 | <b>General-purpose output</b>              |
|      | GTM_TOUT139     | O1    |                                 | <b>GTM muxed output</b>                    |
|      | ASCLIN16_ATX    | O2    |                                 | <b>Transmit output</b>                     |
|      | —               | O3    |                                 | <b>Reserved</b>                            |
|      | —               | O4    |                                 | <b>Reserved</b>                            |
|      | —               | O5    |                                 | <b>Reserved</b>                            |
|      | —               | O6    |                                 | <b>Reserved</b>                            |
|      | —               | O7    |                                 | <b>Reserved</b>                            |

表 2-38 端口 P32 功能

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                                                                                                     |
|------|----------------|-------|---------------------------------|--------------------------------------------------------------------------------------------------------------|
| Y17  | P32.0          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | <b>General-purpose input</b><br>P32.0 / SMPS mode: analog output. External Pass Device gate control for EVRC |
|      | GTM_TIM3_IN2_5 |       |                                 | <b>Mux input channel 2 of TIM module 3</b>                                                                   |
|      | GTM_TIM2_IN2_5 |       |                                 | <b>Mux input channel 2 of TIM module 2</b>                                                                   |
|      | P32.0          | O0    |                                 | <b>General-purpose output</b>                                                                                |
|      | GTM_TOUT36     | O1    |                                 | <b>GTM muxed output</b>                                                                                      |
|      | —              | O2    |                                 | <b>Reserved</b>                                                                                              |
|      | —              | O3    |                                 | <b>Reserved</b>                                                                                              |
|      | —              | O4    |                                 | <b>Reserved</b>                                                                                              |
|      | —              | O5    |                                 | <b>Reserved</b>                                                                                              |
|      | —              | O6    |                                 | <b>Reserved</b>                                                                                              |
|      | —              | O7    |                                 | <b>Reserved</b>                                                                                              |

表 2-38 端口 P32 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                                                                           |
|------|-----------------|-------|---------------------------------|------------------------------------------------------------------------------------|
| W17  | P32.1           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | <b>General-purpose input</b><br>P32.1 / External Pass Device gate control for EVRC |
|      | GTM_TIM3_IN3_15 |       |                                 | <b>Mux input channel 3 of TIM module 3</b>                                         |
|      | P32.1           | O0    |                                 | <b>General-purpose output</b>                                                      |
|      | GTM_TOUT37      | O1    |                                 | <b>GTM muxed output</b>                                                            |
|      | —               | O2    |                                 | <b>Reserved</b>                                                                    |
|      | —               | O3    |                                 | <b>Reserved</b>                                                                    |
|      | —               | O4    |                                 | <b>Reserved</b>                                                                    |
|      | —               | O5    |                                 | <b>Reserved</b>                                                                    |
|      | —               | O6    |                                 | <b>Reserved</b>                                                                    |
|      | —               | O7    |                                 | <b>Reserved</b>                                                                    |
| Y18  | P32.2           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | <b>General-purpose input</b>                                                       |
|      | GTM_TIM1_IN3_8  |       |                                 | <b>Mux input channel 3 of TIM module 1</b>                                         |
|      | GTM_TIM0_IN3_8  |       |                                 | <b>Mux input channel 3 of TIM module 0</b>                                         |
|      | CAN03_RXDB      |       |                                 | <b>CAN receive input node 3</b>                                                    |
|      | ASCLIN3_ARXD    |       |                                 | <b>Receive input</b>                                                               |
|      | CAN21_RXDD      |       |                                 | <b>CAN receive input node 1</b>                                                    |
|      | P32.2           | O0    |                                 | <b>General-purpose output</b>                                                      |
|      | GTM_TOUT38      | O1    |                                 | <b>GTM muxed output</b>                                                            |
|      | ASCLIN3_ATX     | O2    |                                 | <b>Transmit output</b>                                                             |
|      | IOM_MON2_15     |       |                                 | <b>Monitor input 2</b>                                                             |
|      | IOM_REF2_15     |       |                                 | <b>Reference input 2</b>                                                           |
|      | —               | O3    |                                 | <b>Reserved</b>                                                                    |
|      | —               | O4    |                                 | <b>Reserved</b>                                                                    |
|      | —               | O5    |                                 | <b>Reserved</b>                                                                    |
|      | PMS_DCDCSYNCO   | O6    |                                 | <b>DC-DC synchronization output</b>                                                |
|      | —               | O7    |                                 | <b>Reserved</b>                                                                    |

表 2-38 端口 P32 功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                     | Function                            |
|------|----------------|-------|---------------------------------|-------------------------------------|
| Y19  | P32.3          | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM1_IN4_5 |       |                                 | Mux input channel 4 of TIM module 1 |
|      | GTM_TIM0_IN4_5 |       |                                 | Mux input channel 4 of TIM module 0 |
|      | P32.3          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT39     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN3_ATX    | O2    |                                 | Transmit output                     |
|      | IOM_MON2_15    |       |                                 | Monitor input 2                     |
|      | IOM_REF2_15    |       |                                 | Reference input 2                   |
|      | —              | O3    |                                 | Reserved                            |
|      | ASCLIN3_ASCLK  | O4    |                                 | Shift clock output                  |
|      | CAN03_TXD      | O5    |                                 | CAN transmit output node 3          |
|      | IOM_MON2_8     |       |                                 | Monitor input 2                     |
|      | IOM_REF2_8     |       |                                 | Reference input 2                   |
|      | CAN21_TXD      | O6    |                                 | CAN transmit output node 1          |
|      | —              | O7    |                                 | Reserved                            |
| W18  | P32.4          | I     | FAST /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM1_IN5_5 |       |                                 | Mux input channel 5 of TIM module 1 |
|      | GTM_TIM0_IN5_5 |       |                                 | Mux input channel 5 of TIM module 0 |
|      | ASCLIN1_ACTSB  |       |                                 | Clear to send input                 |
|      | MSC1_SDI2      |       |                                 | Upstream asynchronous input signal  |
|      | ASCLIN15_ARXA  |       |                                 | Receive input                       |
|      | P32.4          | O0    |                                 | General-purpose output              |
|      | GTM_TOUT40     | O1    |                                 | GTM muxed output                    |
|      | PMS_DCDCSYNCO  | O2    |                                 | DC-DC synchronization output        |
|      | —              | O3    |                                 | Reserved                            |
|      | GTM_CLK1       | O4    |                                 | CGM generated clock                 |
|      | MSC1_EN0       | O5    |                                 | Chip Select                         |
|      | CCU_EXTCLK1    | O6    |                                 | External Clock 1                    |
|      | CCU60_COUT63   | O7    |                                 | T13 PWM channel 63                  |
|      | IOM_MON1_6     |       |                                 | Monitor input 1                     |
|      | IOM_REF1_0     |       |                                 | Reference input 1                   |

表 2-38 端口 P32 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| T15  | P32.5           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN5_9  |       |                                 | Mux input channel 5 of TIM module 5 |
|      | GTM_TIM4_IN1_14 |       |                                 | Mux input channel 1 of TIM module 4 |
|      | GTM_TIM3_IN5_8  |       |                                 | Mux input channel 5 of TIM module 3 |
|      | SENT_SENT10C    |       |                                 | Receive input channel 10            |
|      | P32.5           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT140     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN2_ATX     | O2    |                                 | Transmit output                     |
|      | IOM_MON2_14     |       |                                 | Monitor input 2                     |
|      | IOM_REF2_14     |       |                                 | Reference input 2                   |
|      | —               | O3    |                                 | Reserved                            |
|      | —               | O4    |                                 | Reserved                            |
|      | —               | O5    |                                 | Reserved                            |
|      | CAN02_TXD       | O6    |                                 | CAN transmit output node 2          |
|      | IOM_MON2_7      |       |                                 | Monitor input 2                     |
|      | IOM_REF2_7      |       |                                 | Reference input 2                   |
|      | —               | O7    |                                 | Reserved                            |
| U15  | P32.6           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN6_9  |       |                                 | Mux input channel 6 of TIM module 5 |
|      | GTM_TIM4_IN4_15 |       |                                 | Mux input channel 4 of TIM module 4 |
|      | GTM_TIM3_IN6_8  |       |                                 | Mux input channel 6 of TIM module 3 |
|      | CAN02_RXDC      |       |                                 | CAN receive input node 2            |
|      | CBS_TGI4        |       |                                 | Trigger input                       |
|      | ASCLIN2_ARXF    |       |                                 | Receive input                       |
|      | ASCLIN6_ARXC    |       |                                 | Receive input                       |
|      | SENT_SENT11C    |       |                                 | Receive input channel 11            |
|      | P32.6           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT141     | O1    |                                 | GTM muxed output                    |
|      | —               | O2    |                                 | Reserved                            |
|      | —               | O3    |                                 | Reserved                            |
|      | QSPI2_SLSO12    | O4    |                                 | Master slave select output          |
|      | CAN22_TXD       | O5    |                                 | CAN transmit output node 2          |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
|      | CBS_TGO4        | O     |                                 | Trigger output                      |

表 2-38 端口 P32 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                     | Function                            |
|------|-----------------|-------|---------------------------------|-------------------------------------|
| U16  | P32.7           | I     | SLOW /<br>PU1 /<br>VEXT /<br>ES | General-purpose input               |
|      | GTM_TIM5_IN7_8  |       |                                 | Mux input channel 7 of TIM module 5 |
|      | GTM_TIM4_IN0_15 |       |                                 | Mux input channel 0 of TIM module 4 |
|      | GTM_TIM3_IN7_8  |       |                                 | Mux input channel 7 of TIM module 3 |
|      | CBS_TGI5        |       |                                 | Trigger input                       |
|      | CAN22_RXDB      |       |                                 | CAN receive input node 2            |
|      | SENT_SENT12C    |       |                                 | Receive input channel 12            |
|      | ASCLIN15_ARXB   |       |                                 | Receive input                       |
|      | P32.7           | O0    |                                 | General-purpose output              |
|      | GTM_TOUT142     | O1    |                                 | GTM muxed output                    |
|      | ASCLIN6_ATX     | O2    |                                 | Transmit output                     |
|      | —               | O3    |                                 | Reserved                            |
|      | ASCLIN15_ATX    | O4    |                                 | Transmit output                     |
|      | —               | O5    |                                 | Reserved                            |
|      | —               | O6    |                                 | Reserved                            |
|      | —               | O7    |                                 | Reserved                            |
|      | CBS_TGO5        | O     |                                 | Trigger output                      |

表 2-39 端口 P33 功能

| Ball | Symbol          | Ctrl. | Buffer Type                        | Function                             |
|------|-----------------|-------|------------------------------------|--------------------------------------|
| W10  | P33.0           | I     | SLOW /<br>PU1 /<br>VEVRSB<br>/ ES5 | General-purpose input                |
|      | GTM_TIM3_IN0_13 |       |                                    | Mux input channel 0 of TIM module 3  |
|      | GTM_TIM1_IN4_6  |       |                                    | Mux input channel 4 of TIM module 1  |
|      | GTM_TIM0_IN4_6  |       |                                    | Mux input channel 4 of TIM module 0  |
|      | EDSADC_ITR0E    |       |                                    | Trigger/Gate input, channel 0        |
|      | SENT_SENT13C    |       |                                    | Receive input channel 13             |
|      | IOM_PIN_0       |       |                                    | GPIO pad input to FPC                |
|      | GTM_DTMT1_2     |       |                                    | CDTM1_DTM0                           |
|      | EVADC_G10CH7    | AI    |                                    | Analog input channel 7, group 10     |
|      | P33.0           | O0    |                                    | General-purpose output               |
|      | GTM_TOUT22      | O1    |                                    | GTM muxed output                     |
|      | IOM_MON0_0      |       |                                    | Monitor input 0                      |
|      | IOM_GTM_0       |       |                                    | GTM-provided inputs to EXOR combiner |
|      | ASCLIN5_ATX     | O2    |                                    | Transmit output                      |
|      | —               | O3    |                                    | Reserved                             |
|      | ASCLIN15_ATX    | O4    |                                    | Transmit output                      |
|      | —               | O5    |                                    | Reserved                             |
|      | EVADC_FC2BFLOUT | O6    |                                    | Boundary flag output, FC channel 2   |
|      | —               | O7    |                                    | Reserved                             |

表 2-39 端口 P33 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                       | Function                                           |
|------|-----------------|-------|-----------------------------------|----------------------------------------------------|
| Y10  | P33.1           | I     | SLOW /<br>PU1 /<br>VEVRB<br>/ ES5 | General-purpose input                              |
|      | GTM_TIM3_IN1_15 |       |                                   | Mux input channel 1 of TIM module 3                |
|      | GTM_TIM1_IN5_6  |       |                                   | Mux input channel 5 of TIM module 1                |
|      | GTM_TIM0_IN5_6  |       |                                   | Mux input channel 5 of TIM module 0                |
|      | EDSADC_ITR1E    |       |                                   | Trigger/Gate input, channel 1                      |
|      | PSI5_RX0C       |       |                                   | RXD inputs (receive data) channel 0                |
|      | EDSADC_DSCIN2B  |       |                                   | Modulator clock input, channel 2                   |
|      | SENT_SENT9C     |       |                                   | Receive input channel 9                            |
|      | ASCLIN8_ARXC    |       |                                   | Receive input                                      |
|      | IOM_PIN_1       |       |                                   | GPIO pad input to FPC                              |
|      | EVADC_G10CH6    | AI    |                                   | Analog input channel 6, group 10                   |
|      | P33.1           | O0    |                                   | General-purpose output                             |
|      | GTM_TOUT23      | O1    |                                   | GTM muxed output                                   |
|      | IOM_MON0_1      |       |                                   | Monitor input 0                                    |
|      | IOM_GTM_1       |       |                                   | GTM-provided inputs to EXOR combiner               |
|      | ASCLIN3_ASLSO   | O2    |                                   | Slave select signal output                         |
|      | QSPI2_SCLK      | O3    |                                   | Master SPI clock output                            |
|      | EDSADC_DSCOUT2  | O4    |                                   | Modulator clock output                             |
|      | EVADC_EMUX02    | O5    |                                   | Control of external analog multiplexer interface 0 |
|      | —               | O6    |                                   | Reserved                                           |
|      | —               | O7    |                                   | Reserved                                           |

表 2-39 端口 P33 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                       | Function                                           |
|------|-----------------|-------|-----------------------------------|----------------------------------------------------|
| W11  | P33.2           | I     | SLOW /<br>PU1 /<br>VEVRB<br>/ ES5 | General-purpose input                              |
|      | GTM_TIM3_IN2_14 |       |                                   | Mux input channel 2 of TIM module 3                |
|      | GTM_TIM1_IN6_6  |       |                                   | Mux input channel 6 of TIM module 1                |
|      | GTM_TIM0_IN6_6  |       |                                   | Mux input channel 6 of TIM module 0                |
|      | EDSADC_ITR2E    |       |                                   | Trigger/Gate input, channel 2                      |
|      | SENT_SENT8C     |       |                                   | Receive input channel 8                            |
|      | EDSADC_DSDIN2B  |       |                                   | Digital datastream input, channel 2                |
|      | IOM_PIN_2       |       |                                   | GPIO pad input to FPC                              |
|      | EVADC_G10CH5    | AI    |                                   | Analog input channel 5, group 10                   |
|      | P33.2           | O0    |                                   | General-purpose output                             |
|      | GTM_TOUT24      | O1    |                                   | GTM muxed output                                   |
|      | IOM_MON0_2      |       |                                   | Monitor input 0                                    |
|      | IOM_GTM_2       |       |                                   | GTM-provided inputs to EXOR combiner               |
|      | ASCLIN3_ASCLK   | O2    |                                   | Shift clock output                                 |
|      | QSPI2_SLSO10    | O3    |                                   | Master slave select output                         |
|      | PSI5_TX0        | O4    |                                   | TXD outputs (send data)                            |
|      | IOM_MON1_14     |       |                                   | Monitor input 1                                    |
|      | IOM_REF1_14     |       |                                   | Reference input 1                                  |
|      | EVADC_EMUX01    | O5    |                                   | Control of external analog multiplexer interface 0 |
|      | EVADC_FC3BFLOUT | O6    |                                   | Boundary flag output, FC channel 3                 |
|      | ASCLIN14_ATX    | O7    |                                   | Transmit output                                    |

表 2-39 端口 P33 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                        | Function                                           |
|------|-----------------|-------|------------------------------------|----------------------------------------------------|
| Y11  | P33.3           | I     | SLOW /<br>PU1 /<br>VEVRSB<br>/ ES5 | General-purpose input                              |
|      | GTM_TIM3_IN3_12 |       |                                    | Mux input channel 3 of TIM module 3                |
|      | GTM_TIM1_IN7_6  |       |                                    | Mux input channel 7 of TIM module 1                |
|      | GTM_TIM0_IN7_6  |       |                                    | Mux input channel 7 of TIM module 0                |
|      | PSI5_RX1C       |       |                                    | RXD inputs (receive data) channel 1                |
|      | SENT_SENT7C     |       |                                    | Receive input channel 7                            |
|      | EDSADC_DSCIN1B  |       |                                    | Modulator clock input, channel 1                   |
|      | ASCLIN14_ARXA   |       |                                    | Receive input                                      |
|      | IOM_PIN_3       |       |                                    | GPIO pad input to FPC                              |
|      | EVADC_G10CH4    | AI    |                                    | Analog input channel 4, group 10                   |
|      | P33.3           | O0    |                                    | General-purpose output                             |
|      | GTM_TOUT25      | O1    |                                    | GTM muxed output                                   |
|      | IOM_MON0_3      |       |                                    | Monitor input 0                                    |
|      | IOM_GTM_3       |       |                                    | GTM-provided inputs to EXOR combiner               |
|      | ASCLIN5_ASCLK   | O2    |                                    | Shift clock output                                 |
|      | QSPI4_SLSO2     | O3    |                                    | Master slave select output                         |
|      | EDSADC_DSCOUT1  | O4    |                                    | Modulator clock output                             |
|      | EVADC_EMUX00    | O5    |                                    | Control of external analog multiplexer interface 0 |
|      | —               | O6    |                                    | Reserved                                           |
|      | ASCLIN14_ATX    | O7    |                                    | Transmit output                                    |

表 2-39 端口 P33 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                        | Function                                           |
|------|-----------------|-------|------------------------------------|----------------------------------------------------|
| W12  | P33.4           | I     | SLOW /<br>PU1 /<br>VEVRSB<br>/ ES5 | General-purpose input                              |
|      | GTM_TIM4_IN4_10 |       |                                    | Mux input channel 4 of TIM module 4                |
|      | GTM_TIM1_IN0_10 |       |                                    | Mux input channel 0 of TIM module 1                |
|      | GTM_TIM0_IN0_10 |       |                                    | Mux input channel 0 of TIM module 0                |
|      | EDSADC_ITR0F    |       |                                    | Trigger/Gate input, channel 0                      |
|      | SENT_SENT6C     |       |                                    | Receive input channel 6                            |
|      | EDSADC_DSDIN1B  |       |                                    | Digital datastream input, channel 1                |
|      | CCU61_CTRAPC    |       |                                    | Trap input capture                                 |
|      | ASCLIN5_ARXB    |       |                                    | Receive input                                      |
|      | ASCLIN14_ARXB   |       |                                    | Receive input                                      |
|      | IOM_PIN_4       |       |                                    | GPIO pad input to FPC                              |
|      | GTM_DTMT2_0     |       |                                    | CDTM2_DTM0                                         |
|      | EVADC_G10CH3    | AI    |                                    | Analog input channel 3, group 10                   |
|      | P33.4           | O0    |                                    | General-purpose output                             |
|      | GTM_TOUT26      | O1    |                                    | GTM muxed output                                   |
|      | IOM_MON0_4      |       |                                    | Monitor input 0                                    |
|      | IOM_GTM_4       |       |                                    | GTM-provided inputs to EXOR combiner               |
|      | ASCLIN2_ARTS    | O2    |                                    | Ready to send output                               |
|      | QSPI2_SLSO12    | O3    |                                    | Master slave select output                         |
|      | PSI5_TX1        | O4    |                                    | TXD outputs (send data)                            |
|      | IOM_MON1_15     |       |                                    | Monitor input 1                                    |
|      | EVADC_EMUX12    | O5    |                                    | Control of external analog multiplexer interface 1 |
|      | EVADC_FC0BFLOUT | O6    |                                    | Boundary flag output, FC channel 0                 |
|      | CAN13_TXD       | O7    |                                    | CAN transmit output node 3                         |

表 2-39 端口 P33 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                                        | Function                                  |
|------|-----------------|-------|----------------------------------------------------|-------------------------------------------|
| Y12  | P33.5           | I     | SLOW /<br>PU1 /<br>VEVRSB<br>/ ES5                 | General-purpose input                     |
|      | GTM_TIM4_IN5_10 |       |                                                    | Mux input channel 5 of TIM module 4       |
|      | GTM_TIM1_IN1_8  |       |                                                    | Mux input channel 1 of TIM module 1       |
|      | GTM_TIM0_IN1_8  |       |                                                    | Mux input channel 1 of TIM module 0       |
|      | EDSADC_DSCIN0B  |       |                                                    | Modulator clock input, channel 0          |
|      | EDSADC_ITR1F    |       |                                                    | Trigger/Gate input, channel 1             |
|      | GPT120_T4EUIDB  |       |                                                    | Count direction control input of timer T4 |
|      | PSI5S_RXC       |       |                                                    | RX data input                             |
|      | ASCLIN2_ACTSB   |       |                                                    | Clear to send input                       |
|      | CCU61_CCPOS2C   |       |                                                    | Hall capture input 2                      |
|      | PSI5_RX2C       |       |                                                    | RXD inputs (receive data) channel 2       |
|      | SENT_SENT5C     |       |                                                    | Receive input channel 5                   |
|      | CAN13_RXDB      |       |                                                    | CAN receive input node 3                  |
|      | IOM_PIN_5       |       |                                                    | GPIO pad input to FPC                     |
|      | EVADC_G10CH2    | AI    |                                                    | Analog input channel 2, group 10          |
|      | P33.5           | O0    | General-purpose output                             |                                           |
|      | GTM_TOUT27      | O1    | GTM muxed output                                   |                                           |
|      | IOM_MON0_5      |       | Monitor input 0                                    |                                           |
|      | IOM_GTM_5       |       | GTM-provided inputs to EXOR combiner               |                                           |
|      | QSPI0_SLSO7     | O2    | Master slave select output                         |                                           |
|      | QSPI1_SLSO7     | O3    | Master slave select output                         |                                           |
|      | EDSADC_DSCOUT0  | O4    | Modulator clock output                             |                                           |
|      | EVADC_EMUX11    | O5    | Control of external analog multiplexer interface 1 |                                           |
|      | EVADC_FC2BFLOUT | O6    | Boundary flag output, FC channel 2                 |                                           |
|      | ASCLIN5_ASLSO   | O7    | Slave select signal output                         |                                           |

表 2-39 端口 P33 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                        | Function                                           |
|------|-----------------|-------|------------------------------------|----------------------------------------------------|
| W13  | P33.6           | I     | SLOW /<br>PU1 /<br>VEVRSB<br>/ ES5 | General-purpose input                              |
|      | GTM_TIM1_IN2_9  |       |                                    | Mux input channel 2 of TIM module 1                |
|      | GTM_TIM0_IN2_9  |       |                                    | Mux input channel 2 of TIM module 0                |
|      | EDSADC_ITR2F    |       |                                    | Trigger/Gate input, channel 2                      |
|      | GPT120_T2EUDB   |       |                                    | Count direction control input of timer T2          |
|      | SENT_SENT4C     |       |                                    | Receive input channel 4                            |
|      | CCU61_CCPOS1C   |       |                                    | Hall capture input 1                               |
|      | EDSADC_DSDIN0B  |       |                                    | Digital datastream input, channel 0                |
|      | ASCLIN8_ARXD    |       |                                    | Receive input                                      |
|      | IOM_PIN_6       |       |                                    | GPIO pad input to FPC                              |
|      | GTM_DTMT2_1     |       |                                    | CDTM2_DTM0                                         |
|      | EVADC_G10CH1    | AI    |                                    | Analog input channel 1, group 10                   |
|      | P33.6           | O0    |                                    | General-purpose output                             |
|      | GTM_TOUT28      | O1    |                                    | GTM muxed output                                   |
|      | IOM_MON0_6      |       |                                    | Monitor input 0                                    |
|      | IOM_GTM_6       |       |                                    | GTM-provided inputs to EXOR combiner               |
|      | ASCLIN2_ASLSO   | O2    |                                    | Slave select signal output                         |
|      | QSPI2_SLSO11    | O3    |                                    | Master slave select output                         |
|      | PSI5_TX2        | O4    |                                    | TXD outputs (send data)                            |
|      | IOM_REF1_15     |       |                                    | Reference input 1                                  |
|      | EVADC_EMUX10    | O5    |                                    | Control of external analog multiplexer interface 1 |
|      | EVADC_FC1BFLOUT | O6    |                                    | Boundary flag output, FC channel 1                 |
|      | PSI5S_TX        | O7    |                                    | TX data output                                     |

表 2-39 端口 P33 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                        | Function                                                    |
|------|-----------------|-------|------------------------------------|-------------------------------------------------------------|
| Y13  | P33.7           | I     | SLOW /<br>PU1 /<br>VEVRSB<br>/ ES5 | General-purpose input                                       |
|      | GTM_TIM1_IN3_9  |       |                                    | Mux input channel 3 of TIM module 1                         |
|      | GTM_TIM0_IN3_9  |       |                                    | Mux input channel 3 of TIM module 0                         |
|      | CAN00_RXDE      |       |                                    | CAN receive input node 0                                    |
|      | GPT120_T2INB    |       |                                    | Trigger/gate input of timer T2                              |
|      | CCU61_CCPOS0C   |       |                                    | Hall capture input 0                                        |
|      | SCU_E_REQ4_0    |       |                                    | ERU Channel 4 inputs 0 to 5 (0 is the LSB and 5 is the MSB) |
|      | SENT_SENT14C    |       |                                    | Receive input channel 14                                    |
|      | IOM_PIN_7       |       |                                    | GPIO pad input to FPC                                       |
|      | EVADC_G10CH0    | AI    |                                    | Analog input channel 0, group 10                            |
|      | P33.7           | O0    |                                    | General-purpose output                                      |
|      | GTM_TOUT29      | O1    |                                    | GTM muxed output                                            |
|      | IOM_MON0_7      |       |                                    | Monitor input 0                                             |
|      | IOM_GTM_7       |       |                                    | GTM-provided inputs to EXOR combiner                        |
|      | ASCLIN2_ASCLK   | O2    |                                    | Shift clock output                                          |
|      | QSPI4_SLS07     | O3    |                                    | Master slave select output                                  |
|      | ASCLIN8_ATX     | O4    |                                    | Transmit output                                             |
|      | —               | O5    |                                    | Reserved                                                    |
|      | EVADC_FC3BFLOUT | O6    |                                    | Boundary flag output, FC channel 3                          |
|      | —               | O7    |                                    | Reserved                                                    |

表 2-39 端口 P33 的功能 (续)

| Ball | Symbol                 | Ctrl. | Buffer Type                 | Function                                         |
|------|------------------------|-------|-----------------------------|--------------------------------------------------|
| W14  | P33.8                  | I     | FAST /<br>HighZ /<br>VEVRSB | General-purpose input                            |
|      | GTM_TIM1_IN4_7         |       |                             | Mux input channel 4 of TIM module 1              |
|      | GTM_TIM0_IN4_7         |       |                             | Mux input channel 4 of TIM module 0              |
|      | ASCLIN2_ARXE           |       |                             | Receive input                                    |
|      | SCU_EMGSTOP_POR<br>T_A |       |                             | Emergency stop Port Pin A input request          |
|      | IOM_PIN_8              |       |                             | GPIO pad input to FPC                            |
|      | P33.8                  | O0    |                             | General-purpose output                           |
|      | GTM_TOUT30             | O1    |                             | GTM muxed output                                 |
|      | IOM_MON0_8             |       |                             | Monitor input 0                                  |
|      | ASCLIN2_ATX            |       |                             | Transmit output                                  |
|      | IOM_MON2_14            | O2    |                             | Monitor input 2                                  |
|      | IOM_REF2_14            |       |                             | Reference input 2                                |
|      | QSPI4_SLSO2            |       |                             | Master slave select output                       |
|      | —                      | O4    |                             | Reserved                                         |
|      | CAN00_TXD              | O5    |                             | CAN transmit output node 0                       |
|      | IOM_MON2_5             |       |                             | Monitor input 2                                  |
|      | IOM_REF2_5             |       |                             | Reference input 2                                |
|      | —                      | O6    |                             | Reserved                                         |
|      | CCU61_COUT62           | O7    |                             | T12 PWM channel 62                               |
|      | IOM_MON1_13            |       |                             | Monitor input 1                                  |
|      | IOM_REF1_8             |       |                             | Reference input 1                                |
|      | SMU_FSP0               | O     |                             | FSP[1..0] Output Signals - Generated by SMU_core |

表 2-39 端口 P33 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                        | Function                            |
|------|----------------|-------|------------------------------------|-------------------------------------|
| Y14  | P33.9          | I     | SLOW /<br>PU1 /<br>VEVRSB<br>/ ES5 | General-purpose input               |
|      | GTM_TIM1_IN1_9 |       |                                    | Mux input channel 1 of TIM module 1 |
|      | GTM_TIM0_IN1_9 |       |                                    | Mux input channel 1 of TIM module 0 |
|      | IOM_PIN_9      |       |                                    | GPIO pad input to FPC               |
|      | P33.9          | O0    |                                    | General-purpose output              |
|      | GTM_TOUT31     | O1    |                                    | GTM muxed output                    |
|      | IOM_MON0_9     |       |                                    | Monitor input 0                     |
|      | ASCLIN2_ATX    | O2    |                                    | Transmit output                     |
|      | IOM_MON2_14    |       |                                    | Monitor input 2                     |
|      | IOM_REF2_14    |       |                                    | Reference input 2                   |
|      | QSPI4_SLSO1    | O3    |                                    | Master slave select output          |
|      | ASCLIN2_ASCLK  | O4    |                                    | Shift clock output                  |
|      | CAN01_TXD      | O5    |                                    | CAN transmit output node 1          |
|      | IOM_MON2_6     |       |                                    | Monitor input 2                     |
|      | IOM_REF2_6     |       |                                    | Reference input 2                   |
|      | ASCLIN0_ATX    | O6    |                                    | Transmit output                     |
|      | IOM_MON2_12    |       |                                    | Monitor input 2                     |
|      | IOM_REF2_12    |       |                                    | Reference input 2                   |
|      | CCU61_CC62     | O7    |                                    | T12 PWM channel 62                  |
|      | IOM_MON1_10    |       |                                    | Monitor input 1                     |
|      | IOM_REF1_11    |       |                                    | Reference input 1                   |

表 2-39 端口 P33 的功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                        | Function                                                                  |
|------|-----------------|-------|------------------------------------|---------------------------------------------------------------------------|
| W15  | P33.10          | I     | FAST /<br>PU1 /<br>VEVRSB<br>/ ES5 | General-purpose input                                                     |
|      | GTM_TIM4_IN4_14 |       |                                    | Mux input channel 4 of TIM module 4                                       |
|      | GTM_TIM1_IN0_9  |       |                                    | Mux input channel 0 of TIM module 1                                       |
|      | GTM_TIM0_IN0_9  |       |                                    | Mux input channel 0 of TIM module 0                                       |
|      | QSPI4_SLSIA     |       |                                    | Slave select input                                                        |
|      | CAN01_RXDD      |       |                                    | CAN receive input node 1                                                  |
|      | ASCLIN0_ARXD    |       |                                    | Receive input                                                             |
|      | IOM_PIN_10      |       |                                    | GPIO pad input to FPC                                                     |
|      | P33.10          | O0    |                                    | General-purpose output                                                    |
|      | GTM_TOUT32      | O1    |                                    | GTM muxed output                                                          |
|      | IOM_MON0_10     |       |                                    | Monitor input 0                                                           |
|      | QSPI1_SLSO6     | O2    |                                    | Master slave select output                                                |
|      | QSPI4_SLSO0     | O3    |                                    | Master slave select output                                                |
|      | ASCLIN1_ASLSO   | O4    |                                    | Slave select signal output                                                |
|      | PSI5S_CLK       | O5    |                                    | PSI5S CLK is a clock that can be used on a pin to drive the external PHY. |
|      | —               | O6    |                                    | Reserved                                                                  |
|      | CCU61_COUT61    | O7    |                                    | T12 PWM channel 61                                                        |
|      | IOM_MON1_12     |       |                                    | Monitor input 1                                                           |
|      | IOM_REF1_9      |       |                                    | Reference input 1                                                         |
|      | SMU_FSP1        | O     |                                    | FSP[1..0] Output Signals - Generated by SMU_core                          |
| Y15  | P33.11          | I     | FAST /<br>PU1 /<br>VEVRSB<br>/ ES5 | General-purpose input                                                     |
|      | GTM_TIM1_IN2_8  |       |                                    | Mux input channel 2 of TIM module 1                                       |
|      | GTM_TIM0_IN2_8  |       |                                    | Mux input channel 2 of TIM module 0                                       |
|      | QSPI4_SCLKA     |       |                                    | Slave SPI clock inputs                                                    |
|      | IOM_PIN_11      |       |                                    | GPIO pad input to FPC                                                     |
|      | P33.11          | O0    |                                    | General-purpose output                                                    |
|      | GTM_TOUT33      | O1    |                                    | GTM muxed output                                                          |
|      | IOM_MON0_11     |       |                                    | Monitor input 0                                                           |
|      | ASCLIN1_ASCLK   | O2    |                                    | Shift clock output                                                        |
|      | QSPI4_SCLK      | O3    |                                    | Master SPI clock output                                                   |
|      | —               | O4    |                                    | Reserved                                                                  |
|      | —               | O5    |                                    | Reserved                                                                  |
|      | EDSADC_CGPWMN   | O6    |                                    | Negative carrier generator output                                         |
|      | CCU61_CC61      | O7    |                                    | T12 PWM channel 61                                                        |
|      | IOM_MON1_9      |       |                                    | Monitor input 1                                                           |
|      | IOM_REF1_12     |       |                                    | Reference input 1                                                         |

表 2-39 端口 P33 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                        | Function                            |
|------|----------------|-------|------------------------------------|-------------------------------------|
| W16  | P33.12         | I     | FAST /<br>PU1 /<br>VEVRSB<br>/ ES5 | General-purpose input               |
|      | GTM_TIM3_IN0_6 |       |                                    | Mux input channel 0 of TIM module 3 |
|      | GTM_TIM2_IN0_6 |       |                                    | Mux input channel 0 of TIM module 2 |
|      | QSPI4_MTSRA    |       |                                    | Slave SPI data input                |
|      | CAN00_RXDD     |       |                                    | CAN receive input node 0            |
|      | PMS_PINBWKP    |       |                                    | PINB (P33.12) pin input             |
|      | IOM_PIN_12     |       |                                    | GPIO pad input to FPC               |
|      | P33.12         | O0    |                                    | General-purpose output              |
|      | GTM_TOUT34     | O1    |                                    | GTM muxed output                    |
|      | IOM_MON0_12    |       |                                    | Monitor input 0                     |
|      | ASCLIN1_ATX    | O2    |                                    | Transmit output                     |
|      | IOM_MON2_13    |       |                                    | Monitor input 2                     |
|      | IOM_REF2_13    |       |                                    | Reference input 2                   |
|      | QSPI4_MTSR     | O3    |                                    | Master SPI data output              |
|      | ASCLIN1_ASCLK  | O4    |                                    | Shift clock output                  |
|      | CAN22_TXD      | O5    |                                    | CAN transmit output node 2          |
|      | EDSADC_CGPWMP  | O6    |                                    | Positive carrier generator output   |
|      | CCU61_COUT60   | O7    |                                    | T12 PWM channel 60                  |
|      | IOM_MON1_11    |       |                                    | Monitor input 1                     |
|      | IOM_REF1_10    |       |                                    | Reference input 1                   |

表 2-39 端口 P33 的功能 (续)

| Ball | Symbol         | Ctrl. | Buffer Type                        | Function                            |
|------|----------------|-------|------------------------------------|-------------------------------------|
| Y16  | P33.13         | I     | FAST /<br>PU1 /<br>VEVRSB<br>/ ES5 | General-purpose input               |
|      | GTM_TIM3_IN1_5 |       |                                    | Mux input channel 1 of TIM module 3 |
|      | GTM_TIM2_IN1_5 |       |                                    | Mux input channel 1 of TIM module 2 |
|      | ASCLIN1_ARXF   |       |                                    | Receive input                       |
|      | EDSADC_SGNB    |       |                                    | Carrier sign signal input           |
|      | QSPI4_MRSTA    |       |                                    | Master SPI data input               |
|      | MSC1_INJ1      |       |                                    | Injection signal from port          |
|      | CAN22_RXDA     |       |                                    | CAN receive input node 2            |
|      | P33.13         | O0    |                                    | General-purpose output              |
|      | GTM_TOUT35     | O1    |                                    | GTM muxed output                    |
|      | ASCLIN1_ATX    | O2    |                                    | Transmit output                     |
|      | IOM_MON2_13    |       |                                    | Monitor input 2                     |
|      | IOM_REF2_13    |       |                                    | Reference input 2                   |
|      | QSPI4_MRST     | O3    |                                    | Slave SPI data output               |
|      | IOM_MON2_4     |       |                                    | Monitor input 2                     |
|      | IOM_REF2_4     |       |                                    | Reference input 2                   |
|      | QSPI2_SLSO6    | O4    |                                    | Master slave select output          |
|      | CAN00_TXD      | O5    |                                    | CAN transmit output node 0          |
|      | IOM_MON2_5     |       |                                    | Monitor input 2                     |
|      | IOM_REF2_5     |       |                                    | Reference input 2                   |
|      | —              | O6    |                                    | Reserved                            |
|      | CCU61_CC60     | O7    |                                    | T12 PWM channel 60                  |
|      | IOM_MON1_8     |       |                                    | Monitor input 1                     |
|      | IOM_REF1_13    |       |                                    | Reference input 1                   |

表 2-39 端口 P33 的功能 (续)

| Ball     | Symbol          | Ctrl.          | Buffer Type                        | Function                            |
|----------|-----------------|----------------|------------------------------------|-------------------------------------|
| T14      | P33.14          | I              | FAST /<br>PU1 /<br>VEVRSB<br>/ ES5 | General-purpose input               |
|          | GTM_TIM5_IN0_8  |                |                                    | Mux input channel 0 of TIM module 5 |
|          | GTM_TIM4_IN5_14 |                |                                    | Mux input channel 5 of TIM module 4 |
|          | GTM_TIM2_IN0_8  |                |                                    | Mux input channel 0 of TIM module 2 |
|          | QSPI2_SCLKD     |                |                                    | Slave SPI clock inputs              |
|          | CBS_TGI6        |                |                                    | Trigger input                       |
|          | P33.14          | O0             |                                    | General-purpose output              |
|          | GTM_TOUT143     | O1             |                                    | GTM muxed output                    |
|          | —               | O2             |                                    | Reserved                            |
|          | QSPI2_SCLK      | O3             |                                    | Master SPI clock output             |
|          | —               | O4             |                                    | Reserved                            |
|          | —               | O5             |                                    | Reserved                            |
|          | —               | O6             |                                    | Reserved                            |
|          | CCU60_CC62      | O7             |                                    | T12 PWM channel 62                  |
|          | IOM_MON1_0      |                |                                    | Monitor input 1                     |
|          | IOM_REF1_4      |                |                                    | Reference input 1                   |
| CBS_TGO6 | O               | Trigger output |                                    |                                     |
| U14      | P33.15          | I              | SLOW /<br>PU1 /<br>VEVRSB<br>/ ES5 | General-purpose input               |
|          | GTM_TIM5_IN1_9  |                |                                    | Mux input channel 1 of TIM module 5 |
|          | GTM_TIM4_IN6_12 |                |                                    | Mux input channel 6 of TIM module 4 |
|          | GTM_TIM2_IN1_7  |                |                                    | Mux input channel 1 of TIM module 2 |
|          | CBS_TGI7        |                |                                    | Trigger input                       |
|          | P33.15          | O0             |                                    | General-purpose output              |
|          | GTM_TOUT144     | O1             |                                    | GTM muxed output                    |
|          | —               | O2             |                                    | Reserved                            |
|          | QSPI2_SLSO11    | O3             |                                    | Master slave select output          |
|          | —               | O4             |                                    | Reserved                            |
|          | —               | O5             |                                    | Reserved                            |
|          | —               | O6             |                                    | Reserved                            |
|          | CCU60_COUT62    | O7             |                                    | T12 PWM channel 62                  |
|          | IOM_MON1_5      |                |                                    | Monitor input 1                     |
|          | IOM_REF1_1      |                |                                    | Reference input 1                   |
|          | CBS_TGO7        | O              |                                    | Trigger output                      |

表 2-40 端口 P34 功能

| Ball | Symbol          | Ctrl. | Buffer Type                        | Function                            |
|------|-----------------|-------|------------------------------------|-------------------------------------|
| U11  | P34.1           | I     | SLOW /<br>PU1 /<br>VEVRSB<br>/ ES5 | General-purpose input               |
|      | GTM_TIM5_IN3_9  |       |                                    | Mux input channel 3 of TIM module 5 |
|      | GTM_TIM3_IN4_12 |       |                                    | Mux input channel 4 of TIM module 3 |
|      | GTM_TIM2_IN3_9  |       |                                    | Mux input channel 3 of TIM module 2 |
|      | EVADC_G10CH11   | AI    |                                    | Analog input channel 11, group 10   |
|      | P34.1           | O0    |                                    | General-purpose output              |
|      | GTM_TOUT146     | O1    |                                    | GTM muxed output                    |
|      | ASCLIN4_ATX     | O2    |                                    | Transmit output                     |
|      | —               | O3    |                                    | Reserved                            |
|      | CAN00_TXD       | O4    |                                    | CAN transmit output node 0          |
|      | IOM_MON2_5      |       |                                    | Monitor input 2                     |
|      | IOM_REF2_5      |       |                                    | Reference input 2                   |
|      | CAN20_TXD       | O5    |                                    | CAN transmit output node 0          |
|      | —               | O6    |                                    | Reserved                            |
|      | CCU60_COUT63    | O7    |                                    | T13 PWM channel 63                  |
|      | IOM_MON1_6      |       |                                    | Monitor input 1                     |
|      | IOM_REF1_0      |       |                                    | Reference input 1                   |
| T12  | P34.2           | I     | SLOW /<br>PU1 /<br>VEVRSB<br>/ ES  | General-purpose input               |
|      | GTM_TIM5_IN4_9  |       |                                    | Mux input channel 4 of TIM module 5 |
|      | GTM_TIM3_IN5_13 |       |                                    | Mux input channel 5 of TIM module 3 |
|      | GTM_TIM2_IN4_8  |       |                                    | Mux input channel 4 of TIM module 2 |
|      | ASCLIN4_ARXB    |       |                                    | Receive input                       |
|      | CAN00_RXDG      |       |                                    | CAN receive input node 0            |
|      | CAN20_RXDC      |       |                                    | CAN receive input node 0            |
|      | EVADC_G10CH10   | AI    |                                    | Analog input channel 10, group 10   |
|      | P34.2           | O0    |                                    | General-purpose output              |
|      | GTM_TOUT147     | O1    |                                    | GTM muxed output                    |
|      | —               | O2    |                                    | Reserved                            |
|      | —               | O3    |                                    | Reserved                            |
|      | —               | O4    |                                    | Reserved                            |
|      | —               | O5    |                                    | Reserved                            |
|      | —               | O6    |                                    | Reserved                            |
|      | CCU60_CC60      | O7    |                                    | T12 PWM channel 60                  |
|      | IOM_MON1_2      |       |                                    | Monitor input 1                     |
|      | IOM_REF1_6      |       |                                    | Reference input 1                   |

表 2-40 端口 P34 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                       | Function                            |
|------|-----------------|-------|-----------------------------------|-------------------------------------|
| U12  | P34.3           | I     | SLOW /<br>PU1 /<br>VEVRSB<br>/ ES | General-purpose input               |
|      | GTM_TIM5_IN5_10 |       |                                   | Mux input channel 5 of TIM module 5 |
|      | GTM_TIM3_IN6_13 |       |                                   | Mux input channel 6 of TIM module 3 |
|      | GTM_TIM2_IN5_9  |       |                                   | Mux input channel 5 of TIM module 2 |
|      | EVADC_G10CH9    | AI    |                                   | Analog input channel 9, group 10    |
|      | P34.3           | O0    |                                   | General-purpose output              |
|      | GTM_TOUT148     | O1    |                                   | GTM muxed output                    |
|      | ASCLIN4_ASCLK   | O2    |                                   | Shift clock output                  |
|      | —               | O3    |                                   | Reserved                            |
|      | QSPI2_SLSO10    | O4    |                                   | Master slave select output          |
|      | —               | O5    |                                   | Reserved                            |
|      | —               | O6    |                                   | Reserved                            |
|      | CCU60_COUT60    | O7    |                                   | T12 PWM channel 60                  |
|      | IOM_MON1_3      |       |                                   | Monitor input 1                     |
|      | IOM_REF1_3      |       |                                   | Reference input 1                   |
| T13  | P34.4           | I     | SLOW /<br>PU1 /<br>VEVRSB<br>/ ES | General-purpose input               |
|      | GTM_TIM5_IN6_10 |       |                                   | Mux input channel 6 of TIM module 5 |
|      | GTM_TIM3_IN7_12 |       |                                   | Mux input channel 7 of TIM module 3 |
|      | GTM_TIM2_IN6_8  |       |                                   | Mux input channel 6 of TIM module 2 |
|      | QSPI2_MRSTD     |       |                                   | Master SPI data input               |
|      | EVADC_G10CH8    | AI    |                                   | Analog input channel 8, group 10    |
|      | P34.4           | O0    |                                   | General-purpose output              |
|      | GTM_TOUT149     | O1    |                                   | GTM muxed output                    |
|      | ASCLIN4_ASLSO   | O2    |                                   | Slave select signal output          |
|      | —               | O3    |                                   | Reserved                            |
|      | QSPI2_MRST      | O4    |                                   | Slave SPI data output               |
|      | IOM_MON2_2      |       |                                   | Monitor input 2                     |
|      | IOM_REF2_2      |       |                                   | Reference input 2                   |
|      | —               | O5    |                                   | Reserved                            |
|      | —               |       |                                   | Reserved                            |
|      | CCU60_CC61      | O7    |                                   | T12 PWM channel 61                  |
|      | IOM_MON1_1      |       |                                   | Monitor input 1                     |
|      | IOM_REF1_5      |       |                                   | Reference input 1                   |

表 2-40 端口 P34 功能 (续)

| Ball | Symbol          | Ctrl. | Buffer Type                       | Function                            |
|------|-----------------|-------|-----------------------------------|-------------------------------------|
| U13  | P34.5           | I     | FAST /<br>PU1 /<br>VEVRSB<br>/ ES | General-purpose input               |
|      | GTM_TIM5_IN7_9  |       |                                   | Mux input channel 7 of TIM module 5 |
|      | GTM_TIM4_IN7_12 |       |                                   | Mux input channel 7 of TIM module 4 |
|      | GTM_TIM2_IN7_9  |       |                                   | Mux input channel 7 of TIM module 2 |
|      | QSPI2_MTSRD     |       |                                   | Slave SPI data input                |
|      | ASCLIN8_ARXE    |       |                                   | Receive input                       |
|      | P34.5           | O0    |                                   | General-purpose output              |
|      | GTM_TOUT150     | O1    |                                   | GTM muxed output                    |
|      | ASCLIN8_ATX     | O2    |                                   | Transmit output                     |
|      | —               | O3    |                                   | Reserved                            |
|      | QSPI2_MTSR      | O4    |                                   | Master SPI data output              |
|      | —               | O5    |                                   | Reserved                            |
|      | —               | O6    |                                   | Reserved                            |
|      | CCU60_COUT61    | O7    |                                   | T12 PWM channel 61                  |
|      | IOM_MON1_4      |       |                                   | Monitor input 1                     |
|      | IOM_REF1_2      |       |                                   | Reference input 1                   |

表 2-41 模拟输入

| Ball | Symbol        | Ctrl. | Buffer Type         | Function                               |
|------|---------------|-------|---------------------|----------------------------------------|
| T10  | AN0           | I     | D / HighZ<br>/ VDDM | Analog Input 0                         |
|      | EVADC_G0CH0   |       |                     | Analog input channel 0, group 0        |
|      | EDSADC_EDS3PA |       |                     | Positive analog input channel 3, pin A |
| U10  | AN1           | I     | D / HighZ<br>/ VDDM | Analog Input 1                         |
|      | EVADC_G0CH1   |       |                     | Analog input channel 1, group 0        |
|      | EDSADC_EDS3NA |       |                     | Negative analog input channel 3, pin A |
| W9   | AN2           | I     | D / HighZ<br>/ VDDM | Analog Input 2                         |
|      | EVADC_G0CH2   |       |                     | Analog input channel 2, group 0        |
|      | EDSADC_EDS0PA |       |                     | Positive analog input channel 0, pin A |
| U9   | AN3           | I     | D / HighZ<br>/ VDDM | Analog Input 3                         |
|      | EVADC_G0CH3   |       |                     | Analog input channel 3, group 0        |
|      | EDSADC_EDS0NA |       |                     | Negative analog input channel 0, pin A |
| T9   | AN4           | I     | D / HighZ<br>/ VDDM | Analog Input 4                         |
|      | EVADC_G11CH0  |       |                     | Analog input channel 0, group 11       |
|      | EVADC_G0CH4   |       |                     | Analog input channel 4, group 0        |
| Y9   | AN5           | I     | D / HighZ<br>/ VDDM | Analog Input 5                         |
|      | EVADC_G11CH1  |       |                     | Analog input channel 1, group 11       |
|      | EVADC_G0CH5   |       |                     | Analog input channel 5, group 0        |

表 2-41 模拟输入 (续)

| Ball | Symbol        | Ctrl. | Buffer Type      | Function                               |
|------|---------------|-------|------------------|----------------------------------------|
| T8   | AN6           | I     | D / HighZ / VDDM | Analog Input 6                         |
|      | EVADC_G11CH2  |       |                  | Analog input channel 2, group 11       |
|      | EVADC_G0CH6   |       |                  | Analog input channel 6, group 0        |
| U8   | AN7           | I     | D / HighZ / VDDM | Analog Input 7                         |
|      | EVADC_G11CH3  |       |                  | Analog input channel 3, group 11       |
|      | EVADC_G0CH7   |       |                  | Analog input channel 7, group 0        |
| W8   | AN8           | I     | D / HighZ / VDDM | Analog Input 8                         |
|      | EVADC_G11CH4  |       |                  | Analog input channel 4, group 11       |
|      | EVADC_G1CH0   |       |                  | Analog input channel 0, group 1        |
| U7   | AN9           | I     | D / HighZ / VDDM | Analog Input 9                         |
|      | EVADC_G11CH5  |       |                  | Analog input channel 5, group 11       |
|      | EVADC_G1CH1   |       |                  | Analog input channel 1, group 1        |
| Y8   | AN10          | I     | D / HighZ / VDDM | Analog Input 10                        |
|      | EVADC_G11CH6  |       |                  | Analog input channel 6, group 11       |
|      | EVADC_G1CH2   |       |                  | Analog input channel 2, group 1        |
| W7   | AN11          | I     | D / HighZ / VDDM | Analog Input 11                        |
|      | EVADC_G11CH7  |       |                  | Analog input channel 7, group 11       |
|      | EVADC_G1CH3   |       |                  | Analog input channel 3, group 1        |
| T7   | AN12          | I     | D / HighZ / VDDM | Analog Input 12                        |
|      | EVADC_G1CH4   |       |                  | Analog input channel 4, group 1        |
|      | EDSADC_EDS0PB |       |                  | Positive analog input channel 0, pin B |
| W6   | AN13          | I     | D / HighZ / VDDM | Analog Input 13                        |
|      | EVADC_G1CH5   |       |                  | Analog input channel 5, group 1        |
|      | EDSADC_EDS0NB |       |                  | Negative analog input channel 0, pin B |
| U6   | AN14          | I     | D / HighZ / VDDM | Analog Input 14                        |
|      | EVADC_G1CH6   |       |                  | Analog input channel 6, group 1        |
|      | EDSADC_EDS3PB |       |                  | Positive analog input channel 3, pin B |
| T6   | AN15          | I     | D / HighZ / VDDM | Analog Input 15                        |
|      | EVADC_G1CH7   |       |                  | Analog input channel 7, group 1        |
|      | EDSADC_EDS3NB |       |                  | Negative analog input channel 3, pin N |
| W5   | AN16          | I     | D / HighZ / VDDM | Analog Input 16                        |
|      | EVADC_G2CH0   |       |                  | Analog input channel 0, group 2        |
|      | EVADC_FC0CH0  |       |                  | Analog input FC channel 0              |
| U5   | AN17/P40.10   | I     | S / HighZ / VDDM | Analog Input 17                        |
|      | SENT_SENT10A  |       |                  | Receive input channel 10               |
|      | EVADC_G2CH1   |       |                  | Analog input channel 1, group 2        |
|      | EVADC_FC1CH0  |       |                  | Analog input FC channel 1              |

表 2-41 模拟输入 (续)

| Ball | Symbol        | Ctrl. | Buffer Type      | Function                               |
|------|---------------|-------|------------------|----------------------------------------|
| W4   | AN18/P40.11   | I     | S / HighZ / VDDM | Analog Input 18                        |
|      | SENT_SENT11A  |       |                  | Receive input channel 11               |
|      | EVADC_G11CH8  |       |                  | Analog input channel 8, group 11       |
|      | EVADC_G2CH2   |       |                  | Analog input channel 2, group 2        |
| W3   | AN19/P40.12   | I     | S / HighZ / VDDM | Analog Input 19                        |
|      | SENT_SENT12A  |       |                  | Receive input channel 12               |
|      | EVADC_G11CH9  |       |                  | Analog input channel 9, group 11       |
|      | EVADC_G2CH3   |       |                  | Analog input channel 3, group 2        |
| Y3   | AN20          | I     | D / HighZ / VDDM | Analog Input 20                        |
|      | EVADC_G2CH4   |       |                  | Analog input channel 4, group 2        |
|      | EDSADC_EDS2PA |       |                  | Positive analog input channel 2, pin A |
| Y2   | AN21          | I     | D / HighZ / VDDM | Analog Input 21                        |
|      | EVADC_G2CH5   |       |                  | Analog input channel 5, group 2        |
|      | EDSADC_EDS2NA |       |                  | Negative analog input channel 2, pin A |
| T5   | AN22          | I     | D / HighZ / VDDM | Analog Input 22                        |
|      | EVADC_G2CH6   |       |                  | Analog input channel 6, group 2        |
| R5   | AN23          | I     | D / HighZ / VDDM | Analog Input 23                        |
|      | EVADC_G2CH7   |       |                  | Analog input channel 7, group 2        |
| W2   | AN24/P40.0    | I     | S / HighZ / VDDM | Analog Input 24                        |
|      | SENT_SENT0A   |       |                  | Receive input channel 0                |
|      | EVADC_G3CH0   |       |                  | Analog input channel 0, group 3        |
|      | CCU60_CCPOS0D |       |                  | Hall capture input 0                   |
|      | EDSADC_EDS2PB |       |                  | Positive analog input channel 2, pin B |
| W1   | AN25/P40.1    | I     | S / HighZ / VDDM | Analog Input 25                        |
|      | SENT_SENT1A   |       |                  | Receive input channel 1                |
|      | EVADC_G3CH1   |       |                  | Analog input channel 1, group 3        |
|      | CCU60_CCPOS1B |       |                  | Hall capture input 1                   |
|      | EDSADC_EDS2NB |       |                  | Negative analog input channel 2, pin B |
| V2   | AN26/P40.2    | I     | S / HighZ / VDDM | Analog Input 26                        |
|      | SENT_SENT2A   |       |                  | Receive input channel 2                |
|      | EVADC_G3CH2   |       |                  | Analog input channel 2, group 3        |
|      | CCU60_CCPOS1D |       |                  | Hall capture input 1                   |
|      | EVADC_G11CH10 |       |                  | Analog input channel 10, group 11      |
| V1   | AN27/P40.3    | I     | S / HighZ / VDDM | Analog Input 27                        |
|      | SENT_SENT3A   |       |                  | Receive input channel 3                |
|      | EVADC_G3CH3   |       |                  | Analog input channel 3, group 3        |
|      | CCU60_CCPOS2B |       |                  | Hall capture input 2                   |
|      | EVADC_G11CH11 |       |                  | Analog input channel 11, group 11      |

表 2-41 模拟输入 (续)

| Ball | Symbol        | Ctrl. | Buffer Type      | Function                               |
|------|---------------|-------|------------------|----------------------------------------|
| U2   | AN28/P40.13   | I     | S / HighZ / VDDM | Analog Input 28                        |
|      | SENT_SENT13A  |       |                  | Receive input channel 13               |
|      | EVADC_G3CH4   |       |                  | Analog input channel 4, group 3        |
|      | EVADC_G4CH4   |       |                  | Analog input channel 4, group 4        |
| U1   | AN29/P40.14   | I     | S / HighZ / VDDM | Analog Input 29                        |
|      | SENT_SENT14A  |       |                  | Receive input channel 14               |
|      | EVADC_G3CH5   |       |                  | Analog input channel 5, group 3        |
|      | EVADC_G4CH5   |       |                  | Analog input channel 5, group 4        |
| T4   | AN30          | I     | D / HighZ / VDDM | Analog Input 30                        |
|      | EVADC_G3CH6   |       |                  | Analog input channel 6, group 3        |
|      | EVADC_G4CH6   |       |                  | Analog input channel 6, group 4        |
| R4   | AN31          | I     | D / HighZ / VDDM | Analog Input 31                        |
|      | EVADC_G3CH7   |       |                  | Analog input channel 7, group 3        |
|      | EVADC_G4CH7   |       |                  | Analog input channel 7, group 4        |
| P4   | AN32/P40.4    | I     | S / HighZ / VDDM | Analog Input 32                        |
|      | SENT_SENT4A   |       |                  | Receive input channel 4                |
|      | EVADC_G8CH0   |       |                  | Analog input channel 0, group 8        |
|      | CCU60_CCPOS2D |       |                  | Hall capture input 2                   |
|      | EVADC_G11CH12 |       |                  | Analog input channel 12, group 11      |
| R1   | AN33/P40.5    | I     | S / HighZ / VDDM | Analog Input 33                        |
|      | SENT_SENT5A   |       |                  | Receive input channel 5                |
|      | EVADC_G8CH1   |       |                  | Analog input channel 1, group 8        |
|      | CCU61_CCPOS0D |       |                  | Hall capture input 0                   |
|      | EVADC_G11CH13 |       |                  | Analog input channel 13, group 11      |
| P5   | AN34          | I     | D / HighZ / VDDM | Analog Input 34                        |
|      | EVADC_G8CH2   |       |                  | Analog input channel 2, group 8        |
|      | EVADC_G11CH14 |       |                  | Analog input channel 14, group 11      |
| R2   | AN35          | I     | D / HighZ / VDDM | Analog Input 35                        |
|      | EVADC_G8CH3   |       |                  | Analog input channel 3, group 8        |
|      | EVADC_G11CH15 |       |                  | Analog input channel 15, group 11      |
| N4   | AN36/P40.6    | I     | S / HighZ / VDDM | Analog Input 36                        |
|      | SENT_SENT6A   |       |                  | Receive input channel 6                |
|      | EVADC_G8CH4   |       |                  | Analog input channel 4, group 8        |
|      | CCU61_CCPOS1B |       |                  | Hall capture input 1                   |
|      | EDSADC_EDS1PA |       |                  | Positive analog input channel 1, pin A |

表 2-41 模拟输入 (续)

| Ball | Symbol        | Ctrl. | Buffer Type      | Function                               |
|------|---------------|-------|------------------|----------------------------------------|
| P2   | AN37/P40.7    | I     | S / HighZ / VDDM | Analog Input 37                        |
|      | SENT_SENT7A   |       |                  | Receive input channel 7                |
|      | EVADC_G8CH5   |       |                  | Analog input channel 5, group 8        |
|      | CCU61_CCPOS1D |       |                  | Hall capture input 1                   |
|      | EDSADC_EDS1NA |       |                  | Negative analog input channel 1, pin A |
| N5   | AN38/P40.8    | I     | S / HighZ / VDDM | Analog Input 38                        |
|      | SENT_SENT8A   |       |                  | Receive input channel 8                |
|      | EVADC_G8CH6   |       |                  | Analog input channel 6, group 8        |
|      | CCU61_CCPOS2B |       |                  | Hall capture input 2                   |
|      | EDSADC_EDS1PB |       |                  | Positive analog input channel 1, pin B |
| P1   | AN39/P40.9    | I     | S / HighZ / VDDM | Analog Input 39                        |
|      | SENT_SENT9A   |       |                  | Receive input channel 9                |
|      | EVADC_G8CH7   |       |                  | Analog input channel 7, group 8        |
|      | CCU61_CCPOS2D |       |                  | Hall capture input 2                   |
|      | EDSADC_EDS1NB |       |                  | Negative analog input channel 1, pin B |
| M5   | AN40          | I     | D / HighZ / VDDM | Analog Input 40                        |
|      | EVADC_G8CH8   |       |                  | Analog input channel 8, group 8        |
|      | EVADC_G4CH0   |       |                  | Analog input channel 0, group 4        |
| M4   | AN41          | I     | D / HighZ / VDDM | Analog Input 41                        |
|      | EVADC_G8CH9   |       |                  | Analog input channel 9, group 8        |
|      | EVADC_G4CH1   |       |                  | Analog input channel 1, group 4        |
| L5   | AN42          | I     | D / HighZ / VDDM | Analog Input 42                        |
|      | EVADC_G8CH10  |       |                  | Analog input channel 10, group 8       |
|      | EVADC_G4CH2   |       |                  | Analog input channel 2, group 4        |
| L4   | AN43          | I     | D / HighZ / VDDM | Analog Input 43                        |
|      | EVADC_G8CH11  |       |                  | Analog input channel 11, group 8       |
|      | EVADC_G4CH3   |       |                  | Analog input channel 3, group 4        |
| N1   | AN44          | I     | D / HighZ / VDDM | Analog Input 44                        |
|      | EVADC_G8CH12  |       |                  | Analog input channel 12, group 8       |
|      | EDSADC_EDS1PC |       |                  | Positive analog input channel 1, pin C |
| N2   | AN45          | I     | D / HighZ / VDDM | Analog Input 45                        |
|      | EVADC_G8CH13  |       |                  | Analog input channel 13, group 8       |
|      | EDSADC_EDS1NC |       |                  | Negative analog input channel 1, pin C |
| M1   | AN46          | I     | D / HighZ / VDDM | Analog Input 46                        |
|      | EVADC_G8CH14  |       |                  | Analog input channel 14, group 8       |
|      | EDSADC_EDS1PD |       |                  | Positive analog input channel 1, pin D |

## 引脚定义和功能 BGA292 封装变体 引脚配置

表 2-41 模拟输入 (续)

| Ball | Symbol        | Ctrl. | Buffer Type      | Function                                      |
|------|---------------|-------|------------------|-----------------------------------------------|
| M2   | AN47          | I     | D / HighZ / VDDM | <b>Analog Input 47</b>                        |
|      | EVADC_G8CH15  |       |                  | <b>Analog input channel 15, group 8</b>       |
|      | EDSADC_EDS1ND |       |                  | <b>Negative analog input channel 1, pin D</b> |

注意：端口引脚P32.0 和P32.1 是双向引脚，具有以下两个功能：

- 如果将这些引脚用作标准 GPIO，则可以使用 P32.0 和 P32.1 引脚配置表中定义的功能。
- 如果引脚用作外部 MOSFET 的预驱动器（内部 DCDC 情况），P32.0 和 P32.1 将充当名为 VGATE1N 和 VGATE1P 的模拟 IO。

表 2-42 系统 I/O

| Ball | Symbol      | Ctrl. | Buffer Type       | Function                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|------|-------------|-------|-------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| G16  | ESR1        | I/O   | FAST / PU1 / VEXT | <b>ESR1 Port Pin input - can be used to trigger a reset or an NMI</b><br>ESR1: External System Request Reset 1. Default NMI function. See also SCU chapter for details. Default after power-on can be different. See also SCU chapter 'Reset Control Unit' and SCU_IOCRR register description.<br>PMS_EVRWUP: EVR Wakeup Pin                                                                                                                                                                                                 |
|      | PMS_ESR1WKP | I     |                   | <b>ESR1 pin input</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| F16  | ESR0        | I/O   | FAST / OD / VEXT  | <b>ESR0 Port Pin input - can be used to trigger a reset or an NMI</b><br>ESR0: External System Request Reset 0. Default configuration during and after reset is open-drain driver. The driver drives low during power-on reset. This is valid additionally after deactivation of PORST_N until the internal reset phase has finished. See also SCU chapter for details. Default after power-on can be different. See also SCU chapter 'Reset Control Unit' and SCU_IOCRR register description.<br>PMS_EVRWUP: EVR Wakeup Pin |
|      | PMS_ESR0WKP | I     |                   | <b>ESR0 pin input</b>                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| W17  | VGATE1P     | O     | —                 | <b>DCDC P ch. MOSFET gate driver output</b><br>P32.1 / External Pass Device gate control for EVRC                                                                                                                                                                                                                                                                                                                                                                                                                            |
| Y17  | VGATE1N     | O     | —                 | <b>DCDC N ch. MOSFET gate driver output</b><br>P32.0 / SMPS mode: analog output. External Pass Device gate control for EVRC                                                                                                                                                                                                                                                                                                                                                                                                  |
| M20  | XTAL1       | I     | XTAL / VEXT       | <b>XTAL pad1</b><br>XTAL1. Main Oscillator/PLL/Clock Generator Input.                                                                                                                                                                                                                                                                                                                                                                                                                                                        |
| M19  | XTAL2       | O     | XTAL / VEXT       | <b>XTAL pad2</b><br>XTAL2. Main Oscillator/PLL/Clock Generator OUTPUT                                                                                                                                                                                                                                                                                                                                                                                                                                                        |

表 2-42 系统 I/O (续)

| Ball | Symbol | Ctrl. | Buffer Type             | Function                                                                              |
|------|--------|-------|-------------------------|---------------------------------------------------------------------------------------|
| L19  | TRST   | I     | FAST /<br>PU2 /<br>VEXT | <b>JTAG Module Reset/Enable Input</b>                                                 |
| J16  | TCK    | I     | FAST /                  | <b>JTAG Module Clock Input</b>                                                        |
|      | DAP0   | I     | PD2 /<br>VEXT           | <b>DAP: DAP0 Clock Input</b>                                                          |
| K16  | TMS    | I     | FAST /                  | <b>JTAG Module State Machine Control Input</b>                                        |
|      | DAP1   | I/O   | PD2 /<br>VEXT           | <b>DAP: DAP1 Data I/O</b>                                                             |
| G17  | PORST  | I/O   | PORST /<br>PD /<br>VEXT | <b>PORST pin</b><br>Power On Reset Input. Additional strong PD in case of power fail. |

表 2-43 供电

| Ball                                                           | Symbol | Ctrl. | Buffer Type | Function                                                   |
|----------------------------------------------------------------|--------|-------|-------------|------------------------------------------------------------|
| P8, P13, N7,<br>N14, E15,<br>H14, D16,<br>G13, G8, H7          | VDD    | I     | —           | <b>Digital Core Power Supply (1.25V)</b>                   |
| A2, B3, V19,<br>W20                                            | VEXT   | I     | —           | <b>External Power Supply (5V / 3.3V)</b>                   |
| D5                                                             | VFLEX  | I     | —           | <b>Digital Power Supply for Flex Port Pads (5V / 3.3V)</b> |
| Y5                                                             | VDDM   | I     | —           | <b>ADC Analog Power Supply (5V / 3.3V)</b>                 |
| B18, A19                                                       | VDDP3  | I     | —           | <b>Flash Power Supply (3.3V)</b>                           |
| B2, D4, E5,<br>T16, U17,<br>W19, Y20,<br>E16, D17,<br>B19, A20 | VSS    | I     | —           | <b>Digital Ground</b>                                      |
| Y4                                                             | VSSM   | I     | —           | <b>Analog Ground for VDDM</b>                              |

表 2-43 供电 (续)

| Ball                                                                                                                                                                                                    | Symbol | Ctrl. | Buffer Type | Function                                                                                                |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-------|-------------|---------------------------------------------------------------------------------------------------------|
| P9, P12, N9, N10, N11, N12, M7, M8, M10, M11, M13, M14, L8, L9, L10, L11, L12, L13, K8, K9, K10, K11, K12, K13, J7, J8, J10, J11, J13, J14, H9, H10, H11, H12, G9, G10, G11, G12, L14, P10, P11, K7, L7 | VSS    | I     | —           | Digital Ground                                                                                          |
| L20                                                                                                                                                                                                     | VSS    | I     | —           | Oscillator Ground, VSS(OSC)                                                                             |
| Y6                                                                                                                                                                                                      | VAREF1 | I     | —           | Positive Analog Reference Voltage 1                                                                     |
| Y7                                                                                                                                                                                                      | VAGND1 | I     | —           | Negative Analog Reference Voltage 1                                                                     |
| T1                                                                                                                                                                                                      | VAREF2 | I     | —           | Positive Analog Reference Voltage 2                                                                     |
| T2                                                                                                                                                                                                      | VAGND2 | I     | —           | Negative Analog Reference Voltage 2                                                                     |
| K14                                                                                                                                                                                                     | NC     | I     | —           | Not connected. These pins are reserved for future extensions and shall not be connected externally      |
| A1, Y1, U4                                                                                                                                                                                              | NC1    | I     | —           | Not connected. These pins are not connected on package level and will not be used for future extensions |
| T11                                                                                                                                                                                                     | VEVRSB | I     | —           | Standby Power Supply (5V / 3.3V) for the Standby SRAM                                                   |
| N19                                                                                                                                                                                                     | VDD    | I     | —           | Digital Power Supply for Oscillator (1.25V), VDD(OSC)                                                   |
| N20                                                                                                                                                                                                     | VEXT   | I     | —           | Digital Power Supply for Oscillator (shall be supplied with same level as used for VEXT), VEXT(OSC)     |

## 2.3 焊盘框中焊盘排列顺序

表2-44 焊盘清单

| Number | Pad Name | Pad Type               | X      | Y      | Comment                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                  |
|--------|----------|------------------------|--------|--------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| 1      | ESR1     | FAST / PU1 / VEXT      | 263799 | 179145 | ESR1 Port Pin input - can be used to trigger a reset or an NMI<br>ESR1: External System Request Reset 1. Default NMI function. See also SCU chapter for details. Default after power-on can be different. See also SCU chapter 'Reset Control Unit' and SCU_IOCRR register description.<br>PMS_EVRWUP: EVR Wakeup Pin                                                                                                                                                                                                    |
| 2      | ESR0     | FAST / OD / VEXT       | 357795 | 179145 | ESR0 Port Pin input - can be used to trigger a reset or an NMI<br>ESR0: External System Request Reset 0. Default configuration during and after reset is open-drain driver.<br>The driver drives low during power-on reset. This is valid additionally after deactivation of PORST_N until the internal reset phase has finished. See also SCU chapter for details. Default after power-on can be different. See also SCU chapter 'Reset Control Unit' and SCU_IOCRR register description.<br>PMS_EVRWUP: EVR Wakeup Pin |
| 3      | P20.9    | FAST / PU1 / VEXT / ES | 409293 | 348147 | General-purpose I/O                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 4      | P20.14   | FAST / PU1 / VEXT / ES | 456291 | 179145 | General-purpose I/O                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 5      | P15.0    | FAST / PU1 / VEXT / ES | 503289 | 348147 | General-purpose I/O                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 6      | P15.2    | FAST / PU1 / VEXT / ES | 550287 | 179145 | General-purpose I/O                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |
| 7      | P15.4    | FAST / PU1 / VEXT / ES | 597285 | 348147 | General-purpose I/O                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                      |

## 引脚定义及功能焊盘框中焊盘的顺序

表2-44 焊盘清单 (续)

| Number | Pad Name | Pad Type                   | X       | Y      | Comment             |
|--------|----------|----------------------------|---------|--------|---------------------|
| 8      | P15.1    | FAST / PU1 /<br>VEXT / ES  | 644283  | 179145 | General-purpose I/O |
| 9      | P15.3    | FAST / PU1 /<br>VEXT / ES  | 691281  | 348147 | General-purpose I/O |
| 10     | P14.0    | FAST / PU1 /<br>VEXT / ES2 | 738279  | 179145 | General-purpose I/O |
| 11     | VDDP3    | Vx                         | 785277  | 348147 | Supply Voltage      |
| 12     | P15.10   | FAST / PU1 /<br>VEXT / ES6 | 832275  | 179145 | General-purpose I/O |
| 13     | P15.11   | FAST / PU1 /<br>VEXT / ES6 | 926271  | 179145 | General-purpose I/O |
| 14     | VDD      | Vx                         | 973269  | 348147 | Supply Voltage      |
| 15     | VSS      | Vx                         | 1048869 | 179145 | Supply Voltage      |
| 16     | P15.12   | FAST / PU1 /<br>VEXT / ES6 | 1124469 | 348147 | General-purpose I/O |
| 17     | P15.6    | FAST / PU1 /<br>VEXT / ES  | 1171467 | 179145 | General-purpose I/O |
| 18     | P15.13   | FAST / PU1 /<br>VEXT / ES6 | 1218465 | 348147 | General-purpose I/O |
| 19     | P15.7    | FAST / PU1 /<br>VEXT / ES  | 1265463 | 179145 | General-purpose I/O |
| 20     | P15.14   | FAST / PU1 /<br>VEXT / ES  | 1312461 | 348147 | General-purpose I/O |
| 21     | VEXT     | Vx                         | 1359459 | 179145 | Supply Voltage      |
| 22     | P15.15   | FAST / PU1 /<br>VEXT / ES  | 1406457 | 348147 | General-purpose I/O |
| 23     | VSS      | Vx                         | 1453455 | 179145 | Supply Voltage      |
| 24     | P14.4    | SLOW / PU2 /<br>VEXT / ES  | 1500453 | 348147 | General-purpose I/O |
| 25     | P15.8    | FAST / PU1 /<br>VEXT / ES  | 1547451 | 179145 | General-purpose I/O |
| 26     | P14.1    | FAST / PU1 /<br>VEXT / ES2 | 1594449 | 348147 | General-purpose I/O |
| 27     | P14.3    | SLOW / PU2 /<br>VEXT / ES  | 1641447 | 179145 | General-purpose I/O |
| 28     | P14.5    | FAST / PU2 /<br>VEXT / ES  | 1688445 | 348147 | General-purpose I/O |
| 29     | P15.5    | FAST / PU1 /<br>VEXT / ES  | 1735443 | 179145 | General-purpose I/O |
| 30     | P14.11   | SLOW / PU1 /<br>VEXT / ES  | 1782441 | 348147 | General-purpose I/O |
| 31     | VSS      | Vx                         | 1858041 | 179145 | Supply Voltage      |

## 引脚定义及功能焊盘框中焊盘的顺序

表2-44 焊盘清单 (续)

| Number | Pad Name | Pad Type                                | X       | Y      | Comment             |
|--------|----------|-----------------------------------------|---------|--------|---------------------|
| 32     | P14.12   | SLOW / PU1 /<br>VEXT / ES               | 1933641 | 348147 | General-purpose I/O |
| 33     | VDD      | Vx                                      | 2009241 | 179145 | Supply Voltage      |
| 34     | P14.13   | FAST / PU1 /<br>VEXT / ES               | 2084841 | 348147 | General-purpose I/O |
| 35     | P14.7    | SLOW / PU1 /<br>VEXT / ES               | 2131839 | 179145 | General-purpose I/O |
| 36     | P14.15   | SLOW / PU1 /<br>VEXT / ES               | 2178837 | 348147 | General-purpose I/O |
| 37     | P14.6    | FAST / PU1 /<br>VEXT / ES               | 2225835 | 179145 | General-purpose I/O |
| 38     | VEXT     | Vx                                      | 2272833 | 348147 | Supply Voltage      |
| 39     | P14.9    | LVDS_RX / FAST<br>/ PU1 / VEXT /<br>ES  | 2347884 | 179145 | General-purpose I/O |
| 40     | P14.10   | LVDS_RX / FAST<br>/ PU1 / VEXT /<br>ES  | 2441880 | 179145 | General-purpose I/O |
| 41     | P14.8    | SLOW / PU1 /<br>VEXT / ES               | 2516931 | 348147 | General-purpose I/O |
| 42     | P14.2    | SLOW / PU2 /<br>VEXT / ES               | 2563929 | 179145 | General-purpose I/O |
| 43     | P13.0    | LVDS_TX / FAST<br>/ PU1 /<br>VEXT / ES6 | 2675430 | 348147 | General-purpose I/O |
| 44     | P13.1    | LVDS_TX / FAST<br>/ PU1 / VEXT /<br>ES6 | 2769426 | 348147 | General-purpose I/O |
| 45     | VDD      | Vx                                      | 2880927 | 348147 | Supply Voltage      |
| 46     | VSS      | Vx                                      | 2936925 | 179145 | Supply Voltage      |
| 47     | P13.2    | LVDS_TX / FAST<br>/ PU1 / VEXT /<br>ES6 | 3048426 | 348147 | General-purpose I/O |
| 48     | P13.3    | LVDS_TX / FAST<br>/ PU1 / VEXT /<br>ES6 | 3142422 | 348147 | General-purpose I/O |
| 49     | VDD      | Vx                                      | 3253923 | 179145 | Supply Voltage      |
| 50     | P13.9    | FAST / PU1 /<br>VEXT / ES               | 3300921 | 348147 | General-purpose I/O |
| 51     | VSS      | Vx                                      | 3347919 | 179145 | Supply Voltage      |
| 52     | P13.4    | LVDS_TX / FAST<br>/ PU1 / VEXT /<br>ES6 | 3459420 | 348147 | General-purpose I/O |

表2-44 焊盘清单 (续)

| Number | Pad Name | Pad Type                                | X       | Y      | Comment             |
|--------|----------|-----------------------------------------|---------|--------|---------------------|
| 53     | P13.5    | LVDS_TX / FAST<br>/ PU1 / VEXT /<br>ES6 | 3553416 | 348147 | General-purpose I/O |
| 54     | P13.6    | LVDS_TX / FAST<br>/ PU1 / VEXT /<br>ES6 | 3729420 | 348147 | General-purpose I/O |
| 55     | P13.7    | LVDS_TX / FAST<br>/ PU1 / VEXT /<br>ES6 | 3823416 | 348147 | General-purpose I/O |
| 56     | VDD      | Vx                                      | 3934917 | 348147 | Supply Voltage      |
| 57     | VSS      | Vx                                      | 3981915 | 179145 | Supply Voltage      |
| 58     | P13.10   | SLOW / PU1 /<br>VEXT / ES               | 4085973 | 348147 | General-purpose I/O |
| 59     | VSS      | Vx                                      | 4132971 | 179145 | Supply Voltage      |
| 60     | P13.12   | SLOW / PU1 /<br>VEXT / ES               | 4179969 | 348147 | General-purpose I/O |
| 61     | VEXT     | Vx                                      | 4226967 | 179145 | Supply Voltage      |
| 62     | VDDP3    | Vx                                      | 4408965 | 348147 | Supply Voltage      |
| 63     | P13.13   | SLOW / PU1 /<br>VEXT / ES               | 4455963 | 179145 | General-purpose I/O |
| 64     | VDDP3    | Vx                                      | 4502961 | 348147 | Supply Voltage      |
| 65     | P13.14   | SLOW / PU1 /<br>VEXT / ES               | 4549959 | 179145 | General-purpose I/O |
| 66     | VDDP3    | Vx                                      | 4596957 | 348147 | Supply Voltage      |
| 67     | P13.11   | SLOW / PU1 /<br>VEXT / ES               | 4643955 | 179145 | General-purpose I/O |
| 68     | P13.15   | SLOW / PU1 /<br>VEXT / ES               | 4690953 | 348147 | General-purpose I/O |
| 69     | P14.14   | FAST / PU1 /<br>VEXT / ES               | 4737951 | 179145 | General-purpose I/O |
| 70     | P12.0    | SLOW / PU1 /<br>VFLEX / ES              | 4832019 | 179145 | General-purpose I/O |
| 71     | P12.1    | SLOW / PU1 /<br>VFLEX / ES              | 4879017 | 348147 | General-purpose I/O |
| 72     | P11.0    | RFAST / PU1 /<br>VFLEX / ES             | 4983021 | 348147 | General-purpose I/O |
| 73     | VFLEX    | Vx                                      | 5030019 | 179145 | Supply Voltage      |
| 74     | P11.1    | RFAST / PU1 /<br>VFLEX / ES             | 5105223 | 348147 | General-purpose I/O |
| 75     | VSS      | Vx                                      | 5152221 | 179145 | Supply Voltage      |
| 76     | P11.2    | RFAST / PU1 /<br>VFLEX / ES             | 5227425 | 348147 | General-purpose I/O |

表2-44 焊盘清单 (续)

| Number | Pad Name | Pad Type                             | X       | Y      | Comment             |
|--------|----------|--------------------------------------|---------|--------|---------------------|
| 77     | VDD      | Vx                                   | 5274423 | 179145 | Supply Voltage      |
| 78     | P11.4    | RFAST / PU1 / VFLEX / ES             | 5390127 | 348147 | General-purpose I/O |
| 79     | VSS      | Vx                                   | 5477625 | 179145 | Supply Voltage      |
| 80     | P11.3    | RFAST / PU1 / VFLEX / ES             | 5552829 | 348147 | General-purpose I/O |
| 81     | VFLEX    | Vx                                   | 5599827 | 179145 | Supply Voltage      |
| 82     | P11.6    | RFAST / PU1 / VFLEX / ES             | 5675031 | 348147 | General-purpose I/O |
| 83     | VSS      | Vx                                   | 5722029 | 179145 | Supply Voltage      |
| 84     | P11.5    | SLOW / RGMII_Input/ PU1 / VFLEX / ES | 5769027 | 348147 | General-purpose I/O |
| 85     | P11.7    | SLOW / RGMII_Input/ PU1 / VFLEX / ES | 5821407 | 179145 | General-purpose I/O |
| 86     | P11.9    | FAST / RGMII_Input/ PU1 / VFLEX / ES | 5872005 | 348147 | General-purpose I/O |
| 87     | VFLEX    | Vx                                   | 5922603 | 179145 | Supply Voltage      |
| 88     | P11.8    | SLOW / RGMII_Input/ PU1 / VFLEX / ES | 5969601 | 348147 | General-purpose I/O |
| 89     | P11.10   | FAST / RGMII_Input/ PU1 / VFLEX / ES | 6020199 | 179145 | General-purpose I/O |
| 90     | P11.11   | FAST / RGMII_Input/ PU1 / VFLEX / ES | 6070797 | 348147 | General-purpose I/O |
| 91     | VSS      | Vx                                   | 6121395 | 179145 | Supply Voltage      |
| 92     | P11.12   | FAST / RGMII_Input/ PU1 / VFLEX / ES | 6168393 | 348147 | General-purpose I/O |
| 93     | P11.14   | SLOW / PU1 / VFLEX / ES              | 6276357 | 348147 | General-purpose I/O |
| 94     | P11.13   | SLOW / PU1 / VFLEX / ES              | 6323355 | 179145 | General-purpose I/O |

## 引脚定义及功能焊盘框中焊盘的顺序

表2-44 焊盘清单 (续)

| Number | Pad Name | Pad Type                | X       | Y       | Comment             |
|--------|----------|-------------------------|---------|---------|---------------------|
| 95     | P11.15   | SLOW / PU1 / VFLEX / ES | 6370353 | 348147  | General-purpose I/O |
| 96     | VDD      | Vx                      | 6444567 | 179145  | Supply Voltage      |
| 97     | VSS      | Vx                      | 6538563 | 179145  | Supply Voltage      |
| 98     | P10.0    | SLOW / PU1 / VEXT / ES  | 6614163 | 348147  | General-purpose I/O |
| 99     | VDD      | Vx                      | 6689763 | 179145  | Supply Voltage      |
| 100    | P10.3    | FAST / PU1 / VEXT / ES  | 6765363 | 348147  | General-purpose I/O |
| 101    | VSS      | Vx                      | 6840963 | 179145  | Supply Voltage      |
| 102    | P10.1    | FAST / PU1 / VEXT / ES  | 6916563 | 348147  | General-purpose I/O |
| 103    | VEXT     | Vx                      | 6972561 | 179145  | Supply Voltage      |
| 104    | P10.9    | SLOW / PU1 / VEXT / ES  | 7089147 | 348147  | General-purpose I/O |
| 105    | VSS      | Vx                      | 7176645 | 179145  | Supply Voltage      |
| 106    | P10.11   | SLOW / PU1 / VEXT / ES  | 7306641 | 179145  | General-purpose I/O |
| 107    | P10.4    | FAST / PU1 / VEXT / ES  | 7391295 | 263799  | General-purpose I/O |
| 108    | P10.10   | SLOW / PU1 / VEXT / ES  | 7391295 | 357795  | General-purpose I/O |
| 109    | P10.15   | SLOW / PU1 / VEXT / ES  | 7222293 | 451791  | General-purpose I/O |
| 110    | P10.13   | SLOW / PU1 / VEXT / ES  | 7391295 | 545787  | General-purpose I/O |
| 111    | P10.2    | FAST / PU1 / VEXT / ES  | 7222293 | 639783  | General-purpose I/O |
| 112    | P10.14   | SLOW / PU1 / VEXT / ES  | 7391295 | 733779  | General-purpose I/O |
| 113    | P10.6    | SLOW / PU2 / VEXT / ES  | 7222293 | 795888  | General-purpose I/O |
| 114    | P10.5    | SLOW / PU2 / VEXT / ES  | 7391295 | 842886  | General-purpose I/O |
| 115    | P10.8    | SLOW / PU1 / VEXT / ES  | 7391295 | 936882  | General-purpose I/O |
| 116    | P10.7    | SLOW / PU1 / VEXT / ES  | 7222293 | 983880  | General-purpose I/O |
| 117    | P02.0    | FAST / PU1 / VEXT / ES  | 7391295 | 1030878 | General-purpose I/O |
| 118    | P02.2    | FAST / PU1 / VEXT / ES  | 7222293 | 1077876 | General-purpose I/O |

## 引脚定义及功能焊盘框中焊盘的顺序

表2-44 焊盘清单 (续)

| Number | Pad Name | Pad Type                  | X       | Y       | Comment             |
|--------|----------|---------------------------|---------|---------|---------------------|
| 119    | P02.1    | SLOW / PU1 /<br>VEXT / ES | 7391295 | 1124874 | General-purpose I/O |
| 120    | P02.5    | FAST / PU1 /<br>VEXT / ES | 7222293 | 1171872 | General-purpose I/O |
| 121    | P02.3    | SLOW / PU1 /<br>VEXT / ES | 7391295 | 1218870 | General-purpose I/O |
| 122    | P02.13   | SLOW / PU1 /<br>VEXT / ES | 7222293 | 1265868 | General-purpose I/O |
| 123    | P02.11   | SLOW / PU1 /<br>VEXT / ES | 7391295 | 1312866 | General-purpose I/O |
| 124    | P02.12   | SLOW / PU1 /<br>VEXT / ES | 7222293 | 1359864 | General-purpose I/O |
| 125    | P02.4    | FAST / PU1 /<br>VEXT / ES | 7391295 | 1406862 | General-purpose I/O |
| 126    | P02.15   | FAST / PU1 /<br>VEXT / ES | 7222293 | 1453860 | General-purpose I/O |
| 127    | VDD      | Vx                        | 7391295 | 1529460 | Supply Voltage      |
| 128    | VSS      | Vx                        | 7391295 | 1623456 | Supply Voltage      |
| 129    | P02.14   | SLOW / PU1 /<br>VEXT / ES | 7222293 | 1699056 | General-purpose I/O |
| 130    | P02.6    | FAST / PU1 /<br>VEXT / ES | 7391295 | 1746054 | General-purpose I/O |
| 131    | P01.0    | SLOW / PU1 /<br>VEXT / ES | 7222293 | 1793052 | General-purpose I/O |
| 132    | P02.7    | FAST / PU1 /<br>VEXT / ES | 7391295 | 1840050 | General-purpose I/O |
| 133    | P01.1    | SLOW / PU1 /<br>VEXT / ES | 7222293 | 1887048 | General-purpose I/O |
| 134    | P02.8    | SLOW / PU1 /<br>VEXT / ES | 7391295 | 1934046 | General-purpose I/O |
| 135    | P01.2    | SLOW / PU1 /<br>VEXT / ES | 7222293 | 1981044 | General-purpose I/O |
| 136    | P02.9    | SLOW / PU1 /<br>VEXT / ES | 7391295 | 2028042 | General-purpose I/O |
| 137    | P01.8    | SLOW / PU1 /<br>VEXT / ES | 7222293 | 2075040 | General-purpose I/O |
| 138    | VEXT     | Vx                        | 7391295 | 2122038 | Supply Voltage      |
| 139    | P01.9    | SLOW / PU1 /<br>VEXT / ES | 7222293 | 2169036 | General-purpose I/O |
| 140    | VSS      | Vx                        | 7391295 | 2216034 | Supply Voltage      |
| 141    | P01.11   | SLOW / PU1 /<br>VEXT / ES | 7222293 | 2263032 | General-purpose I/O |

表2-44 焊盘清单 (续)

| Number | Pad Name | Pad Type                   | X       | Y       | Comment                           |
|--------|----------|----------------------------|---------|---------|-----------------------------------|
| 142    | P02.10   | SLOW / PU1 /<br>VEXT / ES  | 7391295 | 2310030 | General-purpose I/O               |
| 143    | P01.10   | SLOW / PU1 /<br>VEXT / ES  | 7222293 | 2357028 | General-purpose I/O               |
| 144    | VSS      | Vx                         | 7391295 | 2432628 | Supply Voltage                    |
| 145    | VDD      | Vx                         | 7391295 | 2526624 | Supply Voltage                    |
| 146    | P00.0    | FAST / PU1 /<br>VEXT / ES  | 7391295 | 2620620 | General-purpose I/O               |
| 147    | P01.13   | FAST / PU1 /<br>VEXT / ES  | 7222293 | 2667618 | General-purpose I/O               |
| 148    | P01.4    | SLOW / PU1 /<br>VEXT / ES  | 7391295 | 2714616 | General-purpose I/O               |
| 149    | P01.12   | FAST / PU1 /<br>VEXT / ES  | 7222293 | 2761614 | General-purpose I/O               |
| 150    | P01.3    | SLOW / PU1 /<br>VEXT / ES  | 7391295 | 2808612 | General-purpose I/O               |
| 151    | P01.15   | SLOW / PU1 /<br>VEXT / ES  | 7222293 | 2855610 | General-purpose I/O               |
| 152    | P01.6    | FAST / PU1 /<br>VEXT / ES  | 7391295 | 2902608 | General-purpose I/O               |
| 153    | P01.14   | FAST / PU1 /<br>VEXT / ES  | 7222293 | 2949606 | General-purpose I/O               |
| 154    | P01.5    | SLOW / PU1 /<br>VEXT / ES  | 7391295 | 2996604 | General-purpose I/O               |
| 155    | P00.15   | FAST / PU1 /<br>VEXT / ES  | 7222293 | 3043602 | General-purpose I/O               |
| 156    | P01.7    | FAST / PU1 /<br>VEXT / ES  | 7391295 | 3090600 | General-purpose I/O               |
| 157    | P00.13   | FAST / PU1 /<br>VEXT / ES  | 7222293 | 3137598 | General-purpose I/O               |
| 158    | RESERVED | Vx                         | 7391295 | 3184596 | PBIST_OFFMust be bonded to<br>VSS |
| 159    | RESERVED | Vx                         | 7391295 | 3278592 | OTPMust be bonded to VSS          |
| 160    | P00.14   | SLOW / PU1 /<br>VEXT / ES  | 7222293 | 3325590 | General-purpose I/O               |
| 161    | VSS      | Vx                         | 7391295 | 3401190 | Supply Voltage                    |
| 162    | VDD      | Vx                         | 7391295 | 3495186 | Supply Voltage                    |
| 164    | P00.1    | SLOW / PU1 /<br>VEXT / ES  | 7222293 | 3572226 | General-purpose I/O               |
| 165    | P00.2    | SLOW / PU1 /<br>VEXT / ES1 | 7391295 | 3619224 | General-purpose I/O               |

表2-44 焊盘清单 (续)

| Number | Pad Name | Pad Type                   | X       | Y       | Comment             |
|--------|----------|----------------------------|---------|---------|---------------------|
| 166    | P00.3    | SLOW / PU1 /<br>VEXT / ES1 | 7222293 | 3666222 | General-purpose I/O |
| 167    | P00.4    | SLOW / PU1 /<br>VEXT / ES1 | 7391295 | 3713220 | General-purpose I/O |
| 168    | P00.5    | SLOW / PU1 /<br>VEXT / ES1 | 7222293 | 3760218 | General-purpose I/O |
| 169    | VSS      | Vx                         | 7391295 | 3807216 | Supply Voltage      |
| 170    | P00.6    | SLOW / PU1 /<br>VEXT / ES1 | 7222293 | 3854214 | General-purpose I/O |
| 171    | VEXT     | Vx                         | 7391295 | 3901212 | Supply Voltage      |
| 172    | P00.7    | SLOW / PU1 /<br>VEXT / ES1 | 7222293 | 3948210 | General-purpose I/O |
| 173    | P00.8    | SLOW / PU1 /<br>VEXT / ES1 | 7391295 | 3995208 | General-purpose I/O |
| 174    | P00.9    | SLOW / PU1 /<br>VEXT / ES1 | 7222293 | 4042206 | General-purpose I/O |
| 175    | P00.10   | SLOW / PU1 /<br>VEXT / ES1 | 7391295 | 4089204 | General-purpose I/O |
| 176    | P00.11   | SLOW / PU1 /<br>VEXT / ES1 | 7222293 | 4136202 | General-purpose I/O |
| 177    | P00.12   | SLOW / PU1 /<br>VEXT / ES1 | 7391295 | 4183200 | General-purpose I/O |
| 179    | AN47     | D / HighZ /<br>VDDM        | 7222293 | 4257414 | Analog Input 47     |
| 180    | AN46     | D / HighZ /<br>VDDM        | 7391295 | 4304412 | Analog Input 46     |
| 181    | AN45     | D / HighZ /<br>VDDM        | 7222293 | 4351410 | Analog Input 45     |
| 182    | AN44     | D / HighZ /<br>VDDM        | 7391295 | 4398408 | Analog Input 44     |
| 183    | VDDM     | Vx                         | 7222293 | 4445406 | Supply Voltage      |
| 184    | VSSM     | Vx                         | 7391295 | 4492404 | Supply Voltage      |
| 185    | VAREF5   | Vx                         | 7222293 | 4539402 | Supply Voltage      |
| 186    | VAREF4   | Vx                         | 7391295 | 4586400 | Supply Voltage      |
| 187    | VAGND5   | Vx                         | 7222293 | 4633398 | Supply Voltage      |
| 188    | VAGND4   | Vx                         | 7391295 | 4680396 | Supply Voltage      |
| 189    | AN43     | D / HighZ /<br>VDDM        | 7222293 | 4727394 | Analog Input 43     |
| 190    | AN42     | D / HighZ /<br>VDDM        | 7391295 | 4774392 | Analog Input 42     |
| 191    | AN41     | D / HighZ /<br>VDDM        | 7222293 | 4821390 | Analog Input 41     |

表2-44 焊盘清单 (续)

| Number | Pad Name    | Pad Type            | X       | Y       | Comment         |
|--------|-------------|---------------------|---------|---------|-----------------|
| 192    | VSSM        | Vx                  | 7391295 | 4868388 | Supply Voltage  |
| 193    | VDDM        | Vx                  | 7222293 | 4915386 | Supply Voltage  |
| 194    | AN40        | D / HighZ /<br>VDDM | 7391295 | 4962384 | Analog Input 40 |
| 195    | AN39/P40.9  | S / HighZ /<br>VDDM | 7222293 | 5009382 | Analog Input 39 |
| 196    | VSSM        | Vx                  | 7391295 | 5056380 | Supply Voltage  |
| 197    | AN38/P40.8  | S / HighZ /<br>VDDM | 7222293 | 5103378 | Analog Input 38 |
| 198    | VDDM        | Vx                  | 7391295 | 5150376 | Supply Voltage  |
| 199    | AN37/P40.7  | S / HighZ /<br>VDDM | 7222293 | 5197374 | Analog Input 37 |
| 200    | AN36/P40.6  | S / HighZ /<br>VDDM | 7391295 | 5244372 | Analog Input 36 |
| 201    | AN35        | D / HighZ /<br>VDDM | 7222293 | 5291370 | Analog Input 35 |
| 202    | AN34        | D / HighZ /<br>VDDM | 7391295 | 5338368 | Analog Input 34 |
| 203    | AN33/P40.5  | S / HighZ /<br>VDDM | 7222293 | 5385366 | Analog Input 33 |
| 204    | AN32/P40.4  | S / HighZ /<br>VDDM | 7391295 | 5432364 | Analog Input 32 |
| 205    | VAREF3      | Vx                  | 7222293 | 5479362 | Supply Voltage  |
| 206    | VAREF2      | Vx                  | 7391295 | 5526360 | Supply Voltage  |
| 207    | VAGND3      | Vx                  | 7222293 | 5573358 | Supply Voltage  |
| 208    | VAGND2      | Vx                  | 7391295 | 5620356 | Supply Voltage  |
| 209    | AN71/P41.3  | S / HighZ /<br>VDDM | 7222293 | 5667354 | Analog Input 71 |
| 210    | AN70/P41.2  | S / HighZ /<br>VDDM | 7391295 | 5714352 | Analog Input 70 |
| 211    | AN69/P41.1  | S / HighZ /<br>VDDM | 7222293 | 5761350 | Analog Input 69 |
| 212    | AN68/P41.0  | S / HighZ /<br>VDDM | 7391295 | 5808348 | Analog Input 68 |
| 213    | AN67/P40.15 | S / HighZ /<br>VDDM | 7222293 | 5855346 | Analog Input 67 |
| 214    | AN66        | D / HighZ /<br>VDDM | 7391295 | 5902344 | Analog Input 66 |
| 215    | AN65        | D / HighZ /<br>VDDM | 7222293 | 5949342 | Analog Input 65 |
| 216    | AN64/P41.8  | S / HighZ /<br>VDDM | 7391295 | 5996340 | Analog Input 64 |

表2-44 焊盘清单 (续)

| Number | Pad Name    | Pad Type            | X       | Y       | Comment         |
|--------|-------------|---------------------|---------|---------|-----------------|
| 217    | VDDM        | Vx                  | 7222293 | 6043338 | Supply Voltage  |
| 218    | VSSM        | Vx                  | 7391295 | 6090336 | Supply Voltage  |
| 219    | AN63/P41.7  | S / HighZ /<br>VDDM | 7222293 | 6137334 | Analog Input 63 |
| 220    | AN62/P41.6  | S / HighZ /<br>VDDM | 7391295 | 6184332 | Analog Input 62 |
| 221    | AN61        | D / HighZ /<br>VDDM | 7222293 | 6231330 | Analog Input 61 |
| 222    | AN60        | D / HighZ /<br>VDDM | 7391295 | 6278328 | Analog Input 60 |
| 223    | AN59        | D / HighZ /<br>VDDM | 7222293 | 6325326 | Analog Input 59 |
| 224    | AN58        | D / HighZ /<br>VDDM | 7391295 | 6372324 | Analog Input 58 |
| 225    | AN57        | D / HighZ /<br>VDDM | 7222293 | 6419322 | Analog Input 57 |
| 226    | AN56        | D / HighZ /<br>VDDM | 7391295 | 6466320 | Analog Input 56 |
| 227    | AN55/P41.5  | S / HighZ /<br>VDDM | 7222293 | 6513318 | Analog Input 55 |
| 228    | AN54/P41.4  | S / HighZ /<br>VDDM | 7391295 | 6560316 | Analog Input 54 |
| 229    | AN53        | D / HighZ /<br>VDDM | 7222293 | 6607314 | Analog Input 53 |
| 230    | AN52        | D / HighZ /<br>VDDM | 7391295 | 6654312 | Analog Input 52 |
| 231    | AN51        | D / HighZ /<br>VDDM | 7222293 | 6701310 | Analog Input 51 |
| 232    | AN50        | D / HighZ /<br>VDDM | 7391295 | 6748308 | Analog Input 50 |
| 233    | AN49        | D / HighZ /<br>VDDM | 7222293 | 6795306 | Analog Input 49 |
| 234    | AN48        | D / HighZ /<br>VDDM | 7391295 | 6842304 | Analog Input 48 |
| 235    | AN31        | D / HighZ /<br>VDDM | 7391295 | 6936300 | Analog Input 31 |
| 236    | AN30        | D / HighZ /<br>VDDM | 7302141 | 7058295 | Analog Input 30 |
| 237    | AN29/P40.14 | S / HighZ /<br>VDDM | 7208145 | 7058295 | Analog Input 29 |
| 238    | AN28/P40.13 | S / HighZ /<br>VDDM | 7161147 | 6889293 | Analog Input 28 |

表2-44 焊盘清单 (续)

| Number | Pad Name    | Pad Type            | X       | Y       | Comment         |
|--------|-------------|---------------------|---------|---------|-----------------|
| 239    | AN27/P40.3  | S / HighZ /<br>VDDM | 7114149 | 7058295 | Analog Input 27 |
| 240    | AN26/P40.2  | S / HighZ /<br>VDDM | 7067151 | 6889293 | Analog Input 26 |
| 241    | AN25/P40.1  | S / HighZ /<br>VDDM | 7020153 | 7058295 | Analog Input 25 |
| 242    | AN24/P40.0  | S / HighZ /<br>VDDM | 6973155 | 6889293 | Analog Input 24 |
| 243    | AN23        | D / HighZ /<br>VDDM | 6926157 | 7058295 | Analog Input 23 |
| 244    | AN22        | D / HighZ /<br>VDDM | 6879159 | 6889293 | Analog Input 22 |
| 245    | AN21        | D / HighZ /<br>VDDM | 6832161 | 7058295 | Analog Input 21 |
| 246    | AN20        | D / HighZ /<br>VDDM | 6785163 | 6889293 | Analog Input 20 |
| 247    | AN19/P40.12 | S / HighZ /<br>VDDM | 6738165 | 7058295 | Analog Input 19 |
| 248    | AN18/P40.11 | S / HighZ /<br>VDDM | 6691167 | 6889293 | Analog Input 18 |
| 249    | AN17/P40.10 | S / HighZ /<br>VDDM | 6644169 | 7058295 | Analog Input 17 |
| 250    | AN16        | D / HighZ /<br>VDDM | 6597171 | 6889293 | Analog Input 16 |
| 251    | AN15        | D / HighZ /<br>VDDM | 6550173 | 7058295 | Analog Input 15 |
| 252    | VAGND1      | Vx                  | 6503175 | 6889293 | Supply Voltage  |
| 253    | VAGND0      | Vx                  | 6456177 | 7058295 | Supply Voltage  |
| 254    | VAREF1      | Vx                  | 6409179 | 6889293 | Supply Voltage  |
| 255    | VAREF0      | Vx                  | 6362181 | 7058295 | Supply Voltage  |
| 256    | AN14        | D / HighZ /<br>VDDM | 6315183 | 6889293 | Analog Input 14 |
| 257    | AN13        | D / HighZ /<br>VDDM | 6268185 | 7058295 | Analog Input 13 |
| 258    | VDDM        | Vx                  | 6221187 | 6889293 | Supply Voltage  |
| 259    | VSSM        | Vx                  | 6174189 | 7058295 | Supply Voltage  |
| 260    | AN12        | D / HighZ /<br>VDDM | 6127191 | 6889293 | Analog Input 12 |
| 261    | VSSM        | Vx                  | 6080193 | 7058295 | Supply Voltage  |
| 262    | VDDM        | Vx                  | 6033195 | 6889293 | Supply Voltage  |
| 263    | AN11        | D / HighZ /<br>VDDM | 5986197 | 7058295 | Analog Input 11 |

表2-44 焊盘清单 (续)

| Number | Pad Name | Pad Type                     | X       | Y       | Comment                                 |
|--------|----------|------------------------------|---------|---------|-----------------------------------------|
| 264    | AN10     | D / HighZ /<br>VDDM          | 5939199 | 6889293 | Analog Input 10                         |
| 265    | AN9      | D / HighZ /<br>VDDM          | 5892201 | 7058295 | Analog Input 9                          |
| 266    | AN8      | D / HighZ /<br>VDDM          | 5845203 | 6889293 | Analog Input 8                          |
| 267    | AN7      | D / HighZ /<br>VDDM          | 5798205 | 7058295 | Analog Input 7                          |
| 268    | AN6      | D / HighZ /<br>VDDM          | 5751207 | 6889293 | Analog Input 6                          |
| 269    | AN5      | D / HighZ /<br>VDDM          | 5704209 | 7058295 | Analog Input 5                          |
| 270    | AN4      | D / HighZ /<br>VDDM          | 5657211 | 6889293 | Analog Input 4                          |
| 271    | AN3      | D / HighZ /<br>VDDM          | 5610213 | 7058295 | Analog Input 3                          |
| 272    | AN2      | D / HighZ /<br>VDDM          | 5563215 | 6889293 | Analog Input 2                          |
| 273    | AN1      | D / HighZ /<br>VDDM          | 5516217 | 7058295 | Analog Input 1                          |
| 274    | AN0      | D / HighZ /<br>VDDM          | 5469219 | 6889293 | Analog Input 0                          |
| 276    | VSS      | Vx                           | 5386005 | 7058295 | Supply Voltage                          |
| 277    | VDD      | Vx                           | 5310405 | 6889293 | Supply Voltage                          |
| 278    | VDD      | Vx                           | 5234805 | 7058295 | Supply Voltage                          |
| 279    | VSS      | Vx                           | 5140809 | 7058295 | Supply Voltage                          |
| 280    | VEXT     | Vx                           | 4961709 | 6889293 | Supply Voltage                          |
| 281    | P32.1    | SLOW / PU1 /<br>VEXT / ES    | 4914711 | 7058295 | General-purpose I/O                     |
| 282    | VGATE1P  | Vx                           | 4867713 | 6889293 | DCDC P ch. MOSFET gate driver<br>output |
| 283    | VSS      | Vx                           | 4802715 | 7058295 | Supply Voltage                          |
| 284    | VGATE1N  | Vx                           | 4737717 | 6889293 | DCDC N ch. MOSFET gate driver<br>output |
| 285    | P32.0    | SLOW / PU1 /<br>VEXT / ES    | 4690719 | 7058295 | General-purpose I/O                     |
| 286    | VEVRSB   | Vx                           | 4607505 | 6889293 | Supply Voltage                          |
| 287    | VEVRSB   | Vx                           | 4560507 | 7058295 | Supply Voltage                          |
| 288    | P33.1    | SLOW / PU1 /<br>VEVRSB / ES5 | 4513509 | 6889293 | General-purpose I/O                     |
| 289    | VSS      | Vx                           | 4466511 | 7058295 | Supply Voltage                          |

表2-44 焊盘清单 (续)

| Number | Pad Name | Pad Type                        | X       | Y       | Comment             |
|--------|----------|---------------------------------|---------|---------|---------------------|
| 290    | VSS      | —                               | 4354515 | 7058295 | Supply Voltage      |
| 291    | VDD      | —                               | 4307517 | 6889293 | Supply Voltage      |
| 292    | P33.0    | SLOW / PU1 /<br>VEVRSB / ES5    | 4260519 | 7058295 | General-purpose I/O |
| 293    | P33.3    | SLOW / PU1 /<br>VEVRSB / ES5    | 4213521 | 6889293 | General-purpose I/O |
| 294    | P33.2    | SLOW / PU1 /<br>VEVRSB / ES5    | 4166523 | 7058295 | General-purpose I/O |
| 295    | P33.5    | SLOW / PU1 /<br>VEVRSB / ES5    | 4119525 | 6889293 | General-purpose I/O |
| 296    | VSS      | Vx                              | 4016925 | 7058295 | Supply Voltage      |
| 297    | VDD      | Vx                              | 3969927 | 6889293 | Supply Voltage      |
| 298    | P34.1    | SLOW / PU1 /<br>VEVRSB /<br>ES5 | 3922929 | 7058295 | General-purpose I/O |
| 299    | P33.4    | SLOW / PU1 /<br>VEVRSB / ES5    | 3875931 | 6889293 | General-purpose I/O |
| 300    | P34.3    | SLOW / PU1 /<br>VEVRSB / ES     | 3828933 | 7058295 | General-purpose I/O |
| 301    | P33.7    | SLOW / PU1 /<br>VEVRSB / ES5    | 3781935 | 6889293 | General-purpose I/O |
| 302    | P34.2    | SLOW / PU1 /<br>VEVRSB / ES     | 3734937 | 7058295 | General-purpose I/O |
| 303    | P33.6    | SLOW / PU1 /<br>VEVRSB / ES5    | 3687939 | 6889293 | General-purpose I/O |
| 304    | P34.5    | FAST / PU1 /<br>VEVRSB / ES     | 3640941 | 7058295 | General-purpose I/O |
| 305    | P33.9    | SLOW / PU1 /<br>VEVRSB / ES5    | 3593943 | 6889293 | General-purpose I/O |
| 306    | VEVRSB   | Vx                              | 3546945 | 7058295 | Supply Voltage      |
| 307    | P33.8    | FAST / HighZ /<br>VEVRSB        | 3499947 | 6889293 | General-purpose I/O |
| 308    | P34.4    | SLOW / PU1 /<br>VEVRSB / ES     | 3452949 | 7058295 | General-purpose I/O |

表2-44 焊盘清单 (续)

| Number | Pad Name | Pad Type                         | X       | Y       | Comment             |
|--------|----------|----------------------------------|---------|---------|---------------------|
| 309    | P33.11   | FAST / PU1 /<br>VEVR SB / ES5    | 3405951 | 6889293 | General-purpose I/O |
| 310    | VSS      | Vx                               | 3303153 | 7058295 | Supply Voltage      |
| 311    | VDD      | Vx                               | 3256155 | 6889293 | Supply Voltage      |
| 312    | VSS      | Vx                               | 3209157 | 7058295 | Supply Voltage      |
| 313    | P33.10   | FAST / PU1 /<br>VEVR SB / ES5    | 3162159 | 6889293 | General-purpose I/O |
| 314    | P33.15   | SLOW / PU1 /<br>VEVR SB / ES5    | 3115161 | 7058295 | General-purpose I/O |
| 315    | P33.13   | FAST / PU1 /<br>VEVR SB / ES5    | 3068163 | 6889293 | General-purpose I/O |
| 316    | P33.14   | FAST / PU1 /<br>VEVR SB /<br>ES5 | 3021165 | 7058295 | General-purpose I/O |
| 317    | P33.12   | FAST / PU1 /<br>VEVR SB / ES5    | 2974167 | 6889293 | General-purpose I/O |
| 318    | VDD      | —                                | 2890953 | 7058295 | Supply Voltage      |
| 319    | VSS      | —                                | 2796957 | 7058295 | Supply Voltage      |
| 320    | P32.2    | SLOW / PU1 /<br>VEXT / ES        | 2721357 | 6889293 | General-purpose I/O |
| 321    | P32.5    | SLOW / PU1 /<br>VEXT / ES        | 2674359 | 7058295 | General-purpose I/O |
| 322    | P32.4    | FAST / PU1 /<br>VEXT / ES        | 2627361 | 6889293 | General-purpose I/O |
| 323    | VSS      | Vx                               | 2580363 | 7058295 | Supply Voltage      |
| 324    | VEXT     | Vx                               | 2533365 | 6889293 | Supply Voltage      |
| 325    | P32.3    | SLOW / PU1 /<br>VEXT / ES        | 2486367 | 7058295 | General-purpose I/O |
| 326    | P32.7    | SLOW / PU1 /<br>VEXT / ES        | 2439369 | 6889293 | General-purpose I/O |
| 327    | VSS      | Vx                               | 2363769 | 7058295 | Supply Voltage      |
| 328    | P32.6    | SLOW / PU1 /<br>VEXT / ES        | 2288169 | 6889293 | General-purpose I/O |
| 329    | VDD      | Vx                               | 2212569 | 7058295 | Supply Voltage      |
| 330    | P31.1    | FAST / PU1 /<br>VEXT / ES        | 2136969 | 6889293 | General-purpose I/O |
| 331    | P31.0    | FAST / PU1 /<br>VEXT / ES        | 2089971 | 7058295 | General-purpose I/O |

## 引脚定义及功能焊盘框中焊盘的顺序

表2-44 焊盘清单 (续)

| Number | Pad Name | Pad Type                  | X       | Y       | Comment             |
|--------|----------|---------------------------|---------|---------|---------------------|
| 332    | P31.3    | FAST / PU1 /<br>VEXT / ES | 2042973 | 6889293 | General-purpose I/O |
| 333    | P31.2    | FAST / PU1 /<br>VEXT / ES | 1995975 | 7058295 | General-purpose I/O |
| 334    | P31.4    | FAST / PU1 /<br>VEXT / ES | 1948977 | 6889293 | General-purpose I/O |
| 335    | P31.5    | FAST / PU1 /<br>VEXT / ES | 1901979 | 7058295 | General-purpose I/O |
| 336    | P31.6    | FAST / PU1 /<br>VEXT / ES | 1854981 | 6889293 | General-purpose I/O |
| 337    | P31.7    | FAST / PU1 /<br>VEXT / ES | 1807983 | 7058295 | General-purpose I/O |
| 338    | P31.8    | FAST / PU1 /<br>VEXT / ES | 1760985 | 6889293 | General-purpose I/O |
| 339    | P31.10   | FAST / PU1 /<br>VEXT / ES | 1713987 | 7058295 | General-purpose I/O |
| 340    | P31.9    | FAST / PU1 /<br>VEXT / ES | 1666989 | 6889293 | General-purpose I/O |
| 341    | P31.12   | FAST / PU1 /<br>VEXT / ES | 1619991 | 7058295 | General-purpose I/O |
| 342    | P31.11   | FAST / PU1 /<br>VEXT / ES | 1572993 | 6889293 | General-purpose I/O |
| 343    | P31.14   | FAST / PU1 /<br>VEXT / ES | 1525995 | 7058295 | General-purpose I/O |
| 344    | P31.13   | FAST / PU1 /<br>VEXT / ES | 1478997 | 6889293 | General-purpose I/O |
| 345    | VDD      | Vx                        | 1403397 | 7058295 | Supply Voltage      |
| 346    | VSS      | Vx                        | 1309401 | 7058295 | Supply Voltage      |
| 347    | P31.15   | FAST / PU1 /<br>VEXT / ES | 1233801 | 6889293 | General-purpose I/O |
| 348    | P30.2    | FAST / PU1 /<br>VEXT / ES | 1186803 | 7058295 | General-purpose I/O |
| 349    | P30.0    | FAST / PU1 /<br>VEXT / ES | 1139805 | 6889293 | General-purpose I/O |
| 350    | VSS      | Vx                        | 1092807 | 7058295 | Supply Voltage      |
| 351    | P30.1    | FAST / PU1 /<br>VEXT / ES | 1045809 | 6889293 | General-purpose I/O |
| 352    | VEXT     | Vx                        | 998811  | 7058295 | Supply Voltage      |
| 353    | P30.3    | FAST / PU1 /<br>VEXT / ES | 951813  | 6889293 | General-purpose I/O |
| 354    | P30.5    | FAST / PU1 /<br>VEXT / ES | 904815  | 7058295 | General-purpose I/O |

表2-44 焊盘清单 (续)

| Number | Pad Name | Pad Type                  | X      | Y       | Comment             |
|--------|----------|---------------------------|--------|---------|---------------------|
| 355    | P30.4    | FAST / PU1 /<br>VEXT / ES | 857817 | 6889293 | General-purpose I/O |
| 356    | P30.8    | FAST / PU1 /<br>VEXT / ES | 810819 | 7058295 | General-purpose I/O |
| 357    | VDD      | Vx                        | 763821 | 6889293 | Supply Voltage      |
| 358    | VSS      | Vx                        | 716823 | 7058295 | Supply Voltage      |
| 359    | VDD      | Vx                        | 614223 | 6889293 | Supply Voltage      |
| 360    | VSS      | Vx                        | 538623 | 7058295 | Supply Voltage      |
| 361    | P30.6    | FAST / PU1 /<br>VEXT / ES | 463023 | 6889293 | General-purpose I/O |
| 362    | P30.9    | FAST / PU1 /<br>VEXT / ES | 357795 | 7058295 | General-purpose I/O |
| 363    | P30.7    | FAST / PU1 /<br>VEXT / ES | 263799 | 7058295 | General-purpose I/O |
| 369    | P30.10   | FAST / PU1 /<br>VEXT / ES | 179145 | 6973641 | General-purpose I/O |
| 370    | P30.11   | FAST / PU1 /<br>VEXT / ES | 179145 | 6879645 | General-purpose I/O |
| 371    | P30.14   | FAST / PU1 /<br>VEXT / ES | 348147 | 6828147 | General-purpose I/O |
| 372    | P30.15   | FAST / PU1 /<br>VEXT / ES | 179145 | 6781149 | General-purpose I/O |
| 373    | P30.13   | FAST / PU1 /<br>VEXT / ES | 348147 | 6734151 | General-purpose I/O |
| 374    | P30.12   | FAST / PU1 /<br>VEXT / ES | 179145 | 6687153 | General-purpose I/O |
| 375    | P26.0    | SLOW / PU1 /<br>VEXT / ES | 348147 | 6640155 | General-purpose I/O |
| 376    | P25.0    | FAST / PU1 /<br>VEXT / ES | 179145 | 6593157 | General-purpose I/O |
| 377    | P23.0    | SLOW / PU1 /<br>VEXT / ES | 348147 | 6546159 | General-purpose I/O |
| 378    | P23.1    | FAST / PU1 /<br>VEXT / ES | 179145 | 6499161 | General-purpose I/O |
| 379    | P23.2    | SLOW / PU1 /<br>VEXT / ES | 348147 | 6443163 | General-purpose I/O |
| 380    | P25.2    | FAST / PU1 /<br>VEXT / ES | 179145 | 6396165 | General-purpose I/O |
| 381    | P23.3    | SLOW / PU1 /<br>VEXT / ES | 348147 | 6349167 | General-purpose I/O |
| 382    | P25.1    | FAST / PU1 /<br>VEXT / ES | 179145 | 6302169 | General-purpose I/O |

表2-44 焊盘清单 (续)

| Number | Pad Name | Pad Type                  | X      | Y       | Comment             |
|--------|----------|---------------------------|--------|---------|---------------------|
| 383    | VEXT     | Vx                        | 348147 | 6255171 | Supply Voltage      |
| 384    | P25.4    | FAST / PU1 /<br>VEXT / ES | 179145 | 6208173 | General-purpose I/O |
| 385    | VSS      | Vx                        | 348147 | 6161175 | Supply Voltage      |
| 386    | P23.5    | FAST / PU1 /<br>VEXT / ES | 179145 | 6114177 | General-purpose I/O |
| 387    | P23.6    | SLOW / PU1 /<br>VEXT / ES | 348147 | 6067179 | General-purpose I/O |
| 388    | P23.7    | SLOW / PU1 /<br>VEXT / ES | 179145 | 6020181 | General-purpose I/O |
| 389    | P25.3    | FAST / PU1 /<br>VEXT / ES | 348147 | 5973183 | General-purpose I/O |
| 390    | P22.4    | SLOW / PU1 /<br>VEXT / ES | 179145 | 5926185 | General-purpose I/O |
| 391    | P25.7    | FAST / PU1 /<br>VEXT / ES | 348147 | 5879187 | General-purpose I/O |
| 392    | P25.5    | FAST / PU1 /<br>VEXT / ES | 179145 | 5832189 | General-purpose I/O |
| 393    | P25.8    | FAST / PU1 /<br>VEXT / ES | 348147 | 5785191 | General-purpose I/O |
| 394    | P25.9    | FAST / PU1 /<br>VEXT / ES | 179145 | 5738193 | General-purpose I/O |
| 395    | P25.10   | FAST / PU1 /<br>VEXT / ES | 348147 | 5691195 | General-purpose I/O |
| 396    | P22.5    | SLOW / PU1 /<br>VEXT / ES | 179145 | 5644197 | General-purpose I/O |
| 397    | P25.11   | FAST / PU1 /<br>VEXT / ES | 348147 | 5588199 | General-purpose I/O |
| 398    | VSS      | Vx                        | 179145 | 5512599 | Supply Voltage      |
| 399    | VDD      | Vx                        | 348147 | 5436999 | Supply Voltage      |
| 400    | P25.12   | FAST / PU1 /<br>VEXT / ES | 179145 | 5390001 | General-purpose I/O |
| 401    | P23.4    | FAST / PU1 /<br>VEXT / ES | 348147 | 5343003 | General-purpose I/O |
| 402    | P25.14   | FAST / PU1 /<br>VEXT / ES | 179145 | 5296005 | General-purpose I/O |
| 403    | P25.13   | FAST / PU1 /<br>VEXT / ES | 348147 | 5249007 | General-purpose I/O |
| 404    | P25.15   | FAST / PU1 /<br>VEXT / ES | 179145 | 5202009 | General-purpose I/O |
| 405    | P25.6    | FAST / PU1 /<br>VEXT / ES | 348147 | 5155011 | General-purpose I/O |

表2-44 焊盘清单 (续)

| Number | Pad Name | Pad Type                                | X      | Y       | Comment             |
|--------|----------|-----------------------------------------|--------|---------|---------------------|
| 406    | P24.1    | FAST / PU1 /<br>VEXT / ES               | 179145 | 5108013 | General-purpose I/O |
| 407    | P24.0    | FAST / PU1 /<br>VEXT / ES               | 348147 | 5061015 | General-purpose I/O |
| 408    | P24.3    | FAST / PU1 /<br>VEXT / ES               | 179145 | 5014017 | General-purpose I/O |
| 409    | P24.2    | FAST / PU1 /<br>VEXT / ES               | 348147 | 4967019 | General-purpose I/O |
| 410    | P24.5    | FAST / PU1 /<br>VEXT / ES               | 179145 | 4920021 | General-purpose I/O |
| 411    | P24.4    | FAST / PU1 /<br>VEXT / ES               | 348147 | 4873023 | General-purpose I/O |
| 412    | VEXT     | Vx                                      | 179145 | 4826025 | Supply Voltage      |
| 413    | VSS      | Vx                                      | 348147 | 4779027 | Supply Voltage      |
| 414    | P22.7    | SLOW / PU1 /<br>VEXT / ES               | 179145 | 4732029 | General-purpose I/O |
| 415    | P24.9    | FAST / PU1 /<br>VEXT / ES               | 348147 | 4685031 | General-purpose I/O |
| 416    | P22.6    | SLOW / PU1 /<br>VEXT / ES               | 179145 | 4638033 | General-purpose I/O |
| 417    | P24.8    | FAST / PU1 /<br>VEXT / ES               | 348147 | 4591035 | General-purpose I/O |
| 418    | P22.8    | SLOW / PU1 /<br>VEXT / ES               | 179145 | 4544037 | General-purpose I/O |
| 419    | P22.2    | LVDS_TX / FAST<br>/ PU1 / VEXT /<br>ES6 | 348147 | 4432536 | General-purpose I/O |
| 420    | P22.3    | LVDS_TX / FAST<br>/ PU1 / VEXT /<br>ES6 | 348147 | 4338540 | General-purpose I/O |
| 421    | VDD      | Vx                                      | 179145 | 4227039 | Supply Voltage      |
| 422    | P22.0    | LVDS_TX / FAST<br>/ PU1 / VEXT /<br>ES6 | 348147 | 4115538 | General-purpose I/O |
| 423    | P22.1    | LVDS_TX / FAST<br>/ PU1 / VEXT /<br>ES6 | 348147 | 4021542 | General-purpose I/O |
| 424    | VSS      | Vx                                      | 179145 | 3910041 | Supply Voltage      |
| 425    | P24.6    | FAST / PU1 /<br>VEXT / ES               | 348147 | 3834441 | General-purpose I/O |
| 426    | P24.7    | FAST / PU1 /<br>VEXT / ES               | 179145 | 3787443 | General-purpose I/O |

表2-44 焊盘清单 (续)

| Number | Pad Name | Pad Type                               | X      | Y       | Comment                                                              |
|--------|----------|----------------------------------------|--------|---------|----------------------------------------------------------------------|
| 427    | P24.11   | FAST / PU1 /<br>VEXT / ES              | 348147 | 3740445 | General-purpose I/O                                                  |
| 428    | VSS      | Vx                                     | 179145 | 3664845 | Supply Voltage                                                       |
| 429    | VDD      | Vx                                     | 348147 | 3570849 | Supply Voltage                                                       |
| 430    | P24.10   | FAST / PU1 /<br>VEXT / ES              | 179145 | 3495249 | General-purpose I/O                                                  |
| 432    | VDD      | Vx                                     | 348147 | 3406041 | Supply Voltage                                                       |
| 433    | VSS      | Vx                                     | 179145 | 3359043 | Supply Voltage                                                       |
| 434    | XTAL1    | XTAL / VEXT                            | 179145 | 3199392 | XTAL pad1<br>XTAL1. Main<br>Oscillator/PLL/Clock Generator<br>Input. |
| 435    | XTAL2    | XTAL / VEXT                            | 179145 | 3105396 | XTAL pad2<br>XTAL2. Main<br>Oscillator/PLL/Clock Generator<br>OUTPUT |
| 436    | VSS      | —                                      | 179145 | 2945745 | Supply Voltage                                                       |
| 437    | VEXT     | Vx                                     | 348147 | 2898747 | Supply Voltage                                                       |
| 439    | P24.13   | FAST / PU1 /<br>VEXT / ES              | 348147 | 2764233 | General-purpose I/O                                                  |
| 440    | P22.11   | SLOW / PU1 /<br>VEXT / ES              | 179145 | 2717235 | General-purpose I/O                                                  |
| 441    | P24.12   | FAST / PU1 /<br>VEXT / ES              | 348147 | 2670237 | General-purpose I/O                                                  |
| 442    | P22.10   | SLOW / PU1 /<br>VEXT / ES              | 179145 | 2623239 | General-purpose I/O                                                  |
| 443    | P24.15   | FAST / PU1 /<br>VEXT / ES              | 348147 | 2576241 | General-purpose I/O                                                  |
| 444    | P22.9    | SLOW / PU1 /<br>VEXT / ES              | 179145 | 2529243 | General-purpose I/O                                                  |
| 445    | P24.14   | FAST / PU1 /<br>VEXT / ES              | 348147 | 2482245 | General-purpose I/O                                                  |
| 446    | TRST     | FAST / PU2 /<br>VEXT                   | 179145 | 2435247 | JTAG Module Reset/Enable<br>Input                                    |
| 447    | P21.0    | LVDS_RX / FAST<br>/ PU1 / VEXT /<br>ES | 348147 | 2360196 | General-purpose I/O                                                  |
| 448    | P21.1    | LVDS_RX / FAST<br>/ PU1 / VEXT /<br>ES | 348147 | 2266200 | General-purpose I/O                                                  |
| 449    | VDD      | Vx                                     | 179145 | 2191149 | Supply Voltage                                                       |

表2-44 焊盘清单 (续)

| Number | Pad Name  | Pad Type                                | X      | Y       | Comment                                                                                        |
|--------|-----------|-----------------------------------------|--------|---------|------------------------------------------------------------------------------------------------|
| 450    | P21.2     | LVDS_RX / FAST<br>/ PU1 / VEXT /<br>ES  | 348147 | 2116098 | General-purpose I/O                                                                            |
| 451    | P21.3     | LVDS_RX / FAST<br>/ PU1 / VEXT /<br>ES  | 348147 | 2022102 | General-purpose I/O                                                                            |
| 452    | VSS       | Vx                                      | 179145 | 1947051 | Supply Voltage                                                                                 |
| 453    | P21.4     | LVDS_TX / FAST<br>/ PU1 / VEXT /<br>ES6 | 348147 | 1835550 | General-purpose I/O                                                                            |
| 454    | P21.5     | LVDS_TX / FAST<br>/ PU1 / VEXT /<br>ES6 | 348147 | 1741554 | General-purpose I/O                                                                            |
| 455    | VDD       | Vx                                      | 348147 | 1630053 | Supply Voltage                                                                                 |
| 456    | VSS       | Vx                                      | 179145 | 1554453 | Supply Voltage                                                                                 |
| 457    | VSS       | Vx                                      | 348147 | 1460457 | Supply Voltage                                                                                 |
| 458    | VEXT      | Vx                                      | 179145 | 1413459 | Supply Voltage                                                                                 |
| 459    | P20.0     | FAST / PU1 /<br>VEXT / ES               | 348147 | 1366461 | General-purpose I/O                                                                            |
| 460    | TCK       | FAST / PD2 /<br>VEXT                    | 179145 | 1319463 | JTAG Module Clock Input                                                                        |
| 461    | P20.2     | S / PU / VEXT                           | 348147 | 1272465 | General-purpose I/O<br>This pin is latched at power on<br>reset release to enter test<br>mode. |
| 462    | TMS       | FAST / PD2 /<br>VEXT                    | 179145 | 1225467 | JTAG Module State Machine<br>Control Input                                                     |
| 463    | P20.3     | SLOW / PU1 /<br>VEXT / ES               | 348147 | 1178469 | General-purpose I/O                                                                            |
| 464    | P21.7/TDO | FAST / PU2 /<br>VEXT / ES4              | 179145 | 1131471 | General-purpose I/O                                                                            |
| 465    | P20.1     | SLOW / PU1 /<br>VEXT / ES               | 348147 | 1084473 | General-purpose I/O                                                                            |
| 466    | VEXT      | Vx                                      | 179145 | 1037475 | Supply Voltage                                                                                 |
| 467    | P20.8     | FAST / PU1 /<br>VEXT / ES               | 348147 | 990477  | General-purpose I/O                                                                            |
| 468    | VSS       | Vx                                      | 179145 | 943479  | Supply Voltage                                                                                 |
| 469    | P20.7     | FAST / PU1 /<br>VEXT / ES               | 348147 | 896481  | General-purpose I/O                                                                            |
| 470    | VDD       | Vx                                      | 179145 | 820881  | Supply Voltage                                                                                 |
| 471    | P20.11    | FAST / PU1 /<br>VEXT / ES               | 348147 | 745281  | General-purpose I/O                                                                            |

表2-44 焊盘清单 (续)

| Number | Pad Name  | Pad Type                     | X      | Y      | Comment                                                                                                                                                  |
|--------|-----------|------------------------------|--------|--------|----------------------------------------------------------------------------------------------------------------------------------------------------------|
| 472    | P21.6/TDI | FAST / PD / PU2 / VEXT / ES3 | 179145 | 698283 | General-purpose I/O PD during Reset and in DAP/DAPE or JTAG mode. After Reset release and when not in DAP/DAPE or JTAG mode: PU. In Standby mode: HighZ. |
| 473    | P20.10    | FAST / PU1 / VEXT / ES       | 348147 | 651285 | General-purpose I/O                                                                                                                                      |
| 474    | VSS       | Vx                           | 179145 | 575685 | Supply Voltage                                                                                                                                           |
| 475    | P20.13    | FAST / PU1 / VEXT / ES       | 348147 | 500085 | General-purpose I/O                                                                                                                                      |
| 476    | PORST     | PORST / PD / VEXT            | 179145 | 451791 | PORST pin<br>Power On Reset Input.<br>Additional strong PD in case of power fail.                                                                        |
| 477    | P20.12    | FAST / PU1 / VEXT / ES       | 179145 | 357795 | General-purpose I/O                                                                                                                                      |
| 478    | P20.6     | SLOW / PU1 / VEXT / ES       | 179145 | 263799 | General-purpose I/O                                                                                                                                      |

在第3节“电气规范”的表格中，每当使用术语“相邻焊盘”时，详细定义如图2-44所示。此表述也适用于次邻/最近邻焊盘。

为了找出谁在影响目标焊盘上的操作（干扰），必须定义大量活动的近邻焊盘（ACNP）。

寻找近邻焊盘。

焊盘环有四个边：底部、左侧、顶部、右侧。每条边都是有限的，即有两个端点。

每个焊盘都有两个直接（第一个）邻居，除非它位于边缘的末端。在这种情况下，它只有一个相邻焊盘。类似地，每个焊盘都有两个间接（第二）邻居，除非它或它的第一个邻居位于边缘的末端。我们将这些第一和第二个邻居统称为近邻焊盘。因此每个焊盘都有2到4个近邻焊盘。

可以按照以下顺序寻找近邻：

- 1.) 选择目标焊盘并在表格中查找其“X”和“Y”坐标图2-44中查找其“X”和“Y”坐标。
- 2.) 通过计算与选定焊盘的“X”和“Y”距离来找到第一和第二个邻居。图2-44按“Y”坐标排序，这可能有助于定位4个近邻候选者（如果垫子靠近边缘，则最终可能有少于4个近邻）。

定义活跃焊盘：

如果焊盘当前正在使用并且名称中没有“Vxx”，则表示焊盘活跃。

确定活跃的邻近焊盘的数量遵循以下规则：

- 如果第一个邻居是活跃的，那么我们对其进行计数，并检查第二个邻居（在选定垫的同一侧）是否活跃。
- 如果第一个邻居不活跃，那么我们就不会检查同一侧的第二个邻居。

## 2.4 图标说明：

本第 2 章中有关 TE 和 TX 的数据与文件 TC38xpd\_IO\_Spirit\_v1.0.0.1.21.xml 匹配。

### Ctrl 列：

- I = 输入（对于具有 IOCR 位字段选择  $PCx = 0XXX_B$  的 GPIO 端口）
- O = 输出（对于 GPIO 端口，“O”在大多数情况下代表端口 HWOUT 功能）
- O0 = 带有 IOCR 位字段选择的输出  $PCx = 1X000_B$
- O1 = 带有 IOCR 位字段选择的输出  $PCx = 1X001_B$  (ALT1)
- O2 = 带 IOCR 位字段选择的输出  $PCx = 1X010_B$  (ALT2)
- O3 = 带 IOCR 位字段选择的输出  $PCx = 1X011_B$  (ALT3)
- O4 = 带 IOCR 位字段选择的输出  $PCx = 1X100_B$  (ALT4)
- O5 = 带 IOCR 位字段选择的输出  $PCx = 1X101_B$  (ALT5)
- O6 = 带 IOCR 位字段选择的输出  $PCx = 1X110_B$  (ALT6)
- O7 = 带 IOCR 位字段选择的输出  $PCx = 1X111_B$  (ALT7)

### “缓冲区类型”列：

- RFAST = 焊盘类 RFAST (5V/3.3V)
- FAST = 焊盘类 FAST (5V/3.3V)
- SLOW = 焊盘类 SLOW (5V/3.3V)
- LVDS\_TX = 焊盘类 LVDS 发送
- LVDS\_RX = 垫片类 LVDS 接收
- S = 焊盘类 S（模拟输入与通用输入叠加）
- D = 焊盘类 D（模拟输入）
- Porst = Porst 输入焊盘
- XTAL1 = XTAL1 输入焊盘
- XTAL2 = XTAL2 输入焊盘
  
- PU = 复位期间连接上拉电阻 ( $\overline{PORST} = 0$ )
- PU1 = 复位期间连接上拉电阻 ( $\overline{PORST} = 0$ ) <sup>1)</sup>
- PU2 = 启动和复位期间连接上拉电阻，待机模式下为 HighZ
- PD = 复位期间连接下拉电阻 ( $\overline{PORST} = 0$ )
- PD1 = 在复位期间连接下拉电阻 ( $\overline{PORST} = 0$ ) <sup>1)</sup>
- PD2 = 在启动和复位期间连接下拉电阻，待机模式下为高阻态
- OD = 复位期间开漏 ( $\overline{PORST} = 0$ )
- ES = 支持紧急停止
- ES1=ES。ES 可被重用于 VADC，通过 P00\_PCSR 控制
- ES2=ES。ES 可以被用于 DXCPL - DAP 通过 CAN 物理层，不能被用于 DXCM - 通过 CAN 消息调试
- ES3=ES。如果此引脚用作 TDI 则 ES 可以被用于 JTAG 模式。
- ES4 = ES，ES 可由 JTAG 或三引脚 DAP 模式控制

<sup>1)</sup> PORST 下拉期间和之后，GPIO (Px.y) 的默认状态通过 HWCFG6 (P14.4) 控制。请另请参阅 PMS、HWCFG[6] 章节。

ES5=ES。如果实施的话，备用控制器 (SCR) 可以重用 ES。可以通过控制寄存器 P33\_PCSR 和 P34\_PCSR 禁用重用

ES6=ES。在 LVDS TX 焊盘上，ES 仅在 CMOS 模式下影响焊盘，而不在 LVDS 模式下影响焊盘。因此，仅当 LPCRx.TX\_EN 选择 CMOS 模式时，ES 事件中输出才会关闭

## 3 电气规格参数

### 3.1 参数解释

本节列出的参数部分代表TC38x的特性，部分代表其对系统的要求。 为了帮助在评估设计时轻松解释参数，它们在“符号”列中用两个字母的缩写标记：

- **CC**

这些参数表明了**控制器参数**特性，这是TC38x的一个显著特点，在系统设计中必须加以考虑

- **SR**

这些参数表明了**系统要求**，必须由采用TC38x设计的微处理器系统提供。

### 3.2 绝对最大额定值

超过“绝对最大额定值”所列值的载荷可能会对器件造成永久性损坏。这仅仅是一个载荷额定值，并不意味着设备在这些条件下或任何其他高于本规范操作部分所示条件的情况下能够正常运行。暴露于绝对最大额定条件可能会影响器件的可靠性。

表 3-1 绝对最大额定值

| Parameter                                                                                                 | Symbol             | Values |      |      | Unit | Note / Test Condition                  |
|-----------------------------------------------------------------------------------------------------------|--------------------|--------|------|------|------|----------------------------------------|
|                                                                                                           |                    | Min.   | Typ. | Max. |      |                                        |
| Storage Temperature                                                                                       | $T_{ST}$ SR        | -65    | -    | 150  | °C   | upto 65h @ $T_J = 150^{\circ}\text{C}$ |
| Voltage at $V_{DD}$ power supply pins with respect to $V_{SS}$ 1) 2)                                      | $V_{DD}$ SR        | -      | -    | 1.65 | V    | upto 2.8h                              |
|                                                                                                           |                    | -      | -    | 1.45 | V    | upto 72h                               |
| Voltage at $V_{DDP3}$ power supply pins with respect to $V_{SS}$                                          | $V_{DDP3}$ SR      | -      | -    | 4.43 | V    |                                        |
| Voltage at $V_{DDM}$ , $V_{EXT}$ , $V_{FLEX}$ and $V_{EVR SB}$ power supply pins with respect to $V_{SS}$ | $V_{DDM}$ SR       | -      | -    | 6.75 | V    | upto 2.8h                              |
|                                                                                                           |                    | -      | -    | 5.6  | V    | upto 72h                               |
| Voltage on all analog and class S input pins with respect to $V_{SS}$ 3)                                  | $V_{IN}$ SR        | -0.7   | -    | 6.75 | V    |                                        |
| Voltage on all other input pins with respect to $V_{SS}$ 3)                                               | $V_{IN}$ SR        | -0.7   | -    | 6.75 | V    |                                        |
| Input current on any pin during overload condition 4) 5)                                                  | $I_{IN}$ SR        | -10    | -    | 10   | mA   |                                        |
| Absolute maximum sum of all input circuit currents during overload condition. 4)                          | $\Sigma I_{IN}$ SR | -100   | -    | 100  | mA   |                                        |

- 1) 有效期累计长达2.8小时，脉冲形式跟随电源接通阶段，其中上升和下降时间与系统电容和电感有关。
- 2) 由于EVRC输出电压在开关关闭阶段振荡， $V_{DD}$ 可能降至-0.72V，对于 $V_{DD}$ ，输入电平降至关闭阶段的-0.72V不会造成任何损坏或可靠性问题。
- 3) 只要不违反受影响焊盘的过载引脚可靠性部分中定义的时间和电流，低于 $V_{INmin}$ 的电压就不会对器件可靠性产生影响。
- 4) 此参数是绝对最大额定值，长时间暴露于绝对最大额定值可能会损坏器件。
- 5) 指定的最小和最大值表示在运行期间未使用的任何快速、RFast、慢速和S级焊盘的输出端出现短路条件时必须维持的电流限值。  
这也涵盖了 $C_L=200\text{pF}$ 时由于操作切换而产生的输出电流。

### 3.3 过载下的引脚可靠性

当接收来自高压设备的信号时，低压设备会出现超出其自身 IO 电源规格的过载电流和电压。

下表定义了满足以下所有条件的情况下不会对可靠性造成任何负面影响的过载条件：

- 不超过过载条件允许的时间间隔（在注释栏中定义）。如果没有定义时间限制，则允许的时间包括“运行寿命小时数”和“非活动寿命小时数”。表 3-68 和 表 3-69 中的小时数仅作为示例，适用的数字由英飞凌接受的客户资料定义。
- 工作条件满足
  - 焊盘供电电平
  - 温度

如果引脚电流超出工作条件但在过载参数范围内，则无法再保证此引脚的参数功能符合工作条件中的规定。但在大多数情况下，操作仍可进行，因为参数宽松。

表 3-2 过载参数

| Parameter                                                                                                  | Symbol           | Values            |      |                    | Unit | Note / Test Condition                                             |
|------------------------------------------------------------------------------------------------------------|------------------|-------------------|------|--------------------|------|-------------------------------------------------------------------|
|                                                                                                            |                  | Min.              | Typ. | Max.               |      |                                                                   |
| Input current on any digital pin during overload condition                                                 | $I_{IN}$         | -5                | -    | 5                  | mA   | except LVDS pins                                                  |
|                                                                                                            |                  | -15 <sup>1)</sup> | -    | 15 <sup>1)</sup>   | mA   | except LVDS pins; limited to max. 20 pulses with 1ms pulse length |
| Input current on LVDS pin during overload condition                                                        | $I_{INLVDS}$     | -3                | -    | 3                  | mA   |                                                                   |
| Input current on analog input pin during overload condition                                                | $I_{INANA}$      | -3                | -    | 3                  | mA   |                                                                   |
|                                                                                                            |                  | -5                | -    | 5                  | mA   | limited to 60h over lifetime                                      |
| Absolute sum of all analog input currents for analog inputs during overload condition                      | $I_{INSA}$       | -20               | -    | 20                 | mA   |                                                                   |
| Absolute maximum sum of all input circuit currents during overload condition (digital and analog combined) | $\Sigma I_{INS}$ | -100              | -    | 100                | mA   |                                                                   |
| Signal voltage over/undershoot at GPIOs                                                                    | $V_{OUS}$        | $V_{SS} - 2$      | -    | $V_{EXT/FLEX} + 2$ | V    | limited to 60h over lifetime; Valid for non LVDS and analog pads  |
| Sum of all inactive device pin currents                                                                    | $I_{IDS}$        | -100              | -    | 100                | mA   |                                                                   |
| Static pin output current                                                                                  | $I_{OUT CC}$     | -                 | -    | 2.5                | mA   | 100% duty cycle; output driver = medium                           |
|                                                                                                            |                  | -                 | -    | 5                  | mA   | 100% duty cycle; output driver = strong                           |

表 3-2 过载参数 (续)

| Parameter                                                          | Symbol               | Values |      |                     | Unit | Note / Test Condition                                                                                                                    |
|--------------------------------------------------------------------|----------------------|--------|------|---------------------|------|------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                    |                      | Min.   | Typ. | Max.                |      |                                                                                                                                          |
| Overload coupling factor for digital inputs, negative              | $K_{\text{OVDN CC}}$ | -      | -    | $3 \cdot 10^{-4}$   |      | Overload injected on GPIO non LVDS pad and affecting neighbor fast pads; $-5\text{mA} < I_{\text{IN}} < 0\text{mA}$                      |
|                                                                    |                      | -      | -    | $2 \cdot 10^{-3}$   |      | Overload injected on GPIO non LVDS pad and affecting neighbor slow pads VGASTE1N and VGATE1P; $-5\text{mA} < I_{\text{IN}} < 0\text{mA}$ |
|                                                                    |                      | -      | -    | $1 \cdot 10^{-4}$   |      | Overload injected on GPIO non LVDS pad and affecting neighbor slow pads; $-5\text{mA} < I_{\text{IN}} < 0\text{mA}$                      |
|                                                                    |                      | -      | -    | 0.8                 |      | Overload injected on LVDS RX pad and affecting neighbor LVDS pads                                                                        |
|                                                                    |                      | -      | -    | 0.5                 |      | Overload injected on LVDS TX pad and affecting neighbor LVDS pads                                                                        |
|                                                                    |                      | -      | -    | $1.5 \cdot 10^{-3}$ |      | Overload injected on GPIO non LVDS pad and affecting neighbor GPIO non LVDS pads                                                         |
| Overload coupling factor for digital inputs, positive              | $K_{\text{OVDP CC}}$ | -      | -    | 1                   |      | Overload injected on LVDS RX pad and affecting neighbor LVDS pads                                                                        |
|                                                                    |                      | -      | -    | $5 \cdot 10^{-3}$   |      | Overload injected on LVDS TX pad and affecting neighbor LVDS pads                                                                        |
|                                                                    |                      | -      | -    | $1 \cdot 10^{-4}$   |      | Analog inputs overlaid with slow pads or pull down diagnostics; $-5\text{mA} < I_{\text{IN}} < 0\text{mA}$                               |
| Overload coupling factor for analog inputs, negative <sup>2)</sup> | $K_{\text{OVAN CC}}$ | -      | -    | $1 \cdot 10^{-5}$   |      | else; $-5\text{mA} < I_{\text{IN}} < 0\text{mA}$                                                                                         |
|                                                                    |                      | -      | -    |                     |      |                                                                                                                                          |

表 3-2 过载参数 (续)

| Parameter                                                          | Symbol         | Values |      |                   | Unit | Note / Test Condition                                                                              |
|--------------------------------------------------------------------|----------------|--------|------|-------------------|------|----------------------------------------------------------------------------------------------------|
|                                                                    |                | Min.   | Typ. | Max.              |      |                                                                                                    |
| Overload coupling factor for analog inputs, positive <sup>2)</sup> | $K_{OVAP\ CC}$ | -      | -    | $2 \cdot 10^{-4}$ |      | Analog inputs overlaid with slow pads or pull down diagnostics; $0\text{mA} < I_{IN} < 5\text{mA}$ |
|                                                                    |                | -      | -    | $2 \cdot 10^{-5}$ |      | else; $0\text{mA} < I_{IN} < 5\text{mA}$                                                           |

- 1) 降低的 VADC / DSADC 结果精度和 / 或 GPIO 输入电平 (  $V_{IL}$  和  $V_{IH}$  ) 可能与指定参数不同。
- 2) 模拟输入上的过载耦合是由焊盘、输入多路复用器和周围结构之间的寄生效应引起的。已针对所有通道排列验证了给定的参数。  
还观察一个引脚与多个通道的多个连接。

### 3.4 工作条件

为了确保TC38x的正确操作和可靠性，不得超过以下操作条件。除非另有说明，以下部分中指定的所有参数均指这些操作条件。

施加到 TC38x 的数字电源电压必须是静态调节电压。

下表中指定的所有参数均指这些操作条件（见下表），除非在注释/测试条件栏中另有说明。

表 3-3 工作条件

| Parameter                          | Symbol           | Values |      |      | Unit | Note / Test Condition                      |
|------------------------------------|------------------|--------|------|------|------|--------------------------------------------|
|                                    |                  | Min.   | Typ. | Max. |      |                                            |
| SRI frequency                      | $f_{SRI}$ SR     | -      | -    | 300  | MHz  |                                            |
| CPU Frequency (All CPUs)           | $f_{CPUx}$ SR    | -      | -    | 300  | MHz  |                                            |
| PLL0 output frequency              | $f_{PLL0}$ SR    | 20     | -    | 300  | MHz  |                                            |
| SPB frequency                      | $f_{SPB}$ SR     | -      | -    | 100  | MHz  |                                            |
| FSI2 frequency                     | $f_{FSI2}$ SR    | -      | -    | 300  | MHz  |                                            |
| FSI frequency                      | $f_{FSI}$ SR     | 20     | -    | 100  | MHz  |                                            |
| GTM frequency                      | $f_{GTM}$ SR     | -      | -    | 200  | MHz  |                                            |
| STM frequency                      | $f_{STM}$ SR     | -      | -    | 100  | MHz  |                                            |
| ERAY frequency                     | $f_{ERAY}$ SR    | -      | 80   | -    | MHz  |                                            |
| VADC frequency                     | $f_{ADC}$ SR     | -      | -    | 160  | MHz  |                                            |
| ASCLIN Operating Frequency         | $f_{ASCLINx}$ SR | -      | -    | 200  | MHz  |                                            |
| CAN frequency                      | $f_{CAN}$ SR     | -      | -    | 80   | MHz  |                                            |
| I2C frequency                      | $f_{I2C}$ SR     | -      | -    | 100  | MHz  |                                            |
| Operating MSC Frequency            | $f_{MSC}$ SR     | -      | -    | 200  | MHz  |                                            |
| PLL1 output frequency from PER PLL | $f_{PLL1}$ SR    | 20     | -    | 320  | MHz  |                                            |
| PLL2 output frequency from PER PLL | $f_{PLL2}$ SR    | 20     | -    | 200  | MHz  |                                            |
| QSPI Frequency                     | $f_{QSPI}$ SR    | -      | -    | 200  | MHz  |                                            |
| ADAS clock frequency               | $f_{ADAS}$ CC    | 200    | -    | 300  | MHz  |                                            |
| MCANH frequency                    | $f_{MCANH}$ CC   | -      | -    | 100  | MHz  |                                            |
| GETH frequency                     | $f_{GETH}$ CC    | 100    | -    | 150  | MHz  |                                            |
| Ambient Temperature                | $T_A$ SR         | -40    | -    | 125  | °C   | valid for all SAK products                 |
|                                    |                  | -40    | -    | 150  | °C   | valid for all SAL products with package    |
|                                    |                  | -40    | -    | 170  | °C   | valid for all SAL products without package |

表 3-3 工作条件 (续)

| Parameter                                        | Symbol        | Values              |      |                     | Unit | Note / Test Condition                                                                                                                              |
|--------------------------------------------------|---------------|---------------------|------|---------------------|------|----------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                  |               | Min.                | Typ. | Max.                |      |                                                                                                                                                    |
| Junction Temperature                             | $T_J$ SR      | -40                 | -    | 150                 | °C   | valid for all SAK products                                                                                                                         |
|                                                  |               | -40                 | -    | 170                 | °C   | valid for all SAL products                                                                                                                         |
| Core Supply Voltage                              | $V_{DD}$ SR   | 1.125 <sup>1)</sup> | 1.25 | 1.375 <sup>2)</sup> | V    |                                                                                                                                                    |
| ADC analog supply voltage                        | $V_{DDM}$ SR  | 2.97                | 5.0  | 5.5 <sup>3)</sup>   | V    |                                                                                                                                                    |
| Digital external supply voltage for pads and EVR | $V_{EXT}$ SR  | 4.5                 | 5.0  | 5.5 <sup>3)</sup>   | V    | Nominal 5V Pad / Port Pin supply range. 5V pad parameters are valid.                                                                               |
|                                                  |               | 2.97                | 3.3  | 3.63                | V    | Nominal 3.3V Pad / Port Pin supply range with VDDP3 supplied externally and EVR33 inactive. 3.3V pad parameters are valid.                         |
|                                                  |               | 3.6                 | -    | 4.5                 | V    | Flash configured in cranking mode; Flash read operation with reduced performance. EVR33 active in low voltage mode. 3.3V pad parameters are valid. |
|                                                  |               | 2.97                | -    | 3.6                 | V    | Incase EVR33 is active, Flash configured in sleep mode and execution switched to RAM. 3.3V pad parameters are valid.                               |
|                                                  |               |                     |      |                     |      |                                                                                                                                                    |
| Digital supply voltage for Flex port             | $V_{FLEX}$ SR | 2.97                | -    | 4.0                 | V    | 3.3V pad parameters are valid                                                                                                                      |
|                                                  |               | 4.5                 | 5.0  | 5.5 <sup>3)</sup>   | V    | 5V pad parameters are valid                                                                                                                        |
| Digital supply voltage for Flash                 | $V_{DDP3}$ SR | 2.97                | 3.3  | 3.63 <sup>4)</sup>  | V    |                                                                                                                                                    |
|                                                  |               | 2.6                 | -    | 3.63                | V    | Flash configured in cranking mode; Flash read operation with reduced performance.                                                                  |
| Digital ground voltage                           | $V_{SS}$ SR   | 0                   | -    | -                   | V    |                                                                                                                                                    |
| Analog ground voltage for $V_{DDM}$              | $V_{SSM}$ CC  | -0.1                | 0    | 0.1                 | V    |                                                                                                                                                    |

表 3-3 工作条件 (续)

| Parameter                                                       | Symbol                         | Values             |      |      | Unit | Note / Test Condition |
|-----------------------------------------------------------------|--------------------------------|--------------------|------|------|------|-----------------------|
|                                                                 |                                | Min.               | Typ. | Max. |      |                       |
| Digital external supply voltage for EVR and during Standby mode | $V_{\text{EVR SB}} \text{ SR}$ | 2.97 <sup>5)</sup> | -    | 5.5  | V    |                       |
| Voltage to ensure defined pad states                            | $V_{\text{DDPPA}} \text{ CC}$  | 1.3 <sup>6)</sup>  | -    | -    | V    |                       |

- 1) 当  $V_{\text{DD}} 1.08\text{V} \leq V_{\text{DD}} < 1.125\text{V}$  时, 仍可进行操作, 参数宽松。
- 2) 允许过冲电压至 1.69V, 但累计持续时间不得超过 2 小时, ADC 精度降低且漏电增加。
- 3) 允许过冲电压至 6.5V, 但累计持续时间不得超过 2 小时, ADC 精度降低且漏电增加。
- 4) 允许过冲电压至 4.29V, 但累计持续时间不得超过 2 小时, ADC 精度降低且漏电增加。
- 5)  $V_{\text{EVR SB}}$  供电电压在待机模式下可降至 2.6V。  $V_{\text{EVR SB}}$  上需接一个 100nF 电容供应引脚。
- 6) 当 VEXT 达到此电平时, HWCFG[6] 引脚被锁存, 并且在端口引脚处激活上拉或三态。

#### 供电电压随时间的限制

$V_{\text{EXT/FLEX/DDM}}$  电源轨 的最大工作电压在整个使用寿命期间受到限制。

下面的电压曲线就是一个例子。为了满足质量和可靠性目标, 特定应用的电压分布需要经过英飞凌科技的调整和批准。

表 3-4 电压曲线示例

| $V_{\text{EXT/FLEX/DDM}} =$                                  | Duration [h]            |
|--------------------------------------------------------------|-------------------------|
| $5.4\text{ V} < V_{\text{EXT/FLEX/DDM}} \leq 5.5\text{ V}$   | $\leq 5\%$ of lifetime  |
| $5.15\text{ V} < V_{\text{EXT/FLEX/DDM}} \leq 5.4\text{ V}$  | $\leq 15\%$ of lifetime |
| $4.85\text{ V} < V_{\text{EXT/FLEX/DDM}} \leq 5.15\text{ V}$ | $\leq 60\%$ of lifetime |
| $4.6\text{ V} < V_{\text{EXT/FLEX/DDM}} \leq 4.85\text{ V}$  | $\leq 15\%$ of lifetime |
| $4.5\text{ V} < V_{\text{EXT/FLEX/DDM}} \leq 4.6\text{ V}$   | $\leq 5\%$ of lifetime  |

在整个使用寿命期间,  $V_{\text{DD}}$  电源轨的最大工作电压是有限的。

下面的电压曲线就是一个例子。为了满足质量和可靠性目标, 特定应用的电压分布需要经过英飞凌科技的调整和批准。

表 3-5 电压曲线示例

| $V_{\text{DD}} =$                                    | Duration [h]            |
|------------------------------------------------------|-------------------------|
| $1.325\text{ V} < V_{\text{DD}} \leq 1.375\text{ V}$ | $\leq 5\%$ of lifetime  |
| $1.275\text{ V} < V_{\text{DD}} \leq 1.325\text{ V}$ | $\leq 15\%$ of lifetime |
| $1.225\text{ V} < V_{\text{DD}} \leq 1.275\text{ V}$ | $\leq 60\%$ of lifetime |
| $1.175\text{ V} < V_{\text{DD}} \leq 1.225\text{ V}$ | $\leq 15\%$ of lifetime |
| $1.125\text{ V} < V_{\text{DD}} \leq 1.175\text{ V}$ | $\leq 5\%$ of lifetime  |

### 3.5 5 V / 3.3 V 可切换焊盘

焊盘类别慢速 GPIO 和快速 GPIO 支持汽车级 (AL) 或 TTL 级 (TTL) 操作。参数是为 AL 操作定义的，并在 TTL 操作中降低。

表 3-6 PORST 焊盘

| Parameter                                        | Symbol                | Values                   |      |      | Unit | Note / Test Condition                                                                             |
|--------------------------------------------------|-----------------------|--------------------------|------|------|------|---------------------------------------------------------------------------------------------------|
|                                                  |                       | Min.                     | Typ. | Max. |      |                                                                                                   |
| PORST pad Output current                         | $I_{\text{PORST CC}}$ | 13                       | -    | -    | mA   | $V_{\text{EXT}} = 2.97\text{V}$ ; $V_{\text{PORST}} = 0.9\text{V}$                                |
| Spike filter always blocked pulse duration       | $t_{\text{SF1 CC}}$   | -                        | -    | 80   | ns   |                                                                                                   |
| Spike filter pass-through blocked pulse duration | $t_{\text{SF2 CC}}$   | 260                      | -    | -    | ns   | without additional PORST Digital Filter active (PORSTDF = 0).                                     |
| Input hysteresis <sup>1)</sup>                   | $HYS \text{ CC}$      | $0.055 * V_{\text{EXT}}$ | -    | -    | V    | non of the neighbor pads are used as output;TTL (degraded, used for CIF)                          |
| Pull-down current <sup>2)</sup>                  | $I_{\text{PDL CC}}$   | -                        | -    | 130  | μA   | $V_{\text{IH}}$ ; TTL (degraded, used for CIF)                                                    |
|                                                  |                       | 15                       | -    | -    | μA   | $V_{\text{IL}}$ ; TTL (degraded, used for CIF)                                                    |
| Input leakage current                            | $I_{\text{OZ CC}}$    | -450                     | -    | 450  | nA   | $TJ \leq 150^{\circ}\text{C}$ ; $(0.1 * V_{\text{EXT}}) < V_{\text{IN}} < (0.9 * V_{\text{EXT}})$ |
|                                                  |                       | -500                     | -    | 500  | nA   | $TJ \leq 150^{\circ}\text{C}$ ; else                                                              |
|                                                  |                       | -900                     | -    | 900  | nA   | $TJ \leq 170^{\circ}\text{C}$ ; $(0.1 * V_{\text{EXT}}) < V_{\text{IN}} < (0.9 * V_{\text{EXT}})$ |
|                                                  |                       | -950                     | -    | 950  | nA   | $TJ \leq 170^{\circ}\text{C}$ ; else                                                              |
| Input high voltage level                         | $V_{\text{IH SR}}$    | 1.4                      | -    | -    | V    | TTL (degraded, used for CIF); $V_{\text{EXT}} = 2.97\text{V}$                                     |
|                                                  |                       | 2.0                      | -    | -    | V    | TTL; $V_{\text{EXT}} = 4.5\text{V}$                                                               |
| Input low voltage level                          | $V_{\text{IL SR}}$    | -                        | -    | 0.5  | V    | TTL (degraded, used for CIF); $V_{\text{EXT}} = 2.97\text{V}$                                     |
|                                                  |                       | -                        | -    | 0.8  | V    | TTL; $V_{\text{EXT}} = 4.5\text{V}$                                                               |
| Pin capacitance                                  | $C_{\text{IO CC}}$    | -                        | 2    | 3    | pF   | in addition 2.5pF from package to be added                                                        |

1) 实施滞后是为了避免亚稳态和由于内部地弹而引起的切换。不能保证它能抑制由于外部系统噪声而引起的切换。

2) 下拉电阻的值通过表 VADC 5V 中的参数  $R_{\text{MDD}}$  定义。

表 3-7 快速 5V GPIO

| Parameter                         | Symbol                   | Values                              |                  |                  | Unit          | Note / Test Condition                                                                                                         |
|-----------------------------------|--------------------------|-------------------------------------|------------------|------------------|---------------|-------------------------------------------------------------------------------------------------------------------------------|
|                                   |                          | Min.                                | Typ.             | Max.             |               |                                                                                                                               |
| On-Resistance of pad output       | $R_{\text{DS(on) CC}}$   | 125                                 | 225              | 320              | Ohm           | medium driver; $I_{\text{OH/OL}} = 2\text{mA}$                                                                                |
|                                   |                          | 31                                  | 55               | 80               | Ohm           | strong driver; $I_{\text{OH/OL}} = 8\text{mA}$                                                                                |
| Rise / Fall time <sup>1) 2)</sup> | $t_{\text{RF CC}}$       | 1.6                                 | -                | 3.2              | ns            | $C_L = 25\text{pF}$ ; driver = strong sharp edge; from $0.2 * V_{\text{EXT/FLEX/EVRSB}}$ to $0.8 * V_{\text{EXT/FLEX/EVRSB}}$ |
|                                   |                          | $4+0.55 * C_L$                      | $4+0.75 * C_L$   | $12+1.0 * C_L$   | ns            | driver = medium; $C_L \leq 200\text{pF}$                                                                                      |
|                                   |                          | $1.0+0.18 * C_L$                    | $2.5+0.27 * C_L$ | $5.0+0.35 * C_L$ | ns            | driver = strong edge = medium; $C_L \leq 200\text{pF}$                                                                        |
|                                   |                          | $0.5+0.08 * C_L$                    | $0.5+0.11 * C_L$ | $1.0+0.17 * C_L$ | ns            | driver = strong edge = sharp; $C_L \leq 200\text{pF}$                                                                         |
| Asymmetry of sending              | $t_{\text{TX\_ASYM CC}}$ | -1                                  | -                | 1                | ns            | valid for all data rates excluding clock tolerance                                                                            |
| Input frequency                   | $f_{\text{IN CC}}$       | -                                   | -                | 160              | MHz           |                                                                                                                               |
| Input hysteresis <sup>3)</sup>    | $HYS \text{ CC}$         | $0.09 * V_{\text{EXT/FLEX/EVRSB}}$  | -                | -                | V             | non of the neighbor pads are used as output; AL                                                                               |
|                                   |                          | $0.075 * V_{\text{EXT/FLEX/EVRSB}}$ | -                | -                | V             | non of the neighbor pads are used as output; TTL                                                                              |
|                                   |                          | 75                                  | -                | -                | mV            | two of the neighbor pads are used as output with driver=strong and edge=sharp; AL                                             |
| Pull-up current <sup>4)</sup>     | $I_{\text{PUH CC}}$      | 30                                  | -                | -                | $\mu\text{A}$ | $V_{\text{IH}}$ ; AL or TTL                                                                                                   |
|                                   |                          | -                                   | -                | 130              | $\mu\text{A}$ | $V_{\text{IL}}$ ; AL or TTL                                                                                                   |
| Pull-down current <sup>5)</sup>   | $I_{\text{PDL CC}}$      | -                                   | -                | 130              | $\mu\text{A}$ | $V_{\text{IH}}$ ; AL or TTL                                                                                                   |
|                                   |                          | 30                                  | -                | -                | $\mu\text{A}$ | $V_{\text{IL}}$ ; AL                                                                                                          |
|                                   |                          | 28                                  | -                | -                | $\mu\text{A}$ | $V_{\text{IL}}$ ; TTL                                                                                                         |

表 3-7 快速 5V GPIO (续)

| Parameter                                                             | Symbol        | Values                     |      |                             | Unit | Note / Test Condition                                                                                           |
|-----------------------------------------------------------------------|---------------|----------------------------|------|-----------------------------|------|-----------------------------------------------------------------------------------------------------------------|
|                                                                       |               | Min.                       | Typ. | Max.                        |      |                                                                                                                 |
| Input leakage current                                                 | $I_{OZ\ CC}$  | -1100                      | -    | 1100                        | nA   | $T_J \leq 150^\circ\text{C}$ ; $(0.1 * V_{EXT/FLEX/EVRSB}) < V_{IN} < (0.9 * V_{EXT/FLEX/EVRSB})$               |
|                                                                       |               | -2500                      | -    | 2500                        | nA   | $T_J \leq 150^\circ\text{C}$ ; $(0.1 * V_{EXT/FLEX}) < V_{IN} < (0.9 * V_{EXT/FLEX})$ ; LVDS_TX / Fast pad type |
|                                                                       |               | -6000                      | -    | 6000                        | nA   | $T_J \leq 150^\circ\text{C}$ ; LVDS_RX / Fast pad type; else                                                    |
|                                                                       |               | -3200                      | -    | 3200                        | nA   | $T_J \leq 150^\circ\text{C}$ ; LVDS_TX / Fast pad type; else                                                    |
|                                                                       |               | -1500                      | -    | 1500                        | nA   | $T_J \leq 150^\circ\text{C}$ ; else                                                                             |
|                                                                       |               | -2000                      | -    | 2000                        | nA   | $T_J \leq 170^\circ\text{C}$ ; $(0.1 * V_{EXT/FLEX/EVRSB}) < V_{IN} < (0.9 * V_{EXT/FLEX/EVRSB})$               |
|                                                                       |               | -4000                      | -    | 4000                        | nA   | $T_J \leq 170^\circ\text{C}$ ; $(0.1 * V_{EXT/FLEX}) < V_{IN} < (0.9 * V_{EXT/FLEX})$ ; LVDS_TX / Fast pad type |
|                                                                       |               | -13500                     | -    | 13500                       | nA   | $T_J \leq 170^\circ\text{C}$ ; LVDS_RX / Fast pad type; else                                                    |
|                                                                       |               | -5100                      | -    | 5100                        | nA   | $T_J \leq 170^\circ\text{C}$ ; LVDS_TX / Fast pad type; else                                                    |
| Input high voltage level                                              | $V_{IH\ SR}$  | $0.7 * V_{EXT/FLEX/EVRSB}$ | -    | -                           | V    | AL                                                                                                              |
|                                                                       |               | 2.0                        | -    | -                           | V    | TTL                                                                                                             |
| Input low voltage level                                               | $V_{IL\ SR}$  | -                          | -    | $0.44 * V_{EXT/FLEX/EVRSB}$ | V    | AL                                                                                                              |
|                                                                       |               | -                          | -    | 0.8                         | V    | TTL                                                                                                             |
| Input low threshold variation                                         | $V_{ILD\ SR}$ | -50                        | -    | 50                          | mV   | max. variation of 1ms; $V_{EXT/FLEX/EVRSB} = \text{constant}$ ; AL                                              |
| Pin capacitance                                                       | $C_{IO\ CC}$  | -                          | 2    | 3                           | pF   | in addition 2.5pF from package to be added                                                                      |
| Pad set-up time to get an software update of the configuration active | $t_{SET\ CC}$ | -                          | -    | 100                         | ns   |                                                                                                                 |

1) 在公式中，需要以 pF 为单位输入  $C_L$  的值才能获得 ns 为单位的的结果。

2) 上升/下降时间定义为焊盘供电电压的 10% - 90%。

## 电气规格 5 V / 3.3 V 可切换焊盘

- 3) 实施滞后是为了避免亚稳态和由于内部地弹而引起的切换。不能保证它能抑制由于外部系统噪声而引起的切换。
- 4) 上拉电阻的值通过表 VADC 5V 中的参数  $R_{MDU}$  定义。
- 5) 下拉电阻的值通过表 VADC 5V 中的参数  $R_{MDD}$  定义。

表 3-8 快速 3.3V GPIO

| Parameter                         | Symbol            | Values                       |                   |                  | Unit | Note / Test Condition                                                                                    |
|-----------------------------------|-------------------|------------------------------|-------------------|------------------|------|----------------------------------------------------------------------------------------------------------|
|                                   |                   | Min.                         | Typ.              | Max.             |      |                                                                                                          |
| On-Resistance of pad output       | $R_{DS(on) CC}$   | 125                          | 225               | 320              | Ohm  | medium driver; $I_{OH/OL} = 2mA$                                                                         |
|                                   |                   | 31                           | 55                | 80               | Ohm  | strong driver; $I_{OH/OL} = 8mA$                                                                         |
| Rise / Fall time <sup>1) 2)</sup> | $t_{RF} CC$       | 1.6                          | -                 | 4.5              | ns   | $C_L = 25pF$ ; driver = strong sharp edge; from $0.2 * V_{EXT/FLEX/EVRSB}$ to $0.8 * V_{EXT/FLEX/EVRSB}$ |
|                                   |                   | -                            | -                 | 5                | ns   | $C_L = 25pF$ ; driver = strong sharp edge; from 0.8V to 2.0V (RMII)                                      |
|                                   |                   | $2+0.57 * C_L$               | $5.5+0.75 * C_L$  | $10+1.25 * C_L$  | ns   | driver = medium; $C_L \leq 200pF$                                                                        |
|                                   |                   | $1.5+0.18 * C_L$             | $1.5+0.28 * C_L$  | $8+0.4 * C_L$    | ns   | driver = strong edge = medium; $C_L \leq 200pF$                                                          |
|                                   |                   | $0.75+0.08 * C_L$            | $0.75+0.11 * C_L$ | $2.5+0.21 * C_L$ | ns   | driver = strong edge = sharp; $C_L \leq 200pF$                                                           |
|                                   |                   | -                            | -                 | -                | -    | -                                                                                                        |
| Asymmetry of sending              | $t_{TX\_ASYM} CC$ | -1                           | -                 | 1                | ns   | valid for all data rates excluding clock tolerance                                                       |
| Input frequency                   | $f_{IN} CC$       | -                            | -                 | 160              | MHz  |                                                                                                          |
| Input hysteresis <sup>3)</sup>    | $HYS CC$          | $0.055 * V_{EXT/FLEX/EVRSB}$ | -                 | -                | V    | non of the neighbor pads are used as output; AL                                                          |
|                                   |                   | $0.09 * V_{EXT/FLEX/EVRSB}$  | -                 | -                | V    | non of the neighbor pads are used as output; TTL                                                         |
|                                   |                   | $0.055 * V_{EXT/FLEX/EVRSB}$ | -                 | -                | V    | non of the neighbor pads are used as output; TTL (degraded, used for CIF)                                |
|                                   |                   | 125                          | -                 | -                | mV   | two of the neighbor pads are used as output with driver=strong and edge=sharp; AL                        |

表 3-8 快速 3.3V GPIO (续)

| Parameter                       | Symbol       | Values |      |       | Unit | Note / Test Condition                                                                                                   |
|---------------------------------|--------------|--------|------|-------|------|-------------------------------------------------------------------------------------------------------------------------|
|                                 |              | Min.   | Typ. | Max.  |      |                                                                                                                         |
| Pull-up current <sup>4)</sup>   | $I_{PUH}$ CC | 17     | -    | -     | μA   | $V_{IH}$ ; AL and TTL (degraded, used for CIF)                                                                          |
|                                 |              | 11     | -    | -     | μA   | $V_{IH}$ ; TTL                                                                                                          |
|                                 |              | -      | -    | 80    | μA   | $V_{IL}$ ; AL and TTL and TTL (degraded, used for CIF)                                                                  |
| Pull-down current <sup>5)</sup> | $I_{PDL}$ CC | -      | -    | 105   | μA   | $V_{IH}$ ; AL and TTL (degraded, used for CIF)                                                                          |
|                                 |              | -      | -    | 115   | μA   | $V_{IH}$ ; TTL                                                                                                          |
|                                 |              | 19     | -    | -     | μA   | $V_{IL}$ ; AL and TTL                                                                                                   |
|                                 |              | 15     | -    | -     | μA   | $V_{IL}$ ; TTL (degraded, used for CIF)                                                                                 |
| Input leakage current           | $I_{OZ}$ CC  | -1100  | -    | 1100  | nA   | $T_J \leq 150^\circ\text{C}$ ; $(0.1 \cdot V_{EXT/FLEX/EVRSB}) < V_{IN} < (0.9 \cdot V_{EXT/FLEX/EVRSB})$               |
|                                 |              | -2500  | -    | 2500  | nA   | $T_J \leq 150^\circ\text{C}$ ; $(0.1 \cdot V_{EXT/FLEX}) < V_{IN} < (0.9 \cdot V_{EXT/FLEX})$ ; LVDS_TX / Fast pad type |
|                                 |              | -6000  | -    | 6000  | nA   | $T_J \leq 150^\circ\text{C}$ ; LVDS_RX / Fast pad type; else                                                            |
|                                 |              | -3200  | -    | 3200  | nA   | $T_J \leq 150^\circ\text{C}$ ; LVDS_TX / Fast pad type; else                                                            |
|                                 |              | -1500  | -    | 1500  | nA   | $T_J \leq 150^\circ\text{C}$ ; else                                                                                     |
|                                 |              | -2000  | -    | 2000  | nA   | $T_J \leq 170^\circ\text{C}$ ; $(0.1 \cdot V_{EXT/FLEX/EVRSB}) < V_{IN} < (0.9 \cdot V_{EXT/FLEX/EVRSB})$               |
|                                 |              | -4000  | -    | 4000  | nA   | $T_J \leq 170^\circ\text{C}$ ; $(0.1 \cdot V_{EXT/FLEX}) < V_{IN} < (0.9 \cdot V_{EXT/FLEX})$ ; LVDS_TX / Fast pad type |
|                                 |              | -13500 | -    | 13500 | nA   | $T_J \leq 170^\circ\text{C}$ ; LVDS_RX / Fast pad type; else                                                            |
|                                 |              | -5100  | -    | 5100  | nA   | $T_J \leq 170^\circ\text{C}$ ; LVDS_TX / Fast pad type; else                                                            |
|                                 |              | -2500  | -    | 2500  | nA   | $T_J \leq 170^\circ\text{C}$ ; else                                                                                     |

表 3-8 快速 3.3V GPIO (续)

| Parameter                                                             | Symbol       | Values                            |      |                                    | Unit | Note / Test Condition                                            |
|-----------------------------------------------------------------------|--------------|-----------------------------------|------|------------------------------------|------|------------------------------------------------------------------|
|                                                                       |              | Min.                              | Typ. | Max.                               |      |                                                                  |
| Input high voltage level                                              | $V_{IH}$ SR  | 0.7 *<br>$V_{EXT/FLEX/E}$<br>VRSB | -    | -                                  | V    | AL                                                               |
|                                                                       |              | 2.0                               | -    | -                                  | V    | TTL                                                              |
|                                                                       |              | 1.4                               | -    | -                                  | V    | TTL (degraded, used for CIF)                                     |
| Input low voltage level                                               | $V_{IL}$ SR  | -                                 | -    | 0.42 *<br>$V_{EXT/FLEX/E}$<br>VRSB | V    | AL                                                               |
|                                                                       |              | -                                 | -    | 0.8                                | V    | TTL                                                              |
|                                                                       |              | -                                 | -    | 0.5                                | V    | TTL (degraded, used for CIF)                                     |
| Input low/high voltage level                                          | $V_{ILH}$ SR | 1.0                               | -    | 1.9                                | V    | RGMII; no hysteresis available                                   |
| Input low threshold variation                                         | $V_{ILD}$ SR | -33                               | -    | 33                                 | mV   | max. variation of 1ms;<br>$V_{EXT/FLEX/EVRSB} =$<br>constant; AL |
| Pin capacitance                                                       | $C_{IO}$ CC  | -                                 | 2    | 3                                  | pF   | in addition 2.5pF from package to be added                       |
| Pad set-up time to get an software update of the configuration active | $t_{SET}$ CC | -                                 | -    | 100                                | ns   |                                                                  |

1) 在公式中，需要以 pF 为单位输入  $C_L$  的值才能获得 ns 为单位的结果。

2) 上升/下降时间定义为焊盘供电电压的 10% - 90%。

3) 实施滞后是为了避免亚稳态和由于内部地弹而引起的切换。不能保证它能抑制由于外部系统噪声而引起的切换。

4) 上拉电阻的值通过表 VADC 5V 中的参数  $R_{MDU}$  定义。

5) 下拉电阻的值通过表 VADC 5V 中的参数  $R_{MDD}$  定义。

表 3-9 慢速 5V GPIO

| Parameter                         | Symbol            | Values               |                      |                    | Unit | Note / Test Condition                              |
|-----------------------------------|-------------------|----------------------|----------------------|--------------------|------|----------------------------------------------------|
|                                   |                   | Min.                 | Typ.                 | Max.               |      |                                                    |
| On-Resistance of pad output       | $R_{DSOn}$ CC     | 125                  | 225                  | 320                | Ohm  | medium driver; $I_{OH}/I_{OL} = 2mA$               |
| Rise / Fall time <sup>1) 2)</sup> | $t_{RF}$ CC       | $4+0.55 \cdot C_L$   | $4+0.75 \cdot C_L$   | $12+1 \cdot C_L$   | ns   | driver = medium edge = medium ; $C_L \leq 200pF$   |
|                                   |                   | $1.5+0.25 \cdot C_L$ | $2.5+0.40 \cdot C_L$ | $7+0.55 \cdot C_L$ | ns   | driver = medium edge = sharp ; $C_L \leq 200pF$    |
| Asymmetry of sending              | $t_{TX\_ASYM}$ CC | -1                   | -                    | 1                  | ns   | valid for all data rates excluding clock tolerance |
| Input frequency                   | $f_{IN}$ CC       | -                    | -                    | 160                | MHz  |                                                    |

表 3-9 慢速 5V GPIO (续)

| Parameter                       | Symbol         | Values                              |      |                                    | Unit | Note / Test Condition                                                                        |
|---------------------------------|----------------|-------------------------------------|------|------------------------------------|------|----------------------------------------------------------------------------------------------|
|                                 |                | Min.                                | Typ. | Max.                               |      |                                                                                              |
| Input hysteresis <sup>3)</sup>  | $HYS_{CC}$     | 0.09 *<br>$V_{EXT/FLEX/E}$<br>VRSB  | -    | -                                  | V    | non of the neighbor pads are used as output; AL                                              |
|                                 |                | 0.075 *<br>$V_{EXT/FLEX/E}$<br>VRSB | -    | -                                  | V    | non of the neighbor pads are used as output; TTL                                             |
|                                 |                | 75                                  | -    | -                                  | mV   | two of the neighbor pads are used as output with driver=strong and edge=sharp; AL            |
| Pull-up current <sup>4)</sup>   | $I_{PUH_{CC}}$ | 30                                  | -    | -                                  | μA   | $V_{IH}$ ; AL or TTL; exept VGATE1P; exept VGATE1N and $T_J > 150^{\circ}C$                  |
|                                 |                | -                                   | -    | 130                                | μA   | $V_{IL}$ ; AL or TTL; exept VGATE1P; exept VGATE1N and $T_J > 150^{\circ}C$                  |
| Pull-down current <sup>5)</sup> | $I_{PDL_{CC}}$ | -                                   | -    | 130                                | μA   | $V_{IH}$ ; AL or TTL                                                                         |
|                                 |                | 30                                  | -    | -                                  | μA   | $V_{IL}$ ; AL                                                                                |
|                                 |                | 28                                  | -    | -                                  | μA   | $V_{IL}$ ; TTL                                                                               |
| Input leakage current           | $I_{OZ_{CC}}$  | -300                                | -    | 300                                | nA   | $T_J \leq 150^{\circ}C$ ; $(0.1 * V_{EXT/FLEX/EVRSB}) < V_{IN} < (0.9 * V_{EXT/FLEX/EVRSB})$ |
|                                 |                | -400                                | -    | 400                                | nA   | $T_J \leq 150^{\circ}C$ ; else                                                               |
|                                 |                | -600                                | -    | 600                                | nA   | $T_J \leq 170^{\circ}C$ ; $(0.1 * V_{EXT/FLEX/EVRSB}) < V_{IN} < (0.9 * V_{EXT/FLEX/EVRSB})$ |
|                                 |                | -750                                | -    | 750                                | nA   | $T_J \leq 170^{\circ}C$ ; else                                                               |
|                                 |                | -18000                              | -    | 18000                              | nA   | P32.0 and P32.1; $T_J \leq 150^{\circ}C$                                                     |
|                                 |                | -38000                              | -    | 38000                              | nA   | P32.0 and P32.1; $T_J \leq 170^{\circ}C$                                                     |
| Input high voltage level        | $V_{IH_{SR}}$  | 0.7 *<br>$V_{EXT/FLEX/E}$<br>VRSB   | -    | -                                  | V    | AL                                                                                           |
|                                 |                | 2.0                                 | -    | -                                  | V    | TTL                                                                                          |
| Input low voltage level         | $V_{IL_{SR}}$  | -                                   | -    | 0.44 *<br>$V_{EXT/FLEX/E}$<br>VRSB | V    | AL                                                                                           |
|                                 |                | -                                   | -    | 0.8                                | V    | TTL                                                                                          |

表 3-9 慢速 5V GPIO (续)

| Parameter                                                                | Symbol        | Values |      |      | Unit | Note / Test Condition                                            |
|--------------------------------------------------------------------------|---------------|--------|------|------|------|------------------------------------------------------------------|
|                                                                          |               | Min.   | Typ. | Max. |      |                                                                  |
| Input low threshold variation                                            | $V_{ILD\ SR}$ | -50    | -    | 50   | mV   | max. variation of 1ms;<br>$V_{EXT/FLEX/EVRSB} =$<br>constant; AL |
| Pin capacitance                                                          | $C_{IO\ CC}$  | -      | 2    | 3    | pF   | in addition 2.5pF from<br>package to be added                    |
| Pad set-up time to get an software<br>update of the configuration active | $t_{SET\ CC}$ | -      | -    | 100  | ns   |                                                                  |

- 1) 在公式中，需要以 pF 为单位输入  $C_L$  的值才能获得 ns 为单位的结果。
- 2) 上升/下降时间定义为焊盘供电电压的 10% - 90%。
- 3) 实施滞后是为了避免亚稳态和由于内部地弹而引起的切换。不能保证它能抑制由于外部系统噪声而引起的切换。
- 4) 上拉电阻的值通过表 VADC 5V 中的参数  $R_{MDU}$  定义。
- 5) 下拉电阻的值通过表 VADC 5V 中的参数  $R_{MDD}$  定义。

表 3-10 慢速 3.3V GPIO

| Parameter                         | Symbol             | Values                           |                      |                     | Unit | Note / Test Condition                                                                      |
|-----------------------------------|--------------------|----------------------------------|----------------------|---------------------|------|--------------------------------------------------------------------------------------------|
|                                   |                    | Min.                             | Typ.                 | Max.                |      |                                                                                            |
| On-Resistance of pad output       | $R_{DS\ ON\ CC}$   | 125                              | 225                  | 320                 | Ohm  | medium driver; $I_{OH/OL} =$<br>2mA                                                        |
| Rise / Fall time <sup>1) 2)</sup> | $t_{RF\ CC}$       | $2+0.57 \cdot C_L$               | $5.5+0.75 \cdot C_L$ | $10+1.25 \cdot C_L$ | ns   | driver = medium edge =<br>medium ; $C_L \leq 200\text{pF}$                                 |
|                                   |                    | $2+0.30 \cdot C_L$               | $3.5+0.50 \cdot C_L$ | $5+0.70 \cdot C_L$  | ns   | driver = medium edge =<br>sharp ; $C_L \leq 200\text{pF}$                                  |
| Asymmetry of sending              | $t_{TX\_ASYM\ CC}$ | -1                               | -                    | 1                   | ns   | valid for all data rates<br>excluding clock tolerance                                      |
| Input frequency                   | $f_{IN\ CC}$       | -                                | -                    | 160                 | MHz  |                                                                                            |
| Input hysteresis <sup>3)</sup>    | $HYS\ CC$          | $0.055 \cdot V_{EXT/FLEX/EVRSB}$ | -                    | -                   | V    | non of the neighbor<br>pads are used as output;<br>AL                                      |
|                                   |                    | $0.09 \cdot V_{EXT/FLEX/EVRSB}$  | -                    | -                   | V    | non of the neighbor<br>pads are used as output;<br>TTL                                     |
|                                   |                    | $0.055 \cdot V_{EXT/FLEX/EVRSB}$ | -                    | -                   | V    | non of the neighbor<br>pads are used as<br>output;TTL (degraded,<br>used for CIF)          |
|                                   |                    | 125                              | -                    | -                   | mV   | two of the neighbor<br>pads are used as output<br>with driver=strong and<br>edge=sharp; AL |

表 3-10 慢速 3.3V GPIO (续)

| Parameter                       | Symbol        | Values                     |      |       | Unit | Note / Test Condition                                                                                                  |
|---------------------------------|---------------|----------------------------|------|-------|------|------------------------------------------------------------------------------------------------------------------------|
|                                 |               | Min.                       | Typ. | Max.  |      |                                                                                                                        |
| Pull-up current <sup>4)</sup>   | $I_{PUH\ CC}$ | 17                         | -    | -     | μA   | $V_{IH}$ ; AL and TTL (degraded, used for CIF); except VGATE1P; except VGATE1N and $T_J > 150^{\circ}\text{C}$         |
|                                 |               | 11                         | -    | -     | μA   | $V_{IH}$ ; TTL; except VGATE1P; except VGATE1N and $T_J > 150^{\circ}\text{C}$                                         |
|                                 |               | -                          | -    | 80    | μA   | $V_{IL}$ ; AL and TTL and TTL (degraded, used for CIF); except VGATE1P; except VGATE1N and $T_J > 150^{\circ}\text{C}$ |
| Pull-down current <sup>5)</sup> | $I_{PDL\ CC}$ | -                          | -    | 105   | μA   | $V_{IH}$ ; AL and TTL (degraded, used for CIF)                                                                         |
|                                 |               | -                          | -    | 115   | μA   | $V_{IH}$ ; TTL                                                                                                         |
|                                 |               | 19                         | -    | -     | μA   | $V_{IL}$ ; AL and TTL                                                                                                  |
|                                 |               | 15                         | -    | -     | μA   | $V_{IL}$ ; TTL (degraded, used for CIF)                                                                                |
| Input leakage current           | $I_{OZ\ CC}$  | -300                       | -    | 300   | nA   | $T_J \leq 150^{\circ}\text{C}$ ; $(0.1 * V_{EXT/FLEX/EVRSB}) < V_{IN} < (0.9 * V_{EXT/FLEX/EVRSB})$                    |
|                                 |               | -400                       | -    | 400   | nA   | $T_J \leq 150^{\circ}\text{C}$ ; else                                                                                  |
|                                 |               | -600                       | -    | 600   | nA   | $T_J \leq 170^{\circ}\text{C}$ ; $(0.1 * V_{EXT/FLEX/EVRSB}) < V_{IN} < (0.9 * V_{EXT/FLEX/EVRSB})$                    |
|                                 |               | -750                       | -    | 750   | nA   | $T_J \leq 170^{\circ}\text{C}$ ; else                                                                                  |
|                                 |               | -18000                     | -    | 18000 | nA   | P32.0 and P32.1; $T_J \leq 150^{\circ}\text{C}$                                                                        |
|                                 |               | -38000                     | -    | 38000 | nA   | P32.0 and P32.1; $T_J \leq 170^{\circ}\text{C}$                                                                        |
| Input high voltage level        | $V_{IH\ SR}$  | $0.7 * V_{EXT/FLEX/EVRSB}$ | -    | -     | V    | AL                                                                                                                     |
|                                 |               | 2.0                        | -    | -     | V    | TTL                                                                                                                    |
|                                 |               | 1.4                        | -    | -     | V    | TTL (degraded, used for CIF)                                                                                           |

表 3-10 慢速 3.3V GPIO (续)

| Parameter                                                             | Symbol       | Values |      |                                             | Unit | Note / Test Condition                                                          |
|-----------------------------------------------------------------------|--------------|--------|------|---------------------------------------------|------|--------------------------------------------------------------------------------|
|                                                                       |              | Min.   | Typ. | Max.                                        |      |                                                                                |
| Input low voltage level                                               | $V_{IL}$ SR  | -      | -    | $0.42 \cdot \frac{V_{EXT/FLEX/E}}{V_{RSB}}$ | V    | AL                                                                             |
|                                                                       |              | -      | -    | 0.8                                         | V    | TTL                                                                            |
|                                                                       |              | -      | -    | 0.5                                         | V    | TTL (degraded, used for CIF)                                                   |
| Input low/high voltage level                                          | $V_{ILH}$ SR | 1.0    | -    | 1.9                                         | V    | RGMII; no hysteresis available                                                 |
| Input low threshold variation                                         | $V_{ILD}$ SR | -33    | -    | 33                                          | mV   | max. variation of 1ms; $\frac{V_{EXT/FLEX/E}}{V_{RSB}} = \text{constant}$ ; AL |
| Pin capacitance                                                       | $C_{IO}$ CC  | -      | 2    | 3                                           | pF   | in addition 2.5pF from package to be added                                     |
| Pad set-up time to get an software update of the configuration active | $t_{SET}$ CC | -      | -    | 100                                         | ns   |                                                                                |

- 1) 在公式中，需要以 pF 为单位输入  $C_L$  的值才能获得 ns 为单位的结果。
- 2) 上升/下降时间定义为焊盘供电电压的 10% - 90%。
- 3) 实施滞后是为了避免亚稳态和由于内部地弹而引起的切换。不能保证它能抑制由于外部系统噪声而引起的切换。
- 4) 上拉电阻的值通过表 VADC 5V 中的参数  $R_{MDU}$  定义。
- 5) 下拉电阻的值通过表 VADC 5V 中的参数  $R_{MDD}$  定义。

表 3-11 RFast 5V GPIO

| Parameter                         | Symbol            | Values                 |                        |                        | Unit | Note / Test Condition                                                                               |
|-----------------------------------|-------------------|------------------------|------------------------|------------------------|------|-----------------------------------------------------------------------------------------------------|
|                                   |                   | Min.                   | Typ.                   | Max.                   |      |                                                                                                     |
| On-Resistance of pad output       | $R_{DS(on)}$ CC   | 125                    | 225                    | 320                    | Ohm  | medium driver; $I_{OH/OL} = 2\text{mA}$                                                             |
|                                   |                   | 31                     | 55                     | 80                     | Ohm  | strong driver; $I_{OH/OL} = 8\text{mA}$                                                             |
| Rise / Fall time <sup>1) 2)</sup> | $t_{RF}$ CC       | 1.6                    | -                      | 3.2                    | ns   | $C_L = 25\text{pF}$ ; driver = strong sharp edge; from $0.2 \cdot V_{FLEX}$ to $0.8 \cdot V_{FLEX}$ |
|                                   |                   | $4 + 0.55 \cdot C_L$   | $4 + 0.75 \cdot C_L$   | $12 + 1.0 \cdot C_L$   | ns   | driver = medium; $C_L \leq 200\text{pF}$                                                            |
|                                   |                   | $1.0 + 0.18 \cdot C_L$ | $2.5 + 0.27 \cdot C_L$ | $5.0 + 0.35 \cdot C_L$ | ns   | driver = strong edge = medium; $C_L \leq 200\text{pF}$                                              |
|                                   |                   | $0.5 + 0.08 \cdot C_L$ | $0.5 + 0.11 \cdot C_L$ | $1.0 + 0.17 \cdot C_L$ | ns   | driver = strong edge = sharp; $C_L \leq 200\text{pF}$                                               |
| Asymmetry of sending              | $t_{TX\_ASYM}$ CC | -0.5                   | -                      | 0.5                    | ns   | valid for all data rates excluding clock tolerance                                                  |

表 3-11 RFast 5V GPIO (续)

| Parameter                                                             | Symbol        | Values             |      |                   | Unit    | Note / Test Condition                                                             |
|-----------------------------------------------------------------------|---------------|--------------------|------|-------------------|---------|-----------------------------------------------------------------------------------|
|                                                                       |               | Min.               | Typ. | Max.              |         |                                                                                   |
| Input frequency                                                       | $f_{IN\ CC}$  | -                  | -    | 160               | MHz     |                                                                                   |
| Input hysteresis <sup>3)</sup>                                        | $HYS\ CC$     | 0.09 * $V_{FLEX}$  | -    | -                 | V       | non of the neighbor pads are used as output; AL                                   |
|                                                                       |               | 0.075 * $V_{FLEX}$ | -    | -                 | V       | non of the neighbor pads are used as output; TTL                                  |
|                                                                       |               | 75                 | -    | -                 | mV      | two of the neighbor pads are used as output with driver=strong and edge=sharp; AL |
| Pull-up current <sup>4)</sup>                                         | $I_{PUH\ CC}$ | 30                 | -    | -                 | $\mu A$ | $V_{IH}$ ; AL or TTL                                                              |
|                                                                       |               | -                  | -    | 130               | $\mu A$ | $V_{IL}$ ; AL or TTL                                                              |
| Pull-down current <sup>5)</sup>                                       | $I_{PDL\ CC}$ | -                  | -    | 130               | $\mu A$ | $V_{IH}$ ; AL or TTL                                                              |
|                                                                       |               | 30                 | -    | -                 | $\mu A$ | $V_{IL}$ ; AL                                                                     |
|                                                                       |               | 28                 | -    | -                 | $\mu A$ | $V_{IL}$ ; TTL                                                                    |
| Input leakage current                                                 | $I_{OZ\ CC}$  | -1700              | -    | 1700              | nA      | $T_J \leq 150^\circ C$ ; (0.1 * $V_{FLEX}$ ) < $V_{IN}$ < (0.9 * $V_{FLEX}$ )     |
|                                                                       |               | -2100              | -    | 2100              | nA      | $T_J \leq 150^\circ C$ ; else                                                     |
|                                                                       |               | -3000              | -    | 3000              | nA      | $T_J \leq 170^\circ C$ ; (0.1 * $V_{FLEX}$ ) < $V_{IN}$ < (0.9 * $V_{FLEX}$ )     |
|                                                                       |               | -4000              | -    | 4000              | nA      | $T_J \leq 170^\circ C$ ; else                                                     |
| Input high voltage level                                              | $V_{IH\ SR}$  | 0.7 * $V_{FLEX}$   | -    | -                 | V       | AL                                                                                |
|                                                                       |               | 2.0                | -    | -                 | V       | TTL                                                                               |
| Input low voltage level                                               | $V_{IL\ SR}$  | -                  | -    | 0.44 * $V_{FLEX}$ | V       | AL                                                                                |
|                                                                       |               | -                  | -    | 0.8               | V       | TTL                                                                               |
| Input low threshold variation                                         | $V_{ILD\ SR}$ | -50                | -    | 50                | mV      | max. variation of 1ms; $V_{FLEX}$ = constant; AL                                  |
| Pin capacitance                                                       | $C_{IO\ CC}$  | -                  | 2    | 3.5               | pF      | in addition 2.5pF from package to be added                                        |
| Pad set-up time to get an software update of the configuration active | $t_{SET\ CC}$ | -                  | -    | 100               | ns      |                                                                                   |

1) 在公式中，需要以 pF 为单位输入  $C_L$  的值才能获得 ns 为单位的結果。

2) 上升/下降时间定义为焊盘供电电压的 10% - 90%。

3) 实施滞后是为了避免亚稳态和由于内部地弹而引起的切换。不能保证它能抑制由于外部系统噪声而引起的切换。

4) 上拉电阻的值通过表 VADC 5V 中的参数  $R_{MDU}$  定义。

5) 下拉电阻的值通过表 VADC 5V 中的参数  $R_{MDD}$  定义。

表 3-12 RFast 3.3V 焊盘

| Parameter                         | Symbol           | Values            |                   |                  | Unit | Note / Test Condition                                                                |
|-----------------------------------|------------------|-------------------|-------------------|------------------|------|--------------------------------------------------------------------------------------|
|                                   |                  | Min.              | Typ.              | Max.             |      |                                                                                      |
| On-Resistance of pad output       | $R_{DS(on)CC}$   | 8                 | 20                | 30               | Ohm  | Driver = RGMII; $I_{OH/OL} = 8mA$                                                    |
|                                   |                  | 125               | 225               | 320              | Ohm  | medium driver; $I_{OH/OL} = 2mA$                                                     |
|                                   |                  | 31                | 55                | 80               | Ohm  | strong driver; $I_{OH/OL} = 8mA$                                                     |
| Input Duty Cycle                  | $f_D SR$         | 47.5              | 50                | 52.5             |      |                                                                                      |
| Rise / Fall time <sup>1) 2)</sup> | $t_{RFCC}$       | 1.6               | -                 | 4.5              | ns   | $C_L = 25pF$ ; driver = strong sharp edge; from $0.2 * V_{FLEX}$ to $0.8 * V_{FLEX}$ |
|                                   |                  | -                 | -                 | 5                | ns   | $C_L = 25pF$ ; driver = strong sharp edge; from 0.8V to 2.0V (RMII)                  |
|                                   |                  | -                 | -                 | 1                | ns   | Driver = RGMII; from 20%V to 80%V; $C_L = 15pF$                                      |
|                                   |                  | $2+0.57 * C_L$    | $5.5+0.75 * C_L$  | $10+1.25 * C_L$  | ns   | driver = medium; $C_L \leq 200pF$                                                    |
|                                   |                  | $1.5+0.18 * C_L$  | $1.5+0.28 * C_L$  | $8+0.4 * C_L$    | ns   | driver = strong edge = medium; $C_L \leq 200pF$                                      |
|                                   |                  | $0.75+0.08 * C_L$ | $0.75+0.11 * C_L$ | $2.5+0.21 * C_L$ | ns   | driver = strong edge = sharp; $C_L \leq 200pF$                                       |
| Asymmetry of sending              | $t_{TX\_ASYMCC}$ | -0.4              | -                 | 0.4              | ns   | valid for all data rates excluding clock tolerance                                   |
| Input frequency                   | $f_{INCC}$       | -                 | -                 | 160              | MHz  |                                                                                      |

表 3-12 RFast 3.3V 焊盘 (续)

| Parameter                       | Symbol         | Values             |      |      | Unit    | Note / Test Condition                                                             |
|---------------------------------|----------------|--------------------|------|------|---------|-----------------------------------------------------------------------------------|
|                                 |                | Min.               | Typ. | Max. |         |                                                                                   |
| Input hysteresis <sup>3)</sup>  | $HYS_{CC}$     | 0.055 * $V_{FLEX}$ | -    | -    | V       | non of the neighbor pads are used as output; AL                                   |
|                                 |                | 0.09 * $V_{FLEX}$  | -    | -    | V       | non of the neighbor pads are used as output; TTL                                  |
|                                 |                | 0.055 * $V_{FLEX}$ | -    | -    | V       | non of the neighbor pads are used as output;TTL (degraded, used for CIF)          |
|                                 |                | 125                | -    | -    | mV      | two of the neighbor pads are used as output with driver=strong and edge=sharp; AL |
| Pull-up current <sup>4)</sup>   | $I_{PUH_{CC}}$ | 17                 | -    | -    | $\mu A$ | $V_{IH}$ ; AL and TTL (degraded, used for CIF)                                    |
|                                 |                | 11                 | -    | -    | $\mu A$ | $V_{IH}$ ; TTL                                                                    |
|                                 |                | -                  | -    | 80   | $\mu A$ | $V_{IL}$ ; AL and TTL and TTL (degraded, used for CIF)                            |
| Pull-down current <sup>5)</sup> | $I_{PDL_{CC}}$ | -                  | -    | 105  | $\mu A$ | $V_{IH}$ ; AL and TTL (degraded, used for CIF)                                    |
|                                 |                | -                  | -    | 115  | $\mu A$ | $V_{IH}$ ; TTL                                                                    |
|                                 |                | 19                 | -    | -    | $\mu A$ | $V_{IL}$ ; AL and TTL                                                             |
|                                 |                | 15                 | -    | -    | $\mu A$ | $V_{IL}$ ; TTL (degraded, used for CIF)                                           |
| Input leakage current           | $I_{OZ_{CC}}$  | -1700              | -    | 1700 | nA      | $T_J \leq 150^\circ C$ ; (0.1 * $V_{FLEX}$ ) < $V_{IN}$ < (0.9 * $V_{FLEX}$ )     |
|                                 |                | -2100              | -    | 2100 | nA      | $T_J \leq 150^\circ C$ ; else                                                     |
|                                 |                | -3000              | -    | 3000 | nA      | $T_J \leq 170^\circ C$ ; (0.1 * $V_{FLEX}$ ) < $V_{IN}$ < (0.9 * $V_{FLEX}$ )     |
|                                 |                | -4000              | -    | 4000 | nA      | $T_J \leq 170^\circ C$ ; else                                                     |
| Input high voltage level        | $V_{IH_{SR}}$  | 0.7 * $V_{FLEX}$   | -    | -    | V       | AL                                                                                |
|                                 |                | 2.0                | -    | -    | V       | TTL                                                                               |
|                                 |                | 1.4                | -    | -    | V       | TTL (degraded, used for CIF)                                                      |

表 3-12 RFast 3.3V 焊盘 (续)

| Parameter                                                             | Symbol       | Values |      |                      | Unit | Note / Test Condition                               |
|-----------------------------------------------------------------------|--------------|--------|------|----------------------|------|-----------------------------------------------------|
|                                                                       |              | Min.   | Typ. | Max.                 |      |                                                     |
| Input low voltage level                                               | $V_{IL}$ SR  | -      | -    | 0.42 *<br>$V_{FLEX}$ | V    | AL                                                  |
|                                                                       |              | -      | -    | 0.8                  | V    | TTL                                                 |
|                                                                       |              | -      | -    | 0.5                  | V    | TTL (degraded, used for CIF)                        |
| Input low threshold variation                                         | $V_{ILD}$ SR | -33    | -    | 33                   | mV   | max. variation of 1ms;<br>$V_{FLEX}$ = constant; AL |
| Pin capacitance                                                       | $C_{IO}$ CC  | -      | 2    | 3.5                  | pF   | in addition 2.5pF from package to be added          |
| Pad set-up time to get an software update of the configuration active | $t_{SET}$ CC | -      | -    | 100                  | ns   |                                                     |

- 1) 在公式中，需要以 pF 为单位输入  $C_L$  的值才能获得 ns 为单位的结果。
- 2) 上升/下降时间定义为焊盘供电电压的 10% - 90%。
- 3) 实施滞后是为了避免亚稳态和由于内部地弹而引起的切换。不能保证它能抑制由于外部系统噪声而引起的切换。
- 4) 上拉电阻的值通过表 VADC 5V 中的参数  $R_{MDU}$  定义。
- 5) 下拉电阻的值通过表 VADC 5V 中的参数  $R_{MDD}$  定义。

表 3-13 S 类 5V

| Parameter                       | Symbol       | Values               |      |      | Unit | Note / Test Condition                                                             |
|---------------------------------|--------------|----------------------|------|------|------|-----------------------------------------------------------------------------------|
|                                 |              | Min.                 | Typ. | Max. |      |                                                                                   |
| Input frequency                 | $f_{IN}$ CC  | -                    | -    | 160  | MHz  |                                                                                   |
| Input hysteresis <sup>1)</sup>  | $HYS$ CC     | 0.09 *<br>$V_{DDM}$  | -    | -    | V    | non of the neighbor pads are used as output; AL                                   |
|                                 |              | 0.075 *<br>$V_{DDM}$ | -    | -    | V    | non of the neighbor pads are used as output; TTL                                  |
|                                 |              | 75                   | -    | -    | mV   | two of the neighbor pads are used as output with driver=strong and edge=sharp; AL |
| Pull-up current <sup>2)</sup>   | $I_{PUH}$ CC | 30                   | -    | -    | μA   | $V_{IH}$ ; AL or TTL                                                              |
|                                 |              | -                    | -    | 130  | μA   | $V_{IL}$ ; AL or TTL                                                              |
| Pull-down current <sup>3)</sup> | $I_{PDL}$ CC | -                    | -    | 130  | μA   | $V_{IH}$ ; AL or TTL                                                              |
|                                 |              | 30                   | -    | -    | μA   | $V_{IL}$ ; AL                                                                     |
|                                 |              | 28                   | -    | -    | μA   | $V_{IL}$ ; TTL                                                                    |

表 3-13 S 类 5V (续)

| Parameter                                                             | Symbol        | Values          |      |                  | Unit | Note / Test Condition                                                                                                                          |
|-----------------------------------------------------------------------|---------------|-----------------|------|------------------|------|------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                       |               | Min.            | Typ. | Max.             |      |                                                                                                                                                |
| Input leakage current                                                 | $I_{OZ\ CC}$  | -150            | -    | 150              | nA   | $T_J \leq 150^\circ\text{C}$ ; else                                                                                                            |
|                                                                       |               | -300            | -    | 300              | nA   | $T_J \leq 150^\circ\text{C}$ ; PDD option available, or AltRef option available and EDSADC channel connected, or two EDSADC channels connected |
|                                                                       |               | -300            | -    | 300              | nA   | $T_J \leq 170^\circ\text{C}$ ; else                                                                                                            |
|                                                                       |               | -600            | -    | 600              | nA   | $T_J \leq 170^\circ\text{C}$ ; PDD option available, or AltRef option available and EDSADC channel connected, or two EDSADC channels connected |
| Input high voltage level                                              | $V_{IH\ SR}$  | $0.7 * V_{DDM}$ | -    | -                | V    | AL                                                                                                                                             |
|                                                                       |               | 2.0             | -    | -                | V    | TTL                                                                                                                                            |
| Input low voltage level                                               | $V_{IL\ SR}$  | -               | -    | $0.44 * V_{DDM}$ | V    | AL                                                                                                                                             |
|                                                                       |               | -               | -    | 0.8              | V    | TTL                                                                                                                                            |
| Input low threshold variation                                         | $V_{ILD\ SR}$ | -50             | -    | 50               | mV   | max. variation of 1ms; $V_{DDM} = \text{constant}$ ; AL                                                                                        |
| Pin capacitance                                                       | $C_{IO\ CC}$  | -               | 2    | 3                | pF   | in addition 2.5pF from package to be added                                                                                                     |
| Pad set-up time to get an software update of the configuration active | $t_{SET\ CC}$ | -               | -    | 100              | ns   |                                                                                                                                                |

- 1) 实施滞后是为了避免亚稳态和由于内部地弹而引起的切换。不能保证它能抑制由于外部系统噪声而引起的切换。
- 2) 上拉电阻的值通过表 VADC 5V 中的参数  $R_{MDU}$  定义。
- 3) 下拉电阻的值通过表 VADC 5V 中的参数  $R_{MDD}$  定义。

表 3-14 S 类 3.3V

| Parameter       | Symbol       | Values |      |      | Unit | Note / Test Condition |
|-----------------|--------------|--------|------|------|------|-----------------------|
|                 |              | Min.   | Typ. | Max. |      |                       |
| Input frequency | $f_{IN\ CC}$ | -      | -    | 160  | MHz  |                       |

表 3-14 S 类 3.3V (续)

| Parameter                       | Symbol         | Values            |      |      | Unit    | Note / Test Condition                                                                                  |
|---------------------------------|----------------|-------------------|------|------|---------|--------------------------------------------------------------------------------------------------------|
|                                 |                | Min.              | Typ. | Max. |         |                                                                                                        |
| Input hysteresis <sup>1)</sup>  | $HYS_{CC}$     | 0.055 * $V_{DDM}$ | -    | -    | V       | non of the neighbor pads are used as output; AL                                                        |
|                                 |                | 0.09 * $V_{DDM}$  | -    | -    | V       | non of the neighbor pads are used as output; TTL                                                       |
|                                 |                | 0.065 * $V_{DDM}$ | -    | -    | V       | non of the neighbor pads are used as output; TTL (degraded used for CIF)                               |
|                                 |                | 125               | -    | -    | mV      | two of the neighbor pads are used as output with driver=strong and edge=sharp; AL                      |
| Pull-up current <sup>2)</sup>   | $I_{PUH_{CC}}$ | 17                | -    | -    | $\mu A$ | $V_{IH}$ ; AL and TTL (degraded, used for CIF)                                                         |
|                                 |                | 11                | -    | -    | $\mu A$ | $V_{IH}$ ; TTL                                                                                         |
|                                 |                | -                 | -    | 80   | $\mu A$ | $V_{IL}$                                                                                               |
| Pull-down current <sup>3)</sup> | $I_{PDL_{CC}}$ | -                 | -    | 105  | $\mu A$ | $V_{IH}$ ; AL and TTL (degraded, used for CIF)                                                         |
|                                 |                | -                 | -    | 115  | $\mu A$ | $V_{IH}$ ; TTL                                                                                         |
|                                 |                | 19                | -    | -    | $\mu A$ | $V_{IL}$ ; AL and TTL                                                                                  |
|                                 |                | 15                | -    | -    | $\mu A$ | $V_{IL}$ ; TTL (degraded, used for CIF)                                                                |
| Input leakage current           | $I_{OZ_{CC}}$  | -150              | -    | 150  | nA      | $T_J \leq 150^\circ C$ ; else                                                                          |
|                                 |                | -300              | -    | 300  | nA      | $T_J \leq 150^\circ C$ ; PDD option available, or AltRef option available and EDSADC channel connected |
|                                 |                | -300              | -    | 300  | nA      | $T_J \leq 170^\circ C$ ; else                                                                          |
|                                 |                | -600              | -    | 600  | nA      | $T_J \leq 170^\circ C$ ; PDD option available                                                          |
| Input high voltage level        | $V_{IH_{SR}}$  | 0.7 * $V_{DDM}$   | -    | -    | V       | AL                                                                                                     |
|                                 |                | 2.0               | -    | -    | V       | TTL                                                                                                    |
|                                 |                | 1.4               | -    | -    | V       | TTL (degraded, used for CIF)                                                                           |

表 3-14 S 类 3.3V (续)

| Parameter                                                             | Symbol       | Values |      |                     | Unit | Note / Test Condition                              |
|-----------------------------------------------------------------------|--------------|--------|------|---------------------|------|----------------------------------------------------|
|                                                                       |              | Min.   | Typ. | Max.                |      |                                                    |
| Input low voltage level                                               | $V_{IL}$ SR  | -      | -    | 0.42 *<br>$V_{DDM}$ | V    | AL                                                 |
|                                                                       |              | -      | -    | 0.8                 | V    | TTL                                                |
|                                                                       |              | -      | -    | 0.5                 | V    | TTL (degraded, used for CIF)                       |
| Input low threshold variation                                         | $V_{ILD}$ SR | -33    | -    | 33                  | mV   | max. variation of 1ms;<br>$V_{DDM}$ = constant; AL |
| Pin capacitance                                                       | $C_{IO}$ CC  | -      | 2    | 3                   | pF   | in addition 2.5pF from package to be added         |
| Pad set-up time to get an software update of the configuration active | $t_{SET}$ CC | -      | -    | 100                 | ns   |                                                    |

1) 实施滞后是为了避免亚稳态和由于内部地弹而引起的切换。不能保证它能抑制由于外部系统噪声而引起的切换。

2) 上拉电阻的值通过表 VADC 5V 中的参数  $R_{MDU}$  定义。

3) 下拉电阻的值通过表 VADC 5V 中的参数  $R_{MDD}$  定义。

表 3-15 D 类

| Parameter             | Symbol      | Values             |      |                   | Unit | Note / Test Condition                                                                                                                          |
|-----------------------|-------------|--------------------|------|-------------------|------|------------------------------------------------------------------------------------------------------------------------------------------------|
|                       |             | Min.               | Typ. | Max.              |      |                                                                                                                                                |
| Input leakage current | $I_{OZ}$ CC | -150               | -    | 150               | nA   | $T_J \leq 150^\circ\text{C}$ ; else                                                                                                            |
|                       |             | -300 <sup>1)</sup> | -    | 300 <sup>1)</sup> | nA   | $T_J \leq 150^\circ\text{C}$ ; PDD option available, or AltRef option available and EDSADC channel connected, or two EDSADC channels connected |
|                       |             | -300               | -    | 300               | nA   | $T_J \leq 170^\circ\text{C}$ ; else                                                                                                            |
|                       |             | -600 <sup>2)</sup> | -    | 600 <sup>2)</sup> | nA   | $T_J \leq 170^\circ\text{C}$ ; PDD option available, or AltRef option available and EDSADC channel connected, or two EDSADC channels connected |
|                       |             | -                  | -    | -                 | -    | -                                                                                                                                              |
| Pin capacitance       | $C_{IO}$ CC | -                  | 2    | 3                 | pF   | in addition 2.5pF from package to be added                                                                                                     |

1) 对于 AN11, 需要添加 100 nA。

2) 对于 AN11, 需要添加 200 nA。

表 3-16 ADC基准焊盘

| Parameter                            | Symbol        | Values             |      |                   | Unit | Note / Test Condition                                                                              |
|--------------------------------------|---------------|--------------------|------|-------------------|------|----------------------------------------------------------------------------------------------------|
|                                      |               | Min.               | Typ. | Max.              |      |                                                                                                    |
| Input leakage current for $V_{AREF}$ | $I_{OZ2\ CC}$ | -2 <sup>1)</sup>   | -    | 2 <sup>1)</sup>   | μA   | $T_J \leq 150^\circ\text{C}$ ; $V_{AREF} < V_{DDM}$ ; for EVADC; valid for BGA292                  |
|                                      |               | -7 <sup>1)</sup>   | -    | 7 <sup>1)</sup>   | μA   | $T_J \leq 150^\circ\text{C}$ ; $V_{AREF} \leq V_{DDM} + 50\text{mV}$ ; for EVADC; valid for BGA292 |
|                                      |               | -4 <sup>1)</sup>   | -    | 4 <sup>1)</sup>   | μA   | $T_J \leq 170^\circ\text{C}$ ; $V_{AREF} < V_{DDM}$ ; for EVADC; valid for BGA292                  |
|                                      |               | -14 <sup>1)</sup>  | -    | 14 <sup>1)</sup>  | μA   | $T_J \leq 170^\circ\text{C}$ ; $V_{AREF} \leq V_{DDM} + 50\text{mV}$ ; for EVADC; valid for BGA292 |
|                                      |               | -1 <sup>2)</sup>   | -    | 1 <sup>2)</sup>   | μA   | $T_J \leq 150^\circ\text{C}$ ; $V_{AREF} < V_{DDM}$ ; for EVADC; valid for BGA516                  |
|                                      |               | -2 <sup>2)</sup>   | -    | 2 <sup>2)</sup>   | μA   | $T_J \leq 170^\circ\text{C}$ ; $V_{AREF} < V_{DDM}$ ; for EVADC; valid for BGA516                  |
|                                      |               | -3.5 <sup>2)</sup> | -    | 3.5 <sup>2)</sup> | μA   | $T_J \leq 150^\circ\text{C}$ ; $V_{AREF} \leq V_{DDM} + 50\text{mV}$ ; for EVADC; valid for BGA516 |
|                                      |               | -7 <sup>2)</sup>   | -    | 7 <sup>2)</sup>   | μA   | $T_J \leq 170^\circ\text{C}$ ; $V_{AREF} \leq V_{DDM} + 50\text{mV}$ ; for EVADC; valid for BGA516 |
|                                      |               | -2 <sup>3)</sup>   | -    | 2 <sup>3)</sup>   | μA   | $T_J \leq 150^\circ\text{C}$ ; $V_{AREF} < V_{DDM}$ ; for EDSADC                                   |
|                                      |               | -4 <sup>3)</sup>   | -    | 4 <sup>3)</sup>   | μA   | $T_J \leq 170^\circ\text{C}$ ; $V_{AREF} < V_{DDM}$ ; for EDSADC                                   |
|                                      |               | -6 <sup>3)</sup>   | -    | 6 <sup>3)</sup>   | μA   | $T_J \leq 150^\circ\text{C}$ ; $V_{AREF} \leq V_{DDM} + 50\text{mV}$ ; for EDSADC                  |
|                                      |               | -12 <sup>3)</sup>  | -    | 12 <sup>3)</sup>  | μA   | $T_J \leq 170^\circ\text{C}$ ; $V_{AREF} \leq V_{DDM} + 50\text{mV}$ ; for EDSADC                  |

1) 限制对 VAREF2 引脚有效。

2) 限制分别对 VAREF2 和 VAREF3 引脚有效。

3) 限制对 VAREF1 引脚有效。

表 3-17 慢速焊盘的驱动器模式选择

| PDx.2 | PDx.1 | PDx.0 | Port Functionality | Driver Setting         |
|-------|-------|-------|--------------------|------------------------|
| X     | X     | 0     | Speed grade 1      | medium sharp edge (sm) |
| X     | X     | 1     | Speed grade 2      | medium medium edge (m) |

表 3-18 快速焊盘驱动器模式选择

| PDx.2 | PDx.1 | PDx.0 | Port Functionality | Driver Setting                        |
|-------|-------|-------|--------------------|---------------------------------------|
| X     | 0     | 0     | Speed grade 1      | Strong sharp edge (ss)                |
| X     | 0     | 1     | Speed grade 2      | Strong medium edge (sm)               |
| X     | 1     | 0     | Speed grade 3      | medium (m)                            |
| X     | 1     | 1     | Speed grade 4      | Reserved, do not use this combination |

表 3-19 RFast 焊盘驱动器模式选择

| PDx.2 | PDx.1 | PDx.0 | Port Functionality | Driver Setting          |
|-------|-------|-------|--------------------|-------------------------|
| X     | 0     | 0     | Speed grade 1      | Strong sharp edge (ss)  |
| X     | 0     | 1     | Speed grade 2      | Strong medium edge (sm) |
| X     | 1     | 0     | Speed grade 3      | medium (m)              |
| X     | 1     | 1     | Speed grade 4      | RGMII function active   |

### 3.6 高性能 LVDS 焊盘

该 LVDS 焊盘类型用于新型 TC38x 的高速芯片到芯片通信接口。它由一个 LVDS 焊盘和一个快速焊盘组成。

对于所有 LVDS 参数,  $C_L = 2.5 \text{ pF}$ 。

**表 3-20 LVDS - IEEE 标准 LVDS 通用链路 (GPL)**

| Parameter                                 | Symbol                         | Values |      |             | Unit | Note / Test Condition                                                                         |
|-------------------------------------------|--------------------------------|--------|------|-------------|------|-----------------------------------------------------------------------------------------------|
|                                           |                                | Min.   | Typ. | Max.        |      |                                                                                               |
| Output impedance                          | $R_{0 \text{ CC}}$             | 40     | -    | 140         | Ohm  | $V_{\text{cm}} = 1.0 \text{ V}$ and $1.4 \text{ V}$                                           |
| Rise time (20% - 80%)                     | $t_{\text{rise}20 \text{ CC}}$ | -      | -    | $0.75^{1)}$ | ns   | $Z_L = 100 \text{ Ohm} \pm 20\%$<br>@2pF external load                                        |
| Fall time (20% - 80%)                     | $t_{\text{fall}20 \text{ CC}}$ | -      | -    | $0.75^{2)}$ | ns   | $Z_L = 100 \text{ Ohm} \pm 20\%$<br>@2pF external load                                        |
| Output differential voltage <sup>3)</sup> | $V_{\text{OD CC}}$             | 240    | -    | 330         | mV   | $R_T = 100 \text{ Ohm} \pm 1\%$ ;<br>LPCR <sub>x</sub> .VDIFFADJ=00                           |
|                                           |                                | 280    | -    | 370         | mV   | $R_T = 100 \text{ Ohm} \pm 1\%$ ;<br>LPCR <sub>x</sub> .VDIFFADJ=01                           |
|                                           |                                | 320    | -    | 410         | mV   | $R_T = 100 \text{ Ohm} \pm 1\%$ ;<br>LPCR <sub>x</sub> .VDIFFADJ=10                           |
|                                           |                                | 380    | -    | 500         | mV   | $R_T = 100 \text{ Ohm} \pm 1\%$ ;<br>LPCR <sub>x</sub> .VDIFFADJ=11;<br>Multi slave operation |
| Output voltage high                       | $V_{\text{OH CC}}$             | -      | -    | 1475        | mV   | $R_T = 100 \text{ Ohm} \pm 1\%$<br>VDIFFADJ=00 and 01                                         |
|                                           |                                | -      | -    | 1500        | mV   | $R_T = 100 \text{ Ohm} \pm 1\%$<br>VDIFFADJ=10 and 11                                         |
| Output voltage low                        | $V_{\text{OL CC}}$             | 925    | -    | -           | mV   | $R_T = 100 \text{ Ohm} \pm 1\%$<br>VDIFFADJ=00 and 01                                         |
|                                           |                                | 900    | -    | -           | mV   | $R_T = 100 \text{ Ohm} \pm 1\%$<br>VDIFFADJ=10 and 11                                         |
| Output offset (Common mode) voltage       | $V_{\text{OS CC}}$             | 1125   | -    | 1275        | mV   | $R_T = 100 \text{ Ohm} \pm 1\%$                                                               |
| Input voltage range                       | $V_{\text{I SR}}$              | 0      | -    | 1600        | mV   | Driver ground potential difference < 925 mV; $R_T = 100 \text{ Ohm} \pm 10\%$                 |
|                                           |                                | 0      | -    | 2400        | mV   | Driver ground potential difference < 925 mV; $R_T = 100 \text{ Ohm} \pm 20\%$                 |
| Input differential threshold              | $V_{\text{idth SR}}$           | -100   | -    | 100         | mV   | Driver ground potential difference < 900 mV;<br>VDIFFADJ=10 and 11                            |
|                                           |                                | -100   | -    | 100         | mV   | Driver ground potential difference < 925 mV;<br>VDIFFADJ=00 and 01                            |

表 3-20 LVDS - IEEE 标准 LVDS 通用链路 (GPL) (续)

| Parameter                                            | Symbol             | Values |      |      | Unit    | Note / Test Condition                             |
|------------------------------------------------------|--------------------|--------|------|------|---------|---------------------------------------------------|
|                                                      |                    | Min.   | Typ. | Max. |         |                                                   |
| Receiver differential input impedance                | $R_{in}$ CC        | 80     | -    | 120  | Ohm     | $V_I \leq 2400$ mV                                |
| Output differential voltage Sleep Mode <sup>4)</sup> | $V_{ODSM}$ CC      | -5     | -    | 20   | mV      | $R_T = 100$ Ohm $\pm 20\%$ ;<br>LPCRx.VDIFFADJ=xx |
| Delta output impedance                               | $dR_O$ SR          | -      | -    | 10   | %       | $V_{cm} = 1.0$ V and $1.4$ V                      |
| Change in VOS between 0 and 1                        | $dVOS$ CC          | -      | -    | 25   | mV      | $R_T = 100$ Ohm $\pm 1\%$                         |
| Change in Vod between 0 and 1                        | $dVod$ CC          | -      | -    | 25   | mV      | $R_T = 100$ Ohm $\pm 1\%$                         |
| Pad set-up time                                      | $t_{SET\_LVDS}$ CC | -      | 10   | 13   | $\mu$ s |                                                   |
| Duty cycle                                           | $t_{duty}$ CC      | 45     | -    | 55   | %       |                                                   |

1)  $t_{rise20} = 0.75\text{ns} + (C_L - 2)[\text{pF}] * 20\text{ps}$ ,  $C_L$  定义外部负载。

2)  $t_{fall20} = 0.75\text{ns} + (C_L - 2)[\text{pF}] * 20\text{ps}$ ,  $C_L$  定义外部负载。

3) 潜在的对IEEE Std 1596.3 的违反是为了新的多从站支持的特点, 符合 IEEE 标准 1596.3LPCRx.VDIFFADJ 必须配置为 01。

4) Tx的共模电压得以维持。

注释: 驱动器接地电位的差异定义为驱动器-接收器电位差, 在比较驱动器输出电压电平和接收器输入传输信号的电压电平时, 可能会导致电压偏移。

注释: 表“LVDS - IEEE 标准 LVDS 通用链路 (GPL)”中的 $R_T$ 作为IEEE Std 1596.3-1996 图3-5 中的接收器终端电阻, 并在图3-1 中由 $R_{in}$ 或 $R_T=100$  Ohm表示, 但不能同时出现。如果在注释/测试条件栏中提到 $R_T$ , 则始终以图3-1 中的内部电阻 $R_{in}$ 作为选定项。

启动后默认=CMOS功能

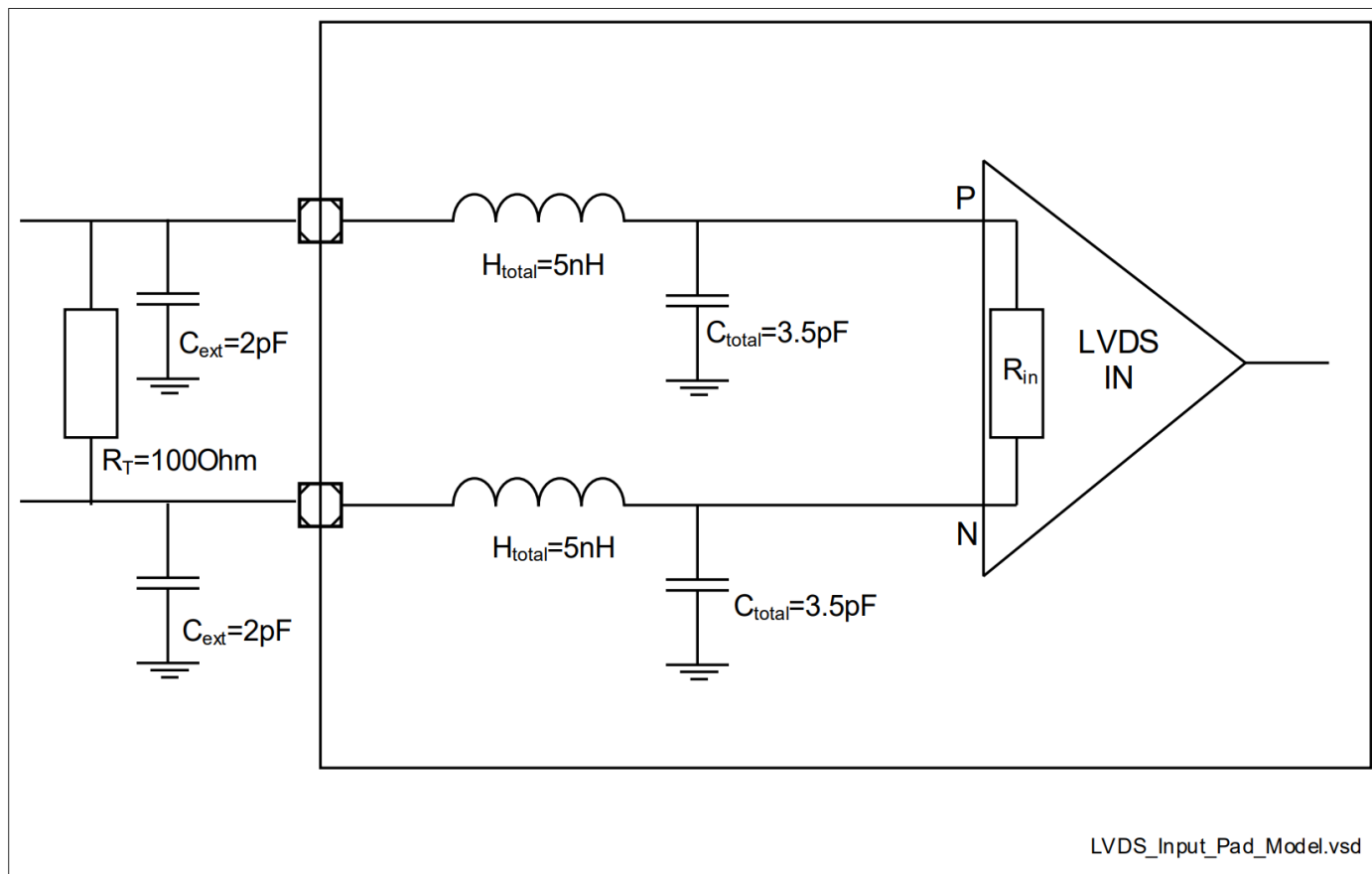


图 3-1 LVDS焊盘输入模型

### 3.7 VADC 参数

转换器结果的准确性取决于基准电压范围。下表中的参数适用于 ( $V_{AREF} - V_{AGND}$ )  $\geq 4.5$  V 的基准电压范围。如果基准电压范围低于 4.5 V k 倍 (例如 3.3 V)，则精度参数将增加 1.1/k 倍 (例如  $1.1 \times 4.5 / 3.3 = 1.5$ )。

电压供应  $V_{DDM}$  上的噪声会影响转换。精度参数定义为供电电压纹波在 10 MHz 以内低于 20 mVpp (在 10 MHz 以上低于 5 mVpp)。

数字功能与模拟输入重叠会影响准确性。

总计不可调整误差/总不可调整误差 (TUE) 的定义是无噪音的。总体偏差取决于 TUE 和  $EN_{RMS}$  (取决于噪声分布)。

示例：对于 4 sigma 的噪声分布且  $EN_{RMS} = 1.0$ ，附加峰峰值噪声误差为  $\pm(4 \times 1.0) = 8 \text{ LSB}_{12\text{o}}$ 。

快速比较操作以 10 位值执行。

降噪功能通过增加额外的转换步骤来改善结果。因此，转换时间也相应增加 (对于 1、3 或 7 个步骤，每个步骤的转换时间分别为  $4 \times t_{ADCI} + 3 \times t_{ADC}$ )。

**表 3-21 VADC 5V**

| Parameter                                 | Symbol                 | Values     |           |                  | Unit | Note / Test Condition                                                                          |
|-------------------------------------------|------------------------|------------|-----------|------------------|------|------------------------------------------------------------------------------------------------|
|                                           |                        | Min.       | Typ.      | Max.             |      |                                                                                                |
| EVADC IVR output voltage                  | $V_{DDK \text{ CC}}$   | 1.15       | -         | 1.35             | V    | Measured at low temperature.                                                                   |
| Deviation of IVR output voltage $V_{DDK}$ | $dV_{DDK \text{ CC}}$  | -2         | -         | 2                | %    | Based on device- specific value                                                                |
| Analog reference voltage <sup>1)</sup>    | $V_{AREF \text{ SR}}$  | 4.5        | 5.0       | $V_{DDM} + 0.05$ | V    | $4.5 \text{ V} \leq V_{DDM} \leq 5.5 \text{ V}$                                                |
|                                           |                        | 2.97       | 3.3       | $V_{DDM} + 0.05$ | V    | $2.97 \text{ V} \leq V_{DDM} < 4.5 \text{ V}$                                                  |
| Analog reference ground                   | $V_{AGND \text{ SR}}$  | $V_{SSM}$  | $V_{SSM}$ | $V_{SSM}$        | V    | $V_{SSM}$ and $V_{AGND}$ are connected together                                                |
| Analog input voltage range                | $V_{AIN \text{ SR}}$   | $V_{AGND}$ | -         | $V_{AREF}$       | V    | $V_{AIN}$ is limited by the respective pad supply voltage; see pin configuration (buffer type) |
| Converter reference clock                 | $f_{ADCI \text{ SR}}$  | 16         | 40        | 53.33            | MHz  | $4.5 \text{ V} \leq V_{DDM} \leq 5.5 \text{ V}$                                                |
|                                           |                        | 16         | 20        | 26.67            | MHz  | $2.97 \text{ V} \leq V_{DDM} < 4.5 \text{ V}$                                                  |
| Total Unadjusted Error <sup>2) 3)</sup>   | $TUE \text{ CC}$       | -4         | -         | 4                | LSB  | 12-bit resolution for primary/secondary groups, 10-bit resolution for fast compare channels    |
| INL Error <sup>2)</sup>                   | $EA_{INL \text{ CC}}$  | -3         | -         | 3                | LSB  |                                                                                                |
| DNL error <sup>2) 4)</sup>                | $EA_{DNL \text{ CC}}$  | -1         | -         | 3                | LSB  |                                                                                                |
| Gain Error <sup>2)</sup>                  | $EA_{GAIN \text{ CC}}$ | -3.5       | -         | 3.5              | LSB  |                                                                                                |
| Offset Error <sup>2) 3)</sup>             | $EA_{OFF \text{ CC}}$  | -4         | -         | 4                | LSB  |                                                                                                |

表 3-21 VADC 5V (续)

| Parameter                                                                                | Symbol        | Values |      |      | Unit | Note / Test Condition                                                                                                                  |
|------------------------------------------------------------------------------------------|---------------|--------|------|------|------|----------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                          |               | Min.   | Typ. | Max. |      |                                                                                                                                        |
| RMS Noise <sup>2)5) 6)</sup>                                                             | $EN_{RMS}$ CC | -      | 0.5  | 0.8  | LSB  | Noise reduction level 3                                                                                                                |
|                                                                                          |               | -      | 0.5  | 1.0  | LSB  | Standard conversion                                                                                                                    |
| Reference input charge consumption per conversion (from $V_{AREF}$ ) <sup>7) 8) 9)</sup> | $Q_{CONV}$ CC | -      | -    | 20   | pC   | $V_{AIN} = 0$ V (worst case), precharging disabled                                                                                     |
|                                                                                          |               | -      | -    | 10   | pC   | $V_{AIN} = 0$ V (worst case), precharging enabled, $V_{DDM} - 5\% < V_{AREF} < V_{DDM} + 50$ mV                                        |
| Switched capacitance of an analog input                                                  | $C_{AINS}$ CC | -      | 2.5  | 3.4  | pF   | Input buffer disabled                                                                                                                  |
| Analog input charge consumption <sup>10)</sup>                                           | $Q_{AINS}$ CC | -      | -    | 3.5  | pC   | Primary groups and fast compare channels; $V_{AIN} = V_{AREF}$ ; $V_{DDM} = 5.0$ V; input buffer enabled; $T_J \leq 150^\circ\text{C}$ |
|                                                                                          |               | -      | -    | 3.8  | pC   | Primary groups and fast compare channels; $V_{AIN} = V_{AREF}$ ; $V_{DDM} = 5.0$ V; input buffer enabled; $T_J > 150^\circ\text{C}$    |
|                                                                                          |               | -      | -    | 4.4  | pC   | Secondary groups; $V_{AIN} = V_{AREF}$ ; $V_{DDM} = 5.0$ V; input buffer enabled; $T_J \leq 150^\circ\text{C}$                         |
|                                                                                          |               | -      | -    | 4.8  | pC   | Secondary groups; $V_{AIN} = V_{AREF}$ ; $V_{DDM} = 5.0$ V; input buffer enabled; $T_J > 150^\circ\text{C}$                            |

## 电气规格 VADC 参数

表 3-21 VADC 5V (续)

| Parameter                                             | Symbol               | Values |      |      | Unit          | Note / Test Condition                                                                                |
|-------------------------------------------------------|----------------------|--------|------|------|---------------|------------------------------------------------------------------------------------------------------|
|                                                       |                      | Min.   | Typ. | Max. |               |                                                                                                      |
| Sampling time                                         | $t_{\text{S SR}}$    | 100    | -    | -    | ns            | Primary group or fast compare channel, 4.5 V $\leq V_{\text{DDM}} \leq 5.5$ V; input buffer disabled |
|                                                       |                      | 300    | -    | -    | ns            | Primary group or fast compare channel, 4.5 V $\leq V_{\text{DDM}} \leq 5.5$ V; input buffer enabled  |
|                                                       |                      | 500    | -    | -    | ns            | Secondary group, 4.5 V $\leq V_{\text{DDM}} \leq 5.5$ V; input buffer disabled                       |
|                                                       |                      | 700    | -    | -    | ns            | Secondary group, 4.5 V $\leq V_{\text{DDM}} \leq 5.5$ V; input buffer enabled                        |
|                                                       |                      | 200    | -    | -    | ns            | Primary Group or fast compare channel, 2.97 V $\leq V_{\text{DDM}} < 4.5$ V; input buffer disabled   |
|                                                       |                      | 400    | -    | -    | ns            | Primary group or fast compare channel, 2.97 V $\leq V_{\text{DDM}} < 4.5$ V; input buffer enabled    |
|                                                       |                      | 1000   | -    | -    | ns            | Secondary group, 2.97 V $\leq V_{\text{DDM}} < 4.5$ V; input buffer disabled                         |
|                                                       |                      | 1200   | -    | -    | ns            | Secondary group, 2.97 V $\leq V_{\text{DDM}} < 4.5$ V; input buffer enabled                          |
| Sampling time for calibration                         | $t_{\text{SCAL SR}}$ | 50     | -    | -    | ns            | 4.5 V $\leq V_{\text{DDM}} \leq 5.5$ V                                                               |
|                                                       |                      | 100    | -    | -    | ns            | 2.97 V $\leq V_{\text{DDM}} < 4.5$ V                                                                 |
| Input buffer switch-on time                           | $t_{\text{BUF CC}}$  | -      | 0.4  | 1    | $\mu\text{s}$ |                                                                                                      |
| Wakeup time                                           | $t_{\text{WU CC}}$   | -      | 0.1  | 0.2  | $\mu\text{s}$ | Fast standby mode                                                                                    |
|                                                       |                      | -      | 1.6  | 3    | $\mu\text{s}$ | Slow standby mode                                                                                    |
| Broken wire detection delay against $V_{\text{AREF}}$ | $t_{\text{BWR CC}}$  | -      | 100  | -    | cycles        | Result above 80% of full scale range, analog input buffer disabled                                   |
| Broken wire detection delay against $V_{\text{AGND}}$ | $t_{\text{BWG CC}}$  | -      | 100  | -    | cycles        | Result below 10% of full scale range, analog input buffer disabled                                   |
| Converter diagnostics unit resistance <sup>11)</sup>  | $R_{\text{CSD CC}}$  | 45     | -    | 75   | kOhm          |                                                                                                      |
| Converter diagnostics voltage accuracy                | $dV_{\text{CSD CC}}$ | -10    | -    | 10   | %             | Percentage refers to $V_{\text{DDM}}$                                                                |

表 3-21 VADC 5V (续)

| Parameter                                                  | Symbol        | Values |      |      | Unit | Note / Test Condition                                               |
|------------------------------------------------------------|---------------|--------|------|------|------|---------------------------------------------------------------------|
|                                                            |               | Min.   | Typ. | Max. |      |                                                                     |
| Resistance of the multiplexer diagnostics pull-up device   | $R_{MDU\ CC}$ | 30     | -    | 42   | kOhm | $0\text{ V} \leq V_{IN} \leq 0.9 \cdot V_{DDM}$ , Automotive Levels |
|                                                            |               | 56     | -    | 78   | kOhm | $0\text{ V} \leq V_{IN} \leq 0.9 \cdot V_{DDM}$ , TTL Levels        |
| Resistance of the multiplexer diagnostics pull-down device | $R_{MDD\ CC}$ | 43     | -    | 58   | kOhm | $0.1 \cdot V_{DDM} \leq V_{IN} \leq V_{DDM}$ , Automotive level     |
|                                                            |               | 18     | -    | 25   | kOhm | $0.1 \cdot V_{DDM} \leq V_{IN} \leq V_{DDM}$ , TTL level            |
| Resistance of the pull-down test device                    | $R_{PDD\ CC}$ | -      | -    | 0.3  | kOhm | Measured at pad input voltage $V_{IN} = V_{DDM} / 2$ .              |

- 1) 这些限制适用于标准基准输入以及备用基准输入。
- 2) 该参数取决于基准电压范围和电源纹波，请参阅简介。最坏情况下的组合误差是 TUE 和  $EN_{RMS}$  的算术组合。测试是在完成启动校准后禁用后校准的情况下进行的。
- 3) 映射到 SLOW 类型焊盘的模拟输入会影响精度。此参数的值以 3 LSB<sub>12</sub> 为单位递增。
- 4) 单调性特性，校准时不会漏码。
- 5) 参数  $EN_{RMS}$  指的是 1 sigma 分布。
- 6) 映射到 SLOW 类型焊盘的模拟输入 RMS 噪声 ( $EN_{RMS}$ ) 最高可达 2 LSB<sub>12</sub> (启用 DC/DC 软开关)。
- 7) 对于降低的参考电压  $V_{AREF} < 3.375\text{V}$ ，消耗的电荷 QCONV 会减少  $k2 = V_{AREF} [\text{V}] / 3.375$ 。对于降低的参考电压  $4.5\text{V} < V_{AREF} \leq 3.375\text{V}$ ，QCONV 不会降低。
- 8) 当 BWD (断线检测) 处于活动状态时，最大电荷增加 15 pC。
- 9) 快速比较通道仅消耗主/次组电荷的 1/3。
- 10) 对于具有叠加数字 GPIO 或 PDD 功能的模拟输入，该值增加 1 pC。
- 11) 使用至少 1.1  $\mu\text{s}$  的采样时间以确保测试电压正确稳定。

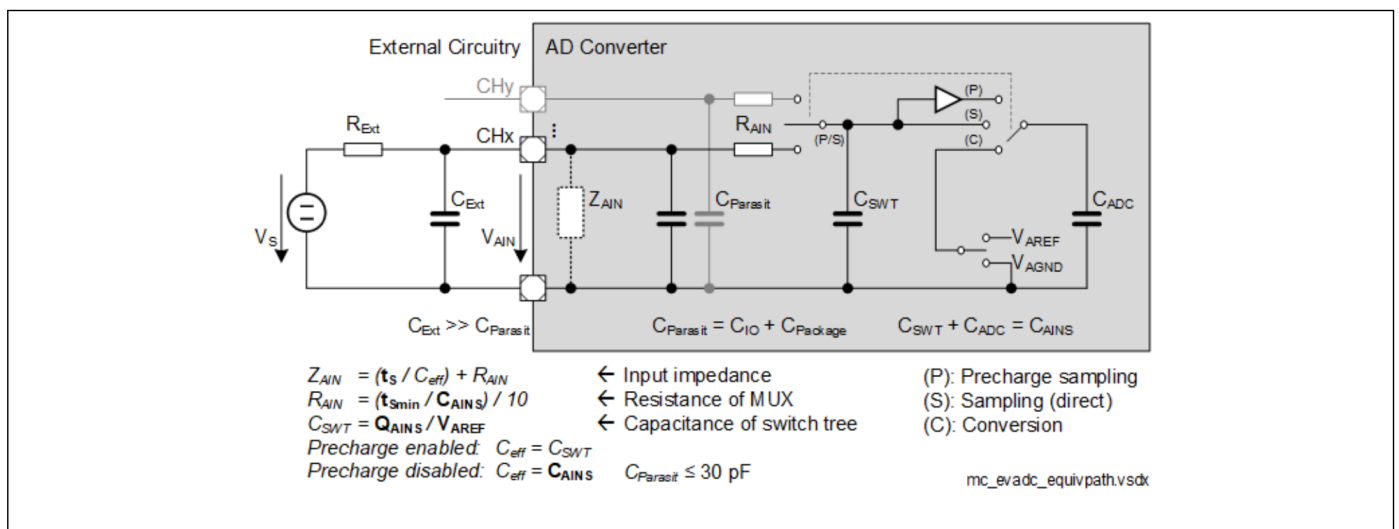


图 3-2 模拟输入等效电路

### 3.8 DSADC 参数

DSADC 参数仅对电压范围  $4.5\text{ V} \leq V_{\text{DDM}} \leq 5.5\text{ V}$  有效。

这些参数描述产品特性，不包括外部电路。如无明确定义，这些值适用于结温  $T_J \leq 150^\circ\text{C}$  的情况。

校准针对增益因子 1 和 2 指定，校准值参考这些设置。

信噪比 (SNR) 针对差分输入进行指定。对于单端工作模式，信噪比会降低 6 dB。对于准差分模式（即使用  $V_{\text{CM}}$ ），当增益 = 1 时，信噪比会降低 6dB，当增益 = 2 时，信噪比会降低 3dB。

表 3-22 DSADC 5V

| Parameter                                  | Symbol                | Values             |                |                         | Unit          | Note / Test Condition                                                                                                                |
|--------------------------------------------|-----------------------|--------------------|----------------|-------------------------|---------------|--------------------------------------------------------------------------------------------------------------------------------------|
|                                            |                       | Min.               | Typ.           | Max.                    |               |                                                                                                                                      |
| Common mode voltage bias resistance        | $R_{\text{BIAS CC}}$  | 105                | 130            | 155                     | kOhm          | On-chip variation $\leq \pm 2.5\%$ .                                                                                                 |
| Positive reference voltage                 | $V_{\text{AREF SR}}$  | 4.5                | -              | $V_{\text{DDM}} + 0.05$ | V             |                                                                                                                                      |
| Reference ground voltage                   | $V_{\text{AGND SR}}$  | $V_{\text{SSM}}$   | -              | $V_{\text{SSM}}$        | V             | $V_{\text{SSM}}$ and $V_{\text{AGND}}$ are connected together                                                                        |
| Reference load current                     | $I_{\text{REF CC}}$   | -                  | 10             | 12                      | $\mu\text{A}$ | Per modulator                                                                                                                        |
|                                            |                       | -                  | -              | 14                      | $\mu\text{A}$ | Per modulator, $T_J > 150^\circ\text{C}$                                                                                             |
| Common mode voltage accuracy <sup>1)</sup> | $dV_{\text{CM CC}}$   | -100               | -              | 100                     | mV            | Deviation from selected voltage                                                                                                      |
| Analog input voltage range                 | $V_{\text{DSIN SR}}$  | $V_{\text{SSM}}$   | -              | $2 * V_{\text{DDM}}$    | V             | Differential; $V_{\text{DSxP}} - V_{\text{DSxN}}$                                                                                    |
|                                            |                       | $V_{\text{SSM}}$   | -              | $V_{\text{DDM}}$        | V             | Single ended                                                                                                                         |
| Input current <sup>2)</sup>                | $I_{\text{RMS CC}}$   | 7                  | 10             | 13                      | $\mu\text{A}$ | Exact value ( $\pm 1\%$ ) available in UCB; valid for gain = 1 and $f_{\text{MOD}} = 26.7\text{ MHz}$                                |
| On-chip modulator clock frequency          | $f_{\text{MOD SR}}$   | 16                 | -              | 40                      | MHz           |                                                                                                                                      |
| Gain error <sup>3) 4)</sup>                | $ED_{\text{GAIN CC}}$ | -0.2 <sup>5)</sup> | $\pm 0.1^{5)}$ | 0.2 <sup>5)</sup>       | %             | $T_J \leq 150^\circ\text{C}$ ; Target, calibrated, $V_{\text{AREF}}$ constant after calibration; $f_{\text{MOD}} = 26.67\text{ MHz}$ |
|                                            |                       | -                  | $\pm 0.25$     | -                       | %             | $T_J > 150^\circ\text{C}$ ; $V_{\text{AREF}}$ constant after calibration; $f_{\text{MOD}} = 26.67\text{ MHz}$                        |
|                                            |                       | -1                 | -              | 1                       | %             | Calibrated once; $f_{\text{MOD}} = 26.67\text{ MHz}$                                                                                 |
|                                            |                       | -2.5               | -              | 2.5                     | %             | Uncalibrated; $f_{\text{MOD}} = 26.67\text{ MHz}$                                                                                    |

## 电气规格 DSADC 参数

表 3-22 DSADC 5V (续)

| Parameter                                                             | Symbol         | Values           |      |                 | Unit          | Note / Test Condition                                                                   |
|-----------------------------------------------------------------------|----------------|------------------|------|-----------------|---------------|-----------------------------------------------------------------------------------------|
|                                                                       |                | Min.             | Typ. | Max.            |               |                                                                                         |
| DC offset error <sup>3)</sup>                                         | $ED_{OFF\ CC}$ | -5 <sup>5)</sup> | -    | 5 <sup>5)</sup> | mV            | Calibrated; $f_{MOD} = 26.67\text{ MHz}$                                                |
|                                                                       |                | -10              | -    | 10              | mV            | Calibrated once; $f_{MOD} = 26.67\text{ MHz}$                                           |
|                                                                       |                | -30              | -    | 30              | mV            | Uncalibrated; $f_{MOD} = 26.67\text{ MHz}$                                              |
| Signal-Noise Ratio for differential input signals <sup>2) 6) 7)</sup> | $SNR\ CC$      | 80               | -    | -               | dB            | $T_J \leq 150^\circ\text{C}$ ; $f_{PB} = 30\text{ kHz}$ ; $f_{MOD} = 26.67\text{ MHz}$  |
|                                                                       |                | 78               | -    | -               | dB            | $T_J \leq 150^\circ\text{C}$ ; $f_{PB} = 50\text{ kHz}$ ; $f_{MOD} = 26.67\text{ MHz}$  |
|                                                                       |                | 74               | -    | -               | dB            | $T_J \leq 150^\circ\text{C}$ ; $f_{PB} = 100\text{ kHz}$ ; $f_{MOD} = 26.67\text{ MHz}$ |
| Signal-Noise Ratio degradation                                        | $DSNR\ CC$     | -                | -    | 3               | dB            | $T_J > 150^\circ\text{C}$ ; Resulting Signal-Noise Ratio value is SNR - DSNR            |
| Spurious-free dynamic range <sup>3)</sup>                             | $SFDR\ CC$     | 60               | -    | -               | dB            | $f_{MOD} = 26.67\text{ MHz}$                                                            |
| Output sampling rate                                                  | $f_D\ CC$      | 3.906            | -    | 300             | kHz           | 16 MHz / 4096, without integrator                                                       |
| Pass band                                                             | $f_{PB}\ CC$   | 1.302            | -    | 100             | kHz           | Output data rate: $f_D = f_{PB} * 3$ ; without integrator                               |
|                                                                       |                | 1.302            | -    | 10              | kHz           | Output data rate: $f_D = f_{PB} * 6$ ; without integrator                               |
| Pass band ripple                                                      | $df_{PB}\ CC$  | -0.08            | -    | 0.08            | dB            | FIR filters enabled                                                                     |
| Stop band attenuation                                                 | $SBA\ CC$      | 40               | -    | -               | dB            | $0.5f_D \dots 1.0f_D$                                                                   |
|                                                                       |                | 45               | -    | -               | dB            | $1.0f_D \dots 1.5f_D$                                                                   |
|                                                                       |                | 50               | -    | -               | dB            | $1.5f_D \dots 2.0f_D$                                                                   |
|                                                                       |                | 55               | -    | -               | dB            | $2.0f_D \dots 2.5f_D$                                                                   |
|                                                                       |                | 60               | -    | -               | dB            | $2.5f_D \dots OSR/2f_D$                                                                 |
| DC compensation factor                                                | $DCF\ CC$      | -3               | -    | -               | dB            | $10^{-5}f_D$ , offset compensation filter enabled (FCFGMx.OCEN = 001 <sub>B</sub> )     |
| Modulator settling time                                               | $t_{MSET}\ CC$ | -                | -    | 20              | $\mu\text{s}$ | After switching on, voltage regulator already running                                   |

1) 在具有叠加 GPIO 功能的引脚上，由于  $T_J > 150^\circ\text{C}$  时的漏电流，最大限值最多增加 25 mV。

2) 有关详细信息，请参阅用户手册章节。

3) 此参数在  $f_{MOD}$  定义的范围内有效。

4) 如果采用相同的校准策略，不同 EDSADC 通道之间的增益不匹配误差在  $\pm 0.5\%$  以内

- 5) 如果温度变化  $>20^{\circ}\text{C}$ ，则需要重新校准
- 6) 这些值对于模拟增益因子 1 有效，每增加一个增益因子，减去 3 dB。
- 7) 对于单端输入信号和增益1，SNR降低6 dB。

### 3.9 MHz 振荡器

OSC\_XTAL 用作精确的时钟源。OSC\_XTAL 支持 16 MHz 至 40 MHz 外部晶振。还支持陶瓷谐振器。

表 3-23 OSC\_XTAL

| Parameter                                              | Symbol          | Values           |       |                 | Unit | Note / Test Condition                                       |
|--------------------------------------------------------|-----------------|------------------|-------|-----------------|------|-------------------------------------------------------------|
|                                                        |                 | Min.             | Typ.  | Max.            |      |                                                             |
| Input current at XTAL1                                 | $I_{IX1}$ CC    | -70              | -     | 70              | μA   | $V_{IN} > 0V$ ; $V_{IN} < V_{EXT}$                          |
| Oscillator frequency                                   | $f_{OSC}$ SR    | 4                | -     | 40              | MHz  | Direct Input Mode selected, if shaper is not bypassed       |
|                                                        |                 | 16               | -     | 40              | MHz  | External Crystal Mode selected                              |
| Oscillator start-up time                               | $t_{OSCS}$ CC   | -                | -     | 3 <sup>1)</sup> | ms   | $20MHz \leq f_{OSC}$ and 8pF load capacitance               |
| Input voltage at XTAL1 <sup>2)</sup>                   | $V_{IX}$ SR     | -0.7             | -     | $V_{EXT} + 0.5$ | V    | If shaper is not bypassed                                   |
| Input amplitude (peak to peak) at XTAL1                | $V_{PPX}$ SR    | $0.3 * V_{EXT}$  | -     | $V_{EXT} + 1.0$ | V    | If shaper is not bypassed; $f_{OSC} > 25MHz$                |
|                                                        |                 | $0.35 * V_{EXT}$ | -     | $V_{EXT} + 1.0$ | V    | If shaper is not bypassed; $f_{OSC} \leq 25MHz$             |
| Internal load capacitor                                | $C_{L0}$ CC     | 1.30             | 1.40  | 1.55            | pF   | enabled via bit OSCCON.CAP0EN                               |
| Internal load capacitor                                | $C_{L1}$ CC     | 3.05             | 3.35  | 3.70            | pF   | enabled via bit OSCCON.CAP1EN                               |
| Internal load capacitor                                | $C_{L2}$ CC     | 7.85             | 8.70  | 9.55            | pF   | enabled via bit OSCCON.CAP2EN                               |
| Internal load capacitor                                | $C_{L3}$ CC     | 12.05            | 13.35 | 14.65           | pF   | enabled via bit OSCCON.CAP3EN                               |
| Internal load stray capacitor between XTAL1 and XTAL2  | $C_{XINTS}$ CC  | 1.15             | 1.20  | 1.25            | pF   |                                                             |
| Internal load stray capacitor between XTAL1 and ground | $C_{XTAL1}$ CC  | -                | 2.5   | 4               | pF   |                                                             |
| Duty cycle at XTAL1 <sup>3)</sup>                      | $DC_{X1}$ SR    | 35               | -     | 65              | %    | $V_{XTAL1} = 0.5 * V_{PPX}$                                 |
| Absolute RMS jitter at XTAL1 <sup>3)</sup>             | $J_{ABSX1}$ SR  | -                | -     | 28              | ps   | 10 KHz to $f_{OSC}/2$                                       |
| Slew rate at XTAL1 <sup>3)</sup>                       | $SR_{XTAL1}$ SR | 0.3              | -     | -               | V/ns | Maximum 30% difference between rising and falling slew rate |

1)  $t_{OSCS}$  定义为从振荡器模式设置为外部晶体模式的时刻开始，直到振荡在 XTAL1 处达到  $0.3 * V_{EXT}$  的幅度。该值取决于所用外部晶体的频率。对于更快的晶振频率，该值会减小。

2) 对于电源 ( $V_{EXT} < 5.3V$   $V_{IX}$ )，最低可低至 -0.9V。对于 XTAL1，低至 -0.9V 的输入电平不会对使用外部晶振的器件造成损坏或可靠性问题。

3) XTAL1 的方波输入信号。

*注意：强烈建议测量最终目标系统（布局）中的振荡裕度（负阻），以确定振荡器运行的最佳参数。请参考晶体或陶瓷谐振器供应商指定的限制。*

### 3.10 备用时钟

备用时钟提供了替代时钟源。

表 3-24 备用时钟

| Parameter                                           | Symbol                         | Values |      |      | Unit | Note / Test Condition              |
|-----------------------------------------------------|--------------------------------|--------|------|------|------|------------------------------------|
|                                                     |                                | Min.   | Typ. | Max. |      |                                    |
| Back-up clock accuracy before trimming              | $f_{\text{BACKUT}} \text{ CC}$ | 70     | 100  | 130  | MHz  | $V_{\text{EXT}} \geq 2.97\text{V}$ |
| Back-up clock accuracy after trimming <sup>1)</sup> | $f_{\text{BACKT}} \text{ CC}$  | 98     | 100  | 102  | MHz  | $V_{\text{EXT}} \geq 2.97\text{V}$ |
| Standby clock                                       | $f_{\text{SB}} \text{ CC}$     | 25     | 70   | 110  | kHz  | $V_{\text{EXT}} \geq 2.97\text{V}$ |

1) 通过每 2 毫秒定期调整温度和电压漂移，可以实现短期调整，从而满足 LIN 通信所需的精度，最高温度可达 125 摄氏度

### 3.11 温度感应器

表3-25 DTS PMS

| Parameter                                          | Symbol          | Values |      |      | Unit | Note / Test Condition                                                            |
|----------------------------------------------------|-----------------|--------|------|------|------|----------------------------------------------------------------------------------|
|                                                    |                 | Min.   | Typ. | Max. |      |                                                                                  |
| Measurement time for each conversion <sup>1)</sup> | $t_M$ CC        | -      | -    | 2.7  | ms   | Measured from cold power-on reset release                                        |
| Calibration reference accuracy                     | $T_{CALACC}$ CC | -1     | -    | 1    | °C   | calibration points @ $T_J = -40^{\circ}\text{C}$ and $T_J = 127^{\circ}\text{C}$ |
| Accuracy over temperature range                    | $T_{NL}$ CC     | -2     | -    | 2    | °C   | $T_{CALACC}$ has to be added in addition                                         |
| DTS temperature range                              | $T_{SR}$ SR     | -40    | -    | 170  | °C   |                                                                                  |

1) 热复位后,  $t_M$  不会重新启动, 而是从上次转换开始测量。

表 3-26 DTS 核心

| Parameter                                                  | Symbol          | Values |      |      | Unit | Note / Test Condition                                                            |
|------------------------------------------------------------|-----------------|--------|------|------|------|----------------------------------------------------------------------------------|
|                                                            |                 | Min.   | Typ. | Max. |      |                                                                                  |
| Measurement time for each conversion <sup>1)</sup>         | $t_M$ CC        | -      | -    | 2.7  | ms   | Measured from cold power-on reset release                                        |
| Temperature difference between on chip temperature sensors | $\Delta T$ CC   | -3     | -    | 3    | °C   |                                                                                  |
| Calibration reference accuracy                             | $T_{CALACC}$ CC | -2     | -    | 2    | °C   | calibration points @ $T_J = -40^{\circ}\text{C}$ and $T_J = 127^{\circ}\text{C}$ |
| Accuracy over temperature range                            | $T_{NL}$ CC     | -2     | -    | 2    | °C   | $T_{CALACC}$ has to be added in addition                                         |
| DTS temperature range                                      | $T_{SR}$ SR     | -40    | -    | 170  | °C   |                                                                                  |

1) 热复位后,  $t_M$  不会重新启动, 而是从上次转换开始测量。

### 3.12 电源电流

下面定义的总电源电流由漏电流和开关分量组成。

应用相关值通常低于下表给出的值，并且取决于客户的系统运行条件（例如热连接或使用的应用配置）。

下表中参数的运行条件为：实际（现实）功率模式定义了以下条件：

- $T_J = 150^\circ\text{C}$
- $f_{\text{SRI}} = f_{\text{CPUX}} = 300\text{ MHz}$
- $f_{\text{GTM}} = 200\text{ MHz}$
- $f_{\text{SPB}} = f_{\text{STM}} = f_{\text{BAUD1}} = f_{\text{BAUD2}} = f_{\text{ASCLINx}} = 100\text{ MHz}$
- $V_{\text{DD}} = 1.275\text{ V}$
- $V_{\text{DDP3}} / \text{FLEX} = 3.366\text{ V}$
- $V_{\text{EXT}} / \text{EVRSB} = V_{\text{DDM}} = 5.1\text{ V}$
- 所有核心都激活，包括两个锁步核
- 以下外设处于非活动状态：HSM、HSCT、以太网、PSI5、I2C、FCE 和 MTU

表 3-27 消耗电流

| Parameter                                                                                                                                                                                  | Symbol                   | Values |      |                  | Unit | Note / Test Condition                                                       |
|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------|------|------------------|------|-----------------------------------------------------------------------------|
|                                                                                                                                                                                            |                          | Min.   | Typ. | Max.             |      |                                                                             |
| $\Sigma$ Sum of $I_{\text{DD}}$ core and peripheral supply currents (incl. $I_{\text{DDPORST}} + \Sigma I_{\text{DDCx0}} + \Sigma I_{\text{DDCxX}} + I_{\text{DDGTM}} + I_{\text{DDSB}}$ ) | $I_{\text{DDRAIL}}$ CC   | -      | -    | 1100             | mA   | max power pattern                                                           |
|                                                                                                                                                                                            |                          | -      | -    | 840              | mA   | real power pattern                                                          |
| $I_{\text{DD}}$ core current during active power-on reset (PORST pin held low). Leakage current of core domain. <sup>1)</sup>                                                              | $I_{\text{DDPORST}}$ CC  | -      | -    | 160              | mA   | $V_{\text{DD}} = 1.275\text{V};$<br>$T_J = 125^\circ\text{C}$               |
|                                                                                                                                                                                            |                          | -      | -    | 290              | mA   | $V_{\text{DD}} = 1.275\text{V};$<br>$T_J = 150^\circ\text{C}$               |
|                                                                                                                                                                                            |                          | -      | -    | 350              | mA   | $V_{\text{DD}} = 1.275\text{V}; T_J = 160^\circ\text{C}$                    |
|                                                                                                                                                                                            |                          | -      | -    | 380              | mA   | $V_{\text{DD}} = 1.275\text{V};$<br>$T_J = 165^\circ\text{C}$               |
| $\Sigma$ Sum of $I_{\text{DDP3}}$ 3.3 V supply currents                                                                                                                                    | $I_{\text{DDP3RAIL}}$ CC | -      | -    | 50               | mA   | max power pattern incl. Flash read current and Dflash programming current.  |
|                                                                                                                                                                                            |                          | -      | -    | 40 <sup>2)</sup> | mA   | real power pattern incl. Flash read current and Dflash programming current. |
| $\Sigma$ Sum of external $I_{\text{EXT}}$ supply currents (incl. $I_{\text{EXTFLEX}} + I_{\text{EVRSB}} + I_{\text{EXTLVDS}}$ )                                                            | $I_{\text{EXTRAIL}}$ CC  | -      | -    | 56               | mA   | max power pattern                                                           |
|                                                                                                                                                                                            |                          | -      | -    | 50               | mA   | real power pattern                                                          |

表 3-27 消耗电流 (续)

| Parameter                                                                                  | Symbol            | Values |      |                   | Unit    | Note / Test Condition                                                                                                        |
|--------------------------------------------------------------------------------------------|-------------------|--------|------|-------------------|---------|------------------------------------------------------------------------------------------------------------------------------|
|                                                                                            |                   | Min.   | Typ. | Max.              |         |                                                                                                                              |
| $I_{EXT}$ and $I_{FLEX}$ supply current                                                    | $I_{EXTFLEX} CC$  | -      | -    | 18 <sup>3)</sup>  | mA      | real power pattern with port activity absent; PORST output inactive.                                                         |
| $I_{EVRSB}$ supply current <sup>1)</sup>                                                   | $I_{EVRSB} CC$    | -      | -    | 8                 | mA      | real power pattern; PMS/EVR module current considered without SCR and Standby RAM during RUN mode.                           |
| $\Sigma$ Sum of external $I_{DDM}$ supply currents (incl. $I_{DDMEVADC} + I_{DDMEDSADC}$ ) | $I_{DDM} CC$      | -      | -    | 48                | mA      | real power pattern; sum of currents of EDSADC and EVADC modules                                                              |
| $\Sigma$ Sum of all currents (incl. $I_{EXTRAIL} + I_{DDMRail} + I_{DDx3RAIL} + I_{DD}$ )  | $I_{DDTOT} CC$    | -      | -    | 978               | mA      | real power pattern; $T_J = 150^\circ C$                                                                                      |
| $\Sigma$ Sum of all currents with DC- DC EVRC regulator active <sup>4)</sup>               | $I_{DDTOTDC3} CC$ | -      | -    | 580               | mA      | real power pattern; EVRC reset settings with 72% efficiency; $V_{EXT} = 3.3V$ ; $T_J = 150^\circ C$                          |
| $\Sigma$ Sum of all currents with DC- DC EVRC regulator active <sup>4)</sup>               | $I_{DDTOTDC5} CC$ | -      | -    | 440               | mA      | real power pattern; EVRC reset settings with 72% efficiency; $V_{EXT} = 5V$ ; $T_J = 150^\circ C$                            |
| $\Sigma$ Sum of all currents (SLEEP mode) <sup>1)</sup>                                    | $I_{SLEEP} CC$    | -      | -    | 27                | mA      | All CPUs in idle, All peripherals in sleep, $f_{SRI/SPB} = 1 MHz$ via LPDIV divider; $T_J = 25^\circ C$                      |
| $\Sigma$ Sum of all currents (STANDBY mode) drawn at $V_{EVRSB}$ supply pin <sup>5)</sup>  | $I_{STANDBY} CC$  | -      | -    | 130 <sup>6)</sup> | $\mu A$ | 32 kB Standby RAM block active. SCR inactive. Power to remaining domains switched off. $T_J = 25^\circ C$ ; $V_{EVRSB} = 5V$ |
| Maximum power dissipation <sup>7)</sup>                                                    | $PD SR$           | -      | -    | 2400              | mW      | max power pattern                                                                                                            |
|                                                                                            |                   | -      | -    | 1700              | mW      | real power pattern                                                                                                           |

1) 限值是根据实际功率模式 ( $V_{DD} = 1.275V$ ) 定义的。对于最大功率模式, 限值必须乘以系数 1.22。

2) 实际的 Pflash 读取模式, Pflash 带宽利用率为 50%, 代码混合为 50% 的 0 和 50% 的 1。使用至少 100nF 的公共去耦电容 ( $V_{DDP3}$ )。在 3.3 V 电源下以突发模式连续进行 Dflash 编程, 并并行进行实际的 Pflash 读取访问。相应闪存模块的擦除电流小于  $V_{DDP3}$  引脚上的相应编程电流。编程和擦除闪存可能会产生高达 45 mA / 20 ns 的瞬态电流尖峰。由去耦电容器和缓冲电容器处理。此参数与外部电源尺寸有关, 与热无关。

3) 消耗电流仅包括最小的端口活动。

- 4) 从外部调节器汲取的总电流是根据 72% EVRC SMPS 调节器效率估算的。IDDTOTDCx 是使用缩放的核心电流  $[(I_{DD} \times V_{DD}) / (V_{in} \times \text{Efficiency})]$  根据 IDDTOT 计算得出的，并构成所有其他轨电流和 IDDM。
- 5) 同样的电流限制也适用于其他功率模式
- 6)  $\Sigma$  运行模式下 VEVR<sub>SB</sub> 电源引脚上所有电流的总和小于  $(I_{EVR<sub>SB</sub>} + 4 \text{ mA 待机 RAM 电流} + I_{SCR<sub>SB</sub>})$  (如果 SCR 处于活动状态)。建议在此引脚上至少使用 100 nF 去耦电容。32kB 待机 SRAM 对 I<sub>STANDBY</sub> 电流的使用不到 10uA。
- 7) 仅当所有电源均由外部供电且不包含 EVR33 和 EVRC 的功率损耗时，这些值才有效。

表3-28 模块电流消耗

| Parameter                                                                          | Symbol            | Values |      |                 | Unit | Note / Test Condition                                                  |
|------------------------------------------------------------------------------------|-------------------|--------|------|-----------------|------|------------------------------------------------------------------------|
|                                                                                    |                   | Min.   | Typ. | Max.            |      |                                                                        |
| $I_{DDP3}$ supply current for programming of a Pflash or Dflash bank <sup>1)</sup> | $I_{DDP3PROG}$ CC | -      | -    | 25              | mA   | Pflash 3.3V programming current adder when using external 3.3V supply. |
|                                                                                    |                   | -      | -    | 9 <sup>2)</sup> | mA   | Pflash 3.3V programming current adder when using external 5V supply.   |
| $I_{EXT}$ supply current added by LVDS pads in LVDS mode <sup>1)</sup>             | $I_{EXTLVDS}$ CC  | -      | -    | 9               | mA   | real power pattern; 6 pairs of LVDS pins active with receive function  |
|                                                                                    |                   | -      | -    | 24              | mA   | real power pattern; 6 pairs of LVDS pins active with transmit function |

表 3-28 模块电流消耗 (续)

| Parameter                                                                                      | Symbol              | Values |       |                  | Unit | Note / Test Condition                                                                                                              |
|------------------------------------------------------------------------------------------------|---------------------|--------|-------|------------------|------|------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                |                     | Min.   | Typ.  | Max.             |      |                                                                                                                                    |
| $\Sigma$ Sum of external $I_{DDM}$ supply currents (incl. $I_{DDMEVADC} + I_{DDMEDSADC}$ )     | $I_{DDM\ CC}$       | -      | -     | 32               | mA   | real power pattern; current for EDSADC modules only and EVADC modules are inactive; 8 EDSADC channels active continuously.         |
|                                                                                                |                     | -      | -     | 45 <sup>3)</sup> | mA   | max power pattern; current for EDSADC modules only and EVADC modules are inactive; all EDSADC channels active continuously.        |
|                                                                                                |                     | -      | -     | 16               | mA   | real power pattern; current for EVADC modules only and EDSADC modules are inactive; 12 EVADC modules active.                       |
|                                                                                                |                     | -      | -     | 20 <sup>4)</sup> | mA   | max power pattern; current for EVADC modules only and EDSADC modules are inactive; all EVADC modules active.                       |
| $I_{DDP3}$ supply current for erasing of a Pflash or Dflash bank                               | $I_{DDP3ERASE\ CC}$ | -      | -     | 25               | mA   | Pflash 3.3V erasing current adder when using external 3.3V supply.                                                                 |
| SCR 8-bit Standby Controller current incl. PMS in STANDBY Mode drawn at $V_{EVRSB}$ supply pin | $I_{SCR\ SB\ CC}$   | -      | -     | 7 <sup>5)</sup>  | mA   | SCR power pattern incl. PMS current consumption with fback clock active; $f_{SYS\_SCR} = 20\text{MHz}$ ; $T_J = 150^\circ\text{C}$ |
|                                                                                                |                     | -      | 0.150 | -                | mA   | SCR power pattern incl. PMS current consumption with fback inactive; $f_{SYS\_SCR} = 70\text{kHz}$ ; $T_J = 25^\circ\text{C}$      |
| SCR 8-bit Standby Controller CPU in IDLE mode <sup>6)</sup>                                    | $I_{SCR\ IDLE\ CC}$ | -      | -     | 3.5              | mA   | real power pattern. CPU set into idle mode.                                                                                        |

1) 同样的电流限制也适用于其他功率模式

2) 在 5V 电压下对 Pflash 进行编程期间, VEXT 电源轨上会额外消耗 3 mA 电流。

3) 单个 DS 通道实例消耗 4 mA。

- 4) 单个 VADC 单元消耗 1.3 mA 的电流。
- 5) 如果激活了 SCR ADCOMP，则需要考虑额外的 0.6 mA 加法器。
- 6) 限值是根据实际功率模式 ( $V_{DD} = 1.275V$ ) 定义的。对于最大功率模式，限值必须乘以系数 1.22。

表 3-29 模块核心电流消耗

| Parameter                                                                | Symbol         | Values |      |                  | Unit | Note / Test Condition                                                                                |
|--------------------------------------------------------------------------|----------------|--------|------|------------------|------|------------------------------------------------------------------------------------------------------|
|                                                                          |                | Min.   | Typ. | Max.             |      |                                                                                                      |
| $I_{DD}$ core current of CPUx main core with CPUx lockstep core inactive | $I_{DDCx0}$ CC | -      | -    | 70               | mA   | max power pattern; IPC=1.2                                                                           |
|                                                                          |                | -      | -    | 45               | mA   | real power pattern; IPC=0.6                                                                          |
| $I_{DD}$ core current of CPUx main core with CPUx lockstep core active   | $I_{DDCx0}$ CC | -      | -    | $I_{DDCx0} + 50$ | mA   | max power pattern; IPC=1.2                                                                           |
|                                                                          |                | -      | -    | $I_{DDCx0} + 40$ | mA   | real power pattern; IPC=0.6                                                                          |
| $I_{DD}$ core current added by GTM                                       | $I_{DDGTM}$ CC | -      | -    | 125              | mA   | max power pattern                                                                                    |
|                                                                          |                | -      | -    | 100              | mA   | real power pattern; TIMx, TOMx, ATOMx, MCSx active. 3 clusters at 200 MHz.                           |
|                                                                          |                | -      | -    | 50               | mA   | TIMx, TOMx active at 100MHz. ATOMx, MCSx, DPLL inactive. 2 clusters at 100 MHz.                      |
| $I_{DD}$ core current added by HSM                                       | $I_{DDHSM}$ CC | -      | -    | 20 <sup>1)</sup> | mA   | max power pattern; HSM running at 100MHz.                                                            |
| $I_{DD}$ core dynamic current added by LBIST                             | $I_{DDLBI}$ CC | -      | -    | 80 <sup>2)</sup> | mA   | LBIST Configuration A; $1.2V \leq V_{DD}$                                                            |
| $I_{DD}$ core dynamic current added by MBIST                             | $I_{DDMBI}$ CC | -      | -    | 200              | mA   | fMBIST = 300MHz; tMBIST < 6ms. MTU Ganging procedure for SRAM test and initialization; VDD = 1.375V. |

- 1) 电流包消耗括基本 HSM 激活。AES 模块。
- 2) LBIST 可在启动阶段执行，也可由应用软件触发。在 LBIST 执行时间 ( $t_{LBIST}$ ) 内，二次电压监控器处于非活动状态。在启动阶段，外部提供的  $V_{DD}$  电压必须等于或大于 1.2V ( $V_{DD}$  标称值 - 4%)，以确保静态准确性。如果  $V_{DD}$  由 EVRC 内部供电，则 EVRC 会注意不要违反  $V_{DD}$  1.2V 静态欠压限制。

### 3.12.1 计算 1.25 V 消耗电流

1.25 V 电源轨的电流消耗由两部分组成：

- 静态电流消耗
- 动态电流消耗

静态电流消耗与器件温度  $T_J$  相关，动态电流消耗取决于配置的时钟频率和执行的软件应用程序，需要将这两部分相加才能得到轨电流消耗。

(3.1)

$$I_0 = 4,7777 \left[ \frac{\text{mA}}{\text{C}} \right] \times e^{0,02273 \times T_J[\text{C}]}$$

(3.2)

$$I_0 = 11,3778 \left[ \frac{\text{mA}}{\text{C}} \right] \times e^{0,02114 \times T_J[\text{C}]}$$

**公式 (3.1)** 定义典型的静态电流消耗和**公式 (3.2)** 定义最大静态电流消耗。这两个函数均在  $V_{DD} = 1.275 \text{ V}$  时有效。

### 3.13 电源基础设施和供电启动

### 3.13.1 供电上升和下降行为

电源轨的启动斜率应符合 SR（见表 3-33 补给坡道）。

#### 3.13.1.1 单电源模式 (a)

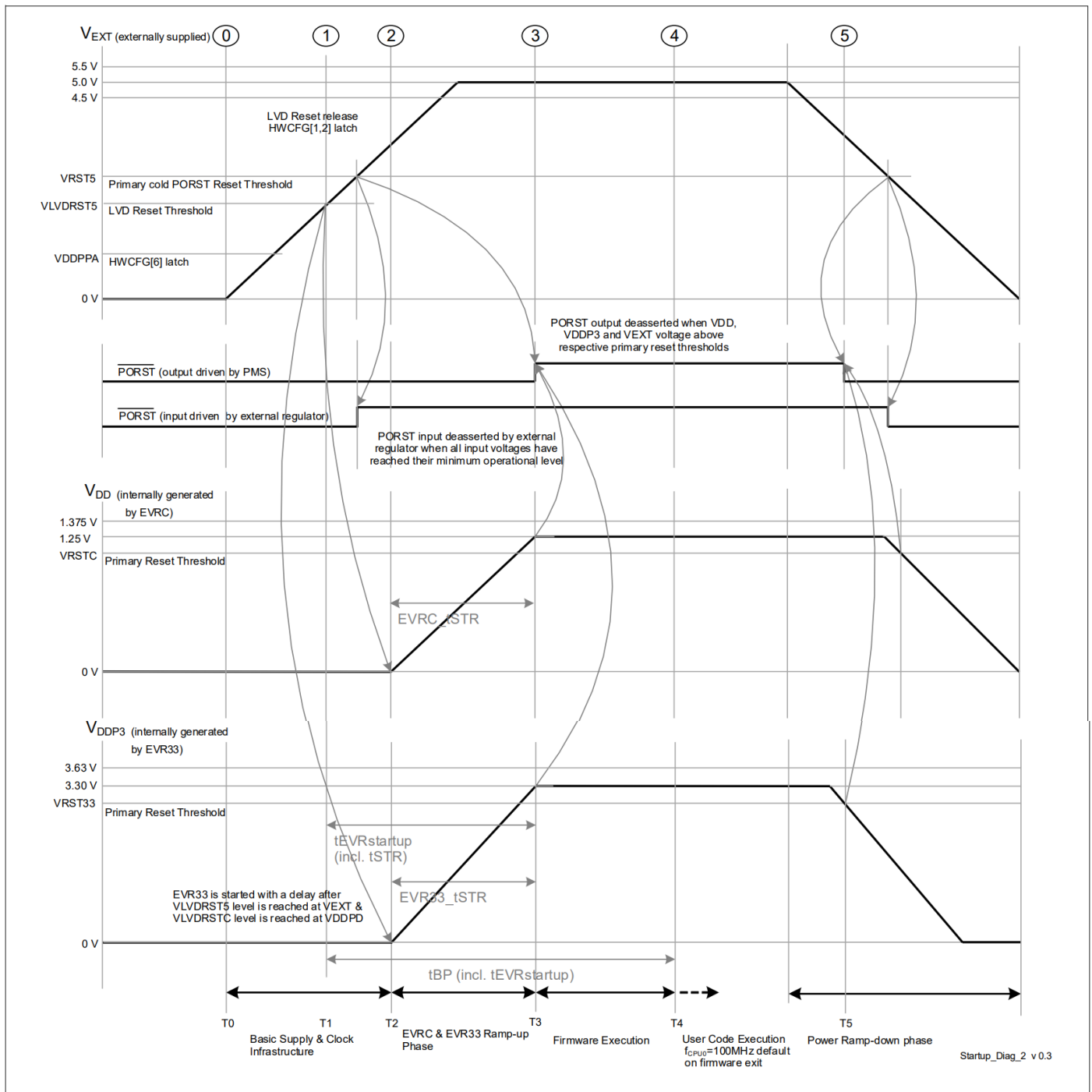


图 3-3 单电源模式 (a) - $V_{EXT}$  (5V) 单电源

$V_{EXT} = 5V$  单电源模式。 $V_{DD}$  和  $V_{DDP3}$  由内置的EVRC 和 EVR33 调节器从内部产生。

## 电气规格 电源基础结构和电源启动

- 在基本基础设施和 EVRx 稳压器启动阶段（T0 至 T2），从外部稳压器 (dIEXT/dt) 吸取电流的速率受到限制，最大为 100 mA，稳定时间为 100  $\mu$ s。电源轨的启动斜率应符合数据表参数 SR。斜率定义为 0% 至 100% 电压电平之间的最大切向斜率。实际波形可能不同于规格书。
- 此外，还确保在固件启动阶段（T3 至 T4）从调节器吸取的电流 (dIDD/dt) 限制为最大 100 mA，稳定时间为 100  $\mu$ s。
- 当 PORST（输入）或 PORST（输出）激活/置位时，PORST 激活/置位。
- PORST（输入）有效意味着外部设备可通过将 PORST 引脚拉低，使复位保持有效。建议保持 PORST（输入）有效，直到外部电源电压高于相应的主复位阈值。
- PORST（输出）有效意味着  $\mu$ C 在内部发出复位信号并将 PORST 引脚驱动至低电平，从而将复位信号传播至外部设备。当三个电源域（VDD、VDDP3 或 VEXT）中至少有一个违反其主要欠压复位阈值时， $\mu$ C 会发出 PORST 置位（输出）信号。当所有电源均高于其主要复位阈值，且基本电源和时钟基础设施可用时， $\mu$ C 会发出 PORST 不置位（输出）信号。在 T3 复位释放期间，预计负载跳变高达 150 mA (dIDD)。
- 电源时序如图 3-3 列举如下
  - T1 至 T2 是指外部电源上升时基本电源和时钟基础设施组件可用的时间段。带隙和内部时钟源启动，根据 HWCFG[2:1,4,5,6] 和 TESTMODE 引脚决定供电模式。T1 至 T2 是指外部电源上升时基本电源和时钟基础设施组件可用的时间段。带隙和内部时钟源启动，根据 HWCFG[2:1,6] 引脚决定供电模式。这些事件在 T1 时 LVD 复位释放后启动。当两个输入电压 VEXT 和 VEVRSB 分别高于 VLVD RST5 和 VLVD RSTSB 电平时，LVD 复位被释放。内部预调节器 VDDPD 输出电压高于 VLVD RSTC 水平。
  - T2 指的是 EVRC 和 EVR33 稳压器软启动的时间点。PORST（输入）对 EVR33 或 EVRC 输出没有任何影响，尽管 PORST 已置位且器件处于复位状态，稳压器仍会继续产生相应的电压。产生的电压在 tSTR（数据表参数）时间内呈软上升趋势，以避免过冲。
  - T3 指的是所有电源都高于其主要复位阈值（由 VRST5、VRST33 和 VRSTC 供电电压水平表示）的时间点。EVRC 和 EVR33 调节器已经启动。  
PORST（输出）不置位，并且 HWCFG[3:5] 引脚被 SCU 锁存在 PORST 上升沿。固件执行已启动。T1 和 T3 之间的时间记录为 tEVRstartup（数据表参数）。
  - T4 指的是固件执行完成并且用户代码以 CPU0 的默认频率 100 MHz 开始执行的时间点。T0 和 T4 之间的时间记录为 tBP（数据表参数）。
  - T5 指的是斜坡下降阶段期间至少一个外部提供或生成的电源（VDD、VDDP3 或 VEXT）降至其各自的初级欠压复位阈值以下的时间点。

### 3.13.1.2 单电源模式 (e)

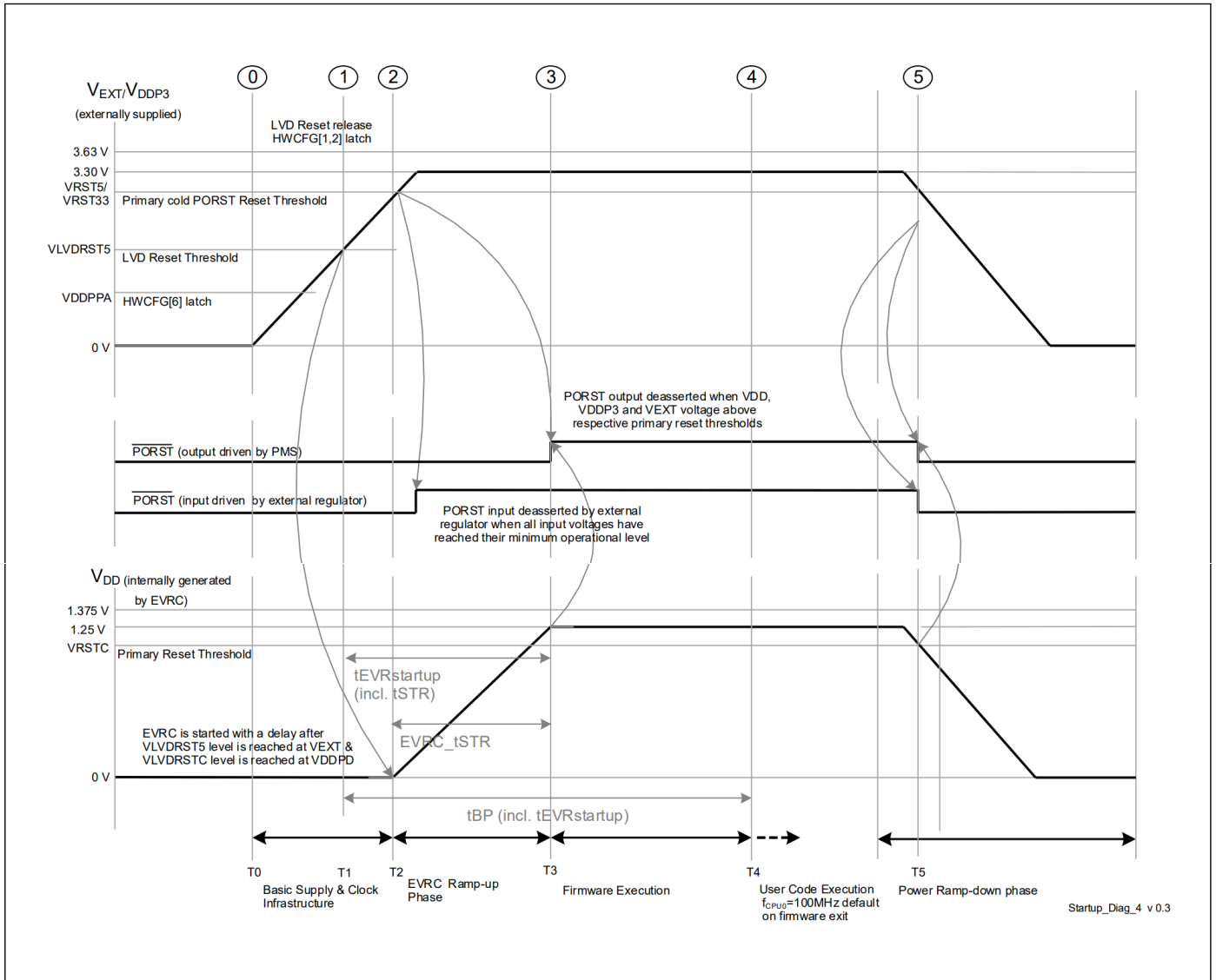


图 3-4 单电源模式 (e) - ( $V_{EXT}$  和  $V_{DDP3}$ ) 3.3 V 单电源

$V_{EXT} = V_{DDP3} = 3.3$  V 单电源模式。VDD 由 EVRC 调节器内部产生。

- 从外部调节器汲取电流的速率 ( $di_{EXT}/dt$ ) 在启动阶段被限制为最大 100 mA，建立时间为 100  $\mu$ s。电源轨的启动斜率应符合数据表参数 SR。斜率定义为 0% 至 100% 电压电平之间的最大切向斜率。实际波形可能不同于规格书。
- 当 PORST (输入) 或 PORST (输出) 激活/置位时，PORST 激活/置位。
- PORST (输入) 有效意味着外部设备可通过将 PORST 引脚拉低，使复位保持有效。建议保持 PORST (输入) 有效，直到外部电源电压高于相应的主复位阈值。
- PORST (输出) 有效意味着  $\mu$ C 在内部发出复位信号并将 PORST 引脚驱动至低电平，从而将复位信号传播至外部设备。当三个电源域 (VDD、VDDP3 或  $V_{EXT}$ ) 中至少有一个违反其主要欠压复位阈值时， $\mu$ C 会发出 PORST 置位 (输出) 信号。当所有电源均高于其主要复位阈值，且基本电源和时钟基础设施可用时， $\mu$ C 会发出 PORST 不置位 (输出) 信号。

基本供电和时钟基础设施可用。在 T3 复位释放期间，预计负载跳变高达 150 mA (dIDD)。

- 功率序列如图 3-4 列举如下
  - T1 至 T2 是指外部电源上升时基本电源和时钟基础设施组件可用的时间段。带隙和内部时钟源启动，根据 HWCFG[2:1,4,5,6] 和 TESTMODE 引脚决定供电模式。T1 至 T2 是指外部电源上升时基本电源和时钟基础设施组件可用的时间段。带隙和内部时钟源启动，根据 HWCFG[2:1,6] 引脚决定供电模式。这些事件在 T1 时 LVD 复位释放后启动。当两个输入电压 VEXT 和 VEVRSB 分别高于 VLVD RST5 和 VLVD RSTSB 电平时，LVD 复位被释放。内部预调节器 VDDPD 输出电压高于 VLVD RSTC 水平。
  - T2 指的是 EVRC 调节器软启动开始的时间点。PORST（输入）对 EVRC 输出没有任何影响，尽管 PORST 已断言且设备处于复位状态，调节器仍会继续产生相应的电压。产生的电压在 tSTR（数据表参数）时间内呈软上升趋势，以避免过冲。
  - T3 指的是所有电源都高于其主要复位阈值（由 VRST5、VRST33 和 VRSTC 供电电压水平表示）的时间点。EVRC 调节器已启动。PORST（输出）不置位，并且 HWCFG[3:5] 引脚被 SCU 锁存在 PORST 上升沿。固件执行已启动。T1 和 T3 之间的时间记录为 tEVRstartup（数据表参数）。
  - T4 指的是固件执行完成并且用户代码以 CPU0 的默认频率 100 MHz 开始执行的时间点。T0 和 T4 之间的时间记录为 tBP（数据表参数）。
  - T5 指的是斜坡下降阶段期间至少一个外部提供或生成的电源（VDD、VDDP3 或 VEXT）降至其各自的初级欠压复位阈值以下的时间点。

### 3.13.1.3 外部供电模式 (d)

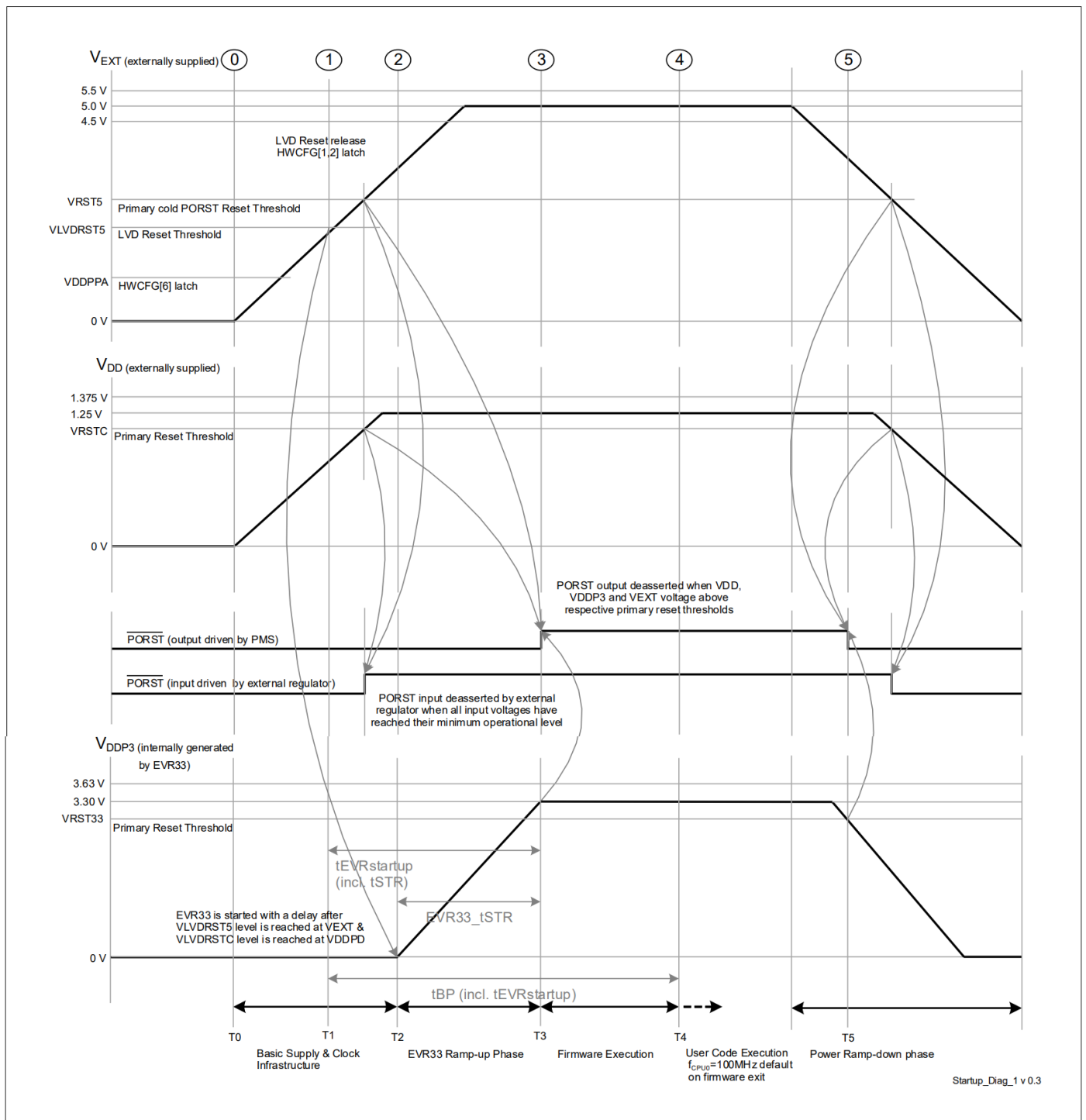


图 3-5 外部供电模式 (d) - $V_{EXT}$  和  $V_{DD}$  外部供电

$V_{EXT} = 5\text{ V}$  且  $V_{DD}$  电源由外部供电。3.3V 由 EVR33 调节器内部产生。

- 外部电源  $V_{EXT}$  和  $V_{DD}$  可以在启动、上升和下降时间方面相互独立地上升或下降。电源轨的启动斜率应符合数据表参数 SR。斜率定义为 0% 至 100% 电压电平之间的最大切向斜率。实际波形可能不同于规格书。预计在启动期间， $V_{EXT}$  会在  $V_{DD}$  轨之前上升。

## 电气规格 电源基础结构和电源启动

如果 VDD 电源轨在 VEXT 之前上升；启动期间的 VDD 电源过冲应限制在工作电压范围内。

- 从外部调节器汲取电流的速率 ( $dI_{EXT}/dt$  或  $dI_{DD}/dt$ ) 在启动阶段被限制为最大 100 mA，建立时间为 100  $\mu$ s。
- 当 PORST (输入) 或 PORST (输出) 激活/置位时，PORST 激活/置位。
- PORST (输入) 有效意味着外部设备可通过将 PORST 引脚拉低，使复位保持有效。建议保持 PORST (输入) 有效，直到外部电源电压高于相应的主复位阈值。
- PORST (输出) 有效意味着  $\mu$ C 在内部发出复位信号并将 PORST 引脚驱动至低电平，从而将复位信号传播至外部设备。当三个电源域 (VDD、VDDP3 或 VEXT) 中至少有一个违反其主要欠压复位阈值时， $\mu$ C 会发出 PORST 置位 (输出) 信号。当所有电源均高于其主要复位阈值，且基本电源和时钟基础设施可用时， $\mu$ C 会发出 PORST 不置位 (输出) 信号。在 T3 复位释放期间，预计负载跳变高达 150 mA ( $dI_{DD}$ )。
- 功率序列如图 3-5 列举如下
  - T1 至 T2 是指外部电源上升时基本电源和时钟基础设施组件可用的时间段。带隙和内部时钟源启动。根据 HWCFG[2:1,4,5,6] 和 TESTMODE 引脚来决定供电模式。T1 至 T2 是指外部电源上升时基本电源和时钟基础设施组件可用的时间段。带隙和内部时钟源启动，根据 HWCFG[2:1,6] 引脚决定供电模式。这些事件在 T1 时 LVD 复位释放后启动。当两个输入电压 VEXT 和 VEVR3B 分别高于 VLVD RST5 和 VLVD RSTSB 电平时，LVD 复位被释放。内部预调节器 VDDPD 输出电压高于 VLVD RSTC 水平。
  - T2 指的是 EVR33 调节器软启动开始的时间点。PORST (输入) 对 EVR33 输出没有任何影响，尽管 PORST 已置位且设备处于复位状态，调节器仍会继续产生相应的电压。产生的电压在  $t_{STR}$  (数据表参数) 时间内呈软上升趋势，以避免过冲。
  - T3 指的是所有电源都高于其主要复位阈值 (由 VRST5、VRST33 和 VRSTC 供电电压水平表示) 的时间点。EVR33 稳压器已启动。PORST (输出) 不置位，并且 HWCFG[3:5] 引脚被 SCU 锁存在 PORST 上升沿。固件执行已启动。T1 和 T3 之间的时间记录为  $t_{EVRstartup}$  (数据表参数)。
  - T4 指的是固件执行完成并且用户代码以 CPU0 的默认频率 100 MHz 开始执行的时间点。T0 和 T4 之间的时间记录为  $t_{BP}$  (数据表参数)。
  - T5 指的是斜坡下降阶段期间至少一个外部提供或生成的电源 (VDD、VDDP3 或 VEXT) 降至其各自的初级欠压复位阈值以下的时间点。

### 3.13.1.4 外部供电模式 (h)

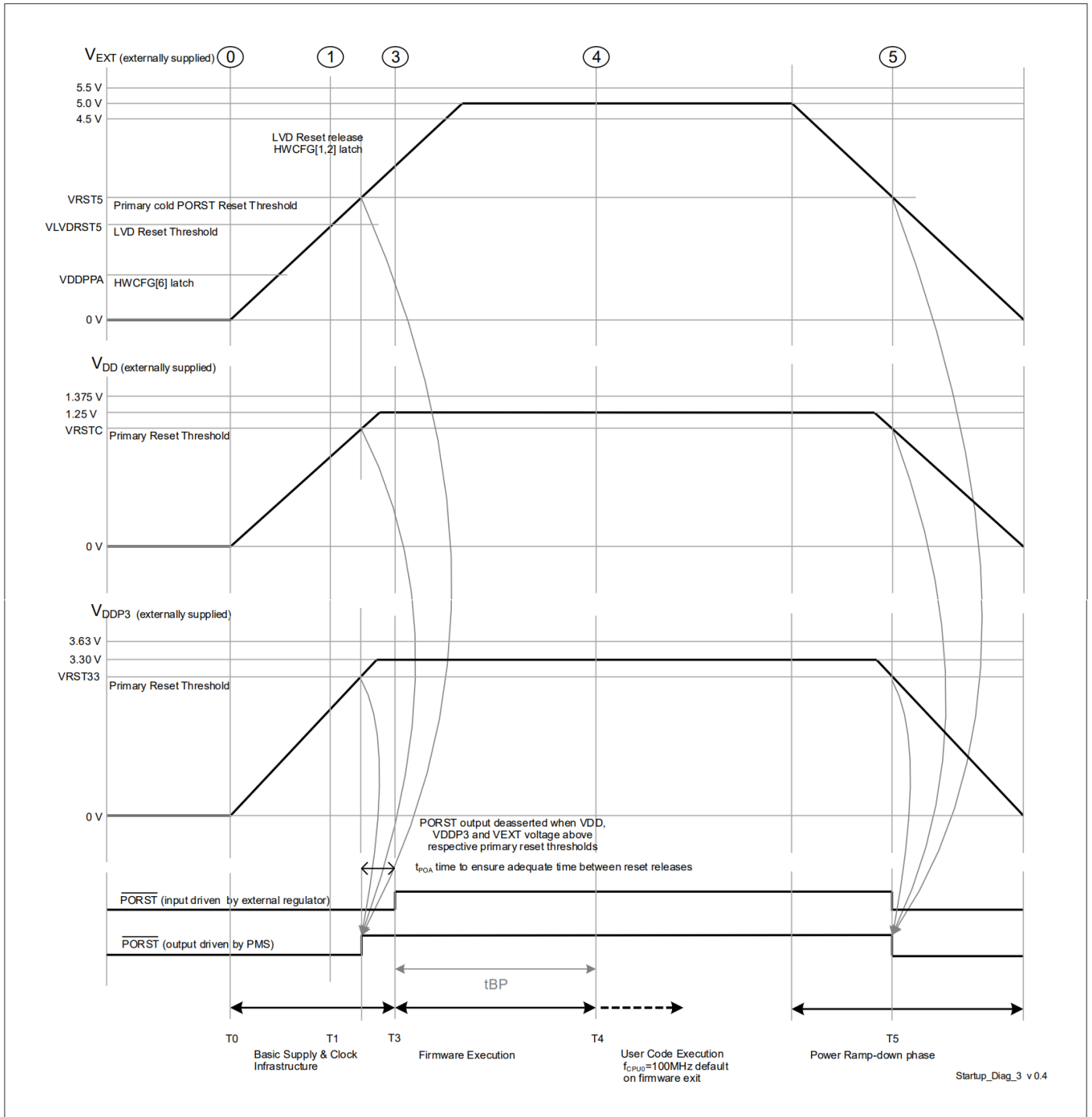


图 3-6 外部供电模式 (h) - $V_{EXT}$ 、 $V_{DDP3}$  和  $V_{DD}$  外部供电

所有电源，即  $V_{EXT}$ 、 $V_{DDP3}$  和  $V_{DD}$  均由外部供电。

- 外部电源  $V_{EXT}$ 、 $V_{DDP3}$  和  $V_{DD}$  可能会根据启动、上升和下降时间而彼此独立地上升或下降。电源轨的启动斜率应符合数据表参数  $SR$ 。斜率定义为 0% 至 100% 电压电平之间的最大切向斜率。实际波形可能不同于规格书。预计在启动期间， $V_{EXT}$  会在  $V_{DDP3}$  和  $V_{DD}$  轨之前上升。如果较小的电压轨在  $V_{EXT}$  之前上升，则启动期间的  $V_{DD}$  和  $V_{DDP3}$  电源过冲应限制在各自电压轨的工作电压范围内。

- 从外部调节器汲取电流的速率 ( $dI_{EXT}/dt$ ,  $dI_{DD}/dt$ 或 $dI_{DDP3}/dt$ ) 在启动阶段被限制为最大 100 mA, 建立时间为 100  $\mu$ s。
- 当 PORST (输入) 或 PORST (输出) 激活/置位时, PORST 激活/置位。
- PORST (输入) 有效意味着外部设备可通过将 PORST 引脚拉低, 使复位保持有效。建议保持 PORST (输入) 有效, 直到外部电源电压高于相应的主复位阈值。
- PORST (输出) 有效意味着  $\mu$ C 在内部发出复位信号并将 PORST 引脚驱动至低电平, 从而将复位信号传播至外部设备。当三个电源域 (VDD、VDDP3 或 VEXT) 中至少有一个违反其主要欠压复位阈值时,  $\mu$ C 会发出 PORST 置位 (输出) 信号。当所有电源均高于其主要复位阈值, 且基本电源和时钟基础设施可用时,  $\mu$ C 会发出 PORST 不置位 (输出) 信号。在 T3 复位释放期间, 预计负载跳变高达 150 mA ( $dI_{DD}$ )。
- 功率序列如图 3-6 列举如下
  - T1 至 T3 是指外部电源上升时基本电源和时钟基础设施组件可用的时间段。带隙和内部时钟源启动。根据 HWCFG[2:1,4,5,6] 和 TESTMODE 引脚来决定供电模式。T1 至 T2 是指外部电源上升时基本电源和时钟基础设施组件可用的时间段。带隙和内部时钟源启动, 根据 HWCFG[2:1,6] 引脚决定供电模式。这些事件在 T1 时 LVD 复位释放后启动。当两个输入电压 VEXT 和 VEVRSB 分别高于 VLVD RST5 和 VLVD RSTSB 电平时, LVD 复位被释放。内部预调节器 VDDPD 输出电压高于 VLVD RSTC 水平。
  - T3 指的是所有电源都高于其主要复位阈值 (由 VRST5、VRST33 和 VRSTC 供电电压水平表示) 的时间点。PORST (输出) 不置位, 并且 HWCFG[3:5] 引脚被 SCU 锁存在 PORST 上升沿。固件执行已启动。
  - T4 指的是固件执行完成并且用户代码以 CPU0 的默认频率 100 MHz 开始执行的时间点。T0 和 T4 之间的时间记录为 tBP (数据表参数)。
  - T5 指的是斜坡下降阶段期间至少一个外部提供或生成的电源 (VDD、VDDP3 或 VEXT) 降至其各自的初级欠压复位阈值以下的时间点。

### 3.14 复位时间

表 3-30 复位

| Parameter                                                                                                    | Symbol                | Values         |      |      | Unit    | Note / Test Condition                                                                                                                                                              |
|--------------------------------------------------------------------------------------------------------------|-----------------------|----------------|------|------|---------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                              |                       | Min.           | Typ. | Max. |         |                                                                                                                                                                                    |
| Application Reset Boot Time                                                                                  | $t_{B\ CC}$           | -              | -    | 400  | $\mu s$ | operating with max. frequencies, with valid BMI header                                                                                                                             |
| System Reset Boot Time                                                                                       | $t_{BS\ CC}$          | -              | -    | 1.1  | ms      | RAM initialization and HSM boot time are not included, with valid BMI header                                                                                                       |
| Cold Power on Reset Boot Time <sup>1)</sup>                                                                  | $t_{BP\ CC}$          | -              | -    | 3.1  | ms      | $dV_{EXT}/dT=1V/ms$ . $V_{EXT}>VLVD_{RST5}$ . Boot time after Cold PORST including EVR ramp-up and Firmware execution time; RAM initialization and HSM boot time are not included. |
|                                                                                                              |                       | -              | -    | 1.6  | ms      | Firmware execution time after PORST release without EVR ramp-up; RAM initialization and HSM boot time is not included                                                              |
| Minimum cold PORST reset hold time in case of power fail event issued by EVR primary monitors                | $t_{EVRPOR\ CC}$      | $10^{2)}$      | -    | -    | $\mu s$ |                                                                                                                                                                                    |
| PMS Infrastructure, EVRC and EVR33 overall start-up time till cold PORST reset release                       | $t_{EVRstart\up\ CC}$ | -              | -    | 1    | ms      | $dV/dT=1V/ms$ . EVRC and EVR33 active                                                                                                                                              |
| Minimum PORST active hold time externally after power supplies are stable at operating levels after start-up | $t_{POA\ SR}$         | $1^{3)}$       | -    | -    | ms      |                                                                                                                                                                                    |
| Configurable PORST digital filter delay in addition to analog pad filter delay                               | $t_{PORSTDF\ CC}$     | 600            | -    | 1200 | ns      |                                                                                                                                                                                    |
| Warm Reset Sequencing Delay                                                                                  | $t_{WARMRSTSEQ\ CC}$  | -              | -    | 180  | $\mu s$ |                                                                                                                                                                                    |
| HWCFG pins hold time from ESR0 rising edge                                                                   | $t_{HDH\ CC}$         | $16 / f_{SPB}$ | -    | -    | ns      |                                                                                                                                                                                    |

表 3-30 复位 (续)

| Parameter                                                      | Symbol           | Values               |      |                       | Unit | Note / Test Condition                                                                            |
|----------------------------------------------------------------|------------------|----------------------|------|-----------------------|------|--------------------------------------------------------------------------------------------------|
|                                                                |                  | Min.                 | Typ. | Max.                  |      |                                                                                                  |
| HWCFG pins setup time to ESR0 rising edge                      | $t_{HDS}$ CC     | 0                    | -    | -                     | ns   |                                                                                                  |
| Ports inactive after ESR0 reset active                         | $t_{PI}$ CC      | $8000/f_{BAC}$<br>KT | -    | $18000/f_{BA}$<br>CKT | s    |                                                                                                  |
| Ports inactive after PORST reset active                        | $t_{PIP}$ CC     | -                    | -    | 150                   | ns   |                                                                                                  |
| Hold time from PORST rising edge                               | $t_{POH}$ SR     | 150                  | -    | -                     | ns   |                                                                                                  |
| Setup time to PORST rising edge                                | $t_{POS}$ SR     | 0                    | -    | -                     | ns   |                                                                                                  |
| Warm PORST reset boot time                                     | $t_{BWP}$ CC     | -                    | -    | 1.3                   | ms   | without RAM initialization                                                                       |
| LBIST execution time extending the boot time                   | $t_{LBIST}$ CC   | -                    | -    | 6                     | ms   | LBIST Configuration A;<br>$1.2V \leq V_{DD}$                                                     |
| SCR reset boot time                                            | $t_{SCR}$ CC     | -                    | -    | 5                     | μs   | User Mode 0                                                                                      |
|                                                                |                  | -                    | -    | 16                    | μs   | User Mode 1                                                                                      |
|                                                                |                  | -                    | 13.3 | -                     | μs   | WDT double bit ECC, soft reset                                                                   |
| Minimum external supplies hold time after warm reset assertion | $t_{SUPHOLD}$ CC | -                    | -    | 250                   | μs   | external supplies are $V_{EVRSB}$ , $V_{EXT}$ , $V_{FLEX}$ , $V_{DDM}$ , $V_{DDP3}$ and $V_{DD}$ |

- 1) RAM 初始化另外增加 500μs。
- 2) 冷 PORST 复位由 uC 驱动，并维持在 VDDPPA 限制和绝对最大额定电压  $V_{EXT}/V_{EVRSB}$  限制之间的扩展电压范围内。
- 3) 电源上升或电源恢复时的复位释放被延迟了 1.5%（默认值）的电压滞后，该电压滞后高于  $V_{EXT}$ 、 $V_{DDP3}$  和  $V_{DD}$  轨上实施的欠压复位限值。这种机制有助于避免在电源缓慢上升期间，由于复位释放时压降/电流跳跃而导致的多个连续的冷 PORST 事件。

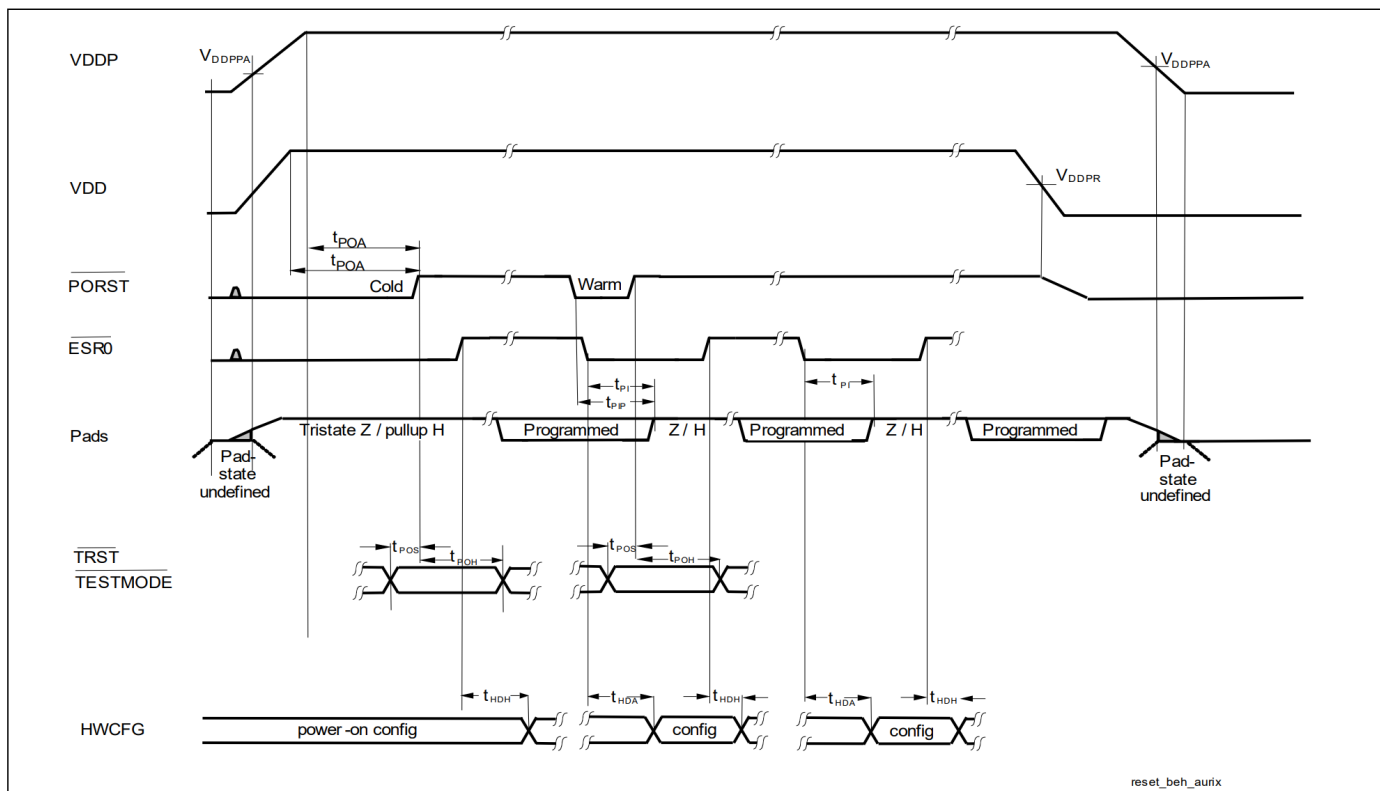


图 3-7 电源、焊盘和复位时间

### 3.15 PMS

表 3-31 EVR33 LDO

| Parameter                                                                                                | Symbol                  | Values             |      |                   | Unit    | Note / Test Condition                                                                                                                       |
|----------------------------------------------------------------------------------------------------------|-------------------------|--------------------|------|-------------------|---------|---------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                          |                         | Min.               | Typ. | Max.              |         |                                                                                                                                             |
| Input voltage range                                                                                      | $V_{IN\ SR}$            | 3.60 <sup>1)</sup> | -    | 5.50              | V       | Normal RUN mode                                                                                                                             |
|                                                                                                          |                         | 2.97 <sup>2)</sup> | -    | 5.50              | V       | Low voltage cranking mode                                                                                                                   |
| Output voltage operational range including load/line regulation and aging <sup>3)</sup>                  | $V_{OUT\ CC}$           | 2.97               | 3.3  | 3.63              | V       | Normal RUN mode                                                                                                                             |
|                                                                                                          |                         | 2.60               | 3.3  | 3.63              | V       | Low voltage cranking mode; $I_{DDP3}=50mA$                                                                                                  |
| Output $V_{DDX3}$ static voltage accuracy after trimming and aging without dynamic load/line regulation. | $V_{OUTT\ CC}$          | 3.225              | 3.3  | 3.375             | V       | Normal RUN mode                                                                                                                             |
|                                                                                                          |                         | 2.78               | 3.3  | 3.375             | V       | Low voltage cranking mode; $I_{DDP3}=50mA$                                                                                                  |
| Output buffer capacitance on $V_{OUT}$                                                                   | $C_{OUT\ SR}$           | 1.45               | 2.2  | 3                 | $\mu F$ |                                                                                                                                             |
| Output buffer capacitor ESR                                                                              | $C_{OUTESR\ SR}$        | -                  | -    | 100 <sup>4)</sup> | mOhm    | $f > 0.5MHz$ ; $f < 10MHz$                                                                                                                  |
| Maximum output current of the regulator                                                                  | $I_{MAX\ CC}$           | 60 <sup>5)</sup>   | -    | -                 | mA      | Normal RUN mode                                                                                                                             |
| Startup time                                                                                             | $t_{STR\ CC}$           | -                  | 500  | 1000              | $\mu s$ | Normal RUN mode                                                                                                                             |
| External $V_{IN}$ supply ramp <sup>6)</sup>                                                              | $dV_{in}/dt\ SR$        | -                  | 1    | -                 | V/ms    |                                                                                                                                             |
| Ripple on Output Voltage                                                                                 | $\Delta V_{OUTTC\ CC}$  | -                  | -    | 33                | mV      | $V_{EXT} \geq 2.97V$ ; $V_{EXT} \leq 5.5V$ ; $I_{OUTTC} \geq 10mA$ ; $I_{OUTTC} \leq 60mA$ ; $\Delta V_{OUTTC}$ = (peak to peak ripple / 2) |
| Load step response <sup>7)</sup>                                                                         | $dV_{out}/dI_{out\ CC}$ | -165               | -    | -                 | mV      | Normal RUN mode; $dI=10$ to $60mA$ ; $dt=20ns$ ; $T_{settle}=20\mu s$                                                                       |
|                                                                                                          |                         | -                  | -    | 165               | mV      | Normal RUN mode; $dI=60$ to $10mA$ ; $dt=20ns$ ; $T_{settle}=20\mu s$                                                                       |
|                                                                                                          |                         | -180               | -    | -                 | mV      | Low voltage cranking mode; $dI=10$ to $50mA$ ; $dt=20ns$ ; $T_{settle}=20\mu s$                                                             |
|                                                                                                          |                         | -                  | -    | 180               | mV      | Low voltage cranking mode; $dI=50$ to $10mA$ ; $dt=20ns$ ; $T_{settle}=20\mu s$                                                             |

表 3-31 EVR33 LDO (续)

| Parameter          | Symbol                   | Values |      |      | Unit | Note / Test Condition                                                                   |
|--------------------|--------------------------|--------|------|------|------|-----------------------------------------------------------------------------------------|
|                    |                          | Min.   | Typ. | Max. |      |                                                                                         |
| Line step response | $dV_{out}/dV_{in}$<br>CC | -      | -    | 40   | mV   | $dV_{in}/dT=1V/ms$ ; $dV=3.6$ to $5V$ ; $I_{MAX}=60mA$ ; $\Delta V_{OUTTC}$ is included |
|                    |                          | -40    | -    | -    | mV   | $dV_{in}/dT=1V/ms$ ; $dV=5$ to $3.6V$ ; $I_{MAX}=60mA$ ; $\Delta V_{OUTTC}$ is included |
|                    |                          | -      | -    | 280  | mV   | $dV_{in}/dT=50V/ms$ ; $dV=3.6$ to $5V$ ; $I_{MAX}=60mA$                                 |
|                    |                          | -165   | -    | -    | mV   | $dV_{in}/dT=50V/ms$ ; $dV=5$ to $3.6V$ ; $I_{MAX}=60mA$                                 |

- 1) 最小输入电压中包含 300mV 的最大传输器件压差，以确保正常运行期间传输器件的最佳性能。
- 2) VEXT 输入电压降到 2.97V，将导致 VDDP3 输出电压降到 2.6V，如果在此之前已经将Flash切换到低性能模式，那么是可以正常工作的。
- 3) 如果使用 EVR33，则不允许使用外部感应负载。
- 4) 还建议从引脚到 EVR 输出电容器的电源走线电阻小于 100 mOhm。应在 Cout 之前靠近引脚的位置放置一个 100nF 的附加去耦电容。
- 5) 在低压模式（启动情况）下，使用片上传输装置时，IMAX 限制为 40 mA。在不使用 EVR33 的情况下，如果在电源上电时序中，3.3V 电压先于 5V 电压由外部稳压器供电，同时 5V VEXT 电压轨上电压不够时，则注入 3.3V VDDP3 电源轨的电流应限制在 500 mA 以内。
- 6) EVR 能够有效抵御 0 - 2.97 V 之间残余电压的上升。稳健性验证涵盖 0.5V/min 至 120V/ms 之间的 VEXT 电压斜坡范围。产生的电压本身在 tSTR 时间内遵循软上升趋势，以避免过冲。
- 7) 建立时间被定义为直到输出电压在单个器件平均值(VOUTT) 的 $\pm 1\%$  范围内。

表 3-32 电源监视器

| Parameter                                                                         | Symbol             | Values             |       |       | Unit | Note / Test Condition                                                                 |
|-----------------------------------------------------------------------------------|--------------------|--------------------|-------|-------|------|---------------------------------------------------------------------------------------|
|                                                                                   |                    | Min.               | Typ.  | Max.  |      |                                                                                       |
| Primary Undervoltage Reset threshold for $V_{DDP3}$ before trimming <sup>1)</sup> | $V_{RST33}$ CC     | -                  | -     | 3.00  | V    | by reset release before EVR trimming on supply ramp-up                                |
| Primary undervoltage reset threshold for $V_{DD}$ before trimming                 | $V_{RSTC}$ CC      | -                  | -     | 1.138 | V    | by reset release before trimming on supply ramp-up including 2 LSB voltage Hysteresis |
| $V_{EXT}$ primary undervoltage monitor accuracy after trimming <sup>2)</sup>      | $V_{EXTPRIUV}$ CC  | 2.86               | 2.92  | 2.97  | V    | $V_{EXT}$ = Undervoltage cold PORST Primary Monitor Threshold                         |
| $V_{DDP3}$ primary undervoltage monitor accuracy after trimming <sup>2)</sup>     | $V_{DDP3PRIUV}$ CC | 2.86 <sup>3)</sup> | 2.90  | 2.97  | V    | VDDP3 = Undervoltage cold PORST Primary Monitor Threshold                             |
| $V_{DD}$ primary undervoltage monitor accuracy after trimming <sup>2)</sup>       | $V_{DDPRIUV}$ CC   | 1.08 <sup>3)</sup> | 1.105 | 1.125 | V    | VDD = Undervoltage cold PORST Primary Monitor Threshold                               |

表 3-32 电源监视器 (续)

| Parameter                                                                                             | Symbol          | Values |      |      | Unit | Note / Test Condition                                                                                 |
|-------------------------------------------------------------------------------------------------------|-----------------|--------|------|------|------|-------------------------------------------------------------------------------------------------------|
|                                                                                                       |                 | Min.   | Typ. | Max. |      |                                                                                                       |
| EVR primary monitor measurement latency for a new supply value                                        | $t_{PRIUV}$ CC  | -      | -    | 300  | ns   | The supply ramp / line jump slope is limited to 50V/ms for $V_{EXT}$ , $V_{DDP3}$ and $V_{DD}$ rails. |
| $V_{EXT}$ , $V_{DDM}$ & $V_{EVRSB}$ secondary supply monitor accuracy after trimming <sup>4) 5)</sup> | $V_{EXTMON}$ CC | 3.2    | 3.3  | 3.4  | V    | SWDxxVAL, VDDMxxVAL & SBxxVAL monitoring threshold=3.3V=90h(O V,UV).<br>EVRMONFILT.SWDFI L=1.         |
|                                                                                                       |                 | 4.5    | 4.6  | 4.7  | V    | SWDxxVAL, VDDMxxVAL & SBxxVAL monitoring threshold=4.6V=C8h(U V)/C9h(OV).<br>EVRMONFILT.SWDFI L=1     |
|                                                                                                       |                 | 5.3    | 5.4  | 5.5  | V    | SWDxxVAL, VDDMxxVAL & SBxxVAL monitoring threshold=5.4V=EAh(U V)/ECh(OV).<br>EVRMONFILT.SWDFI L=1     |
|                                                                                                       |                 | 4.9    | 5.0  | 5.1  | V    | SWDxxVAL, VDDMxxVAL & SBxxVAL monitoring threshold=5V=D9h(UV) /DAh(OV).<br>EVRMONFILT.SWDFI L=1       |

表 3-32 电源监视器 (续)

| Parameter                                                                            | Symbol            | Values |       |       | Unit | Note / Test Condition                                                                       |
|--------------------------------------------------------------------------------------|-------------------|--------|-------|-------|------|---------------------------------------------------------------------------------------------|
|                                                                                      |                   | Min.   | Typ.  | Max.  |      |                                                                                             |
| $V_{DDP3}$ secondary supply monitor accuracy after trimming <sup>5)</sup>            | $V_{DDP3MON}$ CC  | 2.97   | 3.035 | 3.1   | V    | EVR33xxVAL monitoring threshold=3.035V=CBh (UV)/CCh(OV). EVRMONFILT.EVR33 FIL = 3.          |
|                                                                                      |                   | 3.235  | 3.30  | 3.365 | V    | EVR33xxVAL monitoring threshold=3.3V=DDh( OV, UV). EVRMONFILT.EVR33 FIL = 3.                |
|                                                                                      |                   | 3.5    | 3.565 | 3.63  | V    | EVR33xxVAL monitoring threshold=3.565V=EEh (UV)/EFh(OV). EVRMONFILT.EVR33 FIL = 3.          |
| $V_{DD}$ & $V_{DDPD}$ secondary supply monitor accuracy after trimming <sup>5)</sup> | $V_{DDMON}$ CC    | 1.125  | 1.15  | 1.175 | V    | EVRCxxVAL & PRExxVAL monitoring threshold=1.15V=C7h( UV )/C8h(OV). EVRMONFILT.EVRCFI L = 1. |
|                                                                                      |                   | 1.225  | 1.25  | 1.275 | V    | EVRCxxVAL & PRExxVAL monitoring threshold=1.25V=D9h( OV ,UV). EVRMONFILT.EVRCFI L = 1.      |
|                                                                                      |                   | 1.325  | 1.35  | 1.375 | V    | EVRCxxVAL & PRExxVAL monitoring threshold=1.35V=EAh( UV )/EBh(OV). EVRMONFILT.EVRCFI L = 1. |
| $V_{EXT}$ LVD Primary undervoltage reset Monitor threshold                           | $V_{LVDRST5}$ CC  | 2.3    | -     | 2.72  | V    | Power-down                                                                                  |
|                                                                                      |                   | 2.4    | -     | 2.75  | V    | Power-up                                                                                    |
| $V_{EVRSB}$ LVD Primary undervoltage reset Monitor threshold                         | $V_{LVDRSTSB}$ CC | 2.18   | -     | 2.47  | V    | Power-down                                                                                  |
|                                                                                      |                   | 2.21   | -     | 2.5   | V    | Power-up                                                                                    |
| $V_{EXT}$ and $V_{EVRSB}$ PBIST primary overvoltage Monitor threshold                | $V_{PBIST5}$ CC   | 5.63   | -     | -     | V    |                                                                                             |

表 3-32 电源监视器 (续)

| Parameter                                                          | Symbol        | Values |      |      | Unit    | Note / Test Condition                                                      |
|--------------------------------------------------------------------|---------------|--------|------|------|---------|----------------------------------------------------------------------------|
|                                                                    |               | Min.   | Typ. | Max. |         |                                                                            |
| Primary undervoltage reset threshold for $V_{EXT}$ before trimming | $V_{RST5} CC$ | -      | -    | 3.0  | V       | by last cold PORST release on supply ramp-up including voltage hysteresis. |
| EVR secondary monitor measurement latency for all 6 supply rails   | $t_{MON} CC$  | -      | -    | 3.2  | $\mu s$ | HPOSC and SHPBG bandgap trimmed. Filter inactive.                          |

- 1) 电源上升时的复位释放在达到欠压复位阈值后会延迟 20-40 微秒的时间，并且电压滞后会高于欠压复位限值 1.5%。这种机制有助于避免在电源缓慢上升期间，由于复位释放时压降/电流跳跃而导致的多个连续的冷 PORST 事件。引脚的复位限制为 2.97V，适用于 EVR33 内部产生 3.3V 的情况。如果外部提供 3.3V 电源，则键合线压降将导致 VDDP3 引脚上电压达到 3.0V 就复位。
- 2) 监测器公差构成了带隙和 ADC 在工艺、电压和温度操作范围内的固有变化。VxxPRIUV 参数在生产过程中经过单独测试，与 VxxPRIUV 限值有  $\pm 1\%$  的容差。所有电压均在引脚上测量。
- 3) VRSTxx 参数仅与第一次冷 PORST 释放相关。随后，在器件以完整性能使用之前，复位电平由固件调整并反映为 VxxPRIUV 参数。冷 PORST 通过所有主监视器上的电压滞后释放，以避免连续的 PORST 切换行为。
- 4) 如果应用程序使用 3.3V 单电源（单电源模式 (e)，即当 VEXT 与 VDDP3 短接时，建议在通道 VDDP3 上使用二次电源监控，因为 VDDP3MON 参数的精度更高。
- 5) 对于未提供监测器电压电平的条件，OV 和 UV 阈值可以根据给定的点通过线性插值或外推生成。

表 3-33 供电斜坡

| Parameter                                                                       | Symbol               | Values |      |      | Unit | Note / Test Condition |
|---------------------------------------------------------------------------------|----------------------|--------|------|------|------|-----------------------|
|                                                                                 |                      | Min.   | Typ. | Max. |      |                       |
| External $V_{EXT}$ & $V_{EVR5B}$ supply ramp-up and ramp-down slope<br>1) 2) 3) | $dV_{EXT}/dt$<br>SR  | 8.3E-6 | 1    | 100  | V/ms |                       |
| External $V_{DDP3}$ supply ramp-up and ramp-down slope <sup>1)3)</sup>          | $dV_{DDP3}/dt$<br>SR | 8.3E-6 | 1    | 100  | V/ms |                       |
| External $V_{DD}$ supply ramp-up and ramp-down slope <sup>1)3)</sup>            | $dV_{DD}/dt$<br>SR   | 8.3E-6 | 1    | 100  | V/ms |                       |
| External $V_{DDM}$ supply ramp-up and ramp-down slope <sup>1)3)</sup>           | $dV_{DDM}/dt$<br>SR  | 8.3E-6 | 1    | 100  | V/ms |                       |

- 1) 该器件具有很强的抗残余电压上升能力，对于 VEXT、VEVR5B、VDDP3 和 VDDM，电压上升范围为 0 - 2.97 V，对于 VDD，电压上升范围为 0-1 V。稳健性验证涵盖 0.5V/min 至 120V/ms 之间的 VEXT 电压斜坡范围。
- 2) 在使用 EVR33 或 EVRC 的情况下也有效。产生的电压本身在 tSTR 时间内遵循软上升趋势，以避免过冲。
- 3) 斜率定义为 0% 至 100% 电压电平之间的最大切向斜率。实际波形可能不同于规格书。

- TC38x 允许最多 1000000 次电源循环，符合“电源斜坡”表中定义的限制，且对可靠性没有任何限制。

表 3-34 EVRC SMPS

| Parameter                                                                                          | Symbol                 | Values |      |       | Unit    | Note / Test Condition                                                                                                                                                                   |
|----------------------------------------------------------------------------------------------------|------------------------|--------|------|-------|---------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                                                                                    |                        | Min.   | Typ. | Max.  |         |                                                                                                                                                                                         |
| Input $V_{EXT}$ Voltage range                                                                      | $V_{IN\ SR}$           | 2.97   | -    | 5.5   | V       | Start-up $V_{EXT}$ voltage > 2.6 V                                                                                                                                                      |
| SMPS regulator output voltage range including load/line regulation and aging                       | $V_{DDDC\ CC}$         | 1.125  | -    | 1.375 | V       | $V_{EXT} \geq 2.97V$ ; $V_{EXT} \leq 5.5V$ ; $I_{DDDC} \geq 1mA$ ; $I_{DDDC} \leq 1.5A$ ; untrimmed                                                                                     |
| SMPS regulator static voltage output accuracy after trimming without dynamic load/line regulation. | $V_{DDDC\ CT\ CC}$     | 1.225  | 1.25 | 1.275 | V       | $V_{EXT} \geq 2.97V$ ; $V_{EXT} \leq 5.5V$ ; $I_{DDDC} \geq 1mA$ ; $I_{DDDC} \leq 1.5A$                                                                                                 |
| Programmable switching frequency                                                                   | $f_{DCDC\ SR}$         | 1.6    | 1.82 | 2.0   | MHz     | Start-up frequency switches from 500 KHz in open loop operation to 1.82 MHz in closed loop Operation.                                                                                   |
|                                                                                                    |                        | -      | 0.8  | -     | MHz     | Start-up frequency switches from 500 KHz in open loop operation to 1.82 MHz in closed loop Operation. 0.8 MHz to be set in SW.                                                          |
| Startup time                                                                                       | $t_{STRDC\ CC}$        | -      | -    | 900   | $\mu s$ | SMPS Start-up Mode. It is defined between $V_{EXTPRIUV}$ reset threshold till PORST release, on condition that all other PORST requirements were released before. $I_{START} < 700mA$ . |
| Switching frequency modulation spread                                                              | $\Delta f_{DCSPR\ CC}$ | -      | 1.8% | -     | MHz     |                                                                                                                                                                                         |
| Maximum ripple at $I_{MAX}$                                                                        | $\Delta V_{DDDC\ CC}$  | -      | -    | 16    | mV      | $V_{EXT} \geq 2.97V$ ; $V_{EXT} \leq 5.5V$ ; $I_{DDDC} \geq 300mA$ ; $I_{DDDC} \leq 1.5A$ ; $\Delta V_{DDDC} = (\text{Peak to Peak ripple} / 2)$                                        |
| No load current consumption of SMPS regulator                                                      | $I_{DCNL\ CC}$         | -      | 15   | 19    | mA      | $f_{DCDC}=1.82MHz$ ; $I_{DDDC}=I_{SLEEP}$ ; $V_{EXT} > 2.97V$ ; $T_J=25^\circ C$                                                                                                        |
|                                                                                                    |                        | -      | 5    | -     | mA      | LPM mode; $I_{DDDC}=I_{SLEEP}$ ; $V_{EXT} > 2.97V$ ; $T_J=25^\circ C$                                                                                                                   |

表 3-34 EVRC SMPS (续)

| Parameter                              | Symbol                   | Values |      |      | Unit | Note / Test Condition                                                                                                          |
|----------------------------------------|--------------------------|--------|------|------|------|--------------------------------------------------------------------------------------------------------------------------------|
|                                        |                          | Min.   | Typ. | Max. |      |                                                                                                                                |
| SMPS regulator load transient response | $dV_{DDDC}/dl_{OUT\ CC}$ | -50    | -    | 87   | mV   | $dI < -450mA$ ;<br>$I_{DDDC}=500-1500mA$ ;<br>$t_r=0.1\mu s$ ; $t_f=0.1\mu s$ ;<br>$V_{DDDC}=1.25V$ ;<br>$T_{settle}=100\mu s$ |
|                                        |                          | -100   | -    | 145  | mV   | $dI < -700mA$ ;<br>$I_{DDDC}=750-1500mA$ ;<br>$t_r=0.1\mu s$ ; $t_f=0.1\mu s$ ;<br>$V_{DDDC}=1.25V$ ;<br>$T_{settle}=100\mu s$ |
|                                        |                          | -26    | -    | 26   | mV   | $dI < 100mA$ ; $I_{DDDC}=50-1500mA$ ; $t_r=0.1\mu s$ ;<br>$t_f=0.1\mu s$ ; $V_{DDDC}=1.25V$ ;<br>$T_{settle}=20\mu s$ ;        |
| Maximum output current                 | $I_{MAX\ CC}$            | 100    | -    | -    | mA   | LPM mode. Typical current in LPM Mode = $I_{SLEEP}$                                                                            |
|                                        |                          | 1.5    | -    | -    | A    | limited by thermal constraints and component choice                                                                            |
| SMPS regulator line transient response | $dV_{DDDC}/dV_{IN\ CC}$  | -75    | -    | 75   | mV   | $dV/dT=120V/ms$ ; $dV < 2.97 - 5.5V$ ; $I_{DDDC}=50-1500mA$ ;                                                                  |
|                                        |                          | -12.5  | -    | 12.5 | mV   | $dV/dT=1V/ms$ ; $dV < 2.97 - 5.5V$ ; $I_{DDDC}=50-1500mA$ ;                                                                    |
| SMPS regulator efficiency              | $\eta_{DC\ CC}$          | -      | 80   | -    | %    | $V_{IN}=3.3V$ ; $I_{DDDC}=1500mA$ ;<br>$f_{DCDC}=1.82MHz$                                                                      |
|                                        |                          | -      | 75   | -    | %    | $V_{IN}=5V$ ;<br>$I_{DDDC}=1500mA$ ;<br>$f_{DCDC}=1.82MHz$                                                                     |
| Input Synchronisation frequency        | $f_{DCDC\ SYNC\ SR}$     | 1.6    | 1.82 | 2.0  | MHz  |                                                                                                                                |

表 3-35 EVRC SMPS 外部组件

| Parameter                                     | Symbol        | Values |      |      | Unit    | Note / Test Condition                |
|-----------------------------------------------|---------------|--------|------|------|---------|--------------------------------------|
|                                               |               | Min.   | Typ. | Max. |         |                                      |
| External output capacitor value <sup>1)</sup> | $C_{OUT\ SR}$ | 20.8   | 32   | 43.2 | $\mu F$ | $I_{DDDC}=1.5A$ ; $f_{DDDC}=0.8MHz$  |
|                                               |               | 15.4   | 22   | 29.7 | $\mu F$ | $I_{DDDC}=1.5A$ ; $f_{DDDC}=1.82MHz$ |

表 3-35 EVRC SMPS 外部组件 (续)

| Parameter                                             | Symbol              | Values |      |      | Unit          | Note / Test Condition                                                                  |
|-------------------------------------------------------|---------------------|--------|------|------|---------------|----------------------------------------------------------------------------------------|
|                                                       |                     | Min.   | Typ. | Max. |               |                                                                                        |
| External output capacitor ESR                         | $C_{OUT\_ESR}$ SR   | -      | -    | 50   | mOhm          | $f \geq 0.5\text{MHz}$ ; $f \leq 10\text{MHz}$                                         |
|                                                       |                     | -      | -    | 100  | Ohm           | $f = 10\text{Hz}$                                                                      |
| External input capacitor value <sup>1)</sup>          | $C_{IN}$ SR         | 6.5    | 10   | 13.5 | $\mu\text{F}$ | $I_{DDDC} = 1.5\text{A}$                                                               |
| External input capacitor ESR                          | $C_{IN\_ESR}$ SR    | -      | -    | 50   | mOhm          | $f \geq 0.5\text{MHz}$ ; $f \leq 10\text{MHz}$                                         |
|                                                       |                     | -      | -    | 100  | Ohm           | $f = 100\text{Hz}$                                                                     |
| External inductor value                               | $L_{DC}$ SR         | 3.29   | 4.7  | 6.11 |               | $f_{DCDC} = 0.8\text{MHz}$                                                             |
|                                                       |                     | 2.31   | 3.3  | 4.29 | $\mu\text{H}$ | $f_{DCDC} = 1.82\text{MHz}$                                                            |
| External inductor DCR                                 | $L_{DC\_DCR}$ SR    | -      | -    | 0.2  | Ohm           |                                                                                        |
| P + N-channel MOSFET logic level                      | $V_{LL}$ SR         | -      | -    | 2.5  | V             |                                                                                        |
| P + N-channel MOSFET drain source breakdown voltage   | $ V_{BR\_DS} $ SR   | +7     | -    | -    | V             | NMOS - $V_{GS} = 0$ .                                                                  |
|                                                       |                     | -      | -    | -7   | V             | PMOS - $V_{GS} = 0$ .                                                                  |
| P + N-channel MOSFET drain source ON-state resistance | $R_{ON}$ SR         | -      | 150  | -    | mOhm          | $I_{DDDC} = 1.5\text{A}$ ; $ V_{GS}  = 2.5\text{V}$ ; $T_A = 25^\circ\text{C}$         |
| P + N-channel MOSFET Gate Charge                      | $Q_G$ SR            | -      | -    | 8    | nC            | $I_{DDDC} = 1.5\text{A}$ ; NMOS-<br>$ V_{GS}  = 5\text{V}$ ; 1.5A pulsed drain current |
|                                                       |                     | -8     | -    | -    | nC            | $I_{DDDC} = 1.5\text{A}$ ; PMOS-<br>$ V_{GS}  = 5\text{V}$ ; 1.5A pulsed drain current |
| External Inductor Saturation Current Margin           | $\Delta I_{SAT}$ SR | 400    | -    | -    | mA            | The saturation current of the coil must be larger than $I_{DDDC} + \Delta I_{SAT}$     |
| P + N-channel MOSFET Gate threshold voltage           | $V_{GTH}$ SR        | -      | 1    | -    | V             | NMOS                                                                                   |
|                                                       |                     | -      | -1   | -    | V             | PMOS                                                                                   |
| N-channel MOSFET reverse diode forward voltage        | $V_{RDN}$ SR        | -      | 0.8  | -    | V             |                                                                                        |

1) 电容器最小-最大范围代表典型的  $\pm 35\%$  公差，包括直流偏置效应。从电容器到电源或接地轨的走线电阻应限制为 25 mOhm。

### 3.16 系统锁相环 (SYS\_PLL)

表 3-36 PLL 系统

| Parameter                  | Symbol        | Values |      |      | Unit | Note / Test Condition                              |
|----------------------------|---------------|--------|------|------|------|----------------------------------------------------|
|                            |               | Min.   | Typ. | Max. |      |                                                    |
| DCO Input frequency range  | $f_{REF} CC$  | 10     | -    | 40   | MHz  |                                                    |
| Modulation Amplitude       | $MA CC$       | 0      | -    | 2    | %    |                                                    |
| Peak Period jitter         | $DP CC$       | -200   | -    | 200  | ps   | without modulation<br>(PLL output frequency)       |
| Peak Accumulated Jitter    | $D_{PP} CC$   | -5     | -    | 5    | ns   | without modulation                                 |
| Total long term jitter     | $J_{TOT} CC$  | -      | -    | 11.5 | ns   | including modulation;<br>MA 1.25%; $f_{REF}$ 20MHz |
| System frequency deviation | $f_{SYSD} CC$ | -      | -    | 0.01 | %    | with active modulation                             |
| DCO frequency range        | $f_{DCO} CC$  | 400    | -    | 800  | MHz  |                                                    |
| PLL lock-in time           | $t_L CC$      | 4      | -    | 100  | μs   |                                                    |

注意：如果每个引脚的电容负载在最大驱动器和锐边的情况下不超过  $C_L = 20 \text{ pF}$ ，则指定的PLL 抖动值有效。

注意：电源电压上的最大峰峰值噪声限制为噪声频率低于300 KHz时， $V_{pp} = 100 \text{ mV}$ ；噪声频率高于300 KHz时，

$V_{pp} = 40 \text{ mV}$ 。这些条件可以通过在尽可能靠近电源引脚的位置适当阻断电源电压，并使用PCB 电源层和接地层来实现。

### 3.17 外设锁相环 (PER\_PLL)

表 3-37 PLL 外设

| Parameter                             | Symbol         | Values |      |      | Unit    | Note / Test Condition                                                                                                                                 |
|---------------------------------------|----------------|--------|------|------|---------|-------------------------------------------------------------------------------------------------------------------------------------------------------|
|                                       |                | Min.   | Typ. | Max. |         |                                                                                                                                                       |
| Peak Accumulated jitter at SYSCLK pin | $D_{PP} CC$    | -1000  | -    | 1000 | ps      | Peak only                                                                                                                                             |
| Peak accumulated jitter               | $D_{PPI} CC$   | -700   | -    | 700  | ps      | Peak only                                                                                                                                             |
| RMS Accumulated jitter                | $D_{RMS} CC$   | -100   | -    | 100  | ps      | measured over 1 $\mu s$ ;<br>$f_{REF} = 20 \text{ MHz}$ and $f_{DCO} = 640 \text{ MHz}$ or $f_{REF} = 25 \text{ MHz}$ and $f_{DCO} = 800 \text{ MHz}$ |
| Peak Period jitter                    | $DP CC$        | -200   | -    | 200  | ps      | $f_{DCO} = 640 \text{ MHz}$ or $f_{DCO} = 800 \text{ MHz}$                                                                                            |
| Absolute RMS jitter (PLL out)         | $J_{ABS10} CC$ | -125   | -    | 125  | ps      | $f_{REF} = 10 \text{ MHz}$ ; $f_{DCO} = 640 \text{ MHz}$                                                                                              |
| Absolute RMS jitter (PLL out)         | $J_{ABS20} CC$ | -85    | -    | 85   | ps      | $f_{REF} = 20 \text{ MHz}$ ; $f_{DCO} = 640 \text{ MHz}$                                                                                              |
| Absolute RMS jitter (PLL out)         | $J_{ABS25} CC$ | -85    | -    | 85   | ps      | $f_{REF} = 25 \text{ MHz}$ ; $f_{DCO} = 800 \text{ MHz}$                                                                                              |
| DCO frequency range                   | $f_{DCO} CC$   | 400    | -    | 800  | MHz     |                                                                                                                                                       |
| DCO input frequency range             | $f_{REF} CC$   | 10     | -    | 40   | MHz     |                                                                                                                                                       |
| PLL lock-in time                      | $t_L CC$       | 4      | -    | 100  | $\mu s$ |                                                                                                                                                       |

注意：如果每个引脚的电容负载在最大驱动器和锐边的情况下不超过  $C_L = 20 \text{ pF}$ ，则指定的PLL 抖动值有效。

注意：电源电压上的最大峰峰值噪声限制为噪声频率低于300 KHz时， $V_{pp} = 100 \text{ mV}$ ；噪声频率高于300 KHz时，

$V_{pp} = 40 \text{ mV}$ 。这些条件可以通过在尽可能靠近电源引脚的位置适当阻断电源电压，并使用PCB 电源层和接地层来实现。

### 3.18 交流规范

所有交流参数均由3.4章节中定义的完整操作范围指定，除非在“注释/测试条件”栏中另有说明。

除非图中另有说明，否则时间定义遵循以下准则：

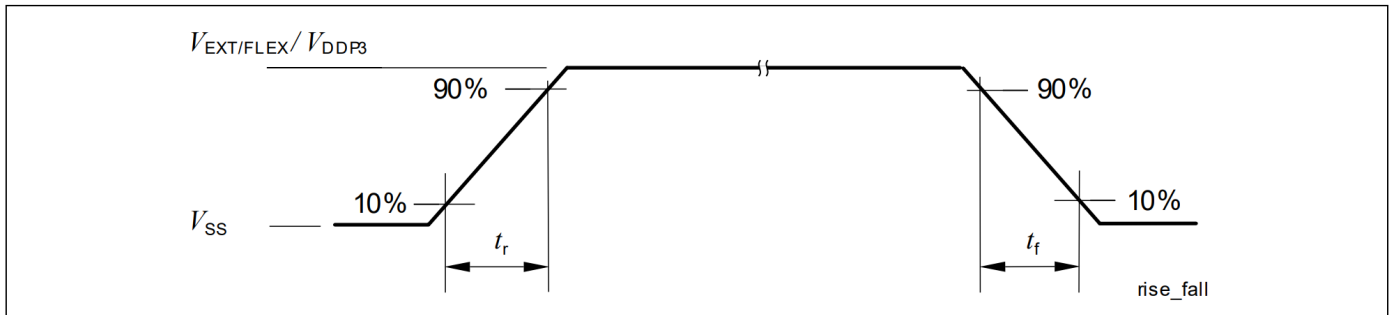


图 3-8 上升/下降时间的定义

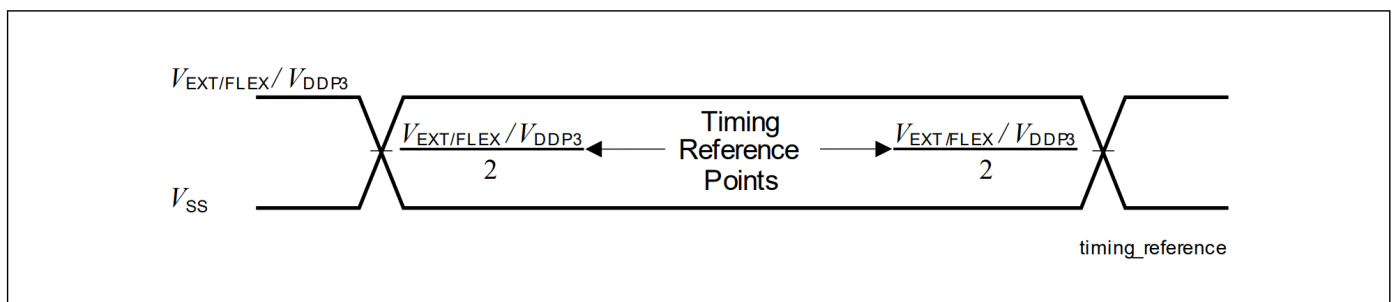


图 3-9 时间基准点定义

### 3.19 JTAG参数

以下参数适用于通过 JTAG 调试接口进行通信。JTAG模块完全符合IEEE1149.1-2000。

表 3-38 JTAG

| Parameter                                                | Symbol      | Values |      |      | Unit | Note / Test Condition  |
|----------------------------------------------------------|-------------|--------|------|------|------|------------------------|
|                                                          |             | Min.   | Typ. | Max. |      |                        |
| TCK clock period                                         | $t_1$ SR    | 50     | -    | -    | ns   |                        |
| TCK high time                                            | $t_2$ SR    | 10     | -    | -    | ns   |                        |
| TCK low time                                             | $t_3$ SR    | 10     | -    | -    | ns   |                        |
| TCK clock rise time                                      | $t_4$ SR    | -      | -    | 4    | ns   |                        |
| TCK clock fall time                                      | $t_5$ SR    | -      | -    | 4    | ns   |                        |
| TDI/TMS setup to TCK rising edge                         | $t_6$ SR    | 6.0    | -    | -    | ns   |                        |
| TDI/TMS hold after TCK rising edge                       | $t_7$ SR    | 6.0    | -    | -    | ns   |                        |
| TDO valid after TCK falling edge (propagation delay)     | $t_8$ CC    | 3.0    | -    | -    | ns   | $C_L \leq 20\text{pF}$ |
|                                                          |             | -      | -    | 25   | ns   | $C_L \leq 50\text{pF}$ |
| TDO hold after TCK falling edge                          | $t_{18}$ CC | 2      | -    | -    | ns   |                        |
| TDO high impedance to valid from TCK falling edge        | $t_9$ CC    | -      | -    | 25   | ns   | $C_L \leq 50\text{pF}$ |
| TDO valid output to high impedance from TCK falling edge | $t_{10}$ CC | -      | -    | 25   | ns   | $C_L \leq 50\text{pF}$ |

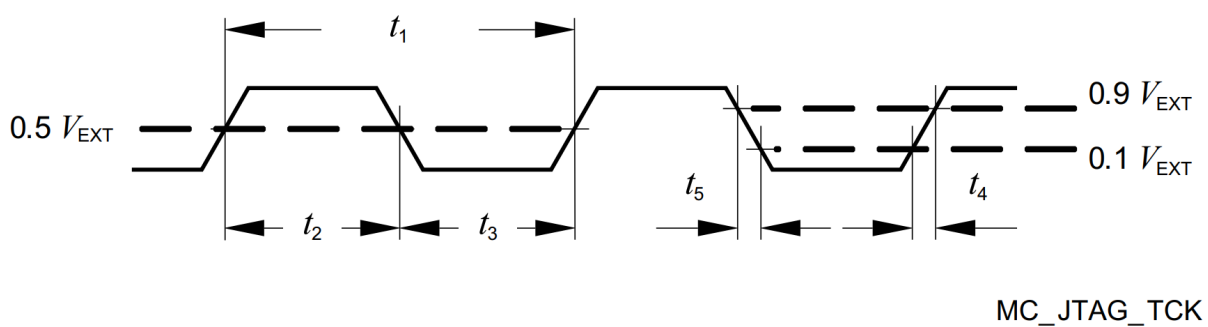


图3-10测试时钟时序 (TCK)

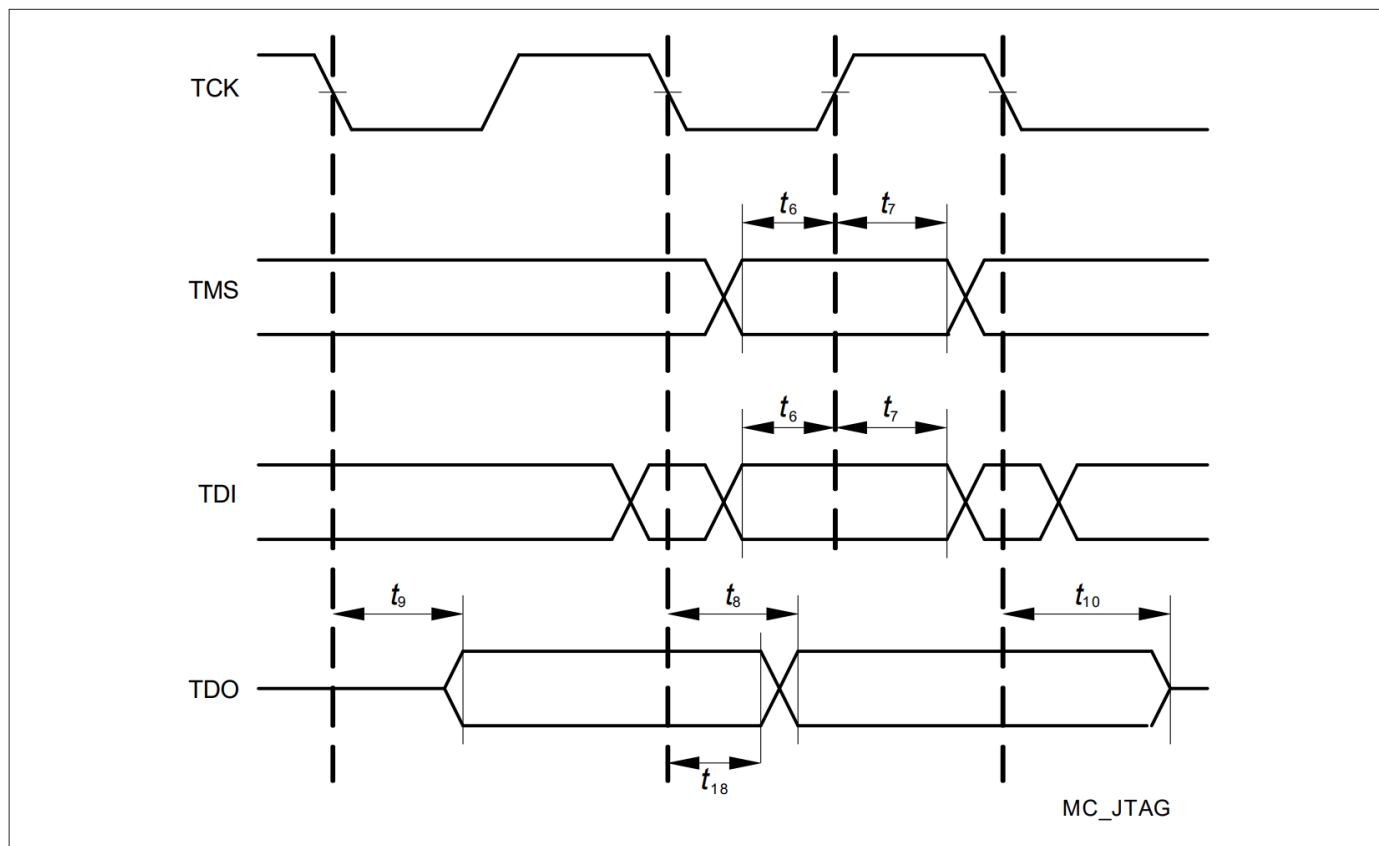


图 3-11 JTAG 时序

### 3.20 DAP 参数

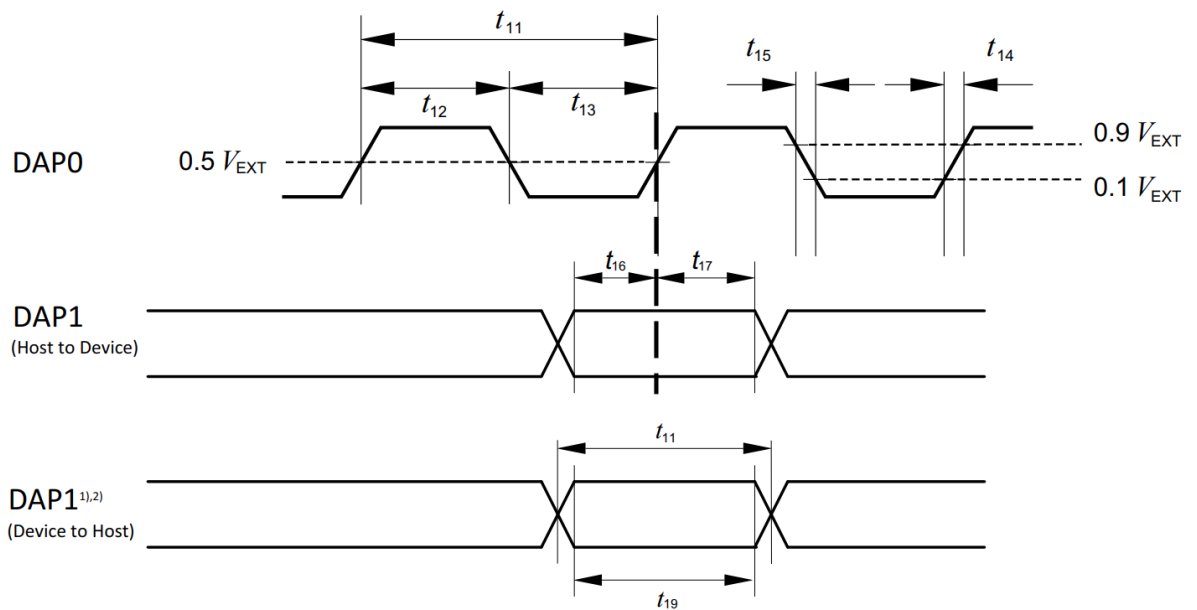
以下参数适用于通过 DAP 调试接口进行通信。

表 3-39 DAP

| Parameter                        | Symbol      | Values |      |      | Unit | Note / Test Condition        |
|----------------------------------|-------------|--------|------|------|------|------------------------------|
|                                  |             | Min.   | Typ. | Max. |      |                              |
| DAP0 clock rise time             | $t_{14}$ SR | -      | -    | 1    | ns   | f=160MHz                     |
|                                  |             | -      | -    | 4    | ns   | f=40MHz                      |
|                                  |             | -      | -    | 2    | ns   | f=80MHz                      |
| DAP0 clock fall time             | $t_{15}$ SR | -      | -    | 1    | ns   | f=160MHz                     |
|                                  |             | -      | -    | 4    | ns   | f=40MHz                      |
|                                  |             | -      | -    | 2    | ns   | f=80MHz                      |
| DAP1 setup to DAP0 rising edge   | $t_{16}$ SR | 4      | -    | -    | ns   |                              |
|                                  |             | 5      | -    | -    | ns   | f=40MHz                      |
| DAP1 hold after DAP0 rising edge | $t_{17}$ SR | 2      | -    | -    | ns   |                              |
| DAP1 valid per DAP0 clock period | $t_{19}$ CC | 4      | -    | -    | ns   | $C_L=20\text{pF}$ ; f=160MHz |
|                                  |             | 8      | -    | -    | ns   | $C_L=20\text{pF}$ ; f=80MHz  |
|                                  |             | 10     | -    | -    | ns   | $C_L=50\text{pF}$ ; f=40MHz  |
| DAP0 high time                   | $t_{12}$ SR | 2      | -    | -    | ns   |                              |
| DAP0 low time                    | $t_{13}$ SR | 2      | -    | -    | ns   |                              |
| DAP0 clock period                | $t_{11}$ SR | 6.25   | -    | -    | ns   |                              |

表 3-40 SCR DAP

| Parameter                        | Symbol      | Values |      |      | Unit | Note / Test Condition       |
|----------------------------------|-------------|--------|------|------|------|-----------------------------|
|                                  |             | Min.   | Typ. | Max. |      |                             |
| DAP0 clock rise time             | $t_{14}$ SR | -      | -    | 8    | ns   | f=20MHz                     |
| DAP0 clock fall time             | $t_{15}$ SR | -      | -    | 8    | ns   | f=20MHz                     |
| DAP1 setup to DAP0 rising edge   | $t_{16}$ SR | 10     | -    | -    | ns   |                             |
| DAP1 hold after DAP0 rising edge | $t_{17}$ SR | 10     | -    | -    | ns   |                             |
| DAP1 valid per DAP0 clock period | $t_{19}$ CC | 30     | -    | -    | ns   | $C_L=20\text{pF}$ ; f=20MHz |
| DAP0 high time                   | $t_{12}$ SR | 15     | -    | -    | ns   |                             |
| DAP0 low time                    | $t_{13}$ SR | 15     | -    | -    | ns   |                             |
| DAP0 clock period                | $t_{11}$ SR | 50     | -    | -    | ns   |                             |



- 1) The DAP1 and DAP2 device to host timing is individual for both pins.  
There is no guaranteed max. signal skew.
- 2) No explicit setup and hold times are given for DAP1 for the direction Device to Host.  
Only  $t_{11}$  and  $t_{19}$  are guaranteed and the tool may set the sample point freely.

图 3-12 DAP 时序

注释: DAP1 和 DAP2 器件对主控器件的两个引脚都是单独的。没有保证的最大值。信号偏差。

### 3.21 ASCLIN SPI 主时序

本节定义了 TC38x 中 ASCLIN 的时序。

注意：焊盘不对称已包含在以下计时中。

表 3-41 主模式强尖锐 (ss) 输出焊盘

| Parameter                               | Symbol       | Values |      |      | Unit | Note / Test Condition |
|-----------------------------------------|--------------|--------|------|------|------|-----------------------|
|                                         |              | Min.   | Typ. | Max. |      |                       |
| ASCLKO clock period                     | $t_{50}$ CC  | 20     | -    | -    | ns   | $C_L=25\text{pF}$     |
| Deviation from ideal duty cycle         | $t_{500}$ CC | -2     | -    | 2    | ns   | $C_L=25\text{pF}$     |
| MTSR delay from ASCLKO shifting edge    | $t_{51}$ CC  | -3.5   | -    | 3.5  | ns   | $C_L=25\text{pF}$     |
| ASLSON delay from the first ASCLKO edge | $t_{510}$ CC | -3     | -    | 3.5  | ns   | $C_L=25\text{pF}$     |
| MRST setup to ASCLKO latching edge      | $t_{52}$ SR  | 25     | -    | -    | ns   | $C_L=25\text{pF}$     |
| MRST hold from ASCLKO latching edge     | $t_{53}$ SR  | -2     | -    | -    | ns   | $C_L=25\text{pF}$     |

表 3-42 主模式强中型 (sm) 输出焊盘

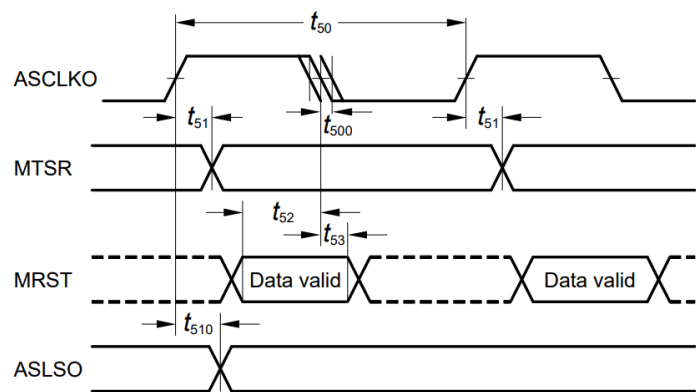
| Parameter                               | Symbol       | Values |      |      | Unit | Note / Test Condition |
|-----------------------------------------|--------------|--------|------|------|------|-----------------------|
|                                         |              | Min.   | Typ. | Max. |      |                       |
| ASCLKO clock period                     | $t_{50}$ CC  | 50     | -    | -    | ns   | $C_L=50\text{pF}$     |
| Deviation from ideal duty cycle         | $t_{500}$ CC | -5     | -    | 5    | ns   | $C_L=50\text{pF}$     |
| MTSR delay from ASCLKO shifting edge    | $t_{51}$ CC  | -7     | -    | 7    | ns   | $C_L=50\text{pF}$     |
| ASLSON delay from the first ASCLKO edge | $t_{510}$ CC | -7     | -    | 7    | ns   | $C_L=50\text{pF}$     |
| MRST setup to ASCLKO latching edge      | $t_{52}$ SR  | 35     | -    | -    | ns   | $C_L=50\text{pF}$     |
| MRST hold from ASCLKO latching edge     | $t_{53}$ SR  | -5     | -    | -    | ns   | $C_L=50\text{pF}$     |

表 3-43 主模式中型 (m) 输出焊盘

| Parameter                               | Symbol       | Values |      |      | Unit | Note / Test Condition |
|-----------------------------------------|--------------|--------|------|------|------|-----------------------|
|                                         |              | Min.   | Typ. | Max. |      |                       |
| ASCLKO clock period                     | $t_{50}$ CC  | 160    | -    | -    | ns   | $C_L=50\text{pF}$     |
| Deviation from ideal duty cycle         | $t_{500}$ CC | -10    | -    | 10   | ns   | $C_L=50\text{pF}$     |
| MTSR delay from ASCLKO shifting edge    | $t_{51}$ CC  | -20    | -    | 20   | ns   | $C_L=50\text{pF}$     |
| ASLSON delay from the first ASCLKO edge | $t_{510}$ CC | -20    | -    | 20   | ns   | $C_L=50\text{pF}$     |

表 3-43 主模式中型 (m) 输出焊盘 (续)

| Parameter                           | Symbol      | Values |      |      | Unit | Note / Test Condition |
|-------------------------------------|-------------|--------|------|------|------|-----------------------|
|                                     |             | Min.   | Typ. | Max. |      |                       |
| MRST setup to ASCLKO latching edge  | $t_{52}$ SR | 80     | -    | -    | ns   | $C_L=50\text{pF}$     |
| MRST hold from ASCLKO latching edge | $t_{53}$ SR | -15    | -    | -    | ns   | $C_L=50\text{pF}$     |



ASCLIN\_TmgMM.vsd

图 3-13 ASCLIN SPI 主机时序

### 3.22 QSPI 时序、主模式和从模式

本节定义了 TC38x 中 QSPI 的时序。

假设 SCLKO、MTSR 和 SLSO 焊盘具有相同的焊盘设置：

注意：焊盘不对称已包含在以下计时中。

表 3-44 主模式时序，LVDS 数据和时钟输出焊盘

| Parameter                                          | Symbol       | Values             |      |                   | Unit | Note / Test Condition                            |
|----------------------------------------------------|--------------|--------------------|------|-------------------|------|--------------------------------------------------|
|                                                    |              | Min.               | Typ. | Max.              |      |                                                  |
| SCLKO clock period                                 | $t_{50}$ CC  | 20 <sup>1)</sup>   | -    | -                 | ns   | CL=25pF                                          |
| Deviation from the ideal duty cycle                | $t_{500}$ CC | -1 <sup>1)</sup>   | -    | 1 <sup>1)</sup>   | ns   | CL=25pF                                          |
| MTSR delay from SCLKO shifting edge                | $t_{51}$ CC  | -3 <sup>1)</sup>   | -    | 4 <sup>1)</sup>   | ns   | CL=25pF                                          |
| SLSOn deviation from the ideal programmed position | $t_{510}$ CC | -4 <sup>1)</sup>   | -    | 5.5 <sup>1)</sup> | ns   | $C_L$ =25pF, driver strength ss                  |
|                                                    |              | -10 <sup>1)</sup>  | -    | 10 <sup>1)</sup>  | ns   | $C_L$ =25pF, driver strength sm                  |
|                                                    |              | -30 <sup>1)</sup>  | -    | 30 <sup>1)</sup>  | ns   | $C_L$ =25pF, driver strength m                   |
| MRST setup to SCLK latching edge                   | $t_{52}$ SR  | 18 <sup>1)</sup>   | -    | -                 | ns   | CL=25pF; valid for LVDS Input pads of QSPI2 only |
|                                                    |              | 19.5 <sup>1)</sup> | -    | -                 | ns   | CL=25pF; valid for LVDS Input pads of QSPI4 only |
| MRST hold from SCLK latching edge                  | $t_{53}$ SR  | -1 <sup>1)</sup>   | -    | -                 | ns   | CL=25pF; valid for LVDS Input pads only          |

1) 条件列表中定义的负载 ( $C_L$ =25pF) 是针对单端信号 SLSO 的负载定义，并不旨在在差分信号线内添加额外负载。对于单端信号，负载定义定义了 PCB 布局上信号的最大长度。对于 LVDS 焊盘，适用 IEEE Std 1596.3-1996 负载定义。

表 3-45 主模式强尖锐 (ss) 输出焊盘

| Parameter                                          | Symbol       | Values              |      |      | Unit | Note / Test Condition |
|----------------------------------------------------|--------------|---------------------|------|------|------|-----------------------|
|                                                    |              | Min.                | Typ. | Max. |      |                       |
| SCLKO clock period                                 | $t_{50}$ CC  | 50                  | -    | -    | ns   | CL=25pF               |
| Deviation from the ideal duty cycle                | $t_{500}$ CC | -2                  | -    | 2    | ns   | CL=25pF               |
| MTSR delay from SCLKO shifting edge                | $t_{51}$ CC  | -4                  | -    | 5    | ns   | CL=25pF               |
| SLSOn deviation from the ideal programmed position | $t_{510}$ CC | -4                  | -    | 5    | ns   | CL=25pF               |
| MRST setup to SCLK latching edge                   | $t_{52}$ SR  | 25 <sup>1) 2)</sup> | -    | -    | ns   | CL=25pF               |
| MRST hold from SCLK latching edge                  | $t_{53}$ SR  | -2 <sup>1) 2)</sup> | -    | -    | ns   | CL=25pF               |

## 电气规格 QSPI 时序、主从模式

- 1) 为了补偿平均片上延迟, QSPI 模块提供了位域 ECONZ.A、B 和 C。
- 2) 建立和保持时间对于输入垫阈值的两种设置均有效: TTL 和 AL。

表 3-46 主模式强中型 (sm) 输出焊盘

| Parameter                                          | Symbol               | Values              |      |      | Unit | Note / Test Condition |
|----------------------------------------------------|----------------------|---------------------|------|------|------|-----------------------|
|                                                    |                      | Min.                | Typ. | Max. |      |                       |
| SCLKO clock period                                 | $t_{50} \text{ CC}$  | 50                  | -    | -    | ns   | CL=50pF               |
| Deviation from the ideal duty cycle                | $t_{500} \text{ CC}$ | -5                  | -    | 5    | ns   | CL=50pF               |
| MTSR delay from SCLKO shifting edge                | $t_{51} \text{ CC}$  | -7                  | -    | 7    | ns   | CL=50pF               |
| SLSON deviation from the ideal programmed position | $t_{510} \text{ CC}$ | -7                  | -    | 7    | ns   | CL=50pF               |
| MRST setup to SCLK latching edge                   | $t_{52} \text{ SR}$  | 35 <sup>1) 2)</sup> | -    | -    | ns   | CL=50pF               |
| MRST hold from SCLK latching edge                  | $t_{53} \text{ SR}$  | -5 <sup>1) 2)</sup> | -    | -    | ns   | CL=50pF               |

- 1) 为了补偿平均片上延迟, QSPI 模块提供了位域 ECONZ.A、B 和 C。
- 2) 建立和保持时间对于输入垫阈值的两种设置均有效: TTL 和 AL。

表 3-47 主模式中等 (m) 输出焊盘

| Parameter                                          | Symbol               | Values               |      |      | Unit | Note / Test Condition |
|----------------------------------------------------|----------------------|----------------------|------|------|------|-----------------------|
|                                                    |                      | Min.                 | Typ. | Max. |      |                       |
| SCLKO clock period                                 | $t_{50} \text{ CC}$  | 160                  | -    | -    | ns   | CL=50pF               |
| Deviation from the ideal duty cycle                | $t_{500} \text{ CC}$ | -10                  | -    | 10   | ns   | CL=50pF               |
| MTSR delay from SCLKO shifting edge                | $t_{51} \text{ CC}$  | -20                  | -    | 20   | ns   | CL=50pF               |
| SLSON deviation from the ideal programmed position | $t_{510} \text{ CC}$ | -20                  | -    | 20   | ns   | CL=50pF               |
| MRST setup to SCLK latching edge                   | $t_{52} \text{ SR}$  | 80 <sup>1) 2)</sup>  | -    | -    | ns   | CL=50pF               |
| MRST hold from SCLK latching edge                  | $t_{53} \text{ SR}$  | -15 <sup>1) 2)</sup> | -    | -    | ns   | CL=50pF               |
|                                                    |                      | -13 <sup>1) 2)</sup> | -    | -    | ns   | CL=50pF; SCR SSC      |

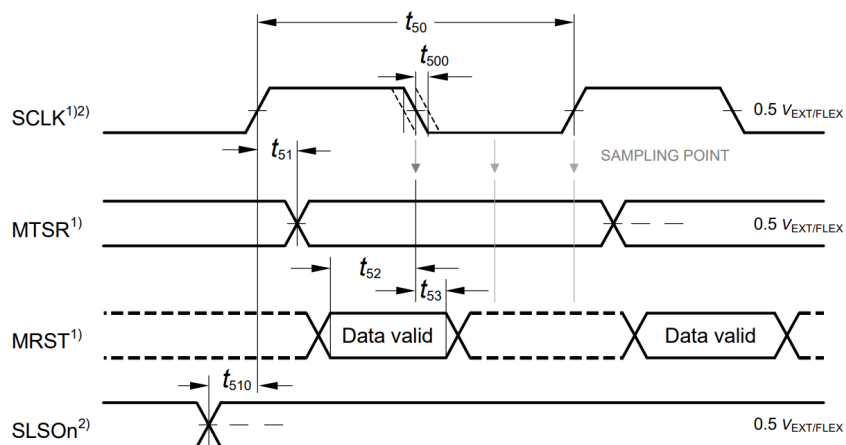
- 1) 为了补偿平均片上延迟, QSPI 模块提供了位域 ECONZ.A、B 和 C。
- 2) 建立和保持时间对于输入垫阈值的两种设置均有效: TTL 和 AL。

表 3-48 从模式时序

| Parameter         | Symbol                     | Values                    |      |      | Unit | Note / Test Condition |
|-------------------|----------------------------|---------------------------|------|------|------|-----------------------|
|                   |                            | Min.                      | Typ. | Max. |      |                       |
| SCLK clock period | $t_{54} \text{ SR}$        | $4 \times T_{\text{MAX}}$ | -    | -    | ns   |                       |
| SCLK duty cycle   | $t_{55}/t_{54} \text{ SR}$ | 40                        | -    | 60   | %    |                       |

表 3-48 从模式时序 (续)

| Parameter                              | Symbol      | Values |      |      | Unit | Note / Test Condition                             |
|----------------------------------------|-------------|--------|------|------|------|---------------------------------------------------|
|                                        |             | Min.   | Typ. | Max. |      |                                                   |
| MTSR setup to SCLK latching edge       | $t_{56}$ SR | 6      | -    | -    | ns   | Input Level AL                                    |
|                                        |             | 6      | -    | -    | ns   | Input Level TTL                                   |
| MTSR hold from SCLK latching edge      | $t_{57}$ SR | 4      | -    | -    | ns   | Input Level AL                                    |
|                                        |             | 6      | -    | -    | ns   | Input Level TTL                                   |
| SLSI setup to first SCLK shift edge    | $t_{58}$ SR | 4      | -    | -    | ns   | Input Level AL                                    |
|                                        |             | 6      | -    | -    | ns   | Input Level TTL                                   |
| SLSI hold from last SCLK latching edge | $t_{59}$ SR | 3      | -    | -    | ns   | Input Level AL                                    |
|                                        |             | 6      | -    | -    | ns   | Input Level TTL                                   |
| MRST delay from SCLK shift edge        | $t_{60}$ CC | 5      | -    | 35   | ns   | driver = strong edge = medium ; $C_L=50\text{pF}$ |
|                                        |             | 2      | -    | 24   | ns   | driver = strong edge = sharp ; $C_L=50\text{pF}$  |
|                                        |             | 15     | -    | 80   | ns   | medium driver ; $C_L=50\text{pF}$                 |
|                                        |             | 14     | -    | -    | ns   | medium driver ; $C_L=50\text{pF}$ ; SCR SSC       |

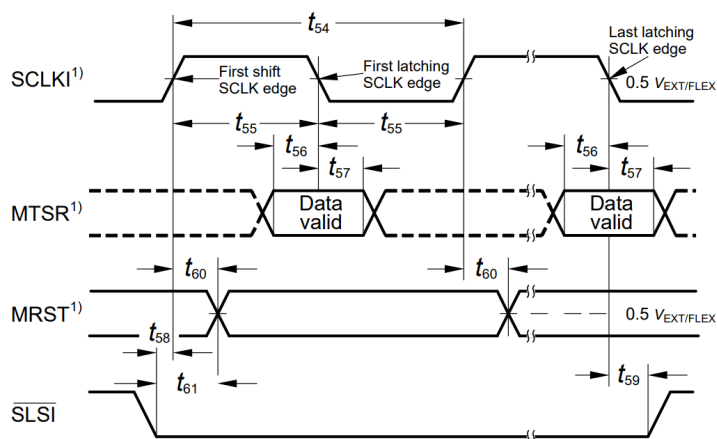


1) This timing is based on the following setup: ECON.CPH = 1, ECON.CPOL = 0, ECON.B=0 (no sampling point delay).

2) t510 is the deviation from the ideal position configured with the leading delay, BACON.LPRE and BACON.LEAD > 0.

QSPI\_TmgMM.vsd

图 3-14 主模式时序



1) This timing is based on the following setup: ECON.CPH = 1, ECON.CPOL = 0. QSPI\_TmgSM.vsd

图3-15 从模式时序

### 3.23 MSC时序 5 V 操作

以下部分定义了时间。

注意：焊盘不对称已包含在以下计时中。

注释：LVDS焊盘的负载在下列时序中定义为差分负载。

表 3-49 5V下的LVDS 时钟/数据（LVDS 模式下的 LVDS 焊盘）

| Parameter                       | Symbol              | Values              |      |                  | Unit | Note / Test Condition                       |
|---------------------------------|---------------------|---------------------|------|------------------|------|---------------------------------------------|
|                                 |                     | Min.                | Typ. | Max.             |      |                                             |
| FCLPx clock period              | $t_{40\text{ CC}}$  | $2 * T_{A1) 2) 3)}$ | -    | -                | ns   | LVDS; $C_L=50\text{pF}$                     |
| Deviation from ideal duty cycle | $t_{400\text{ CC}}$ | -1 <sup>3)</sup>    | -    | 1 <sup>3)</sup>  | ns   | LVDS; $0 < C_L < 50\text{pF}$               |
| SOPx output delay               | $t_{44\text{ CC}}$  | -3 <sup>3)</sup>    | -    | 3 <sup>3)</sup>  | ns   | $C_L=50\text{pF}$                           |
| ENx output delay                | $t_{45\text{ CC}}$  | -4 <sup>3)</sup>    | -    | 5 <sup>3)</sup>  | ns   | ss; $C_L=50\text{pF}$ ; ABRA block bypassed |
|                                 |                     | -4 <sup>3)</sup>    | -    | 4 <sup>3)</sup>  | ns   | ss; $C_L=50\text{pF}$ ; ABRA block used     |
|                                 |                     | -2 <sup>3)</sup>    | -    | 10 <sup>3)</sup> | ns   | sm; $C_L=50\text{pF}$                       |
|                                 |                     | -30 <sup>3)</sup>   | -    | 30 <sup>3)</sup> | ns   | m; $C_L=50\text{pF}$                        |

1)  $T_A$ 取决于为MSC的 ABRA 功能块中的波特率生成选择的时钟源。

2) LVDS引脚上的容性负载是差分的，CMOS 引脚上的容性负载是单端的。

3) 条件列表中定义的负载（ $C_L=50\text{pF}$ ）是针对单端信号 EN 的负载定义，并不旨在在差分信号线内添加额外负载。对于单端信号，负载定义定义了 PCB 布局上信号的最大长度。对于 LVDS 焊盘，适用 IEEE Std 1596.3-1996 负载定义。

表 3-50 5V下的强尖锐（ss）时钟/数据驱动器

| Parameter                       | Symbol              | Values    |      |      | Unit | Note / Test Condition |
|---------------------------------|---------------------|-----------|------|------|------|-----------------------|
|                                 |                     | Min.      | Typ. | Max. |      |                       |
| FCLPx clock period              | $t_{40\text{ CC}}$  | $2 * T_A$ | -    | -    | ns   | $C_L=50\text{pF}$     |
| Deviation from ideal duty cycle | $t_{400\text{ CC}}$ | -2        | -    | 2    | ns   | $C_L=50\text{pF}$     |
| SOPx output delay               | $t_{44\text{ CC}}$  | -4        | -    | 3.5  | ns   | $C_L=50\text{pF}$     |
| ENx output delay                | $t_{45\text{ CC}}$  | -4        | -    | 3.5  | ns   | $C_L=50\text{pF}$     |

表 3-51 5V下的强中型（sm）时钟/数据驱动器

| Parameter                       | Symbol              | Values    |      |      | Unit | Note / Test Condition |
|---------------------------------|---------------------|-----------|------|------|------|-----------------------|
|                                 |                     | Min.      | Typ. | Max. |      |                       |
| FCLPx clock period              | $t_{40\text{ CC}}$  | $2 * T_A$ | -    | -    | ns   | $C_L=50\text{pF}$     |
| Deviation from ideal duty cycle | $t_{400\text{ CC}}$ | -5        | -    | 5    | ns   | $C_L=50\text{pF}$     |
| SOPx output delay               | $t_{44\text{ CC}}$  | -7        | -    | 7    | ns   | $C_L=50\text{pF}$     |
| ENx output delay                | $t_{45\text{ CC}}$  | -7        | -    | 7    | ns   | $C_L=50\text{pF}$     |

表 3-52 5V下的中等（m）时钟/数据驱动器

| Parameter                       | Symbol       | Values    |      |      | Unit | Note / Test Condition |
|---------------------------------|--------------|-----------|------|------|------|-----------------------|
|                                 |              | Min.      | Typ. | Max. |      |                       |
| FCLPx clock period              | $t_{40}$ CC  | $2 * T_A$ | -    | -    | ns   | CL=50pF               |
| Deviation from ideal duty cycle | $t_{400}$ CC | -10       | -    | 10   | ns   | CL=50pF               |
| SOPx output delay               | $t_{44}$ CC  | -20       | -    | 20   | ns   | CL=50pF               |
| ENx output delay                | $t_{45}$ CC  | -20       | -    | 20   | ns   | CL=50pF               |

表 3-53 上行接口

| Parameter     | Symbol      | Values        |      |      | Unit | Note / Test Condition |
|---------------|-------------|---------------|------|------|------|-----------------------|
|               |             | Min.          | Typ. | Max. |      |                       |
| SDI bit time  | $t_{46}$ SR | $8 * t_{MSC}$ | -    | -    | ns   |                       |
| SDI rise time | $t_{48}$ SR | -             | -    | 200  | ns   |                       |
| SDI fall time | $t_{49}$ SR | -             | -    | 200  | ns   |                       |

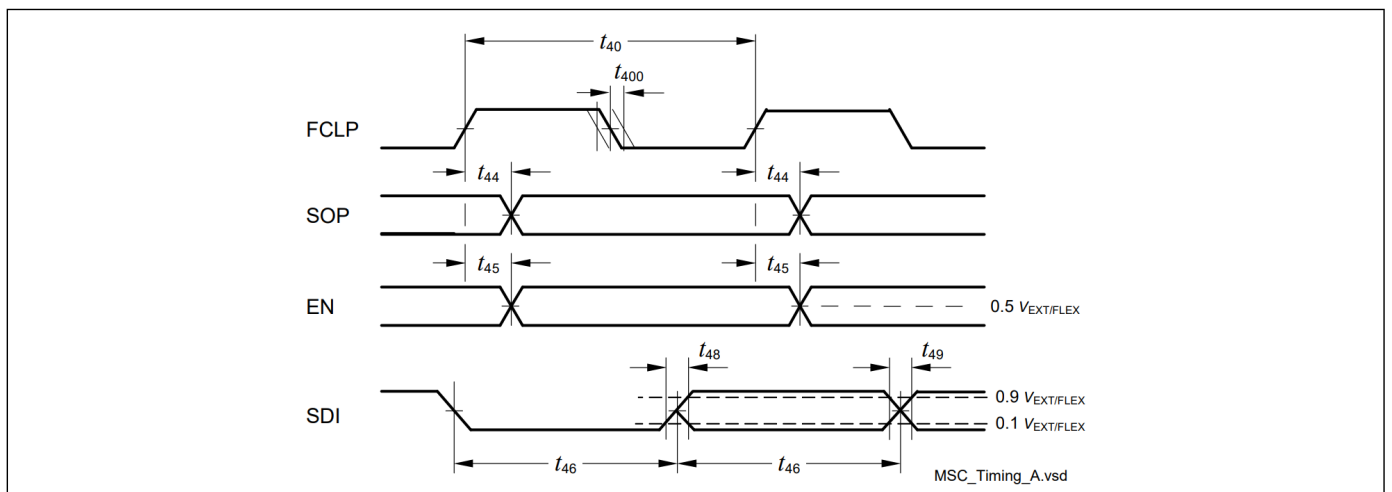


图 3-16 MSC 接口时序

注释：SOP数据信号是在目标器件中的FCLP的下降沿进行采样的。

## 3.24 以太网接口 (ETH) 特性

### 3.24.1 ETH 测量参考点

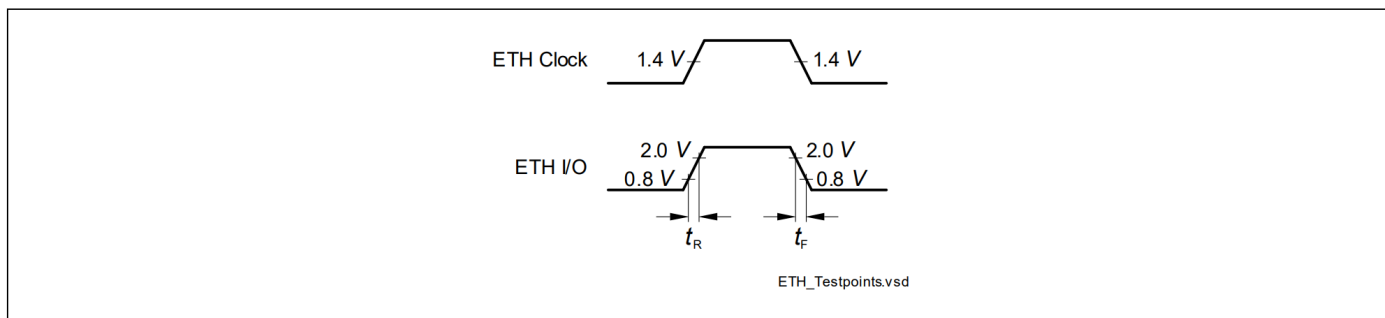


图 3-17 ETH 测量参考点

### 3.24.2 ETH管理信号参数 (ETH\_MDC、ETH\_MDIO)

表 3-54 3.3V 有效的 ETH 管理信号参数

| Parameter                    | Symbol   | Values |      |      | Unit | Note / Test Condition |
|------------------------------|----------|--------|------|------|------|-----------------------|
|                              |          | Min.   | Typ. | Max. |      |                       |
| ETH_MDC period               | $t_1$ CC | 400    | -    | -    | ns   | CL=25pF               |
| ETH_MDC high time            | $t_2$ CC | 160    | -    | -    | ns   | CL=25pF               |
| ETH_MDC low time             | $t_3$ CC | 160    | -    | -    | ns   | CL=25pF               |
| ETH_MDIO setup time (output) | $t_4$ CC | 10     | -    | -    | ns   | CL=25pF               |
| ETH_MDIO hold time (output)  | $t_5$ CC | 10     | -    | -    | ns   | CL=25pF               |
| ETH_MDIO data valid (input)  | $t_6$ SR | 0      | -    | 300  | ns   | CL=25pF               |

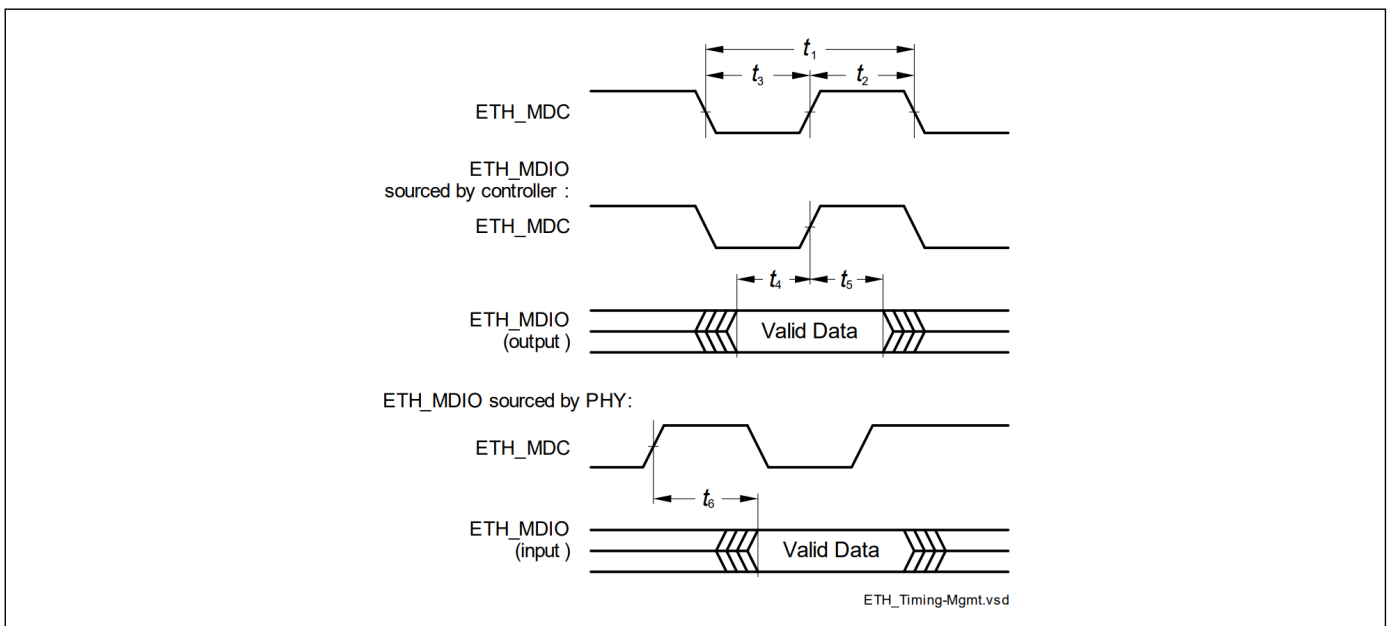


图 3-18 ETH 管理信号时序

### 3.24.3 ETH MII 参数

下面介绍MII（媒体独立接口）的参数。

表 3-55 ETH RMII 信号时序参数

| Parameter         | Symbol      | Values            |      |                   | Unit | Note / Test Condition         |
|-------------------|-------------|-------------------|------|-------------------|------|-------------------------------|
|                   |             | Min.              | Typ. | Max.              |      |                               |
| Clock period      | $t_7$ SR    | -                 | 40   | -                 | ns   | CL=25pF ;<br>baudrate=100Mbps |
|                   |             | -                 | 400  | -                 | ns   | CL=25pF ;<br>baudrate=10Mbps  |
| Clock high time   | $t_8$ SR    | 14                | -    | 26                | ns   | CL=25pF ;<br>baudrate=100Mbps |
|                   |             | 140 <sup>1)</sup> | -    | 260 <sup>2)</sup> | ns   | CL=25pF ;<br>baudrate=10Mbps  |
| Clock low time    | $t_9$ SR    | 14                | -    | 26                | ns   | CL=25pF ;<br>baudrate=100Mbps |
|                   |             | 140 <sup>1)</sup> | -    | 260 <sup>2)</sup> | ns   | CL=25pF ;<br>baudrate=10Mbps  |
| Input setup time  | $t_{10}$ SR | 10                | -    | -                 | ns   | CL=25pF                       |
| Input hold time   | $t_{11}$ SR | 10                | -    | -                 | ns   | CL=25pF                       |
| Output valid time | $t_{12}$ CC | 0                 | -    | 25                | ns   | CL=25pF                       |

1) 按时钟周期的 35% 定义。

2) 按时钟周期的 65% 定义。

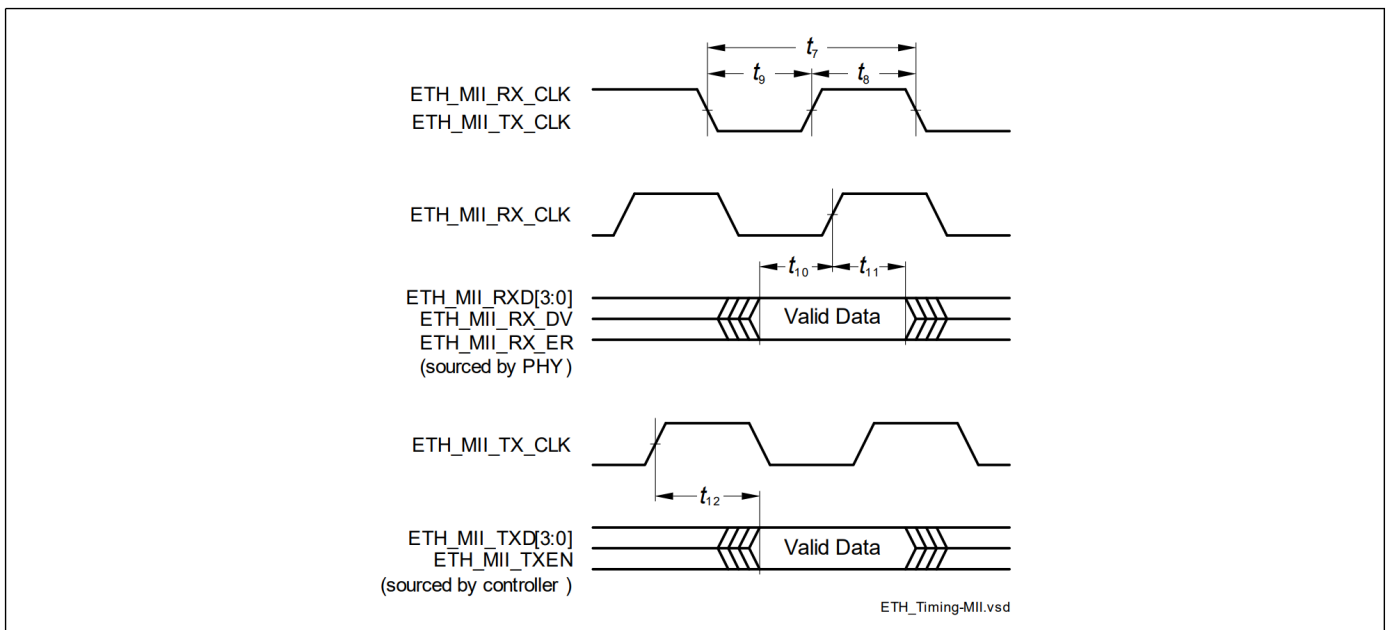


图 3-19 ETH MII 信号时序

### 3.24.4 ETH RMII 参数

下面介绍RMII（精简媒体独立接口）的参数。

表 3-56 ETH RMII 信号时序参数适用于 3.3V

| Parameter                                                             | Symbol      | Values          |      |                  | Unit | Note / Test Condition |
|-----------------------------------------------------------------------|-------------|-----------------|------|------------------|------|-----------------------|
|                                                                       |             | Min.            | Typ. | Max.             |      |                       |
| ETH_RMII_REF_CL clock period                                          | $t_{13}$ SR | -               | 20   | -                | ns   | 50ppm ; CL=25pF       |
| ETH_RMII_REF_CL clock high time                                       | $t_{14}$ SR | 7 <sup>1)</sup> | -    | 13 <sup>2)</sup> | ns   | CL=25pF               |
| ETH_RMII_REF_CL clock low time                                        | $t_{15}$ SR | 7 <sup>1)</sup> | -    | 13 <sup>2)</sup> | ns   | CL=25pF               |
| ETHTXEN, ETHTXD[1:0], ETHRXD[1:0], ETHCRSDV; setup time <sup>3)</sup> | $t_{16}$ CC | 4               | -    | -                | ns   | CL=25pF               |
| ETHTXEN, ETHTXD[1:0], ETHRXD[1:0], ETHCRSDV; hold time <sup>3)</sup>  | $t_{17}$ CC | 2               | -    | -                | ns   | CL=25pF               |

1) 按时钟周期的 35% 定义。

2) 按时钟周期的 65% 定义。

3) 对于 ETHRXD 和 ETHCRSDV 信号，此参数是 SR。

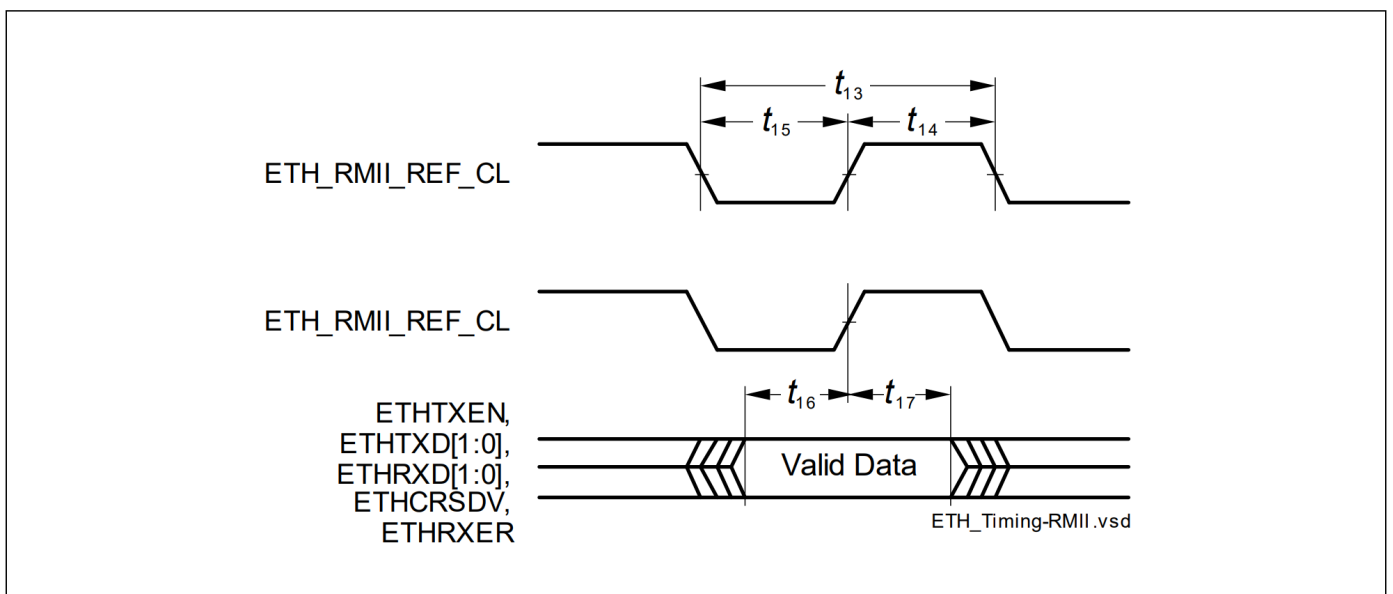


图 3-20 ETH RMII 信号时序

### 3.24.5 ETH RMII 参数

下面介绍RGMII的参数。

表 3-57 ETH RGMII 信号时序参数适用于 3.3V

| Parameter                              | Symbol            | Values |      |       | Unit | Note / Test Condition                   |
|----------------------------------------|-------------------|--------|------|-------|------|-----------------------------------------|
|                                        |                   | Min.   | Typ. | Max.  |      |                                         |
| TX Clock period                        | $t_{19}$ CC       | 36     | 40   | 44    | ns   | 100Mbps                                 |
|                                        |                   | 360    | 400  | 440   | ns   | 10Mbps                                  |
|                                        |                   | 7.2    | 8    | 8.8   | ns   | Gigabit                                 |
| Data to Clock Output skew              | $t_{20}$ CC       | -500   | 0    | 500   | ps   |                                         |
| Data to Clock input skew (at receiver) | $t_{21}$ SR       | 1      | 1.8  | 2.6   | ns   | SKEWCTL.RXCFG = 0;<br>SKEWCTL.TXCFG = 0 |
| Clock duty cycle                       | $t_{duty}$ CC     | 40     | 50   | 60    | %    | 10/100Mbps                              |
|                                        |                   | 45     | 50   | 55    | %    | Gigabit                                 |
| GREFCLK duty cycle                     | $t_{duty\_in}$ SR | 45     | -    | 55    | %    |                                         |
| GREFCLK Input accuracy                 | $ACC$ SR          | -0.005 | -    | 0.005 | %    |                                         |

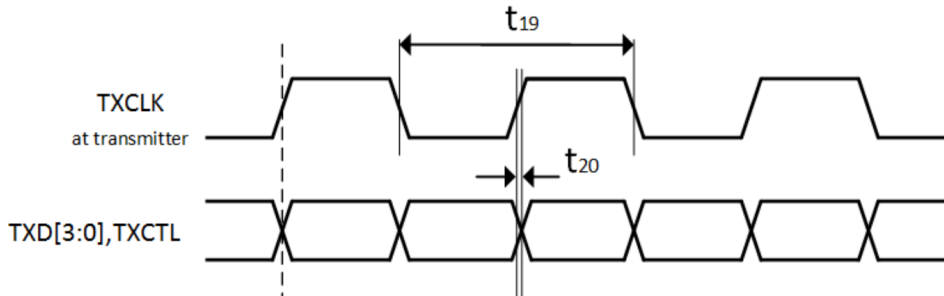


图 3-21 ETH RGMII TX 信号时序（目的地延迟 (DoD)）

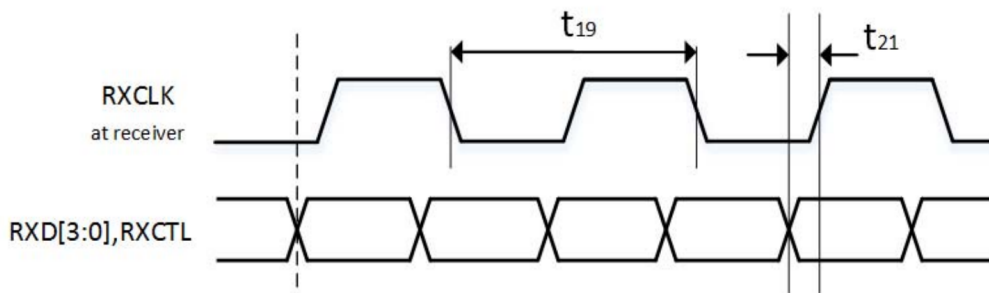


图 3-22 ETH RGMII RX 信号时序（源延迟 (DoS)）

### 3.25 E-射线参数

本节的时间安排适用于  $C_L = 25 \text{ pF}$  的输出驱动器的强驱动器和锐边设置。

表 3-58 发送参数

| Parameter                                                                                    | Symbol                          | Values |      |      | Unit | Note / Test Condition         |
|----------------------------------------------------------------------------------------------|---------------------------------|--------|------|------|------|-------------------------------|
|                                                                                              |                                 | Min.   | Typ. | Max. |      |                               |
| Rise time of TxEN                                                                            | $t_{dCCTxENRise25CC}$           | -      | -    | 9    | ns   | $C_L=25\text{pF}$             |
| Fall time of TxEN                                                                            | $t_{dCCTxENFall25CC}$           | -      | -    | 9    | ns   | $C_L=25\text{pF}$             |
| Sum of rise and fall time                                                                    | $t_{dCCTxRise25+dCCTxFall25CC}$ | -      | -    | 9    | ns   | 20% - 80% ; $C_L=25\text{pF}$ |
| Sum of delay between TP1_FF and TP1_CC and delays derived from TP1_FFi, rising edge of TxEN  | $t_{dCCTxEN01CC}$               | -      | -    | 25   | ns   |                               |
| Sum of delay between TP1_FF and TP1_CC and delays derived from TP1_FFi, falling edge of TxEN | $t_{dCCTxEN10CC}$               | -      | -    | 25   | ns   |                               |
| Asymmetry of sending                                                                         | $t_{tx\_asymCC}$                | -2.45  | -    | 2.45 | ns   | $C_L=25\text{pF}$             |
| Sum of delay between TP1_FF and TP1_CC and delays derived from TP1_FFi, rising edge of TxD   | $t_{dCCTxD01CC}$                | -      | -    | 25   | ns   |                               |
| Sum of delay between TP1_FF and TP1_CC and delays derived from TP1_FFi, falling edge of TxD  | $t_{dCCTxD10CC}$                | -      | -    | 25   | ns   |                               |
| TxD signal sum of rise and fall time at TP1_BD                                               | $t_{txd\_sumCC}$                | -      | -    | 9    | ns   |                               |

表 3-59 接收参数

| Parameter                                 | Symbol                    | Values |      |      | Unit | Note / Test Condition |
|-------------------------------------------|---------------------------|--------|------|------|------|-----------------------|
|                                           |                           | Min.   | Typ. | Max. |      |                       |
| Acceptance of asymmetry at receiving part | $t_{dCCTxAsymAccept25SR}$ | -30.5  | -    | 43.0 | ns   | $C_L=25\text{pF}$     |
| Acceptance of asymmetry at receiving part | $t_{dCCTxAsymAccept15SR}$ | -31.5  | -    | 44.0 | ns   | $C_L=15\text{pF}$     |
| Threshold for detecting logical high      | $T_{uCCLogic1SR}$         | 35     | -    | 70   | %    |                       |
| Threshold for detecting logical low       | $T_{uCCLogic0SR}$         | 30     | -    | 65   | %    |                       |

表 3-59 接收参数 (续)

| Parameter                                                                                   | Symbol            | Values |      |      | Unit | Note / Test Condition |
|---------------------------------------------------------------------------------------------|-------------------|--------|------|------|------|-----------------------|
|                                                                                             |                   | Min.   | Typ. | Max. |      |                       |
| Sum of delay between TP4_CC and TP4_FF and delays derived from TP4_FFi, rising edge of RxD  | $t_{dCCRxD01}$ CC | -      | -    | 10   | ns   |                       |
| Sum of delay between TP4_CC and TP4_FF and delays derived from TP4_FFi, falling edge of RxD | $t_{dCCRxD10}$ CC | -      | -    | 10   | ns   |                       |

### 3.26 HSCT 参数

表 3-60 HSCT - Rx 寄生参数和负载

| Parameter                   | Symbol          | Values |      |      | Unit | Note / Test Condition                                                             |
|-----------------------------|-----------------|--------|------|------|------|-----------------------------------------------------------------------------------|
|                             |                 | Min.   | Typ. | Max. |      |                                                                                   |
| Capacitance total budget    | $C_{total\ CC}$ | -      | 3.5  | 5    | pF   | Total Budget for complete receiver including silicon, package, pins and bond wire |
| Parasitic inductance budget | $H_{total\ CC}$ | -      | 5    | -    | nH   |                                                                                   |

表 3-61 HSCT - Rx/Tx 设置时序

| Parameter                                                             | Symbol              | Values |      |      | Unit | Note / Test Condition                                               |
|-----------------------------------------------------------------------|---------------------|--------|------|------|------|---------------------------------------------------------------------|
|                                                                       |                     | Min.   | Typ. | Max. |      |                                                                     |
| RX o/p duty cycle                                                     | $DC_{rx\ CC}$       | 40     | -    | 60   | %    |                                                                     |
| Disable time of the LVDS pad                                          | $t_{LVDS\ DIS\ CC}$ | -      | -    | 20   | ns   |                                                                     |
| Enable time of the LVDS pad                                           | $t_{LVDS\ SEN\ CC}$ | -      | -    | 400  | ns   |                                                                     |
| Wakeup time from Sleep Mode                                           | $t_{SWU\ CC}$       | -      | -    | 250  | ns   |                                                                     |
| Maximum length of a wake-up glitch that does not wake-up the receiver | $t_{WUP\ CC}$       | -      | -    | 0.2  | ns   |                                                                     |
| Bias startup time                                                     | $t_{bias\ CC}$      | -      | 5    | 10   | μs   | Bias distributor waking up from power down and provide stable Bias. |
| RX startup time                                                       | $t_{rx\ CC}$        | -      | -    | 600  | ns   | Wake-up RX from power down.                                         |
| TX startup time                                                       | $t_{tx\ CC}$        | -      | -    | 280  | ns   | Wake-up TX from power down.                                         |

### 3.27 Inter-IC (I2C) 接口时序

本节定义了 TC38x 中 I2C 的时序。

所有 I2C 时序参数均为主模式的 SR 和从模式的 CC。

表 3-62 I2C 标准模式时序

| Parameter                                        | Symbol   | Values |      |      | Unit | Note / Test Condition                                                          |
|--------------------------------------------------|----------|--------|------|------|------|--------------------------------------------------------------------------------|
|                                                  |          | Min.   | Typ. | Max. |      |                                                                                |
| Fall time of both SDA and SCL                    | $t_1$    | -      | -    | 300  | ns   | Measured with a pull- up resistor of 4.7 kohms at each of the SCL and SDA line |
| Capacitive load for each bus line                | $C_b$ SR | -      | -    | 400  | pF   |                                                                                |
| Bus free time between a STOP and ATART condition | $t_{10}$ | 4.7    | -    | -    | μs   | Measured with a pull- up resistor of 4.7 kohms at each of the SCL and SDA line |
| Rise time of both SDA and SCL                    | $t_2$    | -      | -    | 1000 | ns   | Measured with a pull- up resistor of 4.7 kohms at each of the SCL and SDA line |
| Data hold time                                   | $t_3$    | 0      | -    | -    | μs   | Measured with a pull- up resistor of 4.7 kohms at each of the SCL and SDA line |
| Data set-up time                                 | $t_4$    | 250    | -    | -    | ns   | Measured with a pull- up resistor of 4.7 kohms at each of the SCL and SDA line |
| Low period of SCL clock                          | $t_5$    | 4.7    | -    | -    | μs   | Measured with a pull- up resistor of 4.7 kohms at each of the SCL and SDA line |
| High period of SCL clock                         | $t_6$    | 4      | -    | -    | μs   | Measured with a pull- up resistor of 4.7 kohms at each of the SCL and SDA line |
| Hold time for the (repeated) START condition     | $t_7$    | 4      | -    | -    | μs   | Measured with a pull- up resistor of 4.7 kohms at each of the SCL and SDA line |

## 电气规范 IC 间 (I2C) 接口时序

表 3-62 I2C 标准模式时序 (续)

| Parameter                                  | Symbol | Values |      |      | Unit          | Note / Test Condition                                                         |
|--------------------------------------------|--------|--------|------|------|---------------|-------------------------------------------------------------------------------|
|                                            |        | Min.   | Typ. | Max. |               |                                                                               |
| Set-up time for (repeated) START condition | $t_8$  | 4.7    | -    | -    | $\mu\text{s}$ | Measured with a pull-up resistor of 4.7 kohms at each of the SCL and SDA line |
| Set-up time for STOP condition             | $t_9$  | 4      | -    | -    | $\mu\text{s}$ | Measured with a pull-up resistor of 4.7 kohms at each of the SCL and SDA line |

表 3-63 I2C 快速模式时序

| Parameter                                        | Symbol   | Values             |      |      | Unit          | Note / Test Condition                                                         |
|--------------------------------------------------|----------|--------------------|------|------|---------------|-------------------------------------------------------------------------------|
|                                                  |          | Min.               | Typ. | Max. |               |                                                                               |
| Fall time of both SDA and SCL                    | $t_1$    | $20+0.1 \cdot C_b$ | -    | 300  | ns            | Measured with a pull-up resistor of 4.7 kohms at each of the SCL and SDA line |
| Capacitive load for each bus line                | $C_b$ SR | -                  | -    | 400  | pF            |                                                                               |
| Bus free time between a STOP and ATART condition | $t_{10}$ | 1.3                | -    | -    | $\mu\text{s}$ | Measured with a pull-up resistor of 4.7 kohms at each of the SCL and SDA line |
| Rise time of both SDA and SCL                    | $t_2$    | $20+0.1 \cdot C_b$ | -    | 300  | ns            | Measured with a pull-up resistor of 4.7 kohms at each of the SCL and SDA line |
| Data hold time                                   | $t_3$    | 0                  | -    | -    | $\mu\text{s}$ | Measured with a pull-up resistor of 4.7 kohms at each of the SCL and SDA line |
| Data set-up time                                 | $t_4$    | 100                | -    | -    | ns            | Measured with a pull-up resistor of 4.7 kohms at each of the SCL and SDA line |
| Low period of SCL clock                          | $t_5$    | 1.3                | -    | -    | $\mu\text{s}$ | Measured with a pull-up resistor of 4.7 kohms at each of the SCL and SDA line |
| High period of SCL clock                         | $t_6$    | 0.6                | -    | -    | $\mu\text{s}$ | Measured with a pull-up resistor of 4.7 kohms at each of the SCL and SDA line |

表 3-63 I2C 快速模式时序 (续)

| Parameter                                    | Symbol | Values |      |      | Unit          | Note / Test Condition                                                         |
|----------------------------------------------|--------|--------|------|------|---------------|-------------------------------------------------------------------------------|
|                                              |        | Min.   | Typ. | Max. |               |                                                                               |
| Hold time for the (repeated) START condition | $t_7$  | 0.6    | -    | -    | $\mu\text{s}$ | Measured with a pull-up resistor of 4.7 kohms at each of the SCL and SDA line |
| Set-up time for (repeated) START condition   | $t_8$  | 0.6    | -    | -    | $\mu\text{s}$ | Measured with a pull-up resistor of 4.7 kohms at each of the SCL and SDA line |
| Set-up time for STOP condition               | $t_9$  | 0.6    | -    | -    | $\mu\text{s}$ | Measured with a pull-up resistor of 4.7 kohms at each of the SCL and SDA line |

表 3-64 I2C 高速模式时序

| Parameter                                    | Symbol   | Values            |      |                  | Unit | Note / Test Condition  |
|----------------------------------------------|----------|-------------------|------|------------------|------|------------------------|
|                                              |          | Min.              | Typ. | Max.             |      |                        |
| Capacitive load for each bus line            | $C_b$ SR | -                 | -    | 400              | pF   |                        |
| Fall time of SCL                             | $t_{11}$ | 10 <sup>1)</sup>  | -    | 40 <sup>1)</sup> | ns   | bus line load of 100pF |
| Fall time of SDA                             | $t_{12}$ | 10 <sup>1)</sup>  | -    | 80 <sup>1)</sup> | ns   | bus line load of 100pF |
| Rise time of SCL                             | $t_{13}$ | 10 <sup>1)</sup>  | -    | 40 <sup>1)</sup> | ns   | bus line load of 100pF |
| Rise time of SDA                             | $t_{14}$ | 10 <sup>1)</sup>  | -    | 80 <sup>1)</sup> | ns   | bus line load of 100pF |
| Data hold time                               | $t_3$    | 0 <sup>1)</sup>   | -    | 70 <sup>1)</sup> | ns   | bus line load of 100pF |
| Data set-up time                             | $t_4$    | 10 <sup>1)</sup>  | -    | -                | ns   | bus line load of 100pF |
| Low period of SCL clock                      | $t_5$    | 160 <sup>1)</sup> | -    | -                | ns   | bus line load of 100pF |
| High period of SCL clock                     | $t_6$    | 60 <sup>1)</sup>  | -    | -                | ns   | bus line load of 100pF |
| Hold time for the (repeated) START condition | $t_7$    | 160 <sup>1)</sup> | -    | -                | ns   | bus line load of 100pF |
| Set-up time for (repeated) START condition   | $t_8$    | 160 <sup>1)</sup> | -    | -                | ns   | bus line load of 100pF |
| Set-up time for STOP condition               | $t_9$    | 160 <sup>1)</sup> | -    | -                | ns   | bus line load of 100pF |

1) 值定义为  $C_b = 100\text{pF}$ , 有关  $C_b = 400\text{pF}$  的时序, 请参阅 I2C 标准。

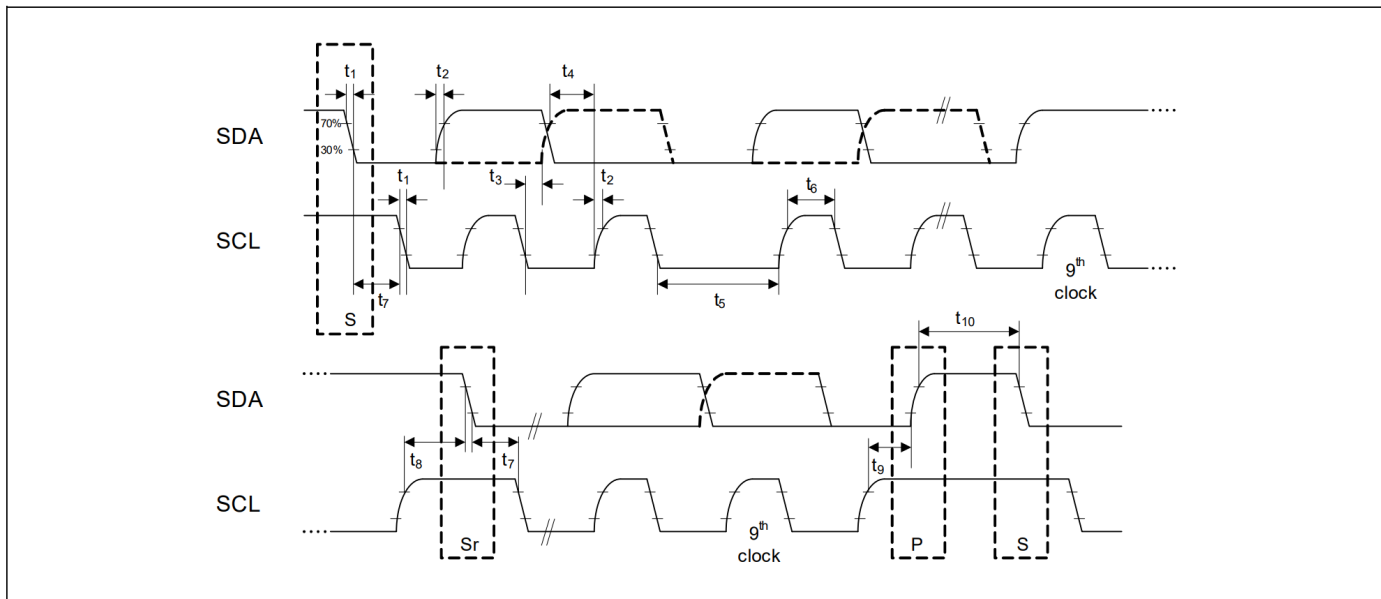


图 3-23 I2C 标准模式和快速模式时序

### 3.28 FSP 参数

表 3-65 安全性

| Parameter                  | Symbol                           | Values |      |      | Unit | Note / Test Condition                  |
|----------------------------|----------------------------------|--------|------|------|------|----------------------------------------|
|                            |                                  | Min.   | Typ. | Max. |      |                                        |
| Skew between FSP0 and FSP1 | $t_{\text{FSPSKEW}}^{\text{CC}}$ | -8     | -    | 9    | ns   | $C_L=50\text{pF}$ , driver strength m  |
|                            |                                  | -5     | -    | 6    | ns   | $C_L=50\text{pF}$ , driver strength sm |
|                            |                                  | -4     | -    | 5    | ns   | $C_L=50\text{pF}$ , driver strength ss |

### 3.29 Flash 目标参数

表 3-66 Flash

| Parameter                                                                                                               | Symbol                             | Values |      |      | Unit   | Note / Test Condition                                                                                 |
|-------------------------------------------------------------------------------------------------------------------------|------------------------------------|--------|------|------|--------|-------------------------------------------------------------------------------------------------------|
|                                                                                                                         |                                    | Min.   | Typ. | Max. |        |                                                                                                       |
| Program Flash Erase Time per logical sector <sup>1)</sup>                                                               | $t_{\text{ERP}} \text{ CC}$        | -      | -    | 0.5  | s      | cycle count < 1000                                                                                    |
| Program Flash Erase Time per Multi-Sector Command <sup>1)</sup>                                                         | $t_{\text{MERP}} \text{ CC}$       | -      | -    | 0.5  | s      | For consecutive logical sectors in a physical sector with total range ≤ 512 kByte; cycle count < 1000 |
| Program Flash program time per page in 5 V mode <sup>1)</sup>                                                           | $t_{\text{PRP5}} \text{ CC}$       | -      | -    | 80   | μs     | 32 Byte                                                                                               |
| Program Flash program time per page in 3.3 V mode <sup>1)</sup>                                                         | $t_{\text{PRP3}} \text{ CC}$       | -      | -    | 115  | μs     | 32 Byte                                                                                               |
| Program Flash program time per burst in 5 V mode <sup>1)</sup>                                                          | $t_{\text{PRPB5}} \text{ CC}$      | -      | -    | 220  | μs     | 256 Byte                                                                                              |
| Program Flash program time per burst in 3.3 V mode <sup>1)</sup>                                                        | $t_{\text{PRPB3}} \text{ CC}$      | -      | -    | 530  | μs     | 256 Byte                                                                                              |
| Program Flash program time for 1 MByte with burst programming in 3.3 V mode excluding communication <sup>1)</sup>       | $t_{\text{PRPB3\_1MB}} \text{ CC}$ | -      | -    | 2.2  | s      | Derived value for documentation purpose                                                               |
| Program Flash program time for 1 MByte with burst programming in 5 V mode excluding communication <sup>1)</sup>         | $t_{\text{PRPB5\_1MB}} \text{ CC}$ | -      | -    | 1    | s      | Derived value for documentation purpose                                                               |
| Program Flash program time for complete PFlash with burst programming in 5 V mode excluding communication <sup>1)</sup> | $t_{\text{PRPB5\_PF}} \text{ CC}$  | -      | -    | 10   | s      | Derived value for documentation purpose                                                               |
| Write Page Once adder <sup>1)</sup>                                                                                     | $t_{\text{ADD}} \text{ CC}$        | -      | -    | 20   | μs     | Adder to Program Time when using Write Page Once                                                      |
| Program Flash suspend to read latency <sup>1)</sup>                                                                     | $t_{\text{SPNDP}} \text{ CC}$      | -      | -    | 120  | μs     | For Write Burst, Verify Erased and for multi-(logical) sector erase commands                          |
| Data Flash Erase Disturb Limit (single ended sensing mode)                                                              | $N_{\text{DFD}} \text{ CC}$        | -      | -    | 50   | cycles |                                                                                                       |
| Data Flash Erase Disturb Limit (complement sensing mode)                                                                | $N_{\text{DFDC}} \text{ CC}$       | -      | -    | 500  | cycles |                                                                                                       |
| UCB Erase Disturb Limit                                                                                                 | $N_{\text{UCBD}} \text{ CC}$       | -      | -    | 500  | cycles |                                                                                                       |

表 3-66 Flash (续)

| Parameter                                                                                 | Symbol                  | Values |      |         | Unit    | Note / Test Condition                                                                     |
|-------------------------------------------------------------------------------------------|-------------------------|--------|------|---------|---------|-------------------------------------------------------------------------------------------|
|                                                                                           |                         | Min.   | Typ. | Max.    |         |                                                                                           |
| Program time data flash per page <sup>1)2)</sup>                                          | $t_{PRD\ CC}$           | -      | -    | 75      | $\mu s$ | 8 Byte                                                                                    |
| Complete Device Flash Erase Time PFlash and DFlash <sup>1)3) 4) 5)</sup>                  | $t_{ER\_Dev\ CC}$       | -      | 6.7  | 11.5    | s       | Valid for less than 1000 cycles, w/o UCB. Derived value for documentation purpose.        |
| Data Flash program time per burst <sup>1)2)</sup>                                         | $t_{PRDB\ CC}$          | -      | -    | 140     | $\mu s$ | 32 Byte                                                                                   |
| Data Flash suspend to read latency <sup>1)</sup>                                          | $t_{SPNDD\ CC}$         | -      | -    | 120     | $\mu s$ |                                                                                           |
| Wait time after margin change                                                             | $t_{FL\_MarginDel\ CC}$ | -      | -    | 2       | $\mu s$ |                                                                                           |
| Program Flash Endurance per Logical Sector                                                | $N_{E\_P\ CC}$          | -      | -    | 1000    | cycles  | Replace logical sector command shall be used if a sector fails during erase or program    |
| Number of erase operations per physical sector in program flash                           | $N_{ERP\ CC}$           | -      | -    | 16000   | cycles  |                                                                                           |
| Program Flash Retention Time, Sector                                                      | $t_{RET\ CC}$           | 20     | -    | -       | years   | Max. 1000 erase/program cycles                                                            |
| UCB Retention Time                                                                        | $t_{RTU\ CC}$           | 20     | -    | -       | years   | Max. 100 erase/program cycles per UCB, max 500 erase/program cycles for all UCBs together |
| Data Flash access delay                                                                   | $t_{DF\ CC}$            | -      | -    | 100     | ns      | see RFLASH of DMU register HF_DWAIT                                                       |
| Data Flash ECC Delay                                                                      | $t_{DFECC\ CC}$         | -      | -    | 20      | ns      | see RECC of DMU register HF_DWAIT                                                         |
| Program Flash access delay                                                                | $t_{PF\ CC}$            | -      | -    | 30      | ns      | see RFLASH of DMU register HF_PWAIT                                                       |
| Program Flash ECC delay                                                                   | $t_{PFECC\ CC}$         | -      | -    | 10      | ns      | see RECC and CECC of DMU register HF_PWAIT                                                |
| Number of erase operations on DF0 over lifetime (complement sensing mode) <sup>6)</sup>   | $N_{ERDOC\ CC}$         | -      | -    | 4000000 | cycles  |                                                                                           |
| Number of erase operations on DF0 over lifetime (single ended sensing mode) <sup>7)</sup> | $N_{ERDOS\ CC}$         | -      | -    | 750000  | cycles  |                                                                                           |

表 3-66 Flash (续)

| Parameter                                                                                             | Symbol                      | Values |      |         | Unit   | Note / Test Condition                                                        |
|-------------------------------------------------------------------------------------------------------|-----------------------------|--------|------|---------|--------|------------------------------------------------------------------------------|
|                                                                                                       |                             | Min.   | Typ. | Max.    |        |                                                                              |
| Number of erase operations on DF1 over lifetime (complement sensing mode) <sup>6)</sup>               | $N_{\text{ERD1C}}$ CC       | -      | -    | 2000000 | cycles |                                                                              |
| Number of erase operations on DF1 over lifetime (single ended sensing mode) <sup>7)</sup>             | $N_{\text{ERD1S}}$ CC       | -      | -    | 500000  | cycles |                                                                              |
| Data Flash Endurance per EEPROMx sector (complement sensing mode) <sup>8)</sup>                       | $N_{\text{E\_EEP10C}}$ CC   | -      | -    | 500000  | cycles | Max. data retention time 10 years                                            |
| DataFlash Endurance per EEPROMx sector (single ended sensing mode) <sup>8)</sup>                      | $N_{\text{E\_EEP10S}}$ CC   | -      | -    | 125000  | cycles | Retention time and Tj according below example temperature profile            |
|                                                                                                       |                             | -      | -    | 125000  | cycles | max data retention time 20y, Tj=110°C                                        |
|                                                                                                       |                             | -      | -    | 125000  | cycles | max data retention time 8.2y, Tj=125°C                                       |
| Data Flash Endurance per HSMx sector (complement sensing mode) <sup>8)</sup>                          | $N_{\text{E\_HSMC}}$ CC     | -      | -    | 250000  | cycles | Max. data retention time 10 years                                            |
| Data Flash Endurance per HSMx sector (single ended sensing mode) <sup>8)</sup>                        | $N_{\text{E\_HSMs}}$ CC     | -      | -    | 125000  | cycles | Retention time and Tj according below example temperature profile            |
|                                                                                                       |                             | -      | -    | 125000  | cycles | max data retention time 20y, Tj=110°C                                        |
|                                                                                                       |                             | -      | -    | 125000  | cycles | max data retention time 8.2y, Tj=125°C                                       |
| Junction temperature limit for PFlash program/erase operations                                        | $T_{\text{JPFlash}}$ SR     | -      | -    | 150     | °C     |                                                                              |
| Data Flash Erase Time per Sector <sup>1)3)5)</sup>                                                    | $t_{\text{ERD1}}$ CC        | -      | -    | 0.5     | s      | Max. 1000 erase/program cycles                                               |
| Data Flash Erase Time per Sector <sup>1)3)5)</sup>                                                    | $t_{\text{ERDM}}$ CC        | -      | -    | 1.5     | s      | Max allowed cycles, see NE_EEP10 and NE_HSM parameters                       |
| DataFlash Adder on Erase Time per 32kByte erase size when using complement sensing mode <sup>1)</sup> | $t_{\text{ER\_ADDC32C}}$ CC | -      | -    | 50      | ms     | Adder per 32 kByte on erase time; applicable only when using complement mode |

## 电气规格 Flash 目标参数

表 3-66 Flash (续)

| Parameter                                                                      | Symbol                   | Values |      |      | Unit          | Note / Test Condition                                                                                            |
|--------------------------------------------------------------------------------|--------------------------|--------|------|------|---------------|------------------------------------------------------------------------------------------------------------------|
|                                                                                |                          | Min.   | Typ. | Max. |               |                                                                                                                  |
| Data Flash Erase Time per Multi-Sector Command <sup>1)3)5)</sup>               | $t_{MERD1\ CC}$          | -      | -    | 0.5  | s             | Max 1000 erase/program cycles; For consecutive logical sectors $\leq 256\text{KBytes}$                           |
| Data Flash Erase Time per Multi-Sector Command <sup>1)3)5)</sup>               | $t_{MERDM\ CC}$          | -      | -    | 1.5  | s             | Max allowed cycles, see NE_EEP10x and NE_HSMx Parameters; For consecutive logical sectors $\leq 256\text{kByte}$ |
| Program Flash Access Delay at reduced VDDP3 voltage supply during cranking     | $t_{PF\_low\_VDDP3\ CC}$ | -      | -    | 60   | ns            | see register DMU_HF_PWAIT.CFL ASH                                                                                |
| Data Flash Erase Verify time per page (Complement Sensing) <sup>2)</sup>       | $t_{VER\_PAGE\_DC\ CC}$  | -      | -    | 10   | $\mu\text{s}$ | Time per 8 Byte page for Verify Erased Page command                                                              |
| Data Flash Erase Verify time per page (Single Ended Sensing) <sup>1)</sup>     | $t_{VER\_PAGE\_DS\ CC}$  | -      | -    | 10   | $\mu\text{s}$ | Time per 8 Byte page for Verify Erased Page command                                                              |
| Program Flash Erase Verify time per page <sup>1)</sup>                         | $t_{VER\_PAGE\_P\ CC}$   | -      | -    | 10   | $\mu\text{s}$ | Time per 32 Byte page for Verify Erased Page command                                                             |
| Data Flash Erase Verify time per sector (Complement Sensing) <sup>1)</sup>     | $t_{VER\_SEC\_DC\ CC}$   | -      | -    | 200  | $\mu\text{s}$ | Time per 2 KB sector for Verify Erased Logical Sector Range command                                              |
| Data Flash Erase Verify time per sector (Single Ended Sensing) <sup>1)</sup>   | $t_{VER\_SEC\_DS\ CC}$   | -      | -    | 360  | $\mu\text{s}$ | Time per 4 KB sector for Verify Erased Logical Sector Range command                                              |
| Program Flash Erase Verify time per sector <sup>1)</sup>                       | $t_{VER\_SEC\_P\ CC}$    | -      | -    | 360  | $\mu\text{s}$ | Time per 16KB sector for Verify Erased Logical Sector Range command                                              |
| Data Flash Erase Verify time per wordline (Complement Sensing) <sup>1)</sup>   | $t_{VER\_WL\_DC\ CC}$    | -      | -    | 30   | $\mu\text{s}$ |                                                                                                                  |
| Data Flash Erase Verify time per wordline (Single Ended Sensing) <sup>1)</sup> | $t_{VER\_WL\_DS\ CC}$    | -      | -    | 50   | $\mu\text{s}$ |                                                                                                                  |
| Program Flash Erase Verify time per wordline <sup>1)</sup>                     | $t_{VER\_WL\_P\ CC}$     | -      | -    | 30   | $\mu\text{s}$ |                                                                                                                  |

1) 仅对  $f_{FSI} = 100\text{MHz}$  有效。

2) 时间不依赖于编程模式 (5V 或 3.3V)。

- 3) 在超出规格的条件下 (例如,由于过度循环)或激活WL定向缺陷, 擦除过程的持续时间可能会增加高达50%。
- 4) 使用 512 kByte / 256 kByte 擦除指令 (PFlash / DFlash)。
- 5) 如果 DataFlash 在互补感应模式下运行, 则擦除时间将增加  $\text{erasing\_size} / 32\text{kByte} \times t_{\text{ER\_ADDC32C}}$
- 6) 允许将可寻址内存划分为 8 个逻辑扇区; 仍必须进行循环以考虑擦除干扰限制  $N_{\text{DFD}}$ 。
- 7) 允许将可寻址内存划分为 6 个逻辑扇区; 仍必须进行循环以考虑擦除干扰限制  $N_{\text{DFD}}$ 。
- 8) 仅在使用强大的 EEPROM 仿真算法时有效。欲了解更多详细信息, 请参阅用户手册。

### 3.30 质量声明

表 3-67 质量参数

| Parameter                                                               | Symbol        | Values |      |                    | Unit | Note / Test Condition                                 |
|-------------------------------------------------------------------------|---------------|--------|------|--------------------|------|-------------------------------------------------------|
|                                                                         |               | Min.   | Typ. | Max.               |      |                                                       |
| Moisture Sensitivity Level                                              | $MSL$ CC      | -      | -    | 3                  |      | Conforming to Jedec J-STD--020C for 240C              |
| ESD susceptibility according to Charged Device Model (CDM)              | $V_{CDM}$ SR  | -      | -    | 500 <sup>1)</sup>  | V    | for all other balls/pins; conforming to JESD22-C101-C |
|                                                                         |               | -      | -    | 750                | V    | for corner balls/pins; conforming to JESD22-C101-C    |
| ESD susceptibility according to Human Body Model (HBM)                  | $V_{HBM}$ SR  | -      | -    | 2000 <sup>2)</sup> | V    | Conforming to JESD22-A114-B                           |
| ESD susceptibility of the LVDS pins according to Human Body Model (HBM) | $V_{HBM1}$ SR | -      | -    | 2000               | V    |                                                       |
| Operation Lifetime                                                      | $t_{OP}$ CC   | -      | -    | 24500              | hour | see below temperature profile as an example           |

1) AGBT 接口的焊盘最大电压限制为 250V。

2) AGBT 接口的焊盘最大电压限制为 1000V。

#### 温度曲线示例

以下温度曲线就是一个例子。运行寿命加上闲置时间定义为 20 年。为了满足质量和可靠性目标，特定应用的温度曲线需要经过英飞凌科技的验证。

表 3-68 非活动寿命温度曲线示例

| $T_J =$                    | Duration [h] | Comment    |
|----------------------------|--------------|------------|
| $\leq 170^{\circ}\text{C}$ | $\leq 30$    |            |
| $\leq 160^{\circ}\text{C}$ | $\leq 120$   |            |
| $\leq 150^{\circ}\text{C}$ | $\leq 220$   |            |
| $\leq 140^{\circ}\text{C}$ | $\leq 350$   |            |
| $\leq 130^{\circ}\text{C}$ | $\leq 780$   |            |
| $\leq 120^{\circ}\text{C}$ | $\leq 1600$  |            |
| $\leq 110^{\circ}\text{C}$ | $\leq 3000$  |            |
| $\leq 100^{\circ}\text{C}$ | $\leq 7000$  |            |
| $\leq 90^{\circ}\text{C}$  | $\leq 8000$  |            |
| $\leq 80^{\circ}\text{C}$  | $\leq 2400$  |            |
| $\leq 70^{\circ}\text{C}$  | $\leq 1000$  |            |
|                            | $\leq 24500$ | total time |

表 3-69 非活动寿命温度曲线示例

| $T_J$ =                   | Duration [h]  | Comment |
|---------------------------|---------------|---------|
| $\leq 55^{\circ}\text{C}$ | $\leq 150700$ |         |

### 3.31 封装外形

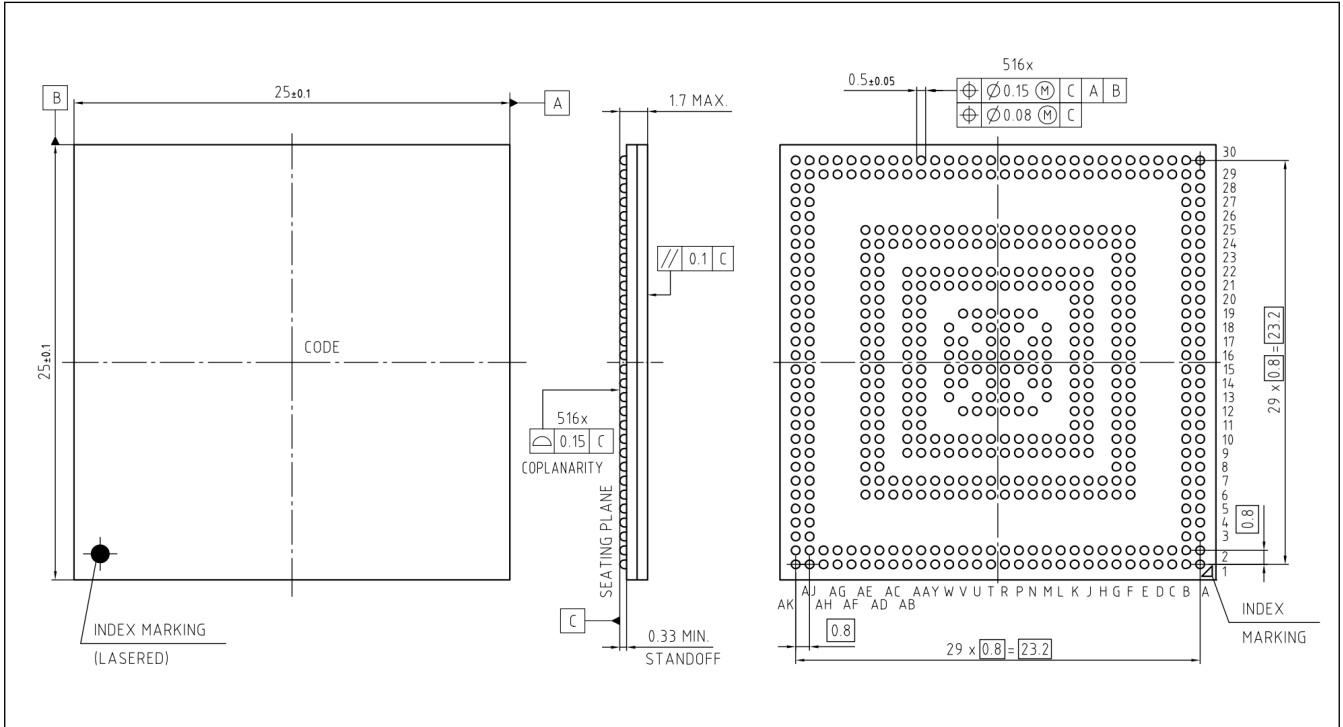


图 3-24 封装外形FBGA-516

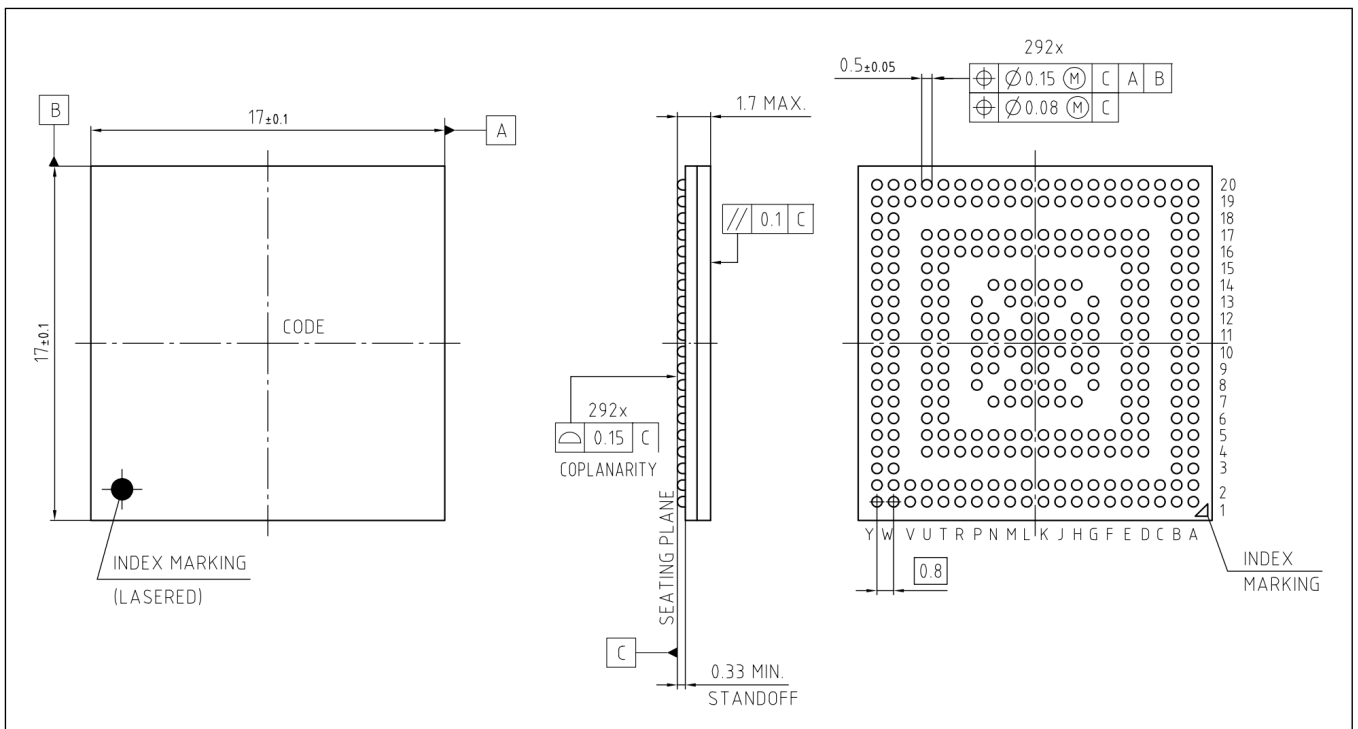


图 3-25 封装外形 LFBGA-292

您可以在我们的英飞凌互联网分页“产品”中找到我们所有的封装、包装种类和其他信息：

<http://www.infineon.com/products>.

### 3.31.1 封装参数

表 3-70 封装参数

| Parameter                                                  | Symbol        | Values |      |      | Unit | Note / Test Condition |
|------------------------------------------------------------|---------------|--------|------|------|------|-----------------------|
|                                                            |               | Min.   | Typ. | Max. |      |                       |
| Thermal resistance (junction to ambient) <sup>1)</sup>     | RTH_JA<br>CC  | -      | -    | 14   | K/W  | FBGA516               |
|                                                            |               | -      | -    | 17   | K/W  | LFPGA292              |
| Thermal resistance (junction to case bottom) <sup>1)</sup> | RTH_JCB<br>CC | -      | -    | 3    | K/W  | FBGA516               |
|                                                            |               | -      | -    | 4    | K/W  | LFPGA292              |
| Thermal resistance (junction to case top) <sup>1)</sup>    | RTH_JCT<br>CC | -      | -    | 5    | K/W  | FBGA516               |
|                                                            |               | -      | -    | 5    | K/W  | LFPGA292              |

1) 外壳与环境之间的顶部和底部热阻 (RTH\_CTA, RTH\_CBA) 将与上面给出的结与外壳之间的热阻 (RTH\_JCT, RTH\_JCB) 相结合, 以计算结与环境之间的总热阻 (RTH\_JA)。外壳和环境之间的热阻 (RTH\_CTA、RTH\_CBA) 取决于外部系统 (PCB、外壳) 的特性, 由用户负责。结温可使用以下公式计算:  $T_J = T_A + RTH\_JA * P_D$ , 其中 RTH\_JA 是结点与环境之间的总热阻。采用“冷板法” (MIL SPEC-883 方法 1012.1) 测量的热阻。

## 4 修订记录

0.4 版是本文档的第一个版本。

### 4.1 从版本 0.4 到版本 0.6 的变更

- 更新表平台特点概述
- 更改输入引脚定义和功能
  - 将焊盘类型 RFAST 添加到图例中
  - 已修正球分配给 NC 和 NC1
  - P32.0 将名称从 EVR13 改为 EVRC
  - P32.1 将名称从 EVR13 改为 EVRC
  - 为 GTM\_TIM\_INxx 符号添加功能描述
  - 更改 GTM\_TIM\_INxx 符号编号
  - 更新CAN信号的功能描述
  - 为 EVADC 添加缺失的功能描述
  - 为 EDSADC 添加缺失的功能描述
  - 为 GTM\_DTMxx 符号添加功能描述
  - 更新 SCU\_E\_REQ 信号的功能描述
  - 更改 SCU\_E\_REQ 信号的符号
  - 更新 SCU\_PD\_HWCFGx 信号的功能描述
  - 移除 PLL\_WRAPPER\_ANA\_0\_PAD\_SYSCLK
  - 将 CBS\_TGyz 从反转切换到非反转
  - 添加 CCUEXTCLK0
  - 将 EDSADC\_EDS9NB 添加到 AN70
  - 将 EDSADC\_EDS9NB 添加到 AN71
  - 将 PMS\_DCDCSYNCO 添加到 P32.4
  - 将 DAP3 添加到 P21.6
  - 从 P15.2 移除 SDMMC\_DS
  - 将 TDI 添加到 P21.6
  - 将 DAPE1 添加到 P21.6
  - 将 DAP2 添加到 P21.7
  - 将 TDO 添加到 P21.7
  - 从 P21.7 输入中删除 DAP 功能描述
  - 将 EVADC\_G5CH2 添加到 AN50
  - 将 EDSADC\_EDS9PB 添加到 AN70
  - 将 EDSADC\_EDS9NB 添加到 AN71
- ‘过载参数’表的变化
  - 将  $K_{OVDN}$  的注释从“在 GPIO 非 LVDS 焊盘上注入过载并影响相邻慢速焊盘-2mA  $< I_{IN} < 0mA$ ”更改为“在 GPIO 非 LVDS 焊盘上注入过载并影响相邻慢速焊盘; -5mA  $< I_{IN} < 0mA$ ”
  - 将  $K_{OVDN}$  的最大值从 " $6 \cdot 10^{-4}$ " 改为 " $1 \cdot 10^{-4}$ "
  - 将  $K_{OVDN}$  的最大值从 " $1.7 \cdot 10^{-3}$ " 改为 " $3 \cdot 10^{-4}$ "

## 记录0.4版本到0.6版本的变化

- 将  $K_{OVDN}$  的注释从“LVDS 焊盘上注入过载并影响相邻 LVDS 焊盘”更改为“LVDS TX 焊盘上注入过载并影响相邻 LVDS 焊盘”
- 将  $K_{OVDN}$  的最大值从 "0.3" 改为 "0.5"
- 将  $K_{OVDP}$  的注释从“LVDS 焊盘上注入过载并影响相邻 LVDS 焊盘”更改为“LVDS TX 焊盘上注入过载并影响相邻 LVDS 焊盘”
- 将  $K_{OVDP}$  的最大值从  $5 \cdot 10^{-4}$  改为  $5 \cdot 10^{-3}$
- 将  $K_{OVDP}$  的最大值从 " $1 \cdot 10^{-5}$ " 改为 " $1.5 \cdot 10^{-3}$ "
- 将  $K_{OVAN}$  的最大值从  $1 \cdot 10^{-4}$  改为  $1 \cdot 10^{-5}$
- 将  $K_{OVAN}$  的注释从“模拟输入覆盖类慢速焊盘或下拉诊断;  $-1\text{mA} < I_{IN} < 0\text{mA}$ " 变更至 "模拟输入与慢速焊盘或下拉诊断重叠;  $-5\text{mA} < I_{IN} < 0\text{mA}$ "
- 将  $K_{OVAN}$  的最大值从  $1 \cdot 10^{-3}$  改为  $1 \cdot 10^{-4}$
- 将  $K_{OVAP}$  的注释从 " $1 \cdot 10^{-5}$ " 更改为 " $2 \cdot 10^{-5}$ "
- 将  $K_{OVAP}$  的注释从 " $1 \cdot 10^{-4}$ " 更改为 " $2 \cdot 10^{-4}$ "。
- 添加参数  $I_{OUT}$
- 工作条件
  - 将  $V_{DDM}$  的注释从“较低电压范围”更改为
  - 将  $V_{EVRSB}$  的注释从“ $V_{EVRSB}$  与  $V_{EXT}$  电源引脚在较小的 LQFP 封装中 结合在一起更改为”
- 标准焊盘‘快速 5V GPIO’表的变化
  - 将  $HYS$  的注释从 " $0.1 \cdot V_{EXT/FLEX}$  V" 更改为 " $0.09 \cdot V_{EXT/FLEX}$  V"
  - 将  $HYS$  的注释从 " $0.09 \cdot V_{EXT/FLEX}$  V" 更改为 " $0.075 \cdot V_{EXT/FLEX}$  V"
  - 将  $R_{DSOIN}$  的最小值从 140 Ohm 更改为 125 Ohm
  - 将  $R_{DSOIN}$  的典型值从 200 Ohm 更改为 225 Ohm
  - 将  $R_{DSOIN}$  的注释从“260 Ohm”更改为“320 Ohm”
  - 将  $R_{DSOIN}$  的注释从“35 Ohm”更改为“31 Ohm”
  - 将  $R_{DSOIN}$  的注释从“50 Ohm”更改为“55 Ohm”
  - 将  $R_{DSOIN}$  的注释从“65 Ohm”更改为“80 Ohm”
  - 将  $t_{RF}$  的注释从 " $C_L = 25\text{pF}$  更改; 驱动器 = 强锋利边缘" 至 " $C_L = 25\text{pF}$ ; 驱动器 = 强锋利的边缘; 从  $0.2 \cdot V_{EXT/FLEX}$  到  $0.8 \cdot V_{EXT/FLEX}$ "
  - 将  $t_{RF}$  的注释从“2.8 ns”更改为“3.2 ns”
  - 将  $t_{RF}$  的最小值从  $0.5 + 0.075 \cdot C_L$  ns 改为  $0.5 + 0.08 \cdot C_L$  ns
  - 将  $t_{RF}$  的最大值从  $0.5 + 0.15 \cdot C_L$  ns 更改为  $1.0 + 0.17 \cdot C_L$  ns
  - 将  $t_{RF}$  的注释从 " $2.5 + 0.18 \cdot C_L$  ns" 更改为 " $1.0 + 0.18 \cdot C_L$  ns"
  - 将  $t_{RF}$  的注释从 " $2.5 + 0.35 \cdot C_L$  ns" 更改为 " $5.0 + 0.35 \cdot C_L$  ns"
  - 将  $t_{RF}$  的最大值从  $4 + 0.95 \cdot C_L$  ns 更改为  $12 + 1.0 \cdot C_L$  ns
  - 将  $I_{OZ}$  的注释从“-3900 nA”更改为“-5000 nA”。
  - 将  $I_{OZ}$  的最小值从 -3600 nA 改为 -5000 nA
  - 将  $I_{OZ}$  的最小值从 -6700 nA 改为 -9000 nA
  - 将  $I_{OZ}$  的最大值从 3900 nA 改为 5000 nA
  - 将  $I_{OZ}$  的最大值从 3600 nA 改为 5000 nA
  - 将  $I_{OZ}$  的注释从“6700nA”更改为“9000nA”。
  - 将  $t_{RF}$  的注释从 " $C_L = 25\text{pF}$  更改; 驱动器 = 强锋利边缘" 至 " $C_L = 25\text{pF}$ ; 驱动器 = 强锋利的边缘; 从  $0.2 \cdot V_{EXT/FLEX}$  到  $0.8 \cdot V_{EXT/FLEX}$ "

- 将  $f_{IND}$  的注释更改为 'AL 和 TTL'
- 将  $f_{OUTD}$  的注释从“”更改为“中型驱动器”
- 将  $I_{PDL}$  的注释从 ' $V_{IL}$ ; AL 或 TTL' 更改为 ' $V_{IL}$ ; AL'
- 标准焊盘的“快速 3.3V GPIO”表的变化
  - 将  $HYS$  的注释从 " $0.065 * V_{EXT/FLEX} V$ " 更改为 " $0.055 * V_{EXT/FLEX} V$ "
  - 将  $HYS$  的最小值从  $0.1 * V_{EXT/FLEX} V$  改为  $0.09 * V_{EXT/FLEX} V$
  - 将  $HYS$  的注释从 " $0.07 * V_{EXT/FLEX} V$ " 更改为 " $0.055 * V_{EXT/FLEX} V$ "
  - 将  $R_{DSOIN}$  的最小值从 140 Ohm 更改为 125 Ohm
  - 将  $R_{DSOIN}$  的注释从“200 Ohm”更改为“225 Ohm”
  - 将  $R_{DSOIN}$  的注释从“300 Ohm”更改为“320 Ohm”
  - 将  $R_{DSOIN}$  的注释从 '35 Ohm' 更改为 '31 Ohm'
  - 将  $R_{DSOIN}$  的典型值从 50 Ohm 更改为 55 Ohm
  - 将  $R_{DSOIN}$  的最大值从 77 Ohm 更改为 80 Ohm
  - 将  $t_{RF}$  的注释从 " $C_L = 25pF$  更改; 驱动器 = 强锋利边缘" 至 " $C_L = 25pF$ ; 驱动器 = 强锋利的边缘; 从  $0.2 * V_{EXT/FLEX}$  到  $0.8 * V_{EXT/FLEX}$ "
  - 将  $t_{RF}$  的注释从“2 ns”更改为“1.6 ns”
  - 将  $t_{RF}$  的最小值从  $4 + 0.57 * C_L ns$  改为  $2 + 0.57 * C_L ns$
  - 将  $t_{RF}$  的最大值从  $0.75 + 0.15 * C_L ns$  更改为  $2.5 + 0.21 * C_L ns$
  - 将  $t_{RF}$  的最大值从  $1.5 + 0.38 * C_L ns$  改为  $8 + 0.4 * C_L ns$
  - 将  $t_{RF}$  的注释从 " $7 + 1.1 * C_L ns$ " 更改为 " $10 + 1.25 * C_L ns$ "
  - 将  $I_{PUH}$  的最小值从  $|19| \mu A$  改为  $|17| \mu A$
  - 将  $I_{PUH}$  的最小值从  $|9| \mu A$  改为  $|11| \mu A$
  - 将  $I_{PDL}$  的最小值从  $|18| \mu A$  改为  $|15| \mu A$
  - 将  $I_{OZ}$  的最小值从 -4100 nA 改为 -5000 nA
  - 将  $I_{OZ}$  的最小值从 -3600 nA 改为 -5000 nA
  - 将  $I_{OZ}$  的最小值从 -6700 nA 改为 -9000 nA
  - 将  $I_{OZ}$  的最大值从 4100 nA 改为 5000 nA
  - 将  $I_{OZ}$  的注释从“3600nA”更改为“5000nA”。
  - 将  $I_{OZ}$  的最大值从 6700 nA 改为 9000 nA
  - 将  $t_{RF}$  的注释从 ' $C_L = 25pF$  更改; 驱动器 = 强锋利边缘' 至 ' $C_L = 25pF$ ; 驱动器 = 强锋利的边缘; 从  $0.2 * V_{EXT/FLEX}$  到  $0.8 * V_{EXT/FLEX}$ '
  - 将  $f_{OUTD}$  的注释从“”更改为“中型驱动器”
- 标准焊盘‘慢速 5V GPIO’表的变化
  - 将  $HYS$  的最小值从  $0.1 * V_{EXT/FLEX} V$  改为  $0.09 * V_{EXT/FLEX} V$
  - 将  $HYS$  的最小值从  $0.09 * V_{EXT/FLEX} V$  改为  $0.075 * V_{EXT/FLEX} V$
  - 将  $R_{DSOIN}$  的最小值从 140 Ohm 更改为 125 Ohm
  - 将  $R_{DSOIN}$  的典型值从 200 Ohm 更改为 225 Ohm
  - 将  $R_{DSOIN}$  的最大值从 260 Ohm 更改为 320 Ohm
  - 将  $t_{RF}$  的注释从 " $4 + 0.95 * C_L ns$ " 更改为 " $12 + 1 * C_L ns$ "
  - 将  $t_{RF}$  的注释从 " $3.5 + 0.55 * C_L ns$ " 更改为 " $7 + 0.55 * C_L ns$ "
  - 将  $I_{PUH}$  的注释从 ' $V_{IH}$ ; AL 或 TTL' 更改为 ' $V_{IH}$ ; AL 或 TTL; VGATE1P 和  $T_J > 150^\circ C$  除外'
  - 将  $I_{PUH}$  的注释从 ' $V_{IH}$ ; AL 或 TTL' 更改为 ' $V_{IH}$ ; AL 或 TTL; VGATE1P 和  $T_J > 150^\circ C$  除外'

- 将 $I_{PDL}$ 的注释从‘ $V_{IL}$ ; AL 或 TTL’更改为‘ $V_{IL}$ ; AL’
- 标准焊盘的“慢速 3.3V GPIO”表的变化
  - 将 $HYS$ 的最小值从  $0.1 * V_{EXT/FLEX}$  V 改为  $0.09 * V_{EXT/FLEX}$  V
  - 将 $HYS$ 的最小值从  $0.065 * V_{EXT/FLEX}$  V 更改为  $0.055 * V_{EXT/FLEX}$  V
  - 将 $HYS$ 的最小值从  $0.07 * V_{EXT/FLEX}$  V 改为  $0.055 * V_{EXT/FLEX}$  V
  - 将 $R_{DS(on)}$ 的注释从“140 Ohm”更改为“125 Ohm”
  - 将 $R_{DS(on)}$ 的典型值从 200 Ohm更改为 225 Ohm
  - 将 $R_{DS(on)}$ 的最大值从300 Ohm更改为 320 Ohm
  - 将 $t_{RF}$ 的注释从“ $4+0.57 * C_L$  ns”更改为“ $2+0.57 * C_L$  ns”
  - 将 $t_{RF}$ 的注释从“ $7+1.1 * C_L$  ns”更改为“ $10+1.25 * C_L$  ns”
  - 将 $I_{PUH}$ 的注释从“ $V_{IH}$ ; AL 和 TTL (降级, 用于 CIF)”更改为“ $V_{IH}$ ; AL 和 TTL (降级, 用于 CIF); VGATE1P 和  $T_J > 150^\circ\text{C}$  除外”
  - 将 $I_{PUH}$ 的最小值从  $|19| \mu\text{A}$  改为  $|17| \mu\text{A}$
  - 将 $I_{PUH}$ 的注释从‘ $V_{IH}$ ; TTL’更改为‘ $V_{IH}$ ; TTL; VGATE1P 和  $T_J > 150^\circ\text{C}$  除外’
  - 将 $I_{PUH}$ 的注释从 ‘ $|9| \mu\text{A}$ ’ 改为 ‘ $|11| \mu\text{A}$ ’
  - 将 $I_{PDL}$ 的最小值从  $|18| \mu\text{A}$  改为  $|15| \mu\text{A}$
  - 将 $I_{PUH}$ 的注释从“ $V_{IL}$ ; AL 和 TTL 和 TTL (降级, 用于 CIF)”更改为“ $V_{IL}$ ; AL 和 TTL 和 TTL (降级, 用于 CIF); VGATE1P 和  $T_J > 150^\circ\text{C}$  除外”
  - 将 $f_{OUTD}$ 的注释从“”更改为“中型驱动器”
- 标准焊盘表格“PORST 焊盘”的变更
  - 将 $HYS$ 的注释从“相邻焊盘均不用作输出; TTL”更改为“相邻焊盘均不用作输出; TTL (降级, 用于 CIF)”
  - 将 $HYS$ 的最小值从  $0.1 * V_{EXT/FLEX}$  V 改为  $0.055 * V_{EXT/FLEX}$  V
  - 将 $I_{PDL}$ 的注释从“ $|18| \mu\text{A}$ ”更改为“ $|15| \mu\text{A}$ ”。
  - 将 $HYS$ 的注释从‘两个相邻的焊盘用作输出, 驱动器=强, 边缘=锐利; TTL’更改为‘两个相邻的焊盘用作输出, 驱动器=强, 边缘=锐利; TTL (降级, 用于 CIF)’
- 标准焊盘的“S 类 5V”表的变更
  - 将 $HYS$ 的最小值从  $0.1 * V_{EXT/FLEX}$  V 改为  $0.09 * V_{EXT/FLEX}$  V
  - 将 $HYS$ 的最小值从  $0.09 * V_{EXT/FLEX}$  V 改为  $0.075 * V_{EXT/FLEX}$  V
  - 将 $I_{PDL}$ 的注释从‘ $V_{IL}$ ; AL 或 TTL’更改为‘ $V_{IL}$ ; AL’
- 标准焊盘表格‘RFast 3.3V 焊盘’的变更
  - 将 $HYS$ 的最小值从  $0.065 * V_{EXT/FLEX}$  V 更改为  $0.055 * V_{EXT/FLEX}$  V
  - 将 $HYS$ 的最小值从  $0.1 * V_{EXT/FLEX}$  V 改为  $0.09 * V_{EXT/FLEX}$  V
  - 将 $HYS$ 的最小值从  $0.07 * V_{EXT/FLEX}$  V 改为  $0.055 * V_{EXT/FLEX}$  V
  - 将 $R_{DS(on)}$ 的最小值从 140 Ohm更改为 125 Ohm
  - 将 $R_{DS(on)}$ 的典型值从 200 Ohm更改为 225 Ohm
  - 将 $R_{DS(on)}$ 的注释从“300 Ohm”更改为“320 Ohm”
  - 将 $R_{DS(on)}$ 的注释从‘35 Ohm’更改为‘31 Ohm’
  - 将 $R_{DS(on)}$ 的典型值从 50 Ohm更改为 55 Ohm
  - 将 $R_{DS(on)}$ 的最大值从 77 Ohm更改为 80 Ohm
  - 将 $R_{DS(on)}$ 的注释从‘10 Ohm’更改为‘8 Ohm’

- 将 $t_{RF}$ 的注释从' $C_L = 25\text{pF}$ 更改; 驱动器 = 强锋利边缘'至 ' $C_L = 25\text{pF}$ ; 驱动器=强锋利的边缘; 从  $0.2 * V_{EXT/FLEX}$  到  $0.8 * V_{EXT/FLEX}$  '
- 将 $t_{RF}$ 的最小值从 2 ns 改为 1.6 ns
- 将 $t_{RF}$ 的最小值从  $4+0.57 * C_L \text{ ns}$  改为  $2+0.57 * C_L \text{ ns}$
- 将 $t_{RF}$ 的注释从" $0.75+0.15 * C_L \text{ ns}$ "更改为" $2.5+0.21 * C_L \text{ ns}$ "
- 将 $t_{RF}$ 的最大值从  $1.5+0.38 * C_L \text{ ns}$  改为  $8+0.4 * C_L \text{ ns}$
- 将 $t_{RF}$ 的最大值从  $7+1.1 * C_L \text{ ns}$  更改为  $10+1.25 * C_L \text{ ns}$
- 将 $I_{PUH}$ 的最小值从  $|19| \mu\text{A}$  改为  $|17| \mu\text{A}$
- 将 $I_{PUH}$ 的注释从 ' $|9| \mu\text{A}$ ' 改为 ' $|11| \mu\text{A}$ '
- 将 $I_{PDL}$ 的最小值从  $|18| \mu\text{A}$  改为  $|15| \mu\text{A}$
- 将 $t_{RF}$ 的注释从' $C_L = 25\text{pF}$ 更改; 驱动器 = 强锋利边缘'至 ' $C_L = 25\text{pF}$ ; 驱动器=强锋利的边缘; 从  $0.2 * V_{EXT/FLEX}$  到  $0.8 * V_{EXT/FLEX}$  '
- 将 $f_{OUTD}$ 的注释从""更改为"中型驱动器"
- 标准焊盘的"RFast 5V GPIO"表的变化
  - 将 $HYS$ 的最小值从  $0.1 * V_{EXT/FLEX} \text{ V}$  改为  $0.09 * V_{EXT/FLEX} \text{ V}$
  - 将 $HYS$ 的注释从" $0.09 * V_{EXT/FLEX} \text{ V}$ "更改为" $0.075 * V_{EXT/FLEX} \text{ V}$ "
  - 将 $R_{DS ON}$ 的最小值从 140 Ohm更改为 125 Ohm
  - 将 $R_{DS ON}$ 的最大值从 260 Ohm更改为 320 Ohm
  - 将 $R_{DS ON}$ 的典型值从 200 Ohm更改为 225 Ohm
  - 将 $R_{DS ON}$ 的注释从'35 Ohm'更改为'31 Ohm'
  - 将 $R_{DS ON}$ 的最大值从 65 Ohm更改为 80 Ohm
  - 将 $R_{DS ON}$ 的注释从'50 Ohm'更改为'55 Ohm'
  - 将 $t_{RF}$ 的注释从" $2.5+0.18 * C_L \text{ ns}$ "更改为" $1.0+0.18 * C_L \text{ ns}$ "
  - 将 $t_{RF}$ 的注释从" $C_L = 25\text{pF}$ 更改; 驱动器 = 强锋利边缘"至 " $C_L = 25\text{pF}$ ; 驱动器=强锋利的边缘; 从  $0.2 * V_{EXT/FLEX}$  到  $0.8 * V_{EXT/FLEX}$  "
  - 将 $t_{RF}$ 的注释从"2.8 ns"更改为"3.2 ns"
  - 将 $t_{RF}$ 的最小值从  $0.5+0.075 * C_L \text{ ns}$  改为  $0.5+0.08 * C_L \text{ ns}$
  - 将 $t_{RF}$ 的注释从" $0.5+0.15 * C_L \text{ ns}$ "更改为" $1.0+0.17 * C_L \text{ ns}$ "
  - 将 $t_{RF}$ 的最大值从  $4+0.95 * C_L \text{ ns}$  更改为  $12+1.0 * C_L \text{ ns}$
  - 将 $t_{RF}$ 的注释从" $2.5+0.35 * C_L \text{ ns}$ "更改为" $5.0+0.35 * C_L \text{ ns}$ "
  - 将 $t_{RF}$ 的注释从' $C_L = 25\text{pF}$ 更改; 驱动器 = 强锋利边缘'至 ' $C_L = 25\text{pF}$ ; 驱动器=强锋利的边缘; 从  $0.2 * V_{EXT/FLEX}$  到  $0.8 * V_{EXT/FLEX}$  '
  - 将 $f_{IND}$ 的注释更改为 'AL 和 TTL '
  - 将 $f_{OUTD}$ 的注释从""更改为"中型驱动器"
  - 将 $I_{PDL}$ 的注释从' $V_{IL}; \text{AL 或 TTL}$ '更改为' $V_{IL}; \text{AL}$ '
- 标准焊盘'D类'表的变更
  - 将 标准焊盘 的脚注更新为"对于 AN11, 需要添加 200 nA"。
  - 将 $I_{OZ}$ 的注释从" $T_J \leq 150^\circ\text{C}$ ; PDD 选项可用, 或 AltRef 选项可用且 EDSADC 通道已连接" $T_J \leq 150^\circ\text{C}$ ; PDD 选项可用, 或 AltRef 选项可用且 EDSADC 通道已连接, 或两个 EDSADC 通道已连接"
- LVDS Pads 表'LVDS - IEEE 标准 LVDS 通用链路 (GPL)'中的变更
  - 将 $t_{rise20}$ 的最大值从 0.5 ns改为 0.75 ns
  - 将 $t_{fall20}$ 的最大值从 0.5 ns 改为 0.75 ns

- 将 $V_{OD}$  最大值从 450 mV 改为 500 mV
- 将 $V_{OD}$  的最小值从 360 mV 改为 380 mV
- VADC 5V
  - 将  $dV_{CSD}$  的注释从“-20 %”更改为“-10 %”
  - 将  $dV_{CSD}$  的注释从“20 %”更改为“10 %”
  - 将  $f_{ADCI}$  的注释从“上限电压范围”更改为“ $4.5V \leq V_{DDM} \leq 5.5V$ ”
  - 将  $t_{SCAL}$  的注释从“上限电压范围”更改为“ $4.5V \leq V_{DDM} \leq 5.5V$ ”
  - 将  $f_{ADCI}$  的注释从“较低电压范围”更改为“ $2.97V \leq V_{DDM} < 4.5V$ ”
  - 将  $t_s$  的注释从‘初级组或快速比较通道，高电压范围；输入缓冲器已启用’更改为‘初级组或快速比较通道， $4.5V \leq V_{DDM} \leq 5.5V$ ；输入缓冲器已启用’
  - 将  $t_{SCAL}$  的注释从“较低电压范围”更改为“ $2.97V \leq V_{DDM} < 4.5V$ ”
  - 将  $t_s$  的注释从‘初级组或快速比较通道，高电压范围；输入缓冲器已启用’更改为‘初级组或快速比较通道， $4.5V \leq V_{DDM} \leq 5.5V$ ；输入缓冲器已启用’
  - 将  $t_s$  的注释从‘次级组，电压范围上限；输入缓冲器启用’更改为‘次级组， $4.5V \leq V_{DDM} \leq 5.5V$ ；输入缓冲器启用’
  - 将  $t_s$  的注释从‘次级组，电压范围上限；输入缓冲器启用’更改为‘次级组， $4.5V \leq V_{DDM} \leq 5.5V$ ；输入缓冲器启用’
  - 将  $t_s$  的注释从‘初级组或快速比较通道，较低电压范围；输入缓冲器已启用’更改为‘初级组或快速比较通道， $2.97V \leq V_{DDM} < 4.5V$ ；输入缓冲器已启用’
  - 将  $t_s$  的注释从‘初级组或快速比较通道，较低电压范围；输入缓冲器已启用’更改为‘初级组或快速比较通道， $2.97V \leq V_{DDM} < 4.5V$ ；输入缓冲器已启用’
  - 将  $t_s$  的注释从‘次级组，较低电压范围；输入缓冲器禁用’更改为‘次级组， $2.97V \leq V_{DDM} < 4.5V$ ；输入缓冲器启用’
  - 将  $t_s$  的注释从‘次级组，较低电压范围；输入缓冲器启用’更改为‘次级组， $2.97V \leq V_{DDM} < 4.5V$ ；输入缓冲器启用’
- DSADC 5V
  - 更新表格DSADC 5V前面的措辞
  - 将 $DCF$ 的注释从 ' $10^{-5}f_D$ ，偏移补偿滤波器启用的 (FCFGMx.OEN = 001<sub>B</sub>)' 更改为 ' $10^{-5}f_D$ ，偏移补偿滤波器启用的 (FCFGMx.OCEN = 001<sub>B</sub>)'
- OSC\_XTAL
  - 添加参数 $C_{XTAL1}$
  - 将 $C_{L1}$  的典型值 从 2.35 pF 改为 3.35 pF
- DTS 表 "DTS PMS" 中的变化
  - 将  $t_M$  的最大值从 2.6 毫秒改为 2.7 毫秒
- 添加表“DTS Core”
- 电流损耗
  - 将 $C_{current\ Consumption}$  的脚注更新为“单个DS 通道实例消耗 4 mA”。
  - 将 $I_{DDRAIL}$  的注释从“800 mA”更改为“840 mA”
  - 将 $I_{DDRAIL}$  的注释从“920 mA”更改为“1100 mA”
  - 将 $I_{DDRAIL}$  的注释从“960 mA”更改为“1100 mA”
  - 将 $I_{DDRAIL}$  的注释从“1020 mA”更改为“1100 mA”
  - 将 $I_{DDRAIL}$  的注释从“1110 mA”更改为“1100 mA”
  - 将 $I_{DDRAIL}$  的注释从“1099 mA”更改为“1100 mA”

- 电流消耗表‘模块核心电流消耗’的变化
  - 将 **模块核心电流消耗** 的名称从模块核心电流消耗更改为模块核心电流消耗
  - 将  $I_{DDC_{X0}}$  的最大值从 40 mA 更改为 45 mA
  - 将  $I_{DDC_{X0}}$  的注释从“实际功率模式”更改为“实际功率模式；IPC=0.6”
  - 将  $I_{DDSPU}$  的注释从“60 mA”更改为“70 mA”
  - 将  $I_{DDC_{X0}}$  的注释从“最大功率模式”更改为“最大功率模式；IPC=1.2”
  - 将  $I_{DDC_{XX}}$  的注释从“ $I_{DDC_{X0}} + 60 \text{ mA}$ ”更改为“ $I_{DDC_{X0}} + 50 \text{ mA}$ ”
  - 将  $I_{DDC_{XX}}$  的注释从“最大功率模式”更改为“最大功率模式；IPC=1.2”
  - 将  $I_{DDGTM}$  的最大值从 60 mA 改为 100 mA
  - 将  $I_{DDGTM}$  的注释从“实际功率模式；TIMx、TOMx、ATOMx、MCSx 激活。200 MHz 时 5 个集群。”更改为“实际功率模式；TIMx、TOMx、ATOMx、MCSx 激活。200 MHz 时 3 个集群。”
  - 将  $I_{DDGTM}$  的最大值从 88 mA 改为 120 mA
  - 将  $I_{DDMBIST}$  的注释从“100 mA”更改为“200 mA”
  - 将  $I_{DDC_{XX}}$  的注释从“实际功率模式”更改为“实际功率模式；IPC=0.6”
  - 将  $I_{DDGTM}$  的最大值从 20 mA 改为 50 mA
  - 将  $I_{DDGTM}$  的注释从“TIMx、TOMx 在 100MHz 时激活。ATOMx、MCSx、DPLL 处于非激活状态。”更改为“TIMx、TOMx 在 100MHz 时激活。ATOMx、MCSx、DPLL 处于非激活状态。2 个集群处于 100 MHz 状态。”
  - 将  $I_{EXTRAIL}$  的最大值从 58 mA 改为 50 mA
  - 将  $I_{EXTRAIL}$  的最大值从 t.b.d mA 改为 56 mA
  - 将  $I_{EXTFLEX}$  的最大值从 30 mA 改为 18 mA
- 电流消耗表“模块电流消耗”的变化
  - 将  $I_{EXTLVDS}$  的最大值从 t.b.d mA 改为 20 mA
  - 将  $I_{SCRSB}$  的注释从“4 mA”更改为“6.5 mA”。
  - 将  $I_{SCRSB}$  的注释从“SCR 8 位待机控制器在待机模式下从  $V_{EVR_{SB}}$  供电引脚汲取电流”更改为“SCR 8 位待机控制器电流（含 PMS）在待机模式下从  $V_{EVR_{SB}}$  供电引脚汲取电流”。
  - 将  $I_{SCRSB}$  的注释从“待机模式下从  $V_{EVR_{SB}}$  供电引脚 汲取的附加 SCR 8 位待机控制器电流”更改为“待机模式下从  $V_{EVR_{SB}}$  供电引脚 汲取的包含 PMS 的 SCR 8 位待机控制器电流”。
  - 将  $I_{SCRSB}$  的注释从“SCR 8 位待机控制器在待机模式下的电流（包括 PMS 在  $V_{EVR_{SB}}$  供电引脚上的电流）”更改为“SCR 8 位待机控制器在待机模式下的电流（包括 PMS 在  $V_{EVR_{SB}}$  供电引脚 上的电流）”。
  - 将  $I_{SCRSB}$  的注释从“SCR 功率模式； $f_{SYS\_SCR} = 20\text{MHz}$ ； $T_J = 150^\circ\text{C}$ ”更改为“SCR 功率模式包括。具有 fback 时钟激活的 PMS 电流消耗； $f_{SYS\_SCR} = 20\text{MHz}$ ； $T_J = 150^\circ\text{C}$ ”
  - 将  $I_{SCRSB}$  的典型值从 0.025 mA 改为 0.190 mA
  - 将  $I_{SCRSB}$  的注释从“实际功率模式； $f_{SYS\_SCR} = 70\text{kHz}$ ； $T_J = 25^\circ\text{C}$ ”更改为“SCR 功率模式包括。Fback 未激活时的 PMS 电流消耗； $f_{SYS\_SCR} = 70\text{kHz}$ ； $T_J = 25^\circ\text{C}$ ”
  - 将  $I_{SCRSB}$  的注释从“SCR 8 位待机控制器在待机模式下从  $V_{EVR_{SB}}$  供电引脚汲取电流”更改为“SCR 8 位待机控制器电流（含 PMS）在待机模式下从  $V_{EVR_{SB}}$  供电引脚汲取电流”。
  - 将  $I_{DDSPU}$  的注释从“66 mA”更改为“32 mA”
  - 将  $I_{DDM}$  的注释从“实际功率模式；仅用于 EDSADC 模块的电流；11 个 EDSADC 通道处于活动状态。”更改为“实际功率模式；仅用于 EDSADC 模块的电流并且 EVADC 模块处于非活动状态；8 个 EDSADC 通道持续处于活动状态。”
  - 将  $I_{DDSPU}$  的注释从“60 mA”更改为“45 mA”

## 记录0.4版本到0.6版本的变化

- 将  $I_{DDM}$  的注释从“最大功率模式；所有 EDSADC 通道 100% 时间处于活动状态”更改为“最大功率模式；仅适用于 EDSADC 模块的电流和 EVADC 模块处于非活动状态；所有 EDSADC 通道持续处于活动状态”。
- 将  $I_{DDM}$  的注释从“真实功率模式；12 个 EVADC 模块处于活动状态”更改为“真实功率模式；仅用于 EVADC 模块的电流并且 EDSADC 模块处于非活动状态；12 个 EVADC 模块处于活动状态”。
- 将  $I_{DDM}$  的最大值从 21 mA 更改为 20 mA
- 将  $I_{DDM}$  的注释从“最大功率模式；所有 EVADC 模块 100% 时间处于活动状态”更改为“最大功率模式；仅 EVADC 模块的电流和 EDSADC 模块处于非活动状态；所有 EVADC 模块均处于活动状态”。
- 将  $I_{DDM}$  的最大值从 56 mA 改为 48 mA
- 将  $I_{SLEEP}$  的最大值从 10 mA 改为 25 mA
- 将  $I_{DDTOT}$  的最大值从 924 mA 更改为 978 mA
- 将  $PD$  的最大值从 t.b.d. mW 更改为 1700mW
- 将  $PD$  的最大值从 t.b.d. mW 改为 2400mW
- 将  $I_{DDTOTDC5}$  的注释从“t.b.d. mW”更改为“440 mA”
- 将  $I_{DDTOTDC5}$  的注释从“实际功率模式； $V_{EXT} = 5V$ ； $T_J = 150^\circ C$ ”更改为“实际功率模式；EVRC 复位设置效率为 72%； $V_{EXT} = 5V$ ； $T_J = 150^\circ C$ ”
- 将  $I_{DDTOTDC5}$  的描述从“ $\Sigma$  DC-DC EVR13 调节器激活时所有电流的总和”更改为“ $\Sigma$  DC-DC EVRC 调节器激活时所有电流的总和”
- 将  $I_{DDTOTDC3}$  的最大值从 t.b.d. mA 改为 580 mA
- 将  $I_{DDTOTDC3}$  的注释从“实际功率模式； $V_{EXT} = 3.3V$ ； $T_J = 150^\circ C$ ”更改为“实际功率模式；EVRC 复位设置效率为 72%； $V_{EXT} = 3.3V$ ； $T_J = 150^\circ C$ ”
- 将  $I_{DDTOTDC3}$  的描述从“ $\Sigma$  DC-DC EVR13 调节器激活时所有电流的总和”更改为“ $\Sigma$  DC-DC EVRC 调节器激活时所有电流的总和”
- 将  $I_{EVRSB}$  的最大值从 4 mA 改为 8 mA
- 将  $I_{DDMBIST}$  的注释从“430mA”更改为“490 mA”
- 复位
  - 将  $t_{POH}$  的最小值从 100 ns 改为 150 ns
  - 将  $t_{BP}$  的注释从“ $dV/dT = 1 V/ms$ ”更改。包括 EVR 启动和固化执行时间；RAM 初始化和 HSM 启动时间不包括“ $dVEXT/dT = 1V/ms$ ”。 $VEXT > VLVD RST5$ 。启动时间  
冷 PORST 包括 EVR 加速和固件执行时间；不包括 RAM 初始化和 HSM 启动时间。'
  - 将  $t_B$  的注释从“以最大频率运行”更改为“以最大频率运行，具有有效的 BMI 帧头”
  - 将  $t_{BS}$  的注释从“”更改为“不包括 RAM 初始化和 HSM 启动时间，具有有效的 BMI 帧头”
  - 将  $t_{BP}$  的注释从“固件执行时间；不包括 EVR 启动时间；不包括 RAM 初始化和 HSM 启动时间”更改为“热启动后固件执行时间，不包括 EVR 启动时间；不包括 RAM 初始化和 HSM 启动时间”。
  - 将  $t_{POA}$  类型从 CC 更改为 SR
  - 将  $t_{POA}$  的描述从“电源稳定在工作水平后外部 PORST 有效保持时间的最小值”更改为“启动后电源稳定在工作水平后外部 PORST 有效保持时间的最小值”
- PMS/EVR33 LDO
  - 将  $C_{OUT}$  的最小值从 0.65  $\mu F$  改为 1.45  $\mu F$
  - 将  $C_{OUT}$  的注释从“1.35  $\mu F$ ”更改为“3  $\mu F$ ”。
  - 将  $C_{OUT}$  的注释从“1  $\mu F$ ”更改为“2.2  $\mu F$ ”。

- 将  $dV_{out}/dI_{out}$  的最小值从 -100 mV 改为 -180 mV
- 将  $dV_{out}/dI_{out}$  的最大值从 100 mV 改为 180 mV
- 将  $I_{DDMBIST}$  的注释从“100 mA”更改为“60 mA”
- 将  $dV_{out}/dV_{in}$  注释从 ' $dV_{in}/dT=50V/ms$ ;  $dV=5$  to  $3.6V$ ' 更改至 ' $dV_{in}/dT=50V/ms$ ;  $dV=5$  至  $3.6V$ ;  $I_{MAX}=60mA$ '
- 将  $dV_{out}/dV_{in}$  注释从 ' $dV_{in}/dT=50V/ms$ ;  $dV=3.6$  更改至  $5V$ ' 至 ' $dV_{in}/dT=50V/ms$ ;  $dV=3.6$  至  $5V$ ;  $I_{MAX}=60mA$ '
- PMS/供电监控器
  - 将  $V_{LVDRST5}$  的注释从“2.7 V”更改为“2.75 V”。
  - 将  $V_{LVDRST5}$  的注释从“2.67 V”更改为“2.72 V”。
- PMS/供电坡道
  - 将  $SR\_V\_EXT$  的描述从“外部  $V_{EXT}$  和  $V_{EVRSB}$  供电斜坡”更改为“外部  $V_{EXT}$  和  $V_{EVRSB}$  供电上升和下降斜率。
  - 将  $SR\_V\_DDP3$  的描述从“外部  $V_{DDP3}$  供电斜坡”更改为“外部  $V_{DDP3}$  供电上升和下降斜坡”。
  - 将  $SR\_V\_DD$  的描述从“外部  $V_{DD}$  供电斜坡”更改为“外部  $V_{DD}$  供电上升和下降斜坡”。
  - 将  $SR\_V\_DDM$  的描述从“外部  $V_{DDM}$  供电斜坡”更改为“外部  $V_{DDM}$  供电上升和下降斜坡”。
- PMS/EVRC SMPS 在表中“EVRC SMPS”的变化
  - 将 *EVRC SMPS* 的名称从 EVR13 SMPS 更改为 EVRC SMPS
- PMS/EVRC SMPS 的“EVRC SMPS 外部组件”表格中的变更
  - 将 *EVRC SMPS 外部元件* 的名称从 EVR13 SMPS 外部元件更改为 EVRC SMPS 外部元件
- JTAG 参数部分的变化
  - 更新图表测试时钟时序 (TCK)
- DAP 参数部分的变化
  - 将测试时钟时序 (DAP0)、DAP 时序主机到设备以及 DAP 时序设备到主机 (DAP1 和 DAP2 引脚) 组合成单个 DAP 时序图
  - 对于  $F=40MHz$  的条件, 添加  $t_{14}$
  - 对于  $F=40MHz$  的条件, 增加  $t_{15}$
  - 对于  $F=40MHz$  的条件, 添加  $t_{16}$
- ASCLIN 的“主模式强锐 (ss) 输出焊盘”表的变化
  - 将  $t_{51}$  的最小值从 -3 ns 改为 -3.5 ns
  - 将  $t_{51}$  的最大值从 3 ns 改为 3.5 ns
  - 将  $t_{510}$  的最大值从 3 ns 改为 3.5 ns
- QSPI 的“主模式时序、LVDS 数据和时钟输出焊盘”表格中的变更
  - 将  $t_{51}$  的注释从“3 ns”更改为“4 ns”。
  - 将  $t_{52}$  的注释从“17 ns”更改为“18 ns”。
- MSC 的“用于 5V 时钟/数据的强尖锐 (ss) 驱动器”表格中的更改
  - 将  $t_{45}$  的最小值从 -3 ns 改为 -4 ns
  - 将  $t_{44}$  的注释从“-3 ns”更改为“-4 ns”。
- 适用于以太网的“3.3V ETH RMII 信号时序参数”变更

- 添加参数 $t_{21}$
- 适用于以太网的“3.3V ETH RMII 信号时序参数”变更
  - 将 $t_{16}$ 的描述从‘ETHTXEN、ETHTXD[1:0]、ETHRXD[1:0]、ETHCRSDV、ETHRXER；设置时间’更改为‘ETHTXEN、ETHTXD[1:0]、ETHRXD[1:0]、ETHCRSDV；设置时间’
  - 将 $t_{17}$ 的描述从‘ETHTXEN、ETHTXD[1:0]、ETHRXD[1:0]、ETHCRSDV、ETHRXER；设置时间’更改为‘ETHTXEN、ETHTXD[1:0]、ETHRXD[1:0]、ETHCRSDV；设置时间’
- LVDS Pads 的‘HSCT - Rx/Tx 设置时序’表格中的变化
  - 将 $t_{tx}$ 的最大值从 250 ns 改为 280 ns
- Flash
  - 将 $t_{ER\_Dev}$ 的注释从“用于文档记录的衍生值”更改为“有效周期少于 1000 次，不含 UCB。用于文档记录的衍生值。”
  - 将 $t_{ER\_Dev}$ 的注释从“17.8 秒”更改为“11.5 秒”。
  - 将 $t_{PRPB5\_PF}$ 的最大值从 16 秒改为 10 秒
- 封装参数
  - 更新封装热特性表
  - 将封装类型从PG-LFBGA-516-9更改为PG-LBGA-516-1
  - 将封装类型从PG-LFBGA-292-9更改为PG-LFBGA-292-11

## 4.2 从版本 0.6到版本 0.7 的变更

- 将步骤描述从“AA”更改为“AB”。
- “平台特点概述”中数据存储器更新至 512 KB
- 在平台特点概述表中将 AGBT 更新为“否”
- 表格“工作条件”中的“BBB频率”
- 更新 Ctrl.用于引脚 ESR0
- 更新 Ctrl.用于引脚 ESR1
- 绝对最大额定值
  - 将 $V_{DDM}$ 的描述从‘ $V_{DDM}$ 、 $V_{EXT}$ 和 $V_{FLEX}$  电源引脚相对于 $V_{SS}$  的电压’更改为‘ $V_{DDM}$ 、 $V_{EXT}$ 、 $V_{FLEX}$ 和 $V_{EVRSB}$  电源引脚相对于 $V_{SS}$  的电压’
- ‘过载参数’表的变化
  - 将 $I_{IN}$ 的注释从“除 LVDS 引脚外”更改为“除 LVDS 引脚外；限制为最大运行时间”。
  - 将 $I_{INLVDS}$ 的注释从“to”更改为“限制在最大运行时间”。
  - 将 $I_{ID}$ 的注释从“所有电源电压 $V_{DDx} = 0$ ”更改为“所有电源电压 $V_{DDx} = 0$ ；限制为最大非活动运行时间小时数”。
  - 将 $I_{OUT}$ 的注释从‘100% 占空比更改为；输出驱动器=强’改为‘100%占空比;输出驱动器=强；限制为最大操作实时时间’
  - 更改“过载下的引脚可靠性”序言
- 标准焊盘的“慢速 3.3V GPIO”表的变化
  - 将 $V_{IL}$ 的注释从“ $0.44 * V_{EXT/FLEX}$  V”更改为“ $0.42 * V_{EXT/FLEX}$  V”
  - 将 $I_{PUH}$ 的注释从“ $V_{IH}$ ；AL 和 TTL（性能下降，用于 CIF）；VGATE1P 和 $T_J > 150^\circ\text{C}$  除外”更改为“ $V_{IH}$ ；AL 和 TTL（性能下降，用于 CIF）；VGATE1P 除外；VGATE1N 和 $T_J > 150^\circ\text{C}$  除外”。

## 记录0.6版本到0.7版本的变化

将 $I_{PUH}$ 的注释从“ $V_{IL}$ ；AL和TTL和TTL（性能下降，用于CIF）；VGATE1P和 $T_J > 150^\circ\text{C}$ 除外”更改为“ $V_{IL}$ ；AL和TTL和TTL（性能下降，用于CIF）；VGATE1P除外；VGATE1N和 $T_J > 150^\circ\text{C}$ 除外”。

- 将 $I_{PUH}$ 的注释从“ $V_{IH}$ ；TTL；除VGATE1P和 $T_J > 150^\circ\text{C}$ 外”更改为“ $V_{IH}$ ；TTL；除VGATE1P；除VGATE1N和 $T_J > 150^\circ\text{C}$ 外”。
- 将 $t_{SET}$ 的描述从‘焊盘设置时间’更改为‘焊盘设置时间以获得配置活动的软件更新’
- 将 $I_{OZ}$ 的最小值从 -200 nA 改为 -300 nA
- 将 $I_{OZ}$ 的最大值从 200 nA 改为 300 nA
- 将 $I_{OZ}$ 的最小值从 -250 nA 改为 -400 nA
- 将 $I_{OZ}$ 的最大值从 250 nA 改为 400 nA
- 将 $I_{OZ}$ 的最小值从 -300 nA 改为 -600 nA
- 将 $I_{OZ}$ 的最大值从 300 nA 改为 600 nA
- 将 $I_{OZ}$ 的最小值从 -500 nA 改为 -750 nA
- 将 $I_{OZ}$ 的最大值从 500 nA 改为 750 nA
- 将 $I_{OZ}$ 的最小值从 -350 nA 改为 -300 nA
- 将 $I_{OZ}$ 的最大值从 350 nA 改为 300 nA
- 将 $I_{OZ}$ 的最小值从 -550 nA 改为 -400 nA
- 将 $I_{OZ}$ 的最大值从 550 nA 改为 400 nA
- 将 $I_{OZ}$ 的最小值从 -700 nA 改为 -600 nA
- 将 $I_{OZ}$ 的最大值从 700 nA 改为 600 nA
- 将 $I_{OZ}$ 的最小值从 -1100 nA 改为 -750 nA
- 将 $I_{OZ}$ 的最大值从 1100 nA 改为 750 nA
- 将 $I_{OZ}$ 的最大值从 11000 nA 更改为 18000 nA
- 将 $I_{OZ}$ 的注释从“-11000 nA”更改为“-18000 nA”。
- 将 $I_{OZ}$ 的最大值从 22000 nA 更改为 38000 nA
- 将 $I_{OZ}$ 的最小值从 -22000 nA 更改为 -38000 nA
- 标准焊盘表格‘RFast 3.3V 焊盘’的变更
  - 将 $V_{IL}$ 的注释从“ $0.44 * V_{EXT/FLEX}$ ”更改为“ $0.42 * V_{EXT/FLEX}$ ”
  - 将 $t_{SET}$ 的描述从‘焊盘设置时间’更改为‘焊盘设置时间以获得配置活动的软件更新’
- 标准焊盘的“快速 3.3V GPIO”表的变化
  - 将 $V_{IL}$ 的注释从“ $0.44 * V_{EXT/FLEX}$ ”更改为“ $0.42 * V_{EXT/FLEX}$ ”
  - 将 $I_{OZ}$ 的注释从“-750 nA”更改为“-1100 nA”。
  - 将 $I_{OZ}$ 的注释从“750 nA”更改为“1100 nA”。
  - 将 $I_{OZ}$ 的最小值从 -5000 nA 改为 -6000 nA
  - 将 $I_{OZ}$ 的注释从“5000nA”更改为“6000nA”。
  - 将 $I_{OZ}$ 的最小值从 -1300 nA 改为 -2000 nA
  - 将 $I_{OZ}$ 的最大值从 1300 nA 改为 2000 nA
  - 将 $I_{OZ}$ 的最小值从 -2000 nA 改为 -2500 nA
  - 将 $I_{OZ}$ 的注释从“2000nA”更改为“2500nA”。
  - 将 $I_{OZ}$ 的最大值从 9000 nA 更改为 13500 nA
  - 将 $I_{OZ}$ 的最小值从 -9000 nA 改为 -13500 nA

- 将 $I_{OZ}$ 的注释“-2300 nA”更改为“-1100 nA”。
- 将 $I_{OZ}$ 的最小值从 -5000 nA 改为 -2000 nA
- 将 $I_{OZ}$ 的注释“2300nA ”更改为“1100nA ”。
- 将 $I_{OZ}$ 的最大值从 5000 nA 改为 2000 nA
- 将 $t_{SET}$ 的描述从 '焊盘设置时间' 更改为 '焊盘设置时间以获得配置活动的软件更新'
- 标准焊盘'快速 5V GPIO'表的变化
  - 将 $I_{OZ}$ 的最大值从 750 nA 改为 1100 nA
  - 将 $I_{OZ}$ 的最小值从 -750 nA 改为 -1100 nA
  - 将 $I_{OZ}$ 的最小值从 -5000 nA 改为 -6000 nA
  - 将 $I_{OZ}$ 的最大值从 5000 nA 改为 6000 nA
  - 将 $I_{OZ}$ 的注释从“-1300 nA”更改为“-2000 nA”。
  - 将 $I_{OZ}$ 的最大值从 1300 nA 改为 2000 nA
  - 将 $I_{OZ}$ 的最小值从 -2000 nA 改为 -2500 nA
  - 将 $I_{OZ}$ 的最大值从 2000 nA 改为 2500 nA
  - 将 $I_{OZ}$ 的注释从“9000nA ”更改为“13500nA ”。
  - 将 $I_{OZ}$ 的最小值从 -9000 nA 改为 -13500 nA
  - 将 $I_{OZ}$ 的注释从“-2300 nA”更改为“-1100 nA”。
  - 将 $I_{OZ}$ 的注释从“-5000 nA”更改为“-2000 nA”。
  - 将 $I_{OZ}$ 的最大值从 2300 nA 改为 1100 nA
  - 将 $I_{OZ}$ 的最大值从 5000 nA 改为 2000 nA
  - 将 $t_{SET}$ 的描述从 '焊盘设置时间' 更改为 '焊盘设置时间以获得配置活动的软件更新'
- 标准焊盘'慢速 5V GPIO'表的变化
  - 将 $I_{OZ}$ 的注释从“-250 nA”更改为“-400 nA”。
  - 将 $I_{OZ}$ 的最大值从 250 nA 改为 400 nA
  - 将 $I_{OZ}$ 的最小值从 -350 nA 改为 -600 nA
  - 将 $I_{OZ}$ 的最大值从 350 nA 改为 600 nA
  - 将 $I_{OZ}$ 的注释从“500nA ”更改为“750nA ”。
  - 将 $I_{OZ}$ 的注释从“-500 nA”更改为“-750 nA”。
  - 将 $I_{OZ}$ 的最小值从 -200 nA 改为 -300 nA
  - 将 $I_{OZ}$ 的最大值从 200 nA 改为 300 nA
  - 将 $I_{PUH}$ 的注释从“ $V_{IH}$ ；AL或TTL；除 VGATE1P 和  $T_J > 150^\circ\text{C}$  外”更改为“ $V_{IH}$ ；AL或TTL；除 VGATE1P；除 VGATE1N 和  $T_J > 150^\circ\text{C}$  外”。
  - 将 $I_{PUH}$ 的注释从“ $V_{IL}$ ；AL或TTL；除 VGATE1P 和  $T_J > 150^\circ\text{C}$  外”更改为“ $V_{IL}$ ；AL或TTL；除 VGATE1P；除 VGATE1N 和  $T_J > 150^\circ\text{C}$  外”。
  - 将 $t_{SET}$ 的描述从 '焊盘设置时间' 更改为 '焊盘设置时间以获得配置活动的软件更新'
  - 将 $I_{OZ}$ 的最小值从 -350 nA 改为 -300 nA
  - 将 $I_{OZ}$ 的最大值从 350 nA 改为 300 nA
  - 将 $I_{OZ}$ 的最小值从 -550 nA 改为 -400 nA
  - 将 $I_{OZ}$ 的注释从“550 nA”改为“400 nA”。
  - 将 $I_{OZ}$ 的最小值从 -700 nA 改为 -600 nA

- 将 $I_{OZ}$ 的最大值从 700 nA 改为 600 nA
- 将 $I_{OZ}$ 的最小值从 -1100 nA 改为 -750 nA
- 将 $I_{OZ}$ 的最大值从 1100 nA 改为 750 nA
- 将 $I_{OZ}$ 的最大值从 11000 nA 更改为 18000 nA
- 将 $I_{OZ}$ 的最小值从 -11000 nA 改为 -18000 nA
- 将 $I_{OZ}$ 的注释从“22000nA”更改为“38000nA”。
- 将 $I_{OZ}$ 的最小值从 -22000 nA 更改为 -38000 nA
- 标准焊盘的“S 类 5V”表的变更
  - 将 $t_{SET}$ 的描述从 '焊盘设置时间' 更改为 '焊盘设置时间以获得配置活动的软件更新'
  - 将 $I_{OZ}$ 的最小值从 -350 nA 改为 -300 nA
  - 将 $I_{OZ}$ 的注释从“350 nA”改为“300 nA”。
  - 将 $I_{OZ}$ 的最小值从 -700 nA 改为 -600 nA
  - 将 $I_{OZ}$ 的最大值从 700 nA 改为 600 nA
- 标准焊盘‘D 类’表的变更
  - 将 $I_{OZ}$ 的最小值从 -350 nA 改为 -300 nA
  - 将 $I_{OZ}$ 的最大值从 350 nA 改为 300 nA
  - 将 $I_{OZ}$ 的最小值从 -700 nA 改为 -600 nA
  - 将 $I_{OZ}$ 的最大值从 700 nA 改为 600 nA
- 标准焊盘的“RFast 5V GPIO”表的变化
  - 将 $t_{SET}$ 的描述从 '焊盘设置时间' 更改为 '焊盘设置时间以获得配置活动的软件更新'
- LVDS Pads 表‘LVDS - IEEE 标准 LVDS 通用链路 (GPL)’中的变更
  - 添加了参数  $t_{SET\_LVDS}$
  - 将 $R_{in}$ 的注释从“1600 mV  $< V_I \leq 2000$  mV”更改为“ $V_I \leq 2000$  mV”。
- VADC 5V
  - 添加参数  $dVDDK$
  - 将 $V_{DDK}$ 的注释从“to”改为“低温下测量”。
  - 将 $t_{SCAL}$ 的注释从“ $4.5V \leq V_{DDM} \leq 5.5V$ ”更改为“ $4.5V \leq V_{DDM} \leq 5.5V$ ”。
  - 将 $f_{ADCI}$ 的注释从“ $4.5V \leq V_{DDM} \leq 5.5V$ ”更改为“ $4.5V \leq V_{DDM} \leq 5.5V$ ”。
  - 将 $R_{PDD}$ 的注释改为 '在焊盘输入电压  $V_{IN} = V_{DDM} / 2$  处测量。'
  - 将 $t_{SCAL}$ 的注释从“ $2.97V \leq V_{DDM} < 4.5V$ ”更改为“ $2.97V \leq V_{DDM} < 4.5V$ ”。
  - 将 $t_S$ 的注释从“主组或快速比较通道,  $4.5V \leq V_{DDM} \leq 5.5V$ ; 输入缓冲器禁用”更改为“主组或快速比较通道,  $4.5V \leq V_{DDM} \leq 5.5V$ ; 输入缓冲器禁用”。
  - 将 $f_{ADCI}$ 的注释从“ $2.97V \leq V_{DDM} < 4.5V$ ”更改为“ $2.97V \leq V_{DDM} < 4.5V$ ”。
  - 将 $t_S$ 的注释从“主要组或快速比较通道,  $4.5V \leq V_{DDM} \leq 5.5V$ ; 输入缓冲器启用'至'主组或快速比较通道,  $4.5V \leq V_{DDM} \leq 5.5V$ ; 输入缓冲器启用'
  - 将 $t_S$ 的注释从“次级组,  $4.5V \leq V_{DDM} < 5.5V$ ”输入缓冲器禁用 更改为“次级组”,  $4.5V \leq V_{DDM} \leq 5.5V$ ; 输入缓冲器禁用
  - 将 $t_S$ 的注释从“次级组,  $4.5V \leq V_{DDM} \leq 5.5V$ ”输入缓冲器启用更改为次级组,  $4.5V \leq V_{DDM} \leq 5.5V$ ; 输入缓冲器启用
  - 将 $t_S$ 的注释从“主要组或快速比较通道,  $2.97V \leq V_{DDM} < 4.5V$ ; 输入缓冲器禁用的'至'主组或快速比较通道,  $2.97V \leq V_{DDM} < 4.5V$ ; 输入缓冲器禁用'

- 将 $t_S$ 的注释从“主要组或快速比较通道,  $2.97V \leq V_{DDM} < 4.5V$ ; 输入指示灯启用的'至'主组或快速比较通道,  $2.97V \leq V_{DDM} < 4.5V$ ; 输入缓冲器禁用”
- 将 $t_S$ 的注释从“次级组,  $2.97V \leq V_{DDM} < 4.5V$ ”输入缓冲器禁用 更改为“次级组”,  $2.97V \leq V_{DDM} < 4.5V$ ; 输入缓冲器禁用
- 将 $t_S$ 的注释从“次级组,  $2.97V \leq V_{DDM} < 4.5V$ ; 输入特效启用的'到'次级组,  $2.97V \leq V_{DDM} < 4.5V$ ; 输入缓冲器启用
- 更改“VADC 参数”前言
- DSADC 5V
  - 添加参数  $R_{BIAS}$
  - 将 $I_{REF}$ 的类型从 SR 更改为 CC
- DTS 的表“DTS 磁芯”发生了变化
  - 添加参数  $\Delta T$ 
    - 电流损耗
  - 将 $I_{DDP3RAIL}$ 的最大值从 "60 mA" 改为 "50 mA"
- 电流消耗表“模块电流消耗”的变化
  - 将 $I_{DDP3ERASE}$ 的最大值从 20 mA 改为 25 mA
  - 添加参数  $I_{DDP3ERASE}$
  - Change description of  $I_{DDP3ERASE}$  from 'Current adder for' to ' $I_{DDP3}$  supply current for erasing of a Pflash or Dflash bank'
  - 将 $I_{SCRSB}$ 的典型值从 0.190 mA 改为 0.150 mA
  - 将 $I_{DDP3PROG}$ 的最大值从 "8 mA" 改为 "9 mA"
  - 将 $I_{DDP3PROG}$ 的最大值从 "20 mA" 改为 "25 mA"
  - 将 $I_{SCRSB}$ 的最大值从 "6.5 mA" 改为 "7 mA"
  - 将 $I_{SCRIDLE}$ 的最大值从 "1 mA" 改为 "3.5 mA"
  - 将 $I_{DDPORST}$ 的最大值从“实际功率模式;  $T_J = 125^\circ C$ ”更改为“ $V_{DD} = 1.275V$ ;  $T_J = 125^\circ C$ ”。
  - 将 $I_{DDPORST}$ 的最大值从 "190 mA" 改为 "185 mA"
  - 将 $I_{SLEEP}$ 的最大值从 25 mA 改为 27 mA
- 电流消耗表“模块核心电流消耗”的变化
  - 将 $I_{DDGTM}$ 的最大值从 120 mA 改为 125 mA
  - 将 $I_{DDPORST}$ 的注释从“实际功率模式;  $T_J = 150^\circ C$ ”更改为“ $V_{DD} = 1.275V$ ;  $T_J = 150^\circ C$ ”。
  - 将 $I_{DDPORST}$ 的最大值从 340 mA 更改为 320 mA
  - 将 $I_{DDPORST}$ 的注释从“实际功率模式;  $T_J = 160^\circ C$ ”更改为“ $V_{DD} = 1.275V$ ;  $T_J = 160^\circ C$ ”。
  - 将 $I_{DDPORST}$ 的最大值从 450 mA 更改为 400 mA
  - 将 $I_{DDPORST}$ 的注释从“实际功率模式;  $T_J = 165^\circ C$ ”更改为“ $V_{DD} = 1.275V$ ;  $T_J = 165^\circ C$ ”。
  - 将 $I_{DDPORST}$ 的注释从“490 mA”更改为“430 mA”
- 复位
  - 将 $t_{BS}$ 的最大值从 1 毫秒改为 1.05 毫秒
  - 将 $t_{BP}$ 的注释从“固件在热启动 PORST 后执行时间（不含 EVR 启动时间）；不包括 RAM 初始化和 HSM 启动时间”更改为“固件在释放 PORST 后执行时间（不含 EVR 启动时间）；不包括 RAM 初始化和 HSM 启动时间”。
  - 将 $t_{BP}$ 的描述从“上电复位启动时间”更改为“冷上电复位启动时间”
  - 将 $t_{LBIST}$ 的注释从“PATTERNS=0x00040, FREQU=5, SPLITSH=4”更改为“LBIST 配置 A”。
  - 删除了带有注释“PATTERNS=0x00280, FREQU=5, SPLITSH=4”的 $t_{LBIST}$ 参数

- PMS/EVR33 LDO
  - 将 $dV_{out}/dV_{in}$ 的注释从“ $dV_{in}/dT=1V/ms$ ;  $dV=3.6$  至  $5V$ ”更改为“ $dV_{in}/dT=1V/ms$ ;  $dV=3.6$  至  $5V$ ;  $\Delta V_{OUTTC}$  包含在内”。
  - 将 $dV_{out}/dV_{in}$ 的注释从“20 mV”更改为“40 mV”。
  - 将 $dV_{out}/dV_{in}$ 的最小值从 -20 mV改为-40 mV
  - 将 $dV_{out}/dV_{in}$ 的注释从“ $dV_{in}/dT=1V/ms$ ;  $dV=5$  至  $3.6V$ ”更改为“ $dV_{in}/dT=1V/ms$ ;  $dV=5$  至  $3.6V$ ; 包含 $\Delta V_{OUTTC}$ ”。
  - 添加参数 $dV_{OUTTC}$
  - 将 $t_{STR}$ 的注释更改为 正常运行模式'
- PMS/供电监控器
  - 将 $V_{RSTC}$ 的最大值从 1.135 V 改为 1.138 V
- PMS/EVRC SMPS 在表中“EVRC SMPS”的变化
  - 将 $\Delta V_{DDDC}$ 的最大值从 12 mV 改为 16 mV
- PLL设计
  - 添加参数 $JABS25$
  - 将 $DP$ 的注释从“ $f_{DCO}=640$  MHz”更改为“ $f_{DCO}=640$  MHz 或 $f_{DCO}=800$  MHz”。
  - 将 $D_{RMS}$ 的注释从 '在  $1\mu s$  内测量;  $f_{REF}=20$  MHz;  $f_{DCO}=640$  MHz' 更改为 '在  $1\mu s$  内测量;  $f_{REF}=20$  MHz 和  $f_{DCO}=640$  MHz 或  $f_{REF}=25$  MHz 和  $f_{DCO}=800$  MHz'
- Flash
  - 将 $N_{E_{HSMS}}$ 的注释从“最大数据保存时间 10 年”更改为“最大数据保存时间 20 年,  $T_j=85^\circ C$ ”
  - 将 $N_{E_{EEP10S}}$ 的注释从“最大数据保存时间 10 年”更改为“最大数据保存时间 20 年,  $T_j=85^\circ C$ ”
  - 添加参数  $N_{E_{EEP10S}}$
  - 将 $N_{E_{EEP10S}}$ 的最大值改为 125000 次循环
  - 添加参数  $N_{E_{EEP10S}}$
  - 将 $N_{E_{EEP10S}}$ 的最大值改为 125000 次循环
  - 添加参数  $N_{E_{EEP10S}}$
  - 将 $N_{E_{EEP10S}}$ 的最大值 改为 70000 周期
  - 添加参数  $N_{E_{HSMS}}$
  - 将 $N_{E_{HSMS}}$ 的最大值改为 125000 周期
  - 添加参数  $N_{E_{HSMS}}$
  - 将 $N_{E_{HSMS}}$ 的最大值改为 125000 周期
  - 添加参数  $N_{E_{HSMS}}$
  - 将 $N_{E_{HSMS}}$ 的最大值改为 70000 周期
  - 将非活动时间添加到表 3-75“温度配置文件示例”
- 封装参数
  - 更新表 3-67 的表格布局
  - 将  $R_{TH\_JA}$  的最大值从 14.8 K/W 改为 17 K/W
  - 将  $R_{TH\_JA}$  的最大值从 12 K/W 改为 14 K/W
  - 将 $R_{TH\_JA}$ 的名称从热阻抗（结到环境）更改为  $R_{TH\_JA}$
  - 将 $R_{TH\_JA}$ 的描述从“”更改为“热阻抗（结到环境）”
  - 将  $R_{TH\_JCT}$  的最大值从 4.5 K/W 改为 3 K/W
  - 将  $R_{TH\_JCT}$  的最大值从 4.7 K/W 改为 3 K/W

- 将 RTH\_JCB 的最大值从 2.8 K/W 改为 2 K/W
- 将  $R_{TH\_JCB}$  的描述 " 更改为 '热阻抗 (结至外壳底部)'
- 将 RTH\_JCB 的注释从“3.5 K/W”更改为“2 K/W”

### 4.3 从版本0.7到版本0.71的变更

- 引脚
  - HSCT 引脚的更正描述
  - 更正了 CCU\_PAD\_SYSCLK 引脚的描述
- 特征描述
  - 以太网描述中包含了 RGMII
- 平台特点概述
  - 将 SDMMC 模块数量从 "1 "更正为 "0
  - 将 MCDS 的值从 "是 "更正为 "否"
  - QSPI模块数量已从“6”更正为“5”。
- 在“高性能LVDS焊盘”部分中，将“LVDSH”更正为“LVDS”。
- “绝对最大额定值”表的变更
  - 更改参数“VDDM”的值
  - 更改参数“VIN”的值
- 变更“过载”部分前导码
- “过载”部分“过载参数”表的变化
  - 参数“IIN”的条件变更
  - 参数“IINLVDS”的条件变更
  - 参数“IOUT”的条件变更
  - 参数“IINANA”的条件变更
  - 删除参数“IID”
- “可切换焊盘”部分中“PORST焊盘”表格的变化
  - 将参数和值的基准电压从“VEXT/FLEX”更改为“VEXT”
- "Class S" 表中的更改“可切换焊盘”
  - 将参数和值的基准电压从“VEXT/FLEX”更改为“VDDM”
- “可切换焊盘”部分中“RFast 3.3V焊垫”表格的变更
  - 将参数和值的基准电压从“VEXT/FLEX”更改为“VFLEX”
- “可切换焊盘”部分中“RFast 5V焊垫”表格的变更
  - 将参数和值的基准电压从“VEXT/FLEX”更改为“VFLEX”
- “可切换焊盘”部分中“快速 3.3V 焊垫”表格的变化
  - 将参数和值的基准电压从“VEXT/FLEX”更改为“VEXT/FLEX/EVRSB”
- “可切换焊盘”部分中“快速 5V 焊垫”表格的变化
  - 将参数和值的基准电压从“VEXT/FLEX”更改为“VEXT/FLEX/EVRSB”
- “可切换焊盘”部分中“慢速 3.3V 焊垫”表格的变化
  - 将参数和值的基准电压从“VEXT/FLEX”更改为“VEXT/FLEX/EVRSB”
- “可切换焊盘”部分中“慢速 5V 焊垫”表格的变化
  - 将参数和值的基准电压从“VEXT/FLEX”更改为“VEXT/FLEX/EVRSB”

## 记录0.7版本到0.71版本的变化

- "VADC 5V"表中的变化
  - 在参数“QCON”中添加脚注
  - 更改了图片“模拟输入的等效电路”
- "DSADC 5V"表中的变化
  - 更改参数“EDGAIN”的值
  - 更改参数“EDOFF”的值
  - 为参数“EDOFF”添加脚注
  - 更改参数“IREF”的值
  - 更改参数“IRMS”的值
  - 在参数“IRMS”中添加脚注
  - 在参数“SNR”中添加脚注
  - 在参数“SFDR”中添加脚注
- “电流消耗”表的变化
  - 更改“IDDRAIL”的参数描述
  - 参数“ISTANDBY”的条件变更
  - 更改参数“ISTANDBY”的值
  - 更改参数“ISTANDBY”的脚注
- “电流损耗”部分“模块磁芯电流损耗”表中的变化
  - 参数“IDDLBIST”的条件变更
  - 更改参数“IDDLBIST”的值
  - 在参数“IDDLBIST”中添加脚注
  - 在参数“ISCRSB”中添加脚注
  - 参数“IDDMBIST”的更改条件
- 添加了“计算 1.25V 电流损耗”部分
- 表格“复位”中的变更
  - 更改参数“tB”的值
  - 更改参数“tBS”的值
  - 为参数“tEVRPOR”添加脚注
  - 更改参数“tBWP”的值
  - 参数“tLBIST”的条件变更
  - 更改“tLBIST”的参数描述
- 表格“EVR33 LDO”的变化
  - 参数“dVout/dIout”的条件变更
  - 参数“Vout/dVin”的条件变更
  - 更改参数“IMAX”的脚注
- "供应监控器"表中的变化
  - 参数“tMON”的条件变更
  - 参数“VDDMON”的条件变更
  - 参数“VDDP3MON”的条件变更
  - 参数“VEXTMON”的条件变更
  - 在参数“VEXTMON”中添加脚注
  - 参数“VRST5”的条件变更

## 记录0.71版本到1.0版本的变化

- 表“Flash”中的更改
  - 参数“NE\_EEP10S”的条件变更
  - 移除参数“NE\_EEP10S”的条件
  - 参数“NE\_HSMS”的条件变更
  - 移除参数“NE\_HSMS”的条件
- “质量声明”部分“质量参数”表的变更
  - 更改“VHBM1”的参数描述
- 添加部分“TC380 载带”
- OSC\_XTAL
  - 删除了  $V_{ILBX}$  参数
  - 删除了  $V_{IHBX}$  参数
- 表“备份时钟的变化”
  - 更新参数“fBACKT”的脚注
- 表“PLL外设”的变化
  - 添加参数“DPP”
  - 添加参数“DPPI”
- “E射线参数”表中“接收参数”的变化
  - 更新参数“tdCCRxD01”的描述

## 4.4 从版本 0.71 到版本 1.0 的变更

- “功能摘要”一章中的变更
  - 将 LMU 内存大小从 128 Kbyte 更改为 256 Kbyte
- 引脚
  - 更正了“显示器类型”栏的描述：PU2
- “电气规格”一章的变更
  - 更正/添加了第 3.1 节“参数解释”中的措辞
  - 添加了温度值的命名，表 3-66，示例操作寿命配置文件
  - 将第 3.16 章的名称从锁相环 (PLL) 更改为系统锁相环 (SYS\_PLL)。
  - 修正了“功能概述”部分的温度
- 绝对最大值表的变化
  - 在  $V_{DD}$  中添加了脚注 2)
- “操作条件”表的变化
  - 在  $V_{DD}$  中添加了脚注 1)
- 标准焊盘表格“PORST 焊盘”的变更
  - 将  $HYS$  的最小值从  $0.055 * V_{EXT/FLEX}$  V 更改为  $0.055 * V_{EXT}$  V
  - 将  $I_{OZ}$  的注释从“ $T_J \leq 150^\circ C$ ;  $(0.1 * V_{EXT/FLEX}) < V_{IN} < (0.9 * V_{EXT/FLEX})$ ”更改为“ $T_J \leq 150^\circ C$ ;  $(0.1 * V_{EXT}) < V_{IN} < (0.9 * V_{EXT})$ ”
  - 将脚注 1) 从 10% 更改为 90%  $V_{EXT/FLEX}$  10% 更改为 90% 焊垫 供电电压
  - 在  $I_{PDL}$  中添加脚注 2)

## 记录0.71版本到1.0版本的变化

- 添加参数 $V_{IH}$ 用于 TTL 条件,  $V_{EXT}$
- 添加参数 $V_{IL}$ 用于条件 TTL,  $V_{EXT}$
- 标准焊盘‘快速 5V GPIO’表的变化
  - 将 $V_{IH}$  的最小值从  $0.7 * V_{EXT/FLEX}$  V 更改为  $0.7 * V_{EXT/FLEX/EVRSB}$  V
  - 将 $V_{IL}$  的注释从“ $0.44 * V_{EXT/FLEX}$  V”更改为“ $0.44 * V_{EXT/FLEX/EVRSB}$  V”
  - 将 $V_{ILD}$  的注释从“最大变化 1ms;  $V_{DDM}$  = 常数; AL”更改为“最大变化 1ms;  $V_{EXT/FLEX/EVRSB}$  = 常量; AL’
  - 单行中  $I_{OZ}$  的相等值组合
  - 为 $I_{PUH}$ 添加了脚注 4)
  - 为 $I_{PDL}$ 添加了脚注 5)
- 标准焊盘的“快速 3.3V GPIO”表的变化
  - 将 $V_{IH}$  的最小值从  $0.7 * V_{EXT/FLEX}$  V 更改为  $0.7 * V_{EXT/FLEX/EVRSB}$  V
  - 将 $V_{IL}$  的注释从“ $0.42 * V_{EXT/FLEX}$  V”更改为“ $0.42 * V_{EXT/FLEX/EVRSB}$  V”
  - 将 $V_{ILD}$  的注释从“最大变化 1ms;  $V_{DDM}$  = 常数; AL”更改为“最大变化 1ms;  $V_{EXT/FLEX/EVRSB}$  = 常量; AL’
  - 单行中  $I_{OZ}$  的相等值组合
  - 为 $I_{PUH}$ 添加了脚注 4)
  - 为 $I_{PDL}$ 添加了脚注 5)
- 标准焊盘‘慢速 5V GPIO’表的变化
  - 将 $V_{IH}$  的最小值从  $0.7 * V_{EXT/FLEX}$  V 更改为  $0.7 * V_{EXT/FLEX/EVRSB}$  V
  - 将 $V_{IL}$  的注释从“ $0.44 * V_{EXT/FLEX}$  V”更改为“ $0.44 * V_{EXT/FLEX/EVRSB}$  V”
  - 将 $V_{ILD}$  的注释从“最大变化 1ms;  $V_{DDM}$  = 常数; AL”更改为“最大变化 1ms;  $V_{EXT/FLEX/EVRSB}$  = 常量; AL’
  - 单行中  $I_{OZ}$  的相等值组合
  - 为 $I_{PUH}$ 添加了脚注 4)
  - 为 $I_{PDL}$ 添加了脚注 5)
- 标准焊盘的“慢速 3.3V GPIO”表的变化
  - 将 $V_{IH}$  的最小值从  $0.7 * V_{EXT/FLEX}$  V 更改为  $0.7 * V_{EXT/FLEX/EVRSB}$  V
  - 将 $V_{IL}$  的注释从“ $0.42 * V_{EXT/FLEX}$  V”更改为“ $0.42 * V_{EXT/FLEX/EVRSB}$  V”
  - 将 $V_{ILD}$  的注释从“最大变化 1ms;  $V_{DDM}$  = 常数; AL”更改为“最大变化 1ms;  $V_{EXT/FLEX/EVRSB}$  = 常量; AL’
  - 单行中  $I_{OZ}$  的相等值组合
  - 为 $I_{PUH}$ 添加了脚注 4)
  - 为 $I_{PDL}$ 添加了脚注 5)
- 标准焊盘的“RFast 5V GPIO”表的变化
  - 将 $HYS$ 的最小值从  $0.09 * V_{EXT/FLEX}$  V 更改为  $0.09 * V_{FLEX}$  V
  - 将 $HYS$ 的注释从“ $0.075 * V_{EXT/FLEX}$  V”更改为“ $0.075 * V_{FLEX}$  V”
  - 将 $V_{IH}$  的最小值从  $0.7 * V_{EXT/FLEX}$  V 更改为  $0.7 * V_{FLEX}$  V
  - 将 $V_{IL}$  的注释从“ $0.44 * V_{EXT/FLEX}$  V”更改为“ $0.44 * V_{FLEX}$  V”
  - 将 $t_{RF}$  的注释从“ $C_L = 25pF$  更改; 驱动器=强锋利的边缘; 从  $0.2 * V_{EXT/FLEX}$  到  $0.8 * V_{EXT/FLEX}$ ”到“ $C_L = 25pF$ ; 驱动器=强锋利的边缘; 从  $0.2 * V_{FLEX}$  到  $0.8 * V_{FLEX}$ ”
  - 将 $I_{OZ}$  的注释从“ $T_J \leq 170^\circ C$ ;  $(0.1 * V_{EXT/FLEX}) < V_{IN} < (0.9 * V_{EXT/FLEX})$ ”更改为“ $T_J \leq 170^\circ C$ ;  $(0.1 * V_{FLEX}) < V_{IN} < (0.9 * V_{FLEX})$ ”

## 记录0.71版本到1.0版本的变化

- 将  $I_{OZ}$  的注释从“ $T_J \leq 150^\circ\text{C}; (0.1 * V_{EXT/FLEX}) < V_{IN} < (0.9 * V_{EXT/FLEX})$ ”更改为“ $T_J \leq 150^\circ\text{C}; (0.1 * V_{FLEX}) < V_{IN} < (0.9 * V_{FLEX})$ ”
- 将  $V_{ILD}$  的注释从“最大变化 1ms;  $V_{DDM}$  = 常数; AL”更改为“最大变化 1ms;  $V_{FLEX}$  = 常数; AL”。
- 为  $I_{PUH}$  添加了脚注 4)
- 为  $I_{PDL}$  添加了脚注 5)
- 标准焊盘表格‘RFast 3.3V 焊盘’的变更
  - 将  $HYS$  的最小值从  $0.055 * V_{EXT/FLEX}$  V 更改为  $0.055 * V_{FLEX}$  V
  - 将  $HYS$  的最小值从  $0.09 * V_{EXT/FLEX}$  V 更改为  $0.09 * V_{FLEX}$  V
  - 将  $HYS$  的最小值从  $0.055 * V_{EXT/FLEX}$  V 更改为  $0.055 * V_{FLEX}$  V
  - 将  $V_{IH}$  的注释从“ $0.7 * V_{EXT/FLEX}$  V”更改为“ $0.7 * V_{FLEX}$  V”
  - 将  $V_{IL}$  的注释从“ $0.42 * V_{EXT/FLEX}$  V”更改为“ $0.42 * V_{FLEX}$  V”
  - 将  $t_{RF}$  的注释从“ $C_L = 25\text{pF}$  更改; 驱动器=强锋利的边缘; 从  $0.2 * V_{EXT/FLEX}$  到  $0.8 * V_{EXT/FLEX}$ ”到“ $C_L = 25\text{pF}$ ; 驱动器=强锋利的边缘; 从  $0.2 * V_{FLEX}$  到  $0.8 * V_{FLEX}$ ”
  - 将  $I_{OZ}$  的注释从“ $T_J \leq 170^\circ\text{C}; (0.1 * V_{EXT/FLEX}) < V_{IN} < (0.9 * V_{EXT/FLEX})$ ”更改为“ $T_J \leq 170^\circ\text{C}; (0.1 * V_{FLEX}) < V_{IN} < (0.9 * V_{FLEX})$ ”。
  - 将  $V_{ILD}$  的注释从“最大变化 1ms;  $V_{DDM}$  = 常数; AL”更改为“最大变化 1ms;  $V_{FLEX}$  = 常数; AL”。
  - 为  $I_{PUH}$  添加了脚注 4)
  - 为  $I_{PDL}$  添加了脚注 5)
- 标准焊盘的“S 类 5V”表的变更
  - 将  $HYS$  的最小值从  $0.09 * V_{EXT/FLEX}$  V 改为  $0.09 * V_{DDM}$  V
  - 将  $HYS$  的最小值从  $0.075 * V_{EXT/FLEX}$  V 改为  $0.075 * V_{DDM}$  V
  - 将  $V_{IH}$  的最小值从  $0.7 * V_{EXT/FLEX}$  V 改为  $0.7 * V_{DDM}$  V
  - 将  $V_{IL}$  的注释从“ $0.44 * V_{EXT/FLEX}$  V”更改为“ $0.44 * V_{DDM}$  V”
  - 为  $I_{PUH}$  添加了脚注 2)
  - 在  $I_{PDL}$  中添加脚注 3)
- 添加标准垫片 “S 3.3V 级” 表
- 表格“ADC 基准 Pads”与“标准 Pads”的变更
  - 将  $I_{OZ2}$  的注释从“ $T_J \leq 150^\circ\text{C}; V_{AREF} \leq V_{DDM} + 50\text{mV}$ ; 用于 EVADC”更改为“ $T_J \leq 150^\circ\text{C}; V_{AREF} \leq V_{DDM} + 50\text{mV}$ ; 适用于 EVADC; 适用于 BGA516 和裸芯片”
  - 将  $I_{OZ2}$  的注释从“ $T_J \leq 150^\circ\text{C}; V_{AREF} < V_{DDM}$ ; 用于 EDSADC”更改为“ $T_J \leq 150^\circ\text{C}; V_{AREF} < V_{DDM}$ ; 用于 EDSADC”。
  - 将  $I_{OZ2}$  的注释从“ $T_J \leq 150^\circ\text{C}; V_{AREF} \leq V_{DDM} + 50\text{mV}$ ; 用于 EDSADC”更改为“ $T_J \leq 150^\circ\text{C}; V_{AREF} \leq V_{DDM} + 50\text{mV}$ ; 对于 EDSADC”
  - 将  $I_{OZ2}$  的值从“ $T_J \leq 150^\circ\text{C}; V_{AREF} < V_{DDM}$ ; 用于 EVADC”更改为“ $T_J \leq 150^\circ\text{C}; V_{AREF} < V_{DDM}$ ; 用于 EVADC; 适用于 BGA516 和裸芯片”。
  - 将  $I_{OZ2}$  的注释从“ $T_J \leq 170^\circ\text{C}; V_{AREF} < V_{DDM}$ ; 用于 EDSADC”更改为“ $T_J \leq 170^\circ\text{C}; V_{AREF} < V_{DDM}$ ; 用于 EDSADC”。
  - 将  $I_{OZ2}$  的注释从“ $T_J \leq 170^\circ\text{C}; V_{AREF} \leq V_{DDM} + 50\text{mV}$ ; 用于 EDSADC”更改为“ $T_J \leq 170^\circ\text{C}; V_{AREF} \leq V_{DDM} + 50\text{mV}$ ; 对于 EDSADC”
  - 将  $I_{OZ2}$  的注释从“ $T_J \leq 170^\circ\text{C}; V_{AREF} \leq V_{DDM} + 50\text{mV}$ ; 用于 EVADC”更改为“ $T_J \leq 170^\circ\text{C}; V_{AREF} \leq V_{DDM} + 50\text{mV}$ ; 适用于 EVADC; 适用于 BGA516 和裸芯片”

- 将 $I_{OZ2}$ 的注释从“ $T_J \leq 170^\circ\text{C}; V_{AREF} < V_{DDM}$ ; 用于 EVADC”更改为“ $T_J \leq 170^\circ\text{C}; V_{AREF} < V_{DDM}$ ; 用于 EVADC; 适用于 BGA516 和裸芯片”。
- 添加了 $I_{OZ2}$ 的值
- 增加脚注 1)
- 增加脚注 2)
- 增加脚注 3)
- LVDS - IEEE 标准 LVDS 通用链路 (GPL)
  - 最大值 $t_{rise20}$ 已添加脚注 1)
  - 最大值 $t_{fall20}$ 已添加脚注 2)
  - 将关于 $V_{OD}$ 的脚注1) 改为脚注 3)
  - 将 $V_{ODSM}$ 的脚注 2) 改为脚注 4)
  - 将图中“LVDS输入模型”的标识从“LVDSH IN”更改为“LVDS IN”。
- VADC 5V
  - 将 $V_{AREF}$ 注释从“”更改为“ $4.5\text{ V} \leq V_{DDM} \leq 5.5\text{ V}$ ”
  - 将 $V_{AREF}$ 的最小值从 $V_{DDMnom} * 0.9\text{ V}$ 改为 $4.5\text{ V}$
  - 添加 $V_{AREF}$ 的最小值
  - 添加 $V_{AREF}$ 的类型值
  - 添加 $V_{AREF}$ 的最大值
  - 将 $V_{AREF}$ 添加注释为“ $2.97\text{ V} \leq V_{DDM} \leq 4.5\text{ V}$ ”
  - 增加脚注 1)
- DSADC 5V
  - 将 $V_{AREF}$ 的最小值从 $V_{DDMnom} * 0.9\text{ V}$ 改为 $4.5\text{ V}$
  - 增加高温时 $I_{REF}$ 的最大值
- OSC\_XTAL
  - 增加了 $DC_{X1}$ 参数
  - 增加了 $J_{ABSX1}$ 参数
  - 增加了 $SR_{XTAL1}$ 参数
  - 增加脚注 3)
- 备用时钟
  - 将 $f_{SB}$ 的最小值从 $30\text{ kHz}$ 改为 $25\text{ kHz}$
  - 将 $I_{f_{BACKT}}$ 的注释LIN从“对于温度和电压漂移, 每 $2\text{ 毫秒}$ 周期性调节一次, 提供通信所需精度的短期调节”更改为“对于温度和电压漂移高达LIN $125^\circ\text{C}$ , 每 $2\text{ 毫秒}$ 周期性调节, 提供通信所需精度的短期调节”
- DTS
  - 将 $T_{NL}$ 的注释更改为“ $T_{CALACC}$ 必须添加”。
- 电源电流
  - 条件从“四个锁定步进核心”变为“两个锁定步进核心”
- 电流损耗
  - 将 $I_{DDPORST}$ 的最大值从“ $185\text{ mA}$ ”改为“ $160\text{ mA}$ ”
  - 将 $I_{DDPORST}$ 的最大值从“ $320\text{ mA}$ ”改为“ $290\text{ mA}$ ”
  - 将 $I_{DDPORST}$ 的最大值从“ $400\text{ mA}$ ”改为“ $350\text{ mA}$ ”

- 将  $I_{DDPORST}$  的最大值从 "430 mA" 改为 "380 mA"
- 脚注 3)
- 模块电流放电
  - 添加  $I_{EXTLVDS}$  接收 参数
- 模块磁芯电流损耗
  - 更改后的脚注 1)
- “计算 1.25 V 电流损耗”一章的更改
  - 公式的变化 (3.2)
- “供应上升和下降行为”一章中的变化
  - 修改了图“单电源模式 (a) - VEXT (5 V) 单电源”的图示和文字描述。
  - 修改了图“单电源模式 (e) - (VEXT & VDDP3) 3.3 V 单电源”的图示和文字描述。
  - 修改了图“单电源模式 (d) - VEXT 和 VDD 外部供电”的图示和文字描述。
  - 修改了图“单电源模式 (h) - VEXT、VDDP3 和 VDD 外部供电”的图示和文字描述。
- 复位时间
  - 添加参数  $t_{WARMRSTSEQ}$
- PMS/供电监控器
  - 将  $V_{EXTMON}$  的最小值从 "3.235 V" 改为 "3.2 V"，最大值从 "3.365 V" 改为 "3.4 V"
  - 已为  $V_{DDMON}$  添加脚注 5)
- EVRC SMPS
  - 添加了典型值 “0.8 MHz” 和  $f_{DC}$  的注释
  - 为  $L_{DC}$  for ' $f_{DCDC} = 0.8 \text{ MHz}$ ' 添加值
- 新增章节 FSP 参数
- PLL 系统
  - 已删除“调制变化频率”的  $f_{MV}$  值
- 表“主模式时序”
  - 添加脚注 1)
- 表“LVDS时钟/数据”
  - 添加脚注 3)
- Flash
  - 添加  $N_{DFDC}$  参数
  - 添加  $N_{UCBD}$  参数
  - 添加参数  $t_{VER\_PAGE\_DC}$
  - Change description of  $t_{VER\_PAGE\_DC}$  from 'Data Flash Erase Verify time per page' to 'Data Flash Erase Verify time per page (Complement Sensing)'
  - 将  $t_{VER\_PAGE\_DS}$  的名称从  $t_{VER\_PAGE\_D}$  改为  $t_{VER\_PAGE\_DS}$
  - Change description of  $t_{VER\_PAGE\_DS}$  from 'Data Flash Erase Verify time per page' to 'Data Flash Erase Verify time per page (Single Ended Sensing)'
  - 将  $t_{RTU}$  的注释从“每个 UCB 最大擦除/编程周期为 100 次，所有 UCB 总共最大擦除/编程周期为 400 次”更改为“每个 UCB 最大擦除/编程周期为 100 次，所有 UCB 总共最大擦除/编程周期为 500 次”。

- 封装参数
  - 将 LFBGA292 的 RTH\_JCT 最大值从 3 K/W 改为 5 K/W
  - 将 LFBGA516 的 RTH\_JCT 最大值从 3 K/W 改为 5 K/W
- TC380 载带
  - 为TC380添加了免责声明
  - 更改了 "TC380 芯片尺寸" 的 X 和 Y 值
  - 更改了 "载带尺寸" 的数字
  - 为“TC380芯片尺寸”添加了精度值
- 特征描述
  - 从表“平台特点概述”中删除了 ASIL 值

#### 4.5 从版本 1.0 到版本 1.1 的变更

- 表“平台特点概述”中的更改 - 更改了封装类型。
- 标题页和章节标题的更改 - AD /AE-Step”
- 表“平台特点概述”中的更改 - LFBGA-516-1 和 LFBGA-292-11 的封装命名拼写
- 表“平台特点概述”的更改 - “HSPDM”的拼写
- “TC38x 的裸芯片变体引脚配置”一章 - 在表“焊垫列表”之后添加了有关“邻居焊盘”的信息
- “标志”章节的改动
  - 添加了有关 I/O-Spirit 文件版本的信息
  - 更改了引用 IO\_Spirit\_file 版本
  - PD2 的解释已更改 = 启动和复位期间连接下拉器件，待机模式下为高阻抗
- ‘绝对最大额定值’表的变化
  - 更改了参数“绝对最大和”的描述
  - 添加脚注 5)
- 标准焊盘‘慢速 5V GPIO’表的变化
  - 更改参数  $I_{OZ}$  的条件
  - 更改参数  $V_{IL}$  的值
- 标准焊盘的“慢速 3.3V GPIO”表的变化
  - 更改参数  $I_{OZ}$  的条件
- 标准焊盘表格‘RFast 3.3V 焊盘’的变更
  - 删除  $f_{IND}$  的参数
- LVDS Pads 表‘LVDS - IEEE 标准 LVDS 通用链路 (GPL)’中的变更
  - 更改参数  $V_{IL}$  的值
  - 变更参数  $V_{idth}$  的条件
  - 添加参数  $V_{idth}$  的值
  - 更改参数  $R_{in}$  的条件
  - 在表格脚注中添加了“驱动器接地电位差”和参数“RT”的注释/提示。
- 表‘VADC 5V’中的更改
  - 添加参数  $V_{AIN}$  的条件

- 表‘DSADC 5V’中的变化
  - 参数附加值  $I_{RMS}$
  - 更改了参数  $ED_{GAIN}$  的脚注
  - 更改了参数  $ED_{OFF}$  的脚注
  - 为参数  $ED_{GAIN}$  添加了脚注4)
- 表‘OSC\_XTAL’中的变化
  - 为参数  $t_{OSCS}$  更改了脚注 1)
- “模块电流消耗”表中的变化
  - 参数  $I_{EXTFLEX}$  已删除脚注 1)
  - 脚注 1 中的更改值)
  - 脚注 6 中的解释有改动)
- ‘模块电流消耗’表中的变化
  - 更改  $I_{EXTLVDS}$  参数的值
  - 参数  $I_{EXTLVDS}$  的条件已更改
  - 脚注 6 中的更改值)
- ‘复位’表的变更
  - 更改了参数  $T_{SCR}$  的值
- “供电”表格的变化
  - 添加注释“电源循环”以供应斜坡台
- 表‘EVRC SMPS’中的变化
  - 参数“ $\Delta f_{DCSPR}$ ”的符号已更改
- 表格‘PLL 系统’中的更改
  - 更改参数  $f_{REF}$  的值
- “ETH RGMII 参数”表的变化
  - 添加了 ETH RGMII TX 和 RX 信号的图片
- “质量参数”表的变化
  - 更改参数  $V_{HBM1}$  的值
- “封装外形”一章中的变化——改变了封装类型。
- “TC380载带”分章中的变化
  - 更改了数字“载带尺寸”的编号

## 4.6 从版本1.1到版本1.2的变更

- “修订记录”章节的变化
  - 年表已完成 –
- “功能摘要”一章中的变更
  - 更改了“DFLASH”的措辞
  - 增加了“AEC-Q100”的描述
  - 添加了“ISO 26262 安全要素”的描述
  - 在表“平台特点概述”中添加了数据负载/快闪式电站的描述
  - 更改了表“平台特点概述”中 GTM 集群的编号

- 更改了表“平台特点概述”中 GTM/CDTM/DTM 模块的数字
- 更改了表“平台特点概述”中的封装类型
- “引脚定义和功能”章节的变更
  - 更改了“BGA-516 Package Variant”表中端口 P00 的 EDSADC 功能描述
  - 更改了“BGA-516 Package Variant”表中端口 P01 的 EDSADC 功能描述
  - 更改了“BGA-516 Package Variant”表中端口 P02 的 EDSADC 功能描述
  - 更改了“BGA-516 Package Variant”表中端口 P02 的 PSI5S 功能描述
  - 删除了“BGA-516 封装变体”表中端口 02 的 PMS 参数
  - 删除了“BGA-516 Package Variant”表中端口 P10 处的 SCU 参数
  - 在“BGA-516 Package Variant”表中的端口 P10 添加了 PMS 参数
  - 更改了“BGA-516 封装变体”表中端口 P11 的 P11.5, P11.7、P11.8、P11.9、P11.10、P11.11、P11.12 的缓冲器类型描述
  - 更改了“BGA-516 Package Variant”表中端口 P11 处 GETH 的功能描述
  - 更改了“BGA-516 Package Variant”表中端口 P11 处 GTM 的功能描述
  - 删除了“BGA-516 封装变体”表中端口 14 处 SCU 的参数
  - 在“BGA-516 封装变体”表中添加了端口 14 处 PMS 的参数
  - 更改了“BGA-516 Package Variant”表中端口 P14 处 GTM 的功能描述
  - 更改了“BGA-516 Package Variant”表中端口 P20 处 HSCT0 的功能描述
  - 更改了“BGA-516 Package Variant”表中端口 P20 处 GTM 的功能描述
  - 在“BGA-516 Package Variant”表中添加了端口 P21 处 DMU 的功能描述
  - 更改了“BGA-516 Package Variant”表中端口 P21 处 HSCT0 的功能描述
  - 更改了“BGA-516 Package Variant”表中端口 P23 处 GTM 的功能描述
  - 更改了“BGA-516 Package Variant”表中端口 P33 的 EDSADC 功能描述
  - 更改了“BGA-516 Package Variant”表中端口 P33 处 GTM 的功能描述
  - 更改了“BGA-516 Package Variant”表中端口 P33 处 PSI5S 的功能描述
  - 在“系统 I/O”表中为“BGA-516 封装变体”添加了注释
  - 改为 "Ctrl"。“系统 I/O”表中“BGA-516 封装变体”的 M21、L21 球信息
  - 更改了“系统 I/O”表中“BGA-516 封装变体”的 M22 球的功能描述
  - 改为 "Ctrl"。“系统 I/O”表中“BGA-516 封装变体”的 M22 球信息 –
  - 更改了“BGA-292 Package Variant”表中端口 P00 处 EDSADC 的功能描述
  - 更改了“BGA-292 Package Variant”表中端口 P01 处 EDSADC 的功能描述
  - 更改了“BGA-292 Package Variant”表中端口 P02 处 EDSADC 的功能描述
  - 更改了“BGA-292 Package Variant”表中端口 P02 处 PSI5S 的功能描述
  - 更改了“BGA-292 封装变体”表中端口 P02 处的 GTM 输入通道
  - 删除了“BGA-292 封装变体”表中端口 P02 处 PMS 的参数
  - 删除了“BGA-292 封装变体”表中端口 P10 处 SCU 的参数
  - 在“BGA-292 封装变体”表中添加了端口 P10 处 PMS 的参数
  - 更改了“BGA-292 封装变体”表中端口 P11 的 P11.5, P11.7、P11.8、P11.9、P11.10、P11.11、P11.12 的缓冲器类型描述
  - 更改了“BGA-292 Package Variant”表中端口 P11 处 GETH 的功能描述

- 更改了“BGA-292 封装变体”表中端口 P11 处的 GTM 输入通道
  - 删除了“ BGA -292 封装变体”表中端口 14 处 SCU 的参数
  - 在“ BGA -292 封装变体”表中添加了端口 14 处 PMS 的参数
  - 更改了“BGA-292 封装变体”表中端口 P14 处的 GTM 输入通道
  - 在“BGA-292 Package Variant”表中添加了端口 P21 处 DMU 的功能描述
  - 更改了“BGA-292 Package Variant”表中端口 P21 处 HSCT0的功能描述
  - 更改了“BGA-292 封装变体”表中端口 P23 处的 GTM 输入通道
  - 更改了“BGA-292 Package Variant”表中端口 P33 处 EDSADC 的功能描述
  - 更改了“BGA-292 封装变体”表中端口 P33 处的 GTM 输入通道
  - 更改了“BGA-292 Package Variant”表中端口 P33 处 PSI5S的功能描述
  - 在“系统 I/O”表中为“BGA-292 封装变体”添加了注释
  - 改为 "Ctrl"。“系统 I/O”表中“BGA-292 封装变体”的 G16、F16、G17 球信息
  - 更改了“系统 I/O”表中“BGA-292 封装变体”的 G17 球的功能描述 –
  - 将子章节标题从“TC38x的焊盘位置配置”更改为“焊盘框架中的焊盘序列”
  - 更改了焊盘“焊盘框架中的焊盘顺序”列表中焊盘名称 VDDP3 (62, 64) 的注释
  - 在“焊盘框架中的焊盘序列”的焊盘列表中，将焊盘类型更改为焊盘名称 P11.5、P11.7、P11.9、P11.8、P11.10、P11.11、P11.12
  - 更改了焊盘“焊盘框架中的焊盘顺序”列表中焊盘 158, 159 的注释
  - 更改了焊盘“焊盘框架中的焊盘顺序”列表中焊盘198, 217, 218, 352, 383的名称
  - 修改/修订了表格“焊垫框架中焊垫的顺序”的脚注
- “标志”章节的改动
    - 更改了“TC38xpd\_IO\_Spirit”文件的版本号 –
- “电气规格”一章的变更
    - 修正了“绝对最大额定值”子章节脚注中的拼写错误
    - 修正了“过载引脚可靠性”子章“过载参数”表中 参数  $I_{INSA}$  的拼写错误
    - 更改了“操作条件”表中 GETH 频率参数的值
    - 更改了 子章节“5V/3.3V 可切换焊盘”中表格“快速 5V GPIO”中 参数  $t_{TX\_ASYM}$  的注释
    - 更改了子章节“5V/3.3V 可切换焊盘”中表格“快速 3.3V GPIO”中 参数  $t_{TX\_ASYM}$  的注释
    - 更改了 子章节“5V/3.3V 可切换焊盘”中表格“慢速 5V GPIO”中 参数  $t_{TX\_ASYM}$  的注释
    - 更改了子章节“5V/3.3V 可切换焊盘”中表格“慢速 3.3V GPIO”中 参数  $t_{TX\_ASYM}$  的注释
    - 更改了子章节“5V/3.3V 可切换焊盘”中表格“RFast 5V GPIO”中 参数  $t_{TX\_ASYM}$  的注释
    - 更改了子章节“5V/3.3V 可切换焊盘”中表格“RFast 3.3V 焊盘”中 参数  $t_{TX\_ASYM}$  的注释
    - 更改了“5V/3.3V 可切换焊盘”子章节“ADC 参考焊盘”表中参数  $I_{OZZ}$  的注释
    - 修正了“高性能 LVDS 焊盘”子章中“LVDS – IEEE 标准 LVDS 通用链路 (GPL)”表脚注3) 中的拼写错误
    - 扩展了“高性能 LVDS 焊盘”子章节中“LVDS – IEEE 标准 LVDS 通用链路 (GPL)”表的子注释

- 修正了“VADC 参数”子章节中“VADC 5V”表中  $dV_{CSD}$  参数的拼写错误
- 更改了“VADC 参数”子章节中“VADC 5V”表的脚注 7)
- 更改了“VADC 参数”子章节中的图片“模拟输入的等效电路”
- 更改了“VADC 参数”子章节中表格“VADC 5V”的脚注 3) 和 6)
- 更改了“DSADC 参数”子章节中“DSADC 5V”表中 参数  $I_{RMS}$
- 更改了“DSADC 参数”子章节中的脚注 4)
- 更改了“MHz 振荡器”子章节脚注 2) 中的拼写
- 更改了“电源电流”子章节中初始文本的拼写
- 更改“电源电流”子章节中“消耗电流”表的脚注2)
- “电源电流”子章节“消耗电流”表增加脚注7)
- 更正了“计算 1.25V 电流损耗”子章节中的拼写错误
- 在“供应上升和下降行为”子章节中添加了一句话
- 更改/添加了“复位时序”子章节中“复位”表中 参数  $t_{PI}$  的值
- 更改了“DAP参数”子章节中的“DAP时序”
- 更改了“ETH MII 信号时序参数”表中“ETH MII 参数”子章中参数  $t_7$  的值（从“最小值”更改为“典型值”）
- 更改了子章节“ETH RMII 参数”中“ETH RMII 信号参数有效于 3.3V”表中 参数  $t_{13}$ 、 $t_{14}$ 、 $t_{15}$  的符号
- 更改了“ETH RMII信号时序参数3.3V有效期”表中 参数  $t_{13}$  的值（从“最小值”更改为“典型值”），位于子章节“ETH RMII 参数”中
- 在子章节“ETH RMII 参数”中为表格“ETH RMII 信号时序参数有效期为 3.3V”添加了脚注 3)
- 将“封装外形”子章节中的图标题更改为“封装外形FBGA -516”
- 将“封装参数”子章节的表“封装参数”中的注释更改为“ FBGA ”
- 删除 "TC380 载带 "子章节



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