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CYT2B6 Datasheet

32-bit Arm® Cortex®-M4F Microcontroller Traveo™ II Family

General Description

CYT2B6 is a family of Traveo™ II microcontrollers targeted at automotive systems such as body control units. CYT2B6 has an Arm® Cortex®-M4 CPU for primary processing and an Arm Cortex-M0+ CPU for peripheral and security processing. These devices contain embedded peripherals supporting Controller Area Network with Flexible Data rate (CAN FD), and Local Interconnect Network (LIN). Traveo II devices are manufactured on an advanced 40-nm process. CYT2B6 incorporates Cypress' low-power flash memory, multiple high-performance analog and digital peripherals, and enables the creation of a secure computing platform.

Features

■ **Dual CPU Subsystem**
- ❒ 80-MHz (max) 32-bit Arm Cortex-M4F CPU with
  - Single-cycle multiply
  - Single-precision floating point unit (FPU)
  - Memory Protection Unit (MPU)
- ❒ 80-MHz (max) 32-bit Arm Cortex M0+ CPU with
  - Single-cycle multiply
  - Memory Protection Unit
- ❒ Inter-processor communication in hardware
- ❒ Three DMA controllers
  - Peripheral DMA controller #0 (P-DMA0) with 54 channels
  - Peripheral DMA controller #1 (P-DMA1) with 26 channels
  - Memory DMA controller #0 (M-DMA0) with 2 channels

■ **Integrated Memories**
- ❒ 576 KB of code-flash with an additional 64 KB of work-flash
  - Read-While-Write (RWW) allows updating the code-flash/work-flash while executing from it
  - Single- and dual-bank modes (specifically for Firmware update Over The Air [FOTA])
  - Flash programming through SWD/JTAG interface
- ❒ 64 KB of SRAM with selectable retention granularity

■ **Crypto Engine**[1]
- ❒ Supports Enhanced Secure Hardware Extension (eSHE) and Hardware Security Module (HSM)
- ❒ Secure boot and authentication
  - Using digital signature verification
  - Using fast secure boot
- ❒ AES: 128-bit blocks, 128-/192-/256-bit keys
- ❒ 3DES[2]: 64-bit blocks, 64-bit key
- ❒ Vector unit[2] supporting asymmetric key cryptography such as Rivest-Shamir-Adleman (RSA) and Elliptic Curve (ECC)
- ❒ SHA-1/2/3[2]: SHA-512, SHA-256, SHA-160 with variable length input data
- ❒ CRC[2]: supports CCITT CRC16 and IEEE-802.3 CRC32
- ❒ True random number generator (TRNG) and pseudo random number generator (PRNG)
- ❒ Galois/Counter Mode (GCM)

■ **Functional Safety for ASIL-B**
- ❒ Memory protection unit (MPU)
- ❒ Shared memory protection unit (SMPU)
- ❒ Peripheral protection unit (PPU)
- ❒ Watchdog timer (WDT)
- ❒ Multi-counter watchdog timer (MCWDT)
- ❒ Low-voltage detector (LVD)
- ❒ Brown-out detector (BOD)
- ❒ Overvoltage detection (OVD)
- ❒ Clock supervisor (CSV)
- ❒ Hardware error correction (SECDED ECC) on all safety-critical memories (SRAM, flash)

■ **Low-Power 2.7-V to 5.5-V Operation**
- ❒ Low-power Active, Sleep, Low-power Sleep, DeepSleep, and Hibernate modes for fine-grained power management
- ❒ Configurable options for robust BOD
  - Two threshold levels (2.7 V and 3.0 V) for BOD on V_{DDD} and V_{DDA}
  - One threshold level (1.1 V) for BOD on V_{CCD}

■ **Wakeup Support**
- ❒ A GPIO pin to wakeup from Hibernate mode
- ❒ Up to 78 GPIO pins to wakeup from Sleep modes
- ❒ Event Generator, SCB, Watchdog Timer, RTC alarms to wake from DeepSleep modes

■ **Clock Sources**
- ❒ Internal main oscillator (IMO)
- ❒ Internal low-speed oscillator (ILO)
- ❒ External crystal oscillator (ECO)
- ❒ Watch crystal oscillator (WCO)
- ❒ Phase-locked loop (PLL)
- ❒ Frequency-locked loop (FLL)

■ **Communication Interfaces**
- ❒ Up to four CAN FD channels
  - Increased data rate (up to 8 Mbps) compared to classic CAN, limited by physical layer topology and transceivers
  - Compliant to ISO 11898-1:2015
  - Supports all the requirements of Bosch CAN FD Specification V1.0 for non-ISO CAN FD
  - ISO 16845:2015 certificate available
- ❒ Up to six runtime-reconfigurable SCB (serial communication block) channels, each configurable as I^2C, SPI, or UART
- ❒ Up to five independent LIN channels
  - LIN protocol compliant with ISO 17987

Notes
1. The Crypto engine features are available on select MPNs.
2. This feature is not available in “eSHE only” parts; for more information, refer to Ordering Information.

■ **Timers**
- ❒ Up to 50 16-bit and two 32-bit Timer/Counter Pulse-Width Modulator (TCPWM) blocks
  - • Up to four 16-bit counters for motor control
  - • Up to 46 16-bit counters and two 32-bit counters for regular operations
  - • Supports timer, capture, quadrature decoding, pulse-width modulation (PWM), PWM with dead time (PWM_DT), pseudo-random PWM (PWM_PR), and shift-register (SR) modes
- ❒ Up to 11 Event Generation (EVTGEN) timers supporting cyclic wakeup from DeepSleep
  - • Events trigger a specific device operation (such as execution of an interrupt handler, a SAR ADC conversion, and so on)

■ **Real Time Clock (RTC)**
- ❒ Year/Month/Date, Day-of-week, Hour:Minute:Second fields
- ❒ 12- and 24-hour formats
- ❒ Automatic leap-year correction

■ **I/O**
- ❒ Up to 78 programmable I/Os
- ❒ Two I/O types
  - • GPIO Standard (GPIO_STD)
  - • GPIO Enhanced (GPIO_ENH)

■ **Regulators**
- ❒ Generates 1.1-V nominal core supply from a 2.7-V to 5.5-V input supply
- ❒ Two types of regulators
  - • DeepSleep
  - • Core internal

■ **Programmable Analog**
- ❒ Three SAR A/D converters with up to 35 external channels (32 I/Os + 3 I/Os for motor control)
  - • ADC0 supports 11 logical channels, with 11 + 1 physical connections
  - • ADC1 supports 13 logical channels, with 13 + 1 physical connections
  - • ADC2 supports 8 logical channels, with 8 + 1 physical connections
  - • Any external channel can be connected to any logical channel in the respective SAR
- ❒ Each ADC supports 12-bit resolution and sampling rates of up to 1 Msps
- ❒ Each ADC also supports up to six internal analog inputs like
  - • Bandgap reference to establish absolute voltage levels
  - • Calibrated diode for junction temperature calculations
  - • Two AMUXBUS inputs and two direct connections to monitor supply levels
- ❒ Each ADC supports addressing of external multiplexers
- ❒ Each ADC has a sequencer supporting autonomous scanning of configured channels
- ❒ Synchronized sampling of all ADCs for motor-sense applications

■ **Smart I/O™**
- ❒ Up to three Smart I/O blocks, which can perform Boolean operations on signals going to and from I/Os
- ❒ Up to 16 I/Os (GPIO_STD) supported

■ **Debug interface**
- ❒ JTAG controller and interface compliant to IEEE-1149.1-2001
- ❒ Arm SWD (Serial Wire Debug) port
- ❒ Supports Arm Embedded Trace Macrocell (ETM) Trace
  - • Data trace using SWD
  - • Instruction and data trace using JTAG

■ **Compatible with industry-standard tools**
- ❒ GHS/MULTI or IAR EWARM for code development and debugging

■ **Packages**
- ❒ 64-LQFP, 10 × 10 × 1.7 mm (max), 0.5-mm lead pitch
- ❒ 80-LQFP, 12 × 12 × 1.7 mm (max). 0.5-mm lead pitch
- ❒ 100-LQFP, 14 × 14 × 1.7 mm (max), 0.5-mm lead pitch

Contents

1. Features List

Table 1-1. CYT2B6 Feature List for All Packages

Features	Packages		
	64-LQFP	80-LQFP	100-LQFP
CPU			
Core	32-bit Arm Cortex-M4F CPU and 32-bit Arm Cortex M0+ CPU		
Functional safety	ASIL-B		
Operating voltage	2.7 V to 5.5 V		
Core voltage	1.05 V to 1.15 V		
Operating frequency	Arm Cortex-M4 80 MHz (max) and Arm Cortex-M0+ 80 MHz (max), related by integer frequency ratio (that is, 1:1, 1:2, 1:3, and so on)		
MPU, PPU	Supported		
FPU	Single precision (32-bit)		
DSP-MUL/DIV/MAC	Supported by Arm Cortex-M4F CPU		
Memory			
Code-flash	576 KB (448 KB + 128 KB)		
Work-flash	64 KB (48 KB + 16 KB)		
SRAM (configurable for retention)	64 KB		
ROM	32 KB		
Communication Interfaces			
CAN 0 (CAN FD: Up to 8 Mbps)	2 ch		
CAN 1 (CAN FD: Up to 8 Mbps)	1 ch	2 ch	
CAN RAM	24 KB per instance (2 ch), 48 KB in total		
Serial communication block (SCB/UART)	6 ch		
Serial communication block (SCB/I2C)	5 ch	6 ch	
Serial communication block (SCB/SPI)	3 ch	6 ch	
LIN0	5 ch		
Timers			
RTC	1 ch		
TCPWM (16-bit) (Motor Control)	4 ch		
TCPWM (16-bit)	46 ch		
TCPWM (32-bit)	2 ch		
External Interrupts	49	63	78
Analog			
12-bit, 1 Msps SAR ADC	3 Units (SAR0/11, SAR1/13, SAR2/8 logical channels)		
	22 external channels (SAR0 8 ch, SAR1 7 ch, SAR2 7 ch)	28 external channels (SAR0 10 ch, SAR1 10 ch, SAR2 8 ch)	32 external channels (SAR0 11 ch, SAR1 13 ch, SAR2 8 ch)
	18 ch (6 per ADC) Internal sampling		
Motor Control Input	3 ch (synchronous sampling of one channel on each of the 3 ADCs)		
Security			
Flash Security (program/work read protection)	Supported		
Flash Chip erase enable	Configurable		
eSHE	By separate firmware[3]		

Note
3. Enhanced Secure Hardware Extension (eSHE) is enabled by third-party firmware.

Table 1-1. CYT2B6 Feature List for All Packages *(continued)*

Features	Packages		
	64-LQFP	80-LQFP	100-LQFP
System			
DMA Controller	P-DMA0 with 54 channels (16 general purpose), P-DMA1 with 26 channels (8 general purpose), and M-DMA0 with 2 channels		
Internal main oscillator	8 MHz		
Internal low-speed oscillator	32.768 kHz (nominal)		
PLL	Input frequency: 3.988 to 33.34 MHz, PLL output frequency: up to 80 MHz		
FLL	Input frequency: 0.25 to 80 MHz, FLL output frequency: up to 80 MHz		
Watchdog timer and multi-counter watchdog timer	Supported		
Clock supervisor	Supported		
Cyclic wakeup from DeepSleep	Supported		
GPIO_STD	45	59	74
GPIO_ENH	4		
Smart I/O (Blocks)	3 blocks, 9 I/Os	3 blocks, 14 I/Os	3 blocks, 16 I/Os
Low-voltage detect	Two, 26 selectable levels		
Maximum ambient temperature	105 °C for S-grade and 125 °C for E-grade		
Debug interface	SWD/JTAG		
Debug trace	Arm Cortex-M4 ETB size of 8 KB, Arm Cortex M0+ MTB size of 4 KB		

1.1 Communication Peripheral Instance List

The following table lists the instances supported under each package for communication peripherals, based on the minimum pins needed for the functionality.

Table 1-2. Peripheral Instance List

Module	64-LQFP	80-LQFP	100-LQFP	Minimum Pin Functions
CAN0	0/1	0/1	0/1	TX, RX
CAN1	0	0/1	0/1	TX, RX
LIN0	0/1/2/3/4	0/1/2/3/4	0/1/2/3/4	TX, RX
SCB/UART	0/1/3/4/5/7	0/1/3/4/5/7	0/1/3/4/5/7	TX, RX
SCB/I2C	0/3/4/5/7	0/1/3/4/5/7	0/1/3/4/5/7	SCL, SDA
SCB/SPI	0/3/4	0/1/3/4/5/7	0/1/3/4/5/7	MISO, MOSI, SCK, SELECT0

2. Blocks and Functionality

Figure 2-1.Block Diagram

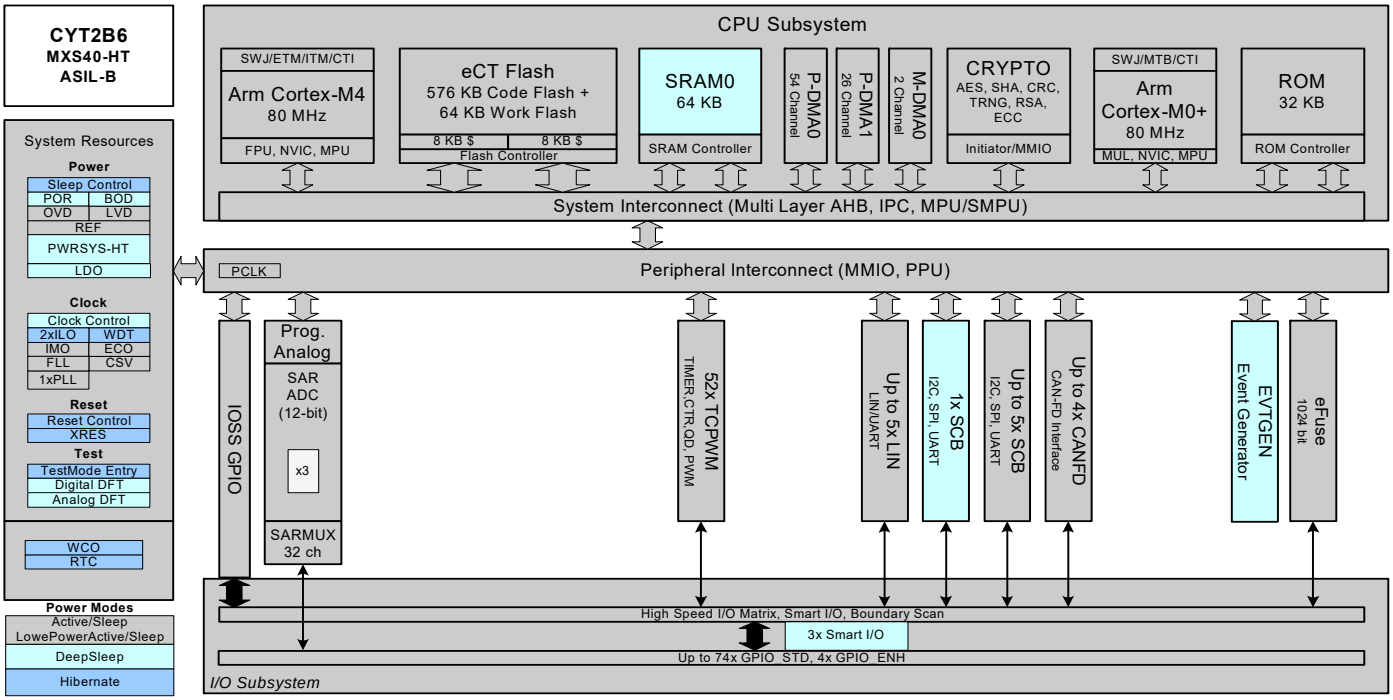


Figure 2-1. shows the CYT2B6 architecture block diagram, giving a simplified view of the interconnection between subsystems and blocks. CYT2B6 has four major subsystems: CPU, system resources, peripherals, and I/O[4, 5]. The color-coding shows the lowest power mode where the particular block is still functional.

CYT2B6 provides extensive support for programming, testing, debugging, and tracing of both hardware and firmware.

Debug-on-chip functionality enables in-system debugging using the production device. It does not require special interfaces, debugging pods, simulators, or emulators.

The JTAG interface is fully compatible with industry-standard third-party probes such as I-jet, J-Link, and GHS.

The debug circuits are enabled by default.

CYT2B6 provides a high level of security with robust flash protection and the ability to disable features such as debug.

Additionally, each device interface can be permanently disabled for applications concerned with phishing attacks from a maliciously reprogrammed device or attempts to defeat security by starting and interrupting flash programming sequences. All programming, debug, and test interfaces are disabled when maximum device security is enabled.

Notes
4. GPIO_STD supporting 2.7 V to 5.5 V V_{DDIO} range.
5. GPIO_ENH supporting 2.7 V to 5.5 V V_{DDIO} range with higher currents at lower voltages.

3. Functional Description

3.1 CPU Subsystem

3.1.1 CPU

The CYT2B6 CPU subsystem contains a 32-bit Arm Cortex-M0+ CPU with MPU and a 32-bit Arm Cortex-M4F CPU with MPU, and single-precision FPU. This subsystem also includes P-/M-DMA controllers, a cryptographic accelerator, 576 KB of code-flash, 64 KB of work-flash, 64 KB of SRAM, and 32 KB of ROM.

The Cortex-M0+ CPU provides a secure, un-interruptible boot function. This guarantees that, following completion of the boot function, system integrity is valid and privileges are enforced. Shared resources (flash, SRAM, peripherals, and so on) can be accessed through bus arbitration, and exclusive accesses are supported by an inter-processor communication (IPC) mechanism using hardware semaphores.

3.1.2 DMA Controllers

CYT2B6 has three DMA controllers: P-DMA0 with 16 general-purpose and 38 dedicated channels, P-DMA1 with 8 general-purpose and 18 dedicated channels, and M-DMA0 with two channels. P-DMA is used for peripheral-to-memory and memory-to-peripheral data transfers and provides low latency for a large number of channels. Each P-DMA controller uses a single data-transfer engine that is shared by the associated channels. General-purpose channels have a rich interconnect matrix including P-DMA cross triggering, which enables demanding data-transfer scenarios. Dedicated channels have a single triggering input (such as an ADC channel) to handle common transfer needs. M-DMA is used for memory-to-memory data transfers and provides high memory bandwidth for a small number of channels. M-DMA uses a dedicated data-transfer engine for each channel. They support independent accesses to peripherals using the AHB multi-layer bus.

3.1.3 Flash

CYT2B6 has 576 KB (448 KB with a 32-KB sector size, and 128 KB with an 8-KB sector size) of code-flash with an additional work-flash of up to 64 KB (48 KB with 2-KB sector size, and 16 KB with 128-B sectors size). Work-flash is optimized for reprogramming many more times than code-flash. Code-flash supports Read-While-Write (RWW) operation allowing flash to be updated while the CPU is active. Both the code-flash and work-flash areas support dual-bank operation for over-the-air (OTA) programming.

3.1.4 SRAM

CYT2B6 has 64 KB of SRAM. The SRAM0 controller provides DeepSleep retention in 32-KB increments.

3.1.5 ROM

CYT2B6 has 32-KB ROM that contains boot and configuration routines. This ROM enables secure boot and authentication of user flash to guarantee a secure system.

3.1.6 Cryptography Accelerator for Security

The cryptography accelerator implements (3)DES block cipher, AES block cipher, SHA hash, cyclic redundancy check, pseudo random number generation, true random number generation, galois/counter mode, and a vector unit to support asymmetric key cryptography such as RSA and ECC.

Depending on the part number, this block is either completely or partially available or not available at all. See Ordering Information for more details.

3.2 System Resources

3.2.1 Power System

The power system ensures that the supply voltage levels meet the requirements of each power mode, and provides a full-system reset when these levels are not valid. Internal power-on reset (POR) guarantees full-chip reset during the initial power ramp.

Three Brown-Out Detection (BOD) circuits monitor the external supply voltages (V_{DDD}, V_{DDA}, V_{CCD}). The BOD on V_{DDD} and V_{CCD} are initially enabled and cannot be disabled. The BOD on V_{DDA} is initially disabled and can be enabled by the user. For the external supplies V_{DDD} and V_{DDA}, BOD circuits are software configurable with two settings; a 2.7-V minimum voltage that is robust for all internal signaling and a 3.0-V minimum voltage, which is also robust for all I/O specifications (which are guaranteed at 2.7 V). The BOD on V_{CCD} is provided as a safety measure and is not a robust detector.

Three overvoltage detection (OVD) circuits are provided for monitoring external supplies (V_{DDD}, V_{DDA}, V_{CCD}), and overcurrent detection circuits (OCD) for monitoring internal and external regulators. OVD thresholds on V_{DDD} and V_{DDA} are configurable with two settings; a 5.0-V and 5.5-V maximum voltage. Two voltage-detection circuits are provided to monitor the external supply voltage (V_{DDD}) for falling and rising levels, each configurable for one of the 26 selectable levels.

All BOD, OVD, and OCD circuits on V_{DDD} and V_{CCD} generate a reset, because these protect the CPUs and fault logic. The BOD and OVD circuits on V_{DDA} can be configured to generate either a reset or a fault.

3.2.2 Regulators

CYT2B6 contains two regulators that provide power to the low-voltage core transistors: DeepSleep and core internal. These regulators accept a 2.7–5.5-V V_{DDD} supply and provide a low-noise 1.1-V supply to various parts of the device. These regulators are automatically enabled and disabled by hardware and firmware when switching between power modes. The core internal and core external regulators operate in active mode, and provide power to the CPU subsystem and associated peripherals.

DeepSleep

The DeepSleep regulator is used to maintain power to a small number of blocks when in DeepSleep mode. These blocks include the ILO and WDT timers, BOD detector, SCB0, SRAM memories, Smart I/O, and other configuration memories. The DeepSleep regulator is enabled when in DeepSleep mode, and the core internal regulator is disabled. It is disabled when XRES_L is asserted (LOW) and when the core internal regulator is disabled.

Core internal

The core internal regulator supports load currents up to 150 mA, and is operational during device start-up (boot process) and in Active/Sleep modes.

3.2.3 Clock System

The CYT2B6 clock system provides clocks to all subsystems that require them, and glitch-free switching between different clock sources. In addition, the clock system ensures that no metastable conditions occur.

The clock system for CYT2B6 consists of the 8-MHz IMO, two ILOs, three watchdog timers, a PLL, an FLL, five clock supervisors (CSV), a 3.988- to 33.34 MHz ECO, and a 32.768-kHz WCO.

The clock system supports two main clock domains: CLK_HF and CLK_LF.

- CLK_HFx are the Active mode clocks. Each can use any of the high-frequency clock sources including IMO, EXT_CLK, ECO, FLL, or PLL
- CLK_LF is a DeepSleep domain clock and provides a reference clock for the MCWDT or RTC modules. The reference clock for the CLK_LF domain is either disabled or selectable from ILO0, ILO1, or WCO

Table 3-1. CLK_HF Destinations

Name	Description
CLK_HF0	CPUSS clocks, PERI, and AHB infrastructure
CLK_HF1	Event Generator, also available in HSIOM as an output

IMO Clock Source

The IMO is the frequency reference in CYT2B6 when no external reference is available or enabled. The IMO operates at a frequency of 8 MHz ±1%. The internal trim settings for the IMO can be dynamically updated to provide a tolerance <1%.

ILO Clock Source

An ILO is a low-power oscillator, nominally 32.768 kHz, which generates clocks for a watchdog timer when in DeepSleep mode. There are two ILOs to ensure clock supervisor (CSV) capability in DeepSleep mode. ILO-driven counters can be calibrated to the IMO, WCO, or ECO to improve their accuracy. ILO1 is also used for clock supervision.

PLL and FLL

A PLL or FLL may be used to generate high-speed clocks from the IMO, the ECO, or EXT_CLK. The FLL provides a much faster lock than the PLL (5 µs instead of 35 µs) in exchange for a small amount (±2%) of frequency error[6].

Clock Supervisor (CSV)

Each CSV allows one clock (reference) to supervise the behavior of another clock (monitored). Each CSV has counters for both the monitored and reference clocks. Parameters for each counter determine the frequency of the reference clock as well as the upper and lower frequency limits of the monitored clock. If the frequency range comparator detects a stopped clock or a clock outside the specified frequency range, an abnormal state is signaled and either a reset or an interrupt is generated.

EXT_CLK

One of the two GPIO_STD I/Os can be used to provide an external clock input of up to 80 MHz. This clock can be used as the source clock for either the PLL or FLL, or can be used directly by the CLK_HF domain.

ECO

The ECO provides high-frequency clocking using an external crystal connected to the ECO_IN and ECO_OUT pins. It supports fundamental mode (non-overtone) quartz crystals, in the range of 3.988 to 33.34 MHz. When used in conjunction with the PLL, it generates CPU and peripheral clocks up to device's maximum frequency. ECO accuracy depends on the selected crystal. If the ECO is disabled, the associated pins can be used for any of the available I/O functions.

WCO

The WCO is a low-power, watch-crystal oscillator intended for real-time-clock applications. It requires an external 32.768-kHz crystal connected to the WCO_IN and WCO_OUT pins. The WCO can also be configured as a clock reference for CLK_LF, which is the clock source for the MCWDT and RTC.

3.2.4 Reset

CYT2B6 can be reset from a variety of sources, including software. Reset events are asynchronous and guarantee reversion to a known state. The reset cause (POR, BOD, OVD, overcurrent, XRES_L, WDT, MCWDT, software reset, fault, CSV, Hibernate wakeup, debug) is recorded in a register, which is sticky through reset and allows software to determine the cause of the reset. An XRES_L pin is available for external reset.

3.2.5 Watchdog Timers

CYT2B6 has one watchdog timer (WDT) and two multi-counter watchdog timers (MCWDT).

The WDT is a free-running counter clocked only by ILO0, which allows it to be used as a wakeup source from Hibernate. Watchdog operation is possible during all power modes. To prevent a device reset from a WDT timeout, the WDT must be serviced during a configured window. A watchdog reset is recorded in the reset cause register.

An MCWDT is available for each of the CPU cores. These timers provide more capabilities than the WDT, and are only available in Active, Sleep, and DeepSleep modes. These timers have multiple counters that can be used separately or cascaded to trigger interrupts and/or resets. They are clocked from ILO0 or the WCO.

Note
6. Operation of reference-timed peripherals (like a UART) with an FLL-based reference is not recommended due the allowed frequency error.

3.2.6 Power Modes

CYT2B6 has the following power modes:

- Active – all peripherals are available
- Low-Power Active (LPACTIVE) – Low-power profile of Active mode where all peripherals and the CPUs are available, but with limited capability
- Sleep – all peripherals except the CPUs are available
- Low-Power Sleep (LPSLEEP) – Low-power profile of Sleep mode where all peripherals except the CPUs are available, but with limited capability
- DeepSleep – only peripherals which work with CLK_LF are available
- Hibernate – the device and I/O states are frozen, and the device resets on wakeup

3.3 Peripherals

3.3.1 Peripheral Clock Dividers

Integer and fractional clock dividers are provided for peripheral and timing purposes.

Table 3-2. Clock Dividers

Divider	Count	Description
div_8	32	Integer divider, 8 bits
div_16	16	Integer divider, 16 bits
div_24_5	8	Fractional divider, 24.5 bits (24 integer bits, 5 fractional bits)

3.3.2 Peripheral Protection Unit

The Peripheral Protection Unit (PPU) controls and monitors unauthorized access from all masters (CPU, P-/M-DMA, Crypto, and any enabled debug interface) to the peripherals. It allows or restricts data transfers on the bus infrastructure. The access rules are enforced based on specific properties of a transfer, such as an address range for the transfer and access attributes (such as read/write, user/privilege, and secure/non-secure).

3.3.3 12-bit SAR ADC

CYT2B6 contains three 1-Msps SAR ADCs. These ADCs can be clocked at up to 26.67 MHz and provide a 12-bit result in 26 clock cycles.

The references for all three SAR ADCs come from a dedicated pair of inputs: VREFH and VREFL[7].

CYT2B6 devices support up to 53 logical ADC channels, and external inputs from up to 35 I/Os. Each ADC also supports six internal connections for diagnostic and monitoring purposes. The number of ADC channels (per ADC and package type) are listed in Table 1-1.

Each ADC has a sequencer, which autonomously cycles through the configured channels (sequencer scan) with zero-switching overhead (that is, the aggregate sampling bandwidth, when clocked at 26.67 MHz, is equal to 1 Msps whether it is for a single channel or distributed over several channels). The sequencer switching is controlled through a state machine or firmware. The sequencer prioritizes trigger requests, enables the appropriate analog channel, controls ADC sampling, initiates ADC data conversion, manages results, and initiates subsequent conversions for repetitive or group conversions without CPU intervention.

Each SAR ADC has an analog multiplexer used to connect the signals to be measured to the ADC. It has 32 GPIO_STD inputs, one special GPIO_STD input for motor-sense, and six additional inputs to measure internal signals such as a band-gap reference, a temperature sensor, and power supplies. The device supports synchronous sampling of one motor-sense channel on each of the three ADCs.

CYT2B6 has one temperature sensor that is shared by all three ADCs. The temperature sensor must only be sampled by one ADC at a time. Software post processing is required to convert the temperature sensor reading into kelvin or Celsius values.

To accommodate signals with varying source impedances and frequencies, it is possible to have different sample times programmed for each channel. Each ADC also supports range comparison, which allows fast detection of out-of-range values without having to wait for a sequencer scan to complete and for the CPU firmware to evaluate the measurement for out-of-range values.

The ADCs are not usable in DeepSleep and Hibernate modes as they require a high-speed clock. The ADC input reference voltage VREFH range is 2.7 V to V_{DDA} and VREFL is V_{SSA}.

3.3.4 Timer/Counter/PWM Block (TCPWM)

The TCPWM block consists of 16-bit (50 channels) and 32-bit (two channels) counters with a user-programmable period. Four of the 16-bit counters include extra features to support motor control operations. Each TCPWM counter contains a capture register to record the count at the time of an event, a period register (used to either stop or auto-reload the counter when its count is equal to the period register), and compare registers to generate signals that are used as PWM duty-cycle outputs.

Each counter within the TCPWM block supports several functional modes such as timer, capture, quadrature, PWM, PWM with dead-time insertion (PWM_DT, 8-bit), pseudo-random PWM (PWM_PR), and shift-register.

In motor-control applications, the counter within the TCPWM block supports enhanced quadrature mode with features such as asymmetric PWM generation, dead-time insertion (16-bit), and association of different dead times for PWM output signals.

The TCPWM block also provides true and complement outputs, with programmable offset between them, to allow their use as deadband complementary PWM outputs. The TCPWM block also has a kill input (only for the PWM mode) to force outputs to a predetermined state; for example, this may be used in motor-drive systems when an overcurrent state is detected and the PWMs driving the FETs need to be shut off immediately (no time for software intervention).

Note

7. VREF_L prevents IR drops in the VSSIO and VSSA paths from impacting the measurements. VREF_L, when properly connected, reduces or removes the impact of IR drops in the VSSIO and VSSA paths from measurements.

3.3.5 Serial Communication Blocks (SCB)

CYT2B6 contains up to six serial communication blocks, each configurable to support I²C, UART, or SPI.

I²C Interface

An SCB can be configured to implement a full I²C master (capable of multi-master arbitration) or slave interface. Each SCB configured for I²C can operate at speeds of up to 1 Mbps (Fast-mode Plus[8]) and has flexible buffering options to reduce the interrupt overhead and latency of the CPU. In addition, each SCB supports FIFO buffering for receive and transmit data, which, by increasing the time for the CPU to read the data, reduces the need for clock stretching. The I²C interface is compatible with Standard, Fast-mode, and Fast-mode Plus devices as specified in the NXP I²C-bus specification and user manual (UM10204). The I²C-bus I/O is implemented with GPIO in open-drain modes[9, 10].

UART Interface

When configured as a UART, each SCB provides a full-featured UART with maximum signaling rate determined by the configured peripheral-clock frequency and over-sampling rate. It supports infrared interface (IrDA) and SmartCard (ISO 7816) protocols, which are minor variants of the UART protocol. It also supports the 9-bit multiprocessor mode that allows the addressing of peripherals connected over common Rx and Tx lines. Common UART functions such as parity, number of stop bits, break detect, and frame error are supported. FIFO buffering of transmit and receive data allows greater CPU service latencies to be tolerated.

The LIN protocol is supported by the UART. LIN is based on a single-master multi-slave topology. There is one master node and multiple slave nodes on the LIN bus. The SCB UART supports only LIN slave functionality. Compared to the dedicated LIN blocks, an SCB/UART used for LIN requires a higher level of software interaction and increased CPU load.

SPI Interface

The SPI configuration supports full Motorola SPI, TI Synchronous Serial Protocol (SSP, essentially adds a start pulse that is used to synchronize SPI-based Codecs), and National Microwire (a half-duplex form of SPI). The SPI interface can use the FIFO. The SPI interface operates with up to a 12.5-MHz SPI Clock. SCB also supports EZSPI[11] mode.

SCB0 supports the following additional features:

- Operable as a slave in DeepSleep mode
- I²C slave EZ (EZI2C[12]) mode with up to 256-B data buffer for multi-byte communication without CPU intervention
- I²C slave externally-clocked operations
- Command/response mode with a 512-B data buffer for multi-byte communication without CPU intervention

3.3.6 CAN FD

CYT2B6 supports two CAN FD controller blocks, each supporting up to two CAN FD channels. All CAN FD controllers are compliant with the ISO 11898-1:2015 standard; an ISO 16845:2015 certificate is available. It also implements the time-triggered CAN (TTCAN) protocol specified in ISO 11898-4 (TTCAN protocol levels 1 and 2) completely in hardware.

All functions concerning the handling of messages are implemented by the Rx and Tx handlers. The Rx handler manages message acceptance filtering, transfer of received messages from the CAN core to a message RAM, and provides receive-message status. The Tx handler is responsible for the transfer of transmit messages from the message RAM, to the CAN core, and provides transmit-message status.

3.3.7 Local Interconnect Network (LIN)

CYT2B6 contains up to five LIN channels. Each channel supports transmission/reception of data following the LIN protocol according to ISO standard 17987. Each LIN channel connects to an external transceiver through a 3-pin interface (including an enable function) and supports master and slave functionality. Each channel also supports classic and enhanced checksum, along with break detection during message reception and wake-up signaling. Break detection, sync field, checksum calculations, and error interrupts are handled in hardware.

3.3.8 One-Time-Programmable (OTP) eFuse

CYT2B6 contains a 1024-bit OTP eFuse memory that can be used to store and access a unique and unalterable identifier or serial number for each device. eFuses are also used to control the device life-cycle (manufacturing, programming, normal operation, end-of-life, and so on) and the security state. Of the 1024 bits, 192 are available for user purposes.

3.3.9 Event Generator

The event generator supports generation of interrupts and triggers in Active mode and interrupts in DeepSleep mode. The event generators are used to trigger a specific device operation (execution of an interrupt handler, a SAR ADC conversion, and so on) and to provide a cyclic wakeup mechanism from DeepSleep mode. They provide CPU-free triggers for device functions, and reduce CPU involvement in triggering device functions, thus reducing overall power consumption and processing overhead.

3.3.10 Trigger Multiplexer

CYT2B6 supports connecting various peripherals using trigger signals. Triggers are used to inform a peripheral of the occurrence of an event or change of state. These triggers are used to affect or initiate some action in other peripherals. The trigger multiplexer is used to route triggers from a source peripheral to a destination. Triggers provide active logic functionality and are typically supported in Active mode.

Notes

8. I/Os drive level does not support the full bus capacitance in Fast-mode Plus speeds.
9. This is not 100% compliant with the I²C-bus specification; I/Os are not over-voltage tolerant, do not support the 20-mA sink requirement of Fast-mode Plus, and violate the leakage specification when no power is applied.
10. Only Port 0 with the slew rate control enabled meets the minimum fall time requirement.
11. The Easy SPI (EZSPI) protocol is based on the Motorola SPI operating in any mode (0, 1, 2, or 3). It allows communication between master and slave reduces the need for CPU intervention.
12. The Easy I²C (EZI2C) protocol is a unique communication scheme built on top of the I²C protocol by Cypress. It uses a meta protocol around the standard I²C protocol to communicate to an I²C slave using indexed memory transfers. This reduces the need for CPU intervention.

3.4 I/Os

CYT2B6 has up to 78 programmable I/Os.

The I/Os are organized as logical entities called ports, which are a maximum of 8 bits wide. During power-on, and reset, the I/Os are forced to the High-Z state. During the Hibernate mode, the I/Os are frozen.

Every I/O can generate an interrupt (if enabled) and each port has an interrupt request (IRQ) and interrupt service routine (ISR) associated with it.

I/O port power source mapping is listed in Table 3-3. The associated supply determines the V_{OH}, V_{OL}, V_{IH}, and V_{IL} levels when configured for CMOS and Automotive thresholds.

Table 3-3. I/O Port Power source

Supply	Ports
VDDD	P0, P2, P3, P5, P17, P18, P19, P21, P22, P23
VDDIO_1	P6, P7, P8[13]
VDDIO_2	P11, P12, P13, P14

3.4.1 Port Nomenclature

Px.y describes a particular bit “y” available within an I/O port “x.”

For example, P4.2 reads “port 4, bit 2”.

Each I/O implements the following:

- Programmable drive mode
  - High impedance
  - Resistive pull-up
  - Resistive pull-down
  - Open drain with strong pull-down
  - Open drain with strong pull-up
  - Strong pull-up or pull-down
  - Weak pull-up or pull-down

CYT2B6 has two types of programmable I/Os: GPIO standard and GPIO Enhanced.

3.4.2 GPIO Standard (GPIO_STD)

Supports standard automotive signaling across the 2.7-V to 5.5-V V_{DDIO} range. GPIO Standard I/Os have multiple configurable drive levels, drive modes, and selectable input levels.

3.4.3 GPIO Enhanced (GPIO_ENH)

Supports extended functionality automotive signaling across the 2.7-V to 5.5-V V_{DDIO} range with higher currents at lower voltages (full I^2C timing support, slew-rate control).

Both GPIO_STD and GPIO_ENH implement the following:

- Configurable input threshold (CMOS, TTL, or Automotive)
- Hold mode for latching previous state (used for retaining the I/O state in DeepSleep mode)
- Analog input mode (input and output buffers disabled)

3.4.4 Smart I/O

Smart I/O allows Boolean operations on signals going to the I/O from the subsystems of the chip or on signals coming into the chip. CYT2B6 has three Smart I/O blocks. Operation can be synchronous or asynchronous and the blocks operate in all device power modes except for the Hibernate mode.

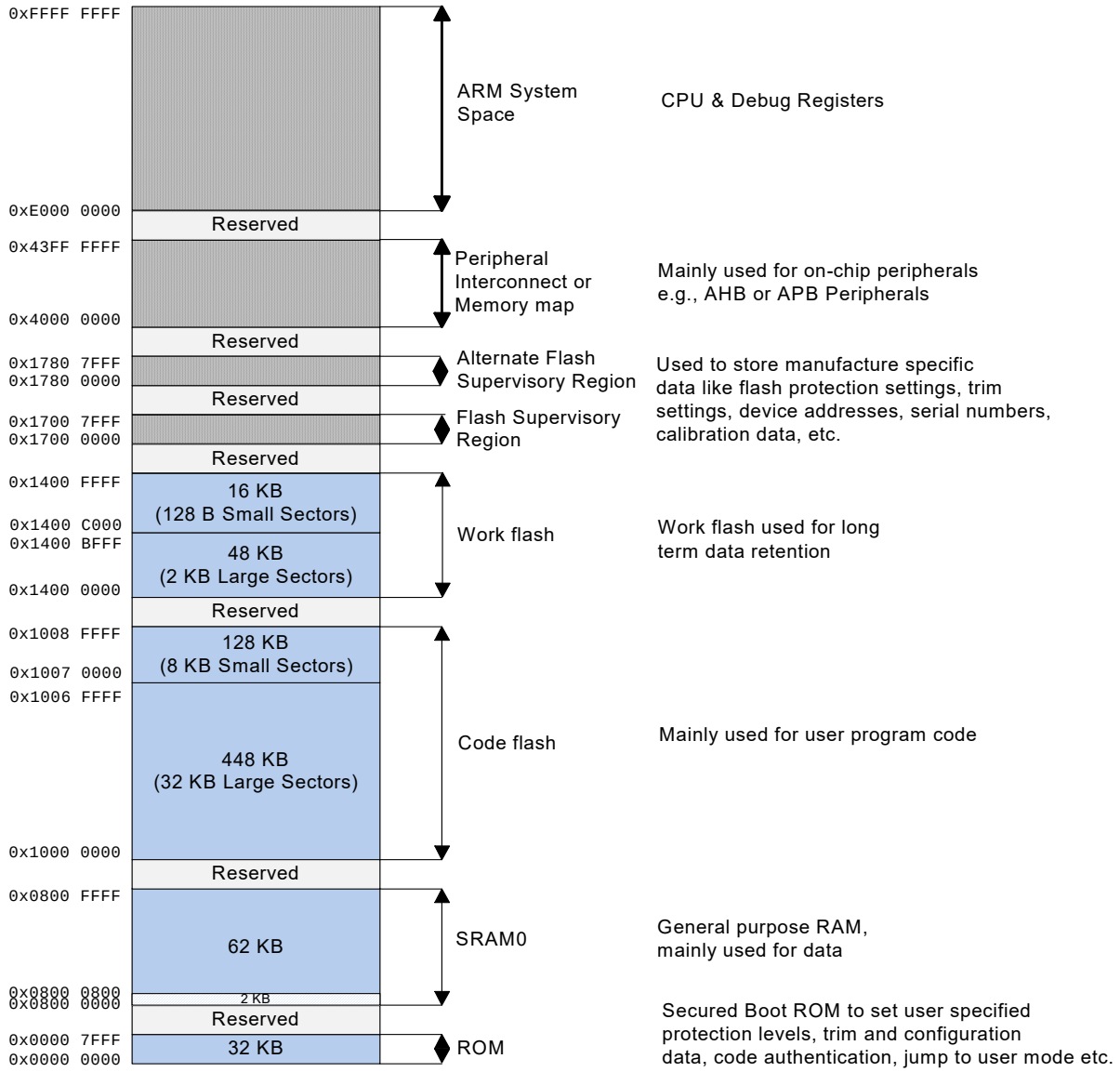
Note
13. The I/Os in VDDIO_1 domain are referred to the VDDD domain in 64-LQFP package.

4. CYT2B6 Address Map

The CYT2B6 microcontroller supports the memory spaces shown in Figure 4-1..

- 576 KB (448 KB + 128 KB) of code-flash, used in the single- or dual-bank mode based on the associated bit in the flash control register
  - Single-bank mode - 576 KB
  - Dual-bank mode - 288 KB per bank
- 64 KB (48 KB + 16 KB) of work-flash, used in the single- or dual-bank mode based on the associated bit in the flash control register
  - Single-bank mode - 64 KB
  - Dual-bank mode - 32 KB per bank
- 64 KB of SRAM (First 2 KB is reserved for internal usage)
- 32 KB of secure ROM

Figure 4-1.CYT2B6 Address Map[14, 15]



Notes

14. The size representation is not up to scale.
15. First 2 KB of SRAM is reserved, not available for users. User must keep the power of first 32KB block of SRAM0 in enabled or retained in all Active, LP Active, Sleep, LP Sleep, DeepSleep modes.

5. Flash Base Address Map

Table 5-1 through Table 5-6 give information about the sector mapping of the code- and work-flash regions along with their respective base addresses.

Table 5-1. Code-flash Address Mapping in Single Bank Mode

Code-flash Size (KB)	Large Sectors (LS)	Small Sectors (SS)	Large Sector Base Address	Small Sector Base Address
576	32 KB × 14	8 KB × 16	0x1000 0000	0x1007 0000

Table 5-2. Work-flash Address Mapping in Single Bank Mode

Work-flash Size (KB)	Large Sectors	Small Sectors	Large Sector Base Address	Small Sector Base Address
64	2 KB × 24	128 B × 128	0x1400 0000	0x1400 C000

Table 5-3. Code-flash Address Mapping in Dual Bank Mode (Mapping A)

Code-flash Size (KB)	First Half LS	First Half SS	Second Half LS	Second Half SS	First Half LS Base Address	First Half SS Base Address	Second Half LS Base Address	Second Half SS Base Address
576	32 KB × 7	8 KB × 8	32 KB × 7	8 KB × 8	0x1000 0000	0x1003 8000	0x1200 0000	0x1203 8000

Table 5-4. Code-flash Address Mapping in Dual Bank Mode (Mapping B)

Code-flash Size (KB)	First Half LS	First Half SS	Second Half LS	Second Half SS	First Half LS Base Address	First Half SS Base Address	Second Half LS Base Address	Second Half SS Base Address
576	32 KB × 7	8 KB × 8	32 KB × 7	8 KB × 8	0x1200 0000	0x1203 8000	0x1000 0000	0x1003 8000

Table 5-5. Work-flash Address Mapping in Dual Bank Mode (Mapping A)

Work-flash Size (KB)	First Half LS	First Half SS	Second Half LS	Second Half SS	First Half LS Base Address	First Half SS Base Address	Second Half LS Base Address	Second Half SS Base Address
64	2 KB × 12	128 B × 64	2 KB × 12	128 B × 64	0x1400 0000	0x1400 6000	0x1500 0000	0x1500 6000

Table 5-6. Work-flash Address Mapping in Dual Bank Mode (Mapping B)

Work-flash Size (KB)	First Half LS	First Half SS	Second Half LS	Second Half SS	First Half LS Base Address	First Half SS Base Address	Second Half LS Base Address	Second Half SS Base Address
64	2 KB × 12	128 B × 64	2 KB × 12	128 B × 64	0x1500 0000	0x1500 6000	0x1400 0000	0x1400 6000

6. Peripheral I/O Map

Table 6-1. CYT2B6 Peripheral I/O Map

Section	Description	Base Address	Instances	Instance Size	Group	Slave
PERI	Peripheral interconnect	0x4000 0000			0	0
	Peripheral group (0, 1, 2, 3, 5, 6, 9)	0x4000 4000	7	0x20		
	Peripheral trigger group	0x4000 8000	11	0x400		
	Peripheral 1:1 trigger group	0x4000 C000	11	0x400		
PERI_MS	Peripheral interconnect, master interface	0x4001 0000			0	1
	PERI Programmable PPU	0x4001 0000	6[16]	0x40		
	PERI Fixed PPU	0x4001 0800	458	0x40		
Crypto	Cryptography component	0x4010 0000			1	0
CPUSS	CPU subsystem (CPUSS)	0x4020 0000			2	0
FAULT	Fault structure subsystem	0x4021 0000			2	1
	Fault structures	0x4021 0000	4	0x100		
IPC	Inter process communication	0x4022 0000			2	2
	IPC structures	0x4022 0000	8	0x20		
	IPC interrupt structures	0x4022 1000	8	0x20		
PROT	Protection	0x4023 0000			2	3
	Shared memory protection unit structures	0x4023 2000	16	0x40		
	Memory protection unit structures	0x4023 4000	16	0x400		
FLASHC	Flash controller	0x4024 0000			2	4
SRSS	System Resources Subsystem Core Registers	0x4026 0000			2	5
	Clock Supervision High Frequency	0x4026 1400	3	0x10		
	Clock Supervision Reference Frequency	0x4026 1710	1			
	Clock Supervision Low Frequency	0x4026 1720	1			
	Clock Supervision Internal Low Frequency	0x4026 1730	1			
	Multi Counter WDT	0x4026 8000	2	0x100		
	Free Running WDT	0x4026 C000	1			
BACKUP	SRSS Backup Domain/RTC	0x4027 0000			2	6
	Backup Register	0x4027 1000	4	0x04		
P-DMA	P-DMA0 Controller	0x4028 0000			2	7
	P-DMA0 channel structures	0x4028 8000	54	0x40		
	P-DMA1 Controller	0x4029 0000			2	8
	P-DMA1 channel structures	0x4029 8000	26	0x40		
M-DMA	M-DMA0 Controller	0x402A 0000			2	9
	M-DMA0 channels	0x402A 1000	2	0x100		
eFUSE	eFUSE Customer Data (192 bits)	0x402C 0868	6	0x04	2	10
HSIOM	High-Speed I/O Matrix (HSIOM)	0x4030 0000	17	0x10	3	0
GPIO	GPIO port control/configuration	0x4031 0000	17	0x80	3	1

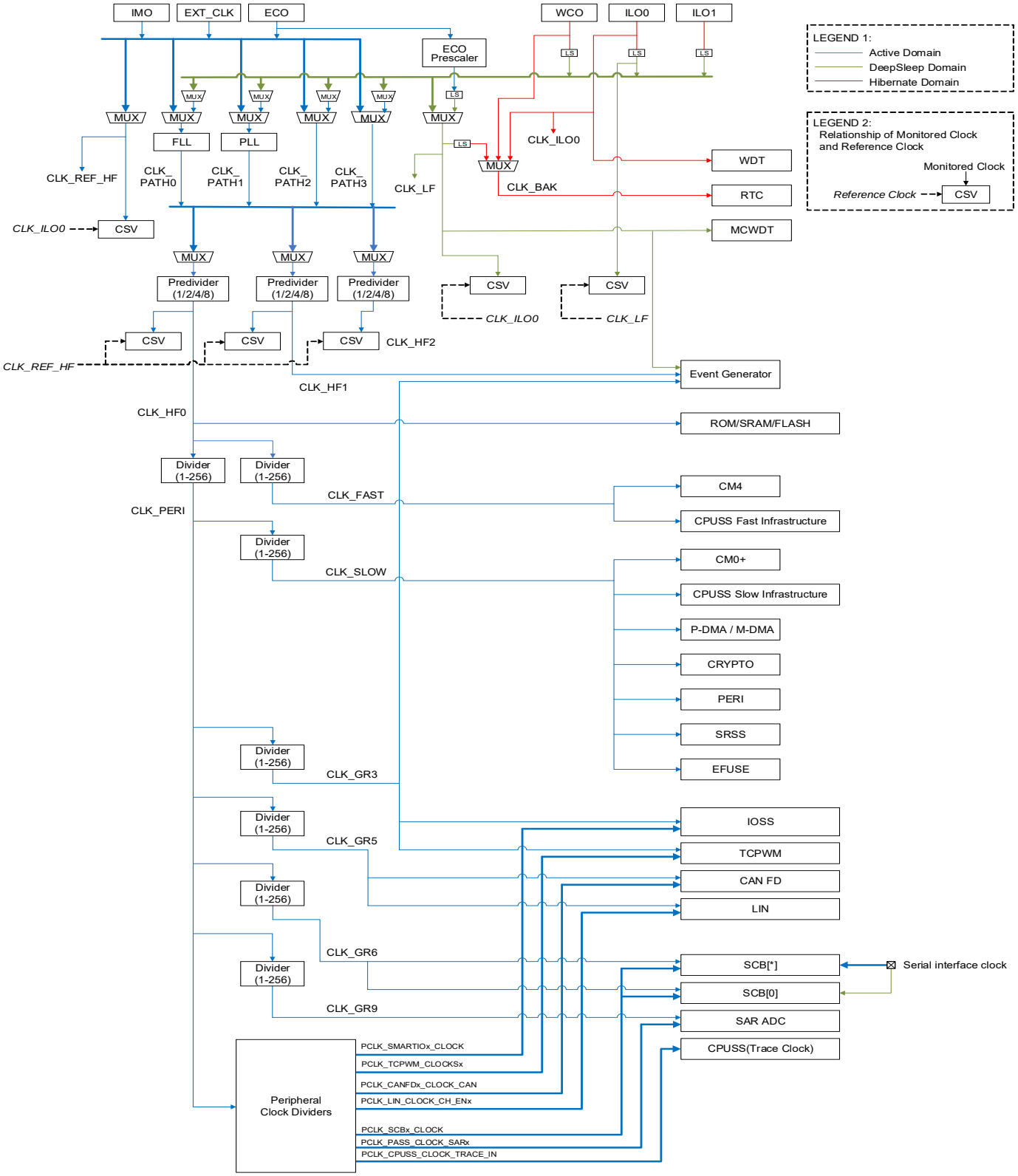
Note
16. These six Programmable PPUs are configured by the Boot ROM and are available for the user based on the access rights. Refer to the device specific TRM to know more about the configuration of these programmable PPUs.

Table 6-1. CYT2B6 Peripheral I/O Map *(continued)*

Section	Description	Base Address	Instances	Instance Size	Group	Slave
SMARTIO	Programmable I/O configuration	0x4032 0000			3	2
	SMARTIO port configuration	0x4032 0C00	3	0x100		
TCPWM	Timer/Counter/PWM 0 (TCPWM0)	0x4038 0000			3	3
	TCPWM0 Group #0 (16-bit)	0x4038 0000	46	0x80		
	TCPWM0 Group #1 (16-bit, Motor control)	0x4038 8000	4	0x80		
	TCPWM0 Group #2 (32-bit)	0x4039 0000	2	0x80		
EVTGEN	Event generator 0 (EVTGEN0)	0x403F 0000			3	4
	Event generator 0 comparator structures	0x403F 0800	11	0x20		
LIN	Local Interconnect Network 0 (LIN0)	0x4050 0000			5	0
	LIN0 Channels	0x4050 8000	5	0x100		
TTCANFD	CAN0 controller	0x4052 0000	2	0x200	5	1
	Message RAM CAN0	0x4053 0000		0x5FFF		
	CAN1 controller	0x4054 0000	2	0x200	5	2
	Message RAM CAN1	0x4055 0000		0x5FFF		
SCB	Serial Communications Block (SPI/UART/I^2C)	0x4060 0000	6	0x10000	6	0-7 [NA 2, 6]
PASS0 SAR	Programmable Analog Subsystem (PASS0)	0x4090 0000			9	0
	SAR0 channel controller	0x4090 0000				
	SAR1 channel controller	0x4090 1000				
	SAR2 channel controller	0x4090 2000				
	SAR0 channel structures	0x4090 0800	11	0x40		
	SAR1 channel structures	0x4090 1800	13	0x40		
	SAR2 channel structures	0x4090 2800	8	0x40		

7. CYT2B6 Clock Diagram

Figure 7-1.CYT2B6 Clock Diagram



8. CYT2B6 CPU Start-up Sequence

The start-up sequence is described in the following steps:

1. System Reset (@0x0000 0000)
2. CM0+ executes ROM boot (@0x0000 0004)
   i. Applies trims
   ii. Applies Debug Access port (DAP) access restrictions and system protection from eFuse and supervisory flash
   iii. Authenticates flash boot (only in SECURE life-cycle stage) and transfers control to it
3. CM0+ executes flash boot (from Supervisory flash @0x1700 2000)
   i. Debug pins are configured as per the SWD/JTAG spec[17]
   ii. Sets CM0+ vector offset register (CM0_VTOR part of the Arm system space) to the beginning of flash (@0x1000 0000)
   iii. CM0+ branches to its Reset handler
4. CM0+ starts execution
   i. Moves CM0+ vector table to SRAM (updates CM0+ vector table base)
   ii. Sets CM4_VECTOR_TABLE_BASE (@0x0000 0200) to the location of CM4 vector table mentioned in flash (specified in CM4 linker definition file)
   iii. Releases CM4 from reset
   iv. Continues execution of CM0+ user application
5. CM4 executes directly from either code-flash or SRAM
   i. CM4 branches to its Reset handler
   ii. Continues execution of CM4 user application

Note
17. Port configuration of SWD/JTAG pins will be changed from the default GPIO mode to support debugging after the boot process, refer to Table 11-1 for pin assignments.

9. Pin Assignment

Figure 9-1.100-LQFP Pin Assignment

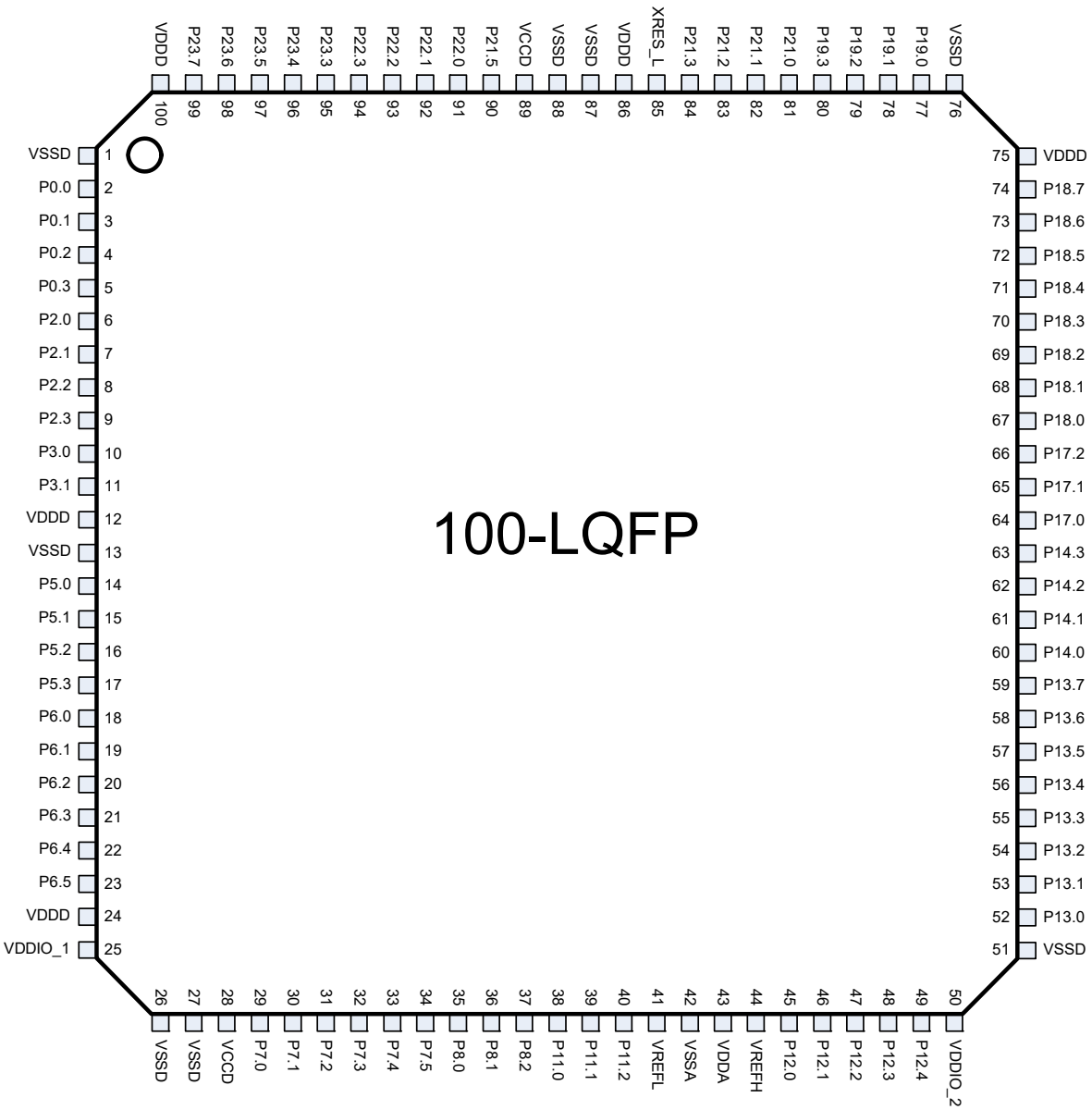


Figure 9-2.100-LQFP Pin Assignment with Alternate Functions

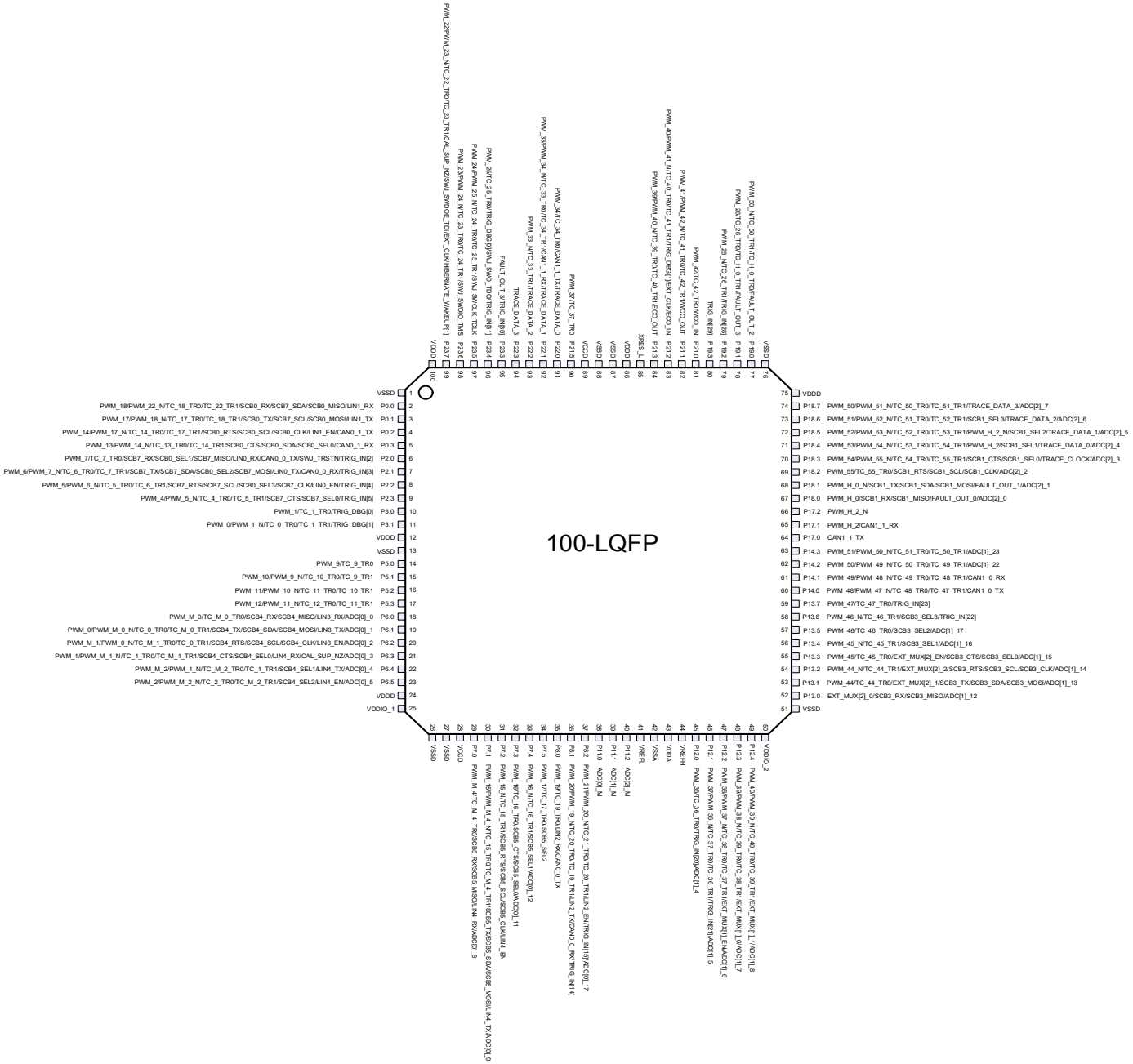


Figure 9-3.80-LQFP Pin Assignment

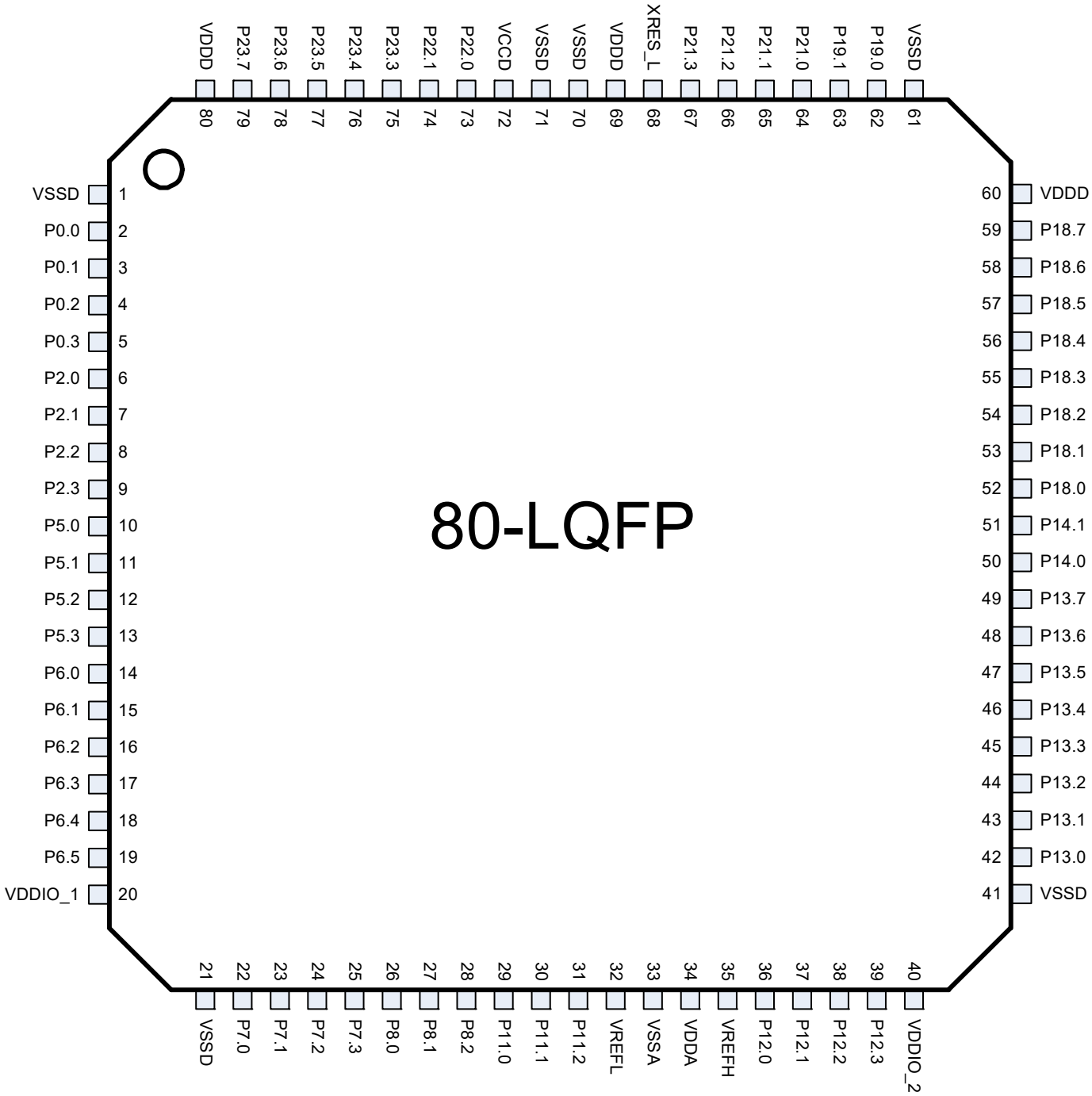


Figure 9-4.80-LQFP Pin Assignment with Alternate Functions

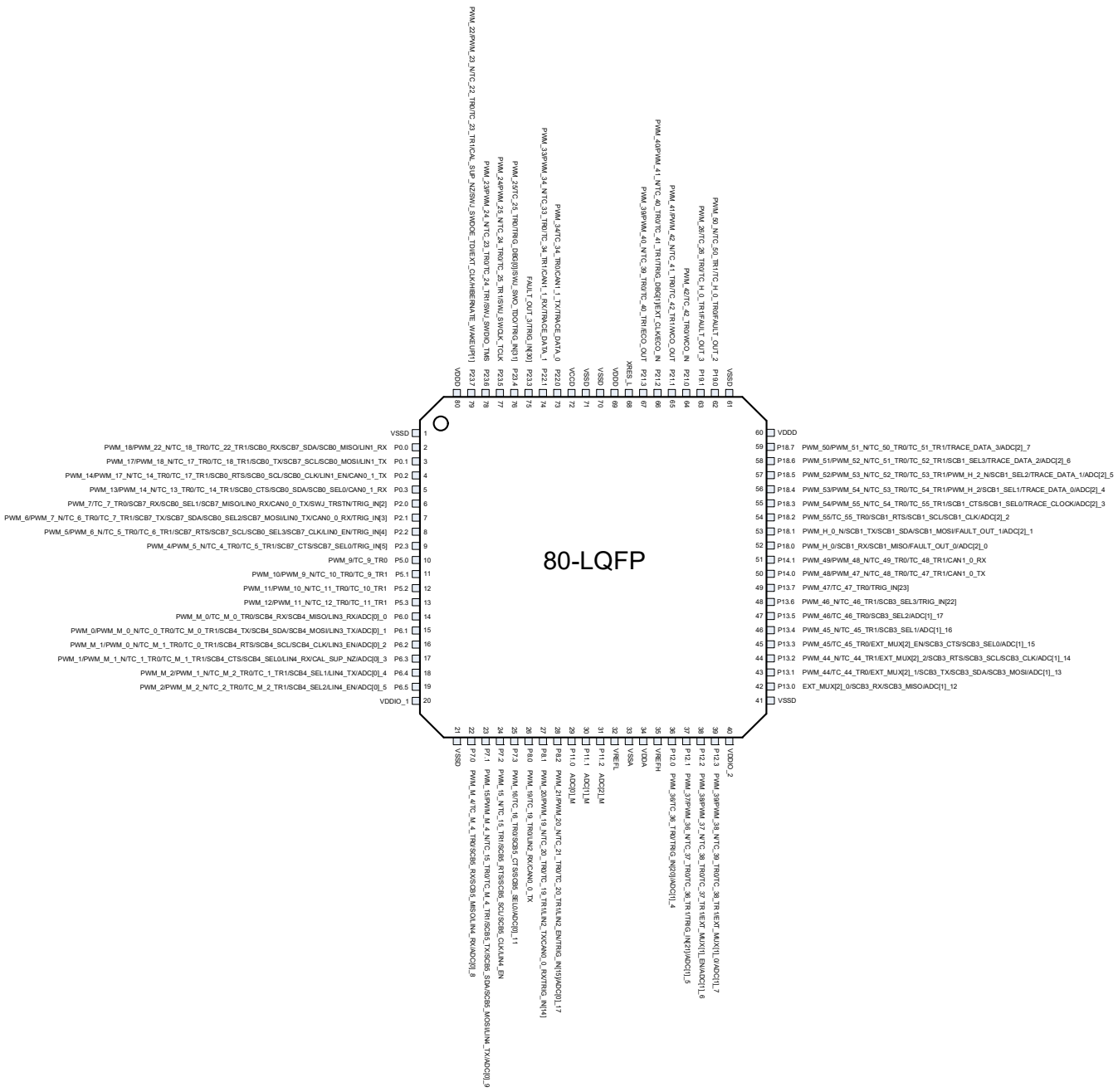


Figure 9-5.64-LQFP Pin Assignment

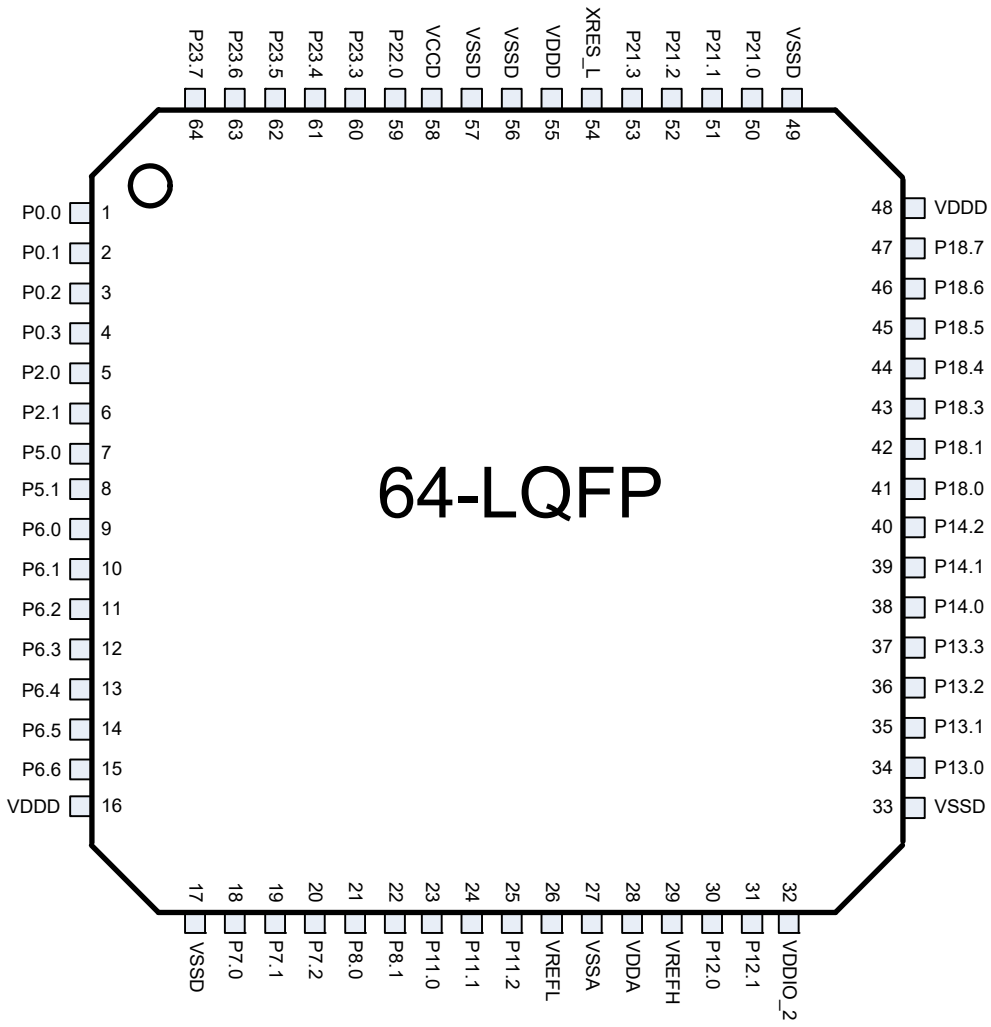
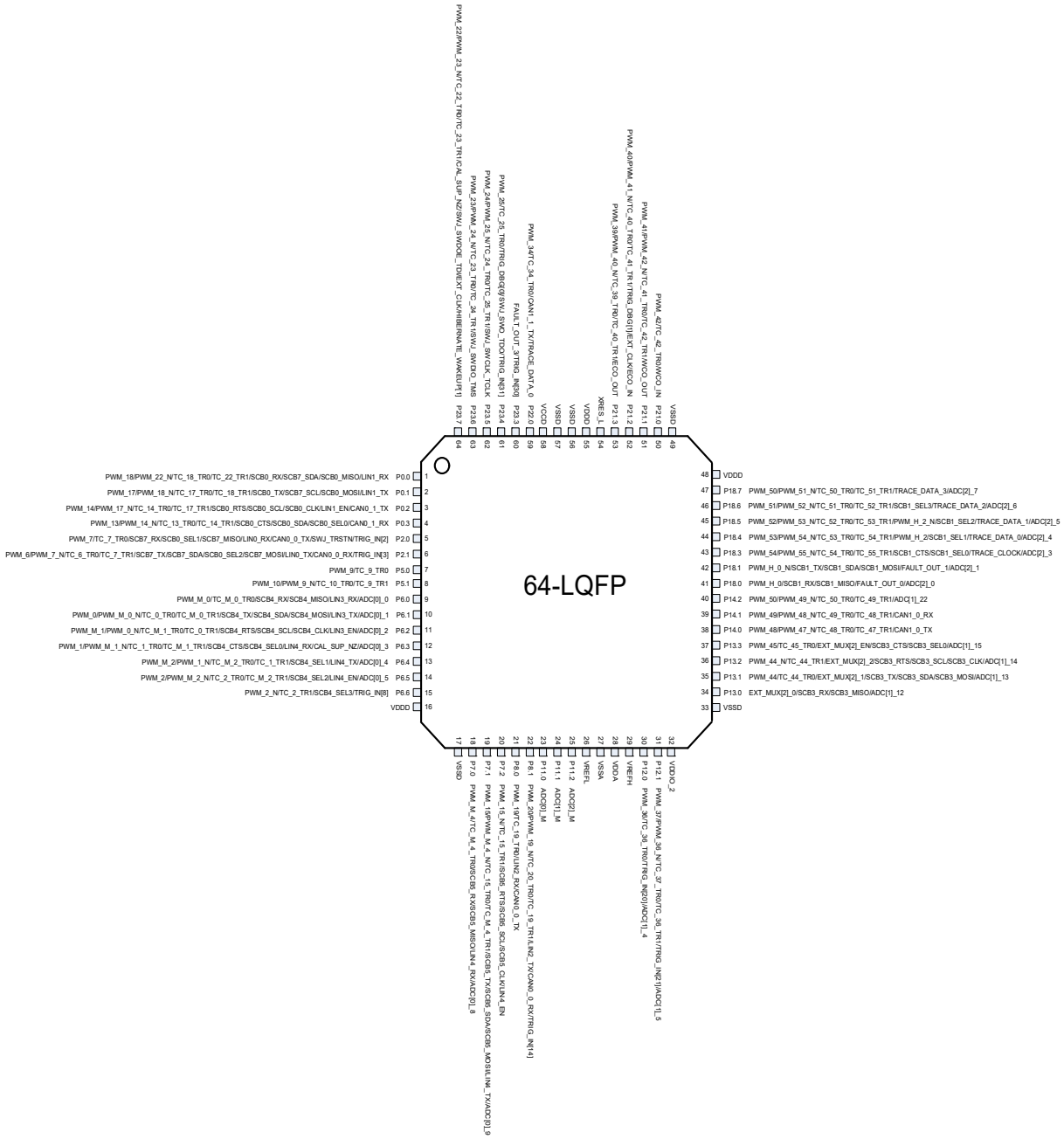


Figure 9-6.64-LQFP Pin Assignment with Alternate Functions



10. High-Speed I/O Matrix Connections

Table 10-1. HSIOM Connections Reference

Name	Number	Description
HSIOM_SEL_GPIO	0	GPIO controls 'out'
HSIOM_SEL_GPIO_DSI	1	Reserved
HSIOM_SEL_DSI_DSI	2	
HSIOM_SEL_DSI_GPIO	3	
HSIOM_SEL_AMUXA	4	
HSIOM_SEL_AMUXB	5	
HSIOM_SEL_AMUXA_DSI	6	
HSIOM_SEL_AMUXB_DSI	7	
HSIOM_SEL_ACT_0	8	Active functionality 0
HSIOM_SEL_ACT_1	9	Active functionality 1
HSIOM_SEL_ACT_2	10	Active functionality 2
HSIOM_SEL_ACT_3	11	Active functionality 3
HSIOM_SEL_DS_0	12	DeepSleep functionality 0
HSIOM_SEL_DS_1	13	DeepSleep functionality 1
HSIOM_SEL_DS_2	14	DeepSleep functionality 2
HSIOM_SEL_DS_3	15	DeepSleep functionality 3
HSIOM_SEL_ACT_4	16	Active functionality 4
HSIOM_SEL_ACT_5	17	Active functionality 5
HSIOM_SEL_ACT_6	18	Active functionality 6
HSIOM_SEL_ACT_7	19	Active functionality 7
HSIOM_SEL_ACT_8	20	Active functionality 8
HSIOM_SEL_ACT_9	21	Active functionality 9
HSIOM_SEL_ACT_10	22	Active functionality 10
HSIOM_SEL_ACT_11	23	Active functionality 11
HSIOM_SEL_ACT_12	24	Active functionality 12
HSIOM_SEL_ACT_13	25	Active functionality 13
HSIOM_SEL_ACT_14	26	Active functionality 14
HSIOM_SEL_ACT_15	27	Active functionality 15
HSIOM_SEL_DS_4	28	DeepSleep functionality 4
HSIOM_SEL_DS_5	29	DeepSleep functionality 5
HSIOM_SEL_DS_6	30	DeepSleep functionality 6
HSIOM_SEL_DS_7	31	DeepSleep functionality 7

11. Package Pin List and Alternate Functions

Most pins have alternate functionality, as specified in Table 11-1.

Port 11 has the following additional features,

- Ability to pass full-level analog signals to the SAR without clipping to V_{DDD} in cases where $V_{DDD} < V_{DDA}$
- Ability to simultaneously capture all three ADC signals with highest priority (ADC[0:2]_M)
- Lower noise, for the most sensitive sensors

Table 11-1. Pin Selector and Alternate Pin Functions in DeepSleep (DS) Mode, Analog, Smart I/O

Name		Package			DeepSleep Mapping[20]			Analog/HV	SMARTIO
	HCon#0[18]	100-LQFP	80-LQFP	64-LQFP	HCon#14	HCon#29	HCon#30		
	I/O Type	Pin	Pin	Pin	DS #0[19]	DS #1	DS #2		
P0.0	GPIO_ENH	2	2	1			SCB0_MISO		
P0.1	GPIO_ENH	3	3	2			SCB0_MOSI		
P0.2	GPIO_ENH	4	4	3	SCB0_SCL		SCB0_CLK		
P0.3	GPIO_ENH	5	5	4	SCB0_SDA		SCB0_SEL0		
P2.0	GPIO_STD	6	6	5		SWJ_TRSTN	SCB0_SEL1		
P2.1	GPIO_STD	7	7	6			SCB0_SEL2		
P2.2	GPIO_STD	8	8	NA			SCB0_SEL3		
P2.3	GPIO_STD	9	9	NA					
P3.0	GPIO_STD	10	NA	NA					
P3.1	GPIO_STD	11	NA	NA					
P5.0	GPIO_STD	14	10	7					
P5.1	GPIO_STD	15	11	8					
P5.2	GPIO_STD	16	12	NA					
P5.3	GPIO_STD	17	13	NA					
P6.0	GPIO_STD	18	14	9				ADC[0]_0	
P6.1	GPIO_STD	19	15	10				ADC[0]_1	
P6.2	GPIO_STD	20	16	11				ADC[0]_2	
P6.3	GPIO_STD	21	17	12				ADC[0]_3	
P6.4	GPIO_STD	22	18	13				ADC[0]_4	
P6.5	GPIO_STD	23	19	14				ADC[0]_5	
P6.6	GPIO_STD	NA	NA	15					
P7.0	GPIO_STD	29	22	18				ADC[0]_8	
P7.1	GPIO_STD	30	23	19				ADC[0]_9	
P7.2	GPIO_STD	31	24	20					
P7.3	GPIO_STD	32	25	NA				ADC[0]_11	
P7.4	GPIO_STD	33	NA	NA				ADC[0]_12	
P7.5	GPIO_STD	34	NA	NA					
P8.0	GPIO_STD	35	26	21					
P8.1	GPIO_STD	36	27	22					

Notes

18. HCon refers to High Speed I/O matrix connection reference as per Table 10-1.
19. DeepSleep ordering (DS #0, DS #1, DS #2) does not have any impact on choosing any alternate functions; the HSIOM module handles the individual alternate function assignment.
20. All port pin functions available in DeepSleep mode are also available in Active mode.

Table 11-1. Pin Selector and Alternate Pin Functions in DeepSleep (DS) Mode, Analog, Smart I/O *(continued)*

Name		Package			DeepSleep Mapping[20]			Analog/HV	SMARTIO
	HCon#0[18]	100-LQFP	80-LQFP	64-LQFP	HCon#14	HCon#29	HCon#30		
	I/O Type	Pin	Pin	Pin	DS #0[19]	DS #1	DS #2		
P8.2	GPIO_STD	37	28	NA				ADC[0]_17	
P11.0	GPIO_STD	38	29	23				ADC[0]_M	
P11.1	GPIO_STD	39	30	24				ADC[1]_M	
P11.2	GPIO_STD	40	31	25				ADC[2]_M	
P12.0	GPIO_STD	45	36	30				ADC[1]_4	SMARTIO12_0
P12.1	GPIO_STD	46	37	31				ADC[1]_5	SMARTIO12_1
P12.2	GPIO_STD	47	38	NA				ADC[1]_6	SMARTIO12_2
P12.3	GPIO_STD	48	39	NA				ADC[1]_7	SMARTIO12_3
P12.4	GPIO_STD	49	NA	NA				ADC[1]_8	SMARTIO12_4
P13.0	GPIO_STD	52	42	34				ADC[1]_12	SMARTIO13_0
P13.1	GPIO_STD	53	43	35				ADC[1]_13	SMARTIO13_1
P13.2	GPIO_STD	54	44	36				ADC[1]_14	SMARTIO13_2
P13.3	GPIO_STD	55	45	37				ADC[1]_15	SMARTIO13_3
P13.4	GPIO_STD	56	46	NA				ADC[1]_16	SMARTIO13_4
P13.5	GPIO_STD	57	47	NA				ADC[1]_17	SMARTIO13_5
P13.6	GPIO_STD	58	48	NA					SMARTIO13_6
P13.7	GPIO_STD	59	49	NA					SMARTIO13_7
P14.0	GPIO_STD	60	50	38					SMARTIO14_0
P14.1	GPIO_STD	61	51	39					SMARTIO14_1
P14.2	GPIO_STD	62	NA	40				ADC[1]_22	SMARTIO14_2
P14.3	GPIO_STD	63	NA	NA				ADC[1]_23	
P17.0	GPIO_STD	64	NA	NA					
P17.1	GPIO_STD	65	NA	NA					
P17.2	GPIO_STD	66	NA	NA					
P18.0	GPIO_STD	67	52	41				ADC[2]_0	
P18.1	GPIO_STD	68	53	42				ADC[2]_1	
P18.2	GPIO_STD	69	54	NA				ADC[2]_2	
P18.3	GPIO_STD	70	55	43				ADC[2]_3	
P18.4	GPIO_STD	71	56	44				ADC[2]_4	
P18.5	GPIO_STD	72	57	45				ADC[2]_5	
P18.6	GPIO_STD	73	58	46				ADC[2]_6	
P18.7	GPIO_STD	74	59	47				ADC[2]_7	
P19.0	GPIO_STD	77	62	NA					
P19.1	GPIO_STD	78	63	NA					
P19.2	GPIO_STD	79	NA	NA					
P19.3	GPIO_STD	80	NA	NA					
P21.0	GPIO_STD	81	64	50				WCO_IN[21]	
P21.1	GPIO_STD	82	65	51				WCO_OUT[21]	
P21.2	GPIO_STD	83	66	52				ECO_IN[21]	

Table 11-1. Pin Selector and Alternate Pin Functions in DeepSleep (DS) Mode, Analog, Smart I/O *(continued)*

Name		Package			DeepSleep Mapping[20]			Analog/HV	SMARTIO
	HCon#0[18]	100-LQFP	80-LQFP	64-LQFP	HCon#14	HCon#29	HCon#30		
	I/O Type	Pin	Pin	Pin	DS #0[19]	DS #1	DS #2		
P21.3	GPIO_STD	84	67	53				ECO_OUT[21]	
P21.5	GPIO_STD	90	NA	NA					
P22.0	GPIO_STD	91	73	59					
P22.1	GPIO_STD	92	74	NA					
P22.2	GPIO_STD	93	NA	NA					
P22.3	GPIO_STD	94	NA	NA					
P23.3	GPIO_STD	95	75	60					
P23.4	GPIO_STD	96	76	61		SWJ_SWO_TDO			
P23.5	GPIO_STD	97	77	62		SWJ_SWCLK_TCLK			
P23.6	GPIO_STD	98	78	63		SWJ_SWDIO_TMS			
P23.7	GPIO_STD	99	79	64		SWJ_SWDOE_TDI		HIBER-NATE_WAKEUP[1]	

Notes
21. I/O pins that support an oscillator function (WCO or ECO) must be configured for high-impedance if the oscillator is enabled.
22. This I/O has increased leakage to ground when the V_{DDD} supply is below the POR threshold.

12. Power Pin Assignments

Table 12-1. Power Pin Assignments

Name	Packages			Remarks
	64-LQFP	80-LQFP	100-LQFP	
VDDD	55, 48, 16	80, 69, 60	100, 86, 75, 24, 12	Main digital supply
VSSD	57, 56, 49, 33, 17	71, 70, 61, 41, 21, 1	88, 87, 76, 51, 27, 26, 13, 1	Main digital ground
VDDIO_1	NA	20	25	I/O supply for analog I/Os (except analog I/Os on V_{DDA})
VDDIO_2	32	40	50	I/O supply for analog I/Os (except analog I/Os on V_{DDA}), P11
VCCD[23]	58	72	89, 28	Main regulated supply. Driven by LDO regulator
VREFH	29	35	44	High reference voltage for SAR ADCs
VREFL	26	32	41	Low reference voltage for SAR ADCs
VDDA	28	34	43	Main analog supply for SAR ADCs
VSSA	27	33	42	Main analog ground
XRES_L	54	68	85	Active LOW external reset input

Note
23. The V_{CCD} pins must be connected together to ensure a low-impedance connection. (see the requirement in Figure 26-2.)

13. Alternate Function Pin Assignments

Table 13-1. Alternate Pin Functions in Active Mode

	Active Mapping											
	HCon#8[24]	HCon#9	HCon#10	HCon#11	HCon#16	HCon#17	HCon#18	HCon#19	HCon#20	HCon#21	HCon#26	HCon#27
Name	ACT #0[25]	ACT #1	ACT #2	ACT #3	ACT #4	ACT #5	ACT #6	ACT #7	ACT #8	ACT #9	ACT #14	ACT #15
P0.0	PWM0_18	PWM0_22_N	TC0_18_TR0	TC0_22_TR1		SCB0_RX	SCB7_SDA		LIN1_RX			
P0.1	PWM0_17	PWM0_18_N	TC0_17_TR0	TC0_18_TR1		SCB0_TX	SCB7_SCL		LIN1_TX			
P0.2	PWM0_14	PWM0_17_N	TC0_14_TR0	TC0_17_TR1		SCB0_RTS			LIN1_EN	CAN0_1_TX		
P0.3	PWM0_13	PWM0_14_N	TC0_13_TR0	TC0_14_TR1		SCB0_CTS				CAN0_1_RX		
P2.0	PWM0_7		TC0_7_TR0			SCB7_RX		SCB7_MISO	LIN0_RX	CAN0_0_TX	TRIG_IN[2]	
P2.1	PWM0_6	PWM0_7_N	TC0_6_TR0	TC0_7_TR1		SCB7_TX	SCB7_SDA	SCB7_MOSI	LIN0_TX	CAN0_0_RX	TRIG_IN[3]	
P2.2	PWM0_5	PWM0_6_N	TC0_5_TR0	TC0_6_TR1		SCB7_RTS	SCB7_SCL	SCB7_CLK	LIN0_EN		TRIG_IN[4]	
P2.3	PWM0_4	PWM0_5_N	TC0_4_TR0	TC0_5_TR1		SCB7_CTS		SCB7_SEL0			TRIG_IN[5]	
P3.0	PWM0_1		TC0_1_TR0									TRIG_DBG[0]
P3.1	PWM0_0	PWM0_1_N	TC0_0_TR0	TC0_1_TR1								TRIG_DBG[1]
P5.0	PWM0_9		TC0_9_TR0									
P5.1	PWM0_10	PWM0_9_N	TC0_10_TR0	TC0_9_TR1								
P5.2	PWM0_11	PWM0_10_N	TC0_11_TR0	TC0_10_TR1								
P5.3	PWM0_12	PWM0_11_N	TC0_12_TR0	TC0_11_TR1								
P6.0	PWM0_M_0		TC0_M_0_TR0			SCB4_RX		SCB4_MISO	LIN3_RX			
P6.1	PWM0_0	PWM0_M_0_N	TC0_0_TR0	TC0_M_0_TR1		SCB4_TX	SCB4_SDA	SCB4_MOSI	LIN3_TX			
P6.2	PWM0_M_1	PWM0_0_N	TC0_M_1_TR0	TC0_0_TR1		SCB4_RTS	SCB4_SCL	SCB4_CLK	LIN3_EN			
P6.3	PWM0_1	PWM0_M_1_N	TC0_1_TR0	TC0_M_1_TR1		SCB4_CTS		SCB4_SEL0	LIN4_RX			CAL_SUP_NZ
P6.4	PWM0_M_2	PWM0_1_N	TC0_M_2_TR0	TC0_1_TR1				SCB4_SEL1	LIN4_TX			
P6.5	PWM0_2	PWM0_M_2_N	TC0_2_TR0	TC0_M_2_TR1				SCB4_SEL2	LIN4_EN			
P6.6		PWM0_2_N		TC0_2_TR1				SCB4_SEL3			TRIG_IN[8]	
P7.0	PWM0_M_4		TC0_M_4_TR0			SCB5_RX		SCB5_MISO	LIN4_RX			
P7.1	PWM0_15	PWM0_M_4_N	TC0_15_TR0	TC0_M_4_TR1		SCB5_TX	SCB5_SDA	SCB5_MOSI	LIN4_TX			
P7.2		PWM0_15_N		TC0_15_TR1		SCB5_RTS	SCB5_SCL	SCB5_CLK	LIN4_EN			

Notes:
24. High Speed I/O matrix connection (HCon) reference as per Table 10-1.
25. Active Mode ordering (ACT#0, ACT#1, and so on) does not have any impact on configuring alternate functions; the HSIOM module handles the alternate function assignments.

Table 13-1. Alternate Pin Functions in Active Mode *(continued)*

	Active Mapping											
	HCon#8[24]	HCon#9	HCon#10	HCon#11	HCon#16	HCon#17	HCon#18	HCon#19	HCon#20	HCon#21	HCon#26	HCon#27
Name	ACT #0[25]	ACT #1	ACT #2	ACT #3	ACT #4	ACT #5	ACT #6	ACT #7	ACT #8	ACT #9	ACT #14	ACT #15
P7.3	PWM0_16		TC0_16_TR0			SCB5_CTS		SCB5_SEL0				
P7.4		PWM0_16_N		TC0_16_TR1				SCB5_SEL1				
P7.5	PWM0_17		TC0_17_TR0					SCB5_SEL2				
P8.0	PWM0_19		TC0_19_TR0						LIN2_RX	CAN0_0_TX		
P8.1	PWM0_20	PWM0_19_N	TC0_20_TR0	TC0_19_TR1					LIN2_TX	CAN0_0_RX	TRIG_IN[14]	
P8.2	PWM0_21	PWM0_20_N	TC0_21_TR0	TC0_20_TR1					LIN2_EN		TRIG_IN[15]	
P11.0												
P11.1												
P11.2												
P12.0	PWM0_36		TC0_36_TR0								TRIG_IN[20]	
P12.1	PWM0_37	PWM0_36_N	TC0_37_TR0	TC0_36_TR1							TRIG_IN[21]	
P12.2	PWM0_38	PWM0_37_N	TC0_38_TR0	TC0_37_TR1	EXT_MUX[1]_EN							
P12.3	PWM0_39	PWM0_38_N	TC0_39_TR0	TC0_38_TR1	EXT_MUX[1]_0							
P12.4	PWM0_40	PWM0_39_N	TC0_40_TR0	TC0_39_TR1	EXT_MUX[1]_1							
P13.0					EXT_MUX[2]_0	SCB3_RX		SCB3_MISO				
P13.1	PWM0_44		TC0_44_TR0		EXT_MUX[2]_1	SCB3_TX	SCB3_SDA	SCB3_MOSI				
P13.2		PWM0_44_N		TC0_44_TR1	EXT_MUX[2]_2	SCB3_RTS	SCB3_SCL	SCB3_CLK				
P13.3	PWM0_45		TC0_45_TR0		EXT_MUX[2]_EN	SCB3_CTS		SCB3_SEL0				
P13.4		PWM0_45_N		TC0_45_TR1				SCB3_SEL1				
P13.5	PWM0_46		TC0_46_TR0					SCB3_SEL2				
P13.6		PWM0_46_N		TC0_46_TR1				SCB3_SEL3			TRIG_IN[22]	
P13.7	PWM0_47		TC0_47_TR0								TRIG_IN[23]	
P14.0	PWM0_48	PWM0_47_N	TC0_48_TR0	TC0_47_TR1						CAN1_0_TX		
P14.1	PWM0_49	PWM0_48_N	TC0_49_TR0	TC0_48_TR1						CAN1_0_RX		
P14.2	PWM0_50	PWM0_49_N	TC0_50_TR0	TC0_49_TR1								
P14.3	PWM0_51	PWM0_50_N	TC0_51_TR0	TC0_50_TR1								
P17.0										CAN1_1_TX		
P17.1					PWM0_H_2					CAN1_1_RX		

Table 13-1. Alternate Pin Functions in Active Mode *(continued)*

	Active Mapping											
	HCon#8[24]	HCon#9	HCon#10	HCon#11	HCon#16	HCon#17	HCon#18	HCon#19	HCon#20	HCon#21	HCon#26	HCon#27
Name	ACT #0[25]	ACT #1	ACT #2	ACT #3	ACT #4	ACT #5	ACT #6	ACT #7	ACT #8	ACT #9	ACT #14	ACT #15
P17.2					PWM0_H_2_N							
P18.0					PWM0_H_0	SCB1_RX		SCB1_MISO				FAULT_OUT_0
P18.1					PWM0_H_0_N	SCB1_TX	SCB1_SDA	SCB1_MOSI				FAULT_OUT_1
P18.2	PWM0_55		TC0_55_TR0			SCB1_RTS	SCB1_SCL	SCB1_CLK				
P18.3	PWM0_54	PWM0_55_N	TC0_54_TR0	TC0_55_TR1		SCB1_CTS		SCB1_SEL0				TRACE_CLOCK
P18.4	PWM0_53	PWM0_54_N	TC0_53_TR0	TC0_54_TR1	PWM0_H_2			SCB1_SEL1				TRACE_DATA_0
P18.5	PWM0_52	PWM0_53_N	TC0_52_TR0	TC0_53_TR1	PWM0_H_2_N			SCB1_SEL2				TRACE_DATA_1
P18.6	PWM0_51	PWM0_52_N	TC0_51_TR0	TC0_52_TR1				SCB1_SEL3				TRACE_DATA_2
P18.7	PWM0_50	PWM0_51_N	TC0_50_TR0	TC0_51_TR1								TRACE_DATA_3
P19.0		PWM0_50_N		TC0_50_TR1	TC0_H_0_TR0							FAULT_OUT_2
P19.1	PWM0_26		TC0_26_TR0		TC0_H_0_TR1							FAULT_OUT_3
P19.2		PWM0_26_N		TC0_26_TR1							TRIG_IN[28]	
P19.3											TRIG_IN[29]	
P21.0	PWM0_42		TC0_42_TR0									
P21.1	PWM0_41	PWM0_42_N	TC0_41_TR0	TC0_42_TR1								
P21.2	PWM0_40	PWM0_41_N	TC0_40_TR0	TC0_41_TR1							EXT_CLK	TRIG_DBG[1]
P21.3	PWM0_39	PWM0_40_N	TC0_39_TR0	TC0_40_TR1								
P21.5	PWM0_37		TC0_37_TR0									
P22.0	PWM0_34		TC0_34_TR0							CAN1_1_TX		TRACE_DATA_0
P22.1	PWM0_33	PWM0_34_N	TC0_33_TR0	TC0_34_TR1						CAN1_1_RX		TRACE_DATA_1
P22.2		PWM0_33_N		TC0_33_TR1								TRACE_DATA_2
P22.3												TRACE_DATA_3
P23.3											TRIG_IN[30]	FAULT_OUT_3
P23.4	PWM0_25		TC0_25_TR0								TRIG_IN[31]	TRIG_DBG[0]
P23.5	PWM0_24	PWM0_25_N	TC0_24_TR0	TC0_25_TR1								
P23.6	PWM0_23	PWM0_24_N	TC0_23_TR0	TC0_24_TR1								
P23.7	PWM0_22	PWM0_23_N	TC0_22_TR0	TC0_23_TR1							EXT_CLK	CAL_SUP_NZ

Table 13-2. Pin Mux Descriptions

Sl. No.	Pin	Module	Description
1	PWMx_y	TCPWM	TCPWM 16-bit PWM (no motor control), PWM_DT and PWM_PR line out, x-TCPWM block, y-counter number
2	PWMx_y_N	TCPWM	TCPWM 16-bit PWM (no motor control), PWM_DT and PWM_PR complementary line out (N), x-TCPWM block, y-counter number
3	PWMx_M_y	TCPWM	TCPWM 16-bit PWM with motor control line out, x-TCPWM block, y-counter number
4	PWMx_M_y_N	TCPWM	TCPWM 16-bit PWM with motor control complementary line out (N), x-TCPWM block, y-counter number
5	PWMx_H_y	TCPWM	TCPWM 32-bit PWM, PWM_DT and PWM_PR line out, x-TCPWM block, y-counter number
6	PWMx_H_y_N	TCPWM	TCPWM 32-bit PWM, PWM_DT and PWM_PR complementary line out (N), x-TCPWM block, y-counter number
7	TCx_y_TRz	TCPWM	TCPWM 16-bit dedicated counter input triggers, x-TCPWM block, y-counter number, z-trigger number
8	TCx_M_y_TRz	TCPWM	TCPWM 16-bit dedicated counter input triggers with motor control, x-TCPWM block, y-counter number, z-trigger number
9	TCx_H_y_TRz	TCPWM	TCPWM 32-bit dedicated counter input triggers, x-TCPWM block, y-counter number, z-trigger number
10	SCBx_RX	SCB	UART Receive, x-SCB block
11	SCBx_TX	SCB	UART Transmit, x-SCB block
12	SCBx_RTS	SCB	UART Request to Send (Handshake), x-SCB block
13	SCBx_CTS	SCB	UART Clear to Send (Handshake), x-SCB block
14	SCBx_SDA	SCB	I2C Data line, x-SCB block
15	SCBx_SCL	SCB	I2C Clock line, x-SCB block
16	SCBx_MISO	SCB	SPI Master Input Slave Output, x-SCB block
17	SCBx_MOSI	SCB	SPI Master Output Slave Input, x-SCB block
18	SCBx_CLK	SCB	SPI Serial Clock, x-SCB block
19	SCBx_SELy	SCB	SPI Slave Select, x-SCB block, y-select line
20	LINx_RX	LIN	LIN Receive line, x-LIN block
21	LINx_TX	LIN	LIN Transmit line, x-LIN block
22	LINx_EN	LIN	LIN Enable line, x-LIN block
23	CANx_y_TX	CANFD	CAN Transmit line, x-CAN block, y-channel number
24	CANx_y_RX	CANFD	CAN Receive line, x-CAN block, y-channel number
25	CAL_SUP_NZ	CPUSS	ETAS Calibration support line
26	FAULT_OUT_x	SRSS	Fault output line x-0 to 3
27	TRACE_DATA_x	SRSS	Trace dataout line x-0 to 3
28	TRACE_CLOCK	SRSS	Trace clock line
29	RTC_CAL	SRSS RTC	RTC calibration clock input
30	SWJ_TRSTN	SRSS	JTAG Test reset line (Active low)
31	SWJ_SWO_TDO	SRSS	JTAG Test data output/SWO (Serial Wire Output)
32	SWJ_SWCLK_TCLK	SRSS	JTAG Test clock/SWD clock (Serial Wire Clock)
33	SWJ_SWDIO_TMS	SRSS	JTAG Test mode select/SWD data (Serial Wire Data Input/Output)
34	SWJ_SWDOE_TDI	SRSS	JTAG Test data input

Table 13-2. Pin Mux Descriptions *(continued)*

Sl. No.	Pin	Module	Description
35	HIBERNATE_WAKEUP[x]	SRSS	Hibernate wakeup line x-0 to 1
36	ADC[x]_y	PASS SAR	SAR, channel, x-SAR number, y-channel number
37	ADC[x]_M	PASS SAR	SAR motor control input, x-SAR number
38	EXT_MUX[x]_y	PASS SAR	External SAR MUX inputs, x-MUX number, y-MUX input 0 to 2
39	EXT_MUX[x]_EN	PASS SAR	External SAR MUX enable line

14. Interrupts and Wake-up Assignments

Table 14-1. Peripheral Interrupt Assignments and Wake-up Sources

Interrupt	Source	Power Mode	Description
0	cpuss_interrupts_ipc_0_IRQn	DeepSleep	CPUSS Inter Process Communication Interrupt #0
1	cpuss_interrupts_ipc_1_IRQn	DeepSleep	CPUSS Inter Process Communication Interrupt #1
2	cpuss_interrupts_ipc_2_IRQn	DeepSleep	CPUSS Inter Process Communication Interrupt #2
3	cpuss_interrupts_ipc_3_IRQn	DeepSleep	CPUSS Inter Process Communication Interrupt #3
4	cpuss_interrupts_ipc_4_IRQn	DeepSleep	CPUSS Inter Process Communication Interrupt #4
5	cpuss_interrupts_ipc_5_IRQn	DeepSleep	CPUSS Inter Process Communication Interrupt #5
6	cpuss_interrupts_ipc_6_IRQn	DeepSleep	CPUSS Inter Process Communication Interrupt #6
7	cpuss_interrupts_ipc_7_IRQn	DeepSleep	CPUSS Inter Process Communication Interrupt #7
8	cpuss_interrupts_fault_0_IRQn	DeepSleep	CPUSS Fault Structure #0 Interrupt
9	cpuss_interrupts_fault_1_IRQn	DeepSleep	CPUSS Fault Structure #1 Interrupt
10	cpuss_interrupts_fault_2_IRQn	DeepSleep	CPUSS Fault Structure #2 Interrupt
11	cpuss_interrupts_fault_3_IRQn	DeepSleep	CPUSS Fault Structure #3 Interrupt
12	srss_interrupt_backup_IRQn	DeepSleep	BACKUP domain Interrupt
13	srss_interrupt_mcwdt_0_IRQn	DeepSleep	Multi Counter Watchdog Timer #0 interrupt
14	srss_interrupt_mcwdt_1_IRQn	DeepSleep	Multi Counter Watchdog Timer #1 interrupt
15	srss_interrupt_wdt_IRQn	DeepSleep	Hardware Watchdog Timer interrupt
16	srss_interrupt_IRQn	DeepSleep	Other combined Interrupts for SRSS (LVD, CLKCAL)
17	scb_0_interrupt_IRQn	DeepSleep	SCB0 interrupt (DeepSleep capable)
18	evtgen_0_interrupt_dpslp_IRQn	DeepSleep	Event gen DeepSleep domain interrupt
19	ioss_interrupt_vdd_IRQn	DeepSleep	I/O Supply (V_{DDIO}, V_{DDA}, V_{DDD}) state change Interrupt
20	ioss_interrupt_gpio_IRQn	DeepSleep	Consolidated Interrupt for GPIO_STD and GPIO_ENH, All Ports
21	ioss_interrupts_gpio_0_IRQn	DeepSleep	GPIO_ENH Port #0 Interrupt
23	ioss_interrupts_gpio_2_IRQn	DeepSleep	GPIO_STD Port #2 Interrupt
24	ioss_interrupts_gpio_3_IRQn	DeepSleep	GPIO_STD Port #3 Interrupt
26	ioss_interrupts_gpio_5_IRQn	DeepSleep	GPIO_STD Port #5 Interrupt
27	ioss_interrupts_gpio_6_IRQn	DeepSleep	GPIO_STD Port #6 Interrupt
28	ioss_interrupts_gpio_7_IRQn	DeepSleep	GPIO_STD Port #7 Interrupt
29	ioss_interrupts_gpio_8_IRQn	DeepSleep	GPIO_STD Port #8 Interrupt
32	ioss_interrupts_gpio_11_IRQn	DeepSleep	GPIO_STD Port #11 Interrupt
33	ioss_interrupts_gpio_12_IRQn	DeepSleep	GPIO_STD Port #12 Interrupt
34	ioss_interrupts_gpio_13_IRQn	DeepSleep	GPIO_STD Port #13 Interrupt
35	ioss_interrupts_gpio_14_IRQn	DeepSleep	GPIO_STD Port #14 Interrupt
38	ioss_interrupts_gpio_17_IRQn	DeepSleep	GPIO_STD Port #17 Interrupt
39	ioss_interrupts_gpio_18_IRQn	DeepSleep	GPIO_STD Port #18 Interrupt
40	ioss_interrupts_gpio_19_IRQn	DeepSleep	GPIO_STD Port #19 Interrupt
42	ioss_interrupts_gpio_21_IRQn	DeepSleep	GPIO_STD Port #21 Interrupt
43	ioss_interrupts_gpio_22_IRQn	DeepSleep	GPIO_STD Port #22 Interrupt
44	ioss_interrupts_gpio_23_IRQn	DeepSleep	GPIO_STD Port #23 Interrupt
45	cpuss_interrupt_crypto_IRQn	Active	Crypto Accelerator Interrupt
46	cpuss_interrupt_fm_IRQn	Active	Flash Macro Interrupt

Table 14-1. Peripheral Interrupt Assignments and Wake-up Sources *(continued)*

Interrupt	Source	Power Mode	Description
47	cpuss_interrupts_cm4_fp_IRQn	Active	CM4 Floating Point operation fault
48	cpuss_interrupts_cm0_cti_0_IRQn	Active	CM0+ CTI (Cross Trigger Interface) #0
49	cpuss_interrupts_cm0_cti_1_IRQn	Active	CM0+ CTI #1
50	cpuss_interrupts_cm4_cti_0_IRQn	Active	CM4 CTI #0
51	cpuss_interrupts_cm4_cti_1_IRQn	Active	CM4 CTI #1
52	evtgen_0_interrupt_IRQn	Active	Event gen Active domain interrupt
53	canfd_0_interrupt0_IRQn	Active	CAN0, Consolidated Interrupt #0 for all three channels
54	canfd_0_interrupt1_IRQn	Active	CAN0, Consolidated Interrupt #1 for all three channels
55	canfd_1_interrupt0_IRQn	Active	CAN1, Consolidated Interrupt #0 for all three channels
56	canfd_1_interrupt1_IRQn	Active	CAN1, Consolidated Interrupt #1 for all three channels
57	canfd_0_interrupts0_0_IRQn	Active	CAN0, Interrupt #0, Channel #0
58	canfd_0_interrupts0_1_IRQn	Active	CAN0, Interrupt #0, Channel #1
60	canfd_0_interrupts1_0_IRQn	Active	CAN0, Interrupt #1, Channel #0
61	canfd_0_interrupts1_1_IRQn	Active	CAN0, Interrupt #1, Channel #1
63	canfd_1_interrupts0_0_IRQn	Active	CAN1, Interrupt #0, Channel #0
64	canfd_1_interrupts0_1_IRQn	Active	CAN1, Interrupt #0, Channel #1
66	canfd_1_interrupts1_0_IRQn	Active	CAN1, Interrupt #1, Channel #0
67	canfd_1_interrupts1_1_IRQn	Active	CAN1, Interrupt #1, Channel #1
69	lin_0_interrupts_0_IRQn	Active	LIN0, Channel #0 Interrupt
70	lin_0_interrupts_1_IRQn	Active	LIN0, Channel #1 Interrupt
71	lin_0_interrupts_2_IRQn	Active	LIN0, Channel #2 Interrupt
72	lin_0_interrupts_3_IRQn	Active	LIN0, Channel #3 Interrupt
73	lin_0_interrupts_4_IRQn	Active	LIN0, Channel #4 Interrupt
77	scb_1_interrupt_IRQn	Active	SCB1 Interrupt
79	scb_3_interrupt_IRQn	Active	SCB3 Interrupt
80	scb_4_interrupt_IRQn	Active	SCB4 Interrupt
81	scb_5_interrupt_IRQn	Active	SCB5 Interrupt
83	scb_7_interrupt_IRQn	Active	SCB7 Interrupt
84	pass_0_interrupts_sar_0_IRQn	Active	SAR0, Logical Channel #0 Interrupt
85	pass_0_interrupts_sar_1_IRQn	Active	SAR0, Logical Channel #1 Interrupt
86	pass_0_interrupts_sar_2_IRQn	Active	SAR0, Logical Channel #2 Interrupt
87	pass_0_interrupts_sar_3_IRQn	Active	SAR0, Logical Channel #3 Interrupt
88	pass_0_interrupts_sar_4_IRQn	Active	SAR0, Logical Channel #4 Interrupt
89	pass_0_interrupts_sar_5_IRQn	Active	SAR0, Logical Channel #5 Interrupt
92	pass_0_interrupts_sar_8_IRQn	Active	SAR0, Logical Channel #8 Interrupt
93	pass_0_interrupts_sar_9_IRQn	Active	SAR0, Logical Channel #9 Interrupt
95	pass_0_interrupts_sar_11_IRQn	Active	SAR0, Logical Channel #11 Interrupt
96	pass_0_interrupts_sar_12_IRQn	Active	SAR0, Logical Channel #12 Interrupt
101	pass_0_interrupts_sar_17_IRQn	Active	SAR0, Logical Channel #17 Interrupt
112	pass_0_interrupts_sar_36_IRQn	Active	SAR1, Logical Channel #4 Interrupt
113	pass_0_interrupts_sar_37_IRQn	Active	SAR1, Logical Channel #5 Interrupt

Table 14-1. Peripheral Interrupt Assignments and Wake-up Sources *(continued)*

Interrupt	Source	Power Mode	Description
114	pass_0_interrupts_sar_38_IRQn	Active	SAR1, Logical Channel #6 Interrupt
115	pass_0_interrupts_sar_39_IRQn	Active	SAR1, Logical Channel #7 Interrupt
116	pass_0_interrupts_sar_40_IRQn	Active	SAR1, Logical Channel #8 Interrupt
120	pass_0_interrupts_sar_44_IRQn	Active	SAR1, Logical Channel #12 Interrupt
121	pass_0_interrupts_sar_45_IRQn	Active	SAR1, Logical Channel #13 Interrupt
122	pass_0_interrupts_sar_46_IRQn	Active	SAR1, Logical Channel #14 Interrupt
123	pass_0_interrupts_sar_47_IRQn	Active	SAR1, Logical Channel #15 Interrupt
124	pass_0_interrupts_sar_48_IRQn	Active	SAR1, Logical Channel #16 Interrupt
125	pass_0_interrupts_sar_49_IRQn	Active	SAR1, Logical Channel #17 Interrupt
130	pass_0_interrupts_sar_54_IRQn	Active	SAR1, Logical Channel #22 Interrupt
131	pass_0_interrupts_sar_55_IRQn	Active	SAR1, Logical Channel #23 Interrupt
140	pass_0_interrupts_sar_64_IRQn	Active	SAR2, Logical Channel #0 Interrupt
141	pass_0_interrupts_sar_65_IRQn	Active	SAR2, Logical Channel #1 Interrupt
142	pass_0_interrupts_sar_66_IRQn	Active	SAR2, Logical Channel #2 Interrupt
143	pass_0_interrupts_sar_67_IRQn	Active	SAR2, Logical Channel #3 Interrupt
144	pass_0_interrupts_sar_68_IRQn	Active	SAR2, Logical Channel #4 Interrupt
145	pass_0_interrupts_sar_69_IRQn	Active	SAR2, Logical Channel #5 Interrupt
146	pass_0_interrupts_sar_70_IRQn	Active	SAR2, Logical Channel #6 Interrupt
147	pass_0_interrupts_sar_71_IRQn	Active	SAR2, Logical Channel #7 Interrupt
148	cpuss_interrupts_dmac_0_IRQn	Active	CPUSS M-DMA0, Channel #0 Interrupt
149	cpuss_interrupts_dmac_1_IRQn	Active	CPUSS M-DMA0, Channel #1 Interrupt
152	cpuss_interrupts_dw0_0_IRQn	Active	CPUSS P-DMA0, Channel #0 Interrupt
153	cpuss_interrupts_dw0_1_IRQn	Active	CPUSS P-DMA0, Channel #1 Interrupt
154	cpuss_interrupts_dw0_2_IRQn	Active	CPUSS P-DMA0, Channel #2 Interrupt
155	cpuss_interrupts_dw0_3_IRQn	Active	CPUSS P-DMA0, Channel #3 Interrupt
156	cpuss_interrupts_dw0_4_IRQn	Active	CPUSS P-DMA0, Channel #4 Interrupt
157	cpuss_interrupts_dw0_5_IRQn	Active	CPUSS P-DMA0, Channel #5 Interrupt
158	cpuss_interrupts_dw0_6_IRQn	Active	CPUSS P-DMA0, Channel #6 Interrupt
159	cpuss_interrupts_dw0_7_IRQn	Active	CPUSS P-DMA0, Channel #7 Interrupt
160	cpuss_interrupts_dw0_8_IRQn	Active	CPUSS P-DMA0, Channel #8 Interrupt
161	cpuss_interrupts_dw0_9_IRQn	Active	CPUSS P-DMA0, Channel #9 Interrupt
162	cpuss_interrupts_dw0_10_IRQn	Active	CPUSS P-DMA0, Channel #10 Interrupt
163	cpuss_interrupts_dw0_11_IRQn	Active	CPUSS P-DMA0, Channel #11 Interrupt
164	cpuss_interrupts_dw0_12_IRQn	Active	CPUSS P-DMA0, Channel #12 Interrupt
165	cpuss_interrupts_dw0_13_IRQn	Active	CPUSS P-DMA0, Channel #13 Interrupt
166	cpuss_interrupts_dw0_14_IRQn	Active	CPUSS P-DMA0, Channel #14 Interrupt
167	cpuss_interrupts_dw0_15_IRQn	Active	CPUSS P-DMA0, Channel #15 Interrupt
168	cpuss_interrupts_dw0_16_IRQn	Active	CPUSS P-DMA0, Channel #16 Interrupt
169	cpuss_interrupts_dw0_17_IRQn	Active	CPUSS P-DMA0, Channel #17 Interrupt
170	cpuss_interrupts_dw0_18_IRQn	Active	CPUSS P-DMA0, Channel #18 Interrupt
171	cpuss_interrupts_dw0_19_IRQn	Active	CPUSS P-DMA0, Channel #19 Interrupt

Table 14-1. Peripheral Interrupt Assignments and Wake-up Sources *(continued)*

Interrupt	Source	Power Mode	Description
172	cpuss_interrupts_dw0_20_IRQn	Active	CPUSS P-DMA0, Channel #20 Interrupt
173	cpuss_interrupts_dw0_21_IRQn	Active	CPUSS P-DMA0, Channel #21 Interrupt
177	cpuss_interrupts_dw0_25_IRQn	Active	CPUSS P-DMA0, Channel #25 Interrupt
178	cpuss_interrupts_dw0_26_IRQn	Active	CPUSS P-DMA0, Channel #26 Interrupt
179	cpuss_interrupts_dw0_27_IRQn	Active	CPUSS P-DMA0, Channel #27 Interrupt
180	cpuss_interrupts_dw0_28_IRQn	Active	CPUSS P-DMA0, Channel #28 Interrupt
181	cpuss_interrupts_dw0_29_IRQn	Active	CPUSS P-DMA0, Channel #29 Interrupt
182	cpuss_interrupts_dw0_30_IRQn	Active	CPUSS P-DMA0, Channel #30 Interrupt
185	cpuss_interrupts_dw0_33_IRQn	Active	CPUSS P-DMA0, Channel #33 Interrupt
186	cpuss_interrupts_dw0_34_IRQn	Active	CPUSS P-DMA0, Channel #34 Interrupt
188	cpuss_interrupts_dw0_36_IRQn	Active	CPUSS P-DMA0, Channel #36 Interrupt
189	cpuss_interrupts_dw0_37_IRQn	Active	CPUSS P-DMA0, Channel #37 Interrupt
194	cpuss_interrupts_dw0_42_IRQn	Active	CPUSS P-DMA0, Channel #42 Interrupt
205	cpuss_interrupts_dw0_53_IRQn	Active	CPUSS P-DMA0, Channel #53 Interrupt
206	cpuss_interrupts_dw0_54_IRQn	Active	CPUSS P-DMA0, Channel #54 Interrupt
207	cpuss_interrupts_dw0_55_IRQn	Active	CPUSS P-DMA0, Channel #55 Interrupt
208	cpuss_interrupts_dw0_56_IRQn	Active	CPUSS P-DMA0, Channel #56 Interrupt
209	cpuss_interrupts_dw0_57_IRQn	Active	CPUSS P-DMA0, Channel #57 Interrupt
213	cpuss_interrupts_dw0_61_IRQn	Active	CPUSS P-DMA0, Channel #61 Interrupt
214	cpuss_interrupts_dw0_62_IRQn	Active	CPUSS P-DMA0, Channel #62 Interrupt
215	cpuss_interrupts_dw0_63_IRQn	Active	CPUSS P-DMA0, Channel #63 Interrupt
216	cpuss_interrupts_dw0_64_IRQn	Active	CPUSS P-DMA0, Channel #64 Interrupt
217	cpuss_interrupts_dw0_65_IRQn	Active	CPUSS P-DMA0, Channel #65 Interrupt
218	cpuss_interrupts_dw0_66_IRQn	Active	CPUSS P-DMA0, Channel #66 Interrupt
223	cpuss_interrupts_dw0_71_IRQn	Active	CPUSS P-DMA0, Channel #71 Interrupt
224	cpuss_interrupts_dw0_72_IRQn	Active	CPUSS P-DMA0, Channel #72 Interrupt
233	cpuss_interrupts_dw0_81_IRQn	Active	CPUSS P-DMA0, Channel #81 Interrupt
234	cpuss_interrupts_dw0_82_IRQn	Active	CPUSS P-DMA0, Channel #82 Interrupt
235	cpuss_interrupts_dw0_83_IRQn	Active	CPUSS P-DMA0, Channel #83 Interrupt
236	cpuss_interrupts_dw0_84_IRQn	Active	CPUSS P-DMA0, Channel #84 Interrupt
237	cpuss_interrupts_dw0_85_IRQn	Active	CPUSS P-DMA0, Channel #85 Interrupt
238	cpuss_interrupts_dw0_86_IRQn	Active	CPUSS P-DMA0, Channel #86 Interrupt
239	cpuss_interrupts_dw0_87_IRQn	Active	CPUSS P-DMA0, Channel #87 Interrupt
240	cpuss_interrupts_dw0_88_IRQn	Active	CPUSS P-DMA0, Channel #88 Interrupt
241	cpuss_interrupts_dw1_0_IRQn	Active	CPUSS P-DMA1, Channel #0 Interrupt
242	cpuss_interrupts_dw1_1_IRQn	Active	CPUSS P-DMA1, Channel #1 Interrupt
243	cpuss_interrupts_dw1_2_IRQn	Active	CPUSS P-DMA1, Channel #2 Interrupt
244	cpuss_interrupts_dw1_3_IRQn	Active	CPUSS P-DMA1, Channel #3 Interrupt
245	cpuss_interrupts_dw1_4_IRQn	Active	CPUSS P-DMA1, Channel #4 Interrupt
246	cpuss_interrupts_dw1_5_IRQn	Active	CPUSS P-DMA1, Channel #5 Interrupt
247	cpuss_interrupts_dw1_6_IRQn	Active	CPUSS P-DMA1, Channel #6 Interrupt

Table 14-1. Peripheral Interrupt Assignments and Wake-up Sources *(continued)*

Interrupt	Source	Power Mode	Description
248	cpuss_interrupts_dw1_7_IRQn	Active	CPUSS P-DMA1, Channel #7 Interrupt
249	cpuss_interrupts_dw1_8_IRQn	Active	CPUSS P-DMA1, Channel #8 Interrupt
250	cpuss_interrupts_dw1_9_IRQn	Active	CPUSS P-DMA1, Channel #9 Interrupt
251	cpuss_interrupts_dw1_10_IRQn	Active	CPUSS P-DMA1, Channel #10 Interrupt
252	cpuss_interrupts_dw1_11_IRQn	Active	CPUSS P-DMA1, Channel #11 Interrupt
255	cpuss_interrupts_dw1_14_IRQn	Active	CPUSS P-DMA1, Channel #14 Interrupt
256	cpuss_interrupts_dw1_15_IRQn	Active	CPUSS P-DMA1, Channel #15 Interrupt
257	cpuss_interrupts_dw1_16_IRQn	Active	CPUSS P-DMA1, Channel #16 Interrupt
258	cpuss_interrupts_dw1_17_IRQn	Active	CPUSS P-DMA1, Channel #17 Interrupt
259	cpuss_interrupts_dw1_18_IRQn	Active	CPUSS P-DMA1, Channel #18 Interrupt
260	cpuss_interrupts_dw1_19_IRQn	Active	CPUSS P-DMA1, Channel #19 Interrupt
263	cpuss_interrupts_dw1_22_IRQn	Active	CPUSS P-DMA1, Channel #22 Interrupt
264	cpuss_interrupts_dw1_23_IRQn	Active	CPUSS P-DMA1, Channel #23 Interrupt
265	cpuss_interrupts_dw1_24_IRQn	Active	CPUSS P-DMA1, Channel #24 Interrupt
266	cpuss_interrupts_dw1_25_IRQn	Active	CPUSS P-DMA1, Channel #25 Interrupt
267	cpuss_interrupts_dw1_26_IRQn	Active	CPUSS P-DMA1, Channel #26 Interrupt
268	cpuss_interrupts_dw1_27_IRQn	Active	CPUSS P-DMA1, Channel #27 Interrupt
269	cpuss_interrupts_dw1_28_IRQn	Active	CPUSS P-DMA1, Channel #28 Interrupt
270	cpuss_interrupts_dw1_29_IRQn	Active	CPUSS P-DMA1, Channel #29 Interrupt
274	tcpwm_0_interrupts_0_IRQn	Active	TCPWM0 Group #0, Counter #0 Interrupt
275	tcpwm_0_interrupts_1_IRQn	Active	TCPWM0 Group #0, Counter #1 Interrupt
276	tcpwm_0_interrupts_2_IRQn	Active	TCPWM0 Group #0, Counter #2 Interrupt
278	tcpwm_0_interrupts_4_IRQn	Active	TCPWM0 Group #0, Counter #4 Interrupt
279	tcpwm_0_interrupts_5_IRQn	Active	TCPWM0 Group #0, Counter #5 Interrupt
280	tcpwm_0_interrupts_6_IRQn	Active	TCPWM0 Group #0, Counter #6 Interrupt
281	tcpwm_0_interrupts_7_IRQn	Active	TCPWM0 Group #0, Counter #7 Interrupt
283	tcpwm_0_interrupts_9_IRQn	Active	TCPWM0 Group #0, Counter #9 Interrupt
284	tcpwm_0_interrupts_10_IRQn	Active	TCPWM0 Group #0, Counter #10 Interrupt
285	tcpwm_0_interrupts_11_IRQn	Active	TCPWM0 Group #0, Counter #11 Interrupt
286	tcpwm_0_interrupts_12_IRQn	Active	TCPWM0 Group #0, Counter #12 Interrupt
287	tcpwm_0_interrupts_13_IRQn	Active	TCPWM0 Group #0, Counter #13 Interrupt
288	tcpwm_0_interrupts_14_IRQn	Active	TCPWM0 Group #0, Counter #14 Interrupt
289	tcpwm_0_interrupts_15_IRQn	Active	TCPWM0 Group #0, Counter #15 Interrupt
290	tcpwm_0_interrupts_16_IRQn	Active	TCPWM0 Group #0, Counter #16 Interrupt
291	tcpwm_0_interrupts_17_IRQn	Active	TCPWM0 Group #0, Counter #17 Interrupt
292	tcpwm_0_interrupts_18_IRQn	Active	TCPWM0 Group #0, Counter #18 Interrupt
293	tcpwm_0_interrupts_19_IRQn	Active	TCPWM0 Group #0, Counter #19 Interrupt
294	tcpwm_0_interrupts_20_IRQn	Active	TCPWM0 Group #0, Counter #20 Interrupt
295	tcpwm_0_interrupts_21_IRQn	Active	TCPWM0 Group #0, Counter #21 Interrupt
296	tcpwm_0_interrupts_22_IRQn	Active	TCPWM0 Group #0, Counter #22 Interrupt
297	tcpwm_0_interrupts_23_IRQn	Active	TCPWM0 Group #0, Counter #23 Interrupt

Table 14-1. Peripheral Interrupt Assignments and Wake-up Sources *(continued)*

Interrupt	Source	Power Mode	Description
298	tcpwm_0_interrupts_24_IRQn	Active	TCPWM0 Group #0, Counter #24 Interrupt
299	tcpwm_0_interrupts_25_IRQn	Active	TCPWM0 Group #0, Counter #25 Interrupt
300	tcpwm_0_interrupts_26_IRQn	Active	TCPWM0 Group #0, Counter #26 Interrupt
307	tcpwm_0_interrupts_33_IRQn	Active	TCPWM0 Group #0, Counter #33 Interrupt
308	tcpwm_0_interrupts_34_IRQn	Active	TCPWM0 Group #0, Counter #34 Interrupt
310	tcpwm_0_interrupts_36_IRQn	Active	TCPWM0 Group #0, Counter #36 Interrupt
311	tcpwm_0_interrupts_37_IRQn	Active	TCPWM0 Group #0, Counter #37 Interrupt
312	tcpwm_0_interrupts_38_IRQn	Active	TCPWM0 Group #0, Counter #38 Interrupt
313	tcpwm_0_interrupts_39_IRQn	Active	TCPWM0 Group #0, Counter #39 Interrupt
314	tcpwm_0_interrupts_40_IRQn	Active	TCPWM0 Group #0, Counter #40 Interrupt
315	tcpwm_0_interrupts_41_IRQn	Active	TCPWM0 Group #0, Counter #41 Interrupt
316	tcpwm_0_interrupts_42_IRQn	Active	TCPWM0 Group #0, Counter #42 Interrupt
318	tcpwm_0_interrupts_44_IRQn	Active	TCPWM0 Group #0, Counter #44 Interrupt
319	tcpwm_0_interrupts_45_IRQn	Active	TCPWM0 Group #0, Counter #45 Interrupt
320	tcpwm_0_interrupts_46_IRQn	Active	TCPWM0 Group #0, Counter #46 Interrupt
321	tcpwm_0_interrupts_47_IRQn	Active	TCPWM0 Group #0, Counter #47 Interrupt
322	tcpwm_0_interrupts_48_IRQn	Active	TCPWM0 Group #0, Counter #48 Interrupt
323	tcpwm_0_interrupts_49_IRQn	Active	TCPWM0 Group #0, Counter #49 Interrupt
324	tcpwm_0_interrupts_50_IRQn	Active	TCPWM0 Group #0, Counter #50 Interrupt
325	tcpwm_0_interrupts_51_IRQn	Active	TCPWM0 Group #0, Counter #51 Interrupt
326	tcpwm_0_interrupts_52_IRQn	Active	TCPWM0 Group #0, Counter #52 Interrupt
327	tcpwm_0_interrupts_53_IRQn	Active	TCPWM0 Group #0, Counter #53 Interrupt
328	tcpwm_0_interrupts_54_IRQn	Active	TCPWM0 Group #0, Counter #54 Interrupt
329	tcpwm_0_interrupts_55_IRQn	Active	TCPWM0 Group #0, Counter #55 Interrupt
337	tcpwm_0_interrupts_256_IRQn	Active	TCPWM0 Group #1, Counter #0 Interrupt
338	tcpwm_0_interrupts_257_IRQn	Active	TCPWM0 Group #1, Counter #1 Interrupt
339	tcpwm_0_interrupts_258_IRQn	Active	TCPWM0 Group #1, Counter #2 Interrupt
341	tcpwm_0_interrupts_260_IRQn	Active	TCPWM0 Group #1, Counter #4 Interrupt
349	tcpwm_0_interrupts_512_IRQn	Active	TCPWM0 Group #2, Counter #0 Interrupt
351	tcpwm_0_interrupts_514_IRQn	Active	TCPWM0 Group #2, Counter #2 Interrupt

15. Core Interrupt Types

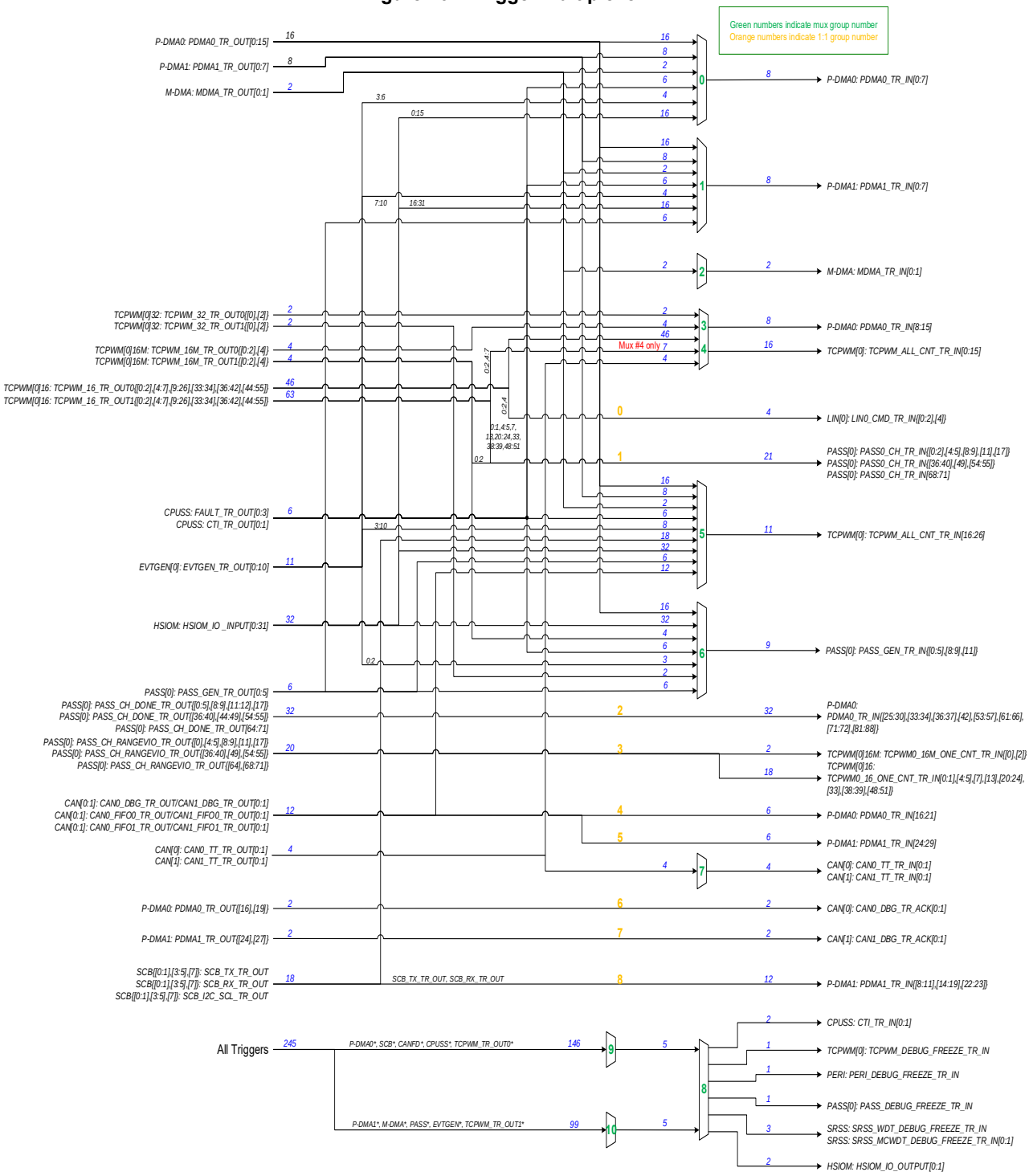
Table 15-1. Core Interrupt Types

Interrupt	Source	Power Mode	Description
0	CPUIntIdx0_IRQn[26]	DeepSleep	CPU User Interrupt #0
1	CPUIntIdx1_IRQn[26]	DeepSleep	CPU User Interrupt #1
2	CPUIntIdx2_IRQn	DeepSleep	CPU User Interrupt #2
3	CPUIntIdx3_IRQn	DeepSleep	CPU User Interrupt #3
4	CPUIntIdx4_IRQn	DeepSleep	CPU User Interrupt #4
5	CPUIntIdx5_IRQn	DeepSleep	CPU User Interrupt #5
6	CPUIntIdx6_IRQn	DeepSleep	CPU User Interrupt #6
7	CPUIntIdx7_IRQn	DeepSleep	CPU User Interrupt #7
8	Internal0_IRQn	Active	Internal Software Interrupt #0
9	Internal1_IRQn	Active	Internal Software Interrupt #1
10	Internal2_IRQn	Active	Internal Software Interrupt #2
11	Internal3_IRQn	Active	Internal Software Interrupt #3
12	Internal4_IRQn	Active	Internal Software Interrupt #4
13	Internal5_IRQn	Active	Internal Software Interrupt #5
14	Internal6_IRQn	Active	Internal Software Interrupt #6
15	Internal7_IRQn	Active	Internal Software Interrupt #7

Note
26. User interrupt cannot be used for CM0+ application, as it is used internally by system calls. Note, this does not impact CM4 application.

16. Trigger Multiplexer

Figure 16-1.Trigger Multiplexer[27]



Note

27. The diagram shows only the TRIG_LABEL, final trigger formation is based on the formula TRIG_{PREFIX(IN/OUT)}_{MUX_x}_{TRIG_LABEL} / TRIG_{PREFIX(IN-_1TO1/OUT_1TO1)}_{x}_{TRIG_LABEL} and the below mentioned tables Table 17-1, Table 18-1, and Table 19-1.

17. Triggers Group Inputs

Table 17-1. Trigger Inputs

Input	Trigger Label (TRIG_LABEL)	Description
MUX Group 0: PDMA0_TR (P-DMA0_0_15 trigger multiplexer)		
1:16[28]	PDMA0_TR_OUT[0:15]	Allow P-DMA0 to chain to itself, useful for triggering once per row for 2D transfer
17:24	PDMA1_TR_OUT[0:7]	Cross connections from P-DMA1 to P-DMA0, Channels 0-7 are used
25:26	MDMA_TR_OUT[0:1]	Cross connections from M-DMA0 to P-DMA0
29:32	FAULT_TR_OUT[0:3]	Allow faults to initiate data transfer for debug purposes
33:34	CTI_TR_OUT[0:1]	Trace events
35:38	EVTGEN_TR_OUT[3:6]	EVTGEN triggers
39:54	HSIOM_IO_INPUT[0:15]	I/O inputs
MUX Group 1: PDMA1_TR (P-DMA1 trigger multiplexer)		
1:16	PDMA0_TR_OUT[0:15]	Allow P-DMA0 to trigger P-DMA1
17:24	PDMA1_TR_OUT[0:7]	Allow P-DMA1 to chain to itself, useful for triggering once per row for 2D transfer
25:26	MDMA_TR_OUT[0:1]	Allow M-DMA0 to trigger P-DMA0
29:32	FAULT_TR_OUT[0:3]	Allow faults to initiate data transfer for debug purposes
33:34	CTI_TR_OUT[0:1]	Trace events
35:38	EVTGEN_TR_OUT[7:10]	EVTGEN triggers
39:54	HSIOM_IO_INPUT[16:31]	I/O inputs
55:60	PASS_GEN_TR_OUT[0:5]	PASS SAR events
MUX Group 2: MDMA (M-DMA0 trigger multiplexer)		
1:2	MDMA_TR_OUT[0:1]	Allow M-DMA0 to trigger itself
MUX Group 3: TCPWM_TO_PDMA0 (TCPWM0 to P-DMA0 trigger multiplexer)		
1	TCPWM_32_TR_OUT0[0]	32-bit TCPWM0 Group #2, Counter #0 counters
3	TCPWM_32_TR_OUT0[2]	32-bit TCPWM0 Group #2, Counter #2 counters
5	TCPWM_16M_TR_OUT0[0]	16-bit Motor enhanced TCPWM0 Group #1, Counter #0 counters
6	TCPWM_16M_TR_OUT0[1]	16-bit Motor enhanced TCPWM0 Group #1, Counter #1 counters
7	TCPWM_16M_TR_OUT0[2]	16-bit Motor enhanced TCPWM0 Group #1, Counter #2 counters
9	TCPWM_16M_TR_OUT0[4]	16-bit Motor enhanced TCPWM0 Group #1, Counter #4 counters
17	TCPWM_16_TR_OUT0[0]	TCPWM0 Group #0, Counter #0
18	TCPWM_16_TR_OUT0[1]	TCPWM0 Group #0, Counter #1
19	TCPWM_16_TR_OUT0[2]	TCPWM0 Group #0, Counter #2
21	TCPWM_16_TR_OUT0[4]	TCPWM0 Group #0, Counter #4
22	TCPWM_16_TR_OUT0[5]	TCPWM0 Group #0, Counter #5
23	TCPWM_16_TR_OUT0[6]	TCPWM0 Group #0, Counter #6
24	TCPWM_16_TR_OUT0[7]	TCPWM0 Group #0, Counter #7
26	TCPWM_16_TR_OUT0[9]	TCPWM0 Group #0, Counter #9
27	TCPWM_16_TR_OUT0[10]	TCPWM0 Group #0, Counter #10
28	TCPWM_16_TR_OUT0[11]	TCPWM0 Group #0, Counter #11
29	TCPWM_16_TR_OUT0[12]	TCPWM0 Group #0, Counter #12
30	TCPWM_16_TR_OUT0[13]	TCPWM0 Group #0, Counter #13
31	TCPWM_16_TR_OUT0[14]	TCPWM0 Group #0, Counter #14
32	TCPWM_16_TR_OUT0[15]	TCPWM0 Group #0, Counter #15
33	TCPWM_16_TR_OUT0[16]	TCPWM0 Group #0, Counter #16
34	TCPWM_16_TR_OUT0[17]	TCPWM0 Group #0, Counter #17
35	TCPWM_16_TR_OUT0[18]	TCPWM0 Group #0, Counter #18

Note
28. “a:b” depicts a range starting from ‘a’ through ‘b’.

Table 17-1. Trigger Inputs *(continued)*

Input	Trigger Label (TRIG_LABEL)	Description
36	TCPWM_16_TR_OUT0[19]	TCPWM0 Group #0, Counter #19
37	TCPWM_16_TR_OUT0[20]	TCPWM0 Group #0, Counter #20
38	TCPWM_16_TR_OUT0[21]	TCPWM0 Group #0, Counter #21
39	TCPWM_16_TR_OUT0[22]	TCPWM0 Group #0, Counter #22
40	TCPWM_16_TR_OUT0[23]	TCPWM0 Group #0, Counter #23
41	TCPWM_16_TR_OUT0[24]	TCPWM0 Group #0, Counter #24
42	TCPWM_16_TR_OUT0[25]	TCPWM0 Group #0, Counter #25
43	TCPWM_16_TR_OUT0[26]	TCPWM0 Group #0, Counter #26
50	TCPWM_16_TR_OUT0[33]	TCPWM0 Group #0, Counter #33
51	TCPWM_16_TR_OUT0[34]	TCPWM0 Group #0, Counter #34
53	TCPWM_16_TR_OUT0[36]	TCPWM0 Group #0, Counter #36
54	TCPWM_16_TR_OUT0[37]	TCPWM0 Group #0, Counter #37
55	TCPWM_16_TR_OUT0[38]	TCPWM0 Group #0, Counter #38
56	TCPWM_16_TR_OUT0[39]	TCPWM0 Group #0, Counter #39
57	TCPWM_16_TR_OUT0[40]	TCPWM0 Group #0, Counter #40
58	TCPWM_16_TR_OUT0[41]	TCPWM0 Group #0, Counter #41
59	TCPWM_16_TR_OUT0[42]	TCPWM0 Group #0, Counter #42
61	TCPWM_16_TR_OUT0[44]	TCPWM0 Group #0, Counter #44
62	TCPWM_16_TR_OUT0[45]	TCPWM0 Group #0, Counter #45
63	TCPWM_16_TR_OUT0[46]	TCPWM0 Group #0, Counter #46
64	TCPWM_16_TR_OUT0[47]	TCPWM0 Group #0, Counter #47
65	TCPWM_16_TR_OUT0[48]	TCPWM0 Group #0, Counter #48
66	TCPWM_16_TR_OUT0[49]	TCPWM0 Group #0, Counter #49
67	TCPWM_16_TR_OUT0[50]	TCPWM0 Group #0, Counter #50
68	TCPWM_16_TR_OUT0[51]	TCPWM0 Group #0, Counter #51
69	TCPWM_16_TR_OUT0[52]	TCPWM0 Group #0, Counter #52
70	TCPWM_16_TR_OUT0[53]	TCPWM0 Group #0, Counter #53
71	TCPWM_16_TR_OUT0[54]	TCPWM0 Group #0, Counter #54
72	TCPWM_16_TR_OUT0[55]	TCPWM0 Group #0, Counter #55
80	CAN0_TT_TR_OUT[0]	CAN0, channel#0 TT Sync Outputs
81	CAN0_TT_TR_OUT[1]	CAN0, channel#1 TT Sync Outputs
83	CAN1_TT_TR_OUT[0]	CAN1, channel#0 TT Sync Outputs
84	CAN1_TT_TR_OUT[1]	CAN1, channel#1 TT Sync Outputs
MUX Group 4: TCPWM_OUT (TCPWM0 loop back multiplexer)		
1	TCPWM_32_TR_OUT0[0]	32-bit TCPWM0 Group #2, Counter #0 counters
3	TCPWM_32_TR_OUT0[2]	32-bit TCPWM0 Group #2, Counter #2 counters
5	TCPWM_16M_TR_OUT0[0]	16-bit Motor enhanced TCPWM0 Group #1, Counter #0 counters
6	TCPWM_16M_TR_OUT0[1]	16-bit Motor enhanced TCPWM0 Group #1, Counter #1 counters
7	TCPWM_16M_TR_OUT0[2]	16-bit Motor enhanced TCPWM0 Group #1, Counter #2 counters
9	TCPWM_16M_TR_OUT0[4]	16-bit Motor enhanced TCPWM0 Group #1, Counter #4 counters
17	TCPWM_16_TR_OUT0[0]	TCPWM0 Group #0, Counter #0
18	TCPWM_16_TR_OUT0[1]	TCPWM0 Group #0, Counter #1
19	TCPWM_16_TR_OUT0[2]	TCPWM0 Group #0, Counter #2
21	TCPWM_16_TR_OUT0[4]	TCPWM0 Group #0, Counter #4
22	TCPWM_16_TR_OUT0[5]	TCPWM0 Group #0, Counter #5
23	TCPWM_16_TR_OUT0[6]	TCPWM0 Group #0, Counter #6

Table 17-1. Trigger Inputs *(continued)*

Input	Trigger Label (TRIG_LABEL)	Description
24	TCPWM_16_TR_OUT0[7]	TCPWM0 Group #0, Counter #7
26	TCPWM_16_TR_OUT0[9]	TCPWM0 Group #0, Counter #9
27	TCPWM_16_TR_OUT0[10]	TCPWM0 Group #0, Counter #10
28	TCPWM_16_TR_OUT0[11]	TCPWM0 Group #0, Counter #11
29	TCPWM_16_TR_OUT0[12]	TCPWM0 Group #0, Counter #12
30	TCPWM_16_TR_OUT0[13]	TCPWM0 Group #0, Counter #13
31	TCPWM_16_TR_OUT0[14]	TCPWM0 Group #0, Counter #14
32	TCPWM_16_TR_OUT0[15]	TCPWM0 Group #0, Counter #15
33	TCPWM_16_TR_OUT0[16]	TCPWM0 Group #0, Counter #16
34	TCPWM_16_TR_OUT0[17]	TCPWM0 Group #0, Counter #17
35	TCPWM_16_TR_OUT0[18]	TCPWM0 Group #0, Counter #18
36	TCPWM_16_TR_OUT0[19]	TCPWM0 Group #0, Counter #19
37	TCPWM_16_TR_OUT0[20]	TCPWM0 Group #0, Counter #20
38	TCPWM_16_TR_OUT0[21]	TCPWM0 Group #0, Counter #21
39	TCPWM_16_TR_OUT0[22]	TCPWM0 Group #0, Counter #22
40	TCPWM_16_TR_OUT0[23]	TCPWM0 Group #0, Counter #23
41	TCPWM_16_TR_OUT0[24]	TCPWM0 Group #0, Counter #24
42	TCPWM_16_TR_OUT0[25]	TCPWM0 Group #0, Counter #25
43	TCPWM_16_TR_OUT0[26]	TCPWM0 Group #0, Counter #26
50	TCPWM_16_TR_OUT0[33]	TCPWM0 Group #0, Counter #33
51	TCPWM_16_TR_OUT0[34]	TCPWM0 Group #0, Counter #34
53	TCPWM_16_TR_OUT0[36]	TCPWM0 Group #0, Counter #36
54	TCPWM_16_TR_OUT0[37]	TCPWM0 Group #0, Counter #37
55	TCPWM_16_TR_OUT0[38]	TCPWM0 Group #0, Counter #38
56	TCPWM_16_TR_OUT0[39]	TCPWM0 Group #0, Counter #39
57	TCPWM_16_TR_OUT0[40]	TCPWM0 Group #0, Counter #40
58	TCPWM_16_TR_OUT0[41]	TCPWM0 Group #0, Counter #41
59	TCPWM_16_TR_OUT0[42]	TCPWM0 Group #0, Counter #42
61	TCPWM_16_TR_OUT0[44]	TCPWM0 Group #0, Counter #44
62	TCPWM_16_TR_OUT0[45]	TCPWM0 Group #0, Counter #45
63	TCPWM_16_TR_OUT0[46]	TCPWM0 Group #0, Counter #46
64	TCPWM_16_TR_OUT0[47]	TCPWM0 Group #0, Counter #47
65	TCPWM_16_TR_OUT0[48]	TCPWM0 Group #0, Counter #48
66	TCPWM_16_TR_OUT0[49]	TCPWM0 Group #0, Counter #49
67	TCPWM_16_TR_OUT0[50]	TCPWM0 Group #0, Counter #50
68	TCPWM_16_TR_OUT0[51]	TCPWM0 Group #0, Counter #51
69	TCPWM_16_TR_OUT0[52]	TCPWM0 Group #0, Counter #52
70	TCPWM_16_TR_OUT0[53]	TCPWM0 Group #0, Counter #53
71	TCPWM_16_TR_OUT0[54]	TCPWM0 Group #0, Counter #54
72	TCPWM_16_TR_OUT0[55]	TCPWM0 Group #0, Counter #55
80	TCPWM_16_TR_OUT1[0]	TCPWM0 Group #1, Counter #0
81	TCPWM_16_TR_OUT1[1]	TCPWM0 Group #1, Counter #1
82	TCPWM_16_TR_OUT1[2]	TCPWM0 Group #1, Counter #2
84	TCPWM_16_TR_OUT1[4]	TCPWM0 Group #1, Counter #4
85	TCPWM_16_TR_OUT1[5]	TCPWM0 Group #1, Counter #5
86	TCPWM_16_TR_OUT1[6]	TCPWM0 Group #1, Counter #6

Table 17-1. Trigger Inputs *(continued)*

Input	Trigger Label (TRIG_LABEL)	Description
87	TCPWM_16_TR_OUT1[7]	TCPWM0 Group #1, Counter #7
88	CAN0_TT_TR_OUT[0]	CAN0, channel#0 TT Sync Outputs
89	CAN0_TT_TR_OUT[1]	CAN0, channel#1 TT Sync Outputs
91	CAN1_TT_TR_OUT[0]	CAN1, channel#0 TT Sync Outputs
92	CAN1_TT_TR_OUT[1]	CAN1, channel#1 TT Sync Outputs
MUX Group 5: TCPWM_IN (TCPWM0 Trigger Multiplexer)		
1:16	PDMA0_TR_OUT[0:15]	General-purpose P-DMA0 triggers
17:24	PDMA1_TR_OUT[0:7]	General-purpose P-DMA1 triggers
25:26	MDMA_TR_OUT[0:1]	M-DMA0 triggers
29:30	CTI_TR_OUT[0:1]	Trace events
31:34	FAULT_TR_OUT[0:3]	Fault events
35:40	PASS_GEN_TR_OUT[0:5]	PASS SAR events
41:72	HSIOM_IO_INPUT[0:31]	I/O inputs
73	SCB_TX_TR_OUT[0]	SCB0 TX trigger
74	SCB_RX_TR_OUT[0]	SCB0 RX trigger
75	SCB_I2C_SCL_TR_OUT[0]	SCB0 I^2C trigger
76	SCB_TX_TR_OUT[1]	SCB1 TX trigger
77	SCB_RX_TR_OUT[1]	SCB1 RX trigger
78	SCB_I2C_SCL_TR_OUT[1]	SCB1 I^2C trigger
82	SCB_TX_TR_OUT[3]	SCB3 TX trigger
83	SCB_RX_TR_OUT[3]	SCB3 RX trigger
84	SCB_I2C_SCL_TR_OUT[3]	SCB3 I^2C trigger
85	SCB_TX_TR_OUT[4]	SCB4 TX trigger
86	SCB_RX_TR_OUT[4]	SCB4 RX trigger
87	SCB_I2C_SCL_TR_OUT[4]	SCB4 I^2C trigger
88	SCB_TX_TR_OUT[5]	SCB5 TX trigger
89	SCB_RX_TR_OUT[5]	SCB5 RX trigger
90	SCB_I2C_SCL_TR_OUT[5]	SCB5 I^2C trigger
94	SCB_TX_TR_OUT[7]	SCB7 TX trigger
95	SCB_RX_TR_OUT[7]	SCB7 RX trigger
96	SCB_I2C_SCL_TR_OUT[7]	SCB7 I^2C trigger
97:98	CAN0_DBG_TR_OUT[0:1]	CAN0 M-DMA0 events
100:101	CAN0_FIFO0_TR_OUT[0:1]	CAN0 FIFO0 events
103:104	CAN0_FIFO1_TR_OUT[0:1]	CAN0 FIFO1 events
106:107	CAN1_DBG_TR_OUT[0:1]	CAN1 M-DMA0 events
109:110	CAN1_FIFO0_TR_OUT[0:1]	CAN1 FIFO0 events
112:113	CAN1_FIFO1_TR_OUT[0:1]	CAN1 FIFO1 events
115:122	EVTGEN_TR_OUT[3:10]	EVTGEN triggers
MUX Group 6: PASS (PASS SAR trigger multiplexer)		
1:16	PDMA0_TR_OUT[0:15]	General-purpose P-DMA0 triggers
17:18	CTI_TR_OUT[0:1]	Trace events
19:22	FAULT_TR_OUT[0:3]	Fault events
23:25	EVTGEN_TR_OUT[0:2]	EVTGEN triggers
26:31	PASS_GEN_TR_OUT[0:5]	PASS SAR done signals
32:63	HSIOM_IO_INPUT[0:31]	I/O inputs
64	TCPWM_32_TR_OUT0[0]	32-bit TCPWM0 Group #2, Counter #0 counters

Table 17-1. Trigger Inputs *(continued)*

Input	Trigger Label (TRIG_LABEL)	Description
66	TCPWM_32_TR_OUT0[2]	32-bit TCPWM0 Group #2, Counter #2 counters
68	TCPWM_16M_TR_OUT0[0]	16-bit Motor enhanced TCPWM0 Group #1, Counter #0 counters
69	TCPWM_16M_TR_OUT0[1]	16-bit Motor enhanced TCPWM0 Group #1, Counter #1 counters
70	TCPWM_16M_TR_OUT0[2]	16-bit Motor enhanced TCPWM0 Group #1, Counter #2 counters
72	TCPWM_16M_TR_OUT0[4]	16-bit Motor enhanced TCPWM0 Group #1, Counter #4 counters
MUX Group 7: CAN TT sync triggers		
1:2	CAN0_TT_TR_OUT[0:1]	CAN0 TT Sync Outputs
4:5	CAN1_TT_TR_OUT[0:1]	CAN1 TT Sync Outputs
MUX Group 8: DebugMain (Debug Multiplexer)		
1:5	TR_GROUP9_OUTPUT[0:4]	Output from debug reduction multiplexer #1
6:10	TR_GROUP10_OUTPUT[0:4]	Output from debug reduction multiplexer #2
MUX Group 9: DebugReduction1 (Debug Reduction #1)		
1	PDMA0_TR_OUT[0]	P-DMA0 triggers
2	PDMA0_TR_OUT[1]	P-DMA0 triggers
3	PDMA0_TR_OUT[2]	P-DMA0 triggers
4	PDMA0_TR_OUT[3]	P-DMA0 triggers
5	PDMA0_TR_OUT[4]	P-DMA0 triggers
6	PDMA0_TR_OUT[5]	P-DMA0 triggers
7	PDMA0_TR_OUT[6]	P-DMA0 triggers
8	PDMA0_TR_OUT[7]	P-DMA0 triggers
9	PDMA0_TR_OUT[8]	P-DMA0 triggers
10	PDMA0_TR_OUT[9]	P-DMA0 triggers
11	PDMA0_TR_OUT[10]	P-DMA0 triggers
12	PDMA0_TR_OUT[11]	P-DMA0 triggers
13	PDMA0_TR_OUT[12]	P-DMA0 triggers
14	PDMA0_TR_OUT[13]	P-DMA0 triggers
15	PDMA0_TR_OUT[14]	P-DMA0 triggers
16	PDMA0_TR_OUT[15]	P-DMA0 triggers
17	PDMA0_TR_OUT[16]	P-DMA0 triggers
18	PDMA0_TR_OUT[17]	P-DMA0 triggers
19	PDMA0_TR_OUT[18]	P-DMA0 triggers
20	PDMA0_TR_OUT[19]	P-DMA0 triggers
21	PDMA0_TR_OUT[20]	P-DMA0 triggers
22	PDMA0_TR_OUT[21]	P-DMA0 triggers
26	PDMA0_TR_OUT[25]	P-DMA0 triggers
27	PDMA0_TR_OUT[26]	P-DMA0 triggers
28	PDMA0_TR_OUT[27]	P-DMA0 triggers
29	PDMA0_TR_OUT[28]	P-DMA0 triggers
30	PDMA0_TR_OUT[29]	P-DMA0 triggers
31	PDMA0_TR_OUT[30]	P-DMA0 triggers
34	PDMA0_TR_OUT[33]	P-DMA0 triggers
35	PDMA0_TR_OUT[34]	P-DMA0 triggers
37	PDMA0_TR_OUT[36]	P-DMA0 triggers
38	PDMA0_TR_OUT[37]	P-DMA0 triggers
43	PDMA0_TR_OUT[42]	P-DMA0 triggers
54	PDMA0_TR_OUT[53]	P-DMA0 triggers

Table 17-1. Trigger Inputs *(continued)*

Input	Trigger Label (TRIG_LABEL)	Description
55	PDMA0_TR_OUT[54]	P-DMA0 triggers
56	PDMA0_TR_OUT[55]	P-DMA0 triggers
57	PDMA0_TR_OUT[56]	P-DMA0 triggers
58	PDMA0_TR_OUT[57]	P-DMA0 triggers
62	PDMA0_TR_OUT[61]	P-DMA0 triggers
63	PDMA0_TR_OUT[62]	P-DMA0 triggers
64	PDMA0_TR_OUT[63]	P-DMA0 triggers
65	PDMA0_TR_OUT[64]	P-DMA0 triggers
66	PDMA0_TR_OUT[65]	P-DMA0 triggers
67	PDMA0_TR_OUT[66]	P-DMA0 triggers
72	PDMA0_TR_OUT[71]	P-DMA0 triggers
73	PDMA0_TR_OUT[72]	P-DMA0 triggers
82	PDMA0_TR_OUT[81]	P-DMA0 triggers
83	PDMA0_TR_OUT[82]	P-DMA0 triggers
84	PDMA0_TR_OUT[83]	P-DMA0 triggers
85	PDMA0_TR_OUT[84]	P-DMA0 triggers
86	PDMA0_TR_OUT[85]	P-DMA0 triggers
87	PDMA0_TR_OUT[86]	P-DMA0 triggers
88	PDMA0_TR_OUT[87]	P-DMA0 triggers
89	PDMA0_TR_OUT[88]	P-DMA0 triggers
90	SCB_TX_TR_OUT[0]	SCB0 TTCAN tx Triggers
91	SCB_TX_TR_OUT[1]	SCB1 TTCAN tx Triggers
93	SCB_TX_TR_OUT[3]	SCB3 TTCAN tx Triggers
94	SCB_TX_TR_OUT[4]	SCB4 TTCAN tx Triggers
95	SCB_TX_TR_OUT[5]	SCB5 TTCAN tx Triggers
97	SCB_TX_TR_OUT[7]	SCB7 TTCAN tx Triggers
98	SCB_RX_TR_OUT[0]	SCB0 TTCAN rx Triggers
99	SCB_RX_TR_OUT[1]	SCB1 TTCAN rx Triggers
101	SCB_RX_TR_OUT[3]	SCB3 TTCAN rx Triggers
102	SCB_RX_TR_OUT[4]	SCB4 TTCAN rx Triggers
103	SCB_RX_TR_OUT[5]	SCB5 TTCAN rx Triggers
105	SCB_RX_TR_OUT[7]	SCB7 TTCAN rx Triggers
106	SCB_I2C_SCL_TR_OUT[0]	SCB0 I^2C triggers
107	SCB_I2C_SCL_TR_OUT[1]	SCB1 I^2C triggers
109	SCB_I2C_SCL_TR_OUT[3]	SCB3 I^2C triggers
110	SCB_I2C_SCL_TR_OUT[4]	SCB4 I^2C triggers
111	SCB_I2C_SCL_TR_OUT[5]	SCB5 I^2C triggers
113	SCB_I2C_SCL_TR_OUT[7]	SCB7 I^2C triggers
114:115	CAN0_DBG_TR_OUT[0:1]	CAN0 P-DMA
117:118	CAN0_FIFO0_TR_OUT[0:1]	CAN0 FIFO0
120:121	CAN0_FIFO1_TR_OUT[0:1]	CAN0 FIFO1
123:124	CAN0_TT_TR_OUT[0:1]	CAN TT Sync Outputs
126:127	CAN1_DBG_TR_OUT[0:1]	CAN1 P-DMA
129:130	CAN1_FIFO0_TR_OUT[0:1]	CAN1 FIFO0
132:133	CAN1_FIFO1_TR_OUT[0:1]	CAN1 FIFO1
135:136	CAN1_TT_TR_OUT[0:1]	CAN TT Sync Outputs

Table 17-1. Trigger Inputs *(continued)*

Input	Trigger Label (TRIG_LABEL)	Description
138:139	CTI_TR_OUT[0:1]	Trace events
140:143	FAULT_TR_OUT[0:3]	Fault events
144	TCPWM_32_TR_OUT0[0]	32-bit TCPWM0 Group #2, Counter #0 counters
146	TCPWM_32_TR_OUT0[2]	32-bit TCPWM0 Group #2, Counter #2 counters
148	TCPWM_16M_TR_OUT0[0]	16-bit Motor enhanced TCPWM0 Group #1, Counter #0 counters
149	TCPWM_16M_TR_OUT0[1]	16-bit Motor enhanced TCPWM0 Group #1, Counter #1 counters
150	TCPWM_16M_TR_OUT0[2]	16-bit Motor enhanced TCPWM0 Group #1, Counter #2 counters
152	TCPWM_16M_TR_OUT0[4]	16-bit Motor enhanced TCPWM0 Group #1, Counter #4 counters
160	TCPWM_16_TR_OUT0[0]	TCPWM0 Group #0, Counter #0
161	TCPWM_16_TR_OUT0[1]	TCPWM0 Group #0, Counter #1
162	TCPWM_16_TR_OUT0[2]	TCPWM0 Group #0, Counter #2
164	TCPWM_16_TR_OUT0[4]	TCPWM0 Group #0, Counter #4
165	TCPWM_16_TR_OUT0[5]	TCPWM0 Group #0, Counter #5
166	TCPWM_16_TR_OUT0[6]	TCPWM0 Group #0, Counter #6
167	TCPWM_16_TR_OUT0[7]	TCPWM0 Group #0, Counter #7
169	TCPWM_16_TR_OUT0[9]	TCPWM0 Group #0, Counter #9
170	TCPWM_16_TR_OUT0[10]	TCPWM0 Group #0, Counter #10
171	TCPWM_16_TR_OUT0[11]	TCPWM0 Group #0, Counter #11
172	TCPWM_16_TR_OUT0[12]	TCPWM0 Group #0, Counter #12
173	TCPWM_16_TR_OUT0[13]	TCPWM0 Group #0, Counter #13
174	TCPWM_16_TR_OUT0[14]	TCPWM0 Group #0, Counter #14
175	TCPWM_16_TR_OUT0[15]	TCPWM0 Group #0, Counter #15
176	TCPWM_16_TR_OUT0[16]	TCPWM0 Group #0, Counter #16
177	TCPWM_16_TR_OUT0[17]	TCPWM0 Group #0, Counter #17
178	TCPWM_16_TR_OUT0[18]	TCPWM0 Group #0, Counter #18
179	TCPWM_16_TR_OUT0[19]	TCPWM0 Group #0, Counter #19
180	TCPWM_16_TR_OUT0[20]	TCPWM0 Group #0, Counter #20
181	TCPWM_16_TR_OUT0[21]	TCPWM0 Group #0, Counter #21
182	TCPWM_16_TR_OUT0[22]	TCPWM0 Group #0, Counter #22
183	TCPWM_16_TR_OUT0[23]	TCPWM0 Group #0, Counter #23
184	TCPWM_16_TR_OUT0[24]	TCPWM0 Group #0, Counter #24
185	TCPWM_16_TR_OUT0[25]	TCPWM0 Group #0, Counter #25
186	TCPWM_16_TR_OUT0[26]	TCPWM0 Group #0, Counter #26
193	TCPWM_16_TR_OUT0[33]	TCPWM0 Group #0, Counter #33
194	TCPWM_16_TR_OUT0[34]	TCPWM0 Group #0, Counter #34
196	TCPWM_16_TR_OUT0[36]	TCPWM0 Group #0, Counter #36
197	TCPWM_16_TR_OUT0[37]	TCPWM0 Group #0, Counter #37
198	TCPWM_16_TR_OUT0[38]	TCPWM0 Group #0, Counter #38
199	TCPWM_16_TR_OUT0[39]	TCPWM0 Group #0, Counter #39
200	TCPWM_16_TR_OUT0[40]	TCPWM0 Group #0, Counter #40
201	TCPWM_16_TR_OUT0[41]	TCPWM0 Group #0, Counter #41
202	TCPWM_16_TR_OUT0[42]	TCPWM0 Group #0, Counter #42
204	TCPWM_16_TR_OUT0[44]	TCPWM0 Group #0, Counter #44
205	TCPWM_16_TR_OUT0[45]	TCPWM0 Group #0, Counter #45
206	TCPWM_16_TR_OUT0[46]	TCPWM0 Group #0, Counter #46
207	TCPWM_16_TR_OUT0[47]	TCPWM0 Group #0, Counter #47

Table 17-1. Trigger Inputs *(continued)*

Input	Trigger Label (TRIG_LABEL)	Description
208	TCPWM_16_TR_OUT0[48]	TCPWM0 Group #0, Counter #48
209	TCPWM_16_TR_OUT0[49]	TCPWM0 Group #0, Counter #49
210	TCPWM_16_TR_OUT0[50]	TCPWM0 Group #0, Counter #50
211	TCPWM_16_TR_OUT0[51]	TCPWM0 Group #0, Counter #51
212	TCPWM_16_TR_OUT0[52]	TCPWM0 Group #0, Counter #52
213	TCPWM_16_TR_OUT0[53]	TCPWM0 Group #0, Counter #53
214	TCPWM_16_TR_OUT0[54]	TCPWM0 Group #0, Counter #54
215	TCPWM_16_TR_OUT0[55]	TCPWM0 Group #0, Counter #55
MUX Group 10: DebugReduction2 (Debug Reduction #2)		
1	PDMA1_TR_OUT[0]	16-bit Motor enhanced TCPWM0 counters
2	PDMA1_TR_OUT[1]	16-bit Motor enhanced TCPWM0 counters
3	PDMA1_TR_OUT[2]	16-bit Motor enhanced TCPWM0 counters
4	PDMA1_TR_OUT[3]	16-bit Motor enhanced TCPWM0 counters
5	PDMA1_TR_OUT[4]	16-bit Motor enhanced TCPWM0 counters
6	PDMA1_TR_OUT[5]	16-bit Motor enhanced TCPWM0 counters
7	PDMA1_TR_OUT[6]	16-bit Motor enhanced TCPWM0 counters
8	PDMA1_TR_OUT[7]	16-bit Motor enhanced TCPWM0 counters
9	PDMA1_TR_OUT[8]	16-bit Motor enhanced TCPWM0 counters
10	PDMA1_TR_OUT[9]	16-bit Motor enhanced TCPWM0 counters
11	PDMA1_TR_OUT[10]	16-bit Motor enhanced TCPWM0 counters
12	PDMA1_TR_OUT[11]	16-bit Motor enhanced TCPWM0 counters
15	PDMA1_TR_OUT[14]	16-bit Motor enhanced TCPWM0 counters
16	PDMA1_TR_OUT[15]	16-bit Motor enhanced TCPWM0 counters
17	PDMA1_TR_OUT[16]	16-bit Motor enhanced TCPWM0 counters
18	PDMA1_TR_OUT[17]	16-bit Motor enhanced TCPWM0 counters
19	PDMA1_TR_OUT[18]	16-bit Motor enhanced TCPWM0 counters
20	PDMA1_TR_OUT[19]	16-bit Motor enhanced TCPWM0 counters
23	PDMA1_TR_OUT[22]	16-bit Motor enhanced TCPWM0 counters
24	PDMA1_TR_OUT[23]	16-bit Motor enhanced TCPWM0 counters
25	PDMA1_TR_OUT[24]	16-bit Motor enhanced TCPWM0 counters
26	PDMA1_TR_OUT[25]	16-bit Motor enhanced TCPWM0 counters
27	PDMA1_TR_OUT[26]	16-bit Motor enhanced TCPWM0 counters
28	PDMA1_TR_OUT[27]	16-bit Motor enhanced TCPWM0 counters
29	PDMA1_TR_OUT[28]	16-bit Motor enhanced TCPWM0 counters
30	PDMA1_TR_OUT[29]	16-bit Motor enhanced TCPWM0 counters
34:35	MDMA_TR_OUT[0:1]	16-bit TCPWM0 counters
38	TCPWM_32_TR_OUT1[0]	32-bit TCPWM0 counters
40	TCPWM_32_TR_OUT1[2]	32-bit TCPWM0 counters
42	TCPWM_16M_TR_OUT1[0]	16-bit Motor enhanced TCPWM0 counters
43	TCPWM_16M_TR_OUT1[1]	16-bit Motor enhanced TCPWM0 counters
44	TCPWM_16M_TR_OUT1[2]	16-bit Motor enhanced TCPWM0 counters
46	TCPWM_16M_TR_OUT1[4]	16-bit Motor enhanced TCPWM0 counters
54	TCPWM_16_TR_OUT1[0]	16-bit TCPWM0 counters
55	TCPWM_16_TR_OUT1[1]	16-bit TCPWM0 counters
56	TCPWM_16_TR_OUT1[2]	16-bit TCPWM0 counters
58	TCPWM_16_TR_OUT1[4]	16-bit TCPWM0 counters

Table 17-1. Trigger Inputs *(continued)*

Input	Trigger Label (TRIG_LABEL)	Description
59	TCPWM_16_TR_OUT1[5]	16-bit TCPWM0 counters
60	TCPWM_16_TR_OUT1[6]	16-bit TCPWM0 counters
61	TCPWM_16_TR_OUT1[7]	16-bit TCPWM0 counters
63	TCPWM_16_TR_OUT1[9]	16-bit TCPWM0 counters
64	TCPWM_16_TR_OUT1[10]	16-bit TCPWM0 counters
65	TCPWM_16_TR_OUT1[11]	16-bit TCPWM0 counters
66	TCPWM_16_TR_OUT1[12]	16-bit TCPWM0 counters
67	TCPWM_16_TR_OUT1[13]	16-bit TCPWM0 counters
68	TCPWM_16_TR_OUT1[14]	16-bit TCPWM0 counters
69	TCPWM_16_TR_OUT1[15]	16-bit TCPWM0 counters
70	TCPWM_16_TR_OUT1[16]	16-bit TCPWM0 counters
71	TCPWM_16_TR_OUT1[17]	16-bit TCPWM0 counters
72	TCPWM_16_TR_OUT1[18]	16-bit TCPWM0 counters
73	TCPWM_16_TR_OUT1[19]	16-bit TCPWM0 counters
74	TCPWM_16_TR_OUT1[20]	16-bit TCPWM0 counters
75	TCPWM_16_TR_OUT1[21]	16-bit TCPWM0 counters
76	TCPWM_16_TR_OUT1[22]	16-bit TCPWM0 counters
77	TCPWM_16_TR_OUT1[23]	16-bit TCPWM0 counters
78	TCPWM_16_TR_OUT1[24]	16-bit TCPWM0 counters
79	TCPWM_16_TR_OUT1[25]	16-bit TCPWM0 counters
80	TCPWM_16_TR_OUT1[26]	16-bit TCPWM0 counters
87	TCPWM_16_TR_OUT1[33]	16-bit TCPWM0 counters
88	TCPWM_16_TR_OUT1[34]	16-bit TCPWM0 counters
90	TCPWM_16_TR_OUT1[36]	16-bit TCPWM0 counters
91	TCPWM_16_TR_OUT1[37]	16-bit TCPWM0 counters
92	TCPWM_16_TR_OUT1[38]	16-bit TCPWM0 counters
93	TCPWM_16_TR_OUT1[39]	16-bit TCPWM0 counters
94	TCPWM_16_TR_OUT1[40]	16-bit TCPWM0 counters
95	TCPWM_16_TR_OUT1[41]	16-bit TCPWM0 counters
96	TCPWM_16_TR_OUT1[42]	16-bit TCPWM0 counters
98	TCPWM_16_TR_OUT1[44]	16-bit TCPWM0 counters
99	TCPWM_16_TR_OUT1[45]	16-bit TCPWM0 counters
100	TCPWM_16_TR_OUT1[46]	16-bit TCPWM0 counters
101	TCPWM_16_TR_OUT1[47]	16-bit TCPWM0 counters
102	TCPWM_16_TR_OUT1[48]	16-bit TCPWM0 counters
103	TCPWM_16_TR_OUT1[49]	16-bit TCPWM0 counters
104	TCPWM_16_TR_OUT1[50]	16-bit TCPWM0 counters
105	TCPWM_16_TR_OUT1[51]	16-bit TCPWM0 counters
106	TCPWM_16_TR_OUT1[52]	16-bit TCPWM0 counters
107	TCPWM_16_TR_OUT1[53]	16-bit TCPWM0 counters
108	TCPWM_16_TR_OUT1[54]	16-bit TCPWM0 counters
109	TCPWM_16_TR_OUT1[55]	16-bit TCPWM0 counters
117:122	PASS_GEN_TR_OUT[0:5]	PASS SAR conversion complete events
123:133	EVTGEN_TR_OUT[0:10]	EVTGEN Triggers

18. Triggers Group Outputs

Table 18-1. Trigger Outputs

Output	Trigger Label (TRIG_LABEL)	Description
MUX Group 0: PDMA0_TR (P-DMA0 trigger multiplexer)		
0:7	PDMA0_TR_IN[0:7]	Triggers to P-DMA0[0:7]
MUX Group 1: PDMA1_TR (P-DMA1 trigger multiplexer)		
0:7	PDMA1_TR_IN[0:7]	Triggers to P-DMA1[0:7]
MUX Group 2: MDMA (M-DMA0 trigger multiplexer)		
0:1	MDMA_TR_IN[0:1]	Triggers to M-DMA0
MUX Group 3: TCPWM_TO_PDMA0 (TCPWM0 to P-DMA0 trigger multiplexer)		
0:7	PDMA0_TR_IN[8:15]	Triggers to P-DMA0[8:15]
MUX Group 4: TCPWM_OUT (TCPWM0 loop back multiplexer)		
0:15	TCPWM_ALL_CNT_TR_IN[0:15]	All counters trigger input
MUX Group 5: TCPWM_IN (TCPWM0 Trigger Multiplexer)		
0:10	TCPWM_ALL_CNT_TR_IN[16:26]	Triggers to TCPWM0
MUX Group 6: PASS (PASS SAR trigger multiplexer)		
0	PASS_GEN_TR_IN[0]	Triggers to SAR ADCs
1	PASS_GEN_TR_IN[1]	Triggers to SAR ADCs
2	PASS_GEN_TR_IN[2]	Triggers to SAR ADCs
3	PASS_GEN_TR_IN[3]	Triggers to SAR ADCs
4	PASS_GEN_TR_IN[4]	Triggers to SAR ADCs
5	PASS_GEN_TR_IN[5]	Triggers to SAR ADCs
8	PASS_GEN_TR_IN[8]	Triggers to SAR ADCs
9	PASS_GEN_TR_IN[9]	Triggers to SAR ADCs
11	PASS_GEN_TR_IN[11]	Triggers to SAR ADCs
MUX Group 7: CANTT (CAN TT Sync)		
0:1	CAN0_TT_TR_IN[0:1]	CAN0 TT Sync Inputs
3:4	CAN1_TT_TR_IN[0:1]	CAN1 TT Sync Inputs
MUX Group 8: DebugMain (Debug Multiplexer)		
0:1	HSIOM_IO_OUTPUT[0:1]	To HSIOM as an output
2:3	CTI_TR_IN[0:1]	To CPU Cross Trigger system
4	PERI_DEBUG_FREEZE_TR_IN	Signal to Freeze PERI operation
5	PASS_DEBUG_FREEZE_TR_IN	Signal to Freeze SAR ADC operation
6	SRSS_WDT_DEBUG_FREEZE_TR_IN	Signal to Freeze WDT operation
7:8	SRSS_MCWDT_DEBUG_FREEZE_TR_IN[0:1]	Signal to Freeze MCWDT operation
9	TCPWM_DEBUG_FREEZE_TR_IN	Signal to Freeze TCPWM0 operation
MUX Group 9: DebugReduction1 (Debug Reduction #1)		
0:4	TR_GROUP8_INPUT[1:5]	To main debug multiplexer
MUX Group 10: DebugReduction2 (Debug Reduction #2)		
0:4	TR_GROUP8_INPUT[6:10]	To main debug multiplexer

19. Triggers One-to-One

Table 19-1. Triggers 1:1

Input	Trigger In	Trigger Out	Description
MUX Group 0: TCPWM0 to LIN0 Triggers			
0	TCPWM0_16_TR_OUT0[0]	LIN0_CMD_TR_IN[0]	TCPWM0 (Group #0 Counter #00) to LIN0
1	TCPWM0_16_TR_OUT0[1]	LIN0_CMD_TR_IN[1]	TCPWM0 (Group #0 Counter #01) to LIN1
2	TCPWM0_16_TR_OUT0[2]	LIN0_CMD_TR_IN[2]	TCPWM0 (Group #0 Counter #02) to LIN2
4	TCPWM0_16_TR_OUT0[4]	LIN0_CMD_TR_IN[4]	TCPWM0 (Group #0 Counter #04) to LIN4
MUX Group 1: TCPWM0 to PASS SARx direct connect			
0	TCPWM0_16M_TR_OUT1[0]	PASS0_CH_TR_IN[0]	TCPWM0 Group #1 Counter #00 (PWM0_M_0) to SAR0 ch#0
1	TCPWM0_16M_TR_OUT1[1]	PASS0_CH_TR_IN[1]	TCPWM0 Group #1 Counter #03 (PWM0_M_3) to SAR0 ch#1
2	TCPWM0_16M_TR_OUT1[2]	PASS0_CH_TR_IN[2]	TCPWM0 Group #1 Counter #06 (PWM0_M_6) to SAR0 ch#2
4	TCPWM0_16_TR_OUT1[0]	PASS0_CH_TR_IN[4]	TCPWM0 Group #0 Counter #00 (PWM0_0) to SAR0 ch#4
5	TCPWM0_16_TR_OUT1[1]	PASS0_CH_TR_IN[5]	TCPWM0 Group #0 Counter #01 (PWM0_1) to SAR0 ch#5
8	TCPWM0_16_TR_OUT1[4]	PASS0_CH_TR_IN[8]	TCPWM0 Group #0 Counter #04 (PWM0_4) to SAR0 ch#8
9	TCPWM0_16_TR_OUT1[5]	PASS0_CH_TR_IN[9]	TCPWM0 Group #0 Counter #05 (PWM0_5) to SAR0 ch#9
11	TCPWM0_16_TR_OUT1[7]	PASS0_CH_TR_IN[11]	TCPWM0 Group #0 Counter #07 (PWM0_7) to SAR0 ch#11
17	TCPWM0_16_TR_OUT1[13]	PASS0_CH_TR_IN[17]	TCPWM0 Group #0 Counter #13 (PWM0_13) to SAR0 ch#17
28	TCPWM0_16_TR_OUT1[20]	PASS0_CH_TR_IN[36]	TCPWM0 Group #0 Counter #20 (PWM0_20) to SAR1 ch#4
29	TCPWM0_16_TR_OUT1[21]	PASS0_CH_TR_IN[37]	TCPWM0 Group #0 Counter #21 (PWM0_21) to SAR1 ch#5
30	TCPWM0_16_TR_OUT1[22]	PASS0_CH_TR_IN[38]	TCPWM0 Group #0 Counter #22 (PWM0_22) to SAR1 ch#6
31	TCPWM0_16_TR_OUT1[23]	PASS0_CH_TR_IN[39]	TCPWM0 Group #0 Counter #23 (PWM0_23) to SAR1 ch#7
32	TCPWM0_16_TR_OUT1[24]	PASS0_CH_TR_IN[40]	TCPWM0 Group #0 Counter #24 (PWM0_24) to SAR1 ch#8
41	TCPWM0_16_TR_OUT1[33]	PASS0_CH_TR_IN[49]	TCPWM0 Group #0 Counter #33 (PWM0_33) to SAR1 ch#17
46	TCPWM0_16_TR_OUT1[38]	PASS0_CH_TR_IN[54]	TCPWM0 Group #0 Counter #38 (PWM0_38) to SAR1 ch#22
47	TCPWM0_16_TR_OUT1[39]	PASS0_CH_TR_IN[55]	TCPWM0 Group #0 Counter #39 (PWM0_39) to SAR1 ch#23
60:63	TCPWM0_16_TR_OUT1[48:51]	PASS0_CH_TR_IN[68:71]	TCPWM0 Group #0 Counter #48 through 51 (PWM0_48 to PWM0_51) to SAR2 ch#4 through SAR2 ch#7
MUX Group 2: PASS SARx to P-DMA0 direct connect			
0	PASS0_CH_DONE_TR_OUT[0]	PDMA0_TR_IN[25]	PASS SAR0 ch#0 to P-DMA0 direct connect
1	PASS0_CH_DONE_TR_OUT[1]	PDMA0_TR_IN[26]	PASS SAR0 ch#1 to P-DMA0 direct connect
2	PASS0_CH_DONE_TR_OUT[2]	PDMA0_TR_IN[27]	PASS SAR0 ch#2 to P-DMA0 direct connect
3	PASS0_CH_DONE_TR_OUT[3]	PDMA0_TR_IN[28]	PASS SAR0 ch#3 to P-DMA0 direct connect
4	PASS0_CH_DONE_TR_OUT[4]	PDMA0_TR_IN[29]	PASS SAR0 ch#4 to P-DMA0 direct connect
5	PASS0_CH_DONE_TR_OUT[5]	PDMA0_TR_IN[30]	PASS SAR0 ch#5 to P-DMA0 direct connect
8	PASS0_CH_DONE_TR_OUT[8]	PDMA0_TR_IN[33]	PASS SAR0 ch#8 to P-DMA0 direct connect
9	PASS0_CH_DONE_TR_OUT[9]	PDMA0_TR_IN[34]	PASS SAR0 ch#9 to P-DMA0 direct connect

Table 19-1. Triggers 1:1 *(continued)*

Input	Trigger In	Trigger Out	Description
11	PASS0_CH_DONE_TR_OUT[11]	PDMA0_TR_IN[36]	PASS SAR0 ch#11 to P-DMA0 direct connect
12	PASS0_CH_DONE_TR_OUT[12]	PDMA0_TR_IN[37]	PASS SAR0 ch#12 to P-DMA0 direct connect
17	PASS0_CH_DONE_TR_OUT[17]	PDMA0_TR_IN[42]	PASS SAR0 ch#17 to P-DMA0 direct connect
28	PASS0_CH_DONE_TR_OUT[36]	PDMA0_TR_IN[53]	PASS SAR1 ch#4 to P-DMA0 direct connect
29	PASS0_CH_DONE_TR_OUT[37]	PDMA0_TR_IN[54]	PASS SAR1 ch#5 to P-DMA0 direct connect
30	PASS0_CH_DONE_TR_OUT[38]	PDMA0_TR_IN[55]	PASS SAR1 ch#6 to P-DMA0 direct connect
31	PASS0_CH_DONE_TR_OUT[39]	PDMA0_TR_IN[56]	PASS SAR1 ch#7 to P-DMA0 direct connect
32	PASS0_CH_DONE_TR_OUT[40]	PDMA0_TR_IN[57]	PASS SAR1 ch#8 to P-DMA0 direct connect
36	PASS0_CH_DONE_TR_OUT[44]	PDMA0_TR_IN[61]	PASS SAR1 ch#12 to P-DMA0 direct connect
37	PASS0_CH_DONE_TR_OUT[45]	PDMA0_TR_IN[62]	PASS SAR1 ch#13 to P-DMA0 direct connect
38	PASS0_CH_DONE_TR_OUT[46]	PDMA0_TR_IN[63]	PASS SAR1 ch#14 to P-DMA0 direct connect
39	PASS0_CH_DONE_TR_OUT[47]	PDMA0_TR_IN[64]	PASS SAR1 ch#15 to P-DMA0 direct connect
40	PASS0_CH_DONE_TR_OUT[48]	PDMA0_TR_IN[65]	PASS SAR1 ch#16 to P-DMA0 direct connect
41	PASS0_CH_DONE_TR_OUT[49]	PDMA0_TR_IN[66]	PASS SAR1 ch#17 to P-DMA0 direct connect
46	PASS0_CH_DONE_TR_OUT[54]	PDMA0_TR_IN[71]	PASS SAR1 ch#22 to P-DMA0 direct connect
47	PASS0_CH_DONE_TR_OUT[55]	PDMA0_TR_IN[72]	PASS SAR1 ch#23 to P-DMA0 direct connect
56	PASS0_CH_DONE_TR_OUT[64]	PDMA0_TR_IN[81]	PASS SAR2 ch#0 to P-DMA0 direct connect
57	PASS0_CH_DONE_TR_OUT[65]	PDMA0_TR_IN[82]	PASS SAR2 ch#1 to P-DMA0 direct connect
58	PASS0_CH_DONE_TR_OUT[66]	PDMA0_TR_IN[83]	PASS SAR2 ch#2 to P-DMA0 direct connect
59	PASS0_CH_DONE_TR_OUT[67]	PDMA0_TR_IN[84]	PASS SAR2 ch#3 to P-DMA0 direct connect
60	PASS0_CH_DONE_TR_OUT[68]	PDMA0_TR_IN[85]	PASS SAR2 ch#4 to P-DMA0 direct connect
61	PASS0_CH_DONE_TR_OUT[69]	PDMA0_TR_IN[86]	PASS SAR2 ch#5 to P-DMA0 direct connect
62	PASS0_CH_DONE_TR_OUT[70]	PDMA0_TR_IN[87]	PASS SAR2 ch#6 to P-DMA0 direct connect
63	PASS0_CH_DONE_TR_OUT[71]	PDMA0_TR_IN[88]	PASS SAR2 ch#7 to P-DMA0 direct connect
MUX Group 3: PASS SARx to TCPWM0 direct connect			
0	PASS0_CH_RANGEVIO_TR_OUT[0]	TCPWM0_16M_ONE_CNT_TR_IN[0]	SAR0 ch#0[29], range violation to TCPWM0 Group #1 Counter #00 trig=2
4	PASS0_CH_RANGEVIO_TR_OUT[4]	TCPWM0_16_ONE_CNT_TR_IN[0]	SAR0 ch#4, range violation to TCPWM0 Group #0 Counter #00 trig=2
5	PASS0_CH_RANGEVIO_TR_OUT[5]	TCPWM0_16_ONE_CNT_TR_IN[1]	SAR0 ch#5, range violation to TCPWM0 Group #0 Counter #01 trig=2
8	PASS0_CH_RANGEVIO_TR_OUT[8]	TCPWM0_16_ONE_CNT_TR_IN[4]	SAR0 ch#8, range violation to TCPWM0 Group #0 Counter #04 trig=2
9	PASS0_CH_RANGEVIO_TR_OUT[9]	TCPWM0_16_ONE_CNT_TR_IN[5]	SAR0 ch#9, range violation to TCPWM0 Group #0 Counter #05 trig=2
11	PASS0_CH_RANGEVIO_TR_OUT[11]	TCPWM0_16_ONE_CNT_TR_IN[7]	SAR0 ch#11, range violation to TCPWM0 Group #0 Counter #07 trig=2
17	PASS0_CH_RANGEVIO_TR_OUT[17]	TCPWM0_16_ONE_CNT_TR_IN[13]	SAR0 ch#17, range violation to TCPWM0 Group #0 Counter #13 trig=2
28	PASS0_CH_RANGEVIO_TR_OUT[36]	TCPWM0_16_ONE_CNT_TR_IN[20]	SAR1 ch#4, range violation to TCPWM0 Group #0 Counter #20 trig=2
29	PASS0_CH_RANGEVIO_TR_OUT[37]	TCPWM0_16_ONE_CNT_TR_IN[21]	SAR1 ch#5, range violation to TCPWM0 Group #0 Counter #21 trig=2
30	PASS0_CH_RANGEVIO_TR_OUT[38]	TCPWM0_16_ONE_CNT_TR_IN[22]	SAR1 ch#6, range violation to TCPWM0 Group #0 Counter #22 trig=2

Note
29. Each logical channel of SAR ADC[x] can be connected to any of the SAR ADC[x]_y external pin. (x = 0, or 1, or, 2 and y=0 to max 31)

Table 19-1. Triggers 1:1 *(continued)*

Input	Trigger In	Trigger Out	Description
31	PASS0_CH_RANGEVIO_TR_OUT[39]	TCPWM0_16_ONE_CNT_TR_IN[23]	SAR1 ch#7, range violation to TCPWM0 Group #0 Counter #23 trig=2
32	PASS0_CH_RANGEVIO_TR_OUT[40]	TCPWM0_16_ONE_CNT_TR_IN[24]	SAR1 ch#8, range violation to TCPWM0 Group #0 Counter #24 trig=2
41	PASS0_CH_RANGEVIO_TR_OUT[49]	TCPWM0_16_ONE_CNT_TR_IN[33]	SAR1 ch#17, range violation to TCPWM0 Group #0 Counter #33 trig=2
46	PASS0_CH_RANGEVIO_TR_OUT[54]	TCPWM0_16_ONE_CNT_TR_IN[38]	SAR1 ch#22, range violation to TCPWM0 Group #0 Counter #38 trig=2
47	PASS0_CH_RANGEVIO_TR_OUT[55]	TCPWM0_16_ONE_CNT_TR_IN[39]	SAR1 ch#23, range violation to TCPWM0 Group #0 Counter #39 trig=2
56	PASS0_CH_RANGEVIO_TR_OUT[64]	TCPWM0_16M_ONE_CNT_TR_IN[2]	SAR2 ch#0, range violation to TCPWM0 Group #1 Counter #02 trig=2
60	PASS0_CH_RANGEVIO_TR_OUT[68]	TCPWM0_16_ONE_CNT_TR_IN[48]	SAR2 ch#4, range violation to TCPWM0 Group #0 Counter #48 trig=2
61	PASS0_CH_RANGEVIO_TR_OUT[69]	TCPWM0_16_ONE_CNT_TR_IN[49]	SAR2 ch#5, range violation to TCPWM0 Group #0 Counter #49 trig=2
62	PASS0_CH_RANGEVIO_TR_OUT[70]	TCPWM0_16_ONE_CNT_TR_IN[50]	SAR2 ch#6, range violation to TCPWM0 Group #0 Counter #50 trig=2
63	PASS0_CH_RANGEVIO_TR_OUT[71]	TCPWM0_16_ONE_CNT_TR_IN[51]	SAR2 ch#7, range violation to TCPWM0 Group #0 Counter #51 trig=2
MUX Group 4: CAN0 to P-DMA0 Triggers			
0	CAN0_DBG_TR_OUT[0]	PDMA0_TR_IN[16]	CAN0, Channel #0 P-DMA0 trigger
1	CAN0_FIFO0_TR_OUT[0]	PDMA0_TR_IN[17]	CAN0, Channel #0 FIFO0 trigger
2	CAN0_FIFO1_TR_OUT[0]	PDMA0_TR_IN[18]	CAN0, Channel #0 FIFO1 trigger
3	CAN0_DBG_TR_OUT[1]	PDMA0_TR_IN[19]	CAN0, Channel #1 P-DMA0 trigger
4	CAN0_FIFO0_TR_OUT[1]	PDMA0_TR_IN[20]	CAN0, Channel #1 FIFO0 trigger
5	CAN0_FIFO1_TR_OUT[1]	PDMA0_TR_IN[21]	CAN0, Channel #1 FIFO1 trigger
MUX Group 5: CAN1 to P-DMA1 triggers			
0	CAN1_DBG_TR_OUT[0]	PDMA1_TR_IN[24]	CAN1, Channel #0 P-DMA01 trigger
1	CAN1_FIFO0_TR_OUT[0]	PDMA1_TR_IN[25]	CAN1, Channel #0 FIFO0 trigger
2	CAN1_FIFO1_TR_OUT[0]	PDMA1_TR_IN[26]	CAN1, Channel #0 FIFO1 trigger
3	CAN1_DBG_TR_OUT[1]	PDMA1_TR_IN[27]	CAN1, Channel #1 P-DMA1 trigger
4	CAN1_FIFO0_TR_OUT[1]	PDMA1_TR_IN[28]	CAN1, Channel #1 FIFO0 trigger
5	CAN1_FIFO1_TR_OUT[1]	PDMA1_TR_IN[29]	CAN1, Channel #1 FIFO1 trigger
MUX Group 6:Acknowledge triggers from P-DMA0 to CAN0			
0	PDMA0_TR_OUT[16]	CAN0_DBG_TR_ACK[0]	CAN0, Channel #0 P-DMA0 acknowledge
1	PDMA0_TR_OUT[19]	CAN0_DBG_TR_ACK[1]	CAN0, Channel #1 P-DMA0 acknowledge
MUX Group 7: Acknowledge triggers from P-DMA1 to CAN1			
0	PDMA1_TR_OUT[24]	CAN1_DBG_TR_ACK[0]	CAN1, Channel #0 P-DMA1 acknowledge
1	PDMA1_TR_OUT[27]	CAN1_DBG_TR_ACK[1]	CAN1, Channel #1 P-DMA1 acknowledge
MUX Group 8: SCBx to P-DMA1 Triggers			
0	SCB0_TX_TR_OUT	PDMA1_TR_IN[8]	SCB0 TX to P-DMA1 Trigger
1	SCB0_RX_TR_OUT	PDMA1_TR_IN[9]	SCB0 RX to P-DMA1 Trigger
2	SCB1_TX_TR_OUT	PDMA1_TR_IN[10]	SCB1 TX to P-DMA1 Trigger
3	SCB1_RX_TR_OUT	PDMA1_TR_IN[11]	SCB1 RX to P-DMA1 Trigger
6	SCB3_TX_TR_OUT	PDMA1_TR_IN[14]	SCB3 TX to P-DMA1 Trigger
7	SCB3_RX_TR_OUT	PDMA1_TR_IN[15]	SCB3 RX to P-DMA1 Trigger

Table 19-1. Triggers 1:1 *(continued)*

Input	Trigger In	Trigger Out	Description
8	SCB4_TX_TR_OUT	PDMA1_TR_IN[16]	SCB4 TX to P-DMA1 Trigger
9	SCB4_RX_TR_OUT	PDMA1_TR_IN[17]	SCB4 RX to P-DMA1 Trigger
10	SCB5_TX_TR_OUT	PDMA1_TR_IN[18]	SCB5 TX to P-DMA1 Trigger
11	SCB5_RX_TR_OUT	PDMA1_TR_IN[19]	SCB5 RX to P-DMA1 Trigger
14	SCB7_TX_TR_OUT	PDMA1_TR_IN[22]	SCB7 TX to P-DMA1 Trigger
15	SCB7_RX_TR_OUT	PDMA1_TR_IN[23]	SCB7 RX to P-DMA1 Trigger

20. Peripheral Clocks

Table 20-1. Peripheral Clock Assignments

Output	Destination	Description
0	PCLK_CPUSS_CLOCK_TRACE_IN	Trace clock
1	PCLK_SMARTIO12_CLOCK	SMART I/O #12
2	PCLK_SMARTIO13_CLOCK	SMART I/O #13
3	PCLK_SMARTIO14_CLOCK	SMART I/O #14
6	PCLK_CANFD0_CLOCK_CAN0	CAN0, Channel #0
7	PCLK_CANFD0_CLOCK_CAN1	CAN0, Channel #1
9	PCLK_CANFD1_CLOCK_CAN0	CAN1, Channel #0
10	PCLK_CANFD1_CLOCK_CAN1	CAN1, Channel #1
12	PCLK_LIN0_CLOCK_CH_EN0	LIN0, Channel #0
13	PCLK_LIN0_CLOCK_CH_EN1	LIN0, Channel #1
14	PCLK_LIN0_CLOCK_CH_EN2	LIN0, Channel #2
15	PCLK_LIN0_CLOCK_CH_EN3	LIN0, Channel #3
16	PCLK_LIN0_CLOCK_CH_EN4	LIN0, Channel #4
20	PCLK_SCB0_CLOCK	SCB0
21	PCLK_SCB1_CLOCK	SCB1
23	PCLK_SCB3_CLOCK	SCB3
24	PCLK_SCB4_CLOCK	SCB4
25	PCLK_SCB5_CLOCK	SCB5
27	PCLK_SCB7_CLOCK	SCB7
28	PCLK_PASS0_CLOCK_SAR0	SAR0
29	PCLK_PASS0_CLOCK_SAR1	SAR1
30	PCLK_PASS0_CLOCK_SAR2	SAR2
31	PCLK_TCPWM0_CLOCKS0	TCPWM0 Group #0, Counter #0
32	PCLK_TCPWM0_CLOCKS1	TCPWM0 Group #0, Counter #1
33	PCLK_TCPWM0_CLOCKS2	TCPWM0 Group #0, Counter #2
35	PCLK_TCPWM0_CLOCKS4	TCPWM0 Group #0, Counter #4
36	PCLK_TCPWM0_CLOCKS5	TCPWM0 Group #0, Counter #5
37	PCLK_TCPWM0_CLOCKS6	TCPWM0 Group #0, Counter #6
38	PCLK_TCPWM0_CLOCKS7	TCPWM0 Group #0, Counter #7
40	PCLK_TCPWM0_CLOCKS9	TCPWM0 Group #0, Counter #9
41	PCLK_TCPWM0_CLOCKS10	TCPWM0 Group #0, Counter #10
42	PCLK_TCPWM0_CLOCKS11	TCPWM0 Group #0, Counter #11
43	PCLK_TCPWM0_CLOCKS12	TCPWM0 Group #0, Counter #12
44	PCLK_TCPWM0_CLOCKS13	TCPWM0 Group #0, Counter #13
45	PCLK_TCPWM0_CLOCKS14	TCPWM0 Group #0, Counter #14
46	PCLK_TCPWM0_CLOCKS15	TCPWM0 Group #0, Counter #15
47	PCLK_TCPWM0_CLOCKS16	TCPWM0 Group #0, Counter #16
48	PCLK_TCPWM0_CLOCKS17	TCPWM0 Group #0, Counter #17
49	PCLK_TCPWM0_CLOCKS18	TCPWM0 Group #0, Counter #18
50	PCLK_TCPWM0_CLOCKS19	TCPWM0 Group #0, Counter #19

Table 20-1. Peripheral Clock Assignments *(continued)*

Output	Destination	Description
51	PCLK_TCPWM0_CLOCKS20	TCPWM0 Group #0, Counter #20
52	PCLK_TCPWM0_CLOCKS21	TCPWM0 Group #0, Counter #21
53	PCLK_TCPWM0_CLOCKS22	TCPWM0 Group #0, Counter #22
54	PCLK_TCPWM0_CLOCKS23	TCPWM0 Group #0, Counter #23
55	PCLK_TCPWM0_CLOCKS24	TCPWM0 Group #0, Counter #24
56	PCLK_TCPWM0_CLOCKS25	TCPWM0 Group #0, Counter #25
57	PCLK_TCPWM0_CLOCKS26	TCPWM0 Group #0, Counter #26
64	PCLK_TCPWM0_CLOCKS33	TCPWM0 Group #0, Counter #33
65	PCLK_TCPWM0_CLOCKS34	TCPWM0 Group #0, Counter #34
67	PCLK_TCPWM0_CLOCKS36	TCPWM0 Group #0, Counter #36
68	PCLK_TCPWM0_CLOCKS37	TCPWM0 Group #0, Counter #37
69	PCLK_TCPWM0_CLOCKS38	TCPWM0 Group #0, Counter #38
70	PCLK_TCPWM0_CLOCKS39	TCPWM0 Group #0, Counter #39
71	PCLK_TCPWM0_CLOCKS40	TCPWM0 Group #0, Counter #40
72	PCLK_TCPWM0_CLOCKS41	TCPWM0 Group #0, Counter #41
73	PCLK_TCPWM0_CLOCKS42	TCPWM0 Group #0, Counter #42
75	PCLK_TCPWM0_CLOCKS44	TCPWM0 Group #0, Counter #44
76	PCLK_TCPWM0_CLOCKS45	TCPWM0 Group #0, Counter #45
77	PCLK_TCPWM0_CLOCKS46	TCPWM0 Group #0, Counter #46
78	PCLK_TCPWM0_CLOCKS47	TCPWM0 Group #0, Counter #47
79	PCLK_TCPWM0_CLOCKS48	TCPWM0 Group #0, Counter #48
80	PCLK_TCPWM0_CLOCKS49	TCPWM0 Group #0, Counter #49
81	PCLK_TCPWM0_CLOCKS50	TCPWM0 Group #0, Counter #50
82	PCLK_TCPWM0_CLOCKS51	TCPWM0 Group #0, Counter #51
83	PCLK_TCPWM0_CLOCKS52	TCPWM0 Group #0, Counter #52
84	PCLK_TCPWM0_CLOCKS53	TCPWM0 Group #0, Counter #53
85	PCLK_TCPWM0_CLOCKS54	TCPWM0 Group #0, Counter #54
86	PCLK_TCPWM0_CLOCKS55	TCPWM0 Group #0, Counter #55
94	PCLK_TCPWM0_CLOCKS256	TCPWM0 Group #1, Counter #0
95	PCLK_TCPWM0_CLOCKS257	TCPWM0 Group #1, Counter #1
96	PCLK_TCPWM0_CLOCKS258	TCPWM0 Group #1, Counter #2
98	PCLK_TCPWM0_CLOCKS260	TCPWM0 Group #1, Counter #4
106	PCLK_TCPWM0_CLOCKS512	TCPWM0 Group #2, Counter #0
108	PCLK_TCPWM0_CLOCKS514	TCPWM0 Group #2, Counter #2

21. Faults

Table 21-1. Fault Assignments

Fault	Source	Description
0	CPUSS_MPU_VIO_0	CM0+ SMPU violation DATA0[31:0]: Violating address. DATA1[0]: User read. DATA1[1]: User write. DATA1[2]: User execute. DATA1[3]: Privileged read. DATA1[4]: Privileged write. DATA1[5]: Privileged execute. DATA1[6]: Non-secure. DATA1[11:8]: Master identifier. DATA1[15:12]: Protection context identifier. DATA1[31]: '0' MPU violation; '1': SMPU violation.
1	CPUSS_MPU_VIO_1	Crypto SMPU violation. See CPUSS_MPU_VIO_0 description.
2	CPUSS_MPU_VIO_2	P-DMA0 MPU/SMPU violation. See CPUSS_MPU_VIO_0 description.
3	CPUSS_MPU_VIO_3	P-DMA1 MPU/SMPU violation. See CPUSS_MPU_VIO_0 description.
4	CPUSS_MPU_VIO_4	M-DMA0 MPU/SMPU violation. See CPUSS_MPU_VIO_0 description.
15	CPUSS_MPU_VIO_15	Test Controller MPU/SMPU violation. See CPUSS_MPU_VIO_0 description.
16	CPUSS_MPU_VIO_16	CM4 system bus AHB-Lite interface MPU violation. See CPUSS_MPU_VIO_0 description.
17	CPUSS_MPU_VIO_17	CM4 code bus AHB-Lite interface MPU violation for non flash controller accesses. See CPUSS_MPU_VIO_0 description.
18	CPUSS_MPU_VIO_18	CM4 code bus AHB-Lite interface MPU violation for flash controller accesses. See CPUSS_MPU_VIO_0 description.
26	PERI_PERI_C_ECC	Peripheral protection SRAM correctable ECC violation DATA0[10:0]: Violating address. DATA1[7:0]: Syndrome of SRAM word.
27	PERI_PERI_NC_ECC	Peripheral protection SRAM non-correctable ECC violation
28	PERI_MS_VIO_0	CM0+ Peripheral Master Interface PPU violation DATA0[31:0]: Violating address. DATA1[0]: User read. DATA1[1]: User write. DATA1[2]: User execute. DATA1[3]: Privileged read. DATA1[4]: Privileged write. DATA1[5]: Privileged execute. DATA1[6]: Non-secure. DATA1[11:8]: Master identifier. DATA1[15:12]: Protection context identifier. DATA1[31:28]: “0”: master interface, PPU violation, “1': timeout detected, “2”: bus error, other: undefined.
29	PERI_MS_VIO_1	CM4 Peripheral Master Interface PPU violation. See PERI_MS_VIO_0 description.
30	PERI_MS_VIO_2	P-DMA0 Peripheral Master Interface PPU violation. See PERI_MS_VIO_0 description.
31	PERI_MS_VIO_3	P-DMA1 Peripheral Master Interface PPU violation. See PERI_MS_VIO_0 description.
32	PERI_GROUP_VIO_0	Peripheral Group #0 violation. DATA0[31:0]: Violating address. DATA1[0]: User read. DATA1[1]: User write. DATA1[2]: User execute. DATA1[3]: Privileged read. DATA1[4]: Privileged write. DATA1[5]: Privileged execute. DATA1[6]: Non-secure. DATA1[11:8]: Master identifier. DATA1[15:12]: Protection context identifier. DATA1[31:28]: “0”: decoder or peripheral bus error, other: undefined.
33	PERI_GROUP_VIO_1	Peripheral Group #1 violation. See PERI_GROUP_VIO_0 description.
34	PERI_GROUP_VIO_2	Peripheral Group #2 violation. See PERI_GROUP_VIO_0 description.

Table 21-1. Fault Assignments *(continued)*

Fault	Source	Description
35	PERI_GROUP_VIO_3	Peripheral Group #3 violation. See PERI_GROUP_VIO_0 description.
37	PERI_GROUP_VIO_5	Peripheral Group #5 violation. See PERI_GROUP_VIO_0 description.
38	PERI_GROUP_VIO_6	Peripheral Group #6 violation. See PERI_GROUP_VIO_0 description.
41	PERI_GROUP_VIO_9	Peripheral Group #9 violation. See PERI_GROUP_VIO_0 description.
48	CPUSS_FLASHC_MAIN_BUS_ERROR	Flash controller main flash bus error FAULT_DATA0[26:0]: Violating address. Append 5'b00010 as most significant bits to derive 32-bit system address. FAULT_DATA1[11:8]: Master identifier.
49	CPUSS_FLASHC_MAIN_C_ECC	Flash controller main flash correctable ECC violation DATA[26:0]: Violating address. Append 5'b00010 as most significant bits to derive 32-bit system address. DATA1[7:0]: Syndrome of 64-bit word (at address offset 0x00). DATA1[15:8]: Syndrome of 64-bit word (at address offset 0x08). DATA1[23:16]: Syndrome of 64-bit word (at address offset 0x10). DATA1[31:24]: Syndrome of 64-bit word (at address offset 0x18).
50	CPUSS_FLASHC_MAIN_NC_ECC	Flash controller main flash non-correctable ECC violation. See CPUSS_FLASHC_MAIN_C_ECC description.
51	CPUSS_FLASHC_WORK_BUS_ERROR	Flash controller work-flash bus error. See CPUSS_FLASHC_MAIN_BUS_ERR description.
52	CPUSS_FLASHC_WORK_C_ECC	Flash controller work flash correctable ECC violation. DATA0[26:0]: Violating address. Append 5'b00010 as most significant bits to derive 32-bit system address. DATA1[6:0]: Syndrome of 32-bit word.
53	CPUSS_FLASHC_WORK_NC_ECC	Flash controller work-flash non-correctable ECC violation. See CPUSS_FLASHC_WORK_C_ECC description.
54	CPUSS_FLASHC_CM0_CA_C_ECC	Flash controller CM0+ cache correctable ECC violation. DATA0[26:0]: Violating address. DATA1[6:0]: Syndrome of 32-bit SRAM word (at address offset 0x0). DATA1[14:8]: Syndrome of 32-bit SRAM word (at address offset 0x4). DATA1[22:16]: Syndrome of 32-bit SRAM word (at address offset 0x8). DATA1[30:24]: Syndrome of 32-bit SRAM word (at address offset 0xc).
55	CPUSS_FLASHC_CM0_CA_NC_ECC	Flash controller CM0+ cache non-correctable ECC violation. See CPUSS_FLASHC_CM0_CA_C_ECC description.
56	CPUSS_FLASHC_CM4_CA_C_ECC	Flash controller CM4 cache correctable ECC violation. See CPUSS_FLASHC_CM0_CA_C_ECC description.
57	CPUSS_FLASHC_CM4_CA_NC_ECC	Flash controller CM4 cache non-correctable ECC violation. See CPUSS_FLASHC_CM0_CA_C_ECC description.
58	CPUSS_RAMC0_C_ECC	System memory controller 0 correctable ECC violation: DATA0[31:0]: Violating address. DATA1[6:0]: Syndrome of 32-bit SRAM code word.
59	CPUSS_RAMC0_NC_ECC	System memory controller 0 non-correctable ECC violation. See CPUSS_RAMC0_C_ECC description.
64	CPUSS_CRYPTO_C_ECC	Crypto memory correctable ECC violation. DATA0[31:0]: Violating address. DATA1[6:0]: Syndrome of Least Significant 32-bit SRAM. DATA1[14:8]: Syndrome of Most Significant 32-bit SRAM.
65	CPUSS_CRYPTO_NC_ECC	Crypto memory non-correctable ECC violation. See CPUSS_CRYPTO_C_ECC description.
70	CPUSS_DW0_C_ECC	P-DMA0 memory correctable ECC violation: DATA0[11:0]: Violating DW SRAM address (word address, assuming byte addressable). DATA1[6:0]: Syndrome of 32-bit SRAM code word.
71	CPUSS_DW0_NC_ECC	P-DMA0 memory non-correctable ECC violation. See CPUSS_DW0_C_ECC description.
72	CPUSS_DW1_C_ECC	P-DMA1 memory correctable ECC violation. See CPUSS_DW0_C_ECC description.
73	CPUSS_DW1_NC_ECC	P-DMA1 memory non-correctable ECC violation. See CPUSS_DW0_C_ECC description.

Table 21-1. Fault Assignments *(continued)*

Fault	Source	Description
74	CPUSS_FM_SRAM_C_ECC	Flash code storage SRAM memory correctable ECC violation: DATA0[15:0]: Address location in the eCT Flash SRAM. DATA1[6:0]: Syndrome of 32-bit SRAM word.
75	CPUSS_FM_SRAM_NC_ECC	Flash code storage SRAM memory non-correctable ECC violation: See CPUSS_FM_SRAMC_C_ECC description.
80	CANFD_0_CAN_C_ECC	CAN0 message buffer correctable ECC violation: DATA0[15:0]: Violating address. DATA0[22:16]: ECC violating data[38:32] from MRAM. DATA0[27:24]: Master ID: 0-7 = CAN channel ID within mxttcanfd cluster, 8 = AHB I/F DATA1[31:0]: ECC violating data[31:0] from MRAM.
81	CANFD_0_CAN_NC_ECC	CAN0 message buffer non-correctable ECC violation: DATA0[15:0]: Violating address. DATA0[22:16]: ECC violating data[38:32] from MRAM (not for Address Error). DATA0[27:24]: Master ID: 0-7 = CAN channel ID within mxttcanfd cluster, 8 = AHB I/F DATA0[30]: Write access, only possible for Address Error DATA0[31]: Address Error: a CAN channel did an MRAM access above MRAM_SIZE DATA1[31:0]: ECC violating data[31:0] from MRAM (not for Address Error).
82	CANFD_1_CAN_C_ECC	CAN1 message buffer correctable ECC violation. See CANFD_0_CAN_C_ECC description.
83	CANFD_1_CAN_NC_ECC	CAN1 message buffer non-correctable ECC violation. See CANFD_0_CAN_NC_ECC description.
90	SRSS_FAULT_CSV	Consolidated fault output for clock supervisors. Multiple CSV can detect a violation at the same time. DATA0[15:0]: CLK_HF* root CSV violation flags. DATA0[24]: CLK_REF CSV violation flag (reference clock for CLK_HF CSVs) DATA0[25]: CLK_LF CSV violation flag DATA0[26]: CLK_HVILO CSV violation flag
91	SRSS_FAULT_SSV	Consolidated fault output for supply supervisors. Multiple CSV can detect a violation at the same time. DATA0[0]: BOD on VDDA DATA[1]: OVD on VDDA DATA[16]: LVD/HVD #1 DATA0[17]: LVD/HVD #2
92	SRSS_FAULT_MCWDT0	Fault output for MCWDT0 (all sub-counters) Multiple counters can detect a violation at the same time. DATA0[0]: MCWDT sub counter 0 LOWER_LIMIT DATA0[1]: MCWDT sub counter 0 UPPER_LIMIT DATA0[2]: MCWDT sub counter 1 LOWER_LIMIT DATA0[3]: MCWDT sub counter 1 UPPER_LIMIT
93	SRSS_FAULT_MCWDT1	Fault output for MCWDT1 (all sub-counters). See SRSS_FAULT_MCWDT0 description.

22. Peripheral Protection Unit Fixed Structure Pairs

Protection pair is a pair PPU structures, a master and a slave structure. The master structure protects the slave structure, and the slave structure protects resources such as peripheral registers, or the peripheral itself.

Table 22-1. PPU Fixed Structure Pairs

Pair No.	PPU Fixed Structure Pair	Address	Size	Description
0	PERI_MS_PPU_FX_PERI_MAIN	0x40000000	0x00002000	Peripheral Interconnect main
1	PERI_MS_PPU_FX_PERI_SECURE	0x40002000	0x00000004	Peripheral interconnect secure
2	PERI_MS_PPU_FX_PERI_GR0_GROUP	0x40004010	0x00000004	Peripheral Group #0 main
3	PERI_MS_PPU_FX_PERI_GR1_GROUP	0x40004030	0x00000004	Peripheral Group #1 main
4	PERI_MS_PPU_FX_PERI_GR2_GROUP	0x40004050	0x00000004	Peripheral Group #2 main
5	PERI_MS_PPU_FX_PERI_GR3_GROUP	0x40004060	0x00000020	Peripheral Group #3 main
6	PERI_MS_PPU_FX_PERI_GR5_GROUP	0x400040A0	0x00000020	Peripheral Group #5 main
7	PERI_MS_PPU_FX_PERI_GR6_GROUP	0x400040C0	0x00000020	Peripheral Group #6 main
8	PERI_MS_PPU_FX_PERI_GR9_GROUP	0x40004120	0x00000020	Peripheral Group #9 main
9	PERI_MS_PPU_FX_PERI_TR	0x40008000	0x00008000	Peripheral trigger multiplexer
10	PERI_MS_PPU_FX_CRYPTO_MAIN	0x40100000	0x00000400	Crypto main
11	PERI_MS_PPU_FX_CRYPTO_CRYPTO	0x40101000	0x00000800	Crypto MMIO (Memory Mapped I/O)
12	PERI_MS_PPU_FX_CRYPTO_BOOT	0x40102000	0x00000100	Crypto boot
13	PERI_MS_PPU_FX_CRYPTO_KEY0	0x40102100	0x00000004	Crypto Key #0
14	PERI_MS_PPU_FX_CRYPTO_KEY1	0x40102120	0x00000004	Crypto Key #1
15	PERI_MS_PPU_FX_CRYPTO_BUF	0x40108000	0x00002000	Crypto buffer
16	PERI_MS_PPU_FX_CPUSS_CM4	0x40200000	0x00000400	CM4 CPU core
17	PERI_MS_PPU_FX_CPUSS_CM0	0x40201000	0x00001000	CM0+ CPU core
18	PERI_MS_PPU_FX_CPUSS_BOOT[30]	0x40202000	0x00000200	CPUSS boot
19	PERI_MS_PPU_FX_CPUSS_CM0_INT	0x40208000	0x00000800	CPUSS CM0+ interrupts
20	PERI_MS_PPU_FX_CPUSS_CM4_INT	0x4020A000	0x00000800	CPUSS CM4 interrupts
21	PERI_MS_PPU_FX_FAULT_STRUCT0_MAIN	0x40210000	0x00000100	CPUSS Fault Structure #0 main
22	PERI_MS_PPU_FX_FAULT_STRUCT1_MAIN	0x40210100	0x00000100	CPUSS Fault Structure #1 main
23	PERI_MS_PPU_FX_FAULT_STRUCT2_MAIN	0x40210200	0x00000100	CPUSS Fault Structure #2 main
24	PERI_MS_PPU_FX_FAULT_STRUCT3_MAIN	0x40210300	0x00000100	CPUSS Fault Structure #3 main
25	PERI_MS_PPU_FX_IPC_STRUCT0_IPC	0x40220000	0x00000020	CPUSS IPC Structure #0
26	PERI_MS_PPU_FX_IPC_STRUCT1_IPC	0x40220020	0x00000020	CPUSS IPC Structure #1
27	PERI_MS_PPU_FX_IPC_STRUCT2_IPC	0x40220040	0x00000020	CPUSS IPC Structure #2
28	PERI_MS_PPU_FX_IPC_STRUCT3_IPC	0x40220060	0x00000020	CPUSS IPC Structure #3
29	PERI_MS_PPU_FX_IPC_STRUCT4_IPC	0x40220080	0x00000020	CPUSS IPC Structure #4
30	PERI_MS_PPU_FX_IPC_STRUCT5_IPC	0x402200A0	0x00000020	CPUSS IPC Structure #5
31	PERI_MS_PPU_FX_IPC_STRUCT6_IPC	0x402200C0	0x00000020	CPUSS IPC Structure #6
32	PERI_MS_PPU_FX_IPC_STRUCT7_IPC	0x402200E0	0x00000020	CPUSS IPC Structure #7
33	PERI_MS_PPU_FX_IPC_INTR_STRUCT0_INTR	0x40221000	0x00000010	CPUSS IPC Interrupt Structure #0
34	PERI_MS_PPU_FX_IPC_INTR_STRUCT1_INTR	0x40221020	0x00000010	CPUSS IPC Interrupt Structure #1
35	PERI_MS_PPU_FX_IPC_INTR_STRUCT2_INTR	0x40221040	0x00000010	CPUSS IPC Interrupt Structure #2
36	PERI_MS_PPU_FX_IPC_INTR_STRUCT3_INTR	0x40221060	0x00000010	CPUSS IPC Interrupt Structure #3

Note
30. Fixed PPU is configured inside the Boot and user is not allowed to change the attributes of this PPU.

Table 22-1. PPU Fixed Structure Pairs *(continued)*

Pair No.	PPU Fixed Structure Pair	Address	Size	Description
37	PERI_MS_PPU_FX_IPC_INTR_STRUCT4_INTR	0x40221080	0x00000010	CPUSS IPC Interrupt Structure #4
38	PERI_MS_PPU_FX_IPC_INTR_STRUCT5_INTR	0x402210A0	0x00000010	CPUSS IPC Interrupt Structure #5
39	PERI_MS_PPU_FX_IPC_INTR_STRUCT6_INTR	0x402210C0	0x00000010	CPUSS IPC Interrupt Structure #6
40	PERI_MS_PPU_FX_IPC_INTR_STRUCT7_INTR	0x402210E0	0x00000010	CPUSS IPC Interrupt Structure #7
41	PERI_MS_PPU_FX_PROT_SMPU_MAIN	0x40230000	0x00000040	Peripheral protection SMPU main
42	PERI_MS_PPU_FX_PROT_MPU0_MAIN	0x40234000	0x00000004	Peripheral protection MPU #0 main
43	PERI_MS_PPU_FX_PROT_MPU14_MAIN	0x40237800	0x00000004	Peripheral protection MPU #14 main
44	PERI_MS_PPU_FX_PROT_MPU15_MAIN	0x40237C00	0x00000400	Peripheral protection MPU #15 main
45	PERI_MS_PPU_FX_FLASHC_MAIN	0x40240000	0x00000008	Flash controller main
46	PERI_MS_PPU_FX_FLASHC_CMD	0x40240008	0x00000004	Flash controller command
47	PERI_MS_PPU_FX_FLASHC_DFT	0x40240200	0x00000100	Flash controller tests
48	PERI_MS_PPU_FX_FLASHC_CM0	0x40240400	0x00000080	Flash controller CM0+
49	PERI_MS_PPU_FX_FLASHC_CM4	0x40240480	0x00000080	Flash controller CM4
50	PERI_MS_PPU_FX_FLASHC_CRYPTO	0x40240500	0x00000004	Flash controller Crypto
51	PERI_MS_PPU_FX_FLASHC_DW0	0x40240580	0x00000004	Flash controller P-DMA0
52	PERI_MS_PPU_FX_FLASHC_DW1	0x40240600	0x00000004	Flash controller P-DMA1
53	PERI_MS_PPU_FX_FLASHC_DMAC	0x40240680	0x00000004	Flash controller M-DMA0
54	PERI_MS_PPU_FX_FLASHC_FlashMgmt[30]	0x4024F000	0x00000080	Flash management
55	PERI_MS_PPU_FX_FLASHC_MainSafety	0x4024F400	0x00000008	Flash controller code-flash safety
56	PERI_MS_PPU_FX_FLASHC_WorkSafety	0x4024F500	0x00000004	Flash controller work-flash safety
57	PERI_MS_PPU_FX_SRSS_GENERAL	0x40260000	0x00000400	SRSS General
58	PERI_MS_PPU_FX_SRSS_MAIN	0x40261000	0x00001000	SRSS main
59	PERI_MS_PPU_FX_SRSS_SECURE	0x40262000	0x00002000	SRSS secure
60	PERI_MS_PPU_FX_MCWDT0_CONFIG	0x40268000	0x00000080	MCWDT #0 configuration
61	PERI_MS_PPU_FX_MCWDT1_CONFIG	0x40268100	0x00000080	MCWDT #1 configuration
62	PERI_MS_PPU_FX_MCWDT0_MAIN	0x40268080	0x00000040	MCWDT #0 main
63	PERI_MS_PPU_FX_MCWDT1_MAIN	0x40268180	0x00000040	MCWDT #1 main
64	PERI_MS_PPU_FX_WDT_CONFIG	0x4026C000	0x00000020	System WDT configuration
65	PERI_MS_PPU_FX_WDT_MAIN	0x4026C040	0x00000020	System WDT main
66	PERI_MS_PPU_FX_BACKUP_BACKUP	0x40270000	0x00010000	SRSS backup
67	PERI_MS_PPU_FX_DW0_DW	0x40280000	0x00000100	P-DMA0 main
68	PERI_MS_PPU_FX_DW1_DW	0x40290000	0x00000100	P-DMA1 main
69	PERI_MS_PPU_FX_DW0_DW_CRC	0x40280100	0x00000080	P-DMA0 CRC
70	PERI_MS_PPU_FX_DW1_DW_CRC	0x40290100	0x00000080	P-DMA1 CRC
71	PERI_MS_PPU_FX_DW0_CH_STRUCT0_CH	0x40288000	0x00000040	P-DMA0 Channel #0
72	PERI_MS_PPU_FX_DW0_CH_STRUCT1_CH	0x40288040	0x00000040	P-DMA0 Channel #1
73	PERI_MS_PPU_FX_DW0_CH_STRUCT2_CH	0x40288080	0x00000040	P-DMA0 Channel #2
74	PERI_MS_PPU_FX_DW0_CH_STRUCT3_CH	0x402880C0	0x00000040	P-DMA0 Channel #3
75	PERI_MS_PPU_FX_DW0_CH_STRUCT4_CH	0x40288100	0x00000040	P-DMA0 Channel #4
76	PERI_MS_PPU_FX_DW0_CH_STRUCT5_CH	0x40288140	0x00000040	P-DMA0 Channel #5
77	PERI_MS_PPU_FX_DW0_CH_STRUCT6_CH	0x40288180	0x00000040	P-DMA0 Channel #6
78	PERI_MS_PPU_FX_DW0_CH_STRUCT7_CH	0x402881C0	0x00000040	P-DMA0 Channel #7
79	PERI_MS_PPU_FX_DW0_CH_STRUCT8_CH	0x40288200	0x00000040	P-DMA0 Channel #8

Table 22-1. PPU Fixed Structure Pairs *(continued)*

Pair No.	PPU Fixed Structure Pair	Address	Size	Description
80	PERI_MS_PPU_FX_DW0_CH_STRUCT9_CH	0x40288240	0x00000040	P-DMA0 Channel #9
81	PERI_MS_PPU_FX_DW0_CH_STRUCT10_CH	0x40288280	0x00000040	P-DMA0 Channel #10
82	PERI_MS_PPU_FX_DW0_CH_STRUCT11_CH	0x402882C0	0x00000040	P-DMA0 Channel #11
83	PERI_MS_PPU_FX_DW0_CH_STRUCT12_CH	0x40288300	0x00000040	P-DMA0 Channel #12
84	PERI_MS_PPU_FX_DW0_CH_STRUCT13_CH	0x40288340	0x00000040	P-DMA0 Channel #13
85	PERI_MS_PPU_FX_DW0_CH_STRUCT14_CH	0x40288380	0x00000040	P-DMA0 Channel #14
86	PERI_MS_PPU_FX_DW0_CH_STRUCT15_CH	0x402883C0	0x00000040	P-DMA0 Channel #15
87	PERI_MS_PPU_FX_DW0_CH_STRUCT16_CH	0x40288400	0x00000040	P-DMA0 Channel #16
88	PERI_MS_PPU_FX_DW0_CH_STRUCT17_CH	0x40288440	0x00000040	P-DMA0 Channel #17
89	PERI_MS_PPU_FX_DW0_CH_STRUCT18_CH	0x40288480	0x00000040	P-DMA0 Channel #18
90	PERI_MS_PPU_FX_DW0_CH_STRUCT19_CH	0x402884C0	0x00000040	P-DMA0 Channel #19
91	PERI_MS_PPU_FX_DW0_CH_STRUCT20_CH	0x40288500	0x00000040	P-DMA0 Channel #20
92	PERI_MS_PPU_FX_DW0_CH_STRUCT21_CH	0x40288540	0x00000040	P-DMA0 Channel #21
96	PERI_MS_PPU_FX_DW0_CH_STRUCT25_CH	0x40288640	0x00000040	P-DMA0 Channel #25
97	PERI_MS_PPU_FX_DW0_CH_STRUCT26_CH	0x40288680	0x00000040	P-DMA0 Channel #26
98	PERI_MS_PPU_FX_DW0_CH_STRUCT27_CH	0x402886C0	0x00000040	P-DMA0 Channel #27
99	PERI_MS_PPU_FX_DW0_CH_STRUCT28_CH	0x40288700	0x00000040	P-DMA0 Channel #28
100	PERI_MS_PPU_FX_DW0_CH_STRUCT29_CH	0x40288740	0x00000040	P-DMA0 Channel #29
101	PERI_MS_PPU_FX_DW0_CH_STRUCT30_CH	0x40288780	0x00000040	P-DMA0 Channel #30
104	PERI_MS_PPU_FX_DW0_CH_STRUCT33_CH	0x40288840	0x00000040	P-DMA0 Channel #33
105	PERI_MS_PPU_FX_DW0_CH_STRUCT34_CH	0x40288880	0x00000040	P-DMA0 Channel #34
107	PERI_MS_PPU_FX_DW0_CH_STRUCT36_CH	0x40288900	0x00000040	P-DMA0 Channel #36
108	PERI_MS_PPU_FX_DW0_CH_STRUCT37_CH	0x40288940	0x00000040	P-DMA0 Channel #37
113	PERI_MS_PPU_FX_DW0_CH_STRUCT42_CH	0x40288A80	0x00000040	P-DMA0 Channel #42
124	PERI_MS_PPU_FX_DW0_CH_STRUCT53_CH	0x40288D40	0x00000040	P-DMA0 Channel #53
125	PERI_MS_PPU_FX_DW0_CH_STRUCT54_CH	0x40288D80	0x00000040	P-DMA0 Channel #54
126	PERI_MS_PPU_FX_DW0_CH_STRUCT55_CH	0x40288DC0	0x00000040	P-DMA0 Channel #55
127	PERI_MS_PPU_FX_DW0_CH_STRUCT56_CH	0x40288E00	0x00000040	P-DMA0 Channel #56
128	PERI_MS_PPU_FX_DW0_CH_STRUCT57_CH	0x40288E40	0x00000040	P-DMA0 Channel #57
132	PERI_MS_PPU_FX_DW0_CH_STRUCT61_CH	0x40288F40	0x00000040	P-DMA0 Channel #61
133	PERI_MS_PPU_FX_DW0_CH_STRUCT62_CH	0x40288F80	0x00000040	P-DMA0 Channel #62
134	PERI_MS_PPU_FX_DW0_CH_STRUCT63_CH	0x40288FC0	0x00000040	P-DMA0 Channel #63
135	PERI_MS_PPU_FX_DW0_CH_STRUCT64_CH	0x40289000	0x00000040	P-DMA0 Channel #64
136	PERI_MS_PPU_FX_DW0_CH_STRUCT65_CH	0x40289040	0x00000040	P-DMA0 Channel #65
137	PERI_MS_PPU_FX_DW0_CH_STRUCT66_CH	0x40289080	0x00000040	P-DMA0 Channel #66
142	PERI_MS_PPU_FX_DW0_CH_STRUCT71_CH	0x402891C0	0x00000040	P-DMA0 Channel #71
143	PERI_MS_PPU_FX_DW0_CH_STRUCT72_CH	0x40289200	0x00000040	P-DMA0 Channel #72
152	PERI_MS_PPU_FX_DW0_CH_STRUCT81_CH	0x40289440	0x00000040	P-DMA0 Channel #81
153	PERI_MS_PPU_FX_DW0_CH_STRUCT82_CH	0x40289480	0x00000040	P-DMA0 Channel #82
154	PERI_MS_PPU_FX_DW0_CH_STRUCT83_CH	0x402894C0	0x00000040	P-DMA0 Channel #83
155	PERI_MS_PPU_FX_DW0_CH_STRUCT84_CH	0x40289500	0x00000040	P-DMA0 Channel #84
156	PERI_MS_PPU_FX_DW0_CH_STRUCT85_CH	0x40289540	0x00000040	P-DMA0 Channel #85
157	PERI_MS_PPU_FX_DW0_CH_STRUCT86_CH	0x40289580	0x00000040	P-DMA0 Channel #86

Table 22-1. PPU Fixed Structure Pairs *(continued)*

Pair No.	PPU Fixed Structure Pair	Address	Size	Description
158	PERI_MS_PPU_FX_DW0_CH_STRUCT87_CH	0x402895C0	0x00000040	P-DMA0 Channel #87
159	PERI_MS_PPU_FX_DW0_CH_STRUCT88_CH	0x40289600	0x00000040	P-DMA0 Channel #88
160	PERI_MS_PPU_FX_DW1_CH_STRUCT0_CH	0x40298000	0x00000040	P-DMA1 Channel #0
161	PERI_MS_PPU_FX_DW1_CH_STRUCT1_CH	0x40298040	0x00000040	P-DMA1 Channel #1
162	PERI_MS_PPU_FX_DW1_CH_STRUCT2_CH	0x40298080	0x00000040	P-DMA1 Channel #2
163	PERI_MS_PPU_FX_DW1_CH_STRUCT3_CH	0x402980C0	0x00000040	P-DMA1 Channel #3
164	PERI_MS_PPU_FX_DW1_CH_STRUCT4_CH	0x40298100	0x00000040	P-DMA1 Channel #4
165	PERI_MS_PPU_FX_DW1_CH_STRUCT5_CH	0x40298140	0x00000040	P-DMA1 Channel #5
166	PERI_MS_PPU_FX_DW1_CH_STRUCT6_CH	0x40298180	0x00000040	P-DMA1 Channel #6
167	PERI_MS_PPU_FX_DW1_CH_STRUCT7_CH	0x402981C0	0x00000040	P-DMA1 Channel #7
168	PERI_MS_PPU_FX_DW1_CH_STRUCT8_CH	0x40298200	0x00000040	P-DMA1 Channel #8
169	PERI_MS_PPU_FX_DW1_CH_STRUCT9_CH	0x40298240	0x00000040	P-DMA1 Channel #9
170	PERI_MS_PPU_FX_DW1_CH_STRUCT10_CH	0x40298280	0x00000040	P-DMA1 Channel #10
171	PERI_MS_PPU_FX_DW1_CH_STRUCT11_CH	0x402982C0	0x00000040	P-DMA1 Channel #11
174	PERI_MS_PPU_FX_DW1_CH_STRUCT14_CH	0x40298380	0x00000040	P-DMA1 Channel #14
175	PERI_MS_PPU_FX_DW1_CH_STRUCT15_CH	0x402983C0	0x00000040	P-DMA1 Channel #15
176	PERI_MS_PPU_FX_DW1_CH_STRUCT16_CH	0x40298400	0x00000040	P-DMA1 Channel #16
177	PERI_MS_PPU_FX_DW1_CH_STRUCT17_CH	0x40298440	0x00000040	P-DMA1 Channel #17
178	PERI_MS_PPU_FX_DW1_CH_STRUCT18_CH	0x40298480	0x00000040	P-DMA1 Channel #18
179	PERI_MS_PPU_FX_DW1_CH_STRUCT19_CH	0x402984C0	0x00000040	P-DMA1 Channel #19
182	PERI_MS_PPU_FX_DW1_CH_STRUCT22_CH	0x40298580	0x00000040	P-DMA1 Channel #22
183	PERI_MS_PPU_FX_DW1_CH_STRUCT23_CH	0x402985C0	0x00000040	P-DMA1 Channel #23
184	PERI_MS_PPU_FX_DW1_CH_STRUCT24_CH	0x40298600	0x00000040	P-DMA1 Channel #24
185	PERI_MS_PPU_FX_DW1_CH_STRUCT25_CH	0x40298640	0x00000040	P-DMA1 Channel #25
186	PERI_MS_PPU_FX_DW1_CH_STRUCT26_CH	0x40298680	0x00000040	P-DMA1 Channel #26
187	PERI_MS_PPU_FX_DW1_CH_STRUCT27_CH	0x402986C0	0x00000040	P-DMA1 Channel #27
188	PERI_MS_PPU_FX_DW1_CH_STRUCT28_CH	0x40298700	0x00000040	P-DMA1 Channel #28
189	PERI_MS_PPU_FX_DW1_CH_STRUCT29_CH	0x40298740	0x00000040	P-DMA1 Channel #29
193	PERI_MS_PPU_FX_DMAC_TOP	0x402A0000	0x00000010	M-DMA0 main
194	PERI_MS_PPU_FX_DMAC_CH0_CH	0x402A1000	0x00000100	M-DMA0 Channel #0
195	PERI_MS_PPU_FX_DMAC_CH1_CH	0x402A1100	0x00000100	M-DMA0 Channel #1
198	PERI_MS_PPU_FX_EFUSE_CTL	0x402C0000	0x00000200	EFUSE control
199	PERI_MS_PPU_FX_EFUSE_DATA	0x402C0800	0x00000200	EFUSE data
200	PERI_MS_PPU_FX_BIST	0x402F0000	0x00001000	Built-in self test
201	PERI_MS_PPU_FX_HSIOM_PRT0_PRT	0x40300000	0x00000008	HSIOm Port #0
203	PERI_MS_PPU_FX_HSIOM_PRT2_PRT	0x40300020	0x00000008	HSIOm Port #2
204	PERI_MS_PPU_FX_HSIOM_PRT3_PRT	0x40300030	0x00000008	HSIOm Port #3
206	PERI_MS_PPU_FX_HSIOM_PRT5_PRT	0x40300050	0x00000008	HSIOm Port #5
207	PERI_MS_PPU_FX_HSIOM_PRT6_PRT	0x40300060	0x00000008	HSIOm Port #6
208	PERI_MS_PPU_FX_HSIOM_PRT7_PRT	0x40300070	0x00000008	HSIOm Port #7
209	PERI_MS_PPU_FX_HSIOM_PRT8_PRT	0x40300080	0x00000008	HSIOm Port #8
212	PERI_MS_PPU_FX_HSIOM_PRT11_PRT	0x403000B0	0x00000008	HSIOm Port #11
213	PERI_MS_PPU_FX_HSIOM_PRT12_PRT	0x403000C0	0x00000008	HSIOm Port #12

Table 22-1. PPU Fixed Structure Pairs *(continued)*

Pair No.	PPU Fixed Structure Pair	Address	Size	Description
214	PERI_MS_PPU_FX_HSIOM_PRT13_PRT	0x403000D0	0x00000008	HSIOm Port #13
215	PERI_MS_PPU_FX_HSIOM_PRT14_PRT	0x403000E0	0x00000008	HSIOm Port #14
218	PERI_MS_PPU_FX_HSIOM_PRT17_PRT	0x40300110	0x00000008	HSIOm Port #17
219	PERI_MS_PPU_FX_HSIOM_PRT18_PRT	0x40300120	0x00000008	HSIOm Port #18
220	PERI_MS_PPU_FX_HSIOM_PRT19_PRT	0x40300130	0x00000008	HSIOm Port #19
222	PERI_MS_PPU_FX_HSIOM_PRT21_PRT	0x40300150	0x00000008	HSIOm Port #21
223	PERI_MS_PPU_FX_HSIOM_PRT22_PRT	0x40300160	0x00000008	HSIOm Port #22
224	PERI_MS_PPU_FX_HSIOM_PRT23_PRT	0x40300170	0x00000008	HSIOm Port #23
225	PERI_MS_PPU_FX_HSIOM_AMUX	0x40302000	0x00000010	HSIOm Analog multiplexer
226	PERI_MS_PPU_FX_HSIOM_MON	0x40302200	0x00000010	HSIOm monitor
227	PERI_MS_PPU_FX_HSIOM_ALTJTAG	0x40302240	0x00000004	HSIOm Alternate JTAG
228	PERI_MS_PPU_FX_GPIO_PRT0_PRT	0x40310000	0x00000040	GPIO_ENH Port #0
230	PERI_MS_PPU_FX_GPIO_PRT2_PRT	0x40310100	0x00000040	GPIO_STD Port #2
231	PERI_MS_PPU_FX_GPIO_PRT3_PRT	0x40310180	0x00000040	GPIO_STD Port #3
233	PERI_MS_PPU_FX_GPIO_PRT5_PRT	0x40310280	0x00000040	GPIO_STD Port #5
234	PERI_MS_PPU_FX_GPIO_PRT6_PRT	0x40310300	0x00000040	GPIO_STD Port #6
235	PERI_MS_PPU_FX_GPIO_PRT7_PRT	0x40310380	0x00000040	GPIO_STD Port #7
236	PERI_MS_PPU_FX_GPIO_PRT8_PRT	0x40310400	0x00000040	GPIO_STD Port #8
239	PERI_MS_PPU_FX_GPIO_PRT11_PRT	0x40310580	0x00000040	GPIO_STD Port #11
240	PERI_MS_PPU_FX_GPIO_PRT12_PRT	0x40310600	0x00000040	GPIO_STD Port #12
241	PERI_MS_PPU_FX_GPIO_PRT13_PRT	0x40310680	0x00000040	GPIO_STD Port #13
242	PERI_MS_PPU_FX_GPIO_PRT14_PRT	0x40310700	0x00000040	GPIO_STD Port #14
245	PERI_MS_PPU_FX_GPIO_PRT17_PRT	0x40310880	0x00000040	GPIO_STD Port #17
246	PERI_MS_PPU_FX_GPIO_PRT18_PRT	0x40310900	0x00000040	GPIO_STD Port #18
247	PERI_MS_PPU_FX_GPIO_PRT19_PRT	0x40310980	0x00000040	GPIO_STD Port #19
249	PERI_MS_PPU_FX_GPIO_PRT21_PRT	0x40310A80	0x00000040	GPIO_STD Port #21
250	PERI_MS_PPU_FX_GPIO_PRT22_PRT	0x40310B00	0x00000040	GPIO_STD Port #22
251	PERI_MS_PPU_FX_GPIO_PRT23_PRT	0x40310B80	0x00000040	GPIO_STD Port #23
252	PERI_MS_PPU_FX_GPIO_PRT0_CFG	0x40310040	0x00000020	GPIO_ENH Port #0 configuration
254	PERI_MS_PPU_FX_GPIO_PRT2_CFG	0x40310140	0x00000020	GPIO_STD Port #2 configuration
255	PERI_MS_PPU_FX_GPIO_PRT3_CFG	0x403101C0	0x00000020	GPIO_STD Port #3 configuration
257	PERI_MS_PPU_FX_GPIO_PRT5_CFG	0x403102C0	0x00000020	GPIO_STD Port #5 configuration
258	PERI_MS_PPU_FX_GPIO_PRT6_CFG	0x40310340	0x00000020	GPIO_STD Port #6 configuration
259	PERI_MS_PPU_FX_GPIO_PRT7_CFG	0x403103C0	0x00000020	GPIO_STD Port #7 configuration
260	PERI_MS_PPU_FX_GPIO_PRT8_CFG	0x40310440	0x00000020	GPIO_STD Port #8 configuration
263	PERI_MS_PPU_FX_GPIO_PRT11_CFG	0x403105C0	0x00000020	GPIO_STD Port #11 configuration
264	PERI_MS_PPU_FX_GPIO_PRT12_CFG	0x40310640	0x00000020	GPIO_STD Port #12 configuration
265	PERI_MS_PPU_FX_GPIO_PRT13_CFG	0x403106C0	0x00000020	GPIO_STD Port #13 configuration
266	PERI_MS_PPU_FX_GPIO_PRT14_CFG	0x40310740	0x00000020	GPIO_STD Port #14 configuration
269	PERI_MS_PPU_FX_GPIO_PRT17_CFG	0x403108C0	0x00000020	GPIO_STD Port #17 configuration
270	PERI_MS_PPU_FX_GPIO_PRT18_CFG	0x40310940	0x00000020	GPIO_STD Port #18 configuration
271	PERI_MS_PPU_FX_GPIO_PRT19_CFG	0x403109C0	0x00000020	GPIO_STD Port #19 configuration
273	PERI_MS_PPU_FX_GPIO_PRT21_CFG	0x40310AC0	0x00000020	GPIO_STD Port #21 configuration

Table 22-1. PPU Fixed Structure Pairs *(continued)*

Pair No.	PPU Fixed Structure Pair	Address	Size	Description
274	PERI_MS_PPU_FX_GPIO_PRT22_CFG	0x40310B40	0x00000020	GPIO_STD Port #22 configuration
275	PERI_MS_PPU_FX_GPIO_PRT23_CFG	0x40310BC0	0x00000020	GPIO_STD Port #23 configuration
276	PERI_MS_PPU_FX_GPIO_GPIO	0x40314000	0x00000040	GPIO main
277	PERI_MS_PPU_FX_GPIO_TEST	0x40315000	0x00000008	GPIO test
278	PERI_MS_PPU_FX_SMARTIO_PRT12_PRT	0x40320C00	0x00000100	SMART I/O #12
279	PERI_MS_PPU_FX_SMARTIO_PRT13_PRT	0x40320D00	0x00000100	SMART I/O #13
280	PERI_MS_PPU_FX_SMARTIO_PRT14_PRT	0x40320E00	0x00000100	SMART I/O #14
283	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT0_CNT	0x40380000	0x00000080	TCPWM0 Group #0, Counter #0
284	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT1_CNT	0x40380080	0x00000080	TCPWM0 Group #0, Counter #1
285	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT2_CNT	0x40380100	0x00000080	TCPWM0 Group #0, Counter #2
287	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT4_CNT	0x40380200	0x00000080	TCPWM0 Group #0, Counter #4
288	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT5_CNT	0x40380280	0x00000080	TCPWM0 Group #0, Counter #5
289	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT6_CNT	0x40380300	0x00000080	TCPWM0 Group #0, Counter #6
290	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT7_CNT	0x40380380	0x00000080	TCPWM0 Group #0, Counter #7
292	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT9_CNT	0x40380480	0x00000080	TCPWM0 Group #0, Counter #9
293	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT10_CNT	0x40380500	0x00000080	TCPWM0 Group #0, Counter #10
294	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT11_CNT	0x40380580	0x00000080	TCPWM0 Group #0, Counter #11
295	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT12_CNT	0x40380600	0x00000080	TCPWM0 Group #0, Counter #12
296	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT13_CNT	0x40380680	0x00000080	TCPWM0 Group #0, Counter #13
297	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT14_CNT	0x40380700	0x00000080	TCPWM0 Group #0, Counter #14
298	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT15_CNT	0x40380780	0x00000080	TCPWM0 Group #0, Counter #15
299	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT16_CNT	0x40380800	0x00000080	TCPWM0 Group #0, Counter #16
300	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT17_CNT	0x40380880	0x00000080	TCPWM0 Group #0, Counter #17
301	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT18_CNT	0x40380900	0x00000080	TCPWM0 Group #0, Counter #18
302	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT19_CNT	0x40380980	0x00000080	TCPWM0 Group #0, Counter #19
303	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT20_CNT	0x40380A00	0x00000080	TCPWM0 Group #0, Counter #20
304	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT21_CNT	0x40380A80	0x00000080	TCPWM0 Group #0, Counter #21
305	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT22_CNT	0x40380B00	0x00000080	TCPWM0 Group #0, Counter #22
306	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT23_CNT	0x40380B80	0x00000080	TCPWM0 Group #0, Counter #23
307	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT24_CNT	0x40380C00	0x00000080	TCPWM0 Group #0, Counter #24
308	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT25_CNT	0x40380C80	0x00000080	TCPWM0 Group #0, Counter #25
309	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT26_CNT	0x40380D00	0x00000080	TCPWM0 Group #0, Counter #26
316	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT33_CNT	0x40381080	0x00000080	TCPWM0 Group #0, Counter #33
317	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT34_CNT	0x40381100	0x00000080	TCPWM0 Group #0, Counter #34
319	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT36_CNT	0x40381200	0x00000080	TCPWM0 Group #0, Counter #36
320	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT37_CNT	0x40381280	0x00000080	TCPWM0 Group #0, Counter #37
321	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT38_CNT	0x40381300	0x00000080	TCPWM0 Group #0, Counter #38
322	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT39_CNT	0x40381380	0x00000080	TCPWM0 Group #0, Counter #39
323	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT40_CNT	0x40381400	0x00000080	TCPWM0 Group #0, Counter #40
324	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT41_CNT	0x40381480	0x00000080	TCPWM0 Group #0, Counter #41
325	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT42_CNT	0x40381500	0x00000080	TCPWM0 Group #0, Counter #42
327	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT44_CNT	0x40381600	0x00000080	TCPWM0 Group #0, Counter #44
328	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT45_CNT	0x40381680	0x00000080	TCPWM0 Group #0, Counter #45

Table 22-1. PPU Fixed Structure Pairs *(continued)*

Pair No.	PPU Fixed Structure Pair	Address	Size	Description
329	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT46_CNT	0x40381700	0x00000080	TCPWM0 Group #0, Counter #46
330	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT47_CNT	0x40381780	0x00000080	TCPWM0 Group #0, Counter #47
331	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT48_CNT	0x40381800	0x00000080	TCPWM0 Group #0, Counter #48
332	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT49_CNT	0x40381880	0x00000080	TCPWM0 Group #0, Counter #49
333	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT50_CNT	0x40381900	0x00000080	TCPWM0 Group #0, Counter #50
334	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT51_CNT	0x40381980	0x00000080	TCPWM0 Group #0, Counter #51
335	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT52_CNT	0x40381A00	0x00000080	TCPWM0 Group #0, Counter #52
336	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT53_CNT	0x40381A80	0x00000080	TCPWM0 Group #0, Counter #53
337	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT54_CNT	0x40381B00	0x00000080	TCPWM0 Group #0, Counter #54
338	PERI_MS_PPU_FX_TCPWM0_GRP0_CNT55_CNT	0x40381B80	0x00000080	TCPWM0 Group #0, Counter #55
346	PERI_MS_PPU_FX_TCPWM0_GRP1_CNT0_CNT	0x40388000	0x00000080	TCPWM0 Group #1, Counter #0
347	PERI_MS_PPU_FX_TCPWM0_GRP1_CNT1_CNT	0x40388080	0x00000080	TCPWM0 Group #1, Counter #1
348	PERI_MS_PPU_FX_TCPWM0_GRP1_CNT2_CNT	0x40388100	0x00000080	TCPWM0 Group #1, Counter #2
350	PERI_MS_PPU_FX_TCPWM0_GRP1_CNT4_CNT	0x40388200	0x00000080	TCPWM0 Group #1, Counter #4
358	PERI_MS_PPU_FX_TCPWM0_GRP2_CNT0_CNT	0x40390000	0x00000080	TCPWM0 Group #2, Counter #0
360	PERI_MS_PPU_FX_TCPWM0_GRP2_CNT2_CNT	0x40390100	0x00000080	TCPWM0 Group #2, Counter #2
362	PERI_MS_PPU_FX_EVTGEN0	0x403F0000	0x00001000	Event generator #0
363	PERI_MS_PPU_FX_LIN0_MAIN	0x40500000	0x00000008	LIN0, main
364	PERI_MS_PPU_FX_LIN0_CH0_CH	0x40508000	0x00000100	LIN0, Channel #0
365	PERI_MS_PPU_FX_LIN0_CH1_CH	0x40508100	0x00000100	LIN0, Channel #1
366	PERI_MS_PPU_FX_LIN0_CH2_CH	0x40508200	0x00000100	LIN0, Channel #2
367	PERI_MS_PPU_FX_LIN0_CH3_CH	0x40508300	0x00000100	LIN0, Channel #3
368	PERI_MS_PPU_FX_LIN0_CH4_CH	0x40508400	0x00000100	LIN0, Channel #4
372	PERI_MS_PPU_FX_CANFD0_CH0_CH	0x40520000	0x00000200	CAN0, Channel #0
373	PERI_MS_PPU_FX_CANFD0_CH1_CH	0x40520200	0x00000200	CAN0, Channel #1
375	PERI_MS_PPU_FX_CANFD1_CH0_CH	0x40540000	0x00000200	CAN1, Channel #0
376	PERI_MS_PPU_FX_CANFD1_CH1_CH	0x40540200	0x00000200	CAN1, Channel #1
378	PERI_MS_PPU_FX_CANFD0_MAIN	0x40521000	0x00000100	CAN0 main
379	PERI_MS_PPU_FX_CANFD1_MAIN	0x40541000	0x00000100	CAN1 main
380	PERI_MS_PPU_FX_CANFD0_BUF	0x40530000	0x00010000	CAN0 buffer
381	PERI_MS_PPU_FX_CANFD1_BUF	0x40550000	0x00010000	CAN1 buffer
382	PERI_MS_PPU_FX_SCB0	0x40600000	0x00010000	SCB0
383	PERI_MS_PPU_FX_SCB1	0x40610000	0x00010000	SCB1
385	PERI_MS_PPU_FX_SCB3	0x40630000	0x00010000	SCB3
386	PERI_MS_PPU_FX_SCB4	0x40640000	0x00010000	SCB4
387	PERI_MS_PPU_FX_SCB5	0x40650000	0x00010000	SCB5
389	PERI_MS_PPU_FX_SCB7	0x40670000	0x00010000	SCB7
390	PERI_MS_PPU_FX_PASS0_SAR0_SAR	0x40900000	0x00000400	PASS SAR0
391	PERI_MS_PPU_FX_PASS0_SAR1_SAR	0x40901000	0x00000400	PASS SAR1
392	PERI_MS_PPU_FX_PASS0_SAR2_SAR	0x40902000	0x00000400	PASS SAR2
393	PERI_MS_PPU_FX_PASS0_SAR0_CH0_CH	0x40900800	0x00000040	SAR0, Channel #0
394	PERI_MS_PPU_FX_PASS0_SAR0_CH1_CH	0x40900840	0x00000040	SAR0, Channel #1
395	PERI_MS_PPU_FX_PASS0_SAR0_CH2_CH	0x40900880	0x00000040	SAR0, Channel #2

Table 22-1. PPU Fixed Structure Pairs *(continued)*

Pair No.	PPU Fixed Structure Pair	Address	Size	Description
396	PERI_MS_PPU_FX_PASS0_SAR0_CH3_CH	0x409008C0	0x00000040	SAR0, Channel #3
397	PERI_MS_PPU_FX_PASS0_SAR0_CH4_CH	0x40900900	0x00000040	SAR0, Channel #4
398	PERI_MS_PPU_FX_PASS0_SAR0_CH5_CH	0x40900940	0x00000040	SAR0, Channel #5
401	PERI_MS_PPU_FX_PASS0_SAR0_CH8_CH	0x40900A00	0x00000040	SAR0, Channel #8
402	PERI_MS_PPU_FX_PASS0_SAR0_CH9_CH	0x40900A40	0x00000040	SAR0, Channel #9
404	PERI_MS_PPU_FX_PASS0_SAR0_CH11_CH	0x40900AC0	0x00000040	SAR0, Channel #11
405	PERI_MS_PPU_FX_PASS0_SAR0_CH12_CH	0x40900B00	0x00000040	SAR0, Channel #12
410	PERI_MS_PPU_FX_PASS0_SAR0_CH17_CH	0x40900C40	0x00000040	SAR0, Channel #17
421	PERI_MS_PPU_FX_PASS0_SAR1_CH4_CH	0x40901900	0x00000040	SAR1, Channel #4
422	PERI_MS_PPU_FX_PASS0_SAR1_CH5_CH	0x40901940	0x00000040	SAR1, Channel #5
423	PERI_MS_PPU_FX_PASS0_SAR1_CH6_CH	0x40901980	0x00000040	SAR1, Channel #6
424	PERI_MS_PPU_FX_PASS0_SAR1_CH7_CH	0x409019C0	0x00000040	SAR1, Channel #7
425	PERI_MS_PPU_FX_PASS0_SAR1_CH8_CH	0x40901A00	0x00000040	SAR1, Channel #8
429	PERI_MS_PPU_FX_PASS0_SAR1_CH12_CH	0x40901B00	0x00000040	SAR1, Channel #12
430	PERI_MS_PPU_FX_PASS0_SAR1_CH13_CH	0x40901B40	0x00000040	SAR1, Channel #13
431	PERI_MS_PPU_FX_PASS0_SAR1_CH14_CH	0x40901B80	0x00000040	SAR1, Channel #14
432	PERI_MS_PPU_FX_PASS0_SAR1_CH15_CH	0x40901BC0	0x00000040	SAR1, Channel #15
433	PERI_MS_PPU_FX_PASS0_SAR1_CH16_CH	0x40901C00	0x00000040	SAR1, Channel #16
434	PERI_MS_PPU_FX_PASS0_SAR1_CH17_CH	0x40901C40	0x00000040	SAR1, Channel #17
439	PERI_MS_PPU_FX_PASS0_SAR1_CH22_CH	0x40901D80	0x00000040	SAR1, Channel #22
440	PERI_MS_PPU_FX_PASS0_SAR1_CH23_CH	0x40901DC0	0x00000040	SAR1, Channel #23
449	PERI_MS_PPU_FX_PASS0_SAR2_CH0_CH	0x40902800	0x00000040	SAR2, Channel #0
450	PERI_MS_PPU_FX_PASS0_SAR2_CH1_CH	0x40902840	0x00000040	SAR2, Channel #1
451	PERI_MS_PPU_FX_PASS0_SAR2_CH2_CH	0x40902880	0x00000040	SAR2, Channel #2
452	PERI_MS_PPU_FX_PASS0_SAR2_CH3_CH	0x409028C0	0x00000040	SAR2, Channel #3
453	PERI_MS_PPU_FX_PASS0_SAR2_CH4_CH	0x40902900	0x00000040	SAR2, Channel #4
454	PERI_MS_PPU_FX_PASS0_SAR2_CH5_CH	0x40902940	0x00000040	SAR2, Channel #5
455	PERI_MS_PPU_FX_PASS0_SAR2_CH6_CH	0x40902980	0x00000040	SAR2, Channel #6
456	PERI_MS_PPU_FX_PASS0_SAR2_CH7_CH	0x409029C0	0x00000040	SAR2, Channel #7
457	PERI_MS_PPU_FX_PASS0_TOP	0x409F0000	0x00001000	PASS0 SAR main

23. Bus Masters

The Arbiter (part of flash controller) performs priority-based arbitration based on the master identifier. Each bus master has a dedicated 4-bit master identifier. This master identifier is used for bus arbitration and IPC functionality.

Table 23-1. Bus Masters for Access and Protection Control

ID No.	Master ID	Description
0	CPUSS_MS_ID_CM0	Master ID for CM0+
1	CPUSS_MS_ID_CRYPTO	Master ID for Crypto
2	CPUSS_MS_ID_DW0	Master ID for P-DMA 0
3	CPUSS_MS_ID_DW1	Master ID for P-DMA 1
4	CPUSS_MS_ID_DMAC	Master ID for M-DMA0
14	CPUSS_MS_ID_CM4	Master ID for CM4
15	CPUSS_MS_ID_TC	Master ID for DAP Tap Controller

24. Miscellaneous Configuration

Table 24-1. Miscellaneous Configuration for CYT2B6 Devices

Sl. No.	Configuration	Number/Instances	Description
0	SRSS_NUM_CLKPATH	4	Number of clock paths. One for each of FLL, PLL, Direct and CSV
1	SRSS_NUM_HFROOT	3	Number of CLK_HFs present
2	PERI_PC_NR	8	Number of protection contexts
3	PERI_CLOCK_NR	110	Number of programmable clocks (outputs)
4	PERI_DIV_8_NR	32	Number of divide-by-8 clock dividers
5	PERI_DIV_16_NR	16	Number of divide-by-16 clock dividers
6	PERI_DIV_24_5_NR	8	Number of divide-by-24.5 clock dividers
7	CPUSS_CM0P_MPU_NR	8	Number of MPU regions in CM0+
8	CPUSS_CM4_MPU_NR	8	Number of MPU regions in CM4
9	CPUSS_CRYPTO_BUFF_SIZE	2048	Number of 32-bit words in the IP internal memory buffer (to allow for a 256-B, 512-B, 1-KB, 2-KB, 4-KB, 8-KB, 16-KB, and 32-KB memory buffer)
10	CPUSS_FAULT_FAULT_NR	4	Number of fault structures
11	CPUSS_IPC_IPC_NR	8	Number of IPC structures 0 - Reserved for CM0+ access 1 - Reserved for CM4 access 2 - Reserved for DAP access Remaining for user purposes
12	SCB0_EZ_DATA_NR	256	Number of EZ memory bytes. This memory is used in EZ mode, CMD_RESP mode and FIFO mode. Note: Only SCB0 supports EZ mode
13	CPUSS_PROT_SMPU_STRUCT_NR	16	Number of SMPU protection structures
14	TCPWM_TR_ONE_CNT_NR	3	Number of input triggers per counter, routed to one counter
15	TCPWM_TR_ALL_CNT_NR	27	Number of input triggers routed to all counters, based on the pin package
16	TCPWM_GRP_NR	3	Number of TCPWM0 counter groups
17	TCPWM_GRP_NR0_GRP_GRP_CNT_NR	46	Number of counters per TCPWM0 Group #0
18	TCPWM_GRP_NR0_CNT_GRP_CNT_WIDTH	16	Counter width in number of bits per TCPWM0 Group #0
19	TCPWM_GRP_NR1_GRP_GRP_CNT_NR	4	Number of counters per TCPWM0 Group #1
20	TCPWM_GRP_NR1_CNT_GRP_CNT_WIDTH	16	Counter width in number of bits per TCPWM0 Group #1
21	TCPWM_GRP_NR2_GRP_GRP_CNT_NR	2	Number of counters per TCPWM0 Group #2
22	TCPWM_GRP_NR2_CNT_GRP_CNT_WIDTH	32	Counter width in number of bits per TCPWM0 Group #2
23	CANFD0_MRAM_SIZE / CANFD1_MRAM_SIZE	24	Message RAM size in KB shared by all the channels
24	EVTGEN_COMP_STRUCT_NR	11	Number of Event Generator comparator structures

25. Development Support

CYT2B6 has a rich set of documentation, programming tools, and online resources to assist during the development process. Visit www.cypress.com to find out more.

25.1 Documentation

A suite of documentation supports CYT2B6 to ensure that you can find answers to your questions quickly. This section contains a list of some of the key documents.

25.1.1 Software User Guide

A step-by-step guide for using the sample driver library along with third-party IDEs such as IAR EWARM and GHS Multi.

25.1.2 Technical Reference Manual

The Technical Reference Manual (TRM) contains all the technical detail needed to use a CYT2B6 device, including a complete description of all registers. The TRM is available in the documentation section at www.cypress.com.

25.2 Tools

CYT2B6 is supported on third-party development tool ecosystems such as IAR and GHS. CYT2B6 is also supported by Cypress programming utilities for programming, erasing, or reading using Cypress' MiniProg4 or Segger J-link. More details are available in the documentation section at www.cypress.com.

26. Electrical Specifications

26.1 Absolute Maximum Ratings

Use of this device under conditions outside the min and max limits listed in Table 26-1 may cause permanent damage to the device. Exposure to conditions within the limits of Table 26-1 but beyond those of normal operation for extended periods of time may affect device reliability. The maximum storage temperature is 150 °C in compliance with JEDEC Standard JESD22-A103, High Temperature Storage Life. When operated under conditions within the limits of Table 26-1 but beyond those of normal operation, the device may not operate to specification.

Power considerations

The average chip-junction temperature, T_J, in °C, may be calculated using Equation 1:

$$T_J = T_A + (P_D \times \theta_{JA}) \quad \text{Equation. 1}$$

Where:

T_A is the ambient temperature in °C.

θ_{JA} is the package junction-to-ambient thermal resistance, in °C/W.

P_D is the sum of P_{INT} and P_{IO} ($P_D = P_{INT} + P_{IO}$).

P_{INT} is the chip internal power. ($P_{INT} = V_{DDD} \times I_{DD} + V_{DDA} \times I_A$)

P_{IO} represents the power dissipation on input and output pins; user determined.

For most applications, $P_{IO} < P_{INT}$ and may be neglected.

On the other hand, P_{IO} may be significant if the device is configured to continuously drive external modules and/or memories.

Table 26-1. Absolute Maximum Ratings

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
SID10_5	$V_{DDD\_ABS\_5}$	V_{DDD} power supply voltage[31]	V_{SSD} – 0.3	–	V_{SSD} + 6.0	V	For ports 0, 2, 3, 5, 17, 18, 19, 21, 22, 23
SID10B_5	$V_{DDIO\_1\_ABS\_5}$	V_{DDIO_1} power supply voltage[31]	V_{SSD} – 0.3	–	V_{SSD} + 6.0	V	$V_{DDIO\_1} \geq V_{DDD}$ For ports 6, 7, 8[32]
SID10C1	$V_{DDIO\_2\_ABS\_5}$	V_{DDIO_2} power supply voltage[31]	V_{SSD} – 0.3	–	V_{SSD} + 6.0	V	For ports 11, 12, 13, 14
SID11	V_{DDA_ABS}	V_{DDA} analog power supply voltage[31]	V_{SSA} – 0.3	–	V_{SSA} + 6.0	V	$V_{DDIO\_2} = V_{DDA}$
SID12	V_{REFH_ABS}	Analog reference voltage, HIGH [31]	V_{SSA} – 0.3	–	V_{SSA} + 6.0	V	$V_{REFH} \leq V_{DDA}$ + 0.3 V
SID12A	V_{REFL_ABS}	Analog reference voltage, LOW[31]	V_{SSA} – 0.3	–	V_{SSA} + 0.3	V	
SID15A_5	$V_{I0\_ABS0\_}5$	Input voltage[31]	V_{SSD} – 0.5	–	V_{DDD} + 0.5	V	For ports 0, 2, 3, 5, 17, 18, 19, 21, 22, 23
SID15B_5	$V_{I1\_ABS1\_}5$	Input voltage[31]	V_{SSD} – 0.5	–	V_{DDIO_1} + 0.5	V	For ports 6, 7, 8[32]
SID15C_5	$V_{I2\_ABS2\_}5$	Input voltage[31]	V_{SSD} – 0.5	–	V_{DDIO_2} + 0.5	V	For ports 11, 12, 13, 14,
SID16	V_{IA_ABS}	Analog input voltage[31]	V_{SSA} – 0.3	–	V_{DDA} + 0.3	V	
SID17A_5	$V_{O0\_ABS0\_}5$	Output voltage[31]	V_{SSD} – 0.3	–	V_{DDD} + 0.3		For ports 0, 2, 3, 5, 17, 18, 19, 21, 22, 23
SID17B_5	$V_{O1\_ABS1\_}5$	Output voltage[31]	V_{SSD} – 0.3	–	V_{DDIO_1} + 0.3	V	For ports 6, 7, 8[32]
SID17C_5	$V_{O2\_ABS2\_}5$	Output voltage[31]	V_{SSD} – 0.3	–	V_{DDIO_2} + 0.3	V	For ports 11, 12, 13, 14
SID18	I_{CLAMP_ABS}	Maximum clamp current [33, 34, 35]	–5	–	5	mA	
SID18A	$I_{CLAMP\_SUPPLY\_POS\_ABS}$	Maximum positive clamp current per I/O supply pin. Limit applies to I/O supply pin closest to the B+ injected current[36]	–	–	10	mA	+B injected DC currents are not allowed for Ports 11 and 21.
SID18B	$I_{CLAMP\_SUPPLY\_NEG\_ABS}$	Maximum negative clamp current per I/O ground pin. Limit applies to I/O supply pin closest to the B+ injected current[36]	–	–	10	mA	+B injected DC currents are not allowed for Ports 11 and 21.
SID18C	$I_{CLAMP\_TOTAL\_POS\_ABS}$	Maximum positive clamp current per I/O supply, if not limited by the per supply pin (based on SID18A).	–	–	50	mA	

Notes

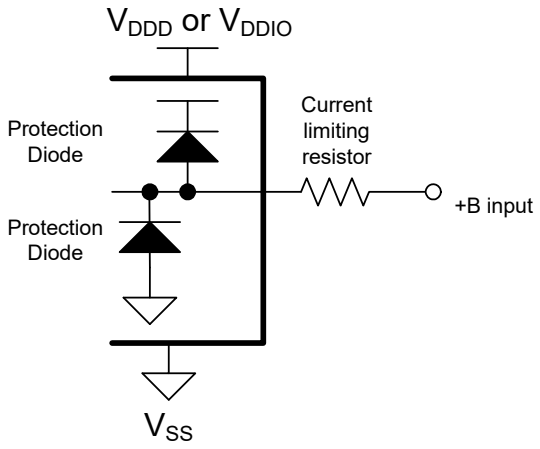
31. These parameters are based on the condition that $V_{SSD} = V_{SSA} = 0.0$ V.
32. The I/Os in V_{DDIO_1} domain are referred to the V_{DDD} domain in 64-LQFP package.
33. A current-limiting resistor must be provided such that the current at the I/O pin does not exceed rated values at any time, including during power transients. Refer to Figure 26-1. for more information on the recommended circuit.
34. V_{DDIO} and V_{DDD} must be sufficiently loaded or protected to prevent them from being pulled out of the recommended operating range by the clamp current.
35. When the conditions of [33], [34], and SID18A/B/C/D are met, $|I_{CLAMP\_ABS}|$ supersedes V_{IA_ABS} and V_{I_ABS}.
36. The definition of “closer” depends on the package. In LQFP packaging, “closest” is determined by counting pins. For example, in a 100-LQFP package, P5.2 (pin 16) is closer to the V_{DDD} on pin 12 than on pin 24. Ports 11 and 21 should not be used for injection currents. The impact of injection currents is only defined for GPIO_STD/GPIO_ENH type I/Os.

Table 26-1. Absolute Maximum Ratings *(continued)*

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
SID18D	$I_{CLAMP\_TOTAL\_NEG\_ABS}$	Maximum negative clamp current per I/O ground, if not limited by the per supply pin (based on SID18B).	–	–	50	mA	
SID20A	I_{OL1A_ABS}	LOW-level maximum output current [37]	–	–	6	mA	For GPIO_STD, configured for drive_sel<1:0>= 0b0X
SID20B	I_{OL1B_ABS}	LOW-level maximum output current [37]	–	–	2	mA	For GPIO_STD, configured for drive_sel<1:0>= 0b10
SID20C	I_{OL1C_ABS}	LOW-level maximum output current [37]	–	–	1	mA	For GPIO_STD, configured for drive_sel<1:0>= 0b11
SID21A	I_{OL2A_ABS}	LOW-level maximum output current [37]	–	–	6	mA	For GPIO_ENH, configured for drive_sel<1:0>= 0b0X
SID21B	I_{OL2B_ABS}	LOW-level maximum output current [37]	–	–	2	mA	For GPIO_ENH, configured for drive_sel<1:0>= 0b10
SID21C	I_{OL2C_ABS}	LOW-level maximum output current [37]	–	–	1	mA	For GPIO_ENH, configured for drive_sel<1:0>= 0b11
SID26A	$\sum I_{OL\_ABS\_GPIO}$	LOW-level total output current [38]	–	–	50	mA	
SID27A	I_{OH1A_ABS}	HIGH-level maximum output current [37]	–	–	–5	mA	For GPIO_STD, configured for drive_sel<1:0>= 0b0X
SID27B	I_{OH1B_ABS}	HIGH-level maximum output current [37]	–	–	–2	mA	For GPIO_STD, configured for drive_sel<1:0>= 0b10
SID27C	I_{OH1C_ABS}	HIGH-level maximum output current [37]	–	–	–1	mA	For GPIO_STD, configured for drive_sel<1:0>= 0b11
SID28A	I_{OH2A_ABS}	HIGH-level maximum output current [37]	–	–	–5	mA	For GPIO_ENH, configured for drive_sel<1:0>= 0b0X
SID28B	I_{OH2B_ABS}	HIGH-level maximum output current [37]	–	–	–2	mA	For GPIO_ENH, configured for drive_sel<1:0>= 0b10
SID28C	I_{OH2C_ABS}	HIGH-level maximum output current [37]	–	–	–1	mA	For GPIO_ENH, configured for drive_sel<1:0 ≥ 0b11
SID33A	$\sum I_{OH\_ABS\_GPIO}$	HIGH-level total output current [38]	–	–	–50	mA	
SID34	P_D	Power dissipation	–	–	1000	mW	T_J should not exceed 150 °C
SID35	T_A	Ambient temperature	–40	–	105	°C	For S-grade devices
SID36	T_A	Ambient temperature	–40	–	125	°C	For E-grade devices
SID37	T_{STG}	Storage temperature	–55	–	150	°C	
SID38	T_J	Operating Junction temperature	–40	–	150	°C	
SID39A	V_{ESD_HBM}	Electrostatic discharge human body model	2000	–	–	V	
SID39B1	V_{ESD_CDM1}	Electrostatic discharge charged device model for corner pins	750	–	–	V	
SID39B2	V_{ESD_CDM2}	Electrostatic discharge charged device model for all other p ins	500	–	–	V	
SID39C	I_{LU}	The maximum pin current the device can tolerate before triggering a latch-up	–100	–	100	mA	

Notes
37. The maximum output current is the peak current flowing through any one I/O.
38. The total output current is the maximum current flowing through all I/Os (GPIO_STD, and GPIO_ENH).

Figure 26-1.Example of a Recommended Circuit[39]



WARNING:
Semiconductor devices may be permanently damaged by application of stress (including, without limitation, voltage, current, or temperature) in excess of absolute maximum ratings. Do not exceed any of these ratings.

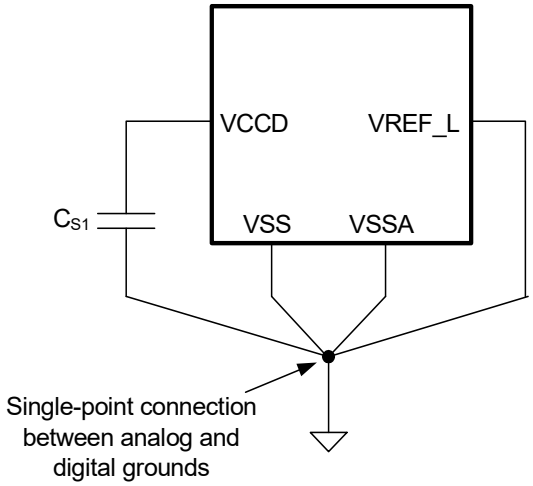
26.2 Device-Level Specifications

Table 26-2. Recommended Operating Conditions

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
Recommended Operating Conditions							
SID40	V_{DDD}, V_{DDA}, V_{DDIO_1}, V_{DDIO_2},	Power supply voltage[40]	2.7[41]	–	5.5[42]	V	
SID40A	$V_{DDIO\_1\_EFP}$	Power supply voltage for eFuse programming[43]	3	–	5.5	V	
SID41	C_{S1}	Smoothing capacitor[44, 45]	3.76	–	11	µF	

Notes
39. +B is the positive battery voltage around 45 V.
40. V_{DDD}, V_{DDIO_1}, V_{DDIO_2}, and V_{DDA} do not have any sequencing limitation and can establish in any order. These supplies (except for V_{DDA} and V_{DDIO_2}) are independent in voltage level. See 12-Bit SAR ADC DC Specifications when using ADC units.
41. 3.0 V ±10% is supported with a lower BOD setting option for V_{DDD} and V_{DDA}. This setting provides robust protection for internal timing but BOD reset occurs at a voltage below the specified operating conditions. A higher BOD setting option is available (consistent with down to 3.0 V) and guarantees that all operating conditions are met.
42. 5.0 V ±10% is supported with a higher OVD setting option for V_{DDD} and V_{DDA}. This setting provides robust protection for internal and interface timing, but OVD reset occurs at a voltage above the specified operating conditions. A lower OVD setting option is available (consistent with up to 5.0 V) and guarantees that all operating conditions are met.
43. eFuse programming must be executed with the part in a “quiet” state, with minimal activity (preferably only JTAG or a single LIN/CAN channel on V_{DDD} domain, no activity on V_{DDIO_1}).
44. Smoothing capacitor, C_{S1} is required per chip (not per V_{CCD} pin). The V_{CCD} pins must be connected together to ensure a low-impedance connection (see the requirement in Figure 26-2.).
45. Capacitors used for power supply decoupling or filtering are operated under a continuous DC-bias. Many capacitors used with DC power across them provide less than their target capacitance, and their capacitance is not constant across their working voltage range. When selecting capacitors for use with this device, ensure that the selected components provide the required capacitance under the specific operating conditions of temperature and voltage used in your design. While the temperature coefficient is normally found within a parts catalog (such as, X7R, C0G, Y5V), the matching voltage coefficient may only be available on the component datasheet or direct from the manufacturer. Use of components that do not provide the required capacitance under the actual operating conditions may cause the device to operate to less than datasheet specifications.

Figure 26-2.Smoothing Capacitor



Smoothing capacitor should be placed as close as possible to the V_{CCD} pin.

26.3 DC Specifications

Table 26-3. DC Specifications, CPU Current and Transition Time Specifications

All specifications are valid for –40 °C ≤ T_A ≤ 125 °C and for 2.7 V to 5.5 V except where noted.

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
SID49C1A	$I_{DD1\_CM04\_8\_1A}$	LP Active mode (CM4 and CM0+ at 8 MHz, all peripherals are disabled)	–	4	9	mA	CM0+ and CM4 clocked at 8 MHz with IMO. All peripherals are disabled. No IO toggling. TYP: T_A = 25 °C, V_{DDD} = 5.0 V, process typ (TT), CM0+ and CM4 executing Dhrystone from flash with cache enabled MAX: T_A = 25 °C, V_{DDD} = 5.5 V, process worst (FF), CM0+ and CM4 executing Dhrystone from flash with cache enabled.
SID49CB	$I_{DD1\_CM04\_8B}$	LP Active mode (CM4 and CM0+ at 8 MHz, all peripherals are enabled)	–	5	49	mA	CM0+ and CM4 clocked at 8 MHz with IMO. All peripherals are enabled. No IO toggling. M-DMA transferring data from code + work flash, P-DMA chains with maximum trigger activity. TYP: T_A = 25 °C, V_{DDD} = 5.0 V, process typ (TT), CM0+ and CM4 executing Dhrystone from flash with cache enabled MAX: T_A = 125 °C, V_{DDD} = 5.5 V, process worst (FF), CM0+ and CM4 executing max_power.c from ARM with cache enabled.
SID49E2	$I_{DD1\_F80\_512}$	Active mode (CM4 at 80 MHz, CM0+ at 80 MHz, all peripherals are enabled)	–	29	85	mA	PLL enabled at 80 MHz with ECO reference. All peripherals are enabled. No I/O toggling. M-DMA transferring data from code + work flash, P-DMA chains with maximum trigger activity. TYP: T_A = 25 °C, V_{DDD} = 5.0 V, process typ (TT), CM4 and CM0+ executing Dhrystone from flash with cache enabled. MAX: T_A = 125 °C, V_{DDD} = 5.5 V, process worst (FF), CM4 and CM0+ executing max_power.c from flash with cache enabled

Table 26-3. DC Specifications, CPU Current and Transition Time Specifications *(continued)*

All specifications are valid for –40 °C ≤ T_A ≤ 125 °C and for 2.7 V to 5.5 V except where noted.

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
SID53A1	$I_{DD2\_8\_1}$	All CPUs in Sleep mode	–	3	46	mA	PLL disabled, CM4 and CM0+ are sleeping at 8 MHz with IMO. All peripherals, peripheral clocks, interrupts, CSV, DMA, FLL, ECO are disabled. No I/O toggling. Typ: T_A = 25 °C, V_{DDD} = 5.0 V, process typ (TT) Max: T_A = 125 °C, V_{DDD} = 5.5 V, process worst (FF)
SID56A	I_{DD_CWU2}	Average current for cyclic wake-up operation This is the average current for the specified LP Active mode and DeepSleep mode (RTC, WDT and Event generator operating).	–	46	136	µA	V_{DDD} = 5.5 V, T_A = 25 °C, 64-KB SRAM, ILO0 operation in DeepSleep, Smart IO operations with ILO0, CM0+, CM4: Retained TYP: process typ (TT) MAX: process worst (FF) This average current is achieved under the following conditions. 1. MCU repetitively goes from DeepSleep to LP Active with a period of 32 ms. 2. One of the I/Os is toggled using Smart I/O to activate an external sensor connected to an analog input of A/D in DeepSleep 3. After 200 µs delay, the CM4 wakes up by event generator trigger to LP Active mode with IMO and A/D conversion is triggered by software. 4. Group A/D conversion is performed on 5 channels with the sampling time of 1 µs each. 5. Once the group A/D conversion is finished, and the results fit in the window of the range comparator, the I/O is toggled back by software to de-activate the sensor and the CM4 goes back to DeepSleep.
SID59A	I_{DD_DS64B}	64-KB SRAM retention, ILO0 operation in DeepSleep mode	–	35	130	µA	DeepSleep Mode (RTC, WDT, and event generator operating, all other peripherals are off except for retention registers), T_A = 25 °C, CM0+, CM4: Retained Typ: V_{DDD} = 5.0 V, process typ (TT) Max: V_{DDD} = 5.5 V, process worst (FF)
SID61A	I_{DD_DS64D}	64-KB SRAM retention, ILO0 operation in DeepSleep mode	–	0.9	3.5	mA	DeepSleep Mode steady state at T_A = 125 °C (RTC, WDT, and event generator operating, all other peripherals are off except for retention registers), CM0+, CM4: Retained Typ: V_{DDD} = 5.0 V, process typ (TT) Max: V_{DDD} = 5.5 V, process worst (FF)
Hibernate Mode							
SID62	I_{DD_HIB1}	Hibernate Mode	–	5	–	µA	ILO0/WDT operating. All other peripherals, and all CPUs are off. T_A = 25 °C, V_{DDD} = 5.5 V, process typ (TT)
SID62A	I_{DD_HIB2}	Hibernate Mode	–	–	130	µA	ILO0/WDT operating. All other peripherals, and all CPUs are off. T_A = 125 °C, V_{DDD} = 5.5 V, process worst (FF)

Table 26-3. DC Specifications, CPU Current and Transition Time Specifications *(continued)*

All specifications are valid for –40 °C ≤ T_A ≤ 125 °C and for 2.7 V to 5.5 V except where noted.

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
Power Mode Transition Times							
SID65	t_{ACT_DS}	Power down time from Active to DeepSleep	–	–	2.5	µs	When the IMO is already running and all HFCLK roots are at least 8 MHz. HFCLK roots that are slower than this will require additional time to turn off.
SID63	t_{DS_ACT}	DeepSleep to Active transition time (IMO clock, SRAM execution)	–	–	10	µs	When using the 8-MHz IMO. Measured from wakeup interrupt during DeepSleep until wakeup.
SID63C	t_{DS_ACT}	DeepSleep to Active transition time (IMO clock, flash execution)	–	–	20	µs	When using the 8-MHz IMO. Measured from wakeup interrupt during DeepSleep until flash execution.
SID63A	$t_{DS\_ACT\_FLL}$	DeepSleep to Active transition time (FLL clock, SRAM execution)	–	–	15	µs	When using the FLL to generate 80 MHz from the 8-MHz IMO. Measured from wakeup interrupt during DeepSleep until the FLL locks.
SID63D	$t_{DS\_ACT\_FLL1}$	DeepSleep to Active transition time (FLL clock, flash execution)	–	–	21.5	µs	When using the FLL to generate 80 MHz from the 8-MHz IMO. Measured from wakeup interrupt during DeepSleep until flash execution.
SID63B	$t_{DS\_ACT\_PLL}$	DeepSleep to Active transition time (PLL clock, SRAM or flash execution)	–	–	60	µs	When using the PLL to generate 80 MHz from the 8-MHz IMO. Measured from wakeup interrupt during DeepSleep until the PLL locks.
SID68	t_{HVR_ACT}	Release time from HV reset (POR, BOD, OVD, OCD, WDT, Hibernate wakeup, or XRES_L) release until CM0+ begins executing ROM boot	–	–	265	µs	Without boot runtime. Guaranteed by design
SID68A	t_{LVR_ACT}	Release time from LV reset (Fault, Internal system reset, MCWDT, or CSV) during Active/Sleep until CM0+ begins executing ROM boot	–	–	10	µs	Without boot runtime. Guaranteed by design
SID68B	t_{LVR_DS}	Release time from LV reset (Fault, or MCWDT) during DeepSleep until CM0+ begins executing ROM boot	–	–	15	µs	Without boot runtime. Guaranteed by design
SID80A	t_{RB_N}	ROM boot startup time or wakeup time from hibernate in NORMAL protection state	–	–	1800	µs	Guaranteed by Design, (Flash boot version 3.1.0.556 and later)
SID80B	t_{RB_S}	ROM boot startup time or wakeup time from hibernate in SECURE protection state	–	–	2740	µs	Guaranteed by Design, (Flash boot version 3.1.0.556 and later)
SID81A	t_{FB}	Flash boot startup time or wakeup time from hibernate in NORMAL/SECURE protection state	–	–	80	µs	Guaranteed by Design, TOC2_FLAGS = 0x2CF, Listen window = 0 ms (Flash boot version 3.1.0.556 and later)

Table 26-3. DC Specifications, CPU Current and Transition Time Specifications *(continued)*

All specifications are valid for –40 °C ≤ T_A ≤ 125 °C and for 2.7 V to 5.5 V except where noted.

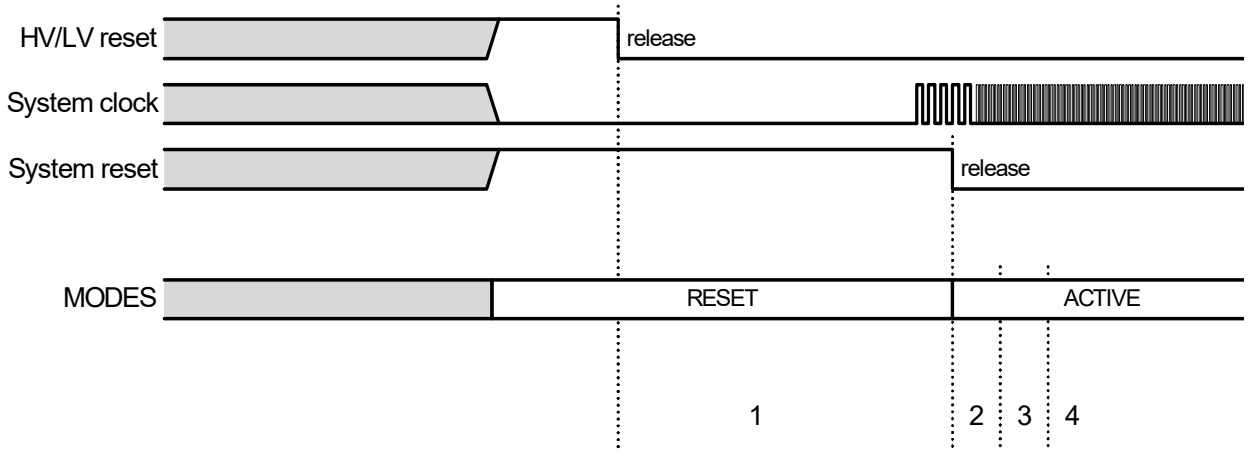
Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
SID81B	t_{FB_A}	Flash boot with app authentication time in NORMAL/SECURE protection state	–	–	5000	µs	Guaranteed by Design, TOC2_FLAGS = 0x24F, Listen window = 0 ms, Public key exponent e = 0x010001, APP size is 64 KB with the last 256 bytes being a digital signature in RSASSA-PKCS1-v1.5. Valid for RSA2K. (Flash boot version 3.1.0.556 and later)
Regulator Specifications							
SID600	V_{CCD}	Core supply voltage	1.05	1.1	1.15	V	
SID601	I_{DD_ACT}	Regulator operating current in Active/Sleep mode	–	80	150	µA	Guaranteed by design
SID602	I_{DD_DPSLP}	Regulator operating current in DeepSleep mode	–	1.5	20	µA	Guaranteed by design
SID604	I_{OUT}	Available regulator output current for operation	–	–	150	mA	Without triggering OVD
SID603	I_{RUSH}	In-rush current	–	–	375	mA	Average V_{DDD} current until C_{s1} (connected to V_{CCD} pin) is charged after Active regulator is turned on

26.4 Reset Specifications

Table 26-4. XRES_L Reset

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
XRES_L DC Specifications							
SID73	I_{DD_XRES}	I_{DD} when XRES_L asserted	–	–	0.9	mA	T_A = 125 °C, V_{DDD} = 5.5 V, process worst (FF)
SID74	V_{IH}	Input voltage HIGH threshold	0.7 × V_{DDD}	–	–	V	CMOS input
SID75	V_{IL}	Input voltage LOW threshold	–	–	0.3 × V_{DDD}	V	CMOS input
SID76	R_{PULLUP}	Pull-up resistor	7	–	20	kΩ	
SID77	C_{IN}	Input capacitance	–	–	5	pF	
SID78	$V_{HYSXRES}$	Input voltage hysteresis	0.05 × V_{DDD}	–	–	V	
XRES_L AC Specifications							
SID70	t_{XRES_ACT}	XRES_L release to Active transition time	–	–	265	µs	Without boot runtime. Guaranteed by design
SID71	t_{XRES_PW}	XRES_L pulse width	5	–	–	µs	
SID72	t_{XRES_FT}	Pulse suppression width	100	–	–	ns	

Figure 26-3.Reset Sequence



1: **SID68/68A/68B**: Time from HV/LV reset release until CM0+ begins executing ROM boot
2: **SID80A/80B**: ROM boot code operation
3: **SID81A/81B**: Flash boot code operation
4: User code operation

26.5 I/O

Table 26-5. I/O Specifications

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
GPIO_STD Specifications for ports P1 through P23							
SID650	$V_{OL1\_GPIO\_STD}$	Output voltage LOW level	–	–	0.6	V	I_{OL} = 6 mA drive_sel<1:0> = 0b0X, 4.5 V ≤ V_{DDD} or V_{DDIO_1} or V_{DDIO_2} ≤ 5.5 V
SID650C	$V_{OL1C\_GPIO\_STD}$	Output voltage LOW level	–	–	0.4	V	I_{OL} = 5 mA drive_sel<1:0> = 0b0X, 4.5 V ≤ V_{DDD} or V_{DDIO_1} or V_{DDIO_2} ≤ 5.5 V
SID651	$V_{OL2\_GPIO\_STD}$	Output voltage LOW level	–	–	0.4	V	I_{OL} = 2 mA drive_sel<1:0> = 0b0X, 2.7 V ≤ V_{DDD} or V_{DDIO_1} or V_{DDIO_2} < 4.5 V
SID652	$V_{OL3\_GPIO\_STD}$	Output voltage LOW level	–	–	0.4	V	I_{OL} = 1 mA drive_sel<1:0> = 0b10, 2.7 V ≤ V_{DDD} or V_{DDIO_1} or V_{DDIO_2} < 4.5 V
SID652C	$V_{OL3C\_GPIO\_STD}$	Output voltage LOW level	–	–	0.4	V	I_{OL} = 2 mA drive_sel<1:0> = 0b10, 4.5 V ≤ V_{DDD} or V_{DDIO_1} or V_{DDIO_2} ≤ 5.5 V
SID653	$V_{OL4\_GPIO\_STD}$	Output voltage LOW level	–	–	0.4	V	I_{OL} = 0.5 mA drive_sel<1:0> = 0b11, 2.7 V ≤ V_{DDD} or V_{DDIO_1} or V_{DDIO_2} < 4.5 V
SID653C	$V_{OL4C\_GPIO\_STD}$	Output voltage LOW level	–	–	0.4	V	I_{OL} = 1 mA drive_sel<1:0> = 0b11, 4.5 V ≤ V_{DDD} or V_{DDIO_1} or V_{DDIO_2} ≤ 5.5 V
SID654	$V_{OH1\_GPIO\_STD}$	Output voltage HIGH level	(V_{DDD} or V_{DDIO_1} or V_{DDIO_2}) – 0.5	–	–	V	I_{OH} = –2 mA drive_sel<1:0> = 0b0X, 2.7 V ≤ V_{DDD} or V_{DDIO_1} or V_{DDIO_2} < 4.5 V
SID655	$V_{OH2\_GPIO\_STD}$	Output voltage HIGH level	(V_{DDD} or V_{DDIO_1} or V_{DDIO_2}) – 0.5	–	–	V	I_{OH} = –5 mA drive_sel<1:0> = 0b0X, 4.5 V ≤ V_{DDD} or V_{DDIO_1} or V_{DDIO_2} ≤ 5.5 V
SID656	$V_{OH3\_GPIO\_STD}$	Output voltage HIGH level	(V_{DDD} or V_{DDIO_1} or V_{DDIO_2}) – 0.5	–	–	V	I_{OH} = –1 mA drive_sel<1:0> = 0b10, 2.7 V ≤ V_{DDD} or V_{DDIO_1} or V_{DDIO_2} < 4.5 V
SID656C	$V_{OH3C\_GPIO\_STD}$	Output voltage HIGH level	(V_{DDD} or V_{DDIO_1} or V_{DDIO_2}) – 0.5	–	–	V	I_{OH} = –2 mA drive_sel<1:0> = 0b10, 4.5 V ≤ V_{DDD} or V_{DDIO_1} or V_{DDIO_2} ≤ 5.5 V
SID657	$V_{OH4\_GPIO\_STD}$	Output voltage HIGH level	(V_{DDD} or V_{DDIO_1} or V_{DDIO_2}) – 0.5	–	–	V	I_{OH} = –0.5 mA drive_sel<1:0> = 0b11, 2.7 V ≤ V_{DDD} or V_{DDIO_1} or V_{DDIO_2} < 4.5 V
SID657C	$V_{OH4C\_GPIO\_STD}$	Output voltage HIGH level	(V_{DDD} or V_{DDIO_1} or V_{DDIO_2}) – 0.5	–	–	V	I_{OH} = –1 mA drive_sel<1:0> = 0b11, 4.5 V ≤ V_{DDD} or V_{DDIO_1} or V_{DDIO_2} ≤ 5.5 V
SID658	$R_{PD\_GPIO\_STD}$	Pull-down resistance	25	50	100	kΩ	
SID659	$R_{PU\_GPIO\_STD}$	Pull-up resistance	25	50	100	kΩ	

Table 26-5. I/O Specifications *(continued)*

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
SID660	$V_{IH\_CMOS\_GPIO\_STD}$	Input voltage HIGH threshold in CMOS mode	0.7 × (V_{DDD} or V_{DDIO_1} or V_{DDIO_2})	–	–	V	
SID661	$V_{IH\_TTL\_GPIO\_STD}$	Input voltage HIGH threshold in TTL mode	2.0	–	–	V	
SID662	$V_{IH\_AUTO\_GPIO\_STD}$	Input voltage HIGH threshold in AUTO mode	0.8 × (V_{DDD} or V_{DDIO_1} or V_{DDIO_2})	–	–	V	
SID663	$V_{IL\_CMOS\_GPIO\_STD}$	Input voltage LOW threshold in CMOS mode	–	–	0.3 × (V_{DDD} or V_{DDIO_1} or V_{DDIO_2})	V	
SID664	$V_{IL\_TTL\_GPIO\_STD}$	Input voltage LOW threshold in TTL mode	–	–	0.8	V	
SID665	$V_{IL\_AUTO\_GPIO\_STD}$	Input voltage LOW threshold in AUTO mode	–	–	0.5 × (V_{DDD} or V_{DDIO_1} or V_{DDIO_2})	V	
SID666	$V_{HYST\_CMOS\_GPIO\_STD}$	Hysteresis in CMOS mode	0.05 × (V_{DDD} or V_{DDIO_1} or V_{DDIO_2})	–	–	V	
SID668	$V_{HYST\_AUTO\_GPIO\_STD}$	Hysteresis in AUTO mode	0.05 × (V_{DDD} or V_{DDIO_1} or V_{DDIO_2})	–	–	V	
SID669	$C_{in\_GPIO\_STD}$	Input pin capacitance	–	–	5	pF	For 10 MHz
SID670	$I_{IL\_GPIO\_STD}$	Input leakage current	–250	0.02	250	nA	For GPIO_STD except P21.0, P21.1, P21.2, P21.3, P23.3, P23.4. $V_{DDIO\_1} = V_{DDIO\_2} = V_{DDD} = V_{DDA} = 5.5$ V, $V_{SSD} < V_I < V_{DDD}$, V_{DDIO_1}, V_{DDIO_2} –40 °C ≤ TA ≤ 125 °C TYP: T_A = 25 °C, $V_{DDIO\_1} = V_{DDIO\_2} = V_{DDD} = V_{DDA} = 5.0$ V
SID670C	$I_{IL\_GPIO\_STD\_B}$	Input leakage current	–700	0.02	700	nA	Only for P21.0, P21.1, P21.2, P21.3, P23.3, P23.4. $V_{DDIO\_1} = V_{DDIO\_2} = V_{DDD} = V_{DDA} = 5.5$ V, $V_{SSD} < V_I < V_{DDD}$, V_{DDIO_1}, V_{DDIO_2} –40 °C ≤ TA ≤ 125 °C TYP: T_A = 25 °C, $V_{DDIO\_1} = V_{DDIO\_2} = V_{DDD} = V_{DDA} = 5.0$ V
SID671	t_R or t_F $(fast)_{20\_0\_GPIO\_STD}$	Rise time or fall time (10% to 90% of V_{DDIO})	1	–	10	ns	20-pF load, drive_sel<1:0> = 0b00
SID672	t_R or t_F $(fast)_{50\_0\_GPIO\_STD}$	Rise time or fall time (10% to 90% of V_{DDIO})	1	–	20	ns	50-pF load, drive_sel<1:0> = 0b00
SID673	t_R or t_F $(fast)_{20\_1\_GPIO\_STD}$	Rise time or fall time (10% to 90% of V_{DDIO})	1	–	20	ns	20-pF load, drive_sel<1:0> = 0b01, guaranteed by design

Table 26-5. I/O Specifications *(continued)*

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
SID674	t_R or t_F (fast)_10_2_GPIO_STD	Rise time or fall time (10% to 90% of V_{DDIO})	1	–	20	ns	10-pF load, drive_sel<1:0> = 0b10, guaranteed by design
SID675	t_R or t_F (fast)_6_3_GPIO_STD	Rise time or fall time (10% to 90% of V_{DDIO})	1	–	20	ns	6-pF load, drive_sel<1:0> = 0b11, guaranteed by design
SID676	t_F (fast)_100_GPIO_STD	Fall time (30% to 70% of V_{DDIO})	0.35	–	250	ns	10-pF to 400-pF load, RPU = 767 Ω, drive_sel<1:0>= 0b00, Freq = 100 kHz
SID677	t_F (fast)_400_GPIO_STD	Fall time (30% to 70% of V_{DDIO})	0.35	–	250	ns	10-pF to 400-pF load, RPU = 350 Ω, drive_sel<1:0>= 0b00, Freq = 400 kHz
SID678	$f_{IN\_GPIO\_STD}$	Input frequency	–	–	80	MHz	
SID679	$f_{OUT\_GPIO\_STD0H}$	Output frequency	–	–	50	MHz	20 pF load, drive_sel<1:0>= 00, 4.5 V ≤ V_{DDD} or V_{DDIO_1} or V_{DDIO_2} ≤ 5.5 V
SID680	$f_{OUT\_GPIO\_STD0L}$	Output frequency	–	–	32	MHz	20 pF load, drive_sel<1:0>= 00, 2.7 V ≤ V_{DDD} or V_{DDIO_1} or V_{DDIO_2} < 4.5 V
SID681	$f_{OUT\_GPIO\_STD1H}$	Output frequency	–	–	25	MHz	20 pF load, drive_sel<1:0>= 01, 4.5 V ≤ V_{DDD} or V_{DDIO_1} or V_{DDIO_2} ≤ 5.5 V
SID682	$f_{OUT\_GPIO\_STD1L}$	Output frequency	–	–	15	MHz	20 pF load, drive_sel<1:0>= 01, 2.7 V ≤ V_{DDD} or V_{DDIO_1} or V_{DDIO_2} < 4.5 V
SID683	$f_{OUT\_GPIO\_STD2H}$	Output frequency	–	–	25	MHz	10 pF load, drive_sel<1:0>= 10, 4.5 V ≤ V_{DDD} or V_{DDIO_1} or V_{DDIO_2} ≤ 5.5 V
SID684	$f_{OUT\_GPIO\_STD2L}$	Output frequency	–	–	15	MHz	10 pF load, drive_sel<1:0>= 10, 2.7 V ≤ V_{DDD} or V_{DDIO_1} or V_{DDIO_2} < 4.5 V
SID685	$f_{OUT\_GPIO\_STD3H}$	Output frequency	–	–	15	MHz	6 pF load, drive_sel<1:0>= 11, 4.5 V ≤ V_{DDD} or V_{DDIO_1} or V_{DDIO_2} ≤ 5.5 V
SID686	$f_{OUT\_GPIO\_STD3L}$	Output frequency	–	–	10	MHz	6 pF load, drive_sel<1:0>= 11, 2.7 V ≤ V_{DDD} or V_{DDIO_1} or V_{DDIO_2} < 4.5 V
GPIO_ENH Specifications only for P0							
SID650A	$V_{OL1\_GPIO\_ENH}$	Output voltage LOW level	–	–	0.6	V	I_{OL} = 6 mA drive_sel<1:0> = 0b0X, 2.7 V ≤ V_{DDD} ≤ 5.5 V

Table 26-5. I/O Specifications *(continued)*

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
SID650D	$V_{OL1D\_GPIO\_ENH}$	Output voltage LOW level	–	–	0.4	V	I_{OL} = 5 mA drive_sel<1:0> = 0b0X, 4.5 V ≤ V_{DDD} ≤ 5.5 V
SID651A	$V_{OL2\_GPIO\_ENH}$	Output voltage LOW level	–	–	0.4	V	I_{OL} = 2 mA, 3 mA drive_sel<1:0> = 0b0X, 2.7 V ≤ V_{DDD} < 4.5 V
SID652A	$V_{OL3\_GPIO\_ENH}$	Output voltage LOW level	–	–	0.4	V	I_{OL} = 1 mA drive_sel<1:0> = 0b10, 2.7 V ≤ V_{DDD} < 4.5 V
SID652D	$V_{OL3D\_GPIO\_ENH}$	Output voltage LOW level	–	–	0.4	V	I_{OL} = 2 mA drive_sel<1:0> = 0b10, 4.5 V ≤ V_{DDD} ≤ 5.5 V
SID653A	$V_{OL4\_GPIO\_ENH}$	Output voltage LOW level	–	–	0.4	V	I_{OL} = 0.5 mA drive_sel<1:0> = 0b11, 2.7 V ≤ V_{DDD} < 4.5 V
SID653D	$V_{OL4D\_GPIO\_ENH}$	Output voltage LOW level	–	–	0.4	V	I_{OL} = 1 mA drive_sel<1:0> = 0b11, 4.5 V ≤ V_{DDD} ≤ 5.5 V
SID654A	$V_{OH1\_GPIO\_ENH}$	Output voltage HIGH level	V_{DDD} – 0.5	–	–	V	I_{OL} = –2 mA drive_sel<1:0> = 0b0X, 2.7 V ≤ V_{DDD} < 4.5 V
SID655A	$V_{OH2\_GPIO\_ENH}$	Output voltage HIGH level	V_{DDD} – 0.5	–	–	V	I_{OL} = –5 mA drive_sel<1:0> = 0b0X, 4.5 V ≤ V_{DDD} ≤ 5.5 V
SID656A	$V_{OH3\_GPIO\_ENH}$	Output voltage HIGH level	V_{DDD} – 0.5	–	–	V	I_{OL} = –1 mA drive_sel<1:0> = 0b10, 2.7 V ≤ V_{DDD} < 4.5 V
SID656D	$V_{OH3D\_GPIO\_ENH}$	Output voltage HIGH level	V_{DDD} – 0.5	–	–	V	I_{OL} = –2 mA drive_sel<1:0> = 0b10, 4.5 V ≤ V_{DDD} ≤ 5.5 V
SID657A	$V_{OH4\_GPIO\_ENH}$	Output voltage HIGH level	V_{DDD} – 0.5	–	–	V	I_{OL} = –0.5 mA drive_sel<1:0> = 0b11, 2.7 V ≤ V_{DDD} < 4.5 V
SID657D	$V_{OH4D\_GPIO\_ENH}$	Output voltage HIGH level	V_{DDD} – 0.5	–	–	V	I_{OL} = –1 mA drive_sel<1:0> = 0b11, 4.5 V ≤ V_{DDD} ≤ 5.5 V
SID658A	$R_{PD\_GPIO\_ENH}$	Pull-down resistance	25	50	100	kΩ	
SID659A	$R_{PU\_GPIO\_ENH}$	Pull-up resistance	25	50	100	kΩ	
SID660A	$V_{IH\_CMOS\_GPIO\_ENH}$	Input voltage HIGH threshold in CMOS mode	0.7 × V_{DDD}	–	–	V	
SID661A	$V_{IH\_TTL\_GPIO\_ENH}$	Input voltage HIGH threshold in TTL mode	2	–	–	V	
SID662A	$V_{IH\_AUTO\_GPIO\_ENH}$	Input voltage HIGH threshold in AUTO mode	0.8 × V_{DDD}	–	–	V	
SID663A	$V_{IL\_CMOS\_GPIO\_ENH}$	Input voltage LOW threshold in CMOS mode	–	–	0.3 × V_{DDD}	V	
SID664A	$V_{IL\_TTL\_GPIO\_ENH}$	Input voltage LOW threshold in TTL mode	–	–	0.8	V	
SID665A	$V_{IL\_AUTO\_GPIO\_ENH}$	Input voltage LOW threshold in AUTO mode	–	–	0.5 × V_{DDD}	V	

Table 26-5. I/O Specifications *(continued)*

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
SID666A	$V_{HYST\_CMOS\_GPIO\_ENH}$	Hysteresis in CMOS mode	0.05 × V_{DDD}	–	–	V	
SID668A	$V_{HYST\_AUTO\_GPIO\_ENH}$	Hysteresis in AUTO mode	0.05 × V_{DDD}	–	–	V	
SID669A	$C_{in\_GPIO\_ENH}$	Input pin capacitance	–	–	5	pF	For 10 MHz
SID670A	$I_{IL\_GPIO\_ENH}$	Input leakage current	–350	0.055	350	nA	$V_{DDD} = V_{DDA} = 5.5$ V, $V_{SSD} < V_I < V_{DDD}$, –40 °C ≤ T_A ≤ 125 °C TYP: T_A = 25 °C, $V_{DDD} = V_{DDA} = 5.0$ V
SID671A	t_R or t_F (fast)$_{20\_0\_GPIO\_ENH}$	Rise time or fall time (10% to 90% of V_{DDIO})	1	–	10	ns	20-pF load, drive_sel<1:0> = 0b00, slow = 0
SID672A	t_R or t_F (fast)$_{50\_0\_GPIO\_ENH}$	Rise time or fall time (10% to 90% of V_{DDIO})	1	–	20	ns	50-pF load, drive_sel<1:0> = 0b00, slow = 0
SID673A	t_R or t_F (fast)$_{20\_1\_GPIO\_ENH}$	Rise time or fall time (10% to 90% of V_{DDIO})	1	–	20	ns	20-pF load, drive_sel<1:0> = 0b01, slow = 0, guaranteed by design
SID674A	t_R or t_F (fast)$_{10\_2\_GPIO\_ENH}$	Rise time or fall time (10% to 90% of V_{DDIO})	1	–	20	ns	10-pF load, drive_sel<1:0> = 0b10, slow = 0, guaranteed by design
SID675A	t_R or t_F (fast)$_{6\_3\_GPIO\_ENH}$	Rise time or fall time (10% to 90% of V_{DDIO})	1	–	20	ns	6-pF load, drive_sel<1:0> = 0b11, slow = 0, guaranteed by design
SID676A	t_{F_I2C} (slow)$_{GPIO\_ENH}$	Fall time (30% to 70% of V_{DDIO})	20 × (V_{DDD} / 5.5)	–	250	ns	10-pF to 400-pF load, drive_sel<1:0> = 0b00, slow = 1, minimum R_{PU} = 400 Ω
SID677A	t_R or t_F (slow)$_{20\_GPIO\_ENH}$	Rise time or fall time (10% to 90% of V_{DDIO})	20 × (V_{DDD} / 5.5)	–	160	ns	20-pF load, drive_sel<1:0> = 0b00, slow = 1, output frequency = 1 MHz
SID678A	t_R or t_F (slow)$_{400\_GPIO\_ENH}$	Rise time or fall time (10% to 90% of V_{DDIO})	20 × (V_{DDD} / 5.5)	–	250	ns	400-pF load, drive_sel<1:0> = 0b00, slow = 1, output frequency = 400 kHz
SID679A	$f_{IN\_GPIO\_ENH}$	Input frequency	–	–	80	MHz	
SID680A	$f_{OUT\_GPIO\_ENH0H}$	Output frequency	–	–	50	MHz	20-pF load, drive_sel<1:0>= 0b00, 4.5 V ≤ V_{DDD} ≤ 5.5 V
SID681A	$f_{OUT\_GPIO\_ENH0L}$	Output frequency	–	–	32	MHz	20-pF load, drive_sel<1:0>= 0b00, 2.7 V ≤ V_{DDD} < 4.5 V
SID682A	$f_{OUT\_GPIO\_ENH1H}$	Output frequency	–	–	25	MHz	20-pF load, drive_sel<1:0>= 0b01, 4.5 V ≤ V_{DDD} ≤ 5.5 V
SID683A	$f_{OUT\_GPIO\_ENH1L}$	Output frequency	–	–	15	MHz	20-pF load, drive_sel<1:0>= 0b01, 2.7 V ≤ V_{DDD} < 4.5 V

Table 26-5. I/O Specifications *(continued)*

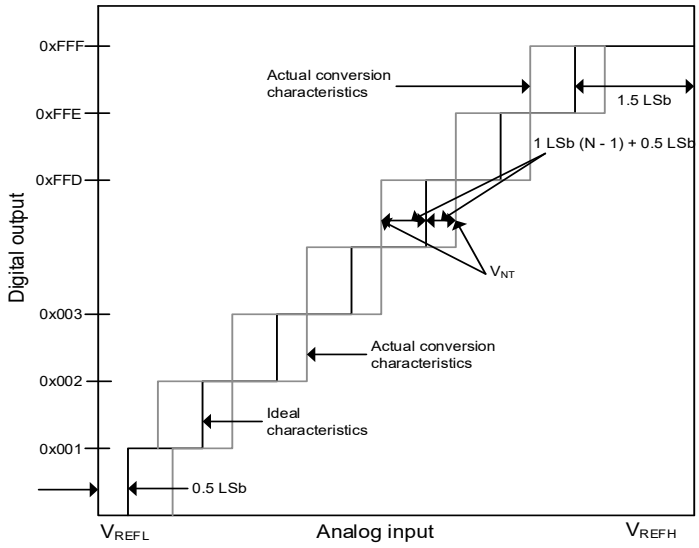
Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
SID684A	$f_{OUT\_GPIO\_ENH2H}$	Output frequency	–	–	25	MHz	10-pF load, drive_sel<1:0>= 0b10, 4.5 V ≤ V_{DDD} ≤ 5.5 V
SID685A	$f_{OUT\_GPIO\_ENH2L}$	Output frequency	–	–	15	MHz	10-pF load, drive_sel<1:0>= 0b10, 2.7 V ≤ V_{DDD} < 4.5 V
SID686A	$f_{OUT\_GPIO\_ENH3H}$	Output frequency	–	–	15	MHz	6-pF load, drive_sel<1:0>= 0b11, 4.5 V ≤ V_{DDD} ≤ 5.5 V
SID687A	$f_{OUT\_GPIO\_ENH3L}$	Output frequency	–	–	10	MHz	6-pF load, drive_sel<1:0>= 0b11, 2.7 V ≤ V_{DDD} < 4.5 V
GPIO Input Specifications							
SID98	t_{FT}	Analog glitch filter (pulse suppression width)	–	–	50[46]	ns	One filter per port group
SID99	t_{INT}	Minimum pulse width for GPIO interrupt	160	–	–	ns	

Note
46. If longer pulse suppression width is required, use Smart I/O.

26.6 Analog Peripherals

26.6.1 SAR ADC

Figure 26-4.ADC Characteristics and Error Definitions



$$\text{Total error of digital output } N = (\ V_{NT}\ \{1\ \text{LSb} \times (N - 1) + 0.5\ \text{LSb}\}\ ) / 1\ \text{LSb} \quad [\text{LSb}]$$

$$1\ \text{LSb (Ideal value)} = (V_{REFH} - V_{REFL}) / 4096 \quad [\text{V}]$$

N: A/D converter digital output value
V_{ZT} (Ideal value): V_{REFL} + 0.5 LSb [V]
V_{FST} (Ideal value): V_{REFH} – 1.5 LSb [V]
V_{NT}: Voltage at which the digital output changes from N – 1 to N

Table 26-6. 12-Bit SAR ADC DC Specifications

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
SID100	A_RES	SAR ADC resolution	–	–	12	bits	
SID101	A_V_{INS}	Input voltage range	V_{REFL}	–	V_{REFH}	V	
SID102	A_V_{REFH}	V_{REFH} voltage range	2.7	–	V_{DDA}	V	ADC performance degrades when high reference is higher than supply
SID102A	A_V_{DDA}[47]	V_{DDA} voltage range	2.7	–	5.5	V	
SID103	A_V_{REFL}	V_{REFL} voltage range	V_{SSA}	–	V_{SSA}	V	ADC performance degrades when low reference is lower than ground
SID103A	V_{band_gap}	Internal band gap reference voltage	0.882	0.9	0.918	V	
SID19A	CLAMP_COUPLING_RATIO_POS	Ratio of current collected on a pin to the positive current injected into a neighboring pin	–	–	0.25	%	
SID19B	CLAMP_COUPLING_RATIO_NEG	Ratio of current collected on a pin to the negative current injected into a neighboring pin	–	–	1.2	%	
SID19C	$R_{CLAMP\_INTERNAL}$	Internal pin resistance to current collection point	–	–	50	Ω	

26.6.2 Calculating the Impact of Neighboring Pins

The three ADC specifications based on SID19A, SID19B, and SID19C, can be used to calculate the pin leakage and resulting ADC offset caused by injection current using the below formula:

$$I_{LEAK} = I_{INJECTED} \times CLAMP\_COUPLING\_RATIO$$
$$V_{ERROR} = I_{LEAK} \times (R_{CLAMP\_INTERNAL} + R_{SOURCE})$$
$$Code\ Error = V_{ERROR} \times 2^{12} / V_{REF}$$

Where:

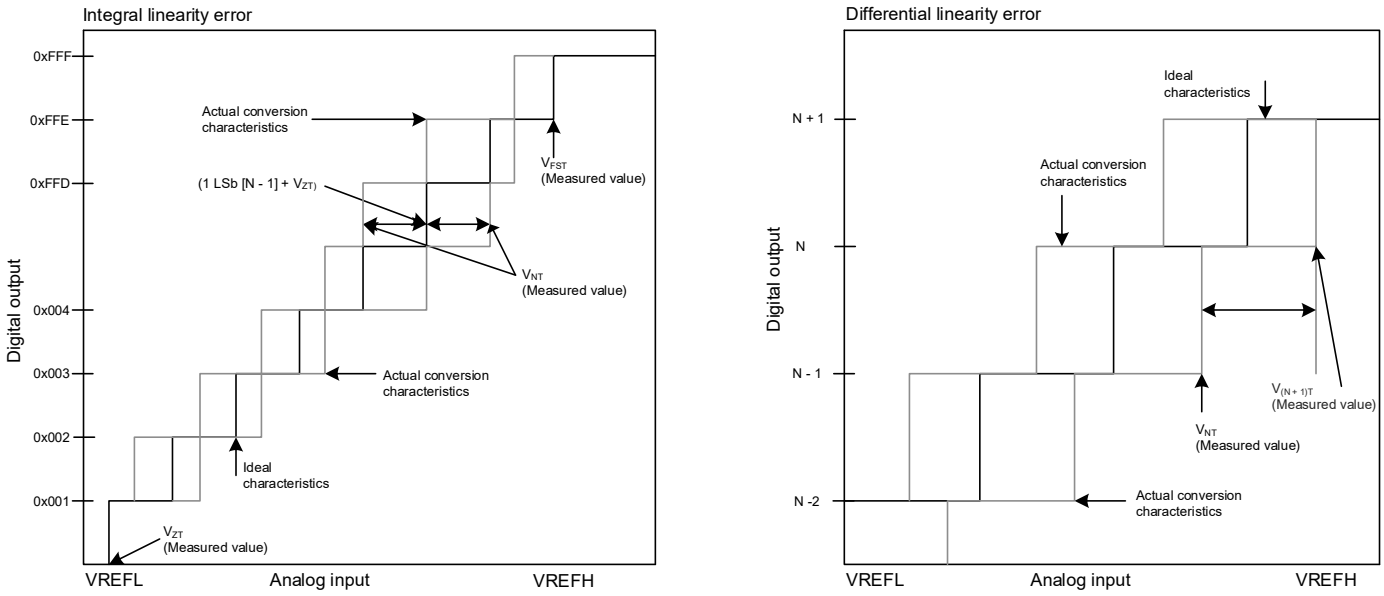
$I_{INJECTED}$ is the injected current in mA.

I_{LEAK} is the calculated leakage current in mA.

V_{ERROR} is the voltage error calculated due to leakage currents in V.

V_{REF} is the ADC reference voltage in V.

Figure 26-5.Integral and Differential Linearity Errors



Integral linearity error of digital output N = $(V_{NT} - \{1\ LSb \times (N - 1) + V_{ZT}\}) / 1\ LSb$ [LSb]

Differential linearity error of digital output N = $(V_{(N+1)T} - V_{NT} - 1\ LSb\ ) / 1\ LSb$ [LSb]

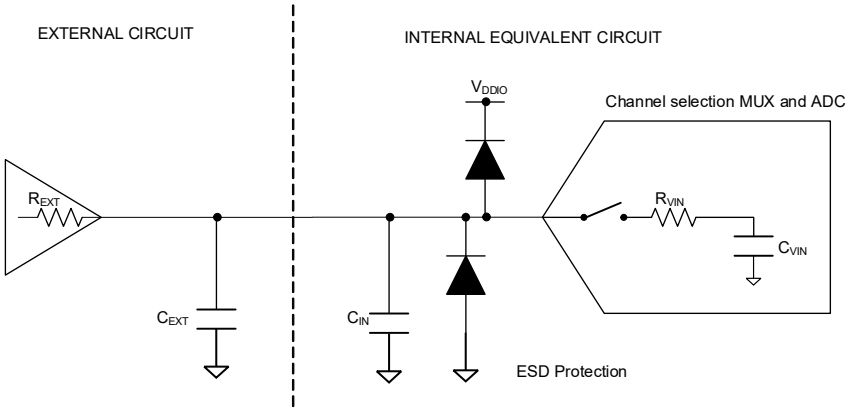
$1\ LSb = (V_{FST} - V_{ZT}\ ) / 4094$ [V]

V_{ZT}: Voltage for which digital output changes from 0x000 to 0x001
V_{FST}: Voltage for which digital output changes from 0xFFE to 0xFFF.

Note

47. V_{DDD} must be greater than 0.8 × V_{DDA} when ADC[2] is enabled. V_{DDIO_1} must be greater than 0.8 × V_{DDA} when ADC[0] is enabled.

Figure 26-6.ADC Equivalent Circuit for Analog Input



R_{EXT}: Source impedance
C_{EXT}: On-PCB capacitance
C_{IN}: I/O pad or Input capacitance
R_{VIN}: ADC equivalent input resistance
C_{VIN}: ADC equivalent input capacitance
K: Constant for sampling accuracy, $K = ln(abs(4096/LSb_{SAMPLE}))$

Sampling Time (t_{SAMPLE}) requirement is shown in the following equation
$t_{SAMPLE} > K \times \{ C_{VIN} \times (R_{VIN} + R_{EXT}) + (C_{IN} + C_{EXT}) \times (R_{EXT}) \}$ [seconds]

K = value of 9.0 is recommended to get ±0.5 LSb sampling accuracy at 12-bit (LSb_{SAMPLE} = ±0.5)

Table 26-7. SAR ADC AC Specifications

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
SID104	V_{ZT}	Zero transition voltage	–20	–	20	mV	V_{DDA} = 2.7 V to 5.5 V, –40 °C ≤ T_A ≤ 125 °C before offset adjustment
SID105	V_{FST}	Full-scale transition voltage	–20	–	20	mV	V_{DDA} = 2.7 V to 5.5 V, –40 °C ≤ T_A ≤ 125 °C before offset adjustment
SID114	f_{ADC_4P5}	ADC operating frequency	2	–	26.67	MHz	4.5 V ≤ V_{DDA} ≤ 5.5 V
SID114A	f_{ADC_2P7}	ADC operating frequency	2	–	13.34	MHz	2.7 V ≤ V_{DDA} < 4.5 V
SID113	t_{S_4P5}	Analog input sample time	412	–	–	ns	4.5 V ≤ V_{DDA} ≤ 5.5 V Guaranteed by design
SID113A	t_{S_2P7}	Analog input sample time	600	–	–	ns	2.7 V ≤ V_{DDA} < 4.5 V Guaranteed by design
SID113B	$t_{S\_DR\_4P5}$	Analog input sample time when input is from diagnostic reference	2	–	–	µs	4.5 V ≤ V_{DDA} ≤ 5.5 V Guaranteed by design
SID113C	$t_{S\_DR\_2P7}$	Analog input sample time when input is from diagnostic reference	2.5	–	–	µs	2.7 V ≤ V_{DDA} < 4.5 V Guaranteed by design
SID113D	t_{S_TS}	Analog input sample time for temperature sensor	3	–	–	µs	2.7 V ≤ V_{DDA} ≤ 5.5 V Guaranteed by design
SID106	t_{ST_4P5}	Max throughput (Sample per second)	–	–	1	Msps	4.5 V ≤ V_{DDA} ≤ 5.5 V, 80 MHz / 3 = 26.67 MHz, 11 sampling cycles, 15 conversion cycles
SID106A	t_{ST_2P7}	Max throughput (Sample per second)	–	–	0.5	Msps	2.7 V ≤ V_{DDA} < 4.5 V 80 MHz / 6 = 13.3 MHz, 11 sampling cycles, 15 conversion cycles

Table 26-7. SAR ADC AC Specifications *(continued)*

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
SID107	C_{VIN}	ADC input sampling capacitance	–	–	4.8	pF	Guaranteed by design
SID108	R_{VIN1}	Input path ON resistance (4.5 V to 5.5 V)	–	–	9.4	kΩ	Guaranteed by design
SID108A	R_{VIN2}	Input path ON resistance (2.7 V to 4.5 V)	–	–	13.9	kΩ	Guaranteed by design
SID108B	R_{DREF1}	Diagnostic path ON resistance (4.5 V to 5.5 V)	–	–	40	kΩ	Guaranteed by design
SID108C	R_{DREF2}	Diagnostic path ON resistance (2.7 V to 4.5 V)	–	–	50	kΩ	Guaranteed by design
SID119	ACC_RLAD	Diagnostic reference resistor ladder accuracy	–4	–	4	%	
SID109	A_TE	Total error	–5	–	5	LSb	$V_{DDA} = V_{REFH}$ = 2.7 V to 5.5 V, $V_{REFL} = V_{SSA}$, –40 °C ≤ T_A ≤ 125 °C Total error after offset and gain adjustment at 12 bit resolution mode
SID109A	A_TEB	Total error	–12	–	12	LSb	$V_{DDA} = V_{REFH}$ = 2.7 V to 5.5 V, $V_{REFL} = V_{SSA}$, –40 °C ≤ T_A ≤ 125 °C Total error before offset and gain adjustment at 12 bit resolution mode
SID110	A_INL	Integral nonlinearity	–2.5	–	2.5	LSb	V_{DDA} = 2.7 V to 5.5 V, –40 °C ≤ T_A ≤ 125 °C
SID111	A_DNL	Differential nonlinearity	–0.99	–	1.9	LSb	V_{DDA} = 2.7 V to 5.5 V, –40 °C ≤ T_A ≤ 125 °C
SID112	A_CE	Channel-to-channel variation (for channels connected to same ADC)	–1	–	1	LSb	V_{DDA} = 2.7 V to 5.5 V, –40 °C ≤ T_A ≤ 125 °C
SID115	I_{AIC}	Analog input leakage current	–350	70	350	nA	When input pad is selected for conversion
SID116	$I_{DIAGREF}$	Diagnostic reference current	–	–	70	µA	
SID117	I_{VDDA}	Analog power supply current while ADC is operating	–	360	550	µA	Per enabled ADC
SID117A	I_{VDDA_DS}	Analog power supply current while ADC is not operating	–	–	21	µA	Per enabled ADC
SID118	I_{VREF}	Analog reference voltage current while ADC is operating	–	360	550	µA	Per enabled ADC
SID118A	I_{VREF_LEAK}	Analog reference voltage current while ADC is not operating	–	1.8	5	µA	Per enabled ADC

26.6.3 Temperature Sensor

Table 26-8. Temperature Sensor Specifications

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
SID200	$T_{SENSACC1}$	Temperature sensor accuracy 1	–2	–	2	°C	T_J = 150 °C This spec is valid when using ADC[0] (V_{DDIO_1}), ADC[1] (V_{DDIO_2}) or ADC[2] (V_{DDD}) with the following conditions: a. 3.0 V ≤ V_{DDD}, V_{DDIO_1} or V_{DDIO_2} = V_{DDA} = V_{REFH} ≤ 3.6 V or b. 4.5 V ≤ V_{DDD}, V_{DDIO_1} or V_{DDIO_2} = V_{DDA} = V_{REFH} ≤ 5.5 V
SID201	$T_{SENSACC2}$	Temperature sensor accuracy 2	–5	–	5	°C	–40 °C ≤ T_J < 150 °C This spec is valid when using ADC[0] (V_{DDIO_1}), ADC[1] (V_{DDIO_2}) or ADC[2] (V_{DDD}) with the following conditions: a. 3.0 V ≤ V_{DDD}, V_{DDIO_1} or V_{DDIO_2} = V_{DDA} = V_{REFH} ≤ 3.6 V or b. 4.5 V ≤ V_{DDD}, V_{DDIO_1} or V_{DDIO_2} = V_{DDA} = V_{REFH} ≤ 5.5 V
SID201A	$T_{SENSACC3}$	Temperature sensor accuracy 3	–10	–	10	°C	–40 °C ≤ T_J ≤ 150 °C This spec is valid when using ADC[0] (V_{DDIO_1}) or ADC[2] (V_{DDD}) with the following condition: 2.7 V ≤ V_{DDD} or V_{DDIO_1} ≤ 5.5 V and 2.7 V ≤ V_{DDA} = V_{REFH} ≤ 5.5 V and 0.8 × V_{DDA} < V_{DDD} or V_{DDIO_1}

26.6.4 Voltage Divider Accuracy

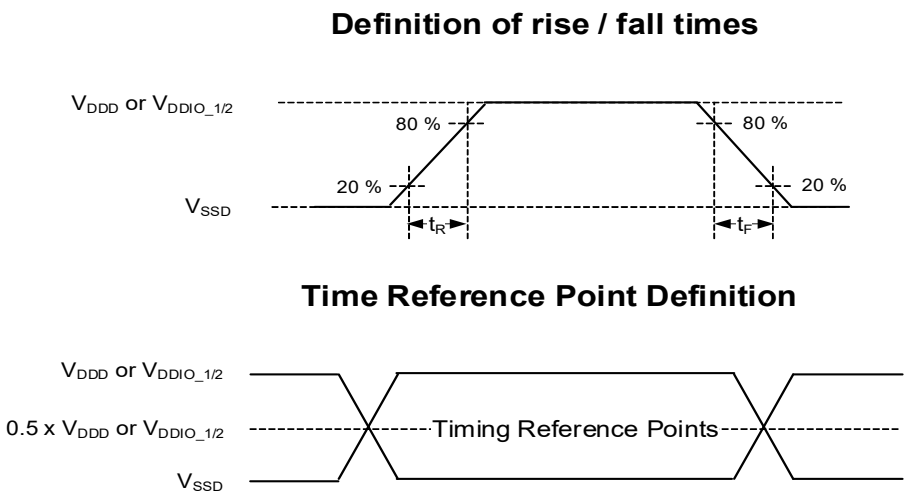
Table 26-9. Voltage Divider Accuracy

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
SID202	V_{MONDIV}	Uncorrected monitor voltage divider accuracy (measured by ADC), compared to ideal supply/2	–20	2	20	%	Any HV supply pad within 2.7 V–5.5 V operating range

26.7 AC Specifications

Unless otherwise noted, the timings are defined with the guidelines mentioned in the Figure 26-7.

Figure 26-7. AC Timings Specifications



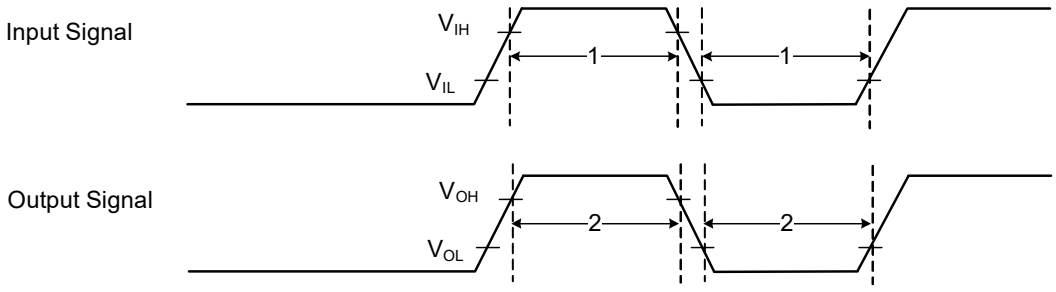
26.8 Digital Peripherals

Table 26-10. Timer/Counter/PWM (TCPWM) Specifications

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
SID120A	f_C	TCPWM operating frequency	–	–	80	MHz	f_C = peripheral clock
SID121	$t_{PWMENEXT}$	Input trigger pulse width for all trigger events	2 / f_C	–	–	ns	Trigger Events can be Stop, Start, Reload, Count, Capture, or Kill depending on which mode of operation is selected.
SID122	t_{PWMEXT}	Output trigger pulse widths	2 / f_C	–	–	ns	Minimum possible width of Overflow, Underflow, and Counter = Compare (CC) value trigger outputs
SID123	t_{CRES}	Resolution of counter	1 / f_C	–	–	ns	Minimum time between successive counts
SID124	t_{PWMRES}	PWM resolution	1 / f_C	–	–	ns	Minimum pulse width of PWM output
SID125	t_{QRES}	Quadrature inputs resolution	2 / f_C	–	–	ns	Minimum pulse width between Quadrature phase inputs.

Figure 26-8.TCPWM Timing Diagrams

TCPWM Timing Diagrams



1: $t_{PWMENEXT}$, t_{QRES}
2: t_{PWMEXT}

Table 26-11. Serial Communication Block (SCB) Specifications

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
SID129A	f_{SCB}	SCB operating frequency	–	–	80	MHz	
I^2C Interface-Standard-mode							
SID130	f_{SCL}	SCL clock frequency	–	–	100	kHz	
SID131	$t_{HD;STA}$	Hold time, START condition	4000	–	–	ns	
SID132	t_{LOW}	Low period of SCL	4700	–	–	ns	
SID133	t_{HIGH}	High period of SCL	4000	–	–	ns	
SID134	$t_{SU;STA}$	Setup time for a repeated START	4700	–	–	ns	
SID135	$t_{HD;DAT}$	Data hold time, for receiver	0	–	–	ns	
SID136	$t_{SU;DAT}$	Data setup time	250	–	–	ns	
SID138	t_F	Fall time of SCL and SDA	–	–	300	ns	Input and output
SID139	$t_{SU;STO}$	Setup time for STOP	4000	–	–	ns	
SID140	t_{BUF}	Bus-free time between START and STOP	4700	–	–	ns	
SID141	C_B	Capacitive load for each bus line	–	–	400	pF	
SID142	$t_{VD;DAT}$	Time for data signal from SCL LOW to SDA output	–	–	3450	ns	
SID143	$t_{VD;ACK}$	Data valid acknowledge time	–	–	3450	ns	
SID144	V_{OL}	LOW level output voltage	0	–	0.4	V	Open-drain at 3 mA sink current
SID145	I_{OL}	LOW level output current	3	–	–	mA	V_{OL} = 0.4 V
I^2C Interface-Fast-mode							
SID150	f_{SCL_F}	SCL clock frequency	–	–	400	kHz	
SID151	$t_{HD;STA\_F}$	Hold time, START condition	600	–	–	ns	
SID152	t_{LOW_F}	Low period of SCL	1300	–	–	ns	
SID153	t_{HIGH_F}	High period of SCL	600	–	–	ns	
SID154	$t_{SU;STA\_F}$	Setup time for a repeated START	600	–	–	ns	
SID155	$t_{HD;DAT\_F}$	Data hold time, for receiver	0	–	–	ns	
SID156	$t_{SU;DAT\_F}$	Data setup time	100	–	–	ns	
SID158	t_{F_F}	Fall time of SCL and SDA	$20 \times (V_{DDD} / 5.5)$	–	300	ns	Input and output, GPIO_ENH: slow mode, 400 pF load
SID158A	t_{FA_F}	Fall time of SCL and SDA	0.35	–	300	ns	Input and output GPIO_STD: drive_sel<1:0>= 0b00 MIN: 10 pF load, RPU = 35.41 kΩ MAX: 400 pF load, RPU = 350 Ω
SID159	$t_{SU;STO\_F}$	Setup time for STOP	600	–	–	ns	Input and output
SID160	t_{BUF_F}	Bus free time between START and STOP	1300	–	–	ns	
SID161	C_{B_F}	Capacitive load for each bus line	–	–	400	pF	
SID162	$t_{VD;DAT\_F}$	Time for data signal from SCL LOW to SDA output	–	–	900	ns	
SID163	$t_{VD;ACK\_F}$	Data valid acknowledge time	–	–	900	ns	

Table 26-11. Serial Communication Block (SCB) Specifications *(continued)*

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
SID164	t_{SP_F}	Pulse width of spikes that must be suppressed by the input filter	–	–	50	ns	
SID165	V_{OL_F}	LOW level output voltage	0	–	0.4	V	Open-drain at 3 mA sink current
SID165	I_{OL_F}	LOW level output current	3	–	–	mA	V_{OL} = 0.4 V
SID167	I_{OL2_F}	LOW level output current	6	–	–	mA	V_{OL} = 0.6 V[48]
I^2C Interface-Fast-Plus mode							
SID170	f_{SCL_FP}	SCL clock frequency	–	–	1	MHz	
SID171	$t_{HD;STA\_FP}$	Hold time, START condition	260	–	–	ns	
SID172	t_{LOW_FP}	Low period of SCL	500	–	–	ns	
SID173	t_{HIGH_FP}	High period of SCL	260	–	–	ns	
SID174	$t_{SU;STA\_FP}$	Setup time for a repeated START	260	–	–	ns	
SID175	$t_{HD;DAT\_FP}$	Data hold time, for receiver	0	–	–	ns	
SID176	$t_{SU;DAT\_FP}$	Data setup time	50	–	–	ns	
SID178	t_{F_FP}	Fall time of SCL and SDA	20 × (V_{DDD} /5.5)	–	160	ns	Input and output 20-pF load GPIO_ENH: slow mode
SID179	$t_{SU;STO\_FP}$	Setup time for STOP	260	–	–	ns	Input and output
SID180	t_{BUF_FP}	Bus free time between START and STOP	500	–	–	ns	
SID181	C_{B_FP}	Capacitive load for each bus line	–	–	20	pF	
SID182	$t_{VD;DAT\_FP}$	Time for data signal from SCL LOW to SDA output	–	–	450	ns	
SID183	$t_{VD;ACK\_FP}$	Data valid acknowledge time	–	–	450	ns	
SID184	t_{SP_FP}	Pulse width of spikes that must be suppressed by the input filter	–	–	50	ns	
SID186	V_{OL_FP}	LOW level output voltage	0	–	0.4	V	Open-drain at 3-mA sink current
SID187	I_{OL_FP}	LOW level output current	3	–	–	mA	V_{OL} = 0.4 V[49]
SPI Interface Master (Full-clock mode: LATE_MISO_SAMPLE = 1) [Conditions: drive_sel<1:0>= 0x]							
SID190B	f_{SPI}	SPI operating frequency	–	–	10	MHz	Do not use half-clock mode: LATE_MISO_SAMPLE = 0
SID191	t_{DMO}	SPI Master: MOSI valid after SCLK driving edge	–	–	15	ns	
SID192	t_{DSI}	SPI Master: MISO valid before SCLK capturing edge	40	–	–	ns	
SID193	t_{HMO}	SPI Master: Previous MOSI data hold time	0	–	–	ns	

Notes
48. In order to drive full bus load at 400 kHz, 6 mA I_{OL} is required at 0.6 V V_{OL}.
49. In order to drive full bus load at 1 MHz, 20 mA I_{OL} is required at 0.4 V V_{OL}. However, this device does not support it.

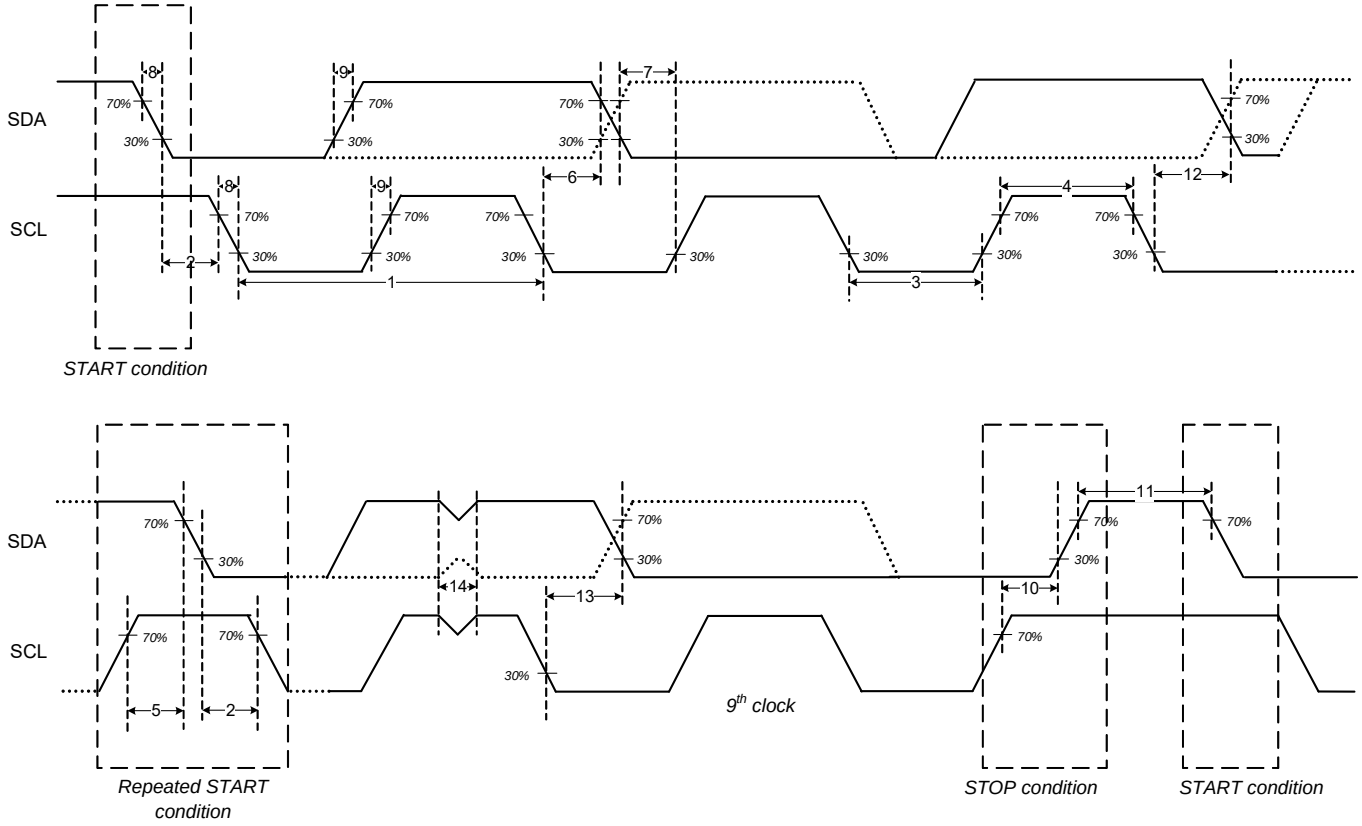
Table 26-11. Serial Communication Block (SCB) Specifications *(continued)*

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
SID194	$t_{W\_SCLK\_H\_L}$	SPI SCLK pulse width HIGH or LOW	–	0.4 × (1 / f_{SPI})	–	ns	
SID196	t_{DHI}	SPI Master: MISO hold time after SCLK capturing edge	0	–	–	ns	
SID198	t_{EN_SETUP}	SSEL valid, before the first SCK capturing edge	0.5 × (1/f_{SPI})	–	–	ns	Min is half clock period
SID199	t_{EN_SHOLD}	SSEL hold, after the last SCK capturing edge	0.5 × (1/f_{SPI})	–	–	ns	Min is half clock period
SID195	C_{SPIM_MS}	SPI capacitive load	–	–	10	pF	
SPI Interface Slave (internally clocked) [Conditions: drive_sel<1:0>= 0x]							
SID205	f_{SPI_INT}	SPI operating frequency	–	–	10	MHz	
SID206	t_{DMI_INT}	SPI Slave: MOSI Valid before Sclock capturing edge	5	–	–	ns	
SID207	t_{DSO_INT}	SPI Slave: MISO Valid after Sclock driving edge, in the internal-clocked mode	–	–	62	ns	
SID208	t_{HSP}	SPI Slave: Previous MISO data hold time	3	–	–	ns	
SID209	$t_{EN\_SETUP\_INT}$	SPI Slave: SSEL valid to first SCK valid edge	33	–	–	ns	
SID210	$t_{EN\_HOLD\_INT}$	SPI Slave Select active (LOW) from last SCLK hold	33	–	–	ns	
SID211	$t_{EN\_SETUP\_PRE}$	SPI Slave: from SSEL valid, to SCK falling edge before the first data bit	20	–	–	ns	
SID212	$t_{EN\_HOLD\_PRE}$	SPI Slave: from SCK falling edge before the first data bit, to SSEL invalid	20	–	–	ns	
SID213	$t_{EN\_SETUP\_CO}$	SPI Slave: from SSEL valid, to SCK falling edge in the first data bit	20	–	–	ns	
SID214	$t_{EN\_HOLD\_CO}$	SPI Slave: from SCK falling edge in the first data bit, to SSEL invalid	20	–	–	ns	
SID215	$t_{W\_DIS\_INT}$	SPI Slave Select inactive time	40	–	–	ns	
SID216	$t_{W\_SCLKH\_INT}$	SPI SCLK pulse width HIGH	20	–	–	ns	
SID217	$t_{W\_SCLKL\_INT}$	SPI SCLK pulse width LOW	20	–	–	ns	
SID218	t_{SIH_INT}	SPI MOSI hold from SCLK	12	–	–	ns	
SID219	C_{SPIS_INT}	SPI Capacitive Load	–	–	10	pF	
SPI Interface Slave (externally clocked) [Conditions: drive_sel<1:0>= 0x]							
SID220B	f_{SPI_EXT}	SPI operating frequency	–	–	10	MHz	
SID221	t_{DMI_EXT}	SPI Slave: MOSI Valid before Sclock capturing edge	5	–	–	ns	
SID222	t_{DSO_EXT}	SPI Slave: MISO Valid after Sclock driving edge, in the external-clocked mode	–	–	32	ns	
SID223	t_{HSO_EXT}	SPI Slave: Previous MISO data hold time	3	–	–	ns	
SID224	$t_{EN\_SETUP\_EXT}$	SPI Slave: SSEL valid to first SCK valid edge	40	–	–	ns	

Table 26-11. Serial Communication Block (SCB) Specifications *(continued)*

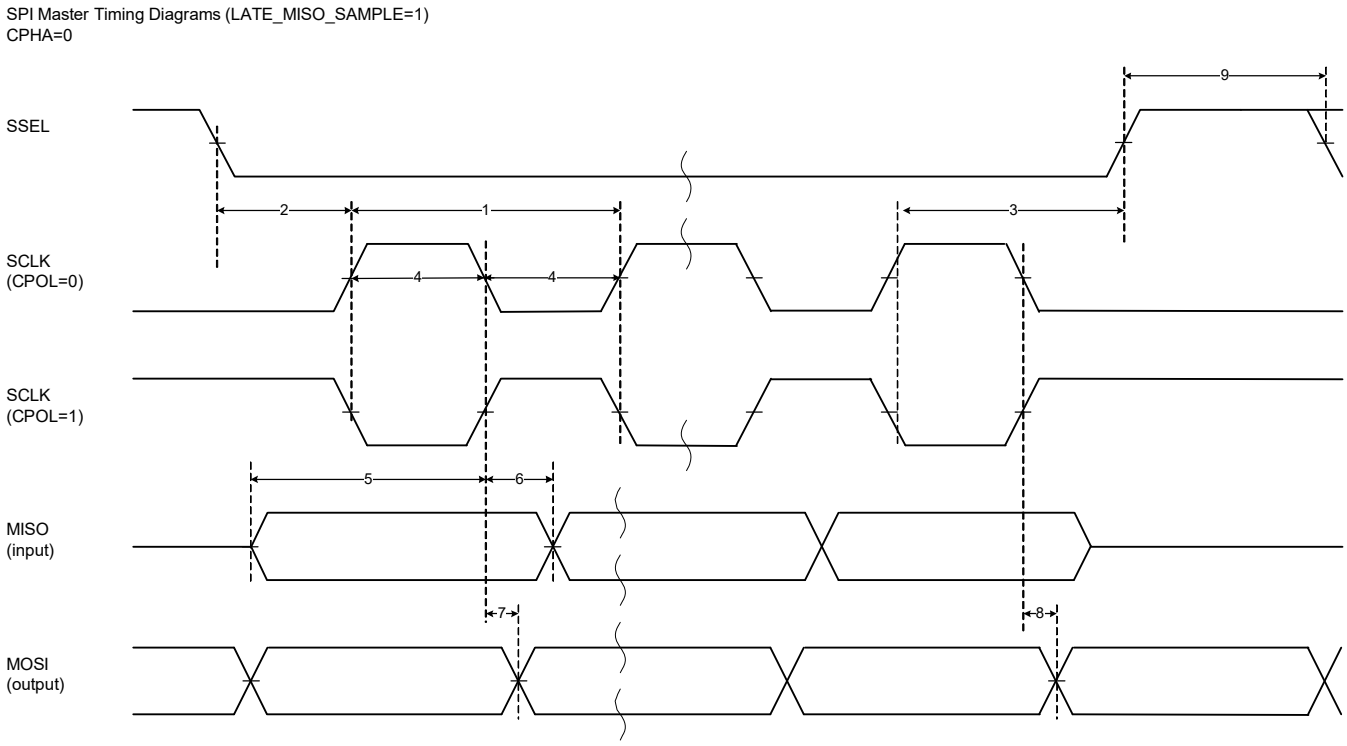
Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
SID225	$t_{EN\_HOLD\_EXT}$	SPI Slave Select active (LOW) from last SCLK hold	40	–	–	ns	
SID226	$t_{W\_DIS\_EXT}$	SPI Slave Select inactive time	80	–	–	ns	
SID227	$t_{W\_SCLKH\_EXT}$	SPI SCLK pulse width HIGH	34	–	–	ns	
SID228	$t_{W\_SCLKL\_EXT}$	SPI SCLK pulse width LOW	34	–	–	ns	
SID229	t_{SIH_EXT}	SPI MOSI hold from SCLK	20	–	–	ns	
SID230	C_{SPIS_EXT}	SPI Capacitive Load	–	–	10	pF	
SID231	t_{VSS_EXT}	SPI Slave: MISO valid after SSEL falling edge (CPHA = 0)	–	–	33	ns	
UART Interface							
SID240	f_{BPS}	Data rate	–	–	10	Mbps	

Figure 26-9.I²C Timing Diagrams



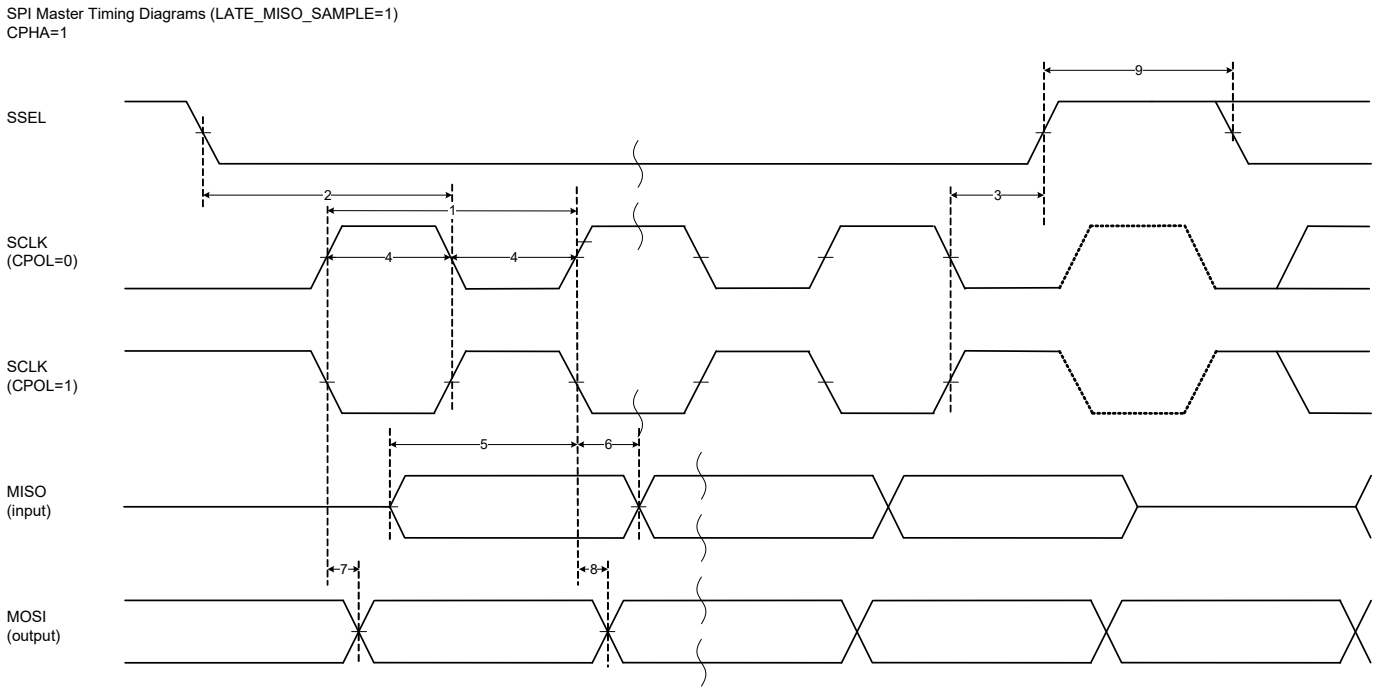
1: SCL clock period = $1/f_{SCL}$
2: Hold time, START condition = $t_{HD;STA}$
3: LOW period of SCL = t_{LOW}
4: HIGH period of SCL = t_{HIGH}
5: Setup time for a repeated START = $t_{SU;STA}$
6: Data hold time, for receiver = $t_{HD;DAT}$
7: Data setup time = $t_{SU;DAT}$
8: Fall time of SCL and SDA = t_F
9: Rise time of SCL and SDA = t_R
10: Setup time for STOP = $t_{SU;STO}$
11: Bus-free time between START and STOP = t_{BUF}
12: Time for data signal from SCL LOW to SDA output = $t_{VD;DAT}$
13: Data valid acknowledge time = $t_{VD;ACK}$
14: Pulse width of spikes that must be suppressed by the input filter = t_{SP}

Figure 26-10.SPI Master Timing Diagrams with LOW Clock Phase



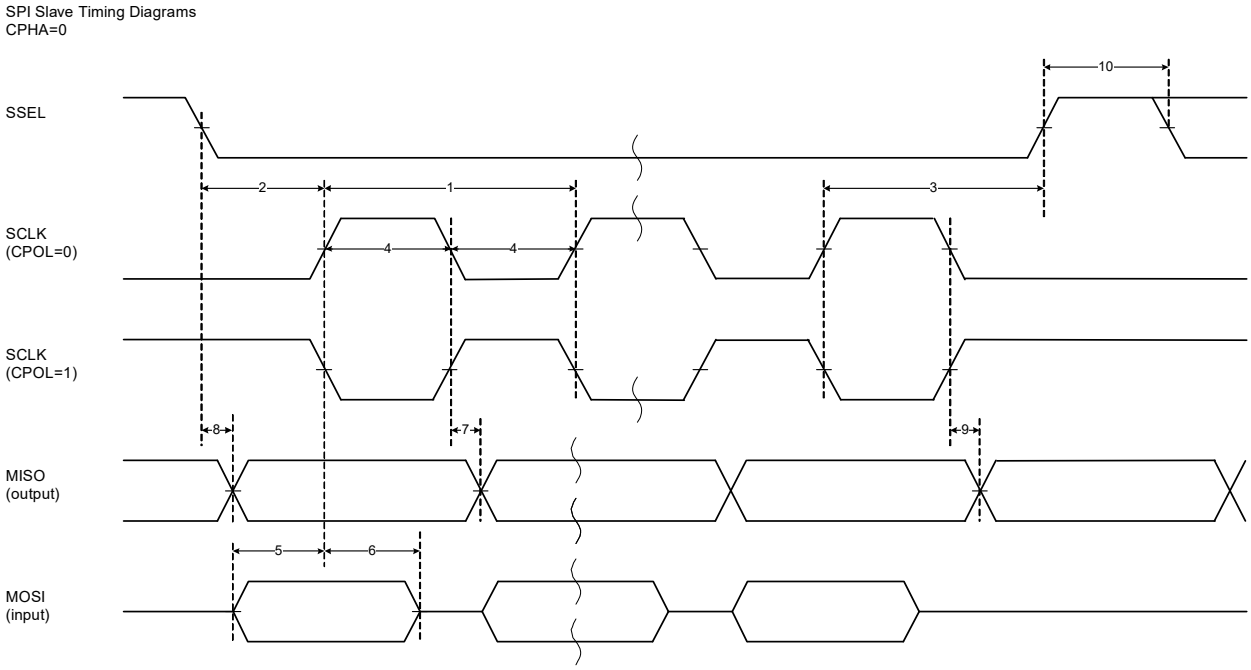
1: SCLK period = 1 / f_{SPI}
2: Enable lead time (setup) = t_{EN_SETUP} = Depends on SPI_CTRL.SSEL_SETUP_DEL (Refer to the Register TRM)
3: Enable trail time (hold) = t_{EN_HOLD} = Depends on SPI_CTRL.SSEL_HOLD_DEL (Refer to the Register TRM)
4: SCLK high or low time = $t_{W\_SCLK\_H\_L}$
5: Input data setup time = t_{DSI}
6: Input data hold time = t_{DHI}
7: Output data valid after SCLK driving edge= t_{DMO}
8: Output data hold time = t_{HMO}
9: SSEL high pulse width = Depends on SPI_CTRL.SSEL_INTER_FRAME_DEL (Refer to the Register TRM)

Figure 26-11.SPI Master Timing Diagrams with HIGH Clock Phase



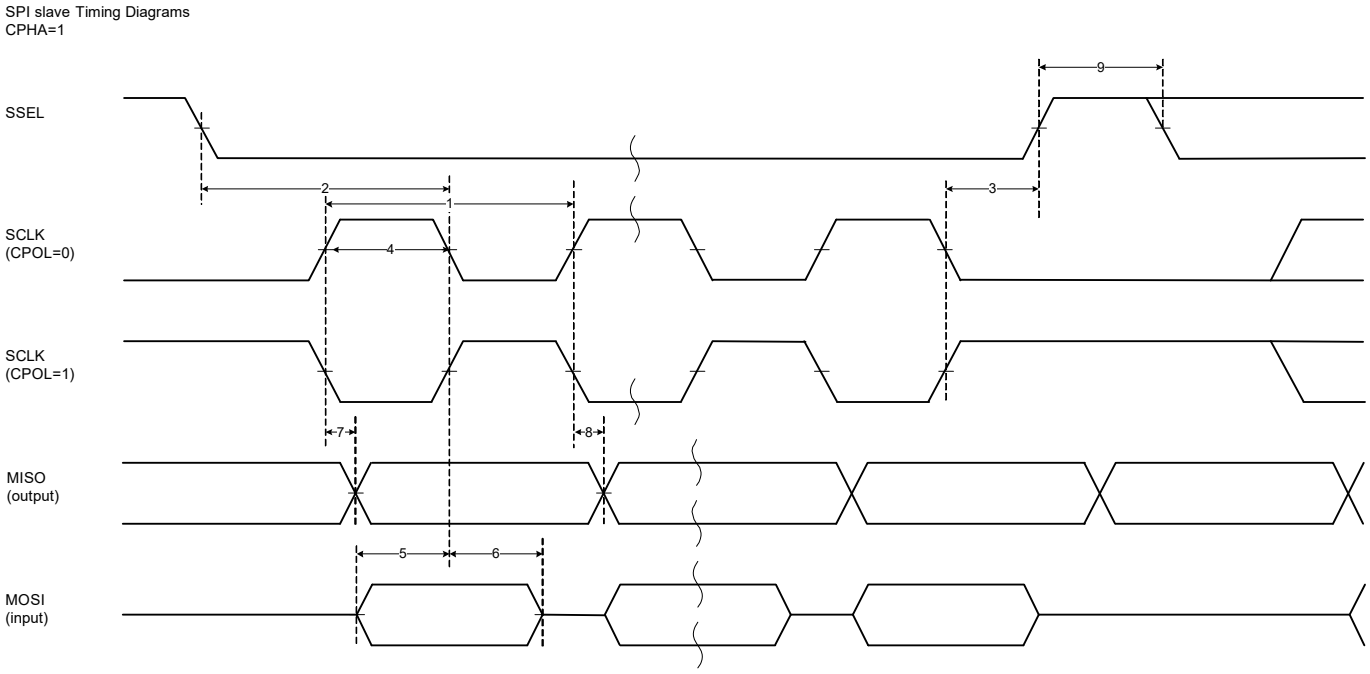
1: SCLK period = 1 / f_{SPI}
2: Enable lead time (setup) = t_{EN_SETUP} = Depends on SPI_CTRL.SSEL_SETUP_DEL (Refer to the Register TRM)
3: Enable trail time (hold) = t_{EN_HOLD} = Depends on SPI_CTRL.SSEL_HOLD_DEL (Refer to the Register TRM)
4: SCLK high or low time = $t_{W\_SCLK\_H\_L}$
5: Input data setup time = t_{DSI}
6: Input data hold time = t_{HDI}
7: Output data valid after SCLK driving edge = t_{DMO}
8: Output data hold time = t_{HMO}
9: SSEL high pulse width = Depends on SPI_CTRL.SSEL_INTER_FRAME_DEL (Refer to the Register TRM)

Figure 26-12.SPI Slave Timing Diagrams with LOW Clock Phase



1: SCLK period = 1 / f_{SPI_EXT}
2: enable lead time (setup) = $t_{EN\_SETUP\_EXT}$
3: enable trail time (hold) = $t_{EN\_HOLD\_EXT}$
4: SCLK high or low time = $t_{w\_SCLKH\_EXT}$ = $t_{w\_SCLKL\_EXT}$
5: input data setup time = t_{DMI_EXT}
6: input data hold time = t_{SIH_EXT}
7: output data valid after SCLK driving edge= t_{DSO_EXT}
8: output data valid after SSEL falling edge (CPHA=0)= t_{VSS_EXT}
9: output data hold time = t_{HSO}
10: SSEL high pulse width = t_{DIS_EXT}

Figure 26-13.SPI Slave Timing Diagrams with HIGH Clock Phase



1: SCLK period = 1 / f_{SPI_EXT}
2: enable lead time (setup) = $t_{EN\_SETUP\_EXT}$
3: enable trail time (hold) = $t_{EN\_HOLD\_EXT}$
4: SCLK high or low time = $t_{w\_SCLKH\_EXT}$ = $t_{w\_SCLKL\_EXT}$
5: input data setup time = t_{DMI_EXT}
6: input data hold time = t_{SIH_EXT}
7: output data valid after SCLK driving edge = t_{DSO_EXT}
8: output data hold time = t_{HSO}
9: SSEL high pulse width = t_{DIS_EXT}

26.8.1 LIN Specifications

Table 26-12. LIN Specifications

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
SID249A	f_{LIN}	Internal clock frequency to the LIN block	–	–	80	MHz	
SID250	BR_NOM	Bit rate on the LIN bus	1	–	20	kbps	Guaranteed by design
SID250A	BR_REF	Bit rate on the LIN bus (not in standard LIN specification) for re-flashing in LIN slave mode	1	–	115.2	kbps	Guaranteed by design

26.8.2 CAN FD Specifications

Table 26-13. CAN FD Specifications

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
SID630A	f_{HCLK}	System clock frequency	–	–	80	MHz	$f_{cclk} \le f_{hclk}$, Guaranteed by design
SID631A	f_{CCLK}	CAN clock frequency	–	–	80	MHz	$f_{cclk} \le f_{hclk}$, Guaranteed by design

26.9 Memory

Table 26-14. Flash DC Specifications

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
SID260	V_{PE}	Erase and program voltage	2.7	–	5.5	V	

Table 26-15. Flash AC Specifications

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
SID257A	f_{FO}	Maximum flash memory operation frequency	–	–	80	MHz	Zero wait access to code-flash memory up to 80 MHz
SID254	t_{ERS_SUS}	Maximum time from erase suspend command till erase is indeed suspend	–	–	37.5	µs	
SID255	$t_{ERS\_RES\_SUS}$	Minimum time allowed from erase resume to erase suspend	250	–	–	µs	Guaranteed by design
SID258A	$t_{BC\_WF\_A}$	Blank check time for N-bytes of work-flash	–	–	12.5 + 0.375 × N	µs	At 80 MHz, N ≥ 4 and multiple of 4, excludes system overhead time
SID259	$t_{SECTORERASE1}$	Sector erase time (Code-flash: 32 KB)	–	45	90	ms	Includes internal preprogramming time
SID259A	$t_{SECTORERASE2}$	Sector erase time (Code-flash: 8 KB)	–	15	30	ms	Includes internal preprogramming time
SID261	$t_{SECTORERASE3}$	Sector erase time (Work-flash, 2 KB)	–	80	160	ms	Includes internal preprogramming time
SID262	$t_{SECTORERASE4}$	Sector erase time (Work-flash, 128 bytes)	–	5	15	ms	Includes internal preprogramming time
SID263	t_{WRITE1}	64-bit write time (Code-flash)	–	30	60	µs	Excludes system overhead time
SID264	t_{WRITE2}	256-bit write time (Code-flash)	–	40	70	µs	Excludes system overhead time
SID265	t_{WRITE3}	4096-bit write time (Code-flash)[50]	–	320	1200	µs	Excludes system overhead time
SID266	t_{WRITE4}	32-bit write time (Work-flash)	–	30	60	µs	Excludes system overhead time
SID267	t_{FRET1}	Code-flash retention. 1000 program/erase cycles	20	–	–	years	T_A (power on and off) ≤ 85 °C average
SID268	t_{FRET3}	Work-flash retention. 125,000 program/erase cycles	20	–	–	years	T_A (power on and off) ≤ 85 °C average
SID269	t_{FRET4}	Work-flash retention. 250,000 program/erase cycles	10	–	–	years	T_A (power on and off) ≤ 85 °C average
SID612	I_{CC_ACT2}	Program operating current (Code or Work-flash)	–	15	48	mA	V_{DDD} = 5 V Guaranteed by design
SID613	I_{CC_ACT3}	Erase operating current (Code or Work-flash)	–	15	48	mA	V_{DDD} = 5 V Guaranteed by design

Note
50. The code-flash includes a 'Write Buffer' of 4096-bit. If the application software writes this buffer multiple times, to get the overall write time multiply one sector write time with the corresponding factor (say for factor 64, example, 64 x 512 B = 32 KB [one sector])

26.10 System Resources

Table 26-16. System Resources

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/ Conditions
Power-On-Reset Specifications							
SID270	V_{POR_R}	V_{DDD} rising voltage to de assert POR	1.5	–	2.35	V	Guaranteed by design
SID276	V_{POR_F}	V_{DDD} falling voltage to assert POR	1.45	–	2.1	V	
SID271	V_{POR_H}	Level detection hysteresis	20	–	300	mV	Guaranteed by design
SID272	t_{DLY_POR}	Delay between V_{DDD} rising through 2.3 V and an internal deassertion of POR	–	–	3	µs	Guaranteed by design
SID273	t_{POFF}	V_{DDD} Power off time	100	–	–	µs	V_{DDD} < 1.45 V
SID274	POR_RR1	V_{DDD} power ramp rate with robust BOD (BOD operation is guaranteed)	–	–	100	mV/µs	This ramp supports robust BOD
SID275	POR_RR2	V_{DDD} power ramp rate without robust BOD	–	–	1000	mV/µs	This ramp does not support robust BOD t_{POFF} must be satisfied
High-Voltage BOD (HV BOD) Specifications							
SID500	$V_{TR\_2P7\_R}$	HV BOD 2.7 V rising detection point for V_{DDD} and V_{DDA} (default)	2.474	2.55	2.627	V	
SID501	$V_{TR\_2P7\_F}$	HV BOD 2.7 V falling detection point for V_{DDD} and V_{DDA} (default)	2.449	2.525	2.601	V	
SID502	$V_{TR\_3P0\_R}$	HV BOD 3.0 V rising detection point for V_{DDD} and V_{DDA}	2.765	2.85	2.936	V	
SID503	$V_{TR\_3P0\_F}$	HV BOD 3.0 V falling detection point for V_{DDD} and V_{DDA}	2.74	2.825	2.91	V	
SID505	HVBOD_RR_A	Power ramp rate: V_{DDD} and V_{DDA} (Active)	–	–	100	mV/µs	
SID506	HVBOD_RR_DS	Power ramp rate: V_{DDD} and V_{DDA} (DeepSleep)	–	–	10	mV/µs	
SID507	$t_{DLY\_ACT\_HVBOD}$	Active mode delay between V_{DDD} falling/rising through $V_{TR\_2P7\_F/R}$ or $V_{TR\_3P0\_F/R}$ and an internal HV BOD signal transitioning	–	–	0.5	µs	Guaranteed by design
SID507A	$t_{DLY\_ACT\_HVBOD}$	Active mode delay between V_{DDA} falling/rising through $V_{TR\_2P7\_F/R}$ or $V_{TR\_3P0\_F/R}$ and internal HV BOD signal transitioning	–	–	1	µs	Guaranteed by design
SID507B	$t_{DLY\_DS\_HVBOD}$	DeepSleep mode delay between V_{DDD}/V_{DDA} falling/rising through $V_{TR\_2P7\_F/R}$ or $V_{TR\_3P0\_F/R}$ and an internal HV BOD signal transitioning	–	–	4	µs	Guaranteed by design
SID508	t_{RES_HVBOD}	Response time of HV BOD, V_{DDD}/V_{DDA} supply. (For falling-then-rising supply at max ramp rate; threshold is $V_{TR\_2P7\_F}$ or $V_{TR\_3P0\_F}$.)	100	–	–	ns	Guaranteed by design
Low-Voltage BOD (LV BOD) Specifications							
SID510	$V_{TR\_R\_LVBOD}$	LV BOD rising detection point for V_{CCD}	0.917	0.945	0.973	V	
SID511	$V_{TR\_F\_LVBOD}$	LV BOD falling detection point for V_{CCD}	0.892	0.92	0.948	V	
SID515	$t_{DLY\_ACT\_LVBOD}$	Active delay between V_{CCD} falling/rising through V_{TR_R/F_LVBOD} and an internal LV BOD signal transitioning	–	–	1	µs	Guaranteed by design

Table 26-16. System Resources *(continued)*

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/ Conditions
SID515A	$t_{DLY\_DS\_LVBOD}$	DeepSleep mode delay between V_{CCD} falling/rising through V_{TR_R/F_LVBOD} and an internal LV BOD signal transitioning	–	–	12	µs	Guaranteed by design
SID516	t_{RES_LVBOD}	Response time of LV BOD. (For falling-then-rising supply at max ramp rate; threshold is $V_{TR\_F\_LVBOD}$.)	100	–	–	ns	Guaranteed by design
Low-Voltage Detector (LVD) DC Specifications							
SID520	$V_{TR\_2P8\_F}$	LVD 2.8 V falling detection point for V_{DDD}	Typ – 4%	2800	Typ + 4%	mV	
SID521	$V_{TR\_2P9\_F}$	LVD 2.9 V falling detection point for V_{DDD}	Typ – 4%	2900	Typ + 4%	mV	
SID522	$V_{TR\_3P0\_F}$	LVD 3.0 V falling detection point for V_{DDD}	Typ – 4%	3000	Typ + 4%	mV	
SID523	$V_{TR\_3P1\_F}$	LVD 3.1 V falling detection point for V_{DDD}	Typ – 4%	3100	Typ + 4%	mV	
SID524	$V_{TR\_3P2\_F}$	LVD 3.2 V falling detection point for V_{DDD}	Typ – 4%	3200	Typ + 4%	mV	
SID525	$V_{TR\_3P3\_F}$	LVD 3.3 V falling detection point for V_{DDD}	Typ – 4%	3300	Typ + 4%	mV	
SID526	$V_{TR\_3P4\_F}$	LVD 3.4 V falling detection point for V_{DDD}	Typ – 4%	3400	Typ + 4%	mV	
SID527	$V_{TR\_3P5\_F}$	LVD 3.5 V falling detection point for V_{DDD}	Typ – 4%	3500	Typ + 4%	mV	
SID528	$V_{TR\_3P6\_F}$	LVD 3.6 V falling detection point for V_{DDD}	Typ – 4%	3600	Typ + 4%	mV	
SID529	$V_{TR\_3P7\_F}$	LVD 3.7 V falling detection point for V_{DDD}	Typ – 4%	3700	Typ + 4%	mV	
SID530	$V_{TR\_3P8\_F}$	LVD 3.8 V falling detection point for V_{DDD}	Typ – 4%	3800	Typ + 4%	mV	
SID531	$V_{TR\_3P9\_F}$	LVD 3.9 V falling detection point for V_{DDD}	Typ – 4%	3900	Typ + 4%	mV	
SID532	$V_{TR\_4P0\_F}$	LVD 4.0 V falling detection point for V_{DDD}	Typ – 4%	4000	Typ + 4%	mV	
SID533	$V_{TR\_4P1\_F}$	LVD 4.1 V falling detection point for V_{DDD}	Typ – 4%	4100	Typ + 4%	mV	
SID534	$V_{TR\_4P2\_F}$	LVD 4.2 V falling detection point for V_{DDD}	Typ – 4%	4200	Typ + 4%	mV	
SID535	$V_{TR\_4P3\_F}$	LVD 4.3 V falling detection point for V_{DDD}	Typ – 4%	4300	Typ + 4%	mV	
SID536	$V_{TR\_4P4\_F}$	LVD 4.4 V falling detection point for V_{DDD}	Typ – 4%	4400	Typ + 4%	mV	
SID537	$V_{TR\_4P5\_F}$	LVD 4.5 V falling detection point for V_{DDD}	Typ – 4%	4500	Typ + 4%	mV	
SID538	$V_{TR\_4P6\_F}$	LVD 4.6 V falling detection point for V_{DDD}	Typ – 4%	4600	Typ + 4%	mV	
SID539	$V_{TR\_4P7\_F}$	LVD 4.7 V falling detection point for V_{DDD}	Typ – 4%	4700	Typ + 4%	mV	
SID540	$V_{TR\_4P8\_F}$	LVD 4.8 V falling detection point for V_{DDD}	Typ – 4%	4800	Typ + 4%	mV	
SID541	$V_{TR\_4P9\_F}$	LVD 4.9 V falling detection point for V_{DDD}	Typ – 4%	4900	Typ + 4%	mV	
SID542	$V_{TR\_5P0\_F}$	LVD 5.0 V falling detection point for V_{DDD}	Typ – 4%	5000	Typ + 4%	mV	
SID543	$V_{TR\_5P1\_F}$	LVD 5.1 V falling detection point for V_{DDD}	Typ – 4%	5100	Typ + 4%	mV	
SID544	$V_{TR\_5P2\_F}$	LVD 5.2 V falling detection point for V_{DDD}	Typ – 4%	5200	Typ + 4%	mV	
SID545	$V_{TR\_5P3\_F}$	LVD 5.3 V falling detection point for V_{DDD}	Typ – 4%	5300	Typ + 4%	mV	
SID546	$V_{TR\_2P8\_R}$	LVD 2.8 V rising detection point for V_{DDD}	Typ – 4%	2825	Typ + 4%	mV	Same as $V_{TR\_2P8\_F}$ + 25 mV
SID547	$V_{TR\_2P9\_R}$	LVD 2.9 V rising detection point for V_{DDD}	Typ – 4%	2925	Typ + 4%	mV	Same as $V_{TR\_2P9\_F}$ + 25 mV
SID548	$V_{TR\_3P0\_R}$	LVD 3.0 V rising detection point for V_{DDD}	Typ – 4%	3025	Typ + 4%	mV	Same as $V_{TR\_3P0\_F}$ + 25 mV
SID549	$V_{TR\_3P1\_R}$	LVD 3.1 V rising detection point for V_{DDD}	Typ – 4%	3125	Typ + 4%	mV	Same as $V_{TR\_3P1\_F}$ + 25 mV
SID550	$V_{TR\_3P2\_R}$	LVD 3.2 V rising detection point for V_{DDD}	Typ – 4%	3225	Typ + 4%	mV	Same as $V_{TR\_3P2\_F}$ + 25 mV
SID551	$V_{TR\_3P3\_R}$	LVD 3.3 V rising detection point for V_{DDD}	Typ – 4%	3325	Typ + 4%	mV	Same as $V_{TR\_3P3\_F}$ + 25 mV

Table 26-16. System Resources *(continued)*

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/ Conditions
SID552	$V_{TR\_3P4\_R}$	LVD 3.4 V rising detection point for V_{DDD}	Typ – 4%	3425	Typ + 4%	mV	Same as $V_{TR\_3P4\_F}$ + 25 mV
SID553	$V_{TR\_3P5\_R}$	LVD 3.5 V rising detection point for V_{DDD}	Typ – 4%	3525	Typ + 4%	mV	Same as $V_{TR\_3P5\_F}$ + 25 mV
SID554	$V_{TR\_3P6\_R}$	LVD 3.6 V rising detection point for V_{DDD}	Typ – 4%	3625	Typ + 4%	mV	Same as $V_{TR\_3P6\_F}$ + 25 mV
SID555	$V_{TR\_3P7\_R}$	LVD 3.7 V rising detection point for V_{DDD}	Typ – 4%	3725	Typ + 4%	mV	Same as $V_{TR\_3P7\_F}$ + 25 mV
SID556	$V_{TR\_3P8\_R}$	LVD 3.8 V rising detection point for V_{DDD}	Typ – 4%	3825	Typ + 4%	mV	Same as $V_{TR\_3P8\_F}$ + 25 mV
SID557	$V_{TR\_3P9\_R}$	LVD 3.9 V rising detection point for V_{DDD}	Typ – 4%	3925	Typ + 4%	mV	Same as $V_{TR\_3P9\_F}$ + 25 mV
SID558	$V_{TR\_4P0\_R}$	LVD 4.0 V rising detection point for V_{DDD}	Typ – 4%	4025	Typ + 4%	mV	Same as $V_{TR\_4P0\_F}$ + 25 mV
SID559	$V_{TR\_4P1\_R}$	LVD 4.1 V rising detection point for V_{DDD}	Typ – 4%	4125	Typ + 4%	mV	Same as $V_{TR\_4P1\_F}$ + 25 mV
SID560	$V_{TR\_4P2\_R}$	LVD 4.2 V rising detection point for V_{DDD}	Typ – 4%	4225	Typ + 4%	mV	Same as $V_{TR\_4P2\_F}$ + 25 mV
SID561	$V_{TR\_4P3\_R}$	LVD 4.3 V rising detection point for V_{DDD}	Typ – 4%	4325	Typ + 4%	mV	Same as $V_{TR\_4P3\_F}$ + 25 mV
SID562	$V_{TR\_4P4\_R}$	LVD 4.4 V rising detection point for V_{DDD}	Typ – 4%	4425	Typ + 4%	mV	Same as $V_{TR\_4P4\_F}$ + 25 mV
SID563	$V_{TR\_4P5\_R}$	LVD 4.5 V rising detection point for V_{DDD}	Typ – 4%	4525	Typ + 4%	mV	Same as $V_{TR\_4P5\_F}$ + 25 mV
SID564	$V_{TR\_4P6\_R}$	LVD 4.6 V rising detection point for V_{DDD}	Typ – 4%	4625	Typ + 4%	mV	Same as $V_{TR\_4P6\_F}$ + 25 mV
SID565	$V_{TR\_4P7\_R}$	LVD 4.7 V rising detection point for V_{DDD}	Typ – 4%	4725	Typ + 4%	mV	Same as $V_{TR\_4P7\_F}$ + 25 mV
SID566	$V_{TR\_4P8\_R}$	LVD 4.8 V rising detection point for V_{DDD}	Typ – 4%	4825	Typ + 4%	mV	Same as $V_{TR\_4P8\_F}$ + 25 mV
SID567	$V_{TR\_4P9\_R}$	LVD 4.9 V rising detection point for V_{DDD}	Typ – 4%	4925	Typ + 4%	mV	Same as $V_{TR\_4P9\_F}$ + 25 mV
SID568	$V_{TR\_5P0\_R}$	LVD 5.0 V rising detection point for V_{DDD}	Typ – 4%	5025	Typ + 4%	mV	Same as $V_{TR\_5P0\_F}$ + 25 mV
SID569	$V_{TR\_5P1\_R}$	LVD 5.1 V rising detection point for V_{DDD}	Typ – 4%	5125	Typ + 4%	mV	Same as $V_{TR\_5P1\_F}$ + 25 mV
SID570	$V_{TR\_5P2\_R}$	LVD 5.2 V rising detection point for V_{DDD}	Typ – 4%	5225	Typ + 4%	mV	Same as $V_{TR\_5P2\_F}$ + 25 mV
SID571	$V_{TR\_5P3\_R}$	LVD 5.3 V rising detection point for V_{DDD}	Typ – 4%	5325	Typ + 4%	mV	Same as $V_{TR\_5P3\_F}$ + 25 mV
SID573	LVD_RR_A	Power ramp rate: V_{DDD} (Active)	–	–	100	mV/µs	
SID574	LVD_RR_DS	Power ramp rate: V_{DDD} (DeepSleep)	–	–	10	mV/µs	
SID575	$t_{DLY\_ACT\_LVD}$	Active mode delay between V_{DDD} falling/rising through LVD rising/falling point and an internal LVD signal transitioning	–	–	1	µs	Guaranteed by design
SID575A	$t_{DLY\_DS\_LVD}$	DeepSleep mode delay between V_{DDD} falling/rising through LVD rising/falling point and an internal LVD signal rising	–	–	4	µs	Guaranteed by design

Table 26-16. System Resources *(continued)*

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/ Conditions
SID576	t_{RES_LVD}	Response time of LVD, V_{DDD} supply. LVD guaranteed to generate pulse for V_{DDD} pulse width greater than this. (For falling-then-rising supply at max ramp rate; pulse width is time below LVD falling point)	100	–	–	ns	Guaranteed by design
High-Voltage OVD (HV OVD) Specifications							
SID580	$V_{TR\_5P0\_R}$	HV OVD 5.0-V rising detection point for V_{DDD} and V_{DDA}	5.049	5.205	5.361	V	
SID581	$V_{TR\_5P0\_F}$	HV OVD 5.0-V falling detection point for V_{DDD} and V_{DDA}	5.025	5.18	5.335	V	
SID582	$V_{TR\_5P5\_R}$	HV OVD 5.5-V rising detection point for V_{DDD} and V_{DDA} (default)	5.548	5.72	5.892	V	
SID583	$V_{TR\_5P5\_F}$	HV OVD 5.5-V falling detection point for V_{DDD} and V_{DDA} (default)	5.524	5.695	5.866	V	
SID585	HVOVD_RR_A	Power ramp rate: V_{DDD} and V_{DDA} (Active)	–	–	100	mV/µs	
SID586	HVOVD_RR_DS	Power ramp rate: V_{DDD} and V_{DDA} (DeepSleep)	–	–	10	mV/µs	
SID587	$t_{DLY\_ACT\_HVOVD}$	Active mode delay between V_{DDD} falling/rising through $V_{TR\_5P0\_F/R}$ or $V_{TR\_5P5\_F/R}$ and an internal HV OVD signal transitioning	–	–	1	µs	Guaranteed by design
SID587A	$t_{DLY\_ACT\_HVOVD\_A}$	Active mode delay between V_{DDA} falling/rising through $V_{TR\_5P0\_F/R}$ or $V_{TR\_5P5\_F/R}$ and an internal HV OVD signal transitioning	–	–	1.5	µs	Guaranteed by design
SID587B	$t_{DLY\_DS\_HVOVD}$	DeepSleep mode delay between V_{DDD}/V_{DDA} falling/rising through $V_{TR\_5P0\_F/R}$ or $V_{TR\_5P5\_F/R}$ and an internal HV OVD signal transitioning	–	–	4	µs	Guaranteed by design
SID588	t_{RES_HVOVD}	Response time of HV OVD. (For rising-then-falling supply at max ramp rate; threshold is $V_{TR\_5P0\_R}$ or $V_{TR\_5P5\_R}$.)	100	–	–	ns	Guaranteed by design
Low-Voltage OVD (LV OVD) Specifications							
SID590	$V_{TR\_R\_LVOVD}$	LV OVD rising detection point for V_{CCD}	1.261	1.3	1.339	V	
SID591	$V_{TR\_F\_LVOVD}$	LV OVD falling detection point for V_{CCD}	1.237	1.275	1.313	V	
SID595	$t_{DLY\_ACT\_LVOVD}$	Active mode delay between V_{CCD} falling/rising through V_{TR_F/R_LVOVD} and an internal LV OVD signal transitioning	–	–	1	µs	Guaranteed by design
SID595A	$t_{DLY\_DS\_LVOVD}$	DeepSleep mode delay between V_{CCD} falling/rising through V_{TR_F/R_LVOVD} and an internal LV OVD signal transitioning	–	–	12	µs	Guaranteed by design
SID596	t_{RES_LVOVD}	Response time of LV OVD. (For rising-then-falling supply at max ramp rate; threshold is $V_{TR\_R\_LVOVD}$.)	100	–	–	ns	Guaranteed by design
Overcurrent Detection (OCD) Specifications							
SID598	I_{OCD}	OCD range for V_{CCD}	156	–	315	mA	Guaranteed by design
SID599	I_{OCD_DPSLP}	OCD range in DeepSleep mode	18	–	72	mA	Guaranteed by design

Figure 26-14.Device Operations Supply Range

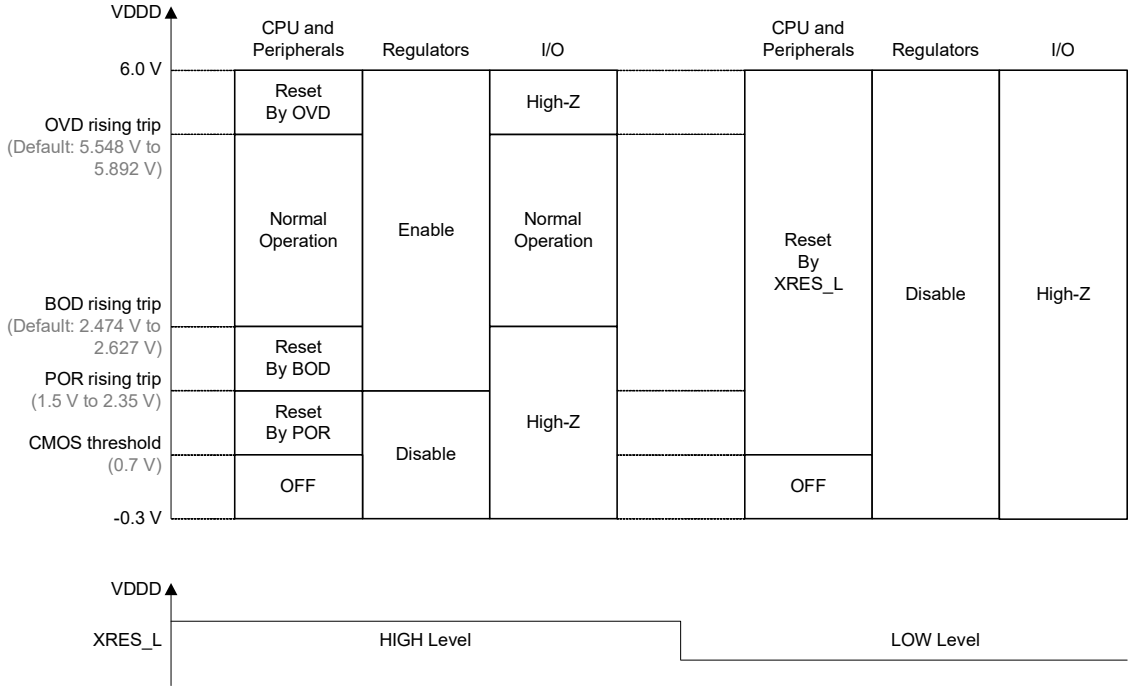


Figure 26-15.POR Specifications

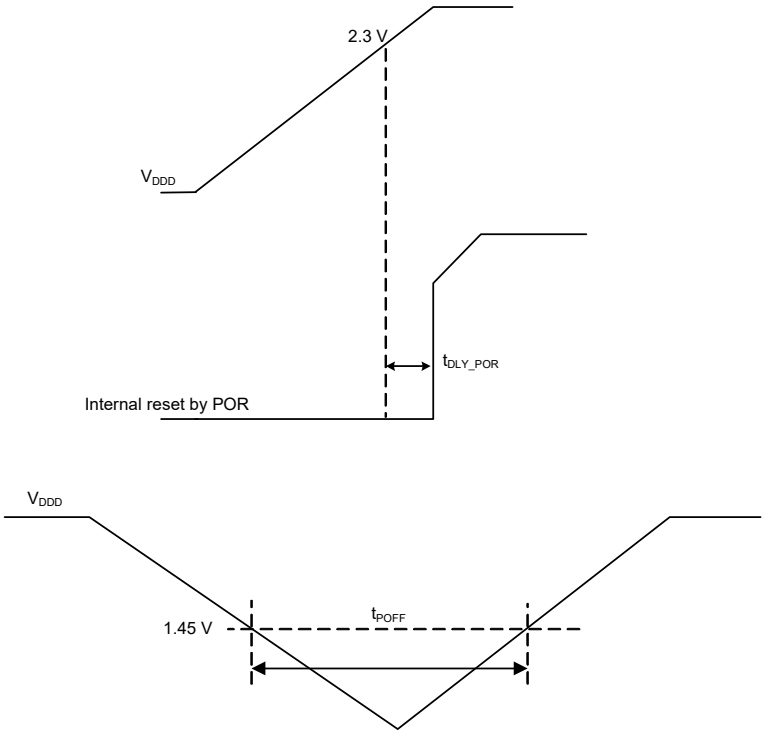


Figure 26-16.High-Voltage BOD Specifications

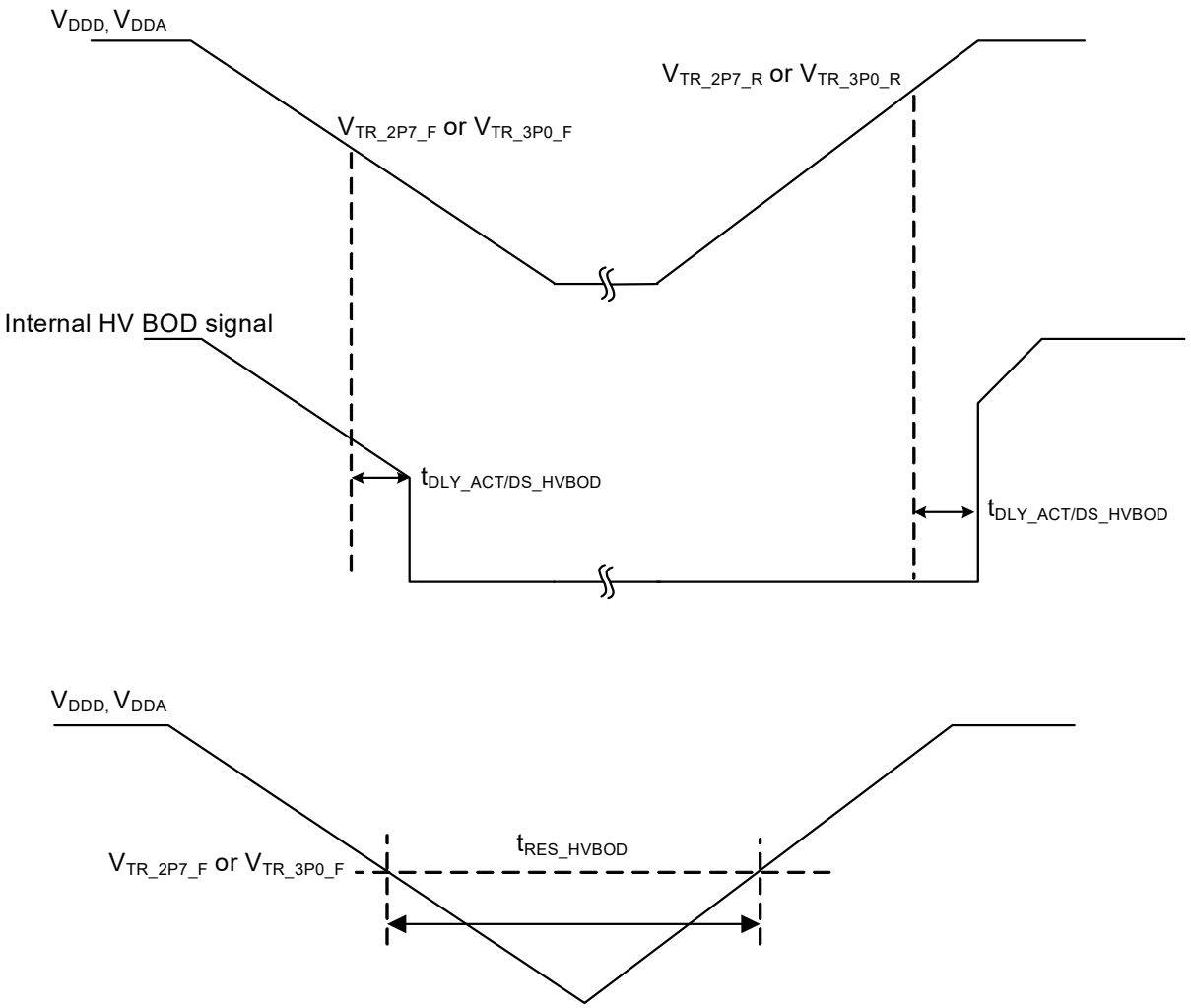


Figure 26-17.Low-Voltage BOD Specifications

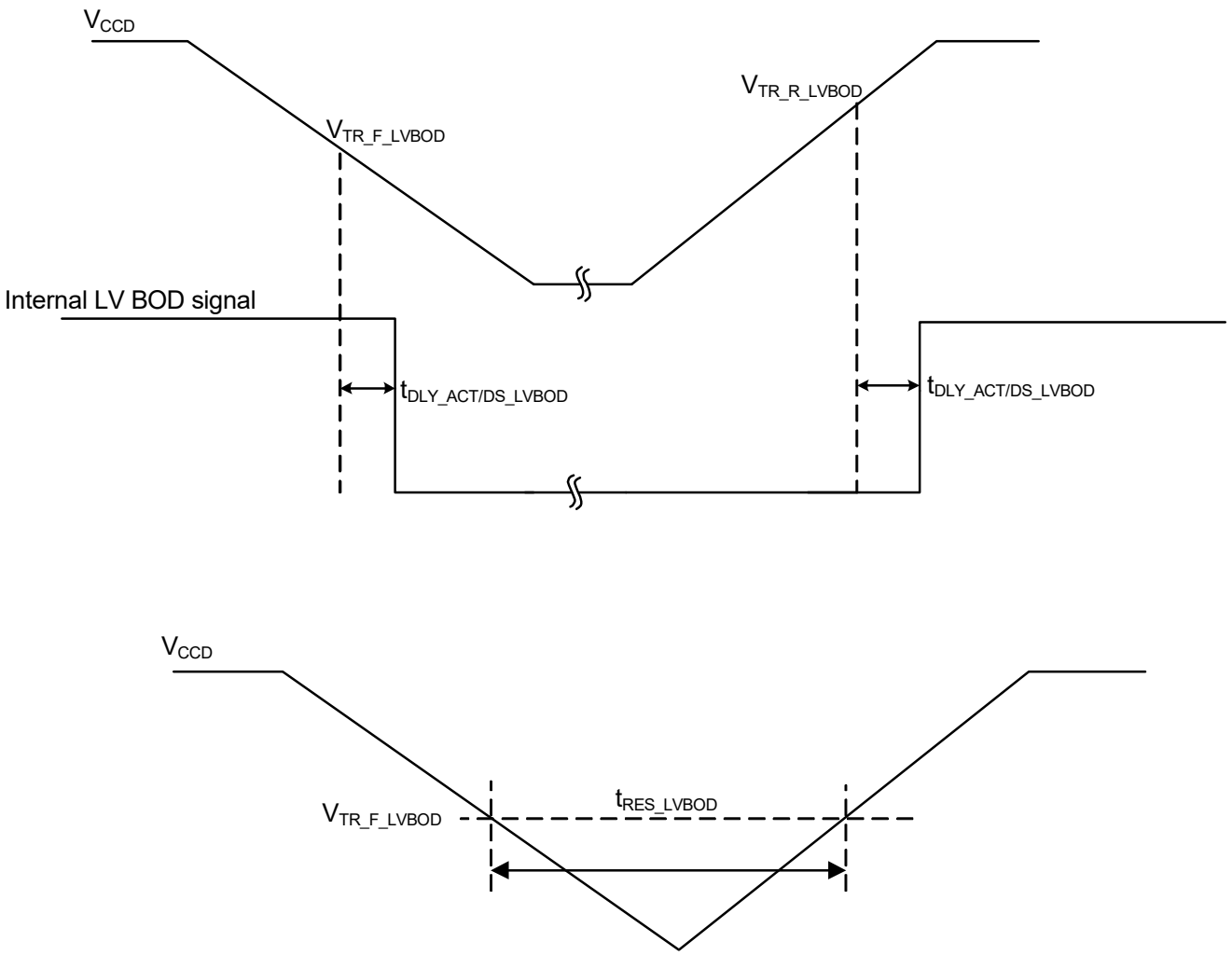


Figure 26-18.High-Voltage OVD Specifications

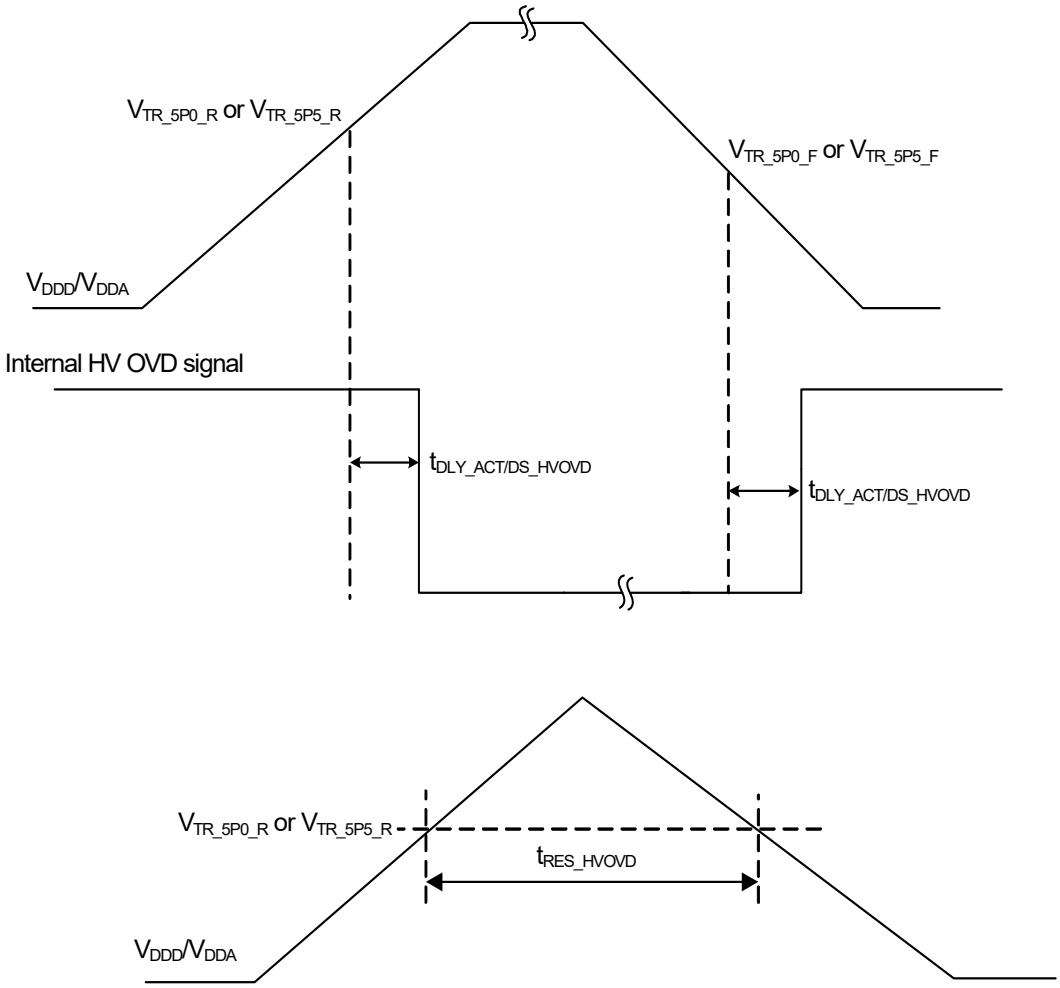


Figure 26-19.Low-Voltage OVD Specifications

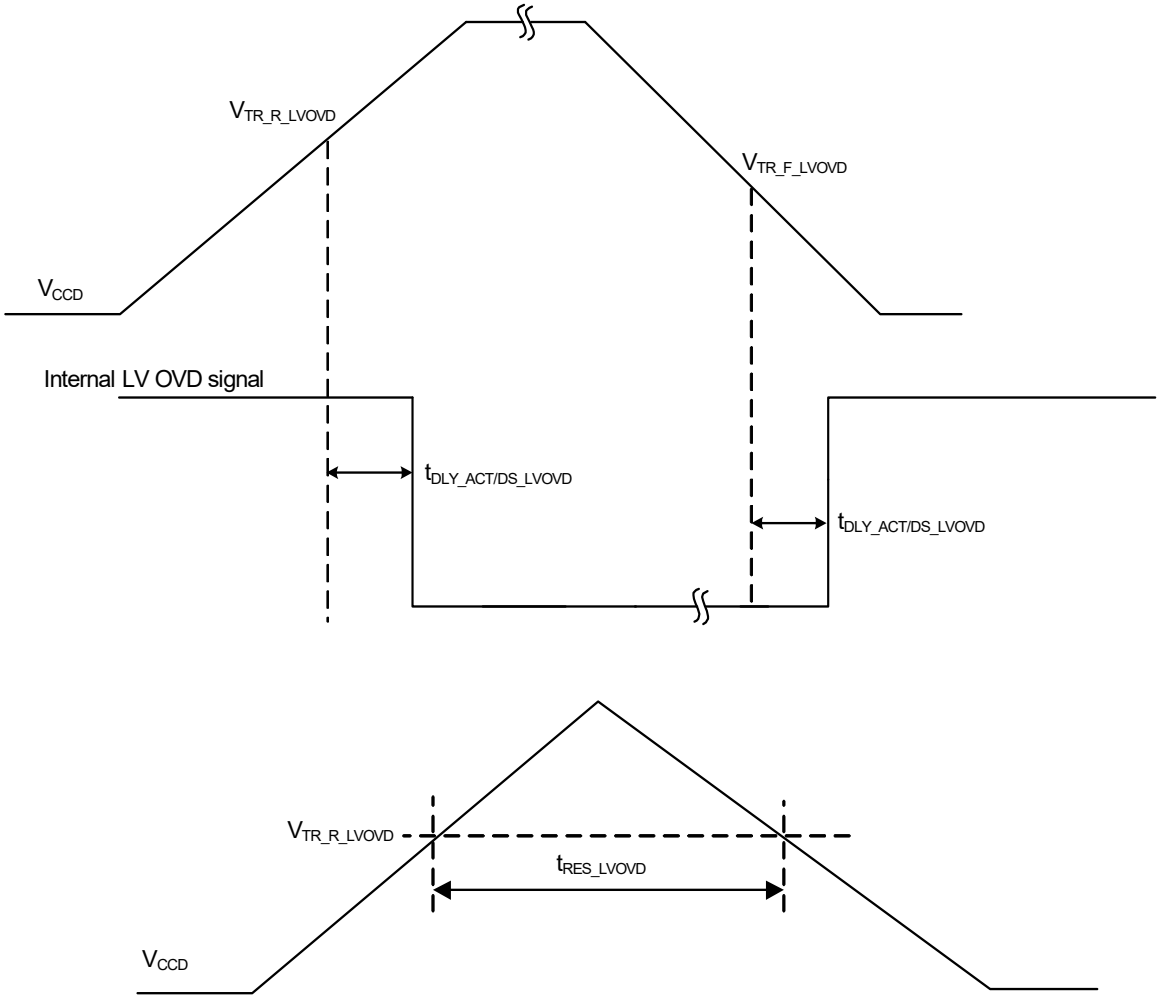
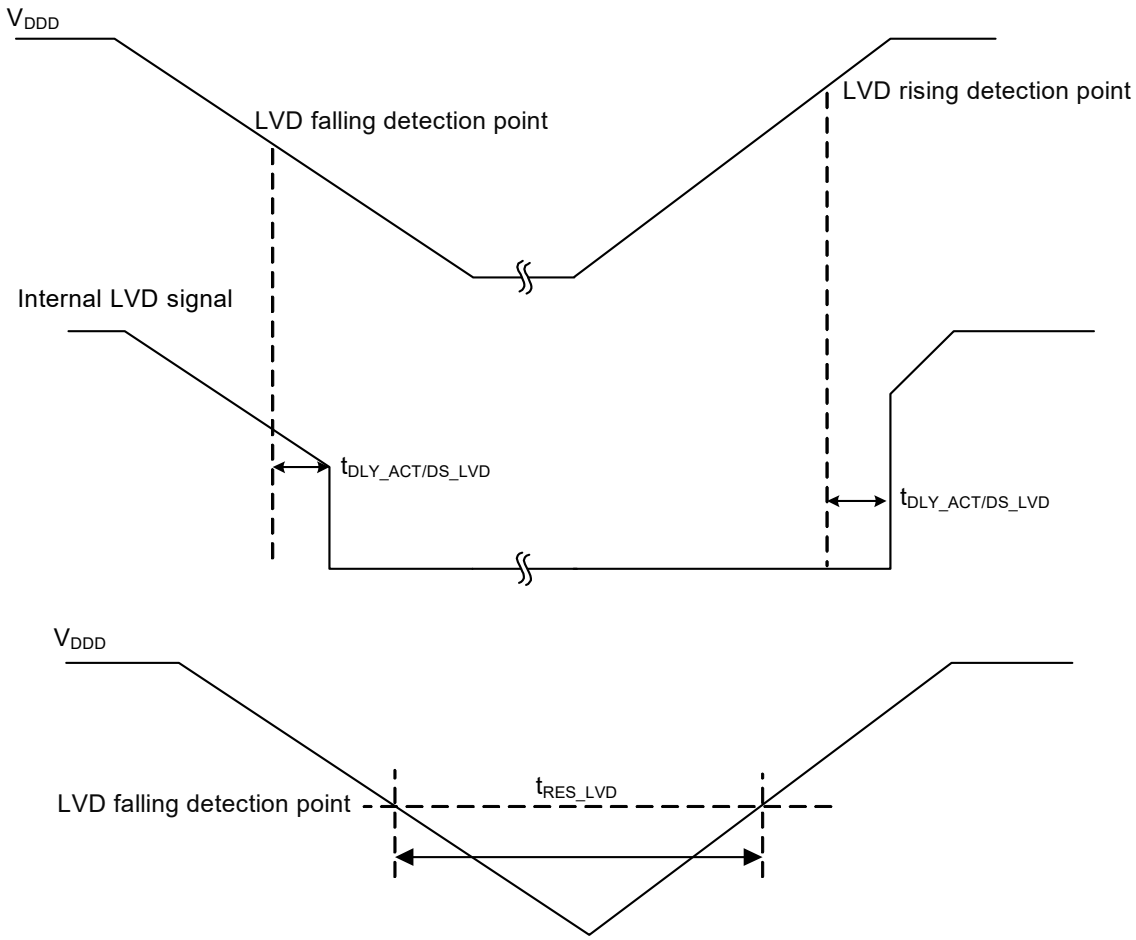


Figure 26-20.LVD Specifications



26.11 Debug

26.11.1 SWD

Table 26-17. SWD Specifications

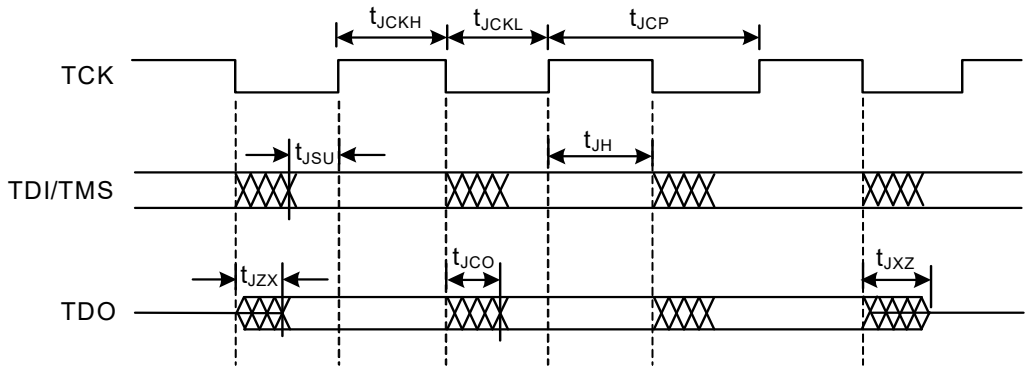
Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
SID300	f_{SWDCLK}	SWD clock input frequency	–	–	10	MHz	2.7 V ≤ V_{DDD} ≤ 5.5 V
SID301	t_{SWDI_SETUP}	SWDI setup time	0.25 × T	–	–	ns	T = 1 / f_{SWDCLK}
SID302	t_{SWDI_HOLD}	SWDI hold time	0.25 × T	–	–	ns	T = 1 / f_{SWDCLK}
SID303	t_{SWDO_VALID}	SWDO valid time	–	–	0.5 × T	ns	T = 1 / f_{SWDCLK}
SID304	t_{SWDO_HOLD}	SWDO hold time	1	–	–	ns	T = 1 / f_{SWDCLK}

26.11.2 JTAG

Table 26-18. JTAG AC Specifications

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
SID620	t_{JCKH}	TCK HIGH time	30	–	–	ns	30-pF load
SID621	t_{JCKL}	TCK LOW time	30	–	–	ns	30-pF load
SID622	t_{JCP}	TCK clock period	66.7	–	–	ns	30-pF load
SID623	t_{JSU}	TDI/TMS setup time	12	–	–	ns	30-pF load
SID624	t_{JH}	TDI/TMS hold time	12	–	–	ns	30-pF load
SID625	t_{JZX}	TDO High-Z to active	–	–	30	ns	30-pF load
SID626	t_{JXZ}	TDO active to High-Z	–	–	30	ns	30-pF load
SID627	t_{JCO}	TDO clock to output	–	–	30	ns	30-pF load

Figure 26-21.JTAG Timing Diagram



26.11.3 Trace

Table 26-19. Trace Specifications

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
SID1412A	C_{TRACE}	Trace Capacitive Load	–	–	30	pF	
SID1412	t_{TRACE_CYC}	Trace clock period	40	–	–	ns	Trace clock cycle time for 25 MHz
SID1413	t_{TRACE_CLKL}	Trace clock LOW pulse width	2	–	–	ns	Clock low pulse width
SID1414	t_{TRACE_CLKH}	Trace clock HIGH pulse width	2	–	–	ns	Clock high pulse width
SID1415A	t_{TRACE_SETUP}	Trace data setup time	3	–	–	ns	Trace data setup time
SID1416A	t_{TRACE_HOLD}	Trace data hold time	2	–	–	ns	Trace data hold time

26.12 Clock Specifications

The following is a basic requirement on the clock frequency dependency of the cores: Cortex-M0+ core should run at an integer divider from the Cortex-M4 core clock.

Example combinations are listed in the Table 26-20.

Table 26-20. Root and Intermediate Clocks[51]

Clock	Max Frequency (MHz)	Description
CLK_HF0	80	Root clock for CPUSS, PERI
CLK_HF1	80	Event generator (CLK_REF), Clock output on EXT_CLK pins (when used as output)
CLK_HF2	8	CSV
CLK_FAST	80	Generated by dividing CLK_HF0, intermediate clock for CM4
CLK_SLOW	80	Generated by clock gating CLK_PERI, intermediate clock for CM0+, Crypto, P-DMA, M-DMA
CLK_PERI	80	Generated by clock gating CLK_HF0, intermediate clock for LIN, SCB, PASS, CAN, TCPWM, IOSS, CPU trace

Table 26-21. IMO AC Specifications

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
SID310	f_{IMOTOL}	IMO operating frequency	7.92	8	8.08	MHz	
SID311	$t_{STARTIMO}$	IMO startup time	–	–	7.5	µs	Startup time to 90% of final frequency
SID312	I_{IMO_ACT}	IMO current	–	13.5	22	µA	Guaranteed by design

Table 26-22. ILO AC Specifications

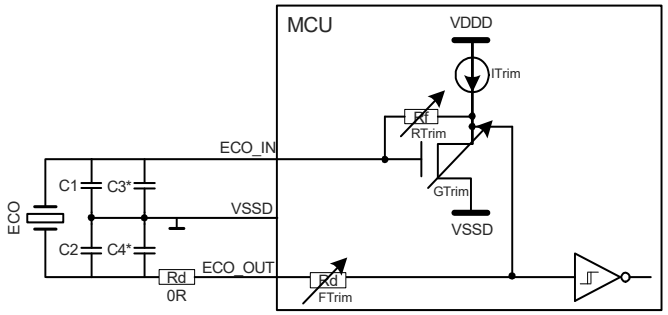
Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
SID320	$f_{ILOTRIM}$	ILO operating frequency	31.1296	32.768	34.4064	kHz	
SID321	$t_{STARTILO}$	ILO startup time	–	8	12	µs	Startup time to 90% of final frequency
SID323	I_{ILO}	ILO current	–	500	2800	nA	Guaranteed by design

Note
51. Intermediate clocks that are not listed have the same limitations as that of their parent clock.

Table 26-23. ECO Specifications

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
SID330	f_{ECO}	Crystal frequency range	3.988	–	33.34	MHz	
SID332	R_{FDBK}	Feedback resistor value. Min: RTRIM = 3; Max: RTRIM = 0 with 100 kΩ step size on RTRIM	100	–	400	kΩ	Guaranteed by design
SID333	I_{ECO3}	ECO current at T_J = 150 °C	–	–	2000	µA	Maximum operation current with a 33-MHz crystal, max 18-pF load
SID334	t_{START_4M}	4-MHz ECO startup time[52]	–	–	10	ms	Startup time to 90% of final frequency
SID335	t_{START_33M}	33-MHz ECO startup time[52]	–	–	1	ms	Startup time to 90% of final frequency

Figure 26-22.ECO Connection Scheme[53]



ECO_IN: External crystal oscillator input pin
ECO_OUT: External crystal oscillator output pin
C1, C2: Load Capacitors
C3*, C4*: Stray Capacitance of the PCB

Table 26-24. PLL Specifications

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
SID340	PLL_LOCK	Time to achieve PLL lock	–	–	35	µs	
SID341A	f_{PLL_OUT}	Output frequency from PLL block	11	–	80	MHz	
SID342	PLL_LJIT1	Long term jitter	–0.25	–	0.25	ns	For 125 ns f_{PLL_VCO}: 320 MHz f_{PLL_OUT}: 40 MHz to 80 MHz f_{PLL_PFD}: 8 MHz f_{PLL_IN}: ECO
SID343	PLL_LJIT2	Long term jitter	–0.5	–	0.5	ns	For 500 ns f_{PLL_VCO}: 320 MHz f_{PLL_OUT}: 40 MHz to 80 MHz f_{PLL_PFD}: 8 MHz f_{PLL_IN}: ECO
SID344	PLL_LJIT3	Long term jitter	–0.5	–	0.5	ns	For 1000 ns f_{PLL_VCO}: 320 MHz f_{PLL_OUT}: 40 MHz to 80 MHz f_{PLL_PFD}: 8 MHz f_{PLL_IN}: ECO
SID345A	PLL_LJIT5	Long term jitter	–0.75	–	0.75	ns	For 10000 ns f_{PLL_VCO}: 320 MHz f_{PLL_OUT}: 40 MHz to 80 MHz f_{PLL_PFD}: 8 MHz f_{PLL_IN}: ECO

Notes
52. Mainly depends on the external crystal.
53. Refer to the family-specific Architecture TRM for more information on crystal requirements (002-19314, Traveo™ II Automotive Body Controller Entry Family Architecture Technical Reference Manual (TRM)).

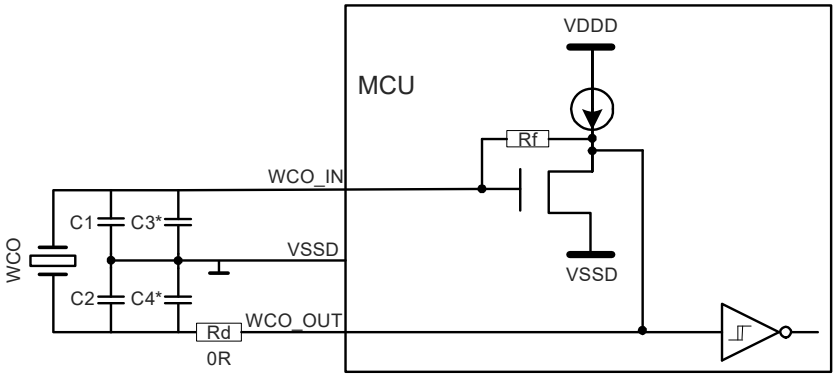
Table 26-24. PLL Specifications *(continued)*

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
SID346	f_{PLL_IN}	PLL input frequency	3.988	–	33.34	MHz	
SID347	I_{PLL_320M1}	PLL operating current (f_{OUT} = 80 MHz)	–	740	1110	µA	f_{IN} = 4 MHz, f_{PFD} = 4 MHz, f_{VCO} = 320 MHz, f_{OUT} = 80 MHz
SID347A	I_{PLL_320M2}	PLL operating current (f_{OUT} = 80 MHz)	–	750	1125	µA	f_{IN} = 8 MHz, f_{PFD} = 8 MHz, f_{VCO} = 320 MHz, f_{OUT} = 80 MHz
SID347B	I_{PLL_320M3}	PLL operating current (f_{OUT} = 80 MHz)	–	750	1125	µA	f_{IN} = 16 MHz, f_{PFD} = 8 MHz, f_{VCO} = 320 MHz, f_{OUT} = 80 MHz
SID348	I_{PLL_80M1}	PLL operating current (f_{OUT} = 80 MHz)	–	520	780	µA	f_{IN} = 4 MHz, f_{PFD} = 4 MHz, f_{VCO} = 240 MHz, f_{OUT} = 80 MHz
SID348A	I_{PLL_80M2}	PLL operating current (f_{OUT} = 80 MHz)	–	530	795	µA	f_{IN} = 8 MHz, f_{PFD} = 8 MHz, f_{VCO} = 240 MHz, f_{OUT} = 80 MHz
SID348B	I_{PLL_80M3}	PLL operating current (f_{OUT} = 80 MHz)	–	530	795	µA	f_{IN} = 16 MHz, f_{PFD} = 8 MHz, f_{VCO} = 240 MHz, f_{OUT} = 80 MHz
SID348C	f_{PLL_VCO}	VCO frequency	170	–	400	MHz	
SID349C	f_{PLL_PFD}	PFD frequency	3.988	–	8	MHz	

Table 26-25. FLL Specifications

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
SID350A	$t_{FLL\_WAKE\_A}$	FLL wake up time	–	–	3.5	µs	Wakeup with < 10 °C temperature change while in DeepSleep. f_{FLL_IN} = 8 MHz, f_{FLL_OUT} = 80 MHz, Time from stable reference clock until FLL frequency is within 5% of final value
SID351	f_{FLL_OUT}	Output frequency from FLL block	24	–	80	MHz	Output range of FLL divided-by-2 output
SID352	FLL_CJIT	FLL frequency accuracy	–1	–	1	%	This is added to the error of the source
SID353	f_{FLL_IN}	Input frequency	0.25	–	80	MHz	
SID354	I_{FLL}	FLL operating current	–	250	360	µA	Reference clock: IMO, CCO frequency: 160 MHz, FLL frequency: 80 MHz, guaranteed by design

Figure 26-23.WCO Connection Scheme[55]



WCO_IN: Watch crystal oscillator input pin
WCO_OUT: Watch crystal oscillator output pin
C1, C2: Load Capacitors
C3*, C4*: Stray Capacitance of the PCB

Table 26-26. WCO Specifications

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
SID360	f_{WCO}	Watch Crystal frequency	–	32.768	–	kHz	Maximum drive level: 0.5 µW
SID361	WCO_DC	WCO duty cycle	10	–	90	%	
SID362	t_{START_WCO}	WCO start up time[54]	–	–	1000	ms	For Grade-S devices
SID362E	t_{START_WCOE}	WCO start up time[54]	–	–	1400	ms	For Grade-E devices
SID363	I_{WCO}	WCO current	–	1.4	–	µA	

Table 26-27. External Clock Input Specifications

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
SID366	f_{EXT}	External clock input frequency	0.25	–	80	MHz	For EXT_CLK pin (all input level settings: CMOS, TTL, Automotive)
SID367	EXT_DC	External clock duty cycle	45	–	55	%	

Notes
54. Mainly depends on the external crystal.
55. Please refer to family specific Architecture TRM for more information on crystal requirements (002-19314, TRAVEO(TM) II AUTOMOTIVE BODY CONTROLLER ENTRY FAMILY ARCHITECTURE TECHNICAL REFERENCE MANUAL (TRM)).

26.12.1 ***Clock Timing Diagrams***

Figure 26-24.ECO to PLL or FLL Diagram

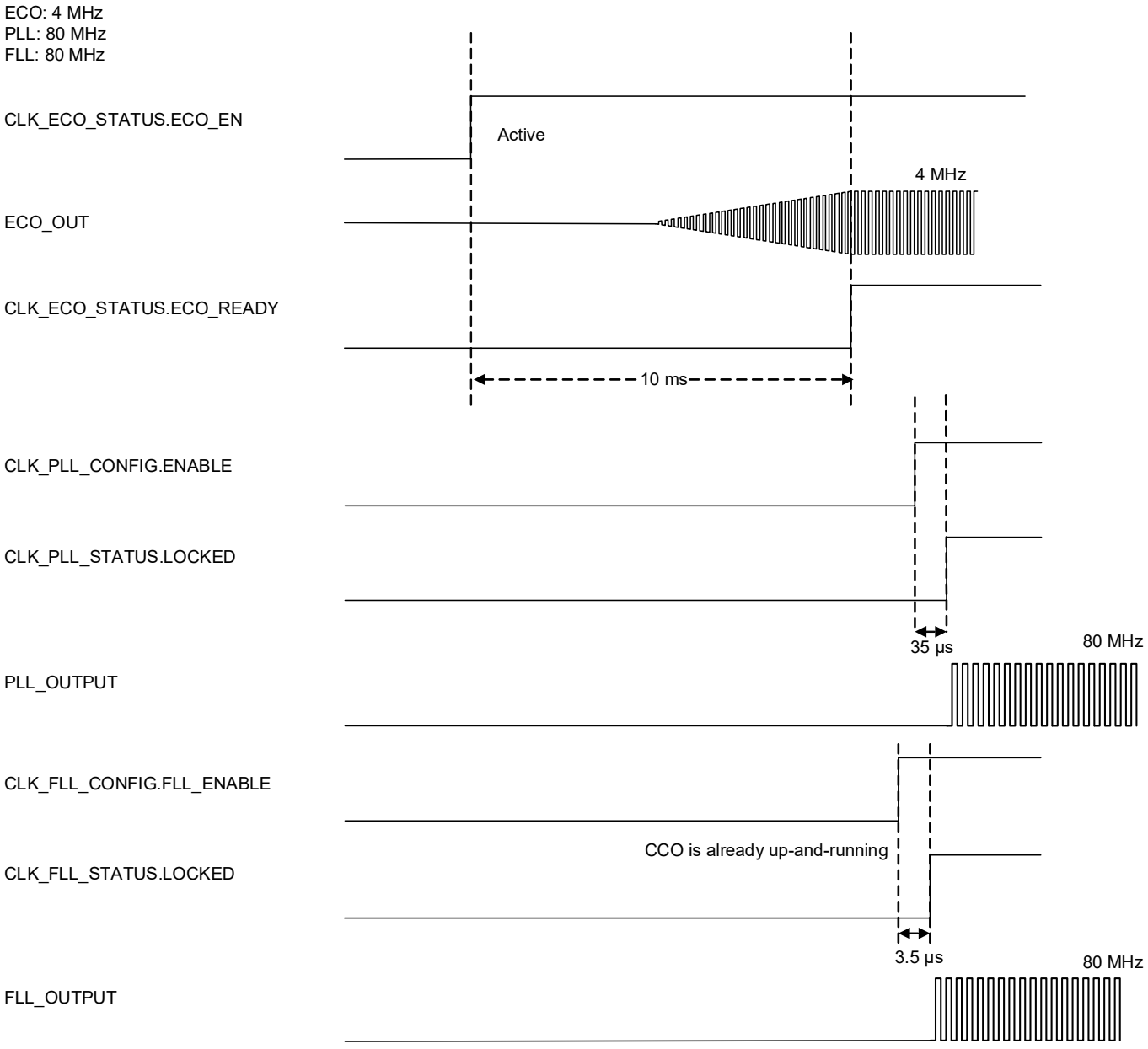


Figure 26-25.WCO to FLL Diagram

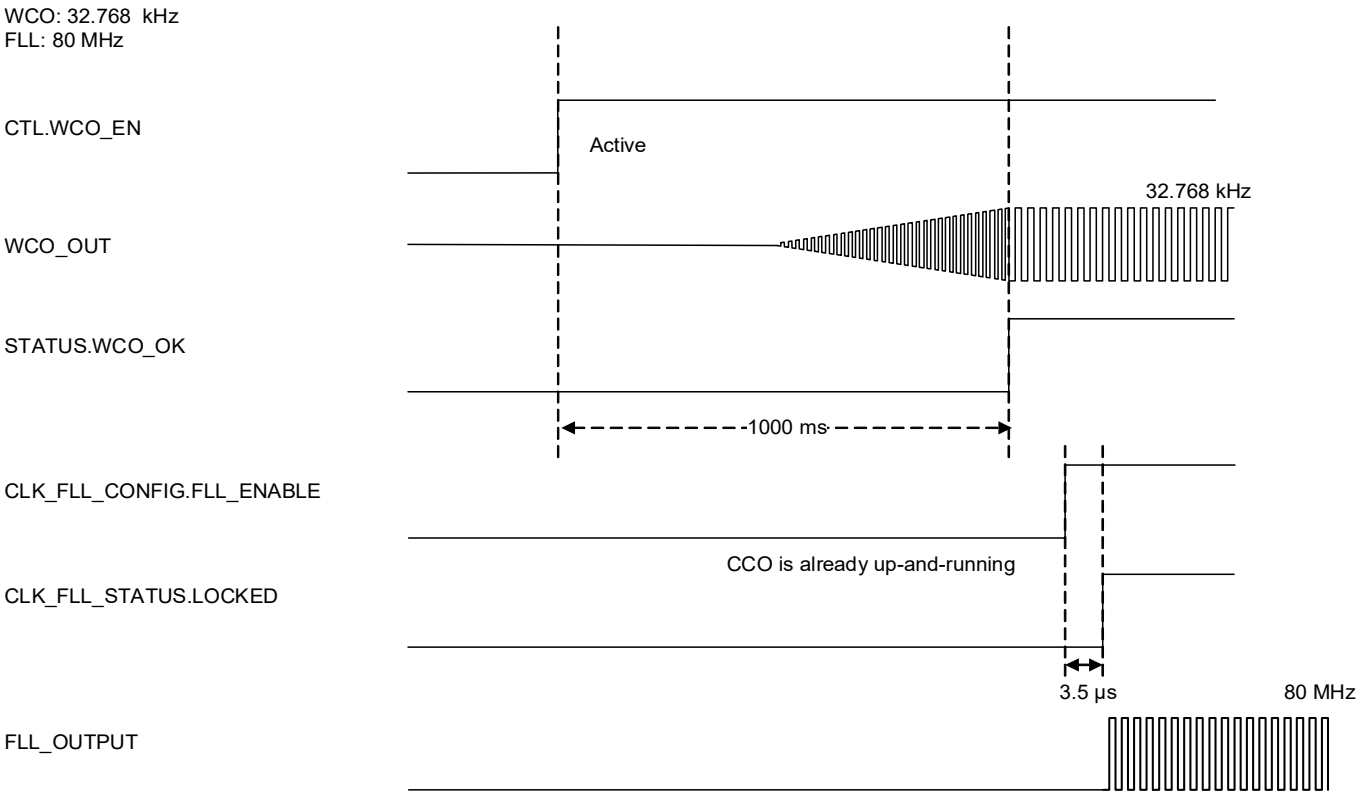


Table 26-28. MCWDT Timeout Specifications

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
SID410	t_{MCWDT1}	Minimum MCWDT timeout	58.12	–	–	µs	When using the ILO (32.768 kHz + 5%) and 16-bit MCWDT counter Guaranteed by design
SID411	t_{MCWDT2}	Maximum MCWDT timeout	–	–	2.11	s	When using the ILO (32.768 kHz – 5%) and 16-bit MCWDT counter Guaranteed by design

Table 26-29. WDT Timeout Specifications

Spec ID	Parameter	Description	Min	Typ	Max	Units	Details/Conditions
SID412	t_{WDT1}	Minimum WDT timeout	58.12	–	–	µs	When using the ILO (32.768 kHz + 5%) and 32-bit WDT counter Guaranteed by design
SID413	t_{WDT2}	Maximum WDT timeout	–	–	38.33	h	When using the ILO (32.768 kHz – 5%) and 32-bit WDT counter Guaranteed by design
SID414	t_{WDT3}	Default WDT timeout	–	1000	–	ms	When using the ILO and 32-bit WDT counter at 0x8000 (default value), guaranteed by design

27. Ordering Information

The CYT2B6 microcontroller part numbers and features are listed in Table 27-1. The Arm TAP JTAG ID is 0x6BA0 0477.

Table 27-1. CYT2B6 Ordering Information[56]

Device Code	Ordering Code[56]	Package	Code-flash (KB)	Work-flash (KB)	RAM (KB)	ADC Channels	SCB Channels	LIN Channels	CANFD Channels	eSHE /HSM	Temperature Grade	JTAG ID Code
CYT2B63BAS[57]	CYT2B63BADQ0AZSGS	64-LQFP	576[58]	64[59]	64	22	6	5	3	eSHE	S[60]	0x2E349069[62]
CYT2B63BAE[57]	CYT2B63BADQ0AZEGS	64-LQFP	576	64	64	22	6	5	3	eSHE	E[61]	0x2E349069
CYT2B63CAS	CYT2B63CADQ0AZSGS	64-LQFP	576	64	64	22	6	5	3	HSM	S	0x2E349069
CYT2B63CAE	CYT2B63CADQ0AZEGS	64-LQFP	576	64	64	22	6	5	3	HSM	E	0x2E349069
CYT2B64BAS[57]	CYT2B64BADQ0AZSGS	80-LQFP	576	64	64	28	6	5	4	eSHE	S	0x2E351069
CYT2B64BAE[57]	CYT2B64BADQ0AZEGS	80-LQFP	576	64	64	28	6	5	4	eSHE	E	0x2E351069
CYT2B64CAS	CYT2B64CADQ0AZSGS	80-LQFP	576	64	64	28	6	5	4	HSM	S	0x2E351069
CYT2B64CAE	CYT2B64CADQ0AZEGS	80-LQFP	576	64	64	28	6	5	4	HSM	E	0x2E351069
CYT2B65BAS[57]	CYT2B65BADQ0AZSGS	100-LQFP	576	64	64	32	6	5	4	eSHE	S	0x2E359069
CYT2B65BAE[57]	CYT2B65BADQ0AZEGS	100-LQFP	576	64	64	32	6	5	4	eSHE	E	0x2E359069
CYT2B65CAS	CYT2B65CADQ0AZSGS	100-LQFP	576	64	64	32	6	5	4	HSM	S	0x2E359069
CYT2B65CAE	CYT2B65CADQ0AZEGS	100-LQFP	576	64	64	32	6	5	4	HSM	E	0x2E359069

27.1 Part Number Nomenclature

Table 27-2. Device Code Nomenclature

Field	Description	Value	Meaning
CY	Cypress Prefix	CY	
T	Category	T	Traveo
2	Family Name	2	Traveo II (Core M4)
B	Application	B	Body
D	Code-flash/Work-flash/SRAM quantity	6	576 KB / 64 KB / 64 KB
P	Packages	3	64-LQFP
		4	80-LQFP
		5	100-LQFP
H	Hardware Option	B	eSHE – on, HSM – off, RSA - 2K
		C	eSHE – on, HSM – on, RSA - 2K
I	Marketing Option	A	No options
C	Temperature Grade	S	S-grade (–40 °C to 105 °C)
		E	E-grade (–40 °C to 125 °C)

Notes
56. Supported shipment types are “Tray” (default) and “Tape and Reel”. Add the character ‘T’ at the end to get the ordering code for “Tape and Reel” shipment type.
57. 3DES/SHA-1/SHA-2/SHA-3/CRC/Vector unit for asymmetric cryptography features are not supported.
58. Code-flash size 576 KB = 32 KB × 14 (Large Sectors) + 8 KB × 16 (Small Sectors)
59. Work-flash size 64 KB = 2 KB × 24 (Large Sectors) + 128 B × 128 (Small Sectors).
60. S-grade Temperature (–40 °C to 105 °C).
61. E-grade Temperature (–40 °C to 125 °C).
62. JTAG ID CODE bits 12 through 27, represents the Silicon ID of the device.

Table 27-3. Ordering Code Nomenclature

Field	Description	Value	Meaning
CY	Cypress Prefix	CY	
T	Category	T	Traveo
2	Family Name	2	Traveo II (Core M4)
B	Application	B	Body
D	Code-flash/Work-flash/SRAM quantity	6	576 KB / 64 KB / 64 KB
P	Packages	3	64 LQFP
		4	80 LQFP
		5	100 LQFP
H	Hardware Option	B	eSHE – on, HSM – off, RSA - 2K
		C	eSHE – on, HSM – on, RSA - 2K
I	Marketing Option	A	No options
R	Revision	D	First revision
F	Fab Location	Q	UMC (Fab 12i) Singapore
X	Reserved	0	Reserved
K	Package Code	AZ	LQFP
C	Temperature Grade	S	S-grade (–40 °C to 105 °C)
		E	E-grade (–40 °C to 125 °C)
Q	Quality Grade	ES	Engineering samples
		GS	Standard grade of automotive
S	Shipment Type	Blank	Tray shipment
		T	Tape and Reel shipment

28. Packaging

CYT2B6 is offered in the packages listed in the Table 28-1.

Table 28-1. Package Information

Package	Dimensions	Contact/Lead Pitch	Coefficient of Thermal Expansion	I/O Pins
100-LQFP	14 × 14 × 1.7 mm (max)	0.5 mm	a1[65] = 8.5 ppm/°C, a2[66] = 33.6 ppm/°C	78
80-LQFP	12 × 12 × 1.7 mm (max)	0.5 mm	a1[65] = 8.5 ppm/°C, a2[66] = 33.5 ppm/°C	63
64-LQFP	10 × 10 × 1.7 mm (max)	0.5 mm	a1[65] = 8.5 ppm/°C, a2[66] = 33.2 ppm/°C	49

Table 28-2. Package Characteristics

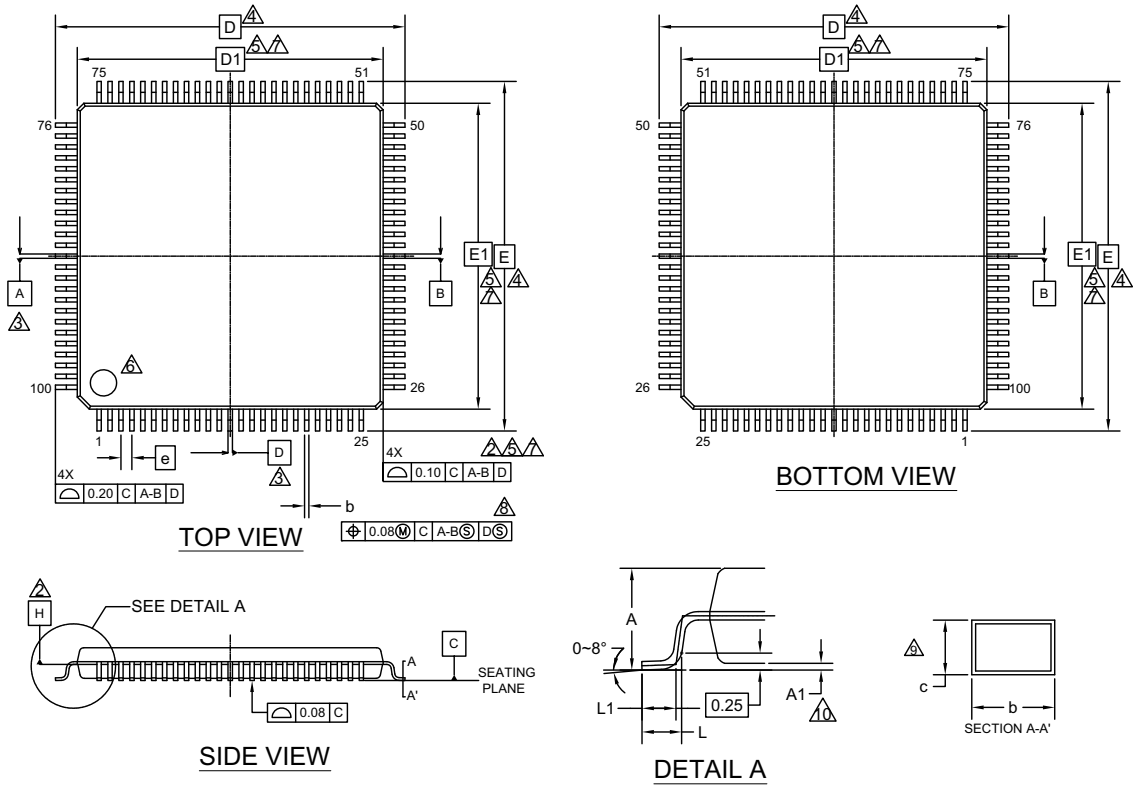
Parameter	Description	Conditions	Min	Typ	Max	Units
T_A	Operating ambient temperature	S-grade	–40	–	105	°C
T_A	Operating ambient temperature	E-grade	–40	–	125	°C
T_J	Operating junction temperature	–	–	–	150	°C
$R_{\theta JA}$	Package thermal resistance, junction to ambient θ_{JA}[63, 64]	64 LQFP	–	–	37.6	°C/Watt
		80 LQFP	–	–	32.7	°C/Watt
		100 LQFP	–	–	29.8	°C/Watt
$R_{\theta JB}$	Package θ_{JB}	64 LQFP	–	–	32.0	°C/Watt
		80 LQFP	–	–	26.7	°C/Watt
		100 LQFP	–	–	21.3	°C/Watt
$R_{\theta JC}$	Package thermal resistance, junction to case θ_{JC}	64 LQFP	–	–	7.8	°C/Watt
		80 LQFP	–	–	6.6	°C/Watt
		100 LQFP	–	–	5.6	°C/Watt

Table 28-3. Solder Reflow Peak Temperature, Package Moisture Sensitivity Level (MSL), IPC/JEDEC J-STD-2

Package	Maximum Peak Temperature (°C)	Maximum Time at Peak Temperature (seconds)	MSL
100 LQFP	260	30 seconds	3
80 LQFP	260	30 seconds	3
64 LQFP	260	30 seconds	3

Notes
63. Board condition complies to JESD51-7(4 Layers).
64. Maximum value °C/Watt shown is for T_A = 125 °C.
65. a1 = CTE (Coefficient of Thermal Expansion) value below T_g (ppm/°C) (T_g is glass transition temperature which is 131°C).
66. a2 = CTE value above T_g (ppm/°C).

Figure 28-1.100-LQFP Package Outline



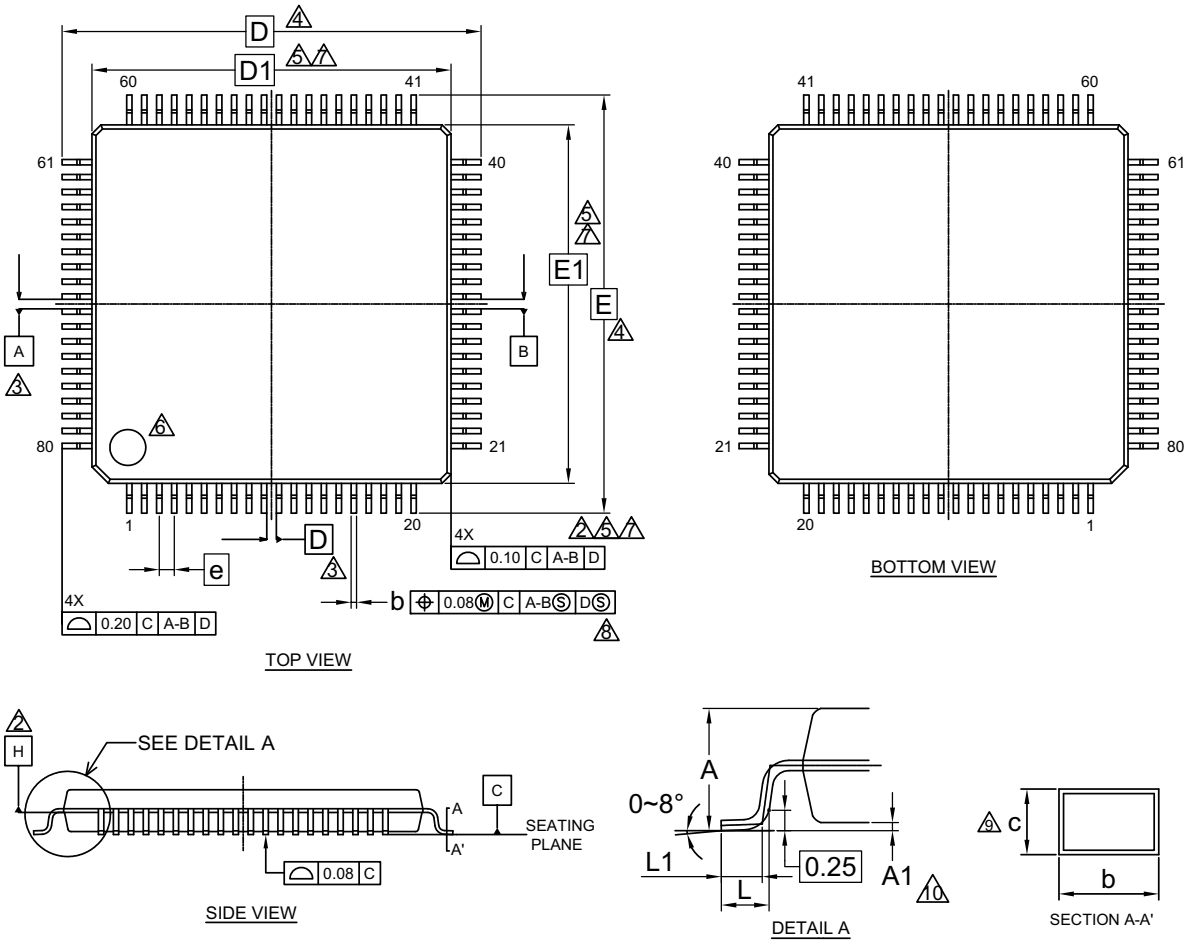
SYMBOL	DIMENSIONS		
	MIN.	NOM.	MAX.
A	—	—	1.70
A1	0.05	—	0.15
b	0.15	—	0.27
c	0.09	—	0.20
D	16.00 BSC		
D1	14.00 BSC		
e	0.50 BSC		
E	16.00 BSC		
E1	14.00 BSC		
L	0.45	0.60	0.75
L1	0.30	0.50	0.70

NOTES :

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DATUM PLANE H IS LOCATED AT THE BOTTOM OF THE MOLD PARTING LINE COINCIDENT WITH WHERE THE LEAD EXITS THE BODY.
3. DATUMS A-B AND D TO BE DETERMINED AT DATUM PLANE H.
4. TO BE DETERMINED AT SEATING PLANE C.
5. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25mm PRE SIDE. DIMENSIONS D1 AND E1 INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE H.
6. DETAILS OF PIN 1 IDENTIFIER ARE OPTIONAL BUT MUST BE LOCATED WITHIN THE ZONE INDICATED.
7. REGARDLESS OF THE RELATIVE SIZE OF THE UPPER AND LOWER BODY SECTIONS. DIMENSIONS D1 AND E1 ARE DETERMINED AT THE LARGEST FEATURE OF THE BODY EXCLUSIVE OF MOLD FLASH AND GATE BURRS. BUT INCLUDING ANY MISMATCH BETWEEN THE UPPER AND LOWER SECTIONS OF THE MOLDER BODY.
8. DIMENSION b DOES NOT INCLUDE DAMBAR PROTRUSION. THE DAMBAR PROTRUSION (S) SHALL NOT CAUSE THE LEAD WIDTH TO EXCEED b MAXIMUM BY MORE THAN 0.08mm. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE LEAD FOOT.
9. THESE DIMENSIONS APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN 0.10mm AND 0.25mm FROM THE LEAD TIP.
10. A1 IS DEFINED AS THE DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT OF THE PACKAGE BODY.

002-11500 *A

Figure 28-2.80-LQFP Package Outline



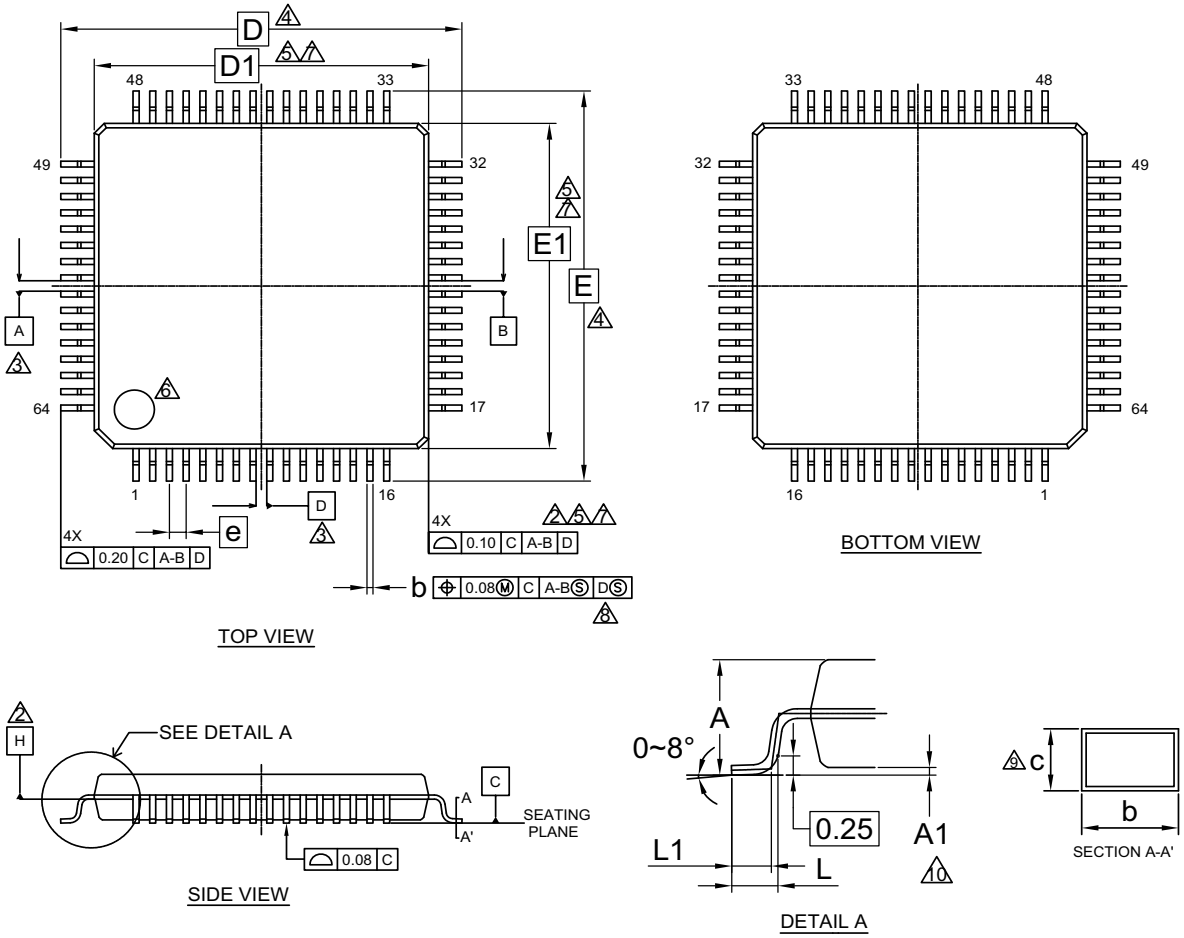
SYMBOL	DIMENSIONS		
	MIN.	NOM.	MAX.
A	—	—	1.70
A1	0.05	—	0.15
b	0.15	—	0.27
c	0.09	—	0.20
D	14.00 BSC.		
D1	12.00 BSC.		
e	0.50 BSC		
E	14.00 BSC.		
E1	12.00 BSC.		
L	0.45	0.60	0.75
L1	0.30	0.50	0.70

NOTES

1. CONTROLLING DIMENSIONS ARE IN MILLIMETERS (mm)
2. DATUM PLANE H IS LOCATED AT THE BOTTOM OF THE MOLD PARTING LINE COINCIDENT WITH WHERE THE LEAD EXITS THE BODY.
3. DATUMS A-B AND D TO BE DETERMINED AT DATUM PLANE H.
4. TO BE DETERMINED AT SEATING PLANE C.
5. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25mm PRE SIDE. DIMENSIONS D1 AND E1 INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE H.
6. DETAILS OF PIN 1 IDENTIFIER ARE OPTIONAL BUT MUST BE LOCATED WITHIN THE ZONE INDICATED.
7. REGARDLESS OF THE RELATIVE SIZE OF THE UPPER AND LOWER BODY SECTIONS. DIMENSIONS D1 AND E1 ARE DETERMINED AT THE LARGEST FEATURE OF THE BODY EXCLUSIVE OF MOLD FLASH AND GATE BURRS. BUT INCLUDING ANY MISMATCH BETWEEN THE UPPER AND LOWER SECTIONS OF THE MOLDER BODY.
8. DIMENSION b DOES NOT INCLUDE DAMBER PROTRUSION. THE DAMBAR PROTRUSION (S) SHALL NOT CAUSE THE LEAD WIDTH TO EXCEED b MAXIMUM BY MORE THAN 0.08mm. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE LEAD FOOT.
9. THESE DIMENSIONS APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN 0.10mm AND 0.25mm FROM THE LEAD TIP.
10. A1 IS DEFINED AS THE DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT OF THE PACKAGE BODY.

002-11501 **

Figure 28-3.64-LQFP Package Outline



SYMBOL	DIMENSIONS		
	MIN.	NOM.	MAX.
A	——	——	1.70
A1	0.00	——	0.20
b	0.15	——	0.27
c	0.09	——	0.20
D	12.00 BSC.		
D1	10.00 BSC.		
e	0.50 BSC		
E	12.00 BSC.		
E1	10.00 BSC.		
L	0.45	0.60	0.75
L1	0.30	0.50	0.70

NOTES

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. DATUM PLANE H IS LOCATED AT THE BOTTOM OF THE MOLD PARTING LINE COINCIDENT WITH WHERE THE LEAD EXITS THE BODY.
3. DATUMS A-B AND D TO BE DETERMINED AT DATUM PLANE H.
4. TO BE DETERMINED AT SEATING PLANE C.
5. DIMENSIONS D1 AND E1 DO NOT INCLUDE MOLD PROTRUSION. ALLOWABLE PROTRUSION IS 0.25mm PRE SIDE. DIMENSIONS D1 AND E1 INCLUDE MOLD MISMATCH AND ARE DETERMINED AT DATUM PLANE H.
6. DETAILS OF PIN 1 IDENTIFIER ARE OPTIONAL BUT MUST BE LOCATED WITHIN THE ZONE INDICATED.
7. REGARDLESS OF THE RELATIVE SIZE OF THE UPPER AND LOWER BODY SECTIONS. DIMENSIONS D1 AND E1 ARE DETERMINED AT THE LARGEST FEATURE OF THE BODY EXCLUSIVE OF MOLD FLASH AND GATE BURRS. BUT INCLUDING ANY MISMATCH BETWEEN THE UPPER AND LOWER SECTIONS OF THE MOLDER BODY.
8. DIMENSION b DOES NOT INCLUDE DAMBER PROTRUSION. THE DAMBAR PROTRUSION (S) SHALL NOT CAUSE THE LEAD WIDTH TO EXCEED b MAXIMUM BY MORE THAN 0.08mm. DAMBAR CANNOT BE LOCATED ON THE LOWER RADIUS OR THE LEAD FOOT.
9. THESE DIMENSIONS APPLY TO THE FLAT SECTION OF THE LEAD BETWEEN 0.10mm AND 0.25mm FROM THE LEAD TIP.
10. A1 IS DEFINED AS THE DISTANCE FROM THE SEATING PLANE TO THE LOWEST POINT OF THE PACKAGE BODY.

002-11499 **

29. Appendix

29.1 Bootloading or End-of-line Programming

- Triggered at device startup, if a trigger condition is applied
- Either CAN or LIN communication may be used
- Bootloader polls for the communication on CAN or LIN at separate time frames, until the overall 300-second timeout is reached
- If a bootloader command is received on either communication interface, the polling stops and bootloader starts using this interface

Figure 29-1.Bootloading Sequence

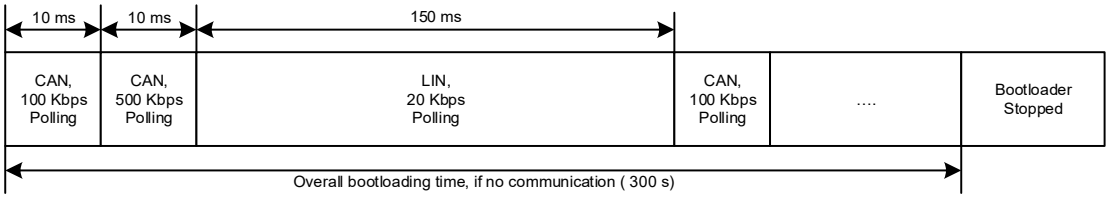


Table 29-1. CAN Interface Details

Sl. No.	CAN Interface	Configuration
1	CAN Mode	Classic CAN
2	CAN Instance	CAN0, Channel#1
3	CAN TX	P0.2 / CAN0_1_TX
4	CAN RX	P0.3 / CAN0_1_RX
5	CAN Transceiver NSTB / EN (Low)	P23.3 (optional)
6	CAN Transceiver EN / EN (High)	P2.1 (optional)
7	CAN RX Message ID	0x1A1
8	CAN TX Message ID	0x1B1
9	Baud	100 or 500 kbps alternating

Figure 29-2.MCU to CAN Transceiver Connections

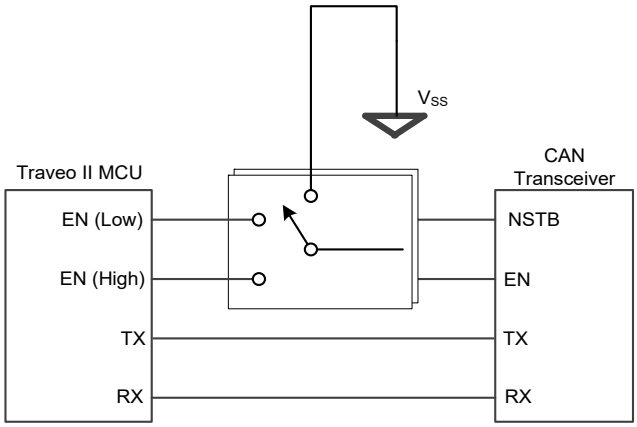
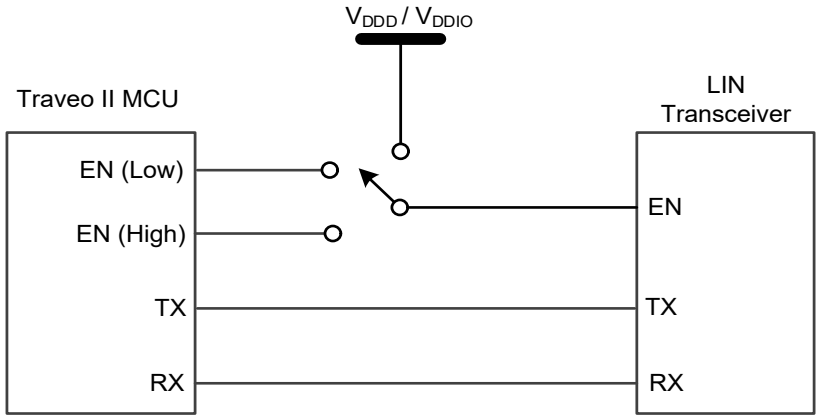


Table 29-2. LIN Interface Details

Sl. No.	LIN Interface	Configuration
1	LIN Type	LIN0, Channel#1
2	LIN Mode	Slave
3	LIN Checksum Type	Classic
4	LIN TX	P0.1 / LIN1_TX
5	LIN RX	P0.0 / LIN1_RX
6	LIN EN / EN (High)	P2.1 (optional)
7	LIN EN (Low)	P23.3 (optional)
8	LIN TX PID	0x46
9	LIN RX PID	0x45
10	Baud	20 or 115.2 kbps
11	Break Field Length	11
12	Break Delimiter Length	1 bit

Figure 29-3.MCU to LIN Transceiver Connections



29.2 External IP Revisions

Table 29-3. IP Revisions

Module	IP	Revision	Vendor
CANFD	mxttcanfd	M_TTCAN IP revision: Rev.3.2.3	Bosch
Arm Cortex-M0+	armcm0p	Cortex-M0+-r0p1	Arm
Arm Cortex-M4	armcm4	Cortex-M4-r0p1	Arm
Arm Coresight	armcoresighttk	CoreSight-SoC-TM100-r3p2	Arm

30. Acronyms

Table 30-1. Acronyms used in the Document

Acronym	Description	Acronym	Description
A/D	Analog to Digital	JTAG	Joint test action group
ABS	Absolute	LDO	Low drop out regulators
ADC	Analog to Digital converter	LIN	Local Interconnect Network, a communications protocol
AES	Advanced encryption standard	LVD	Low voltage detection
AHB	AMBA (advanced microcontroller bus architecture) high-performance bus, Arm data transfer bus	OTA	Over-the-air programming
Arm	Advanced RISC machine, a CPU architecture	OTP	One-time programmable
ASIL	Automotive safety integrity level	OVD	Over voltage detection
BOD	Brown-out detection	P-DMA	Peripheral-Direct Memory Access same as DW
CAN FD	Controller Area Network with Flexible Data rate	PLL	Phase Locked Loop
CMOS	Complementary metal-oxide-semiconductor	POR	Power-on reset
CPU	Central Processing Unit	PPU	Peripheral protection unit
CRC	Cyclic redundancy check, an error-checking protocol	PRNG	Pseudorandom number generator
CSV	Clock supervisor	PWM	Pulse-width modulation
CTI	Cross trigger interface	MCU	Microcontroller Unit
DES	Data encryption standard	MCWDT	Multi-counter watchdog timer
DFT	Design-For-Test	M-DMA	Memory-Direct Memory Access
DW	Datawire same as P-DMA	MISO	SPI Master-in slave-out
ECC	Error correcting code/Elliptical curve cryptography	MMIO	Memory mapped I/O
ECO	External crystal oscillator	MOSI	SPI Master-out slave-in
ETM	Embedded Trace Macrocell	MPU	Memory protection unit
EVTGEN	Event Generator	MTB	Micro trace buffer
FLL	Frequency Locked Loop	MUL	Multiplier
FPU	Floating point unit	MUX	Multiplexer
GHS	Green Hills tool chain with Multi IDE	NVIC	Nested vectored interrupt controller
GPIO	General purpose input/output	RAM	Random access memory
HSM	Hardware security module	RISC	Reduced-instruction-set computing
I/O	Input/output	ROM	Read only memory
I^2C	Inter-Integrated Circuit, a communications protocol	RSA	Rivest-Shamir-Adleman Public Key Encryption Algorithm
ILO	Internal low-speed oscillator	RTC	Real-time clock
IMO	Internal main oscillator	SAR	Successive approximation register
IOSS	Input/output sub-system	SCB	Serial communication block
IPC	Inter-processor communication	SCL	I^2C serial clock
IrDA	Infrared interface	SDA	I^2C serial data
IRQ	Interrupt request	SECDED	Single error correction, double error detection

Table 30-1. Acronyms used in the Document *(continued)*

Acronym	Description	Acronym	Description
SHA	Secure hash algorithm	TCPWM	Timer/Counter Pulse-width modulator
SHE	Secure hardware extension	TTL	Transistor-transistor logic
SMPU	Shared memory protection unit	TRNG	True random number generator
SPI	Serial peripheral interface, a communications protocol	UART	Universal Asynchronous Transmitter Receiver
SRAM	Static random access memory	WCO	Watch crystal oscillator
SWD	Serial wire debug	WDT	Watchdog timer reset
SWJ	Serial wire JTAG		

31. Errata

This section describes the errata for the CYT2B6 product family. Details include errata trigger conditions, scope of impact, available workaround, and silicon revision applicability. Contact your local Cypress Sales Representative if you have questions.

Part Numbers Affected

Part Number
All CYT2B6 parts

CYT2B6 Qualification Status

Production samples

CYT2B6 Errata Summary

The following table defines the errata applicability to available CYT2B6 family devices.Click on an

Items	Errata ID	CYT2B6	Silicon Rev.	Fix Status
[1.] Crypto LSL1, LSR1, LSL1_WITH_CARRY, & LSR1_WITH_CARRY instructions may work incorrectly in certain scenarios	53	CYT2B63BADQ0AZSGS CYT2B63BADQ0AZEGS CYT2B63CADQ0AZSGS CYT2B63CADQ0AZEGS CYT2B64BADQ0AZSGS CYT2B64BADQ0AZEGS CYT2B64CADQ0AZSGS CYT2B64CADQ0AZEGS CYT2B65BADQ0AZSGS CYT2B65BADQ0AZEGS CYT2B65CADQ0AZSGS CYT2B65CADQ0AZEGS	D	No silicon fix planned. Use workaround.
[2] Crypto MEM_BUF may be corrupted	42			No silicon fix planned. Use workaround.
[3] ConfigureFmInterrupt API assumes a parameter with 8 bytes boundary, but actual boundary is 4 bytes	67			No silicon fix planned. Use workaround.
[4] SMPU/MPU/PPU protection region size is limited to 2 GB	68			No silicon fix planned. Use workaround.
[5] DirectExecute API may return error if called with arguments placed in SRAM memory	69			No silicon fix planned. Use workaround.
[6] CAN FD RX FIFO top pointer feature does not function as expected	96			No silicon fix planned. Use workaround.
[7] CAN FD debug message handling state machine does not reset to Idle state when CANFD_CH_CCCR.INIT is set	97			No silicon fix planned. Use workaround.
[8] TPIU Peripheral ID mismatch	98			No fix planned
[9] Limitation of the memory hole in SCB register space	124			No silicon fix planned. Use workaround
[10] WDT service can be missed	129			No silicon fix planned. Use workaround
[11] CAN FD controller message order inversion when transmitting from dedicated Tx Buffers configured with same Message ID	147			No silicon fix planned. Use workaround

1. Crypto LSL1, LSR1, LSL1_WITH_CARRY, & LSR1_WITH_CARRY instructions may work incorrectly in certain scenarios	
Problem Definition	LSL1, LSR1, LSL1_WITH_CARRY, and LSR1_WITH_CARRY instructions should ignore the value in IW[3:0] (shift by 1 instruction does not use these fields). But because of a HW issue, shift does not work if the register data field pointed by IW[3:0] is '0' (destination data is same as source data).
Parameters Affected	NA
Trigger Condition(s)	Using LSL1, LSR1, LSL1_WITH_CARRY, and LSR1_WITH_CARRY instructions
Scope of Impact	The shift does not happen (destination data is same as source data).

Workaround	IW[3:0] should be pointed to a dummy register where the data field of the register is a non-zero value (rsrc0->data[12:0]).
	Since the stack pointer (r15) points to a non-zero value (to use the LSL1 instruction, you must have allocated at least one register, so that SP will not be zero), it is safe to use r15 as rsrc0.
	static __forceinline void LSL1 (int rdst, int rsrc1)
	{
	AHB_WRITE_W (MMIO_CRYPTO_INSTR_FF_WR, (CRYPTO_VU_LSL_OPC << 24)
	| (rdst << 12)
	| (rsrc1 << 4)
	| 15);
	}
	
	This software workaround applies to other instructions such as LSR1, LSL1_WITH_CARRY & LSR1_WITH_CARRY as well.

Fix Status	No silicon fix planned. Use workaround.

2. Crypto MEM_BUF may be corrupted	
Problem Definition	The SRAM in the Crypto block is 8 KB but the address decode is wired to create four 8-KB images of the SRAM within a 32-KB address space. Writes to memory space above the initial 8-KB image will corrupt SRAM contents.
Parameters Affected	NA
Trigger Condition(s)	Any write to address between 0x40108000 and 0x4010FFFF
Scope of Impact	CRYPTO MEM_BUF may be corrupted
Workaround	The software should ensure that there is no access beyond 8 KB MEM_BUF address range from either MMIO writes or address overflows while executing CRYPTO operations
Fix Status	No silicon fix planned. Use workaround.

3. ConfigureFmInterrupt API assumes a parameter with 8 bytes boundary, but actual boundary is 4 bytes	
Problem Definition	STATUS_ADDR_PROTECTED will be returned if the ConfigureFmInterrupt API is called with arguments stored in SRAM with 4-byte boundary (available SRAM or protected boundary SRAM).
Parameters Affected	NA
Trigger Condition(s)	Call ConfigureFmInterrupt API with arguments stored in SRAM at 4 bytes boundary of available SRAM or protected boundary of SRAM.
Scope of Impact	ConfigureFmInterrupt API will fail by returning STATUS_ADDR_PROTECTED error status when called with argument having 4 bytes boundary of available SRAM or protected boundary of SRAM.

Workaround	Allow 4 bytes margin (that is, assume that the API parameter size is 8 and store the arguments) for ConfigureFmInterrupt API parameter.
Fix Status	No silicon fix planned. Use workaround.

4. SMPU/MPU/PPU protection region size is limited to 2 GB	
Problem Definition	If SMPU/MPU/PPU protection block size is configured for 4 GB (PROT_SMPU_SMPU_STRUCT_ATT0.REGION.SIZE = 31), then during protection check in SROM, the value of the internal uint32 variable will overflow (4G = 0x1 0000 0000). Therefore, SROM assumes the protection size equals zero, and no protection will be applied.
Parameters Affected	NA
Trigger Condition(s)	Configure SMPU/MPU/PPU to protect with region size equal to 4 GB or the region size with value 31u.
Scope of Impact	If SMPU/MPU/PPU is configured to protect region size of 4 GB, then SROM software does not apply any protection as per the request.
Workaround	Use two protection blocks of region size equal to 2 GB if 4-GB region size protection is required.
Fix Status	No silicon fix planned. Use workaround.

5. DirectExecute API may return error if called with arguments placed in SRAM memory	
Problem Definition	If DirectExecute API is called in the master PC (other than PC0 or PC1) with arguments in SRAM_SCRATCH_ADDR, then the API will return STATUS_ADDR_PROTECTED status.
Parameters Affected	NA
Trigger Condition(s)	Call DirectExecute API with arguments in SRAM_SCRATCH_ADDR and master PC configured > 1.
Scope of Impact	DirectExecute API, if called with master PC configured > 1 and arguments in SRAM_SCRATCH_ADDR, the API will return STATUS_ADDR_PROTECTED.
Workaround	Call DirectExecute API with master PC0 or PC1, if arguments are stored in SRAM memory.
Fix Status	No silicon fix planned. Use workaround.

6. CAN FD RX FIFO top pointer feature does not function as expected	
Problem Definition	The RX FIFO top pointer function calculates the address for received messages in Message RAM by hardware. This address should restart from the start address after reading all messages of RX FIFO n size (n: 0 or 1). However, the address does not restart from the start address when the RX FIFO n size is set to 1 (CANFD_CH_RXFnC.FnS = 0x01). This results in CPU/DMA reading messages from the wrong address in Message RAM.
Parameters Affected	NA
Trigger Condition(s)	RX FIFO top pointer function is used when RX FIFO n size is set to 1 element (CANFD_CH_RXFnC.FnS = 0x01).
Scope of Impact	Received message cannot be correctly read by using the RX FIFO top pointer function, when the RX FIFO n size is set to 1 element.
Workaround	Any of the following. 1) Set RX FIFO n size to 2 or more when using the RX FIFO top pointer function. 2) Do not use the RX FIFO top pointer function when RX FIFO n size is set to 1 element. Instead of reading received messages from the RX FIFO top pointer, read directly from the Message RAM.
Fix Status	No silicon fix planned. Use workaround.

7. CAN FD debug message handling state machine does not reset to Idle state when CANFD_CH_CCCR.INIT is set	
Problem Definition	If either of the CANFD_CH_CCCR.INIT bits is set by the Host or when the M_TTCAN module enters BusOff state, the debug message handling state machine stays in its current state instead of being reset to Idle state. Configuring the CANFD_CH_CCCR.CCE bit does not change CANFD_CH_RXF1S.DMS.
Parameters Affected	NA
Trigger Condition(s)	Either of the CANFD_CH_CCCR.INIT bits is set by the Host or when the M_TTCAN module enters BusOff state.
Scope of Impact	The errata is limited to the use case when the Debug on CAN functionality is active. Normal operation of the CAN module is not affected, in which case the debug message handling state machine always remains in Idle state. In the described use case, the debug message handling state machine is stopped and remains in the current state signaled by the CANFD_CH_RXF1S.DMS bit. If CANFD_CH_RXF1S.DMS is set to 0b11, the DMA request remains active.
Workaround	In case the debug message handling state machine stops while CANFD_CH_RXF1S.DMS is 0b01 or 0b10, it can be reset to Idle state by hardware reset or by reception of debug messages after CANFD_CH_CCCR.INIT is reset to zero.
Fix Status	No silicon fix planned. Use workaround.

8. TPIU Peripheral ID mismatch	
Problem Definition	TPIU peripheral ID indicates that it is M3-TPIU instead of M4-TPIU.
Parameters Affected	NA
Trigger Condition(s)	When the debugger reads PID registers for component identification.
Scope of Impact	The only impact is that the debuggers read the TPIU as M3-TPIU.
Workaround	No specific workaround required. Debuggers can use trace features.
Fix Status	No fix planned

9. Limitation of the memory hole in SCB register space	
Problem Definition	The memory hole [offset address: 0x1000 to 0xFFFF] inside the SCB register space is not aligned to the below defined spec. Since the offset address bits [15:12] are ignored and treated as 4'b0000, write/read access to the offset address [0x1000 to 0xFFFF] will actually happen to [0x0000 to 0x0FFF]. - Access to address gaps in mapped memory space: writes are ignored and any read returns a zero.
Parameters Affected	NA
Trigger Condition(s)	Access to the memory hole [offset address: 0x1000 to 0xFFFF] in the SCB register space
Scope of Impact	The memory hole [offset address: 0x1000 to 0xFFFF] in the SCB register space is not aligned to other IP registers.
Workaround	Do not access to the memory hole [offset address: 0x1000 to 0xFFFF] in SCB register space.
Fix Status	No fix planned

10. WDT service can be missed	
Problem Definition	If WDT service happens within 4 ILO clock cycles before DeepSleep entry, it clears the counter but does not fully complete an internal handshake. A service after DeepSleep wakeup may then be missed if it occurs less than 2 ILO clock cycles after the processor resumes clocking. After this time, the internal handshake is complete and servicing works normally.
Parameters Affected	NA
Trigger Condition(s)	Service WDT within four ILO clock cycles before DeepSleep entry and within two ILO clock cycles of processor clock resuming
Scope of Impact	WDT service after DeepSleep wakeup may be ignored and WDT continues counting. This can cause unintended WARN_ACTION or UPPER_ACTION, including interrupt, fault, and/or reset.
Workaround	Wait 130 µs or more after DeepSleep wakeup. (For example, to measure 130 µs, software can read the WDT_CNT register at wake up and make sure that WDT_CNT was incremented of 4 units before servicing WDT). Afterwards, write '1' to WDT service (WDT_SERVICE.SERVICE) after waiting until WDT service (WDT_SERVICE.SERVICE) reads '0'.
Fix Status	No silicon fix planned. Use workaround.

11. CAN FD controller message order inversion when transmitting from dedicated Tx Buffers configured with same Message ID	
Problem Definition	Configuration: Several Tx Buffers are configured with the same Message ID. Transmission of these Tx Buffers is requested sequentially with a delay between the individual Tx requests. Expected behavior: When multiple Tx Buffers that are configured with the same Message ID have pending Tx requests, they shall be transmitted in ascending order of their Tx Buffer numbers. The Tx Buffer with lowest buffer number and pending Tx request is transmitted first. Observed behavior: It may happen, depending on the delay between the individual Tx requests, that in the case where multiple Tx Buffers are configured with the same Message ID the Tx Buffers are not transmitted in order of the Tx Buffer number (lowest number first).
Parameters Affected	NA
Trigger Condition(s)	When multiple Tx Buffers that are configured with the same Message ID have pending Tx requests.
Scope of Impact	In the case described it may happen, that Tx Buffers configured with the same Message ID and pending Tx request are not transmitted with lowest Tx Buffer number first (message order inversion).
Workaround	Any of the following: 1) First write the group of Tx message with the same Message ID to the Message RAM and then afterwards request transmission of all these messages concurrently by a single write access to CANFDx-_CHy_TXBAR. 2) Use the Tx FIFO instead of dedicated Tx Buffers for the transmission of several messages with the same Message ID in a specific order. Applications not able to use workaround #1 or #2 can implement a counter within the data section of their messages sent with same ID in order to allow the recipients to determine the correct sending sequence.
Fix Status	No silicon fix planned. Use workaround.

Document History Page

Document Title: CYT2B6 Datasheet 32-bit Arm® Cortex®-M4F Microcontroller Traveo™ II Family Document Number: 002-25756			
Revision	**ECN**	**Submission Date**	**Description of Change**
**	6801701	02/07/2020	New datasheet
*A	6905699	06/29/2020	Changed datasheet status to Preliminary. Updated Features List: - Updated TCPWM (16-bit) and Internal low-speed oscillator in Table 1-1. - Added Communication Peripheral Instance List. Updated ILO Clock Source description in Clock System. Updated the block of CLOCK_PATH3 in the CYT2B6 Clock Diagram. Updated VCCD in Power Pin Assignments. Removed associated footnotes in Alternate Pin Functions in Active Mode table. Added Pin Mux Descriptions. Updated MUX Group 10 in Trigger Inputs. Updated Peripheral Clock Assignments. Updated Fault Assignments. Updated Miscellaneous Configuration for CYT2B6 Devices. Updated Figure 26-2. Updated Ordering Information. Updated Device Code Nomenclature and Ordering Code Nomenclature. Added note in Package Characteristics. Added External IP Revisions.
*B	7182512	07/08/2021	Updated Features. Updated Features List. Updated Communication Peripheral Instance List. Updated System Resources. Updated I/Os. Updated High-Speed I/O Matrix Connections. Updated Alternate Function Pin Assignments. Updated Triggers One-to-One. Updated Faults. Updated Miscellaneous Configuration. Updated Electrical Specifications. Updated Part Number Nomenclature. Updated Appendix. Updated Errata.

Revision History Change Log

Rev. *B Section Updates

Section	Change Description	Current Spec (Rev *A)	New Spec (Rev *B)	Reason for change
Features	Wakeup Support	Up to two pins to wakeup from Hibernate mode	A GPIO pin to wakeup from Hibernate mode	Correction
1. Features List	Renamed Features in Table 1-1	LIN	LIN0	Updated
1.1 Communication Peripheral Instance List	Renamed module in Table 1-2	LIN	LIN0	Updated
3.2 System Resources	Updated description in 3.2.6 Power Modes	Hibernate – the device and I/Os are in High-Z state, the device resets on wakeup	Hibernate – the device and I/O states are frozen, the device resets on wakeup	Updated
3.4 I/Os	Updated description	During power-on, Hibernate, and reset, the I/Os are forced to the High-Z state.	During power-on, and reset, the I/Os are forced to the High-Z state. During the Hibernate mode, I/Os are frozen.	Updated
10. High-Speed I/O Matrix Connections	Updated Table 10-1	Number: Description 1: GPIO controls 'out', DSI controls 'output enable' 2: DSI controls 'out' and 'output enable' 3: DSI controls 'out', GPIO controls 'output enable' 4: Analog multiplexer bus A 5: Analog multiplexer bus B 6: Analog multiplexer bus A, DSI control 7: Analog multiplexer bus B, DSI control	Number: Description 1: 2: 3: 4: Reserved 5: 6: 7:	Updated
13. Alternate Function Pin Assignments	Updated Table 13-1	PWM_xx, PWM_xx_N, TC_xx_TR0, and TC_xx_TR1	PWM0_xx, PWM0_xx_N, TC0_xx_TR0, and TC0_xx_TR1	Updated
19. Triggers One-to-One	Corrected Table 19-1: MUX Group 2	Input: Description: 3: PASS SAR0 ch#0 to P-DMA0 direct connect	Input: Description: 3: PASS SAR0 ch#3 to P-DMA0 direct connect	Correction
21. Faults	Updated Table 21-1	No.: Description 32: Peripheral Group #0 PPU violation. 33: Peripheral Group #1 PPU violation. 34: Peripheral Group #2 PPU violation. 35: Peripheral Group #3 PPU violation. 37: Peripheral Group #4 PPU violation. 38: Peripheral Group #5 PPU violation. 41: Peripheral Group #6 PPU violation. 49: Flash controller main flash cache correctable ECC violation 50: Flash controller main flash cache non-correctable ECC violation. 52: Flash controller work flash cache correctable ECC violation. 53: Flash controller work-flash cache non-correctable ECC violation.	No.: Description 32: Peripheral Group #0 violation. 33: Peripheral Group #1 violation. 34: Peripheral Group #2 violation. 35: Peripheral Group #3 violation. 37: Peripheral Group #5 violation. 38: Peripheral Group #6 violation. 41: Peripheral Group #9 violation. 49: Flash controller main flash correctable ECC violation 50: Flash controller main flash non-correctable ECC violation. 52: Flash controller work flash correctable ECC violation. 53: Flash controller work-flash non-correctable ECC violation.	Correction
24. Miscellaneous Configuration	Updated Table 24-1	No.: Number/Instances 15: TBD	No.: Number/Instances: 15: 27	Updated
26. Electrical Specifications	Removed Table 26-3. Smoothing Capacitor Connections	Table 26-3. Smoothing Capacitor Connections	(none)	This table is provided in Hardware Design Guide (002-20270).
26. Electrical Specifications	Added 26.7 AC Specifications	(none)	Added 26.7 AC Specifications	Added description
26. Electrical Specifications	Updated Figure 26-8	1: tPWMEBEXT, tQRES	1: tPWMENEXT, tQRES	Updated
26. Electrical Specifications	Updated Figure 26-10 to 26-13	Time reference point: VOH/VOL, VIH/VIL	Time reference point: 50%	Updated
26. Electrical Specifications	Updated Table 26-21	CLK_HF1:Description Event generator, …	CLK_HF1:Description Event generator (CLK_REF), …	Updated
26. Electrical Specifications	Updated Figure 26-24, 26-25	TBD us	3.5 us	Updated
27.1 Part Number Nomenclature	Updated Table 27-2, 27-3	Hardware Option: Value / Meaning B / eSHE – on, HSM – off C / eSHE – on, HSM – on	Hardware Option: Value / Meaning B / eSHE – on, HSM – off, RSA - 2K C / eSHE – on, HSM – on, RSA - 2K	Updated
27.1 Part Number Nomenclature	Added Note [62]	(none)	62. JTAG ID CODE bits 12 through 27, represents the Silicon ID of the device.	Added description
29. Appendix	Updated Table 29-1	CAN Instance: TBD CAN TX: TBD CAN RX: TBD CAN Transceiver NSTB: TBD CAN Transceiver EN: TBD CAN RX Message ID: TBD CAN TX Message ID: TBD	CAN Instance: CAN0, Channel#1 CAN TX: P0.2 / CAN0_1_TX CAN RX: P0.3 / CAN0_1_RX CAN Transceiver NSTB / EN (Low): P23.3 (optional) CAN Transceiver EN / EN (High): P2.1 (optional) CAN RX Message ID: 0x1A1 CAN TX Message ID: 0x1B1	Updated

Rev. *B Section Updates *(continued)*

Section	Change Description	Current Spec (Rev *A)	New Spec (Rev *B)	Reason for change
29. Appendix	Updated Table 29-2	LIN Type: TBD LIN TX: TBD LIN RX: TBD LIN EN: TBD LIN TX PID: TBD LIN RX PID: TBD	LIN Type: LIN0, Channel#1 LIN TX: P0.1 / LIN1_TX LIN RX: P0.0 / LIN1_RX LIN EN / EN (High): P2.1 (optional) LIN EN (Low): P23.3 (optional) LIN TX PID: 0x46 LIN RX PID: 0x45	Updated
29. Appendix	Updated Figure 29-3	EN (LOW) and VDDIO line do not present.	Added EN (LOW) and VDDIO line	Updated
29. Appendix	Updated Table 29-3	Module / Revision Arm Cortex-M0+ / Cortex-M0+ AT590-r0p1-00rel0 Arm Cortex-M4 / armcm4: cortexm4_r0p1_00rel0 Arm Coresight / armcoresighttk: CoreSight-SoC-TM100-r3p2-00rel0	Module / Revision Arm Cortex-M0+ / armcm0p: Cortex-M0+-r0p1 Arm Cortex-M4 / armcm4: Cortex-M4-r0p1 Arm Coresight / armcoresighttk: CoreSight-SoC-TM100-r3p2	Updated
31. Errata	Added errata section	(none)	Added Errata section	Added errata

Rev *B Electrical Specification Updates

Spec ID	Description	Changed Item	Current Spec (Rev *A)	New Spec (Rev *B)	Reason for Change
SID40	Power Supply voltage	Note[40]	[40] VDDD, VDDIO_1, VDDIO_2, and VDDA do not have any sequencing limitation and can establish in any order. These supplies (except VDDA and VDDIO_2) are independent in voltage level. For example, VDDIO_1 = 5.0 V, VDDD = 3.3 V, and VDDA = VDDIO_2 = 4.0 V are supported, as is any other combination of voltages between 2.7 V and 5.5 V inclusive. The presence of VDDA without VDDD can cause some leakage from VDDA. However, the device does not drive any analog or digital output.	[40] VDDD, VDDIO_1, VDDIO_2, and VDDA do not have any sequencing limitation and can establish in any order. These supplies (except VDDA and VDDIO_2) are independent in voltage level. See 12-Bit SAR ADC DC Specifications when using ADC units.	Updated description
SID49C1A	LP Active mode (CM4 and CM0+ at 8 MHz, all peripherals are disabled)	Details/Conditions	MAX: TA = 125 °C, VDDD = 5.5 V, process typ (FF)	MAX: TA = 25 °C, VDDD = 5.5 V, process worst (FF)	Updated condition
SID49CB	LP Active mode (CM4 and CM0+ at 8 MHz, all peripherals are enabled)	SID Parameter Max	SID49CA Parameter: IDD1_CM04_8A Max: 51 mA	SID49CB Parameter: IDD1_CM04_8B Max: 49 mA	Updated spec
SID49E2	Active mode (CM4 at 80 MHz, CM0+ at 80 MHz, all peripherals are enabled)	Typ Max	Typ: TBD Max: TBD	Typ: 29 mA Max: 85 mA	Updated spec
SID56A	Average current for cyclic wake-up operation This is the average current for the specified LP Active mode and DeepSleep mode (RTC, WDT and Event generator operating).	Details/Conditions	MAX: process typ (FF)	MAX: process worst (FF)	Updated condition
SID62	Hibernate Mode	Details/Conditions	TA = 25 °C, VDDD = 5.5 V	ILO0/WDT operating. All other peripherals, and all CPUs are off. TA = 25 °C, VDDD = 5.5 V, process typ (TT)	Updated condition
SID62A	Hibernate Mode	Max Details/Conditions	Max: 175 uA Details/Conditions: TA = 125 °C, VDDD = 5.5 V	Max: 130 uA Details/Conditions: ILO0/WDT operating. All other peripherals, and all CPUs are off. TA = 125 °C, VDDD = 5.5 V, process worst (FF)	Updated condition
SID63A	DeepSleep to Active transition time (FLL clock, SRAM execution)	Max	TBD	15 us	Updated spec
SID63D	DeepSleep to Active transition time (FLL clock, flash execution)	Max	TBD	21.5 us	Updated spec
SID63B	DeepSleep to Active transition time (PLL clock, SRAM or flash execution)	Max	TBD	60 us	Updated spec
SID80A	ROM boot startup time or wakeup time from hibernate in NORMAL protection state	Max	Max: TBD	Max: 1800 us	Updated spec

Rev *B Electrical Specification Updates *(continued)*

Spec ID	Description	Changed Item	Current Spec (Rev *A)	New Spec (Rev *B)	Reason for Change
SID80B	ROM boot startup time or wakeup time from hibernate in SECURE protection state	Max Details/Conditions	Max: TBD Details/Conditions: Guaranteed by Design, TOC2_-FLAGS=0x2CF	Max: 2740 us Details/Conditions: Guaranteed by Design	Updated spec
SID81A	Flash boot startup time or wakeup time from hibernate in NORMAL/SECURE protection state	Max	Max: TBD	Max: 80 us	Updated spec
SID81B	Flash boot with app authentication time in NORMAL/SECURE protection state	Max Details/Conditions	Max: TBD Details/Conditions: Guaranteed by Design, TOC2_-FLAGS=0x2CF, Listen window = 0 ms, App size is 64 KB with the last 256 bytes being a digital signature in RSASSA-PKCS1-v1.5	Max: 5000 us Details/Conditions: Guaranteed by Design, TOC2_-FLAGS=0x24F, Listen window = 0 ms, Public key exponent e = 0x010001, App size is 64 KB with the last 256 bytes being a digital signature in RSASSA-PKCS1-v1.5 Valid for RSA2K.	Updated spec
SID102A	VDDA voltage range	All	(none)	VDDA voltage range	Added spec
SID103A	Internal band gap reference voltage	All	(none)	Internal band gap reference voltage	Added spec
SID113D	Analog input sample time for temperature sensor	All	(none)	Analog input sample time for temperature sensor	Added spec
SID200	Temperature Sensor accuracy 1	Details/Conditions	TJ = 150 °C This spec is valid for the following conditions: a. 3.0 V ≤ VDDD=VDDA=VREFH ≤ 3.6 V or b. 4.5 V ≤ VDDD=VDDA=VREFH ≤ 5.5 V	TJ = 150 °C This spec is valid when using ADC[0] (VDDIO_1), ADC[1] (VDDIO_2) or ADC[2] (VDDD) with the following conditions: a. 3.0 V ≤ VDDD, VDDIO_1 or VDDIO_2 = VDDA = VREFH ≤ 3.6 V or b. 4.5 V ≤ VDDD, VDDIO_1 or VDDIO_2 = VDDA = VREFH ≤ 5.5 V	Updated condition
SID201	Temperature Sensor accuracy 2	Details/Conditions	- 40 °C ≤ TJ < 150 °C This spec is valid for the following conditions: a. 3.0 V ≤ VDDD=VDDA=VREFH ≤ 3.6 V or b. 4.5 V ≤ VDDD=VDDA=VREFH ≤ 5.5 V	- 40 °C ≤ TJ < 150 °C This spec is valid when using ADC[0] (VDDIO_1), ADC[1] (VDDIO_2) or ADC[2] (VDDD) with the following conditions: a. 3.0 V ≤ VDDD, VDDIO_1 or VDDIO_2 = VDDA = VREFH ≤ 3.6 V or b. 4.5 V ≤ VDDD, VDDIO_1 or VDDIO_2 = VDDA = VREFH ≤ 5.5 V	Updated condition
SID201A	Temperature Sensor accuracy 3	Details/Conditions	- 40 °C ≤ TJ ≤ 150 °C This spec is valid for the following conditions except SID201 conditions: 2.7 V ≤ VDDD ≤ 5.5 V and 2.7 V ≤ VDDA=VREFH ≤ 5.5 V	- 40 °C ≤ TJ ≤ 150 °C This spec is valid when using ADC[0] (VDDIO_1) or ADC[2] (VDDD) with the following condition: 2.7 V ≤ VDDD or VDDIO_1 ≤ 5.5 V and 2.7 V ≤ VDDA = VREFH ≤ 5.5 V and 0.8 x VDDA < VDDD or VDDIO_1	Updated condition
SID258A	Blank check time for N-bytes of work-flash	SID Parameter Max Details/Conditions	SID258 tBC_WF Max: TBD Details/Conditions: (none)	SID258A tBC_WF_A Max: 12.5 + 0.375 * N (us) Details/Conditions: At 80 MHz, N >= 4 and multiply of 4, Excludes system overhead time	Updated spec
SID598	Over current detection range in Active/Sleep mode	Details/Conditions	(None)	Guaranteed by Design	Added condition
SID599	Over current detection range in DeepSleep mode	Details/Conditions	(None)	Guaranteed by Design	Added condition
SID332	Feedback resistor value for ECO	Details/Conditions	(None)	Guaranteed by Design	Added condition
SID349C	PFD frequency	Min	4 MHz	3.988 MHz	Updated spec
SID350A	FLL wake up time	SID Parameter Max	SID350 tFLL_WAKE Max: TBD	SID350A tFLL_WAKE_A Max: 3.5 us	Updated spec
SID412	Minimum WDT timeout	Details/Conditions	When using the ILO (32.768 kHz + 5%) and 16-bit WDT counter. Guaranteed by Design.	When using the ILO (32.768 kHz + 5%) and 32-bit WDT counter. Guaranteed by Design.	Updated condition
SID413	Maximum WDT timeout	Details/Conditions	When using the ILO (32.768 kHz - 5%) and 16-bit WDT counter. Guaranteed by Design.	When using the ILO (32.768 kHz - 5%) and 32-bit WDT counter. Guaranteed by Design.	Updated condition

Rev *B Electrical Specification Updates *(continued)*

Spec ID	Description	Changed Item	Current Spec (Rev *A)	New Spec (Rev *B)	Reason for Change
SID414	Default WDT timeout	Typ Details/Conditions	Typ: 125 ms Details/Conditions: When using the ILO and 32-bit WDT counter at 0x1000 (default value). Guaranteed by Design.	Typ: 1000 ms Details/Conditions: When using the ILO and 32-bit WDT counter at 0x8000 (default value). Guaranteed by Design.	Updated spec

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