TLE986xQX Family
TLE987xQX Family

Overview

This document lists all differences between BE-Step and BF-Step.

This document applies to the following products:

- TLE9861QXA20
- TLE9867QXA20
- TLE9867QXA40
- TLE9869QXA20
- TLE9871QXA20
- TLE9877QXA20
- TLE9877QXA40
- TLE9879QXA20
- TLE9879QXA40

Table 1 Device individual document references

Product	BE-Step Reference	BF-Step Reference
TLE9861QXA20	TLE9861QXA20-Data-Sheet-10-Infineon	TLE9861QXA20-BF-Data-Sheet-10-Infineon
TLE9867QXA20	TLE9867QXA20-Data-Sheet-10-Infineon	TLE9867QXA20-BF-Data-Sheet-10-Infineon
TLE9867QXA40	TLE9867QXA40-Data-Sheet-10-Infineon	TLE9867QXA40-BF-Data-Sheet-10-Infineon
TLE9869QXA20	TLE9869QXA20-Data-Sheet-10-Infineon	TLE9869QXA20-BF-Data-Sheet-10-Infineon
TLE9871QXA20	TLE9871QXA20-Data-Sheet-10-Infineon	TLE9871QXA20-BF-Data-Sheet-10-Infineon
TLE9877QXA20	TLE9877QXA20-Data-Sheet-10-Infineon	TLE9877QXA20-BF-Data-Sheet-10-Infineon
TLE9877QXA40	TLE9877QXA40-Data-Sheet-10-Infineon	TLE9877QXA40-BF-Data-Sheet-10-Infineon
TLE9879QXA20	TLE9879QXA20-Data-Sheet-10-Infineon	TLE9879QXA20-BF-Data-Sheet-10-Infineon
TLE9879QXA40	TLE9879QXA40-Data-Sheet-10-Infineon	TLE9879QXA40-BF-Data-Sheet-10-Infineon

Table 2 General document references

Document Type	BE-Step Reference	BF-Step Reference
BootROM User Manual	TLE986xQX-BootROM-User-Manual-13-Infineon.pdf TLE987xQX-BootROM-User-Manual-13-Infineon.pdf	TLE986xQX-BootROM-User-Manual-14-Infineon.pdf TLE987xQX-BootROM-User-Manual-14-Infineon.pdf

Note: The information provided with this document should be treated as a hint for changes between the design steps only. For the device specification please refere to the individual data sheet.

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1 Functional Changes

This chapter lists all the functional changes.

1.1 BSL: LIN BSL removed

In BF-Step the normal LIN BSL mode is removed.

1.2 BSL: FastLIN BSL improvements

Due to the fact that the LIN BSL mode was removed in BF-Step the FastLIN BSL mode was improved agains unwanted BSL entry due to random noise on the LIN line during the NAC active time. In order to improve the robustness against noise on the LIN line during the NAC active time, the FastLIN mode expects the “Get ChipID” BSL command as first command upon connection establishing. The FastLIN mode will reject all other information on the LIN line before a valid “Get ChipID” command was received. Only after the “Get ChipID” command was received successfully the NAC timer will be disabled and the device waits for further BSL commands. FastLIN is only supporting a fix baudrate of 115.2kBaud. Changing of the baudrate is not supported in FastLIN mode.

1.3 BootROM: Sector Erase Verification function

The function USER_SECTOR_ERASE_VERIFY performs a check of all pages inside a given sector agains Hardread margins on the erased side. It allows the user to check the erase quality of each page in a given sector. This function only operates on erased sectors. For sectors which are not fully in erased state (i.e. one page is programmed) the function returns a fail without performing an page-by-page check.

This function also operates on the data flash sector , it checks if all pages are unmapped and a valid spare page is available, then page-by-page the erase quality is checked. The result is returned to the user.

```
uint8 USER_ERASE_SECTOR_VERIFY(uint32 sector_addr);
```

For more details please see also the BF-Step BootROM UsersManual.

1.4 BootROM: Page Erase Verification function

The function USER_ERASEPG_VERIFY performs a check of one single flash page agains Hardread margins on the erased side. It allows the user to check the erase quality of a given flash page.

This function also operates on mapped data flash pages , but only the erase quality of the current spare page is being checked and returned.

```
uint8 USER_ERASEPG_VERIFY(uint32 page_addr);
```

For more details please see also the BF-Step BootROM UsersManual.

1.5 BootROM: Page Verify function

The function USER_VERIFY_PAGE provides the user the capability to check the quality of a programmed page against the hardread margins.

```
uint8 USER_VERIFY_PAGE(uint32 page_addr);
```

For more details please see also the BF-Step BootROM UsersManual.

1.6 BootROM: MapRAM Initialization in Soft Reset

The MapRAM initialization is also executed for Soft Reset, a call of the Service Algorithm at this point is not implemented. The result of the MapRAM init is reported in the SYS_STRTUP_STS register. An explicit calling of the USER_MAPRAM_INIT function is not required anymore in the user code on Soft Reset entry.

1.7 BDRV: Cross-current protection

In order to have more flexibility in configuring the cross-current protection, additional dividers for the existing cross protection settings were added. These additional dividers allow to extend the cross-current protection time by a factor of 2 or 4.

1.8 PMU: VAREF undervoltage shutdown disabled

The shutdown of the VAREF (5V, for ADC1) in case of undervoltage, detected by ADC2.Ch6, is disabled. The workaround for reenabling the VAREF is no longer needed.

2 Changes on the Electrical Characteristics

This chapter lists all the changes to the electrical characteristics.

2.1 BDRV: min. V_{GH}, min. V_{SH}, min. V_{GL}

V_{GH} min. has been extended to -8V (P_1.1.9).

V_{SH} min. has been extended to -8V (P_1.1.11).

V_{GL} min. has been extended to -8V (P_1.1.13).

Stepping	Number	Min.	Typ.	Max.
BE	P_1.1.9	-6V	-	48V
BF	P_1.1.9	-8V	-	48V

Stepping	Number	Min.	Typ.	Max.
BE	P_1.1.11	-6V	-	48V
BF	P_1.1.11	-8V	-	48V

Stepping	Number	Min.	Typ.	Max.
BE	P_1.1.13	-6V	-	48V
BF	P_1.1.13	-8V	-	48V

2.2 BDRV: V_{GLvsSL}

The declaration of the nominal and max. values for the parameter VGLvsSL was removed (P_1.1.45).

Stepping	Number	Min.	Typ.	Max.
BE	P_1.1.45	14V	16V	19V
BF	P_1.1.45	14V	-	-

2.3 PMU: I_{Stop} for -40°C to 85°C

The current consumption in Stop Mode has been increased (P_1.3.10).

Stepping	Number	Min.	Typ.	Max.
BE	P_1.3.10	-	100µA	150µA
BF	P_1.3.10	-	110µA	160µA

2.4 PMU: I_{Stop} for -40°C to 150°C

The current consumption in Stop Mode for the the temperature range -40°C to 150°C has been added (P_1.3.20).

Stepping	Number	Min.	Typ.	Max.
BE	n/a			
BF	P_1.3.20	-	600µA	1800µA

2.5 PMU: Current Consumption in Slow Down Mode added

The parameter ISDM_23P was added (P_1.3.19). This parameter specifies the current consumption on V_S in SLow Down Mode.

Stepping	Number	Min.	Typ.	Max.
BE	n/a			
BF	P_1.3.19	-	-	35mA

2.6 VDDC: $V_{DDC_OUT_Stop_Red}$ added

The parameter VDDC_OUT_Stop_Red added (P_2.2.23). This parameter specifies the output voltage of the V_{DDC} regulator in reduced output voltage mode for Stop Mode.

Stepping	Number	Min.	Typ.	Max.
BE	n/a			
BF	P_2.2.23	0.95V	1.1V	1.3V

2.7 XTAL: Specification added

A new chapter was added specifying the XTAL parameters.

2.8 GPIO: Input Leakage specification added for Tj ≤ 25°C

An extended specification for the GPIO input leakage for -40°C ≤ Tj ≤ 25°C was added (P_5.1.20).

Stepping	Number	Min.	Typ.	Max.
BE	n/a			
BF	P_5.1.20	-500nA	-	500nA

2.9 GPIO: Input Leakage notes and conditions

The notes and conditions for the parameter P_5.1.10 is set to 25°C < Tj ≤ 85°C.

The notes and conditions for the parameter P_5.1.11 is set to 85°C < Tj ≤ 150°C.

2.10 LIN Trx: Bus dominant output voltage specification added

The specification of the $V_{Bus,do}$ of the LIN transceiver was added (P_6.1.78).

Stepping	Number	Min.	Typ.	Max.
BE	n/a			
BF	P_6.1.78	-	-	0.22 x V_S

2.11 LIN Trx: R_{ON} specification added

The specification of the R_{ON} of the LIN transceiver was added (P_6.1.72).

Stepping	Number	Min.	Typ.	Max.
BE	n/a			
BF	P_6.1.72	-	20 Ohm	-

2.12 LIN Trx: Thermal Shutdown

The thermal shutdown temperature of the LIN transceiver was raised (P_6.1.65).

Stepping	Number	Min.	Typ.	Max.
BE	P_6.1.65	160°C	180°C	200°C
BF	P_6.1.65	190°C	200°C	215°C

2.13 Measurement Unit: Specified on full Temperature Range

For the following parameters the temperature limitation in notes and conditions are removed. The overall temperature range of Tj = -40° to 150°C becomes valid.

P_8.1.70, P_8.1.44, P_8.1.47, P_8.1.62, P_8.1.68, P_8.1.5, P_8.1.48, P_8.1.6, P_8.1.39.

2.14 Measurement Unit: V_{BG} measurement

The parameter for V_{BG} measurment after calibration added (P_8.1.73).

Stepping	Number	Min.	Typ.	Max.
BE	n/a			
BF	P_8.1.73	1.01V	1.07V	1.18V

2.15 Measurement Unit: V_{DH} Input attenuator

The specification attenuator has been changed (P_8.1.65).

Stepping	Number	Min.	Typ.	Max.
BE	P_8.1.65	-	0.226	-
BF	P_8.1.65	-	0.224	-

2.16 Measurement Unit: V_S accuracy, Range 1

The accuracy of VS after calibration for Range 1 has been tightened and the temperature range extended (P_8.1.70).

Stepping	Number	Min.	Typ.	Max.	Conditions
BE	P_8.1.70	-312mV	-	312mV	-40°C..85°C
BF	P_8.1.70	-220mV	-	220mV	-40°C..150°C

2.17 Measurement Unit: V_S accuracy, Range 2

The accuracy of VS after calibration for Range 1 has been tightened and the temperature range extended (P_8.1.44).

Stepping	Number	Min.	Typ.	Max.	Conditions
BE	P_8.1.44	-440mV	-	440mV	-40°C..85°C
BF	P_8.1.44	-370mV	-	370mV	-40°C..150°C

2.18 Measurement Unit: V_{DH} 10-bit ADC, Range 2 extended temperature

The specification for the VDH resolution for range 2 has been widened due to input attenuator change, see Chapter 2.15. The temperature range has been increased to Tj = -40° to 85°C (P_8.1.71).

Stepping	Number	Min.	Typ.	Max.
BE	P_8.1.71	-200mV	-	200mV
BF	P_8.1.71	-250mV	-	250mV

2.19 Measurement Unit: V_{DH} accuracy, Range 2 extended temperature

The accuracy of VDH for Range 2 for Tj = 85°C to 150°C has been added (P_8.1.74).

Stepping	Number	Min.	Typ.	Max.
BE	n/a			
BF	P_8.1.74	-400mV	-	400mV

2.20 Measurement Unit: Input Leakage for V_{DH}

The specification for the lower limit for the VDH input leakage was extended (P_8.1.10).

Stepping	Number	Min.	Typ.	Max.
BE	P_8.1.10	0	-	2.0µA
BF	P_8.1.10	-0.05µA	-	2.0µA

2.21 ADC2: VBG specification added

A new chapter was added specifying the ADC2 V_{BG}.

Stepping	Number	Min.	Typ.	Max.
BE	n/a			
BF	P_8.3.1	1.199V	1.211V	1.223V

2.22 ADC2: Input reffered noise removed

The parameter for Input referred noise was removed (P_8.3.23).

Stepping	Number	Min.	Typ.	Max.
BE	P_8.3.23	-	0.5 LSBrms	1.5 LSBrms
BF	n/a			

2.23 MON: Wake-up / Monitoring Threshold Voltage

The temperature range has been extened to -40°C to 150°C. The max. value has been updated.

Stepping	Number	Min.	Typ.	Max.	Conditions
BE	P_11.1.1	0.4 x V_S	0.5 x V_S	0.6 x V_S	-40°C..85°C
BF	P_11.1.1	0.4 x V_S	0.5 x V_S	0.675 x V_S	-40°C..150°C

2.24 BDRV: Max. Charge capablibilty

The parameter for the max. total charge driver capability added (P_12.1.20).

Stepping	Number	Min.	Typ.	Max.
BE	n/a			
BF	P_12.1.20	-	-	100nC

2.25 BDRV: max. Source Current increased

The former parameter P_12.1.44 (BE) was split and replaced by the parameters P_12.1.78 (BF) and P_12.1.80 (BF).

Stepping	Number	Min.	Typ.	Max.
BE	P_12.1.44	200mA	250mA	420mA
BF	P_12.1.78	230mA	345mA	450mA
BF	P_12.1.80	200mA	295mA	375mA

2.26 BDRV: max. Sink Current increased

The former parameter P_12.1.45 (BE) was split and replaced by the parameters P_12.1.79 (BF) and P_12.1.81 (BF).

Stepping	Number	Min.	Typ.	Max.
BE	P_12.1.45	200mA	250mA	420mA

Stepping	Number	Min.	Typ.	Max.
BF	P_12.1.79	230mA	330mA	450mA
BF	P_12.1.81	200mA	314mA	375mA

2.27 BDRV: Drain Source Monitoring

The min./max. values for the drain souce monitoring thresholds added (P_12.1.46).

2.28 BDRV: min. Turn ON time lowered

The lower limit for Turn ON time was decreased (P_12.1.59).

Stepping	Number	Min.	Typ.	Max.
BE	P_12.1.59	80µs	88µs	120µs
BF	P_12.1.59	16µs	24µs	32µs

2.29 BDRV: min. rise time lowered

The lower limit for the rise time was decreased (P_12.1.60).

Stepping	Number	Min.	Typ.	Max.
BE	P_12.1.60	60µs	72µs	88µs
BF	P_12.1.60	28µs	50µs	72µs

2.30 CSA: Adjusted output offset added

The parameter for the adjusted output offset voltage added (P_13.1.17).

Stepping	Number	Min.	Typ.	Max.
BE	n/a			
BF	P_13.1.17	-40mV	10mV	40mV

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