# 32-Bit

Microcontroller

# TC233 / TC234 / TC237

32-Bit Single-Chip Microcontroller
AC-Step

# 32-Bit Single-Chip Microcontroller

## Data Sheet

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Microcontrollers

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# 1 Summary of Features

The TC23x product family has the following features:

- High Performance Microcontroller with one CPU core
- Power Efficient scalar TriCore CPU (TC1.6E), having the following features:
  - Binary code compatibility with TC1.6P
  - up to 200 MHz operation at full temperature range
  - up to 184 Kbyte Data Scratch-Pad RAM (DSPR)
  - up to 8 Kbyte Instruction Scratch-Pad RAM (PSPR)
  - 8 Kbyte Instruction Cache (ICACHE)
  - 4 line read buffer (DRB)
- Lockstepped shadow core for TC1.6E
- Multiple on-chip memories
  - All embedded NVM and SRAM are ECC protected
  - up to 2 Mbyte Program Flash Memory (PFLASH)
  - up to 128 Kbyte Data Flash Memory (DFLASH) usable for EEPROM emulation
  - 32 Kbyte Memory (LMU)
  - 512 Kbyte Memory (EMEM)
  - BootROM (BROM)
- 16-Channel DMA Controller with safe data transfer
- Sophisticated interrupt system (ECC protected)
- High performance on-chip bus structure
  - 64-bit Cross Bar Interconnect (SRI) giving fast parallel access between bus masters, CPUs and memories
  - 32-bit System Peripheral Bus (SPB) for on-chip peripheral and functional units
  - One bus bridge (SFI Bridge)
- Optional Hardware Security Module (HSM) on some variants (See below)
- Safety Management Unit (SMU) handling safety monitor alarms
- Memory Test Unit with ECC, Memory Initialization and MBIST functions (MTU)
- Hardware I/O Monitor (IOM) for checking of digital I/O
- Versatile On-chip Peripheral Units
  - Two Asynchronous/Synchronous Serial Channels (ASCLIN) with hardware LIN support (V1.3, V2.0, V2.1 and J2602) up to 50 MBaud
  - Four Queued SPI Interface Channels (QSPI) with master and slave capability up to 50 Mbit/s
  - Two MultiCAN+ Module with 3CAN nodes each and 128 free assignable message objects for high efficiency data handling via FIFO buffering and gateway data transfer
  - 4 Single Edge Nibble Transmission (SENT) channels for connection to sensors
  - One FlexRay™ module with 2 channels (E-Ray) supporting V2.1
  - One Generic Timer Module (GTM) providing a powerful set of digital signal filtering and timer functionality to realize autonomous and complex Input/Output management
  - One Capture / Compare 6 module (Two kernels CCU60 and CCU61)
  - One General Purpose 12 Timer Unit (GPT120)
  - IEEE802.3 Ethernet MAC with RMII and MII interfaces (ETH)
- Versatile Successive Approximation ADC (VADC)

  - Cluster of 4 independent ADC kernels
  - Input voltage range from 0 V to 5.5V (ADC supply)
- Digital programmable I/O ports
- On-chip debug support for OCDS Level 1 (CPUs, DMA, On Chip Buses)
- Four/five wire JTAG (IEEE 1149.1) or DAP (Device Access Port) interface
- Power Management System and on-chip regulators
- Clock Generation Unit with System PLL and Flexray PLL
- Embedded Voltage Regulator

### Ordering Information

The ordering code for Infineon microcontrollers provides an exact reference to the required product. This ordering code identifies:

- The derivative itself, i.e. its function set, the temperature range, and the supply voltage
- The package and the type of delivery.

For the available ordering codes for the TC233 / TC234 / TC237 please refer to the **"AURIX TC23x Microcontrollers Variant Overview"**, which summarizes all available variants.

**Table 1-1 Overview of TC23x Functions**

| Feature | | |
|---|---|---|
| CPU Core | Type | TC1.6E |
| | E Cores / Checker Cores | 1 / 1 |
| | Max. Freq. | 200 MHz |
| | FPU | yes |
| Program Flash | Size | 2 Mbyte |
| Data Flash | Size | 128 Kbyte |
| Cache | Instruction | 8 Kbyte |
| | Data | 4 line read buffer |
| SRAM | Size TC1.6E (DSPR/PSPR) | 184 Kbyte / 8 Kbyte [1)] |
| | Size EMEM | 0 Kbyte |
| | Size LMU | 0 Kbyte |
| DMA | Channels | 16 |
| ADC | Channels | 12+12 |
| | Converter | 2 |
| GTM | TIM | 1 |
| | TOM | 2 |
| | DTM | 2 |
| | CMU / ICM | 1 / 1 |
| | TBU | 1 |
| Timer | GPT12 | 1 |
| | CCU6 | 1 |
| STM | Modules | 1 |
| FlexRay | Modules | 1 |
| | Channels | 2 |
| CAN | Modules | 2 |
| | Nodes per Module | 3 |
| | Message Objects | 128 |
| | CAN FD | yes |
| QSPI | Channels | 4 |

**Table 1-1 Overview of TC23x Functions** (cont'd)

| **Feature** | | |
|---|---|---|
| ASCLIN | Interfaces | 2 |
| SENT | Channels | 4 |
| Ethernet | Channels | 0 |
| ASIL | Level | up to ASIL-D |
| Safety support | SMU | 1 |
| | IOM | 1 |
| FFT | | 0 |
| HSIC | Channels | 2 |
| Security | HSM | 1 |
| Embedded Voltage Regulator | DCDC from 3.3 V to 1.3 V | Yes |
| Embedded Voltage Regulator | LDO from 3.3 V to 1.3 V | Yes |
| Low Power Feature | Standby RAM | Yes |
| Packages | Type | PG-TQFP-100-23 / PG-TQFP-144-27 / PG-LFBGA-292-6 |
| I/O | Type | 3.3 V CMOS (5V input supported on ADC pins) |
| $T_{ambient}$ | Range | −40 … +125°C / +150°C |

1) To ensure the processor cores are provided with a constant stream of instructions the Instruction Fetch Units will speculatively fetch instructions from the up to 64 bytes ahead of the current PC.
If the current PC is within 64 bytes of the top of an instruction memory the Instruction Fetch Unit may attempt to speculatively fetch instruction from beyond the physical range. This may then lead to error conditions and alarms being triggered by the bus and memory systems.
It is therefore recommended that the upper 64 bytes of any memory be unused for instruction storage.

# 2 Package and Pinning Definitions

This chapter gives a pinning of the different packages of the TC233 / TC234 / TC237.

## 2.1 PG-LFBGA-292-6 Package Variant Pin Configuration of TC237x

**Figure 2-1** is showing the TC237x pinout for the package variant: PG-LFBGA-292-6.

| | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Y | $V_{SS}$ | NC | VCAP1 | VCAP0 | NC | P33.11 | P33.9 | P33.7 | P33.5 | P33.3 | P33.1 | AN1/P40.1 | AN3/P40.3 | $V_{AGND}$ | $V_{AREF}$ | $V_{DDM}$ | $V_{SSM}$ | AN9/P40.9 | AN10/P40.10 | NC | Y |
| W | $V_{DDP3}$ | $V_{SS}$ | NC | NC | P33.12 | P33.10 | P33.8 | P33.6 | P33.4 | P33.2 | P33.0 | AN0/P40.0 | AN2/P40.2 | AN4/P40.4 | AN5/P40.5 | AN6/P40.6 | AN7/P40.7 | AN8/P40.8 | NC | AN11/P40.11 | W |
| V | NC | $V_{DDP3}$ | | | | | | | | | | | | | | | | | AN12/P41.0 | AN13/P41.1 | V |
| U | NC | P23.1 | | $V_{SS}$ | NC | NC | NC | NC | P34.3 | P34.1 | P34.0 | NC | NC | NC | NC | NC | NC | | AN14/P41.2 | AN15/P41.3 | U |
| T | NC | NC | | NC | $V_{SS}$ | NC | NC | NC | P34.2 | $V_{DDP3}$ | NC | NC | NC | NC | NC | NC | NC | | NC | NC | T |
| R | P22.2 | P22.3 | | NC | NC | | | | | | | | | | | NC | NC | | AN17/P41.5 | AN16/P41.4 | R |
| P | P22.0 | P22.1 | | NC | P22.4 | | | $V_{DD}$ | $V_{SS}$ | $V_{SS}$ | $V_{SS}$ | $V_{SS}$ | $V_{DD}$ | | | NC | NC | | AN18/P41.6 | AN19/P41.7 | P |
| N | $V_{DDP3}$ | $V_{DD}$ | | NC | NC | | $V_{DD}$ | | $V_{SS}$ | $V_{SS}$ | $V_{SS}$ | $V_{SS}$ | | $V_{DD}$ | | NC | NC | | AN21/P41.9 | AN20/P41.8 | N |
| M | XTAL1 | XTAL2 | | NC | NC | | $V_{SS}$ | $V_{SS}$ | | $V_{SS}$ | $V_{SS}$ | | $V_{SS}$ | $V_{SS}$ | | NC | NC | | AN23/P41.11 | AN22/P41.10 | M |
| L | $V_{SS}$ | $\overline{TRST}$ | | NC | NC | | $V_{SS}$ | $V_{SS}$ | $V_{SS}$ | $V_{SS}$ | $V_{SS}$ | $V_{SS}$ | $V_{SS}$ | $V_{SS}$ | | NC | NC | | P00.12 | NC | L |
| K | P21.4 | P21.2 | | NC | TMS/DAP1 | | NC | $V_{SS}$ | $V_{SS}$ | $V_{SS}$ | $V_{SS}$ | $V_{SS}$ | $V_{SS}$ | $V_{SS}$ | | NC | P00.8 | | P00.9 | P00.7 | K |
| J | P21.5 | P21.3 | | NC | TCK/DAP0 | | $V_{SS}$ | $V_{SS}$ | | $V_{SS}$ | $V_{SS}$ | | $V_{SS}$ | $V_{SS}$ | | NC | P00.6 | | P00.5 | P00.4 | J |
| H | P20.0 | P20.2 /TESTMODE | | P21.6 /TDI | P21.7 /TDO/DAP2 | | $V_{DD}$ | | $V_{SS}$ | $V_{SS}$ | $V_{SS}$ | $V_{SS}$ | | $V_{DD}$ | | NC | NC | | P00.3 | P00.2 | H |
| G | P20.3 | NC | | $\overline{PORST}$ | $\overline{ESR1}$ | | | $V_{DD}$ | $V_{SS}$ | $V_{SS}$ | $V_{SS}$ | $V_{SS}$ | $V_{DD}$ | | | NC | NC | | P00.1 | P00.0 | G |
| F | P20.8 | P20.7 | | P20.6 | $\overline{ESR0}$ | | | | | | | | | | | NC | NC | | P02.7 | P02.8 | F |
| E | P20.11 | P20.10 | | P20.9 | $V_{SS}$ | $V_{DDP3}$ | P15.5 | P14.2 | NC | NC | NC | NC | NC | P11.8 | NC | $V_{SS}$ | NC | | P02.5 | P02.6 | E |
| D | P20.13 | P20.12 | | $V_{SS}$ | $V_{DDP3}$ | P15.7 | P15.8 | P14.7 | NC | NC | NC | P11.6 | NC | NC | NC | $V_{DDP3}$ | $V_{SS}$ | | P02.3 | P02.4 | D |
| C | P20.14 | P15.2 | | | | | | | | | | | | | | | | | P02.1 | P02.2 | C |
| B | P15.0 | $V_{SS}$ | $V_{DDP3}$ | P15.3 | P14.0 /Bootload | P14.4 | P14.3 | P14.6 | P13.0 | P13.2 | P11.3 | P11.10 | P11.12 | P10.1 | NC | P10.5 | NC | $V_{DDP3}$ | $V_{SS}$ | P02.0 | B |
| A | $V_{SS}$ | $V_{DDP3}$ | P15.1 | P15.4 | P15.6 | P14.1 /Bootload | P14.5 | P14.8 | P13.1 | P13.3 | P11.2 | P11.9 | P11.11 | NC | P10.3 | P10.2 | P10.6 | NC | $V_{DDP3}$ | NC | A |
| | 20 | 19 | 18 | 17 | 16 | 15 | 14 | 13 | 12 | 11 | 10 | 9 | 8 | 7 | 6 | 5 | 4 | 3 | 2 | 1 | |

TC23x - (top view)

**Figure 2-1 TC237x Pinout for the package variant PG-LFBGA-292-6.**

### 2.1.1 Port Functions and Pinning Tables

#### 2.1.1.1 How to Read the Following Port Function Tables

Some hints for interpreting the following tables.

**Column "Ctrl.":**

I = Input (for GPIO port Lines with IOCR bit field Selection PCx = $0XXX_B$)

AI = Analog input

O = Output
O0 = Output with IOCR bit field selection PCx = $1X000_B$
O1 = Output with IOCR bit field selection PCx = $1X001_B$ (ALT1)
O2 = Output with IOCR bit field selection PCx = $1X010_B$ (ALT2)
O3 = Output with IOCR bit field selection PCx = $1X011_B$ (ALT3)
O4 = Output with IOCR bit field selection PCx = $1X100_B$ (ALT4)
O5 = Output with IOCR bit field selection PCx = $1X101_B$ (ALT5)
O6 = Output with IOCR bit field selection PCx = $1X110_B$ (ALT6)
O7 = Output with IOCR bit field selection PCx = $1X111_B$ (ALT7)

**Table 2-1 Example Port Table**

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| G10 | Pxx.y | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIMm_n | | | **GTM_TIN** |
| | TOMa_b | O1 | | **GTM_TOUT** |
| | TOMc_d | | | **GTM_TOUT** |
| | IOM_REFv_w | | | **IOM reference input** |
| | ASCLINz_RTS | O2 | | **ASCLIN0 output (aka ARTSz)** |

To each input several functions can be connected. The peripherals' configuration defines if this input is used.

The port module (see corresponding chapter) decides which of the 8 output signals O0 to O7 drives the pad.

Some Ox rows list more than one function, e.g. several GTM_TOUT outputs and IOM reference inputs. The GTM module (see corresponding chapter) has its own sub-multiplexer structure that defines which of the GTM sub-units drives this signal. Additionally the IOM modules "listens" on these output signals (see IOM chapter).

Some pin symbol names were changed in this AURIX device compared to other AURIX devices to improve naming systematics. The previously used symbol name is documented in the "Function" column with the text "(aka …)"[1].

**Column "Type":**

IN = Input only
A1 = Pad class A1 (3.3V)
A1+ = Pad class A1+ (3.3V)
S = ADC with digital input. Pad class D for analog input "AI", pad class S for digital input "I".

1) "aka" as abbreviation for "also known as".

PU = with pull-up device connected during reset ($\overline{PORST}$ = 0)
PD = with pull-down device connected during reset ($\overline{PORST}$ = 0)
High-Z = High-Z during reset ($\overline{PORST}$ = 0)

### 2.1.1.2 Tables

Port function and pinning tables.

**Table 2-2 Port 00 Functions**

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| G1 | P00.0 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_0 | | | **GTM_TIN** |
| | CCU61_CTRAPA | | | **CCU61 input** |
| | CCU60_T12HRE | | | **CCU60 input** |
| | P00.0 | O0 | | **General-purpose output** |
| | TOM0_8 | O1 | | **GTM_TOUT** |
| | TOM1_0 | | | **GTM_TOUT** |
| | TOM0_4 | | | **GTM_TOUT (= DTM1_OUT4)** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | IOM_REF0_9 | | | **IOM reference input** |
| | ASCLIN0_SCLK | O2 | | **ASCLIN0 output (aka: ASCLK0)** |
| | ASCLIN0_TX | O3 | | **ASCLIN0 output (aka: ATX0)** |
| | IOM_MON2_12 | | | **IOM monitor input** |
| | IOM_REF2_12 | | | **IOM reference input** |
| | — | O4 | | **Reserved** |
| | CAN1_TXD | O5 | | **CAN node 1 output (aka: TXDCAN1)** |
| | IOM_MON2_6 | | | **IOM monitor input** |
| | IOM_REF2_6 | | | **IOM reference input** |
| | — | O6 | | **Reserved** |
| | CCU60_COUT63 | O7 | | **CCU60 output** |
| | IOM_MON1_6 | | | **IOM monitor input** |
| | IOM_REF1_0 | | | **IOM reference input** |

**Table 2-2 Port 00 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| G2 | P00.1 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_1 | | | **GTM_TIN** |
| | ASCLIN0_RXC | | | **ASCLIN0 input (aka: ARX0C)** |
| | CAN1_RXDD | | | **CAN node 1 input (aka: RXDCAN1D)** |
| | SENT_SENT0B | | | **SENT input** |
| | CCU60_CC60INB | | | **CCU60 input** |
| | CCU61_CC60INA | | | **CCU61 input** |
| | P00.1 | O0 | | **General-purpose output** |
| | TOM0_9 | O1 | | **GTM_TOUT** |
| | TOM1_1 | | | **GTM_TOUT** |
| | TOM0_4N | | | **GTM_TOUT (= DTM1_OUT4_N)** |
| | TOM1_4N | | | **GTM_TOUT (= DTM5_OUT4_N)** |
| | IOM_REF0_10 | | | **IOM reference input** |
| | ASCLIN0_TX | O2 | | **ASCLIN0 output (aka: ATX0)** |
| | IOM_MON2_12 | | | **IOM monitor input** |
| | IOM_REF2_12 | | | **IOM reference input** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | SENT_SPC0 | O6 | | **SENT output** |
| | CCU61_CC60 | O7 | | **CCU61 output** |
| | IOM_MON1_8 | | | **IOM monitor input** |
| | IOM_REF1_13 | | | **IOM reference input** |

**Table 2-2 Port 00 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| H1 | P00.2 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_1 | | | **GTM_TIN** |
| | SENT_SENT1B | | | **SENT input** |
| | P00.2 | O0 | | **General-purpose output** |
| | TOM0_9 | O1 | | **GTM_TOUT** |
| | TOM1_1 | | | **GTM_TOUT** |
| | TOM0_5 | | | **GTM_TOUT (= DTM1_OUT5)** |
| | TOM1_5 | | | **GTM_TOUT (= DTM5_OUT5)** |
| | IOM_REF0_11 | | | **IOM reference input** |
| | ASCLIN0_SCLK | O2 | | **ASCLIN0 output (aka: ASCLK0)** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | CAN12_TXD | O5 | | **CAN1 node 2 output (aka: TXDCAN12)** |
| | — | O6 | | **Reserved** |
| | CCU61_COUT60 | O7 | | **CCU61 output** |
| | IOM_MON1_11 | | | **IOM monitor input** |
| | IOM_REF1_10 | | | **IOM reference input** |
| H2 | P00.3 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | SENT_SENT2B | | | **SENT input** |
| | CCU60_CC61INB | | | **CCU60 input** |
| | CCU61_CC61INA | | | **CCU61 input** |
| | CAN11_RXDA | | | **CAN1 node 1 input (aka: RXDCAN11A)** |
| | CAN12_RXDA | | | **CAN1 node 2 input (aka: RXDCAN12A)** |
| | P00.3 | O0 | | **General-purpose output** |
| | TOM0_10 | O1 | | **GTM_TOUT** |
| | TOM1_2 | | | **GTM_TOUT** |
| | TOM0_5N | | | **GTM_TOUT (= DTM1_OUT5_N)** |
| | TOM1_5N | | | **GTM_TOUT (= DTM5_OUT5_N)** |
| | IOM_REF0_12 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | SENT_SPC2 | O6 | | **SENT output** |
| | CCU61_CC61 | O7 | | **CCU61 output** |
| | IOM_MON1_9 | | | **IOM monitor input** |
| | IOM_REF1_12 | | | **IOM reference input** |

**Table 2-2 Port 00 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| J1 | P00.4 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | SCU_REQ7 | | | **SCU input** |
| | SENT_SENT3B | | | **SENT input** |
| | P00.4 | O0 | | **General-purpose output** |
| | TOM0_11 | O1 | | **GTM_TOUT** |
| | TOM1_3 | | | **GTM_TOUT** |
| | TOM0_6 | | | **GTM_TOUT (= DTM1_OUT6)** |
| | TOM1_6 | | | **GTM_TOUT (= DTM5_OUT6)** |
| | IOM_REF0_13 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | CAN10_TXD | O3 | | **CAN1 node 0 output (aka: TXDCAN10)** |
| | — | O4 | | **Reserved** |
| | VADC_G1BFL0 | O5 | | **VADC output** |
| | SENT_SPC3 | O6 | | **SENT output** |
| | CCU61_COUT61 | O7 | | **CCU61 output** |
| | IOM_MON1_12 | | | **IOM monitor input** |
| | IOM_REF1_9 | | | **IOM reference input** |
| J2 | P00.5 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | CCU60_CC62INB | | | **CCU60 input** |
| | CCU61_CC62INA | | | **CCU61 input** |
| | CAN10_RXDG | | | **CAN1 node 0 input (aka: RXDCAN10G)** |
| | P00.5 | O0 | | **General-purpose output** |
| | TOM0_12 | O1 | | **GTM_TOUT** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | TOM0_6N | | | **GTM_TOUT (= DTM1_OUT6_N)** |
| | TOM1_6N | | | **GTM_TOUT (= DTM5_OUT6_N)** |
| | IOM_REF0_14 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | VADC_G1BFL1 | O5 | | **VADC output** |
| | — | O6 | | **Reserved** |
| | CCU61_CC62 | O7 | | **CCU61 output** |
| | IOM_MON1_10 | | | **IOM monitor input** |
| | IOM_REF1_11 | | | **IOM reference input** |

**Table 2-2 Port 00 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| J4 | P00.6 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | CAN11_RXDG | | | **CAN1 node 1 input (aka: RXDCAN11G)** |
| | P00.6 | O0 | | **General-purpose output** |
| | TOM0_13 | O1 | | **GTM_TOUT** |
| | TOM1_5 | | | **GTM_TOUT (= DTM5_OUT5)** |
| | TOM0_7 | | | **GTM_TOUT (= DTM1_OUT7)** |
| | TOM1_7 | | | **GTM_TOUT (= DTM5_OUT7)** |
| | IOM_REF0_15 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | VADC_G1BFL2 | O3 | | **VADC output** |
| | — | O4 | | **Reserved** |
| | VADC_EMUX10 | O5 | | **VADC output** |
| | — | O6 | | **Reserved** |
| | CCU61_COUT62 | O7 | | **CCU61 output** |
| | IOM_MON1_13 | | | **IOM monitor input** |
| | IOM_REF1_8 | | | **IOM reference input** |
| K1 | P00.7 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | CCU61_CC60INC | | | **CCU61 input** |
| | CCU61_CCPOS0A | | | **CCU61 input** |
| | CCU60_T12HRB | | | **CCU60 input** |
| | GPT120_T2INA | | | **GPT120 input** |
| | P00.7 | O0 | | **General-purpose output** |
| | TOM0_14 | O1 | | **GTM_TOUT** |
| | TOM1_6 | | | **GTM_TOUT (= DTM5_OUT6)** |
| | TOM0_7N | | | **GTM_TOUT (= DTM1_OUT7_N)** |
| | TOM1_7N | | | **GTM_TOUT (= DTM5_OUT7_N)** |
| | CAN11_TXD | O2 | | **CAN1 node 1 output (aka: TXDCAN11)** |
| | VADC_G1BFL3 | O3 | | **VADC output** |
| | — | O4 | | **Reserved** |
| | VADC_EMUX11 | O5 | | **VADC output** |
| | — | O6 | | **Reserved** |
| | CCU61_CC60 | O7 | | **CCU61 output** |
| | IOM_MON1_8 | | | **IOM monitor input** |
| | IOM_REF1_13 | | | **IOM reference input** |

**Table 2-2 Port 00 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| K4 | P00.8 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | CCU61_CC61INC | | | **CCU61 input** |
| | CCU61_CCPOS1A | | | **CCU61 input** |
| | CCU60_T13HRB | | | **CCU60 input** |
| | GPT120_T2EUDA | | | **GPT120 input** |
| | CAN12_RXDG | | | **CAN1 node 2 input (aka: RXDCAN12G)** |
| | P00.8 | O0 | | **General-purpose output** |
| | TOM0_15 | O1 | | **GTM_TOUT** |
| | TOM1_7 | | | **GTM_TOUT (= DTM5_OUT7)** |
| | QSPI3_SLSO6 | O2 | | **QSPI3 output (aka: SLSO36)** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | VADC_EMUX12 | O5 | | **VADC output** |
| | — | O6 | | **Reserved** |
| | CCU61_CC61 | O7 | | **CCU61 output** |
| | IOM_MON1_9 | | | **IOM monitor input** |
| | IOM_REF1_12 | | | **IOM reference input** |
| K2 | P00.9 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_0 | | | **GTM_TIN** |
| | CCU61_CC62INC | | | **CCU61 input** |
| | CCU61_CCPOS2A | | | **CCU61 input** |
| | CCU60_T13HRC | | | **CCU60 input** |
| | CCU60_T12HRC | | | **CCU60 input** |
| | GPT120_T4EUDA | | | **GPT120 input** |
| | P00.9 | O0 | | **General-purpose output** |
| | TOM0_0 | O1 | | **GTM_TOUT** |
| | TOM1_0 | | | **GTM_TOUT** |
| | QSPI3_SLSO7 | O2 | | **QSPI3 output (aka: SLSO37)** |
| | ASCLIN0_RTS | O3 | | **ASCLIN0 output (aka: ARTS0)** |
| | — | O4 | | **Reserved** |
| | CAN12_TXD | O5 | | **CAN1 node 2 output (aka: TXDCAN12)** |
| | — | O6 | | **Reserved** |
| | CCU61_CC62 | O7 | | **CCU61 output** |
| | IOM_MON1_10 | | | **IOM monitor input** |
| | IOM_REF1_11 | | | **IOM reference input** |

**Table 2-2 Port 00 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| L2 | P00.12 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_3 | | | **GTM_TIN** |
| | ASCLIN0_CTSA | | | **ASCLIN0 input (aka: ACTS0A)** |
| | P00.12 | O0 | | **General-purpose output** |
| | TOM0_3 | O1 | | **GTM_TOUT** |
| | TOM1_3 | | | **GTM_TOUT** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | CCU61_COUT63 | O7 | | **CCU61 output** |
| | IOM_MON1_7 | | | **IOM monitor input** |
| | IOM_REF1_7 | | | **IOM reference input** |

**Table 2-3 Port 02 Functions**

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| B1 | P02.0 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_0 | | | **GTM_TIN** |
| | SCU_REQ6 | | | **SCU input** |
| | CCU60_CC60INA | | | **CCU60 input** |
| | CCU61_CC60INB | | | **CCU61 input** |
| | P02.0 | O0 | | **General-purpose output** |
| | TOM0_8 | O1 | | **GTM_TOUT** |
| | TOM1_8 | | | **GTM_TOUT** |
| | TOM0_4 | | | **GTM_TOUT (= DTM1_OUT4)** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | IOM_REF0_0 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | QSPI3_SLSO1 | O3 | | **QSPI3 output (aka: SLSO31)** |
| | — | O4 | | **Reserved** |
| | CAN0_TXD | O5 | | **CAN node 0 output (aka: TXDCAN0)** |
| | IOM_MON2_5 | | | **IOM monitor input** |
| | IOM_REF2_5 | | | **IOM reference input** |
| | ERAY0_TXDA | O6 | | **ERAY0 output** |
| | CCU60_CC60 | O7 | | **CCU60 output** |
| | IOM_MON1_2 | | | **IOM monitor input** |
| | IOM_REF1_6 | | | **IOM reference input** |

**Table 2-3 Port 02 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| C2 | P02.1 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_1 | | | **GTM_TIN** |
| | CAN0_RXDA | | | **CAN node 0 input (aka: RXDCAN0A)** |
| | ERAY0_RXDA2 | | | **ERAY0 input** |
| | SCU_REQ14 | | | **SCU input** |
| | P02.1 | O0 | | **General-purpose output** |
| | TOM0_9 | O1 | | **GTM_TOUT** |
| | TOM1_9 | | | **GTM_TOUT** |
| | TOM0_4N | | | **GTM_TOUT (= DTM1_OUT4_N)** |
| | TOM1_4N | | | **GTM_TOUT (= DTM5_OUT4_N)** |
| | IOM_REF0_1 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | QSPI3_SLSO2 | O3 | | **QSPI3 output (aka: SLSO32)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | CCU60_COUT60 | O7 | | **CCU60 output** |
| | IOM_MON1_3 | | | **IOM monitor input** |
| | IOM_REF1_3 | | | **IOM reference input** |

**Table 2-3 Port 02 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| C1 | P02.2 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_2 | | | **GTM_TIN** |
| | CCU60_CC61INA | | | **CCU60 input** |
| | CCU61_CC61INB | | | **CCU61 input** |
| | P02.2 | O0 | | **General-purpose output** |
| | TOM0_10 | O1 | | **GTM_TOUT** |
| | TOM1_10 | | | **GTM_TOUT** |
| | TOM0_5 | | | **GTM_TOUT (= DTM1_OUT5)** |
| | TOM1_5 | | | **GTM_TOUT (= DTM5_OUT5)** |
| | IOM_REF0_2 | | | **IOM reference input** |
| | ASCLIN1_TX | O2 | | **ASCLIN1 output (aka: ATX1)** |
| | IOM_MON2_13 | | | **IOM monitor input** |
| | IOM_REF2_13 | | | **IOM reference input** |
| | QSPI3_SLSO3 | O3 | | **QSPI3 output (aka: SLSO33)** |
| | — | O4 | | **Reserved** |
| | CAN2_TXD | O5 | | **CAN node 2 output (aka: TXDCAN2)** |
| | IOM_MON2_7 | | | **IOM monitor input** |
| | IOM_REF2_7 | | | **IOM reference input** |
| | ERAY0_TXDB | O6 | | **ERAY0 output** |
| | CCU60_CC61 | O7 | | **CCU60 output** |
| | IOM_MON1_1 | | | **IOM monitor input** |
| | IOM_REF1_5 | | | **IOM reference input** |

**Table 2-3 Port 02 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| D2 | P02.3 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_3 | | | **GTM_TIN** |
| | ASCLIN1_RXG | | | **ASCLIN1 input (aka: ARX1G)** |
| | CAN2_RXDB | | | **CAN node 2 input (aka: RXDCAN2B)** |
| | ERAY0_RXDB2 | | | **ERAY0 input** |
| | P02.3 | O0 | | **General-purpose output** |
| | TOM0_11 | O1 | | **GTM_TOUT** |
| | TOM1_11 | | | **GTM_TOUT** |
| | TOM0_5N | | | **GTM_TOUT (= DTM1_OUT5_N)** |
| | TOM1_5N | | | **GTM_TOUT (= DTM5_OUT5_N)** |
| | IOM_REF0_3 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | QSPI3_SLSO4 | O3 | | **QSPI3 output (aka: SLSO34)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | CCU60_COUT61 | O7 | | **CCU60 output** |
| | IOM_MON1_4 | | | **IOM monitor input** |
| | IOM_REF1_2 | | | **IOM reference input** |

**Table 2-3 Port 02 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| D1 | P02.4 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_4 | | | **GTM_TIN** |
| | QSPI3_SLSIA | | | **QSPI3 input (aka: SLSI3A)** |
| | CAN0_RXDD | | | **CAN node 0 input (aka: RXDCAN0D)** |
| | CCU60_CC62INA | | | **CCU60 input** |
| | CCU61_CC62INB | | | **CCU61 input** |
| | P02.4 | O0 | | **General-purpose output** |
| | TOM0_12 | O1 | | **GTM_TOUT** |
| | TOM1_12 | | | **GTM_TOUT** |
| | TOM0_6 | | | **GTM_TOUT (= DTM1_OUT6)** |
| | TOM1_6 | | | **GTM_TOUT (= DTM5_OUT6)** |
| | IOM_REF0_4 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | QSPI3_SLSO0 | O3 | | **QSPI3 output (aka: SLSO30)** |
| | — | O4 | | **Reserved** |
| | CAN10_TXD | O5 | | **CAN1 node 0 output (aka: TXDCAN10)** |
| | ERAY0_TXENA | O6 | | **ERAY0 output** |
| | CCU60_CC62 | O7 | | **CCU60 output** |
| | IOM_MON1_0 | | | **IOM monitor input** |
| | IOM_REF1_4 | | | **IOM reference input** |

**Table 2-3 Port 02 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| E2 | P02.5 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_5 | | | **GTM_TIN** |
| | QSPI3_MRSTA | | | **QSPI3 input (aka: MRST3A)** |
| | SENT_SENT3C | | | **SENT input** |
| | P02.5 | O0 | | **General-purpose output** |
| | TOM0_13 | O1 | | **GTM_TOUT** |
| | TOM1_13 | | | **GTM_TOUT** |
| | TOM0_6N | | | **GTM_TOUT (= DTM1_OUT6_N)** |
| | TOM1_6N | | | **GTM_TOUT (= DTM5_OUT6_N)** |
| | IOM_REF0_5 | | | **IOM reference input** |
| | CAN0_TXD | O2 | | **CAN node 0 output (aka: TXDCAN0)** |
| | IOM_MON2_5 | | | **IOM monitor input** |
| | IOM_REF2_5 | | | **IOM reference input** |
| | QSPI3_MRST | O3 | | **QSPI3 output (aka: MRST3)** |
| | IOM_MON2_3 | | | **IOM monitor input** |
| | IOM_REF2_3 | | | **IOM reference input** |
| | — | O4 | | **Reserved** |
| | CAN11_TXD | O5 | | **CAN1 node 1 output (aka: TXDCAN11)** |
| | ERAY0_TXENB | O6 | | **ERAY0 output** |
| | CCU60_COUT62 | O7 | | **CCU60 output** |
| | IOM_MON1_5 | | | **IOM monitor input** |
| | IOM_REF1_1 | | | **IOM reference input** |

**Table 2-3 Port 02 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| E1 | P02.6 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_6 | | | **GTM_TIN** |
| | QSPI3_MTSRA | | | **QSPI3 input (aka: MTSR3A)** |
| | SENT_SENT2C | | | **SENT input** |
| | CCU60_CC60INC | | | **CCU60 input** |
| | CCU60_CCPOS0A | | | **CCU60 input** |
| | CCU61_T12HRB | | | **CCU61 input** |
| | GPT120_T3INA | | | **GPT120 input** |
| | CAN10_RXDF | | | **CAN1 node 0 input (aka: RXDCAN10F)** |
| | P02.6 | O0 | | **General-purpose output** |
| | TOM0_14 | O1 | | **GTM_TOUT** |
| | TOM1_14 | | | **GTM_TOUT** |
| | TOM0_7 | | | **GTM_TOUT (= DTM1_OUT7)** |
| | TOM1_7 | | | **GTM_TOUT (= DTM5_OUT7)** |
| | IOM_REF0_6 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | QSPI3_MTSR | O3 | | **QSPI3 output (aka: MTSR3)** |
| | — | O4 | | **Reserved** |
| | VADC_EMUX00 | O5 | | **VADC output** |
| | — | O6 | | **Reserved** |
| | CCU60_CC60 | O7 | | **CCU60 output** |
| | IOM_MON1_2 | | | **IOM monitor input** |
| | IOM_REF1_6 | | | **IOM reference input** |

**Table 2-3 Port 02 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| F2 | P02.7 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_7 | | | **GTM_TIN** |
| | QSPI3_SCLKA | | | **QSPI3 input (aka: SCLK3A)** |
| | SENT_SENT1C | | | **SENT input** |
| | CCU60_CC61INC | | | **CCU60 input** |
| | CCU60_CCPOS1A | | | **CCU60 input** |
| | CCU61_T13HRB | | | **CCU61 input** |
| | GPT120_T3EUDA | | | **GPT120 input** |
| | CAN11_RXDF | | | **CAN1 node 1 input (aka: RXDCAN11F)** |
| | PMU_FDEST | | | **PMU input** |
| | P02.7 | O0 | | **General-purpose output** |
| | TOM0_15 | O1 | | **GTM_TOUT** |
| | TOM1_15 | | | **GTM_TOUT** |
| | TOM0_7N | | | **GTM_TOUT (= DTM1_OUT7_N)** |
| | TOM1_7N | | | **GTM_TOUT (= DTM5_OUT7_N)** |
| | IOM_REF0_7 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | QSPI3_SCLK | O3 | | **QSPI3 output (aka: SCLK3)** |
| | — | O4 | | **Reserved** |
| | VADC_EMUX01 | O5 | | **VADC output** |
| | SENT_SPC1 | O6 | | **SENT output** |
| | CCU60_CC61 | O7 | | **CCU60 output** |
| | IOM_MON1_1 | | | **IOM monitor input** |
| | IOM_REF1_5 | | | **IOM reference input** |

**Table 2-3 Port 02 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| F1 | P02.8 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_0 | | | **GTM_TIN** |
| | SENT_SENT0C | | | **SENT input** |
| | CCU60_CC62INC | | | **CCU60 input** |
| | CCU60_CCPOS2A | | | **CCU60 input** |
| | CCU61_T12HRC | | | **CCU61 input** |
| | CCU61_T13HRC | | | **CCU61 input** |
| | GPT120_T4INA | | | **GPT120 input** |
| | P02.8 | O0 | | **General-purpose output** |
| | TOM0_8 | O1 | | **GTM_TOUT** |
| | TOM1_0 | | | **GTM_TOUT** |
| | TOM0_4N | | | **GTM_TOUT (= DTM1_OUT4_N)** |
| | TOM1_4N | | | **GTM_TOUT (= DTM5_OUT4_N)** |
| | IOM_REF0_8 | | | **IOM reference input** |
| | QSPI3_SLSO5 | O2 | | **QSPI3 output (aka: SLSO35)** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | VADC_EMUX02 | O5 | | **VADC output** |
| | — | O6 | | **Reserved** |
| | CCU60_CC62 | O7 | | **CCU60 output** |
| | IOM_MON1_0 | | | **IOM monitor input** |
| | IOM_REF1_4 | | | **IOM reference input** |

**Table 2-4 Port 10 Functions**

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| B7 | P10.1 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_1 | | | **GTM_TIN** |
| | QSPI1_MRSTA | | | **QSPI1 input (aka: MRST1A)** |
| | GPT120_T5EUDB | | | **GPT120 input** |
| | P10.1 | O0 | | **General-purpose output** |
| | TOM0_1 | O1 | | **GTM_TOUT** |
| | TOM1_9 | | | **GTM_TOUT** |
| | QSPI1_MTSR | O2 | | **QSPI1 output (aka: MTSR1)** |
| | QSPI1_MRST | O3 | | **QSPI1 output (aka: MRST1)** |
| | IOM_MON2_1 | | | **IOM monitor input** |
| | IOM_REF2_1 | | | **IOM reference input** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |
| A5 | P10.2 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_2 | | | **GTM_TIN** |
| | QSPI1_SCLKA | | | **QSPI1 input (aka: SCLK1A)** |
| | CAN2_RXDE | | | **CAN node 2 input (aka: RXDCAN2E)** |
| | SCU_REQ2 | | | **SCU input** |
| | GPT120_T6INB | | | **GPT120 input** |
| | P10.2 | O0 | | **General-purpose output** |
| | TOM0_2 | O1 | | **GTM_TOUT** |
| | TOM1_10 | | | **GTM_TOUT** |
| | IOM_MON2_9 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | QSPI1_SCLK | O3 | | **QSPI1 output (aka: SCLK1)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-4 Port 10 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| A6 | P10.3 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_3 | | | **GTM_TIN** |
| | QSPI1_MTSRA | | | **QSPI1 input (aka: MTSR1A)** |
| | SCU_REQ3 | | | **SCU input** |
| | GPT120_T5INB | | | **GPT120 input** |
| | P10.3 | O0 | | **General-purpose output** |
| | TOM0_3 | O1 | | **GTM_TOUT** |
| | TOM1_11 | | | **GTM_TOUT** |
| | IOM_MON2_10 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | QSPI1_MTSR | O3 | | **QSPI1 output (aka: MTSR1)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | CAN2_TXD | O6 | | **CAN node 2 output (aka: TXDCAN2)** |
| | IOM_MON2_7 | | | **IOM monitor input** |
| | IOM_REF2_7 | | | **IOM reference input** |
| | — | O7 | | **Reserved** |
| B5 | P10.5 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_2 | | | **GTM_TIN** |
| | SCU_HWCFG4 | | | **SCU input** |
| | CAN10_RXDA | | | **CAN1 node 0 input (aka: RXDCAN10A)** |
| | P10.5 | O0 | | **General-purpose output** |
| | TOM0_2 | O1 | | **GTM_TOUT** |
| | TOM1_10 | | | **GTM_TOUT** |
| | IOM_REF2_9 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | QSPI3_SLSO8 | O3 | | **QSPI3 output (aka: SLSO38)** |
| | QSPI1_SLSO9 | O4 | | **QSPI1 output (aka: SLSO19)** |
| | GPT120_T6OUT | O5 | | **GPT120 output** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-4 Port 10 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| A4 | P10.6 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_3 | | | **GTM_TIN** |
| | QSPI3_MTSRB | | | **QSPI3 input (aka: MTSR3B)** |
| | SCU_HWCFG5 | | | **SCU input** |
| | P10.6 | O0 | | **General-purpose output** |
| | TOM0_3 | O1 | | **GTM_TOUT** |
| | TOM1_11 | | | **GTM_TOUT** |
| | IOM_REF2_10 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | QSPI3_MTSR | O3 | | **QSPI3 output (aka: MTSR3)** |
| | GPT120_T3OUT | O4 | | **GPT120 output** |
| | CAN10_TXD | O5 | | **CAN1 node 0 output (aka: TXDCAN10)** |
| | QSPI1_MRST | O6 | | **QSPI1 output (aka: MRST1)** |
| | IOM_MON2_1 | | | **IOM monitor input** |
| | IOM_REF2_1 | | | **IOM reference input** |
| | — | O7 | | **Reserved** |

**Table 2-5 Port 11 Functions**

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| A10 | P11.2 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | P11.2 | O0 | | **General-purpose output** |
| | TOM0_8 | O1 | | **GTM_TOUT** |
| | TOM1_1 | | | **GTM_TOUT** |
| | TOM0_4N | | | **GTM_TOUT (= DTM1_OUT4_N)** |
| | TOM1_4N | | | **GTM_TOUT (= DTM5_OUT4_N)** |
| | — | O2 | | **Reserved** |
| | QSPI0_SLSO5 | O3 | | **QSPI0 output (aka: SLSO05)** |
| | QSPI1_SLSO5 | O4 | | **QSPI1 output (aka: SLSO15)** |
| | CCU61_COUT63 | O5 | | **CCU61 output** |
| | IOM_MON1_7 | | | **IOM monitor input** |
| | IOM_REF1_7 | | | **IOM reference input** |
| | — | O6 | | **Reserved** |
| | CCU60_COUT63 | O7 | | **CCU60 output** |
| | IOM_MON1_6 | | | **IOM monitor input** |
| | IOM_REF1_0 | | | **IOM reference input** |

**Table 2-5 Port 11 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| B10 | P11.3 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | QSPI1_MRSTB | | | **QSPI1 input (aka: MRST1B)** |
| | P11.3 | O0 | | **General-purpose output** |
| | TOM0_10 | O1 | | **GTM_TOUT** |
| | TOM1_2 | | | **GTM_TOUT** |
| | TOM0_5 | | | **GTM_TOUT (= DTM1_OUT5)** |
| | TOM1_5 | | | **GTM_TOUT (= DTM5_OUT5)** |
| | — | O2 | | **Reserved** |
| | QSPI1_MRST | O3 | | **QSPI1 output (aka: MRST1)** |
| | IOM_MON2_1 | | | **IOM monitor input** |
| | IOM_REF2_1 | | | **IOM reference input** |
| | ERAY0_TXDA | O4 | | **ERAY0 output** |
| | CCU61_COUT62 | O5 | | **CCU61 output** |
| | IOM_MON1_13 | | | **IOM monitor input** |
| | IOM_REF1_8 | | | **IOM reference input** |
| | — | O6 | | **Reserved** |
| | CCU60_COUT62 | O7 | | **CCU60 output** |
| | IOM_MON1_5 | | | **IOM monitor input** |
| | IOM_REF1_1 | | | **IOM reference input** |
| D9 | P11.6 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | QSPI1_SCLKB | | | **QSPI1 input (aka: SCLK1B)** |
| | P11.6 | O0 | | **General-purpose output** |
| | TOM0_11 | O1 | | **GTM_TOUT** |
| | TOM1_3 | | | **GTM_TOUT** |
| | TOM0_5N | | | **GTM_TOUT (= DTM1_OUT5_N)** |
| | TOM1_5N | | | **GTM_TOUT (= DTM5_OUT5_N)** |
| | ERAY0_TXENB | O2 | | **ERAY0 output** |
| | QSPI1_SCLK | O3 | | **QSPI1 output (aka: SCLK1)** |
| | ERAY0_TXENA | O4 | | **ERAY0 output** |
| | CCU61_COUT61 | O5 | | **CCU61 output** |
| | IOM_MON1_12 | | | **IOM monitor input** |
| | IOM_REF1_9 | | | **IOM reference input** |
| | — | O6 | | **Reserved** |
| | CCU60_COUT61 | O7 | | **CCU60 output** |
| | IOM_MON1_4 | | | **IOM monitor input** |
| | IOM_REF1_2 | | | **IOM reference input** |

**Table 2-5 Port 11 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| E7 | P11.8 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | QSPI1_MTSRC | | | **QSPI1 input (aka: MTSR1C)** |
| | P11.8 | O0 | | **General-purpose output** |
| | TOM0_4 | O1 | | **GTM_TOUT (= DTM1_OUT4)** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | — | O2 | | **Reserved** |
| | QSPI1_SLSO10 | O3 | | **QSPI1 output (aka: SLSO110)** |
| | QSPI1_MTSR | O4 | | **QSPI1 output (aka: MTSR1)** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |
| A9 | P11.9 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | QSPI1_MTSRB | | | **QSPI1 input (aka: MTSR1B)** |
| | ERAY0_RXDA1 | | | **ERAY0 input** |
| | P11.9 | O0 | | **General-purpose output** |
| | TOM0_12 | O1 | | **GTM_TOUT** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | TOM0_6 | | | **GTM_TOUT (= DTM1_OUT6)** |
| | TOM1_6 | | | **GTM_TOUT (= DTM5_OUT6)** |
| | — | O2 | | **Reserved** |
| | QSPI1_MTSR | O3 | | **QSPI1 output (aka: MTSR1)** |
| | — | O4 | | **Reserved** |
| | CCU61_COUT60 | O5 | | **CCU61 output** |
| | IOM_MON1_11 | | | **IOM monitor input** |
| | IOM_REF1_10 | | | **IOM reference input** |
| | — | O6 | | **Reserved** |
| | CCU60_COUT60 | O7 | | **CCU60 output** |
| | IOM_MON1_3 | | | **IOM monitor input** |
| | IOM_REF1_3 | | | **IOM reference input** |

**Table 2-5 Port 11 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| B9 | P11.10 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | ASCLIN1_RXE | | | **ASCLIN1 input (aka: ARX1E)** |
| | ERAY0_RXDB1 | | | **ERAY0 input** |
| | SCU_REQ12 | | | **SCU input** |
| | CAN12_RXDD | | | **CAN1 node 2 input (aka: RXDCAN12D)** |
| | P11.10 | O0 | | **General-purpose output** |
| | TOM0_13 | O1 | | **GTM_TOUT** |
| | TOM1_5 | | | **GTM_TOUT (= DTM5_OUT5)** |
| | TOM0_6N | | | **GTM_TOUT (= DTM1_OUT6_N)** |
| | TOM1_6N | | | **GTM_TOUT (= DTM5_OUT6_N)** |
| | — | O2 | | **Reserved** |
| | QSPI0_SLSO3 | O3 | | **QSPI0 output (aka: SLSO03)** |
| | QSPI1_SLSO3 | O4 | | **QSPI1 output (aka: SLSO13)** |
| | CCU61_CC62 | O5 | | **CCU61 output** |
| | IOM_MON1_10 | | | **IOM monitor input** |
| | IOM_REF1_11 | | | **IOM reference input** |
| | — | O6 | | **Reserved** |
| | CCU60_CC62 | O7 | | **CCU60 output** |
| | IOM_MON1_0 | | | **IOM monitor input** |
| | IOM_REF1_4 | | | **IOM reference input** |
| A8 | P11.11 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | P11.11 | O0 | | **General-purpose output** |
| | TOM0_14 | O1 | | **GTM_TOUT** |
| | TOM1_6 | | | **GTM_TOUT (= DTM5_OUT6)** |
| | TOM0_7N | | | **GTM_TOUT (= DTM1_OUT7_N)** |
| | TOM1_7N | | | **GTM_TOUT (= DTM5_OUT7_N)** |
| | — | O2 | | **Reserved** |
| | QSPI0_SLSO4 | O3 | | **QSPI0 output (aka: SLSO04)** |
| | QSPI1_SLSO4 | O4 | | **QSPI1 output (aka: SLSO14)** |
| | CCU61_CC61 | O5 | | **CCU61 output** |
| | IOM_MON1_9 | | | **IOM monitor input** |
| | IOM_REF1_12 | | | **IOM reference input** |
| | ERAY0_TXENB | O6 | | **ERAY0 output** |
| | CCU60_CC61 | O7 | | **CCU60 output** |
| | IOM_MON1_1 | | | **IOM monitor input** |
| | IOM_REF1_5 | | | **IOM reference input** |

**Table 2-5 Port 11 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| B8 | P11.12 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | P11.12 | O0 | | **General-purpose output** |
| | TOM0_15 | O1 | | **GTM_TOUT** |
| | TOM1_7 | | | **GTM_TOUT (= DTM5_OUT7)** |
| | TOM0_7 | | | **GTM_TOUT (= DTM1_OUT7)** |
| | TOM1_7 | | | **GTM_TOUT (= DTM5_OUT7)** |
| | ASCLIN1_TX | O2 | | **ASCLIN1 output (aka: ATX1)** |
| | IOM_MON2_13 | | | **IOM monitor input** |
| | IOM_REF2_13 | | | **IOM reference input** |
| | GTM_CLK2 | O3 | | **GTM output** |
| | ERAY0_TXDB | O4 | | **ERAY0 output** |
| | CCU61_CC60 | O5 | | **CCU61 output** |
| | IOM_MON1_8 | | | **IOM monitor input** |
| | IOM_REF1_13 | | | **IOM reference input** |
| | SCU_EXTCLK1 | O6 | | **SCU output** |
| | CCU60_CC60 | O7 | | **CCU60 output** |
| | IOM_MON1_2 | | | **IOM monitor input** |
| | IOM_REF1_6 | | | **IOM reference input** |

**Table 2-6 Port 13 Functions**

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| B12 | P13.0 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | CCU60_CTRAPA | | | **CCU60 input** |
| | GPT120_T6EUDB | | | **GPT120 input** |
| | P13.0 | O0 | | **General-purpose output** |
| | TOM0_5 | O1 | | **GTM_TOUT (= DTM1_OUT5)** |
| | TOM1_5 | | | **GTM_TOUT (= DTM5_OUT5)** |
| | TOM0_6N | | | **GTM_TOUT (= DTM1_OUT6_N)** |
| | TOM1_6N | | | **GTM_TOUT (= DTM5_OUT6_N)** |
| | — | O2 | | **Reserved** |
| | QSPI2_SCLK | O3 | | **QSPI2 output (aka: SCLK2)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | CAN10_TXD | O7 | | **CAN1 node 0 output (aka: TXDCAN10)** |

**Table 2-6 Port 13 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| A12 | P13.1 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | CCU60_CCPOS0C | | | **CCU60 input** |
| | GPT120_T3INB | | | **GPT120 input** |
| | CAN10_RXDB | | | **CAN1 node 0 input (aka: RXDCAN10B)** |
| | P13.1 | O0 | | **General-purpose output** |
| | TOM0_6 | O1 | | **GTM_TOUT (= DTM1_OUT6)** |
| | TOM1_6 | | | **GTM_TOUT (= DTM5_OUT6)** |
| | TOM0_7 | | | **GTM_TOUT (= DTM1_OUT7)** |
| | TOM1_7 | | | **GTM_TOUT (= DTM5_OUT7)** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |
| B11 | P13.2 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | CCU60_CCPOS1C | | | **CCU60 input** |
| | GPT120_T3EUDB | | | **GPT120 input** |
| | GPT120_CAPINA | | | **GPT120 input** |
| | P13.2 | O0 | | **General-purpose output** |
| | TOM0_7 | O1 | | **GTM_TOUT (= DTM1_OUT7)** |
| | TOM1_7 | | | **GTM_TOUT (= DTM5_OUT7)** |
| | TOM0_7N | | | **GTM_TOUT (= DTM1_OUT7_N)** |
| | TOM1_7N | | | **GTM_TOUT (= DTM5_OUT7_N)** |
| | CAN11_TXD | O2 | | **CAN1 node 1 output (aka: TXDCAN11)** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-6 Port 13 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| A11 | P13.3 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | CCU60_CCPOS2C | | | **CCU60 input** |
| | GPT120_T4INB | | | **GPT120 input** |
| | CAN11_RXDB | | | **CAN1 node 1 input (aka: RXDCAN11B)** |
| | P13.3 | O0 | | **General-purpose output** |
| | TOM0_8 | O1 | | **GTM_TOUT** |
| | TOM1_0 | | | **GTM_TOUT** |
| | TOM0_4 | | | **GTM_TOUT (= DTM1_OUT4)** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | — | O2 | | **Reserved** |
| | QSPI2_MTSR | O3 | | **QSPI2 output (aka: MTSR2)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-7 Port 14 Functions**

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| B16 | P14.0 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_3 | | | **GTM_TIN** |
| | P14.0 | O0 | | **General-purpose output** |
| | TOM0_3 | O1 | | **GTM_TOUT** |
| | TOM1_3 | | | **GTM_TOUT** |
| | TOM0_6 | | | **GTM_TOUT (= DTM1_OUT6)** |
| | TOM1_6 | | | **GTM_TOUT (= DTM5_OUT6)** |
| | ASCLIN0_TX | O2 | | **ASCLIN0 output (aka: ATX0)** |
| | IOM_MON2_12 | | | **IOM monitor input** |
| | IOM_REF2_12 | | | **IOM reference input** |
| | ERAY0_TXDA | O3 | | **ERAY0 output** |
| | ERAY0_TXDB | O4 | | **ERAY0 output** |
| | CAN1_TXD | O5 | | **CAN node 1 output (aka: TXDCAN1)** |
| | IOM_MON2_6 | | | **IOM monitor input** |
| | IOM_REF2_6 | | | **IOM reference input** |
| | ASCLIN0_SCLK | O6 | | **ASCLIN0 output (aka: ASCLK0)** |
| | CCU60_COUT62 | O7 | | **CCU60 output** |
| | IOM_MON1_5 | | | **IOM monitor input** |
| | IOM_REF1_1 | | | **IOM reference input** |

**Table 2-7 Port 14 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| A15 | P14.1 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_4 | | | **GTM_TIN** |
| | ASCLIN0_RXA | | | **ASCLIN0 input (aka: ARX0A)** |
| | CAN1_RXDB | | | **CAN node 1 input (aka: RXDCAN1B)** |
| | ERAY0_RXDA3 | | | **ERAY0 input** |
| | SCU_REQ15 | | | **SCU input** |
| | ERAY0_RXDB3 | | | **ERAY0 input** |
| | SCU_EVRWUPA | AI | | **SCU input** |
| | P14.1 | O0 | | **General-purpose output** |
| | TOM0_4 | O1 | | **GTM_TOUT (= DTM1_OUT4)** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | TOM0_7 | | | **GTM_TOUT (= DTM1_OUT7)** |
| | TOM1_7 | | | **GTM_TOUT (= DTM5_OUT7)** |
| | IOM_REF1_14 | | | **IOM reference input** |
| | ASCLIN0_TX | O2 | | **ASCLIN0 output (aka: ATX0)** |
| | IOM_MON2_12 | | | **IOM monitor input** |
| | IOM_REF2_12 | | | **IOM reference input** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | CCU60_COUT63 | O7 | | **CCU60 output** |
| | IOM_MON1_6 | | | **IOM monitor input** |
| | IOM_REF1_0 | | | **IOM reference input** |

**Table 2-7 Port 14 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| E13 | P14.2 | I | A1 / PU / VDDP3 | **General-purpose input** |
| | TIM0_5 | | | **GTM_TIN** |
| | SCU_HWCFG2_EVR13 | | | **SCU input** |
| | P14.2 | O0 | | **General-purpose output** |
| | TOM0_5 | O1 | | **GTM_TOUT (= DTM1_OUT5)** |
| | TOM1_5 | | | **GTM_TOUT (= DTM5_OUT5)** |
| | TOM0_6N | | | **GTM_TOUT (= DTM1_OUT6_N)** |
| | TOM1_6N | | | **GTM_TOUT (= DTM5_OUT6_N)** |
| | IOM_REF1_15 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | QSPI2_SLSO1 | O3 | | **QSPI2 output (aka: SLSO21)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |
| B14 | P14.3 | I | A1 / PU / VDDP3 | **General-purpose input** |
| | TIM0_6 | | | **GTM_TIN** |
| | SCU_REQ10 | | | **SCU input** |
| | SCU_HWCFG3_BMI | | | **SCU input** |
| | P14.3 | O0 | | **General-purpose output** |
| | TOM0_6 | O1 | | **GTM_TOUT (= DTM1_OUT6)** |
| | TOM1_6 | | | **GTM_TOUT (= DTM5_OUT6)** |
| | IOM_REF2_4 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | QSPI2_SLSO3 | O3 | | **QSPI2 output (aka: SLSO23)** |
| | ASCLIN1_SLSO | O4 | | **ASCLIN1 output (aka: ASLSO1)** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-7 Port 14 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| B15 | P14.4 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_7 | | | **GTM_TIN** |
| | P14.4 | O0 | | **General-purpose output** |
| | TOM0_7 | O1 | | **GTM_TOUT (= DTM1_OUT7)** |
| | TOM1_7 | | | **GTM_TOUT (= DTM5_OUT7)** |
| | TOM0_7N | | | **GTM_TOUT (= DTM1_OUT7_N)** |
| | TOM1_7N | | | **GTM_TOUT (= DTM5_OUT7_N)** |
| | IOM_REF2_8 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |
| A14 | P14.5 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_0 | | | **GTM_TIN** |
| | P14.5 | O0 | | **General-purpose output** |
| | TOM0_0 | O1 | | **GTM_TOUT** |
| | TOM1_0 | | | **GTM_TOUT** |
| | IOM_REF2_11 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | ERAY0_TXDB | O6 | | **ERAY0 output** |
| | — | O7 | | **Reserved** |

**Table 2-7 Port 14 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| B13 | P14.6 | I | A1+ / PU / VDDP3 | **General-purpose input** |
| | TIM0_1 | | | **GTM_TIN** |
| | SCU_HWCFG0_DCLDO | | | **SCU input** |
| | QSPI0_MRSTD | | | **QSPI0 input (aka: MRST0D)** |
| | P14.6 | O0 | | **General-purpose output** |
| | TOM0_1 | O1 | | **GTM_TOUT** |
| | TOM1_1 | | | **GTM_TOUT** |
| | IOM_REF2_14 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | QSPI2_SLSO2 | O3 | | **QSPI2 output (aka: SLSO22)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | ERAY0_TXENB | O6 | | **ERAY0 output** |
| | — | O7 | | **Reserved** |
| D13 | P14.7 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_0 | | | **GTM_TIN** |
| | ERAY0_RXDB0 | | | **ERAY0 input** |
| | P14.7 | O0 | | **General-purpose output** |
| | TOM0_0 | O1 | | **GTM_TOUT** |
| | IOM_REF2_15 | | | **IOM reference input** |
| | ASCLIN0_RTS | O2 | | **ASCLIN0 output (aka: ARTS0)** |
| | QSPI2_SLSO4 | O3 | | **QSPI2 output (aka: SLSO24)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-7 Port 14 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| A13 | P14.8 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | ASCLIN1_RXD | | | **ASCLIN1 input (aka: ARX1D)** |
| | CAN2_RXDD | | | **CAN node 2 input (aka: RXDCAN2D)** |
| | ERAY0_RXDA0 | | | **ERAY0 input** |
| | P14.8 | O0 | | **General-purpose output** |
| | TOM0_2 | O1 | | **GTM_TOUT** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-8 Port 15 Functions**

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| B20 | P15.0 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | P15.0 | O0 | | **General-purpose output** |
| | TOM1_3 | O1 | | **GTM_TOUT** |
| | TOM0_11 | | | **GTM_TOUT** |
| | TOM0_7N | | | **GTM_TOUT (= DTM1_OUT7_N)** |
| | TOM1_7N | | | **GTM_TOUT (= DTM5_OUT7_N)** |
| | ASCLIN1_TX | O2 | | **ASCLIN1 output (aka: ATX1)** |
| | IOM_MON2_13 | | | **IOM monitor input** |
| | IOM_REF2_13 | | | **IOM reference input** |
| | QSPI0_SLSO13 | O3 | | **QSPI0 output (aka: SLSO013)** |
| | — | O4 | | **Reserved** |
| | CAN2_TXD | O5 | | **CAN node 2 output (aka: TXDCAN2)** |
| | IOM_MON2_7 | | | **IOM monitor input** |
| | IOM_REF2_7 | | | **IOM reference input** |
| | ASCLIN1_SCLK | O6 | | **ASCLIN1 output (aka: ASCLK1)** |
| | — | O7 | | **Reserved** |

**Table 2-8 Port 15 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| A18 | P15.1 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | ASCLIN1_RXA | | | **ASCLIN1 input (aka: ARX1A)** |
| | QSPI2_SLSIB | | | **QSPI2 input (aka: SLSI2B)** |
| | CAN2_RXDA | | | **CAN node 2 input (aka: RXDCAN2A)** |
| | SCU_REQ16 | | | **SCU input** |
| | SCU_EVRWUPB | AI | | **SCU input** |
| | P15.1 | O0 | | **General-purpose output** |
| | TOM1_4 | O1 | | **GTM_TOUT (= DTM5_OUT4)** |
| | TOM0_12 | | | **GTM_TOUT** |
| | TOM0_4 | | | **GTM_TOUT (= DTM1_OUT4)** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | ASCLIN1_TX | O2 | | **ASCLIN1 output (aka: ATX1)** |
| | IOM_MON2_13 | | | **IOM monitor input** |
| | IOM_REF2_13 | | | **IOM reference input** |
| | QSPI2_SLSO5 | O3 | | **QSPI2 output (aka: SLSO25)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |
| C19 | P15.2 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | QSPI2_MRSTE | | | **QSPI2 input (aka: MRST2E)** |
| | QSPI2_SLSIA | | | **QSPI2 input (aka: SLSI2A)** |
| | QSPI2_HSICINA | | | **QSPI2 input (aka: HSIC2INA)** |
| | P15.2 | O0 | | **General-purpose output** |
| | TOM1_5 | O1 | | **GTM_TOUT (= DTM5_OUT5)** |
| | TOM0_13 | | | **GTM_TOUT** |
| | TOM0_4N | | | **GTM_TOUT (= DTM1_OUT4_N)** |
| | TOM1_4N | | | **GTM_TOUT (= DTM5_OUT4_N)** |
| | ASCLIN0_TX | O2 | | **ASCLIN0 output (aka: ATX0)** |
| | IOM_MON2_12 | | | **IOM monitor input** |
| | IOM_REF2_12 | | | **IOM reference input** |
| | QSPI2_SLSO0 | O3 | | **QSPI2 output (aka: SLSO20)** |
| | — | O4 | | **Reserved** |
| | CAN1_TXD | O5 | | **CAN node 1 output (aka: TXDCAN1)** |
| | IOM_MON2_6 | | | **IOM monitor input** |
| | IOM_REF2_6 | | | **IOM reference input** |
| | ASCLIN0_SCLK | O6 | | **ASCLIN0 output (aka: ASCLK0)** |
| | — | O7 | | **Reserved** |

**Table 2-8 Port 15 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| B17 | P15.3 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | ASCLIN0_RXB | | | **ASCLIN0 input (aka: ARX0B)** |
| | QSPI2_SCLKA | | | **QSPI2 input (aka: SCLK2A)** |
| | QSPI2_HSICINB | | | **QSPI2 input (aka: HSIC2INB)** |
| | CAN1_RXDA | | | **CAN node 1 input (aka: RXDCAN1A)** |
| | P15.3 | O0 | | **General-purpose output** |
| | TOM1_6 | O1 | | **GTM_TOUT (= DTM5_OUT6)** |
| | TOM0_14 | | | **GTM_TOUT** |
| | TOM0_5 | | | **GTM_TOUT (= DTM1_OUT5)** |
| | TOM1_5 | | | **GTM_TOUT (= DTM5_OUT5)** |
| | ASCLIN0_TX | O2 | | **ASCLIN0 output (aka: ATX0)** |
| | IOM_MON2_12 | | | **IOM monitor input** |
| | IOM_REF2_12 | | | **IOM reference input** |
| | QSPI2_SCLK | O3 | | **QSPI2 output (aka: SCLK2)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |
| A17 | P15.4 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | QSPI2_MRSTA | | | **QSPI2 input (aka: MRST2A)** |
| | SCU_REQ0 | | | **SCU input** |
| | P15.4 | O0 | | **General-purpose output** |
| | TOM1_7 | O1 | | **GTM_TOUT (= DTM5_OUT7)** |
| | TOM0_15 | | | **GTM_TOUT** |
| | ASCLIN1_TX | O2 | | **ASCLIN1 output (aka: ATX1)** |
| | IOM_MON2_13 | | | **IOM monitor input** |
| | IOM_REF2_13 | | | **IOM reference input** |
| | QSPI2_MRST | O3 | | **QSPI2 output (aka: MRST2)** |
| | IOM_MON2_2 | | | **IOM monitor input** |
| | IOM_REF2_2 | | | **IOM reference input** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | CCU60_CC62 | O7 | | **CCU60 output** |
| | IOM_MON1_0 | | | **IOM monitor input** |
| | IOM_REF1_4 | | | **IOM reference input** |

**Table 2-8 Port 15 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| E14 | P15.5 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | ASCLIN1_RXB | | | **ASCLIN1 input (aka: ARX1B)** |
| | QSPI2_MTSRA | | | **QSPI2 input (aka: MTSR2A)** |
| | SCU_REQ13 | | | **SCU input** |
| | P15.5 | O0 | | **General-purpose output** |
| | TOM0_0 | O1 | | **GTM_TOUT** |
| | TOM1_0 | | | **GTM_TOUT** |
| | TOM0_5N | | | **GTM_TOUT (= DTM1_OUT5_N)** |
| | TOM1_5N | | | **GTM_TOUT (= DTM5_OUT5_N)** |
| | ASCLIN1_TX | O2 | | **ASCLIN1 output (aka: ATX1)** |
| | IOM_MON2_13 | | | **IOM monitor input** |
| | IOM_REF2_13 | | | **IOM reference input** |
| | QSPI2_MTSR | O3 | | **QSPI2 output (aka: MTSR2)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | CCU60_CC61 | O7 | | **CCU60 output** |
| | IOM_MON1_1 | | | **IOM monitor input** |
| | IOM_REF1_5 | | | **IOM reference input** |
| A16 | P15.6 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_0 | | | **GTM_TIN** |
| | QSPI2_MTSRB | | | **QSPI2 input (aka: MTSR2B)** |
| | P15.6 | O0 | | **General-purpose output** |
| | TOM0_0 | O1 | | **GTM_TOUT** |
| | TOM1_0 | | | **GTM_TOUT** |
| | — | O2 | | **Reserved** |
| | QSPI2_MTSR | O3 | | **QSPI2 output (aka: MTSR2)** |
| | — | O4 | | **Reserved** |
| | QSPI2_SCLK | O5 | | **QSPI2 output (aka: SCLK2)** |
| | — | O6 | | **Reserved** |
| | CCU60_CC60 | O7 | | **CCU60 output** |
| | IOM_MON1_2 | | | **IOM monitor input** |
| | IOM_REF1_6 | | | **IOM reference input** |

**Table 2-8 Port 15 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| D15 | P15.7 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_1 | | | **GTM_TIN** |
| | QSPI2_MRSTB | | | **QSPI2 input (aka: MRST2B)** |
| | P15.7 | O0 | | **General-purpose output** |
| | TOM0_1 | O1 | | **GTM_TOUT** |
| | TOM1_1 | | | **GTM_TOUT** |
| | — | O2 | | **Reserved** |
| | QSPI2_MRST | O3 | | **QSPI2 output (aka: MRST2)** |
| | IOM_MON2_2 | | | **IOM monitor input** |
| | IOM_REF2_2 | | | **IOM reference input** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | CCU60_COUT60 | O7 | | **CCU60 output** |
| | IOM_MON1_3 | | | **IOM monitor input** |
| | IOM_REF1_3 | | | **IOM reference input** |
| D14 | P15.8 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_2 | | | **GTM_TIN** |
| | QSPI2_SCLKB | | | **QSPI2 input (aka: SCLK2B)** |
| | SCU_REQ1 | | | **SCU input** |
| | P15.8 | O0 | | **General-purpose output** |
| | TOM0_2 | O1 | | **GTM_TOUT** |
| | TOM1_2 | | | **GTM_TOUT** |
| | — | O2 | | **Reserved** |
| | QSPI2_SCLK | O3 | | **QSPI2 output (aka: SCLK2)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | CCU60_COUT61 | O7 | | **CCU60 output** |
| | IOM_MON1_4 | | | **IOM monitor input** |
| | IOM_REF1_2 | | | **IOM reference input** |

**Table 2-9 Port 20 Functions**

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| H20 | P20.0 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_6 | | | **GTM_TIN** |
| | SCU_REQ9 | | | **SCU input** |
| | $\overline{\text{OCDS_TGI0}}$ | | | **OCDS input** |
| | GPT120_T6EUDA | | | **GPT120 input** |
| | CAN11_RXDC | | | **CAN1 node 1 input (aka: RXDCAN11C)** |
| | CAN12_RXDC | | | **CAN1 node 2 input (aka: RXDCAN12C)** |
| | P20.0 | O0 | | **General-purpose output** |
| | TOM0_6 | O1 | | **GTM_TOUT (= DTM1_OUT6)** |
| | TOM1_6 | | | **GTM_TOUT (= DTM5_OUT6)** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |
| | $\overline{\text{OCDS_TGO0}}$ | O | | **OCDS** |
| H19 | P20.2 | I | Input Only / PU / VDDP3 | **General-purpose input** |
| | $\overline{\text{TESTMODE}}$ | | | **Factory Test Mode Enable** |
| G20 | P20.3 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_4 | | | **GTM_TIN** |
| | GPT120_T6INA | | | **GPT120 input** |
| | P20.3 | O0 | | **General-purpose output** |
| | TOM1_12 | O1 | | **GTM_TOUT** |
| | TOM0_4 | | | **GTM_TOUT (= DTM1_OUT4)** |
| | IOM_MON1_14 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | QSPI0_SLSO9 | O3 | | **QSPI0 output (aka: SLSO09)** |
| | QSPI2_SLSO9 | O4 | | **QSPI2 output (aka: SLSO29)** |
| | CAN12_TXD | O5 | | **CAN1 node 2 output (aka: TXDCAN12)** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-9 Port 20 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| F17 | P20.6 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_6 | | | **GTM_TIN** |
| | P20.6 | O0 | | **General-purpose output** |
| | TOM1_10 | O1 | | **GTM_TOUT** |
| | TOM0_10 | | | **GTM_TOUT** |
| | IOM_MON1_15 | | | **IOM monitor input** |
| | ASCLIN1_RTS | O2 | | **ASCLIN1 output (aka: ARTS1)** |
| | QSPI0_SLSO8 | O3 | | **QSPI0 output (aka: SLSO08)** |
| | QSPI2_SLSO8 | O4 | | **QSPI2 output (aka: SLSO28)** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |
| F19 | P20.7 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_7 | | | **GTM_TIN** |
| | ASCLIN1_CTSA | | | **ASCLIN1 input (aka: ACTS1A)** |
| | CAN0_RXDB | | | **CAN node 0 input (aka: RXDCAN0B)** |
| | P20.7 | O0 | | **General-purpose output** |
| | TOM1_11 | O1 | | **GTM_TOUT** |
| | TOM0_11 | | | **GTM_TOUT** |
| | IOM_MON2_4 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | CCU61_COUT63 | O7 | | **CCU61 output** |
| | IOM_MON1_7 | | | **IOM monitor input** |
| | IOM_REF1_7 | | | **IOM reference input** |

**Table 2-9 Port 20 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| F20 | P20.8 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_7 | | | **GTM_TIN** |
| | P20.8 | O0 | | **General-purpose output** |
| | TOM1_7 | O1 | | **GTM_TOUT (= DTM5_OUT7)** |
| | TOM0_7 | | | **GTM_TOUT (= DTM1_OUT7)** |
| | TOM0_4 | | | **GTM_TOUT (= DTM1_OUT4)** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | IOM_MON2_8 | | | **IOM monitor input** |
| | ASCLIN1_SLSO | O2 | | **ASCLIN1 output (aka: ASLSO1)** |
| | QSPI0_SLSO0 | O3 | | **QSPI0 output (aka: SLSO00)** |
| | QSPI1_SLSO0 | O4 | | **QSPI1 output (aka: SLSO10)** |
| | CAN0_TXD | O5 | | **CAN node 0 output (aka: TXDCAN0)** |
| | IOM_MON2_5 | | | **IOM monitor input** |
| | IOM_REF2_5 | | | **IOM reference input** |
| | SCU_WDT0LCK | O6 | | **SCU output** |
| | CCU61_CC60 | O7 | | **CCU61 output** |
| | IOM_MON1_8 | | | **IOM monitor input** |
| | IOM_REF1_13 | | | **IOM reference input** |
| E17 | P20.9 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | ASCLIN1_RXC | | | **ASCLIN1 input (aka: ARX1C)** |
| | QSPI0_SLSIB | | | **QSPI0 input (aka: SLSI0B)** |
| | SCU_REQ11 | | | **SCU input** |
| | CAN12_RXDE | | | **CAN1 node 2 input (aka: RXDCAN12E)** |
| | P20.9 | O0 | | **General-purpose output** |
| | TOM1_13 | O1 | | **GTM_TOUT** |
| | TOM0_13 | | | **GTM_TOUT** |
| | TOM0_4N | | | **GTM_TOUT (= DTM1_OUT4_N)** |
| | TOM1_4N | | | **GTM_TOUT (= DTM5_OUT4_N)** |
| | IOM_MON2_11 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | QSPI0_SLSO1 | O3 | | **QSPI0 output (aka: SLSO01)** |
| | QSPI1_SLSO1 | O4 | | **QSPI1 output (aka: SLSO11)** |
| | — | O5 | | **Reserved** |
| | SCU_WDTSLCK | O6 | | **SCU output** |
| | CCU61_CC61 | O7 | | **CCU61 output** |
| | IOM_MON1_9 | | | **IOM monitor input** |
| | IOM_REF1_12 | | | **IOM reference input** |

**Table 2-9 Port 20 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| E19 | P20.10 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | P20.10 | O0 | | **General-purpose output** |
| | TOM1_14 | O1 | | **GTM_TOUT** |
| | TOM0_14 | | | **GTM_TOUT** |
| | TOM0_5 | | | **GTM_TOUT (= DTM1_OUT5)** |
| | TOM1_5 | | | **GTM_TOUT (= DTM5_OUT5)** |
| | IOM_MON2_14 | | | **IOM monitor input** |
| | ASCLIN1_TX | O2 | | **ASCLIN1 output (aka: ATX1)** |
| | IOM_MON2_13 | | | **IOM monitor input** |
| | IOM_REF2_13 | | | **IOM reference input** |
| | QSPI0_SLSO6 | O3 | | **QSPI0 output (aka: SLSO06)** |
| | QSPI2_SLSO7 | O4 | | **QSPI2 output (aka: SLSO27)** |
| | CAN12_TXD | O5 | | **CAN1 node 2 output (aka: TXDCAN12)** |
| | ASCLIN1_SCLK | O6 | | **ASCLIN1 output (aka: ASCLK1)** |
| | CCU61_CC62 | O7 | | **CCU61 output** |
| | IOM_MON1_10 | | | **IOM monitor input** |
| | IOM_REF1_11 | | | **IOM reference input** |
| E20 | P20.11 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | QSPI0_SCLKA | | | **QSPI0 input (aka: SCLK0A)** |
| | P20.11 | O0 | | **General-purpose output** |
| | TOM1_15 | O1 | | **GTM_TOUT** |
| | TOM0_15 | | | **GTM_TOUT** |
| | TOM0_5N | | | **GTM_TOUT (= DTM1_OUT5_N)** |
| | TOM1_5N | | | **GTM_TOUT (= DTM5_OUT5_N)** |
| | IOM_MON2_15 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | QSPI0_SCLK | O3 | | **QSPI0 output (aka: SCLK0)** |
| | — | O4 | | **Reserved** |
| | CAN11_TXD | O5 | | **CAN1 node 1 output (aka: TXDCAN11)** |
| | — | O6 | | **Reserved** |
| | CCU61_COUT60 | O7 | | **CCU61 output** |
| | IOM_MON1_11 | | | **IOM monitor input** |
| | IOM_REF1_10 | | | **IOM reference input** |

**Table 2-9 Port 20 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| D19 | P20.12 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | QSPI0_MRSTA | | | **QSPI0 input (aka: MRST0A)** |
| | CAN11_RXDH | | | **CAN1 node 1 input (aka: RXDCAN11H)** |
| | IOM_PIN13 | | | **IOM pad input** |
| | P20.12 | O0 | | **General-purpose output** |
| | TOM1_0 | O1 | | **GTM_TOUT** |
| | TOM0_8 | | | **GTM_TOUT** |
| | TOM0_6 | | | **GTM_TOUT (= DTM1_OUT6)** |
| | TOM1_6 | | | **GTM_TOUT (= DTM5_OUT6)** |
| | IOM_MON0_13 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | QSPI0_MRST | O3 | | **QSPI0 output (aka: MRST0)** |
| | IOM_MON2_0 | | | **IOM monitor input** |
| | IOM_REF2_0 | | | **IOM reference input** |
| | QSPI0_MTSR | O4 | | **QSPI0 output (aka: MTSR0)** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | CCU61_COUT61 | O7 | | **CCU61 output** |
| | IOM_MON1_12 | | | **IOM monitor input** |
| | IOM_REF1_9 | | | **IOM reference input** |
| D20 | P20.13 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | QSPI0_SLSIA | | | **QSPI0 input (aka: SLSI0A)** |
| | CAN12_RXDH | | | **CAN1 node 2 input (aka: RXDCAN12H)** |
| | IOM_PIN14 | | | **IOM pad input** |
| | P20.13 | O0 | | **General-purpose output** |
| | TOM1_1 | O1 | | **GTM_TOUT** |
| | TOM0_9 | | | **GTM_TOUT** |
| | TOM0_6N | | | **GTM_TOUT (= DTM1_OUT6_N)** |
| | TOM1_6N | | | **GTM_TOUT (= DTM5_OUT6_N)** |
| | IOM_MON0_14 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | QSPI0_SLSO2 | O3 | | **QSPI0 output (aka: SLSO02)** |
| | QSPI1_SLSO2 | O4 | | **QSPI1 output (aka: SLSO12)** |
| | QSPI0_SCLK | O5 | | **QSPI0 output (aka: SCLK0)** |
| | — | O6 | | **Reserved** |
| | CCU61_COUT62 | O7 | | **CCU61 output** |
| | IOM_MON1_13 | | | **IOM monitor input** |
| | IOM_REF1_8 | | | **IOM reference input** |

**Table 2-9 Port 20 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| C20 | P20.14 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | QSPI0_MTSRA | | | **QSPI0 input (aka: MTSR0A)** |
| | IOM_PIN15 | | | **IOM pad input** |
| | P20.14 | O0 | | **General-purpose output** |
| | TOM1_2 | O1 | | **GTM_TOUT** |
| | TOM0_10 | | | **GTM_TOUT** |
| | TOM0_7 | | | **GTM_TOUT (= DTM1_OUT7)** |
| | TOM1_7 | | | **GTM_TOUT (= DTM5_OUT7)** |
| | IOM_MON0_15 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | QSPI0_MTSR | O3 | | **QSPI0 output (aka: MTSR0)** |
| | — | O4 | | **Reserved** |
| | CAN12_TXD | O5 | | **CAN1 node 2 output (aka: TXDCAN12)** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-10 Port 21 Functions**

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| K19 | P21.2 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_0 | | | **GTM_TIN** |
| | SCU_EMGSTOPB | | | **SCU input** |
| | P21.2 | O0 | | **General-purpose output** |
| | TOM0_0 | O1 | | **GTM_TOUT** |
| | TOM1_0 | | | **GTM_TOUT** |
| | TOM0_4 | | | **GTM_TOUT (= DTM1_OUT4)** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-10 Port 21 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| J19 | P21.3 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_1 | | | **GTM_TIN** |
| | P21.3 | O0 | | **General-purpose output** |
| | TOM0_1 | O1 | | **GTM_TOUT** |
| | TOM1_1 | | | **GTM_TOUT** |
| | TOM0_4N | | | **GTM_TOUT (= DTM1_OUT4_N)** |
| | TOM1_4N | | | **GTM_TOUT (= DTM5_OUT4_N)** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |
| K20 | P21.4 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_2 | | | **GTM_TIN** |
| | P21.4 | O0 | | **General-purpose output** |
| | TOM0_2 | O1 | | **GTM_TOUT** |
| | TOM1_2 | | | **GTM_TOUT** |
| | TOM0_5 | | | **GTM_TOUT (= DTM1_OUT5)** |
| | TOM1_5 | | | **GTM_TOUT (= DTM5_OUT5)** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-10 Port 21 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| J20 | P21.5 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_3 | | | **GTM_TIN** |
| | P21.5 | O0 | | **General-purpose output** |
| | TOM0_3 | O1 | | **GTM_TOUT** |
| | TOM1_3 | | | **GTM_TOUT** |
| | TOM0_5N | | | **GTM_TOUT (= DTM1_OUT5_N)** |
| | TOM1_5N | | | **GTM_TOUT (= DTM5_OUT5_N)** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |
| H17 | P21.6 | I | A1 / PU / VDDP3 | **General-purpose input** |
| | TIM0_4 | | | **GTM_TIN** |
| | TDI | | | **OCDS input** |
| | $\overline{\text{OCDS_TGI2}}$ | | | **OCDS input** |
| | GPT120_T5EUDA | | | **GPT120 input** |
| | P21.6 | O0 | | **General-purpose output** |
| | TOM0_4 | O1 | | **GTM_TOUT (= DTM1_OUT4)** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | GPT120_T3OUT | O7 | | **GPT120 output** |
| | $\overline{\text{OCDS_TGO2}}$ | O | | **OCDS** |

**Table 2-10 Port 21 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| H16 | P21.7 | I | A1+ / PU / VDDP3 | **General-purpose input** |
| | TIM0_5 | | | **GTM_TIN** |
| | OCDS_DAP2 | | | **OCDS input** |
| | $\overline{\text{OCDS_TGI3}}$ | | | **OCDS input** |
| | GPT120_T5INA | | | **GPT120 input** |
| | P21.7 | O0 | | **General-purpose output** |
| | TOM0_5 | O1 | | **GTM_TOUT (= DTM1_OUT5)** |
| | TOM1_5 | | | **GTM_TOUT (= DTM5_OUT5)** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | GPT120_T6OUT | O7 | | **GPT120 output** |
| | $\overline{\text{OCDS_TGO3}}$ | O | | **OCDS** |
| | OCDS_DAP2 | O | | **OCDS Output** |
| | TDO | O | | **JTAG Output** |

**Table 2-11 Port 22 Functions**

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| P20 | P22.0 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_1 | | | **GTM_TIN** |
| | QSPI3_MTSRE | | | **QSPI3 input (aka: MTSR3E)** |
| | P22.0 | O0 | | **General-purpose output** |
| | TOM0_9 | O1 | | **GTM_TOUT** |
| | TOM1_1 | | | **GTM_TOUT** |
| | — | O2 | | **Reserved** |
| | QSPI3_MTSR | O3 | | **QSPI3 output (aka: MTSR3)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-11 Port 22 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| P19 | P22.1 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_0 | | | **GTM_TIN** |
| | QSPI3_MRSTE | | | **QSPI3 input (aka: MRST3E)** |
| | P22.1 | O0 | | **General-purpose output** |
| | TOM0_8 | O1 | | **GTM_TOUT** |
| | TOM1_0 | | | **GTM_TOUT** |
| | TOM0_6 | | | **GTM_TOUT (= DTM1_OUT6)** |
| | TOM1_6 | | | **GTM_TOUT (= DTM5_OUT6)** |
| | — | O2 | | **Reserved** |
| | QSPI3_MRST | O3 | | **QSPI3 output (aka: MRST3)** |
| | IOM_MON2_3 | | | **IOM monitor input** |
| | IOM_REF2_3 | | | **IOM reference input** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |
| R20 | P22.2 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_3 | | | **GTM_TIN** |
| | QSPI3_SLSID | | | **QSPI3 input (aka: SLSI3D)** |
| | P22.2 | O0 | | **General-purpose output** |
| | TOM0_11 | O1 | | **GTM_TOUT** |
| | TOM1_3 | | | **GTM_TOUT** |
| | TOM0_6N | | | **GTM_TOUT (= DTM1_OUT6_N)** |
| | TOM1_6N | | | **GTM_TOUT (= DTM5_OUT6_N)** |
| | — | O2 | | **Reserved** |
| | QSPI3_SLSO12 | O3 | | **QSPI3 output (aka: SLSO312)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-11 Port 22 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| R19 | P22.3 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_4 | | | **GTM_TIN** |
| | QSPI3_SCLKE | | | **QSPI3 input (aka: SCLK3E)** |
| | P22.3 | O0 | | **General-purpose output** |
| | TOM0_12 | O1 | | **GTM_TOUT** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | TOM0_7 | | | **GTM_TOUT (= DTM1_OUT7)** |
| | TOM1_7 | | | **GTM_TOUT (= DTM5_OUT7)** |
| | — | O2 | | **Reserved** |
| | QSPI3_SCLK | O3 | | **QSPI3 output (aka: SCLK3)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |
| P16 | P22.4 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | P22.4 | O0 | | **General-purpose output** |
| | TOM0_7N | O1 | | **GTM_TOUT (= DTM1_OUT7_N)** |
| | TOM1_7N | | | **GTM_TOUT (= DTM5_OUT7_N)** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | QSPI0_SLSO12 | O4 | | **QSPI0 output (aka: SLSO012)** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-12 Port 23 Functions**

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| U19 | P23.1 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_6 | | | **GTM_TIN** |
| | P23.1 | O0 | | **General-purpose output** |
| | TOM0_6 | O1 | | **GTM_TOUT (= DTM1_OUT6)** |
| | TOM0_15 | | | **GTM_TOUT** |
| | ASCLIN1_RTS | O2 | | **ASCLIN1 output (aka: ARTS1)** |
| | QSPI3_SLSO13 | O3 | | **QSPI3 output (aka: SLSO313)** |
| | GTM_CLK0 | O4 | | **GTM output** |
| | SCU_EXTCLK1 | O5 | | **SCU output** |
| | SCU_EXTCLK0 | O6 | | **SCU output** |
| | — | O7 | | **Reserved** |

**Table 2-13 Port 33 Functions**

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| W10 | P33.0 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_4 | | | **GTM_TIN** |
| | IOM_PIN0 | | | **IOM pad input** |
| | P33.0 | O0 | | **General-purpose output** |
| | TOM0_4 | O1 | | **GTM_TOUT (= DTM1_OUT4)** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | IOM_MON0_0 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | VADC_G1BFL0 | O6 | | **VADC output** |
| | — | O7 | | **Reserved** |

**Table 2-13 Port 33 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| Y10 | P33.1 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_5 | | | **GTM_TIN** |
| | IOM_PIN1 | | | **IOM pad input** |
| | P33.1 | O0 | | **General-purpose output** |
| | TOM0_5 | O1 | | **GTM_TOUT (= DTM1_OUT5)** |
| | TOM1_5 | | | **GTM_TOUT (= DTM5_OUT5)** |
| | IOM_MON0_1 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | VADC_EMUX02 | O5 | | **VADC output** |
| | VADC_G1BFL1 | O6 | | **VADC output** |
| | — | O7 | | **Reserved** |
| W11 | P33.2 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_6 | | | **GTM_TIN** |
| | IOM_PIN2 | | | **IOM pad input** |
| | P33.2 | O0 | | **General-purpose output** |
| | TOM0_6 | O1 | | **GTM_TOUT (= DTM1_OUT6)** |
| | TOM1_6 | | | **GTM_TOUT (= DTM5_OUT6)** |
| | IOM_MON0_2 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | VADC_EMUX01 | O5 | | **VADC output** |
| | VADC_G1BFL2 | O6 | | **VADC output** |
| | CCU61_COUT63 | O7 | | **CCU61 output** |
| | IOM_MON1_7 | | | **IOM monitor input** |
| | IOM_REF1_7 | | | **IOM reference input** |

**Table 2-13 Port 33 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| Y11 | P33.3 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_7 | | | **GTM_TIN** |
| | IOM_PIN3 | | | **IOM pad input** |
| | P33.3 | O0 | | **General-purpose output** |
| | TOM0_7 | O1 | | **GTM_TOUT (= DTM1_OUT7)** |
| | TOM1_7 | | | **GTM_TOUT (= DTM5_OUT7)** |
| | IOM_MON0_3 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | VADC_EMUX00 | O5 | | **VADC output** |
| | VADC_G1BFL3 | O6 | | **VADC output** |
| | CCU61_CC60 | O7 | | **CCU61 output** |
| | IOM_MON1_8 | | | **IOM monitor input** |
| | IOM_REF1_13 | | | **IOM reference input** |
| W12 | P33.4 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_0 | | | **GTM_TIN** |
| | CCU61_CTRAPC | | | **CCU61 input** |
| | IOM_PIN4 | | | **IOM pad input** |
| | P33.4 | O0 | | **General-purpose output** |
| | TOM0_0 | O1 | | **GTM_TOUT** |
| | TOM1_0 | | | **GTM_TOUT** |
| | IOM_MON0_4 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | VADC_EMUX12 | O5 | | **VADC output** |
| | VADC_G0BFL0 | O6 | | **VADC output** |
| | — | O7 | | **Reserved** |

**Table 2-13 Port 33 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| Y12 | P33.5 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_1 | | | **GTM_TIN** |
| | CCU61_CCPOS2C | | | **CCU61 input** |
| | GPT120_T4EUDB | | | **GPT120 input** |
| | IOM_PIN5 | | | **IOM pad input** |
| | P33.5 | O0 | | **General-purpose output** |
| | TOM0_1 | O1 | | **GTM_TOUT** |
| | TOM1_1 | | | **GTM_TOUT** |
| | TOM0_5 | | | **GTM_TOUT (= DTM1_OUT5)** |
| | TOM1_5 | | | **GTM_TOUT (= DTM5_OUT5)** |
| | IOM_MON0_5 | | | **IOM monitor input** |
| | QSPI0_SLSO7 | O2 | | **QSPI0 output (aka: SLSO07)** |
| | QSPI1_SLSO7 | O3 | | **QSPI1 output (aka: SLSO17)** |
| | — | O4 | | **Reserved** |
| | VADC_EMUX11 | O5 | | **VADC output** |
| | VADC_G0BFL1 | O6 | | **VADC output** |
| | CCU61_CC60 | O7 | | **CCU61 output** |
| | IOM_MON1_8 | | | **IOM monitor input** |
| | IOM_REF1_13 | | | **IOM reference input** |

**Table 2-13 Port 33 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| W13 | P33.6 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_2 | | | **GTM_TIN** |
| | ASCLIN1_RXF | | | **ASCLIN1 input (aka: ARX1F)** |
| | CCU61_CCPOS1C | | | **CCU61 input** |
| | GPT120_T2EUDB | | | **GPT120 input** |
| | CAN10_RXDH | | | **CAN1 node 0 input (aka: RXDCAN10H)** |
| | IOM_PIN6 | | | **IOM pad input** |
| | P33.6 | O0 | | **General-purpose output** |
| | TOM0_2 | O1 | | **GTM_TOUT** |
| | TOM1_2 | | | **GTM_TOUT** |
| | TOM0_5N | | | **GTM_TOUT (= DTM1_OUT5_N)** |
| | TOM1_5N | | | **GTM_TOUT (= DTM5_OUT5_N)** |
| | IOM_MON0_6 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | ASCLIN1_TX | O4 | | **ASCLIN1 output (aka: ATX1)** |
| | IOM_MON2_13 | | | **IOM monitor input** |
| | IOM_REF2_13 | | | **IOM reference input** |
| | VADC_EMUX10 | O5 | | **VADC output** |
| | VADC_G0BFL2 | O6 | | **VADC output** |
| | CCU61_CC61 | O7 | | **CCU61 output** |
| | IOM_MON1_9 | | | **IOM monitor input** |
| | IOM_REF1_12 | | | **IOM reference input** |
| | HSM_HSM1 | O | | **HSM output** |

**Table 2-13 Port 33 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| Y13 | P33.7 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_3 | | | **GTM_TIN** |
| | CAN0_RXDE | | | **CAN node 0 input (aka: RXDCAN0E)** |
| | SCU_REQ8 | | | **SCU input** |
| | CCU61_CCPOS0C | | | **CCU61 input** |
| | GPT120_T2INB | | | **GPT120 input** |
| | IOM_PIN7 | | | **IOM pad input** |
| | P33.7 | O0 | | **General-purpose output** |
| | TOM0_3 | O1 | | **GTM_TOUT** |
| | TOM1_3 | | | **GTM_TOUT** |
| | TOM0_6 | | | **GTM_TOUT (= DTM1_OUT6)** |
| | TOM1_6 | | | **GTM_TOUT (= DTM5_OUT6)** |
| | IOM_MON0_7 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | QSPI3_SLSO7 | O3 | | **QSPI3 output (aka: SLSO37)** |
| | — | O4 | | **Reserved** |
| | CAN10_TXD | O5 | | **CAN1 node 0 output (aka: TXDCAN10)** |
| | VADC_G0BFL3 | O6 | | **VADC output** |
| | CCU61_COUT60 | O7 | | **CCU61 output** |
| | IOM_MON1_11 | | | **IOM monitor input** |
| | IOM_REF1_10 | | | **IOM reference input** |
| | HSM_HSM2 | O | | **HSM output** |

**Table 2-13 Port 33 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| W14 | P33.8 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_4 | | | **GTM_TIN** |
| | SCU_EMGSTOPA | | | **SCU input** |
| | IOM_PIN8 | | | **IOM pad input** |
| | P33.8 | O0 | | **General-purpose output** |
| | TOM0_4 | O1 | | **GTM_TOUT (= DTM1_OUT4)** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | TOM0_6N | | | **GTM_TOUT (= DTM1_OUT6_N)** |
| | TOM1_6N | | | **GTM_TOUT (= DTM5_OUT6_N)** |
| | IOM_MON0_8 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | QSPI3_SLSO2 | O3 | | **QSPI3 output (aka: SLSO32)** |
| | — | O4 | | **Reserved** |
| | CAN0_TXD | O5 | | **CAN node 0 output (aka: TXDCAN0)** |
| | IOM_MON2_5 | | | **IOM monitor input** |
| | IOM_REF2_5 | | | **IOM reference input** |
| | — | O6 | | **Reserved** |
| | CCU61_COUT62 | O7 | | **CCU61 output** |
| | IOM_MON1_13 | | | **IOM monitor input** |
| | IOM_REF1_8 | | | **IOM reference input** |
| | SMU_FSP | O | | **SMU** |

**Table 2-13 Port 33 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| Y14 | P33.9 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_1 | | | **GTM_TIN** |
| | QSPI3_HSICINA | | | **QSPI3 input (aka: HSIC3INA)** |
| | IOM_PIN9 | | | **IOM pad input** |
| | P33.9 | O0 | | **General-purpose output** |
| | TOM0_1 | O1 | | **GTM_TOUT** |
| | TOM1_1 | | | **GTM_TOUT** |
| | TOM0_7 | | | **GTM_TOUT (= DTM1_OUT7)** |
| | TOM1_7 | | | **GTM_TOUT (= DTM5_OUT7)** |
| | IOM_MON0_9 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | QSPI3_SLSO1 | O3 | | **QSPI3 output (aka: SLSO31)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | CCU61_CC62 | O7 | | **CCU61 output** |
| | IOM_MON1_10 | | | **IOM monitor input** |
| | IOM_REF1_11 | | | **IOM reference input** |
| W15 | P33.10 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_0 | | | **GTM_TIN** |
| | QSPI3_SLSIC | | | **QSPI3 input (aka: SLSI3C)** |
| | QSPI3_HSICINB | | | **QSPI3 input (aka: HSIC3INB)** |
| | IOM_PIN10 | | | **IOM pad input** |
| | P33.10 | O0 | | **General-purpose output** |
| | TOM0_0 | O1 | | **GTM_TOUT** |
| | TOM1_0 | | | **GTM_TOUT** |
| | TOM0_7N | | | **GTM_TOUT (= DTM1_OUT7_N)** |
| | TOM1_7N | | | **GTM_TOUT (= DTM5_OUT7_N)** |
| | IOM_MON0_10 | | | **IOM monitor input** |
| | QSPI1_SLSO6 | O2 | | **QSPI1 output (aka: SLSO16)** |
| | QSPI3_SLSO11 | O3 | | **QSPI3 output (aka: SLSO311)** |
| | ASCLIN1_SLSO | O4 | | **ASCLIN1 output (aka: ASLSO1)** |
| | GTM_CLK1 | O5 | | **GTM output** |
| | SCU_EXTCLK1 | O6 | | **SCU output** |
| | CCU61_COUT61 | O7 | | **CCU61 output** |
| | IOM_MON1_12 | | | **IOM monitor input** |
| | IOM_REF1_9 | | | **IOM reference input** |

**Table 2-13 Port 33 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| Y15 | P33.11 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_2 | | | **GTM_TIN** |
| | QSPI3_SCLKD | | | **QSPI3 input (aka: SCLK3D)** |
| | SCU_REQ17 | | | **SCU input** |
| | IOM_PIN11 | | | **IOM pad input** |
| | P33.11 | O0 | | **General-purpose output** |
| | TOM0_2 | O1 | | **GTM_TOUT** |
| | TOM1_2 | | | **GTM_TOUT** |
| | IOM_MON0_11 | | | **IOM monitor input** |
| | ASCLIN1_SCLK | O2 | | **ASCLIN1 output (aka: ASCLK1)** |
| | QSPI3_SCLK | O3 | | **QSPI3 output (aka: SCLK3)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | SMPS_DCDCSYNC | O6 | | **SCU output** |
| | CCU61_CC61 | O7 | | **CCU61 output** |
| | IOM_MON1_9 | | | **IOM monitor input** |
| | IOM_REF1_12 | | | **IOM reference input** |
| | SMPS_DCDCSYNC | O | | **SCU output** |
| W16 | P33.12 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_0 | | | **GTM_TIN** |
| | QSPI3_MTSRD | | | **QSPI3 input (aka: MTSR3D)** |
| | IOM_PIN12 | | | **IOM pad input** |
| | P33.12 | O0 | | **General-purpose output** |
| | TOM1_12 | O1 | | **GTM_TOUT** |
| | TOM0_12 | | | **GTM_TOUT** |
| | IOM_MON0_12 | | | **IOM monitor input** |
| | ASCLIN1_TX | O2 | | **ASCLIN1 output (aka: ATX1)** |
| | IOM_MON2_13 | | | **IOM monitor input** |
| | IOM_REF2_13 | | | **IOM reference input** |
| | QSPI3_MTSR | O3 | | **QSPI3 output (aka: MTSR3)** |
| | ASCLIN1_SCLK | O4 | | **ASCLIN1 output (aka: ASCLK1)** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | CCU61_COUT60 | O7 | | **CCU61 output** |
| | IOM_MON1_11 | | | **IOM monitor input** |
| | IOM_REF1_10 | | | **IOM reference input** |

**Table 2-14 Port 34 Functions**

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| U10 | P34.0 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | P34.0 | O0 | | **General-purpose output** |
| | TOM1_12 | O1 | | **GTM_TOUT** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |
| U11 | P34.1 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | P34.1 | O0 | | **General-purpose output** |
| | TOM1_13 | O1 | | **GTM_TOUT** |
| | ASCLIN0_TX | O2 | | **ASCLIN0 output (aka: ATX0)** |
| | IOM_MON2_12 | | | **IOM monitor input** |
| | IOM_REF2_12 | | | **IOM reference input** |
| | — | O3 | | **Reserved** |
| | CAN0_TXD | O4 | | **CAN node 0 output (aka: TXDCAN0)** |
| | IOM_MON2_5 | | | **IOM monitor input** |
| | IOM_REF2_5 | | | **IOM reference input** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |
| T12 | P34.2 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | ASCLIN0_RXD | | | **ASCLIN0 input (aka: ARX0D)** |
| | CAN0_RXDG | | | **CAN node 0 input (aka: RXDCAN0G)** |
| | P34.2 | O0 | | **General-purpose output** |
| | TOM1_14 | O1 | | **GTM_TOUT** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-14 Port 34 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| U12 | P34.3 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | ASCLIN1_CTSB | | | **ASCLIN1 input (aka: ACTS1B)** |
| | P34.3 | O0 | | **General-purpose output** |
| | TOM1_15 | O1 | | **GTM_TOUT** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | QSPI2_SLSO10 | O4 | | **QSPI2 output (aka: SLSO210)** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-15 Port 40 Functions**

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| W9 | P40.0 | I | S / VDDM | **General-purpose input** |
| | VADCG0_0 | AI | | **VADC input channel 0 of group 0** |
| Y9 | P40.1 | I | S / VDDM | **General-purpose input** |
| | VADCG0_1 | AI | | **VADC input channel 1 of group 0** (with multiplexer diagnostics) |
| W8 | P40.2 | I | S / VDDM | **General-purpose input** |
| | VADCG0_2 | AI | | **VADC input channel 2 of group 0** (with multiplexer diagnostics) |
| Y8 | P40.3 | I | S / VDDM | **General-purpose input** |
| | VADCG0_3 | AI | | **VADC input channel 3 of group 0** |
| W7 | P40.4 | I | S / VDDM | **General-purpose input** |
| | VADCG0_4 | AI | | **VADC input channel 4 of group 0** |
| W6 | P40.5 | I | S / VDDM | **General-purpose input** |
| | VADCG0_5 | AI | | **VADC input channel 5 of group 0** |
| W5 | P40.6 | I | S / VDDM | **General-purpose input** |
| | VADCG0_6 | AI | | **VADC input channel 6 of group 0** |
| W4 | P40.7 | I | S / VDDM | **General-purpose input** |
| | VADCG0_7 | AI | | **VADC input channel 7 of group 0** (with pull down diagnostics) |
| W3 | P40.8 | I | S / VDDM | **General-purpose input** |
| | VADCG0_8 | AI | | **VADC input channel 8 of group 0** |
| Y3 | P40.9 | I | S / VDDM | **General-purpose input** |
| | VADCG0_9 | AI | | **VADC input channel 9 of group 0** (with multiplexer diagnostics) |

**Table 2-15 Port 40 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| Y2 | P40.10 | I | S / VDDM | **General-purpose input** |
| | VADCG0_10 | AI | | **VADC input channel 10 of group 0** (with multiplexer diagnostics) |
| W1 | P40.11 | I | S / VDDM | **General-purpose input** |
| | SENT_SENT0A | | | **SENT input** |
| | CCU60_CCPOS0D | | | **CCU60 input** |
| | VADCG0_11 | AI | | **VADC input channel 11 of group 0** |

**Table 2-16 Port 41 Functions**

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| V2 | P41.0 | I | S / VDDM | **General-purpose input** |
| | SENT_SENT1A | | | **SENT input** |
| | CCU60_CCPOS1B | | | **CCU60 input** |
| | VADCG1_0 | AI | | **VADC input channel 0 of group 1** |
| V1 | P41.1 | I | S / VDDM | **General-purpose input** |
| | VADCG1_1 | AI | | **VADC input channel 1 of group 1** (with multiplexer diagnostics) |
| U2 | P41.2 | I | S / VDDM | **General-purpose input** |
| | SENT_SENT2A | | | **SENT input** |
| | CCU61_CCPOS1B | | | **CCU61 input** |
| | VADCG1_2 | AI | | **VADC input channel 2 of group 1** (with multiplexer diagnostics) |
| U1 | P41.3 | I | S / VDDM | **General-purpose input** |
| | SENT_SENT3A | | | **SENT input** |
| | CCU61_CCPOS1D | | | **CCU61 input** |
| | VADCG1_3 | AI | | **VADC input channel 3 of group 1** (with pull down diagnostics) |
| R1 | P41.4 | I | S / VDDM | **General-purpose input** |
| | VADCG1_4 | AI | | **VADC input channel 4 of group 1** |
| R2 | P41.5 | I | S / VDDM | **General-purpose input** |
| | VADCG1_5 | AI | | **VADC input channel 5 of group 1** |
| P2 | P41.6 | I | S / VDDM | **General-purpose input** |
| | VADCG1_6 | AI | | **VADC input channel 6 of group 1** |
| P1 | P41.7 | I | S / VDDM | **General-purpose input** |
| | VADCG1_7 | AI | | **VADC input channel 7 of group 1** |
| N1 | P41.8 | I | S / VDDM | **General-purpose input** |
| | VADCG1_8 | AI | | **VADC input channel 8 of group 1** |

**Table 2-16 Port 41 Functions** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| N2 | P41.9 | I | S / VDDM | **General-purpose input** |
| | VADCG1_9 | AI | | **VADC input channel 9 of group 1** (with multiplexer diagnostics) |
| M1 | P41.10 | I | S / VDDM | **General-purpose input** |
| | VADCG1_10 | AI | | **VADC input channel 10 of group 1** (with multiplexer diagnostics) |
| M2 | P41.11 | I | S / VDDM | **General-purpose input** |
| | VADCG1_11 | AI | | **VADC input channel 11 of group 1** |

**Table 2-17 System I/O**

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| M20 | XTAL1 | I | VDDP3 | **Main Oscillator/PLL/Clock Generator Input** |
| M19 | XTAL2 | O | VDDP3 | **Main Oscillator/PLL/Clock Generator Output** |
| K16 | TMS/DAP1 | I | A1+ / PD / VDDP3 | **Debug Interface** |
| | DAP1 | I/O | | **Device Access Port LIne 1** |
| L19 | $\overline{\text{TRST}}$ | I | Input Only / PD / VDDP3 | **JTAG Module Reset/Enable Input** |
| J16 | TCK/DAP0 | I | Input Only / PD / VDDP3 | **OCDS input** |
| | DAP0 | I | | **Device Access Port LIne 0** |
| G16 | $\overline{\text{ESR1}}$ | I/O | A1+ / PU / VDDP3 | **SCU input** |
| | EVRWUP | I | | **EVR Wakeup Pin** |
| G17 | $\overline{\text{PORST}}$ | I | Input Only / PD / VDDP3 | **Power On Reset** Additional strong PD in case of power fail. |
| F16 | $\overline{\text{ESR0}}$ | I/O | A1+ / OD / VDDP3 | **SCU input/output** |
| | EVRWUP | I | | **EVR Wakeup Pin** |

**Table 2-18 Supply**

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| Y7 | $V_{AGND}$ | I | — | **Negative Analog Reference Voltage 0** |
| Y6 | $V_{AREF}$ | I | — | **Positive Analog Reference Voltage 0** |

**Table 2-18 Supply** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| H7, G8, P8, N7, P13, N14, H14, G13 | $V_{DD}$ | I | — | **Digital Core Power Supply (1.3V)** |
| A2, B3, W20, V19, T11, A19, B18, D16, E15, D5 | $V_{DDP3}$ | I | — | **Digital I/O Power Supply (3.3V)** |
| Y4 | $V_{SSM}$ | I | — | **Analog Ground for VDDM** |
| Y5 | $V_{DDM}$ | I | — | **ADC Power Supply (5.0V)** |
| M14, L14, J14, M13, L13, K13, J13 | $V_{SS}$ | I | — | **Digital Core Ground (0V)** |
| P12, N12, L12, K12, H12, G12 | $V_{SS}$ | I | — | **Digital Core Ground (0V)** |
| P11, N11, M11, L11, K11, J11, H11, G11 | $V_{SS}$ | I | — | **Digital Core Ground (0V)** |

**Table 2-18 Supply** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| P10, N10, M10, L10, K10, J10, H10, G10 | $V_{SS}$ | I | — | **Digital Core Ground (0V)** |
| P9, N9, L9, K9, H9, G9 | $V_{SS}$ | I | — | **Digital Core Ground (0V)** |
| M8, L8, K8, J8, M7, L7, K7, J7 | $V_{SS}$ | I | — | **Digital Core Ground (0V)** |
| Y20, W19, U17, T16, A20, B19, D17, E16, B2, D4, E5 | $V_{SS}$ | I | — | **Digital Core Ground (0V)** |
| L20 | $V_{SS}$ | I | — | **Digital Core Ground (0V)** |
| N19 | $V_{DD}$ | I | — | **Digital Core Power Supply (1.3V)**<br>This pin supplies also the main XTAL Oscillator/PLL (1.3V). A higher decoupling capacitor is therefore recommended to the VSS pin for better noise immunity. |
| N20 | $V_{DDP3}$ | I | — | **Digital I/O Power Supply (3.3V)**<br>This pin supplies also the main XTAL Oscillator/PLL (3.3V). A higher decoupling capacitor is therefore recommended to the VSS pin for better noise immunity. |

**Table 2-18 Supply** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| A1, L1, T1, Y1, T2, W2, A3, B4, E4, F4, G4, H4, L4, M4, N4, P4, R4, T4, U4, F5, G5, H5, J5, K5, L5, M5, N5, P5, R5, T5, U5 | NC | I | — | **Not connected**<br>These pins are reserved for future extensions and shall not be connected externally. |

**Table 2-18 Supply** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| B6,<br>D6,<br>E6,<br>T6,<br>U6,<br>A7,<br>D7,<br>T7,<br>U7,<br>D8,<br>E8,<br>T8,<br>U8,<br>E9,<br>T9,<br>U9,<br>D10,<br>E10,<br>T10,<br>D11,<br>E11,<br>D12,<br>E12,<br>T13,<br>U13,<br>K14,<br>T14,<br>U14 | NC | I | — | **Not connected**<br>These pins are reserved for future extensions and shall not be connected externally. |

**Table 2-18 Supply** (cont'd)

| Ball | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| T15, U15, L16, M16, N16, R16, U16, Y16, J17, K17, L17, M17, N17, P17, R17, T17, W17, W18, G19, T19, Y19, T20, U20, V20 | NC | I | — | **Not connected**<br>These pins are reserved for future extensions and shall not be connected externally. |

## 2.1.2 Pull-Up/Pull-Down Reset Behavior of the Pins

**Table 2-19 List of Pull-Up/Pull-Down Reset Behavior of the Pins**

| Pins | $\overline{\text{PORST}}$ = 0 | $\overline{\text{PORST}}$ = 1 |
|---|---|---|
| all GPIOs | High-Z | |
| TDI, $\overline{\text{TESTMODE}}$ | Pull-up | |
| $\overline{\text{PORST}}$[1)] | Pull-down with $I_{PORST}$ relevant | Pull-down with $I_{PDLI}$ relevant |
| $\overline{\text{TRST}}$, TCK, TMS | Pull-down | |
| $\overline{\text{ESR0}}$ | The open-drain driver is used to drive low.[2)] | Pull-up[3)] |
| $\overline{\text{ESR1}}$ | Pull-up[3)] | |
| P14.2, P14.3, P14.6 | Pull-up | |
| P21.7 / TDO | Pull-up | High-Z/Pull-up[4)] |

1) Pull-down with $I_{PORST}$ relevant is always activated when a primary supply monitor detects a violation.
2) Valid additionally after deactivation of $\overline{\text{PORST}}$ until the internal reset phase has finished. See the SCU chapter for details.
3) See the SCU_IOCR register description.
4) Depends on JTAG/DAP selection with $\overline{\text{TRST}}$.

## 2.2 PG-TQFP-144-27 Package Variant Pin Configuration of TC23x-ADAS

**Figure 2-1** is showing the TC23x pinout for the package variant: PG-TQFP-144-27.

**Figure 2-2 TC23x-ADAS Pinout for the package variant PG-TQFP-144-27.**

## 2.2.1 Port Functions and Pinning Tables

### 2.2.1.1 How to Read the Following Port Function Tables

Some hints for interpreting the following tables.

**Column "Ctrl.":**

I = Input (for GPIO port Lines with IOCR bit field Selection PCx = $0XXX_B$)

AI = Analog input

O = Output
O0 = Output with IOCR bit field selection PCx = $1X000_B$
O1 = Output with IOCR bit field selection PCx = $1X001_B$ (ALT1)
O2 = Output with IOCR bit field selection PCx = $1X010_B$ (ALT2)
O3 = Output with IOCR bit field selection PCx = $1X011_B$ (ALT3)
O4 = Output with IOCR bit field selection PCx = $1X100_B$ (ALT4)
O5 = Output with IOCR bit field selection PCx = $1X101_B$ (ALT5)
O6 = Output with IOCR bit field selection PCx = $1X110_B$ (ALT6)
O7 = Output with IOCR bit field selection PCx = $1X111_B$ (ALT7)

**Table 2-20 Example Port Table**

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 10 | Pxx.y | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIMm_n | | | **GTM_TIN** |
| | TOMa_b | O1 | | **GTM_TOUT** |
| | TOMc_d | | | **GTM_TOUT** |
| | IOM_REFv_w | | | **IOM reference input** |

To each input several functions can be connected. The peripherals' configuration defines if this input is used.

The port module (see corresponding chapter) decides which of the 8 output signals O0 to O7 drives the pad.

Some Ox rows list more than one function, e.g. several GTM_TOUT and IOM reference inputs. The GTM module (see corresponding chapter) has its own sub-multiplexer structure that defines which of the GTM sub-units drives this signal. Additionally the IOM modules "listens" on these output signals (see IOM chapter).

**Column "Type":**

IN = Input only
A1 = Pad class A1 (3.3V)
A1+ = Pad class A1+ (3.3V)
S = ADC with digital input. Pad class D for analog input "AI", pad class S for digital input "I".
PU = with pull-up device connected during reset ($\overline{PORST}$ = 0)
PD = with pull-down device connected during reset ($\overline{PORST}$ = 0)
High-Z = High-Z during reset ($\overline{PORST}$ = 0)
$V_x$ = Supply (the Exposed Pad is also considered as VSS and shall be connected to ground)

### 2.2.1.2 Tables

Port function and pinning tables.

**Table 2-21 Port 00 Functions**

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 11 | P00.0 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_0 | | | **GTM_TIN** |
| | CCU61_CTRAPA | | | **CCU61 input** |
| | CCU60_T12HRE | | | **CCU60 input** |
| | ETH0_MDIOA | | | **Ethernet input** |
| | P00.0 | O0 | | **General-purpose output** |
| | TOM0_8 | O1 | | **GTM_TOUT** |
| | TOM1_0 | | | **GTM_TOUT** |
| | TOM0_4 | | | **GTM_TOUT (= DTM1_OUT4)** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | IOM_REF0_9 | | | **IOM reference input** |
| | ASCLIN0_SCLK | O2 | | **ASCLIN0 output (aka: ASCLK0)** |
| | ASCLIN0_TX | O3 | | **ASCLIN0 output (aka: ATX0)** |
| | IOM_MON2_12 | | | **IOM monitor input** |
| | IOM_REF2_12 | | | **IOM reference input** |
| | — | O4 | | **Reserved** |
| | CAN1_TXD | O5 | | **CAN node 1 output (aka: TXDCAN1)** |
| | IOM_MON2_6 | | | **IOM monitor input** |
| | IOM_REF2_6 | | | **IOM reference input** |
| | — | O6 | | **Reserved** |
| | CCU60_COUT63 | O7 | | **CCU60 output** |
| | IOM_MON1_6 | | | **IOM monitor input** |
| | IOM_REF1_0 | | | **IOM reference input** |
| | ETH0_MDIO | O | | **Ethernet output** |

**Table 2-21 Port 00 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 12 | P00.1 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_1 | | | **GTM_TIN** |
| | ASCLIN0_RXC | | | **ASCLIN0 input (aka: ARX0C)** |
| | CAN1_RXDD | | | **CAN node 1 input (aka: RXDCAN1D)** |
| | SENT_SENT0B | | | **SENT input** |
| | CCU60_CC60INB | | | **CCU60 input** |
| | CCU61_CC60INA | | | **CCU61 input** |
| | P00.1 | O0 | | **General-purpose output** |
| | TOM0_9 | O1 | | **GTM_TOUT** |
| | TOM1_1 | | | **GTM_TOUT** |
| | TOM0_4N | | | **GTM_TOUT (= DTM1_OUT4_N)** |
| | TOM1_4N | | | **GTM_TOUT (= DTM5_OUT4_N)** |
| | IOM_REF0_10 | | | **IOM reference input** |
| | ASCLIN0_TX | O2 | | **ASCLIN0 output (aka: ATX0)** |
| | IOM_MON2_12 | | | **IOM monitor input** |
| | IOM_REF2_12 | | | **IOM reference input** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | SENT_SPC0 | O6 | | **SENT output** |
| | CCU61_CC60 | O7 | | **CCU61 output** |
| | IOM_MON1_8 | | | **IOM monitor input** |
| | IOM_REF1_13 | | | **IOM reference input** |

**Table 2-21 Port 00 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 13 | P00.2 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_1 | | | **GTM_TIN** |
| | SENT_SENT1B | | | **SENT input** |
| | P00.2 | O0 | | **General-purpose output** |
| | TOM0_9 | O1 | | **GTM_TOUT** |
| | TOM1_1 | | | **GTM_TOUT** |
| | TOM0_5 | | | **GTM_TOUT (= DTM1_OUT5)** |
| | TOM1_5 | | | **GTM_TOUT (= DTM5_OUT5)** |
| | IOM_REF0_11 | | | **IOM reference input** |
| | ASCLIN0_SCLK | O2 | | **ASCLIN0 output (aka: ASCLK0)** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | CAN12_TXD | O5 | | **CAN1 node 2 output (aka: TXDCAN12)** |
| | — | O6 | | **Reserved** |
| | CCU61_COUT60 | O7 | | **CCU61 output** |
| | IOM_MON1_11 | | | **IOM monitor input** |
| | IOM_REF1_10 | | | **IOM reference input** |
| 14 | P00.3 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | SENT_SENT2B | | | **SENT input** |
| | CCU60_CC61INB | | | **CCU60 input** |
| | CCU61_CC61INA | | | **CCU61 input** |
| | CAN11_RXDA | | | **CAN1 node 1 input (aka: RXDCAN11A)** |
| | CAN12_RXDA | | | **CAN1 node 2 input (aka: RXDCAN12A)** |
| | P00.3 | O0 | | **General-purpose output** |
| | TOM0_10 | O1 | | **GTM_TOUT** |
| | TOM1_2 | | | **GTM_TOUT** |
| | TOM0_5N | | | **GTM_TOUT (= DTM1_OUT5_N)** |
| | TOM1_5N | | | **GTM_TOUT (= DTM5_OUT5_N)** |
| | IOM_REF0_12 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | SENT_SPC2 | O6 | | **SENT output** |
| | CCU61_CC61 | O7 | | **CCU61 output** |
| | IOM_MON1_9 | | | **IOM monitor input** |
| | IOM_REF1_12 | | | **IOM reference input** |

**Table 2-21 Port 00 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 15 | P00.4 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | SCU_REQ7 | | | **SCU input** |
| | SENT_SENT3B | | | **SENT input** |
| | P00.4 | O0 | | **General-purpose output** |
| | TOM0_11 | O1 | | **GTM_TOUT** |
| | TOM1_3 | | | **GTM_TOUT** |
| | TOM0_6 | | | **GTM_TOUT (= DTM1_OUT6)** |
| | TOM1_6 | | | **GTM_TOUT (= DTM5_OUT6)** |
| | IOM_REF0_13 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | CAN10_TXD | O3 | | **CAN1 node 0 output (aka: TXDCAN10)** |
| | — | O4 | | **Reserved** |
| | VADC_G1BFL0 | O5 | | **VADC output** |
| | SENT_SPC3 | O6 | | **SENT output** |
| | CCU61_COUT61 | O7 | | **CCU61 output** |
| | IOM_MON1_12 | | | **IOM monitor input** |
| | IOM_REF1_9 | | | **IOM reference input** |
| 16 | P00.5 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | CCU60_CC62INB | | | **CCU60 input** |
| | CCU61_CC62INA | | | **CCU61 input** |
| | CAN10_RXDG | | | **CAN1 node 0 input (aka: RXDCAN10G)** |
| | P00.5 | O0 | | **General-purpose output** |
| | TOM0_12 | O1 | | **GTM_TOUT** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | TOM0_6N | | | **GTM_TOUT (= DTM1_OUT6_N)** |
| | TOM1_6N | | | **GTM_TOUT (= DTM5_OUT6_N)** |
| | IOM_REF0_14 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | VADC_G1BFL1 | O5 | | **VADC output** |
| | — | O6 | | **Reserved** |
| | CCU61_CC62 | O7 | | **CCU61 output** |
| | IOM_MON1_10 | | | **IOM monitor input** |
| | IOM_REF1_11 | | | **IOM reference input** |

**Table 2-21 Port 00 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 17 | P00.6 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | CAN11_RXDG | | | **CAN1 node 1 input (aka: RXDCAN11G)** |
| | P00.6 | O0 | | **General-purpose output** |
| | TOM0_13 | O1 | | **GTM_TOUT** |
| | TOM1_5 | | | **GTM_TOUT (= DTM5_OUT5)** |
| | TOM0_7 | | | **GTM_TOUT (= DTM1_OUT7)** |
| | TOM1_7 | | | **GTM_TOUT (= DTM5_OUT7)** |
| | IOM_REF0_15 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | VADC_G1BFL2 | O3 | | **VADC output** |
| | — | O4 | | **Reserved** |
| | VADC_EMUX10 | O5 | | **VADC output** |
| | — | O6 | | **Reserved** |
| | CCU61_COUT62 | O7 | | **CCU61 output** |
| | IOM_MON1_13 | | | **IOM monitor input** |
| | IOM_REF1_8 | | | **IOM reference input** |
| 18 | P00.7 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | CCU61_CC60INC | | | **CCU61 input** |
| | CCU61_CCPOS0A | | | **CCU61 input** |
| | CCU60_T12HRB | | | **CCU60 input** |
| | GPT120_T2INA | | | **GPT120 input** |
| | P00.7 | O0 | | **General-purpose output** |
| | TOM0_14 | O1 | | **GTM_TOUT** |
| | TOM1_6 | | | **GTM_TOUT (= DTM5_OUT6)** |
| | TOM0_7N | | | **GTM_TOUT (= DTM1_OUT7_N)** |
| | TOM1_7N | | | **GTM_TOUT (= DTM5_OUT7_N)** |
| | CAN11_TXD | O2 | | **CAN1 node 1 output (aka: TXDCAN11)** |
| | VADC_G1BFL3 | O3 | | **VADC output** |
| | — | O4 | | **Reserved** |
| | VADC_EMUX11 | O5 | | **VADC output** |
| | — | O6 | | **Reserved** |
| | CCU61_CC60 | O7 | | **CCU61 output** |
| | IOM_MON1_8 | | | **IOM monitor input** |
| | IOM_REF1_13 | | | **IOM reference input** |

**Table 2-21 Port 00 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 19 | P00.8 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | CCU61_CC61INC | | | **CCU61 input** |
| | CCU61_CCPOS1A | | | **CCU61 input** |
| | CCU60_T13HRB | | | **CCU60 input** |
| | GPT120_T2EUDA | | | **GPT120 input** |
| | CAN12_RXDG | | | **CAN1 node 2 input (aka: RXDCAN12G)** |
| | P00.8 | O0 | | **General-purpose output** |
| | TOM0_15 | O1 | | **GTM_TOUT** |
| | TOM1_7 | | | **GTM_TOUT (= DTM5_OUT7)** |
| | QSPI3_SLSO6 | O2 | | **QSPI3 output (aka: SLSO36)** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | VADC_EMUX12 | O5 | | **VADC output** |
| | — | O6 | | **Reserved** |
| | CCU61_CC61 | O7 | | **CCU61 output** |
| | IOM_MON1_9 | | | **IOM monitor input** |
| | IOM_REF1_12 | | | **IOM reference input** |
| 20 | P00.9 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_0 | | | **GTM_TIN** |
| | CCU61_CC62INC | | | **CCU61 input** |
| | CCU61_CCPOS2A | | | **CCU61 input** |
| | CCU60_T13HRC | | | **CCU60 input** |
| | CCU60_T12HRC | | | **CCU60 input** |
| | GPT120_T4EUDA | | | **GPT120 input** |
| | P00.9 | O0 | | **General-purpose output** |
| | TOM0_0 | O1 | | **GTM_TOUT** |
| | TOM1_0 | | | **GTM_TOUT** |
| | QSPI3_SLSO7 | O2 | | **QSPI3 output (aka: SLSO37)** |
| | ASCLIN0_RTS | O3 | | **ASCLIN0 output (aka: ARTS0)** |
| | — | O4 | | **Reserved** |
| | CAN12_TXD | O5 | | **CAN1 node 2 output (aka: TXDCAN12)** |
| | — | O6 | | **Reserved** |
| | CCU61_CC62 | O7 | | **CCU61 output** |
| | IOM_MON1_10 | | | **IOM monitor input** |
| | IOM_REF1_11 | | | **IOM reference input** |

**Table 2-21 Port 00 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 21 | P00.12 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_3 | | | **GTM_TIN** |
| | ASCLIN0_CTSA | | | **ASCLIN0 input (aka: ACTS0A)** |
| | P00.12 | O0 | | **General-purpose output** |
| | TOM0_3 | O1 | | **GTM_TOUT** |
| | TOM1_3 | | | **GTM_TOUT** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | CCU61_COUT63 | O7 | | **CCU61 output** |
| | IOM_MON1_7 | | | **IOM monitor input** |
| | IOM_REF1_7 | | | **IOM reference input** |

**Table 2-22 Port 02 Functions**

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 1 | P02.0 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_0 | | | **GTM_TIN** |
| | SCU_REQ6 | | | **SCU input** |
| | CCU60_CC60INA | | | **CCU60 input** |
| | CCU61_CC60INB | | | **CCU61 input** |
| | P02.0 | O0 | | **General-purpose output** |
| | TOM0_8 | O1 | | **GTM_TOUT** |
| | TOM1_8 | | | **GTM_TOUT** |
| | TOM0_4 | | | **GTM_TOUT (= DTM1_OUT4)** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | IOM_REF0_0 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | QSPI3_SLSO1 | O3 | | **QSPI3 output (aka: SLSO31)** |
| | — | O4 | | **Reserved** |
| | CAN0_TXD | O5 | | **CAN node 0 output (aka: TXDCAN0)** |
| | IOM_MON2_5 | | | **IOM monitor input** |
| | IOM_REF2_5 | | | **IOM reference input** |
| | ERAY0_TXDA | O6 | | **ERAY0 output** |
| | CCU60_CC60 | O7 | | **CCU60 output** |
| | IOM_MON1_2 | | | **IOM monitor input** |
| | IOM_REF1_6 | | | **IOM reference input** |

**Table 2-22 Port 02 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 2 | P02.1 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_1 | | | **GTM_TIN** |
| | CAN0_RXDA | | | **CAN node 0 input (aka: RXDCAN0A)** |
| | ERAY0_RXDA2 | | | **ERAY0 input** |
| | SCU_REQ14 | | | **SCU input** |
| | P02.1 | O0 | | **General-purpose output** |
| | TOM0_9 | O1 | | **GTM_TOUT** |
| | TOM1_9 | | | **GTM_TOUT** |
| | TOM0_4N | | | **GTM_TOUT (= DTM1_OUT4_N)** |
| | TOM1_4N | | | **GTM_TOUT (= DTM5_OUT4_N)** |
| | IOM_REF0_1 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | QSPI3_SLSO2 | O3 | | **QSPI3 output (aka: SLSO32)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | CCU60_COUT60 | O7 | | **CCU60 output** |
| | IOM_MON1_3 | | | **IOM monitor input** |
| | IOM_REF1_3 | | | **IOM reference input** |

**Table 2-22 Port 02 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 3 | P02.2 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_2 | | | **GTM_TIN** |
| | CCU60_CC61INA | | | **CCU60 input** |
| | CCU61_CC61INB | | | **CCU61 input** |
| | P02.2 | O0 | | **General-purpose output** |
| | TOM0_10 | O1 | | **GTM_TOUT** |
| | TOM1_10 | | | **GTM_TOUT** |
| | TOM0_5 | | | **GTM_TOUT (= DTM1_OUT5)** |
| | TOM1_5 | | | **GTM_TOUT (= DTM5_OUT5)** |
| | IOM_REF0_2 | | | **IOM reference input** |
| | ASCLIN1_TX | O2 | | **ASCLIN1 output (aka: ATX1)** |
| | IOM_MON2_13 | | | **IOM monitor input** |
| | IOM_REF2_13 | | | **IOM reference input** |
| | QSPI3_SLSO3 | O3 | | **QSPI3 output (aka: SLSO33)** |
| | — | O4 | | **Reserved** |
| | CAN2_TXD | O5 | | **CAN node 2 output (aka: TXDCAN2)** |
| | IOM_MON2_7 | | | **IOM monitor input** |
| | IOM_REF2_7 | | | **IOM reference input** |
| | ERAY0_TXDB | O6 | | **ERAY0 output** |
| | CCU60_CC61 | O7 | | **CCU60 output** |
| | IOM_MON1_1 | | | **IOM monitor input** |
| | IOM_REF1_5 | | | **IOM reference input** |

**Table 2-22 Port 02 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 4 | P02.3 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_3 | | | **GTM_TIN** |
| | ASCLIN1_RXG | | | **ASCLIN1 input (aka: ARX1G)** |
| | CAN2_RXDB | | | **CAN node 2 input (aka: RXDCAN2B)** |
| | ERAY0_RXDB2 | | | **ERAY0 input** |
| | P02.3 | O0 | | **General-purpose output** |
| | TOM0_11 | O1 | | **GTM_TOUT** |
| | TOM1_11 | | | **GTM_TOUT** |
| | TOM0_5N | | | **GTM_TOUT (= DTM1_OUT5_N)** |
| | TOM1_5N | | | **GTM_TOUT (= DTM5_OUT5_N)** |
| | IOM_REF0_3 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | QSPI3_SLSO4 | O3 | | **QSPI3 output (aka: SLSO34)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | CCU60_COUT61 | O7 | | **CCU60 output** |
| | IOM_MON1_4 | | | **IOM monitor input** |
| | IOM_REF1_2 | | | **IOM reference input** |

**Table 2-22 Port 02 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 5 | P02.4 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_4 | | | **GTM_TIN** |
| | QSPI3_SLSIA | | | **QSPI3 input (aka: SLSI3A)** |
| | CAN0_RXDD | | | **CAN node 0 input (aka: RXDCAN0D)** |
| | CCU60_CC62INA | | | **CCU60 input** |
| | CCU61_CC62INB | | | **CCU61 input** |
| | P02.4 | O0 | | **General-purpose output** |
| | TOM0_12 | O1 | | **GTM_TOUT** |
| | TOM1_12 | | | **GTM_TOUT** |
| | TOM0_6 | | | **GTM_TOUT (= DTM1_OUT6)** |
| | TOM1_6 | | | **GTM_TOUT (= DTM5_OUT6)** |
| | IOM_REF0_4 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | QSPI3_SLSO0 | O3 | | **QSPI3 output (aka: SLSO30)** |
| | — | O4 | | **Reserved** |
| | CAN10_TXD | O5 | | **CAN1 node 0 output (aka: TXDCAN10)** |
| | ERAY0_TXENA | O6 | | **ERAY0 output** |
| | CCU60_CC62 | O7 | | **CCU60 output** |
| | IOM_MON1_0 | | | **IOM monitor input** |
| | IOM_REF1_4 | | | **IOM reference input** |

**Table 2-22 Port 02 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 6 | P02.5 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_5 | | | **GTM_TIN** |
| | QSPI3_MRSTA | | | **QSPI3 input (aka: MRST3A)** |
| | SENT_SENT3C | | | **SENT input** |
| | P02.5 | O0 | | **General-purpose output** |
| | TOM0_13 | O1 | | **GTM_TOUT** |
| | TOM1_13 | | | **GTM_TOUT** |
| | TOM0_6N | | | **GTM_TOUT (= DTM1_OUT6_N)** |
| | TOM1_6N | | | **GTM_TOUT (= DTM5_OUT6_N)** |
| | IOM_REF0_5 | | | **IOM reference input** |
| | CAN0_TXD | O2 | | **CAN node 0 output (aka: TXDCAN0)** |
| | IOM_MON2_5 | | | **IOM monitor input** |
| | IOM_REF2_5 | | | **IOM reference input** |
| | QSPI3_MRST | O3 | | **QSPI3 output (aka: MRST3)** |
| | IOM_MON2_3 | | | **IOM monitor input** |
| | IOM_REF2_3 | | | **IOM reference input** |
| | — | O4 | | **Reserved** |
| | CAN11_TXD | O5 | | **CAN1 node 1 output (aka: TXDCAN11)** |
| | ERAY0_TXENB | O6 | | **ERAY0 output** |
| | CCU60_COUT62 | O7 | | **CCU60 output** |
| | IOM_MON1_5 | | | **IOM monitor input** |
| | IOM_REF1_1 | | | **IOM reference input** |

**Table 2-22 Port 02 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 7 | P02.6 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_6 | | | **GTM_TIN** |
| | QSPI3_MTSRA | | | **QSPI3 input (aka: MTSR3A)** |
| | SENT_SENT2C | | | **SENT input** |
| | CCU60_CC60INC | | | **CCU60 input** |
| | CCU60_CCPOS0A | | | **CCU60 input** |
| | CCU61_T12HRB | | | **CCU61 input** |
| | GPT120_T3INA | | | **GPT120 input** |
| | CAN10_RXDF | | | **CAN1 node 0 input (aka: RXDCAN10F)** |
| | P02.6 | O0 | | **General-purpose output** |
| | TOM0_14 | O1 | | **GTM_TOUT** |
| | TOM1_14 | | | **GTM_TOUT** |
| | TOM0_7 | | | **GTM_TOUT (= DTM1_OUT7)** |
| | TOM1_7 | | | **GTM_TOUT (= DTM5_OUT7)** |
| | IOM_REF0_6 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | QSPI3_MTSR | O3 | | **QSPI3 output (aka: MTSR3)** |
| | — | O4 | | **Reserved** |
| | VADC_EMUX00 | O5 | | **VADC output** |
| | — | O6 | | **Reserved** |
| | CCU60_CC60 | O7 | | **CCU60 output** |
| | IOM_MON1_2 | | | **IOM monitor input** |
| | IOM_REF1_6 | | | **IOM reference input** |

**Table 2-22 Port 02 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 8 | P02.7 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_7 | | | **GTM_TIN** |
| | QSPI3_SCLKA | | | **QSPI3 input (aka: SCLK3A)** |
| | SENT_SENT1C | | | **SENT input** |
| | CCU60_CC61INC | | | **CCU60 input** |
| | CCU60_CCPOS1A | | | **CCU60 input** |
| | CCU61_T13HRB | | | **CCU61 input** |
| | GPT120_T3EUDA | | | **GPT120 input** |
| | CAN11_RXDF | | | **CAN1 node 1 input (aka: RXDCAN11F)** |
| | PMU_FDEST | | | **PMU input** |
| | P02.7 | O0 | | **General-purpose output** |
| | TOM0_15 | O1 | | **GTM_TOUT** |
| | TOM1_15 | | | **GTM_TOUT** |
| | TOM0_7N | | | **GTM_TOUT (= DTM1_OUT7_N)** |
| | TOM1_7N | | | **GTM_TOUT (= DTM5_OUT7_N)** |
| | IOM_REF0_7 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | QSPI3_SCLK | O3 | | **QSPI3 output (aka: SCLK3)** |
| | — | O4 | | **Reserved** |
| | VADC_EMUX01 | O5 | | **VADC output** |
| | SENT_SPC1 | O6 | | **SENT output** |
| | CCU60_CC61 | O7 | | **CCU60 output** |
| | IOM_MON1_1 | | | **IOM monitor input** |
| | IOM_REF1_5 | | | **IOM reference input** |

**Table 2-22 Port 02 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 9 | P02.8 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_0 | | | **GTM_TIN** |
| | SENT_SENT0C | | | **SENT input** |
| | CCU60_CC62INC | | | **CCU60 input** |
| | CCU60_CCPOS2A | | | **CCU60 input** |
| | CCU61_T12HRC | | | **CCU61 input** |
| | CCU61_T13HRC | | | **CCU61 input** |
| | GPT120_T4INA | | | **GPT120 input** |
| | P02.8 | O0 | | **General-purpose output** |
| | TOM0_8 | O1 | | **GTM_TOUT** |
| | TOM1_0 | | | **GTM_TOUT** |
| | TOM0_4N | | | **GTM_TOUT (= DTM1_OUT4_N)** |
| | TOM1_4N | | | **GTM_TOUT (= DTM5_OUT4_N)** |
| | IOM_REF0_8 | | | **IOM reference input** |
| | QSPI3_SLSO5 | O2 | | **QSPI3 output (aka: SLSO35)** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | VADC_EMUX02 | O5 | | **VADC output** |
| | ETH0_MDC | O6 | | **Ethernet output** |
| | CCU60_CC62 | O7 | | **CCU60 output** |
| | IOM_MON1_0 | | | **IOM monitor input** |
| | IOM_REF1_4 | | | **IOM reference input** |

**Table 2-23 Port 10 Functions**

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 140 | P10.1 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_1 | | | **GTM_TIN** |
| | QSPI1_MRSTA | | | **QSPI1 input (aka: MRST1A)** |
| | GPT120_T5EUDB | | | **GPT120 input** |
| | ETH0_CRSC | | | **Ethernet input** |
| | P10.1 | O0 | | **General-purpose output** |
| | TOM0_1 | O1 | | **GTM_TOUT** |
| | TOM1_9 | | | **GTM_TOUT** |
| | QSPI1_MTSR | O2 | | **QSPI1 output (aka: MTSR1)** |
| | QSPI1_MRST | O3 | | **QSPI1 output (aka: MRST1)** |
| | IOM_MON2_1 | | | **IOM monitor input** |
| | IOM_REF2_1 | | | **IOM reference input** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |
| 141 | P10.2 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_2 | | | **GTM_TIN** |
| | QSPI1_SCLKA | | | **QSPI1 input (aka: SCLK1A)** |
| | CAN2_RXDE | | | **CAN node 2 input (aka: RXDCAN2E)** |
| | SCU_REQ2 | | | **SCU input** |
| | GPT120_T6INB | | | **GPT120 input** |
| | ETH0_COLB | | | **Ethernet input** |
| | P10.2 | O0 | | **General-purpose output** |
| | TOM0_2 | O1 | | **GTM_TOUT** |
| | TOM1_10 | | | **GTM_TOUT** |
| | IOM_MON2_9 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | QSPI1_SCLK | O3 | | **QSPI1 output (aka: SCLK1)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-23 Port 10 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 142 | P10.3 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_3 | | | **GTM_TIN** |
| | QSPI1_MTSRA | | | **QSPI1 input (aka: MTSR1A)** |
| | SCU_REQ3 | | | **SCU input** |
| | GPT120_T5INB | | | **GPT120 input** |
| | ETH0_RXERC | | | **Ethernet input** |
| | P10.3 | O0 | | **General-purpose output** |
| | TOM0_3 | O1 | | **GTM_TOUT** |
| | TOM1_11 | | | **GTM_TOUT** |
| | IOM_MON2_10 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | QSPI1_MTSR | O3 | | **QSPI1 output (aka: MTSR1)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | CAN2_TXD | O6 | | **CAN node 2 output (aka: TXDCAN2)** |
| | IOM_MON2_7 | | | **IOM monitor input** |
| | IOM_REF2_7 | | | **IOM reference input** |
| | — | O7 | | **Reserved** |
| 143 | P10.5 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_2 | | | **GTM_TIN** |
| | SCU_HWCFG4 | | | **SCU input** |
| | CAN10_RXDA | | | **CAN1 node 0 input (aka: RXDCAN10A)** |
| | ETH0_RXD3B | | | **Ethernet input** |
| | P10.5 | O0 | | **General-purpose output** |
| | TOM0_2 | O1 | | **GTM_TOUT** |
| | TOM1_10 | | | **GTM_TOUT** |
| | IOM_REF2_9 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | QSPI3_SLSO8 | O3 | | **QSPI3 output (aka: SLSO38)** |
| | QSPI1_SLSO9 | O4 | | **QSPI1 output (aka: SLSO19)** |
| | GPT120_T6OUT | O5 | | **GPT120 output** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-23 Port 10 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 144 | P10.6 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_3 | | | **GTM_TIN** |
| | QSPI3_MTSRB | | | **QSPI3 input (aka: MTSR3B)** |
| | SCU_HWCFG5 | | | **SCU input** |
| | P10.6 | O0 | | **General-purpose output** |
| | TOM0_3 | O1 | | **GTM_TOUT** |
| | TOM1_11 | | | **GTM_TOUT** |
| | IOM_REF2_10 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | QSPI3_MTSR | O3 | | **QSPI3 output (aka: MTSR3)** |
| | GPT120_T3OUT | O4 | | **GPT120 output** |
| | CAN10_TXD | O5 | | **CAN1 node 0 output (aka: TXDCAN10)** |
| | QSPI1_MRST | O6 | | **QSPI1 output (aka: MRST1)** |
| | IOM_MON2_1 | | | **IOM monitor input** |
| | IOM_REF2_1 | | | **IOM reference input** |
| | — | O7 | | **Reserved** |

**Table 2-24 Port 11 Functions**

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 132 | P11.2 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | P11.2 | O0 | | **General-purpose output** |
| | TOM0_8 | O1 | | **GTM_TOUT** |
| | TOM1_1 | | | **GTM_TOUT** |
| | TOM0_4N | | | **GTM_TOUT (= DTM1_OUT4_N)** |
| | TOM1_4N | | | **GTM_TOUT (= DTM5_OUT4_N)** |
| | — | O2 | | **Reserved** |
| | QSPI0_SLSO5 | O3 | | **QSPI0 output (aka: SLSO05)** |
| | QSPI1_SLSO5 | O4 | | **QSPI1 output (aka: SLSO15)** |
| | CCU61_COUT63 | O5 | | **CCU61 output** |
| | IOM_MON1_7 | | | **IOM monitor input** |
| | IOM_REF1_7 | | | **IOM reference input** |
| | ETH0_TXD1 | O6 | | **Ethernet output** |
| | CCU60_COUT63 | O7 | | **CCU60 output** |
| | IOM_MON1_6 | | | **IOM monitor input** |
| | IOM_REF1_0 | | | **IOM reference input** |

**Table 2-24 Port 11 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 133 | P11.3 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | QSPI1_MRSTB | | | **QSPI1 input (aka: MRST1B)** |
| | P11.3 | O0 | | **General-purpose output** |
| | TOM0_10 | O1 | | **GTM_TOUT** |
| | TOM1_2 | | | **GTM_TOUT** |
| | TOM0_5 | | | **GTM_TOUT (= DTM1_OUT5)** |
| | TOM1_5 | | | **GTM_TOUT (= DTM5_OUT5)** |
| | — | O2 | | **Reserved** |
| | QSPI1_MRST | O3 | | **QSPI1 output (aka: MRST1)** |
| | IOM_MON2_1 | | | **IOM monitor input** |
| | IOM_REF2_1 | | | **IOM reference input** |
| | ERAY0_TXDA | O4 | | **ERAY0 output** |
| | CCU61_COUT62 | O5 | | **CCU61 output** |
| | IOM_MON1_13 | | | **IOM monitor input** |
| | IOM_REF1_8 | | | **IOM reference input** |
| | ETH0_TXD0 | O6 | | **Ethernet output** |
| | CCU60_COUT62 | O7 | | **CCU60 output** |
| | IOM_MON1_5 | | | **IOM monitor input** |
| | IOM_REF1_1 | | | **IOM reference input** |
| 134 | P11.6 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | QSPI1_SCLKB | | | **QSPI1 input (aka: SCLK1B)** |
| | P11.6 | O0 | | **General-purpose output** |
| | TOM0_11 | O1 | | **GTM_TOUT** |
| | TOM1_3 | | | **GTM_TOUT** |
| | TOM0_5N | | | **GTM_TOUT (= DTM1_OUT5_N)** |
| | TOM1_5N | | | **GTM_TOUT (= DTM5_OUT5_N)** |
| | ERAY0_TXENB | O2 | | **ERAY0 output** |
| | QSPI1_SCLK | O3 | | **QSPI1 output (aka: SCLK1)** |
| | ERAY0_TXENA | O4 | | **ERAY0 output** |
| | CCU61_COUT61 | O5 | | **CCU61 output** |
| | IOM_MON1_12 | | | **IOM monitor input** |
| | IOM_REF1_9 | | | **IOM reference input** |
| | ETH0_TXEN | O6 | | **Ethernet output** |
| | CCU60_COUT61 | O7 | | **CCU60 output** |
| | IOM_MON1_4 | | | **IOM monitor input** |
| | IOM_REF1_2 | | | **IOM reference input** |

**Table 2-24 Port 11 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 136 | P11.8 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | QSPI1_MTSRC | | | **QSPI1 input (aka: MTSR1C)** |
| | ETH0_RXD2A | | | **Ethernet input** |
| | P11.8 | O0 | | **General-purpose output** |
| | TOM0_4 | O1 | | **GTM_TOUT (= DTM1_OUT4)** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | — | O2 | | **Reserved** |
| | QSPI1_SLSO10 | O3 | | **QSPI1 output (aka: SLSO110)** |
| | QSPI1_MTSR | O4 | | **QSPI1 output (aka: MTSR1)** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |
| 135 | P11.9 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | QSPI1_MTSRB | | | **QSPI1 input (aka: MTSR1B)** |
| | ERAY0_RXDA1 | | | **ERAY0 input** |
| | ETH0_RXD1A | | | **Ethernet input** |
| | P11.9 | O0 | | **General-purpose output** |
| | TOM0_12 | O1 | | **GTM_TOUT** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | TOM0_6 | | | **GTM_TOUT (= DTM1_OUT6)** |
| | TOM1_6 | | | **GTM_TOUT (= DTM5_OUT6)** |
| | — | O2 | | **Reserved** |
| | QSPI1_MTSR | O3 | | **QSPI1 output (aka: MTSR1)** |
| | — | O4 | | **Reserved** |
| | CCU61_COUT60 | O5 | | **CCU61 output** |
| | IOM_MON1_11 | | | **IOM monitor input** |
| | IOM_REF1_10 | | | **IOM reference input** |
| | — | O6 | | **Reserved** |
| | CCU60_COUT60 | O7 | | **CCU60 output** |
| | IOM_MON1_3 | | | **IOM monitor input** |
| | IOM_REF1_3 | | | **IOM reference input** |

**Table 2-24 Port 11 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 137 | P11.10 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | ASCLIN1_RXE | | | **ASCLIN1 input (aka: ARX1E)** |
| | ERAY0_RXDB1 | | | **ERAY0 input** |
| | SCU_REQ12 | | | **SCU input** |
| | CAN12_RXDD | | | **CAN1 node 2 input (aka: RXDCAN12D)** |
| | ETH0_RXD0A | | | **Ethernet input** |
| | P11.10 | O0 | | **General-purpose output** |
| | TOM0_13 | O1 | | **GTM_TOUT** |
| | TOM1_5 | | | **GTM_TOUT (= DTM5_OUT5)** |
| | TOM0_6N | | | **GTM_TOUT (= DTM1_OUT6_N)** |
| | TOM1_6N | | | **GTM_TOUT (= DTM5_OUT6_N)** |
| | — | O2 | | **Reserved** |
| | QSPI0_SLSO3 | O3 | | **QSPI0 output (aka: SLSO03)** |
| | QSPI1_SLSO3 | O4 | | **QSPI1 output (aka: SLSO13)** |
| | CCU61_CC62 | O5 | | **CCU61 output** |
| | IOM_MON1_10 | | | **IOM monitor input** |
| | IOM_REF1_11 | | | **IOM reference input** |
| | — | O6 | | **Reserved** |
| | CCU60_CC62 | O7 | | **CCU60 output** |
| | IOM_MON1_0 | | | **IOM monitor input** |
| | IOM_REF1_4 | | | **IOM reference input** |

**Table 2-24 Port 11 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 138 | P11.11 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | ETH0_RXDVA | | | **Ethernet input** |
| | ETH0_CRSDVA | | | **Ethernet input** |
| | ETH0_CRSB | | | **Ethernet input** |
| | P11.11 | O0 | | **General-purpose output** |
| | TOM0_14 | O1 | | **GTM_TOUT** |
| | TOM1_6 | | | **GTM_TOUT (= DTM5_OUT6)** |
| | TOM0_7N | | | **GTM_TOUT (= DTM1_OUT7_N)** |
| | TOM1_7N | | | **GTM_TOUT (= DTM5_OUT7_N)** |
| | — | O2 | | **Reserved** |
| | QSPI0_SLSO4 | O3 | | **QSPI0 output (aka: SLSO04)** |
| | QSPI1_SLSO4 | O4 | | **QSPI1 output (aka: SLSO14)** |
| | CCU61_CC61 | O5 | | **CCU61 output** |
| | IOM_MON1_9 | | | **IOM monitor input** |
| | IOM_REF1_12 | | | **IOM reference input** |
| | ERAY0_TXENB | O6 | | **ERAY0 output** |
| | CCU60_CC61 | O7 | | **CCU60 output** |
| | IOM_MON1_1 | | | **IOM monitor input** |
| | IOM_REF1_5 | | | **IOM reference input** |

**Table 2-24 Port 11 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 139 | P11.12 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | ETH0_REFCLK | | | **Ethernet input** |
| | ETH0_RXCLKA | | | **Ethernet input** |
| | ETH0_TXCLKB | | | **Ethernet input** |
| | P11.12 | O0 | | **General-purpose output** |
| | TOM0_15 | O1 | | **GTM_TOUT** |
| | TOM1_7 | | | **GTM_TOUT (= DTM5_OUT7)** |
| | TOM0_7 | | | **GTM_TOUT (= DTM1_OUT7)** |
| | TOM1_7 | | | **GTM_TOUT (= DTM5_OUT7)** |
| | ASCLIN1_TX | O2 | | **ASCLIN1 output (aka: ATX1)** |
| | IOM_MON2_13 | | | **IOM monitor input** |
| | IOM_REF2_13 | | | **IOM reference input** |
| | GTM_CLK2 | O3 | | **GTM output** |
| | ERAY0_TXDB | O4 | | **ERAY0 output** |
| | CCU61_CC60 | O5 | | **CCU61 output** |
| | IOM_MON1_8 | | | **IOM monitor input** |
| | IOM_REF1_13 | | | **IOM reference input** |
| | SCU_EXTCLK1 | O6 | | **SCU output** |
| | CCU60_CC60 | O7 | | **CCU60 output** |
| | IOM_MON1_2 | | | **IOM monitor input** |
| | IOM_REF1_6 | | | **IOM reference input** |

**Table 2-25 Port 13 Functions**

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 128 | P13.0 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | CCU60_CTRAPA | | | **CCU60 input** |
| | GPT120_T6EUDB | | | **GPT120 input** |
| | P13.0 | O0 | | **General-purpose output** |
| | TOM0_5 | O1 | | **GTM_TOUT (= DTM1_OUT5)** |
| | TOM1_5 | | | **GTM_TOUT (= DTM5_OUT5)** |
| | TOM0_6N | | | **GTM_TOUT (= DTM1_OUT6_N)** |
| | TOM1_6N | | | **GTM_TOUT (= DTM5_OUT6_N)** |
| | — | O2 | | **Reserved** |
| | QSPI2_SCLK | O3 | | **QSPI2 output (aka: SCLK2)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | ETH0_TXER | O6 | | **Ethernet output** |
| | CAN10_TXD | O7 | | **CAN1 node 0 output (aka: TXDCAN10)** |
| 129 | P13.1 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | CCU60_CCPOS0C | | | **CCU60 input** |
| | GPT120_T3INB | | | **GPT120 input** |
| | CAN10_RXDB | | | **CAN1 node 0 input (aka: RXDCAN10B)** |
| | ETH0_TXCLKC | | | **Ethernet input** |
| | P13.1 | O0 | | **General-purpose output** |
| | TOM0_6 | O1 | | **GTM_TOUT (= DTM1_OUT6)** |
| | TOM1_6 | | | **GTM_TOUT (= DTM5_OUT6)** |
| | TOM0_7 | | | **GTM_TOUT (= DTM1_OUT7)** |
| | TOM1_7 | | | **GTM_TOUT (= DTM5_OUT7)** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-25 Port 13 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 130 | P13.2 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | CCU60_CCPOS1C | | | **CCU60 input** |
| | GPT120_T3EUDB | | | **GPT120 input** |
| | GPT120_CAPINA | | | **GPT120 input** |
| | P13.2 | O0 | | **General-purpose output** |
| | TOM0_7 | O1 | | **GTM_TOUT (= DTM1_OUT7)** |
| | TOM1_7 | | | **GTM_TOUT (= DTM5_OUT7)** |
| | TOM0_7N | | | **GTM_TOUT (= DTM1_OUT7_N)** |
| | TOM1_7N | | | **GTM_TOUT (= DTM5_OUT7_N)** |
| | CAN11_TXD | O2 | | **CAN1 node 1 output (aka: TXDCAN11)** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | ETH0_TXD3 | O6 | | **Ethernet output** |
| | — | O7 | | **Reserved** |
| 131 | P13.3 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | CCU60_CCPOS2C | | | **CCU60 input** |
| | GPT120_T4INB | | | **GPT120 input** |
| | CAN11_RXDB | | | **CAN1 node 1 input (aka: RXDCAN11B)** |
| | P13.3 | O0 | | **General-purpose output** |
| | TOM0_8 | O1 | | **GTM_TOUT** |
| | TOM1_0 | | | **GTM_TOUT** |
| | TOM0_4 | | | **GTM_TOUT (= DTM1_OUT4)** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | — | O2 | | **Reserved** |
| | QSPI2_MTSR | O3 | | **QSPI2 output (aka: MTSR2)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | ETH0_TXD2 | O6 | | **Ethernet output** |
| | — | O7 | | **Reserved** |

**Table 2-26 Port 14 Functions**

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 118 | P14.0 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_3 | | | **GTM_TIN** |
| | P14.0 | O0 | | **General-purpose output** |
| | TOM0_3 | O1 | | **GTM_TOUT** |
| | TOM1_3 | | | **GTM_TOUT** |
| | TOM0_6 | | | **GTM_TOUT (= DTM1_OUT6)** |
| | TOM1_6 | | | **GTM_TOUT (= DTM5_OUT6)** |
| | ASCLIN0_TX | O2 | | **ASCLIN0 output (aka: ATX0)** |
| | IOM_MON2_12 | | | **IOM monitor input** |
| | IOM_REF2_12 | | | **IOM reference input** |
| | ERAY0_TXDA | O3 | | **ERAY0 output** |
| | ERAY0_TXDB | O4 | | **ERAY0 output** |
| | CAN1_TXD | O5 | | **CAN node 1 output (aka: TXDCAN1)** |
| | IOM_MON2_6 | | | **IOM monitor input** |
| | IOM_REF2_6 | | | **IOM reference input** |
| | ASCLIN0_SCLK | O6 | | **ASCLIN0 output (aka: ASCLK0)** |
| | CCU60_COUT62 | O7 | | **CCU60 output** |
| | IOM_MON1_5 | | | **IOM monitor input** |
| | IOM_REF1_1 | | | **IOM reference input** |

**Table 2-26 Port 14 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 119 | P14.1 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_4 | | | **GTM_TIN** |
| | ASCLIN0_RXA | | | **ASCLIN0 input (aka: ARX0A)** |
| | CAN1_RXDB | | | **CAN node 1 input (aka: RXDCAN1B)** |
| | ERAY0_RXDA3 | | | **ERAY0 input** |
| | SCU_REQ15 | | | **SCU input** |
| | ERAY0_RXDB3 | | | **ERAY0 input** |
| | SCU_EVRWUPA | AI | | **SCU input** |
| | P14.1 | O0 | | **General-purpose output** |
| | TOM0_4 | O1 | | **GTM_TOUT (= DTM1_OUT4)** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | TOM0_7 | | | **GTM_TOUT (= DTM1_OUT7)** |
| | TOM1_7 | | | **GTM_TOUT (= DTM5_OUT7)** |
| | IOM_REF1_14 | | | **IOM reference input** |
| | ASCLIN0_TX | O2 | | **ASCLIN0 output (aka: ATX0)** |
| | IOM_MON2_12 | | | **IOM monitor input** |
| | IOM_REF2_12 | | | **IOM reference input** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | CCU60_COUT63 | O7 | | **CCU60 output** |
| | IOM_MON1_6 | | | **IOM monitor input** |
| | IOM_REF1_0 | | | **IOM reference input** |

**Table 2-26 Port 14 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 120 | P14.2 | I | A1 / PU / VDDP3 | **General-purpose input** |
| | TIM0_5 | | | **GTM_TIN** |
| | SCU_HWCFG2_EVR13 | | | **SCU input** |
| | P14.2 | O0 | | **General-purpose output** |
| | TOM0_5 | O1 | | **GTM_TOUT (= DTM1_OUT5)** |
| | TOM1_5 | | | **GTM_TOUT (= DTM5_OUT5)** |
| | TOM0_6N | | | **GTM_TOUT (= DTM1_OUT6_N)** |
| | TOM1_6N | | | **GTM_TOUT (= DTM5_OUT6_N)** |
| | IOM_REF1_15 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | QSPI2_SLSO1 | O3 | | **QSPI2 output (aka: SLSO21)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |
| 121 | P14.3 | I | A1 / PU / VDDP3 | **General-purpose input** |
| | TIM0_6 | | | **GTM_TIN** |
| | SCU_REQ10 | | | **SCU input** |
| | SCU_HWCFG3_BMI | | | **SCU input** |
| | P14.3 | O0 | | **General-purpose output** |
| | TOM0_6 | O1 | | **GTM_TOUT (= DTM1_OUT6)** |
| | TOM1_6 | | | **GTM_TOUT (= DTM5_OUT6)** |
| | IOM_REF2_4 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | QSPI2_SLSO3 | O3 | | **QSPI2 output (aka: SLSO23)** |
| | ASCLIN1_SLSO | O4 | | **ASCLIN1 output (aka: ASLSO1)** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-26 Port 14 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 122 | P14.4 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_7 | | | **GTM_TIN** |
| | P14.4 | O0 | | **General-purpose output** |
| | TOM0_7 | O1 | | **GTM_TOUT (= DTM1_OUT7)** |
| | TOM1_7 | | | **GTM_TOUT (= DTM5_OUT7)** |
| | TOM0_7N | | | **GTM_TOUT (= DTM1_OUT7_N)** |
| | TOM1_7N | | | **GTM_TOUT (= DTM5_OUT7_N)** |
| | IOM_REF2_8 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |
| 123 | P14.5 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_0 | | | **GTM_TIN** |
| | P14.5 | O0 | | **General-purpose output** |
| | TOM0_0 | O1 | | **GTM_TOUT** |
| | TOM1_0 | | | **GTM_TOUT** |
| | IOM_REF2_11 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | ERAY0_TXDB | O6 | | **ERAY0 output** |
| | — | O7 | | **Reserved** |

**Table 2-26 Port 14 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 124 | P14.6 | I | A1+ / PU / VDDP3 | **General-purpose input** |
| | TIM0_1 | | | **GTM_TIN** |
| | SCU_HWCFG0_DCLDO | | | **SCU input** |
| | QSPI0_MRSTD | | | **QSPI0 input (aka: MRST0D)** |
| | P14.6 | O0 | | **General-purpose output** |
| | TOM0_1 | O1 | | **GTM_TOUT** |
| | TOM1_1 | | | **GTM_TOUT** |
| | IOM_REF2_14 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | QSPI2_SLSO2 | O3 | | **QSPI2 output (aka: SLSO22)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | ERAY0_TXENB | O6 | | **ERAY0 output** |
| | — | O7 | | **Reserved** |
| 125 | P14.7 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_0 | | | **GTM_TIN** |
| | ERAY0_RXDB0 | | | **ERAY0 input** |
| | P14.7 | O0 | | **General-purpose output** |
| | TOM0_0 | O1 | | **GTM_TOUT** |
| | IOM_REF2_15 | | | **IOM reference input** |
| | ASCLIN0_RTS | O2 | | **ASCLIN0 output (aka: ARTS0)** |
| | QSPI2_SLSO4 | O3 | | **QSPI2 output (aka: SLSO24)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-26 Port 14 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 127 | P14.8 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | ASCLIN1_RXD | | | **ASCLIN1 input (aka: ARX1D)** |
| | CAN2_RXDD | | | **CAN node 2 input (aka: RXDCAN2D)** |
| | ERAY0_RXDA0 | | | **ERAY0 input** |
| | P14.8 | O0 | | **General-purpose output** |
| | TOM0_2 | O1 | | **GTM_TOUT** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-27 Port 15 Functions**

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 109 | P15.0 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | P15.0 | O0 | | **General-purpose output** |
| | TOM1_3 | O1 | | **GTM_TOUT** |
| | TOM0_11 | | | **GTM_TOUT** |
| | TOM0_7N | | | **GTM_TOUT (= DTM1_OUT7_N)** |
| | TOM1_7N | | | **GTM_TOUT (= DTM5_OUT7_N)** |
| | ASCLIN1_TX | O2 | | **ASCLIN1 output (aka: ATX1)** |
| | IOM_MON2_13 | | | **IOM monitor input** |
| | IOM_REF2_13 | | | **IOM reference input** |
| | QSPI0_SLSO13 | O3 | | **QSPI0 output (aka: SLSO013)** |
| | — | O4 | | **Reserved** |
| | CAN2_TXD | O5 | | **CAN node 2 output (aka: TXDCAN2)** |
| | IOM_MON2_7 | | | **IOM monitor input** |
| | IOM_REF2_7 | | | **IOM reference input** |
| | ASCLIN1_SCLK | O6 | | **ASCLIN1 output (aka: ASCLK1)** |
| | — | O7 | | **Reserved** |

**Table 2-27 Port 15 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 110 | P15.1 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | ASCLIN1_RXA | | | **ASCLIN1 input (aka: ARX1A)** |
| | QSPI2_SLSIB | | | **QSPI2 input (aka: SLSI2B)** |
| | CAN2_RXDA | | | **CAN node 2 input (aka: RXDCAN2A)** |
| | SCU_REQ16 | | | **SCU input** |
| | SCU_EVRWUPB | AI | | **SCU input** |
| | P15.1 | O0 | | **General-purpose output** |
| | TOM1_4 | O1 | | **GTM_TOUT (= DTM5_OUT4)** |
| | TOM0_12 | | | **GTM_TOUT** |
| | TOM0_4 | | | **GTM_TOUT (= DTM1_OUT4)** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | ASCLIN1_TX | O2 | | **ASCLIN1 output (aka: ATX1)** |
| | IOM_MON2_13 | | | **IOM monitor input** |
| | IOM_REF2_13 | | | **IOM reference input** |
| | QSPI2_SLSO5 | O3 | | **QSPI2 output (aka: SLSO25)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |
| 111 | P15.2 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | QSPI2_MRSTE | | | **QSPI2 input (aka: MRST2E)** |
| | QSPI2_SLSIA | | | **QSPI2 input (aka: SLSI2A)** |
| | QSPI2_HSICINA | | | **QSPI2 input (aka: HSIC2INA)** |
| | P15.2 | O0 | | **General-purpose output** |
| | TOM1_5 | O1 | | **GTM_TOUT (= DTM5_OUT5)** |
| | TOM0_13 | | | **GTM_TOUT** |
| | TOM0_4N | | | **GTM_TOUT (= DTM1_OUT4_N)** |
| | TOM1_4N | | | **GTM_TOUT (= DTM5_OUT4_N)** |
| | ASCLIN0_TX | O2 | | **ASCLIN0 output (aka: ATX0)** |
| | IOM_MON2_12 | | | **IOM monitor input** |
| | IOM_REF2_12 | | | **IOM reference input** |
| | QSPI2_SLSO0 | O3 | | **QSPI2 output (aka: SLSO20)** |
| | — | O4 | | **Reserved** |
| | CAN1_TXD | O5 | | **CAN node 1 output (aka: TXDCAN1)** |
| | IOM_MON2_6 | | | **IOM monitor input** |
| | IOM_REF2_6 | | | **IOM reference input** |
| | ASCLIN0_SCLK | O6 | | **ASCLIN0 output (aka: ASCLK0)** |
| | — | O7 | | **Reserved** |

**Table 2-27 Port 15 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 112 | P15.3 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | ASCLIN0_RXB | | | **ASCLIN0 input (aka: ARX0B)** |
| | QSPI2_SCLKA | | | **QSPI2 input (aka: SCLK2A)** |
| | QSPI2_HSICINB | | | **QSPI2 input (aka: HSIC2INB)** |
| | CAN1_RXDA | | | **CAN node 1 input (aka: RXDCAN1A)** |
| | P15.3 | O0 | | **General-purpose output** |
| | TOM1_6 | O1 | | **GTM_TOUT (= DTM5_OUT6)** |
| | TOM0_14 | | | **GTM_TOUT** |
| | TOM0_5 | | | **GTM_TOUT (= DTM1_OUT5)** |
| | TOM1_5 | | | **GTM_TOUT (= DTM5_OUT5)** |
| | ASCLIN0_TX | O2 | | **ASCLIN0 output (aka: ATX0)** |
| | IOM_MON2_12 | | | **IOM monitor input** |
| | IOM_REF2_12 | | | **IOM reference input** |
| | QSPI2_SCLK | O3 | | **QSPI2 output (aka: SCLK2)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |
| 113 | P15.4 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | QSPI2_MRSTA | | | **QSPI2 input (aka: MRST2A)** |
| | SCU_REQ0 | | | **SCU input** |
| | P15.4 | O0 | | **General-purpose output** |
| | TOM1_7 | O1 | | **GTM_TOUT (= DTM5_OUT7)** |
| | TOM0_15 | | | **GTM_TOUT** |
| | ASCLIN1_TX | O2 | | **ASCLIN1 output (aka: ATX1)** |
| | IOM_MON2_13 | | | **IOM monitor input** |
| | IOM_REF2_13 | | | **IOM reference input** |
| | QSPI2_MRST | O3 | | **QSPI2 output (aka: MRST2)** |
| | IOM_MON2_2 | | | **IOM monitor input** |
| | IOM_REF2_2 | | | **IOM reference input** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | CCU60_CC62 | O7 | | **CCU60 output** |
| | IOM_MON1_0 | | | **IOM monitor input** |
| | IOM_REF1_4 | | | **IOM reference input** |

**Table 2-27 Port 15 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 114 | P15.5 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | ASCLIN1_RXB | | | **ASCLIN1 input (aka: ARX1B)** |
| | QSPI2_MTSRA | | | **QSPI2 input (aka: MTSR2A)** |
| | SCU_REQ13 | | | **SCU input** |
| | P15.5 | O0 | | **General-purpose output** |
| | TOM0_0 | O1 | | **GTM_TOUT** |
| | TOM1_0 | | | **GTM_TOUT** |
| | TOM0_5N | | | **GTM_TOUT (= DTM1_OUT5_N)** |
| | TOM1_5N | | | **GTM_TOUT (= DTM5_OUT5_N)** |
| | ASCLIN1_TX | O2 | | **ASCLIN1 output (aka: ATX1)** |
| | IOM_MON2_13 | | | **IOM monitor input** |
| | IOM_REF2_13 | | | **IOM reference input** |
| | QSPI2_MTSR | O3 | | **QSPI2 output (aka: MTSR2)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | CCU60_CC61 | O7 | | **CCU60 output** |
| | IOM_MON1_1 | | | **IOM monitor input** |
| | IOM_REF1_5 | | | **IOM reference input** |
| 115 | P15.6 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_0 | | | **GTM_TIN** |
| | QSPI2_MTSRB | | | **QSPI2 input (aka: MTSR2B)** |
| | P15.6 | O0 | | **General-purpose output** |
| | TOM0_0 | O1 | | **GTM_TOUT** |
| | TOM1_0 | | | **GTM_TOUT** |
| | — | O2 | | **Reserved** |
| | QSPI2_MTSR | O3 | | **QSPI2 output (aka: MTSR2)** |
| | — | O4 | | **Reserved** |
| | QSPI2_SCLK | O5 | | **QSPI2 output (aka: SCLK2)** |
| | — | O6 | | **Reserved** |
| | CCU60_CC60 | O7 | | **CCU60 output** |
| | IOM_MON1_2 | | | **IOM monitor input** |
| | IOM_REF1_6 | | | **IOM reference input** |

**Table 2-27 Port 15 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 116 | P15.7 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_1 | | | **GTM_TIN** |
| | QSPI2_MRSTB | | | **QSPI2 input (aka: MRST2B)** |
| | P15.7 | O0 | | **General-purpose output** |
| | TOM0_1 | O1 | | **GTM_TOUT** |
| | TOM1_1 | | | **GTM_TOUT** |
| | — | O2 | | **Reserved** |
| | QSPI2_MRST | O3 | | **QSPI2 output (aka: MRST2)** |
| | IOM_MON2_2 | | | **IOM monitor input** |
| | IOM_REF2_2 | | | **IOM reference input** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | CCU60_COUT60 | O7 | | **CCU60 output** |
| | IOM_MON1_3 | | | **IOM monitor input** |
| | IOM_REF1_3 | | | **IOM reference input** |
| 117 | P15.8 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_2 | | | **GTM_TIN** |
| | QSPI2_SCLKB | | | **QSPI2 input (aka: SCLK2B)** |
| | SCU_REQ1 | | | **SCU input** |
| | P15.8 | O0 | | **General-purpose output** |
| | TOM0_2 | O1 | | **GTM_TOUT** |
| | TOM1_2 | | | **GTM_TOUT** |
| | — | O2 | | **Reserved** |
| | QSPI2_SCLK | O3 | | **QSPI2 output (aka: SCLK2)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | CCU60_COUT61 | O7 | | **CCU60 output** |
| | IOM_MON1_4 | | | **IOM monitor input** |
| | IOM_REF1_2 | | | **IOM reference input** |

**Table 2-28 Port 20 Functions**

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 93 | P20.0 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_6 | | | **GTM_TIN** |
| | SCU_REQ9 | | | **SCU input** |
| | $\overline{\text{OCDS_TGI0}}$ | | | **OCDS input** |
| | GPT120_T6EUDA | | | **GPT120 input** |
| | CAN11_RXDC | | | **CAN1 node 1 input (aka: RXDCAN11C)** |
| | CAN12_RXDC | | | **CAN1 node 2 input (aka: RXDCAN12C)** |
| | P20.0 | O0 | | **General-purpose output** |
| | TOM0_6 | O1 | | **GTM_TOUT (= DTM1_OUT6)** |
| | TOM1_6 | | | **GTM_TOUT (= DTM5_OUT6)** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |
| | $\overline{\text{OCDS_TGO0}}$ | O | | **OCDS** |
| 94 | P20.2 | I | Input Only / PU / VDDP3 | **General-purpose input** |
| | $\overline{\text{TESTMODE}}$ | | | **Factory Test Mode Enable** |
| 95 | P20.3 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_4 | | | **GTM_TIN** |
| | GPT120_T6INA | | | **GPT120 input** |
| | P20.3 | O0 | | **General-purpose output** |
| | TOM1_12 | O1 | | **GTM_TOUT** |
| | TOM0_4 | | | **GTM_TOUT (= DTM1_OUT4)** |
| | IOM_MON1_14 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | QSPI0_SLSO9 | O3 | | **QSPI0 output (aka: SLSO09)** |
| | QSPI2_SLSO9 | O4 | | **QSPI2 output (aka: SLSO29)** |
| | CAN12_TXD | O5 | | **CAN1 node 2 output (aka: TXDCAN12)** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-28 Port 20 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 100 | P20.6 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_6 | | | **GTM_TIN** |
| | P20.6 | O0 | | **General-purpose output** |
| | TOM1_10 | O1 | | **GTM_TOUT** |
| | TOM0_10 | | | **GTM_TOUT** |
| | IOM_MON1_15 | | | **IOM monitor input** |
| | ASCLIN1_RTS | O2 | | **ASCLIN1 output (aka: ARTS1)** |
| | QSPI0_SLSO8 | O3 | | **QSPI0 output (aka: SLSO08)** |
| | QSPI2_SLSO8 | O4 | | **QSPI2 output (aka: SLSO28)** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |
| 101 | P20.7 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_7 | | | **GTM_TIN** |
| | ASCLIN1_CTSA | | | **ASCLIN1 input (aka: ACTS1A)** |
| | CAN0_RXDB | | | **CAN node 0 input (aka: RXDCAN0B)** |
| | P20.7 | O0 | | **General-purpose output** |
| | TOM1_11 | O1 | | **GTM_TOUT** |
| | TOM0_11 | | | **GTM_TOUT** |
| | IOM_MON2_4 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | CCU61_COUT63 | O7 | | **CCU61 output** |
| | IOM_MON1_7 | | | **IOM monitor input** |
| | IOM_REF1_7 | | | **IOM reference input** |

**Table 2-28 Port 20 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 102 | P20.8 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_7 | | | **GTM_TIN** |
| | P20.8 | O0 | | **General-purpose output** |
| | TOM1_7 | O1 | | **GTM_TOUT (= DTM5_OUT7)** |
| | TOM0_7 | | | **GTM_TOUT (= DTM1_OUT7)** |
| | TOM0_4 | | | **GTM_TOUT (= DTM1_OUT4)** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | IOM_MON2_8 | | | **IOM monitor input** |
| | ASCLIN1_SLSO | O2 | | **ASCLIN1 output (aka: ASLSO1)** |
| | QSPI0_SLSO0 | O3 | | **QSPI0 output (aka: SLSO00)** |
| | QSPI1_SLSO0 | O4 | | **QSPI1 output (aka: SLSO10)** |
| | CAN0_TXD | O5 | | **CAN node 0 output (aka: TXDCAN0)** |
| | IOM_MON2_5 | | | **IOM monitor input** |
| | IOM_REF2_5 | | | **IOM reference input** |
| | SCU_WDT0LCK | O6 | | **SCU output** |
| | CCU61_CC60 | O7 | | **CCU61 output** |
| | IOM_MON1_8 | | | **IOM monitor input** |
| | IOM_REF1_13 | | | **IOM reference input** |
| 103 | P20.9 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | ASCLIN1_RXC | | | **ASCLIN1 input (aka: ARX1C)** |
| | QSPI0_SLSIB | | | **QSPI0 input (aka: SLSI0B)** |
| | SCU_REQ11 | | | **SCU input** |
| | CAN12_RXDE | | | **CAN1 node 2 input (aka: RXDCAN12E)** |
| | P20.9 | O0 | | **General-purpose output** |
| | TOM1_13 | O1 | | **GTM_TOUT** |
| | TOM0_13 | | | **GTM_TOUT** |
| | TOM0_4N | | | **GTM_TOUT (= DTM1_OUT4_N)** |
| | TOM1_4N | | | **GTM_TOUT (= DTM5_OUT4_N)** |
| | IOM_MON2_11 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | QSPI0_SLSO1 | O3 | | **QSPI0 output (aka: SLSO01)** |
| | QSPI1_SLSO1 | O4 | | **QSPI1 output (aka: SLSO11)** |
| | — | O5 | | **Reserved** |
| | SCU_WDTSLCK | O6 | | **SCU output** |
| | CCU61_CC61 | O7 | | **CCU61 output** |
| | IOM_MON1_9 | | | **IOM monitor input** |
| | IOM_REF1_12 | | | **IOM reference input** |

**Table 2-28 Port 20 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 104 | P20.10 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | P20.10 | O0 | | **General-purpose output** |
| | TOM1_14 | O1 | | **GTM_TOUT** |
| | TOM0_14 | | | **GTM_TOUT** |
| | TOM0_5 | | | **GTM_TOUT (= DTM1_OUT5)** |
| | TOM1_5 | | | **GTM_TOUT (= DTM5_OUT5)** |
| | IOM_MON2_14 | | | **IOM monitor input** |
| | ASCLIN1_TX | O2 | | **ASCLIN1 output (aka: ATX1)** |
| | IOM_MON2_13 | | | **IOM monitor input** |
| | IOM_REF2_13 | | | **IOM reference input** |
| | QSPI0_SLSO6 | O3 | | **QSPI0 output (aka: SLSO06)** |
| | QSPI2_SLSO7 | O4 | | **QSPI2 output (aka: SLSO27)** |
| | CAN12_TXD | O5 | | **CAN1 node 2 output (aka: TXDCAN12)** |
| | ASCLIN1_SCLK | O6 | | **ASCLIN1 output (aka: ASCLK1)** |
| | CCU61_CC62 | O7 | | **CCU61 output** |
| | IOM_MON1_10 | | | **IOM monitor input** |
| | IOM_REF1_11 | | | **IOM reference input** |
| 105 | P20.11 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | QSPI0_SCLKA | | | **QSPI0 input (aka: SCLK0A)** |
| | P20.11 | O0 | | **General-purpose output** |
| | TOM1_15 | O1 | | **GTM_TOUT** |
| | TOM0_15 | | | **GTM_TOUT** |
| | TOM0_5N | | | **GTM_TOUT (= DTM1_OUT5_N)** |
| | TOM1_5N | | | **GTM_TOUT (= DTM5_OUT5_N)** |
| | IOM_MON2_15 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | QSPI0_SCLK | O3 | | **QSPI0 output (aka: SCLK0)** |
| | — | O4 | | **Reserved** |
| | CAN11_TXD | O5 | | **CAN1 node 1 output (aka: TXDCAN11)** |
| | — | O6 | | **Reserved** |
| | CCU61_COUT60 | O7 | | **CCU61 output** |
| | IOM_MON1_11 | | | **IOM monitor input** |
| | IOM_REF1_10 | | | **IOM reference input** |

**Table 2-28 Port 20 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 106 | P20.12 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | QSPI0_MRSTA | | | **QSPI0 input (aka: MRST0A)** |
| | CAN11_RXDH | | | **CAN1 node 1 input (aka: RXDCAN11H)** |
| | IOM_PIN13 | | | **IOM pad input** |
| | P20.12 | O0 | | **General-purpose output** |
| | TOM1_0 | O1 | | **GTM_TOUT** |
| | TOM0_8 | | | **GTM_TOUT** |
| | TOM0_6 | | | **GTM_TOUT (= DTM1_OUT6)** |
| | TOM1_6 | | | **GTM_TOUT (= DTM5_OUT6)** |
| | IOM_MON0_13 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | QSPI0_MRST | O3 | | **QSPI0 output (aka: MRST0)** |
| | IOM_MON2_0 | | | **IOM monitor input** |
| | IOM_REF2_0 | | | **IOM reference input** |
| | QSPI0_MTSR | O4 | | **QSPI0 output (aka: MTSR0)** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | CCU61_COUT61 | O7 | | **CCU61 output** |
| | IOM_MON1_12 | | | **IOM monitor input** |
| | IOM_REF1_9 | | | **IOM reference input** |
| 107 | P20.13 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | QSPI0_SLSIA | | | **QSPI0 input (aka: SLSI0A)** |
| | CAN12_RXDH | | | **CAN1 node 2 input (aka: RXDCAN12H)** |
| | IOM_PIN14 | | | **IOM pad input** |
| | P20.13 | O0 | | **General-purpose output** |
| | TOM1_1 | O1 | | **GTM_TOUT** |
| | TOM0_9 | | | **GTM_TOUT** |
| | TOM0_6N | | | **GTM_TOUT (= DTM1_OUT6_N)** |
| | TOM1_6N | | | **GTM_TOUT (= DTM5_OUT6_N)** |
| | IOM_MON0_14 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | QSPI0_SLSO2 | O3 | | **QSPI0 output (aka: SLSO02)** |
| | QSPI1_SLSO2 | O4 | | **QSPI1 output (aka: SLSO12)** |
| | QSPI0_SCLK | O5 | | **QSPI0 output (aka: SCLK0)** |
| | — | O6 | | **Reserved** |
| | CCU61_COUT62 | O7 | | **CCU61 output** |
| | IOM_MON1_13 | | | **IOM monitor input** |
| | IOM_REF1_8 | | | **IOM reference input** |

**Table 2-28 Port 20 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 108 | P20.14 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | QSPI0_MTSRA | | | **QSPI0 input (aka: MTSR0A)** |
| | IOM_PIN15 | | | **IOM pad input** |
| | P20.14 | O0 | | **General-purpose output** |
| | TOM1_2 | O1 | | **GTM_TOUT** |
| | TOM0_10 | | | **GTM_TOUT** |
| | TOM0_7 | | | **GTM_TOUT (= DTM1_OUT7)** |
| | TOM1_7 | | | **GTM_TOUT (= DTM5_OUT7)** |
| | IOM_MON0_15 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | QSPI0_MTSR | O3 | | **QSPI0 output (aka: MTSR0)** |
| | — | O4 | | **Reserved** |
| | CAN12_TXD | O5 | | **CAN1 node 2 output (aka: TXDCAN12)** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-29 Port 21 Functions**

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 84 | P21.2 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_0 | | | **GTM_TIN** |
| | SCU_EMGSTOPB | | | **SCU input** |
| | P21.2 | O0 | | **General-purpose output** |
| | TOM0_0 | O1 | | **GTM_TOUT** |
| | TOM1_0 | | | **GTM_TOUT** |
| | TOM0_4 | | | **GTM_TOUT (= DTM1_OUT4)** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | ETH0_MDC | O5 | | **Ethernet output** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-29 Port 21 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 85 | P21.3 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_1 | | | **GTM_TIN** |
| | ETH0_MDIOD | | | **Ethernet input** |
| | P21.3 | O0 | | **General-purpose output** |
| | TOM0_1 | O1 | | **GTM_TOUT** |
| | TOM1_1 | | | **GTM_TOUT** |
| | TOM0_4N | | | **GTM_TOUT (= DTM1_OUT4_N)** |
| | TOM1_4N | | | **GTM_TOUT (= DTM5_OUT4_N)** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |
| | ETH0_MDIO | O | | **Ethernet output** |
| 86 | P21.4 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_2 | | | **GTM_TIN** |
| | P21.4 | O0 | | **General-purpose output** |
| | TOM0_2 | O1 | | **GTM_TOUT** |
| | TOM1_2 | | | **GTM_TOUT** |
| | TOM0_5 | | | **GTM_TOUT (= DTM1_OUT5)** |
| | TOM1_5 | | | **GTM_TOUT (= DTM5_OUT5)** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-29 Port 21 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 87 | P21.5 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_3 | | | **GTM_TIN** |
| | P21.5 | O0 | | **General-purpose output** |
| | TOM0_3 | O1 | | **GTM_TOUT** |
| | TOM1_3 | | | **GTM_TOUT** |
| | TOM0_5N | | | **GTM_TOUT (= DTM1_OUT5_N)** |
| | TOM1_5N | | | **GTM_TOUT (= DTM5_OUT5_N)** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |
| 88 | P21.6 | I | A1 / PU / VDDP3 | **General-purpose input** |
| | TIM0_4 | | | **GTM_TIN** |
| | TDI | | | **OCDS input** |
| | $\overline{\text{OCDS_TGI2}}$ | | | **OCDS input** |
| | GPT120_T5EUDA | | | **GPT120 input** |
| | P21.6 | O0 | | **General-purpose output** |
| | TOM0_4 | O1 | | **GTM_TOUT (= DTM1_OUT4)** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | GPT120_T3OUT | O7 | | **GPT120 output** |
| | $\overline{\text{OCDS_TGO2}}$ | O | | **OCDS** |

**Table 2-29 Port 21 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 90 | P21.7 | I | A1+ / PU / VDDP3 | **General-purpose input** |
| | TIM0_5 | | | **GTM_TIN** |
| | OCDS_DAP2 | | | **OCDS input** |
| | $\overline{\text{OCDS_TGI3}}$ | | | **OCDS input** |
| | GPT120_T5INA | | | **GPT120 input** |
| | ETH0_RXERB | | | **Ethernet input** |
| | P21.7 | O0 | | **General-purpose output** |
| | TOM0_5 | O1 | | **GTM_TOUT (= DTM1_OUT5)** |
| | TOM1_5 | | | **GTM_TOUT (= DTM5_OUT5)** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | GPT120_T6OUT | O7 | | **GPT120 output** |
| | $\overline{\text{OCDS_TGO3}}$ | O | | **OCDS** |
| | OCDS_DAP2 | O | | **OCDS Output** |
| | TDO | O | | **JTAG Output** |

**Table 2-30 Port 22 Functions**

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 74 | P22.0 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_1 | | | **GTM_TIN** |
| | QSPI3_MTSRE | | | **QSPI3 input (aka: MTSR3E)** |
| | P22.0 | O0 | | **General-purpose output** |
| | TOM0_9 | O1 | | **GTM_TOUT** |
| | TOM1_1 | | | **GTM_TOUT** |
| | — | O2 | | **Reserved** |
| | QSPI3_MTSR | O3 | | **QSPI3 output (aka: MTSR3)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-30 Port 22 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 75 | P22.1 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_0 | | | **GTM_TIN** |
| | QSPI3_MRSTE | | | **QSPI3 input (aka: MRST3E)** |
| | P22.1 | O0 | | **General-purpose output** |
| | TOM0_8 | O1 | | **GTM_TOUT** |
| | TOM1_0 | | | **GTM_TOUT** |
| | TOM0_6 | | | **GTM_TOUT (= DTM1_OUT6)** |
| | TOM1_6 | | | **GTM_TOUT (= DTM5_OUT6)** |
| | — | O2 | | **Reserved** |
| | QSPI3_MRST | O3 | | **QSPI3 output (aka: MRST3)** |
| | IOM_MON2_3 | | | **IOM monitor input** |
| | IOM_REF2_3 | | | **IOM reference input** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |
| 76 | P22.2 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_3 | | | **GTM_TIN** |
| | QSPI3_SLSID | | | **QSPI3 input (aka: SLSI3D)** |
| | P22.2 | O0 | | **General-purpose output** |
| | TOM0_11 | O1 | | **GTM_TOUT** |
| | TOM1_3 | | | **GTM_TOUT** |
| | TOM0_6N | | | **GTM_TOUT (= DTM1_OUT6_N)** |
| | TOM1_6N | | | **GTM_TOUT (= DTM5_OUT6_N)** |
| | — | O2 | | **Reserved** |
| | QSPI3_SLSO12 | O3 | | **QSPI3 output (aka: SLSO312)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-30 Port 22 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 77 | P22.3 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_4 | | | **GTM_TIN** |
| | QSPI3_SCLKE | | | **QSPI3 input (aka: SCLK3E)** |
| | P22.3 | O0 | | **General-purpose output** |
| | TOM0_12 | O1 | | **GTM_TOUT** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | TOM0_7 | | | **GTM_TOUT (= DTM1_OUT7)** |
| | TOM1_7 | | | **GTM_TOUT (= DTM5_OUT7)** |
| | — | O2 | | **Reserved** |
| | QSPI3_SCLK | O3 | | **QSPI3 output (aka: SCLK3)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |
| 78 | P22.4 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | P22.4 | O0 | | **General-purpose output** |
| | TOM0_7N | O1 | | **GTM_TOUT (= DTM1_OUT7_N)** |
| | TOM1_7N | | | **GTM_TOUT (= DTM5_OUT7_N)** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | QSPI0_SLSO12 | O4 | | **QSPI0 output (aka: SLSO012)** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-31 Port 23 Functions**

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 73 | P23.1 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_6 | | | **GTM_TIN** |
| | P23.1 | O0 | | **General-purpose output** |
| | TOM0_6 | O1 | | **GTM_TOUT (= DTM1_OUT6)** |
| | TOM0_15 | | | **GTM_TOUT** |
| | ASCLIN1_RTS | O2 | | **ASCLIN1 output (aka: ARTS1)** |
| | QSPI3_SLSO13 | O3 | | **QSPI3 output (aka: SLSO313)** |
| | GTM_CLK0 | O4 | | **GTM output** |
| | SCU_EXTCLK1 | O5 | | **SCU output** |
| | SCU_EXTCLK0 | O6 | | **SCU output** |
| | — | O7 | | **Reserved** |

**Table 2-32 Port 33 Functions**

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 56 | P33.0 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_4 | | | **GTM_TIN** |
| | IOM_PIN0 | | | **IOM pad input** |
| | P33.0 | O0 | | **General-purpose output** |
| | TOM0_4 | O1 | | **GTM_TOUT (= DTM1_OUT4)** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | IOM_MON0_0 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | VADC_G1BFL0 | O6 | | **VADC output** |
| | — | O7 | | **Reserved** |

**Table 2-32 Port 33 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 57 | P33.1 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_5 | | | **GTM_TIN** |
| | IOM_PIN1 | | | **IOM pad input** |
| | P33.1 | O0 | | **General-purpose output** |
| | TOM0_5 | O1 | | **GTM_TOUT (= DTM1_OUT5)** |
| | TOM1_5 | | | **GTM_TOUT (= DTM5_OUT5)** |
| | IOM_MON0_1 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | VADC_EMUX02 | O5 | | **VADC output** |
| | VADC_G1BFL1 | O6 | | **VADC output** |
| | — | O7 | | **Reserved** |
| 58 | P33.2 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_6 | | | **GTM_TIN** |
| | IOM_PIN2 | | | **IOM pad input** |
| | P33.2 | O0 | | **General-purpose output** |
| | TOM0_6 | O1 | | **GTM_TOUT (= DTM1_OUT6)** |
| | TOM1_6 | | | **GTM_TOUT (= DTM5_OUT6)** |
| | IOM_MON0_2 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | VADC_EMUX01 | O5 | | **VADC output** |
| | VADC_G1BFL2 | O6 | | **VADC output** |
| | CCU61_COUT63 | O7 | | **CCU61 output** |
| | IOM_MON1_7 | | | **IOM monitor input** |
| | IOM_REF1_7 | | | **IOM reference input** |

**Table 2-32 Port 33 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 59 | P33.3 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_7 | | | **GTM_TIN** |
| | IOM_PIN3 | | | **IOM pad input** |
| | P33.3 | O0 | | **General-purpose output** |
| | TOM0_7 | O1 | | **GTM_TOUT (= DTM1_OUT7)** |
| | TOM1_7 | | | **GTM_TOUT (= DTM5_OUT7)** |
| | IOM_MON0_3 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | VADC_EMUX00 | O5 | | **VADC output** |
| | VADC_G1BFL3 | O6 | | **VADC output** |
| | CCU61_CC60 | O7 | | **CCU61 output** |
| | IOM_MON1_8 | | | **IOM monitor input** |
| | IOM_REF1_13 | | | **IOM reference input** |
| 60 | P33.4 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_0 | | | **GTM_TIN** |
| | CCU61_CTRAPC | | | **CCU61 input** |
| | IOM_PIN4 | | | **IOM pad input** |
| | P33.4 | O0 | | **General-purpose output** |
| | TOM0_0 | O1 | | **GTM_TOUT** |
| | TOM1_0 | | | **GTM_TOUT** |
| | IOM_MON0_4 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | VADC_EMUX12 | O5 | | **VADC output** |
| | VADC_G0BFL0 | O6 | | **VADC output** |
| | — | O7 | | **Reserved** |

**Table 2-32 Port 33 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 61 | P33.5 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_1 | | | **GTM_TIN** |
| | CCU61_CCPOS2C | | | **CCU61 input** |
| | GPT120_T4EUDB | | | **GPT120 input** |
| | IOM_PIN5 | | | **IOM pad input** |
| | P33.5 | O0 | | **General-purpose output** |
| | TOM0_1 | O1 | | **GTM_TOUT** |
| | TOM1_1 | | | **GTM_TOUT** |
| | TOM0_5 | | | **GTM_TOUT (= DTM1_OUT5)** |
| | TOM1_5 | | | **GTM_TOUT (= DTM5_OUT5)** |
| | IOM_MON0_5 | | | **IOM monitor input** |
| | QSPI0_SLSO7 | O2 | | **QSPI0 output (aka: SLSO07)** |
| | QSPI1_SLSO7 | O3 | | **QSPI1 output (aka: SLSO17)** |
| | — | O4 | | **Reserved** |
| | VADC_EMUX11 | O5 | | **VADC output** |
| | VADC_G0BFL1 | O6 | | **VADC output** |
| | CCU61_CC60 | O7 | | **CCU61 output** |
| | IOM_MON1_8 | | | **IOM monitor input** |
| | IOM_REF1_13 | | | **IOM reference input** |

**Table 2-32 Port 33 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 62 | P33.6 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_2 | | | **GTM_TIN** |
| | ASCLIN1_RXF | | | **ASCLIN1 input (aka: ARX1F)** |
| | CCU61_CCPOS1C | | | **CCU61 input** |
| | GPT120_T2EUDB | | | **GPT120 input** |
| | CAN10_RXDH | | | **CAN1 node 0 input (aka: RXDCAN10H)** |
| | IOM_PIN6 | | | **IOM pad input** |
| | P33.6 | O0 | | **General-purpose output** |
| | TOM0_2 | O1 | | **GTM_TOUT** |
| | TOM1_2 | | | **GTM_TOUT** |
| | TOM0_5N | | | **GTM_TOUT (= DTM1_OUT5_N)** |
| | TOM1_5N | | | **GTM_TOUT (= DTM5_OUT5_N)** |
| | IOM_MON0_6 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | ASCLIN1_TX | O4 | | **ASCLIN1 output (aka: ATX1)** |
| | IOM_MON2_13 | | | **IOM monitor input** |
| | IOM_REF2_13 | | | **IOM reference input** |
| | VADC_EMUX10 | O5 | | **VADC output** |
| | VADC_G0BFL2 | O6 | | **VADC output** |
| | CCU61_CC61 | O7 | | **CCU61 output** |
| | IOM_MON1_9 | | | **IOM monitor input** |
| | IOM_REF1_12 | | | **IOM reference input** |
| | HSM_HSM1 | O | | **HSM output** |

**Table 2-32 Port 33 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 63 | P33.7 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_3 | | | **GTM_TIN** |
| | CAN0_RXDE | | | **CAN node 0 input (aka: RXDCAN0E)** |
| | SCU_REQ8 | | | **SCU input** |
| | CCU61_CCPOS0C | | | **CCU61 input** |
| | GPT120_T2INB | | | **GPT120 input** |
| | IOM_PIN7 | | | **IOM pad input** |
| | P33.7 | O0 | | **General-purpose output** |
| | TOM0_3 | O1 | | **GTM_TOUT** |
| | TOM1_3 | | | **GTM_TOUT** |
| | TOM0_6 | | | **GTM_TOUT (= DTM1_OUT6)** |
| | TOM1_6 | | | **GTM_TOUT (= DTM5_OUT6)** |
| | IOM_MON0_7 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | QSPI3_SLSO7 | O3 | | **QSPI3 output (aka: SLSO37)** |
| | — | O4 | | **Reserved** |
| | CAN10_TXD | O5 | | **CAN1 node 0 output (aka: TXDCAN10)** |
| | VADC_G0BFL3 | O6 | | **VADC output** |
| | CCU61_COUT60 | O7 | | **CCU61 output** |
| | IOM_MON1_11 | | | **IOM monitor input** |
| | IOM_REF1_10 | | | **IOM reference input** |
| | HSM_HSM2 | O | | **HSM output** |

**Table 2-32 Port 33 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 64 | P33.8 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_4 | | | **GTM_TIN** |
| | SCU_EMGSTOPA | | | **SCU input** |
| | IOM_PIN8 | | | **IOM pad input** |
| | P33.8 | O0 | | **General-purpose output** |
| | TOM0_4 | O1 | | **GTM_TOUT (= DTM1_OUT4)** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | TOM0_6N | | | **GTM_TOUT (= DTM1_OUT6_N)** |
| | TOM1_6N | | | **GTM_TOUT (= DTM5_OUT6_N)** |
| | IOM_MON0_8 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | QSPI3_SLSO2 | O3 | | **QSPI3 output (aka: SLSO32)** |
| | — | O4 | | **Reserved** |
| | CAN0_TXD | O5 | | **CAN node 0 output (aka: TXDCAN0)** |
| | IOM_MON2_5 | | | **IOM monitor input** |
| | IOM_REF2_5 | | | **IOM reference input** |
| | — | O6 | | **Reserved** |
| | CCU61_COUT62 | O7 | | **CCU61 output** |
| | IOM_MON1_13 | | | **IOM monitor input** |
| | IOM_REF1_8 | | | **IOM reference input** |
| | SMU_FSP | O | | **SMU** |

**Table 2-32 Port 33 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 65 | P33.9 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_1 | | | **GTM_TIN** |
| | QSPI3_HSICINA | | | **QSPI3 input** |
| | IOM_PIN9 | | | **IOM pad input** |
| | P33.9 | O0 | | **General-purpose output** |
| | TOM0_1 | O1 | | **GTM_TOUT** |
| | TOM1_1 | | | **GTM_TOUT** |
| | TOM0_7 | | | **GTM_TOUT (= DTM1_OUT7)** |
| | TOM1_7 | | | **GTM_TOUT (= DTM5_OUT7)** |
| | IOM_MON0_9 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | QSPI3_SLSO1 | O3 | | **QSPI3 output (aka: SLSO31)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | CCU61_CC62 | O7 | | **CCU61 output** |
| | IOM_MON1_10 | | | **IOM monitor input** |
| | IOM_REF1_11 | | | **IOM reference input** |
| 66 | P33.10 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_0 | | | **GTM_TIN** |
| | QSPI3_SLSIC | | | **QSPI3 input (aka: SLSI3C)** |
| | QSPI3_HSICINB | | | **QSPI3 input** |
| | IOM_PIN10 | | | **IOM pad input** |
| | P33.10 | O0 | | **General-purpose output** |
| | TOM0_0 | O1 | | **GTM_TOUT** |
| | TOM1_0 | | | **GTM_TOUT** |
| | TOM0_7N | | | **GTM_TOUT (= DTM1_OUT7_N)** |
| | TOM1_7N | | | **GTM_TOUT (= DTM5_OUT7_N)** |
| | IOM_MON0_10 | | | **IOM monitor input** |
| | QSPI1_SLSO6 | O2 | | **QSPI1 output (aka: SLSO16)** |
| | QSPI3_SLSO11 | O3 | | **QSPI3 output (aka: SLSO311)** |
| | ASCLIN1_SLSO | O4 | | **ASCLIN1 output (aka: ASLSO1)** |
| | GTM_CLK1 | O5 | | **GTM output** |
| | SCU_EXTCLK1 | O6 | | **SCU output** |
| | CCU61_COUT61 | O7 | | **CCU61 output** |
| | IOM_MON1_12 | | | **IOM monitor input** |
| | IOM_REF1_9 | | | **IOM reference input** |

**Table 2-32 Port 33 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 67 | P33.11 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_2 | | | **GTM_TIN** |
| | QSPI3_SCLKD | | | **QSPI3 input (aka: SCLK3D)** |
| | SCU_REQ17 | | | **SCU input** |
| | IOM_PIN11 | | | **IOM pad input** |
| | P33.11 | O0 | | **General-purpose output** |
| | TOM0_2 | O1 | | **GTM_TOUT** |
| | TOM1_2 | | | **GTM_TOUT** |
| | IOM_MON0_11 | | | **IOM monitor input** |
| | ASCLIN1_SCLK | O2 | | **ASCLIN1 output (aka: ASCLK1)** |
| | QSPI3_SCLK | O3 | | **QSPI3 output (aka: SCLK3)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | SMPS_DCDCSYNC | O6 | | **SCU output** |
| | CCU61_CC61 | O7 | | **CCU61 output** |
| | IOM_MON1_9 | | | **IOM monitor input** |
| | IOM_REF1_12 | | | **IOM reference input** |
| | SMPS_DCDCSYNC | O | | **SCU output** |
| 68 | P33.12 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_0 | | | **GTM_TIN** |
| | QSPI3_MTSRD | | | **QSPI3 input (aka: MTSR3D)** |
| | IOM_PIN12 | | | **IOM pad input** |
| | P33.12 | O0 | | **General-purpose output** |
| | TOM1_12 | O1 | | **GTM_TOUT** |
| | TOM0_12 | | | **GTM_TOUT** |
| | IOM_MON0_12 | | | **IOM monitor input** |
| | ASCLIN1_TX | O2 | | **ASCLIN1 output (aka: ATX1)** |
| | IOM_MON2_13 | | | **IOM monitor input** |
| | IOM_REF2_13 | | | **IOM reference input** |
| | QSPI3_MTSR | O3 | | **QSPI3 output (aka: MTSR3)** |
| | ASCLIN1_SCLK | O4 | | **ASCLIN1 output (aka: ASCLK1)** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | CCU61_COUT60 | O7 | | **CCU61 output** |
| | IOM_MON1_11 | | | **IOM monitor input** |
| | IOM_REF1_10 | | | **IOM reference input** |

**Table 2-33 Port 34 Functions**

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 52 | P34.0 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | P34.0 | O0 | | **General-purpose output** |
| | TOM1_12 | O1 | | **GTM_TOUT** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |
| 53 | P34.1 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | P34.1 | O0 | | **General-purpose output** |
| | TOM1_13 | O1 | | **GTM_TOUT** |
| | ASCLIN0_TX | O2 | | **ASCLIN0 output (aka: ATX0)** |
| | IOM_MON2_12 | | | **IOM monitor input** |
| | IOM_REF2_12 | | | **IOM reference input** |
| | — | O3 | | **Reserved** |
| | CAN0_TXD | O4 | | **CAN node 0 output (aka: TXDCAN0)** |
| | IOM_MON2_5 | | | **IOM monitor input** |
| | IOM_REF2_5 | | | **IOM reference input** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |
| 54 | P34.2 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | ASCLIN0_RXD | | | **ASCLIN0 input (aka: ARX0D)** |
| | CAN0_RXDG | | | **CAN node 0 input (aka: RXDCAN0G)** |
| | P34.2 | O0 | | **General-purpose output** |
| | TOM1_14 | O1 | | **GTM_TOUT** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-33 Port 34 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 55 | P34.3 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | ASCLIN1_CTSB | | | **ASCLIN1 input (aka: ACTS1B)** |
| | P34.3 | O0 | | **General-purpose output** |
| | TOM1_15 | O1 | | **GTM_TOUT** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | QSPI2_SLSO10 | O4 | | **QSPI2 output (aka: SLSO210)** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-34 Port 40 Functions**

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 51 | P40.0 | I | S / VDDM | **General-purpose input** |
| | VADCG0_0 | AI | | **VADC input channel 0 of group 0** |
| 50 | P40.1 | I | S / VDDM | **General-purpose input** |
| | VADCG0_1 | AI | | **VADC input channel 1 of group 0** (with multiplexer diagnostics) |
| | VADCG2_0 | | | **VADC input channel 0 of group 2** |
| 49 | P40.2 | I | S / VDDM | **General-purpose input** |
| | VADCG0_2 | AI | | **VADC input channel 2 of group 0** (with multiplexer diagnostics) |
| 48 | P40.3 | I | S / VDDM | **General-purpose input** |
| | VADCG0_3 | AI | | **VADC input channel 3 of group 0** |
| 47 | P40.4 | I | S / VDDM | **General-purpose input** |
| | VADCG0_4 | AI | | **VADC input channel 4 of group 0** |
| 46 | P40.5 | I | S / VDDM | **General-purpose input** |
| | VADCG0_5 | AI | | **VADC input channel 5 of group 0** |
| 45 | P40.6 | I | S / VDDM | **General-purpose input** |
| | VADCG0_6 | AI | | **VADC input channel 6 of group 0** |
| 40 | P40.7 | I | S / VDDM | **General-purpose input** |
| | VADCG0_7 | AI | | **VADC input channel 7 of group 0** (with pull down diagnostics) |
| 39 | P40.8 | I | S / VDDM | **General-purpose input** |
| | VADCG0_8 | AI | | **VADC input channel 8 of group 0** |
| 38 | P40.9 | I | S / VDDM | **General-purpose input** |
| | VADCG0_9 | AI | | **VADC input channel 9 of group 0** (with multiplexer diagnostics) |

**Table 2-34 Port 40 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 37 | P40.10 | I | S / VDDM | **General-purpose input** |
| | VADCG0_10 | AI | | **VADC input channel 10 of group 0** (with multiplexer diagnostics) |
| 36 | P40.11 | I | S / VDDM | **General-purpose input** |
| | SENT_SENT0A | | | **SENT input** |
| | CCU60_CCPOS0D | | | **CCU60 input** |
| | VADCG0_11 | AI | | **VADC input channel 11 of group 0** |

**Table 2-35 Port 41 Functions**

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 35 | P41.0 | I | S / VDDM | **General-purpose input** |
| | SENT_SENT1A | | | **SENT input** |
| | CCU60_CCPOS1B | | | **CCU60 input** |
| | VADCG1_0 | AI | | **VADC input channel 0 of group 1** |
| 34 | P41.1 | I | S / VDDM | **General-purpose input** |
| | VADCG1_1 | AI | | **VADC input channel 1 of group 1** (with multiplexer diagnostics) |
| | VADCG3_0 | | | **VADC input channel 0 of group 3** |
| 33 | P41.2 | I | S / VDDM | **General-purpose input** |
| | SENT_SENT2A | | | **SENT input** |
| | CCU61_CCPOS1B | | | **CCU61 input** |
| | VADCG1_2 | AI | | **VADC input channel 2 of group 1** (with multiplexer diagnostics) |
| 32 | P41.3 | I | S / VDDM | **General-purpose input** |
| | SENT_SENT3A | | | **SENT input** |
| | CCU61_CCPOS1D | | | **CCU61 input** |
| | VADCG1_3 | AI | | **VADC input channel 3 of group 1** (with pull down diagnostics) |
| 31 | P41.4 | I | S / VDDM | **General-purpose input** |
| | VADCG1_4 | AI | | **VADC input channel 4 of group 1** |
| 30 | P41.5 | I | S / VDDM | **General-purpose input** |
| | VADCG1_5 | AI | | **VADC input channel 5 of group 1** |
| 29 | P41.6 | I | S / VDDM | **General-purpose input** |
| | VADCG1_6 | AI | | **VADC input channel 6 of group 1** |
| 28 | P41.7 | I | S / VDDM | **General-purpose input** |
| | VADCG1_7 | AI | | **VADC input channel 7 of group 1** |
| 27 | P41.8 | I | S / VDDM | **General-purpose input** |
| | VADCG1_8 | AI | | **VADC input channel 8 of group 1** |

**Table 2-35 Port 41 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 26 | P41.9 | I | S / VDDM | **General-purpose input** |
| | VADCG1_9 | AI | | **VADC input channel 9 of group 1** (with multiplexer diagnostics) |
| 25 | P41.10 | I | S / VDDM | **General-purpose input** |
| | VADCG1_10 | AI | | **VADC input channel 10 of group 1** (with multiplexer diagnostics) |
| 24 | P41.11 | I | S / VDDM | **General-purpose input** |
| | VADCG1_11 | AI | | **VADC input channel 11 of group 1** |

**Table 2-36 System I/O**

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 81 | XTAL1 | I | VDDP3 | **Main Oscillator/PLL/Clock Generator Input** |
| 82 | XTAL2 | O | VDDP3 | **Main Oscillator/PLL/Clock Generator Output** |
| 89 | TMS/DAP1 | I | A1+ / PD / VDDP3 | **Debug Interface** |
| | DAP1 | I/O | | **Device Access Port LIne 1** |
| 91 | $\overline{\text{TRST}}$ | I | Input Only / PD / VDDP3 | **JTAG Module Reset/Enable Input** |
| 92 | TCK/DAP0 | I | Input Only / PD / VDDP3 | **OCDS input** |
| | DAP0 | I | | **Device Access Port LIne 0** |
| 96 | $\overline{\text{ESR1}}$ | I/O | A1+ / PU / VDDP3 | **SCU input** |
| | EVRWUP | I | | **EVR Wakeup Pin** |
| 97 | $\overline{\text{PORST}}$ | I | Input Only / PD / VDDP3 | **Power On Reset** Additional strong PD in case of power fail. |
| 98 | $\overline{\text{ESR0}}$ | I/O | A1+ / OD / VDDP3 | **SCU input/output** |
| | EVRWUP | I | | **EVR Wakeup Pin** |

**Table 2-37 Supply**

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 41 | $V_{AGND}$ | I | — | **Negative Analog Reference Voltage 0** |
| 42 | $V_{AREF}$ | I | — | **Positive Analog Reference Voltage 0** |
| 126 | $V_{DDP3}$ | I | — | **Digital I/O Power Supply (3.3V)** This pin supplies also the Flash 3.3V. |
| 69 | $V_{DDP3}$ | I | — | **Digital I/O Power Supply (3.3V)** |
| 70 | $V_{DD}$ | I | — | **Digital Core Power Supply (1.3V)** Output of EVR13. |

**Table 2-37 Supply** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 79 | $V_{DD}$ | I | — | **Digital Core Power Supply (1.3V)**<br>This pin supplies also the main XTAL Oscillator/PLL (1.3V). A higher decoupling capacitor is therefore recommended to the VSS pin for better noise immunity. |
| 83 | $V_{DDP3}$ | I | — | **Digital I/O Power Supply (3.3V)**<br>This pin supplies also the main XTAL Oscillator/PLL (3.3V). A higher decoupling capacitor is therefore recommended to the VSS pin for better noise immunity. |
| 44 | $V_{DDM}$ | I | — | **ADC Power Supply (5.0V)** |
| 23 | $V_{DDP3}$ | I | — | **Digital I/O Power Supply (3.3V)** |
| 10 | $V_{DD}/V_{DDSB}$ | I | — | **Digital Core Power Supply (1.3V)** |
| 22 | $V_{DD}$ | I | — | **Digital Core Power Supply (1.3V)** |
| 99 | $V_{DD}$ | I | — | **Digital Core Power Supply (1.3V)** |
| 43 | $V_{SSM}$ | I | — | **Analog Ground for VDDM** |
| 80 | $V_{SS}$ | I | — | **Digital Ground** |

### 2.2.2 Pull-Up/Pull-Down Reset Behavior of the Pins

**Table 2-38 List of Pull-Up/Pull-Down Reset Behavior of the Pins**

| Pins | $\overline{\text{PORST}}$ = 0 | $\overline{\text{PORST}}$ = 1 |
|---|---|---|
| all GPIOs | High-Z | |
| TDI, $\overline{\text{TESTMODE}}$ | Pull-up | |
| $\overline{\text{PORST}}$[1)] | Pull-down with $I_{PORST}$ relevant | Pull-down with $I_{PDLI}$ relevant |
| $\overline{\text{TRST}}$, TCK, TMS | Pull-down | |
| $\overline{\text{ESR0}}$ | The open-drain driver is used to drive low.[2)] | Pull-up[3)] |
| $\overline{\text{ESR1}}$ | Pull-up[3)] | |
| P14.2, P14.3, P14.6 | Pull-up | |
| P21.7 / TDO | Pull-up | High-Z/Pull-up[4)] |

1) Pull-down with $I_{PORST}$ relevant is always activated when a primary supply monitor detects a violation.
2) Valid additionally after deactivation of $\overline{\text{PORST}}$ until the internal reset phase has finished. See the SCU chapter for details.
3) See the SCU_IOCR register description.
4) Depends on JTAG/DAP selection with $\overline{\text{TRST}}$.

## 2.3 PG-TQFP-100-23 Package Variant Pin Configuration of TC233x

**Figure 2-1** is showing the TC233x pinout for the package variant: PG-TQFP-100-23.

**Figure 2-3 TC233x Pinout for the package variant PG-TQFP-100-23.**

## 2.3.1 Port Functions and Pinning Tables

### 2.3.1.1 How to Read the Following Port Function Tables

Some hints for interpreting the following tables.

**Column "Ctrl.":**

I = Input (for GPIO port Lines with IOCR bit field Selection PCx = $0XXX_B$)

AI = Analog input

O = Output
O0 = Output with IOCR bit field selection PCx = $1X000_B$
O1 = Output with IOCR bit field selection PCx = $1X001_B$ (ALT1)
O2 = Output with IOCR bit field selection PCx = $1X010_B$ (ALT2)
O3 = Output with IOCR bit field selection PCx = $1X011_B$ (ALT3)
O4 = Output with IOCR bit field selection PCx = $1X100_B$ (ALT4)
O5 = Output with IOCR bit field selection PCx = $1X101_B$ (ALT5)
O6 = Output with IOCR bit field selection PCx = $1X110_B$ (ALT6)
O7 = Output with IOCR bit field selection PCx = $1X111_B$ (ALT7)

**Table 2-39 Example Port Table**

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 10 | Pxx.y | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIMm_n | | | **GTM_TIN** |
| | TOMa_b | O1 | | **GTM_TOUT** |
| | TOMc_d | | | **GTM_TOUT** |
| | IOM_REFv_w | | | **IOM reference input** |
| | ASCLINz_RTS | O2 | | **ASCLIN0 output (aka ARTSz)** |

To each input several functions can be connected. The peripherals' configuration defines if this input is used.

The port module (see corresponding chapter) decides which of the 8 output signals O0 to O7 drives the pad.

Some Ox rows list more than one function, e.g. several GTM_TOUT outputs and IOM reference inputs. The GTM module (see corresponding chapter) has its own sub-multiplexer structure that defines which of the GTM sub-units drives this signal. Additionally the IOM modules "listens" on these output signals (see IOM chapter).

Some pin symbol names were changed in this AURIX device compared to other AURIX devices to improve naming systematics. The previously used symbol name is documented in the "Function" column with the text "(aka …)"[1].

**Column "Type":**

IN = Input only
A1 = Pad class A1 (3.3V)
A1+ = Pad class A1+ (3.3V)
S = ADC with digital input. Pad class D for analog input "AI", pad class S for digital input "I".

PU = with pull-up device connected during reset ($\overline{PORST}$ = 0)
PD = with pull-down device connected during reset ($\overline{PORST}$ = 0)

1) "aka" as abbreviation for "also known as".

High-Z = High-Z during reset ($\overline{PORST}$ = 0)
$V_x$ = Supply (the Exposed Pad is also considered as VSS and shall be connected to ground)

### 2.3.1.2 Tables

Port function and pinning tables.

**Table 2-40 Port 00 Functions**

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 10 | P00.0 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_0 | | | **GTM_TIN** |
| | CCU61_CTRAPA | | | **CCU61 input** |
| | CCU60_T12HRE | | | **CCU60 input** |
| | P00.0 | O0 | | **General-purpose output** |
| | TOM0_8 | O1 | | **GTM_TOUT** |
| | TOM1_0 | | | **GTM_TOUT** |
| | TOM0_4 | | | **GTM_TOUT (= DTM1_OUT4)** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | IOM_REF0_9 | | | **IOM reference input** |
| | ASCLIN0_SCLK | O2 | | **ASCLIN0 output (aka: ASCLK0)** |
| | ASCLIN0_TX | O3 | | **ASCLIN0 output (aka: ATX0)** |
| | IOM_MON2_12 | | | **IOM monitor input** |
| | IOM_REF2_12 | | | **IOM reference input** |
| | — | O4 | | **Reserved** |
| | CAN1_TXD | O5 | | **CAN node 1 output (aka: TXDCAN1)** |
| | IOM_MON2_6 | | | **IOM monitor input** |
| | IOM_REF2_6 | | | **IOM reference input** |
| | — | O6 | | **Reserved** |
| | CCU60_COUT63 | O7 | | **CCU60 output** |
| | IOM_MON1_6 | | | **IOM monitor input** |
| | IOM_REF1_0 | | | **IOM reference input** |

**Table 2-41 Port 02 Functions**

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 1 | P02.0 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_0 | | | **GTM_TIN** |
| | SCU_REQ6 | | | **SCU input** |
| | CCU60_CC60INA | | | **CCU60 input** |
| | CCU61_CC60INB | | | **CCU61 input** |
| | P02.0 | O0 | | **General-purpose output** |
| | TOM0_8 | O1 | | **GTM_TOUT** |
| | TOM1_8 | | | **GTM_TOUT** |
| | TOM0_4 | | | **GTM_TOUT (= DTM1_OUT4)** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | IOM_REF0_0 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | QSPI3_SLSO1 | O3 | | **QSPI3 output (aka: SLSO31)** |
| | — | O4 | | **Reserved** |
| | CAN0_TXD | O5 | | **CAN node 0 output (aka: TXDCAN0)** |
| | IOM_MON2_5 | | | **IOM monitor input** |
| | IOM_REF2_5 | | | **IOM reference input** |
| | ERAY0_TXDA | O6 | | **ERAY0 output** |
| | CCU60_CC60 | O7 | | **CCU60 output** |
| | IOM_MON1_2 | | | **IOM monitor input** |
| | IOM_REF1_6 | | | **IOM reference input** |

**Table 2-41 Port 02 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 2 | P02.1 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_1 | | | **GTM_TIN** |
| | CAN0_RXDA | | | **CAN node 0 input (aka: RXDCAN0A)** |
| | ERAY0_RXDA2 | | | **ERAY0 input** |
| | SCU_REQ14 | | | **SCU input** |
| | P02.1 | O0 | | **General-purpose output** |
| | TOM0_9 | O1 | | **GTM_TOUT** |
| | TOM1_9 | | | **GTM_TOUT** |
| | TOM0_4N | | | **GTM_TOUT (= DTM1_OUT4_N)** |
| | TOM1_4N | | | **GTM_TOUT (= DTM5_OUT4_N)** |
| | IOM_REF0_1 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | QSPI3_SLSO2 | O3 | | **QSPI3 output (aka: SLSO32)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | CCU60_COUT60 | O7 | | **CCU60 output** |
| | IOM_MON1_3 | | | **IOM monitor input** |
| | IOM_REF1_3 | | | **IOM reference input** |

**Table 2-41 Port 02 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 3 | P02.2 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_2 | | | **GTM_TIN** |
| | CCU60_CC61INA | | | **CCU60 input** |
| | CCU61_CC61INB | | | **CCU61 input** |
| | P02.2 | O0 | | **General-purpose output** |
| | TOM0_10 | O1 | | **GTM_TOUT** |
| | TOM1_10 | | | **GTM_TOUT** |
| | TOM0_5 | | | **GTM_TOUT (= DTM1_OUT5)** |
| | TOM1_5 | | | **GTM_TOUT (= DTM5_OUT5)** |
| | IOM_REF0_2 | | | **IOM reference input** |
| | ASCLIN1_TX | O2 | | **ASCLIN1 output (aka: ATX1)** |
| | IOM_MON2_13 | | | **IOM monitor input** |
| | IOM_REF2_13 | | | **IOM reference input** |
| | QSPI3_SLSO3 | O3 | | **QSPI3 output (aka: SLSO33)** |
| | — | O4 | | **Reserved** |
| | CAN2_TXD | O5 | | **CAN node 2 output (aka: TXDCAN2)** |
| | IOM_MON2_7 | | | **IOM monitor input** |
| | IOM_REF2_7 | | | **IOM reference input** |
| | ERAY0_TXDB | O6 | | **ERAY0 output** |
| | CCU60_CC61 | O7 | | **CCU60 output** |
| | IOM_MON1_1 | | | **IOM monitor input** |
| | IOM_REF1_5 | | | **IOM reference input** |

**Table 2-41 Port 02 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 4 | P02.3 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_3 | | | **GTM_TIN** |
| | ASCLIN1_RXG | | | **ASCLIN1 input (aka: ARX1G)** |
| | CAN2_RXDB | | | **CAN node 2 input (aka: RXDCAN2B)** |
| | ERAY0_RXDB2 | | | **ERAY0 input** |
| | P02.3 | O0 | | **General-purpose output** |
| | TOM0_11 | O1 | | **GTM_TOUT** |
| | TOM1_11 | | | **GTM_TOUT** |
| | TOM0_5N | | | **GTM_TOUT (= DTM1_OUT5_N)** |
| | TOM1_5N | | | **GTM_TOUT (= DTM5_OUT5_N)** |
| | IOM_REF0_3 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | QSPI3_SLSO4 | O3 | | **QSPI3 output (aka: SLSO34)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | CCU60_COUT61 | O7 | | **CCU60 output** |
| | IOM_MON1_4 | | | **IOM monitor input** |
| | IOM_REF1_2 | | | **IOM reference input** |

**Table 2-41 Port 02 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 5 | P02.4 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_4 | | | **GTM_TIN** |
| | QSPI3_SLSIA | | | **QSPI3 input (aka: SLSI3A)** |
| | CAN0_RXDD | | | **CAN node 0 input (aka: RXDCAN0D)** |
| | CCU60_CC62INA | | | **CCU60 input** |
| | CCU61_CC62INB | | | **CCU61 input** |
| | P02.4 | O0 | | **General-purpose output** |
| | TOM0_12 | O1 | | **GTM_TOUT** |
| | TOM1_12 | | | **GTM_TOUT** |
| | TOM0_6 | | | **GTM_TOUT (= DTM1_OUT6)** |
| | TOM1_6 | | | **GTM_TOUT (= DTM5_OUT6)** |
| | IOM_REF0_4 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | QSPI3_SLSO0 | O3 | | **QSPI3 output (aka: SLSO30)** |
| | — | O4 | | **Reserved** |
| | CAN10_TXD | O5 | | **CAN1 node 0 output (aka: TXDCAN10)** |
| | ERAY0_TXENA | O6 | | **ERAY0 output** |
| | CCU60_CC62 | O7 | | **CCU60 output** |
| | IOM_MON1_0 | | | **IOM monitor input** |
| | IOM_REF1_4 | | | **IOM reference input** |

**Table 2-41 Port 02 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 6 | P02.5 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_5 | | | **GTM_TIN** |
| | QSPI3_MRSTA | | | **QSPI3 input (aka: MRST3A)** |
| | SENT_SENT3C | | | **SENT input** |
| | P02.5 | O0 | | **General-purpose output** |
| | TOM0_13 | O1 | | **GTM_TOUT** |
| | TOM1_13 | | | **GTM_TOUT** |
| | TOM0_6N | | | **GTM_TOUT (= DTM1_OUT6_N)** |
| | TOM1_6N | | | **GTM_TOUT (= DTM5_OUT6_N)** |
| | IOM_REF0_5 | | | **IOM reference input** |
| | CAN0_TXD | O2 | | **CAN node 0 output (aka: TXDCAN0)** |
| | IOM_MON2_5 | | | **IOM monitor input** |
| | IOM_REF2_5 | | | **IOM reference input** |
| | QSPI3_MRST | O3 | | **QSPI3 output (aka: MRST3)** |
| | IOM_MON2_3 | | | **IOM monitor input** |
| | IOM_REF2_3 | | | **IOM reference input** |
| | — | O4 | | **Reserved** |
| | CAN11_TXD | O5 | | **CAN1 node 1 output (aka: TXDCAN11)** |
| | ERAY0_TXENB | O6 | | **ERAY0 output** |
| | CCU60_COUT62 | O7 | | **CCU60 output** |
| | IOM_MON1_5 | | | **IOM monitor input** |
| | IOM_REF1_1 | | | **IOM reference input** |

**Table 2-41 Port 02 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 7 | P02.6 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_6 | | | **GTM_TIN** |
| | QSPI3_MTSRA | | | **QSPI3 input (aka: MTSR3A)** |
| | SENT_SENT2C | | | **SENT input** |
| | CCU60_CC60INC | | | **CCU60 input** |
| | CCU60_CCPOS0A | | | **CCU60 input** |
| | CCU61_T12HRB | | | **CCU61 input** |
| | GPT120_T3INA | | | **GPT120 input** |
| | CAN10_RXDF | | | **CAN1 node 0 input (aka: RXDCAN10F)** |
| | P02.6 | O0 | | **General-purpose output** |
| | TOM0_14 | O1 | | **GTM_TOUT** |
| | TOM1_14 | | | **GTM_TOUT** |
| | TOM0_7 | | | **GTM_TOUT (= DTM1_OUT7)** |
| | TOM1_7 | | | **GTM_TOUT (= DTM5_OUT7)** |
| | IOM_REF0_6 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | QSPI3_MTSR | O3 | | **QSPI3 output (aka: MTSR3)** |
| | — | O4 | | **Reserved** |
| | VADC_EMUX00 | O5 | | **VADC output** |
| | — | O6 | | **Reserved** |
| | CCU60_CC60 | O7 | | **CCU60 output** |
| | IOM_MON1_2 | | | **IOM monitor input** |
| | IOM_REF1_6 | | | **IOM reference input** |

**Table 2-41 Port 02 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 8 | P02.7 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_7 | | | **GTM_TIN** |
| | QSPI3_SCLKA | | | **QSPI3 input (aka: SCLK3A)** |
| | SENT_SENT1C | | | **SENT input** |
| | CCU60_CC61INC | | | **CCU60 input** |
| | CCU60_CCPOS1A | | | **CCU60 input** |
| | CCU61_T13HRB | | | **CCU61 input** |
| | GPT120_T3EUDA | | | **GPT120 input** |
| | CAN11_RXDF | | | **CAN1 node 1 input (aka: RXDCAN11F)** |
| | PMU_FDEST | | | **PMU input** |
| | P02.7 | O0 | | **General-purpose output** |
| | TOM0_15 | O1 | | **GTM_TOUT** |
| | TOM1_15 | | | **GTM_TOUT** |
| | TOM0_7N | | | **GTM_TOUT (= DTM1_OUT7_N)** |
| | TOM1_7N | | | **GTM_TOUT (= DTM5_OUT7_N)** |
| | IOM_REF0_7 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | QSPI3_SCLK | O3 | | **QSPI3 output (aka: SCLK3)** |
| | — | O4 | | **Reserved** |
| | VADC_EMUX01 | O5 | | **VADC output** |
| | SENT_SPC1 | O6 | | **SENT output** |
| | CCU60_CC61 | O7 | | **CCU60 output** |
| | IOM_MON1_1 | | | **IOM monitor input** |
| | IOM_REF1_5 | | | **IOM reference input** |

**Table 2-41 Port 02 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 9 | P02.8 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_0 | | | **GTM_TIN** |
| | SENT_SENT0C | | | **SENT input** |
| | CCU60_CC62INC | | | **CCU60 input** |
| | CCU60_CCPOS2A | | | **CCU60 input** |
| | CCU61_T12HRC | | | **CCU61 input** |
| | CCU61_T13HRC | | | **CCU61 input** |
| | GPT120_T4INA | | | **GPT120 input** |
| | P02.8 | O0 | | **General-purpose output** |
| | TOM0_8 | O1 | | **GTM_TOUT** |
| | TOM1_0 | | | **GTM_TOUT** |
| | TOM0_4N | | | **GTM_TOUT (= DTM1_OUT4_N)** |
| | TOM1_4N | | | **GTM_TOUT (= DTM5_OUT4_N)** |
| | IOM_REF0_8 | | | **IOM reference input** |
| | QSPI3_SLSO5 | O2 | | **QSPI3 output (aka: SLSO35)** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | VADC_EMUX02 | O5 | | **VADC output** |
| | — | O6 | | **Reserved** |
| | CCU60_CC62 | O7 | | **CCU60 output** |
| | IOM_MON1_0 | | | **IOM monitor input** |
| | IOM_REF1_4 | | | **IOM reference input** |

**Table 2-42 Port 10 Functions**

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 99 | P10.5 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_2 | | | **GTM_TIN** |
| | SCU_HWCFG4 | | | **SCU input** |
| | CAN10_RXDA | | | **CAN1 node 0 input (aka: RXDCAN10A)** |
| | P10.5 | O0 | | **General-purpose output** |
| | TOM0_2 | O1 | | **GTM_TOUT** |
| | TOM1_10 | | | **GTM_TOUT** |
| | IOM_REF2_9 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | QSPI3_SLSO8 | O3 | | **QSPI3 output (aka: SLSO38)** |
| | QSPI1_SLSO9 | O4 | | **QSPI1 output (aka: SLSO19)** |
| | GPT120_T6OUT | O5 | | **GPT120 output** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |
| 100 | P10.6 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_3 | | | **GTM_TIN** |
| | QSPI3_MTSRB | | | **QSPI3 input (aka: MTSR3B)** |
| | SCU_HWCFG5 | | | **SCU input** |
| | P10.6 | O0 | | **General-purpose output** |
| | TOM0_3 | O1 | | **GTM_TOUT** |
| | TOM1_11 | | | **GTM_TOUT** |
| | IOM_REF2_10 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | QSPI3_MTSR | O3 | | **QSPI3 output (aka: MTSR3)** |
| | GPT120_T3OUT | O4 | | **GPT120 output** |
| | CAN10_TXD | O5 | | **CAN1 node 0 output (aka: TXDCAN10)** |
| | QSPI1_MRST | O6 | | **QSPI1 output (aka: MRST1)** |
| | IOM_MON2_1 | | | **IOM monitor input** |
| | IOM_REF2_1 | | | **IOM reference input** |
| | — | O7 | | **Reserved** |

**Table 2-43 Port 11 Functions**

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 91 | P11.2 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | P11.2 | O0 | | **General-purpose output** |
| | TOM0_8 | O1 | | **GTM_TOUT** |
| | TOM1_1 | | | **GTM_TOUT** |
| | TOM0_4N | | | **GTM_TOUT (= DTM1_OUT4_N)** |
| | TOM1_4N | | | **GTM_TOUT (= DTM5_OUT4_N)** |
| | — | O2 | | **Reserved** |
| | QSPI0_SLSO5 | O3 | | **QSPI0 output (aka: SLSO05)** |
| | QSPI1_SLSO5 | O4 | | **QSPI1 output (aka: SLSO15)** |
| | CCU61_COUT63 | O5 | | **CCU61 output** |
| | IOM_MON1_7 | | | **IOM monitor input** |
| | IOM_REF1_7 | | | **IOM reference input** |
| | — | O6 | | **Reserved** |
| | CCU60_COUT63 | O7 | | **CCU60 output** |
| | IOM_MON1_6 | | | **IOM monitor input** |
| | IOM_REF1_0 | | | **IOM reference input** |
| 92 | P11.3 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | QSPI1_MRSTB | | | **QSPI1 input (aka: MRST1B)** |
| | P11.3 | O0 | | **General-purpose output** |
| | TOM0_10 | O1 | | **GTM_TOUT** |
| | TOM1_2 | | | **GTM_TOUT** |
| | TOM0_5 | | | **GTM_TOUT (= DTM1_OUT5)** |
| | TOM1_5 | | | **GTM_TOUT (= DTM5_OUT5)** |
| | — | O2 | | **Reserved** |
| | QSPI1_MRST | O3 | | **QSPI1 output (aka: MRST1)** |
| | IOM_MON2_1 | | | **IOM monitor input** |
| | IOM_REF2_1 | | | **IOM reference input** |
| | ERAY0_TXDA | O4 | | **ERAY0 output** |
| | CCU61_COUT62 | O5 | | **CCU61 output** |
| | IOM_MON1_13 | | | **IOM monitor input** |
| | IOM_REF1_8 | | | **IOM reference input** |
| | — | O6 | | **Reserved** |
| | CCU60_COUT62 | O7 | | **CCU60 output** |
| | IOM_MON1_5 | | | **IOM monitor input** |
| | IOM_REF1_1 | | | **IOM reference input** |

**Table 2-43 Port 11 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 93 | P11.6 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | QSPI1_SCLKB | | | **QSPI1 input (aka: SCLK1B)** |
| | P11.6 | O0 | | **General-purpose output** |
| | TOM0_11 | O1 | | **GTM_TOUT** |
| | TOM1_3 | | | **GTM_TOUT** |
| | TOM0_5N | | | **GTM_TOUT (= DTM1_OUT5_N)** |
| | TOM1_5N | | | **GTM_TOUT (= DTM5_OUT5_N)** |
| | ERAY0_TXENB | O2 | | **ERAY0 output** |
| | QSPI1_SCLK | O3 | | **QSPI1 output (aka: SCLK1)** |
| | ERAY0_TXENA | O4 | | **ERAY0 output** |
| | CCU61_COUT61 | O5 | | **CCU61 output** |
| | IOM_MON1_12 | | | **IOM monitor input** |
| | IOM_REF1_9 | | | **IOM reference input** |
| | — | O6 | | **Reserved** |
| | CCU60_COUT61 | O7 | | **CCU60 output** |
| | IOM_MON1_4 | | | **IOM monitor input** |
| | IOM_REF1_2 | | | **IOM reference input** |
| 95 | P11.8 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | QSPI1_MTSRC | | | **QSPI1 input (aka: MTSR1C)** |
| | P11.8 | O0 | | **General-purpose output** |
| | TOM0_4 | O1 | | **GTM_TOUT (= DTM1_OUT4)** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | — | O2 | | **Reserved** |
| | QSPI1_SLSO10 | O3 | | **QSPI1 output (aka: SLSO110)** |
| | QSPI1_MTSR | O4 | | **QSPI1 output (aka: MTSR1)** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-43 Port 11 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 94 | P11.9 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | QSPI1_MTSRB | | | **QSPI1 input (aka: MTSR1B)** |
| | ERAY0_RXDA1 | | | **ERAY0 input** |
| | P11.9 | O0 | | **General-purpose output** |
| | TOM0_12 | O1 | | **GTM_TOUT** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | TOM0_6 | | | **GTM_TOUT (= DTM1_OUT6)** |
| | TOM1_6 | | | **GTM_TOUT (= DTM5_OUT6)** |
| | — | O2 | | **Reserved** |
| | QSPI1_MTSR | O3 | | **QSPI1 output (aka: MTSR1)** |
| | — | O4 | | **Reserved** |
| | CCU61_COUT60 | O5 | | **CCU61 output** |
| | IOM_MON1_11 | | | **IOM monitor input** |
| | IOM_REF1_10 | | | **IOM reference input** |
| | — | O6 | | **Reserved** |
| | CCU60_COUT60 | O7 | | **CCU60 output** |
| | IOM_MON1_3 | | | **IOM monitor input** |
| | IOM_REF1_3 | | | **IOM reference input** |
| 96 | P11.10 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | ASCLIN1_RXE | | | **ASCLIN1 input (aka: ARX1E)** |
| | ERAY0_RXDB1 | | | **ERAY0 input** |
| | SCU_REQ12 | | | **SCU input** |
| | CAN12_RXDD | | | **CAN1 node 2 input (aka: RXDCAN12D)** |
| | P11.10 | O0 | | **General-purpose output** |
| | TOM0_13 | O1 | | **GTM_TOUT** |
| | TOM1_5 | | | **GTM_TOUT (= DTM5_OUT5)** |
| | TOM0_6N | | | **GTM_TOUT (= DTM1_OUT6_N)** |
| | TOM1_6N | | | **GTM_TOUT (= DTM5_OUT6_N)** |
| | — | O2 | | **Reserved** |
| | QSPI0_SLSO3 | O3 | | **QSPI0 output (aka: SLSO03)** |
| | QSPI1_SLSO3 | O4 | | **QSPI1 output (aka: SLSO13)** |
| | CCU61_CC62 | O5 | | **CCU61 output** |
| | IOM_MON1_10 | | | **IOM monitor input** |
| | IOM_REF1_11 | | | **IOM reference input** |
| | — | O6 | | **Reserved** |
| | CCU60_CC62 | O7 | | **CCU60 output** |
| | IOM_MON1_0 | | | **IOM monitor input** |
| | IOM_REF1_4 | | | **IOM reference input** |

**Table 2-43 Port 11 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 97 | P11.11 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | P11.11 | O0 | | **General-purpose output** |
| | TOM0_14 | O1 | | **GTM_TOUT** |
| | TOM1_6 | | | **GTM_TOUT (= DTM5_OUT6)** |
| | TOM0_7N | | | **GTM_TOUT (= DTM1_OUT7_N)** |
| | TOM1_7N | | | **GTM_TOUT (= DTM5_OUT7_N)** |
| | — | O2 | | **Reserved** |
| | QSPI0_SLSO4 | O3 | | **QSPI0 output (aka: SLSO04)** |
| | QSPI1_SLSO4 | O4 | | **QSPI1 output (aka: SLSO14)** |
| | CCU61_CC61 | O5 | | **CCU61 output** |
| | IOM_MON1_9 | | | **IOM monitor input** |
| | IOM_REF1_12 | | | **IOM reference input** |
| | ERAY0_TXENB | O6 | | **ERAY0 output** |
| | CCU60_CC61 | O7 | | **CCU60 output** |
| | IOM_MON1_1 | | | **IOM monitor input** |
| | IOM_REF1_5 | | | **IOM reference input** |
| 98 | P11.12 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | P11.12 | O0 | | **General-purpose output** |
| | TOM0_15 | O1 | | **GTM_TOUT** |
| | TOM1_7 | | | **GTM_TOUT (= DTM5_OUT7)** |
| | TOM0_7 | | | **GTM_TOUT (= DTM1_OUT7)** |
| | TOM1_7 | | | **GTM_TOUT (= DTM5_OUT7)** |
| | ASCLIN1_TX | O2 | | **ASCLIN1 output (aka: ATX1)** |
| | IOM_MON2_13 | | | **IOM monitor input** |
| | IOM_REF2_13 | | | **IOM reference input** |
| | GTM_CLK2 | O3 | | **GTM output** |
| | ERAY0_TXDB | O4 | | **ERAY0 output** |
| | CCU61_CC60 | O5 | | **CCU61 output** |
| | IOM_MON1_8 | | | **IOM monitor input** |
| | IOM_REF1_13 | | | **IOM reference input** |
| | SCU_EXTCLK1 | O6 | | **SCU output** |
| | CCU60_CC60 | O7 | | **CCU60 output** |
| | IOM_MON1_2 | | | **IOM monitor input** |
| | IOM_REF1_6 | | | **IOM reference input** |

**Table 2-44 Port 13 Functions**

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 87 | P13.0 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | CCU60_CTRAPA | | | **CCU60 input** |
| | GPT120_T6EUDB | | | **GPT120 input** |
| | P13.0 | O0 | | **General-purpose output** |
| | TOM0_5 | O1 | | **GTM_TOUT (= DTM1_OUT5)** |
| | TOM1_5 | | | **GTM_TOUT (= DTM5_OUT5)** |
| | TOM0_6N | | | **GTM_TOUT (= DTM1_OUT6_N)** |
| | TOM1_6N | | | **GTM_TOUT (= DTM5_OUT6_N)** |
| | — | O2 | | **Reserved** |
| | QSPI2_SCLK | O3 | | **QSPI2 output (aka: SCLK2)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | CAN10_TXD | O7 | | **CAN1 node 0 output (aka: TXDCAN10)** |
| 88 | P13.1 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | CCU60_CCPOS0C | | | **CCU60 input** |
| | GPT120_T3INB | | | **GPT120 input** |
| | CAN10_RXDB | | | **CAN1 node 0 input (aka: RXDCAN10B)** |
| | P13.1 | O0 | | **General-purpose output** |
| | TOM0_6 | O1 | | **GTM_TOUT (= DTM1_OUT6)** |
| | TOM1_6 | | | **GTM_TOUT (= DTM5_OUT6)** |
| | TOM0_7 | | | **GTM_TOUT (= DTM1_OUT7)** |
| | TOM1_7 | | | **GTM_TOUT (= DTM5_OUT7)** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-44 Port 13 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 89 | P13.2 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | CCU60_CCPOS1C | | | **CCU60 input** |
| | GPT120_T3EUDB | | | **GPT120 input** |
| | GPT120_CAPINA | | | **GPT120 input** |
| | P13.2 | O0 | | **General-purpose output** |
| | TOM0_7 | O1 | | **GTM_TOUT (= DTM1_OUT7)** |
| | TOM1_7 | | | **GTM_TOUT (= DTM5_OUT7)** |
| | TOM0_7N | | | **GTM_TOUT (= DTM1_OUT7_N)** |
| | TOM1_7N | | | **GTM_TOUT (= DTM5_OUT7_N)** |
| | CAN11_TXD | O2 | | **CAN1 node 1 output (aka: TXDCAN11)** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |
| 90 | P13.3 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | CCU60_CCPOS2C | | | **CCU60 input** |
| | GPT120_T4INB | | | **GPT120 input** |
| | CAN11_RXDB | | | **CAN1 node 1 input (aka: RXDCAN11B)** |
| | P13.3 | O0 | | **General-purpose output** |
| | TOM0_8 | O1 | | **GTM_TOUT** |
| | TOM1_0 | | | **GTM_TOUT** |
| | TOM0_4 | | | **GTM_TOUT (= DTM1_OUT4)** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | — | O2 | | **Reserved** |
| | QSPI2_MTSR | O3 | | **QSPI2 output (aka: MTSR2)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-45 Port 14 Functions**

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 81 | P14.0 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_3 | | | **GTM_TIN** |
| | P14.0 | O0 | | **General-purpose output** |
| | TOM0_3 | O1 | | **GTM_TOUT** |
| | TOM1_3 | | | **GTM_TOUT** |
| | TOM0_6 | | | **GTM_TOUT (= DTM1_OUT6)** |
| | TOM1_6 | | | **GTM_TOUT (= DTM5_OUT6)** |
| | ASCLIN0_TX | O2 | | **ASCLIN0 output (aka: ATX0)** |
| | IOM_MON2_12 | | | **IOM monitor input** |
| | IOM_REF2_12 | | | **IOM reference input** |
| | ERAY0_TXDA | O3 | | **ERAY0 output** |
| | ERAY0_TXDB | O4 | | **ERAY0 output** |
| | CAN1_TXD | O5 | | **CAN node 1 output (aka: TXDCAN1)** |
| | IOM_MON2_6 | | | **IOM monitor input** |
| | IOM_REF2_6 | | | **IOM reference input** |
| | ASCLIN0_SCLK | O6 | | **ASCLIN0 output (aka: ASCLK0)** |
| | CCU60_COUT62 | O7 | | **CCU60 output** |
| | IOM_MON1_5 | | | **IOM monitor input** |
| | IOM_REF1_1 | | | **IOM reference input** |

**Table 2-45 Port 14 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 82 | P14.1 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_4 | | | **GTM_TIN** |
| | ASCLIN0_RXA | | | **ASCLIN0 input (aka: ARX0A)** |
| | CAN1_RXDB | | | **CAN node 1 input (aka: RXDCAN1B)** |
| | ERAY0_RXDA3 | | | **ERAY0 input** |
| | SCU_REQ15 | | | **SCU input** |
| | ERAY0_RXDB3 | | | **ERAY0 input** |
| | SCU_EVRWUPA | AI | | **SCU input** |
| | P14.1 | O0 | | **General-purpose output** |
| | TOM0_4 | O1 | | **GTM_TOUT (= DTM1_OUT4)** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | TOM0_7 | | | **GTM_TOUT (= DTM1_OUT7)** |
| | TOM1_7 | | | **GTM_TOUT (= DTM5_OUT7)** |
| | IOM_REF1_14 | | | **IOM reference input** |
| | ASCLIN0_TX | O2 | | **ASCLIN0 output (aka: ATX0)** |
| | IOM_MON2_12 | | | **IOM monitor input** |
| | IOM_REF2_12 | | | **IOM reference input** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | CCU60_COUT63 | O7 | | **CCU60 output** |
| | IOM_MON1_6 | | | **IOM monitor input** |
| | IOM_REF1_0 | | | **IOM reference input** |
| 83 | P14.3 | I | A1 / PU / VDDP3 | **General-purpose input** |
| | TIM0_6 | | | **GTM_TIN** |
| | SCU_REQ10 | | | **SCU input** |
| | SCU_HWCFG3_BMI | | | **SCU input** |
| | P14.3 | O0 | | **General-purpose output** |
| | TOM0_6 | O1 | | **GTM_TOUT (= DTM1_OUT6)** |
| | TOM1_6 | | | **GTM_TOUT (= DTM5_OUT6)** |
| | IOM_REF2_4 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | QSPI2_SLSO3 | O3 | | **QSPI2 output (aka: SLSO23)** |
| | ASCLIN1_SLSO | O4 | | **ASCLIN1 output (aka: ASLSO1)** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-45 Port 14 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 84 | P14.4 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_7 | | | **GTM_TIN** |
| | P14.4 | O0 | | **General-purpose output** |
| | TOM0_7 | O1 | | **GTM_TOUT (= DTM1_OUT7)** |
| | TOM1_7 | | | **GTM_TOUT (= DTM5_OUT7)** |
| | TOM0_7N | | | **GTM_TOUT (= DTM1_OUT7_N)** |
| | TOM1_7N | | | **GTM_TOUT (= DTM5_OUT7_N)** |
| | IOM_REF2_8 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |
| 85 | P14.6 | I | A1+ / PU / VDDP3 | **General-purpose input** |
| | TIM0_1 | | | **GTM_TIN** |
| | SCU_HWCFG0_DCLDO | | | **SCU input** |
| | QSPI0_MRSTD | | | **QSPI0 input (aka: MRST0D)** |
| | P14.6 | O0 | | **General-purpose output** |
| | TOM0_1 | O1 | | **GTM_TOUT** |
| | TOM1_1 | | | **GTM_TOUT** |
| | IOM_REF2_14 | | | **IOM reference input** |
| | — | O2 | | **Reserved** |
| | QSPI2_SLSO2 | O3 | | **QSPI2 output (aka: SLSO22)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | ERAY0_TXENB | O6 | | **ERAY0 output** |
| | — | O7 | | **Reserved** |

**Table 2-46 Port 15 Functions**

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 76 | P15.0 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | P15.0 | O0 | | **General-purpose output** |
| | TOM1_3 | O1 | | **GTM_TOUT** |
| | TOM0_11 | | | **GTM_TOUT** |
| | TOM0_7N | | | **GTM_TOUT (= DTM1_OUT7_N)** |
| | TOM1_7N | | | **GTM_TOUT (= DTM5_OUT7_N)** |
| | ASCLIN1_TX | O2 | | **ASCLIN1 output (aka: ATX1)** |
| | IOM_MON2_13 | | | **IOM monitor input** |
| | IOM_REF2_13 | | | **IOM reference input** |
| | QSPI0_SLSO13 | O3 | | **QSPI0 output (aka: SLSO013)** |
| | — | O4 | | **Reserved** |
| | CAN2_TXD | O5 | | **CAN node 2 output (aka: TXDCAN2)** |
| | IOM_MON2_7 | | | **IOM monitor input** |
| | IOM_REF2_7 | | | **IOM reference input** |
| | ASCLIN1_SCLK | O6 | | **ASCLIN1 output (aka: ASCLK1)** |
| | — | O7 | | **Reserved** |
| 77 | P15.1 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | ASCLIN1_RXA | | | **ASCLIN1 input (aka: ARX1A)** |
| | QSPI2_SLSIB | | | **QSPI2 input (aka: SLSI2B)** |
| | CAN2_RXDA | | | **CAN node 2 input (aka: RXDCAN2A)** |
| | SCU_REQ16 | | | **SCU input** |
| | SCU_EVRWUPB | AI | | **SCU input** |
| | P15.1 | O0 | | **General-purpose output** |
| | TOM1_4 | O1 | | **GTM_TOUT (= DTM5_OUT4)** |
| | TOM0_12 | | | **GTM_TOUT** |
| | TOM0_4 | | | **GTM_TOUT (= DTM1_OUT4)** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | ASCLIN1_TX | O2 | | **ASCLIN1 output (aka: ATX1)** |
| | IOM_MON2_13 | | | **IOM monitor input** |
| | IOM_REF2_13 | | | **IOM reference input** |
| | QSPI2_SLSO5 | O3 | | **QSPI2 output (aka: SLSO25)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-46 Port 15 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 78 | P15.2 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | QSPI2_MRSTE | | | **QSPI2 input (aka: MRST2E)** |
| | QSPI2_SLSIA | | | **QSPI2 input (aka: SLSI2A)** |
| | QSPI2_HSICINA | | | **QSPI2 input (aka: HSIC2INA)** |
| | P15.2 | O0 | | **General-purpose output** |
| | TOM1_5 | O1 | | **GTM_TOUT (= DTM5_OUT5)** |
| | TOM0_13 | | | **GTM_TOUT** |
| | TOM0_4N | | | **GTM_TOUT (= DTM1_OUT4_N)** |
| | TOM1_4N | | | **GTM_TOUT (= DTM5_OUT4_N)** |
| | ASCLIN0_TX | O2 | | **ASCLIN0 output (aka: ATX0)** |
| | IOM_MON2_12 | | | **IOM monitor input** |
| | IOM_REF2_12 | | | **IOM reference input** |
| | QSPI2_SLSO0 | O3 | | **QSPI2 output (aka: SLSO20)** |
| | — | O4 | | **Reserved** |
| | CAN1_TXD | O5 | | **CAN node 1 output (aka: TXDCAN1)** |
| | IOM_MON2_6 | | | **IOM monitor input** |
| | IOM_REF2_6 | | | **IOM reference input** |
| | ASCLIN0_SCLK | O6 | | **ASCLIN0 output (aka: ASCLK0)** |
| | — | O7 | | **Reserved** |
| 79 | P15.3 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | ASCLIN0_RXB | | | **ASCLIN0 input (aka: ARX0B)** |
| | QSPI2_SCLKA | | | **QSPI2 input (aka: SCLK2A)** |
| | QSPI2_HSICINB | | | **QSPI2 input (aka: HSIC2INB)** |
| | CAN1_RXDA | | | **CAN node 1 input (aka: RXDCAN1A)** |
| | P15.3 | O0 | | **General-purpose output** |
| | TOM1_6 | O1 | | **GTM_TOUT (= DTM5_OUT6)** |
| | TOM0_14 | | | **GTM_TOUT** |
| | TOM0_5 | | | **GTM_TOUT (= DTM1_OUT5)** |
| | TOM1_5 | | | **GTM_TOUT (= DTM5_OUT5)** |
| | ASCLIN0_TX | O2 | | **ASCLIN0 output (aka: ATX0)** |
| | IOM_MON2_12 | | | **IOM monitor input** |
| | IOM_REF2_12 | | | **IOM reference input** |
| | QSPI2_SCLK | O3 | | **QSPI2 output (aka: SCLK2)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-46 Port 15 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 80 | P15.5 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | ASCLIN1_RXB | | | **ASCLIN1 input (aka: ARX1B)** |
| | QSPI2_MTSRA | | | **QSPI2 input (aka: MTSR2A)** |
| | SCU_REQ13 | | | **SCU input** |
| | P15.5 | O0 | | **General-purpose output** |
| | TOM0_0 | O1 | | **GTM_TOUT** |
| | TOM1_0 | | | **GTM_TOUT** |
| | TOM0_5N | | | **GTM_TOUT (= DTM1_OUT5_N)** |
| | TOM1_5N | | | **GTM_TOUT (= DTM5_OUT5_N)** |
| | ASCLIN1_TX | O2 | | **ASCLIN1 output (aka: ATX1)** |
| | IOM_MON2_13 | | | **IOM monitor input** |
| | IOM_REF2_13 | | | **IOM reference input** |
| | QSPI2_MTSR | O3 | | **QSPI2 output (aka: MTSR2)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | CCU60_CC61 | O7 | | **CCU60 output** |
| | IOM_MON1_1 | | | **IOM monitor input** |
| | IOM_REF1_5 | | | **IOM reference input** |

**Table 2-47 Port 20 Functions**

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 64 | P20.2 | I | Input Only / PU / VDDP3 | **General-purpose input** |
| | $\overline{\text{TESTMODE}}$ | | | **Factory Test Mode Enable** |

**Table 2-47 Port 20 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 69 | P20.8 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_7 | | | **GTM_TIN** |
| | P20.8 | O0 | | **General-purpose output** |
| | TOM1_7 | O1 | | **GTM_TOUT (= DTM5_OUT7)** |
| | TOM0_7 | | | **GTM_TOUT (= DTM1_OUT7)** |
| | TOM0_4 | | | **GTM_TOUT (= DTM1_OUT4)** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | IOM_MON2_8 | | | **IOM monitor input** |
| | ASCLIN1_SLSO | O2 | | **ASCLIN1 output (aka: ASLSO1)** |
| | QSPI0_SLSO0 | O3 | | **QSPI0 output (aka: SLSO00)** |
| | QSPI1_SLSO0 | O4 | | **QSPI1 output (aka: SLSO10)** |
| | CAN0_TXD | O5 | | **CAN node 0 output (aka: TXDCAN0)** |
| | IOM_MON2_5 | | | **IOM monitor input** |
| | IOM_REF2_5 | | | **IOM reference input** |
| | SCU_WDT0LCK | O6 | | **SCU output** |
| | CCU61_CC60 | O7 | | **CCU61 output** |
| | IOM_MON1_8 | | | **IOM monitor input** |
| | IOM_REF1_13 | | | **IOM reference input** |
| 70 | P20.9 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | ASCLIN1_RXC | | | **ASCLIN1 input (aka: ARX1C)** |
| | QSPI0_SLSIB | | | **QSPI0 input (aka: SLSI0B)** |
| | SCU_REQ11 | | | **SCU input** |
| | CAN12_RXDE | | | **CAN1 node 2 input (aka: RXDCAN12E)** |
| | P20.9 | O0 | | **General-purpose output** |
| | TOM1_13 | O1 | | **GTM_TOUT** |
| | TOM0_13 | | | **GTM_TOUT** |
| | TOM0_4N | | | **GTM_TOUT (= DTM1_OUT4_N)** |
| | TOM1_4N | | | **GTM_TOUT (= DTM5_OUT4_N)** |
| | IOM_MON2_11 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | QSPI0_SLSO1 | O3 | | **QSPI0 output (aka: SLSO01)** |
| | QSPI1_SLSO1 | O4 | | **QSPI1 output (aka: SLSO11)** |
| | — | O5 | | **Reserved** |
| | SCU_WDTSLCK | O6 | | **SCU output** |
| | CCU61_CC61 | O7 | | **CCU61 output** |
| | IOM_MON1_9 | | | **IOM monitor input** |
| | IOM_REF1_12 | | | **IOM reference input** |

**Table 2-47 Port 20 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 71 | P20.10 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | P20.10 | O0 | | **General-purpose output** |
| | TOM1_14 | O1 | | **GTM_TOUT** |
| | TOM0_14 | | | **GTM_TOUT** |
| | TOM0_5 | | | **GTM_TOUT (= DTM1_OUT5)** |
| | TOM1_5 | | | **GTM_TOUT (= DTM5_OUT5)** |
| | IOM_MON2_14 | | | **IOM monitor input** |
| | ASCLIN1_TX | O2 | | **ASCLIN1 output (aka: ATX1)** |
| | IOM_MON2_13 | | | **IOM monitor input** |
| | IOM_REF2_13 | | | **IOM reference input** |
| | QSPI0_SLSO6 | O3 | | **QSPI0 output (aka: SLSO06)** |
| | QSPI2_SLSO7 | O4 | | **QSPI2 output (aka: SLSO27)** |
| | CAN12_TXD | O5 | | **CAN1 node 2 output (aka: TXDCAN12)** |
| | ASCLIN1_SCLK | O6 | | **ASCLIN1 output (aka: ASCLK1)** |
| | CCU61_CC62 | O7 | | **CCU61 output** |
| | IOM_MON1_10 | | | **IOM monitor input** |
| | IOM_REF1_11 | | | **IOM reference input** |
| 72 | P20.11 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | QSPI0_SCLKA | | | **QSPI0 input (aka: SCLK0A)** |
| | P20.11 | O0 | | **General-purpose output** |
| | TOM1_15 | O1 | | **GTM_TOUT** |
| | TOM0_15 | | | **GTM_TOUT** |
| | TOM0_5N | | | **GTM_TOUT (= DTM1_OUT5_N)** |
| | TOM1_5N | | | **GTM_TOUT (= DTM5_OUT5_N)** |
| | IOM_MON2_15 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | QSPI0_SCLK | O3 | | **QSPI0 output (aka: SCLK0)** |
| | — | O4 | | **Reserved** |
| | CAN11_TXD | O5 | | **CAN1 node 1 output (aka: TXDCAN11)** |
| | — | O6 | | **Reserved** |
| | CCU61_COUT60 | O7 | | **CCU61 output** |
| | IOM_MON1_11 | | | **IOM monitor input** |
| | IOM_REF1_10 | | | **IOM reference input** |

**Table 2-47 Port 20 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 73 | P20.12 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | QSPI0_MRSTA | | | **QSPI0 input (aka: MRST0A)** |
| | CAN11_RXDH | | | **CAN1 node 1 input (aka: RXDCAN11H)** |
| | IOM_PIN13 | | | **IOM pad input** |
| | P20.12 | O0 | | **General-purpose output** |
| | TOM1_0 | O1 | | **GTM_TOUT** |
| | TOM0_8 | | | **GTM_TOUT** |
| | TOM0_6 | | | **GTM_TOUT (= DTM1_OUT6)** |
| | TOM1_6 | | | **GTM_TOUT (= DTM5_OUT6)** |
| | IOM_MON0_13 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | QSPI0_MRST | O3 | | **QSPI0 output (aka: MRST0)** |
| | IOM_MON2_0 | | | **IOM monitor input** |
| | IOM_REF2_0 | | | **IOM reference input** |
| | QSPI0_MTSR | O4 | | **QSPI0 output (aka: MTSR0)** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | CCU61_COUT61 | O7 | | **CCU61 output** |
| | IOM_MON1_12 | | | **IOM monitor input** |
| | IOM_REF1_9 | | | **IOM reference input** |
| 74 | P20.13 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | QSPI0_SLSIA | | | **QSPI0 input (aka: SLSI0A)** |
| | CAN12_RXDH | | | **CAN1 node 2 input (aka: RXDCAN12H)** |
| | IOM_PIN14 | | | **IOM pad input** |
| | P20.13 | O0 | | **General-purpose output** |
| | TOM1_1 | O1 | | **GTM_TOUT** |
| | TOM0_9 | | | **GTM_TOUT** |
| | TOM0_6N | | | **GTM_TOUT (= DTM1_OUT6_N)** |
| | TOM1_6N | | | **GTM_TOUT (= DTM5_OUT6_N)** |
| | IOM_MON0_14 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | QSPI0_SLSO2 | O3 | | **QSPI0 output (aka: SLSO02)** |
| | QSPI1_SLSO2 | O4 | | **QSPI1 output (aka: SLSO12)** |
| | QSPI0_SCLK | O5 | | **QSPI0 output (aka: SCLK0)** |
| | — | O6 | | **Reserved** |
| | CCU61_COUT62 | O7 | | **CCU61 output** |
| | IOM_MON1_13 | | | **IOM monitor input** |
| | IOM_REF1_8 | | | **IOM reference input** |

**Table 2-47 Port 20 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 75 | P20.14 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | QSPI0_MTSRA | | | **QSPI0 input (aka: MTSR0A)** |
| | IOM_PIN15 | | | **IOM pad input** |
| | P20.14 | O0 | | **General-purpose output** |
| | TOM1_2 | O1 | | **GTM_TOUT** |
| | TOM0_10 | | | **GTM_TOUT** |
| | TOM0_7 | | | **GTM_TOUT (= DTM1_OUT7)** |
| | TOM1_7 | | | **GTM_TOUT (= DTM5_OUT7)** |
| | IOM_MON0_15 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | QSPI0_MTSR | O3 | | **QSPI0 output (aka: MTSR0)** |
| | — | O4 | | **Reserved** |
| | CAN12_TXD | O5 | | **CAN1 node 2 output (aka: TXDCAN12)** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-48 Port 21 Functions**

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 56 | P21.2 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_0 | | | **GTM_TIN** |
| | SCU_EMGSTOPB | | | **SCU input** |
| | P21.2 | O0 | | **General-purpose output** |
| | TOM0_0 | O1 | | **GTM_TOUT** |
| | TOM1_0 | | | **GTM_TOUT** |
| | TOM0_4 | | | **GTM_TOUT (= DTM1_OUT4)** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-48 Port 21 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 57 | P21.3 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_1 | | | **GTM_TIN** |
| | P21.3 | O0 | | **General-purpose output** |
| | TOM0_1 | O1 | | **GTM_TOUT** |
| | TOM1_1 | | | **GTM_TOUT** |
| | TOM0_4N | | | **GTM_TOUT (= DTM1_OUT4_N)** |
| | TOM1_4N | | | **GTM_TOUT (= DTM5_OUT4_N)** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |
| 58 | P21.4 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_2 | | | **GTM_TIN** |
| | P21.4 | O0 | | **General-purpose output** |
| | TOM0_2 | O1 | | **GTM_TOUT** |
| | TOM1_2 | | | **GTM_TOUT** |
| | TOM0_5 | | | **GTM_TOUT (= DTM1_OUT5)** |
| | TOM1_5 | | | **GTM_TOUT (= DTM5_OUT5)** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | — | O7 | | **Reserved** |

**Table 2-48 Port 21 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 59 | P21.6 | I | A1 / PU / VDDP3 | **General-purpose input** |
| | TIM0_4 | | | **GTM_TIN** |
| | TDI | | | **OCDS input** |
| | $\overline{\text{OCDS_TGI2}}$ | | | **OCDS input** |
| | GPT120_T5EUDA | | | **GPT120 input** |
| | P21.6 | O0 | | **General-purpose output** |
| | TOM0_4 | O1 | | **GTM_TOUT (= DTM1_OUT4)** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | GPT120_T3OUT | O7 | | **GPT120 output** |
| | $\overline{\text{OCDS_TGO2}}$ | O | | **OCDS** |
| 61 | P21.7 | I | A1+ / PU / VDDP3 | **General-purpose input** |
| | TIM0_5 | | | **GTM_TIN** |
| | OCDS_DAP2 | | | **OCDS input** |
| | $\overline{\text{OCDS_TGI3}}$ | | | **OCDS input** |
| | GPT120_T5INA | | | **GPT120 input** |
| | P21.7 | O0 | | **General-purpose output** |
| | TOM0_5 | O1 | | **GTM_TOUT (= DTM1_OUT5)** |
| | TOM1_5 | | | **GTM_TOUT (= DTM5_OUT5)** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | GPT120_T6OUT | O7 | | **GPT120 output** |
| | $\overline{\text{OCDS_TGO3}}$ | O | | **OCDS** |
| | OCDS_DAP2 | O | | **OCDS Output** |
| | TDO | O | | **JTAG Output** |

**Table 2-49 Port 23 Functions**

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 51 | P23.1 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_6 | | | **GTM_TIN** |
| | P23.1 | O0 | | **General-purpose output** |
| | TOM0_6 | O1 | | **GTM_TOUT (= DTM1_OUT6)** |
| | TOM0_15 | | | **GTM_TOUT** |
| | ASCLIN1_RTS | O2 | | **ASCLIN1 output (aka: ARTS1)** |
| | QSPI3_SLSO13 | O3 | | **QSPI3 output (aka: SLSO313)** |
| | GTM_CLK0 | O4 | | **GTM output** |
| | SCU_EXTCLK1 | O5 | | **SCU output** |
| | SCU_EXTCLK0 | O6 | | **SCU output** |
| | — | O7 | | **Reserved** |

**Table 2-50 Port 33 Functions**

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 41 | P33.5 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_1 | | | **GTM_TIN** |
| | CCU61_CCPOS2C | | | **CCU61 input** |
| | GPT120_T4EUDB | | | **GPT120 input** |
| | IOM_PIN5 | | | **IOM pad input** |
| | P33.5 | O0 | | **General-purpose output** |
| | TOM0_1 | O1 | | **GTM_TOUT** |
| | TOM1_1 | | | **GTM_TOUT** |
| | TOM0_5 | | | **GTM_TOUT (= DTM1_OUT5)** |
| | TOM1_5 | | | **GTM_TOUT (= DTM5_OUT5)** |
| | IOM_MON0_5 | | | **IOM monitor input** |
| | QSPI0_SLSO7 | O2 | | **QSPI0 output (aka: SLSO07)** |
| | QSPI1_SLSO7 | O3 | | **QSPI1 output (aka: SLSO17)** |
| | — | O4 | | **Reserved** |
| | VADC_EMUX11 | O5 | | **VADC output** |
| | VADC_G0BFL1 | O6 | | **VADC output** |
| | CCU61_CC60 | O7 | | **CCU61 output** |
| | IOM_MON1_8 | | | **IOM monitor input** |
| | IOM_REF1_13 | | | **IOM reference input** |

**Table 2-50 Port 33 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 42 | P33.6 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_2 | | | **GTM_TIN** |
| | ASCLIN1_RXF | | | **ASCLIN1 input (aka: ARX1F)** |
| | CCU61_CCPOS1C | | | **CCU61 input** |
| | GPT120_T2EUDB | | | **GPT120 input** |
| | CAN10_RXDH | | | **CAN1 node 0 input (aka: RXDCAN10H)** |
| | IOM_PIN6 | | | **IOM pad input** |
| | P33.6 | O0 | | **General-purpose output** |
| | TOM0_2 | O1 | | **GTM_TOUT** |
| | TOM1_2 | | | **GTM_TOUT** |
| | TOM0_5N | | | **GTM_TOUT (= DTM1_OUT5_N)** |
| | TOM1_5N | | | **GTM_TOUT (= DTM5_OUT5_N)** |
| | IOM_MON0_6 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | — | O3 | | **Reserved** |
| | ASCLIN1_TX | O4 | | **ASCLIN1 output (aka: ATX1)** |
| | IOM_MON2_13 | | | **IOM monitor input** |
| | IOM_REF2_13 | | | **IOM reference input** |
| | VADC_EMUX10 | O5 | | **VADC output** |
| | VADC_G0BFL2 | O6 | | **VADC output** |
| | CCU61_CC61 | O7 | | **CCU61 output** |
| | IOM_MON1_9 | | | **IOM monitor input** |
| | IOM_REF1_12 | | | **IOM reference input** |
| | HSM_HSM1 | O | | **HSM output** |

**Table 2-50 Port 33 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 43 | P33.7 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_3 | | | **GTM_TIN** |
| | CAN0_RXDE | | | **CAN node 0 input (aka: RXDCAN0E)** |
| | SCU_REQ8 | | | **SCU input** |
| | CCU61_CCPOS0C | | | **CCU61 input** |
| | GPT120_T2INB | | | **GPT120 input** |
| | IOM_PIN7 | | | **IOM pad input** |
| | P33.7 | O0 | | **General-purpose output** |
| | TOM0_3 | O1 | | **GTM_TOUT** |
| | TOM1_3 | | | **GTM_TOUT** |
| | TOM0_6 | | | **GTM_TOUT (= DTM1_OUT6)** |
| | TOM1_6 | | | **GTM_TOUT (= DTM5_OUT6)** |
| | IOM_MON0_7 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | QSPI3_SLSO7 | O3 | | **QSPI3 output (aka: SLSO37)** |
| | — | O4 | | **Reserved** |
| | CAN10_TXD | O5 | | **CAN1 node 0 output (aka: TXDCAN10)** |
| | VADC_G0BFL3 | O6 | | **VADC output** |
| | CCU61_COUT60 | O7 | | **CCU61 output** |
| | IOM_MON1_11 | | | **IOM monitor input** |
| | IOM_REF1_10 | | | **IOM reference input** |
| | HSM_HSM2 | O | | **HSM output** |

**Table 2-50 Port 33 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 44 | P33.8 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_4 | | | **GTM_TIN** |
| | SCU_EMGSTOPA | | | **SCU input** |
| | IOM_PIN8 | | | **IOM pad input** |
| | P33.8 | O0 | | **General-purpose output** |
| | TOM0_4 | O1 | | **GTM_TOUT (= DTM1_OUT4)** |
| | TOM1_4 | | | **GTM_TOUT (= DTM5_OUT4)** |
| | TOM0_6N | | | **GTM_TOUT (= DTM1_OUT6_N)** |
| | TOM1_6N | | | **GTM_TOUT (= DTM5_OUT6_N)** |
| | IOM_MON0_8 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | QSPI3_SLSO2 | O3 | | **QSPI3 output (aka: SLSO32)** |
| | — | O4 | | **Reserved** |
| | CAN0_TXD | O5 | | **CAN node 0 output (aka: TXDCAN0)** |
| | IOM_MON2_5 | | | **IOM monitor input** |
| | IOM_REF2_5 | | | **IOM reference input** |
| | — | O6 | | **Reserved** |
| | CCU61_COUT62 | O7 | | **CCU61 output** |
| | IOM_MON1_13 | | | **IOM monitor input** |
| | IOM_REF1_8 | | | **IOM reference input** |
| | SMU_FSP | O | | **SMU** |

**Table 2-50 Port 33 Functions** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 45 | P33.9 | I | A1 / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_1 | | | **GTM_TIN** |
| | QSPI3_HSICINA | | | **QSPI3 input (aka: HSIC3INA)** |
| | IOM_PIN9 | | | **IOM pad input** |
| | P33.9 | O0 | | **General-purpose output** |
| | TOM0_1 | O1 | | **GTM_TOUT** |
| | TOM1_1 | | | **GTM_TOUT** |
| | TOM0_7 | | | **GTM_TOUT (= DTM1_OUT7)** |
| | TOM1_7 | | | **GTM_TOUT (= DTM5_OUT7)** |
| | IOM_MON0_9 | | | **IOM monitor input** |
| | — | O2 | | **Reserved** |
| | QSPI3_SLSO1 | O3 | | **QSPI3 output (aka: SLSO31)** |
| | — | O4 | | **Reserved** |
| | — | O5 | | **Reserved** |
| | — | O6 | | **Reserved** |
| | CCU61_CC62 | O7 | | **CCU61 output** |
| | IOM_MON1_10 | | | **IOM monitor input** |
| | IOM_REF1_11 | | | **IOM reference input** |
| 46 | P33.10 | I | A1+ / HighZ / VDDP3 | **General-purpose input** |
| | TIM0_0 | | | **GTM_TIN** |
| | QSPI3_SLSIC | | | **QSPI3 input (aka: SLSI3C)** |
| | QSPI3_HSICINB | | | **QSPI3 input (aka: HSIC3INB)** |
| | IOM_PIN10 | | | **IOM pad input** |
| | P33.10 | O0 | | **General-purpose output** |
| | TOM0_0 | O1 | | **GTM_TOUT** |
| | TOM1_0 | | | **GTM_TOUT** |
| | TOM0_7N | | | **GTM_TOUT (= DTM1_OUT7_N)** |
| | TOM1_7N | | | **GTM_TOUT (= DTM5_OUT7_N)** |
| | IOM_MON0_10 | | | **IOM monitor input** |
| | QSPI1_SLSO6 | O2 | | **QSPI1 output (aka: SLSO16)** |
| | QSPI3_SLSO11 | O3 | | **QSPI3 output (aka: SLSO311)** |
| | ASCLIN1_SLSO | O4 | | **ASCLIN1 output (aka: ASLSO1)** |
| | GTM_CLK1 | O5 | | **GTM output** |
| | SCU_EXTCLK1 | O6 | | **SCU output** |
| | CCU61_COUT61 | O7 | | **CCU61 output** |
| | IOM_MON1_12 | | | **IOM monitor input** |
| | IOM_REF1_9 | | | **IOM reference input** |

**Table 2-51 Port 40 Functions**

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 40 | P40.0 | I | S / VDDM | **General-purpose input** |
| | VADCG0_0 | AI | | **VADC input channel 0 of group 0** |
| 39 | P40.1 | I | S / VDDM | **General-purpose input** |
| | VADCG0_1 | AI | | **VADC input channel 1 of group 0** (with multiplexer diagnostics) |
| 38 | P40.2 | I | S / VDDM | **General-purpose input** |
| | VADCG0_2 | AI | | **VADC input channel 2 of group 0** (with multiplexer diagnostics) |
| 37 | P40.3 | I | S / VDDM | **General-purpose input** |
| | VADCG0_3 | AI | | **VADC input channel 3 of group 0** |
| 36 | P40.4 | I | S / VDDM | **General-purpose input** |
| | VADCG0_4 | AI | | **VADC input channel 4 of group 0** |
| 35 | P40.5 | I | S / VDDM | **General-purpose input** |
| | VADCG0_5 | AI | | **VADC input channel 5 of group 0** |
| 34 | P40.6 | I | S / VDDM | **General-purpose input** |
| | VADCG0_6 | AI | | **VADC input channel 6 of group 0** |
| 29 | P40.7 | I | S / VDDM | **General-purpose input** |
| | VADCG0_7 | AI | | **VADC input channel 7 of group 0** (with pull down diagnostics) |
| 28 | P40.8 | I | S / VDDM | **General-purpose input** |
| | VADCG0_8 | AI | | **VADC input channel 8 of group 0** |
| 27 | P40.9 | I | S / VDDM | **General-purpose input** |
| | VADCG0_9 | AI | | **VADC input channel 9 of group 0** (with multiplexer diagnostics) |
| 26 | P40.10 | I | S / VDDM | **General-purpose input** |
| | VADCG0_10 | AI | | **VADC input channel 10 of group 0** (with multiplexer diagnostics) |
| 25 | P40.11 | I | S / VDDM | **General-purpose input** |
| | SENT_SENT0A | | | **SENT input** |
| | CCU60_CCPOS0D | | | **CCU60 input** |
| | VADCG0_11 | AI | | **VADC input channel 11 of group 0** |

**Table 2-52 Port 41 Functions**

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 24 | P41.0 | I | S / VDDM | **General-purpose input** |
| | SENT_SENT1A | | | **SENT input** |
| | CCU60_CCPOS1B | | | **CCU60 input** |
| | VADCG1_0 | AI | | **VADC input channel 0 of group 1** |
| 23 | P41.1 | I | S / VDDM | **General-purpose input** |
| | VADCG1_1 | AI | | **VADC input channel 1 of group 1** (with multiplexer diagnostics) |
| 22 | P41.2 | I | S / VDDM | **General-purpose input** |
| | SENT_SENT2A | | | **SENT input** |
| | CCU61_CCPOS1B | | | **CCU61 input** |
| | VADCG1_2 | AI | | **VADC input channel 2 of group 1** (with multiplexer diagnostics) |
| 21 | P41.3 | I | S / VDDM | **General-purpose input** |
| | SENT_SENT3A | | | **SENT input** |
| | CCU61_CCPOS1D | | | **CCU61 input** |
| | VADCG1_3 | AI | | **VADC input channel 3 of group 1** (with pull down diagnostics) |
| 20 | P41.4 | I | S / VDDM | **General-purpose input** |
| | VADCG1_4 | AI | | **VADC input channel 4 of group 1** |
| 19 | P41.5 | I | S / VDDM | **General-purpose input** |
| | VADCG1_5 | AI | | **VADC input channel 5 of group 1** |
| 18 | P41.6 | I | S / VDDM | **General-purpose input** |
| | VADCG1_6 | AI | | **VADC input channel 6 of group 1** |
| 17 | P41.7 | I | S / VDDM | **General-purpose input** |
| | VADCG1_7 | AI | | **VADC input channel 7 of group 1** |
| 16 | P41.8 | I | S / VDDM | **General-purpose input** |
| | VADCG1_8 | AI | | **VADC input channel 8 of group 1** |
| 15 | P41.9 | I | S / VDDM | **General-purpose input** |
| | VADCG1_9 | AI | | **VADC input channel 9 of group 1** (with multiplexer diagnostics) |
| 14 | P41.10 | I | S / VDDM | **General-purpose input** |
| | VADCG1_10 | AI | | **VADC input channel 10 of group 1** (with multiplexer diagnostics) |
| 13 | P41.11 | I | S / VDDM | **General-purpose input** |
| | VADCG1_11 | AI | | **VADC input channel 11 of group 1** |

**Table 2-53 System I/O**

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 53 | XTAL1 | I | VDDP3 | **Main Oscillator/PLL/Clock Generator Input** |
| 54 | XTAL2 | O | VDDP3 | **Main Oscillator/PLL/Clock Generator Output** |
| 60 | TMS/DAP1 | I | A1+ / PD / VDDP3 | **Debug Interface** |
| | DAP1 | I/O | | **Device Access Port LIne 1** |
| 62 | $\overline{\text{TRST}}$ | I | Input Only / PD / VDDP3 | **JTAG Module Reset/Enable Input** |
| 63 | TCK/DAP0 | I | Input Only / PD / VDDP3 | **OCDS input** |
| | DAP0 | I | | **Device Access Port LIne 0** |
| 65 | $\overline{\text{ESR1}}$ | I/O | A1+ / PU / VDDP3 | **SCU input** |
| | EVRWUP | I | | **EVR Wakeup Pin** |
| 66 | $\overline{\text{PORST}}$ | I | Input Only / PD / VDDP3 | **Power On Reset**<br>Additional strong PD in case of power fail. |
| 67 | $\overline{\text{ESR0}}$ | I/O | A1+ / OD / VDDP3 | **SCU input/output** |
| | EVRWUP | I | | **EVR Wakeup Pin** |

**Table 2-54 Supply**

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 30 | $V_{AGND}$ | I | — | **Negative Analog Reference Voltage 0** |
| 31 | $V_{AREF}$ | I | — | **Positive Analog Reference Voltage 0** |
| 86 | $V_{DDP3}$ | I | — | **Digital I/O Power Supply (3.3V)**<br>This pin supplies also the Flash 3.3V. |
| 47 | $V_{DDP3}$ | I | — | **Digital I/O Power Supply (3.3V)** |
| 48 | $V_{DD}$ | I | — | **Digital Core Power Supply (1.3V)**<br>Output of EVR13. |
| 52 | $V_{DD}$ | I | — | **Digital Core Power Supply (1.3V)**<br>This pin supplies also the main XTAL Oscillator/PLL (1.3V). A higher decoupling capacitor is therefore recommended to the VSS pin for better noise immunity. |
| 55 | $V_{DDP3}$ | I | — | **Digital I/O Power Supply (3.3V)**<br>This pin supplies also the main XTAL Oscillator/PLL (3.3V). A higher decoupling capacitor is therefore recommended to the VSS pin for better noise immunity. |
| 33 | $V_{DDM}$ | I | — | **ADC Power Supply (5.0V)** |
| 12 | $V_{DDP3}$ | I | — | **Digital I/O Power Supply (3.3V)** |
| 11 | $V_{DD}$ | I | — | **Digital Core Power Supply (1.3V)** |

**Table 2-54 Supply** (cont'd)

| Pin | Symbol | Ctrl. | Buffer Type | Function |
|---|---|---|---|---|
| 68 | $V_{DD}$ | I | — | **Digital Core Power Supply (1.3V)** |
| 32 | $V_{SSM}$ | I | — | **Analog Ground for VDDM** |

## 2.3.2 Pull-Up/Pull-Down Reset Behavior of the Pins

**Table 2-55 List of Pull-Up/Pull-Down Reset Behavior of the Pins**

| Pins | $\overline{\text{PORST}}$ = 0 | $\overline{\text{PORST}}$ = 1 |
|---|---|---|
| all GPIOs | High-Z | |
| TDI, $\overline{\text{TESTMODE}}$ | Pull-up | |
| $\overline{\text{PORST}}$[1)] | Pull-down with $I_{PORST}$ relevant | Pull-down with $I_{PDLI}$ relevant |
| $\overline{\text{TRST}}$, TCK, TMS | Pull-down | |
| $\overline{\text{ESR0}}$ | The open-drain driver is used to drive low.[2)] | Pull-up[3)] |
| $\overline{\text{ESR1}}$ | Pull-up[3)] | |
| P14.2, P14.3, P14.6 | Pull-up | |
| P21.7 / TDO | Pull-up | High-Z/Pull-up[4)] |

1) Pull-down with $I_{PORST}$ relevant is always activated when a primary supply monitor detects a violation.
2) Valid additionally after deactivation of $\overline{\text{PORST}}$ until the internal reset phase has finished. See the SCU chapter for details.
3) See the SCU_IOCR register description.
4) Depends on JTAG/DAP selection with $\overline{\text{TRST}}$.

# 3 Electrical Specification

## 3.1 Parameter Interpretation

The parameters listed in this section partly represent the characteristics of the TC233 / TC234 / TC237 and partly its requirements on the system. To aid interpreting the parameters easily when evaluating them for a design, they are marked with an two-letter abbreviation in column “Symbol”:

- **CC**
  Such parameters indicate **C**ontroller **C**haracteristics which are a distinctive feature of the TC233 / TC234 / TC237 and must be regarded for a system design.
- **SR**
  Such parameters indicate **S**ystem **R**equirements which must provided by the microcontroller system in which the TC233 / TC234 / TC237 designed in.

## 3.2 Absolute Maximum Ratings

Stresses above the values listed under “Absolute Maximum Ratings” may cause permanent damage to the device. This is a stress rating only and functional operation of the device at these or any other conditions above those indicated in the Operational Conditions of this specification is not implied. Exposure to absolute maximum rating conditions may affect device reliability.

**Table 3-1 Absolute Maximum Ratings**

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Storage Temperature | $T_{ST}$ SR | -65 | - | 170 | °C | upto 65h @ $T_J$ = 150°C; upto 15h @ $T_J$ = 170°C |
| Voltage at $V_{DD}$ power supply pins with respect to $V_{SS}$ [1)] | $V_{DD}$ SR | - | - | 1.9 | V | |
| Voltage at $V_{DDP3}$ power supply pins with respect to $V_{SS}$ | $V_{DDP3}$ SR | - | - | 4.43 | V | |
| Voltage at $V_{DDM}$ power supply pin with respect to $V_{SS}$ | $V_{DDM}$ SR | - | - | 7.0 | V | |
| Voltage on all analog and class S input pins with respect to $V_{SS}$ [2)] | $V_{IN}$ SR | -0.5 | - | 7.0 | V | |
| Voltage on all other input pins with respect to $V_{SS}$ [1)2)] | $V_{IN}$ SR | -0.5 | - | min( $V_{DDP3}$ + 0.6 , 4.23 ) | V | Whatever is lower |
| Input current on any pin during overload condition [3)] | $I_{IN}$ SR | -10 | - | 10 | mA | |
| Absolute maximum sum of all input circuit currents during overload condition [3)] | $\Sigma I_{IN}$ SR | -100 | - | 100 | mA | |

1) Valid for cumulated for up to 2.8h and pulse forms following a power supply switch on phase, where the rise and fall times are releated to the system capacities and coils.

2) Voltages below $V_{INmin}$ have no Impact to the device reliabiltiy as Long as the times and currents defined in section Pin Reliability in Overload for the affected pad(s) are not violated.

3) This parameter is an Absolute Maximum Rating. Exposure to Absolute Maximum Ratings for extended periods of time may damage the device.

## 3.3 Pin Reliability in Overload

When receiving signals from higher voltage devices, low-voltage devices experience overload currents and voltages that go beyond their own IO power supplies specification.

The following table defines overload conditions that will not cause any negative reliability impact if all the following conditions are met:

- full operation life-time is not exceeded
- **Operating Conditions** are met for
  - pad supply levels
  - temperature
- Parameters defined in **Absolute Maximum Ratings** are not violated

If a pin current is out of the **Operating Conditions** but within the overload parameters, then the parameters functionality of this pin as stated in the Operating Conditions can no longer be guaranteed. Operation is still possible in most cases but with relaxed parameters.

*Note: An overload condition on one or more pins does not require a reset.*

**Table 3-2 Overload Parameters**

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Input current on any digital pin during overload condition | $I_{IN}$ | -5 | - | 5 | mA | |
| Input current on analog input pin during overload condition | $I_{INANA}$ | -1 | - | 3 | mA | |
| | | -5 | - | 5 | mA | limited to 60h over lifetime |
| Absolute sum of all ADC inputs during overload condition | $I_{INSCA}$ | -20 | - | 20 | mA | |
| Absolute maximum sum of all input circuit currents during overload condition | $\Sigma I_{INS}$ | -100 | - | 100 | mA | |
| Inactive device pin current during overload condtion [1)] | $I_{ID}$ | -1 | - | 1 | mA | All power supply voltages $V_{DDx}$ = 0 |
| Sum of all inactive device pin currents [1)] | $I_{IDS}$ | -100 | - | 100 | mA | |
| Overload coupling factor for digital inputs, negative [2)] | $K_{OVDN}$ CC | - | - | $1.5*10^{-3}$ | | Overload injected on GPIO pad and affecting neighbor GPIO pad |
| Overload coupling factor for digital inputs, positive [2)] | $K_{OVDP}$ CC | - | - | $1*10^{-5}$ | | Overload injected on GPIO pad and affecting neighbor GPIO pad |
| Overload coupling factor for analog inputs, negative | $K_{OVAN}$ CC | - | - | $1*10^{-3}$ | | Analog Inputs overlaid with pull down diagnostics |
| | | - | - | $1*10^{-4}$ | | else |

**Table 3-2 Overload Parameters** (cont'd)

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Overload coupling factor for analog inputs, positive | $K_{OVAP}$ CC | - | - | $1*10^{-4}$ | | Analog Inputs overlaid with pull down diagnostics |
| | | - | - | $1*10^{-5}$ | | else |

1) Limitations for time and supply levels specified in this section are not valid for this parameter.
2) Overload is measured as increase of pad leakage caused by injection on neighbor pad.

**Table 3-3 PN-Junction Characteristics for positive Overload**

| Pad Type | $I_{IN}$ = 3 mA | $I_{IN}$ = 5 mA |
|---|---|---|
| A1 / A1+ | $U_{IN} = V_{DDP3}$ + 0.5 V | $U_{IN} = V_{DDP3}$ + 0.6 V |
| D | $U_{IN} = V_{DDM}$ + 0.75 V | - |

**Table 3-4 PN-Junction Characteristics for negative Overload**

| Pad Type | $I_{IN}$ = -3 mA | $I_{IN}$ = -5 mA |
|---|---|---|
| A1 / A1+ | $U_{IN} = V_{SS}$ - 0.5 V | $U_{IN} = V_{SS}$ - 0.6 V |
| D | $U_{IN} = V_{SS}$ - 0.75 V | - |

## 3.4 Operating Conditions

The following operating conditions must not be exceeded in order to ensure correct operation and reliability of the TC233 / TC234 / TC237. All parameters specified in the following tables refer to these operating conditions, unless otherwise noticed.

Digital supply voltages applied to the TC233 / TC234 / TC237 must be static regulated voltages.

All parameters specified in the following tables refer to these operating conditions (see table below), unless otherwise noticed in the Note / Test Condition column.

**Table 3-5 Operating Conditions**

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| SRI frequency | $f_{SRI}$ SR | - | - | 200 | MHz | |
| | | - | - | 133 | MHz | vaild only for SAK-TC233LC-24F133F |
| Max System Frequency | $f_{MAX}$ SR | - | - | 200 | MHz | |
| | | - | - | 133 | MHz | vaild only for SAK-TC233LC-24F133F |
| CPU0 Frequency | $f_{CPU0}$ SR | - | - | 200 | MHz | |
| | | - | - | 133 | MHz | vaild only for SAK-TC233LC-24F133F |
| PLL output frequency | $f_{PLL}$ SR | 20 | - | 200 | MHz | |
| | | - | - | 133 | MHz | vaild only for SAK-TC233LC-24F133F |
| PLL_ERAY output frequency | $f_{PLLERAY}$ SR | 20 | - | 160 | MHz | |
| | | - | - | 80 | MHz | vaild only for SAK-TC233LC-24F133F |
| SPB frequency | $f_{SPB}$ SR | - | - | 100 | MHz | |
| ASCLIN fast frequency | $f_{ASCLINF}$ SR | - | - | 200 | MHz | |
| | | - | - | 133 | MHz | vaild only for SAK-TC233LC-24F133F |
| ASCLIN slow frequency | $f_{ASCLINS}$ SR | - | - | 100 | MHz | |
| Baud2 frequency | $f_{BAUD2}$ SR | - | - | 200 | MHz | |
| | | - | - | 133 | MHz | vaild only for SAK-TC233LC-24F133F |
| FSI2 frequency | $f_{FSI2}$ SR | - | - | 200 | MHz | |
| | | - | - | 133 | MHz | vaild only for SAK-TC233LC-24F133F |
| FSI frequency | $f_{FSI}$ SR | - | - | 100 | MHz | |
| GTM frequency | $f_{GTM}$ SR | - | - | 100 | MHz | |
| STM frequency | $f_{STM}$ SR | - | - | 100 | MHz | |
| ERAY frequency | $f_{ERAY}$ SR | - | - | 80 | MHz | |
| BBB frequency | $f_{BBB}$ SR | - | - | 100 | MHz | |
| MultiCAN frequency | $f_{CAN}$ SR | - | - | 100 | MHz | |

**Table 3-5 Operating Conditions** (cont'd)

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Absolute sum of short circuit currents of the device | $\Sigma I_{SC_D}$ SR | - | - | 100 | mA | |
| Ambient Temperature | $T_A$ SR | -40 | - | 125 | °C | valid for all SAK products |
| | | -40 | - | 150 | °C | valid for all SAL products |
| Junction Temperature | $T_J$ SR | -40 | - | 150 | °C | valid for all SAK products |
| | | -40 | - | 165 | °C | valid for all SAL products |
| Core Supply Voltage [1)] | $V_{DD}$ SR | 1.17 | 1.3 | 1.43 [2)] | V | Only required if externally supplied |
| ADC analog supply voltage | $V_{DDM}$ SR | 2.97 | 5.0 | 5.5 [3)] | V | |
| Digital ground voltage | $V_{SS}$ SR | 0 | - | - | V | |
| Analog ground voltage for $V_{DDM}$ | $V_{SSM}$ CC | -0.1 | 0 | 0.1 | V | |
| Voltage to ensure defined pad states [4)] | $V_{DDPPA}$ CC | 0.72 | - | - | V | |
| Digital supply voltage for GPIO pads and EVR [5)] | $V_{DDP3}$ SR | 2.97 | 3.3 | 3.63 | V | |

1) No external inductive load permissible if EVR is used. All $V_{DD}$ pins shall be connected together externally on the PCB.
2) Voltage overshoot to 1.69V is permissible, provided the duration is less than 2h cumulated. Reduced ADC accuracy and leakage is increased.
3) Voltage overshoot to 6.5V is permissible, provided the duration is less than 2h cumulated. Reduced ADC accuracy and leakage is increased.
4) This parameter is valid under the assumption the PORST signal is constantly at low level during the power-up/power-down of $V_{DDP3}$.
5) All $V_{DDP3}$ pins shall be connected together externally on the PCB.

## 3.5 3.3 V Pads

**Table 3-6 Standard Pads**

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Pin capacitance (digital inputs/outputs) | $C_{IO}$ CC | - | 6 | 10 | pF | |
| Spike filter always blocked pulse duration | $t_{SF1}$ CC | - | - | 80 | ns | PORST only |
| Spike filter pass-through pulse duration | $t_{SF2}$ CC | 220 | - | - | ns | PORST only |
| PORST pad output current [1)] | $I_{PORST}$ CC | 10.1 | - | - | mA | $V_{DDP3}$ = 3.0V; $V_{PORST}$ = 0.9V; $T_J$ = 150°C; |

1) Pull-down with $I_{PORST}$ relevant is always activated when a primary supply monitor detects a violation.

**Table 3-7 Class_A1**

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Input frequency | $f_{IN}$ SR | - | - | 100 | MHz | |
| Input Hysteresis A1 | $HYSA1$ CC | 0.1 * $V_{DDP3}$ | - | - | V | else |
| Input Leakage Current Class A1 | $I_{OZA1}$ CC | -400 | - | 400 | nA | (0.1*$V_{DDP3}$) < $V_{IN}$ < (0.9*$V_{DDP3}$) |
| | | -475 | - | 475 | nA | (0.1*$V_{DDP3}$) < $V_{IN}$ < (0.9*$V_{DDP3}$); only vaild for P0.0 |
| | | -800 | - | 800 | nA | else |
| Pull-down current class A1 pads | $I_{PDLA1}$ CC | - | - | \|120\| | µA | $V_{IHmin}$ |
| | | \|15\| | - | - | µA | $V_{ILmax}$ |
| Pull-up current class A1 pads | $I_{PUHA1}$ CC | \|15\| | - | - | µA | $V_{IHmin}$ |
| | | - | - | \|120\| | µA | $V_{ILmax}$ |
| On-Resistance of the A1 pad, medium driver | $R_{DSONA1M}$ CC | 50 | 125 | 200 | Ohm | $I_{OH}$=2mA; $I_{OL}$=2mA |
| On-Resistance of the class A1 pad, weak driver | $R_{DSONA1W}$ CC | 250 | 500 | 800 | Ohm | $I_{OH}$=0.5mA; $I_{OL}$=0.5mA |
| Input high voltage class A1 pads | $V_{IHA1}$ CC | 0.7 * $V_{DDP3}$ | - | - | V | CMOS |
| Input low voltage, class A1 pads | $V_{ILA1}$ CC | - | - | 0.3 * $V_{DDP3}$ | V | CMOS |

**Table 3-7 Class_A1** (cont'd)

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Rise/fall time [1] | $t_{A1}$ CC | - | - | 10+0.4 * $C_L$ | ns | $C_L$≤100pF; pin out driver=medium |
| | | - | - | 30+2.0 * $C_L$ | ns | $C_L$≤100pF; pin out driver=weak |

1) Rise / fall times are defined 10% - 90% of $V_{DDP3}$.

**Table 3-8 Class_A1+**

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Input frequency | $f_{IN}$ SR | - | - | 75 | MHz | |
| Input Leakage Current Class A1+ | $I_{OZA1+}$ CC | -1 | - | 1 | µA | (0.1*$V_{DDP3}$) < $V_{IN}$ < (0.9*$V_{DDP3}$) |
| | | -2 | - | 2 | µA | else |
| Pull-down current class A1+ pads | $I_{PDLA1+}$ CC | - | - | \|120\| | µA | $V_{IHmin}$ |
| | | \|15\| | - | - | µA | $V_{ILmax}$ |
| Pull-up current class A1+ pads | $I_{PUHA1+}$ CC | \|15\| | - | - | µA | $V_{IHmin}$ |
| | | - | - | \|120\| | µA | $V_{ILmax}$ |
| On-Resistance of the A1+ pad, medium driver | $R_{DSONA1+M}$ CC | 50 | 125 | 200 | Ohm | $I_{OH}$=2mA; $I_{OL}$=2mA |
| On-Resistance of the A1+ pad, strong driver | $R_{DSONA1+S}$ CC | 10 | 40 | 65 | Ohm | $I_{OH}$=6mA; $I_{OL}$=6mA |
| On-Resistance of the A1+ pad, weak driver | $R_{DSONA1+W}$ CC | 250 | 500 | 800 | Ohm | $I_{OH}$=0.5mA; $I_{OL}$=0.5mA |
| Input high voltage, Class A1+ pads | $V_{IHA1+}$ CC | 0.7 * $V_{DDP3}$ | - | - | V | CMOS |
| Input low voltage Class A1+ pads | $V_{ILA1+}$ CC | - | - | 0.3 * $V_{DDP3}$ | V | CMOS |
| Rise/fall time [1] | $t_{A1+}$ CC | - | - | 8+0.14 * $C_L$ | ns | $C_L$≤100pF; edge=slow ; pin out driver=strong (sw) |
| | | - | - | 1+0.14 * $C_L$ | ns | $C_L$≤100pF; edge=soft ; pin out driver=strong (sf) |
| | | - | - | 10+0.4 * $C_L$ | ns | $C_L$≤100pF; pin out driver=medium |
| | | - | - | 30+2.0 * $C_L$ | ns | $C_L$≤100pF; pin out driver=weak |
| Input Hysteresis A1+ | HYSA1+ CC | 0.1 * $V_{DDP3}$ | - | - | V | else |

1) Rise / fall times are defined 10% - 90% of $V_{DDP3}$.

**Table 3-9 Class_S**

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Input frequency | $f_{IN}$ SR | - | - | 75 | MHz | |
| Input Hysteresis for S pad [1] | $HYSS$ CC | 0.3 | - | - | V | |
| Pull-up current for S pad | $I_{PUHS}$ CC | \|11\| | - | - | µA | $V_{IHmin}$ |
| | | - | - | \|120\| | µA | $V_{ILmax}$ |
| Pull-down current for S pad | $I_{PDLS}$ CC | - | - | \|120\| | µA | $V_{IHmin}$ |
| | | \|30\| | - | - | µA | $V_{ILmax}$ |
| Input Leakage current Class S | $I_{OZS}$ CC | -350 | - | 350 | nA | Analog Inputs overlaid with pull down diagnosis |
| | | -150 | - | 150 | nA | else |
| Input voltage high for S pad | $V_{IHS}$ SR | - | - | 3.8 [2] | V | |
| Input voltage low for S pad | $V_{ILS}$ SR | 1.39 [3] | - | - | V | |
| Input low threshold variation for S pad [4] | $V_{ILSD}$ SR | -50 | - | 50 | mV | max. variation of 1ms; $V_{DDM}$=constant |
| Input capacitance for S pad | $C_{INS}$ CC | - | - | 10 | pF | |
| Pad set-up time for S pad | $t_{SETS}$ CC | - | - | 100 | ns | |

1) Hysteresis is implemented to avoid metastable states and switching due to internal ground bounce. It can't be guaranteed that it suppresses switching due to external system noise.
2) $V_{ILx}$ = 0.65 * $V_{DDM}$
3) $V_{ILx}$ = 0.41 * $V_{DDM}$
4) VILSD is implemented to ensure J2716 specification. For details of dedicated pins please see AP32286 for details.

**Table 3-10 Class I**

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Input frequency | $f_{IN}$ SR | - | - | 100 | MHz | |
| Input Hysteresis for I pad [1] | $HYSI$ CC | 0.1 * $V_{DDP3}$ | - | - | V | |
| Pull-up current for I pad | $I_{PUHI}$ CC | \|15\| | - | - | µA | $V_{IHImin}$ |
| | | - | - | \|120\| | µA | $V_{ILImax}$ |
| Pull-down current for I pad | $I_{PDLI}$ CC | - | - | \|120\| | µA | $V_{IHImin}$ |
| | | \|15\| | - | - | µA | $V_{ILImax}$ |
| Input Leakage Current for I pad | $I_{OZI}$ CC | -150 | - | 150 | nA | $(0.1*V_{DDP3}) < V_{IN} < (0.9*V_{DDP3})$ |
| | | -500 | - | 350 | nA | else |
| Input high voltage for I pad | $V_{IHI}$ SR | 0.7 * $V_{DDP3}$ | - | - | V | CMOS |

**Table 3-10 Class I** (cont'd)

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Input low voltage for I pad | $V_{ILI}$ SR | - | - | 0.3 * $V_{DDP3}$ | V | CMOS |
| Pad set-up time for I pad | $t_{SETI}$ CC | - | - | 100 | ns | |

1) Hysteresis is implemented to avoid metastable states and switching due to internal ground bounce. It can't be guaranteed that it suppresses switching due to external system noise.

**Table 3-11 Driver Mode Selection for A1 Pads**

| PDx.2 | PDx.1 | PDx.0 | Port Functionality | Driver Setting |
|---|---|---|---|---|
| X | X | 0 | Speed grade 1 | medium (A1m) |
| X | X | 1 | Speed grade 2 | weak (A1w) |

**Table 3-12 Driver Mode Selection for A1+ Pads**

| PDx.2 | PDx.1 | PDx.0 | Port Functionality | Driver Setting |
|---|---|---|---|---|
| X | 0 | 0 | Speed grade 1 | Strong soft edge (A1+sf) |
| X | 0 | 1 | Speed grade 2 | Strong slow edge (A1+sw) |
| X | 1 | 0 | Speed grade 3 | medium (A1+m) |
| X | 1 | 1 | Speed grade 4 | weak (A1+w) |

## 3.6 VADC Parameters

VADC parameter are valid for $V_{DDM}$ = 4.5 V to 5.5 V.

This table also covers the parameters for Class D pads.

**Table 3-13 VADC**

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Analog reference voltage [1] | $V_{AREF}$ SR | $V_{AGND}$ + 1.0 | - | $V_{DDM}$ + 0.05 | V | |
| Analog reference ground | $V_{AGND}$ SR | $V_{SSM}$ - 0.05 | - | $V_{SSM}$ + 0.05 | V | |
| Analog input voltage range | $V_{AIN}$ SR | $V_{AGND}$ | - | $V_{AREF}$ | V | |
| Converter reference clock | $f_{ADCI}$ SR | 2 | - | 20 | MHz | |
| Charge consumption per conversion [2] [3] | $Q_{CONV}$ CC | - | 50 | 75 | pC | $V_{AIN}$ = 5 V, charge consumed from reference pin, precharging disabled |
| | | - | 10 | 22 | pC | $V_{AIN}$ = 5 V, charge consumed from reference pin, precharging enabled |
| Conversion time for 12-bit result | $t_{C12}$ CC | - | (16 + STC) x $t_{ADCI}$ + 2 x $t_{VADC}$ | - | | Includes sample time and post calibration |
| Conversion time for 10-bit result | $t_{C10}$ CC | - | (14 + STC) x $t_{ADCI}$ + 2 x $t_{VADC}$ | - | | Includes sample time |
| Conversion time for 8-bit result | $t_{C8}$ CC | - | (12 + STC) x $t_{ADCI}$ + 2 x $t_{VADC}$ | - | | Includes sample time |
| Conversion time for fast compare mode | $t_{CF}$ CC | - | (4 + STC) x $t_{ADCI}$ + 2 x $t_{VADC}$ | - | | Includes sample time |
| Broken wire detection delay against $V_{AGND}$ [4] | $t_{BWG}$ CC | - | - | 120 | cycles | Result below 10% |
| Broken wire detection delay against $V_{AREF}$ [5] | $t_{BWR}$ CC | - | - | 60 | cycles | Result above 80% |
| Input leakage at analog inputs | $I_{OZ1}$ CC | -350 | - | 350 | nA | Analog Inputs overlaid with pull down diagnosis |
| | | -150 | - | 150 | nA | else |
| Total Unadjusted Error [1] | $TUE$ CC | -4 [6] | - | 4 [6] | LSB | 12-bit resolution |

**Table 3-13 VADC** (cont'd)

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| INL Error | $EA_{INL}$ CC | -3 | - | 3 | LSB | 12-bit resolution |
| Gain Error [1] | $EA_{GAIN}$ CC | -3.5 | - | 3.5 | LSB | 12-bit resolution |
| DNL error [1] | $EA_{DNL}$ CC | -3 | - | 3 | LSB | 12-bit resolution |
| Offset Error [1] | $EA_{OFF}$ CC | -4 | - | 4 | LSB | 12-bit resolution |
| Total capacitance of an analog input | $C_{AINT}$ CC | - | - | 30 | pF | |
| Switched capacitance of an analog input | $C_{AINS}$ CC | 2 | - | 7 | pF | |
| Resistance of the analog input path | $R_{AIN}$ CC | - | - | 1.5 | kOhm | |
| Switched capacitance of a reference input | $C_{AREFS}$ CC | - | - | 30 | pF | |
| RMS Noise [7] | $EN_{RMS}$ CC | - | 0.5 | 0.8 [6][8] | LSB | |
| Positive reference $V_{AREFx}$ pin leakage | $I_{OZ2}$ CC | -2 | - | 2 | µA | $V_{AREFx} = V_{AREF}$; $T_J$>150°C |
| | | -1 | - | 1 | µA | $V_{AREFx} = V_{AREF}$; $T_J$≤150°C |
| Negative reference $V_{AGNDx}$ pin leakage | $I_{OZ3}$ CC | -2.5 | - | 2.5 | µA | $V_{AGNDx} = V_{AGND}$; $T_J$>150°C |
| | | -1.5 | - | 1.5 | µA | $V_{AGNDx} = V_{AGND}$; $T_J$≤150°C |
| Resistance of the reference input path | $R_{AREF}$ CC | - | - | 1 | kOhm | |
| CSD resistance [9] | $R_{CSD}$ CC | - | - | 28 | kOhm | |
| Resistance of the multiplexer diagnostics pull-down device | $R_{MDD}$ CC | $25 + 1*V_{IN}$ | - | $35 - 8*V_{IN}$ | kOhm | 0 V ≤ $V_{IN}$ ≤ 2.5 V |
| | | $-5 + 13*V_{IN}$ | - | $15 + 16*V_{IN}$ | kOhm | 2.5 V ≤ $V_{IN}$ ≤ $V_{DDM}$ |
| Resistance of the multiplexer diagnostics pull-up device | $R_{MDU}$ CC | $45 - 6*V_{IN}$ | - | $90 - 16*V_{IN}$ | kOhm | 0 V ≥ $V_{IN}$ ≤ 2.5 V |
| | | $40 - 4*V_{IN}$ | - | $65 - 6*V_{IN}$ | kOhm | 2.5 V ≤ $V_{IN}$ ≤ $V_{DDM}$ |
| Resistance of the pull-down test device [10] | $R_{PDD}$ CC | - | - | 0.3 | kOhm | |
| CSD voltage accuracy [11] [12] | $dVCSD$ CC | - | - | 10 | % | |
| Wakeup time | $t_{WU}$ CC | - | - | 12 | µs | |

1) If the reference voltage is reduced by the factor k (k < 1), TUE,DNL,INL,Gain, and Offset errors increase also by the factor 1/k. $V_{AREF}$ must be decoupled with an external capacitor.
2) For QCONV = X pC and a conversion time of 1 µs a rms value of X µA results for $I_{AREFx}$.
3) For the details of the mapping for a VADC group to pin $V_{AREFx}$ please see the User's Manual.
4) The broken wire detection delay against $V_{AGND}$ is measured in numbers of consecutive precharge cycles at a conversion rate higher than 1 conversion per 500 ms.
5) The broken wire detection delay against $V_{AREF}$ is measured in numbers of consecutive precharge cycles at a conversion rate higher than 1 conversion per 10 ms. This function is influenced by leakage current, in particular at high temperature.

6) Resulting worst case combined error is arithmetic combination of TUE and $EN_{RMS}$.
7) This parameter is valid for soldered devices and requires careful analog board design.
8) Value is defined for one sigma Gauss distribution.
9) In order to avoid an additional error due to incomplete sampling, the sampling time shall be set greater than 5 * $R_{CSD}$ * $C_{AINS}$.
10) The pull-down resistor $R_{PDD}$ is connected between the input pad and the analog multiplexer. The input pad itself adds another 200-Ohm series resistance, when measuring through the pin.
11) CSD: Converter Self Diagnostics, for details please consult the User's Manual.
12) Note, that in case CSD voltage is chosen to nom. 1/3 or 2/3 of $V_{AREF}$ voltage, the reference voltage is loaded with a current of max. $V_{AREF}$ / 45 kOhm.

VADC parameter are valid for $V_{DDM}$ = 2.97 V to 4.5 V.

**Table 3-14 VADC_33**

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Analog reference voltage [1] | $V_{AREF}$ SR | $V_{AGND}$ + 1.0 | - | $V_{DDM}$ + 0.05 | V | |
| Analog reference ground | $V_{AGND}$ SR | $V_{SSM}$ - 0.05 | - | $V_{SSM}$ + 0.05 | V | |
| Analog input voltage range | $V_{AIN}$ SR | $V_{AGND}$ | - | $V_{AREF}$ | V | |
| Converter reference clock | $f_{ADCI}$ SR | 2 | - | 20 | MHz | |
| Charge consumption per conversion [2] [3] | $Q_{CONV}$ CC | - | 35 | 50 | pC | $V_{AIN}$ = 3.3 V, charge consumed from reference pin, precharging disabled |
| | | - | 8 | 17 | pC | $V_{AIN}$ = 3.3 V, charge consumed from reference pin, precharging enabled |
| Conversion time for 12-bit result | $t_{C12}$ CC | - | (16 + STC) x $t_{ADCI}$ + 2 x $t_{VADC}$ | - | | Includes sample time and post calibration |
| Conversion time for 10-bit result | $t_{C10}$ CC | - | (14 + STC) x $t_{ADCI}$ + 2 x $t_{VADC}$ | - | | Includes sample time |
| Conversion time for 8-bit result | $t_{C8}$ CC | - | (12 + STC) x $t_{ADCI}$ + 2 x $t_{VADC}$ | - | | Includes sample time |
| Conversion time for fast compare mode | $t_{CF}$ CC | - | (4 + STC) x $t_{ADCI}$ + 2 x $t_{VADC}$ | - | | Includes sample time |
| Broken wire detection delay against $V_{AGND}$ [4] | $t_{BWG}$ CC | - | - | 120 | cycles | Result below 10% |

**Table 3-14 VADC_33** (cont'd)

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Broken wire detection delay against $V_{AREF}$ [5] | $t_{BWR}$ CC | - | - | 60 | cycles | Result above 80% |
| Input leakage at analog inputs | $I_{OZ1}$ CC | -350 | - | 350 | nA | Analog Inputs overlaid with pull down diagnostics |
| | | -150 | - | 150 | nA | else |
| Total Unadjusted Error [1] | $TUE$ CC | -12 | - | 12 | LSB | 12-bit Resolution; $T_J$ > 150 °C |
| | | -6 | - | 6 | LSB | 12-bit Resolution; $T_J$ ≤ 150 °C |
| INL Error | $EA_{INL}$ CC | -12 | - | 12 | LSB | 12-bit Resolution; $T_J$ > 150 °C |
| | | -5 | - | 5 | LSB | 12-bit Resolution; $T_J$ ≤ 150 °C |
| Gain Error [1] | $EA_{GAIN}$ CC | -6 | - | 6 | LSB | 12-bit Resolution; $T_J$ > 150 °C |
| | | -5.5 | - | 5.5 | LSB | 12-bit Resolution; $T_J$ ≤ 150 °C |
| DNL error [1] | $EA_{DNL}$ CC | -4 | - | 4 | LSB | 12-bit resolution |
| Offset Error [1] | $EA_{OFF}$ CC | -6 | - | 6 | LSB | 12-bit Resolution; $T_J$ > 150 °C |
| | | -5 | - | 5 | LSB | 12-bit Resolution; $T_J$ ≤ 150 °C |
| Total capacitance of an analog input | $C_{AINT}$ CC | - | - | 30 | pF | |
| Switched capacitance of an analog input | $C_{AINS}$ CC | 2 | 4 | 7 | pF | |
| Resistance of the analog input path | $R_{AIN}$ CC | - | - | 4.5 | kOhm | |
| Switched capacitance of a reference input | $C_{AREFS}$ CC | - | - | 30 | pF | |
| RMS Noise [6] | $EN_{RMS}$ CC | - | - | 1.7 | LSB | |
| Positive reference $V_{AREFx}$ pin leakage | $I_{OZ2}$ CC | -2 | - | 2 | µA | $V_{AREFx}$ = $V_{AREF}$; $T_J$>150°C |
| | | -1 | - | 1 | µA | $V_{AREFx}$ = $V_{AREF}$; $T_J$≤150°C |
| Negative reference $V_{AGNDx}$ pin leakage | $I_{OZ3}$ CC | -2.5 | - | 2.5 | µA | $V_{AGNDx}$ = $V_{AGND}$; $T_J$>150°C |
| | | -1 | - | 1 | µA | $V_{AGNDx}$ = $V_{AGND}$; $T_J$≤150°C |
| Resistance of the reference input path | $R_{AREF}$ CC | - | - | 3 | kOhm | |

**Table 3-14 VADC_33** (cont'd)

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| CSD resistance [7] | $R_{CSD}$ CC | - | - | 28 | kOhm | |
| Resistance of the multiplexer diagnostics pull-down device | $R_{MDD}$ CC | $25 + 3*V_{IN}$ | - | $40 + 12*V_{IN}$ | kOhm | $0\ V \le V_{IN} \le 1.667\ V$ |
| | | $0 + 18*V_{IN}$ | - | $0 + 18*V_{IN}$ | kOhm | $1.667\ V \le V_{IN} \le V_{DDM}$ |
| Resistance of the multiplexer diagnostics pull-up device | $R_{MDU}$ CC | $60 - 12*V_{IN}$ | - | $120 - 30*V_{IN}$ | kOhm | $0\ V \le V_{IN} \le 1.667\ V$ |
| | | $55 - 9*V_{IN}$ | - | $95 - 15*V_{IN}$ | kOhm | $1.667\ V \le V_{IN} \le V_{DDM}$ |
| Resistance of the pull-down test device [8] | $R_{PDD}$ CC | - | - | 0.9 | kOhm | |
| CSD voltage accuracy [9] [10] | $dVCSD$ CC | - | - | 10 | % | |
| Wakeup time | $t_{WU}$ CC | - | - | 12 | µs | |

1) If the reference voltage is reduced by the factor k (k < 1), TUE,DNL,INL,Gain, and Offset errors increase also by the factor 1/k. $V_{AREF}$ must be decoupled with an external capacitor.
2) For QCONV = X pC and a conversion time of 1 µs a rms value of X µA results for $I_{AREFx}$.
3) For the details of the mapping for a VADC group to pin $V_{AREFx}$ please see the User's Manual.
4) The broken wire detection delay against $V_{AGND}$ is measured in numbers of consecutive precharge cycles at a conversion rate higher than 1 conversion per 500 ms.
5) The broken wire detection delay against $V_{AREF}$ is measured in numbers of consecutive precharge cycles at a conversion rate higher than 1 conversion per 10 ms. This function is influenced by leakage current, in particular at high temperature.
6) This parameter is valid for soldered devices and requires careful analog board design.
7) In order to avoid an additional error due to incomplete sampling, the sampling time shall be set greater than $5 * R_{CSD} * C_{AINS}$.
8) The pull-down resistor $R_{PDD}$ is connected between the input pad and the analog multiplexer. The input pad itself adds another 200-Ohm series resistance, when measuring through the pin.
9) CSD: Converter Self Diagnostics, for details please consult the User's Manual.
10) Note, that in case CSD voltage is chosen to nom. 1/3 or 2/3 of $V_{AREF}$ voltage, the reference voltage is loaded with a current of max. $V_{AREF}$ / 45 kOhm.

**Figure 3-1 Equivalent Circuitry for Analog Inputs**

## 3.7 MHz Oscillator

OSC_XTAL is used as accurate and exact clock source. OSC_XTAL supports 8 MHz to 40 MHz crystals external outside of the device. Support of ceramic resonators is also provided.

**Table 3-15 OSC_XTAL**

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Input current at XTAL1 | $I_{IX1}$ CC | -25 | - | 25 | µA | $V_{IN}$>0V; $V_{IN}$<$V_{DDP3}$V |
| Oscillator frequency | $f_{OSC}$ SR | 4 | - | 40 | MHz | Direct Input Mode selected |
| | | 8 | - | 40 | MHz | External Crystal Mode selected |
| Oscillator start-up time [1] | $t_{OSCS}$ CC | - | - | 5 [2] | ms | |
| Input high voltage at XTAL1 | $V_{IHBX}$ SR | 0.8 | - | $V_{DDP3}$ + 0.5 | V | If shaper is bypassed |
| Input low voltage at XTAL1 | $V_{ILBX}$ SR | -0.5 | - | 0.4 | V | If shaper is bypassed |
| Input voltage at XTAL1 | $V_{IX}$ SR | -0.5 | - | $V_{DDP3}$ + 0.5 | V | If shaper is not bypassed |
| Input amplitude (peak to peak) at XTAL1 | $V_{PPX}$ SR | 0.3 * $V_{DDP3}$ | - | $V_{DDP3}$ + 1.0 | V | If shaper is not bypassed; $f_{OSC}$ > 25MHz |
| | | 0.4 * $V_{DDP3}$ | - | $V_{DDP3}$ + 1.0 | V | If shaper is not bypassed; $f_{OSC}$ ≤ 25MHz |

1) $t_{OSCS}$ is defined from the moment when $V_{DDP3}$ = 3.13V until the oscillations reach an amplitude at XTAL1 of 0.3 * $V_{DDP3}$. The external oscillator circuitry must be optimized by the customer and checked for negative resistance as recommended and specified by crystal suppliers.

2) This value depends on the frequency of the used external crystal. For faster crystal frequencies this value decrease.

*Note: It is strongly recommended to measure the oscillation allowance (negative resistance) in the final target system (layout) to determine the optimal parameters for the oscillator operation. Please refer to the limits specified by the crystal or ceramic resonator supplier.*

## 3.8 Back-up Clock

The back-up clock provides an alternative clock source.

**Table 3-16 Back-up Clock**

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Back-up clock before trimming | $f_{BACKUT}$ CC | 75 | 100 | 125 | MHz | |
| Slow speed Back-up clock | $f_{BACKSS}$ CC | 75 | 100 | 125 | kHz | |
| Back-up clock after trimming | $f_{BACKT}$ CC | 97.5 | 100 | 102.5 | MHz | |

## 3.9 Temperature Sensor

**Table 3-17 DTS**

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Measurement time | $t_M$ CC | - | - | 100 | µs | |
| Calibration reference accuracy | $T_{CALACC}$ CC | -1 | - | 1 | °C | calibration points @ $T_J$=-40°C and $T_J$=127°C |
| Non-linearity accuracy over temperature range | $T_{NL}$ CC | -2 | - | 2 | °C | |
| Temperature sensor range | $T_{SR}$ SR | -40 | - | 170 | °C | |
| Start-up time after resets inactive | $t_{TSST}$ SR | - | - | 20 | µs | |

The following formula calculates the temperature measured by the DTS in [°C] from the RESULT bit field of the DTSSTAT register.

$$Tj = \frac{DTSSTATRESULT - (607)}{2,13} \quad (3.1)$$

## 3.10 Power Supply Current

The total power supply current defined below consists of leakage and switching component.

Application relevant values are typically lower than those given in the following table and depend on the customer's system operating conditions (e.g. thermal connection or used application configurations).

The operating conditions for the parameters in the following table are:

The real (realisic) power pattern defines the following conditions:

- $T_J$ = 150 °C
- $f_{SRI}$ = $f_{MAX}$ = $f_{CPU0}$ = 200 MHz
- $f_{SPB}$ = $f_{STM}$ = $f_{GTM}$ = $f_{BAUD1}$ = $f_{BAUD2}$ = $f_{ASCLIN}$ = 40 MHz
- $V_{DD}$ = 1.326 V
- $V_{DDP3}$ = 3.366 V
- $V_{DDM}$ = 5.1 V
- core is active
- the following peripherals are inactive: HSM, Ethernet, and MTU

The max power pattern defines the following conditions:

- $T_J$ = 150 °C
- $f_{SRI}$ = $f_{MAX}$ = $f_{CPU0}$ = 200 MHz
- $f_{SPB}$ = $f_{STM}$ = $f_{GTM}$ = $f_{BAUD1}$ = $f_{BAUD2}$ = $f_{ASCLIN}$ = 100 MHz
- $V_{DD}$ = 1.43 V
- $V_{DDP3}$ = 3.63 V
- $V_{DDM}$ = 5.5 V
- core is active
- all peripherals are active

**Table 3-18 Power Supply**

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| ∑ Sum of $I_{DD}$ 1.3 V core and peripheral supply currents | $I_{DD}$ CC | - | - | 215 [1)] | mA | valid for Feature Package L, LC, LP, S, and SP; max power pattern |
| | | - | - | 160 | mA | valid for Feature Package L, LC, LP, S, and SP; real power pattern |

**Table 3-18 Power Supply** (cont'd)

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| $I_{DD}$ core current during active power-on reset (PORST held low) | $I_{DDPORST}$ CC | - | - | 85 | mA | valid for Feature Package L, LC, LP, S, and SP; $T_J$=165°C |
| | | - | - | 60 | mA | valid for Feature Package L, LC, LP, S, and SP; $T_J$=150°C |
| | | - | - | 40 | mA | valid for Feature Package L, LC, LP, S, and SP; $T_J$=125°C |
| $I_{DD}$ core current of CPU0 lockstep core active | $I_{DDC01}$ CC | - | - | 34 | mA | real power pattern |
| $I_{DD}$ core current added by HSM | $I_{DDHSM}$ CC | - | - | 20 | mA | HSM running at 100MHz. |
| $I_{DD}$ core current added by FFT | $I_{DDFFT}$ CC | - | - | 40 | mA | FFT running at 200MHz |
| ∑ Sum of 3.3 V supply currents without pad activity | $I_{DDx3RAIL}$ CC | - | - | 34 [2)] | mA | real power pattern; incl. OSC, EVR and Pflash read current |
| | | - | - | 44 | mA | incl. OSC, EVR, Pflash read and Pflash programming current. |
| $I_{DDM}$ supply current | $I_{DDM}$ CC | - | - | 6 | mA | max pattern; current for 2x VADC modules. |
| Σ Sum of all currents with DC-DC EVR13 regulator active [3)] | $I_{DDTOTDC3}$ CC | - | - | 129 | mA | real power pattern; $V_{DDP3}$ = 3.3$V$ |
| ∑ Sum of all currents (incl. $I_{DDP3RAIL}$+$I_{DD}$+$I_{DDM}$) | $I_{DDTOTL}$ CC | - | - | 200 | mA | valid for Feature Package L, LC, LP, S, and SP; real power pattern |
| ∑ Sum of all currents (STANDBY mode) | $I_{EVRSB}$ CC | - | - | 150 [4)] | µA | Standby RAM is active. Power to remaining domains switched off. $T_J$ = 25°$C$; $V_{EVRSB}$ = 5$V$ |
| ∑ Sum of all currents (SLEEP mode) | $I_{SLEEP}$ CC | - | - | 10 | mA | CPU is in idle, All peripherals in sleep, $f_{SRI/SPB}$ = 1 $MHz$; $T_J$ = 55°$C$ |

**Table 3-18 Power Supply** (cont'd)

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Maximum power dissipation | *PD* CC | - | - | 460 | mW | valid for Feature Package L, LC, LP, S, and SP; max power pattern |
| | | - | - | 360 [5)] | mW | valid for Feature Package L, LC, LP, S, and SP; real power pattern |

1) It shall be ensured when using the SC DC DC EVR13 that the current is limited to the maximum value documented in the EVR section. EVR SRCSCDC Interrupt shall be kept active to indicate violations of max current and temperature shall be monitored to keep leakage current within limits.
2) Realistic Pflash read pattern with 50% Pflash bandwidth utlilization and a code mix of 50% 0s and 50% 1s. Dynamic Flash Idle via FCON.IDLE is activated bringing a benefit of 4 mA. A decoupling capacitor of atleast 100nF is used. Dflash read current is also included. In TC23x, separate VDDFL3 pin is not available, so only the total VDDx3RAIL is measured and characterized.
3) The total current drawn from external regulator is estimated with 72% EVR13 SMPS regulator Efficiency. $I_{DDTOTDC}$x is calculated from $I_{DDTOT}$ using the scaled core current [($I_{DD}$ x $V_{DD}$)/(VinxEfficiency)] and constitutes all other rail currents and $I_{DDM}$.
4) The current during STANDBY mode is drawn at $V_{DDP3}$ supply pin. During RUN-STANDBY mode transition the current drawn at $V_{DDP3}$ supply pin is less than 6mA.
5) Incase of EVR13 SCDCDC mode, 50 mW need to be additionally added for the real pattern usecase considering 72% SCDCDC efficiency. Incase of EVR13 LDO mode, 320 mW need to be additionally added to consider the pass device power drop out.

### 3.10.1 Calculating the 1.3 V Current Consumption

The current consumption of the 1.3 V rail compose out of two parts:

- Static current consumption
- Dynamic current consumption

The static current consumption is related to the device temperature $T_J$ and the dynamic current consumption depends of the configured clocking frequencies and the software application executed. These two parts needs to be added in order to get the rail current consumption.

Valid for Feature Package L, LC, LP, S, and SP products:

$$I_0 = 1,2092\left[\frac{mA}{C}\right] \times e^{0,01792 \times T_J[C]} \tag{3.2}$$

$$I_0 = 3,196\left[\frac{mA}{C}\right] \times e^{0,01982 \times T_J[C]} \tag{3.3}$$

Function 2 defines the typical static current consumption and Function 3 defines the maximum static current consumption. Both functions are valid for $V_{DD}$ = 1.326 V.

## 3.11 Power-up and Power-down

**Figure 3-2 Single Supply mode - 3.3 V single supply**

### 3.11.1 Single Supply mode

3.3 V single supply mode. 1.3 V is generated internally by the EVR13 regulator.

- The rate at which current is drawn from the external regulator (dIEXT /dt) is limited during the basic infrastructure and EVR13 regulator start-up phase (T0 upto T2) to a maximum of 100 mA/100 us. EVR13 is also robust against a voltage ramp-up starting from a residual voltage between 0 - 1 V. Start-up slew rates for supply rails should comply to datasheet values.
- Furthermore it is also ensured that the current drawn from the external regulator (dIEXT /dt) is limited during the Firmware start-up phase (T2 upto T3) to a maximum of 100 mA/100 us.
- PORST is active/ asserted when either PORST (input) or PORST (output) is active/ asserted.
- PORST (input) active means that the reset is held active by external agents by pulling the PORST pin low. It is recommended to keep the PORST (input) asserted until the external supply is above the respective primary reset threshold.
- PORST (output) active means that µC asserts the reset internally and drives the PORST pin low thus propagating the reset to external devices. The PORST (output) is asserted by the µC when atleast one among the two supply domains (1.3 V or 3.3 V) violate their primary under-voltage reset thresholds.The PORST (output) is deasserted by the µC when all supplies are above their primary reset thresholds and the basic supply and clock infrastructure is available.
- The power sequence as shown in **Figure 3-2** is enumerated below
  - T1 refers to the point in time when basic supply and clock infrastructure is available as the external supply ramps up. The supply mode is evaluated based on the HWCFG[0,2] pins and consequently a soft start of EVR13 regulator is initiated.
  - T2 refers to the point in time when all supplies are above their primary reset thresholds. EVR13 regulator has ramped up. PORST (output) is deasserted and HWCFG[3:5] pins are latched on PORST rising edge. Firmware execution is initiated.
  - T3 refers to the point in time when Firmware execution is completed. User code execution starts with a default frequency of 100 MHz.
  - T4 refers to the point in time during the Ramp-down phase when atleast one of the externally provided or generated supplies (1.3 V or 3.3 V) drop below their respective primary under-voltage reset thresholds.

**Figure 3-3 External Supply mode - 3.3 V and 1.3 V external supply**

### 3.11.2 External Supply mode

All supplies, namely 3.3 V & 1.3 V, are externally supplied.

- External supplies VDDP3 & VDD may ramp-up or ramp-down independent of each other with regards to start, rise and fall time(s). The supply system is also robust against a voltage ramp-up starting from a residual voltage between 0 - 1 V. Start-up slew rates for supply rails should comply to datasheet values.
- The rate at which current is drawn from the external regulator (dIEXT /dt, dIDD /dt) is limited in the Start-up phase to a maximum of 50 mA/100 us.
- PORST is active/ asserted when either PORST (input) or PORST (output) is active/ asserted.
- PORST (input) active means that the reset is held active by external agents by pulling the PORST pin low. It is recommended to keep the PORST (input) asserted until all the external supplies are above their primary reset thresholds.
- PORST (output) active means that µC asserts the reset internally and drives the PORST pin low thus propagating the reset to external devices. The PORST (output) is asserted by the µC when atleast one among the two supply domains (1.3 V or 3.3 V) violate their primary under-voltage reset thresholds.The PORST (output) is deasserted by the µC when all supplies are above their primary reset thresholds and the basic supply and clock infrastructure is available.
- The power sequence as shown in **Figure 3-3** is enumerated below
  - T1 refers to the point in time when all supplies are above their primary reset thresholds and basic clock infrastructure is available. The supply mode is evaluated based on the HWCFG[0,2] pins. PORST (output) is deasserted and HWCFG[3:5] pins are latched on PORST rising edge. Firmware execution is initiated.
  - T2 refers to the point in time when Firmware execution is completed. User code execution starts with a default frequency of 100 MHz.
  - T3 refers to the point in time during the Ramp-down phase when atleast one of the externally provided supplies (1.3 V or 3.3 V) drop below their respective primary under-voltage reset thresholds.

## 3.12 Reset Timing

**Table 3-19 Reset Timings**

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Application Reset Boot Time [1] | $t_B$ CC | - | - | 350 | µs | operating with max. frequencies |
| System Reset Boot Time | $t_{BS}$ CC | - | - | 1 | ms | |
| Power on Reset Boot Time [2] | $t_{BP}$ CC | - | - | 2.5 | ms | $dV/dT$=1$V/ms$. including EVR ramp-up and Firmware execution time |
| | | - | - | 1.1 | ms | Firmware execution time; without EVR operation (external supply only) |
| EVR start-up or ramp-up time | $t_{EVRstartup}$ CC | - | - | 1 | ms | $dV/dT$=1$V/ms$ |
| Minimum PORST active hold time after power supplies are stable at operating levels [3] | $t_{POA}$ CC | 1 | - | - | ms | |
| HWCFG pins hold time from ESR0 rising edge | $t_{HDH}$ CC | 16 / $f_{SPB}$ | - | - | ns | |
| HWCFG pins setup time to ESR0 rising edge | $t_{HDS}$ CC | 0 | - | - | ns | |
| Ports inactive after ESR0 reset active | $t_{PI}$ CC | - | - | 8/$f_{SPB}$ | ns | |
| Ports inactive after PORST reset active [4] | $t_{PIP}$ CC | - | - | 150 | ns | |
| Hold time from PORST rising edge | $t_{POH}$ SR | 150 | - | - | ns | |
| Setup time to PORST rising edge | $t_{POS}$ SR | 0 | - | - | ns | |

1) The duration of the boot time is defined between the rising edge of the internal application reset and the clock cycle when the first user instruction has entered the CPU pipeline and its processing starts.

2) The duration of the boot time is defined by all external supply voltages are inside there operation condictions and the clock cycle when the first user instruction has entered the CPU pipeline and its processing starts.

3) The regulator that supplies $V_{EXT}$ should ensure that $V_{EXT}$ is in the operational region before PORST is externally released by the regulator. Incase of 5V nominal supply, it should be ensured that $V_{EXT}$ > 4V before PORST is released. Incase of 3.3V nominal supply , it should be ensured that $V_{EXT}$ > 3V before PORST is released. The additional minimum PORST hold time is required as an additional mechanism to avoid consecutive PORST toggling owing to slow supply slopes or residual supply ramp-ups. It is also required to activate external PORST atleast 100us before power-fail is recognised to avoid consecutive PORST toggling on a power fail event.

4) This parameter includes the delay of the analog spike filter in the $\overline{\text{PORST}}$ pad.

**Figure 3-4 Power, Pad and Reset Timing**

## 3.13 EVR

**Table 3-20 LDO**

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Input voltage range [1] | $V_{IN}$ SR | 2.97 | - | 3.63 | V | pass device=on chip |
| Output voltage operational range including load/line regulation and aging incase of LDO regulator | $V_{OUT}$ CC | 1.17 | 1.3 | 1.43 | V | pass device=on chip |
| Output $V_{DD}$ static voltage accuracy after trimming without dynamic load/line regulation with aging incase of LDO regulator. | $V_{OUTT}$ CC | 1.275 | 1.3 | 1.325 | V | *product* load equal to $I_{DD}$ of max power pattern; either TJ≤150°C and pass device=on chip or TJ≤170°C and pass device=off chip |
| Output buffer capacitance on $V_{OUT}$ [2] | $C_{OUT}$ CC | 1.4 | 2.2 | 3 | µF | On chip pass device usage restricted to IDD < 230mA.; pass device=on chip |
| Primary undervoltage reset threshold for $V_{DD}$ [3] | $V_{RST13}$ CC | - | - | 1.17 [4] | V | pass device=on chip |
| Startup time | $t_{STR}$ CC | - | - | 1000 | µs | pass device=on chip |
| External $V_{IN}$ supply ramp [5] | $dVin/dT$ SR | - | 1 | 50 | V/ms | pass device=on chip |
| Load step response | $dVout/dIout$ CC | - | - | 100 | mV | $dI$=-100$mA$; $Tsettle$=20$\mu s$; pass device=on chip |
| | | -100 | - | - | mV | $dI$=75$mA$; $Tsettle$=20$\mu s$; pass device=on chip |
| Line step response | $dVout/dVin$ CC | -10 | - | 10 | mV | $dV/dT$=1$V/ms$; pass device=on chip |

1) A maximum pass device dropout voltage of 700mV is included in the minimum input voltage to ensure optimal pass device operation.
2) It is recommended to select a capacitor with ESR less than 50 mOhm (0.5MHz - 10 MHz). It is also recommended that the resistance of the supply trace from the pin to the EVR output capacitor is less than 100 mOhm.
3) The reset release on supply ramp-up is delayed by a time duration 30-60 µs after reaching undervoltage reset threshold. This serves as a time hysteresis to avoid multiple consecutive cold PORST events during slow supply ramp-ups owing to voltage drop/current jumps when reset is released.The reset limit of 1,17V at pin is for the case with 1.3V generated internally from EVR13. In case the 1.3V supply is provided externally, the bondwire drop will cause a reset at a higher voltage of 1.18V at the VDD pin.
4) In TQFP-100 pin package, only $V_{DDPRIUV}$ is tested instead of VRST13 as HWCFG2 pin is absent.
5) EVR robust against residual voltage ramp-up starting between 0-1 V.

**Table 3-21 Supply Monitoring**

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| $V_{DDP3}$ primary undervoltage monitor accuracy after trimming [1] | $V_{DDP3PRIUV}$ SR | 2.86 | 2.92 | 2.97 | V | |
| $V_{DD}$ primary undervoltage monitor accuracy after trimming [1] | $V_{DDPRIUV}$ SR | 1.13 | 1.15 | 1.17 | V | |
| $V_{DDP3}$ secondary supply monitor accuracy | $V_{DDP3MON}$ CC | 3.23 | 3.30 | 3.37 | V | SWDxxVAL $V_{DDP3}$ monitoring threshold=3.3V=91h |
| $V_{DD}$ secondary supply monitor accuracy | $V_{DDMON}$ CC | 1.27 | 1.30 | 1.33 | V | EVR13xxVAL $V_{DD}$ monitoring threshold=1.3V=E4h |
| EVR primary and secondary monitor measurement latency for a new supply value | $t_{EVRMON}$ CC | - | - | 1.8 | µs | |

1) The monitor tolerances constitute the inherent variation of the bandgap and ADC over process, voltage and temperature operational ranges. The xxxPRIUV parameters are device individually tested in production with ±1% tolerance about the min and max xxxPRIUV limits. In TQFP100 and QFP80 pin packages, VDDPRIUV is not tested as HWCFG2 pin is absent.

**Table 3-22 EVR13 SMPS**

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Input $V_{DDP3}$ voltage range | $V_{IN}$ CC | 2.97 | - | 3.63 | V | |
| SMPS regulator output voltage range including load/line regulation and aging [1] | $V_{DDDC}$ CC | - | - | 1.43 | V | $V_{DDP3} > 2.97V$; $I_{DDDC} < 200mA$; $f_{DCDC} = 1MHz$ |
| | | 1.17 | - | - | V | $V_{DDP3} > 2.97V$; $I_{DDDC} < 250mA$; $f_{DCDC} = 1MHz$ |
| SMPS regulator static voltage output accuracy after trimming without dynamic load/line Regulation with aging. [2] | $V_{DDDCT}$ CC | 1.275 | 1.3 | 1.325 | V | $V_{DDP3} > 2.97V$; $I_{DDDC} < 230mA$; $f_{DCDC} = 1MHz$ |
| Programmable switching frequency | $f_{DCDC}$ CC | 0.4 | - | 2.0 | MHz | |
| Maximum ripple at $I_{MAX}$ (peak-to-peak) [3] | $\Delta V_{DDDC}$ CC | - | - | 26 | mV | $V_{DDP3} > 2.97V$; $I_{DDDC} < 230mA$; $f_{DCDC} = 1MHz$ |
| SMPS regulator load transient response | $dVout/dIout$ CC | -90 | - | 90 | mV | $dI < 100mA$ ; $f_{DCDC}$=1$MHz$; $t_r$=0.1µs; $t_f$=0.1µs; $V_{DDDC}$=1.3V |

**Table 3-22 EVR13 SMPS** (cont'd)

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Maximum output current of the regulator | $I_{MAX}$ SR | - | - | 250 [4] | mA | $V_{DDP3}$ > 2.97$V$; $V_{DD}$ = 1.17$V$; $f_{DCDC}$ = 1$MHz$ |
| SMPS regulator efficiency | $n_{DC}$ CC | - | 72 | - | % | $V_{IN}$=3.3$V$; $I_{DDDC}$=200$mA$; $f_{DCDC}$=1$MHz$ |

1) Incase of SMPS mode, It shall be ensured that the $V_{DD}$ output pin shall be connected on PCB level to all other $V_{DD}$ Input pins.
2) Incase of $f_{SRI}$ running with max frequency, it shall be ensured that the $V_{DD}$ operating range is limited to 1.235V upto 1.430V. The DCDC may be configured in this case with a nominal voltage of 1.33V±7.5%. The static accuracy and regulation parameter ranges remain also valid for this case.
3) If frequency spreading (SDFREQSPRD = 1) is activated, an additional ripple of 1% need to be considered.
4) It shall be ensured when using the SC DC DC EVR13 that the current is limited to the maximum value. EVR SRCSCDC Interrupt shall be kept active to indicate violations of max current and temperature shall be monitored to keep leakage current within limits.

**Table 3-23 EVR13 SMPS External components**

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| External output capacitor value [1] | $C_{OUTDC}$ SR | 6.5 | 10 | 13.5 | µF | $I_{DDDC}$=230mA |
| External output capacitor ESR | $C_{DC_ESR}$ SR | - | - | 50 | mOhm | $f$≥0.5MHz; $f$≤10MHz |
| | | - | - | 100 | Ohm | $f$=10Hz |
| External input capacitor value [1] | $C_{IN}$ SR | 3.29 | 4.7 | 6.11 | µF | $I_{DDDC}$=230mA |
| External input capacitor ESR | $C_{IN_ESR}$ SR | - | - | 50 | mOhm | $f$≥0.5MHz; $f$≤10MHz |
| | | - | - | 100 | Ohm | $f$=100Hz |
| External flying capacitor value [1] | $C_{FLY}$ SR | 0.7 | 1[2] | 1.3 | µF | $I_{DDDC}$=230mA |
| Flying capacitor ESR | $C_{FLY_ESR}$ SR | - | - | 50 | mOhm | f≥0.5MHz ; f≤10MHz |
| | | - | - | 100 | Ohm | f=100Hz |

1) Capacitor min-max range represent typical ±35% tolerance including DC bias effect. The trace resistance from the capacitor to the supply or ground rail should be limited to 25 mOhm.
2) It is recommended to place the flying capacitor close to the pins without vias to have minimal routing resistance from pin to the capacitor terminal of less than 25mOhm.

## 3.14 Phase Locked Loop (PLL)

**Table 3-24 PLL**

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| PLL base frequency | $f_{PLLBASE}$ CC | 80 | 150 | 360 | MHz | |
| VCO frequency range | $f_{VCO}$ SR | 400 | - | 800 | MHz | |
| VCO Input frequency range | $f_{REF}$ CC | 8 | - | 24 | MHz | |
| Modulation Amplitude | $MA$ CC | 0 | - | 2 | % | |
| Peak Period jitter | $DP$ CC | -200 | - | 200 | ps | |
| Peak Accumulated Jitter | $D_{PP}$ CC | -5 | - | 5 | ns | without modulation |
| Total long term jitter | $J_{TOT}$ CC | - | - | 12.2 | ns | including modulation; MA ≤ 1% |
| | | - | - | 11.5 | ns | including modulation; MA≤0.9% |
| System frequency deviation | $f_{SYSD}$ CC | - | - | 0.01 | % | with active modulation |
| Modulation variation frequency | $f_{MV}$ CC | 2 | 3.6 | 5.4 | MHz | |
| PLL lock-in time | $t_L$ CC | 11.5 | - | 200 | µs | |

*Note: The specified PLL jitter values are valid if the capacitive load per pin does not exceed $C_L$ = 20 pF with the maximum driver and soft edge (speed grade 1).*

*Note: The maximum peak-to-peak noise on the power supply voltage, is limited to a peak-to-peak voltage of $V_{PP}$ = 100 mV for noise frequencies below 300 KHz and $V_{PP}$ = 40 mV for noise frequencies above 300 KHz. These conditions can be achieved by appropriate blocking of the supply voltage as near as possible to the supply pins and using PCB supply and ground planes.*

## 3.15 ERAY Phase Locked Loop (ERAY_PLL)

**Table 3-25 PLL_ERAY**

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| PLL Base Frequency of the ERAY PLL | $f_{PLLBASE_ERAY}$ CC | 50 | 200 | 320 | MHz | |
| VCO frequency range of the ERAY PLL | $f_{VCO_ERAY}$ SR | 400 | - | 480 | MHz | |
| VCO input frequency of the ERAY PLL | $f_{REF}$ SR | 16 | - | 24 | MHz | |
| Accumulated_Jitter | $D_P$ CC | -0.5 | - | 0.5 | ns | |
| Accumulated jitter at SYSCLK pin | $D_{PP}$ CC | -0.8 | - | 0.8 | ns | |
| PLL lock-in time | $t_L$ CC | 5.6 | - | 200 | µs | |

*Note: The specified PLL jitter values are valid if the capacitive load per pin does not exceed $C_L$ = 20 pF with the maximum driver and soft edge (speed grade 1).*

*Note: The maximum peak-to-peak noise on the power supply voltage, is limited to a peak-to-peak voltage of $V_{PP}$ = 100 mV for noise frequencies below 300 KHz and $V_{PP}$ = 40 mV for noise frequencies above 300 KHz. These conditions can be achieved by appropriate blocking of the supply voltage as near as possible to the supply pins and using PCB supply and ground planes.*

## 3.16 AC Specifications

All AC parameters are specified for the complette operating range defined in **Chapter 3.4** unless otherwise noted in colum Note / test Condition.

Unless otherwise noted in the figures the timings are defined with the following guidelines:

**Figure 3-5 Definition of rise / fall times**

**Figure 3-6 Time Reference Point Definition**

## 3.17 JTAG Parameters

The following parameters are applicable for communication through the JTAG debug interface. The JTAG module is fully compliant with IEEE1149.1-2000.

**Table 3-26 JTAG**

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| TCK clock period | $t_1$ SR | 25 | - | - | ns | |
| TCK high time | $t_2$ SR | 10 | - | - | ns | |
| TCK low time | $t_3$ SR | 10 | - | - | ns | |
| TCK clock rise time | $t_4$ SR | - | - | 4 | ns | |
| TCK clock fall time | $t_5$ SR | - | - | 4 | ns | |
| TDI/TMS setup to TCK rising edge | $t_6$ SR | 6.0 | - | - | ns | |
| TDI/TMS hold after TCK rising edge | $t_7$ SR | 6.0 | - | - | ns | |
| TDO valid after TCK falling edge (propagation delay) [1] | $t_8$ CC | 3.0 | - | - | ns | $C_L$≤20pF |
| | | - | - | 16 | ns | $C_L$≤50pF |
| TDO hold after TCK falling edge [1] | $t_{18}$ CC | 2 | - | - | ns | |
| TDO high impedance to valid from TCK falling edge [1][2] | $t_9$ CC | - | - | 14 | ns | $C_L$≤50pF |
| TDO valid output to high impedance from TCK falling edge [1] | $t_{10}$ CC | - | - | 13.5 | ns | $C_L$≤50pF |

1) The falling edge on TCK is used to generate the TDO timing.
2) The setup time for TDO is given implicitly by the TCK cycle time.

**Figure 3-7 Test Clock Timing (TCK)**

**Figure 3-8 JTAG Timing**

## 3.18 DAP Parameters

The following parameters are applicable for communication through the DAP debug interface.

**Table 3-27 DAP**

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| DAP0 clock period | $t_{11}$ SR | 6.25 | - | - | ns | |
| DAP0 high time | $t_{12}$ SR | 2 | - | - | ns | |
| DAP0 low time | $t_{13}$ SR | 2 | - | - | ns | |
| DAP0 clock rise time | $t_{14}$ SR | - | - | 1 | ns | $f$=160MHz |
| | | - | - | 2 | ns | $f$=80MHz |
| DAP0 clock fall time | $t_{15}$ SR | - | - | 1 | ns | $f$=160MHz |
| | | - | - | 2 | ns | $f$=80MHz |
| DAP1 setup to DAP0 rising edge | $t_{16}$ SR | 4 | - | - | ns | |
| DAP1 hold after DAP0 rising edge | $t_{17}$ SR | 2 | - | - | ns | |
| DAP1 valid per DAP0 clock period [1)] | $t_{19}$ CC | 3 | - | - | ns | $C_L$=20pF; $f$=160MHz |
| | | 8 | - | - | ns | $C_L$=20pF; $f$=80MHz |
| | | 10 | - | - | ns | $C_L$=50pF; $f$=40MHz |

1) The Host has to find a suitable sampling point by analyzing the sync telegram response.

**Figure 3-9 Test Clock Timing (DAP0)**

**Figure 3-10 DAP Timing Host to Device**

**Figure 3-11 DAP Timing Device to Host (DAP1 and DAP2 pins)**

*Note: The DAP1 and DAP2 device to host timing is individual for both pins. There is no guaranteed max. signal skew.*

## 3.19 ASCLIN SPI Master Timing

This section defines the timings for the ASCLIN in the TC233 / TC234 / TC237.

**Table 3-28 Master Mode A1+strong soft (sf) output pads**

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| ASCLKO clock period [1] | $t_{50}$ CC | 20 | - | - | ns | $C_L$=25pF |
| Deviation from ideal duty cycle [2] | $t_{500}$ CC | -3 | - | 3 | ns | $C_L$=25pF |
| MTSR delay from ASCLKO shifting edge | $t_{51}$ CC | -4 | - | 4 | ns | $C_L$=25pF |
| ASLSOn delay from the first ASCLKO edge | $t_{510}$ CC | -4 | - | 4 | ns | $C_L$=25pF |
| MRST setup to ASCLKO latching edge | $t_{52}$ SR | 20 | - | - | ns | $C_L$=25pF |
| MRST hold from ASCLKO latching edge | $t_{53}$ SR | -3 | - | - | ns | $C_L$=25pF |

1) PLL Jitter not included. Should be considered additionally, corresponding to the used baudrate. The duty cycle can be adjusted using the BITCON.SAMPLEPOINT bitfield with the finest granularity of $T_{MAX}$ = 1 / $f_{MAX}$.

2) Positive deviation lenghtens the high time and shortens the low time of a clock period. Negative deviation does the opposite.

**Table 3-29 Master Mode A1+strong slow (sw) output pads**

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| ASCLKO clock period [1] | $t_{50}$ CC | 80 | - | - | ns | $C_L$=50pF |
| Deviation from ideal duty cycle [2] | $t_{500}$ CC | -8 | - | 8 | ns | $C_L$=50pF |
| MTSR delay from ASCLKO shifting edge | $t_{51}$ CC | -12 | - | 12 | ns | $C_L$=50pF |
| ASLSOn delay from the first ASCLKO edge | $t_{510}$ CC | -12 | - | 12 | ns | $C_L$=50pF |
| MRST setup to ASCLKO latching edge | $t_{52}$ SR | 40 | - | - | ns | $C_L$=50pF |
| MRST hold from ASCLKO latching edge | $t_{53}$ SR | -3 | - | - | ns | $C_L$=50pF |

1) PLL Jitter not included. Should be considered additionally, corresponding to the used baudrate. The duty cycle can be adjusted using the BITCON.SAMPLEPOINT bitfield with the finest granularity of $T_{MAX}$ = 1 / $f_{MAX}$.

2) Positive deviation lenghtens the high time and shortens the low time of a clock period. Negative deviation does the opposite.

**Table 3-30 Master Mode medium output pads**

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| ASCLKO clock period [1] | $t_{50}$ CC | 100 | - | - | ns | $C_L$=50pF |
| Deviation from ideal duty cycle [2] | $t_{500}$ CC | -10 | - | 10 | ns | $C_L$=50pF |
| MTSR delay from ASCLKO shifting edge | $t_{51}$ CC | -15 | - | 15 | ns | $C_L$=50pF |
| ASLSOn delay from the first ASCLKO edge | $t_{510}$ CC | -15 | - | 15 | ns | $C_L$=50pF |
| MRST setup to ASCLKO latching edge | $t_{52}$ SR | 50 | - | - | ns | $C_L$=50pF |
| MRST hold from ASCLKO latching edge | $t_{53}$ SR | -5 | - | - | ns | $C_L$=50pF |

1) PLL Jitter not included. Should be considered additionally, corresponding to the used baudrate. The duty cycle can be adjusted using the BITCON.SAMPLEPOINT bitfield with the finest granularity of $T_{MAX}$ = 1 / $f_{MAX}$.
2) Positive deviation lenghtens the high time and shortens the low time of a clock period. Negative deviation does the opposite.

**Table 3-31 Master Mode weak output pads**

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| ASCLKO clock period [1] | $t_{50}$ CC | 1000 | - | - | ns | $C_L$=50pF |
| Deviation from ideal duty cycle [2] | $t_{500}$ CC | -25 | - | 25 | ns | $C_L$=50pF |
| MTSR delay from ASCLKO shifting edge | $t_{51}$ CC | -65 | - | 65 | ns | $C_L$=50pF |
| ASLSOn delay from the first ASCLKO edge | $t_{510}$ CC | -65 | - | 65 | ns | $C_L$=50pF |
| MRST setup to ASCLKO latching edge | $t_{52}$ SR | 150 | - | - | ns | $C_L$=50pF |
| MRST hold from ASCLKO latching edge | $t_{53}$ SR | -10 | - | - | ns | $C_L$=50pF |

1) PLL Jitter not included. Should be considered additionally, corresponding to the used baudrate. The duty cycle can be adjusted using the BITCON.SAMPLEPOINT bitfield with the finest granularity of $T_{MAX}$ = 1 / $f_{MAX}$.
2) Positive deviation lenghtens the high time and shortens the low time of a clock period. Negative deviation does the opposite.

**Figure 3-12 ASCLIN SPI Master Timing**

## 3.20 QSPI Timings, Master and Slave Mode

This section defines the timings for the QSPI in the TC233 / TC234 / TC237.
It is assumed that SCLKO, MTSR, and SLSO pads have the same pad settings:

**Table 3-32 Master Mode timing A1+ strong soft (sf) output pads**

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| SCLKO clock period [1] | $t_{50}$ CC | 20 | - | - | ns | $C_L$=25pF |
| Deviation from the ideal duty cycle [2] [3] | $t_{500}$ CC | -3 | - | 3 | ns | $C_L$=25pF |
| MTSR delay from SCLKO shifting edge | $t_{51}$ CC | -4 | - | 4 | ns | $C_L$=25pF |
| SLSOn deviation from the ideal programmed position | $t_{510}$ CC | -4 | - | 4 | ns | $C_L$=25pF |
| MRST setup to SCLK latching edge [4] | $t_{52}$ SR | 20 [4] | - | - | ns | $C_L$=25pF |
| MRST hold from SCLK latching edge | $t_{53}$ SR | -3 [4] | - | - | ns | $C_L$=25pF |

1) Documented value is valid for master transmit or slave receive only. For full duplex the external SPI counterpart timing has to be taken into account.
2) The PLL jitter is not included. It should be considered additionally, corresponding to the used baudrate. The duty cycle can be adjusted using the bit fields ECONz.A, B and C with the finest granularity of $T_{MAX} = 1 / f_{MAX}$.
3) Positive deviation lenghtens the high time and shortens the low time of a clock period. Negative deviation does the opposite.
4) For compensation of the average on-chip delay the QSPI module provides the bit fields ECONz.A, B and C.

**Table 3-33 Master Mode timing A1+ strong slow (sw) output pads**

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| SCLKO clock period [1] | $t_{50}$ CC | 80 | - | - | ns | $C_L$=50pF |
| Deviation from the ideal duty cycle [2] [3] | $t_{500}$ CC | -8 | - | 8 | ns | $C_L$=50pF |
| MTSR delay from SCLKO shifting edge | $t_{51}$ CC | -12 | - | 12 | ns | $C_L$=50pF |
| SLSOn deviation from the ideal programmed position | $t_{510}$ CC | -12 | - | 12 | ns | $C_L$=50pF |
| MRST setup to SCLK latching edge [4] | $t_{52}$ SR | 40 [4] | - | - | ns | $C_L$=50pF |
| MRST hold from SCLK latching edge | $t_{53}$ SR | -3 | - | - | ns | $C_L$=50pF |

1) Documented value is valid for master transmit or slave receive only. For full duplex the external SPI counterpart timing has to be taken into account.
2) The PLL jitter is not included. It should be considered additionally, corresponding to the used baudrate. The duty cycle can be adjusted using the bit fields ECONz.A, B and C with the finest granularity of $T_{MAX}$ = 1 / $f_{MAX}$.
3) Positive deviation lenghtens the high time and shortens the low time of a clock period. Negative deviation does the opposite.
4) For compensation of the average on-chip delay the QSPI module provides the bit fields ECONz.A, B and C.

**Table 3-34 Master Mode timing A1+m/A1m output pads**

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| SCLKO clock period [1] | $t_{50}$ CC | 100 | - | - | ns | $C_L$=50pF |
| Deviation from the ideal duty cycle [2] [3] | $t_{500}$ CC | -3 | - | 3 | ns | $C_L$=50pF |
| MTSR delay from SCLKO shifting edge | $t_{51}$ CC | -8 | - | 8 | ns | $C_L$=50pF |
| SLSOn deviation from the ideal programmed position | $t_{510}$ CC | -15 | - | 15 | ns | $C_L$=50pF |
| MRST setup to SCLK latching edge [4] | $t_{52}$ SR | 50 [4] | - | - | ns | $C_L$=50pF |
| MRST hold from SCLK latching edge | $t_{53}$ SR | -5 [4] | - | - | ns | $C_L$=50pF |

1) Documented value is valid for master transmit or slave receive only. For full duplex the external SPI counterpart timing has to be taken into account.
2) The PLL jitter is not included. It should be considered additionally, corresponding to the used baudrate. The duty cycle can be adjusted using the bit fields ECONz.A, B and C with the finest granularity of $T_{MAX}$ = 1 / $f_{MAX}$.
3) Positive deviation lenghtens the high time and shortens the low time of a clock period. Negative deviation does the opposite.
4) For compensation of the average on-chip delay the QSPI module provides the bit fields ECONz.A, B and C.

**Table 3-35 Master Mode Weak output pads**

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| SCLKO clock period [1] | $t_{50}$ CC | 1000 | - | - | ns | $C_L$=50pF |
| Deviation from the ideal duty cycle [2] [3] | $t_{500}$ CC | -25 | - | 25 | ns | $C_L$=50pF |
| MTSR delay from SCLKO shifting edge | $t_{51}$ CC | -65 | - | 65 | ns | $C_L$=50pF |
| SLSOn deviation from the ideal programmed position | $t_{510}$ CC | -65 | - | 65 | ns | $C_L$=50pF |
| MRST setup to SCLK latching edge [4] | $t_{52}$ SR | 150 [4] | - | - | ns | $C_L$=50pF |
| MRST hold from SCLK latching edge | $t_{53}$ SR | -10 [4] | - | - | ns | $C_L$=50pF |

1) Documented value is valid for master transmit or slave receive only. For full duplex the external SPI counterpart timing has to be taken into account.
2) The PLL jitter is not included. It should be considered additionally, corresponding to the used baudrate. The duty cycle can be adjusted using the bit fields ECONz.A, B and C with the finest granularity of $T_{MAX}$ = 1 / $f_{MAX}$.
3) Positive deviation lenghtens the high time and shortens the low time of a clock period. Negative deviation does the opposite.
4) For compensation of the average on-chip delay the QSPI module provides the bit fields ECONz.A, B and C.

**Table 3-36 Slave mode timing**

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| SCLK clock period | $t_{54}$ SR | 4 x $T_{MAX}$ | - | - | ns | |
| SCLK duty cycle | $t_{55/t54}$ SR | 40 | - | 60 | % | |
| MTSR setup to SCLK latching edge | $t_{56}$ SR | 3 | - | - | ns | |
| MTSR hold from SCLK latching edge | $t_{57}$ SR | 3 | - | - | ns | |
| SLSI setup to first SCLK shift edge | $t_{58}$ SR | 3 | - | - | ns | |
| SLSI hold from last SCLK latching edge | $t_{59}$ SR | 3 | - | - | ns | |
| MRST delay from SCLK shift edge | $t_{60}$ CC | 5 | - | 50 | ns | A1+m/A1m; $C_L$=50pF |
| | | 3 | - | 20 | ns | A1+sf; $C_L$=25pF |
| | | 5 | - | 40 | ns | A1+sw; $C_L$=50pF |
| | | 10 | - | 150 | ns | A1+w/A1w; $C_L$=50pF |
| SLSI to valid data on MRST | $t_{61}$ SR | - | - | 9 | ns | |

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

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

QSPI_TmgMM_EP.vsd

**Figure 3-13 Master Mode Timing**

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

QSPI_TmgSM_EP.vsd

**Figure 3-14 Slave Mode Timing**

## 3.21 Ethernet Interface (ETH) Characteristics

### 3.21.1 ETH Measurement Reference Points

**Figure 3-15 ETH Measurement Reference Points**

### 3.21.2 ETH Management Signal Parameters (ETH_MDC, ETH_MDIO)

**Table 3-37 ETH Management Signal Parameters**

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

**Figure 3-16 ETH Management Signal Timing**

### 3.21.3 ETH MII Parameters

In the following, the parameters of the MII (Media Independent Interface) are described.

**Table 3-38 ETH MII Signal Timing Parameters**

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

1) Defined by 35% of clock period.
2) Defined by 65% of clock period.

**Figure 3-17 ETH MII Signal Timing**

### 3.21.4 ETH RMII Parameters

In the following, the parameters of the RMII (Reduced Media Independent Interface) are described.

**Table 3-39 ETH RMII Signal Timing Parameters**

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

1) Defined by 35% of clock period.

2) Defined by 65% of clock period.

**Figure 3-18 ETH RMII Signal Timing**

## 3.22 E-Ray Parameters

The timings of this section are valid for the strong driver and sharp edge settings of the output drivers with $C_L$ = 25 pF.

**Table 3-40 Transmit Parameters**

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Rise time of TxEN | $t_{dCCTxENRise25}$ CC | - | - | 9 | ns | $C_L$=25pF |
| Fall time of TxEN | $t_{dCCTxENFall25}$ CC | - | - | 9 | ns | $C_L$=25pF |
| Sum of rise and fall time | $t_{dCCTxRise25+dCCTxFall25}$ CC | - | - | 9 | ns | 20% - 80%; $C_L$=25pF |
| Sum of delay between TP1_FF and TP1_CC and delays derived from TP1_FFi, rising edge of TxEN | $t_{dCCTxEN01}$ CC | - | - | 25 | ns | |
| Sum of delay between TP1_FF and TP1_CC and delays derived from TP1_FFi, falling edge of TxEN | $t_{dCCTxEN10}$ CC | - | - | 25 | ns | |
| Asymmetry of sending | $t_{tx_asym}$ CC | -2.45 | - | 2.45 | ns | $C_L$=25pF |
| Sum of delay between TP1_FF and TP1_CC and delays derived from TP1_FFi, rising edge of TxD | $t_{dCCTxD01}$ CC | - | - | 25 | ns | |
| Sum of delay between TP1_FF and TP1_CC and delays derived from TP1_FFi, falling edge of TxD | $t_{dCCTxD10}$ CC | - | - | 25 | ns | |
| TxD signal sum of rise and fall time at TP1_BD | $t_{txd_sum}$ CC | - | - | 9 | ns | |

**Table 3-41 Receive Parameters**

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Acceptance of asymmetry at receiving part | $t_{dCCTxAsymAccept25}$ SR | -30.5 | - | 43.0 | ns | $C_L$=25pF |
| Acceptance of asymmetry at receiving part | $t_{dCCTxAsymAccept15}$ SR | -31.5 | - | 44.0 | ns | $C_L$=15pF |
| Threshold for detecting logical high | $T_{uCCLogic1}$ SR | 35 | - | 70 | % | |
| Threshold for detecting logical low | $T_{uCCLogic0}$ SR | 30 | - | 65 | % | |

**Table 3-41 Receive Parameters** (cont'd)

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Sum of delay between TP4_CC and TP4_FF and delays derived from TP4_FFi, rising edge of RxD | $t_{dCCRxD01}$ CC | - | - | 10 | ns | |
| Sum of delay between TP1_CC and TP1_CC and delays derived from TP4_FFi, falling edge of RxD | $t_{dCCRxD10}$ CC | - | - | 10 | ns | |

## 3.23 Flash Parameters

Program Flash program and erase operation is only allowed up the $T_J$ = 150°C.

**Table 3-42 Flash**

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Program Flash Erase Time per logical sector | $t_{ERP}$ CC | - | - | 1 | s | cycle count < 1000 |
| | | - | 0.207 + 0.003 * ($S$ [KByte]) / ($f_{FSI}$ [MHz])[1)] | - | s | cycle count < 1000, for sector of size S |
| Program Flash Erase Time per Multi-Sector Command | $t_{MERP}$ CC | - | - | 1 | s | For consecutive logical sectors in a physical sector, cycle count < 1000 |
| | | - | 0.207 + 0.003 * ($S$ [KByte]) / ($f_{FSI}$ [MHz])[1)] | - | s | For consecutive logical sector range of size S in a physical sector, cycle count < 1000 |
| Program Flash program time per page in 3.3 V mode | $t_{PRP3}$ CC | - | - | 81 + 3400/($f_{FSI}$ [MHz]) | µs | 32 Byte |
| Program Flash program time per burst in 3.3 V mode | $t_{PRPB3}$ CC | - | - | 410 + 12000/($f_{FSI}$ [MHz]) | µs | 256 Byte |
| Program Flash program time for 1 MByte with burst programming in 3 V mode excluding communication | $t_{PRPB3_1MB}$ CC | - | - | 2.2 | s | Derived value for documentation purpose, valid for $f_{FSI}$ = 100MHz |
| Write Page Once adder | $t_{ADD}$ CC | - | - | 15 + 500/($f_{FSI}$ [MHz]) | µs | Adder to Program Time when using Write Page Once |
| Program Flash suspend to read latency | $t_{SPNDP}$ CC | - | - | 12000/($f_{FSI}$ [MHz]) | µs | For Write Burst, Verify Erased and for multi-(logical) sector erase commands |
| Data Flash Erase Time per Sector [2)] | $t_{ERD}$ CC | - | 0.12 + 0.08/($f_{FSI}$ [MHz])[1)] | - | s | cycle count < 1000 |
| | | - | 0.57 + 0.15/($f_{FSI}$ [MHz])[1)] | 0.928 + 0.15/($f_{FSI}$ [MHz]) | s | cycle count < 125000 |

**Table 3-42 Flash** (cont'd)

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Data Flash Erase Time per Multi-Sector Command [2] | $t_{MERD}$ CC | - | 0.12 + 0.01 * ($S$ [KByte]) / ($f_{FSI}$ [MHz])[1] | - | s | For consecutive logical sector range of size S, cycle count < 1000 |
| | | - | 0.57 + 0.019 * ($S$ [KByte]) / ($f_{FSI}$ [MHz])[1] | 0.928 + 0.019 * ($S$ [KByte]) / ($f_{FSI}$ [MHz]) | s | For consecutive logical sector range of size S, cycle count < 125000 |
| Data Flash erase disturb limit | $N_{DFD}$ CC | - | - | 50 | cycles | |
| Program time data flash per page [3] | $t_{PRD}$ CC | - | - | 50 + 2500/($f_{FSI}$ [MHz]) [3] | µs | 8 Byte |
| Data Flash program time per burst [3] | $t_{PRDB}$ CC | - | - | 96 + 4400/($f_{FSI}$ [MHz]) [3] | µs | 32 Bytes |
| Data Flash suspend to read latency | $t_{SPNDD}$ CC | - | - | 12000/($f_{FSI}$ [MHz]) | µs | |
| Wait time after margin change | $t_{FL_MarginDel}$ CC | - | - | 10 | µs | |
| Program Flash Retention Time, Sector | $t_{RET}$ CC | 20 | - | - | years | Max. 1000 erase/program cycles |
| Data Flash Endurance per EEPROMx sector [4] | $N_{E_EEP10}$ CC | 125000 | - | - | cycles | Max. data retention time 10 years |
| UCB Retention Time | $t_{RTU}$ CC | 20 | - | - | years | Max. 100 erase/program cycles per UCB, max 400 erase/program cycles in total |
| Data Flash access delay | $t_{DF}$ CC | - | - | 100 | ns | see PMU_FCON.WSDFLASH |
| Data Flash ECC Delay | $t_{DFECC}$ CC | - | - | 20 | ns | see PMU_FCON.WSECDF |
| Program Flash access delay | $t_{PF}$ CC | - | - | 30 | ns | see PMU_FCON.WSPFLASH |
| Program Flash ECC delay | $t_{PFECC}$ CC | - | - | 10 | ns | see PMU_FCON.WSECPF |

**Table 3-42 Flash** (cont'd)

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Number of erase operations on DF0 over lifetime | $N_{ERD0}$ CC | - | - | 750000 | cycles | |
| Junction temperature limit for PFlash program/erase operations | $T_{JPFlash}$ SR | - | - | 150 | °C | |

1) All typical values were characterised, but are not tested. Typical values are safe median values at room temperature
2) Under out-of-spec conditions (e.g. over-cycling) or in case of activation of WL oriented defects, the duration of erase processes may be increased by up to 50%.
3) Time is not dependent on program mode (5V or 3.3V).
4) Only valid when a robust EEPROM emulation algorithm is used. For more details see the Users Manual.

## 3.24 Package Outline

**Figure 3-19 Package Outlines PG-LFBGA-292-6**

**Figure 3-20 Package Outlines PG-TQFP-144-27**

**Table 3-43 Exposed Pad Dimensions**

| | |
|---|---|
| **Ex; vaild for Feature Package L and LP (nominal EPad size)** | **5.7 mm ± 50 µm** |
| **Ey; vaild for Feature Package L and LP (nominal EPad size)** | **5.7 mm ± 50 µm** |
| **Ax; vaild for Feature Package L and LP (solder able EPad size)** | **4.9 mm ± 50 µm** |
| **Ay; vaild for Feature Package L and LP (solder able EPad size)** | **4.9 mm ± 50 µm** |

*Note: It is recommended to use dimensions Ex and Ey for board layout considerations. Solder wetting between Ex / Ey and Ax / Ay and lead between Ex / Ey and Ax / Ay will not case any harm.*

**Figure 3-21 Package Outlines PG-TQFP-100-23**

**Table 3-44 Exposed Pad Dimensions**

| | |
|---|---|
| **Ex; vaild for Feature Package L, LC, LP, S, and SP (nominal EPad size)** | **5.7 mm ± 50 µm** |
| **Ey; vaild for Feature Package L, LC, LP, S, and SP (nominal EPad size)** | **5.7 mm ± 50 µm** |
| **Ax; vaild for Feature Package L, LC, LP, S, and SP (solder able EPad size)** | **4.9 mm ± 50 µm** |
| **Ay; vaild for Feature Package L, LC, LP, S, and SP (solder able EPad size)** | **4.9 mm ± 50 µm** |

*Note: It is recommended to use dimensions Ex and Ey for board layout considerations. Solder wetting between Ex / Ey and Ax / Ay and lead between Ex / Ey and Ax / Ay will not case any harm.*

You can find all of our packages, sorts of packing and others in our Infineon Internet Page “Products”: http://www.infineon.com/products.

## 3.24.1 Package Parameters

**Table 3-45 Thermal Characteristics of the Package**

| Device | Package | RQJCT[1)] | RQJCB[1)] | RQJA | Unit | Note |
|---|---|---|---|---|---|---|
| TC233 | PG-TQFP-100-23 | 21.2 | 12.1 | 30.4[2)] | K/W | with soldered exposed pad and internal pass device |
| | | 11.9 | 2.9 | 20.4[2)] | K/W | with soldered exposed pad and DCDC EVR |

**Table 3-45 Thermal Characteristics of the Package**

| Device | Package | RQJCT[1)] | RQJCB[1)] | RQJA | Unit | Note |
|---|---|---|---|---|---|---|
| TC234 | PG-TQFP-144-27 | 20.9 | 11.7 | 30.0[2)] | K/W | with soldered exposed pad and internal pass device |
| | | 11.7 | 2.8 | 19.8[2)] | K/W | with soldered exposed pad and DCDC EVR |
| TC237 | PG-LFBGA-292-6 | 13.7 | 21.0 | 33.1[2)] | K/W | with internal pass device |
| | | 7.6 | 14.1 | 25.4[2)] | K/W | with DCDC EVR |

1) The top and bottom thermal resistances between the case and the ambient ($R_{TCAT}$, $R_{TCAB}$) are to be combined with the thermal resistances between the junction and the case given above ($R_{TJCT}$, $R_{TJCB}$), in order to calculate the total thermal resistance between the junction and the ambient ($R_{TJA}$). The thermal resistances between the case and the ambient ($R_{TCAT}$, $R_{TCAB}$) depend on the external system (PCB, case) characteristics, and are under user responsibility.
The junction temperature can be calculated using the following equation: $T_J = T_A + R_{TJA} * P_D$, where the $R_{TJA}$ is the total thermal resistance between the junction and the ambient. This total junction ambient resistance $R_{TJA}$ can be obtained from the upper four partial thermal resistances.
Thermal resistances as measured by the 'cold plate method' (MIL SPEC-883 Method 1012.1).

2) Value is defined in accordance with JEDEC JESD51-3, JESD51-5, and JESD51-7.

## 3.25 Quality Declarations

**Table 3-46 Quality Parameters**

| Parameter | Symbol | Values | | | Unit | Note / Test Condition |
|---|---|---|---|---|---|---|
| | | Min. | Typ. | Max. | | |
| Operation Lifetime | $t_{OP}$ | - | - | 24500 | hour | |
| ESD susceptibility according to Human Body Model (HBM) | $V_{HBM}$ | - | - | 2000 | V | Conforming to JESD22-A114-B |
| ESD susceptibility according to Charged Device Model (CDM) | $V_{CDM}$ | - | - | 500 | V | for all other balls/pins; conforming to JESD22-C101-C |
| | | - | - | 750 | V | for corner balls/pins; conforming to JESD22-C101-C |
| Moisture Sensitivity Level | $MSL$ | - | - | 3 | | Conforming to Jedec J-STD--020C for 240C |

# 4 History

## 4.1 Changes from Version TC23x_DS_v1.1 to Version TC23xAC_DS_v1.0

This Data Sheet is only valid for the Feature Packages L, LC, LP, S, and SP.

Feature Packages S and SP are newly added.

- PG-LFBGA-292-6 Package Varinat Pin Configuration of TC237x
  - Remove pin U17 from the NC list
- Overload
  - Remove parameter $I_{ING}$
- changes in table' Class_S' of Standard_Pads
  - add footenote ' VILx = 0.65 * $V_{DDM}$' to $V_{IHS}$
  - add footenote ' $V_{ILx}$ = 0.41 * $V_{DDM}$' to $V_{ILS}$
- Back-up Clock
  - Add parameter $f_{BACKSS}$
- EVR
  - Update footnote of $EVR$ to 'It is recommended to place the flying capacitor close to the pins without vias to have minimal routing resistance from pin to the capacitor terminal of less than 25mOhm. Likewise it is recommended to limit the routing resistance to input and output capacitor is to less than 25mOhm.'
- EVR/LDO
  - Update footnote of $LDO$ to 'LDO operation is only possible for $T_J$≤150°C.'
- Changes in table 'VOUTT TC23xAC' of EVR/LDO
  - Change of $V_{OUTT13}$ from load equal to $I_{DD}$ of max power pattern; either TJ≤150°C and pass device=on chip or TJ≤170°C and pass device=off chip to load equal to $I_{DD}$ of max power pattern; pass device=on chip
- VADC
  - Add parameter $t_{WU}$
  - Add parameter $R_{MDU}$
  - Add parameter $R_{MDD}$
- VADC_33
  - Add parameter $t_{WU}$
  - Add parameter $R_{MDU}$
  - Add parameter $R_{MDD}$
- Power Supply
  - Change max value of $I_{EVRSB}$ from 650 µA to 150 µA
  - Change note of $I_{EVRSB}$ from 'Standby RAM is active. Power to remaining domains switched off. $T_J$ =25°$C$' to 'Standby RAM is active. Power to remaining domains switched off. $T_J$ = 25°$C$; $V_{EVRSB}$ = 5$V$'
  - Change max value of $I_{DDPORST}$ from 70 mA to 85 mA for Note 'valid for Feature Package L, LC, and LP; TJ=165°C'
  - Change max value of $I_{DDPORST}$ from 45 mA to 60 mA for Note 'valid for Feature Package L, LC, and LP; TJ=150°C'

– Change max value of $I_{DDPORST}$ from 25 mA to 40 mA for Note ‘valid for Feature Package L, LC, and LP; TJ=125°C’
– Update formulas 3.2 and 3.3
– add formulas 3.4 and 3.5

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