



MT6260 GSM/GPRS/EDGE-RX SOC Processor Technical Brief (Draft)

Version: 0.10
Release date: 2012-12-27

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Document Revision History

| Revision | Date | Author | Description |
|----------|------------|-------------|---------------|
| 0.10 | 2012-12-27 | Alisa Huang | Draft version |
| | | | |

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Preface

Acronyms for register types

- R/W** For both read and write access
- RO** Read only
- RC** Read only. After the register bank is read, every bit that is HIGH(1) will be cleared to LOW(0) automatically.
- WO** Write only
- W1S** Write only. When data bits are written to the register bank, every bit that is HIGH(1) will cause the corresponding bit to be set to 1. Data bits that are LOW(0) have no effects on the corresponding bit.
- W1C** Write only. When data bits are written to the register bank, every bit that is HIGH(1) will cause the corresponding bit to be cleared to 0. Data bits that are LOW(0) have no effects on the corresponding bit.

1 System Overview

MT6260 is a monolithic chip integrating leading edge power management unit, analog baseband and radio circuitry based on the low-power CMOS process.

MT6260 is a feature-rich and extremely powerful single-chip solution for high-end GSM/GPRS and EDGE-Rx capability. Based on the 32-bit ARM7EJ-S™ RISC processor, MT6260's superb processing power, along with high bandwidth architecture and dedicated hardware support, provides a platform for high-performance GPRS/EDGE-Rx Class 12 MODEM application and leading-edge multimedia applications.

MT6260 also features:

- A highly integrated Bluetooth transceiver which is fully compliant with Bluetooth specification v3.0.
- A FM receiver supporting both audio broadcast de-modulation and RDS/RBDS data decoding.

Typical application diagram is shown in Figure 1.

Platform

MT6260 is capable of running the ARM7EJ-S™ RISC processor, which provides the best trade-off between system performance and power consumption.

For large amounts of data transfer, high-performance DMA (Direct Memory Access) with hardware flow control is implemented, which greatly enhances the data movement speed while reducing the MCU processing load.

Targeted as a media-rich platform for mobile applications, MT6260 also provides hardware security digital rights management for copyright protection. For further safeguard and to protect the manufacturer's development investment, hardware flash content protection is provided to

prevent unauthorized porting of the software load.

Memory

MT6260 supports serial flash interface with various operating frequencies.

Multimedia

The MT6260 multimedia subsystem provides conventional parallel interface and 2-bit serial interface for CMOS sensors. The camera resolution is up to 2M pixels. The software-based codec can be used to process various video types. Besides, MT6260 provides fancy UI capabilities through its hardware 2D accelerator. The 2D accelerator performs high-speed linear transformations with filtering. To take advantage of the high MCU performance, GIF and PNG decoders are implemented by the software.

In addition, MT6260 is implemented with a high-performance audio synthesis technology, as well as a high-quality audio amplifier to provide superior audio experiences.

Connectivity and storage

MT6260 supports UART, USB 1.1 FS/LS, SDIO, HIF interface and MMC/SD storage systems. These interfaces provide MT6260 users with the highest level of flexibility in implementing high-end solutions.

To achieve a complete user interface, MT6260 also brings together all the necessary peripheral blocks for a multimedia GSM/GPRS/EDGE-RX phone. The peripheral blocks include the keypad scanner with the capability to detect multiple key presses, SIM controller, real-time clock, PWM, serial/parallel LCD controller and general-purpose programmable I/Os.

Audio

Using a highly integrated mixed-signal audio front-end, the MT6260 architecture provides easy audio interfacing with direct connection to the audio transducers. The audio interface integrates A/D converters for voice band, as well as high-resolution stereo D/A converters for both audio and voice band.

MT6260 supports AMR codec to adaptively optimize the quality of speech and audio. Moreover, HE-AAC codec is implemented to deliver CD-quality audio at low bit rates.

In addition, a 850mW class-AB amplifier is also embedded to save the BOM cost of adopting external amplifiers.

GSM/GPRS/EDGE-Rx radio

MT6260 integrates a mixed-signal baseband front-end in order to provide a well-organized radio interface with flexibility for efficient customization. The front-end contains gain and offset calibration mechanisms and filters with programmable coefficients for comprehensive compatibility control on RF modules. MT6260 achieves outstanding MODEM performance by utilizing a highly dynamic range ADC in the RF downlink path.

MT6260 embeds a high-performance and completely integrated single-ended SAW-less RF transceiver for multi-band GSM cellular system. In this RF transceiver, a quad-band receiving feature with high sensitivity is supported utilizing one RF receiver and a fully integrated channel filter. With ultra-high dynamic range, the off-chip balun and SAW filters on the receiving path can be removed for BOM cost reduction. In addition, the minimum component count is guaranteed by realizing a highly integrated transmitter, low-spur frequency synthesizer and a Digitally-Controlled Crystal Oscillator (DCXO).

Bluetooth radio

MT6260 offers a highly integrated Bluetooth radio and baseband processor. Only a minimum of external components are required. MT6260 provides superior sensitivity and class 1 output power and thus ensures the quality of the connection with a wide range of Bluetooth devices.

MT6260 is fully compliant with Bluetooth v3.0 and offers enhanced data rates of up to 3Mbps. It also provides the coexistence protocol with 802.11 system.

MT6260 supports rich Bluetooth profiles, enabling diversified applications that are widely used on the handset with excellent interoperability.

FM radio

The FM radio subsystem provides a completely integrated FM Rx receiver supporting 87.5 ~ 108MHz FM bands with 50kHz tuning step. It also performs fast channel seek/scan algorithm to validate 200 carrier frequencies in 6 seconds. In addition to receiving FM audio broadcasting, the digital RDS/RBDS data system is supported as well. The integrated FM transceiver utilizes state-of-the-art digital demodulation/modulation techniques to achieve excellent performance.

In order to achieve high SINAD, good sensitivity and excellent noise suppression, the FM receiver adopts adaptive demodulation scheme to optimize Rx system performance in all ranges of signal quality by reference of a very sophisticated channel quality index (CQI). When the received signal quality is poor, the design not only enhances the ACI rejection capability but also uses a very ingenious skill to soft mute annoying noise so as to provide good perception quality.

The FM radio subsystem supports both long antenna, which is usually an earphone, and auto-calibrated short antenna, which is usually a FPC short antenna or shared antenna with GSM for different application scenarios.

Debugging function

The JTAG interface enables in-circuit debugging of the software program with the ARM7EJ-S™ core. With this standardized debugging interface, MT6260 provides developers with a wide set of options in choosing ARM development kits from different third party vendors.

Power management

A power management is embedded in MT6260 to provide rich features a high-end feature phone supports, including Li-ion battery charger, high performance and low quiescent current LDOs, and drivers for LED and backlight.

MT6260 offers various low-power features to help reduce the system power consumption. MT6260 is also fabricated in an advanced low-power CMOS process, hence providing an overall ultra-low leakage solution.

Package

The MT6260 device is offered in a 9.6mm×8.6mm, 199-ball, 0.5mm pitch, TFBGA package.



Figure 1. Typical application of MT6260

1.1 Platform Features

General

- Integrated voice-band, audio-band and base-band analog front-end
- Integrated full-featured power management unit

MCU subsystem

- ARM7EJ-S™ 32-bit RISC processor
- Java hardware acceleration for fast Java-based games and applets
- High-performance multi-layer AHB bus
- Dedicated DMA bus with 15 DMA channels
- On-chip boot ROM for factory flash programming
- Watchdog timer for system crash recovery
- 4 sets of general-purpose timers
- Circuit switch data coprocessor
- Division coprocessor

Serial flash interfaces

- Supports various operating frequency combinations for serial flash
- Supports QPI and SPI serial flash

User interfaces

- 5-row x 5-column keypad controller with hardware scanner
- Supports multiple key presses for gaming
- Dual SIM/USIM controller with hardware T = 0/T = 1 protocol control
- Real-time clock (RTC) operating with a low-quiescent-current power supply
- General-purpose I/Os (GPIOs) available for auxiliary applications
- 1 sets of Pulse Width Modulation (PWM) output
- 10 external interrupt lines
- 1 external channel auxiliary 10-bit A/D converter

Security

- Supports security key and chip random ID

Connectivity

- 2 UARTs with hardware flow control and supports baud rate up to 921,600 bps
- FS/LS USB 1.1 device controller
- Multimedia card, secure digital Memory Card, host controller with flexible I/O voltage power
- Supports SDIO interface for SDIO peripherals as well as WIFI connectivity
- DAI/PCM and I2S interface for audio applications
- I2C master interface for peripheral management including image sensors
- SPI master interface for peripheral management including digital TV chips

Power management

- Li-ion battery charger
- 14 LDOs for the power supply of memory card, camera, Bluetooth, RF, SIM card and other diversified usage
- 4 open-drain output switches to supply/control the LED
- LDO type vibrator
- One NMOS switch to control keypad LED
- Thermal overload protection
- Under-voltage lock-out protection
- Over-voltage protection
- Different levels of power-down modes with sophisticated software control enables excellent power saving performance.

Test and debugging

- Built-in digital and analog loop back modes for both audio and baseband front-end
- DAI port complies with GSM Rec.11.10.
- JTAG port for debugging embedded MCU

1.2 MODEM Features

Radio interface and baseband front-end

- Digital PM data path with baseband front-end
- High dynamic range delta-sigma ADC converts the downlink analog I and Q signals to digital baseband.
- 10-bit D/A converter for Automatic Power Control (APC)
- Programmable radio Rx filter with adaptive gain control
- Dedicated Rx filter for FB acquisition
- 4-pin Baseband Parallel Interface (BPI) with programmable driving strength
- Supports multi-band

Voice and modem CODEC

- Dial tone generation
- Voice memo
- Noise reduction
- Echo suppression
- Advanced sidetone oscillation reduction
- Digital sidetone generator with programmable gain
- Two programmable acoustic compensation filters
- Supports GSM/GPRS/EDGE-Rx modem
- GSM quad vocoders for adaptive multirate (AMR), enhanced full rate (EFR), full rate (FR) and half rate (HR)
- GSM channel coding, equalization and A5/1, A5/2 and A5/3 ciphering
- GPRS/EDGE-Rx GEA1, GEA2 and GEA3 ciphering
- GPRS packet switched data with CS1/CS2/CS3/CS4 coding schemes
- EDGE-Rx with MCS1-9 receiver coding schemes
- GSM circuit switch data
- GPRS/EDGE-Rx Class 12

- Supports SAIC (single antenna interference cancellation) technology
- Supports VAMOS (Voice services over Adaptive Multi-user channels on One Slot) technology in R9 spec.

Voice interface and voice front-end

- Two microphone inputs share one low-noise amplifier with programmable gain and Automatic Gain Control (AGC) mechanisms
- Voice power amplifier with programmable gain
- 2nd order Sigma-Delta A/D converter for voice uplink path
- Shares D/A converter with audio playback path
- Supports full-duplex hands-free operation
- Compliant with GSM 03.50

1.3 GSM/GPRS/EDGE RF Features

Receiver

- Quad band single-ended input LNAs
- Quadrature RF mixer
- Fully integrated channel filter
- High dynamic range ADC
- 24dB PGA gain with 6dB gain step

Transmitter

- Transmitter outputs support quad bands.
- Highly precise and low noise RF transmitter for GSM/GPRS applications

Frequency synthesizer

- Programmable fractional-N synthesizer
- Integrated wide range RFVCO
- Integrated loop filter
- Fast settling time suitable for multi-slot GPRS/EDGE-Rx applications

Digitally-Controlled Crystal Oscillator (DCXO)

- Two-pin 26MHz crystal oscillator
- On-chip programmable capacitor array for coarse-tuning
- On-chip programmable capacitor array for fine-tuning
- Low power mode supports 32K crystal removal

1.4 Multimedia Features

LCD/ WiFi interface

- Dedicated parallel interface supports 3 external devices with 8-bit for WiFi interface and 8-/9-bit for parallel LCD interface.

LCD controller

- Supports simultaneous connection to 2 parallel and 2 serial LCD modules
- LCM formats supported: RGB565, RGB666, RGB888
- Supports LCD module with maximum resolution up to 480x320
- Per pixel alpha channel
- True color engine
- Supports hardware display rotation
- Capable of combining display memories with up to 4 blending layers

Camera interface

- YUV422 format image input

JPEG decoder

- Baseline JPEG decoding
- Supports various YUV formats, DC/AC Huffman tables and quantization tables

JPEG encoder

- Motion JPEG encoder for video encoding
- ISO/IEC 10918-1 JPEG baseline mode
- ISO/IEC 10918-2 compliance
- Supports YUV420 and grayscale formats
- Supports EXIF/JFIF
- Standard DC and AC Huffman tables
- Provides 5 levels of encode quality
- Supports zeros shutter delay

Image data processing

- Supports 4x digital zoom
- High throughput hardware scaler. Capable of tailoring an image to an arbitrary size.

- Horizontal scaling with bilinear interpolation
- Vertical scaling with bilinear interpolation
- YUV and RGB color space conversion
- RGB/YCbCr format thumbnail output

MPEG-4/H.263 CODEC

- Hybrid MPEG4 encoder
- Software-based MPEG4 decoder
- ISO/IEC 14496-2 simple profile:
- ISO/IEC 14496-2 advanced simple profile:
- Supports visual tools for decoder: I-VOP, P-VOP, B-VOP, AC/DC prediction, 4-MV, unrestricted MV, error resilience, short header, global motion compensation, method 1/2 quantization, quarter-pel motion compensation.
- Error resilience for decoder: Slice resynchronization, data partitioning, reversible VLC
- Supports visual tools for encoder: I-VOP, P-VOP, Half-Pel, DC prediction, unrestricted MV, short header

H.264

- ISO/IEC 14496-10 baseline profile

2D accelerator

- Supports 32-bpp ARGB8888, 24-bpp RGB888, 16-bpp RGB565, 24-bpp ARGB6666.
- 4 layers overlay with individual color format, window size, source key, constant alpha and rotation
- Rectangle fill with constant
- BitBlt: Capable with 7 rotation types
- Alpha blending with 7 rotation types, per-pixel alpha and pre-multiplied alpha
- Font drawing: Normal font and anti-aliasing font

- Linear transformation: Supports perspective transform, truncate/nearest/bi-linear sample filter.

Audio CODEC

- Supports HE-AAC codec decoding
- Supports AAC codec decoding
- Wavetable synthesis with up to 64 tones
- Advanced wavetable synthesizer capable of generating simulated stereo
- Wavetable including GM full set of 128 instruments and 47 sets of percussions
- PCM playback and record
- Digital audio playback

Audio interface and audio front-end

- Supports I2S interface
- High-resolution D/A converters for stereo audio playback
- Voice band A/D converter with digital MIC input support
- Stereo to mono conversion

1.5 Bluetooth Features

Radio features

- Fully compliant with Bluetooth specification 3.0 + EDR
- Low out-of-band spurious emissions support simultaneous operation with GPS and GSM/GPRS worldwide radio systems
- Low-IF architecture with high degree of linearity and high order channel filter
- Integrated T/R switch and Balun
- Fully integrated PA provides 10dBm output power
- -95dBm sensitivity with excellent interference rejection performance
- Hardware AGC dynamically adjusts receiver performance in changing environments
- Embedded processor for Bluetooth protocol stack with built-in memory system
- Fully verified ROM based system with code patch for feature enhancement

Baseband features

- Up to 4 simultaneous active ACL links
- Up to 1 simultaneous SCO or eSCO link with CVSD coding
- Supports eSCO
- Scatternet support: Up to 4 piconets simultaneously with background inquiry/page scan
- Supports sniff mode
- AFH and PTA collaborative support for WLAN/BT coexistence
- Idle mode and sleep mode enables ultra-low power consumption.
- Supports PCM interface and built-in programmable transcoders for linear voice with re-transmission
- Built-in hardware modem engine for access code correlation, header error correction, forward error correction, CRC, whitening and encryption
- Channel quality driven data rate adaptation
- Channel assessment for AFH

Platform features

1.6 FM Features

- 76-108MHz worldwide FM bands with 50kHz tuning step
- Supports RDS/RBDS radio data system
- Supports long/short antenna
- 40ms seek time per channel, and 9sec search time for all channels(87.5~108MHz)
- Superior stereo noise reduction
- Soft mute volume control
- Supports short antenna, auto calibration for different FM channels
- 60dB SINAD with 22.5kHz FM deviation
- 3dBuVemf FM RX sensitivity with superior interference rejection
- 20dBuVemf RDS sensitivity (dev: 2kHz)
- More than 55dBc rejection capability against -200kHz ACI



Figure 2 MT6260 block diagram

2 Product Descriptions

2.1 Pin Description

2.1.1 Ball Diagram

For MT6260, an TFBGA 9.6mm*8.6mm, 199-ball, 0.5mm pitch package is offered. Pin-outs and the top view are illustrated in **Figure 3** for this package.

| | | | | | | | | | | | | | | | | | | | | | |
|---|-----------|------------|-----------|------------|------------|------------|------------|---------|-------------|----------|----------|-----------|----------|------------|------------|-----------|---------|---------|--------|---|---|
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | | |
| A | AVSS_2G | RXLB_P | RXLB_N | | AVSS_2G | XTAL1 | | | DVDD28 | | URXD2 | CMPCLK | | CMPDN | CMDAT5 | | CMMCLK | KCOL1 | GND | A | |
| B | RXHB_P | RXHB_N | | TP2 | TP4 | XTAL2 | AVSS_BT | BT_LNA | DVDD18EM | UTXD1 | UTXD2 | CMRST | CMDAT3 | CMDAT0 | CMDAT4 | CMVREF | GPIO19 | GPIO17 | GPIO16 | B | |
| C | TXO_LB | TXO_HB | AVSS_2G | TP1 | TP3 | | CLK_SEL | AVSS_BT | BPL_BUS1 | BPL_BUS0 | URXD1 | | CMDAT2 | KROW1 | CMDAT7 | KROW2 | KROW0 | KCOL4 | EDICK | C | |
| D | AVSS_2G | AVSS_2G | | AVSS_2G | | FREF1 | | | BPL_BUS2 | | BPL_BUS3 | CMDAT6 | | DVDD28 | | SCL28 | KROW4 | KROW3 | EDIWS | D | |
| E | VCAMA | VRF | VBAT_VA | | AVSS43_PMU | | AVSS_2G | | | | CMHREF | CMDAT1 | | | | | | KCOL0 | KCOL2 | | E |
| F | | VCAMD | | VREF | | BATSNS | | | DVDD18EM | VDDK | | | | DVDD18_EMI | DVDD18_EMI | WATCHDOG | KCOL3 | SDA28 | EDIDAT | F | |
| G | | ISINK0 | ISINK1 | TESTMODE | AGND | ISENSE | | | | GND | | GND | | | | NLD1 | NLD0 | | GND | G | |
| H | KPLED | ISINK2 | ISINK3 | PWRKEY | | | | | | | GND | | | | | NLD7 | NLD2 | LSRSTB | | H | |
| J | DRV | BATDET | CHR_LDO | VCDT | | BATON | AVSS43_PMU | | SRCKENAI | GND | | GND | | | | LSCE1_B | LPTE | NLD3 | NLD8 | J | |
| K | FLYN | FLYP | | AVSS43_CP | | | AVSS43_PMU | | XTAL_SEL | RESETB | | VDDK | | | | LPA0 | NLD4 | LPRSTB | NLD6 | K | |
| L | | VBOOST | AVDD43_CP | AVSS43_BPK | AVSS43_PMU | | | VRTC | XIN | XOUT | | | | | | LWR_B | LRD_B | LPCE0_B | | L | |
| M | SPK_OUTP | SPK_OUTN | VBAT_SPK | | | AVSS43_PMU | | | | | | | | | | DVDD28_SF | LPCE1_B | GND | GND | M | |
| N | | | ACCDET | | | | | VUSB | VSIM2 | VSIM1 | | | | | | SCK | SWP | NLD5 | | N | |
| P | APC | AU_MCB1A81 | | | HSP | | | | | | | | | | | | SHOLD | SFCS0 | MCINS | P | |
| R | AUX_IN4 | AU_MCB1A80 | XP | | HSN | | VSF | VMC | | | | | | SIM1_SIO | SIM2_SIO | DVDD18EM | MCDA3 | SFCS1 | SIN | R | |
| T | AU_VIN0_P | AU_VIN1_N | YP | XM | HPL | VIBR | | VIO18 | VCORE | AVSS_FM | FM_ANT_N | AVDD28_FM | USB11_DP | SIM1_SRST | SIM2_SRST | MCDA0 | MCCM0 | MCDA1 | SOUT | T | |
| U | AU_VIN0_N | AU_VIN1_P | YM | AVSS28_48B | HPR | VA | | VIO28 | VBAT_ORITAL | | FM_ANT_P | GND | USB11_DM | SIM1_SCLK | | SIM2_SCLK | MCDA2 | MCCM | GND | U | |
| | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 | 18 | 19 | | |

Figure 3. Ball diagram and top view

2.1.2 Pin Coordination

Table 1. Pin coordinates

| Pin# | Net name | Pin# | Net name | Pin# | Net name |
|------|----------|------|------------|------|------------|
| A1 | AVSS_2G | E5 | AVSS43_PMU | M17 | LPCE1_B |
| A11 | URXD2 | E7 | AVSS_2G | M18 | GND |
| A12 | CMPCLK | F10 | VDDK | M19 | GND |
| A14 | CMPDN | F14 | DVDD18_EMI | M2 | SPK_OUTN |
| A15 | CMDAT5 | F15 | DVDD18_EMI | M3 | VBAT_SPK |
| A17 | CMMCLK | F16 | WATCHDOG | M6 | AVSS43_PMU |
| A18 | KCOL1 | F17 | KCOL3 | N10 | VSIM1 |
| A19 | GND | F18 | SDA28 | N16 | SCK |
| A2 | RXLB_P | F19 | EDIDAT | N17 | SWP |
| A3 | RXLB_N | F2 | VCAMD | N18 | NLD5 |

| Pin# | Net name | Pin# | Net name | Pin# | Net name |
|------|-------------|------|--------------|------|-------------|
| A5 | AVSS_2G | F4 | VREF | N3 | ACCDET |
| A6 | XTAL1 | F6 | BATSNS | N8 | VUSB |
| A9 | DVDD28 | F9 | AVDD28_2GAPE | N9 | VSIM2 |
| B1 | RXHB_P | G10 | GND | P1 | APC |
| B10 | UTXD1 | G12 | GND | P17 | SHOLD |
| B11 | UTXD2 | G16 | NLD1 | P18 | SFCS0 |
| B12 | CMRST | G17 | NLD0 | P19 | MCINS |
| B13 | CMDAT3 | G19 | GND | P2 | AU_MICBIAS1 |
| B14 | CMDAT0 | G2 | ISINK0 | P5 | HSP |
| B15 | CMDAT4 | G3 | ISINK1 | R1 | AUX_IN4 |
| B16 | CMVREF | G4 | TESTMODE | R14 | SIM1_SIO |
| B17 | GPIO19 | G5 | AGND | R15 | SIM2_SIO |
| B18 | GPIO17 | G6 | ISENSE | R16 | DVDD33_MSDC |
| B19 | GPIO16 | H1 | KPLED | R17 | MCDA3 |
| B2 | RXHB_N | H11 | GND | R18 | SFCS1 |
| B4 | TP2 | H16 | NLD7 | R19 | SIN |
| B5 | TP4 | H17 | NLD2 | R2 | AU_MICBIAS0 |
| B6 | XTAL2 | H18 | LSRSTB | R3 | XP |
| B7 | AVSS_BT | H2 | ISINK2 | R5 | HSN |
| B8 | BT_LNA | H3 | ISINK3 | R7 | VSF |
| B9 | DVDD28_FSRC | H4 | PWRKEY | R8 | VMC |
| C1 | TXO_LB | J1 | DRV | T1 | AU_VIN0_P |
| C10 | BPI_BUS0 | J10 | GND | T10 | AVSS_FM |
| C11 | URXD1 | J12 | GND | T11 | FM_ANT_N |
| C13 | CMDAT2 | J16 | LSCE1_B | T12 | AVDD28_FM |
| C14 | KROW1 | J17 | LPTE | T13 | USB11_DP |
| C15 | CMDAT7 | J18 | NLD3 | T14 | SIM1_SRST |
| C16 | KROW2 | J19 | NLD8 | T15 | SIM2_SRST |
| C17 | KROW0 | J2 | BATDET | T16 | MCDA0 |
| C18 | KCOL4 | J3 | CHR_LDO | T17 | MCCM0 |
| C19 | EDICK | J4 | VCDT | T18 | MCDA1 |
| C2 | TXO_HB | J6 | BATON | T19 | SOUT |
| C3 | AVSS_2G | J7 | AVSS43_PMU | T2 | AU_VIN1_N |
| C4 | TP1 | J9 | SRCLKENAI | T3 | YP |
| C5 | TP3 | K1 | FLYN | T4 | XM |
| C7 | CLK_SEL | K10 | RESETB | T5 | HPL |
| C8 | AVSS_BT | K12 | VDDK | T6 | VIBR |
| C9 | BPI_BUS1 | K16 | LPA0 | T8 | VIO18 |
| D1 | AVSS_2G | K17 | NLD4 | T9 | VCORE |
| D11 | BPI_BUS3 | K18 | LPRSTB | U1 | AU_VIN0_N |
| D12 | CMDAT6 | K19 | NLD6 | U11 | FM_ANT_P |
| D14 | DVDD28 | K2 | FLYP | U12 | GND |
| D16 | SCL28 | K4 | AVSS43_CP | U13 | USB11_DM |
| D17 | KROW4 | K7 | AVSS43_PMU | U14 | SIM1_SCLK |
| D18 | KROW3 | K9 | XTAL_SEL | U16 | SIM2_SCLK |
| D19 | EDIWS | L10 | XOUT | U17 | MCDA2 |

| Pin# | Net name | Pin# | Net name | Pin# | Net name |
|------|----------|------|------------|------|--------------|
| D2 | AVSS_2G | L16 | LWR_B | U18 | MCCK |
| D4 | AVSS_2G | L17 | LRD_B | U19 | GND |
| D6 | FREF1 | L18 | LPCE0_B | U2 | AU_VIN1_P |
| D9 | BPI_BUS2 | L2 | VBOOST | U3 | YM |
| E1 | VCAMA | L3 | AVDD43_CP | U4 | AVSS28_ABB |
| E11 | CMHREF | L4 | AVSS43_SPK | U5 | HPR |
| E12 | CMDAT1 | L5 | AVSS43_PMU | U6 | VA |
| E17 | KCOL0 | L8 | VRTC | U8 | VIO28 |
| E18 | KCOL2 | L9 | XIN | U9 | VBAT_DIGITAL |
| E2 | VRF | M1 | SPK_OUTP | | |
| E3 | VBAT_VA | M16 | DVDD28_SF | | |

2.1.3 Detailed Pin Description

Table 2. Acronym for pin types

| Abbreviation | Description |
|--------------|----------------------|
| AI | Analog input |
| AO | Analog output |
| AIO | Analog bi-direction |
| DI | Digital input |
| DO | Digital output |
| DIO | Digital bi-direction |
| P | Power |
| G | Ground |

Table 3. PIN function description and power domain

| Pin name | Type | Description | Power domain |
|-----------------------------|------|-----------------------------------------|--------------|
| System | | | |
| RESETB | DIO | System reset | DVDD18 |
| SRCLKENAI | DIO | 26MHz clock request by external devices | DVDD18 |
| GPIO16 | DIO | General purpose input /output 16 | DVDD18 |
| GPIO17 | DIO | General purpose input /output 17 | DVDD18 |
| GPIO19 | DIO | General purpose input /output 19 | DVDD18 |
| EDI interface | | | |
| EDICK | DIO | I2S clock | DVDD18 |
| EDIDATA | DIO | I2S data | DVDD18 |
| EDIWS | DIO | I2S word sync | DVDD18 |
| RF control circuitro | | | |
| BPI_BUS0 | DIO | RF hard-wire control bus bit 0 | DVDD28 |
| BPI_BUS1 | DIO | RF hard-wire control bus bit 1 | DVDD28 |

| Pin name | Type | Description | Power domain |
|-----------------------------|------|-------------------------------------------------|--------------|
| BPI_BUS2 | DIO | RF hard-wire control bus bit 2 | DVDD28 |
| BPI_BUS3 | DIO | RF hard-wire control bus bit 3 | DVDD28 |
| UART interface | | | |
| URXD1 | DIO | UART1 receive data | DVDD28 |
| UTXD1 | DIO | UART1 transmit data | DVDD28 |
| URXD2 | DIO | UART2 receive data | DVDD28 |
| UTXD2 | DIO | UART2 transmit data | DVDD28 |
| Keypad interface | | | |
| KCOL0 | DIO | Keypad column 0 | DVDD28 |
| KCOL1 | DIO | Keypad column 1 | DVDD28 |
| KCOL2 | DIO | Keypad column 2 | DVDD28 |
| KCOL3 | DIO | Keypad column 3 | DVDD28 |
| KCOL4 | DIO | Keypad column 4 | DVDD28 |
| KROW0 | DIO | Keypad row 0 | DVDD28 |
| KROW1 | DIO | Keypad row 1 | DVDD28 |
| KROW2 | DIO | Keypad row 2 | DVDD28 |
| KROW3 | DIO | Keypad row 3 | DVDD28 |
| KROW4 | DIO | Keypad row 4 | DVDD28 |
| Camera interface | | | |
| CMRST | DIO | CMOS sensor reset signal output | DVDD28 |
| CMPDN | DIO | CMOS sensor power down control | DVDD28 |
| CMVREF | DIO | CMOS sensor vertical reference signal input | DVDD28 |
| CMHREF | DIO | CMOS sensor horizontal reference signal input | DVDD28 |
| CMDAT0 | DIO | CMOS sensor data input 0 | DVDD28 |
| CMDAT1 | DIO | CMOS sensor data input 1 | DVDD28 |
| CMDAT2 | DIO | CMOS sensor data input 2 | DVDD28 |
| CMDAT3 | DIO | CMOS sensor data input 3 | DVDD28 |
| CMDAT4 | DIO | CMOS sensor data input 4 | DVDD28 |
| CMDAT5 | DIO | CMOS sensor data input 5 | DVDD28 |
| CMDAT6 | DIO | CMOS sensor data input 6 | DVDD28 |
| CMDAT7 | DIO | CMOS sensor data input 7 | DVDD28 |
| CMPCLK | DIO | CMOS sensor master clock output | DVDD28 |
| CMMCLK | DIO | CMOS sensor master clock output | DVDD28 |
| MS/SD card interface | | | |
| MCINS | DIO | SD card detect Input | DVDD18_EMI |
| MCDA0 | DIO | SD serial data IO 0/memory stick serial data IO | DVDD33_MSDC |
| MCDA1 | DIO | SD serial data IO 0/memory stick serial data IO | DVDD33_MSDC |
| MCDA2 | DIO | SD serial data IO 0/memory stick serial data IO | DVDD33_MSDC |

| Pin name | Type | Description | Power domain |
|--------------------------------------|------|-------------------------------------------------|--------------|
| MCDA3 | DIO | SD serial data IO 0/memory stick serial data IO | DVDD33_MSDC |
| MCCK | DIO | SD serial clock/memory stick serial clock | DVDD33_MSDC |
| MCCM0 | DIO | SD command output/memory stick bus state output | DVDD33_MSDC |
| SIM card interface | | | |
| SIM1_SIO | DIO | SIM1 data input/outputs | VSIM1 |
| SIM1_SRST | DIO | SIM1 card reset output | VSIM1 |
| SIM1_SCLK | DIO | SIM1 card clock output | VSIM1 |
| SIM2_SIO | DIO | SIM2 data input/outputs | VSIM2 |
| SIM2_SRST | DIO | SIM2 card reset output | VSIM2 |
| SIM2_SCLK | DIO | SIM2 card clock output | VSIM2 |
| I2C interface | | | |
| SCL28 | DIO | I2C clock 2.8v power domain | DVDD28 |
| SDA28 | DIO | I2C data 2.8v power domain | DVDD28 |
| LCD interface | | | |
| LSRSTB | DIO | Serial display interface reset signal | DVDD18_EMI |
| LSCE1_B | DIO | Serial display interface chip select 1 output | DVDD18_EMI |
| LPCE1_B | DIO | Parallel display interface chip select 1 output | DVDD18_EMI |
| LPCE0_B | DIO | Parallel display interface chip select 0 output | DVDD18_EMI |
| LPTE | DIO | Parallel display interface tearing effect | DVDD18_EMI |
| LPRSTB | DIO | Parallel display interface reset signal | DVDD18_EMI |
| LRD_B | DIO | Parallel display interface read strobe | DVDD18_EMI |
| LPA0 | DIO | Parallel display interface address output | DVDD18_EMI |
| LWR_B | DIO | Parallel display interface write strobe | DVDD18_EMI |
| NLD8 | DIO | Parallel LCD data 8 | DVDD18_EMI |
| NLD7 | DIO | Parallel LCD data 7 | DVDD18_EMI |
| NLD6 | DIO | Parallel LCD data 6 | DVDD18_EMI |
| NLD5 | DIO | Parallel LCD data 5 | DVDD18_EMI |
| NLD4 | DIO | Parallel LCD data 4 | DVDD18_EMI |
| NLD3 | DIO | Parallel LCD data 3 | DVDD18_EMI |
| NLD2 | DIO | Parallel LCD data 2 | DVDD18_EMI |
| NLD1 | DIO | Parallel LCD data 1 | DVDD18_EMI |
| NLD0 | DIO | Parallel LCD data 0 | DVDD18_EMI |
| Watchdog reset | | | |
| WATCHDOG | DIO | Reset external memory device | DVDD18_EMI |
| General purpose I/O interface | | | |
| SFCS1 | DIO | General purpose input/output 66 | DVDD28_SF |

| Pin name | Type | Description | Power domain |
|------------------------|------|------------------------------------------------------|--------------|
| SFCS0 | DIO | General purpose input/output 68 | DVDD28_SF |
| SFIN | DIO | General purpose input/output 70 | DVDD28_SF |
| SFOUT | DIO | General purpose input/output 71 | DVDD28_SF |
| SFSHOLD | DIO | General purpose input/output 72 | DVDD28_SF |
| SFWP | DIO | General purpose input/output 67 | DVDD28_SF |
| SFCK | DIO | General purpose input/output 69 | DVDD28_SF |
| FM | | | |
| RXLNA_INN_LA | AI | FM input from long antenna | AVDD28_FM |
| RXLNA_INP_LA | AI | FM input from long antenna | AVDD28_FM |
| RXLNA_INN_SA | AI | FM input from short antenna | AVDD28_FM |
| RXLNA_INP_SA | AI | FM input from short antenna | AVDD28_FM |
| Bluetooth | | | |
| BTRF2P4G_N | AIO | Bluetooth RF single-ended input | - |
| BTREXT | AIO | Bluetooth external reference resistor | - |
| 2G RF | | | |
| RXHB_P | AIO | Differential RF input for highband Rx (DCS/PCS) | - |
| RXHB_N | AIO | Differential RF input for highband Rx (DCS/PCS) | - |
| RXLB_P | AIO | Differential RF input for lowband Rx (GSM900/GSM850) | - |
| RXLB_N | AIO | Differential RF input for lowband Rx (GSM900/GSM850) | - |
| TXO_HB | AIO | RF output for highband Tx (DCS/PCS) | - |
| TXO_LB | AIO | RF output pin for lowband Tx (GSM900/GSM850) | - |
| FREF1 | AIO | DCXO reference clock output | - |
| FREF2 | AIO | DCXO reference clock output | - |
| XTAL1 | AIO | Input 1 for DCXO crystal | - |
| XTAL2 | AIO | Input 2 for DCXO crystal | - |
| TP1 | AIO | Test pin 1 | - |
| TP2 | AIO | Test pin 2 | - |
| TP3 | AIO | Test pin 3 | - |
| TP4 | AIO | Test pin 4 | - |
| CLK_SEL | AIO | DCXO mode selection | - |
| USB | | | |
| USB11_DM | AIO | D- data input/output | - |
| USB11_DP | AIO | D+ data input/output | - |
| Analog baseband | | | |
| HPR | AIO | Audio head phone output (R channel) | AVDD28_ABB |
| HPL | AIO | Audio head phone output (L channel) | AVDD28_ABB |
| HSP | AIO | Voice handset output (positive) | AVDD28_ABB |
| HSN | AIO | Voice handset output (negative) | AVDD28_ABB |

| Pin name | Type | Description | Power domain |
|------------------------------|------|--------------------------------------------|--------------|
| AU_VIN0_P | AIO | Microphone 0 input (positive) | AVDD28_ABB |
| AU_VIN0_N | AIO | Microphone 0 input (negative) | AVDD28_ABB |
| AU_VIN1_P | AIO | Microphone 1 input (positive) | AVDD28_ABB |
| AU_VIN1_N | AIO | Microphone 1 input (negative) | AVDD28_ABB |
| AUX_IN4 | AIO | Auxiliary ADC input | AVDD28_ABB |
| SPK_OUTP | AIO | Speaker positive output | AVDD28_ABB |
| SPK_OUTN | AIO | Speaker negative output | AVDD28_ABB |
| APC | AIO | Automatic power control DAC output | AVDD28_ABB |
| XP | AIO | Touch panel X-axis positive input | AVDD28_ABB |
| XM | AIO | Touch panel X-axis negative input | AVDD28_ABB |
| YP | AIO | Touch panel Y-axis positive input | AVDD28_ABB |
| YM | AIO | Touch panel Y-axis negative input | AVDD28_ABB |
| AU_MICBIAS0 | AIO | Microphone bias source 0 | AVDD28_ABB |
| AU_MICBIAS1 | AIO | Microphone bias source 1 | AVDD28_ABB |
| ACCDDET | AIO | Accessory detection | AVDD28_ABB |
| Real-time clock | | | |
| XIN | AIO | Input pin for 32K crystal | VRTC |
| XOUT | AIO | Input pin for 32K crystal | VRTC |
| XTAL_SEL | DIO | Pin option for external 32K crystal | VRTC |
| Power management unit | | | |
| VA | AIO | LDO output for ABB - VA | VBAT_ANALOG |
| VBT | AIO | LDO output for BTRF - VBT | VBAT_RF |
| VCAMA | AIO | LDO output for sensor – VCAMA | VBAT_ANALOG |
| VCAMD | AIO | LDO output for sensor - VCAMD | VBAT_DIGITAL |
| VIBR | AIO | LDO output for vibrator - VIBR | VBAT_DIGITAL |
| VIO18 | AIO | LDO output for 1.8V power - VIO18 | VBAT_DIGITAL |
| VIO28 | AIO | LDO output for 2.8V power - VIO28 | VBAT_DIGITAL |
| VMC | AIO | LDO output for memory card - VMC | VBAT_DIGITAL |
| VSF | AIO | LDO output - VSF | VBAT_DIGITAL |
| VRF | AIO | LDO output for GSMRF - VRF | VBAT_DIGITAL |
| VRTC | AIO | LDO output for RTC - VRTC | VBAT_DIGITAL |
| VSIM1 | AIO | LDO output for 1 st SIM - VSIM | VBAT_DIGITAL |
| VSIM2 | AIO | LDO output for 2 nd SIM - VSIM2 | VBAT_DIGITAL |
| VTCXO | AIO | LDO output for DCXO - VTCXO | VBAT_ANALOG |
| VUSB | AIO | LDO output for USB - VUSB | VBAT_DIGITAL |
| VCORE | AIO | LDO output for core circuit - Vcore | VBAT_DIGITAL |
| VREF | AIO | Band gap reference | BATSNS |
| VCDT | AIO | Charger-In level sense pin | BATSNS |
| DRV | AIO | IDAC current output open-drain pin | BATSNS |
| BATON | AIO | Battery Pack, NTC connected pin | BATSNS |

| Pin name | Type | Description | Power domain |
|----------------------|------|-----------------------------------------------------|--------------|
| ISENSE | AIO | Top node of current sensing 0.2ohm Rsense resistor | BATSNS |
| CHR_LDO | AIO | 2.8V shunt-regulator output | BATSNS |
| BATDET | AIO | Battery detection pin | BATSNS |
| ISINK0 | AIO | Backlight driver channel 0 | VBAT_SPK |
| ISINK1 | AIO | Backlight driver channel 1 | VBAT_SPK |
| ISINK2 | AIO | Backlight driver channel 2 | VBAT_SPK |
| ISINK3 | AIO | Backlight driver channel 3 | VBAT_SPK |
| KPLED | AIO | Keypad led driver | VBAT_SPK |
| TESTMODE | AIO | Test mode | BATSNS |
| PWRKEY | AIO | PWR key | BATSNS |
| Analog power | | | |
| AVDD28_FM | P | FM power | - |
| AVDD28_VRF | P | 2.8V power supply for 2G RF | - |
| AVDD28_TCXO | P | 2.8V power supply for 2G TCXO | - |
| AVDD28_2GAFE | P | 2.8V power supply for 2G AFE | - |
| AVDD28_ABB | P | ABB 2.8V power | - |
| AVDD28_DBT | P | 2.8V power supply for DBT | - |
| AVDD28_ABT | P | 2.8V power supply for ABT | - |
| VBAT_RF | P | RF LDOs used battery voltage input | - |
| VBAT_DIGITAL | P | Digital LDOs used battery voltage input | - |
| VBAT_ANALOG | P | Analog LDOs used battery voltage input | - |
| VBAT_SPK | P | VBAT input for loud speaker driver | - |
| BATSNS | P | Battery node of battery pack | - |
| Analog ground | | | |
| AVSS28_ABB | G | ABB 2.8V ground | - |
| AVSS_BT | G | BT ground | - |
| AVSS_BT1 | G | BT1 ground | - |
| AVSS_2G | G | 2G RF ground | - |
| AVSS_FM | G | FM ground | - |
| AVSS43_PMU | G | PMU ground | - |
| AVSS43_SPK | G | SPK ground | - |
| AGND | G | GND for VREF | - |
| Digital power | | | |
| DVDD28 | P | 2.8V power supply for digital macros in transceiver | - |
| DVDD18 | P | 1.8V power supply for digital macros in transceiver | - |
| DVDD28_FSRC | P | E-FUSE blowing power control | - |
| DVDD33_MSDC | P | 3.3V memory card power | - |
| DVDD18_EMI | P | 1.8V EMI IO power | - |
| DVDD28_SF | P | 2.8V IO power | - |

| Pin name | Type | Description | Power domain |
|-----------------------|------|-----------------|--------------|
| DVDD28_SFP | P | 2.8V IO power | - |
| VDDK | P | 1.2V core power | |
| Digital ground | | | |
| GND | G | Ground | - |

Table 4. Acronym for state of pins

| Abbreviation | Description |
|--------------|-----------------------|
| I | Input |
| LO | Low output |
| HO | High output |
| XO | Low or high output |
| PU | Pull-up |
| PD | Pull-down |
| - | No PU/PD |
| 0~N | Aux. function number |
| X | Delicate function pin |

Table 5. State of pins

| Name | Reset | | | Output drivability | Termination when not used | IO type |
|-----------------------------|--------------------|------------------|--------------------|--------------------|---------------------------|-----------|
| | State ¹ | Aux ² | PU/PD ³ | | | |
| System | | | | | | |
| RESETB | O | 1 | - | DIOH6/DIOL6 | No need | IO Type 6 |
| SRCLKENAI | I | 7 | PD | DIOH6/DIOL6 | No need | IO Type 6 |
| GPIO16 | I | 1 | PD | DIOH2/DIOL2 | No need | IO Type 1 |
| GPIO17 | I | 1 | PD | DIOH2/DIOL2 | No need | IO Type 1 |
| GPIO19 | I | 1 | PD | DIOH2/DIOL2 | No need | IO Type 1 |
| EDI interface | | | | | | |
| EDICK | I | 0 | PD | DIOH1/DIOL1 | No need | IO Type 1 |
| EDIDAT | I | 0 | PD | DIOH1/DIOL1 | No need | IO Type 1 |
| EDIWS | I | 0 | PD | DIOH1/DIOL1 | No need | IO Type 1 |
| RF control circuitry | | | | | | |
| BPI_BUS0 | O | 1 | - | DIOH1/DIOL1 | No need | IO Type 1 |
| BPI_BUS1 | I | 1 | PD | DIOH1/DIOL1 | No need | IO Type 1 |
| BPI_BUS2 | O | 1 | - | DIOH1/DIOL1 | No need | IO Type 1 |
| BPI_BUS3 | I | 1 | PD | DIOH1/DIOL1 | No need | IO Type 1 |

¹ The column "State" of "Reset" shows the pin state during reset. (Input, High Output, Low Output, etc)

² The column "Aux" for "Reset" means the default aux function number, shown in the table "Pin Multiplexing, Capability and Settings".

³ The column "PU/PD" for "Reset" means if there is internal pull-up or pull-down when the pin is input in the reset state.

| Name | Reset | | | Output drivability | Termination when not used | IO type |
|-----------------------------|--------------------|------------------|--------------------|--------------------|---------------------------|-----------|
| | State ¹ | Aux ² | PU/PD ³ | | | |
| UART interface | | | | | | |
| URXD1 | I | 1 | PU | DIOH3/DIOL3 | No need | IO Type 3 |
| UTXD1 | O | 1 | - | DIOH1/DIOL1 | No need | IO Type 1 |
| URXD2 | I | 0 | PD | DIOH1/DIOL1 | No need | IO Type 1 |
| UTXD2 | I | 0 | PD | DIOH1/DIOL1 | No need | IO Type 1 |
| Keypad Interface | | | | | | |
| KCOL0 | I | 0 | PU | DIOH4/DIOL4 | No need | IO Type 4 |
| KCOL1 | I | 0 | PD | DIOH4/DIOL4 | No need | IO Type 4 |
| KCOL2 | I | 0 | PD | DIOH4/DIOL4 | No need | IO Type 4 |
| KCOL3 | I | 0 | PD | DIOH4/DIOL4 | No need | IO Type 4 |
| KCOL4 | I | 0 | PD | DIOH4/DIOL4 | No need | IO Type 4 |
| KROW0 | O | 0 | - | DIOH5/DIOL5 | No need | IO Type 5 |
| KROW1 | I | 0 | PD | DIOH5/DIOL5 | No need | IO Type 5 |
| KROW2 | I | 0 | PD | DIOH5/DIOL5 | No need | IO Type 5 |
| KROW3 | I | 0 | PD | DIOH5/DIOL5 | No need | IO Type 5 |
| KROW4 | I | 0 | PD | DIOH5/DIOL5 | No need | IO Type 5 |
| Camera interface | | | | | | |
| CMRST | I | 0 | PD | DIOH1/DIOL1 | No need | IO Type 1 |
| CMPDN | O | 0 | - | DIOH1/DIOL1 | No need | IO Type 1 |
| CMVREF | I | 0 | PD | DIOH1/DIOL1 | No need | IO Type 1 |
| GMHREF | I | 0 | PD | DIOH1/DIOL1 | No need | IO Type 1 |
| CMDAT0 | I | 0 | PD | DIOH1/DIOL1 | No need | IO Type 1 |
| CMDAT1 | I | 0 | PD | DIOH1/DIOL1 | No need | IO Type 1 |
| CMDAT2 | I | 0 | PD | DIOH1/DIOL1 | No need | IO Type 1 |
| CMDAT3 | I | 0 | PD | DIOH1/DIOL1 | No need | IO Type 1 |
| CMDAT4 | I | 0 | PD | DIOH1/DIOL1 | No need | IO Type 1 |
| CMDAT5 | I | 0 | PD | DIOH1/DIOL1 | No need | IO Type 1 |
| CMDAT6 | I | 0 | PD | DIOH1/DIOL1 | No need | IO Type 1 |
| CMDAT7 | I | 0 | PD | DIOH1/DIOL1 | No need | IO Type 1 |
| CMPCLK | I | 0 | PD | DIOH1/DIOL1 | No need | IO Type 1 |
| CMMCLK | I | 0 | PD | DIOH1/DIOL1 | No need | IO Type 1 |
| MS/SD card interface | | | | | | |
| MCINS | I | 0 | PD | DIOH2/DIOL2 | No need | IO Type 2 |
| MCDA0 | I | 0 | PD | DIOH3/DIOL3 | No need | IO Type 3 |
| MCDA1 | I | 0 | PD | DIOH3/DIOL3 | No need | IO Type 3 |
| MCDA2 | I | 0 | PD | DIOH3/DIOL3 | No need | IO Type 3 |
| MCDA3 | I | 0 | PD | DIOH3/DIOL3 | No need | IO Type 3 |
| MCCM | I | 0 | PD | DIOH3/DIOL3 | No need | IO Type 3 |
| MCMM0 | I | 0 | PD | DIOH3/DIOL3 | No need | IO Type 3 |
| I2C interface | | | | | | |
| SCL28 | I | 0 | PD | DIOH1/DIOL1 | No need | IO Type 1 |

| Name | Reset | | | Output drivability | Termination when not used | IO type |
|--------------------------------------|--------------------|------------------|--------------------|--------------------|---------------------------|-----------|
| | State ¹ | Aux ² | PU/PD ³ | | | |
| SDA28 | I | 0 | PD | DIOH1/DIOL1 | No need | IO Type 1 |
| LCD interface | | | | | | |
| LSRSTB | I | 0 | PD | DIOH2/DIOL2 | No need | IO Type 2 |
| LSCE1B | O | 1 | - | DIOH2/DIOL2 | No need | IO Type 2 |
| LPCE0B | O | 1 | - | DIOH2/DIOL2 | No need | IO Type 7 |
| LPCE1B | O | 1 | - | DIOH2/DIOL2 | No need | IO Type 2 |
| LPTE | I | 0 | PD | DIOH2/DIOL2 | No need | IO Type 2 |
| LPRSTB | I | 0 | PD | DIOH2/DIOL2 | No need | IO Type 2 |
| LRD_B | I | 0 | PD | DIOH2/DIOL2 | No need | IO Type 7 |
| LPA0 | I | 0 | PD | DIOH2/DIOL2 | No need | IO Type 7 |
| LWR_B | I | 0 | PD | DIOH2/DIOL2 | No need | IO Type 7 |
| NLD8 | I | 0 | PD | DIOH2/DIOL2 | No need | IO Type 2 |
| NLD7 | I | 0 | PD | DIOH2/DIOL2 | No need | IO Type 2 |
| NLD6 | I | 0 | PD | DIOH2/DIOL2 | No need | IO Type 2 |
| NLD5 | I | 0 | PD | DIOH2/DIOL2 | No need | IO Type 2 |
| NLD4 | I | 0 | PD | DIOH2/DIOL2 | No need | IO Type 2 |
| NLD3 | I | 0 | PD | DIOH2/DIOL2 | No need | IO Type 2 |
| NLD2 | I | 0 | PD | DIOH2/DIOL2 | No need | IO Type 2 |
| NLD1 | I | 0 | PD | DIOH2/DIOL2 | No need | IO Type 7 |
| NLD0 | I | 0 | PD | DIOH2/DIOL2 | No need | IO Type 7 |
| Watchdog reset | | | | | | |
| WATCHDOG | O | 1 | - | DIOH1/DIOL1 | No need | IO Type 1 |
| General purpose I/O interface | | | | | | |
| SFCS0 | O | 1 | - | DIOH7/DIOL7 | No need | IO Type 7 |
| SFCS1 | I | 0 | PD | DIOH7/DIOL7 | No need | IO Type 7 |
| SFIN | I | 1 | PU | DIOH7/DIOL7 | No need | IO Type 7 |
| SFOUT | O | 1 | - | DIOH7/DIOL7 | No need | IO Type 7 |
| SFSHOLD | O | 1 | - | DIOH7/DIOL7 | No need | IO Type 7 |
| SFWP | O | 1 | - | DIOH7/DIOL7 | No need | IO Type 7 |
| SFCK | O | 1 | - | DIOH7/DIOL7 | No need | IO Type 7 |

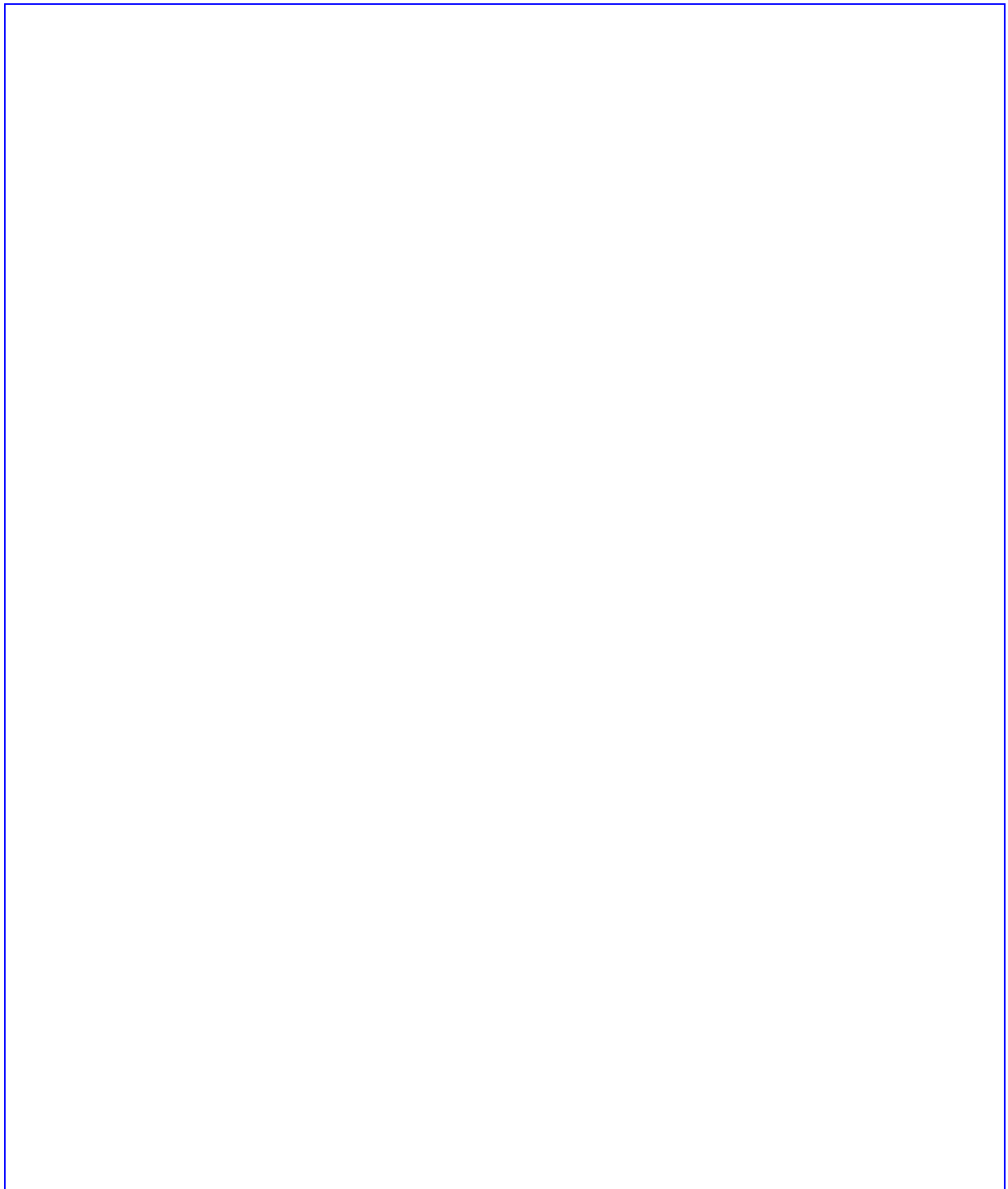




Figure 4. IO types in state of pins

2.1.4 Pin Multiplexing, Capability and Settings

Table 6. Acronym for pull-up and pull-down types

| Abbreviation | Description |
|---------------------|---------------------------|
| PU | Pull-up, not controllable |

| Abbreviation | Description |
|--------------|-----------------------------|
| PD | Pull-down, not controllable |
| CU | Pull-up, controllable |
| CD | Pull-down, controllable |
| X | Cannot pull-up or pull-down |

Table 7. Capability of PU/PD, driving and Schmitt trigger

| Name | Aux. function | Aux. name | Aux. type | PU/PD/ CU/CD | Driving | SMT |
|--------|---------------|-----------|-----------|--------------|----------------|-----|
| EDICK | 0 | GPIO0 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | EDICK | O | - | 4, 8, 12, 16mA | 0 |
| | 2 | PWM | O | - | 4, 8, 12, 16mA | 0 |
| | 3 | EINT0 | I | - | 4, 8, 12, 16mA | 0 |
| EDIDAT | 0 | GPIO61 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | EDIDAT | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 2 | PWM | O | - | 4, 8, 12, 16mA | 0 |
| | 3 | EINT8 | I | - | 4, 8, 12, 16mA | 0 |
| EDIWS | 0 | GPIO18 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | EDIWS | O | - | 4, 8, 12, 16mA | 0 |
| GPIO16 | 0 | GPIO16 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | GPSFSYNC | O | - | 4, 8, 12, 16mA | 0 |
| GPIO17 | 0 | GPIO17 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | BPIBUS5 | O | - | 4, 8, 12, 16mA | 0 |
| GPIO19 | 0 | GPIO19 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | BPIBUS4 | O | - | 4, 8, 12, 16mA | 0 |
| SCL28 | 0 | GPIO1 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | SCL | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 4 | SPISCK0 | O | - | 4, 8, 12, 16mA | 0 |
| | 5 | D1_ICK | I | PD | 4, 8, 12, 16mA | 0 |
| SDA28 | 0 | GPIO2 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | SDA | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 4 | SPICS0 | O | - | 4, 8, 12, 16mA | 0 |
| | 5 | D1_IMS | I | CU, CD | 4, 8, 12, 16mA | 0 |
| KCLO4 | 0 | GPIO5 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | KCOL4 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 3 | EINT1 | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 4 | FMJTDI | I | CU, CD | 4, 8, 12, 16mA | 0 |

| Name | Aux. function | Aux. name | Aux. type | PU/PD/ CU/CD | Driving | SMT |
|-------|---------------|-----------|-----------|--------------|----------------|-----|
| | 5 | JDI | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 6 | BTJDI | I | CU, CD | 4, 8, 12, 16mA | 0 |
| KCOL3 | 0 | GPIO6 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | KCOL3 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 2 | EDI2CK | O | CU, CD | 4, 8, 12, 16mA | 0 |
| | 4 | FMJTMS | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 5 | JTMS | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 6 | BTJTMS | I | CU, CD | 4, 8, 12, 16mA | 0 |
| KCOL2 | 0 | GPIO7 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | KCOL2 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 4 | FMJTCK | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 5 | JTCK | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 6 | BTJTCK | I | CU, CD | 4, 8, 12, 16mA | 0 |
| KCOL1 | 0 | GPIO8 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | KCOL1 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| KCOL0 | 0 | GPIO9 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | KCLO0 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| KROW4 | 0 | GPIO11 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | KROW4 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 2 | EDI2WS | O | - | 4, 8, 12, 16mA | 0 |
| | 3 | EINT3 | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 4 | FMJTRSTB | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 5 | JTRSTB | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 6 | BTJTRSTB | I | CU, CD | 4, 8, 12, 16mA | 0 |
| KROW3 | 0 | GPIO12 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | KROW3 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 2 | EDI2DAT | O | - | 4, 8, 12, 16mA | 0 |
| | 4 | FMJTDO | O | - | 4, 8, 12, 16mA | 0 |
| | 5 | JTDO | O | - | 4, 8, 12, 16mA | 0 |
| | 6 | BTJTDO | O | - | 4, 8, 12, 16mA | 0 |
| KROW2 | 0 | GPIO13 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | KROW2 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 5 | JTRCK | O | - | 4, 8, 12, 16mA | 0 |
| | 6 | BTDBGACKN | O | - | 4, 8, 12, 16mA | 0 |
| KROW1 | 0 | GPIO17 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | KROW1 | IO | CU, CD | 4, 8, 12, 16mA | 0 |

| Name | Aux. function | Aux. name | Aux. type | PU/PD/CU/CD | Driving | SMT |
|-------|---------------|-----------|-----------|-------------|------------------------|-----|
| | 5 | DI_IDA | IO | PU, CD | 4, 8, 12, 16mA | 0 |
| | 6 | BTDBGIN | I | CU, CD | 4, 8, 12, 16mA | 0 |
| KROW0 | 0 | GPIO15 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | KROW0 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 2 | LSDI0 | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 4 | CLKO6 | O | - | 4, 8, 12, 16mA | 0 |
| | 5 | LSCK0 | O | - | 4, 8, 12, 16mA | 0 |
| URXD2 | 0 | GPIO20 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | U2RXD | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 2 | U1RTS | O | - | 4, 8, 12, 16mA | 0 |
| | 3 | BTPRI | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 4 | SPIMISIO | O | - | 4, 8, 12, 16mA | 0 |
| UTXD2 | 0 | GPIO24 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | U2TXD | O | - | 4, 8, 12, 16mA | 0 |
| | 2 | U1CTS | I | PU | 4, 8, 12, 16mA | 0 |
| | 3 | CLKO0 | O | - | 4, 8, 12, 16mA | 0 |
| | 4 | SPIMISO0 | I | PD | 4, 8, 12, 16mA | 0 |
| URXD1 | 0 | GPIO22 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | U1RXD | I | PU | 4, 8, 12, 16mA | 0 |
| | 4 | EINT4 | I | CU, CD | 4, 8, 12, 16mA | 0 |
| UTXD1 | 0 | GPIO23 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | U1TXD | O | - | 4, 8, 12, 16mA | 0 |
| MCINS | 0 | GPIO24 | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 1 | EINT5 | I | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| MCCK | 0 | GPIO25 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | MCCK | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 5 | JRTCK | O | - | 4, 8, 12, 16mA | 0 |
| MCDA0 | 0 | GPIO26 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | MCDA0 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 4 | FMJTRSTB | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 5 | JTRST_B | I | CU, CD | 4, 8, 12, 16mA | 0 |
| MCDA1 | 0 | GPIO27 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | MCDA0 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| MCDA2 | 0 | GPIO3 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | MCDA0 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 4 | FMJTDI | I | CU, CD | 4, 8, 12, 16mA | 0 |

| Name | Aux. function | Aux. name | Aux. type | PU/PD/CU/CD | Driving | SMT |
|-------|---------------|-----------|-----------|-------------|------------------------|-----|
| | 5 | JTDI | I | CU, CD | 4, 8, 12, 16mA | 0 |
| MCDA3 | 0 | GPIO4 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | MCDA0 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 4 | FMJTDI | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 5 | JTDI | I | CU, CD | 4, 8, 12, 16mA | 0 |
| MCCM0 | 0 | GPIO27 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | MCCM0 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 4 | FMJTDO | O | - | 4, 8, 12, 16mA | 0 |
| | 5 | JTDO | O | - | 4, 8, 12, 16mA | 0 |
| NLD8 | 0 | GPIO28 | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 1 | NLD8 | IO | PU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 5 | CMMCLK | O | - | 2,4,6,8,10,12 ,14,16mA | 0 |
| NLD7 | 0 | GPIO29 | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 1 | NLD7 | IO | PU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 5 | CMCSK | I | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| NLD6 | 0 | GPIO30 | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 1 | NLD6 | IO | PU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 5 | CMRST | O | - | 2,4,6,8,10,12 ,14,16mA | 0 |
| NLD5 | 0 | GPIO31 | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 1 | NLD5 | IO | PU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 5 | CMCSD0 | I | PD | 2,4,6,8,10,12 ,14,16mA | 0 |
| NLD4 | 0 | GPIO32 | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 1 | NLD4 | IO | PU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 5 | CMPDN | O | - | 2,4,6,8,10,12 ,14,16mA | 0 |
| NLD3 | 0 | GPIO33 | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 1 | NLD3 | IO | PU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 2 | LSDI3 | I | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 5 | CMCSD1 | I | CU,CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| NLD2 | 0 | GPIO34 | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 1 | NLD2 | IO | PU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| NLD1 | 0 | GPIO35 | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 1 | NLD1 | IO | PU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 3 | SFWP | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| NLD0 | 0 | GPIO36 | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 1 | NLD0 | IO | PU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 2 | LSA0DA0 | O | - | 2,4,6,8,10,12 ,14,16mA | 0 |

| Name | Aux. function | Aux. name | Aux. type | PU/PD/ CU/CD | Driving | SMT |
|----------|---------------|-----------|-----------|--------------|------------------------|-----|
| | 3 | SFCS0 | O | - | 2,4,6,8,10,12 ,14,16mA | 0 |
| LWR_B | 0 | GPIO37 | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 1 | LWRB | O | - | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 2 | LSCK0 | O | - | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 3 | SFCK | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| LRD_B | 0 | GPIO38 | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 1 | LRDB | O | - | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 2 | LSDA0 | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 3 | SFIN | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| LPA0 | 0 | GPIO39 | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 1 | LPA0 | O | - | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 2 | LSDI0 | I | PD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 3 | SFOUT | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| LPCE0_B | 0 | GPIO40 | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 1 | LPCE0B | O | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 2 | LSCE0B1 | O | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 3 | SFHOLD | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| LSCE1_B | 0 | GPIO41 | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 1 | LSCE1B | O | - | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 2 | DAISYNC | O | - | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 3 | SCL | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| LPCE1_B | 0 | GPIO42 | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 1 | LPCE1B | O | - | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 2 | LPTE1 | I | CU,CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 3 | SDA | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| LSRSTB | 0 | GPIO43 | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 1 | LSRSTB | O | - | 2,4,6,8,10,12 ,14,16mA | 0 |
| WATCHDOG | 0 | GPIO44 | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 1 | WATCHDOG | O | - | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 2 | LPCE2B | O | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 3 | EINT6 | I | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| LPTE | 0 | GPIO45 | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 1 | LPTE1 | I | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 3 | CLKO1 | O | - | 2,4,6,8,10,12 ,14,16mA | 0 |
| LPRSTB | 0 | GPIO46 | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 1 | LPRSTB | O | - | 2,4,6,8,10,12 ,14,16mA | 0 |

| Name | Aux. function | Aux. name | Aux. type | PU/PD/ CU/CD | Driving | SMT |
|--------|---------------|-----------|-----------|--------------|------------------------|-----|
| | 2 | LPSRSTB | O | - | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 4 | LPTE1 | I | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 5 | LPCE3B | O | - | 2,4,6,8,10,12 ,14,16mA | 0 |
| CMDAT0 | 0 | GPIO47 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | CMDAT0 | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 2 | CMCSD0 | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 4 | FMJTDI | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 5 | JTDI | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 6 | BTJTDI | I | CU, CD | 4, 8, 12, 16mA | 0 |
| CMDAT1 | 0 | GPIO48 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | CMDAT1 | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 2 | CMCSD1 | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 4 | FMJTMS | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 5 | JTMS | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 6 | BTJTMS | I | CU, CD | 4, 8, 12, 16mA | 0 |
| CMDAT2 | 0 | GPIO49 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | CMDAT2 | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 2 | SCL | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 4 | FMJTCK | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 5 | JTCK | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 6 | BTJTCK | I | CU, CD | 4, 8, 12, 16mA | 0 |
| CMDAT3 | 0 | GPIO50 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | CMDAT3 | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 2 | LRSTB | O | - | 4, 8, 12, 16mA | 0 |
| | 3 | MC3DA0 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 4 | DAICK | O | - | 4, 8, 12, 16mA | 0 |
| | 5 | JTRCK | O | - | 4, 8, 12, 16mA | 0 |
| | 6 | BTDBGACKN | O | - | 4, 8, 12, 16mA | 0 |
| CMDAT4 | 0 | GPIO51 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | CMDAT4 | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 2 | LSA0DA1 | O | - | 4, 8, 12, 16mA | 0 |
| | 3 | MC3DA0 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 4 | FMJTRSTB | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 5 | JTRST_B | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 6 | BTJTRST_B | I | CU, CD | 4, 8, 12, 16mA | 0 |
| CMDAT5 | 0 | GPIO52 | IO | CU, CD | 4, 8, 12, 16mA | 0 |

| Name | Aux. function | Aux. name | Aux. type | PU/PD/CU/CD | Driving | SMT |
|--------|---------------|-----------|-----------|-------------|----------------|-----|
| | 1 | CMDAT5 | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 2 | L5CK5 | O | - | 4, 8, 12, 16mA | 0 |
| | 3 | DAIPCMOUT | O | - | 4, 8, 12, 16mA | 0 |
| | 4 | U2RXD | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 7 | EGND48 | I | PD | 4, 8, 12, 16mA | 0 |
| CMDAT6 | 0 | GPIO53 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | CMDAT6 | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 2 | L5DA1 | IO | PU, CD | 4, 8, 12, 16mA | 0 |
| | 3 | MC2DA2 | O | - | 4, 8, 12, 16mA | 0 |
| | 4 | DAIPCMIN | I | - | 4, 8, 12, 16mA | 0 |
| CMDAT7 | 0 | GPIO54 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | CMDAT7 | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 2 | L5DI1 | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 3 | MCDA3 | O | - | 4, 8, 12, 16mA | 0 |
| | 4 | DAIPCMOUT | I | CU, CD | 4, 8, 12, 16mA | 0 |
| CMHREF | 0 | GPIO55 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | CMHREF | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 2 | LSCE0B1 | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 3 | MC3CK | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 4 | DAISYNC | O | - | 4, 8, 12, 16mA | 0 |
| CMVREF | 0 | GPIO56 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | CMVREF | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 2 | SDA | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 3 | EINT7 | I | PD | 4, 8, 12, 16mA | 0 |
| | 4 | DAIRST | I | PD | 4, 8, 12, 16mA | 0 |
| | 5 | LPTE0 | I | PD | 4, 8, 12, 16mA | 0 |
| CMPDN | 0 | GPIO57 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | CMPDN | O | - | 4, 8, 12, 16mA | 0 |
| CMMCLK | 0 | GPIO58 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | CMMCLK | O | - | 4, 8, 12, 16mA | 0 |
| CMPCLK | 0 | GPIO59 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | CMPCLK | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 2 | CMCSK | I | CU, CD | 4, 8, 12, 16mA | 0 |
| CMRST | 0 | GPIO60 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | CMRST | O | - | 4, 8, 12, 16mA | 0 |
| EDIDAT | 0 | GPIO61 | IO | CU, CD | 4, 8, 12, 16mA | 0 |

| Name | Aux. function | Aux. name | Aux. type | PU/PD/ CU/CD | Driving | SMT |
|-----------|---------------|-----------|-----------|--------------|------------------------|-----|
| | 1 | EDIDAT | IO | CU,CD | 4, 8, 12, 16mA | 0 |
| | 2 | PWM | O | - | 4, 8, 12, 16mA | 0 |
| | 3 | EINT8 | I | CU,CD | 4, 8, 12, 16mA | 0 |
| BPI_BUS3 | 0 | GPIO62 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | BPIBUS3 | O | - | 4, 8, 12, 16mA | 0 |
| BPI_BUS2 | 0 | GPIO63 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | BPIBUS2 | O | - | 4, 8, 12, 16mA | 0 |
| BPI_BUS1 | 0 | GPIO64 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | BPIBUS1 | O | - | 4, 8, 12, 16mA | 0 |
| BPI_BUS0 | 0 | GPIO65 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | BPIBUS0 | O | - | 4, 8, 12, 16mA | 0 |
| SFSCK | 0 | GPIO69 | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 1 | SFSCK | O | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 2 | MC2DA1 | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| SFSWP | 0 | GPIO67 | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 1 | SFSWP | O | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 2 | MC2CK | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| SFSHOLD | 0 | GPIO72 | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 1 | SFSHOLD | O | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 2 | MC2DA3 | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| SFSCS0 | 0 | GPIO68 | O | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 1 | SFSCS0 | O | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 2 | MC2DA1 | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| SFSCS1 | 0 | GPIO66 | O | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 1 | SFSCS1 | O | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| SFSIN | 0 | GPIO70 | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 1 | SFSIN | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 2 | MC2DA2 | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| SFSOUT | 0 | GPIO71 | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 1 | SFSOUT | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| | 2 | MC2MC0 | IO | CU, CD | 2,4,6,8,10,12 ,14,16mA | 0 |
| SIM1_SIO | 0 | GPIO73 | IO | CU, CD | 2, 4, 6, 8mA | 0 |
| | 1 | SIMSIO | IO | CU, CD | 2, 4, 6, 8mA | 0 |
| SIM1_SRST | 0 | GPIO74 | IO | CU, CD | 2, 4, 6, 8mA | 0 |
| | 1 | SIMSRST | IO | CU, CD | 2, 4, 6, 8mA | 0 |
| SIM2_SIO | 0 | GPIO75 | IO | CU, CD | 2, 4, 6, 8mA | 0 |

| Name | Aux. function | Aux. name | Aux. type | PU/PD/ CU/CD | Driving | SMT |
|-----------|---------------|-----------|-----------|--------------|----------------|-----|
| | 1 | SIM2SIO | IO | CU, CD | 2, 4, 6, 8mA | 0 |
| SIM1_SCLK | 0 | GPIO76 | IO | CU, CD | 2, 4, 6, 8mA | 0 |
| | 1 | SIMSCLK | IO | CU, CD | 2, 4, 6, 8mA | 0 |
| SIM2_SCLK | 0 | GPIO77 | IO | CU, CD | 2, 4, 6, 8mA | 0 |
| | 1 | SIM2SCLK | IO | CU, CD | 2, 4, 6, 8mA | 0 |
| SIM2_SRST | 0 | GPIO78 | IO | CU, CD | 2, 4, 6, 8mA | 0 |
| | 1 | SIM2SRST | IO | CU, CD | 2, 4, 6, 8mA | 0 |
| SRCLKENAI | 0 | GPIO105 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | SRCLKENAI | I | CU, CD | 4, 8, 12, 16mA | 0 |
| RESETB | 0 | GPIO106 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | RESETB | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 7 | EGND70 | I | PD | 4, 8, 12, 16mA | 0 |
| EINT12 | 0 | GPIO107 | IO | CU, CD | 4, 8, 12, 16mA | 0 |
| | 1 | EINT12 | I | CU, CD | 4, 8, 12, 16mA | 0 |
| | 7 | EGND71 | I | PD | 4, 8, 12, 16mA | 0 |

2.2 Electrical Characteristics

2.2.1 Absolute Maximum Ratings

Table 8. Absolute maximum ratings for power supply

| Symbol or pin name | Description | Min. | Max. | Unit |
|--------------------|-----------------------------------------------------|-------|-------|------|
| VBAT_DIGITAL | Digital used battery voltage input | -0.3 | +4.3 | V |
| VBAT_ANALOG | Analog used battery voltage input | -0.3 | +4.3 | V |
| VBAT_SPK | VBAT input for loud speaker driver | -0.3 | +4.3 | V |
| VBAT_RF | RF used battery voltage input | -0.3 | +4.3 | V |
| VUSB | LDO output for USB-VUSB | +3.0 | +3.6 | V |
| AVDD28_FM | 2.8V power supply for FM | +2.52 | +3.08 | V |
| AVDD28_VRF | 2.8V power supply for 2G RF | +2.52 | +3.08 | V |
| AVDD28_TCXO | 2.8V power supply for 2G TCXO | +2.52 | +3.08 | V |
| AVDD28_2GAFE | 2.8V power supply for 2G AFE | +2.52 | +3.08 | V |
| AVDD28_ABB | 2.8V power supply for ABB | +2.52 | +3.08 | V |
| AVDD28_DBT | 2.8V power supply for DBT | +2.52 | +3.08 | V |
| AVDD28_ABT | 2.8V power supply for ABT | +2.52 | +3.08 | V |
| DVDD28 | 2.8V power supply for digital macros in transceiver | +2.52 | +3.08 | V |
| DVDD18 | 1.8V power supply for digital macros in transceiver | +1.62 | +1.98 | V |

| Symbol or pin name | Description | Min. | Max. | Unit |
|--------------------|------------------------------|-------|-------|------|
| DVDD28_SF | 2.8V IO power | +2.7 | +3.6 | V |
| | 1.8V IO power | +1.7 | +1.98 | V |
| DVDD33_MSDC | 3.3V memory card power | +3.0 | +3.6 | V |
| DVDD18_EMI | 1.8V EMI IO power | +1.62 | +1.98 | V |
| DVDD28_FSRC | E-FUSE blowing power control | +2.52 | +3.08 | V |
| VDDK | 1.3v core power | +1.17 | +1.43 | V |

Table 9. **Absolute maximum ratings for voltage input**

| Symbol or pin name | Description | Min. | Max. | Unit |
|--------------------|-------------------------------------|------|------|------|
| VIN1 | Digital input voltage for IO Type 1 | -0.3 | 3.08 | V |
| VIN2 | Digital input voltage for IO Type 2 | -0.3 | 3.08 | V |
| VIN3 | Digital input voltage for IO Type 3 | -0.3 | 3.08 | V |
| VIN4 | Digital input voltage for IO Type 4 | -0.3 | 3.08 | V |
| VIN5 | Digital input voltage for IO Type 5 | -0.3 | 3.08 | V |
| VIN6 | Digital input voltage for IO Type 6 | -0.3 | 3.08 | V |

Table 10. **Absolute maximum ratings for storage temperature**

| Symbol or pin name | Description | Min. | Max. | Unit |
|--------------------|---------------------|------|------|------|
| Tstg | Storage temperature | -55 | 125 | °C |

2.2.2 Recommended Operating Conditions

Table 11. **Recommended operating conditions for power supply**

| Symbol or pin name | Description | Min. | Typ. | Max. | Unit |
|--------------------|-----------------------------------------------------|------|------|------|------|
| VBAT_DIGITAL | Digital used battery voltage input | 3.4 | 3.8 | 4.2 | V |
| VBAT_ANALOG | Analog used battery voltage input | 3.4 | 3.8 | 4.2 | V |
| VBAT_SPK | VBAT input for loud speaker driver | 3.4 | 3.8 | 4.2 | V |
| VBAT_RF | RF used battery voltage input | 3.4 | 3.8 | 4.2 | V |
| VUSB | LDO output for USB-VUSB | 3.0 | 3.3 | 3.6 | V |
| AVDD28_FM | 2.8V power supply for FM | 2.6 | 2.8 | 3.0 | V |
| AVDD28_VRF | 2.8V power supply for 2G RF | 2.65 | 2.8 | 2.95 | V |
| AVDD28_TCXO | 2.8V power supply for 2G TCXO | 2.65 | 2.8 | 2.95 | V |
| AVDD28_2GAFFE | 2.8V power supply for 2G AFE | 2.65 | 2.8 | 2.95 | V |
| AVDD28_ABB | 2.8V power supply for ABB | 2.6 | 2.8 | 3.0 | V |
| AVDD28_DBT | 2.8V power supply for DBT | 2.6 | 2.8 | 3.0 | V |
| AVDD28_ABT | 2.8V power supply for ABT | 2.6 | 2.8 | 3.0 | V |
| DVDD28 | 2.8V power supply for digital macros in transceiver | 2.7 | 2.8 | 2.9 | V |

| Symbol or pin name | Description | Min. | Typ. | Max. | Unit |
|--------------------|-----------------------------------------------------|------|------|------|------|
| DVDD18 | 1.8V power supply for digital macros in transceiver | 1.62 | 1.8 | 1.98 | V |
| DVDD28_SF | 2.8V IO power | 2.7 | 3.3 | 3.6 | V |
| | 1.8V IO power | 1.7 | 1.8 | 1.98 | |
| DVDD33_MSDC | 3.3V memory card power | 3.0 | 3.3 | 3.6 | V |
| DVDD18_EMI | 1.8V EMI IO power | 1.62 | 1.8 | 1.98 | V |
| DVDD28_FSRC | E-FUSE blowing power control | 2.7 | 2.8 | 3.08 | V |
| VDDK | 1.2v core power | 1.17 | 1.3 | 1.43 | VDDK |

Table 12. Recommended operating conditions for voltage input

| Symbol or pin name | Description | Min. | Typ. | Max. | Unit |
|--------------------|-------------------------------------|------|------|-----------|------|
| VIN1 | Digital input voltage for IO Type 1 | -0.3 | - | DVDIO+0.3 | V |
| VIN2 | Digital input voltage for IO Type 2 | -0.3 | - | DVDIO+0.3 | V |
| VIN3 | Digital input voltage for IO Type 3 | -0.3 | - | DVDIO+0.3 | V |
| VIN4 | Digital input voltage for IO Type 4 | -0.3 | - | DVDIO+0.3 | V |
| VIN5 | Digital input voltage for IO Type 5 | -0.3 | - | DVDIO+0.3 | V |
| VIN6 | Digital input voltage for IO Type 6 | -0.3 | - | DVDIO+0.3 | V |
| VIN7 | Digital input voltage for IO Type 7 | -0.3 | - | DVDIO+0.3 | V |

Table 13. Recommended operating conditions for operating temperature

| Symbol or pin name | Description | Min. | Typ | Max. | Unit |
|--------------------|-----------------------|------|-----|------|------|
| Tc | Operating temperature | -20 | - | 85 | °C |

2.2.3 Electrical Characteristics under Recommended Operating Conditions

Table 14. Electrical characteristics

| Symbol | Description | Condition | Min. | Typ. | Max. | Unit |
|--------|------------------------------------------|-------------------------------------------------|-------|------|------|------|
| DIIH1 | Digital high input current for IO Type 1 | PU/PD disabled, DVDIO = 2.8V, 2.1 < VIN1 < 3.1 | -5 | - | 5 | μA |
| | | PU enabled, DVDIO = 2.8V, 2.1 < VIN1 < 3.1 | -22.5 | - | 12.5 | |
| | | PD enabled, DVDIO = 2.8V, 2.1 < VIN1 < 3.1 | 6.1 | - | 82.5 | |
| | | PU/PD disabled, DVDIO = 1.8V, 1.35 < VIN1 < 2.1 | -5 | - | 5 | μA |

| Symbol | Description | Condition | Min. | Typ. | Max. | Unit |
|--------|------------------------------------------------------|--------------------------------------------------------|-------|------|------|------|
| | | PU enabled, DVDIO = 1.8V, 1.35 < VIN1 < 2.1 | -11.4 | - | 9.3 | |
| | | PD enabled, DVDIO = 1.8V, 1.35 < VIN1 < 2.1 | -0.8 | - | 35 | |
| DIIL1 | Digital low input current for IO Type 1 | PU/PD disabled, DVDIO = 2.8V, -0.3 < VIN1 < 0.7 | -5 | - | 5 | μA |
| | | PU enabled, DVDIO = 2.8V, -0.3 < VIN1 < 0.7 | -82.5 | - | -6.1 | |
| | | PD enabled, DVDIO = 2.8V, -0.3 < VIN1 < 0.7 | -12.5 | - | 22.5 | |
| | | PU/PD disabled, DVDIO = 1.8V, -0.3 < VIN1 < 0.45 | -5 | - | 5 | μA |
| | | PU enabled, DVDIO = 1.8V, -0.3 < VIN1 < 0.45 | -35 | - | 0.8 | |
| | | PD enabled, DVDIO = 1.8V, -0.3 < VIN1 < 0.45 | -9.3 | - | 11.4 | |
| DIOH1 | Digital high output current for IO Type 1 | DVOH > 2.38V, DVDIO = 2.8V | -16 | - | - | mA |
| | | DVOH > 1.53V, DVDIO = 1.8V | -12 | - | - | mA |
| DIOL1 | Digital low output current for IO Type 1 | DVOL < 0.42V, DVDIO = 2.8V | - | - | 16 | mA |
| | | DVOL < 0.27V, DVDIO = 1.8V | - | - | 12 | mA |
| DRPU1 | Digital I/O pull-up resistance for IO Type 1 | DVDIO = 2.8V | 40 | 85 | 190 | kΩ |
| | | DVDIO = 1.8V | 70 | 150 | 320 | kΩ |
| DRPD1 | Digital I/O pull-down resistance for IO Type 1 | DVDIO = 2.8V | 40 | 85 | 190 | kΩ |
| | | DVDIO = 1.8V | 70 | 150 | 320 | kΩ |
| DVOH1 | Digital output high voltage for IO Type 1 | DVDIO = 2.8V | 2.38 | | | V |
| | | DVDIO = 1.8V | 1.53 | | | V |
| DVOL1 | Digital output low voltage for IO Type 1 | DVDIO = 2.8V | | | 0.42 | V |
| | | DVDIO = 1.8V | | | 0.27 | V |
| DIIH2 | Digital high input current for IO Type 2 | PU/PD disabled, DVDIO = 2.8V, 2.1 < VIN2 < 3.1 | -5 | - | 5 | μA |

| Symbol | Description | Condition | Min. | Typ. | Max. | Unit |
|--------|----------------------------------------------------|--------------------------------------------------------|-------|------|------|------|
| | | PU enabled, DVDIO = 2.8V, 2.1 < VIN2 < 3.1 | -22.5 | - | 12.5 | |
| | | PD enabled, DVDIO = 2.8V, 2.1 < VIN2 < 3.1 | 6.1 | - | 82.5 | |
| | | PU/PD disabled, DVDIO = 1.8V, 1.35 < VIN2 < 2.1 | -5 | - | 5 | μA |
| | | PU enabled, DVDIO = 1.8V, 1.35 < VIN2 < 2.1 | -11.4 | - | 9.3 | |
| | | PD enabled, DVDIO = 1.8V, 1.35 < VIN2 < 2.1 | -0.8 | - | 35 | |
| DIIL2 | Digital low input current for IO Type 2 | PU/PD disabled, DVDIO = 2.8V, -0.3 < VIN2 < 0.7 | -5 | - | 5 | μA |
| | | PU enabled, DVDIO = 2.8V, -0.3 < VIN2 < 0.7 | -82.5 | - | -6.1 | |
| | | PD enabled, DVDIO = 2.8V, -0.3 < VIN2 < 0.7 | -12.5 | - | 22.5 | |
| | | PU/PD disabled, DVDIO = 1.8V, -0.3 < VIN2 < 0.45 | -5 | - | 5 | μA |
| | | PU enabled, DVDIO = 1.8V, -0.3 < VIN2 < 0.45 | -35 | - | 0.8 | |
| | | PD enabled, DVDIO = 1.8V, -0.3 < VIN2 < 0.45 | -9.3 | - | 11.4 | |
| DIOH2 | Digital high output current for IO Type 2 | DVOH > 2.38V, DVDIO = 2.8V | -16 | - | - | mA |
| | | DVOH > 1.53V, DVDIO = 1.8V | -12 | - | - | mA |
| DIOL2 | Digital low output current for IO Type 2 | DVOL < 0.42V, DVDIO = 2.8V | - | - | 16 | mA |
| | | DVOL < 0.27V, DVDIO = 1.8V | - | - | 12 | mA |
| DRPU2 | Digital I/O pull-up resistance for IO Type 2 | DVDIO = 2.8V | 40 | 85 | 190 | kΩ |
| | | DVDIO = 1.8V | 70 | 150 | 320 | kΩ |
| DRPD2 | Digital I/O pull-down | DVDIO = 2.8V | 40 | 85 | 190 | kΩ |

| Symbol | Description | Condition | Min. | Typ. | Max. | Unit |
|--------|------------------------------------------------|-------------------------------------------------------|-------|------|------|------|
| | | DVOH > 1.53V, DVDIO = 1.8V | -12 | - | - | mA |
| DIOL3 | Digital low output current for IO Type 3 | DVOL < 0.42V, DVDIO = 2.8V | - | - | 16 | mA |
| | | DVOL < 0.27V, DVDIO = 1.8V | - | - | 12 | mA |
| DRPU3 | Digital I/O pull-up resistance for IO Type 3 | DVDIO = 2.8V | 10 | 47 | 100 | kΩ |
| | | DVDIO = 1.8V | 10 | 47 | 100 | kΩ |
| DRPD3 | Digital I/O pull-down resistance for IO Type 3 | DVDIO = 2.8V | 10 | 47 | 100 | kΩ |
| | | DVDIO = 1.8V | 10 | 47 | 100 | kΩ |
| DVOH3 | Digital output high voltage for IO Type 3 | DVDIO = 2.8V | 2.38 | | | V |
| | | DVDIO = 1.8V | 1.53 | | | V |
| DVOL3 | Digital output low voltage for IO Type 3 | DVDIO = 2.8V | | | 0.42 | V |
| | | DVDIO = 1.8V | | | 0.27 | V |
| DIIH4 | Digital high input current for IO Type 4 | PU/PD disabled, DVDIO = 2.8V, 2.1 < VIN4 < 3.1 | -5 | - | 5 | μA |
| | | PU enabled, DVDIO = 2.8V, 2.1 < VIN4 < 3.1 | -22.5 | - | 12.5 | |
| | | PD enabled, DVDIO = 2.8V, 2.1 < VIN4 < 3.1 | 6.1 | - | 82.5 | |
| | | PU/PD disabled, DVDIO = 1.8V, 1.35 < VIN4 < 2.1 | -5 | - | 5 | μA |
| | | PU enabled, DVDIO = 1.8V, 1.35 < VIN4 < 2.1 | -11.4 | - | 9.3 | |
| | | PD enabled, DVDIO = 1.8V, 1.35 < VIN4 < 2.1 | -0.8 | - | 35 | |
| DIIL4 | Digital low input current for IO Type 4 | PU/PD disabled, DVDIO = 2.8V, -0.3 < VIN4 < 0.7 | -5 | - | 5 | μA |
| | | PU enabled, DVDIO = 2.8V, -0.3 < VIN4 < 0.7 | -82.5 | - | -6.1 | |
| | | PD enabled, DVDIO = 2.8V, -0.3 < VIN4 < 0.7 | -12.5 | - | 22.5 | |

| Symbol | Description | Condition | Min. | Typ. | Max. | Unit |
|------------|---------------------------------------------------------------|--------------------------------------------------------|-------|------|------|------|
| | | PU/PD disabled, DVDIO = 1.8V, -0.3 < VIN4 < 0.45 | -5 | - | 5 | μA |
| | | PU enabled, DVDIO = 1.8V, -0.3 < VIN4 < 0.45 | -35 | - | 0.8 | |
| | | PD enabled, DVDIO = 1.8V, -0.3 < VIN4 < 0.45 | -9.3 | - | 11.4 | |
| DIOH4 | Digital high output current for IO Type 4 | DVOH > 2.38V, DVDIO = 2.8V | -16 | - | - | mA |
| | | DVOH > 1.53V, DVDIO = 1.8V | -12 | - | - | mA |
| DIOL4 | Digital low output current for IO Type 4 | DVOL < 0.42V, DVDIO = 2.8V | - | - | 16 | mA |
| | | DVOL < 0.27V, DVDIO = 1.8V | - | - | 12 | mA |
| DRPU4 | Digital I/O pull-up resistance for IO Type 4 (GPIO mode) | DVDIO = 2.8V | 40 | 75 | 190 | kΩ |
| | | DVDIO = 1.8V | 70 | 150 | 320 | kΩ |
| DRPD4 | Digital I/O pull-down resistance for IO Type 4 (GPIO mode) | DVDIO = 2.8V | 40 | 75 | 190 | kΩ |
| | | DVDIO = 1.8V | 70 | 150 | 320 | kΩ |
| DRPU4 200K | Digital I/O pull-up resistance for IO Type 4 (Key PAD mode) | DVDIO = 2.8V | 200 | - | 380 | kΩ |
| DRPD4 200K | Digital I/O pull-down resistance for IO Type 4 (Key PAD mode) | DVDIO = 2.8V | 200 | - | 380 | kΩ |
| DVOH4 | Digital output high voltage for IO Type 4 | DVDIO = 2.8V | 2.38 | | | V |
| | | DVDIO = 1.8V | 1.53 | | | V |
| DVOL4 | Digital output low voltage for IO Type 4 | DVDIO = 2.8V | | | 0.42 | V |
| | | DVDIO = 1.8V | | | 0.27 | V |
| DIIH5 | Digital high input current for IO Type 5 | PU/PD disabled, DVDIO = 2.8V, 2.1 < VIN5 < 3.1 | -5 | - | 5 | μA |
| | | PU enabled, DVDIO = 2.8V, 2.1 < VIN5 < 3.1 | -22.5 | - | 12.5 | |
| | | PD enabled, DVDIO = 2.8V, 2.1 < VIN5 < 3.1 | 6.1 | - | 82.5 | |
| | | PU/PD disabled, DVDIO = 1.8V, 1.35 < VIN5 < 2.1 | -5 | - | 5 | μA |

| Symbol | Description | Condition | Min. | Typ. | Max. | Unit |
|-------------|---------------------------------------------------------------------|--------------------------------------------------------|-------|------|------|------|
| | | PU enabled, DVDIO = 1.8V, 1.35 < VIN5 < 2.1 | -11.4 | - | 9.3 | |
| | | PD enabled, DVDIO = 1.8V, 1.35 < VIN5 < 2.1 | -0.8 | - | 35 | |
| DIIL5 | Digital low input current for IO Type 5 | PU/PD disabled, DVDIO = 2.8V, -0.3 < VIN5 < 0.7 | -5 | - | 5 | μA |
| | | PU enabled, DVDIO = 2.8V, -0.3 < VIN5 < 0.7 | -82.5 | - | -6.1 | |
| | | PD enabled, DVDIO = 2.8V, -0.3 < VIN5 < 0.7 | -12.5 | - | 22.5 | |
| | | PU/PD disabled, DVDIO = 1.8V, -0.3 < VIN5 < 0.45 | -5 | - | 5 | μA |
| | | PU enabled, DVDIO = 1.8V, -0.3 < VIN5 < 0.45 | -35 | - | 0.8 | |
| | | PD enabled, DVDIO = 1.8V, -0.3 < VIN5 < 0.45 | -9.3 | - | 11.4 | |
| DIOH5 | Digital high output current for IO Type 5 | DVOH > 2.38V, DVDIO = 2.8V | -16 | - | - | mA |
| | | DVOH > 1.53V, DVDIO = 1.8V | -12 | - | - | mA |
| DIOL5 | Digital low output current for IO Type 5 | DVOL < 0.42V, DVDIO = 2.8V | - | - | 16 | mA |
| | | DVOL < 0.27V, DVDIO = 1.8V | - | - | 12 | mA |
| DRPU5 | Digital I/O pull-up resistance for IO Type 5 (GPIO mode) | DVDIO = 2.8V | 40 | 75 | 190 | kΩ |
| | | DVDIO = 1.8V | 70 | 150 | 320 | kΩ |
| DRPD5 | Digital I/O pull-down resistance for IO Type 5 (GPIO mode) | DVDIO = 2.8V | 40 | 75 | 190 | kΩ |
| | | DVDIO = 1.8V | 70 | 150 | 320 | kΩ |
| DRPU5 2K | Digital I/O pull-up resistance for IO Type 4 (Key PAD mode) | DVDIO = 2.8V | 1 | - | 2 | kΩ |
| DRPD5 2K | Digital I/O pull-down resistance for IO Type 4 (Key PAD mode) | DVDIO = 2.8V | 1 | - | 2 | kΩ |
| DVOH5 | Digital output high voltage for IO Type 5 | DVDIO = 2.8V | 2.38 | | | V |
| | | DVDIO = 1.8V | 1.53 | | | V |
| DVOL5 | Digital output low | DVDIO = 2.8V | | | 0.42 | V |

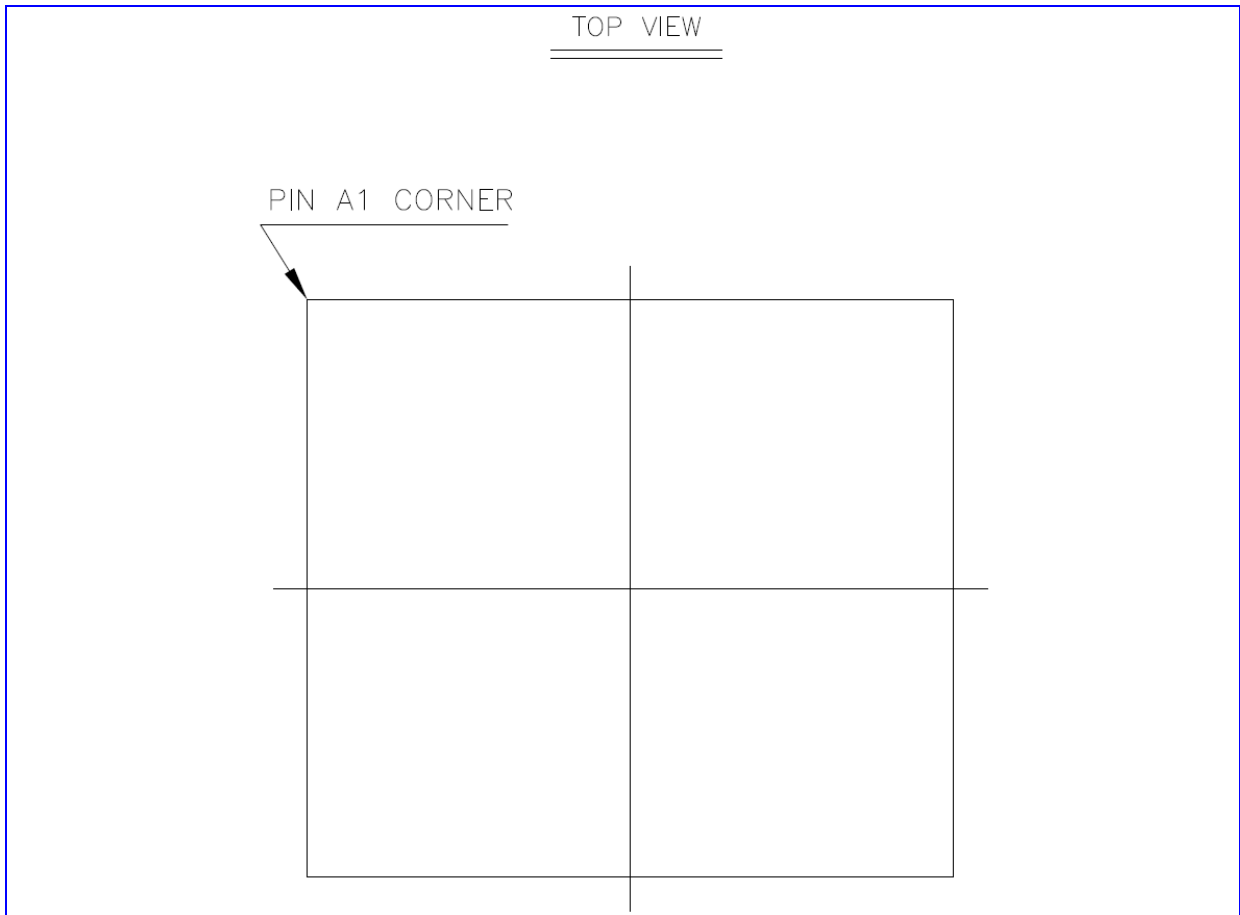
| Symbol | Description | Condition | Min. | Typ. | Max. | Unit |
|--------|-------------------------------------------|--------------------------------------------------|-------|------|------|------|
| | voltage for IO Type 5 | DVDIO = 1.8V | | | 0.27 | V |
| DIIH6 | Digital high input current for IO Type 6 | PU/PD disabled, DVDIO = 2.8V, 2.1 < VIN6 < 3.1 | -5 | - | 5 | μA |
| | | PU enabled, DVDIO = 2.8V, 2.1 < VIN6 < 3.1 | -22.5 | - | 12.5 | |
| | | PD enabled, DVDIO = 2.8V, 2.1 < VIN6 < 3.1 | 6.1 | - | 82.5 | |
| | | PU/PD disabled, DVDIO = 1.8V, 1.35 < VIN6 < 2.1 | -5 | - | 5 | μA |
| | | PU enabled, DVDIO = 1.8V, 1.35 < VIN6 < 2.1 | -11.4 | - | 9.3 | |
| | | PD enabled, DVDIO = 1.8V, 1.35 < VIN6 < 2.1 | -0.8 | - | 35 | |
| DIIL6 | Digital low input current for IO Type 6 | PU/PD disabled, DVDIO = 2.8V, -0.3 < VIN6 < 0.7 | -5 | - | 5 | μA |
| | | PU enabled, DVDIO = 2.8V, -0.3 < VIN6 < 0.7 | -82.5 | - | -6.1 | |
| | | PD enabled, DVDIO = 2.8V, -0.3 < VIN6 < 0.7 | -12.5 | - | 22.5 | |
| | | PU/PD disabled, DVDIO = 1.8V, -0.3 < VIN6 < 0.45 | -5 | - | 5 | μA |
| | | PU enabled, DVDIO = 1.8V, -0.3 < VIN6 < 0.45 | -35 | - | 0.8 | |
| | | PD enabled, DVDIO = 1.8V, -0.3 < VIN6 < 0.45 | -9.3 | - | 11.4 | |
| DIOH6 | Digital high output current for IO Type 6 | DVOH > 2.38V, DVDIO = 2.8V | -8 | - | - | mA |
| | | DVOH > 1.53V, DVDIO = 1.8V | -6 | - | - | mA |
| DIOL6 | Digital low output current for IO Type 6 | DVOL < 0.42V, DVDIO = 2.8V | - | - | 8 | mA |
| | | DVOL < 0.27V, DVDIO = 1.8V | - | - | 6 | mA |
| DRPU6 | Digital I/O pull-up | DVDIO = 2.8V | 40 | 85 | 190 | kΩ |

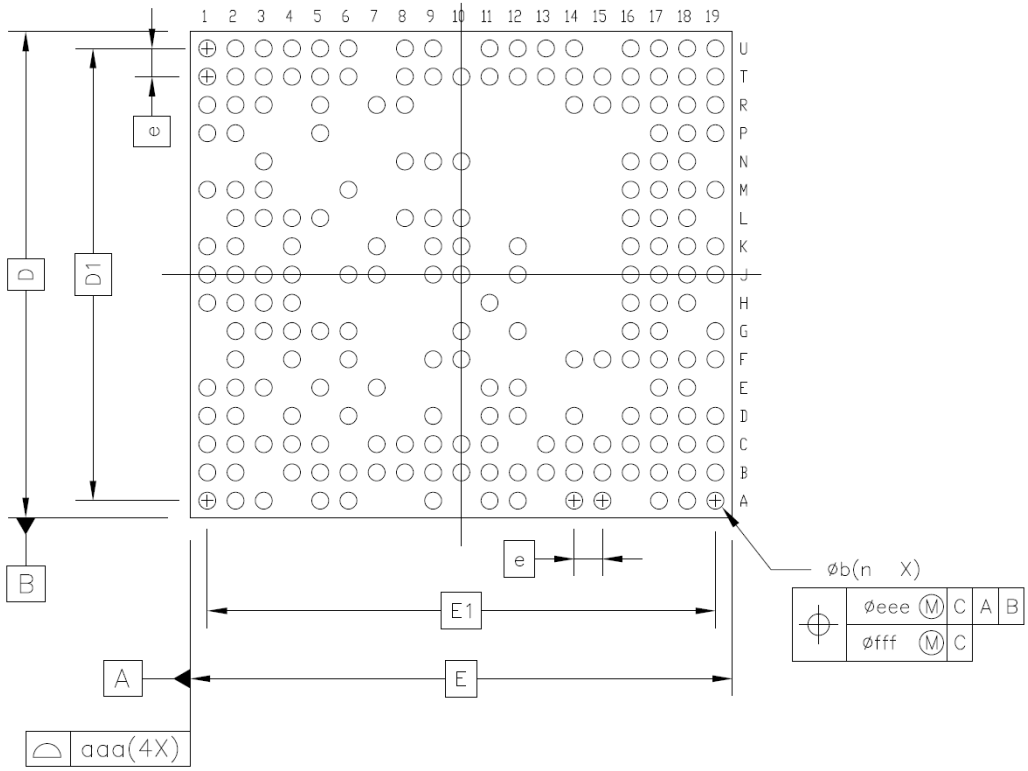
| Symbol | Description | Condition | Min. | Typ. | Max. | Unit |
|--------|------------------------------------------------|--------------------------------------------------|-------|------|------|------|
| | resistance for IO Type 6 | DVDIO = 1.8V | 70 | 150 | 320 | kΩ |
| DRPD6 | Digital I/O pull-down resistance for IO Type 6 | DVDIO = 2.8V | 40 | 85 | 190 | kΩ |
| | | DVDIO = 1.8V | 70 | 150 | 320 | kΩ |
| DVOH6 | Digital output high voltage for IO Type 6 | DVDIO = 2.8V | 2.38 | | | V |
| | | DVDIO = 1.8V | 1.53 | | | V |
| DVOL6 | Digital output low voltage for IO Type 6 | DVDIO = 2.8V | | | 0.42 | V |
| | | DVDIO = 1.8V | | | 0.27 | V |
| DIIH7 | Digital high input current for IO Type 7 | PU/PD disabled, DVDIO = 2.8V, 2.1 < VIN7 < 3.1 | -5 | - | 5 | μA |
| | | PU enabled, DVDIO = 2.8V, 2.1 < VIN7 < 3.1 | -22.5 | - | 12.5 | |
| | | PD enabled, DVDIO = 2.8V, 2.1 < VIN7 < 3.1 | 6.1 | - | 82.5 | |
| | | PU/PD disabled, DVDIO = 1.8V, 1.35 < VIN7 < 2.1 | -5 | - | 5 | μA |
| | | PU enabled, DVDIO = 1.8V, 1.35 < VIN7 < 2.1 | -11.4 | - | 9.3 | |
| | | PD enabled, DVDIO = 1.8V, 1.35 < VIN7 < 2.1 | -0.8 | - | 35 | |
| | | PU/PD disabled, DVDIO = 2.8V, -0.3 < VIN7 < 0.7 | -5 | - | 5 | μA |
| | | PU enabled, DVDIO = 2.8V, -0.3 < VIN7 < 0.7 | -82.5 | - | -6.1 | |
| | | PD enabled, DVDIO = 2.8V, -0.3 < VIN7 < 0.7 | -12.5 | - | 22.5 | |
| | | PU/PD disabled, DVDIO = 1.8V, -0.3 < VIN7 < 0.45 | -5 | - | 5 | μA |
| | PU enabled, DVDIO = 1.8V, -0.3 < VIN7 < 0.45 | -35 | - | 0.8 | | |
| | PD enabled, DVDIO = 1.8V, -0.3 < VIN7 < 0.45 | -9.3 | - | 11.4 | | |

| Symbol | Description | Condition | Min. | Typ. | Max. | Unit |
|--------|------------------------------------------------|-------------------------------|------|------|------|------|
| DIOH7 | Digital high output current for IO Type 7 | DVOH > 2.38V, DVDIO = 2.8V | -16 | - | - | mA |
| | | DVOH > 1.53V, DVDIO = 1.8V | -12 | - | - | mA |
| DIOL7 | Digital low output current for IO Type 7 | DVOL < 0.42V, DVDIO = 2.8V | - | - | 16 | mA |
| | | DVOL < 0.27V, DVDIO = 1.8V | - | - | 12 | mA |
| DRPU7 | Digital I/O pull-up resistance for IO Type 7 | DVDIO = 2.8V | 40 | 85 | 190 | kΩ |
| | | DVDIO = 1.8V | 70 | 150 | 320 | kΩ |
| DRPD7 | Digital I/O pull-down resistance for IO Type 7 | DVDIO = 2.8V | 40 | 85 | 190 | kΩ |
| | | DVDIO = 1.8V | 70 | 150 | 320 | kΩ |
| DVOH7 | Digital output high voltage for IO Type 7 | DVDIO = 2.8V | 2.38 | | | V |
| | | DVDIO = 1.8V | 1.53 | | | V |
| DVOL7 | Digital output low voltage for IO Type 7 | DVDIO = 2.8V | | | 0.42 | V |
| | | DVDIO = 1.8V | | | 0.27 | V |

2.3 Package Information

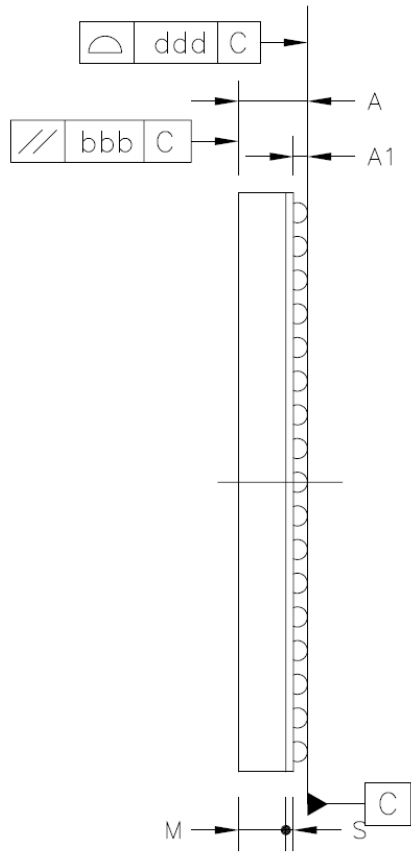
2.3.1 Package Outlines





BOTTOM VIEW

SIDE VIEW



| | | Symbol | Common Dimensions | | |
|------------------------------|---|--------|-------------------|------|-------|
| | | | MIN. | NOM. | MAX. |
| Package : | | | SBS TFBGA | | |
| Body Size: | X | E | 9.600 | | |
| | Y | D | 8.600 | | |
| Ball Pitch : | | e | 0.500 | | |
| Total Thickness : | | A | — | — | 1.100 |
| Mold Thickness : | | M | 0.700 Ref. | | |
| Substrate Thickness : | | S | 0.110 Ref. | | |
| Ball Diameter : | | | 0.300 | | |
| Stand Off : | | A1 | 0.160 | — | 0.260 |
| Ball Width : | | b | 0.250 | — | 0.350 |
| Package Edge Tolerance : | | aaa | 0.100 | | |
| Mold Flatness : | | bbb | 0.100 | | |
| Coplanarity: | | ddd | 0.080 | | |
| Ball Offset (Package) : | | eee | 0.150 | | |
| Ball Offset (Ball) : | | fff | 0.050 | | |
| Ball Count : | | n | 199 | | |
| Edge Ball Center to Center : | X | E1 | 9.000 | | |
| | Y | D1 | 8.000 | | |

Figure 5. Outlines and dimension of TFBGA 9.6mm*8.6mm, 199-ball, 0.5 mm pitch package

2.3.2 Thermal Operating Specifications

| Symbol | Description | Value | Unit | Notes |
|--------|---------------------------------------------------------|-------|-------|-------|
| | Thermal resistance from device junction to package case | 48 | C/W | |
| | Maximum package temperature | 65 | Deg C | |
| | Maximum power dissipation | 1.28 | W | |

2.3.3 Lead-free Packaging

MT6260 is provided in a lead-free package and meets RoHS requirements

2.4 Ordering Information

2.4.1 Top Marking Definition

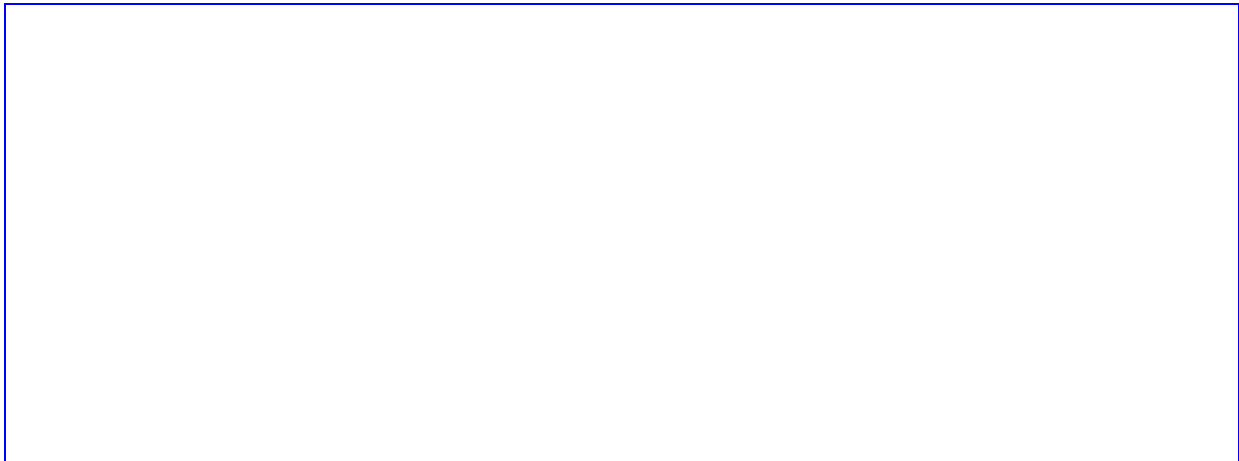


Figure 6. Mass production top marking of MT6260

| Part number | Package | Description |
|-------------------|---------|-------------------------------------------------------------------|
| MT6260A/BMB-PCU-H | TFBGA | 8.6mm*9.6mm, 199-ball, 0.5 mm pitch package, non-security version |