Section 1 Overview

1.1 Features

This LSI chip includes the AI dedicated accelerator (DRP-AI) and 4K-compatible image signal processor (ISP). This processor is vision-AI ASSP for real-time human and object recognition.

The AI dedicated hardware IP, DRP-AI, configured with the dynamic reconfigurable processor (DRP) and AI-MAC, combines both a high-speed AI inference and low power consumption and realizes 1TOPS/W class power performance. In addition, the image signal processor (ISP) is highly robust, producing a stable image independent of the environment, allowing for a high AI recognition accuracy. With these features, this LSI realizes low power consumption, which is a critical factor for embedded devices, making heat dissipation measures easier. The result is that it is ideal for vision AI applications in a wide range of embedded markets, including surveillance security, retail, office automation (OA), industrial automation, and robotics. In addition, this LSI also features abundant high-speed communication interfaces such as USB 3.1, PCI Express®, Gigabit Ethernet, and many CPU peripheral functions, so it can also be used in a variety of applications.

■ CPU and DDR Memory Interfaces

- Cortex®-A53 Dual (996 MHz maximum)
- 32-bit LPDDR4-3200

■ Vision and AI

- AI accelerator: DRP-AI (1.0 TOPS/W class)
- Image signal processor (ISP) with multi-stream capability
- Camera interface: 2× MIPI® CSI-2®
- Face and Human Detection Engine

■ Video and Graphics, Display

- H.265/H.264 Multi Codec

  Encoding: H.265 up to 2160p30, H.264 up to 1080p60

  Decoding: H.265 up to 2160p30, H.264 up to 1080p60
- 2D Graphics Engine: 200 MPixels/s
- Display: HDMI® 1.4a

■ High Speed Interfaces

- 1× Gigabit Ethernet
- 1× USB3.1 Gen1 Host/Peripheral
- 1× PCIe® Gen 2 (2 lanes)
- 2× SDIO 3.0
- 1× eMMC™ 4.5.1

■ Hardware Security Engine provided

■ Package

- FCBGA (15×15 mm, 0.5-mm pitch)

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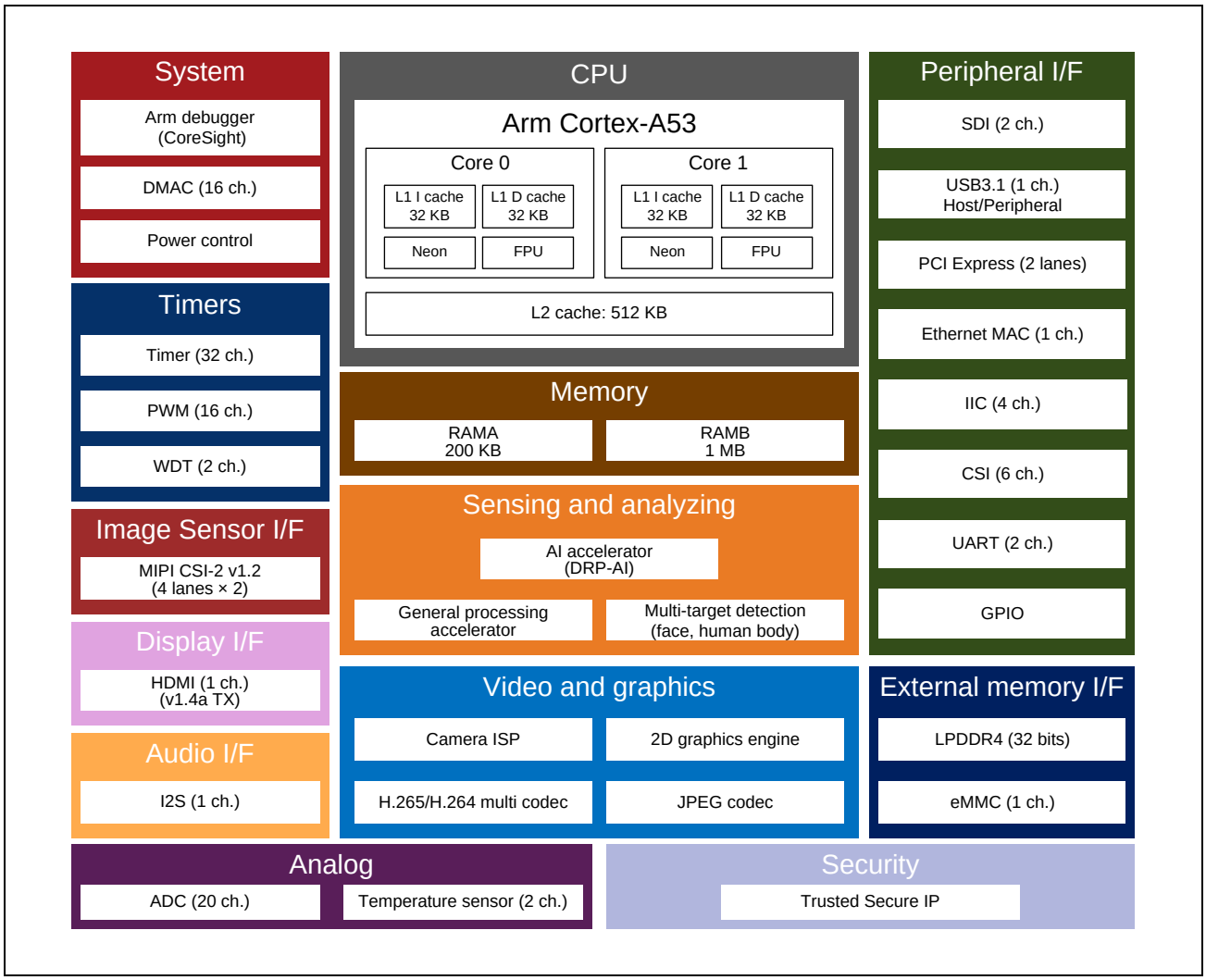


Figure 1.1-1 Diagram of Functional Overview

1.2 Product Lineup

The group currently consists of the following products.

Table 1.2-1 Product Lineup

Product Part Number	Part Number for Ordering	Package	Packing
R9A09G011GBG	R9A09G011GBG#ACC	PRBG0841KA-A	Individual tray
	R9A09G011GBG#BCC	PRBG0841KA-A	Full carton

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1.3 Functions

Table 1.3-1 Overview of Functions (1/4)

Item	Function
CPU	• Arm® Cortex-A53 dual core (CA53): 996 MHz – L1 cache: 32 KB (for instructions) + 32 KB (for data) for each core – L2 cache: 512 KB – FPU, Neon™ extension – ECC supported • Debugger interface (JTAG/SWD) – CoreSight™ debugging components incorporated – ETF (64-Kbyte trace RAM), ETR, and STM incorporated – External trace output (16-bit width)
Memory	• RAM A (RAMA): 200 KB (with ECC) • RAM B (RAMB): 1 MB • ROM: 128 KB
Timers	• Watchdog timer (WDT): 2 channels (CA53 core 0, CA53 core 1) • Compare-match timer: 32 channels • Pulse-width modulation timer (PWM): 16 channels • Real-time clock (RTC)
DMA controller	DMA controller (16 channels)
CMOS image sensor interfaces	• MIPI CSI-2 Ver.1.2/ D-PHY Ver.1.2 4 lanes × 2, 2.5 Gbps per lane: Supports 2 sensor inputs • Formats: – RAW: 8/10/12 bits – YUV422: 8 bits*1 • Supports WDR extraction • Virtual channel
Audio interfaces	I2S interface for the external audio codec: 1 channel Audio sampling rate: 32 kHz, 44.1 kHz, 48 kHz
Sensing and analyzing	• AI accelerator (DRP-AI) • Multi-target detection (face, human body) • General-purpose accelerator

Note 1. The input of data in this format limits the available functions of the LSI chip. For details, contact a Renesas Electronics sales representative.

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Table 1.3-1 Overview of Functions (2/4)

Item	Function
Video & graphics	• Camera ISP – 3840 × 2160 p × 30 fps / 1920 × 1080 p × 30 fps × 2 / 640 × 480 p × 800 fps supported – WDR processing – 3D noise reduction • H.265/H.264 multi codec – Supported functions H.265 encoding and H.265 decoding, or H.264 encoding and H.264 decoding – Support encoding/decoding standard H.265/HEVC main profile at level 5 H.264/AVC constrained baseline/main/high profile at level 4.2 – I-/P-slice supported for H.264/H.265 encoding and decoding – H.265 encoding and decoding performance 3840 × 2160 p × 30 fps encoding, 3840 × 2160 p × 30 fps decoding 1920 × 1080 p × 60 fps encoding, 1920 × 1080 p × 60 fps decoding 640 × 480 p × 800 fps encoding – H.264 encoding and decoding performance 1920 × 1080 p × 60 fps encoding, 1920 × 1080 p × 60 fps decoding 640 × 480 p × 800 fps encoding • JPEG codec – JPEG extended DCT-based process/baseline-process compliant – Color format: YUV – Image data rate: Max. 16 samples/clock cycle • 2D graphics engine – 200 Mpixels per second fill rate (200-MHz clock, single pipeline) – 4096 × 4096 texture size
External memory interfaces	• LPDDR4 interface – 3200 Mbps – 32-bit data width – Up to 4 GB supported • eMMC interface conforming to eMMC version 4.51 – Supports HS200 (high-speed DDR and HS400 are not supported) – 1/4/8-bit data bus

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Table 1.3-1 Overview of Functions (3/4)

Item	Function
Peripheral interfaces	• SD host interface (SDI): 2 channels (SD specification version 3.01 compliant) – SD memory / I/O card interface (1-bit/4-bit SD bus) – SD memory card access for SD, SDHC, and SDXC – Supports default, high-speed, UHS-I/SDR12, SDR25, SDR50, and SDR104 transfer modes (DDR50, not supported) – Supports card detection and write protection • USB interface: 1 channel – USB3.1 Gen1 standard compliant – Dual-role device function supported (static switching of the host controller function and the peripheral controller function) – Supports super-speed (5 Gbps), high-speed (480 Mbps), full-speed (12 Mbps), and low-speed (1.5 Mbps) transfer (low-speed is only supported for the host controller) • PCI Express interface Gen2 (5GT/s): 2 lanes – PCI Express base specification revision 4.0 compliant – Supports root complex/endpoint • Ethernet MAC interface: 1 channel – Supports transfer at 1000 Mbps, and 100 Mbps in full-duplex mode – Supports IEEE802.3 PHY GMII, MII compliant interface • IIC bus interface: 4 channels • Clocked serial interface: 6 channels • UART: 2 channels • GPIO
Display interfaces	• Display control – Display control via HDMI – Resolution conversion, picture compositing, and image frame adjustment • HDMI Tx interface v1.4a: 1 channel – Supports DTV with 1280 × 720 p, 1920 × 1080 p resolution – YUV digital video output format, supported – HDCP™, CEC, and HEAC, not supported
Security engine	• AES and ARC4 encryption and decryption algorithms implemented • RSA2048 signature verification algorithm implemented • SHA-224/256 tamper proofing algorithms implemented • Hardware Random Number Generator
Analog	• A/D converter: 12 channels, A/D converter: 8 channels (12 bits, 600 ksamples /sec) • Temperature sensor: 2 channels
Power control	• External power supply sequence control • Internal power domain control

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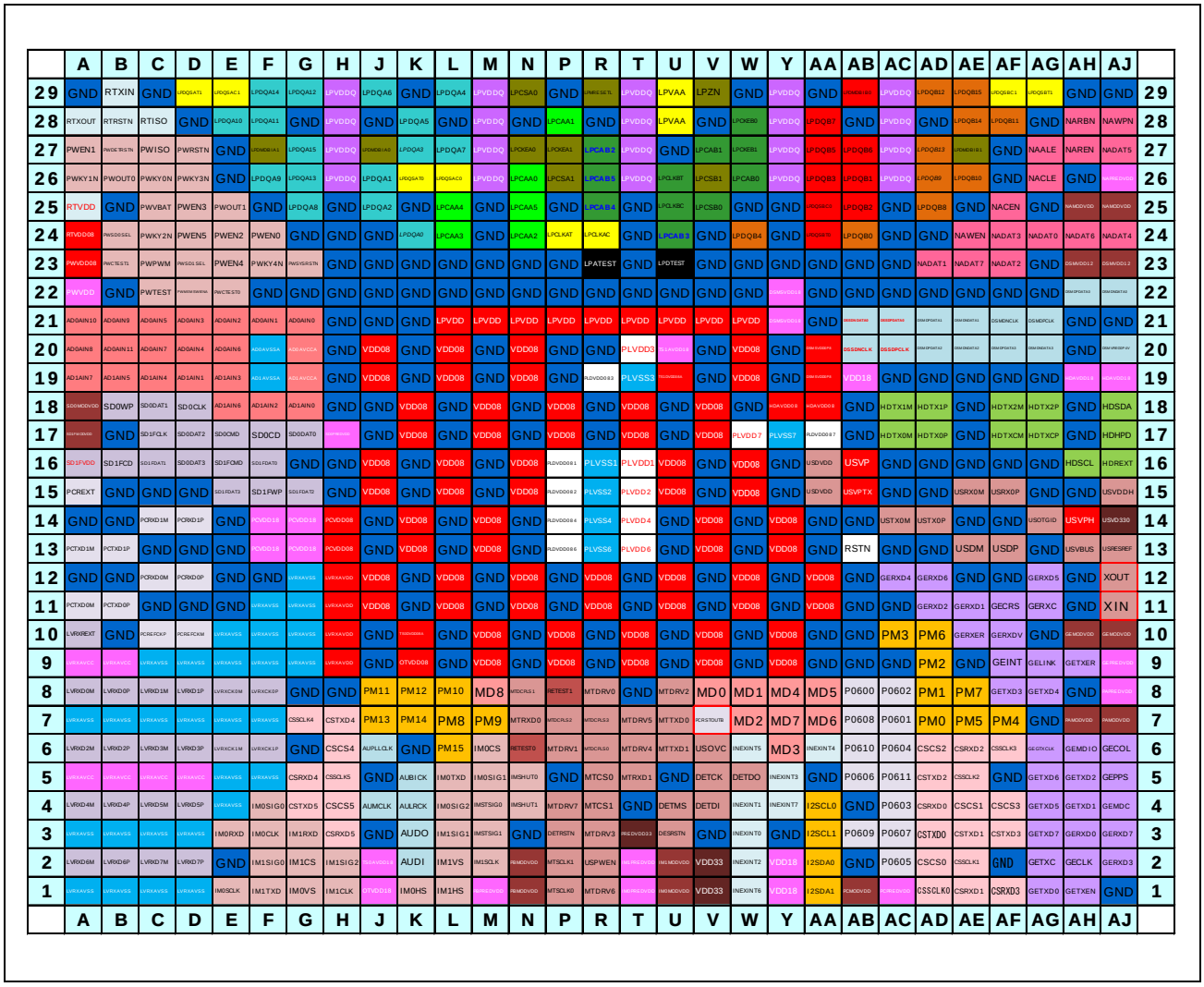
Table 1.3-1 Overview of Functions (4/4)

Item	Function
Power voltage	• 0.8-V power supply VDD08, RTVDD08, PWVDD08, LPVDD, PLDVDD08n (n = 1, 2, 3, 4, 6, 7), OTVDD08, TSnDVDD08A (n = 0, 1), LVRXAVDD, HDAVDD08, DSMSVDD0P8, PCVDD08, USDVDD, USVP, USVPTX • 1.1-V power supply LPVDDQ • 1.2-V power supply DSMVDD12 • 1.5-V power supply RTVDD • 1.8-V power supply PLVDDn (n = 1, 2, 3, 4, 6, 7), OTVDD18, TSnAVDD18 (n = 0, 1), ADnAVCCA (n = 0, 1), LVRXAVCC, LPVAA, HDAVDD18, DSMSVDD18, PCVDD18, USVDDH, PWVDD, VDD18, PAPREDVDD, PBPREDVDD, PCPREDVDD, IM0PREDVDD, IM1PREDVDD, NAPREDVDD, SD0PREDVDD, SD1FVDD,GEPREDVDD, PREDVDD33 • 3.3-V power supply USVD330, USVPH, VDD33 • 3.3-V/1.8-V switchable power supply PAMODVDD, PBMODVDD, PCMODVDD, IM0MODVDD, IM1MODVDD, NAMODVDD, SD0MODVDD, SD1FMODVDD,GEMODVDD
Operating temperature	Tj = 103ºC (max.) Tj: Junction temperature

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Section 2 Pins

2.1 Pin Assignment



	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	T	U	V	W	Y	AA	AB	AC	AD	AE	AF	AG	AH	AJ	
29	GND	RTXIN	GND	LPDQSAT1	LPDQSAC1	LPDQA14	LPDQA12	LPVDDQ	LPDQA6	GND	LPDQA4	LPVDDQ	LPCSA0	GND	LPAREFSETL	LPVDDQ	LPVAA	LPZN	GND	LPVDDQ	GND	LPDMDBI0	LPVDDQ	LPDQB12	LPDQB15	LPDQSBC1	LPDQSBT1	GND	GND	29
28	RTXOUT	RTRSTN	RTISO	GND	LPDQA10	LPDQA11	GND	LPVDDQ	GND	LPDQA5	GND	LPVDDQ	GND	LPCAA1	GND	LPVDDQ	LPVAA	GND	LPCKEB0	LPVDDQ	LPDQB7	GND	LPVDDQ	GND	LPDQB14	LPDQB11	GND	NARBN	NAWPN	28
27	PWEN1	PWDETRSTN	PWISO	PWRSTN	GND	LPDMDBIA1	LPDQA15	LPVDDQ	LPDMDBIA0	LPDQA3	LPDQA7	LPVDDQ	LPCKEA0	LPCKEA1	LPCAB2	LPVDDQ	GND	LPCAB1	LPCKEB1	LPVDDQ	LPDQB5	LPDQB6	LPVDDQ	LPDQB13	LPDMDBI1	GND	NAALE	NAREN	NADAT5	27
26	PWKY1N	PWOUT0	PWKY0N	PWKY3N	GND	LPDQA9	LPDQA13	LPVDDQ	LPDQA1	LPDQSAT0	LPDQSAC0	LPVDDQ	LPCAA0	LPCSA1	LPCAB5	LPVDDQ	LPCLKBT	LPCSB1	LPCAB0	LPVDDQ	LPDQB3	LPDQB1	LPVDDQ	LPDQB9	LPDQB10	GND	NACLE	GND		26
25	RTVDD	GND	PWVBAT	PWEN3	PWOUT1	GND	LPDQA8	GND	LPDQA2	GND	LPCAA4	GND	LPCAA5	GND	LPCAB4	GND	LPCLKBC	LPCSB0	GND	GND	LPDQSBC0	LPDQB2	GND	LPDQB8	GND	NACEN	GND	NAMDDVDD	NAMDDVDD	25
24	RTVDD08	PWSDDSEL	PWKY2N	PWEN5	PWEN2	PWEN0	GND	GND	GND	LPDQA0	LPCAA3	GND	LPCAA2	LPCLKAT	LPCLKAC	GND	LPCAB3	GND	LPDQB4	GND	LPDQSBT0	LPDQB0	GND	GND	NAWEN	NADAT3	NADAT0	NADAT6	NADAT4	24
23	PWVDD08	PWCTEST1	PWPWM	PWSDDSEL	PWEN4	PWKY4N	PWSYSRSTN	GND	GND	GND	GND	GND	GND	GND	LPATEST	GND	LPDTEST	GND	GND	GND	GND	GND	GND	NADAT1	NADAT7	NADAT2	GND	DSWDD12	DSWDD12	23
22	PWVDD	GND	PWTEST	PWWKUSWIRE	PWCTEST0	GND	GND	GND	GND	GND	GND	GND	GND	GND	GND	GND	GND	GND	GND	DSWDD18	GND	GND	GND	GND	GND	GND	GND	DSWDD33	DSWDD33	22
21	AD0AIN10	AD0AIN9	AD0AIN5	AD0AIN3	AD0AIN2	AD0AIN1	AD0AIN0	GND	GND	GND	LPVDD	LPVDD	LPVDD	LPVDD	LPVDD	LPVDD	LPVDD	LPVDD	LPVDD	DSWDD18	GND	DSWDQST00	DSWDQST01	DSWDQST11	DSWDQST01	DSWDQST41	DSWDQST41	DSWDPCLK	GND	GND	21
20	AD0AIN8	AD0AIN11	AD0AIN7	AD0AIN4	AD0AIN6	AD0AVSSA	AD0AVCCA	GND	VDD08	GND	VDD08	GND	VDD08	GND	GND	PLVDD3	S1AVDD33	GND	VDD08	GND	DSWVDDIO0	DSSDNCLK	DSSDPCLK	DSWDQST12	DSWDQST32	DSWDQST53	DSWDQST53	GND	DSWVREGPUV	20
19	AD1AIN7	AD1AIN5	AD1AIN4	AD1AIN1	AD1AIN3	AD1AVSSA	AD1AVCCA	GND	VDD08	GND	VDD08	GND	VDD08	GND	PLDVDDD83	PLVSS3	TSDVDD08	GND	VDD08	GND	DSWVDDIO6	VDD18	GND	GND	GND	GND	GND	DSWVDD18	DSWVDD18	19
18	SD0MDDVDD	SD0WP	SD0DAT1	SD0CLK	AD1AIN6	AD1AIN2	AD1AIN0	GND	GND	VDD08	GND	VDD08	GND	VDD08	GND	VDD08	GND	VDD08	GND	HDAVDD08	HDAVDD08	GND	HDTX1M	HDTX1P	GND	HDTX2M	HDTX2P	GND	HDSDA	18
17	SD0FBGDVDD	GND	SD1FCLK	SD0DAT2	SD0CMD	SD0CD	SD0DAT0	SD0FBGSS	GND	VDD08	GND	VDD08	GND	VDD08	GND	VDD08	GND	VDD08	PLVDD7	PLVSS7	PLDVDD87	GND	HDTX0M	HDTX0P	GND	HDTXCM	HDTXCP	GND	HDHPD	17
16	SD1FVDD	SD1FCD	SD1FDAT0	SD0DAT3	SD1FCMD	SD1FDAT0	GND	GND	VDD08	GND	VDD08	GND	VDD08	PLDVDD81	PLVSS1	PLVDD1	VDD08	GND	VDD08	GND	USDVDD	USVP	GND	GND	GND	GND	GND	HDSCL	HDREXT	16
15	PCREXT	GND	GND	GND	SD1FDAT3	SD1FWP	SD1FDAT2	GND	VDD08	GND	VDD08	GND	VDD08	PLDVDD82	PLVSS2	PLVDD2	VDD08	GND	VDD08	GND	USDVDD	USVPTX	GND	GND	USRX0M	USRX0P	GND	GND	USVDDH	15
14	GND	GND	PCRXD1M	PCRXD1P	GND	VDDD18	VDDD18	PCVDD08	GND	VDD08	GND	VDD08	GND	PLDVDD84	PLVSS4	PLVDD4	GND	VDD08	GND	VDD08	GND	GND	USTX0M	USTX0P	GND	GND	USOTGID	USVPH	USVD330	14
13	PCTXD1M	PCTXD1P	GND	GND	GND	VDDD18	PCVDD18	PCVDD08	GND	VDD08	GND	VDD08	GND	PLDVDD86	PLVSS6	PLVDD6	GND	VDD08	GND	VDD08	GND	RSTN	GND	GND	USDM	USDP	GND	USVBUS	USRESREF	13
12	GND	GND	PCRXD0M	PCRXD0P	GND	GND	LVRXAVSS	LVRXAVDD	VDD08	GND	VDD08	GND	VDD08	GND	VDD08	GND	VDD08	GND	VDD08	GND	VDD08	GND	GERXD4	GERXD6	GND	GND	GERXD5	GND	XOUT	12
11	PCTXD0M	PCTXD0P	GND	GND	GND	LVRXAVSS	LVRXAVSS	LVRXAVDD	VDD08	GND	VDD08	GND	VDD08	GND	VDD08	GND	VDD08	GND	VDD08	GND	VDD08	GND	GND	GERXD2	GERXD1	GECRS	GERXC	GND	XIN	11
10	LVRXREXT	GND	PCREFCKP	PCREFCKM	LVRXAVSS	LVRXAVSS	LVRXAVSS	LVRXAVDD	GND	TBDGND084	GND	VDD08	GND	VDD08	GND	VDD08	GND	VDD08	GND	VDD08	GND	GND	PM3	PM6	GERXER	GERXDV	GND	GEMDVDD	GEMDVDD	10
9	LVRXAVSS	LVRXAVSS	LVRXAVSS	LVRXAVSS	LVRXAVSS	LVRXAVSS	LVRXAVSS	LVRXAVDD	GND	OTVDD08	GND	VDD08	GND	VDD08	GND	VDD08	GND	VDD08	GND	VDD08	GND	GND	GND	PM2	GND	GEINT	GELINK	GETXER	GEFREFDVDD	9
8	LVRXD0M	LVRXD0P	LVRXD1M	LVRXD1P	LVRXCK0M	LVRXCK0P	GND	GND	PM11	PM12	PM10	MD8	MTDCRLS1	RETEST1	MTDRV0	GND	MTDRV2	MD0	MD1	MD4	MD5	P0600	P0602	PM1	PM7	GETXD3	GETXD4	GND	GEMDVDD	8
7	LVRXAVSS	LVRXAVSS	LVRXAVSS	LVRXAVSS	LVRXAVSS	LVRXAVSS	CSSCLK4	CSTXD4	PM13	PM14	PM8	PM9	MTRXD0	MTDCRLS2	MTDCRLS3	MTDRV5	MTTXD0	ICRSTOUT0	MD2	MD7	MD6	P0608	P0601	PM0	PM5	PM4	GND	PAMDDVDD	PAMDDVDD	7
6	LVRXD2M	LVRXD2P	LVRXD3M	LVRXD3P	LVRXCK1M	LVRXCK1P	GND	CSCS4	AUPLLCLK	GND	PM15	IM0CS	RETEST0	MTDRV1	MTDCRLS0	MTDRV4	MTTXD1	USOVC	INEXINT5	MD3	INEXINT4	P0610	P0604	CSCS2	CSRXD2	CSSCLK3	GEGTXCLK	GEMDIO	GECOL	6
5	LVRXAVCC	LVRXAVCC	LVRXAVCC	LVRXAVCC	LVRXAVSS	LVRXAVSS	CSRXD4	CSSCLK5	GND	AUBICK	IM0TXD	IM0SIG1	IMSHUT0	GND	MTCS0	MTRXD1	GND	DETCK	DETDO	INEXINT3	GND	P0606	P0611	CSTXD2	CSSCLK2	GND	GETXD6	GETXD2	GEPPS	5
4	LVRXD4M	LVRXD4P	LVRXD5M	LVRXD5P	LVRXAVSS	IM0SIG0	CSTXD5	CSCS5	AUMCLK	AULRCK	IM0SIG2	IMSTSIG0	IMSHUT1	MTDRV7	MTCS1	GND	DETMS	DETDI	INEXINT1	INEXINT7	I2SCL0	GND	P0603	CSRXD0	CSCS1	CSCS3	GETXD5	GETXD1	GEMDC	4
3	LVRXAVSS	LVRXAVSS	LVRXAVSS	LVRXAVSS	IM0RXD	IM0CLK	IM1RXD	CSRXD5	GND	AUDO	IM1SIG1	IMSTSIG1	GND	DETRSTN	MTDRV3	PREDVDD33	DESRSTN	GND	INEXINT0	GND	I2SCL1	P0609	P0607	CSTXD0	CSTXD1	CSTXD3	GETXD7	GERXD0	GERXD7	3
2	LVRXD6M	LVRXD6P	LVRXD7M	LVRXD7P	GND	IM1SIG0	IM1CS	IM1SIG2	GEPPSVDD	AUDI	IM1VS	IM1SCLK	REMDDVDD	MTSCLK1	USPWEN	DESTESTSEL	IM0LMDDVDD	VDD33	INEXINT2	VDD18	I2SDA0	GND	P0605	CSCS0	CSSCLK1	GND	GETXC	GECLK	GERXD3	2
1	LVRXAVSS	LVRXAVSS	LVRXAVSS	LVRXAVSS	IM0SCLK	IM1TXD	IM0VS	IM1CLK	GTVDD18	IM0HS	IM1HS	GPRCDVDD	REMDDVDD	MTSCLK0	MTDRV6	DESRSEDVDD	IM0LMDDVDD	VDD33	INEXINT6	VDD18	I2SDA1	PCMDDVDD	PCMDDVDD	CSSCLK0	CSRXD1	CSRXD3	GETXD0	GETXEN	GND	1
	A	B	C	D	E	F	G	H	J	K	L	M	N	P	R	T	U	V	W	Y	AA	AB	AC	AD	AE	AF	AG	AH	AJ	

Figure 2.1-1 Pin Assignment (Top view)

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Table 2.1-1 Ball Numbers and External Pin Names (1/5)

Ball Num.	External Pin Name
A1	LVRXAVSS
A2	LVRXD6M
A3	LVRXAVSS
A4	LVRXD4M
A5	LVRXAVCC
A6	LVRXD2M
A7	LVRXAVSS
A8	LVRXD0M
A9	LVRXAVCC
A10	LVRXREXT
A11	PCTXD0M
A12	GND
A13	PCTXD1M
A14	GND
A15	PCREXT
A16	SD1FVDD
A17	SD1FMODVDD
A18	SD0MODVDD
A19	AD1AIN7
A20	AD0AIN8
A21	AD0AIN10
A22	PWVDD
A23	PWVDD08
A24	RTVDD08
A25	RTVDD
A26	PWKY1N
A27	PWEN1
A28	RTXOUT
A29	GND
B1	LVRXAVSS
B2	LVRXD6P
B3	LVRXAVSS
B4	LVRXD4P
B5	LVRXAVCC
B6	LVRXD2P
B7	LVRXAVSS
B8	LVRXD0P
B9	LVRXAVCC
B10	GND
B11	PCTXD0P
B12	GND
B13	PCTXD1P
B14	GND
B15	GND
B16	SD1FCD

Ball Num.	External Pin Name
B17	GND
B18	SD0WP
B19	AD1AIN5
B20	AD0AIN11
B21	AD0AIN9
B22	GND
B23	PWCTEST1
B24	PWSD0SEL
B25	GND
B26	PWOUT0
B27	PWDETRSTN
B28	RTRSTN
B29	RTXIN
C1	LVRXAVSS
C2	LVRXD7M
C3	LVRXAVSS
C4	LVRXD5M
C5	LVRXAVCC
C6	LVRXD3M
C7	LVRXAVSS
C8	LVRXD1M
C9	LVRXAVSS
C10	PCREFCKP
C11	GND
C12	PCRXD0M
C13	GND
C14	PCRXD1M
C15	GND
C16	SD1FDAT1
C17	SD1FCLK
C18	SD0DAT1
C19	AD1AIN4
C20	AD0AIN7
C21	AD0AIN5
C22	PWTEST
C23	PWPWM
C24	PWKY2N
C25	PWVBAT
C26	PWKY0N
C27	PWISO
C28	RTISO
C29	GND
D1	LVRXAVSS
D2	LVRXD7P
D3	LVRXAVSS

Ball Num.	External Pin Name
D4	LVRXD5P
D5	LVRXAVCC
D6	LVRXD3P
D7	LVRXAVSS
D8	LVRXD1P
D9	LVRXAVSS
D10	PCREFCKM
D11	GND
D12	PCRXD0P
D13	GND
D14	PCRXD1P
D15	GND
D16	SD0DAT3
D17	SD0DAT2
D18	SD0CLK
D19	AD1AIN1
D20	AD0AIN4
D21	AD0AIN3
D22	PWMEMSWIENA
D23	PWSD1SEL
D24	PWEN5
D25	PWEN3
D26	PWKY3N
D27	PWRSTN
D28	GND
D29	LPDQSAT1
E1	IM0SCLK
E2	GND
E3	IM0RXD
E4	LVRXAVSS
E5	LVRXAVSS
E6	LVRXCK1M
E7	LVRXAVSS
E8	LVRXCK0M
E9	LVRXAVSS
E10	LVRXAVSS
E11	GND
E12	GND
E13	GND
E14	GND
E15	SD1FDAT3
E16	SD1FCMD
E17	SD0CMD
E18	AD1AIN6
E19	AD1AIN3

Ball Num.	External Pin Name
E20	AD0AIN6
E21	AD0AIN2
E22	PWCTEST0
E23	PWEN4
E24	PWEN2
E25	PWOUT1
E26	GND
E27	GND
E28	LPDQA10
E29	LPDQSAC1
F1	IM1TXD
F2	IM1SIG0
F3	IM0CLK
F4	IM0SIG0
F5	LVRXAVSS
F6	LVRXCK1P
F7	LVRXAVSS
F8	LVRXCK0P
F9	LVRXAVSS
F10	LVRXAVSS
F11	LVRXAVSS
F12	GND
F13	PCVDD18
F14	PCVDD18
F15	SD1FWP
F16	SD1FDAT0
F17	SD0CD
F18	AD1AIN2
F19	AD1AVSSA
F20	AD0AVSSA
F21	AD0AIN1
F22	GND
F23	PWKY4N
F24	PWEN0
F25	GND
F26	LPDQA9
F27	LPDMDBIA1
F28	LPDQA11
F29	LPDQA14
G1	IM0VS
G2	IM1CS
G3	IM1RXD
G4	CSTXD5
G5	CSRXD4
G6	GND

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Table 2.1-1 Ball Numbers and External Pin Names (2/5)

Ball Num.	External Pin Name
G7	CSSCLK4
G8	GND
G9	LVRXAVSS
G10	LVRXAVSS
G11	LVRXAVSS
G12	LVRXAVSS
G13	PCVDD18
G14	PCVDD18
G15	SD1FDAT2
G16	GND
G17	SD0DAT0
G18	AD1AIN0
G19	AD1AVCCA
G20	AD0AVCCA
G21	AD0AIN0
G22	GND
G23	PWSYSRSTN
G24	GND
G25	LPDQA8
G26	LPDQA13
G27	LPDQA15
G28	GND
G29	LPDQA12
H1	IM1CLK
H2	IM1SIG2
H3	CSRXD5
H4	CSCS5
H5	CSSCLK5
H6	CSCS4
H7	CSTXD4
H8	GND
H9	LVRXAVDD
H10	LVRXAVDD
H11	LVRXAVDD
H12	LVRXAVDD
H13	PCVDD08
H14	PCVDD08
H15	GND
H16	GND
H17	SD0PREDVDD
H18	GND
H19	GND
H20	GND
H21	GND
H22	GND

Ball Num.	External Pin Name
H23	GND
H24	GND
H25	GND
H26	LPVDDQ
H27	LPVDDQ
H28	LPVDDQ
H29	LPVDDQ
J1	OTVDD18
J2	TS0AVDD18
J3	GND
J4	AUMCLK
J5	GND
J6	AUPLLCLK
J7	PM13
J8	PM11
J9	GND
J10	GND
J11	VDD08
J12	VDD08
J13	GND
J14	GND
J15	VDD08
J16	VDD08
J17	GND
J18	GND
J19	VDD08
J20	VDD08
J21	GND
J22	GND
J23	GND
J24	GND
J25	LPDQA2
J26	LPDQA1
J27	LPDMDBIA0
J28	GND
J29	LPDQA6
K1	IM0HS
K2	AUDI
K3	AUDO
K4	AULRCK
K5	AUBICK
K6	GND
K7	PM14
K8	PM12
K9	OTVDD08

Ball Num.	External Pin Name
K10	TS0DVDD08A
K11	GND
K12	GND
K13	VDD08
K14	VDD08
K15	GND
K16	GND
K17	VDD08
K18	VDD08
K19	GND
K20	GND
K21	GND
K22	GND
K23	GND
K24	LPDQA0
K25	GND
K26	LPDQSAT0
K27	LPDQA3
K28	LPDQA5
K29	GND
L1	IM1HS
L2	IM1VS
L3	IM1SIG1
L4	IM0SIG2
L5	IM0TXD
L6	PM15
L7	PM8
L8	PM10
L9	GND
L10	GND
L11	VDD08
L12	VDD08
L13	GND
L14	GND
L15	VDD08
L16	VDD08
L17	GND
L18	GND
L19	VDD08
L20	VDD08
L21	LPVDD
L22	GND
L23	GND
L24	LPCAA3
L25	LPCAA4

Ball Num.	External Pin Name
L26	LPDQSAC0
L27	LPDQA7
L28	GND
L29	LPDQA4
M1	PBPREDVDD
M2	IM1SCLK
M3	IMSTSIG1
M4	IMSTSIG0
M5	IM0SIG1
M6	IM0CS
M7	PM9
M8	MD8
M9	VDD08
M10	VDD08
M11	GND
M12	GND
M13	VDD08
M14	VDD08
M15	GND
M16	GND
M17	VDD08
M18	VDD08
M19	GND
M20	GND
M21	LPVDD
M22	GND
M23	GND
M24	GND
M25	GND
M26	LPVDDQ
M27	LPVDDQ
M28	LPVDDQ
M29	LPVDDQ
N1	PBMODVDD
N2	PBMODVDD
N3	GND
N4	IMSHUT1
N5	IMSHUT0
N6	RETEST0
N7	MTRXD0
N8	MTDCPLS1
N9	GND
N10	GND
N11	VDD08
N12	VDD08

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Table 2.1-1 Ball Numbers and External Pin Names (3/5)

Ball Num.	External Pin Name
N13	GND
N14	GND
N15	VDD08
N16	VDD08
N17	GND
N18	GND
N19	VDD08
N20	VDD08
N21	LPVDD
N22	GND
N23	GND
N24	LPCAA2
N25	LPCAA5
N26	LPCAA0
N27	LPCKEA0
N28	GND
N29	LPCSA0
P1	MTSCLK0
P2	MTSCLK1
P3	DETRSTN
P4	MTDRV7
P5	GND
P6	MTDRV1
P7	MTDCPLS2
P8	RETEST1
P9	VDD08
P10	VDD08
P11	GND
P12	GND
P13	PLDVDD086
P14	PLDVDD084
P15	PLDVDD082
P16	PLDVDD081
P17	VDD08
P18	VDD08
P19	GND
P20	GND
P21	LPVDD
P22	GND
P23	GND
P24	LPCLKAT
P25	GND
P26	LPCSA1
P27	LPCKEA1
P28	LPCAA1

Ball Num.	External Pin Name
P29	GND
R1	MTDRV6
R2	USPWEN
R3	MTDRV3
R4	MTCS1
R5	MTCS0
R6	MTDCPLS0
R7	MTDCPLS3
R8	MTDRV0
R9	GND
R10	GND
R11	VDD08
R12	VDD08
R13	PLVSS6
R14	PLVSS4
R15	PLVSS2
R16	PLVSS1
R17	GND
R18	GND
R19	PLDVDD083
R20	GND
R21	LPVDD
R22	GND
R23	LPATEST
R24	LPCLKAC
R25	LPCAB4
R26	LPCAB5
R27	LPCAB2
R28	GND
R29	LPMRESETL
T1	IM0PREDVDD
T2	IM1PREDVDD
T3	PREDVDD33
T4	GND
T5	MTRXD1
T6	MTDRV4
T7	MTDRV5
T8	GND
T9	VDD08
T10	VDD08
T11	GND
T12	GND
T13	PLVDD6
T14	PLVDD4
T15	PLVDD2

Ball Num.	External Pin Name
T16	PLVDD1
T17	VDD08
T18	VDD08
T19	PLVSS3
T20	PLVDD3
T21	LPVDD
T22	GND
T23	GND
T24	GND
T25	GND
T26	LPVDDQ
T27	LPVDDQ
T28	LPVDDQ
T29	LPVDDQ
U1	IM0MODVDD
U2	IM1MODVDD
U3	DESRSTN
U4	DETMS
U5	GND
U6	MTTXD1
U7	MTTXD0
U8	MTDRV2
U9	GND
U10	GND
U11	VDD08
U12	VDD08
U13	GND
U14	GND
U15	VDD08
U16	VDD08
U17	GND
U18	GND
U19	TS1DVDD08A
U20	TS1AVDD18
U21	LPVDD
U22	GND
U23	LPDTEST
U24	LPCAB3
U25	LPCLKBC
U26	LPCLKBT
U27	GND
U28	LPVAA
U29	LPVAA
V1	VDD33
V2	VDD33

Ball Num.	External Pin Name
V3	GND
V4	DETDI
V5	DETCK
V6	USOVC
V7	PCRSTOUTB
V8	MD0
V9	VDD08
V10	VDD08
V11	GND
V12	GND
V13	VDD08
V14	VDD08
V15	GND
V16	GND
V17	VDD08
V18	VDD08
V19	GND
V20	GND
V21	LPVDD
V22	GND
V23	GND
V24	GND
V25	LPCSB0
V26	LPCSB1
V27	LPCAB1
V28	GND
V29	LPZN
W1	INEXINT6
W2	INEXINT2
W3	INEXINT0
W4	INEXINT1
W5	DETDO
W6	INEXINT5
W7	MD2
W8	MD1
W9	GND
W10	GND
W11	VDD08
W12	VDD08
W13	GND
W14	GND
W15	VDD08
W16	VDD08
W17	PLVDD7
W18	GND

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Table 2.1-1 Ball Numbers and External Pin Names (4/5)

Ball Num.	External Pin Name
W19	VDD08
W20	VDD08
W21	LPVDD
W22	GND
W23	GND
W24	LPDQB4
W25	GND
W26	LPCAB0
W27	LPCKEB1
W28	LPCKEB0
W29	GND
Y1	VDD18
Y2	VDD18
Y3	GND
Y4	INEXINT7
Y5	INEXINT3
Y6	MD3
Y7	MD7
Y8	MD4
Y9	VDD08
Y10	VDD08
Y11	GND
Y12	GND
Y13	VDD08
Y14	VDD08
Y15	GND
Y16	GND
Y17	PLVSS7
Y18	HDAVDD08
Y19	GND
Y20	GND
Y21	DSMSVDD18
Y22	DSMSVDD18
Y23	GND
Y24	GND
Y25	GND
Y26	LPVDDQ
Y27	LPVDDQ
Y28	LPVDDQ
Y29	LPVDDQ
AA1	I2SDA1
AA2	I2SDA0
AA3	I2SCL1
AA4	I2SCL0
AA5	GND

Ball Num.	External Pin Name
AA6	INEXINT4
AA7	MD6
AA8	MD5
AA9	GND
AA10	GND
AA11	VDD08
AA12	VDD08
AA13	GND
AA14	GND
AA15	USDVDD
AA16	USDVDD
AA17	PLDVDD087
AA18	HDAVDD08
AA19	DSMSVDD0P8
AA20	DSMSVDD0P8
AA21	GND
AA22	GND
AA23	GND
AA24	LPDQSBT0
AA25	LPDQSBC0
AA26	LPDQB3
AA27	LPDQB5
AA28	LPDQB7
AA29	GND
AB1	PCMODVDD
AB2	GND
AB3	P0609
AB4	GND
AB5	P0606
AB6	P0610
AB7	P0608
AB8	P0600
AB9	GND
AB10	GND
AB11	GND
AB12	GND
AB13	RSTN
AB14	GND
AB15	USVPTX
AB16	USVP
AB17	GND
AB18	GND
AB19	VDD18
AB20	DSSDNCLK
AB21	DSSDNDATA0

Ball Num.	External Pin Name
AB22	GND
AB23	GND
AB24	LPDQB0
AB25	LPDQB2
AB26	LPDQB1
AB27	LPDQB6
AB28	GND
AB29	LPDMDBIB0
AC1	PCPREDVDD
AC2	P0605
AC3	P0607
AC4	P0603
AC5	P0611
AC6	P0604
AC7	P0601
AC8	P0602
AC9	GND
AC10	PM3
AC11	GND
AC12	GERXD4
AC13	GND
AC14	USTX0M
AC15	GND
AC16	GND
AC17	HDTX0M
AC18	HDTX1M
AC19	GND
AC20	DSSDPCLK
AC21	DSSDPDATA0
AC22	GND
AC23	GND
AC24	GND
AC25	GND
AC26	LPVDDQ
AC27	LPVDDQ
AC28	LPVDDQ
AC29	LPVDDQ
AD1	CSSCLK0
AD2	CSCS0
AD3	CSTXD0
AD4	CSRXD0
AD5	CSTXD2
AD6	CSCS2
AD7	PM0
AD8	PM1

Ball Num.	External Pin Name
AD9	PM2
AD10	PM6
AD11	GERXD2
AD12	GERXD6
AD13	GND
AD14	USTX0P
AD15	GND
AD16	GND
AD17	HDTX0P
AD18	HDTX1P
AD19	GND
AD20	DSMDPDATA2
AD21	DSMDPDATA1
AD22	GND
AD23	NADAT1
AD24	GND
AD25	LPDQB8
AD26	LPDQB9
AD27	LPDQB13
AD28	GND
AD29	LPDQB12
AE1	CSRXD1
AE2	CSSCLK1
AE3	CSTXD1
AE4	CSCS1
AE5	CSSCLK2
AE6	CSRXD2
AE7	PM5
AE8	PM7
AE9	GND
AE10	GERXER
AE11	GERXD1
AE12	GND
AE13	USDM
AE14	GND
AE15	USRX0M
AE16	GND
AE17	GND
AE18	GND
AE19	GND
AE20	DSMDNDATA2
AE21	DSMDNDATA1
AE22	GND
AE23	NADAT7
AE24	NAWEN

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Table 2.1-1 Ball Numbers and External Pin Names (5/5)

Ball Num.	External Pin Name
AE25	GND
AE26	LPDQB10
AE27	LPDMDBIB1
AE28	LPDQB14
AE29	LPDQB15
AF1	CSRXD3
AF2	GND
AF3	CSTXD3
AF4	CSCS3
AF5	GND
AF6	CSSCLK3
AF7	PM4
AF8	GETXD3
AF9	GEINT
AF10	GERXDV
AF11	GECRS
AF12	GND
AF13	USDP
AF14	GND
AF15	USRX0P
AF16	GND
AF17	HDTXCM
AF18	HDTX2M
AF19	GND
AF20	DSMDPDATA3
AF21	DSMDNCLK
AF22	GND
AF23	NADAT2
AF24	NADAT3
AF25	NACEN
AF26	GND

Ball Num.	External Pin Name
AF27	GND
AF28	LPDQB11
AF29	LPDQSBC1
AG1	GETXD0
AG2	GETXC
AG3	GETXD7
AG4	GETXD5
AG5	GETXD6
AG6	GEGTXCLK
AG7	GND
AG8	GETXD4
AG9	GELINK
AG10	GND
AG11	GERXC
AG12	GERXD5
AG13	GND
AG14	USOTGID
AG15	GND
AG16	GND
AG17	HDTXCP
AG18	HDTX2P
AG19	GND
AG20	DSMDNDATA3
AG21	DSMDPCLK
AG22	GND
AG23	GND
AG24	NADAT0
AG25	GND
AG26	NACLE
AG27	NAALE
AG28	GND

Ball Num.	External Pin Name
AG29	LPDQSBT1
AH1	GETXEN
AH2	GECLK
AH3	GERXD0
AH4	GETXD1
AH5	GETXD2
AH6	GEMDIO
AH7	PAMODVDD
AH8	GND
AH9	GETXER
AH10	GEMODVDD
AH11	GND
AH12	GND
AH13	USVBUS
AH14	USVPH
AH15	GND
AH16	HDSCL
AH17	GND
AH18	GND
AH19	HDAVDD18
AH20	GND
AH21	GND
AH22	DSMDPDATA0
AH23	DSMVDD12
AH24	NADAT6
AH25	NAMODVDD
AH26	GND
AH27	NAREN
AH28	NARBN
AH29	GND
AJ1	GND

Ball Num.	External Pin Name
AJ2	GERXD3
AJ3	GERXD7
AJ4	GEMDC
AJ5	GEPPS
AJ6	GECOL
AJ7	PAMODVDD
AJ8	PAPREDVDD
AJ9	GEPREDVDD
AJ10	GEMODVDD
AJ11	XIN
AJ12	XOUT
AJ13	USRESREF
AJ14	USVD330
AJ15	USVDDH
AJ16	HDREXT
AJ17	HDHPD
AJ18	HDSDA
AJ19	HDAVDD18
AJ20	DSMVREG0P4V
AJ21	GND
AJ22	DSMDNDATA0
AJ23	DSMVDD12
AJ24	NADAT4
AJ25	NAMODVDD
AJ26	NAPREDVDD
AJ27	NADAT5
AJ28	NAWPN
AJ29	GND
—	—
—	—
—	—

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2.2 External Pins

2.2.1 List of External Pins

Table 2.2-1 List of External Pins (1/18)

Pin Name	I/O	Voltage (V)	I/O Group	Initial Value after Power-on Reset	Pin State when not in Use	Input		Output		Multiplexed Pin
						Schmitt Trigger	Pull-up/ Pull-down	N-ch Open-Drain	Drive Strength Selectable / Fixed	
RTXIN	I	1.5	1.5-V OSC	CLOCK	Pull down	—	—	—	—	—
RTXOUT	O	1.5	1.5-V OSC	CLOCK	Open	—	—	—	—	—
RTRSTN	I	1.5	RTC I/O	Don't care	Pull down	●	—	—	—	—
RTISO	I	1.5	RTC I/O	Hi-Z	Pull up	●	—	—	—	—
RTVDD	—	1.5	RTC I/O, 1.5-V OSC power supply	—	—	—	—	—	—	—
RTVDD08	—	0.8	RTC core power supply	—	—	—	—	—	—	—
PWRSTN	I	1.8	PWC I/O	Don't care	Pull down	●	—	—	—	—
PWTEST	I	1.8	PWC I/O	Don't care	Pull down	●	—	—	—	—
PWVBAT	I	1.8	PWC I/O	Don't care	Pull up*4	●	—	—	—	—
PWKY0N	I	1.8	PWC I/O	Don't care	Pull up	●	—	—	—	—
PWKY1N	I	1.8	PWC I/O	Don't care	Pull up	●	—	—	—	—
PWKY2N	I	1.8	PWC I/O	Don't care	Pull up	●	—	—	—	—
PWKY3N	I	1.8	PWC I/O	Don't care	Pull up	●	—	—	—	—
PWKY4N	I	1.8	PWC I/O	Don't care	Pull up	●	—	—	—	—
PWDETRSTN	I	1.8	PWC I/O	Don't care	Pull up	●	—	—	—	—
PWEN0	O	1.8	PWC I/O	L	Open	—	—	—	Fixed*2	—
PWEN1	O	1.8	PWC I/O	L	Open	—	—	—	Fixed*2	—
PWEN2	O	1.8	PWC I/O	L	Open	—	—	—	Fixed*2	—
PWEN3	O	1.8	PWC I/O	L	Open	—	—	—	Fixed*2	—
PWEN4	O	1.8	PWC I/O	L	Open	—	—	—	Fixed*2	—
PWEN5	O	1.8	PWC I/O	L	Open	—	—	—	Fixed*2	—
PWSYSRSTN	O	1.8	PWC I/O	L	Open	—	—	●	Fixed*2	—
PWOUT0	O	1.8	PWC I/O	L	Open	—	—	—	Fixed*2	—
PWOUT1	O	1.8	PWC I/O	L	Open	—	—	—	Fixed*2	—
PWPWM	O	1.8	PWC I/O	L	Open	—	—	—	Fixed*2	—
PWSD0SEL	O	1.8	PWC I/O	L	Open	—	—	—	Fixed*2	—
PWSD1SEL	O	1.8	PWC I/O	L	Open	—	—	—	Fixed*2	—
PWCTEST0	O	1.8	PWC I/O	L	Open	—	—	—	Fixed*2	—
PWCTEST1	I	1.8	PWC I/O	Don't care	Pull up	●	—	—	—	—
PWMEMSWIENA	O	1.8	PWC I/O	L	Open	—	—	—	Fixed*2	—
PWISO	O	1.8	PWC I/O	Hi-Z	Open	—	—	●	Fixed*2	—
PWVDD08	—	0.8	PWC core power supply	—	—	—	—	—	—	—
PWVDD	—	1.8	PWC I/O power supply	—	—	—	—	—	—	—
NADAT0	IO	3.3/1.8	PORT00 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-3**)
NADAT1	IO	3.3/1.8	PORT00 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-3**)
NADAT2	IO	3.3/1.8	PORT00 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-3**)

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Table 2.2-1 List of External Pins (2/18)

Pin Name	I/O	Voltage (V)	I/O Group	Initial Value after Power-on Reset	Pin State when not in Use	Input		Output		Multiplexed Pin
						Schmitt Trigger	Pull-up/ Pull-down	N-ch Open-Drain	Drive Strength Selectable / Fixed	
NADAT3	IO	3.3/1.8	PORT00 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-3**)
NADAT4	IO	3.3/1.8	PORT00 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-3**)
NADAT5	IO	3.3/1.8	PORT00 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-3**)
NADAT6	IO	3.3/1.8	PORT00 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-3**)
NADAT7	IO	3.3/1.8	PORT00 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-3**)
NACEN	IO	3.3/1.8	PORT00 I/O	PU	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-3**)
NAREN	IO	3.3/1.8	PORT00 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-3**)
NAWEN	IO	3.3/1.8	PORT00 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-3**)
NACLE	IO	3.3/1.8	PORT00 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-3**)
NAALE	IO	3.3/1.8	PORT00 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-3**)
NARBN	IO	3.3/1.8	PORT00 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-3**)
NAWPN	O	3.3/1.8	PORT00 I/O	L	Open	—	—	—	Selectable*2	—
NAMODVDD	—	3.3/1.8	PORT00 I/O power supply	—	—	—	—	—	—	—
NAPREDVDD	—	1.8	PORT00 pre-driver power supply	—	—	—	—	—	—	—
PM0*3	IO	3.3/1.8	PORT01(A) I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-4**)
PM1*3	IO	3.3/1.8	PORT01(A) I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-4**)
PM2*3	IO	3.3/1.8	PORT01(A) I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-4**)
PM3*3	IO	3.3/1.8	PORT01(A) I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-4**)

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Table 2.2-1 List of External Pins (3/18)

Pin Name	I/O	Voltage (V)	I/O Group	Initial Value after Power-on Reset	Pin State when not in Use	Input		Output		Multiplexed Pin
						Schmitt Trigger	Pull-up/ Pull-down	N-ch Open-Drain	Drive Strength Selectable / Fixed	
PM4*3	IO	3.3/1.8	PORT01(A) I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-4**)
PM5*3	IO	3.3/1.8	PORT01(A) I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-4**)
PM6*3	IO	3.3/1.8	PORT01(A) I/O	PD	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-4**)
PM7*3	IO	3.3/1.8	PORT01(A) I/O	PD	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-4**)
PAMODVDD	—	3.3/1.8	PORT01(A), PORT03 I/O power supply	—	—	—	—	—	—	—
PAPREDVDD	—	1.8	PORT01(A), PORT03 pre-driver power supply	—	—	—	—	—	—	—
PM8	IO	3.3/1.8	PORT01(B) I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-4**)
PM9	IO	3.3/1.8	PORT01(B) I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-4**)
PM10	IO	3.3/1.8	PORT01(B) I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-4**)
PM11	IO	3.3/1.8	PORT01(B) I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-4**)
PM12	IO	3.3/1.8	PORT01(B) I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-4**)
PM13	IO	3.3/1.8	PORT01(B) I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-4**)
PM14	IO	3.3/1.8	PORT01(B) I/O	PD	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-4**)
PM15*3	IO	3.3/1.8	PORT01(B) I/O	PD	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-4**)
PBMODVDD	—	3.3/1.8	PORT01(B), PORT04, PORT07, PORT21 I/O power supply	—	—	—	—	—	—	—
PBPREDVDD	—	1.8	PORT01(B), PORT04, PORT07, PORT21 pre-driver power supply	—	—	—	—	—	—	—
INEXINT0*1,*3	IO	1.8	PORT02 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-5**)

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Table 2.2-1 List of External Pins (4/18)

Pin Name	I/O	Voltage (V)	I/O Group	Initial Value after Power-on Reset	Pin State when not in Use	Input		Output		Multiplexed Pin
						Schmitt Trigger	Pull-up/ Pull-down	N-ch Open-Drain	Drive Strength Selectable / Fixed	
INEXINT1*1,*3	IO	1.8	PORT02 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-5**)
INEXINT2*1,*3	IO	1.8	PORT02 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-5**)
INEXINT3*1, *3	IO	1.8	PORT02 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-5**)
INEXINT4*1	IO	1.8	PORT02 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-5**)
INEXINT5*1	IO	1.8	PORT02 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-5**)
INEXINT6*1	IO	1.8	PORT02 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-5**)
INEXINT7*1	IO	1.8	PORT02 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-5**)
CSTXD0	IO	3.3/1.8	PORT03 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-6**)
CSRXD0	IO	3.3/1.8	PORT03 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-6**)
CSSCLK0	IO	3.3/1.8	PORT03 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-6**)
CSCS0	IO	3.3/1.8	PORT03 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-6**)
CSTXD1*3	IO	3.3/1.8	PORT03 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-6**)
CSRXD1*3	IO	3.3/1.8	PORT03 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-6**)
CSSCLK1*3	IO	3.3/1.8	PORT03 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-6**)
CSCS1*3	IO	3.3/1.8	PORT03 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-6**)
CSTXD2	IO	3.3/1.8	PORT03 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-6**)
CSRXD2	IO	3.3/1.8	PORT03 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-6**)

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Table 2.2-1 List of External Pins (5/18)

Pin Name	I/O	Voltage (V)	I/O Group	Initial Value after Power-on Reset	Pin State when not in Use	Input		Output		Multiplexed Pin
						Schmitt Trigger	Pull-up/ Pull-down	N-ch Open-Drain	Drive Strength Selectable / Fixed	
CSSCLK2*3	IO	3.3/1.8	PORT03 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-6**)
CSCS2*3	IO	3.3/1.8	PORT03 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-6**)
CSTXD3*3	IO	3.3/1.8	PORT03 I/O	PD	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-6**)
CSRXD3*3	IO	3.3/1.8	PORT03 I/O	PD	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-6**)
CSSCLK3*3	IO	3.3/1.8	PORT03 I/O	PD	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-6**)
CSCS3*3	IO	3.3/1.8	PORT03 I/O	PD	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-6**)
CSTXD4	IO	3.3/1.8	PORT04 I/O	PD	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-7**)
CSRXD4	IO	3.3/1.8	PORT04 I/O	PD	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-7**)
CSSCLK4	IO	3.3/1.8	PORT04 I/O	PD	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-7**)
CSCS4	IO	3.3/1.8	PORT04 I/O	PD	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-7**)
CSTXD5*3	IO	3.3/1.8	PORT04 I/O	PD	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-7**)
CSRXD5*3	IO	3.3/1.8	PORT04 I/O	PD	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-7**)
CSSCLK5*3	IO	3.3/1.8	PORT04 I/O	PD	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-7**)
CSCS5*3	IO	3.3/1.8	PORT04 I/O	PD	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-7**)
I2SDA0*1	IO	1.8	PORT05 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-8**)
I2SCL0*1	IO	1.8	PORT05 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-8**)
I2SDA1*1,*3	IO	1.8	PORT05 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-8**)

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Table 2.2-1 List of External Pins (6/18)

Pin Name	I/O	Voltage (V)	I/O Group	Initial Value after Power-on Reset	Pin State when not in Use	Input		Output		Multiplexed Pin
						Schmitt Trigger	Pull-up/ Pull-down	N-ch Open-Drain	Drive Strength Selectable / Fixed	
I2SCL1*1,*3	IO	1.8	PORT05 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-8**)
P0600*3	IO	3.3/1.8	PORT06 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-9**)
P0601*3	IO	3.3/1.8	PORT06 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-9**)
P0602*3	IO	3.3/1.8	PORT06 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-9**)
P0603*3	IO	3.3/1.8	PORT06 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-9**)
P0604*3	IO	3.3/1.8	PORT06 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-9**)
P0605*3	IO	3.3/1.8	PORT06 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-9**)
P0606*3	IO	3.3/1.8	PORT06 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-9**)
P0607*3	IO	3.3/1.8	PORT06 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-9**)
P0608	IO	3.3/1.8	PORT06 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-9**)
P0609	IO	3.3/1.8	PORT06 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-9**)
P0610	IO	3.3/1.8	PORT06 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-9**)
P0611	IO	3.3/1.8	PORT06 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-9**)
PCMODVDD	—	3.3/1.8	PORT06 I/O power supply	—	—	—	—	—	—	—
PCPREDVDD	—	1.8	PORT06 pre-driver power supply	—	—	—	—	—	—	—
AULRCK*3	IO	3.3/1.8	PORT07 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-10**)
AUBICK*3	IO	3.3/1.8	PORT07 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-10**)
AUDI*3	IO	3.3/1.8	PORT07 I/O	PD	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-10**)

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Table 2.2-1 List of External Pins (7/18)

Pin Name	I/O	Voltage (V)	I/O Group	Initial Value after Power-on Reset	Pin State when not in Use	Input		Output		Multiplexed Pin
						Schmitt Trigger	Pull-up/ Pull-down	N-ch Open-Drain	Drive Strength Selectable / Fixed	
AUDO*3	IO	3.3/1.8	PORT07 I/O	PD	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-10**)
AUMCLK*3	IO	3.3/1.8	PORT07 I/O	PD	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-10**)
AUPLLCLK*3	IO	3.3/1.8	PORT07 I/O	PD	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-10**)
SD0CMD	IO	3.3/1.8	PORT08 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-11**)
SD0CLK	IO	3.3/1.8	PORT08 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-11**)
SD0DAT0	IO	3.3/1.8	PORT08 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-11**)
SD0DAT1	IO	3.3/1.8	PORT08 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-11**)
SD0DAT2	IO	3.3/1.8	PORT08 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-11**)
SD0DAT3	IO	3.3/1.8	PORT08 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-11**)
SD0WP	IO	3.3/1.8	PORT08 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-11**)
SD0CD	IO	3.3/1.8	PORT08 I/O	PU	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-11**)
SD0MODVDD	—	3.3/1.8	PORT08 I/O power supply	—	—	—	—	—	—	—
SD0PREDVDD	—	1.8	PORT08 pre-driver power supply	—	—	—	—	—	—	—
SD1FCMD	IO	3.3/1.8	PORT09 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-12**)
SD1FCLK	IO	3.3/1.8	PORT09 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-12**)
SD1FDAT0	IO	3.3/1.8	PORT09 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-12**)
SD1FDAT1	IO	3.3/1.8	PORT09 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-12**)
SD1FDAT2	IO	3.3/1.8	PORT09 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-12**)

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Table 2.2-1 List of External Pins (8/18)

Pin Name	I/O	Voltage (V)	I/O Group	Initial Value after Power-on Reset	Pin State when not in Use	Input		Output		Multiplexed Pin
						Schmitt Trigger	Pull-up/ Pull-down	N-ch Open-Drain	Drive Strength Selectable / Fixed	
SD1FDAT3	IO	3.3/1.8	PORT09 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-12**)
SD1FWP	IO	3.3/1.8	PORT09 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-12**)
SD1FCD	IO	3.3/1.8	PORT09 I/O	PU	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-12**)
SD1FMODVDD	—	3.3/1.8	PORT09 I/O power supply	—	—	—	—	—	—	—
SD1FVDD	—	1.8	PORT09 pre-driver power supply	—	—	—	—	—	—	—
IM0VS*3	IO	3.3/1.8	PORT10 I/O	PD	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-13**)
IM0HS*3	IO	3.3/1.8	PORT10 I/O	PD	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-13**)
IM0CLK*3	O	3.3/1.8	PORT10 I/O	L	Open	—	PU/PD/OFF changeable	—	Selectable*2	—
IM0CS*3	IO	3.3/1.8	PORT10 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-13**)
IM0TXD*3	IO	3.3/1.8	PORT10 I/O	PD	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-13**)
IM0RXD*3	IO	3.3/1.8	PORT10 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-13**)
IM0SCLK*3	IO	3.3/1.8	PORT10 I/O	PD	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-13**)
IM0SIG0*3	IO	3.3/1.8	PORT10 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-13**)
IM0SIG1*3	IO	3.3/1.8	PORT10 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-13**)
IM0SIG2*3	IO	3.3/1.8	PORT10 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-13**)
IM0MODVDD	—	3.3/1.8	PORT10 I/O power supply	—	—	—	—	—	—	—
IM0PREDVDD	—	1.8	PORT10 pre-driver power supply	—	—	—	—	—	—	—
IM1VS*3	IO	3.3/1.8	PORT11 I/O	PD	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-14**)
IM1HS*3	IO	3.3/1.8	PORT11 I/O	PD	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-14**)
IM1CLK*3	O	3.3/1.8	PORT11 I/O	L	Open	—	—	—	Selectable*2	—

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Table 2.2-1 List of External Pins (9/18)

Pin Name	I/O	Voltage (V)	I/O Group	Initial Value after Power-on Reset	Pin State when not in Use	Input		Output		Multiplexed Pin
						Schmitt Trigger	Pull-up/ Pull-down	N-ch Open-Drain	Drive Strength Selectable / Fixed	
IM1CS*3	IO	3.3/1.8	PORT11 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-14**)
IM1TXD*3	IO	3.3/1.8	PORT11 I/O	PD	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-14**)
IM1RXD*3	IO	3.3/1.8	PORT11 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-14**)
IM1SCLK*3	IO	3.3/1.8	PORT11 I/O	PD	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-14**)
IM1SIG0*3	IO	3.3/1.8	PORT11 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-14**)
IM1SIG1*3	IO	3.3/1.8	PORT11 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-14**)
IM1SIG2*3	IO	3.3/1.8	PORT11 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-14**)
IM1MODVDD	—	3.3/1.8	PORT11 I/O power supply	—	—	—	—	—	—	—
IM1PREDVDD	—	1.8	PORT11 pre-driver power supply	—	—	—	—	—	—	—
IMSHUT0*3	IO	3.3	PORT12 I/O	PD	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-15**)
IMSHUT1*3	IO	3.3	PORT12 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-15**)
IMSTSIG0*3	IO	3.3	PORT12 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-15**)
IMSTSIG1*3	IO	3.3	PORT12 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-15**)
MTDRV0*3	IO	3.3	PORT13 I/O	PD	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-16**)
MTDRV1*3	IO	3.3	PORT13 I/O	PD	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-16**)
MTDRV2*3	IO	3.3	PORT13 I/O	PD	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-16**)
MTDRV3*3	IO	3.3	PORT13 I/O	PD	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-16**)
MTDRV4*3	IO	3.3	PORT13 I/O	PD	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-16**)

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Table 2.2-1 List of External Pins (10/18)

Pin Name	I/O	Voltage (V)	I/O Group	Initial Value after Power-on Reset	Pin State when not in Use	Input		Output		Multiplexed Pin
						Schmitt Trigger	Pull-up/ Pull-down	N-ch Open-Drain	Drive Strength Selectable / Fixed	
MTDRV5*3	IO	3.3	PORT13 I/O	PD	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-16**)
MTDRV6*3	IO	3.3	PORT13 I/O	PD	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-16**)
MTDRV7*3	IO	3.3	PORT13 I/O	PD	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-16**)
MTDCPLS0*3	IO	3.3	PORT13 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-16**)
MTDCPLS1*3	IO	3.3	PORT13 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-16**)
MTDCPLS2*3	IO	3.3	PORT13 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-16**)
MTDCPLS3*3	IO	3.3	PORT13 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-16**)
MTCS0*3	IO	3.3	PORT14 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-17**)
MTTXD0*3	IO	3.3	PORT14 I/O	PD	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-17**)
MTRXD0*3	IO	3.3	PORT14 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-17**)
MTSCLK0*3	IO	3.3	PORT14 I/O	PD	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-17**)
MTCS1*3	IO	3.3	PORT14 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-17**)
MTTXD1*3	IO	3.3	PORT14 I/O	PD	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-17**)
MTRXD1*3	IO	3.3	PORT14 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-17**)
MTSCLK1*3	IO	3.3	PORT14 I/O	PD	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-17**)
GETXC	IO	3.3/1.8	PORT15 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-18**)
GETXEN	IO	3.3/1.8	PORT15 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-18**)

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Table 2.2-1 List of External Pins (11/18)

Pin Name	I/O	Voltage (V)	I/O Group	Initial Value after Power-on Reset	Pin State when not in Use	Input		Output		Multiplexed Pin
						Schmitt Trigger	Pull-up/ Pull-down	N-ch Open-Drain	Drive Strength Selectable / Fixed	
GETXER	IO	3.3/1.8	PORT15 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-18**)
GETXD0	IO	3.3/1.8	PORT15 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-18**)
GETXD1	IO	3.3/1.8	PORT15 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-18**)
GETXD2	IO	3.3/1.8	PORT15 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-18**)
GETXD3	IO	3.3/1.8	PORT15 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-18**)
GETXD4	IO	3.3/1.8	PORT15 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-18**)
GETXD5	IO	3.3/1.8	PORT15 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-18**)
GETXD6	IO	3.3/1.8	PORT15 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-18**)
GETXD7	IO	3.3/1.8	PORT15 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-18**)
GERXC	IO	3.3/1.8	PORT15 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-18**)
GERXDV	IO	3.3/1.8	PORT15 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-18**)
GERXER	IO	3.3/1.8	PORT15 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-18**)
GERXD0	IO	3.3/1.8	PORT15 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-18**)
GERXD1	IO	3.3/1.8	PORT15 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-18**)
GERXD2	IO	3.3/1.8	PORT16 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-19**)
GERXD3	IO	3.3/1.8	PORT16 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-19**)
GERXD4	IO	3.3/1.8	PORT16 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-19**)

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Table 2.2-1 List of External Pins (12/18)

Pin Name	I/O	Voltage (V)	I/O Group	Initial Value after Power-on Reset	Pin State when not in Use	Input		Output		Multiplexed Pin
						Schmitt Trigger	Pull-up/ Pull-down	N-ch Open-Drain	Drive Strength Selectable / Fixed	
GERXD5	IO	3.3/1.8	PORT16 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-19**)
GERXD6	IO	3.3/1.8	PORT16 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-19**)
GERXD7	IO	3.3/1.8	PORT16 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-19**)
GECRS	IO	3.3/1.8	PORT16 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-19**)
GECOL	IO	3.3/1.8	PORT16 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-19**)
GEMDC	IO	3.3/1.8	PORT16 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-19**)
GEMDIO	IO	3.3/1.8	PORT16 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-19**)
GEGTXCLK	IO	3.3/1.8	PORT16 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-19**)
GELINK	IO	3.3/1.8	PORT16 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-19**)
GEINT	IO	3.3/1.8	PORT16 I/O	Hi-Z	Open	●	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-19**)
GECLK	IO	3.3/1.8	PORT16 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-19**)
GEPPS	IO	3.3/1.8	PORT17 I/O	Hi-Z	Open	—	PU/PD/OFF changeable	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-20**)
GEMODVDD	—	3.3/1.8	PORT15, PORT16, PORT17 I/O power supply	—	—	—	—	—	—	—
GEPREDVDD	—	1.8	PORT15, PORT16, PORT17 pre-driver power supply	—	—	—	—	—	—	—
DETCK	I	1.8	Debugger I/O	PD	Open	—	PD	—	—	—
DETDI	I	1.8	Debugger I/O	PU	Open	—	PU	—	—	—
DETDO	O	1.8	Debugger I/O	Hi-Z	Open	—	—	—	Selectable*2	—
DETMS	IO	1.8	Debugger I/O	PU	Open	—	PU	—	Selectable*2	—
DETRSTN	I	1.8	Debugger I/O	PU	Open	—	PU	—	—	—
DESRSTN	I	1.8	Debugger I/O	PU	Open	—	PU	—	—	—
RETEST0	I	3.3	LSI test I/O	PD	Pull down	●	PD	—	—	—
RETEST1	I	3.3	LSI test I/O	PD	Pull down	●	PD	—	—	—
LPATEST	O	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPCAA0	O	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPCAA1	O	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—

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Table 2.2-1 List of External Pins (13/18)

Pin Name	I/O	Voltage (V)	I/O Group	Initial Value after Power-on Reset	Pin State when not in Use	Input		Output		Multiplexed Pin
						Schmitt Trigger	Pull-up/ Pull-down	N-ch Open-Drain	Drive Strength Selectable / Fixed	
LPCAA2	O	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPCAA3	O	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPCAA4	O	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPCAA5	O	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPCAB0	O	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPCAB1	O	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPCAB2	O	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPCAB3	O	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPCAB4	O	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPCAB5	O	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPCKEA0	O	1.1	LPDDR4 PHY	L	Open	—	—	—	—	—
LPCKEA1	O	1.1	LPDDR4 PHY	L	Open	—	—	—	—	—
LPCKEB0	O	1.1	LPDDR4 PHY	L	Open	—	—	—	—	—
LPCKEB1	O	1.1	LPDDR4 PHY	L	Open	—	—	—	—	—
LPCLKAC	O	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPCLKAT	O	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPCLKBC	O	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPCLKBT	O	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPCSA0	O	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPCSA1	O	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPCSB0	O	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPCSB1	O	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDMDBIA0	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDMDBIA1	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDMDBIB0	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDMDBIB1	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQA0	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQA1	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQA2	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQA3	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQA4	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQA5	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQA6	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQA7	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQA8	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQA9	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQA10	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQA11	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQA12	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQA13	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQA14	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQA15	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQB0	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQB1	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQB2	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQB3	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQB4	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQB5	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQB6	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQB7	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—

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Table 2.2-1 List of External Pins (14/18)

Pin Name	I/O	Voltage (V)	I/O Group	Initial Value after Power-on Reset	Pin State when not in Use	Input		Output		Multiplexed Pin
						Schmitt Trigger	Pull-up/ Pull-down	N-ch Open-Drain	Drive Strength Selectable / Fixed	
LPDQB8	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQB9	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQB10	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQB11	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQB12	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQB13	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQB14	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQB15	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQSAC0	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQSAC1	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQSAT0	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQSAT1	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQSBC0	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQSBC1	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQSBT0	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPDQSBT1	IO	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPMRESETL	O	1.1	LPDDR4 PHY	L	Open	—	—	—	—	—
LPZN	O	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LPVAA	—	1.8	LPDDR4 PLL 1.8-V power supply	—	—	—	—	—	—	—
LPVDD	—	0.8	LPDDR4 core 0.8-V power supply	—	—	—	—	—	—	—
LPVDDQ	—	1.1	LPDDR4 PHY 1.1-V power supply	—	—	—	—	—	—	—
LPDTEST	O	1.1	LPDDR4 PHY	Hi-Z	Open	—	—	—	—	—
LVRXD0P	I	1.8	CIF PHY	Hi-Z	Pull down	—	—	—	—	MPRXD0P
LVRXD0M	I	1.8	CIF PHY	Hi-Z	Pull down	—	—	—	—	MPRXD0M
LVRXD1P	I	1.8	CIF PHY	Hi-Z	Pull down	—	—	—	—	MPRXD1P
LVRXD1M	I	1.8	CIF PHY	Hi-Z	Pull down	—	—	—	—	MPRXD1M
LVRXD2P	I	1.8	CIF PHY	Hi-Z	Pull down	—	—	—	—	MPRXD2P
LVRXD2M	I	1.8	CIF PHY	Hi-Z	Pull down	—	—	—	—	MPRXD2M
LVRXD3P	I	1.8	CIF PHY	Hi-Z	Pull down	—	—	—	—	MPRXD3P
LVRXD3M	I	1.8	CIF PHY	Hi-Z	Pull down	—	—	—	—	MPRXD3M
LVRXCK0P	I	1.8	CIF PHY	Hi-Z	Pull down	—	—	—	—	MPRXCK0P
LVRXCK0M	I	1.8	CIF PHY	Hi-Z	Pull down	—	—	—	—	MPRXCK0M
LVRXD4P	I	1.8	CIF PHY	Hi-Z	Pull down	—	—	—	—	MPRXD4P
LVRXD4M	I	1.8	CIF PHY	Hi-Z	Pull down	—	—	—	—	MPRXD4M
LVRXD5P	I	1.8	CIF PHY	Hi-Z	Pull down	—	—	—	—	MPRXD5P
LVRXD5M	I	1.8	CIF PHY	Hi-Z	Pull down	—	—	—	—	MPRXD5M
LVRXD6P	I	1.8	CIF PHY	Hi-Z	Pull down	—	—	—	—	MPRXD6P
LVRXD6M	I	1.8	CIF PHY	Hi-Z	Pull down	—	—	—	—	MPRXD6M
LVRXD7P	I	1.8	CIF PHY	Hi-Z	Pull down	—	—	—	—	MPRXD7P
LVRXD7M	I	1.8	CIF PHY	Hi-Z	Pull down	—	—	—	—	MPRXD7M
LVRXCK1P	I	1.8	CIF PHY	Hi-Z	Pull down	—	—	—	—	MPRXCK1P
LVRXCK1M	I	1.8	CIF PHY	Hi-Z	Pull down	—	—	—	—	MPRXCK1M
LVRXREXT	I	1.8	CIF PHY	Hi-Z	Pull down (10 kΩ)	—	—	—	—	—
LVRXAVCC	—	1.8	CIF PHY 1.8-V power supply	—	—	—	—	—	—	—
LVRXAVDD	—	0.8	CIF PHY 0.8-V power supply	—	—	—	—	—	—	—
LVRXAVSS	—	0	CIF PHY GND	—	—	—	—	—	—	—

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Table 2.2-1 List of External Pins (15/18)

Pin Name	I/O	Voltage (V)	I/O Group	Initial Value after Power-on Reset	Pin State when not in Use	Input		Output		Multiplexed Pin
						Schmitt Trigger	Pull-up/ Pull-down	N-ch Open-Drain	Drive Strength Selectable / Fixed	
DSMDPDATA0	IO	1.8	Reserved	L	Open	—	—	—	—	—
DSMDNDATA0	IO	1.8	Reserved	L	Open	—	—	—	—	—
DSMDPDATA1	IO	1.8	Reserved	L	Open	—	—	—	—	—
DSMDNDATA1	IO	1.8	Reserved	L	Open	—	—	—	—	—
DSMDPDATA2	IO	1.8	Reserved	L	Open	—	—	—	—	—
DSMDNDATA2	IO	1.8	Reserved	L	Open	—	—	—	—	—
DSMDPDATA3	IO	1.8	Reserved	L	Open	—	—	—	—	—
DSMDNDATA3	IO	1.8	Reserved	L	Open	—	—	—	—	—
DSMDPCLK	IO	1.8	Reserved	L	Open	—	—	—	—	—
DSMDNCLK	IO	1.8	Reserved	L	Open	—	—	—	—	—
DSMVREG0P4V	IO	1.8	Reserved	L	Open (external capacitor not required)	—	—	—	—	—
DSSDPDATA0	IO	1.8	Reserved	Hi-Z	Pull down	—	—	—	—	—
DSSDNDATA0	IO	1.8	Reserved	Hi-Z	Pull down	—	—	—	—	—
DSSDPCLK	IO	1.8	Reserved	Hi-Z	Pull down	—	—	—	—	—
DSSDNCLK	IO	1.8	Reserved	Hi-Z	Pull down	—	—	—	—	—
DSMSVDD18	—	1.8	1.8-V power supply	—	—	—	—	—	—	—
DSMVDD12*8	—	1.2	1.2-V power supply	—	—	—	—	—	—	—
DSMSVDD0P8	—	0.8	0.8-V power supply	—	—	—	—	—	—	—
PCRXD0P	I	1.8	PCIe PHY	—	Open	—	—	—	—	—
PCRXD0M	I	1.8	PCIe PHY	—	Open	—	—	—	—	—
PCTXD0P	O	1.8	PCIe PHY	X	Open	—	—	—	—	—
PCTXD0M	O	1.8	PCIe PHY	X	Open	—	—	—	—	—
PCREFCKP	I	1.8	PCIe PHY	CLOCK	Open	—	—	—	—	—
PCREFCKM	I	1.8	PCIe PHY	CLOCK	Open	—	—	—	—	—
PCREXT	I	1.8	PCIe PHY	—	Open	—	—	—	—	—
PCRXD1P	I	1.8	PCIe PHY	—	Open	—	—	—	—	—
PCRXD1M	I	1.8	PCIe PHY	—	Open	—	—	—	—	—
PCTXD1P	O	1.8	PCIe PHY	X	Open	—	—	—	—	—
PCTXD1M	O	1.8	PCIe PHY	X	Open	—	—	—	—	—
PCVDD08	—	0.8	PCIe PHY 0.8-V power supply	—	—	—	—	—	—	—
PCVDD18	—	1.8	PCIe PHY 1.8-V power supply	—	—	—	—	—	—	—
PCRSTOUTB	O	3.3	PCIe I/O	H	Open	—	—	—	Selectable*2	—
USDP	IO	3.3	USB PHY	L	Open	—	—	—	—	—
USDM	IO	3.3	USB PHY	L	Open	—	—	—	—	—
USRESREF	I	0.25	USB RESREF	—	Open	—	—	—	—	—
USVD330	—	3.3	USB PHY HS section 3.3-V power supply	—	—	—	—	—	—	—
USVDDH	—	1.8	USB PHY HS section 1.8-V power supply	—	—	—	—	—	—	—
USDVDD*5	—	0.8	USB PHY HS section 0.8-V power supply	—	—	—	—	—	—	—
USVBUS	I	3.3*6	USB PHY	Hi-Z	Open	—	—	—	—	—
USRX0M	I	0.8	USB PHY	—	Open	—	—	—	—	—
USRX0P	I	0.8	USB PHY	—	Open	—	—	—	—	—
USTX0M	O	0.8	USB PHY	—	Open	—	—	—	—	—
USTX0P	O	0.8	USB PHY	—	Open	—	—	—	—	—

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Table 2.2-1 List of External Pins (16/18)

Pin Name	I/O	Voltage (V)	I/O Group	Initial Value after Power-on Reset	Pin State when not in Use	Input		Output		Multiplexed Pin
						Schmitt Trigger	Pull-up/ Pull-down	N-ch Open-Drain	Drive Strength Selectable / Fixed	
USOTGID	I	1.8	USB PHY	—	Open	—	—	—	—	—
USVP	—	0.8	USB PHY SS section 0.8-V power supply	—	—	—	—	—	—	—
USVPH	—	3.3	USB PHY SS section 3.3-V power supply	—	—	—	—	—	—	—
USVPTX	—	0.8	USB PHY SS section transmitter power supply	—	—	—	—	—	—	—
USPWEN	O	3.3	USB I/O	L	Open	—	OFF	—	Selectable*2	—
USOVC	I	3.3	USB I/O	Hi-Z	Pull up	—	OFF	—	—	—
HDTXCP	O	1.8	HDMI PHY	Hi-Z	Open	—	—	—	—	—
HDTXCM	O	1.8	HDMI PHY	Hi-Z	Open	—	—	—	—	—
HDTX0P	O	1.8	HDMI PHY	Hi-Z	Open	—	—	—	—	—
HDTX0M	O	1.8	HDMI PHY	Hi-Z	Open	—	—	—	—	—
HDTX1P	O	1.8	HDMI PHY	Hi-Z	Open	—	—	—	—	—
HDTX1M	O	1.8	HDMI PHY	Hi-Z	Open	—	—	—	—	—
HDTX2P	O	1.8	HDMI PHY	Hi-Z	Open	—	—	—	—	—
HDTX2M	O	1.8	HDMI PHY	Hi-Z	Open	—	—	—	—	—
HDREXT	IO	1.8	HDMI PHY	—	Open	—	—	—	—	—
HDAVDD18	—	1.8	HDMI PHY 1.8-V power supply	—	—	—	—	—	—	—
HDAVDD08	—	0.8	HDMI PHY 0.8-V power supply	—	—	—	—	—	—	—
HDSCL*3	IO	1.8	PORT20 I/O	Hi-Z	Open	●	OFF	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-21**)
HDSDA*3	IO	1.8	PORT20 I/O	Hi-Z	Open	●	OFF	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-21**)
HDHPD*3	IO	1.8	PORT20 I/O	Hi-Z	Open	●	OFF	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-21**)
AD0AIN0	I	1.8	ADCA I/O	—	Pull down	—	—	—	—	—
AD0AIN1	I	1.8	ADCA I/O	—	Pull down	—	—	—	—	—
AD0AIN2	I	1.8	ADCA I/O	—	Pull down	—	—	—	—	—
AD0AIN3	I	1.8	ADCA I/O	—	Pull down	—	—	—	—	—
AD0AIN4	I	1.8	ADCA I/O	—	Pull down	—	—	—	—	—
AD0AIN5	I	1.8	ADCA I/O	—	Pull down	—	—	—	—	—
AD0AIN6	I	1.8	ADCA I/O	—	Pull down	—	—	—	—	—
AD0AIN7	I	1.8	ADCA I/O	—	Pull down	—	—	—	—	—
AD0AIN8	I	1.8	ADCA I/O	—	Pull down	—	—	—	—	—
AD0AIN9	I	1.8	ADCA I/O	—	Pull down	—	—	—	—	—
AD0AIN10	I	1.8	ADCA I/O	—	Pull down	—	—	—	—	—
AD0AIN11	I	1.8	ADCA I/O	—	Pull down	—	—	—	—	—
AD0AVCCA	—	1.8	ADCA 1.8-V power supply	—	—	—	—	—	—	—
AD0AVSSA	—	0	ADCA GND	—	—	—	—	—	—	—
AD1AIN0	I	1.8	ADCA I/O	—	Pull down	—	—	—	—	—
AD1AIN1	I	1.8	ADCA I/O	—	Pull down	—	—	—	—	—
AD1AIN2	I	1.8	ADCA I/O	—	Pull down	—	—	—	—	—
AD1AIN3	I	1.8	ADCA I/O	—	Pull down	—	—	—	—	—
AD1AIN4	I	1.8	ADCA I/O	—	Pull down	—	—	—	—	—
AD1AIN5	I	1.8	ADCA I/O	—	Pull down	—	—	—	—	—

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Table 2.2-1 List of External Pins (17/18)

Pin Name	I/O	Voltage (V)	I/O Group	Initial Value after Power-on Reset	Pin State when not in Use	Input		Output		Multiplexed Pin
						Schmitt Trigger	Pull-up/ Pull-down	N-ch Open-Drain	Drive Strength Selectable / Fixed	
AD1AIN6	I	1.8	ADCA I/O	—	Pull down	—	—	—	—	—
AD1AIN7	I	1.8	ADCA I/O	—	Pull down	—	—	—	—	—
AD1AVCCA	—	1.8	ADCA 1.8-V power supply	—	—	—	—	—	—	—
AD1AVSSA	—	0	ADCA GND	—	—	—	—	—	—	—
MD0	I	1.8	MD7-0 I/O	Hi-Z	Always in use	—	—	—	—	—
MD1	I	1.8	MD7-0 I/O	Hi-Z	Always in use	—	—	—	—	—
MD2	I	1.8	MD7-0 I/O	Hi-Z	Always in use	—	—	—	—	—
MD3	I	1.8	MD7-0 I/O	Hi-Z	Always in use	—	—	—	—	—
MD4	I	1.8	MD7-0 I/O	Hi-Z	Always in use	—	—	—	—	—
MD5	I	1.8	MD7-0 I/O	PD	Always in use	—	PD	—	—	—
MD6	I	1.8	MD7-0 I/O	PD	Always in use	—	PD	—	—	—
MD7	I	1.8	MD7-0 I/O	Hi-Z	Always in use	—	—	—	—	—
MD8*7	IO	3.3/1.8	PORT21 I/O	Hi-Z	Always in use	—	—	—	Selectable*2	Multiplexed pin (see **Table 2.2-2** and **Table 2.2-22**)
OTVDD18	—	1.8	1.8-V power supply for test	—	—	—	—	—	—	—
OTVDD08	—	0.8	0.8-V power supply for test	—	—	—	—	—	—	—
TS0AVDD18	—	1.8	TSU ch. 0 1.8-V power supply	—	—	—	—	—	—	—
TS0DVDD08A	—	0.8	TSU ch. 0 0.8-V power supply	—	—	—	—	—	—	—
TS1AVDD18	—	1.8	TSU ch. 1 1.8-V power supply	—	—	—	—	—	—	—
TS1DVDD08A	—	0.8	TSU ch. 1 0.8-V power supply	—	—	—	—	—	—	—
XIN	I	1.8	1.8-V OSC	CLOCK	Always in use	—	—	—	—	—
XOUT	O	1.8	1.8-V OSC	CLOCK	Always in use	—	—	—	—	—
RSTN	I	1.8	RSTN I/O	PU	Always in use	●	PU	—	—	—
PLVDD1	—	1.8	PLL ch. 1 1.8-V power supply	—	—	—	—	—	—	—
PLVSS1	—	0	PLL ch. 1 GND	—	—	—	—	—	—	—
PLVDD2	—	1.8	PLL ch. 2 1.8-V power supply	—	—	—	—	—	—	—
PLVSS2	—	0	PLL ch. 2 GND	—	—	—	—	—	—	—
PLVDD3	—	1.8	PLL ch. 3 1.8-V power supply	—	—	—	—	—	—	—
PLVSS3	—	0	PLL ch. 3 GND	—	—	—	—	—	—	—
PLVDD4	—	1.8	PLL ch. 4 1.8-V power supply	—	—	—	—	—	—	—
PLVSS4	—	0	PLL ch. 4 GND	—	—	—	—	—	—	—
PLVDD6	—	1.8	PLL ch. 6 1.8-V power supply	—	—	—	—	—	—	—
PLVSS6	—	0	PLL ch. 6 GND	—	—	—	—	—	—	—

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Table 2.2-1 List of External Pins (18/18)

Pin Name	I/O	Voltage (V)	I/O Group	Initial Value after Power-on Reset	Pin State when not in Use	Input		Output		Multiplexed Pin
						Schmitt Trigger	Pull-up/ Pull-down	N-ch Open-Drain	Drive Strength Selectable / Fixed	
PLVDD7	—	1.8	PLL ch. 7 1.8-V power supply	—	—	—	—	—	—	—
PLVSS7	—	0	PLL ch. 7 GND	—	—	—	—	—	—	—
PLDVDD081	—	0.8	PLL ch. 1 0.8-V power supply	—	—	—	—	—	—	—
PLDVDD082	—	0.8	PLL ch. 2 0.8-V power supply	—	—	—	—	—	—	—
PLDVDD083	—	0.8	PLL ch. 3 0.8-V power supply	—	—	—	—	—	—	—
PLDVDD084	—	0.8	PLL ch. 4 0.8-V power supply	—	—	—	—	—	—	—
PLDVDD086	—	0.8	PLL ch. 6 0.8-V power supply	—	—	—	—	—	—	—
PLDVDD087	—	0.8	PLL ch. 7 0.8-V power supply	—	—	—	—	—	—	—
VDD08	—	0.8	VDD08 0.8-V power supply	—	—	—	—	—	—	—
VDD18	—	1.8	VDD18 group I/O power supply (PORT02 I/O, PORT05 I/O, PORT20 I/O. 1.8-V OSC, RSTN I/O, debugger I/O, MD0-7 I/O)	—	—	—	—	—	—	—
VDD33	—	3.3	VDD33 group I/O power supply (PORT12 I/O, PORT13 I/O, PORT14 I/O, PCIe I/O, USB I/O, LSI test I/O)	—	—	—	—	—	—	—
PREDVDD33	—	1.8	VDD33 group pre-driver power supply (PORT12 I/O, PORT13 I/O, PORT14 I/O, PCIe I/O, USB I/O, LSI test I/O)	—	—	—	—	—	—	—
GND	—	0	GND	—	—	—	—	—	—	—

Note 1. For 3.3-V input tolerant

Note 2. For the drive strength, see **Section 3.4.2, Standard I/O Characteristics**.

Note 3. These multiplexed pins are for use with the ISP support package, so do not change the multiplexed functional blocks. For details, refer to *RZ/V2M Default Pin Function List*.

Note 4. If PWVBAT is not used, pulled up by PWVDD.

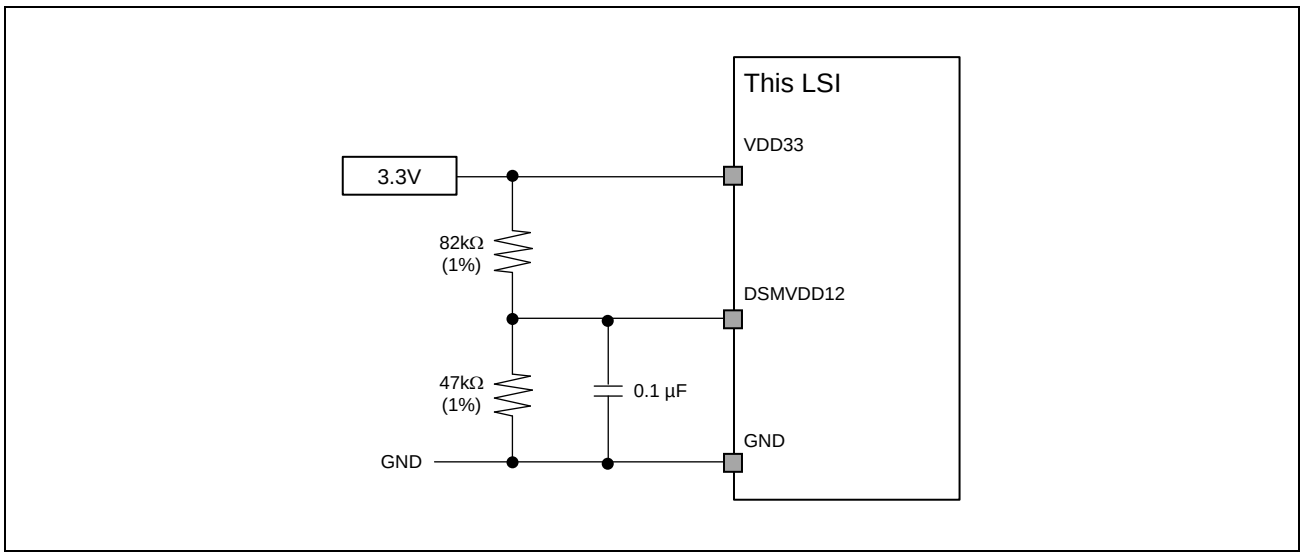
Note 5. Connect an external resistor (1.1kΩ). For details, refer to *the RZ/V2M High-Speed Interface PCB Design Guidelines*.

Note 6. See **Section 2.3, Pin Functions of Functional Blocks** for how to connect the USVBUS.

Note 7. This pin is intended to be used for LED control during boot sequence. Therefore, do not use this pin for any other purpose.

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Note 8. DSMVDD12 can be supplied with 1.2 V by the resistance voltage divider of VDD33. The schematic diagram is shown below.



<Usage Note>

In this LSI, supply power to all power pins.

It is necessary to supply power even if the power pin is an unused function and to connect the ground pin to the ground.

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2.2.2 List of Multiplexed Functional Blocks

Table 2.2-2 List of Multiplexed Functional Blocks

I/O Group	Share Group 0	Share Group 1	Share Group 2	Share Group 3	Share Group 4	Share Group 5	Share Group 6	Share Group 7
PORT00	GPIO	—	eMMC	—	—	—	—	—
PORT01*1	GPIO	PWM	Ex. interrupt	CLK out	—	—	—	—
PORT02*1	GPIO	—	Ex. interrupt	—	—	—	—	—
PORT03*1	GPIO	CSI0 CSI1 CSI2 CSI3	UART0 UART1 IIC2 IIC3 CSI3	CSI0 CSI1 CSI2	TRACE	—	—	—
PORT04*1	GPIO	CSI4 CSI5	CSI4 CSI5	—	TRACE	—	—	—
PORT05*1	GPIO	—	IIC0 IIC1	—	—	—	—	—
PORT06*1	GPIO	—	—	—	—	—	—	—
PORT07*1	GPIO	I2S	—	—	—	—	—	—
PORT08	GPIO	SDI0	—	—	—	—	—	—
PORT09	GPIO	SDI1	Ex. interrupt	—	—	—	—	—
PORT10*1	GPIO	STG0	Ex. interrupt	—	—	—	—	—
PORT11*1	GPIO	STG1	Ex. interrupt	—	—	—	—	—
PORT12*1	GPIO	Flash control	Ex. interrupt	—	—	—	—	—
PORT13*1	GPIO	—	Ex. interrupt	—	—	—	—	—
PORT14*1	GPIO	—	Ex. interrupt	—	—	—	—	—
PORT15	GPIO	ETHER	—	—	TRACE	—	—	—
PORT16	GPIO	ETHER	—	—	TRACE	—	—	—
PORT17	GPIO	ETHER	—	—	—	—	—	—
PORT20*1	GPIO	HDMI	—	—	—	—	—	—
PORT21	GPIO	—	—	—	—	—	—	—

Note 1. Some or all pins in the same I/O group are used by the ISP support package. Therefore, do not change the function of those pins. For details, refer to the following pages.

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Table 2.2-3 I/O Group PORT00 in the Multiplexed Mode

External Pin Name	Share Pin Name 0	Share Pin Name 1	Share Pin Name 2	Share Pin Name 3	Share Pin Name 4	Share Pin Name 5	Share Pin Name 6	Share Pin Name 7
	GPIO	—	eMMC	—	—	—	—	—
NADAT0	P00_00	—	MMDAT0	—	—	—	—	—
NADAT1	P00_01	—	MMDAT1	—	—	—	—	—
NADAT2	P00_02	—	MMDAT2	—	—	—	—	—
NADAT3	P00_03	—	MMDAT3	—	—	—	—	—
NADAT4	P00_04	—	MMDAT4	—	—	—	—	—
NADAT5	P00_05	—	MMDAT5	—	—	—	—	—
NADAT6	P00_06	—	MMDAT6	—	—	—	—	—
NADAT7	P00_07	—	MMDAT7	—	—	—	—	—
NACEN	P00_08	—	—	—	—	—	—	—
NAREN	P00_09	—	—	—	—	—	—	—
NAWEN	P00_10	—	MMCMD	—	—	—	—	—
NACLE	P00_11	—	MMCLK	—	—	—	—	—
NAALE	P00_12	—	—	—	—	—	—	—
NARBN	P00_13	—	—	—	—	—	—	—

Table 2.2-4 I/O Group PORT01 in the Multiplexed Mode

External Pin Name	Share Pin Name 0	Share Pin Name 1	Share Pin Name 2	Share Pin Name 3	Share Pin Name 4	Share Pin Name 5	Share Pin Name 6	Share Pin Name 7
	GPIO	PWM	Ex. interrupt	CLK out	—	—	—	—
PM0*1	P01_00	PM0	INEXINT8	—	—	—	—	—
PM1*1	P01_01	PM1	INEXINT9	—	—	—	—	—
PM2*1	P01_02	PM2	INEXINT10	—	—	—	—	—
PM3*1	P01_03	PM3	INEXINT11	—	—	—	—	—
PM4*1	P01_04	PM4	INEXINT12	—	—	—	—	—
PM5*1	P01_05	PM5	INEXINT13	—	—	—	—	—
PM6*1	P01_06	PM6	INEXINT14	GMCLK0	—	—	—	—
PM7*1	P01_07	PM7	INEXINT15	GMCLK1	—	—	—	—
PM8	P01_08	PM8	INEXINT16	—	—	—	—	—
PM9	P01_09	PM9	INEXINT17	—	—	—	—	—
PM10	P01_10	PM10	INEXINT18	—	—	—	—	—
PM11	P01_11	PM11	INEXINT19	—	—	—	—	—
PM12	P01_12	PM12	INEXINT20	—	—	—	—	—
PM13	P01_13	PM13	INEXINT21	—	—	—	—	—
PM14	P01_14	PM14	INEXINT22	GMCLK0	—	—	—	—
PM15*1	P01_15	PM15	INEXINT23	GMCLK1	—	—	—	—

Note 1. This multiplexed pin is used by the ISP support package. Therefore, do not change the multiplexed mode.

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Table 2.2-5 I/O Group PORT02 in the Multiplexed Mode

External Pin Name	Share Pin Name 0	Share Pin Name 1	Share Pin Name 2	Share Pin Name 3	Share Pin Name 4	Share Pin Name 5	Share Pin Name 6	Share Pin Name 7
	GPIO	—	Ex. interrupt	—	—	—	—	—
INEXINT0*1	P02_00	—	INEXINT0	—	—	—	—	—
INEXINT1*1	P02_01	—	INEXINT1	—	—	—	—	—
INEXINT2*1	P02_02	—	INEXINT2	—	—	—	—	—
INEXINT3*1	P02_03	—	INEXINT3	—	—	—	—	—
INEXINT4	P02_04	—	INEXINT4	—	—	—	—	—
INEXINT5	P02_05	—	INEXINT5	—	—	—	—	—
INEXINT6	P02_06	—	INEXINT6	—	—	—	—	—
INEXINT7	P02_07	—	INEXINT7	—	—	—	—	—

Note 1. This multiplexed pin is used by the ISP support package. Therefore, do not change the multiplexed mode.

Table 2.2-6 I/O Group PORT03 in the Multiplexed Mode

External Pin Name	Share Pin Name 0	Share Pin Name 1	Share Pin Name 2	Share Pin Name 3	Share Pin Name 4	Share Pin Name 5	Share Pin Name 6	Share Pin Name 7
	GPIO	CSI0, CSI1, CSI2, CSI3	UART0, UART1, IIC2, IIC3, CSI3	CSI0, CSI1, CSI2	TRACE	—	—	—
CSTXD0	P03_00	CSTXD0	UATX0	CSRXD0	—	—	—	—
CSRXD0	P03_01	CSRXD0	UARX0	—	—	—	—	—
CSSCLK0	P03_02	CSSCLK0	UACTS0N	—	—	—	—	—
CSCS0	P03_03	CSCS0	UARTS0N	—	—	—	—	—
CSTXD1*1	P03_04	CSTXD1	UATX1	CSRXD1	—	—	—	—
CSRXD1*1	P03_05	CSRXD1	UARX1	—	—	—	—	—
CSSCLK1*1	P03_06	CSSCLK1	UACTS1N	—	TRDAT15	—	—	—
CSCS1*1	P03_07	CSCS1	UARTS1N	—	TRDAT14	—	—	—
CSTXD2	P03_08	CSTXD2	I2SDA2	CSRXD2	TRDAT13	—	—	—
CSRXD2	P03_09	CSRXD2	I2SCL2	—	TRDAT12	—	—	—
CSSCLK2*1	P03_10	CSSCLK2	I2SDA3	—	TRDAT11	—	—	—
CSCS2*1	P03_11	CSCS2	I2SCL3	—	TRDAT10	—	—	—
CSTXD3*1	P03_12	CSTXD3	CSRXD3	—	TRDAT9	—	—	—
CSRXD3*1	P03_13	CSRXD3	—	—	TRDAT8	—	—	—
CSSCLK3*1	P03_14	CSSCLK3	—	—	TRDAT7	—	—	—
CSCS3*1	P03_15	CSCS3	—	—	TRDAT6	—	—	—

Note 1. This multiplexed pin is used by the ISP support package. Therefore, do not change the multiplexed mode.

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Table 2.2-7 I/O Group PORT04 in the Multiplexed Mode

External Pin Name	Share Pin Name 0	Share Pin Name 1	Share Pin Name 2	Share Pin Name 3	Share Pin Name 4	Share Pin Name 5	Share Pin Name 6	Share Pin Name 7
	GPIO	CSI4, CSI5	CSI4, CSI5	—	TRACE	—	—	—
CSTXD4	P04_00	CSTXD4	CSRXD4	—	TRDAT5	—	—	—
CSRXD4	P04_01	CSRXD4	—	—	TRDAT4	—	—	—
CSSCLK4	P04_02	CSSCLK4	—	—	TRDAT3	—	—	—
CSCS4	P04_03	CSCS4	—	—	TRDAT2	—	—	—
CSTXD5*1	P04_04	CSTXD5	CSRXD5	—	TRDAT1	—	—	—
CSRXD5*1	P04_05	CSRXD5	—	—	TRDAT0	—	—	—
CSSCLK5*1	P04_06	CSSCLK5	—	—	TRCLK	—	—	—
CSCS5*1	P04_07	CSCS5	—	—	TRCTL	—	—	—

Note 1. This multiplexed pin is used by the ISP support package. Therefore, do not change the multiplexed mode.

Table 2.2-8 I/O Group PORT05 in the Multiplexed Mode

External Pin Name	Share Pin Name 0	Share Pin Name 1	Share Pin Name 2	Share Pin Name 3	Share Pin Name 4	Share Pin Name 5	Share Pin Name 6	Share Pin Name 7
	GPIO	—	IIC0, IIC1	—	—	—	—	—
I2SDA0	P05_00	—	I2SDA0	—	—	—	—	—
I2SCL0	P05_01	—	I2SCL0	—	—	—	—	—
I2SDA1*1	P05_02	—	I2SDA1	—	—	—	—	—
I2SCL1*1	P05_03	—	I2SCL1	—	—	—	—	—

Note 1. This multiplexed pin is used by the ISP support package. Therefore, do not change the multiplexed mode.

Table 2.2-9 I/O Group PORT06 in the Multiplexed Mode

External Pin Name	Share Pin Name 0	Share Pin Name 1	Share Pin Name 2	Share Pin Name 3	Share Pin Name 4	Share Pin Name 5	Share Pin Name 6	Share Pin Name 7
	GPIO	—	—	—	—	—	—	—
P0600*1	P06_00	—	—	—	—	—	—	—
P0601*1	P06_01	—	—	—	—	—	—	—
P0602*1	P06_02	—	—	—	—	—	—	—
P0603*1	P06_03	—	—	—	—	—	—	—
P0604*1	P06_04	—	—	—	—	—	—	—
P0605*1	P06_05	—	—	—	—	—	—	—
P0606*1	P06_06	—	—	—	—	—	—	—
P0607*1	P06_07	—	—	—	—	—	—	—
P0608	P06_08	—	—	—	—	—	—	—
P0609	P06_09	—	—	—	—	—	—	—
P0610	P06_10	—	—	—	—	—	—	—
P0611	P06_11	—	—	—	—	—	—	—

Note 1. This multiplexed pin is used by the ISP support package. Therefore, do not change the multiplexed mode.

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Table 2.2-10 I/O Group PORT07 in the Multiplexed Mode

External Pin Name	Share Pin Name 0	Share Pin Name 1	Share Pin Name 2	Share Pin Name 3	Share Pin Name 4	Share Pin Name 5	Share Pin Name 6	Share Pin Name 7
	GPIO	AUI	—	—	—	—	—	—
AULRCK*1	P07_00	AULRCK	—	—	—	—	—	—
AUBICK*1	P07_01	AUBICK	—	—	—	—	—	—
AUDI*1	P07_02	AUDI	—	—	—	—	—	—
AUDO*1	P07_03	AUDO	—	—	—	—	—	—
AUMCLK*1	P07_04	AUMCLK	—	—	—	—	—	—
AUPLLCLK*1	P07_05	AUPLLCLK	—	—	—	—	—	—

Note 1. This multiplexed pin is used by the ISP support package. Therefore, do not change the multiplexed mode.

Table 2.2-11 I/O Group PORT08 in the Multiplexed Mode

External Pin Name	Share Pin Name 0	Share Pin Name 1	Share Pin Name 2	Share Pin Name 3	Share Pin Name 4	Share Pin Name 5	Share Pin Name 6	Share Pin Name 7
	GPIO	SDI0	—	—	—	—	—	—
SD0CMD	P08_00	SD0CMD	—	—	—	—	—	—
SD0CLK	P08_01	SD0CLK	—	—	—	—	—	—
SD0DAT0	P08_02	SD0DAT0	—	—	—	—	—	—
SD0DAT1	P08_03	SD0DAT1	—	—	—	—	—	—
SD0DAT2	P08_04	SD0DAT2	—	—	—	—	—	—
SD0DAT3	P08_05	SD0DAT3	—	—	—	—	—	—
SD0WP	P08_06	SD0WP	—	—	—	—	—	—
SD0CD	P08_07	SD0CD	—	—	—	—	—	—

Table 2.2-12 I/O Group PORT09 in the Multiplexed Mode

External Pin Name	Share Pin Name 0	Share Pin Name 1	Share Pin Name 2	Share Pin Name 3	Share Pin Name 4	Share Pin Name 5	Share Pin Name 6	Share Pin Name 7
	GPIO	SDI1	Ex. interrupt	—	—	—	—	—
SD1FCMD	P09_00	SD1FCMD	—	—	—	—	—	—
SD1FCLK	P09_01	SD1FCLK	—	—	—	—	—	—
SD1FDAT0	P09_02	SD1FDAT0	—	—	—	—	—	—
SD1FDAT1	P09_03	SD1FDAT1	—	—	—	—	—	—
SD1FDAT2	P09_04	SD1FDAT2	—	—	—	—	—	—
SD1FDAT3	P09_05	SD1FDAT3	—	—	—	—	—	—
SD1FWP	P09_06	SD1FWP	INEXINT24	—	—	—	—	—
SD1FCD	P09_07	SD1FCD	INEXINT25	—	—	—	—	—

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Table 2.2-13 I/O Group PORT10 in the Multiplexed Mode

External Pin Name	Share Pin Name 0	Share Pin Name 1	Share Pin Name 2	Share Pin Name 3	Share Pin Name 4	Share Pin Name 5	Share Pin Name 6	Share Pin Name 7
	GPIO	STG0	Ex. interrupt	—	—	—	—	—
IM0VS*1	P10_00	IM0VS	—	—	—	—	—	—
IM0HS*1	P10_01	IM0HS	—	—	—	—	—	—
IM0CS*1	P10_02	IM0CS	—	—	—	—	—	—
IM0TXD*1	P10_03	IM0TXD	—	—	—	—	—	—
IM0RXD*1	P10_04	IM0RXD	—	—	—	—	—	—
IM0SCLK*1	P10_05	IM0SCLK	—	—	—	—	—	—
IM0SIG0*1	P10_06	IM0SIG0	INEXINT26	—	—	—	—	—
IM0SIG1*1	P10_07	IM0SIG1	INEXINT27	—	—	—	—	—
IM0SIG2*1	P10_08	IM0SIG2	—	—	—	—	—	—

Note 1. This multiplexed pin is used by the ISP support package. Therefore, do not change the multiplexed mode.

Table 2.2-14 I/O Group PORT11 in the Multiplexed Mode

External Pin Name	Share Pin Name 0	Share Pin Name 1	Share Pin Name 2	Share Pin Name 3	Share Pin Name 4	Share Pin Name 5	Share Pin Name 6	Share Pin Name 7
	GPIO	STG1	Ex. interrupt	—	—	—	—	—
IM1VS*1	P11_00	IM1VS	—	—	—	—	—	—
IM1HS*1	P11_01	IM1HS	—	—	—	—	—	—
IM1CS*1	P11_02	IM1CS	—	—	—	—	—	—
IM1TXD*1	P11_03	IM1TXD	—	—	—	—	—	—
IM1RXD*1	P11_04	IM1RXD	—	—	—	—	—	—
IM1SCLK*1	P11_05	IM1SCLK	—	—	—	—	—	—
IM1SIG0*1	P11_06	IM1SIG0	INEXINT28	—	—	—	—	—
IM1SIG1*1	P11_07	IM1SIG1	INEXINT29	—	—	—	—	—
IM1SIG2*1	P11_08	IM1SIG2	—	—	—	—	—	—

Note 1. This multiplexed pin is used by the ISP support package. Therefore, do not change the multiplexed mode.

Table 2.2-15 I/O Group PORT12 in the Multiplexed Mode

External Pin Name	Share Pin Name 0	Share Pin Name 1	Share Pin Name 2	Share Pin Name 3	Share Pin Name 4	Share Pin Name 5	Share Pin Name 6	Share Pin Name 7
	GPIO	—	Ex. interrupt	—	—	—	—	—
IMSHUT0*1	P12_00	—	INEXINT30	—	—	—	—	—
IMSHUT1*1	P12_01	—	INEXINT31	—	—	—	—	—
IMSTSIG0*1	P12_02	IMSTSIG0	INEXINT32	—	—	—	—	—
IMSTSIG1*1	P12_03	IMSTSIG1	INEXINT33	—	—	—	—	—

Note 1. This multiplexed pin is used by the ISP support package. Therefore, do not change the multiplexed mode.

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Table 2.2-16 I/O Group PORT13 in the Multiplexed Mode

External Pin Name	Share Pin Name 0	Share Pin Name 1	Share Pin Name 2	Share Pin Name 3	Share Pin Name 4	Share Pin Name 5	Share Pin Name 6	Share Pin Name 7
	GPIO	—	Ex. interrupt	—	—	—	—	—
MTDRV0*1	P13_00	—	—	—	—	—	—	—
MTDRV1*1	P13_01	—	—	—	—	—	—	—
MTDRV2*1	P13_02	—	—	—	—	—	—	—
MTDRV3*1	P13_03	—	—	—	—	—	—	—
MTDRV4*1	P13_04	—	—	—	—	—	—	—
MTDRV5*1	P13_05	—	—	—	—	—	—	—
MTDRV6*1	P13_06	—	—	—	—	—	—	—
MTDRV7*1	P13_07	—	—	—	—	—	—	—
MTDCPLS0*1	P13_08	—	—	—	—	—	—	—
MTDCPLS1*1	P13_09	—	INEXINT34	—	—	—	—	—
MTDCPLS2*1	P13_10	—	INEXINT35	—	—	—	—	—
MTDCPLS3*1	P13_11	—	INEXINT36	—	—	—	—	—

Note 1. This multiplexed pin is used by the ISP support package. Therefore, do not change the multiplexed mode.

Table 2.2-17 I/O Group PORT14 in the Multiplexed Mode

External Pin Name	Share Pin Name 0	Share Pin Name 1	Share Pin Name 2	Share Pin Name 3	Share Pin Name 4	Share Pin Name 5	Share Pin Name 6	Share Pin Name 7
	GPIO	—	Ex. interrupt	—	—	—	—	—
MTCS0*1	P14_00	—	—	—	—	—	—	—
MTTXD0*1	P14_01	—	—	—	—	—	—	—
MTRXD0*1	P14_02	—	INEXINT37	—	—	—	—	—
MTSCLK0*1	P14_03	—	—	—	—	—	—	—
MTCS1*1	P14_04	—	—	—	—	—	—	—
MTTXD1*1	P14_05	—	—	—	—	—	—	—
MTRXD1*1	P14_06	—	INEXINT38	—	—	—	—	—
MTSCLK1*1	P14_07	—	—	—	—	—	—	—

Note 1. This multiplexed pin is used by the ISP support package. Therefore, do not change the multiplexed mode.

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Table 2.2-18 I/O Group PORT15 in the Multiplexed Mode

External Pin Name	Share Pin Name 0	Share Pin Name 1	Share Pin Name 2	Share Pin Name 3	Share Pin Name 4	Share Pin Name 5	Share Pin Name 6	Share Pin Name 7
	GPIO	ETHER	—	—	TRACE	—	—	—
GETXC	P15_00	GETXC	—	—	TRCLK	—	—	—
GETXEN	P15_01	GETXEN	—	—	TRCTL	—	—	—
GETXER	P15_02	GETXER	—	—	—	—	—	—
GETXD0	P15_03	GETXD0	—	—	—	—	—	—
GETXD1	P15_04	GETXD1	—	—	—	—	—	—
GETXD2	P15_05	GETXD2	—	—	—	—	—	—
GETXD3	P15_06	GETXD3	—	—	—	—	—	—
GETXD4	P15_07	GETXD4	—	—	—	—	—	—
GETXD5	P15_08	GETXD5	—	—	TRDAT0	—	—	—
GETXD6	P15_09	GETXD6	—	—	TRDAT1	—	—	—
GETXD7	P15_10	GETXD7	—	—	TRDAT2	—	—	—
GERXC	P15_11	GERXC	—	—	TRDAT3	—	—	—
GERXDV	P15_12	GERXDV	—	—	TRDAT4	—	—	—
GERXER	P15_13	GERXER	—	—	TRDAT5	—	—	—
GERXD0	P15_14	GERXD0	—	—	TRDAT6	—	—	—
GERXD1	P15_15	GERXD1	—	—	TRDAT7	—	—	—

Table 2.2-19 I/O Group PORT16 in the Multiplexed Mode

External Pin Name	Share Pin Name 0	Share Pin Name 1	Share Pin Name 2	Share Pin Name 3	Share Pin Name 4	Share Pin Name 5	Share Pin Name 6	Share Pin Name 7
	GPIO	ETHER	—	—	TRACE	—	—	—
GERXD2	P16_00	GERXD2	—	—	TRDAT8	—	—	—
GERXD3	P16_01	GERXD3	—	—	TRDAT9	—	—	—
GERXD4	P16_02	GERXD4	—	—	TRDAT10	—	—	—
GERXD5	P16_03	GERXD5	—	—	TRDAT11	—	—	—
GERXD6	P16_04	GERXD6	—	—	TRDAT12	—	—	—
GERXD7	P16_05	GERXD7	—	—	TRDAT13	—	—	—
GECRS	P16_06	GECRS	—	—	TRDAT14	—	—	—
GECOL	P16_07	GECOL	—	—	TRDAT15	—	—	—
GEMDC	P16_08	GEMDC	—	—	—	—	—	—
GEMDIO	P16_09	GEMDIO	—	—	—	—	—	—
GEGTXCLK	P16_10	GEGTXCLK	—	—	—	—	—	—
GELINK	P16_11	GELINK	—	—	—	—	—	—
GEINT	P16_12	GEINT	—	—	—	—	—	—
GECLK	P16_13	GECLK	—	—	—	—	—	—

Table 2.2-20 I/O Group PORT17 in the Multiplexed Mode

External Pin Name	Share Pin Name 0	Share Pin Name 1	Share Pin Name 2	Share Pin Name 3	Share Pin Name 4	Share Pin Name 5	Share Pin Name 6	Share Pin Name 7
	GPIO	—	—	—	—	—	—	—
GEPPS	P17_00	—	—	—	—	—	—	—

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Table 2.2-21 I/O Group PORT20 in the Multiplexed Mode

External Pin Name	Share Pin Name 0	Share Pin Name 1	Share Pin Name 2	Share Pin Name 3	Share Pin Name 4	Share Pin Name 5	Share Pin Name 6	Share Pin Name 7
	GPIO	HDMI	—	—	—	—	—	—
HDSCL*1	P20_00	HDSCL	—	—	—	—	—	—
HDSDA*1	P20_01	HDSDA	—	—	—	—	—	—
HDHPD*1	P20_02	HDHPD	—	—	—	—	—	—

Note 1. This multiplexed pin is used by the ISP support package. Therefore, do not change the multiplexed mode.

Table 2.2-22 I/O Group PORT21 in the Multiplexed Mode

External Pin Name	Share Pin Name 0	Share Pin Name 1	Share Pin Name 2	Share Pin Name 3	Share Pin Name 4	Share Pin Name 5	Share Pin Name 6	Share Pin Name 7
	GPIO	—	—	—	—	—	—	—
MD8*1	P21_00	—	—	—	—	—	—	—

Note 1. This pin is intended to be used for LED control during boot sequence. Therefore, do not use this pin for any other purpose.

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2.3 Pin Functions of Functional Blocks

Table 2.3-1 List of Pin Functions (1/7)

Classification	Pin Name	I/O	Function
Real time clock (RTC)	RTXIN	I	To connect a 32.768-kHz crystal resonator
	RTXOUT	O	To connect a 32.768-kHz crystal resonator
	RTRSTN	I	RTC reset input (active low)
	RTISO	I	RTC isolation input pin
Power control (PWC)	PWRSTN	I	PWC reset input (active low)
	PWTEST	I	LSI test pin, fixed to the low level
	PWVBAT	I	Battery voltage detection
	PWKY2N to PWKY0N	I	Reserved, pulled up by a 1.8-V power supply
	PWKY4N, PWKY3N	I	Reserved, pulled up by a 1.8-V power supply
	PWDETRSTN	I	Reserved, pulled up by a 1.8-V power supply
	PWEN5 to PWEN0	O	Power enable 5 to 0 (active high)
	PWSYSRSTN	O	System reset output. Connected to the RSTN pin to use the power control function of PWC.
	PWOUT1, PWOUT0	O	Reserved, leave these pins open-circuit.
	PWPWM	O	Reserved, leave this pin open-circuit.
	PWSD0SEL	O	PWC SDI0 interface power supply selection
	PWSD1SEL	O	PWC SDI1 interface power supply selection
	PWCTEST0	O	LSI test pin: leave this pin open-circuit.
	PWCTEST1	I	LSI test pin: fixed to the high level.(pulled up by the PWVDD)
	PWMEMSWIENA	O	Enable signal output pin for controlling the LPVDD power supply on/off
	PWISO	O	RTC separation output pin. Open drain output. Connected to the RTISO pin and pulled up (with 10kΩ to 100kΩ) to a 1.5-V power supply.*1
eMMC interface (eMMC)	MMDAT7 to MMDAT0	I/O	eMMC data [7:0]
	MMCMD	I/O	eMMC command
	MMCLK	O	eMMC clock
Pulse-width modulation timer (PWM)	PM15 to PM0	O	PWM output
External interrupt	INEXINT38 to INEXINT0	I	External interrupt

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Table 2.3-1 List of Pin Functions (2/7)

Classification	Pin Name	I/O	Function
CSI ch. 0 (CSI0)	CSTXD0	O	CSI0 serial data output
	CSRXD0	I	CSI0 serial data input
	CSSCLK0	I/O	CSI0 serial clock
	CSCS0	I	CSI0 serial chip select
CSI ch. 1 (CSI1)	CSTXD1	O	CSI1 serial data output
	CSRXD1	I	CSI1 serial data input
	CSSCLK1	I/O	CSI1 serial clock
	CSCS1	I	CSI1 serial chip select
CSI ch. 2 (CSI2)	CSTXD2	O	CSI2 serial data output
	CSRXD2	I	CSI2 serial data input
	CSSCLK2	I/O	CSI2 serial clock
	CSCS2	I	CSI2 serial chip select
CSI ch. 3 (CSI3)	CSTXD3	O	CSI3 serial data output
	CSRXD3	I	CSI3 serial data input
	CSSCLK3	I/O	CSI3 serial clock
	CSCS3	I	CSI3 serial chip select
CSI ch. 4 (CSI4)	CSTXD4	O	CSI4 serial data output
	CSRXD4	I	CSI4 serial data input
	CSSCLK4	I/O	CSI4 serial clock
	CSCS4	I	CSI4 serial chip select
CSI ch. 5 (CSI5)	CSTXD5	O	CSI5 serial data output
	CSRXD5	I	CSI5 serial data input
	CSSCLK5	I/O	CSI5 serial clock
	CSCS5	I	CSI5 serial chip select
IIC ch. 0 (IIC0)	I2SDA0	I/O	IIC0 serial data
	I2SCL0	I/O	IIC0 serial clock
IIC ch. 1 (IIC1)	I2SDA1	I/O	IIC1 serial data
	I2SCL1	I/O	IIC1 serial clock
IIC ch. 2 (IIC2)	I2SDA2	I/O	IIC2 serial data
	I2SCL2	I/O	IIC2 serial clock
IIC ch. 3 (IIC3)	I2SDA3	I/O	IIC3 serial data
	I2SCL3	I/O	IIC3 serial clock
UART ch. 0 (UART0)	UATX0	O	UART0 transmission data
	UARX0	I	UART0 reception data
	UACTS0N	I	UART0 transmission enable signal (active low)
	UARTS0N	O	UART0 reception enable signal (active low)
UART ch. 1 (UART1)	UATX1	O	UART1 transmission data
	UARX1	I	UART1 reception data
	UACTS1N	I	UART1 transmission enable signal (active low)
	UARTS1N	O	UART1 reception enable signal (active low)

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Table 2.3-1 List of Pin Functions (3/7)

Classification	Pin Name	I/O	Function
Audio interface (AUI)	AULRCK	I	Audio channel clock
	AUBICK	I	Audio serial clock
	AUDI	I	Audio serial data input
	AUDO	O	Audio serial data output
	AUMCLK	O	Audio master clock output
	AUPLLCLK	I	Audio master clock input
SD host interface ch. 0 (SDI0)	SD0CMD	I/O	SDI0 command/response signal
	SD0CLK	O	SDI0 clock
	SD0DAT3 to SD0DAT0	I/O	SDI0 data line bits [3:0]
	SD0WP	I	SDI0 write protect signal
	SD0CD	I	SDI0 card detection signal
SD host interface ch. 1 (SDI1)	SD1FCMD	I/O	SDI1 command/response signal
	SD1FCLK	O	SDI1 clock
	SD1FDAT3 to SD1FDAT0	I/O	SDI1 data line bits [3:0]
	SD1FWP	I	SDI1 write protect signal
	SD1FCD	I	SDI1 card detection signal
Image sensor timing generator ch. 0 (STG0)	IM0VS	I/O	Image sensor 0 vertical synchronization signal
	IM0HS	I/O	Image sensor 0 horizontal synchronization signal
	IM0CLK	O	Image sensor 0 clock supply port
	IM0CS	I/O	Image sensor 0 dedicated serial chip select output (or dedicated IIC clock)
	IM0TXD	O	Image sensor 0 dedicated serial transmission data output
	IM0RXD	I/O	Image sensor 0 dedicated serial reception data input (or dedicated IIC data)
	IM0SCLK	O	Image sensor 0 dedicated serial clock output
	IM0SIG2 to IM0SIG0	O	Image sensor 0 control pulse output
Image sensor timing generator ch. 1 (STG1)	IM1VS	I/O	Image sensor 1 vertical synchronization signal
	IM1HS	I/O	Image sensor 1 horizontal synchronization signal
	IM1CLK	O	Image sensor 1 clock supply port
	IM1CS	I/O	Image sensor 1 dedicated serial chip select output (or dedicated IIC clock)
	IM1TXD	O	Image sensor 1 dedicated serial transmission data output
	IM1RXD	I/O	Image sensor 1 dedicated serial reception data input (or dedicated IIC data)
	IM1SCLK	O	Image sensor 1 dedicated serial clock output
	IM1SIG2 to IM1SIG0	O	Image sensor 1 control pulse output
Flash control	IMSTSIG0	O	External flash control pin 0
	IMSTSIG1	O	External flash control pin 1

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Table 2.3-1 List of Pin Functions (4/7)

Classification	Pin Name	I/O	Function
Gigabit Ethernet MAC interface (ETHER)	GETXC	I	Transmission clock for Ethernet 100-Mbps mode
	GETXEN	O	Transmission enable signal (active high)
	GETXER	O	Transmission error signal (active high)
	GETXD7 to GETXD0	O	Transmission data [7:0]
	GERXC	I	Ethernet reception clock
	GERXDV	I	Reception data valid signal (active high)
	GERXER	I	Reception error signal (active high)
	GERXD7 to GERXD0	I	Receive data [7:0]
	GECRS	I	Carrier detection signal (active high)
	GECOL	I	Transmission collision signal (active high)
	GEMDC	O	PHY management clock
	GEMDIO	I/O	PHY management I/O data
	GEGTXCLK	O	GMII transmission clock
	GELINK	I	PHY LINK signal
	GEINT	I	PHY interrupt signal
	GECLK*2	I	Clock input
Debugger interface	DETCK	I	JTAG TCK
	DETDI	I	JTAG TDI
	DETDO	O	JTAG TDO
	DETMS	I/O	JTAG TMS
	DETRSTN	I	JTAG TRST (active low)
	DESRSTN	I	System reset from debugger (active low)
For LSI test	RETEST0	I	LSI test enable, fixed to the low level
	RETEST1	I	LSI test enable, fixed to the low level

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Table 2.3-1 List of Pin Functions (5/7)

Classification	Pin Name	I/O	Function
LPDDR4 interface	LPATEST	O	LSI test pin, leave this pin open-circuit.
	LPCAA5 to LPCAA0	O	DRAM address and command bits: Ch-A command/address input
	LPCAB5 to LPCAB0	O	DRAM address and command bits: Ch-B command/address input
	LPCKEA1, LPCKEA0	O	DRAM address and command bits: Ch-A clock enable
	LPCKEB1, LPCKEB0	O	DRAM address and command bits: Ch-B clock enable
	LPCLKAC	O	DRAM address and command bits: Ch-A clock (negative)
	LPCLKAT	O	DRAM address and command bits: Ch-A clock (positive)
	LPCLKBC	O	DRAM address and command bits: Ch-B clock (negative)
	LPCLKBT	O	DRAM address and command bits: Ch-B clock (positive)
	LPCSA1, LPCSA0	O	DRAM address and command bits: Ch-A chip select
	LPCSB1, LPCSB0	O	DRAM address and command bits: Ch-B chip select
	LPDMDBIA1, LPDMDBIA0	I/O	DRAM data bits and strobes: Ch-A data mask inversion
	LPDMDBIB1, LPDMDBIB0	I/O	DRAM data bits and strobes: Ch-B data mask inversion
	LPDQA15 to LPDQA0	I/O	DRAM data bits and strobes: Ch-A data input/output
	LPDQB15 to LPDQB0	I/O	DRAM data bits and strobes: Ch-B data input/output
	LPDQSAC1, LPDQSAC0	I/O	DRAM data bits and strobes: Ch-A data strobe (negative)
	LPDQSAT1, LPDQSAT0	I/O	DRAM data bits and strobes: Ch-A data strobe (positive)
	LPDQSBC1, LPDQSBC0	I/O	DRAM data bits and strobes: Ch-B data strobe (negative)
	LPDQSBT1, LPDQSBT0	I/O	DRAM data bits and strobes: Ch-B data strobe (positive)
	LPMRESETL	O	DRAM reset. Note that this requires no external resistor.
	LPZN	O	External reference resistor connection pin for use in calibration. * To connect a pull-down resistor. Resistance: 240Ω±1%
	LPDTEST	O	LSI test pin, leave this pin open-circuit.
MIPI CSI-2	LVRXREXT	I	External reference resistor connection pin * Resistance: 10kΩ ±1%
MIPI CSI-2 interface	MPRXD7P to MPRXD0P	I	MIPI CSI-2 differential data 7 to 0 (positive)
	MPRXD7M to MPRXD0M	I	MIPI CSI-2 differential data 7 to 0 (negative)
	MPRXCK1P, MPRXCK0P	I	MIPI CSI-2 differential clocks 1, 0 (positive)
	MPRXCK1M, MPRXCK0M	I	MIPI CSI-2 differential clocks 1, 0 (negative)
Reserved pins	DSMDPDATA3 to DSMDPDATA0	I/O	Reserved pins, leave these pins open-circuit
	DSMDNDATA3 to DSMDNDATA0	I/O	Reserved pins, leave these pins open-circuit
	DSMDPCLK	I/O	Reserved pin, leave this pin open-circuit
	DSMDNCLK	I/O	Reserved pin, leave this pin open-circuit
	DSMVREG0P4V	I/O	External capacitor connection pin * Connect the pin to GND via the capacitance. Recommended capacitance: 2.2 nF
	DSSDPCLK	I/O	LSI test pin, fixed to the low level
	DSSDNCLK	I/O	LSI test pin, fixed to the low level
	DSSDPDATA0	I/O	LSI test pin, fixed to the low level
	DSSDNDATA0	I/O	LSI test pin, fixed to the low level

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Table 2.3-1 List of Pin Functions (6/7)

Classification	Pin Name	I/O	Function
PCI Express interface	PCRXD1P, PCRXD0P	I	Rx serial data inputs 1, 0 (positive)
	PCRXD1M, PCRXD0M	I	Rx serial data inputs 1, 0 (negative)
	PCTXD1P, PCTXD0P	O	Tx serial data outputs 1, 0 (positive)
	PCTXD1M, PCTXD0M	O	Tx serial data outputs 1, 0 (negative)
	PCREFCKP	I	Differential reference clock (positive)
	PCREFCKM	I	Differential reference clock (negative)
	PCREXT	I	Reference resistor connection pin for band-gap reference (BGR) and bias generator * To connect a pull-down resistor. Resistance: 8.2kΩ ±1%
	PCRSTOUTB	O	Reset output (for other-party PCIe devices) (active low)
USB interface	USDP	I/O	USB2.0 USB D+ signal (positive)
	USDM	I/O	USB2.0 USB D− signal (negative)
	USRESREF	I	Reference resistor connection pin * To connect a pull-down resistor. Resistance: 200Ω ±1%
	USVBUS	I	USB VBUS signal detection pin*3 * Resistance partial pressure outside the chip
	USRX0M	I	USB3.1 super-speed differential reception pair (negative)
	USRX0P	I	USB3.1 super-speed differential reception pair (positive)
	USTX0M	O	USB3.1 super-speed differential transmission pair (negative)
	USTX0P	O	USB3.1 super-speed differential transmission pair (positive)
	USOTGID	I	ID detection (OTG ID input, 0: Host, 1: Peripheral) In the initial state, an internal pull-up resistor is enabled.*4
	USPWEN	O	VBUS control signal (active high)*5
	USOVC	I	Overcurrent detection (active low)*5
HDMI Tx interface (HDMI)	HDTXCP	O	TXPHY clock output (positive)*5
	HDTXCM	O	TXPHY clock output (negative)*5
	HDTX0P	O	Data channel 0 TXPHY output (positive)*5
	HDTX0M	O	Data channel 0 TXPHY output (negative)*5
	HDTX1P	O	Data channel 1 TXPHY output (positive)*5
	HDTX1M	O	Data channel 1 TXPHY output (negative)*5
	HDTX2P	O	Data channel 2 TXPHY output (positive)*5
	HDTX2M	O	Data channel 2 TXPHY output (negative)*5
	HDREXT	I/O	External reference resistor connection pin * To connect a pull-down resistor. Resistance: 8.2kΩ ±1%
	HDSCL	I/O	DDC IIC master SCL
	HDSDA	I/O	DDC IIC master SDA
	HDHPD	I/O	Hot plug detection (active high)
ADC unit A (ADCA)	AD0AIN11 to AD0AIN0	I	Analog input signal
ADC unit B (ADCB)	AD1AIN7 to AD1AIN0	I	Analog input signal

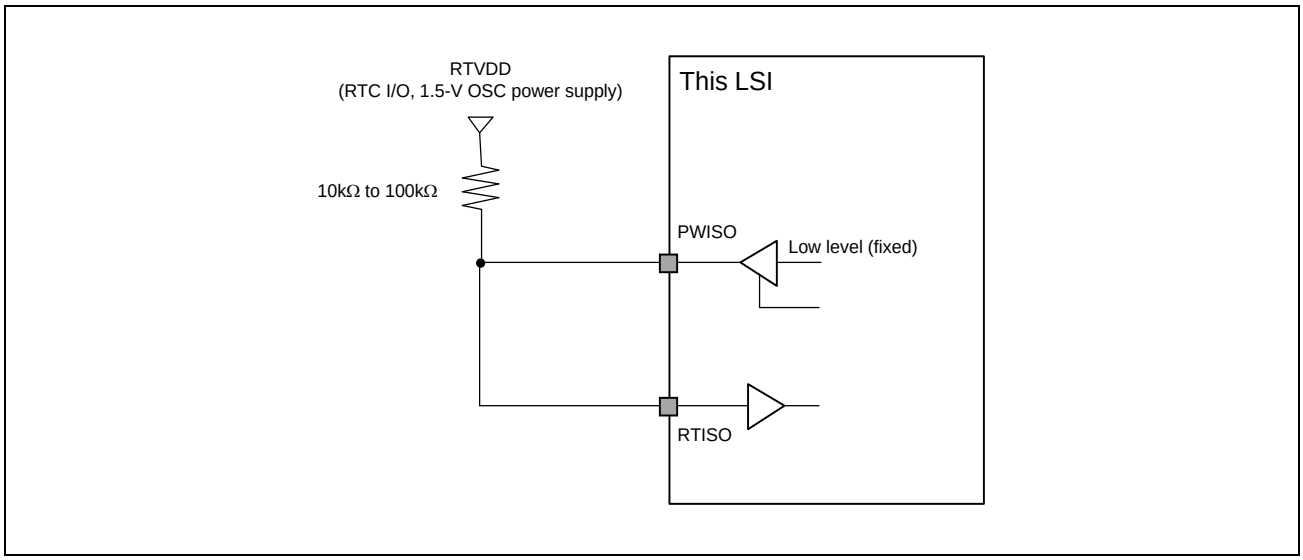
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Table 2.3-1 List of Pin Functions (7/7)

Classification	Pin Name	I/O	Function
Boot	MD2 to MD0	I	Boot device select [2:0]
	MD3	I	Boot device write interface select When not using security, fix the input level to low. When using security, prepare a circuit that is capable of switching the input level externally to low or high (pull up with VDD18).
	MD4, MD5	I	Boot mode select [1:0] (reserved) Fix the pin to the low level.
	MD6	I	Boot mode select [2]
	MD7	I	Boot mode select [3] (reserved) Fix the pin to the low level.
	MD8	I/O	Boot GPIO (LED control when booted)*6
Clock/reset	XIN	I	To connect a 48-MHz crystal resonator
	XOUT	O	To connect a 48-MHz crystal resonator
	RSTN	I	System reset (active low)
Clock output	GMCLK0	O	Clock output 0
	GMCLK1	O	Clock output 1
Trace interface (TRACE)	TRDAT15 to TRDAT0	O	Trace data [15:0]
	TRCLK	O	Trace clock
	TRCTL	O	Trace control
General-purpose input/output ports (GPIO)	P00_13 to P00_00	I/O	GPIO port 00 [13:0]
	P01_15 to P01_00	I/O	GPIO port 01 [15:0]
	P02_07 to P02_00	I/O	GPIO port 02 [7:0]
	P03_15 to P03_00	I/O	GPIO port 03 [15:0]
	P04_07 to P04_00	I/O	GPIO port 04 [7:0]
	P05_03 to P05_00	I/O	GPIO port 05 [3:0]
	P06_11 to P06_00	I/O	GPIO port 06 [11:0]
	P07_05 to P07_00	I/O	GPIO port 07[5:0]
	P08_07 to P08_00	I/O	GPIO port 08[7:0]
	P09_07 to P09_00	I/O	GPIO port 09[7:0]
	P10_08 to P10_00	I/O	GPIO port 10[8:0]
	P11_08 to P11_00	I/O	GPIO port 11[8:0]
	P12_03 to P12_00	I/O	GPIO port 12[3:0]
	P13_11 to P13_00	I/O	GPIO port 13[11:0]
	P14_07 to P14_00	I/O	GPIO port 14[7:0]
	P15_15 to P15_00	I/O	GPIO port 15[15:0]
	P16_13 to P16_00	I/O	GPIO port 16[13:0]
	P17_00	I/O	GPIO port 17[0]
	P20_02 to P20_00	I/O	GPIO port 20[2:0]
	P21_00	I/O	GPIO port 21[0]*6

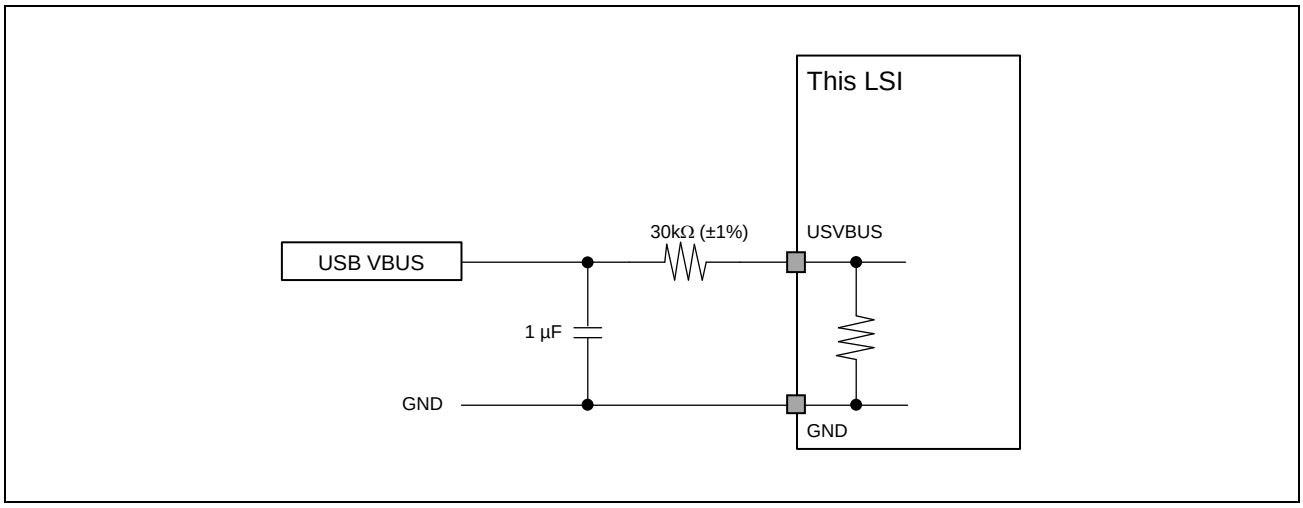
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Note 1. The PWISO and RTISO pins are connected to this LSI, and these nodes should be pulled up with a 10kΩ to 100kΩ resistor. The schematic diagram is shown below.



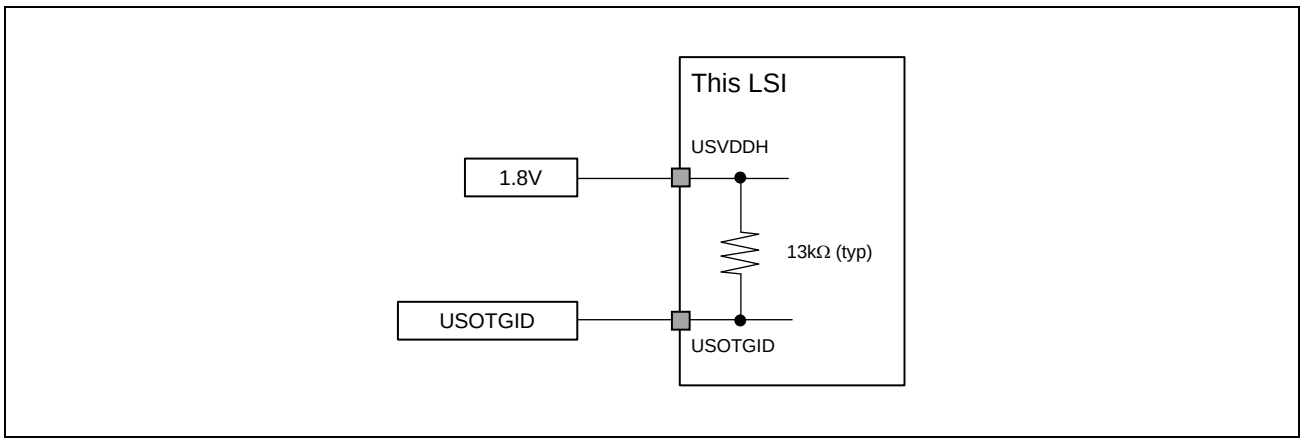
Note 2. GECLK is the input clock for GEGTXCLK.

Note 3. Since this LSI has a resistor mounted between the USVBUS pin and GND, connect the pin to the USVBUS pin via a 30-kΩ (±1%) resistor. The schematic diagram is shown below.
In addition, design so that the voltage is applied to the USVBUS pin after supplying USDVDD, USVP and USVPTX.



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Note 4. USOTGID has the internal pull-up resistor.



Note 5. When the power of this LSI is turned off, applying the 3.3-V pull-up voltage in the opposite direction to these pins does not cause any problem.

Note 6. This pin is intended to be used for LED control during boot sequence. Therefore, do not use this pin for any other purpose.

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Section 3 Electrical Characteristics

3.1 Absolute Maximum Ratings

Permanent damage to the LSI may result if absolute maximum ratings are exceeded.

Table 3.1-1 Absolute Maximum Ratings (1/3)

Item	Symbol	Min.	Max.	Unit
VDD08 core power supply	V_{DD08}	−0.4	1.2	V
RTC core power supply	RTV_{DD08}	−0.4	1.2	V
RTC I/O, 1.5-V OSC power supply	RTV_{DD}	−0.4	2.5	V
PWC core power supply	PWV_{DD08}	−0.4	1.2	V
PWC I/O power supply	PWV_{DD}	−0.4	2.5	V
PORT01(A), PORT03 pre-driver power supply	$PAPREDV_{DD}$	−0.4	2.5	V
PORT01(A), PORT03 I/O power supply	$PAMODV_{DD}$	−0.4	3.8	V
PORT01(B), PORT04, PORT07, PORT21 pre-driver power supply	$PBPREDV_{DD}$	−0.4	2.5	V
PORT01(B), PORT04, PORT07, PORT21 I/O power supply	$PBMODV_{DD}$	−0.4	3.8	V
PORT06 pre-driver power supply	$PCPREDV_{DD}$	−0.4	2.5	V
PORT06 I/O power supply	$PCMODV_{DD}$	−0.4	3.8	V
PORT10 pre-driver power supply	$IM0PREDV_{DD}$	−0.4	2.5	V
PORT10 I/O power supply	$IM0MODV_{DD}$	−0.4	3.8	V
PORT11 pre-driver power supply	$IM1PREDV_{DD}$	−0.4	2.5	V
PORT11 I/O power supply	$IM1MODV_{DD}$	−0.4	3.8	V
PORT00 pre-driver power supply	$NAPREDV_{DD}$	−0.4	2.5	V
PORT00 I/O power supply	$NAMODV_{DD}$	−0.4	3.8	V
PORT08 pre-driver power supply	$SD0PREDV_{DD}$	−0.4	2.5	V
PORT08 I/O power supply	$SD0MODV_{DD}$	−0.4	3.8	V
PORT09 pre-driver power supply	$SD1FV_{DD}$	−0.4	2.5	V
PORT09 I/O power supply	$SD1FMODV_{DD}$	−0.4	3.8	V
PORT15, PORT16, PORT17 pre-driver power supply	$GEPREDV_{DD}$	−0.4	2.5	V
PORT15, PORT16, PORT17 I/O power supply	$GEMODV_{DD}$	−0.4	3.8	V

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Table 3.1-1 Absolute Maximum Ratings (2/3)

Item	Symbol	Min.	Max.	Unit
VDD18 group I/O power supply (PORT02 I/O, PORT05 I/O, PORT20 I/O. 1.8-V OSC, RSTN I/O, debugger I/O, MD0-7 I/O)	V_{DD18}	−0.4	2.5	V
VDD33 group pre-driver power supply (PORT12 I/O, PORT13 I/O, PORT14 I/O, PCIe I/O, USB I/O, LSI test I/O)	$PREDV_{DD33}$	−0.4	2.5	V
VDD33 group I/O power supply (PORT12 I/O, PORT13 I/O, PORT14 I/O, PCIe I/O, USB I/O, LSI test I/O)	V_{DD33}	−0.4	3.8	V
PLL ch. 1, 2, 3, 4, 6, 7 0.8-V power supply	$PLDV_{DD08n}$ (n = 1, 2, 3, 4, 6, 7)	−0.4	1.2	V
PLL ch. 1, 2, 3, 4, 6, 7 1.8-V power supply	PLV_{DDn} (n = 1, 2, 3, 4, 6, 7)	−0.4	2.5	V
0.8-V power supply for test	OTV_{DD08}	−0.4	1.2	V
1.8-V power supply for test	OTV_{DD18}	−0.4	2.5	V
TSU ch. 0 0.8-V power supply	$TS0DV_{DD08A}$	−0.4	1.2	V
TSU ch. 1 0.8-V power supply	$TS1DV_{DD08A}$	−0.4	1.2	V
TSU ch. 0 1.8-V power supply	$TS0AV_{DD18}$	−0.4	2.5	V
TSU ch. 1 1.8-V power supply	$TS1AV_{DD18}$	−0.4	2.5	V
ADC unit A 1.8-V power supply	$AD0AV_{CCA}$	−0.4	2.5	V
ADC unit B 1.8-V power supply	$AD1AV_{CCA}$	−0.4	2.5	V
CIF PHY 0.8-V power supply	$LVRXAV_{DD}$	−0.4	1.2	V
CIF PHY 1.8-V power supply	$LVRXAV_{CC}$	−0.4	2.5	V
LPDDR4 core 0.8-V power supply	LPV_{DD}	−0.4	1.2	V
LPDDR4 PLL 1.8-V power supply	LPV_{AA}	−0.4	2.5	V
LPDDR4 I/O 1.1-V power supply	LPV_{DDQ}	−0.4	1.5	V
HDMI PHY 1.8-V power supply	$HDAV_{DD18}$	−0.4	2.5	V
HDMI PHY 0.8-V power supply	$HDAV_{DD08}$	−0.4	1.2	V
1.8-V power supply	$DSMSV_{DD18}$	−0.4	2.5	V
1.2-V power supply	$DSMV_{DD12}$	−0.4	2.5	V
0.8-V power supply	$DSMSV_{DD0P8}$	−0.4	1.2	V
PCIe PHY 0.8-V power supply	PCV_{DD08}	−0.4	1.2	V
PCIe PHY 1.8-V power supply	PCV_{DD18}	−0.4	2.5	V
USB PHY HS section 3.3-V power supply	USV_{D330}	−0.4	3.8	V
USB PHY HS section 1.8-V power supply	USV_{DDH}	−0.4	2.5	V
USB PHY HS section 0.8-V power supply	$USDV_{DD}$	−0.4	1.2	V

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Table 3.1-1 Absolute Maximum Ratings (3/3)

Item	Symbol	Min.	Max.	Unit
USB PHY SS section 0.8-V power supply	USV_P	−0.4	1.2	V
USB PHY SS section 3.3-V power supply	USV_{PH}	−0.4	3.8	V
USB3.0 transmitter power supply	USV_{PTX}	−0.4	1.2	V
Input voltage (1.1-V I/O)	V_{in11}	−0.4	LPV_{DDQ}+0.3*3	V
Input voltage (1.5-V I/O)	V_{in15}	−0.4	RTV_{DD} + 0.3*4	V
Input voltage (1.8-V I/O)*1	V_{in18}	−0.4	V_{18} + 0.3*5	V
Input voltage (1.8-V I/O (3.3-V tolerant))*2	V_{in18_tol}	−0.4	3.6	V
Input voltage (3.3-V I/O)	V_{in33}	−0.4	V_{33} + 0.3*6	V
Analog input voltage (ADC unit A AIN)	V_{ain18_0}	0	$AD0AV_{CCA}$	V
Analog input voltage (ADC unit B AIN)	V_{ain18_1}	0	$AD1AV_{CCA}$	V
Junction temperature	T_j	−40	125	°C
Storage temperature	T_{stg}	−40	150	°C

Note 1. 1.8-V I/O (except for PORT02 I/O and PORT05 I/O)

Note 2. 1.8-V I/O (PORT02 I/O and PORT05 I/O)

Note 3. The voltage to be applied must be within the absolute maximum rating (1.5 V).

Note 4. The voltage to be applied must be within the absolute maximum rating (2.5 V).

Note 5. The voltage to be applied must be within the absolute maximum rating (2.5 V). V18 indicates the power supply voltage for 1.8-V I/O pins.

Note 6. The voltage to be applied must be within the absolute maximum rating (3.8 V). V33 indicates the power supply voltage for 3.3-V I/O pins.

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3.2 Recommended Operating Range

Table 3.2-1 Recommended Operating Range (1/2)

Item	Symbol	Min.	Typ.	Max.	Unit	Note
VDD08 core power supply	V_{DD08}	0.76	0.8	0.84	V	
RTC core power supply	RTV_{DD08}	0.76	0.8	0.84	V	
RTC I/O, 1.5-V OSC power supply	RTV_{DD}	1.425	1.5	1.575	V	
PWC core power supply	PWV_{DD08}	0.76	0.8	0.84	V	
PWC I/O power supply	PWV_{DD}	1.71	1.8	1.89	V	
PORT01(A), PORT03 pre-driver power supply	$PAPREDV_{DD}$	1.71	1.8	1.89	V	
PORT01(A), PORT03 I/O power supply	$PAMODV_{DD}$	3.135/1.71	3.3/1.8	3.465/1.89	V	3.3-V/1.8-V selectable
PORT01(B), PORT04, PORT07, PORT21 pre-driver power supply	$PBPREDV_{DD}$	1.71	1.8	1.89	V	
PORT01(B), PORT04, PORT07, PORT21 I/O power supply	$PBMODV_{DD}$/	3.135/1.71	3.3/1.8	3.465/1.89	V	3.3-V/1.8-V selectable
PORT06 pre-driver power supply	$PCPREDV_{DD}$	1.71	1.8	1.89	V	
PORT06 I/O power supply	$PCMODV_{DD}$	3.135/1.71	3.3/1.8	3.465/1.89	V	3.3-V/1.8-V selectable
PORT10 pre-driver power supply	$IM0PREDV_{DD}$	1.71	1.8	1.89	V	
PORT10 I/O power supply	$IM0MODV_{DD}$	3.135/1.71	3.3/1.8	3.465/1.89	V	3.3-V/1.8-V selectable
PORT11 pre-driver power supply	$IM1PREDV_{DD}$	1.71	1.8	1.89	V	
PORT11 I/O power supply	$IM1MODV_{DD}$	3.135/1.71	3.3/1.8	3.465/1.89	V	3.3-V/1.8-V selectable
PORT00 pre-driver power supply	$NAPREDV_{DD}$	1.71	1.8	1.89	V	
PORT00 I/O power supply	$NAMODV_{DD}$	3.135/1.71	3.3/1.8	3.465/1.89	V	3.3-V/1.8-V selectable
PORT08 pre-driver power supply	$SD0PREDV_{DD}$	1.71	1.8	1.89	V	
PORT08 I/O power supply	$SD0MODV_{DD}$	3.135/1.71	3.3/1.8	3.465/1.89	V	3.3-V/1.8-V selectable
PORT09 pre-driver power supply	$SD1FV_{DD}$	1.71	1.8	1.89	V	
PORT09 I/O power supply	$SD1FMODV_{DD}$	3.135/1.71	3.3/1.8	3.465/1.89	V	3.3-V/1.8-V selectable
PORT15, PORT16, PORT17 pre-driver power supply	$GEPREDV_{DD}$	1.71	1.8	1.89	V	
PORT15, PORT16, PORT17 I/O power supply	$GEMODV_{DD}$	3.135/1.71	3.3/1.8	3.465/1.89	V	3.3-V/1.8-V selectable
VDD18 group I/O power supply (PORT02 I/O, PORT05 I/O, PORT20 I/O. 1.8-V OSC, RSTN I/O, debugger I/O, MD0-7 I/O)	V_{DD18}	1.71	1.8	1.89	V	
VDD33 group pre-driver power supply (PORT12 I/O, PORT13 I/O, PORT14 I/O, PCIe I/O, USB I/O, LSI test I/O)	$PREDV_{DD33}$	1.71	1.8	1.89	V	

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Table 3.2-1 Recommended Operating Range (2/2)

Item	Symbol	Min.	Typ.	Max.	Unit	Note
VDD33 group I/O power supply (PORT12 I/O, PORT13 I/O, PORT14 I/O, PCIe I/O, USB I/O, LSI test I/O)	V_{DD33}	3.135	3.3	3.465	V	
PLL ch. 1, 2, 3, 4, 6, 7 0.8-V power supply	$PLDV_{DD08n}$, (n = 1, 2, 3, 4, 6, 7)	0.76	0.8	0.84	V	
PLL ch. 1, 2, 3, 4, 6, 7 1.8-V power supply	PLVDDn (n = 1, 2, 3, 4 ,6, 7)	1.71	1.8	1.89	V	
0.8-V power supply for test	OTV_{DD08}	0.76	0.8	0.84	V	
1.8-V power supply for test	OTV_{DD18}	1.71	1.8	1.89	V	
TSU ch. 0 0.8-V power supply	$TS0DV_{DD08A}$	0.76	0.8	0.84	V	
TSU ch. 1 0.8-V power supply	$TS1DV_{DD08A}$	0.76	0.8	0.84	V	
TSU ch. 0 1.8-V power supply	$TS0AV_{DD18}$	1.71	1.8	1.89	V	
TSU ch. 1 1.8-V power supply	$TS1AV_{DD18}$	1.71	1.8	1.89	V	
ADC unit A 1.8-V power supply	$AD0AV_{CCA}$	1.71	1.8	1.89	V	
ADC unit B 1.8-V power supply	$AD1AV_{CCA}$	1.71	1.8	1.89	V	
CIF PHY 0.8-V power supply	$LVRXAV_{DD}$	0.76	0.8	0.84	V	
CIF PHY 1.8-V power supply	$LVRXAV_{CC}$	1.71	1.8	1.89	V	
LPDDR4 core 0.8-V power supply	LPV_{DD}	0.76	0.8	0.84	V	
LPDDR4 PLL 1.8-V power supply	LPV_{AA}	1.71	1.8	1.89	V	
LPDDR4 PHY 1.1-V power supply	LPV_{DDQ}	1.06	1.1	1.17	V	
HDMI PHY 0.8-V power supply	$HDAV_{DD08}$	0.76	0.8	0.84	V	
HDMI PHY 1.8-V power supply	$HDAV_{DD18}$	1.71	1.8	1.89	V	
0.8-V power supply	$DSMSV_{DD0P8}$	0.76	0.8	0.84	V	
1.8-V power supply	$DSMSV_{DD18}$	1.71	1.8	1.89	V	
1.2-V power supply	$DSMV_{DD12}$	1.14	1.2	1.26	V	
PCIe PHY 0.8-V power supply	PCV_{DD08}	0.76	0.8	0.84	V	
PCIe PHY 1.8-V power supply	PCV_{DD18}	1.71	1.8	1.89	V	
USB PHY SS section 0.8-V power supply	USV_{P}	0.76	0.8	0.84	V	
USB PHY HS section 1.8-V power supply	USV_{DDH}	1.71	1.8	1.89	V	
USB PHY HS section 3.3-V power supply	USV_{D330}	3.135	3.3	3.465	V	
USB PHY HS section 0.8-V power supply	$USDV_{DD}$	0.76	0.8	0.84	V	
USB PHY SS section transmitter power supply	USV_{PTX}	0.76	0.8	0.84	V	
USB PHY SS section 3.3-V power supply	USV_{PH}	3.135	3.3	3.465	V	
Junction temperature	T_j	—	—	103	°C	

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3.3 Power-On/Off Procedures

3.3.1 Power-On Sequence (RTC/PWC)

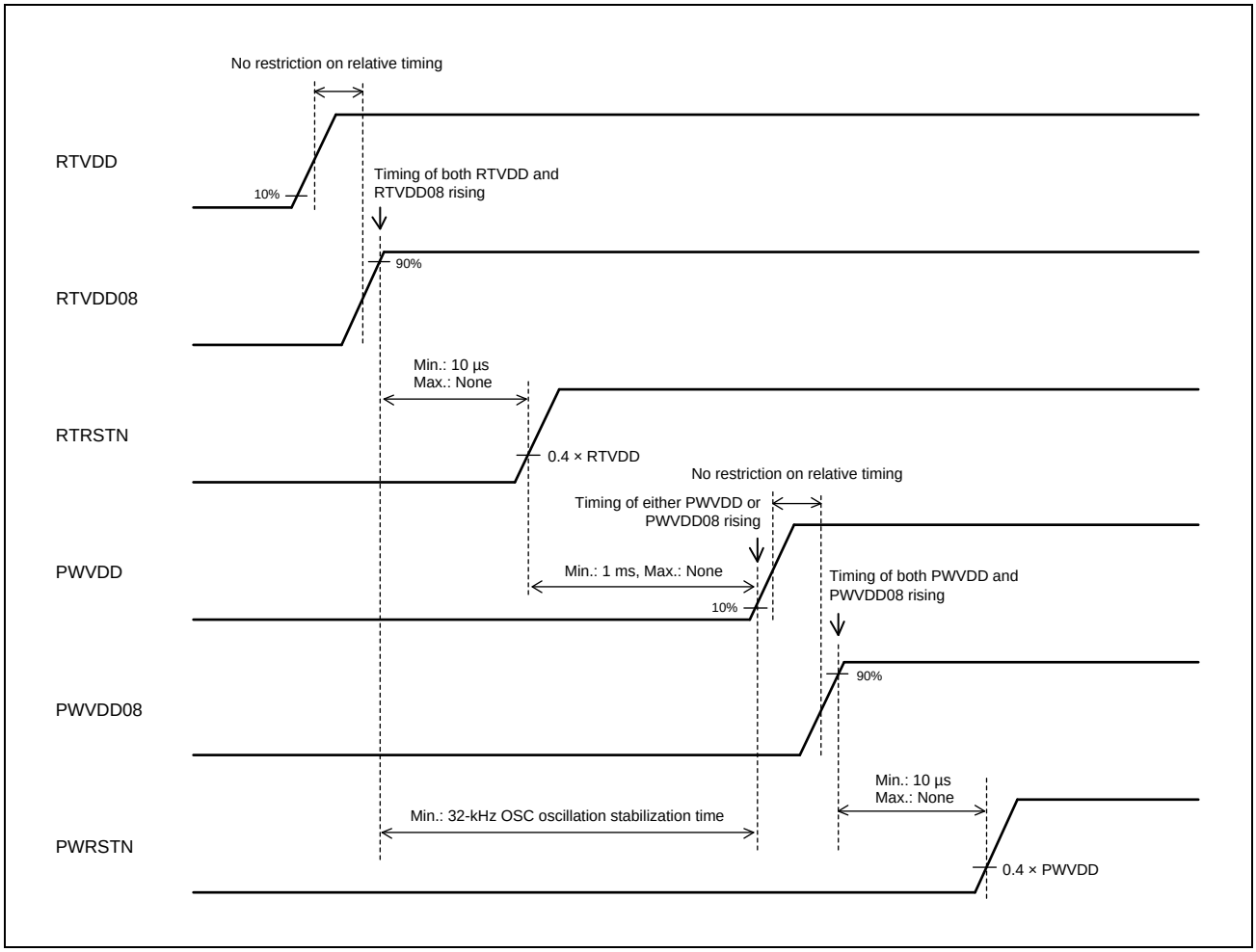
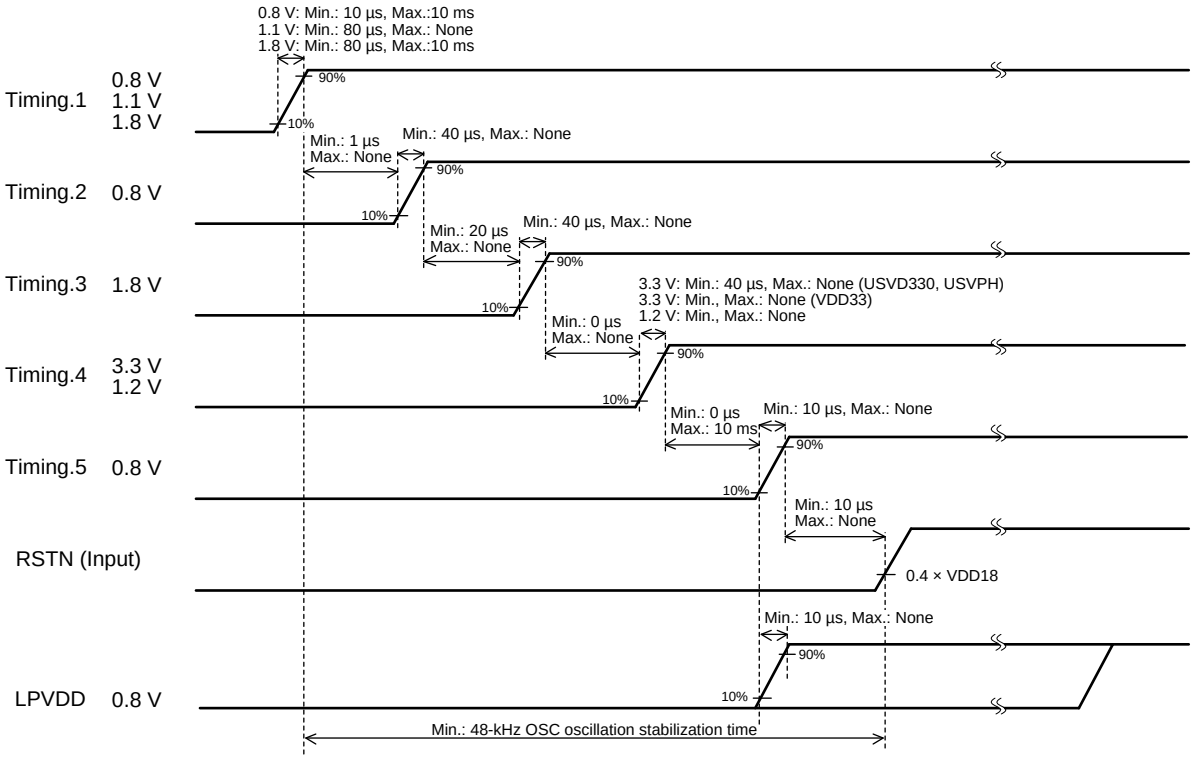


Figure 3.3-1 Power-On Sequence (RTC/PWC)

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3.3.2 Power-On/Off Sequence (other than for RTC/PWC)

3.3.2.1 Power-On Sequence (other than for RTC/PWC)



Note: See **Table 3.3-1**, **Table 3.3-2**, and **Table 3.3-3** for the power supplies which are turned on with the given timing.

Figure 3.3-2 Power-On Sequence (other than for RTC/PWC)

Table 3.3-1, **Table 3.3-2**, and **Table 3.3-3** show the correspondence between the power supplies and the power-on (off) timings.

Table 3.3-1 Various Power Supplies and Power On/Off Timings

Power Voltage	Power Supply Name	Timing
0.8 V	VDD08	Timing.1
1.1 V	LPVDDQ	
1.8 V	VDD18, LPVAA	
0.8 V	DSMSVDD0P8, PCVDD08, HDAVDD08, OTVDD08, LVRXAVDD	Timing.2
1.8 V	DSMSVDD18, PCVDD18, HDAVDD18, OTVDD18, LVRXAVCC, USVDDH	Timing.3
3.3 V	VDD33, USVD330, USVPH	Timing.4
1.2 V	DSMVDD12	
0.8 V	USDVDD, USVP, USVPTX, LPVDD*1	Timing.5

Note 1. When not controlled by the System FW, the power is on (off) at Timing.5.
When controlled by the System FW, connect the 0.8-V power supply to the LPVDD pin of this LSI via the power switch. In addition, connect the PWMEMSWIENA pin of this LSI to an enable pin of this power switch.

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Table 3.3-2 Various Power Supplies and Power On/Off Timings (PLL, TSU, ADC, etc.)

Power Voltage	Power Supply Name	Timing
0.8 V	PLDVDD08n (n = 1, 2, 3, 4, 6, 7), TSnDVDD08A (n = 0, 1)	Timing.1 or Timing.2
1.8 V	PLVDDn (n = 1, 2, 3, 4, 6, 7), TSnAVDD18 (n = 0, 1), ADnAVCCA (n = 0, 1), PREDVDD33	Timing.1 or Timing.3

Table 3.3-3 Various Power Supplies and Power On/Off Timings (1.8-V/3.3-V Switching I/O)

I/O Voltage	Power Supply Name	Case	Timing
Used as the 1.8-V I/O	Pre-driver power supply*1	1	Timing.1
	I/O power supply*2		
	Pre-driver power supply*1	2	Timing.1
	I/O power supply*2		Timing.3
	Pre-driver power supply*1	3	Timing.3
	I/O power supply*2		
Used as the 3.3-V IO	Pre-driver power supply*1	4	Timing.1
	I/O power supply*2		Timing.4
	Pre-driver power supply*1	5	Timing.3
	I/O power supply*2		Timing.4

Note 1. NAPREDVDD, PAPREDVDD,PBPREDVDD, PCPREDVDD, SD0PREDVDD, SD1FVDD, IM0PREDVDD, IM1PREDVDD, GEPREDVDD

Note 2. NAMODVDD, PAMODVDD, PBMODVDD, PCMODVDD, SD0MODVDD, SD1FMODVDD, IM0MODVDD, IM1MODVDD, GEMODVDD

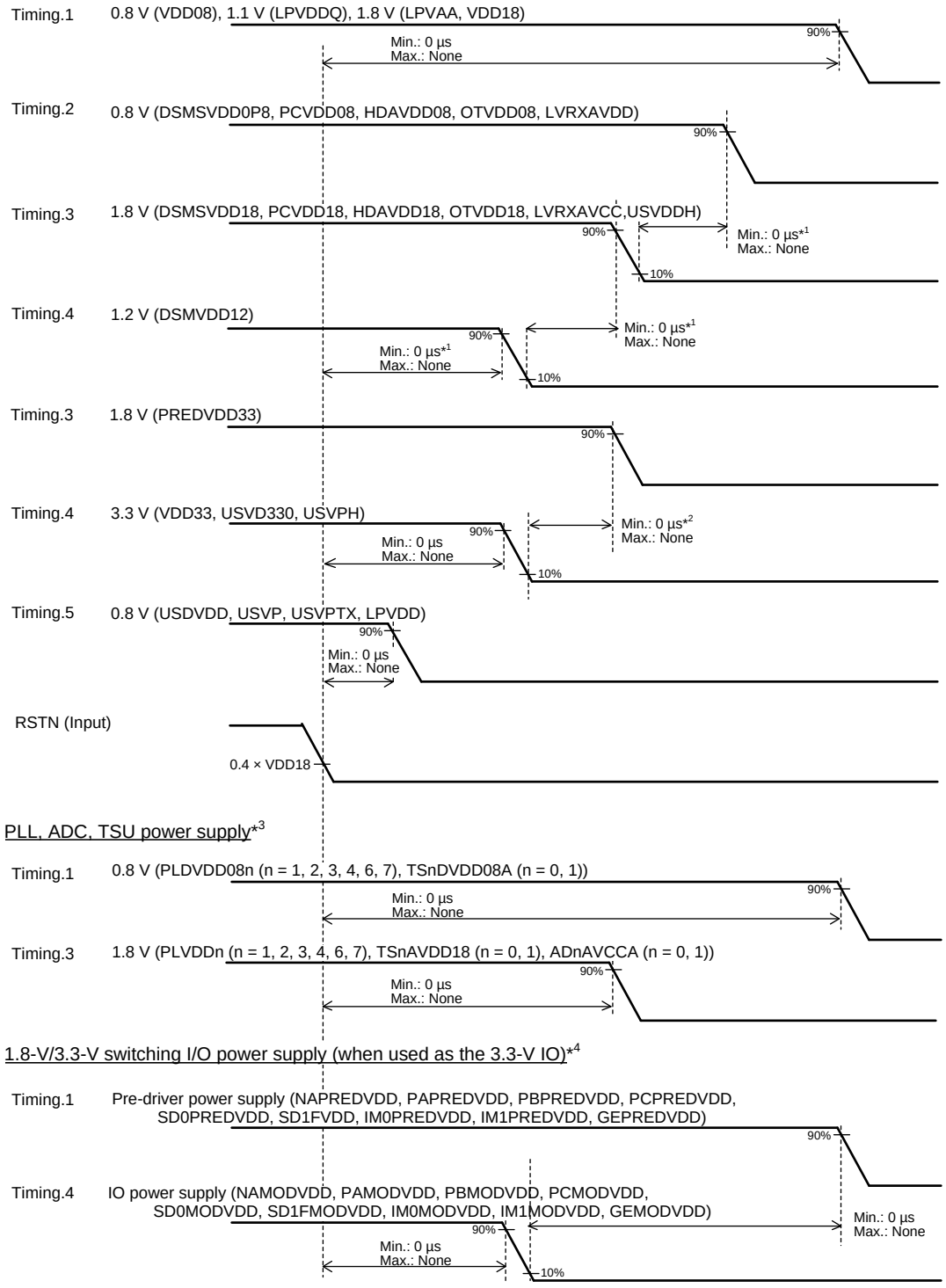
The following restrictions apply to the order of turning on the pre-driver power supply and the I/O power supply for the power supply of the 1.8-V/3.3-V switching I/O.

- When used as the 1.8-V I/O, “the pre-driver power supply and the I/O power supply are turned on at the same time” or “the pre-driver power supply is turned on first and then the I/O power supply”.
- When used as the 3.3-V I/O, “the pre-driver power supply is turned on first and then the I/O power supply”.

When used as the 1.8-V I/O, the pre-driver power supply and the I/O power supply must be turned on or off in case 1, 2, or 3. When used as the 3.3-V I/O, they must be turned on or off in case 4 or 5.

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3.3.2.2 Power-Off Sequence (other than for RTC/PWC)



Note: The power off time difference must be minimized.

Note 1. The power supply in the case of Timing.2 (0.8 V) must be turned off no less than 0 ns after the power supply in the case of Timing.3 (1.8 V) is turned off and the power supply in the case of Timing.3 (1.8 V) must be turned off no less than 0 ns after the power supply in the case of Timing.4 (1.2 V) is turned off.

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Note 2. The power supply in the case of Timing.3 (1.8 V) must be turned off no less than 0 ns after the power supply in the case of Timing.4 (3.3 V) is turned off.

Note 3. The 0.8-V power supply and the 1.8-V power supply are indicated in the case of Timing.1 and Timing.3, respectively.
No restrictions apply to the order of turning off the 0.8-V power supply and the 1.8-V power supply.

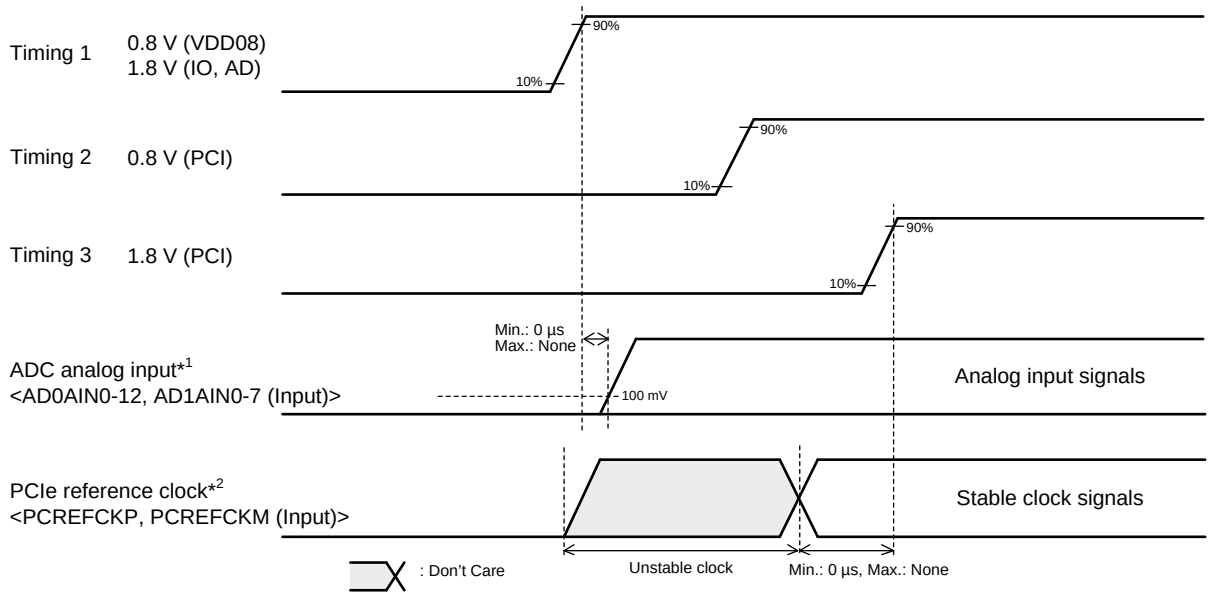
Note 4. This is used as the 3.3-V I/O, and the pre-driver power supply and the I/O power supply are indicated in the case of Timing.1 and Timing.4, respectively.
The pre-driver power supply must be turned off no less than 0 ns after the I/O power supply is turned off.
When used as the 1.8-V I/O, no restrictions apply to the order of turning on the pre-driver power supply and the I/O power supply.

Figure 3.3-3 Power-Off Sequence (other than for RTC/PWC)

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3.3.3 Timing Limitations when Power is being Turned On

Control the input signals according to the timing limitations for power being turned on.

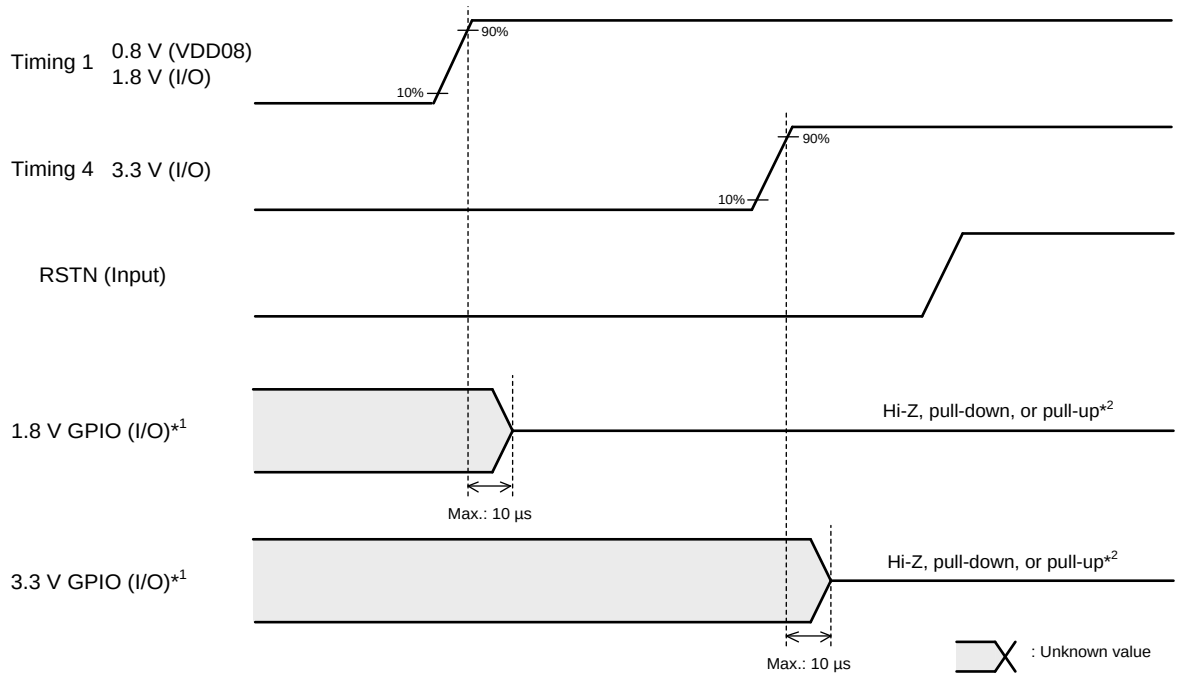


Note 1. Only apply analog input voltages after the ADC 1.8-V power supply voltages (AD0AVCCA, AD1AVCCA) have risen. Analog input voltages should be kept below 100 mV before the ADC 1.8-V power supplies have risen.

Note 2. For the PCIe reference clock, input the clock signal after the oscillation stabilization before the PCI 1.8-V power supply (PCVDD18) is risen.

Figure 3.3-4 ADC Analog Inputs at Power-On/PCI Reference Clock Input Timing

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Note 1. After both the internal power and I/O power supply voltages (1.8 V or 3.3 V) have risen, the reset is effective by the time 10 µs (max.) have elapsed and the pin states are stable. The pin states are not guaranteed between the supply voltages rising and the reset becoming effective.

Note 2. The state depends on the pin. For the initial states of the respective pins, refer to “Initial Value after POR” in the list of external pins.

Figure 3.3-5 GPIO Timing at Power-On

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3.4 DC Characteristics

3.4.1 Supply Current

3.4.1.1 Maximum Supply Current

Conditions for the supply current: Power supply voltage = Max. value, Tj = −40 to 125ºC

Table 3.4-1 Max. Supply Currents during Operation (1/2)

Item	Symbol	Max.	Unit	Note
VDD08 core power supply current	I_{DD08}	4770	mA	The current must be within the maximum supply current.
RTC core power supply current	$I_{DDRTVDD08}$	700	µA	RTV_{DD08}*1
RTC I/O, 1.5-V OSC power supply current	$I_{DDRTVDD}$	300*3	µA	RTV_{DD}*2
PWC core power supply current	$I_{DDPWVDD08}$	1	mA	PWV_{DD08}
PWC I/O power supply current	$I_{DDPWVDD}$	3	mA	PWV_{DD}
PORT01(A), PORT03 pre-driver power supply current	$I_{DDPAPRE}$	2	mA	$PAPREDV_{DD}$: PWM0 - 7, CSI0, TRDAT6 - 15
PORT01(A), PORT03 I/O power supply current	$I_{DDPAMOD}$	23	mA	$PAMODV_{DD}$: PWM0 - 7, CSI0, TRDAT6 - 15
PORT01(B), PORT04, PORT07, PORT21 pre-driver power supply current	$I_{DDPBPRE}$	1	mA	$PBPREDV_{DD}$: PWM8 - 15, TRACE0 - 6, AUI
PORT01(B), PORT04, PORT07, PORT21 I/O power supply current	$I_{DDPBMOD}$	16	mA	$PBMODV_{DD}$: PWM8 - 15, TRACE0 - 6, AUI
PORT06 pre-driver power supply current	$I_{DDPCPRE}$	1	mA	$PCPREDV_{DD}$: P0600 - 11
PORT06 I/O power supply current	$I_{DDPCMOD}$	11	mA	$PCMODV_{DD}$: P0600 - 11
PORT10 pre-driver power supply current	$I_{DDIM0PRE}$	1	mA	$IM0PREDV_{DD}$
PORT10 I/O power supply current	$I_{DDIM0MOD}$	4	mA	$IM0MODV_{DD}$
PORT11 pre-driver power supply current	$I_{DDIM1PRE}$	1	mA	$IM1PREDV_{DD}$
PORT11 I/O power supply current	$I_{DDIM1MOD}$	4	mA	$IM1MODV_{DD}$
PORT00 pre-driver power supply current	$I_{DDNAPRE}$	2	mA	$NAPREDV_{DD}$: eMMC HS200
PORT00 I/O power supply current	$I_{DDNAMOD}$	10	mA	$NAMODV_{DD}$: eMMC HS200
PORT08 pre-driver power supply current	$I_{DDSD0PRE}$	1	mA	$SD0PREDV_{DD}$: SDIO SDR104
PORT08 I/O power supply current	$I_{DDSD0MOD}$	16	mA	$SD0MODV_{DD}$: SDIO SDR104
PORT09 pre-driver power supply current	I_{DDSD1F}	1	mA	$SD1FV_{DD}$: SDIO SDR104
PORT09 I/O power supply current	$I_{DDSD1MOD}$	16	mA	$SD1FMODV_{DD}$: SDIO SDR104
PORT15, PORT16, PORT17 pre-driver power supply current	$I_{DDGEPRE}$	1	mA	$GEPREDV_{DD}$
PORT15, PORT16, PORT17 I/O power supply current	$I_{DDGEMOD}$	17	mA	$GEMODV_{DD}$
VDD18 group I/O power supply current (PORT02 I/O, PORT05 I/O, PORT20 I/O. 1.8-V OSC, RSTN I/O, debugger I/O, MD0-7 I/O)	I_{DD18}	3	mA	V_{DD18}: IIC0 - 1, DEBUG

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Table 3.4-1 Max. Supply Currents during Operation (2/2)

Item	Symbol	Max.	Unit	Note
VDD33 group pre-driver power supply current (PORT12 I/O, PORT13 I/O, PORT14 I/O, PCIe I/O, USB I/O, LSI test I/O)	$I_{DDPRE33}$	2	mA	$PREDV_{DD33}$
VDD33 group I/O power supply current (PORT12 I/O, PORT13 I/O, PORT14 I/O, PCIe I/O, USB I/O, LSI test I/O)	I_{DD33}	20	mA	V_{DD33}
PLL ch. 1, 2, 3, 4, 6, 7 0.8-V power supply current	I_{DDPL08}	16	mA	Total of $PLDV_{DD081}$, $PLDV_{DD082}$, $PLDV_{DD083}$, $PLDV_{DD084}$, $PLDV_{DD086}$, $PLDV_{DD087}$
PLL ch. 1, 2, 3, 4, 6, 7 1.8-V power supply current	I_{DDPL18}	14	mA	Total of PLV_{DD1}, PLV_{DD2}, PLV_{DD3}, PLV_{DD4}, PLV_{DD6}, PLV_{DD7}
OTP 0.8-V power supply current	I_{DDOT08}	9	mA	OTV_{DD08}
OTP 1.8-V power supply current	I_{DDOT18}	60	mA	OTV_{DD18}
TSU ch. 0 0.8-V power supply current	I_{DDTS08}	1	mA	$TS0DV_{DD08A}$
TSU ch. 1 0.8-V power supply current	I_{DDTS08}	1	mA	$TS1DV_{DD08A}$
TSU ch. 0 1.8-V power supply current	I_{DDTS18}	4	mA	$TS0AV_{DD18}$
TSU ch. 1 1.8-V power supply current	I_{DDTS18}	4	mA	$TS1AV_{DD18}$
ADC unit A 1.8-V power supply current	I_{DDAD0}	1	mA	$AD0AV_{CCA}$
ADC unit B 1.8-V power supply current	I_{DDAD1}	1	mA	$AD1AV_{CCA}$
CIF PHY 0.8-V power supply current	$I_{DDLVVDD}$	127	mA	$LVRXAV_{DD}$
CIF PHY 1.8-V power supply current	$I_{DDLVVCC}$	81	mA	$LVRXAV_{CC}$
LPDDR4 core 0.8-V power supply current	$I_{DDLPVDD}$	800	mA	LPV_{DD}: 3200 Mbps
LPDDR4 PLL 1.8-V power supply current	$I_{DDLPVAA}$	6	mA	LPV_{AA}: 3200 Mbps
LPDDR4 PHY 1.1-V power supply current	$I_{DDLPVDDQ}$	314	mA	LPV_{DDQ}: 3200 Mbps
HDMI PHY 0.8-V power supply current	I_{DDHD08}	24	mA	$HDAV_{DD08}$
HDMI PHY 1.8-V power supply current	I_{DDHD18}	10	mA	$HDAV_{DD18}$
0.8-V power supply current	$I_{DDDSM08}$	2	mA	$DSMSV_{DD0P8}$
1.8-V power supply current	$I_{DDDSM18}$	30	mA	$DSMSV_{DD18}$
1.2-V power supply current	$I_{DDDSM12}$	8	mA	$DSMV_{DD12}$
PCIe PHY 0.8-V power supply current	I_{DDPC08}	188	mA	PCV_{DD08}
PCIe PHY 1.8-V power supply current	I_{DDPC18}	132	mA	PCV_{DD18}
USB PHY 0.8-V power supply current	I_{DDUS08}	88	mA	Total of $USDV_{DD}$, USV_{P}, USV_{PTX}
USB PHY 1.8-V power supply current	I_{DDUS18}	21	mA	USV_{DDH}
USB PHY 3.3-V power supply current	I_{DDUS33}	57	mA	Total of USV_{D330}, USV_{PH}

Note 1. Reference value for the RTC core power supply current (at normal temperature at 0.8 V): 35 µA

Note 2. Reference value for the RTC I/O, 1.5-V OSC power supply current (at normal temperature at 1.5 V): 10 µA

Note 3. In normal operation (when the power supplies other than for the RTC power domain are turned on), current flows to the PWISO pin via a pull-up resistor, so this amount of current must be taken into account when the current drawn is estimated.
[*Example*] When the pull-up resistance is 10kΩ, 1.5 V/10kΩ = 150 µA

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3.4.2 Standard I/O Characteristics

For the I/O groups, refer to the multiplexed pin group numbers in the list of external pins.

Table 3.4-2 DC Characteristics

V_{DD} = 1.35 V to 1.65 V (I.5-V I/O group), V_{DD} = 1.65 V to 1.95 V (1.8-V I/O groups 1, 2, 3, and 4), V_{DD} = 1.65 V to 3.60 V (3.3/1.8-V switching I/O groups 1 and 2), V_{DD} = 3.00 V to 3.60 V (3.3-V I/O group)

Item		Symbol	Min.	Typ.	Max.	Unit	Condition
External voltage tolerance	1.8-V I/O group 3*4	V_{TOL}	—	—	3.6	V	V_{DD} power-off & on
High-level input voltage	—	V_{IH}	0.7 × V_{DD}	—	V_{DD} + 0.3	V	—
Low-level input voltage	—	V_{IL}	−0.3	—	0.3 × V_{DD}	V	—
Hysteresis voltage	1.5-V I/O group*1	ΔV	0.1 × V_{DD}	—	—	V	—
	1.8-V I/O group 1*2 1.8-V I/O group 2*3	ΔV	0.1 × V_{DD}	—	—	V	
	1.8-V I/O group 3*4	ΔV	0.08 × V_{DD}	—	—	V	
	3.3/1.8-V switching I/O group 1*6	ΔV	0.08 × V_{DD}	—	—	V	
	3.3/1.8-V switching I/O group 2*7	ΔV	0.1	—	—	V	
	3.3-V I/O group*8	ΔV	0.08 × V_{DD}	—	—	V	
High-level input current (Non-tolerant input buffer)	1.5V I/O group*1	I_{IH}	—	—	12	μA	V_{in15} = V_{DD} max & V_{DD} power-on
	1.8-V I/O group 1*2 1.8-V I/O group 2*3 1.8-V I/O group 4*5	I_{IH}	—	—	12	μA	V_{in18} = V_{DD} max & V_{DD} power-on
	3.3/1.8-V switching I/O group 1*6 3.3/1.8-V switching I/O group 2*7	I_{IH}	—	—	12	μA	Vin_{33} = V_{DD} max & V_{DD} power-on
	3.3-V I/O group*8	I_{IH}	—	—	12	μA	
High-level input current (Tolerant input buffer)	1.8-V I/O group 3*4	I_{IH}	—	—	12	μA	V_{in18_tol} = V_{DD} max & V_{DD} power-on
High-level input current (Input buffer with pull-down resistor)	1.8-V I/O group 3*4 1.8-V I/O group 4*5	I_{IH}	—	—	200	μA	V_{in18} = V_{DD} max
	3.3/1.8-V switching I/O group 1*6	I_{IH}	—	—	200	μA	V_{in33} = V_{DD} max
	3.3/1.8-V switching I/O group 2*7	I_{IH}	—	—	150	μA	
	3.3-V I/O group*8	I_{IH}	—	—	200	μA	
Low-level input current (Non-tolerant input buffer)	1.5-V I/O group*1	I_{IL}	−12	—	—	μA	V_{in15} = V_{SS}
	1.8-V I/O group 1*2 1.8-V I/O group 2*3	I_{IL}	−12	—	—	μA	V_{in18} = V_{SS}
	1.8-V I/O group 4*5	I_{IL}	−12	—	—	μA	
	3.3/1.8-V switching I/O group 1*6	I_{IL}	−12	—	—	μA	V_{in33} = V_{SS}
	3.3/1.8-V switching I/O group 2*7	I_{IL}	−12	—	—	μA	
	3.3-V I/O group*8	I_{IL}	−12	—	—	μA	
Low-level input current (Tolerant input buffer)	1.8-V I/O group 3*4	I_{IL}	−12	—	—	μA	V_{in18_tol} = V_{SS}
Low-level input current (Input buffer with pull-down resistor)	1.8-V I/O group 2*3	I_{IL}	−180	—	—	μA	V_{in18} = V_{SS}
	1.8-V I/O group 3*4 1.8-V I/O group 4*5	I_{IL}	−200	—	—	μA	
	3.3/1.8-V switching I/O group 1*6	I_{IL}	−200	—	—	μA	V_{in33} = V_{SS}
	3.3/1.8-V switching I/O group 2*7	I_{IL}	−190	—	—	μA	
	3.3-V I/O group*8	I_{IL}	−200	—	—	μA	

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Item		Symbol	Min.	Typ.	Max.	Unit	Condition
High-level output voltage	1.5-V I/O group*1	V_{OH}	0.8 × V_{DD}	—	V_{DD}	V	I_{OH} = −1.8 mA-
	1.8-V I/O group 1*2	V_{OH}	0.8 × V_{DD}	—	V_{DD}	V	I_{OH} = −3.8 mA
	1.8-V I/O group 2*3	V_{OH}	0.8 × V_{DD}	—	V_{DD}	V	I_{OH} = −1.8/−3.8/−7.8/−11 mA (drive strength X1/X2/X4/X6)
	1.8-V I/O group 3*4 1.8-V I/O group 4*5	V_{OH}	0.8 × V_{DD}	—	V_{DD}	V	I_{OH} = −1.6/−3.2/−6.4/−9.6 mA (drive strength X1/X2/X4/X6)
	3.3/1.8-V switching I/O group 1 (1.8 V)*6	V_{OH}	0.8 × V_{DD}	—	V_{DD}	V	I_{OH} = −1.6/−3.2/−6.4/−9.6 mA (drive strength X1/X2/X4/X6)
	3.3/1.8-V switching I/O group 1 (3.3 V)*6	V_{OH}	0.8 × V_{DD}	—	V_{DD}	V	I_{OH} = −2/−4/−8/−12 mA (drive strength X1/X2/X4/X6)
	3.3/1.8-V switching I/O group 2 (1.8 V)*7	V_{OH}	0.8 × V_{DD}	—	V_{DD}	V	I_{OH} = −5/−6/−7/−10 mA (drive strength X1/X2/X4/X6)
	3.3/1.8-V switching I/O group 2 (3.3 V)*7	V_{OH}	0.8×V_{DD}	—	V_{DD}	V	I_{OH} = −9/−11/−13/−18 mA (drive strength X1/X2/X4/X6)
	3.3-V I/O group*8	V_{OH}	0.8 × V_{DD}	—	V_{DD}	V	I_{OH} = −2/−4/−8/−12 mA (drive strength X1/X2/X4/X6)
Low-level output voltage	1.5-V I/O group*1	V_{OL}	0	—	0.2 × V_{DD}	V	I_{OL} = 1.8 mA
	1.8-V I/O group 1*2	V_{OL}	0	—	0.2 × V_{DD}	V	I_{OL} = 3.8 mA
	1.8-V I/O group 2*3	V_{OL}	0	—	0.2 × V_{DD}	V	I_{OL} = 1.8/3.8/7.8/11 mA (drive strength X1/X2/X4/X6)
	1.8-V I/O group 3*4 1.8-V I/O group 4*5	V_{OL}	0	—	0.2 × V_{DD}	V	I_{OL} = 1.6/3.2/6.4/9.6 mA (drive strength X1/X2/X4/X6)
	3.3/1.8-V switching I/O group 1 (1.8 V)*6	V_{OL}	0	—	0.2 × V_{DD}	V	I_{OL} = 1.6/3.2/6.4/9.6 mA (drive strength X1/X2/X4/X6)
	3.3/1.8-V switching I/O group 1 (3.3 V)*6	V_{OL}	0	—	0.2 × V_{DD}	V	I_{OL} = 2/4/8/12 mA (drive strength X1/X2/X4/X6)
	3.3/1.8-V switching I/O group 2 (1.8 V)*7	V_{OL}	0	—	0.2 × V_{DD}	V	I_{OL} = 5/6/7/10 mA (drive strength X1/X2/X4/X6)
	3.3/1.8-V switching I/O group 2 (3.3 V)*7	V_{OL}	0	—	0.2×V_{DD}	V	I_{OL} = 9/11/13/18 mA (drive strength X1/X2/X4/X6)
	3.3-V I/O group*8	V_{OL}	0	—	0.2 × V_{DD}	V	I_{OL} = 2/4/8/12 mA (drive strength X1/X2/X4/X6)
Pull-up resistance	1.8-V I/O group 2*3	R_{PU}	11	—	47	kΩ	—
	1.8-V I/O group 3*4 1.8-V I/O group 4*5	R_{PU}	11	—	49	kΩ	—
	3.3/1.8-V switching I/O group 1 (1.8 V)*6	R_{PU}	11	—	49	kΩ	—
	3.3/1.8-V switching I/O group 1 (3.3 V)*6	R_{PU}	15	—	83	kΩ	—
	3.3/1.8-V switching I/O group 2 (1.8 V)*7	R_{PU}	12	—	92	kΩ	—
	3.3/1.8-V switching I/O group 2 (3.3 V)*7	R_{PU}	18	—	72	kΩ	—
	3.3-V I/O group*8	R_{PU}	15	—	83	kΩ	—

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Item		Symbol	Min.	Typ.	Max.	Unit	Condition
Pull-down resistance	1.8-V I/O group 3*4 1.8V I/O group 4*5	R_{PD}	12	—	45	kΩ	—
	3.3/1.8-V switching I/O group 1 (1.8 V)*6	R_{PD}	12	—	45	kΩ	—
	3.3/1.8-V switching I/O group 1 (3.3 V)*6	R_{PD}	20	—	75	kΩ	—
	3.3/1.8-V switching I/O group 2 (1.8 V)*7	R_{PD}	13	—	92	kΩ	—
	3.3/1.8-V switching I/O group 2 (3.3 V)*7	R_{PD}	24	—	87	kΩ	—
	3.3-V I/O group*8	R_{PD}	20	—	75	kΩ	—
Input capacitance	—	C_{in}	—	—	10	pF	

Note 1. Target I/O group: 1.5-V OSC, RTC I/O

Note 2. Target I/O group: PWC I/O

Note 3. Target I/O group: PORT20 I/O, RSTN I/O, 1.8-V OSC

Note 4. Target I/O group: PORT02 I/O, PORT05 I/O

Note 5. Target I/O group: MD0-7 I/O, debugger I/O

Note 6. Target I/O group:
PORT01(A) I/O, PORT03 I/O, PORT01(B) I/O, PORT04 I/O, PORT07 I/O, PORT21 I/O, PORT06 I/O, PORT10 I/O, PORT11 I/O

Note 7. Target I/O group:
PORT00 I/O, PORT08 I/O, PORT09 I/O, PORT15 I/O, PORT16 I/O, PORT17 I/O

Note 8. Target I/O group:
PORT12 I/O, PORT13 I/O, PORT14 I/O, PCIe I/O, USB I/O, LSI test I/O

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3.5 AC Characteristics

AC characteristics measurement conditions

- I/O signal reference levels:
  $V_{DD18}/2$, $V_{DD33}/2$, $NAMODV_{DD}/2$, $PAMODC_{DD}/2$, $PBMODV_{DD}/2$, $PCMODV_{DD}/2$, $SD0MODV_{DD}/2$, $SD1FMODV_{DD}/2$, $IM0MODV_{DD}/2$, $GEMODV_{DD}/2$, $IM1MODV_{DD}/2$, V_{IH}, V_{OH} (min.), V_{IL}, V_{OL} (max.)
  (Refer to the corresponding timing charts.)
- Output load: C_L = 20 pF if not otherwise stated

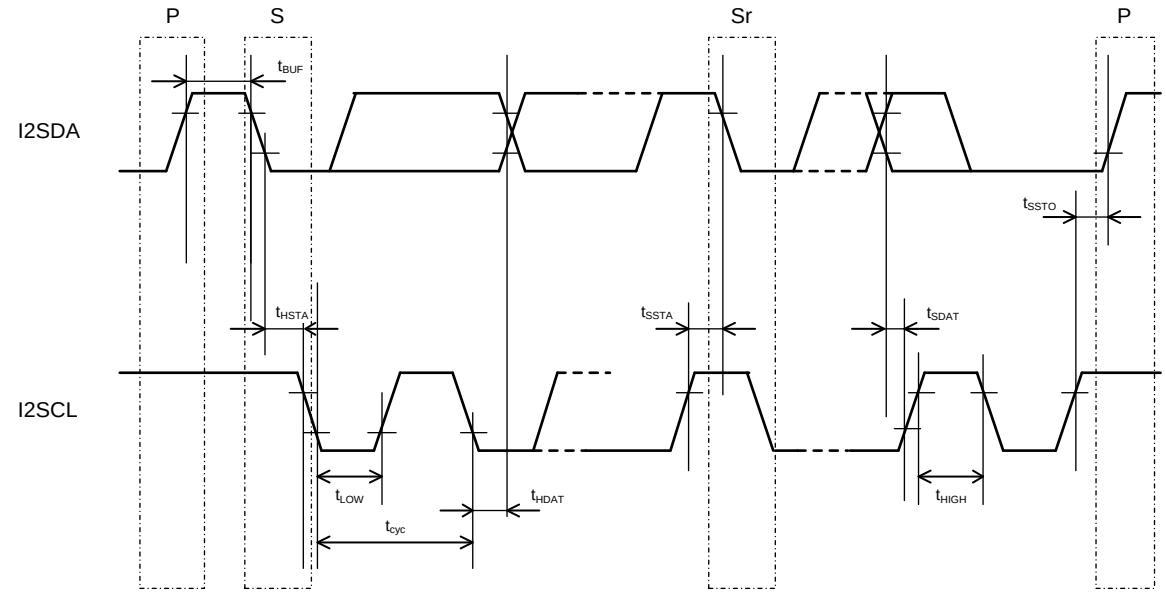
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3.5.1 IIC Bus Interface

Table 3.5-1 IIC Timing

Item	Symbol	Min.	Typ.	Max.	Unit	Note
I2SCLn cycle time	t_{cyc}	2500	—	—	ns	
I2SCLn low level width	t_{LOW}	1300	—	—	ns	
I2SCLn high level width	t_{HIGH}	600	—	—	ns	
Bus free time (time from start to stop condition)	t_{BUF}	1300	—	—	ns	
Start condition hold time	t_{HSTA}	600	—	—	ns	
Restart condition setup time	t_{SSTA}	600	—	—	ns	
Stop condition setup time	t_{SSTO}	600	—	—	ns	
I2SDAn setup time	t_{SDAT}	100	—	—	ns	
I2SDAn hold time	t_{HDAT}	0	—	900	ns	

Note: n = 0 to 3



Note: S: START condition
P: STOP condition
Sr: Repeated START condition

Figure 3.5-1 IIC Timing

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3.5.2 Clocked Serial Interface (CSI)

3.5.2.1 Master Mode

Table 3.5-2 Master Mode Timing

Item	Symbol	Min.	Typ.	Max.	Unit	Note
CSSCLKn cycle time	t_{cyc}	41.66	—	—	ns	
CSSCLKn output low level width	t_{LOW}	18	—	—	ns	Falling edge mode*1
CSSCLKn output high level width	t_{HIGH}	18	—	—	ns	Rising edge mode*1
CSRXDn setup time (CSSCLKn rising and falling edges)	t_{SRXD}	t_{LOW} − 9	—	—	ns	
CSRXDn hold time (CSSCLKn rising and falling edges)	t_{HRXD}	5.0	—	—	ns	
CSTXDn output delay time (CSSCLKn rising and falling edges)	t_{DTXD}	−5.0	—	7.5	ns	*1

Note: n = 0 to 5

Note 1. The 3-wire serial interface (CSI) should be used with a driving ability of at least X2.
Select one of the driving abilities listed below according to the load capacitance.
X2@C_L = 15 pF, X4@C_L = 20 pF

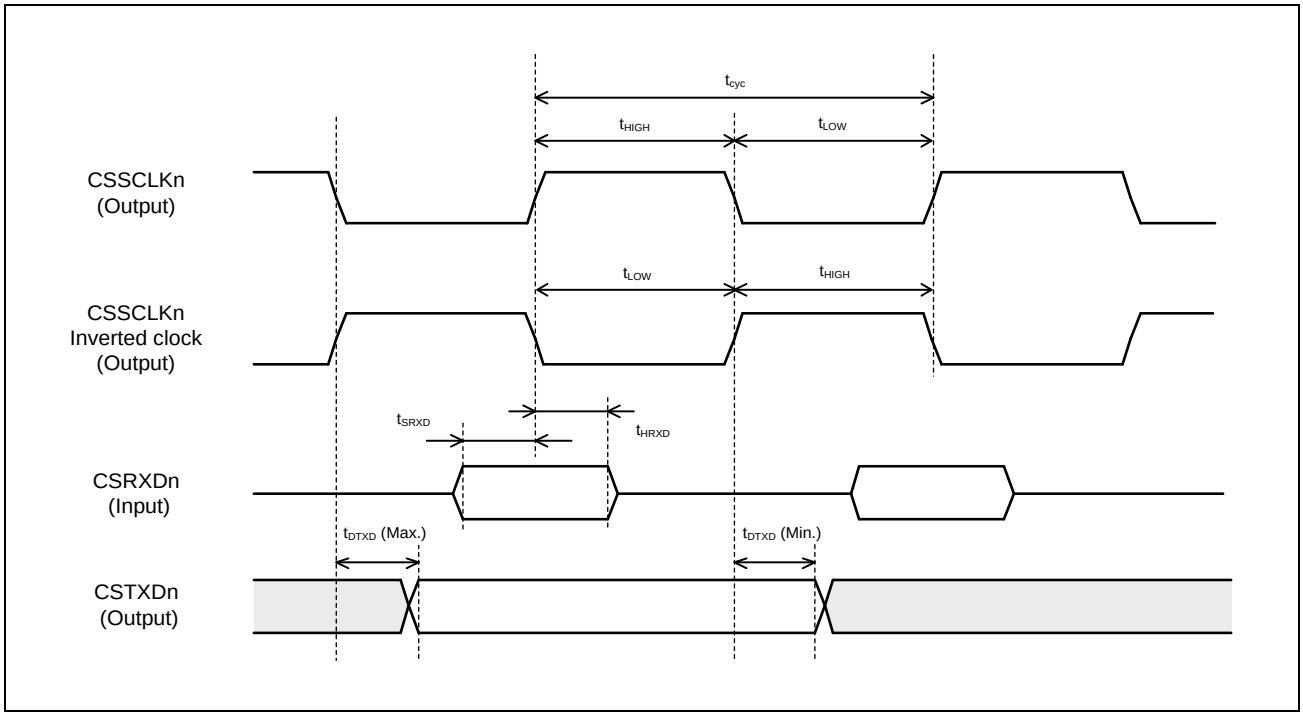


Figure 3.5-2 Master Mode Timing

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3.5.2.2 Slave Mode

Table 3.5-3 Slave Mode Timing

Item	Symbol	Min.	Typ.	Max.	Unit	Note
CSSCLKn cycle time	t_{cyc}	41.66	—	—	ns	
CSSCLKn input low level width	t_{LOW}	18	—	—	ns	Falling edge mode
CSSCLKn input high level width	t_{HIGH}	18	—	—	ns	Rising edge mode
CSRXDn setup time (CSSCLKn rising and falling edges)	t_{SRXD}	7.5	—	—	ns	
CSRXDn hold time (CSSCLKn rising and falling edges)	t_{HRXD}	5.0	—	—	ns	
CSCSn setup time (CSSCLKn rising and falling edges)	t_{SCS}	84	—	—	ns	
CSCSn hold time (CSSCLKn rising and falling edges)	t_{HCS}	21	—	—	ns	
CSTXDn output delay time (CSSCLKn rising and falling edges)	t_{DTXD}	−5.0	—	10.5	ns	*1

Note: n=0 to 5

Note 1. The 3-wire serial interface (CSI) should be used with a driving ability of at least X2.
Select one of the driving abilities listed below according to the load capacitance.
X2@C_L = 15 pF, X4@C_L = 20 pF

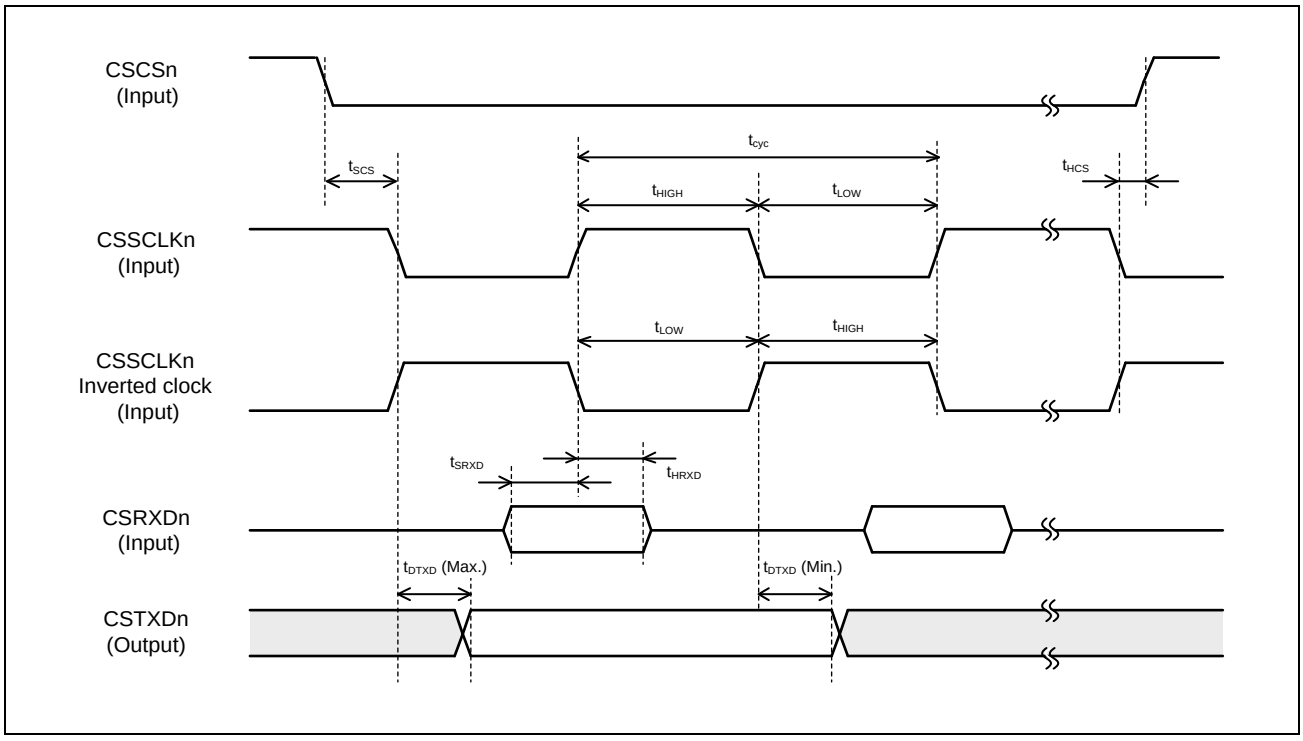


Figure 3.5-3 Slave Mode Timing

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3.5.3 Ethernet MAC interface (ETHER)

3.5.3.1 100-Mbps Ethernet Mode

Table 3.5-4 100-Mbps Ethernet Mode Timing

Item	Symbol	Min.	Typ.	Max.	Unit	Note
GETXC cycle time	t_{Tcyc}	39.5	40	40.5	ns	
GETXEN output delay time	t_{DTXE}	0	—	25	ns	
GETXD output delay time	t_{DTXD}	0	—	25	ns	
GERXC cycle time	t_{Rcyc}	39.5	40	40.5	ns	
GERXDV setup time	t_{SRXV}	10	—	—	ns	
GERXDV hold time	t_{HRXV}	10	—	—	ns	
GERXD setup time	t_{SRXD}	10	—	—	ns	
GERXD hold time	t_{HRXD}	10	—	—	ns	
GERXER setup time	t_{SRER}	10	—	—	ns	
GERXER hold time	t_{HRER}	10	—	—	ns	

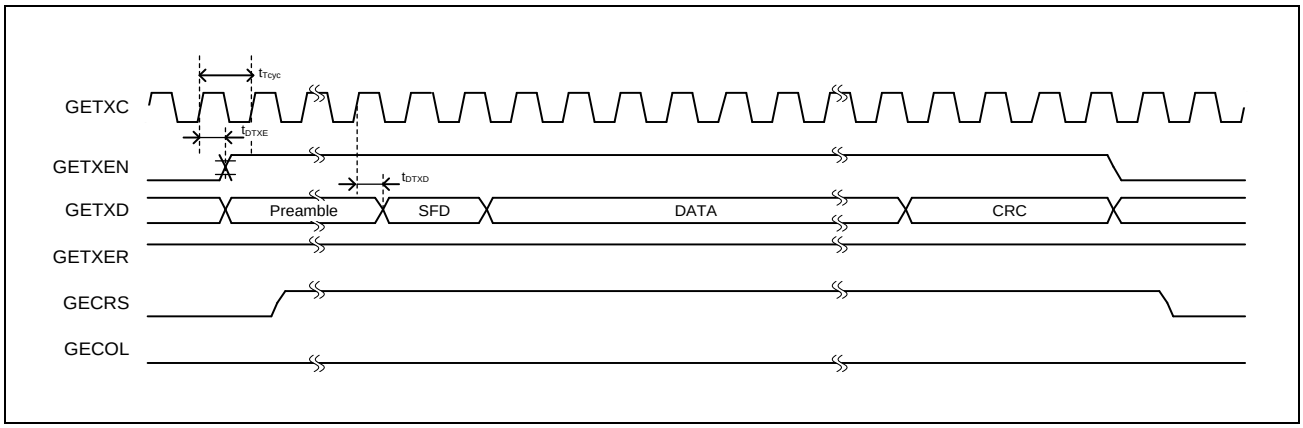


Figure 3.5-4 Transmission Timing

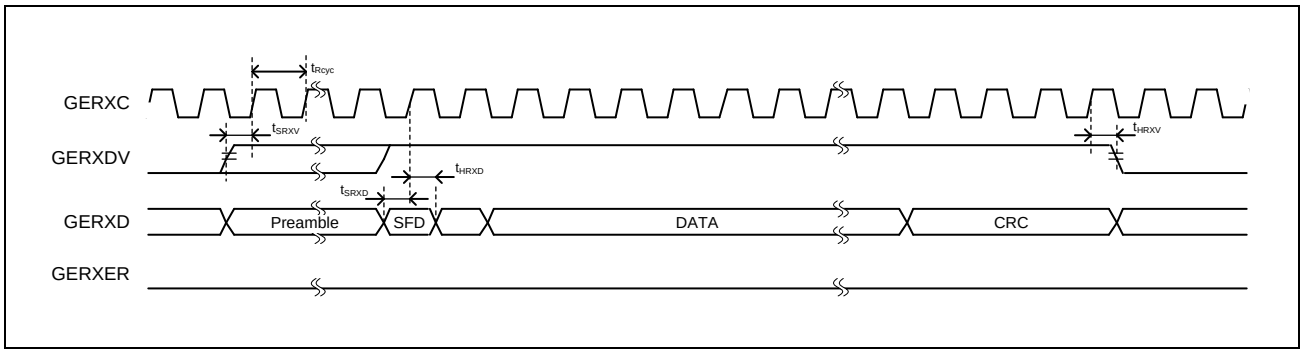


Figure 3.5-5 Reception Timing (Normal)

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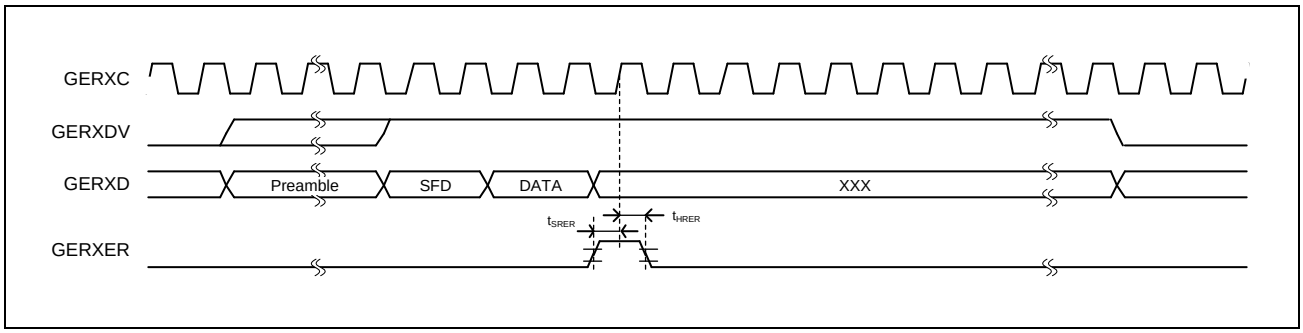


Figure 3.5-6 Reception Timing (in Cases of Error)

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3.5.3.2 1-Gbps Ethernet Mode

Table 3.5-5 1-Gbps Ethernet Mode Timing

Item	Symbol	Min.	Typ.	Max.	Unit	Note
GECLK input frequency	$f_{REF125CK}$	125 − 100 ppm	—	125 + 100 ppm	MHz	
GECLK input duty ratio	I_{DUTY}	45	50	55	%	
GEGTXCLK cycle time	t_{GTcyc}	7.5	8	8.5	ns	
GETXEN output delay time	t_{DGTXE}	0.5	—	5.5	ns	
GETXD output delay time	t_{DGTXD}	0.5	—	5.5	ns	
GERXC cycle time	t_{GRcyc}	7.5	8	8.5	ns	
GERXDV setup time	t_{SGRXV}	2.5	—	—	ns	
GERCDV hold time	t_{HGRXV}	0.5	—	—	ns	
GERXD setup time	t_{SGRXD}	2.5	—	—	ns	
GERXD hold time	t_{HGRXD}	0.5	—	—	ns	
GERXER setup time	t_{SGRER}	2.5	—	—	ns	
GERXER hold time	t_{HGRER}	0.5	—	—	ns	

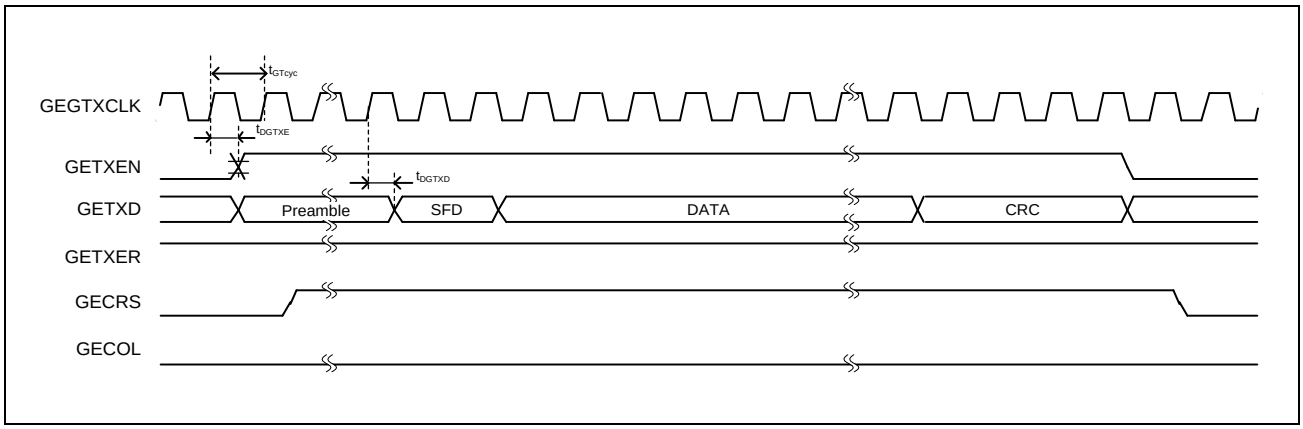


Figure 3.5-7 Transmission Timing

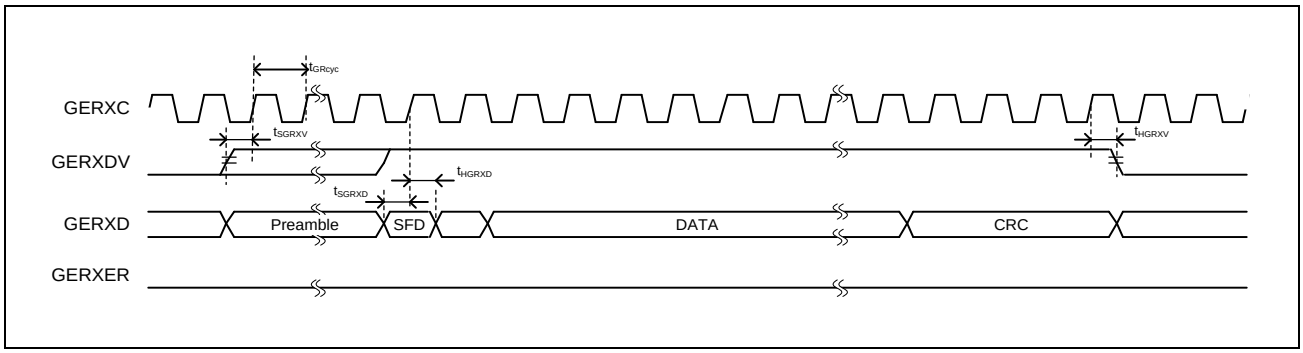


Figure 3.5-8 Reception Timing (Normal)

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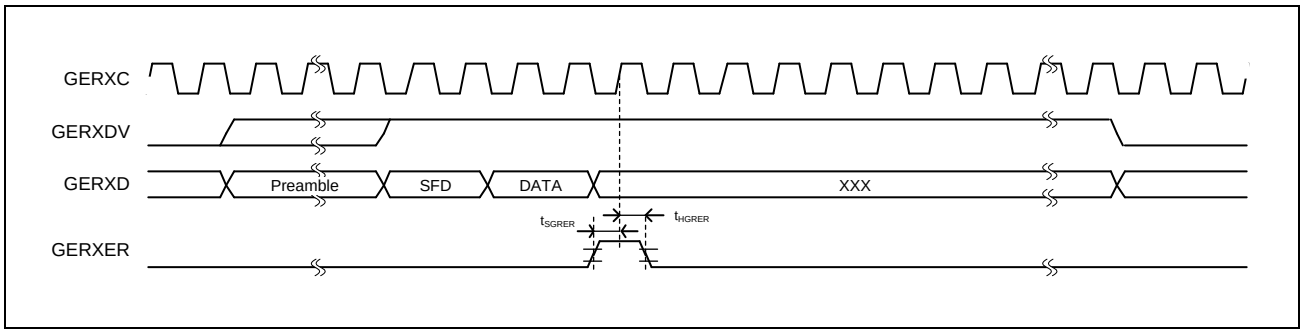


Figure 3.5-9 Reception Timing (in Cases of Error)

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3.5.4 SD Host Interface (SDI)

This LSI includes *the SD host interfaces that are compliant with the SD specification version 3.01*.

3.5.5 eMMC Interface (eMMC)

The eMMC interface should be used with a driving ability of at least X2.

Table 3.5-6 HS200 Timing

Item	Symbol	Min.	Typ.	Max.	Unit	Note
MMCLK cycle time	t_{cyc}	5	—	10	ns	C_L = 15 pF V_{OH} = 0.65 × V_{DD}(NAMODV$_{DD}$) V_{OL} = 0.35 × V_{DD}(NAMODV$_{DD}$)
MMCLK output low level width	t_{LOW}	1.5	—	—	ns	
MMCLK output high level width	t_{HIGH}	1.5	—	—	ns	
MMCLK rise time	t_r	—	—	1	ns	
MMCLK fall time	t_f	—	—	1	ns	
MMCMD/ MMDAT output delay time	t_{DDAT}	−1.5	—	0.9	ns	
MMCMD/ MMDAT setup time*1	t_{SDAT}	—	—	—	ns	
MMCMD/ MMDAT hold time*1	t_{HDAT}	—	—	—	ns	
MMCMD/ MMDAT data width*1	t_{WDAT}	2.88	—	—	ns	

Note 1. In HS200 mode, the sampling clock controller (SCC) must be used for tuning.

Table 3.5-7 High Speed Timing

Item	Symbol	Min.	Typ.	Max.	Unit	Note
MMCLK cycle time	t_{cyc}	20	—	—	ns	C_L = 30 pF 1.8-V operation: V_{OH} = 0.65 × V_{DD}(NAMODV$_{DD}$) V_{OL} = 0.35 × V_{DD}(NAMODV$_{DD}$) 3.3-V operation: V_{OH} = 0.625 × V_{DD}(NAMODV$_{DD}$) V_{OL} = 0.25 × V_{DD}(NAMODV$_{DD}$)
MMCLK output low level width	t_{LOW}	6.5	—	—	ns	
MMCLK output high level width	t_{HIGH}	6.5	—	—	ns	
MMCLK rise time	t_r	—	—	3	ns	
MMCLK fall time	t_f	—	—	3	ns	
MMCMD/ MMDAT output delay time	t_{DDAT}	−6.5	—	2.5	ns	
MMCMD/ MMDAT setup time	t_{SDAT}	4.0	—	—	ns	
MMCMD/ MMDAT hold time	t_{HDAT}	2.0	—	—	ns	

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Table 3.5-8 Backward Compatible Timing

Item	Symbol	Min.	Typ.	Max.	Unit	Note
MMCLK cycle time	t_{cyc}	40	—	—	ns	C_L = 30 pF 1.8-V operation: V_{OH} = 0.65 × V_{DD}(NAMODV$_{DD}$) V_{OL} = 0.35 × V_{DD}(NAMODV$_{DD}$) 3.3-V operation: V_{OH} = 0.625 × V_{DD}(NAMODV$_{DD}$) V_{OL} = 0.25 × V_{DD}(NAMODV$_{DD}$)
MMCLK output low level width	t_{LOW}	10	—	—	ns	
MMCLK output high level width	t_{HIGH}	10	—	—	ns	
MMCLK rise time	t_r	—	—	10	ns	
MMCLK fall time	t_f	—	—	10	ns	
MMCMD/ MMDAT output delay time	t_{DDAT}	−7.5	—	2.5	ns	
MMCMD/ MMDAT setup time	t_{SDAT}	4.0	—	—	ns	
MMCMD/ MMDAT hold time	t_{HDAT}	2.0	—	—	ns	

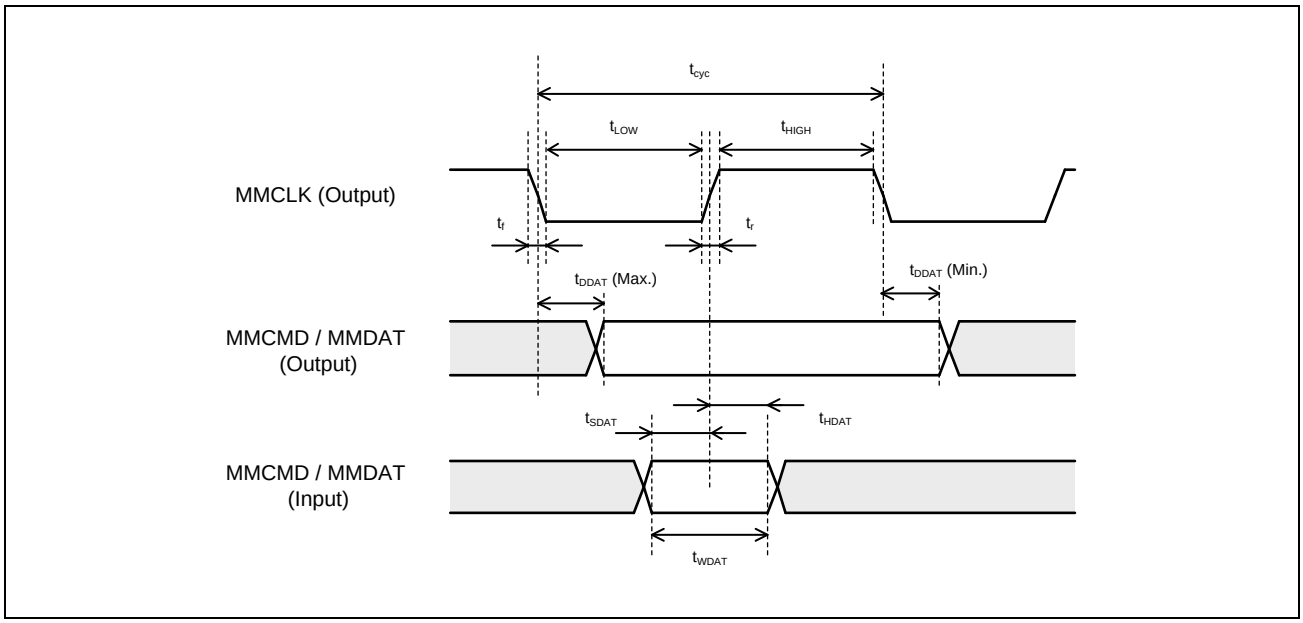


Figure 3.5-10 eMMC Timing

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3.5.6 Image Sensor Timing Generator (STG)

3.5.6.1 Clock Synchronous Serial Interface

Table 3.5-9 Clock Synchronous Serial Data I/O Timing

Item	Symbol	Min.	Typ.	Max.	Unit	Note
IMnSCLK cycle time	t_{cyc}	26.9	—	—	ns	
IMnSCLK output low level time	t_{LOW}	t_{cyc} × 0.45	—	t_{cyc} × 0.55	ns	
IMnSCLK output high level time	t_{HIGH}	t_{cyc} × 0.45	—	t_{cyc} × 0.55	ns	
IMnTXD output delay time	t_{DTXD}	−3	—	3	ns	C_L = 15 pF
IMnRXD setup time	t_{SRXD}	t_{cyc} − 12	—	—	ns	
IMnRXD hold time	t_{HRXD}	0	—	—	ns	

Note: n = 0, 1

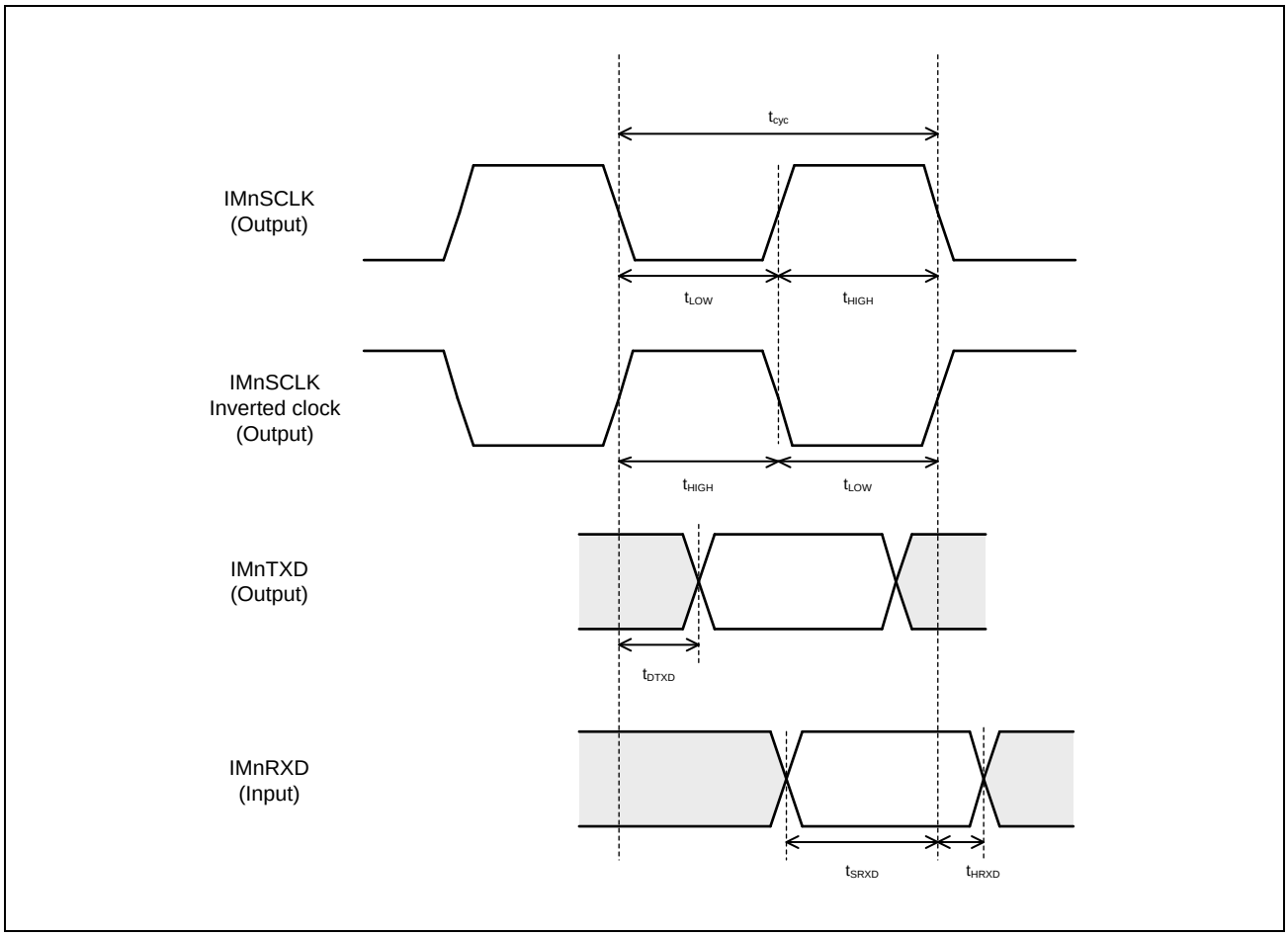


Figure 3.5-11 Clock Synchronous Serial Data I/O Timing

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Table 3.5-10 Clock Synchronous HS/VS/SIG0 Signal Output Timing

Item	Symbol	Min.	Typ.	Max.	Unit	Note
IMnSCLK cycle time	t_{cyc}	13.4	—	—	ns	
IMnSCLK output low level time	t_{LOW}	t_{cyc} × 0.45	—	t_{cyc} × 0.55	ns	
IMnSCLK output high level time	t_{HIGH}	t_{cyc} × 0.45	—	t_{cyc} × 0.55	ns	
IMnHS/ IMnVS/ IMnSIG0 output delay time	t_{DSIG}	−3	—	3	ns	C_L = 15 pF

Note: n = 0, 1

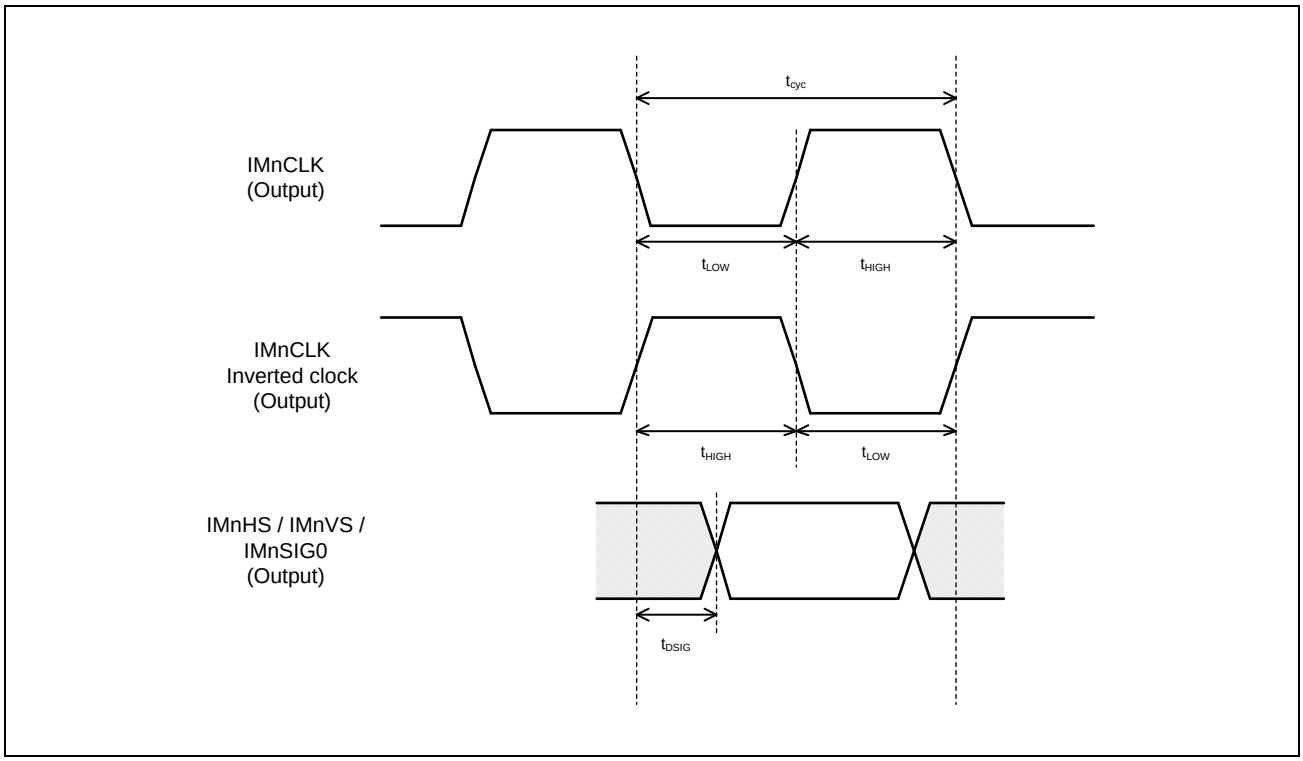


Figure 3.5-12 Clock Synchronous HS/VS/SIG0 Signal Output Timing

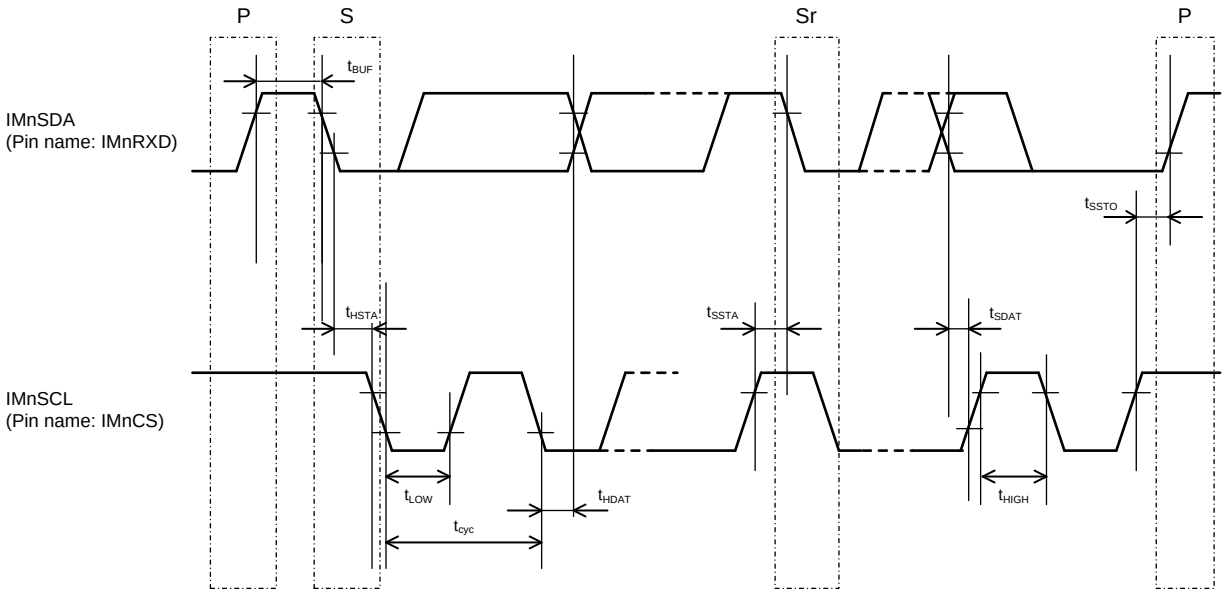
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3.5.6.2 IIC Interface

Table 3.5-11 IIC Timing

Item	Symbol	Min.	Typ.	Max.	Unit	Note
IMnSCL cycle time	t_{cyc}	2500	—	—	ns	
IMnSCL low level width	t_{LOW}	1300	—	—	ns	
IMnSCL high level width	t_{HIGH}	600	—	—	ns	
Bus free time (time from start to stop condition)	t_{BUF}	1300	—	—	ns	
Start condition hold time	t_{HSTA}	600	—	—	ns	
Restart condition setup time	t_{SSTA}	600	—	—	ns	
Stop condition setup time	t_{SSTO}	600	—	—	ns	
IMnSDA setup time	t_{SDAT}	100	—	—	ns	
IMnSDA hold time	t_{HDAT}	0	—	900	ns	

Note: n = 0, 1



Note: S: START condition
P: STOP condition
Sr: Repeated START condition

Figure 3.5-13 IIC Timing

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3.5.7 Audio Interface (AUI)

Table 3.5-12 Audio Interface Timing

Item	Symbol	Min.	Typ.	Max.	Unit	Note
AUBICK cycle time	t_{cyc}	325.5	—	—	ns	
AUBICK low level time	t_{LOW}	t_{cyc} × 0.45	—	t_{cyc} × 0.55	ns	
AUBICK high level time	t_{HIGH}	t_{cyc} × 0.45	—	t_{cyc} × 0.55	ns	
AUDO output delay time	t_{DAU}	41.6	—	79.5	ns	C_L = 15 pF
AUDI/ AULRCK setup time	t_{SAU}	26.9	—	—	ns	
AUDI/ AULRCK hold time	t_{HAU}	26.9	—	—	ns	

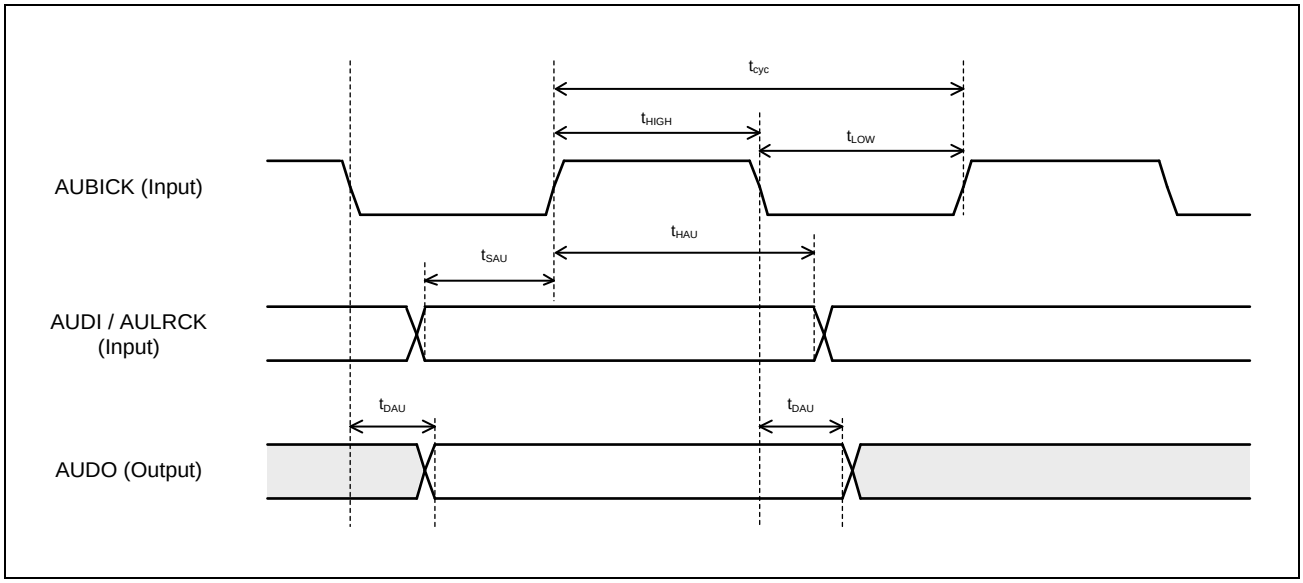


Figure 3.5-14 Audio Interface Timing

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3.5.8 TRACE Interface (TRACE)

Table 3.5-13 TRACE Interface Timing

Item	Symbol	Min.	Typ.	Max.	Unit	Note
TRCLK cycle time	t_{cyc}	20	—	—	ns	
TRCLK output low level width	t_{LOW}	9	—	—	ns	
TRCLK output high level width	t_{HIGH}	9	—	—	ns	
TRCTL/ TRDATA output delay time (TRCLK rising edge)	t_{DRDAT}	2	—	7	ns	
TRCTL/ TRDATA output delay time (TRCLK falling edge)	t_{DFDAT}	2	—	7	ns	

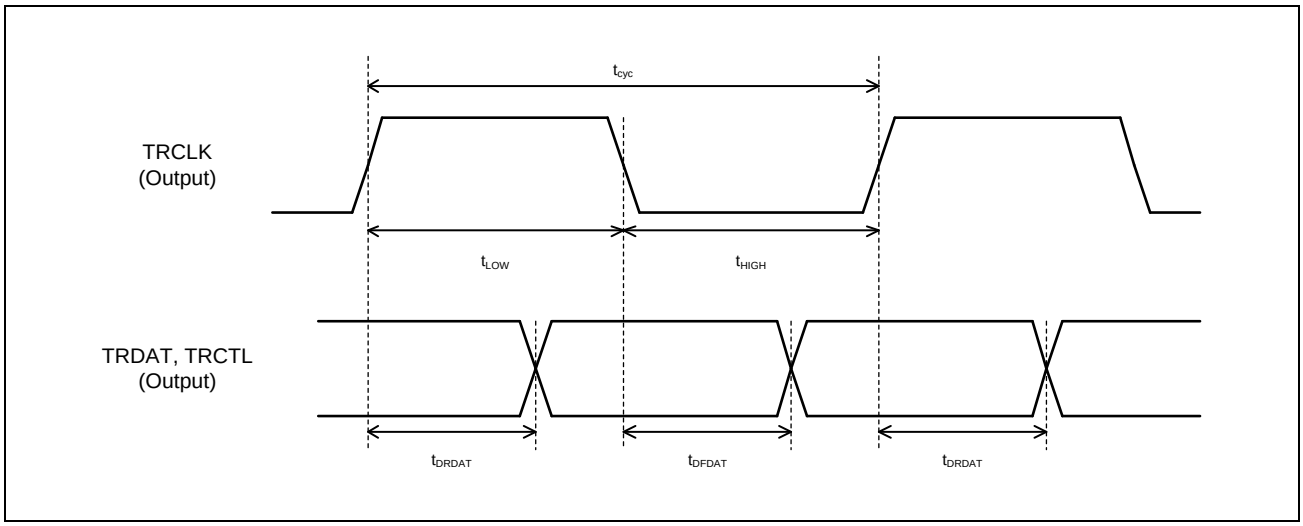


Figure 3.5-15 TRACE Interface Timing

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3.6 Various Analog Characteristics

3.6.1 MIPI CSI-2 PHY Characteristics

The MIPI CSI-2 Rx D-PHY of this LSI is equivalent to the MIPI CSI-2 Ver.1.2/D-PHY Ver.1.2. For details, refer to the MIPI specification.

3.6.2 HDMI Tx PHY Characteristics

The HDMI Tx PHY of this LSI is compliant with the following HDMI 1.4a standard:

Version 1.4a of *the High-Definition Multimedia Interface Specification*, released on March 4, 2010

3.6.3 LPDDR4 PHY Characteristics

The LPDDR4 PHY of this LSI is compliant with the JEDEC 209-4A standard.

3.6.4 USB PHY Characteristics

The USB PHY of this LSI is compliant with the following USB 3.1 GEN1 standard:

Universal Serial Bus 3.1 Specification

3.6.5 PCI Express PHY Characteristics

The PCI Express PHY of this LSI is compliant with the following PCIe standard:

Revision 4.0 of *the PCI Express® Base Specification* for Gen1/Gen 2

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3.6.6 ADC Characteristics

Table 3.6-1 DC Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Resolution	—	—	12	—	Bit	
Differential non-linearity	DNL	—	±1.0	±3.0	LSB	FAIN = 100 kHz, Ramp wave
Integral non-linearity	INL	—	±2.0	±6.0	LSB	
Top offset voltage	EOT	—	±10	±20	LSB	
Bottom offset voltage	EOB	—	±10	±20	LSB	

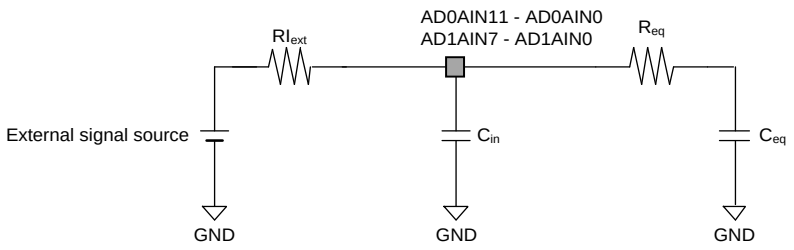
Table 3.6-2 AC Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Main clock duty ratio	—	45	50	55	%	
Analog input frequency (AD0AIN11-AD0AIN0, AD1AIN7-AD1AIN0)	FAIN	DC	—	100k	Hz	

Table 3.6-3 Recommended External Input Resistance

Item	Symbol	Min.	Typ.	Max.	Unit	Test Condition
External input resistance*1 (AD0AIN11-AD0AIN0, AD1AIN7-AD1AIN0)	RI_{ext}	—	—	2	kΩ	FCLK = 10 MHz

Note 1. Output resistance of signal generator + Series parasitic resistance between signal source and ADC input



Note: Analog input equivalent resistance (R_{eq}): 2 kΩ
Analog input equivalent capacitance (C_{eq}): 5 pF
Analog input pin capacitance (C_{in}): 2 pF

Figure 3.6-1 ADC Input Equivalent Circuit

3.6.7 Temperature Sensor Characteristics

Table 3.6-4 Temperature Sensor Characteristics

Item	Symbol	Min.	Typ.	Max.	Unit	Test Condition
Accuracy from 70°C to 125°C	Acc70_125	—	±2.0	±3.0	°C	
Accuracy from −40°C to 70°C	Accm40_70	—	±3.0	±5.0	°C	

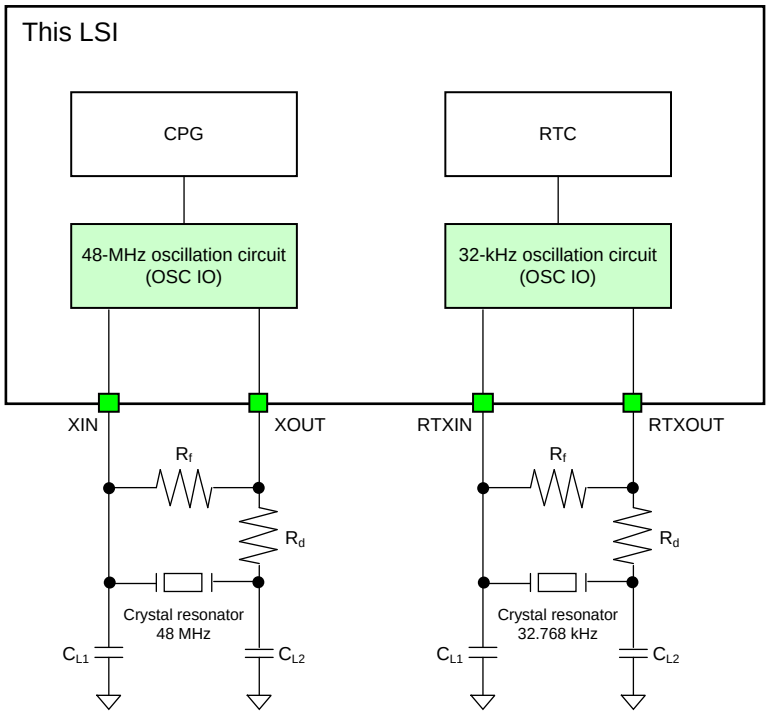
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3.7 Oscillation Circuits for Connecting Crystal Resonators (OSC)

This LSI chip includes two oscillation circuits (OSC) for connection to crystal resonators, specifically a 48-MHz crystal resonator for the system clock and a 32.768-kHz crystal resonator for the real-time clock. **Table 3.7-1** lists the pins for connecting the crystal resonators and the clock frequencies. **Figure 3.7-1** shows an example of the connections with crystal resonators.

Table 3.7-1 Pins for Connecting Crystal Resonators and Clock Frequency

External Pin Name	I/O	Clock Frequency
For the system clock		
XIN	Input	48 MHz (frequency deviation: ±50 ppm, frequency temperature characteristic: ±30 ppm)
XOUT	Output	48 MHz
For the real-time clock		
RTXIN	Input	32.768 kHz (frequency deviation: ±20 ppm)
RTXOUT	Output	32.768 kHz



Note: R_f: Feedback resistor
R_d: Dumping resistor
C_{load} (load capacitance of the crystal): See below for the formula.
$C_{load} = \{C_{L1} \times C_{L2} / (C_{L1} + C_{L2})\}$ + PCB's floating capacitance

Figure 3.7-1 Example of Connections with Crystal Resonators

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Place the crystal resonators and the capacitors C_{L1} and C_{L2} as close as possible to the pins to connect crystal resonators. To avoid interference and to ensure correct oscillation, the grounding points of the capacitors appended to the crystal resonators should be shared, and no wiring patterns should be placed near these components.

The characteristics of the crystal resonators are closely related to the design of the user board. Therefore, the user should sufficiently evaluate them with reference to the example of connection of crystal resonators in **Figure 3.7-1**.

The circuit rating of a crystal resonator depends on the crystal resonator and the stray capacitance of the mounting circuit. Therefore, contact the manufacturer of the crystal resonator before deciding upon the circuit rating. The user should thoroughly evaluate and then set the parameters (resistor and capacitor values).

Table 3.7-2 is a list of recommended values for the crystal resonators.

Table 3.7-2 Recommended Model Values for the Crystal Resonators

	Model Values for the Crystal Resonators			
Clock Frequency	Max. ESR*1	Max. C_L*2	Max. C_0*3	Max. Drive Level
32.768 kHz	70 kΩ	12.5 pF	1.4 pF	1 μW
48 MHz	50 Ω	10 pF	7 pF	100 μW

Note 1. ESR means the equivalent series resistor of the crystal resonator.

Note 2. C_L is the load capacitance of the crystal resonator.

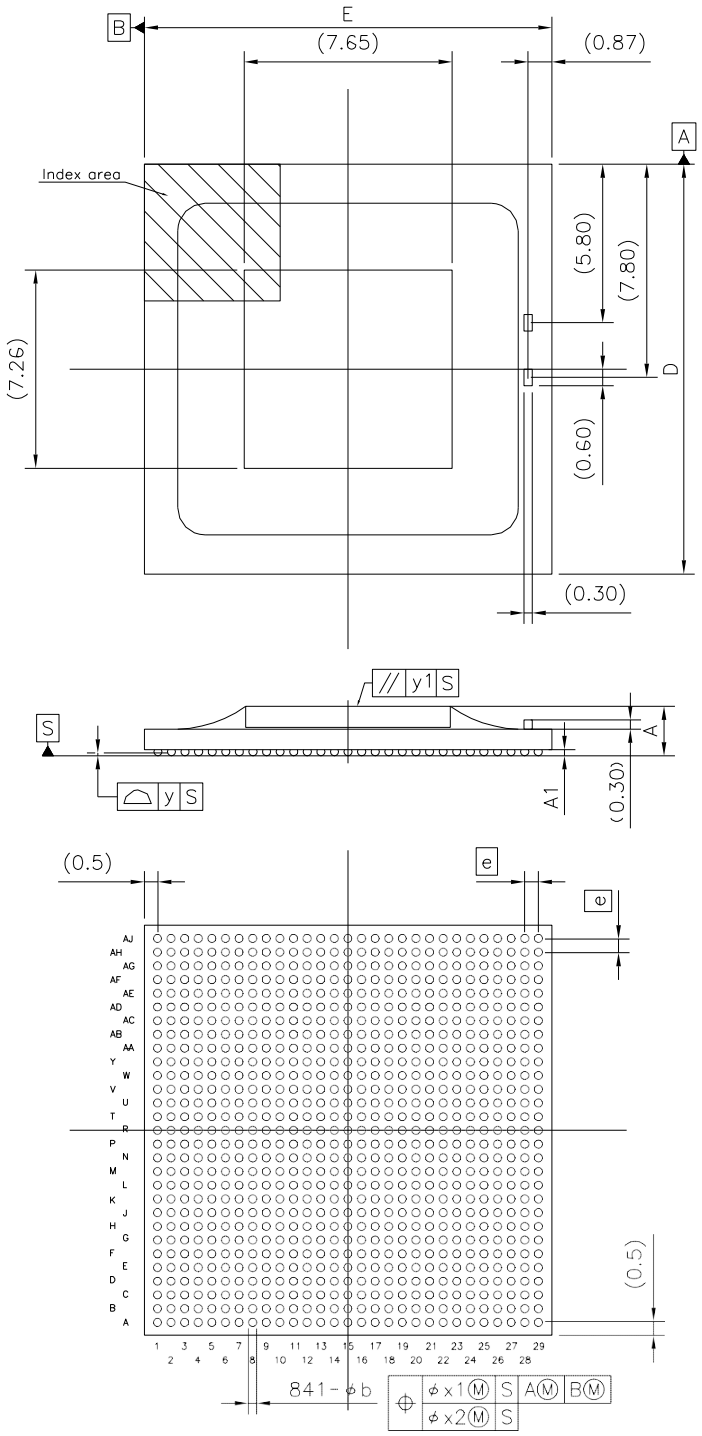
Note 3. C_0 is the parallel capacitance of the crystal resonator.

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Section 4 Package Dimensions

JEITA Package code	RENESAS code	Previous code	MASS(TYP.)[g]
P-FBGA841-15x15-0.50	PRBG0841KA-A	–	0.71

Unit:mm



Reference Symbol	Dimension in Millimeters		
	Min	Nom	Max
D	14.85	15.00	15.15
E	14.85	15.00	15.15
e	–	0.50	–
A	(1.70)	(1.90)	2.10
A1	0.15	(0.25)	–
b	0.25	0.30	0.35
x1	–	–	0.20
x2	–	–	0.05
y	–	–	0.12
y1	–	–	0.20

Figure 4.1 Package Dimensions

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REVISION HISTORY — RZ/V Series, VisionAI_ASSP RZ/V2M Datasheet

Rev.	Date	Description	
		Page	Summary
1.00	Apr 28, 2021	—	First edition issued
1.10	Jul 23, 2021	Section 1 Overview	
		4	Table 1.3-1 Overview of Functions (2/4): Video & graphics: JPEC → JPEG
		6	Table 1.3-1 Overview of Functions (4/4): Operating temperature: T_j, modified
		Section 2 Pins	
		30	2.2.1 List of External Pins: Usage Note, added
		43	Table 2.3-1 List of Pin Functions (5/7): The functional description of the LVRXREXT pin, modified
		43	Table 2.3-1 List of Pin Functions (5/7): The functional description of the DSMVREG0P4V pin, modified
		45	Table 2.3-1 List of Pin Functions (7/7): The functional description of the MD3 pin, modified
		Section 3 Functional Specifications	
		48	3.2 Memory: RAM (RMAB) → RAM (RAMB)
		63	3.11.2 USB Interface: low-speed (1.5 MHz) → low-speed (1.5 Mbps)
		Section 4 Electrical Characteristics	
		81	Table 4.1-1 Absolute Maximum Ratings (3/3): Case temperature (T_c), deleted
		83	Table 4.2-1 Recommended Operating Range (2/2): Junction temperature (T_j), added
		93	Table 4.4-1 Max. Supply Currents during Operation (2/2): $I_{DDLPVDD}$: The max. value, modified
		116	4.6.1 MIPI CSI-2 PHY Characteristics: The description, modified
		116	4.6.2 MIPI DSI Tx D-PHY Characteristics: The description, modified
		116	4.6.3 HDMI Tx PHY Characteristics: The description, modified: this LSI chip → this LSI
		116	4.6.4 LPDDR4 PHY Characteristics: The description, modified: this LSI chip → this LSI
		116	4.6.5 USB PHY Characteristics: The description, modified: this LSI chip → this LSI
		116	4.6.6 PCI Express PHY Characteristics: The description, modified
2.00	Jul 19, 2024	Section 1 Overview	
		1	1.1 Features The functional description of “Vision and AI”, “Video and Graphics, Display”, and “High Speed Interfaces”, modified
		2	Figure 1.1-1 Diagram of Functional Overview Note 1, deleted
		3	Table 1.3-1 Overview of Functions (1/4) Note 1, modified
		4	Table 1.3-1 Overview of Functions (2/4) The “Function” column of “Video & graphics” and “External memory interfaces”, modified
		5	Table 1.3-1 Overview of Functions (3/4) The “Function” column of “Peripheral interfaces”, “Display interfaces”, and “Security engine”, modified
		Section 2 Pins	
		13 to 31	Table 2.2-1 List of External Pins, modified
		32	Table 2.2-2 List of Multiplexed Functional Blocks, modified
		33	Table 2.2-3 I/O Group PORT00 in the Multiplexed Mode, modified
		33	Table 2.2-4 I/O Group PORT01 in the Multiplexed Mode, modified
		34	Table 2.2-5 I/O Group PORT02 in the Multiplexed Mode Note 1, added
		34	Table 2.2-6 I/O Group PORT03 in the Multiplexed Mode, modified

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Rev.	Date	Description	
		Page	Summary
2.00	Jul 19, 2024	35	Table 2.2-7 I/O Group PORT04 in the Multiplexed Mode Note 1, added
		35	Table 2.2-8 I/O Group PORT05 in the Multiplexed Mode Note 1, added
		35	Table 2.2-9 I/O Group PORT06 in the Multiplexed Mode Note 1, added
		36	Table 2.2-10 I/O Group PORT07 in the Multiplexed Mode Note 1, added
		37	Table 2.2-13 I/O Group PORT10 in the Multiplexed Mode Note 1, added
		37	Table 2.2-14 I/O Group PORT11 in the Multiplexed Mode Note 1, added
		37	Table 2.2-15 I/O Group PORT12 in the Multiplexed Mode, modified
		38	Table 2.2-16 I/O Group PORT13 in the Multiplexed Mode, modified
		38	Table 2.2-17 I/O Group PORT14 in the Multiplexed Mode, modified
		39	Table 2.2-19 I/O Group PORT16 in the Multiplexed Mode, modified
		39	Table 2.2-20 I/O Group PORT17 in the Multiplexed Mode, modified
		40	Table 2.2-21 I/O Group PORT20 in the Multiplexed Mode Note 1, added
		40	Table 2.2-22 I/O Group PORT21 in the Multiplexed Mode Note 1, added
		41	Table 2.3-1 List of Pin Functions (1/7) Pin Name: The “Function” column of “PWKY2N to PWKY0N” and “PWKY4N, PWKY3N”, modified Classification: NAND flash interface, deleted
		43	Table 2.3-1 List of Pin Functions (3/7) Classification: Flash control, modified Pin Name: IMSHUT0 and IMSHUT1, deleted
		44	Table 2.3-1 List of Pin Functions (4/7) Classification: Motor controller, deleted Pin Name: GEPPS, deleted
		45	Table 2.3-1 List of Pin Functions (5/7) Classification: Reserved pins, modified Pin Name: The “Function” column of “DSMDPDATA3 to DSMDPDATA0”, “DSMDNDATA3 to DSMDNDATA0”, “DSMDPCLK”, “DSMDNCLK”, and “DSMVREG0P4V”, modified
		46	Table 2.3-1 List of Pin Functions (6/7) Pin Name: The “Function” column of “USVBUS” and “USOTGID”, modified Classification: Environment sensor interface, deleted
		47	Table 2.3-1 List of Pin Functions (7/7) Classification: The “Pin Name” and “Function” columns of “Boot”, modified Classification: Clock output, modified Pin Name: GFPLS0 and GFPLS1, deleted
		48	Table 2.3-1 List of Pin Functions Notes 2 and 3, modified Notes 4, 5, and 6, added
		Section 3 Functional Specifications, deleted	
		Section 3 Electrical Characteristics	
		51	Table 3.1-1 Absolute Maximum Ratings (2/3), modified
		54	Table 3.2-1 Recommended Operating Range (2/2), modified
		55	3.3.1 Power-On Sequence (RTC/PWC): The section title, modified

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Rev.	Date	Description	
		Page	Summary
2.00	Jul 19, 2024	—	Figure 4.3-2 Power-Off Sequence (RTC/PWC), deleted
		63	Table 3.4-1 Max. Supply Currents during Operation (2/2), modified
		64, 65	Table 3.4-2 DC Characteristics, modified
		—	4.5.7 Motor Controller (MTR), deleted
		—	4.5.8 Environment Sensor Interface (ESI), deleted
		—	4.5.10 Debugger Interface, deleted
		—	4.6.2 MIPI DSI Tx D-PHY Characteristics, deleted
2.01	May 23, 2025	Section 1 Overview	
		4	Table 1.3-1 Overview of Functions (2/4) Video & graphics: The function of Camera ISP, modified (Fisheye correction, deleted)

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General Precautions in the Handling of Microprocessing Unit and Microcontroller Unit Products

The following usage notes are applicable to all Microprocessing unit and Microcontroller unit products from Renesas. For detailed usage notes on the products covered by this document, refer to the relevant sections of the document as well as any technical updates that have been issued for the products.

1. Precaution against Electrostatic Discharge (ESD)
   A strong electrical field, when exposed to a CMOS device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop the generation of static electricity as much as possible, and quickly dissipate it when it occurs. Environmental control must be adequate. When it is dry, a humidifier should be used. This is recommended to avoid using insulators that can easily build up static electricity. Semiconductor devices must be stored and transported in an anti-static container, static shielding bag or conductive material. All test and measurement tools including work benches and floors must be grounded. The operator must also be grounded using a wrist strap. Semiconductor devices must not be touched with bare hands. Similar precautions must be taken for printed circuit boards with mounted semiconductor devices.
2. Processing at power-on
   The state of the product is undefined at the time when power is supplied. The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the time when power is supplied. In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the time when power is supplied until the reset process is completed. In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the time when power is supplied until the power reaches the level at which resetting is specified.
3. Input of signal during power-off state
   Do not input signals or an I/O pull-up power supply while the device is powered off. The current injection that results from input of such a signal or I/O pull-up power supply may cause malfunction and the abnormal current that passes in the device at this time may cause degradation of internal elements. Follow the guideline for input signal during power-off state as described in your product documentation.
4. Handling of unused pins
   Handle unused pins in accordance with the directions given under handling of unused pins in the manual. The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of the LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible.
5. Clock signals
   After applying a reset, only release the reset line after the operating clock signal becomes stable. When switching the clock signal during program execution, wait until the target clock signal is stabilized. When the clock signal is generated with an external resonator or from an external oscillator during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Additionally, when switching to a clock signal produced with an external resonator or by an external oscillator while program execution is in progress, wait until the target clock signal is stable.
6. Voltage application waveform at input pin
   Waveform distortion due to input noise or a reflected wave may cause malfunction. If the input of the CMOS device stays in the area between V_{IL} (Max.) and V_{IH} (Min.) due to noise, for example, the device may malfunction. Take care to prevent chattering noise from entering the device when the input level is fixed, and also in the transition period when the input level passes through the area between V_{IL} (Max.) and V_{IH} (Min.).
7. Prohibition of access to reserved addresses
   Access to reserved addresses is prohibited. The reserved addresses are provided for possible future expansion of functions. Do not access these addresses as the correct operation of the LSI is not guaranteed.
8. Differences between products
   Before changing from one product to another, for example to a product with a different part number, confirm that the change will not lead to problems. The characteristics of a microprocessing unit or microcontroller unit products in the same group but having a different part number might differ in terms of internal memory capacity, layout pattern, and other factors, which can affect the ranges of electrical characteristics, such as characteristic values, operating margins, immunity to noise, and amount of radiated noise. When changing to a product with a different part number, implement a system-evaluation test for the given product.

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