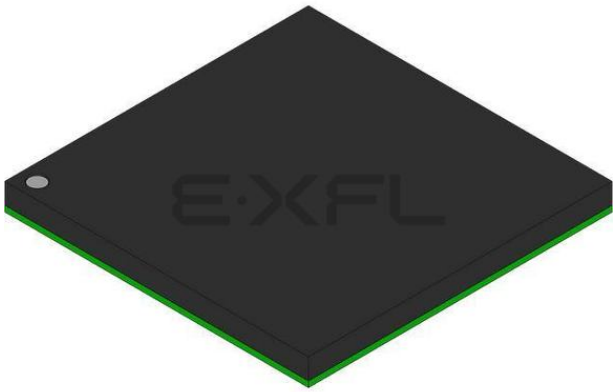

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Product Status	Active
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Peripherals	-
Number of I/O	-
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Program Memory Type	-
EEPROM Size	-
RAM Size	-
Voltage - Supply (Vcc/Vdd)	-
Data Converters	-
Oscillator Type	-
Operating Temperature	-
Mounting Type	-
Package / Case	-
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- Four I^2C
- Two 10/100 Ethernet Controller (IEEE1588 compliant)
- Eight Pulse Width Modulators (PWM)
- System JTAG Controller (SJC)
- GPIO with interrupt capabilities
- 8x8 Key Pad Port (KPP)
- One Quad SPI
- Two Flexible Controller Area Network (FlexCAN)
- Three Watchdog timers (WDOG)
- Two 12-bit Analog to Digital Converters (ADC) with up to 10 input channels in total
- Touch Screen Controller (TSC)

The i.MX 6UltraLite processors integrate advanced power management unit and controllers:

- Provide PMU, including LDO supplies, for on-chip resources
- Use Temperature Sensor for monitoring the die temperature
- Use Voltage Sensor for monitoring the die voltage
- Support DVFS techniques for low power modes
- Use SW State Retention and Power Gating for ARM and NEON
- Support various levels of system power modes
- Use flexible clock gating control scheme
- Two smart card interfaces compatible with EVM Standard 4.3

The i.MX 6UltraLite processors use dedicated hardware accelerators to meet the targeted multimedia performance. The use of hardware accelerators is a key factor in obtaining high performance at low power consumption, while having the CPU core relatively free for performing other tasks.

The i.MX 6UltraLite processors incorporate the following hardware accelerators:

- PXP—Pixel Processing Pipeline for imagine resize, rotation, overlay, and CSC[1]. Off loading key pixel processing operations are required to support the LCD display applications.
- ASRC—Asynchronous Sample Rate Converter

Security functions are enabled and accelerated by the following hardware:

- ARM TrustZone including the TZ architecture (separation of interrupts, memory mapping, etc.)
- SJC—System JTAG Controller. Protecting JTAG from debug port attacks by regulating or blocking the access to the system debug features.
- CAAM—Cryptographic Acceleration and Assurance Module, containing cryptographic and hash engines, 32 KB secure RAM, and True and Pseudo Random Number Generator (NIST certified).
- SNVS—Secure Non-Volatile Storage, including Secure Real Time Clock.
- CSU—Central Security Unit. CSU is configured during boot and by eFUSEs and determine the security level operation mode as well as the TZ policy.

1. G2 and G3 only

3 Modules List

The i.MX 6UltraLite processors contain a variety of digital and analog modules. Table 3 describes these modules in alphabetical order.[1]

Table 3. i.MX 6UltraLite Modules List

Block Mnemonic	Block Name	Subsystem	Brief Description
ADC1 ADC2	Analog to Digital Converter	—	The ADC is a 12-bit general purpose analog to digital converter.
ARM	ARM Platform	ARM	The ARM Core Platform includes 1x Cortex-A7 core. It also includes associated sub-blocks, such as the Level 2 Cache Controller, SCU (Snoop Control Unit), GIC (General Interrupt Controller), private timers, watchdog, and CoreSight debug modules.
ASRC	Asynchronous Sample Rate Converter	Multimedia Peripherals	The Asynchronous Sample Rate Converter (ASRC) converts the sampling rate of a signal associated to an input clock into a signal associated to a different output clock. The ASRC supports concurrent sample rate conversion of up to 10 channels of about -120dB THD+N. The sample rate conversion of each channel is associated to a pair of incoming and outgoing sampling rates. The ASRC supports up to three sampling rate pairs.
BCH	Binary-BCH ECC Processor	System Control Peripherals	The BCH module provides up to 40-bit ECC for NAND Flash controller (GPMI)
CAAM	Cryptographic accelerator and assurance module	Security	CAAM is a cryptographic accelerator and assurance module. CAAM implements several encryption and hashing functions, a run-time integrity checker, and a Pseudo Random Number Generator (PRNG). The pseudo random number generator is certified by Cryptographic Algorithm Validation Program (CAVP) of National Institute of Standards and Technology (NIST). Its DRBG validation number is 94 and its SHS validation number is 1455. CAAM also implements a Secure Memory mechanism. In i.MX 6UltraLite processors, the security memory provided is 32 KB.
CCM GPC SRC	Clock Control Module, General Power Controller, System Reset Controller	Clocks, Resets, and Power Control	These modules are responsible for clock and reset distribution in the system, and also for the system power management.
CSI	Parallel CSI	Multimedia Peripherals	The CSI IP provides parallel CSI standard camera interface port. The CSI parallel data ports are up to 24 bits. It is designed to support 24-bit RGB888/YUV444, CCIR656 video interface, 8-bit YCbCr, YUV or RGB, and 8-bit/10-bit/16-bit Bayer data input.
CSU	Central Security Unit	Security	The Central Security Unit (CSU) is responsible for setting comprehensive security policy within the i.MX 6UltraLite platform.

1. Note that some modules listed in this table are not offered on all derivatives. See Table 2 for exceptions.

Table 5. JTAG Controller Interface Summary (continued)

JTAG	I/O Type	On-chip Termination
JTAG_TRSTB	Input	47 kΩ pull-up
JTAG_MOD	Input	100 kΩ pull-up

3.2 Recommended connections for unused analog interfaces

Table 6 shows the recommended connections for unused analog interfaces.

Table 6. Recommended Connections for Unused Analog Interfaces

Module	Pad Name	Recommendations if Unused
CCM	CCM_CLK1_N, CCM_CLK1_P	Float
USB	USB_OTG1_CHD_B, USB_OTG1_DN, USB_OTG1_DP, USB_OTG1_VBUS, USB_OTG2_CHD_B, USB_OTG2_DN, USB_OTG2_DP, USB_OTG2_VBUS	Float
ADC	ADC_VREFH	Tie to VDDA_ADC_3P3
	VDDA_ADC_3P3	VDDA_ADC_3P3 must be powered even if the ADC is not used.

power from VDD_HIGH_IN when that supply is available and transitions to the backup battery when VDD_HIGH_IN is lost.

In addition, if the clock monitor determines that the OSC32K is not present, then the source of the 32 K will automatically switch to a crude internal ring oscillator. The frequency range of this block is approximately 10–45 kHz. It highly depends on the process, voltage, and temperature.

The OSC32k runs from VDD_SNVS_CAP supply, which comes from the VDD_HIGH_IN/VDD_SNVS_IN. The target battery is a ~3 V coin cell. Proper choice of coin cell type is necessary for chosen VDD_HIGH_IN range. Appropriate series resistor (Rs) must be used when connecting the coin cell. Rs depends on the charge current limit that depends on the chosen coin cell. For example, for Panasonic ML621:

- Average Discharge Voltage is 2.5 V
- Maximum Charge Current is 0.6 mA

For a charge voltage of 3.2 V, Rs = (3.2-2.5)/0.6 m = 1.17 k.

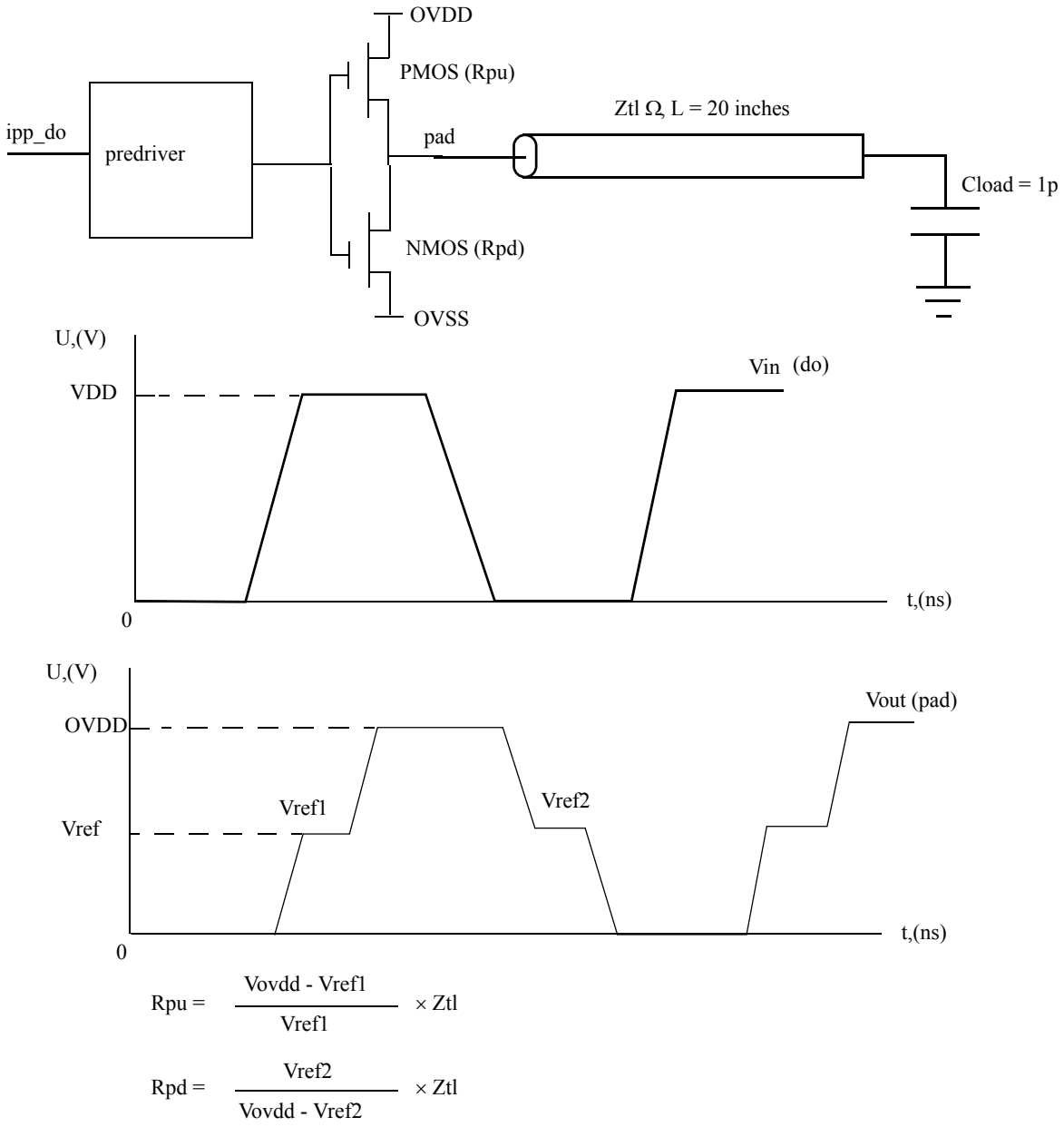
Table 22. OSC32K Main Characteristics

	Min	Typ	Max	Comments
Fosc	—	32.768 KHz	—	This frequency is nominal and determined mainly by the crystal selected. 32.0 K would work as well.
Current consumption	—	4 μA	—	The 4 μA is the consumption of the oscillator alone (OSC32k). Total supply consumption will depend on what the digital portion of the RTC consumes. The ring oscillator consumes 1 μA when ring oscillator is inactive, 20 μA when the ring oscillator is running. Another 1.5 μA is drawn from vdd_rtc in the power_detect block. So, the total current is 6.5 μA on vdd_rtc when the ring oscillator is not running.
Bias resistor	—	14 MΩ	—	This integrated bias resistor sets the amplifier into a high gain state. Any leakage through the ESD network, external board leakage, or even a scope probe that is significant relative to this value will debias the amp. The debiasing will result in low gain, and will impact the circuit's ability to start up and maintain oscillations.
Crystal Properties				
Cload	—	10 pF	—	Usually crystals can be purchased tuned for different Cloads. This Cload value is typically 1/2 of the capacitances realized on the PCB on either side of the quartz. A higher Cload will decrease oscillation margin, but increases current oscillating through the crystal.
ESR	—	50 kΩ	100 kΩ	Equivalent series resistance of the crystal. Choosing a crystal with a higher value will decrease the oscillating margin.

4.6 I/O DC parameters

This section includes the DC parameters of the following I/O types:

- XTALI and RTC_XTALI (Clock Inputs) DC Parameters
- General Purpose I/O (GPIO)
- Double Data Rate I/O (DDR) for LPDDR2 and DDR3 modes
- LVDS I/O DC Parameters



$$Rpu = \frac{Vovdd - Vref1}{Vref1} \times Ztl$$

$$Rpd = \frac{Vref2}{Vovdd - Vref2} \times Ztl$$

Figure 6. Impedance Matching Load for Measurement

4.11.2 Source synchronous mode AC timing (ONFI 2.x compatible)

Figure 26 to Figure 28 show the write and read timing of Source Synchronous Mode.

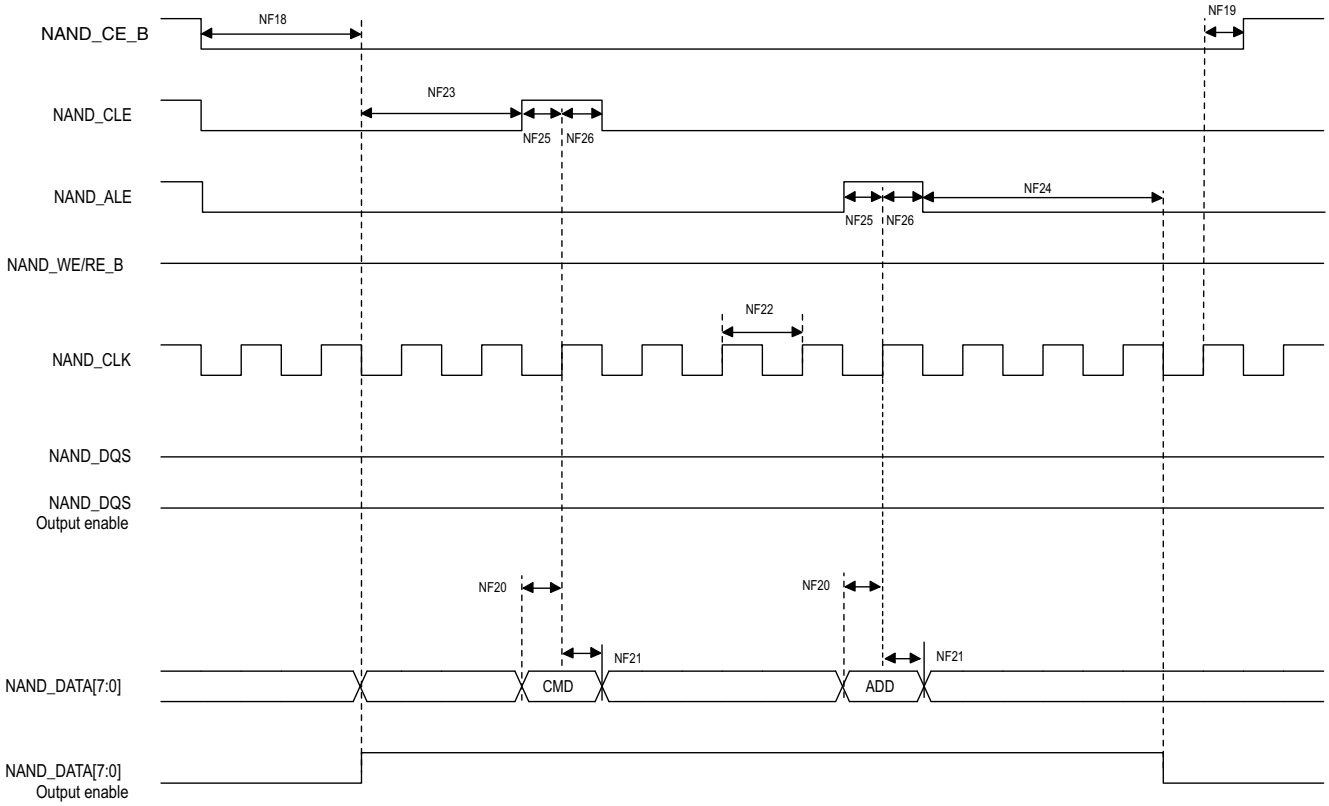


Figure 26. Source Synchronous Mode Command and Address Timing Diagram

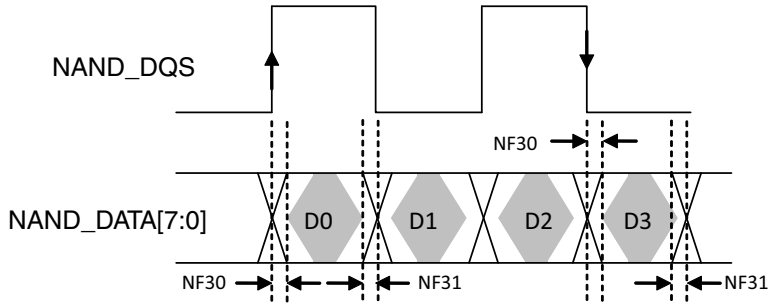


Figure 29. NAND_DQS/NAND_DQ Read Valid Window

Table 43. Source Synchronous Mode Timing Parameters[1]

ID	Parameter	Symbol	Timing T = GPMI Clock Cycle		Unit
			Min.	Max.	
NF18	NAND_CE0_B access time	tCE	CE_DELAY × T - 0.79 [see 2]		ns
NF19	NAND_CE0_B hold time	tCH	0.5 × tCK - 0.63 [see 2]		ns
NF20	Command/address NAND_DATAxx setup time	tCAS	0.5 × tCK - 0.05		ns
NF21	Command/address NAND_DATAxx hold time	tCAH	0.5 × tCK - 1.23		ns
NF22	Clock period	tCK	—		ns
NF23	Preamble delay	tPRE	PRE_DELAY × T - 0.29 [see 2]		ns
NF24	Postamble delay	tPOST	POST_DELAY × T - 0.78 [see 2]		ns
NF25	NAND_CLE and NAND_ALE setup time	tCALS	0.5 × tCK - 0.86		ns
NF26	NAND_CLE and NAND_ALE hold time	tCALH	0.5 × tCK - 0.37		ns
NF27	NAND_CLK to first NAND_DQS latching transition	tDQSS	T - 0.41 [see 2]		ns
NF28	Data write setup	—	0.25 × tCK - 0.35		—
NF29	Data write hold	—	0.25 × tCK - 0.85		—
NF30	NAND_DQS/NAND_DQ read setup skew	—	—	2.06	—
NF31	NAND_DQS/NAND_DQ read hold skew	—	—	1.95	—

1 GPMI's source synchronous mode output timing can be controlled by the module's internal registers GPMI_TIMING2_CE_DELAY, GPMI_TIMING_PREAMBLE_DELAY, GPMI_TIMING2_POST_DELAY. This AC timing depends on these registers settings. In the table, CE_DELAY/PRE_DELAY/POST_DELAY represents each of these settings.

2 T = tCK(GPMI clock period) -0.075ns (half of maximum p-p jitter).

For DDR Source sync mode, Figure 29 shows the timing diagram of NAND_DQS/NAND_DATAxx read valid window. The typical value of tDQSQ is 0.85ns (max) and 1ns (max) for tQHS at 200MB/s. GPMI will sample NAND_DATA[7:0] at both rising and falling edge of a delayed NAND_DQS signal, which can be provided by an internal DPLL. The delay value can be controlled by GPMI register GPMI_READ_DDR_DLL_CTRL.SLV_DLY_TARGET (see the GPMI chapter of the *i.MX 6UltraLite Reference Manual*). Generally, the typical delay value of this register is equal to 0x7 which means 1/4 clock cycle delay expected. But if the board delay is big enough and cannot be ignored, the delay value should be made larger to compensate the board delay.

Figure 45 shows RMII mode timings. Table 57 describes the timing parameters (M16–M21) shown in the figure.

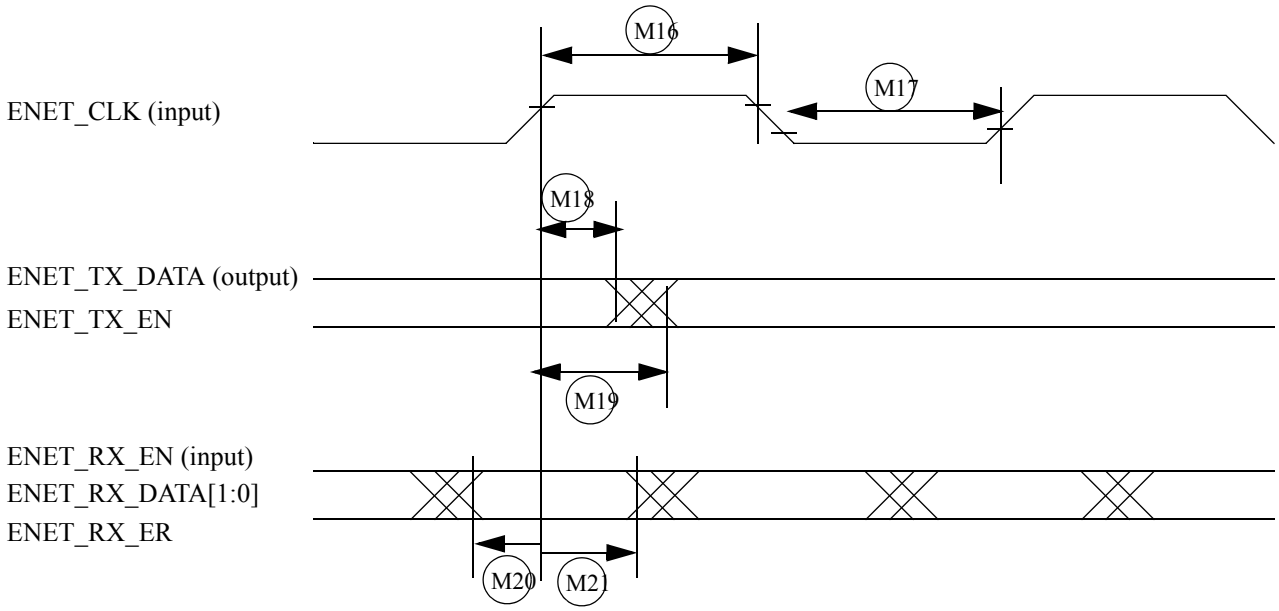


Figure 45. RMII Mode Signal Timing Diagram

Table 57. RMII Signal Timing

ID	Characteristic	Min.	Max.	Unit
M16	ENET_CLK pulse width high	35%	65%	ENET_CLK period
M17	ENET_CLK pulse width low	35%	65%	ENET_CLK period
M18	ENET_CLK to ENET0_TXD[1:0], ENET_TX_DATA invalid	4	—	ns
M19	ENET_CLK to ENET0_TXD[1:0], ENET_TX_DATA valid	—	13	ns
M20	ENET_RX_DATAD[1:0], ENET_RX_EN(ENET_RX_EN), ENET_RX_ER to ENET_CLK setup	2	—	ns
M21	ENET_CLK to ENET_RX_DATAD[1:0], ENET_RX_EN, ENET_RX_ER hold	2	—	ns

4.12.5 Flexible Controller Area Network (FLEXCAN) AC electrical specifications

The Flexible Controller Area Network (FlexCAN) module is a communication controller implementing the CAN protocol according to the CAN 2.0B protocol specification. The processor has two CAN modules available for systems design. Tx and Rx ports for both modules are multiplexed with other I/O pins. See the IOMUXC chapter of the *i.MX 6UltraLite Reference Manual* (IMX6ULRM) to see which pins expose Tx and Rx pins; these ports are named FLEXCAN_TX and FLEXCAN_RX, respectively.

Table 64. QuadSPI Output/Write Timing (SDR mode)

Symbol	Parameter	Value		Unit
		Min	Max	
T_{DVO}	Output data valid time	—	2	ns
T_{DHO}	Output data hold time	0	—	ns
T_{CK}	SCK clock period	10	—	ns
T_{CSS}	Chip select output setup time	3	—	SCK cycle(s)
T_{CSH}	Chip select output hold time	3	—	SCK cycle(s)

NOTE

T_{css} and T_{csh} are configured by the QuadSPIx_FLSHCR register, the default value of 3 are shown on the timing. Please refer to the *i.MX 6UltraLite Reference Manual (IMX6ULRM)* for more details.

4.12.9.2 DDR mode

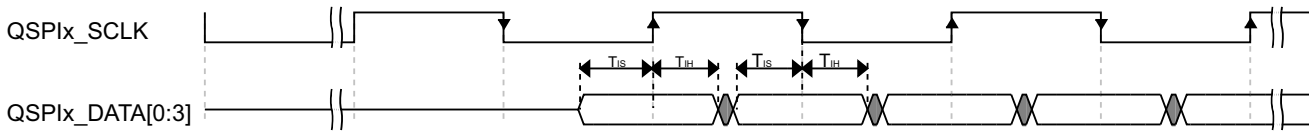


Figure 52. QuadSPI Input/Read Timing (DDR mode with internal sampling)

Table 65. QuadSPI Input/Read Timing (DDR mode with internal sampling)

Symbol	Parameter	Value		Unit
		Min	Max	
T_{IS}	Setup time for incoming data	8.67	—	ns
T_{IH}	Hold time requirement for incoming data	0	—	ns

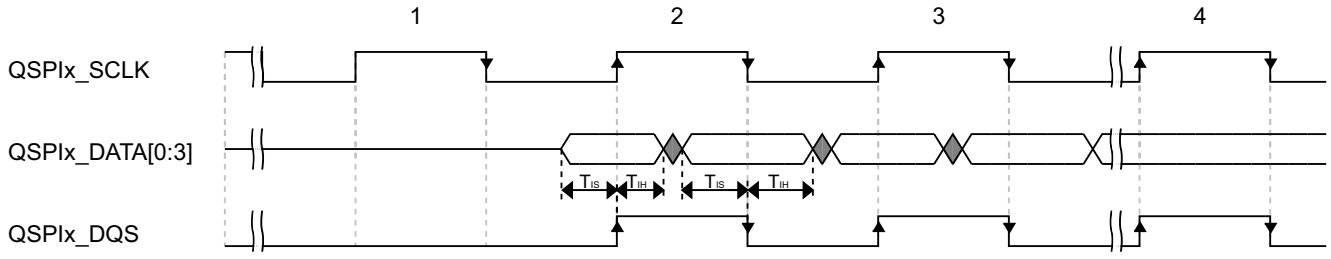


Figure 53. QuadSPI Input/Read Timing (DDR mode with loopback DQS sampling)

Table 66. QuadSPI Input/Read Timing (DDR mode with loopback DQS sampling)

Symbol	Parameter	Value		Unit
		Min	Max	
T_{IS}	Setup time for incoming data	2	—	ns
T_{IH}	Hold time requirement for incoming data	1	—	ns

NOTE

- For internal sampling, the timing values assumes using sample point 0, that is QuadSPIx_SMPR[SDRSMP] = 0.
- For loopback DQS sampling, the data strobe is output to the DQS pad together with the serial clock. The data strobe is looped back from DQS pad and used to sample input data.

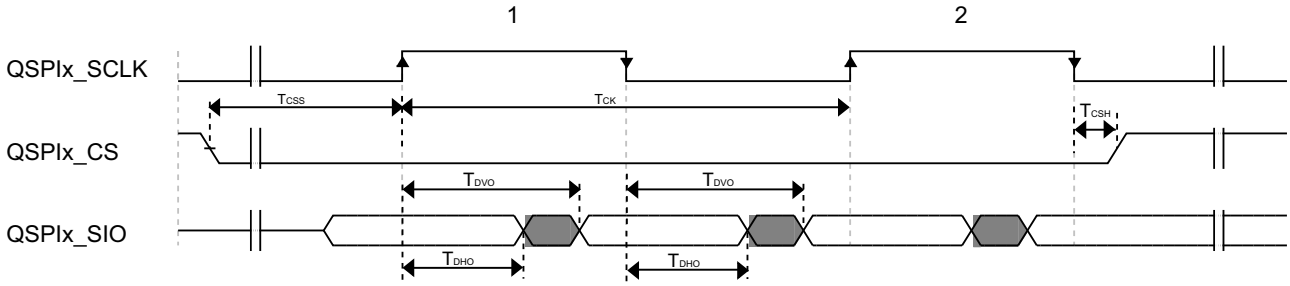


Figure 54. QuadSPI Output/Write Timing (DDR mode)

Table 67. QuadSPI Output/Write Timing (DDR mode)

Symbol	Parameter	Value		Unit
		Min	Max	
T_{DVO}	Output data valid time	—	0.25 x T_{SCLK} + 2 ns	ns
T_{DHO}	Output data hold time	0.25 x T_{SCLK}	—	ns
T_{CK}	SCK clock period	20	—	ns

2 T_{ref_clk}: The period of UART reference clock *ref_clk* (*ipg_perclk* after RFDIV divider).

UART IrDA mode receiver

Figure 66 depicts the UART IrDA mode receive timing, with 8 data bit/1 stop bit format. Table 75 lists the receive timing characteristics.

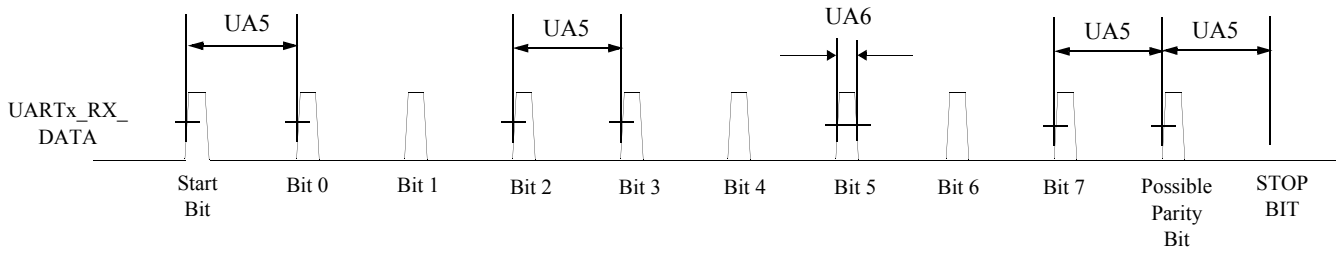


Figure 66. UART IrDA Mode Receive Timing Diagram

Table 75. IrDA Mode Receive Timing Parameters

ID	Parameter	Symbol	Min	Max	Unit
UA5	Receive Bit Time[1] in IrDA mode	t_{RIRbit}	$1/F_{baud\_rate}$[2] - $1/(16 \times F_{baud\_rate})$	$1/F_{baud\_rate} + 1/(16 \times F_{baud\_rate})$	—
UA6	Receive IR Pulse Duration	$t_{RIRpulse}$	1.41 µs	$(5/16) \times (1/F_{baud\_rate})$	—

1 The UART receiver can tolerate $1/(16 \times F_{baud\_rate})$ tolerance in each bit. But accumulation tolerance in one frame must not exceed $3/(16 \times F_{baud\_rate})$.

2 F_{baud_rate}: Baud rate frequency. The maximum baud rate the UART can support is (*ipg_perclk* frequency)/16.

4.12.14 USB PHY parameters

This section describes the USB-OTG PHY parameters.

The USB PHY meets the electrical compliance requirements defined in the Universal Serial Bus Revision 2.0 OTG with the following amendments.

- USB ENGINEERING CHANGE NOTICE
  - Title: 5V Short Circuit Withstand Requirement Change
  - Applies to: Universal Serial Bus Specification, Revision 2.0
- Errata for USB Revision 2.0 April 27, 2000 as of 12/7/2000
- USB ENGINEERING CHANGE NOTICE
  - Title: Pull-up/Pull-down resistors
  - Applies to: Universal Serial Bus Specification, Revision 2.0
- USB ENGINEERING CHANGE NOTICE
  - Title: Suspend Current Limit Changes
  - Applies to: Universal Serial Bus Specification, Revision 2.0
- USB ENGINEERING CHANGE NOTICE
  - Title: USB 2.0 Phase Locked SOFs

Table 77. 12-bit ADC Characteristics (V_{REFH} = V_{DDAD}, V_{REFL} = V_{SSAD}) (continued)

Characteristic	Conditions[1]	Symb	Min	Typ[2]	Max	Unit	Comment
Sample Cycles	ADLSMP=0, ADSTS=00	Csamp	—	2	—	cycles	—
	ADLSMP=0, ADSTS=01			4			
	ADLSMP=0, ADSTS=10			6			
	ADLSMP=0, ADSTS=11			8			
	ADLSMP=1, ADSTS=00			12			
	ADLSMP=1, ADSTS=01			16			
	ADLSMP=1, ADSTS=10			20			
	ADLSMP=1, ADSTS=11			24			
Conversion Cycles	ADLSMP=0 ADSTS=00	Cconv	—	28	—	cycles	—
	ADLSMP=0 ADSTS=01			30			
	ADLSMP=0 ADSTS=10			32			
	ADLSMP=0 ADSTS=11			34			
	ADLSMP=1 ADSTS=00			38			
	ADLSMP=1 ADSTS=01			42			
	ADLSMP=1 ADSTS=10			46			
	ADLSMP=1, ADSTS=11			50			

Table 84. NAND Boot through GPMI (continued)

Ball Name	Signal Name	Mux Mode	Common	BOOT_CFG1[3:2]= 01b	BOOT_CFG1[3:2]= 10b
NAND_DATA00	rawnand.DATA00	Alt 0	Yes		
NAND_DATA01	rawnand.DATA01	Alt 0	Yes		
NAND_DATA02	rawnand.DATA02	Alt 0	Yes		
NAND_DATA03	rawnand.DATA03	Alt 0	Yes		
NAND_DATA04	rawnand.DATA04	Alt 0	Yes		
NAND_DATA05	rawnand.DATA05	Alt 0	Yes		
NAND_DATA06	rawnand.DATA06	Alt 0	Yes		
NAND_DATA07	rawnand.DATA07	Alt 0	Yes		
NAND_DQS	rawnand.DQS	Alt 0	Yes		
CSI_MCLK	rawnand.CE2_B	Alt 2			Yes
CSI_PIXCLK	rawnand.CE3_B	Alt 2			Yes

Table 85. SD/MMC Boot through USDHC1

Ball Name	Signal Name	Mux Mode	Common	4-bit	8-bit	BOOT_CFG1[1]=1 (SD Power Cycle)	SDMMC MFG mode
UART1_RTS_B	usdhc1.CD_B	Alt 2					Yes
SD1_CLK	usdhc1.CLK	Alt 0	Yes				
SD1_CMD	usdhc1.CMD	Alt 0	Yes				
SD1_DATA0	usdhc1.DATA0	Alt 0	Yes				
SD1_DATA1	usdhc1.DATA1	Alt 0		Yes	Yes		
SD1_DATA2	usdhc1.DATA2	Alt 0		Yes	Yes		
SD1_DATA3	usdhc1.DATA3	Alt 0	Yes				
NAND_READY_B	usdhc1.DATA4	Alt 1			Yes		
NAND_CE0_B	usdhc1.DATA5	Alt 1			Yes		
NAND_CE1_B	usdhc1.DATA6	Alt 1			Yes		
NAND_CLE	usdhc1.DATA7	Alt 1			Yes		
GPIO1_IO09	usdhc1.RESET_B	Alt 5				Yes	
GPIO1_IO05	usdhc1.VSELECT	Alt 4				Yes	

Table 87. NOR/OneNAND Boot through EIM (continued)

Ball Name	Signal Name	Mux Mode	Common	ADL16 Non-Mux	AD16 Mux
NAND_ALE	weim.ADDR[17]	Alt 4		Yes	Yes
NAND_CE1_B	weim.ADDR[18]	Alt 4		Yes	Yes
SD1_CMD	weim.ADDR[19]	Alt 4		Yes	Yes
SD1_CLK	weim.ADDR[20]	Alt 4		Yes	Yes
SD1_DATA0	weim.ADDR[21]	Alt 4		Yes	Yes
SD1_DATA1	weim.ADDR[22]	Alt 4		Yes	Yes
SD1_DATA2	weim.ADDR[23]	Alt 4		Yes	Yes
SD1_DATA3	weim.ADDR[24]	Alt 4		Yes	Yes
ENET2_RXER	weim.ADDR[25]	Alt 4		Yes	Yes
ENET2_CRS_DV	weim.ADDR[26]	Alt 4		Yes	Yes
CSI_MCLK	weim.CS0_B	Alt 4	Yes		
LCD_DATA08	weim.DATA[0]	Alt 4		Yes	
LCD_DATA09	weim.DATA[1]	Alt 4		Yes	
LCD_DATA10	weim.DATA[2]	Alt 4		Yes	
LCD_DATA11	weim.DATA[3]	Alt 4		Yes	
LCD_DATA12	weim.DATA[4]	Alt 4		Yes	
LCD_DATA13	weim.DATA[5]	Alt 4		Yes	
LCD_DATA14	weim.DATA[6]	Alt 4		Yes	
LCD_DATA15	weim.DATA[7]	Alt 4		Yes	
LCD_DATA16	weim.DATA[8]	Alt 4		Yes	
LCD_DATA17	weim.DATA[9]	Alt 4		Yes	
LCD_DATA18	weim.DATA[10]	Alt 4		Yes	
LCD_DATA19	weim.DATA[11]	Alt 4		Yes	
LCD_DATA20	weim.DATA[12]	Alt 4		Yes	
LCD_DATA21	weim.DATA[13]	Alt 4		Yes	
LCD_DATA22	weim.DATA[14]	Alt 4		Yes	
LCD_DATA23	weim.DATA[15]	Alt 4		Yes	
NAND_RE_B	weim.EB_B[0]	Alt 4		Yes	Yes
NAND_WE_B	weim.EB_B[1]	Alt 4		Yes	Yes
CSI_HSYNC	weim.LBA_B	Alt 4	Yes		
CSI_PIXCLK	weim.OE	Alt 4	Yes		
CSI_VSYNC	weim.RW	Alt 4	Yes		

Table 91. 14x14 mm Functional Contact Assignments (continued)

DRAM_DATA09	U3	NVCC_DRAM	DDR	ALT0	DRAM_DATA09	Input	100 kΩ pull-up
DRAM_DATA10	U5	NVCC_DRAM	DDR	ALT0	DRAM_DATA10	Input	100 kΩ pull-up
DRAM_DATA11	R4	NVCC_DRAM	DDR	ALT0	DRAM_DATA11	Input	100 kΩ pull-up
DRAM_DATA12	P5	NVCC_DRAM	DDR	ALT0	DRAM_DATA12	Input	100 kΩ pull-up
DRAM_DATA13	P3	NVCC_DRAM	DDR	ALT0	DRAM_DATA13	Input	100 kΩ pull-up
DRAM_DATA14	R2	NVCC_DRAM	DDR	ALT0	DRAM_DATA14	Input	100 kΩ pull-up
DRAM_DATA15	R1	NVCC_DRAM	DDR	ALT0	DRAM_DATA15	Input	100 kΩ pull-up
DRAM_DQM0	T7	NVCC_DRAM	DDR	ALT0	DRAM_DQM0	Output	100 kΩ pull-up
DRAM_DQM1	T3	NVCC_DRAM	DDR	ALT0	DRAM_DQM1	Output	100 kΩ pull-up
DRAM_ODT0	N1	NVCC_DRAM	DDR	ALT0	DRAM_ODT0	Output	100 kΩ pull-down
DRAM_ODT1	F1	NVCC_DRAM	DDR	ALT0	DRAM_ODT1	Output	100 kΩ pull-down
DRAM_RAS_B	M5	NVCC_DRAM	DDR	ALT0	DRAM_RAS_B	Output	100 kΩ pull-up
DRAM_RESET	G4	NVCC_DRAM	DDR	ALT0	DRAM_RESET	Output	100 kΩ pull-down
DRAM_SDBA0	M1	NVCC_DRAM	DDR	ALT0	DRAM_SDBA0	Output	100 kΩ pull-up
DRAM_SDBA1	H1	NVCC_DRAM	DDR	ALT0	DRAM_SDBA1	Output	100 kΩ pull-up
DRAM_SDBA2	K2	NVCC_DRAM	DDR	ALT0	DRAM_SDBA2	Output	100 kΩ pull-up
DRAM_SDCKE0	M3	NVCC_DRAM	DDR	ALT0	DRAM_SDCKE0	Output	100 kΩ pull-down
DRAM_SDCKE1	J3	NVCC_DRAM	DDR	ALT0	DRAM_SDCKE1	Output	100 kΩ pull-down
DRAM_SDCLK0_N	P2	NVCC_DRAM	DDRCLK	ALT0	DRAM_SDCLK0_N	Input	100 kΩ pull-up
DRAM_SDCLK0_P	P1	NVCC_DRAM	DDRCLK	ALT0	DRAM_SDCLK0_P	Input	100 kΩ pull-up
DRAM_SDQS0_N	P7	NVCC_DRAM	DDRCLK	ALT0	DRAM_SDQS0_N	Input	100 kΩ pull-down

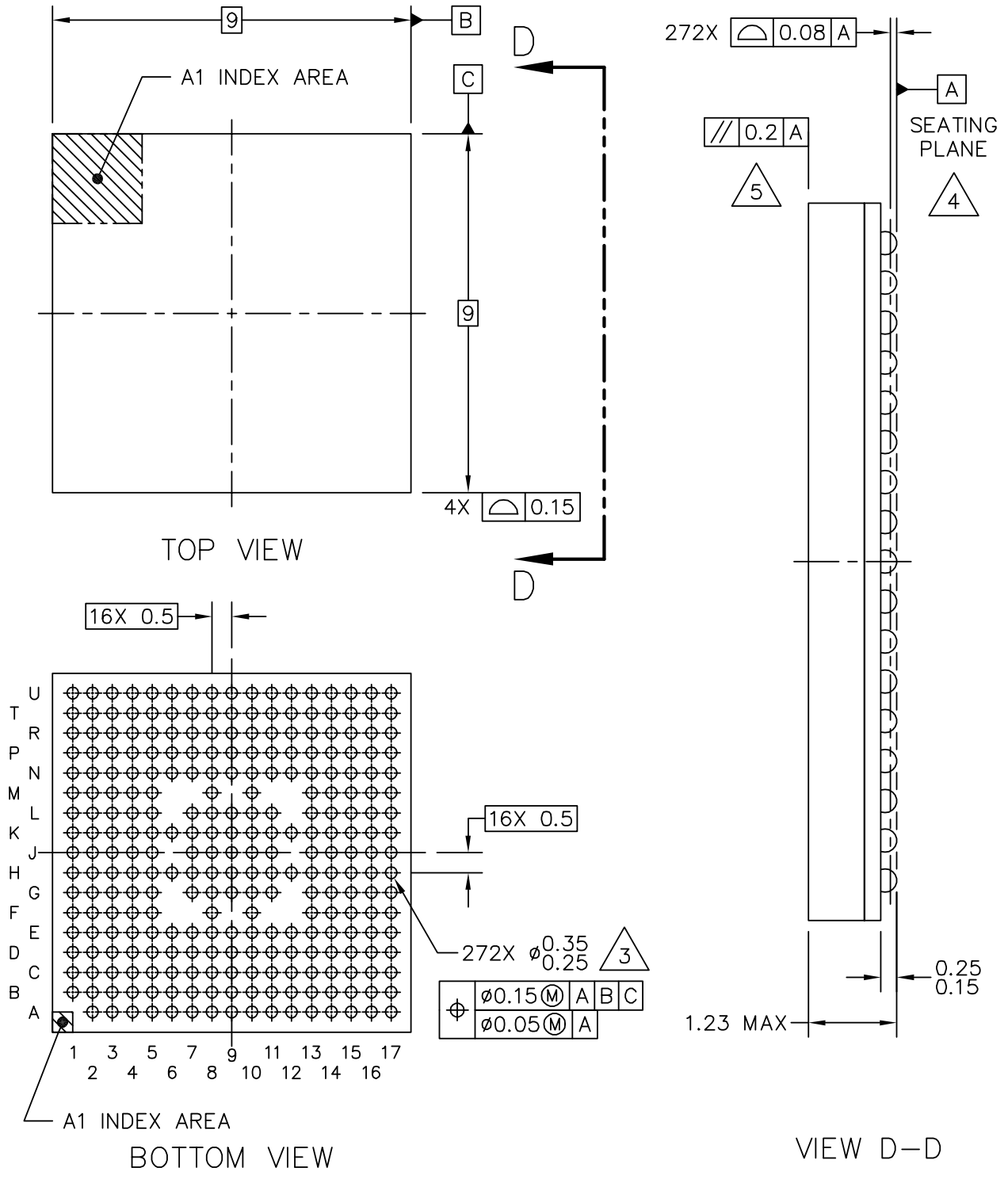


Figure 69. 9X9 mm BGA, Case x Package Top, Bottom, and Side Views

Table 94. 9x9 mm Functional Contact Assignments (continued)

DRAM_ADDR07	J4	NVCC_DRAM	DDR	ALT0	DRAM_ADDR07	Output	100 kΩ pull-up
DRAM_ADDR08	J5	NVCC_DRAM	DDR	ALT0	DRAM_ADDR08	Output	100 kΩ pull-up
DRAM_ADDR09	J1	NVCC_DRAM	DDR	ALT0	DRAM_ADDR09	Output	100 kΩ pull-up
DRAM_ADDR10	M2	NVCC_DRAM	DDR	ALT0	DRAM_ADDR10	Output	100 kΩ pull-up
DRAM_ADDR11	K5	NVCC_DRAM	DDR	ALT0	DRAM_ADDR11	Output	100 kΩ pull-up
DRAM_ADDR12	L3	NVCC_DRAM	DDR	ALT0	DRAM_ADDR12	Output	100 kΩ pull-up
DRAM_ADDR13	H4	NVCC_DRAM	DDR	ALT0	DRAM_ADDR13	Output	100 kΩ pull-up
DRAM_ADDR14	E3	NVCC_DRAM	DDR	ALT0	DRAM_ADDR14	Output	100 kΩ pull-up
DRAM_ADDR15	E2	NVCC_DRAM	DDR	ALT0	DRAM_ADDR15	Output	100 kΩ pull-up
DRAM_CAS_B	G4	NVCC_DRAM	DDR	ALT0	DRAM_CAS_B	Output	100 kΩ pull-up
DRAM_CS0_B	L1	NVCC_DRAM	DDR	ALT0	DRAM_CS0_B	Output	100 kΩ pull-up
DRAM_CS1_B	H5	NVCC_DRAM	DDR	ALT0	DRAM_CS1_B	Output	100 kΩ pull-up
DRAM_DATA00	T3	NVCC_DRAM	DDR	ALT0	DRAM_DATA00	Input	100 kΩ pull-up
DRAM_DATA01	N5	NVCC_DRAM	DDR	ALT0	DRAM_DATA01	Input	100 kΩ pull-up
DRAM_DATA02	T4	NVCC_DRAM	DDR	ALT0	DRAM_DATA02	Input	100 kΩ pull-up
DRAM_DATA03	T5	NVCC_DRAM	DDR	ALT0	DRAM_DATA03	Input	100 kΩ pull-up
DRAM_DATA04	U5	NVCC_DRAM	DDR	ALT0	DRAM_DATA04	Input	100 kΩ pull-up
DRAM_DATA05	T6	NVCC_DRAM	DDR	ALT0	DRAM_DATA05	Input	100 kΩ pull-up
DRAM_DATA06	R4	NVCC_DRAM	DDR	ALT0	DRAM_DATA06	Input	100 kΩ pull-up
DRAM_DATA07	U3	NVCC_DRAM	DDR	ALT0	DRAM_DATA07	Input	100 kΩ pull-up
DRAM_DATA08	P1	NVCC_DRAM	DDR	ALT0	DRAM_DATA08	Input	100 kΩ pull-up

6.2.3 9x9 mm, 0.5 mm pitch, ball map

Table 95 shows the 9x9 mm, 0.5 mm pitch ball map for the i.MX 6UltraLite.

Table 95. 9x9 mm, 0.5 mm Pitch, Ball Map

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	
A		VSS	CSI_DATA06	SD1_DATA1	SD1_DATA0	NAND_DATA05	VSS	NAND_WEB	NAND_DATA01	LCD_ENABLE	LCD_DATA04	VSS	LCD_DATA09	LCD_DATA13	LCD_DATA16	LCD_DATA15	VSS	A
B	VSS	CSI_DATA02	CSI_DATA05	SD1_DATA3	SD1_DATA2	NAND_CE1_B	NAND_CLE	NAND_DATA07	NAND_DATA06	LCD_HSYNC	LCD_DATA03	LCD_DATA01	LCD_DATA08	LCD_DATA14	LCD_DATA18	LCD_DATA22	LCD_DATA20	B
C	CSI_MCLK	CSI_DATA07	CSI_DATA00	CSI_DATA04	SD1_CLK	SD1_CMD	NAND_DATA03	NAND_DATA04	NAND_DATA02	LCD_VSYNC	LCD_CLK	LCD_DATA07	LCD_DATA11	LCD_DATA12	VSS	LCD_DATA21	LCD_DATA23	C
D	CSI_DATA03	CSI_HSYNC	CSI_VSYNC	CSI_DATA01	CSI_PIXCLK	NAND_WP_B	NAND_DATA00	NAND_ALE	NAND_RE_B	LCD_DATA02	LCD_DATA00	LCD_DATA05	LCD_DATA06	LCD_DATA10	LCD_DATA17	ENET2_RX_EN	ENET2_RX_DATA1	D
E	DRAM_ODT1	DRAM_ADDR15	DRAM_ADDR14	DRAM_ADDR06	NVCC_CSI	NAND_DQS	NVCC_SD1	NAND_CE0_B	NAND_READY_B	LCD_RESET	NVCC_NAND	LCD_DATA19	NVCC_LCD	ENET2_TX_DATA0	ENET2_TX_EN	ENET1_TX_DATA0	ENET2_RX_DATA0	E
F	VSS	DRAM_RESET	VSS	DRAM_SDWE_B	DRAM_SDBA1			VSS		VSS			ENET1_TX_DATA1	ENET2_TX_DATA1	ENET1_TX_EN	ENET1_RX_DATA1	VSS	F
G	DRAM_ADDR00	DRAM_ADDR01	DRAM_SDBA2	DRAM_CAS_B	NVCC_DRAM		VDD_SOC_CAP	VDD_SOC_CAP	VDD_ARM_CAP	VDD_ARM_CAP	VDD_ARM_CAP		NVCC_ENET	ENET1_RX_ER	ENET1_TX_CLK	ENET1_RX_EN	ENET1_RX_DATA0	G

7 Revision history

Table 97 provides a revision history for this data sheet.

Table 97. i.MX 6UltraLite Data Sheet Document Revision History

Rev. Number	Date	Substantive Change(s)
0	08/2015	• Initial release
0.1	01/2015	• Updated Table 1 Ordering Information • Added Table 2 Detailed peripherals information
0.2	02/2015	• Updated Figure 2 i.MX 6UltraLite System Block Diagram • Updated Table 39 EIM Bus Timing Parameters and Table 40 EIM Asynchronous Timing Parameters Relative to Chip Select • Updated Table 92 14x14 mm Functional contact Assignments and Table 95 9x9 mm Functional contact Assignments • Updated Figure 65 UART IrDA Mode Transmit Timing Diagram and Figure 66 UART IrDA Mode Transmit Timing Diagram • Added Table 96 GPIO behaviors during reset
0.3	03/2016	• Updated Figure 1 Part Number Nomenclature—i.MX 6UltraLite • Updated Table 1 Ordering Information • Updated Table 3 i.MX 6UltraLite Modules List
1	04/2016	• Updated Table 3 i.MX 6UltraLite Module list for BCH descriptions • Updated Table 4 Special Signal Considerations • Added a note for Table 9 14x14 MM Package Thermal Resistance • UpdatedTable 15 Low Power Mode Current and Power Consumption • Added a note for Table 23 XTALI and RTC_XTALI DC Parameters • Updated Table 38 EIM Internal Module Multiplexing • Updated Table 51 SDR50/SDR104 Interface Timing Specification • Updated Table 91 14x14 mm Functional Contact Assignments and footnote • Updated Section 4.1.1, “Absolute maximum ratings" • Updated Section 4.6.3, “DDR I/O DC parameters" • Added Section 4.12.8, “LCD controller (LCDIF) parameters" • Updated Section 4.12.9, “QUAD SPI (QSPI) timing parameters"
2	02/2017	• Updated Table 8 Absolute Maximum Ratings • Added a footnote in the Table 11 Operating Ranges • Updated Section 4.2.1, “Power-up sequence" and Section 4.2.2, “Power-down sequence" • Removed Section 4.9.4 DDR SDRAM Specific Parameters (DDR3 and LPDDR2) • Updated Figure 18, "Asynchronous A/D Muxed Write Access" • Added a new Section 4.10, “Multi-Mode DDR Controller (MMDC)" • Added a new Section 4.12.8.1, “LCDIF signal mapping" • Updated Table 51 SDR50/SDR104 Interface Timing Specification • Updated Figure 40, "HS200 Mode Timing" • Updated Table 52 HS200 Interface Timing Specification
2.1	03/2017	• Updated the silicon revision definition in the Figure 1, "Part Number Nomenclature—i.MX 6UltraLite" • Added Rev .1.2 part numbers in the Table 1 Ordering Information
2.2	05/2017	• Changed terminology from “floating” to “not connected” • Added a footnote regarding maximum voltage allowance in the Table 8 Absolute Maximum Ratings • Replaced the MMDC compatible information with a cross reference in the Section 4.6.3, “DDR I/O DC parameters" and Section 4.7.2, “DDR I/O AC parameters" • Changed SD3 min to 1.7 ns in the Table 50 eMMC4.4/4.41 Interface Timing Specification

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