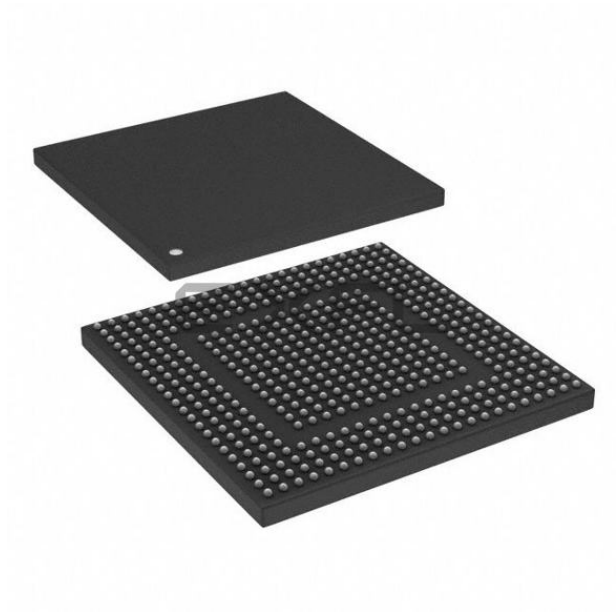

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Embedded microprocessors are utilized across a broad spectrum of applications, making them indispensable in

Details	
Product Status	Last Time Buy
Core Processor	PowerPC e300c3
Number of Cores/Bus Width	1 Core, 32-Bit
Speed	400MHz
Co-Processors/DSP	-
RAM Controllers	DDR2
Graphics Acceleration	No
Display & Interface Controllers	-
Ethernet	10/100/1000Mbps (3)
SATA	-
USB	USB 2.0 (1)
Voltage - I/O	1.8V, 2.5V, 3.3V
Operating Temperature	0°C ~ 105°C (TA)
Security Features	-
Package / Case	473-LFBGA
Supplier Device Package	473-MAPBGA (19x19)
Purchase URL	https://www.e-xfl.com/product-detail/nxp-semiconductors/mpc8308zqagda

5.2 RESET AC Electrical Characteristics

This table provides the reset initialization AC timing specifications.

Table 11. RESET Initialization Timing Specifications

Parameter/Condition	Min	Max	Unit	Notes
Required assertion time of $\overline{\text{HRESET}}$ (input) to activate reset flow	32	—	$t_{SYS\_CLK\_IN}$	1
Required assertion time of $\overline{\text{PORESET}}$ with stable power and clock applied to SYS_CLK_IN	32	—	$t_{SYS\_CLK\_IN}$	—
$\overline{\text{HRESET}}$ assertion (output)	512	—	$t_{SYS\_CLK\_IN}$	1
Input setup time for POR configuration signals (CFG_RESET_SOURCE[0:3]) with respect to negation of PORESET	4	—	$t_{SYS\_CLK\_IN}$	—
Input hold time for POR configuration signals with respect to negation of $\overline{\text{HRESET}}$	0	—	ns	—
Time for the device to turn off POR configuration signal drivers with respect to the assertion of $\overline{\text{HRESET}}$	—	4	ns	2
Time for the device to turn on POR configuration signal drivers with respect to the negation of $\overline{\text{HRESET}}$	1	—	ns	1, 2

Notes:
1. $t_{SYS\_CLK\_IN}$ is the clock period of the input clock applied to SYS_CLK_IN.
2. POR configuration signals consists of CFG_RESET_SOURCE[0:3].

This table provides the PLL lock times.

Table 12. PLL Lock Times

Parameter/Condition	Min	Max	Unit	Note
System PLL lock time	—	100	μs	—
e300 core PLL lock time	—	100	μs	—

This table provides the current draw characteristics for MV_{REF}.

Table 15. Current Draw Characteristics for MV_{REF}

Parameter / Condition	Symbol	Min	Max	Unit	Note
Current draw for MV_{REF}	I_{MVREF}	—	500	μA	1

Note:
1. The voltage regulator for MV_{REF} must be able to supply up to 500 μA current.

6.2 DDR2 SDRAM AC Electrical Characteristics

This section provides the AC electrical characteristics for the DDR2 SDRAM interface.

6.2.1 DDR2 SDRAM Input AC Timing Specifications

This table provides input AC timing specifications for the DDR2 SDRAM when $GV_{DD}(typ)$=1.8 V.

Table 16. DDR2 SDRAM Input AC Timing Specifications for 1.8 V Interface

At recommended operating conditions with GV_{DD} of 1.8 ± 100 mV

Parameter	Symbol	Min	Max	Unit	Notes
AC input low voltage	V_{IL}	—	MV_{REF} – 0.45	V	—
AC input high voltage	V_{IH}	MV_{REF} + 0.45	—	V	—

This table provides input AC timing specifications for the DDR2 SDRAM interface.

Table 17. DDR2 SDRAM Input AC Timing Specifications

At recommended operating conditions. with GV_{DD} of 1.8± 100 mV

Parameter	Symbol	Min	Max	Unit	Notes
Controller skew for MDQS—MDQ/MECC 266 MHz	t_{CISKEW}	–875	875	ps	1, 2,3

Notes:
1. t_{CISKEW} represents the total amount of skew consumed by the controller between MDQS[n] and any corresponding bit that is captured with MDQS[n]. This should be subtracted from the total timing budget.
2. The amount of skew that can be tolerated from MDQS to a corresponding MDQ or MECC signal is called t_{DISKEW}. This can be determined by the following equation: t_{DISKEW} = +/–(T/4 – abs(t_{CISKEW})) where T is the clock period and abs(t_{CISKEW}) is the absolute value of t_{CISKEW}.
3. Memory controller ODT value of 150 Ω is recommended

This figure illustrates the DDR2 input timing diagram showing the t_{DISKEW} timing parameter.

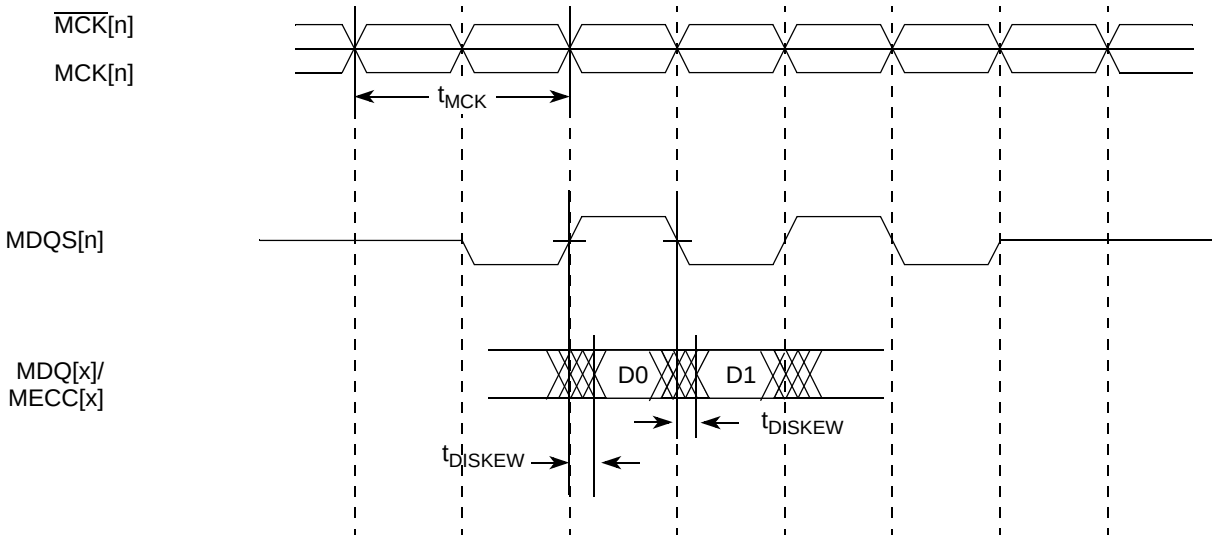


Figure 4. Timing Diagram for t_{DISKEW}

6.2.2 DDR2 SDRAM Output AC Timing Specifications

Table 18. DDR2 SDRAM Output AC Timing Specifications

Parameter	Symbol [1]	Min	Max	Unit	Notes
MCK[n] cycle time, MCK[n]/$\overline{\text{MCK}}$[n] crossing	t_{MCK}	7.5	10	ns	2
ADDR/CMD output setup with respect to MCK	t_{DDKHAS}		—	ns	3
266 MHz		2.9			
ADDR/CMD output hold with respect to MCK	t_{DDKHAX}		—	ns	3
266 MHz		2.33			
$\overline{\text{MCS}}$[n] output setup with respect to MCK	t_{DDKHCS}		—	ns	3
266 MHz		2.5			
$\overline{\text{MCS}}$[n] output hold with respect to MCK	t_{DDKHCX}		—	ns	3
266 MHz		3.15			
MCK to MDQS Skew	t_{DDKHMH}	–0.6	0.6	ns	4

Table 25. RGMII AC Timing Specifications (continued)

At recommended operating conditions with LV_{DD} of 2.5 V ± 5%.

GTX_CLK125 reference clock period	t_{G12} [6]	—	8.0	—	ns
GTX_CLK125 reference clock duty cycle	t_{G125H}/t_{G125}	47	—	53	%

Notes:

1. In general, the clock reference symbol representation for this section is based on the symbols RGT to represent RGMII timing. For example, the subscript of t_{RGT} represents the RGMII receive (RX) clock. Note also that the notation for rise (R) and fall (F) times follows the clock symbol that is being represented. For symbols representing skews, the subscript is skew (SK) followed by the clock that is being skewed (RGT).
2. This implies that PC board design requires clocks to be routed such that an additional trace delay of greater than 1.5 ns is added to the associated clock signal.
3. For 10 and 100 Mbps, t_{RGT} scales to 400 ns ± 40 ns and 40 ns ± 4 ns, respectively.
4. Duty cycle may be stretched/shrunk during speed changes or while transitioning to a received packet's clock domains as long as the minimum duty cycle is not violated and stretching occurs for no more than three t_{RGT} of the lowest speed transitioned between.
5. Duty cycle reference is $0.5*LV_{DD}$
6. This symbol is used to represent the external GTX_CLK125 and does not follow the original symbol naming convention.

This figure shows the RGMII AC timing and multiplexing diagrams.

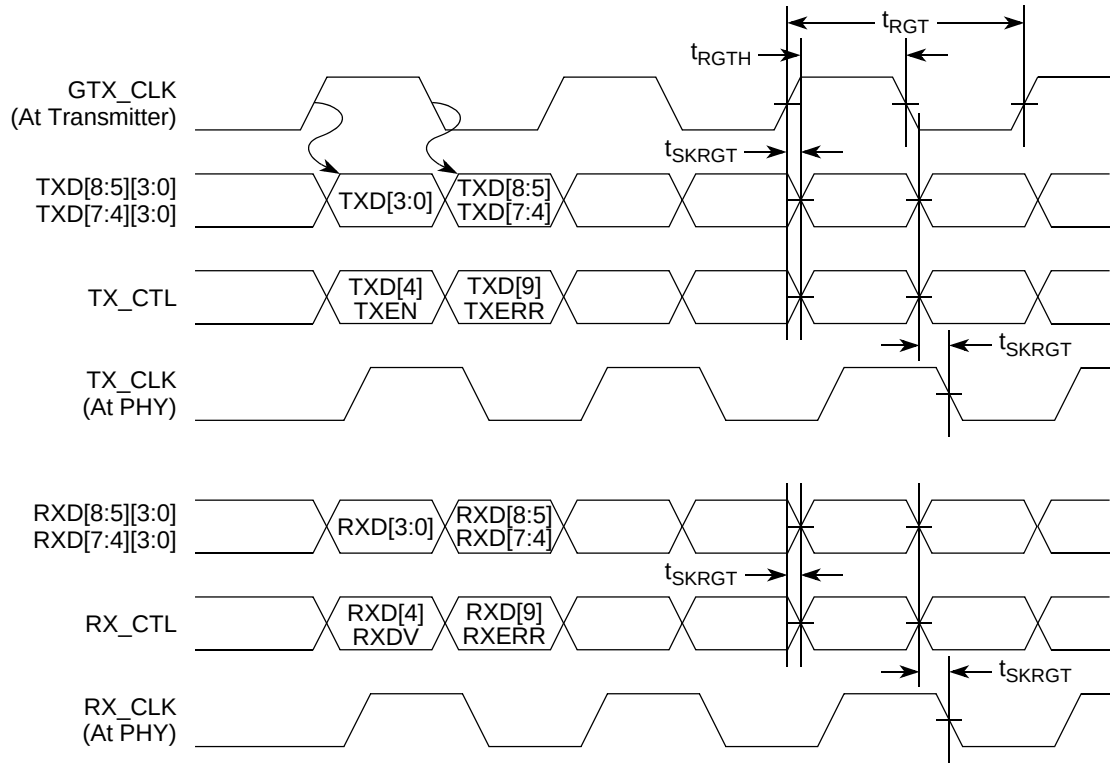


Figure 11. RGMII AC Timing and Multiplexing Diagrams

8.3 Ethernet Management Interface Electrical Characteristics

The electrical characteristics specified here apply to MII management interface signals MDIO (management data input/output) and MDC (management data clock). The electrical characteristics for MII

10.2.2 DC Level Requirement for SerDes Reference Clocks

The DC level requirement for the MPC8308 SerDes reference clock inputs is different depending on the signaling mode used to connect the clock driver chip and SerDes reference clock inputs as described below.

- **Differential Mode**
  - The input amplitude of the differential clock must be between 400 mV and 1600 mV differential peak-peak (or between 200 mV and 800 mV differential peak). In other words, each signal wire of the differential pair must have a single-ended swing less than 800 mV and greater than 200 mV. This requirement is the same for both external DC-coupled or AC-coupled connection.
  - For **external DC-coupled** connection, as described in Section 10.2.1, "SerDes Reference Clock Receiver Characteristics," the maximum average current requirements sets the requirement for average voltage (common mode voltage) to be between 100 mV and 400 mV. Figure 17 shows the SerDes reference clock input requirement for DC-coupled connection scheme.
  - For **external AC-coupled** connection, there is no common mode voltage requirement for the clock driver. Since the external AC-coupling capacitor blocks the DC level, the clock driver and the SerDes reference clock receiver operate in different command mode voltages. The SerDes reference clock receiver in this connection scheme has its common mode voltage set to XCOREVSS. Each signal wire of the differential inputs is allowed to swing below and above the common mode voltage (XCOREVSS). Figure 18 shows the SerDes reference clock input requirement for AC-coupled connection scheme.
- **Single-ended Mode**
  - The reference clock can also be single-ended. The SD_REF_CLK input amplitude (single-ended swing) must be between 400 mV and 800 mV peak-peak (from Vmin to Vmax) with $\overline{\text{SD\_REF\_CLK}}$ either left unconnected or tied to ground.
  - The SD_REF_CLK input average voltage must be between 200 and 400 mV. Figure 19 shows the SerDes reference clock input requirement for single-ended signaling mode.
  - To meet the input amplitude requirement, the reference clock inputs might need to be DC or AC-coupled externally. For the best noise performance, the reference of the clock could be DC or AC-coupled into the unused phase ($\overline{\text{SD\_REF\_CLK}}$) through the same source impedance as the clock input (SD_REF_CLK) in use.

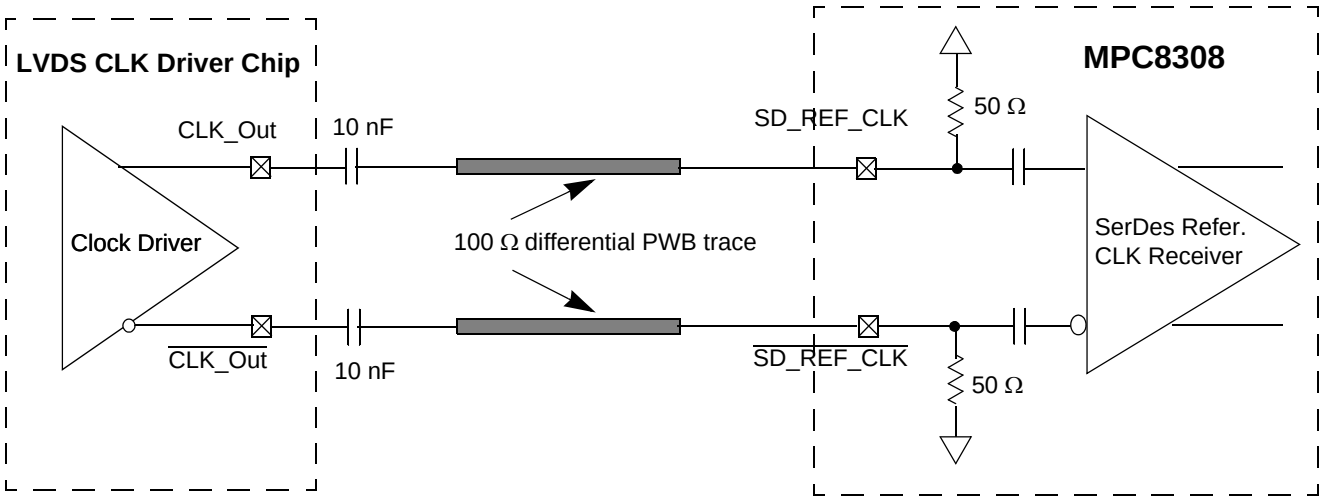


Figure 21. AC-Coupled Differential Connection with LVDS Clock Driver (Reference Only)

Figure 22 shows the SerDes reference clock connection reference circuits for LVPECL type clock driver. Since LVPECL driver's DC levels (both common mode voltages and output swing) are incompatible with MPC8308 SerDes reference clock input's DC requirement, AC-coupling has to be used.

This figure assumes that the LVPECL clock driver's output impedance is 50 Ω. R1 is used to DC-bias the LVPECL outputs prior to AC-coupling. Its value could be ranged from 140 Ω to 240 Ω depending on clock driver vendor's requirement. R2 is used together with the SerDes reference clock receiver's 50-Ω termination resistor to attenuate the LVPECL output's differential peak level such that it meets the MPC8308's SerDes reference clock's differential input amplitude requirement (between 200 mV and 800 mV differential peak). For example, if the LVPECL output's differential peak is 900 mV and the desired SerDes reference clock input amplitude is selected as 600 mV, the attenuation factor is 0.67, which requires R2 = 25 Ω. Please consult clock driver chip manufacturer to verify whether this connection scheme is compatible with a particular clock driver chip.

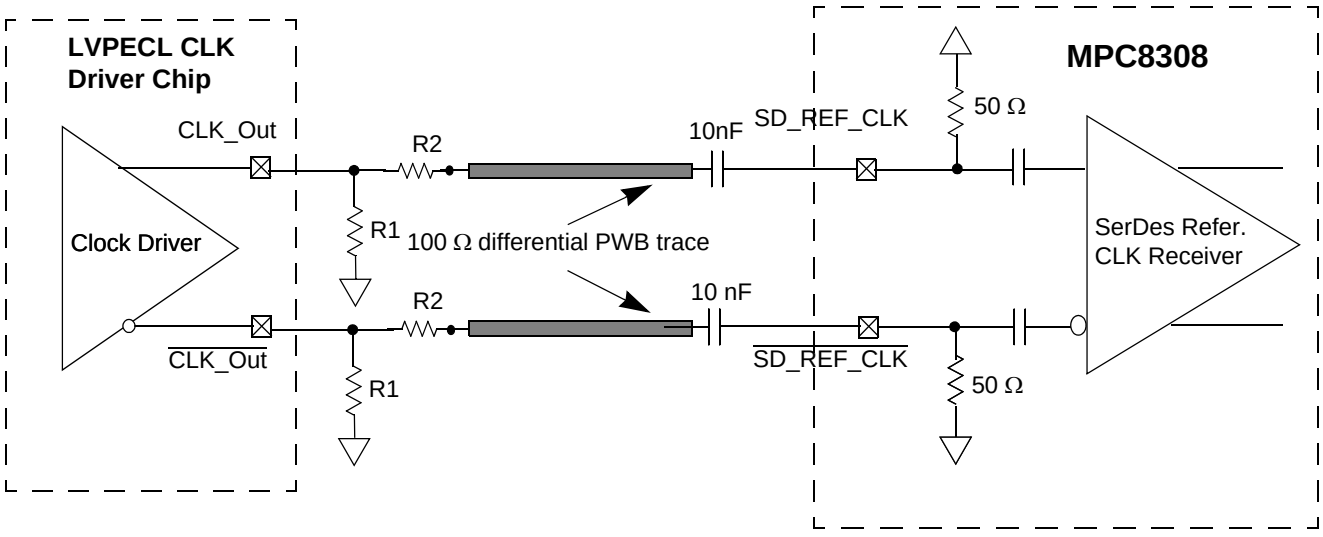


Figure 22. AC-Coupled Differential Connection with LVPECL Clock Driver (Reference Only)

This figure shows the SerDes reference clock connection reference circuits for a single-ended clock driver. It assumes the DC levels of the clock driver are compatible with the device's SerDes reference clock input's DC requirement.

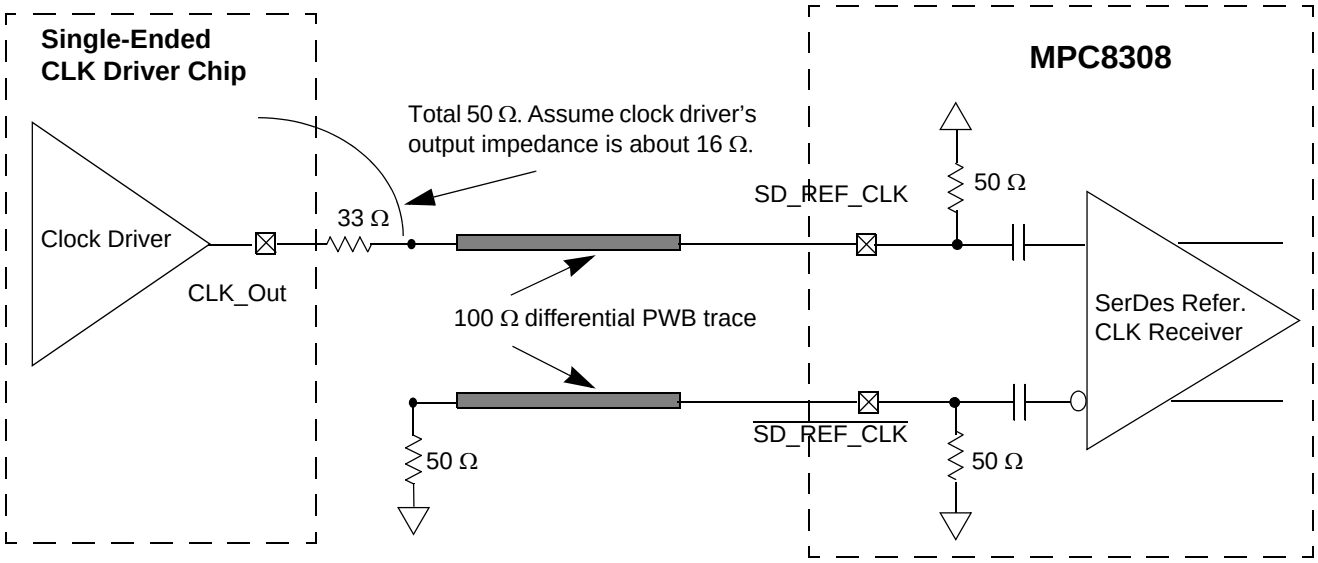


Figure 23. Single-Ended Connection (Reference Only)

10.2.4 AC Requirements for SerDes Reference Clocks

The clock driver selected should provide a high quality reference clock with low phase noise and cycle-to-cycle jitter. Phase noise less than 100 kHz can be tracked by the PLL and data recovery loops and is less of a problem. Phase noise above 15 MHz is filtered by the PLL. The most problematic phase noise occurs in the 1–15 MHz range. The source impedance of the clock driver should be 50 Ω to match the transmission line and reduce reflections which are a source of noise to the system.

This table describes some AC parameters for PCI Express protocol.

Table 32. SerDes Reference Clock AC Parameters

At recommended operating conditions with XCOREVDD= 1.0V ± 5%

Parameter	Symbol	Min	Max	Unit	Notes
Rising Edge Rate	Rise Edge Rate	1.0	4.0	V/ns	2, 3
Falling Edge Rate	Fall Edge Rate	1.0	4.0	V/ns	2, 3
Differential Input High Voltage	V_{IH}	+200	—	mV	2
Differential Input Low Voltage	V_{IL}	—	–200	mV	2

11.3 Clocking Dependencies

The ports on the two ends of a link must transmit data at a rate that is within 600 parts per million (ppm) of each other at all times. This is specified to allow bit rate clock sources with a ±300 ppm tolerance.

11.4 Physical Layer Specifications

Following is a summary of the specifications for the physical layer of PCI Express on this device. For further details as well as the specifications of the transport and data link layer please use the *PCI Express Base Specification*, Rev. 1.0a.

11.4.1 Differential Transmitter (TX) Output

This table defines the specifications for the differential output at all transmitters (TXs). The parameters are specified at the component pins.

Table 34. Differential Transmitter (TX) Output Specifications

Parameter	Symbol	Comments	Min	Typical	Max	Units	Note
Unit interval	UI	Each U_{PETX} is 400 ps ± 300 ppm. U_{PETX} does not account for Spread Spectrum Clock dictated variations.	399.88	400	400.12	ps	1
Differential peak-to-peak output voltage	$V_{TX-DIFFp-p}$	$V_{PEDPPTX} = 2*\|V_{TX-D+} - V_{TX-D-}\|$	0.8	—	1.2	V	2
De-Emphasized differential output voltage (ratio)	$V_{TX-DE-RATIO}$	Ratio of the $V_{PEDPPTX}$ of the second and following bits after a transition divided by the $V_{PEDPPTX}$ of the first bit after a transition.	–3.0	–3.5	–4.0	dB	2
Minimum TX eye width	T_{TX-EYE}	The maximum Transmitter jitter can be derived as $T_{TX-MAX-JITTER} = 1 - U_{PEEWTX} = 0.3$ UI.	0.70	—	—	UI	2, 3
Maximum time between the jitter median and maximum deviation from the median	$T_{TX-EYE-MEDIAN-to-MAX-JITTER}$	Jitter is defined as the measurement variation of the crossing points ($V_{PEDPPTX}$ = 0 V) in relation to a recovered TX UI. A recovered TX UI is calculated over 3500 consecutive unit intervals of sample data. Jitter is measured using all edges of the 250 consecutive UI in the center of the 3500 UI used for calculating the TX UI.	—	—	0.15	UI	2, 3
D+/D- TX output rise/fall time	$T_{TX-RISE}$, $T_{TX-FALL}$	—	0.125	—	—	UI	2, 5
RMS AC peak common mode output voltage	$V_{TX-CM-ACp}$	$V_{PEACPCMTX} = RMS(\|V_{TXD+} + V_{TXD-}\|/2 - V_{TX-CM-DC})$ $V_{TX-CM-DC} = DC_{(avg)}$ of $\|V_{TX-D+} + V_{TX-D-}\|/2$	—	—	20	mV	2

NOTE

The reference impedance for return loss measurements is 50 Ω to ground for both the D+ and D- line (that is, as measured by a Vector Network Analyzer with 50 Ω probes—see Figure 29). Note that the series capacitors, $C_{PEACCTX}$, are optional for the return loss measurement.

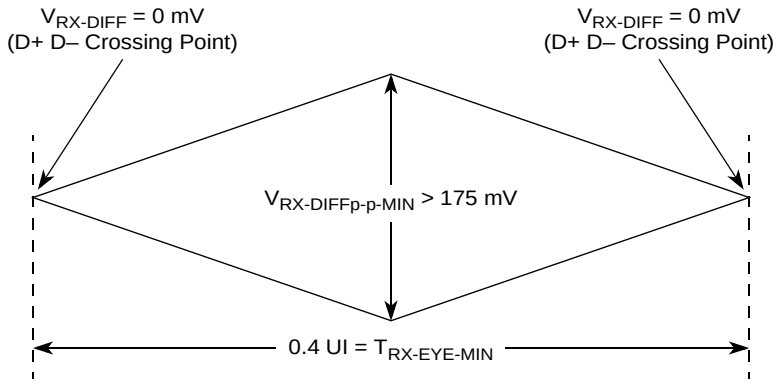


Figure 28. Minimum Receiver Eye Timing and Voltage Compliance Specification

11.5.1 Compliance Test and Measurement Load

The AC timing and voltage parameters must be verified at the measurement point, as specified within 0.2 inches of the package pins, into a test/measurement load shown in Figure 29.

NOTE

The allowance of the measurement point to be within 0.2 inches of the package pins is meant to acknowledge that package/board routing may benefit from D+ and D– not being exactly matched in length at the package pin boundary.

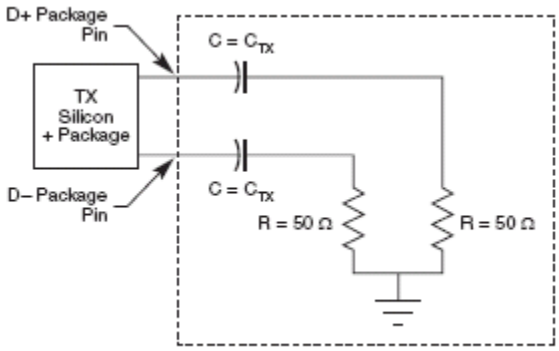


Figure 29. Compliance Test/Measurement Load

12 Enhanced Local Bus

This section describes the DC and AC electrical specifications for the enhanced local bus interface.

13.2.2 Full Speed Input Path (Read)

This figure provides the data and command input timing diagram.

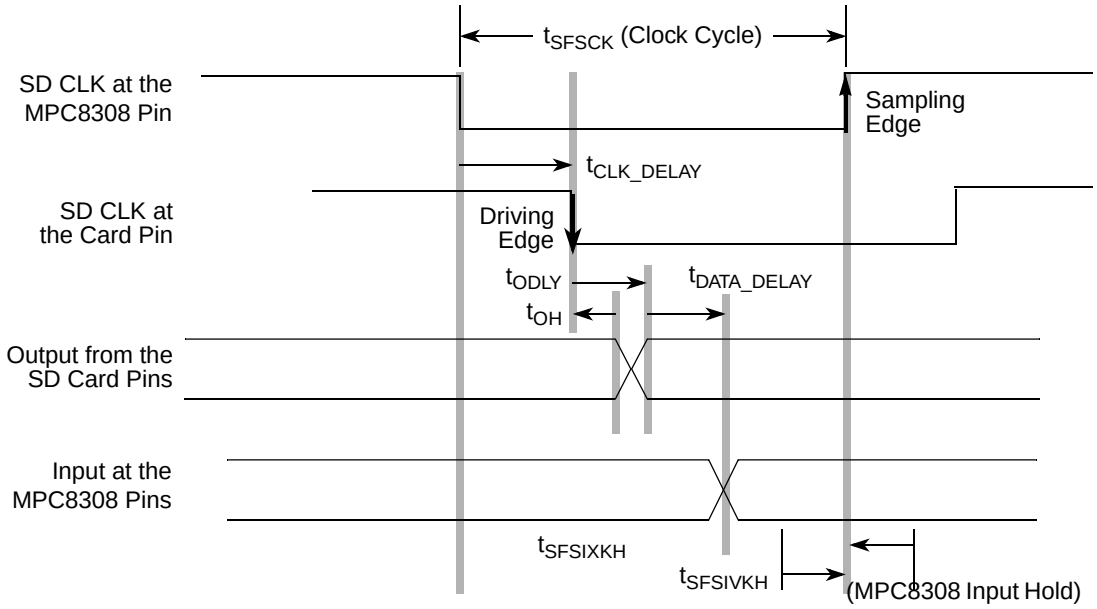


Figure 36. Full Speed Input Path

13.3 eSDHC AC Timing Specifications

This table provides the eSDHC AC timing specifications.

Table 40. eSDHC AC Timing Specifications for High Speed Mode

At recommended operating conditions NV_{DD} = 3.3 V ± 300 mV.

Parameter	Symbol [1]	Min	Max	Unit	Notes
SD_CLK clock frequency—high speed mode	f_{SHSCK}	0	50	MHz	3
SD_CLK clock cycle	t_{SHSCK}	20	—	ns	—
SD_CLK clock frequency—identification mode	f_{SIDCK}	0	400	kHz	—
SD_CLK clock low time	t_{SHSCKL}	7	—	ns	2
SD_CLK clock high time	t_{SHSCKH}	7	—	ns	2
SD_CLK clock rise and fall times	t_{SHSCKR}/ t_{SHSCKF}	—	3	ns	2
Input setup times: SD_CMD, SD_DATx	$t_{SHSIVKH}$	3	—	ns	2
Input hold times: SD_CMD, SD_DATx	$t_{SHSIXKH}$	2	—	ns	2
Output delay time: SD_CLK to SD_CMD, SD_DATx valid	$t_{SHSKHOV}$	3	—	ns	2
Output Hold time: SD_CLK to SD_CMD, SD_DATx invalid	$t_{SHSKHOX}$	–3	—	ns	2
SD Card Input Setup	t_{ISU}	6	—	ns	3
SD Card Input Hold	t_{IH}	2	—	ns	3

Table 40. eSDHC AC Timing Specifications for High Speed Mode (continued)

At recommended operating conditions NV_{DD} = 3.3 V ± 300 mV.

Parameter	Symbol [1]	Min	Max	Unit	Notes
SD Card Output Valid	t_{ODLY}	—	14	ns	3
SD Card Output Hold	t_{OH}	2.5	—	ns	3

Notes:

1. The symbols used for timing specifications herein follow the pattern of $t_{\text{(first three letters of functional block)(signal)(state) (reference)(state)}}$ for inputs and $t_{\text{(first three letters of functional block)(reference)(state)(signal)(state)}}$ for outputs. For example, $t_{SFSIXKH}$ symbolizes eSDHC full mode speed device timing (SFS) input (I) to go invalid (X) with respect to the clock reference (K) going to high (H). Also $t_{SFSKHOV}$ symbolizes eSDHC full speed timing (SFS) for the clock reference (K) to go high (H), with respect to the output (O) going valid (V) or data output valid time. Note that, in general, the clock reference symbol representation is based on five letters representing the clock of a particular functional. For rise and fall times, the latter convention is used with the appropriate letter: R (rise) or F (fall).
2. Measured at capacitive load of 40 pF.
3. For reference only, according to the SD card specifications.

This figure provides the eSDHC clock input timing diagram.

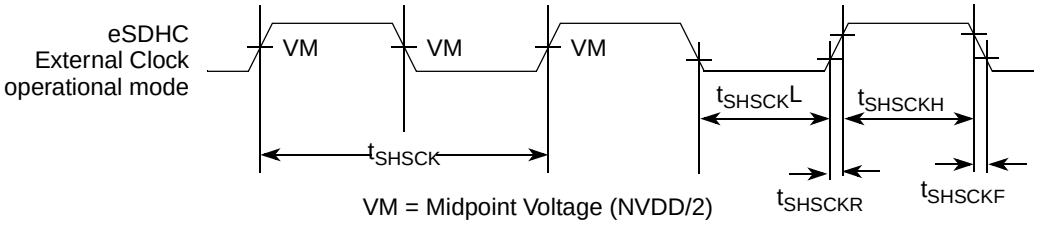


Figure 37. eSDHC Clock Input Timing Diagram

Table 42. JTAG AC Timing Specifications (Independent of SYS_CLK_IN) [1] (continued)

At recommended operating conditions (see Table 2).

Parameter	Symbol[2]	Min	Max	Unit	Note
Output hold times: Boundary-scan data TDO	 t_{JTKLDX} t_{JTKLOX}	 2 2	 — —	ns	5
JTAG external clock to output high impedance: Boundary-scan data TDO	 t_{JTKLDZ} t_{JTKLOZ}	 2 2	 19 9	ns	5, 6

Notes:

1. All outputs are measured from the midpoint voltage of the falling/rising edge of t_{TCLK} to the midpoint of the signal in question. The output timings are measured at the pins. All output timings assume a purely resistive 50-Ω load (see Figure 40). Time-of-flight delays must be added for trace lengths, vias, and connectors in the system.
2. The symbols used for timing specifications follow the pattern of $t_{\text{(first two letters of functional block)(signal)(state) (reference)(state)}}$ for inputs and $t_{\text{(first two letters of functional block)(reference)(state)(signal)(state)}}$ for outputs. For example, t_{JTDVKH} symbolizes JTAG device timing (JT) with respect to the time data input signals (D) reaching the valid state (V) relative to the t_{JTG} clock reference (K) going to the high (H) state or setup time. Also, t_{JTDXKH} symbolizes JTAG timing (JT) with respect to the time data input signals (D) went invalid (X) relative to the t_{JTG} clock reference (K) going to the high (H) state. Note that, in general, the clock reference symbol representation is based on three letters representing the clock of a particular functional. For rise and fall times, the latter convention is used with the appropriate letter: R (rise) or F (fall).
3. $\overline{\text{TRST}}$ is an asynchronous level sensitive signal. The setup time is for test purposes only.
4. Non-JTAG signal input timing with respect to t_{TCLK}.
5. Non-JTAG signal output timing with respect to t_{TCLK}.
6. Guaranteed by design and characterization.

This figure provides the AC test load for TDO and the boundary-scan outputs.

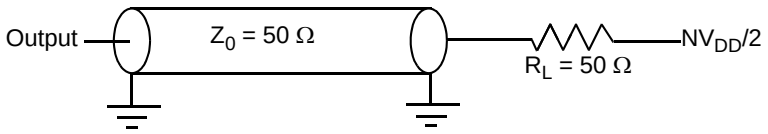


Figure 40. AC Test Load for the JTAG Interface

This figure provides the JTAG clock input timing diagram.

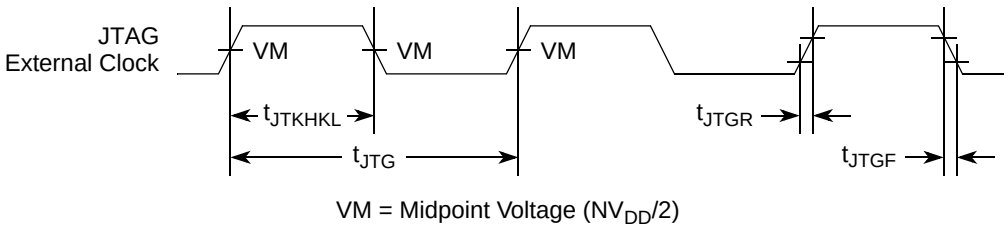


Figure 41. JTAG Clock Input Timing Diagram

17 GPIO

This section describes the DC and AC electrical specifications for the GPIO of MPC8308

17.1 GPIO DC Electrical Characteristics

This table provides the DC electrical characteristics for the GPIO.

Table 47. GPIO DC Electrical Characteristic

Characteristic	Symbol	Condition	Min	Max	Unit
Output high voltage	V_{OH}	I_{OH} = –8.0 mA	2.4	—	V
Output low voltage	V_{OL}	I_{OL} = 8.0 mA	—	0.5	V
Output low voltage	V_{OL}	I_{OL} = 3.2 mA	—	0.4	V
Input high voltage	V_{IH}	—	2.1	NV_{DD} + 0.3	V
Input low voltage	V_{IL}	—	–0.3	0.8	V
Input current	I_{IN}	$0 V \le V_{IN} \le NV_{DD}$	—	± 5	μA

17.2 GPIO AC Timing Specifications

This table provides the GPIO input and output AC timing specifications.

Table 48. GPIO Input AC Timing Specifications

Characteristic	Symbol[1]	Min	Unit
GPIO inputs—minimum pulse width	t_{PIWID}	20	ns

Note:

1. GPIO inputs and outputs are asynchronous to any visible clock. GPIO outputs should be synchronized before use by any external synchronous logic. GPIO inputs are required to be valid for at least t_{PIWID} ns to ensure proper operation.

This figure provides the AC test load for the GPIO.

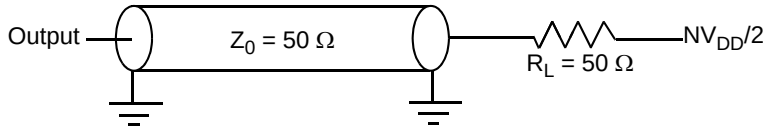
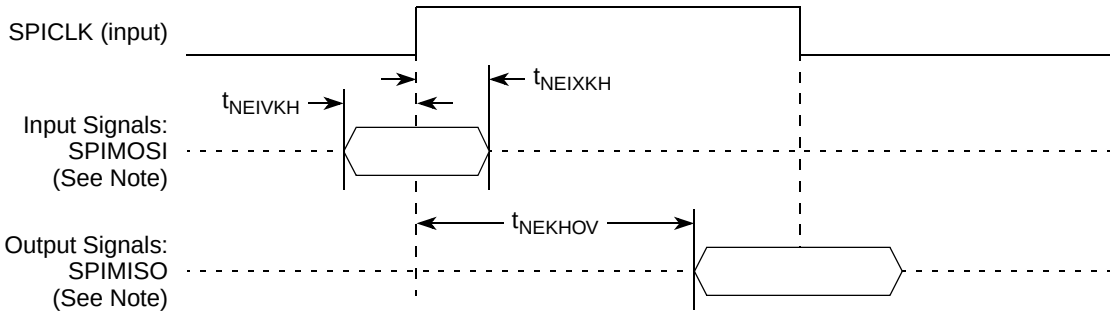


Figure 48. GPIO AC Test Load

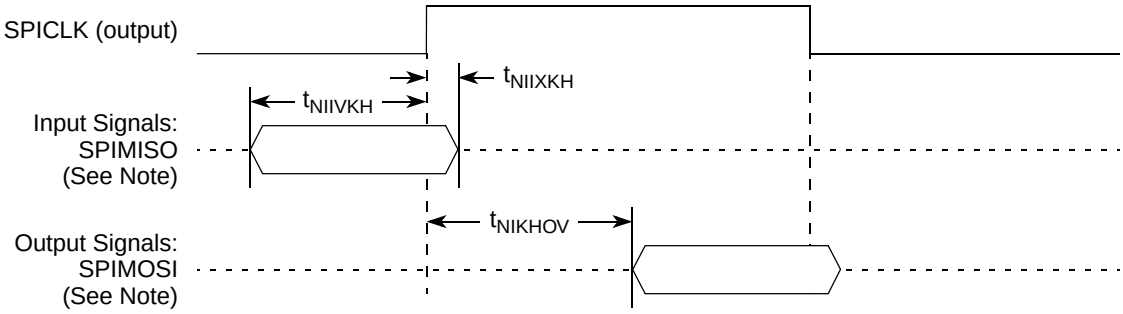
This figure shows the SPI timing in slave mode (external clock).



Note: The clock edge is selectable on SPI.

Figure 50. SPI AC Timing in Slave Mode (External Clock) Diagram

This figure shows the SPI timing in master mode (internal clock).



Note: The clock edge is selectable on SPI.

Figure 51. SPI AC Timing in Master Mode (Internal Clock) Diagram

20 Package and Pin Listings

This section details package parameters, pin assignments, and dimensions. The MPC8308 is available in a moulded array process ball grid array (MAPBGA). For information on the MAPBGA, see Section 20.1, "Package Parameters for the MPC8308 MAPBGA," and Section 20.2, "Mechanical Dimensions of the MPC8308 MAPBGA."

20.1 Package Parameters for the MPC8308 MAPBGA

The package parameters are as provided in the following list. The package type is 19 mm × 19 mm, 473 MAPBGA.

Package outline	19 mm × 19 mm
Interconnects	473
Pitch	0.80 mm
Module height (typical)	1.39 mm
Solder Balls	96.5 Sn/ 3.5Ag
Ball diameter (typical)	0.40 mm

20.2 Mechanical Dimensions of the MPC8308 MAPBGA

This figure shows the mechanical dimensions and bottom surface nomenclature of the MAPBGA package.

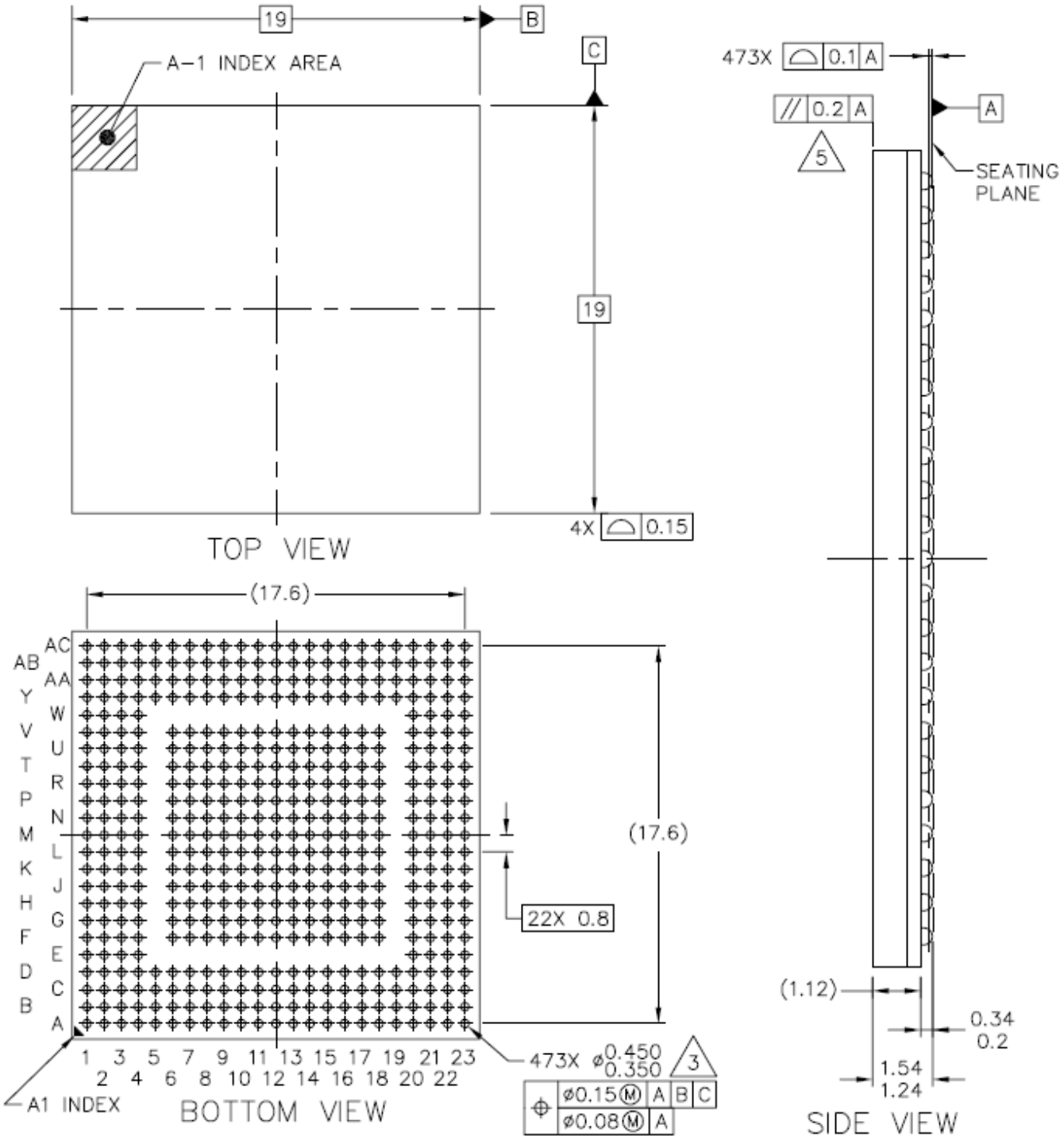


Figure 52. Mechanical Dimension and Bottom Surface Nomenclature of the MPC8308 MAPBG

Notes:
1. All dimensions are in millimeters.

Table 53. MPC8308 Pinout Listing (continued)

Signal	Package Pin Number	Pin Type	Power Supply	Note
$\overline{\text{MEMC\_MCAS}}$	C5	O	GV_{DDB}	—
$\overline{\text{MEMC\_MCS}}$[0]	B6	O	GV_{DDB}	—
$\overline{\text{MEMC\_MCS}}$[1]	C6	O	GV_{DDB}	—
MEMC_MCKE	H3	O	GV_{DDB}	3
MEMC_MCK [0]	A3	O	GV_{DDB}	—
MEMC_MCK [1]	U2	O	GV_{DDB}	—
MEMC_MCK [2]	G1	O	GV_{DDB}	—
$\overline{\text{MEMC\_MCK}}$ [0]	A4	O	GV_{DDB}	—
$\overline{\text{MEMC\_MCK}}$ [1]	U1	O	GV_{DDB}	—
$\overline{\text{MEMC\_MCK}}$ [2]	H1	O	GV_{DDB}	—
MEMC_MODT[0]	A5	O	GV_{DDB}	—
MEMC_MODT[1]	B5	O	GV_{DDB}	—
MEMC_MECC[0]	L4	I/O	GV_{DDB}	—
MEMC_MECC[1]	L6	I/O	GV_{DDB}	—
MEMC_MECC[2]	K4	I/O	GV_{DDB}	—
MEMC_MECC[3]	K3	I/O	GV_{DDB}	—
MEMC_MECC[4]	J2	I/O	GV_{DDB}	—
MEMC_MECC[5]	K6	I/O	GV_{DDB}	—
MEMC_MECC[6]	J3	I/O	GV_{DDB}	—
MEMC_MECC[7]	J6	I/O	GV_{DDB}	—
MV_{REF}	G6	I	GV_{DDB}	—
Local Bus Controller Interface				
LD0	U18	I/O	NV_{DDP_K}	8
LD1	V18	I/O	NV_{DDP_K}	8
LD2	U16	I/O	NV_{DDP_K}	8
LD3	Y20	I/O	NV_{DDP_K}	8
LD4	AA21	I/O	NV_{DDP_K}	8
LD5	AC22	I/O	NV_{DDP_K}	8
LD6	V17	I/O	NV_{DDP_K}	8
LD7	AB21	I/O	NV_{DDP_K}	8
LD8	Y19	I/O	NV_{DDP_K}	8
LD9	AA20	I/O	NV_{DDP_K}	8
LD10	Y17	I/O	NV_{DDP_K}	8

Table 53. MPC8308 Pinout Listing (continued)

Signal	Package Pin Number	Pin Type	Power Supply	Note
LD11	AC21	I/O	NV_{DDP_K}	8
LD12	AB20	I/O	NV_{DDP_K}	8
LD13	V16	I/O	NV_{DDP_K}	8
LD14	AA19	I/O	NV_{DDP_K}	8
LD15	AC17	I/O	NV_{DDP_K}	8
LA0	AC20	O	NV_{DDP_K}	—
LA1	Y16	O	NV_{DDP_K}	—
LA2	U15	O	NV_{DDP_K}	—
LA3	V15	O	NV_{DDP_K}	—
LA4	AA18	O	NV_{DDP_K}	—
LA5	AA17	O	NV_{DDP_K}	—
LA6	AC19	O	NV_{DDP_K}	—
LA7	AA16	O	NV_{DDP_K}	—
LA8	AB18	O	NV_{DDP_K}	—
LA9	AC18	O	NV_{DDP_K}	—
LA10	V14	O	NV_{DDP_K}	—
LA11	AB17	O	NV_{DDP_K}	—
LA12	AA15	O	NV_{DDP_K}	—
LA13	AC16	O	NV_{DDP_K}	—
LA14	Y14	O	NV_{DDP_K}	—
LA15	AC15	O	NV_{DDP_K}	—
LA16	U13	O	NV_{DDP_K}	—
LA17	V13	O	NV_{DDP_K}	—
LA18	Y13	O	NV_{DDP_K}	—
LA19	AB15	O	NV_{DDP_K}	—
LA20	AA14	O	NV_{DDP_K}	—
LA21	AB14	O	NV_{DDP_K}	—
LA22	U12	O	NV_{DDP_K}	—
LA23	V12	O	NV_{DDP_K}	—
LA24	Y12	O	NV_{DDP_K}	—
LA25	AC14	O	NV_{DDP_K}	—
$\overline{\text{LCS}}$[0]	AA13	O	NV_{DDP_K}	4
$\overline{\text{LCS}}$[1]	AB13	O	NV_{DDP_K}	4
$\overline{\text{LCS}}$[2]	AA12	O	NV_{DDP_K}	4

Table 53. MPC8308 Pinout Listing (continued)

Signal	Package Pin Number	Pin Type	Power Supply	Note
IIC_SCL1	A9	I/O	NV_{DDA}	2
IIC_SDA2/$\overline{\text{CKSTOP\_OUT}}$	D10	I/O	NV_{DDA}	2
IIC_SCL2/$\overline{\text{CKSTOP\_IN}}$	C10	I/O	NV_{DDA}	2
Interrupts				
IRQ[0]/$\overline{\text{MCP\_IN}}$	A17	I	NV_{DDB}	—
IRQ[1]/$\overline{\text{MCP\_OUT}}$	F16	I/O	NV_{DDB}	—
IRQ[2] /$\overline{\text{CKSTOP\_OUT}}$	B17	I/O	NV_{DDB}	—
IRQ[3] /$\overline{\text{CKSTOP\_IN}}$	A18	I	NV_{DDB}	—
JTAG				
TCK	Y7	I	NV_{DDP_K}	—
TDI	U9	I	NV_{DDP_K}	4
TDO	AC5	O	NV_{DDP_K}	3
TMS	AA6	I	NV_{DDP_K}	4
$\overline{\text{TRST}}$	V8	I	NV_{DDP_K}	4
TEST				
TEST_MODE	AC6	I	NV_{DDP_K}	5
System Control				
$\overline{\text{HRESET}}$	AA9	I/O	NV_{DDP_K}	1
$\overline{\text{PORESET}}$	AA8	I	NV_{DDP_K}	—
$\overline{\text{SRESET}}$	AB7	I/O	NV_{DDP_K}	—
Clocks				
SYS_CLK_IN	AC8	I	NV_{DDP_K}	—
RTC_PIT_CLOCK	AA23	I	NV_{DDJ}	—
MISC				
QUIESCE	AA7	O	NV_{DDP_K}	—
THERM0	AC7	I	NV_{DDP_K}	6
ETSEC1				
TSEC1_COL	B20	I	NV_{DDC}	—
TSEC1_CRS	B21	I	NV_{DDC}	—
TSEC1_GTX_CLK	F18	O	NV_{DDC}	3
TSEC1_RX_CLK	A22	I	NV_{DDC}	—
TSEC1_RX_DV	D21	I	NV_{DDC}	—
TSEC1_RXD[3]	C22	I	NV_{DDC}	—
TSEC1_RXD[2]	C21	I	NV_{DDC}	—

This table provides the operating frequencies for the device under recommended operating conditions (Table 2).

Table 55. Operating Frequencies for MPC8308

Characteristic[1]	Maximum Operating Frequency	Unit
e300 core frequency (*core_clk*)	400	MHz
Coherent system bus frequency (*csb_clk*)	133	MHz
DDR2 memory bus frequency (MCK)[2]	133	MHz
Local bus frequency (LCLK*0*)[3]	66	MHz

Notes:
1. The SYS_CLK_IN frequency, RCWL[SPMF], and RCWL[COREPLL] settings must be chosen such that the resulting *csb_clk*, MCK, LCLK0, and *core_clk* frequencies do not exceed their respective maximum or minimum operating frequencies.
2. The DDR data rate is 2x the DDR memory bus frequency.
3. The local bus frequency is 1/2, 1/4, or 1/8 of the *lbc_clk* frequency (depending on LCCR[CLKDIV]) which is in turn, 1x or 2x the *csb_clk* frequency (depending on RCWL[LBCM]).

21.2 System PLL Configuration

The system PLL is controlled by the RCWL[SPMF] parameter. This table shows the multiplication factor encodings for the system PLL.

Table 56. System PLL Ratio

RCWL[SPMF]	csb_clk: SYS_CLK_IN
0000	Reserved
0001	Reserved
0010	2 : 1
0011	3 : 1
0100	4 : 1
0101	5 : 1
0110–1111	Reserved

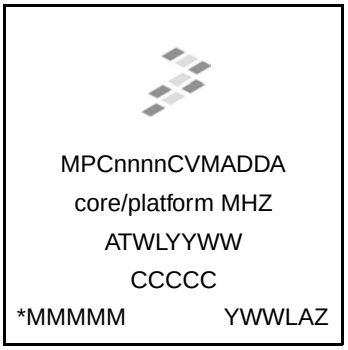
As described in Section 21, “Clocking,” the LBCM, DDRCM, and SPMF parameters in the reset configuration word low select the ratio between the primary clock input (SYS_CLK_IN) and the internal coherent system bus clock (*csb_clk*). This table shows the expected frequency values for the CSB frequency for select *csb_clk* to SYS_CLK_IN ratios.

Table 57. CSB Frequency Options

SPMF *csb_clk* :Input Clock Ratio		Input Clock Frequency (MHz)		
		25	33.33	66.67
0010	2:1			133
0100	4:1		133	
0101	5:1	125	167	

24.2 Part Marking

Parts are marked as in the example shown in this figure.



PBGA

Notes:
ATWLYYWW is the traceability code.
CCCCC is the country code.
MMMMM is the mask number.
YWWLAZ is the assembly traceability code.

Figure 56. Freescale Part Marking for PBGA Devices

This table lists the SVR settings.

Table 62. SVR Settings

Device	Package	SVR
MPC8308	MAPBGA	0x8101 _0110

Note: PVR = 8085_0020 for the device.