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

Details

Product Status	Obsolete
Core Processor	MPC8xx
Number of Cores/Bus Width	1 Core, 32-Bit
Speed	66MHz
Co-Processors/DSP	Communications; CPM
RAM Controllers	DRAM
Graphics Acceleration	No
Display & Interface Controllers	-
Ethernet	10Mbps (4)
SATA	-
USB	-
Voltage - I/O	3.3V
Operating Temperature	-40°C ~ 95°C (TA)
Security Features	-
Package / Case	357-BBGA
Supplier Device Package	357-PBGA (25x25)
Purchase URL	https://www.e-xfl.com/product-detail/nxp-semiconductors/mpc860encvr66d4

3 Maximum Tolerated Ratings

This section provides the maximum tolerated voltage and temperature ranges for the MPC860. [Table 2](#) provides the maximum ratings.

This device contains circuitry protecting against damage due to high-static voltage or electrical fields; however, it is advised that normal precautions be taken to avoid application of any voltages higher than maximum-rated voltages to this high-impedance circuit. Reliability of operation is enhanced if unused inputs are tied to an appropriate logic voltage level (for example, either GND or V_{DD}).

Table 2. Maximum Tolerated Ratings

(GND = 0 V)

Rating	Symbol	Value	Unit
Supply voltage ¹	V_{DDH}	−0.3 to 4.0	V
	V_{DDL}	−0.3 to 4.0	V
	KAPWR	−0.3 to 4.0	V
	V_{DDSYN}	−0.3 to 4.0	V
Input voltage ²	V_{in}	GND − 0.3 to V_{DDH}	V
Temperature ³ (standard)	$T_{A(min)}$	0	°C
	$T_{j(max)}$	95	°C
Temperature ³ (extended)	$T_{A(min)}$	−40	°C
	$T_{j(max)}$	95	°C
Storage temperature range	T_{stg}	−55 to 150	°C

¹ The power supply of the device must start its ramp from 0.0 V.

² Functional operating conditions are provided with the DC electrical specifications in [Table 6](#). Absolute maximum ratings are stress ratings only; functional operation at the maxima is not guaranteed. Stress beyond those listed may affect device reliability or cause permanent damage to the device.

Caution: All inputs that tolerate 5 V cannot be more than 2.5 V greater than the supply voltage. This restriction applies to power-up and normal operation (that is, if the MPC860 is unpowered, voltage greater than 2.5 V must not be applied to its inputs).

³ Minimum temperatures are guaranteed as ambient temperature, T_A . Maximum temperatures are guaranteed as junction temperature, T_j .

Figure 1 shows the undershoot and overshoot voltages at the interface of the MPC860.

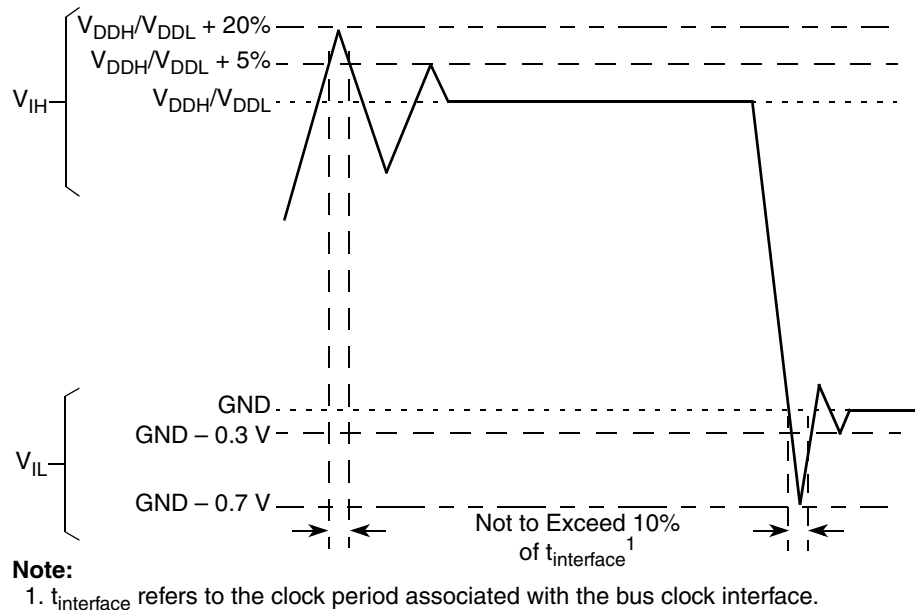


Figure 1. Undershoot/Overshoot Voltage for V_{DDH} and V_{DDL}

4 Thermal Characteristics

Table 3. Package Description

Package Designator	Package Code (Case No.)	Package Description
ZP	5050 (1103-01)	PBGA 357 25*25*0.9P1.27
ZQ/VR	5058 (1103D-02)	PBGA 357 25*25*1.2P1.27

Table 4 shows the thermal characteristics for the MPC860.

Table 4. MPC860 Thermal Resistance Data

Rating	Environment		Symbol	ZP MPC860P	ZQ / VR MPC860P	Unit
Mold Compound Thickness				0.85	1.15	mm
Junction-to-ambient ¹	Natural convection	Single-layer board (1s)	R _{θJA} ²	34	34	°C/W
		Four-layer board (2s2p)	R _{θJMA} ³	22	22	
	Airflow (200 ft/min)	Single-layer board (1s)	R _{θJMA} ³	27	27	
		Four-layer board (2s2p)	R _{θJMA} ³	18	18	
Junction-to-board ⁴			R _{θJB}	14	13	
Junction-to-case ⁵			R _{θJC}	6	8	
Junction-to-package top ⁶	Natural convection		Ψ _{JT}	2	2	

¹ Junction temperature is a function of on-chip power dissipation, package thermal resistance, mounting site (board) temperature, ambient temperature, airflow, power dissipation of other components on the board, and board thermal resistance.

² Per SEMI G38-87 and JEDEC JESD51-2 with the single-layer board horizontal.

³ Per JEDEC JESD51-6 with the board horizontal.

⁴ Thermal resistance between the die and the printed-circuit board per JEDEC JESD51-8. Board temperature is measured on the top surface of the board near the package.

⁵ Indicates the average thermal resistance between the die and the case top surface as measured by the cold plate method (MIL SPEC-883 Method 1012.1) with the cold plate temperature used for the case temperature. For exposed pad packages where the pad would be expected to be soldered, junction-to-case thermal resistance is a simulated value from the junction to the exposed pad without contact resistance.

⁶ Thermal characterization parameter indicating the temperature difference between the package top and the junction temperature per JEDEC JESD51-2.

7 Thermal Calculation and Measurement

For the following discussions, $P_D = (V_{DD} \times I_{DD}) + P_{I/O}$, where $P_{I/O}$ is the power dissipation of the I/O drivers.

7.1 Estimation with Junction-to-Ambient Thermal Resistance

An estimation of the chip junction temperature, T_J , in °C can be obtained from the equation:

$$T_J = T_A + (R_{\theta JA} \times P_D)$$

where:

T_A = ambient temperature (°C)

$R_{\theta JA}$ = package junction-to-ambient thermal resistance (°C/W)

P_D = power dissipation in package

The junction-to-ambient thermal resistance is an industry standard value which provides a quick and easy estimation of thermal performance. However, the answer is only an estimate; test cases have demonstrated that errors of a factor of two (in the quantity $T_J - T_A$) are possible.

7.2 Estimation with Junction-to-Case Thermal Resistance

Historically, the thermal resistance has frequently been expressed as the sum of a junction-to-case thermal resistance and a case-to-ambient thermal resistance:

$$R_{\theta JA} = R_{\theta JC} + R_{\theta CA}$$

where:

$R_{\theta JA}$ = junction-to-ambient thermal resistance (°C/W)

$R_{\theta JC}$ = junction-to-case thermal resistance (°C/W)

$R_{\theta CA}$ = case-to-ambient thermal resistance (°C/W)

$R_{\theta JC}$ is device related and cannot be influenced by the user. The user adjusts the thermal environment to affect the case-to-ambient thermal resistance, $R_{\theta CA}$. For instance, the user can change the airflow around the device, add a heat sink, change the mounting arrangement on the printed-circuit board, or change the thermal dissipation on the printed-circuit board surrounding the device. This thermal model is most useful for ceramic packages with heat sinks where some 90% of the heat flows through the case and the heat sink to the ambient environment. For most packages, a better model is required.

7.3 Estimation with Junction-to-Board Thermal Resistance

A simple package thermal model which has demonstrated reasonable accuracy (about 20%) is a two-resistor model consisting of a junction-to-board and a junction-to-case thermal resistance. The junction-to-case thermal resistance covers the situation where a heat sink is used or where a substantial amount of heat is dissipated from the top of the package. The junction-to-board thermal resistance describes the thermal performance when most of the heat is conducted to the printed-circuit board. It has been observed that the thermal performance of most plastic packages, especially PBGA packages, is strongly dependent on the board temperature; see [Figure 2](#).

where:

Ψ_{JT} = thermal characterization parameter

T_T = thermocouple temperature on top of package

P_D = power dissipation in package

The thermal characterization parameter is measured per JEDEC JESD51-2 specification using a 40 gauge type T thermocouple epoxied to the top center of the package case. The thermocouple should be positioned so that the thermocouple junction rests on the package. A small amount of epoxy is placed over the thermocouple junction and over 1 mm of wire extending from the junction. The thermocouple wire is placed flat against the package case to avoid measurement errors caused by cooling effects of the thermocouple wire.

7.6 References

Semiconductor Equipment and Materials International (415) 964-5111
805 East Middlefield Rd.
Mountain View, CA 94043

MIL-SPEC and EIA/JESD (JEDEC) Specifications 800-854-7179 or
(Available from Global Engineering Documents) 303-397-7956

JEDEC Specifications <http://www.jedec.org>

1. C.E. Triplett and B. Joiner, "An Experimental Characterization of a 272 PBGA Within an Automotive Engine Controller Module," Proceedings of SemiTherm, San Diego, 1998, pp. 47–54.
2. B. Joiner and V. Adams, "Measurement and Simulation of Junction to Board Thermal Resistance and Its Application in Thermal Modeling," Proceedings of SemiTherm, San Diego, 1999, pp. 212–220.

8 Layout Practices

Each V_{DD} pin on the MPC860 should be provided with a low-impedance path to the board's supply. Each GND pin should likewise be provided with a low-impedance path to ground. The power supply pins drive distinct groups of logic on the chip. The V_{DD} power supply should be bypassed to ground using at least four 0.1 μ F-bypass capacitors located as close as possible to the four sides of the package. The capacitor leads and associated printed circuit traces connecting to chip V_{DD} and GND should be kept to less than half an inch per capacitor lead. A four-layer board employing two inner layers as V_{CC} and GND planes is recommended.

All output pins on the MPC860 have fast rise and fall times. Printed circuit (PC) trace interconnection length should be minimized in order to minimize undershoot and reflections caused by these fast output switching times. This recommendation particularly applies to the address and data buses. Maximum PC trace lengths of 6 inches are recommended. Capacitance calculations should consider all device loads as well as parasitic capacitances due to the PC traces. Attention to proper PCB layout and bypassing becomes especially critical in systems with higher capacitive loads because these loads create higher transient currents in the V_{CC} and GND circuits. Pull up all unused inputs or signals that will be inputs during reset. Special care should be taken to minimize the noise levels on the PLL supply pins.

Table 7. Bus Operation Timings (continued)

Num	Characteristic	33 MHz		40 MHz		50 MHz		66 MHz		Unit
		Min	Max	Min	Max	Min	Max	Min	Max	
B29d	$\overline{WE}(0:3)$ negated to D(0:31), DP(0:3) High-Z GPCM write access, TRLX = 1, CSNT = 1, EBDF = 0	43.45	—	35.5	—	28.00	—	20.73	—	ns
B29e	\overline{CS} negated to D(0:31), DP(0:3) High-Z GPCM write access, TRLX = 1, CSNT = 1, ACS = 10, or ACS = 11, EBDF = 0	43.45	—	35.5	—	28.00	—	29.73	—	ns
B29f	$\overline{WE}(0:3)$ negated to D(0:31), DP(0:3) High-Z GPCM write access, TRLX = 0, CSNT = 1, EBDF = 1	8.86	—	6.88	—	5.00	—	3.18	—	ns
B29g	\overline{CS} negated to D(0:31), DP(0:3) High-Z GPCM write access, TRLX = 0, CSNT = 1, ACS = 10, or ACS = 11, EBDF = 1	8.86	—	6.88	—	5.00	—	3.18	—	ns
B29h	$\overline{WE}(0:3)$ negated to D(0:31), DP(0:3) High-Z GPCM write access, TRLX = 1, CSNT = 1, EBDF = 1	38.67	—	31.38	—	24.50	—	17.83	—	ns
B29i	\overline{CS} negated to D(0:31), DP(0:3) High-Z GPCM write access, TRLX = 1, CSNT = 1, ACS = 10, or ACS = 11, EBDF = 1	38.67	—	31.38	—	24.50	—	17.83	—	ns
B30	\overline{CS} , $\overline{WE}(0:3)$ negated to A(0:31), BADDR(28:30) invalid GPCM write access ⁸	5.58	—	4.25	—	3.00	—	1.79	—	ns
B30a	$\overline{WE}(0:3)$ negated to A(0:31), BADDR(28:30) invalid GPCM, write access, TRLX = 0, CSNT = 1, \overline{CS} negated to A(0:31) invalid GPCM write access, TRLX = 0, CSNT = 1, ACS = 10, or ACS = 11, EBDF = 0	13.15	—	10.50	—	8.00	—	5.58	—	ns
B30b	$\overline{WE}(0:3)$ negated to A(0:31), invalid GPCM BADDR(28:30) invalid GPCM write access, TRLX = 1, CSNT = 1. \overline{CS} negated to A(0:31), Invalid GPCM, write access, TRLX = 1, CSNT = 1, ACS = 10, or ACS = 11, EBDF = 0	43.45	—	35.50	—	28.00	—	20.73	—	ns
B30c	$\overline{WE}(0:3)$ negated to A(0:31), BADDR(28:30) invalid GPCM write access, TRLX = 0, CSNT = 1. \overline{CS} negated to A(0:31) invalid GPCM write access, TRLX = 0, CSNT = 1, ACS = 10, ACS = 11, EBDF = 1	8.36	—	6.38	—	4.50	—	2.68	—	ns
B30d	$\overline{WE}(0:3)$ negated to A(0:31), BADDR(28:30) invalid GPCM write access, TRLX = 1, CSNT = 1. \overline{CS} negated to A(0:31) invalid GPCM write access TRLX = 1, CSNT = 1, ACS = 10, or ACS = 11, EBDF = 1	38.67	—	31.38	—	24.50	—	17.83	—	ns
B31	CLKOUT falling edge to \overline{CS} valid—as requested by control bit CST4 in the corresponding word in UPM	1.50	6.00	1.50	6.00	1.50	6.00	1.50	6.00	ns

Table 7. Bus Operation Timings (continued)

Num	Characteristic	33 MHz		40 MHz		50 MHz		66 MHz		Unit
		Min	Max	Min	Max	Min	Max	Min	Max	
B35	A(0:31), BADDR(28:30) to \overline{CS} valid—as requested by control bit BST4 in the corresponding word in UPM	5.58	—	4.25	—	3.00	—	1.79	—	ns
B35a	A(0:31), BADDR(28:30), and D(0:31) to \overline{BS} valid—as requested by control bit BST1 in the corresponding word in UPM	13.15	—	10.50	—	8.00	—	5.58	—	ns
B35b	A(0:31), BADDR(28:30), and D(0:31) to \overline{BS} valid—as requested by control bit BST2 in the corresponding word in UPM	20.73	—	16.75	—	13.00	—	9.36	—	ns
B36	A(0:31), BADDR(28:30), and D(0:31) to \overline{GPL} valid—as requested by control bit GxT4 in the corresponding word in UPM	5.58	—	4.25	—	3.00	—	1.79	—	ns
B37	UPWAIT valid to CLKOUT falling edge ⁹	6.00	—	6.00	—	6.00	—	6.00	—	ns
B38	CLKOUT falling edge to UPWAIT valid ⁹	1.00	—	1.00	—	1.00	—	1.00	—	ns
B39	\overline{AS} valid to CLKOUT rising edge ¹⁰	7.00	—	7.00	—	7.00	—	7.00	—	ns
B40	A(0:31), TSIZ(0:1), RD/ \overline{WR} , \overline{BURST} , valid to CLKOUT rising edge	7.00	—	7.00	—	7.00	—	7.00	—	ns
B41	\overline{TS} valid to CLKOUT rising edge (setup time)	7.00	—	7.00	—	7.00	—	7.00	—	ns
B42	CLKOUT rising edge to \overline{TS} valid (hold time)	2.00	—	2.00	—	2.00	—	2.00	—	ns
B43	\overline{AS} negation to memory controller signals negation	—	TBD	—	TBD	—	TBD	—	TBD	ns

¹ Phase and frequency jitter performance results are only valid if the input jitter is less than the prescribed value.

² If the rate of change of the frequency of EXTAL is slow (that is, it does not jump between the minimum and maximum values in one cycle) or the frequency of the jitter is fast (that is, it does not stay at an extreme value for a long time) then the maximum allowed jitter on EXTAL can be up to 2%.

³ The timings specified in B4 and B5 are based on full strength clock.

⁴ The timing for \overline{BR} output is relevant when the MPC860 is selected to work with external bus arbiter. The timing for \overline{BG} output is relevant when the MPC860 is selected to work with internal bus arbiter.

⁵ The timing required for \overline{BR} input is relevant when the MPC860 is selected to work with internal bus arbiter. The timing for \overline{BG} input is relevant when the MPC860 is selected to work with external bus arbiter.

⁶ The D(0:31) and DP(0:3) input timings B18 and B19 refer to the rising edge of the CLKOUT in which the \overline{TA} input signal is asserted.

⁷ The D(0:31) and DP(0:3) input timings B20 and B21 refer to the falling edge of the CLKOUT. This timing is valid only for read accesses controlled by chip-selects under control of the UPM in the memory controller, for data beats where DLT3 = 1 in the UPM RAM words. (This is only the case where data is latched on the falling edge of CLKOUT.)

⁸ The timing B30 refers to \overline{CS} when ACS = 00 and to \overline{WE} (0:3) when CSNT = 0.

⁹ The signal UPWAIT is considered asynchronous to the CLKOUT and synchronized internally. The timings specified in B37 and B38 are specified to enable the freeze of the UPM output signals as described in [Figure 18](#).

¹⁰ The \overline{AS} signal is considered asynchronous to the CLKOUT. The timing B39 is specified in order to allow the behavior specified in [Figure 21](#).

Figure 14 through Figure 16 provide the timing for the external bus write controlled by various GPCM factors.

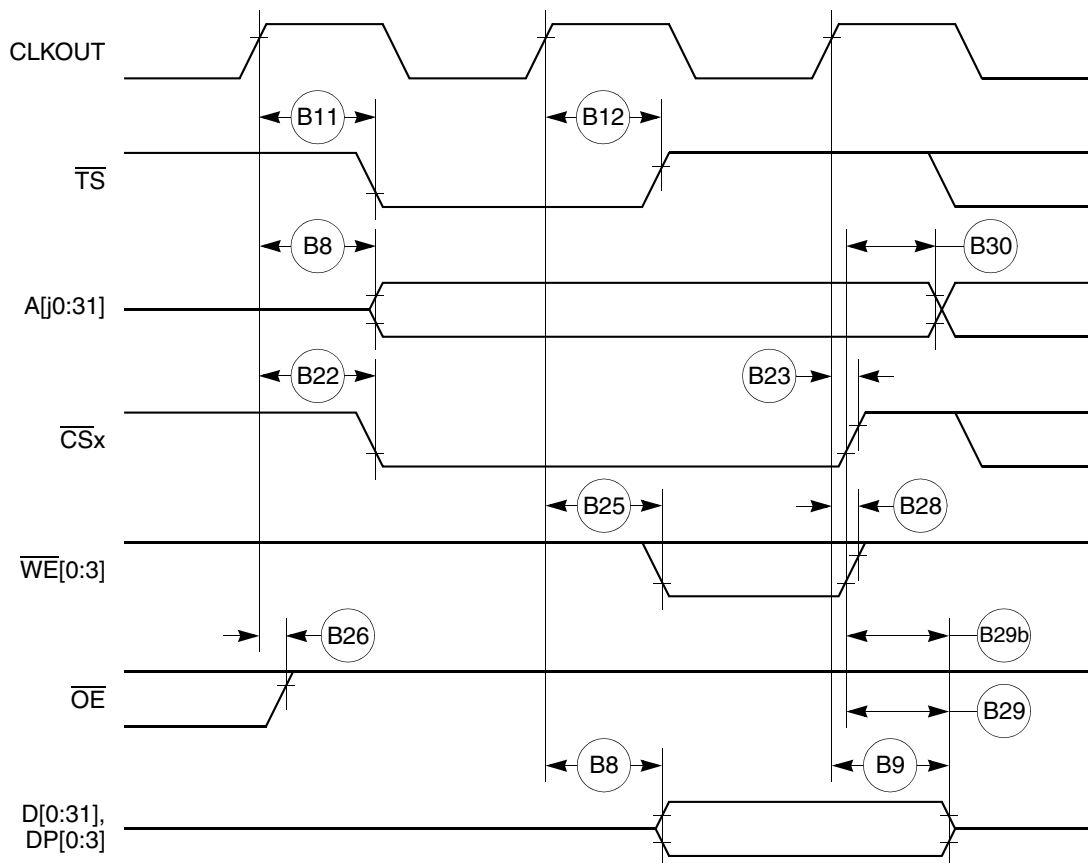


Figure 14. External Bus Write Timing (GPCM Controlled—TRLX = 0 or 1, CSNT = 0)

11 CPM Electrical Characteristics

This section provides the AC and DC electrical specifications for the communications processor module (CPM) of the MPC860.

11.1 PIP/PIO AC Electrical Specifications

Table 14 provides the PIP/PIO AC timings as shown in Figure 39 through Figure 43.

Table 14. PIP/PIO Timing

Num	Characteristic	All Frequencies		Unit
		Min	Max	
21	Data-in setup time to STBI low	0	—	ns
22	Data-in hold time to STBI high	$2.5 - t_3^1$	—	CLK
23	STBI pulse width	1.5	—	CLK
24	STBO pulse width	1 CLK – 5 ns	—	ns
25	Data-out setup time to STBO low	2	—	CLK
26	Data-out hold time from STBO high	5	—	CLK
27	STBI low to STBO low (Rx interlock)	—	2	CLK
28	STBI low to STBO high (Tx interlock)	2	—	CLK
29	Data-in setup time to clock high	15	—	ns
30	Data-in hold time from clock high	7.5	—	ns
31	Clock low to data-out valid (CPU writes data, control, or direction)	—	25	ns

¹ t_3 = Specification 23.

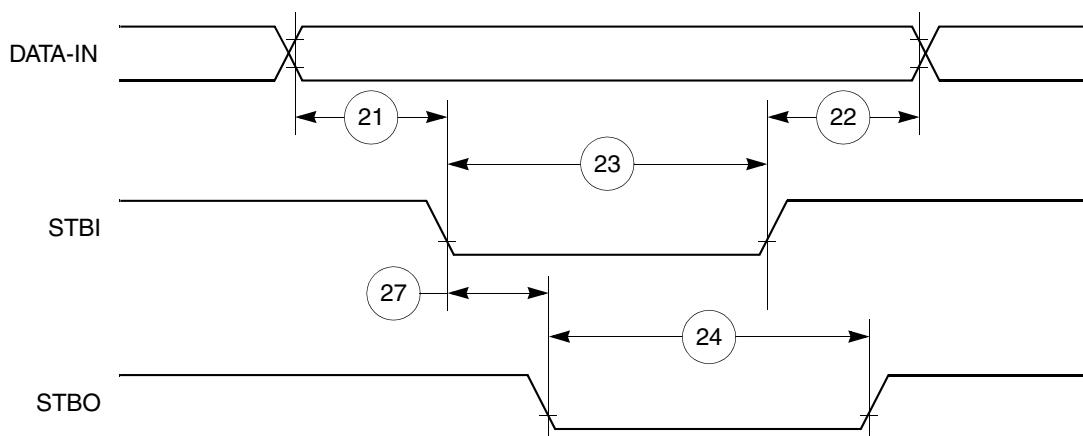


Figure 39. PIP Rx (Interlock Mode) Timing Diagram

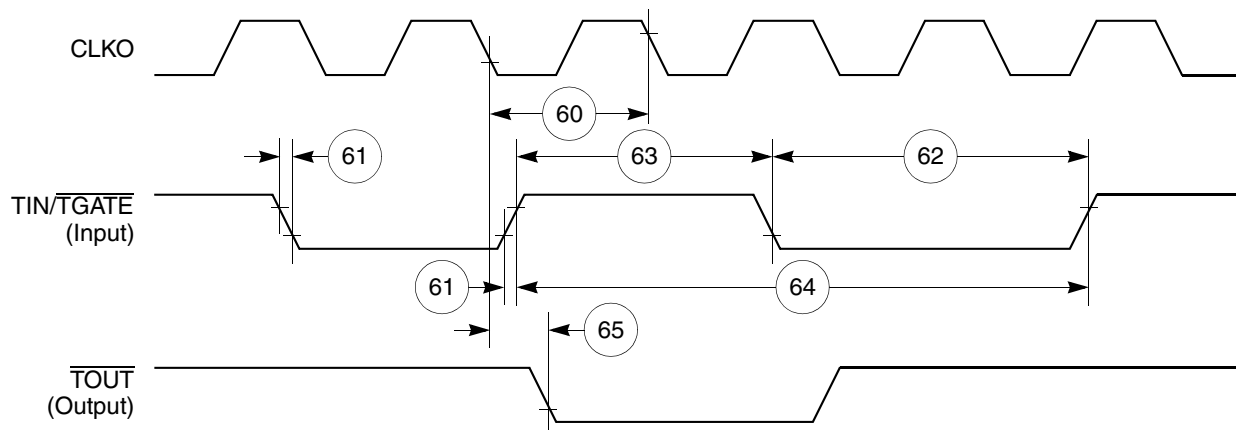


Figure 50. CPM General-Purpose Timers Timing Diagram

11.6 Serial Interface AC Electrical Specifications

Table 19 provides the serial interface timings as shown in Figure 51 through Figure 55.

Table 19. SI Timing

Num	Characteristic	All Frequencies		Unit
		Min	Max	
70	L1RCLK, L1TCLK frequency (DSC = 0) ^{1, 2}	—	SYNCCCLK/2.5	MHz
71	L1RCLK, L1TCLK width low (DSC = 0) ²	P + 10	—	ns
71a	L1RCLK, L1TCLK width high (DSC = 0) ³	P + 10	—	ns
72	L1TXD, L1ST(1–4), $\overline{\text{L1RQ}}$, L1CLKO rise/fall time	—	15.00	ns
73	L1RSYNC, L1TSYNC valid to L1CLK edge (SYNC setup time)	20.00	—	ns
74	L1CLK edge to L1RSYNC, L1TSYNC, invalid (SYNC hold time)	35.00	—	ns
75	L1RSYNC, L1TSYNC rise/fall time	—	15.00	ns
76	L1RXD valid to L1CLK edge (L1RXD setup time)	17.00	—	ns
77	L1CLK edge to L1RXD invalid (L1RXD hold time)	13.00	—	ns
78	L1CLK edge to L1ST(1–4) valid ⁴	10.00	45.00	ns
78A	L1SYNC valid to L1ST(1–4) valid	10.00	45.00	ns
79	L1CLK edge to L1ST(1–4) invalid	10.00	45.00	ns
80	L1CLK edge to L1TXD valid	10.00	55.00	ns
80A	L1TSYNC valid to L1TXD valid ⁴	10.00	55.00	ns
81	L1CLK edge to L1TXD high impedance	0.00	42.00	ns
82	L1RCLK, L1TCLK frequency (DSC = 1)	—	16.00 or SYNCCCLK/2	MHz
83	L1RCLK, L1TCLK width low (DSC = 1)	P + 10	—	ns
83a	L1RCLK, L1TCLK width high (DSC = 1) ³	P + 10	—	ns

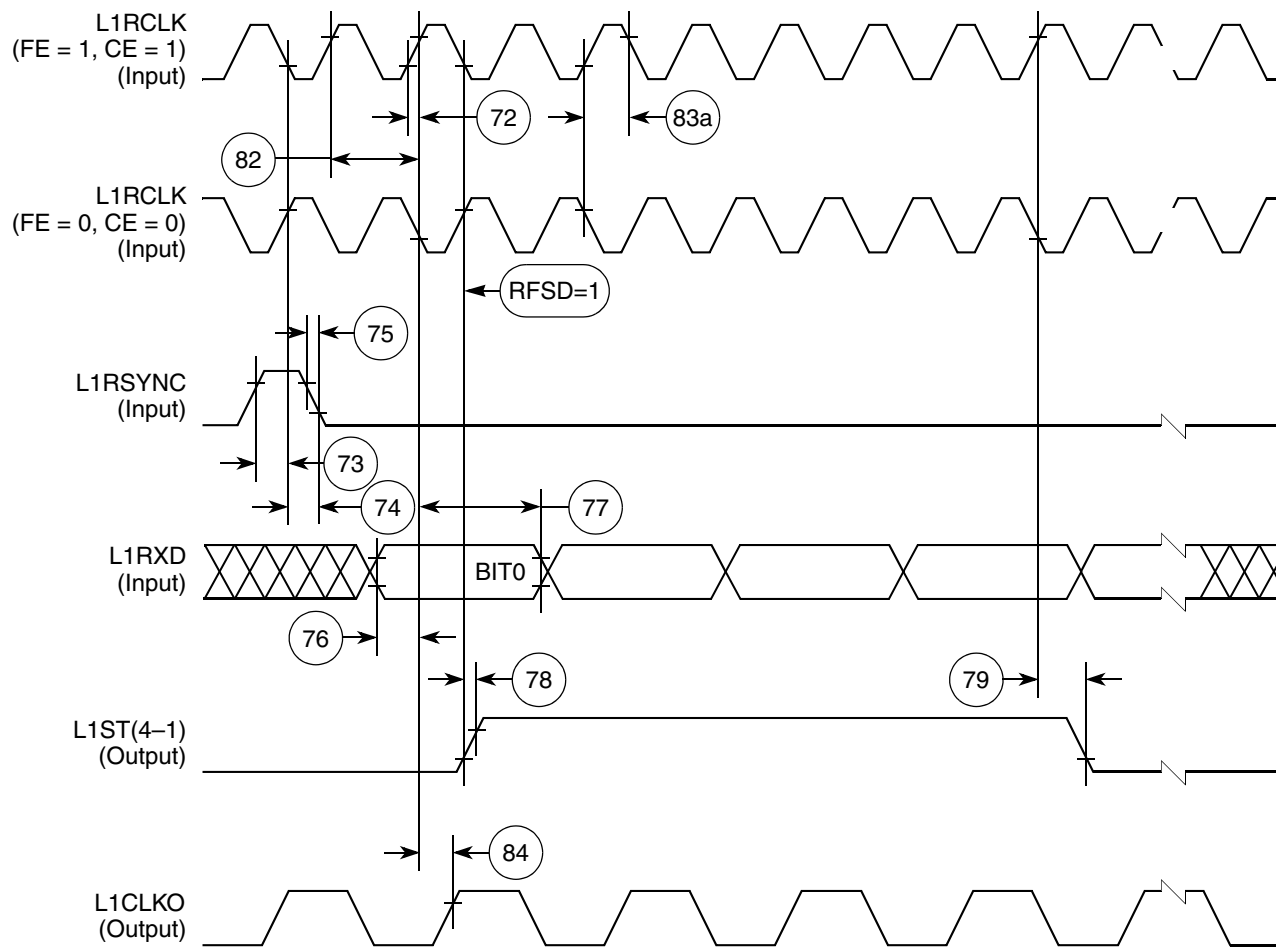


Figure 52. SI Receive Timing with Double-Speed Clocking (DSC = 1)

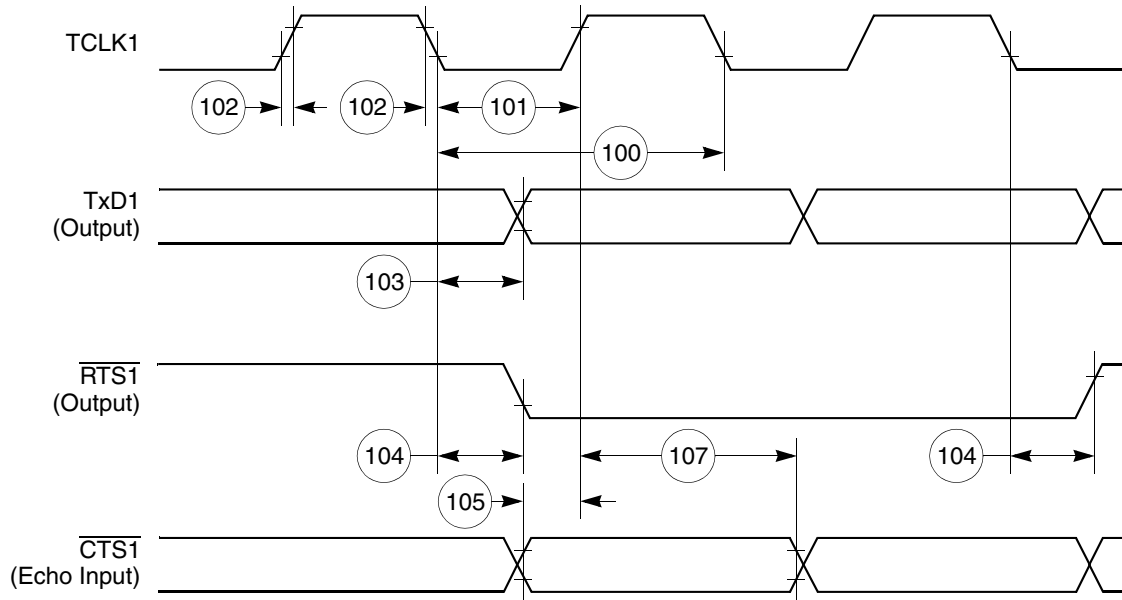


Figure 58. HDLC Bus Timing Diagram

11.8 Ethernet Electrical Specifications

Table 22 provides the Ethernet timings as shown in Figure 59 through Figure 63.

Table 22. Ethernet Timing

Num	Characteristic	All Frequencies		Unit
		Min	Max	
120	CLSN width high	40	—	ns
121	RCLK1 rise/fall time	—	15	ns
122	RCLK1 width low	40	—	ns
123	RCLK1 clock period ¹	80	120	ns
124	RXD1 setup time	20	—	ns
125	RXD1 hold time	5	—	ns
126	RENA active delay (from RCLK1 rising edge of the last data bit)	10	—	ns
127	RENA width low	100	—	ns
128	TCLK1 rise/fall time	—	15	ns
129	TCLK1 width low	40	—	ns
130	TCLK1 clock period ¹	99	101	ns
131	TXD1 active delay (from TCLK1 rising edge)	10	50	ns
132	TXD1 inactive delay (from TCLK1 rising edge)	10	50	ns
133	TENA active delay (from TCLK1 rising edge)	10	50	ns
134	TENA inactive delay (from TCLK1 rising edge)	10	50	ns

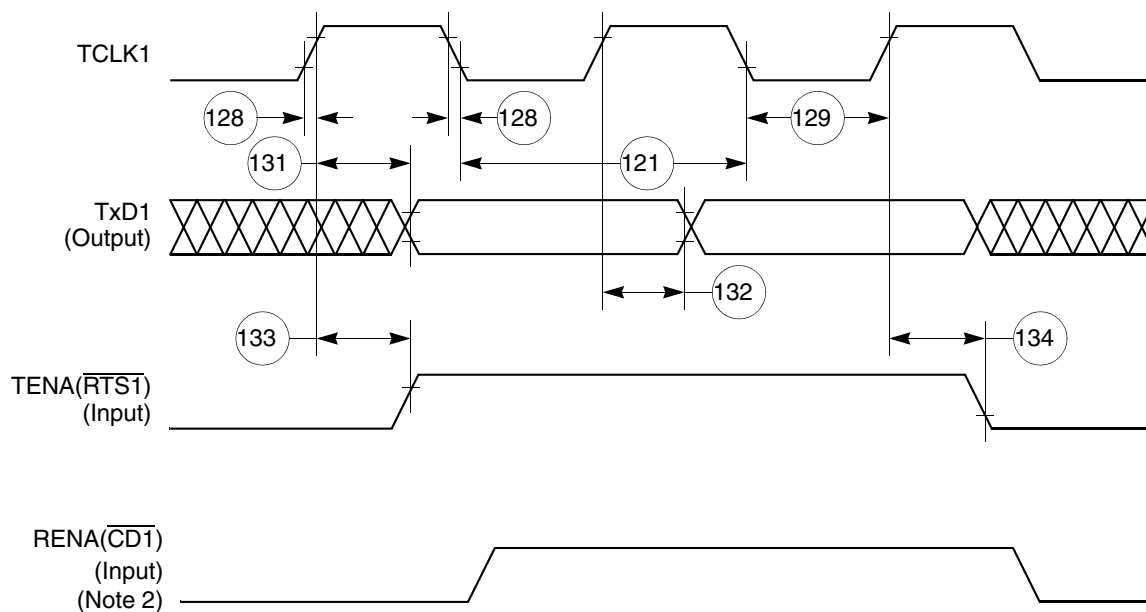


Figure 61. Ethernet Transmit Timing Diagram

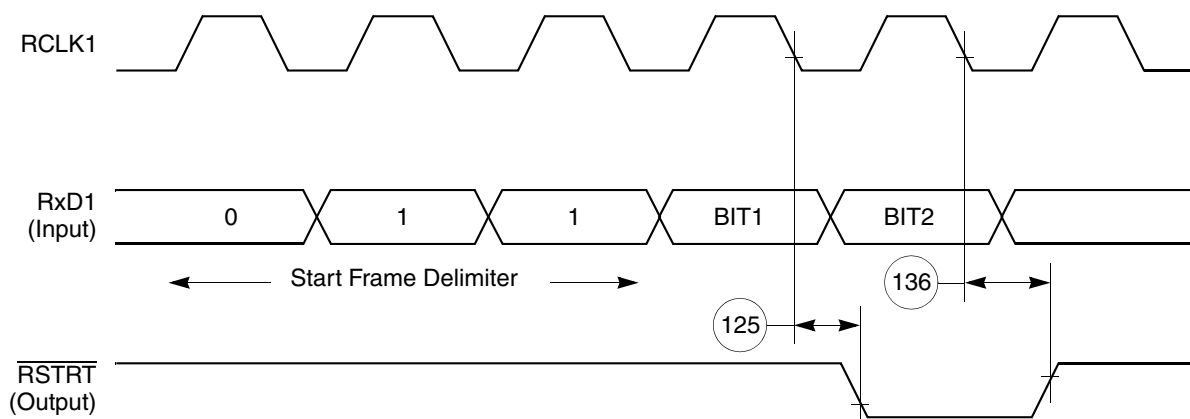


Figure 62. CAM Interface Receive Start Timing Diagram

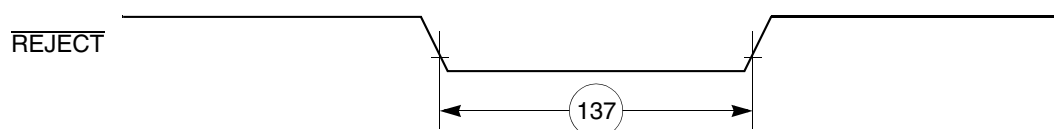


Figure 63. CAM Interface $\overline{\text{REJECT}}$ Timing Diagram

11.10 SPI Master AC Electrical Specifications

Table 24 provides the SPI master timings as shown in Figure 65 and Figure 66.

Table 24. SPI Master Timing

Num	Characteristic	All Frequencies		Unit
		Min	Max	
160	MASTER cycle time	4	1024	t_{cyc}
161	MASTER clock (SCK) high or low time	2	512	t_{cyc}
162	MASTER data setup time (inputs)	50	—	ns
163	Master data hold time (inputs)	0	—	ns
164	Master data valid (after SCK edge)	—	20	ns
165	Master data hold time (outputs)	0	—	ns
166	Rise time output	—	15	ns
167	Fall time output	—	15	ns

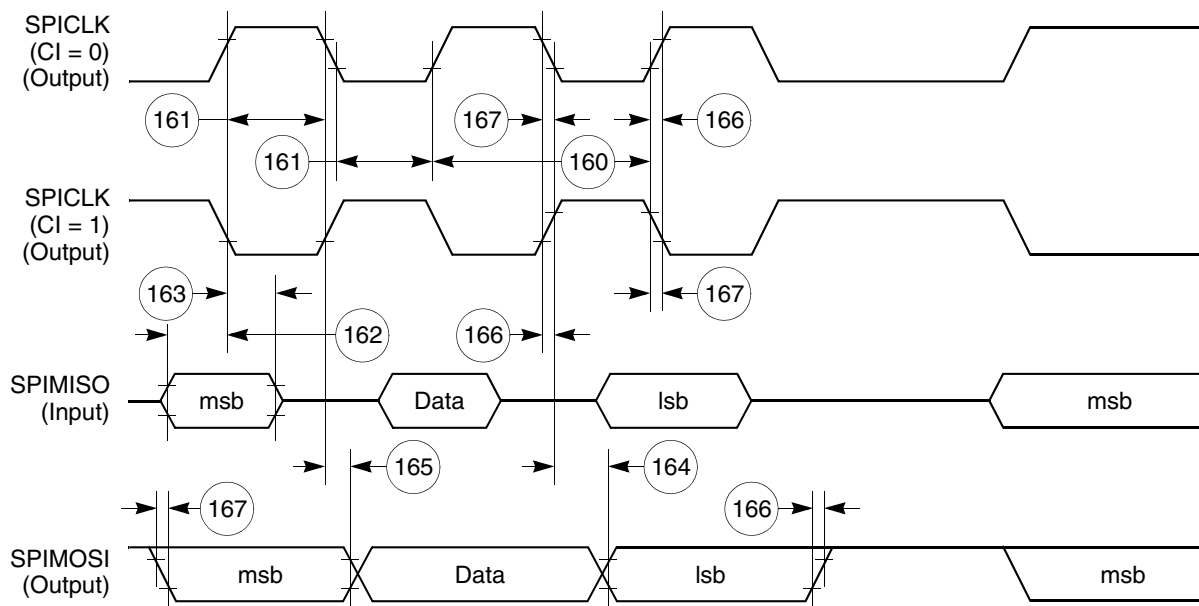


Figure 65. SPI Master (CP = 0) Timing Diagram

Figure 69 shows the I²C bus timing.

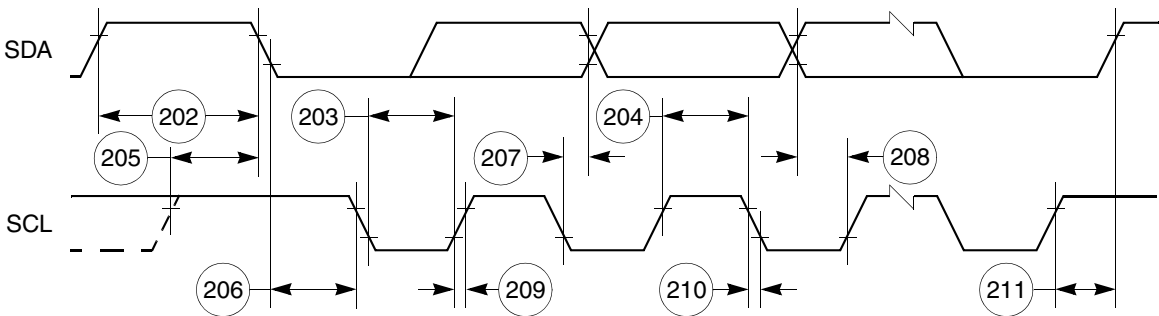


Figure 69. I²C Bus Timing Diagram

12 UTOPIA AC Electrical Specifications

Table 28 shows the AC electrical specifications for the UTOPIA interface.

Table 28. UTOPIA AC Electrical Specifications

Num	Signal Characteristic	Direction	Min	Max	Unit
U1	UtpClk rise/fall time (Internal clock option)	Output	—	3.5	ns
	Duty cycle		50	50	%
	Frequency		—	50	MHz
U1a	UtpClk rise/fall time (external clock option)	Input	—	3.5	ns
	Duty cycle		40	60	%
	Frequency		—	50	MHz
U2	$\overline{\text{RxEnb}}$ and $\overline{\text{TxEnb}}$ active delay	Output	2	16	ns
U3	UTPB, SOC, Rxclav and Txclav setup time	Input	8	—	ns
U4	UTPB, SOC, Rxclav and Txclav hold time	Input	1	—	ns
U5	UTPB, SOC active delay (and PHREQ and PHSEL active delay in MPHY mode)	Output	2	16	ns

13.2 MII Transmit Signal Timing (MII_TXD[3:0], MII_TX_EN, MII_TX_ER, MII_TX_CLK)

The transmitter functions correctly up to a MII_TX_CLK maximum frequency of 25 MHz +1%. There is no minimum frequency requirement. In addition, the processor clock frequency must exceed the MII_TX_CLK frequency – 1%.

Table 30 provides information on the MII transmit signal timing.

Table 30. MII Transmit Signal Timing

Num	Characteristic	Min	Max	Unit
M5	MII_TX_CLK to MII_TXD[3:0], MII_TX_EN, MII_TX_ER invalid	5	—	ns
M6	MII_TX_CLK to MII_TXD[3:0], MII_TX_EN, MII_TX_ER valid	—	25	
M7	MII_TX_CLK pulse width high	35	65%	MII_TX_CLK period
M8	MII_TX_CLK pulse width low	35%	65%	MII_TX_CLK period

Figure 73 shows the MII transmit signal timing diagram.

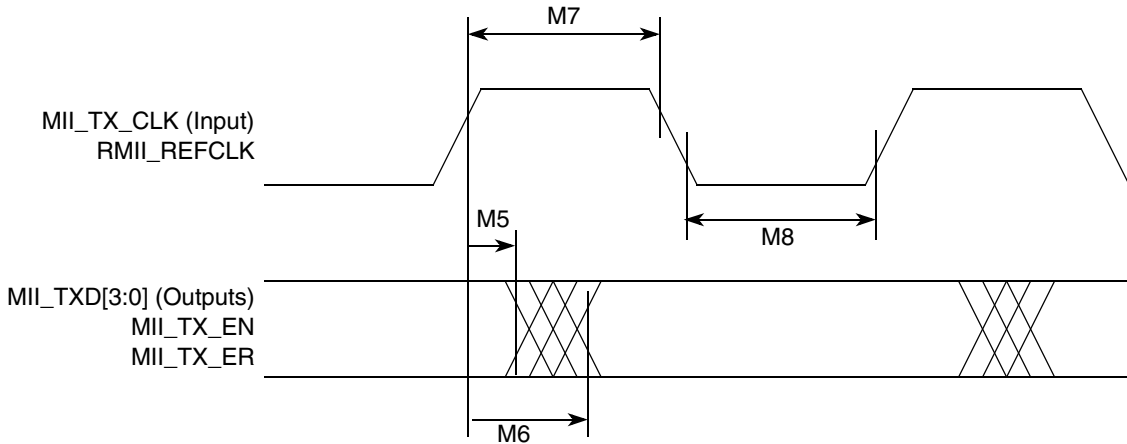


Figure 73. MII Transmit Signal Timing Diagram

Figure 75 shows the MII serial management channel timing diagram.

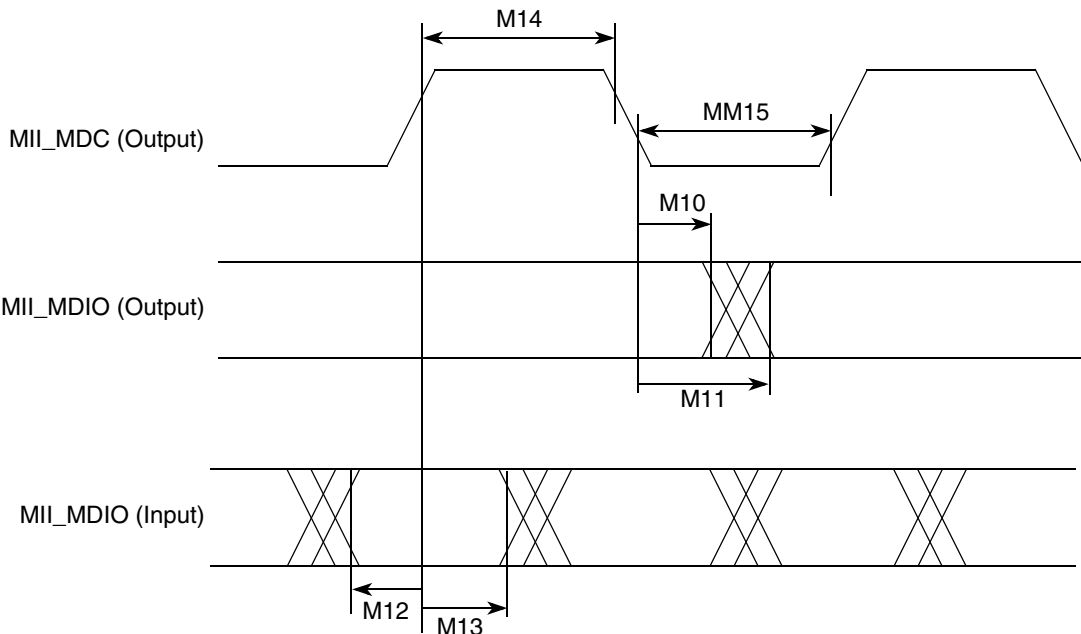


Figure 75. MII Serial Management Channel Timing Diagram

14 Mechanical Data and Ordering Information

14.1 Ordering Information

Table 33 provides information on the MPC860 Revision D.4 derivative devices.

Table 33. MPC860 Family Revision D.4 Derivatives

Device	Number of SCCs ¹	Ethernet Support ² (Mbps)	Multichannel HDLC Support	ATM Support
MPC855T	1	10/100	Yes	Yes
MPC860DE	2	10	N/A	N/A
MPC860DT		10/100	Yes	Yes
MPC860DP		10/100	Yes	Yes
MPC860EN	4	10	N/A	N/A
MPC860SR		10	Yes	Yes
MPC860T		10/100	Yes	Yes
MPC860P		10/100	Yes	Yes

¹ Serial communications controller (SCC)

² Up to 4 channels at 40 MHz or 2 channels at 25 MHz

Table 34. MPC860 Family Package/Frequency Availability (continued)

Package Type	Freq. (MHz) / Temp. (Tj)	Package	Order Number
Ball grid array (<i>continued</i>) ZP suffix—leaded ZQ suffix—leaded VR suffix—lead-free	80 0° to 95°C	ZP/ZQ ¹	MPC855TZQ80D4 MPC860DEZQ80D4 MPC860DTZQ80D4 MPC860ENZQ80D4 MPC860SRZQ80D4 MPC860TZQ80D4 MPC860DPZQ80D4 MPC860PZQ80D4
		Tape and Reel	MPC860PZQ80D4R2 MPC860PVR80D4R2
		VR	MPC855TVR80D4 MPC860DEV80D4 MPC860DPVR80D4 MPC860ENVR80D4 MPC860PVR80D4 MPC860SRVR80D4 MPC860TVR80D4
Ball grid array (CZP suffix) CZP suffix—leaded CZQ suffix—leaded CVR suffix—lead-free	50 –40° to 95°C	ZP/ZQ ¹	MPC855TCZQ50D4 MPC855TCVR50D4 MPC860DECZQ50D4 MPC860DTCZQ50D4 MPC860ENCZQ50D4 MPC860SRCZQ50D4 MPC860TCZQ50D4 MPC860DPCZQ50D4 MPC860PCZQ50D4
		Tape and Reel	MPC855TCZQ50D4R2 MC860ENCVR50D4R2
		CVR	MPC860DECVR50D4 MPC860DTCVR50D4 MPC860ENCVR50D4 MPC860PCVR50D4 MPC860SRCVR50D4 MPC860TCVR50D4
	66 –40° to 95°C	ZP/ZQ ¹	MPC855TCZQ66D4 MPC855TCVR66D4 MPC860ENCZQ66D4 MPC860SRCZQ66D4 MPC860TCZQ66D4 MPC860DPCZQ66D4 MPC860PCZQ66D4
		CVR	MPC860DTCVR66D4 MPC860ENCVR66D4 MPC860PCVR66D4 MPC860SRCVR66D4 MPC860TCVR66D4

¹ The ZP package is no longer recommended for use. The ZQ package replaces the ZP package.

Figure 76 shows the top view pinout of the PBGA package. For additional information, see the *MPC860 PowerQUICC User's Manual*, or the *MPC855T User's Manual*.

NOTE: This is the top view of the device.

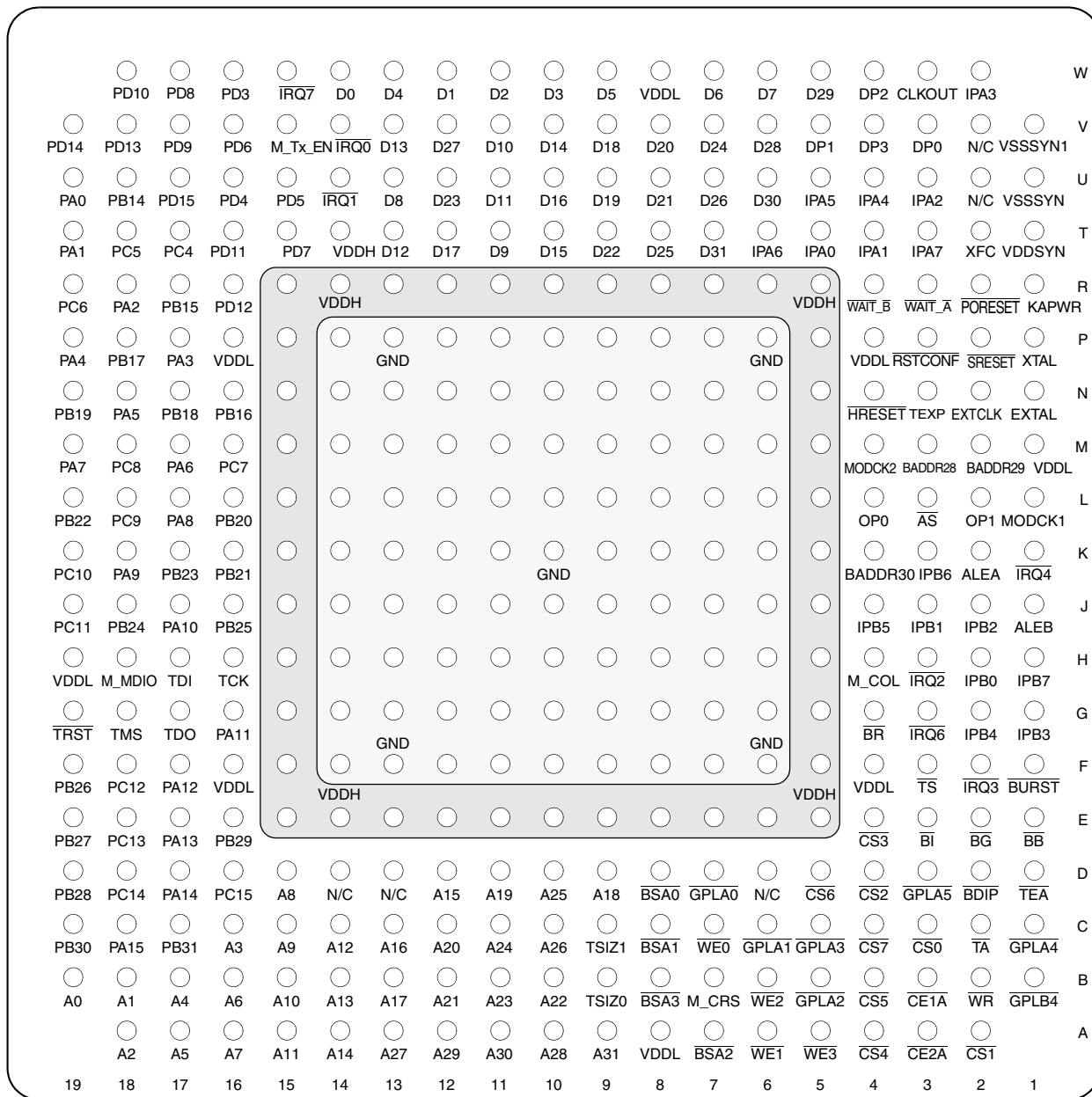


Figure 76. Pinout of the PBGA Package

15 Document Revision History

Table 35 lists significant changes between revisions of this hardware specification.

Table 35. Document Revision History

Revision	Date	Changes
10	09/2015	In Table 34 , moved MPC855TCVR50D4 and MPC855TCVR66D4 under the extended temperature (–40° to 95°C) and removed MC860ENCVR50D4R2 from the normal temperature Tape and Reel.
9	10/2011	Updated orderable part numbers in Table 34 , “MPC860 Family Package/Frequency Availability.”
8	08/2007	<ul style="list-style-type: none"> Updated template. On page 1, added a second paragraph. After Table 2, inserted a new figure showing the undershoot/overshoot voltage (Figure 1) and renumbered the rest of the figures. In Figure 3, changed all reference voltage measurement points from 0.2 and 0.8 V to 50% level. In Table 16, changed num 46 description to read, “\overline{TA} assertion to rising edge ...” In Figure 46, changed \overline{TA} to reflect the rising edge of the clock.
7.0	9/2004	<ul style="list-style-type: none"> Added a tablefootnote to Table 6 DC Electrical Specifications about meeting the VIL Max of the I2C Standard Replaced the thermal characteristics in Table 4 by the ZQ package Add the new parts to the Ordering and Availability Chart in Table 34 Added the mechanical spec of the ZQ package in Figure 78 Removed all of the old revisions from Table 5
6.3	9/2003	<ul style="list-style-type: none"> Added Section 11.2 on the Port C interrupt pins Nontechnical reformatting
6.2	8/2003	<ul style="list-style-type: none"> Changed B28a through B28d and B29d to show that TRLX can be 0 or 1 Changed reference documentation to reflect the Rev 2 MPC860 PowerQUICC Family Users Manual Nontechnical reformatting
6.1	11/2002	<ul style="list-style-type: none"> Corrected UTOPIA RXenb* and TXenb* timing values Changed incorrect usage of Vcc to Vdd Corrected dual port RAM to 8 Kbytes
6	10/2002	Added the MPC855T. Corrected Figure 26 on page -36 .
5.1	11/2001	Revised template format, removed references to MAC functionality, changed Table 7 B23 max value @ 66 MHz from 2ns to 8ns, added this revision history table