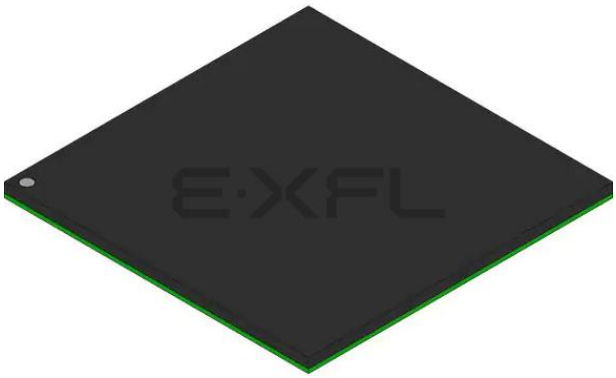

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Purchase URL	https://www.e-xfl.com/pro/item?MUrl=&PartUrl=mpc870zt80

7.2 Estimation with Junction-to-Case Thermal Resistance

Historically, 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 that 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 and especially PBGA packages is strongly dependent on the board temperature. If the board temperature is known, an estimate of the junction temperature in the environment can be made using the following equation:

$$T_J = T_B + (R_{\theta JB} \times P_D)$$

where:

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

T_B = board temperature (°C)

P_D = power dissipation in package

If the board temperature is known and the heat loss from the package case to the air can be ignored, acceptable predictions of junction temperature can be made. For this method to work, the board and board mounting must be similar to the test board used to determine the junction-to-board thermal resistance, namely a 2s2p (board with a power and a ground plane) and vias attaching the thermal balls to the ground plane.

7.4 Estimation Using Simulation

When the board temperature is not known, a thermal simulation of the application is needed. The simple two-resistor model can be used with the thermal simulation of the application [2], or a more accurate and complex model of the package can be used in the thermal simulation.

7.5 Experimental Determination

To determine the junction temperature of the device in the application after prototypes are available, the thermal characterization parameter (Ψ_{JT}) can be used to determine the junction temperature with a measurement of the temperature at the top center of the package case using the following equation:

$$T_J = T_T + (\Psi_{JT} \times P_D)$$

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 the JESD51-2 specification published by JEDEC 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 about 1 mm of wire extending from the junction. The thermocouple wire is placed flat against the package case to avoid measurement errors caused by the cooling effects of the thermocouple wire.

7.6 References

Semiconductor Equipment and Materials International 805 East Middlefield Rd Mountain View, CA 94043	(415) 964-5111
MIL-SPEC and EIA/JESD (JEDEC) specifications (Available from Global Engineering Documents)	800-854-7179 or 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. 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 Power Supply and Power Sequencing

This section provides design considerations for the MPC875/MPC870 power supply. The MPC875/MPC870 has a core voltage (V_{DDL}) and PLL voltage (V_{DDSYN}), which both operate at a lower voltage than the I/O voltage (V_{DDH}). The I/O section of the MPC875/MPC870 is supplied with 3.3 V across V_{DDH} and V_{SS} (GND).

The signals PA[0:3], PA[8:11], PB15, PB[24:25], PB[28:31], PC[4:7], PC[12:13], PC15, PD[3:15], TDI, TDO, TCK, $\overline{\text{TRST}}$, TMS, MII_TXEN, and MII_MDIO are 5 V tolerant. No input can be more than 2.5 V greater than V_{DDH}. In addition, 5-V tolerant pins cannot exceed 5.5 V, and remaining input pins cannot exceed 3.465 V. This restriction applies to power up, power down, and normal operation.

One consequence of multiple power supplies is that when power is initially applied, the voltage rails ramp up at different rates. The rates depend on the nature of the power supply, the type of load on each power supply, and the manner in which different voltages are derived. The following restrictions apply:

- V_{DDL} must not exceed V_{DDH} during power up and power down
- V_{DDL} must not exceed 1.9 V, and V_{DDH} must not exceed 3.465 V

These cautions are necessary for the long-term reliability of the part. If they are violated, the electrostatic discharge (ESD) protection diodes are forward-biased, and excessive current can flow through these diodes. If the system power supply design does not control the voltage sequencing, the circuit shown in Figure 4 can be added to meet these requirements. The MUR420 Schottky diodes control the maximum potential difference between the external bus and core power supplies on power up, and the 1N5820 diodes regulate the maximum potential difference on power down.

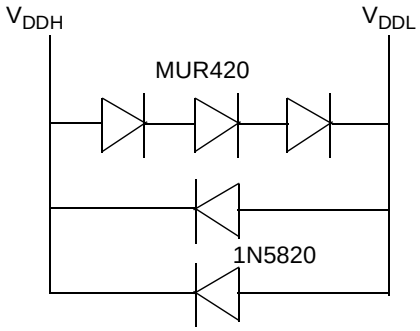


Figure 4. Example Voltage Sequencing Circuit

9 Mandatory Reset Configurations

The MPC875/MPC870 requires a mandatory configuration during reset.

If hardware reset configuration word (HRCW) is enabled, the HRCW[DBGC] value needs to be set to binary X1 in the HRCW and the SIUMCR[DBGC] should be programmed with the same value in the boot code after reset. This can be done by asserting the $\overline{\text{RSTCONF}}$ during $\overline{\text{HRESET}}$ assertion.

If HRCW is disabled, the SIUMCR[DBGC] should be programmed with binary X1 in the boot code after reset by negating the $\overline{\text{RSTCONF}}$ during the $\overline{\text{HRESET}}$ assertion.

The MBMR[GPLB4DIS], PAPAR, PADIR, PBPAR, PBDIR, PCPAR, and PCDIR need to be configured with the mandatory values in Table 7 in the boot code after the reset is negated.

Table 7. Mandatory Reset Configuration of MPC875/MPC870

Register/Configuration	Field	Value (Binary)
HRCW (Hardware reset configuration word)	HRCW[DBGC]	X1
SIUMCR (SIU module configuration register)	SIUMCR[DBGC]	X1
MBMR (Machine B mode register)	MBMR[GPLB4DIS}	0
PAPAR (Port A pin assignment register)	PAPAR[5:9] PAPAR[12:13]	0

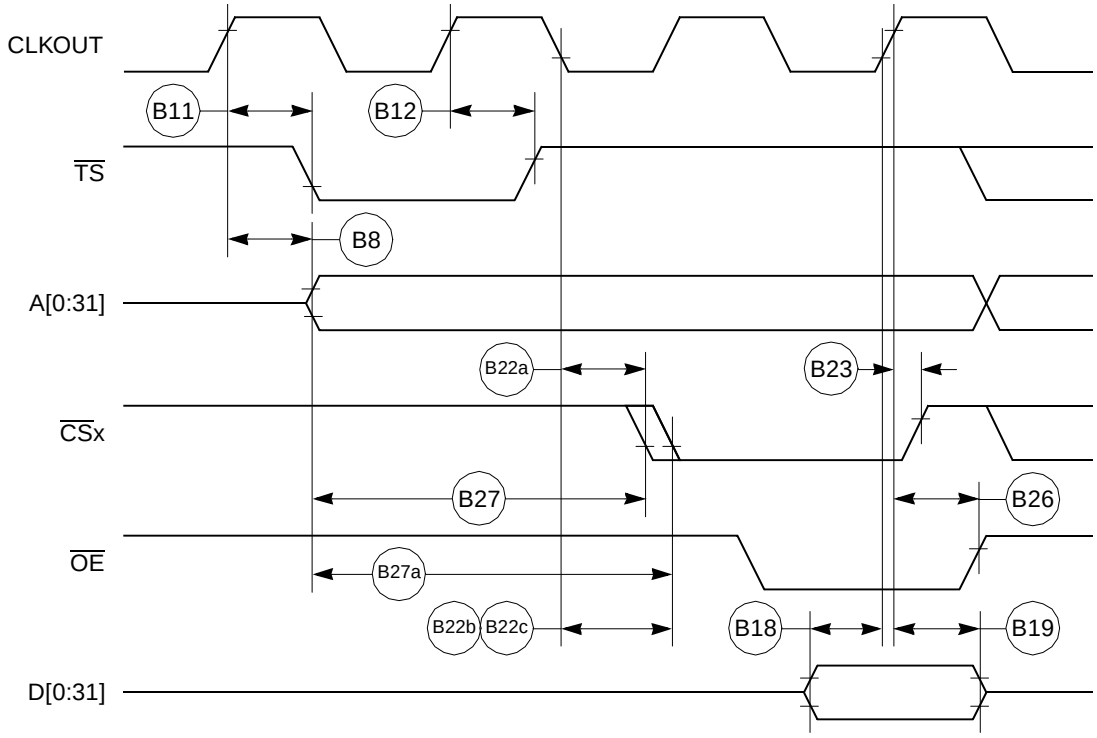


Figure 15. External Bus Read Timing (GPCM Controlled—TRLX = 1, ACS = 10, ACS = 11)

Figure 16 through Figure 18 provide the timing for the external bus write controlled by various GPCM factors.

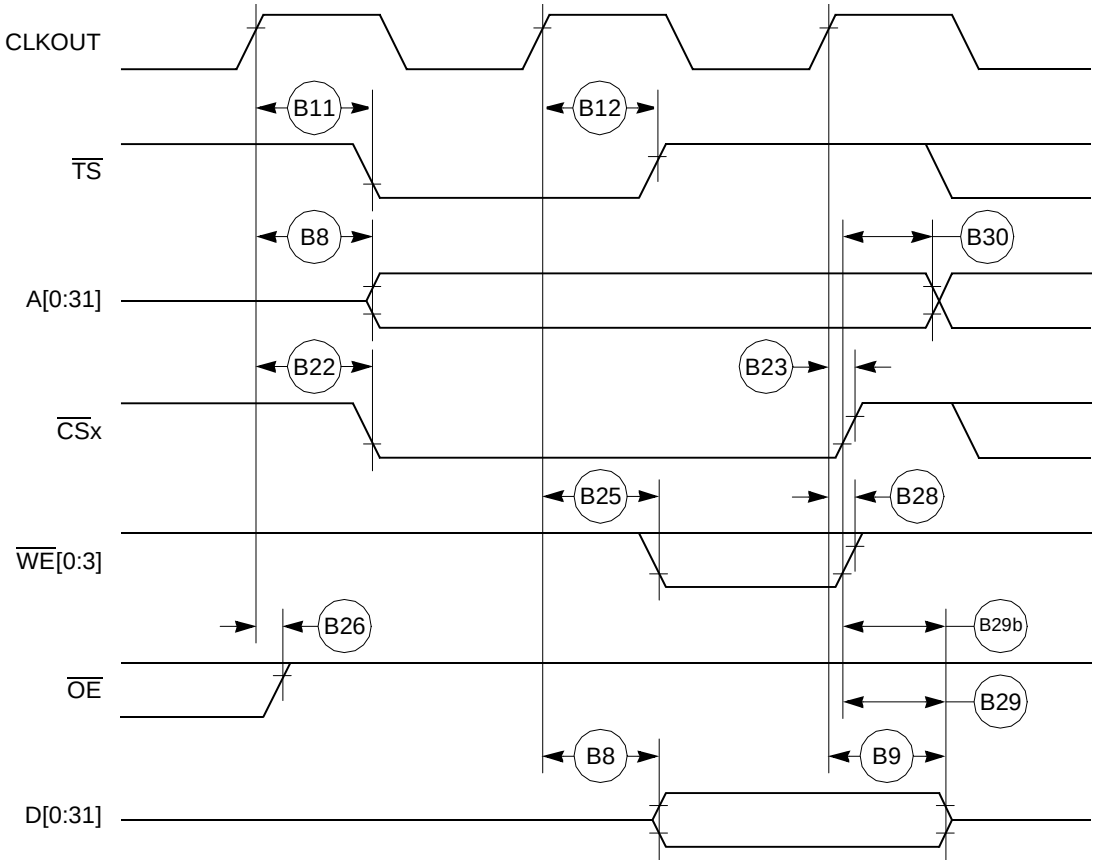


Figure 16. External Bus Write Timing (GPCM Controlled—TRLX = 0, CSNT = 0)

Table 11 provides the interrupt timing for the MPC875/MPC870.

Table 11. Interrupt Timing

Num	Characteristic[1]	All Frequencies		Unit
		Min	Max	
I39	$\overline{\text{IRQ}}$x valid to CLKOUT rising edge (setup time)	6.00		ns
I40	$\overline{\text{IRQ}}$x hold time after CLKOUT	2.00		ns
I41	$\overline{\text{IRQ}}$x pulse width low	3.00		ns
I42	$\overline{\text{IRQ}}$x pulse width high	3.00		ns
I43	$\overline{\text{IRQ}}$x edge-to-edge time	$4 \times T_{CLOCKOUT}$		—

1 The I39 and I40 timings describe the testing conditions under which the $\overline{\text{IRQ}}$ lines are tested when being defined as level sensitive. The $\overline{\text{IRQ}}$ lines are synchronized internally and do not have to be asserted or negated with reference to the CLKOUT. The I41, I42, and I43 timings are specified to allow correct functioning of the $\overline{\text{IRQ}}$ lines detection circuitry and have no direct relation with the total system interrupt latency that the MPC875/MPC870 is able to support.

Figure 25 provides the interrupt detection timing for the external level-sensitive lines.

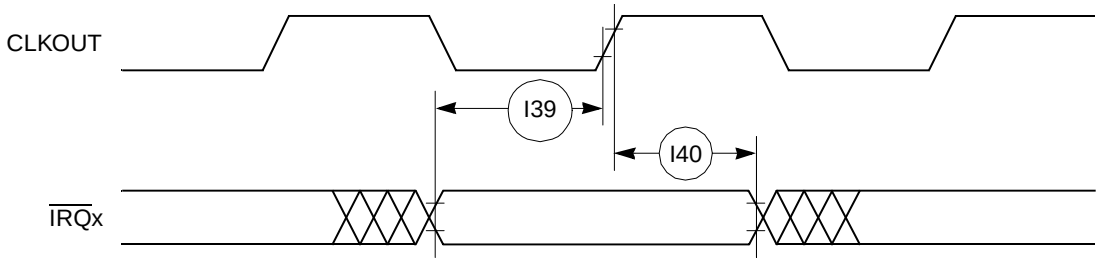


Figure 25. Interrupt Detection Timing for External Level Sensitive Lines

Figure 26 provides the interrupt detection timing for the external edge-sensitive lines.

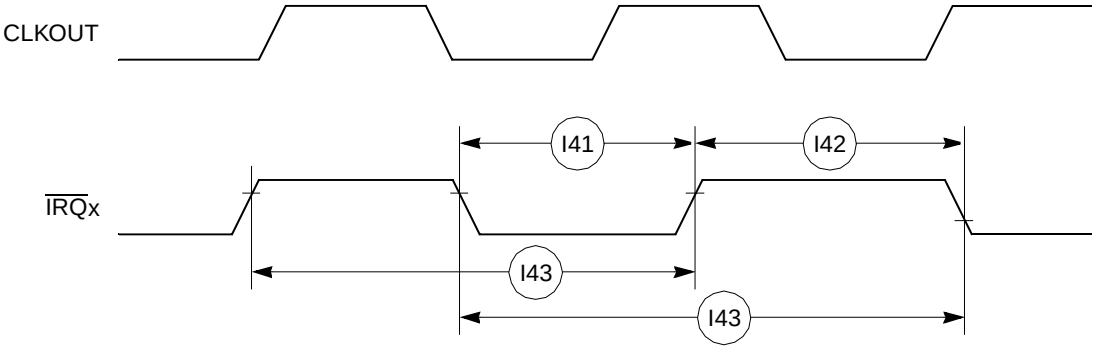


Figure 26. Interrupt Detection Timing for External Edge-Sensitive Lines

Table 12 shows the PCMCIA timing for the MPC875/MPC870.

Table 12. PCMCIA Timing

Num	Characteristic	33 MHz		40 MHz		66 MHz		80 MHz		Unit
		Min	Max	Min	Max	Min	Max	Min	Max	
P44	A(0:31), $\overline{\text{REG}}$ valid to PCMCIA strobe asserted[1] (MIN = 0.75 × B1 – 2.00)	20.70	—	16.70	—	9.40	—	7.40	—	ns
P45	A(0:31), $\overline{\text{REG}}$ valid to ALE negation[1] (MIN = 1.00 × B1 – 2.00)	28.30	—	23.00	—	13.20	—	10.50	—	ns
P46	CLKOUT to $\overline{\text{REG}}$ valid (MAX = 0.25 × B1 + 8.00)	7.60	15.60	6.30	14.30	3.80	11.80	3.13	11.13	ns
P47	CLKOUT to $\overline{\text{REG}}$ invalid (MIN = 0.25 × B1 + 1.00)	8.60	—	7.30	—	4.80	—	4.125	—	ns
P48	CLKOUT to $\overline{\text{CE1}}$, $\overline{\text{CE2}}$ asserted (MAX = 0.25 × B1 + 8.00)	7.60	15.60	6.30	14.30	3.80	11.80	3.13	11.13	ns
P49	CLKOUT to $\overline{\text{CE1}}$, $\overline{\text{CE2}}$ negated (MAX = 0.25 × B1 + 8.00)	7.60	15.60	6.30	14.30	3.80	11.80	3.13	11.13	ns
P50	CLKOUT to $\overline{\text{PCOE}}$, $\overline{\text{IORD}}$, $\overline{\text{PCWE}}$, $\overline{\text{IOWR}}$ assert time (MAX = 0.00 × B1 + 11.00)	—	11.00	—	11.00	—	11.00	—	11.00	ns
P51	CLKOUT to $\overline{\text{PCOE}}$, $\overline{\text{IORD}}$, $\overline{\text{PCWE}}$, $\overline{\text{IOWR}}$ negate time (MAX = 0.00 × B1 + 11.00)	2.00	11.00	2.00	11.00	2.00	11.00	2.00	11.00	ns
P52	CLKOUT to ALE assert time (MAX = 0.25 × B1 + 6.30)	7.60	13.80	6.30	12.50	3.80	10.00	3.13	9.40	ns
P53	CLKOUT to ALE negate time (MAX = 0.25 × B1 + 8.00)	—	15.60	—	14.30	—	11.80	—	11.13	ns
P54	$\overline{\text{PCWE}}$, $\overline{\text{IOWR}}$ negated to D(0:31) invalid[1] (MIN = 0.25 × B1 – 2.00)	5.60	—	4.30	—	1.80	—	1.125	—	ns
P55	$\overline{\text{WAITA}}$ and $\overline{\text{WAITB}}$ valid to CLKOUT rising edge[1] (MIN = 0.00 × B1 + 8.00)	8.00	—	8.00	—	8.00	—	8.00	—	ns
P56	CLKOUT rising edge to $\overline{\text{WAITA}}$ and $\overline{\text{WAITB}}$ invalid[1] (MIN = 0.00 × B1 + 2.00)	2.00	—	2.00	—	2.00	—	2.00	—	ns

1 PSST = 1. Otherwise add PSST times cycle time.
PSHT = 0. Otherwise add PSHT times cycle time.
These synchronous timings define when the $\overline{\text{WAITA}}$ signals are detected in order to freeze (or relieve) the PCMCIA current cycle. The $\overline{\text{WAITA}}$ assertion will be effective only if it is detected 2 cycles before the PSL timer expiration. See Chapter 16, “PCMCIA Interface,” in the *MPC885 PowerQUICC™ Family Reference Manual*.

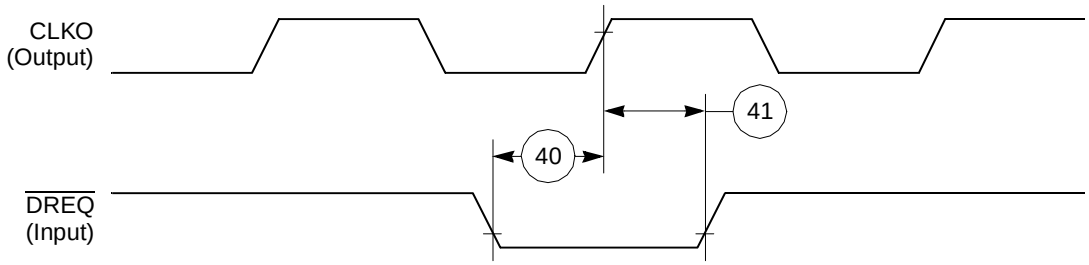


Figure 42. IDMA External Requests Timing Diagram

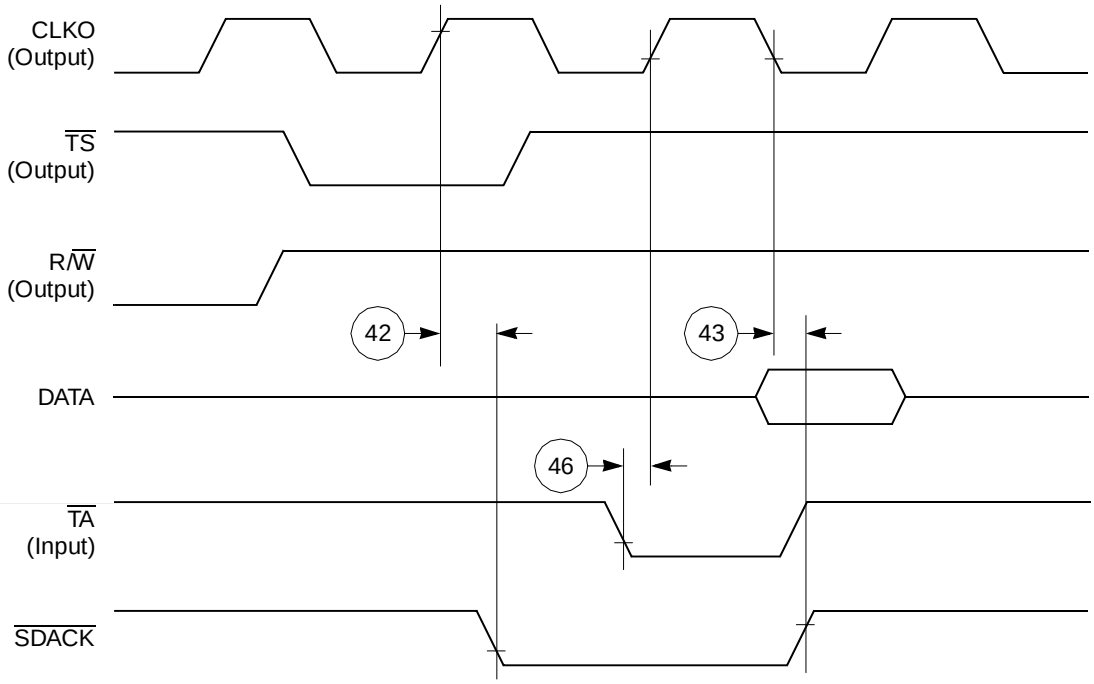


Figure 43. SDACK Timing Diagram—Peripheral Write, Externally-Generated TA

13.3 Baud Rate Generator AC Electrical Specifications

Table 19 provides the baud rate generator timings as shown in Figure 46.

Table 19. Baud Rate Generator Timing

Num	Characteristic	All Frequencies		Unit
		Min	Max	
50	BRGO rise and fall time	—	10	ns
51	BRGO duty cycle	40	60	%
52	BRGO cycle	40	—	ns

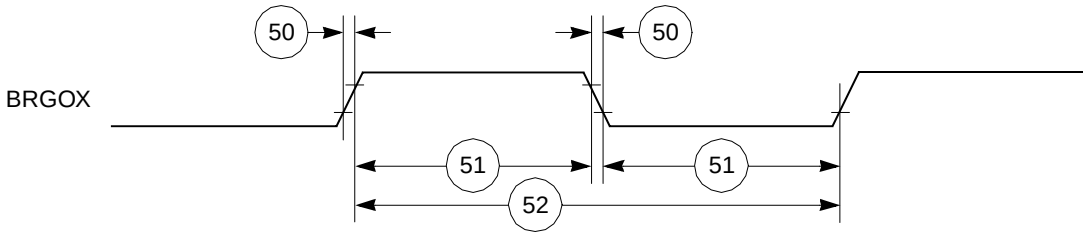


Figure 46. Baud Rate Generator Timing Diagram

13.4 Timer AC Electrical Specifications

Table 20 provides the general-purpose timer timings as shown in Figure 47.

Table 20. Timer Timing

Num	Characteristic	All Frequencies		Unit
		Min	Max	
61	TIN/$\overline{\text{TGATE}}$ rise and fall time	10	—	ns
62	TIN/$\overline{\text{TGATE}}$ low time	1	—	clk
63	TIN/$\overline{\text{TGATE}}$ high time	2	—	clk
64	TIN/$\overline{\text{TGATE}}$ cycle time	3	—	clk
65	CLKO low to $\overline{\text{TOUT}}$ valid	3	25	ns

13.6 SCC in NMSI Mode Electrical Specifications

Table 22 provides the NMSI external clock timing.

Table 22. NMSI External Clock Timing

Num	Characteristic	All Frequencies		Unit
		Min	Max	
100	RCLK3 and TCLK3 width high[1]	1/SYNCCLK	—	ns
101	RCLK3 and TCLK3 width low	1/SYNCCLK + 5	—	ns
102	RCLK3 and TCLK3 rise/fall time	—	15.00	ns
103	TXD3 active delay (from TCLK3 falling edge)	0.00	50.00	ns
104	$\overline{\text{RTS3}}$ active/inactive delay (from TCLK3 falling edge)	0.00	50.00	ns
105	$\overline{\text{CTS3}}$ setup time to TCLK3 rising edge	5.00	—	ns
106	RXD3 setup time to RCLK3 rising edge	5.00	—	ns
107	RXD3 hold time from RCLK3 rising edge[2]	5.00	—	ns
108	$\overline{\text{CD3}}$ setup time to RCLK3 rising edge	5.00	—	ns

1 The ratios SYNCCLK/RCLK3 and SYNCCLK/TCLK3 must be greater than or equal to 2.25/1.
2 Also applies to $\overline{\text{CD}}$ and $\overline{\text{CTS}}$ hold time when they are used as external SYNC signals.

Table 23 provides the NMSI internal clock timing.

Table 23. NMSI Internal Clock Timing

Num	Characteristic	All Frequencies		Unit
		Min	Max	
100	RCLK3 and TCLK3 frequency[1]	0.00	SYNCCLK/3	MHz
102	RCLK3 and TCLK3 rise/fall time	—	—	ns
103	TXD3 active delay (from TCLK3 falling edge)	0.00	30.00	ns
104	$\overline{\text{RTS3}}$ active/inactive delay (from TCLK3 falling edge)	0.00	30.00	ns
105	$\overline{\text{CTS3}}$ setup time to TCLK3 rising edge	40.00	—	ns
106	RXD3 setup time to RCLK3 rising edge	40.00	—	ns
107	RXD3 hold time from RCLK3 rising edge[2]	0.00	—	ns
108	$\overline{\text{CD3}}$ setup time to RCLK3 rising edge	40.00	—	ns

1 The ratios SYNCCLK/RCLK3 and SYNCCLK/TCLK3 must be greater or equal to 3/1.
2 Also applies to $\overline{\text{CD}}$ and $\overline{\text{CTS}}$ hold time when they are used as external SYNC signals.

Figure 53 through Figure 55 show the NMSI timings.

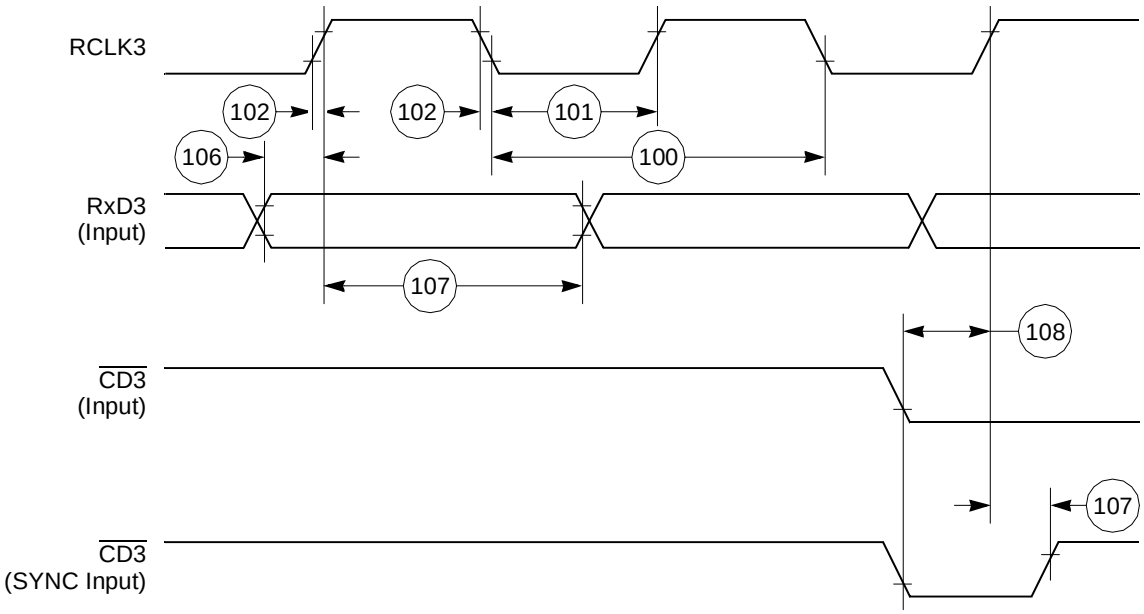


Figure 53. SCC NMSI Receive Timing Diagram

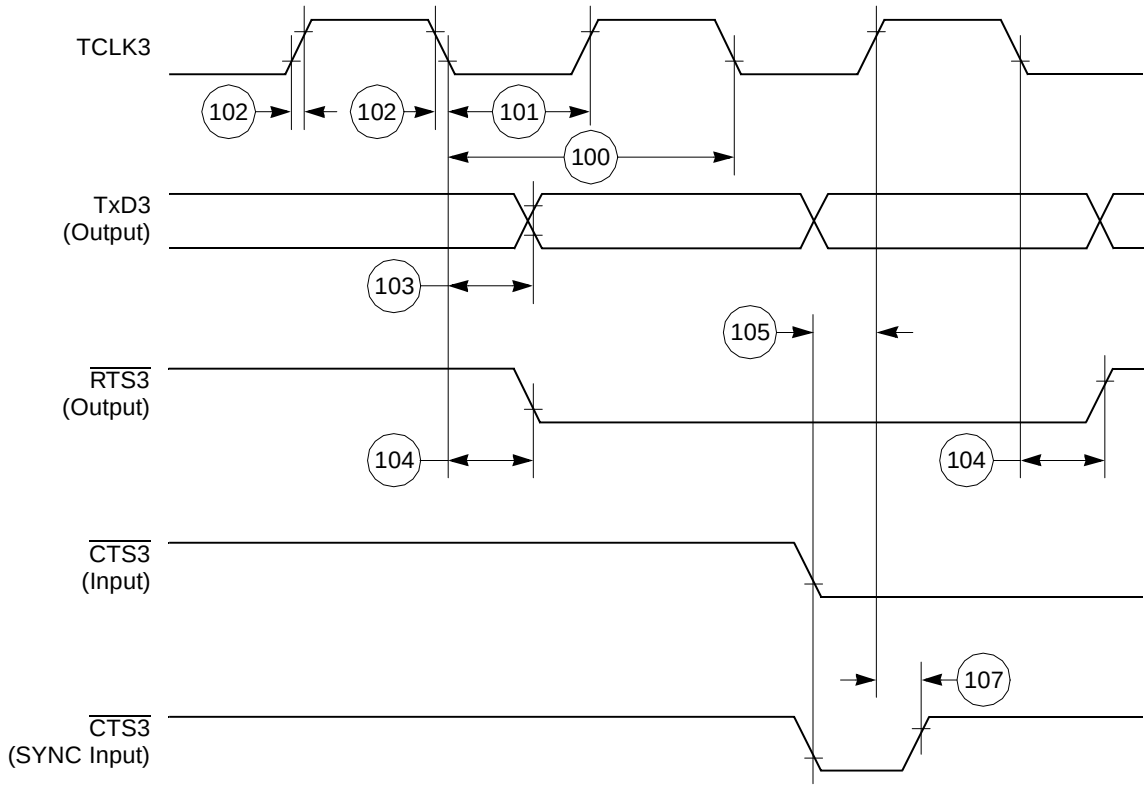


Figure 54. SCC NMSI Transmit Timing Diagram

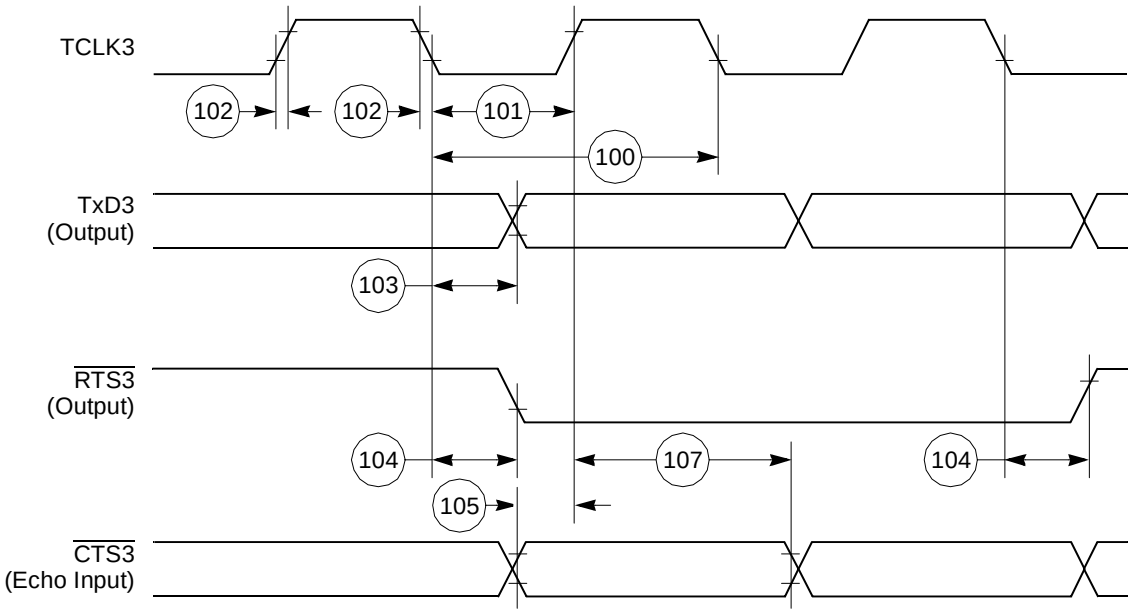


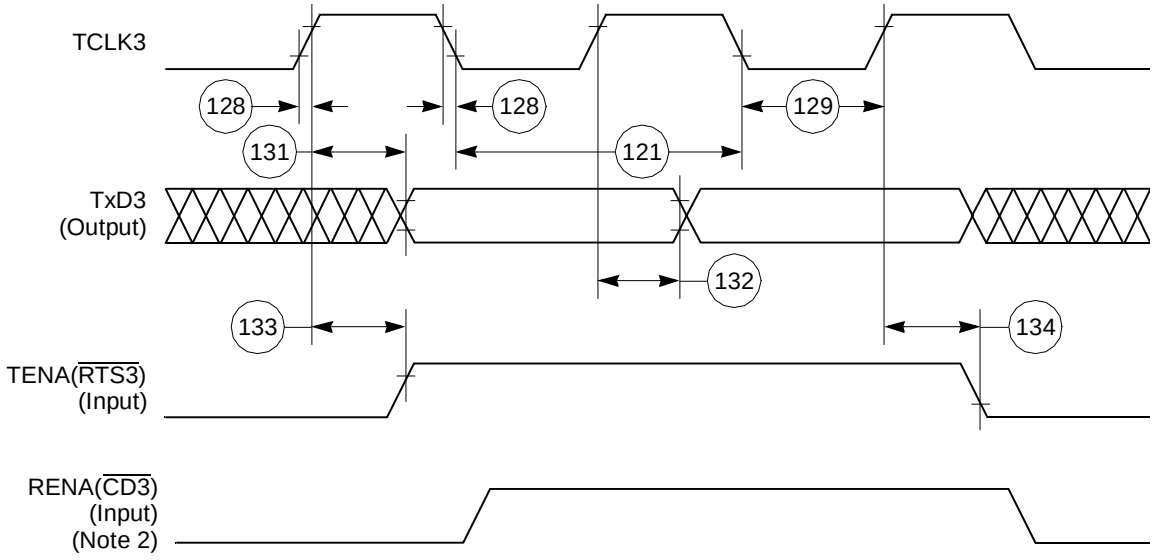
Figure 55. HDLC Bus Timing Diagram

13.7 Ethernet Electrical Specifications

Table 24 provides the Ethernet timings as shown in Figure 56 through Figure 58.

Table 24. Ethernet Timing

Num	Characteristic	All Frequencies		Unit
		Min	Max	
120	CLSN width high	40	—	ns
121	RCLK3 rise/fall time	—	15	ns
122	RCLK3 width low	40	—	ns
123	RCLK3 clock period[1]	80	120	ns
124	RXD3 setup time	20	—	ns
125	RXD3 hold time	5	—	ns
126	RENA active delay (from RCLK3 rising edge of the last data bit)	10	—	ns
127	RENA width low	100	—	ns
128	TCLK3 rise/fall time	—	15	ns
129	TCLK3 width low	40	—	ns
130	TCLK3 clock period[1]	99	101	ns
131	TXD3 active delay (from TCLK3 rising edge)	—	50	ns
132	TXD3 inactive delay (from TCLK3 rising edge)	6.5	50	ns
133	TENA active delay (from TCLK3 rising edge)	10	50	ns
134	TENA inactive delay (from TCLK3 rising edge)	10	50	ns



Notes:
1. Transmit clock invert (TCI) bit in GSMR is set.
2. If RENA is negated before TENA or RENA is not asserted at all during transmit, then the CSL bit is set in the buffer descriptor at the end of the frame transmission.

Figure 58. Ethernet Transmit Timing Diagram

13.8 SMC Transparent AC Electrical Specifications

Table 25 provides the SMC transparent timings as shown in Figure 59.

Table 25. SMC Transparent Timing

Num	Characteristic	All Frequencies		Unit
		Min	Max	
150	SMCLK clock period[1]	100	—	ns
151	SMCLK width low	50	—	ns
151A	SMCLK width high	50	—	ns
152	SMCLK rise/fall time	—	15	ns
153	SMTXD active delay (from SMCLK falling edge)	10	50	ns
154	SMRXD/SMSYNC setup time	20	—	ns
155	RXD1/SMSYNC hold time	5	—	ns

1 SYNCCLK must be at least twice as fast as SMCLK.

Figure 66 shows the MII transmit signal timing diagram.

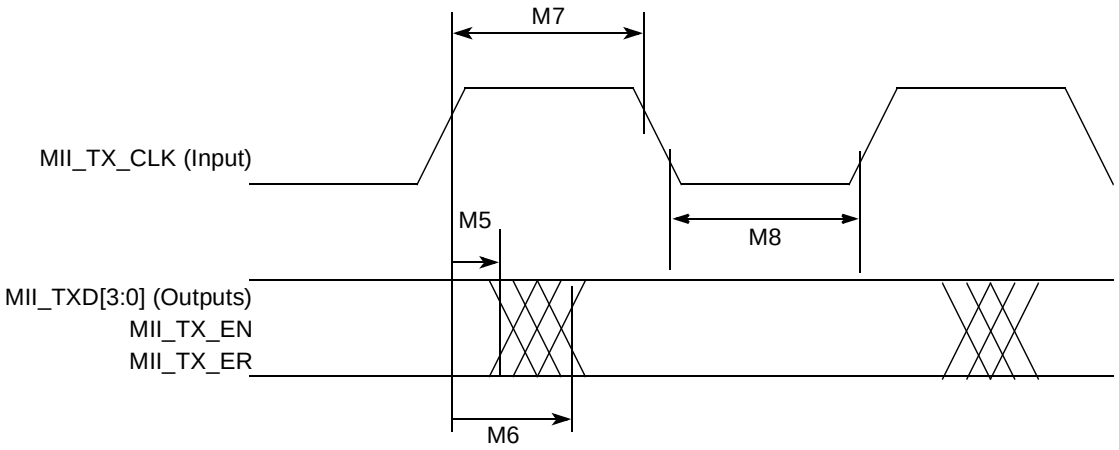


Figure 66. MII Transmit Signal Timing Diagram

15.3 MII Async Inputs Signal Timing (MII_CRS, MII_COL)

Table 33 provides information on the MII async inputs signal timing.

Table 33. MII Async Inputs Signal Timing

Num	Characteristic	Min	Max	Unit
M9	MII_CRS, MII_COL minimum pulse width	1.5	—	MII_TX_CLK period

Figure 67 shows the MII asynchronous inputs signal timing diagram.

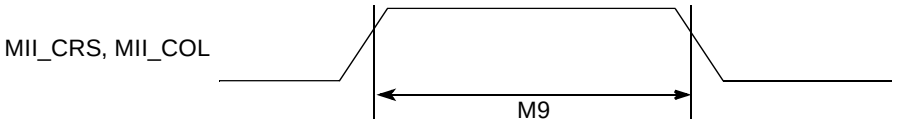


Figure 67. MII Async Inputs Timing Diagram

15.4 MII Serial Management Channel Timing (MII_MDIO, MII_MDC)

Table 34 provides information on the MII serial management channel signal timing. The FEC functions correctly with a maximum MDC frequency in excess of 2.5 MHz.

Table 34. MII Serial Management Channel Timing

Num	Characteristic	Min	Max	Unit
M10	MII_MDC falling edge to MII_MDIO output invalid (minimum propagation delay)	0	—	ns
M11	MII_MDC falling edge to MII_MDIO output valid (max prop delay)	—	25	ns
M12	MII_MDIO (input) to MII_MDC rising edge setup	10	—	ns
M13	MII_MDIO (input) to MII_MDC rising edge hold	0	—	ns
M14	MII_MDC pulse width high	40%	60%	MII_MDC period
M15	MII_MDC pulse width low	40%	60%	MII_MDC period

Table 36 contains a list of the MPC875/MPC870 input and output signals and shows multiplexing and pin assignments.

Table 36. Pin Assignments—JEDEC Standard

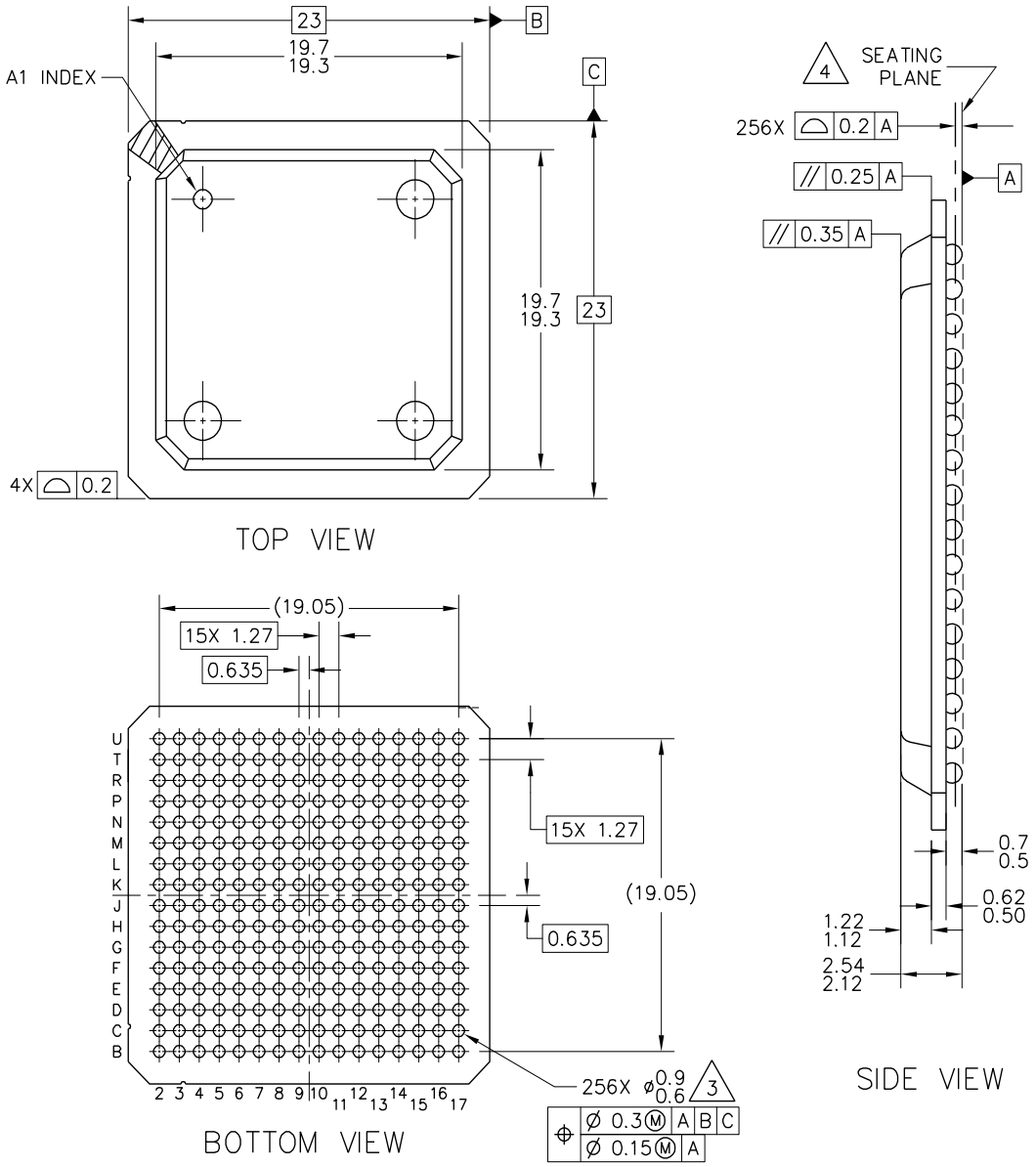
Name	Pin Number	Type
A[0:31]	R16, N14, M14, P15, P17, P16, N15, N16, M15, N17, L14, M16, L15, M17, K14, L16, L17, K17, G17, K15, J16, J15, G16, J14, H17, H16, G15, K16, H14, J17, H15, F17	Bidirectional Three-state (3.3 V only)
TSIZ0, $\overline{\text{REG}}$	F16	Bidirectional Three-state (3.3 V only)
TSIZ1	G14	Bidirectional Three-state (3.3 V only)
RD/$\overline{\text{WR}}$	D13	Bidirectional Three-state (3.3 V only)
$\overline{\text{BURST}}$	B9	Bidirectional Three-state (3.3 V only)
$\overline{\text{BDIP}}$, $\overline{\text{GPL\_B5}}$	C13	Output
$\overline{\text{TS}}$	C11	Bidirectional Active pull-up (3.3 V only)
$\overline{\text{TA}}$	C12	Bidirectional Active pull-up (3.3 V only)
$\overline{\text{TEA}}$	B12	Open-drain
$\overline{\text{BI}}$	B13	Bidirectional Active pull-up (3.3 V only)
$\overline{\text{IRQ2}}$, $\overline{\text{RSV}}$	C9	Bidirectional Three-state (3.3 V only)
$\overline{\text{IRQ4}}$, $\overline{\text{KR}}$, $\overline{\text{RETRY}}$, SPKROUT	E9	Bidirectional Three-state (3.3 V only)
D[0:31]	L5, N3, L3, L2, R2, K2, H3, G2, R3, M3, N2, M2, M4, N4, K5, K3, K4, P3, J2, J3, J4, J5, H2, P2, H4, H5, G5, L4, G3, F2, F3, E2	Bidirectional Three-state (3.3 V only)
CR, $\overline{\text{IRQ3}}$	E10	Input
FRZ, $\overline{\text{IRQ6}}$	B10	Bidirectional Three-state (3.3 V only)
$\overline{\text{BR}}$	B11	Bidirectional (3.3 V only)
$\overline{\text{BG}}$	D10	Bidirectional (3.3 V only)
$\overline{\text{BB}}$	C10	Bidirectional Active pull-up (3.3 V only)
$\overline{\text{IRQ0}}$	M6	Input (3.3 V only)
$\overline{\text{IRQ1}}$	P5	Input (3.3 V only)
$\overline{\text{IRQ7}}$	N5	Input (3.3 V only)
$\overline{\text{CS}}$[0:5]	B14, E11, C14, B15, E13, B16	Output

Table 36. Pin Assignments—JEDEC Standard (continued)

Name	Pin Number	Type
IP_A6	F4	Input (3.3 V only)
IP_A7	C2	Input (3.3 V only)
ALE_B, DSCK	C8	Bidirectional Three-state (3.3 V only)
IP_B[0:1], IWP[0:1], VFLS[0:1]	B8, D9	Bidirectional (3.3 V only)
OP0	B6	Bidirectional (3.3 V only)
OP1	C6	Output
OP2, MODCK1, $\overline{\text{STS}}$	B5	Bidirectional (3.3 V only)
OP3, MODCK2, DSDO	B2	Bidirectional (3.3 V only)
BADDR[28:29]	E8, C5	Output
BADDR30, $\overline{\text{REG}}$	D8	Output
$\overline{\text{AS}}$	C7	Input (3.3 V only)
PA15, USBRXD	P14	Bidirectional
PA14, USBOE	U16	Bidirectional (Optional: open-drain)
PA11, RXD4, MII1-TXD0, RMII1-TXD0	R9	Bidirectional (Optional: open-drain) (5-V tolerant)
PA10, MII1-TXERR, TIN4, CLK7	R12	Bidirectional (Optional: open-drain) (5-V tolerant)
PA7, CLK1, BRGO1, TIN1	R11	Bidirectional
PA6, CLK2, $\overline{\text{TOUT1}}$	P11	Bidirectional
PA4, $\overline{\text{CTS4}}$, MII1-TXD1, RMII-TXD1	P7	Bidirectional
PA3, MII1-RXER, RMII1-RXER, BRGO3	R5	Bidirectional (5-V tolerant)
PA2, MII1-RXDV, RMII1-CRS_DV, TXD4	N6	Bidirectional (5-V tolerant)
PA1, MII1-RXD0, RMII1-RXD0, BRGO4	T4	Bidirectional (5-V tolerant)
PA0, MII1-RXD1, RMII1-RXD1, TOUT4	P6	Bidirectional (5-V tolerant)
PB31, $\overline{\text{SPISEL}}$, MII1-TXCLK, RMII1-REFCLK	T5	Bidirectional (Optional: open-drain) (5-V tolerant)

16.2 Mechanical Dimensions of the PBGA Package

Figure 70 shows the mechanical dimensions of the PBGA package.



NOTES:

1. ALL DIMENSIONS ARE IN MILLIMETERS.
2. INTERPRET DIMENSIONS AND TOLERANCES PER ASME Y14.5M—1994.
3. MAXIMUM SOLDER BALL DIAMETER MEASURED PARALLEL TO DATUM A.
4. DATUM A, THE SEATING PLANE, IS DEFINED BY THE SPHERICAL CROWNS OF THE SOLDER BALLS.

Note: Solder sphere composition is 95.5%Sn 45%Ag 0.5%Cu for MPC875/MPC870VRXXX.
Solder sphere composition is 62%Sn 36%Pb 2%Ag for MPC875/MPC870ZTXXX.

Figure 70. Mechanical Dimensions and Bottom Surface Nomenclature of the PBGA Package

17 Document Revision History

Table 37 lists significant changes between revisions of this hardware specification.

Table 37. Document Revision History

Revision Number	Date	Changes
0	2/2003	Initial release.
0.1	3/2003	Took out the time-slot assigner and changed the SCC for SCC3 to SCC4.
0.2	5/2003	Changed the package drawing, removed all references to Data Parity. Changed the SPI Master Timing Specs. 162 and 164. Added the RMII and USB timing. Added the 80-MHz timing.
0.3	5/2003	Made sure the pin types were correct. Changed the Features list to agree with the MPC885.
0.4	5/2003	Corrected the signals that had overlines on them. Made corrections on two pins that were typos.
0.5	5/2003	Changed the pin descriptions for PD8 and PD9.
0.6	5/2003	Changed a few typos. Put back the I^2C. Put in the new reset configuration, corrected the USB timing.
0.7	6/2003	Changed the pin descriptions per the June 22 spec, removed Utopia from the pin descriptions, changed PADIR, PBDIR, PCDIR and PDDIR to be 0 in the Mandatory Reset Config.
0.8	8/2003	Added the reference to USB 2.0 to the Features list and removed 1.1 from USB on the block diagrams.
0.9	8/2003	Changed the USB description to full-/low-speed compatible.
1.0	9/2003	Added the DSP information in the Features list. Put a new sentence under Mechanical Dimensions. Fixed table formatting. Nontechnical edits. Released to the external web.
1.1	10/2003	Added TDMb to the MPC875 Features list, the MPC875 Block Diagram, added 13.5 Serial Interface AC Electrical Specifications, and removed TDMa from the pin descriptions.
2.0	12/2003	Changed DBGC in the Mandatory Reset Configuration to X1. Changed the maximum operating frequency to 133 MHz. Put the timing in the 80 MHz column. Put in the orderable part numbers. Rounded the timings to hundredths in the 80 MHz column. Put the pin numbers in footnotes by the maximum currents in Table 6. Changed 22 and 41 in the Timing. Put TBD in the Thermal table.

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