Advance Information

MPC8280EC/D
Rev. 0.3, 6/2003

MPC8280
Hardware Specifications

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This document contains detailed information on power considerations, DC/AC electrical characteristics, and AC timing specifications for .13µm (HiP7) members of the PowerQUICC II™ family of integrated communications processors—the MPC8280, the MPC8275, and the MPC8270 (collectively referred to throughout this document as the MPC8280).

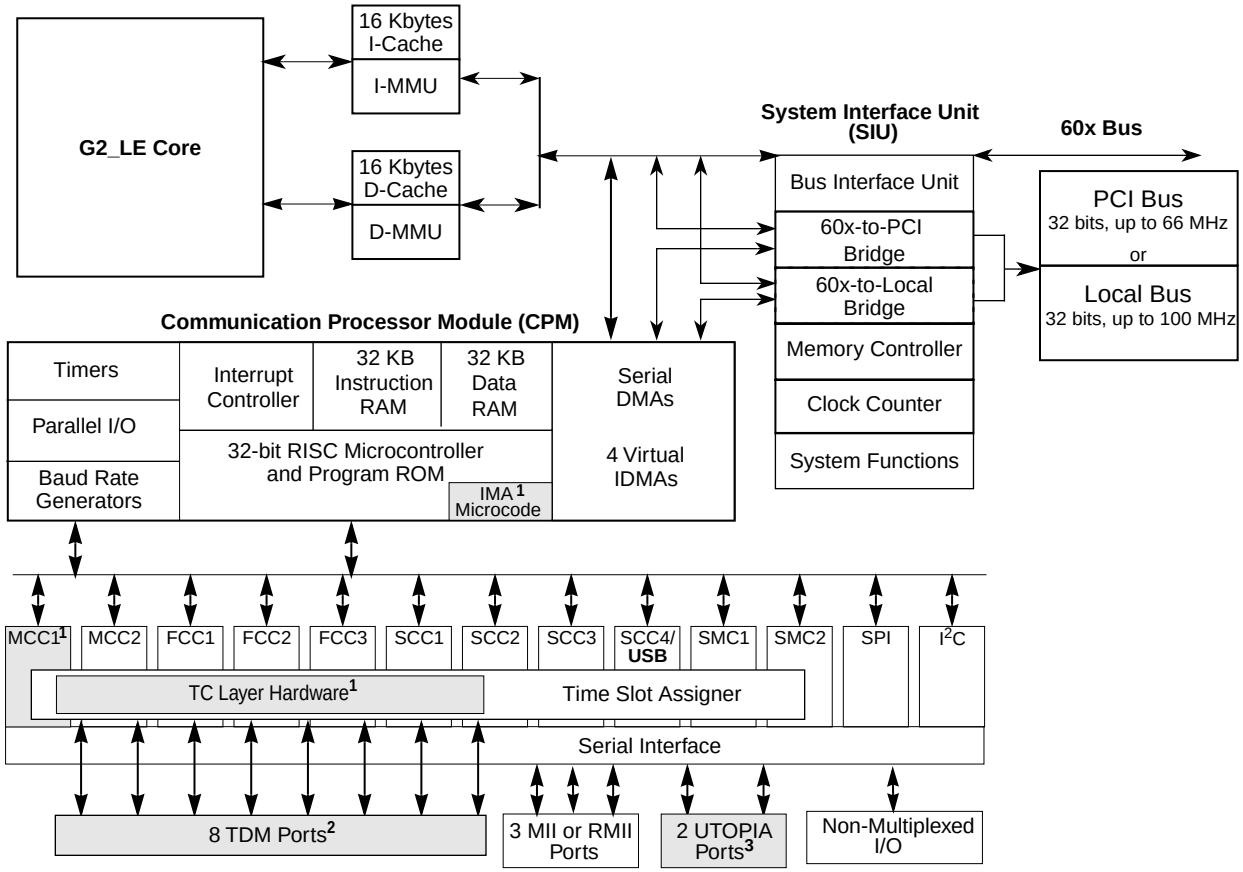
The following topics are addressed:

HiP7 members of the PowerQUICC II family are available in two packages—the standard ZU package and an alternate VR package—as shown in Table 1. Note that throughout this document references to the MPC8280 and the MPC8270 are inclusive of VR-package devices unless otherwise specified. For more information on VR packages, contact your Motorola sales office.

Table 1. HiP7 PowerQUICC II Device Packages

ZU (480 TBGA)	VR (516 PBGA)
MPC8280	MPC8275VR
MPC8270	MPC8270VR

Figure 1 shows the block diagram. Shaded portions are device-specific; refer to the notes below.



Notes:
1 MPC8280 only (not on MPC8270 nor the VR package (MPC8270VR and MPC8275VR))
2 MPC8280 only (4 TDMs on MPC8270 and the VR package (MPC8270VR and MPC8275VR))
3 MPC8280 and MPC8275VR only (not on MPC8270 nor MPC8270VR)

Figure 1. MPC8280 Block Diagram

1.1 Features

The major features of the MPC8280 are as follows:

- Dual-issue integer (G2_LE) core
  - A core version of the EC603e microprocessor
  - System core microprocessor supporting frequencies of 150–450 MHz
  - Separate 16-Kbyte data and instruction caches:
    - Four-way set associative
    - Physically addressed
    - LRU replacement algorithm
  - PowerPC architecture-compliant memory management unit (MMU)
  - Common on-chip processor (COP) test interface
  - High-performance (SPEC95 benchmark at 450 MHz; 855 Dhrystones MIPS at 450 MHz)

  - Supports bus snooping for data cache coherency
  - Floating-point unit (FPU)
- Separate power supply for internal logic and for I/O
- Separate PLLs for G2_LE core and for the CPM
  - G2_LE core and CPM can run at different frequencies for power/performance optimization
  - Internal core/bus clock multiplier that provides 2:1, 2.5:1, 3:1, 3.5:1, 4:1, 4.5:1, 5:1, 6:1, 7:1, 8:1 ratios
  - Internal CPM/bus clock multiplier that provides 2:1, 2.5:1, 3:1, 3.5:1, 4:1, 5:1, 6:1, 8:1 ratios
- 64-bit data and 32-bit address 60x bus
  - Bus supports multiple master designs
  - Supports single- and four-beat burst transfers
  - 64-, 32-, 16-, and 8-bit port sizes controlled by on-chip memory controller
  - Supports data parity or ECC and address parity
- 32-bit data and 18-bit address local bus
  - Single-master bus, supports external slaves
  - Eight-beat burst transfers
  - 32-, 16-, and 8-bit port sizes controlled by on-chip memory controller
- 60x-to-PCI bridge
  - Programmable host bridge and agent
  - 32-bit data bus, 66.67/83.3/100 MHz, 3.3 V
  - Synchronous and asynchronous 60x and PCI clock modes
  - All internal address space available to external PCI host
  - DMA for memory block transfers
  - PCI-to-60x address remapping
- PCI bridge
  - PCI Specification Revision 2.2 compliant and supports frequencies up to 66 MHz
  - On-chip arbitration
  - Support for PCI-to-60x-memory and 60x-memory-to-PCI streaming
  - PCI Host Bridge or Peripheral capabilities
  - Includes 4 DMA channels for the following transfers:
    - PCI-to-60x to 60x-to-PCI
    - 60x-to-PCI to PCI-to-60x
    - PCI-to-60x to PCI-to-60x
    - 60x-to-PCI to 60x-to-PCI
  - Includes all of the configuration registers (which are automatically loaded from the EPROM and used to configure the MPC8280) required by the PCI standard as well as message and doorbell registers
  - Supports the I_2O standard
  - Hot-Swap friendly (supports the Hot Swap Specification as defined by PICMG 2.1 R1.0 August 3, 1998)

  - Support for 66.67/83.33/100 MHz, 3.3 V specification
  - 60x-PCI bus core logic which uses a buffer pool to allocate buffers for each port
  - Makes use of the local bus signals, so there is no need for additional pins
- System interface unit (SIU)
  - Clock synthesizer
  - Reset controller
  - Real-time clock (RTC) register
  - Periodic interrupt timer
  - Hardware bus monitor and software watchdog timer
  - IEEE 1149.1 JTAG test access port
- Twelve-bank memory controller
  - Glueless interface to SRAM, page mode SDRAM, DRAM, EPROM, Flash and other user-definable peripherals
  - Byte write enables and selectable parity generation
  - 32-bit address decodes with programmable bank size
  - Three user programmable machines, general-purpose chip-select machine, and page-mode pipeline SDRAM machine
  - Byte selects for 64 bus width (60x) and byte selects for 32 bus width (local)
  - Dedicated interface logic for SDRAM
- CPU core can be disabled and the device can be used in slave mode to an external core
- Communications processor module (CPM)
  - Embedded 32-bit communications processor (CP) uses a RISC architecture for flexible support for communications protocols
  - Interfaces to G2_LE core through an on-chip 32-Kbyte dual-port data RAM, an on-chip 32-Kbyte dual-port instruction RAM and DMA controller
  - Serial DMA channels for receive and transmit on all serial channels
  - Parallel I/O registers with open-drain and interrupt capability
  - Virtual DMA functionality executing memory-to-memory and memory-to-I/O transfers
  - Three fast communications controllers supporting the following protocols:
    - 10/100-Mbit Ethernet/IEEE 802.3 CDMA/CS interface through media independent interface (MII) or reduced media independent interface (RMII)
    - ATM—Full-duplex SAR protocols at 155 Mbps, through UTOPIA interface, AAL5, AAL1, AAL0 protocols, TM 4.0 CBR, VBR, UBR, ABR traffic types, up to 16 K external connections (no ATM support for the MPC8270)
    - Transparent
    - HDLC—Up to T3 rates (clear channel)
    - FCC2 can also be connected to the TC layer (MPC8280 only)
  - Two multichannel controllers (MCCs) (one MCC on the MPC8270)
    - Each MCC handles 128 serial, full-duplex, 64-Kbps data channels. Each MCC can be split into four subgroups of 32 channels each.

  - Almost any combination of subgroups can be multiplexed to single or multiple TDM interfaces up to four TDM interfaces per MCC
- — Four serial communications controllers (SCCs) identical to those on the MPC860, supporting the digital portions of the following protocols:
  - Ethernet/IEEE 802.3 CDMA/CS
  - HDLC/SDLC and HDLC bus
  - Universal asynchronous receiver transmitter (UART)
  - Synchronous UART
  - Binary synchronous (BISYNC) communications
  - Transparent
- — Universal serial bus (USB) controller—supports both host and slave modes
- — Two serial management controllers (SMCs), identical to those of the MPC860
  - Provide management for BRI devices as general circuit interface (GCI) controllers in time-division-multiplexed (TDM) channels
  - Transparent
  - UART (low-speed operation)
- — One serial peripheral interface identical to the MPC860 SPI
- — One inter-integrated circuit (I^2C) controller (identical to the MPC860 I^2C controller)
  - Microwire compatible
  - Multiple-master, single-master, and slave modes
- — Up to eight TDM interfaces (four on the MPC8270)
  - Supports two groups of four TDM channels for a total of eight TDMs (one group of four on the MPC8270)
  - 2,048 bytes of SI RAM
  - Bit or byte resolution
  - Independent transmit and receive routing, frame synchronization
  - Supports T1, CEPT, T1/E1, T3/E3, pulse code modulation highway, ISDN basic rate, ISDN primary rate, Motorola interchip digital link (IDL), general circuit interface (GCI), and user-defined TDM serial interfaces
- — Eight independent baud rate generators and 20 input clock pins for supplying clocks to FCCs, SCCs, SMCs, and serial channels
- — Four independent 16-bit timers that can be interconnected as two 32-bit timers

- Inverse multiplexing for ATM capabilities (IMA) (MPC8280 only).Supported by eight transfer transmission convergence (TC) layers between the TDMs and FCC2.
- Transmission convergence (TC) layer (MPC8280 only)

1.2 Electrical and Thermal Characteristics

This section provides AC and DC electrical specifications and thermal characteristics for the MPC8280.

1.2.1 DC Electrical Characteristics

This section describes the DC electrical characteristics for the MPC8280. Table 2 shows the maximum electrical ratings.

Table 2. Absolute Maximum Ratings[1]

Rating	Symbol	Value	Unit
Core supply voltage[2]	VDD	-0.3 – 2.25	V
PLL supply voltage[2]	VCCSYN	-0.3 – 2.25	V
I/O supply voltage[3]	VDDH	-0.3 – 4.0	V
Input voltage[4]	VIN	GND(-0.3) – 3.6	V
Junction temperature	T_j	120	˚C
Storage temperature range	T_{STG}	(-55) – (+150)	˚C

1 Absolute maximum ratings are stress ratings only; functional operation (see Table 3) at the maximums is not guaranteed. Stress beyond those listed may affect device reliability or cause permanent damage.
2 **Caution:** VDD/VCCSYN must not exceed VDDH by more than 0.4 V at any time, including during power-on reset.
3 **Caution:** VDDH can exceed VDD/VCCSYN by 3.3 V during power on reset by no more than 100 mSec. VDDH should not exceed VDD/VCCSYN by more than 2.5 V during normal operation.
4 **Caution:** VIN must not exceed VDDH by more than 2.5 V at any time, including during power-on reset.

Table 3 lists recommended operational voltage conditions.

Table 3. Recommended Operating Conditions[1]

Rating	Symbol	Value	Unit
Core supply voltage	VDD	1.425 – 1.575	V
PLL supply voltage	VCCSYN	1.425 – 1.575	V
I/O supply voltage	VDDH	3.135 – 3.465	V
Input voltage	VIN	GND (-0.3) – 3.465	V
Junction temperature (maximum)	T_j	105[2]	˚C
Ambient temperature	T_A	0–70[2]	˚C

1 **Caution:** These are the recommended and tested operating conditions. Proper operation outside of these conditions is not guaranteed.
2 Note that for extended temperature parts the range is $(-40)_{T_A}$ – 105_{T_j}.

NOTE: Core, PLL, and I/O Supply Voltages

VDDH, VCCSYN, and VDD must track each other and must vary in the same direction—in the positive direction (+0.165 VDDH and +0.075 VDD and VCCSYN) or in the negative direction (-0.165 VDDH and -0.075 VDD and VCCSYN).

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 (either GND or V_{CC}).

Figure 2 shows the undershoot and overshoot voltage of the 60x and local bus memory interface of the MPC8280. Note that in PCI mode the I/O interface is different.

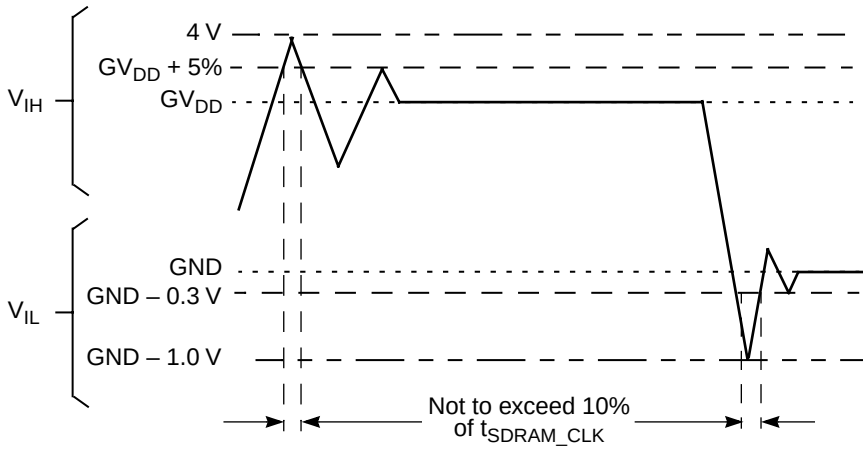


Figure 2. Overshoot/Undershoot Voltage

Table 4 shows DC electrical characteristics.

Table 4. DC Electrical Characteristics[1]

Characteristic	Symbol	Min	Max	Unit
Input high voltage, all inputs except CLKIN	V_{IH}	2.0	3.465	V
Input low voltage	V_{IL}	GND	0.8	V
CLKIN input high voltage	V_{IHC}	2.4	3.465	V
CLKIN input low voltage	V_{ILC}	GND	0.4	V
Input leakage current, V_{IN} = VDDH[2]	I_{IN}	—	10	µA
Hi-Z (off state) leakage current, V_{IN} = VDDH[2]	I_{OZ}	—	10	µA
Signal low input current, V_{IL} = 0.8 V	I_L	—	1	µA
Signal high input current, V_{IH} = 2.0 V	I_H	—	1	µA
Output high voltage, I_{OH} = –2 mA except UTOPIA mode, and open drain pins In UTOPIA mode[3] (UTOPIA pins only): I_{OH} = -8.0mA PA[0-31] PB[4-31] PC[0-31] PD[4-31]	V_{OH}	2.4	—	V
In UTOPIA mode[3] (UTOPIA pins only): I_{OL} = 8.0mA PA[0-31] PB[4-31] PC[0-31] PD[4-31]	V_{OL}	—	0.5	V

Table 4. DC Electrical Characteristics[1] (Continued)

Characteristic	Symbol	Min	Max	Unit
I_{OL} = 7.0mA BR BG ABB/IRQ2 TS A[0-31] TT[0-4] TBST TSIZE[0–3] AACK ARTRY DBG DBB/IRQ3 D[0-63] DP(0)/RSRV/EXT_BR2 DP(1)/IRQ1/EXT_BG2 DP(2)/TLBISYNC/IRQ2/EXT_DBG2 DP(3)/IRQ3/EXT_BR3/CKSTP_OUT DP(4)/IRQ4/EXT_BG3/CORE_SREST DP(5)/TBEN/IRQ5/EXT_DBG3 DP(6)/CSE(0)/IRQ6 DP(7)/CSE(1)/IRQ7 PSDVAL TA TEA GBL/IRQ1 CI/BADDR29/IRQ2 WT/BADDR30/IRQ3 L2_HIT/IRQ4 CPU_BG/BADDR31/IRQ5 CPU_DBG CPU_BR IRQ0/NMI_OUT IRQ7/INT_OUT/APE PORESET HRESET SRESET RSTCONF QREQ	V_{OL}	—	0.4	V

Table 4. DC Electrical Characteristics[1] (Continued)

Characteristic	Symbol	Min	Max	Unit
I_{OL} = 5.3mA CS[0-9] CS(10)/BCTL1 CS(11)/AP(0) BADDR[27–28] ALE BCTL0 PWE[0–7]/PSDDQM[0–7]/PBS[0–7] PSDA10/PGPL0 PSDWE/PGPL1 POE/PSDRAS/PGPL2 PSDCAS/PGPL3 PGTA/PUPMWAIT/PGPL4/PPBS PSDAMUX/PGPL5 LWE[0–3]LSDDQM[0–3]/LBS[0–3]/PCI_CFG[0–3] LSDA10/LGPL0/PCI_MODCKH0 LSDWE/LGPL1/PCI_MODCKH1 LOE/LSDRAS/LGPL2/PCI_MODCKH2 LSDCAS/LGPL3/PCI_MODCKH3 LGTA/LUPMWAIT/LGPL4/LPBS LSDAMUX/LGPL5/PCI_MODCK LWR MODCK1/AP(1)/TC(0)/BNKSEL(0) MODCK2/AP(2)/TC(1)/BNKSEL(1) MODCK3/AP(3)/TC(2)/BNKSEL(2)	V_{OL}	—	0.4	V
I_{OL} = 3.2mA L_A14/PAR L_A15/FRAME/SMI L_A16/TRDY L_A17/IRDY/CKSTP_OUT L_A18/STOP L_A19/DEVSEL L_A20/IDSEL L_A21/PERR L_A22/SERR L_A23/REQ0 L_A24/REQ1/HSEJSW L_A25/GNT0 L_A26/GNT1/HSLED L_A27/GNT2/HSENUM L_A28/RST/CORE_SRESET L_A29/INTA L_A30/REQ2 L_A31 LCL_D(0-31)/AD(0-31) LCL_DP(0-3)/C/BE(0-3) PA[0–31] PB[4–31] PC[0–31] PD[4–31] TDO				

[1] The default configuration of the CPM pins (PA[0–31], PB[4–31], PC[0–31], PD[4–31]) is input. To prevent excessive DC current, it is recommended to either pull unused pins to GND or VDDH, or to configure them as outputs.

[2] The leakage current is measured for nominal VDDH,VCCSYN, and VDD.

[3] MPC8280 and MPC8275VR only.

1.2.2 Thermal Characteristics

Table 5 describes thermal characteristics for both the packages. Refer to Table 1 for information on a given device's package.

Table 5. Thermal Characteristics

Characteristic	Symbol	Value		Unit	Air Flow
		480 TBGA (ZU package)	516 PBGA (VR package)		
Junction to ambient—single-layer board[1]	θ_{JA}	16	27	°C/W	Natural convection
		11	21		1 m/s
Junction to ambient—four-layer board	θ_{JA}	12	19	°C/W	Natural convection
		9	16		1 m/s
Junction to board[2]	θ_{JB}	6	11	°C/W	—
Junction to case[3]	θ_{JC}	2	8	°C/W	—

[1] Assumes no thermal vias
[2] 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.
[3] Thermal resistance between the die and the case top surface as measured by the cold plate method (MIL SPEC-883 Method 1012.1).

1.2.2.1 Layout Practices

Each V_{CC} pin should be provided with a low-impedance path to the board's power supply. Each ground pin should likewise be provided with a low-impedance path to ground. The power supply pins drive distinct groups of logic on chip. The V_{CC} power supply should be bypassed to ground using at least four 0.1 µF by-pass 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_{CC} and ground should be kept to less than half an inch per capacitor lead. A four-layer board is recommended, employing two inner layers as V_{CC} and GND planes.

All output pins on the MPC8280 have fast rise and fall times. Printed circuit (PC) trace interconnection length should be minimized in order to minimize overdamped conditions and reflections caused by these fast output switching times. This recommendation particularly applies to the address and data buses. Maximum PC trace lengths of six 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 6 provides preliminary, estimated power dissipation for various configurations. Note that suitable thermal management is required to ensure the junction temperature does not exceed the maximum specified value. Also note that the I/O power should be included when determining whether to use a heat sink.

Table 6. Estimated Power Dissipation for Various Configurations[1]

Bus (MHz)	CPM Multiplication Factor	CPM (MHz)	CPU Multiplication Factor	CPU (MHz)	P_{INT}(W)[2,3]	
					Vddl 1.5 Volts	
					Nominal	Maximum
66.67	2.5	166	3.5	233	0.8	0.85
66.67	2.5	166	4	266	0.85	0.9
66.67	3	200	4	266	0.9	0.95
66.67	3.5	233	4.5	300	0.9	1.0
83.33	3	250	4	333	1.1	1.2
83.33	3	250	4.5	375	1.15	1.25
83.33	3.5	292	5	417	1.3	1.4
100	3	300	4	400	1.35	1.45
100	3	300	4.5	450	1.4	1.5

1 Test temperature = 105° C)
2 $P_{INT} = I_{DD} \times V_{DD}$ Watts
3 Values do not include I/O. Add the following estimates for active I/O based on the following bus speeds:
66.7 MHz = 0.35 W (nominal), 0.4 W (maximum)
83.3 MHz = 0.4 W (nominal), 0.5 W (maximum)
100 MHz = 0.5 W (nominal), 0.6 W (maximum)

1.2.3 AC Electrical Characteristics

The following sections include illustrations and tables of clock diagrams, signals, and CPM outputs and inputs for 66.67/83.33/100 MHz MPC8280 devices. Note that AC timings are based on a 50-p*f* load. Typical output buffer impedances are shown in Table 7.

Table 7. Output Buffer Impedances[1]

Output Buffers	Typical Impedance (Ω)
60x bus	45
Local bus	45
Memory controller	45
Parallel I/O	45
PCI	25

1 These are typical values at 65° C. Impedance may vary by ±25% with process and temperature.

1.2.3.1 CPM AC Characteristics

Table 8 lists CPM output characteristics.

Table 8. AC Characteristics for CPM Outputs[1]

Spec Number		Characteristic	Value (ns)					
Max	Min		Maximum Delay			Minimum Delay		
			66 MHz	83 MHz	100 MHz	66 MHz	83 MHz	100 MHz
sp36a	sp37a	FCC outputs—internal clock (NMSI)	6	5.5	5.5	1	1	1
sp36b	sp37b	FCC outputs—external clock (NMSI)	14	12	12	2	2	2
sp38a	sp39a	SCC/SMC/SPI/I2C outputs—internal clock (NMSI)	19	16	16	1	0.5	0.5
sp38b	sp39b	SCC/SMC/SPI/I2C outputs—external clock (NMSI)	19	16	16	2	2	2
sp40	sp41	TDM outputs/SI	14	12	12	5	3	3
sp42	sp43	TIMER/IDMA outputs	14	11	11	1	0.5	0.5
sp42a	sp43a	PIO outputs	14	11	11	0.5	0.5	0.5

[1] Output specifications are measured from the 50% level of the rising edge of CLKIN to the 50% level of the signal. Timings are measured at the pin.

Table 9 lists CPM input characteristics.

Table 9. AC Characteristics for CPM Inputs[1]

Spec Number		Characteristic	Value (ns)					
Setup	Hold		Setup			Hold		
			66 MHz	83 MHz	100 MHz	66 MHz	83 MHz	100 MHz
sp16a	sp17a	FCC inputs—internal clock (NMSI)	10	8	8	0	0	0
sp16b	sp17b	FCC inputs—external clock (NMSI)	3	2.5	2.5	2	2	2
sp18a	sp19a	SCC/SMC/SPI/I2C inputs—internal clock (NMSI)	20	16	16	0	0	0
sp18b	sp19b	SCC/SMC/SPI/I2C inputs—external clock (NMSI)	5	4	4	2	2	2
sp20	sp21	TDM inputs/SI	7	5	5	4	3	3
sp22	sp23	PIO/TIMER/IDMA inputs	10	8	8	0.5	0.5	0.5

[1] Input specifications are measured from the 50% level of the signal to the 50% level of the rising edge of CLKIN. Timings are measured at the pin.

NOTE

Although the specifications generally reference the rising edge of the clock, the following AC timing diagrams also apply when the falling edge is the active edge.

Figure 3 shows the FCC internal clock.

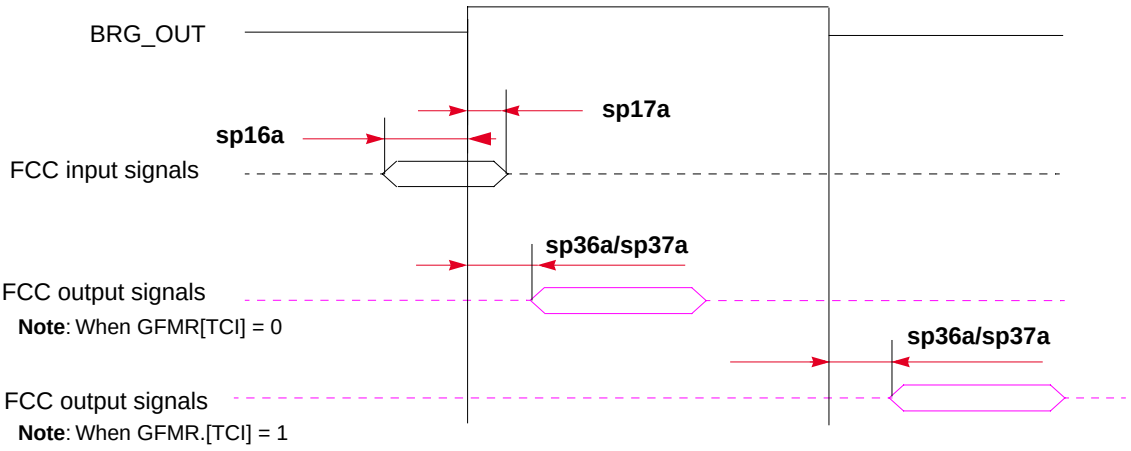


Figure 3. FCC Internal Clock Diagram

Figure 4 shows the FCC external clock.

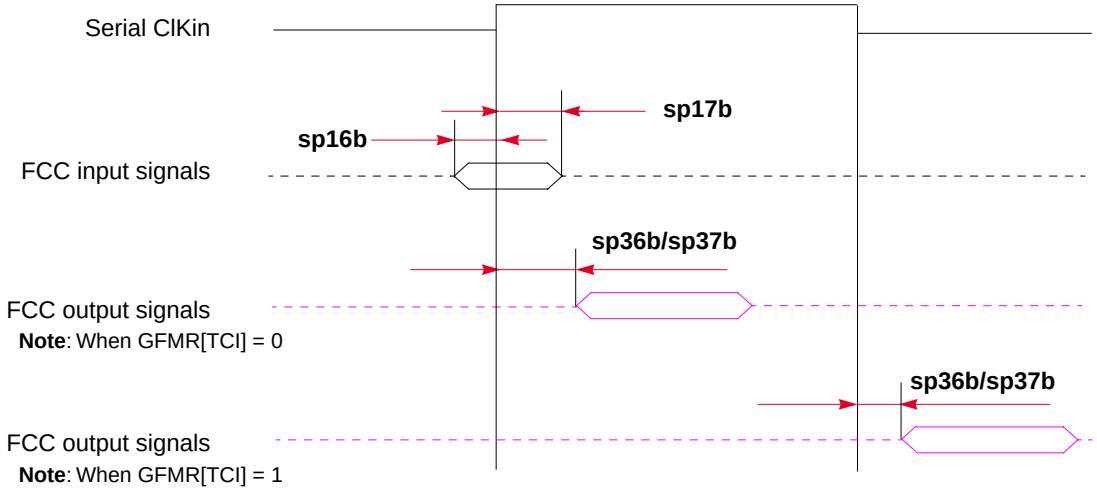
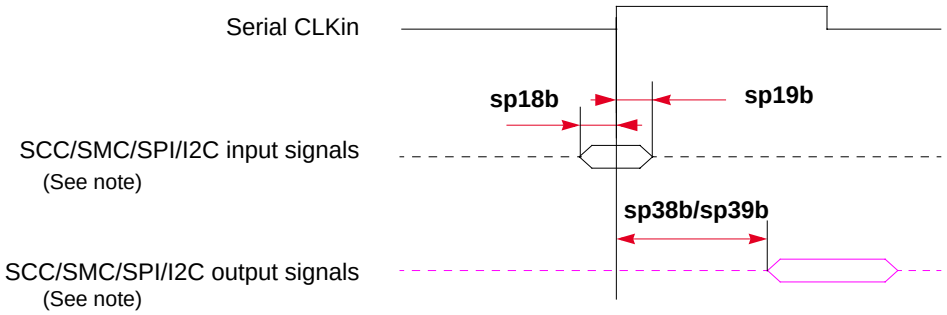


Figure 4. FCC External Clock Diagram

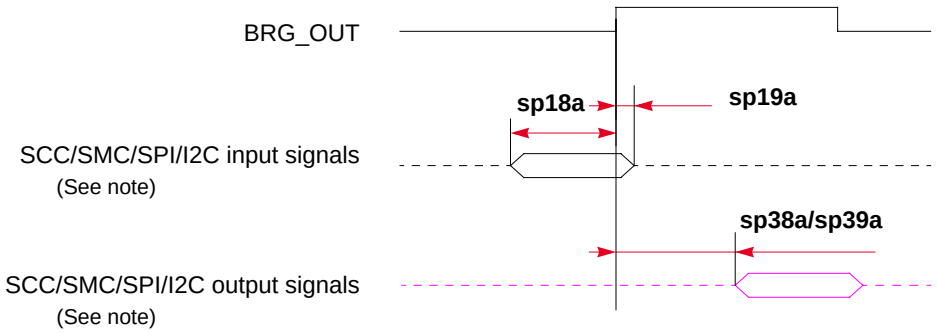
Figure 5 shows the SCC/SMC/SPI/I^{2}C external clock.



Note: There are four possible timing conditions for SCC and SPI:
1. Input sampled on the rising edge and output driven on the rising edge (shown).
2. Input sampled on the rising edge and output driven on the falling edge.
3. Input sampled on the falling edge and output driven on the falling edge.
4. Input sampled on the falling edge and output driven on the rising edge.

Figure 5. SCC/SMC/SPI/I^{2}C External Clock Diagram

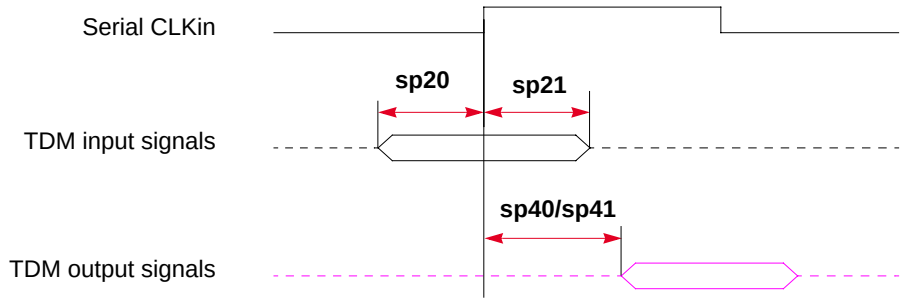
Figure 6 shows the SCC/SMC/SPI/I^{2}C internal clock.



Note: There are four possible timing conditions for SCC and SPI:
1. Input sampled on the rising edge and output driven on the rising edge (shown).
2. Input sampled on the rising edge and output driven on the falling edge.
3. Input sampled on the falling edge and output driven on the falling edge.
4. Input sampled on the falling edge and output driven on the rising edge.

Figure 6. SCC/SMC/SPI/I^{2}C Internal Clock Diagram

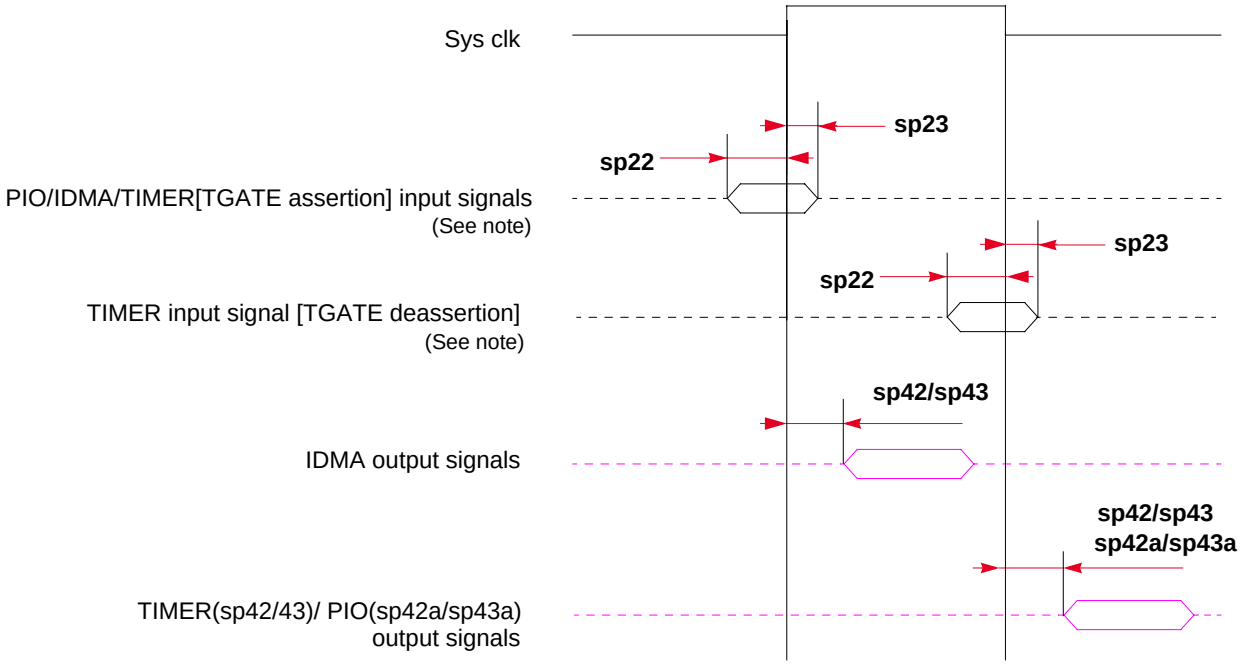
Figure 7 shows TDM input and output signals.



Note: There are four possible TDM timing conditions:
1. Input sampled on the rising edge and output driven on the rising edge (shown).
2. Input sampled on the rising edge and output driven on the falling edge.
3. Input sampled on the falling edge and output driven on the falling edge.
4. Input sampled on the falling edge and output driven on the rising edge.

Figure 7. TDM Signal Diagram

Figure 8 shows PIO and timer signals.



Note: TGATE is asserted on the rising edge of the clock; it is deasserted on the falling edge.

Figure 8. PIO and Timer Signal Diagram

1.2.3.2 SIU AC Characteristics

Table 10 lists SIU input characteristics.

NOTE: PCI AC Timing

The MPC8280 meets the timing requirements of *PCI Specification Revision 2.2*. Refer to Section 1.3.2, "PCI Mode" and "Note: Tval (Output Hold)" to determine if a specific clock configuration is compliant.

Table 10. AC Characteristics for SIU Inputs[1]

Spec Number		Characteristic	Value (ns)					
Setup	Hold		Setup			Hold		
			66 MHz	83 MHz	100 MHz	66 MHz	83 MHz	100 MHz
sp11	sp10	$\overline{\text{AACK}}$/$\overline{\text{TA}}$/$\overline{\text{TS}}$/$\overline{\text{DBG}}$/$\overline{\text{BG}}$/$\overline{\text{BR}}$	6	5	3.5	0.5	0.5	0.5
sp11a	sp10	$\overline{\text{ARTRY}}$/ $\overline{\text{TEA}}$	6	5	4	0.5	0.5	0.5
sp12	sp10	Data bus in normal mode	5	4	3.5	0.5	0.5	0.5
sp13	sp10	Data bus in ECC and PARITY modes	8	6	3.5	0.5	0.5	0.5
sp13a	sp10	Pipeline mode— Data bus in ECC and PARITY modes	5	4	2.5	0.5	0.5	0.5
sp14	sp10	DP pins	7	6	3.5	0.5	0.5	0.5
sp14a	sp10	Pipeline mode—DP pins	—	4	2.5	—	0.5	0.5
sp15	sp10	All other pins	5	4	3.5	0.5	0.5	0.5

[1] Input specifications are measured from the 50% level of the signal to the 50% level of the rising edge of CLKIN. Timings are measured at the pin.

Table 11 lists SIU output characteristics.

Table 11. AC Characteristics for SIU Outputs[1]

Spec Number		Characteristic	Value (ns)					
Max	Min		Maximum Delay			Minimum Delay		
			66 MHz	83 MHz	100 MHz	66 MHz	83 MHz	100 MHz
sp31	sp30	$\overline{\text{PSDVAL}}$/$\overline{\text{TEA}}$/$\overline{\text{TA}}$	7	6	5.5	1	1	1
sp32	sp30	ADD/ADD_atr./BADDR/CI/GBL/WT	8	6.5	5.5	1	1	1
sp33a	sp30	Data bus[2]	6.5	6.5	5.5	0.5	0.5	0.5
sp33b	sp30	DP	8	7	6.5	1	1	1
sp34	sp30	Memory controller signals/ALE	6	5.5	5.5	1	1	1
sp35	sp30	All other signals	6	5.5	5.5	1	1	1
sp35a	sp30	AP	7	7	7	1	1	1

[1] Output specifications are measured from the 50% level of the rising edge of CLKIN to the 50% level of the signal. Timings are measured at the pin.

[2] To achieve 1 ns of hold time at 66.67/83.33/100 MHZ, a minimum loading of 20 pF is required.

NOTE

Activating data pipelining (setting BR*x*[DR] in the memory controller) improves the AC timing.

Figure 9 shows the interaction of several bus signals.

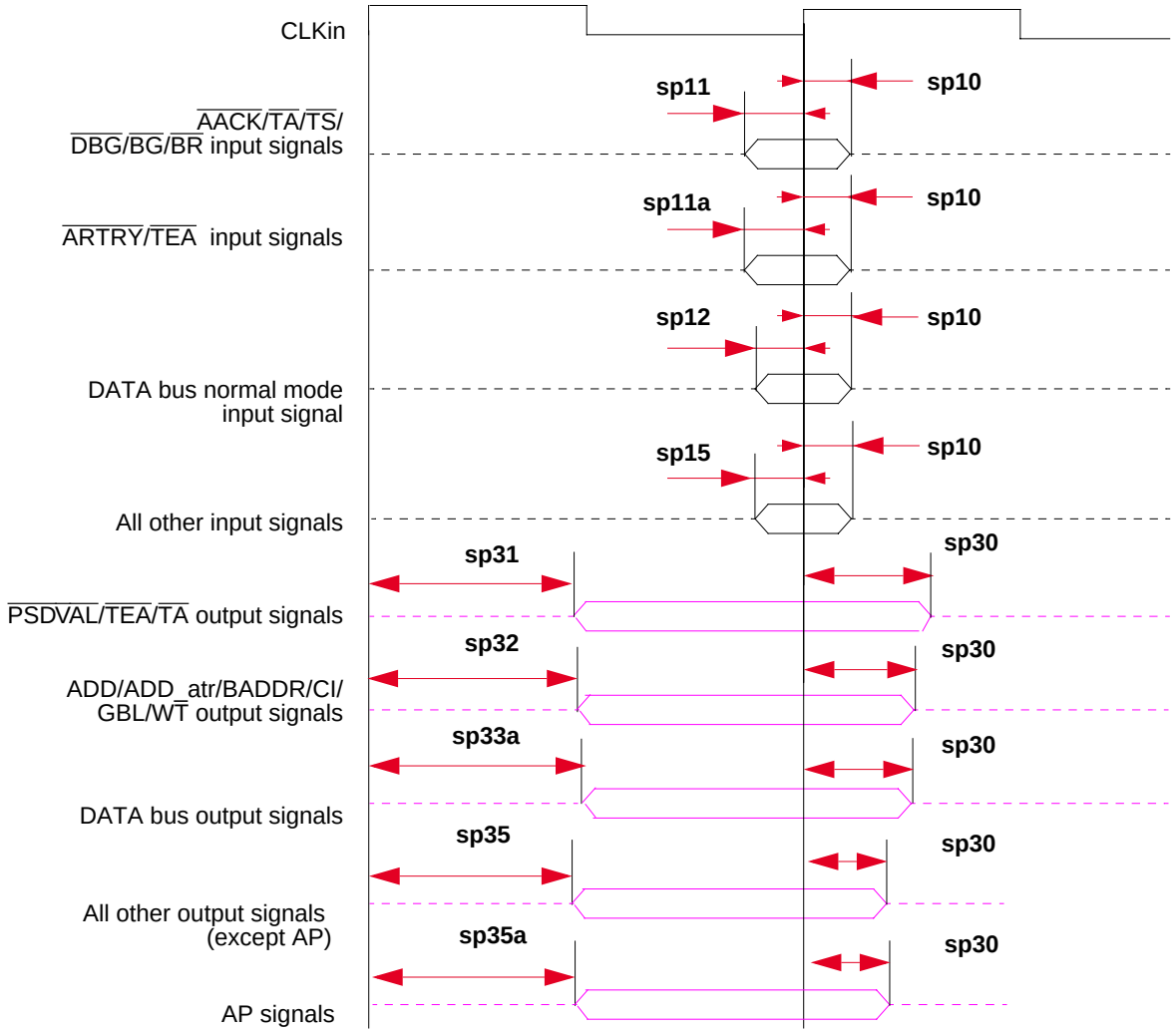


Figure 9. Bus Signals

Figure 10 shows signal behavior for all parity modes (including ECC, RMW parity, and standard parity).

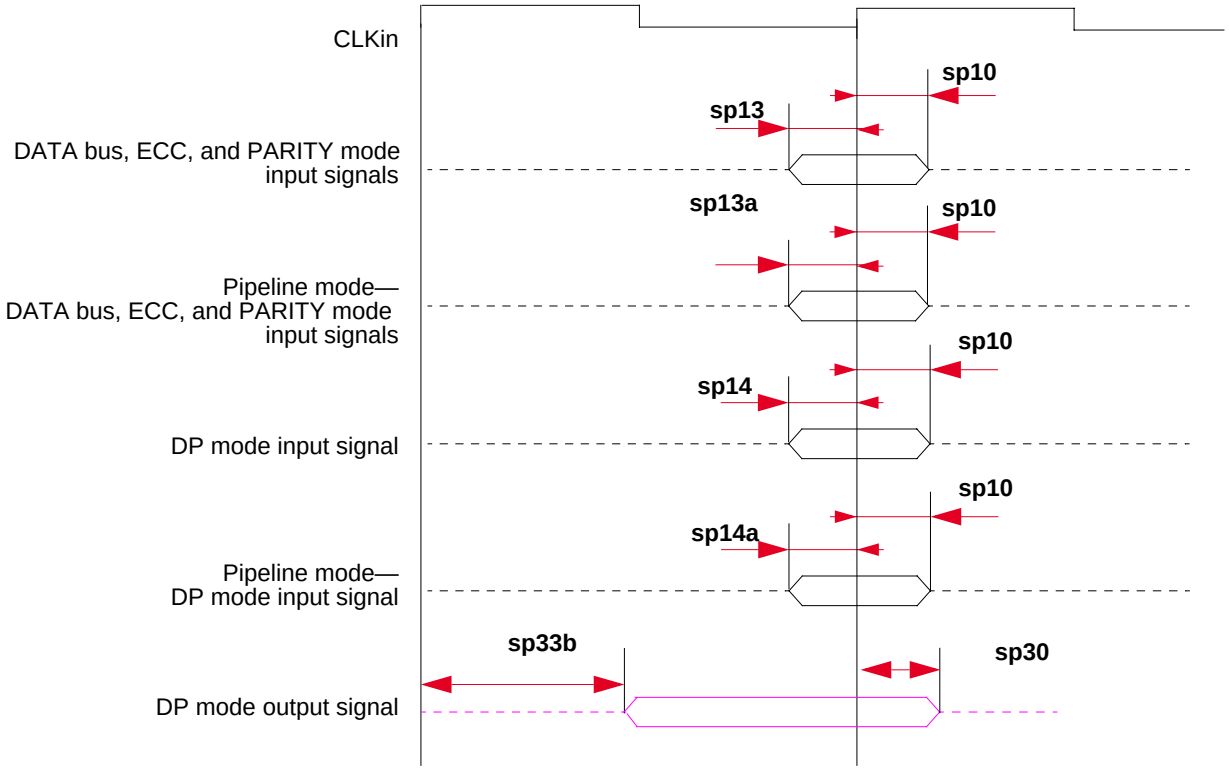


Figure 10. Parity Mode Diagram

Figure 11 shows signal behavior in MEMC mode.

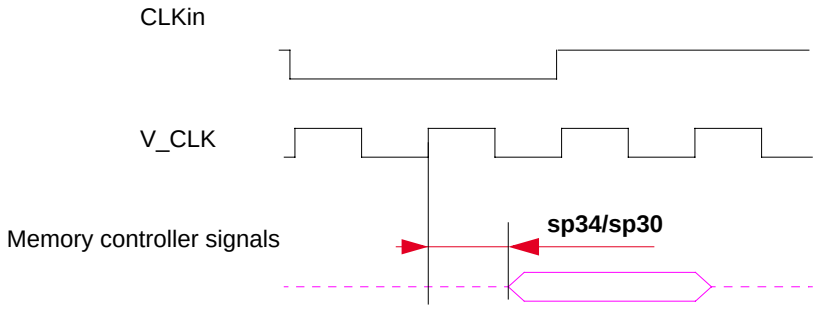


Figure 11. MEMC Mode Diagram

NOTE

Generally, all MPC8280 bus and system output signals are driven from the rising edge of the input clock (CLKin). Memory controller signals, however, trigger on four points within a CLKin cycle. Each cycle is divided by four internal ticks: T1, T2, T3, and T4. T1 always occurs at the rising edge, and T3 at the falling edge, of CLKin. However, the spacing of T2 and T4 depends on the PLL clock ratio selected, as shown in Table 12.

Table 12. Tick Spacing for Memory Controller Signals

PLL Clock Ratio	Tick Spacing (T1 Occurs at the Rising Edge of CLKin)		
	T2	T3	T4
1:2, 1:3, 1:4, 1:5, 1:6	1/4 CLKin	1/2 CLKin	3/4 CLKin
1:2.5	3/10 CLKin	1/2 CLKin	8/10 CLKin
1:3.5	4/14 CLKin	1/2 CLKin	11/14 CLKin

Figure 12 is a representation of the information in Table 12.

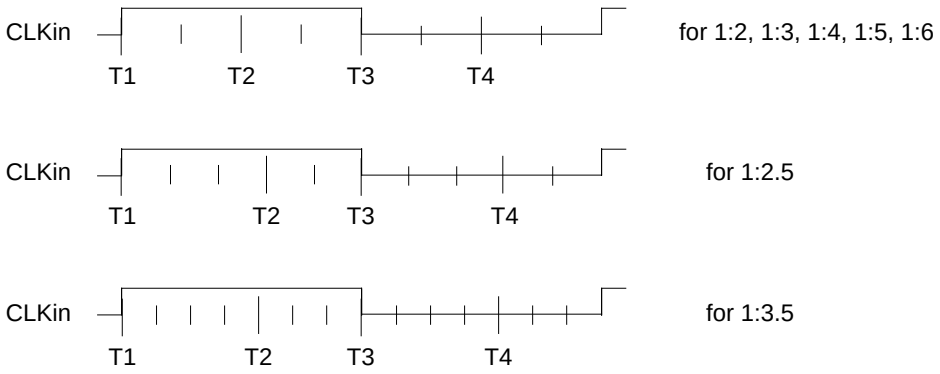


Figure 12. Internal Tick Spacing for Memory Controller Signals

NOTE

The UPM machine outputs change on the internal tick determined by the memory controller programming; the AC specifications are relative to the internal tick. Note that SDRAM and GPCM machine outputs change on CLKin's rising edge.

1.3 Clock Configuration Modes

The MPC8280 has three clocking modes: local, PCI host, and PCI agent. The clocking mode is set according to three input pins—PCI_MODE, PCI_CFG[0], PCI_MODCK—as shown in Table 13.

Table 13. MPC8280 Clocking Modes

Pins			Clocking Mode	PCI Clock Frequency Range (MHZ)	Reference
$\overline{\text{PCI\_MODE}}$	PCI_CFG[0]	PCI_MODCK[1]			
1	—	—	Local bus	—	Table 14
0	0	0	PCI host	50–66	Table 15
0	0	1		25–50	Table 16
0	1	0	PCI agent	50–66	Table 17
0	1	1		25–50	Table 18

[1] Determines PCI clock frequency range. Refer to Section 1.3.2, "PCI Mode."

In each clocking mode, the configuration of bus, core, PCI, and CPM frequencies is determined by seven bits during the power-up reset—three hardware configuration pins (MODCK[1–3]) and four bits from hardware configuration word[28–31] (MODCK_H). Both the PLLs and the dividers are set according to the selected MPC8280 clock operation mode as described in the following sections.

1.3.1 Local Bus Mode

Table 14 lists default and full configurations for the MPC8280 in local bus mode. The frequencies listed are for the purpose of illustration only. Users must select a mode and input bus frequency so that the resulting configuration does not exceed the frequency rating of the user's device.

NOTE

Clock configurations change only after $\overline{\text{POR}}$ is asserted.

Table 14. Clock Configurations for Local Bus Mode[1]

Mode[2]	Bus Clock[3] (MHz)		CPM Multiplication Factor[4]	CPM Clock (MHz)		CPU Multiplication Factor[5]	CPU Clock (MHz)	
MODCK_H-MODCK[1-3]	low	high		low	high		low	high
Default Modes (MODCK_H= 0000)								
0000_000	62.5	133.3	3	187.5	400.0	4	250.0	533.3
0000_001	50.0	133.3	3	150.0	400.0	5	250.0	666.7
0000_010	62.5	100.0	4	250.0	400.0	4	250.0	400.0
0000_011	50.0	100.0	4	200.0	400.0	5	250.0	500.0
0000_100	50.0	167.0	2	100.0	334.0	2.5	125.0	417.5
0000_101	50.0	167.0	2	100.0	334.0	3	150.0	501.0
0000_110	50.0	160.0	2.5	125.0	400.0	2.5	125.0	400.0
0000_111	41.7	160.0	2.5	104.2	400.0	3	125.0	480.0
Full Configuration Modes								
0001_000	62.5	167.0	2	125.0	334.0	4	250.0	668.0
0001_001	50.0	167.0	2	100.0	334.0	5	250.0	835.0
0001_010	50.0	167.0	2	100.0	334.0	6	300.0	1002.0
0001_011	Reserved							
0001_100	Reserved							
0001_101	62.5	133.3	3	187.5	400.0	4	250.0	533.3
0001_110	50.0	133.3	3	150.0	400.0	5	250.0	666.7
1000_111	45.5	133.3	3	136.4	400.0	5.5	250.0	733.3
0001_111	41.7	133.3	3	125.0	400.0	6	250.0	800.0
0010_000	Reserved							
0010_001	Reserved							

Table 14. Clock Configurations for Local Bus Mode[1] (Continued)

Mode[2]	Bus Clock[3] (MHz)		CPM Multiplication Factor[4]	CPM Clock (MHz)		CPU Multiplication Factor[5]	CPU Clock (MHz)	
MODCK_H-MODCK[1-3]	low	high		low	high		low	high
0010_010	62.5	100.0	4	250.0	400.0	4	250.0	400.0
0010_011	50.0	100.0	4	200.0	400.0	5	250.0	500.0
0010_100	41.7	100.0	4	166.7	400.0	6	250.0	600.0
0010_101	35.7	100.0	4	142.9	400.0	7	250.0	700.0
0010_110	31.3	100.0	4	125.0	400.0	8	250.0	800.0
0010_111	Reserved							
0011_000	50.0	80.0	5	250.0	400.0	5	250.0	400.0
0011_001	41.7	80.0	5	208.3	400.0	6	250.0	480.0
0011_010	35.7	80.0	5	178.6	400.0	7	250.0	560.0
0011_011	31.3	80.0	5	156.3	400.0	8	250.0	640.0
0011_100	Reserved							
0011_101	Reserved							
0011_110	41.7	66.7	6	250.0	400.0	6	250.0	400.0
0011_111	35.7	66.7	6	214.3	400.0	7	250.0	466.7
0100_000	31.3	66.7	6	187.5	400.0	8	250.0	533.3
0101_101	62.5	167.0	2	125.0	334.0	2	125.0	334.0
0101_110	50.0	167.0	2	100.0	334.0	2.5	125.0	417.5
0101_111	50.0	167.0	2	100.0	334.0	3	150.0	501.0
0110_000	71.4	167.0	2	142.9	334.0	3.5	250.0	584.5
0110_001	62.5	167.0	2	125.0	334.0	4	250.0	668.0
0110_010	55.6	167.0	2	111.1	334.0	4.5	250.0	751.5
0110_011	Reserved							
0110_100	50.0	160.0	2.5	125.0	400.0	2.5	125.0	400.0
0110_101	41.7	160.0	2.5	104.2	400.0	3	125.0	480.0
0110_110	71.4	160.0	2.5	178.6	400.0	3.5	250.0	560.0
0110_111	62.5	160.0	2.5	156.3	400.0	4	250.0	640.0
0111_000	55.6	160.0	2.5	138.9	400.0	4.5	250.0	720.0
0111_001	Reserved							
0111_010	Reserved							

Table 14. Clock Configurations for Local Bus Mode[1] (Continued)

Mode[2]	Bus Clock[3] (MHz)		CPM Multiplication Factor[4]	CPM Clock (MHz)		CPU Multiplication Factor[5]	CPU Clock (MHz)	
MODCK_H-MODCK[1-3]	low	high		low	high		low	high
0111_011	41.7	133.3	3	125.0	400.0	3	125.0	400.0
0111_100	71.4	133.3	3	214.3	400.0	3.5	250.0	466.7
0111_101	62.5	133.3	3	187.5	400.0	4	250.0	533.3
0111_110	55.6	133.3	3	166.7	400.0	4.5	250.0	600.0
0111_111	Reserved							
1000_000	Reserved							
1000_001	Reserved							
1000_010	71.4	114.3	3.5	250.0	400.0	3.5	250.0	400.0
1000_011	62.5	114.3	3.5	218.8	400.0	4	250.0	457.1
1000_100	55.6	114.3	3.5	194.4	400.0	4.5	250.0	514.3
1000_101	50.0	114.3	3.5	175.0	400.0	5	250.0	571.4
1000_110	45.5	114.3	3.5	159.1	400.0	5.5	250.0	628.6
1100_000	Reserved							
1100_001	Reserved							
1100_010	Reserved							
1101_000	Reserved							

1 The “low” values are the minimum allowable frequencies for a given clock mode. The minimum bus frequency guarantees the required minimum CPU operating frequency. Minimum CPU frequency is determined by the clock mode. For modes with a CPU multiplication factor ≤ 3, the minimum CPU frequency is 125 MHz or 150 MHz, as shown in the table. For modes with a CPU multiplication factor ≥ 3.5, the minimum CPU frequency is 250 MHz. The “high” values are for the purpose of illustration only. Users must select a mode and input bus frequency so that the resulting configuration does not exceed the frequency rating of the user’s device.

2 MODCK_H = hard reset configuration word [28–31] (refer to Section 5.4 in the *MPC8260 User’s Manual*). MODCK[1-3] = three hardware configuration pins.

3 60x and local bus frequency. Identical to CLKIN.

4 CPM multiplication factor = CPM clock/bus clock

5 CPU multiplication factor = Core PLL multiplication factor

1.3.2 PCI Mode

The following tables show the possible clock configurations for the MPC8280 in both PCI host and PCI agent modes. In addition, note the following:

NOTE: PCI_MODCK

In PCI mode only, PCI_MODCK comes from the LGPL5 pin and MODCK_H[0–3] comes from {LGPL0, LGPL1, LGPL2, LGPL3}.

NOTE: Tval (Output Hold)

The minimum Tval = 2 when PCI_MODCK = 1, and the minimum Tval = 1 when PCI_MODCK = 0. Therefore, designers should use clock configurations that fit this condition to achieve PCI-compliant AC timing.

1.3.2.1 PCI Host Mode

Table 15 and Table 16 show configurations for PCI host mode. The frequencies listed are for the purpose of illustration only. Users must select a mode and input bus frequency so that the resulting configuration does not exceed the frequency rating of the user's device.

Table 15. Clock Configurations for PCI Host Mode (PCI_MODCK=0)[1,2]

Mode[3]	Bus Clock[4] (MHz)		CPM Multiplication Factor[5]	CPM Clock (MHz)		CPU Multiplication Factor[6]	CPU Clock (MHz)		PCI Division Factor	PCI Clock (MHz)	
MODCK_H-MODCK[1-3]	low	high		low	high		low	high		low	high
Default Modes (MODCK_H=0000)											
0000_000	50.0	66.7	2	100.0	133.3	2.5	125.0	166.7	2	50.0	66.7
0000_001	50.0	66.7	2	100.0	133.3	3	150.0	200.0	2	50.0	66.7
0000_010	60.0	80.0	2.5	150.0	200.0	3	180.0	240.0	3	50.0	66.7
0000_011	71.4	80.0	2.5	178.6	200.0	3.5	250.0	280.0	3	59.5	66.7
0000_100	62.5	80.0	2.5	156.3	200.0	4	250.0	320.0	3	52.1	66.7
0000_101	50.0	66.7	3	150.0	200.0	3	150.0	200.0	3	50.0	66.7
0000_110	PCI host mode (PCI_MODCK=1) only (refer to Table 16)										
0000_111	62.5	66.7	3	187.5	200.0	4	250.0	266.6	3	62.5	66.7
Full Configuration Modes											
0001_000	50.0	66.7	3	150.0	200.0	5	250.0	333.3	3	50.0	66.7
0001_001	50.0	66.7	3	150.0	200.0	6	300.0	400.0	3	50.0	66.7
0001_010	50.0	66.7	3	150.0	200.0	7	350.0	466.6	3	50.0	66.7
0001_011	50.0	66.7	3	150.0	200.0	8	400.0	533.3	3	50.0	66.7
0010_000	50.0	66.7	4	200.0	266.6	5	250.0	333.3	4	50.0	66.7
0010_001	50.0	66.7	4	200.0	266.6	6	300.0	400.0	4	50.0	66.7
0010_010	50.0	66.7	4	200.0	266.6	7	350.0	466.6	4	50.0	66.7
0010_011	50.0	66.7	4	200.0	266.6	8	400.0	533.3	4	50.0	66.7
0010_100	75.0	100.0	4	300.0	400.0	5	375.0	500.0	6	50.0	66.7
0010_101	75.0	100.0	4	300.0	400.0	5.5	412.5	549.9	6	50.0	66.7
0010_110	75.0	100.0	4	300.0	400.0	6	450.0	599.9	6	50.0	66.7

Table 15. Clock Configurations for PCI Host Mode (PCI_MODCK=0)[1,2] (Continued)

Mode[3]	Bus Clock[4] (MHz)		CPM Multiplication Factor[5]	CPM Clock (MHz)		CPU Multiplication Factor[6]	CPU Clock (MHz)		PCI Division Factor	PCI Clock (MHz)	
MODCK_H-MODCK[1-3]	low	high		low	high		low	high		low	high
0011_000	50.0	66.7	5	250.0	333.3	5	250.0	333.3	5	50.0	66.7
0011_001	50.0	66.7	5	250.0	333.3	6	300.0	400.0	5	50.0	66.7
0011_010	50.0	66.7	5	250.0	333.3	7	350.0	466.6	5	50.0	66.7
0011_011	50.0	66.7	5	250.0	333.3	8	400.0	533.3	5	50.0	66.7
0100_000	Reserved										
0100_001	50.0	66.7	6	300.0	400.0	6	300.0	400.0	6	50.0	66.7
0100_010	50.0	66.7	6	300.0	400.0	7	350.0	466.6	6	50.0	66.7
0100_011	50.0	66.7	6	300.0	400.0	8	400.0	533.3	6	50.0	66.7
0101_000	50.0	66.7	2	100.0	133.3	2.5	125.0	166.7	2	50.0	66.7
0101_001	50.0	66.7	2	100.0	133.3	3	150.0	200.0	2	50.0	66.7
0101_010	PCI host mode (PCI_MODCK=1) only (refer to Table 16)										
0101_011	62.5	66.7	2	125.0	133.3	4	250.0	266.6	2	62.5	66.7
0101_100	55.6	66.7	2	111.1	133.3	4.5	250.0	300.0	2	55.6	66.7
0110_000	60.0	80.0	2.5	150.0	200.0	2.5	150.0	200.0	3	50.0	66.7
0110_001	60.0	80.0	2.5	150.0	200.0	3	180.0	240.0	3	50.0	66.7
0110_010	71.4	80.0	2.5	178.6	200.0	3.5	250.0	280.0	3	59.5	66.7
0110_011	62.5	80.0	2.5	156.3	200.0	4	250.0	320.0	3	52.1	66.7
0110_100	60.0	80.0	2.5	150.0	200.0	4.5	270.0	360.0	3	50.0	66.7
0110_101	60.0	80.0	2.5	150.0	200.0	5	300.0	400.0	3	50.0	66.7
0110_110	60.0	80.0	2.5	150.0	200.0	6	360.0	480.0	3	50.0	66.7
0111_000	Reserved										
0111_001	50.0	66.7	3	150.0	200.0	3	150.0	200.0	3	50.0	66.7
0111_010	PCI host mode (PCI_MODCK=1) only (refer to Table 16)										
0111_011	62.5	66.7	3	187.5	200.0	4	250.0	266.6	3	62.5	66.7
0111_100	55.6	66.7	3	166.7	200.0	4.5	250.0	300.0	3	55.6	66.7
1000_000	Reserved										
1000_001	66.7	88.9	3	200.0	266.6	3	200.0	266.6	4	50.0	66.7
1000_010	71.4	88.9	3	214.3	266.6	3.5	250.0	311.1	4	53.6	66.7

Table 15. Clock Configurations for PCI Host Mode (PCI_MODCK=0)[1,2] (Continued)

Mode[3]	Bus Clock[4] (MHz)		CPM Multiplication Factor[5]	CPM Clock (MHz)		CPU Multiplication Factor[6]	CPU Clock (MHz)		PCI Division Factor	PCI Clock (MHz)	
MODCK_H-MODCK[1-3]	low	high		low	high		low	high		low	high
1000_011	66.7	88.9	3	200.0	266.6	4	266.7	355.5	4	50.0	66.7
1000_100	66.7	88.9	3	200.0	266.6	4.5	300.0	400.0	4	50.0	66.7
1000_101	66.7	88.9	3	200.0	266.6	6	400.0	533.3	4	50.0	66.7
1000_110	66.7	88.9	3	200.0	266.6	6.5	433.3	577.7	4	50.0	66.7
1001_000	57.1	76.2	3.5	200.0	266.6	2.5	142.9	190.5	4	50.0	66.7
1001_001	57.1	76.2	3.5	200.0	266.6	3	171.4	228.5	4	50.0	66.7
1001_010	71.4	76.2	3.5	250.0	266.6	3.5	250.0	266.6	4	62.5	66.7
1001_011	62.5	76.2	3.5	218.8	266.6	4	250.0	304.7	4	54.7	66.7
1001_100	57.1	76.2	3.5	200.0	266.6	4.5	257.1	342.8	4	50.0	66.7
1001_101	85.7	114.3	3.5	300.0	400.0	5	428.6	571.4	6	50.0	66.7
1001_110	85.7	114.3	3.5	300.0	400.0	5.5	471.4	628.5	6	50.0	66.7
1001_111	85.7	114.3	3.5	300.0	400.0	6	514.3	685.6	6	50.0	66.7
1010_000	75.0	100.0	2	150.0	200.0	2	150.0	200.0	3	50.0	66.7
1010_001	75.0	100.0	2	150.0	200.0	2.5	187.5	250.0	3	50.0	66.7
1010_010	75.0	100.0	2	150.0	200.0	3	225.0	300.0	3	50.0	66.7
1010_011	75.0	100.0	2	150.0	200.0	3.5	262.5	350.0	3	50.0	66.7
1010_100	75.0	100.0	2	150.0	200.0	4	300.0	400.0	3	50.0	66.7
1011_000	Reserved										
1011_001	80.0	106.7	2.5	200.0	266.6	2.5	200.0	266.6	4	50.0	66.7
1011_010	80.0	106.7	2.5	200.0	266.6	3	240.0	320.0	4	50.0	66.7
1011_011	80.0	106.7	2.5	200.0	266.6	3.5	280.0	373.3	4	50.0	66.7
1011_100	80.0	106.7	2.5	200.0	266.6	4	320.0	426.6	4	50.0	66.7
1011_101	80.0	106.7	2.5	200.0	266.6	4.5	360.0	480.0	4	50.0	66.7
1101_000	100.0	133.3	2.5	250.0	333.3	3	300.0	400.0	5	50.0	66.7
1101_001	100.0	133.3	2.5	250.0	333.3	3.5	350.0	466.6	5	50.0	66.7
1101_010	100.0	133.3	2.5	250.0	333.3	4	400.0	533.3	5	50.0	66.7
1101_011	100.0	133.3	2.5	250.0	333.3	4.5	450.0	599.9	5	50.0	66.7
1101_100	100.0	133.3	2.5	250.0	333.3	5	500.0	666.6	5	50.0	66.7

Table 15. Clock Configurations for PCI Host Mode (PCI_MODCK=0)[1,2] (Continued)

Mode[3]	Bus Clock[4] (MHz)		CPM Multiplication Factor[5]	CPM Clock (MHz)		CPU Multiplication Factor[6]	CPU Clock (MHz)		PCI Division Factor	PCI Clock (MHz)	
MODCK_H-MODCK[1-3]	low	high		low	high		low	high		low	high
1101_101	125.0	166.7	2	250.0	333.3	3	375.0	500.0	5	50.0	66.7
1101_110	125.0	166.7	2	250.0	333.3	4	500.0	666.6	5	50.0	66.7
1110_000	100.0	133.3	3	300.0	400.0	3.5	350.0	466.6	6	50.0	66.7
1110_001	100.0	133.3	3	300.0	400.0	4	400.0	533.3	6	50.0	66.7
1110_010	100.0	133.3	3	300.0	400.0	4.5	450.0	599.9	6	50.0	66.7
1110_011	100.0	133.3	3	300.0	400.0	5	500.0	666.6	6	50.0	66.7
1110_100	100.0	133.3	3	300.0	400.0	5.5	550.0	733.3	6	50.0	66.7
1100_000	Reserved										
1100_001	Reserved										
1100_010	Reserved										

1 The “low” values are the minimum allowable frequencies for a given clock mode. The minimum bus frequency guarantees the required minimum CPU operating frequency. Minimum CPU frequency is determined by the clock mode. For modes with a CPU multiplication factor ≤ 3, the minimum CPU frequency is 125 MHz or 150 MHz, as shown in the table. For modes with a CPU multiplication factor ≥ 3.5, the minimum CPU frequency is 250 MHz. The “high” values are for the purpose of illustration only. Users must select a mode and input bus frequency so that the resulting configuration does not exceed the frequency rating of the user’s device.

2 As shown in Table 13, PCI_MODCK determines the PCI clock frequency range. Refer to Table 16 for lower range configurations.

3 MODCK_H = hard reset configuration word [28–31] (refer to Section 5.4 in the *MPC8260 User’s Manual*). MODCK[1-3] = three hardware configuration pins.

4 60x and local bus frequency. Identical to CLKIN.

5 CPM multiplication factor = CPM clock/bus clock

6 CPU multiplication factor = Core PLL multiplication factor

Table 16. Clock Configurations for PCI Host Mode (PCI_MODCK=1)[1,2]

Mode[3]	Bus Clock[4] (MHz)		CPM Multiplication Factor[5]	CPM Clock (MHz)		CPU Multiplication Factor[6]	CPU Clock (MHz)		PCI Division Factor	PCI Clock (MHz)	
MODCK_H-MODCK[1-3]	low	high		low	high		low	high		low	high
Default Modes (MODCK_H=0000)											
0000_000	50.0	100.0	2	100.0	200.0	2.5	125.0	250.0	4	25.0	50.0
0000_001	50.0	100.0	2	100.0	200.0	3	150.0	300.0	4	25.0	50.0
0000_010	60.0	120.0	2.5	150.0	300.0	3	180.0	360.0	6	25.0	50.0
0000_011	71.4	120.0	2.5	178.6	300.0	3.5	250.0	420.0	6	29.8	50.0
0000_100	62.5	120.0	2.5	156.3	300.0	4	250.0	480.0	6	26.0	50.0

Table 16. Clock Configurations for PCI Host Mode (PCI_MODCK=1)[1,2] (Continued)

Mode[3]	Bus Clock[4] (MHz)		CPM Multiplication Factor[5]	CPM Clock (MHz)		CPU Multiplication Factor[6]	CPU Clock (MHz)		PCI Division Factor	PCI Clock (MHz)	
MODCK_H-MODCK[1-3]	low	high		low	high		low	high		low	high
0000_101	50.0	100.0	3	150.0	300.0	3	150.0	300.0	6	25.0	50.0
0000_110	71.4	100.0	3	214.3	300.0	3.5	250.0	350.0	6	35.7	50.0
0000_111	62.5	100.0	3	187.5	300.0	4	250.0	400.0	6	31.3	50.0
Full Configuration Modes											
0001_000	50.0	100.0	3	150.0	300.0	5	250.0	500.0	6	25.0	50.0
0001_001	50.0	100.0	3	150.0	300.0	6	300.0	600.0	6	25.0	50.0
0001_010	50.0	100.0	3	150.0	300.0	7	350.0	700.0	6	25.0	50.0
0001_011	50.0	100.0	3	150.0	300.0	8	400.0	800.0	6	25.0	50.0
0010_000	50.0	100.0	4	200.0	400.0	5	250.0	500.0	8	25.0	50.0
0010_001	50.0	100.0	4	200.0	400.0	6	300.0	600.0	8	25.0	50.0
0010_010	50.0	100.0	4	200.0	400.0	7	350.0	700.0	8	25.0	50.0
0010_011	50.0	100.0	4	200.0	400.0	8	400.0	800.0	8	25.0	50.0
0010_100	50.0	75.0	4	200.0	300.0	5	250.0	375.0	6	33.3	50.0
0010_101	45.5	75.0	4	181.8	300.0	5.5	250.0	412.5	6	30.3	50.0
0010_110	41.7	75.0	4	166.7	300.0	6	250.0	450.0	6	27.8	50.0
0011_000	50.0	50.0	5	250.0	250.0	5	250.0	250.0	5	50.0	50.0
0011_001	41.7	50.0	5	208.3	250.0	6	250.0	300.0	5	41.7	50.0
0011_010	35.7	50.0	5	178.6	250.0	7	250.0	350.0	5	35.7	50.0
0011_011	31.3	50.0	5	156.3	250.0	8	250.0	400.0	5	31.3	50.0
0100_000	Reserved										
0100_001	41.7	50.0	6	250.0	300.0	6	250.0	300.0	6	41.7	50.0
0100_010	35.7	50.0	6	214.3	300.0	7	250.0	350.0	6	35.7	50.0
0100_011	31.3	50.0	6	187.5	300.0	8	250.0	400.0	6	31.3	50.0
0101_000	50.0	100.0	2	100.0	200.0	2.5	125.0	250.0	4	25.0	50.0
0101_001	50.0	100.0	2	100.0	200.0	3	150.0	300.0	4	25.0	50.0
0101_010	71.4	100.0	2	142.9	200.0	3.5	250.0	350.0	4	35.7	50.0
0101_011	62.5	100.0	2	125.0	200.0	4	250.0	400.0	4	31.3	50.0
0101_100	55.6	100.0	2	111.1	200.0	4.5	250.0	450.0	4	27.8	50.0

Table 16. Clock Configurations for PCI Host Mode (PCI_MODCK=1)[1,2] (Continued)

Mode[3]	Bus Clock[4] (MHz)		CPM Multiplication Factor[5]	CPM Clock (MHz)		CPU Multiplication Factor[6]	CPU Clock (MHz)		PCI Division Factor	PCI Clock (MHz)	
MODCK_H-MODCK[1-3]	low	high		low	high		low	high		low	high
0110_000	60.0	120.0	2.5	150.0	300.0	2.5	150.0	300.0	6	25.0	50.0
0110_001	60.0	120.0	2.5	150.0	300.0	3	180.0	360.0	6	25.0	50.0
0110_010	71.4	120.0	2.5	178.6	300.0	3.5	250.0	420.0	6	29.8	50.0
0110_011	62.5	120.0	2.5	156.3	300.0	4	250.0	480.0	6	26.0	50.0
0110_100	60.0	120.0	2.5	150.0	300.0	4.5	270.0	540.0	6	25.0	50.0
0110_101	60.0	120.0	2.5	150.0	300.0	5	300.0	600.0	6	25.0	50.0
0110_110	60.0	120.0	2.5	150.0	300.0	6	360.0	720.0	6	25.0	50.0
0111_000	Reserved										
0111_001	50.0	100.0	3	150.0	300.0	3	150.0	300.0	6	25.0	50.0
0111_010	71.4	100.0	3	214.3	300.0	3.5	250.0	350.0	6	35.7	50.0
0111_011	62.5	100.0	3	187.5	300.0	4	250.0	400.0	6	31.3	50.0
0111_100	55.6	100.0	3	166.7	300.0	4.5	250.0	450.0	6	27.8	50.0
1000_000	Reserved										
1000_001	66.7	133.3	3	200.0	400.0	3	200.0	400.0	8	25.0	50.0
1000_010	71.4	133.3	3	214.3	400.0	3.5	250.0	466.7	8	26.8	50.0
1000_011	66.7	133.3	3	200.0	400.0	4	266.7	533.3	8	25.0	50.0
1000_100	66.7	133.3	3	200.0	400.0	4.5	300.0	600.0	8	25.0	50.0
1000_101	66.7	133.3	3	200.0	400.0	6	400.0	800.0	8	25.0	50.0
1000_110	66.7	133.3	3	200.0	400.0	6.5	433.3	866.7	8	25.0	50.0
1001_000	Reserved										
1001_001	Reserved										
1001_010	71.4	114.3	3.5	250.0	400.0	3.5	250.0	400.0	8	31.3	50.0
1001_011	62.5	114.3	3.5	218.8	400.0	4	250.0	457.1	8	27.3	50.0
1001_100	57.1	114.3	3.5	200.0	400.0	4.5	257.1	514.3	8	25.0	50.0
1001_101	50.0	85.7	3.5	175.0	300.0	5	250.0	428.6	6	29.2	50.0
1001_110	45.5	85.7	3.5	159.1	300.0	5.5	250.0	471.4	6	26.5	50.0
1001_111	42.9	85.7	3.5	150.0	300.0	6	257.1	514.3	6	25.0	50.0

Table 16. Clock Configurations for PCI Host Mode (PCI_MODCK=1)[1,2] (Continued)

Mode[3]	Bus Clock[4] (MHz)		CPM Multiplication Factor[5]	CPM Clock (MHz)		CPU Multiplication Factor[6]	CPU Clock (MHz)		PCI Division Factor	PCI Clock (MHz)	
MODCK_H-MODCK[1-3]	low	high		low	high		low	high		low	high
1010_000	75.0	150.0	2	150.0	300.0	2	150.0	300.0	6	25.0	50.0
1010_001	75.0	150.0	2	150.0	300.0	2.5	187.5	375.0	6	25.0	50.0
1010_010	75.0	150.0	2	150.0	300.0	3	225.0	450.0	6	25.0	50.0
1010_011	75.0	150.0	2	150.0	300.0	3.5	262.5	525.0	6	25.0	50.0
1010_100	75.0	150.0	2	150.0	300.0	4	300.0	600.0	6	25.0	50.0
1011_000	Reserved										
1011_001	80.0	160.0	2.5	200.0	400.0	2.5	200.0	400.0	8	25.0	50.0
1011_010	80.0	160.0	2.5	200.0	400.0	3	240.0	480.0	8	25.0	50.0
1011_011	80.0	160.0	2.5	200.0	400.0	3.5	280.0	560.0	8	25.0	50.0
1011_100	80.0	160.0	2.5	200.0	400.0	4	320.0	640.0	8	25.0	50.0
1011_101	80.0	160.0	2.5	200.0	400.0	4.5	360.0	720.0	8	25.0	50.0
1101_000	50.0	100.0	2.5	125.0	250.0	3	150.0	300.0	5	25.0	50.0
1101_001	71.4	100.0	2.5	178.6	250.0	3.5	250.0	350.0	5	35.7	50.0
1101_010	62.5	100.0	2.5	156.3	250.0	4	250.0	400.0	5	31.3	50.0
1101_011	55.6	100.0	2.5	138.9	250.0	4.5	250.0	450.0	5	27.8	50.0
1101_100	50.0	100.0	2.5	125.0	250.0	5	250.0	500.0	5	25.0	50.0
1101_101	62.5	125.0	2	125.0	250.0	3	187.5	375.0	5	25.0	50.0
1101_110	62.5	125.0	2	125.0	250.0	4	250.0	500.0	5	25.0	50.0
1110_000	71.4	100.0	3	214.3	300.0	3.5	250.0	350.0	6	35.7	50.0
1110_001	62.5	100.0	3	187.5	300.0	4	250.0	400.0	6	31.3	50.0
1110_010	55.6	100.0	3	166.7	300.0	4.5	250.0	450.0	6	27.8	50.0
1110_011	50.0	100.0	3	150.0	300.0	5	250.0	500.0	6	25.0	50.0
1110_100	50.0	100.0	3	150.0	300.0	5.5	275.0	550.0	6	25.0	50.0
1100_000	Reserved										
1100_001	Reserved										
1100_010	Reserved										

[1] The “low” values are the minimum allowable frequencies for a given clock mode. The minimum bus frequency guarantees the required minimum CPU operating frequency. Minimum CPU frequency is determined by the clock mode. For modes with a CPU multiplication factor ≤ 3, the minimum CPU frequency is 125 MHz or 150 MHz, as shown in the table. For modes with a CPU multiplication factor ≥ 3.5, the minimum CPU frequency is 250 MHz. The “high” values are for the purpose of illustration only. Users must select a mode and input bus frequency so that the resulting configuration does not exceed the frequency rating of the user’s device.

[2] As shown in Table 13, PCI_MODCK determines the PCI clock frequency range. Refer to Table 15 for higher range configurations.

[3] MODCK_H = hard reset configuration word [28–31] (refer to Section 5.4 in the *MPC8260 User’s Manual*). MODCK[1-3] = three hardware configuration pins.

[4] 60x and local bus frequency. Identical to CLKIN.

[5] CPM multiplication factor = CPM clock/bus clock

[6] CPU multiplication factor = Core PLL multiplication factor

1.3.2.2 PCI Agent Mode

Table 17 and Table 18 show configurations for PCI agent mode. The frequencies listed are for the purpose of illustration only. Users must select a mode and input bus frequency so that the resulting configuration does not exceed the frequency rating of the user’s device.

Table 17. Clock Configurations for PCI Agent Mode (PCI_MODCK=0)[1,2]

Mode[3]	PCI Clock (MHz)		CPM Multiplication Factor[4]	CPM Clock (MHz)		CPU Multiplication Factor[5]	CPU Clock (MHz)		Bus Division Factor	Bus Clock (MHz)	
MODCK_H-MODCK[1-3]	low	high		low	high		low	high		low	high
Default Modes (MODCK_H=0000											
0000_000	50.0	66.7	2	100.0	133.3	2.5	125.0	166.7	2	50.0	66.7
0000_001	50.0	66.7	2	100.0	133.3	3	150.0	200.0	2	50.0	66.7
0000_010	50.0	66.7	3	150.0	200.0	3	150.0	200.0	3	50.0	66.7
0000_011	62.5	66.7	3	187.5	200.0	4	250.0	266.6	3	62.5	66.7
0000_100	50.0	66.7	3	150.0	200.0	3	180.0	240.0	2.5	60.0	80.0
0000_101	59.5	66.7	3	178.6	200.0	3.5	250.0	280.0	2.5	71.4	80.0
0000_110	53.6	66.7	4	214.3	266.6	3.5	250.0	311.1	3	71.4	88.9
0000_111	50.0	66.7	4	200.0	266.6	3	240.0	320.0	2.5	80.0	106.7
Full Configuration Modes											
0001_001	Reserved										
0001_010	Reserved										
0001_011	Reserved										
0001_100	62.5	66.7	2	125.0	133.3	8	250.0	266.6	4	31.3	33.3
0010_001	50.0	66.7	3	150.0	200.0	3	180.0	240.0	2.5	60.0	80.0
0010_010	59.5	66.7	3	178.6	200.0	3.5	250.0	280.0	2.5	71.4	80.0
0010_011	52.1	66.7	3	156.3	200.0	4	250.0	320.0	2.5	62.5	80.0
0010_100	50.0	66.7	3	150.0	200.0	4.5	270.0	360.0	2.5	60.0	80.0

Table 17. Clock Configurations for PCI Agent Mode (PCI_MODCK=0)[1,2] (Continued)

Mode[3]	PCI Clock (MHz)		CPM Multiplication Factor[4]	CPM Clock (MHz)		CPU Multiplication Factor[5]	CPU Clock (MHz)		Bus Division Factor	Bus Clock (MHz)	
MODCK_H-MODCK[1-3]	low	high		low	high		low	high		low	high
0011_000	Reserved										
0011_001	Reserved										
0011_010	Reserved										
0011_011	Reserved										
0011_100	Reserved										
0100_000	Reserved										
0100_001	50.0	66.7	3	150.0	200.0	3	150.0	200.0	3	50.0	66.7
0100_010	Reserved										
0100_011	62.5	66.7	3	187.5	200.0	4	250.0	266.6	3	62.5	66.7
0100_100	55.6	66.7	3	166.7	200.0	4.5	250.0	300.0	3	55.6	66.7
0101_000	50.0	66.7	5	250.0	333.3	2.5	250.0	333.3	2.5	100.0	133.3
0101_001	50.0	66.7	5	250.0	333.3	3	300.0	400.0	2.5	100.0	133.3
0101_010	50.0	66.7	5	250.0	333.3	3.5	350.0	466.6	2.5	100.0	133.3
0101_011	50.0	66.7	5	250.0	333.3	4	400.0	533.3	2.5	100.0	133.3
0101_100	50.0	66.7	5	250.0	333.3	4.5	450.0	599.9	2.5	100.0	133.3
0101_101	50.0	66.7	5	250.0	333.3	5	500.0	666.6	2.5	100.0	133.3
0101_110	50.0	66.7	5	250.0	333.3	5.5	550.0	733.3	2.5	100.0	133.3
0110_000	Reserved										
0110_001	50.0	66.7	4	200.0	266.6	3	200.0	266.6	3	66.7	88.9
0110_010	53.6	66.7	4	214.3	266.6	3.5	250.0	311.1	3	71.4	88.9
0110_011	50.0	66.7	4	200.0	266.6	4	266.7	355.5	3	66.7	88.9
0110_100	50.0	66.7	4	200.0	266.6	4.5	300.0	400.0	3	66.7	88.9
0111_000	50.0	66.7	3	150.0	200.0	2	150.0	200.0	2	75.0	100.0
0111_001	50.0	66.7	3	150.0	200.0	2.5	187.5	250.0	2	75.0	100.0
0111_010	50.0	66.7	3	150.0	200.0	3	225.0	300.0	2	75.0	100.0
0111_011	50.0	66.7	3	150.0	200.0	3.5	262.5	350.0	2	75.0	100.0
1000_000	Reserved										

Table 17. Clock Configurations for PCI Agent Mode (PCI_MODCK=0)[1,2] (Continued)

Mode[3]	PCI Clock (MHz)		CPM Multiplication Factor[4]	CPM Clock (MHz)		CPU Multiplication Factor[5]	CPU Clock (MHz)		Bus Division Factor	Bus Clock (MHz)	
MODCK_H-MODCK[1-3]	low	high		low	high		low	high		low	high
1000_001	50.0	66.7	3	150.0	200.0	2.5	150.0	200.0	2.5	60.0	80.0
1000_010	50.0	66.7	3	150.0	200.0	3	180.0	240.0	2.5	60.0	80.0
1000_011	59.5	66.7	3	178.6	200.0	3.5	250.0	280.0	2.5	71.4	80.0
1000_100	52.1	66.7	3	156.3	200.0	4	250.0	320.0	2.5	62.5	80.0
1000_101	50.0	66.7	3	150.0	200.0	4.5	270.0	360.0	2.5	60.0	80.0
1001_000	Reserved										
1001_001	Reserved										
1001_010	Reserved										
1001_011	62.5	66.7	4	250.0	266.6	4	250.0	266.6	4	62.5	66.7
1001_100	55.6	66.7	4	222.2	266.6	4.5	250.0	300.0	4	55.6	66.7
1010_000	Reserved										
1010_001	50.0	66.7	4	200.0	266.6	3	200.0	266.6	3	66.7	88.9
1010_010	53.6	66.7	4	214.3	266.6	3.5	250.0	311.1	3	71.4	88.9
1010_011	50.0	66.7	4	200.0	266.6	4	266.7	355.5	3	66.7	88.9
1010_100	50.0	66.7	4	200.0	266.6	4.5	300.0	400.0	3	66.7	88.9
1011_000	Reserved										
1011_001	50.0	66.7	4	200.0	266.6	2.5	200.0	266.6	2.5	80.0	106.7
1011_010	50.0	66.7	4	200.0	266.6	3	240.0	320.0	2.5	80.0	106.7
1011_011	50.0	66.7	4	200.0	266.6	3.5	280.0	373.3	2.5	80.0	106.7
1011_100	50.0	66.7	4	200.0	266.6	4	320.0	426.6	2.5	80.0	106.7
1100_101	50.0	66.7	6	300.0	400.0	4	400.0	533.3	3	100.0	133.3
1100_110	50.0	66.7	6	300.0	400.0	4.5	450.0	599.9	3	100.0	133.3
1100_111	50.0	66.7	6	300.0	400.0	5	500.0	666.6	3	100.0	133.3
1101_000	50.0	66.7	6	300.0	400.0	5.5	550.0	733.3	3	100.0	133.3
1101_001	50.0	66.7	6	300.0	400.0	3.5	420.0	559.9	2.5	120.0	160.0
1101_010	50.0	66.7	6	300.0	400.0	4	480.0	639.9	2.5	120.0	160.0
1101_011	50.0	66.7	6	300.0	400.0	4.5	540.0	719.9	2.5	120.0	160.0
1101_100	50.0	66.7	6	300.0	400.0	5	600.0	799.9	2.5	120.0	160.0

Table 17. Clock Configurations for PCI Agent Mode (PCI_MODCK=0)[1,2] (Continued)

Mode[3]	PCI Clock (MHz)		CPM Multiplication Factor[4]	CPM Clock (MHz)		CPU Multiplication Factor[5]	CPU Clock (MHz)		Bus Division Factor	Bus Clock (MHz)	
MODCK_H-MODCK[1-3]	low	high		low	high		low	high		low	high
1110_000	50.0	66.7	5	250.0	333.3	2.5	312.5	416.6	2	125.0	166.7
1110_001	50.0	66.7	5	250.0	333.3	3	375.0	500.0	2	125.0	166.7
1110_010	50.0	66.7	5	250.0	333.3	3.5	437.5	583.3	2	125.0	166.7
1110_011	50.0	66.7	5	250.0	333.3	4	500.0	666.6	2	125.0	166.7
1110_100	50.0	66.7	5	250.0	333.3	4	333.3	444.4	3	83.3	111.1
1110_101	50.0	66.7	5	250.0	333.3	4.5	375.0	500.0	3	83.3	111.1
1110_110	50.0	66.7	5	250.0	333.3	5	416.7	555.5	3	83.3	111.1
1110_111	50.0	66.7	5	250.0	333.3	5.5	458.3	611.1	3	83.3	111.1
1100_000	Reserved										
1100_001	Reserved										
1100_010	Reserved										

1 The “low” values are the minimum allowable frequencies for a given clock mode. The minimum bus frequency guarantees the required minimum CPU operating frequency. Minimum CPU frequency is determined by the clock mode. For modes with a CPU multiplication factor ≤ 3, the minimum CPU frequency is 125 MHz or 150 MHz, as shown in the table. For modes with a CPU multiplication factor ≥ 3.5, the minimum CPU frequency is 250 MHz. The “high” values are for the purpose of illustration only. Users must select a mode and input bus frequency so that the resulting configuration does not exceed the frequency rating of the user’s device.

2 As shown in Table 13, PCI_MODCK determines the PCI clock frequency range. Refer to Table 18 for lower range configurations.

3 MODCK_H = hard reset configuration word [28–31] (refer to Section 5.4 in the *MPC8260 User’s Manual*). MODCK[1-3] = three hardware configuration pins.

4 CPM multiplication factor = CPM clock/bus clock

5 CPU multiplication factor = Core PLL multiplication factor

Table 18. Clock Configurations for PCI Agent Mode (PCI_MODCK=1)[1,2]

Mode[3]	PCI Clock (MHz)		CPM Multiplication Factor[4]	CPM Clock (MHz)		CPU Multiplication Factor[5]	CPU Clock (MHz)		Bus Division Factor	Bus Clock (MHz)	
MODCK_H-MODCK[1-3]	low	high		low	high		low	high		low	high
Default Modes (MODCK_H=0000)											
0000_000	25.0	50.0	4	100.0	200.0	2.5	125.0	250.0	2	50.0	100.0
0000_001	25.0	50.0	4	100.0	200.0	3	150.0	300.0	2	50.0	100.0
0000_010	25.0	50.0	6	150.0	300.0	3	150.0	300.0	3	50.0	100.0
0000_011	31.3	50.0	6	187.5	300.0	4	250.0	400.0	3	62.5	100.0

Table 18. Clock Configurations for PCI Agent Mode (PCI_MODCK=1)[1,2] (Continued)

Mode[3]	PCI Clock (MHz)		CPM Multiplication Factor[4]	CPM Clock (MHz)		CPU Multiplication Factor[5]	CPU Clock (MHz)		Bus Division Factor	Bus Clock (MHz)	
MODCK_H-MODCK[1-3]	low	high		low	high		low	high		low	high
0000_100	25.0	50.0	6	150.0	300.0	3	180.0	360.0	2.5	60.0	120.0
0000_101	29.8	50.0	6	178.6	300.0	3.5	250.0	420.0	2.5	71.4	120.0
0000_110	26.8	50.0	8	214.3	400.0	3.5	250.0	466.7	3	71.4	133.3
0000_111	25.0	50.0	8	200.0	400.0	3	240.0	480.0	2.5	80.0	160.0
Full Configuration Modes											
0001_001	50.0	50.0	4	200.0	200.0	5	250.0	250.0	4	50.0	50.0
0001_010	41.7	50.0	4	166.7	200.0	6	250.0	300.0	4	41.7	50.0
0001_011	35.7	50.0	4	142.9	200.0	7	250.0	350.0	4	35.7	50.0
0001_100	31.3	50.0	4	125.0	200.0	8	250.0	400.0	4	31.3	50.0
0010_001	25.0	50.0	6	150.0	300.0	3	180.0	360.0	2.5	60.0	120.0
0010_010	29.8	50.0	6	178.6	300.0	3.5	250.0	420.0	2.5	71.4	120.0
0010_011	26.0	50.0	6	156.3	300.0	4	250.0	480.0	2.5	62.5	120.0
0010_100	25.0	50.0	6	150.0	300.0	4.5	270.0	540.0	2.5	60.0	120.0
0011_000	Reserved										
0011_001	31.3	50.0	4	125.0	200.0	2.5	104.3	166.7	3	41.7	66.7
0011_010	Reserved										
0011_011	46.9	50.0	4	187.5	200.0	4	250.0	266.7	3	62.5	66.7
0011_100	41.7	50.0	4	166.7	200.0	4.5	250.0	300.0	3	55.6	66.7
0100_000	Reserved										
0100_001	25.0	50.0	6	150.0	300.0	3	150.0	300.0	3	50.0	100.0
0100_010	35.7	50.0	6	214.3	300.0	3.5	250.0	350.0	3	71.4	100.0
0100_011	31.3	50.0	6	187.5	300.0	4	250.0	400.0	3	62.5	100.0
0100_100	27.8	50.0	6	166.7	300.0	4.5	250.0	450.0	3	55.6	100.0
0101_000	25.0	50.0	5	125.0	250.0	2.5	125.0	250.0	2.5	50.0	100.0
0101_001	25.0	50.0	5	125.0	250.0	3	150.0	300.0	2.5	50.0	100.0
0101_010	35.7	50.0	5	178.6	250.0	3.5	250.0	350.0	2.5	71.4	100.0
0101_011	31.3	50.0	5	156.3	250.0	4	250.0	400.0	2.5	62.5	100.0
0101_100	27.8	50.0	5	138.9	250.0	4.5	250.0	450.0	2.5	55.6	100.0
0101_101	25.0	50.0	5	125.0	250.0	5	250.0	500.0	2.5	50.0	100.0

Table 18. Clock Configurations for PCI Agent Mode (PCI_MODCK=1)[1,2] (Continued)

Mode[3]	PCI Clock (MHz)		CPM Multiplication Factor[4]	CPM Clock (MHz)		CPU Multiplication Factor[5]	CPU Clock (MHz)		Bus Division Factor	Bus Clock (MHz)	
MODCK_H-MODCK[1-3]	low	high		low	high		low	high		low	high
0101_110	25.0	50.0	5	125.0	250.0	5.5	275.0	550.0	2.5	50.0	100.0
0110_000	Reserved										
0110_001	25.0	50.0	8	200.0	400.0	3	200.0	400.0	3	66.7	133.3
0110_010	26.8	50.0	8	214.3	400.0	3.5	250.0	466.7	3	71.4	133.3
0110_011	25.0	50.0	8	200.0	400.0	4	266.7	533.3	3	66.7	133.3
0110_100	25.0	50.0	8	200.0	400.0	4.5	300.0	600.0	3	66.7	133.3
0111_000	25.0	50.0	6	150.0	300.0	2	150.0	300.0	2	75.0	150.0
0111_001	25.0	50.0	6	150.0	300.0	2.5	187.5	375.0	2	75.0	150.0
0111_010	25.0	50.0	6	150.0	300.0	3	225.0	450.0	2	75.0	150.0
0111_011	25.0	50.0	6	150.0	300.0	3.5	262.5	525.0	2	75.0	150.0
1000_000	Reserved										
1000_001	25.0	50.0	6	150.0	300.0	2.5	150.0	300.0	2.5	60.0	120.0
1000_010	25.0	50.0	6	150.0	300.0	3	180.0	360.0	2.5	60.0	120.0
1000_011	29.8	50.0	6	178.6	300.0	3.5	250.0	420.0	2.5	71.4	120.0
1000_100	26.0	50.0	6	156.3	300.0	4	250.0	480.0	2.5	62.5	120.0
1000_101	25.0	50.0	6	150.0	300.0	4.5	270.0	540.0	2.5	60.0	120.0
1001_000	Reserved										
1001_001	Reserved										
1001_010	Reserved										
1001_011	31.3	50.0	8	250.0	400.0	4	250.0	400.0	4	62.5	100.0
1001_100	27.8	50.0	8	222.2	400.0	4.5	250.0	450.0	4	55.6	100.0
1010_000	Reserved										
1010_001	25.0	50.0	8	200.0	400.0	3	200.0	400.0	3	66.7	133.3
1010_010	26.8	50.0	8	214.3	400.0	3.5	250.0	466.7	3	71.4	133.3
1010_011	25.0	50.0	8	200.0	400.0	4	266.7	533.3	3	66.7	133.3
1010_100	25.0	50.0	8	200.0	400.0	4.5	300.0	600.0	3	66.7	133.3
1011_000	Reserved										

Table 18. Clock Configurations for PCI Agent Mode (PCI_MODCK=1)[1,2] (Continued)

Mode[3]	PCI Clock (MHz)		CPM Multiplication Factor[4]	CPM Clock (MHz)		CPU Multiplication Factor[5]	CPU Clock (MHz)		Bus Division Factor	Bus Clock (MHz)	
MODCK_H-MODCK[1-3]	low	high		low	high		low	high		low	high
1011_001	25.0	50.0	8	200.0	400.0	2.5	200.0	400.0	2.5	80.0	160.0
1011_010	25.0	50.0	8	200.0	400.0	3	240.0	480.0	2.5	80.0	160.0
1011_011	25.0	50.0	8	200.0	400.0	3.5	280.0	560.0	2.5	80.0	160.0
1011_100	25.0	50.0	8	200.0	400.0	4	320.0	640.0	2.5	80.0	160.0
1100_101	31.3	50.0	6	187.5	300.0	4	250.0	400.0	3	62.5	100.0
1100_110	27.8	50.0	6	166.7	300.0	4.5	250.0	450.0	3	55.6	100.0
1100_111	25.0	50.0	6	150.0	300.0	5	250.0	500.0	3	50.0	100.0
1101_000	25.0	50.0	6	150.0	300.0	5.5	275.0	550.0	3	50.0	100.0
1101_001	29.8	50.0	6	178.6	300.0	3.5	250.0	420.0	2.5	71.4	120.0
1101_010	26.0	50.0	6	156.3	300.0	4	250.0	480.0	2.5	62.5	120.0
1101_011	25.0	50.0	6	150.0	300.0	4.5	270.0	540.0	2.5	60.0	120.0
1101_100	25.0	50.0	6	150.0	300.0	5	300.0	600.0	2.5	60.0	120.0
1110_000	25.0	50.0	5	125.0	250.0	2.5	156.3	312.5	2	62.5	125.0
1110_001	25.0	50.0	5	125.0	250.0	3	187.5	375.0	2	62.5	125.0
1110_010	28.6	50.0	5	142.9	250.0	3.5	250.0	437.5	2	71.4	125.0
1110_011	25.0	50.0	5	125.0	250.0	4	250.0	500.0	2	62.5	125.0
1110_100	37.5	50.0	5	187.5	250.0	4	250.0	333.3	3	62.5	83.3
1110_101	33.3	50.0	5	166.7	250.0	4.5	250.0	375.0	3	55.6	83.3
1110_110	30.0	50.0	5	150.0	250.0	5	250.0	416.7	3	50.0	83.3
1110_111	27.3	50.0	5	136.4	250.0	5.5	250.0	458.3	3	45.5	83.3
1100_000	Reserved										
1100_001	Reserved										
1100_010	Reserved										

1 The “low” values are the minimum allowable frequencies for a given clock mode. The minimum bus frequency guarantees the required minimum CPU operating frequency. Minimum CPU frequency is determined by the clock mode. For modes with a CPU multiplication factor ≤ 3, the minimum CPU frequency is 125 MHz or 150 MHz, as shown in the table. For modes with a CPU multiplication factor ≥ 3.5, the minimum CPU frequency is 250 MHz. The “high” values are for the purpose of illustration only. Users must select a mode and input bus frequency so that the resulting configuration does not exceed the frequency rating of the user’s device.

2 As shown in Table 13, PCI_MODCK determines the PCI clock range. Refer to Table 17 for higher range configurations.

[3] MODCK_H = hard reset configuration word [28–31] (refer to Section 5.4 in the *MPC8260 User's Manual*).
MODCK[1-3] = three hardware configuration pins.
[4] CPM multiplication factor = CPM clock/bus clock
[5] CPU multiplication factor = Core PLL multiplication factor

1.4 Pinout

This section provides the pin assignments and pinout lists for both HiP7 PowerQUICC II packages.

1.4.1 ZU Package—MPC8280 and MPC8270

The following figures and table represent the standard 480 TBGA package. For information on the alternate package, refer to Section 1.4.2, "VR Package—MPC8275VR and MPC8270VR" on page 52.

1.4.1.1 ZU Pin Assignments

Figure 13 shows the pinout of the ZU package as viewed from the top surface.

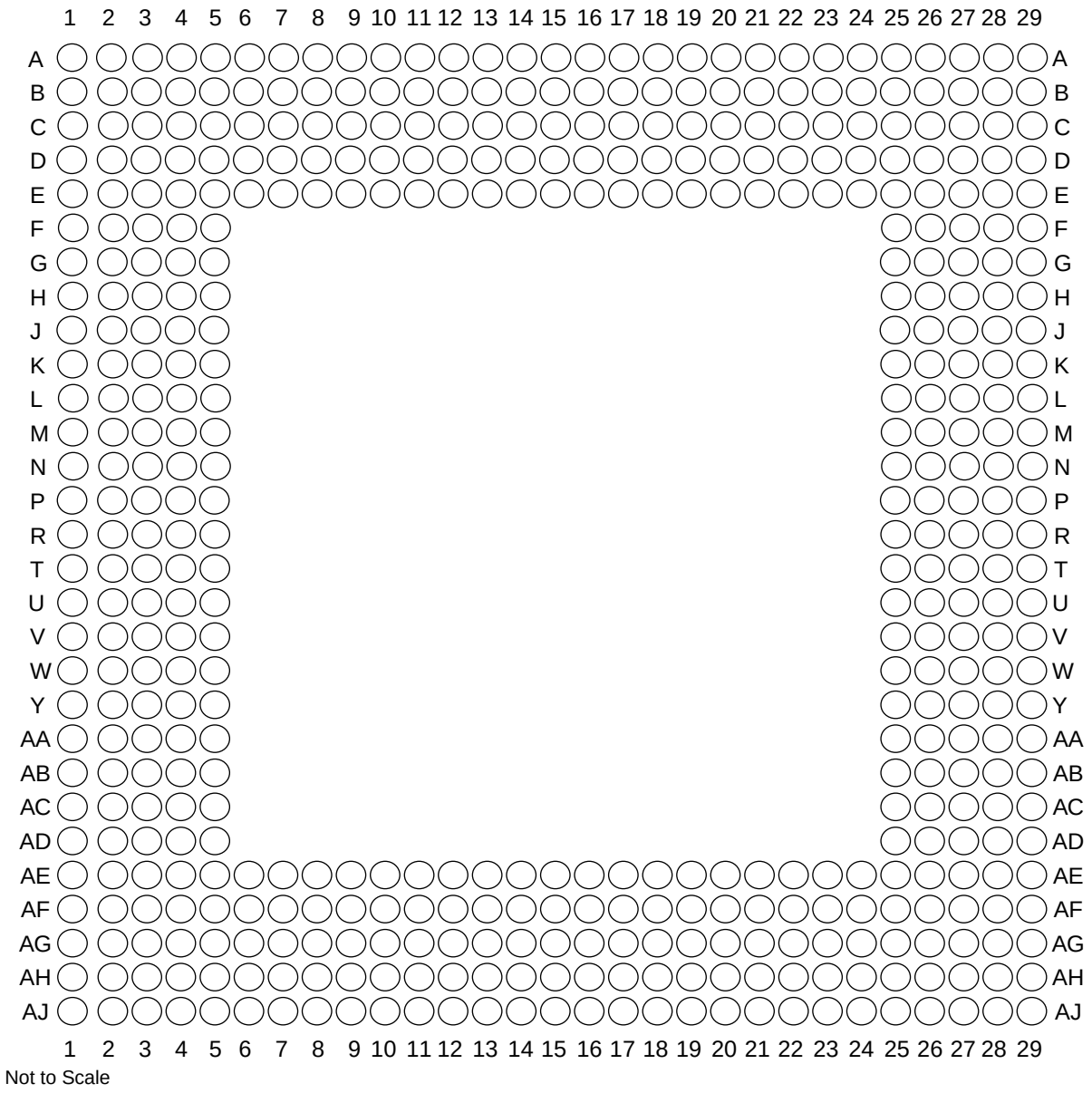


Figure 13. Pinout of the 480 TBGA Package (View from Top)

Figure 14 shows the side profile of the TBGA package to indicate the direction of the top surface view.

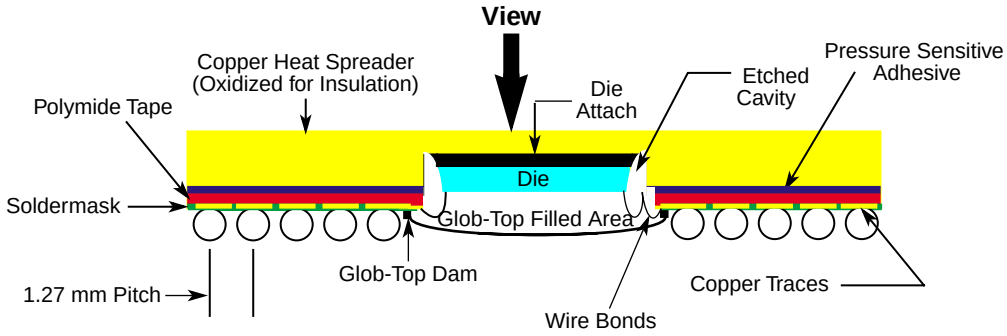


Figure 14. Side View of the TBGA Package

Table 19 shows the pinout list of the MPC8280 and MPC8270. Table 20 defines conventions and acronyms used in Table 19.

Table 19. MPC8280 and MPC8270 Pinout List

Pin Name		Ball
MPC8280/MPC8270	MPC8280 only (UTOPIA Pins)	
$\overline{BR}$		W5
$\overline{BG}$		F4
$\overline{ABB}$/$\overline{IRQ2}$		E2
$\overline{TS}$		E3
A0		G1
A1		H5
A2		H2
A3		H1
A4		J5
A5		J4
A6		J3
A7		J2
A8		J1
A9		K4
A10		K3
A11		K2
A12		K1
A13		L5
A14		L4
A15		L3
A16		L2
A17		L1
A18		M5
A19		N5
A20		N4
A21		N3
A22		N2
A23		N1
A24		P4
A25		P3
A26		P2
A27		P1

Table 19. MPC8280 and MPC8270 Pinout List (Continued)

Pin Name		Ball
MPC8280/MPC8270	MPC8280 only (UTOPIA Pins)	
A28		R1
A29		R3
A30		R5
A31		R4
TT0		F1
TT1		G4
TT2		G3
TT3		G2
TT4		F2
$\overline{\text{TBST}}$		D3
TSIZ0		C1
TSIZ1		E4
TSIZ2		D2
TSIZ3		F5
$\overline{\text{AACK}}$		F3
$\overline{\text{ARTRY}}$		E1
$\overline{\text{DBG}}$		V1
$\overline{\text{DBB}}$/$\overline{\text{IRQ3}}$		V2
D0		B20
D1		A18
D2		A16
D3		A13
D4		E12
D5		D9
D6		A6
D7		B5
D8		A20
D9		E17
D10		B15
D11		B13
D12		A11
D13		E9
D14		B7
D15		B4

Table 19. MPC8280 and MPC8270 Pinout List (Continued)

Pin Name		Ball
MPC8280/MPC8270	MPC8280 only (UTOPIA Pins)	
D16		D19
D17		D17
D18		D15
D19		C13
D20		B11
D21		A8
D22		A5
D23		C5
D24		C19
D25		C17
D26		C15
D27		D13
D28		C11
D29		B8
D30		A4
D31		E6
D32		E18
D33		B17
D34		A15
D35		A12
D36		D11
D37		C8
D38		E7
D39		A3
D40		D18
D41		A17
D42		A14
D43		B12
D44		A10
D45		D8
D46		B6
D47		C4
D48		C18
D49		E16

Table 19. MPC8280 and MPC8270 Pinout List (Continued)

Pin Name		Ball
MPC8280/MPC8270	MPC8280 only (UTOPIA Pins)	
D50		B14
D51		C12
D52		B10
D53		A7
D54		C6
D55		D5
D56		B18
D57		B16
D58		E14
D59		D12
D60		C10
D61		E8
D62		D6
D63		C2
DP0/$\overline{\text{RSRV}}$/$\overline{\text{EXT\_BR2}}$		B22
$\overline{\text{IRQ1}}$/DP1/$\overline{\text{EXT\_BG2}}$		A22
$\overline{\text{IRQ2}}$/DP2/$\overline{\text{TLBISYNC}}$/$\overline{\text{EXT\_DBG2}}$		E21
$\overline{\text{IRQ3}}$/DP3/$\overline{\text{CKSTP\_OUT}}$/$\overline{\text{EXT\_BR3}}$		D21
$\overline{\text{IRQ4}}$/DP4/$\overline{\text{CORE\_SRESET}}$/$\overline{\text{EXT\_BG3}}$		C21
$\overline{\text{IRQ5}}$/DP5/$\overline{\text{TBEN}}$/$\overline{\text{EXT\_DBG3}}$		B21
$\overline{\text{IRQ6}}$/DP6/CSE0		A21
$\overline{\text{IRQ7}}$/DP7/CSE1		E20
$\overline{\text{PSDVAL}}$		V3
$\overline{\text{TA}}$		C22
$\overline{\text{TEA}}$		V5
$\overline{\text{GBL}}$/$\overline{\text{IRQ1}}$		W1
$\overline{\text{CI}}$/BADDR29/$\overline{\text{IRQ2}}$		U2
$\overline{\text{WT}}$/BADDR30/$\overline{\text{IRQ3}}$		U3
$\overline{\text{L2\_HIT}}$/$\overline{\text{IRQ4}}$		Y4
$\overline{\text{CPU\_BG}}$/BADDR31/$\overline{\text{IRQ5}}$		U4
$\overline{\text{CPU\_DBG}}$		R2
$\overline{\text{CPU\_BR}}$		Y3
$\overline{\text{CS0}}$		F25
$\overline{\text{CS1}}$		C29

Table 19. MPC8280 and MPC8270 Pinout List (Continued)

Pin Name		Ball
MPC8280/MPC8270	MPC8280 only (UTOPIA Pins)	
$\overline{\text{CS2}}$		E27
$\overline{\text{CS3}}$		E28
$\overline{\text{CS4}}$		F26
$\overline{\text{CS5}}$		F27
$\overline{\text{CS6}}$		F28
$\overline{\text{CS7}}$		G25
$\overline{\text{CS8}}$		D29
$\overline{\text{CS9}}$		E29
$\overline{\text{CS10}}$/$\overline{\text{BCTL1}}$		F29
$\overline{\text{CS11}}$/AP0		G28
BADDR27		T5
BADDR28		U1
ALE		T2
$\overline{\text{BCTL0}}$		A27
$\overline{\text{PWE0}}$/$\overline{\text{PSDDQM0}}$/$\overline{\text{PBS0}}$		C25
$\overline{\text{PWE1}}$/$\overline{\text{PSDDQM1}}$/$\overline{\text{PBS1}}$		E24
$\overline{\text{PWE2}}$/$\overline{\text{PSDDQM2}}$/$\overline{\text{PBS2}}$		D24
$\overline{\text{PWE3}}$/$\overline{\text{PSDDQM3}}$/$\overline{\text{PBS3}}$		C24
$\overline{\text{PWE4}}$/$\overline{\text{PSDDQM4}}$/$\overline{\text{PBS4}}$		B26
$\overline{\text{PWE5}}$/$\overline{\text{PSDDQM5}}$/$\overline{\text{PBS5}}$		A26
$\overline{\text{PWE6}}$/$\overline{\text{PSDDQM6}}$/$\overline{\text{PBS6}}$		B25
$\overline{\text{PWE7}}$/$\overline{\text{PSDDQM7}}$/$\overline{\text{PBS7}}$		A25
PSDA10/PGPL0		E23
$\overline{\text{PSDWE}}$/PGPL1		B24
$\overline{\text{POE}}$/$\overline{\text{PSDRAS}}$/PGPL2		A24
$\overline{\text{PSDCAS}}$/PGPL3		B23
$\overline{\text{PGTA}}$/PUPMWAIT/PGPL4/$\overline{\text{PPBS}}$		A23
PSDAMUX/PGPL5		D22
$\overline{\text{LWE0}}$/$\overline{\text{LSDDQM0}}$/$\overline{\text{LBS0}}$/PCI_CFG0		H28
$\overline{\text{LWE1}}$/$\overline{\text{LSDDQM1}}$/$\overline{\text{LBS1}}$/PCI_CFG1		H27
$\overline{\text{LWE2}}$/$\overline{\text{LSDDQM2}}$/$\overline{\text{LBS2}}$/PCI_CFG2		H26
$\overline{\text{LWE3}}$/$\overline{\text{LSDDQM3}}$/$\overline{\text{LBS3}}$/PCI_CFG3		G29
LSDA10/LGPL0/PCI_MODCKH0		D27
$\overline{\text{LSDWE}}$/LGPL1/PCI_MODCKH1		C28

Table 19. MPC8280 and MPC8270 Pinout List (Continued)

Pin Name		Ball
MPC8280/MPC8270	MPC8280 only (UTOPIA Pins)	
LOE/LSDRAS/LGPL2/PCI_MODCKH2		E26
LSDCAS/LGPL3/PCI_MODCKH3		D25
LGTA/LUPMWAIT/LGPL4/LPBS		C26
LGPL5/LSDAMUX/PCI_MODCK		B27
LWR		D28
L_A14/PAR		N27
L_A15/FRAME/SMI		T29
L_A16/TRDY		R27
L_A17/IRDY/CKSTP_OUT		R26
L_A18/STOP		R29
L_A19/DEVSEL		R28
L_A20/IDSEL		W29
L_A21/PERR		P28
L_A22/SERR		N26
L_A23/REQ0		AA27
L_A24/REQ1/HSEJSW		P29
L_A25/GNT0		AA26
L_A26/GNT1/HSLED		N25
L_A27/GNT2/HSENUM		AA25
L_A28/RST/CORE_SRESET		AB29
L_A29/INTA		AB28
L_A30/REQ2		P25
L_A31/DLLOUT		AB27
LCL_D0/AD0		H29
LCL_D1/AD1		J29
LCL_D2/AD2		J28
LCL_D3/AD3		J27
LCL_D4/AD4		J26
LCL_D5/AD5		J25
LCL_D6/AD6		K25
LCL_D7/AD7		L29
LCL_D8/AD8		L27
LCL_D9/AD9		L26
LCL_D10/AD10		L25

Table 19. MPC8280 and MPC8270 Pinout List (Continued)

Pin Name		Ball
MPC8280/MPC8270	MPC8280 only (UTOPIA Pins)	
LCL_D11/AD11		M29
LCL_D12/AD12		M28
LCL_D13/AD13		M27
LCL_D14/AD14		M26
LCL_D15/AD15		N29
LCL_D16/AD16		T25
LCL_D17/AD17		U27
LCL_D18/AD18		U26
LCL_D19/AD19		U25
LCL_D20/AD20		V29
LCL_D21/AD21		V28
LCL_D22/AD22		V27
LCL_D23/AD23		V26
LCL_D24/AD24		W27
LCL_D25/AD25		W26
LCL_D26/AD26		W25
LCL_D27/AD27		Y29
LCL_D28/AD28		Y28
LCL_D29/AD29		Y25
LCL_D30/AD30		AA29
LCL_D31/AD31		AA28
LCL_DP0/C0/$\overline{\text{BE0}}$		L28
LCL_DP1/C1/$\overline{\text{BE1}}$		N28
LCL_DP2/C2/$\overline{\text{BE2}}$		T28
LCL_DP3/C3/$\overline{\text{BE3}}$		W28
$\overline{\text{IRQ0}}$/$\overline{\text{NMI\_OUT}}$		T1
$\overline{\text{IRQ7}}$/$\overline{\text{INT\_OUT}}$/$\overline{\text{APE}}$		D1
$\overline{\text{TRST}}$		AH3
TCK		AG5
TMS		AJ3
TDI		AE6
TDO		AF5
$\overline{\text{TRIS}}$		AB4
$\overline{\text{PORESET}}$		AG6

Table 19. MPC8280 and MPC8270 Pinout List (Continued)

Pin Name		Ball
MPC8280/MPC8270	MPC8280 only (UTOPIA Pins)	
HRESET		AH5
SRESET		AF6
QREQ		AA3
RSTCONF		AJ4
MODCK1/AP1/TC0/BNKSEL0		W2
MODCK2/AP2/TC1/BNKSEL1		W3
MODCK3/AP3/TC2/BNKSEL2		W4
CLKIN1		AH4
PA0/RESTART1/DREQ3	FCC2_UTM_TXADDR2	AC29[1]
PA1/REJECT1/DONE3	FCC2_UTM_TXADDR1	AC25[1]
PA2/CLK20/DACK3	FCC2_UTM_TXADDR0	AE28[1]
PA3/CLK19/DACK4/L1RXD1A2	FCC2_UTM_RXADDR0	AG29[1]
PA4/REJECT2/DONE4	FCC2_UTM_RXADDR1	AG28[1]
PA5/RESTART2/DREQ4	FCC2_UTM_RXADDR2/FCC1_UT_RX PRTY	AG26[1]
PA6/FCC2_RXADDR3	L1RSYNCA1	AE24[1]
PA7/SMSYN2/FCC2_TXADDR3	L1TSYNCA1/L1GNTA1	AH25[1]
PA8/SMRXD2/FCC2_TXADDR4	L1RXD0A1/L1RXDA1	AF23[1]
PA9/SMTXD2	L1TXD0A1	AH23[1]
PA10/MSNUM5	FCC1_UT8_RXD0/FCC1_UT16_RXD8	AE22[1]
PA11/MSNUM4	FCC1_UT8_RXD1/FCC1_UT16_RXD9	AH22[1]
PA12/MSNUM3	FCC1_UT8_RXD2/ FCC1_UT16_RXD10	AJ21[1]
PA13/MSNUM2	FCC1_UT8_RXD3/ FCC1_UT16_RXD11	AH20[1]
PA14/FCC1_MII_HDLC_RXD3	FCC1_UT8_RXD4/ FCC1_UT16_RXD12	AG19[1]
PA15/FCC1_MII_HDLC_RXD2	FCC1_UT8_RXD5/ FCC1_UT16_RXD13	AF18[1]
PA16/FCC1_MII_HDLC_RXD1/ FCCI_RMII_RXD1	FCC1_UT8_RXD6/ FCC1_UT16_RXD14	AF17[1]
PA17/FCC1_MII_HDLC_RXD0/ FCC1_MII_TRAN_RXD/ FCCI_RMII_RXD0	FCC1_UT8_RXD7/ FCC1_UT16_RXD15	AE16[1]
PA18/FCC1_MII_HDLC_TXD0/ FCC1_MII_TRAN_TXD/ FCC1_RMII_TXD0	FCC1_UT8_TXD7/FCC1_UT16_TXD15	AJ16[1]

Table 19. MPC8280 and MPC8270 Pinout List (Continued)

Pin Name		Ball
MPC8280/MPC8270	**MPC8280 only (UTOPIA Pins)**	
PA19/FCC1_MII_HDLC_TXD1/ FCC1_RMII_TXD1	FCC1_UT8_TXD6/FCC1_UT16_TXD14	AG15[1]
PA20/FCC1_MII_HDLC_TXD2	FCC1_UT8_TXD5/FCC1_UT16_TXD13	AJ13[1]
PA21/FCC1_MII_HDLC_TXD3	FCC1_UT8_TXD4/FCC1_UT16_TXD12	AE13[1]
PA22	FCC1_UT8_TXD3/FCC1_UT16_TXD11	AF12[1]
PA23	FCC1_UT8_TXD2/FCC1_UT16_TXD10	AG11[1]
PA24/MSNUM1	FCC1_UT8_TXD1/FCC1_UT16_TXD9	AH9[1]
PA25/MSNUM0	FCC1_UT8_TXD0/FCC1_UT16_TXD8	AJ8[1]
PA26/FCC1_RMII_RX_ER	FCC1_UTM_RXCLAV/ FCC1_UTS_RXCLAV	AH7[1]
PA27/FCC1_MII_RX_DV/ FCC1_RMII_CRS_DV	FCC1_UT_RXSOC	AF7[1]
PA28/FCC1_MII_TX_EN/ FCC1_RMII_TX_EN	$\overline{\text{FCC1\_UTM\_RXENB}}$/ $\overline{\text{FCC1\_UTS\_RXENB}}$	AD5[1]
PA29/FCC1_MII_TX_ER	FCC1_UT_TXSOC	AF1[1]
PA30/FCC1_MII_CRS/$\overline{\text{FCC1\_RTS}}$	FCC1_UTM_TXCLAV/ FCC1_UTS_TXCLAV	AD3[1]
PA31/FCC1_MII_COL	$\overline{\text{FCC1\_UTM\_TXENB}}$/ $\overline{\text{FCC1\_UTS\_TXENB}}$	AB5[1]
PB4/FCC3_MII_HDLC_TXD3/ L1RSYNCA2/$\overline{\text{FCC3\_RTS}}$	FCC2_UT8_RXD0	AD28[1]
PB5/FCC3_MII_HDLC_TXD2/ L1TSYNCA2/L1GNTA2	FCC2_UT8_RXD1	AD26[1]
PB6/FCC3_MII_HDLC_TXD1/ FCC3_RMII_TXD1/ L1RXDA2/L1RXD0A2	FCC2_UT8_RXD2	AD25[1]
PB7/FCC3_MII_HDLC_TXD0/ FCC3_RMII_TXD0/ FCC3_TXD/L1TXDA2/L1TXD0A2	FCC2_UT8_RXD3	AE26[1]
PB8/FCC3_MII_HDLC_RXD0/ FCC3_RMII_RXD0/ FCC3_RXD/TXD3	FCC2_UT8_TXD3/L1RSYNCD1	AH27[1]
PB9/FCC3_MII_HDLC_RXD1/ FCC3_RMII_RXD1/L1TXD2A2	FCC2_UT8_TXD2/L1TSYNCD1/ L1GNTD1	AG24[1]
PB10/FCC3_MII_HDLC_RXD2	FCC2_UT8_TXD1/L1RXDD1	AH24[1]
PB11/FCC3_MII_HDLC_RXD3	FCC2_UT8_TXD0/L1TXDD1	AJ24[1]
PB12/FCC3_MII_CRS/TXD2	L1CLKOB1/L1RSYNCC1	AG22[1]
PB13/FCC3_MII_COL/L1TXD1A2	$\overline{\text{L1RQB1}}$/L1TSYNCC1/L1GNTC1	AH21[1]
PB14/FCC3_MII_RMII_TX_EN	L1RXDC1	AG20[1]
PB15/FCC3_MII_TX_ER/RXD2	L1TXDC1	AF19[1]

Table 19. MPC8280 and MPC8270 Pinout List (Continued)

Pin Name		Ball
MPC8280/MPC8270	**MPC8280 only (UTOPIA Pins)**	
PB16/FCC3_MII_RMII_RX_ER/CLK18	L1CLKOA1	AJ18[1]
PB17/FCC3_MII_RX_DV/CLK17/ FCC3_RMII_CRS_DV	L1RQA1	AJ17[1]
PB18/FCC2_MII_HDLC_RXD3/ L1CLKOD2/L1RXD2A2	FCC2_UT8_RXD4	AE14[1]
PB19FCC2_MII_HDLC_RXD2/ L1RQD2/L1RXD3A2	FCC2_UT8_RXD5	AF13[1]
PB20/FCC2_MII_HDLC_RMII_RXD1 /L1RSYNCD2/L1TXD1A1	FCC2_UT8_RXD6	AG12[1]
PB21//FCC2_MII_HDLC_RMII_RXD0/ FCC2_TRAN_RXD/L1TSYNCD2/ L1GNTD2	FCC2_UT8_RXD7/L1TXD2A1	AH11[1]
PB22/FCC2_MII_HDLC_TXD0/ FCC2_TXD/FCC2_RMII_TXD0/ L1RXDD2	FCC2_UT8_TXD7/L1RXD1A1	AH16[1]
PB23/FCC2_MII_HDLC_TXD1/ L1RXD2A1/L1TXDD2/ FCC2_RMII_TXD1	FCC2_UT8_TXD6/L1RXD2A1	AE15[1]
PB24/FCC2_MII_HDLC_TXD2/ L1RSYNCC2	FCC2_UT8_TXD5/L1RXD3A1	AJ9[1]
PB25/FCC2_MII_HDLC_TXD3/ L1TSYNCC2/L1GNTC2	FCC2_UT8_TXD4/L1TXD3A1	AE9[1]
PB26/FCC2_MII_CRS/L1RXDC2	FCC2_UT8_TXD1	AJ7[1]
PB27/FCC2_MII_COL/L1TXDC2	FCC2_UT8_TXD0	AH6[1]
PB28/FCC2_MII_RX_ER/ FCC2_RMII_RX_ER/FCC2_RTS/ L1TSYNCB2/L1GNTB2/TXD1		AE3[1]
PB29/L1RSYNCB2/FCC2_MII_TX_EN/ FCC2_RMII_TX_EN	FCC2_UTM_RXCLAV/ FCC2_UTS_RXCLAV	AE2[1]
PB30/FCC2_MII_RX_DV/ FCC2_RMII_CRS_DV/L1RXDB2	FCC2_UT_TXSOC	AC5[1]
PB31/FCC2_MII_TX_ER/L1TXDB2	FCC2_UT_RXSOC	AC4[1]
PC0/DREQ1/BRGO7/SMSYN2/ L1CLKOA2		AB26[1]
PC1/DREQ2/BRGO6/L1RQA2/ SPISEL		AD29[1]
PC2/FCC3_CD/DONE2	FCC2_UT8_TXD3	AE29[1]
PC3/FCC3_CTS/DACK2/CTS4/ USB_RP	FCC2_UT8_TXD2	AE27[1]
PC4/SI2_L1ST4/FCC2_CD	FCC2_UTM_RXENB/ FCC2_UTS_RXENB	AF27[1]

Table 19. MPC8280 and MPC8270 Pinout List (Continued)

Pin Name		Ball
MPC8280/MPC8270	**MPC8280 only (UTOPIA Pins)**	
PC5/SI2_L1ST3/FCC2_CTS	FCC2_UTM_TXCLAV/ FCC2_UTS_TXCLAV	AF24[1]
PC6/FCC1_CD	L1CLKOC1/FCC1_UTM_RXADDR2/ FCC1_UTS_RXADDR2/ FCC1_UTM_RXCLAV1	AJ26[1]
PC7/FCC1_CTS	L1RQC1/FCC1_UTM_TXADDR2/ FCC1_UTS_TXADDR2/ FCC1_UTM_TXCLAV1	AJ25[1]
PC8/CD4/RENA4/SI2_L1ST2/CTS3/ USBRN	FCC1_UT16_TXD0	AF22[1]
PC9/CTS4/CLSN4/SI2_L1ST1/ L1TSYNCA2/L1GNTA2/USB_RP	FCC1_UT16_TXD1	AE21[1]
PC10/CD3/RENA3	FCC1_UT16_TXD2/SI1_L1ST4/ FCC2_UT8_RXD3	AF20[1]
PC11/CTS3/CLSN3/L1TXD3A2	L1CLKOD1/FCC2_UT8_RXD2	AE19[1]
PC12/CD2/RENA2	SI1_L1ST3/FCC1_UTM_RXADDR1/ FCC1_UTS_RXADDR1	AE18[1]
PC13/CTS2/CLSN2	L1RQD1/FCC1_UTM_TXADDR1/ FCC1_UTS_TXADDR1	AH18[1]
PC14/CD1/RENA1	FCC1_UTM_RXADDR0/ FCC1_UTS_RXADDR0	AH17[1]
PC15/CTS1/CLSN1/SMTXD2	FCC1_UTM_TXADDR0/ FCC1_UTS_TXADDR0	AG16[1]
PC16/CLK16/TIN4		AF15[1]
PC17/CLK15/TIN3/BRGO8		AJ15[1]
PC18/CLK14/TGATE2		AH14[1]
PC19/CLK13/BRGO7/SPICLK		AG13[1]
PC20/CLK12/TGATE1/USB_OE		AH12[1]
PC21/CLK11/BRGO6		AJ11[1]
PC22/CLK10/DONE1/FCC1_UT_TXPRTY		AG10[1]
PC23/CLK9/BRGO5/DACK1		AE10[1]
PC24/CLK8/TOUT4	FCC2_UT8_TXD3	AF9[1]
PC25/CLK7/BRGO4	FCC2_UT8_TXD2	AE8[1]
PC26/CLK6/TOUT3/TMCLK		AJ6[1]
PC27/FCC3_TXD/FCC3_MII_TXD0/ FCC3_RMII_TXD0/CLK5/BRGO3		AG2[1]
PC28/CLK4/TIN1/TOUT2/CTS2/CLSN2/ FCC2_RXADDR4		AF3[1]
PC29/CLK3/TIN2/BRGO2/CTS1/CLSN1		AF2[1]

Table 19. MPC8280 and MPC8270 Pinout List (Continued)

Pin Name		Ball
MPC8280/MPC8270	**MPC8280 only (UTOPIA Pins)**	
PC30/CLK2/$\overline{\text{TOUT1}}$	FCC2_UT8_TXD3	AE1[1]
PC31/CLK1/BRGO1		AD1[1]
PD4/BRGO8/$\overline{\text{FCC3\_RTS}}$/SMRXD2	L1TSYNCD1/L1GNTD1	AC28[1]
PD5/$\overline{\text{DONE1}}$	FCC1_UT16_TXD3	AD27[1]
PD6/$\overline{\text{DACK1}}$	FCC1_UT16_TXD4	AF29[1]
PD7/SMSYN1/FCC1_TXCLAV2	FCC1_UTM_TXADDR3/ FCC1_UTS_TXADDR3/ FCC2_UTM_TXADDR4 FCC2_UTS_TXADDR1	AF28[1]
PD8/SMRXD1/BRGO5	FCC2_UT_TXPRTY	AG25[1]
PD9/SMTXD1/BRGO3	FCC2_UT_RXPRTY	AH26[1]
PD10/L1CLKOB2/BRGO4	FCC2_UT8_RXD1/L1RSYNCB1	AJ27[1]
PD11/$\overline{\text{L1RQB2}}$	FCC2_UT8_RXD0/L1TSYNCB1/ L1GNTB1	AJ23[1]
PD12	SI1_L1ST2/L1RXDB1	AG23[1]
PD13	SI1_L1ST1/L1TXDB1	AJ22[1]
PD14/L1CLKOC2/I2CSCL	FCC1_UT16_RXD0	AE20[1]
PD15/$\overline{\text{L1RQC2}}$/I2CSDA	FCC1_UT16_RXD1	AJ20[1]
PD16/SPIMISO	FCC1_UT_TXPRTY/L1TSYNCC1/ L1GNTC1	AG18[1]
PD17/BRGO2/SPIMOSI	FCC1_UT_RXPRTY	AG17[1]
PD18/SPICLK	FCC1_UTM_RXADDR4/ FCC1_UTS_RXADDR4/ FCC1_UTM_RXCLAV3/ FCC2_UTM_RXADDR3/ FCC2_UTS_RXADDR0	AF16[1]
PD19/SPISEL/BRGO1	FCC1_UTM_TXADDR4/ FCC1_UTS_TXADDR4/ FCC1_UTM_TXCLAV3/ FCC2_UTM_TXADDR3/ FCC2_UTS_TXADDR0	AH15[1]
PD20/$\overline{\text{RTS4}}$/TENA4/L1RSYNCA2/ USB_TP	FCC1_UT16_RXD2	AJ14[1]
PD21/TXD4/L1RXD0A2/L1RXDA2/ USB_TN	FCC1_UT16_RXD3	AH13[1]
PD22/RXD4L1TXD0A2/L1TXDA2/ USB_RXD	FCC1_UT16_TXD5	AJ12[1]
PD23/$\overline{\text{RTS3}}$/TENA3	FCC1_UT16_RXD4/L1RSYNCD1	AE12[1]
PD24/TXD3	FCC1_UT16_RXD5/L1RXDD1	AF10[1]
PD25/RXD3	FCC1_UT16_TXD6/L1TXDD1	AG9[1]

Table 19. MPC8280 and MPC8270 Pinout List (Continued)

Pin Name		Ball
MPC8280/MPC8270	**MPC8280 only (UTOPIA Pins)**	
PD26/$\overline{\text{RTS2}}$/TENA2	FCC1_UT16_RXD6/L1RSYNCC1	AH8[1]
PD27/TXD2	FCC1_UT16_RXD7/L1RXDC1	AG7[1]
PD28/RXD2	FCC1_UT16_TXD7/L1TXDC1	AE4[1]
PD29/$\overline{\text{RTS1}}$/TENA1	FCC1_UTM_RXADDR3/ FCC1_UTS_RXADDR3/ FCC1_UTM_RXCLAV2/ FCC2_UTM_RXADDR4/ FCC2_UTS_RXADDR1	AG1[1]
PD30/TXD1	$\overline{\text{FCC2\_UTM\_TXENB}}$/ $\overline{\text{FCC2\_UTS\_TXENB}}$	AD4[1]
PD31/RXD1		AD2[1]
VCCSYN		AB3
VCCSYN1		B9
CLKIN2		AE11
SPARE4[2]		U5
$\overline{\text{PCI\_MODE}}$[3]		AF25
SPARE6[2]		V4
THERMAL0[4]		AA1
THERMAL1[4]		AG4
I/O power		AG21, AG14, AG8, AJ1, AJ2, AH1, AH2, AG3, AF4, AE5, AC27, Y27, T27, P27, K26, G27, AE25, AF26, AG27, AH28, AH29, AJ28, AJ29, C7, C14, C16, C20, C23, E10, A28, A29, B28, B29, C27, D26, E25, H3, M4, T3, AA4, A1, A2, B1, B2, C3, D4, E5
Core Power		U28, U29, K28, K29, A9, A19, B19, M1, M2, Y1, Y2, AC1, AC2, AH19, AJ19, AH10, AJ10, AJ5
Ground		AA5, AB1[5], AB2[6], AF21, AF14, AF8, AE7, AF11, AE17, AE23, AC26, AB25, Y26, V25, T26, R25, P26, M25, K27, H25, G26, D7, D10, D14, D16, D20, D23, C9, E11, E13, E15, E19, E22, B3, G5, H4, K5, M3, P5, T4, Y5, AA2, AC3

[1] The default configuration of the CPM pins (PA[0–31], PB[4–31], PC[0–31], PD[4–31]) is input. To prevent excessive DC current, it is recommended to either pull unused pins to GND or VDDH, or to configure them as outputs.
[2] Must be pulled down or left floating.
[3] If PCI is not desired, must be pulled up or left floating.
[4] For information on how to use this pin, refer to *MPC8260 PowerQUICC II Thermal Resistor Guide* (AN2271/D).

[5] GNDSYN (AB1): This pin exists as a separate ground signal in MPC826x(A) devices; it does not exist as a separate ground signal on the MPC8280. New designs must connect AB1 to GND and follow the suggestions in Section 1.2.2.1, “Layout Practices.” Old designs in which the MPC8280 is used as a drop-in replacement can leave the pin connected to GND with the noise filtering capacitors.

[6] XFC (AB2) pin: This pin is used in MPC826x(A) devices; it is not used in MPC8280 because there is no need for external capacitor to operate the PLL. New designs should connect AB2 (XFC) pin to GND. Old designs in which the MPC8280 is used as a drop-in replacement can leave the pin connected to the current capacitor.

Symbols used in Table 19 are described in Table 20.

Table 20. Symbol Legend

Symbol	Meaning
$\overline{\text{OVERBAR}}$	Signals with overbars, such as $\overline{\text{TA}}$, are active low.
UTM	Indicates that a signal is part of the UTOPIA master interface.
UTS	Indicates that a signal is part of the UTOPIA slave interface.
UT8	Indicates that a signal is part of the 8-bit UTOPIA interface.
UT16	Indicates that a signal is part of the 16-bit UTOPIA interface.
MII	Indicates that a signal is part of the media independent interface.

1.4.2 VR Package—MPC8275VR and MPC8270VR

The following figures and table represent the alternate 516 PBGA package. For information on the standard package for the MPC8280 and the MPC8270, refer to Section 1.4.1, “ZU Package—MPC8280 and MPC8270” on page 37.

1.4.2.1 VR Pin Assignments

Figure 15 shows the pinout of the VR package as viewed from the top surface.

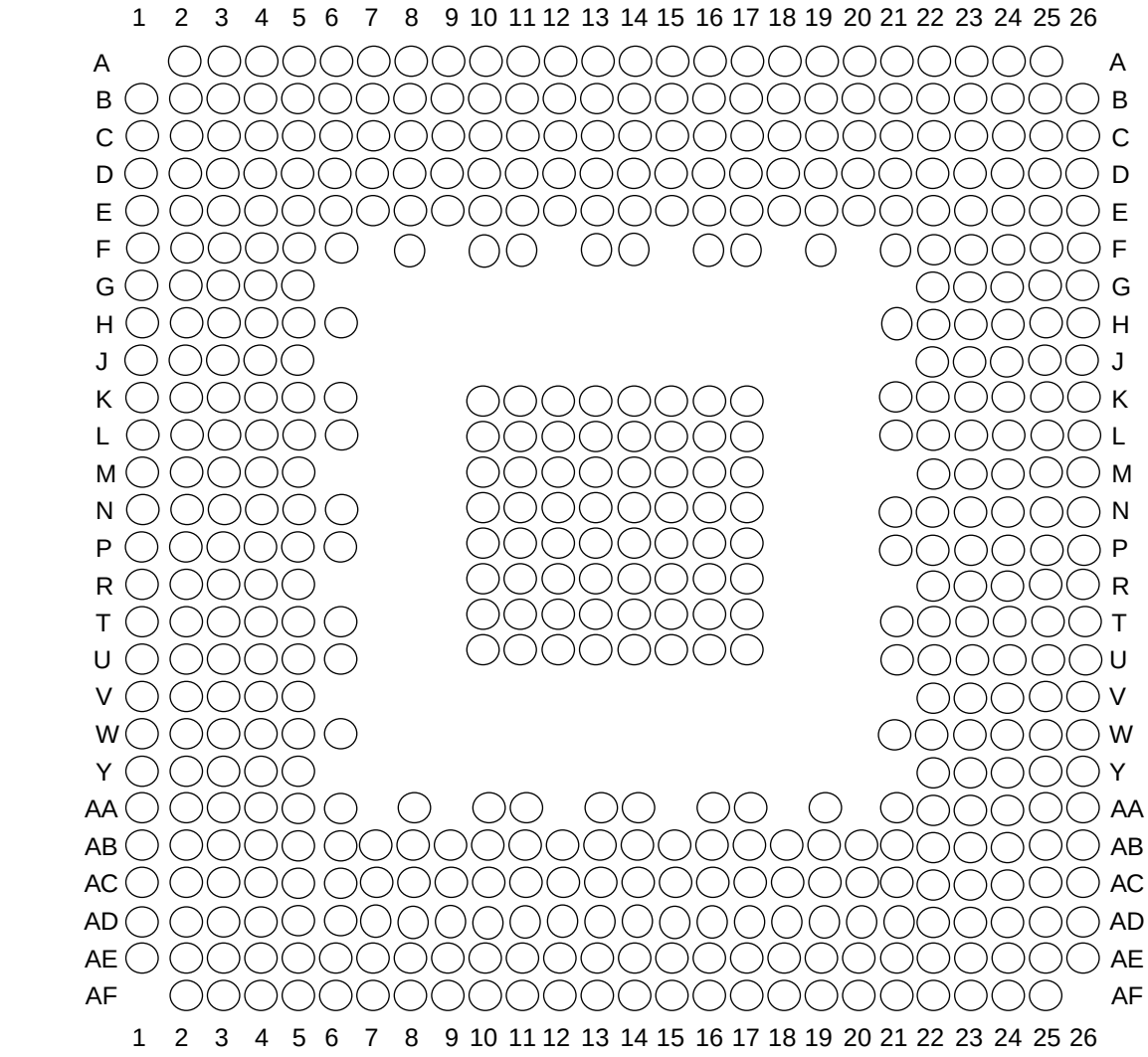


Figure 15. Pinout of the 516 PBGA Package (View from Top)

Figure 16 shows the side profile of the PBGA package to indicate the direction of the top surface view.

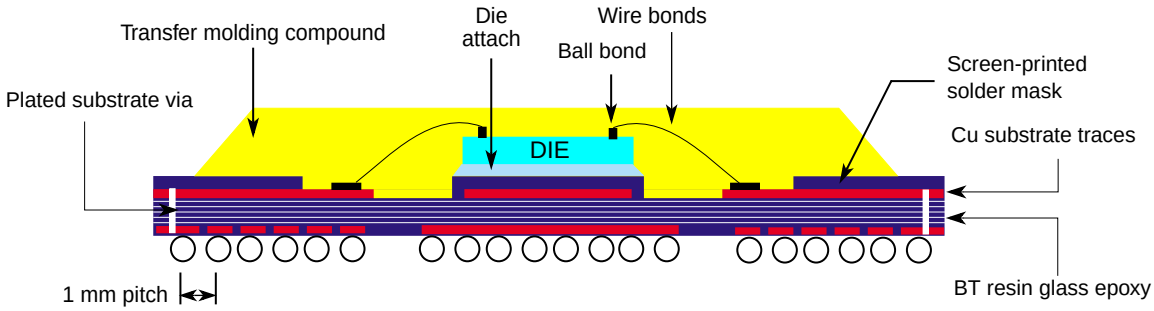


Figure 16. Side View of the PBGA Package Remove

Table 21 shows the pinout list of the MPC8275VR and MPC8270VR. Table 20 defines conventions and acronyms used in Table 21.

Table 21. MPC8275VR and MPC8270VR Pinout List

Pin Name		Ball
MPC8275VR/MPC8270VR	MPC8275VR only (UTOPIA Pins)	
$\overline{BR}$		C16
$\overline{BG}$		D2
$\overline{ABB}$/$\overline{IRQ2}$		C1
$\overline{TS}$		D1
A0		D5
A1		E8
A2		C4
A3		B4
A4		A4
A5		D7
A6		D8
A7		C6
A8		B5
A9		B6
A10		C7
A11		C8
A12		A6
A13		D9
A14		F11
A15		B7
A16		B8
A17		C9
A18		A7
A19		B9
A20		E11
A21		A8
A22		D11
A23		B10
A24		C11
A25		A9
A26		B11
A27		C12
A28		D12
A29		A10

Table 21. MPC8275VR and MPC8270VR Pinout List (Continued)

Pin Name		Ball
MPC8275VR/MPC8270VR	MPC8275VR only (UTOPIA Pins)	
A30		B12
A31		B13
TT0		E7
TT1		B3
TT2		F8
TT3		A3
TT4		C3
$\overline{\text{TBST}}$		F5
TSIZ0		E3
TSIZ1		E2
TSIZ2		E1
TSIZ3		E4
$\overline{\text{AACK}}$		D3
$\overline{\text{ARTRY}}$		C2
$\overline{\text{DBG}}$		A14
$\overline{\text{DBB}}$/$\overline{\text{IRQ3}}$		C15
D0		W4
D1		Y1
D2		V1
D3		P4
D4		N3
D5		K5
D6		J4
D7		G1
D8		AB1
D9		U4
D10		U2
D11		N6
D12		N1
D13		L1
D14		J5
D15		G3
D16		AA2
D17		W1

Table 21. MPC8275VR and MPC8270VR Pinout List (Continued)

Pin Name		Ball
MPC8275VR/MPC8270VR	MPC8275VR only (UTOPIA Pins)	
D18		T3
D19		T1
D20		M2
D21		K2
D22		J1
D23		G4
D24		U5
D25		T5
D26		P5
D27		P3
D28		M3
D29		K3
D30		H2
D31		G5
D32		AA1
D33		V2
D34		U1
D35		P2
D36		M4
D37		K4
D38		H3
D39		F2
D40		Y2
D41		U3
D42		T2
D43		N2
D44		M5
D45		K1
D46		H4
D47		F1
D48		W2
D49		T4
D50		R3
D51		N4

Table 21. MPC8275VR and MPC8270VR Pinout List (Continued)

Pin Name		Ball
MPC8275VR/MPC8270VR	MPC8275VR only (UTOPIA Pins)	
D52		M1
D53		J2
D54		H5
D55		F3
D56		V3
D57		R5
D58		R2
D59		N5
D60		L2
D61		J3
D62		H1
D63		F4
DP0/$\overline{\text{RSRV}}$/$\overline{\text{EXT\_BR2}}$		AB3
$\overline{\text{IRQ1}}$/DP1/$\overline{\text{EXT\_BG2}}$		W5
$\overline{\text{IRQ2}}$/DP2/$\overline{\text{TLBISYNC}}$/$\overline{\text{EXT\_DBG2}}$		AC2
$\overline{\text{IRQ3}}$/DP3/$\overline{\text{CKSTP\_OUT}}$/$\overline{\text{EXT\_BR3}}$		AA3
$\overline{\text{IRQ4}}$/DP4/$\overline{\text{CORE\_SRESET}}$/$\overline{\text{EXT\_BG3}}$		AD1
$\overline{\text{IRQ5}}$/DP5/$\overline{\text{TBEN}}$/$\overline{\text{EXT\_DBG3}}$		AC1
$\overline{\text{IRQ6}}$/DP6/CSE0		AB2
$\overline{\text{IRQ7}}$/DP7/CSE1		Y3
$\overline{\text{PSDVAL}}$		D15
$\overline{\text{TA}}$		Y4
$\overline{\text{TEA}}$		D16
$\overline{\text{GBL}}$/$\overline{\text{IRQ1}}$		E15
$\overline{\text{CI}}$/BADDR29/$\overline{\text{IRQ2}}$		D14
$\overline{\text{WT}}$/BADDR30/$\overline{\text{IRQ3}}$		E14
$\overline{\text{L2\_HIT}}$/$\overline{\text{IRQ4}}$		A17
$\overline{\text{CPU\_BG}}$/BADDR31/$\overline{\text{IRQ5}}$		B14
$\overline{\text{CPU\_DBG}}$		F13
$\overline{\text{CPU\_BR}}$		B17
$\overline{\text{CS0}}$		AC6
$\overline{\text{CS1}}$		AD6
$\overline{\text{CS2}}$		AE6
$\overline{\text{CS3}}$		AB7

Table 21. MPC8275VR and MPC8270VR Pinout List (Continued)

Pin Name		Ball
MPC8275VR/MPC8270VR	MPC8275VR only (UTOPIA Pins)	
$\overline{CS4}$		AF7
$\overline{CS5}$		AC7
$\overline{CS6}$		AD7
$\overline{CS7}$		AF8
$\overline{CS8}$		AE8
$\overline{CS9}$		AD8
$\overline{CS10}$/$\overline{BCTL1}$		AC8
$\overline{CS11}$/AP0		AB8
BADDR27		C13
BADDR28		A12
ALE		D13
$\overline{BCTL0}$		AF4
$\overline{PWE0}$/$\overline{PSDDQM0}$/$\overline{PBS0}$		AA5
$\overline{PWE1}$/$\overline{PSDDQM1}$/$\overline{PBS1}$		AE4
$\overline{PWE2}$/$\overline{PSDDQM2}$/$\overline{PBS2}$		AD4
$\overline{PWE3}$/$\overline{PSDDQM3}$/$\overline{PBS3}$		AF3
$\overline{PWE4}$/$\overline{PSDDQM4}$/$\overline{PBS4}$		AB4
$\overline{PWE5}$/$\overline{PSDDQM5}$/$\overline{PBS5}$		AE3
$\overline{PWE6}$/$\overline{PSDDQM6}$/$\overline{PBS6}$		AF2
$\overline{PWE7}$/$\overline{PSDDQM7}$/$\overline{PBS7}$		AD3
PSDA10/PGPL0		AE2
$\overline{PSDWE}$/PGPL1		AD2
$\overline{POE}$/$\overline{PSDRAS}$/PGPL2		AE1
$\overline{PSDCAS}$/PGPL3		AC3
$\overline{PGTA}$/PUPMWAIT/PGPL4/$\overline{PPBS}$		W6
PSDAMUX/PGPL5		AA4
$\overline{LWE0}$/$\overline{LSDDQM0}$/$\overline{LBS0}$/PCI_CFG0		AC9
$\overline{LWE1}$/$\overline{LSDDQM1}$/$\overline{LBS1}$/PCI_CFG1		AD9
$\overline{LWE2}$/$\overline{LSDDQM2}$/$\overline{LBS2}$/PCI_CFG2		AE9
$\overline{LWE3}$/$\overline{LSDDQM3}$/$\overline{LBS3}$/PCI_CFG3		AF9
LSDA10/LGPL0/PCI_MODCKH0		AB6
$\overline{LSDWE}$/LGPL1/PCI_MODCKH1		AF5
$\overline{LOE}$/$\overline{LSDRAS}$/LGPL2/PCI_MODCKH2		AE5
$\overline{LSDCAS}$/LGPL3/PCI_MODCKH3		AD5

Table 21. MPC8275VR and MPC8270VR Pinout List (Continued)

Pin Name		Ball
MPC8275VR/MPC8270VR	MPC8275VR only (UTOPIA Pins)	
LGTA/LUPMWAIT/LGPL4/LPBS		AC5
LGPL5/LSDAMUX/PCI_MODCK		AB5
LWR		AF6
L_A14/PAR		AE13
L_A15/FRAME/SMI		AD15
L_A16/TRDY		AF16
L_A17/IRDY/CKSTP_OUT		AF15
L_A18/STOP		AE15
L_A19/DEVSEL		AE14
L_A20/IDSEL		AC17
L_A21/PERR		AD14
L_A22/SERR		AF13
L_A23/REQ0		AE20
L_A24/REQ1/HSEJSW		AC14
L_A25/GNT0		AC19
L_A26/GNT1/HSLED		AD13
L_A27/GNT2/HSENUM		AF21
L_A28/RST/CORE_SRESET		AF22
L_A29/INTA		AE21
L_A30/REQ2		AB14
L_A31/DLLOUT		AD20
LCL_D0/AD0		AB9
LCL_D1/AD1		AB10
LCL_D2/AD2		AC10
LCL_D3/AD3		AD10
LCL_D4/AD4		AE10
LCL_D5/AD5		AF10
LCL_D6/AD6		AF11
LCL_D7/AD7		AB12
LCL_D8/AD8		AB11
LCL_D9/AD9		AF12
LCL_D10/AD10		AE11
LCL_D11/AD11		AC13
LCL_D12/AD12		AC12

Table 21. MPC8275VR and MPC8270VR Pinout List (Continued)

Pin Name		Ball
MPC8275VR/MPC8270VR	MPC8275VR only (UTOPIA Pins)	
LCL_D13/AD13		AB13
LCL_D14/AD14		AD12
LCL_D15/AD15		AF14
LCL_D16/AD16		AF17
LCL_D17/AD17		AE16
LCL_D18/AD18		AD16
LCL_D19/AD19		AC16
LCL_D20/AD20		AB16
LCL_D21/AD21		AF18
LCL_D22/AD22		AE17
LCL_D23/AD23		AD17
LCL_D24/AD24		AB17
LCL_D25/AD25		AE18
LCL_D26/AD26		AD18
LCL_D27/AD27		AC18
LCL_D28/AD28		AE19
LCL_D29/AD29		AF20
LCL_D30/AD30		AD19
LCL_D31/AD31		AB18
LCL_DP0/C0/$\overline{\text{BE0}}$		AE12
LCL_DP1/C1/$\overline{\text{BE1}}$		AA13
LCL_DP2/C2/$\overline{\text{BE2}}$		AC15
LCL_DP3/C3/$\overline{\text{BE3}}$		AF19
$\overline{\text{IRQ0}}$/$\overline{\text{NMI\_OUT}}$		A11
$\overline{\text{IRQ7}}$/$\overline{\text{INT\_OUT}}$/$\overline{\text{APE}}$		E5
$\overline{\text{TRST}}$		F22
TCK		A24
TMS		C24
TDI		A25
TDO		B24
$\overline{\text{TRIS}}$		C19
$\overline{\text{PORESET}}$		B25
$\overline{\text{HRESET}}$		D24
$\overline{\text{SRESET}}$		E23

Table 21. MPC8275VR and MPC8270VR Pinout List (Continued)

Pin Name		Ball
MPC8275VR/MPC8270VR	MPC8275VR only (UTOPIA Pins)	
$\overline{\text{QREQ}}$		D18
$\overline{\text{RSTCONF}}$		E24
MODCK1/AP1/TC0/BNKSEL0		B16
MODCK2/AP2/TC1/BNKSEL1		F16
MODCK3/AP3/TC2/BNKSEL2		A15
CLKIN1		G22
PA0/$\overline{\text{RESTART1}}$/DREQ3	FCC2_UTM_TXADDR2	AC20[1]
PA1/$\overline{\text{REJECT1}}$/$\overline{\text{DONE3}}$	FCC2_UTM_TXADDR1	AC21[1]
PA2/CLK20/$\overline{\text{DACK3}}$	FCC2_UTM_TXADDR0	AF25[1]
PA3/CLK19/$\overline{\text{DACK4}}$/L1RXD1A2	FCC2_UTM_RXADDR0	AE24[1]
PA4/$\overline{\text{REJECT2}}$/$\overline{\text{DONE4}}$	FCC2_UTM_RXADDR1	AA21[1]
PA5/$\overline{\text{RESTART2}}$/DREQ4	FCC2_UTM_RXADDR2	AD25[1]
PA6	L1RSYNCA1	AC24[1]
PA7/SMSYN2	L1TSYNCA1/L1GNTA1	AA22[1]
PA8/SMRXD2	L1RXD0A1/L1RXDA1	AA23[1]
PA9/SMTXD2	L1TXD0A1	Y26[1]
PA10/MSNUM5	FCC1_UT8_RXD0/FCC1_UT16_RXD8	W22[1]
PA11/MSNUM4	FCC1_UT8_RXD1/FCC1_UT16_RXD9	W23[1]
PA12/MSNUM3	FCC1_UT8_RXD2/ FCC1_UT16_RXD10	V26[1]
PA13/MSNUM2	FCC1_UT8_RXD3/ FCC1_UT16_RXD11	V25[1]
PA14/FCC1_MII_HDLC_RXD3	FCC1_UT8_RXD4/ FCC1_UT16_RXD12	T22[1]
PA15/FCC1_MII_HDLC_RXD2	/FCC1_UT8_RXD5/ FCC1_UT16_RXD13	T25[1]
PA16/FCC1_MII_HDLC_RXD1/ FCC1_RMII_RXD1	FCC1_UT8_RXD6/ FCC1_UT16_RXD14	R24[1]
PA17/FCC_MII_HDLC_RXD0/ FCC1_MII_TRAN_RXD/ FCCI_RMII_RXD0	FCC1_UT8_RXD7/ FCC1_UT16_RXD15	P22[1]
PA18/FCC1_MII_HDLC_TXD0/ FCC1_MIITRAN_TXD/ FCC1_RMII_TXD0	FCC1_UT8_TXD7/FCC1_UT16_TXD15	N26[1]
PA19/FCC1_MII_HDLC_TXD1/ FCC1_RMII_TXD1	FCC1_UT8_TXD6/FCC1_UT16_TXD14	N23[1]
PA20/FCC1_MII_HDLC_TXD2	FCC1_UT8_TXD5/FCC1_UT16_TXD13	K26[1]
PA21/FCC1_MII_HDLC_TXD3	FCC1_UT8_TXD4/FCC1_UT16_TXD12	L23[1]

Table 21. MPC8275VR and MPC8270VR Pinout List (Continued)

Pin Name		Ball
MPC8275VR/MPC8270VR	MPC8275VR only (UTOPIA Pins)	
PA22	FCC1_UT8_TXD3/FCC1_UT16_TXD11	K23[1]
PA23	FCC1_UT8_TXD2/FCC1_UT16_TXD10	H26[1]
PA24/MSNUM1	FCC1_UT8_TXD1/FCC1_UT16_TXD9	F25[1]
PA25/MSNUM0	FCC1_UT8_TXD0/FCC1_UT16_TXD8	D26[1]
PA26/FCC1_MII_RMII_RX_ER/	FCC1_UTM_RXCLAV/ FCC1_UTS_RXCLAV	D25[1]
PA27/FCC1_MII_RX_DV/ FCC1_RMII_CRS_DV	FCC1_UT_RXSOC	C25[1]
PA28/FCC1_MII_TX_EN/ FCC1_RMII_TX_EN	$\overline{\text{FCC1\_UTM\_RXENB}}$/ $\overline{\text{FCC1\_UTS\_RXENB}}$	C22[1]
PA29/FCC1_MII_TX_ER	FCC1_UT_TXSOC	B21[1]
PA30/FCC1_MII_CRS/$\overline{\text{FCC1\_RTS}}$	FCC1_UTM_TXCLAV/ FCC1_UTS_TXCLAV	A20[1]
PA31/FCC1_MII_COL	$\overline{\text{FCC1\_UTM\_TXENB}}$/ $\overline{\text{FCC1\_UTS\_TXENB}}$	A19[1]
PB4/FCC3_MII_HDLC_TXD3/ L1RSYNCA2/$\overline{\text{FCC3\_RTS}}$	FCC2_UT8_RXD0	AD21[1]
PB5/FCC3_MII_HDLC_TXD2/ L1TSYNCA2/L1GNTA2	FCC2_UT8_RXD1	AD22[1]
PB6/FCC3_MII_HDLC_TXD1/ FCC3_RMII_TXD1/ L1RXDA2/L1RXD0A2	FCC2_UT8_RXD2	AC22[1]
PB7/FCC3_MII_HDLC_TXD0/ FCC3_RMII_TXD0/ FCC3_TXD/L1TXDA2/L1TXD0A2	FCC2_UT8_RXD3	AE26[1]
PB8/FCC3_MII_HDLC_RXD0/ FCC3_RMII_RXD0/ FCC3_RXD/TXD3	FCC2_UT8_TXD3/L1RSYNCD1	AB23[1]
PB9/FCC3_MII_HDLC_RXD1/ FCC3_RMII_RXD1/L1TXD2A2	FCC2_UT8_TXD2/L1TSYNCD1/ L1GNTD1	AC26[1]
PB10/FCC3_MII_HDLC_RXD2	FCC2_UT8_TXD1/L1RXDD1	AB26[1]
PB11/FCC3_MII_HDLC_RXD3	FCC2_UT8_TXD0/L1TXDD1	AA25[1]
PB12/FCC3_MII_CRS/TXD2	L1CLKOB1/L1RSYNCC1	W26[1]
PB13/FCC3_MII_COL/L1TXD1A2	$\overline{\text{L1RQB1}}$/L1TSYNCC1/L1GNTC1	W25[1]
PB14/FCC3_MII_RMII_TX_EN	L1RXDC1	V24[1]
PB15/FCC3_MII_TX_ER/RXD2	L1TXDC1	U24[1]
PB16/FCC3_MII_RMII_RX_ER/CLK18	L1CLKOA1	R22[1]
PB17/FCC3_MII_RX_DV/ CLK17/FCC3_RMII_CRS_DV	L1RQA1	R23[1]

Table 21. MPC8275VR and MPC8270VR Pinout List (Continued)

Pin Name		Ball
MPC8275VR/MPC8270VR	**MPC8275VR only (UTOPIA Pins)**	
PB18/FCC2_MII_HDLC_RXD3/ L1CLKOD2/L1RXD2A2	FCC2_UT8_RXD4	M23[1]
PB19FCC2_MII_HDLC_RXD2/ L1RQD2/L1RXD3A2	FCC2_UT8_RXD5	L24[1]
PB20/FCC2_MII_HDLC_RMII_RXD1 /L1RSYNCD2/L1TXD1A1	FCC2_UT8_RXD6	K24[1]
PB21//FCC2_MII_HDLC_RMII_RXD0/ FCC2_TRAN_RXD/L1TSYNCD2/ L1GNTD2	FCC2_UT8_RXD7/L1TXD2A1	L21[1]
PB22/FCC2_MII_HDLC_RMII_TXD0/ FCC2_TXD/FCC2_RMII_TXD0/ L1RXDD2	FCC2_UT8_TXD7/L1RXD1A1	P25[1]
PB23/FCC2_MII_HDLC_TXD1/ L1RXD2A1/L1TXDD2/ FCC2_RMII_TXD1	FCC2_UT8_TXD6/L1RXD2A1	N25[1]
PB24/FCC2_MII_HDLC_TXD2/ L1RSYNCC2	FCC2_UT8_TXD5/L1RXD3A1	E26[1]
PB25/FCC2_MII_HDLC_TXD3/ L1TSYNCC2/L1GNTC2	FCC2_UT8_TXD4/L1TXD3A1	H23[1]
PB26/FCC2_MII_CRS/L1RXDC2	FCC2_UT8_TXD1	C26[1]
PB27/FCC2_MII_COL/L1TXDC2	FCC2_UT8_TXD0	B26[1]
PB28/FCC2_MII_RX_ER/FCC2_RMII_RX_ER/ $\overline{\text{FCC2\_RTS}}$/L1TSYNCB2/L1GNTB2/TXD1		A22[1]
PB29/L1RSYNCB2/ FCC2_MII_TX_EN/FCC2_RMII_TX_EN	FCC2_UTM_RXCLAV/ FCC2_UTS_RXCLAV	A21[1]
PB30/FCC2_MII_RX_DV/L1RXDB2/ FCC2_RMII_CRS_DV	FCC2_UT_TXSOC	E20[1]
PB31/FCC2_MII_TX_ER/L1TXDB2	FCC2_UT_RXSOC	C20[1]
PC0/DREQ1/BRGO7/$\overline{\text{SMSYN2}}$/ L1CLKOA2		AE22[1]
PC1/DREQ2/$\overline{\text{SPISEL}}$/BRGO6/$\overline{\text{L1RQA2}}$		AA19[1]
PC2/$\overline{\text{FCC3\_CD}}$/$\overline{\text{DONE2}}$	FCC2_UT8_TXD3	AF24[1]
PC3/$\overline{\text{FCC3\_CTS}}$/$\overline{\text{DACK2}}$/$\overline{\text{CTS4}}$/ USB_RP	FCC2_UT8_TXD2	AE25[1]
PC4/SI2_L1ST4/$\overline{\text{FCC2\_CD}}$	$\overline{\text{FCC2\_UTM\_RXENB}}$/ $\overline{\text{FCC2\_UTS\_RXENB}}$	AB22[1]
PC5/SI2_L1ST3/$\overline{\text{FCC2\_CTS}}$	FCC2_UTM_TXCLAV/ FCC2_UTS_TXCLAV	AC25[1]
PC6/$\overline{\text{FCC1\_CD}}$	L1CLKOC1/FCC1_UTM_RXADDR2/ FCC1_UTS_RXADDR2/ FCC1_UTM_RXCLAV1	AB25[1]

Table 21. MPC8275VR and MPC8270VR Pinout List (Continued)

Pin Name		Ball
MPC8275VR/MPC8270VR	MPC8275VR only (UTOPIA Pins)	
PC7/FCC1_CTS	L1RQC1/FCC1_UTM_TXADDR2/ FCC1_UTS_TXADDR2/ FCC1_UTM_TXCLAV1	AA24[1]
PC8/CD4/RENA4/SI2_L1ST2/CTS3/ USB_RN	FCC1_UT16_TXD0	Y24[1]
PC9/CTS4/CLSN4/SI2_L1ST1/ L1TSYNCA2/L1GNTA2/USB_RP	FCC1_UT16_TXD1	U22[1]
PC10/CD3/RENA3	FCC1_UT16_TXD2/SI1_L1ST4/ FCC2_UT8_RXD3	V23[1]
PC11/CTS3/CLSN3/L1TXD3A2	L1CLKOD1/FCC2_UT8_RXD2	U23[1]
PC12/CD2/RENA2	SI1_L1ST3/FCC1_UTM_RXADDR1/ FCC1_UTS_RXADDR1	T26[1]
PC13/CTS2/CLSN2	L1RQD1/FCC1_UTM_TXADDR1/ FCC1_UTS_TXADDR1	R26[1]
PC14/CD1/RENA1	FCC1_UTM_RXADDR0/ FCC1_UTS_RXADDR0	P26[1]
PC15/CTS1/CLSN1/SMTXD2	FCC1_UTM_TXADDR0/ FCC1_UTS_TXADDR0	P24[1]
PC16/CLK16/TIN4		M26[1]
PC17/CLK15/TIN3/BRGO8		L26[1]
PC18/CLK14/TGATE2		M24[1]
PC19/CLK13/BRGO7		L22[1]
PC20/CLK12/TGATE1/USB_OE		K25[1]
PC21/CLK11/BRGO6		J25[1]
PC22/CLK10/DONE1		G26[1]
PC23/CLK9/BRGO5/DACK1		F26[1]
PC24/CLK8/TOUT4	FCC2_UT8_TXD3	G24[1]
PC25/CLK7/BRGO4	FCC2_UT8_TXD2	E25[1]
PC26/CLK6/TOUT3/TMCLK		G23[1]
PC27/FCC3_TXD/FCC3_TXD0/CLK5/ BRGO3		B23[1]
PC28/CLK4/TIN1/TOUT2/CTS2/CLSN2		E22[1]
PC29/CLK3/TIN2/BRGO2/CTS1/CLSN1		E21[1]
PC30/CLK2/TOUT1	FCC2_UT8_TXD3	D21[1]
PC31/CLK1/BRGO1		B20[1]
PD4/BRGO8/FCC3_RTS/SMRXD2	L1TSYNCD1/L1GNTD1	AF23[1]
PD5/DONE1	FCC1_UT16_TXD3	AE23[1]
PD6/DACK1	FCC1_UT16_TXD4	AB21[1]

Table 21. MPC8275VR and MPC8270VR Pinout List (Continued)

Pin Name		Ball
MPC8275VR/MPC8270VR	**MPC8275VR only (UTOPIA Pins)**	
PD7/SMSYN1/FCC1_TXCLAV2	FCC1_UTM_TXADDR3/ FCC1_UTS_TXADDR3/ FCC2_UTM_TXADDR4 FCC2_UTS_TXADDR1	AD23[1]
PD8/SMRXD1/BRGO5	FCC2_UT_TXPRTY	AD26[1]
PD9/SMTXD1/BRGO3	FCC2_UT_RXPRTY	Y22[1]
PD10/L1CLKOB2/BRGO4	FCC2_UT8_RXD1/L1RSYNCB1	AB24[1]
PD11/$\overline{\text{L1RQB2}}$	FCC2_UT8_RXD0/L1TSYNCB1/ L1GNTB1	Y23[1]
PD12	SI1_L1ST2/L1RXDB1	AA26[1]
PD13	SI1_L1ST1/L1TXDB1	W24[1]
PD14/L1CLKOC2/I2CSCL	FCC1_UT16_RXD0	V22[1]
PD15/$\overline{\text{L1RQC2}}$/I2CSDA	FCC1_UT16_RXD1	U26[1]
PD16/SPIMISO	FCC1_UT_TXPRTY/L1TSYNCC1/ L1GNTC1	T23[1]
PD17/BRGO2/SPIMOSI	FCC1_UT_RXPRTY	R25[1]
PD18/SPICLK	FCC1_UTM_RXADDR4/ FCC1_UTS_RXADDR4/ FCC1_UTM_RXCLAV3/ FCC2_UTM_RXADDR3/ FCC2_UTS_RXADDR0	P23[1]
PD19/SPISEL/BRGO1	FCC1_UTM_TXADDR4/ FCC1_UTS_TXADDR4/ FCC1_UTM_TXCLAV3/ FCC2_UTM_TXADDR3/ FCC2_UTS_TXADDR0	N22[1]
PD20/$\overline{\text{RTS4}}$/TENA4/L1RSYNCA2/ USB_TP	FCC1_UT16_RXD2	M25[1]
PD21/TXD4/L1RXD0A2/L1RXDA2/ USB_TN	FCC1_UT16_RXD3	L25[1]
PD22/RXD4L1TXD0A2/L1TXDA2/ USB_RXD	FCC1_UT16_TXD5	J26[1]
PD23/$\overline{\text{RTS3}}$/TENA3	FCC1_UT16_RXD4/L1RSYNCD1	K22[1]
PD24/TXD3	FCC1_UT16_RXD5/L1RXDD1	G25[1]
PD25/RXD3	FCC1_UT16_TXD6/L1TXDD1	H24[1]
PD26/$\overline{\text{RTS2}}$/TENA2	FCC1_UT16_RXD6/L1RSYNCC1	F24[1]
PD27/TXD2	FCC1_UT16_RXD7/L1RXDC1	H22[1]
PD28/RXD2	FCC1_UT16_TXD7/L1TXDC1	B22[1]

Table 21. MPC8275VR and MPC8270VR Pinout List (Continued)

Pin Name		Ball
MPC8275VR/MPC8270VR	**MPC8275VR only (UTOPIA Pins)**	
PD29/$\overline{\text{RTS1}}$/TENA1	FCC1_UTM_RXADDR3/ FCC1_UTS_RXADDR3/ FCC1_UTM_RXCLAV2/ FCC2_UTM_RXADDR4/ FCC2_UTS_RXADDR1	D22[1]
PD30/TXD1	$\overline{\text{FCC2\_UTM\_TXENB}}$/ $\overline{\text{FCC2\_UTS\_TXENB}}$	C21[1]
PD31/RXD1		E19[1]
VCCSYN		D19
VCCSYN1		K6
CLKIN2		K21
SPARE4[2]		C14
$\overline{\text{PCI\_MODE}}$[3]		AD24
SPARE6[2]		B15
THERMAL0[4]		E17
THERMAL1[4]		C23
I/O power		E6, F6, H6, L5, L6, P6, T6, U6, V5, Y5, AA6, AA8, AA10, AA11, AA14, AA16, AA17, AB19, AB20, W21, U21, T21, P21, N21, M22, J22, H21, F21, F19, F17, E16, F14, E13, E12, F10, E10, E9
Core Power		L3, V4, W3, AC11, AD11, AB15, U25, T24, J24, H25, F23, B19, D17, C17, D10, C10
Ground		B18[5], A18[6], A2, B1, B2, A5, C5, C18, D4, D6, G2, L4, P1, R1, R4, AC4, AE7, AC23, Y25, N24, J23, A23, D23, D20, E18, A13, A16, K10, K11, K12, K13, K14, K15, K16, K17, L10, L11, L12, L13, L14, L15, L16, L17, M10, M11, M12, M13, M14, M15, M16, M17, N10, N11, N12, N13, N14, N15, N16, N17, P10, P11, P12, P13, P14, P15, P16, P17, R10, R11,R12, R13, R14, R15, R16, R17, T10, T11, T12, T13, T14, T15, T16, T17, U10, U11, U12, U13, U14, U15, U16, U17

[1] The default configuration of the CPM pins (PA[0–31], PB[4–31], PC[0–31], PD[4–31]) is input. To prevent excessive DC current, it is recommended to either pull unused pins to GND or VDDH, or to configure them as outputs.
[2] Must be pulled down or left floating.
[3] If PCI is not desired, must be pulled up or left floating.
[4] For information on how to use this pin, refer to *MPC8260 PowerQUICC II Thermal Resistor Guide* (AN2271/D).

[5] GNDSYN (B18): This pin exists as a separate ground signal in MPC826x(A) devices; it does not exist as a separate ground signal on the MPC8275VR/MPC8270VR. New designs must connect B18 to GND and follow the suggestions in Section 1.2.2.1, “Layout Practices.” Old designs in which the MPC8275VR/MPC8270VR is used as a drop-in replacement can leave the pin connected to GND with the noise filtering capacitors.

[6] XFC (A18) pin: This pin is used in MPC826x(A) devices; it is not used in MPC8275VR/MPC8270VR because there is no need for external capacitor to operate the PLL. New designs should connect A18 (XFC) pin to GND. Old designs in which the MPC8275VR/MPC8270VR is used as a drop-in replacement can leave the pin connected to the current capacitor.

1.5 Package Description

The following sections provide the package parameters and mechanical dimensions.

1.5.1 Package Parameters

Package parameters are provided in Table 22.

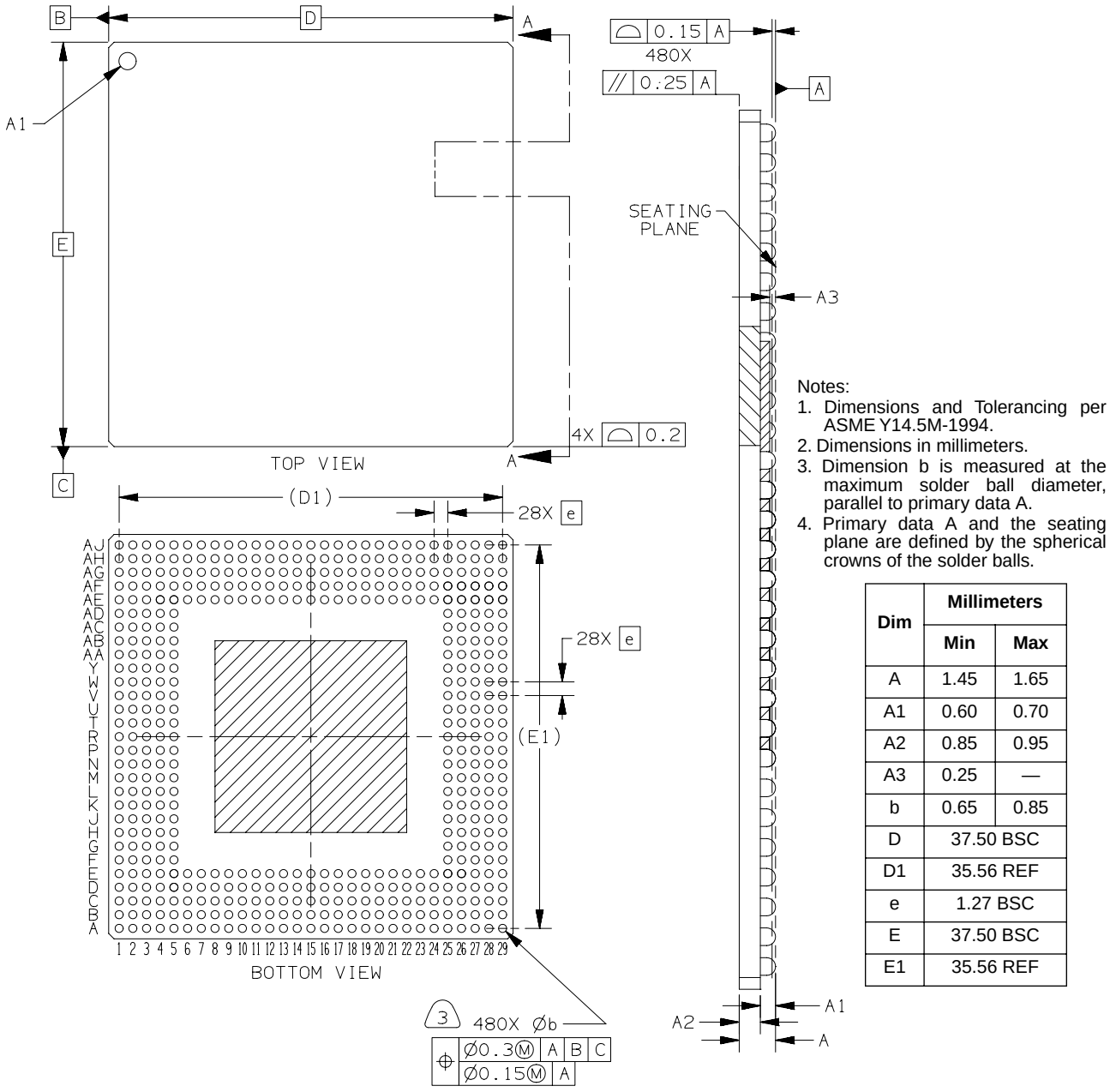
Table 22. Package Parameters

Package	Devices	Outline (mm)	Type	Interconnects	Pitch (mm)	Nominal Unmounted Height (mm)
ZU	MPC8280 MPC8270	37.5 x 37.5	TBGA	480	1.27	1.55
VR	MPC8275VR MPC8270VR	27 x 27	PBGA	516	1	2.25

1.5.2 Mechanical Dimensions

1.5.2.1 ZU Package Dimensions

Figure 17 provides the mechanical dimensions and bottom surface nomenclature of the 480 TBGA package.



Notes:
1. Dimensions and Tolerancing per ASME Y14.5M-1994.
2. Dimensions in millimeters.
3. Dimension b is measured at the maximum solder ball diameter, parallel to primary data A.
4. Primary data A and the seating plane are defined by the spherical crowns of the solder balls.

Dim	Millimeters	
	Min	Max
A	1.45	1.65
A1	0.60	0.70
A2	0.85	0.95
A3	0.25	—
b	0.65	0.85
D	37.50 BSC	
D1	35.56 REF	
e	1.27 BSC	
E	37.50 BSC	
E1	35.56 REF	

Figure 17. Mechanical Dimensions and Bottom Surface Nomenclature—480 TBGA

1.5.2.2 VR Package Dimensions

Figure 18 provides the mechanical dimensions and bottom surface nomenclature of the 516 PBGA package.

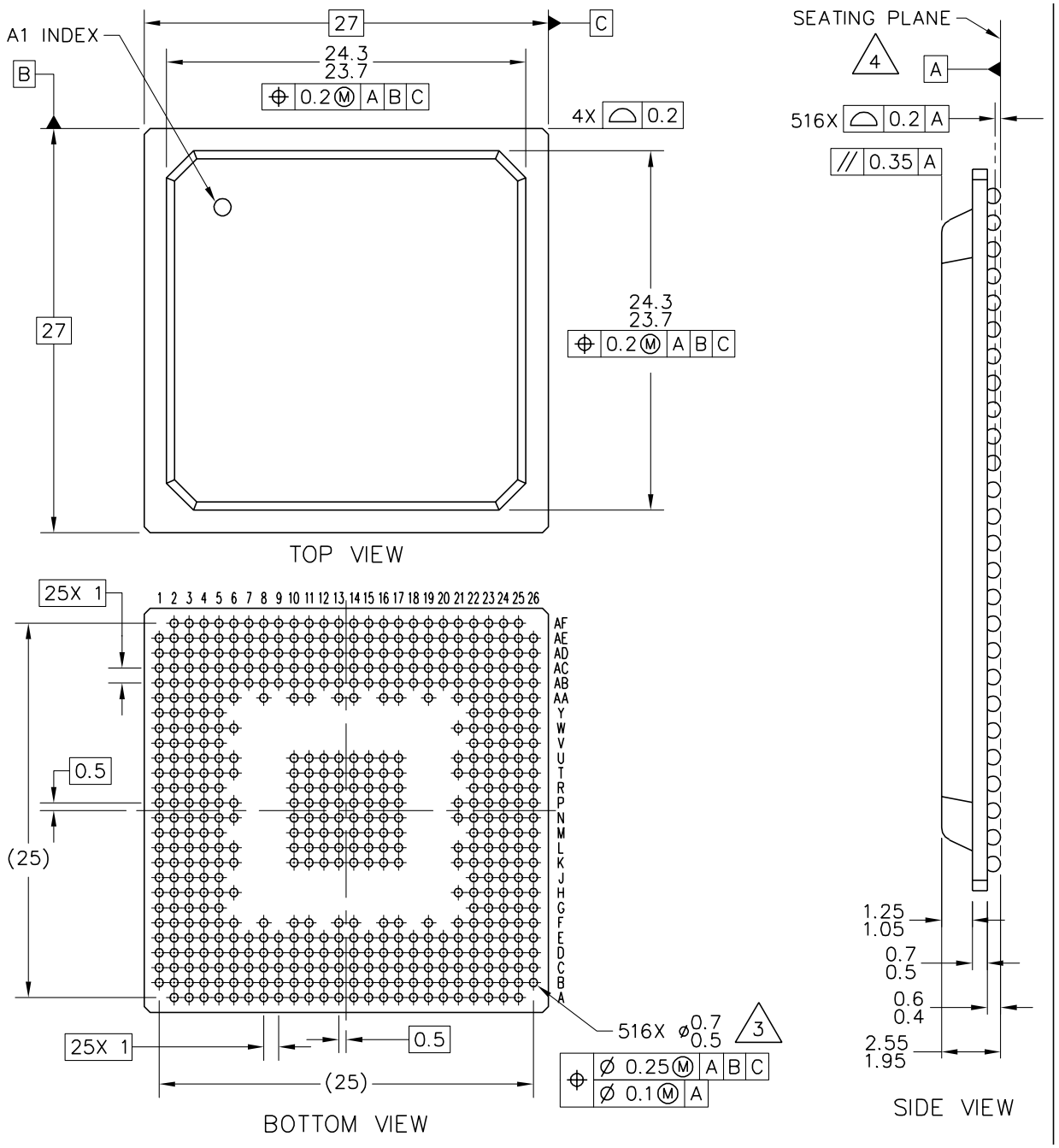


Figure 18. Mechanical Dimensions and Bottom Surface Nomenclature—516 PBGA

1.6 Ordering Information

Figure 19 provides an example of the Motorola part numbering nomenclature for the MPC8280. In addition to the processor frequency, the part numbering scheme also consists of a part modifier that indicates any enhancement(s) in the part from the original production design. Each part number also contains a revision code that refers to the die mask revision number and is specified in the part numbering scheme for identification purposes only. For more information, contact your local Motorola sales office.

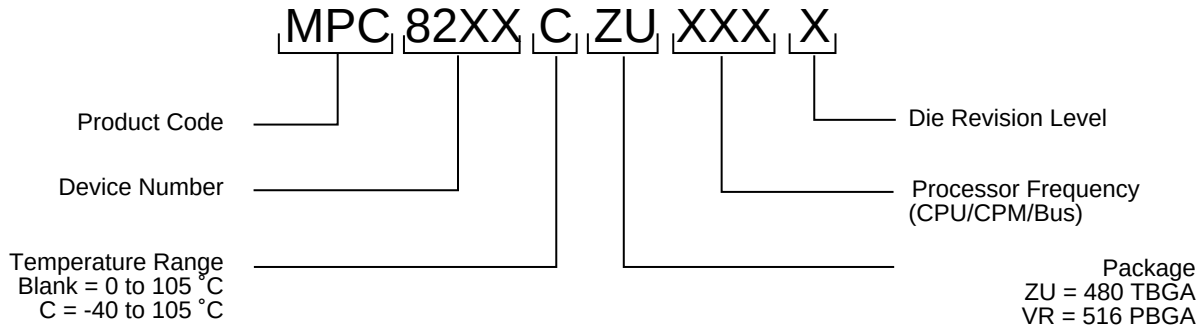


Figure 19. Motorola Part Number Key

Table 23. Document Revision History

Revision	Date	Substantive Changes
0	—	—
0.1		Initial public release
0.2	11/2002	Table 21, “VR Pinout”: Addition of C18 to the Ground (GND) pin list (page 63)
0.3	6/2003	• Removal of notes stating “no local bus” on VR-package devices. The MPC8270VR and the MPC8275VR have local bus support. • References to “G2 core” changed to “G2_LE core.” Refer to the *G2 Core Reference Manual* (G2CORERM/D). • Addition of VCCSYN to “Note” below Table 3, and to note 2 of Table 4 • Figure 2: New • Table 4: Addition of note 1 • Table 5: Addition of θ_{JB} and θ_{JC}. Modifications to ZU package values. • Table 6: Addition of various configurations, Modification of values. Addition of note 3. • Table 8: Addition of 66 MHZ and 100 MHz values. Addition of sp42a/sp43a. • Table 9: Addition of 66 MHZ and 100 MHz values • Table 11: sp30 values. sp33b @100 MHz value. Removal of previous note 2. Modification of current note 2. • Figure 5, Figure 6, Figure 7, and Figure 8: Addition of notes • Section 1.2.3.2: Addition of note on PCI timing • Table 14, Table 15, Table 16, Table 17, Table 18: Addition of note 1 concerning minimum operating frequencies • Addition of statement before clock tables about selection of clock configuration and input frequency • Table 19 and Table 21: Addition of note 1 to CPM pins

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