

## Advance Information

MPC8280EC/D  
Rev. 0.1, 10/2002

MPC8280  
Hardware Specifications



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

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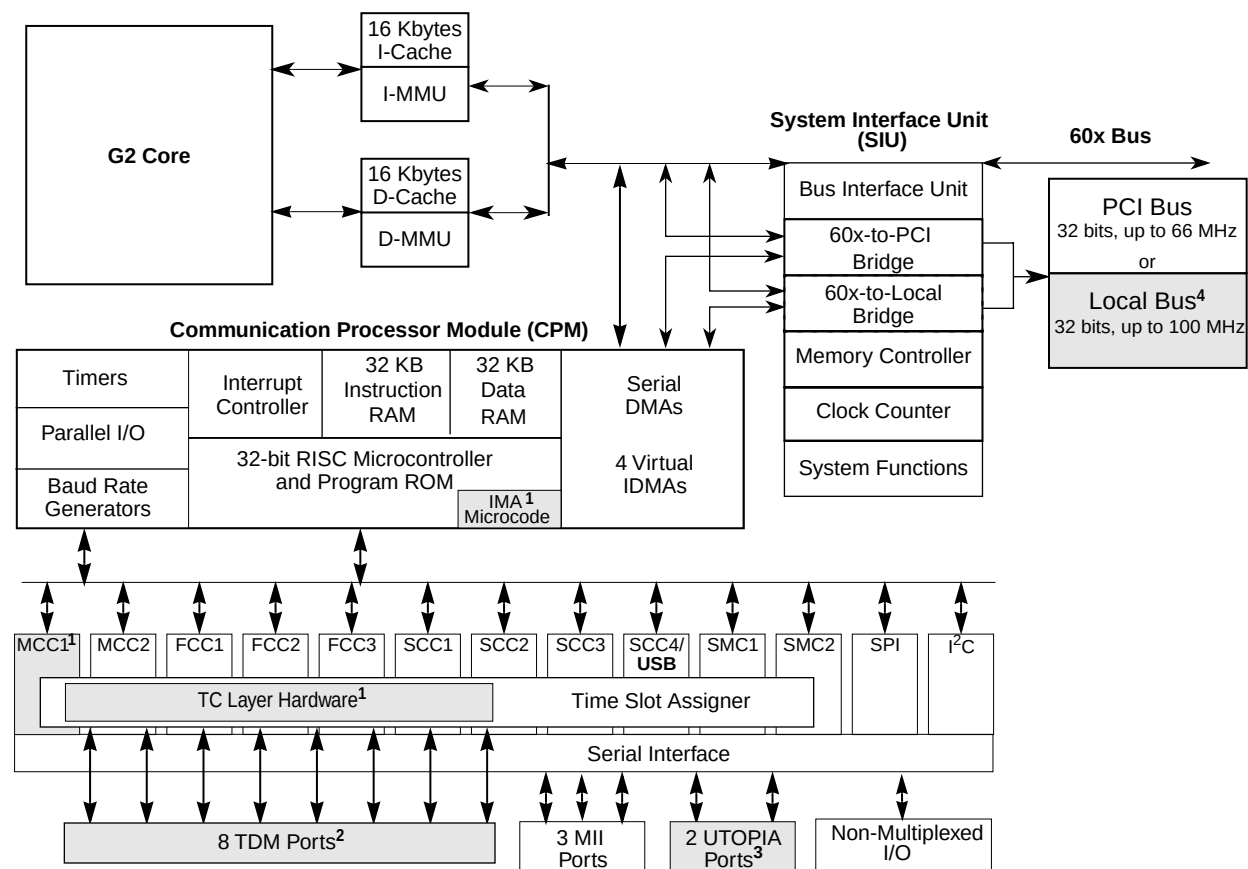
HiP7 members of the PowerQUICC II™ family are available in two packages—the standard ZU package and an alternate VR package—as shown in Table 1. For more information on VR packages, contact your Motorola sales office. Note that throughout this document references to the MPC8280 are inclusive of VR-package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

**Table 1. HiP7 PowerQUICC II Device Packages**

| ZU<br>(480 TBGA) | VR<br>(516 PBGA) |
|------------------|------------------|
| MPC8280          | —                |
| —                | MPC8275VR        |
| MPC8270          | MPC8270VR        |

## Features

Figure 1 shows the block diagram for the MPC8280. Shaded portions are device- or package-specific; refer to the notes below.



### Notes:

- <sup>1</sup> MPC8280 only (not on MPC8270 nor the VR package (MPC8270VR and MPC8275VR))
- <sup>2</sup> MPC8280 only (4 TDMs on MPC8270 and the VR package (MPC8270VR and MPC8275VR))
- <sup>3</sup> MPC8280 and MPC8275VR only (not on MPC8270 nor MPC8270VR)
- <sup>4</sup> No local bus on the VR package (MPC8270VR and MPC8275VR)

Figure 1. MPC8280 Block Diagram

## 1.1 Features

The major features of the MPC8280 are as follows:

- Dual-issue integer (G2) 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 (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 core and for the CPM
  - G2 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<sub>2</sub>O standard
  - Hot-Swap friendly (supports the Hot Swap Specification as defined by PICMG 2.1 R1.0)

## Features

- 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 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<sup>2</sup>C) controller (identical to the MPC860 I<sup>2</sup>C 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<sup>1</sup>**

| Rating                           | Symbol           | Value           | Unit |
|----------------------------------|------------------|-----------------|------|
| Core supply voltage <sup>2</sup> | VDD              | -0.3 – 2.25     | V    |
| PLL supply voltage <sup>2</sup>  | VCCSYN           | -0.3 – 2.25     | V    |
| I/O supply voltage <sup>3</sup>  | VDDH             | -0.3 – 4.0      | V    |
| Input voltage <sup>4</sup>       | VIN              | GND(-0.3) – 3.6 | V    |
| Junction temperature             | T <sub>j</sub>   | 120             | °C   |
| Storage temperature range        | T <sub>STG</sub> | (-55) – (+150)  | °C   |

<sup>1</sup> 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.

<sup>2</sup> **Caution:** VDD/VCCSYN must not exceed VDDH by more than 0.4 V at any time, including during power-on reset.

<sup>3</sup> **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.

<sup>4</sup> **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<sup>1</sup>**

| 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 <sub>j</sub> | 105 <sup>2</sup>   | °C   |
| Ambient temperature            | T <sub>A</sub> | 0–70 <sup>2</sup>  | °C   |

<sup>1</sup> **Caution:** These are the recommended and tested operating conditions. Proper operation outside of these conditions is not guaranteed.

<sup>2</sup> Note that for extended temperature parts the range is (-40)<sub>T<sub>A</sub></sub>–105<sub>T<sub>j</sub></sub>.

#### NOTE

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

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  $V_{CC}$ ).

Table 4 shows DC electrical characteristics.

**Table 4. DC Electrical Characteristics**

| 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, $V_{IN} = V_{DDH}^1$                                                                                                                                                                | $I_{IN}$  | —   | 10    | $\mu A$ |
| Hi-Z (off state) leakage current, $V_{IN} = V_{DDH}^1$                                                                                                                                                     | $I_{OZ}$  | —   | 10    | $\mu A$ |
| Signal low input current, $V_{IL} = 0.8$ V                                                                                                                                                                 | $I_L$     | —   | 1     | $\mu A$ |
| Signal high input current, $V_{IH} = 2.0$ V                                                                                                                                                                | $I_H$     | —   | 1     | $\mu A$ |
| Output high voltage, $I_{OH} = -2$ mA<br>except UTOPIA mode, and open drain pins<br><br>In UTOPIA mode <sup>2</sup> (UTOPIA pins only): $I_{OH} = -8.0$ mA<br>PA[0-31]<br>PB[4-31]<br>PC[0-31]<br>PD[4-31] | $V_{OH}$  | 2.4 | —     | V       |
| In UTOPIA mode <sup>2</sup> (UTOPIA pins only): $I_{OL} = 8.0$ mA<br>PA[0-31]<br>PB[4-31]<br>PC[0-31]<br>PD[4-31]                                                                                          | $V_{OL}$  | —   | 0.5   | V       |

Table 4. DC Electrical Characteristics (Continued)

| Characteristic                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Symbol   | Min | Max | Unit |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-----|-----|------|
| $I_{OL} = 7.0\text{mA}$<br>$\overline{\text{BR}}$<br>$\overline{\text{BG}}$<br>$\overline{\text{ABB/IRQ2}}$<br>$\overline{\text{TS}}$<br>$\text{A}[0-31]$<br>$\text{TT}[0-4]$<br>$\overline{\text{TBST}}$<br>$\text{TSIZE}[0-3]$<br>$\overline{\text{AACK}}$<br>$\overline{\text{ARTRY}}$<br>$\overline{\text{DBG}}$<br>$\overline{\text{DBB/IRQ3}}$<br>$\text{D}[0-63]$<br>$\text{DP}(0)/\overline{\text{RSRV/EXT\_BR2}}$<br>$\text{DP}(1)/\overline{\text{IRQ1/EXT\_BG2}}$<br>$\text{DP}(2)/\overline{\text{TLBISYNC/IRQ2/EXT\_DBG2}}$<br>$\text{DP}(3)/\overline{\text{IRQ3/EXT\_BR3/CKSTP\_OUT}}$<br>$\text{DP}(4)/\overline{\text{IRQ4/EXT\_BG3/CORE\_SREST}}$<br>$\text{DP}(5)/\overline{\text{TBEN/IRQ5/EXT\_DBG3}}$<br>$\text{DP}(6)/\overline{\text{CSE}(0)/\text{IRQ6}}$<br>$\text{DP}(7)/\overline{\text{CSE}(1)/\text{IRQ7}}$<br>$\overline{\text{PSDVAL}}$<br>$\overline{\text{TA}}$<br>$\overline{\text{TEA}}$<br>$\overline{\text{GBL/IRQ1}}$<br>$\overline{\text{CI/BADDR29/IRQ2}}$<br>$\overline{\text{WT/BADDR30/IRQ3}}$<br>$\overline{\text{L2\_HIT/IRQ4}}$<br>$\overline{\text{CPU\_BG/BADDR31/IRQ5}}$<br>$\overline{\text{CPU\_DBG}}$<br>$\overline{\text{CPU\_BR}}$<br>$\overline{\text{IRQ0/NMI\_OUT}}$<br>$\overline{\text{IRQ7/INT\_OUT/APE}}$<br>$\overline{\text{PORESET}}$<br>$\overline{\text{HRESET}}$<br>$\overline{\text{SRESET}}$<br>$\overline{\text{RSTCONF}}$<br>$\overline{\text{QREQ}}$ | $V_{OL}$ | —   | 0.4 | V    |



Table 4. DC Electrical Characteristics (Continued)

| Characteristic                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                | Symbol   | Min | Max | Unit |
|---------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------|-----|-----|------|
| $I_{OL} = 5.3\text{mA}$<br>$\overline{CS}[0-9]$<br>$\overline{CS}(10)/\overline{BCTL1}$<br>$\overline{CS}(11)/\overline{AP}(0)$<br>$\overline{BADDR}[27-28]$<br>$\overline{ALE}$<br>$\overline{BCTL0}$<br>$\overline{PWE}[0-7]/\overline{PSDDQM}[0-7]/\overline{PBS}[0-7]$<br>$\overline{PSDA10}/\overline{PGPL0}$<br>$\overline{PSDWE}/\overline{PGPL1}$<br>$\overline{POE}/\overline{PSDRAS}/\overline{PGPL2}$<br>$\overline{PSDCAS}/\overline{PGPL3}$<br>$\overline{PGTA}/\overline{PUPMWAIT}/\overline{PGPL4}/\overline{PPBS}$<br>$\overline{PSDAMUX}/\overline{PGPL5}$<br>$\overline{LWE}[0-3]/\overline{LSDDQM}[0-3]/\overline{LBS}[0-3]/\overline{PCI\_CFG}[0-3]$<br>$\overline{LSDA10}/\overline{LGPL0}/\overline{PCI\_MODCKH0}$<br>$\overline{LSDWE}/\overline{LGPL1}/\overline{PCI\_MODCKH1}$<br>$\overline{LOE}/\overline{LSDRAS}/\overline{LGPL2}/\overline{PCI\_MODCKH2}$<br>$\overline{LSDCAS}/\overline{LGPL3}/\overline{PCI\_MODCKH3}$<br>$\overline{LGTA}/\overline{LUPMWAIT}/\overline{LGPL4}/\overline{LPBS}$<br>$\overline{LSDAMUX}/\overline{LGPL5}/\overline{PCI\_MODCK}$<br>$\overline{LWR}$<br>$\overline{MODCK1}/\overline{AP}(1)/\overline{TC}(0)/\overline{BNKSEL}(0)$<br>$\overline{MODCK2}/\overline{AP}(2)/\overline{TC}(1)/\overline{BNKSEL}(1)$<br>$\overline{MODCK3}/\overline{AP}(3)/\overline{TC}(2)/\overline{BNKSEL}(2)$ | $V_{OL}$ | —   | 0.4 | V    |
| $I_{OL} = 3.2\text{mA}$<br>$\overline{L\_A14}/\overline{PAR}$<br>$\overline{L\_A15}/\overline{FRAME}/\overline{SMI}$<br>$\overline{L\_A16}/\overline{TRDY}$<br>$\overline{L\_A17}/\overline{IRDY}/\overline{CKSTP\_OUT}$<br>$\overline{L\_A18}/\overline{STOP}$<br>$\overline{L\_A19}/\overline{DEVSEL}$<br>$\overline{L\_A20}/\overline{IDSEL}$<br>$\overline{L\_A21}/\overline{PERR}$<br>$\overline{L\_A22}/\overline{SERR}$<br>$\overline{L\_A23}/\overline{REQ0}$<br>$\overline{L\_A24}/\overline{REQ1}/\overline{HSEJSW}$<br>$\overline{L\_A25}/\overline{GNT0}$<br>$\overline{L\_A26}/\overline{GNT1}/\overline{HSLED}$<br>$\overline{L\_A27}/\overline{GNT2}/\overline{HSENUM}$<br>$\overline{L\_A28}/\overline{RST}/\overline{CORE\_SRESET}$<br>$\overline{L\_A29}/\overline{INTA}$<br>$\overline{L\_A30}/\overline{REQ2}$<br>$\overline{L\_A31}$<br>$\overline{LCL\_D}(0-31)/\overline{AD}(0-31)$<br>$\overline{LCL\_DP}(0-3)/\overline{C}/\overline{BE}(0-3)$<br>$\overline{PA}[0-31]$<br>$\overline{PB}[4-31]$<br>$\overline{PC}[0-31]$<br>$\overline{PD}[4-31]$<br>$\overline{TDO}$                                                                                                                                                                                                                                                               |          |     |     |      |

<sup>1</sup> The leakage current is measured for nominal VDDH and VDD or both VDDH and VDD must vary in the same direction—VDDH and VDD must both vary in the positive direction (+0.165 VDDH and +0.075 VDD) or both vary in the negative direction (-0.165 VDDH and -0.075 VDD).

<sup>2</sup> MPC8280 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<br>(ZU package) | 516 PBGA<br>(VR package) |      |                    |
| Junction to ambient—<br>single-layer board <sup>1</sup> | $\theta_{JA}$ | 13.07                    | 27                       | °C/W | Natural convection |
|                                                         |               | 9.55                     | 21                       |      | 1 m/s              |
| Junction to ambient—<br>four-layer board                | $\theta_{JA}$ | 10.48                    | 19                       | °C/W | Natural convection |
|                                                         |               | 7.78                     | 16                       |      | 1 m/s              |

<sup>1</sup> Assumes no thermal vias

### 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  $\mu$ F 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 for conditions above  $P_D = 3W$  (when the ambient temperature is 70° C or greater) 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<sup>1</sup>**

| Bus<br>(MHz) | CPM<br>Multiplication<br>Factor | CPM<br>(MHz) | CPU<br>Multiplication<br>Factor | CPU<br>(MHz) | $P_{INT}(W)^2$             |         |
|--------------|---------------------------------|--------------|---------------------------------|--------------|----------------------------|---------|
|              |                                 |              |                                 |              | V <sub>DDI</sub> 1.5 Volts |         |
|              |                                 |              |                                 |              | Nominal                    | Maximum |
| 83.33        | 3                               | 250          | 4.5                             | 350          | 1.0                        | 1.2     |
| 83.33        | 3.5                             | 292          | 5                               | 417          | 1.1                        | 1.3     |
| 83.33        | 4                               | 333          | 6                               | 500          | 1.3                        | 1.5     |
| 100          | 3                               | 300          | 4                               | 400          | 1.1                        | 1.3     |
| 100          | 3                               | 300          | 4.5                             | 450          | 1.2                        | 1.45    |
| 100          | 3                               | 300          | 5                               | 500          | 1.25                       | 1.5     |

<sup>1</sup> Test temperature = room temperature (25° C)<sup>2</sup>  $P_{INT} = I_{DD} \times V_{DD}$  Watts

### 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-pf load. Typical output buffer impedances are shown in Table 7.

**Table 7. Output Buffer Impedances<sup>1</sup>**

| Output Buffers    | Typical Impedance ( $\Omega$ ) |
|-------------------|--------------------------------|
| 60x bus           | 45                             |
| Local bus         | 45                             |
| Memory controller | 45                             |
| Parallel I/O      | 45                             |
| PCI               | 25                             |

<sup>1</sup> These are typical values at 65° C. Impedance may vary by  $\pm 25\%$  with process and temperature.

Table 8 lists CPM output characteristics.

**Table 8. AC Characteristics for CPM Outputs<sup>1</sup>**

| Spec_num | Characteristic                                | Maximum Delay (ns) | Minimum Delay (ns) |
|----------|-----------------------------------------------|--------------------|--------------------|
| sp36a    | FCC outputs-internal clock (NMSI)             | 5.5                | 1                  |
| sp36b    | FCC outputs-external clock (NMSI)             | 12                 | 2                  |
| sp40     | TDM outputs/SI                                | 12                 | 3                  |
| sp38a    | SCC/SMC/SPI/I2C outputs-internal clock (NMSI) | 16                 | 0.5                |
| sp38b    | SCC/SMC/SPI/I2C outputs-external clock (NMSI) | 16                 | 2                  |
| sp42     | PIO/TIMER/DMA outputs                         | 11                 | 1                  |
| sp43     | COL width high (FCC)                          | —                  | 1.5 CLK            |

<sup>1</sup> 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.

## Electrical and Thermal Characteristics

Table 9 lists CPM input characteristics.

**Table 9. AC Characteristics for CPM Inputs<sup>1</sup>**

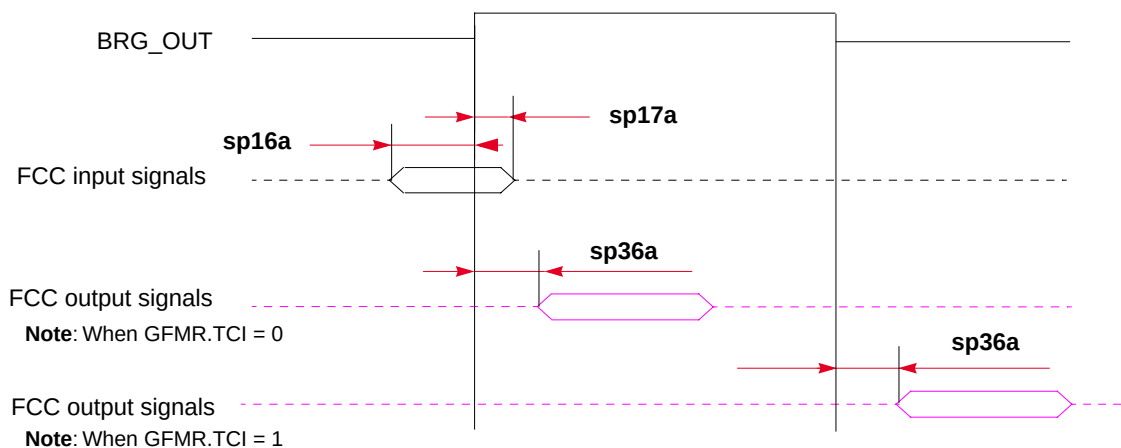
| Spec_num    | Characteristic                               | Setup (ns) | Hold (ns) |
|-------------|----------------------------------------------|------------|-----------|
| sp16a/sp17a | FCC inputs-internal clock (NMSI)             | 8          | 0         |
| sp16b/sp17b | FCC inputs-external clock (NMSI)             | 2.5        | 2         |
| sp20/sp21   | TDM inputs/SI                                | 5          | 3         |
| sp18a/sp19a | SCC/SMC/SPI/I2C inputs-internal clock (NMSI) | 16         | 0         |
| sp18b/sp19b | SCC/SMC/SPI/I2C inputs-external clock (NMSI) | 4          | 2         |
| sp22/sp23   | PIO/TIMER/DMA inputs                         | 8          | 1         |

<sup>1</sup> 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 2 shows the FCC internal clock.



**Figure 2. FCC Internal Clock Diagram**

Figure 3 shows the FCC external clock.

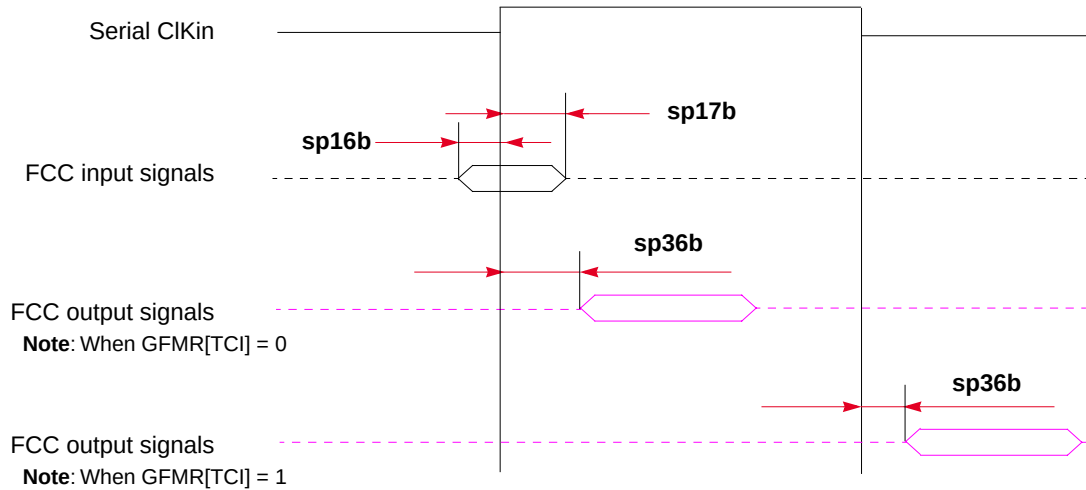
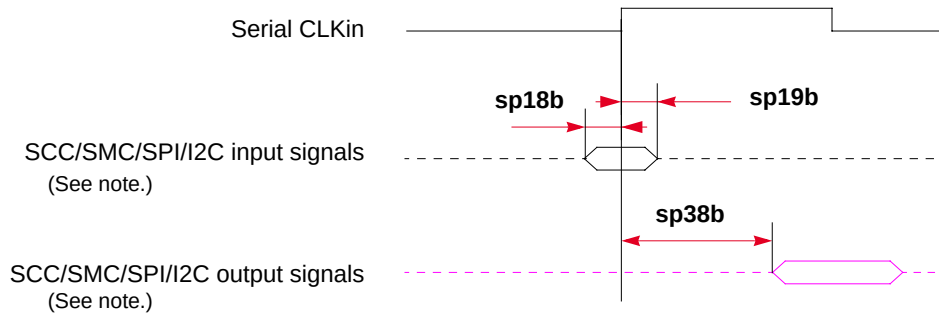


Figure 3. FCC External Clock Diagram

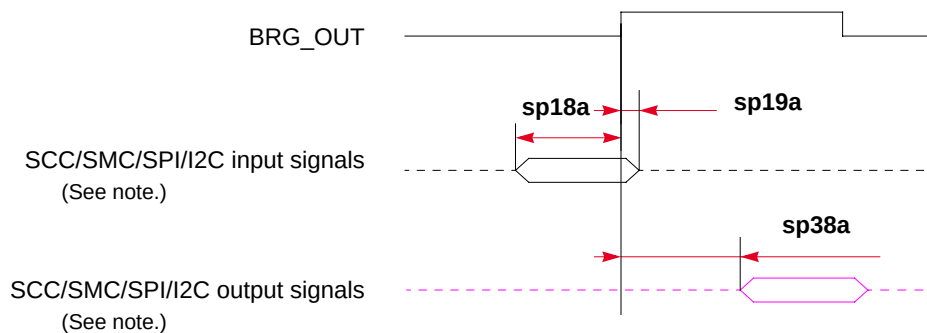
Figure 4 shows the SCC/SMC/SPI/I<sup>2</sup>C external clock.



Note: The clock edge is selectable on SCC and SPI.

Figure 4. SCC/SMC/SPI/I<sup>2</sup>C External Clock Diagram

Figure 5 shows the SCC/SMC/SPI/I<sup>2</sup>C internal clock.

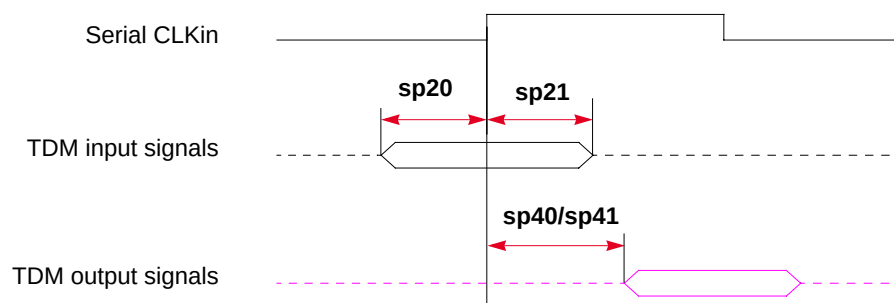


Note: The clock edge is selectable on SCC and SPI.

Figure 5. SCC/SMC/SPI/I<sup>2</sup>C Internal Clock Diagram

## Electrical and Thermal Characteristics

Figure 6 shows TDM input and output signals.

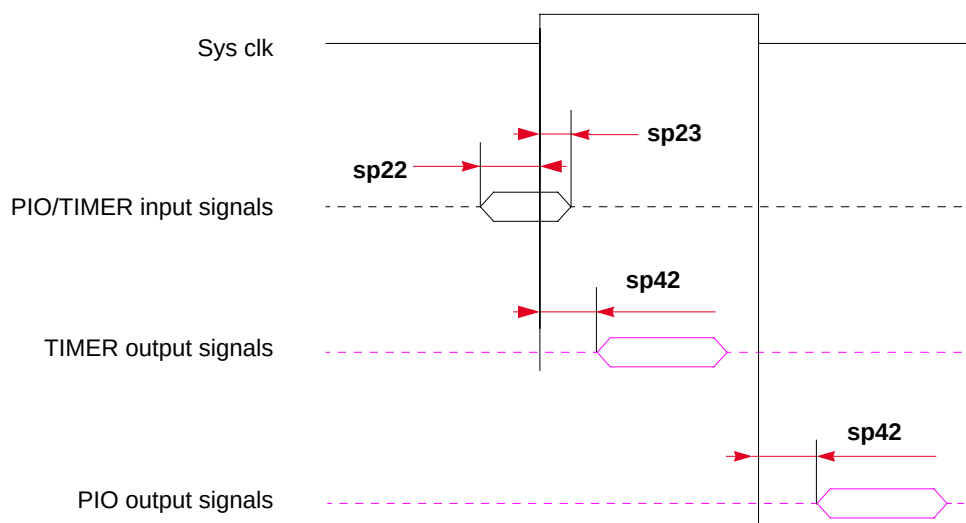


**Note:** There are four possible TDM timing conditions:

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 6. TDM Signal Diagram**

Figure 7 shows PIO and timer signals.



**Figure 7. PIO and Timer Signal Diagram**

Table 10 lists SIU input characteristics.

Table 10. AC Characteristics for SIU Inputs<sup>1</sup>

| Spec_num   | Characteristic                                     | Setup (ns) |        |         | Hold (ns) |        |         |
|------------|----------------------------------------------------|------------|--------|---------|-----------|--------|---------|
|            |                                                    | 66 MHz     | 83 MHz | 100 MHz | 66 MHz    | 83 MHz | 100 MHz |
| sp11/sp10  | AACK/TA/TS/DBG/BG/BR                               | 6          | 5      | 3.5     | 0.5       | 0.5    | 0.5     |
| sp11a/sp10 | ARTRY/ 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—<br>Data bus in ECC and PARITY modes | —          | 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    | 0.5     |
| sp15/sp10  | All other pins                                     | 5          | 4      | 3.5     | 0.5       | 0.5    | 0.5     |

<sup>1</sup> 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<sup>1</sup>

| Spec_num<br>(max/min) | Characteristic                              | Maximum Delay (ns) |        |         | Minimum Delay (ns) |                  |                  |
|-----------------------|---------------------------------------------|--------------------|--------|---------|--------------------|------------------|------------------|
|                       |                                             | 66 MHz             | 83 MHz | 100 MHz | 66 MHz             | 83 MHz           | 100 MHz          |
| sp31/sp30             | PSDVAL/TEA/TA                               | 7                  | 6      | 5.5     | 0.5                | 0.5              | 0.5              |
| sp32/sp30             | ADD/ADD_atr./BADDR/CI/GBL/WT <sup>2,3</sup> | 8                  | 6.5    | 5.5     | 0.5 <sup>2</sup>   | 0.5 <sup>2</sup> | 0.5 <sup>2</sup> |
| sp33a/sp30            | Data bus <sup>2, 3</sup>                    | 6.5                | 6.5    | 5.5     | 0.5 <sup>2</sup>   | 0.5 <sup>2</sup> | 0.5 <sup>2</sup> |
| sp33b/sp30            | DP                                          | 8                  | 7      | 6       | 1                  | 1                | 1                |
| sp34/sp30             | Memory controller signals/ALE <sup>2</sup>  | 6                  | 5.5    | 5.5     | 0.5 <sup>2</sup>   | 0.5 <sup>2</sup> | 0.5 <sup>2</sup> |
| sp35/sp30             | All other signals <sup>2</sup>              | 6                  | 5.5    | 5.5     | 0.5 <sup>2</sup>   | 0.5 <sup>2</sup> | 0.5 <sup>2</sup> |
| sp35a/sp30            | AP                                          | 7                  | 7      | 7       | 0.5                | 0.5              | 0.5              |

<sup>1</sup> 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.

<sup>2</sup> The signals in **boldface** have a minimum delay of 1 ns at 66.67/83.33/100 MHz when communicating to SDRAM:

|                     |                    |                        |                                                |
|---------------------|--------------------|------------------------|------------------------------------------------|
| <b>A[0–31]</b>      | <b>LCL_D[0–31]</b> | <b>OE/SDRAS/GP12</b>   | <b>LSDCAS/GP13</b>                             |
| <b>BADDR[27–31]</b> | <b>LCL_DP[0–3]</b> | <b>SDCAS/GP13</b>      | <b>MODCLK[1–3]/AP[1–3]/TC[0–2]/BNKSEL[0–2]</b> |
| <b>D[0–63]</b>      | <b>CS[0–11]</b>    | <b>LSDA10/GP10</b>     | <b>LWE[0–3]/LSDDQM[0–3]/LBS[0–3]</b>           |
| <b>DP[0–7]</b>      | <b>SDA10/GP10</b>  | <b>LSDWE/GP11</b>      | <b>PWE[0–7]/PSDDQM[0–7]/PBS[0–7]</b>           |
| <b>L_A[14–31]</b>   | <b>SDWE/GP11</b>   | <b>LOE/LSDRAS/GP12</b> |                                                |

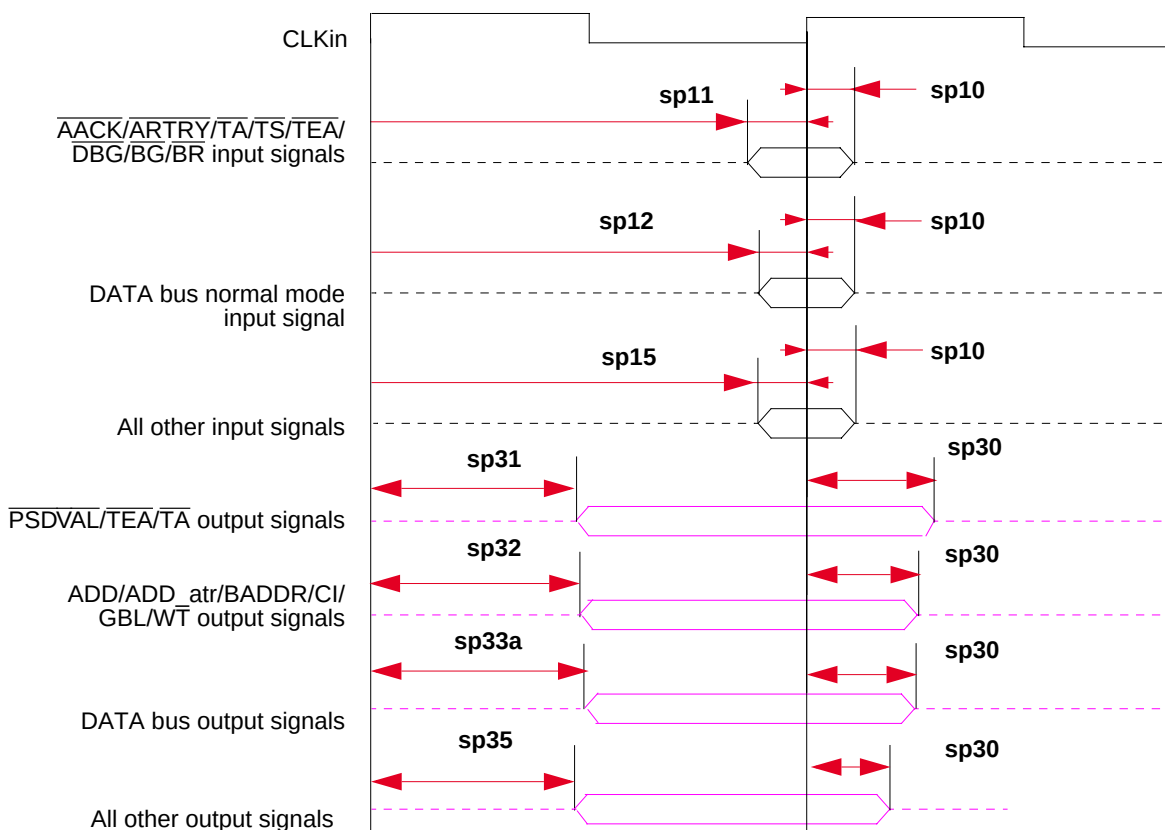
<sup>3</sup> A minimum loading of 20 pF is required to meet 1 ns hold time for communicating to SDRAM.

#### NOTE

Activating data pipelining (setting BRx[DR] in the memory controller) improves the AC timing. Also, sp33a can be used as the AC specification for DP signals.

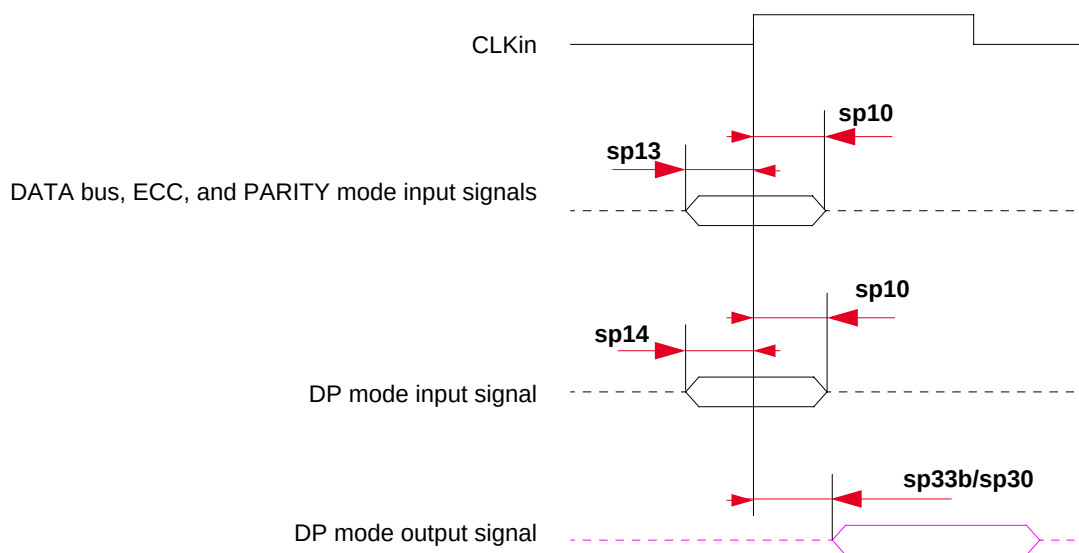
## Electrical and Thermal Characteristics

Figure 8 shows the interaction of several bus signals.



**Figure 8. Bus Signals**

Figure 9 shows signal behavior for all parity modes (including ECC, RMW parity, and standard parity).



**Figure 9. Parity Mode Diagram**

Figure 10 shows signal behavior in MEMC mode.



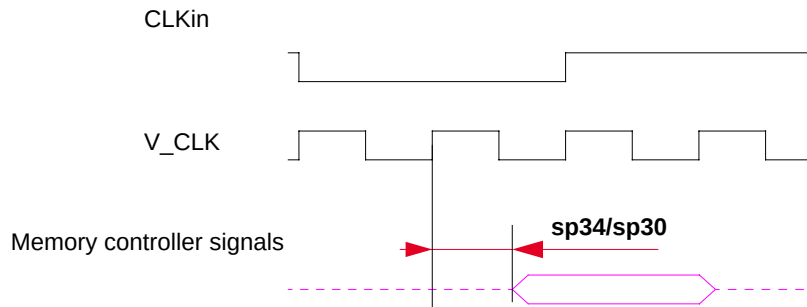


Figure 10. MEMC Mode Diagram

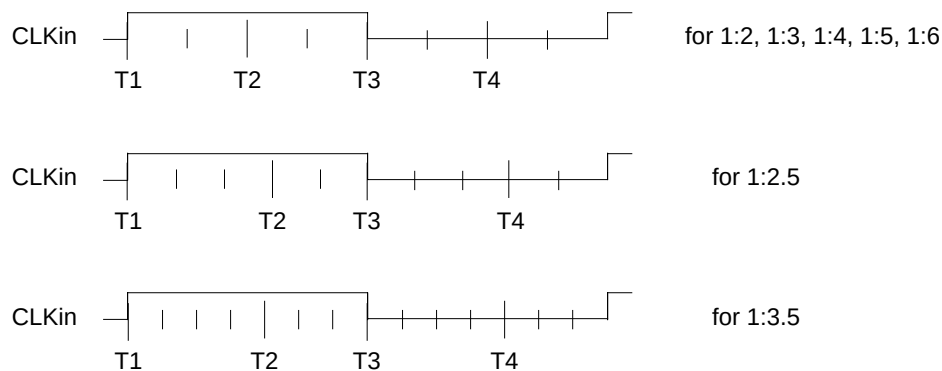
**NOTE**

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 11 is a representation of the information in Table 12.

**Figure 11. 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 |
|----------|------------|------------------------|---------------|---------------------------------|-----------|
| PCI_MODE | PCI_CFG[0] | PCI_MODCK <sup>1</sup> |               |                                 |           |
| 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  |

<sup>1</sup> 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.

#### NOTE

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

Note also that basic modes are shown in boldface type.

**Table 14. Local Bus Clock Modes**

| Mode <sup>1</sup>             | Bus Clock <sup>2,3</sup><br>(MHz) |       | CPM<br>Multiplication<br>Factor <sup>4</sup> | CPM Clock <sup>3</sup><br>(MHz) |       | CPU<br>Multiplication<br>Factor <sup>5</sup> | CPU Clock <sup>3</sup><br>(MHz) |       |
|-------------------------------|-----------------------------------|-------|----------------------------------------------|---------------------------------|-------|----------------------------------------------|---------------------------------|-------|
|                               | low                               | high  |                                              | low                             | high  |                                              | low                             | high  |
| MODCK_H-MODCK[1-3]            |                                   |       |                                              |                                 |       |                                              |                                 |       |
| 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      |                                   |       |                                              |                                 |       |                                              |                                 |       |

Table 14. Local Bus Clock Modes (Continued)

| Mode <sup>1</sup>  | Bus Clock <sup>2,3</sup><br>(MHz) |       | CPM<br>Multiplication<br>Factor <sup>4</sup> | CPM Clock <sup>3</sup><br>(MHz) |       | CPU<br>Multiplication<br>Factor <sup>5</sup> | CPU Clock <sup>3</sup><br>(MHz) |        |
|--------------------|-----------------------------------|-------|----------------------------------------------|---------------------------------|-------|----------------------------------------------|---------------------------------|--------|
| MODCK_H-MODCK[1-3] | low                               | high  |                                              | low                             | high  |                                              | low                             | high   |
| 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                          |       |                                              |                                 |       |                                              |                                 |        |
|                    |                                   |       |                                              |                                 |       |                                              |                                 |        |
| 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  |

## Clock Configuration Modes

**Table 14. Local Bus Clock Modes (Continued)**

| Mode <sup>1</sup>  | Bus Clock <sup>2,3</sup><br>(MHz) |       | CPM<br>Multiplication<br>Factor <sup>4</sup> | CPM Clock <sup>3</sup><br>(MHz) |       | CPU<br>Multiplication<br>Factor <sup>5</sup> | CPU Clock <sup>3</sup><br>(MHz) |       |
|--------------------|-----------------------------------|-------|----------------------------------------------|---------------------------------|-------|----------------------------------------------|---------------------------------|-------|
|                    | low                               | high  |                                              | low                             | high  |                                              | low                             | high  |
| MODCK_H-MODCK[1-3] |                                   |       |                                              |                                 |       |                                              |                                 |       |
| 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                          |       |                                              |                                 |       |                                              |                                 |       |
| 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           | 50.0                              | 167.0 | 2                                            | 100.0                           | 334.0 | Bypass                                       | 50.0                            | 167.0 |
| 1100_001           | 40.0                              | 160.0 | 2.5                                          | 100.0                           | 400.0 | Bypass                                       | 40.0                            | 160.0 |
| 1100_010           | 33.3                              | 133.3 | 3                                            | 100.0                           | 400.0 | Bypass                                       | 33.3                            | 133.3 |
| 1101_000           | Reserved                          |       |                                              |                                 |       |                                              |                                 |       |

<sup>1</sup> 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.

<sup>2</sup> 60x and local bus frequency. Identical to CLKIN.

<sup>3</sup> 'High' and 'low' indicate frequency limits for a given configuration.

<sup>4</sup> CPM multiplication factor = CPM clock/bus clock

<sup>5</sup> 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

In PCI mode only, PCI\_MODCK comes from the LGPL5 pin and MODCK\_H[0–3] comes from {LGPL0, LGPL1, LGPL2, LGPL3}.

### NOTE

The minimum Tval = 2 when PCI\_MODCK = 1 and minimum Tval = 1 when PCI\_MODCK = 0; therefore, board 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. Note that the range of the PCI clock frequency is determined by PCI\_MODCK.

**Table 15. Clock Configurations for PCI Host Mode (PCI\_MODCK=0)<sup>1</sup>**

| Mode <sup>2</sup>            | Bus Clock <sup>3,4</sup><br>(MHz)                    |      | CPM<br>Multiplication<br>Factor <sup>5</sup> | CPM Clock <sup>4</sup><br>(MHz) |       | CPU<br>Multiplication<br>Factor <sup>6</sup> | CPU Clock <sup>4</sup><br>(MHz) |       | PCI<br>Division<br>Factor | PCI Clock<br>(MHz) |      |
|------------------------------|------------------------------------------------------|------|----------------------------------------------|---------------------------------|-------|----------------------------------------------|---------------------------------|-------|---------------------------|--------------------|------|
| MODCK_H-<br>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 |
|                              |                                                      |      |                                              |                                 |       |                                              |                                 |       |                           |                    |      |

## Clock Configuration Modes

**Table 15. Clock Configurations for PCI Host Mode (PCI\_MODCK=0)<sup>1</sup> (Continued)**

| Mode <sup>2</sup>      | Bus Clock <sup>3,4</sup><br>(MHz)                    |       | CPM<br>Multiplication<br>Factor <sup>5</sup> | CPM Clock <sup>4</sup><br>(MHz) |       | CPU<br>Multiplication<br>Factor <sup>6</sup> | CPU Clock <sup>4</sup><br>(MHz) |       | PCI<br>Division<br>Factor | PCI Clock<br>(MHz) |      |
|------------------------|------------------------------------------------------|-------|----------------------------------------------|---------------------------------|-------|----------------------------------------------|---------------------------------|-------|---------------------------|--------------------|------|
|                        | low                                                  | high  |                                              | low                             | high  |                                              | low                             | high  |                           | low                | high |
| MODCK_H-<br>MODCK[1-3] |                                                      |       |                                              |                                 |       |                                              |                                 |       |                           |                    |      |
| 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 |
|                        |                                                      |       |                                              |                                 |       |                                              |                                 |       |                           |                    |      |
| 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 |
|                        |                                                      |       |                                              |                                 |       |                                              |                                 |       |                           |                    |      |

Table 15. Clock Configurations for PCI Host Mode (PCI\_MODCK=0)<sup>1</sup> (Continued)

| Mode <sup>2</sup>      | Bus Clock <sup>3,4</sup><br>(MHz)                    |       | CPM<br>Multiplication<br>Factor <sup>5</sup> | CPM Clock <sup>4</sup><br>(MHz) |       | CPU<br>Multiplication<br>Factor <sup>6</sup> | CPU Clock <sup>4</sup><br>(MHz) |       | PCI<br>Division<br>Factor | PCI Clock<br>(MHz) |      |
|------------------------|------------------------------------------------------|-------|----------------------------------------------|---------------------------------|-------|----------------------------------------------|---------------------------------|-------|---------------------------|--------------------|------|
| MODCK_H-<br>MODCK[1-3] | low                                                  | high  |                                              | low                             | high  |                                              | low                             | high  |                           | low                | high |
|                        |                                                      |       |                                              |                                 |       |                                              |                                 |       |                           |                    |      |
| 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 |
| 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 |

## Clock Configuration Modes

**Table 15. Clock Configurations for PCI Host Mode (PCI\_MODCK=0)<sup>1</sup> (Continued)**

| Mode <sup>2</sup> | Bus Clock <sup>3,4</sup><br>(MHz) |       | CPM<br>Multiplication<br>Factor <sup>5</sup> | CPM Clock <sup>4</sup><br>(MHz) |       | CPU<br>Multiplication<br>Factor <sup>6</sup> | CPU Clock <sup>4</sup><br>(MHz) |       | PCI<br>Division<br>Factor | PCI Clock<br>(MHz) |      |
|-------------------|-----------------------------------|-------|----------------------------------------------|---------------------------------|-------|----------------------------------------------|---------------------------------|-------|---------------------------|--------------------|------|
|                   | low                               | high  |                                              | low                             | high  |                                              | low                             | high  |                           | low                | high |
| 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 |
|                   |                                   |       |                                              |                                 |       |                                              |                                 |       |                           |                    |      |
| 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          | 50.0                              | 66.7  | 2                                            | 100.0                           | 133.3 | Bypass                                       | 50.0                            | 66.7  | 2                         | 50.0               | 66.7 |
| 1100_001          | 60.0                              | 80.0  | 2.5                                          | 150.0                           | 200.0 | Bypass                                       | 60.0                            | 80.0  | 3                         | 50.0               | 66.7 |
| 1100_010          | 50.0                              | 66.7  | 3                                            | 150.0                           | 200.0 | Bypass                                       | 50.0                            | 66.7  | 3                         | 50.0               | 66.7 |

<sup>1</sup> As shown in Table 13, PCI\_MODCK determines the PCI clock frequency range. Refer to Table 16 for lower range configurations.

<sup>2</sup> 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.

<sup>3</sup> 60x and local bus frequency. Identical to CLKIN.

<sup>4</sup> 'High' and 'low' indicate frequency limits for a given configuration.

<sup>5</sup> CPM multiplication factor = CPM clock/bus clock

<sup>6</sup> CPU multiplication factor = Core PLL multiplication factor



Table 16. Clock Configurations for PCI Host Mode (PCI\_MODCK=1)<sup>1</sup>

| Mode <sup>2</sup>            | Bus Clock <sup>3,4</sup><br>(MHz) |       | CPM<br>Multiplication<br>Factor <sup>5</sup> | CPM Clock <sup>4</sup><br>(MHz) |       | CPU<br>Multiplication<br>Factor <sup>6</sup> | CPU Clock <sup>4</sup><br>(MHz) |       | PCI<br>Division<br>Factor | PCI Clock<br>(MHz) |      |
|------------------------------|-----------------------------------|-------|----------------------------------------------|---------------------------------|-------|----------------------------------------------|---------------------------------|-------|---------------------------|--------------------|------|
| MODCK_H-<br>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 |
| 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 |

## Clock Configuration Modes

**Table 16. Clock Configurations for PCI Host Mode (PCI\_MODCK=1)<sup>1</sup> (Continued)**

| Mode <sup>2</sup>      | Bus Clock <sup>3,4</sup><br>(MHz) |       | CPM<br>Multiplication<br>Factor <sup>5</sup> | CPM Clock <sup>4</sup><br>(MHz) |       | CPU<br>Multiplication<br>Factor <sup>6</sup> | CPU Clock <sup>4</sup><br>(MHz) |       | PCI<br>Division<br>Factor | PCI Clock<br>(MHz) |      |
|------------------------|-----------------------------------|-------|----------------------------------------------|---------------------------------|-------|----------------------------------------------|---------------------------------|-------|---------------------------|--------------------|------|
| MODCK_H-<br>MODCK[1-3] | low                               | high  |                                              | low                             | high  |                                              | low                             | high  |                           | low                | high |
|                        |                                   |       |                                              |                                 |       |                                              |                                 |       |                           |                    |      |
| 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 |
|                        |                                   |       |                                              |                                 |       |                                              |                                 |       |                           |                    |      |
| 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 |

Table 16. Clock Configurations for PCI Host Mode (PCI\_MODCK=1)<sup>1</sup> (Continued)

| Mode <sup>2</sup>      | Bus Clock <sup>3,4</sup><br>(MHz) |       | CPM<br>Multiplication<br>Factor <sup>5</sup> | CPM Clock <sup>4</sup><br>(MHz) |       | CPU<br>Multiplication<br>Factor <sup>6</sup> | CPU Clock <sup>4</sup><br>(MHz) |       | PCI<br>Division<br>Factor | PCI Clock<br>(MHz) |      |
|------------------------|-----------------------------------|-------|----------------------------------------------|---------------------------------|-------|----------------------------------------------|---------------------------------|-------|---------------------------|--------------------|------|
| MODCK_H-<br>MODCK[1-3] | low                               | high  |                                              | low                             | high  |                                              | low                             | high  |                           | low                | high |
| 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 |
|                        |                                   |       |                                              |                                 |       |                                              |                                 |       |                           |                    |      |
| 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 |

## Clock Configuration Modes

**Table 16. Clock Configurations for PCI Host Mode (PCI\_MODCK=1)<sup>1</sup> (Continued)**

| Mode <sup>2</sup>      | Bus Clock <sup>3,4</sup><br>(MHz) |       | CPM<br>Multiplication<br>Factor <sup>5</sup> | CPM Clock <sup>4</sup><br>(MHz) |       | CPU<br>Multiplication<br>Factor <sup>6</sup> | CPU Clock <sup>4</sup><br>(MHz) |       | PCI<br>Division<br>Factor | PCI Clock<br>(MHz) |      |
|------------------------|-----------------------------------|-------|----------------------------------------------|---------------------------------|-------|----------------------------------------------|---------------------------------|-------|---------------------------|--------------------|------|
| MODCK_H-<br>MODCK[1-3] | low                               | high  |                                              | low                             | high  |                                              | low                             | high  |                           | low                | high |
| 1100_000               | 50.0                              | 100.0 | 2                                            | 100.0                           | 200.0 | Bypass                                       | 50.0                            | 100.0 | 4                         | 25.0               | 50.0 |
| 1100_001               | 60.0                              | 120.0 | 2.5                                          | 150.0                           | 300.0 | Bypass                                       | 60.0                            | 120.0 | 6                         | 25.0               | 50.0 |
| 1100_010               | 50.0                              | 100.0 | 3                                            | 150.0                           | 300.0 | Bypass                                       | 50.0                            | 100.0 | 6                         | 25.0               | 50.0 |

<sup>1</sup> As shown in Table 13, PCI\_MODCK determines the PCI clock frequency range. Refer to Table 15 for higher range configurations.

<sup>2</sup> 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.

<sup>3</sup> 60x and local bus frequency. Identical to CLKIN.

<sup>4</sup> 'High' and 'low' indicate frequency limits for a given configuration.

<sup>5</sup> CPM multiplication factor = CPM clock/bus clock

<sup>6</sup> 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. Note that the range of the PCI clock frequency is determined by PCI\_MODCK.

**Table 17. Clock Configurations for PCI Agent Mode (PCI\_MODCK=0)<sup>1</sup>**

| Mode <sup>2</sup>           | PCI Clock <sup>3</sup><br>(MHz) |      | CPM<br>Multiplication<br>Factor <sup>4</sup> | CPM Clock <sup>3</sup><br>(MHz) |       | CPU<br>Multiplication<br>Factor <sup>5</sup> | CPU Clock <sup>3</sup><br>(MHz) |       | Bus<br>Division<br>Factor | Bus Clock <sup>3,6</sup><br>(MHz) |       |
|-----------------------------|---------------------------------|------|----------------------------------------------|---------------------------------|-------|----------------------------------------------|---------------------------------|-------|---------------------------|-----------------------------------|-------|
| MODCK_H-<br>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  |

Table 17. Clock Configurations for PCI Agent Mode (PCI\_MODCK=0)<sup>1</sup> (Continued)

| Mode <sup>2</sup>  | PCI Clock <sup>3</sup><br>(MHz) |      | CPM<br>Multiplication<br>Factor <sup>4</sup> | CPM Clock <sup>3</sup><br>(MHz) |       | CPU<br>Multiplication<br>Factor <sup>5</sup> | CPU Clock <sup>3</sup><br>(MHz) |       | Bus<br>Division<br>Factor | Bus Clock <sup>3,6</sup><br>(MHz) |       |
|--------------------|---------------------------------|------|----------------------------------------------|---------------------------------|-------|----------------------------------------------|---------------------------------|-------|---------------------------|-----------------------------------|-------|
|                    | low                             | high |                                              | low                             | high  |                                              | low                             | high  |                           | low                               | high  |
| MODCK_H-MODCK[1-3] |                                 |      |                                              |                                 |       |                                              |                                 |       |                           |                                   |       |
| 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  |
| 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 |

## Clock Configuration Modes

**Table 17. Clock Configurations for PCI Agent Mode (PCI\_MODCK=0)<sup>1</sup> (Continued)**

| Mode <sup>2</sup>      | PCI Clock <sup>3</sup><br>(MHz) |      | CPM<br>Multiplication<br>Factor <sup>4</sup> | CPM Clock <sup>3</sup><br>(MHz) |       | CPU<br>Multiplication<br>Factor <sup>5</sup> | CPU Clock <sup>3</sup><br>(MHz) |       | Bus<br>Division<br>Factor | Bus Clock <sup>3,6</sup><br>(MHz) |       |
|------------------------|---------------------------------|------|----------------------------------------------|---------------------------------|-------|----------------------------------------------|---------------------------------|-------|---------------------------|-----------------------------------|-------|
| MODCK_H-<br>MODCK[1-3] | low                             | high |                                              | low                             | high  |                                              | low                             | high  |                           | low                               | high  |
| 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                        |      |                                              |                                 |       |                                              |                                 |       |                           |                                   |       |
| 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 |

Table 17. Clock Configurations for PCI Agent Mode (PCI\_MODCK=0)<sup>1</sup> (Continued)

| Mode <sup>2</sup>      | PCI Clock <sup>3</sup><br>(MHz) |      | CPM<br>Multiplication<br>Factor <sup>4</sup> | CPM Clock <sup>3</sup><br>(MHz) |       | CPU<br>Multiplication<br>Factor <sup>5</sup> | CPU Clock <sup>3</sup><br>(MHz) |       | Bus<br>Division<br>Factor | Bus Clock <sup>3,6</sup><br>(MHz) |       |
|------------------------|---------------------------------|------|----------------------------------------------|---------------------------------|-------|----------------------------------------------|---------------------------------|-------|---------------------------|-----------------------------------|-------|
| MODCK_H-<br>MODCK[1-3] | low                             | high |                                              | low                             | high  |                                              | low                             | high  |                           | low                               | high  |
|                        |                                 |      |                                              |                                 |       |                                              |                                 |       |                           |                                   |       |
| 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 |
|                        |                                 |      |                                              |                                 |       |                                              |                                 |       |                           |                                   |       |
| 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               | 50.0                            | 66.7 | 2                                            | 100.0                           | 133.3 | Bypass                                       | 50.0                            | 66.7  | 2                         | 50.0                              | 66.7  |
| 1100_001               | 50.0                            | 66.7 | 3                                            | 150.0                           | 200.0 | Bypass                                       | 60.0                            | 80.0  | 2.5                       | 60.0                              | 80.0  |
| 1100_010               | 50.0                            | 66.7 | 3                                            | 150.0                           | 200.0 | Bypass                                       | 50.0                            | 66.7  | 3                         | 50.0                              | 66.7  |

<sup>1</sup> As shown in Table 13, PCI\_MODCK determines the PCI clock frequency range. Refer to Table 18 for lower range configurations.

<sup>2</sup> 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.

<sup>3</sup> 'High' and 'low' indicate frequency limits for a given configuration.

<sup>4</sup> CPM multiplication factor = CPM clock/bus clock

<sup>5</sup> CPU multiplication factor = Core PLL multiplication factor

<sup>6</sup> 60x and local bus frequency. Identical to CLKIN.

## Clock Configuration Modes

**Table 18. Clock Configurations for PCI Agent Mode (PCI\_MODCK=1)<sup>1</sup>**

| Mode <sup>2</sup>            | PCI Clock <sup>3</sup><br>(MHz) |      | CPM<br>Multiplication<br>Factor <sup>4</sup> | CPM Clock <sup>3</sup><br>(MHz) |       | CPU<br>Multiplication<br>Factor <sup>5</sup> | CPU Clock <sup>3</sup><br>(MHz) |       | Bus<br>Division<br>Factor | Bus Clock <sup>3,6</sup><br>(MHz) |       |
|------------------------------|---------------------------------|------|----------------------------------------------|---------------------------------|-------|----------------------------------------------|---------------------------------|-------|---------------------------|-----------------------------------|-------|
| MODCK_H-<br>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 |
| 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                                          | 125.0                           | 200.0 | 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 |
|                              |                                 |      |                                              |                                 |       |                                              |                                 |       |                           |                                   |       |



Table 18. Clock Configurations for PCI Agent Mode (PCI\_MODCK=1)<sup>1</sup> (Continued)

| Mode <sup>2</sup> | PCI Clock <sup>3</sup><br>(MHz) |      | CPM<br>Multiplication<br>Factor <sup>4</sup> | CPM Clock <sup>3</sup><br>(MHz) |       | CPU<br>Multiplication<br>Factor <sup>5</sup> | CPU Clock <sup>3</sup><br>(MHz) |       | Bus<br>Division<br>Factor | Bus Clock <sup>3,6</sup><br>(MHz) |       |
|-------------------|---------------------------------|------|----------------------------------------------|---------------------------------|-------|----------------------------------------------|---------------------------------|-------|---------------------------|-----------------------------------|-------|
|                   | low                             | high |                                              | low                             | high  |                                              | low                             | high  |                           | low                               | high  |
| 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 |
| 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                        |      |                                              |                                 |       |                                              |                                 |       |                           |                                   |       |

## Clock Configuration Modes

**Table 18. Clock Configurations for PCI Agent Mode (PCI\_MODCK=1)<sup>1</sup> (Continued)**

| Mode <sup>2</sup> | PCI Clock <sup>3</sup><br>(MHz) |      | CPM<br>Multiplication<br>Factor <sup>4</sup> | CPM Clock <sup>3</sup><br>(MHz) |       | CPU<br>Multiplication<br>Factor <sup>5</sup> | CPU Clock <sup>3</sup><br>(MHz) |       | Bus<br>Division<br>Factor | Bus Clock <sup>3,6</sup><br>(MHz) |       |
|-------------------|---------------------------------|------|----------------------------------------------|---------------------------------|-------|----------------------------------------------|---------------------------------|-------|---------------------------|-----------------------------------|-------|
|                   | low                             | high |                                              | low                             | high  |                                              | low                             | high  |                           | low                               | high  |
| 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                        |      |                                              |                                 |       |                                              |                                 |       |                           |                                   |       |
| 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  |

Table 18. Clock Configurations for PCI Agent Mode (PCI\_MODCK=1)<sup>1</sup> (Continued)

| Mode <sup>2</sup>      | PCI Clock <sup>3</sup><br>(MHz) |      | CPM<br>Multiplication<br>Factor <sup>4</sup> | CPM Clock <sup>3</sup><br>(MHz) |       | CPU<br>Multiplication<br>Factor <sup>5</sup> | CPU Clock <sup>3</sup><br>(MHz) |       | Bus<br>Division<br>Factor | Bus Clock <sup>3,6</sup><br>(MHz) |       |
|------------------------|---------------------------------|------|----------------------------------------------|---------------------------------|-------|----------------------------------------------|---------------------------------|-------|---------------------------|-----------------------------------|-------|
|                        | low                             | high |                                              | low                             | high  |                                              | low                             | high  |                           | low                               | high  |
| MODCK_H-<br>MODCK[1-3] |                                 |      |                                              |                                 |       |                                              |                                 |       |                           |                                   |       |
| 1100_000               | 25.0                            | 50.0 | 4                                            | 100.0                           | 200.0 | Bypass                                       | 50.0                            | 100.0 | 2                         | 50.0                              | 100.0 |
| 1100_001               | 25.0                            | 50.0 | 6                                            | 150.0                           | 300.0 | Bypass                                       | 60.0                            | 120.0 | 2.5                       | 60.0                              | 120.0 |
| 1100_010               | 25.0                            | 50.0 | 6                                            | 150.0                           | 300.0 | Bypass                                       | 50.0                            | 100.0 | 3                         | 50.0                              | 100.0 |

<sup>1</sup> As shown in Table 13, PCI\_MODCK determines the PCI clock frequency range. Refer to Table 17 for higher range configurations.

<sup>2</sup> 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.

<sup>3</sup> 'High' and 'low' indicate frequency limits for a given configuration.

<sup>4</sup> CPM multiplication factor = CPM clock/bus clock

<sup>5</sup> CPU multiplication factor = Core PLL multiplication factor

<sup>6</sup> 60x and local bus frequency. Identical to CLKIN.

## 1.4 Pinout

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

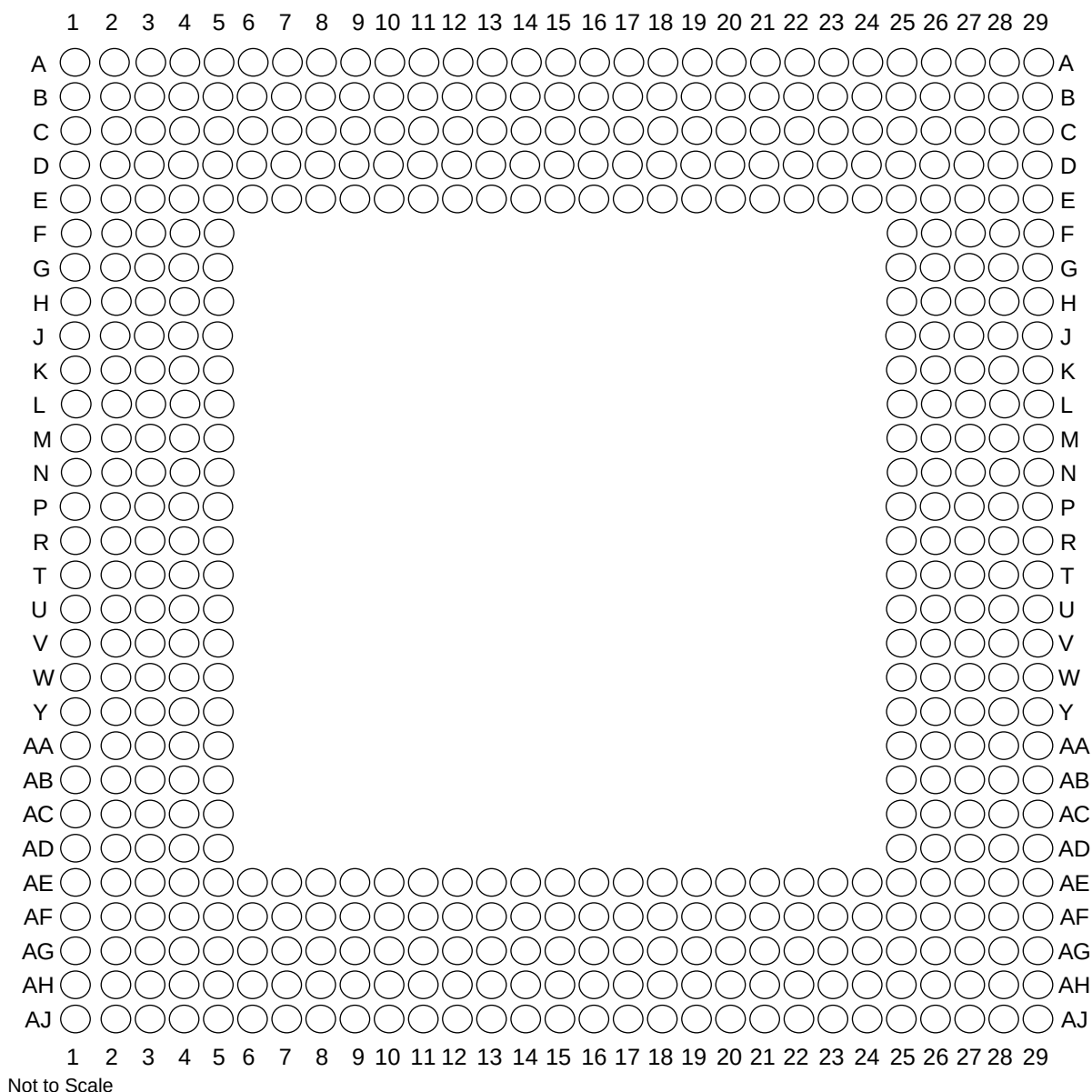
### 1.4.1 ZU Package—MPC8280 and MPC8270

The following figures and table represent the standard 480 TBGA package. For information on the alternate package for the MPC8280 and the MPC8270, refer to Section 1.4.2, “VR Package—MPC8275VR and MPC8270VR” on page 49.

#### 1.4.1.1 ZU Pin Assignments

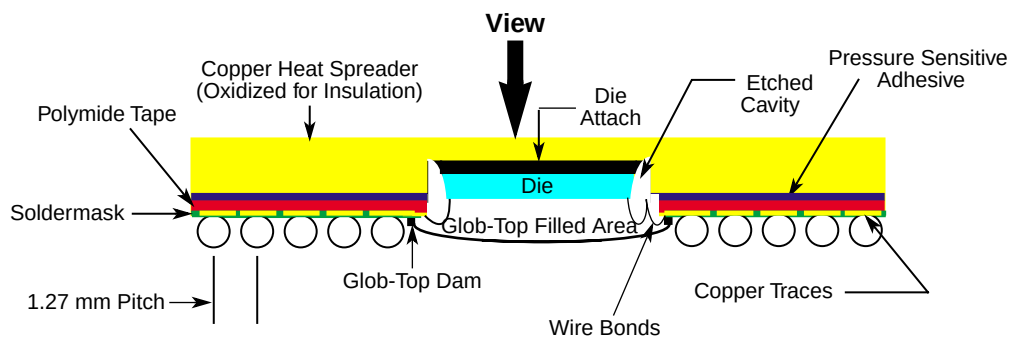
Figure 12 shows the pinout of the ZU package as viewed from the top surface.

## Pinout



**Figure 12. Pinout of the 480 TBGA Package (View from Top)**

Figure 13 shows the side profile of the TBGA package to indicate the direction of the top surface view.



**Figure 13. 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   |
| $\overline{ABB/IRQ2}$ |                            | 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   |
| TBST            |                            | D3   |
| TSIZ0           |                            | C1   |
| TSIZ1           |                            | E4   |
| TSIZ2           |                            | D2   |
| TSIZ3           |                            | F5   |
| AACK            |                            | F3   |
| ARTRY           |                            | E1   |
| DBG             |                            | V1   |
| DBB/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  |

## Pinout

**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/RSRV/EXT_BR2             |                            | B22  |
| IRQ1/DP1/EXT_BG2             |                            | A22  |
| IRQ2/DP2/TLBISYNC/EXT_DBG2   |                            | E21  |
| IRQ3/DP3/CKSTP_OUT/EXT_BR3   |                            | D21  |
| IRQ4/DP4/CORE_SRESET/EXT_BG3 |                            | C21  |
| IRQ5/DP5/TBEN/EXT_DBG3       |                            | B21  |
| IRQ6/DP6/CSE0                |                            | A21  |
| IRQ7/DP7/CSE1                |                            | E20  |
| PSDVAL                       |                            | V3   |
| TA                           |                            | C22  |
| TEA                          |                            | V5   |
| GBL/IRQ1                     |                            | W1   |
| CI/BADDR29/IRQ2              |                            | U2   |
| WT/BADDR30/IRQ3              |                            | U3   |
| L2_HIT/IRQ4                  |                            | Y4   |
| CPU_BG/BADDR31/IRQ5          |                            | U4   |
| CPU_DBG                      |                            | R2   |
| CPU_BR                       |                            | Y3   |
| CS0                          |                            | F25  |
| CS1                          |                            | C29  |



Table 19. MPC8280 and MPC8270 Pinout List (Continued)

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

## Pinout

**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  |
| LGTALUPMWAIT/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/BE $\overline{0}$ |                            | L28  |
| LCL_DP1/C1/BE $\overline{1}$ |                            | N28  |
| LCL_DP2/C2/BE $\overline{2}$ |                            | T28  |
| LCL_DP3/C3/BE $\overline{3}$ |                            | W28  |
| IRQ0/NMI_OUT                 |                            | T1   |
| IRQ7/INT_OUT/APE             |                            | D1   |
| TRST                         |                            | AH3  |
| TCK                          |                            | AG5  |
| TMS                          |                            | AJ3  |
| TDI                          |                            | AE6  |
| TDO                          |                            | AF5  |
| TRIS                         |                            | AB4  |
| 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 |
| PA1/REJECT1/DONE3        | FCC2_UTM_TXADDR1                   | AC25 |
| PA2/CLK20/DACK3          | FCC2_UTM_TXADDR0                   | AE28 |
| PA3/CLK19/DACK4/L1RXD1A2 | FCC2_UTM_RXADDR0                   | AG29 |
| PA4/REJECT2/DONE4        | FCC2_UTM_RXADDR1                   | AG28 |
| PA5/RESTART2/DREQ4       | FCC2_UTM_RXADDR2                   | AG26 |
| PA6                      | L1RSYNCA1                          | AE24 |
| PA7/SMSYN2               | L1TSYNCA1/L1GNTA1                  | AH25 |
| PA8/SMRXD2               | L1RXD0A1/L1RXDA1                   | AF23 |
| PA9/SMTXD2               | L1TXD0A1                           | AH23 |
| PA10/MSNUM5              | FCC1_UT8_RXD0/FCC1_UT16_RXD8       | AE22 |
| PA11/MSNUM4              | FCC1_UT8_RXD1/FCC1_UT16_RXD9       | AH22 |
| PA12/MSNUM3              | FCC1_UT8_RXD2/<br>FCC1_UT16_RXD10  | AJ21 |
| PA13/MSNUM2              | FCC1_UT8_RXD3/<br>FCC1_UT16_RXD11  | AH20 |
| PA14/FCC1_RXD3           | FCC1_UT8_RXD4/<br>FCC1_UT16_RXD12  | AG19 |
| PA15/FCC1_RXD2           | /FCC1_UT8_RXD5/<br>FCC1_UT16_RXD13 | AF18 |
| PA16/FCC1_RXD1           | FCC1_UT8_RXD6/<br>FCC1_UT16_RXD14  | AF17 |
| PA17/FCC1_RXD0/FCC1_RXD  | FCC1_UT8_RXD7/<br>FCC1_UT16_RXD15  | AE16 |
| PA18/FCC1_TXD0/FCC1_TXD  | FCC1_UT8_TXD7/FCC1_UT16_TXD15      | AJ16 |
| PA19/FCC1_TXD1           | FCC1_UT8_TXD6/FCC1_UT16_TXD14      | AG15 |
| PA20/FCC1_TXD2           | FCC1_UT8_TXD5/FCC1_UT16_TXD13      | AJ13 |
| PA21/FCC1_TXD3           | FCC1_UT8_TXD4/FCC1_UT16_TXD12      | AE13 |

Table 19. MPC8280 and MPC8270 Pinout List (Continued)

| Pin Name                                    |                                     | Ball |
|---------------------------------------------|-------------------------------------|------|
| MPC8280/MPC8270                             | MPC8280 only (UTOPIA Pins)          |      |
| PA22                                        | FCC1_UT8_TXD3/FCC1_UT16_TXD11       | AF12 |
| PA23                                        | FCC1_UT8_TXD2/FCC1_UT16_TXD10       | AG11 |
| PA24/MSNUM1                                 | /FCC1_UT8_TXD1/FCC1_UT16_TXD9       | AH9  |
| PA25/MSNUM0                                 | FCC1_UT8_TXD0/FCC1_UT16_TXD8        | AJ8  |
| PA26/FCC1_MII_RX_ER                         | FCC1_UTM_RXCLAV/<br>FCC1_UTS_RXCLAV | AH7  |
| PA27/FCC1_MII_RX_DV                         | FCC1_UT_RXSOC                       | AF7  |
| PA28/FCC1_MII_TX_EN                         | FCC1_UTM_RXENB/<br>FCC1_UTS_RXENB   | AD5  |
| PA29/FCC1_MII_TX_ER                         | FCC1_UT_TXSOC                       | AF1  |
| PA30/FCC1_MII_CRIS/FCC1_RTS                 | FCC1_UTM_TXCLAV/<br>FCC1_UTS_TXCLAV | AD3  |
| PA31/FCC1_MII_COL                           | FCC1_UTM_TXENB/<br>FCC1_UTS_TXENB   | AB5  |
| PB4/FCC3_TXD3/L1RSYNCA2/<br>FCC3_RTS        | FCC2_UT8_RXD0                       | AD28 |
| PB5/FCC3_TXD2/L1TSYNCA2/<br>L1GNTA2         | FCC2_UT8_RXD1                       | AD26 |
| PB6/FCC3_TXD1/L1RXDA2/L1RXD0A2              | FCC2_UT8_RXD2                       | AD25 |
| PB7/FCC3_TXD0/FCC3_TXD/<br>L1TXDA2/L1TXD0A2 | FCC2_UT8_RXD3                       | AE26 |
| PB8/FCC3_RXD0/FCC3_RXD/TXD3                 | FCC2_UT8_TXD3/L1RSYNCD1             | AH27 |
| PB9/FCC3_RXD1/L1TXD2A2                      | FCC2_UT8_TXD2/L1TSYNCD1/<br>L1GNTD1 | AG24 |
| PB10/FCC3_RXD2                              | FCC2_UT8_TXD1/L1RXDD1               | AH24 |
| PB11/FCC3_RXD3                              | FCC2_UT8_TXD0/L1TXDD1               | AJ24 |
| PB12/FCC3_MII_CRIS/TXD2                     | L1CLKOB1/L1RSYNCC1                  | AG22 |
| PB13/FCC3_MII_COL/L1TXD1A2                  | L1RQB1/L1TSYNCC1/L1GNTE1            | AH21 |
| PB14/FCC3_MII_TX_EN/RXD3                    | L1RXDC1                             | AG20 |
| PB15/FCC3_MII_TX_ER/RXD2                    | L1TXDC1                             | AF19 |
| PB16/FCC3_MII_RX_ER/CLK18                   | L1CLKOA1                            | AJ18 |
| PB17/FCC3_MII_RX_DV/CLK17                   | L1RQA1                              | AJ17 |
| PB18/FCC2_RXD3/L1CLKOD2/<br>L1RXD2A2        | FCC2_UT8_RXD4                       | AE14 |
| PB19/FCC2_RXD2/L1RQD2/L1RXD3A2              | FCC2_UT8_RXD5                       | AF13 |
| PB20/FCC2_RXD1/L1RSYNCD2/<br>L1TXD1A1       | FCC2_UT8_RXD6                       | AG12 |

Table 19. MPC8280 and MPC8270 Pinout List (Continued)

| Pin Name                                                |                                                                     | Ball |
|---------------------------------------------------------|---------------------------------------------------------------------|------|
| MPC8280/MPC8270                                         | MPC8280 only (UTOPIA Pins)                                          |      |
| PB21/FCC2_RXD0/FCC2_RXD/<br>L1TSYNCD2/L1GNTD2           | FCC2_UT8_RXD7/L1TXD2A1                                              | AH11 |
| PB22/FCC2_TXD0/FCC2_TXD/<br>L1RXDD2                     | FCC2_UT8_TXD7/L1RXD1A1                                              | AH16 |
| PB23/FCC2_TXD1/L1TXDD2                                  | FCC2_UT8_TXD6/L1RXD2A1                                              | AE15 |
| PB24/FCC2_TXD2/L1RSYNCC2                                | FCC2_UT8_TXD5/L1RXD3A1                                              | AJ9  |
| PB25/FCC2_TXD3/L1TSYNCC2/<br>L1GNCT2                    | FCC2_UT8_TXD4/L1TXD3A1                                              | AE9  |
| PB26/FCC2_MII_CRSL1RXDC2                                | FCC2_UT8_TXD1                                                       | AJ7  |
| PB27/FCC2_MII_COL/L1TXDC2                               | FCC2_UT8_TXD0                                                       | AH6  |
| PB28/FCC2_MII_RX_ER/FCC2_RTS/<br>L1TSYNCB2/L1GNTB2/TXD1 |                                                                     | AE3  |
| PB29/L1RSYNCB2/<br>FCC2_MII_TX_EN                       | FCC2_UTM_RXCLAV/<br>FCC2_UTS_RXCLAV                                 | AE2  |
| PB30/FCC2_MII_RX_DV/L1RXDB2                             | FCC2_UT_TXSOC                                                       | AC5  |
| PB31/FCC2_MII_TX_ER/L1TXDB2                             | FCC2_UT_RXSOC                                                       | AC4  |
| PC0/DREQ1/BRGO7/SMSYN2/<br>L1CLKOA2                     |                                                                     | AB26 |
| PC1/DREQ2/BRGO6/L1RQA2                                  |                                                                     | AD29 |
| PC2/FCC3_CD/DONE2                                       | FCC2_UT8_TXD3                                                       | AE29 |
| PC3/FCC3_CTS/DACK2/CTS4                                 | FCC2_UT8_TXD2                                                       | AE27 |
| PC4/SI2_L1ST4/FCC2_CD                                   | FCC2_UTM_RXENB/<br>FCC2_UTS_RXENB                                   | AF27 |
| PC5/SI2_L1ST3/FCC2_CTS                                  | FCC2_UTM_TXCLAV/<br>FCC2_UTS_TXCLAV                                 | AF24 |
| PC6/FCC1_CD                                             | L1CLKOC1/FCC1_UTM_RXADDR2/<br>FCC1_UTS_RXADDR2/<br>FCC1_UTM_RXCLAV1 | AJ26 |
| PC7/FCC1_CTS                                            | L1RQC1/FCC1_UTM_TXADDR2/<br>FCC1_UTS_TXADDR2/<br>FCC1_UTM_TXCLAV1   | AJ25 |
| PC8/CD4/RENA4/SI2_L1ST2/CTS3                            | FCC1_UT16_TXD0                                                      | AF22 |
| PC9/CTS4/CLSN4/SI2_L1ST1/<br>L1TSYNCA2/L1GNTA2          | FCC1_UT16_TXD1                                                      | AE21 |
| PC10/CD3/RENA3                                          | FCC1_UT16_TXD2/SI1_L1ST4/<br>FCC2_UT8_RXD3                          | AF20 |
| PC11/CTS3/CLSN3/L1TXD3A2                                | L1CLKOD1/FCC2_UT8_RXD2                                              | AE19 |
| PC12/CD2/RENA2                                          | SI1_L1ST3/FCC1_UTM_RXADDR1/<br>FCC1_UTS_RXADDR1                     | AE18 |

Table 19. MPC8280 and MPC8270 Pinout List (Continued)

| Pin Name                               |                                              | Ball |
|----------------------------------------|----------------------------------------------|------|
| MPC8280/MPC8270                        | MPC8280 only (UTOPIA Pins)                   |      |
| PC13/CTS2/CLSN2                        | L1RQD1/FCC1_UTM_TXADDR1/<br>FCC1_UTS_TXADDR1 | AH18 |
| PC14/CD1/RENA1                         | FCC1_UTM_RXADDR0/<br>FCC1_UTS_RXADDR0        | AH17 |
| PC15/CTS1/CLSN1/SMTXD2                 | FCC1_UTM_TXADDR0/<br>FCC1_UTS_TXADDR0        | AG16 |
| PC16/CLK16/TIN4                        |                                              | AF15 |
| PC17/CLK15/TIN3/BRGO8                  |                                              | AJ15 |
| PC18/CLK14/TGATE2                      |                                              | AH14 |
| PC19/CLK13/BRGO7                       |                                              | AG13 |
| PC20/CLK12/TGATE1                      |                                              | AH12 |
| PC21/CLK11/BRGO6                       |                                              | AJ11 |
| PC22/CLK10/DONE1                       |                                              | AG10 |
| PC23/CLK9/BRGO5/DACK1                  |                                              | AE10 |
| PC24/CLK8/TOUT4                        | FCC2_UT8_TXD3                                | AF9  |
| PC25/CLK7/BRGO4                        | FCC2_UT8_TXD2                                | AE8  |
| PC26/CLK6/TOUT3/TMCLK                  |                                              | AJ6  |
| PC27/FCC3_TXD/FCC3_TXD0/CLK5/<br>BRGO3 |                                              | AG2  |
| PC28/CLK4/TIN1/TOUT2/CTS2/CLSN2        |                                              | AF3  |
| PC29/CLK3/TIN2/BRGO2/CTS1/CLSN1        |                                              | AF2  |
| PC30/CLK2/TOUT1                        | FCC2_UT8_TXD3                                | AE1  |
| PC31/CLK1/BRGO1                        |                                              | AD1  |
| PD4/BRGO8/FCC3_RTS/SMRXD2              | L1TSYNCD1/L1GNTD1                            | AC28 |
| PD5/DONE1                              | FCC1_UT16_TXD3                               | AD27 |
| PD6/DACK1                              | FCC1_UT16_TXD4                               | AF29 |
| PD7/SMSYN1/FCC1_TXCLAV2                | FCC1_UTM_TXADDR3/<br>FCC1_UTS_TXADDR3        | AF28 |
| PD8/SMRXD1/BRGO5                       | FCC2_UT_TXPRTY                               | AG25 |
| PD9/SMTXD1/BRGO3                       | FCC2_UT_RXPRTY                               | AH26 |
| PD10/L1CLKOB2/BRGO4                    | FCC2_UT8_RXD1/L1RSYNCB1                      | AJ27 |
| PD11/L1RQB2                            | FCC2_UT8_RXD0/L1TSYNCB1/<br>L1GNTB1          | AJ23 |
| PD12                                   | SI1_L1ST2/L1RXDB1                            | AG23 |
| PD13                                   | SI1_L1ST1/L1TXDB1                            | AJ22 |
| PD14/L1CLKOC2/I2CSCL                   | FCC1_UT16_RXD0                               | AE20 |

Table 19. MPC8280 and MPC8270 Pinout List (Continued)

| Pin Name                   |                                                            | Ball |
|----------------------------|------------------------------------------------------------|------|
| MPC8280/MPC8270            | MPC8280 only (UTOPIA Pins)                                 |      |
| PD15/L1RQC2/I2CSDA         | FCC1_UT16_RXD1                                             | AJ20 |
| PD16/SPIMISO               | FCC1_UT_TXPRTY/L1TSYNCC1/<br>L1GNTC1                       | AG18 |
| PD17/BRGO2/SPIMOSI         | FCC1_UT_RXPRTY                                             | AG17 |
| PD18/SPICLK                | FCC1_UTM_RXADDR4/<br>FCC1_UTS_RXADDR4/<br>FCC1_UTM_RXCLAV3 | AF16 |
| PD19/SPISEL/BRGO1          | FCC1_UTM_TXADDR4/<br>FCC1_UTS_TXADDR4/<br>FCC1_UTM_TXCLAV3 | AH15 |
| PD20/RTS4/TENA4/L1RSYNCA2  | FCC1_UT16_RXD2                                             | AJ14 |
| PD21/TXD4/L1RXD0A2/L1RXDA2 | FCC1_UT16_RXD3                                             | AH13 |
| PD22/RXD4/L1TXD0A2/L1TXDA2 | FCC1_UT16_TXD5                                             | AJ12 |
| PD23/RTS3/TENA3            | FCC1_UT16_RXD4/L1RSYNCD1                                   | AE12 |
| PD24/TXD3                  | FCC1_UT16_RXD5/L1RXDD1                                     | AF10 |
| PD25/RXD3                  | FCC1_UT16_TXD6/L1TXDD1                                     | AG9  |
| PD26/RTS2/TENA2            | FCC1_UT16_RXD6/L1RSYNCC1                                   | AH8  |
| PD27/TXD2                  | FCC1_UT16_RXD7/L1RXDC1                                     | AG7  |
| PD28/RXD2                  | FCC1_UT16_TXD7/L1TXDC1                                     | AE4  |
| PD29/RTS1/TENA1            | FCC1_UTM_RXADDR3/<br>FCC1_UTS_RXADDR3/<br>FCC1_UTM_RXCLAV2 | AG1  |
| PD30/TXD1                  | FCC2_UTM_TXENB/<br>FCC2_UTS_TXENB                          | AD4  |
| PD31/RXD1                  |                                                            | AD2  |
| VCCSYN                     |                                                            | AB3  |
| VCCSYN1                    |                                                            | B9   |
| CLKIN2                     |                                                            | AE11 |
| SPARE4 <sup>1</sup>        |                                                            | U5   |
| PCI_MODE <sup>2</sup>      |                                                            | AF25 |
| SPARE6 <sup>1</sup>        |                                                            | V4   |
| THERMAL0 <sup>3</sup>      |                                                            | AA1  |
| THERMAL1 <sup>3</sup>      |                                                            | AG4  |



Table 19. MPC8280 and MPC8270 Pinout List (Continued)

| Pin Name        |                            | Ball                                                                                                                                                                                                                                           |
|-----------------|----------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MPC8280/MPC8270 | MPC8280 only (UTOPIA Pins) |                                                                                                                                                                                                                                                |
| 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 <sup>4</sup> , AB2 <sup>5</sup> , 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 |

<sup>1</sup> Must be pulled down or left floating.

<sup>2</sup> If PCI is not desired, must be pulled up or left floating.

<sup>3</sup> For information on how to use this pin, refer to *MPC8260 PowerQUICC II Thermal Resistor Guide (AN2271/D)*.

<sup>4</sup> GND SYN (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.

<sup>5</sup> 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

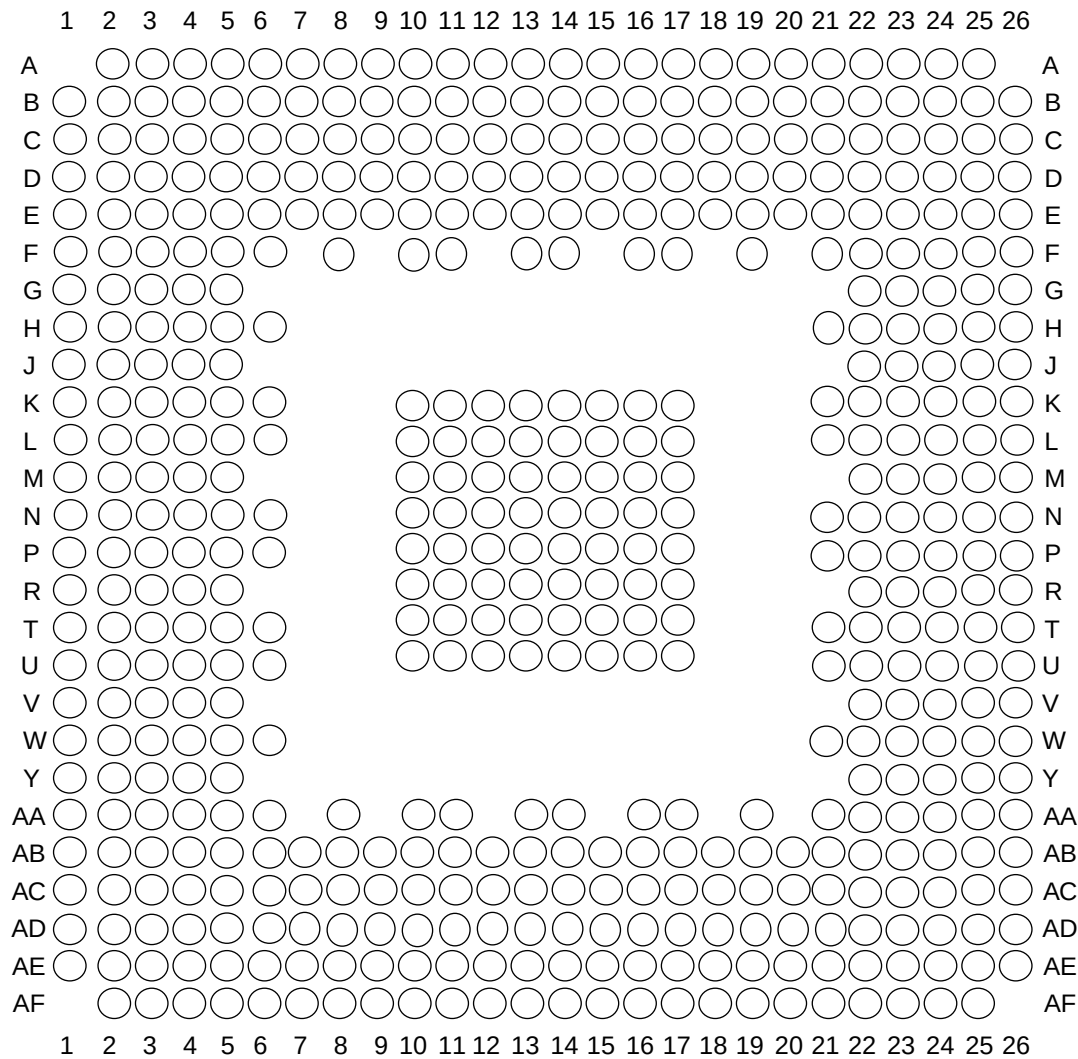
| Symbol  | Meaning                                                             |
|---------|---------------------------------------------------------------------|
| OVERBAR | Signals with overbars, such as $\overline{TA}$ , are active low.    |
| UTM     | Indicates that a signal is part of the UTOPIA 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 35.

1.4.2.1 VR Pin Assignments

Figure 14 shows the pinout of the VR package as viewed from the top surface.



Not to Scale

Figure 14. Pinout of the 516 PBGA Package (View from Top)

Figure 15 shows the side profile of the PBGA package to indicate the direction of the top surface view.

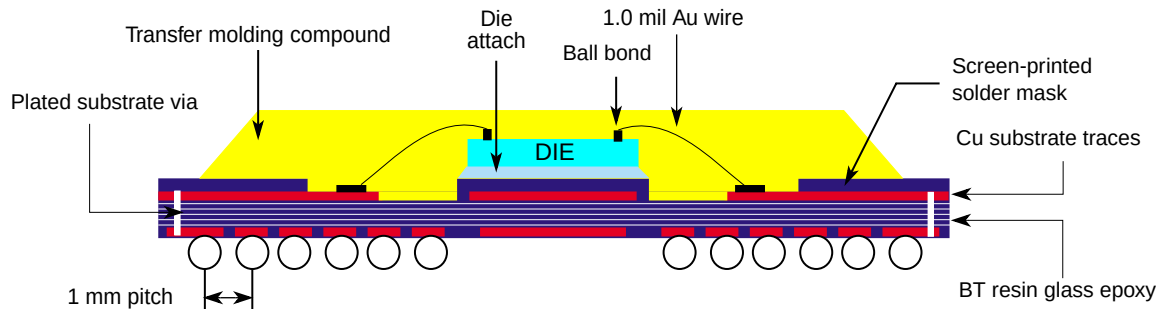


Figure 15. Side View of the PBGA Package

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   |
| $\overline{ABB/IRQ2}$ |                              | 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  |

## Pinout

**Table 21. MPC8275VR and MPC8270VR Pinout List (Continued)**

| Pin Name            |                              | Ball |
|---------------------|------------------------------|------|
| MPC8275VR/MPC8270VR | MPC8275VR only (UTOPIA Pins) |      |
| A28                 |                              | D12  |
| A29                 |                              | A10  |
| A30                 |                              | B12  |
| A31                 |                              | B13  |
| TT0                 |                              | E7   |
| TT1                 |                              | B3   |
| TT2                 |                              | F8   |
| TT3                 |                              | A3   |
| TT4                 |                              | C3   |
| TBST                |                              | F5   |
| TSIZ0               |                              | E3   |
| TSIZ1               |                              | E2   |
| TSIZ2               |                              | E1   |
| TSIZ3               |                              | E4   |
| AACK                |                              | D3   |
| ARTRY               |                              | C2   |
| DBG                 |                              | A14  |
| DBB/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   |

Table 21. MPC8275VR and MPC8270VR Pinout List (Continued)

| Pin Name            |                              | Ball |
|---------------------|------------------------------|------|
| MPC8275VR/MPC8270VR | MPC8275VR only (UTOPIA Pins) |      |
| D16                 |                              | AA2  |
| D17                 |                              | W1   |
| 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   |

## Pinout

**Table 21. MPC8275VR and MPC8270VR Pinout List (Continued)**

| Pin Name                     |                              | Ball |
|------------------------------|------------------------------|------|
| MPC8275VR/MPC8270VR          | MPC8275VR only (UTOPIA Pins) |      |
| D50                          |                              | R3   |
| D51                          |                              | N4   |
| 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/RSRV/EXT_BR2             |                              | AB3  |
| IRQ1/DP1/EXT_BG2             |                              | W5   |
| IRQ2/DP2/TLBISYNC/EXT_DBG2   |                              | AC2  |
| IRQ3/DP3/CKSTP_OUT/EXT_BR3   |                              | AA3  |
| IRQ4/DP4/CORE_SRESET/EXT_BG3 |                              | AD1  |
| IRQ5/DP5/TBEN/EXT_DBG3       |                              | AC1  |
| IRQ6/DP6/CSE0                |                              | AB2  |
| IRQ7/DP7/CSE1                |                              | Y3   |
| PSDVAL                       |                              | D15  |
| TA                           |                              | Y4   |
| TEA                          |                              | D16  |
| GBL/IRQ1                     |                              | E15  |
| CI/BADDR29/IRQ2              |                              | D14  |
| WT/BADDR30/IRQ3              |                              | E14  |
| L2_HIT/IRQ4                  |                              | A17  |
| CPU_BG/BADDR31/IRQ5          |                              | B14  |
| CPU_DBG                      |                              | F13  |
| CPU_BR                       |                              | B17  |
| CS0                          |                              | AC6  |
| CS1                          |                              | AD6  |

Table 21. MPC8275VR and MPC8270VR Pinout List (Continued)

| Pin Name                   |                              | Ball |
|----------------------------|------------------------------|------|
| MPC8275VR/MPC8270VR        | MPC8275VR only (UTOPIA Pins) |      |
| CS2                        |                              | AE6  |
| CS3                        |                              | AB7  |
| CS4                        |                              | AF7  |
| CS5                        |                              | AC7  |
| CS6                        |                              | AD7  |
| CS7                        |                              | AF8  |
| CS8                        |                              | AE8  |
| CS9                        |                              | AD8  |
| CS10/BCTL1                 |                              | AC8  |
| CS11/AP0                   |                              | AB8  |
| BADDR27                    |                              | C13  |
| BADDR28                    |                              | A12  |
| ALE                        |                              | D13  |
| BCTL0                      |                              | AF4  |
| PWE0/PSDDQM0/PBS0          |                              | AA5  |
| PWE1/PSDDQM1/PBS1          |                              | AE4  |
| PWE2/PSDDQM2/PBS2          |                              | AD4  |
| PWE3/PSDDQM3/PBS3          |                              | AF3  |
| PWE4/PSDDQM4/PBS4          |                              | AB4  |
| PWE5/PSDDQM5/PBS5          |                              | AE3  |
| PWE6/PSDDQM6/PBS6          |                              | AF2  |
| PWE7/PSDDQM7/PBS7          |                              | AD3  |
| PSDA10/PGPL0               |                              | AE2  |
| PSDWE/PGPL1                |                              | AD2  |
| POE/PSDRAS/PGPL2           |                              | AE1  |
| PSDCAS/PGPL3               |                              | AC3  |
| PGTA/PUPMWAIT/PGPL4/PPBS   |                              | W6   |
| PSDAMUX/PGPL5              |                              | AA4  |
| LWE0/LSDDQM0/LBS0/PCI_CFG0 |                              | AC9  |
| LWE1/LSDDQM1/LBS1/PCI_CFG1 |                              | AD9  |
| LWE2/LSDDQM2/LBS2/PCI_CFG2 |                              | AE9  |
| LWE3/LSDDQM3/LBS3/PCI_CFG3 |                              | AF9  |
| LSDA10/LGPL0/PCI_MODCKH0   |                              | AB6  |
| LSDWE/LGPL1/PCI_MODCKH1    |                              | AF5  |

Table 21. MPC8275VR and MPC8270VR Pinout List (Continued)

| Pin Name                     |                              | Ball |
|------------------------------|------------------------------|------|
| MPC8275VR/MPC8270VR          | MPC8275VR only (UTOPIA Pins) |      |
| LOE/LSDRAS/LGPL2/PCI_MODCKH2 |                              | AE5  |
| LSDCAS/LGPL3/PCI_MODCKH3     |                              | AD5  |
| LGTALUPMWAIT/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 |



Table 21. MPC8275VR and MPC8270VR Pinout List (Continued)

| Pin Name                     |                              | Ball |
|------------------------------|------------------------------|------|
| MPC8275VR/MPC8270VR          | MPC8275VR only (UTOPIA Pins) |      |
| LCL_D11/AD11                 |                              | AC13 |
| LCL_D12/AD12                 |                              | AC12 |
| 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/BE $\overline{0}$ |                              | AE12 |
| LCL_DP1/C1/BE $\overline{1}$ |                              | AA13 |
| LCL_DP2/C2/BE $\overline{2}$ |                              | AC15 |
| LCL_DP3/C3/BE $\overline{3}$ |                              | AF19 |
| IRQ0/NMI_OUT                 |                              | A11  |
| IRQ7/INT_OUT/APE             |                              | E5   |
| TRST                         |                              | F22  |
| TCK                          |                              | A24  |
| TMS                          |                              | C24  |
| TDI                          |                              | A25  |
| TDO                          |                              | B24  |
| TRIS                         |                              | C19  |
| PORESET                      |                              | B25  |

Table 21. MPC8275VR and MPC8270VR Pinout List (Continued)

| Pin Name                 |                                    | Ball |
|--------------------------|------------------------------------|------|
| MPC8275VR/MPC8270VR      | MPC8275VR only (UTOPIA Pins)       |      |
| HRESET                   |                                    | D24  |
| SRESET                   |                                    | E23  |
| QREQ                     |                                    | D18  |
| RSTCONF                  |                                    | E24  |
| MODCK1/AP1/TC0/BNKSEL0   |                                    | B16  |
| MODCK2/AP2/TC1/BNKSEL1   |                                    | F16  |
| MODCK3/AP3/TC2/BNKSEL2   |                                    | A15  |
| CLKIN1                   |                                    | G22  |
| PA0/RESTART1/DREQ3       | FCC2_UTM_TXADDR2                   | AC20 |
| PA1/REJECT1/DONE3        | FCC2_UTM_TXADDR1                   | AC21 |
| PA2/CLK20/DACK3          | FCC2_UTM_TXADDR0                   | AF25 |
| PA3/CLK19/DACK4/L1RXD1A2 | FCC2_UTM_RXADDR0                   | AE24 |
| PA4/REJECT2/DONE4        | FCC2_UTM_RXADDR1                   | AA21 |
| PA5/RESTART2/DREQ4       | FCC2_UTM_RXADDR2                   | AD25 |
| PA6                      | L1RSYNCA1                          | AC24 |
| PA7/SMSYN2               | L1TSYNCA1/L1GNTA1                  | AA22 |
| PA8/SMRXD2               | L1RXD0A1/L1RXDA1                   | AA23 |
| PA9/SMTXD2               | L1TXD0A1                           | Y26  |
| PA10/MSNUM5              | FCC1_UT8_RXD0/FCC1_UT16_RXD8       | W22  |
| PA11/MSNUM4              | FCC1_UT8_RXD1/FCC1_UT16_RXD9       | W23  |
| PA12/MSNUM3              | FCC1_UT8_RXD2/<br>FCC1_UT16_RXD10  | V26  |
| PA13/MSNUM2              | FCC1_UT8_RXD3/<br>FCC1_UT16_RXD11  | V25  |
| PA14/FCC1_RXD3           | FCC1_UT8_RXD4/<br>FCC1_UT16_RXD12  | T22  |
| PA15/FCC1_RXD2           | /FCC1_UT8_RXD5/<br>FCC1_UT16_RXD13 | T25  |
| PA16/FCC1_RXD1           | FCC1_UT8_RXD6/<br>FCC1_UT16_RXD14  | R24  |
| PA17/FCC1_RXD0/FCC1_RXD  | FCC1_UT8_RXD7/<br>FCC1_UT16_RXD15  | P22  |
| PA18/FCC1_TXD0/FCC1_TXD  | FCC1_UT8_TXD7/FCC1_UT16_TXD15      | N26  |
| PA19/FCC1_TXD1           | FCC1_UT8_TXD6/FCC1_UT16_TXD14      | N23  |
| PA20/FCC1_TXD2           | FCC1_UT8_TXD5/FCC1_UT16_TXD13      | K26  |
| PA21/FCC1_TXD3           | FCC1_UT8_TXD4/FCC1_UT16_TXD12      | L23  |

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  |
| PA23                                        | FCC1_UT8_TXD2/FCC1_UT16_TXD10       | H26  |
| PA24/MSNUM1                                 | /FCC1_UT8_TXD1/FCC1_UT16_TXD9       | F25  |
| PA25/MSNUM0                                 | FCC1_UT8_TXD0/FCC1_UT16_TXD8        | D26  |
| PA26/FCC1_MII_RX_ER                         | FCC1_UTM_RXCLAV/<br>FCC1_UTS_RXCLAV | D25  |
| PA27/FCC1_MII_RX_DV                         | FCC1_UT_RXSOC                       | C25  |
| PA28/FCC1_MII_TX_EN                         | FCC1_UTM_RXENB/<br>FCC1_UTS_RXENB   | C22  |
| PA29/FCC1_MII_TX_ER                         | FCC1_UT_TXSOC                       | B21  |
| PA30/FCC1_MII_CRS/FCC1_RTS                  | FCC1_UTM_TXCLAV/<br>FCC1_UTS_TXCLAV | A20  |
| PA31/FCC1_MII_COL                           | FCC1_UTM_TXENB/<br>FCC1_UTS_TXENB   | A19  |
| PB4/FCC3_TXD3/L1RSYNCA2/<br>FCC3_RTS        | FCC2_UT8_RXD0                       | AD21 |
| PB5/FCC3_TXD2/L1TSYNCA2/<br>L1GNTA2         | FCC2_UT8_RXD1                       | AD22 |
| PB6/FCC3_TXD1/L1RXDA2/L1RXD0A2              | FCC2_UT8_RXD2                       | AC22 |
| PB7/FCC3_TXD0/FCC3_TXD/<br>L1TXDA2/L1TXD0A2 | FCC2_UT8_RXD3                       | AE26 |
| PB8/FCC3_RXD0/FCC3_RXD/TXD3                 | FCC2_UT8_TXD3/L1RSYNCD1             | AB23 |
| PB9/FCC3_RXD1/L1TXD2A2                      | FCC2_UT8_TXD2/L1TSYNCD1/<br>L1GNTD1 | AC26 |
| PB10/FCC3_RXD2                              | FCC2_UT8_TXD1/L1RXDD1               | AB26 |
| PB11/FCC3_RXD3                              | FCC2_UT8_TXD0/L1TXDD1               | AA25 |
| PB12/FCC3_MII_CRS/TXD2                      | L1CLKOB1/L1RSYNCC1                  | W26  |
| PB13/FCC3_MII_COL/L1TXD1A2                  | L1RQB1/L1TSYNCC1/L1GNTE1            | W25  |
| PB14/FCC3_MII_TX_EN/RXD3                    | L1RXDC1                             | V24  |
| PB15/FCC3_MII_TX_ER/RXD2                    | L1TXDC1                             | U24  |
| PB16/FCC3_MII_RX_ER/CLK18                   | L1CLKOA1                            | R22  |
| PB17/FCC3_MII_RX_DV/CLK17                   | L1RQA1                              | R23  |
| PB18/FCC2_RXD3/L1CLKOD2/<br>L1RXD2A2        | FCC2_UT8_RXD4                       | M23  |
| PB19/FCC2_RXD2/L1RQD2/L1RXD3A2              | FCC2_UT8_RXD5                       | L24  |
| PB20/FCC2_RXD1/L1RSYNCD2/<br>L1TXD1A1       | FCC2_UT8_RXD6                       | K24  |

Table 21. MPC8275VR and MPC8270VR Pinout List (Continued)

| Pin Name                                                |                                                                     | Ball |
|---------------------------------------------------------|---------------------------------------------------------------------|------|
| MPC8275VR/MPC8270VR                                     | MPC8275VR only (UTOPIA Pins)                                        |      |
| PB21/FCC2_RXD0/FCC2_RXD/<br>L1TSYNCD2/L1GNTD2           | FCC2_UT8_RXD7/L1TXD2A1                                              | L21  |
| PB22/FCC2_TXD0/FCC2_TXD/<br>L1RXDD2                     | FCC2_UT8_TXD7/L1RXD1A1                                              | P25  |
| PB23/FCC2_TXD1/L1TXDD2                                  | FCC2_UT8_TXD6/L1RXD2A1                                              | N25  |
| PB24/FCC2_TXD2/L1RSYNCC2                                | FCC2_UT8_TXD5/L1RXD3A1                                              | E26  |
| PB25/FCC2_TXD3/L1TSYNCC2/<br>L1GNCT2                    | FCC2_UT8_TXD4/L1TXD3A1                                              | H23  |
| PB26/FCC2_MII_CRD/L1RXDC2                               | FCC2_UT8_TXD1                                                       | C26  |
| PB27/FCC2_MII_COL/L1TXDC2                               | FCC2_UT8_TXD0                                                       | B26  |
| PB28/FCC2_MII_RX_ER/FCC2_RTS/<br>L1TSYNCB2/L1GNTB2/TXD1 |                                                                     | A22  |
| PB29/L1RSYNCB2/<br>FCC2_MII_TX_EN                       | FCC2_UTM_RXCLAV/<br>FCC2_UTS_RXCLAV                                 | A21  |
| PB30/FCC2_MII_RX_DV/L1RXDB2                             | FCC2_UT_TXSOC                                                       | E20  |
| PB31/FCC2_MII_TX_ER/L1TXDB2                             | FCC2_UT_RXSOC                                                       | C20  |
| PC0/DREQ1/BRGO7/SMSYN2/<br>L1CLKOA2                     |                                                                     | AE22 |
| PC1/DREQ2/BRGO6/L1RQA2                                  |                                                                     | AA19 |
| PC2/FCC3_CD/DONE2                                       | FCC2_UT8_TXD3                                                       | AF24 |
| PC3/FCC3_CTS/DACK2/CTS4                                 | FCC2_UT8_TXD2                                                       | AE25 |
| PC4/SI2_L1ST4/FCC2_CD                                   | FCC2_UTM_RXENB/<br>FCC2_UTS_RXENB                                   | AB22 |
| PC5/SI2_L1ST3/FCC2_CTS                                  | FCC2_UTM_TXCLAV/<br>FCC2_UTS_TXCLAV                                 | AC25 |
| PC6/FCC1_CD                                             | L1CLKOC1/FCC1_UTM_RXADDR2/<br>FCC1_UTS_RXADDR2/<br>FCC1_UTM_RXCLAV1 | AB25 |
| PC7/FCC1_CTS                                            | L1RQC1/FCC1_UTM_TXADDR2/<br>FCC1_UTS_TXADDR2/<br>FCC1_UTM_TXCLAV1   | AA24 |
| PC8/CD4/RENA4/SI2_L1ST2/CTS3                            | FCC1_UT16_TXD0                                                      | Y24  |
| PC9/CTS4/CLSN4/SI2_L1ST1/<br>L1TSYNCA2/L1GNTA2          | FCC1_UT16_TXD1                                                      | U22  |
| PC10/CD3/RENA3                                          | FCC1_UT16_TXD2/SI1_L1ST4/<br>FCC2_UT8_RXD3                          | V23  |
| PC11/CTS3/CLSN3/L1TXD3A2                                | L1CLKOD1/FCC2_UT8_RXD2                                              | U23  |
| PC12/CD2/RENA2                                          | SI1_L1ST3/FCC1_UTM_RXADDR1/<br>FCC1_UTS_RXADDR1                     | T26  |

Table 21. MPC8275VR and MPC8270VR Pinout List (Continued)

| Pin Name                               |                                              | Ball |
|----------------------------------------|----------------------------------------------|------|
| MPC8275VR/MPC8270VR                    | MPC8275VR only (UTOPIA Pins)                 |      |
| PC13/CTS2/CLSN2                        | L1RQD1/FCC1_UTM_TXADDR1/<br>FCC1_UTS_TXADDR1 | R26  |
| PC14/CD1/RENA1                         | FCC1_UTM_RXADDR0/<br>FCC1_UTS_RXADDR0        | P26  |
| PC15/CTS1/CLSN1/SMTXD2                 | FCC1_UTM_TXADDR0/<br>FCC1_UTS_TXADDR0        | P24  |
| PC16/CLK16/TIN4                        |                                              | M26  |
| PC17/CLK15/TIN3/BRGO8                  |                                              | L26  |
| PC18/CLK14/TGATE2                      |                                              | M24  |
| PC19/CLK13/BRGO7                       |                                              | L22  |
| PC20/CLK12/TGATE1                      |                                              | K25  |
| PC21/CLK11/BRGO6                       |                                              | J25  |
| PC22/CLK10/DONE1                       |                                              | G26  |
| PC23/CLK9/BRGO5/DACK1                  |                                              | F26  |
| PC24/CLK8/TOUT4                        | FCC2_UT8_TXD3                                | G24  |
| PC25/CLK7/BRGO4                        | FCC2_UT8_TXD2                                | E25  |
| PC26/CLK6/TOUT3/TMCLK                  |                                              | G23  |
| PC27/FCC3_TXD/FCC3_TXD0/CLK5/<br>BRGO3 |                                              | B23  |
| PC28/CLK4/TIN1/TOUT2/CTS2/CLSN2        |                                              | E22  |
| PC29/CLK3/TIN2/BRGO2/CTS1/CLSN1        |                                              | E21  |
| PC30/CLK2/TOUT1                        | FCC2_UT8_TXD3                                | D21  |
| PC31/CLK1/BRGO1                        |                                              | B20  |
| PD4/BRGO8/FCC3_RTS/SMRXD2              | L1TSYNCD1/L1GNTD1                            | AF23 |
| PD5/DONE1                              | FCC1_UT16_TXD3                               | AE23 |
| PD6/DACK1                              | FCC1_UT16_TXD4                               | AB21 |
| PD7/SMSYN1/FCC1_TXCLAV2                | FCC1_UTM_TXADDR3/<br>FCC1_UTS_TXADDR3        | AD23 |
| PD8/SMRXD1/BRGO5                       | FCC2_UT_TXPRTY                               | AD26 |
| PD9/SMTXD1/BRGO3                       | FCC2_UT_RXPRTY                               | Y22  |
| PD10/L1CLKOB2/BRGO4                    | FCC2_UT8_RXD1/L1RSYNCB1                      | AB24 |
| PD11/L1RQB2                            | FCC2_UT8_RXD0/L1TSYNCB1/<br>L1GNTB1          | Y23  |
| PD12                                   | SI1_L1ST2/L1RXDB1                            | AA26 |
| PD13                                   | SI1_L1ST1/L1TXDB1                            | W24  |
| PD14/L1CLKOC2/I2CSCL                   | FCC1_UT16_RXD0                               | V22  |

Table 21. MPC8275VR and MPC8270VR Pinout List (Continued)

| Pin Name                   |                                                            | Ball                                                                                                                                                                                               |
|----------------------------|------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MPC8275VR/MPC8270VR        | MPC8275VR only (UTOPIA Pins)                               |                                                                                                                                                                                                    |
| PD15/L1RQC2/I2CSDA         | FCC1_UT16_RXD1                                             | U26                                                                                                                                                                                                |
| PD16/SPIMISO               | FCC1_UT_TXPRTY/L1TSYNCC1/<br>L1GNTC1                       | T23                                                                                                                                                                                                |
| PD17/BRGO2/SPIMOSI         | FCC1_UT_RXPRTY                                             | R25                                                                                                                                                                                                |
| PD18/SPICLK                | FCC1_UTM_RXADDR4/<br>FCC1_UTS_RXADDR4/<br>FCC1_UTM_RXCLAV3 | P23                                                                                                                                                                                                |
| PD19/SPISEL/BRGO1          | FCC1_UTM_TXADDR4/<br>FCC1_UTS_TXADDR4/<br>FCC1_UTM_TXCLAV3 | N22                                                                                                                                                                                                |
| PD20/RTS4/TENA4/L1RSYNCA2  | FCC1_UT16_RXD2                                             | M25                                                                                                                                                                                                |
| PD21/TXD4/L1RXD0A2/L1RXDA2 | FCC1_UT16_RXD3                                             | L25                                                                                                                                                                                                |
| PD22/RXD4/L1TXD0A2/L1TXDA2 | FCC1_UT16_TXD5                                             | J26                                                                                                                                                                                                |
| PD23/RTS3/TENA3            | FCC1_UT16_RXD4/L1RSYNCD1                                   | K22                                                                                                                                                                                                |
| PD24/TXD3                  | FCC1_UT16_RXD5/L1RXDD1                                     | G25                                                                                                                                                                                                |
| PD25/RXD3                  | FCC1_UT16_TXD6/L1TXDD1                                     | H24                                                                                                                                                                                                |
| PD26/RTS2/TENA2            | FCC1_UT16_RXD6/L1RSYNCC1                                   | F24                                                                                                                                                                                                |
| PD27/TXD2                  | FCC1_UT16_RXD7/L1RXDC1                                     | H22                                                                                                                                                                                                |
| PD28/RXD2                  | FCC1_UT16_TXD7/L1TXDC1                                     | B22                                                                                                                                                                                                |
| PD29/RTS1/TENA1            | FCC1_UTM_RXADDR3/<br>FCC1_UTS_RXADDR3/<br>FCC1_UTM_RXCLAV2 | D22                                                                                                                                                                                                |
| PD30/TXD1                  | FCC2_UTM_TXENB/<br>FCC2_UTS_TXENB                          | C21                                                                                                                                                                                                |
| PD31/RXD1                  |                                                            | E19                                                                                                                                                                                                |
| VCCSYN                     |                                                            | D19                                                                                                                                                                                                |
| VCCSYN1                    |                                                            | K6                                                                                                                                                                                                 |
| CLKIN2                     |                                                            | K21                                                                                                                                                                                                |
| SPARE4 <sup>1</sup>        |                                                            | C14                                                                                                                                                                                                |
| PCI_MODE <sup>2</sup>      |                                                            | AD24                                                                                                                                                                                               |
| SPARE6 <sup>1</sup>        |                                                            | B15                                                                                                                                                                                                |
| THERMAL0 <sup>3</sup>      |                                                            | E17                                                                                                                                                                                                |
| THERMAL1 <sup>3</sup>      |                                                            | C23                                                                                                                                                                                                |
| I/O power                  |                                                            | E6, F6, H6, L5, L6, P6, T6, U6, V5,<br>Y5, AA6, AA8, AA10, AA11,<br>AA14, AA16, AA17, AB19, AB20,<br>W21, U21, T21, P21, N21, M22,<br>J22, H21, F21, F19, F17, E16,<br>F14, E13, E12, F10, E10, E9 |

Table 21. MPC8275VR and MPC8270VR Pinout List (Continued)

| Pin Name            |                              | Ball                                                                                                                                                                                                                                                                                                                                                                                                                                                                              |
|---------------------|------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| MPC8275VR/MPC8270VR | MPC8275VR only (UTOPIA Pins) |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
| Core Power          |                              | L3, V4, W3, AC11, AD11, AB15, U25, T24, J24, H25, F23, B19, D17, C17, D10, C10                                                                                                                                                                                                                                                                                                                                                                                                    |
| Ground              |                              | B18 <sup>4</sup> , A18 <sup>5</sup> , A2, B1, B2, A5, C5, 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 |

<sup>1</sup> Must be pulled down or left floating.

<sup>2</sup> If PCI is not desired, must be pulled up or left floating.

<sup>3</sup> For information on how to use this pin, refer to *MPC8260 PowerQUICC II Thermal Resistor Guide (AN2271/D)*.

<sup>4</sup> 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.

<sup>5</sup> 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<br>MPC8270      | 37.5 x 37.5  | TBGA | 480           | 1.27       | 1.55                          |
| VR      | MPC8275VR<br>MPC8270VR) | 27 x 27      | PBGA | 516           | 1          | 2.25                          |

## 1.5.2 Mechanical Dimensions

### 1.5.2.1 ZU Package Dimensions

Figure 16 provides the mechanical dimensions and bottom surface nomenclature of the 480 TBGA package.

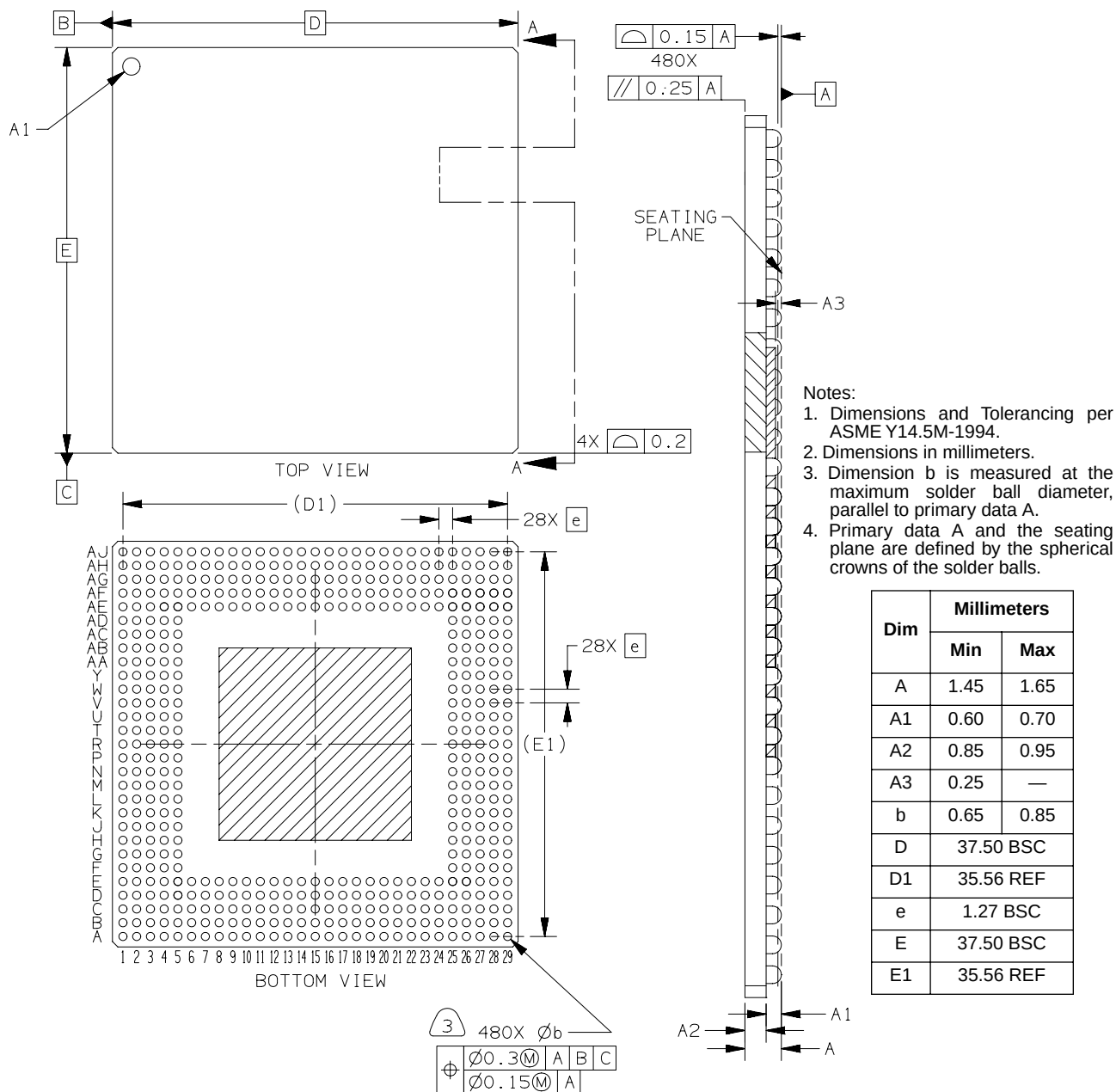
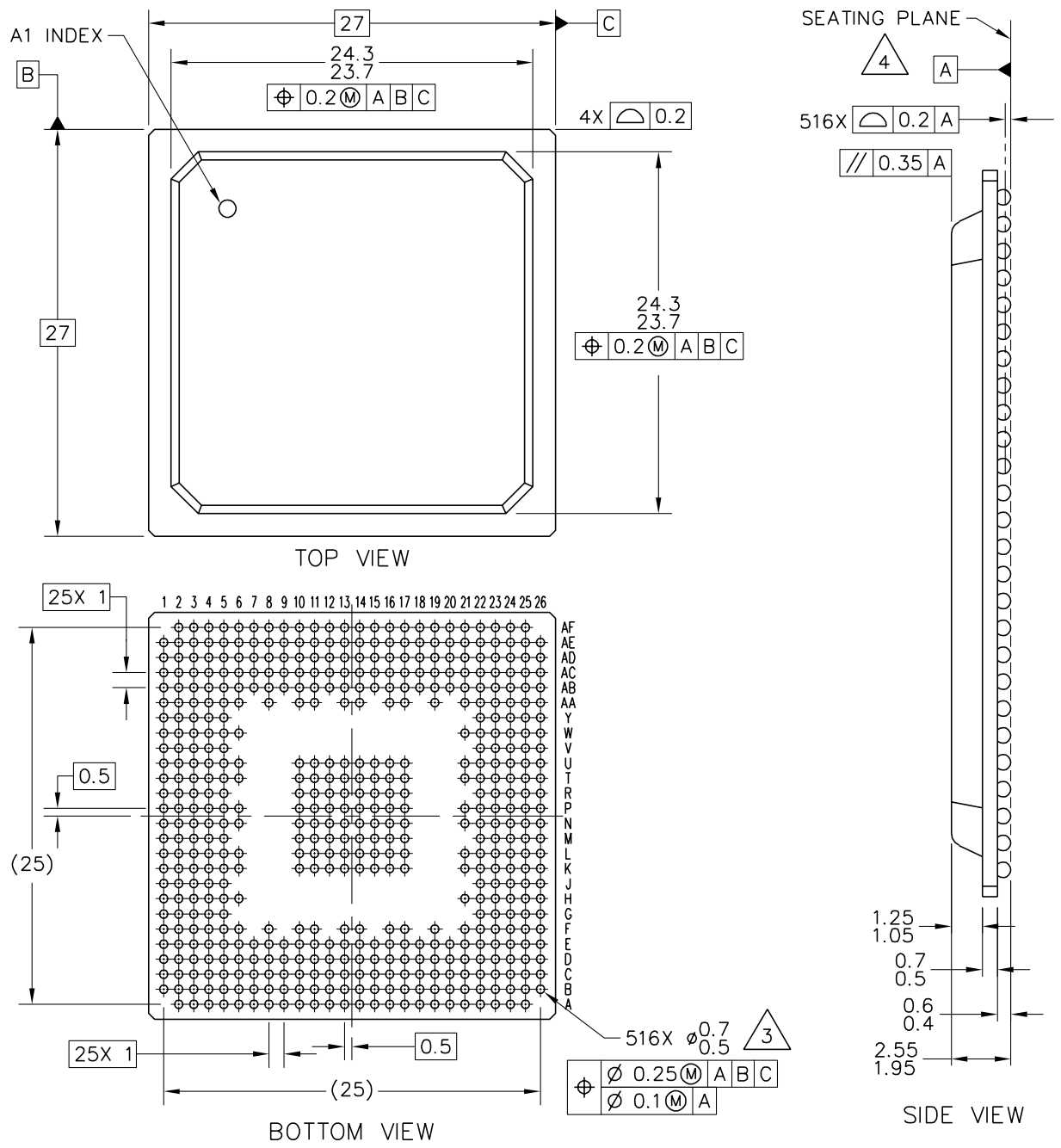


Figure 16. Mechanical Dimensions and Bottom Surface Nomenclature—480 TBGA



### 1.5.2.2 VR Package Dimensions

Figure 17 provides the mechanical dimensions and bottom surface nomenclature of the 516 PBGA package.



**Figure 17. Mechanical Dimensions and Bottom Surface Nomenclature—516 PBGA**

## 1.6 Ordering Information

Figure 18 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.

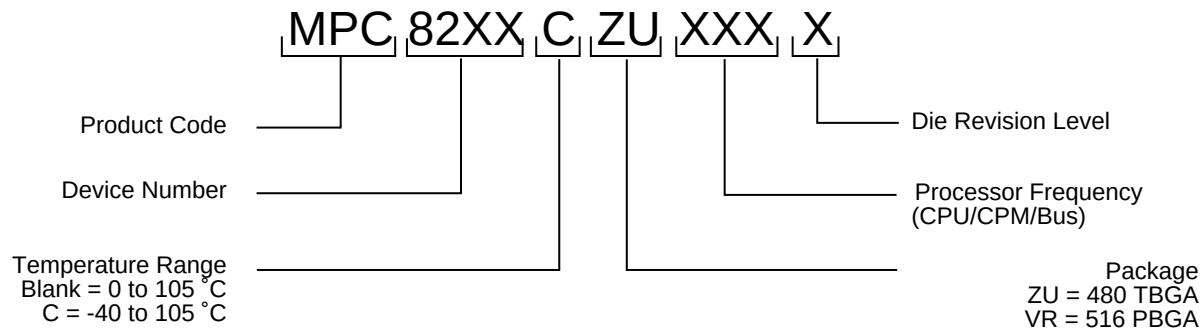


Figure 18. Motorola Part Number Key

Table 23. Document Revision History

| Document Revision | Substantive Changes    |
|-------------------|------------------------|
| 0                 | —                      |
| 0.1               | Initial public release |



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