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Power PMC-260

Installation Guide

P/N QMAN-PPMC-260
May 2002

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Using this Guide

This Installation Guide explains how to install, use and troubleshoot problems associated with Power PMC-260.
This Installation Guide is intended for users qualified in electronics or electrical engineering. It is presumed that you have the prerequisite knowledge, and working experience with:

- Peripheral Component Interconnect (PCI) bus
- PCI mezannine cards (PMCs)
- Processor PCI mezzanine cards (PPMCs)
- Power PC

Conventions

Notation	Description
57	All numbers are decimal numbers except when used with the notations described below
00000000_{16}	Typical notation for hexadecimal numbers (digits are 0 through F), e.g. used for addresses and offsets
0000_2	Same for binary numbers (digits are 0 and 1)
x	Generic use of a letter
n	Generic use of numbers
n.nn	Decimal point indicator is signaled
Bold	Character format used to emphasize a word
`Courier`	Character format used for on-screen output
`Courier+Bold`	Character format used to characterize user input
Italics	Character format for references, table, and figure descriptions
<text>	Typical notation used for variables and keys
[text]	Typical notation for buttons
...	Repeated item
. . .	Omission of information from example/command that is not necessary at the time being
..	Ranges

Notation	Description
:	Extents
|	Logical OR
Note:	No danger encountered. Pay attention to important information marked using this layout.
Caution 	Possibly dangerous situation: slight injuries to people or damage to objects possible
Danger 	Dangerous situation: injuries to people or severe damage to objects possible

Abbreviations

BIOS	Basic Input Output System
CMC	Common Mezannine Card
CPCI	Compact Peripheral Connect Interface
CPLD	Complex Programmable Logic Device
CPU	Central Processing Unit
ECC	Error Correcting Code
EEPROM	Electrically Erasable Programmable Read-Only Memory
EIA	Electronic Industries Association
EMC	Electromagnetic compatibility
EMI	Electromagnetic interference
ESD	Electrostatic discharge
FAE	Field Applications Engineer
FCC	Federal Communications Commission
IEEE	International Electrical and Electronics Engineers
I^2C	Inter Integrated Circuit
IDMA	Internal Direct Memory Access

I/O	Input/Output
ISP	In System Programmability
JTAG	Joint Test Action Group
MAC	Message Authentication Code/Media Access Control
NVRAM	Non-Volatile Random Access Memory
PCB	Printed Circuit Board
PBGA	Plastic Ball Grid Array
RefDes	Reference Designator
RTC	Real Time Clock
SDRAM	Synchronous Dynamic Random Access Memory
SO DIMM	Small Outline Dual In-line Memory Module
TFTP	Trivial File Transfer Protocol
UART	Universal Asynchronous Receiver Transmitter

Revision History

Drawing Number	Revision	Date	Description
74-0003-01	A	March 2002	Initial Release
74-0003-01	B	May 2002	Updated Table 5 “Power Requirement for Power PMC-260” page 2-7 Updated Table 6 “Environmental Requirements” page 2-8. Corrected Intel ® Flash ® memory information on page 5-2 Added section for Power up and initialization “Board Power Up and Initialization” page 2-18. Added note on page 3-3 Added the “Memory Map and Interrupts” chapter. Editorial changes.

Other Sources of Information

For further information refer to the following documents:

Company	www.	Document
International Business Machines	ibm.com	PowerPC 750CXe
Marvell Technology Group Ltd.	marvell.com	GT-64260A System Controller
Intel Corporation	intel.com	3V Intel®Strata Flash® Memory



Safety Notes

This section provides safety precautions to follow when installing, operating, and maintaining the Power PMC-260.

We intend to provide all necessary information to install and handle the Power PMC-260 in this Installation Guide. However, as the product is complex and its usage manifold, we do not guarantee that the given information is complete. If you need additional information, ask your Force Computers representative.

The Power PMC-260 has been designed to meet the standard industrial safety requirements. It must not be used except in its specific area of office telecommunication industry and industrial control.

Only personnel trained by Force Computers or persons qualified in electronics or electrical engineering are authorized to install, maintain, and operate the Power PMC-260. The information given in this manual is meant to complete the knowledge of a specialist and must not be taken as replacement for qualified personnel.

Installation

Electrostatic discharge and incorrect board installation and removal can damage circuits or shorten their life. Therefore:

- **Before installing or removing the board, read "Action Plan" on page 2-3.**
- **Before touching boards or electronic components, make sure that you are working in an ESD-safe environment.**
- **When plugging the board in or removing it, do not press on the front panel but use the handles.**
- **Before installing or removing an additional device or module, read the respective documentation.**
- **Make sure that the board is connected to the CompactPCI backplane via all assembled connectors and that power is available on all power pins.**



Carrier Card

The Power PMC-260 Test Card manufactured by Force Computers is designed specifically as a carrier card for Power PMC-260. It is recommended that you use this carrier card for proper operation.

Any damage arising out of improper use of Power PMC-260 on non-compliant connector slots of a carrier card is not the responsibility of Force Computers. See "Carrier Card Requirements" on page 2-6 for further information.

Operation

While operating the board ensure that the environmental and power requirements are met.

Do not operate the product outside the specified environmental limits. High humidity and condensation may cause short circuits. Make sure the product is completely dry and there is no moisture on any surface before applying power.

When operating the board in areas of electromagnetic radiation ensure that the board is bolted on the CompactPCI system and the system is shielded by an enclosure.

Make sure that contacts and cables of the board cannot be touched while the board is operating.

Replacement/Expansion

Only replace or expand components or system parts with those recommended by Force Computers. Otherwise, you are fully responsible for the impact on EMC and the possibly changed functionality of the product.

Check the total power consumption of all components installed (see the technical specification of the respective components). Ensure that any individual output current of any source stays within its acceptable limits (see the technical specification of the respective source).



Environment

Always dispose used boards according to your country's legislation, if possible in an environmentally acceptable way.



1

Introduction

Product Overview

Power PMC-260, a Processor PCI Mezannine Card (PPMC) is based on the IBM 750CXe PowerPC and Galileo GT-64260A System Controller. The highly integrated controller along with a wealth of on-board memory and I/O resources in the PMC form factor offers extensive usage possibilities as a high performance processing engine. Key features of Power PMC-260 are listed here:

- IBM Power PC 750CXe RISC microprocessor
  - 600MHz core frequency and 133MHz bus frequency
  - On-die 256K L2 cache running at core frequency with ECC logic
  - CPU provided with a heat sink assembly
- Galileo Technology's GT-64260A System Controller
  - SDRAM interface: 3.3V, 72 bit (64 bit + 8 bit ECC), 133 MHz memory bus
  - IDMA controller for data transfer between PCI, SDRAM, Device bus and CPU
  - Three 10/100 Mbps Fast Ethernet MAC controllers
  - I^2C support for controlling other I^2C devices on board
  - Watchdog timer
  - General purpose I/O and interrupt ports
- On-board SDRAM
  - 512MB PC 133 unbuffered
  - ECC SDRAM
- Flash memory
  - 1MB BIOS Boot flash in 40 pin TSOP package on the device controller bus of GT-64260A
  - 64MB on-board programmable Intel®Strata Flash®memory
- Three 10/100baseTX Ethernet Ports through the PMC I/O connector
  - MAC integrated in GT-64260A chip
  - Fast Ethernet PHY transceiver PHY and magnetics provided on-board
- Two UART channels
- Y2K-compliant RTC

In addition, Power PMC-260 supports two-wire serial I^2C with a multiple master environment. Two 2K bit serial EEPROMs reside on the I^2C bus. All clocks necessary for Power PMC-260 are generated on-board except the PCI clock which is supplied by the carrier card.

Software Support

Power PMC-260 supports Linux (with PPCBoot as the boot loader) and VxWorks. The following features are supported:

- User Flash
- PCI support including VPD and Monarch / Non-Monarch Operation
- I^2C
- UART (through MPSC ports of GT-64260A)
- Ethernet
- RTC
- Watchdog timer
- Monarch and Non-Monarch operation

The PPCBoot firmware supports download of Linux kernel and root file system using TFTP from the server or a network. It also supports booting of Linux with the root file system (RAMDISK).

Function Blocks

The function blocks are shown in Figure 1.

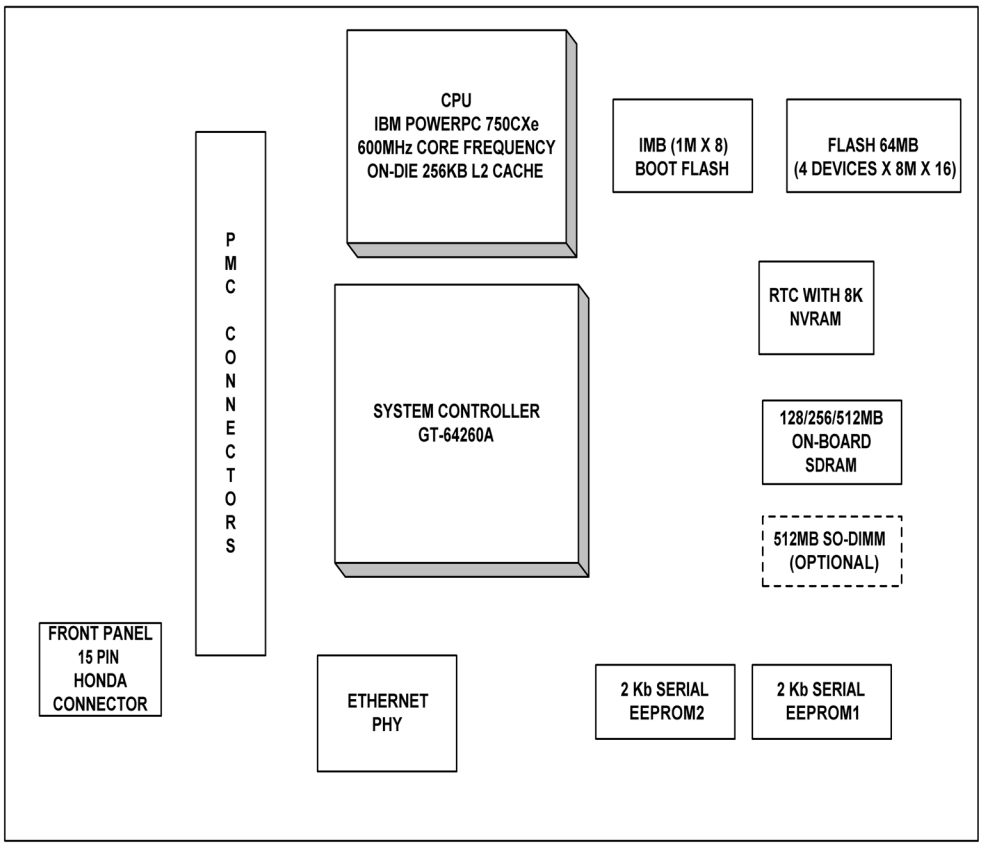


Figure 1: *Function Blocks*

Variants

The basic variant offers on-board SDRAM of 256MB or 512MB. This basic variant is a 74mm x 149mm card with the standard form-factor as per the *Processor PMC Specification (VITA 32x-199x Draft 0.5a).*

Table 1: *Variants*

Variant	Description
110248	Standard PMC form factor (IEEE P1386.1) Maximum Component Height on Side 2 is 1.9mm Basic Memory (all on-board) 256MB
110249	Standard PMC form factor (IEEE P1386.1) Maximum Component Height on Side 2 is 1.9mm Basic Memory (all on-board) 512MB

Note: An additional SDRAM is also provided on an SO-DIMM module. In this case, the Power PMC-260 is a tall form-factor Processor PMC because of increased component height on the secondary side of the PCB.

Board Layout

This Installation Guide refers to two sides (Side 1 and Side 2) of Power PMC-260:

- You can identify Side 1 by the CPU heat-sink and PMC connectors.
- You can identify Side 2 by Ethernet Magnetics.

The Top and Bottom layout of the Power PMC-260 are shown in Figure 2 and Figure 3. See "Controls, Indicators and Connectors" (Chapter 4) and "Devices and Other Functions" (Chapter 5) for detailed information.

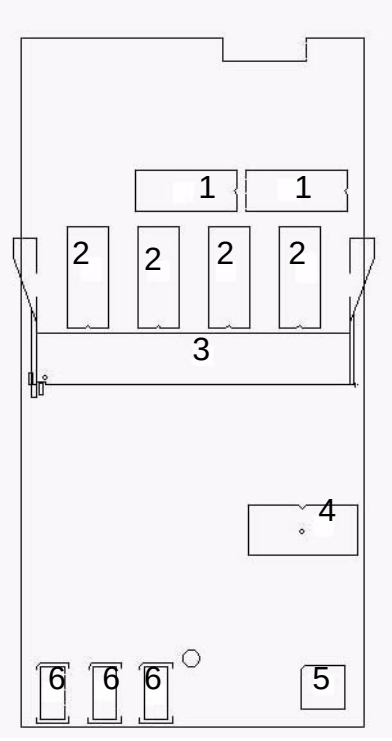


Figure 2: *Top Layout of Power PMC-260 showing major components*

The major components numbered in Figure 2 are listed here:

1. ECC SDRAMs
2. SDRAMs
3. SO-DIMM Socket footprint

4. Boot Flash
5. CPLD
6. Ethernet Magnetics

The bottom layout of Power PMC-260 is shown in Figure 3.

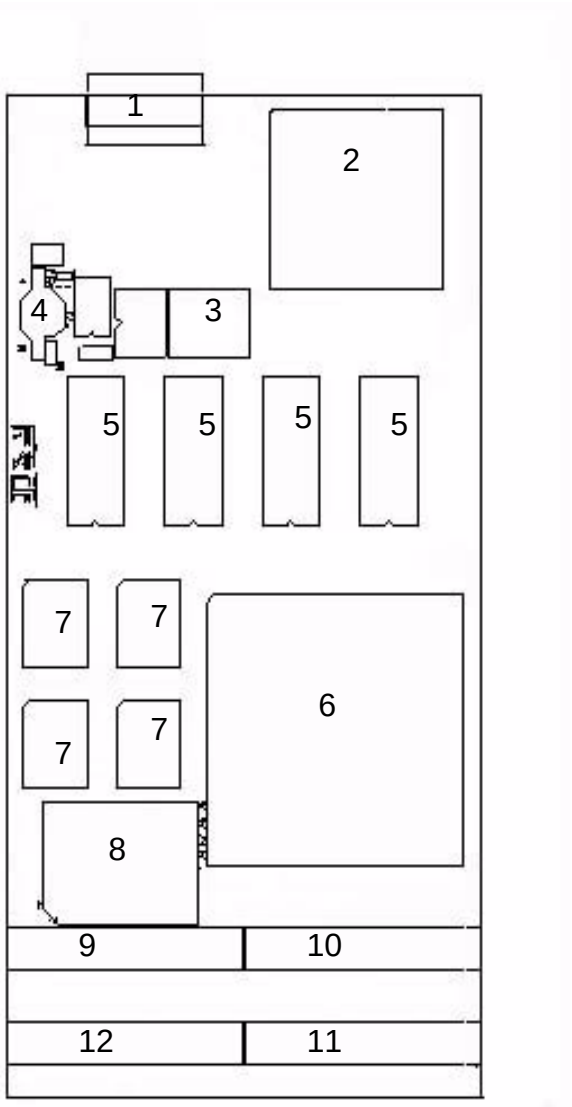


Figure 3: *Bottom Layout of Power PMC-260 showing major components*

The major components numbered in Figure 3 are listed here:

1. 15-pin connector

2. Central Processing Unit
3. Real Time Clock
4. Battery
5. SDRAMs
6. System Controller
7. User Flash
8. Ethernet PHY
9. PMC P1 Connector
10. PMC P3 Connector
11. PMC P4 Connector
12. PMC P2 Connector

Standard Compliance

Power PMC-260 meets the following standards:

Table 2: *Standard Compliance*

Standard	Description
IPC	Quality level requirements
IEC 68-2-1 / 2 / 3 / 13 / 14	Climatic environmental requirements.The Power PMC-260 can only be used in a restricted temperature range. See “Environmental Requirements” on page 2-7 for details.
IEC 68-2-6 / 27 / 32	Mechanical environmental requirements
EN 609 50 / UL 1950 (predefined Force system)	Legal requirements

The features relevant to PMC / Processor PMC standards that are supported by Power PMC-260 are:

- 64-bit, 66MHz, PCI2.2-compliant interface to an IEE P1386.1 PMC or VITA 32-199x Draft 0.5a Processor PMC compliant carrier board
- Universal signalling PCI interface (supporting both 3.3V and 5V)
- Four 64-pin EIA E700 AAAB connectors as per the EIA standard. These PMC connectors labelled P11, P12, P13, P14 (as entailed by the CMC specification P1386) are referred to as P1, P2, P3, and P4 in this Installation Guide.
- Monarch or Non-Monarch Operating Modes

Note: Take into account that the board is not yet qualified.

Ordering Information

When ordering the Power PMC-260 variants use the order numbers given below.

Order Numbers

The order numbers are provided in Table 3.

Table 3: *Ordering Information Excerpt* [1)]

Order No.	Power PMC-260	Description
110248	SMT, PPC / PMC-260 / 256-600-64	Standard PMC form factor (IEEE P1386.1) Maximum Component Height on Side 2 is 1.9mm Basic Memory (all on-board): 256MB
110249	SMT, PPC / PMC-260 / 512-600-64	Standard PMC form factor (IEEE P1386.1) Maximum Component Height on Side 2 is 1.9mm Basic Memory (all on-board): 512MB

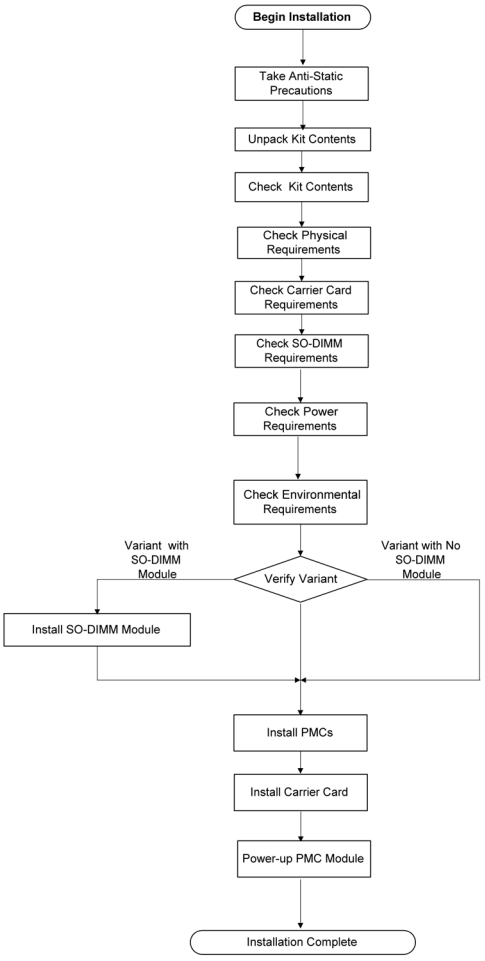
1) Status: May 2002

2

Installation

Action Plan

This chapter details how you can install Power PMC-260 on the carrier card. For information on I/O interfaces and related installation, see the "I/0 Interfaces" chapter. To install Power PMC-260 on the carrier card, follow these steps. Each step is described in detail in this chapter.



Preparing for Installation

The following sections explain how to prepare for an installation. Topics include:

- "Taking Antistatic Precautions" on page 2-4
- "Unpacking Kit Contents" on page 2-4
- "Checking Kit Contents" on page 2-5
- "Physical Requirements" on page 2-5
- "Carrier Card Requirements" on page 2-6
- "Environmental Requirements" on page 2-7

Taking Antistatic Precautions

When handling circuit boards and associated internal computer components, use an antistatic wriststrap or wear isolation gloves. In addition to using an antistatic wriststrap or wearing isolation gloves, consider the following precautions:

- Do not allow a circuit board or other components to make contact with non-conductors, including your clothing.
- Keep loose circuit boards inside or on top of conductive plastic bags.
- Before touching a loose circuit board or component, discharge static electricity.

Unpacking Kit Contents

Start preparing for your installation by unpacking the card kit.

1. Verify that the order numbers on labels of your kit carton match the numbers for the product you ordered. If the order numbers do not match, contact your Force Computers sales representative.
2. Locate and put on an antistatic wriststrap.
3. Clip the wire attached to the wriststrap to the frame of your system chassis.

4. Remove all items from the carton.
5. Remove hardware components from conductive plastic bags in which they were packaged and place components on the bags.

Note: Store the original packaging material in case a factory return is necessary.

Checking Kit Contents

Table 4 lists the contents of the card kit. Verify that the material you unpacked matches contents listed in Table 4.

.

Table 4: *Package Contents*

Part	Part Name	Part Number
	Installation Guide	QMAN-PPMC-260 Revision B
	Power PMC-260	SRTYNE750E256PPMC0 (PCBA,TYNE,PMC260,750E,256MB, 64MB) Or SRTYNE750E512PPMC0 (PCBA,TYNE,PMC260,750E,512MB, 64MB)

Note: For information on how to use the accessory cable see the "I/0 Interfaces" chapter.

Physical Requirements

Power PMC-260 features the industry-standard form-factor. The card must be placed on a carrier card.

Carrier Card Requirements

Power PMC-260 is to be plugged into the PMC slot of the Power PMC-260 Test card. You can also use a carrier card that meets the following carrier card requirements detailed here.

- Ensure that the carrier card is compliant with the Common Mezannine Card specification (IEEE1386.1) and Processor Mezannine Cards specifications (VITA23-199x) for carrier cards.
- Ensure that the carrier card implements the changes required by the PPMC specification when special PPMC signals are used.
- Ensure the following when PPMC special signals are used
  - Ensure that weak pull-ups and pull-downs are present on the carrier card for PUP / PDN signals on the PMC connectors.
  - The carrier card must support special PPMC signals (MONARCH#, EREADY, RESETOUT#) with a weak pull-up of 5KOhm for EREADY.
- Ensure that the carrier card provides the PCI clock, PCI reset, PCI arbiter and other necessary PCI signal pull-ups as per the PCI 2.2 specifications. Since PCI arbitration is not provided by the Power PMC-260, ensure that any other participant in the system provides the same.
- When the carrier card has a J4 PMC slot, ensure that the pinout of J4 is compliant with the P4 pinout of Power PMC-260.
- When the carrier card has a J4 PMC slot, ensure that maximum voltages applied to the signals are:
  - 2.5V for PowerPC COP signals
  - RS232 levels for RS-232 signals
  - 3.3V for other signals
- If the carrier card accesses the COP signals of the Power PMC-260 CPU through the P4 connector, ensure that voltage levels on these are safe for IBM750CXe (nominal 2.5V, maximum 2.65V)
- Ensure that care is taken to prevent I^2C address clash if the carrier card interfaces to the I^2C bus on Power PMC-260.
- Ensure that the following voltage supplies are provided by the carrier card to Power PMC-260
  - Mandatory 3.3V, +5% or -5%, 3.84A (for CPU core frequency of 600MHz) typical, 5A maximum
  - Optional 3.3Vaux (3V to 3.6V)

  (3.3Vaux powers only the serial EEPROM on Power PMC-260).

SO-DIMM Requirements

Ensure that the SO-DIMM module is:

- Unbuffered
- 3.3V, PC133 SDRAM module compliant to the following specifications
  - "PC133 SDRAM specification"
  - "SO-DIMM Module-Unbuffered SDRAM / SGRAM Graphics" published by INTEL®
- Size of any value limited to 512MB. (Power PMC-260 will configure memory maps automatically on boot).

If ECC support is required, ensure that the SO-DIMM supports ECC. When the SO-DIMM is non-ECC, Power PMC-260 will automatically configure the entire memory as non-ECC.

Power Requirements

The power requirement of Power PMC-260 to be supplied by the carrier card is given in Table 5.

Table 5: *Power Requirement for Power PMC-260*

Requirement	Range or Value
Voltage	3.3V
Current	3.84A typical 4.97A maximum
Power	12.67W typical 16.39W maximum

The power requirement detailed here is for the case when one Power PMC-260 is populated on the carrier card. The figures provided here will roughly double when two Power PMC-260s are populated on the carrier card.

Environmental Requirements

The conditions listed below refer to the surroundings of the board within the user environment.

Note: Operating temperatures refer to the temperature of the air circulating around the board and not to the component temperature.

Caution



Do not operate the product outside the specified environmental limits. High humidity, temperature and condensation may cause short circuits. Make sure the product is completely dry and there is no moisture on any surface before applying power.

Table 6: *Environmental Requirements*

Feature	Operating	Non-Operating
Temperature range	0 ° C (32 ° F) to 55 ° C (131 ° F)[1)]	–40 ° C (–40 ° F) to 85 ° C (185 ° F)
Temp. change	±0.5 ° C per minute	±1 ° C per minute
Relative humidity	5% to 95% at 40 ° C (104 ° F) (noncondensing)	5% to 95% at 40 ° C (104 ° F) (noncondensing)
Altitude	–300m to 3000m (–984.3ft. to 9843ft.)	–300m to 12000m (–984.3 ft. to 39372 ft.)
Shock	5g / 11 ms half sine	15g / 11 ms half sine
Vibration	10Hz to 1Hz: 2 mm amplitude 15Hz to 150Hz: 2 g	10Hz to 15Hz: 5 mm amplitude 15Hz to 150Hz: 5g
Packaging free fall	100mm / 3 axis	1200mm / all edges and corners

1) at 300 LFM airflow

Power PMC-260 Installation on Carrier Card

Power PMC-260 can be installed on the Power PMC-260 Test Card or any other suitable carrier card (See “Carrier Card Requirements” page 2-6).

Note: The instructions detailed here do not describe how to install the carrier card and power up the board. Follow the instructions detailed in the carrier documentation for the same.

The steps to install the Power PMC-260 depend on the type of variant. You can install either:

a) Power PMC-260 without the SO-DIMM module

or

b) Power PMC-260 with the SO-DIMM module

Caution **Always install Power PMC-260 when power is turned off.**



Installing Power PMC-260 Variant without SO-DIMM module

Follow these steps to install Power PMC-260 without the SO-DIMM module:

1. Switch off power.
2. Remove the carrier card from the system according to the user’s documentation.
3. Identify and locate the PMC slot on the carrier card into which you are installing Power PMC-260.
4. Remove corresponding PMC slot filler from the carrier card’s front panel.

5. Insert the bezel of Power PMC-260 into the cutout on the front panel (1) of the carrier card as shown in Figure 4.

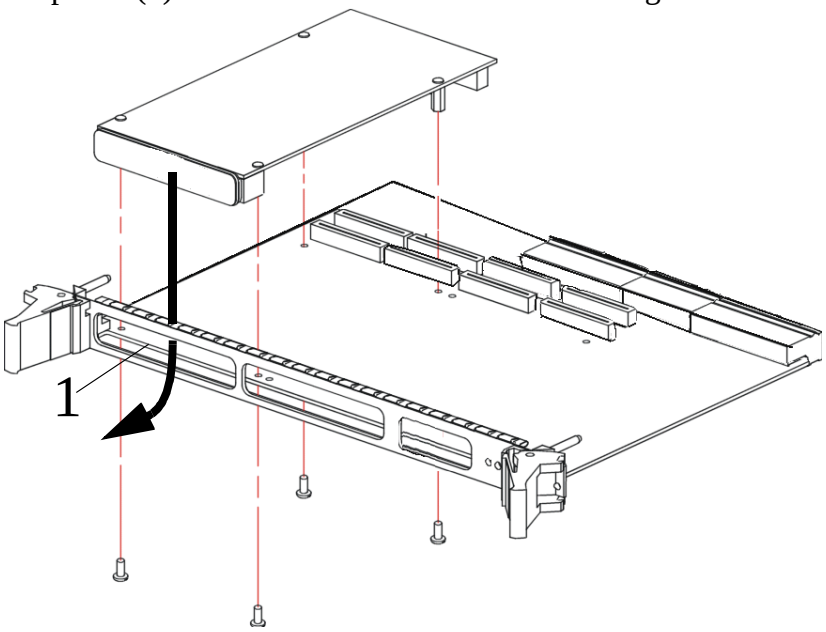


Figure 4: *Installing Power PMC-260: insert bezel into carrier card front panel cutout*

6. Engage the connectors (2) as shown Figure 5 making sure they are seated completely.

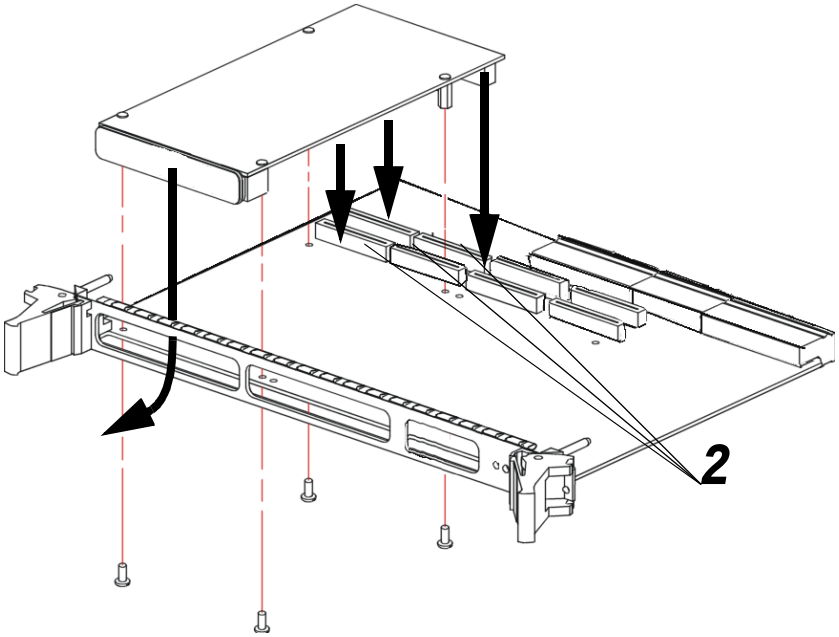


Figure 5: *Installing Power PMC-260- engage connectors*

7. Secure Power PMC-260 using four screws provided. Ensure that you screw Power PMC-260 from the rear side of the carrier card through clearance holes (3) as in Figure 6.

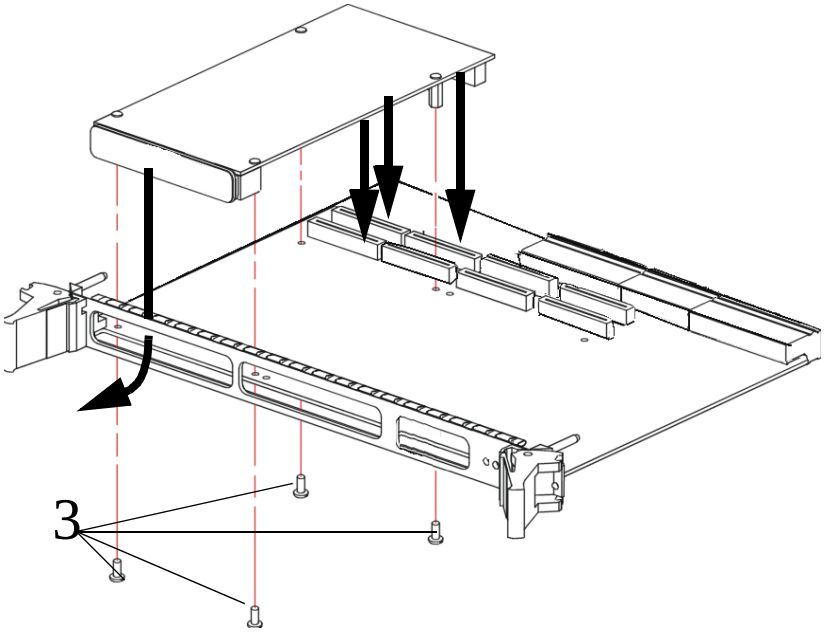


Figure 6: *Installing Power PMC-260: affix screws from rear side of carrier card*

Installation of Power PMC-260 on the carrier card now complete. A view of the Power PMC-260 Test Card with two installed Power PMC-260s is shown in Figure 7.

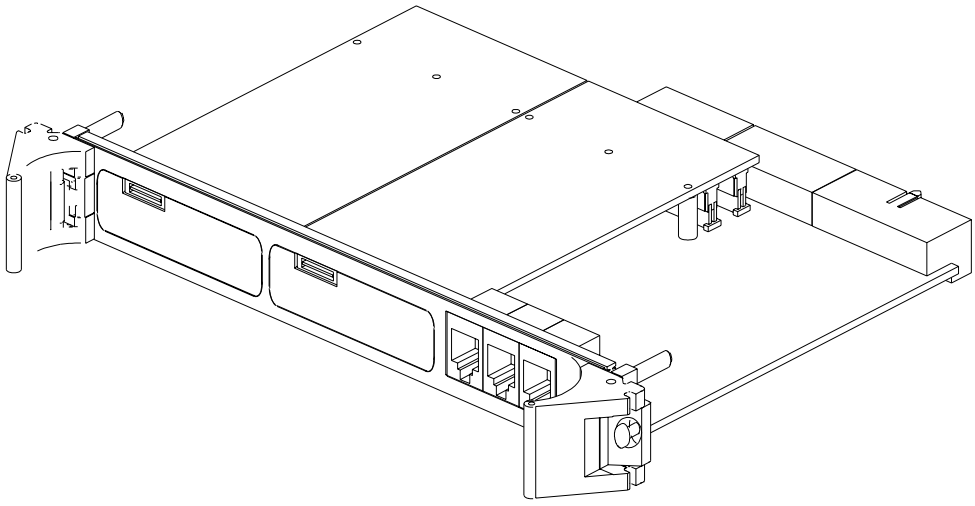


Figure 7: *Two Power PMC-260s Installed on Power PMC-260 Test Card*

Installing Variant with SO-DIMM Module

The steps required to install Power PMC-260 with the SO-DIMM module involve:

- Installing SO-DIMM on Power PMC-260.
- Installing Power PMC-260 with SO-DIMM Module on carrier card

Caution **Ensure that these steps are performed when power is turned off.**



Follow the steps detailed here.

Installing SO-DIMM on Power PMC-260

1. Identify the SO-DIMM socket located on Side 1 of Power PMC-260. (To locate the SO-DIMM socket refer to Figure 3 on page 1-8.)

2. Locate the notch on the SO-DIMM module as shown in Figure 8.

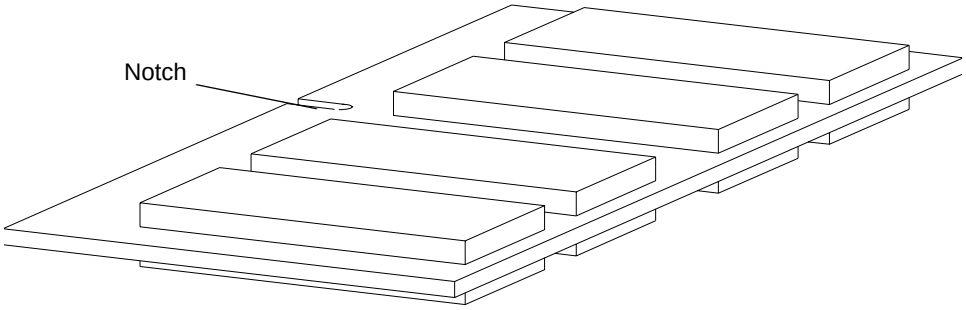


Figure 8: *SO-DIMM Module*

3. Locate the projection on the SO-DIMM socket as shown in Figure 9.

Note: If the notch does not match the projection on the socket, flip the SO-DIMM Module over to match notch with projection.

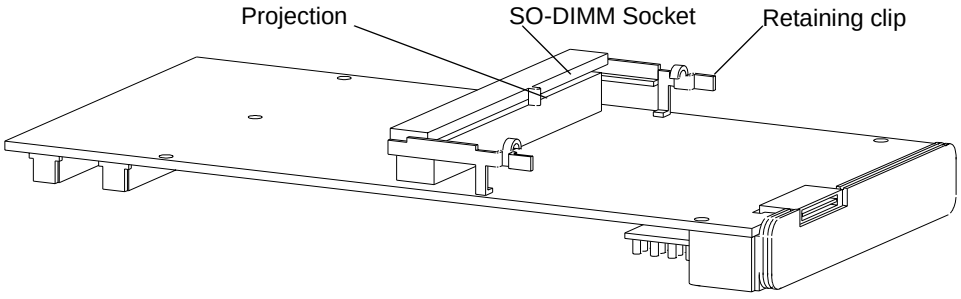


Figure 9: *SO-DIMM Socket on Power PMC-260*

4. Firmly insert the SO-DIMM module into the socket at a 45^{o} angle. as shown in Figure 10.

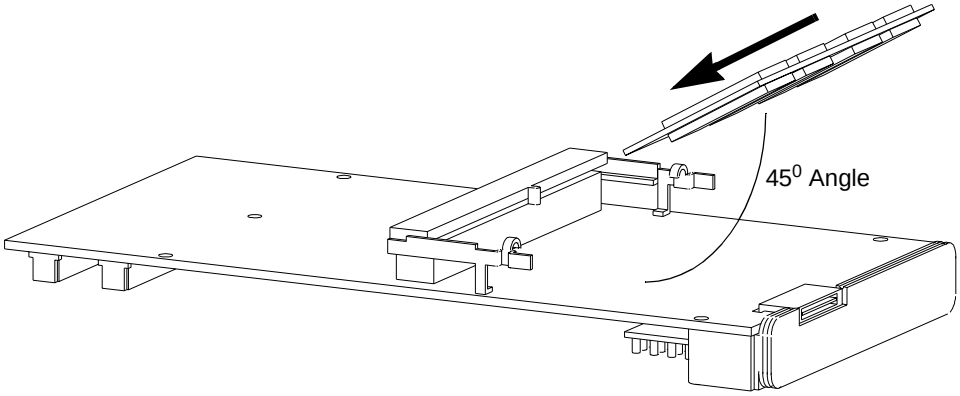


Figure 10: *Insert SO-DIMM Module into Socket*

The SO-DIMM module will be held by the socket as shown in Figure 10.

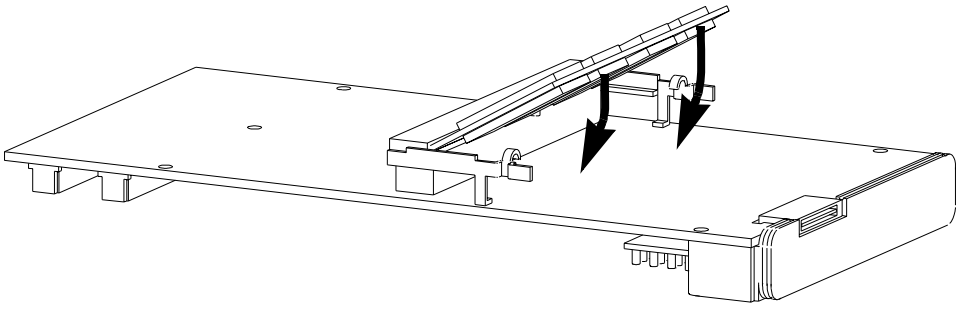


Figure 11: *Inserting SO-DIMM Module*

5. Push the SO-DIMM Module down until the retaining clip of the socket locks the SO-DIMM Module into position. The direction in which you should push the module down is shown by arrows in Figure 11.

The SO-DIMM module is now installed as shown in Figure 12.

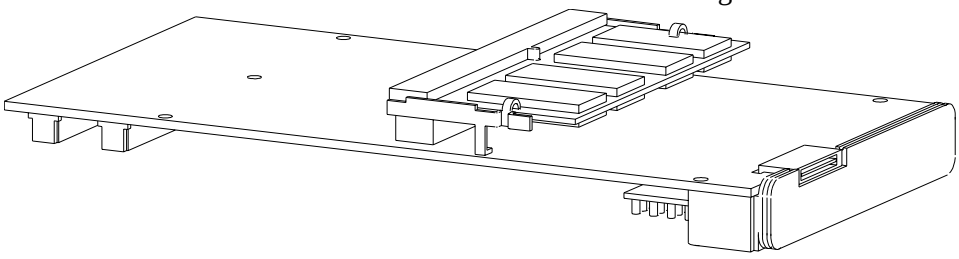


Figure 12: *Inserted SO-DIMM Module locked in position.*

You can now install Power PMC-260 with the SO-DIMM module onto the carrier card.

Installing Power PMC-260 with SO-DIMM Module on Carrier Card

To install Power PMC-260 with the SO-DIMM module on the carrier card, follow the steps described under “Installing Power PMC-260 Variant without SO-DIMM module” on page 2-9.

Removal Procedure

To remove Power PMC-260 from the carrier card follow these steps:

1. Turn off system power. (Ensure that you follow the steps to turn off power for the carrier card as per carrier card documentation.)
2. If the carrier card is installed into a backplane, remove the carrier card according to the carrier card documented procedure.
3. Remove the screws that secure Power PMC-260 to the carrier card.
4. Carefully disengage Power PMC-260 carefully from the PMC slot. Power PMC-260 is now removed from the carrier card.

Removing SO-DIMM Module

To remove the SO-DIMM Module from the SO-DIMM socket on Power PMC-260 follow these steps:

1. Follow the steps to remove Power PMC-260 from the carrier card as detailed in the previous section.
2. Pull the two retaining clips of the SO-DIMM socket outwards in a direction that is parallel to the surface of the board as shown by arrows in Figure 13.

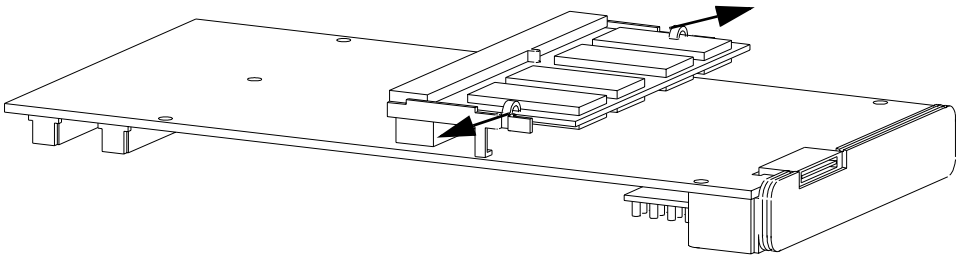


Figure 13: *Removing SO-DIMM Module- pull retaining clips outwards*

3. The SO-DIMM Module will no longer be locked in position, but will be at an angle of 45^0 as shown in Figure 14. Pull the SO-DIMM Module outwards in the direction of the arrow as shown in Figure 14.

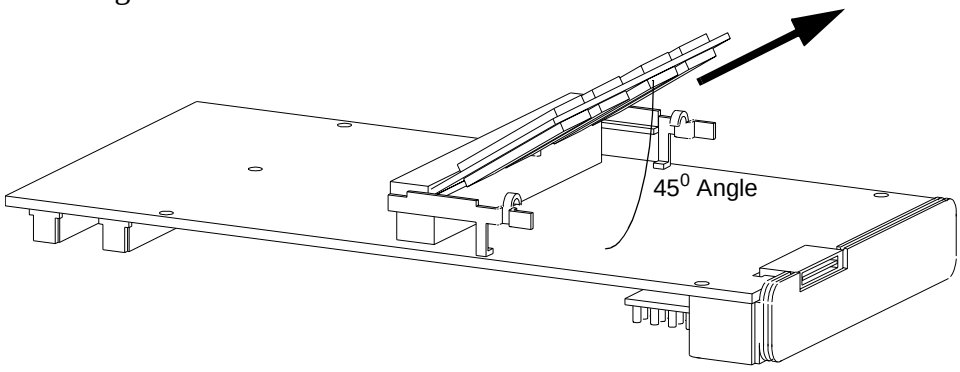


Figure 14: *Removing SO-DIMM Module- slide module out*

The SO-DIMM Module is now removed from Power PMC-260.

Board Power Up and Initialization

These steps detail the board power up and initialization procedure:

1. Install Power PMC-260 on the carrier card. (Refer to “Power PMC-260 Installation on Carrier Card” on page 2-9).
2. Verify whether the MONARCH# signal of Power PMC-260 is asserted by the carrier card when Power PMC-260 is to be used as a monarch. If Power PMC-260 is to be used as a non-monarch the carrier card must float the signal.
3. Connect the Serial Port 0 of Power PMC-260 to the PC terminal using a cross wired cable. Ensure that the PC serial port is set for a baud rate of 115200. (Refer to “Accessing Serial Ports” on page 3-9 for more information on serial ports).
4. Switch on system power. The power on LED (RefDes:CR3) on Power PMC-260 should glow to indicate that the board has powered up. (Refer to “LEDs” on page 4-3 for a detailed description of the LEDs on Power PMC-260).
5. The Operating System command prompt comes up on the terminal. The board is now fully configured and ready to accept any commands given at the command prompt.

3

I/0 Interfaces

Accessory Cable

Power PMC-260 is provided with an accessory cable as shown in Figure 15.

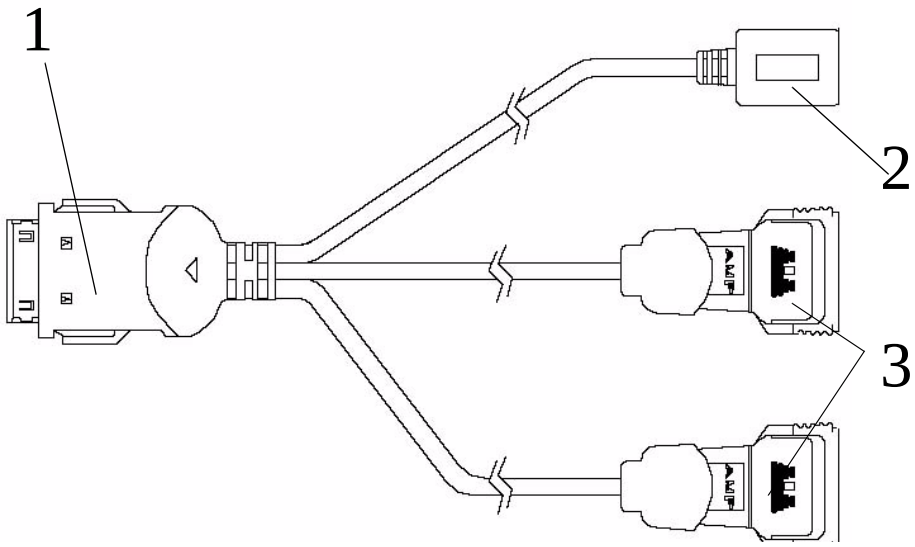


Figure 15:*Accessory Cable- Split Dongle*

Note: The accessory cable is intended for configuring Power PMC-260. Ensure that you remove the cable after use.

You can use the accessory cable for connecting Power PMC-260 to the following ports:

- One Ethernet port
- Two PC Serial Ports

Use the mating connector end of the cable marked (1) in Figure 15 to connect to the front panel 15 pin Honda connector.
Use the RJ45 jack end of the cable marked (2) in Figure 15 to connect to the Ethernet.
Use the DB9 female connector ends marked (3) in Figure 15 to connect to two PC Serial Ports.

Ethernet Connectivity

You can plug the mating end of the accessory cable into the front panel 15 pin Honda connector. Plug the RJ45 jack into the ethernet. This will permit you to access only one of three Ethernet ports of Power PMC-260. You must also use specific strapping options as detailed in "Strapping Options" (Chapter 6) to access this Ethernet port. Also see "Accessing Ethernet Ports on Power PMC-260" on page 3-5 for further information.

Note:

- **When you use the accessory cable, only one ethernet port (by default Port 0) of Power PMC-260 is accessed through strapping options. To change the default port you must use the appropriate strapping option. See the "Strapping Options" chapter for details.**
- **When you use the accessory cable, ensure that the corresponding Ethernet port in the carrier card is not used.**

Serial Port Connectivity

When you plug the mating end of the accessory cable into the front panel 15 pin Honda connector, and plug the DB9 female connectors to the PC Serial COM ports, you can access both the serial ports of Power PMC-260.See "Accessing Serial Ports" on page 3-9 for further information.

Note: To access two serial ports of Power PMC-260 without using the accessory cable, ensure that carrier card serial headers are connected to the PC Serial COM ports.

Attaching Accessory Cable

After you implement Power PMC-260 installation procedure as detailed in the previous chapter, you can attach the accessory cable.

Power PMC-260 has:

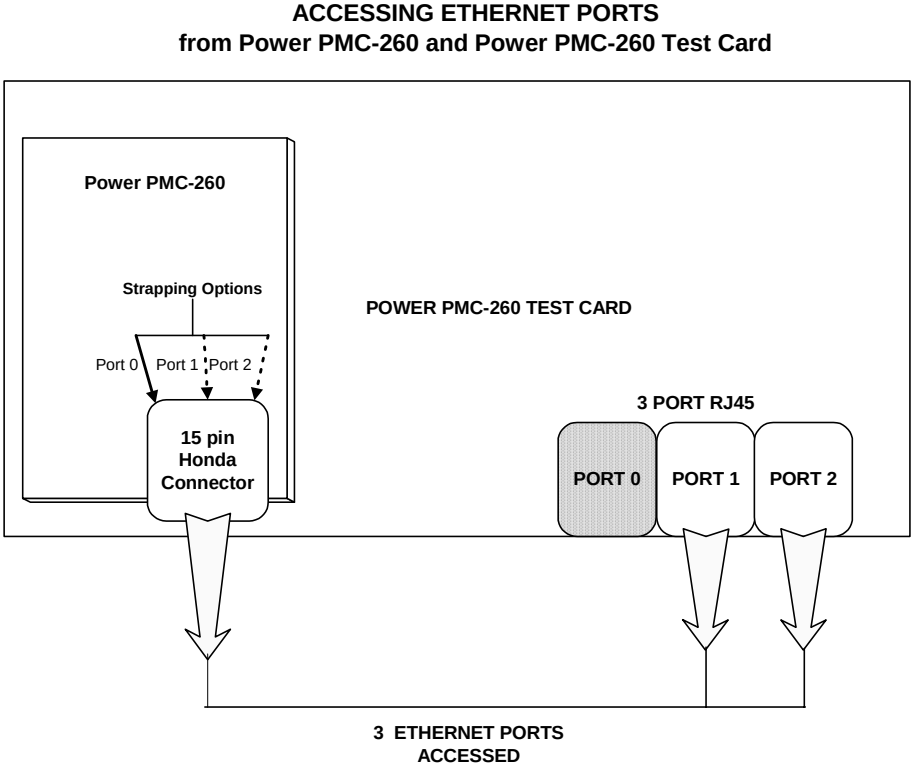
- Three Ethernet Ports (Port 0, Port 1 and Port 2)
- Two Serial Ports (Port 0 and Port 1)

Accessing Ethernet Ports on Power PMC-260

There are three 10 Mbps or 100 Mbps Ethernet Ports on Power PMC-260.

- You can use a network Ethernet to access a single Ethernet port on Power PMC-260.
- You can use the three port RJ45 connector on the carrier card to access all three Ethernet ports on Power PMC-260.
- You can use a single port RJ45 on the carrier card to access the corresponding Ethernet port on Power PMC-260.
- You can use two ports of the RJ45 on the carrier card to access the corresponding two Ethernet ports on Power PMC-260.

Note: When you use the accessory cable to access Ethernet on Power PMC-260, only one of the three Ethernet ports will be accessed. By default this port is Port 0. You can change this default port through Strapping Options.



Accessing Three Ethernet Ports:
Option 1. Using Port 0 of Power PMC-260 (through 15 pin Honda Connector) and Port 1 and Port 2 of Power PMC-260 Test Card

Option 2. Using Port 1 of Power PMC-260 (through 15 pin Honda Connector) and Port 0 and Port 2 of Power PMC-260 Test Card

Option 3. Using Port 2 of Power PMC-260 (through 15 pin Honda Connector) and Port 0 and Port 1 of Power PMC-260 Test Card

Figure 16:*Accessing Ethernet Ports using 15 Pin Honda Connector (Power PMC-260) and RJ45 Ports(Power PMC-260 Test Card)*

Accessing Ethernet Using Accessory Cable

The steps to access Ethernet using the accessory cable are described here. Refer to Figure 15 “Accessory Cable- Split Dongle” page 3-3 and Figure 19 “Front Panel” page 4-3.

Note:

- **When you connect to the Ethernet using the accessory cable, only one Ethernet (by default Port 0) of the Power PMC-260 is accessed.**
- **You can change the default port by strapping options. See "Strapping Options" (Chapter 4) for further details on changing the Ethernet Port accessed.**

To connect to the Ethernet using the accessory cable:

1. Implement the strapping options detailed in "Strapping Options" (Chapter 5).
2 Plug the mating connector of the accessory cable into the front panel 15 pin Honda connector of Power PMC-260.
3 Plug the RJ45 jack of the accessory cable into the Ethernet network connector.

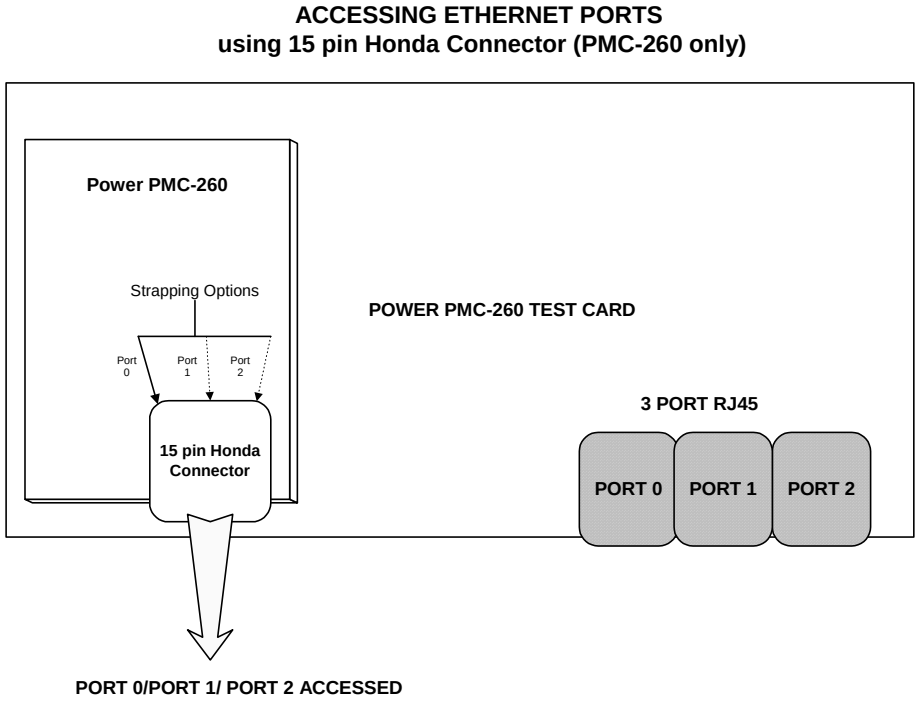


Figure 17: *Accessing one Ethernet Port on Power PMC-260 using 15 pin Honda Connector*

Accessing Three Ethernet Ports Using Three Port RJ45 of Carrier Card

You can access all the three ethernet ports on Power PMC-260 using the three ports of RJ45 on the carrier card. To do this:

Connect the Ethernet network connectors into the three port RJ45 connector on the carrier card.

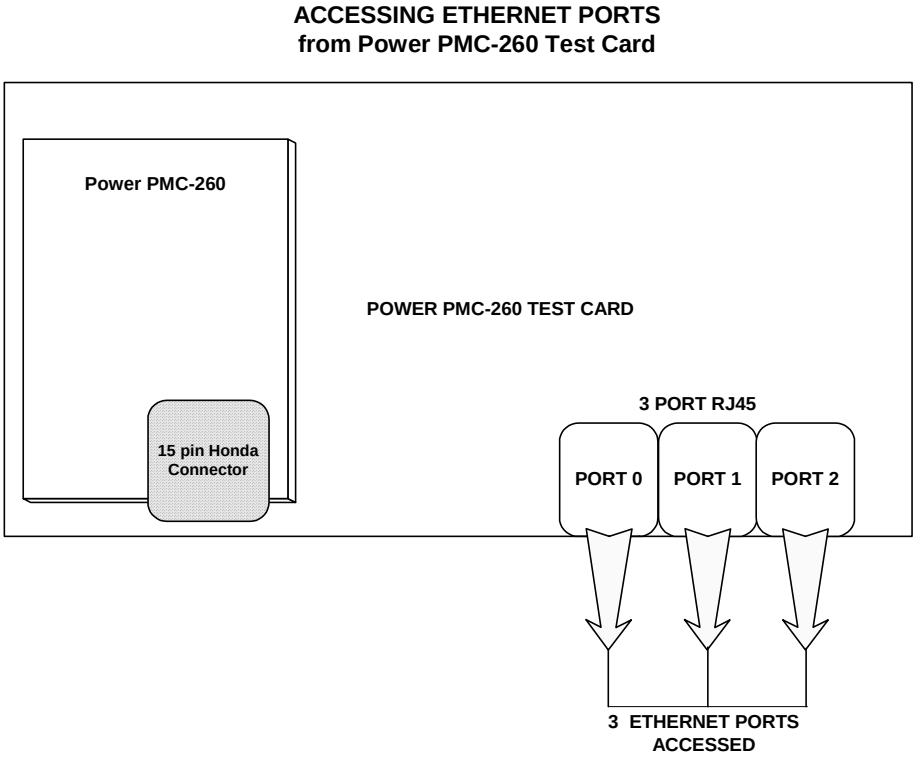


Figure 18: *Accessing Ethernet using 3 Port RJ45 of Power PMC-260 Test Card*

Accessing Specific Ethernet Ports Using RJ45 of Carrier Card

You can access a specific ethernet port on Power PMC-260 using the corresponding RJ45 port on the carrier card. To do this:

Connect the Ethernet network connector into the corresponding port of the RJ45 array on the carrier card.
(For example to access Ethernet 0 on Power PMC-260, connect the Ethernet network connector into Port 0 of the RJ45 array on the carrier card).

Verifying Ethernet Link Status

To verify Ethernet link status check to see whether the on-board LEDs of Power PMC-260 glow. Refer to Table 7 “LED indications” page 4-4 for details.
In addition, the carrier card LED indicators glow to indicate speed and status indicating the Ethernet interface is able to establish a link with the network. Refer to the carrier card’s documentation for further details.

Accessing Serial Ports

You can access the two serial debug ports on Power PMC-260 using the RS-232 headers on the carrier card. Two UART channels are available to the carrier card through PMC P4 of Power PMC-260. In addition, you can use the RS-232 port on Power PMC-260 as a debug console through the 15 pin front panel connector.

Accessing Serial Ports via Carrier Card

To access the two serial debug ports on Power PMC-260 using the RS-232 Headers on the carrier card, use two serial port connector cables. Follow these steps:

1. Locate the two RS-232 Headers on the carrier card. (Refer to the carrier card documentation to locate the RS-232 Header).
2. Plug the mating end of the serial port connector cable into the RS-232 Header.
3. Connect the other end of the cables into standard PC Serial ports.

Accessing Serial Ports via Front Panel Connector

To access the two serial debug ports on Power PMC-260 using the 15 pin Honda connector on the front panel, you must use the accessory cable provided. Follow these steps:

1. Connect the mating end of the accessory cable into the 15 pin Honda connector on the front panel of Power PMC-260. (Refer to Figure 15 on page 3-3).
2. Connect the two DB9 female ends of the accessory cable into two standard PC serial ports.

4

Controls, Indicators and Connectors

Front Panel

The front panel has a cutout for the 15 pin Honda connector shown in Figure 19.

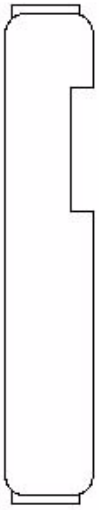


Figure 19: *Front Panel*

LEDs

Each variant has link status LEDs for each Ethernet port. Both link LED and speed LED (10/100Mbps indication) drive signals are wired to the PMC P4 connector. These can be used to drive LEDs on the carrier card. The LED indications is provided in Table 7. The location of the LEDs on Power PMC-260 is shown in Figure 20.

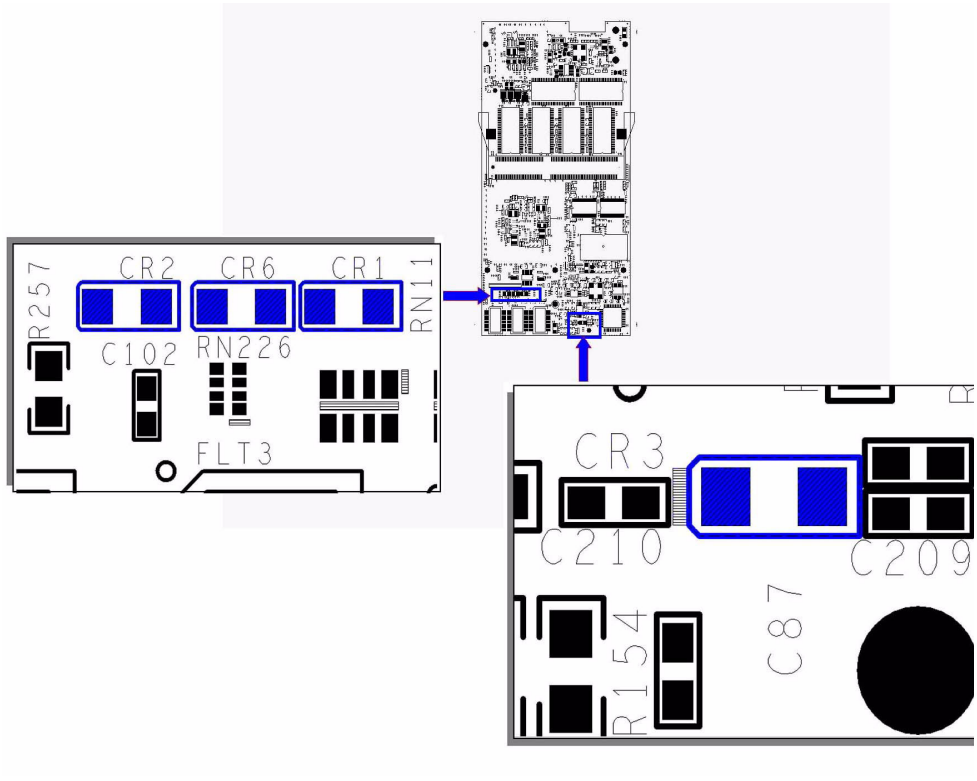


Figure 20: *Zoomed Areas for LED indicators: Power PMC-260 (Top View)*

Table 7: *LED indications*

LED RefDes	Indication
CR3	Power-on LED
CR2	Link status on Ethernet Port 0 is good
CR1	Link status on Ethernet Port 1 is good
CR6	Link status on Ethernet Port 2 is good

Front Panel Connector

The front panel of the Power PMC-260 has a 15 pin Honda connector. One of the three Ethernet ports can be optionally routed to this front panel connector. A 15 pin RJ45 adapter cable can be plugged into this connector to achieve twisted pair network interface. A RS-232 port can also be used as a debug console through this 15 pin front panel connector. See the "I/0 Interfaces" (Chapter 3) for further details.
The pinout of the 15 pin Honda connector is shown in Figure 21.

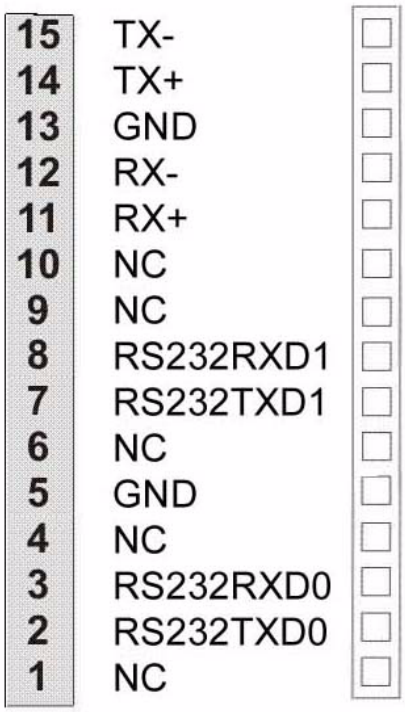


Figure 21: *Front Panel Connector Pinout*

RX+, RX-, TX+, TX-: Ethernet signals.
RS232TXD0, RS232RXD0: RS232 console, using UART0 of GT-64260A
RS232TXD1, RS232RXD1: RS232 console, using UART1 of GT-64260A.

On-Board Connectors

Power PMC-260 has four on-board PMC connectors located on board.

PMC Connectors

Four 64 pin PMC connectors P1, P2, P3 and P4 are located on Side 1 of the board.

Note: As per the CMC specification (P1386) the PMC connectors are labelled P11, P12, P13 and P14, but are referred to as P1, P2, P3 and P4 in this document.

The location of the four PMC connectors are shown in Figure 3 “Bottom Layout of Power PMC-260 showing major components” page 1-8.

The PCI interface between Power PMC-260 and the carrier card is made through the PMC connectors P1, P2 and P3. PMC Connectors P1 and P2 carry the 32 bit PCI signals. PMC connector P3 carries the 64 bit extension signals. PMC connector P4 is used to support the three 10/100base TX Ethernet ports. The link (status) LED and speed LED (10/100 Mbps indication) drive signals are wired to the PMC P4 connector. Further, two UART channels are made available to the carrier card through the PMC P4 connector. In addition, debug support is provided through P4 for COP port and JTAG access.
The pinouts of the four PMC connectors are shown the following figures.

Note: # at the end of a signal name indicates that the signal is active low.

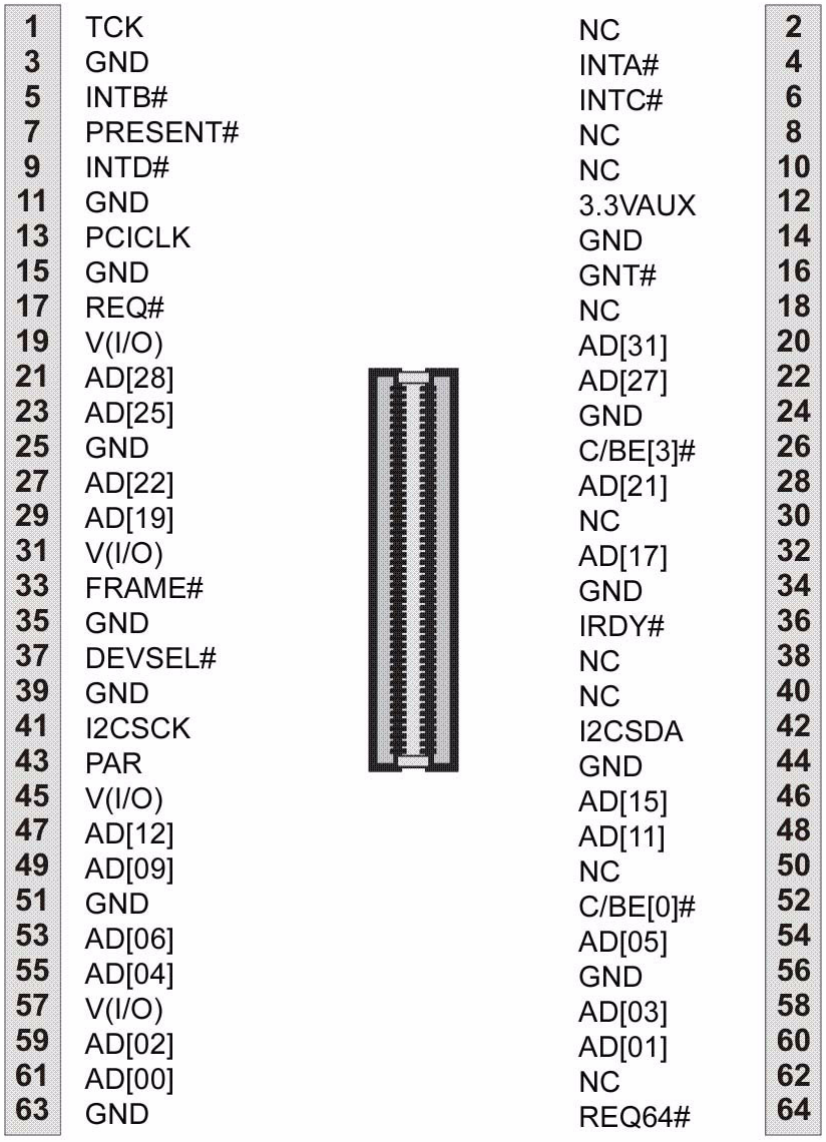


Figure 22: *Pinout of P1 PMC Connector*

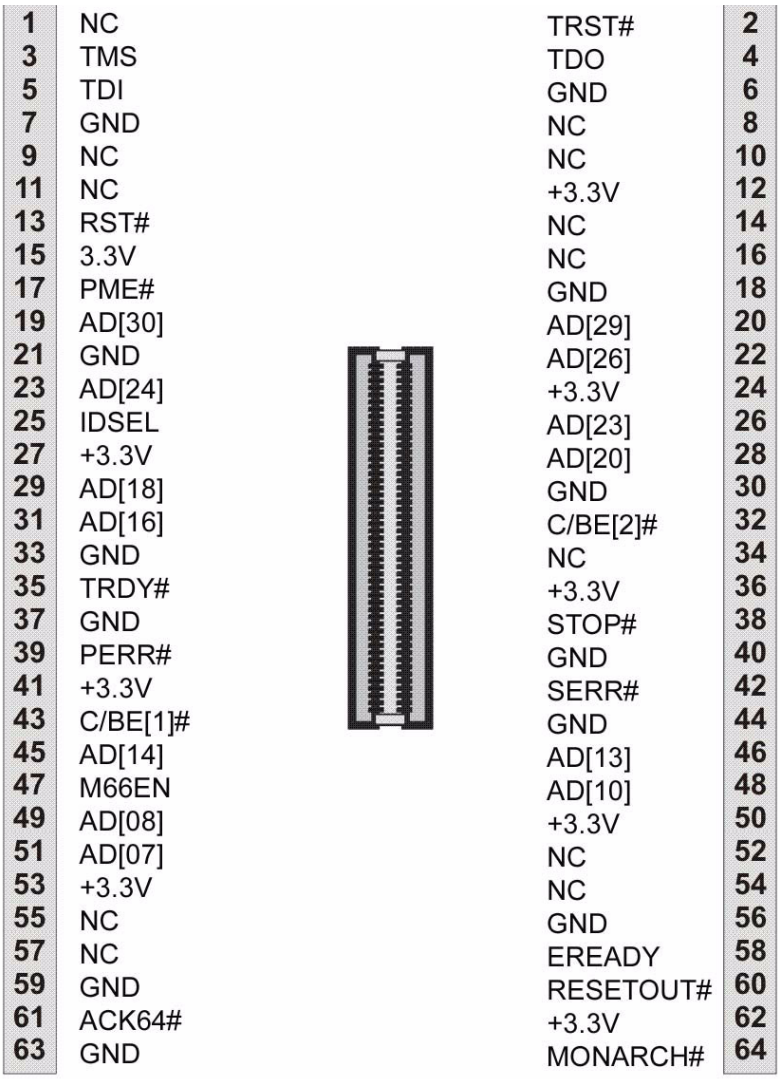


Figure 23: *Pinout of P2 PMC Connector*

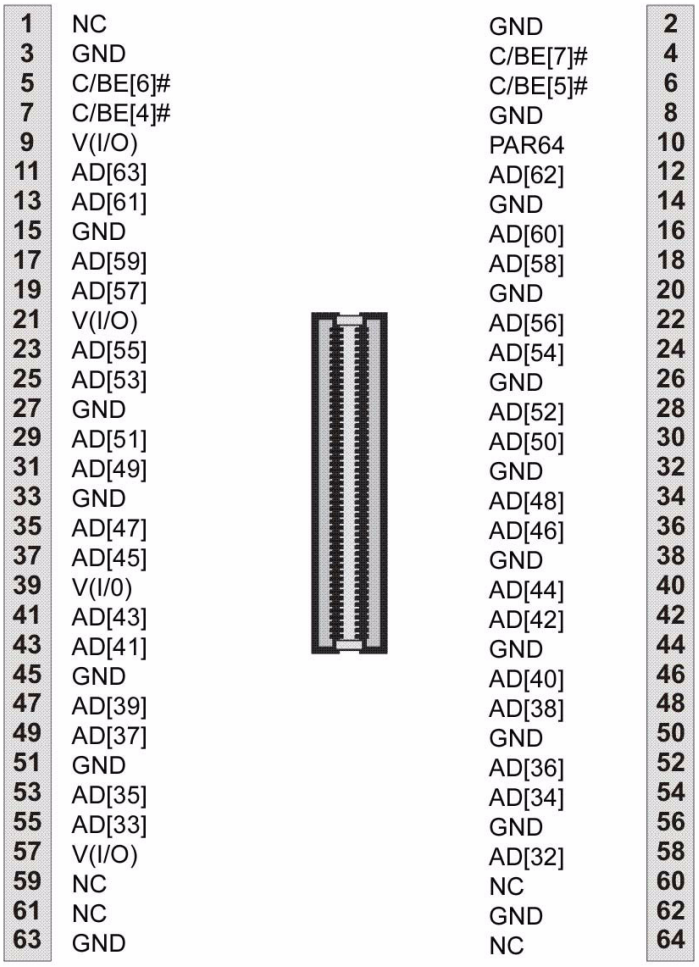


Figure 24: *Pinout of P3 PMC Connector*

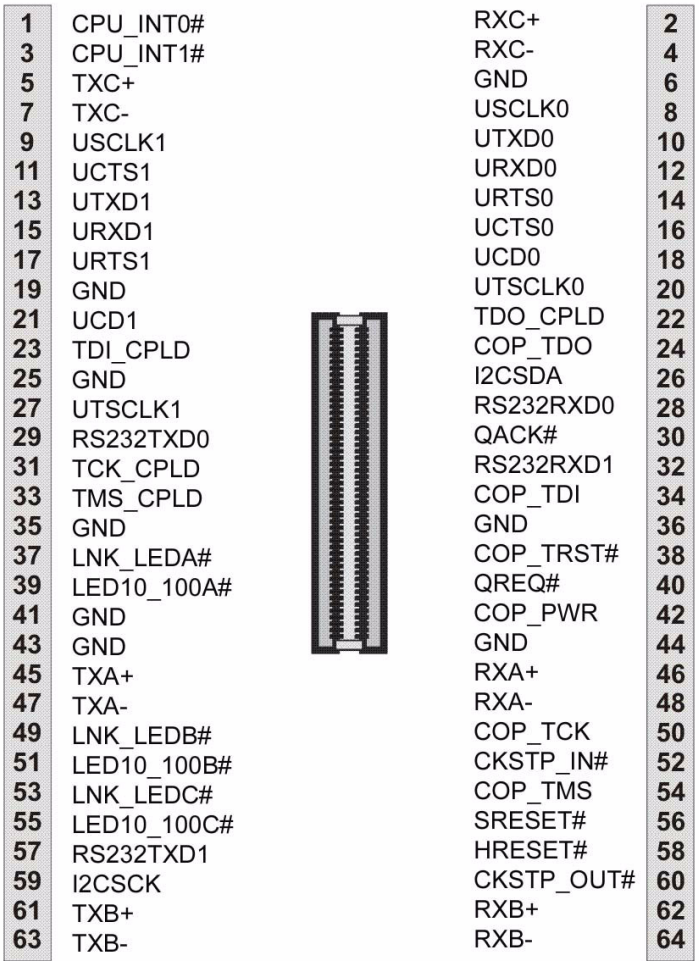


Figure 25: *Pinout of P4 PMC Connector*

The P4 PMC signal classification is provided in Table 8.

Table 8: *P4 PMC Signal Classification*

Signal Classification	Signals
Network Ethernet Network Interface Signals of Ethernet Port 0	TXA+, TXA-,RXA+,RXA-
Network Ethernet Network Interface Signals of Ethernet Port 1	TXB+, TXB-,RXB+, RXB-

Table 8: *P4 PMC Signal Classification*

Signal Classification	Signals
Network Ethernet Network Interface Signals of Ethernet Port 2	TXC+, TXC-, RXC+, RXC-
Serial Port 0 TTL Levels	UTXD0, URxD0, URTS0, UCTS0, UCD0, USCLK0, UTSCLK0
Serial Port 1 TTL Levels	UTxD1, URxD1, URTS1, UCTS1, UCD1, USCLK1, UTSCLK1
I^2C Bus Signals	I2CSCK: I2C Bus serial clock I2CSDA: I2C bus serial data
CPU Interrupts	CPU_INT[0:1]#
Debug	HRESET#, SRESET#, CKSTP_IN#, CKSTP_OUT#, QREQ#, QACK#: PowerPC RISCWatch / COP signals COP_PWR: 2.5V power for COPRS232TXD0, RS232TXD0, RS232RXD0: Serial (RS232) console port0 signals RS232TXD1, RS232RXD1: Serial (RS232) console port1 signals

5

Devices and Other Functions

On-Board Devices

A list of the major on-board devices is provided here:

- CPU: IBM PowerPC 750CXe
- PowerPC System Controller GT-64260A
- 1MB Boot flash
- Intel®Strata Flash®
- RTC
- 2Kb serial EEPROM
- SDRAM
- SO-DIMM, unbuffered, ECC
- Ethernet 10/100Mbps quad PHY
- Ethernet magnetics
- CPLD

Details of these devices are provided in this section. See Figure 2 and Figure 3 on Page 1-7 and Page 1-8 for the location of these devices.

Table 9: *List of Major Devices*

Description	Manufacturer	Manufacturing Part Number
CPU: IBM PowerPC 750CXe	IBM	IBM25PPC750CXEJP 702T
PowerPC System Controller GT-64260A	Galileo Technology/ Marvell	GT-64260A-B-0
1MB boot flash	AMD	AM29LV008BB-EI
Strata Flash	Intel	RC28F128J3A-150
RTC	Dallas/Maxim	DS17885-E3
2kb serial EEPROM	Atmel	AT24C02A-10TC-2.7
512Mb SDRAM, 8Mx16	Elpida Memory, Inc.	HM5259165BTD-75
256Mb SDRAM, 8Mx8	Elpida Memory, Inc.	HM5255805BTD-75
512MB SO-DIMM, unbuffered, ECC	Smart Modular Technologies	SM57264CSC8D9BPS B0

Table 9: *List of Major Devices*

Description	Manufacturer	Manufacturing Part Number
Ethernet 10/100Mbps quad PHY	Broadcom	BCM5214
Ethernet magnetics	Pulse Engineering	H0013
1.8V power supply regulator	Linear Technology	LTC1649CS
2.5V power supply regulator	Semtech	SC1565IS-2.5TR
CPLD	Altera	EPM7064AETC44-7

Central Processing Unit

Power PMC-260 uses PowerPC 750CXe RISC microprocessor from IBM as the central processing unit. It is a 256-ball PBGA chip that operates at a core frequency of 600 MHz and a bus frequency of 133MHz. The heat sink for the CPU is on Side 1 of Power PMC-260.
Additional key features of the CPU are:

- On-die 256K L2 cache
  - Running at core frequency
  - ECC logic
- Bus interface supporting
  - 32 bit address bus
  - 64 bit data bus (32/64 bit data modes)

System Controller

Power PMC-260 uses GT-64260A from Galileo Technology (Marvell Technology Group) as the system controller. GT-64260A is a 665-ball PBGA package. The following features of the controller are used by Power PMC-260:

- PCI2.2 compliant interface
- SDRAM interface uses a 3.3V, 72 bit (64 bit + 8 bit ECC) and 133MHz memory bus
- Controllers

  - Device controller with dedicated 32 bit bus and support for boot device
  - IDMA controller for data transfer between PCI, SDRAM, Device bus and CPU
  - Interrupt Controller
- Communication Unit
  - Three 10/100 Mbps Fast Ethernet MAC controllers
  - Two multi-protocol serial controllers with serial DMA for data transfer between communication unit and PCI, SDRAM, Device bus and CPU
- I^2C support to control other I^2C devices on board
- Watchdog timer
- General purpose I/O and interrupt ports

Main Memory

The main memory consists of:

- On-board SDRAM
- Extended memory on SO-DIMM

On-board SDRAM

Power PMC-260 has 512MB, PC133 unbuffered ECC SDRAM on-board. This on-board memory is arranged in two banks of 256MB each. The organization of the on-board memory depends on the Power PMC-260 variant. The details of the on-board memory is provided in Table 10.

Table 10: *On-Board SDRAM Organization for Variants*

Power PMC-260 Variant	256MB on-board	512 MB on-board
Data SDRAM device	4M locations x 16 bit x 4 banks	8M locations x16 bit x 4 banks
ECC SDRAM device	4M locations x 8 bit x 4 banks	8M locations x 8 bit x 4 banks

The memory controller resides in the GT-64260A chip and has a 72 bit (64 bit + 8 bit ECC) data interface running at 133MHz.

Extended Memory on SO-DIMM

Power PMC-260 also provides support for additional PC133 unbuffered SDRAM with ECC. This is provided on an SO-DIMM module that you must insert into an SO-DIMM socket provided on Side 2 of the board. See “Installing Variant with SO-DIMM Module” on page 2-12 for further details.

Flash Memory

Power PMC-260 supports boot flash memory and user flash memory.

Boot Flash Memory

The boot flash memory of Power PMC-260 is a BIOS device of 1MB flash. The flash memory resides on the device controller bus of GT-64260A.

User Flash

In addition to boot flash memory, Power PMC-260 supports user flash memory. There is 64MB of user flash memory that is on-board and is programmable. The user flash memory is composed of as four 128Mbit linear Flash devices from Intel® and is organized as two banks each of which is 32MB (8MX32).

PCI Interface

The PCI interface between Power PMC-260 and the carrier card is made through the PMC connectors P1, P2 and P3. The PCI interface is a 3.3/5V, 64 bit 66 MHz, PCI2.2 compliant interface that is implemented in GT-64260A. PMC Connectors P1 and P2 carry 32 bit PCI signals, and PMC Connector P3 carries 64 bit extension signals. Connector pin assignments are provided in Chapter 3.

PCI Signalling Voltage

PCI signaling voltage that Power PMC-260 uses is either 3.3V or 5V and is provided by the carrier card. Strapping Options provided on the Power PMC-260 Test Card decide the connection of V I/O pins to 3.3V or 5V. See Power PMC-260 Test Card documentation for further details.

PCI Clock

The PCI clock is provided by the carrier card. Clock frequency can be of any value with a maximum of 66MHz.

Note: PCI clock is independent of and asynchronous with respect to the processor bus and SDRAM frequencies.

Monarch and Non Monarch Operation

When there are two Power PMC-260s installed on the carrier card, PCI enumeration is performed by the Monarch (Power PMC-260 Processor PMC operating in the monarch mode). The carrier card or (Power PMC-260 Test Card) is responsible for assigning monarch status to either of the two PMC slots on the carrier card. Depending on the Power PMC-260 installed in either PMC slot 1 or PMC slot 2 and the corresponding monarch assignment by the carrier card, one Power PMC-260 will run in the monarch mode while the other Power PMC-260 will operate in the non-monarch mode.

To assign the monarch mode to Power PMC-260, the carrier card must ground the MONARCH# pin on the corresponding PMC connector. The corresponding Power PMC-260 software will configure it as a monarch and PCI bus enumeration is performed. When the carrier card floats the MONARCH# pin, Power PMC-260 will operate as a non-monarch.

Strapping Options on the carrier card are necessary to assign monarch or non-monarch status to Power PMC-260. Refer to the carrier card documentation for further details.

Ethernet Ports

There are three 10/100base TX Ethernet ports supported on Power PMC-260. The three ports Port 0, Port 1 and Port 2 are supported through the PMC P4 connector.

Integrated into the GT-64260A chip is the Ethernet PHY. The Ethernet PHY transceiver is provided on-board. LED indications are provided for each port. See “LEDs” on page 4-3 for further details. In addition, on the carrier card there are LEDs for link status and speed. See the carrier card documentation for further details. The link and speed LED drive signals are wired to the PMC P4 connector and are used to drive the LEDs on the carrier card.

You can also route one of the three Ethernet ports to the front panel 15 pin connector. Refer “Ethernet Ports” on page 5-6 and “Accessing Ethernet Ports on Power PMC-260” on page 3-5 for further details.

Serial Interface

Two UART channels are available to the carrier card through the PMC P4 connector of Power PMC-260. A RS-232 transceiver can also access a minimal subset of each channel. You can also access the RS-232 port for debug purposes through the 15 pin connector on the front panel. See “Serial Port Connectivity” on page 3-4 and “Accessing Serial Ports” on page 3-9 for further information.

Real Time Clock

Power PMC-260 has a Y2K compliant Real Time Clock (RTC) that resides on the device bus of GT-64260A. This supports 114bytes of user NVRAM and 8K of NVRAM.
There is a 3V, 3mAH rechargeable manganese silicon lithium-ion battery. An on -board charging circuit is powered from the 3.3V rail.

Note:

- **Contact your local Force Computers representative to replace the battery.**
- **The battery provides a data retention of five years summing up all periods of actual battery use.**
- **Force Computers therefore assumes that there usually is no need to exchange the Lithium battery except for example in the case of long-term spare part handling.**

I^2C Bus Devices

Power PMC-260 has the two wire serial I^2C interface in a multi- master environment that is supported by GT-64260A. The I^2C bus can be separated into two independent I^2C buses by strapping options. See the Strapping Options chapter for more details.

Serial EEPROM

Power PMC-260 has two 2Kbit serial EEPROMs on the I^2C bus. Each 2Kbit SO-8 device is organized as 256 8 bit locations and has a write-protect feature. The EEPROMs I^2C address is configurable to one of eight options through strapping options. See the Strappings Options chapter for further details. The EEPROM is powered by the 3.3Vaux supply on the carrier card. You can also use a strapping option to short the 3.3Vaux to 3.3V supply.

Clocks

All clocks required for Power PMC-260 are generated on-board except the PCI clock that is supplied by the carrier card. A 33MHz oscillator is used by the clock generator to drive the following:

- CPU clock (133MHz, 2.5V)
- GT-64260A TCLK (133MHz, 3.3V)
- GT-64260A SYSCLK (133 MHz, 2.5V)
- SDRAM clocks (133MHz, 3.3V)

A 50MHz oscillator provides the clocks for the Ethernet section. Serial ports are clocked by Baud rate generators internal to GT-64260A.

Power Supply

Power PMC-260 has an on-board power supply that derives required voltages from 3.3V input provided by the carrier card. Other on-board devices require 3.3V that is supplied by the carrier card.
Two switching regulators provide the following outputs:

Table 11: *Power Supply Output*

Power Supply	Values
CPU and GT-64260A core power supply	1.8V ±5%, 4.1A (typical)
CPU / GT-64260A I / O power supply	2.5V ±5%, 0.7A maximum

Watchdog Timer

Power PMC-260 uses the watchdog timer that resides in GT-64260A. The watchdog timer is disabled at reset and is activated by the configuration mechanism. It provides a non-maskable interrupt that is routed to the interrupt controller of GT-64260A that in turn interrupts the CPU.

6

Memory Map and Interrupts

Memory Map

The memory map for Power PMC-260 is detailed in the following table:

Table 12: *Memory Map*

Address Range	Description
00000000 – 3FFFFFFF	SDRAM / System Memory
40000000 – 4FFFFFFF	Not defined
50000000 – 51FFFFFF	User Flash Bank 0 (CS2#)
52000000 – 53FFFFFF	User Flash Bank 1 (CS3#)
54000000 – 540FFFFF	Not defined
54100000 – 541FFFFF	Not defined
55000000 – 7FFFFFFF	Not defined
80000000 – 81FFFFFF	PCI_0 Memory 0
82000000 – 83FFFFFF	PCI_0 Memory 1
84000000 – 85FFFFFF	PCI_0 Memory 2
86000000 – 87FFFFFF	PCI_0 Memory 3
88000000 – EFFFFFFF	Not defined
F0000000 – F000FFFF	GT Internal Registers Space
F1000000 – F1FFFFFF	Reserved
F2000000 – F2FFFFFF	PCI_0 I/O
F3000000 – FF7FFFFF	Not defined
FF800000 – FFFFFFFF	Boot Flash (BootCS#)

Interrupt Routing on Power PMC-260

PCI Interrupts

The PCI interrupts INTA#, INTB#, INTC# and INTD# are routed to GT-64260A's pins as shown in Table 13.

Table 13: *PCI Interrupts*

PCI Interrupts	Pin number
PCI_INTA#	MPP10
PCI_INTB#	MPP11
PCI_INTC#	MPP12
PCI_INTD#	MPP13

The mapping between the MPPx to the IRQ number is given by the following formula:
IRQ = 64 + x;
where x = MPP pin number. The offset of 64 is because of the fact that the Main Interrupt Cause registers (Low and High) are 32-bit registers each with every bit corresponding to interrupt from a device (internal or external to GT64260A).
Based on this, the PCI INTA#, INTB#, INTC# and INTD# take IRQ values as shown in the Table 14.

Table 14: *IRQ Values*

PCI Interrupts	IRQ Values
PCI_INTA#	74
PCI_INTB#	75
PCI_INTC#	76
PCI_INTD#	77

7

Strapping Options

Strapping Resistor Options

You can chose to select optional resistors for certain functional features on Power PMC-260. Refer to the tables in the following sections for the functions. Depending on whether a resistor is mounted or not mounted the function is enabled or disabled. The tables also detail the default settings available on Power PMC-260. Refer to the figures before each table to identify the location of each RefDes on Power PMC-260.
The strapping options that are available are for the following sets of functions:

- Single Resistor / Resistor Networks
  - Ethernet Strappings
  - Serial EEPROM I^2C Address
  - I^2C Bus Separation
  - Serial EEPROM Write Protection
  - PCI Interrupt Routing
  - Flash Program Enable / Write Protection
  - Ethernet Port Routing to Front Panel
  - JTAG Chain
  - CPU Reset
- Tripad Resistor Settings
  - GT_64260A Strapping Resistors
  - CPU PLL Configuration

Caution



- **Ensure that you perform all strapping options when the board is powered off.**
- **All strapping options to be performed require a knowledge of soldering and must be performed by skilled persons.**

Ethernet Strappings

Figure 26 shows the location of the RefDes for Ethernet Strapping Resistors. Table 15 details the Ethernet strapping options and default settings.

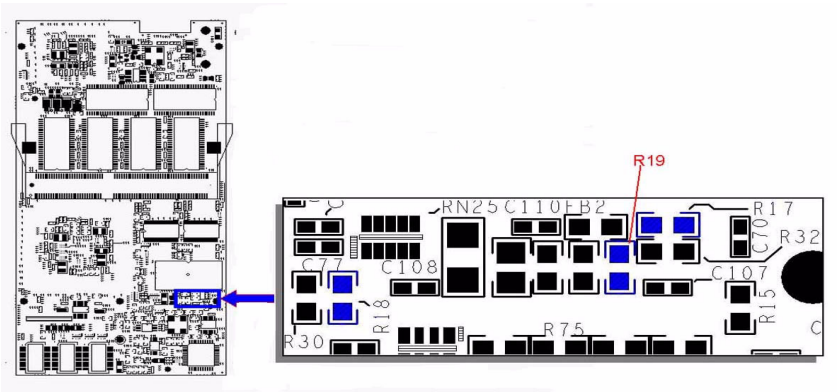


Figure 26:*Zoomed Areas for Ethernet Strappings: Power PMC-260 (Top View)*

Table 15:*Ethernet Strappings*

#	RefDes.	Function	Mounted	Not mounted	Default
Note: These settings for BCM5214 can be overridden by software, or may not work if other conditions are not met. Refer to BCM5214 data sheet for details					
1	R17	10/100 mode select	10-baseT	100-baseTX	Not mounted
2	R18	Transmit slew rate	10-90% rise time = 4 ns	10-90% rise time = 1 ns	Not mounted
3	R19	Full-duplex enable	Full-duplex mode	Half-duplex mode	Not mounted

Serial EEPROM I^2C Address

Figure 27 shows the location of the RefDes for Serial EEPROM I^2C Address. Table 16 details the Serial EEPROM I^2C Address strapping options and default settings.

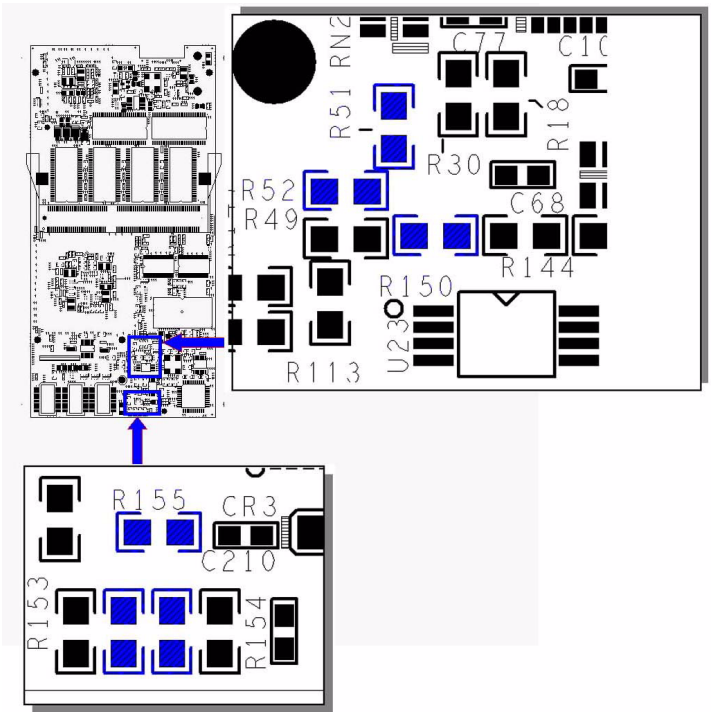


Figure 27:*Zoomed areas for Serial EEPROM I²C Address Strappings: Power PMC-260 (Top View)*

Table 16:*Serial EEPROM I²C Address*

#	RefDes.	Function	Mounted	Not mounted	Default
Allows selection of any of the following 8 addresses: 1010 001 through 1010 111 **Note**: The default settings should not be changed unless the main I²C bus and EEPROM I²C buses are separated (by means of strapping options in I²C Bus Separation or address conflict is avoided by some other means).					
EEPROM1 (GT64260A INITIALISATION): default address = 1010 001					
4	R155	Bit A0 (LSB) of I2C address	A0=0	A0=1	Not mounted.
5	R156	Bit A1 of I2C address	A1=0	A1=1	Mounted
6	R157	Bit A2 of I2C address	A2=0	A2=1	Mounted

Table 16:*Serial EEPROM I²C Address*

#	RefDes.	Function	Mounted	Not mounted	Default
EEPROM2 (BOARD INFORMATION BLOCK): default address = 1010 011					
7	R51	Bit A0 of I2C address	A0=0	A0=1	Not mounted
8	R52	Bit A1 of I2C address	A1=0	A1=1	Not mounted
9	R150	Bit A2 of I2C address	A2=0	A2=1	Mounted

I²C Bus Separation

Figure 28 shows the location of the RefDes for I²C Bus Separation. Table 17 details the I²C Bus Separation strapping options and default settings.

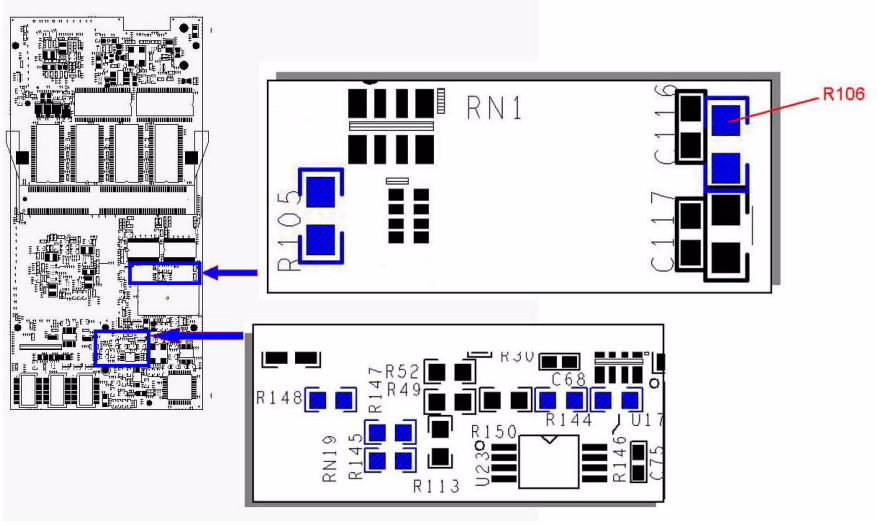


Figure 28:*Zoomed Areas for I²C Bus Separation: Power PMC-260 (Top View)*

Table 17: *I^2C Bus Separation Strappings*

#	RefDes.	Function	Mounted	Not Mounted	Default
10	R105, R106	I2C-GT isolation	I2C-GT connected to I2C-A	I2C-GT isolated from I2C-A (also see EEPROM2 (Board Information Block) on Page 7-6)	Not mounted
11	R144, R145	I2C-B isolation	I2C-B connected to I2C-A. Also see #12	I2C-B connected to I2C-A	Not mounted
12	R146, R147	3.3Vaux I2C pull-ups for E2PROM2	I2C-B signals pulled up to 3.3VAux	I2C-B signals need to use R33 & R34 for pull-ups to 3.3V	Not Mounted
13	R148	3.3Vaux and 3.3V short	3.3Vaux shorted to 3.3V	3.3Vaux isolated	Not mounted

Serial EEPROM Write Protection

Figure 29 shows the location of the RefDes for Serial EEPROM Write Protection Strappings. Table 18 details the Serial EEPROM Write Protection strapping options and default settings.

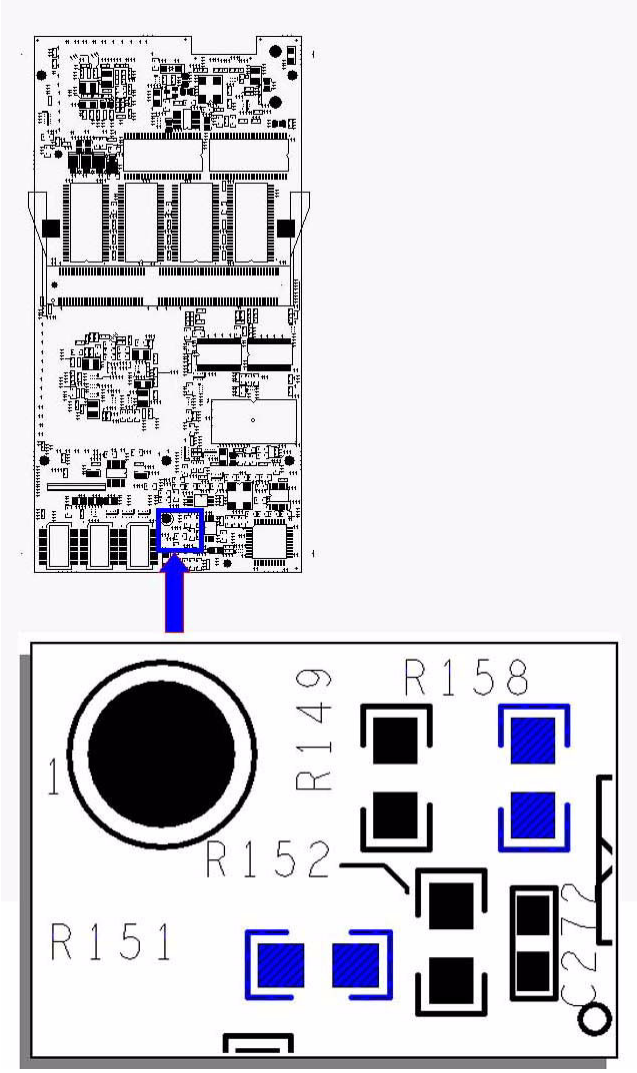


Figure 29:*Zoomed Area for Serial EEPROM Write Protection: Power PMC-260 (Top View)*

Table 18:*Serial EEPROM Write Protection*

#	RefDes.	Function	Mounted	Not Mounted	Default
SERIAL EEPROM WRITE PROTECTION					
14	R151	E^2PROM2 write protect	Write protected	Normal operation	Not mounted
15	R158	E^2PROM1 write protect	Write protected	Normal operation	Not mounted

PCI Interrupt Routing

This is required when Power PMC-260 operates in the Non-Monarch mode. Figure 30 shows the location of the RefDes for PCI Interrupt Routing Strappings.Table 19 details PCI Interrupt Routing strapping options and default settings.

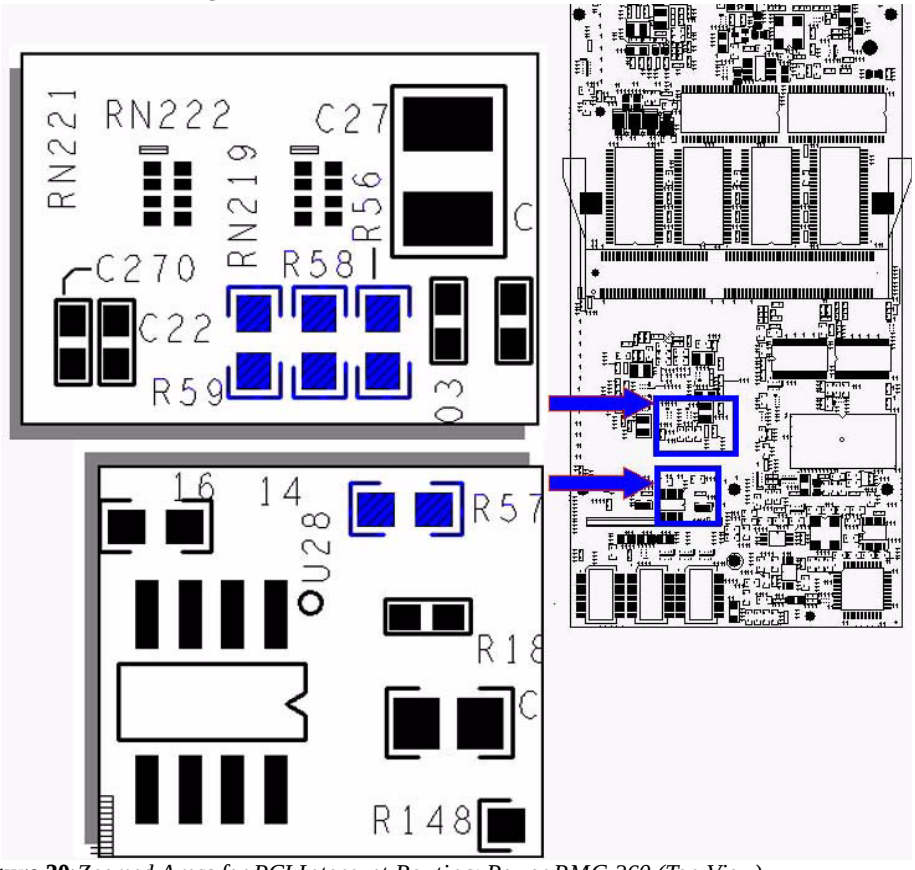


Figure 30:*Zoomed Areas for PCI Interrupt Routing: Power PMC-260 (Top View)*

Table 19:*PCI Interrupt Routing*

#	RefDes.	Function	Mounted	Not Mounted	Default
PCI INTERRUPT ROUTING (When TYNE is a non-monarch)					
16	R56	Routing of GT's PCI interrupt output	Routed to PCI INTA#		Mounted
17	R57	same as above	Routed to PCI INTB#		Not mounted
18	R58	same as above	Routed to PCI INTC#		Not mounted
19	R59	same as above	Routed to PCI INTD#		Not mounted

Flash Program Enable/Write Protection

Figure 31 shows the location of the RefDes for Flash Program Enable. Table 20 details the Flash Program Enable / Write Protection strapping options and default settings.

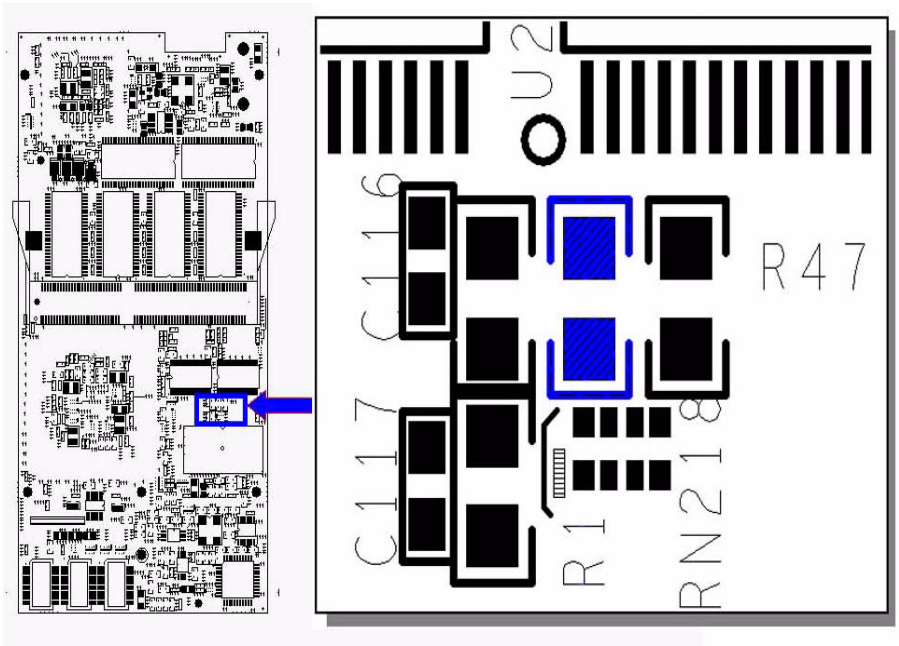


Figure 31:*Zoomed Area for Flash Program Enable/Write Protection: Power PMC-260 (Top View)*

Table 20:*Flash Program Enable/Write Protection*

#	RefDes.	Function	Mounted	Not Mounted	Default
20	R1	Program-ming enable of flash	Programming enabled	Programming disabled	Mounted

Ethernet Port Routing to Front Panel Connector

Figure 32 shows the location of the RefDes for Ethernet Port Routing to Front Panel Connector. Table 21 details the Ethernet Port Routing to Front Panel Connector strapping options and default settings.

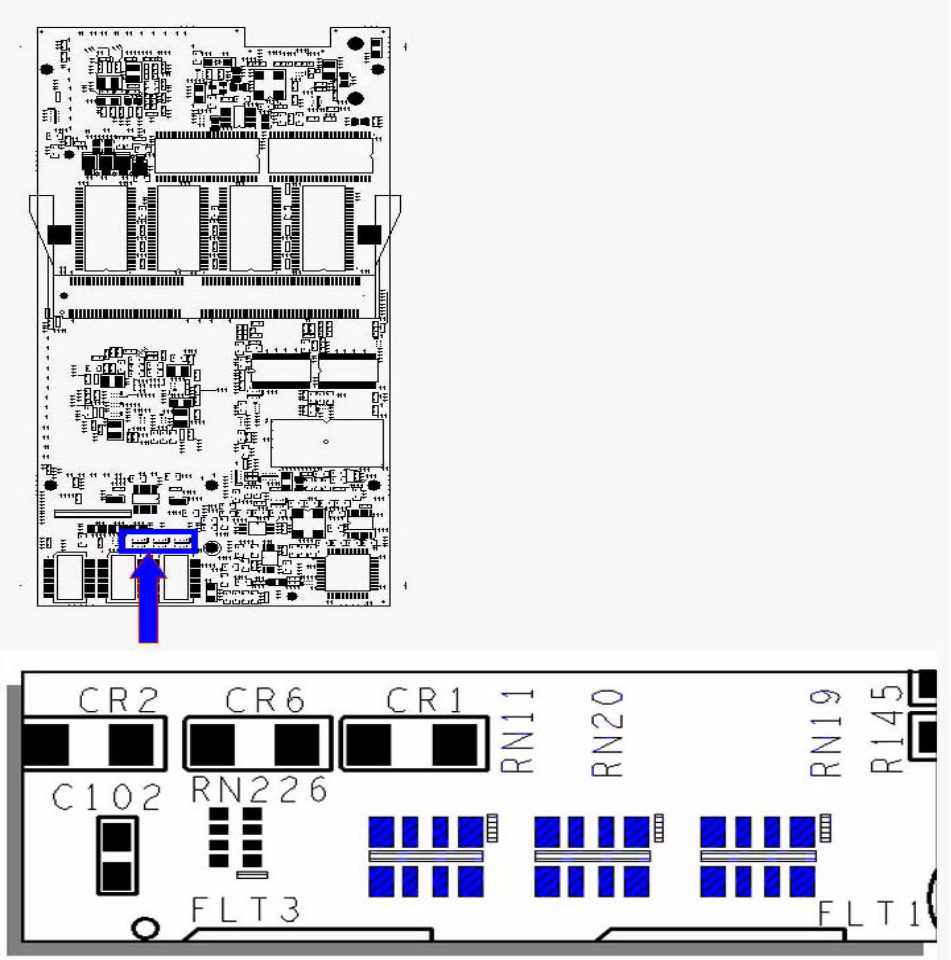


Figure 32:*Zoomed Area for Ethernet Port Routing:Power PMC-260 (Top View)*

Table 21:*Ethernet Port Routing to Front Panel Connector*

#	RefDes.	Function	Mounted	Not Mounted	Default
21	RN19	Select port A	Port A selected	See #22, 23	Mounted
22	RN11	Select port B	Port B selected	See #21, 23	Not mounted
23	RN20	Select port C	Port C selected	See #21, 22	Not mounted

JTAG Chain

Figure 33 shows the location of the RefDes for JTAG Chain Strappings.Table 22 details the JTAG Chain strapping options and default settings.

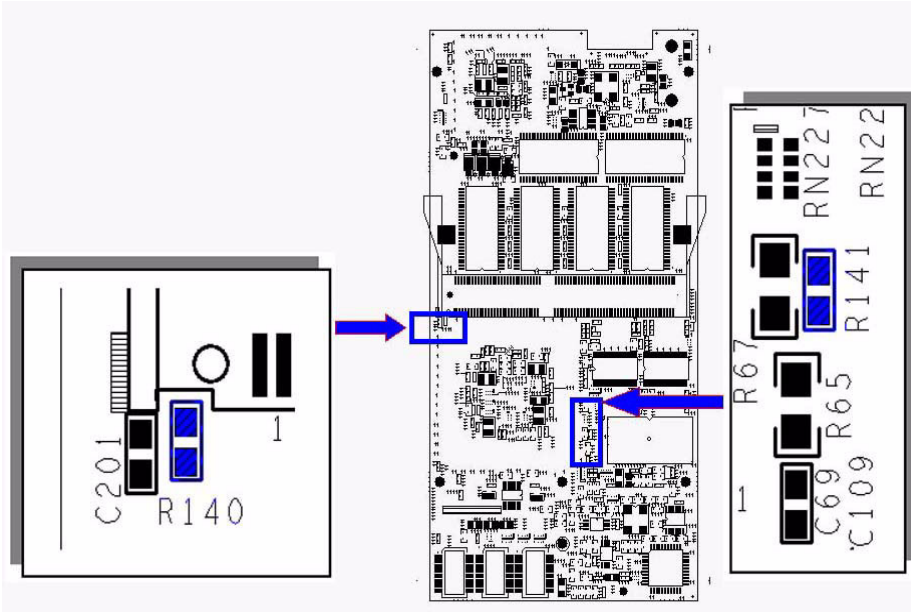


Figure 33:*Zoomed Areas for JTAG Strappings: Power PMC-260 (Top View)*

Table 22:*JTAG Chain*

#	RefDes.	Function	Mounted	Not Mounted	Default
24	R140	GT64260A bypass	GT bypassed in chain	GT first device in chain	Not mounted
25	R141	BCM5214 bypass	BCM5214 bypassed	BCM5214 last device in chain	Not mounted

CPU Reset

Figure 34 shows the location of the RefDes for CPU Reset. Table 23 details CPU Reset strapping options and default settings. Also see “Clock Synthesizer Configuration” on page 7-20.

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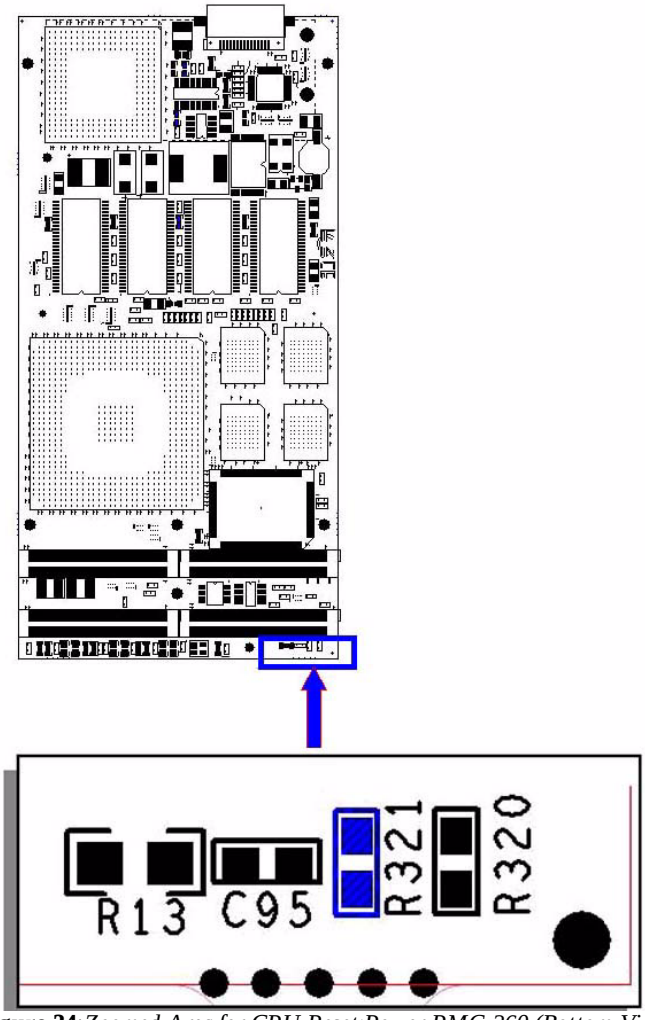


Figure 34:*Zoomed Area for CPU Reset:Power PMC-260 (Bottom View)*

Table 23:*CPU Reset*

#	RefDes.	Function	Mounted	Not Mounted	Default
26	R321	CPU reset timing	I2C initialization for GT-64260A and hence delayed reset for CPU	Normal (hardware strapping) initialization for GT-64260A and CPU reset simultaneous to system reset	Not mounted

Tripad Dual Resistor Strappings

The Tripad Dual Resistor Strappings are:

- GT-64260A Strapping Resistors
- CPU PLL Configuration Strapping Options

GT-64260A Strapping Resistors

The GT-64260A strapping resistors are not required if the GT-64260A initializes from the Serial ROM. Refer to the GT-64260A data sheet for further details. Figure 35 shows the location of the RefDes for GT-64260A Strapping Resistors. Table 24 details the strapping options and default settings.

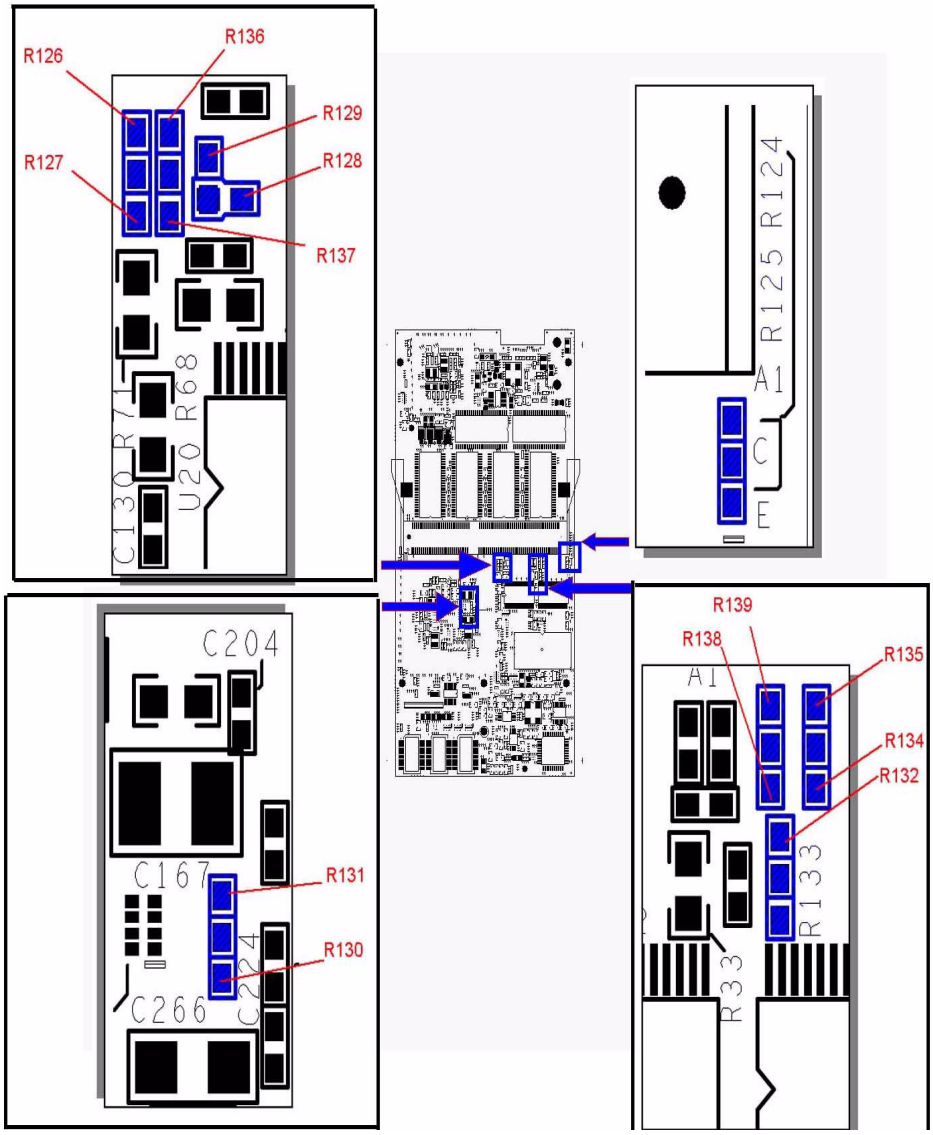


Figure 35:*Zoomed Areas for GT-64260A Strappings:Power PMC-260 (Top View)*

Table 24:*GT-64260A Strapping Resistors*

#	RefDes	Function	Mounted	Not Mounted	Default
1	(R124, R125)	I2C EEPROM initialisation enable	I2C initial-ization enabled (also see C.1:26)	Normal (hard-ware strap-pings) initialisation	R124 unmounted, R125 mounted
2	(R126, R127)	Serial ROM Byte offset width	> 8-bit	Upto 8-bit	R126 unmounted, R127 mounted
3	(R128, R129)	Serial ROM address bit 0	Address bit 0 = 1	Address bit 0 = 0	R128 mounted, R129 unmounted
4	(R136, R137)	Serial ROM address bit 1	Address bit 1 = 1	Address bit 1 = 0	R136 unmounted, R137 mounted
5	(R138, R139)	CPU interface clock of GT	CPU inter-face runs at GT_SYSCLK	CPU interface runs synchro-nous to GT_TCLK	R138 mounted, R139 unmounted
6	(R130, R131)	PCI retry	PCI retry of GT enabled	PCI retry of GT disabled	R130 unmounted, R131 mounted

CPU PLL Configuration

Figure 36 shows the location of the RefDes for CPU PLL Configuration. Table 24 details CPU PLL Configuration and default settings.

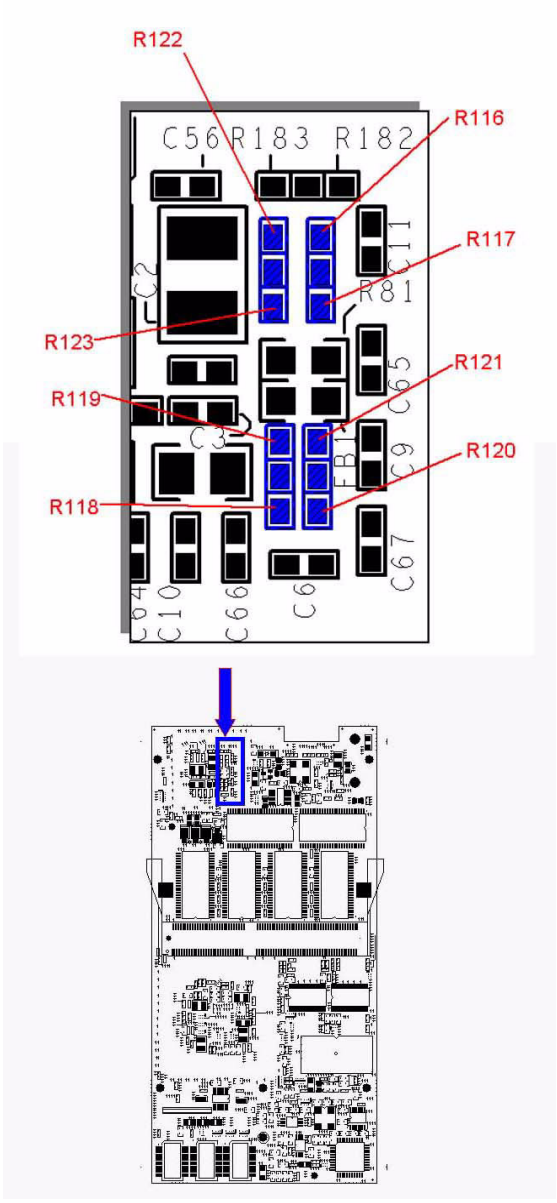


Figure 36:*Zoomed Area for CPU PLL Configuration:Power PMC-260 (Top View)*

Table 25:*CPU PLL Configuration*

#	RefDes.	Function	Mounted	Not Mounted	Default
Bits PLL_CFG[0:3] control the bus-to-core frequency ratio. Refer CPU data sheet for multiplier values; default multiplier = 4.5					
7	(R116, R117)	PLL_CFG0	Pulled high	Pulled low	Pulled low
8	(R118, R119)	PLL_CFG1	Pulled high	Pulled low	Pulled high
9	(R120, R121)	PLL_CFG2	Pulled high	Pulled low	Pulled high
10	(R122, R123)	PLL_CFG3	Pulled high	Pulled low	Pulled high

Clock Synthesizer Configuration

Figure 37 shows zoomed areas of Power PMC-260 for resistors R167, R169, R171 and R173 required for clock synthesizer configuration. The clock synthesizer configuration details is provided in Table 26.

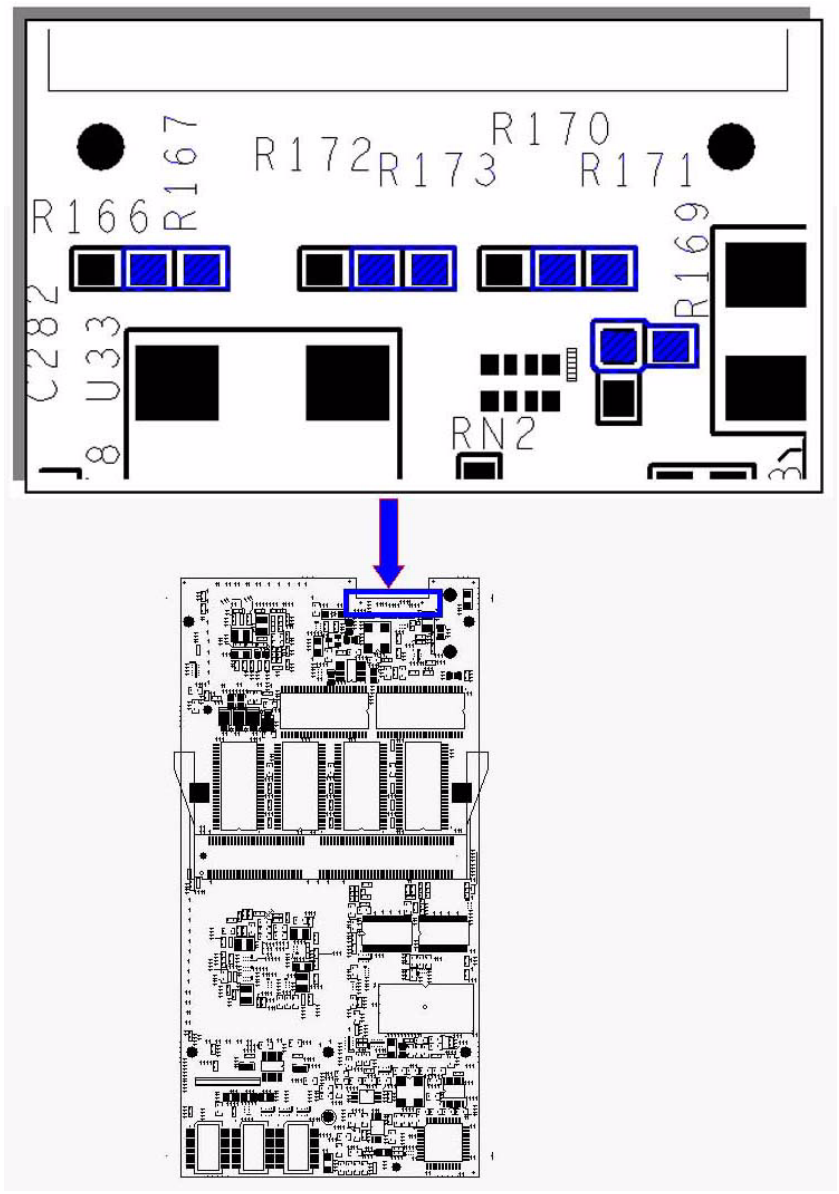


Figure 37:*Zoomed Area for Clock Synthesizer Configuration: Power PMC-260 (Top View)*

Table 26:*Clock Synthesizer Configuration*

#	R167	R169	R171	R173	SysClk (and CPU bus) frequency MHz	TCLK (and SDRAM) frequency MHz
1	OUT	OUT	OUT	OUT	133	133
2	IN	OUT	OUT	OUT	66	133
3	IN	IN	IN	OUT	66	66
4	IN	IN	IN	IN	100	100

A

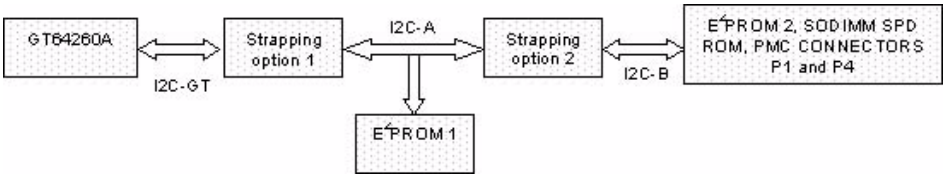
Appendix

I²C Bus Devices -Wiring to Devices

The GT-64260A supports two-wire serial I²C interface, with a multiple master environment. The I²C bus is wired to the following devices:

Device/connector	I²C address	Function	Note
GT-64260A - supports both normal (100kHz) and fast (400kHz) mode	Slave address program-mable		
Serial E²PROM 1 (AT24C02A) – 100kHz	1010001	GT-64260A initialization data	See "Serial EEPROM" on page 5-8
Serial E²PROM 2 (AT24C02A) – 100kHz	1010011	BIB (board information block) User configuration data	Works on 3.3V Aux
SO-DIMM socket	1010000	SO-DIMM SPD access	
PMC connectors P1 and P4	I2C addresses of carrier card devices should not clash with any of the above.	(a) The carrier card can read board identification /configuration informa-tion from the serial EEPROM (b) If the TYNE operates as a master, it is possible for it to read board identi-fication / configuration information from an I2C ROM device, if imple-mented, on other cards in the system	See "I2C Bus Devices" on page 5-7.

It is possible to separate the I²C bus describe above into two independent I²C buses by a pair of strapping options as described in "Strapping Options" on page 7-1(Chaper5). When you use the strapping options, the I²C bus address of the EEPROMs may be altered as shown here:



This enables either of the following:

a) The carrier card could write GT-64260A initialization date into EEPROM1 without the GT-64260A being a participant in the I^2C Bus.
OR

b) The carrier card could access the BIB EEPROM without actually powering the rest of Power PMC-260. This is because EEPROM2 works on an auxillary 3.3V supply provided from the carrier card.

B

Troubleshooting

Troubleshooting

This appendix provides a hint list for detecting erroneous system configurations and any untoward or unusual behavior of Power PMC-260.It cannot replace a serious and sophisticated pre- and post-sales support during application development.
If it is not possible to fix a problem with the help of this chapter, contact your local sales representative or FAE for further support.
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Problem	Possible Reason	Solution
Mechanical		
Unable to insert board into carrier card	Damaged plugs, bent or broken pins	1. Check PMC connector on carrier card for bent or broken pins 2. Replace carrier card.
	Board defect	Replace board
After Power-On		
Powering-on the board fails	Power Supply voltages for device not within the specified range	1. Check that voltages are within their specific ranges 2. Check that power supply is capable to drive the respective loads.
	Board defect	Replace board
	Damaged plugs, bent or broken pins	1. Check PMC connector on carrier card for bent or broken pins 2. Replace carrier card.

Problem	Possible Reason	Solution
During Boot-up Procedure		
Board does not boot	Card is not properly installed on PMC slot	1. Check that the card is seated properly with no gap between the PMC plugs and the base of the receptacles. 2. Ensure that the voltage key(s) on the carrier card are properly inserted into the corresponding key-holes on Power PMC-260. 3. Ensure that the Power-OK LED lights up
	Power Supply not proper (The 3.3V supply from the carrier card might be inadequate in terms of current capability or tolerance)	Verify that the power supply meets power supply requirements as given under “Power Requirements” page 2-7.
	Reset improper (The PCI reset sourced by the carrier card results in system reset on Power PMC-260. This may have an inadequate pulse-width or might occur repeatedly)	
	In the augmented version with SO-DIMM, the SO-DIMM may not meet the requirements specified.	1. Ensure that the SO-DIMM requirements are met with as given under “SO-DIMM Requirements” page 2-7. 2. Ensure proper mounting of SO-DIMM
	The on-board switching regulator tripped because it detected a faulty condition.	Replace the board.
	Incorrect strappings leading to wrong configuration	1. Verify strapping options as per details in the Strapping Options chapter. 2. Verify if GT-64260A is configured for I^2C initialization 3. Verify if the I^2C EEPROM is programmed 4. Verify the I^2C strappings

Problem	Possible Reason	Solution
	Serial port is not OK	1. Check whether the correct serial port (0 or 1) is used per Board Support Package 2. Verify if the terminal is configured to the right baud rate 3. Check whether a a null-modem cable is used.
	CPLD not functioning	1. Observe the RESETN and GT_PCI_RSTN signals and verify if they meet the specified timings 2. Observe the BOOTCSN signal pulsing on power up 3. Reprogram the CPLD
	Board failure	1. Check for proper power (2.5V, 1.8V) and clocks 2. Replace the board if power and clocks are OK
During Board Operation		
Board seems to boot but hangs midway	GT-64260A PCI controller hangs	1. Verify if Power PMC-260 is assigned the monarch status 2. Verify there are not more than one monarchs in the system 3. Verify if there is another non-monarch PPMC in the system which does not flag EREADY 4. Check IDSEL and IRQ mappings on the carrier card 5. If Power PMC-260 is in the non-monarch mode, verify if the monarch waits till Power PMC-260 flags EREADY 6. Verify if the PCI clock, reset and VI/O from the carrier card are OK

Problem	Possible Reason	Solution
	Hanging in memory initialization	1. Verify the SO-DIMM populated-ensure that the SO-DIMM populated is the one supplied. 2. Verify that the SO-DIMM meets the requirements mentioned in "SO-DIMM Requirements" page 2-7 3. Verify if the Power on LED (CR3) glows
	Hangs in I^2C initialization	1. Check the I^2C strappings for address conflict 2. Verify if there is an address conflict on the carrier card
	Keeps rebooting unexpectedly	1. Check the PCI reset from the carrier card 2. Check RESET output of the CPLD 3. Verify if CPU HRESETN and SRESETN are used by the carrier card 4. Check the watchdog NMI output of the GT-64260A 5. Verify whether 3.3V is well within tolerance and not on the margin
Board runs unstable	Disregard of environmental requirements	1. Check that temperature inside system stays within specified ranges for all system devices 2. Check for hot-spots within system Improve cooling system if necessary. 3. Check that other environmental values like moisture or altitude are kept within specified ranges

Problem	Possible Reason	Solution
	Drivers are missing, faulty or do not match hardware	1. Check that all used hardware parts have a driver matching the hardware 2. Reinstall hardware drivers
	Board defect	Replace board
Memory / SO-DIMM module does not work	Module defect	Replace module
	Module not defined for the used board	1. Check if module specification match with interface specification of board. 2. Replace module if specifications do not match
	Module not installed correctly	Check if module fits perfectly in socket.
	Wrong board configuration, faulty switch setting	Configure the board correctly for the respective module
PCI In-operational	PCI specifications are being violated by the carrier card	1. Verify the PCI interface voltage (V I / O), PCI clock, PCI reset and PCI arbiter on the carrier card meet the PCI2.2 specifications. 2. Ensure that all pull-ups necessitated by the PCI2.2 specifications are provided on the carrier card. 3. If Power PMC-260 is installed on a 32 bit PMC slot, ensure that the REQ# signal to this slot is separately pulled high.
	Board defective	1. Ensure that the PCI interface in the system works without Power PMC-260 2. If the PCI interface in the system works without Power PMC-260, then replace the board.
Power PMC-260 does not operate in the monarch mode	Power PMC-260 does not recognize the monarch status	Verify that the monarch signal of Power PMC-260 is pulled low by the carrier card

Problem	Possible Reason	Solution
	Another non-monarch board in the system is not releasing the EREADY signal	1. Verify for the offending participant and remove the non-monarch board. 2. If required, re-boot and verify if Power PMC-260 operates in the monarch mode 3. If not critical, you may also disconnect the EREADY signal of the offending board from the other boards.
	Two or three monarchs in the system	Ensure that the carrier card does not assign monarch status to more than one board
Power PMC-260 does not operate in non-monarch mode	The non-monarch status is not recognized	Ensure that the carrier card has tristated / left unconnected the monarch signal of Power PMC-260
	Power PMC-260 does not release the EREADY signal	Replace the board
Ethernet is in-operational (Network download of Linux fails)	Network link is not OK	1. Verify if the link activity LED glowing on the carrier card 2. Verify that the Ethernet cable and the external link is fine
	Incorrect strappings	1. Verify if any of the hardware configuration strappings have been tampered with. 2. Rectify the strappings as per the default settings
	Port connected at both ends- P4 and front panel connector (It is not advisable to connect an Ethernet channel to both the front panel side and the carrier side simultaneously	Disconnect any of the two ports connected
	Board failure	Replace board
	Poor EMI / ESD performance	Poor isolation and trace impedance implemented on Power PMC-260 may not be effective if the carrier card takes the ethernet signals too far

Problem	Possible Reason	Solution
RTC in-operational	Battery drained if the board has not been used for a long time of ten months or more	Exchange battery and have new data written into the RTC afresh. If this is not possible replace the board

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Product Error Report

Product:	Serial No.:
Date Of Purchase:	Originator:
Company:	Point Of Contact:
Tel.:	Ext.:
Address:	
Present Date:	
Affected Product: ❏ Hardware ❏ Software ❏ Systems	Affected Documentation: ❏ Hardware ❏ Software ❏ Systems
Error Description:	

This Area to Be Completed by Force Computers:

Date:

PR#:

Responsible Dept.: ❏ Marketing ❏ Production

Engineering ➠ ❏ Board ❏ Systems

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