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PMC260

PCI Expansion Card

HARDWARE AND INSTALLATION MANUAL

DOCUMENT NUMBER: Rx-URM-022 Rev A



GE Intelligent Platforms

Embedded Systems, Inc.

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PMC260 Hardware and Installation Manual

PMC260 PCI Expansion Card

1 GENERAL INFORMATION

1.1 INTRODUCTION

This manual describes operation, configuration, and installation instructions for the GE Embedded Systems PMC260 PCI Expansion module. The PMC260 assembly consists of two cards:

•6U PMC260 Feature card implementing the functional capabilities.

• PMC Adapter Card (e.g., PMC007 or PMC008) connecting the PMC260 with a VMEbus Single Board Computer (SBC) host.

The PMC260 attaches to an SBC using the industry standard CMC/PCI (Common Mezzanine Card). When attached to the host SBC, the complete assembly (i.e., host SBC & PMC260) is ready for insertion into a VMEbus chassis. Using the PMC260 integrates significant additional functionality to the SBC host, directly on the host's primary I/O bus (i.e., PCI) for maximum performance.

1.1.1 FEATURES

The PMC260 assembly complies with CMC specification for PCI Mezzanine Cards (commonly known as PMC), and the VMEbus mechanical specification. As such, it will directly connect to most SBC cards. When used, one additional VMEbus slot is consumed by the PMC260.

Note: (there is no connection to the VMEbus I/O protocol, all data and control transfer occurs from the SBC host PCI bus.)

All initialization, and functional configuration of the PMC260 is done automatically by software.

Features implemented on the PMC260 include:

• PCI/PCI bridge between host and PMC260 I/O functions.

• Four, independent 10/100Mbit Ethernet controllers.

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• Front Panel Ethernet activity LEDs.

• PCMCIA Type I/II/III socket.

• PMC Connector for expansion PMC module.

• Automatic power-up configuration per PCI specification.

• All External I/O connections via VME P2 Connector.

2 HARDWARE INSTALLATION

2.1 Introduction

This chapter provides unpacking, hardware preparation, and installation procedures for the PMC260 module.

2.1.1 Unpacking Instructions

GE Embedded Systems boards are protected by an anti-static envelope and/or wrapping. Observe anti-static precautions and work at an approved anti-static workstation when unpacking the board.

Note: The PMC260 is shipped in an individual, reusable shipping box. When you receive the shipping container, inspect it for any evidence of physical damage. If the container is damaged, request that the carrier's agent be present during unpacking and inspection of the unit.

Unpack the PMC260 module from shipping carton. Check to verify that all items are present by referring to the packing list.

2.1.1.1 Included Items

Each PMC260 is shipped with the following items:

• PMC260 Assembly

This includes the PMC260 VMEbus card, and the appropriate PMC Adapter card (e.g., PMC007 or PMC008).

2.1.2 Handling

Electronic assemblies use devices that are sensitive to static discharge; this applies to both the

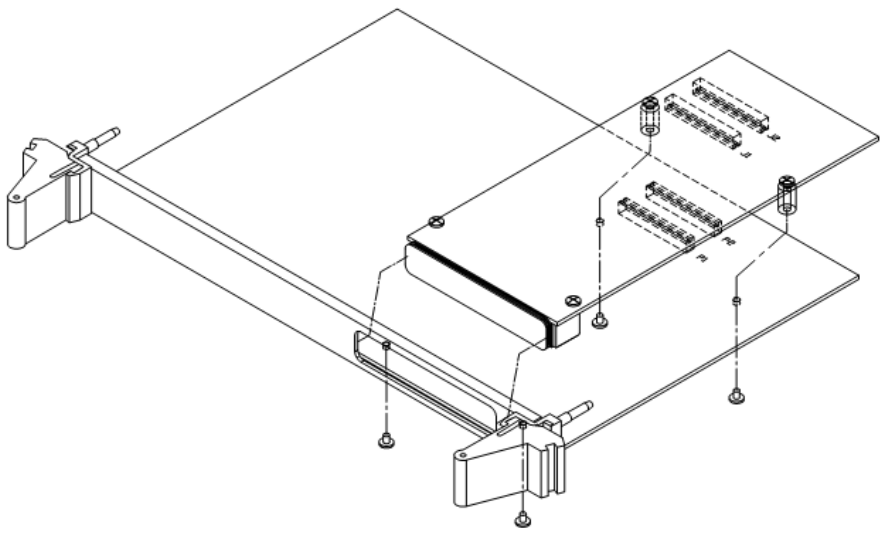
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PMC260, and the host board onto which it will be mounted. Observe anti-static procedures when handling these boards. The PMC260 should be in an anti-static plastic bag or conductive foam for storage or shipment.

2.2 PMC260 INSTALLATION

The PMC260 Module is now ready for installation. Turn all system power off. Remove the host board from the chassis (if currently installed). Locate the PMC connectors on the host board. Carefully plug the PMC260 into the mating connectors on the host's printed circuit board. Be sure the module is seated properly into CMC connectors on the host. Use screws to fasten the module into the host PCB. (See Figure).

(Note: for clarity, only the PMC Adapter card is shown. When attaching to the SBC host, the PMC Adapter card should be connected to the PMC 260 6U card. This is how the assembly is shipped from the factory.)



1. Remove the four screws from bottom of the stand-offs of the PMC260 Adapter Card.

2. Line-up the J1, and J2 on the host PCB to PMC260 Adapter card, J1 & J2.

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3. Push the PMC260 down (make sure the connectors J1, and J2 are positioned properly).

4. Use the four screws to connect the PMC260 stand-offs to the host PCB.

3 External I/O Connections and Front Panel Indicators

3.1 Connection to the Local Network Media

The PMC260 has four 10/100Tx transceiver connections access on the VMEbus P2 conn

Pin assignments for the I/O are:

Ethernet I/O Pin Assignment

Enet Port	Rx+	Rx-	Tx+	Tx-	Act	Tct
Lan0	A10	C10	A11	C11	A12	C12
Lan1	A13	C13	A14	C14	A15	C15
Lan3	A18	C18	A19	C19	A20	C20
Lan4	A21	C21	A22	C22	A23	C23

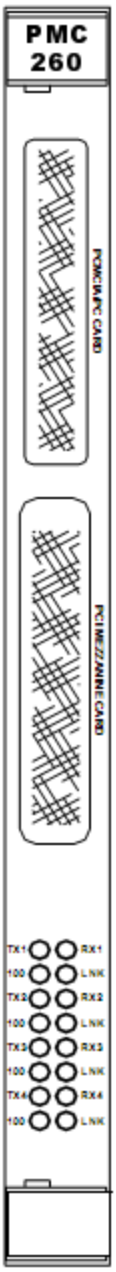
Pin nomenclature is per VMEbus specification, identifying a pin on the 96 pin P2 DIN connector.

Front Panel Indicators

Each Ethernet Port has four LED indictors associated with it. These are:

- Activity - Illuminated when receiver detects packet
- Transmit - Illuminated when transmitter is sending packet
- Link - Illuminated when link is detected (from hub/switch)
- Speed - Illuminated when link speed is 100Mbit

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3.1.2 PCMCIA Support

The PMC260 has support for a dual PCMCIA Type I/II or single Type III device. PCMCIA devices should be inserted through the PMC260 front panel into the PCMCIA socket/guide. Connection is per PCMCIA standard.

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3.1.3 PMC Module Support

A PMC may be attached to the PMC260 card to provide additional application-specific functions.

Note: that the first time of attaching a PMC device that it will require removing the PMC260 assembly, in order to insert, and tighten the screws holding the additional PMC in place.

Attached PMC modules can use either front panel I/O, or rear access I/O via the D&Z rows of the

PMC260 P2 connector. (The latter assumes the PMC module supports "J4" I/O). Pin assignments for the PMC J4 connector are:

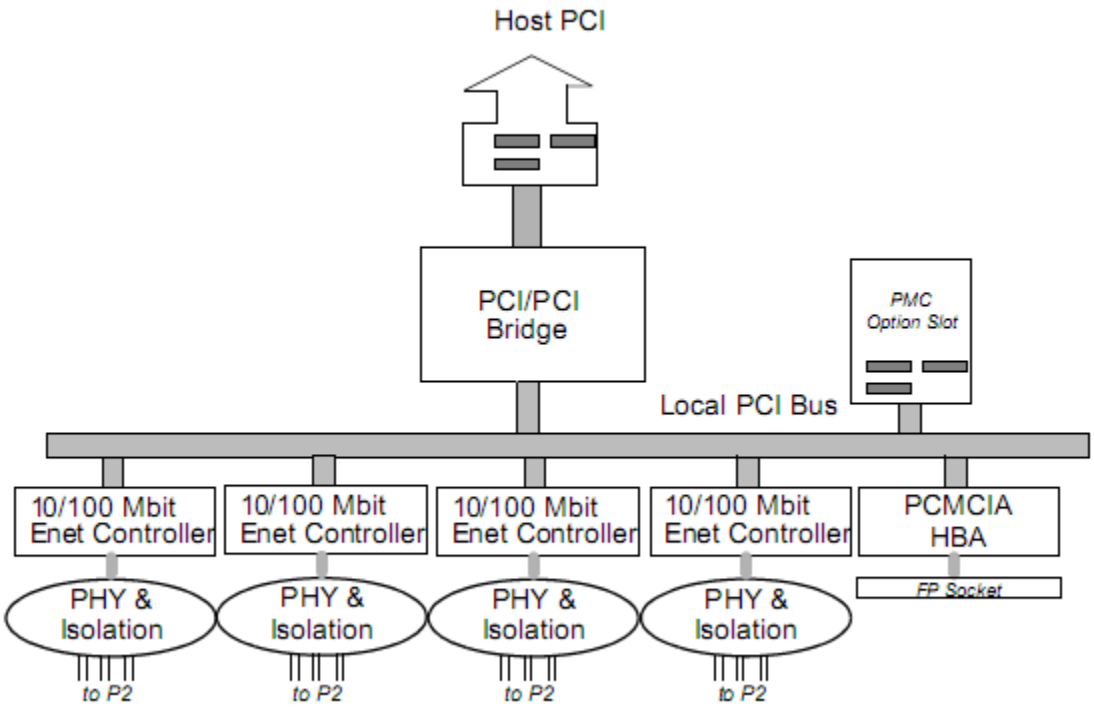
Add On PMC J4/P2 Pin Assignments

PMC J4	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16
VME P2	D1	D2	Z2	D3	Z3	D4	D5	Z5	D6	D7	Z7	D8	D9	Z9	D10	D11
PMC J4	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32
VME P2	Z11	D12	D13	Z13	D14	D15	Z15	D16	D17	Z17	D18	D19	Z19	D20	D21	Z21
PMCJ4	33	34	35	36	37	38	39	40	41	42	43	44	45	46		
VMEP2	D22	D23	Z23	D24	D25	Z25	D26	D27	Z27	D28	D29	Z29	D30	D31		

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3.2 PMC260 Architecture

The PMC260 provides I/O expansion, as illustrated in the block diagram below:



3.2.1 PMC260 Subsystems

The PCI/PCI Bridge provides electrical isolation between the Local PCI bus on the PMC260, and the SBC Host PCI bus. This is necessary to assure compliance with the PCI loading specification.

3.2.2 Transaction Isolation

While primarily for electrical isolation, the bridge does provide some logical isolation as well. It creates a PCI address window from the primary (host) PCI to the local PCI. Transactions on the primary side that are destined for the window are accepted by the bridge. Where possible (e.g., posted writes), the bridge will immediately acknowledge the address, allowing data to begin flowing from the initiator. This “pipelining” function is also provided for transactions that are initiated by devices on the PMC260 (e.g., Ethernet controllers). If a transaction, initiated by a device on the PMC260 is destined for an address that is within the primary PCI window, then it is

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not forwarded to the primary. This allows local control of on-card resources (e.g., from an embedded processor on the PMC option slot), should this be required.

Note: (general usage is to have all traffic be between a device on the PMC260, and the host SBC.)

3.2.3 Initialization

Initialization of the PMC260 is, (as described in the PCI Specification), fully software driven, and supported by standard operating system or BIOS initialization code. During the initialization sequence, the local PCI bus (i.e., the segment on the PMC260) is "probed" to discover each of the devices. Each device indicates the amount of PCI address resource it requires.

All PCI address decoding (for each device on the PMC260) is set up, from the host, during initialization.

3.2.4 ETHERNET CONTROLLERS

The Ethernet Controllers on the PMC260 have enjoyed several years of active evolution, featuring improvements at both the PCI bus, and Ethernet interface. Each controller is a fully independent unit, with local FIFO buffers to decouple PCI, and Ethernet activity. Decoupling the Ethernet, and PCI ensures that data transfers will meet the timing requirements of each transaction (which is of particular importance on the Ethernet) regardless of the loading on the other bus interface. These FIFO buffers are sufficiently deep to support good burst transfers, and presenting minimum overhead to the PCI bus. When doing data transfer on the PCI bus, the Ethernet DMA engine will attempt to maximize the length of burst transactions, which is critical to obtain the potential bandwidth of the PCI protocol. These properties allow sustained full bandwidth transfers on both Ethernet ports.

3.2.4.1 PHY & Isolation

The Ethernet controllers use the industry standard MII (Media Independent Interface) protocol to communicate with the PHY (Physical Layer) component. The PHY is responsible for creating the physical bit stream, at the speed detected (or negotiated) from the network. Isolation transforms maintain necessary electrical isolation from the general network media.

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3.2.5 PCMCIA Host Bus Adapter

The PCMCIA Host Bus Adapter translates PCI transactions into PCcard transactions. Any PCMCIA or PCcard device may be inserted into the socket. Hot swap is supported.

3.2.6 PMC Expansion Slot

The PMC260 includes a PMC Expansion Slot, allowing an additional I/O device to be configured into the SBC PCI hierarchy. Any PMC compliant device may be added. As all configuration is "soft" (i.e., software driven), no modifications or hardware adjustments are necessary.

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4 SPECIFICATIONS

4.1 General

General specifications for PMC260 are listed below.

CHARACTERISTICS	SPECIFICATIONS
PCMCIA Host Bus Adapter	PC Card Standard
Compatibility	PCMCIA Specification - PCI Revision 2.1
PCMCIA Device Support	Two Type I/II or one Type III
PMC Expansion Slot:	
Compatibility	IEEE1386, Standard Single PMC
Ethernet:	
Transfer Types	10/100 BaseTx
Compatibility	IEEE1386, IEEE802.3,
Interface	PCI Revision 2.1
PMC260:	
Size	6U VMEbus
Power Consumption	2 Amp @ 5V MAX
Drivers	VxWorks
Temperature:	
Operating	0°C to 60°C
Storage	-40°C to 95°C

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