Gigabit Ethernet/82543 PMC Module

Owner's Manual

214134 Revision AB

April 2005 Edition

Safety Summary

The following general safety precautions must be observed during all phases of operation, service, and repair of this equipment. Failure to comply with these precautions or with specific warnings elsewhere in this manual could result in personal injury or damage to the equipment.

The safety precautions listed below represent warnings of certain dangers of which Motorola is aware. You, as the user of the product, should follow these warnings and all other safety precautions necessary for the safe operation of the equipment in your operating environment.

Ground the Instrument.

To minimize shock hazard, the equipment chassis and enclosure must be connected to an electrical ground. If the equipment is supplied with a three-conductor AC power cable, the power cable must be plugged into an approved three-contact electrical outlet, with the grounding wire (green/yellow) reliably connected to an electrical ground (safety ground) at the power outlet. The power jack and mating plug of the power cable meet International Electrotechnical Commission (IEC) safety standards and local electrical regulatory codes.

Do Not Operate in an Explosive Atmosphere.

Do not operate the equipment in any explosive atmosphere such as in the presence of flammable gases or fumes. Operation of any electrical equipment in such an environment could result in an explosion and cause injury or damage.

Keep Away From Live Circuits Inside the Equipment.

Operating personnel must not remove equipment covers. Only Factory Authorized Service Personnel or other qualified service personnel may remove equipment covers for internal subassembly or component replacement or any internal adjustment. Service personnel should not replace components with power cable connected. Under certain conditions, dangerous voltages may exist even with the power cable removed. To avoid injuries, such personnel should always disconnect power and discharge circuits before touching components.

Use Caution When Exposing or Handling a CRT.

Breakage of a Cathode-Ray Tube (CRT) causes a high-velocity scattering of glass fragments (implosion). To prevent CRT implosion, do not handle the CRT and avoid rough handling or jarring of the equipment. Handling of a CRT should be done only by qualified service personnel using approved safety mask and gloves.

Do Not Substitute Parts or Modify Equipment.

Do not install substitute parts or perform any unauthorized modification of the equipment. Contact your local Motorola representative for service and repair to ensure that all safety features are maintained.

Observe Warnings in Manual.

Warnings, such as the example below, precede potentially dangerous procedures throughout this manual. Instructions contained in the warnings must be followed. You should also employ all other safety precautions which you deem necessary for the operation of the equipment in your operating environment.

Warning

To prevent serious injury or death from dangerous voltages, use extreme caution when handling, testing, and adjusting this equipment and its components.

CE Notice (European Community)

This is a Class A product. In a domestic environment, this product may cause radio interference, in which case the user may be required to take adequate measures.

Embedded Communications Computing products with the CE marking comply with the EMC Directive (89/336/EEC). Compliance with this directive implies conformity to the following European Norms:

EN55022 "Limits and Methods of Measurement of Radio Interference Characteristics of Information Technology Equipment"; this product tested to Equipment Class A

EN55024 "Information technology equipment—Immunity characteristics—Limits and methods of measurement"

Board products are tested in a representative system to show compliance with the above mentioned requirements. A proper installation in a CE-marked system will maintain the required EMC performance.

In accordance with European Community directives, a "Declaration of Conformity" has been made and is available on request. Please contact your sales representative.

FCC Notice

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC rules.

Safety Notice for Information Technology Equipment

This equipment is to be used only with products that are certified by an internationally recognized safety organization (for instance, UL or CSA).

Flammability

All Motorola PWBs (printed wiring boards) are manufactured with a flammability rating of 94V-0 by UL-recognized manufacturers.

EMI Caution

Caution

This equipment generates, uses and can radiate electromagnetic energy. It may cause or be susceptible to electromagnetic interference (EMI) if not installed and used with adequate EMI protection.

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About this Manual

This manual describes and explains how to install the Gigabit Ethernet 82543 PCI mezzanine card (PMC). This network interface card (NIC) is designed for the PCI bus and operates independently of a host processor.

Audience

This manual is intended for anyone who designs OEM systems, supplies additional capability to existing compatible systems, or works in a lab environment for experimental purposes. It is important to note that a basic knowledge of computers and digital logic is assumed.

It is presumed that users have knowledge and working experience with:

- ❏ Basic concepts and uses of Ethernet networks
- ❏ Peripheral Component Interconnect (PCI) bus
- ❏ PCI Mezzanine Cards (PMCs)

Summary of Changes

This is the second release of the *Gigabit Ethernet/82543 PMC Module Installation and Use* guide.

Date	Description of Change
June 2001	Initial print.
April 2005	Modified Figure 1-3 on page 1-12. Updated Table 3-6 on page 3-9. Included UL details. Modified *Power Requirements* on page B-2. Added *EMC Compliance* on page B-5. Editorial changes.

Overview of Contents

This manual is divided into the following chapters and appendices:

Chapter 1, *Preparation and Installation*, provides a brief description of the Gigabit Ethernet/82543 PMC Module. It also provides basic startup and hardware preparation information. The remainder of the chapter describes the installation procedure for the Gigabit Ethernet/82543 PMC Module.

Chapter 2, *Functional Description*, lists the features of the Gigabit Ethernet 82543 PMC provided by the major onboard components. It also provides a brief general description and a block diagram of Gigabit Ethernet 82543 PMC. The remainder of the chapter is an overview of each functional characteristic of the board along with a description of what component or components provide each function.

Chapter 3, *Controls, Indicators and Connector Pin Assignments*, provides a description of controls, indicators and onboard connectors of the Gigabit Ethernet 82543 PMC as well as their pin assignments.

Appendix A, *Troubleshooting*, provides a hint list for detecting possible errors. This chapter lists symptoms, probable causes, and recommended corrective actions.

Appendix B, *Specifications*, provides general specifications of the Gigabit Ethernet 82543 PMC including physical, power and environmental specifications. This chapter also details the standard and EMC compliance requirements of Gigabit Ethernet 82543 PMC.

Appendix C, *Related Documents*, provides a listing of related Motorola product documentation, manufacturer's documents and industry standard specifications.

Comments and Suggestions

Motorola welcomes and appreciates your comments on its documentation. We want to know what you think about our manuals and how we can make them better. Mail comments to:

Embedded Communications Computing
Reader Comments DW164
2900 S. Diablo Way
Tempe, Arizona 85282

You can also submit comments to the following e-mail address:
reader-comments@mcg.mot.com

In all your correspondence, please list your name, position and company. Be sure to include the title and part number of the manual and tell how you used it. Then tell us your feelings about its strengths and weaknesses and any recommendations for improvements.

Conventions Used in This Manual

The following typographical conventions are used in this document:

bold

is used for user input that you type just as it appears; it is also used for commands, options and arguments to commands and names of programs, directories and files.

italic

is used for names of variables to which you assign values, for function parameters and for structure names and fields. Italic is also used for comments in screen displays and examples and to introduce new terms.

courier

is used for system output (for example, screen displays, reports), examples and system prompts.

<Enter>, <Return> or <CR>

represents the carriage return or Enter key.

Ctrl

represents the Control key. Execute control characters by pressing the **Ctrl** key and the letter simultaneously, for example, **Ctrl-d**.

Note: Contains information that is not critical to the procedure, task, or information you are describing. Notes are usually used to give the reader a tip or additional information.

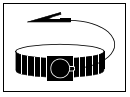
Caution

Identifies any risk of system failure, service interruption, or damage to equipment and should explicitly state the nature of the risk and specify how to reduce or avoid the risk.

Caution

Avoid touching areas of integrated circuitry; static discharge can damage circuits.

Use ESD



Wrist Strap

Before you install or remove a board Motorola strongly recommends that you use an antistatic wrist strap and a conductive foam pad.

Warning

Identifies any risk of personal injury or loss of life and should explicitly state the nature of the risk and specify how to reduce or avoid the risk.

Abbreviations

The following abbreviations are used in this manual:

Abbreviation	Meaning
BOM	Bill of materials
CD	Carrier detect
CSMA/CD	Carrier Sense Multiple Access/Collision Detection
CSR	Control/status register

Abbreviation	Meaning
DC	Direct current
DSP	Digital signal processor
EEPROM	Electrically erasable programmable read-only memory
ESD	Electrostatic discharge
FCC	Federal Communication Commission
FIFO	First-in/first-out
FTP	File Transfer Protocol
GMII	Gigabit Media Independent Interface
IEEE	Institute of Electrical and Electronics Engineers
I/O	Input/output
IRQ	Interrupt request
LAN	Local area network
LED	Light emitting diode
LFM	Linear feet per minute
MAC	Media Access Control
MDI	Media dependent interface
MII	Media Independent Interface
MIB	Management information base
MIS	Management Information Service
NIC	Network interface card
PCI	Peripheral component interconnect
PMC	PCI mezzanine card
RX	Receive signal
SBC	Single-board computer
SNMP	Simple Network Management Protocol
TCP/IP	Transmission Control Protocol/Internet Protocol
TX	Transmit signal
UL	Underwriters Laboratories Inc.
UTP	Unshielded twisted-pair

Preparation and Installation

1

Introduction

This chapter provides a brief description of the Gigabit Ethernet/82543 PMC Module and explains how to install the Gigabit Ethernet/82543 PMC Module onto a host module, such as a single-board computer (SBC) or carrier card, and how to connect the PMC to the network.

Caution

When you add PMCs to your system, verify that the combined power (wattage) required for the PMCs does not exceed the system's power supply rating. Refer to your computer system documentation for this information.

In this manual, the name Gigabit Ethernet/82543 PMC Module refers to all models of the Gigabit Ethernet/82543 PMC Module series boards, unless otherwise specified.

General Description

The Gigabit Ethernet 82543 PCI mezzanine card (PMC), shown in Figure 1-1 on page 1-2, is a network interface card (NIC) that provides a direct interface to the local 32-bit or 64-bit PCI bus. Gigabit Ethernet technology allows the PMC to use a single connector for 10 megabits per second (10-Mb/s), 100 megabits per second (100-Mb/s), or 1000 megabits per second (1000-Mb/s) Ethernet network connection (Institute for Electrical and Electronics Engineers (IEEE) 802.3).

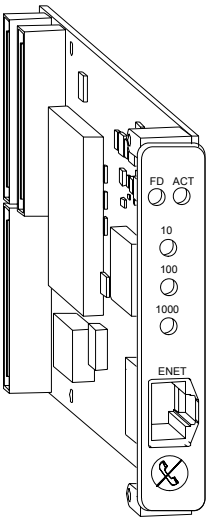


Figure 1-1. PMC/Gigabit Ethernet/82543

Gigabit Ethernet Technology

Gigabit Ethernet (1000 Base-T) is a technology that can be integrated into current 10 and 100 Base-T local area networks (LANs) and allow them to upgrade easily to 1000 Mb/s. Gigabit Ethernet provides higher bandwidth without a major change in infrastructure and is supported on major platforms. It delivers an excellent business solution to increasing requirements for bandwidth on a LAN.

Gigabit Ethernet technology offers the following advantages:

- ❏ High performance
- ❏ Standards-based technology
- ❏ Cost-effective migration
- ❏ Growing vendor support

High Performance

In workgroup environments, Gigabit Ethernet can handle combined demands of multiple LAN users and the peak traffic created by high-performance PCs and sophisticated applications that require significant bandwidth.

Standards-Based Technology

The standard for Gigabit Ethernet technology is set by the IEEE 802.3 Committee, the same committee that developed the original Ethernet standard and the Fast Ethernet standard. This technology is a simple extension of 10/100 Base-T Ethernet. Gigabit Ethernet uses the Carrier Sense Multiple Access/Collision Detection (CSMA/CD) protocol, defined in the Ethernet Media Access Control (MAC) layer.

The 1000 Base-T MAC is a scaled up version of the MAC used in 10 and 100 Mb/s Ethernet. In other words, 1000Base-T is conventional Ethernet, only faster. It is reliable, robust, and economical. Additionally, the technologies can be offered with shared or switched Ethernet connections. Shared environments provide a total of 10, 100, or 1000 Mb/s to all stations attached to a hub. They are ideal for a medium-size workgroup with occasional peak bandwidth demands. Shared Ethernet delivers the bandwidth economically.

Cost-Effective Migration

The seamless compatibility between 10/100/1000 Base-T and prior Ethernet implementations allows easy migration to high-speed connections because of:

- ❏ LAN cabling

  10/100/1000 Base-Tx Ethernet can run on the most common unshielded twisted-pair (UTP) Ethernet wiring: 1000 BaseTx (1000 Mb/s) on Category 5e cabling, 100 BaseTx (100 Mb/s) on Category 5 cabling, and 10 BaseTx (10 Mb/s) on Category 3, 4, or 5 cabling.

- ❏ Administrative expertise

Managers can rely on familiar network analysis tools and procedures in 10/100/1000 Base-T environments. Administrative information translates easily from prior Ethernet implementations to 10/100/1000 Ethernet networks, which means minimal retraining of Management Information Service (MIS) support staff. Administrators and system integrators already know the technology, cabling, protocols, and software.

❏ Management software

You can manage 10/100/1000 Ethernet LANs with existing Simple Network Management Protocol (SNMP) management application software and Ethernet management information bases (MIBs).

❏ Software support

Application and networking software functions unchanged on 10/100/1000 Base-T LANs.

❏ Flexible migration

Automatic speed selection, where controllers can run at 10, 100, or 1000 Mb/s on existing wire, ensures non disruptive transition to Gigabit Ethernet. Similarly, 10/100/1000 Mb/s Ethernet switching hubs enable smooth migration to Gigabit Ethernet in the wiring closet.

Vendor Support

Gigabit Ethernet has the support of a growing number of vendors of network controllers, network systems, and systems. Extensive multi-vendor support ensures the development of a wide range of interoperable products.

System Enclosure

The type of system enclosure you use is determined by the configuration and architecture of the host board (either SBC or carrier card). In some cases, the host board and Gigabit Ethernet/82543 PMC Module assembly requires only a single slot in the chassis. A customized chassis may

accommodate a slightly wider board assembly into each slot. For more information refer to the PMC specification, as referenced in Appendix C, *Related Documents*.

Guidelines for Unpacking

If the shipping carton is damaged upon receipt, request that the carrier's agent be present during the unpacking and inspection of the equipment.

Caution

When unpacking, avoid touching areas of integrated circuitry; static discharge can damage circuits.

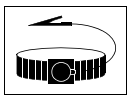
Refer to the packing list and verify that all items are present. Save the packing material for storing and reshipping of equipment.

Installation Preliminaries

Boards may be damaged if improperly installed or handled. Please read and follow the guidelines in this section to protect your equipment.

This section applies to all hardware installations you may perform that involve the Gigabit Ethernet/82543 PMC Module and host board. If the host board is a hot-swap module, you can install it or remove it without shutting down the operating system or removing system power. Replacing a hot-swap module can be accomplished in under five minutes. For more information about hot swap concepts and the *PCI Industrial Computer Manufacturer's Group Hot Swap Specification* (PICMG 2.1 R2.0), refer to the sources listed in Appendix C, *Related Documents*.

Use ESD



Wrist Strap

Motorola strongly recommends that you use an antistatic wrist strap and a conductive foam pad when installing or upgrading a system. Electronic components, such as disk drives, computer boards and memory modules, can be extremely sensitive to electrostatic discharge (ESD). After removing the component from its protective wrapper or from the system,

place the component flat on a grounded, static-free surface (and, in the case of a board, component side up). Do not slide the component over any surface.

If an ESD station is not available, you can avoid damage resulting from ESD by wearing an antistatic wrist strap (available at electronics stores) that is attached to an active electrical ground. Note that a system chassis may not be grounded if it is unplugged.

Equipment Required

To install the Gigabit Ethernet/82543 PMC Module, you need the following equipment.

- ❏ System enclosure with power supply
- ❏ Host board
- ❏ Ethernet cable (Motorola recommends using Category 5 UTP cabling)

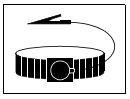
Before You Install or Remove a Board

Boards may be damaged if improperly installed or handled. Please read and follow the guidelines in this section to protect your equipment.

Refer to Appendix B, *Specifications* for details about the physical, environmental and power requirements for the Gigabit Ethernet/82543 PMC Module.

Observe ESD Precautions

Use ESD



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place the component flat on a grounded, static-free surface (and, in the case of a board, component side up). Do not slide the component over any surface.

If an ESD station is not available, you can avoid damage resulting from ESD by wearing an antistatic wrist strap (available at electronics stores) that is attached to an active electrical ground. Note that a system chassis may not be grounded if it is unplugged.

Watch for Bent Pins or Other Damage

Caution

Damage to board/backplane or system components
Bent pins or loose components can cause damage to the board, the backplane, or other system components.
Therefore, carefully inspect your board and the backplane for both pin and component integrity before installation.

It is critical that two prerequisite steps be performed prior to installing your board into the CompactPCI backplane to prevent possible backplane pin damage.

- ❏ Visually inspect the board connectors to ensure they are not damaged by previous insertions or accidental mishandling. If any board connector damage is observed, do not install board into the backplane. This may cause a bent pin on the connector, resulting in an expensive repair.
- ❏ Visually inspect the backplane pins for any bent pins from previous board installations in the slot where the board will be installed.

Embedded Communications Computing (ECC) and our suppliers take significant steps to ensure there are no bent pins on the backplane or connector damage to the boards prior to leaving our factory. Bent pins caused by improper installation or by inserting boards with damaged connectors could void the ECC warranty for the backplane or boards.

If a system contains one or more crushed pins, power off the system and contact your local sales representative to schedule delivery of a replacement chassis assembly.

Use Caution When Installing or Removing Boards

When first installing boards in an empty chassis, we recommend that you start at the left of the card cage and work to the right when cards are vertically aligned; in horizontally aligned cages, work from bottom to top.

When inserting or removing a board in a slot adjacent to other boards, use extra caution to avoid damage to the pins and components located on the primary or secondary sides of the boards.

Preserve EMI Compliance

Board/Component Damage
If the EMI barrier is open, devices may cause or be susceptible to excessive interference.
Therefore, to preserve compliance with applicable standards and regulations for electromagnetic interference (EMI), during operation all front and rear openings on the chassis or board faceplates must be filled with an appropriate card or covered with a filler panel.

Understand Hot Swap

Board/Component Damage
Inserting or removing non-hot swap cards or transition modules with power applied may result in damage to module components.
Therefore, make sure that your board manufacturer identifies your module as hot swap ready.

The PICMG 2.1 Hot Swap specification defines varying levels of hot swap. A board that is compliant with the specification can be inserted and removed safely with system power on without damage to onboard circuitry. If a module is not hot swap compliant, you should remove power to the slot or system before inserting or removing the module.

To facilitate hot swap, PICMG 2.1 specifies a blue LED on the faceplate. This LED is under software control.

If your system is using software that provides full hot swap capabilities, the software will illuminate the blue hot swap LED on the faceplate when software has stopped and it is safe to remove the board.

If your system does not have hot-swap aware software running, behavior of the blue LED may be indeterminate. In this case, you may need to manually shut down applications or operating systems running on the board prior to board removal, even if the blue LED is lit.

Caution

Corruption of Data or File System
Powering down or removing a board before the operating system or other software running on the board has been properly shut down may cause corruption of data or file systems.
Therefore, ensure that the board has been properly shut down. You should ensure that the blue hot swap LED on the face plate of the host board is illuminated.

Refer to the documents listed in Appendix C, *Related Documents* for more information about hot swap and the PCI Industrial Computer Manufacturers Group (PICMG) Hot Swap Specification.

Recognize Different Injector/Ejector Lever Types

The modules you install may have different ejector handles and latching mechanisms. The following illustration shows the typical board ejector handles used with ECC payload cards:

A) Elma Latching,

B) Rittal Type II,

C) Rittal Type IV.

All handles are compliant with the CompactPCI specification and are designed to meet the IEEE1101.10 standards.

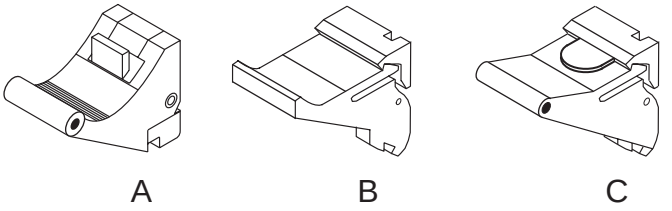


Figure 1-2. Injector/Ejector Lever Types

Each lever type has a latching mechanism to prevent the lever from being opened accidentally. You must press the lever release before you can open the lever. Never force the lever. If the lever does not open easily, you may not have pressed firmly enough on the release. If the lever does not close easily, the board may not be properly seated in the chassis.

To open a lever, press the release and move the lever outward away from the faceplate.

To close a lever, move the lever inward toward the faceplate until the latch engages.

Verify Slot Usage

Caution

Prevent possible damage to module components by verifying the proper slot usage for your configuration.

Capability glyphs provide visual indication of backplane connector and board capability. Capability glyphs are:

(Triangle) for System Slot

(Circle) for Peripheral Slots

Installation and Removal

The following instructions tell how to install or replace the Gigabit Ethernet/82543 PMC Module on a typical host board.

Installation of Gigabit Ethernet/82543 PMC Module on a Host Board

To install a Gigabit Ethernet/82543 PMC Module on a host board (either SBC or carrier card), refer to the Figure 1-3 on page 1-12, read all cautions and warnings and perform the following steps. This figure is for reference only and may not represent the exact host board you are using.

Note: Since the Gigabit Ethernet/82543 PMC Module is not hot-swappable, always install the Gigabit Ethernet/82543 PMC Module when power is turned off.

Damage of Carrier Card
The power supply circuits on carrier card may be overloaded if more than one Gigabit Ethernet/82543 PMC Module modules are assembled. This results in permanent damage to the carrier card.
Therefore, make sure that the carrier card's 5V and 3.3V supply supports the power requirements as described in *Power Requirements* on page B-2.

Damage of Circuits
Electrostatic discharge and incorrect board installation and removal can damage circuits or shorten their life.
Therefore, before touching boards or electronic components, make sure that you are working in an ESD-safe environment.

Module damage
Only mount permitted combinations of Gigabit Ethernet/82543 PMC Module variants. Otherwise, damage to PMC module, carrier card and

equipment attached to the rear transition board may occur. Therefore, only install and use the PMC module together with the Embedded Communications Computing's carrier card.

1. Attach an ESD strap to your wrist. Attach the other end of the ESD strap to the chassis as a ground. The ESD strap must be secured to your wrist and to ground throughout the procedure.

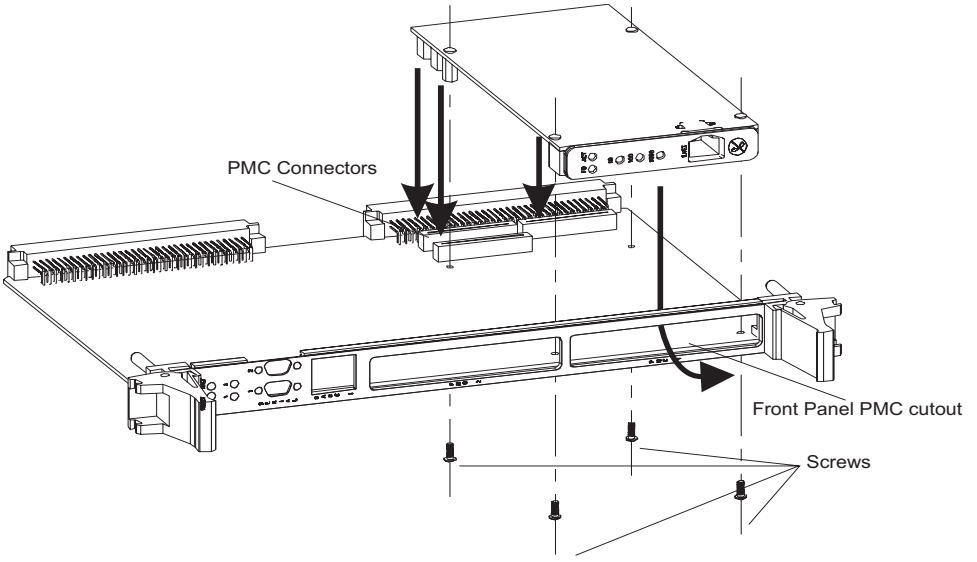


Figure 1-3. Installing the Gigabit Ethernet/82543 PMC Module on Host Board

2. Perform an operating system shutdown. Turn the AC or DC power off and remove the AC cord or DC power lines from the system. Remove the chassis or system cover(s) as necessary to gain access to the PMC module or host board.

3. Carefully remove the host board (either SBC or carrier card) from its card slot and place it on a clean and adequately protected working surface (preferably an ESD mat) with the backplane connectors facing you.

4. Remove PMC slot filler panels from front panel of the carrier card.

5. Remove the screws from the stand-offs on the Gigabit Ethernet/82543 PMC Module.
6. Identify the PMC slot on the carrier card and insert the PMC's bezel into the cutout on the front panel of the host module, as shown in Figure 1-3 on page 1-12.
7. Align the PMC module over the PMC slot connectors: P11, P12 and P13. Carefully press the PMC module into connectors. Ensure that standoffs of the module are seated into the mounting holes of the host board.
8. On the secondary side of the host board, fasten the four screws through the holes in the host board and the spacers. Tighten the screws.

The PMC module is now fully installed on the host board. Install the PMC and host board assembly in its proper card slot by following the procedures in *Installing a Board Module into the Chassis*.

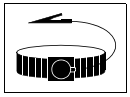
For details regarding connecting the Ethernet cable to the RJ–45 connector on the PMC Module front panel, refer to *Connecting the Ethernet Cable to the PMC Module* on page 1-15.

Installing a Board Module into the Chassis

This section describes a recommended procedure for installing a board module in a chassis.

Before you install your module, please read all cautions, warnings and instructions presented in this section and the guidelines explained in *Before You Install or Remove a Board* on page 1-6.

Use ESD



Wrist Strap

Handling modules and peripherals can result in static damage. Use a grounded wrist strap, static-dissipating work surface and antistatic containers when handling and storing components.

Caution

Insert the board by gently holding the injector levers - do not exert unnecessary pressure on the faceplate.

Hot swap compliant modules may be installed while the system is powered on. If a module is not hot swap compliant, you should remove power to the slot or system before installing the module. See *Understand Hot Swap* on page 1-8 for more information.

Refer to the Figure 1-4 and perform these steps when installing modules. Note that this illustration is for general reference only and may not accurately depict the connectors and handles on the board you are installing.

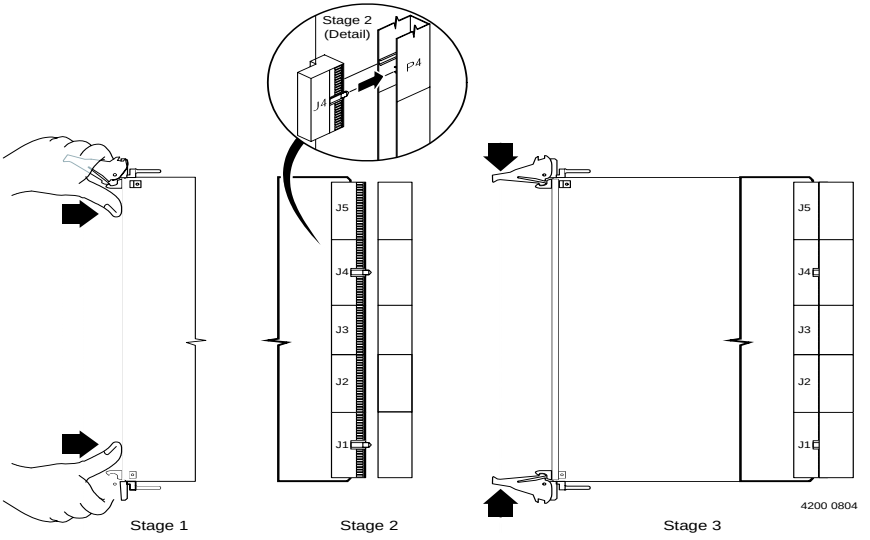


Figure 1-4. General Host Board Installation

1. Open the injector levers on your board (see *Recognize Different Injector/Ejector Lever Types* on page 1-9).
2. Verify the proper slot for the module you are inserting (see *Verify Slot Usage* on page 1-10). Align the edges of the module with the card cage rail guides in the appropriate slot.
3. Using your thumbs, apply equal and steady pressure as necessary to carefully slide the module into the card cage rail guides (Stage 1).

Continue to gently push until the prealignment guide pegs engage with the backplane connector (Stage 2) and the injector levers make contact with the chassis rails. ***DO NOT FORCE THE BOARD INTO THE BACKPLANE SLOT***.

4. Use the injector levers to seat the module in the slot by closing the levers until they latch into the locked position (Stage 3). If the levers do not completely latch, remove the module from the chassis and visually inspect the slot to ensure there are no bent pins.

Note: Install the PMC and host board assembly in its proper card slot. Ensure it is seated properly in the backplane connectors. Do not damage or bend connector pins.

---

5. When the module you are installing is completely latched, secure it by tightening the captive screws at both ends of the faceplate.
6. Replace the chassis or system cover(s) and connect the system to the AC or DC power source. Turn the equipment power on.

Connecting the Ethernet Cable to the PMC Module

Refer to Table 3-7 on page 3-10 for Ethernet connector pin assignments and to Figure 1-5 on page 1-16 for a diagram showing the location of the Ethernet connector on the PMC front panel.

1. Connect the Ethernet cable to the RJ–45 connector on the front panel of the PMC (see Figure 1-5 on page 1-16).

Warning

For continued safe operation, connect the PMC to Ethernet wiring only. Do not connect the PMC to telephone wiring.

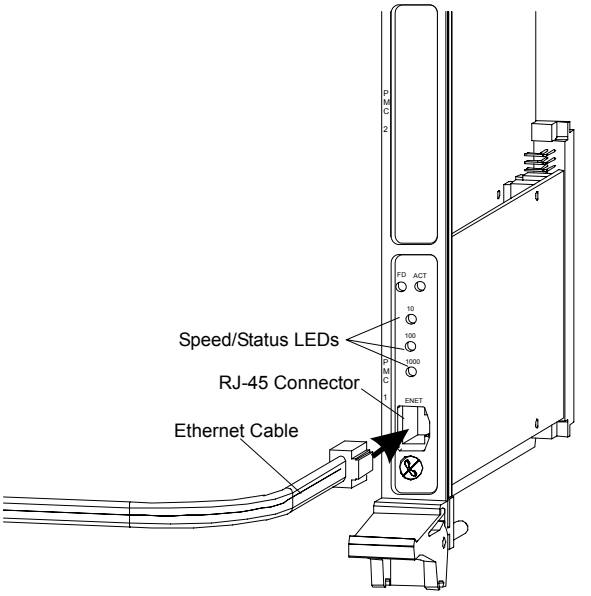


Figure 1-5. Connecting to the Network

2. Observe the appropriate green speed/status LED. The 10, 100, or 1000 Mb/s LED lights and stays lit when the PMC is connected to the network properly.
3. Verify that the PMC is operational in the network by using the ping, telnet/rlogin, and File Transfer Protocol (FTP) services of your Transmission Control Protocol/Internet Protocol (TCP/IP) environment.
   - To establish a valid 1000-Mb/s connection, connect an unshielded twisted pair (UTP) Category 5e cable either point-to-point or to a 1000 Base-Tx hub.
   - To establish a valid 100-Mb/s connection, connect a UTP Category 5 cable either point-to-point or to a 100 Base-Tx hub.
   - To establish a valid 10-Mb/s connection, connect a UTP Category 3, 4, or 5 cable either point-to-point or to a 10 Base-T hub.

Note: Auto-negotiation for speed and duplex is the default behavior for most network devices that support it. However, to ensure that you know how your network ports are operating, you should configure them explicitly for the correct speed and duplex for the connected device.

Removal of Gigabit Ethernet/82543 PMC Module from a Host Board

To remove a Gigabit Ethernet/82543 PMC Module from a host board (either SBC or carrier card), refer to Figure 1-3 on page 1-12 read all cautions and warnings and perform the following steps.

Damage to module components
Inserting or removing modules with power applied may result in damage to module components.
Therefore, ensure that you power down before inserting or removing the Gigabit Ethernet/82543 PMC Module module.

Damage to Board or electronic components
Avoid touching areas of integrated circuitry; static discharge can damage the circuits.
Therefore, before touching boards or electronic components, make sure that you are working in an ESD-safe environment.

1. Attach an ESD strap to your wrist. Attach the other end of the ESD strap to the chassis as a ground. The ESD strap must be secured to your wrist and to ground throughout the procedure.
2. Perform an operating system shutdown. Turn the AC or DC power off and remove the AC cord or DC power lines from the system. Remove the chassis or system cover(s) as necessary to gain access to the host board.

3. Carefully remove the host module from its card slot and place it on a clean and adequately protected working surface (preferably an ESD mat) with the secondary side of the board facing up.
4. Remove the four screws from the holes in the host board that fasten the Gigabit Ethernet/82543 PMC Module module to the host board.
5. Carefully turn the host board to the primary side and place on your working surface. Gently separate the Gigabit Ethernet/82543 PMC Module from the PMC connectors on the host board. Do not damage or bend connector pins.
6. Tilt the board up slightly and remove it from the front panel slot.

Functional Description 2

Introduction

This chapter describes the Gigabit Ethernet/82543 PMC Module on a feature and block diagram level. Figure 2-1 on page 2-2 shows a block diagram of the overall board architecture.

The following sections contain detailed descriptions of several blocks of circuitry.

Product Features

In addition to the features offered through Gigabit Ethernet technology, the Gigabit Ethernet/82543 PMC Module features the following:

- ❏ PMC form factor
- ❏ 32- or 64-bit bus operations at speeds of 33 or 66 MHz
- ❏ Data rate of 125 Mb/s in half-duplex mode and 250 Mb/s in full-duplex mode
- ❏ Standard RJ–45 connection
- ❏ Automatic speed selection
- ❏ 64 KB on-chip first-in/first-out (FIFO) data buffer for buffering receive and transmit frames
- ❏ 1000 BaseTx (1000 Mb/s) on UTP Category 5e cabling, 100 BaseTx (100 Mb/s) on UTP Category 5 cabling, and 10 BaseTx (10 Mb/s) on UTP Category 3, 4, or 5 cabling
- ❏ Support for full-duplex mode, increasing the aggregate maximum bandwidth up to 2000 Mb/s, 200 Mb/s, and 20 Mb/s
- ❏ Automatic media dependent interface (MDI) cross-over function for all modes of operation, including 100 BaseTx and 10 BaseTx

- ❏ Automatic polarity correction
- ❏ IEEE 802.3u auto-negotiation with next-page support for automatic speed and duplex configuration
- ❏ Front panel light emitting diode (LED) status indicators

Functional Components

Figure 2-1 shows a functional block diagram of the Gigabit Ethernet/82543 PMC Module. As the diagram shows, the key functional components are the Intel 82543GC Ethernet LAN Controller, the Marvell Alaska™ 88E1000 Gigabit Ethernet Transceiver chip, and serial electrically erasable programmable read-only memory (EEPROM).

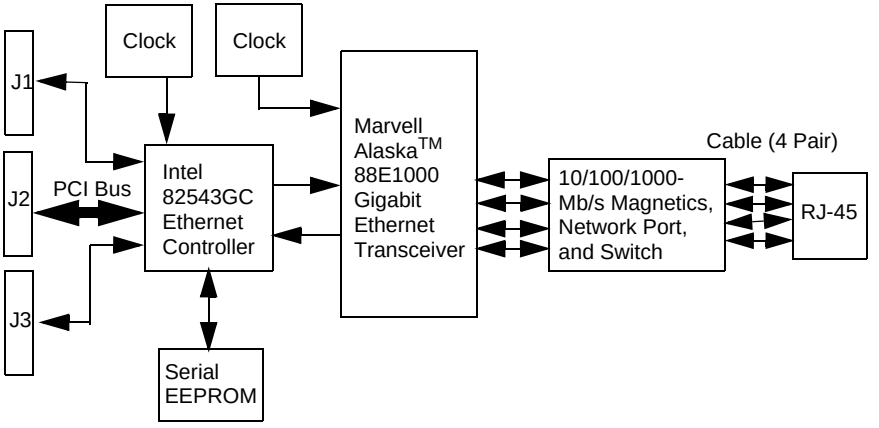


Figure 2-1. Functional Block Diagram

Intel 82543GC Ethernet LAN Controller

The Intel 82543GC Ethernet LAN Controller is a PCI bus controller that supports IEEE 802.3 10 Mb/s, IEEE 802.3u 100 Mb/s, and IEEE 802.3z and 802.3ab 1000 Mb/s data transfer rates. The controller is capable of operating at bus speeds of 33 or 66 MHz, using bus widths of 32 or 64 bits.

The controller interfaces to the PCI bus directly and supports the Media Independent Interface (MII) for 10/100 Mb/s operation and the Gigabit Media Independent Interface (GMII) for 10/100/1000 Mb/s operation. Other features of the controller include:

- ❏ Integration of the 10 Mb/s, 100 Mb/s, and 1000 Mb/s physical layer interfaces, which:
  - – Reduces the need for external support chips
  - – Provides full support for auto detection among network ports
  - – Improves performance
  - – Consumes less power
- ❏ Enhanced bus mastering capabilities
- ❏ High-speed data transfers over the PCI bus
- ❏ Processing of high-level commands and multiple operations, which lowers CPU utilization by off-loading communication tasks from the CPU
- ❏ A 64 KB on-chip FIFO data buffer that helps to prevent data underruns and overruns while waiting for bus access
- ❏ Operation in full- or half-duplex mode

Table 2-1 lists speed and duplex mode combinations supported by the controller with auto-negotiation enabled and disabled.

Table 2-1. Supported Mode Settings

Auto-Negotiation Enabled	Auto-Negotiation Disabled
1000 Mb/s, full duplex	1000 Mb/s is NOT supported
100 Mb/s, full duplex	100 Mb/s, full duplex
100 Mb/s, half duplex	100 Mb/s, half duplex
10 Mb/s, full duplex	10 Mb/s, full duplex
10 Mb/s, half duplex	10 Mb/s, half duplex

Note: Based on current errata to the *Intel 82543GC Gigabit Ethernet Controller Datasheet/Developer's Manual* (OR-2403), the 82543GC Ethernet controller:

- ❑ Requires that auto-negotiation be enabled for 1000 Mb/s operation
- ❑ Can operate at 1000 Mb/s only in full-duplex mode

Marvell Alaska 88E1000 Gigabit Ethernet Transceiver

The Marvell Alaska 88E100 Gigabit Ethernet Transceiver is the PMC's physical layer device. This integrated physical device supports 10BaseT, 100BaseT, and 1000BaseT applications with power dissipation lower than 2W. The device supports IEEE 802.3 compliant interfaces GMII and MII and supports IEEE 802.3u and 802.3ab auto-negotiation with next-page support. Together, the device's digital signal processor (DSP) architecture, mixed-signal processing, and digital design technology support features such as digital adaptive equalization, echo and cross-talk cancellation, and data recovery and error correction at a gigabit per second data rate.

For more information, see the product brief on the Marvell web site (http://www.marvell.com).

Serial EEPROM

A 1 KB serial EEPROM stores the PMC's Ethernet address and other configuration information. The Intel 82543GC Ethernet LAN Controller and its device driver use this information. The device driver for the controller gains access to the EEPROM through the control/status register (CSR). Routines are available for reading from and writing to the EEPROM.

For more information on the contents of the EEPROM, see the *PMC/Gigabit Ethernet/82543 Driver Development Information*. For more information on the Intel 82543GC Ethernet LAN Controller's read and write routines, see the *Intel 82543GC Gigabit Ethernet Controller Datasheet/Developer's Manual* (OR-2403).

Interrupt Request Line

The interrupt request (IRQ) line for the Gigabit Ethernet/82543 PMC Module is connected to PCI interrupt signal INTA.

Device Drivers

For information on supported device drivers for the Gigabit Ethernet/82543 PMC Module, see the *PMC/Gigabit Ethernet/82543 Supported Driver Information*. For information on programming drivers for the PMC, see the *PMC/Gigabit Ethernet/82543 Driver Development Information.*

Ethernet Address

A unique Ethernet address is assigned to the PMC's Ethernet port at the factory. For convenience, the address appears on a label on the back side of the card.

Regulatory Compliance

The Gigabit Ethernet/82543 PMC Module complies with the following:

- ❏ FCC Class A
- ❏ CISPR-22 Class A
- ❏ CE Mark Class A
- ❏ UL/cUL Recognized Component

Controls, Indicators and Connector Pin Assignments

3

Introduction

This chapter provides details of controls, indicators as well as connector pin assignments for all connectors on the Gigabit Ethernet/82543 PMC Module. The following connectors on the Gigabit Ethernet/82543 PMC Module, are described:

Bezel Connector and LEDs

Figure 3-1 on page 3-2 shows the connector and LEDs on the PMC's front bezel. Table 3-1 on page 3-2 describes these components.

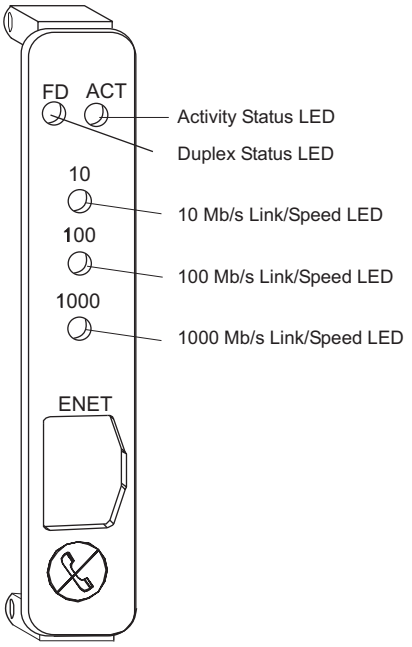


Figure 3-1. Bezel Connector and LEDs

Table 3-1. Bezel Connector and LEDs

Label	Component	Description
ACT	Activity status LED	An amber LED. ON indicates receive (RX) and transmit (TX) network activity is occurring. OFF indicates no network activity.
FD	Duplex status LED	An green LED. ON indicates that full duplex mode is enabled and OFF indicates that half duplex mode is enabled.
10	10 Mb/s	A green LED. ON indicates 10 Mb/s mode is selected and a CD signal has been detected.

Table 3-1. Bezel Connector and LEDs (Continued)

Label	Component	Description
100	100 Mb/s	A green LED. ON indicates 100 Mb/s mode is selected and a CD signal has been detected.
1000	1000 Mb/s	A green LED. ON indicates 1000 Mb/s mode is selected and a CD signal has been detected.
ENET	Connector	A standard RJ–45 connector.

Note: Based on current errata to the Intel 82543GC Gigabit Ethernet Controller Datasheet/Developer's Manual (OR-2403), the 82543GC Ethernet controller:

- ❏ Requires that auto-negotiation be enabled for 1000 Mb/s operation
- ❏ Can operate at 1000 Mb/s only in full-duplex mode

J1 and J2 PCI Bus Connectors

Table 3-2 on page 3-4 and Table 3-3 on page 3-5 identify the 32-bit J1 and J2 PCI bus connector pin assignments, respectively. Table 3-4 on page 3-6 defines the signals associated with the connector pins.

Note: An asterisk (*) in a signal name indicates that the signal is active low.

Table 3-2. J1 PCI Bus Connector Pin Assignments

Pin	Signal	Signal	Pin
1	TCK	-12V	2
3	GND	INTA*	4
5	INTB*	INTC*	6
7	BUSMODE1*	+5V	8
9	INTD*	NC	10
11	GND	NC	12
13	CLK	GND	14
15	GND	GNT*	16
17	REQ*	+5V	18
19	V(I/O)	AD31	20
21	AD28	AD27	22
23	AD25	GND	24
25	GND	C/BE3*	26
27	AD22	AD21	28
29	AD19	+5V	30
31	V(I/O)	AD17	32
33	FRAME*	GND	34
35	GND	IRDY*	36
37	DEVSEL*	+5V	38
39	GND	LOCK*	40
41	SDONE*	SBO*	42
43	PAR	GND	44
45	V(I/O)	AD15	46
47	AD12	AD11	48
49	AD09	+5V	50
51	GND	C/BE0*	52
53	AD06	AD05	54
55	AD04	GND	56

Table 3-2. J1 PCI Bus Connector Pin Assignments (Continued)

Pin	Signal	Signal	Pin
57	V(I/O)	AD03	58
59	AD02	AD01	60
61	AD00	+5V	62
63	GND	REQ64*	64

Table 3-3. J2 PCI Bus Connector Pin Assignments

Pin	Signal	Signal	Pin
1	+12V	TRST*	2
3	TMS	TDO	4
5	TDI	GND	6
7	GND	NC	8
9	NC	NC	10
11	BUSMODE2*	+3.3V	12
13	RST*	BUSMODE3*	14
15	+3.3V	BUSMODE4*	16
17	NC	GND	18
19	AD30	AD29	20
21	GND	AD26	22
23	AD24	+3.3V	24
25	IDSEL	AD23	26
27	+3.3V	AD20	28
29	AD18	GND	30
31	AD16	C/BE2*	32
33	GND	NC	34
35	TRDY*	+3.3V	36
37	GND	STOP*	38
39	PERR*	GND	40
41	+3.3V	SERR*	42

Table 3-3. J2 PCI Bus Connector Pin Assignments (Continued)

Pin	Signal	Signal	Pin
43	C/BE1*	GND	44
45	AD14	AD13	46
47	GND	AD10	48
49	AD08	+3.3V	50
51	AD07	NC	52
53	+3.3V	NC	54
55	NC	GND	56
57	NC	NC	58
59	GND	NC	60
61	ACK64*	+3.3V	62
63	GND	NC	64

Table 3-4. J1 and J2 PCI Bus Connector Signal Definitions

Signal	Definition
+3.3V	+3.3 V power supply
+5V	+5 V power supply
–12V	–12 V power supply
+12V	+12 V power supply
ACK64*	Acknowledge 64-bit transfers
AD<31:0>	PCI address lines
BUSMODE<4:1>*	Indicates the presence of a card in a given slot and sets the logical protocol of the bus
C/BE<3:0>*	PCI bus command and byte enable control and status
CLK	PCI I/O clock signals
DEVSEL*	PCI device select signals
FRAME*	PCI data block transfer control signal
GND	Ground
GNT*	PCI bus mastering grant signal
IDSEL	Logical slot ID signal

Table 3-4. J1 and J2 PCI Bus Connector Signal Definitions (Continued)

Signal	Definition
INTA*, INTB*, INTC*, INTD*	PCI device interrupt request signal
IRDY*	PCI device initiator ready signal
LOCK*	PCI data exchange bus control line signal
NC	No connection
PAR	Parity validation signal
PERR*	PCI data and address parity error signal
REQ*	PCI bus mastering request signal
REQ64*	64-bit transfer request signal
RST*	PCI I/O reset signal
SBO*	Snoop backoff
SDONE*	Snoop done
SERR*	PCI system error signal
STOP*	PCI device data transfer stop signal
TCK	Test clock
TDI	JTAG, test data input
TDO	JTAG, test data output
TMS	TMS Test mode select
TRDY*	Target ready
TRST*	JTAG, test reset
V(I/O)	Voltage I/O source

J3 PCI Bus Connector

Table 3-5 on page 3-8 identifies the 32-bit J3 PCI bus connector pin assignments, respectively. Table 3-6 on page 3-9 defines the signals associated with the connector pins.

Note: An asterisk (*) in a signal name indicates that the signal is active low.

Table 3-5. J3 PCI Bus Connector Pin Assignment

Pin	Signal	Signal	Pin
1	NC	GND	2
3	GND	C/BE7*	4
5	C/BE6*	C/BE5*	6
7	C/BE4*	GND	8
9	V(I/O)	PAR64	10
11	AD63	AD62	12
13	AD61	GND	14
15	GND	AD60	16
17	AD59	AD58	18
19	AD57	GND	20
21	V(I/O)	AD56	22
23	AD55	AD54	24
25	AD53	GND	26
27	GND	AD52	28
29	AD51	AD50	30
31	AD49	GND	32
33	GND	AD48	34
35	AD47	AD46	36
37	AD45	GND	38
39	V(I/O)	AD44	40
41	AD43	AD42	42
43	AD41	GND	44
45	GND	AD40	46
47	AD39	AD38	48
49	AD37	GND	50

Table 3-5. J3 PCI Bus Connector Pin Assignment (Continued)

Pin	Signal	Signal	Pin
51	GND	AD36	52
53	AD35	AD34	54
55	AD33	GND	56
57	V(I/O)	AD32	58
59	NC	NC	60
61	NC	GND	62
63	GND	NC	64

Table 3-6. J3 PCI Bus Connector Signal Definitions

Signal	Definition
AD<63:32>	PCI address lines
C/BE<7:4>*	PCI bus command and byte enable control and status
GND	Ground
PAR64	Parity validation signal
V(I/O)	Voltage I/O source

RJ-45 Ethernet Connector

The RJ–45 Ethernet connector resides on the PMC's bezel. Figure 3-2 on page 3-9 shows the pin layout for the RJ–45 Ethernet connector (pin side up). Table 3-7 on page 3-10 lists the connector pin assignments and Table 3-8 on page 3-10 lists the signal definitions.

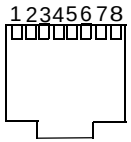


Figure 3-2. RJ–45 Ethernet Connector Pin Layout

Table 3-7. RJ–45 Ethernet Connector Pin Assignments

Pin	Wire Color	Signal
1	White/Green	Data A+
2	Green/White	Data A–
3	White/Orange	Data B+
4	Blue/White	Data C+
5	White/Blue	Data C–
6	Orange/White	Data B–
7	White/Brown	Data D+
8	Brown/White	Data D–

Table 3-8. RJ-45 Ethernet Connector Signal Definitions

Pin	Signal
Data *x*+	Transmit/receive positive signal
Data *x*–	Transmit/receive negative signal

Cross-Over Cable Connector (10/100 Mb/s Only)

To connect two systems back-to-back, you must use a cross-over cable or a network hub. Table 3-9 lists the connections for creating a cross-over cable.

Table 3-9. Cross-Over Cable Connections

Connector 1 Pin	Wire Color	Signal	Connector 2 Pin
1	White/Green	Transmit+	3
2	Green/White	Transmit–	6
3	White/Orange	Receive+	1
4	Blue/White	No connection	4

Table 3-9. Cross-Over Cable Connections (Continued)

Connector 1 Pin	Wire Color	Signal	Connector 2 Pin
5	White/Blue	No connection	5
6	Orange/White	Receive–	2
7	White/Brown	No connection	7
8	Brown/White	No connection	8

Loopback Connector (10/100 Mb/s Only)

You can create a loopback connector with a plug by connecting the pins listed in Table 3-10.

Table 3-10. Loopback Connections

Connect Pin...	Signal	To Pin...	Signal
1	Transmit+	3	Receive+
2	Transmit–	6	Receive–

Troubleshooting A

Error List

This appendix provides a hint list for detecting erroneous system configurations and any untoward or unusual behavior of the Gigabit Ethernet/82543 PMC Module. It cannot replace a serious and sophisticated pre- and post-sales support during application development.

If it is not possible to fix a problem using the Error List provided, contact your local sales representative or FAE for further support.

Note: Table 3-1 on page A-2 assumes that the computer was operating properly before you began the installation process and that the self-test was successful.

Table 3-1. Troubleshooting an Installation

Problem	Probable Cause	Corrective Action
A speed/status LED flashes green and does not change to solid green when the cable is connected.	The cable connecting to the PMC or the PMC connection is faulty.	Verify the integrity of the cable and cable connection. If the cable is defective, replace it. Verify that the cable has been connected between transmit to receive and receive to transmit. **Note:** Point-to-point system connections require a cross-over cable.
The speed/status LED flashes green and does not change to solid green when the cable is connected.	The PMC is faulty.	For 10 Mb/s and 100 Mb/s connections, connect a loopback connector and observe the results: If the speed/status LED changes to solid green (does not flash), a problem exists with the cable or the concentrator. If the speed/status LED flashes green, replace the PMC. If no loopback connector is available, test the concentrator. If the concentrator is functional, replace the PMC.
The 1000 Mb/s mode has been selected, but the 1000 Mb/s LED is not lit.	A carrier detect (CD) signal could not be detected because the network cable is loose, disconnected, or connected to a device that does not support 1000 Mb/s mode.	Check that the network cable is connected to the network port, that the connection is secure, and that the connected device supports 1000 Mb/s mode.

Table 3-1. Troubleshooting an Installation (Continued)

Problem	Probable Cause	Corrective Action
The 100 Mb/s mode has been selected, but the 100 Mb/s LED is not lit.	A CD signal could not be detected because the network cable is loose, disconnected, or connected to a device that does not support 100 Mb/s mode.	Check that the network cable is connected to the network port, that the connection is secure, and that the connected device supports 100 Mb/s mode.
The Ethernet speed does not change automatically.	Operating system settings are not set correctly.	Check whether the operating system setting for the Ethernet speed is 10, 100, or 1000 Mb/s or is set for automatic speed selection. Configure network ports explicitly for the correct speed and duplex for the connected device.
The PMC is preventing the system from operating correctly.	The network cable is loose.	Secure the cable.
	The PMC is faulty.	Disconnect the network cable from the PMC. Turn off the system, re-seat the PMC, and turn the system on again. If the problem persists, contact your system administrator or authorized Motorola distributor.
	A conflict exists with another module.	Enable the PMC slot for bus mastering. Check that the slot is enabled.

Specifications

This appendix provides general specifications including mechanical, environmental and electrical for the Gigabit Ethernet/82543 PMC Module.

Safety Compliance

The Gigabit Ethernet/82543 PMC Module is a UL listed accessory.

This equipment is to be used only with products that are certified by an internationally recognized safety organization (for instance, UL or CSA).

Physical Requirements

The Gigabit Ethernet/82543 PMC Module measures 149 mm by 74 mm and is constructed using six-layer circuit board technology with four signal layers and two power/ground layers. The PMC uses 32- and 64-bit PCI bus connectors.

The PMC must be installed on a host module (for example, an SBC or carrier card) that has an available PMC slot with a removable front panel slot cover. Table 3-1 gives the physical specifications of the Gigabit Ethernet/82543 PMC Module.

Table 3-1. Physical Specifications

Characteristic	Specification
Form factor	Single PMC
PMC conformance	IEEE P1386.1/Draft 2.0
PCI interface	32- or 64-bit, 33 or 66 MHz master and slave PCI
PCI controller	Intel 82543GC
Protocols	Ethernet 10 BaseTx, 100 BaseTx, 1000 BaseTx

Table 3-1. Physical Specifications (Continued)

Receive/transmit FIFO	64 KB
Front panel I/O access	RJ-45 connector
LED indicators	Duplex, activity, and speed
Dimensions	74 mm x 149 mm

Power Requirements

Caution

Damage of PMC Module

The **PMC Standard VITA 32 - 2003**, Revision 1.0a, specifies a maximum total power consumption of 5.15W per PMC module. The Gigabit Ethernet/82543 PMC Module in its standard configuration may exceed this value.

Therefore, it is necessary to synchronize the base board's power supply with the Gigabit Ethernet/82543 PMC Module power requirements. Due to the high power dissipation, forced air-cooling is necessary.

Caution

Damage of power supply circuits

The power supply circuits on the carrier card may be overloaded if more than one Gigabit Ethernet/82543 PMC Module module is assembled. This results in permanent damage to the carrier card.

Therefore, make sure that the carrier card's 3.3V and 5V supply supports the power requirements as described in Table 3-2.

The current requirement for one PMC module is:

- ❏ 3.3V Rail : 1.56A typical
- ❏ 5V Rail : NA

This results in a typical total power consumption of 5.15W. However, the carrier card should be able to provide maximum current requirements as given below:

- ❏ 3.3V Rail : 1.73A maximum

- 5V Rail : 0.4mAmp maximum

The power requirement of the Gigabit Ethernet/82543 PMC Module, which is supplied by the carrier card, is detailed below in Table 3-2.

Table 3-2. Power Requirements

Requirement	Value
Maximum power	5.71W
Maximum DC amps (+3.3 V)	1.73A

Caution

When you add PMCs to your system, verify that the combined power (wattage) required for the PMCs does not exceed the system's power supply rating. Refer to your computer system documentation for this information.

Environmental Requirements

The Gigabit Ethernet/82543 PMC Module features the industry-standard PMC form factor. The PMC module must be placed on a carrier card.

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

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

Caution

Board Damage
Do not operate the product outside the specified environmental limits. High humidity, temperature and condensation may cause short circuits.

Therefore, ensure that the product is completely dry and there is no moisture on any surface before applying power.

Table 3-3 lists environmental requirements for the Gigabit Ethernet/82543 PMC Module.

Table 3-3. Environmental Requirements

Characteristic	Specification
Temperature range (at sea level)	Operating : 0°C to 55°C (32°F to 158°F) Nonoperating : -40°C to 85°C (-40°F to 185°F)
Temperature change	Operating : ±0.5°C (33°F) per minute Nonoperating : ±1.0°C (34°F) per minute
Air flow	200 linear feet per minute (LFM)
Relative humidity	Operating : 5% to 95% @ 40°C (104°F) to 55°C (131°F) — noncondensing Nonoperating : 5% to 95% @ 40°C (104°F) to 55°C (131°F) — noncondensing
Altitude	Operating : -300 m to +3000 m Nonoperating : -300 m to +13000 m
Shock	Operating : 5 G / 11 ms halfsine — applied once in either direction of three orthogonal axes Nonoperating : 15 G / 11 ms halfsine — applied once in either direction of three orthogonal axes
Vibration	Operating : 10 to 15 Hz, 2 mm amplitude — 15 to 150 Hz, 2G Nonoperating : 10 to 15 Hz, 5 mm amplitude — 15 to 150 Hz, 5G
Free fall	Operating : 100 mm / 3 axis Nonoperating : 1200 mm / all edges and corners
Radiated emissions	FCC Class A, CISPR-22 Class A (dated 1998), CISPR-24 (dated 1998), CE Mark Class A, UL/cUL Recognized Component

EMC Compliance

The Gigabit Ethernet/82543 PMC Module is an add-on module meant to be used in conjunction with standard SBC or carrier card. As such, it is the responsibility of the OEM to meet the regulatory guidelines as determined by their application.

The Gigabit Ethernet/82543 PMC Module has been tested in conjunction with a standard Embedded Communications Computing baseboard and chassis for CE certification and meets the requirements for EN55022 Class A equipment. Compliance was achieved under the following conditions:

- ❏ Shielded cables on all external I/O ports
- ❏ Cable shields connected to earth ground via metal shell connectors bonded to a conductive module front panel
- ❏ Conductive chassis rails connected to earth ground which provides the path for connecting shields to earth ground
- ❏ Front panel screws properly tightened

For minimum RF emissions, it is essential that the conditions above be implemented. Failure to do so could compromise the EMC compliance of the equipment containing the module.

Related Documents

C

Embedded Communications Computing Documents

The Motorola publications listed below are referenced in this manual. You can obtain electronic copies of Embedded Communications Computing publications by:

- ❏ Contacting your local Motorola sales office
- ❏ Visiting Embedded Communications Computing's World Wide Web literature site, http://www.motorola.com/computer/literature

Table C-1. Embedded Communications Computing Documentation

Document Title	Motorola Publication Number
PMC/Gigabit Ethernet/82543 Driver Development Information	214135
PMC/Gigabit Ethernet/82543 Supported Driver Information	214136

To obtain the most up-to-date product information in PDF or HTML format, visit http://www.motorola.com/computer/literature.

Manufacturers' Documents

Table C-2 lists the manufacturers' data sheets and other useful manuals. Please note that in many cases, the information is preliminary and the revision levels of the documents are subject to change without notice.

Table C-2. Manufacturers' Documents

Document Title and Source	Publication Number
Intel 82543GC Gigabit Ethernet Controller 82543GC Gigabit Ethernet Controller Datasheet OR-2710 82543GC Gigabit Ethernet Controller Developer's Manual http://www.intel.com	Not Available
Alaska™ 88E1000/88E1000S Integrated 10/100/1000 Gigabit Ethernet Transceiver Datasheet http://www.marvell.com/	MV-S100153-00

Related Specifications

This table lists the product's related specifications. The appropriate source for the listed document is also provided. Please note that in many cases, the information is preliminary and the revision levels of the documents are subject to change without notice.

Table C-3. Related Specifications

Document Title and Source	Publication Number
IEEE http://standards.ieee.org/catalog/	
IEEE - Common Mezzanine Card Specification (CMC) Institute of Electrical and Electronics Engineers, Inc.	P1386 Revision 2.0
IEEE - PCI Mezzanine Card Specification (PMC) Institute of Electrical and Electronics Engineers, Inc.	P1386.1 Revision 2.0

Table C-3. Related Specifications (Continued)

Document Title and Source	Publication Number
IEEE Standard for Local Area Networks: Carrier Sense Multiple Access with Collision Detection (CSMA/CD) Access Method and Physical Layer Specifications Institute of Electrical and Electronics Engineers, Inc.	IEEE 802.3
PCI Industrial Manufacturers Group (PICMG) http://www.picmg.com/	
Peripheral Component Interconnect (PCI) Local Bus Specification, Revision 2.0, 2.1, 2.2	PCI Local Bus Specification
Embedded PCI-X (ePCI-X) for Standard Form Factor PCI Specification	PICMG 1.2 R1.0
Electronic Industries Alliance http://www.eia.org/	

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