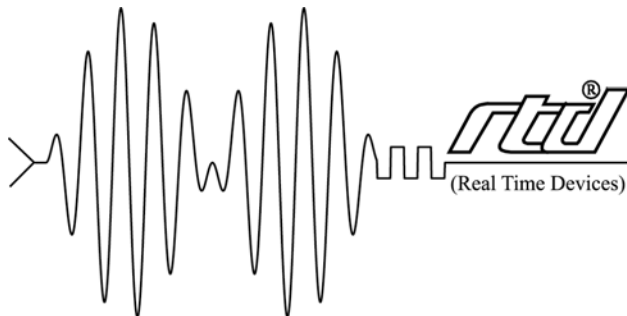


**CM9222ER & CM17222ER
Dual UTP Gigabit Ethernet
PCI/104-Express & PC/104-Plus
utilityModule™**

User's Manual



RTD Embedded Technologies, Inc.

"Accessing the Analog World"®

BDM-610020069

Rev. B

CM9222ER & CM17222ER
Dual UTP Gigabit Ethernet
PCI/104-Express & PC/104-Plus
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Chapter 1 INTRODUCTION

This manual gives information on the CM9222 (PCI/104-Express) and CM17222 (PC/104-Plus) Dual Gigabit Ethernet utilityModule™. This module provides two (2) independent Ethernet connections. Each channel is capable of operating through a standard RJ-45 connector.

Features

General Features

- Two Independent Gigabit Ethernet Connections.
- Auto-negotiate 10/100/1000 Mbps on each channel
- Intel® 82575EB Gigabit Ethernet Controller
- Preboot eXecution Environment (PXE) enables system to boot up via the LAN.
- Wake on LAN support with packet recognition.
- Multi-color LED to monitor link status, speed, and activity.
- Auto-crossover for MDI/MDI-X
- Smart Speed reduces speed for bad cabling

Gigabit MAC/PHY Advanced Features

- Intel® I/O Acceleration Technology (Intel® I/OAT) accelerates TCP I/O for improved CPU utilization.
- MSI-X support minimizes the overhead of interrupts and allows load balancing of interrupt handling between cores/CPUs.
- Mechanism available for reducing interrupts generated from Tx/Rx operations to maximize system performance and throughput.
- Dual 48 kB configurable Rx and Tx FIFO buffers means no external FIFO memory requirements.
- Support for transmission and reception of jumbo frames up to 9.5kBytes enables higher and better throughput of data.
- IEEE 802.3 compliant flow-control support with software-controllable pause times and threshold values to reduce frame loss from receive overruns.
- Built-in cable diagnostics and adjustments for cable faults for improved end-user troubleshooting and tolerance of common wiring faults.

Host Offloading Features

- Direct Cache Access (DCA) enables the I/O device to activate a pre-fetch engine in the CPU that loads the data into the CPU cache before use, eliminating cache misses and reducing CPU load.
- Checksum offloading, segmentation offloading, and packet filtering capabilities lower processor utilization.
- IEEE 802.1q virtual local area network (VLAN) support with VLAN tag insertion, stripping and packet filtering for up to 4096 VLAN tags allows creation of multiple VLAN segments.

Electrical Specifications

- CM9222 Bus Connections
 - Compatible with *PCI Express™ Base Specification Revision 1.1*
 - Compatible with *PC/104-Express™ Specification Revision 1.0*
 - PCI Express x1 Connection
- CM17222 Bus Connections
 - Compatible with *PCI Local Bus Specification Revision 3.0*
 - Compatible with *PC/104-Plus™ Specification Revision 2.3*
 - PCI Connection
- Only requires +5VDC power
- Power Consumption: 3.0 W typical*

Mechanical Specifications

- PCB Dimensions: 3.6 x 3.8 x 0.6" (90 x 96 x 16 mm)
- Weight (mass): 0.22 lbs. (0.10 Kg)

Environmental

- Operating Temperature: 0° to 70° C, 90% Humidity non-condensing
- Storage Temperature: -55° to 125°

* Typical power consumption is defined as both Ethernet connections plugged into a network with moderate background activity.

Chapter 2 CONNECTING THE UTILITYMODULE™

Finding Pin 1 of Connectors

The three possible ways to determine pin 1 on the connectors are:

1. A square white area silk-screened on the PC board
2. A square solder pad visible on the bottom of the PC board
3. A numeral 1 silk-screened near pin 1 on the top of the PC board

Connector Locations-CM9222

The figures below show the switch and connector locations for the CM9222.

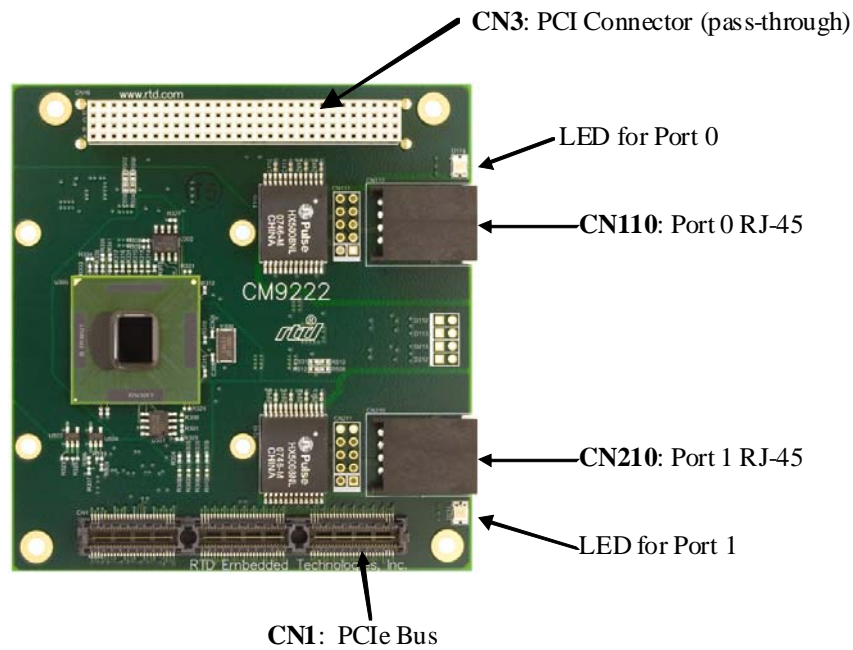


Figure 1: Component Locations on CM9222

List of Connectors-CM9222

Connector	Function	Type
CN1, CN2	PCIe Bus Connector	156 pins
CN3	PCI Bus Connector (pass-through)	120 pins
CN110	Port 0 UTP	RJ-45
CN210	Port 1 UTP	RJ-45

Table 1: List of Connectors

Connector Locations-CM17222

The figures below show the switch and connector locations for the CM17222.

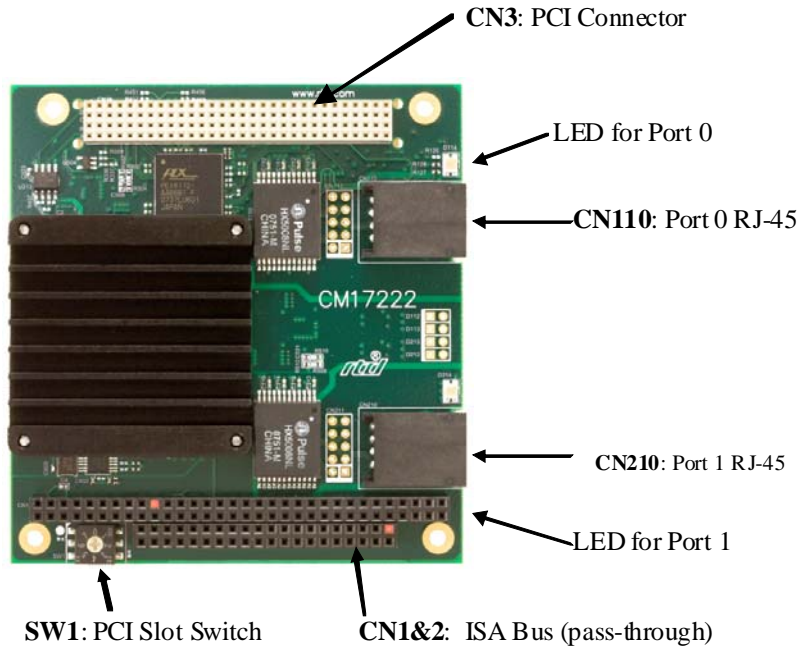


Figure 2: Component Locations on CM17222

List of Connectors and Switches-CM17222

Connector	Function	Type
CN1, CN2	ISA Bus Connector (pass-through)	156 pins
CN3	PCI Bus Connector	120 pins
CN110	Port 0 UTP	RJ-45
CN210	Port 1 UTP	RJ-45
SW1	Selects PCI Slot position	Rotary Switch

Table 2: List of Connectors and Switches

PC/104 ISA Connectors, CN1 and CN2-CM17222

Connector CN1 and CN2 carry the signals of the PC/104-Plus ISA bus. Refer to PC/104-Plus Specification Revision 1.0 for the pinout of this connector. This is a pass-through connector. The CM17222 connects to the power and ground pins only, and does not use any of the signals.

PC/104-Express Bus Connectors, CN1 and CN2-CM9222

Connectors CN1 and CN2 provide the PC/104 Express bus connections. CN1 is on the top, and CN2 is on the bottom. Refer to the PC/104-Express™ Specification Revision 1.0 for the pinout of these connectors.

The CM9222 connects to one of the PCIe x1 links on the PCIe bus connector, and passes through the x16 link. It will automatically detect the direction to the host, so it can be stacked above or below the CPU.

PC/104-Plus PCI Connector, CN3

Connector CN3 carries the signals of the PC/104-Plus PCI bus. Refer to PC/104-Plus™ Specification for the pinout of this connector. The CM9222 connects to the power and ground pins only, and does not use any of the signals. The CM17222 uses this connector for communication with the CPU.

PCI Slot Switch, SW1 (CM17222)

The CM17222 has an eight position rotary switch which supports 4 bus master configurations. The PCI Slot Number can be configured as follows:

Switch Position	PCI Slot Number	Bus Master
0	Slot 0 (closest to CPU)	<i>4 bus master configuration</i>
1	Slot 1	
2	Slot 2	
3	Slot 3	
4	<i>Slot 0</i>	<i>4 bus master configuration</i>
5	<i>Slot 1</i>	
6	<i>Slot 2</i>	
7	<i>Slot 3</i>	

Wake Support

Support for Power Management Event (PME) reporting was added in Revision 2.3 of the PC/104-Plus Specification. The CM17222 takes advantage of the signals that were added to support Wake-On-LAN. Several events are supported, including wake on Magic Packet, Directed Packet, and Link. Support for Wake-On-LAN is dependant on the CPU supporting PME reporting. (The CM9222 also supports the same wake events).

RJ45 Twisted Pair Ethernet, CN110 and CN210

Connector CN110 and CN210 is for UTP (Unshielded Twisted Pair) wiring normally used for 10/100/1000 Base-T Ethernet. It is the default factory installed twisted pair connector on the board.

The following table gives the pinout of CN110 and CN210.

Pin	1000 Function	10/100 Function
1	MDI_A+	Transmit +
2	MDI_A-	Transmit -
3	MDI_B+	Receive +
4	MDI_C+	Not Used
5	MDI_C-	Not Used
6	MDI_B-	Receive -
7	MDI_D+	Not Used
8	MDI_D-	Not Used

Table 3: RJ45 Signal Assignments

CN110 and CN210 are standard female RJ-45 connectors. The figure below shows the pin numbering when **looking into the connector**:

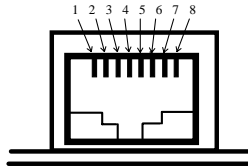


Figure 3: RJ-45 Jack Connector

Twisted Pair Ethernet, CN111 and CN211

CN111 and CN211 are optional connectors which can be factory installed in place of the RJ45 connector. This connector is not installed when the RJ45 connector is installed

Pin	1000 Function	10/100 Function	RJ-45 Pin
1	MDI_B+	Receive +	3
2	MDI_B-	Receive -	6
3	MDI_C+	Not Used	4
4	MDI_C-	Not Used	5
5	MDI_A+	Transmit +	1
6	MDI_A-	Transmit -	2
7	MDI_D+	Not Used	7
8	MDI_D-	Not Used	8
9	Shield Ground		
10	Shield Ground		

Table 4: DIL Signal Assignments

Status LEDs

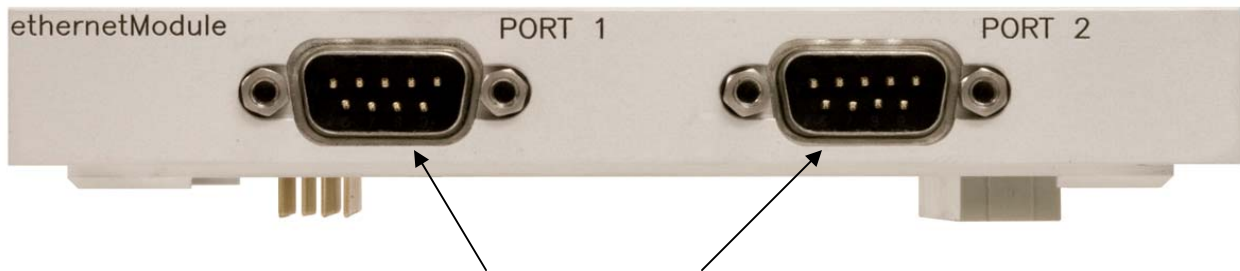
The LEDs on the board are used to indicate status of the Ethernet ports.

LED	Description
Off	No Link
Blue	Link at 1000 Mbps
Green	Link at 100 Mbps
Red	Link at 10 Mbps
Blink	Activity

Table 5: Status LEDs

Chapter 3 **CONNECTING THE IDAN UTILITYMODULE™**

This utilityModule is also available in an IDAN configuration. The IDAN module is shown below.



9 pin “D”: male

Module Part#: Adam Tech DE09PD

Mating Part#: Adam Tech DE09SD

Twisted Pair Ethernet, PORT1 and PORT2

As an IDAN, the Ethernet signals are available on a male, DB-9 connector. A DB-9 to RJ-45 adapter is also included for each port.

DB-9 Pin	1000 Function	10/100 Function	RJ-45 Pin
1	MDI_B+	Receive +	3
2	MDI_C+	Not Used	4
3	MDI_A+	Transmit +	1
4	MDI_D+	Not Used	7
5	Shield Ground		
6	MDI_B-	Receive -	6
7	MDI_C-	Not Used	5
8	MDI_A-	Transmit -	2
9	MDI_D-	Not Used	8

Chapter 4 INSTALLING THE UTILITYMODULE™

WARNING!

Like all equipment using CMOS devices, the CM9222/CM17222 must be protected from static discharge. Never touch any of the parts except at static-free workstation. Use anti-static bag shipped with the CM9222/CM17222 to handle the board

The following sections contain information on configuring the CM9222/CM17222 PC/104-Express Ethernet utilityModule™. **Please read the entire section** before attempting to use the utilityModule™!

Recommended Procedure

We recommend you follow the procedure below to ensure the stacking of the modules does not damage connectors or electronics.

- 0 Turn off power to the PC/104 system or stack.
- 1 Select and install standoffs to properly position the utilityModule™ on the PC/104 stack.
- 2 Touch a grounded metal part of the stack to discharge any buildup of static electricity.
- 3 Remove the utilityModule™ from its anti-static bag.
- 4 Hold the utilityModule™ by its edges and orient it so that the bus connector pins line up with the matching connector pins on the stack.
- 5 Gently and evenly press the utilityModule™ onto the PC/104-*Plus* stack.

CAUTION: Do not force the module onto the stack! Wiggling the module or applying too much force may damage it. If the module does not readily press into place, remove it, check for bent pins or out-of-place keying pins, and try again.

Chapter 5 USING THE UTILITYMODULE™

Ethernet Boot

The CM9222/CM17222 support Ethernet boot. This allows the CPU to request a boot image from a server, negating the need to have any bootable media directly attached to the system. The ability to use Ethernet Boot is dependant on the BIOS of the CPU, and the boot order is controlled by the BIOS on the CPU. The CM9222/CM17222 comes with a PXE boot agent installed. Other boot agents, including iSCSI, and the programming utilities are available from Intel's website, www.intel.com. Contact RTD technical support for more information.

Driver Support

For Windows XP/Vista, the CM9222/CM17222 is supported by an Ethernet driver provided by Intel. A copy of this driver is provided on the companion CD that is shipped with the board, and may also be downloaded from the RTD web site (www.rtd.com). It is recommended that you frequently check the RTD web site for updated documentation and drivers.

Under Linux, the Ethernet controller is supported via the *igb* kernel module that is included in Linux kernels 2.6.25 or later. Most modern desktop Linux distributions will automatically detect the Ethernet controller and load the necessary drivers. Contact the vendor of your Linux distribution for more information.

For other operating systems, the CM9222/CM17222 may be natively supported. Many operating systems include support for the Intel 82575EB PCI Ethernet controller, which the CM9222/CM17222 is based on. Your operating system vendor should be able to provide the necessary information.

Chapter 6 **ADDITIONAL INFORMATION**

Ethernet Controller

For more information on the Ethernet Controller used on the CM9222/CM17222, refer to the following documents from Intel:

- Intel 82575EB Datasheet

This document may be downloaded from Intel's web site (www.intel.com).

Chapter 7 TECHNICAL SUPPORT AND WARRANTY

Getting Technical Support

For help with this product, or any other product made by RTD, you can contact RTD Embedded Technologies via the following methods:

- Phone: +1-814-234-8087
- E-Mail: techsupport@rtd.com

Be sure to check the RTD web site (<http://www.rtd.com>) frequently for product updates, including newer versions of the board manual and application software.

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