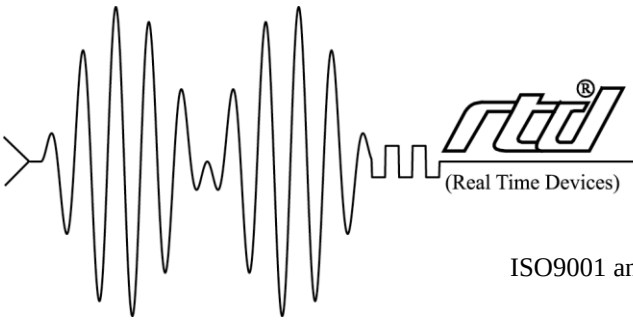
CM17215HR 100Mb/s Fiber
CM17212HR 10/100Mb/s UTP
PC/104-*Plus* Dual Ethernet
utilityModule™

User's Manual



RTD Embedded Technologies, Inc.
"Accessing the Analog World"®

ISO9001 and AS9100 Certified

BDM-610020066
Rev. E

CM17215HR 100Mb/s Fiber
CM17212HR 10/100Mb/s Twisted Pair
PC/104-*Plus* Dual Ethernet utilityModule™
User's Manual

RTD Embedded Technologies, Inc.
103 Innovation Blvd.
State College, PA 16803-0906

Phone: +1-814-234-8087
FAX: +1-814-234-5218

E-mail
sales@rtd.com
techsupport@rtd.com

web site
http://www.rtd.com

Revision History

Rev. A	08/07/2007	Initial Release
Rev. B	09/11/2007	Added references for 82551IT Ethernet Controller Added chapter on using the module Added chapter for additional information Updated PC/104-*Plus* specification information, and connector pinout
Rev. C	02/24/2009	Added pin out information for CN5 and CN8
Rev. D	12/07/2010	Updated Link LED description for new PCB. Removed Fiber Interface Considerations (CM17215 Only)
Rev E	3/4/2011	Corrected port 1 LED descriptions

Published by:

RTD Embedded Technologies, Inc.
103 Innovation Blvd.
State College, PA 16803-0906

Table of Contents

Table of Tables

Table of Figures

Chapter 1 INTRODUCTION

This manual gives information on the CM17215 PC/104-*Plus* Dual 100Mb/s Fiber Ethernet utilityModule™ and the CM17212 PC/104-*Plus* Dual 10/100Mb/s Fast Ethernet utilityModule™.

This module provides two (2) independent Ethernet connections (Fiber – CM17215, UTP – CM17212). Each channel is capable of operating through a MT-RJ fiber connector (CM17215) or a standard RJ-45 connector (CM17212).

Each channel of the CM17212/17215 utilityModule™ operates using its own Intel 82551IT PCI Ethernet Controller. An onboard PCI-to-PCI bridge allows the two Ethernet controllers to appear as a single PCI slot to the host computer. In the case of the CM17215, an Intel LXT973 2-Port Ethernet PHY Transceiver provides the bridging to the fiber interface.

Electrical Specifications

- Compatible with *PCI Local Bus Specification Revision 2.2*
- Compatible with PC/104-*Plus* Specification Revision 2.0
- 5V Tolerant PCI Interface
- Only requires +5VDC power
- Power Consumption:
  - CM17212: 1.7 W typical*
  - CM17215: 4.6 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: -40° to 85° C, 90% Humidity non-condensing
- Storage Temperature: -55° to 125° C

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

Chapter 2 CM17212/17215HR LAYOUT

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

Component Locations

The figures below show switch and connector locations.

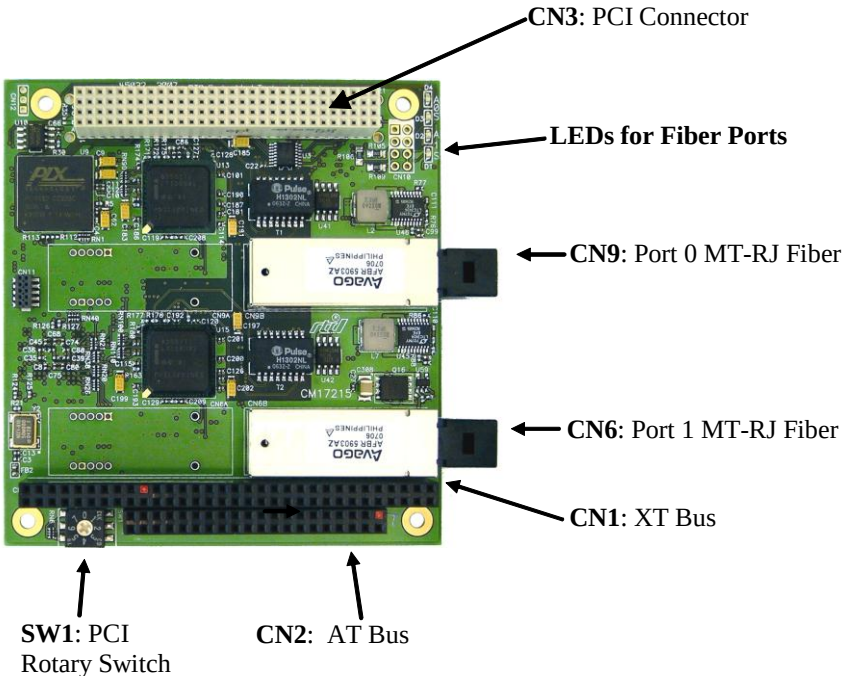


Figure 1: Component Locations on CM17215

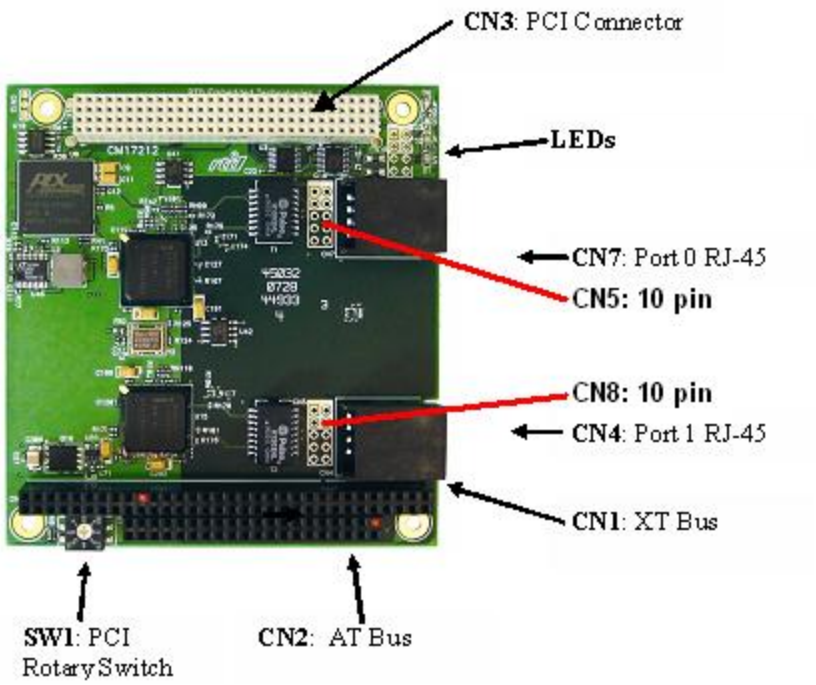


Figure 2: Component Locations on CM17212

List of Connectors and Switches

Connector	Function	Dimension
CN1, CN2	XT/AT Bus Connector (pass-through)	64 + 32 pins
CN3	PCI Bus Connector	120 pins
CN9	Port 0 Fiber Connector (CM17215 only)	MT-RJ
CN6	Port 1 Fiber Connector (CM17215 only)	MT-RJ
CN7	Port 0 UTP (CM17212 only)	RJ-45
CN4	Port 1 UTP (CM17212 only)	RJ-45
SW1	PCI Board Selector Rotary Switch	Rotary Switch
CN5	Port 0 UTP (CM17212 only)	10 pin DIL
CN8	Port 1 UTP (CM17212 only)	10 pin DIL

Table 1: List of Connectors and Switches

CN8 Port 1			
Pin	Name	Pin	Name
1	RX1+	2	RX1-
3	Term1	4	Term1
5	TX1+	6	TX1-
7	Term2	8	Term2
9	frame1	10	frame1
CN5 Port 2			
Pin	Name	Pin	Name
1	RX2+	2	RX2-
3	Term3	4	Term3
5	TX2+	6	TX2-
7	Term4	8	Term4
9	frame2	10	frame2

Term1 is the output receive termination of Port 1
Term2 is the output transmit termination of Port 1
Term3 is the output receive termination of Port 2
Term4 is the output transmit termination of Port 2
Frame1 is separated from frame ground by solder blob B2
Frame2 is separated from frame ground by solder blob B3
(B2 and B3 are unpopulated by default)

Table 2: UTP 10pin DIL connectors CN5 and CN8

PC/104 ISA Bus Connectors, CN1 and CN2

Connectors CN1 and CN2 provide PC/104 bus connections. CN1 carries XT bus signals, and CN2 carries additional signals for the AT bus. Refer to table 4 of the PC/104-*Plus* Specification Revision 2.0 for the pinout of these connectors

Since the CM17212/17215 is a PCI device, the ISA bus connectors are simply pass-through connections.

Note: Two locations on the bus have mechanical keying pins to help prevent misconnection of the PC/104 bus. These keying pins are a part of the PC/104 standard, and we strongly recommend you leave them in place.

If you have other modules without keying pins, we suggest you modify them to include keying.

PC/104-Plus PCI connector, CN3

Connector CN3 carries the signals of the PC/104-*Plus* PCI bus. These signals match definitions of the PCI Local Bus specification Revision 2.2. Refer to table 3 of the PC/104-*Plus* Specification Revision 2.0 for the pinout of this connector.

MT-RJ Fiber Ethernet, CN6 and CN9

The fiber connectors on the CM17215 are male MT-RJ fiber transceivers (Avago AFBR-5903AZ). The transmitter transmits using a 1300 nm surface emitting InGaAsP LED and the receiver receives using an InGaAs PIN photodiode. It is designed to be used with Multi-Mode fiber. For other fiber interfaces, contact RTD technical support.

Before installing a MT-RJ fiber into the connector, remove the protection plug from the connector.

	Test Method	Performance
Eye Safety	IEC 825 Issue 1 1993:11 Class 1 CENELEC EN60825 Class 1	Compliant per Avago testing under single fault conditions TUV Certification: LED Class 1

PCI Board Selector Rotary Switch, SW1

Since the utilityModule™ uses stack through buses, the only hardware installation you will need to do is to place the module onto the PC/104-*Plus* or PCI-104 stack. To do this, you will connect the PCI and/or ISA bus connectors on the CM17212/17215 to the respective connectors of your stack.

Before you can use this module you have to set the PCI board selector rotary switch located on the module (SW1). If this module is the first module from the CPU module select ’0,’ if it is the second module select ’1,’ etc.

Status LEDs

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

Table 3: CM17212 Status LEDs

Port	DESCRIPTION	Diode #
Port 0	Speed ▪ On = 100Mb/s ▪ Off = 10Mb/s	D3
	Link/Activity ▪ Off = No link detected ▪ On = Link Detected ▪ Flashing = Activity	D4
Port 1	Speed ▪ On = 100Mb/s ▪ Off = 10Mb/s	D2
	Link/Activity ▪ Off = No link detected ▪ On = Link Detected ▪ Flashing = Activity	D1

Table 4: CM17215 Status LEDs

Port	DESCRIPTION	Diode #
Port 0	Link ▪ On = Link Detected ▪ Off = No link detected	D3
	Activity ▪ On = Activity ▪ Off = No activity	D4
Port 1	Link ▪ On = Link Detected ▪ Off = No link detected	D1
	Activity ▪ On = Activity ▪ Off = No activity	D2

Chapter 3 INSTALLING THE UTILITYMODULE™

WARNING!

Like all equipment using CMOS devices, the CM17212/17215 must be protected from static discharge. Never touch any of the parts except at static-free workstation. Use anti-static bag shipped with the CM17212/17215 to handle the board

The following sections contain information on configuring the CM17212/17215 PC/104-*Plus* 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-*Plus* system or stack.

1 Select and install standoffs to properly position the utilityModule™ on the PC/104-*Plus* 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 Check to see if the keying pins in the PCI bus connector are properly positioned.

5 Check the stacking order and set the PCI Board Selector Rotary Switch, SW1.

6 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.

7 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 4 USING THE CM17212/17215

Driver Support

For Windows 2000/XP, the CM17212/17215 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 *e100* kernel module that is built into the official 2.4 and 2.6 Linux kernels. 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 CM17212/17215 may be natively supported. Many operating systems include support for the Intel 82551IT PCI Ethernet controller, which the CM17212/17215 is based on. Your operating system vendor should be able to provide the necessary information.

Chapter 5 ADDITIONAL INFORMATION

Ethernet Controller

For more information on the Ethernet Controller used on the CM17212/17215, refer to the following documents from Intel:

- Intel 82551IT Datasheet
- Intel 8255x Software Developer Manual

Both of these may be downloaded from Intel's web site (www.intel.com).

Fiber Interface

For more information on the physical fiber interface, refer to the datasheet for the Avago AFBR-5903AZ Fiber Transceiver, which can be downloaded from www.avagotech.com.

Chapter 6 RETURN POLICY AND WARRANTY

Return Policy

If you wish to return a product to the factory for service, please follow this procedure:

Read the Limited Warranty to familiarize yourself with our warranty policy.

Contact the factory for a Return Merchandise Authorization (RMA) number.

Please have the following available:

- Complete board name
- Board serial number
- A detailed description of the board's behavior

When returning the board, list the name of a contact person, familiar with technical details of the problem or situation, **along with their phone and fax numbers, address, and e-mail address** (if available).

List your shipping address!!

Indicate the shipping method you would like used to return the product to you. We will not ship by next-day service without your pre-approval.

Carefully package the product, using proper anti-static packaging.

Write the RMA number in large (1") letters on the outside of the package.

Return the package to:

RTD Embedded Technologies, Inc.
103 Innovation Blvd.
State College PA 16803-0906
USA

Limited Warranty

RTD Embedded Technologies, Inc. warrants the hardware and software products it manufactures and produces to be free from defects in materials and workmanship for one year following the date of shipment from RTD Embedded Technologies, INC. This warranty is limited to the original purchaser of product and is not transferable.

During the one year warranty period, RTD Embedded Technologies will repair or replace, at its option, any defective products or parts at no additional charge, provided that the product is returned, shipping prepaid, to RTD Embedded Technologies. All replaced parts and products become the property of RTD Embedded Technologies. Before returning any product for repair, customers are required to contact the factory for an RMA number.

THIS LIMITED WARRANTY DOES NOT EXTEND TO ANY PRODUCTS WHICH HAVE BEEN DAMAGED AS A RESULT OF ACCIDENT, MISUSE, ABUSE (such as: use of incorrect input voltages, improper or insufficient ventilation, failure to follow the operating instructions that are provided by RTD Embedded Technologies, "acts of God" or other contingencies beyond the control of RTD Embedded Technologies), OR AS A RESULT OF SERVICE OR MODIFICATION BY ANYONE OTHER THAN RTD Embedded Technologies. EXCEPT AS EXPRESSLY SET FORTH ABOVE, NO OTHER WARRANTIES ARE EXPRESSED OR IMPLIED, INCLUDING, BUT NOT LIMITED TO, ANY IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, AND RTD Embedded Technologies EXPRESSLY DISCLAIMS ALL WARRANTIES NOT STATED HEREIN. ALL IMPLIED WARRANTIES, INCLUDING IMPLIED WARRANTIES FOR MECHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE, ARE LIMITED TO THE DURATION OF THIS WARRANTY. IN THE EVENT THE PRODUCT IS NOT FREE FROM DEFECTS AS WARRANTED ABOVE, THE PURCHASER'S SOLE REMEDY SHALL BE REPAIR OR REPLACEMENT AS PROVIDED ABOVE. UNDER NO CIRCUMSTANCES WILL RTD Embedded Technologies BE LIABLE TO THE PURCHASER OR ANY USER FOR ANY DAMAGES, INCLUDING ANY INCIDENTAL OR CONSEQUENTIAL DAMAGES, EXPENSES, LOST PROFITS, LOST SAVINGS, OR OTHER DAMAGES ARISING OUT OF THE USE OR INABILITY TO USE THE PRODUCT.

SOME STATES DO NOT ALLOW THE EXCLUSION OR LIMITATION OF INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR CONSUMER PRODUCTS, AND SOME STATES DO NOT ALLOW LIMITATIONS ON HOW LONG AN IMPLIED WARRANTY LASTS, SO THE ABOVE LIMITATIONS OR EXCLUSIONS MAY NOT APPLY TO YOU.

THIS WARRANTY GIVES YOU SPECIFIC LEGAL RIGHTS, AND YOU MAY ALSO HAVE OTHER RIGHTS WHICH VARY FROM STATE TO STATE.