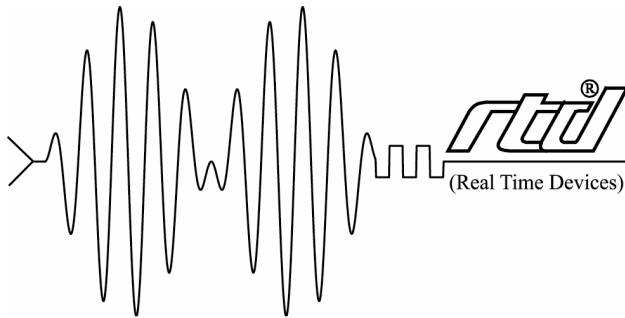


CM17205HR
PC/104-Plus Dual Fast Ethernet
Fiber and/or Twisted Pair
utilityModule™

User's Manual



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

BDM-610020021
Rev. B

ISO9001 and AS9100 Certified

CM17205HR
PC/104-Plus Dual Fast Ethernet
Fiber and/or Twisted Pair utilityModule™
User's Manual



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Rev. A	New Manual Naming Method	
Rev. B	Connectors and Jumpers CN5, CN6, CN7, JP1, JP2, JP3, JP4, JP5, JP6, JP7, JP8, JP9, and JP10 relabeled to CN6, CN7, CN9, JP5, JP6, JP7, JP8, JP1, JP2, JP3, JP4, CN5, CN8, respectively. Diodes D6, D5, D\$, D3 relabeled to D3, D4, D1, D2, respectively. JP11 and JP12 removed.	

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Chapter 1 INTRODUCTION

This manual gives information on the CM17205 PC/104-*Plus* Dual Fast FX/TX Ethernet utilityModule™.

This module provides two (2) Independent Fast Ethernet connections while utilizing the resources of only one slot on a PC/104-*Plus* stack. Each channel is capable of operating through an RJ45 twisted pair connector or a MT-RJ fiber connector

Each channel of the CM17205 utilityModule™ operates using its own Intel™ 21143-TD PCI Fast Ethernet Controller and Intel LXT973 2-Port Fast Ethernet PHY Transceiver

Electrical Specifications

- Compatible with *PCI Local Bus Specification Revision 2.1*
- Compatible with *PC/104-Plus Specification Revision 1.2*
- 3.8 W @ +5 VDC typical

Mechanical Specifications

- Compatible with the *PC/104-Plus Specification* when using the 10 pin twisted pair connector, JP10 and JP9. This connector is not the default factory installed connector. The factory default connector is the RJ45 connector, CN6 and CN4. Please note that all RJ45 connectors (default configuration), violate the height limit of all *PC/104 Specifications*. If height limit is required, the RJ45 connector cannot be installed, and the optional 10 pin connector must be installed by the factory.
- 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
- Storage Temperature: -40° to +85° C
- Non-Condensing Relative Humidity: < 95% at 40°C

WARNING!

Like all equipment using CMOS devices, the CM17205HR must be protected from static discharge. Never touch any of the parts except at static-free workstation. Use anti-static bag shipped with the CM17205HR to handle the board

Software

The 21143-TD is supported by DOS, Windows 3.1, Windows 95, Windows 98, Windows NT, Windows 2000, Windows XP, VxWorks, QNX, and Linux. For DOS and Windows 3.1, drivers can be downloaded from the Intel Developer web site at the 21143 Drivers page. For Windows 95, Windows 98, Windows NT, and Windows 2000, the drivers are supplied by Microsoft along with the operating system. The latest drivers for all of the above mentioned operating systems can also be found at the Intel Developer web site at the 21143 Drivers page. For VxWorks and QNX please contact them directly. For the latest Linux drivers, contact the vendor of your Linux distribution.

Chapter 2 CM17205HR 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 figure below shows switch and jumper locations.

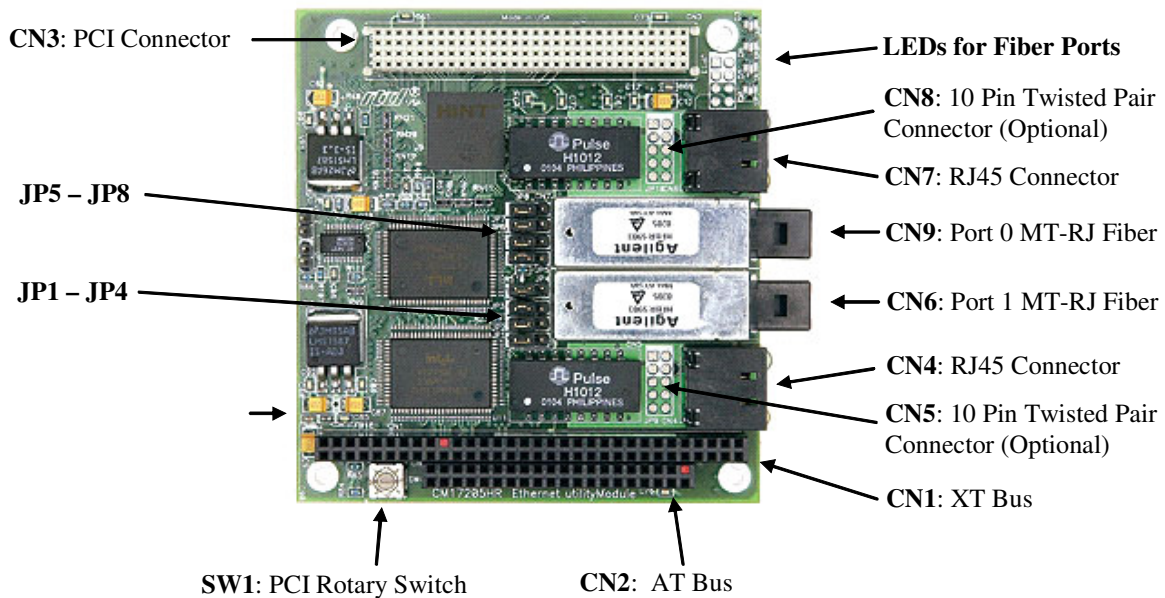


Figure 1: Component Locations

List of Connectors and Switches

Connector	Function	Dimension
CN1, CN2	XT/AT Bus Connector	64 + 32 pins
CN3	PCI Bus Connector	120 pins
CN7	Port 0 Twisted Pair Ethernet Connector	RJ45
CN8	Port 0 Twisted Pair Ethernet Connector	10 pins
CN9	Port 0 Fiber Connector	MT-RJ
CN4	Port 1 Twisted Pair Ethernet Connector	RJ45
CN5	Port 1 Twisted Pair Ethernet Connector	10 pins
CN6	Port 1 Fiber Connector	MT-RJ
SW1:	PCI Board Selector Rotary Switch	Rotary Switch

Table 1: List of Connectors and Switches

PC/104 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.

PC/104 XT Bus Connector, CN1		
Pin	Row A	Row B
1	IOCHCHK*	0V
2	SD7	RESETDRV
3	SD6	+5V
4	SD5	IRQ9
5	SD4	-5V
6	SD3	DRQ2
7	SD2	-12V
8	SD1	ENDXFR*
9	SD0	+12V
10	IOCHRDY	(KEYING PIN)
11	AEN	SMEMW*
12	SA19	SMEMR*
13	SA18	IOW*
14	SA17	IOR*
15	SA16	DACK3
16	SA15	DRQ3
17	SA14	DACK1*
18	SA13	DRQ1
19	SA12	REFRESH
20	SA11	SYSCLK
21	SA10	IRQ7
22	SA9	IRQ6
23	SA8	IRQ5
24	SA7	IRQ4
25	SA6	IRQ3
26	SA5	DACK2*
27	SA4	TC
28	SA3	BALE
29	SA2	+5V
30	SA1	OSC
31	SA0	0V
32	0V	0V

Table 2: PC/104 XT Bus Connector

* indicate active low

PC/104 AT Bus Connector, CN2		
Pin	Row C	Row D
0	0V	0V
1	SBHE*	MEMCS16*
2	LA23	IOCS16*
3	LA22	IRQ10
4	LA21	IRQ11
5	LA20	IRQ12
6	LA19	IRQ15
7	LA18	IRQ14
8	LA17	DACK0*
9	MEMR*	DRQ0
10	MEMW*	DACK5*
11	SD8	DRQ5
12	SD9	DACK6*
13	SD10	DRQ6
14	SD11	DRQ6
15	SD12	DRQ7
16	SD13	+5V
17	SD14	MASTER*
18	SD15	0V
19	(KEYING PIN)	0V

Table 3: PC/104 AT Bus Connector

* indicate active low

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 2.1. The following tables list the pinouts of the PC/104-Plus bus connector.

Pin	A	B	C	D
1	GND/5.0V KEY ¹	Reserved	+5V	AD00
2	VI/O	AD02	AD01	+5V
3	AD05	GND	AD04	AD03
4	C/BE0*	AD07	GND	AD06
5	GND	AD09	AD08	GND
6	AD11	VI/O	AD10	M66EN
7	AD14	AD13	GND	AD12
8	+3.3V	C/BE1*	AD15	+3.3V
9	SERR*	GND	SB0*	PAR
10	GND	PERR*	+3.3V	SDONE
11	STOP*	+3.3V	LOCK*	GND
12	+3.3V	TRDY*	GND	DEVSEL*
13	FRAME*	GND	IRDY*	+3.3V
14	GND	AD16	+3.3V	C/BE2*
15	AD18	+3.3V	AD17	GND
16	AD21	AD20	GND	AD19
17	+3.3V	AD23	AD22	+3.3V
18	IDSEL0	GND	IDSEL1	IDSEL2
19	AD24	C/BE3*	VI/O	IDSEL3
20	GND	AD26	AD25	GND
21	AD29	+5V	AD28	AD27
22	+5V	AD30	GND	AD31
23	REQ0*	GND	REQ1*	VI/O
24	GND	REQ2*	+5V	GNT0*
25	GNT1*	VI/O	GNT2*	GND
26	+5V	CLK0	GND	CLK1
27	CLK2	+5V	CLK3	GND
28	GND	INTD*	+5V	RST*
29	+12V	INTA*	INTB*	INTC*
30	-12V	Reserved	Reserved	GND/3.3V KEY ¹

Table 4: PC/104-Plus Bus Signal Assignments

* indicate active low

Note: The KEY pins are to guarantee proper module installation. Pin-A1 will be removed and the female side plugged for 5.0V I/O signals and Pin-D30 will be modified in the same manner for 3.3V I/O. It is recommended that both KEY pins (A1 and D30) be electrically connected to GND for shielding.

PC/104-Plus PCI Bus Signals

The following text contains brief descriptions of the PC/104-Plus PCI bus signals.

Address and Data

AD[31:00] -- Address and Data are multiplexed. A bus transaction consists of an address cycle followed by one or more data cycles.

C/BE[3:0]* -- Bus Command/Byte Enables are multiplexed. During the address cycle, the command is defined. During the Data cycle, they define the byte enables.

PAR -- Parity is even on AD[31:00] and C/BE[3:0]* and is required.

Interface Control Pins

FRAME* -- Frame is driven by the current master to indicate the start of a transaction and will remain active until the final data cycle.

TRDY* -- Target Ready indicates the selected device's ability to complete the current data cycle of the transaction. Both IRDY* and TRDY* must be asserted to terminate a data cycle.

IRDY* -- Initiator Ready indicates the master's ability to complete the current data cycle of the transaction.

STOP* -- Stop indicates the current selected device is requesting the master to stop the current transaction.

DEVSEL* -- Device Select is driven by the target device when its address is decoded.

IDSEL -- Initialization Device Select is used as a chip-select during configuration.

LOCK* -- Lock indicates an operation that may require multiple transactions to complete.

Error Reporting

PERR* -- Parity Error is for reporting data parity errors.

SERR* -- System Error is for reporting address parity errors.

Arbitration (Bus Masters Only)

REQ* -- Request indicates to the arbitrator that this device desires use of the bus.

GNT* -- Grant indicates to the requesting device that access has been granted.

System

CLK -- Clock provides timing for all transactions on the PCI bus.

RST* -- Reset is used to bring PCI-specific registers to a known state.

Interrupts

INTA* -- Interrupt A is used to request Interrupts.

INTB* -- Interrupt B is used to request Interrupts only for multi-function devices.

INTC* -- Interrupt C is used to request Interrupts only for multi-function devices.

INTD* -- Interrupt D is used to request Interrupts only for multi-function devices.

Power Supplies and VIO

+5V -- +5 volt supply

+12V -- +12 volt supply

-12V -- -12 volt supply

+3.3V -- +3.3 volt supply

VIO -- This signal typically is the I/O power to the bus drivers on a PCI bus card.

RJ45 Twisted Pair Ethernet, CN4 & CN7

Connector CN7 (Port 0) & CN4 (Port 1) are for UTP (Unshielded Twisted Pair) wiring normally used for 10/100Base-T Ethernet. They are the default factory installed twisted pair connectors on the board.

The following table gives the pinout of CN4 and CN7.

Pin	Signal	Function	in/out
1	TX+	Transmit +	out
2	TX-	Transmit -	out
3	RX+	Receive +	in
4	N.C.	Reserved	
5	N.C.	Not connected	
6	RX-	Receive -	in
7	N.C.	Not connected	
8	N.C.	Not connected	

Table 5: RJ45 Signal Assignments

The figure below shows the pin numbering of CN4 and CN7 when **looking into the connector**:

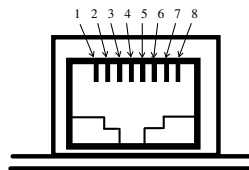


Figure 2: RJ-45 Jack Connector

CN4 and CN7 are standard female RJ-45 connectors.

Note: The RJ45 connector exceeds the height limit of the PC/104 specifications. The optional CN9 (Port 0) and CN5 (Port 1) connectors are also 10/100Base-TX connections and can be factory installed if the RJ45 connector height is a problem

Twisted Pair Ethernet, CN8 (Port 0) and CN5 (Port 1)

These are optional connectors which can be factory installed in place of the RJ45 connector. This connector is not installed when the RJ45 connectors, CN4 and CN7, are installed

Pin	Signal	Function	in/out
1	TX+	Transmit +	out
2	RX-	Receive -	in
3	TX-	Transmit -	out
4	N.C.	Not connected	
5	RX+	Receive +	in
6	N.C.	Not connected	
7	N.C.	Reserved	
8	N.C.	Not connected	
9	N.C.	Not connected	
10	N.C.	Not connected	

Table 6: CN5 and CN8 Signal Assignments

MT-RJ Fiber Ethernet, CN6 and CN9

The fiber connectors are MT-RJ fiber transceivers. The transmitter transmits using a 1300 nm surface emitting InGaAsP LED and the receiver receives using an InGaAs PIN photodiode.

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 Agilent 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 CM17202 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.

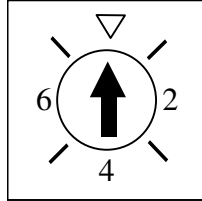


Figure 3: PCI Selector Rotary Switch

Fiber LED Indicators

The LEDs on the board are used to indicate various operations occurring through the fiber ports. They do not indicate anything about the Twisted Pair channels. The LEDs for the Twisted Pair channels are found on the RJ45 connectors. Listed below are the LEDs.

Port	DESCRIPTION	Diode #
MT-RJ Port 0	Speed	D3
MT-RJ Port 0	Link/Activity	D4
MT-RJ Port 1	Speed	D1
MT-RJ Port 1	Link/Activity	D2

Table 7: MT-RJ LED Indicators

Chapter 3 INSTALLING THE UTILITYMODULE™

WARNING!

Like all equipment using CMOS devices, the CM17205HR must be protected from static discharge. Never touch any of the parts except at static-free workstation. Use anti-static bag shipped with the CM17205HR to handle the board

The following sections contain information on configuring the CM17202HR PC/104-*Plus* Dual Fast Ethernet Fiber and/or Twisted Pair 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, RSW1 (see Section 2.13).
- 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.

Jumper Settings

You cannot use both the RJ45 connector and the MT-RJ connector on a single port at the same time. You can use the RJ45 connector on one port and the MT-RJ connector on the other port. Table 9 lists the Jumper settings to select each of the connectors.

		Jumper Position							
		JP1	JP2	JP3	JP4	JP5	JP6	JP7	JP8
Port 0	RJ45 Selected					1-2	1-2	1-2	1-2
	MT-RJ Selected					2-3	2-3	2-3	2-3
Port 1	RJ45 Selected	1-2	1-2	1-2	1-2				
	MT-RJ Selected	2-3	2-3	2-3	2-3				

Table 8: Connector Jumper Settings

Chapter 4 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

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.

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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 MERCHANTABILITY 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.

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