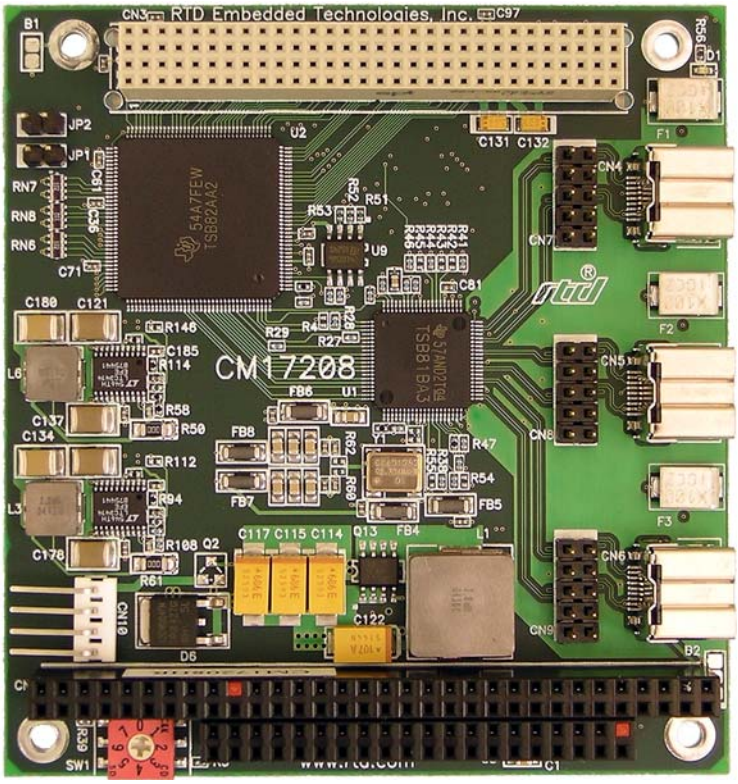
CM17208HR FireWire™ Communication Module



User's Manual

BDM-610020050 Revision B

www.rtd.com

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"Accessing the Analog World®"

CM17208HR FireWire™ Communication Module User's Manual

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Revision History

Revision	Date	Reason for Change
A	3/31/06	Initial release.
B	10/18/06	Added Cable Pinout section. Corrected IDAN pinout.

CM17208HR
FireWire™ Communication Module

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Chapter 1 Introduction

This manual provides comprehensive hardware and software information for users developing with the CM17208HR PC/104-*Plus* FireWire communication module.

This manual is organized as follows:

Chapter 1	***Introduction*** introduces main features and specifications
Chapter 2	***Installing the FireWire Communication Module*** describes the connectors, external I/O connections, and installation of the CM17208HR
Appendix A	***Reference Information*** provides operating system considerations and physical dimensions of the CM17208HR
Appendix B	***IDAN™ Dimensions and Pinout*** provides connector pinouts for the CM17208HR installed in an RTD Intelligent Data Acquisition Node (IDAN) frame
Appendix C	***Limited Warranty***

CM17208HR FireWire Communication Module

The CM17208HR FireWire communication module features three independent FireWire connections that support FireWire, iLINK, and SB1394 implementation of IEEE STD-1394b. Each connector is a 1394 bilingual port, supporting both 1394a and 1394b products, and enabling 100/200/400/800 Mb/s transfer rates. Cables are readily available that allow you to connect to both technologies.

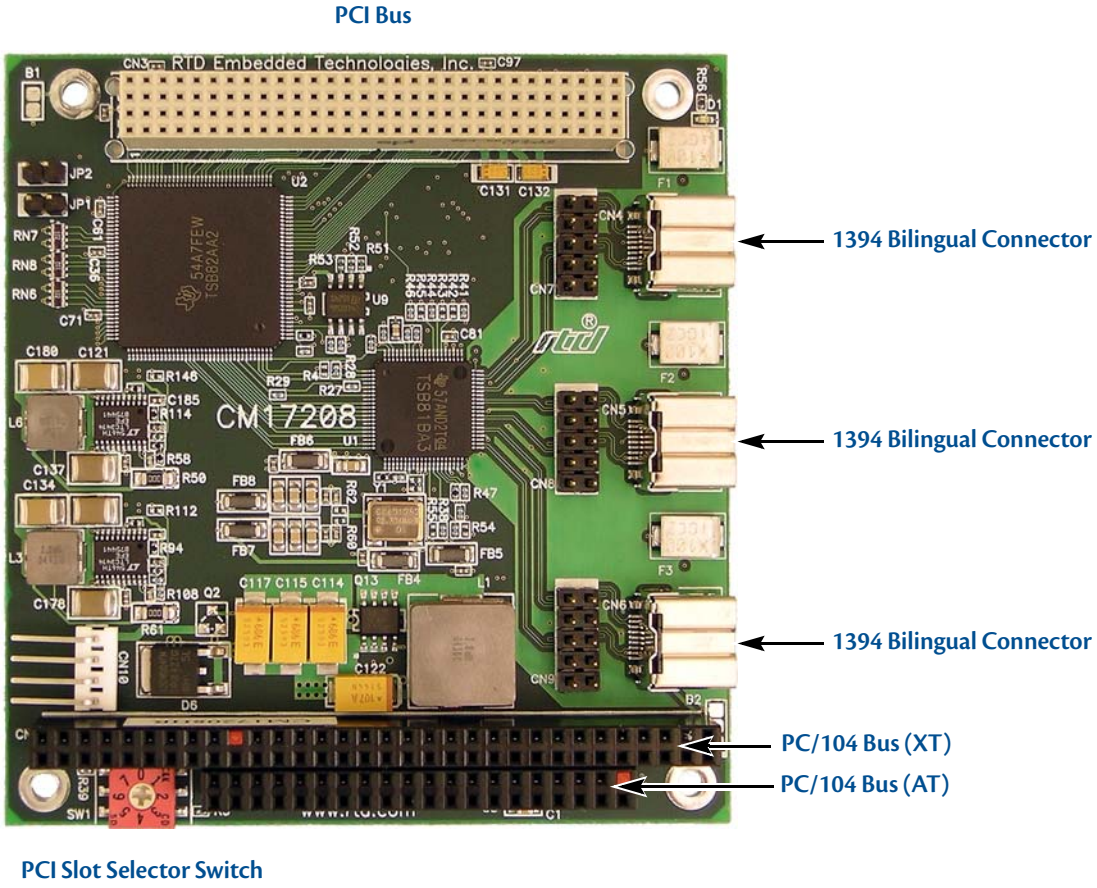

Figure 1 CM17208HR FireWire Communication Module (top view)

Ordering Information

The CM17208HR is an RTD peripheral module that provides high performance serial bus communication complete with FireWire, iLINK, and SB1394 implementation of IEEE STD-1394b. Three independent channels support 100/200/400/800 Mb/s on each channel. The CM17208HR is equipped with a 1394b bilingual connector for universal integration with both 1394a and 1394b devices. Each input is protected with a 1 A resettable fuse. Refer to *Reference Information* for more information on the CM17208HR resettable fuses.

The CM17208HR can also be purchased as part of an Intelligent Data Acquisition Node (IDAN™) building block, which consists of the FireWire communication module and a milled aluminum IDAN frame. The IDAN building block can be used in just about any combination with other IDAN building blocks to create a simple but rugged PC/104 stack. The FireWire module can also be purchased as part of a custom-built RTD HiDAN™ or HiDAN*plus* High Reliability Intelligent Data Acquisition Node. Contact RTD for more information on our high reliability PC/PCI-104 systems.

Board Features

The following sections describe the major features of the CM17208HR FireWire communication module.

General Features

- 3 independent channels
- 3 universal 1394b bilingual connectors, which support connections to both 1394a and 1394b devices
- Support for 100/200/400/800 Mb/s on each channel
- Resettable 1 A fuse on each input channel
- FireWire™, iLINK™, and SB1394™ implementation of IEEE STD-1394b

Software

- Uses standard OHCI FireWire drivers built into modern operating systems
- FireWire interfaces natively supported under:
  - Windows 98 and 2000 (1394a transfer rates only)
  - Windows XP
  - Linux 2.4 and 2.6 kernels via open source driver
  - Windows CE 5.0 (1394a transfer rates only)

Physical Characteristics

- Size: 3.6 x 3.8 x 0.6 inches (90 x 96 x 15 mm)
- Weight: 0.14 lbs (0.06 Kg)
- Operating Temperature: –40 to +85°C, 90% humidity noncondensing
- Storage Temperature: –55 to +125 °C
- Power requirements 0.5 W @ 5 VDC typical (board only)
  - Power consumption can increase depending on the type and number of FireWire devices attached

Block Diagram

The CM17208HR is designed on the PC/104 form factor for an easy mechanical interface to PC/104 systems. Refer to *External I/O Connections* on page 9 for a detailed discussion of the CM17208HR FireWire communication module external I/O connections. The next figure shows a simplified block diagram of the CM17208HR.

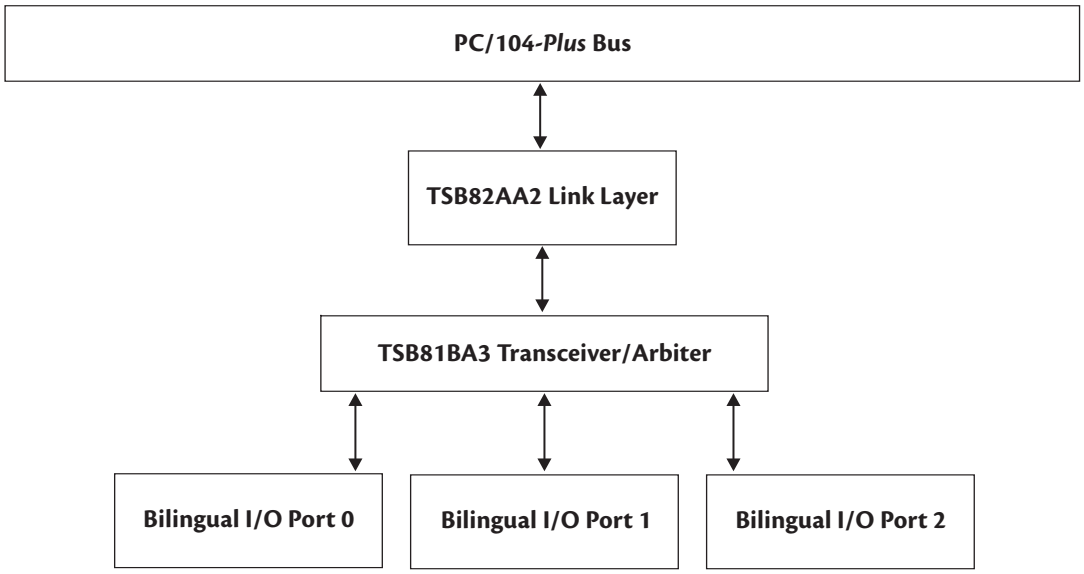

Figure 2 CM17208HR FireWire Communication Module Simplified Block Diagram

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Be sure to check the RTD web site (www.rtd.com) frequently for product updates, including newer versions of application software and this manual.

Chapter 2 Installing the FireWire Communication Module

The CM17208HR FireWire communication module interfaces easily to PC/104 systems. This chapter shows the external I/O connections and connector pinouts, and provides module installation instructions.

CM17208HR Connectors

Figure 3 shows the connectors and PCI Slot Selector Switch of the CM17208HR FireWire communication module.

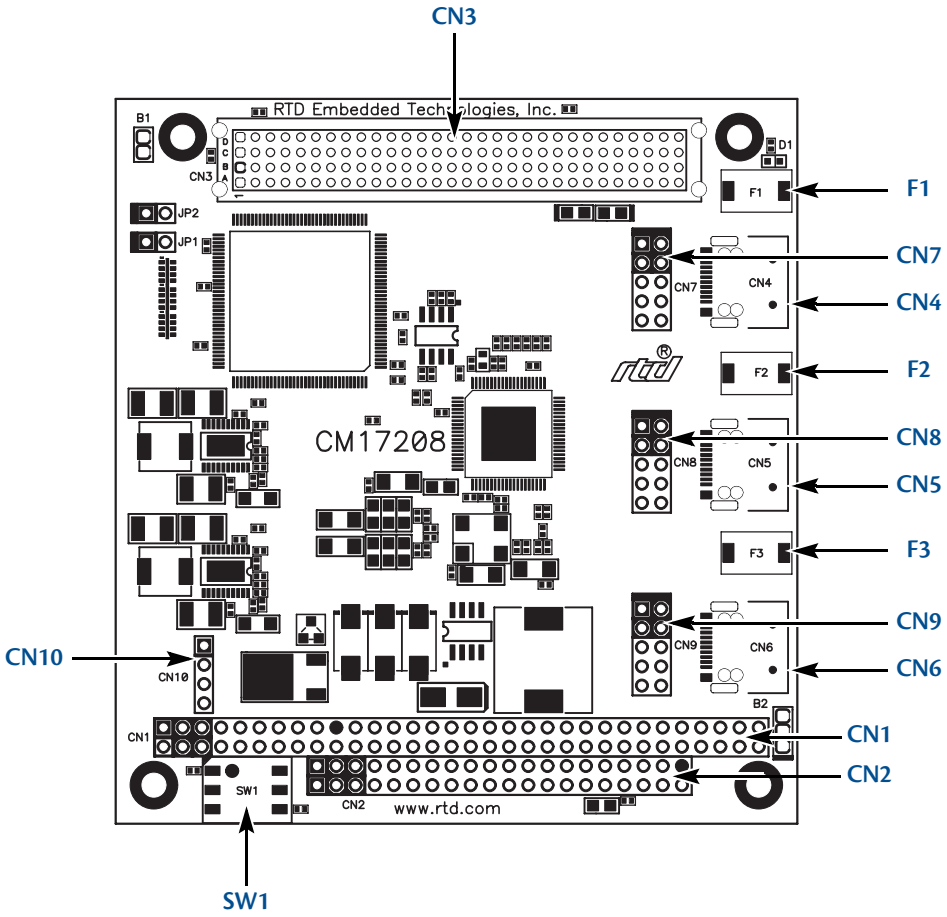


Figure 3 CM17208HR Connector Locations

Note *Pin 1 of each connector is indicated by a square within a white square on both the top and bottom of the board. Pin 1 of the XT and AT connectors match when stacking with other PC/104 modules.*

Table 1 CM17208HR Connectors

Connector	Function	Size
CN1	PC/104 Bus (XT)	64-pin
CN2	PC/104 Bus (AT)	40-pin
CN3	PCI Bus	120-pin
CN4	1394 bilingual socket (1394a and 1394b)	—
CN5	1394 bilingual socket (1394a and 1394b)	—
CN6	1394 bilingual socket (1394a and 1394b)	—
CN7	1394 bilingual socket (1394a and 1394b)	10-pin
CN8	1394 bilingual socket (1394a and 1394b)	10-pin
CN9	1394 bilingual socket (1394a and 1394b)	10-pin
CN10	External power	4-pin
SW1	PCI Slot Selector Switch	—

External I/O Connections

The following sections describe the external I/O connections of the CM17208HR.

Note that, in addition to the standard 1394 bilingual connectors, **CN4**, **CN5**, and **CN6**, the 10-pin connectors, **CN7**, **CN8**, and **CN9**, are 1394 bilingual connectors as well. These 10-pin connectors are generally reserved for RTD IDAN systems, but you can also use them to route signals to the side of an enclosure.

Table 2 1394 Bilingual Connector Pinout

Pin	Signal	Function
1	TPA+	Twisted Pair A+
2	TPA–	Twisted Pair A–
3	TPR(A)	Ground, Twisted Pair A
4	TPR(B)	Ground, Twisted Pair B
5	TPB+	Twisted Pair B+
6	TPB–	Twisted Pair A–
7	SGND	Shield Ground
8	VCC	+12 V
9	GND	Ground
10	GND	Ground

Switch SW1—PCI Slot Selector

This rotary switch is used to set the positioning of the CM17208HR with respect to the CPU module and other PC/104-*Plus* or PCI/104 cards in the stack.

Note *All PC/104-Plus and PCI/104 modules (including the CM17208HR) must be on the same side of the CPU module.*

If the CM17208HR is the first module from the CPU module, set the switch to position "0". If it is the second module from the CPU module, set the switch to position "1". Similarly, position "2" refers to the third module and position "3" refers to the fourth module away from the CPU module.

The PCI slot number can be configured as follows:

Table 3 PCI Slot Selector Switch

Switch Position	PCI Slot Number
0	Slot 0 (closest to CPU)
1	Slot 1
2	Slot 2
3	Slot 3
4	undefined
5	undefined
6	undefined
7	undefined

Installation Considerations

Consider the following points before integrating the CM17208HR into a PC/104-*Plus* stack.

1. The CM17208HR is a PC/104-*Plus* module with an ISA bus (PC XT and AT connectors) and a PCI bus. Therefore, the CM17208HR should be installed with a PC/104-*Plus* or PCI/104 cpuModule and other PC/104-*Plus* or PCI/104 peripheral modules.
2. RTD recommends building your PC/104-*Plus* or PCI/104 computer by stacking the power supply module and cpuModule on the ends of the stack. These two modules produce heat, and stacking them on the top and bottom maximizes heat dissipation. Placing the cpuModule on one end of the stack also minimizes reflections. RTD-built PC/104-*Plus* systems, such as the Intelligent Data Acquisition Node (IDAN™), normally have a power supply module on the bottom and a cpuModule on the top. Any other combination of PC/104-*Plus* or PCI/104 modules, including the CM17208HR, can be integrated into the stack.

Before You Begin

CAUTION *Keep your CM17208HR in the antistatic bag until you are ready to install it to your system!*

When removing the CM17208HR from the antistatic bag, hold it at the edges and do not touch the components or connectors. Please handle the module in an antistatic environment and use a grounded workbench for testing and handling.

Installing the CM17208HR in a PC/104-*Plus* Stack

1. Turn off power to your PC/104-*Plus* or PCI/104 system and unplug the cord.
2. Ground yourself with an anti-static strap.
3. Check that the keying pins in the PC/104 bus connector are properly positioned. Two keying pins should reside in pins C19 and B10.
4. Use the PCI slot selector switch **SW1** to set the positioning of the CM17208HR with respect to the CPU module and other PC/104-*Plus* or PCI/104 cards in the stack.

Note *All PC/104-Plus and PCI/104 modules (including the CM17208HR) must be on the same side of the CPU module.*

If the CM17208HR is the first module from the CPU module, set the switch to position "0". If it is the second module from the CPU module, set the switch to position "1". Similarly, position "2" refers to the third module and position "3" refers to the fourth module away from the CPU module.

CAUTION *The CM17208HR should slide into the matching PC/104 connector easily. Do not force the connection. Doing so might bend or break pins.*

5. Line up the pins of the CM17208HR's PC/104 connector with the PC/104 bus of the stack and gently press the module onto the stack. The module should slide into the matching PC/104-*Plus* and PCI connectors easily. Do not attempt to force the module, as this can lead to bent/broken pins.

Note *If the CM17208HR does not press into place, check modules in your stack for bent pins or out-of-place keying pins, and try again.*

6. If any modules are to be installed above the CM17208HR, install them. If the other modules are PC/104-*Plus* or PCI/104 devices, set the PCI slot selector switches on these modules based on their position away from the CPU module.
7. Attach any necessary cables to the PC/104-*Plus* stack.
8. Reconnect the power cord and apply power to the stack.
9. Boot the system and verify that all of the hardware is working properly.

Appendix A Reference Information

This appendix provides reference information for the CM17208HR FireWire communication module.

Jumpers, Solder Blobs, and LED

Table 4 below describes the CM17208HR components shown in Figure 4.

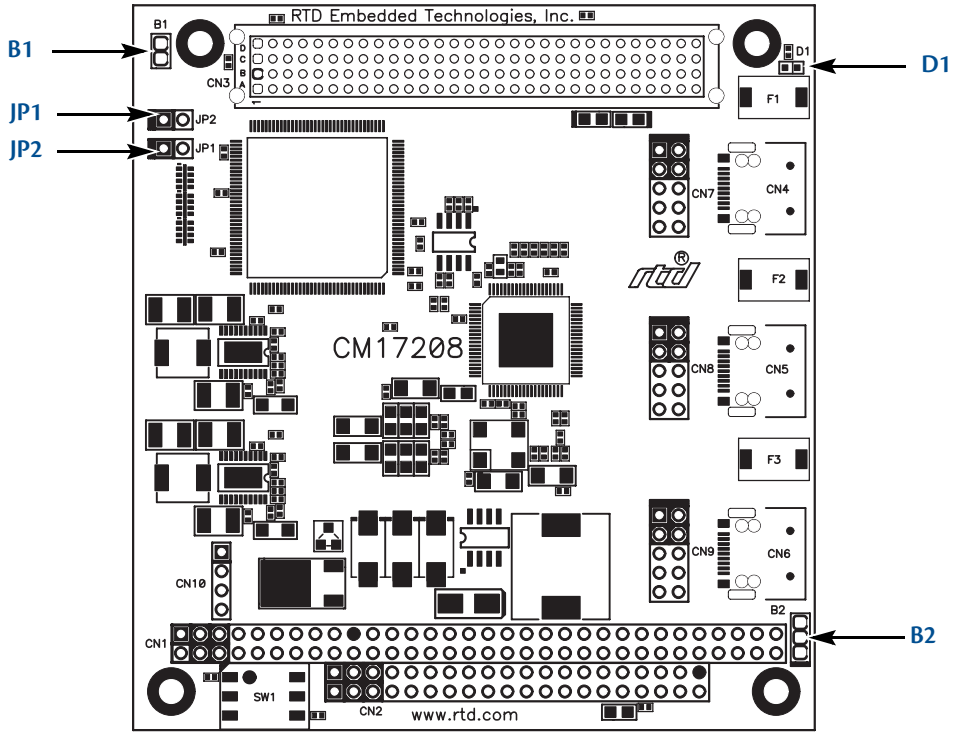


Figure 4 CM17208HR Jumpers, Solder Blobs, and LED

Table 4 CM17208HR Jumpers, Solder Blobs, and LED

Component	Pins/ Positions	Function	Default
JP1	2	Factory use only	—
JP2	2	Factory use only	—
B1	2	Solder closed to connect board ground to frame ground	open
B2	3	Solder closed to connect shield ground to either board ground or frame ground **positions 1–2**: shield ground to frame ground **positions 2–3**: shield ground to board ground	open
D1	—	On: communication link has been established between a device and the board Off: no communication link	—

Resettable Fuses

The CM17208HR has three onboard fuses, one for each 1394 bilingual connector. These fuses are rated for 1 A and are connected to the power pin on the connector (pin 8 onboard; pin 9 when in an IDAN configuration). FireWire communication provides +12 V through the cable to power devices on the receiving end. If any device attached to the CM17208HR draws more than 1 A, the fuse will blow. The fuse is a resettable fuse and will not need to be replaced if it is tripped. If the CM17208HR draws more than 1 A, the metals on the fuse will expand due to the increased heat, creating a gap and removing the connection between the CM17208HR and the connected device. When the fuse cools, it contracts, removing the air gap and re-establishing the connection.

External Power

The CM17208HR has an onboard power supply that provides +12 V to each bilingual connector. This power supply is only rated for 2 A. If more power than the rated 1 A per connector is required, connector **CN10** can be used to supply power externally.

Cable Pinout

The following table lists the connections required to build a cable that connects the CM17208HR to standard FireWire devices.

Table 5 FireWire Cable Pinout[1]

FireWire 9-pin	DIL 10-pin	IDAN DB9	Left Signal	Right Signals	IDAN DB9	DIL 10-pin	FireWire 4-pin	FireWire 6-pin	FireWwire 9-pin
4	1	1	TPA+	TPB+	3	5	2	4	2
3	2	6	TPA–	TPB–	8	6	1	3	1
5	3	2	TPR(A)	TPR(B)	7	4	Shield	2	9
2	5	3	TPB+	TPA+	1	1	4	6	4
1	6	8	TPB–	TPA–	6	2	3	5	3
9	4	7	TPR(B)	TPR(A)	2	3	Shield	2	5
8	8	9	VCC	VCC	9	8	n.c.	1	8
6	9,10	5	GND	GND	5	9,10	Shield	2	6
Shield	7	4	SGND	SGND	4	7	Shield	Shield	Shield

1.Pinout for all three ports.

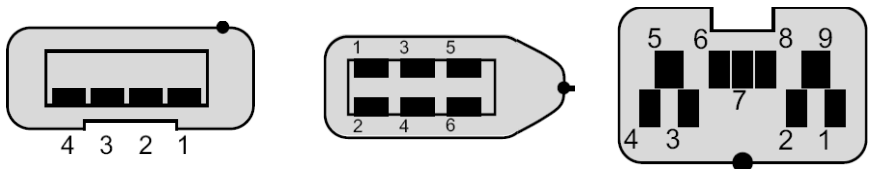


Figure 5 FireWire 4-pin, 6-pin, and 9-pin Connectors (looking into cable end)

Physical Dimensions

Figure 6 shows the mechanical dimensions of the CM17208HR FireWire communication module (in inches).

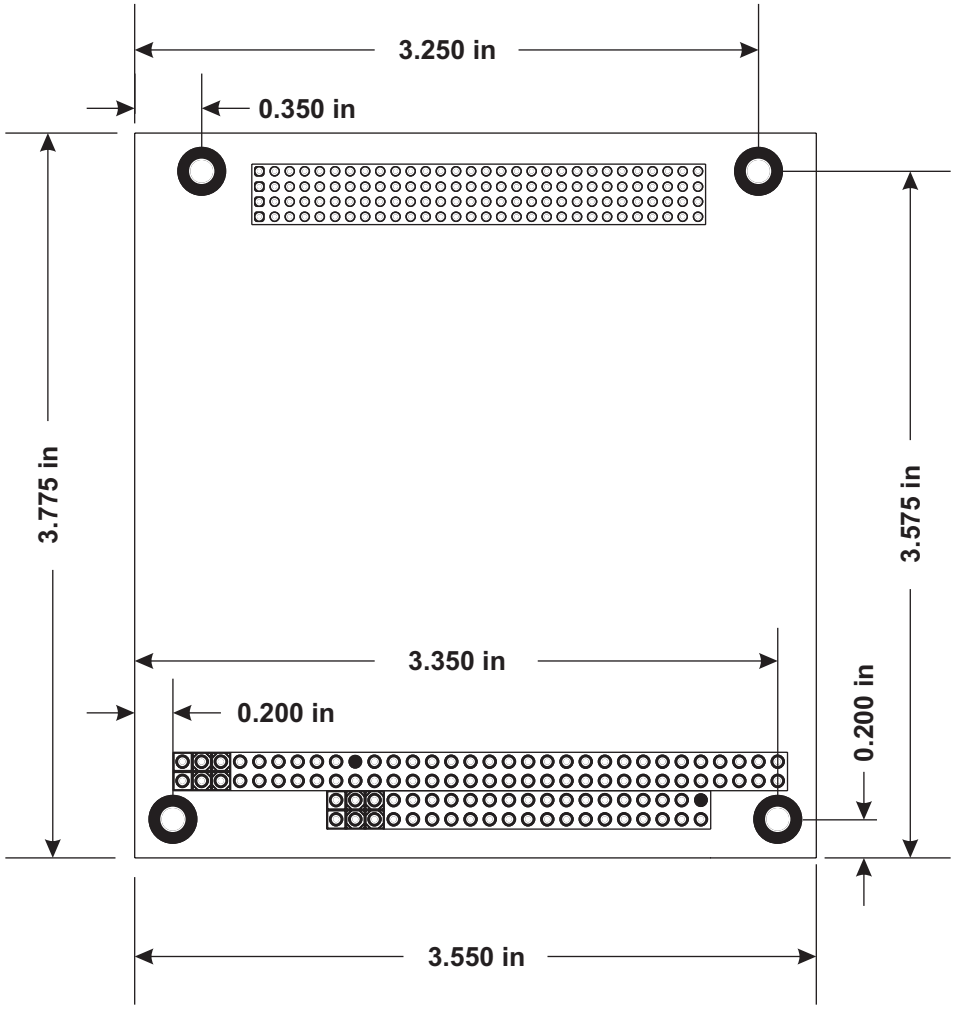
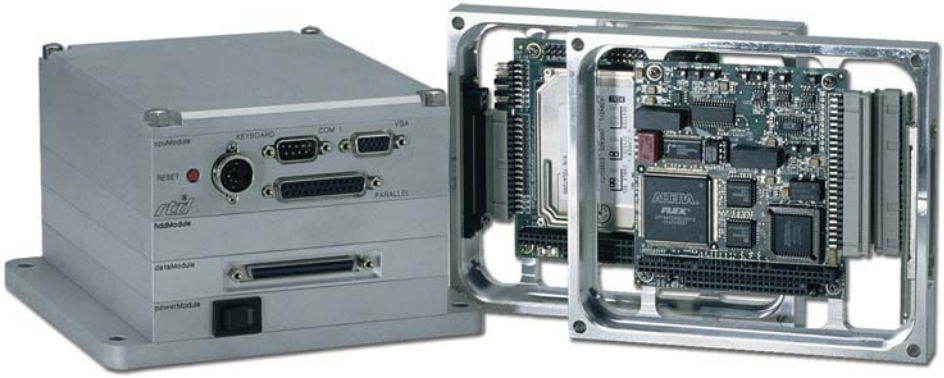


Figure 6 CM17208HR Physical Dimensions (±0.005 inches)

Appendix B IDAN™ Dimensions and Pinout

FireWire communication modules, like all other RTD PC/PCI-104 modules, can be packaged in Intelligent Data Acquisition Node (IDAN) frames, which are milled aluminum frames with integrated heat sinks and heat pipes for fanless operation. RTD modules installed in IDAN frames are called building blocks. IDAN building blocks maintain the simple but rugged PC/104 stacking concept. Each RTD module is mounted in its own IDAN frame and all I/O connections are brought to the walls of each frame using standard PC connectors. No connections are made from module to module internal to the system other than through the PC/104 and PC/104-*Plus* bus, enabling quick interchangeability and system expansion without hours of rewiring and board redesign.

The CM17208HR FireWire communication module can also be purchased as part of a custom-built RTD HiDAN™ or HiDAN*plus*™ High Reliability Intelligent Data Acquisition Node. This appendix provides the dimensions and pinouts of the CM17208HR installed in an IDAN frame. Contact RTD for more information on high reliability IDAN, HiDAN, and HiDAN*plus* PC/PCI-104 systems.



IDAN—Adhering to the PC/104 stacking concept, IDAN allows you to build a customized system with any combination of RTD modules.

IDAN Heat Pipes—Advanced heat pipe technology maximizes heat transfer to heat sink fins.

HiDAN*plus*—Integrating the modularity of IDAN with the ruggedization of HiDAN, HiDAN*plus* enables connectors on all system frames, with signals running between frames through a dedicated stack-through raceway.

IDAN Dimensions and Connectors

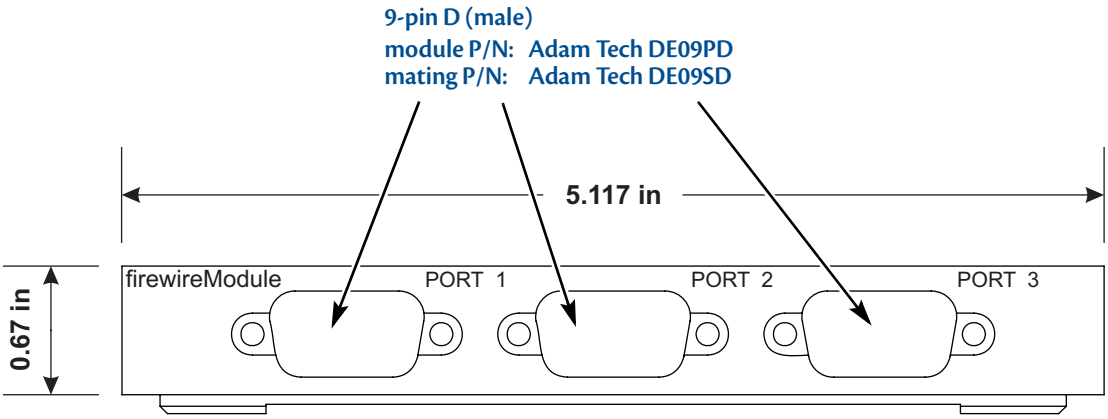


Figure 7 IDAN-CM17208HRS Connectors

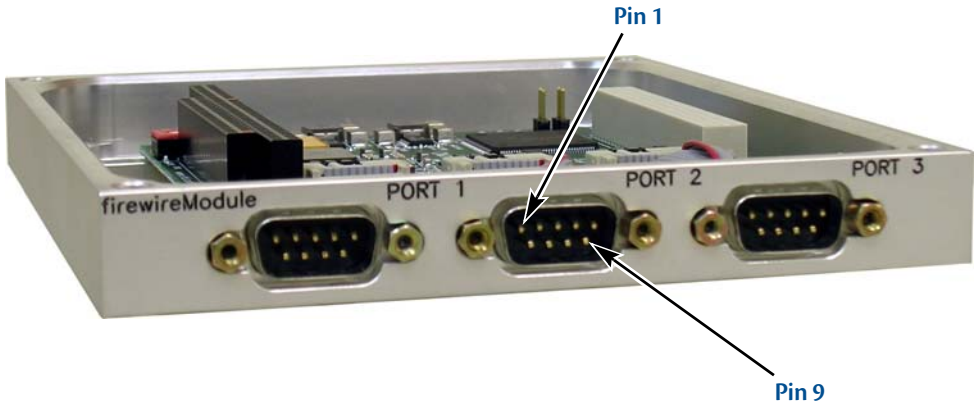


Figure 8 IDAN-CM17208HRS Connector Pins

Note *Photographs are not to scale.*

External I/O Connections

Table 6 IDAN-CM17208HRS Pinout[1]

IDAN Pin #	Signal	Function
1	TPA+	Twisted Pair A+
2	TPR(A)	Ground, Twisted Pair A
3	TPB+	Twisted Pair B+
4	SGND	Shield Ground
5	GND	Ground
6	TPA–	Twisted Pair A–
7	TPR(B)	Ground, Twisted Pair B
8	TPB–	Twisted Pair B–
9	VCC	+12 V

1. Pinout for all three ports.

Appendix C 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 a Return Material Authorization 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.

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.

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