



**MiniModule™ 1394
PC/104-Plus Expansion Board
QuickStart Guide and
Reference Manual**

P/N 5001686A Revision A

Notice Page

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Audience Assumptions

This manual is for the person who designs computer related equipment, including but not limited to hardware and software design and implementation of the same. Ampro Computers, Inc. assumes you are qualified in designing and implementing your hardware designs and its related software into your prototype computer equipment.

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Chapter 1 About This Manual

Purpose

This manual provides information regarding the installation and setup of the MiniModule 1394 as well as sufficient technical information that permits embedded system designers to easily expand their embedded systems based on any additional design requirements.

NOTE	The MiniModule 1394 is designed for CPU modules with PC/104-Plus only. PC/104 only CPU modules are not supported.
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Information provided in the QuickStart Setup Chapter (2) of this manual includes:

- Removing the MiniModule 1394 board from the shipping container
- Inventorying the accessories
- Connecting the MiniModule 1394 board to the respective target board
- Powering up the MiniModule 1394 board with the target board

Information provided in the Reference Chapters (1, 3, and 4) of this manual includes:

- MiniModule 1394 board Specifications
- Environmental requirements
- Major integrated circuits (chips) and features implemented
- MiniModule 1394 board connector/pin numbers and definition

Information not provided in this manual includes:

- Detailed chip specifications
- Internal component operation
- Internal registers or signal operations
- Bus or signal timing for industry standard busses and signals

Reference Material

The following list of reference materials may be helpful for you to complete your custom design successfully. Most of this reference material is also available on the Ampro web site in the Embedded Design Resource Center. The Embedded Design Resource Center was created for the benefit of embedded system developers to share Ampro's knowledge, insight, and expertise gained from years of experience.

Specifications

- PC/104 Specification, Revision 2.4 August 2001
- PC/104-Plus Specification, Revision 1.2 August 2001

For latest revision of either PC/104 specification, contact the PC/104 Consortium, at:

Web site: [http:// www.pc104.org](http://www.pc104.org)

- PCI 2.2 Compliant Specification, Revision 2.2, December 18, 1998

For latest revision of the PCI specifications, contact the PCI Special Interest Group at:

Web site: [http:// www.pcisig.com](http://www.pcisig.com)

- IEEE 1394 Specification, Revisions 1394-1995 and 1394a-2000

For the latest revision of the IEEE 1394 specification, contact the Institute of Electrical and Electronics Engineers (IEEE) at:

Web site: [http:// www.ieee.org](http://www.ieee.org)

Chip specifications used in the MiniModule 1394 expansion board:

- VIA Technologies, Inc and the chip, VT6307L, used for the IEEE 1394 controller

Web site: [http:// www.viatech.com](http://www.viatech.com)

Related Ampro Products

The following items are directly related to successfully using the Ampro product you have just purchased or plan to purchase. Ampro highly recommends that you purchase and utilize a MiniModule 1394 QuickStart Kit simultaneously with the design of your product.

MiniModule Support Products

- MiniModule 1394 QuickStart Kit (QSK)

The MiniModule 1394 QuickStart Kit includes the MiniModule 1394 expansion board, documentation, and drivers for Ampro supported operating systems on the MiniModule 1394 Documentation and Support Software (Doc & SW) CD-ROM.

Other MiniModule Products

- MiniModule™ PCC II Expansion Board – This MiniModule is a compact, low power PC/104 peripheral board with two PCMCIA card sockets for connecting one or two PCMCIA memory or peripheral cards to an Ampro embedded system. Up to two MiniModule PCC IIs can be installed in a system. This MiniModule allows the integration of PCMCIA memory cards and PCMCIA peripheral cards into systems based on Ampro's CoreModule™ and Little Board™ CPUs.

The MiniModule PCC II supports memory cards such as Flash EPROM, SRAM, and One Time Programmable EPROM (OTPROM) and I/O devices such as modems, LAN adapters, or PCMCIA-ATA (IDE) drives. PCMCIA XIP (eXecute In Place) is fully supported. The MiniModule PCC II has two PCMCIA card sockets that are compatible with Type I, Type II, Type III, and Type IV cards. The MiniModule PCC II can be used with any PC/104 compatible CPU including the Ampro CoreModule or Little Board families (See Other Ampro Products).

The MiniModule PCC II also comes in a local and remote version where the Local Version is used as a stand-alone board, mounted directly on a CPU module. The Remote Version is connected to the CPU remotely through an additional board, the Buffer Module and its ribbon cable. The Remote Version can be mounted up to 14 inches from the Buffer Module and CPU.

- MiniModule™ ESB Expansion Board – This MiniModule is a multipurpose communications board with one Ethernet port, two serial ports, and one byte-wide socket. The MiniModule ESB size and expansion bus connectors conform to the PC/104-Plus standard and can be installed directly on Ampro's Little Board™ and CoreModule™ computer systems supporting the PC/104-Plus expansion bus. The MiniModule ESB supports one 10/100BaseT Ethernet port, two 16C550-type RS232 Serial Ports (with optional RS485 and TTL interfaces) and the byte-wide socket supports Disk-On-Chip, flash EPROM, SRAM, or NVRAM.

- MiniModule™ PCC III Expansion Board – This MiniModule is a compact, low power PC/104-Plus peripheral board with two PCMCIA card sockets for connecting one or two PCMCIA memory or peripheral cards to an Ampro CPU module or single board computer. Up to two MiniModule PCC III boards can be installed in a system. This MiniModule allows the integration of commercially available 16-bit or 32-bit PC cards or PCMCIA memory cards and peripheral cards.

The MiniModule PCC III supports memory cards such as EPROM, SRAM, and One Time Programmable EPROM (OTPROM) and I/O devices such as 802.11 Wireless LANs (WiFi®) modems, 10/100BaseT LAN adapters, or PCMCIA-ATA (IDE) drives. PCMCIA XIP (eXecute In Place) is fully supported. The MiniModule PCC III has two PCMCIA card sockets that are compatible with Type I, Type II, Type III, and Type IV cards. The MiniModule PCC III can be used with any PC/104-Plus compatible CPU including the Ampro CoreModule or Little Board families (See Other Ampro Products).

- MiniModule™ USB2 Expansion Board – This MiniModule is a compact, low power PC/104-Plus peripheral board with four USB 2.0 high speed interface connectors. The MiniModule USB2 supports both legacy speeds (1.5Mbps and 12Mbps) and the new high speed (480Mbps) USB 2.0 standard (December 21, 2000). The MiniModule USB2 supports a USB host, root hub and four downstream USB ports with hot insertion or removal of any USB 2.0 cable. The MiniModule USB2 can be used with any PC/104-Plus compatible CPU including the Ampro CoreModule or Little Board families (See Other Ampro Products).

Other Ampro Products

- CoreModule™ Family – These complete embedded-PC subsystems on single PC/104 or PC/104-Plus form-factor (3.6x3.8 inches) boards feature 486 and Mobile Pentium CPUs. Each CoreModule includes a full complement of PC core logic functions, plus disk controllers, and serial and parallel ports. Some boards also include CRT and flat panel graphics controllers or an Ethernet interface. The CoreModules also come with built-in extras to meet the critical reliability requirements of embedded applications. These include onboard solid state disk compatibility, watchdog timer, smart power monitor, and other embedded-PC BIOS enhancements.
- EnCore™ Family - These high-performance, compact, modular CPU solutions use various processor technologies including Intel x86, MIPS, and PowerPC architectures to plug into your custom logic board. Each EnCore module provides standard peripherals, including IDE, floppy drive interface, PCI bus, serial, parallel, PS/2 keyboard and mouse interfaces, 10/100BaseT Ethernet, and USB ports. Some EnCore modules also provide video and AC97 sound. Depending on the model, EnCore modules can hold between 16MB and 512MB of SODIMM SDRAM memory.
- Little Board™ Family – These high-performance, highly integrated single board computers use the EBX form factor (5.75x8.00 inches), and are available with 486, Mobile Pentium, Pentium II, Pentium III, and Celeron processors. The EBX-compliant Little Board single board computers offer functions equivalent to a complete laptop or desktop PC system, plus several expansion cards. Built-in extras to meet the critical requirements of embedded applications include onboard solid state disk capability, Watchdog timer, smart power monitor, and other embedded-PC BIOS enhancements.

Chapter 2 Setting Up the MiniModule 1394

Using the MiniModule 1394 QuickStart Kit

This QuickStart setup chapter provides the most efficient way to set up your MiniModule 1394 board installed on an Ampro target board (CoreModule or Little Board). The instructions provided in this setup chapter include:

- Removing the MiniModule 1394 board from the shipping container
- Inventorying the accessories
- Connecting the MiniModule 1394 board to the respective target board
- Powering up the MiniModule 1394 board and the target system

Information not provided in this chapter includes:

- MiniModule 1394 board specifications
- Environmental requirements
- MiniModule 1394 board connector pin numbers and definitions
- Supplied software driver use and programming considerations

Requirements

The following devices are needed to make full use of the MiniModule 1394 and the target board.

- Target System (PC/104-Plus compliant)
 - ◆ Ampro CoreModule CPUs
 - ◆ Ampro Little Board SBCs
 - ◆ 3rd party target systems
- Power supply:
 - ◆ AT or lab power supply – A target system power supply is required to provide power to the target board and the MiniModule 1394 board.
 - ◆ Optional power cable for +5V and +12V input
- Boot Device for the target system
- Optional Devices/Connections for Target System
 - ◆ Display, keyboard, mouse, etc.
 - ◆ Ethernet connection

What's in the Box

Refer to the QuickStart Kit Contents sheet for a list of the items in the shipping container.

Setup Steps

It is important to follow the setup steps in this chapter in the exact order listed here, but skip any steps that do not apply to your situation. References are provided to chapters within this guide or other Ampro manuals, which provide more information about installation and use of the MiniModule 1394 board.

Preparations

1) Open shipping box.	<ul style="list-style-type: none"> • Locate the QuickStart Kit Contents sheet. • Unpack the contents of the shipping box.
2) Verify Contents.	<ul style="list-style-type: none"> • Verify the contents of the shipping box against the QuickStart Kit Contents sheet included with your MiniModule 1394 shipping box. • If anything is missing or damaged, contact your sales representative or Ampro Technical Support.
3) Support Documentation (MiniModule Documentation & Support Software (Doc & SW) CD-ROM)	<ul style="list-style-type: none"> • MiniModule 1394 QuickStart Setup Chapter 2 describes how to setup, install, and power up the MiniModule 1394 board found in the QuickStart Kit. This chapter is found in the <i>MiniModule 1394 QuickStart Guide and Reference Manual</i> found under the MiniModule 1394 menu on the MiniModule Documentation & Support Software CD-ROM (MiniModule Doc & SW CD-ROM) as a PDF file. • MiniModule 1394 Reference Material Chapters 1, 3, and 4 describe the MiniModule 1394 board in more detail and provide more reference information. These chapters are found in the <i>MiniModule 1394 QuickStart Guide and Reference Manual</i> found under the MiniModule 1394 menu on the MiniModule Documentation & Support Software CD-ROM (MiniModule Doc & SW CD-ROM) as a PDF file.

Setting Up the MiniModule 1394

CAUTION	<p>To prevent damage to the electronic components on the MiniModule 1394 board, or the target system, do not handle the boards until you have used Electrostatic Discharge precautions.</p> <p>Always touch a grounded, unpainted metal surface before touching the MiniModule 1394 board or the target system.</p> <p>Always use an anti-static wrist or ankle strap connected to a grounding mat, which has static-dissipating characteristics and attached to earth ground.</p>
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4) Select workbench location	<ul style="list-style-type: none"> • The workbench location should be flat, clear of debris, and have a static-free mat (or the equivalent) to place the target board and MiniModule 1394 onto for setup and operation (including the target system power supply, peripherals, and support devices).
5) Connect an ESD strap to your body.	<ul style="list-style-type: none"> • Connect an ESD strap between your body (wrist or ankle) and ground or the static-free mat. <p>If you do not have your own ESD strap, an ESD kit is provided in the QuickStart Kit with an anti-static wrist strap.</p>

Setting Up the Target System

	<ul style="list-style-type: none"> • If the target system has already been setup on the workbench for installation of the MiniModule 1394 board, skip this section and go to Step 9. • Refer also to the target system QuickStart Guide for the install instructions referenced in the following steps. See Figures 2-1 and 2-2 for examples of CoreModule and Little Board Target Systems.
6) Place the target system on the workbench	<ul style="list-style-type: none"> • If the target system is in its protective plastic case, remove from the plastic case and place it on a flat, static-free work surface.
7) Connect all cables to the target system	<ul style="list-style-type: none"> • This includes connecting cables used for any peripherals, boot devices, and the power supply used for the target system.
8) Connect the peripherals and boot devices	<ul style="list-style-type: none"> • This includes the keyboard, mouse, monitor, floppy drive, and IDE devices
9) Connect the power supply	<ul style="list-style-type: none"> • Connect the power supply to the target system, but do not turn it on, or connect the power cord to the AC power source yet.

CAUTION

To prevent damage to the MiniModule 1394 board or the target system, do not connect the power cord to the AC power source or apply power to the target system, until you have completely installed the MiniModule 1394 onto the target system. The typical AT power supply will supply standby current to the target system as long as the power cord is connected.

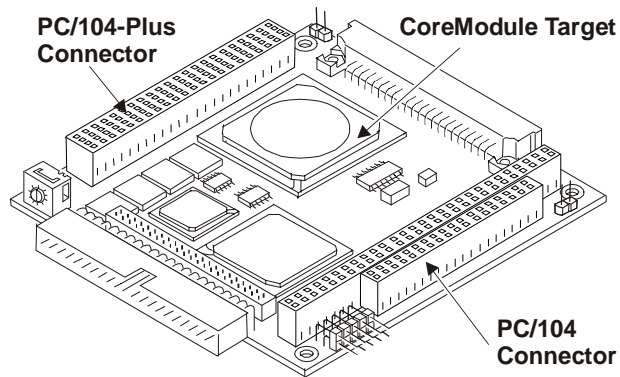


Figure 2-1. CoreModule Target System Example

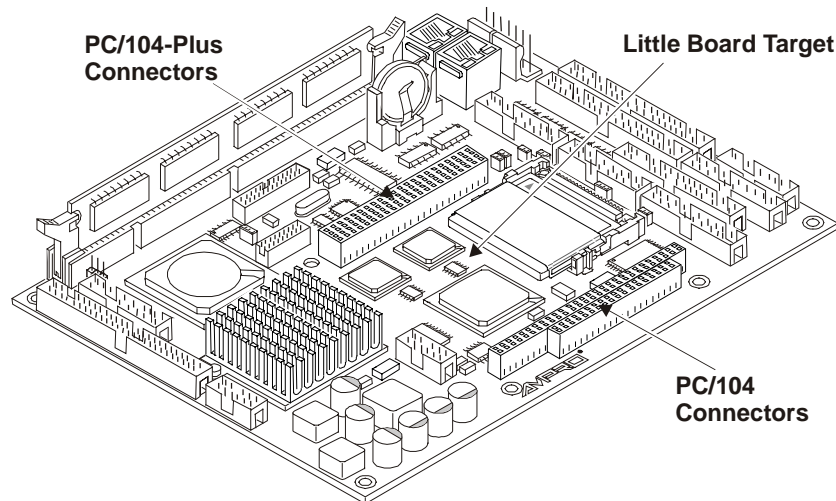


Figure 2-2. Little Board Target System Example

Mounting the Module onto the Target System

CAUTION To prevent damage to the MiniModule 1394 board or the target board, do not attempt to mount the MiniModule 1394 board to a non-standard PC/104-Plus target board. The MiniModule 1394, CoreModule, and Little Board boards conform to the standard PC/104-Plus mounting hole and board dimensions. Details about mounting hole positions, sizes, and board dimensions are provided in the Chapter 3, *Product Overview* later in this manual.

10) Unpack the MiniModule 1394 board.	<ul style="list-style-type: none"> Remove the MiniModule 1394 from its protective plastic case and place it on a flat, static-free work surface.
11) Check the MiniModule 1394 for bent pins	<ul style="list-style-type: none"> Ensure there are no bent or broken pins on the underside of the board at the PC/104 connector, before attempting to install the MiniModule 1394.
12) Position the MiniModule 1394 over the target system	<ul style="list-style-type: none"> The MiniModule 1394 must be positioned over the PC/104 and PC/104-Plus connectors on the target system. See Figures 2-1 to 2-4. <p>Typically the MiniModule 1394 board is installed on the top side of the target system, but in some cases, it may be installed underneath the target system.</p>

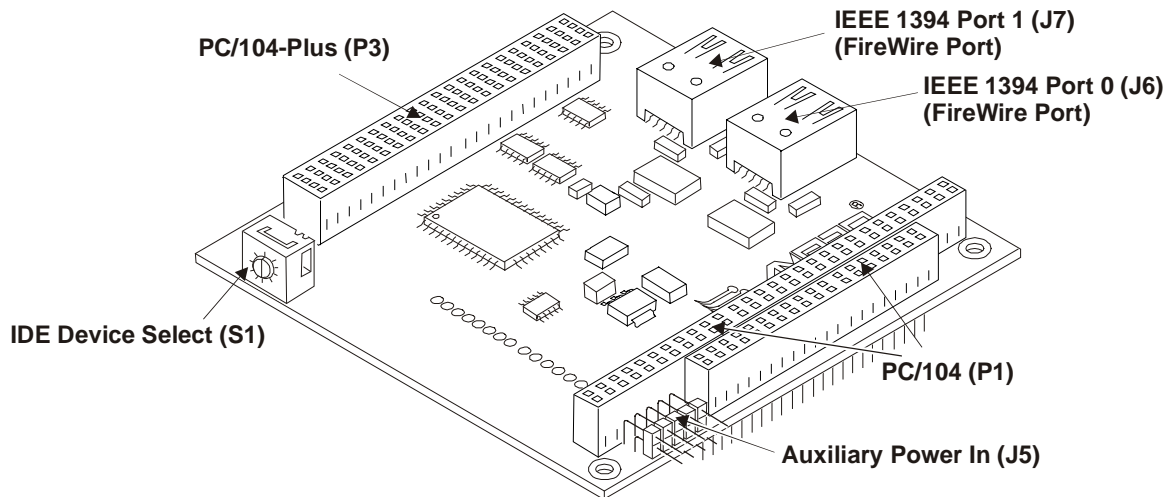


Figure 2-3. MiniModule 1394

13) Install the spacers on the target board	<ul style="list-style-type: none"> Install the threaded spacers onto the target board at the four corners of the MiniModule 1394. See Figures 2-4 and 2-5.
14) Gently align the connectors and pins	<ul style="list-style-type: none"> Place the PC/104 pins over the connector beneath and align the pins to the connector. Gently insert the PC/104 pins into the connector, ensuring each pin goes into its hole in the connector. <p>If you have difficulty matching pins, do not try to force the pins in. Use a small flat blade screwdriver to help position the pins over the holes.</p>
15) Slowly insert the MiniModule board into the connectors	<ul style="list-style-type: none"> Once the pins are aligned with the proper holes, slowly insert the MiniModule 1394 into the connectors. Ensure the pins go all the way into the connector and are seated on the target board. <p>There should just be enough space between the target board and the MiniModule 1394 to insert the threaded spacers and secure.</p>

16) If necessary, install any additional MiniModule boards	If there are any additional expansion boards, install the boards now, before powering up the target system.
17) Set the Device ID in the stack, if known.	The Device ID Select switch (S1) is used to configure the PCI position of MiniModule 1394 in the board stack. Refer to Figure 2-3, Table 2-1, and Table 3-3 in Chapter 3, <i>Product Overview</i> for more information.

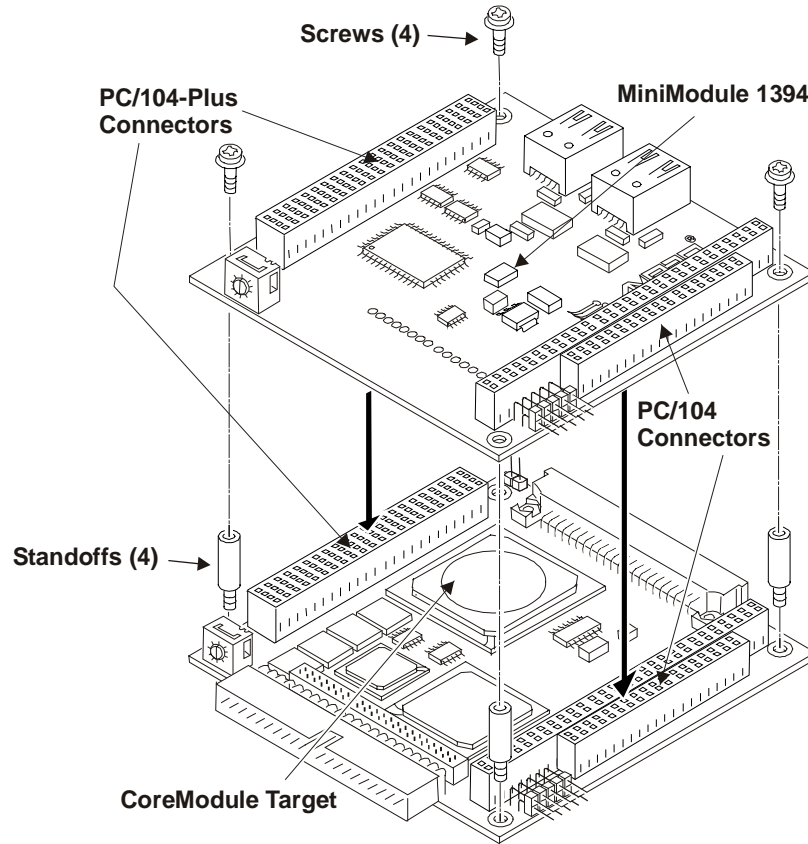


Figure 2-4. Installing MiniModule 1394 on CoreModule Target

Table 2-1. Device ID Select Position Switch (S1)

Switch Position	Module Position in PCI Stack
0 (or 4)	1
1 (or 5)	2
2 (or 6)	3
3 (or 7)	4

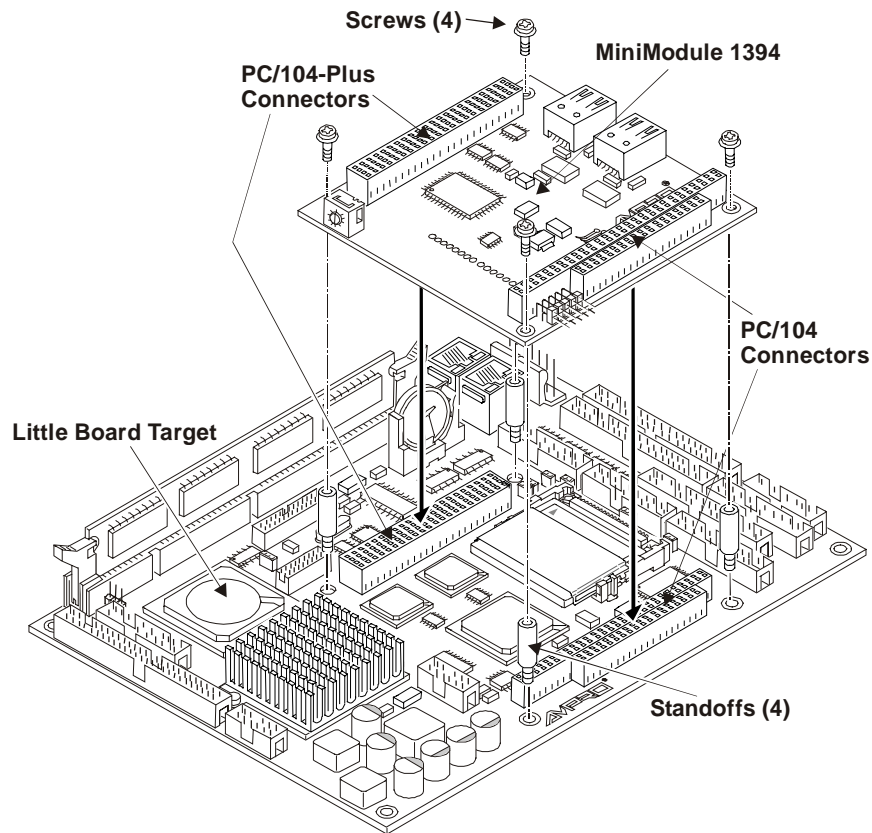


Figure 2-5. Installing MiniModule 1394 on Little Board Target

Applying Power to the Target System

18) Check/Set the Power Supply Input Voltage	<ul style="list-style-type: none"> • If the power supply uses auto-ranging operation at 50/60Hz, skip this step. • Check the input voltage switch on the power supply located on the rear of the supply just below the power connector. The input voltage switch typically has two positions: 115 or 230 volts – 115 volts is default position.
19) Power up the the target system.	<ul style="list-style-type: none"> • Plug the CRT monitor's power cord into an AC outlet and turn on the monitor. • Plug the AT power supply's power cord into the AC outlet. • Turn the AT power supply's power switch to On before continuing.
20) Verify the target system powers-up satisfactorily.	<ul style="list-style-type: none"> • Refer to the target system's QuickStart Guide for further instructions about completing the boot process.

The MiniModule 1394 board does not require any further setup, except the connection of the IEEE 1394 cables to the IEEE 1394 ports on the board.

- The MiniModule 1394 supports hot insertion or removal of the IEEE 1394 cables.
- The MiniModule 1394 supports the Plug and Play option with Plug 'n Play operating systems.
- Older operating systems may not support the IEEE 1394 standard.
- The BIOS of the target system is not affected by the MiniModule 1394 board.

For more specific technical information about the MiniModule 1394, refer to the reference chapters.

Accessing Drivers and Documentation

To check for updates, access drivers for supported operating systems that do not support Plug 'n Play operation, or get a PDF copy of this manual, refer to the following steps.

1. Run the MiniModule Documentation & Support Software CD-ROM (Doc & SW CD-ROM) to access the CD's contents.

This includes the MiniModule 1394 documentation, release notes, and any OS drivers that are not part of the target system OS or on the OS manufacturer's diskette(s) or CD-ROM.

The Doc & SW CD-ROM will operate on any Windows PC, allowing you to view, download, or print the contents of the CD-ROM. This includes the MiniModule 1394 *QuickStart Guide and Reference Manual*, Release Notes, and any software drivers.

NOTE

You must have an Internet browser to view the main menu and make selections (examples: Microsoft Internet Explorer 4.x, or greater, Netscape Navigator version 4.x, or greater, or the equivalent on a PC). Software download links are provided for Adobe Acrobat Reader version 4.x or greater to view the manuals and documents.

The Doc & SW CD-ROM should auto-start, but if it does not, go to the root level of the CD-ROM and locate the index.htm by:

- a. Selecting Run from the Start menu in any Windows PC.
- b. Browsing the contents of the CD-ROM until you find the index.htm at the root level.
- c. Selecting this file and pressing OK to start the CD-ROM.

The CD-ROM starts and opens the main menu of the CD-ROM.

2. Select the MiniModule 1394 from the main menu:

This menu has links to all the documentation, including the manual and release notes, and links for any for available software drivers for the supported operating systems.

3. Install any special OS drivers not found as part of the target system OS or on the OS manufacturer's diskette(s) or CD-ROM.

Refer to the directory under the MiniModule 1394 menu item on the Doc & SW CD-ROM for instructions on installing the special drivers for the desired OS.

If the desired drivers can not be found, contact Ampro through the Virtual Technician on the web site with a request for the driver(s), or use the *Check for Latest Updates* link on the Doc & SW CD-ROM to check for the latest drivers on the web site.

Chapter 3 Product Overview

This introduction presents general information about the PC/104 architecture and the MiniModule 1394 (FireWire) expansion board. After reading this chapter you should understand:

- PC/104 and PC/104-Plus Concept
- MiniModule 1394 Architecture and Features
- Major components and Connectors
- Specifications

PC/104 Architecture

The PC/104-Plus architecture affords a great deal of flexibility in system design. You can build a simple system using only a CPU/Controller, such as an Ampro Little Board or CoreModule SBC, which provides the processor, memory, and input/output device connections (keyboard, mouse, serial, parallel, floppy drive, and IDE drives). To expand the I/O capability of a simple system, simply add self-stacking PC/104 and PC/104-Plus expansion boards, such as Ampro's MiniModules, to provide additional capabilities, such as:

- Additional serial and Ethernet ports
- USB or IEEE 1394 (FireWire)
- PC card interfaces
- Sound cards

PC/104-Plus expansion boards can be stacked with the CPU Board avoiding the need for card cages and backplanes. The PC/104-Plus expansion boards can be mounted directly to the PC/104 and PC/104-Plus connectors of the target CPU Boards. PC/104-Plus compliant boards can be stacked with an inter-board spacing of ~0.66 inches so that a 3-board system fits in a 3.6 inch by 3.8 inch by 2.4 inch space. See Figure 3-1.

One or more PC/104-Plus boards can be installed on the CPU board's expansion connectors. When installed on an Ampro CoreModule or Little Board, the expansion board fits within the CoreModule or Little Board outline dimensions. Most MiniModule products have stackthrough connectors compatible with the PC/104-Plus Version 2.1 specification. Each additional board increases the thickness of the package by 15mm (0.66"). See Figure 3-2.

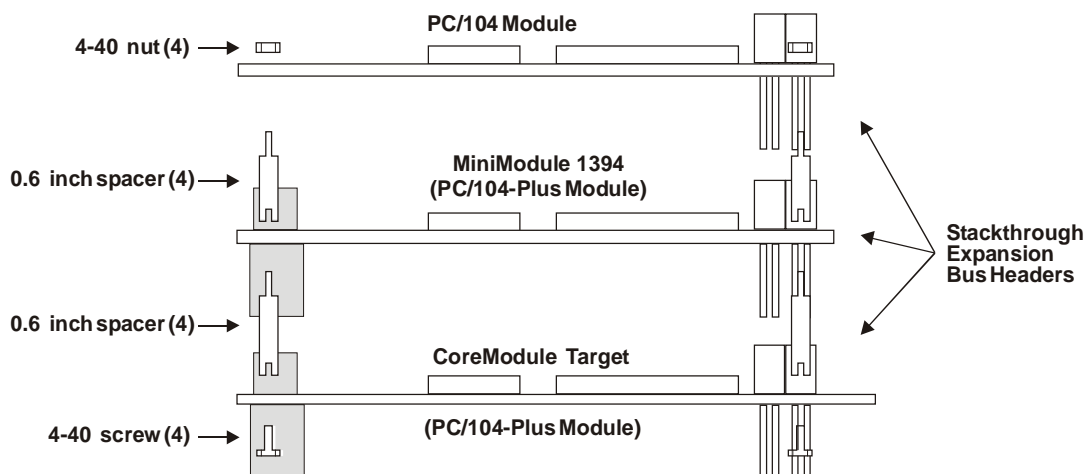


Figure 3-1. CoreModule Target Stackthrough Connections

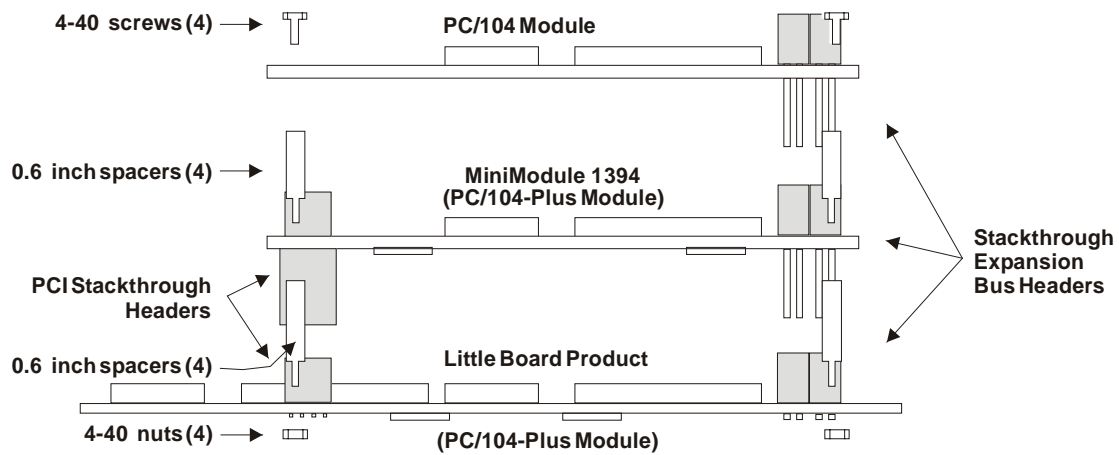


Figure 3-2. Little Board Target Stackthrough Connections

Product Description

The MiniModule 1394 is a PC/104-Plus compliant communication board providing two IEEE 1394 (FireWire) interface connectors. The size of the expansion bus connectors on the MiniModule 1394 conform to the PC/104-Plus standard and can be installed directly on Ampro's Little Board and CoreModule single board computer systems supporting the PC/104-Plus expansion bus. The MiniModule 1394 provides a 32-bit PCI host interface. The MiniModule 1394 only requires a single +5V power source, usually provided over the PC/104-Plus bus.

The MiniModule 1394 is particularly well suited to either embedded or portable applications. Its flexibility makes system design quick and easy. It can be stacked with other Ampro MiniModules or other PC/104-Plus compliant expansion boards.

Module Features

- Platform
 - ◆ Supports the PC/104-Plus platform
 - ◆ Conforms to the PC/104-Plus form factor (96x90x23 mm)
 - ◆ User Selectable Device IDs
- Controller (VT6307L)
 - ◆ IEEE 1394 Host Controller
 - ◆ Supports IEEE 1394 Standards, 1394-1995 and 1394a-2000
 - ◆ Supports transfer speeds of 100, 200, or 400Mbps
 - ◆ Compliant with IEEE 1394 Open HCI Rev. 1.0 and 1.1
 - ◆ Descriptor based isochronous and asynchronous DMA channels for receive/transmit packets
 - ◆ Requires no BIOS support changes in target system
 - ◆ Supports 4-wire 4k-bit Serial EEPROM (SEEP)
 - ◆ Supports PCI bus specification revision 2.2 interface (32-bit, 33MHz, PCI bus master and target)
- Device Interfaces
 - ◆ Supports two standard IEEE 1394 (FireWire) connectors
 - ◆ Supports two fully compliant IEEE 1394 ports at 100, 200, or 400Mbps

- ◆ Supports cable power presence monitoring
- ◆ Supports separate TPBIAS for each port
- ◆ Supports full interoperability with IEEE standard 1395-1995 devices
- ◆ Supports hot insertion or removal of any IEEE 1394 cable
- Software
 - ◆ Supports Plug and Play operation with target board Plug-n-Play operating systems
 - ◆ Supports drivers for:
 - Windows 98se/Me/2000/XP/XP Embedded
 - Windows CE.NET (4.1)
 - TimeSys Linux
- Power Supply voltages
 - ◆ +5.0VDC +/-5% @ 0.05Amps (Typically provided through PC/104-Plus bus)
 - ◆ +12VDC +/- 5% @ < 1.5 Amps (Used for IEEE 1394 cable/bus power only; typically provided through auxiliary power cable to J5. As an alternate, use a PC/104-Plus power supply board.)

Block Diagram

Figure 3-3 provides a functional block diagram of the MiniModule 1394 board.

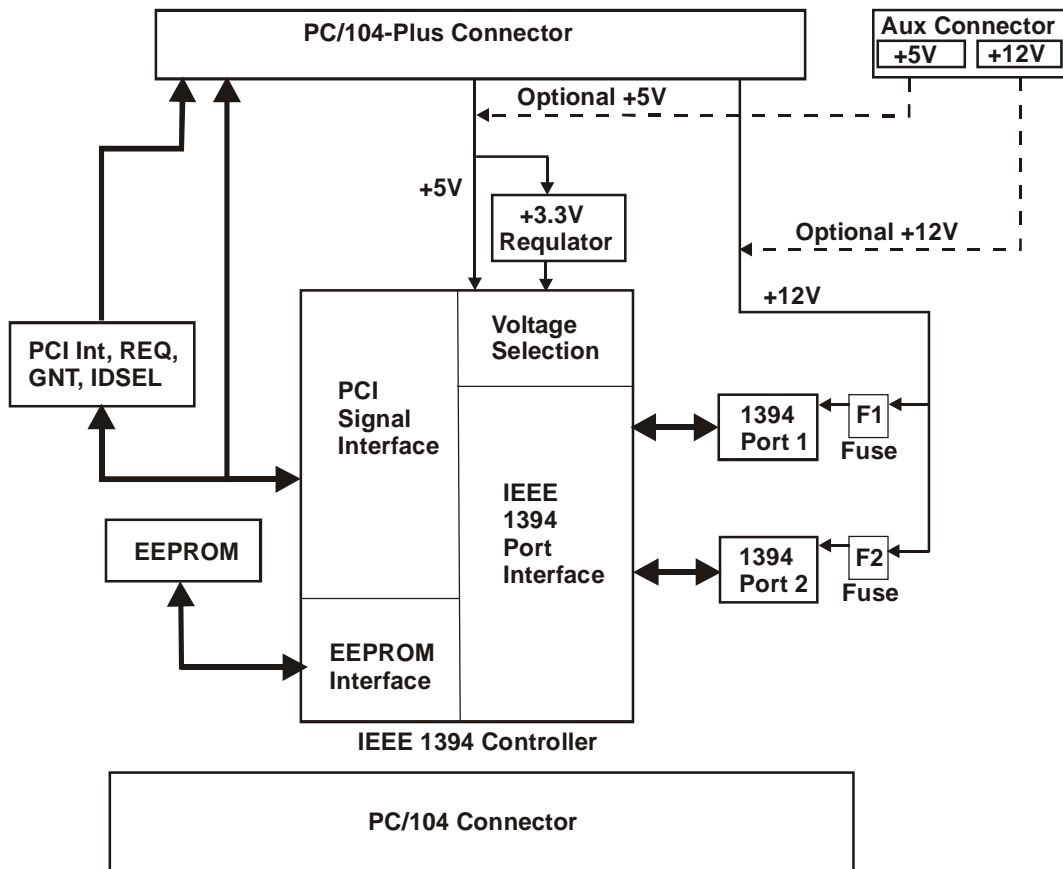


Figure 3-3. MiniModule 1394 Block Diagram

Major Integrated Circuits (ICs)

Table 3-1 lists the major integrated circuits, including a brief description of each, on the MiniModule 1394 and Figure 3-4 shows the location of the major chips. .

Table 3-1. Major Integrated Circuit Description and Function

Chip Type	Mfg.	Model	Description	Function
IEEE 1394 Host Controller (U1)	VIA Technologies, Inc.	VT6307L	IEEE 1394 host controller and PCI interface	IEEE 1394 controller

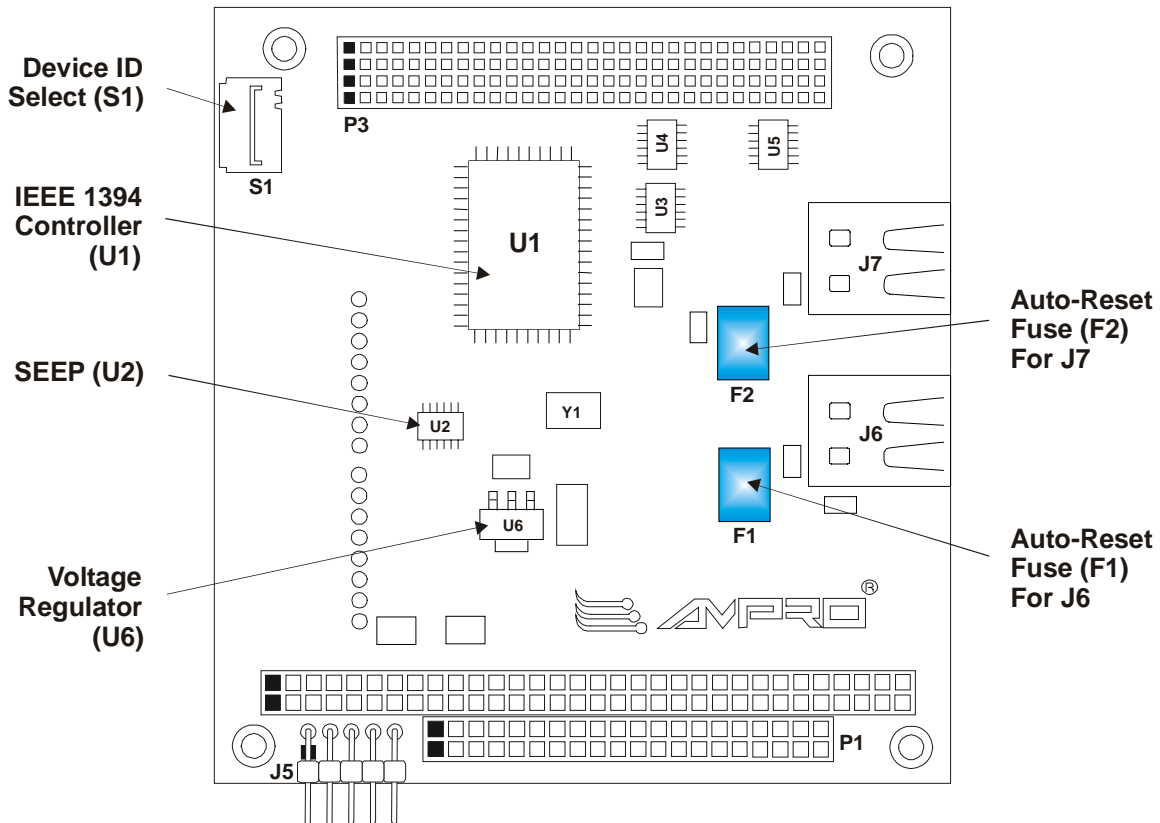


Figure 3-4. MiniModule 1394 (Top View)

NOTE Pin 1 is shown as black square pin in connectors in all illustrations.

NOTE The auto reset fuses (F1 and F2) will automatically reset when the trip current falls below the trip value (1.5A).

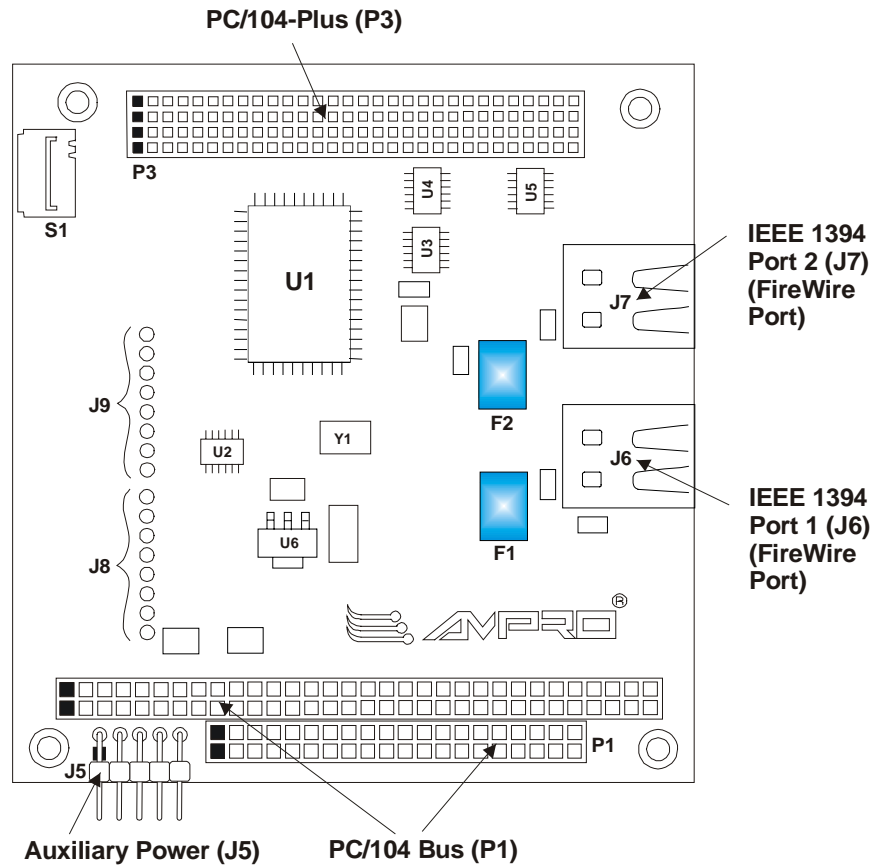
Connectors and Switches

Connector Definitions

Table 3-2 describes the connectors shown in Figure 3-5.

Table 3-2. Connector Descriptions

Jack/Plug #	Board Access	Description
P1A/1B & P1C/1D – PC/104 Bus	Top/Bottom	104-pin connector used for the PC/104 bus (ISA bus) (PC/104 connector is used as pass-through connector)
P3 – PC/104-Plus	Top/Bottom	120-pin connector used for the PC/104-Plus bus (PCI bus)
J5 – Auxiliary Power	Top	10-pin connector used for optional Auxiliary Power connection
J6 – IEEE 1394 Port 0	Top	6-pin connector used for the IEEE 1394 interface
J7 – IEEE 1394 Port 1	Top	6-pin connector used for the IEEE 1394 interface



NOTE

Pin 1 is shown as black square pin in all connectors in all illustrations. Connector positions J8 and J9 are available for optional right angle headers used with transition cables. Contact Ampro for more information.

Selection Switch

The 10-position rotary switch (S1) is used to configure the MiniModule 1394 position in the stack of PCI card slots. Every PCI card in the stack must have a unique address. Table 3-3 provides the switch settings in Figure 3-6.

Table 3-3. Device ID Selection Switch (S1)

Switch Position	Module Slot	REQ#	GNT#	CLK	INT#0	INT#1	INT#2	INT#3
0 (or 4)	1	REQ0#	GNT0#	CLK0	INTA#	INTB#	INTC#	INTD#
1 (or 5)	2	REQ1#	GNT1#	CLK1	INTB#	INTC#	INTD#	INTA#
2 (or 6)	3	REQ2#	GNT2#	CLK2	INTC#	INTD#	INTA#	INTB#
3 (or 7)	4	REQ3#	GNT3#	CLK3	INTD#	INTA#	INTB#	INTC#

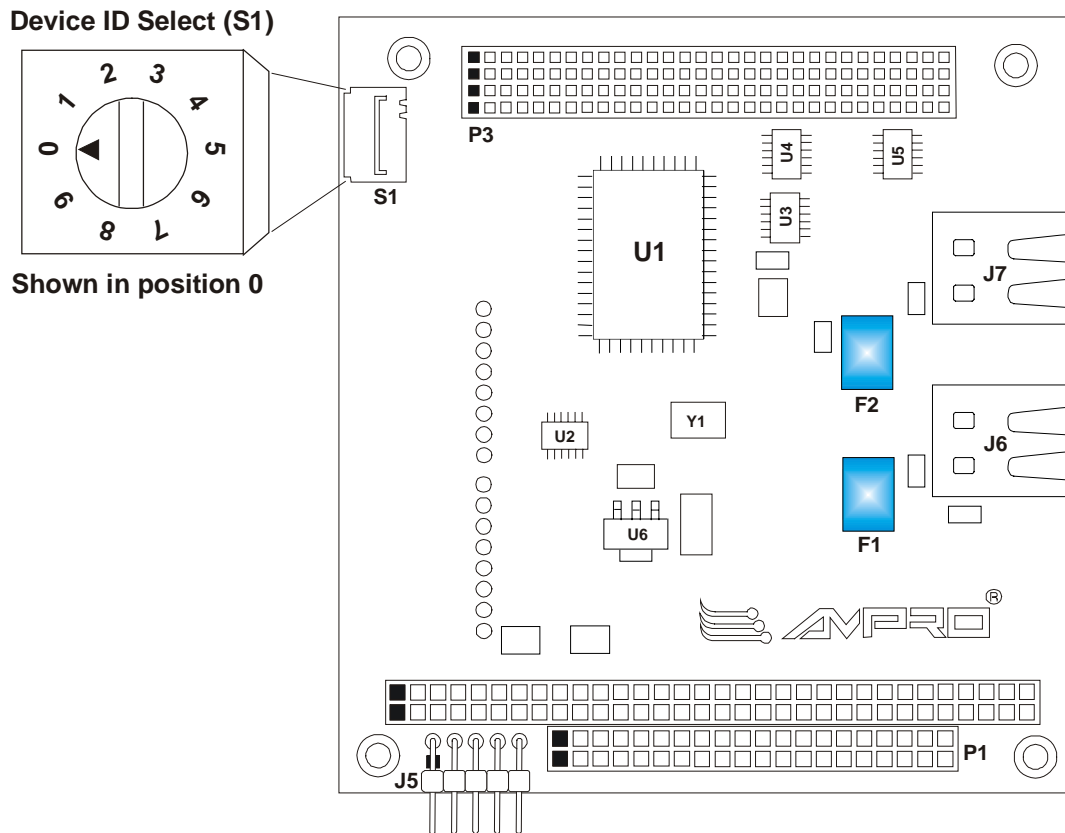


Figure 3-6. Device IDE Selection Switch (Top View)

Specifications

Physical Specifications

Table 3-4 gives the physical dimensions of the board and Figure 3-7 gives the mounting dimensions.

Table 3-4. Weight and Footprint Dimensions

Item	Dimension
Weight	0.068kg. (0.15lbs)
Height (overall, connector)	23.49 mm (0.925 inches)
Width	90.2 mm (3.6 inches)
Length	95.9 mm (3.8 inches)

Mechanical Specifications

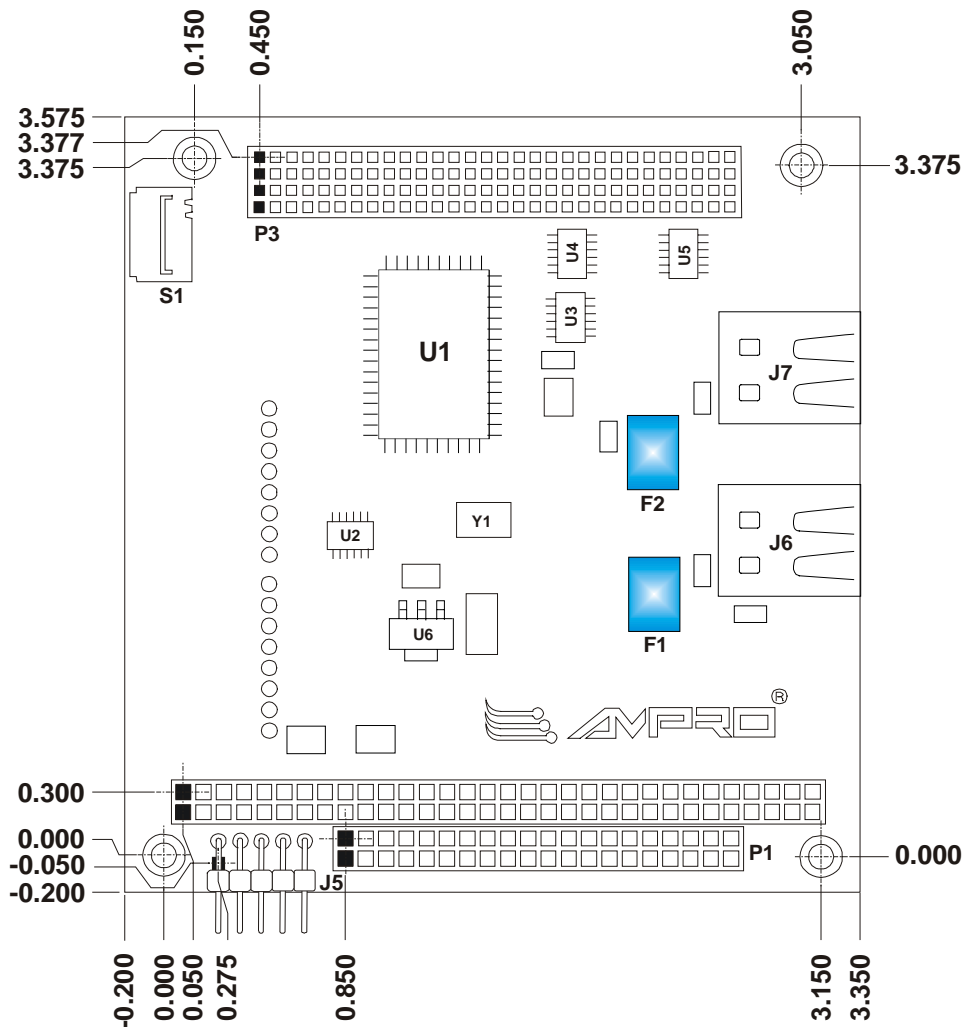


Figure 3-7. Mechanical Dimensions (Top View)

NOTE All dimensions are given in inches. Pin 1 is shown as a black square in all connectors in all illustrations.

Power Specifications

Table 3-5 gives the power requirements.

Table 3-5. Power Supply Requirements

Parameter	Characteristics
Input Type	Regulated DC voltages
Input Power Requirements	+5VDC +/- 5% @ 0.05 Amps +12VDC +/- 5% @ < 1.5 Amps (Used for IEEE 1394 cable/bus power only)
Operating Power	0.28 W Continuous

Environmental Specifications

Table 3-6 provides the most efficient operating and storage condition ranges required for this board.

Table 3-6. Environmental Requirements

Parameter	Conditions
Temperature	
Operating	+0° to +70° C (32° to 158° F)
Extended (Optional)	-40° to +85° C (-40° F to +185° F)
Storage	-55° to +85° C (-67° F to +185° F)
Humidity	
Operating	20% to 80% relative humidity, non-condensing
Non-operating	5% to 95% relative humidity, non-condensing

Thermal/Cooling Requirements

The IEEE 1394 controller (U1) does not require a heatsink.

Chapter 4 Hardware Description

Overview

This chapter discusses the chips and connectors of the board features in the following order:

- PC/104-Plus (P3)
- PC/104 (P1A, B, C, D)
- IEEE 1394 connectors (J6, J7)
- Power Connector (J5)

NOTE	Ampro Computers, Inc. only supports the features/options tested and listed in this manual. The integrated circuits used in the MiniModule 1394 may provide more features or options than are listed for the MiniModule 1394, but some of these features/options are not supported on the board and will not function as specified.
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PC/104-Plus Interface (P3)

The PC/104-Plus uses a 120-pin (30x4) header interface. This interface header will carry all of the appropriate PCI signals operating at clock speeds up to 33MHz. This interface header is stackable and is located on the top and bottom of the board.

Table 4-1 provides the signals and descriptions for each of the PC/104-Plus bus pin-outs.

Table 4-1. PC/104-Plus Pin/Signal Descriptions (P3)

Pin #	Signal	Input/ Output	Description
1 (A1)	GND/(Key)		Key - Digital Ground
2 (A2)	VI/O		+5 volts \pm 5% power supply
3 (A3)	AD05	T/S	PCI Address and Data Bus Line 5 – There are 32 signal lines (address and data) and the signals on these lines are multiplexed. A bus transaction consists of an address followed by one or more data cycles.
4 (A4)	C/BE0*	T/S	PCI Bus Command/Byte Enable 0 – This signal line is one of four signal lines. These signal lines are multiplexed, so that during the address cycle, the command is defined and during the data cycle, the byte enable is defined.
5 (A5)	GND		Digital Ground
6 (A6)	AD11	T/S	PCI Address and Data Bus Line 11 – Refer to Pin 3 for more information.
7 (A7)	AD14	T/S	PCI Address and Data Bus Line 14 – Refer to Pin 3 for more information.
8 (A8)	+3.3V		+3.3 volts \pm 5% power supply
9 (A9)	NC (SERR*)	O/D	Not connected (System parity Error)
10 (A10)	GND		Digital Ground
11 (A11)	STOP*	S/T/S	Stop – This signal indicates the current selected device is requesting the master to stop the current transaction

Pin #	Signal	Input/ Output	Description
12 (A12)	+3.3V		+3.3 volts \pm 5% power supply
13 (A13)	FRAME*	S/T/S	PCI bus Frame access – This signal is driven by the current master to indicate the start of a transaction and will remain active until the final data cycle
14 (A14)	GND		Digital Ground
15 (A15)	AD18	T/S	PCI Address and Data Bus Line 18 – Refer to Pin 3 for more information.
16 (A16)	AD21	T/S	PCI Address and Data Bus Line 21 – Refer to Pin 3 for more information.
17 (A17)	+3.3V		+3.3 volts \pm 5% power supply
18 (A18)	IDSEL0	In	Initialization Device Select 0 – This signal line is one of four signal lines. These signals are used as the chip-select signals during configuration
19 (A19)	AD24	T/S	PCI Address and Data Bus Line 24 – Refer to Pin 3 for more information.
20 (A20)	GND		Digital Ground
21 (A21)	AD29	T/S	PCI Address and Data Bus Line 29 – Refer to Pin 3 for more information.
22 (A22)	+5V		+5 volts \pm 5% power supply
23 (A23)	REQ0*	T/S	Bus Request 0 – This signal line is one of three signal lines. These signals indicate the device desires use of the bus to the arbitrator.
24 (A24)	GND		Digital Ground
25 (A25)	GNT1*	T/S	Grant 1 – This signal line is one of three signal lines. These signal lines indicate access has been granted to the requesting device (PCI Masters).
26 (A26)	+5V		+5 volts \pm 5% power supply
27 (A27)	CLK2	In	PCI clock 2 – This signal line is one of four signal lines. These clock signals provide the timing outputs for four external PCI devices and the timing for all transactions on the PCI bus
28 (A28)	GND		Digital Ground
29 (A29)	+12V		+12 volts \pm 5% power supply
30 (A30)	NC		Not connected - Reserved
31 (B1)	NC		Not connected - Reserved
32 (B2)	AD02	T/S	PCI Address and Data Bus Line 2 – Refer to Pin 3 for more information.
33 (B3)	GND		Digital Ground
34 (B4)	AD07	T/S	PCI Address and Data Bus Line 7 – Refer to Pin 3 for more information.
35 (B5)	AD09	T/S	PCI Address and Data Bus Line 9 – Refer to Pin 3 for more information.
36 (B6)	VI/O		+5 volts \pm 5% power supply

Pin #	Signal	Input/ Output	Description
37 (B7)	AD13	T/S	PCI Address and Data Bus Lines 13 – Refer to Pin 3 for more information.
38 (B8)	C/BE1*	T/S	PCI Bus Command/Byte Enable 1 – Refer to Pin 4 for more information.
39 (B9)	GND		Digital Ground
40 (B10)	PERR*		Parity Error – This signal is for reporting data parity errors.
41 (B11)	+3.3V		+3.3 volts $\pm 5\%$ power supply
42 (B12)	TRDY*	S/T/S	Target Ready – This signal indicates the selected device's ability to complete the current cycle of transaction. Both IRDY* and TRDY* must be asserted to terminate a data cycle
43 (B13)	GND		Digital Ground
44 (B14)	AD16	T/S	PCI Address and Data Bus Line 16 – Refer to Pin 3 for more information.
45 (B15)	+3.3V		+3.3 volts $\pm 5\%$ power supply
46 (B16)	AD20	T/S	PCI Address and Data Bus Lines 20 – Refer to Pin 3 for more information.
47 (B17)	AD23	T/S	PCI Address and Data Bus Line 23 – Refer to Pin 3 for more information.
48 (B18)	GND		Digital Ground
49 (B19)	C/BE3*	T/S	PCI Bus Command/Byte Enable 3 – Refer to Pin 4 for more information.
50 (B20)	AD26	T/S	PCI Address and Data Bus Line 26 – Refer to Pin 3 for more information.
51 (B21)	+5V		+5 volts $\pm 5\%$ power supply
52 (B22)	AD30	T/S	PCI Address and Data Bus Line 30 – Refer to Pin 3 for more information.
53 (B23)	GND		Digital Ground
54 (B24)	REQ2*	T/S	Bus Request – This signal indicates this device desires use of the bus to the arbitrator.
55 (B25)	VI/O		+5 volts $\pm 5\%$ power supply
56 (B26)	CLK0	In	PCI clock 0– Refer to Pin 27 for more information
57 (B27)	+5V		+5 volts $\pm 5\%$ power supply
58 (B28)	INTD*	O/D	Interrupt D – This signal is used to request interrupts only for multi-function devices.
59 (B29)	INTA*	O/D	Interrupt A – This signal is used to request an interrupt.
60 (B30)	NC		Not connected - Reserved
61 (C1)	+5		+5 volts $\pm 5\%$ power supply
62 (C2)	AD01	T/S	PCI Address and Data Bus Line 1 – Refer to Pin 3 for more information.
63 (C3)	AD04	T/S	PCI Address and Data Bus Lines 4 – Refer to Pin 3 for more information.
64 (C4)	GND		Digital Ground

Pin #	Signal	Input/ Output	Description
65 (C5)	AD08	T/S	PCI Address and Data Bus Line 8 – Refer to Pin 3 for more information.
66 (C6)	AD10	T/S	PCI Address and Data Bus Line 10 – Refer to Pin 3 for more information.
67 (C7)	GND		Digital Ground
68 (C8)	AD15	T/S	PCI Address and Data Bus Line 15 – Refer to Pin 3 for more information.
69 (C9)	NC (SB0*)	NC	Not connected (Snoop Backoff)
70 (C10)	+3.3V		+3.3 volts \pm 5% power supply
71 (C11)	NC (LOCK*)	S/T/S	Not connected (Lock)
72 (C12)	GND		Digital Ground
73 (C13)	IRDY*	S/T/S	Initiator Ready – This signal indicates the master’s ability to complete the current data cycle of the transaction
74 (C14)	+3.3V		+3.3 volts \pm 5% power supply
75 (C15)	AD17	T/S	PCI Address and Data Bus Line 17 – Refer to Pin 3 for more information.
76 (C16)	GND		Digital Ground
77 (C17)	AD22	T/S	PCI Address and Data Bus Line 22 – Refer to Pin 3 for more information.
78 (C18)	IDSEL1		Initialization Device Select 1 – Refer to Pin 18 for more information
79 (C19)	VI/O	NC	(+5V) Not connected
80 (C20)	AD25	T/S	PCI Address and Data Bus Line 25 – Refer to Pin 3 for more information.
81 (C21)	AD28	T/S	PCI Address and Data Bus Line 28 – Refer to Pin 3 for more information.
82 (C22)	GND		Digital Ground
83 (C23)	REQ1*	T/S	Bus Request 1 – Refer to Pin 23 for more information.
84 (C24)	+5V		+5 volts \pm 5% power supply
85 (C25)	GNT2*	T/S	Grant 2 – Refer to Pin 25 for more information
86 (C26)	GND		Digital Ground
87 (C27)	CLK3	In	PCI clock 3 – Refer to Pin 27 for more information
88 (C28)	+5V		+5 volts \pm 5% power supply
89 (C29)	INTB*	O/D	Interrupt B – This signal is used to request interrupts only for multi-function devices.
90 (C30)	PME*		Power Management Event – This signal is used for power management events
91 (D1)	AD00	T/S	PCI Address and Data Bus Line 0 – Refer to Pin 3 for more information.
92 (D2)	+5V		+5 volts \pm 5% power supply
93 (D3)	AD03	T/S	PCI Address and Data Bus Lines 3 – Refer to Pin 3 for more information.

Pin #	Signal	Input/ Output	Description
94 (D4)	AD06	T/S	PCI Address and Data Bus Lines 6 – Refer to Pin 3 for more information.
95 (D5)	GND		Digital Ground
96 (D6)	NC (M66EN)		Not connected (66MHz device enable)
97 (D7)	AD12	T/S	PCI Address and Data Bus Line 12 – Refer to Pin 3 for more information.
98 (D8)	+3.3V		+3.3 volts $\pm 5\%$ power supply
99 (D9)	PAR	T/S	PCI bus Parity bit – This signal is the even parity bit on AD[31:0] and C/BE[3:0]*
100 (D10)	NC (SDONE)		Not connected (Snoop Done)
101 (D11)	GND		Digital Ground
102 (D12)	DEVSEL*	S/T/S	Device Select – This signal is driven by the target device when its address is decoded.
103 (D13)	+3.3V		+3.3 volts $\pm 5\%$ power supply
104 (D14)	C/BE2*		PCI Bus Command/Byte Enable 2 – Refer to Pin 4 for more information.
105 (D15)	GND		Digital Ground
106 (D16)	AD19	T/S	PCI Address and Data Bus Line 19 – Refer to Pin 3 for more information.
107 (D17)	+3.3V		+3.3 volts $\pm 5\%$ power supply
108 (D18)	IDSEL2		Initialization Device Select 2 – Refer to Pin 18 for more information.
109 (D19)	IDSEL3		Initialization Device Select 3 – Refer to Pin 18 for more information.
110 (D20)	GND		Digital Ground
111 (D21)	AD27	T/S	PCI Address and Data Bus Line 27 – Refer to Pin 3 for more information.
112 (D22)	AD31	T/S	PCI Address and Data Bus Line 31 – Refer to Pin 3 for more information.
113 (D23)	VI/O		+5 volts $\pm 5\%$ power supply
114 (D24)	GNT0*	T/S	Grant 0 – Refer to Pin 25 for more information.
115 (D25)	GND		Digital Ground
116 (D26)	CLK1	In	PCI clock 1 – Refer to Pin 27 for more information
117 (D27)	GND		Digital Ground
118 (D28)	RST*	In	PCI bus reset – This signal is an output signal to reset the entire PCI Bus. This signal will be asserted during system reset
119 (D29)	INTC*	O/D	Interrupt C – This signal is used to request interrupts only for multi-function devices.
120 (D30)	GND		Digital Ground

Notes: The shaded area denotes power or ground. The signals marked with * = Negative true logic.

The Input/Output signals in this table refer to the input/output signals listed in the *PCI Local Bus Manual*, Revision 2.2, Chapter 2, paragraph 2.1, Signal definitions. The following terms or acronyms are used in this table:

- In – Input is standard input only signal
- Out – Totem Pole output is a standard active driver
- T/S – Tri-State is a bi-directional input output pin
- S/TS – Sustained Tri-State is an active low tri-state signal driven by one and only one agent at a time
- O/D – Open Drain allows multiple devices to share as a wire-OR.

PC/104 Bus Interface (P1A,B,C,D)

The PC/104 Bus uses a 104-pin 100mm header interface. This interface header will carry all of the appropriate PC/104 signals operating at clock speeds up to 8MHz. The interface header is located on the both the top and bottom of the board.

NOTE The PC/104 Bus connector is only used as a pass through connector to other boards in the stack and has no connections to the MiniModule 1394 expansion board except the +5V and ground connections

Table 4-2. PC/104 Bus Interface Pin/Signal Descriptions (P1A)

Pin #	Signal	Description (P1 Row A)
1 (A1)	NC (IOCHCHK*)	Not Connected (bus NMI input)
2 (A2)	NC (SD7)	Not Connected (Data bit 7)
3 (A3)	NC (SD6)	Not Connected (Data bit 6)
4 (A4)	NC (SD5)	Not Connected (Data bit 5)
5 (A5)	NC (SD4)	Not Connected (Data bit 4)
6 (A6)	NC (SD3)	Not Connected (Data bit 3)
7 (A7)	NC (SD2)	Not Connected (Data bit 2)
8 (A8)	NC (SD1)	Not Connected (Data bit 1)
9 (A9)	NC (SD0)	Not Connected (Data bit 0)
10 (A10)	NC (IOCHRDY)	Not Connected (Processor Ready Ctrl)
11 (A11)	NC (AEN)	Not Connected (Address Enable)
12 (A12)	NC (SA19)	Not Connected (Address bit 19)
13 (A13)	NC (SA18)	Not Connected (Address bit 18)
14 (A14)	NC (SA17)	Not Connected (Address bit 17)
15 (A15)	NC (SA16)	Not Connected (Address bit 16)
16 (A16)	NC (SA15)	Not Connected (Address bit 15)
17 (A17)	NC (SA14)	Not Connected (Address bit 14)
18 (A18)	NC (SA13)	Not Connected (Address bit 13)
19 (A19)	NC (SA12)	Not Connected (Address bit 12)
20 (A20)	NC (SA11)	Not Connected (Address bit 11)
21 (A21)	NC (SA10)	Not Connected (Address bit 10)
22 (A22)	NC (SA9)	Not Connected (Address bit 9)
23 (A23)	NC (SA8)	Not Connected (Address bit 8)
24 (A24)	NC (SA7)	Not Connected (Address bit 7)

Pin #	Signal	Description (P1 Row A)
25 (A25)	NC (SA6)	Not Connected (Address bit 6)
26 (A26)	NC (SA5)	Not Connected (Address bit 5)
27 (A27)	NC (SA4)	Not Connected (Address bit 4)
28 (A28)	NC (SA3)	Not Connected (Address bit 3)
29 (A29)	NC (SA2)	Not Connected (Address bit 2)
30 (A30)	NC (SA1)	Not Connected (Address bit 1)
31 (A31)	NC (SA0)	Not Connected (Address bit 0)
32 (A32)	GND	Ground

Notes: The shaded area denotes power or ground. The signals marked with * = Negative true logic.

Table 4-3. PC/104 Bus Interface Pin/Signal Descriptions (P1B)

Pin #	Signal	Description (P1 Row B)
33 (B1)	GND	Ground
34 (B2)	NC (RESETDRV)	Not Connected (System reset signal)
35 (B3)	+5V	+5V power
36 (B4)	NC (IRQ9)	Not Connected (Interrupt request 9)
37 (B5)	NC (-5V)	Not Connected (-5V)
38 (B6)	NC (DRQ2)	Not Connected (DMA request 2)
39 (B7)	NC (-12V)	Not Connected (-12V)
40 (B8)	NC (ENDXFR*)	Not Connected (Zero wait state)
41 (B9)	+12V	+12V power
42 (B10)	GND	Key pin
43 (B11)	NC (SMEMW*)	Not Connected (System Memory Write (lower 1MB))
44 (B12)	NC (SMEMR*)	Not Connected (System Memory Read (lower 1MB))
45 (B13)	NC (IOW*)	Not Connected (I/O Write)
46 (B14)	NC (IOR*)	Not Connected (I/O Read)
47 (B15)	NC (DACK3*)	Not Connected (DMA Acknowledge 3)
48 (B16)	NC (DRQ3)	Not Connected (DMA Request 3)
49 (B17)	NC (DACK1*)	Not Connected (DMA Acknowledge 1)
50 (B18)	NC (DRQ1)	Not Connected (DMA Request 1)
51 (B19)	NC (REFRESH*)	Not Connected (Memory Refresh)
52 (B20)	NC (SYSCLK)	Not Connected (Sys Clock)
53 (B21)	NC (IRQ7)	Not Connected (Interrupt Request 7)
54 (B22)	NC (IRQ6)	Not Connected (Interrupt Request 6)
55 (B23)	NC (IRQ5)	Not Connected (Interrupt Request 5)
56 (B24)	NC (IRQ4)	Not Connected (Interrupt Request 4)
57 (B25)	NC (IRQ3)	Not Connected (Interrupt Request 3)
58 (B26)	NC (DACK2*)	Not Connected (DMA Acknowledge 2)
59 (B27)	NC (TC)	Not Connected (DMA Terminal Count)
60 (B28)	NC (BALE)	Not Connected (Address latch enable)

Pin #	Signal	Description (P1 Row B)
61 (B29)	+5V	+5V power
62 (B30)	NC (OSC)	Not Connected (14.3MHz clock)
63 (B31)	GND	Ground
64 (B32)	GND	Ground

Notes: The shaded area denotes power or ground. The signals marked with * = Negative true logic.

Table 4-4. PC/104 Bus Interface Pin/Signal Descriptions (P1C)

Pin #	Signal	Description (P1 Row C)
1 (C0)	GND	Ground
2 (C1)	NC (SBHE*)	Not Connected (System Bus High Enable)
3 (C2)	NC (LA23)	Not Connected (Address bit 23)
4 (C3)	NC (LA22)	Not Connected (Address bit 22)
5 (C4)	NC (LA21)	Not Connected (Address bit 21)
6 (C5)	NC (LA20)	Not Connected (Address bit 20)
7 (C6)	NC (LA19)	Not Connected (Address bit 19)
8 (C7)	NC (LA18)	Not Connected (Address bit 18)
9 (C8)	NC (LA17)	Not Connected (Address bit 17)
10 (C9)	NC (MEMR*)	Not Connected (Memory Read)
11 (C10)	NC (MEMW*)	Not Connected (Memory Write)
12 (C11)	NC (SD8)	Not Connected (Data Bit 8)
13 (C12)	NC (SD9)	Not Connected (Data Bit 9)
14 (C13)	NC (SD10)	Not Connected (Data Bit 10)
15 (C14)	NC (SD11)	Not Connected (Data Bit 11)
16 (C15)	NC (SD12)	Not Connected (Data Bit 12)
17 (C16)	NC (SD13)	Not Connected (Data Bit 13)
18 (C17)	NC (SD14)	Not Connected (Data Bit 14)
19 (C18)	NC (SD15)	Not Connected (Data Bit 15)
20 (C19)	GND	Key Pin

Notes: The shaded area denotes power or ground. The signals marked with * = Negative true logic.

Table 4-5. PC/104 Bus Interface Pin/Signal Descriptions (P1D)

Pin #	Signal	Description (P1 Row D)
21 (D0)	GND	Ground
22 (D1)	NC (MEMCS16*)	Not Connected (16-bit Memory Access)
23 (D2)	NC (IOCS16*)	Not Connected (16-bit I/O Access)
24 (D3)	NC (IRQ10)	Not Connected (Interrupt Request 10)
25 (D4)	NC (IRQ11)	Not Connected (Interrupt Request 11)
26 (D5)	NC (IRQ12)	Not Connected (Interrupt Request 12)
27 (D6)	NC (IRQ15)	Not Connected (Interrupt Request 15)
28 (D7)	NC (IRQ14)	Not Connected (Interrupt Request 14)
29 (D8)	NC (DACK0*)	Not Connected (DMA Acknowledge 0)

Pin #	Signal	Description (P1 Row D)
30 (D9)	NC (DRQ0)	Not Connected (DMA Request 0)
31 (D10)	NC (DACK5*)	Not Connected (DMA Acknowledge 5)
32 (D11)	NC (DRQ5)	Not Connected (DMA Request 5)
33 (D12)	NC (DACK6*)	Not Connected (DMA Acknowledge 6)
34 (D13)	NC (DRQ6)	Not Connected (DMA Request 6)
35 (D14)	NC (DACK7*)	Not Connected (DMA Acknowledge 7)
36 (D15)	NC (DRQ7)	Not Connected (DMA Request 7)
37 (D16)	+5V	+5V Power
38 (D17)	NC (MASTER*)	Not Connected (Bus Master Assert)
39 (D18)	GND	Ground
40 (D19)	GND	Ground

Notes: The shaded area denotes power or ground. The signals marked with * = Negative true logic.

IEEE 1394 Interfaces (J6, J7)

Table 4-6. IEEE 1394 Port 0 Interface Pin/Signal Descriptions (J6)

Pin #	Signal	Description
1	CPwr	+12V power +/- 5 % (connected to auto re-settable fuse)
2	GND	Common or power ground
3	TPB0-	Twisted Pair B, Port 0, Negative I/O signal
4	TPB0+	Twisted Pair B, Port 0, Positive I/O signal
5	TPA0-	Twisted Pair A, Port 0, Negative I/O signal
6	TPA0+	Twisted Pair A, Port 0, Positive I/O signal
7	SHLD1	Shield 1 to earth ground
8	SHLD2	Shield 2 to earth ground

Note: The shaded area denotes power or ground.

Table 4-7. IEEE 1394 Port 1 Interface Pin/Signal Descriptions (J7)

Pin #	Signal	Description
1	CPwr	+12V power +/- 5 % (connected to auto re-settable fuse)
2	GND	Common or power ground
3	TPB1-	Twisted Pair B, Port 1, Negative I/O signal
4	TPB1+	Twisted Pair B, Port 1, Positive I/O signal
5	TPA1-	Twisted Pair A, Port 1, Negative I/O signal
6	TPA1+	Twisted Pair A, Port 1, Positive I/O signal
7	SHLD1	Shield 1 to earth ground
8	SHLD2	Shield 2 to earth ground

Note: The shaded area denotes power or ground.

NOTE The auto reset fuses (F1 and F2) will automatically reset when the trip current falls below the trip value (1.5A).)

Auxiliary Power Interface (J5)

The MiniModule 1394 draws its power from the PC/104-Plus bus connector and only requires +5 volt input power, but uses the +12 volts for cable/bus power only. The +5V is used to generate +3.3V on board.)

- +5VDC +/- 5% @ 0.05 Amps
- +12VDC +/- 5% @ < 1.5 Amps (Used for IEEE 1394 cable/bus power only)

If additional +5V or +12V power is required to power IEEE 1394 devices, it can be provided by the auxiliary power connector (J5). The auxiliary power connector uses a 10-pin header with 0.100" spacing. The auxiliary power connector (J5) supplies the voltages listed in Table 4-8 directly to the board for external use:

Table 4-8 gives the signals for power supply pin-outs and Table 4-9 provides the pin arrangement.

Table 4-8. Auxiliary Power Interface Pins/Signals (J5)

Pin #	Signal	Description
1	GND	Ground
2	+5	+5 Volts +/- 5%
3	Key	Key pin
4	+12V	+12 Volts +/- 5%
5	GND	Ground
6	NC	Not connected
7	GND	Ground
8	+5	+5 Volts +/- 5%
9	GND	Ground
10	+5	+5 Volts +/- 5%

Note: The shaded area denotes power or ground.

Table 4-9. Auxiliary Power Pin Arrangement (J5)

Pin #	Signal	Pin #	Signal
1	GND	2	+5V
3	KEY	4	+12V
5	GND	6	NC
7	GND	8	+5V
9	GND	10	+5V

Note: The shaded area denotes power or ground.

Appendix A Technical Support

Contacting Support

Ampro Computers, Inc. provides a number of methods for contacting Technical Support listed in the Table A-1 below. Requests for support through the Virtual Technician are given the highest priority, and usually will be addressed within one working day.

- Ampro Virtual Technician – This is a comprehensive support center designed to meet all your technical needs. This service is free and available 24 hours a day through the Ampro web site at <http://ampro.custhelp.com>. This includes a searchable database of Frequently Asked Questions, which will help you with the common information requested by most customers. This is a good source of information to look at first for your technical solutions. However, you must sign in to access this service.

Personal Assistance – You may also request personal assistance by going to the "Ask a Question" area in the Virtual Technician. Requests can be submitted 24 hours a day, 7 days a week. You will receive immediate confirmation that your request has been entered. Once you have submitted your request you can go to the "My Stuff" area and log in to check status, update your request, and access other features.

- Embedded Design Resource Center – This service is also free and available 24 hours a day at the Ampro web site at <http://www.ampro.com>. However, you must sign in to access this service.

The Embedded Design Resource Center was created as a resource for embedded system developers to share Ampro's knowledge, insight, and expertise gained from years of experience. This page contains links to White Papers, Specifications, and additional technical information.

Table A-1. USA Technical Support Contact Information

Method	Contact Information
Virtual Technician	http://ampro.custhelp.com
Web Site	http://www.ampro.com
E-mail	support@ampro.com
Standard Mail	Ampro Computers, Incorporated 5215 Hellyer Avenue San Jose, CA 95138-1007, USA

Getting Updates

This feature is provided for you on the MiniModule Doc & SW (Documentation & Software) CD-ROM and is a hot link to Ampro's Web site. You can access the latest updates by clicking on *Check for Latest Update* in you're CD-ROM's main menu. The link on the CD-ROM takes you to the Ampro web site where the search and compare engine on the web site compares your current CD-ROM to the latest files available on the Ampro web site.

Once you have made a selection of desired updated material, the search and compare engine generates a list of the current manuals or software updates not on your CD-ROM and displays this list on the screen for you to view. Once the list is displayed you can select the desired updates or new files from the list you want to download to your PC. You can then printout the updates or files, save it to disk, or store it on a new CD-ROM. This list includes documentation and software updates. However, you will have to login in to the Ampro web site to access this information.

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