



**MiniModule™ GPIO
PC/104 Expansion Modules
QuickStart Guide and
Reference Manual**

P/N 5001716A Revision A

Notice Page

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REVISION HISTORY

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Audience Assumptions

This guide and reference manual are 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 Ampro Introduction

Using This Guide

This manual provides reference information links for the installation and setup of the MiniModule™ GPIO Expansion Modules, as well as, sufficient technical information for embedded system designers to easily expand their embedded systems based on any additional design requirements.

NOTE	The MiniModule GPIO Expansion Modules are designed to plug into CPU boards with PC/104 interface only. PC/104-Plus CPU boards may be used in the PC/104 stack, but the PCI bus is not supported.
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Information provided through the document links in this manual include:

- Inventorying the accessories
- Connecting the MiniModule GPIO to the respective target board
- Powering up the MiniModule GPIO with the target board
- MiniModule GPIO Specifications
- Environmental requirements

Information not provided in this reference manual includes:

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

Product Guide

The products listed in this manual are manufactured for Ampro Computers, Inc. by Sealevel Systems, Inc. The following documentation is provided by Sealevel using their model number in place of Ampro's model number.

Table 1-1. Model Number Conversion

Ampro Model #	Description	Vendor Model #
MM2-GPIO-Q-01	MiniModule GPIO, 48 in/out non-isolated	Sealevel 3701
MM2-GPIO-Q-02	MiniModule GPIO, 16 in, 16 out, isolated	Sealevel 3730
MM2-GPIO-Q-03	MiniModule GPIO, 16 in, isolated	Sealevel 3720
MM2-GPIO-Q-04	MiniModule GPIO, 16 out, isolated	Sealevel 3710

To access the User Documentation, click on one of the following links:

- MiniModule GPIO, 48 in/out non-isolated – [3701.pdf](#)
- MiniModule GPIO, 16 in, 16 out, isolated – [3730.pdf](#)
- MiniModule GPIO, 16 in, isolated – [3720.pdf](#)
- MiniModule GPIO, 16 out, isolated – [3710.pdf](#)

NOTE	Refer also to the ReadMe/Release Notes for these products on the MiniModule Doc & SW CD-ROM for more up to date instructions and information.
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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 embedded system developers to share Ampro's knowledge, insight, and expertise gained from years of experience.

Reference Specifications

- PC/104 Specifications, Revision 2.5, November 2003

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

Web site: <http://www.pc104.org>

Chip Specifications

The following integrated circuits (chips) are used on the MiniModule GPIO products:

- Xilinx, Inc. and the XC95144XV in-system programmable CPLD (Complex Programmable Logic Device) components used in some of the MiniModule GPIO products.

Web site: <http://www.xilinx.com/bvdocs/publications/ds051.pdf>

- Xilinx, Inc. and the XC9572XL in-system programmable CPLD (Complex Programmable Logic Device) components used on in some of the MiniModule GPIO products.

Web site: <http://www.xilinx.com/bvdocs/publications/ds057.pdf>

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 QuickStart Kit simultaneously with the design of your product.

MiniModule Support Products

- MiniModule GPIO QuickStart Kit (QSK)

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

Other MiniModule Products

All of the MiniModules products listed here conform to the PC/104 or PC/104-Plus standard and are compatible with PC/104, PC/104-Plus, EPIC, and EBX CPUs and SBCs. These modules can be installed directly on Ampro's CoreModule™, LittleBoard™, or ReadyBoard™ families (See Other Ampro Products).

- MiniModule™ USB2 Expansion Module – This MiniModule is a low power PC/104-Plus peripheral module with four USB 2.0 high speed interface connectors, supporting both legacy speeds (1.5Mbps and 12Mbps) and the new high speed (480Mbps) USB 2.0 standard.
- MiniModule™ 1394 Expansion Module – This low power PC/104-Plus compatible MiniModule provides two IEEE 1394 (FireWire™) interface connectors supporting a host controller at speeds of 100, 200, or 400Mbps. This allows easy integration of cameras or other FireWire devices, with hot insertion or removal of any IEEE 1394 cables.
- MiniModule™ PCC III Expansion Module – This PC/104-Plus compatible MiniModule supports one or two PC Cards (PCMCIA) and is based on Version 8.0 of the 32-bit CardBus standard, which supports Type I, II or III PC Card products.

- MiniModule™ ESB Expansion Module – This PC/104 compatible MiniModule is a multipurpose communications module with one 10/100BaseT Ethernet port, two 16C550-type RS232 Serial Ports (with optional RS485 and TTL interfaces) and a byte-wide socket supporting Disk-On-Chip, flash EPROM, SRAM, or NVRAM.
- MiniModule™ A2D Expansion Module – This PC/104 compatible MiniModule series supports A/D and D/A circuitry with configurable analog inputs and outputs, such as, (8) single ended 12-bit A/D inputs with a software selectable range of 0-5V, 0-10V, +/-5V, and +/-10V. Some models also include two 12-bit D/A outputs at 2.048V or 4.095V full scale output, or 16 TTL general-purpose I/Os (GPIOs).
- MiniModule™ UART Expansion Module – This PC/104 compatible MiniModule series provides four configurable serial ports (RS232, RS422, or RS485) which support individually selectable IRQs (jumper or software selectable).
- MiniModule™ FPGA Expansion Module – This PC/104 compatible MiniModule series features Field Programmable Gate Arrays (FPGAs), from Altera's FLEX 10K, FLEX 10KE, and APEX 20KE families. This MiniModule series provides gate counts from 20k to 1M, I/O pin counts from 132 to 150.
- MiniModule™ PCC Expansion Module – This PC/104 compatible MiniModule provides two PCMCIA card sockets for connecting one or two PCMCIA memory or peripheral cards into PC/104-based embedded systems. This MiniModule PCC also comes in a local and remote version.
- MiniModule™ SPL Expansion Module – This PC/104 compatible MiniModule supports two fully PC-compatible serial ports and one PC-compatible parallel port.
- MiniModule™ SSP Expansion Module – This PC/104 compatible MiniModule supports two fully PC-compatible serial ports with RS485 capability and one PC-compatible parallel port.

Other Ampro Products

- CoreModule™ Family – These complete embedded-PC subsystems on single PC/104 or PC/104-Plus form-factor (3.6x3.8 inches) modules feature 486, Pentium MMX, and Celeron CPUs. Each CoreModule includes a full complement of PC core logic functions, plus disk controllers, and serial and parallel ports. Some modules 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.
- LittleBoard™ Family – These high-performance, highly integrated single-board computers use the EBX form factor (5.75x8.00 inches), and are available with Pentium III and Celeron processors. The EBX-compliant LittleBoard 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.
- ReadyBoard™ Family – These mid-sized, high integration, low cost, embedded quality single-board systems contain all the component subsystems of a PC/AT PCI motherboard plus the equivalent of up to 5 PCI expansion boards. The ReadyBoard family supports both high performance Pentium® III and Celeron® processors or low-cost Via Eden™ processors in the new industry-standard EPIC form factor, with full PC/104-Plus expansion. ReadyBoard products support up to four serial ports, floppy/parallel port, up to four USB 1.1 UHCI or USB 2.0 ports, PS/2 keyboard/mouse, up to two Ultra/DMA 33/66 IDE controllers supporting two IDE drives and one CompactFlash socket, two independent 10/100BaseT or 1000BaseT Ethernet interfaces, and an audio AC'97 CODEC on the board. ReadyBoard products support up to 1GB of SDRAM in a single SODIMM socket, and a high performance AGP 4x graphics controller, which provides CRT and flat panel video interfaces for the most popular LCD panels.

Appendix A Technical Support

Contacting Support

Ampro Computers, Inc fully supports these products and all of the following links will provide access to support for these products.

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 register online before you can login 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 be registered online before you can login 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. Technical Support Contact Information

Method	Contact Information
Virtual Technician	http://ampro.custhelp.com
Web Site	http://www.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 Updates* in your 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 must be registered online before you can login to the Ampro web site to access this information.

