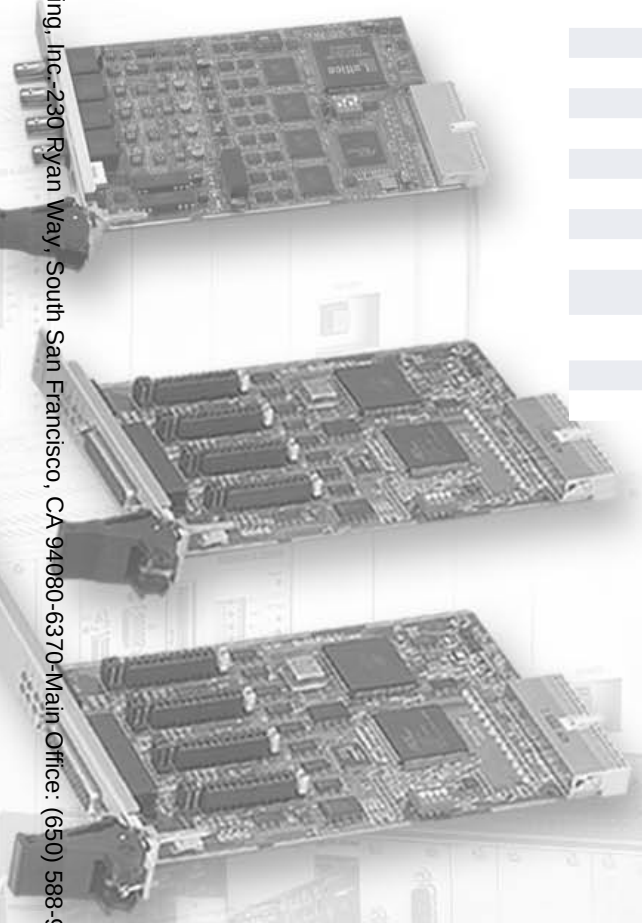
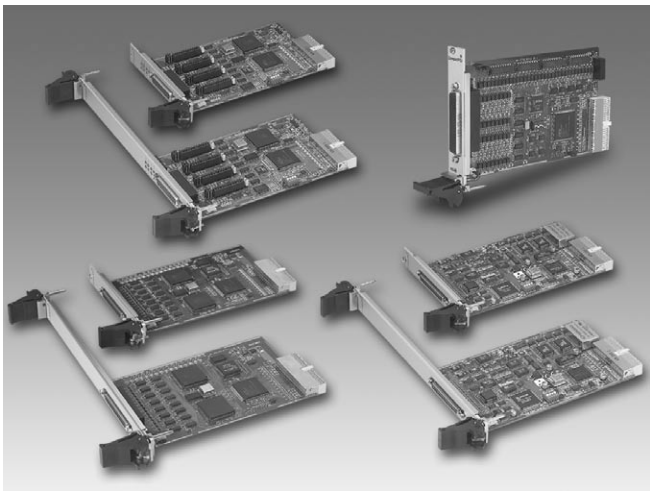
7

CompactPCI Systems



Advantech CompactPCI



Features

- Commercial standard PCI chips provide high performance at a low price
- Up to eight slots in one bus segment. Expandable using PCI-to-PCI bridge chips
- Eurocard form factor
- Airtight, high density, 2 mm pin-and-socket connectors
- Front loading and removal
- Vertical card orientation for better cooling
- Staged power pins for hot-swap capability
- Excellent shock and vibration characteristics

Introduction

Engineers have been trying to apply high-performance, low-cost PC technologies to critical applications such as telecommunications and industrial automation for quite some time. Unfortunately, the characteristics of desktop PC technologies do not readily lend themselves to critical applications where high serviceability, vibration & shock resistance, and good ventilation are required. CompactPCI® may be the answer.

What is CompactPCI ?

CompactPCI is a small, rugged, high-performance industrial computer architecture based on the standard PCI bus specification. It was developed by the PCI Industrial Computers Manufacturers Group (PICMG) in late 1994, and is ideal for embedded applications.

Three important technologies form the core of CompactPCI: PCI local bus, Eurocard mechanics, and airtight pin-and-socket connectors.

PCI Local Bus

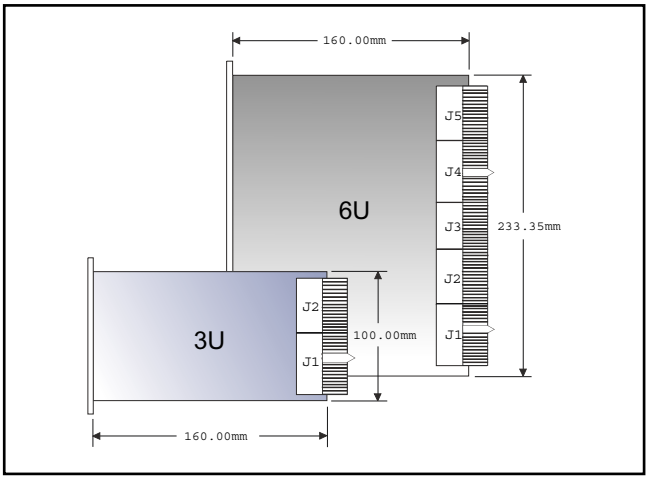
PCI stands for Peripheral Component Interconnect. It was published by Intel® in 1992, and soon became popular in commercial PC designs. It is a high-performance, processor-independent data bus, and most importantly, it is very inexpensive. The PCI local bus specification defines two data widths: 32-bit and 64-bit operating at a speeds up to 66 MHz. This provides theoretical throughput up to 264 MB/s at 32-bit or 528 MB/s at 64-bit. Most computer systems and operating systems support the PCI bus. For example, Pentium® , Alpha, PowerPC®, Windows®, Unix, and MacOS®. Because PCI components are manufactured in large quantities, they are inexpensive and readily available. With these advantages, the PCI bus is very suitable for high speed computing and high speed data communication applications.

Eurocard Mechanics

Eurocard is an industrial-grade packaging standard popularized by VMEbus. CompactPCI allows the use of 3U and 6U Eurocards. The dimensions of a 3U CompactPCI board are 160 mm deep x 100 mm high, while the dimensions of a 6U CompactPCI board are 160 mm deep x 233.35 mm high. The front panels of CompactPCI boards are IEEE 1101.1 and IEEE 1101.10 compliant, and may include optional EMC gaskets to minimize electromagnetic interference. Typically, the front panel contains I/O connectors, LED indicators, and switches. CompactPCI also supports rear panel I/O, which is compliant with IEEE 1101.11. Rear panel I/O is popular for telecommunication equipment because of its easy-to-maintain characteristics. If all the wiring is done on rear transition boards (passive boards), the front CompactPCI boards (active boards), which may require maintenance, are "clean" without any connected wiring. The front CompactPCI boards can then simply be replaced without the need for rewiring.

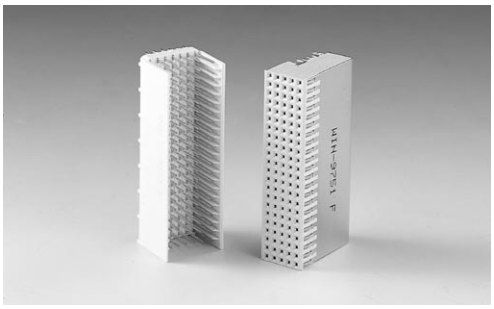
Airtight Pin-and-Socket Connectors

CompactPCI uses airtight, high-density pin-and-socket connectors as specified in the IEC-1076 international standard. These 2 mm "hard metric" connectors have low inductance and controlled impedance, which reduce signal reflections caused by the high speed PCI bus. They enable CompactPCI systems to have up to eight slots in one bus segment.



Eurocard Form Factor

The CompactPCI specification defines five connectors, designated as J1 through J5. The 3U CompactPCI board has two connectors labeled J1 and J2, while the 6U CompactPCI board has five connectors labeled J1 through J5. J1 and J2 are defined identically on both 3U and 6U CompactPCI boards, so 3U and 6U CompactPCI boards are electrically interchangeable.



Pin-and-Socket Connector

CompactPCI versus Conventional Industrial PCs

Serviceability

Replacement of a card from a conventional industrial PC system is always time-consuming. Users need to unfasten the chassis cover, disconnect all wiring from the card, replace the card, reconnect the wiring, and refasten the chassis cover. It is a process prone to error because there can be internal cabling between cards and peripheral devices, and it is necessary to remove all cabling before a card can be replaced. The serviceability of conventional industrial PC systems is not as simple and fast as CompactPCI systems.

CompactPCI is designed to be a front loading and removable system. The replacement of a CompactPCI board is very simple, with no need to remove the chassis cover. In addition, if the I/O is cabled through the back of the system, the front CompactPCI boards are "clean" without any connected wiring, and the replacement of a CompactPCI board is quick and easy. The maintenance time can be reduced from a matter of hours (conventional industrial PCs) to a matter of minutes, yielding a lower Mean Time To Repair (MTTR).

3U 8-Slot CompactPCI Enclosure

Vibration and Shock Resistance

Conventional industrial PCs do not provide reliable and secure support for peripheral cards in the system. Cards inside conventional industrial PCs are screwed down at one point only, and the top and bottom card edges are not supported by guide rails. Therefore, the connecting edge of a card is prone to shift under shock and vibration.

CompactPCI boards are firmly mounted in the system. Guide rails support the top and bottom edges of the boards. Front panel retaining mechanisms securely lock the front panel to the surrounding mechanical frame. The connecting edge of the board is held tightly in place by the pin-and-socket connectors. With all four sides of the board firmly held in place, it is much less prone to suffer loss of electrical contact in high vibration and shock environments.

Ventilation

Conventional industrial PC systems cannot provide regular airflow paths, resulting in uneven cooling within the chassis. Airflow is blocked by backplanes, card brackets, and disk drives. Cooling air cannot circulate over all the cards, and hot air is not immediately forced out of the chassis. Electronic devices and circuit boards deteriorate because of these cooling related problems: warped circuit boards, bad connections, broken traces, and shortened component lives.

CompactPCI systems provide clear paths for airflow over all active, heat-producing boards in the system. Cooling air easily flows through the spaces between cards, and carries heat out of the spaces. A fan system can be integrated at the bottom of the boards to provide forced air to each slot. CompactPCI systems are therefore much less susceptible to cooling problems because of the even cooling pattern inherent in their mechanical design.

The Complete Offering for Mission-Critical Applications

The MIC-3000 series is an industrial CompactPCI solution which features front-end access, high shock and vibration tolerance characteristics, automatic cooling system, fault resilient and hot swappable capabilities. These features make MIC-3000 the most reliable PC-based computing platform, for mission-critical applications. Advantech leverages 3U CompactPCI as the industrial high-end computing platform, providing Pentium 4-grade CPU modules, 8-slot chassis, high-speed I/O and serial communication modules, to become a total solution provider for industrial CompactPCI solutions. Target applications include military defense, transportation, traffic control, test and measurement (T&M) and critical data acquisition & control markets.

MIC-3001/8
MIC-3001R/8

3U 8-slot CompactPCI® Enclosure

3U 8-slot CompactPCI® Enclosure with Rear I/O Slots

Features

- Eight 3U CompactPCI® slots
- Easy installation: rackmount or panelmount
- Hot-swap compliant backplane
- Hot-swap fan tray module
- Optional fault detection and alarm notification
- Logic Ground and Chassis Ground can be isolated or common

Introduction

The MIC-3001/8 is a 4U-size enclosure with eight CompactPCI® slots for rack or panel mounting. Its flexible modular design allows users to configure for a variety of applications. Reserved space in Device Bay can be used to install peripherals such as an alarm module, a power supply or a CD-ROM drive.

Hot-swap Passive Backplane

The 3U-size 8-slot backplane of the MIC-3001/8 supports 32-bit or 64-bit (optional) operation. The backplane complies with the PICMG 2.1 Hot-Swap Specification, and you can build easy-to-maintain systems with hot-swappable CompactPCI® boards and software.

Hot-swap Fan Tray Module

A 1U-high fan module provides forced cooling air into the system. Two 133-CFM high-speed fans are mounted in a hot-swap tray directly underneath the card slots. The fan's tachometer output enables the alarm module to monitor the speed of the fans, and a protective circuit has been designed into the fan backplane to reduce spikes and noise during hot-swapping. This design allows replacement of fans without turning the system off.

Specifications

- **Construction** Aluminum frame and galvanized sheet steel
- **Slots** 21-slot space (84 TE), 8 CompactPCI® slots, including one system slot and seven peripheral slots.
- **32-bit CompactPCI bus**
- **Hot Swap Compliance** PICMG 2.1 R 1.0 Hot Swap Specification
- **Dimensions (W x H x D)** 440 x 178 x 240 mm (17.3" x 7" x 10")
  Mnt. flanges not inc.
- **Weight** 7 kg (15 lb)
- **Operating Temperature** 0 ~ 50° C (32 ~ 122° F)
- **Relative Humidity (operating and storage)** 10 ~ 90% @ 40° C, non-condensing

ATX Power Supply

- **Input** 90 ~ 135 or 180 ~ 265 V_{AC} @ 47 ~ 63 Hz, switchable
- **Max. Output** 400W total, 210 W for +3.3 V and 5 V
- **MTBF** 100 kHrs at 75% load for 25° C, Ambient Temperature
- **Safety** UL/CUL/CE

Backplane

- **Slots** 8 CompactPCI® slots (one system slot and 7 peripheral slots)
- **Bus Width** 32-bit (64-bit upon request)
- **PCB** 8-layer PCB, 3.0 mm thick
- **Separation** Separate power and ground planes
- **Power Connector** One ATX power connector for connecting standard ATX power supply
- **Alarm Connector** 20-pin connector for MIC-3920/MIC-3921 alarm board signals
- **Compliance** Complies with PICMG 2.0, Ver. 2.1 CompactPCI® Specification and PICMG 2.1, Ver. 1.0 Hot Swap Specification
- **I/O Voltage** 3.3 V or 5 V, jumper selectable
- **Logic Ground and Chassis Ground can be isolated or common**
- **Dimensions (W x H)** 262.8 x 128.6 mm
- **Operating Temperature** -40 ~ 80° C (-40 ~ 176° F)

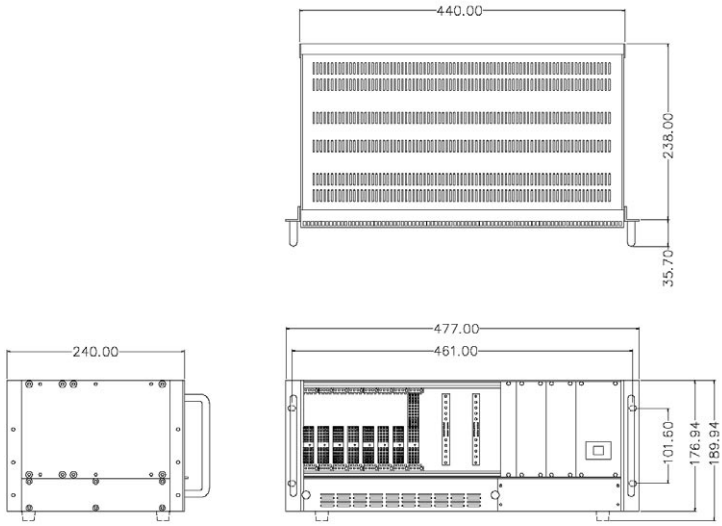
Fan Tray Module

- **Air Flow** Two fans, providing a total of 266 CFM (or above)
- **Power Consumption** 0.53 A @ 12 V per fan, 1.06 A total
- **Rated Fan Speed** 3400 rpm
- **Life Span** 70,000 hours continuous operation @ 40° C with 15~65% relative humidity

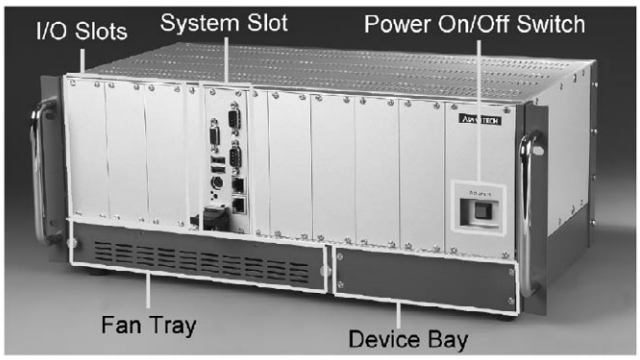
Ordering Information

- **MIC-3001/8-4B** 3U CompactPCI® chassis with 8-slot backplane, fan tray module, and AC ATX power supply
- **MIC-3001R/8-4B** 3U CompactPCI® chassis with 8-slot backplane, for tray module and AC ATX power supply

Dimensions



Front View of MIC-3001/8 and MIC-3001R/8



Rear View of MIC-3001R/8

MIC-3002AD/6

3U 6-slot CompactPCI® Enclosure

Features

- 6-slot 3U CompactPCI® backplane
- Compact size, 4U high enclosure for 3U cPCI modules
- Side handle design and optional 6.4" LCD display for portable applications
- Stand feet on the bottom side for desktop applications
- Hot-swap compliant backplane
- Logic ground and chassis ground can be isolated or common

Introduction

The MIC-3002AD/6 is a compact 3U CompactPCI® chassis designed specially for portable applications. With a side handle design it can be carried conveniently, and it also has an onboard 6.4" LCD display on the rear panel. The MIC-3002AD/6 is therefore suitable as a rugged all-in-one mobile controller for applications in battle fields, production lines, transportation systems and traffic control systems.

Hot-swap Passive Backplane

The 3U-size, 6-slot backplane of MIC-3002AD/6 supports 32-bit operation. The backplane complies with the PICMG 2.1 Hot-Swap Specification. and you can build easy-to-maintain systems with hot-swappable CompactPCI boards and software.

Specifications

Backplane

- **3U Slots** 3 slots for system module
  5 slots for peripheral cards
- **No rear I/O support**
- **Bus** 32-bit / 33 MHz
- **I/O Voltage** 3.3V / 5V (jumper selectable)

Cooling

- **Two 46 CFM fans, 12 V_{DC} brush-less, dual ball bearing**
- **Bottom-access removable filter for easy maintenance**
- **MTBF** 80,048 hours @ 25° C

6.4" LCD option

- **Dimensions** 3U height x 10-slot (40HP) width
- **Screen Size** 6.4 inches (diagonal)
- **Resolution** 640 x 480 x 18-bit colors (262,144 colors)
- **Pixel pitch** 0.203 x 0.203 mm
- **Brightness** High Brightness 300 cd/m2
- **Lamp Life Time** 15,000 hours @ 25° C (77° F)
- **Integrated with back light inverter**

Mounting

- **Wall/Panel mounting on the front side or rear side**
- **Side (Upper) handle design for portable applications**
- **Stand feet on the bottom side for desktop applications**

Physical

- **Dimensions (W x H x D)** 220 x 190 x 245 mm (8.7" x 7.5" x 9.7")

Power Supply

- **Safety Approvals** CE, UL, cUL, TUV
- **Input** 100~240 V_{AC} @ 47~63Hz, full range
- **Output** 250 (or 300) W ATX power supply
- **MTBF** 105,405 hours @ 25° C

Environment

- **Operating Temperature** 0 ~ 60° C (32~140° F)
  0 ~ 50° C (32 ~ 122° F) for LCD model
- **Storage Temperature** -40 ~ 80° C (-40~112° F)
  0 ~ 70° C (32 ~ 158° F) for LCD model
- **Humidity** 95% @ 60° C (140° F), non-condensing
- **Storage Vibration** 2.0 Grms
- **Shock** 20 G peak-to-peak, 11ms duration
- **MTBF** 87,191 hours @ 25° C

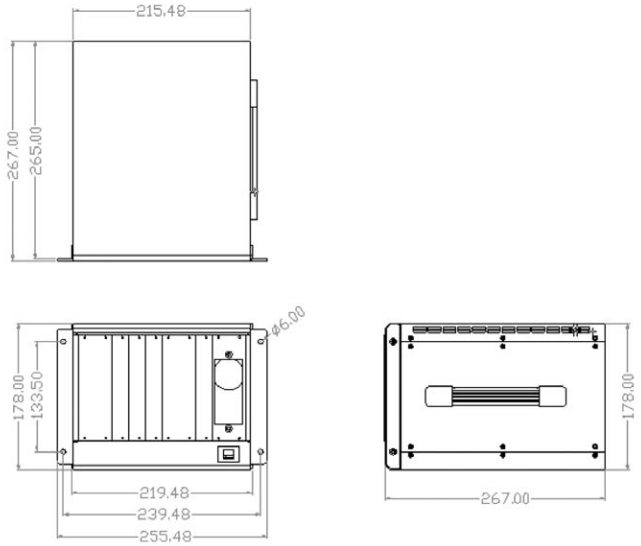
Compliance

- **PICMG 2.0, R3.0 CompactPCI Specification**
- **PICMG 2.1, R2.0 Hot-Swap Specification**

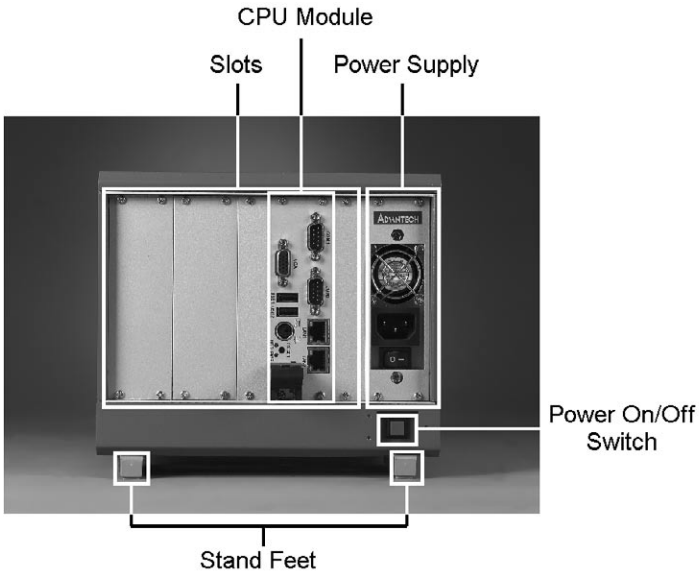
Ordering Information

- **MIC-3002AD/6** 3U CompactPCI® chassis with 6-slot backplane and 6.4" LCD
- **MIC-3002A/6** 3U CompactPCI® chassis with 6-slot backplane

Dimensions

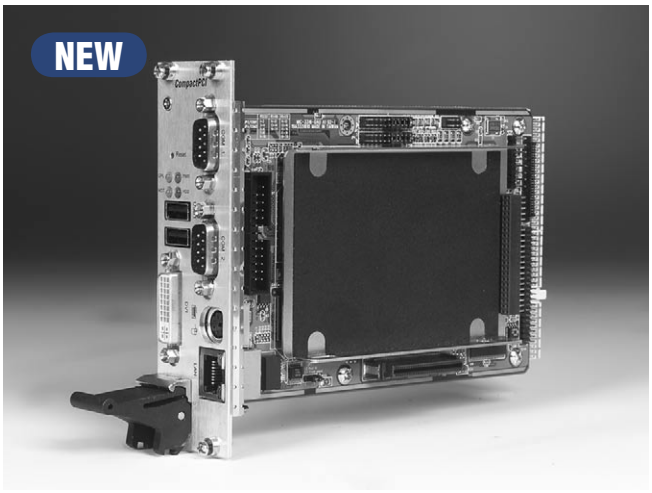


Front View



MIC-3316

3U CompactPCI® Ultra Low Voltage Intel® Celeron® 650 MHz CPU board 2-slot with MIC-3316 basic function



CE

Features

- Build-in Ultra Low Voltage Intel® Celeron® 650 MHz
- Support up to 384 MB SDRAM
- Two on-board CompactFlash® Socket
- Two RS-232/422/485 ports
- Two USB ports
- One 10/100 Mbps Ethernet port
- Watchdog timer
- One DVI-I interface
- One PCI-to-PCI bridge drives up to 7 Masters
- Battery-backup 512K RAM
- Timer IRQ
- Support AC97-audio, Line in, Line out, MIC in
- Rear I/O support (MIC-3316R only)

Introduction

MIC-3316 is a 3U-sized CompactPCI® all-in-one single board computer that is optimized for its Ultra Low Voltage Intel® Celeron® 650 MHz processor. On-chip 256 KB L2 cache provides high performance, while the fanless design increases reliability. The CPU is also designed for a wide operating temperature range.

MIC-3316 has compliance with the PICMG 2.0 R2.1 CompactPCI specifications and provides very powerful functions on a 3U-sized board for demanding applications like real-time machine control and industrial automation.

Compact Mechanical Design

MIC-3316 offers many functions on 2 or 3-slot width. Advantech provides a CPU heat sink specially designed for the Ultra Low Voltage Intel® Celeron® 400/650 MHz and Low Voltage Intel® Pentium® III 800/933 MHz processors, enabling the MIC-3316 to operate without a cooling fan on the heat sink. It only needs external cooling air from the chassis fans for ventilation. This enables the MIC-3316 to use the Ultra Low Voltage Intel® Celeron® 400/650 MHz and Low Voltage Intel® Pentium® III 800/933 MHz processors within a mere 2-slot wide space.

Specifications

Standard SBC functions

- **CPU** — MIC-3316 supports Ultra Low Voltage Intel® Celeron® 650 MHz
  Options: Celeron® 400 MHz ULV or Pentium® 800/933 MHz LV
- **BIOS** — Award 4Mb flash memory
- **Chipset** — Intel® 82815E Graphics and Memory Controller Hub (GMCH)
  Intel® 82801BA I/O Controller Hub (ICH2)
- **Front Side Bus** — 100 MHz (Ultra Low Voltage Intel® Celeron® 400/650 MHz)
  133 MHz (Low Voltage Intel® Pentium® III Processor 800/933)
- **2nd level cache** — Built-in 256 KB on Ultra Low Voltage Intel® Celeron®
  Built-in 512KB on Low Voltage Intel® Pentium® III Processor 800/933
- **RAM** — Up to 384 MB in one 144-pin DIMM socket and soldered SDRAM
  128MB (On-board) soldered SDRAM (no ECC)
  And one 144-pin SODIMM Socket supports up to 256 MB (Optional)
  Supports PC100/ PC133-compliant SDRAMs
  ECC (parity) DRAM not supports
- **Enhanced IDE interface** — In second slot, One IDE channel have two connectors (One IDE connector and space reserved for embedded 2.5" HDD and one external 44-pin (2 mm) connector for external IDE Device). Supports PIO mode 4 (16.67 MB/s data transfer rate) and Ultra ATA 100/66/33 (100/66/33 MB/s data transfer rate). BIOS enabled/ disabled
- **CompactFlash Socket** — Two sockets, One IDE CompactFlash® socket on board. 3-slot model has one USB Hot-swapable CompactFlash® Reader
- **Enhanced Parallel Port** — In 3-slot Configurable to LPT1, LPT2, LPT3, or disabled. Standard DB-25 female connector provided. Supports EPP/SPP/ECP
- **Serial Ports** — Four RS-232/422/485 (jumper selectable) ports with 16C550 UARTs (or compatible) with 16-byte FIFO buffer.
  Two port are autoflow support in 2-slot,and Two port in rear I/O are not autoflow support in Rear I/O.Supports speeds up to 115.2 Kbps. Ports can be individually configured to COM1, COM2 , COM3,COM4 or disabled
- **Keyboard and PS/2 Mouse Connector** — One 6-pin mini-DIN connector is located on the mounting bracket for easy connection to a keyboard or PS/2 mouse. An on-board keyboard pin header connector is also available

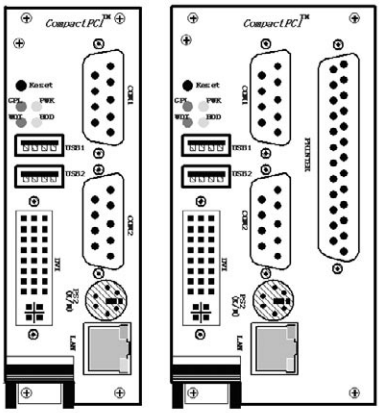
- **USB Ports** Four USB ports with fuse protection comply with USB specification 1.1
  One for 3-slot CompactFlash® reader, and one for rear I/O USB connector,two for front panel
- **PCI-to-PCI Bridge** One PERICOM PI7C8150 controller chip, drives up to seven bus master peripherals.
- **Watchdog Timer** Provides system reset and software control. Time interval is programmable from 1 to 255 seconds/ minutes.
- **Ethernet LAN** 10/100Base-TX Ethernet Interface
- **Controller Chips** One Intel® 82551QM Ethernet controller chips provides one ports, one front RJ-45 LAN port 10 Mbps, 100 Mbps auto-switching
  One RTC8100 Ethernet on Rear I/O, supports 10/100 Mbps
- **VGA Interface**
- **Controller** Intel 815E chipset integrated
- **Display Memory** Shared from system memory up to 11 MB SDRAM
  2D Graphics- Up to 1600 X 1200 in 8-bit color at 85 Hz refresh
  3D Graphics- Up to 1024 X 768 in 16-bit color at 85 Hz refresh
  VGA-RGB CRT, One CRT on Rear I/O
  Digital Video Output-DVI
  Sil 164 Scaleable Bandwidth: 25 - 165 MHz
  Flexible Graphics Controller Interface: 12-bit
- **Audio** AC'97 Compliant Audio IN 3-slot -Line IN, Line OUT, MIC IN
- **Battery-backup RAM** 512 KB
- **Timer IRQ**
- **Input /Output Bus Interface** PCI 2.2 compliant, 32 bit/33 MHz
- **PICMG 2.1 CompactPCI Hot Swap Specification R1.0 Compliant**
- **Board Size** 160 x 100 mm (3U size), 2 or 3-slot (8TE) wide.
- **Max. Power Requirements** CPU ULV C650 MHz
  +5 V (4.75 ~ 5.25 V) @ 2.3 A
  +3.3 V (4.75 ~ 5.25 V) @ 1.9 A
  +12 V (4.75 ~ 5.25 V) @ 44 mA
  CPU LV P3 933 MHz
  +5 V (4.75 ~ 5.25 V) @ 2.5 A
  +3.3 V (3.1 ~ 3.5 V) @ 2.7 A
  +12 V (11.0 ~ 13.0 V) @ 44m A
- **Operating Temperature** 0 ~ 60° C (32 ~ 140° F)
- **Storage Temperature** -20 ~ 80° C (-4 ~ 176° F)
- **Humidity (operating and storage)** 5 ~ 95% (non-condensing)
- **Operating System** Windows® 2000/XP
- **Rear I/O** Transition Board for MIC-3316R Series

COM	COM3, COM4
LAN	10/100 Mbps Lan
USB	1 (USB 1.1)
VGA	RGB-CRT (shared)
KB/MS	Yes (shared)

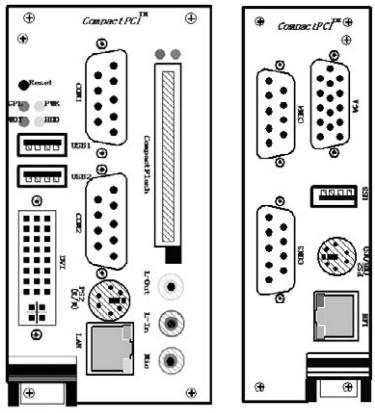
Ordering Information

- **MIC-3316** 3U CompactPCI® Ultra Low Voltage Intel® Celeron® 650 MHz CPU board 2-slot with MIC-3316 basic function and 128 MB on-board SDRAM
- **MIC-3316P** 3U CompactPCI® Ultra Low Voltage Intel® Celeron® 650 MHz CPU board 3-slot with a parallelport and 128 MB on-board SDRAM
- **MIC-3316F** 3U CompactPCI® Ultra Low Voltage Intel® Celeron® 650 MHz CPU board 3-slot with AC97 Audio and CF Card Reader and 128 MB on-board SDRAM
- **MIC-3316R** 3U CompactPCI® Ultra Low Voltage Intel® Celeron® 650 MHz CPU board 2-slot with MIC-3316 basic function and 128 MB on-board SDRAM and Rear I/O support
- **MIC-3316PR** 3U CompactPCI® Ultra Low Voltage Intel® Celeron® 650 MHz CPU board 3-slot with a parallelport and 128 MB on-board SDRAM and Rear I/O support
- **MIC-3316FR** 3U CompactPCI® Ultra Low Voltage Intel® Celeron® 650 MHz CPU board 3-slot with AC97 Audio and CF Card Reader and 128 MB on-board SDRAM and Rear I/O support
- **MIC-3516** Rear I/O Module for MIC-3316R

Front View of MIC-3316



MIC-3316 MIC-3316P



MIC-3316F MIC-3516

MIC-3318

3U CompactPCI® Pentium® 4-M Controller

Features

- Built-in Intel® Pentium® 4-M CPU processor up to 1.7 GHz
- Supports up to 512 MB DDR-266 memory on board
- On-board high-performance VGA display
- Dual Gigabit Ethernet with RJ-45 connector on board
- Supports 2 Ultra ATA 33/66/100 high-speed IDE devices
- Onboard CompactFlash® disk socket
- One PCI-to-PCI bridge drives up to 7 bus master peripherals
- Advantech Hot-swap Manager to support Advantech I/O and Communication Hot-swap function
- Rear I/O signal support for easy wiring (MIC-3318R only)
- Supports on-board 2.5" HDD

Introduction

The MIC-3318 is a 3U CompactPCI® controller that has been optimized for its on-board Intel® Pentium® 4 Processor-M, and Intel® 845GV Chipset. Designed to be a high performance CompactPCI® platform, MIC-3318 delivers compelling system bus speed performance at 400 MHz with its Intel NetBurst™ microarchitecture. Innovative wide data paths and flexible memory refresh technology optimize the DDR SDRAM's performance in the MIC-3318. 512 KB of On-die L2 Cache, and dual Gigabit Ethernet ports are also provided.

MIC-3318 is a powerful 3U CompactPCI® Controller that fulfills your requirements in mission-critical applications, such as military defense, transportation, traffic control, test and measurement (T&M) as well as critical data acquisition & control applications.

Specifications

Processor System

- **CPU** Intel® Pentium® 4 Processor–M (fanless)
- **Speed** 1.2 or 1.7 GHz (400MHz FSB), BIOS selection
- **L2 Cache** 512 KB on die
- **Chipset** Intel® 845GV
- **BIOS** Award 4 MB Flash

Bus

- **Front Side Bus** 400 MHz
- **PCI-to-PCI Bridge Controller Pericom** PI7C8150
- **PCI** 32-bit/33 MHz

Memory

- **Technology** PC-2100 DDR266 SO-DIMM, 200-pin socket x 1
- **Capacity** 512 MB

Graphics

- **Controller** Integrated in Intel® 845GV chipset
- **VRAM** DVMT 64 MB
- **Resolution** 2048 x 1536 High Color @ 75 Hz for Flat panel
  1920 x 1080 True Color @ 85 Hz for CRT

Ethernet

- **Interface** 10/100/1000Base-TX Gigabit Ethernet
- **Controller** Intel® 82540 x 2
- **Connector** RJ-45 x 2
- LAN1 supports both front and rear I/O access on MIC-3318R (jumper selectable)

Serial

- **Interface** RS-232/422/485, jumper selectable
- **Controller** Winbond™ 83627HF Super IO chip
- **Data Bits** 5, 6, 7, 8
- **Stop Bits** 1, 1.5, 2
- **Parity** None, even, odd
- **Speed (bps)** 50 ~ 115.2 k
- **Data signals** RS-232: TxD, RxD, RTS, CTS, DTR, DSR, DCD, GND, RI
- **RS-422/485** TxD, RxD, RTS, CTS
- **Connectors** DB-9 x 2
- COM1 supports both front and rear I/O access on MIC-3318R

EIDE

- **Mode** ATA 33/66/100 mode
- **Channels** 2 (One 44-pin 2.5" HDD connector and ext-connector; another for CF socket)
- **Storage Site** One IDE connector and space reserved for embedded 2.5" HDD

Front I/O Interface

- **LAN** 2 x Gigabit Ethernet, RJ-45 connector
- **Serial** 2 x RS-232/422/485, DB-9 connector

Rear I/O Signal Interface (MIC-3318R series)

- VGA, KB/MS, USB3, USB4, LAN1, COM1

Operating Systems

- **Compatibility** Windows® 2000/XP

Hardware Monitor

- **Controller** Winbond™ 83627HF Super IO chip
- **Monitor** CPU temperature, 3.3 V/5 V/12 V

Watchdog Timer

- **Output** System reset
- **Interval** Programmable, 0 ~ 255 sec.

Miscellaneous

- **Solid State Disk** One on-board CompactFlash socket
- **2.5" HDD** One 2.5" HDD bay for easy installation
- **LEDs** Power, IDE
- **USB (v2.0)** 2 channels
- **Real Time Clock** Built into the South Bridge

Power Requirements

With P4-M 1.2 GHz				
	+3.3 V	**+5 V**	**+12 V**	**-12 V**
Typical	1.7 A	3.4 A	16 mA	16 mA
Max	1.7 A	4.7 A	16 mA	16 mA

With P4-M 1.7 GHz				
	+3.3 V	**+5 V**	**+12 V**	**-12 V**
Typical	1.7 A	4.1 A	16 mA	16 mA
Max	1.7 A	5.7 A	16 mA	16 mA

Environment

- **Operating Temperature** -10 ~ 60° C @1.2 GHz CPU
  -10 ~ 50° C @1.7 GHz CPU
- **Storage Temperature** -40 ~ 80° C (-40~140° F)
- **Humidity** 95% @ 60° C, non-condensing

Physical

- **Dimensions** 100 x 160 mm (3U), 2-slot (8 TE) width
- **Weight** 0.6 kg

Compliance

- **Standard** PICMG 2.0, R3.0 CompactPCI® Specification
  PICMG 2.1, R2.0 Hot-Swap Specification

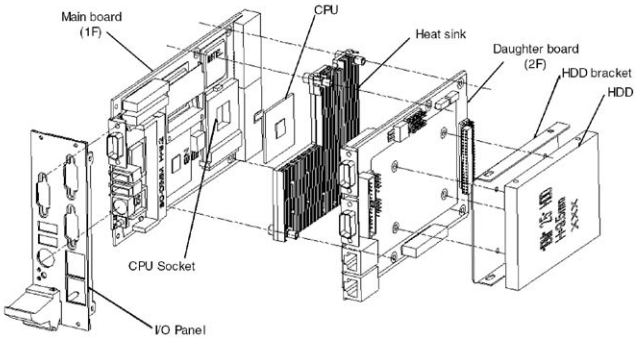
Rear Transition Board for MIC-3318R series

- **P/N** MIC-3518
- **KB/MS** Yes
- **COM** COM1
- **LAN** LAN1
- **VGA** Yes
- **USB** USB3, USB4

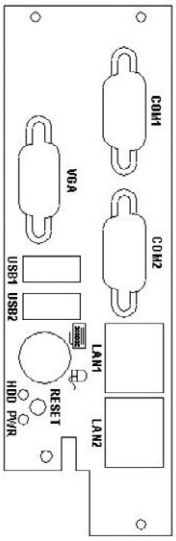
Ordering Information

- **MIC-3318-AC00** MIC-3318 w/ on-board P4-M 1.7 GHz CPU, 256 MB RAM without Rear I/O support
- **MIC-3318-AD00** MIC-3318 w/ on-board P4-M 1.7 GHz CPU, 512 MB RAM without Rear I/O support
- **MIC-3318R-AC00** MIC-3318 w/ on-board P4-M 1.7 GHz CPU, 256 MB RAM and Rear I/O support
- **MIC-3318R-AD00** MIC-3318 w/ on-board P4-M 1.7 GHz CPU, 512 MB RAM and Rear I/O support
- **MIC-3518** Rear I/O module for MIC-3318R

Asssembling/ Disassembling MIC-3318

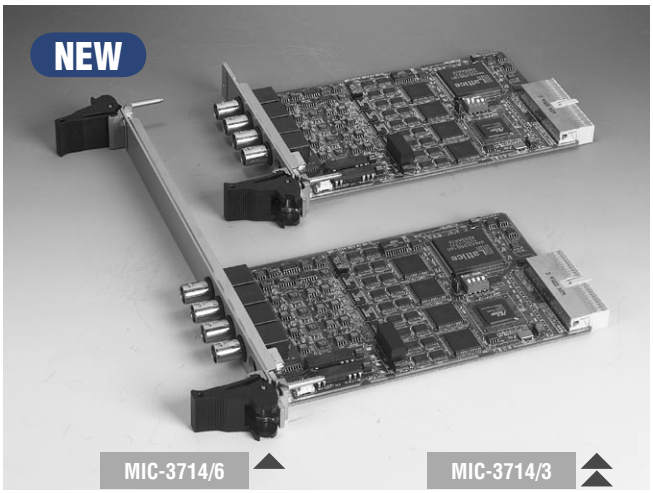


Front View of MIC-3318



MIC-3714

30 MS/s Simultaneous 4-ch Analog Input Card



CE FCC

Features

- 12-bit A/D converter up to 30 MS/s
- 4 single-ended analog input channels
- Programmable gain for each input channel
- 32 K samples on board FIFO memory per channel
- 4 A/D converters simultaneously sampling
- Multiple A/D triggering modes
- Programmable pacer/counter

Introduction

The MIC-3714 is an advanced performance data acquisition card based on 32-bit PCI bus architecture. The maximum sampling rate of the MIC-3714 is 30 M samples per second, with an emphasis on continuous, non-stop, high-speed, streaming data of A/D samples to host memory.

Specifications

Analog Input

- **Channels** 4 single-ended analog input channels
- **Resolution** 12-bit
- **FIFO Size** 32K Samples/ch
- **Max. Sampling Rate** Up to 30 MS/s
- **Common Mode Voltage** ±11 V max. (operational)

Input range and Gain List	**Gain**	1	2	5	10
	Range	±5 V	±2.5 V	±1 V	±0.5 V
Drift	**Gain**	1	2	5	10
	Zero(μV/° C)	±30	±30	±30	±30
	Gain(ppm//° C)	±30	±30	±30	±30
Small Signal Bandwidth for PGA	**Gain**	1	2	5	10
	Bandwidth	7 MHz	7 MHz	7 MHz	7 MHz

- **Max. Input Voltage** ±15 V
- **Input Surge Protection** 30
- **Input Impedance** 50 Ω/1 M Ω / jumper selectable 100 pF
- **Trigger Modes** Software, pacer, post-trigger, pre-trigger, delay-trigger, about-trigger

Accuracy	**DC**	DNLE: ±1LSB (No Missing Codes:12 Bits Guaranteed)	
		INLE: ±2LSB	
		Offset error	Adjustable to ±1LSB
		Gain error	Adjustable to ±1LSB
	AC	SINAD: S/(N+D): 68 dB ENOB: 11bitsTHD: -75 dB	
External TTL Trigger Input	**Logic level**	Low: 0.8 V max. High: 2.0V min.	
	Input impedance	50 Ω	
	Input coupled	DC	
External Sin Wave Trigger Input	**Logic level**	2.0 V peak to peak	
	Input impedance	50 Ω	
	Input coupled	AC	
External Analog Trigger Input	**Range**	By analog input range	
	Resolution	8-bit	

General

- **I/O Connector Types** 4 BNC connector (for AI)
1 PS2 connector (for ext. colock and trigger)
- **Dimensions** 160 x 100 mm (6.3" x 3.9") with 3U/6U bracket
- **Power Consumption** Typical: +3.3 V @ 550 mA , +5 V @ 150 mA , +12 V @ 600 mA
Max.: +3.3 V @ 850 mA, +5 V @ 200 mA, +12 V @ 700 mA
- **Operating Temperature** 0 ~ 70° C (32~158° F)
- **Storage Temperature** -20 ~ 85° C (-4~185° F)
- **Relative Humidity** 5~95%RH non-condensing (refer to IEC 68-2-3)
- **Certifications** CE and FCC certified

Ordering Information

- **MIC-3714/3** 3U, 30 MS/s Simultaneous 4-ch Analog Input Card, user's manual and driver CD-ROM (PCL-10901-1 cable included)
- **MIC-3714/6** 6U, 30 MS/s Simultaneous 4-ch Analog Input Card, user's manual and driver CD-ROM (PCL-10901-1 cable included)
- **ADAM-3909** DB-9 Wiring Terminal for DIN-rail Mounting
- **PCL-10901-1** PS2 to DB-9 wiring cable, 1 m
- **PCL-10901-3** PS2 to DB-9 wiring cable, 3 m
- **PCL-1010B-1** BNC to BNC wiring cable, 1 m

Feature Details

Simultaneous Sampling

The MIC-3714 is capable of simultaneous sampling as it uses 4 identical circuitries and ADC for each analog input channel. Where the time relationship between inputs is important, this feature let you sample simultaneously.

Supports S/W, Internal and External Pacer Triggering

The MIC-3714 supports three kinds of trigger modes for A/D conversion: software triggering, internal pacer triggering and external pacer triggering. The software trigger allows users to acquire a sample when it is needed. The internal pacer triggers continuous high-speed data acquisition. The MIC-3714 also accepts external trigger sources, allowing synchronous sampling with external devices.

PCI-bus Mastering Data Transfer

The MIC-3714 supports PCI-bus mastering DMA data transfer for high speed and gap-free data acquisition. By setting aside a block of memory in the PC, the MIC-3714 performs bus-mastering data transfers without CPU intervention, allowing the CPU to perform other tasks such as data analysis and graphics.

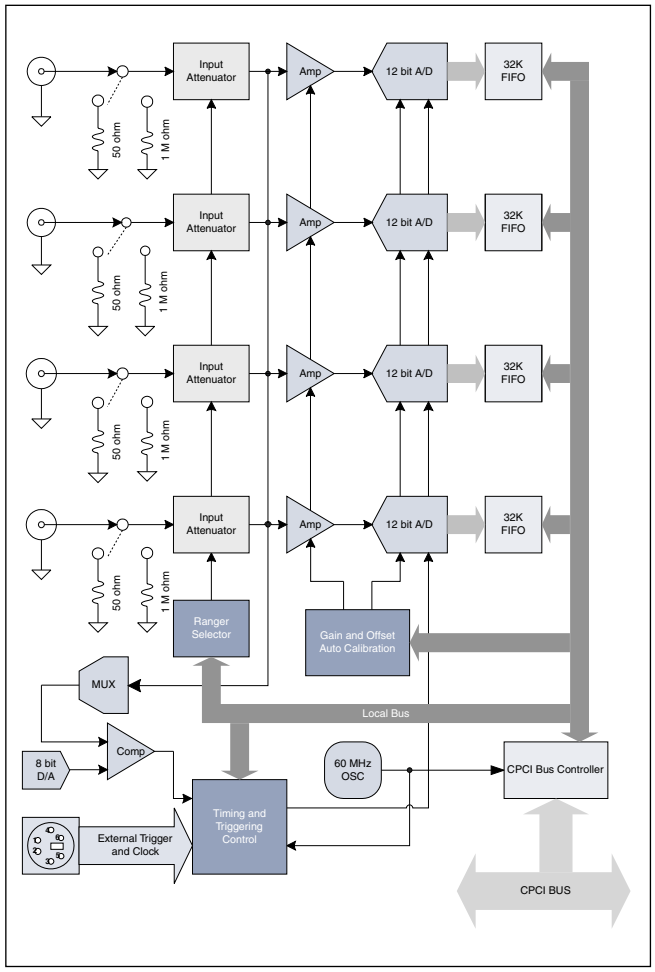
On-board FIFO Memory

There is 32K sample FIFO memory on the MIC-3714. This is an important feature for faster data transfer and more predictable performance under Windows®.

Auto Calibration

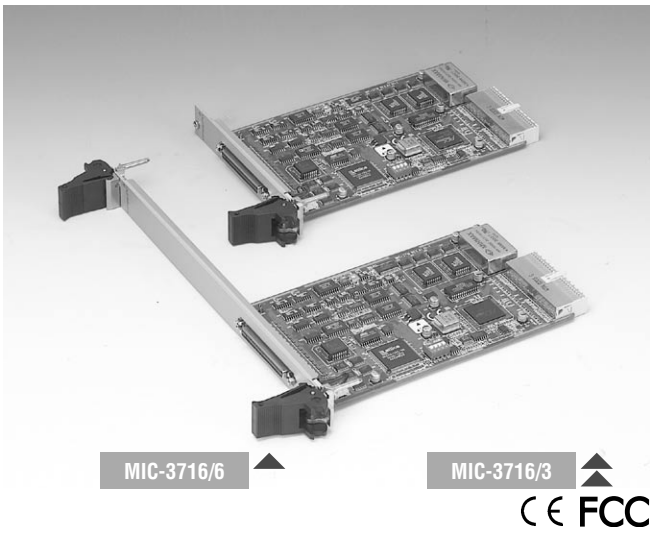
The MIC-3714 features convenient software auto calibration with no variable resistor trimming required.

Function Block Diagram



MIC-3716

250 kS/s, 16-bit, 16-ch High-resolution Multifunction Card



CE FCC

Features

- 16-bit high resolution
- 250 kS/s sampling rate
- Auto calibration function
- PCI-bus mastering for data transfer
- 16 analog input channels with 1K FIFO
- 16 S.E. or 8 Diff. AI, or a combination
- Unipolar/Bipolar input range
- 2 analog output channels
- 16 digital input channels
- 16 digital output channels
- One 10 MHz 16-bit resolution counter
- BoardID™ switch

Introduction

The MIC-3716 is a powerful high-resolution multifunction card for the PCI bus. It features a 250 kS/s 16-bit A/D converter, and an on-board 1K sample FIFO buffer for A/D. The MIC-3716 provides a total of 16 single-ended or eight differential A/D input channels or a mixed combination of these. There are also two 16-bit D/A output channels, 16 digital input/output channels, and one 10 MHz 16-bit counter channel. MIC-3716 provides specific functions for different user requirements.

Specifications

Analog Input

Channels	16 single-ended or 8 differential or combination						
Resolution	16-bit						
FIFO Size	1 K Samples/ch						
Sampling Rate*	250 kS/s max.						
Input range and Gain List	Gain		0.5	1	2	4	8
	Unipolar		N/A	0 ~ 10	0 ~ 5	0 ~ 0.25	0 ~ 1.25
	Bipolar		±10	±5	±2.5	±1.25	±0.625
Small Signal Bandwidth for PGA	Gain		0.5	1	2	4	8
	Bandwidth		4.0 MHz	4.0 MHz	2.0 MHz	1.5 MHz	0.65 MHz
Common Mode Voltage	±11 V max. (operational)						
Max. Input Voltage	±20 V						
Input Protection	30 Vp-p						
Input Impedance	100 MΩ/10pF(Off); 100 MΩ/10pF(On)						
Trigger Mode	Software, on-board programmable pacer or external						
Accuracy	DC	DNLE: ±1LSB					
		INLE: ±1 LSB					
		Zero (Offset) error; Adjustable to ±1 LSB					
		Gain	0.5	1	2	4	8
		Gain error (% FSR)	0.15	0.03	0.03	0.05	0.1
	AC	SNR: 82 dB					
		ENOB: 13.5 bits					
		THD: -84 dB typical					
Clocking and Trigger Inputs	Trigger Mode	Software, onboard programmable pacer or external					
	A/D pacer clock	250 kHz (max.); 58 μHz (min.)					
	External A/D trigger clock	MIN. pulse width: 2 μs (high); 2 μs (low) Max. frequency: 250 kHz					

Digital Input /Output

Input Channels	16	
Input Voltage	Low	0.4 V max.
	High	2.4 V min.
Input Load	Low	0.4 V max. @ -0.2 mA
	High	2.7 V min. @ 20 μA
Output Channels	16	
Output Voltage	Low	0.4 V max. @ +8.0 mA (sink)
	High	2.4 V min. @ -0.4 mA (source)

Analog Output

Channels	2	
Resolution	16-bit	
Operation mode	Single output	
Throughput*	200 kS/s max. per channel (FSR)	
Output Range (Internal & External Reference)	Using Internal Reference	0 ~ +5 V, 0 ~ +10 V, -5 ~ +5 V, -10 ~ +10 V
	Using External Reference	0 ~ +x V @ +x v (-10 ≤ x ≤ 10) -x ~ +x V @ +x v (-10 ≤ x ≤ 10)
Accuracy	DC	DNLE: ±1 LSB (monotonic)
		INLE: ±1 LSB
		Zero (Offset) error: Adjustable to ±1 LSB
		Gain (Full-scale) error: Adjustable to ±1 LSB
Dynamic Performance	Setting Time	5 μs (to 4 LSB of FSR)
	Slew Rate	20 V/μs
Drift	10 ppm/°C	
Driving Capability	±20 mA	
Output Impedance	0.1 Ω max.	

Ordering Information

- **MIC-3716/3** 3U, 250 kS/s, 16-bit, 16-ch High-Resolution Multifunction Card, user's manual and driver CD-ROM. (cable not included)
- **MIC-3716/6** 6U, 250 kS/s, 16-bit, 16-ch High-Resolution Multifunction Card, user's manual and driver CD-ROM. (cable not included)
- **PCLD-8710** Industrial Wiring Terminal Board with CJC circuit for DIN-rail Mounting. (cable not included)
- **PCL-10168** 68-pin SCSI-II cable with male connectors on both ends and special shielding for noise reduction, 1 and 2 m
- **ADAM-3968** 68-pin SCSI-II Wiring Terminal Board for DIN-rail Mounting

Feature Details

PCI-Bus Mastering Data Transfer

The MIC-3716 supports PCI-Bus mastering DMA for high-speed data transfer and gap-free analog input as well as analog output. By setting aside a block of memory in the PC, the MIC-3716 performs bus-mastering data transfers without CPU intervention, setting the CPU free to perform more urgent tasks such as data analysis and graphic manipulation. This function allows users to run all I/O functions simultaneously at full speed without losing data.

Auto-Calibration Function

The MIC-3716 provides an auto-calibration function by using a calibration utility. The built-in calibration circuitry of the MIC-3716 corrects gain and offset errors in analog input and analog output channels, thereby eliminating the need for external equipment and user adjustments.

BoardID™ Switch

The MIC-3716 has a built-in DIP switch that helps define each card's ID when multiple MIC-3716 cards have been installed on the same PC chassis. The BoardID™ switch is very useful when users build their system with multiple MIC-3716 cards. With the correct BoardID™ switch, the user can easily identify and access each card during hardware configuration and software programming.

Plug & Play Function

The MIC-3716 is a Plug & Play device that fully complies with the PCI Specification Rev 2.2. During card installation, there is no need to set jumpers or DIP switches. Instead, all bus-related configurations such as base I/O address and interrupt are automatically done by the Plug & Play function.

Automatic Channel/Gain/SD*/BU* Scanning

The MIC-3716 features an automatic channel/gain/SD/BU scanning circuit. This circuit controls the multiplexer switching during sampling in a way that is more efficient than what can be achieved by software implementation. On-board SRAM stores different gain, SD and BU values for each channel. This combination lets users perform multi-channel high speed sampling with different gain, SD and BU values for each channel.

SD: Single-Ended/Differential; BU: Bipolar/Unipolar

On-Board FIFO Memory

The MIC-3716 provides a 1K samples onboard FIFO (First In First Out) memory buffer for AD. This is an important feature for faster data transfer and more predictable performance under the Windows® system.

On-Board Programmable Timer/Counter

The MIC-3716 provides a programmable timer/counter for generating a pacer trigger for the A/D conversion. The timer/counter chip is 82C54, which includes three 16-bit counter 10 MHz clocks. One counter is used as an event counter for counting events coming from the input channel. The other two are cascaded together to make a 32-bit timer for pacer trigger time base.

Counter/Timer

Channels	3 channels, 2 channels are permanently configured as programmable pacers; 1 channel is free for user application	
Resolution	16-bit	
Compatibility	TTL level	
Base Clock	Channel 2: Takes input from output of channel 1 Channel 1: 10 MHz Channel 0: Internal 1 MHz or external clock (10 MHz) max Selected by software	
Max. Input Frequency	1 MHz	
Clock Input	Low	0.8 V max.
	High	2.0 V min.
Gate Input	Low	0.8 V max.
	High	2.0 V min.
Counter Output	Low	0.5 V max. @ +24 mA
	High	2.4 V min. @ -15 mA

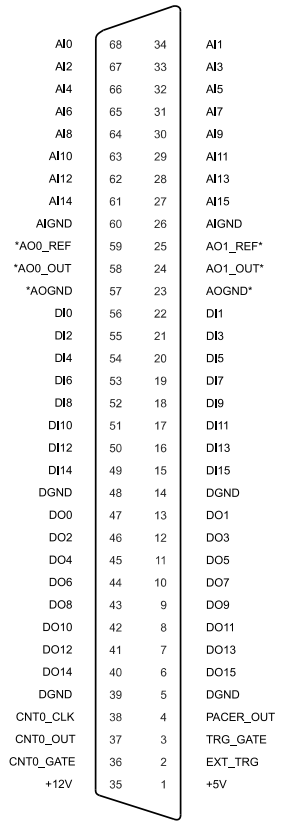
General

I/O Connector Type	68-pin SCSI-II female	
Dimensions (L x H)	160 x 100 mm (6.9" x 3.9") with 3U/6U Bracket	
Power Consumption	Typical	+5 V @ 850 mA, +12 V @ 600 mA
	Max.	+5 V @ 1 A, +12 V @ 700 mA
Temperature	Operating	0 ~ 60° C (32 ~ 158° F) (refer to IEC 68-2-1, 2)
	Storage	-20 ~ 85° C (-4 ~ 158° F)
Relative Humidity	Operating	5 ~ 85% RH non-condensing (refer to IEC 68-1, -2, -3)
	Storage	5 ~ 95% RH non-condensing (refer to IEC 68-1, -2, -3)
Certification	CE certified	

Note:

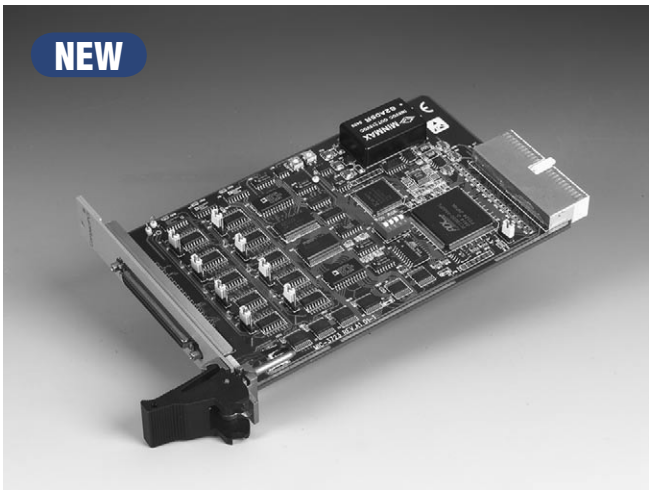
The sampling rate and throughput depends on the computer hardware architecture and software environment. The rates may vary due to programming language, code efficiency, CPU utilization and other factors.

Pin Assignments



MIC-3723

16-bit,8-ch Non-isolated Analog Output Card



Features

- 16-bit high resolution
- 8 Analog output channels
- Support hot swap function
- Auto-calibration
- BoardID™ switch

CE

Introduction

MIC-3723 is a non-isolated multiple channel analog output card for the PCI bus, and each analog output channel is equipped with a 16-bit, double-buffered DAC. It also features an auto-calibration function and BoardID™ switch. MIC-3723 is an ideal solution for industrial applications where multiple analog output channels are required.

Plug & Play Function

MIC-3723 is a Plug & Play device that fully complies with the PCI Specification Rev 2.2. During card installation, there is no need to set jumpers or DIP switches. Instead, all bus-related configurations such as base I/O address and interrupt are automatically done by the Plug & Play function.

Specification

Analog Output

- **Channels** 8
- **Resolution** 16-bit
- **Operation Mode** Single output, synchronized output
- **Output Range** -10 ~ +10 V, 0 ~ 20 mA, 4 ~ 20 mA (Internal Reference only)
- **Accuracy** Relative ±6 LSB; Differential Non-linearity ±6 LSB (monotonic)
- **Offset** < 6 LSB
- **Output Impedance** 0.1 Ω max.
- **Throughput** PC dependent, Software update (Direct AO)
- **Setting Time** 30 µs
- **Auto-Calibration Function**

Digital Input/Output

- **Channels** 16 (bi-directional)
- **Number of Ports** 2
- **Input Voltage** Low 0.8 V max; High 2.0 V min
- **Output Voltage** Low 0.5 V max. @ 24 mA (sink); High 2.4 V min. @ -15 mA (source)

General

- **I/O Connector Type** 68-pin SCSI-II female
- **Dimensions (L x H)** 160 x 100 mm (6.9" × 3.9")
- **Operating Temperature** 0 ~ 60°C (32 ~ 140°F) (refer to IEC 68-2-1,2)
- **Storage Temperature** -20 ~ 70°C (-4 ~ 158°F)
- **Operating Humidity** 5~95% RH non-condensing (refer to IEC 68-2-3)
- **Hot-Swap Support**
- **BoardID™ Switch**

Ordering Information

- **MIC-3723** 16-bit, 8-ch Non-isolated Analog Output Card
- **PL-10168** 68-pin SCSI-II cable with male connectors on both ends and special shielding for noise reduction, 1 and 2 m
- **ADAM-3968** 68-pin SCSI-II Wiring Terminal Board for DIN-rail mounting

Auto-Calibration Function

MIC-3723 provides an auto-calibration function by using a calibration utility. The built-in calibration circuitry of MIC-3723 corrects gain and offset errors in analog output channels, thereby eliminating the need for external equipment and user adjustments.

Flexible Voltage Output Range

MIC-3723 provides a fixed voltage output range of ±10 V for applications that need a flexible range. You can define the specific voltage output range and output data format via the enclosed software utility and driver.

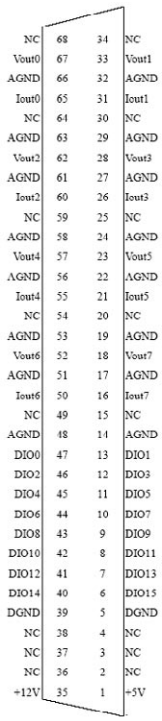
Keeps Output Values after System Reset

You can independently set the eight outputs to different ranges: ±10 V, 0 ~ 20 mA or 4 ~ 20 mA, and all ranges are software selectable. When the system is hot reset (power not shut down), MIC-3723 can either retain the last analog output values, or return to its default configuration, depending on the jumper setting. This practical function eliminates danger caused by improper operation during unexpected system resets.

BoardID™ Switch

MIC-3723 has a built-in DIP Switch that helps define each card's ID when multiple MIC-3723 cards have been installed on the same PC chassis. The BoardID switch function is very useful when users build their system with multiple MIC-3723 cards. With correct BoardID switch settings, you can easily identify and access each card during hardware configuration and software programming.

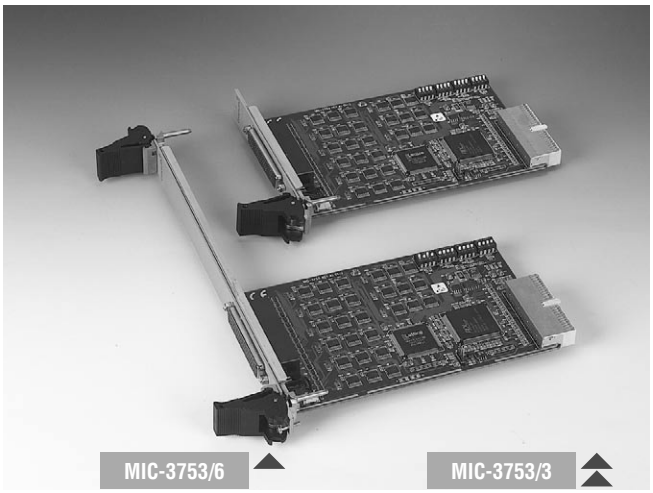
Pin Assignments



NC	68	34	NC
Vout0	67	33	Vout1
AGND	66	32	AGND
Iout0	65	31	Iout1
NC	64	30	NC
AGND	63	29	AGND
Vout2	62	28	Vout3
AGND	61	27	AGND
Iout2	60	26	Iout3
NC	59	25	NC
AGND	58	24	AGND
Vout4	57	23	Vout5
AGND	56	22	AGND
Iout4	55	21	Iout5
NC	54	20	NC
AGND	53	19	AGND
Vout6	52	18	Vout7
AGND	51	17	AGND
Iout6	50	16	Iout7
NC	49	15	NC
AGND	48	14	AGND
DIO0	47	13	DIO1
DIO2	46	12	DIO3
DIO4	45	11	DIO5
DIO6	44	10	DIO7
DIO8	43	9	DIO9
DIO10	42	8	DIO11
DIO12	41	7	DIO13
DIO14	40	6	DIO15
DGND	39	5	DGND
NC	38	4	NC
NC	37	3	NC
NC	36	2	NC
+12V	35	1	+5V

MIC-3753

72-ch Digital I/O Card



CE FCC

Features

- 72 TTL digital I/O lines
- Emulates mode 0 of 8255 PPI
- Buffered circuits for higher driving capacity than 8255
- Multiple-source interrupt handling
- Interrupt output pin for simultaneously triggering external devices with the interrupt
- Output status read-back
- "Pattern match" and "Change of state" interrupt functions for critical I/O monitoring
- Keeps I/O setting and digital output values when hot system reset
- Supports dry contact and wet contact

Introduction

The MIC-3753 is a 72-channel digital I/O card for the PCI bus. The card emulates mode 0 of the 8255 PPI chip, but the buffered circuits offer a higher driving capability than the 8255. The 72 I/O lines are divided into nine 8-bit I/O ports: A0, B0, C0, A1, B1, C1, A2, B2, C2. Users can configure each port as input or output via software.

Easy to Install: Plug & Play

The MIC-3753 uses a PCI controller to interface the card to the PCI bus. The controller fully implements the PCI bus specification Rev 2.1. All bus relative configurations, such as the base address and interrupt assignments, are automatically controlled by software.

Dry Contact Support for Digital Input

Each digital input channel of the MIC-3753 accepts either 0 ~ 5 V_{DC} wet contact or dry contact inputs. This dry contact capability allows the channels to respond to changes in external circuitry (e.g., the closing of a switch in the external circuitry) when no voltage is present in the external circuit.

Reset Protection Fulfills the True Requirement of Industrial Applications

When the system is hot reset (the power is not turned off), the MIC-3753 can either retain the value of the last I/O port settings and outputs, or return to its default configuration, depending on the jumper setting. This function protects the system from wrong operations during unexpected system resets.

Interrupt Functions Ensure Faster System Response

Two lines of each port C (i.e., ports C0, C1 and C2) are connected to an interrupt circuit. The "Interrupt Control Register" of the MIC-3753 controls how these signals generate an interrupt. Two interrupt request signals can be generated at the same time, and the software can process these two request signals by ISR. The dual interrupt sources provide the card with more capability and flexibility.

The MIC-3753 also provides a "Pattern Match" interrupt function for port A0. The card monitors the states of port A0 and compares them with a pre-set pattern. When the received state matches the pre-set pattern, the MIC-3753 generates an interrupt signal to the system.

A "Change of State" interrupt function is provided at port B0. When any signal line of port B0 changes its state, the card generates an interrupt to the system to handle this event.

These interrupt functions release the CPU from the burden of pulling all I/O points, enabling a PC to handle more I/O points with higher performance.

Specifications

- **I/O Channels** 72 digital I/O lines
- **Programming Mode** 8255 PPI mode 0
- **Input Signal** Logic level 0: 0.8 V max.
Logic level 1: 2.0 V min.
- **Output Signal** Logic level 0: 0.44 V max. @ 24 mA (sink)
Logic level 1: 3.76 V min. @ 24 mA (source)
- **Transfer Rate** 1.6 MB/s (tested under DOS, K6 300 MHz CPU)
- **Power Consumption** +5 V @ 400 mA (typical), +5 V @ 0.7 A (max.)
- **Operating Temperature** 0 ~ 60° C (32 ~ 140° F) (refer to IEC 68-2-1, 2)
- **Storage Temperature** -20 ~ 70° C (-4 ~ 158° F) (refer to IEC 68-2-3)
- **Operating Humidity** 5 ~ 95% RH non-condensing
- **Connector** One 78-pin D-type female connector
- **Dimensions (LxH)** 160 x 100 mm (6.3" x 3.9"), 3U/6U Bracket

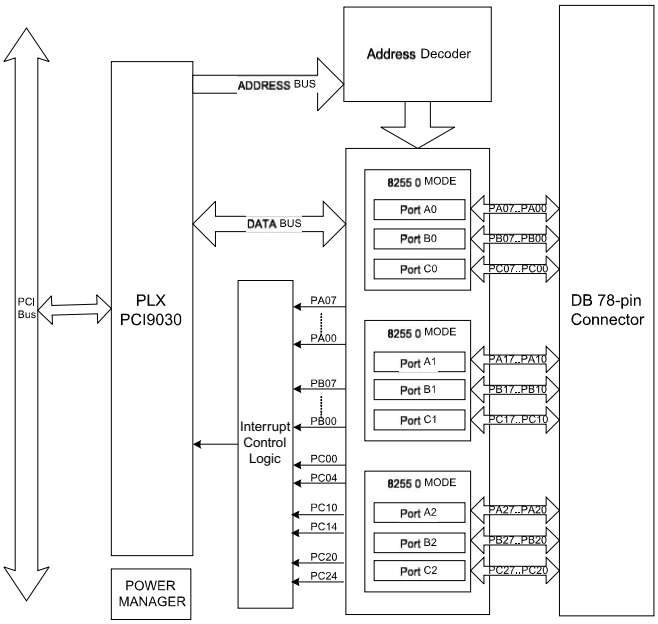
Ordering Information

- **MIC-3753/3** 3U 72-channel Digital I/O Card, user's manual and driver CD-ROM. (cable not included)
- **MIC-3753/6** 6U 72-channel Digital I/O Card, user's manual and driver CD-ROM. (cable not included)
- **PCL-10178-1** DB-78 cable assembly, 1 m
- **ADAM-3978** DB-78 wiring terminal for DIN-rail mounting

Applications

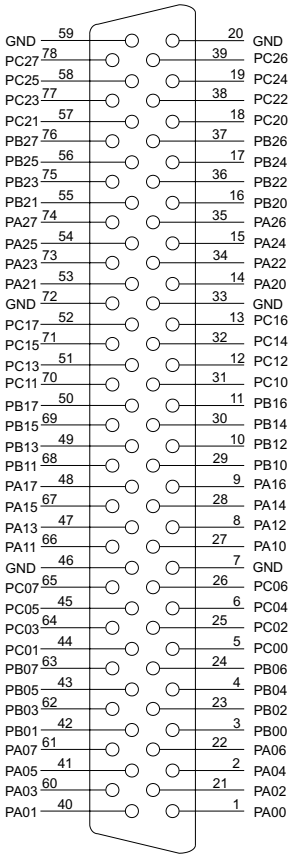
- Industrial AC/DC I/O devices for monitoring and controlling
- Relay and switch monitoring and controlling
- Parallel data transfer
- TTL, DTL and CMOS logic signal sensing
- Indicator LED driving

Block Diagram



MIC-3753 Block Diagram

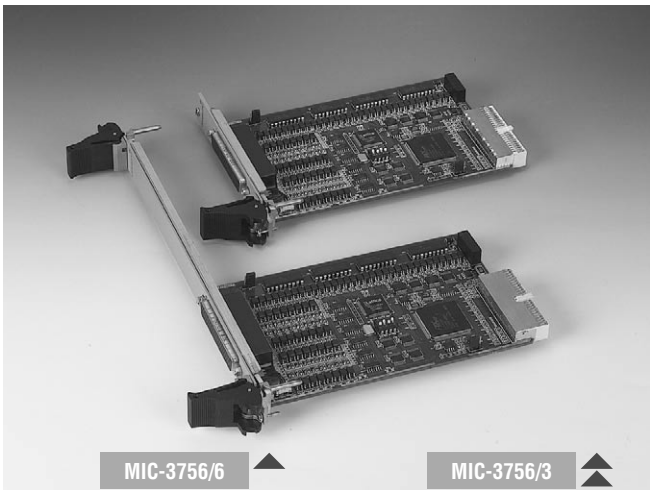
Pin Assignments



PA00 ~ PA07	I/O pins of Port A0
PA10 ~ PA17	I/O pins of Port A1
PA20 ~ PA27	I/O pins of Port A2
PB00 ~ PB07	I/O pins of Port B0
PB10 ~ PB17	I/O pins of Port B1
PB20 ~ PB27	I/O pins of Port B2
PC00 ~ PC07	I/O pins of Port C0
PC10 ~ PC17	I/O pins of Port C1
PC20 ~ PC27	I/O pins of Port C2
GND : Ground	

MIC-3756

64-ch Isolated Digital I/O Card



CE FCC

Features

- 32 isolated digital output channels
- 32 isolated digital input channels
- Either +/- voltage input for DI by group
- High-voltage isolation on I/O channels (2,500 V_{DC})
- Wide input range (10 ~ 50 V_{DC})
- Wide output range (5 ~ 40 V_{DC})
- High-sink current on isolated output channels (200 mA max./channel)
- High over-voltage protection (70 V_{DC}) for input channels
- BoardID™ switch
- Output status read-back for output channels
- Keeps digital output values after hot system reset
- Channel-Freeze function for output channels
- Interrupt handling capability
- Provides convenient wiring terminal module with LED indicators for DIN-rail mounting

Introduction

The MIC-3756 card offers 32 isolated digital input channels as well as 32 isolated digital output channels with isolation protection up to 2,500 V_{DC}, which makes it ideal for industrial applications where high-voltage isolation is required. In addition, all output channels are able to keep their last values after a hot system reset. Furthermore, the MIC-3756 provides a channel-freeze function that keeps the current output status unchanged for each channel during operation.

The MIC-3756 features robust isolation protection for applications in industrial, lab and machinery automation. It can durably withstand voltage up to 2,500 V_{DC} , preventing your host system from any incidental harm. If connected to an external input source with surge-protection, the MIC-3756 can offer up to a maximum of 2,000 V_{DC} ESD (Electrostatic Discharge) protection for input channels. Even if the input voltage rises up to 70 V_{DC}, the input channels of MIC-3756 can still manage to work properly for a short period of time.

Specifications

General

- **I/O Connector Type** One female 78-pin D-type connector
- **Dimensions** 160 x 100 mm (6.3" x 3.9") with 3U/6U Bracket
- **Power Consumption** Typical: +5 V @ 285 mA
  Max: +5V @ 475 mA
- **Operating Temperature** 0 ~ 60° C (32 ~ 140° F) IEC 68-2-1,2)
- **Storage Temperature** -20 ~ 70° C (-4 ~ 158° F)
- **Relative Humidity** 5 ~ 95% RH non-condensing (IEC-68-2-3)

Isolated Digital Input

- **Channels** 32
- **Interrupt Inputs** 2 (DI00, DI16)
- **Optical Isolation** 2500 V_{DC}
- **Over-voltage Protection** 70 V_{DC}
- **Input Resistance** 1 kΩ (50 V), 4 kΩ (5 V)
- **Input Voltage**
  VIH (max.) 50 V_{DC}
  VIH (min.) 5 V_{DC}
  VIL (max.) 2 V_{DC}

Isolated Digital Output

- **Channels** 32
- **Optical Isolation** 2500 V_{DC}
- **DO Response Time**
  OFF delay (±20%) 5 µs
  ON delay (±20%) 120 µs
- **Supplied Voltage** 5~40 V_{DC}
- **Sink Current** 200 mA max/channel

- **Photo-Couple Response Time**

Input Voltage	*OFF delay (±20%)	*ON delay (±20%)
5 V	100 µs	60 µs
12 V	120 µs	10 µs
24 V	140 µs	5 µs
30 V	150 µs	4 µs
50 V	200 µs	4 µs

*OFF delay means the photo-couple turn OFF delay time when DI input is removed

*ON delay means the photo-couple turn ON delay time when DI input voltage is connected.

Ordering Information

- **MIC-3756/3** 3U 64-channel isolated digital I/O Card, user's manual and driver CD-ROM. (cable not included)
- **MIC-3756/6** 6U 64-channel isolated digital I/O Card, user's manual and driver CD-ROM. (cable not included)
- **PCL-10178-1** DB-78 cable assembly 1 m
- **ADAM-3978** DB-78 wiring terminal for DIN-rail mounting

Feature Details

Wide Input/Output Range

The MIC-3756 has a wide range of input voltage from 10 to 50 V_{DC}, and it is suitable for most industrial applications with 12 V_{DC}, 24 V_{DC} and 48 V_{DC} input voltage. It also features a wide output voltage range from 5 to 40 V_{DC}, suitable for most industrial applications with 12 V_{DC}/24 V_{DC} output voltage. You can also request tailored solutions for specific input/out voltage ranges.

BoardID™ Switch

The MIC-3756 has a built-in DIP switch that helps define each card's unique ID when multiple MIC-3756 cards have been installed on the same PC chassis. The BoardID switch setting is very useful when users build their system with multiple MIC-3756 cards. With correct Board ID settings, you can easily identify and access each card during hardware configuration and software programming.

Channel-Freeze Function

The MIC-3756 provides a Channel-Freeze function, which can be enabled either in dry contact or wet contact mode (selected by the on-board jumper). When the Channel-Freeze function is enabled, the last status of each digital output channel will be safely kept for emergency use. Moreover, you can enable this function through software since it is useful in software simulations and testing programs.

Reset Protection Fulfills Requirement for Industrial Applications

If the system has undergone a hot reset (i.e. without turning off the system power), the MIC-3756 can either retain the output values of each channel or return to its default configuration as open status, depending on its on-board jumper setting. This function protects the system from wrong operations during unexpected system resets.

Pin Assignments

CN1

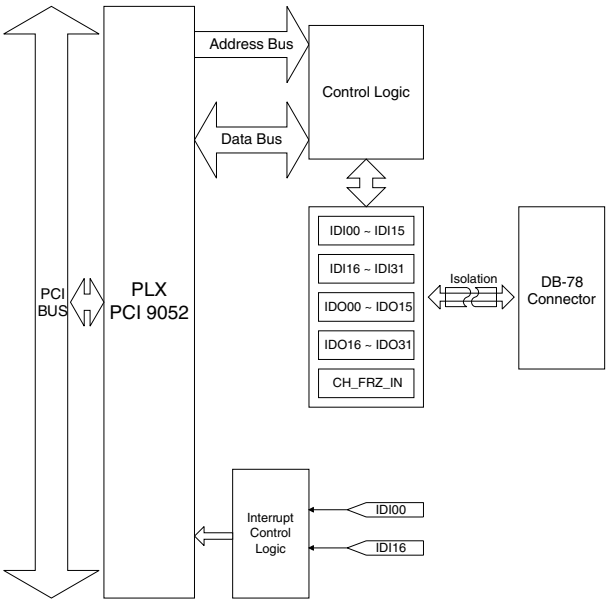
GND	59	20	GND
PC27	78	39	PC26
PC25	58	19	PC24
PC23	77	38	PC22
PC21	57	18	PC20
PB27	76	37	PB26
PB25	56	17	PB24
PB23	75	36	PB22
PB21	55	16	PB20
PA27	74	35	PA26
PA25	54	15	PA24
PA23	73	34	PA22
PA21	53	14	PA20
GND	72	33	GND
PC17	52	13	PC16
PC15	71	32	PC14
PC13	51	12	PC12
PC11	70	31	PC10
PB17	50	11	PB16
PB15	69	30	PB14
PB13	49	10	PB12
PB11	68	29	PB10
PA17	48	9	PA16
PA15	67	28	PA14
PA13	47	8	PA12
PA11	66	27	PA10
GND	46	7	GND
PC07	65	26	PC06
PC05	45	6	PC04
PC03	64	25	PC02
PC01	44	5	PC00
PB07	63	24	PB06
PB05	43	4	PB04
PB03	62	23	PB02
PB01	42	3	PB00
PA07	61	22	PA06
PA05	41	2	PA04
PA03	60	21	PA02
PA01	40	1	PA00

D-SUB 78 M

Applications

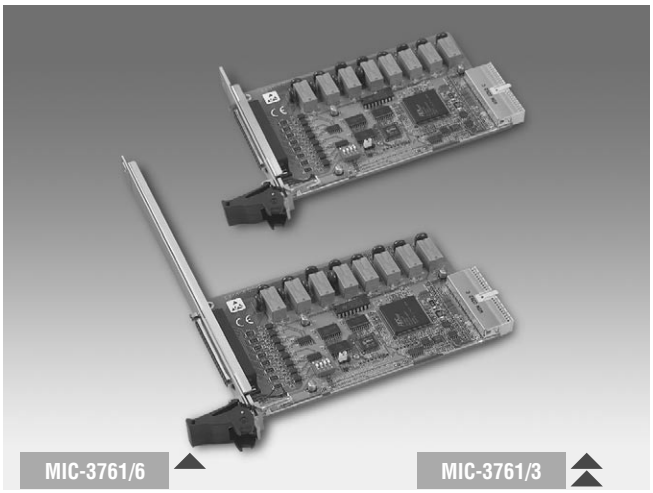
- Industrial ON/OFF control
- Switch status sensing
- BCD interfacing
- Digital I/O control
- Industrial and lab automation
- SMT/PCB machinery
- Semi-conductor machinery
- PC-based Industrial Machinery
- Testing & Measurement
- Laboratory & Education

Block Diagram



MIC-3761

8-ch Relay Actuator and 8-ch Isolated Digital Input Card



CE FCC

Features

- 8 relay output channels and 8 isolated digital input channels
- LED indicators to show activated relays
- 4 Form C and 4 Form A type relay output channels
- Output status read-back
- Retained relay output values when hot system reset
- High-voltage isolation on input channels (3,750 V_{DC})
- High ESD protection (2,000 V_{DC})
- High over-voltage protection (70 V_{DC})
- Wide input range (10 ~ 50 V_{DC})
- Interrupt handling capability
- BoardID™ switch

Introduction

The MIC-3761 relay actuator and isolated D/I card is an add-on card for the PCI bus. It provides 8 opto-isolated digital inputs with isolation protection of 3,750 V_{DC} for collecting digital inputs in noisy environments, and 8 relay actuators for serving as ON/OFF control devices or small power switches. For easy monitoring, each relay is equipped with one red LED to show its ON/OFF status. The MIC-3761's eight optically-isolated digital input channels are ideal for digital input in noisy environments or with floating potentials.

Rugged Protection

The MIC-3761 digital input channels feature rugged protection for industrial, lab and machinery automation applications. It durably withstands voltage up to 3,750 V_{DC}, protecting your host system from any incidental harms. If connected to an external input source with surge-protection, the MIC-3761 can offer up to a maximum of 2,000 V_{DC} ESD (Electrostatic Discharge) protection. Even with an input voltage rising up to 70 V_{DC}, the MIC-3761 can still manage to work properly for a short period of time.

Reset Protection Fulfills Requirement for Industrial Applications

When the system has undergone a hot reset (i.e. without turning off the system power), the MIC-3761 can either retain output values of each channel, or return to its default configuration as open status, depending on its on-board jumper setting. This function protects the system from unwanted operations during unexpected system resets.

Specifications

Isolated Digital Input

- **Channels** 8
- **Optical Isolation** 3,750 V_{DC}
- **Opto-Isolator Response Time** 25 µs
- **Over-Voltage Protection** 70 V_{DC}
- **Input Voltage** 10 ~ 50 V_{DC}
- **Input Current** 1.6 mA @ 10 V_{DC}
  8.9 mA @ 50 V_{DC}

Relay Output

- **Channels** 8
- **Relay Type** SPDT (4 Form C and 4 Form A)
- **Rating (resistive)** 3 A @ 250 V_{AC} or 3 A @ 24 V_{DC}
- **Max. Switching Power** 750 AV, 72 W
- **Max. Switching Load** 10 mA @ 5 V_{DC}
- **Insulation Resistance** 1,000 MΩ min. (at 500 V_{DC})
- **Operate Time** 15 ms max.
- **Release Time** 5 ms max.

General

- **Connector** One 37-pin D-type female connector
- **Dimensions (L x H)** 175 x 100 mm (6.9" x 3.9")
- **Power Consumption** +5 V @ 220 mA (typical)
  +5 V @ 750 mA (max.)
- **Operating Temperature** 0 ~ 60° C (32 ~ 140° F) (refer to IEC 68-2-1, 2)
- **Storage Temperature** -20 ~ 70° C (-4 ~ 158° F)
- **Operating Humidity** 5 ~ 95 % RH non-condensing (refer to IEC 68-2-3)
- **Certifications** CE Class A certified

Isolated Digital Input

- **Input Channels** 8
- **Optical Isolation** 3750 V_{DC}
- **Opto-isolator Response Time** 25 µs
- **Over-voltage Protection** 70 V_{DC}
- **Input Voltage** VIH (max.) 50 V_{DC}
  VIH (min.) 10 V_{DC}
  VIL (max.) 3 V_{DC}
- **Input Current** 10 V_{DC} 1.6 mA (typical)
  12 V_{DC} 1.9 mA (typical)
  24 V_{DC} 4.1 mA (typical)
  48 V_{DC} 8.5 mA (typical)
  50 V_{DC} 8.9 mA (typical)

Relay Output

- **Output Channels** 8
- **Relay Type** SPDT (4 Form C and 4 Form A)
- **Rating (resistive)** 3 A @ 250 V_{AC} or 3 A @ 24 V_{DC}
- **Max. Switching Power** 750 AV, 72 W
- **Max. Switching Voltage** 250 V_{AC} , 24 V_{DC}
- **Max. Switching Current** 3 A
- **Min. Switching Load** 10 mA @ 5 V_{DC}
- **Breakdown Voltage** 5,000 V_{AC} for 1 min. (Between coil and contacts)
- **Operate time** 15 ms max.
- **Release time** 5 ms max.
- **Insulation Resistance** 1,000 MΩ min. (at 500 V_{DC})
- **Life Expectancy** Mechanical 2 x 107 ops. min.
  Electrical 2x105 ops. min. (contact rating)

Note:

The current specifications are limited by the cable and wiring terminal board.

Ordering Information

- **MIC-3761/3** 3U 8-ch Relay Actuator and 8-ch Isolated D/I Card, user's manual and driver CD-ROM. (cable not included)
- **MIC-3761/6** 6U 8-ch Relay Actuator and 8-ch Isolated D/I Card, user's manual and driver CD-ROM. (cable not included)
- **PCL-10137-1/2/3** DB-37 cable assembly, 1 ,2 and 3 m
- **ADAM-3937** DB-37 Wiring Terminal for Din-rail Mounting
- **PCLD-780** Universal Screw Terminal Board

Pin Assignments

Description of pin use:

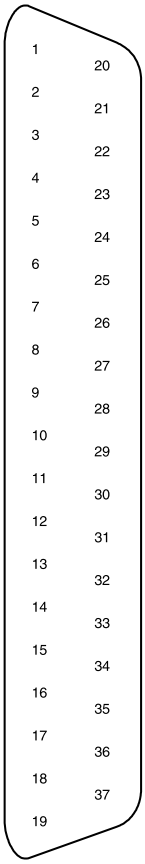
IDInA* (n=0 ~ 7):
Isolated digital input A

IDInB* (n=0 ~ 7):
Isolated digital input B

Rn_NO(n=0 ~ 7):
Normally Open pin of relay output

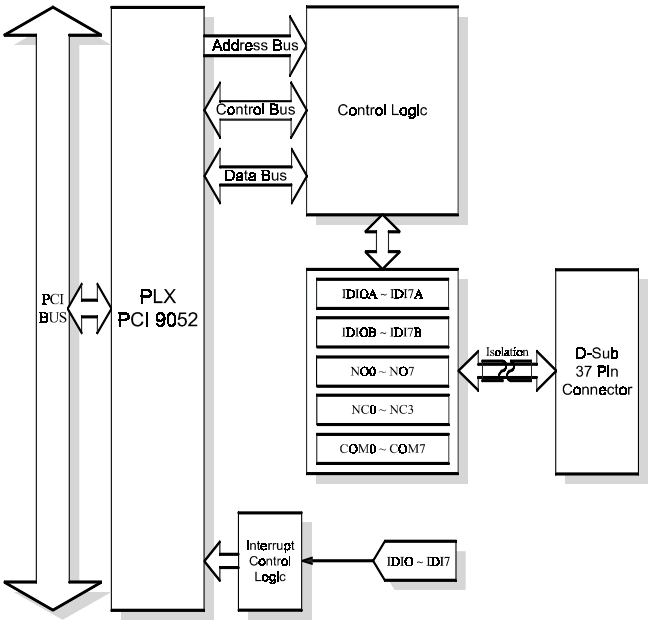
Rn_NC(n=0 ~ 7):
Normally Close pin of relay output

Rn_COM(n=0 ~ 7):
Common pin of relay output



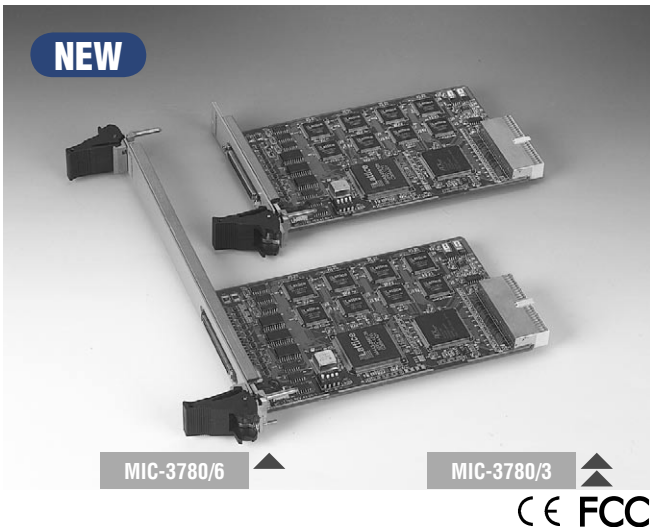
	R0_NO	1	20	R3_NO
	R0_COM	2	21	R3_COM
	R0_NC	3	22	R3_NC
	R1_NO	4	23	R4_NO
	R1_COM	5	24	R4_COM
	R1_NC	6	25	R5_NO
	R2_NO	7	26	R5_COM
	R2_COM	8	27	R6_NO
	R2_NC	9	28	R6_COM
	R7_NO	10	29	N/A
	R7_COM	11	30	IDI 0B
	IDI 0A	12	31	IDI 1B
	IDI 1A	13	32	IDI 2B
	IDI 2A	14	33	IDI 3B
	IDI 3A	15	34	IDI 4B
	IDI 4A	16	35	IDI 5B
	IDI 5A	17	36	IDI 6B
	IDI 6A	18	37	IDI 7B
	IDI 7A	19		

Block Diagram



MIC-3780

8-ch Counter/Timer Card



CE FCC

Features

- 8 independent 16-bit counters
- 8 programmable clock source
- 8 digital TTL outputs and 8 digital TTL inputs
- Up to 20 MHz input frequency
- Multiple counter clock source selectable
- Counter output programmable
- Counter gate function
- Flexible interrupt source select
- BoardID™ switch

Introduction

The MIC-3780 is a general purpose multiple channel counter/timer card for the 3U/6U CompactPCI® system. It targets the AM9513 to implement the counter/timer function by CPLD. Plus, it provides eight 16-bit counter channels and 8 digital outputs and 8 digital inputs. Advantech has designed in powerful counter functions to fulfill your industrial or laboratory applications.

Flexible Counter Modes

The MIC-3780 features up to 12 programmable counter modes, to provide one shot output, PWM output, periodic interrupt output, time-delay output, and to measure the frequency and the pulse width. The MIC-3780 is an ideal solution for variant counter/timer applications.

Special Shielded Cable for Noise Reduction

The PCL-10168 shielded cable is specially designed for the MIC-3780 to reduce noise. Its wires are all twisted pairs, and the input signals and output signals are separately shielded, providing minimal cross talk between signals and solid protection against EMI/EMC problems.

BoardID™ switch

The MIC-3780 has a built-in DIP switch that helps define each card's ID when multiple cards have been installed on the same PC chassis. The board ID setting function is very useful when users build their system with multiple MIC-3780 cards. With correct Board ID settings, you can easily identify and access each card during hardware configuration and software programming.

Plug & Play Function

The MIC-3780 is a Plug & Play device, which fully complies with PICMG 2.0, Ver 2.1 CompactPCI specifications. During card installation, there is no need to set jumpers or DIP switches. Instead, all bus-related configurations such as base I/O address and interrupt are automatically done by the Plug & Play function.

Specifications

Programmable Counter

- **Channels** 8 (independent)
- **Resolution** 16-bit
- **Programmable Clock Source** 8 (independent)
- **Programmable Counter Modes** 12
- **Max. Frequency** 20 MHz
- **Interrupt Source** 8 counter outputs

Digital Input/Output

- **Input Channels** 8
- **Input Voltage** Low: 0.8 V max. High: 2.4 V min.
- **Interrupt Source** Channel 0
- **Output Channels** 8
- **Output Voltage** Low: 0.5 V max. @ 24 mA (sink)
  High: 2.4 V min. @ -15 mA (source)

General

- **I/O Connector Type** 68-pin SCSI-II female
- **Dimensions (L x H)** 160 x 100 mm (6.3" x 3.9") with 3U/6U Bracket
- **Power Consumption** Typical: +5 V @ 900 mA
  Max: +5 V @ 1.2 A
- **Operating Temperature** 0 ~ 60° C (32 ~ 140° F) (refer to IEC 68-2-1, 2)
- **Storage Temperature** -20 ~ 70° C (-4 ~ 158° F)
- **Relative Humidity** 5 ~ 95 % RH non-condensing (refer to IEC 68-2-3)
- **Certifications** CE, FCC Class A

Ordering Information

- **MIC-3780/3** 3U, 8-ch. Counter/Timer Card, user's manual and driver CD-ROM. (cable not included)
- **MIC-3780/6** 6U, 8-ch. Counter/Timer Card, user's manual and driver CD-ROM. (cable not included)
- **PCL-10168** 68-pin SCSI-II cable with male connectors on both ends and special shielding for noise reduction, 1 and 2 m
- **ADAM-3968** 68-pin SCSI-II Wiring Terminal Board for DIN-rail mounting

Applications

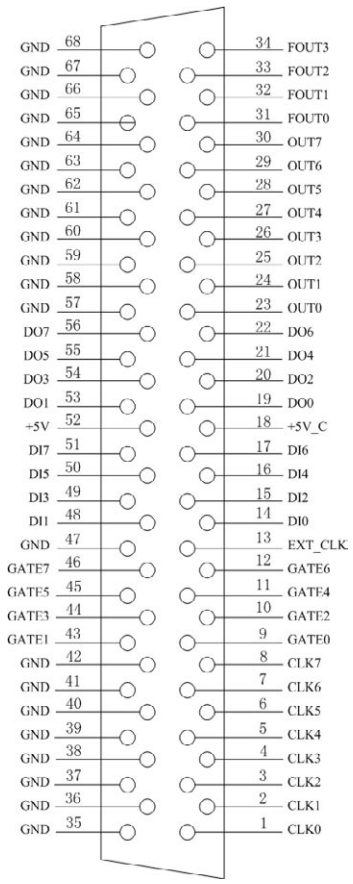
- Event counting
- One shot output
- Programmable frequency output
- Frequency measurement
- Pulse width measurement
- PWM output
- Periodic interrupt generation
- Time-delay generation

Counter Mode Table

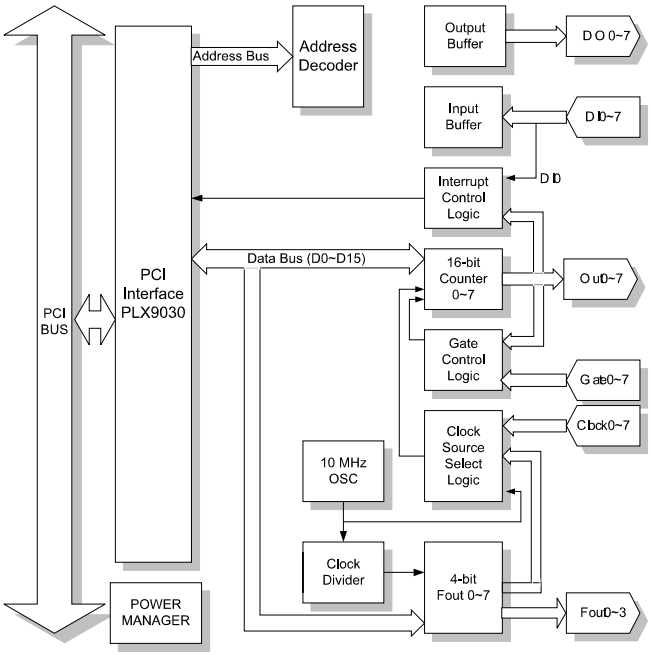
Counter Mode	A	B	C	D	E	F	G	H	I	J	K	L
Reload Source (CM5)	0	0	0	0	0	0	1	1	1	1	1	1
Repetition (CM4)	0	0	0	1	1	1	0	0	0	1	1	1
Gate Control (CM15 ~ CM12)	N	L	E	N	L	E	N	L	E	N	L	E
Count to T/C once, then disarm	√	√	√									
Count to T/C twice, then disarm							√	√	√			
Count to T/C repeatedly without disarming				√	√	√				√	√	√
Gate input dose not gate counter input	√			√			√			√		
Count only during active gate level		√			√			√			√	
Start count on active gate edge and stop count on next T/C			√			√						
Start count on active gate edge and stop count on second T/C									√			√
No hardware re-triggering	√	√	√	√	√	√	√	√	√	√	√	√
Reload counter from Load Register on T/C	√	√	√	√	√	√						
Reload counter on each T/C, alternating reload source between Load and Hold Registers							√	√	√	√	√	√

Note: Gate Control: N: No gate control
L: Level gate control
E: Edge gate control

Pin Assignments

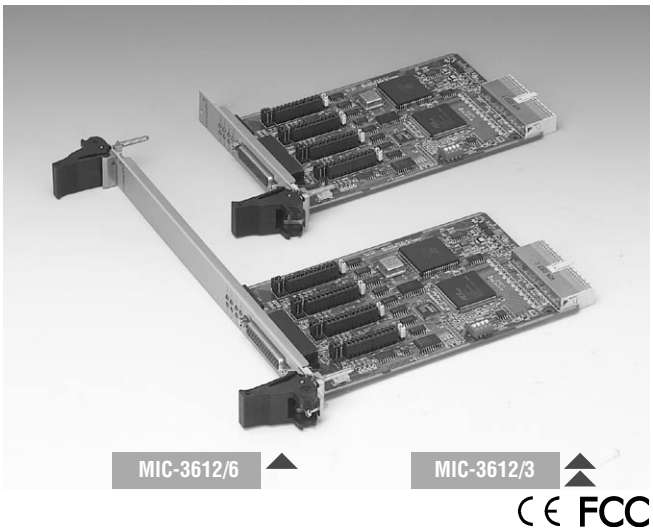


Block Diagram



MIC-3612

4-port RS-232/422/485 Communication Card, w/Surge Protection



CE FCC

Features

- PCI Specification 2.1 compliant
- Speeds up to 921.6 kbps
- 4-port RS-232/422/485
- 16C954 UARTs with 128-byte standard
- Standard Industrial CompactPCI® 3U Board size
- I/O address automatically assigned by PCI Plug & Play
- OS supported: Windows® 98/NT/2000/XP
- Interrupt status register for increased performance
- Automatic RS-485 data flow control
- Tx/Rx LED indicator

Introduction

The MIC-3612 is a 4 port RS-232/422/485 PCI communication card. It is compatible with the PCI 2.1 bus specification and has four surge protected, RS-232/422/485 ports.It features functions such as high transmission speed at 921.6 kbps, four independent RS-232/422/485 ports, optional surge protection etc. The MIC-3612 also comes with high-performance 16PCI954 UARTs with 128-byte FIFO to reduce CPU load. These components make the it more stable and reliable. Thus, the MIC-3612 is especially suitable for multitasking environments.

To improve the performance of the system, the MIC-3612 allows transmission rates up to 921.6 kbps. To further increase reliability, the MIC-3612 offers surge protection technology, protecting your system from abrupt high voltage of 2500 V_{DC}. Besides, Advantech also provides a convenient utility program, ICOM Tools, to help users test the CompactPCI® card performance by analyzing the port status. It's easy to use the menu commands and toolbar buttons. ICOM tools acts as a PC-based data scope that lets you set a trigger condition, capture the communication data and monitor the signal status. ICOM Tools is applicable to all series of Advantech ICOM cards.

Specifications

- **Bus Interface** CompactPCI® bus specification 2.1 compliant
- **Communication Controller** BUS controller: PLX9030
  UART: 16C954
- **IRQ** All ports use the same IRQ assigned by PCI Plug & Play
- **Data Bits** 5, 6, 7, 8
- **Stop Bits** 1, 1.5, 2
- **Parity** None, even, odd
- **Speed (bps)** 50 ~ 921.6 k
- **Data Signals** TxD, RxD, RTS, CTS, DTR, DSR, DCD, RI, GND (for RS-232)
  TxD, RxD, RTS, CTS (for RS-422)
  DATA+, DATA- (for RS-485)
- **Surge Protection** 2500 V_{DC}
- **Power Consumption**

	Typical	Max.
+5 V	220 mA	285 mA
+3.3 V	100 mA	200 mA
+12 V	60 mA	80 mA

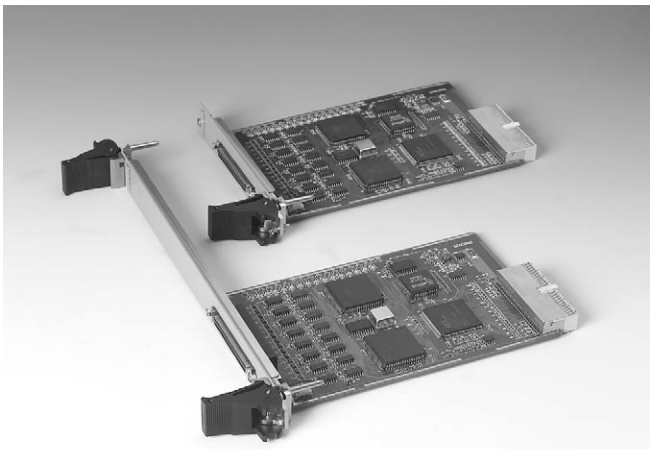
- **Dimensions (L x H)** 160 x 100 mm (6.3" x 3.9"), 3U/6U bracket
- **Operating Temperature** 0 ~ 70° C (IEC68-2-1, 2)
- **Operating Humidity** 5 ~ 95% relative humidity, non-condensing (IEC 68-2-1, 2)
- **Operating Humidity** 5 ~ 95% relative humidity, non-condensing (IEC 68-2-3)
- **Storage Temperature** -20 ~ 80° C

Ordering Information

- **MIC-3612/3** 3U CompactPCI® 4-port RS-232/422/485 Card, user's manual and driver CD-ROM. (30 cm DB-44 to DB-9 cable included)
- **MIC-3612/6** 6U CompactPCI® 4-port RS-232/422/485 Card, user's manual and driver CD-ROM. (30 cm DB-44 to DB-9 cable included)

MIC-3620

8-port RS-232 Communication Card



MIC-3620/6 MIC-3620/3

CE FCC

Features

- PCI Specification 2.1 compliant
- Speeds up to 921.6 kbps
- 16C954 UARTs with 128-byte standard
- 8-port RS-232
- Standard Industrial CompactPCI® 3U Board size
- I/O address automatically assigned by PCI Plug & Play
- OS support: Windows® 98/NT/2000/XP
- Interrupt status register for increased performance
- Optional surge protection
- Space reserved for termination resistors

Introduction

The MIC-3620 is a 8 port RS-232 communication card that is compatible with the PCI 2.1 bus specification. The MIC-3620 provides eight optional surge protected RS-232 ports, and functions such as high transmission speed of 921.6 kbps, eight independent RS-232 ports, optional surge protection etc. The MIC-3620 also comes with high-performance 16PCI954 UARTs with 128-byte FIFO and 16C954 UARTs to reduce CPU load. These components increases stability and reliability. Thus, the MIC-3620 is especially suitable for multitasking environments.

To further increase reliability, The MIC-3620 offers surge protection technology, protecting your system from abrupt high voltage of 2500 V_{DC}. Besides, Advantech also provides a convenient utility program, ICOM Tools, to help users test the CompactPCI card performance by analyzing the port status through easy-to-use menu commands and toolbar buttons. ICOM Tools acts as a PC-based data scope that lets you set a trigger condition, capture the communication data and monitor the signal status. In addition, ICOM Tools is applicable to all series of Advantech ICOM cards.

Specifications

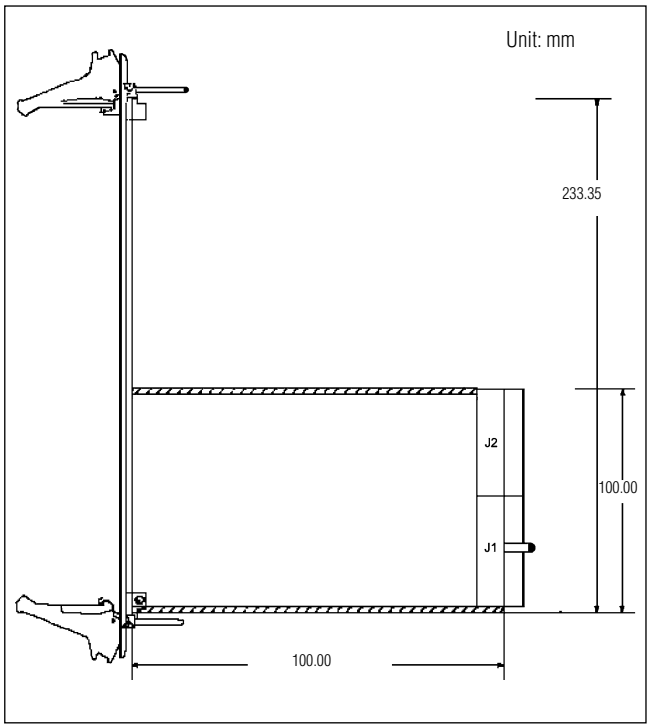
Bus Interface	CompactPCI® bus specification 2.1 compliant
IRQ	All ports use the same IRQ assigned by PCI Plug & Play
Data Bits	5, 6, 7, 8
Stop Bits	1, 1.5, 2
Parity	None, even, odd
Communication Controller	PCI9030 + 16C954
Speed (bps)	50 ~ 921.6 k
Data Signals	TxD, RxD, RTS, CTS, DTR, DSR, DCD, RI, GND
Surge Protection	2500 V_{DC}
Power Consumption	+5V, +3.3V, +12V
Dimensions (LxH)	160 x 100 mm (6.3" x 3.9"), 3U/6U Bracket
Operating Temperature	0~ 70° C (refer to IEC68-2-1, 2)
Operating Humidity	5 ~ 95% Relative Humidity, non-condensing (IEC 68-2-1, 2)
Operating Humidity	5 ~ 95% Relative Humidity, non-condensing (IEC 68-2-3)
Storage Temperature	-20 ~ 80° C

Ordering Information

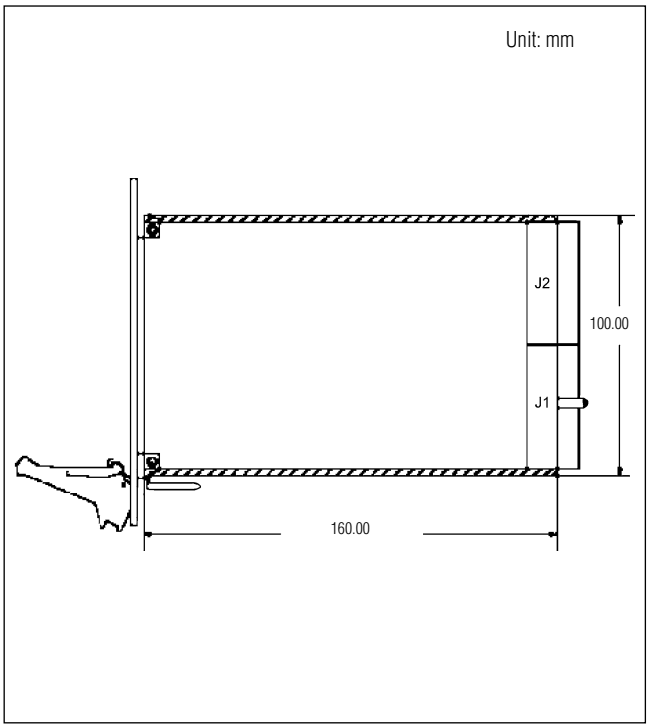
MIC-3620/3	3U CompactPCI® 8-port RS-232 Card, User's manual and CD-ROM. (50 cm SCSI-68 to DB-9 cable included)
MIC-3620/6	6U CompactPCI® 8-port RS-232 Card, User's manual and CD-ROM. (50 cm SCSI-68 to DB-9 cable included)

MIC-3000 Series

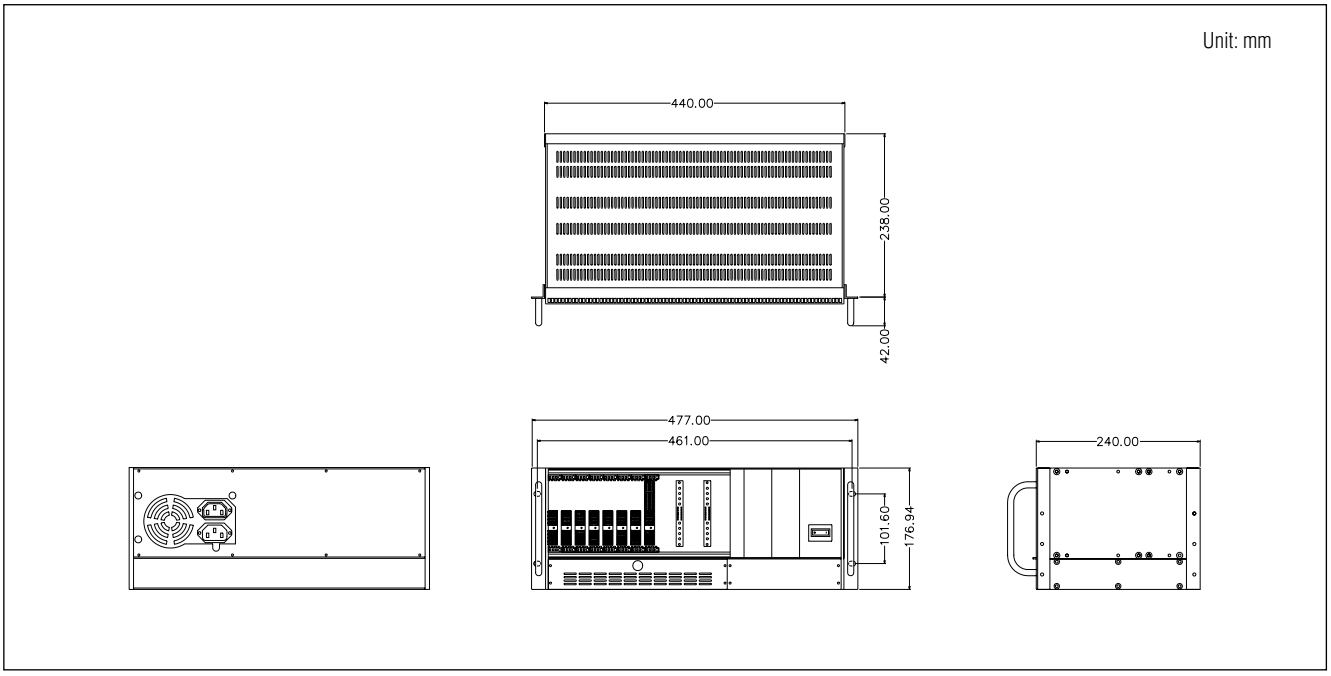
Dimensions



3U-size Card with 6U Bracket



3U-size Card with 3U Bracket



4U-size Enclosure