Data Acquisition Boards

Data Acquisition and Control Tutorial & Software
ActiVo DAQ Pro Introduction
Glossary
Selection Guide

Multifunction Cards
- PCI-1710U/UL, 100 kS/s, 12-bit, 16-ch Universal PCI Multifunction Card
- PCI-1710HG, 100 kS/s, 12-bit, 16-ch Universal PCI Multifunction Card
- PCI-1710HG/U, 100 kS/s, 12-bit, 16-ch Universal PCI Multifunction Card
- PCI-1712L, 80 MB/s, 12-bit, 16-ch PCI Multifunction Card
- PCI-1716L, 250 kS/s, 16-bit, 16-ch PCI Multifunction Card
- PCI-1716DU, 100 kS/s, 12-bit, 16-ch Universal PCI Multifunction Card
- PCI-1741U, 200 kS/s, 16-bit, 16-ch Universal PCI Multifunction Card
- PCI-1742U, 16-bit, 16-ch Universal PCI Multifunction Card
- PCI-711B, 40 kS/s, 12-bit, 8-ch ISA Multifunction Card
- PCI-9136, 30 kS/s, 16-bit, 16-ch ISA Multifunction Card
- PCI-8108D/HD, 100 kS/s, 12-bit, 16-ch ISA Multifunction Card
- PCI-8108D, 40 kS/s, 12-bit, 16-ch ISA Multifunction Card

Analogue I/O Cards
- PCIE-1744 (New), 80 MB/s, 32-ch Digital I/O PCI Card
- PCI-1743U, 500 kS/s, 12-bit, 32-ch Isolated Analog Input Universal PCI Card
- PCI-1743U, 250 kS/s, 16-bit, 64-ch Analog Input Universal PCI Card
- PCI-9138, 25 kS/s, 12-bit, 16-ch Isolated Analog Input ISA Card
- PCI-1720U, 12-bit, 4-ch Isolated Analog Input Universal PCI Card
- PCI-7121, 12-bit, 4-ch Analog Output PCI Card with 16-ch Digital I/O
- PCI-7123, 16-bit, 8-ch Analog Output PCI Card with 16-ch Digital I/O
- PCI-1724U, 14-bit, 32-ch Isolated Analog Output Universal PCI Card
- PCI-1727U, 14-bit, 12-ch Analog Output Universal PCI Card with 32-ch Digital I/O
- PCI-1726, 12-bit, 6-ch Analog Output ISA Card with 32-ch Digital I/O
- PCI-1725, 12-bit, 2-ch Analog Output ISA Card

Digital I/O & Counter Cards
- PCI-1730U, 64-ch Digital I/O and Counter Universal PCI Card
- PCI-1730U, 24-ch Digital I/O Universal PCI Card
- PCI-1730U, 48-ch Digital I/O Universal PCI Card
- PCI-1730U, 48-ch Digital I/O and 2-ch Counter PCI Card
- PCI-1730U, 96-ch Digital I/O PCI Card
- PCI-1730U, 96-ch Digital I/O Extension Card for PCI-1730U
- PCI-1730U, 80 MB/s, 12-ch Digital I/O PCI Card
- PCI-1730UP, 24-ch Digital I/O Low Profile Universal PCI Card
- PCI-720+, 64-ch Digital I/O and Counter ISA Card
- PCI-720+, 144-ch Digital I/O ISA Card
- PCI-724, 24-ch Digital I/O ISA Card
- PCI-731, 48-ch Digital I/O ISA Card
- PCI-732U, 32-ch Isolated Digital I/O Universal PCI Card
- PCI-733, 32-ch Isolated Digital Input PCI Card
- PCI-734, 32-ch Isolated Digital Output PCI Card
- PCI-735, 32-ch Isolated Digital I/O and 3-ch Counter PCI Card
- PCI-735U, 64-ch Isolated Digital Output Universal PCI Card
- PCI-754, 64-ch Isolated Digital Input PCI Card
- PCI-756, 64-ch Isolated Digital I/O PCI Card
- PCI-756UDD, 128-ch Isolated Digital Output Universal PCI Card
- PCI-756UDD, 128-ch Isolated Digital I/O Universal PCI Card
- PCI-1760U, 8-ch Relay and 8-ch Isolated Digital Input Universal PCI Card with 10-ch Counter/Timer
- PCI-1761, 8-ch Relay and 8-ch Isolated Digital Input PCI Card
- PCI-1762, 8-ch Relay and 8-ch Isolated Digital Input PCI Card
- PCI-725, 8-ch Relay and 8-ch Isolated Digital Input ISA Card
- PCI-735, 12-ch Relay ISA Card
- PCI-738U, 8-ch, 16-bit Counter/Timer Universal PCI Card
- PCI-836, 6-ch, 16-bit Counter/Timer ISA Card
- PCI-1671UP, 16-64, Interface Low Profile Universal PCI Card

PC/104 & PCI-104 DAQ Modules
- PCI-3810I (New), 250 kS/s, 12-bit, 16-ch Multifunction PCI-104 Module
- PCI-3813I, 100 kS/s, 12-bit, 32-ch Isolated Analog Input PCI-104 Module
- PCI-3710EHG/HG, 100 kS/s, 12-bit, 16-ch Multifunction PC/104 Module
- PCI-3724, 48-ch Digital I/O PC/104 Module
- PCI-3725, 8-ch Relay and Isolated Digital Input PC/104 Module
- PCI-3730, 16-ch Isolated Digital I/O PC/104 Module
- PCI-3780, 2-ch Counter/Timer with 24-ch Digital I/O PC/104 Module
- PCI-3738U, 32-ch Isolated Digital I/O PC/104 Module
- PCI-3733U, 96-ch Digital I/O PC/104 Module
- PCI-3761I, 8-ch Relay and 8-ch Isolated Digital Input PC/104 Module
PC-based Data Acquisition (DAQ) System Overview

Because industrial PC I/O interface products have become increasingly reliable, accurate, and affordable in the last few years, PC-based data acquisition and control systems are nowadays widely used in industrial and laboratory applications such as monitoring, control, data acquisition and automated testing.

It requires know-how of electrical and computer engineering to select and build a data acquisition (DAQ) and control system that actually does what you want. This tutorial gives a brief introduction to what data acquisition and control systems do and how to configure them. Here, we cover:

- Transducers and Actuators
- Signal Conditioning
- Data Acquisition and Control Hardware
- Getting Started

Transducers and Actuators

A transducer converts temperature, pressure, level, length, position, etc. into voltage, current, frequency, pulses or other signals.

Thermocouples, thermistors and resistance temperature detectors (RTDs) are common transducers for temperature measurements. Other types of transducers include flow sensors, pressure sensors, strain gauges, load cells and LVDTs, which measure flow rate, pressure variances, force or displacement.

An actuator is a device that activates process control equipment by using pneumatic, hydraulic or electrical power. For example, a valve actuator can open and close a valve to control fluid rates.

Signal Conditioning

Signal conditioning circuits improve the quality of signals generated by transducers before they are converted into digital signals by the PC’s data-acquisition hardware. Examples of signal conditioning are signal scaling, amplification, linearization, cold-junction compensation, filtering, attenuation, excitation, common-mode rejection, and so on.

One of the most common signal conditioning functions is amplification. For maximum resolution, the voltage range of the input signals should be approximately equal to the maximum input range of the A/D converter. Amplification expands the range of the transducer signals so that they match the input range of the A/D converter. For example, a x10 amplifier maps transducer signals that range from 0 to 1 V into the range 0 to 10 V before they go into the A/D converter.

Using digital I/O and SSRs to open and close a valve

The layout of a typical PC-based data acquisition system
Data Acquisition & Control Hardware

Data acquisition and control hardware generally performs one or more of the following functions: analog input, analog output, digital input, digital output and counter/timer functions. This section will discuss each function and list some considerations that are important when you select a data acquisition and control system.

Analog Inputs (A/D)

Analog to digital (A/D) conversion changes analog voltage or current levels into digital information. The conversion is necessary to enable a computer to process or store the signals.

The most significant criteria when selecting A/D hardware are:
1. Number of input channels
2. Single-ended or differential input signals
3. Sampling rate (in samples per second)
4. Resolution (usually measured in bits of resolution)
5. Input range (specified in full-scale volts)
6. Noise and nonlinearity

Analog Outputs (D/A)

The opposite of analog to digital conversion is digital to analog (D/A) conversion. This operation converts digital information into analog voltage or current. D/A devices allow a computer to control real-world events.

Analog output signals may directly control process equipment. The process can give feedback in the form of analog input signals. This is referred to as a closed loop control system with PID control. Analog outputs can also be used to generate waveforms. In this case, the device behaves as a function generator.

Digital Inputs and Outputs

Digital input/output functions are useful in applications such as contact closure and switch status monitoring, industrial On/Off control and digital communications.

Counter/Timer

A counter/timer can be used for event counting, flowmeter monitoring, frequency counting, pulse width measurement, time period measurement, and so on.

Getting Started

Advantech: The Source For What You Need

Advantech manufactures data acquisition hardware and software for measurement, monitoring and applications control. The following guide is provided to help you choose components for your data acquisition system.

Step 1: Know Your Fundamental Goal

Decide whether your DAQ system will be used primarily for measurement, monitoring, control, or analysis. Know the data requirements of your process, and know the number of data collection points in your system. Know the required data collection speed, the sampling rate, the type of measurement, the voltage or current being produced, the desired accuracy and the output resolution at each data collection point. Finally, know the timing of events in your system, and any special environmental conditions that exist.

Step 2: Hardware Selection

Select the hardware required to achieve your fundamental goal. Advantech provides plug-in boards for Analog-to-Digital, Digital-to-Analog, Digital I/O needs. Both ISA and PCI bus products are available. Your hardware selection should be based on five major criteria:
1. Number and types of channels
2. Differential or single-ended inputs
3. Resolution
4. Speed
5. Software compatibility with hardware

Step 3: Accessory Selection

Most applications require additional accessories which are available as separate items. These include:
1. Expansion peripherals to add channels to your system
2. Cables, signal conditioners and external boxes such as screw terminals or BNC accessories

Step 4: Software Selection

More than any other single factor, software will determine your system start-up time, as well as its effectiveness, suitability for your application, and ease of modification. Three major criteria should determine the choice of software:
1. Operating system used
2. User programming expertise
3. Software compatibility with hardware
ActiveDAQ Pro Introduction

What is ActiveDAQ Pro?
ActiveDAQ Pro is a collection of ActiveX controls for performing I/O operations within any compatible ActiveX control container, such as Visual Basic, Delphi, etc. You can easily perform the I/O operations through properties, events and methods. With ActiveDAQ Pro, you can perform versatile I/O operations to control your Advantech devices.

The ActiveDAQ Pro package contains the following components:
- Advantech ActiveDAQ Pro Device Control: Enumerate all Advantech devices, direct I/O operation.
- Advantech ActiveDAQ Pro AI Control: Retrieve data from Advantech AI device.
- Advantech ActiveDAQ Pro AO Control: Export data to Advantech AO device.
- Advantech ActiveDAQ Pro Digital I/O Control: Digital I/O operation.
- Advantech ActiveDAQ Pro Thermo Control: Retrieve temperature by thermocouple measurement.
- Advantech ActiveDAQ Pro Counter Control: Counter input signal.
- Advantech ActiveDAQ Pro Pulse Control: Pulse signal output.

You can use these ActiveX controls in any development tool that supports them, including Microsoft Visual C++, Microsoft Visual Basic, Borland C++ Builder, Borland Delphi and Microsoft Visual Studio .NET.

What's New in ActiveDAQ Pro?
In the latest version of the ActiveDAQ series: ActiveDAQ Pro, efforts have been made to improve on the technical aspects and to provide a clear-cut mode of operation, as explained in the following summary:

Graphic User Interface Control Components
Advantech ActiveDAQ Pro GUI control collection consists of abundant of graphic user interface (GUI) control components, which enable users to conveniently and quickly build graph display modules for data acquisition so as to supervise the changing status of the object. ActiveDAQ Pro GUI control collection also helps users easily develop prototype vision applications in an interactive environment without programming. These control components include:
- Button Control: It offers various display styles (2D and 3D) and is a Boolean control that displays an on or off state (True or False).
- Graph Control: This control provides abundant graph display functions, which enable the user to display data of various sources simultaneously.
- Intensity Control: It offers two-dimensional display and simple interpolation for scattered 3D data points so that the user can conveniently check the intensity variation trend of scattered 3D data points.
- Knob Control: It is a circular data controlling control that provides various graph styles and can be used to display one or more values on the same interface.
- LED Control: This control provides data display and editing functions with the seven-segment nixie tube mode.
- NumEditor Control: This control provides the user with the functions of data displaying and editing. After the FormatString has been chosen or defined by the user, the values of the control will be adjusted automatically according to the FormatString and displayed in the text edit box.
- Slider Control: It is a linear data controlling control that provides various graph styles. A Slider control can be used to set or display one or more values.
ActiveDAQ Pro Introduction

Supports All Advantech DAQ Devices with High Speed Functions
ActiveDAQ Pro now fully supports all Advantech DAQ cards and functions with complete high speed data acquisition, including AI (analog input), AO (analog output), DI/O (digital input/output) and counter cards. These high speed functions are performed by interrupt and DMA data transfer.

Easy-to-use Property Sheet Interface for Configuring Controls
The property page will offer selections which will give easy access to all settings and eliminate unnecessary programming. Programming will only be required in specialized situations.

Independent Operation of Controls
ActiveDAQ Pro offers total independent control operation, needing no support from other existing controls.

Uses Known Physical Properties
Physical properties like voltage, current and frequency can now be directly applied by the user and will automatically be reassigned to the data needed by GainCode and sampling rate. Making these changes has ensured that ActiveDAQ Pro has become much more user friendly.

Uses Optional Lists Instead of Direct Input
Now lists are provided with values which remain limited over various processes. This option is much more convenient to input and will eliminate a large portion of the direct data input.

Default Settings for Immediate Execution
Proper default settings have now been added to all methods and properties. That means quicker execution for the user, which will offer a prompt response.

Properties and Parameters are Chosen Automatically
When the user opts for some specific methods in ActiveDAQ Pro it can result automatically in appropriate properties and parameters. For example, ActiveDAQ Pro control can automatically determine an appropriate data transferring method to perform the data acquisition. (Software, interrupt and DMA transfer)

Parameter Check-up and Correction
Each input parameter has to be within a certain range. As a result it has to have check-up to ensure legitimacy. In most cases the user will be notified and in others there will be an automatic correction.

Better Defined Error Messages and Diagnostic Guide
ActiveDAQ Pro offers clear error messages description and diagnostic guides for all return errors.

Supports All Widely Known Development Platforms
ActiveDAQ Pro support Microsoft Windows 2000 and Windows XP operation system. As with the previous version, ActiveDAQ 1.6x, it continues to support all widely known development platforms based on ActiveX technology. These platforms include Microsoft Visual Basic, Visual C++, Visual Basic.Net, Visual C#, Borland C++ Builder and Delphi.

System Requirements

- PC with at least a 266 MHz or higher microprocessor
- Microsoft Windows 2000 or XP Vista
- VGA compatible graphics card, supporting at least 256 colors
- Minimum 64 MB of RAM
- 74 MB of free local hard disk space
- One CD-ROM driver

Ordering Information
- PCLS-ADPSTD ActiveX Control-based Software for DAQ
Data Acquisition Boards

Glossary

Accuracy
Accuracy is the deviation of a measurement from a known standard. Accuracy is normally specified in percent.

ADC - Analog-to-Digital Converter
ADC is used to convert DC voltage from transducers into digital words (data). The voltage representing a temperature, pressure, flow, pH, or speed and must converted to a digital word before it can be passed to an intelligent device like a computer.

Amplifier
Amplifiers are used to boost the analog level (voltage) of the signal.

AO - Analog Output
The D/A converter performs the opposite function of an A/D converter. It interprets commands from the computer and outputs the proper DC voltage or current. The output stays at this output level until the computer tells the D/A converter to output a new value.

Auto Calibration
The built-in auto-calibration circuitry corrects gain and offset errors in analog input and analog output channels thereby eliminating the need for external equipment and user adjustments.

Automatic Channel/Gain/SD*/BU* Scanning
Advantech's DAQ cards with this function feature an automatic channel/gain/SD/BU scanning circuit. This circuit controls multiplexer switching during sampling in a way that is more efficient than software implementation. Onboard 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.

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

BoardID Switch
BoardID DIP switch helps define each card's unique identity when multiple identical PCI cards have been installed in the same computer. The BoardID switch is very useful when you build your system with multiple identical PCI cards. With the correct BoardID switch settings, you can easily identify and access each card during hardware configuration and software programming.

C/T - Counter/Timer
The counter card can be used to sense the presence or absence of a voltage, much like digital input card. The counter is used to count the number of electronic pulses (totalize), the duration of the pulse (pulse width), or the rate of pulses (frequency) coming out of an external device.

Channel-freeze
The channel-freeze function can be enabled either in dry contact or wet contact mode (selected by the onboard 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 as it is useful in software simulation and testing program.

Common Mode Noise
Common mode noise most often results when the ground potential between the measuring instrument and the device being measured are different. The difference in grounds results in a ground loop, a current flowing through ground and the low lead. Once this current appears in the low lead wire it will cause a voltage because the wire has some resistance. The longer the lead, the more lead resistance and greater the voltage error.

TIP : To reduce common mode noise, use a guarded voltmeter. Tie the guard to the low side of the device being measured. This will shunt any ground loop currents away from the high and low measurement wires.

DI - Digital Input
A digital input card is used to determine whether an external device is on or off by sensing the presence or absence of a voltage. The DI can only report ON/OFF status and not the value of the voltage on each channel (sometimes called a bit). The bit is considered to be ON if the voltage exceeds a certain value.

Digital cards usually feature 8, 16, or 32 channels. They can monitor a number of devices at the same time. For example, a digital card can be attached to a single operator panel to sense the position of switches on that panel.

Digital Filter
The digital filter function is used to eliminate glitches on input data and reduce the number of changes to examine and process. The filter blocks pulses that are shorter than the specified timing interval and passes pulses that are twice as long as the specified interval. Intermediate-length pulses that are longer than half of the interval, but less than the interval, may or may not pass the filter depending on your settings.

DMA - Direct Memory Access
A method of transferring data from or to memory at a high rate without involving the CPU. DMA is the hardware/software technique that allows the highest speed transfer of data, to or from random memory (RAM). Given the potentially more expensive hardware, DMA can provide the means to read or write data at precise times without restricting the microprocessor” tasks. For example, one system under DMA control can read or write any combination of analog, digital or counter/timer data to or from RAM at rates up to 360KB/second. This is accomplished without taking time from the other tasks of the microprocessor. The amount of time required to respond to a DMA request is much smaller than the one required to service an interrupt. This makes the goal of foreground/background operation, at high speed, possible.

DO - Digital Output
The digital output card interprets a command from the computer and outputs a high or low voltage on each of its channels (bits). It is commonly used to turn on/off small lights or to send digital words to machinery.

FSR - Full Scale Range
FSR stands for the difference between the largest positive and negative voltages which a channel can measure or a AO channel can output.

Gain - Magnitude Ratio
For a linear system or element, the ratio of the magnitude (amplitude) of a steady-state sinusoidal output relative to the causal input; the length of a phasor form the origin to a point of the transfer locus in a complex plane.

GPiB - General Purpose Interface/Instrument Bus
A standard for IEEE-488 communication interface.

Interrupt Data Transfer
Interrupts provide a mean of tightly controlling the timing of events, while allowing the processing of more than one task. Multitasking systems are also known as “foreground/background” systems. One way of putting data acquisition in the background is to relegate it to an interrupt routine. The clock or external timing signal, rather than being polled continuously, is used to generate an interrupt to the computer. Whenever the interrupt occurs, the computer suspends current activity, and executes an “interrupt service routine”. The interrupt service routine in this case might be a short program which acquires one frame of data, and stores it in memory. The computer can perform other operations in the foreground while collecting data in the background. Whenever a clock tick or external interrupt occurs, the computer will automatically stop the foreground processing, acquire the data, and then resume where it left off.

The reaction speed of the interrupt system is much higher than that of a polling loop. Speed, for a PCI, is about 10 kHz – 30 kHz in the interrupt mode.
Isolation Protection
Isolation circuits are used to protect sensitive measurement circuitry from interference currents or voltages. These circuits are useful when the external voltage (from a transducer) is separated from the measurement hardware.

Keeping The Output Values After System Reset
When the system is hot reset (power is not shut off), the Advantech’s DAQ cards with this function can either retain the last digital (or analog) output values, or return to its default configuration, depending on jumper setting. This practical function eliminates danger caused by misoperation during unexpected system reset.

LSB - Least Significant Bit

Onboard FIFO Memory
FIFO is the abbreviation of “First-In, First-Out.” It functions as a “buffer” memory, which plays an important role in the data acquisition device. You can either enable or disable the interrupt request of the FIFO buffer. While the interrupt request for FIFO is enabled, you can further specify whether the interrupt request will be sent whenever one sampling takes place or when the FIFO buffer is half saturated. Advantech’s data acquisition cards with onboard FIFO memory enables a continuous high-speed data transfer with more predictable performance on Windows systems.

Onboard Programmable Counter
Advantech’s multifunction cards provide a programmable counter to generate a pacer trigger for the A/D conversion. The counter chip is an 82C54 or equivalent, which includes three 16-bit counters on a 10 MHz clock. One counter is used as an event counter for counting events coming from the input channels. The other two are cascaded together to make a 32-bit timer for a pacer trigger.

Optical Isolators
Optical isolators are used with digital circuitry to shield high voltage signals from affecting digital circuitry.

PCI Mastering Data Transfer
Advantech’s high-speed DA & C cards support PCI-Bus mastering DMA for high-speed data transfer and gap-free analog input and analog output. By setting aside a block of memory in the PC, the DA&C cards performs bus-mastering data transfers without CPU intervention, setting the CPU free to perform other more urgent tasks such as data analysis and graphic manipulation. The function allows users to run all I/O functions simultaneously at full speed without losing data.

Plug & Play Function
Advantech DAQ cards fully comply with the PCI specication Rev 2.2 and thus are Plug & Play devices. During card installation, it is virtually unnecessary to set any jumpers or DIP switches. Instead, all bus-related configurations such as base I/O address and interrupts are conveniently taken care of by the Plug & Play function.

Polling
Polling is the simplest method for detecting a unique condition and then taking action. This involves a software loop that contains all the required measurement, analysis, decision-making algorithms and planned actions. The data acquisition program periodically tests the system’s clock or external trigger input to sense a transition. Whenever a transition occurs, the program then samples each of the inputs and stores their values in a “frame”. A frame is simply a list that contains the values representing the specified inputs at a given time. The frames can be stored in RAM, disk or other types of memory. Each time the program senses a clock “tick”, the inputs are scanned and converted, and a new frame is added to memory. In this mode, generic computers can support an acquisition rate of about 10 kHz.

In addition, the PC is continuously busy when the polling loop is under operation, and hence no other tasks can be serviced. When an application cannot tolerate these characteristics, interrupt techniques may be needed.

Programmable Power-Up States
With this function, all output lines are user-configurable for logic high or logic low when the system is powering up. User-configurable power-up states are useful for ensuring that the data acquisition card powers up in a known state. Power-up states are programmed in the EEPROM through the driver. The default settings are all set to 0.

PWM - Pulse Width Modulation
Pulse width modulation (PWM) technology is widely used for industrial applications such as measurement, motor control, power control and so on. It offers a simple way for digital control logic to create an analog equivalence. By using Advantech’s high-resolution counter cards, the duty cycle of a square wave could be modulated to encode some specific analog signal levels so they can be used to control many electronic devices.

Resolution
Resolution is the smallest change that a measurement instrument can sense. Resolution is normally specified in bits.

S.E. Input - Single Ended Input
A single-ended configuration is the best when you need analog measurements against respect to a common external ground. This configuration is also appropriate when there is no practical way to bring both a signal ground and an analog ground (AGND) back to the system’s input terminals.

Shielding
An extra layer of conductive material surrounding a wire to prevent external electrical signals from interfering with the signal on the wire.

SPDT Relay - Single-Pole Double-Throw Relay

SPST Relay - Single-Pole Single-Throw Relay

TTL - Transistor Transistor Logic

Watchdog Timer
The watchdog timer is a software-configurable feature used to set critical outputs to safe states in the event of a software failure. It will activate if there is a loss of communication between the application and the data acquisition card. If the card does not receive a watchdog clear software command within the interval time specified for the watchdog timer, the outputs go to a user-defined safe state and remain in that state until the watchdog timer is disabled and new values are written by the software. After the watchdog timer expires, the card ignores any writes until the watchdog timer is disabled. Users can set the watchdog timer timeout period through WDT register to specify the amount of time that must elapse before the watchdog timer expires. The counter on the watchdog timer is configurable up to (232-1) x 100 ns (approximately seven minutes) before it expires.
## Analog I/O & Multifunction Card Selection Guide

### Analog Input

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<th>Category</th>
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### Analog Output

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<td>2 (PCI-1710HGU only)</td>
<td>2 (PCI-1711U only)</td>
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### Digital I/O

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### Timer/Counter

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### Notes

- *All channels should be set to the same range.*
- **SS**: Single DMA channel, Single A/D channel scan; **SM**: Single DMA channel, Multiple A/D channel scan
## Selection Guide

### Multifunction

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<tr>
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<td>Width</td>
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### Details

- **DB37**
  - 68-pin SC5I
  - 3 x 20-pin
  - 5 x 20-pin
  - DB37
  - DB37
  - DB37

- **DB37**
  - 68-pin SC5I
  - 3 x 20-pin
  - 5 x 20-pin
  - DB37
  - DB37
  - DB37

- **DB37**
  - 68-pin SC5I
  - 3 x 20-pin
  - 5 x 20-pin
  - DB37
  - DB37
  - DB37

- **DB37**
  - 68-pin SC5I
  - 3 x 20-pin
  - 5 x 20-pin
  - DB37
  - DB37
  - DB37
## Analog I/O & Multifunction Card Selection Guide

### Category

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<tr>
<th>Model</th>
<th>Multifunction</th>
<th>PCI-104</th>
<th>PCI-104</th>
<th>PCI-104</th>
<th>PCIe-1744</th>
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### Analog Input

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<td>4,096 samples</td>
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<td>0 ~ 10, 0 ~ 5</td>
<td>0 ~ 10, 0 ~ 5</td>
<td>0 ~ 10, 0 ~ 5</td>
<td>0 ~ 10, 0 ~ 5</td>
<td>0 ~ 10, 0 ~ 5</td>
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<td>SS**</td>
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### Digital I/O

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* 80 kHz on Pentium 4-based (or upper) system
** SS: Single DMA channel, Single A/D channel scan
### Selection Guide

#### Analog Input

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<th>PCI-1714UL</th>
<th>PCI-1715U</th>
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<th>PCI-3813I</th>
<th>PCI-1720U</th>
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- **PCI-1714U**
- **PCI-1714UL**
- **PCI-1715U**
- **PCI-1747U**
- **PCI-813B**
- **PCI-3813I**
- **PCI-1720U**
- **PCI-1721**

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## Digital I/O & Counter Card Selection Guide

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### Isolated D/I/O

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### Timers/Counters

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### Advanced Function

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<tr>
<td>Output Status Read</td>
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<tr>
<td>Dry/Wet Contact*</td>
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### Dimensions (mm)

- 175 x 100
- 175 x 100
- 175 x 100
- 175 x 100
- 175 x 100
- 12 x 65

### Connector

- 5 x 20-pin
- 1 x 50-pin
- 2 x 50-pin
- 68-pin SCSI
- 100-pin SCSI
- 100-pin SCSI-II
- 1 x DB25

### Software

- Windows 2000/XP DLL Driver
- Windows Vista DLL Driver
- Windows 2000/XP SDK
- Win CE 5.0/6.0 Driver
- Linux Driver
- ActiveDAQ/ActiveDAQ Pro
- Labview I/O Drivers
- KW Win33 Driver

* Dry/wet contact can be mixed at the same time within one group.
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* Dry/wet contact can be mixed at the same time within one group.
## Selection Guide

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** Jumper selectable Form A/Form B-type relay output
## Isolated Digital I/O

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<th>PCL-3760U</th>
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</tbody>
</table>

## Counter

- 16 bits
- 20 MHz
- 10 MHz
- 20 MHz
Introduction
The PCI-1710U series are multifunction cards for the PCI bus. Their advanced circuit design provides higher quality and more functions, including the five most desired measurement and control functions: 12-bit A/D conversion, D/A conversion, digital input, digital output, and counter/timer.

Specifications

Analog Input
- Channels: 16 single-ended/8 differential (software programmable)
- Resolution: 12 bits
- FIFO Size: 4,096 samples
- Overvoltage Protection: 30Vp-p
- Input Impedance: 1 GΩ
- Sampling Modes: Software, onboard programmable pacer and external
- Input Range: (V, software programmable)

<table>
<thead>
<tr>
<th>Model</th>
<th>Gain</th>
<th>Max. Sampling Rate</th>
</tr>
</thead>
<tbody>
<tr>
<td>PCI-1710U/UL</td>
<td>0.5, 1, 2, 4, 8</td>
<td>100 kS/s</td>
</tr>
<tr>
<td></td>
<td>5, 10</td>
<td>35 kS/s</td>
</tr>
<tr>
<td></td>
<td>20, 100</td>
<td>7 kS/s</td>
</tr>
<tr>
<td></td>
<td>500, 1000</td>
<td>770 μS</td>
</tr>
</tbody>
</table>

Analog Output (PCI-1710U/HGU only)
- Channels: 2
- Resolution: 12 bits
- Output Rate: Static update
- Output Range: (V, software programmable)

<table>
<thead>
<tr>
<th>Internal Reference</th>
<th>Unipolar</th>
<th>External Reference</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 – 5</td>
<td>0 – 10</td>
</tr>
<tr>
<td>N/A</td>
<td>0 – 10</td>
<td>0 – 10x V @ -x V (-10 ≤ x ≤ 10)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Gain</th>
<th>0.5</th>
<th>1</th>
<th>2</th>
<th>4</th>
<th>8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bipolar</td>
<td>±0.5</td>
<td>±1</td>
<td>±2</td>
<td>±3.25</td>
<td>±6.25</td>
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<tr>
<td>Unipolar</td>
<td>N/A</td>
<td>0 – 10</td>
<td>0 – 5</td>
<td>0 – 2.5</td>
<td>0 – 1.25</td>
</tr>
<tr>
<td>Accuracy (% of FSR ±1LSB)</td>
<td>0.1</td>
<td>0.1</td>
<td>0.2</td>
<td>0.2</td>
<td>0.4</td>
</tr>
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</table>

<table>
<thead>
<tr>
<th>Gain</th>
<th>0.5</th>
<th>1</th>
<th>5</th>
<th>10</th>
<th>50</th>
<th>100</th>
<th>500</th>
<th>1000</th>
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</thead>
<tbody>
<tr>
<td>Bipolar</td>
<td>±10</td>
<td>±5</td>
<td>±1</td>
<td>±0.5</td>
<td>±0.1</td>
<td>±0.05</td>
<td>±0.01</td>
<td>±0.005</td>
</tr>
<tr>
<td>Unipolar</td>
<td>N/A</td>
<td>0 – 10</td>
<td>N/A</td>
<td>0 – 1</td>
<td>N/A</td>
<td>0 – 1</td>
<td>N/A</td>
<td>0 – 0.1</td>
</tr>
<tr>
<td>Accuracy (% of FSR ±1LSB)</td>
<td>0.1</td>
<td>0.1</td>
<td>0.2</td>
<td>0.2</td>
<td>0.4</td>
<td>0.4</td>
<td>0.8</td>
<td>0.8</td>
</tr>
</tbody>
</table>

- Maximum Sampling Rate (S/s, depending on PGIA settling time)

Analog Output (PCI-1710U/HGU only)
- Channels: 2
- Resolution: 12 bits
- Output Rate: Static update
- Output Range: (V, software programmable)

- Slew Rate: 10 V/μs
- Driving Capability: 3 mA
- Operation Mode: Software polling
- Accuracy: INLE: ±1 LSB, DNLE: ±1 LSB

Digital Input
- Channels: 16
- Compatibility: 5 V/TTL
- Input Voltage: Logic 0: 0.8 V max. Logic 1: 2.0 V min.

Digital Output
- Channels: 16
- Compatibility: 5 V/TTL
- Output Voltage: Logic 0: 0.4 V max. Logic 1: 2.4 V min.
- Output Capability: Sink: 8.0 mA @ 0.8 V Source: 0.4 mA @ 2.0 V

Pacer/Counter
- Channels: 1
- Resolution: 16 bits
- Compatibility: 5 V/TTL
- Max. Input Frequency: 1 MHz
Specifications Continued

General

- **Bus Type**: Universal PCI V2.2
- **I/O Connector**: 1 x 68-pin SCSI female connector
- **Dimensions (L x H)**: 175 x 100 mm (6.9” x 3.9”)
- **Power Consumption**:
  - Typical: 5 V @ 850 mA
  - Max.: 5 V @ 1.0 A
- **Operating Temperature**: 0 ~ 60°C (32 ~ 140°F) (refer to IEC 68-2-1, 2)
- **Storage Temperature**: -20 ~ 70°C (-4 ~ 158°F)
- **Storage Humidity**: 5 ~ 95% RH non-condensing (refer to IEC 68-2-3)

Ordering Information

- **PCI-1710U**: 100 kS/s, 12-bit Multifunction Card
- **PCI-1710UL**: 100 kS/s, 12-bit Multifunction Card w/o AO
- **PCI-1710HGU**: 100 kS/s, 12-bit High-gain Multifunction Card
- **PCLD-8710**: DIN-rail Wiring Board w/ CJC
- **PCL-10168-1**: 68-pin SCSI Shielded Cable, 1 m
- **PCL-10168-2**: 68-pin SCSI Shielded Cable, 2 m
- **ADAM-3968**: 68-pin DIN-rail SCSI Wiring Board

Pin Assignments

<table>
<thead>
<tr>
<th>Pin</th>
<th>Function</th>
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<tbody>
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<td>A10</td>
<td>68</td>
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<tr>
<td>A11</td>
<td>34</td>
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<tr>
<td>A12</td>
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<td>A13</td>
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<td>A14</td>
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<tr>
<td>A19</td>
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</tr>
<tr>
<td>A1A</td>
<td>63</td>
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*: Pins 23–25 and pins 57–59 are not defined for PCI-1710UL
Introduction

PCI-1711U and PCI-1711UL are powerful, but low-cost multifunction cards for the PCI bus. PCI-1711U comes with 2 analog output channels, while the PCI-1711UL doesn’t. Thus, PCI-1711UL represents a cost saver for those that do not need analog output.

Specifications

**Analog Input**
- **Channels**: 16 single-ended
- **Resolution**: 12 bits
- **Max. Sampling Rate**: 100 kS/s
- **FIFO Size**: 1,024 samples
- **Overvoltage Protection**: 30 Vp-p
- **Input Impedance**: 2 MΩ / 5 pF
- **Sampling Modes**: Software, onboard programmable pacer, or external
- **Input Range**: (V, software programmable)

<table>
<thead>
<tr>
<th>Bipolar</th>
<th>±10</th>
<th>±5</th>
<th>±2.5</th>
<th>±1.25</th>
<th>±0.625</th>
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<tbody>
<tr>
<td>Accuracy (% of FSR ±1LSB)</td>
<td>0.1</td>
<td>0.1</td>
<td>0.2</td>
<td>0.2</td>
<td>0.4</td>
</tr>
</tbody>
</table>

**Analog Output (PCI-1711U only)**
- **Channels**: 2
- **Resolution**: 12 bits
- **Output Rate**: Static update
- **Output Range**: (V, software programmable)

**Digital Input**
- **Channels**: 16
- **Compatibility**: 5 V/TTL
- **Input Voltage**: Logic 0: 0.8 V max.
  Logic 1: 2.0 V min.

**Digital Output**
- **Channels**: 16
- **Compatibility**: 5 V/TTL
- **Output Voltage**: Logic 0: 0.8 V
  Logic 1: 2.0 V
- **Output Capability**: Sink: 8.0 mA @ 0.8 V
  Source: -0.4 mA @ 2.0 V

**Pacer/Counter**
- **Channels**: 1
- **Resolution**: 16 bits
- **Compatibility**: 5 V/TTL
- **Max. Input Frequency**: 10 MHz
- **Reference Clock**: Internal: 10 MHz

**General**
- **Bus Type**: Universal PCI V2.2
- **I/O Connector**: 1 x 68-pin SCSI female connector
- **Dimensions (L x H)**: 175 x 100 mm (6.9” x 3.9”)
- **Power Consumption**
  - PCI-1711U: Typical: 5 V @ 850 mA
    Max.: 5 V @ 1.0 A
  - PCI-1711UL: Typical: 5 V @ 700 mA
    Max.: 5 V @ 1.0 A
- **Operating Temperature**: 0 – 60° C (32 – 140° F) (refer to IEC 68-2-1, 2)
- **Storage Temperature**: -20 – 70° C (-4 – 158° F)
- **Storage Humidity**: 5 – 95% RH non-condensing (refer to IEC 68-2-3)
Ordering Information

- **PCI-1711U**
  - Entry-level 100 kS/s, 12-bit Multifunction Card
- **PCI-1711UL**
  - Entry-level 100 kS/s, 12-bit Multi. Card w/o AO
- **PCLD-8710**
  - DIN-rail Wiring Board w/ CJC
- **PCL-10168-1**
  - 68-pin SCSI Shielded Cable, 1 m
- **PCL-10168-2**
  - 68-pin SCSI Shielded Cable, 2 m
- **ADAM-3968**
  - 68-pin DIN-rail SCSI Wiring Board

Pin Assignments

* Pins 23-25 and pins 57-59 are not defined for PCI-1711UL.
Introduction

PCI-1712 and PCI-1712L are powerful high-speed multifunction cards for the PCI bus. They feature a 1 MHz 12-bit A/D converter, an onboard FIFO buffer (storing up to 1024 samples for A/D, and up to 32,768 samples for D/A conversion). The PCI-1712 cards provide a total of up to 16 single-ended or 8 differential A/D input channels or a mixed combination, two 12-bit D/A output channels, 16 digital input/output channels, and three 10 MHz 16-bit multifunction counter channels. PCI-1712L is a low-cost version without analog output.

Specifications

Analog Input
- Channels: 16 single-ended or 8 differential (software programmable)
- Resolution: 12 bits
- Max. Sampling Rate:
  - Multi-channel, single gain: 1 MS/s
  - Multi-channel, multi gain: 600 kS/s
  - Multi-channel, multi gain, unipolar/bipolar: 400 kS/s
- FIFO Size: 1,024 samples
- Overvoltage Protection: 30 Vp-p
- Input Impedance:
  - Off: 100 MW/10 pF
  - On: 100 MW/100 pF
- Sampling Modes: Software, onboard programmable pacer and external
- Trigger Modes:
  - Pre-trigger, post-trigger, delay-trigger and about-trigger (V, software programmable)
- Input Range (V, software programmable):
  - Unipolar: N/A 0 ~ 10 0 ~ 5 0 ~ 2.5 0 ~ 1.25
  - Bipolar: ±10 ±5 ±2.5 ±1.25 ±0.625
  - Accuracy (% of FSR ±1LSB):
    - Unipolar: 0.1 0.1 0.2 0.2 0.4
    - Bipolar: ±10 ±5 ±2.5 ±1.25 ±0.625

Analog Output (PCI-1712 only)
- Channels: 2
- Resolution: 12 bits
- Output Rate: 1 MS/s
- FIFO Size: 32,768 samples
- Output Range (V, software programmable):
  - Unipolar: 0 ~ 5, 0 ~ 10
  - Bipolar: ±5, ±10
- Internal Reference:
  - Bipolar: ±5, ±10
  - Unipolar: 0 ~ 5, 0 ~ 10
- External Reference:
  - Bipolar: ±5, ±10
  - Unipolar: 0 ~ 5, 0 ~ 10

- Slew Rate: 20 V/μs
- Driving Capability: 10 mA
- Output Impedance: 0.1 W max.
- Operation Mode: Software polling, continuous output and waveform output
- Accuracy:
  - INL: ±1 LSB
  - DNL: ±1 LSB (monotonic)

Digital Input
- Channels: 16
- Compatibility: 5 V/TTL
- Input Voltage: Logic 0: 0.8 V max.
  Logic 1: 2.0 V min.

Digital Output
- Channels: 16
- Compatibility: 5 V/TTL
- Output Voltage: Logic 0: 0.8 V max.
  Logic 1: 2.0 V min.
- Output Capability:
  - Sink: 8.0 mA @ 0.8 V
  - Source: -0.4 mA @ 2.0 V

Pacer/Counter
- Channels: 3
- Resolution: 16 bits
- Compatibility: 5 V/TTL
- Max. Input Frequency: 10 MHz
- Reference Clock: Internal: 10 MHz, 1 MHz, 100 kHz, 10 kHz
  External Frequency: 10 MHz max.

General
- Bus Type: PCI V 2.2
- I/O Connector: 1 x 68-pin SCSI female connector
- Dimensions (L x H): 175 x 100 mm (6.9" x 3.9")
- Power Consumption:
  - Typical: 5 V @ 850 mA, 12 V @ 600 mA
  - Max.: 5 V @ 1.0 A, 12 V @ 700 mA
- Operating Temperature: 0 ~ 60° C (32 ~ 140° F) [refer to IEC 68-2-1, 2]
- Storage Temperature: -20 ~ 85° C (-4 ~ 185° F)
- Storage Humidity: 5 ~ 95% RH non-condensing [refer to IEC 68-2-3]
Ordering Information

- PCI-1712  
  1 MS/s, 12-bit High-speed Multifunction PCI Card
- PCI-1712L  
  1 MS/s, 12-bit High-speed Multi. PCI Card w/o AO
- PCLD-8712  
  DIN-rail Wiring Board for PCI-1712L
- PCL-10168-1  
  68-pin SCSI Shielded Cable, 1 m
- PCL-10168-2  
  68-pin SCSI Shielded Cable, 2 m
- ADAM-3968  
  68-pin DIN-rail SCSI Wiring Board

Pin Assignments

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## Introduction

PCI-1716 and PCI-1716L are powerful high-resolution multifunction cards for the PCI bus. They feature a 250 kS/s 16-bit A/D converter, and an onboard 1,024-sample FIFO buffer for A/D. The cards have up to 16 single-ended or 8 differential A/D input channels or a combination of these; two 16-bit D/A output channels, 16 digital input/output channels, and one 10 MHz 16-bit counter channel. PCI-1716 and PCI-1716L provide specific functions for different user requirements.

## Specifications

### Analog Input

- **Channels**: 16 single-ended/8 differential (software programmable)
- **Resolution**: 16 bits
- **Max. Sampling Rate**: 250 kS/s
- **FIFO Size**: 1,024 samples
- **Overvoltage Protection**: 30 Vp-p
- **Input Impedance**: 100 MΩ/10 pF (off), 100 MΩ/100 pF (on)
- **Sampling Modes**: Software, onboard programmable pacer and external
- **Input Range**:
  - Unipolar: N/A, 0 ~ 10 V, 0 ~ 5 V, 0 ~ 2.5 V, 0 ~ 1.25 V
  - Bipolar: ±10 V, ±5 V, ±2.5 V, ±1.25 V
- **Accuracy (% of FSR ±1 LSB)**:
  - Unipolar: 0.05, 0.03, 0.03, 0.05, 0.1
  - Bipolar: ±0.125

### Analog Output (PCI-1716 only)

- **Channels**: 2
- **Resolution**: 16 bits
- **Output Rate**: Static update
- **Output Range** (V, software programmable):
  - Unipolar: 0 ~ 10 V
  - Bipolar: ±10 V
- **Slew Rate**: 20 V/μs
- **Driving Capability**: 20 mA
- **Output Impedance**: 0.1 W max.
- **Operation Mode**: Software polling
- **Accuracy**: INLE ±1 LSB

### Digital Input

- **Channels**: 16
- **Compatibility**: 5 V/TTL
- **Input Voltage**: Logic 0: 0.8 V max.
  Logic 1: 2.0 V min.

### Digital Output

- **Channels**: 16
- **Compatibility**: 5 V/TTL
- **Output Voltage**: Logic 0: 0.4 V max.
  Logic 1: 2.4 V min.
- **Output Capability**:
  - Sink: 0.8 mA @ 0.8 V
  - Source: -2.4 mA @ 2.0 V

### Pacer/Counter

- **Channels**: 1
- **Resolution**: 16 bits
- **Compatibility**: 5 V/TTL
- **Max. Input Frequency**: 1 MHz
- **Reference Clock**:
  - Internal: 10 MHz
  - External Clock Frequency: 10 MHz max.

### General

- **Bus Type**: PCI V2.2
- **I/O Connector**: 1 x 68-pin SCSI female connector
- **Dimensions (L x H)**: 175 x 100 mm (6.9" x 3.9")
- **Power Consumption**:
  - Typical: 5 V @ 850 mA, 12 V @ 600 mA
  - Max.: 5 V @ 1 A, 12 V @ 700 mA
- **Operating Temperature**: 0 ~ 70° C (32 ~ 158° F) (refer to IEC 68-2-1, 2)
- **Storage Temperature**: -20 ~ 85° C (-4 ~ 185° F)
- **Operating Humidity**: 5 ~ 85% RH non-condensing (refer to IEC 68-2-3)
- **Storage Humidity**: 5 ~ 95% RH non-condensing (refer to IEC 68-2-3)
Ordering Information

- **PCI-1716**: 250 kS/s, 16-bit High-resolution Multi. Card
- **PCI-1716L**: 250 kS/s, 16-bit High-res. Multi. Card w/o AO
- **PCLD-8710**: DIN-rail Wiring Board w/ CJC
- **PCL-10168-1**: 68-pin SCSI Shielded Cable, 1 m
- **PCL-10168-2**: 68-pin SCSI Shielded Cable, 2 m
- **ADAM-3968**: 68-pin DIN-rail SCSI Wiring Board

Pin Assignments

| A8 | 68 | 34 | A11 |
| A9 | 67 | 33 | A13 |
| A10| 66 | 32 | A15 |
| A11| 65 | 31 | A17 |
| A12| 64 | 30 | A19 |
| A13| 63 | 29 | A11 |
| A14| 62 | 28 | A13 |
| A15| 61 | 27 | A15 |
| A16| 60 | 26 | A16 |
| *AOG *REF | 59 | 25 | *AOG *REF |
| *AOG *OUT | 58 | 24 | *AOG *OUT |
| *AOG *N | 57 | 23 | *AOG *N |
| D10 | 56 | 22 | D11 |
| D11 | 55 | 21 | D12 |
| D12 | 54 | 20 | D13 |
| D13 | 53 | 19 | D14 |
| D14 | 52 | 18 | D15 |
| D15 | 51 | 17 | D16 |
| D16 | 50 | 16 | D17 |
| D17 | 49 | 15 | D18 |
| D18 | 48 | 14 | D19 |
| D19 | 47 | 13 | D20 |
| D20 | 46 | 12 | D21 |
| D21 | 45 | 11 | D22 |
| D22 | 44 | 10 | D23 |
| D23 | 43 | 9 | D24 |
| D24 | 42 | 8 | D25 |
| D25 | 41 | 7 | D26 |
| D26 | 40 | 6 | D27 |
| D27 | 39 | 5 | D28 |
| D28 | 38 | 4 | D29 |
| D29 | 37 | 3 | D30 |
| D30 | 36 | 2 | D31 |
| D31 | 35 | 1 | +12V |

*: Pins 23-25 and pins 57-59 are not defined for the PCI-1716L
## Introduction

The PCI-1718HDU and the PCL-818H series are 100 kS/s multifunction data acquisition boards that offer the five most desired measurement and control functions: 12-bit A/D conversion, 12-bit D/A conversion, digital input, digital output, and counter/timer. With 3-way compatibility, migration is possible from ISA bus to PCI bus.

## Features
- ISA-Compliant with PCL-818HDU
- 16-ch single-ended or 8-ch differential analog input
- 12-bit A/D converter, with up to 100 kHz sampling rate
- Programmable gain
- Automatic channel/gain scanning
- Onboard FIFO memory (1,024 samples)
- One 12-bit analog output channel
- 16-ch digital input and 16-ch digital output
- Universal PCI bus (support 3.3 V or 5 V PCI bus signal)
- BoardID™ switch

## Specifications

### Analog Input
- **Channels**: 16 single-ended/8 differential (software programmable)
- **Resolution**: 12 bits
- **Max. Sampling Rate**: 100 kS/s
- **FIFO Size**: 1,024 samples
- **Overvoltage Protection**: 30 Vp-p
- **Input Impedance**: 100 MΩ
- **Sampling Modes**: Software, onboard or external programmable pacer
- **Input Range**:
  - **Unipolar**: N/A, ±10, ±5, ±2.5, ±1.25, ±0.625
  - **Bipolar**: ±10, ±5, ±2.5, ±1.25, ±0.625
  - **Accuracy (% of FSR ±1LSB)**: 0.1, 0.1, 0.2, 0.2, 0.4

<table>
<thead>
<tr>
<th>Channel Ranges</th>
<th>Unipolar</th>
<th>Bipolar</th>
</tr>
</thead>
<tbody>
<tr>
<td>±10</td>
<td>0.1</td>
<td>0.1</td>
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<tr>
<td>±5</td>
<td>0.1</td>
<td>0.1</td>
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<tr>
<td>±2.5</td>
<td>0.2</td>
<td>0.2</td>
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<tr>
<td>±1.25</td>
<td>0.4</td>
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<tr>
<td>±0.625</td>
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</tbody>
</table>

### Analog Output
- **Channels**: 1
- **Resolution**: 12 bits
- **Output Mode**: Static update
- **Output Range**:
  - **Unipolar**: 0 – 5, 0 – 10
  - **Bipolar**: 0 – x V (V, software programmable)

<table>
<thead>
<tr>
<th>Internal Reference</th>
<th>Unipolar</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 – 5, 0 – 10</td>
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</table>

| Slew Rate | 10 V/μs |
| Driving Capability | 10 mA |
| Output Impedance | 0.1 W max. |
| Operation Mode | Software polling |
| Accuracy | INLE: ±1LSB |

### Digital Input
- **Channels**: 16
- **Compatibility**: 5 V/TTL
- **Input Voltage**: Logic 0: 0.8 V max., Logic 1: 2 V min.

### Digital Output
- **Channels**: 16
- **Compatibility**: 5 V/TTL
- **Output Voltage**: Logic 0: 0.8 V max.
- **Output Capability**: Sink: 8.0 mA @ 0.8 V
- **Source**: -0.4 mA @ 2.0 V

### Counter/Timer
- **Channels**: 1
- **Resolution**: 16 bits
- **Compatibility**: 5 V/TTL
- **Max. Input Frequency**: 10 MHz
- **Reference Clock**: Internal: 10 MHz
- **External Clock Frequency**: 10 MHz

### General
- **Bus Type**: Universal PCI V2.2
- **I/O Connector**: 1 x DB37 female connector, 2 x 20-pin box header
- **Dimensions (L x H)**: 175 x 100 mm (6.9” x 3.9”)
- **Power Consumption**: Typical: 5 V @ 850 mA
- **Max.**: 5 V @ 1 A
- **Operating Temperature**: 0 – 60 °C (32 – 140 °F)
- **Storage Temperature**: -20 – 70 °C (-4 – 158 °F)
- **Operating Humidity**: 5 – 85% RH non-condensing (refer to IEC 68-1, -2, -3)
- **Storage Humidity**: 5 – 95% RH non-condensing (refer to IEC 68-1, -2, -3)
- **Certifications**: CE
Ordering Information

- **PCI-1718HDU** 100 kS/s, 12-bit, 16-ch Univ. PCI Multi. Card
- **PCL-10120-1** 20-pin Flat Cable, 1 m
- **PCL-10120-2** 20-pin Flat Cable, 2 m
- **PCL-10137-1** DB37 Cable, 1 m
- **PCL-10137-2** DB37 Cable, 2 m
- **PCL-10137-3** DB37 Cable, 3 m
- **PCLD-8115** Wiring Board w/ CJC Circuit & One DB37 Cable
- **PCLD-880** Wiring Board w/ Two 20-pin Flat Cables & Adapter

Pin Assignments

| DIO 0 | CN1 | DIO 12 | DIO 15 | DIO 18 | +5V | A/D S0 | A/D S1 | A/D S2 | A/D S3 | A/D S4 | A/D S5 | A/D S6 | A/D S7 | A.GND | A.GND | V.REF | S0* | +12 V | S2* | D.GND | NC | Counter 0 CLK | Counter 0 OUT |
|-------|-----|--------|--------|--------|-----|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-------|-----|-------|-----|---------|---------|
| 1     | 2   | 3      | 4      | 5      | 6   | 7     | 8     | 9     | 10    | 11    | 12    | 13    | 14    | 15    | 16    | 17    | 18    | 19   |       |       |       |       |
| A/D S8| 20  | A/D S9 | A/D S10| A/D S11| A/D S12| A/D S13| A/D S14| A/D S15| A/GND | A/GND | A/GND | DA0.OUT| DA0.VREF| S1* | S3* |       |       |     |       |       |
|       |     |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |       |     |       |       |

<table>
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<tr>
<th>CN2</th>
<th>DIO 0</th>
<th>DIO 1</th>
<th>DIO 2</th>
<th>DIO 3</th>
<th>DIO 4</th>
<th>DIO 5</th>
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PCI-1741U and PCI-1742U are powerful high-resolution multifunction data acquisition cards supporting universal PCI bus. The sampling rate is up to 1 MS/s (PCI-1742U) or 200 kS/s (PCI-1741U). Coupled with the 16-bit A/D converter, they are suitable for most data acquisition applications. PCI-1741U and PCI-1742U provide 16 single-ended or 8 differential analog input channels and 16 digital input/output channels. PCI-1741U provides one 16-bit D/A output channel, while PCI-1742U provides two 16-bit D/A output channels.

### Introduction
PCI-1741U and PCI-1742U are powerful high-resolution multifunction data acquisition cards supporting universal PCI bus. The sampling rate is up to 1 MS/s (PCI-1742U) or 200 kS/s (PCI-1741U). Coupled with the 16-bit A/D converter, they are suitable for most data acquisition applications. PCI-1741U and PCI-1742U provide 16 single-ended or 8 differential analog input channels and 16 digital input/output channels. PCI-1741U provides one 16-bit D/A output channel, while PCI-1742U provides two 16-bit D/A output channels.

### Specifications

**Analog Input**
- **Channels**: 16 single-ended/8 differential (software programmable)
- **Resolution**: 16 bits
- **Max. Sampling Rate**: PCI-1741U: 200 kS/s, PCI-1742U: single-channel - 1 MS/s, multi-channel - 800 kS/s, unipolar bipolar mixed - 250 kS/s
- **FIFO Size**: 1,024 samples
- **Overvoltage Protection**: 20 Vp-p
- **Input Impedance**: 100 MΩ/10 pF (Off); 100 MΩ/100 pF (On)
- **Sampling Mode**: Software, onboard programmable pacer and external
- **Input Range**
  - **Unipolar**: N/A, 0 ~ 10, 0 ~ 5, 0 ~ 2.5, 0 ~ 1.25
  - **Bipolar**: ±10, ±5, ±2.5, ±1.25, ±0.625
- **Accuracy**: (% of FSR ±1 LSB)
  - Unipolar: 0.02, 0.02, 0.02, 0.03, 0.04
  - Bipolar: 0.02, 0.02, 0.02, 0.03, 0.04

*Note: All channels should be set to the same range*

**Analog Output**
- **Channels**: PCI-1741U: 1, PCI-1742U: 2
- **Resolution**: 16 bits
- **Output Rate**: Static update
- **Output Range**
  - **Bipolar**: ±10 V
  - **Unipolar**: ±5 V

**Digital Input**
- **Channels**: 16
- **Compatibility**: 5 V/TTL
- **Input Voltage**: Logic 0: 0.8 V max.
  - Logic 1: 2.0 V min.

**Digital Output**
- **Channels**: 16
- **Compatibility**: 5 V/TTL
- **Output Voltage**: Logic 0: 0.8 V max.
  - Logic 1: 2.0 V min.
- **Output Capability**: Sink: 24 mA @ 0.8 V
  - Source: -15 mA @ 2.0 V

**Counter/Timer**
- **Channels**: 1
- **Compatibility**: 5 V/TTL
- **Resolution**: 16 bits
- **Max. Input Frequency**: 10 MHz
- **Reference Clock**: Internal: 10 MHz
  - External Clock Frequency: 10 MHz

**General**
- **Bus Type**: Universal PCI V2.2
- **I/O Connector Type**: 1 x 68-pin SCSI female connector
- **Dimensions (L x H)**: 175 x 100 mm (6.9” x 3.9”)
- **Power Consumption**: Typical: 5 V @ 850 mA, 12 V @ 600 mA
  - Max.: 5 V @ 1 A, 12 V @ 700 mA
- **Operating Temperature**: 0 ~ 60°C (32 ~ 140°F) (refer to IEC 68-2-1, 2)
- **Storage Temperature**: -20 ~ 70°C (-4 ~ 158°F)
- **Storage Humidity**: 5 ~ 95% RH, non-condensing (refer to IEC 68-2-3)
- **Certifications**: CE
Ordering Information

- PCI-1741U: 200 kS/s, 16-bit, 16-ch Univ. PCI Multi. Card
- PCI-1742U: 1 MS/s, 16-bit, 16-ch Univ. PCI Multi. Card
- PCL-10168-1: 68-pin SCSI Shielded Cable, 1 m
- PCL-10168-2: 68-pin SCSI Shielded Cable, 2 m
- ADAM-3968: 68-pin DIN-rail SCSI Wiring Board
- PCLD-8710: DIN-rail Wiring Board w/ CJC

Pin Assignments

**PCI-1741U**

- A0: 68
- A2: 34
- A1: 8
- A4: 32
- A5: 16
- A6: 31
- A8: 30
- A9: 29
- A10: 28
- A12: 27
- A14: 26
- A0GND: 59
- A0G_REF: 25
- A0G_OUT: 24
- A0GND: 23
- D0: 58
- D2: 56
- D4: 54
- D6: 52
- D8: 51
- D10: 50
- D12: 49
- D14: 48
- D0N: 48
- D0: 47
- D0: 46
- D0: 45
- D0: 44
- D0: 43
- D0: 42
- DO1: 41
- DO1: 40
- DO1: 39
- CNT0_CLK: 38
- CNT0_CLK: 37
- CNT0_CLK: 36
- +12V: 35

**PCI-1742U**

- A0: 68
- A2: 34
- A1: 8
- A4: 32
- A5: 16
- A6: 31
- A8: 30
- A9: 29
- A10: 28
- A12: 27
- A14: 26
- A0GND: 59
- A0G_REF: 25
- A0G_OUT: 24
- A0GND: 23
- D0: 58
- D2: 56
- D4: 54
- D6: 52
- D8: 51
- D10: 50
- D12: 49
- D14: 48
- D0N: 48
- D0: 47
- D0: 46
- D0: 45
- D0: 44
- D0: 43
- D0: 42
- DO1: 41
- DO1: 40
- DO1: 39
- CNT0_CLK: 38
- CNT0_CLK: 37
- CNT0_CLK: 36
- +12V: 35

Ordering Information

- PCI-1741U: 200 kS/s, 16-bit, 16-ch Univ. PCI Multi. Card
- PCI-1742U: 1 MS/s, 16-bit, 16-ch Univ. PCI Multi. Card
- PCL-10168-1: 68-pin SCSI Shielded Cable, 1 m
- PCL-10168-2: 68-pin SCSI Shielded Cable, 2 m
- ADAM-3968: 68-pin DIN-rail SCSI Wiring Board
- PCLD-8710: DIN-rail Wiring Board w/ CJC
Introduction

PCL-711B offers four of the most popular I/O functions for PC and compatible systems: A/D conversion, D/A conversion, digital input and digital output. The inexpensive PCL-711B is ideal for entry level applications. The features of this half-sized card include: eight 12-bit analog inputs, one 12-bit analog output, 16 digital inputs and 16 digital outputs. In addition, it comes with a 20-point screw-terminal board and a flat cable connector. PCL-711B performs a variety of I/O jobs, and features solid software support and a large selection of available daughterboards and accessories. It is an ideal and affordable performer for OEMs, schools and hobbyists who require a combination of analog and digital I/O.

Specifications

### Analog Input
- **Channels**: 8 single-ended
- **Resolution**: 12 bits
- **Max. Sampling Rate**: 40 kS/s
- **FIFO Size**: 0
- **Overvoltage Protection**: 30 Vp-p
- **Input Impedance**: >10 MΩ
- **Sampling Modes**: Software, pacer or external trigger
- **Input Range (V)**: ±5, ±2.5, ±1.25, ±0.625, ±0.3125
- **Accuracy**: ±2 LSB

### Analog Output
- **Channels**: 1 double-buffered
- **Resolution**: 12 bits
- **Output Rate**: Static update
- **Output Range**: 0 – 5 V or 0 – 10 V
- **Driving Capability**: 5 mA

### Digital Input
- **Channels**: 16
- **Compatibility**: 5 V/TTL
- **Input Voltage**: Logic 0: 0.8V max. Logic 1: 2.0V min.

### Digital Output
- **Channels**: 16
- **Compatibility**: 5 V/TTL
- **Output Voltage**: Logic 0: 0.8 V max. Logic 1: 2.0 V min.
- **Output Capability**: Sink: 8 mA Source: 0.4 mA

### General
- **Bus Type**: ISA
- **I/O Connectors**: 3 x 20-pin box header
- **Dimensions (L x H)**: 155 x 100 mm (6.1” x 3.9”)
- **Power Consumption**: 5 V @ 500 mA typical, 1.0 A max.
- **Operating Temperature**: 0 – 50° C (32 – 122° F)
- **Storage Temperature**: -20 – 65° C (-4 – 149° F)
- **Storage Humidity**: 5% – 95% RH non-condensing (refer to IEC 68-2-3)
- **Certifications**: CE

### Ordering Information
- **PCL-711B**: 40 kS/s, 12-bit, 8-ch ISA Multifunction Card
- **PCL-10120-1**: 20-pin Flat Cable, 1 m
- **PCL-10120-2**: 20-pin Flat Cable, 2 m
Introduction

PCL-812PG is a multifunction analog and digital I/O card that features the five most desired measurement and control functions for PC/AT and compatible systems: A/D conversion, D/A conversion, digital input, digital output, and counter/timer. This half-size card neatly packages 16 12-bit analog input channels, two 12-bit analog output channels, 16 digital input channels, 16 digital output channels, and a programmable counter/timer.

In addition to all the features listed above, PCL-812PG offers the convenience of programmable analog input ranges, where the analog input range can be switched by software commands instead of DIP switches. PCL-812PG also delivers convenience and maximum resolution for applications that need different gains for different channels or different gains for different stages of a process. Comprehensive software support, numerous I/O options and a wide range of available daughterboards make the PCL-812PG ideal for industrial applications that require a combination of analog and digital I/O.

Specifications

Analog Input
- Channels: 16 single-ended
- Resolution: 12 bits
- Max. Sampling Rate: 30 kS/s
- FIFO Size: 0
- Overvoltage Protection: 30 Vp-p
- Input Impedance: >10 MΩ
- Sampling Modes: Software, pac or external trigger
- Input Range: (V, software programmable)
  - ±10, ±5, ±2.5, ±1.25, ±0.625, ±0.3125
  - 0.4% of reading ±1 LSB

Analog Output
- Channels: 2 double-buffered
- Resolution: 12 bits
- Output Rate: Software polling
- Output Range: (V, software programmable)

Digital Input
- Channels: 16
- Compatibility: 5 V/TTL
- Input Voltage: Logic 0: 0.8 V, Logic 1: 2.0 V

Digital Output
- Channels: 16
- Compatibility: 5 V/TTL
- Output Voltage: Logic 0: 0.5 V max., Logic 1: 2.4 V min.
- Output Capacity: Sink: 8.0 mA, Source: 0.4 mA

Counter/Timer
- Channels: 1
- Resolution: 16 bits
- Compatibility: 5 V/TTL
- Max. Input Frequency: 500 kHz
- Reference Clock: Internal: 2 MHz, External Frequency: 10 MHz
- External Voltage Range: 5V/TTL

General
- Bus Type: ISA
- I/O Connectors: 5 x 20-pin box header
- Dimensions (L x H): 185 x 100 mm (7.3" x 3.9")
- Power Consumption: 5 V @ 500 mA typical, 1.0 A max.
- Operating Temperature: 0 ~ 50° C (32 ~ 122° F)
- Storage Temperature: -20 ~ 65° C (-4 ~ 149° F)
- Storage Humidity: 5 ~ 95% RH, non-condensing (refer to IEC 68-2-3)

Ordering Information
- PCL-812PG: 30 kS/s, 12-bit, 16-ch ISA Multifunction Card
- PCL-10120-1: 20-pin Flat Cable, 1 m
- PCL-10120-2: 20-pin Flat Cable, 2 m
- PCLD-780: Screw Terminal Board w/ Two 20-pin Flat Cables
Introduction

The PCL-818L series was designed for entry-level models to the PCL-818 series. The cards have been designed with the cost-sensitive customer in mind, but still offers the same functions as the rest of the series, except that they have a 40 kHz sampling rate and only accepts bipolar inputs. They are fully software and connector compatible with the PCL-818HD and PCL-818HG. This lets you upgrade your applications to these higher performance cards without hardware or software changes.

The PCL-818LS bundle consists of the PCL-818L card, the PCLD-8115 wiring terminal board and a DB37 cable assembly. The PCLD-8115 accommodates onboard passive signal conditioning components (resistors and capacitors), allowing you to easily implement a low-pass filter, a voltage attenuator or a 4~20 mA voltage converter.

Specifications

Analog Input
- Channels: 16 single-ended / 8 differential
- Resolution: 12 bits
- Max. Sampling Rate: 100 kS/s for all input ranges (PCL-818HD/HG only) 40 kS/s for all input ranges (PCL-818L only)
- FIFO Size: 1,024 samples
- Overvoltage Protection: 30 Vp-p
- Input Impedance: 10 MΩ
- Sampling Modes: Software, pacer or external
- Input Range
  - PCL-818L/818HD
    - Bipolar: ±10 ±5 ±2.5 ±1.25 ±0.625
    - Unipolar*: N/A 0 ~ 10 0 ~ 5 0 ~ 2.5 0 ~ 1.25
    - Accuracy (% of FSR ±1LSB): 0.1 0.1 0.2 0.2 0.4
  - PCL-818HG
    - Bipolar: ±10 ±5 ±1 ±0.5 ±0.1 ±0.05 ±0.01 ±0.005
    - Accuracy (% of FSR ±1LSB): 0.1 0.1 0.2 0.2 0.4 0.4 0.8 0.8
  * Note: PCL-818L doesn’t support unipolar input range.

Analog Output
- Channels: 1
- Resolution: 12 bits
- Output Rate: Static update
- Output Range (V, software programmable)
  - Internal Reference: Unipolar: 0 ~ 5, 0 ~ 10
  - External Reference: 0 ~ 10, 0 ~ 10

Digital Input
- Channels: 16
- Compatibility: 5 V/TTL
- Input Voltage
  - Logic 0: 0.8 V max.
  - Logic 1: 2.0 V min.

Digital Output
- Channels: 16
- Compatibility: 5 V/TTL
- Output Voltage
  - Logic 0: 0.4 V max.
  - Logic 1: 2.4 V min.
- Output Capability
  - Sink: 8 mA
  - Source: -0.4 mA

Timer/Counter
- Channels: 1
- A/D Pacer: 32-bit with 10 MHz or 1 MHz time base
- Max. and Min. Rates: 2.5 MHz and 0.00023 Hz
- Counter: One 16-bit counter with 100 kHz time base

General
- Power Consumption
  - 5 V @ 210 mA typical, 500 mA max.
  - 12 V @ 20 mA typical, 100 mA max.
  - -12 V @ 20 mA typical, 40 mA max.
- I/O Connector
  - 1 x DB37 female connector
  - 2 x 20-pin box header
- Dimensions (L x H)
  - 155 x 100 mm (6.1” x 3.9”)
- Operating Temperature
  - 0 ~ 50°C (32 ~ 122°F)
- Storage Temperature
  - -20 ~ 60°C (-4 ~ 149°F)
- Operating Humidity
  - 5 ~ 95% RH, non-condensing (refer to IEC 68-2-3)
### Ordering Information

- **PCL-818HD**: High-performance Half-size Multi-function Card
- **PCL-818HG**: High-performance and High-gain Multi. Card
- **PCL-818L**: Low-cost High-performance Multi. Card
- **PCL-818LS**: PCL-818L w/ PCLD-8115 and DB37 Cable
- **PCL-10137-1**: DB37 Cable, 1 m
- **PCL-10137-2**: DB37 Cable, 2 m
- **PCL-10137-3**: DB37 Cable, 3 m
- **PCLD-8115**: Wiring Board w/ CJC Circuit & One DB37 Cable
- **PCLD-880**: Wiring Board w/ Two 20-pin Flat Cables & Adapter

### Pin Assignments

#### PCL-818HD/HG

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<th>CN2</th>
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<td>D.GND</td>
<td>D.GND</td>
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<tr>
<td>+5 V</td>
<td>+12 Y</td>
<td>+5 V</td>
<td>+12 Y</td>
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- **CN3 (Single ended)**
  - A/D S0
  - A/D S1
  - A/D S2
  - A/D S3
  - A/D S4
  - A/D S5
  - A/D S6
  - A/D S7
  - A/GND
  - A/GND
  - VREF
  - VREF
  - S1
  - S1
  - S2
  - S2
  - D.GND
  - D.GND
  - NC
  - Counter
  - Counter
  +5 V

- **CN3 (Differential)**
  - A/D H0
  - A/D H1
  - A/D H2
  - A/D H3
  - A/D H4
  - A/D H5
  - A/D H6
  - A/D H7
  - A/GND
  - A/GND
  - YREF
  - YREF
  - S1
  - S2
  - S1
  - S2
  - D.GND
  - D.GND
  - NC
  - Counter
  - Counter
  +5 V

---

**Ordering Information**

- **PCL-818HD**
- **PCL-818HG**
- **PCL-818L**
- **PCL-818LS**
- **PCL-10137-1**
- **PCL-10137-2**
- **PCL-10137-3**
- **PCLD-8115**
- **PCLD-880**

**Product Details**

- **High-performance Half-size Multi-function Card**
- **High-performance and High-gain Multi. Card**
- **Low-cost High-performance Multi. Card**
- **PCL-818L w/ PCLD-8115 and DB37 Cable**
- **DB37 Cable, 1 m**
- **DB37 Cable, 2 m**
- **DB37 Cable, 3 m**
- **Wiring Board w/ CJC Circuit & One DB37 Cable**
- **Wiring Board w/ Two 20-pin Flat Cables & Adapter**

**Pin Assignments**

- **PCL-818HD/HG**
- **PCL-818L**

**Ordering Information**

- **PCL-818HD**
- **PCL-818HG**
- **PCL-818L**
- **PCL-818LS**
- **PCL-10137-1**
- **PCL-10137-2**
- **PCL-10137-3**
- **PCLD-8115**
- **PCLD-880**

**Product Details**

- **High-performance Half-size Multi-function Card**
- **High-performance and High-gain Multi. Card**
- **Low-cost High-performance Multi. Card**
- **PCL-818L w/ PCLD-8115 and DB37 Cable**
- **DB37 Cable, 1 m**
- **DB37 Cable, 2 m**
- **DB37 Cable, 3 m**
- **Wiring Board w/ CJC Circuit & One DB37 Cable**
- **Wiring Board w/ Two 20-pin Flat Cables & Adapter**

**Pin Assignments**

- **PCL-818HD/HG**
- **PCL-818L**
Introduction

PCIE-1744 is an advanced high-performance data acquisition card based on the PCI Express bus. With a large FIFO of 32k for each channel, the maximum sampling rate can get up to 30 MS/s, on each channel, with an emphasis on continuous, non-stop, high-speed, streaming data of samples to host memory.

Specifications

**Analog Input**
- **Channels**: 4 single-ended
- **Resolution**: 12 bits
- **Max. Sampling Rate**: 30 MS/s
- **FIFO Size**: 32,768 samples for each channel
- **Overvoltage Protection**: 14 Vp-p
- **Input Impedance**: 50 Ω, 1 MΩ, Hi Z jumper selectable, 100 pF
- **Sampling Modes**: Software polling, pacer
- **Trigger Modes**: Post-trigger, pre-trigger, delay-trigger, about-trigger
- **Input Range (V)**: ±5, ±2.5, ±1, ±0.5

**General**
- **Bus Type**: PCI Express V1.0
- **I/O Connectors**: 4 x BNC connector (for AI), 1 x PS/2 connector (for Ext. clock and trigger)
- **Dimensions (L x H)**: 175 x 100 mm (6.9" x 3.9")
- **Power Consumption**: Typical: 5 V @ 850 mA; 12 V @ 600 mA
  - Max.: 5 V @ 1 A; 12 V @ 700mA
- **Operating Temperature**: 0 ~ 60° C (32 ~ 140° F)
- **Storage Temperature**: -20 ~ 85° C (-4 ~ 185° F)
- **Storage Humidity**: 5 ~ 95% RH, non-condensing (refer to IEC 68-2-3)
- **Certifications**: CE

Ordering Information

- **PCIE-1744**: 30 MS/s, 12-bit, Simultaneous 4-ch AI PCIe Card
- **ADAM-3909**: DB9 DIN-rail Wiring Board
- **PCL-1010B-1**: BNC to BNC Wiring Cable, 1 m
- **PCL-10901-1**: PS/2 to DB9 Cable, 1 m
- **PCL-10901-3**: PS/2 to DB9 Cable, 3 m

Pin Assignments

Onboard PS/2 Connector

- NC
- EXT CLK1
- EXT CLK2
- EXT TRIG1
- EXT TRIG2
- GND

PS/2 To DB9 Cable Connector

- NC
- EXT CLK1
- EXT CLK2
- EXT TRIG1
- EXT TRIG2
- GND
- GND

---

Data Acquisition Boards

16-34
**PCI-1714U**

- 30 MS/s, 12-bit, Simultaneous 4-ch Analog Input Universal PCI Card

**PCI-1714UL**

- 10 MS/s, 12-bit, Simultaneous 4-ch Analog Input Universal PCI Card

---

### Specification

**Analog Input**

- **Channels**: 4 single-ended
- **Resolution**: 12 bits
- **Max. Sampling Rate**:
  - PCI-1714U: 30 MS/s
  - PCI-1714UL: 10 MS/s
- **FIFO Size**:
  - PCI-1714U: 32,768 samples for each channel
  - PCI-1714UL: 8,192 samples for each channel
- **Overvoltage Protection**: 30 Vp-p
- **Input Impedance**: 50 Ω/1 MΩ/Hi Z jumper selectable/100 pF
- **Sampling Modes**: Software polling, pacer
- **Trigger Modes**: Post-trigger, pre-trigger, delay-trigger, about-trigger
- **Input Range (V)**: ±5, ±2.5, ±1, ±0.5

**General**

- **Bus Type**: Universal PCI V2.2
- **I/O Connectors**: 4 x BNC connector (for AI)
- **Dimensions (L x H)**: 175 x 100 mm (6.9" x 3.9")
- **Power Consumption**: Typical: 5 V @ 850 mA; 12 V @ 600 mA
- **Max.**: 5 V @ 1 A; 12 V @ 700mA
- **Operating Temperature**: 0 ~ 60°C (32 ~ 140°F)
- **Storage Temperature**: -20 ~ 85°C (-4 ~ 185°F)
- **Storage Humidity**: 5 ~ 95% RH, non-condensing (refer to IEC 68-2-3)
- **Certifications**: CE

---

### Ordering Information

- **PCI-1714U**: 30 MS/s, 12-bit, Simultaneous 4-ch AI PCI Card
- **PCI-1714UL**: 10 MS/s, 12-bit, Simultaneous 4-ch AI PCI Card
- **ADAM-3909**: DB9 DIN-rail Wiring Board
- **PCL-1010B-1**: BNC to BNC Wiring Cable, 1 m
- **PCL-10901-1**: PS/2 to DB9 Cable, 1 m
- **PCL-10901-3**: PS/2 to DB9 Cable, 3 m

---

### Pin Assignments

**PCI-1714U**

- **NC**: EXT CLOCK0
- **EXT**: EXT CLOCK1

**PCI-1714UL**

- **NC**: EXT CLOCK0
- **EXT**: EXT CLOCK1

**Onboard PS/2 Connector**

- **PS/2 To DB9 Cable Connector**

---

**Introduction**

PCI-1714U is an advanced high-performance data acquisition card based on the PCI bus. With a large FIFO of 32,768 for each channel, the maximum sampling rate of PCI-1714U can get up to 30 MS/s, on each channel, with an emphasis on continuous, non-stop, high-speed, streaming data of samples to host memory. The low-cost PCI-1714UL offers 10 MS/s on each channel at a stable rate, and has also been equipped with a universal PCI interface.
**Introduction**

The PCI-1713U is an isolated high-speed analog input card for the PCI bus. It provides 32 analog input channels with a sampling rate up to 100 kS/s, 12-bit resolution and isolation protection of 2,500 Vdc.

**Specifications**

**Analog Input**
- **Channels**: 32 single-ended/16 differential (software programmable)
- **Resolution**: 12 bits
- **Max. Sampling Rate**: 100 kS/s
- **FIFO Size**: 4,096 samples
- **Overvoltage Protection**: 30 Vp-p
- **Isolation Protection**: 2,500 VDC
- **Input Impedance**: 1 GΩ
- **Input Range (V, software programmable)**:
  - Unipolar: ±10 V, ±5 V, ±2.5 V, ±1.25 V, ±0.625 V
  - bipolar: N/A
- **Accuracy (% of FSR ±1 LSB)**:
  - Unipolar: ±0.1, ±0.5, ±0.2, ±0.2, ±0.4
  - Bipolar: N/A

**General**
- **Bus Type**: Universal PCI V2.2
- **I/O Connector**: 1 x DB37 female connector
- **Dimensions (L x H)**: 175 x 100 mm (6.9" x 3.9")
- **Power Consumption**: Typical: 5 V @ 850 mA
  Max.: 5 V @ 1.0 A
- **Operating Temperature**: 0 – 60°C (32 – 140°F) (refer to IEC 68-2-1, 2)
- **Storage Temperature**: -20 – 70°C (-4 – 158°F)
- **Storage Humidity**: 5 – 95% RH non-condensing (refer to IEC 68-2-3)

**Ordering Information**
- PCI-1713U
- PCLD-881B
- ADAM-3937
- PCL-10137-1
- PCL-10137-2
- PCL-10137-3

**Pin Assignments**

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<tr>
<td>A28</td>
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**Features**
- 2,500 Vdc isolation protection
- 32-ch single-ended or 16-ch differential or a combination of analog input
- 12-bit A/D converter, with up to 100 kHz sampling rate
- Programmable gain
- Onboard FIFO memory (4,096 samples)
- SW, internal or external pacer sampling modes supported
### Introduction
The PCI-1715U is an isolated high-speed analog input card for the PCI bus. It provides 32 analog input channels with a sampling rate up to 500 kS/s, 12-bit resolution and isolation protection of 2,500 Vcc.

### Specifications

#### Analog Input
- **Channels**: 32 single-ended/16 differential (software programmable)
- **Resolution**: 12 bits
- **Max. Sampling Rate**: 500 kS/s
- **FIFO Size**: 1,024 samples
- **Overvoltage Protection**: 30 Vp-p
- **Isolation Protection**: 2,500 VDC
- **Input Impedance**: 1 GΩ
- **Sampling Modes**: Software, onboard programmable pacer and external (TTL level)
- **Input Range**: 1 Vcc

#### Accuracy (% of FSR ±1LSB)

| Unipolar | N/A | 0.1 | 0.2 | 0.2 | 0.4 |
| Bipolar | ±10 | ±5 | ±2.5 | ±1.25 | ±0.625 |

### Ordering Information
- **PCI-1715U**: 500 kS/s, 12-bit, 32-ch Isolated AI PCI Card
- **PCLD-881B**: Wiring Board for PCI-1713U, PCI-1715U & PCL-813B
- **ADAM-3937**: DB37 DIN-rail Wiring Board
- **PCL-10137-1**: DB37 Cable, 1 m
- **PCL-10137-2**: DB37 Cable, 2 m
- **PCL-10137-3**: DB37 Cable, 3 m

### Pin Assignments

![Pin Assignments Diagram]
PCI-1747U

250 kS/s, 16-bit, 64-ch Analog Input
Universal PCI Card

Features
- 64-ch single-ended or 32-ch differential or a combination of analog input
- 16-bit A/D converter, with up to 250 kHz sampling rate
- Auto calibration
- Onboard FIFO memory (1,024 samples)
- PCI-Bus mastering data transfer
- Universal PCI Bus (support 3.3 V or 5 V PCI bus signal)
- BoardID™ switch

Introduction
PCI-1747U is a high-resolution, high-channel-count analog input card for the PCI bus. Its sampling rate is up to 250 kS/s and 16-bit resolution provides the resolution needed for most data acquisition applications. PCI-1747U provides 64 single-ended, 32 differential analog input channels or a combination of these. It also has built in a 1,024 FIFO buffer for analog input data.

Specifications

Analog Input
- Channels 64 single-ended, 32 differential, or combination
- Resolution 16 bits
- Max. Sampling Rate 250 kS/s
- FIFO Size 1,024 samples
- Overvoltage Protection 20 Vp-p
- Input Impedance 100 MΩ (Off); 100 MΩ/100 pF (On)
- Input Range (V, software programmable)
  - Unipolar
    - +/-10
    - +/-5
    - +/-2.5
    - +/-1.25
  - Accuracy (% of FSR ±1 LSB)
    - 0.03
    - 0.02
    - 0.02
    - 0.03
    - 0.04

Ordering Information
- PCI-1747U 250 kS/s, 16-bit, 64-ch AI Universal PCI Card
- ADAM-3968 68-pin DIN-rail SCSI Wiring Board
- PCL-10168-1 68-pin SCSI Shielded Cable, 1 m
- PCL-10168-2 68-pin SCSI Shielded Cable, 2 m

General
- Bus Type Universal PCI V2.2
- I/O Connector 1 x 68-pin SCSI female connector
- Dimensions (L x H) 175 x 100 mm (6.9” x 3.9”)
- Power Consumption Typical: 5 V @ 850 mA, 12 V @ 600 mA
  - Max.: 5 V @ 1 A, 12 V @ 700 mA
- Operating Temperature 0 – 60°C (32 – 140°F) (refer to IEC 68-2-1, 2)
- Storage Temperature -20 – 70°C (-4 – 158°F)
- Storage Humidity 5 – 95% RH, non-condensing (refer to IEC 68-2-3)
- Certifications CE

Pin Assignments

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<th>Description</th>
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ADANTECH | Data Acquisition Boards

16-38
PCL-813B

Introduction

PCL-813B is a 12-bit 32-channel analog input card that offers high-voltage isolation on each analog input. It is an extremely cost effective solution for applications in industrial measurement and monitoring. The card offers 32 analog input channels with software programmable gain on each channel and two DC-to-DC converters on a 4-layer PCB with an integral ground plane. Optically-isolated inputs provide over 500 VDC of isolation between the analog inputs and the PC, protecting the PC and peripherals from damage due to high voltages on the input lines. PCL-813B is ideal for situations where the budget-conscious user requires flexibility, stability and a high level of isolation protection. PCL-813B comes with the PCLD-881B wiring terminal board and a DB37 cable assembly.

Specifications

Analog Input
- Channels: 32 single-ended
- Resolution: 12 bits
- Max. Sampling Rate: 25 kHz
- Overvoltage Protection: 30 Vp-p
- Isolation Protection: 500 VDC from analog input to PC
- Input Impedance: > 10 MΩ
- Sampling Modes: software trigger
- Input Range: (V, software programmable)
  | Unipolar (jumper selection) | 0 – 10 | 0 – 5 | 0 – 2.5 | 0 – 1.25 |
  | Accuracy (% of FSR ±1LSB)   | ±0.1 | ±0.2 | ±0.25 | ±0.4 |

General
- Bus Type: ISA
- I/O Connectors: 1 x DB37 female connector
- Dimensions (L x H): 219 x 100 mm (8.6” x 3.9”)
- Power Consumption: 5 V @ 660 mA max.
  12 V @ 140 mA max.
- Operating Temperature: 0 – 50° C (32 – 122° F)
- Storage Temperature: -20 – 65° C (4 – 149° F)
- Storage Humidity: 5 – 95% RH non-condensing (refer to IEC 68-2-3)

Features
- 32 single-ended analog input channels
- 12-bit A/D converter, with up to 25 kHz sampling rate
- Isolation protection (500 VDC)
- Program-controlled A/D trigger and data transfer

Ordering Information
- PCL-813B: 25 kS/s, 12-bit, 32-ch Isolated AI ISA Card
- PCLD-881B: Wiring Board for PCI-1713U, PCI-1715U & PCL-813B
- PCL-10137-1: DB37 Cable, 1 m
- PCL-10137-2: DB37 Cable, 2 m
- PCL-10137-3: DB37 Cable, 3 m
- ADAM-3937: DB37 DIN-rail Wiring Board

Typical application for PCL-813B:

Industrial 4 – 20 mA Output Device Monitoring
Introduction

The PCI-1720U provides four 12-bit isolated digital-to-analog outputs for the Universal PCI bus. With isolation protection of 2500 VDC between the outputs and the PCI bus, the PCI-1720U is ideal for industrial applications where high-voltage protection is required.

Specifications

**Analog Output**
- Channels: 4 isolated
- Resolution: 12 bits
- Output Rate: Static update
- Output Range: (Software programmable)

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<tr>
<td></td>
<td>0 - 5, 0 - 10</td>
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</tbody>
</table>

- Slew Rate: 2 V/μs
- Isolation Protection: 2500 VDC
- Driving Capability: 5 mA
- Operation Modes: Software polling
- Accuracy: ±0.024%
- Excitation Voltage: 50 V (max.)

**General**
- Bus Type: Universal PCI V2.2
- I/O Connectors: 1 x DB37 female connector
- Dimensions (L x H): 175 x 100 mm (6.9" x 3.9")
- Power Consumption: 5 V @ 350 mA (typical), 500 mA (max.)
- 12 V @ 200 mA (typical), 350 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)
- Storage Humidity: 5 – 95% RH, non-condensing (refer to IEC 68-2-3)
- Certifications: CE

**Features**
- 4 x 12-bit D/A output channels
- Multiple output ranges
- 2,500 VDC isolation between the outputs and the PCI bus
- Keeps the output settings and values after system reset
- One DB37 connector for easy wiring
- Universal PCI and BoardID™ switch

**Ordering Information**
- PCI-1720U 12-bit, 4-ch Isolated AO Universal PCI Card
- PCL-10137-1 DB37 Cable, 1 m
- PCL-10137-2 DB37 Cable, 2 m
- PCL-10137-3 DB37 Cable, 3 m
- ADAM-3937 DB37 DIN-rail Wiring Board
- PCLD-880 Wiring Board w/ Two 20-pin Flat Cables & Adapter

**Pin Assignments**

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**ADANTECH**

Data Acquisition Boards
PCI-1721 is an advanced high-speed analog output card for the PCI bus, and each of analog output channels are equipped with a 12-bit, double-buffered DAC. It features many powerful and unique functions, like a waveform output function with 10 MHz maximum update rate, auto-calibration and a BoardID switch. PCI-1721 is an ideal solution for industrial applications where high-speed continuous analog output or real-time waveform output functions are required.

**Specifications**

### Analog Output
- Channels: 4
- Resolution: 12 bits
- FIFO Size: 1,024 samples
- Output Rate: 10 MHz or static update
- Reference Clock:
  - Internal: 10 MHz
  - External Clock Frequency: 10 MHz max.
  - External Voltage Range: 0.8 V max., 2 V min.
- Output Range:
  - **Internal Reference**
    - Unipolar: 0 ~ 5 V, 0 ~ 10 V
    - Bipolar: ±5 V, ±10 V
  - **External Reference**
    - Current Loop: 0 ~ ±20 mA, 4 ~ 20 mA

- **Slew Rate**: 10 V/μs
- **Driving Capability**: 10 mA
- **Output Impedance**: 0.1 Ω max.
- **Operation Modes**: Single/continuous/waveform/synchronized output
- **Accuracy**:
  - Relative: ±1 LSB
  - Differential Non-linearity: ±1 LSB (monotonic)

### Counter/Timer
- Channels: 1
- Resolution: 16 bits
- Compatibility: 5 V/TTL
- Max. Input Frequency: 10 MHz
- Reference Clock:
  - Internal: 10 MHz
  - External Clock Frequency: 10 MHz max.
  - External Voltage Range: 0.8 V max., 2 V min.

### General
- **Bus Type**: PCI V2.2
- **I/O Connectors**: 1 x 68-pin SCSI female connector
- **Max. Input Frequency**: 10 MHz
- **Reference Clock**:
  - Internal: 10 MHz
  - External Clock Frequency: 10 MHz max.
  - External Voltage Range: 0.8 V max., 2 V min.

### Ordering Information
- **PCI-1721**: 12-bit, 4-ch Advanced PCI Analog Output Card
- **PCL-10168-1**: 68-pin SCI Shielded Cable, 1 m
- **PCL-10168-2**: 68-pin SCI Shielded Cable, 2 m
- **ADAM-3968**: 68-pin DIN-rail SCI Wiring Board

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**Introduction**

PCI-1721 is an advanced high-speed analog output card for the PCI bus, and each of analog output channels are equipped with a 12-bit, double-buffered DAC. It features many powerful and unique functions, like a waveform output function with 10 MHz maximum update rate, auto-calibration and a BoardID switch. PCI-1721 is an ideal solution for industrial applications where high-speed continuous analog output or real-time waveform output functions are required.
PCI-1723
16-bit, 8-ch Analog Output PCI Card with 16-ch Digital I/O

Introduction
PCI-1723 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 a BoardID™ switch. The PCI-1723 is an ideal solution for industrial applications where multiple analog output channels are required.

Specifications

Analog Output
- Channels: 8
- Resolution: 16 bits
- Output Rate: Static update
- Output Range: (Software programmable)

<table>
<thead>
<tr>
<th>Internal Reference</th>
<th>Bipolar (V)</th>
<th>±10</th>
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<tbody>
<tr>
<td>Current Loop (mA)</td>
<td>0 – 20</td>
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</tr>
</tbody>
</table>

- Driving Capability: 5 mA
- Output Impedance: 0.1 Ω max.
- Operation Modes: Software polling, synchronized output
- Accuracy: Relative: ±6 LSB
- Differential Non-linearity: ±6 LSB (monotonic)

Digital Input/Output
- Channels: 16 (shared by input/output)
- Compatibility: 5 V/TTL
- Input Voltage: Logic 0: 0.8 V max.
- Logic 1: 2.0 V min.
- Output Capability: Sink: 0.5 V @ 24 mA
- Source: 2.0 V @ -15 mA

General
- Bus Type: PCI V2.2
- I/O Connectors: 1 x 68-pin SCSI female connector
- Dimensions (L x H): 175 x 100 mm (6.9" x 3.9")
- Power Consumption: Typical: 5 V @ 850 mA, 12 V @ 600 mA
- Max.: 5 V @ 1 A, 12 V @ 700 mA
- Operating Temperature: 0 – 60° C (32 – 158° F) (IEC 68-2-1, 2)
- Storage Temperature: -20 – 85° C (-4 – 185° F)
- Storage Humidity: 5 – 95 % RH non-condensing (IEC 68-2-3)
- Certifications: CE

Features
- Auto calibration function
- A 16-bit DAC is equipped for each analog output channel
- Synchronized output function
- Keeps the output settings and values after system hot reset
- 2-port (16-channel) user-defined digital input/output channels
- BoardID™ switch

Ordering Information
- PCI-1723: 16-bit, 8-ch Non-isolated Analog Output PCI Card
- PCL-10168-1: 68-pin SCSI Shielded Cable, 1 m
- PCL-10168-2: 68-pin SCSI Shielded Cable, 2 m
- ADAM-3968: 68-pin DIN-rail SCSI Wiring Board

Pin Assignments

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<td>+12V</td>
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PCI-1724U

Introduction

PCI-1724U is an isolated high-density multiple channel analog output card for the PCI bus, where each analog output channel is equipped with a 14-bit DAC. It features optional voltages, current output and a BoardID™ switch. PCI-1724U is an ideal solution for industrial applications where multiple analog output channels are required.

Specifications

Analog Output
- Channels: 32 isolated
- Resolution: 14 bits
- Output Rate: Static update
- Output Range: (Software programmable)

<table>
<thead>
<tr>
<th>Internal Reference</th>
<th>Bipolar (V)</th>
<th>Current Loop (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGND</td>
<td>0 – 20, 4 – 20</td>
<td></td>
</tr>
</tbody>
</table>

- Isolation Protection: 1.5kV system isolation
- Output Impedance: 0.1Ω max.
- Operation Modes: Software polling, synchronized output
- Accuracy: Relative: ±4 LSB
- Driving Capacity: 10 mA

General
- Bus Type: Universal PCI V2.2
- I/O Connectors: 1 x DB62 female connector
- Dimensions (L x H): 175 x 100 mm (6.9" x 3.9")
- Power Consumption: 5 V @ 400 mA, 12 V @ 270 mA max.
- Operating Temperature: 0 – 60°C (-4°C to 140°F) (refer to IEC 68-2-1, 2)
- Storage Temperature: -20 – 70°C (-4 – 158°F)
- Storage Humidity: 5 – 95 % RH, non-condensing (refer to IEC 68-2-3)

Ordering Information
- PCI-1724U: 14-bit, 32-ch Isolated AO Universal PCI Card
- PCL-10162-1: DB62 Cable, 1 m
- PCL-10162-3: DB62 Cable, 3 m
- ADAM-3962: DB62 DIN-rail Wiring Board

Features

- 32 high-density analog output channels
- Flexible Output Range: +/-10 V, 0 – 20 mA and 4 – 20 mA
- Synchronized output function
- Keeps the output settings and values after system hot reset
- BoardID™ switch

Pin Assignments
PCI-1727U

14-bit, 12-ch Analog Output Universal PCI Card with 32-ch Digital I/O

Introduction
PCI-1727U provides twelve 14-bit analog output channels, and is pin-compatible with the ISA PCL-727 card for easy migration. It supports both ±10 V and 0 ~ 20 mA current loop (sink). The card's onboard DC-to-DC converter ensures the full 10 V D/A output is always available.

Each analog output channel has a built-in fuse to protect the circuit, PC and the external devices. PCI-1727U is an ideal, economical solution for the applications which require multiple PID control loops. In addition to its analog outputs, PCI-1727U provides 16 TTL digital input and 16 TTL digital output channels that are easily applied with industrial on/off control applications.

Specifications

### Analog Output

- **Channels**: 12
- **Resolution**: 14 bits
- **Output Rate**: Static update
- **Output Range**: (Software programmable)
  - Bipolar (V): ±5
  - Unipolar (V): 0 ~ 5, 0 ~ 10
  - Current Loop (mA): 0 ~ 20
- **Slew Rate**: 0.7 V/μs
- **Driving Capability**: 15 mA
- **Operation Modes**: Software polling, synchronized output
- **Current Loop**: 6 ~ 36 V
- **Excitation Voltage**: 8 ~ 36 V

### Digital Input

- **Channels**: 16
- **Compatibility**: 5 V/TTL
- **Input Voltage**: Logic 0: 0.8 V max.  
  Logic 1: 2.0 V min.
- **Input Loading**: 0.5 V @ 0.4 mA max. (low)  
  2.7 V @ 50 μA max. (high)

### Digital Output

- **Channels**: 16
- **Compatibility**: 5 V/TTL
- **Output Voltage**: Logic 0: 0.5 V, Logic 1: 2.4 V  
  Sink: 0.8 mA @ 0.5 V  
  Source: 0.4 mA @ 2.4 V

### General

- **Bus Type**: Universal PCI V2.2
- **I/O Connectors**: 1 x 37-pin D-type female connector  
  2 x 20-pin box header
- **Power Consumption**:  
  5 V @ 460 mA typical, 500 mA max  
  12 V @ 150 mA typical, 100 mA max
- **Dimensions (L x H)**: 175 x 100 mm (6.9" x 3.9")
- **Operating Temperature**: 0 ~ 50° C (32 ~ 122° F)
- **Storing Temperature**: -20 ~ 65° C (-4 ~ 149° F)
- **Storing Humidity**: 5 ~ 95% RH, non-condensing

Ordering Information

- **PCI-1727U**: 14-bit, 12-ch Universal Analog Output Card
- **PCL-10120-1**: 20-pin flat cable, 1 m
- **PCL-10137-1**: DB37 cable assembly, 1 m
- **ADAM-3937**: DB37 wiring terminal for DIN-rail mounting
- **PCLD-788**: Two 20-pin screw terminal board
- **PCLD-782**: Opto-isolated D/I board
- **PCLD-785**: Relay output board
Introduction
The PCL-727 provides 12 analog output channels on a full-size add-on card. In addition to its analog output, the PCL-727 provides 16 digital output channels and 16 digital output channels. It is an ideal and economical solution for industrial applications that requires multiple analog and/or current output channels.

Specifications

**Analog Output**

- **Channels**: 12
- **Resolution**: 12 bits
- **Output Rate**: Static update
- **Output Range**: (Software programmable)

<table>
<thead>
<tr>
<th>Bipolar (V)</th>
<th>Unipolar (V)</th>
<th>Current Loop (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td>0 ~ 5</td>
<td>0 ~ 10</td>
<td>4 ~ 20</td>
</tr>
</tbody>
</table>

- **Driving Capability**: 15 mA
- **Operation Modes**: Software polling, synchronized output
- **Current Loop**: 8 ~ 36 V
- **Excitation Voltage**: 8 ~ 36 V

**Digital Input**

- **Channels**: 16
- **Compatibility**: 5 V/TTL
- **Input Voltage**: Logic 0: 0.8 V max. Logic 1: 2.0 V min.
- **Input loading**: 0.5 V @ 0.4 mA max. (Low) 2.7 V @ 50 μA max. (High)

**Digital Output**

- **Channels**: 16
- **Compatibility**: 5 V/TTL
- **Output Voltage**: Logic 0: 0.5 V, Logic 1: 2.4 V
- **Output Capability**: Sink: 0.8 mA @ 0.5 V Source: 0.4 mA @ 2.4 V

**General**

- **Bus Type**: ISA
- **I/O Connectors**: 1 x DB37 female connector 2 x 20-pin box header
- **Power Consumption**: 5 V @ 500 mA typical, 1A max. 12 V @ 50 mA typical, 110 mA max. -12 V @ 14 mA typical, 90 mA max.
- **Dimensions (L x H)**: 340 x 100 mm (13.4" x 3.9")
- **Operating Temperature**: 0 ~ 50° C (32 ~ 122° F)
- **Storage Temperature**: 0 ~ 65° C (32 ~ 149° F)
- **Storage Humidity**: 5 ~ 95% RH, non-condensing

**Ordering Information**

- **PCL-727**: 12-bit, 12-ch AO ISA Card w/ Digital I/O
- **PCL-10120-1**: 20-pin Flat Cable, 1 m
- **PCL-10120-2**: 20-pin Flat Cable, 2 m
- **PCL-10137-1**: DB37 Cable, 1 m
- **PCL-10137-2**: DB37 Cable, 2 m
- **PCL-10137-3**: DB37 Cable, 3 m
- **ADAM-3937**: DB37 DIN-rail Wiring Board
- **PCLD-780**: Screw Terminal Board w/ Two 20-pin Flat Cables
- **PCLD-782**: 16-ch Isolated DI Board w/ One 20-pin Flat Cable
- **PCLD-785**: 16-ch Relay Board w/ One 1m 20-pin Flat Cable
**PCL-726**

**PCL-728**

12-bit, 6-ch Analog Output ISA Card with 32-ch Digital I/O

12-bit, 2-ch Isolated Analog Output ISA Card

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**Introduction**

PCL-726 and PCL-728 are analog output cards with 12-bit analog output channels. You can individually configure each channel to any of the following ranges: 0 ~ 5 V, 0 ~ 10 V, ±5 V, ±10 V and 4 ~ 20 mA current loop (sink). Designed for use in industrial environments, these cards are ideal, economical solutions for applications that require multiple analog outputs or current loops.

**Specifications**

**Analog Output**

- **Channels**
  - PCL-726: 6
  - PCL-728: 2 isolated
- **Resolution**
  - 12 bits, double buffered
- **Output Rate**
  - Static update
- **Reference Voltage**
  - Internal: -5 V (±0.05 V), -10 V (±0.05 V)
  - External: DC or AC, ±10 V max.
- **Output Range**
  - (Software programmable)
  - Internal Reference
    - Bipolar (V)
      - ±5
    - Unipolar (V)
      - 0 ~ 5, 0 ~ 10
  - External Reference
    - Bipolar (V)
      - ±10
- **Isolation Protection**
  - 500 VDC (PCL-728)
- **Driving Capability**
  - 5 mA
- **Output Impedance**
  - 0.1 Ω
- **Operation Modes**
  - Software polling
- **Accuracy**
  - 0.12%
- **Excitation Voltage**
  - 8 ~ 36 V for 4 ~ 20 mA current loop

**Digital Input (PCL-726)**

- **Channels**
  - 16
- **Compatibility**
  - 5 V/TTL
- **Input Voltage**
  - Logic 0: 0.8 V max.
  - Logic 1: 2.0 V min.

**Digital Output (PCL-726)**

- **Channels**
  - 16
- **Compatibility**
  - 5 V/TTL
- **Output Voltage**
  - Logic 0: 0.5 V, Logic 1: 2.4 V
- **Output Capability**
  - Sink: 0.5 V @ 0.4 mA max.
  - Source: 2.7 V @ 50 mA max.

**General**

- **Bus Type**
  - ISA
- **I/O Connectors**
  - PCL-726: 4 x 20-pin box header
  - PCL-728: 2 x DB9 female connector
- **Dimensions (L x H)**
  - PCL-726: 340 x 100 mm (13.4” x 3.9”)
  - PCL-728: 184 x 119 mm (7.25” x 4.7”)
- **Power Consumption**
  - PCL-726: 5 V @ 500 mA typical, 1 A max.
  - 12 V @ 80 mA typical, 110 mA max.
  - 12 V @ 60 mA typical, 90 mA max.
  - PCL-728: 5V @ 800 mA max.
- **Operating Temperature**
  - 0 ~ 50° C (32 ~ 122° F)
- **Storage Temperature**
  - 0 ~ 65° C (32 ~ 149° F)
- **Operating Humidity**
  - 5 ~ 95% RH, non-condensing (refer to IEC 68-2-3)

**Ordering Information**

- **PCL-726**
  - 12-bit, 6-ch AO ISA Card w/ Digital I/O
- **PCL-728**
  - 12-bit, 2-ch Isolated AO ISA Card
- **PCL-10120-1**
  - 20-pin Flat Cable, 1 m
- **PCL-10120-2**
  - 20-pin Flat Cable, 2 m
- **PCLD-788**
  - Screw Terminal Board w/ Two 20-pin Flat Cables
- **PCLD-789**
  - 16-ch Isolated DI Board w/ 1m 20-pin Flat Cable
- **PCLD-785**
  - 16-ch Relay Board w/ One 1m 20-pin Flat Cable
- **PCLD-880**
  - Wiring Board w/ Two 20-pin Flat Cables & Adapter
- **ADAM-3909**
  - DB9 DIN-rail Wiring Board
- **ADAM-3920**
  - 20-pin DIN-rail Flat Cable Wiring Board
Introduction

The PCI-1735U digital I/O and counter card is PC-compatible add-on card with 32 digital input channels, 32 digital output channels, and three programmable counter/timer channels. Their digital I/O channels are TTL-compatible and use 74LS244 driver/buffer circuits to provide high output driving capacity. These buffered circuits also require lower input loading current than regular TTL circuits. The cards' 8254 programmable counter/timer provides three flexible 16-bit counter/timer channels. You can generate waves and pulses by programming the 8254. Jumper settings determine the clock crystal frequency. The card also includes a breadboard area perfect for customized circuits.

Specifications

Digital Input
- Channels: 32
- Compatibility: 5 V/TTL
- Input Voltage: Logic 0: 0.8 V max.
  Logic 1: 2.0 V min.

Digital Output
- Channels: 32
- Compatibility: 5 V/TTL
- Output Voltage: Logic 0: 0.5 V max.
  Logic 1: 2.0 V min.
- Output Capability: Sink: 0.5 V max @ 24 mA
  Source: 2.0 V min @ 15 mA

Counter/Timer
- Channels: 3
- Resolution: 16 bits
- Compatibility: 5 V/TTL
- Max. Input Frequency: 1 MHz
- Reference Clock
  Internal: Selectable 1 MHz, 100 kHz, or 10 kHz base clock
  Jumper selectable divider: x2, x1, x0.5, and x0.25
- Programmable Counter Modes: 6

General
- Breadboard Area: 540 (30 x 18) plated-through "donuts", each with a .038" hole on 0.10" centers. Further, provide 5 V on the left side, and provide GND on the right side
- Bus Type: Universal PCI V2.2
- I/O Connectors: 5 x 20-pin box header
- Dimensions (L x H): 175 x 100 mm (6.9" x 3.9")
- Power Consumption: Max.: 5 V @ 98.8 mA
- Operating Temperature: 0 ~ 65° C (32 ~ 149° F)
- Storing Temperature: -25 ~ 80° C (-13 ~ 176° F)
- Storing Humidity: 5 ~ 95% RH, non-condensing (refer to IEC 68-2-3)

Ordering Information
- PCI-1735U: 64-ch Digital I/O and Counter Card
- PCL-10120-1: IDC-20 Flat Cable, 1 m
- PCL-10120-2: IDC-20 Flat Cable, 2 m
- PCLD-780: 2 x IDC-20 Wiring Terminal
- PCLD-782: Opto-Isolated D/I Board
- PCLD-785: 16-ch Relay Output Terminal
- PCLD-786: SSR and Relay Driver Board
- PCLD-885: 16-ch Power Relay Output Terminal
- ADAM-3920: 20-Pin Flat Cable Terminal, DIN-rail Mount
PCI-1737U
PCI-1739U

24-ch Digital I/O Universal PCI Card
48-ch Digital I/O Universal PCI Card

Features
- ISA-Compliant with PCL-724 (PCI-1737U) and PCL-731 (PCI-1739U)
- 24 TTL digital I/O channels for PCI-1737U and 48 TTL digital I/O channels for PCI-1739U
- Emulates mode 0 of 8255 PPI
- Interrupt handling capability
- Opto-22 compatible 50-pin connectors
- Output status readback
- PCI universal card

Specifications

Digital Input
- Channels
  - PCI-1737U: 24 (shared with output)
  - PCI-1739U: 48 (shared with output)
- Compatibility
  - 5 V/TTL
- Input Voltage
  - Logic 0: 0.8 V max.
  - Logic 1: 2.0 V min.
- Interrupt Capable Ch.
  - PCI-1737U: 1
  - PCI-1739U: 2

Digital Output
- Channels
  - PCI-1737U: 24 (shared with input)
  - PCI-1739U: 48 (shared with input)
- Compatibility
  - 5 V/TTL
- Output Voltage
  - Logic 0: 0.4 V max.
  - Logic 1: 2.4 V min.
- Output Capability
  - Sink: 0.4 V max. @ 24 mA
  - Source: 2.4 V min. @ 15 mA

General
- Bus Type
  - Universal PCI V2.2
- I/O Connectors
  - PCI-1737U: 2 x 20-pin & 1 x 50-pin box header
  - PCI-1739U: 2 x 50-pin box header
- Dimensions (L x H)
  - 175 x 100 mm (6.9” x 3.9”)
- Power Consumption
  - PCI-1737U: 5 V @ 294.9 mA (max.)
  - PCI-1739U: 5 V @ 540.8 mA (max.)
- Operating Temperature
  - 0 ~ 65°C (32 ~ 149°F)
- Storage Temperature
  - -25 ~ 80°C (-13 ~ 176°F)
- Storage Humidity
  - 5 ~ 95% RH, non-condensing (refer to IEC 68-2-3)

Ordering Information
- PCI-1737U 24-ch Digital I/O Universal PCI Card
- PCI-1739U 48-ch Digital I/O Universal PCI Card
- PCL-18150-1.2 50-pin Flat Cable, 1.2 m
- PCLD-782B 24-ch IDI Board w/ 20-pin & 50-pin Flat Cables
- PCLD-785B 24-ch Relay Board w/ 20-pin & 50-pin Flat Cables
- PCLD-7216 16-ch SSR I/O Module Carrier Board
- PCLD-885 16-ch Power Relay Board w/ 20p & 50p Flat Cables
- ADAM-3950 50-pin DIN-rail Flat Cable Wiring Board

Pin Assignments

<table>
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<tr>
<th>CN1</th>
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*Note: CN2 is only for PCI-1739U

16-48

Data Acquisition Boards
Introduction

PCI-1751 is a 48-bit digital I/O card for the PCI bus. Its 48 bits are divided into six 8-bit I/O ports and users can configure each port as input or output via software. PCI-1751 also provides one event counter and two 16-bit timers, which can be cascaded to become a 32-bit timer.

Specifications

Digital Input
- Channels: 48 (shared with output)
- Compatibility: 5 V/TTL
- Input Voltage: Logic 0: 0.8 V max. Logic 1: 2 V min.
- Interrupt Capable Ch.: 4

Digital Output
- Channels: 48 (shared with input)
- Compatibility: 5 V/TTL
- Output Voltage: Logic 0: 0.4 V max. Logic 1: 2.4 V min.
- Output Capability: Sink: 0.4 V @ 24 mA Source: 2.4 V @ 15 mA

Counter/Timer
- Channels: 3
- Resolution: 2 x 16-bit counters, or 1 x 32-bit counter (jumper selectable) 1 x 16-bit event counter
- Compatibility: 5 V/TTL
- Max. Input Frequency: 10 MHz
- Reference Clock: Internal: 10 MHz External Clock Frequency: 10 MHz External Voltage Range: 5 V/TTL

General
- Bus Type: Universal PCI V2.2
- I/O Connectors: 1 x 68-pin SCSI female connector
- Dimensions (L x H): 175 x 100 mm (6.9" x 3.9")
- Power Consumption: Typical: 5 V @ 850 mA Max.: 5 V @ 1.0 A
- Operating Temperature: 0 – 70° C (32 – 158° F)
- Storage Temperature: -20 – 80° C (-4 – 176° F)
- Storage Humidity: 5 – 95% RH, non-condensing (refer to IEC 68-2-3)

Features
- 48 TTL digital I/O lines
- Emulates mode 0 of 8255 PPI
- Buffered circuits for higher driving capacity than the 8255
- Interrupt handling capability
- Timer/Counter interrupt capability
- Supports both dry and wet contact
- Keeps the I/O port setting and D0 state after system reset
- BoardID switch

Ordering Information
- PCI-1751: 48-ch Digital I/O and Counter PCI Card
- PCL-10168-1: 68-pin SCSI Shielded Cable, 1 m
- PCL-10168-2: 68-pin SCSI Shielded Cable, 2 m
- ADAM-3968: 68-pin DIN-rail SCSI Wiring Board
- ADAM-3968/20: 68-pin SCSI to 20-pin Box Header Board
- ADAM-3968/50: 68-pin SCSI to 50-pin Box Header Board
- PCLD-8751: 48-ch Isolated Digital Input Board
- PCLD-8761: 24-ch Relay/Isolated Digital Input Board
- PCLD-8762: 48-ch Relay Board

Pin Assignments

<table>
<thead>
<tr>
<th>PA08</th>
<th>PA09</th>
<th>PA10</th>
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1: PA08 35: PA16
2: PA09 36: PA17
3: PA10 37: PA18
4: PA11 38: PA19
5: PA12 39: PA20
6: PA13 40: PA21
7: PA14 41: PA22
8: PA15 42: PA23
9: GND 43: GND
10: PA08 44: PA08
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13: PA11 47: PA11
14: PA12 48: PA12
15: PA13 49: PA13
16: PA14 50: PA14
17: PA15 51: PA15
18: GND 52: GND
19: PA08 53: PA08
20: PA09 54: PA09
21: PA10 55: PA10
22: PA11 56: PA11
23: PA12 57: PA12
24: PA13 58: PA13
25: PA14 59: PA14
26: PA15 60: PA15
27: GND 61: GND
28: CNT0_OUT 62: CNT0_OUT
29: CNT1_OUT 63: CNT1_OUT
30: CNT2_OUT 64: CNT2_OUT
31: INT0 65: INT0
32: INT1 66: INT1
33: INT2 67: INT2
34: VCC 68: VCC

Pin A21 is for PCL-10168-1 and PCL-10168-2, while pin A22 is for ADAM-3968/20 and ADAM-3968/50. Pins 63 and 64 are for PCLD-8751 and PCLD-8761. Pins 33 and 34 are for PCLD-8762.
### Features
- Up to 96 TTL digital I/O lines
- Emulates mode 0 of 8255 PPI
- Buffered circuits for higher driving capability than the 8255
- Multiple-source interrupt handling capability
- 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 the output settings and values after system hot reset
- Supports both dry and wet contact
- High-density 100-pin SCSI connector

### Introduction
PCI-1753 is a 96-bit digital I/O card for the PCI bus, which can be extended to 192 digital I/O channels by connecting its extension board - PCI-1753E. The card emulates mode 0 of the 8255 PPI chip, but the buffered circuits offer a higher driving capability than the 8255. The 96 I/O lines are divided into twelve 8-bit I/O ports: A0, B0, C0, A1, B1, C1, A2, B2, C2, A3, B3 and C3. You can configure each port as input or output via software.

### Specifications

#### Digital Input/Output
- **Channels**: 96 digital I/O lines for PCI-1753, 192 digital I/O lines if extending with PCI-1753E
- **Programming Mode**: 8255 PPI mode 0
- **Compatibility**: 5 V/TTL
- **Input Voltage**
  - Logic 0: 0.8 V max.
  - Logic 1: 2.0 V min.
- **Output Voltage**
  - Logic 0: 0.44 V max.
  - Logic 1: 3.76 V min.
- **Output Capability**
  - Sink: 0.44 V max. @ 24 mA
  - Source: 3.76 V min. @ 24 mA

#### General
- **Bus Type**: PCI V2.2
- **I/O Connector**: 1 x 100-pin SCSI female connector
- **Dimensions (L x H)**: 175 x 100 mm (6.9” x 3.9”)
- **Power Consumption**
  - Typical: 5 V @ 400 mA
  - Max.: 5 V @ 2.7 A
- **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)
- **Storage Humidity**: 5 – 95% RH, non-condensing

#### Ordering Information
- **PCI-1753**: 96-ch Digital I/O PCI Card
- **PCI-1753E**: Extension Board for PCI-1753
- **ADAM-3968**: 68-pin D-in-rail SCSI Wiring Board
- **ADAM-3968/20**: 68-pin SCI to 2 20-pin Box Header Board
- **ADAM-3968/50**: 68-pin SCI to 2 50-pin Box Header Board
- **PCLD-8751**: 48-ch Isolated Digital Input Board
- **PCLD-8761**: 24-ch Relay/Isolated Digital Input Board
- **PCLD-8762**: 48-ch Relay Board
- **PCL-10268**: 100-pin to Two 68-pin SCSI Cables, 1 m and 2 m

### Pin Assignments
Introduction

The PCI-1755 supports PCI-bus mastering DMA for high-speed data transfer. By setting aside a block of memory in the PC, the PCI-1755 performs bus-mastering data transfers without CPU intervention, setting the CPU free to perform other more urgent tasks such as data analysis and graphic manipulation. The function allows users to run all I/O functions simultaneously at full speed without losing data.

Specifications

Digital Input
- **Channels**: General: 8 (shared with output), High speed: 32 (shared with output)
- **Compatibility**: 5V/TTL
- **Input Voltage**: Logic 0: 0.8 V max., Logic 1: 2.0 V min.
- **Interrupt Capable Ch.**: DIO0-DIO7

Digital Output
- **Channels**: General: 8 (shared with input), High speed: 32 (shared with input)
- **Compatibility**: 5V/TTL
- **Output Voltage**: Logic 0: 0.5 V max., Logic 1: 2.7 V min.
- **Output Capacity**: Sink: 0.5 V max. @ 48 A, Source: 2.4 V min. @ 15 A

Transfer Characteristics
- **Onboard FIFO**: 16 KB for DI & 16 KB DO channels
- **Data Transfer Mode**: Bus Mastering DMA with Scatter-Gather
- **Data Transfer Bus Width**: 8/16/32 bits (programmable)
- **Max. Transfer Rate**: DI: 80 M bytes/sec, 32-bit @ 20 MHz, 120 M bytes/sec, 32-bit @ 40 MHz, external pacer when data length is less than FIFO size
  DO: 80 MBytes/sec, 32-bit @ 20 MHz
- **Operation Mode**: Handshaking

Features
- Bus-mastering DMA data transfer with scatter gather technology
- 32/16/8-bit pattern I/O with start and stop trigger function, 2 modes handshaking I/O Interrupt handling capability
- Onboard active terminators for high speed and long distance transfer
- Pattern match and change state detection interrupt function
- General-purpose 8-ch digital I/O

General
- **Bus Type**: PCI V2.2
- **I/O Connectors**: 1 x 100-pin SCSI female connector
- **Dimensions (L x H)**: 175 x 100 mm (6.9" x 3.9")
- **Power Consumption**: Typical: 5 V @ 1 A, Max.: 5 V @ 1 A
- **Operating Temperature**: 0 – 60° C (32 – 140° F)
- **Storage Temperature**: -20 – 85° C (-4 – 185° F)
- **Storage Humidity**: 5 – 95% RH, non-condensing (refer to IEC 68-2-3)

Ordering Information
- **PCI-1755**: Ultra-speed 32-ch Digital I/O Card
- **ADAM-39100**: 100-pin DIN-rail SCSI Wiring Board
- **PCL-101100-1**: SCSI Cable 100-pin Male 1m w/ Bolt Screw, 1m
Introduction

PCI-1757UP is a 24-channel digital I/O low profile PCI card that meets the PCI standard REV.2.2 (universal PCI expansion card). The card also works with 3.3 V and 5 V PCI slots, and provides you with 24 parallel digital input/output channels that emulate mode 0 of the 8255 PPI chip. However, the buffered circuits offer a higher driving capability than the 8255.

Specifications

**Digital Input**
- Channels: 24 (shared with output)
- Compatibility: 5 V/TTL
- Input Voltage: Logic 0: 0.8 V @ -0.2 mA
  Logic 1: 2.0 V @ 20 mA
- Interrupt Capable Ch.: 2

**Digital Output**
- Channels: 24 (shared with input)
- Compatibility: 5 V/TTL
- Output Voltage: Logic 0: 0.5 V max. @ -24 mA
  Logic 1: 3.7 V max. @ 24 mA
- Output Capability: Sink: 24 mA
  Source: 15 mA

**General**
- Bus Type: Universal PCI V2.2
- I/O Connectors: 1 x DB25 female connector
- Dimensions (L x H): 120 x 64 mm (4.7" x 2.5") Low profile MD1
- Power Consumption: Typical: 5 V @ 140 mA
  Max.: 5 V @ 200 mA
- Operating Temperature: 0 – 70° C (32 – 158° F)
- Storage Temperature: -20 – 80° C(-4 – 176° F)
- Storage Humidity: 5 – 95% non-condensing

**Features**
- Low profile PCI form factor
- Universal PCI bus
- 24 TTL level digital I/O channels
- Emulates mode 0 of 8255 PPI
- Buffered circuits provide higher driving capability
- Output status read-back
- I/O configurable by software or on board DIP switch
- Keeps the output settings and values after system hot reset
- BoardID™ switch
- Convenient DB25 connector
- Supports both dry and wet contact

**Ordering Information**
- **PCI-1757UP**: 24-ch Digital I/O Low Profile Universal PCI Card
- **ADAM-3925**: DB25 DIN-rail Wiring Board
- **PCL-10125-1**: DB25 Cable, 1 m
- **PCL-10125-3**: DB25 Cable, 3 m
- **PCLD-782B**: 24-ch IDI Board w/ 20-pin & 50-pin Flat Cables
- **PCLD-785B**: 24-ch Relay Board w/ 20-pin & 50-pin Flat Cables

**Pin Assignments**

![Pin Assignment Diagram]
Introduction
The PCL-720+ digital I/O and counter card is PC-compatible add-on cards with 32 digital input channels, 32 digital output channels and three programmable counter/timer channels. Their digital I/O channels are TTL-compatible and use 74LS244 driver/buffer circuits to provide high output driving capacity. These buffered circuits also require lower input loading current than regular TTL circuits. The card's 8254 programmable counter/timer provides three flexible 16-bit counter/timer channels. You can generate waves and pulses by programming the 8254. Jumper settings determine the clock crystal frequency. The cards also includes a breadboard area perfect for customized circuits.

Specifications

### Digital Input
- **Channels**: 32
- **Compatibility**: 5 V/TTL
- **Input Voltage**
  - Logic 0: 0.8 V max.
  - Logic 1: 2.0 V min.

### Digital Output
- **Channels**: 32
- **Compatibility**: 5 V/TTL
- **Output Voltage**
  - Logic 0: 0.5 V max.
  - Logic 1: 2.0 V min.
- **Output Capability**
  - Sink: 0.5 V max. @ 24 mA
  - Source: 2.0 V min. @ 15 mA

### Counter/Timer
- **Channels**: 3
- **Resolution**: 16 bits
- **Compatibility**: 5 V/TTL
- **Max. Input Frequency**: 1 MHz
- **Reference Clock**
  - Internal: Selectable 1 MHz, 100 kHz, or 10 kHz base clock
  - External Clock Frequency: Jumper selectable divider: x2, x1, x0.5, and x0.25
- **Programmable Counter Modes**: 6

### General
- **Breadboard Area**: 540 (30 x 18) plated-through "donuts", each with a .038" hole on 0.10" centers. Further, provide 5 V on the left side, and provide GND on the right side
- **Bus Type**: ISA
- **I/O Connectors**: 5 x 20-pin box header
- **Dimensions (L x H)**: 185 x 100 mm (7.3" x 4")
- **Power Consumption**: 5 V @ 500 mA
- **Operating Temperature**: 0 ~ 60° C (32 ~ 140° F)
- **Storage Temperature**: -20 ~ 70° C (-4 ~ 158° F)
- **Storage Humidity**: 5 ~ 95% RH, non-condensing (refer to IEC 68-2-3)

### Ordering Information
- **PCL-720+**: 64-ch Digital I/O and Counter ISA Card
- **PCL-10120-1**: 20-pin Flat Cable, 1 m
- **PCL-10120-2**: 20-pin Flat Cable, 2 m
- **PCLD-780**: Screw Terminal Board w/ Two 20-pin Flat Cables
- **PCLD-782**: 16-ch Isolated DI Board w/ 1 m 20-pin Flat Cable
- **PCLD-785**: 16-ch Relay Board w/ One 1 m 20-pin Flat Cable
- **PCLD-786**: 8-ch SSR I/O Module Board w/ 20-pin Flat Cable
- **PCLD-885**: 16-ch Power Relay Board w/ 20p & 50p Flat Cables
- **ADAM-3920**: 20-pin DIN-rail Flat Cable Wiring Board
PCL-722

144-ch Digital I/O ISA Card

Features
- Emulates 8255 PPI mode 0
- Buffered circuits for higher driving capacity than the 8255
- Interrupt handling capability
- Output status readback
- Pin compatible with Opto-22 I/O module racks

Specifications

Digital Input
- **Channels**: 144 (24 channels x 6 ports) shared with output
- **Compatibility**: 5 V/TTL
- **Input Voltage**
  - Logic 0: 0.8 V max.
  - Logic 1: 2.0 V min.
- **Interrupt Capable Ch.**: Bits 0 and 3 of Port C can generate an interrupt to IRQ 2, 3, 4, 5, 6 or 7

Digital Output
- **Channels**: 144 (24 channels x 6 ports) shared with input
- **Compatibility**: 5 V/TTL
- **Output Voltage**
  - Port A, B: Logic 0: 0.5 V max.
  - Logic 1: 2.4 V min.
  - Port C: Logic 0: 0.4 V max.
  - Logic 1: 2.0 V min.
- **Output Capability**
  - Port A, B: Sink: 12 mA
  - Source: 8 mA
  - Port C: Sink: 24 mA
  - Source: 15 mA

General
- **Bus Type**: ISA
- **Power Consumption**
  - Typical: 5 V @ 1.3 A
  - Max.: 5 V @ 1.8 A
- **Operating Temperature**: 0 – 60° C (32 – 140° F)
- **Storage Temperature**: -20 – 70° C (-4 – 158° F)
- **Operating Humidity**: 5 – 95% RH, non-condensing (refer to IEC 68-2-3)
- **I/O Connectors**: 6 x 50-pin box header
- **Dimensions (L x H)**: 334 x 100 mm (13.2” x 3.9”)

Ordering Information
- **PCL-722**: 144-ch Digital I/O ISA Card
- **PCL-10150-1.2**: 50-pin Flat Cable, 1.2 m
- **PCLD-782B**: 24-ch I/O Board w/ 20-pin & 50-pin Flat Cables
- **PCLD-785B**: 24-ch Relay Board w/ 20-pin & 50-pin Flat Cables
- **PCLD-7216**: 16-ch SSR I/O Module Carrier Board
- **PCLD-085**: 16-ch Power Relay Board w/ 20p & 50p Flat Cables
- **ADAM-3950**: 50-pin DIN-rail Flat Cable Wiring Board

Pin Assignments

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16-54

ADVANTECH

Data Acquisition Boards
PCL-724
PCL-731

Features
- 24 TTL digital I/O channels for PCL-724 and 48 TTL digital I/O channels for PCL-731
- Emulates mode 0 of 8255 PPI
- Interrupt handling capability
- Opto-22 compatible 50-pin connectors
- Output status readback

Specifications

Digital Input
- Channels
  - PCL-724: 24 (shared with output)
  - PCL-731: 48 (shared with output)
- Compatibility
  - 5 V/TTL
- Input Voltage
  - Logic 0: 0.8 V max.
  - Logic 1: 2.0 V min.
- Interrupt Capable Ch.
  - PCL-724: 1
  - PCL-731: 2

Digital Output
- Channels
  - PCL-724: 24 (shared with input)
  - PCL-731: 48 (shared with input)
- Compatibility
  - 5 V/TTL
- Output Voltage
  - Logic 0: 0.4 V max.
  - Logic 1: 2.4 V min.
- Output Capability
  - Sink: 0.4 V max. @ 24 mA
  - Source: 2.4 V min. @ 15 mA

General
- Bus Type
  - ISA
- I/O Connectors
  - PCL-724: 1 x DB50 female connector
  - PCL-731: 16-pin box header
- Dimensions (L x H)
  - PCL-724: 125 x 100 mm (4.9” x 3.9”)
  - PCL-731: 185 x 100 mm (7.3” x 3.9”)
- Power Consumption
  - Typical: 5 V @ 0.5 A
  - Max.: 5 V @ 0.8 A
- Operating Temperature
  - 0 – 60°C (32 – 140°F)
- Storage Temperature
  - -20 – 70°C (-4 – 158°F)
- Storage Humidity
  - 5 – 95% RH, non-condensing (refer to IEC 68-2-3)

Ordering Information
- PCL-724
  - 24-ch Digital I/O ISA Card
- PCL-731
  - 48-ch Digital I/O ISA Card
- PCL-10150-1.2
  - 50-pin Flat Cable, 1.2 m
- PCLD-782B
  - 24-ch IDI Board w/ 20-pin & 50-pin Flat Cables
- PCLD-785B
  - 24-ch Relay Board w/ 20-pin & 50-pin Flat Cables
- PCLD-7216
  - 16-ch SSR I/O Module Carrier Board
- PCLD-885
  - 16-ch Power Relay Board w/ 20p & 50p Flat Cables
- ADAM-3950
  - 50-pin DIN-rail Flat Cable Wiring Board

Pin Assignments

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<td>21</td>
</tr>
<tr>
<td>PB 03</td>
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<tr>
<td>PB 02</td>
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<td>PB 01</td>
<td>27</td>
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<td>PB 00</td>
<td>29</td>
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<tr>
<td>PA 07</td>
<td>31</td>
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<td>PA 06</td>
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<td>PA 05</td>
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<td>PA 04</td>
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<td>PA 03</td>
<td>39</td>
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<td>PA 02</td>
<td>41</td>
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<td>PA 01</td>
<td>43</td>
</tr>
<tr>
<td>PA 00</td>
<td>45</td>
</tr>
<tr>
<td>+5 V</td>
<td>47</td>
</tr>
<tr>
<td>50 V</td>
<td>49</td>
</tr>
</tbody>
</table>

*Note: CN2 is only for PCL-731*
PCI-1730U, PCI-1733, and PCI-1734 offer isolated digital input channels as well as isolated digital output channels with isolation protection up to 2,500 V<sub>DC</sub>, which makes them ideal for industrial applications where high-voltage isolation is required. There are also 32 TTL digital I/O channels on PCI-1730U.

### Specifications

#### Digital Input (PCI-1730U only)
- **Channels:** 16 (16-ch/group)
- **Compatibility:** 5 V/TTL
- **Input Voltage:**
  - Logic 0: 0.8 V max.
  - Logic 1: 2.0 V min.
- **Interrupt Capable Ch.:** 2 (DI0, DI1)

#### Isolated Digital Input
- **Channels:** 16 (16-ch/group)
- **Input Voltage:**
  - Logic 0: 1 V max. (2 V max.)
  - Logic 1: 5V min. (30 V max.)
- **Interrupt Capable Ch.:** 2 (IDI0, IDI1)
- **Isolation Protection:** 2,500 V<sub>DC</sub>
- **Opto-Isolator Response:** 25 μs
- **Input Resistance:** 2.7 kΩ @ 1 W

#### Digital Output (PCI-1730U only)
- **Channels:** 16 (16-ch/group)
- **Compatibility:** 5 V/TTL
- **Output Voltage:**
  - Logic 0: 0.8 V max.
  - Logic 1: 2.0 V min.
- **Output Capability:**
  - Sink: 24 mA
  - Source: 15 mA

#### Isolated Digital Output
- **Channels:** 16 (16-ch/group)
- **Output Type:** Sink type (NPN)
- **Isolation Protection:** 2,500 V<sub>DC</sub>
- **Output Voltage:** 5 – 40 V<sub>CC</sub>
- **Sink Current:** 300 mA max./channel
- **Opto-Isolator Response:** 25 μs

### General
- **Bus Type:** PCI V2.2 (Universal PCI V2.2 for PCI-1730U)
- **I/O Connectors:**
  - 1 x DB37 female connector
  - 4 x 20-pin box header (1730U only)
- **Dimensions (L x H):** 175 x 100 mm (6.9” x 3.9”)
- **Power Consumption:**
  - Typical: 5 V @ 250 mA, 12 V @ 35 mA
  - Max.: 5 V @ 400 mA, 12 V @ 60 mA
- **Operating Temperature:** 0 – 60° C (32 – 140° F)
- **Storage Temperature:** -25 – 85° C (-13 – 185° F)
- **Storage Humidity:** 5 – 95% RH, non-condensing (see IEC 68-2-3)

### Ordering Information
- **PCI-1730U**: 32-ch Isolated Digital I/O Univ. PCI Card
- **PCI-1733**: 32-ch Isolated Digital Input PCI Card
- **PCI-1734**: 32-ch Isolated Digital Output PCI Card
- **PCL-10120-1**: 20-pin Flat Cable, 1 m
- **PCL-10120-2**: 20-pin Flat Cable, 2 m
- **PCLD-782**: 16-ch Isolated DI Board w/ 1m 20-pin Flat Cable
- **ADAM-3920**: 20-pin DIN-rail Flat Cable Wiring Board
- **PCLD-885**: 16-ch Power Relay Board w/ 20p & 50p Flat Cables
- **PCLD-785**: 16-ch Relay Board w/ 1m 20-pin Flat Cable
- **PCLD-786**: 8-ch SSR I/O Module Board w/ 20-pin Flat Cable
- **PCLD-888**: Wiring Board w/ Two 20-pin Flat Cables & Adapter
- **ADAM-3937**: DB37 DIN-rail Wiring Board
- **PCL-10137-1**: DB37 Cable, 1 m
- **PCL-10137-2**: DB37 Cable, 2 m
- **PCL-10137-3**: DB37 Cable, 3 m
Introduction
PCI-1750 offers 16 isolated digital input channels, 16 isolated digital output channels, and one isolated counter/timer for the PCI bus. With isolation protection of 2,500 VDC, and dry contact support, PCI-1750 is ideal for industrial applications where high-voltage protection is required. Each I/O channel of the PCI-1750 corresponds to a bit in a PC I/O port. This makes PCI-1750 very easy to program. This card also offers a counter or timer interrupt and two digital input interrupt lines to a PC. So you can then easily do configurations by software.

Specifications

Isolated Digital Input
- Channels: 16
- Input Voltage: Logic 0: 2 V max., Logic 1: 5 V min. (50 VDC max.) or dry contact
- Interrupt Capable Ch.: 2
- Isolation Protection: 2,500 VDC
- Opto-Isolator Response: 100 μs

Isolated Digital Output
- Channels: 16
- Output Type: Sink (NPN)
- Isolation Protection: 2,500 VDC
- Output Voltage: 5 – 40 VDC
- Sink Current: 200 mA max. per channel
- Opto-Isolator Response: 100 μs

Counter/Timer
- Channels: 1
- Resolution: 1 x 32-bit timer
- 1 x 16-bit isolated counter
- Compatibility: 5 V/TTL
- Max. Input Frequency: 1 MHz
- Isolation Protection: 2,500 VDC

General
- Bus Type: PCI V2.2
- I/O Connectors: 1 x DB37 female connector; 1 x 2-gin terminal block for extended ground
- Dimensions (L x H): 175 x 100 mm (6.9” x 3.9”)
- Power Consumption: Typical 5 V @ 850 mA; Max. 5 V @ 1.0 A
- Operating Temperature: 0 – 70° C (32 – 158° F)
- Storage Temperature: -20 – 80° C (-4 – 176° F)
- Storage Humidity: 5 – 95% RH, non-condensing (refer to IEC 68-2-3)

Ordering Information
- PCI-1750: 32-ch Isolated Digital I/O and Counter PCI Card
- PCL-10137-1: DB37 Cable, 1 m
- PCL-10137-2: DB37 Cable, 2 m
- PCL-10137-3: DB37 Cable, 3 m
- ADAM-3937: DB37 DIN-rail Wiring Board

Pin Assignments

Features
- 16 isolated DI and 16 isolated DO channels
- High voltage isolation on all isolated channels (2,500 VDC)
- High sink current on isolated output channels (200 mA/channel)
- Supports dry contact or 5 – 50 VDC isolated inputs
- Interrupt handling capability
- Timer/counter interrupt capability
PCI-1752U
PCI-1754
PCI-1756

64-ch Isolated Digital Output Universal PCI Card
64-ch Isolated Digital Input PCI Card
64-ch Isolated Digital I/O PCI Card

Features
- 64 isolated digital output channels
- High-voltage isolation on output channels (2,500 V<sub>DC</sub>)
- 2,000 V<sub>DC</sub> ESD protection
- Wide output range (5 ~ 40 V<sub>DC</sub>)
- High-sink current on isolated output channels (200 mA max./channel)
- Output status readback
- Keeps the output settings and values after system hot reset
- Channel-freeze function
- High-density 100-pin SCSI connector
- Support sink

Specifications
Isolated Digital Output
- Channels: 64 (16-ch/group)
- Output Type: Sink (NPN)
- Isolation Protection: 2,500 V<sub>DC</sub>
- Output Voltage: 5 ~ 40 V<sub>DC</sub>
- Sink Current: 200 mA max./channel
- Opto-isolator Response: 25 μs

General
- Bus Type: Universal PCI V2.2
- I/O Connectors: 1 x 100-pin SCSI female connector
- Dimensions (L x H): 175 x 100 mm (6.9” x 3.9”)
- Power Consumption: Typical: 5 V @ 230 mA
- Operating Temperature: 0 ~ 60° C (32 ~ 140° F)
- Storage Temperature: -20 ~ 70° C (-4 ~ 158° F)
- Storage Humidity: 5 ~ 95% RH (IEC 68-2-3) non-condensing

Ordering Information
- PCI-1752U: 64-ch Isolated Digital Output Universal PCI Card
- PCL-10250-1: 100-pin SCSI to Two 50-pin SCSI Cable, 1 m
- ADAM-3951: 50-pin DIN-rail Wiring Board w/ LED Indicators

Features
- 64 isolated digital input channels
- Either ± voltage input for DI by group
- High-voltage isolation on input channels (2,500 V<sub>DC</sub>)
- High over-voltage protection (70 V<sub>DC</sub>)
- Wide input range (10 ~ 50 V<sub>DC</sub>)
- Interrupt handling capability
- High-density 100-pin SCSI connector

Specifications
Isolated Digital Input
- Channels: 64 (16-ch/group)
- Input Voltage: Logic 0: 3 V max.
- Input Current (Typical): 10 V<sub>DC</sub> @ 1.7 mA, 12 V<sub>DC</sub> @ 2.1 mA
- Overvoltage Protection: 70 V<sub>DC</sub>
- ESD: 2,000 V<sub>DC</sub>
- Opto-Isolator Response: 25 μs

General
- Bus Type: PCI V2.2
- I/O Connectors: 1 x 100-pin SCSI female connector
- Dimensions (L x H): 175 x 100 mm (6.9” x 3.9”)
- Power Consumption: Typical: 5 V @ 340 mA
- Operating Temperature: 0 ~ 50° C (32 ~ 140° F)
- Storage Temperature: -20 ~ 70° C (-4 ~ 158° F)
- Storage Humidity: 5 ~ 95% RH (IEC 68-2-3) non-condensing

Ordering Information
- PCI-1754: 64-ch Isolated Digital Input PCI Card
- PCL-10250-1: 100-pin SCSI to Two 50-pin SCSI Cable, 1 m
- ADAM-3951: 50-pin DIN-rail Wiring Board w/ LED Indicators

Features
- Either ± voltage input for DI by group
- Output status readback
- Keeps the output settings and values after system hot reset
- Interrupt handling capability
- High-density 100-pin SCSI connector

Specifications
Isolated Digital Output
- Channels: 32 (16-ch/group)
- Input Voltage: Logic 0: 3 V max.
- Interrupt Capable Ch.: 4
- Isolation Protection: 2,500 V<sub>DC</sub>
- ESD: 2,000 V<sub>DC</sub>
- Opto-Isolator Response: 25 μs

General
- Bus Type: PCI V2.2
- I/O Connectors: 1 x 100-pin SCSI female connector
- Dimensions (L x H): 175 x 100 mm (6.9” x 3.9”)
- Power Consumption: Typical: 5 V @ 475 mA
- Operating Temperature: 0 ~ 60° C (32 ~ 140° F)
- Storage Temperature: -20 ~ 70° C (-4 ~ 158° F)
- Storage Humidity: 5 ~ 95% RH (IEC 68-2-3) non-condensing

Ordering Information
- PCI-1756: 64-ch Isolated Digital I/O PCI Card
- PCL-10250-1: 100-pin SCSI to Two 50-pin SCSI Cable, 1 m
- ADAM-3951: 50-pin DIN-rail Wiring Board w/ LED Indicators
Features

PCI-1758UDI and PCI-1758UDIO
- 128 isolated digital output channels (64 channels for PCI-1758UDIO)
- High-voltage isolation on output channels (2,500 Vdc)
- Wide output range (5 ~ 40 Vdc)
- Sink current for isolated output channels (90 mA max/channel)
- High ESD protection (2,000 Vdc)
- Digital Filter function
- BoardID™ switch
- Interrupt handling capability for each channel

General

- Interrupt Function (PCI-1758UDI/PCI-1758UDIO)
- The digital filter function is used to eliminate glitches on input data and reduce the number of changes to examine and process. The filter blocks pulses that are shorter than the specified timing interval and passes pulses that are twice as long as the specified interval. Intermediate-length pulses that are longer than half of the interval, but less than the interval, may or may not pass the filter depending on your settings.

Ordering Information

- PCI-1758UDI: 128-ch Isolated DI Universal PCI Card
- PCI-1758UDO: 128-ch Isolated DO Universal PCI Card
- PCI-1758UDIO: 128-ch Isolated Digital I/O Universal PCI Card
- PCL-101100S-1: 100-pin SCSI Cable, 1 m
- PCL-101100S-2: 100-pin SCSI Cable, 2 m
- ADAM-39100: 100-pin DIN-rail SCSI Wiring Board

Specifications

Isolated Digital Input
- Channels: PCI-1758UDI: 128
- Input Voltage: Logic 0: 2.5 V max.
- Interrupt Capable Ch.: PCI-1758UDI: 128
- Isolation Protection: 2,500 Vdc
- Opto-Isolator Response: 20 μs
- Input Resistance: 3 kΩ

Isolated Digital Output
- Channels: PCI-1758UDO: 64
- Output Type: Sink (NPN)
- Output Protection: 2,500 Vdc
- Output Voltage: 5 ~ 40 Vdc
- Sink Current: 90 mA max/channel
- Opto-Isolator Response: 20 μs

General
- Bus Type: Universal PCI V2.2
- I/O Connectors: 1 x mini-SCSI HDRA-E100 female connector
- Dimensions (L x H): 175 x 100 mm (6.9" x 3.9")
- Power Consumption
  - Typical: 5 V @ 0.3 A
  - Max.: 5 V @ 0.6 A

Operating Information
- Operating Temperature: 0 ~ 60° C (22 ~ 140° F) (IEC 68-2-1, 2)
- Storage Temperature: -20 ~ 70° C (-4 ~ 158° F)
- Storage Humidity: 5 ~ 95% (IEC 68-2-3) non-condensing
PCI-1760U

8-ch Relay and 8-ch Isolated Digital Input
Universal PCI Card with 10-ch Counter/Timer

Introduction
PCI-1760U relay actuator and isolated digital input card is a PC add-on card for the PCI bus. It meets the PCI standard Rev. 2.2 (Universal PCI expansion card), and works with both 3.3 V and 5 V PCI slots. It provides 8 opto-isolated digital inputs with isolation protection of 2,500 VDC for collecting digital inputs in noisy environments, 8 relay actuators that can be used as an on/off control devices or small power switches, and 2 isolated PWM (Pulse Width Modulation) outputs for custom applications.

For easy monitoring, each relay is equipped with one red LED to show its on/off status. Each isolated input supports both dry contact and wet contact so that it can easily interface with other devices when no voltage is present in the external circuit.

Specifications

Isolated Digital Input
- Channels: 8 (Sink)
- Input Voltage: Logic 0: 1.0 V max., Logic 1: 4.5 V min. (12 V max.)
- Interrupt Capable Ch.: 8 (IDI0 ~ IDI7)
- Isolation Protection: 2,500 VDC
- Opto-Isolator Response: 25 μs
- Input Resistance: 2 kΩ 1/4 W

Counter/Timer
- Channels: 8
- Resolution: 16 bits
- Compatibility: 5 V/TTL
- Max. Input Frequency: 500 Hz
- Isolation Protection: 2,500 VDC
- PWM Channels: 2
- Digital Noise Filter:
  - Min. effective high input period ≥ [(2 ~ 65535) x 5 ms] + 5 ms
  - Min. effective low input period ≥ [(2 ~ 65535) x 5 ms] + 5 ms

Relay Output
- Channels: 8
- Relay Type: 2 x Form C, and 6 x Form A
- Contact Rating: 120 VDC, 0.5 A, or 30 VDC, 1 A
- Relay on Time: 5 ms max.
- Relay off Time: 5 ms max.
- Life Span: 200,000 operations @ 0.5 A 120 VDC, 500,000 operations @ 1.0 A 30 VDC
- Resistance:
  - Contact: < 100 mΩ
  - Insulation: 50 MΩ

General
- Bus Type: Universal PCI V2.2
- I/O Connectors: 1 x DB37 female connector
- Dimensions (L x H): 175 x 100 mm (6.9” x 3.9”)
- Power Consumption:
  - Typical: 5 V @ 450 mA
  - Max.: 5 V @ 850 mA
- Operating Temperature: 0 ~ 60° C (32 ~ 140° F) (IEC 68-2-1, 2)
- Storage Temperature: -20 ~ 70° C (-4 ~ 158° F)
- Storage Humidity: 5 ~ 95 % RH, non-condensing (IEC 68-2-3)

Ordering Information
- PCI-1760U: 8-ch Relay/IDI PCI Card w/ 10-ch Counter/Timer
- PCL-10137-1: DB37 Cable, 1 m
- PCL-10137-2: DB37 Cable, 2 m
- PCL-10137-3: DB37 Cable, 3 m
- ADAM-3937: DB37 DIN-rail Wiring Board
PCI-1761

Introduction
The PCI-1761 relay actuator and isolated DI card is an add-on card for the PCI bus. It provides 8 optically-isolated digital inputs with isolation protection of 3,750 Vdc 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 PCI-1761’s eight optically-isolated digital input channels are ideal for digital input in noisy environments or with floating potentials.

The PCI-1761 digital input channels feature a rugged isolation protection for industrial, lab and machinery automation applications. It durably withstands voltage up to 3,750 Vdc, protecting your host system from any incidental harms. If connected to an external input source with surge-protection, the PCI-1761 can offer up to a maximum of 2,000 Vdc ESD (Electrostatic Discharge) protection. Even with an input voltage rising up to 70 Vdc, the PCI-1761 can still manage to work properly, albeit for only a short period of time.

Specifications
Isolated Digital Input
- Channels: 8
- Input Voltage: Logic 0: 3 V max. Logic 1: 5 V min. (50 V max.)
- Interrupt Capable Ch.: 8
- Isolation Protection: 3,750 Vdc
- Overvoltage Protection: 70 Vdc
- Opto-Isolator Response: 25 μs
- Input Resistance: 5,600 Ω
- Input Current: 1.6 mA @ 10 Vdc, 8.9 mA @ 50 Vdc

Relay Output
- Channels: 8
- Relay Type: SPDT (4 x Form C and 4 x Form A)
- Contact Rating: 250 Vdc @ 3 A, or 24 Vdc @ 3 A
- Relay on Time: 15 ms max.
- Relay off Time: 5 ms max.
- Life Span: 2 x 10⁶ operations
- Resistance: Contact: 50 mA Ω
  Insulation: 1 GΩ min.

Features
- ISA-Compatible with PCL-725
- 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
- Male DB37 matching connector included
- Output status readback
- Retained relay output values when hot system reset
- High-voltage isolation on input channels (3,750 Vdc)
- High ESD protection (2,000 Vdc)
- High over-voltage protection (70 Vdc)
- Wide input range (10 – 50 Vdc)
- Interrupt handling capability
- BoardID™ switch

General
- Bus Type: PCI V2.2
- I/O Connectors: 1 x DB37 female connector
- Dimensions (L x W x H): 175 x 100 mm (6.9" x 3.9")
- Power Consumption: Typical: 5 V @ 500 mA Max.: 5 V @ 750 mA
- Operating Temperature: 0 ~ 60° C (32 ~ 140° F) (IEC 68-2-1, 2)
- Storage Temperature: -20 ~ 70° C (-4 ~ 158° F)
- Storage Humidity: 5 – 95 % RH, non-condensing (IEC 68-2-3)

Ordering Information
- PCI-1761: 8-ch Relay/Isolated Digital Input PCI Card
- PCL-10137-1: DB25 Cable, 1 m
- PCL-10137-2: DB25 Cable, 2 m
- PCL-10137-3: DB25 Cable, 3 m
- ADAM-3937: DB25 DIN-rail Wiring Board
- PCLD-888: Wiring Board w/ Two 20-pin Flat Cables & Adapter
Introduction

The PCI-1762 relay actuator and isolated DI card is a PC add-on card for the PCI bus. It provides 16 opto-isolated digital inputs with isolation protection of 2,500 VDC for collecting digital inputs in noisy environments, 16 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 PCI-1762's sixteen optically-isolated digital input channels are ideal for digital input in noisy environments or with floating potentials.

Specifications

Isolated Digital Input
- Channels: 16
- Input Voltage: Logic 0: 3 V max.  Logic 1: 10 V min. (50 V max.)
- Interrupt Capable Ch.: 2
- Isolation Protection: 2,500 VDC
- Overvoltage Protection: 70 VDC
- Opto-Isolator Response: 25 μs
- Input Resistance: 4.7 KΩ

Relay Output
- Channels: 16
- Relay Type: SPDT (Form A or Form B, jumper selectable)
- Contact Rating: 0.5 A @ 125 VAC or 1 A @ 30 VDC
- Relay on Time: 6 ms max.
- Relay off Time: 4 ms max.
- Life Span: 2 x 10⁹ ops. min. (0.5 A @ 125 VAC), 5 x 10⁸ ops. min. (1 A @ 30 VDC)
- Resistance: Contact: 50 mΩ, Insulation: 1,000 MΩ min. (at 500 VDC)

General
- Bus Type: PCI V2.2
- I/O Connectors: 1 x DB62 female connector
- Dimensions (L x H): 175 x 100 mm (6.9" x 3.9")
- Power Consumption: Typical: 5 V @ 250 mA Max.: 5 V @ 620 mA
- Operating Temperature: 0 ~ 60° C (32 ~ 140° F) (IEC 68-2-1, 2)
- Storage Temperature: -20 ~ 70° C (-4 ~ 158° F)
- Storage Humidity: 5 - 95 % non-condensing (IEC 68-2-3)

Ordering Information
- PCI-1762 16-ch Relay/Isolated Digital Input PCI Card
- PCL-10162-1 DB62 Cable, 1 m
- PCL-10162-3 DB62 Cable, 3 m
- ADAM-3962 DB62 DIN-rail Wiring Board

Pin Assignments
Introduction

The PCL-725 relay actuator and isolated digital input card offers 8 relay actuators and 8 opto-isolated digital inputs on a single board. Typically, the onboard relays can serve as on/off control devices or small power switches. The 8 x opto-isolated DI channels are ideal devices for collecting digital inputs under noisy environment or floating potential. Also, the 8 x isolated inputs provide the best method to prevent any ground loop problems.

For easy monitoring, each relay is equipped with one red LED to reflect its on/off status. Each input channel is jumper selectable to either isolated or non-isolated input. Access to input and output channels is made possible through an onboard 37-pin D-type connector.

Specifications

Isolated Digital Input

- **Channels**: 8
- **Input Voltage**: 5 – 24 VDC
- **Isolation Protection**: 1500 VDC
- **Input Resistance**: 560 Ω
- **Input Current**: 60 mA max.

Non-isolated Digital Input

- **Channels**: 8 (Jumper-selectable)
- **Input Voltage**: Logic 0: 0.8 V max.
  Logic 1: 2.0 V min. (5.25 V max.)

Relay Output

- **Channels**: 8
- **Relay Type**: SPDT (4 x Form C and 4 x Form A)
- **Contact Rating**: 120 VAC @ 0.5 A, or 30 VDC @ 1 A
- **Relay on Time**: 8 ms max.
- **Relay off Time**: 8 ms max.
- **Life Span**: 1 x 10^7 operations
- **Resistance**: Contact: 50 mΩ
  Insulation: 100 MΩ min.

Features

- 8 x relay output channels and 8 x isolated digital input channels
- LED indicators to show activated relays
- 4 x Form C and 4 x Form A type relay output channels
- Male DB37 matching connector included
- Output status readback

General

- **Bus Type**: ISA
- **I/O Connectors**: 1 x DB37 female connector
- **Dimensions (L x H)**: 147 x 100 mm (5.75" x 3.9")
- **Power Consumption**: 5 V @ 0.2 A, 12 V @ 33 mA for each relay < 0.27 A if all eight relays are energized
- **Operating Temperature**: 0 – 60° C (32 – 140° F) (IEC 68-2-1, 2)
- **Storage Temperature**: -20 – 70° C (-4 – 158° F)
- **Storage Humidity**: 5 – 95 % RH, non-condensing (IEC 68-2-3)

Ordering Information

- **PCL-725**: 8-ch Relay/Isolated Digital Input ISA Card
- **PCL-10137-1**: DB37 Cable, 1 m
- **PCL-10137-2**: DB37 Cable, 2 m
- **PCL-10137-3**: DB37 Cable, 3 m
- **ADAM-3937**: DB37 DIN-rail Wiring Board
- **PCLD-880**: Wiring Board w/ Two 20-pin Flat Cables & Adapter
Introduction

Ideal for applications such as on/off control or signal switching, the PCL-735 12-channel relay actuator provides 12 SPDT relays on a half-size card. The on/off status of each relay is easy to monitor. A red LED next to each relay shows its on/off status, and the software can read each relay’s status. An onboard DB-37 connector provides access to all output channels.

Specifications

### Relay Outputs
- **Channels**: 12
- **Relay Type**: SPDT, Form C
- **Contact Rating**: 2 A @ 30 VDC, 1 A @ 125 VAC
- **Relay on Time**: 5 ms typical
- **Relay off Time**: 5 ms typical
- **Life Span**: > 5 x 10⁶ operations @ 30 VDC and 2 A, > 2 x 10⁶ operations @ 30 VDC and 1 A
- **Resistance**: Contact: 50 mΩ, Insulation: 1 GΩ @ 500 VDC min.

### General
- **Bus Type**: ISA
- **I/O Connectors**: 1 x DB37 female connector
- **Dimensions (L x H)**: 155 x 100 mm (6.1" x 3.9")
- **Power Consumption**: Typical: 5 V @ 280 mA, Max.: 12 V @ 200 mA
- **Operating Temperature**: 0 ~ 60° C (32 ~ 140° F)
- **Storage Temperature**: -20 ~ 70° C (-4 ~ 158° F)
- **Storage Humidity**: 5 ~ 95% RH, non-condensing (refer to IEC 68-2-3)

### Ordering Information
- PCL-735: 12-ch Relay ISA Card
- PCL-10137-1: DB37 Cable, 1 m
- PCL-10137-2: DB37 Cable, 2 m
- PCL-10137-3: DB37 Cable, 3 m
- ADAM-3937: DB37 DIN-rail Wiring Board
- PCLD-880: Wiring Board w/ Two 20-pin Flat Cables & Adapter

### Pin Assignments

```
1  10 19
2  11 20
3  12 21
4  13 22
5  14 23
6  15 24
7  16 25
8  17 26
9  18 27

NW   NC6
NO   COM6
COM0 NC7
NC1  NO7
COM2 NC8
NC2  NO8
COM3 NC9
NC3  NO9
NC4  COM9
NC5  COM10
NC6  NO10
NO6  NC11
COM11
```

Output status readback

12 relay outputs
- LED indicators to show activated relays
- Male DB37 matching connector included

PCL-735: 12-ch Relay ISA Card
# PCI-1780U

**8-ch, 16-bit Counter/Timer Universal PCI Card**

## 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
PCI-1780U is a general purpose multi-channel counter/timer card for the PCI bus. It targets the AM9513 to implement the counter/timer function by CPLD. It provides eight 16-bit counter channels, 8 digital outputs and 8 digital inputs. Its powerful counter functions cater to a broad range of industrial and laboratory applications.

The card features 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 PCI-10168 shielded cable works well with PCI-1780U 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 the best protection against EMI/EMC problems.

## Specifications

### General
- **Bus Type:** Universal PCI V2.2
- **I/O Connectors:** 1 x 68-pin SCSI female connector
- **Dimensions (L x H):** 175 x 100 mm (6.9” x 3.9”)
- **Power Consumption:**
  - Typical: 5 V @ 900 mA
  - Max.: 5 V @ 1.2 A
- **Operating Temperature:** 0 ~ 60°C (32 ~ 140°F) (IEC 68-2-1, 2)
- **Storage Temperature:** -20 ~ 70°C (-4 ~ 158°F)
- **Storage Humidity:** 5 ~ 95% RH, non-condensing (IEC 68-2-3)

### Ordering Information
- **PCI-1780U:** 8-ch, 16-bit Counter/Timer Universal PCI Card
- **PCL-10168-1:** 68-pin SCSI Shielded Cable, 1 m
- **PCL-10168-2:** 68-pin SCSI Shielded Cable, 2 m
- **ADAM-3968:** 68-pin DIN-rail SCSI Wiring Board

## Digital Input
- **Channels:** 8
- **Compatibility:** 5 V/TTL
- **Input Voltage:**
  - Logic 0: 0.8 V max.
  - Logic 1: 2.0 V min.
- **Interrupt Capable Ch.:** Ch. 0

## Digital Output
- **Channels:** 8
- **Compatibility:** 5 V/TTL
- **Output Voltage:**
  - Logic 0: 0.8 V
  - Logic 1: 2.0 V
- **Output Capability:**
  - Sink: 24 mA @ 0.8 V
  - Source: -15 mA @ 2.0 V

## Counter/Timer
- **Channels:** 8 (independent)
- **Resolution:** 16 bits
- **Compatibility:** 5 V/TTL
- **Max. Input Frequency:** 20 MHz
- **Reference Clock:**
  - Internal: 20 MHz
  - External clock: 20 MHz max.
- **Counter Modes:** 12 (programmable)
- **Interrupt Capable Ch.:** 6
- **PWM Channels:** 8
### Introduction

PCL-836 is a general purpose counter/timer and digital I/O card for PC/AT compatible computers. It provides six 16-bit counter channels. It also includes 16 digital outputs and 16 digital inputs. Two 8254 chips provide a variety of powerful counter/timer function modes to match your industrial and/or laboratory applications.

### Unique Digital Filter

PCL-836 includes a unique digital filter to eliminate noise on the input signal. The frequency can be adjusted to provide more stable output readings.

### Specifications

**Digital Input**
- **Channels**: 16
- **Compatibility**: 5 V/TTL
- **Input Voltage**: Logic 0: 0.8 V max. Logic 1: 2.0 V min.

**Digital Output**
- **Channels**: 16
- **Compatibility**: 5 V/TTL
- **Output Voltage**: Logic 0: 0.8 V Logic 1: 2.0 V
- **Output Capability**: Sink: 8 mA @ 0.8 V Source: -0.4 mA @ 2.0 V

**Counter/Timer**
- **Channels**: 6
- **Resolution**: 16 bits
- **Compatibility**: 5 V/TTL
- **Max. Input Frequency**: 10 MHz
- **Reference Clock**: Internal: 10 MHz External clock: 10 MHz
- **Counter Modes**: 6 programmable counter modes
- **Interrupt Capable Ch.**: IRQ 2, 4, 5, 7, 10, 11, 12, 15 (jumper selectable)
- **PWM Channels**: 3
- **Digital Noise Filter**: 1.6 ms to 52 ms (programmable)

**General**
- **Power Consumption**: Typical: 5 V @ 360 mA Max.: 5 V @ 400 mA
- **Operating Temperature**: 0 – 60°C (32 – 140°F)
- **Storage Temperature**: -20 – 70°C (-4 – 158°F)
- **Operating Humidity**: 5 – 95% RH non-condensing (refer to IEC 68-2-3)
- **Connector**: 1 x DB37 female connector for counter 2 x 20-pin box header for digital I/O
- **Dimensions (L x H)**: 185 x 100 mm (7.3” x 3.9”)

### Ordering Information

- **PCL-836**: 6-ch, 16-bit Counter/Timer ISA Card
- **PCL-10137-1**: DB37 Cable, 1 m
- **PCL-10137-2**: DB37 Cable, 2 m
- **PCL-10137-3**: DB37 Cable, 3 m
- **ADAM-3937**: DB37 DIN-rail Wiring Board
- **PCLD-880**: Wiring Board w/ Two 20-pin Flat Cables & Adapter

### Pin Assignments

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<thead>
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<th>Pin Assignments</th>
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### Features

- Periodic interrupt generation
- 6 independent 16-bit counters
- Digital filter for noise reduction
- Binary or BCD counting
- Programmable frequency output
- Complex duty-cycle output
- Single-shot output
- 16-bit TTL input and 16-bit TTL output ports
- Selectable interrupt input channel
- Up to 10 MHz input frequency
- Pulsewidth and period measurement
- Time-delay generation
- F/V conversion and accumulation
Introduction
The PCI-1671UP IEEE-488 interface converts any PCI bus personal computer into an instrumentation control and data acquisition system. Connect up to 14 instruments using standard IEEE-488 cables such as the PCL-10488-2, 2 meter IEEE-488 interface cable. The PCI-1671UP transfers data over the GPIB at rates in excess of 1.5 million bytes per second using the maximum IEEE-488 specification cable length (2 meters times the # of devices). A 1,024-word FIFO buffer and the advanced REP-INSW ISR data transfer method provide the horsepower required to then transfer the data between the GPIB board and the host computer. The high-speed state machine also provides byte-to-word packing and unpacking, and because words carry twice the information that bytes do, packed data requires fewer bus cycles to transfer the same GPIB information.

The PCI-1671UP adheres to ANSI/IEEE Standard 488-1978. Often referred to as the IEEE-488.2 bus, GPIB bus or HP-IB bus, the GPIB (General Purpose Interface Bus) is a standard for instrumentation communication and control for instruments from manufacturers the world over. The GPIB provides handshaking and interface communications over an 8-bit data bus employing 5 control and 3 handshake signals. Equipped with PCI-1671UP, a personal computer can control GPIB instruments, gather data from GPIB test equipment, or become a data acquisition station in a GPIB system.

Specifications

**GPIB**
- Compatability: IEEE 488.1, 488.2
- GPIB Transfer Rate: 1.5 MB/s
- OS Support: Windows® 2000/XP
- Max. GPIB Connections: 15

**General**
- Bus Type: Universal PCI V2.2
- I/O Connectors: 1 x 24-pin IEEE 488
- Dimensions (L x H): 120 x 64 mm (Low profile MD1)
- Power Consumption: 5 VCC @ 375 mA
- Operating Temperature: 0 – 60°C (32 – 158°F) @ 0-90% RH
- Storage Temperature: -40 – 100°C (-40 – 212°F) @ 5-90% RH
- Operating Humidity: 0 – 90% RH, non-condensing

**Ordering Information**
- PCI-1671UP: High-perform. IEEE-488.2 Interface PCI Card
- PCL-10488-2: IEEE-488 Cable, 2 m

Features
- IEEE 488.2 Standard interface
- Complete Talker/Listener/Controller
- Industry standard 32-bit PCI bus
- Data transfer rates over 1.5 MB/s
- 1,024-word FIFO buffer
- High-Speed State Machine Bus Manager
- 7 Interrupt lines, shared interrupt capability
- Transparent interrupt enabling/disabling
- Includes GPIB-Library software
- Low profile MD1 size
PCM-3810I
PCM-3813I

250 kS/s, 12-bit, 16-ch Multifunction PCI-104 Module
100 kS/s, 12-bit, 32-ch Isolated Analog Input PCI-104 Module

Specifications

Analog Input
- Channels: 16 single-ended or 8 differential or combination
- Resolution: 12 bits
- Max. Sampling Rate: 250 kS/s
- Ring Buffer Size: 4,096 samples
- Input Range and Gain List

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<tr>
<th>Gain</th>
<th>Unipolar</th>
<th>Bipolar</th>
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<tr>
<td>0.5</td>
<td>N/A</td>
<td>±10</td>
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<td>1</td>
<td>0 ~ 10</td>
<td>±5</td>
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<td>2</td>
<td>0 ~ 5</td>
<td>±2.5</td>
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<td>4</td>
<td>0 ~ 2.5</td>
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<td>8</td>
<td>0 ~ 1.25</td>
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- Input Protection: 30 Vp-p
- Sampling Mode: Polling, pacer, double-clock, or external TTL trigger
- Trigger Mode: Pre-trigger, post-trigger, delay-trigger, about-trigger

Analog Output
- Channels: 2
- Output Range: Internal Reference (V): 0 ~ 5, 0 ~ 10, ±5, ±10
- External Reference: x ~ x V @ x V (10 ≤ x ≤ 10)
- Resolution: 12 bits
- Output Rate: 250 kS/s
- Ring Buffer Size: 4,096 samples
- Slew Rate: 20 V/μs
- Operation Mode: Software polling, continuous out

Digital Input/Output
- Channels: 16
- Compatibility: 5V/TTL

Counter/Timer
- Channels: 16
- Resolution: 24 bits
- Compatibility: 5V/VTTL
- Max. Input Frequency: 10 MHz
- Counter Modes: 12 (programmable)
- Interrupt Capable Ch.: 3
- PWM Channels: 3

General
- Bus Type: PCI-104
- I/O Connectors: 1 x 26-pin, 1 x 50-pin box header
- Dimensions (L x H): 96 x 90 mm (3.8” x 3.5”)
- Operating Temperature: 0 ~ 60°C (32 ~ 140°F) (refer to IEC 68-2-1, 2)
- Storage Temperature: -20 ~ -70°C (-4 ~-158°F)

Ordering Information
- PCM-3810I: 250 kS/s, 12-bit Multi. PCI-104 Module
- PCM-3813I: 100 kS/s, 12-bit Isolated AI PCI-104 Module
- ADAM-3937: DB37 DIN-rail Wiring Board

Features
- 32 single-ended or 16 differential analog inputs
- Programmable gain for each input channel
- Automatic channel/gain/SD scanning
- Onboard ring buffer (1,024 samples)
- Isolation protection (2,500 Vrms)
- BoardID™ switch

Analog Input
- Channels: 32 single-ended or 16 differential or combination
- Resolution: 12 bits
- Max. Sampling Rate: 100 kS/s
- Ring Buffer Size: 1,024 samples
- Input Range and Gain List

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<tr>
<th>Gain</th>
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<th>Bipolar</th>
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<td>8</td>
<td>0 ~ 1.25</td>
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- Input Protection: 30 Vp-p
- Input Impedance: 100 MΩ/10pF (off); 100 MΩ/100pF (on)
- Sampling Mode: Software polling, onboard programmable pacer, or external TTL trigger

General
- Bus Type: PCI-104
- I/O Connectors: 1 x 40-pin box header
- Dimensions (L x H): 96 x 90 mm (3.8” x 3.5”)
- Operating Temperature: 0 ~ 60°C (32 ~ 140°F) (refer to IEC 68-2-1, 2)
- Storage Temperature: -20 ~ -70°C (-4 ~-158°F)

Ordering Information
- PCM-3810I: 250 kS/s, 12-bit Multi. PCI-104 Module
- PCM-3813I: 100 kS/s, 12-bit Isolated AI PCI-104 Module
- ADAM-3937: DB37 DIN-rail Wiring Board
PCM-3718H/HG/HO

100 kS/s, 12-bit, 16-ch Multifunction PC/104 Module
48-ch Digital I/O PC/104 Module

Specifications

Analog Input
- Channels: 16 single-ended / 8 differential
- Resolution: 12 bits
- Max. Sampling Rate: 100 kHz (DMA transfer)
- Input Impedance: 10 MΩ
- Input Range: Software, pacer or external

| PCM-3718H | Bipolar | ±10, ±5, ±2.5, ±1.25, ±0.625 |
| PCM-3718HG | Unipolar | 0 – 10, 0 – 5, 0 – 2.5, 0 – 1.25 |

Analog Output (PCM-3718HO only)
- Channels: 1 (12 bits)
- Output Range:
  - Internal Reference: Unipolar (V) 0 – 5, 0 – 10
  - External Reference (V): 0 – 10, 0 – 10
- Slew Rate: 10 V/μs
- Output Impedance: 0.1 W max.

Digital Input/Output
- Channels: 48 (shared with output)
- Compatibility: 5 V/TTL
- Input Voltage: Logic 0: 0.8 V max.
- Output Voltage: Logic 0: 0.5 V max.
  - @ 6 mA
- General
  - Bus Type: PC/104
  - I/O Connectors: 2 x 20-pin box header
  - Dimensions (L x H): 96 x 90 mm (3.8” x 3.5”)
  - Power Consumption: 5 V @ 90 mA

Features
- 48 TTL digital I/O lines
- Supports dry contact and wet contact
- Keeps the I/O port setting and DO state after system reset
- Output status read-back
- Channels simulate B255 PPI mode 0
- Interrupt triggering, rising/falling edge

Ordering Information
- PCM-3718H
  - 100 kS/s, 12-bit Multi. PC/104 Module
- PCM-3718HG
  - 100 kS/s, 12-bit High-gain Multi. PC/104 Module
- PCM-3718HO
  - 100 kS/s, 12-bit Multi. PC/104 Module w/AO
- ADAM-3920
  - 20-pin Flat Cable (includes 8255 PPI board)
- PCLD-780
  - Screw Terminal Board w/ Two 20-pin Flat Cables
- PCL-10120-1
  - 20-pin Flat Cable, 1 m
- PCL-10120-2
  - 20-pin Flat Cable, 2 m

PCM-3724

100 kS/s, 12-bit, 16-ch Multifunction PC/104 Module
48-ch Digital I/O PC/104 Module

Specifications

Digital Input
- Channels: 48 (shared with output)
- Compatibility: 5 V/TTL
- Input Voltage: Logic 0: 0.8 V max.
- Output Voltage: Logic 0: 0.5 V max.
  - @ 6 mA
- General
  - Bus Type: PC/104
  - I/O Connectors: 2 x 50-pin box header
  - Dimensions (L x H): 96 x 90 mm (3.8” x 3.5”)
  - Power Consumption: 5 V @ 90 mA

Ordering Information
- PCM-3724
  - 48-ch Digital I/O PC/104 Module w/ 50-pin Cable
- ADAM-3950
  - 50-pin DIN-rail Flat Cable Wiring Board
- PCLD-782B
  - 24-ch I/O Board w/ 20-pin & 50-pin Flat Cables
- PCLD-785B
  - 24-ch Relay Board w/ 20-pin & 50-pin Flat Cables
- PCL-10150-1.2
  - 50-pin Flat Cable, 1.2 m
### PCM-3725
- **Channels**: 8
- **Input Voltage**: Logic 0: 3 V
- **Input Protection**: 2,500 V_{ac}
- **Isolation Protection**: 70 V_{ac}
- **Response**: 25 μs
- **Input Resistance**: 4.7 Ω
- **Bus Type**: PC/104
- **Dimensions (L x H)**: 56 x 85 mm
- **Temperature**: Operating: 0 ~ 60° C (-32 ~ 140° F)
- **Humidity**: Storage: 5 ~ 95% RH, non-cond.

### PCM-3730
- **Channels**: 16
- **Input Voltage**: 5.5 V/TTL
- **Input Protection**: 2,500 V_{ac}
- **Response**: 25 μs
- **Input Resistance**: 4.7 Ω
- **Bus Type**: PC/104
- **Dimensions (L x H)**: 56 x 85 mm
- **Temperature**: Operating: 0 ~ 60° C (-32 ~ 140° F)
- **Humidity**: Storage: 5 ~ 95% RH, non-cond.

### PCM-3780
- **Channels**: 16
- **Input Voltage**: 5.5 V/TTL
- **Input Protection**: 2,500 V_{ac}
- **Response**: 25 μs
- **Input Resistance**: 4.7 Ω
- **Bus Type**: PC/104
- **Dimensions (L x H)**: 56 x 85 mm
- **Temperature**: Operating: 0 ~ 60° C (-32 ~ 140° F)
- **Humidity**: Storage: 5 ~ 95% RH, non-cond.

### Ordering Information
- **PCM-3725**: 8-ch Relay/Isolated Digital Input PC/104 Module
- **PCL-10120-1**: 20-pin Flat Cable, 1 m
- **PCL-10120-2**: 20-pin Flat Cable, 2 m
- **PCL-10150-1.2**: 20-pin DIN-rail Flat Cable
- **ADAM-3920**: 16-ch Relay Board
- **PCLD-780**: Screw Terminal Board w/ Two 20-pin Flat Cables
- **PCLD-885**: 16-ch Power Relay Board w/ 20p & 50p Flat Cables

### Specifications
#### Isolated Digital Input
- **Channels**: 8
- **Input Voltage**: Logic 0: 3 V
- **Input Protection**: 2,500 V_{ac}
- **Isolation Protection**: 70 V_{ac}
- **Response**: 25 μs
- **Input Resistance**: 4.7 Ω

#### Relay Output
- **Channels**: 8
- **Relay Type**: SPDT (Form C)
- **Contact Rating**: 30 V_{cc} @ 1.5 A
- **Relay on Time**: 4 ms
- **Relay off Time**: 4 ms
- **Life Span**: 100,000 min @ 2 A/30 V
- **Resistance**: Contact: 100 mΩ
- **Insulation**: 1 GΩ @ 500 V_{dc}

#### General
- **Bus Type**: PC/104
- **I/O Connectors**: 1 x 20-pin header for IDI
- **Dimensions (L x H)**: 56 x 85 mm (3.8" x 3.5")
- **Power Consumption**: Typical: 5 V @ 100 mA
- **Operating Temperature**: 0 ~ 60° C (-32 ~ 140° F)
- **Storage Temperature**: -20 ~ 70° C (-4 ~ 158° F)
- **Storage Humidity**: 5 ~ 95% RH, non-cond.

### Digital Input
- **Channels**: 16
- **Input Voltage**: 16, 5 V/TTL
- **Input Protection**: 2,500 V_{ac}
- **Response**: 25 μs
- **Input Resistance**: 4.7 Ω

### Digital Output
- **Channels**: 16
- **Input Voltage**: 16, 5 V/TTL
- **Output Capability**: Sink: 8 mA @ 0.5 V max.
- **Output Type**: Sink (NPN)
- **Source**: 0.4 mA @ 2.4 V min.
- **Isolation Protection**: 2,500 V_{ac}
- **Response**: 25 μs
- **Input Resistance**: 4.7 Ω

### Counter/Timer
- **Channels**: 2
- **Resolution**: 16 bits
- **Compatibility**: 5 V/TTL
- **Max. Input Frequency**: 20 MHz
- **Counter Modes**: 12 (programmable)
- **Interrupt Capable Ch.**: 2

### Ordering Information
- **PCM-3730**: 16-ch Isolated DI/O PC/104 Module
- **PCL-10120-1**: 20-pin Flat Cable, 1 m
- **PCL-10120-2**: 20-pin Flat Cable, 2 m
- **ADAM-3920**: 16-ch Relay Board
- **PCLD-780**: Screw Terminal Board w/ Two 20-pin Flat Cables
- **PCLD-885**: 16-ch Power Relay Board w/ 20p & 50p Flat Cables

### Ordering Information
- **PCM-3780**: 2-ch Counter/Timer, DI/O, PC/104 Module w/Cables
- **PCL-10120-1**: 20-pin Flat Cable, 1 m
- **PCL-10150-1.2**: 20-pin DIN-rail Flat Cable
- **ADAM-3920**: 16-ch Relay Board
- **ADAM-3920**: 16-ch Power Relay Board w/ 20p & 50p Flat Cables

### Ordering Information
- **PCM-3780**: 2-ch Counter/Timer, DI/O, PC/104 Module w/Cables
- **PCL-10120-1**: 20-pin Flat Cable, 1 m
- **PCL-10150-1.2**: 20-pin DIN-rail Flat Cable
- **ADAM-3920**: 16-ch Relay Board
- **ADAM-3920**: 16-ch Power Relay Board w/ 20p & 50p Flat Cables
**Ordering Information**

**PCM-3730I**
- 32-ch Isolated Digital I/O
- ADAM-3920
- PCL-10120

**PCM-3753I**
- 8-ch Relay and 8-ch Isolated Digital Input
- PCI-104 Module
- ADAM-3950
- PCL-10120

**PCM-3761I**
- 8-ch Relay Isolated Digital Input
- PCI-104 Module
- ADAM-3950
- PCL-10120

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**PCM-3761I**

32-ch Isolated Digital I/O PCI-104 Module

96-ch Digital I/O PCI-104 Module

8-ch Relay and 8-ch Isolated Digital Input PCI-104 Module

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**Features**

- High-voltage isolation on both input and output channels (2,500 V<sub>dc</sub>)
- High output driving capacity
- Interrupt handling capability
- Keep digital output values after system reset

**Specifications**

**Isolated Digital Input**

- **Channels:** 16
- **Input Voltage:** Logic 0: 3 V max., Logic 1: 5 V min.
- **Input Current:** 2.5 mA @ 5 V, 15 mA @ 30 V
- **Input Resistance:** 2 kΩ
- **Isolation Voltage:** 2,500 V<sub>dc</sub>
- **Over Voltage Protection:** 70 V<sub>dc</sub>
- **Opto-isolator Response Time:** 25 μs
- **Interrupt Capable:** All channels

**Isolated Digital Output**

- **Channels:** 16
- **Output Voltage:** 5 – 30 V<sub>dc</sub>
- **Output Sink Current:** 200 mA max.
- **Isolation Voltage:** 2,500 V<sub>dc</sub>
- **Over Current Protection:** 1.6 A per 8 channels
- **Opto-isolator Response Time:** 25 μs

**General**

- **Bus Type:** PCI-104
- **I/O Connectors:** 4 x 50-pin box header
- **Dimensions (L x W):** 96 x 90 mm (3.8” x 3.5”)
- **Operating Temperature:** -20 – 70°C (-4 – 158°F)
- **Storage Temperature:** -50 – 120°C (-58 – 248°F)

**Ordering Information**

**PCM-3753I**
- 96-ch Digital I/O PCI-104 Module w/ 50-pin Cable
- 50-pin Flat Cable, 1.2 m
- 50-pin DIN-rail Flat Cable Wiring Board

**PCM-3761I**
- 24-ch I/O Board w/ 20-pin & 50-pin Flat Cables
- 24-ch Relay Board w/ 20-pin & 50-pin Flat Cables

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**Features**

- Supports dry/wet contact
- Keeps the last output value after system hot reset
- Interrupt handling capability
- “Pattern match” and “change of state” interrupt functions
- Output status read-back
- Interrupt output pin for simultaneously triggering external devices

**Specifications**

**Isolated Digital Input**

- **Channels:** 8
- **Input Voltage:** Logic 0: 3 V max., Logic 1: 5 V min.
- **Input Current:** 2.5 mA @ 5 V, 15 mA @ 30 V
- **Input Resistance:** 2 kΩ
- **Isolation Voltage:** 2,500 V<sub>dc</sub>
- **Over Voltage Protection:** 70 V<sub>dc</sub>
- **Interrupt Capable:** All channels
- **Opto-isolator Response Time:** 25 μs

**Relay Output**

- **Channels:** 8
- **Relay Type:** DPDT, Form C
- **Contact Rating:** 240 V<sub>ac</sub> @ 0.25 A, or 30 V<sub>dc</sub> @ 1 A
- **Contact Rating:** 5 ms max., 4 ms max.
- **Life Span:** 1 x 10<sup>7</sup> @ 5 V/100 mA
- **Contact Rating:** Contact > 50 mW
- **Insulation:** 1 kV min. (at 500 V<sub>dc</sub>)

**Ordering Information**

**PCM-3761I**
- 8-ch Relay Isolated Digital Input PCI-104 Module
- 50-pin DIN-rail Flat Cable Wiring Board
- 50-pin Flat Cable, 1.2 m
- 20-pin Flat Cable, 1 m
- 20-pin Flat Cable, 2 m

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**Features**

- 8 Form C type relay output channels
- Retained relay output values when hot system reset
- High-voltage isolation on input channels (2,500 V<sub>dc</sub>)
- Wide input range (5 – 30 V<sub>dc</sub>)
- Interrupt handling capability

**Specifications**

**Isolated Digital Input**

- **Channels:** 8
- **Input Voltage:** Logic 0: 3 V max., Logic 1: 5 V min.
- **Input Current:** 2.5 mA @ 5 V, 15 mA @ 30 V
- **Input Resistance:** 2 kΩ
- **Isolation Voltage:** 2,500 V<sub>dc</sub>
- **Over Voltage Protection:** 70 V<sub>dc</sub>
- **Interrupt Capable:** All channels

**Ordering Information**

**PCM-3740I**
- 8-channel isolated digital input module
- ADAM-3950
- PCL-10120

**PCM-3753I**
- 8-channel isolated digital input module
- ADAM-3950
- PCL-10120