# Plug-In I/O Cards

## Data Acquisition and Control Tutorial & Software

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PC-based Data Acquisition System Overview

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

Selecting and building a DA&C (Data Acquisition and Control) system that actually does what you want it to do requires some knowledge of electrical and computer engineering. This tutorial gives a brief introduction to what DA&C systems do and how to configure them. It covers:

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

Transducers and Actuators

A transducer converts temperature, pressure, level, 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.

The layout of a typical PC-based data acquisition system

Using digital I/O and SSRs to open and close a valve
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 DA&C 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, RS-232 or RS-485 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 DIO Control: Digital input/output 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 displays 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. After the FormattString has been chosen or defined by the user, the displayed value of the control will be adjusted automatically according to the FormattString and displayed in the text edit box.
- NumEditor control: This control provides the user with the functions of data displaying and editing. After the FormattString has been chosen or defined by the user, the values of the control will be adjusted automatically according to the FormattString 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.

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
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 preformed by interrupt and DMA data transfer which were previously excluded.

Easy-to-use property sheet interface for configuring controls
The property page will offer selections which will give easy access to all settings 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
- IBM compatible PC using at least a 266 MHz or higher microprocessor
- Microsoft Windows 2K / XP
- VGA compatible graphics card, supporting at least 256 colors.
- Minimum 64 MB of RAM.
- 74MB of free local hard disk space.
- One CD-ROM driver

Straightforward user interface
The new version has become less-hardware dependent and it has relied more on intuition during the user interface. During the redesigned process, the target was to decrease the development difficulties. It has become easier for both entry level and advanced level users to manage.

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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 represents 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/O 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 DA&C card’s 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.

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Common Mode Noise
Electrical interference on both signal leads of an analog measurement which change simultaneously relative to ground. 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 are usually 8, 16, or 32 channels. They can monitor a number of devices. 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 360K/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 very small compared to the time 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
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.

Interrupts data transfer
Interrupts provide a means 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 the background 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 PC, is about 10K ~ 30K Hz 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 different than expected by the measurement hardware.

**Keeping the output values after system reset**

When the system is hot reset (power is not shut off), the Advantech’s DA&C 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 pac 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-Bus 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**

PCI-1711 and PCI-1711L fully comply with the PCI Specification 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 of 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 PC/AT’s can support an acquisition rate of about 10KHz.

In addition, the PC is continuously busy when the polling loop is operational, 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 best when you need to make analog measurements with 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 Dual-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 Cards

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

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| 80kHz on P4-based (or upper) system **Note: System-dependent**
## Analog I/O & Multifunction Cards

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*Note: SS = Single DMA channel, Single A/D channel scan  SM = Single DMA channel, Multiple A/D channel scan
## Digital I/O & Counter Cards

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| Advanced Function | Pattern Match | - | -  | -  | -  | -  | -  | -  | -  |
|                   | Change of State | - | -  | -  | -  | -  | -  | -  | -  |
|                   | BoardID Switch  | ✓ | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  |
|                   | Channel-Freeze Function | ✓ | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  |
|                   | Output Status Read Back | ✓ | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  |

| Dimensions (mm) | 175 x 100 | 175 x 100 | 175 x 100 | 175 x 100 | 175 x 100 | 175 x 100 | 175 x 100 | 120 x 65 | 185 x 100 | 334 x 100 |
| Connectors      | 5 x 20-pin | 1 x 50-pin | 2 x 50-pin | 88-pin SCSI-II | 100-pin SCSI-II | 100-pin SCSI-II | 1 x DB-25 | 5 X 20-pin | 6 x 50-pin |
| Windows 98/2000/XP DLL Driver | ✓ | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  |
| Windows 98/2000/XP Test Utility | ✓ | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  |
| VC++, VB & delphi Examples | ✓ | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  |
| Advantech ActiveDAQ/ActiveDAQ Pro | ✓ | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  |
| Labview I/O Drivers (Ver. 6i and 7.0) | ✓ | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  |
| Mathworks MATLAB & Simulink Data Acquisition Tool Box 2.5.1 | ✓ | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  |
| KW Win32 Driver | ✓ | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  | ✓  |

* Dry/wet contact can be mixed at the same time within one group.
## Digital I/O & Counter Cards

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<tr>
<th>Category</th>
<th>Non-Isolated DI/O</th>
<th>Isolated DI/O</th>
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<td>USB, PCI</td>
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<td>PCL-1734, PCI-1736UP, PCI-1756, PCI-1758UDI, PCI-1758UDO</td>
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<tr>
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<td><strong>Output Channels</strong></td>
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<tr>
<td><strong>Sink Current</strong></td>
<td>24 mA @ 0.4 V</td>
<td>8 mA @ 0.5 V</td>
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<td><strong>Source Current</strong></td>
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<td>1 x DB-37 4 x 20-pin, 1 x DB-37 1 x DB-37, 1 x DB-37, 100-pin SCSI-II, 100-pin SCSI-II, 100-pin mini-SCSI, 100-pin mini-SCSI</td>
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**Notes:**
- 2 x opto-22 compatible box header
- 1 x DB-37 4 x 20-pin
- 1 x DB-37
- 100-pin SCSI-II
- 100-pin mini-SCSI
- 100-pin mini-SCSI
- Dual 100-pin mini-SCSI
- Dual 100-pin mini-SCSI
### Selection Guide

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### Additional Information

- **Timer/Counter:** 250 VAC @ 3 A, 24 VDC @ 3 A
- **Input Range:** 2.4 V, 0.4 V
- **Sink Current:** 24 mA @ 2.4 V, 0.4 mA @ 2.4 V
- **Output Channels:** 1 MHz, 500 Hz
- **Resolution:** 16-bit, 10-bit
- **Input Range:** 2.4 V, 0.4 V
- **Sink Current:** 24 mA @ 2.4 V, 0.4 mA @ 2.4 V
- **Output Channels:** 1 MHz, 500 Hz
- **Resolution:** 16-bit, 10-bit
- **Input Range:** 2.4 V, 0.4 V
- **Sink Current:** 24 mA @ 2.4 V, 0.4 mA @ 2.4 V
- **Output Channels:** 1 MHz, 500 Hz
- **Resolution:** 16-bit, 10-bit

For more information, visit [Advantech’s website](www.advantech.com/products).
Introduction

The PCI-1710 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 (SW programmable)
- Resolution: 12 bits
- Max. Sampling Rate*: 100 kS/s
- FIFO Size: 4096 samples
- Overvoltage Protection: ±30Vp-p
- Input Impedance: 1 GΩ
- Sampling Modes: Software, onboard programmable pacer, or external
- Input Range: (V, software programmable)
  - PCI-1710/1710HG
    - Bipolar: ±10 ±5 ±2.5 ±1 ±0.5 ±0.25 ±0.1 ±0.05 ±0.01 ±0.005
    - Unipolar: 0 ~ +10 V @ -10 V
  - PCI-1710L
    - Bipolar: ±10 ±5 ±2.5 ±1 ±0.5 ±0.25 ±0.1 ±0.05 ±0.01 ±0.005
    - Unipolar: -10 ~ 10 V
- Accuracy (% of FSR ±1LSB):
  - PCI-1710/1710HG
    - Bipolar: 0.1 0.1 0.2 0.2 0.2 0.4 0.4
    - Unipolar: 0.1 0.1 0.2 0.2 0.2 0.4 0.4

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

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

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

*Note:
The sampling rate and throughput depends on the computer hardware architecture and software environment. The rates may vary due to programming language, code efficiency, CPU utilization and so on.
## Specifications Continued

### General
- **Bus Type**: PCI V2.2
- **I/O Connector**: SCSI-68P female x 1
- **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)
- **Storing Temperature**: -20 – 70°C (-4 – 158°F)
- **Storing Humidity**: 5 – 95% RH non-condensing (refer to IEC 68-2-3)

### Pin Assignments

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* Pins 23–25 and pins 57–58 are not defined for PCI-1710HG/1710HGL.

### Ordering Information

- **PCI-1710**: 100 kS/s, 12-bit multifunction card
- **PCI-1710L**: 100 kS/s, 12-bit multifunction card without AO
- **PCI-1710HG**: 100 kS/s, 12-bit high-gain multifunction card
- **PCI-1710HGL**: 100 kS/s, 12-bit high-gain multifunction card without AO
- **PCLD-8710**: SCSI-68 wiring terminal w/CJC, DIN-rail mount
- **PCLD-8710BNC**: SCSI-68 wiring terminal w/CJC and BNC connectors, DIN-rail mount
- **PCI-10168-1**: SCSI-68 Shielded Cable, 1 m
- **PCI-10168-2**: SCSI-68 Shielded Cable, 2 m
- **ADAM-3968**: SCSI-68 wiring terminal, DIN-rail mount
## PCI-1711
### PCI-1711L

### 100 kS/s, 12-bit, 16-ch S.E. Input Low-cost Multifunction Card

### 100 kS/s, 12-bit, 16-ch S.E. Input Low-cost Multifunction Card w/o AO function

## Features
- 16 single-ended analog inputs
- 12-bit A/D converter, with up to 100 kHz sampling rate
- Programmable gain
- Automatic channel/gain scanning
- Onboard FIFO memory (1024 samples)
- Two 12-bit analog output channels (PCI-1711 only)
- 16 digital inputs and 16 digital outputs
- Onboard programmable counter

## Introduction
PCI-1711 and PCI-1711L are powerful, but low-cost multifunction cards for the PCI bus. PCI-1711 comes with 2 analog output channels, while the PCI-1711L doesn’t. Thus, PCI-1711L 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 max.
- **FIFO Size**: 1024 samples
- **Overvoltage Protection**: 30 Vp-p
- **Input Impedance**: $2 \text{ M}\Omega/5 \text{ pF}$
- **Sampling Modes**: Software, onboard programmable pacer, or external

<table>
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<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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\(^*\)Note: The sampling rate and throughput depends on the computer hardware architecture and software environment. The rates may vary due to programming language, code efficiency, CPU utilization and so on.

### Analog Output (only for PCI-1711)
- **Channels**: 2
- **Resolution**: 12 bits
- **Output Rate**: Static update
- **Output Range**\(^{\text{(V. software programmable)}}\)

### Digital Inputs
- **Channels**: 16
- **Compatibility**: 5 V/TTL
- **Input Voltage**\(^\text{(Logic 0)}\): 0.8 V max.
- **Output Capability**\(^\text{Sink}\): 8.0 mA @ 0.8 V

### Digital Outputs
- **Channels**: 16
- **Compatibility**: 5 V/TTL
- **Output Voltage**\(^\text{Logic 0)}\): 0.8 V
- **Output Capability**\(^\text{Source}\): -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**: PCI V2.2
- **I/O Connector**: SCSI-68P female x 1
- **Dimensions (L x H)**: 175 x 100 mm (6.9" x 3.9")
- **Power Consumption**
  - PCI-1711: Typical: +5 V @ 850 mA
  - Max: +5 V @ 1.0 A
  - PCI-1711L: 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)
- **Storing Temperature**: -20 – 70°C (-4 – 158°F)
- **Storing Humidity**: 5 – 95% RH non-condensing (refer to IEC 68-2-3)
Ordering Information

- **PCI-1711**
  - 100 kS/s, 12-bit multifunction card
- **PCI-1711L**
  - 100 kS/s, 12-bit multifunction card without AD
- **PCLD-8710**
  - SCSI-68 wiring terminal w/CJC, DIN-rail mount
- **PCLD-8710BNC**
  - SCSI-68 wiring terminal w/CJC and BNC connectors, DIN-rail mount
- **PCL-10168-1**
  - SCSI-68 shielded cable, 1 m
- **PCL-10168-2**
  - SCSI-68 shielded cable, 2 m
- **ADAM-3968**
  - SCSI-68 wiring terminal, DIN-rail mount

---

Pin Assignments

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* Pins 23–25 and pins 57–59 are not defined for PCI-1711L
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 K 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/8 differential (SW 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**: 1024 samples
- **Overvoltage Protection**: 30 Vp-p
- **Input Impedance**
  - Unipolar: 100 MΩ (10 pF (Off), 100 MΩ (On))
  - Bipolar: 100 MΩ
- **Sampling Modes**: Software, onboard Programmable Pacer or External
- **Input Range** (V, software programmable)
  - Unipolar: N/A
  - Bipolar: ±10, ±5, ±2.5, ±1.25, ±0.625
- **Accuracy (% of FSR ±1LSB)**
  - Unipolar: 0.05, 0.03, 0.03, 0.05, 0.1
  - Bipolar: ±0.1 mV, ±0.05 mV, ±0.1 mV, ±0.05 mV, ±0.1 mV

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

### Analog Output
- **Channels**: 2
- **Resolution**: 12 bits
- **Output Rate**: 1 MS/s
- **FIFO Size**: 32768 samples
- **Output Impedance**: 0.1 max.
- **Operation Mode**: Software polling, continuous output, waveform output
- **Accuracy**: INLE: ±1 LSB, DNLE: ±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.
- **Output Voltage**: Logic 0: 0.8 V max.
- **Output Capability**: Sink: 8.0 mA @ 0.8 V, Source: -0.4 mA @ 2.0 V

### 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

### 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 2.2
- **I/O Connector**: SCSI-68P female x 1
- **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)
- **Storing Temperature**: -20 ~ -85° C (−4 ~ 185° F)
- **Storing Humidity**: 5 ~ 95% RH non-condensing (refer to IEC 68-2-3)
**Ordering Information**

- **PCI-1712**
  1M S/s, 12-bit high-speed multifunction card
- **PCI-1712L**
  1M S/s, 12-bit high-speed multifunction card without AO
- **PCLD-8712**
  Industrial Wiring Terminal Board for DIN-rail mounting
- **PCL-10168-1**
  SCSI-68 Shielded Cable, 1 m
- **PCL-10168-2**
  SCSI-68 Shielded Cable, 2 m
- **ADAM-3968**
  SCSI-68 wiring terminal, DIN-rail mount

**Pin Assignments**

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<th>Pin</th>
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*: Pin 20, 22–25, 54, 56–59 are not defined on PCI-1712L
PCI-1716
PCI-1716L

250 kS/s, 16-bit High-Resolution Multifunction Card

PCI-1716L
250 kS/s, 16-bit High-Resolution Multifunction Card w/o AO Function

Features
- 16 single-ended, 8 differential or a combination of analog inputs
- 16-bit A/D converter, with up to 250 kHz sampling rate
- Onboard FIFO memory (1024 samples)
- Auto-calibration
- PCI-Bus mastering data transfer
- 2 analog output channels (PCI-1716 only)
- 16 digital inputs and 16 digital outputs
- Onboard programmable counter
- BoardID™ switch

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 1K sample FIFO buffer for A/D. The cards can also have up to sixteen single-ended or eight 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 (SW programmable)
- Resolution: 16 bits
- Max. Sampling Rate*: 250 kS/s max.
- FIFO Size: 1024 samples
- Overvoltage Protection: 30 Vp-p
- Input Impedance:
  - Off: 100 MΩ/10 pF
  - On: 100 MΩ/100 pF
- Sampling Modes: Software, onboard programmable pacer, or external
- Trigger Modes: Pre-trigger, Post-trigger, Delay-trigger, About-trigger
- Input Range: (V, software programmable)
  - Unipolar: N/A, 0 ~ 10, 0 ~ 5, 0 ~ 2.5, 0 ~ 1.25, 0 ~ 0.625
  - Bipolar: ±10, ±5, ±2.5, ±1.25, ±0.625
- Accuracy (% of FSR ±1LSB):
  - Unipolar: 0.05, 0.03, 0.03, 0.05, 0.1
  - Bipolar: ±0.05, ±0.03, ±0.03, ±0.05, ±0.1

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

Analog Output (PCI-1716 only)
- Channels: 2
- Resolution: 16 bits
- Output Rate: Static update
- Output Range: (V, software programmable)
- Internal Reference: Unipolar: 0 ~ 5, 0 ~ 10, Bipolar: ±5 V, ±10 V
- External Reference: 0 ~ ±10 V @ ±10 V, (10 ≤ x ≤ 10)
- Slew Rate: 20 V/µs
- Driving Capability: ±20 mA
- Output Impedance: 0.1 Ω max.
- Operation Mode: Software polling
- Accuracy: INLE: ±1 LSB

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

Digital Output
- Channels: 16
- Compatibility: 5 V/TL
- 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/TL
- 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: SCSI-68P female x 1
- Dimensions: 175 x 100 mm (6.9” x 3.9”)
- Power Consumption: Typical: ±5 V @ 850 mA, +12 V @ 600 mA
- Operating Temperature: 0 ~ 60°C (32 ~ 158°F) (refer to IEC 62-2-1, 2)
- Storing Temperature: -20 ~ -85°C (-4 ~ -158°F)
- Operating Humidity: 5 ~ 85% RH non-condensing (refer to IEC 62-1, -2, -3)
- Storage Humidity: 5 ~ 95% RH non-condensing (refer to IEC 62-1, -2, -3)
Ordering Information

- **PCI-1716**
  250 kS/s, 16-bit high-resolution multifunction card
- **PCI-1716L**
  250 kS/s, 16-bit high-resolution multifunction card without AO
- **PCLD-8710**
  SCSI-68 wiring terminal w/CJC, DIN-rail mount
- **PCLD-8710BNC**
  SCSI-68 wiring terminal w/CJC and BNC connectors, DIN-rail mount
- **PCL-10168-1**
  SCSI-68 Shielded Cable, 1 m
- **PCL-10168-2**
  SCSI-68 Shielded Cable, 2 m
- **ADAM-3968**
  SCSI-68 wiring terminal, DIN-rail mount

Pin Assignments

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*: Pins 23–25 and pins 57–59 are not defined for the PCI-1742U
Introduction

The PCI-1718 series and the PCI-818H series are 100 kS/s multifunction data acquisition cards 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. The HG cards have the same specifications as the HD cards, but also offer a special high-gain programmable instrument amplifier for reading very low input signals.

Specifications

Analog Input
- Channels: 16 single-ended/8 differential (SW programmable)
- Resolution: 12 bits
- Max. Sampling Rate: 100 kS/s
- FIFO Size: 1024 samples
- Overvoltage Protection: 30 Vp-p
- Input Impedance: 100 MΩ
- Sampling Modes: Software, onboard or external programmable pacer
- Input Range
  - PCI-1718HDU
    - 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): 0.1, 0.1, 0.2, 0.2, 0.4
  - PCI-1718HGU
    - Unipolar: N/A, 0~10, N/A, 0~1, N/A, 0~0.1, N/A, 0~0.01
    - 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

Analog Output
- Channels: 1
- Resolution: 12 bits
- Output Rate: Static Update
- Output Range (V, software programmable)
  - PCI-1718HDU
    - Unipolar: 0–x V @ x V (-10 ≤ x ≤ 10)
  - PCI-1718HGU
    - Unipolar: 0–x V @ x V (-10 ≤ x ≤ 10)
- Slew Rate: 10 V/µs
- Driving Capability: ±10 mA
- Output Impedance: 0.1 Ω max.
- Operation Mode: Software polling
- Accuracy: INL: ±1/2 LSB

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.
  - Logic 1: 2.0 V min.
- 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 2.2
- I/O Connector: DB-37P female x 1
- Dimensions: 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 – 158 °F)
- Storing Temperature: -20 – 70 °C (-4 – 158 °F)
- Operating Humidity: 5 – 85% RH non-condensing (refer to IEC 68-1:2-3)
- Storing Humidity: 5 – 95% RH non-condensing (refer to IEC 68-1:2-3)
- Certifications: CE
Ordering Information

- **PCI-1718HDU**: 12-bit multi-function card with PCI bus
- **PCI-1718HGU**: 12-bit high-gain multi-function card with PCI bus
- **PCL-818HG**: High-performance and High-gain multifunction card
- **PCL-10120-1**: 20-pin flat cable, 1 m
- **PCL-10120-2**: 20-pin flat cable, 2 m
- **PCL-10137-1**: DB37 cable assembly, 1 m
- **PCL-10137-2**: DB37 cable assembly, 2 m
- **PCL-10137-3**: DB37 cable assembly, 3 m
- **PCLD-8115**: Industrial Wiring Terminal with CJC circuit and DB37 connector
- **PCLD-880**: Industrial Wiring Terminal with DB37 connector

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Introduction
PCI-1741U is a powerful high-resolution multifunction DAS card for the PCI bus. Its sampling rate is up to 200 kS/s and the 16-bit resolution makes it suitable for most data acquisition applications. PCI-1741U provides 16 single-ended or 8 differential analog input channels, one 16-bit D/A output channel, 16 digital input/output channels, and one 10 MHz 16-bit counter channel.

Specifications

Analog Input
- Channels: 16 single-ended/8 differential (SW programmable)
- Resolution: 16 bits
- Max. Sampling Rate: 200 kS/s
- FIFO Size: 1024 samples
- Overvoltage Protection: 30 Vp-p
- Input Impedance: 100 MΩ/10pF (Off); 100 MΩ/100pF (On)
- Sampling Mode: Software, onboard programmable pacer or 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 ±1LSB): 0.03, 0.02, 0.02, 0.03, 0.04

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 2.2
- I/O Connector Type: SCSI-68P female x 1
- Dimensions: 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) (refer to IEC 68-2-1, 2)
- Storing Temperature: -20 ~ 70°C (-4 ~ 185°F)
- Storing Humidity: 5 ~ 95% RH, non-condensing (refer to IEC 68-2-3)
- Certifications: CE
### Ordering Information

- **PCI-1741U**: 200k S/s, 16-bit high-resolution multifunction card
- **PCI-1741S**: PCI-1741U with PCLD-8710 and PCL-10168 cable
- **PCL-10168-1**: SCSI-68 Shielded Cable, 1 m
- **PCL-10168-2**: SCSI-68 Shielded Cable, 2 m
- **ADAM-3968**: SCSI-68 wiring terminal, DIN-rail mount
- **PCLD-8710**: SCSI-68 wiring terminal w/CJC, DIN-rail mount
- **PCLD-8710BNC**: SCSI-68 wiring terminal w/CJC and BNC connectors, DIN-rail mount

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**PCI-1742U**

1 MS/s, 16-bit, 16-ch High-Resolution Multifunction Card

### Features
- 16 single-ended, 8 differential or a combination of analog inputs
- 16-bit A/D converter, with up to 1 MHz sampling rate
- Onboard FIFO memory (1024 samples)
- Auto calibration
- Two 16-bit analog output channels
- 16 digital inputs and 16 digital outputs
- Onboard programmable counter
- Universal PCI Bus (support 3.3 V or 5 V PCI bus signal)
- BoardID™ switch

### Introduction
PCI-1742U is a powerful high-resolution multifunction DAS card for the PCI bus. Its sampling rate of up to 1 MS/s and 16-bit resolution, fulfill the needs of most data acquisition applications. PCI-1742U provides 16 single-ended or 8 differential analog input channels, two 16-bit D/A output channels, 16 digital input/output channels, and one 10 MHz 16-bit counter channel.

### Specifications

#### Analog Input
- **Channels**: 16 single-ended / 8 differential (SW programmable)
- **Resolution**: 16 bits
- **Max. Sampling Rate**: 1 MS/s single-channel
  - 800kS/s multi-channel
  - 250kS/s unipolar bipolar mixed
- **FIFO Size**: 1024 samples
- **Overvoltage Protection**: 100 MΩ/10pF (Off); 100 MΩ/100pF (On)
- **Input Impedance**: 100 MΩ
- **Sampling Mode**: Software, onboard programmable pacer or external
- **Trigger Mode**: Input Range
- **Input Range (V, Software programmable)**

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<th>0–2.5</th>
<th>0–1.25</th>
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#### Analog Output
- **Channels**: 2
- **Resolution**: 16 bits
- **Output Rate**: Static Update
- **Reference Clock**: Internal Reference
- **Output Range (V, Software programmable)**

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

#### Digital Output
- **Channels**: 16
- **Capability**: 5 V/TTL
- **Output Voltage**: Logic 0: 0.8 V max.
  - Logic 1: 2.0 V min.
- **Output Capability**: Sink: 0.5 V max. @ +24 mA
  - Source: 2.4 V min. @ -15 mA

#### Counter/Timer
- **Channels**: 1
- **Compatibility**: 5V/TTL

#### General
- **Bus Type**: Universal PCI 2.2
- **I/O connector Type**: 68-pin SCSI-II female
- **Dimensions**: 175 mm × 100 mm (6.9" × 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 ~ 158°F) (refer to IEC 68-2-1,2)
- **Storing Temperature**: -20 ~ +85°C (-4 ~ 185°F)
- **Storing Humidity**: 5 ~ 95%RH non-condensing (refer to IEC 68-2-3)
- **Certificates**: CE
Ordering Information

- PCI-1742U  
  16-bit, 1MS/s Multifunction Card
- PCL-10168  
  SCSI-68 Shielded Cable, 1 m
- PCL-10168-2  
  SCSI-68 Shielded Cable, 2 m
- ADAM-3968  
  SCSI-68 Wiring Terminal, DIN-rail Mount
- PCLD-8710  
  SCSI-68 Wiring Terminal w/CJC, DIN-rail Mount
- PCLD-8710BNC  
  SCSI-68 Wiring Terminal w/CJC and BNC connectors, DIN-rail Mount

Pin Assignments

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PCL-711B

40 kS/s, 12-bit, ISA-bus Multifunction Card

Features
- 8 single-ended analog inputs
- 12-bit A/D converter, with up to 40 kHz sampling rate
- Programmable gain
- One 12-bit analog output channel
- 16 digital inputs and 16 digital outputs
- Screw-terminal board and cable included

Introduction
PCL-711 offers four of the most popular I/O functions for PC/AT and compatible systems: A/D conversion, D/A conversion, digital input and digital output. The inexpensive PCL-711 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-711 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 VDC
- 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: One double-buffered channel
- Resolution: 12 bits
- Output Rate: Static Update
- Output Range: 0 – 5 V or 0 – 10 V
- Driving Capability: 10 mA

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 mA Source: 0.4 mA

General
- Bus Type: ISA
- I/O Connectors: Box header 20P x 3
- Dimensions (L x H): 155 x 100 mm (6.1” x 3.9”)
- Power Consumption: +5 V @ 500 mA typical, 1.0 A max. +12 V @ 50 mA typical, 100 mA max. -12 V @ 14 mA typical, 20 mA max.
- Operating Temperature: 0 – 50° C (32 ~ 122° F)
- Storing Temperature: -20 – 65° C (-4 ~ 149° F)
- Storing Humidity: 5 – 95% RH non-condensing (refer to IEC 68-2-3)
- Certifications: CE

Ordering Information
- PCL-711S: PCL-711B card, user’s manual, driver CD-ROM, PCLD-7115 and 1 m 20-pin flat cable (PCL-10120-1)
- PCL-711B: 40kS/s, 12-bit 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 VDC
- Input Impedance: >10 MΩ
- Sampling Modes: Software, paced or external trigger
- Input Range: (V, software programmable)
  - ±10, ±5, ±2.5, ±1.25, ±0.625, ±0.3125
- Accuracy: 0.01% of reading ±1 LSB

Analog Output
- Channels: 2 double-buffered
- Resolution: 12 bits
- Output Range: Software polling
- Output Range: (V, software programmable)
- Internal Reference: Unipolar: 0 – 5, 0 – 10
  - External Reference: Unipolar: ±10 max.
- Driving Capability: 10 mA max.

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: Box header 20P x 2
- Dimensions (L x H): 165 x 100 mm (6.5" x 3.9")
- Power Consumption: +5 V @ 500 mA typical, 1.0 A max.
  - +12 V @ 50 mA typical, 100 mA max.
- Operating Temperature: 0 – 50°C (32 – 122°F)
- Storing Temperature: -20 – 65°C (-4 – 149°F)
- Storing Humidity: 5 – 95% RH, non-condensing (refer to IEC 68-2-3)

Ordering Information
- PCL-812PG: 30 kS/s, 12-bit, 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
# 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 offer the same functions as the rest of the series, except that they have a 40 kHz sampling rate and only accept 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, or 8 differential
- **Resolution**: 12 bits
- **Max. Sampling Rate**: 40 kS/s for all input ranges
- **Overvoltage Protection**: ±30 VDC max.
- **Input Impedance**: 10 MΩ
- **Sampling Modes**: Software, pacer or external
- **Input Range**:
  - Bipolar: \( \pm 10 \), \( \pm 5 \), \( \pm 2.5 \), \( \pm 1.25 \), \( \pm 0.625 \) V
  - Accuracy (% of FSR ±1LSB): 0.1, 0.1, 0.2, 0.2, 0.4

### Analog Output

- **Channels**: 1
- **Resolution**: 12 bits
- **Output Rate**: Static update
- **Output Range** (V, software programmable):
  - Internal Reference: 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 to 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**: DB37-F
- **Dimensions (L x H)**: 155 x 100 mm (6.1” x 3.9”)
- **Operating Temperature**: 0 – 50°C (32 – 122°F)
- **Storage Temperature**: -20 – 65°C (-4 – 149°F)
- **Operating Humidity**: 5 – 95% RH, non-condensing (refer to IEC 68-2-3)
Ordering Information

- **PCL-818L**
  Low-cost high-performance half-size multi-function card, user’s manual and driver CD-ROM. (cable not included)

- **PCL-818LS**
  PCL-818L with PCLD-8115 and DB-37 cable assembly (PCL-10137-1)

- **PCL-10137-1**
  DB37 cable assembly, 1 m

- **PCL-10137-2**
  DB37 cable assembly, 2 m

- **PCL-10137-3**
  DB37 cable assembly, 3 m

- **PCLD-8115**
  Industrial Wiring Terminal with CJC circuit and DB37 connector

- **PCLD-880**
  Industrial Wiring Terminal with DB37 connector

---

PCL-818L

Low-cost high-performance half-size multi-function card, user’s manual and driver CD-ROM. (cable not included)

PCL-818LS

PCL-818L with PCLD-8115 and DB-37 cable assembly (PCL-10137-1)

PCL-10137-1

DB37 cable assembly, 1 m

PCL-10137-2

DB37 cable assembly, 2 m

PCL-10137-3

DB37 cable assembly, 3 m

PCLD-8115

Industrial Wiring Terminal with CJC circuit and DB37 connector

PCLD-880

Industrial Wiring Terminal with DB37 connector
PCI-1713

100 kS/s, 12-bit, 32-ch, Isolated Analog Input Card

Introduction
The PCI-1713 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 2500 V_{DC}.

Specifications

Analog Input
- Channels: 32 single-ended/16 differential (SW programmable)
- Resolution: 12 bits
- Max. Sampling Rate: 100 kS/s
- FIFO Size: 4096 samples
- Overvoltage Protection: ±30 V
- Isolation Protection: 2500 V_{DC}
- Input Impedance: 1 GΩ
- Sampling Modes: Software, onboard programmable pacer or external (TTL level)
- Input Range: (V, software programmable)
  - Unipolar: -10, -5, 0, 2.5, 5, 10
  - Bipolar: ±10, ±5, ±2.5, ±5, ±10
- Accuracy (% of FSR ±1LSB): 0.01, 0.01, 0.02, 0.02, 0.04

General
- Bus Type: PCI V2.2
- I/O Connector: 37-pin D-type female
- 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)
- Storing Temperature: -20 – 70°C (-4 – 158°F)
- Storing Humidity: 5 – 95% RH non-condensing (refer to IEC 68-2-3)

Programmable Pa
- Timer: 32-bit programmable timer
- Timer Base: 10 MHz

Features
- 32 single-ended, 16 differential or a combination of analog inputs
- 12-bit A/D converter, with up to 100 kHz sampling rate
- Programmable gain
- Onboard FIFO memory (4096 samples)
- Isolation protection (2500 V_{DC})
- S/W, internal or external pacer sampling modes supported

Ordering Information
- PCI-1713: 100 kS/s, 12-bit, 32-channel Isolated Analog Input Card, user's manual and driver CD-ROM. (cable not included)
- PCLD-881B: Industrial Wiring Terminal Board (cable not included)
- ADAM-3937: Wiring Terminal Board
- PCL-10137-1: DB37 cable assembly, 1 m
- PCL-10137-2: DB37 cable assembly, 2 m
- PCL-10137-3: DB37 cable assembly, 3 m

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Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
PCI-1715U

500 kS/s, 12-bit, 32-channel
Isolated Analog Input Card

Features
- 2500 V<sub>dc</sub> isolation protection
- 32 single-ended or 16 differential analog inputs, or a combination
- 12-bit resolution for A/D conversion
- Up to 500 kS/s sampling rate for A/D conversion
- Programmable gain for each input channel
- Onboard 1024 samples FIFO buffer
- S/W, internal or external pacer sampling modes supported
- Universal PCI Bus
- BoardID™ switch

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 2500 V<sub>dc</sub>.

Specifications

<table>
<thead>
<tr>
<th>Analog Input</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channels</td>
</tr>
<tr>
<td>Resolution</td>
</tr>
<tr>
<td>Max. Sampling Rate</td>
</tr>
<tr>
<td>FIFO Size</td>
</tr>
<tr>
<td>Overvoltage Protection</td>
</tr>
<tr>
<td>Isolation Protection</td>
</tr>
<tr>
<td>Input Impedance</td>
</tr>
<tr>
<td>Sampling Modes</td>
</tr>
<tr>
<td>Input Range</td>
</tr>
</tbody>
</table>

| Unipolar  | ±10 | ±5  | ±2.5 | ±1.25 | ±0.625 |
| Bipolar   | 0.01 | 0.01 | 0.02 | 0.02  | 0.04   |

| Accuracy (% of FSR ±1LSB) |

Ordering Information
- PCI-1715U 500 kS/s 12-bit, 32-channel Isolated Analog Input Card, user’s manual and driver CD-ROM. (cable not included)
- PCLD-881B Industrial Wiring Terminal Board (cable not included)
- ADAM-3937 Wiring Terminal Board
- PCL-10137-1 DB37 cable assembly, 1 m
- PCL-10137-2 DB37 cable assembly, 2 m
- PCL-10137-3 DB37 cable assembly, 3 m

General
- Bus Type: Universal PCI V2.2
- I/O Connector: 37-pin D-type female
- Dimensions (L x H): 175 x 100 mm (6.9" x 3.9")
- Power Consumption: Typical: ±5 V @ 850 mA
- Operating Temperature: 0 – 60°C (32 – 140° F) (refer to IEC 68-2-1, 2)
- Storing Temperature: -20 – 70° C (-4 – 158° F)
- Storing Humidity: 5 – 95% RH non-condensing (refer to IEC 68-2-3)
Introduction
PCI-1714 is an advanced high-performance data acquisition card based on the PCI bus. With a large FIFO of 32 K for each channel, the maximum sampling rate of PCI-1714 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 10MS/s on each channel at a stable rate, and has also been equipped with a universal PCI interface.

Specifications

### Analog Input
- **Channels**: 4 single-ended
- **Resolution**: 12 bits
- **Max. Sampling Rate**:
  - 30 MS/s for PCI-1714 (Under 32,768 samples for ea. ch)
  - 10 MS/s for PCI-1714UL (Under 8,192 samples for ea. ch)
- **FIFO Size**:
  - PCI-1714: 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**
  - Bipolar: ±5V, ±2.5V, ±1V, ±0.5V
  - (V, software programmable)

### General
- **Bus Type**: PCI-1714: PCI V2.2
  - PCI-1714UL: Universal PCI V2.2
- **I/O Connectors**: 4 x BNC connector (for AI), 1 x PS/2 connector (for Ext. clock and trigger)
- **Dimensions**: 175 x 100mm (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 – 70° C (32 – 158° F)
- **Storage Temperature**: -20 – 85° C (-4 – 185° F)
- **Storing Humidity**: 5 - 95% RH, non-condensing (refer to IEC 68-2-3)
- **Certifications**: CE

### Features
- 4 single-ended analog input channels
- 12-bit A/D converter, with up to 30 MHz sampling rate
- Programmable gain
- Onboard FIFO memory
  - PCI-1714: 32,768 samples PCI-1714UL: 8,192 samples, each channel
- 4 A/D converters simultaneously sampling
- Multiple A/D triggering modes
- Programmable pacer/counter
- BoardID™ switch

### Ordering Information
- **PCI-1714**: 30 MHz Simultaneous 4-ch Analog Input card
- **PCI-1714UL**: 10 MHz Simultaneous 4-ch Analog Input card
- **ADAM-3909**: DB-9 Wiring Terminal for DIN-rail Mounting
- **PCL-10901-1**: PS2 to DB9 Wiring Cable, 1 m
- **PCL-10901-3**: PS2 to DB9 Wiring Cable, 3 m
- **PCL-1010B-1**: BNC to BNC Wiring Cable, 1 m

### Pin Assignments

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**Onboard PS/2 connector**

**PS/2 To DB-9 Cable Connector**

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Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
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 1K 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: 1024 samples
- Overvoltage Protection: 30 Vp-p
- Input Impedance: 100 MΩ/10 pF (Off); 100 MΩ/100 pF (On)
- Input Range (V, software programmable):
  - Unipolar: -0.10, 0-5, 0-2.5, 0-1.25
  - Bipolar: ±10, ±5, ±2.5, ±1.25, ±0.625
- Accuracy (% of FSR ±1LSB):
  - Unipolar: 0.03, 0.02, 0.02, 0.03, 0.04
  - Bipolar: 0.03, 0.02, 0.02, 0.03, 0.04

General
- Bus Type: Universal PCI V2.2
- I/O Connector: 68-pin SCSI-II female
- Dimensions: 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) (refer to IEC 68-2-1,2)
- Storing Temperature: -20 – 70°C (-4 – 185°F)
- Storing Humidity: 5 – 95% RH, non-condensing (refer to IEC 68-2-3)
- Certifications: CE

Ordering Information
- PCI-1747U: 250 kS/s, 16-bit, 64-ch analog input universal PCI bus card
- ADAM-3968: SCSI-68 wiring terminal, DIN-rail mount
- PCL-10168-1: SCSI-68 shielded cable, 1 m
- PCL-10168-2: SCSI-68 shielded cable, 2 m
PCL-813B
32-ch S.E. Isolated Analog Input Card

Features
- 32 single-ended analog input channels
- 12-bit A/D converter, with up to 100 kHz sampling rate
- Isolation protection (500 V<sub>dc</sub>)
- Program-controlled A/D trigger and data transfer

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 V<sub>dc</sub> 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-881 wiring terminal board and a DB-37 cable assembly.

Specifications

<table>
<thead>
<tr>
<th>Analog Input</th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Channels</td>
<td>32 single-ended</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Resolution</td>
<td>12 bits</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Max. Sampling Rate</td>
<td>25 kHz</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overvoltage Protection</td>
<td>Continuous ±30 V (max.)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Isolation Protection</td>
<td>500 V&lt;sub&gt;dc&lt;/sub&gt; from analog input to PC</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input Impedance</td>
<td>&gt; 10 MΩ</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Sampling Modes</td>
<td>software trigger</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Input Range (V)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Uni-polar (jumper selection)</th>
<th>Bi-polar (software selection)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 – 10</td>
<td>±5</td>
<td>±2.5</td>
</tr>
<tr>
<td></td>
<td>0 – 5</td>
<td>±1.25</td>
<td>±1.25</td>
</tr>
<tr>
<td></td>
<td>0 – 2.5</td>
<td>±0.625</td>
<td>±0.625</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th></th>
<th>Accuracy (% of FSR ±1LSB)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0.01% of reading ±1 LSB</td>
</tr>
</tbody>
</table>

|    | 0.01 | 0.01 | 0.01 | 0.01 |

General
- Bus Type: ISA
- I/O Connectors: 1 x DB37-F
- 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)
- Storing Temperature: -20 – 65° C (-4 – 149° F)
- Storing Humidity: 5 – 95% RH non-condensing (refer to IEC 68-2-3)

Ordering Information
- PCL-813B: 32-ch. isolated analog input card, PCLD-881B wiring terminal board, DB-37 cable assembly, manual and driver CD-ROM.
- PCLD-881B: Industrial terminal board for PCI-1713 & PCL-813B
- PCL-10137-1: DB37 cable assembly, 1 m
- PCL-10137-2: DB37 cable assembly, 2 m
- PCL-10137-3: DB37 cable assembly, 3 m
- ADAM-3937: DB37 wiring terminal for DIN-rail mounting

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 V<sub>DC</sub> 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 channels
- **Resolution**: 12 bits
- **Output Rate**: Static update
- **Output Range**: (Software programmable)

<table>
<thead>
<tr>
<th>Internal Reference</th>
<th>Unipolar (V)</th>
<th>Bipolar (V)</th>
<th>Current Loop (mA)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0 – 5, 0 – 10</td>
<td>±5, ±10</td>
<td>0 – 20, 4 – 20</td>
</tr>
</tbody>
</table>

- **Slew Rate**: 2 V/µs
- **Isolation Protection**: 2,500 V<sub>DC</sub> (between the outputs and the PCI bus)
- **Driving Capability**: ±5 mA max.
- **Operation Modes**: Software polling
- **Accuracy**: ±0.024%
- **Current Loop Excitation**: 50 V (max.)
- **Voltage**: 50 V (max.)

**General**
- **Bus Type**: PCI-1720: PCI V2.2
- PCI-1720U: Universal PCI 2.2
- **I/O Connectors**: 1 x DB37-F
- **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)
- **Storing Temperature**: -20 – +70° C (-4 – 158° F)
- **Storing Humidity**: 5 – 95% RH, non-condensing (refer to IEC 68-2-3)
- **Certifications**: CE

Ordering Information
- **PCI-1720U**: 4-ch, 12-bit isolated Universal PCI analog output card
- **PCI-10137-1**: DB37 cable assembly, 1 m
- **PCI-10137-2**: DB37 cable assembly, 2 m
- **PCI-10137-3**: DB37 cable assembly, 3 m
- **ADAM-3937**: DB37 Wiring terminal for DIN-rail mounting
- **PCLD-880**: Screw terminal board

Pin Assignments
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.

Specifications

### Analog Output
- **Channels**: 4
- **Resolution**: 12 bits
- **FIFO Size**: 1024 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
  - 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)
- **Current Loop Excitation**: +15 V (external)
- **Voltage**:

### 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-II female
- **Dimensions**: 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)
- **Storing Temperature**: -20 ~ 85° C (-4 ~ 185° F)
- **Storing Humidity**: 5 ~ 95% RH, non-condensing (refer to IEC 68-2-3)
- **Certifications**: CE

### Ordering Information
- **PCI-1721**: 4-ch, 12-bit advanced PCI analog output card
- **PCL-10168-1**: SCSI-68 shielded cable, 1 m
- **PCL-10168-2**: SCSI-68 shielded cable, 2 m
- **ADAM-3968**: SCSI-68 wiring terminal, DIN-rail mount
 PCI-1723
16-bit, 8-ch Non-isolated Analog Output Card

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.

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

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>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Current Loop (mA)</td>
<td>0 – 20, 4 – 20</td>
</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-II female
- Dimensions 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)
- Storing Temperature -20 – 85° C (-4 – 185° F)
- Storing Humidity 5 – 95 % RH non-condensing (IEC 68-2-3)
- Certifications CE

Ordering Information
- PCI-1723 16-bit, 8-ch Non-isolated Analog Output Card
- PCL-10168-1 SCSI-68 shielded cable, 1 m
- PCL-10168-2 SCSI-68 shielded cable, 2 m
- ADAM-3968 SCSI-68 wiring terminal, DIN-rail mount

Pin Assignments

16-bit, 8-ch Non-isolated Analog Output Card
**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></td>
<td>±10</td>
<td>0 – 20, 4 – 20</td>
</tr>
</tbody>
</table>

- Isolation Protection: 1,500 VDC system isolation
- Output Impedance: 0.1 Ω max.
- Operation Modes: Software polling, synchronized output
- Accuracy
  - Relative: +/- 4 LSB
  - Differential Non-linearity: +/- 2 LSB (monotonic)
- Driving Capacity: +/- 10 mA

**General**
- Bus Type: Universal PCI V2.2
- I/O Connectors: 1 x 62-pin D-type
- 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 (32 – 140° F) (refer to IEC 68-2-1, 2)
- Storing Temperature: -20 – 70° C (-4 – 158° F)
- Storing Humidity: 5 – 95 % RH, non-condensing (refer to IEC 68-2-3)

**Ordering Information**
- PCI-1724U: 14-bit, 32-ch isolated analog output Card
- PCI-10162: DB62 cable assembly (1 m, 3 m)
- ADAM-3962: DB62 cable wiring terminal for DIN-rail mounting

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

**Pin Assignments**
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 +/-10V and 0 ~ 20mA current loop (sink). The card's on board DC-to-DC converter ensures the full 10V 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 DI and 16 TTL DO channels that are easily applied with industrial on/off control applications.

### Specifications

#### Analog Output

- **Channels**: PCI-1727U: 12  
  PCL-727: 12
- **Resolution**: PCI-1727U: 14 bits  
  PCL-727: 12 bits
- **Output Rate**: Static output
- **Output Range**: (Software programmable)

<table>
<thead>
<tr>
<th>Internal Reference</th>
<th>Bipolar (V)</th>
<th>±10</th>
<th>Current Loop (mA)</th>
<th>0 ~ 20</th>
</tr>
</thead>
<tbody>
<tr>
<td>Slew Rate</td>
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<tr>
<td>Driving Capability</td>
<td>15 mA</td>
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<tr>
<td>Operation Modes</td>
<td>Software polling, synchronized output</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>Current Loop</td>
<td>8 ~ 36 V</td>
<td></td>
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<tr>
<td>Excitation Voltage</td>
<td></td>
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</tbody>
</table>

#### 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**: PCI-1727U: Universal PCI V2.2  
  PCL-727: ISA
- **I/O Connectors**: 1 x 37-pin D-type female  
  2 x 20-pin male ribbon cable connectors
- **Power Consumption**: PCI-1727U  
  +5 V @ 460 mA typical, 500 mA max  
  +12 V @ 150 mA typical, 100 mA max
  PCL-727  
  +5 V @ 500 mA typical, 1 A max  
  +12 V @ 50 mA typical, 110 mA max  
  -12 V @ 14 mA typical, 90 mA max
- **Dimensions**: PCI-1720U: 175 x 100 mm (6.9” x 3.9”)  
  PCL-727: 340 x 100 mm (13.4” x 3.9”)
- **Operating Temperature**: 0 ~ 50°C (32 ~ 122°F)
- **Storing Temperature**: PCI-1727U: -20 ~ 65°C (-4 ~ 149°F)  
  PCL-727: 0 ~ 65°C (32 ~ 149°F)
- **Storing Humidity**: 5 ~ 95% RH, non-condensing

### Ordering Information

- **PCI-1727U**: 12-ch, 14-bit Universal PCI 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-780**: Two 20-pin screw terminal board
- **PCLD-782**: Opto-isolated DI board
- **PCLD-785**: Relay output board
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 to +5 V, 0 to +10 V, ±5 V, ±10 V and 4 to 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**: 6
- **Resolution**: 12 bits, double buffered
- **Output Rate**: Static update
- **Reference Clock**: Internal: External Clock Frequency: External Voltage Range: (Software programmable)
- **Output Range**:
  - Internal Reference
    - Bipolar (V): ±/5, ±/10
    - Unipolar (V): 0 ~ 5, 0 ~ 10
    - Current Loop (mA): 4 ~ 20
  - Slew Rate: 0.3 V/µs
  - Driving Capability: ±5 mA max.
  - Output Impedance: 0.1 Ω
  - Operation Modes: Software polling
  - Accuracy: Relative: ±0.012% full scale range
  - Differential Linearity: ±1/2 bit
  - Current Loop Excitation Voltage: Minimum +8 V, maximum +36 V for 4 ~ 20 Voltage 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.

**Features**
- Independent analog output channels
- 12-bit resolution double-buffered D/A converter
- Multiple voltage ranges: ±10 V, ±5 V, 0 ~ +5 V, 0 ~ +10 V and 4 ~ 20 mA current loop (sink)
- 16 digital input and 16 digital output channels (PCL-726)
- Two DB9 connectors for easy wiring (PCL-728)

**General**
- **Bus Type**: ISA
- **I/O Connectors**: 4 x 20-pin male ribbon cable connectors
- **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**: PCI-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)
- **Storing Temperature**: 0 ~ 65° C (32 ~ 149° F)
- **Operating Humidity**: 5 ~ 95% RH, non-condensing (refer to IEC 68-2-3)

**Ordering Information**
- **PCL-726**: 6-ch analog output card with digital I/O, user manual and driver CD-ROM (cable not included)
- **PCL-728**: Isolated 2-ch analog output card, user manual and driver CD-ROM (cable not included)
- **PCL-10120-1**: 20-pin flat cable, 1 m
- **PCL-10120-2**: 20-pin flat cable, 2 m
- **PCLD-780**: Screw terminal board
- **PCLD-782**: Opto-Isolated D/I board (16-ch)
- **PCLD-785**: Relay output board (16-ch)
- **PCLD-880**: Universal screw terminal board
- **ADAM-3909**: DB9 wiring terminal for DIN-rail mounting
- **ADAM-3920**: 20-pin wiring terminal for DIN-rail mounting

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Introduction

The PCI-720+ and PCI-1735U digital I/O and counter cards are 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 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 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 .036" hole on 0.10" centers. Further, provide +5 V on the left side, and provide GND on the right side
- Bus Type:
  - PCI-1735U: Universal PCI V2.2
  - PCI-720+: ISA
- I/O Connectors: 5 x 20-pin male ribbon-cable connectors
- 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 TTL Digital I/O Card w/Counter
- PCL-10120-1: IDC-20 Flat Cable, 1 m
- PCL-10120-2: IDC-20 Flat Cable, 2 m
- PCLD-780: 2”IDC-20 Wiring Terminal
- PCLD-782: Opto-Isolated D/I Board
- PCLD-785: 16-ch Relay Output Terminal
- PCLD-786: 16-ch Power Relay Output Terminal
- PCLD-885: SSR and Relay Driver Board
- ADAM-3920: 20-Pin Flat Cable Terminal, DIN-rail Mount

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PCI-1737U

24-ch Digital I/O Card

Features
- 24 TTL digital I/O channels
- Emulates mode 0 of 8255 PPI
- Interrupt handling
- Opto-22 compatible 50-pin connectors
- Output status readback
- PCI universal card

Specifications

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

Digital Output
- Channels: 24 (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: PCI-1737: Universal PCI V2.2
  PCL-724: ISA
- I/O Connectors: 50-pin male ribbon-cable connector
- Dimensions (L x H): 175 x 100 mm (6.9” x 3.9”)
- Power Consumption: Max: +5 V @ 294.9 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-1737U: 24-ch TTL Digital I/O Card
- PCL-10150-1.2: IDC-50 Flat Cable, 1.2 m
- PCLD-782B: 16/24-ch Opto-isolated DI Board
- PCLD-785B: 24/16-ch relay output board
- PCLD-7216: 16-ch SSR Carrier Module Board
- PCLD-885: 16-ch Power Relay Output Terminal
- ADAM-3950: 50-Pin Flat Cable Terminal, DIN-rail Mount

Pin Assignments

| PC 7 | 1 | GND |
| PC 6 | 3 | 4 |
| PC 5 | 5 | 6 |
| PC 4 | 7 | 8 |
| PC 3 | 9 | 10 |
| PC 2 | 11 | 12 |
| PC 1 | 13 | 14 |
| PC 0 | 15 | 16 |
| PB 7 | 17 | 18 |
| PB 6 | 19 | 20 |
| PB 5 | 21 | 22 |
| PB 4 | 23 | 24 |
| PB 3 | 25 | 26 |
| PB 2 | 27 | 28 |
| PB 1 | 29 | 30 |
| PB 0 | 31 | 32 |
| PA 7 | 33 | 34 |
| PA 6 | 35 | 36 |
| PA 5 | 37 | 38 |
| PA 4 | 39 | 40 |
| PA 3 | 41 | 42 |
| PA 2 | 43 | 44 |
| PA 1 | 45 | 46 |
| PA 0 | 47 | 48 |
| +5 V | 49 | 50 | GND |
PCI-1739U
48-ch Digital I/O PCI Card

Features
- 48 TTL digital I/O channels
- Emulates mode 0 of 8255 PPI
- Interrupt handling
- Opto-22 compatible 50-pin connectors
- Output status readback
- PCI universal card

Specifications

Digital Input
- Channels: 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.: 2

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 max. @ 24 mA  
  Source: 2.4 V min. @ 15 mA

General
- Bus Type: PCI V2.2
- I/O Connectors: 2 x 50-pin male ribbon-cable connectors
- Dimensions (L x H): 175 x 100 mm (6.9" x 3.9")
- Power Consumption: Max: +5 V @ 540.8 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-1739U: 48-ch TTL Digital I/O Card
- PCL-10150-1.2: IDC-50 Flat Cable, 1.2 m
- PCLD-782B: 16/24-ch Opto-isolated DI Board
- PCLD-785B: 16/24-ch Relay Output Terminal
- PCLD-7216: 16-ch Relay Output Terminal
- PCLD-885: 16-ch Power Relay Output Terminal
- ADAM-3950: 50-Pin Flat Cable Terminal, DIN-rail Mount

Courtesy of Steven Engineering, Inc. - 230 Ryan Way, South San Francisco, CA 94080-6370 - Main Office: (650) 588-9200 - Outside Local Area: (800) 258-9200 - www.stevenengineering.com
## Features
- 48 TTL digital I/O lines
- Emulates mode 0 of 8255 PPI
- Buffered circuits for higher driving capacity than 8255
- Interrupt handling
- Timer/Counter interrupt capability
- Supports both dry and wet contact
- Keeps the I/O port setting and DO state after system reset
- Universal PCI & BoardID switch

## 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.**: 2

### 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**: 68-pin SCSI-II female connector (Centronics type)
- **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)
- **Storing Temperature**: -20 ~ 80°C (-4 ~ 176°F)
- **Storing Humidity**: 5 ~ 95% RH, non-condensing (refer to IEC 68-2-3)

## Ordering Information
- **PCI-1751**: 48-bit universal digital I/O card and Counter Card,
- **PCL-10168**: 68-pin SCSI cable, 1 and 2 m
- **ADAM-3968**: 68-pin SCSI cable wiring terminal for DIN-rail mounting
- **ADAM-3968/20**: 68-pin SCSI-II to three 20-pin Wiring Terminal Module for DIN-Rail Mounting
- **ADAM-3968/50**: 68-pin SCSI to 2 x 50-pin box headers converter module
- **PCLD-8751**: 48-ch Isolated DI Board
- **PCLD-8761**: 24-ch Replay and 24-IDI Board
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
- **I/O 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 (Centronics™)
- **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)
- **Storing Temperature**: -20 – 70°C (-4 – 158°F) (refer to IEC 68-2-3)
- **Storing Humidity**: 5 – 95% RH, non-condensing

Ordering Information
- **PCI-1753**: 96 ch. Digital I/O Card, user’s manual and driver CD-ROM. (cable not included)
- **PCI-1753E**: Extension Board for PCI-1753
- **PCL-10268**: 100-pin to 2x68-pin SCSI cable, 1 and 2m
- **ADAM-3968**: SCSI-68 wiring terminal, DIN-rail mount
- **ADAM-3968/20**: 68-pin SCSI-II to Three 20-pin Wiring Terminal Module for DIN-Rail Mounting
- **ADAM-3968/50**: 68-pin SCSI wiring terminal for DIN-rail mounting
- **PCLD-8751**: 48-ch Isolated DI Board
- **PCLD-8761**: 48-ch Relay and 24-IDI Board

Features
- Up to 192 (96 + 96) TTL digital I/O lines
- Emulates mode 0 of 8255 PPI
- Buffered circuits for higher driving capacity than 8255
- Multiple-source interrupt handling
- Interrupt output pin for simultaneously triggering external devices with the interrupt
- Output status read-back
- “Pattern match” and “Change of state” interrupt functions for critical I/O monitoring
- Keeps I/O setting and digital output values when hot system reset
- Supports dry contact and wet contact
- High-density 100-pin SCSI connector

Pin Assignments

<table>
<thead>
<tr>
<th>Pin</th>
<th>Name</th>
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<tbody>
<tr>
<td>PA0</td>
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<td>PA1</td>
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<td>PC7</td>
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</table>

Pin Functions:
- PA0 – PA07: I/O pins of Port A
- PA10 – PA17: I/O pins of Port A1
- PA20 – PA27: I/O pins of Port B
- PA30 – PA37: I/O pins of Port B1
- PA40 – PA47: I/O pins of Port C
- PA50 – PA57: I/O pins of Port C1
- PA60 – PA67: I/O pins of Port C2
- PA70 – PA77: I/O pins of Port C3
- PA80 – PA87: I/O pins of Port B2
- PA90 – PA97: I/O pins of Port B3
- PA100 – PA107: I/O pins of Port C0
- PA110 – PA117: I/O pins of Port C2
- PA120 – PA127: I/O pins of Port C4
- PA130 – PA137: I/O pins of Port C5
- PA140 – PA147: I/O pins of Port B4
- PA150 – PA157: I/O pins of Port B5
- PA160 – PA167: I/O pins of Port C6
- PA170 – PA177: I/O pins of Port C7

VCC: +5V voltage output
GND: Ground
### PCI-1755

#### Ultra-Speed 32-ch Digital I/O Card

**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

<table>
<thead>
<tr>
<th>Channel</th>
<th>32 TTL compatible</th>
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<tbody>
<tr>
<td>Number of Ports Port A, Port B, Port C and Port D (each port)</td>
<td></td>
</tr>
<tr>
<td>I/O Configuration 256 (PA-PD) (default), 3200 (PA-PD), 16x (PA-PD) &amp; 16x (PC-PD), 40x (PA) &amp; 40x (PC) (Programmable)</td>
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<tr>
<td>Onboard FIFO 16 KB for DI &amp; 16 KB DO channels</td>
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</table>

**Transfer Characteristics**

- Data Transfer Mode: Bus Mastering DMA with Scatter-Gather
- Bus Width: 0/16/32 bits (programmable)
- Max. Transfer Rate: 180 Mbyte/sec, 32-bit @ 40 Mbyte/sec; external pacer when data length is less than FIFO size
- Operation Mode: Handshaking
- Direction: I/O
- Asynchronous: PCI bus
- Clock source for Burst Handshaking: Internal: 30 MHz, 20 MHz, 15 MHz, 12 MHz, 10 MHz, Timer#2
- Clock Source for DI: Internal: 30 MHz, 20 MHz, 15 MHz, 12 MHz, 10 MHz, Timer#1, Timer#2
- Clock Source for DO: Internal: 30 MHz, 20 MHz, 15 MHz, 12 MHz, 10 MHz, Timer#1, Timer#2
- Start Mode: Software command/Trigger signal occurred from DI_STR or DO_STR (Pattern DI/DO)
- Stop Mode: Software command/Trigger signal occurred from DI_STP or DO_STP (Pattern DI/DO) "Finite transfers"

**Handshaking Mode**

- General-purpose DI/O
- Pattern match and Change state detection interrupt function
- Onboard active terminators for high-speed and long-distance transfers
- Handshaking I/O Interrupt handling capability
- 32/16/8-bit Pattern I/O with start and stop trigger function, 2 modes
- 32-ch Digital I/O Card

**Input Load**

- **Low** 0.5 V ± 0.2 mA
- **High** 0 V ± 0.1 mA

**Input Voltage**

- **Low** +0.5 V ± 20 mA
- **High** +2.7 V ± 1 mA

**Output Voltage**

- **Low** 0.5 V ± 0.2 mA
- **High** ±2.7 V ± 1 mA

**Output Capacitance**

- **Low** ±2.7 V ± 1 mA

**Oscillation**

- **Low** 10 ns min.

**Clock Source**

- **Internal**: 30 MHz, 20 MHz, 15 MHz, 12 MHz, 10 MHz, Timer#0
- **External**: EXT_CLKIN

**Driver Capability**

- **DI**: 80 MBytes/sec, 32-bit @ 20 MHz
- **DO**: 80 MBytes/sec, 32-bit @ 20 MHz
- **DO** (qué): 80 MBytes/sec, 32-bit @ 20 MHz

**Max. Transfer Rate**

- **DI**: 80 Mbytes/sec, 32-bit @ 20 MHz
- **DO**: 120 Mbytes/sec, 32-bit @ 40 MHz external pacer when data length is less than FIFO size

**Driving Capacity**

- **DI**: +0.5 V ± 20 mA
- **DO**: +2.7 V ± 1 mA

**Hysteresis**

- **DI**: 0.5 V
- **DO**: 2.7 V

**General-purpsose DI/O**

- **DI Channels**: 80 - 64 (TTL compatible)
- **DO Channels**: 256 - 128 (TTL compatible)

**Interrupt Source**

- **DI-7 and Timer#2**: Pattern match and Change detection, DI FIFO overflow and DO FIFO underflow, DI_FIFO and DO_FIFO

**Pacer**

- **Channels**: Timer#0, Timer#1 and Timer#2
- **Timer #0**: Timer pacer for digital input
- **Timer #1**: Timer pacer for digital output
- **Timer #2**: Interrupt source
- **Resolution**: 16-bit
- **Base Clock**: 10 MHz

**General**

**I/O Connector Type**

- **100-pin SCSI-II female**

**Dimensions (L x H)**

- **175 x 100 mm (6.9" x 3.9")**

**Power Consumption**

- **Typical**: Terminator OFF: +5 V @ 1 A
- **Max.**: Terminator OFF: +5 V @ 1 A

**Temperature**

- **Operating**: 0 ~ 60°C (32 ~ 140°F)
- **Storage**: 0 ~ 85°C (-4 ~ 185°F)

**Relative Humidity**

- **5 ~ 95% RH non-condensing (refer to IEC 68-2-3)**

**Certification**

- **FCC, CE certified**

### Ordering Information

- **PCI-1755**: Ultra-speed 32-ch Digital I/O Card
- **ADAM-39100**: 32-ch Digital I/O Card
- **PCI-1755 Wiring Terminal for DIN-rail Mounting**: 100-pin SCSI-II cable with male connectors on both ends and special shielding for noise reduction, 1 m
PCI-1757UP is a 24-channel DI/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.

### 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 port I/O settings and digital output states after hot reset
- BoardID™ switch
- Convenient DB-25 connector
- Dry/wet contact support

### 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 DB-25 female
- **Dimensions**: 119.91 x 64.41 mm (4.721" x 2.536") Low profile MD1
- **Power Consumption**
  - Typical: 5 V @ 140 mA
  - Max: 5 V @ 200 mA
- **Operating Temperature**: 0 ~ 70° C (32 ~ 158° F)
- **Storing Temperature**: -20 ~ 80° C (-4 ~ 176° F)
- **Storing Humidity**: 5 ~ 95% non-condensing

### Ordering Information
- **PCI-1757UP**: 24-channel digital input/output card
- **ADAM-3925**: DB25 Wiring terminal for DIN-rail mounting
- **PCL-10125-1**: DB25 cable assembly, 1 m
- **PCLD-782B**: 24/16-ch. opto-isolated digital input board
- **PCLD-785B**: 24/16-ch. relay output board
- **PCL-12125-1**: DB25 to IDC50 flat cable for PCI-1757UP, 1 m

### Pin Assignments

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Introduction
The PCL-720+ digital I/O and counter cards are 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 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 cards also include 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 .036” hole on 0.10” centers. Further, provide +5 V on the left side, and provide GND on the right side.
  - Bus Type: PCI-1735U: Universal PCI V2.2
  - I/O Connectors: PCI-720+: ISA
  - Dimensions (L x H): 185 x 100 mm (7.3” x 4”)
  - Power Consumption:
    - Typical: +5 V @ 500 mA
  - Operating Temperature: 0 – 60° C (32 – 140° F)
  - Storing Temperature: -20 – 70° C (-4 – 158° F)
  - Storing Humidity: 5 – 95% RH, non-condensing (refer to IEC 68-2-3)

Ordering Information
- PCL-720+
- PCL-10120-1
- PCL-10120-2
- PCLD-780
- PCLD-782
- PCLD-785
- PCLD-786
- PCLD-885
- ADAM-3920

64-ch TTL Digital I/O Card w/Counter

- 64-ch TTL Digital I/O Card w/Counter
- IDC-20 Flat Cable, 1 m
- IDC-20 Flat Cable, 2 m
- 2*IDC-20 Wiring Terminal
- Opto-Isolated D/I Board
- 16-ch Relay Output Terminal
- SSR and Relay Driver Board
- 16-ch Power Relay Output Terminal
- 20-Pin Flat Cable Terminal, DIN-rail Mount
# PCL-722

## 144-ch TTL Digital I/O ISA Card

### Features
- Emulates 8255 PPI mode 0
- Buffered circuits for higher driving capacity than the 8255
- Interrupt handling
- 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
- **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 male ribbon-cable connectors. Pin assignments are fully compatible with Opto-22 I/O module racks
- **Dimensions (L x H)**: 334 x 100 mm (13.2” x 3.9”)

### Ordering Information
- **PCL-722**: 144-ch TTL digital I/O ISA card
- **PCL-10150-1.2**: 50-pin flat cable, 1.2 m
- **PCLD-782B**: 24/16-ch. opto-isolated digital input board
- **PCLD-785B**: 24/16-ch. relay output board
- **PCLD-7216**: 16-ch. carrier board for SSR I/O modules
- **PCLD-885**: 16-ch. power relay (Form A) output board
- **ADAM-3950**: 50-pin flat cable wiring terminal for din-rail mounting

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**Courtesy of Steven Engineering, Inc. - 230 Ryan Way, South San Francisco, CA 94080-6370 - Main Office: (650) 588-9200 - Outside Local Area: (800) 258-9200 - www.stevenengineering.com**
PCL-724
24-ch Digital I/O Card

Features
- 24 TTL digital I/O channels
- Emulates mode 0 of 8255 PPI
- Interrupt handling
- Opto-22 compatible 50-pin connectors
- Output status readback

Specifications

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

Digital Output
- Channels: 24 (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: 50-pin male ribbon-cable connector
- Dimensions (L x H): 125 x 100 mm (4.9" 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)
- Storing Temperature: -20 ~ 70° C (-4 ~ 158° F)
- Storing Humidity: 5 ~ 95% RH, non-condensing (refer to IEC 68-2-3)

Ordering Information
- PCL-724: 24-ch TTL Digital I/O Card
- PCL-10150-1.2: IDC-50 Flat Cable, 1.2 m
- PCLD-782B: 16/24-ch Opto-isolated DI Board
- PCLD-785B: 24/16-ch, relay output board
- PCLD-7216: 16-ch SSR Carrier Module Board
- PCLD-885: 16-ch Power Relay Output Terminal
- ADAM-3950: 50-Pin Flat Cable Terminal, DIN-rail Mount

Pin Assignments

| PC 7 | 1 | 2 | GND |
| PC 6 | 3 | 4 | GND |
| PC 5 | 5 | 6 | GND |
| PC 4 | 7 | 8 | GND |
| PC 3 | 9 | 10 | GND |
| PC 2 | 11 | 12 | GND |
| PC 1 | 13 | 14 | GND |
| PC 0 | 15 | 16 | GND |
| PB 7 | 17 | 18 | GND |
| PB 6 | 19 | 20 | GND |
| PB 5 | 21 | 22 | GND |
| PB 4 | 23 | 24 | GND |
| PB 3 | 25 | 26 | GND |
| PB 2 | 27 | 28 | GND |
| PB 1 | 29 | 30 | GND |
| PB 0 | 31 | 32 | GND |
| PA 7 | 33 | 34 | GND |
| PA 6 | 35 | 36 | GND |
| PA 5 | 37 | 38 | GND |
| PA 4 | 39 | 40 | GND |
| PA 3 | 41 | 42 | GND |
| PA 2 | 43 | 44 | GND |
| PA 1 | 45 | 46 | GND |
| PA 0 | 47 | 48 | GND |
| +5 V | 49 | 50 | GND |
PCL-731
48-ch Digital I/O ISA Card

Features
- 48 TTL digital I/O channels
- Emulates mode 0 of 8255 PPI
- Interrupt handling
- Opto-22 compatible 50-pin connectors
- Output status readback

Specifications

Digital Input
- Channels: 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.: 2

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 max. @ 24 mA
  - Source: 2.4 V min. @ 15 mA

General
- Bus Type: ISA
- I/O Connectors: 2 x 50-pin male ribbon-cable connectors
- Dimensions (L x H): 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)
- Storing Temperature: -20 – 70°C (-4 – 158°F)
- Storing Humidity: 5 – 95% RH, non-condensing (refer to IEC 68-2-3)

Ordering Information
- PCL-731: 48-ch TTL Digital I/O Card
- PCL-10150-1.2: IDC-50 Flat Cable, 1.2 m
- PCLD-782B: 16/24-ch Opto-isolated DI Board
- PCLD-785B: 16/24-ch Relay Output Terminal
- PCLD-7216: 16/24-ch Relay Output Terminal
- PCLD-885: 16-ch Power Relay Output Terminal
- ADAM-3950: 50-pin Flat Cable Terminal, DIN-rail Mount

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370—Main Office: (650) 588-9200—Outside Local Area: (800) 258-9200—www.stevenengineering.com
### Introduction
PCI-1730, 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 DIO channels.

### Specifications

#### Digital Input
- **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: 5 V 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
- **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>DC</sub>
- **Sink Current**: 200 mA max./channel
- **Opto-Isolator Response**: 25 ms

### General
- **Bus Type**: PCI V2.2
- **I/O Connectors**: 1 x 37-pin D-type female
  - 2 x 20-pin box header for flat cable
- **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)
- **Storing Temperature**: -25 – 85° C (-13 – 185° F)
- **Storing Humidity**: 5 – 95% RH, non-condensing (see IEC 68-2-3)

### Ordering Information
- **PCI-1730**: 32-ch Isolated DIO Card, manual and driver CD-ROM (cable not included.)
- **PCL-10120-1**: 20-pin flat cable, 1 m
- **PCL-10120-2**: 20-pin flat cable, 2 m
- **PCLD-782**: 16-ch opto-isolated D/I board
- **ADAM-3920**: 20-pin flat cable wiring terminal for DIN-rail mounting
- **PCLD-885**: 16-ch power relay (form A) output board
- **PCLD-785**: 16-ch relay output board
- **PCLD-786**: 8-ch SSR I/O module carrier board
- **PCLD-780**: Universal screw terminal board
- **PCLD-880**: Universal screw terminal board
- **ADAM-3937**: DB37 wiring terminal for DIN-rail mounting
- **PCL-10137-1**: DB37 cable, 1 m
- **PCL-10137-2**: DB37 cable, 2 m
- **PCL-10137-3**: DB37 cable, 3 m
PCI-1736UP

32-ch Low-Profile Isolated Digital I/O Card

Introduction

PCI-1736UP offers isolated digital input channels as well as isolated digital output channels with isolation protection up to 2,500 V, which makes it ideal for industrial applications where high-voltage isolation is required. In addition, all output channels provide high-voltage protection. The low profile PCI form factor and universal PCI connector (V2.2 compliant) meet requirements for size and power consumption.

Specifications

Isolated Digital Input
- Channels: 16
- Input Voltage: Logic 0: 2 V max., Logic 1: 5 V min. (30 V max.)
- Interrupt Capable Ch.: 2
- Isolation Protection: 2500 V
- Opto-Isolator Response: 25 µs
- Input Resistance: 2.8 KΩ

Isolated Digital Output
- Channels: 16
- Output Type: Sink (NPN)
- Isolation Protection: 2500 V
- Output Voltage: 5-40 VDC
- Sink Current: 200 mA max./channel
- Opto-Isolator Response: 25 µs

General
- Bus Type: Universal PCI V2.2
- I/O Connectors: DB-44 female
- Dimensions: 119.91 x 64.41 mm (Low profile MD1)
- 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)
- Storing Temperature: -25 – 85° C (-4 – 185° F)
- Storing Humidity: 5 – 95% RH, non-condensing

Ordering Information

- PCI-1736UP
- PCL-10144-1
- ADAM-3944

Pin Assignments

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<tr>
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<tr>
<td>E GND17</td>
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<td>E GND17</td>
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</table>

Shipping Information

- 32-ch low-profile isolated digital I/O card
- DB 44-pin cable, 1 m
- DB-44 Wiring Terminal for DIN-rail mounting

Ordering Information

- 32-ch low-profile isolated digital I/O card
- DB 44-pin cable, 1 m
- DB-44 Wiring Terminal for DIN-rail mounting
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 37-pin D-type female connector
  1 x 2-pin 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)

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
- Timer/counter interrupt capability

Ordering Information
- PCI-1750: 32-ch isolated digital I/O and counter card
- PCL-10137-1: DB37 cable assembly, 1 m
- PCL-10137-2: DB37 cable assembly, 2 m
- PCL-10137-3: DB37 cable assembly, 3 m
- ADAM-3937: 37-pin D-type cable wiring terminal for DIN-rail mounting

Pin Assignments

Storing Temperature: -20 ~ 80° C (-4 ~ 176° F)
Storing Humidity: 5 ~ 95% RH, non-condensing (refer to IEC 68-2-3)
## General

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of Channels</td>
<td>64 (16-ch/group)</td>
</tr>
<tr>
<td>Bus Type</td>
<td>Universal PCI V2.2</td>
</tr>
<tr>
<td>I/O Connectors</td>
<td>1 x 100-pin SCSI-II female</td>
</tr>
<tr>
<td>Dimensions (L x H)</td>
<td>175 x 100mm (6.9&quot; x 3.9&quot;)</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>Typical: -5 V @ 230 mA Max.: +5 V @ 500 mA Max.</td>
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<tr>
<td>Operating Temperature</td>
<td>0 - 60°C (32 - 140°F)</td>
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<tr>
<td>Storing Temperature</td>
<td>-20 - 70°C (-4 - 158°F)</td>
</tr>
<tr>
<td>Storing Humidity</td>
<td>5 - 95% RH (IEC 68-2-3) non-condensing</td>
</tr>
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</table>

### Specifications

#### Isolated Digital Output

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channels</td>
<td>64 (16-ch/group)</td>
</tr>
<tr>
<td>Input Voltage</td>
<td>Logic 0: 3 V max. Logic 1: 10 V min. (50 V max.)</td>
</tr>
<tr>
<td>Input Current (Typical)</td>
<td>10 Vc @ 1.7 mA, 12 Vc @ 2.1 mA</td>
</tr>
<tr>
<td>Interrupt Capable Ch.</td>
<td>2,500 Vc</td>
</tr>
<tr>
<td>Overvoltage Protection</td>
<td>40 Vc (50 V max.)</td>
</tr>
<tr>
<td>ESD</td>
<td>2,000 Vc</td>
</tr>
<tr>
<td>Opto-Isolator Response</td>
<td>25 µs</td>
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#### General

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bus Type</td>
<td>PCI V2.2</td>
</tr>
<tr>
<td>I/O Connectors</td>
<td>100-pin SCSI-II female</td>
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<tr>
<td>Dimensions (L x H)</td>
<td>175 x 100mm (6.9&quot; x 3.9&quot;)</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>Typical: -5 V @ 340 mA Max.: +5 V @ 450 mA</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>0 - 60°C (32 - 140°F)</td>
</tr>
<tr>
<td>Storing Temperature</td>
<td>-20 - 70°C (-4 - 158°F)</td>
</tr>
<tr>
<td>Storing Humidity</td>
<td>5 - 95% RH (IEC 68-2-3) non-condensing</td>
</tr>
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### Ordering Information

<table>
<thead>
<tr>
<th>Information</th>
<th>Details</th>
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</thead>
<tbody>
<tr>
<td>PCI-1752U</td>
<td>64-ch isolated PCI card (Sink type)</td>
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<tr>
<td>PCI-1752USO</td>
<td>64-ch isolated PCI card (Source type)</td>
</tr>
<tr>
<td>PCI-10250-1</td>
<td>1w-pin to two 50-pin SCSI Cable, lm</td>
</tr>
<tr>
<td>ADAM-3951</td>
<td>Wiring terminal module with LED-indicators</td>
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</tbody>
</table>

## Isolated Digital Input

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<tbody>
<tr>
<td>Channels</td>
<td>32 (16-ch/group)</td>
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<tr>
<td>Input Voltage</td>
<td>Logic 0: 3 V max. Logic 1: 10 V min. (50 V max.)</td>
</tr>
<tr>
<td>Interrupt Capable Ch.</td>
<td>2 (IDIO, ID16)</td>
</tr>
<tr>
<td>Isolation Protection</td>
<td>2,500 Vc</td>
</tr>
<tr>
<td>Overvoltage Protection</td>
<td>70 Vc</td>
</tr>
<tr>
<td>ESD</td>
<td>2,000 Vc</td>
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<tr>
<td>Opto-Isolator Response</td>
<td>25 µs</td>
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#### General

<table>
<thead>
<tr>
<th>Specification</th>
<th>Value</th>
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<tbody>
<tr>
<td>Bus Type</td>
<td>PCI V2.2</td>
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<tr>
<td>I/O Connectors</td>
<td>100-pin SCSI-II female</td>
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<tr>
<td>Dimensions (L x H)</td>
<td>175 x 100mm (6.9&quot; x 3.9&quot;)</td>
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<tr>
<td>Power Consumption</td>
<td>Typical: -5 V @ 285 mA Max.: +5 V @ 475 mA</td>
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<td>Operating Temperature</td>
<td>0 - 60°C (32 - 140°F)</td>
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<td>Storing Temperature</td>
<td>-20 - 70°C (-4 - 158°F)</td>
</tr>
<tr>
<td>Storing Humidity</td>
<td>5 - 95% RH (IEC 68-2-3) non-condensing</td>
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### Ordering Information

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<thead>
<tr>
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<tbody>
<tr>
<td>PCI-1754</td>
<td>64-ch isolated digital input card</td>
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<tr>
<td>PCI-10250-1</td>
<td>1w-pin to two 50-pin SCSI Cable, lm</td>
</tr>
<tr>
<td>ADAM-3951</td>
<td>Wiring terminal module with LED-indicators</td>
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## Isolated Digital Output

<table>
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<th>Value</th>
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<tbody>
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<tr>
<td>Input Voltage</td>
<td>Logic 0: 3 V max. Logic 1: 10 V min. (50 V max.)</td>
</tr>
<tr>
<td>Interrupt Capable Ch.</td>
<td>2 (IDIO, ID16)</td>
</tr>
<tr>
<td>Isolation Protection</td>
<td>2,500 Vc</td>
</tr>
<tr>
<td>Overvoltage Protection</td>
<td>70 Vc</td>
</tr>
<tr>
<td>ESD</td>
<td>2,000 Vc</td>
</tr>
<tr>
<td>Opto-Isolator Response</td>
<td>25 µs</td>
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#### General

<table>
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<tbody>
<tr>
<td>Bus Type</td>
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<tr>
<td>I/O Connectors</td>
<td>100-pin SCSI-II female</td>
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<td>Typical: -5 V @ 240 mA Max.: +5 V @ 405 mA</td>
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<td>Operating Temperature</td>
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</tr>
<tr>
<td>Storing Temperature</td>
<td>-20 - 70°C (-4 - 158°F)</td>
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<tr>
<td>Storing Humidity</td>
<td>5 - 95% RH (IEC 68-2-3) non-condensing</td>
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### Ordering Information

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<td>64-ch Isolated Digital I/O Card</td>
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<tr>
<td>ADAM-3951</td>
<td>Wiring terminal module with LED-indicators</td>
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</tbody>
</table>
PCI-1758UDI
PCI-1758UDO
PCI-1758UDIO

128-ch Isolated Digital Input Card
128-ch Isolated Digital Output Card
128-ch Isolated Digital I/O Card

Specifications

Isolated Digital Input
- Channels: PCI-1758UDI: 128
  PCI-1758UDIO: 64
- Input Voltage: Logic 0: 2.5 V max.
  Logic 1: 5 V min. (25 V max.)
- Interrupt Capable Ch.: PCI-1758UDI: 128
  PCI-1758UDIO: 64
- Isolation Protection: 2,500 Vdc
- Opto-Isolator Response: 20 µs
- Input Resistance: 3 kΩ

Isolated Digital Output
- Channels: PCI-1758UDI: 128
  PCI-1758UDIO: 64
- Output Type: Sink (NPN)
- Isolation 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
- Dimensions (L x H): 175 x 100 mm (6.9” x 3.9”)
- Power Consumption

<table>
<thead>
<tr>
<th>PCI-1758UDI</th>
<th>PCI-1758UDO</th>
<th>PCI-1758UDIO</th>
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<tbody>
<tr>
<td>Typical</td>
<td>+5 V @ 0.3 A</td>
<td>+5 V @ 1.1 A</td>
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<tr>
<td>Max.</td>
<td>+5 V @ 0.6 A</td>
<td>+5 V @ 2.2 A</td>
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- Operating Temperature: 0 – 60°C (32 – 140°F) (IEC 68-2-1, 2)
- Storing Temperature: -20 – 70°C (-4 – 158°F)
- Storing Humidity: 5 – 95 % (IEC 68-2-3) non-condensing

Ordering Information
- PCI-1758UDI: 128-ch Isolated Digital Input Card
- PCI-1758UDO: 128-ch Isolated Digital Output Card
- PCI-1758UDIO: 128-ch Isolated Digital Input/Output Card
- PCI-191106S-1: 100-pin SCSI Cable, 1 m
- ADAM-39100: 100-pin SCSI wiring terminal, DIN-rail mounting

Features

PCI-1758UDI and PCI-1758UDIO
- 128 isolated digital output channels (64 for PCI-1758UDIO)
- High-voltage isolation on output channels (2,500 Vdc)
- Wide input range (5 – 40 Vdc)
- High-sink current for isolated output channels (90 mA max./channel)
- Current protection for each port
- BoardID™ switch
- Output status read-back
- Digital output value retained after hot system reset
- Programmable Power-Up States
- Watchdog timer

PCI-1758UDI and PCI-1758UDIO
- 128 isolated digital input channels (64 for PCI-1758UDIO)
- Wide input range (5 – 25 Vdc)
- High ESD protection (2,000 Vdc)
- Digital Filter function
- BoardID™ switch
- Interrupt handling capability for each channel

Feature Details

Interrupt Function (PCI-1758UDI/PCI-1758UDIO)
PCI-1758UDI and PCI-1758UDIO provide an interrupt function for every digital input channel. You can disable/enable the interrupt functions, and select trigger type by setting the Rising Edge Interrupt Registers or Falling Edge Interrupt Registers of the card. When the interrupt request signals occur, software will service these interrupt requests by ISR. The multiple interrupt sources provide the card with more flexibility.

Digital Filter 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.

Pin Assignments

I/O Connector Pin Assignment for PCI-1758UDI
PCI-1760U
8-ch Relay Actuator and Isolated DI Card

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 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: 1 kΩ 1/4 W

Counter/Timer
- Channels: 8
- Resolution: 16 bits
- Compatibility: 5 V/TTL
- Max. Input Frequency: 500 Hz
- PWM Channels: 2
- Digital Noise Filter: Minimum effective high input period ≥ [(2 – 65535) x 5 ms] + 5 ms
  Minimum 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 VAC @ 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 VAC
  500,000 operations @ 1.0 A 30 VDC
- Resistance: Contact: < 100 mΩ
  Insulation: 50 MΩ

Features
- Universal card, for 3.3 V and 5 V PCI slot
- 8 opto-isolated digital input channels
- 8 relay actuator output channels
- 2 opto-isolated PWM outputs
- LED indicators to show activated relays
- Jumper selectable dry contact/wet contact input signals
- Up event counters for DI
- Programmable digital filter function for DI
- Pattern match interrupt function for DI
- "Change of State" interrupt function for DI
- Universal PCI and BoardID switch

General
- Bus Type: PCI-1760U: Universal PCI V2.2
- I/O Connectors: 1 x 37-pin D-type connector, female
- 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)
- Storing Temperature: -20 ~ 70° C (-4 ~ 158° F)
- Storing Humidity: 5 ~ 95 % RH, non-condensing (IEC 68-2-3)

Ordering Information
- PCI-1760U: 8-ch Relay Actuator and Isolated D/I Card
- PCL-10137-1: DB37 cable assembly, 1 m
- PCL-10137-2: DB37 cable assembly, 2 m
- PCL-10137-3: DB37 cable assembly, 3 m
- ADAM-3937: DB37 wiring terminal for DIN-rail mounting

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Introduction
The PCI-1761 relay actuator and isolated D/I 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’s 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.

When the system has undergone a hot reset (i.e. without turning off the system power), the PCI-1761 can either retain output values of each channel, or return to its default configuration as open status, depending on its onboard jumper setting. This function protects the system from unwanted operations during unexpected system resets.

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**: 5600 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 10^7
- **Resistance**
  - Contact: 50 MΩ
  - Insulation: 1 GΩ min.

### General
- **Bus Type**: PCI V2.2
- **I/O Connectors**: 1 x 37-pin D-type
- **Dimensions (L x H)**: 175 x 100 mm (6.9” x 3.9”)
- **Power Consumption**
  - Typical: +5 V @ 220 mA
  - Max: +5 V @ 750 mA
- **Operating Temperature**: 0 – 60° C (32 – 140° F) (IEC 68-2-1, 2)
- **Storing Temperature**: -20 – 70° C (-4 – 158° F)
- **Storing Humidity**: 5 – 95 % RH, non-condensing (IEC 68-2-3)

### Ordering Information
- **PCI-1761**: 8-ch Relay Actuator/Isolated DI PCI Card
- **PCL-10137-1**: DB37 cable assembly, 1 m
- **PCL-10137-2**: DB37 cable assembly, 2 m
- **PCL-10137-3**: DB37 cable assembly, 3 m
- **ADAM-3937**: DB37 Wiring Terminal for Din-rail Mounting
- **PCLD-880**: Universal screw terminal board
Introduction
The PCI-1762 relay actuator and isolated D/I 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 105 ops. min. (0.5 A @ 125 VAC),
  - 5 x 105 ops. min. (1 A @ 30 VDC)
- **Resistance**
  - Contact: 50 MW
  - Insulation: 1,000 MW min. (at 500 VDC)

**General**
- **Bus Type**: PCI V2.2
- **I/O Connectors**: 1 x DB62 D-type female
- **Dimensions (L x H)**: 175 x 100 mm (6.9" x 3.9")
- **Power Consumption**
  - Typical: +5V @ 250 mA
  - Max: +6V @ 600 mA
- **Operating Temperature**: 0 ~ 60° C (32 ~ 140° F) (IEC 68-2-1,2)
- **Storing Temperature**: -20 ~ 70° C (-4 ~ 158° F)
- **Storing Humidity**: 5 ~ 95 % non-condensing (IEC 68-2-3)

**Ordering Information**
- **PCI-1762**: 16-ch Isolated DI/Relay Output Card
- **PCL-10162-1**: PCI-1762-1 DB-62 cable assembly, 1 m
- **PCL-10162-3**: PCI-1762-3 DB-62 cable assembly, 3 m
- **PCL-10162-5**: PCI-1762-5 DB-62 cable assembly, 5 m
- **ADAM-3962**: DB62 Wiring Terminal for Din-rail Mounting

Courtesy of Steven Engineering, Inc.-230 Ryan Way, South San Francisco, CA 94080-6370-Main Office: (650) 588-9200-Outside Local Area: (800) 258-9200-www.stevenengineering.com
Features
- 8 relay output channels and 8 isolated digital input channels
- LED indicators to show activated relays
- 8 Form C type relay output channels
- Output status read-back
- Retained relay output values when hot system reset
- High-voltage isolation on input channels (2,500 V_{DC})
- High ESD protection (2,000 V_{DC})
- High over-voltage protection (70 V_{DC})
- Wide input range (10 – 50 V_{DC})
- Interrupt handling capability
- Support Universal PCI Bus
- Low Profile PCI card
- BoardID™ switch

Introduction
PCI-1763UP relay actuator and isolated digital input card is an add-on card for the PCI bus. It provides 8 optically-isolated digital inputs with isolation protection of 2500 V_{DC} for collecting digital inputs in noisy environments, and 8 relay actuators for serving as on/off control devices or small power switches. For easy monitoring, each relay is equipped with one red LED to show its on/off status. PCI-1763UP's eight optically-isolated digital input channels are ideal for digital input in noisy environments or with floating potentials. The low profile PCI form factor and universal PCI connector (V2.2 compliant), meet requirements for size and reduced power consumption.

Specifications

<table>
<thead>
<tr>
<th>Isolated Digital Input</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channels</td>
</tr>
<tr>
<td>Input Voltage</td>
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<tr>
<td></td>
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<tr>
<td>Input Current</td>
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<tr>
<td>Interrupt Capable Ch.</td>
</tr>
<tr>
<td>Isolation Protection</td>
</tr>
<tr>
<td>Overvoltage Protection</td>
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<tr>
<td>Opto-isolator Response</td>
</tr>
<tr>
<td>Input Resistance</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Relay Output</th>
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</thead>
<tbody>
<tr>
<td>Channels</td>
</tr>
<tr>
<td>Relay Type</td>
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<tr>
<td>Contact Rating</td>
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<tr>
<td>Relay on Time</td>
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<tr>
<td>Relay off Time</td>
</tr>
<tr>
<td>Life Span</td>
</tr>
<tr>
<td>Resistance</td>
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<td></td>
</tr>
</tbody>
</table>

General
- I/O Connector Type: DB44 female
- Dimensions: 119.91 x 64.41 mm (Low-Profile MD1)
- Power Consumption: +5V @ 107.5 mA (typical) +5V @ 301.3 mA (max.)
- Operating Temperature: 0 – 60°C (32 – 140°F) (refer to IEC 68-2-1,2)
- Storing Temperature: -20 – 70°C (-4 – 158°F)
- Storing Humidity: 5 – 95 % RH, non-condensing (refer to IEC 68-2-3)

Ordering Information
- PCI-1763UP  Low-profile 8-ch Relay/Isolated DI Card
- PCL-10144-1  DB 44-pin cable, 1 m
- ADAM-3944  DB-44 Wiring Terminal for DIN-rail mounting

Pin Assignments
PCL-725
8-ch Relay Actuator/Isolated DI ISA Card

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

**Introduction**
The PCI-1761 relay actuator and isolated D/I 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.

When the system has undergone a hot reset (i.e. without turning off the system power), the PCI-1761 can either retain output values of each channel, or return to its default configuration as open status, depending on its onboard jumper setting. This function protects the system from unwanted operations during unexpected system resets.

**Specifications**

**Isolated Digital Input**
- Channels: 8
- Input Voltage: Logic 0: 3 V max., Logic 1: 5V min. (30V max.)
- Interrupt Capable Ch.: 8
- Isolation Protection: 1500 VDC
- Overvoltage Protection: 70 VDC
- Opto-Isolator Response: 25 µs
- Input Resistance: 560 Ω
- Input Current: 42 mA @ 24 V

**Relay Output**
- Channels: 8
- Relay Type: SPDT (4 x Form C, and 4 x Form A)
- Contact Rating: 120 VDC @ 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
- Resistance:
  - Contact: 50 MΩ
  - Insulation: 100 MΩ min.

**General**
- Bus Type: ISA
- I/O Connectors: 1 x 37-pin D-type
- 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 Actuator/Isolated DI ISA Card
- PCL-10137-1: DB37 cable assembly, 1 m
- PCL-10137-2: DB37 cable assembly, 2 m
- PCL-10137-3: DB37 cable assembly, 3 m
- ADAM-3937: DB37 Wiring Terminal for Din-rail Mounting
- PCLD-880: Universal screw terminal board
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

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Channels</td>
<td>12</td>
</tr>
<tr>
<td>Relay Type</td>
<td>SPDT, Form C</td>
</tr>
<tr>
<td>Contact Rating</td>
<td>2 A @ 30 Vdc, 1 A @ 125 Vdc</td>
</tr>
<tr>
<td>Relay on Time</td>
<td>5 ms. typical</td>
</tr>
<tr>
<td>Relay off Time</td>
<td>5 ms. typical</td>
</tr>
<tr>
<td>Life Span</td>
<td>&gt; 5 x 10^6 operations @ 30 Vdc and 2 A</td>
</tr>
<tr>
<td></td>
<td>&gt; 2 x 10^6 operations @ 30 Vdc and 1 A</td>
</tr>
<tr>
<td>Resistance</td>
<td>Contact: 50 MΩ</td>
</tr>
<tr>
<td></td>
<td>Insulation: 1 GΩ @ 500 Vdc min.</td>
</tr>
</tbody>
</table>

General

<table>
<thead>
<tr>
<th>Feature</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>Bus Type</td>
<td>ISA</td>
</tr>
<tr>
<td>I/O Connectors</td>
<td>1 x 37-pin D-type female</td>
</tr>
<tr>
<td>Dimensions (L x H)</td>
<td>155 x 100 mm (6.1&quot; x 3.9&quot;)</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>Typical: +5 V @ 280 mA</td>
</tr>
<tr>
<td></td>
<td>Max: +12 V @ 200 mA</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>0 – 60° C (32 – 140° F)</td>
</tr>
<tr>
<td>Storing Temperature</td>
<td>-20 – 70° C (-4 – 158° F)</td>
</tr>
<tr>
<td>Storing Humidity</td>
<td>5 – 95% RH, non-condensing (refer to IEC 68-2-3)</td>
</tr>
</tbody>
</table>

Features

- 12 relay outputs
- LED relay status indicators
- Male DB37 matching connector included
- Relay status readback function

Ordering Information

- PCL-735: 12-ch Relay Actuator Card
- PCL-10137-1: DB37 cable assembly, 1 m
- PCL-10137-2: DB37 cable assembly, 2 m
- PCL-10137-3: DB37 cable assembly, 3 m
- PCLD-880: Screw terminal board
- ADAM-3937: DB37 wiring terminal for DIN-rail mounting
Introduction

PCI-1780 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-1780 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.

For easier configuration, PCI-1780 supports Plug & Play, and have also been equipped with an Advantech BoardID™ DIP switch that 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.

Specifications

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.: CH0

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.: 8
- PWM Channels: 8

General
- Bus Type: PCI V2.2
- I/O Connectors: 1 x 68-pin SCSI-II female
- 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)
- Storing Temperature: -20 ~ 70° C (-4 ~ 158° F)
- Storing Humidity: 5 ~ 95 % RH, non-condensing (IEC 68-2-3)

Ordering Information
- PCI-1780: 8-ch Counter/Timer Card
- PCL-10168-1: SCSI-68 shielded cable, 1 m
- ADAM-3968: SCSI-68 wiring terminal, DIN-rail mount
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.

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
- Pulselength and period measurement
- Time-delay generation
- F/V conversion and accumulation

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: +5 V @ 360 mA (typical)
  +5 V @ 400 mA (max.)
- 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: One 37-pin D-type female connector for counter I/O
  Two 20-pin male flat-cable connector for digital I/O
- Dimensions (L x H): 185 x 100 mm (7.3” x 3.9”)

Ordering Information

- PCL-836: 6-ch Counter/Timer Card
- PCL-10137-1: DB37 cable assembly, 1 m
- PCL-10137-2: DB37 cable assembly, 2 m
- PCL-10137-3: DB37 cable assembly, 3 m
- PCLD-880: Screw terminal board
- ADAM-3937: DB-37 wiring terminal for DIN-rail mounting

Pin Assignments

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>CLK1</td>
</tr>
<tr>
<td>2</td>
<td>OUT1</td>
</tr>
<tr>
<td>3</td>
<td>GATE2</td>
</tr>
<tr>
<td>4</td>
<td>GATE3</td>
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<tr>
<td>5</td>
<td>GATE4</td>
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<tr>
<td>6</td>
<td>GATE5</td>
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<tr>
<td>7</td>
<td>GATE6</td>
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<tr>
<td>8</td>
<td>CLK4</td>
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<tr>
<td>9</td>
<td>CLK5</td>
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<td>10</td>
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<td>11</td>
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<td>13</td>
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<td>15</td>
<td>GATE9</td>
</tr>
<tr>
<td>16</td>
<td>PWR1</td>
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<tr>
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<td>PWR2</td>
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<td>IN3</td>
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<td>36</td>
<td>IN17</td>
</tr>
<tr>
<td>37</td>
<td>IN18</td>
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</tbody>
</table>

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.
**PCM-3712**
**PCM-3718H/HG/HO**
**PCM-3724**

### Features
- Good selection of output ranges, including current loop, unipolar and bipolar.

### Specifications

#### Analog Output
- **Channels**: 2
- **Resolution**: 12 bits
- **Output Rate**: Static update
- **Output Range**: ±10 V Internal

#### Specifications
- **Internal Reference**
  - Unipolar (V): ±5, 0~10
  - Bipolar (V): ±2.5, ±5, ±10
- **Current Loop**: 4~20 mA
- **External Reference**: ±10 V
- **Slew Rate**: 0.3 V/μs typ. (Voltage) 1.2 mA/μs (Current)
- **Driving Capability**: ±5 mA
- **Output Impedance**: 0.1 Ω max./0.02 Ω typ.
- **Accuracy**: ±1 LSB
- **Relative**: ±1 LSb
- **Differential Non-linearity**: ±1/2 LSb

#### General
- **Bus Type**: PC/104
- **I/O Connectors**: 1 x 10-pin box header
- **Dimensions (L x H)**: 96 x 90 mm (3.8" x 3.5")
- **Power Consumption**: 5 V @ 700 mA max.
- **Operating Temperature**: 0~60°C (32~140°F)
- **Storing Temperature**: -20~85°C (-4~185°F)
- **Storing Humidity**: 0~90% RH, non-condensing

### Ordering Information
- **PCM-3712**: 2-ch AO Module (18 cm flat cable 10-pin to DB9-F included)
- **PCM-3718H/HG/HO**: DB9 cable wiring for DIN-rail mounting
- **PCM-3724**: 48-ch DI/O Module

---

### PCM-3718H/HG/HO

#### Analog Output
- **Channels**: 16 single-ended, or 6 differential inputs
- **Resolution**: 12 bits
- **Max. Sampling Rate**: 100 kHz (DAM transfer)
- **Input Impedance**: 10 MΩ
- **Sampling Modes**: Software, pacer or ext.
- **Input Range**: ±0.01, ±0.005
- **Output Range**: ±10 V, ±5, ±2.5, ±1.25, ±0.625

#### Specifications
- **Internal Reference**
  - Unipolar (V): ±5, 0~10
  - Bipolar (V): ±2.5, ±5, ±10
- **Current Loop**: 4~20 mA
- **External Reference**: ±10 V
- **Slew Rate**: 0.3 V/μs typ. (Voltage) 1.2 mA/μs (Current)
- **Output impedance**: ±5 mA
- **Output Impedance**: 0.1 Ω max./0.02 Ω typ.
- **Precision**: 0.1 Ω max.
- **Relative**: ±1 LSb
- **Differential Non-linearity**: ±1/2 LSb

#### 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
- **Operating Temperature**: 0~60°C (32~140°F)
- **Storing Temperature**: -40~85°C (-40~185°F)
- **Storing Humidity**: 0~90% RH, non-condensing

### Ordering Information
- **PCM-3718H**: 12-bit Multifunction Module w/ Programmable Gain (cable not included)
- **PCM-3718HG**: PCM-3718H w/high gain
- **PCM-3718HO**: 20-pin flat cable wiring terminal for DIN-Rail
- **PCM-3724**: 48-ch DI/O Module (cable not included)
- **ADAM-3900**: 50-pin flat cable wiring terminal for DIN-Rail
- **PCD-785B**: 24-ch Relay Output Card
- **PCL-10150-1**: 16,5V/TTL
- **PCL-10150-1.2**: Logic 1: 3.84 V min. @ 6 mA (source)
- **PCL-10150-2**: Logic 1: 2.0 V min. @ 15 mA (source)

---

### PCM-3724

#### Analog Output
- **Channels**: 48 (shared with output)
- **Compatibility**: 5 V/TTL
- **Input Voltage**: Logic 0: 0.8 V max.
- **Output Voltage**: Logic 1: 2.0 V min.
- **Interrupt Capable Ch.**: 1

#### Digital Output
- **Channels**: 48 (shared with input)
- **Compatibility**: 5 V/TTL
- **Output Voltage**: Logic 0: 0.5 V max.
- **Logic 1: 2.0 V min.**

#### 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
- **Operating Temperature**: 0~60°C (32~140°F)
- **Storing Temperature**: -40~85°C (-40~185°F)
- **Storing Humidity**: 0~90% RH, non-condensing

### Ordering Information
- **PCM-3724**: 48-ch DI/O Module (cable not included)
- **ADAM-3900**: 50-pin flat cable wiring terminal for DIN-Rail
- **PCL-785B**: 24-ch Relay Output Card
- **PCL-782B**: 24-ch Opto-isolated DI Board
- **PCL-10150-1.2**: 50-pin flat cable, 1.2 m
PCM-3725
PCM-3730
PCM-3780

Features
- LED indicators to show activated relays

Specifications
Isolated Digital Input
- Channels: 8
- Input Voltage: Logic 0: 3 V, Logic 1: 10 V (50 V max.)
- Isolation Protection: 2500 Vrms
- Overvoltage Protection: 70 Vpp
- Opto-Isolator Response: 25 µs
- Input Resistance: 4.7 kΩ

Relay Output
- Channels: 8
- Relay Type: SPDT (Form C)
- Contact Rating: 30 VDC, 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 VDC

General
- Bus Type: PC/104
- I/O Connectors: 1 x 20-pin head for I/O
- Dimensions (L x H): 96 x 90 mm (3.8” x 3.5”)
- Power Consumption: Typical: 100 mA @ +5 V, 280 mA @ +5 V
- Operating Temperature: 0–60°C (32–158°F)
- Storing Temperature: -20–70°C (-4–158°F)
- Storing Humidity: 5–95% RH, non-cond.

Ordering Information
- PCM-3725: 8-ch Isolated DI/Relay Output Module (no cables incl.)
- PCL-10120-1: 20-pin flat cable 1 m
- PCL-10120-2: 20-pin flat cable 2 m
- PCL-10150-1.2: 50-pin flat cable 1.2 m
- ADAM-3920: 20-pin flat cable wiring terminal for DIN-rail
- ADAM-3950: 50-pin flat cable wiring terminal for DIN-rail
- PCLD-780: Screw-terminal board for 20-pin Flat Cable

Features
- High driving capacity and high-voltage isolation

Specifications
Isolated Digital Input
- Channels: 16
- Interrupt Capable Ch.: 5 V/TTL
- Input Voltage: Logic 0: 2 V max.
- Isolation Protection: 2,500 VDC
- Overvoltage Protection: 100 µs
- Opto-Isolator Response: 8 mA @ 0.5 V max.
- Input Resistance: 8 kΩ

Digital Output
- Channels: 16
- Output Capability: 8 mA @ 0.5 V max., -0.4 mA @ 2.4 V min.

Isolated Digital Output
- Channels: 8
- Output Type: Sink (NPN)
- Isolation Protection: 2 kΩ
- Output Voltage: 8 mA @ 0.5 V min.
- Sink Current: 200 mA max./channel
- Opto-Isolator Response: 100 µs

General
- Bus Type: PC/104
- I/O Connectors: 3 x 20-pin header, 96 x 90 mm (3.8” x 3.5”)
- Dimensions (L x H): 96 x 90 mm (3.8” x 3.5”)
- Power Consumption: Typical: 330 mA @ +5 V
- Operating Temperature: 0–60°C (32–158°F)
- Storing Temperature: -20–70°C (-4–158°F)
- Storing Humidity: 5–95% RH, non-cond.

Ordering Information
- PCM-3730: 16-ch Isolated DI Module (cable included)
- PCL-10120-1: 20-pin flat cable 1 m
- PCL-10120-2: 20-pin flat cable 2 m
- PCLD-780: Screw-terminal board for 20-pin flat cable
- PCLD-785: 16-ch relay/power relay output board

Specifications
Programmable Counter
- 2 independent 16-bit counters
- 4 independent programmable clock sources
- 12 programmable counter modes

Digital Input
- Channels: 24 (shared with output)
- Compatibility: 5 V/TTL
- Input Voltage: Logic 0: 0.8 V max.
- Output Voltage: Logic 0: 0.5 V max. @ 24 mA (sink)
- Interrupt Capable Ch.: 24

Digital Output
- Channels: 24 (shared with input)
- Compatibility: 5 V/TTL
- Max. Input Frequency: 20 MHz
- Counter Modes: 12 (programmable)
- Interrupt Capable Ch.: 2

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

General
- Bus Type: PC/104
- I/O Connectors: 1 x 50-pin header
- Dimensions (L x H): 96 x 90 mm (3.8” x 3.5”)
- Power Consumption: Typical: +5 V @ 300 mA
- Operating Temperature: 0–60°C (32–158°F)
- Storing Temperature: -20–70°C (-4–158°F)
- Storing Humidity: 5–85% RH non-cond.

Ordering Information
- PCM-3780: 2-ch Counter/Timer with 24-ch TTL DI/O Module
- PCL-10120-1: 20-pin flat cable 1 m
- PCL-10150-1.2: 50-pin flat cable 1.2 m
- ADAM-3920/50: 20/50-pin flat cable wiring terminal for DIN-rail
PCI-1670

Introduction

PCI-1670 is a high-performance PCI-bus card with a GPIB interface. The card is fully compatible with IEEE 488.1 and 488.2 standards with its PCI 2.1 bus specification. With two driver control modes: controller mode and slave mode; PCI-1670 can perform basic the IEEE 488 talker, listener and controller functions required by IEEE 488.2. You can also connect up to 15 GPIB instruments. Therefore, PCI-1670 is especially suitable for instrument measurements and control.

PCI-1670 is available for Windows 95/98/NT/ME/2000/XP and DOS, and it supports complete drivers and libraries. To make driver development easier, PCI-1670 comes with example drivers programmed in: Visual C++, C++ Builder, Labwindows/CVI, Visual Basic, Delphi and LabVIEW.

Furthermore, PCI-1670 also offers powerful testing features and a configuration utility that allows users to easily access and control instruments.

PCI-1670 offers a comprehensive supplementary controller driver database and provides NI-like commands to help users develop applications. Users can use an interactive GPIB window interface to control devices directly without any need of programming.

Specifications

- **GPIB**
  - Compatibility: IEEE 488, 488.1, 488.2
  - GPIB Transfer Rate: 1 MB/s
  - OS Support: Windows 95/98/NT/2000/XP, DOS
  - Max. GPIB Connections: 15

- **General**
  - Bus Type: PCI V2.1
  - I/O Connectors: 1 x IEEE 488 standard 24-pin
  - Dimensions (L x H): 131 x 106 mm (5.15” x 4.17”)
  - Operating Temperature: 0 – 55° C (32–131° F)
  - Storing Temperature: -20–70° C (-4 – 158° F)
  - Operating Humidity: 10 – 90% RH, non-condensing

Ordering Information

- **PCI-1670**
  - GPIB Interface PCI-bus Card, IEEE-488 Cable, 2 M

- **PCL-1670L**
  - GPIB Interface PCI-bus Card without cable

- **PCL-10488-2**
  - IEEE-488 Cable, 2 M

Features

- Complete IEEE 488.2 compatibility
- Supports Windows® 95/98/NT/ME/2000/XP and DOS
- Full driver, library, and example support, including Visual C++, C++ Builder®, LabWindows/CVI, Visual Basic®, Delphi® and LabView® drivers.
- Provides NI-like driver & function libraries.
- PCI bus specification 2.1 compliant
- I/O address automatically assigned by PCI Plug & Play
- Provides powerful and easy-to-use configuration utility
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.

Greater than 1.5 MB/s Transfer Rates
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 1024-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.

IEEE-488.2 (GPIB) Compatibility
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.

Software
The PCI-1671UP includes powerful GPIB-Library. The library greatly simplifies your programming effort. The PCI-1671UP is also supported by a wide variety of application software packages including LabWindows/CVI®, LabVIEW® and many others.

Specifications

<table>
<thead>
<tr>
<th>GPIB</th>
<th></th>
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</thead>
<tbody>
<tr>
<td>Compatibility</td>
<td>IEEE 488.1, 488.2</td>
</tr>
<tr>
<td>GPIB Transfer Rate</td>
<td>1.5 MB/s</td>
</tr>
<tr>
<td>OS Support</td>
<td>Windows® 2000/XP</td>
</tr>
<tr>
<td>Max. GPIB Connections</td>
<td>15</td>
</tr>
</tbody>
</table>

General

<table>
<thead>
<tr>
<th>Bus Type</th>
<th>PCI-1671UP: Universal PCI V2.2</th>
</tr>
</thead>
<tbody>
<tr>
<td>I/O Connectors</td>
<td>1 x IEEE 488 standard 24-pin</td>
</tr>
<tr>
<td>Dimensions (L x H)</td>
<td>119.91 x 64.41 mm (Low profile MD1)</td>
</tr>
<tr>
<td>Power Consumption</td>
<td>Typical: 5 VDC @ 375 mA</td>
</tr>
<tr>
<td>Operating Temperature</td>
<td>0 – 60°C (32 – 158°F) @ 0-90% RH</td>
</tr>
<tr>
<td>Storing Temperature</td>
<td>-40 – 100°C (-40 – 212°F) @ 5-90% RH</td>
</tr>
<tr>
<td>Operating Humidity</td>
<td>0 – 90% RH, non-condensing</td>
</tr>
</tbody>
</table>

Ordering Information

| PCI-1671UP                                | High-Performance IEEE-488.2 Interface for PCI-Bus Computers (cable is not included) |
| PCL-10488-2                               | IEEE-488 Cable, 2 m |
| PCL-ADP488                                | GPIB Adapter (Necesssary while using PCI-1671UP in low-profile chassis) |
| PCI-1671S2                                | High-performance IEEE-488.2 Interface Card, PCI-1671UP, with IEEE-488 cable 2 m |