# Data Acquisition Boards

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<td>10 MS/s, 12-bit, Simultaneous 4-ch Analog Input Universal PCI Card</td>
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<tr>
<td>PCI-1713U</td>
<td>100 kS/s, 12-bit, 32-ch Isolated Analog Input Universal PCI Card</td>
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<td>PCI-1724U</td>
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<td>PCI-1721</td>
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To view all of Advantech’s Data Acquisition Boards, please visit www.advantech.com/products.
Data Acquisition and Control Tutorial & Software

PC-based Data Acquisition (DAQ) System Overview

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

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

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

Transducers and Actuators

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

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

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

Signal Conditioning

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

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

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.

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

Digital Inputs and Outputs

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

Counter/Timer

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

Getting Started

Advantech: The Source For What You Need

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

Step 1: Know Your Fundamental Goal

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

Step 2: Hardware Selection

Select the hardware required to achieve your fundamental goal. Advantech provides plug-in boards for Analog-to-Digital, Digital-to-Analog, Digital I/O needs. Both ISA and PCI bus products are available. Your hardware selection should be based on five major criteria:

1. Number and types of channels
2. Differential or single-ended inputs
3. Resolution
4. Speed
5. Software compatibility with hardware

Step 3: Accessory Selection

Most applications require additional accessories which are available as separate items. These include:

1. Expansion peripherals to add channels to your system
2. Cables, signal conditioners and external boxes such as screw terminals or BNC accessories

Step 4: Software Selection

More than any other single factor, software will determine your system start-up time, as well as its effectiveness, suitability for your application, and ease of modification. Three major criteria should determine the choice of software:

1. Operating system used
2. User programming expertise
3. Software compatibility with hardware
What is DAQNavi?

DAQNavi is an Advantech next-generation driver package, for programmers to develop their application programs using Advantech DAQ boards or devices. This integrated driver package includes device drivers, SDK, tutorial and utility. With the user-friendly design, even the beginner can quickly get familiar with how to utilize DAQ hardware and write programs through the intuitive “Advantech Navigator” utility environment. Many example codes for different development environment dramatically decrease users' programming time and effort. You can go to www.advantech.com/DAQNavi for more information about Advantech DAQNavi.

Multiple Operating System Support
DAQNavi supports many popular operating systems (OS) used in automation applications. For different OSs, API functions will be the same, so users can simply install the driver without modifying their program again when migrating between two different OSs. DAQNavi supports latest Windows 8/7/Vista/XP and Windows CE (both 32-bit and 64-bit). Besides Windows operating system, Linux is famous for its openness and flexibility. DAQNavi software package also support Linux OS including Ubuntu, Fedora, Debian, Susi distributions. For other distributions, please contact the local Advantech branch or dealer in your area.

Note: DAQNavi only supports Windows 8 desktop version. Windows RT version is not supported.

LabVIEW and Matlab Support
LabVIEW is popular graphical development environment used for measurement and automation. For LabVIEW user, DAQNavi offers two options for programming: Express VI and Polymorphic VIs. Express VI helps user quickly complete his programming without extra wiring. When user drags the Express VI on LabVIEW Block Diagram, a pop-up intuitive wizard window will appear and user can perform configurations. After that, the programming is done. So it is similar to the .NET Component DAQ Wizard used in Microsoft Visual Studio environment, making programming more easily. As for the Polymorphic VI, user can use several VIs and wiring to build more complex program. Except LabVIEW, DAQNavi also support Matlab programming.

.NET Support
DAQNavi offers a series of .NET Component object, that you can benefit from platform-unified feature by latest .NET technology. User can simply drag and drop the .NET Components within .NET programming environment, such as Microsoft Visual C# and VB .NET. An intuitive window (called “DAQNavi Wizard”) will pop-up, and user can perform all configurations by sequence. It is so-called “Configure & Run” programming. Programmers also can choose writing code manually with the .NET Component, to have a more flexible object calling. With Advantech CSCL technology, engineers can do the similar programming in an native environment such as Visual C++.

C++, Delphi, VB, BCB, Java and Qt Support
DAQNavi offers C++ Class Library (for VC++ and Borland C++ Builder) and ActiveX (for Visual Basic, Delphi, and BCB) for Native programming environment with the same calling interface as .NET Class Library. With DAQNavi Java class library and Qt class library, users can develop Java and Qt programs to migrate between different operating systems (including Windows and Linux).

Support Modules
DAQNavi supports all PCI Express, PCI, PC/104, and PCI-104 cards, as well as all USB DAQ devices.

DAQNavi Driver Package Architecture

Note: When you visit Advantech DAQNavi download website, you can find two software: (1) DAQNavi SDK (2) individual DAQNavi driver for specific hardware. You need to install these two software on your computer to utilize the hardware.
DAQNavi Introduction

Powerful Intuitive Utility: Advantech Navigator

SDKs

1. DAQ User Interface Manual
To shorten the development time, Advantech offer a lot of tutorial and reference documentation. There are two programming ways you can refer: (1) Class Library (2) Device Control. You can find instructions for programming. It not only teaches you how to create one application project, but also how to write the program with a programming chart and example code.

2. Tutorial Video
If you don’t know how to start creating a project, Advantech offers a tutorial video for your programming reference.

Devices
You can see all your installed Advantech DAQ devices here, including the simulated DAQ device called “DemoDevice”. In other words, you don’t need any hardware installed on your computer to test all operations within DAQNavi. For each device, there are four items you can select.

1. Device Setting
You can perform all hardware configurations for the selected device.

2. Device Test
You can test all hardware functionality here, without any programming.

3. Scenarios
Advantech defines commonly-used measurement and automation applications, named “scenarios” for users to refer. For each scenario, one example program is embedded within Advantech Navigator that you can execute it directly. Corresponding source code for each scenario is provided, written by different language (C#, VB.NET, C++, Delphi, Qt, VB6, and Java). Besides, wiring diagram for each scenario is available here.

4. Reference
You can find the detailed user manual for the selected device.

Scenarios: Commonly-used for Measurement and Automation Applications

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<th>Scenario</th>
<th>Description</th>
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<td>Instant AI</td>
<td>Read single AI value once</td>
</tr>
<tr>
<td></td>
<td>Asynchronous One Buffered AI</td>
<td>Don’t need to wait the acquisition is done to run other program</td>
</tr>
<tr>
<td></td>
<td>Synchronous One Buffered AI</td>
<td>Need to wait the acquisition is done to run other program</td>
</tr>
<tr>
<td></td>
<td>Streaming AI</td>
<td>Continuously read a buffer of AI values</td>
</tr>
<tr>
<td>Analog Output</td>
<td>Static AO</td>
<td>Change AO value once</td>
</tr>
<tr>
<td></td>
<td>Asynchronous One Waveform AO</td>
<td>Change AO value based on a pre-defined waveform once</td>
</tr>
<tr>
<td></td>
<td>Synchronous One Waveform AO</td>
<td>Need to wait the generation is done to run other program</td>
</tr>
<tr>
<td></td>
<td>Streaming AO</td>
<td>Continuously change AO value based on a pre-defined waveform</td>
</tr>
<tr>
<td>Digital Input</td>
<td>Static DI</td>
<td>Read the selected DI port value once</td>
</tr>
<tr>
<td></td>
<td>DI Interrupt</td>
<td>When DI bit meets a pre-defined edge change (rising or falling), an interrupt is generated</td>
</tr>
<tr>
<td></td>
<td>DI Pattern Match Interrupt</td>
<td>When selected DI port meets pre-defined pattern, an interrupt is generated</td>
</tr>
<tr>
<td></td>
<td>DI Status Change Interrupt</td>
<td>When the status of certain selected channel of DI port changes, an interrupt is generated</td>
</tr>
<tr>
<td>Digital Output</td>
<td>Static DO</td>
<td>Change DO values once</td>
</tr>
<tr>
<td></td>
<td>Delayed Pulse Generation</td>
<td>When a trigger from counter gate is met, a pulse is generated after a specific period</td>
</tr>
<tr>
<td></td>
<td>Pulse Output with Timer Interrupt</td>
<td>Continuously generate a periodic pulse train (using counter internal clock), and an event will be sent out at the same time</td>
</tr>
<tr>
<td></td>
<td>Event Counter</td>
<td>Continuously count the pulse number of signal from counter input</td>
</tr>
<tr>
<td>Time/ Counter</td>
<td>Frequency Measurement</td>
<td>Measure frequency of signal from counter input</td>
</tr>
<tr>
<td></td>
<td>Pulse Width Measurement</td>
<td>Measure pulse width of signal from counter input</td>
</tr>
<tr>
<td></td>
<td>PWM Output</td>
<td>Generate PWM (Pulse Width Modulation) signal</td>
</tr>
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</table>
Introduction

Advantech DAQNavi Data Logger is ready-to-use application software that engineers can leverage its easy-to-use interface to perform data logging, display and recording. Without spending any time on programming, engineers can benefit from flexibility to acquire and store data from various Advantech data acquisition devices for their data logging tasks.

Features Details

Data Acquisition Devices Configuration
Before data logging measurement, engineers can do all necessary analog and digital input channels configuration using built-in DAQNavi wizard. Step-by-step instructions by intuitive window can help engineer easily complete related settings. Except real data acquisition devices, DAQNavi Data Logger also offer simulated device that engineers can do all operation without any hardware installed on computer.

Configuration Management by Project Files
Engineer can create and edit a project to include one or several data logging tasks. Within one project, data can be acquired and displayed from one or multiple data acquisition devices. Current input channels configurations and logging settings can be saved as a specific project file. Afterwards, engineer can open previous project file to load all configurations and start data logging tasks immediately.

Real-time Data Logging, Display and Recording
After data acquisition configuration is done, engineers can immediately start data acquisition and display the logging data on a real-time graph. The graph can be zoom in, zoom out or pan dynamically during data logging. Engineers can decide if they want to record the data (save data into a pre-defined file) during data logging.

Historical Data Playback
Previous recorded data can be loaded back to DAQNavi Data Logger software and viewed by Playback function. Related zoom in, zoom out and pan operation is also available for historical data display.

Specifications

Supported Hardware
- PCI Express multifunction, analog input and digital input cards
- PCI multifunction, analog input and digital input cards
- USB multifunction, analog input and digital input modules
- PC/104 and PCI-104 multifunction, analog input and digital input cards
## Analog I/O & Multifunction
### Card Selection Guide

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<td>PCI</td>
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<tr>
<td>Model</td>
<td>PCI-1710U/UL</td>
</tr>
<tr>
<td>Resolution</td>
<td>12 bits</td>
</tr>
<tr>
<td>Channels</td>
<td>16 SE/8 Diff.</td>
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<tr>
<td>Onboard FIFO</td>
<td>4,096 samples</td>
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<tr>
<td>Sampling Rate</td>
<td>100 kS/s</td>
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<tr>
<td>Input Ranges</td>
<td></td>
</tr>
<tr>
<td>Unipolar Inputs (V)</td>
<td>±10, 5, 2.5, 1.25, 0.625</td>
</tr>
<tr>
<td>Bipolar Inputs (V)</td>
<td></td>
</tr>
<tr>
<td>Analog Input</td>
<td></td>
</tr>
<tr>
<td>Configurable Per-Channel</td>
<td>✓</td>
</tr>
<tr>
<td>Trigger Modes</td>
<td></td>
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<tr>
<td>Pacer/Software/External Pulse</td>
<td>✓</td>
</tr>
<tr>
<td>Advanced Trigger</td>
<td>✓</td>
</tr>
<tr>
<td>Data Transfer Modes</td>
<td></td>
</tr>
<tr>
<td>Software</td>
<td>✓</td>
</tr>
<tr>
<td>DMA</td>
<td>✓</td>
</tr>
<tr>
<td>Analog Output</td>
<td></td>
</tr>
<tr>
<td>Resolution</td>
<td>12 bits</td>
</tr>
<tr>
<td>Channels</td>
<td>2 (PCI-1710U only)</td>
</tr>
<tr>
<td>Onboard FIFO</td>
<td>-</td>
</tr>
<tr>
<td>Output Range (V)</td>
<td>0 ~ 5, 0 ~ 10</td>
</tr>
<tr>
<td>Output Rate</td>
<td>Static update</td>
</tr>
<tr>
<td>DMA Transfer</td>
<td>-</td>
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<tr>
<td>Digital I/O</td>
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<tr>
<td>Input Channels</td>
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</tr>
<tr>
<td>Output Channels</td>
<td>16</td>
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<td>Channels</td>
<td>1</td>
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<tr>
<td>Resolution</td>
<td>16 bits</td>
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<td>Max. Input Frequency</td>
<td>10 MHz</td>
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<td>Isolation Voltage</td>
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<td>Auto Calibration</td>
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<td>BoardID Switch</td>
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<td>Dimensions (mm)</td>
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<tr>
<td>Connector</td>
<td>68-pin SCSI</td>
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* All channels should be set to the same range.
** SS: Single DMA channel, Single A/D channel scan; SM: Single DMA channel, Multiple A/D channel scan
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* All channels should be set to the same range.
** SS: Single DMA channel, Single A/D channel scan; SM: Single DMA channel, Multiple A/D channel scan

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*Online Download*  www.advantech.com/products  ADVANTECH
## Analog I/O & Multifunction Card Selection Guide

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* 80 kHz on Pentium 4-based (or upper) system
** SS: Single DMA channel, Single A/D channel scan
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* 80 kHz on Pentium 4-based (or upper) system
** SS: Single DMA channel, Single A/D channel scan
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**Note:** The table provides a summary of the features and specifications for various data acquisition boards. The details include bus options, model numbers, general specifications, input ranges, trigger modes, data transfer modes, analog output specifications, digital I/O channels, timer/counter channels, isolation voltage, auto calibration, and various driver support options. The page number for this selection guide is 19-33.
## Selection Guide

### Non-Isolated Digital I/O

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

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

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

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<td><strong>Dimensions (mm)</strong></td>
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<td><strong>Connector</strong></td>
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<td>1 x DB37</td>
<td>1 x DB37</td>
<td>1 x DB37</td>
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<tr>
<td><strong>Windows 8/7/Vista/XP/2000</strong></td>
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* Dry/wet contact can be mixed at the same time within one group.
<table>
<thead>
<tr>
<th>Category</th>
<th>Isolated Digital I/O</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Bus</strong></td>
<td>PCI-1756 PCI-1758UDI PCI-1758UDO PCI-1758UDIO PCI-1760U PCI-1761 PCI-1762</td>
</tr>
<tr>
<td><strong>Input Channels</strong></td>
<td>- - - - - - -</td>
</tr>
<tr>
<td><strong>Output Channels</strong></td>
<td>- - - - - - -</td>
</tr>
<tr>
<td><strong>Sink Current</strong></td>
<td>- - - - - - -</td>
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<tr>
<td><strong>Source Current</strong></td>
<td>- - - - - - -</td>
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<tr>
<td><strong>Channels</strong></td>
<td>32 128 - 64 8 8 16</td>
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<tr>
<td><strong>Isolation Voltage</strong></td>
<td>2,500 VDC 2,500 VMS 2,500 VDC 2,500 VDC 2,500 VDC 2,500 VDC 2,500 VDC 2,500 VDC 2,500 VDC 2,500 VDC</td>
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<tr>
<td><strong>Input Range</strong></td>
<td>10 ~ 50 VDC 5 ~ 25 VDC 4.5 ~ 12 VDC 5 ~ 50 VDC 10 ~ 50 VDC</td>
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<tr>
<td><strong>Output Channels</strong></td>
<td>32 (Sink) - 128 64 2 x Form A 4 x Form C 16**</td>
</tr>
<tr>
<td><strong>Isolation Voltage</strong></td>
<td>2,500 VDC 2,500 VDC 2,500 VDC 2,500 VDC 2,500 VDC 2,500 VDC 2,500 VDC 2,500 VDC</td>
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<tr>
<td><strong>Output Range</strong></td>
<td>5 ~ 40 VDC 5 ~ 40 VDC 5 ~ 40 VDC</td>
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<tr>
<td><strong>Max. Sink Current</strong></td>
<td>200 mA - 90 mA</td>
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<tr>
<td><strong>Timer/Counter Channels</strong></td>
<td>- - - - 8 x Up CTR 6 x Form A 4 x Form C 16**</td>
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<tr>
<td><strong>Resolution</strong></td>
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<tr>
<td><strong>Max. Input Frequency</strong></td>
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<tr>
<td><strong>Change of State</strong></td>
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<tr>
<td><strong>BoardID Switch</strong></td>
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<tr>
<td><strong>Channel-Freeze Function</strong></td>
<td>- - - - - - -</td>
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<tr>
<td><strong>Output Status Read Back</strong></td>
<td>- - - - - - -</td>
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<tr>
<td><strong>Dry/Wet Contact</strong></td>
<td>- - - - - - -</td>
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<tr>
<td><strong>Dimensions (mm)</strong></td>
<td>175 x 100 175 x 100 175 x 100 175 x 100 175 x 100 175 x 100 175 x 100</td>
</tr>
<tr>
<td><strong>Connector</strong></td>
<td>100-pin SCSI Dual 100-pin mini-SCSI Dual 100-pin mini-SCSI Dual 100-pin mini-SCSI 1 x DB37 1 x DB37 1 x DB62</td>
</tr>
<tr>
<td><strong>Legacy Driver</strong></td>
<td>Windows XP/2000 WinCE Linux Windows 8/7/Vista/XP/2000 WinCE Linux LabVIEW Driver</td>
</tr>
</tbody>
</table>

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

### Category

<table>
<thead>
<tr>
<th>Bus</th>
<th>Isolated Digital I/O</th>
<th>Counter</th>
</tr>
</thead>
<tbody>
<tr>
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<td>ISA</td>
<td>PCI/104</td>
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<tr>
<td>Model</td>
<td>PCL-725</td>
<td>PCM-3725</td>
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<tr>
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<td>PCL-735</td>
<td>PCM-7205</td>
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<tr>
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<td>PCL-735</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

### TTL Di/O

**Input Channels**: - - 8 16 - - 8 16 24 (shared)

**Output Channels**: - - 8 16 - - 8 16

**Input Channel**

- **Sink Current**: 0.5 V @ 8 mA - - 24 mA @ 0.5 V 8 mA @ 24 V
- **Source Current**: 0.4 mA @ 2.4 V - - 15 mA @ 0.5 V

**Isolated DI/O**

- **Input Channels**: 8 - 8 8 16 8 - -
- **Isolation Voltage**: 1,500 V DC - 2,500 V DC 2,500 V DC 2,500 V DC 2,500 V DC 2,500 V DC

**Input Range**: 5 ~ 24 Vcc - - 10 ~ 50 Vcc 5 ~ 24 Vcc 5 ~ 30 Vcc

**Output Channels**: 4 x Form A 4 x Form C 12 x Form C 8 x Form C 8 x Form C

**Isolation Voltage**: 1,000 Vcc 1,000 Vcc 2,000 Vcc 2,500 Vcc 2,500 Vcc 2,000 Vcc

**Output Range**: 0.5A @ 120 Vcc 1A @ 30 Vcc 0.25A @ 24 Vcc 1A @ 30 Vcc 5 ~ 40 Vcc 5 ~ 30 Vcc

**Max. Sink Current**: 200 mA 300 mA - - - -

**Timer/Counter Channels**: - - - - - - 8 x CTR 6 x CTR 3 x PWM 2

**Resolution**: - - - - - - - - - - - - - 16 bits 16 bits 16 bits

**Max. Input Frequency**: - - - - - - - - - - - - - 20 MHz 10 MHz 20 MHz

**Pattern Match**: - - - - - - - - - - - - - -

**Change of State**: - - - - - - - - - - - - - -

**BoardID Switch**: - - - - - - - - - - - - - -

**Channel-Freeze Function**: - - - - - - - - - - - - - -

**Output Status Read Back**: - - - - - - - - - - - - - -

**Dry/Wet Contact**

**Dimensions (mm)**: 147 x 95 155 x 100 96 x 90 96 x 90 96 x 90 175 x 100 185 x 100 96 x 90

**Connector**: 1 x DB37 1 x DB37 1 x 20-pin 1 x 50-pin 3 x 20-pin 2 x 20-pin 1 x 20-pin 1 x 50-pin 68-pin SCSI

**Legacy Driver**

- **Windows XP/2000**: ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓
- **WinCE**: - - ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓
- **Linux**: - - ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓

**Driver/Driver**

- **Windows 8/7/Vista/XP (2000)**: - - ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓
- **WinCE**: - - ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓
- **Linux**: - - ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓

**LabVIEW I/O Driver**: ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓ ✓

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

** Jumper selectable Form A/Form B-type relay output.
Introduction
PCIE-1730 offers isolated digital input channels as well as isolated digital output channels with isolation protection up to 2,500 V<sub>DC</sub>, which makes them ideal for industrial applications where high-voltage isolation is required. There are also 32 TTL digital I/O channels on PCIE-1730.

Specifications

Digital Input
- Channels: 16
- Compatibility: 5 V/TTL
- Input Voltage: Logic 0: 0.8 V max., Logic 1: 2.0 V min.
- Interrupt Capable Ch.: 2 (DI0, D10)

Isolated Digital Input
- Channels: 16
- Input Voltage: Logic 0: 3 V max., Logic 1: 10 V min. (30 V max.)
- Interrupt Capable Ch.: 2 (IDIO, ID10)
- Isolation Protection: 2,500 V<sub>DC</sub>
- Opto-Isolator Response: 50 µs
- Input Resistance: 2.7 kΩ @ 1 W

Digital Output
- Channels: 16
- Compatibility: 5 V/TTL
- Output Voltage: Logic 0: 0.5V max., Logic 1: 2.4V min.
- Output Capability: Sink: 24mA @ 0.5V, Source: 15mA @ 2.4V

Isolated Digital Output
- Channels: 16
- Output Type: Sink type (NPN)
- Isolation Protection: 2,500 V<sub>DC</sub>
- Sink Current: 500 mA max./channel
- Opto-Isolator Response: 50 µs

General
- Bus Type: PCI Express V1.0
- I/O Connectors: 1 x DB37 female connector, 4 x 20-pin box header
- Dimensions (L x H): 168 x 100 mm (6.6” x 3.9”)
- Power Consumption: Typical: 3.3 V @ 280 mA, 12 V @ 330 mA, Max.: 3.3 V @ 420 mA, 12 V @ 400 mA
- Operating Temperature: 0 ~ 60°C (32 ~ 140°F)
- Storage Temperature: -25 ~ 85°C (-13 ~ 185°F)
- Storage Humidity: 5 ~ 95% RH, non-condensing

Ordering Information
- PCIE-1730: 32-ch Isolated Digital I/O PCIe Card

Accessories
- PCL-10120-1E: 20-pin Flat Cable, 1 m
- PCL-10120-2E: 20-pin Flat Cable, 2 m
- ADAM-3920: 20-pin DIN-rail Flat Cable Wiring Board
- PCLD-782: 16-ch Isolated DI Board w/ 1m 20-pin Flat Cable
- PCLD-885: 16-ch Power Relay Board w/ 20p & 50p Flat Cables
- PCLD-785: 16-ch Relay Board w/ 1m 20-pin Flat Cable
- ADAM-3937: DB37 DIN-rail Wiring Board
- PCL-10137-1E: DB37 Cable, 1 m
- PCL-10137-2E: DB37 Cable, 2 m
- PCL-10137-3E: DB37 Cable, 3 m
### Introduction

PCIE-1751 is a 48-bit digital I/O card for the PCI Express bus. Its 48 channels are divided into six 8-bit I/O ports and users can configure each 4-channel per port (nibble) as input or output via software. PCIE-1751 also provides three 32-bit counters.

### 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.**: 6

#### 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: 24mA @ 0.4 V
  - Source: 15mA @ 2.4 V

#### Counter/Timer
- **Channels**: 3
- **Resolution**: 3 x 32-bit counter
- **Max. Input Frequency**: 10 MHz
- **Reference Clock**
  - Internal: 20K / 200K / 2M / 20MHz
  - External Clock Frequency: 10 MHz
  - External Voltage Range: 5 V/TTL

#### General
- **Bus Type**: Universal PCI Express
- **I/O Connectors**: 1 x 68-pin SCSI female connector
- **Dimensions (L x H)**: 168 x 100 mm (6.6” x 3.9”)
- **Power Consumption**
  - Typical: 3.3 V @ 850 mA
  - Max.: 3.3V @ 2.63 A
  - Note: The maximum power consumption includes power consumption for +5 V output (on pin 34 and pin 68, with 0.5 A)
- **Operating Temperature**: 0-60°C (32-140°F)
- **Storage Temperature**: -20 – 70°C (-4 – 158°F)
- **Storage Humidity**: 5 – 95% RH, non-condensing

### Features
- Emulates mode 0 of 8255 PPI (every port with nibble)
- Buffered circuits for higher driving capacity than the 8255
- Interrupt handling capability
- Timer/Counter interrupt capability
- Supports both dry and wet contact
- Keeps the I/O port setting and DO state after system reset
- BoardID switch
- Pattern match interrupt function for DI
- “Change of state” interrupt function for DI
- Programmable digital filter function for DI
- Output status read back

### Ordering Information

#### PCIE-1751
48-ch Digital I/O and 3-ch Counter PCI Express

#### Accessories
- **PCL-10168-1E**: 68-pin SCSI Shielded Cable, 1 m
- **PCL-10168-2E**: 68-pin SCSI Shielded Cable, 2 m
- **ADAM-3968**: 68-pin DIN-rail SCSI Wiring Board
- **ADAM-3968/20**: 68-pin SCSI to 2 20-pin Box Header Board
- **ADAM-3968/50**: 68-pin SCSI to 2 50-pin Box Header Board
- **PCLD-8751**: 48-ch Isolated Digital Input Board
- **PCLD-8761**: 24-ch Relay/Isolated Digital Input Board
- **PCLD-8762**: 48-ch Relay Board

### Pin Assignment

![Pin Assignment Table]

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**Data Acquisition Boards**
Introduction

The Advantech PCIE-1752, PCIE-1754 and PCIE-1756 series products offer 64 isolated digital input and output channels with 2,500 V<sub>DC</sub> isolation protection. They feature a wide input range (10 ~ 30 V<sub>DC</sub>), wide output range (5 ~ 40 V<sub>DC</sub>) and high sink current (500mA max./channel) that make PCIE-1752/1754/1756 series products easily used in industrial automation control systems. With the help of the latest Advantech driver - DAQNavi, users can perform the configuration and setting easily and efficiently in the programming.

Features

**PCIE-1752/1756**
- Wide input range (5 ~ 40 V<sub>DC</sub>)
- High sink current on isolated output channels (500mA max./ch)
- 2,000 V<sub>DC</sub> ESD protection
- High-voltage isolation (2,500 V<sub>DC</sub>)
- Interrupt handling capability

**PCIE-1754/1756**
- Wide input range (10 ~ 30 V<sub>DC</sub>)
- Either +/- voltage input for DI by group
- High over-voltage protection (70 V<sub>DC</sub>)
- High-voltage isolation (2,500 V<sub>DC</sub>)
- Output status read-back
- Keeps the output settings and values after system hot reset
- Channel-freeze function

Specifications

**Isolated Digital Input**
- **Channels**
  - PCIE-1754: 64
  - PCIE-1756: 32
- **Input Voltage**
  - Logic 0: 3 V max.
  - Logic 1: 10 V min. (30 V<sub>DC</sub> max.)
- **Input Current**
  - 10 V<sub>DC</sub> @ 2.97 mA
  - 20 V<sub>DC</sub> @ 6.35 mA
  - 30 V<sub>DC</sub> @ 9.73 mA
- **Interrupt Capable Ch.**
  - PCIE-1754: 4
  - PCIE-1756: 2
- **Isolation Protection**
  - 2,500 V<sub>DC</sub>
- **Overvoltage Protection**
  - 70 V<sub>DC</sub>
- **ESD Protection**
  - 2,000 V<sub>DC</sub>
- **Opto-Isolator Response**
  - 50 µs

**Isolated Digital Output**
- **Channels**
  - PCIE-1752: 64
  - PCIE-1756: 32
- **Output Type**
  - Sink (NPN)
- **Isolation Protection**
  - 2,500 V<sub>DC</sub>
- **Output Voltage**
  - 5 ~ 40 V<sub>DC</sub>
- **Sink Current**
  - 500 mA max./channel
- **Opto-isolator Response**
  - 50 µs

General
- **Bus Type**
  - PCI Express V1.0
- **I/O Connectors**
  - 1 x 100-pin SCSI female connector
- **Dimensions (L x H)**
  - 168 x 100 mm (6.6" x 3.9")
- **Power Consumption**
  - **PCIE-1752**
    - Typical: 3.3 V @ 485 mA
    - Max.: 3.3 V @ 530 mA; 12V @ 90 mA
  - **PCIE-1754**
    - Typical: 3.3 V @ 285 mA
    - Max.: 3.3 V @ 330 mA
  - **PCIE-1756**
    - Typical: 3.3 V @ 385 mA
    - Max.: 3.3 V @ 430 mA; 12V @ 55 mA
- **Operating Temperature**
  - 0 ~ 60°C (32 ~ 140°F)
- **Storage Temperature**
  - -20 ~ 70°C (-4 ~ 158°F)
- **Storage Humidity**
  - 5 ~ 95% RH, non-condensing

Ordering Information
- **PCIE-1752**
  - 64-ch Isolated Digital Output PCI Express Card
- **PCIE-1754**
  - 64-ch Isolated Digital Input PCI Express Card
- **PCIE-1756**
  - 64-ch Isolated Digital I/O PCI Express Card

Accessories
- **PCL-10250-1E**
  - 100-pin SCI to Two 50-pin SCI Cable, 1 m
- **PCL-10250-2E**
  - 100-pin SCI to Two 50-pin SCI Cable, 2 m
- **ADAM-3951**
  - 50-pin DIN-rail Wiring Board w/ LED Indicators
- **PCL-101100M-3E**
  - 100-pin SCI to 100-pin SCI Cable, 3 m
- **ADAM-39100**
  - 100-pin DIN-rail Wiring Board
Introduction

PCIE-1760 relay actuator and isolated digital input card is a PC add-on card for the PCI Express bus. It meets the PCI Express standard Rev. 1.0. 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 a 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
- Input Voltage: Logic 0: 1.0 V max. Logic 1: 4.5 V min. (12 V max.)
- Interrupt Capable Ch.: 8
- Isolation Protection: 2,500 Vdc
- Opto-Isolator Response: 25 µs
- Input Resistance: 2 kΩ 1/4 W

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

Relay Output
- Channels: 8
- Relay Type: 2 x Form C, and 6 x Form A
- Contact Rating: 1 A @ 125 Vcc, 2 A @ 30 Vcc
- Max. Switching Power: 125 VA, 60 W
- Max. Switching Voltage: 250 Vcc, 220 Vcc
- Max. Switching Current: 2 A
- Operate/Release Time: 5 / 3.5 ms max
- Resistance: Contact: 50 mΩ max.
  Insulation: 100 MΩ min. @ 500 Vcc
- Life Expectancy (Electrical): 3 x 10⁶ cycles min.; 2 A @ 30 Vcc, 1 A @ 125 Vcc

General
- Bus Type: PCI Express V1.0
- I/O Connectors: 1 x DB37 female connector
- Dimensions (L x H): 168 x 100 mm (6.6” x 3.9”)
- Power Consumption: Typical: 5 V @ 450 mA
  Max.: 5 V @ 850 mA
- Operating Temperature: 0 ~ 60°C (32 ~ 140°F)
- Storage Temperature: -20 ~ 70°C (-4 ~ 158°F)
- Storage Humidity: 5 ~ 95 % RH, non-condensing

Ordering Information
- PCIE-1760: 8-ch Relay/IDI PCIe Card w/ 10-ch Counter/Timer

Accessories
- PCL-10137-1E: DB37 Cable, 1 m
- PCL-10137-2E: DB37 Cable, 2 m
- PCL-10137-3E: DB37 Cable, 3 m
- ADAM-3937: DB37 DIN-rail Wiring Board
PCIE-1810

800 kS/s, 12-bit, 16-ch PCI Express Multifunction DAQ Car

Introducing the PCIE-1810, a multifunction PCI Express card that includes digital I/O, analog I/O and counter functions. It also features a 800 kS/s 12-bit A/D converter and supports analog trigger for A/D data acquisition.

Specifications

Analog Input
- Channels: Single-end 16-ch, Differential 8-ch
- Resolution: 12 bits
- Sample Rate: Single Channel 800 kS/s max., Multi-Channel 500 kS/s max.

Note: The sampling rate for each channel will be affected by the used channel number. For example, if 4 channels of PCIE-1810 are used, the sampling rate is 500k/4 = 125 kS/s per channel.

- Trigger Reference: Digital Trigger
- Trigger Mode: Start trigger, Delay to Start trigger
- FIFO Size: 4k samples
- Overvoltage Protection: 30 Vp-p
- Input Impedance: 1 G
- Sampling Modes: Software and external clock
- Input Range: Software programmable

Gain
- Bipolar: +10V, +5, +2.5, +1.25, +0.625
- Unipolar: N/A, 0 – 10, 0 – 5, 0 – 2.5, 0 – 1.25

Absolute Accuracy (% of FSR)*
- 0.5%
- 1%
- 2%
- 4%
- 8%

Digital I/O
- Channels: 24
- 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., Logic 1: 2.0 V min.
- Output Capability: Sink: 15 mA @ 0.8 V, Source: 15 mA @ 2.0 V

Counter
- Channels: 2
- Resolution: 32 bits
- Compatibility: 5 V/TTL
- Max. Input Frequency: 10 MHz
- Pulse Generation: Yes
- Timebase Stability: 50 ppm

General
- Form factor: PCI Express x 1
- Triggering: 12 bits Analog x 2 / Digital x 2
- I/O Connector: 68-pin SCSI female connector
- Dimensions (L x W): 167 x 100 mm
- Power Consumption:
  - Typical: 3.3 V @ 488 mA, 12 V @ 112 mA
  - Max.: 3.3 V @ 2.25 A, 12 V @ 390 mA
- Operating Temperature: 0 ~ 60°C (32 ~ 140°F) (refer to IEC 60068-2-1, 2)
- Storage Temperature: -40 ~ 70°C (-40 ~ 158°F)
- Storage Humidity: 5 ~ 95% RH non-condensing (refer to IEC 60068-2-3)

Ordering Information
- PCIE-1810: 800 kS/s, 12-bit Multifunction Card

Accessories
- PCL-10168-1E: 68-pin SCSI Shielded Cable with Noise Rejecting, 1 m
- PCL-10168-2E: 68-pin SCSI Shielded Cable with Noise Rejecting, 2 m
- PCL-10168-1E: 68-pin SCSI Shielded Cable, 1 m
- PCL-10168-2E: 68-pin SCSI Shielded Cable, 2 m
- ADAM-3968: 68-pin DIN-rail SCSI Wiring Board
Features

PCIE-1816
- 16 analog inputs, up to 1 MS/s, 16-bit resolution
- PCIE-1816H
- 16 analog inputs, up to 5 MS/s, 16-bit resolution

PCIE-1816/1816H
- 2 analog outputs up to 3 MS/s, 16-bit resolution
- Support Analog and Digital Trigger for AI/O
- Support Waveform generation for AO
- 24 programmable digital I/O lines
- Two 32-bit programmable counter/timers
- Onboard FIFO memory (4k samples)
- Support for Microsoft Windows 8 (desktop mode only)/7/XP

Introduction

PCIE-1816/1816H is a 16-ch, up to 5 MS/s multi-function DAQ card and integrates digital I/O, analog I/O, and counter functions. The PCIE-1816/1816H also features analog and digital triggering, 2-ch 16-bit analog outputs with waveform generation capability, 24-ch programmable digital I/O lines, and two 32-bit general-purpose timer/counters.

Specifications

Analog Input
- **Channels**
  - Single-end: 16-ch
  - Differential: 8-ch
- **Resolution**
  - 16 bits
- **Sample Rate**
  - PCIE-1816: Single Channel 1 MS/s max., Multi-Channel 500 kS/s max.
  - PCIE-1816H: Single Channel 5 MS/s max., Multi-Channel 1 MS/s max.
  - Note: The sampling rate for each channel will be affected by used channel number. For example, if 4 channels of PCIE-1816H are used, the sampling rate is 1M/4 = 250 kS/s per channel.
- **Trigger Reference**
  - Analog Trigger, Digital Trigger
- **FIFO Size**
  - 4k samples
- **Overvoltage Protection**
  - 30 Vp-p
- **Input Impedance**
  - 1 GΩ
- **Sampling Mode**
  - Software and external clock
- **Input Range**
  - Software programmable

Digital I/O
- **Channels**
  - 24
- **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.
  - Logic 1: 2.0 V min.
- **Output Capability**
  - Sink: 15 mA @ 0.8 V
  - Source: 15 mA @ 2.0 V

Counter
- **Channels**
  - 2
- **Resolution**
  - 32 bits
- **Compatibility**
  - 5 V/TTL
- **Max. Input Frequency**
  - 10 MHz
- **Pulse Generation**
  - Yes
- **Timebase Stability**
  - 50 ppm

General
- **Form factor**
  - PCI Express x 1
- **Triggering**
  - 16 bits Analog x 2 / Digital x 2
- **I/O Connector**
  - 68-pin SCSI female connector
- **Dimensions (L x W)**
  - 167 x 100 mm
- **Power Consumption**
  - Typical: 3.3 V @ 488 mA
  - 12 V @ 112 mA
  - Max.: 3.3 V @ 2.25 A
  - 12 V @ 390 mA
- **Operating Temperature**
  - 0 ~ 60°C (32 ~ 140°F)
- **Storage Temperature**
  - -40 ~ 70°C (-40 ~ 158°F)
- **Storage Humidity**
  - 5 ~ 95% RH non-condensing

Ordering Information

- **PCIE-1816**
  - 1 MS/s, 16-bit Multifunction Card
- **PCIE-1816H**
  - 5 MS/s, 16-bit Multifunction Card

Accessories
- **PCL-10168H-1E**
  - 68-pin SCSI Shielded Cable with Noise Rejecting, 1 m
- **PCL-10168H-2E**
  - 68-pin SCSI Shielded Cable with Noise Rejecting, 2 m
- **PCL-10168-1E**
  - 68-pin SCSI Shielded Cable, 1 m
- **PCL-10168-2E**
  - 68-pin SCSI Shielded Cable, 2 m
- **ADAM-3968**
  - 68-pin DIN-rail SCSI Wiring Board

**NEW**

1  MS/s, 16-bit, 16-ch PCI Express Multifunction DAQ Card

5 MS/s, 16-bit, 16-ch PCI Express Multifunction DAQ Card

**Data Acquisition Boards**
Introduction

The Advantech PCIE-1802 is a 24-bit high-accuracy data acquisition PCI Express module specifically designed for sound and vibration applications. This module has built-in 4 or 10 mA excitation currents for IEPE sensors such as accelerometers and microphones.

Specifications

Analog Input
- Channels: 8 (simultaneously sample, differential or 50 Ω pseudo-differential)
- Resolution: 24 bits (Delta-sigma)
- Max. Sampling Rate: 100 S/s to 204.8 kS/s (with resolution ≤ 363.80 µS/s)
- Input Coupling: AC/DC, selectable per channel
- AC Cut-Off Frequency: 0.016 Hz (-3 dB)
- DC Offset Adjustment: ±50 % of input range
- Trigger Modes: Start trigger, Delay to Start trigger, Stop trigger, Delay to Stop trigger
- Input Range: ±0.2, ±0.5, ±1, ±2, ±5, ±10 Vpp
- Offset Error: < ±0.002 %
- Gain Error: < ±0.2 %
- Total Harmonic Distortion (THD): 100 dB
- Dynamic Range: 115 dB
- IEPE Excitation: 0, 4, or 10 mA, selectable per channel (open/short detect)
- Data Transfer: Direct memory access (DMA)
- Multiple Card: For more than 8 AI channels
- Synchronization

Digital Input/Output
- DI Channels: 1 (edge detect, noise filter)
- DO Channels: 2

General
- Bus Type: PCI Express x1
- I/O Connectors: CN600 36-pin Mini-SCSI (for AI)
- CN601 HDMI (for clock, trigger, and DI/Os)
- Dimensions (L x H): 175 x 100 mm (6.9” x 3.9”)
- Operating Temperature: 0 – 60°C (32 – 140°F)
- Storage Temperature: -40 – 70°C (40 – 158°F)
- Storage Humidity: 5 – 95 % RH, non-condensing

Ordering Information
- PCI-1802 8-ch, 24-Bit, 216 kS/s Dynamic Signal Acquisition PCI Express Card
PCIE-1840

4-ch 16-Bit 125 MS/s High-Speed PCI Express Digitizer

Introduction
The PCIE-1840 high-speed digitizers feature four 125 MS/s simultaneously sampled analog input channels with 16-bit resolution, 100 MHz bandwidth, and up to 2 GB of memory in a PCI Express device.

Specifications

Analog Input
- Channels: 4 single-ended, simultaneously sampling
- Resolution: 16 bits
- Max. Sampling Rate: 125 MS/s per channel
- Memory Size: 2GB
- Over Voltage Protection: 30 Vp-p
- Input Impedance: 50Ω / 1MΩ
- Input Coupling: AC/DC (only for 1MΩ input impedance)
- Sampling Modes: Software and external clock
- Trigger Modes: Start trigger, Delay to Start trigger, Stop trigger, Delay to Stop trigger
- Input Range: 0.2 / 0.4 / 1 / 2 / 4 / 10 / 20 Vpp (input Impedance must be 1 MΩ)
- Time Interleaved Sampling: 4 channels combined, 500 MSPS max., 2 channels combined, 250 MSPS max., No time interleaved, 125 MSPS max., Configured automatically by setting sampling rate

General
- Bus Type: PCI Express x 4
- I/O Connectors: 4 x BNC connector (for AI), 1 x HDMI connector (for Ext. clock and trigger)
- Dimensions (L x H): 175 x 100 mm (6.9” x 3.9”)
- Operating Temperature: 0 – 50°C (32 – 140°F)
- Storage Temperature: -40 – 70°C (40 – 158°F)
- Storage Humidity: 5 – 95% RH, non-condensing

Features
- 4 simultaneously sample analog inputs, up to 125 MS/s, 16-bit resolution
- 500 MS/s Time Interleaved Sampling
- Non-stop data streaming capable
- 2 GB on-board memory
- 1M or 50 Ohm selectable input impedance
- On-Board tunable anti-aliasing filter
- AC/DC Coupling

Ordering Information
- PCIE-1840 4-ch 16Bit 125 MS/s High-Speed PCI Express Digitizer

Pin Assignments

[Diagram of pin assignments]
PCI-1710U/UL
PCI-1710HGU

100 kS/s, 12-bit, 16-ch Universal PCI Multifunction DAQ Card
100 kS/s, 12-bit, 16-ch Universal PCI Multifunction DAQ Card with High Gain

Features
- 16-ch single-ended or 8-ch differential or a combination of analog input
- 12-bit A/D converter, with up to 100 kHz sampling rate
- Programmable gain
- Automatic channel/gain scanning
- Onboard FIFO memory (4,096 samples)
- Two 12-bit analog output channels (PCI-1710U/HGU only)
- 16-ch digital input and 16-ch digital output
- Onboard programmable counter
- BoardID™ switch

Specifications

Analog Input
- Channels 16 single-ended/ 8 differential (software programmable)
- Resolution 12 bits
- FIFO Size 4,096 samples
- Overvoltage Protection 30Vp-p
- Input Impedance 1 GΩ
- Sampling Modes Software, onboard programmable pacer and external
- Input Range (V, software programmable) & Absolute Accuracy
<table>
<thead>
<tr>
<th>PCI-1710U/UL</th>
<th>PCI-1710HGU</th>
</tr>
</thead>
<tbody>
<tr>
<td>Gain</td>
<td>Bipolar</td>
</tr>
<tr>
<td></td>
<td>Unipolar</td>
</tr>
<tr>
<td>Absolute Accuracy (% of FSR)*</td>
<td>0.1</td>
</tr>
</tbody>
</table>

* ±1 LSB is added as the derivative for absolute accuracy

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: 2.0 V min.
- Output Capability Sink: 8.0 mA @ 0.8 V Source: 0.4 mA @ 2.0 V

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

General
- Bus Type Universal PCI V2.2
- I/O Connector 1 x 68-pin SCSI female connector
- Dimensions (L x H) 175 x 100 mm (6.9” x 3.9”)
- Power Consumption Typical: 5 V @ 850 mA Max.: 5 V @ 1.0 A
- Operating Temperature 0 – 80°C (32 – 140°F)
- Storage Temperature -20 – 70°C (-4 – 158°F)
- Storage Humidity 5 – 95% RH non-condensing

Ordering Information
- PCI-1710U 100 kS/s, 12-bit Multifunction Card
- PCI-1710UL 100 kS/s, 12-bit Multifunction Card w/o AO
- PCI-1710HGU 100 kS/s, 12-bit High-gain Multifunction Card

Accessories
- PCLD-8710 DIN-rail Wiring Board w/ CJC
- PCL-10166-1E 68-pin SCSI Shielded Cable, 1 m
- PCL-10168-2E 68-pin SCSI Shielded Cable, 2 m
- ADAM-3968 68-pin DIN-rail SCSI Wiring Board

Note: The sampling rate for each channels will be affected by used channel number. For example, if 4 channels of PCI-1710U are used, the sampling rate is 100k/4 = 25 kS/s per channel.
### Features
- 16-ch single-ended analog input
- 12-bit A/D converter, with up to 100 kHz sampling rate
- Programmable gain
- Automatic channel/gain scanning
- Onboard FIFO memory (1,024 samples)
- Two 12-bit analog output channels (PCI-1711U only)
- 16-ch digital input and 16-ch digital output
- Onboard programmable counter

### Specifications

**Analog Input**
- **Channels**: 16 single-ended
- **Resolution**: 12 bits
- **Max. Sampling Rate**: 100 kS/s
- **FIFO Size**: 1,024 samples
- **Overvoltage Protection**: 30 Vp-p
- **Input Impedance**: 2 MΩ\(\times\)5 pF
- **Sampling Modes**: Software, onboard programmable pacer, or external
- **Input Range (V, software programmable) & Absolute Accuracy**
  - Bipolar: ± 10 ± 5 ± 2.5 ± 1.25 ± 0.625
  - Absolute Accuracy (% of FSR)*
    - ±0.1 ±0.1 ±0.2 ±0.2 ±0.4

  * ±1 LSB is added as the derivative for absolute accuracy

**Analog Output (PCI-1711U only)**
- **Channels**: 2
- **Resolution**: 12 bits
- **Output Rate**: Static update
- **Output Range**: (Software programmable)
- **Internal Reference**: Unipolar
  - 0 - 5 V, 0 - 10 V
- **External Reference**: 0 - ±V @ ±V (-10 ≤ x ≤ 10)
- **Slew Rate**: 11 V/µs
- **Driving Capability**: 3 mA
- **Output Impedance**: 0.81 Ω
- **Operation Mode**: Static update
- **Accuracy**
  - INLE: ±0.5 LSB
  - DNLE: ±0.5 LSB

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

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

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

### Ordering Information
- **PCI-1711U**: Entry-level 100 kS/s, 12-bit Multifunction Card
- **PCI-1711UL**: Entry-level 100 kS/s, 12-bit Mult. Card w/o AO

### Accessories
- **PCLD-8710**: DIN-rail Wiring Board w/ CJC
- **PCL-10168-1E**: 68-pin SCSI Shielded Cable, 1 m
- **PCL-10168-2E**: 68-pin SCSI Shielded Cable, 2 m
- **ADAM-3968**: 68-pin DIN-rail SCSI Wiring Board
Features
- 16 single-ended or 8 differential or a combination of analog inputs
- 12-bit A/D converter, with up to 1 MHz sampling rate
- Programmable gain
- Automatic channel/gain scanning
- Onboard FIFO memory (AI: 1,024 samples AO: 32,768 samples)
- Two 12-bit analog output channels with continuous waveform output function (PCI-1712 only)
- 16-ch digital input or output (programmable)
- Three 16-bit programmable multifunction counter/timers on 10 MHz
- Auto-calibration (AI/AO)
- PCI-Bus mastering/data transfer
- Pre-, post-, about- and delay-trigger data acquisition modes for analog input channels
- Flexible triggering and clocking capabilities

Specifications

**Analog Input**
- **Channels**: 16 single-ended/8 differential (software programmable)
- **Resolution**: 12 bits
- **Max. Sampling Rate**:
  - Multi-channel, single gain: 1 MS/s
  - Multi-channel, multi gain: 600 kS/s
  - Multi-channel, multi gain, unipolar/bipolar: 400 kS/s
  - 1,024 samples
- **FIFO Size**: 1,024 samples
  - Note: The sampling rate for each channel will be affected by the number of channels.
  - For example, if 4 channels are used, the sampling rate is 600 kS/s / 4 = 150 kS/s per channel.
  - (multi gain, without unipolar/bipolar mixed)
- **Overvoltage Protection**: 30 Vp-p
- **Input Impedance**: 100 MΩ/10 pF (Diff), 100 MΩ/100 pF (On)
- **Sampling Modes**: Software, onboard programmable and external
- **Trigger Modes**: Pre-trigger, post-trigger, delay-trigger and about-trigger
- **Input Range (V, software programmable) & Absolute Accuracy**
  - **Unipolar**: N/A, 0~10, 0~5, 0~2.5, 0~1.25
  - **Bipolar**: ±10, ±5, ±2.5, ±1.25
  - **Absolute Accuracy**: ±0.1%, ±0.5%, ±2.5%, ±1.25%
  - Note: ±1 LSB is added as the derivative for absolute accuracy
- **Output Range**: ±10 V, ±5 V, ±2.5 V, ±1.25 V
- **Resolution**: 12 bits
- **Overvoltage Protection**: 30 Vp-p
- **Input Impedance**: 100 MΩ/10 pF (Diff), 100 MΩ/100 pF (On)
- **FIFO Size**: 1,024 samples
- **Overvoltage Protection**: 30 Vp-p
- **Input Impedance**: 100 MΩ/10 pF (Diff), 100 MΩ/100 pF (On)
- **Sampling Modes**: Software, onboard programmable and external
- **Trigger Modes**: Pre-trigger, post-trigger, delay-trigger and about-trigger
- **Input Range (V, software programmable) & Absolute Accuracy**
  - **Unipolar**: N/A, 0~10, 0~5, 0~2.5, 0~1.25
  - **Bipolar**: ±10, ±5, ±2.5, ±1.25
  - **Absolute Accuracy**: ±0.1%, ±0.5%, ±2.5%, ±1.25%
  - Note: ±1 LSB is added as the derivative for absolute accuracy

**Analog Output (PCI-1712 only)**
- **Channels**: 2
- **Resolution**: 12 bits
- **Output Rate**: 1 MS/s max.
- **FIFO Size**: 32,768 samples
- **Output Range**: (Software programmable)
- **Internal Reference**: Bipolar ±5 V, ±10 V
- **External Reference**: Unipolar 0~5 V, 0~10 V
- **Slew Rate**: 20 V/µs
- **Driving Capability**: 10 mA
- **Output Impedance**: 0.1 Ω max.
- **Operation Mode**: Static update, waveform generation
- **Accuracy**: INL: ±1 LSB
- **Driving Capability**: 10 mA
- **Output Impedance**: 0.1 Ω max.
- **Operation Mode**: Static update, waveform generation
- **Accuracy**: INL: ±1 LSB

**Digital I/O**
- **Channels**: 16
- **Compatibility**: 5 V/TTL
- **Input Voltage**: Logic 0: 0.8 V max.
- **Output Voltage**: Logic 0: 0.8 V max.
- **Output Capability**: 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**: External: 10 MHz

**General**
- **Bus Type**: PCI V 2.2
- **I/O Connector**: 1 x 68-pin SCSI female connector
- **Dimensions (L x W x H)**: 175 x 110 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)
- **Storage Temperature**: -20 ~ 85°C (4 ~ 185°F)
- **Storage Humidity**: 5 ~ 95% RH non-condensing

**Ordering Information**
- **PCI-1712**: 1 MS/s, 12-bit High-speed Multifunction PCI Card
- **PCI-1712L**: 1 MS/s, 12-bit High-speed Multi. PCI Card w/o AD

**Accessories**
- **PCLD-8712**: DIN-rail Wiring Board for PCI-1712/L
- **PCL-1816B-1E**: 68-pin SCSI Shielded Cable, 1 m
- **PCL-1816B-2E**: 68-pin SCSI Shielded Cable, 2 m
- **ADAM-3968**: 68-pin DIN-rail SCSI Wiring Board
PCI-1716/L

250 kS/s, 16-bit, 16-ch PCI Multifunction DAQ Card

Features
- 16 single-ended or 8 differential or a combination of analog inputs
- 16-bit A/D converter, with up to 250 kHz sampling rate
- Onboard FIFO memory (1,024 samples)
- Auto-calibration
- PCI-Bus mastering data transfer
- 2 analog output channels (PCI-1716 only)
- 16-ch digital input and 16-ch digital output
- Onboard programmable counter
- BoardID switch

Specifications

Analog Input
- Channels: 16 single-ended/ 8 differential (software programmable)
- Resolution: 16 bits
- Max. Sampling Rate: 250 kS/s
Note: The sampling rate for each channel will be affected by used channel number. For example, if 4 channels are used, the sampling rate is 250k/4 = 62.5 kS/s per channel.
- FIFO Size: 1,024 samples
- Overvoltage Protection: 30 Vp-p
- Input Impedance: 100 MΩ/10 pF (off), 100 MΩ/100 pF (on)
- Sampling Modes: Software, onboard programmable pacer and external
- Input Range (V, software programmable) & Absolute Accuracy
  | Unipolar | N/A | 0 – 10 | 0 – 5 | 0 – 2.5 | 0 – 1.25 |
  | Bipolar | ±10 | ±5 | ±2.5 | ±1.25 | ±0.625 |
  | Absolute Accuracy (% of FSR)* | 0.05 | 0.03 | 0.03 | 0.05 | 0.1 |
  * ±1 LSB is added as the derivative for absolute accuracy

Analog Output (PCI-1716 only)
- Channels: 2
- Resolution: 16 bits
- Output Rate: Static update
- Output Range (Software programmable)
  | Unipolar | 0 - 5 V | 0 - 10 V |
  | Bipolar | ±5 V | ±10 V |

- Slew Rate: 20 V/µs
- Driving Capability: 20 mA
- Output Impedance: 0.1 Ω max.
- Operation Mode: Static update
- Accuracy: INLE: ±1 LSB

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

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

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

Ordering Information
- PCI-1716: 250 kS/s, 16-bit High-resolution Multi. Card
- PCI-1716L: 250 kS/s, 16-bit High-res. Multi. Card w/o AD

Accessories
- PCLD-6710: DIN-rail Wiring Board w/ CJC
- PCL-10168-1E: 68-pin SCSI Shielded Cable, 1 m
- PCL-10168-2E: 68-pin SCSI Shielded Cable, 2 m
- ADAM-3968: 68-pin DIN-rail SCSI Wiring Board
# PCI-1741U
## PCI-1742U

## Specifications

### Analog Input
- **Channels:** 16 single-ended/8 differential (software programmable)
- **Resolution:** 16 bits
- **Max. Sampling Rate**
  - PCI-1741U: 200 kS/s
  - PCI-1742U: single-channel - 1 MS/s
  - multi-channel - 800 kS/s
  - unipolar bipolar mixed - 250 kS/s
- **FIFO Size:** 1,024 samples
- **Overvoltage Protection:** 30 Vp-p
- **Input Impedance**
  - Off: 100 MΩ/10pF
  - On: 100 MΩ/100pF
- **Sampling Mode:** Software, onboard programmable pacer and external
- **Input Range*:**
  - **Unipolar:** N/A 0 ~ 10 0 ~ 5 0 ~ 2.5 0 ~ 1.25
  - **Bipolar:** ±10 ±5 ±2.5 ±1.25 ±0.625
- **Accuracy (% of FSR ±1LSB):**
  - Unipolar: 0.02 0.02 0.02 0.03 0.04
  - Bipolar: ±0.10  ±0.05  ±0.025  ±0.0125

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

### Analog Output
- **Channels**
  - PCI-1741U: 1
  - PCI-1742U: 2
- **Resolution:** 16 bits
- **Output Rate:** Static update
- **Output Range**
  - (V, software programmable)
  - **Internal Reference:** Bipolar: ±10, Unipolar: ±5
  - **External Reference:** Bipolar: 0 ~ xV @ ±xV (|x| ≤ 10), Unipolar: 0 ~ xV @ ±xV (|x| ≤ 10)
- **Slew Rate:** PCI-1741U: 20 V/us
- **Driving Capability:** ±20 mA
- **Output Impedance:** 0.1 W max.
- **Operation Mode:** Software polling
- **Accuracy:** INLE: ±2LSB

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

### Digital Output
- **Channels:** 16
- **Compatibility:** 5 V/TTL
- **Output Voltage**
  - Logic 0: 0.8 V max.
  - Logic 1: 2.0 V min.
- **Output Capability**
  - Sink: 24 mA @ 0.8 V
  - Source: -15 mA @ 2.0 V
- **Counter/Timer**
  - **Channels:** 1
  - **Compatibility:** 5 V/TTL
  - **Resolution:** 16 bits
  - **Max. Input Frequency:** 10 MHz
  - **Reference Clock**
    - Internal: 10 MHz
    - External Clock Frequency: 10 MHz

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

### Ordering Information
- **PCI-1741U**
  - 200 kS/s, 16-bit, 16-ch Univ. PCI Multi. Card
- **PCI-1742U**
  - 1 MS/s, 16-bit, 16-ch Universal PCI Multi. Card

### Accessories
- **PCL-10168-1**
  - 68-pin SCSI Shielded Cable, 1 m
- **PCL-10168-2**
  - 68-pin SCSI Shielded Cable, 2 m
- **ADAM-3968**
  - 68-pin DIN-rail SCSI Wiring Board
- **PCLD-8710**
  - DIN-rail Wiring Board w/ CJC

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**RoHS COMPLIANT**

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**Features**
- 16-ch single-ended or 8-ch differential analog input
- PCI-1741U: 16-bit A/D converter, with up to 200 kHz sampling rate
- PCI-1742U: 16-bit A/D converter, with up to 1 MHz sampling rate
- Onboard FIFO memory (1,024 samples)
- Auto calibration
- PCI-1741U: 1 x 16-bit analog output channel
- PCI-1742U: 2 x 16-bit analog output channels
- 16-ch digital input and 16-ch digital output
- Universal PCI bus (support 3.3 V or 5 V PCI bus signal)
- Onboard programmable counter
- BoardID™ switch

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**Digital Input**

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<th>Channels</th>
<th>16</th>
</tr>
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<tbody>
<tr>
<td>Resolution</td>
<td>16</td>
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<tr>
<td>Output Rate</td>
<td>Static update</td>
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<tr>
<td>Output Range</td>
<td>(V, software programmable)</td>
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**Digital Output**

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<th>Channels</th>
<th>16</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compatibility</td>
<td>5 V/TTL</td>
</tr>
<tr>
<td>Output Voltage</td>
<td>Logic 0: 0.8 V max. Logic 1: 2.0 V min.</td>
</tr>
<tr>
<td>Output Capability</td>
<td>Sink: 24 mA @ 0.8 V Source: -15 mA @ 2.0 V</td>
</tr>
</tbody>
</table>

**Counter/Timer**

<table>
<thead>
<tr>
<th>Channels</th>
<th>1</th>
</tr>
</thead>
<tbody>
<tr>
<td>Compatibility</td>
<td>5 V/TTL</td>
</tr>
<tr>
<td>Resolution</td>
<td>16 bits</td>
</tr>
<tr>
<td>Max. Input Frequency</td>
<td>10 MHz</td>
</tr>
<tr>
<td>Reference Clock</td>
<td>Internal: 10 MHz External Clock Frequency: 10 MHz</td>
</tr>
</tbody>
</table>

---

**General**

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

---

**Ordering Information**

| PCI-1741U | 200 kS/s, 16-bit, 16-ch Univ. PCI Multi. Card |
| PCI-1742U | 1 MS/s, 16-bit, 16-ch Universal PCI Multi. Card |

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**Accessories**

| PCL-10168-1 | 68-pin SCSI Shielded Cable, 1 m |
| PCL-10168-2 | 68-pin SCSI Shielded Cable, 2 m |
| ADAM-3968 | 68-pin DIN-rail SCSI Wiring Board |
| PCLD-8710 | DIN-rail Wiring Board w/ CJC |

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**Features**

16-ch single-ended or 8-ch differential analog input
- PCI-1741U: 16-bit A/D converter, with up to 200 kHz sampling rate
- PCI-1742U: 16-bit A/D converter, with up to 1 MHz sampling rate
- Onboard FIFO memory (1,024 samples)
- Auto calibration
- PCI-1741U: 1 x 16-bit analog output channel
- PCI-1742U: 2 x 16-bit analog output channels
- 16-ch digital input and 16-ch digital output
- Universal PCI bus (support 3.3 V or 5 V PCI bus signal)
- Onboard programmable counter
- BoardID™ switch
Introduction

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

Specifications

Analog Input
- Channels: 4 single-ended
- Resolution: 12 bits
- Max. Sampling Rate:
  - PCI-1714U: 30 MS/s per channel
  - PCI-1714UL: 10 MS/s per channel
- FIFO Size:
  - PCI-1714U: 32,768 samples each channel
  - PCI-1714UL: 8,192 samples each channel
- Overvoltage Protection: 30 Vp-p
- Input Impedance: 50 Ω/1 MΩ/Hi Z jumper selectable/100 pF
- Sampling Modes: Software polling, pacer
- Trigger Modes: Post-trigger, pre-trigger, delay-trigger, about-trigger
- Input Range (V, software programmable) & Absolute Accuracy
  - Bipolar: ±5 ±2.5 ±1 ±0.5
  - Absolute Accuracy (% of FSR)*: 0.1 0.2 0.2 0.4

*R ±1 LSB is added as the derivative for absolute accuracy

General
- Bus Type: Universal PCI V2.2
- I/O Connectors:
  - 4 x BNC connector (for AI)
  - 1 x PS/2 connector (for Ext. clock and trigger)
- Dimensions (L x H): 175 x 100 mm (6.9” x 3.9”)
- Power Consumption:
  - Typical: 5 V @ 650 mA; 12 V @ 600 mA
  - Max.: 5 V @ 1 A; 12 V @ 700mA
- Operating Temperature: 0 ~ 60°C (32 ~ 140°F)
- Storage Temperature: -20 ~ 85°C (-4 ~ 185°F)
- Storage Humidity: 5 ~ 95% RH, non-condensing

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-1714U: 32,768 samples each channel; PCI-1714UL: 8,192 samples, each channel)
- 4 A/D converters simultaneously sampling
- Multiple A/D triggering modes
- Programmable pacer/counter
- BoardID™ switch
- Universal PCI Bus (supports 3.3 V or 5 V PCI bus signals)

Ordering Information
- PCI-1714U: 30 MS/s, 12-bit, Simultaneous 4-ch AI PCI Card
- PCI-1714UL: 10 MS/s, 12-bit, Simultaneous 4-ch AI PCI Card

Accessories
- ADAM-3909: DB9 DIN-rail Wiring Board
- PCL-10108-1E: BNC to BNC Wiring Cable, 1 m
- PCL-10901-1E: DB9 to PS/2 Cable, 1 m
- PCL-10901-3E: DB9 to PS/2 Cable, 3 m

Pin Assignments
### Specifications

**Analog Input**
- **Channels**: 32 single-ended/16 differential (software programmable)
- **Resolution**: 12 bits
- **Max. Sampling Rate**
  - PCI-1713U: 100 kS/s
  - PCI-1715U: 500 kS/s

Note: The sampling rate for each channel will be affected by the number of used channels. For example, if 4 channels of PCI-1713U are used, the sampling rate is 100k/4 = 25 kS/s per channel.
- **FIFO Size**
  - PCI-1713U: 4,096 samples
  - PCI-1715U: 1,024 samples
- **Overvoltage Protection**: 30 Vp-p
- **Isolation Protection**: 2,500 V DC
- **Input Impedance**: 1 GΩ
- **Sampling Modes**: Software, onboard programmable pacer and external clock (TTL level)
- **Input Range (V, software programmable) & Absolute Accuracy**

<table>
<thead>
<tr>
<th>Range</th>
<th>Unipolar</th>
<th>Bipolar</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N/A</td>
<td>±10</td>
</tr>
<tr>
<td>0–10</td>
<td>±0.1</td>
<td>±0.1</td>
</tr>
<tr>
<td>0–5</td>
<td>±0.2</td>
<td>±0.25</td>
</tr>
<tr>
<td>0–2.5</td>
<td>±0.2</td>
<td>±0.25</td>
</tr>
<tr>
<td>0–1.25</td>
<td>±0.4</td>
<td>±0.625</td>
</tr>
</tbody>
</table>

Absolute Accuracy (% of FSR)* = ±1 LSB as added as the derivative for absolute accuracy

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

### Ordering Information
- **PCI-1713U**: 100 kS/s, 12-bit, 32-ch Isolated AI PCI Card
- **PCI-1715U**: 500 kS/s, 12-bit, 32-ch Isolated AI PCI Card

### Accessories
- **ADAM-3937**: DB37 DIN-rail Wiring Board
- **PCL-10137-1E**: DB37 Cable, 1 m
- **PCL-10137-2E**: DB37 Cable, 2 m
- **PCL-10137-3E**: DB37 Cable, 3 m

### Pin Assignments

<table>
<thead>
<tr>
<th>Pin</th>
<th>Description</th>
</tr>
</thead>
</table>

* ±1 LSB is added as the derivative for absolute accuracy
Data Acquisition Boards

PCI-1747U

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

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

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

Specifications

Analog Input
- Channels: 64 single-ended, 32 differential, or combination
- Resolution: 16 bits
- Max. Sampling Rate: 250 kS/s
- FIFO Size: 1,024 samples
- Overvoltage Protection: 30 Vp-p
- Input Impedance: 100 MΩ/10 pF (Off); 100 MΩ/100 pF (On)
- Sampling Modes: Software and onboard programmable pacer
- 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: 0.01, 0.02, 0.02, 0.03, 0.04
  - Bipolar: 0.017

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

Ordering Information
- PCI-1747U 250 kS/s, 16-bit, 64-ch AI Universal PCI Card

Accessories
- ADAM-3968 68-pin DIN-rail SCSI Wiring Board
- PCL-10168-1 68-pin SCSI Shielded Cable, 1 m
- PCL-10168-2 68-pin SCSI Shielded Cable, 2 m

Pin Assignments

|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|

RoHS COMPLIANT
### Specifications

#### Analog Output
- **Channels**: 4 isolated
- **Resolution**: 12 bits
- **Output Rate**: Static update
- **Output Range**
  - **Bipolar**: ±5, ±10 V
  - **Unipolar**: 0 ~ 5, 0 ~ 10 V
  - **Current Loop**: 0 ~ 20 mA (typically), 4 ~ 20 mA (software programmable)
- **Slew Rate**: 2 V/μs
- **Isolation Protection**: 2,500 V DC
- **Driving Capability**: 5 mA
- **Operation Modes**: Software polling
- **Accuracy**
  - **Relative**: ±1 LSB
  - **Differential Non-linearity**: ±1 LSB (monotonic)
- **Excitation Voltage**: 50 V (max.)

#### General
- **Bus Type**: Universal PCI V2.2
- **I/O Connectors**: 1 x DB37 female connector
- **Dimensions (L x H)**: 175 x 100 mm (6.9” x 3.9”)
- **Power Consumption**
  - **5 V**: 200 mA (typical), 350 mA (max.)
  - **12 V**: 200 mA (typical), 350 mA (max.)
- **Operating Temperature**: 0 ~ 60°C (-4 ~ 140°F)
- **Storage Temperature**: -20 ~ 70°C (-4 ~ 158°F)
- **Storage Humidity**: 5 ~ 95% RH, non-condensing

#### Ordering Information
- **PCI-1720U**: 12-bit, 4-ch Isolated AO Universal PCI Card
- **Accessories**
  - PCL-10137-1E: DB37 Cable, 1 m
  - PCL-10137-2E: DB37 Cable, 2 m
  - PCL-10137-3E: DB37 Cable, 3 m
  - ADAM-3937: DB37 DIN-rail Wiring Board

### Specifications

#### Analog Output
- **Channels**: 32 isolated
- **Resolution**: 14 bits
- **Output Rate**: Static update
- **Output Range**
  - **Bipolar**: ±10 V
  - **Current Loop**: 0 ~ 20 mA, 4 ~ 20 mA (software programmable)
- **Isolation Protection**: 1,500 V
dc 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 DB62 female connector
- **Dimensions (L x H)**: 175 x 100 mm (6.9” x 3.9”)
- **Power Consumption**
  - **5 V**: 400 mA (typical), 500 mA (max.)
  - **12 V**: 270 mA (max.)
- **Operating Temperature**: 0 ~ 60°C (32 ~ 140°F)
- **Storage Temperature**: -20 ~ 70°C (-4 ~ 158°F)
- **Storage Humidity**: 5 ~ 95% RH, non-condensing

#### Ordering Information
- **PCI-1724U**: 14-bit, 32-ch Isolated AO Universal PCI Card
- **Accessories**
  - PCL-10162-1E: DB62 Cable, 1 m
  - PCL-10162-3E: DB62 Cable, 3 m
  - ADAM-3962: DB62 DIN-rail Wiring Board
PCI-1721

12-bit, 4-ch Analog Output PCI Card with 16-ch Digital I/O

**Features**
- 10 MHz maximum digital update rate
- Auto calibration function
- Four analog output channels with 1,024 samples FIFO buffer
- A 12-bit DAC is equipped for each of analog output channels
- Real-time waveform output function with internal/external pacer
- Synchronized output function
- Flexible output types and range settings
- Keeps the output settings and values after system hot reset
- 16-ch DI/O and one 10 MHz 16-bit resolution counter
- BoardID™ switch

**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**: 1,024 samples
- **Output Rate**: 10 MHz or static update
- **Reference Clock**: Internal: 10 MHz, External Clock Frequency: 10 MHz max. External Voltage Range: 0.8 V max., 2 V min.
- **Output Range**
  - **Internal Reference**
    - Unipolar: 0 - 5 V, 0 - 10 V
    - Bipolar: ±5 V, ±10 V
    - Current Loop: 0 - 20 mA, 4 - 20 mA (software programmable)
  - **External Reference**
    - 0 - ±x V @ ±x V (-10 ≤ x ≤ 10)
    - -x - +x V @ +x V (-10 ≤ x ≤ 10)
- **Slew Rate**: 10 V/µs
- **Driving Capability**: 10 mA
- **Output Impedance**: 0.1 Ω max.
- **Operation Modes**: Single/continuous/waveform/synchronized output
- **Accuracy**
  - Relative: ±1 LSB
  - Differential Non-linearity: ±1 LSB (monotonic)

### Counter/Timer
- **Channels**: 1
- **Resolution**: 16 bits
- **Compatibility**: 5 V/TTL
- **Max. Input Frequency**: 10 MHz
- **Reference Clock**: Internal: 10 MHz, External Clock Frequency: 10 MHz max. External Voltage Range: 0.8 V max., 2.0 V min.

### General
- **Bus Type**: PCI V2.2
- **I/O Connectors**: 1 x 68-pin SCSI female connector
- **Dimensions (L x H)**: 175 x 100 mm (6.9" x 3.9")
- **Reference Clock**: Internal: 10 MHz, External Clock Frequency: 10 MHz max. External Voltage Range: 0.8 V max., 2.0 V min.
- **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)
- **Storage Temperature**: -20 ~ 85°C (-4 ~ 185°F)
- **Storage Humidity**: 5 – 95% RH, non-condensing

**Ordering Information**
- **PCI-1721**: 12-bit, 4-ch Advanced PCI Analog Output Card

**Accessories**
- **PCL-10168-1E**: 68-pin SCSI Shielded Cable, 1 m
- **PCL-10168-2E**: 68-pin SCSI Shielded Cable, 2 m
- **ADAM-3968**: 68-pin DIN-rail SCSI Wiring Board

**Data Acquisition Boards**
### PCI-1723 Specifications

- **Analog Output**
  - **Channels**: 8
  - **Resolution**: 16 bits
  - **Output Rate**: Static update
  - **Output Range**:
    - Bipolar (V): ±10
    - Current Loop (mA): 0 ~ 20, 4 ~ 20 (software programmable)
  - **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.
  - **Input Loading**:
    - Low: 0.5 V @ 0.4 mA max.
    - High: 2.7 V @ 50 µA max.

- **General**
  - **Bus Type**: PCI V2.2
  - **I/O Connectors**: 1 x 68-pin SCSI female connector
  - **Dimensions (L x H)**: 175 x 100 mm (6.9” x 3.9”)
  - **Power Consumption**: Typical: 5 V @ 850 mA, 12 V @ 600 mA
    - Max.: 5 V @ 1 A, 12 V @ 700 mA
  - **Operating Temperature**: 0 ~ 60°C (32 ~ 158°F)
  - **Storage Temperature**: -20 ~ 85°C (-4 ~ 149°F)
  - **Storage Humidity**: 5 ~ 95% RH, non-condensing

### Ordering Information

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

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### PCI-1727U Specifications

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

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

- **Digital Output**
  - **Channels**: 16
  - **Compatibility**: 5 V/TTL
  - **Output Voltage**:
    - Logic 0: 0.5 V
    - Logic 1: 2.4 V
  - **Output Capability**:
    - Sink: 0.5 V @ 8 mA
    - Source: 2.4 V @ 0.4 mA

- **General**
  - **Bus Type**: Universal PCI V2.2
  - **I/O Connectors**: 1 x 37-pin D-type female connector
  - **Power Consumption**:
    - Typical: 5 V @ 460 mA, 12 V @ 150 mA
    - Max.: 5 V @ 460 mA, 12 V @ 700 mA
  - **Dimensions (L x H)**: 175 x 100 mm (6.9” x 3.9”)
  - **Operating Temperature**: 0 ~ 50°C (32 ~ 122°F)
  - **Storage Temperature**: -20 ~ 65°C (-4 ~ 149°F)
  - **Storage Humidity**: 5 ~ 95% RH, non-condensing

### Ordering Information

- **PCI-1727U**: 14-bit, 12-ch Analog Output Universal PCI Card
- **Accessories**:
  - PCL-10120-1E: 20-pin flat cable, 1 m
  - PCL-10137-1E: DB37 cable assembly, 1 m
  - ADAM-3937: DB37 wiring terminal for DIN-rail mounting

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Online Download: www.advantech.com/products
PCI-1735U
PCI-1737U
PCI-1739U

64-ch Digital I/O and Counter Universal PCI Card
24-ch Digital I/O Universal PCI Card
48-ch Digital I/O Universal PCI Card

Features
- ISA-Compatible with PCL-720+ (PCI-1735U), PCL-724 (PCI-1737U) and PCL-731 (PCI-1739U)
- TTL-level digital input and output compatibility
- Emulates mode 0 of 8255 PPI (PCI-1737U and PCI-1739U)
- Interrupt handling capability (PCI-1737U and PCI-1739U)
- Output status readback (PCI-1737U and PCI-1739U)
- 3 programmable counter/timer channels and User configurable clock source (PCI-1735U)
- Breadboard area for custom circuits (PCI-1735U and PCI-1739U)
- PCI universal card

Specifications

Digital Input
- **Channels**
  - PCI-1735U: 32
  - PCI-1737U: 24 (shared with output)
  - PCI-1739U: 48 (shared with output)
- **Compatibility**
  - 5 V/TTL
- **Input Voltage**
  - PCI-1735U: Logic 0: 0.8V max.
    Logic 1: 2.0V min.
  - PCI-1737U/1739U: Logic 0: 0.4V max.
    Logic 1: 2.4V min.
- **Interrupt Capable Ch.**
  - PCI-1737U: 1
  - PCI-1739U: 2

Digital Output
- **Channels**
  - PCI-1735U: 32
  - PCI-1737U: 24 (shared with input)
  - PCI-1739U: 48 (shared with input)
- **Compatibility**
  - 5 V/TTL
- **Output Voltage**
  - PCI-1735U: Logic 0: 0.5 V max.
    Logic 1: 2.4 V min.
  - PCI-1737U/1739U: Logic 0: 0.4 V max.
    Logic 1: 2.4 V min.
- **Output Capability**
  - PCI-1735U: Sink: 0.5 V @ 24 mA
    Source: 2.4 V @ 15 mA
  - PCI-1737U/1739U: Sink: 0.4 V @ 24 mA
    Source: 2.4 V @ 15 mA

Counter/Timer (PCI-1735U)
- **Channels**
  - 3
- **Resolution**
  - 16 bits
- **Compatibility**
  - 5 V/TTL
- **Max. Input Frequency**
  - 1 MHz
- **Re. Clock Internal**
  - Selectable 1 MHz, 100 kHz, or 10 kHz base clock
- **Ext. Clock Frequency**
  - Jumper selectable divider: x2, x1, x0.5, and x0.25

General
- **Bus Type** Universal PCI V2.2
- **I/O Connectors**
  - PCI-1735U: 5 x 20-pin box header
  - PCI-1737U: 2 x 20-pin & 1 x 50-pin box header
  - PCI-1739U: 2 x 50-pin box header
- **Dimensions (L x H)**
  - PCI-1735U: 175 x 100 mm (6.9" x 3.9")
  - PCI-1737U: 175 x 100 mm (6.9" x 3.9")
  - PCI-1739U: 175 x 100 mm (6.9" x 3.9")
- **Power Consumption**
  - PCI-1735U: 5V @365 mA (max.)
  - PCI-1737U: 5V @300 mA (max.)
  - PCI-1739U: 5V @720 mA (max.)
- **Operating Temperature**
  - 0 ~ 65°C (32 ~ 149°F)
- **Storage Temperature**
  - -25 ~ 80°C (-13 ~ 176°F)
- **Storage Humidity**
  - 5 ~ 95% RH, non-condensing

Ordering Information
- **PCI-1735U**
  - 64-ch Digital I/O and Counter Card
- **PCI-1737U**
  - 24-ch Digital I/O Universal PCI Card
- **PCI-1739U**
  - 48-ch Digital I/O Universal PCI Card

Accessories
- **PCL-10120-1E**
  - IDC-20 Flat Cable, 1 m
- **PCL-10120-2E**
  - IDC-20 Flat Cable, 2 m
- **PCL-10150-1.2E**
  - 50-pin Flat Cable, 1.2 m
- **ADAM-3920**
  - 20-Pin Flat Cable Terminal, DIN-rail Mount
- **ADAM-3950**
  - 50-pin DIN-rail Flat Cable Wiring Board
### Features
- 48 TTL digital I/O lines
- Emulates mode 0 of 8255 PPI
- Buffered circuits for higher driving capacity than the 8255
- Interrupt handling capability
- Timer/Counter interrupt capability
- Supports both dry and wet contact
- Keeps the I/O port setting and DO state after system reset
- 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**: 1 x 68-pin SCSI female connector
- **Dimensions (L x H)**: 175 x 100 mm (6.9” x 3.9”)
- **Power Consumption**
  - Typical: 5 V @ 850 mA
  - Max.: 5 V @ 1.0 A
- **Operating Temperature**: 0 – 70°C (32 – 158°F)
- **Storage Temperature**: -20 – 80°C (-4 – 176°F)
- **Storage Humidity**: 5 – 95% RH, non-condensing

### Ordering Information
- **PCI-1751**: 48-ch Digital I/O and Counter PCI Card

#### Accessories
- **PCL-10168-1E**: 68-pin SCSI Shielded Cable, 1 m
- **PCL-10168-2E**: 68-pin SCSI Shielded Cable, 2 m
- **ADAM-3968**: 68-pin DIN-rail SCSI Wiring Board
- **ADAM-3968/20**: 68-pin SCSI to 20-pin Box Header Board
- **ADAM-3968/50**: 68-pin SCSI to 50-pin Box Header Board
- **PCLD-8751**: 48-ch Isolated Digital Input Board
- **PCLD-8761**: 24-ch Relay/Isolated Digital Input Board
- **PCLD-8782**: 48-ch Relay Board

### Pin Assignments

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

### Specifications

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

**General**
- **Bus Type**: PCI V2.2
- **I/O Connector**: 1 x 100-pin SCSI female connector
- **Dimensions (L x H)**: 175 x 100 mm (6.9” x 3.9”)
- **Power Consumption**
  - Typical: 5 V @ 400 mA
  - Max.: 5 V @ 2.7 A
- **Operating Temperature**: 0 – 60°C (32 – 140°F)
- **Storage Temperature**: -20 – 70°C (-4 – 158°F)
- **Storage Humidity**: 5 – 95% RH, non-condensing

**Ordering Information**
- **PCI-1753**: 96-ch Digital I/O PCI Card
- **PCI-1753E**: Extension Board for PCI-1753

**Accessories**
- **ADAM-3968**: 68-pin DIN-rail SCSI Wiring Board
- **ADAM-3968/20**: 68-pin SCSI to 2 20-pin Box Header Board
- **ADAM-3968/50**: 68-pin SCSI to 5 50-pin Box Header Board
- **PCLD-8751**: 48-ch Isolated Digital Input Board
- **PCLD-8762**: 48-ch Relay Board
- **PCL-10268-2E**: 100-pin to Two 68-pin SCSI Cables, 1 m and 2 m

### Pin Assignments

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**Pin Assignments**

**Features**
- Up to 96 TTL digital I/O lines
- Emulates mode 0 of 8255 PPI
- Buffered circuits for higher driving capacity than the 8255
- Multiple-source interrupt handling capability
- Interrupt output pin for simultaneously triggering external devices with the interrupt
- Output status read-back
- “Pattern match” and “Change of state” interrupt functions for critical I/O monitoring
- Keeps the output settings and values after system hot reset
- Supports both dry and wet contact
- High-density 100-pin SCSI connector
Introduction
The PCI-1755 supports PCI-bus mastering DMA for high-speed data transfer. By setting aside a block of memory in the PC, the PCI-1755 performs bus-mastering data transfers without CPU intervention, setting the CPU free to perform other more urgent tasks such as data analysis and graphic manipulation. The function allows users to run all I/O functions simultaneously at full speed without losing data.

Specifications

Digital Input
- **Channels**: General: 8 (shared with output)
  High speed: 32 (shared with output)
- **Compatibility**: 5V/TTL
- **Input Voltage**: Logic 0: 0.8 V max.
  Logic 1: 2.0 V min.
- **Interrupt Capable Ch.**: DI00-DI07

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

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

General
- **Bus Type**: PCI V2.2
- **I/O Connectors**: 1 x 100-pin SCSI female connector
- **Dimensions (L x H)**: 175 x 100 mm (6.9” x 3.9”)
- **Power Consumption**: Typical: 5 V @ 1 A
  Max.: 5 V @ 1 A
- **Operating Temperature**: 0 – 60°C (32 – 140°F)
- **Storage Temperature**: -20 – 85°C (-4 – 185°F)
- **Storage Humidity**: 5 – 90% RH, non-condensing

Ordering Information
- **PCI-1755**: 80 MB/s, 32-ch Digital I/O PCI Card

Accessories
- **ADAM-39100**: 100-pin DIN-rail SCSI Wiring Board
- **PCL-101100-1E**: 100-pin SCSI High-Speed Cable, 1 m
PCI-1730U
PCI-1733
PCI-1734

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

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

Specifications

Digital Input (PCI-1730U only)
- Channels: 16
- 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 (PCI-1730U/PCI-1733)
- Channels: PCI-1730U: 16, PCI-1733: 32
- Input Voltage: Logic 0: 1 V max., (2 V max.), Logic 1: 5V min., (30 V max.)
- Interrupt Capable Ch.: PCI-1730U: 2 (IDI0, IDI1), PCI-1733: 4 (IDI0, IDI1, IDI16, IDI17)
- Isolation Protection: 2,500 V DC
- Opto-Isolator Response: 25 μs
- Input Resistance: 2.7 kΩ @ 1 W

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

Isolated Digital Output (PCI-1730U/PCI-1734)
- Channels: 16
- Output Type: Sink type (NPW)
- Isolation Protection: 2,500 V DC
- Output Voltage: 5 – 40 V DC
- Sink Current: PCI-1730U: 300 mA max./channel, PCI-1734: 200 mA max./channel
- Opto-Isolator Response: 25 μs

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

Ordering Information
- PCI-1730U: 32-ch Isolated Digital I/O Univ. PCI Card
- PCI-1733: 32-ch Isolated Digital Input PCI Card
- PCI-1734: 32-ch Isolated Digital Output PCI Card

Accessories
- PCL-10120-1E: 20-pin Flat Cable, 1 m
- PCL-10120-2E: 20-pin Flat Cable, 2 m
- ADAM-3920: 20-pin DIN-rail Flat Cable Wiring Board
- PCLD-782: 16-ch Isolated DI Board w/ 1m 20-pin Flat Cable
- PCLD-885: 16-ch Power Relay Board w/ 20p & 50p Flat Cables
- PCLD-785: 16-ch Relay Board w/ One 1m 20-pin Flat Cable
- ADAM-3937: DB37 DIN-rail Wiring Board
- PCL-10137-1E: DB37 Cable, 1 m
- PCL-10137-2E: DB37 Cable, 2 m
- PCL-10137-3E: DB37 Cable, 3 m
### Introduction

PCI-1750 offers 16 isolated digital input channels, 16 isolated digital output channels, and one isolated counter/timer for the PCI bus. With isolation protection of 2,500 V<sub>DC</sub>, 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 configure the card with software.

### Specifications

#### Isolated Digital Input
- **Channels**: 16
- **Input Voltage**: Logic 0: 2 V max.  
  Logic 1: 5 V min. (30 V<sub>DC</sub> max.) or dry contact
- **Interrupt Capable Ch.**: 2
- **Isolation Protection**: 2,500 V<sub>DC</sub>
- **Opto-Isolator Response**: 100 µs

#### Isolated Digital Output
- **Channels**: 16
- **Output Type**: Sink (NPN)
- **Isolation Protection**: 2,500 V<sub>DC</sub>
- **Output Voltage**: 5 – 40 V<sub>DC</sub>
- **Sink Current**: 200 mA max. per channel
- **Opto-Isolator Response**: 100 µs

#### Counter/Timer
- **Channels**: 1
- **Resolution**: 1 x 16-bit isolated counter
- **Input Voltage**: Logic 0: 2V max.  
  Logic 1: 5V min. (30 V<sub>DC</sub> max.)
- **Max. Input Frequency**: 1 MHz
- **Isolation Protection**: 2,500 V<sub>DC</sub>

### Features
- 16 isolated DI and 16 isolated DO channels
- High voltage isolation on all isolated channels (2,500 V<sub>DC</sub>)
- High sink current on isolated output channels (200 mA/channel)
- Supports dry contact or 5 – 50 V<sub>DC</sub> isolated inputs
- Interrupt handling capability
- Timer/counter interrupt capability

### General
- **Bus Type**: PCI V2.2
- **I/O Connectors**: 1 x DB37 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)
- **Storage Temperature**: -20 – 80°C (-4 – 176°F)
- **Storage Humidity**: 5 – 95% RH, non-condensing

### Ordering Information
- **PCI-1750**: 32-ch Isolated Digital I/O and Counter PCI Card

### Accessories
- **PCL-10137-1E**: DB37 Cable, 1 m
- **PCL-10137-2E**: DB37 Cable, 2 m
- **PCL-10137-3E**: DB37 Cable, 3 m
- **ADAM-3937**: DB37 DIN-rail Wiring Board

### Pin Assignments
PCI-1752U
PCI-1754
PCI-1756

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

**Specifications**

### Isolated Digital Output
- **Channels**: 64 (16-ch/group)
- **Output Type**: Sink (NPN)
- **Output Voltage**: 5 ~ 40 V<sub>dc</sub>
- **Sink Current**: 200 mA max./channel
- **Opto-isolator Response**: 25 µs

### General
- **Bus Type**: Universal PCI V2.2
- **I/O Connectors**: 1 x 100-pin SCSI female connector
- **Dimensions (L x H)**: 175 x 100 mm (6.9” x 3.9”)
- **Power Consumption**: Typical: 5 V @ 230 mA
  - Max.: 5 V @ 500 mA

### Ordering Information
- **PCI-1752U**: 64-ch Isolated Digital Output Universal PCI Card
- **Accessories**:
  - PCI-10250-1E
  - ADAM-3951

---

**Features**
- 64 isolated digital input channels
- Either + voltage input for DI by group
- High-voltage isolation on input channels (2,500 V<sub>dc</sub>)
- High-over-voltage protection (70 V<sub>dc</sub>)
- Wide input range (10 ~ 50 V<sub>dc</sub>)
- 2,000 V<sub>ac</sub> ESD protection
- Interrupt handling capability
- High-density 100-pin SCSI connector

**Specifications**

### Isolated Digital Input
- **Channels**: 64 (16-ch/group)
- **Input Voltage**: Logic 0: 3 V max.  
  Logic 1: 10 V min. (50 V max.)
- **Input Current** (Typical):
  - Logic 1: 10 mA
  - Logic 0: 2.1 mA
- **Interrupt Capable Ch.**: 4
- **Isolation Protection**: 2,500 V<sub>dc</sub>
- **Overvoltage Protection**: 70 V<sub>dc</sub>
- **ESD**: 2,000 V<sub>dc</sub>
- **Opto-Isolator Response**: 25 µs

### General
- **Bus Type**: PCI V2.2
- **I/O Connectors**: 1 x 105-pin SCSI female connector
- **Dimensions (L x H)**: 175 x 100 mm (6.9” x 3.9”)
- **Power Consumption**: Typical: 5 V @ 340 mA
  - Max.: 5 V @ 450 mA
- **Operating Temperature**: 0 ~ 60°C (32 ~ 140°F)
- **Storage Temperature**: -20 ~ 70°C (-4 ~ 158°F)
- **Storage Humidity**: 5 ~ 95%, RH non-condensing

### Ordering Information
- **PCI-1754**: 64-ch Isolated Digital Input PCI Card
- **Accessories**:
  - PCI-10250-1E
  - ADAM-3951

---

**Features**
- Either + voltage input for DI by group
- High-voltage isolation input/output channels (2,500 V<sub>dc</sub>)
- 2,000 V<sub>ac</sub> ESD protection for DI
- High-over-voltage protection (70 V<sub>dc</sub>) for DI
- High-sink current on isolated output channels (200 mA max./channel)
- Output status readable
- Keeps output settings/values after system hot reset
- Interrupt handling capability
- High-density 100-pin SCSI connector

**Specifications**

### Isolated Digital Input
- **Channels**: 32 (16-ch/group)
- **Input Voltage**: Logic 0: 3 V max.  
  Logic 1: 10 V min. (50 V max.)
- **Input Current**: Typical: 4.2 mA
- **Interrupt Capable Ch.**: 4
- **Isolation Protection**: 2,500 V<sub>dc</sub>
- **Overvoltage Protection**: 70 V<sub>dc</sub>
- **ESD**: 2,000 V<sub>dc</sub>
- **Opto-Isolator Response**: 25 µs

### General
- **Bus Type**: PCI V2.2
- **I/O Connectors**: 1 x 105-pin SCSI female connector
- **Dimensions (L x H)**: 175 x 100 mm (6.9” x 3.9”)
- **Power Consumption**: Typical: 5 V @ 285 mA
  - Max.: 5 V @ 475 mA
- **Operating Temperature**: 0 ~ 60°C (32 ~ 140°F)
- **Storage Temperature**: -20 ~ 70°C (-4 ~ 158°F)
- **Storage Humidity**: 5 ~ 95%, non-condensing

### Ordering Information
- **PCI-1756**: 64-ch Isolated Digital I/O PCI Card
- **Accessories**:
  - PCI-10250-1E
  - ADAM-3951

---
## PCI-1758UDI
PCI-1758UDO
PCI-1758UDOIO

### Specifications

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

**Isolated Digital Output**
- **Channels**: PCI-1758UDOIO: 128
  - PCI-1758UDOIO: 64
- **Output Type**: Sink (NPN)
- **Isolation Protection**: 2,500 V
- **Output Voltage**: 5 ~ 40 V
- **Sink Current**: 90 mA max./channel
- **Opto-isolator Response**: 20 µs

**General**
- **Bus Type**: Universal PCI V2.2
- **I/O Connectors**: 1 x mini-SATA HDRA-E100 female connector
- **Dimensions (L x H)**: 170 x 100 mm (6.9" x 3.9")
- **Power Consumption**
  - **Typical**: 5 V @ 0.3 A
  - 5 V @ 1.1 A
  - 5 V @ 1.2 A
  - 5 V @ 1.8 A
- **Operating Temperature**: 0 ~ 60°C (32 ~ 140°F) (IEC 68-2-1, 2)
- **Storage Temperature**: -20 ~ 70°C (4 ~ 158°F)
- **Storage Humidity**: 5 ~ 95% non-condensing

### Ordering Information
- **PCI-1758UDI**: 128-ch Isolated DI Universal PCI Card
- **PCI-1758UDO**: 128-ch Isolated DO Universal PCI Card
- **PCI-1758UDOIO**: 128-ch Isolated Digital I/O Universal PCI Card

### Accessories
- PCL-101100S-1E: 100-pin Mini-SCSI Cable, 1 m
- PCL-101100S-2E: 100-pin Mini-SCSI Cable, 2 m
- ADAM-39100: 100-pin DIN-rail SCSI Wiring Board

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### Feature Details

**Interrupt Function (PCI-1758UDI/PCI-1758UDOIO)**
- PCI-1758UDI and PCI-1758UDOIO 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-1758UDOIO)**
- 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.

### Pin Assignments

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[Refer to the pin assignment table for detailed pinout information.]

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[For more information, visit www.advantech.com/products]
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 V\textsubscript{DC} for collecting digital inputs in noisy environments, 8 relay actuators that can be used as a 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
- **Input Voltage**
  - Logic 0: 1.0 V\textsubscript{max}
  - Logic 1: 4.5 V\textsubscript{min} (12 V\textsubscript{max})
- **Interrupt Capable**: Ch. 8 (IDI0 – IDI7)
- **Isolation Protection**: 2,500 V\textsubscript{DC}
- **Opto-Isolator Response**: 100 µs
- **Input Resistance**: 2 k\textsubscript{Ohm} \(\oplus\) 1/4 W

### Counter/Timer
- **Channels**: 8
- **Resolution**: 16 bits
- **Compatibility**: 5 V/TTL
- **Max. Input Frequency**: 500 Hz
- **Isolation Protection**: 2,500 V\textsubscript{DC}
- **PWM Channels**: 2
- **Digital Noise Filter**
  - Min. effective high input period \(\geq (2 \times 65535) \times 5\) ms + 5 ms
  - Min. effective low input period \(\geq (2 \times 65535) \times 5\) ms + 5 ms

### Relay Output
- **Channels**: 8
- **Relay Type**: 2 x Form C, and 6 x Form A
- **Contact Rating**: 1 A \(\oplus\) 125 V\textsubscript{AC}, 2 A \(\oplus\) 30 V\textsubscript{DC}
- **Max. Switching Power**: 125 VA, 60 W
- **Max. Switching Voltage**: 250 V\textsubscript{AC}, 220 V\textsubscript{DC}
- **Max. Switching Current**: 2 A
- **Operate/Release Time**: max. 5 / 3.5 ms
- **Resistance**: Contact: 50 m\textsubscript{W} max.
- **Life Expectancy (Electrical)**
  - Min. 3 x 10⁴ cycles: 2 A \(\oplus\) 30 V\textsubscript{DC}, 1 A \(\oplus\) 125 V\textsubscript{AC}
  - Min. 10⁴ cycles: 1 A \(\oplus\) 30 V\textsubscript{DC}, 0.5 A \(\oplus\) 125 V\textsubscript{AC}

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

### Ordering Information
- **PCI-1760U**: 8-ch Relay/IDI PCI Card w/ 8-ch Counter/Timer

### Accessories
- **PCL-10137-1E**: DB37 Cable, 1 m
- **PCL-10137-2E**: DB37 Cable, 2 m
- **PCL-10137-3E**: DB37 Cable, 3 m
- **ADAM-3937**: DB37 DIN-rail Wiring Board
PCI-1761

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

Introduction

The PCI-1761 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. 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
- Input Voltage: Logic 0: 3.0 V max, Logic 1: 10 V min (50 V max.)
- Interrupt Capable Ch.: 8 (IDI0 – IDI7)
- Isolation Protection: 2,500 VDC
- Opto-Isolator Response: 100 μs
- Input Resistance: 5.7 kΩ @ 1 W

Relay Output
- Channels: 8
- Relay Type: 4 x Form C, and 4 x Form A
- Contact Rating: 2 A @ 250 VAC, 2 A @ 30 VDC
- Max. Switching Power: 500 VA, 60 W
- Max. Switching Voltage: 400 VAC, 300 VDC
- Operating Time: Typical: 7 ms, Max: 15 ms
- Release Time: Typical: 2 ms, Max: 6 ms
- Resistance: Contact: 100 mΩ max.
- Life Expectancy: 2 x 10⁶ cycles min. @ 2A/ 250VAC

General
- I/O Connectors: 1 x DB37 female connector
- Dimensions (L x H): 175 x 100 mm (6.9" x 3.9")
- Power Consumption: Typical: 5 V @ 220 mA
- Operating Temperature: 0 – 60°C (32 – 140°F)
- Storage Temperature: -20 – 70°C (-4 – 158°F)
- Storage Humidity: 5 – 95 % RH, non-condensing

Ordering Information
- PCI-1761: 8-ch Relay and 8-ch Isolated Digital Input PCI Card

Accessories
- PCL-10137-1E: DB37 Cable, 1 m
- PCL-10137-2E: DB37 Cable, 2 m
- PCL-10137-3E: DB37 Cable, 3 m
- ADAM-3937: DB37 DIN-rail Wiring Board
Introduction

The PCI-1762 provides 16 opto-isolated digital inputs with isolation protection of 2,500 VDC for collecting digital inputs in noisy environments, 16 relay actuators that can be used 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. 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**: 16
- **Input Voltage**: Logic 0: 3.0 V max.  
  Logic 1: 10 V min. (50 V max.)
- **Interrupt Capable Ch.**: 2 (IDI0, IDI8)
- **Isolation Protection**: 2,500 VDC
- **Opto-Isolator Response**: 100 µs
- **Input Resistance**: 5.7 kOhm 1 W

 Relay Output

- **Channels**: 16
- **Relay Type**: Form A or Form B (Jumper selectable)
- **Contact Rating**: 0.5 A @ 250 VAC, 0.5 A @ 30 VDC
- **Max. Switching Power**: 125 VA, 15 W
- **Max. Switching Voltage**: 250 VAC, 220 VDC
- **Operate Time**: Typical: 3 ms, Max.: 5 ms
- **Release Time**: Typical: 2 ms, Max.: 4 ms
- **Resistance**: Contact: 50 mOhm max.
- **Life Expectancy**: 2 x 10^6 cycles min. @ 0.5A/ 250VAC

General

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

Ordering Information

- **PCI-1762**: 16-ch Relay and 16-ch Isolated Digital Input PCI Card

Accessories

- **PCL-10162-1E**: DB62 Cable, 1 m
- **PCL-10162-3E**: DB62 Cable, 3 m
- **ADAM-3962**: DB62 DIN-rail Wiring Board
PCI-1780U is a general purpose multi-channel counter/timer PCI card. 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 PCL-10168 shielded cable works well with PCI-1780U to reduce noise. Its wires are all twisted pairs, and the input signals and output signals are separately shielded, providing minimal cross talk between signals and the best protection against EMI/EMC problems.

### Specifications

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

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

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

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

### Ordering Information
- **PCI-1780U**: 8-ch, 16-bit Counter/Timer Universal PCI Card
- **Accessories**
  - PCL-10168-1E: 68-pin SCSI Shielded Cable, 1 m
  - PCL-10168-2E: 68-pin SCSI Shielded Cable, 2 m
  - ADAM-3968: 68-pin DIN-rail SCSI Wiring Board
# PCI-1784U

## 4-ch, 32-bit Encoder Counter Universal PCI Card with 8-ch Isolated Digital I/O

### Features
- Four 32-bit encoder counters
- Single-ended or differential inputs
- Quadrature (x1, x2, x4), pulse/direction, and up/down counting modes
- Optically isolated up to 2,500 VDC
- 4-stage digital filter with selectable sampling rate
- On-board 8-bit timer with wide range time-base selector
- Multiple interrupt sources for precision applications
- 4 isolated digital inputs and 4 isolated digital outputs
- BoardID switch

### Introduction
PCI-1784U is a 4-ch encoder counter universal PCI card. It includes four 32-bit encoder counters, 8-bit timer with multiple range time-base selector, 4 isolated digital inputs, and 4 isolated digital outputs. Its flexible interrupt sources are suitable for motor control and position monitoring.

### Specifications

#### Encoder Counter
- **Channels**: 4
- **Resolution**: 32 bits
- **Counting Modes**: Quadrature, pulse/direction, or up/down
- **Max. Input Frequency**:
  - 8 MHz for pulse/direction and up/down modes
  - 2 MHz for quadrature mode without digital filter
  - 1 MHz for quadrature mode with digital filter
- **Digital Filter**: 4 stages
- **Isolation**: 2,500 V<sub>DC</sub>
- **Sample Clock Frequency**: 8, 4, 2, or 1 MHz
- **Interrupt Sources**: Overflow, underflow, index status, counter over compare, counter under compare
- **Input Voltage**:
  - Single-ended:
    - Logic 0: 0.8 V max.
    - Logic 1: 2.8 V min. (12 V max.)
  - Differential:
    - Logic 0: -0.2 V max. (-12 V min.)
    - Logic 1: 0.2 V min. (12 V max.)

#### Isolated Digital Input
- **Channels**: 4
- **Input Voltage**:
  - Logic 0: 3 V max
  - Logic 1: 10 V min. (30 V max.)
- **Interrupt Capable**: All 4 channels
- **Isolation**: 2,500 V<sub>DC</sub>
- **Opto-Isolator Response**: 100 µs
- **Overvoltage Protection**: 70 V<sub>DC</sub>

#### Isolated Digital Output
- **Channels**: 4
- **Output Voltage**:
  - Logic 0: 0.8 V max.
  - Logic 1: 2.0 V min.
- **Output Capability**:
  - 50 mA @ 0.8 V
  - -50 mA @ 2.0 V
- **Isolation**: 2,500 V<sub>DC</sub>
- **Opto-Isolator Response**: 2 µs

### General
- **Bus Type**: Universal PCI V2.2
- **Connector**: 37-pin D-sub female
- **Dimension (L x H)**: 175 x 100 mm<sup>2</sup> (6.9” x 3.9”)
- **Power Consumption**:
  - Typical: +5 V @ 200 mA
  - Maximum: +5 V @ 450 mA
- **Operating Temperature**: 0 – 60°C (32 – 140°F)
- **Storage Temperature**: -20 – 70°C (-4 – 158°F)
- **Storage Humidity**: 5 – 95% RH, non-condensing (refer to IEC 68-2-3)
- **Certification**: CE

### Ordering Information
- **PCI-1784U**: 4-ch encoder counter universal PCI card
- **PCL-10137H-3E**: High-speed DB37 cable, 3 m
- **ADAM-3937**: DB37 DIN-rail wiring board