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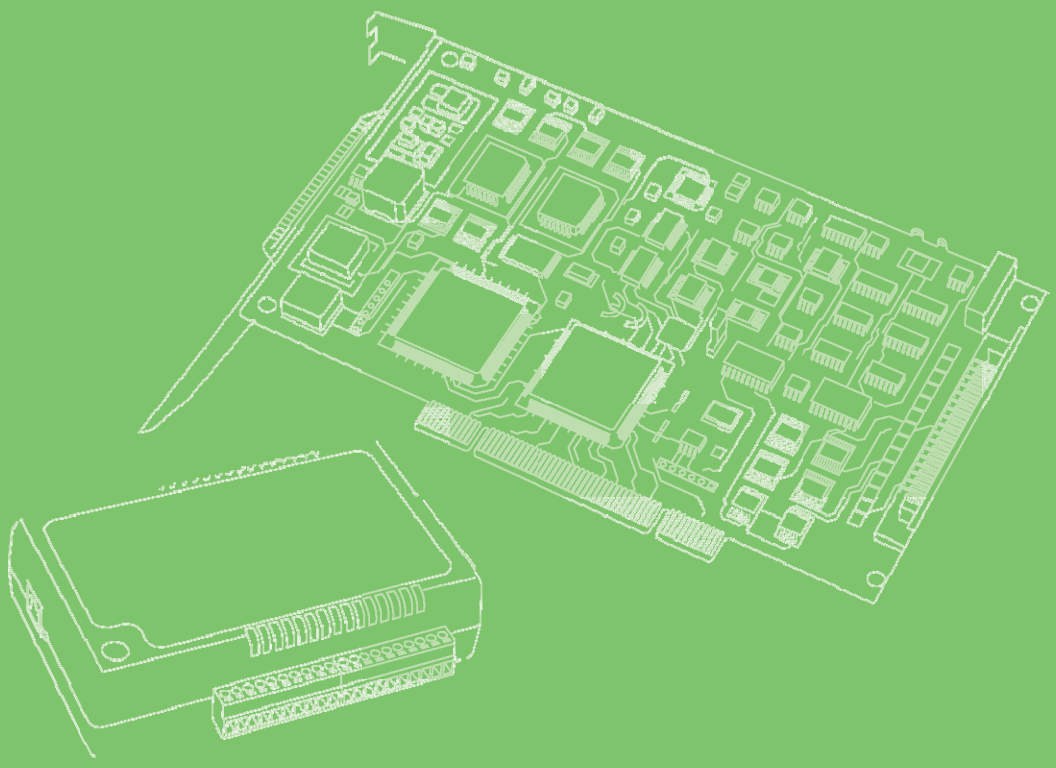
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User Manual

PCI-1730U/1733/1734

32-ch Isolated Digital I/O PCI Cards

ADVANTECH
eAutomation

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Product Warranty (2 years)

Advantech warrants to you, the original purchaser, that each of its products will be free from defects in materials and workmanship for two years from the date of purchase.

This warranty does not apply to any products which have been repaired or altered by persons other than repair personnel authorized by Advantech, or which have been subject to misuse, abuse, accident or improper installation. Advantech assumes no liability under the terms of this warranty as a consequence of such events.

Because of Advantech's high quality-control standards and rigorous testing, most of our customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time and freight. Please consult your dealer for more details.

If you think you have a defective product, follow these steps:

1. Collect all the information about the problem encountered. (For example, CPU speed, Advantech products used, other hardware and software used, etc.) Note anything abnormal and list any onscreen messages you get when the problem occurs.
2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
3. If your product is diagnosed as defective, obtain an RMA (return merchandize authorization) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a fully-completed Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.
5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

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Declaration of Conformity

CE

This product has passed the CE test for environmental specifications when shielded cables are used for external wiring. We recommend the use of shielded cables. This kind of cable is available from Advantech. Please contact your local supplier for ordering information.

FCC Class B

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

Technical Support and Assistance

1. Visit the Advantech web site at www.advantech.com/support where you can find the latest information about the product.
2. Contact your distributor, sales representative, or Advantech's customer service center for technical support if you need additional assistance. Please have the following information ready before you call:
   - Product name and serial number
   - Description of your peripheral attachments
   - Description of your software (operating system, version, application software, etc.)
   - A complete description of the problem
   - The exact wording of any error messages

Warnings, Cautions and Notes

Warning! *Warnings indicate conditions, which if not observed, can cause personal injury!*



Caution! *Cautions are included to help you avoid damaging hardware or losing data. e.g.*



There is a danger of a new battery exploding if it is incorrectly installed. Do not attempt to recharge, force open, or heat the battery. Replace the battery only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.

Safety Instructions

1. Read these safety instructions carefully.
2. Keep this User Manual for later reference.
3. Disconnect this equipment from any AC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.
4. For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.
5. Keep this equipment away from humidity.
6. Put this equipment on a reliable surface during installation. Dropping it or letting it fall may cause damage.
7. The openings on the enclosure are for air convection. Protect the equipment from overheating. DO NOT COVER THE OPENINGS.
8. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
9. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
10. All cautions and warnings on the equipment should be noted.
11. If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient overvoltage.
12. Never pour any liquid into an opening. This may cause fire or electrical shock.
13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
14. If one of the following situations arises, get the equipment checked by service personnel:
15. The power cord or plug is damaged.
16. Liquid has penetrated into the equipment.
17. The equipment has been exposed to moisture.
18. The equipment does not work well, or you cannot get it to work according to the user's manual.
19. The equipment has been dropped and damaged.

20. The equipment has obvious signs of breakage.
21. DO NOT LEAVE THIS EQUIPMENT IN AN ENVIRONMENT WHERE THE STORAGE TEMPERATURE MAY GO BELOW -20°C (-4°F) OR ABOVE 85°C (140° F). THIS COULD DAMAGE THE EQUIPMENT. THE EQUIPMENT SHOULD BE IN A CONTROLLED ENVIRONMENT.
22. CAUTION: DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER, DISCARD USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.
23. The sound pressure level at the operator's position according to IEC 704-1:1982 is no more than 70 dB (A).

Safety Precaution - Static Electricity

DISCLAIMER: This set of instructions is given according to IEC 704-1. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

Follow these simple precautions to protect yourself from harm and the products from damage.

- To avoid electrical shock, always disconnect the power from your PC chassis before you work on it. Don't touch any components on the CPU card or other cards while the PC is on.
- Disconnect power before making any configuration changes. The sudden rush of power as you connect a jumper or install a card may damage sensitive electronic components.

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Chapter 1

Overview

Introduction

Thank you for buying the Advantech PCI-1730U/1733/1734. The Advantech PCI-1730U/1733/1734 is a 32-channel isolated digital input/output card for the PCI bus.

For easy monitoring, each isolated digital input channel is equipped with one red LED, and each isolated digital output channel is equipped with one green LED to show its ON/OFF status. The PCI-1730U and PCI-1733's isolated digital input channels are ideal for digital input in noisy environments or with floating potentials.

The PCI-1730U/1733/1734 provides specific functions for different user requirements:

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

The following sections of this chapter will provide further information about features, installation guide, together with some brief information on software and accessories for the PCI-1730U/1733/1734 card.

Features

PCI-1730U

- 32 isolated DIO channels (16 inputs and 16 outputs)
- 32 TTL-level DIO channels (16 inputs and 16 outputs)
- High output driving capacity
- High-voltage isolation on isolated I/O channels (2,500 VDC)
- Interrupt handling capability
- 2 x 20-pin connectors for isolated DI/O channels and two for TTL DI/O channels
- D-type connector for isolated input and output channels
- High ESD protection (2,000 VDC)
- High over-voltage protection (70 VDC)
- Wide input range (5 ~ 30 VDC)
- Board ID

PCI-1733

- Compatible as PCL-733
- 32 isolated Digital Input channels
- High output driving capacity
- High-voltage isolation on isolated Input channels (2,500 VDC)
- Interrupt handling capability
- D-type connector for isolated input channels
- High ESD protection (2,000 VDC)
- High over-voltage protection (70 VDC)
- Wide input range (5 ~ 30 VDC)
- Board ID

PCI-1734

- Compatible as PCL-734
- 32 isolated Digital Output channels
- High output driving capacity
- High-voltage isolation on isolated Output channels (2,500 VDC)
- D-type connector for isolated input and output channels
- High ESD protection (2,000 VDC)
- Board ID

The Advantech PCI-1730U/1733/1734 offers the following main features:

Fully Compatible with ISA-bus Products

All the specifications, connectors, pin-assignments, registries format are the same. Users can upgrade their system to PCI bus without changing any existing wiring.

For Existing Windows Application Programs:

Users just need to remove the PCL-730/733/734 via the 'Device Manager', then install the PCI-1730U/1733/1734 instead (the device number must be the same). After that, the user's original windows application program can work with PCI-1730U/1733/1734 properly.

For Existing DOS Application Programs:

Users just need to add some statements (to get the PCI bus PCI-1730U/1733/1734 card's address and IRQ information) from our PCI-1730U/1733/1734 DOS example program into their original DOS application program. After that, user's original DOS application program can work with PCI-1730U/1733/1734 properly.

Robust Protection

The PCI-1730U/1733 digital input channels feature robust isolation protection for industrial, lab and machinery automation applications. It durably withstands voltage up to 2,500 VDC, preventing your host system from any incidental harm. If connected to an external input source with surge-protection, the PCI-1730U/1733/1734 can offer up to a maximum of 2,000 VDC ESD (Electrostatic Discharge) protection. Even with an input voltage rising up to 70 VDC, the PCI-1730U/1733 can still manage to work properly, albeit only for a short period of time.

Wide Input Range

The PCI-1730U/1733 has a wide range of input voltage from 5 to 30 VDC, and is suitable for most industrial applications with 12 VDC or 24 VDC input voltage.

Plug-and-Play Function

The PCI-1730U/1733/1734 is a Plug-and-Play device, which fully complies with PCI Specification Rev 2.2. During card installation, there is no need to set jumpers or DIP switches. Instead, all bus-related configurations such as base I/O address and interrupt are automatically done by the Plug-and-Play function.

Board ID

The PCI-1730U/1733/1734 has a built-in DIP Switch that helps define each card's ID when multiple PCI-1730U/1733/1734 cards have been installed on the same PC chassis. The board ID setting function is very useful when users build their system with multiple PCI-1730U/1733/1734 cards. With correct Board ID settings, you can easily identify and access each card during hardware configuration and software programming.

Note:

--For detailed specifications of the PCI-1730U/1733/1734, please refer to Appendix A, Specifications.

Applications

- Industrial ON/OFF control
- Switch status sensing
- BCD interfacing
- Digital I/O control
- Industrial and lab automation
- Laboratory & Education

Installation Guide

Before you install your PCI-1730U/1733/1734 card, please make sure you have the following necessary components:

- PCI-1730U/1733/1734 card
- PCI-1730U/1733/1734 User's Manual
- Driver software Advantech DLL drivers

(Included in the companion CD-ROM)

- Wiring cable PCL-10137 (option)
- Wiring board PCLD-880, ADAM-3937 (option)
- Computer Personal computer or workstation with a PCI-bus slot

Some other optional components are also available for enhanced operation:

After you get the necessary components and maybe some of the accessories for enhanced operation of your Multifunction card, you can then begin the Installation procedures. Figure 1-1 on the next page provides a concise flow chart to give users a broad picture of the software and hardware installation procedures:

Software Overview

Advantech offers a rich set of DLL drivers, third-party driver support and application software to help fully exploit the functions of your PCI-1730U/1733/1734 card:

- Device Drivers (on the companion DVD-ROM)
- LabVIEW driver
- Advantech DAQ NAVi
- Datalogger

Programming Choices for DA&C Cards

You may use Advantech application software such as Advantech Device Drivers. On the other hand, advanced users are allowed another option for register-level programming, although not recommended due to its laborious and time-consuming nature.

DAQNavi Software

Advantech DAQNavi software includes device drivers and a SDK which features a complete I/O function library to help boost your applications performance. This software is included in the companion DVD-ROM at no extra charge and comes with all Advantech DA&C cards. The Advantech DAQNavi software for Windows XP/7/8 (desktop mode) works seamlessly with development tools such as Visual Studio .Net, Visual C++, Visual Basic and Borland Delphi.

Accessories

Advantech offers a complete set of accessory products to support the PCI-1730U/1733/1734 card. These accessories include:

Wiring Cable

The PCL-10137 shielded cable is specially designed for PCI-1730U/1733/1734 cards to provide high resistance to noise. To achieve better signal quality, the signal wires are twisted in such a way as to form a “twisted-pair cable”, reducing cross-talk and noise from other signal sources. Furthermore, its analog and digital lines are separately sheathed and shielded to neutralize EMI/EMC problems.

Wiring Boards

The ADAM-3937 is a 37-pin D-type wiring terminal module for DIN-rail mounting. This terminal module can be readily connected to the Advantech PC-Lab cards and allow easy yet reliable access to individual pin connections for the PCI-1730U/1733/1734 card.

The PCLD-880 is a universal screw-terminal board to be used with any of the PC-LabCards which have 37-pin D-type connectors.

All the specifications, connectors, pin-assignments, registries format are the same. Users can upgrade their system into PCI bus without change any existed wiring system.

Chapter 2

Installation

Unpacking

After receiving your PCI-1730U/1733/1734 package, please inspect its contents first. The package should contain the following items:

- PCI-1730U/1733/1734 card
- Companion CD-ROM (Device Drivers included)
- Startup Manual

The PCI-1730U/1733/1734 card harbors certain electronic components vulnerable to electrostatic discharge (ESD). ESD could easily damage the integrated circuits and certain components if preventive measures are not carefully paid attention to.

Before removing the card from the antistatic plastic bag, you should take following precautions to ward off possible ESD damage:

- Touch the metal part of your computer chassis with your hand to discharge static electricity accumulated on your body. Or one can also use a grounding strap.
- Touch the anti-static bag to a metal part of your computer chassis before opening the bag.
- Take hold of the card only by the metal bracket when removing it out of the bag.

After taking out the card, first you should:

Inspect the card for any possible signs of external damage (loose or damaged components, etc.). If the card is visibly damaged, please notify our service department or our local sales representative immediately. Avoid installing a damaged card into your system.

Also pay extra caution to the following aspects to ensure proper installation:

- Avoid physical contact with materials that could hold static electricity such as plastic, vinyl and Styrofoam.
- Whenever you handle the card, grasp it only by its edges. DO NOT TOUCH the exposed metal pins of the connector or the electronic components.

Note! *Keep the anti-static bag for future use. You might need the original bag to store the card if you have to remove the card from PC or transport it elsewhere.*

Hardware Installation

After the device driver installation is completed, you can now go on to install the PCI-1730U/1733/1734 card in any PCI slot on your computer. But it is suggested that you should refer to the computer user manual or related documentation if you have any doubt. Please follow the steps below to install the card on your system.

1. Turn off your computer and unplug the power cord and cables. TURN OFF your computer before installing or removing any components on the computer.
2. Remove the cover of your computer.
3. Remove the slot cover on the back panel of your computer.
4. Touch the metal part on the surface of your computer to neutralize the static electricity that might be on your body.
5. Insert the PCI-1730U/1733/1734 card into a PCI slot. Hold the card only by its edges and carefully align it with the slot. Insert the card firmly into place. Use of excessive force must be avoided, otherwise the card might be damaged.
6. Fasten the bracket of the PCI card on the back panel of the computer.
7. Connect appropriate accessories to the PCI card.
8. Replace the cover of your computer chassis. Re-connect the cables you removed in step 2.
9. Plug in the power cord and turn on the computer

After your card has been properly installed on your system, you can now configure your device using the Device Installation Program that has itself already been installed on your system during driver setup. A complete device installation procedure should include device setup, configuration and testing. The following sections will guide you through the Setup, Configuration and Testing of your device.

Chapter 3

Signal Connections

Overview

Maintaining signal connections is one of the most important factors in ensuring that your application system is sending and receiving data correctly. A good signal connection can avoid unnecessary and costly damage to your PC and other hardware devices. This chapter provides useful information about how to connect input and output signals to the PCI-1730U/1733/1734 via the I/O connector.

Switch and Jumper Settings

3.2.1 PCI-1730U

The PCI-1730U card has two function jumper settings.

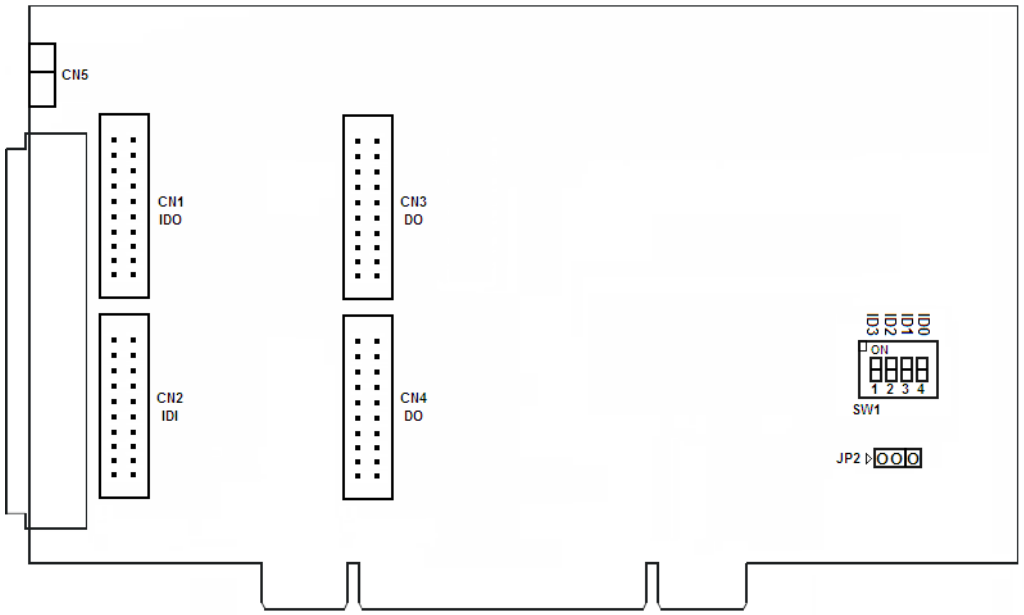


Figure 3.1 Card Connector, Jumper and Switches

Table 3.1: Summary of Jumper Settings

Names of Jumpers	Function description
JP2 (1,2 short)	DO will set to Low after system reset (Default)
JP2 (2,3 short)	DO will keep last status after system reset

Table 3.2: Board ID setting (SW1)				
ID3	ID2	ID1	ID0	Board ID
1	1	1	1	0
1	1	1	0	1
1	1	0	1	2
1	1	0	0	3
1	0	1	1	4
1	0	1	0	5
1	0	0	1	6
1	0	0	0	7
0	1	1	1	8
0	1	1	0	9
0	1	0	1	10
0	1	0	0	11
0	0	1	1	12
0	0	1	0	13
0	0	0	1	14
0	0	0	0	15

Note: On: 1, Off: 0

3.2.2 PCI-1733

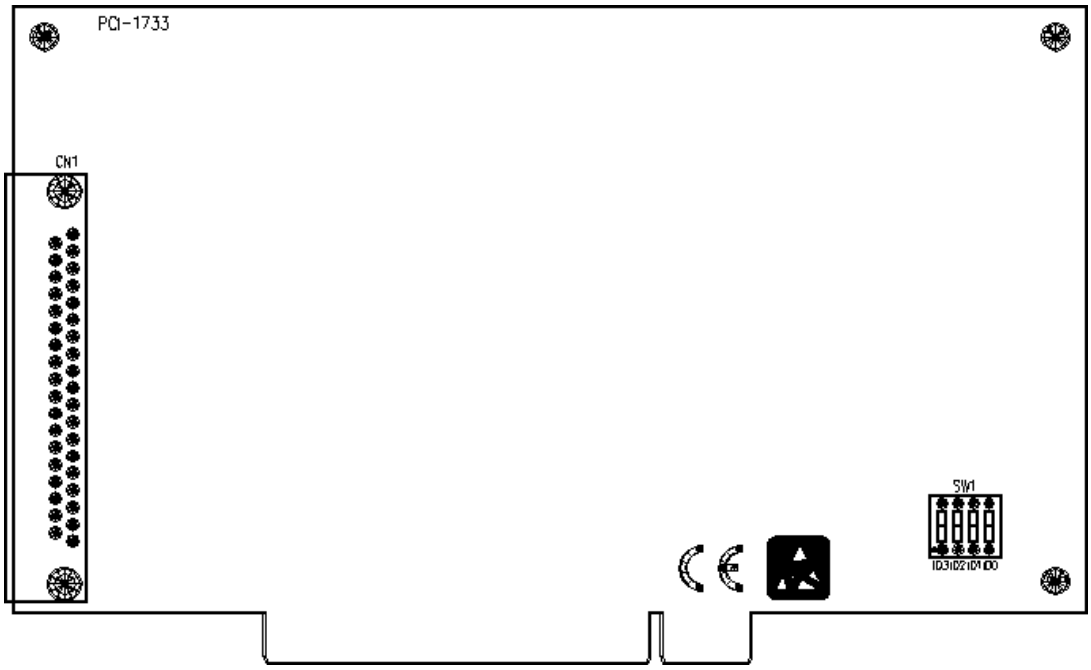


Figure 3.2 Card Connector, Jumpers and Switches

Table 3.3: Board ID setting (SW1)				
ID3	ID2	ID1	ID0	Board ID
1	1	1	1	0
1	1	1	0	1
1	1	0	1	2
1	1	0	0	3
1	0	1	1	4
1	0	1	0	5
1	0	0	1	6
1	0	0	0	7
0	1	1	1	8
0	1	1	0	9
0	1	0	1	10
0	1	0	0	11
0	0	1	1	12
0	0	1	0	13
0	0	0	1	14
0	0	0	0	15

Note: On: 1, Off: 0

3.2.3 PCI-1734

The PCI-1734 card has one function jumper setting.

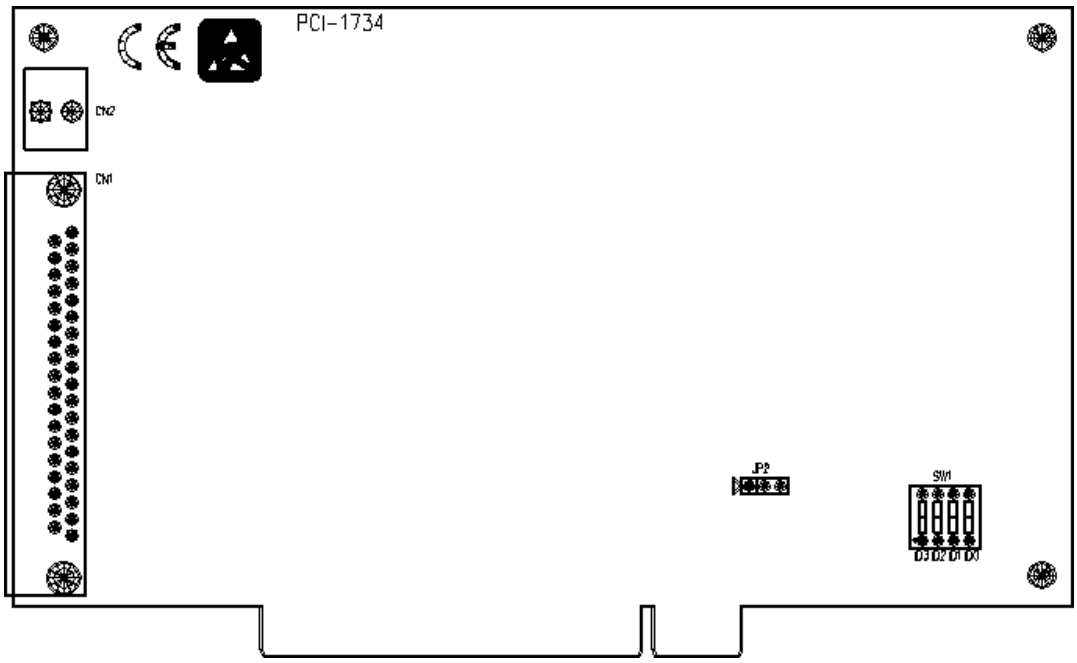


Figure 3.3 Card Connector, Jumpers and Switches

Table 3.4: Board ID setting (SW1)				
ID3	ID2	ID1	ID0	Board ID
1	1	1	1	0
1	1	1	0	1
1	1	0	1	2
1	1	0	0	3
1	0	1	1	4
1	0	1	0	5
1	0	0	1	6
1	0	0	0	7
0	1	1	1	8
0	1	1	0	9
0	1	0	1	10
0	1	0	0	11
0	0	1	1	12
0	0	1	0	13
0	0	0	1	14
0	0	0	0	15

Note: On: 1, Off: 0

Signal Connections

PCI-1730U Pin Assignments

CN1

IDO 0	1	2	IDO 1
IDO 2	3	4	IDO 3
IDO 4	5	6	IDO 5
IDO 6	7	8	IDO 7
IDO 8	9	10	IDO 9
IDO 10	11	12	IDO 11
IDO 12	13	14	IDO 13
IDO 14	15	16	IDO 15
EGND	17	18	EGND
NC	19	20	NC

CN2

IDI 0	1	2	IDI 1
IDI 2	3	4	IDI 3
IDI 4	5	6	IDI 5
IDI 6	7	8	IDI 7
IDI 8	9	10	IDI 9
IDI 10	11	12	IDI 11
IDI 12	13	14	IDI 13
IDI 14	15	16	IDI 15
ECOM0	17	18	ECOM1
ECOM0	19	20	ECOM1

CN3

DO 0	1	2	DO 1
DO 2	3	4	DO 3
DO 4	5	6	DO 5
DO 6	7	8	DO 7
DO 8	9	10	DO 9
DO 10	11	12	DO 11
DO 12	13	14	DO 13
DO 14	15	16	DO 15
GND	17	18	GND
+5 V	19	20	+12 V

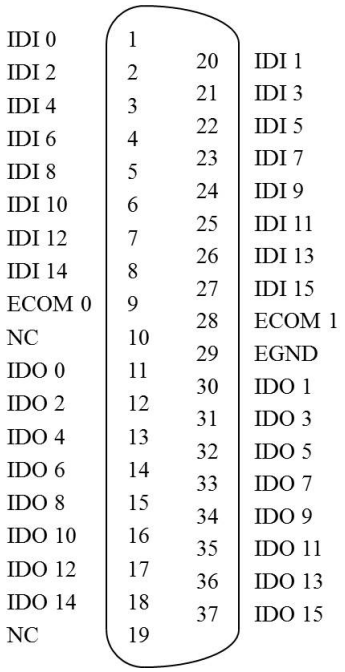
CN4

DI 0	1	2	DI 1
DI 2	3	4	DI 3
DI 4	5	6	DI 5
DI 6	7	8	DI 7
DI 8	9	10	DI 9
DI 10	11	12	DI 11
DI 12	13	14	DI 13
DI 14	15	16	DI 15
GND	17	18	GND
+5 V	19	20	+12 V

CN5

EGND | 1 2 | EGND

CN6



Description of pin use:

IDI*n* (*n*=0 ~ 15):
Isolated digital input
IDO*n* (*n*=0 ~ 15):
Isolated digital output
ECOM*n* (*n*=0 ~ 1):
External common Vcc/GND of IDI

EGND:
External ground for IDO
NC: Not connected
DI*n* (*n*=0 ~ 15):
Digital input
DO*n* (*n*=0 ~ 15):
Digital output
GND:
Digital ground

TTL-level Digital Input/Output

The PCI-1730U has 16 TTL-level digital inputs and 16 TTL-level digital outputs. The following figure shows connections to exchange digital signals with other TTL devices:

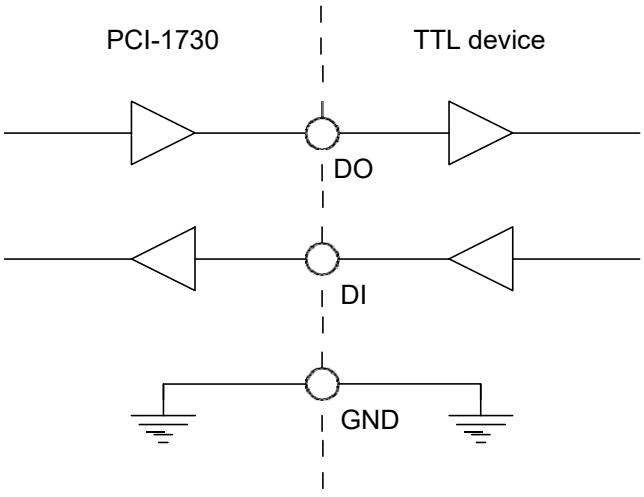


Figure 3.4 TTL-level DI/O Connection

If you want to receive an OPEN/SHORT signal from a switch or relay.
See the figure below:

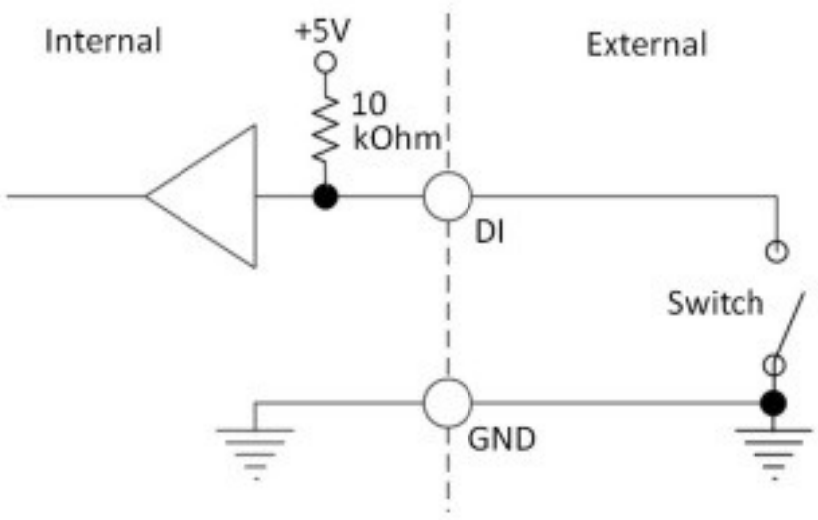


Figure 3.5 Open/Short Connection

Isolated Digital Input

Each isolated digital input channel accepts bi-directional 5~30V voltage inputs means that user can apply positive or negative voltage to any input pin. Every eight input channels share one external common. (Channels 0 ~ 7 use ECOM0.

Channels 8 ~ 15 use ECOM1.) The following figure shows how to connect an external input source to the card's isolated inputs.

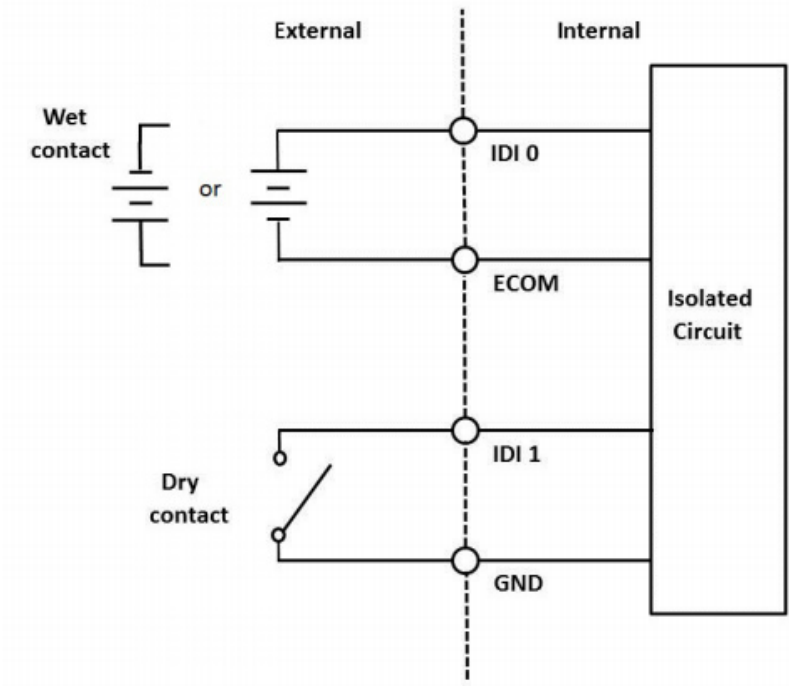


Figure 3.6 Isolated DI Connection

Isolated Digital Output

If the external voltage source (5~40 V) is connected to each isolated output channel (IDO) and its isolated digital output turns on (300 mA max./ch), the card's current will sink from the external voltage source. CN5 provides two EGND pins for IDO connection.

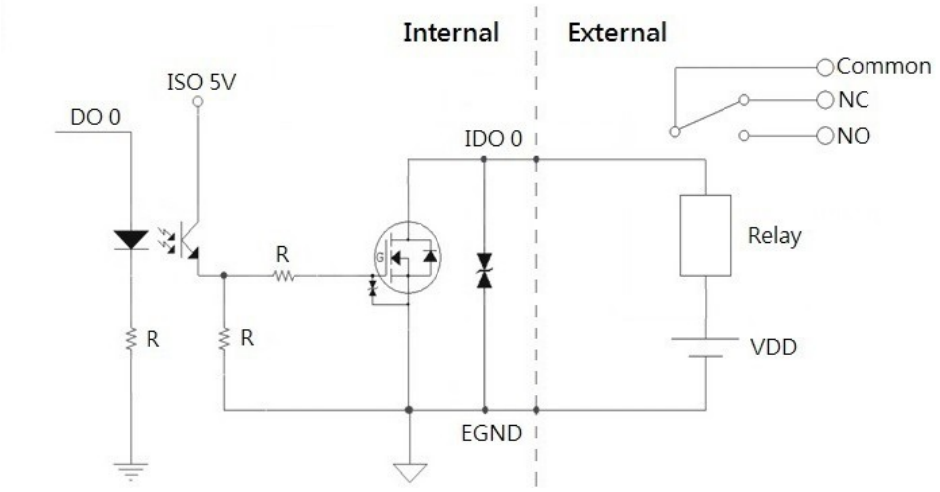


Figure 3.7 Isolated Digital Output Connection

PCI-1733 Pin Assignments

CN1

Description of pin use:

IDI*n* (*n*=0 ~ 31):
Isolated digital input
ECOM *n* (*n*=0 ~ 3):
External common Vcc/GND of IDI
EGND:
External ground for IDI

IDI 0	1	20	IDI 1
IDI 2	2	21	IDI 3
IDI 4	3	22	IDI 5
IDI 6	4	23	IDI 7
ECOM 0	5	24	IDI 8
IDI 9	6	25	IDI 10
IDI 11	7	26	IDI 12
IDI 13	8	27	IDI 14
IDI 15	9	28	ECOM 1
IDI 16	10	29	IDI 17
IDI 18	11	30	IDI 19
IDI 20	12	31	IDI 21
IDI 22	13	32	IDI 23
ECOM 2	14	33	IDI 24
IDI 25	15	34	IDI 26
IDI 27	16	35	IDI 28
IDI 29	17	36	IDI 30
IDI 31	18	37	ECOM 3
EGND	19		

Isolated Digital Input

Each isolated digital input channel accepts bi-directional 5~30V voltage inputs means that user can apply positive or negative voltage to any input pin. Every eight input channels share one external common. (Channels 0 ~ 7 use ECOM0. Channels 8 ~ 15 use ECOM1. Channels 16 ~ 23 use ECOM2. Channels 24 ~ 31 use ECOM3.) The following figure shows how to connect an external input source to the card's isolated inputs.

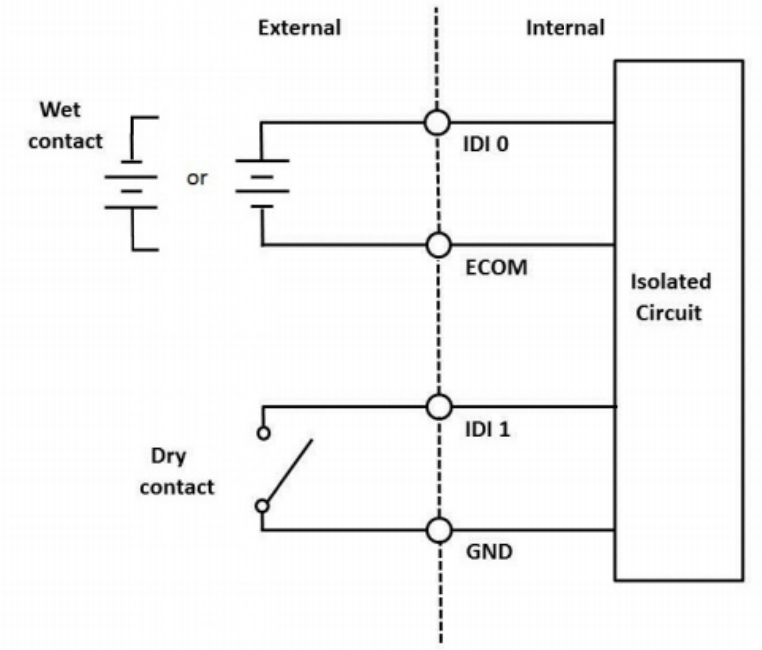


Figure 3.8 Isolated Digital Input Connection

PCI-1734 Pin Assignments

Description of pin use:

IDO*n* (*n*=0 ~ 31):
Isolated digital output
PCOM *n* (*n*=0 ~ 3):
Free wheeling common diode for
EGND:
External ground for IDO

CN1

IDO 0	1	20	IDO 1
IDO 2	2	21	IDO 3
IDO 4	3	22	IDO 5
IDO 6	4	23	IDO 7
PCOM 0	5	24	IDO 8
IDO 9	6	25	IDO 10
IDO 11	7	26	IDO 12
IDO 13	8	27	IDO 14
IDO 15	9	28	PCOM 1
IDO 16	10	29	IDO 17
IDO 18	11	30	IDO 19
IDO 20	12	31	IDO 21
IDO 22	13	32	IDO 23
PCOM 2	14	33	IDO 24
IDO 25	15	34	IDO 26
IDO 27	16	35	IDO 28
IDO 29	17	36	IDO 30
IDO 31	18	37	PCOM 3
EGND	19		

CN2

EGND	1	2	EGND

Isolated Digital Output

Each of the 32 isolated digital output channels comes equipped with a darlington transistor. Every eight ouput channels share common emitters and integral suppression diodes for inductive load, activated by connecting PCOM to VDD. (Channels 0 ~ 7 use PCOM0. Channels 8 ~ 15 use PCOM1. Channels 16 ~ 23 use PCOM2. If the external voltage source (5~40 V) is connected to each isolated output channel (IDO) and its isolated digital output turns on (200 mA max./ch), the card's current will sink from the external voltage source. The current through EGND should not exceed 4.8 A. If the current for all channels combined exceeds 2 A, CN2 must be connected to the external ground to share the extra current. The following figure shows how to connect an external output load to the card's isolated outputs.

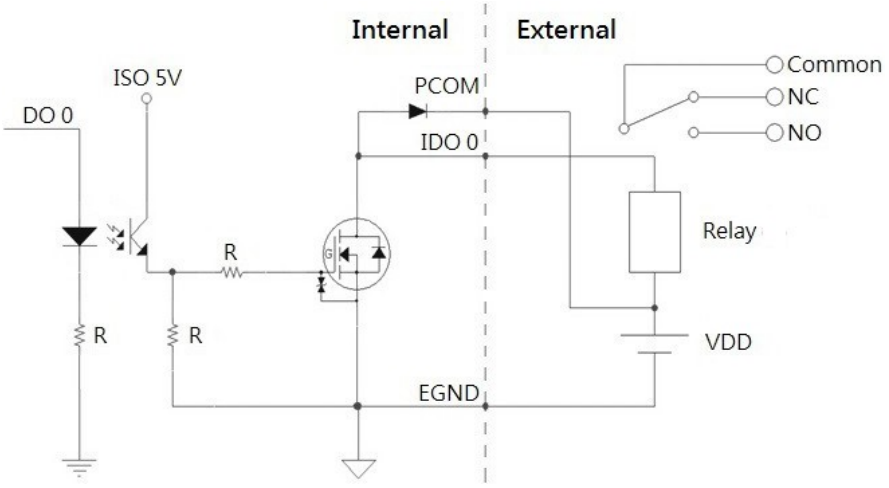


Figure 3.9 Isolated Digital Output Connection

Appendix A

Specifications

Specifications

PCI-1730U

Isolated Digital Input

Number of Channel	16 (bi-directional)	
Optical Isolation	2,500 V_{DC}	
Opto-isolator response time	100 μs	
Over-voltage Protect	70 V_{DC}	
Input Voltage	VIH (max.)	30 V_{DC}
	VIH (min.)	5 V_{DC}
	VIL (max.)	2 V_{DC}
Input Current	5 V_{DC}	1.4 mA (typical)
	12 V_{DC}	3.9 mA (typical)
	24 V_{DC}	8.2 mA (typical)
	30 V_{DC}	10.3 mA (typical)

Isolated Digital Output

Number of Channel	16
Optical Isolation	2,500 V_{DC}
Output Voltage	Open collector 5 to 40 V_{DC}
Sink/Source Current	300 mA max./channel

Non-isolated Digital Input/Output

Input Channels	16	
Input Voltage	Low	0.8 V max.
	High	2.0 V min.
Output Channels	16	
Output Voltage	Low	0.5 V max. @ +24 mA (sink)
	High	2.0 V min. @ -15 mA (source)

General

I/O Connector Type	37-pin D-Sub female	
Dimensions	175 mm x 100 mm (6.9" x 3.9")	
Power Consumption	Typical	+5 V @ 250 mA +12 V @ 35 mA
	Max.	+5 V @ 400 mA
Temperature	Operation	0~+60°C (32~140°F) (refer to *IEC 68-2-1,2)*
	Storage	-20~+85°C (-4~185°F)
Relative Humidity	5~95%RH non-condensing (refer to *IEC 68-2-3*)	
Certification	CE/FCC	

PCI-1733

Isolated Digital Input

Number of Input Channel	32
Interrupt Inputs	4 (IDI0,IDI1,IDI16,IDI17)
Optical Isolation	2500 V_{DC}
Optical Isolator response time	100 us
Input Resistance	2.8KΩ @1W
Over Voltage Protect	70 V_{DC}
Input Voltage	V_{IH}(max.) = 30 V_{DC} V_{IH}(min.) = 5 V_{DC} V_{IL}(max.) = 2 V_{DC}
Input Current	1.4 mA @5 V_{DC} (typical) 3.9 mA @12 V_{DC} (typical) 8.2 mA @24 V_{DC} (typical) 10.3 mA @30 V_{DC} (typical)

General Specifications

I/O Connector Type	37-pin D-Sub female
Dimensions	175 mm x 100 mm (6.9” x 3.9”)
Power Consumption	+5V @ 200 mA (typical) +12V @ 50 mA (typical)
	+5V @ 350 mA (max.)
Temperature	Operating: 0 ~ +60°C (32 ~ 140°F) Storage: -20 ~ +70 °C (-4 ~ 158°F)
Relative Humidity	5 – 95 % RH non-condensing (refer to IEC 60068-2-3)
Certifications	CE / FCC

PCI-1734

Isolated Digital Output

Number of Output Channel	32
Optical Isolation	2500 V_{DC}
Optical Isolator response time	100 us
Supply Voltage	5~40 V_{DC}
Sink Current	200 mA max./channel

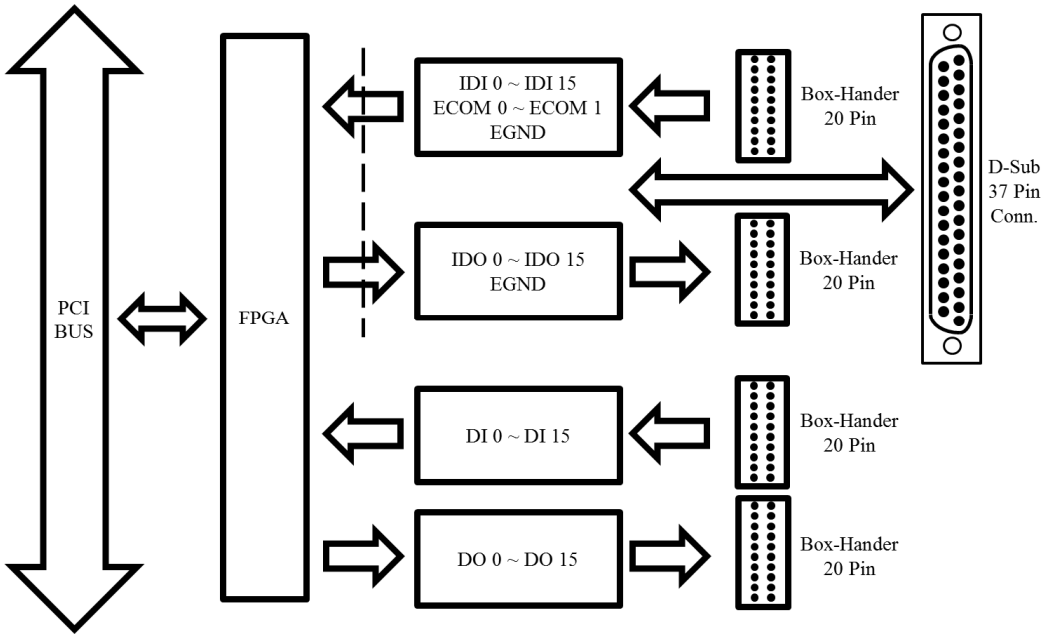
General Specifications

I/O Connector Type	37-pin D-Sub female
Dimensions	175 mm x 100 mm (6.9” x 3.9”)
Power Consumption	+5V @ 150 mA (typical) +12V @ 15 mA (typical)
	+5V @ 250 mA (max.)
Temperature	Operating: 0 ~ +60°C (32 ~ 140°F) Storage: -20 ~ +70°C (-4 ~ 158°F)
Relative Humidity	5 – 95 % RH non-condensing (refer to IEC 60068-2-3)
Certifications	CE / FCC

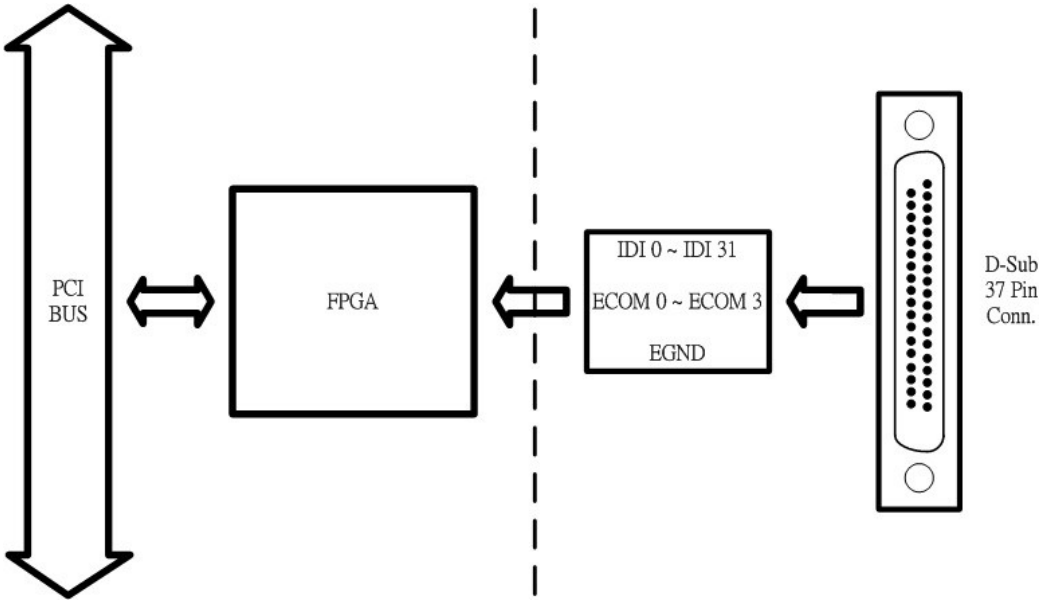
Appendix B

Block Diagram

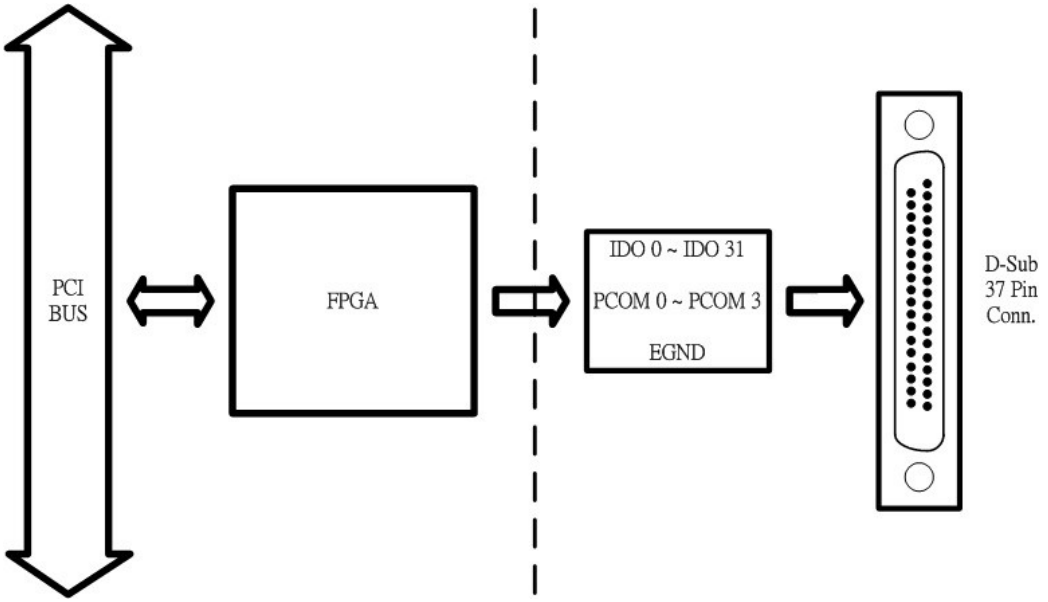
PCI-1730U Block Diagram



PCI-1733 Block Diagram



PCI-1734 Block Diagram



Appendix C

Register Structure & Format

Overview

The most important consideration in programming the PCI-1730U/1733/1734 at the register level is to understand the function of the card's registers. The information in the following sections is provided only for users who would like to do their own low-level programming.

I/O Port Address Map

The PCI-1730U/1733/1734 requires 16 consecutive addresses in the PC's I/O space. The address of each register is specified as an offset from the card's base address. For example, BASE+0 is the card's base address and BASE+6 is the base address plus six bytes. The table C-1 shows the function of each register of the PCI-1730U/1733/1734 or driver and its address relative to the card's base address.

Base Addr. +HEX		7	6	5	4	3	2	1	0
0H	R	Isolated Digital Input							
		IDI7	IDI6	IDI5	IDI4	IDI3	IDI2	IDI1	IDI0
	W	Isolated Digital Output							
		IDO7	IDO6	IDO5	IDO4	IDO3	IDO2	IDO1	IDO0
01H	R	Isolated Digital Input							
		IDI15	IDI14	IDI13	IDI12	IDI11	IDI10	IDI9	IDI8
	W	Isolated Digital Output							
		IDO15	IDO14	IDO13	IDO12	IDO11	IDO10	IDO9	IDO8
02H	R	Digital Input							
		DI7	DI6	DI5	DI4	DI3	DI2	DI1	DI0
	W	Digital Output							
		DO7	DO6	DO5	DO4	DO3	DO2	DO1	DO0
03H	R	Digital Input							
		DI15	DI14	DI13	DI12	DI11	DI10	DI9	DI8
	W	Digital Output							
		DO15	DO14	DO13	DO12	DO11	DO10	DO9	DO8
04H	R	Board ID Register							
						BD3	BD2	BD1	BD0
08H	R	Interrupt Enable Status							
						DI1EN	DI0EN	IDI1EN	IDI0EN
	W	Interrupt Enable Register							
						DI1EN	DI0EN	IDI1EN	IDI0EN
0CH	R	Interrupt Triggering Status							
						DI1RF	DI0RF	IDI1RF	IDI0RF
	W	Interrupt Triggering Register							
						DI1RF	DI0RF	IDI1RF	IDI0RF
10H	R	Interrupt Flag							
						DI1F	DI0F	IDI1F	IDI0F
	W	Interrupt Clear Register							
						DI1CLR	DI0CLR	IDI1CLR	IDI0CLR

Table C-2 PCI-1733 Register Format

Base Addr. +HEX		7	6	5	4	3	2	1	0
00H	R	Isolated Digital Input							
		IDI7	IDI6	IDI5	IDI4	IDI3	IDI2	IDI1	IDI0
	W	N/A							
01H	R	Isolated Digital Input							
		IDI15	IDI14	IDI13	IDI12	IDI11	IDI10	IDI9	IDI8
	W	N/A							
02H	R	Isolated Digital Input							
		IDI23	IDI22	IDI21	IDI20	IDI19	IDI18	IDI17	IDI16
	W	N/A							
03H	R	Isolated Digital Input							
		IDI31	IDI30	IDI29	IDI28	IDI27	IDI26	IDI25	IDI24
	W	N/A							
04H	R	Board ID Register							
						BD3	BD2	BD1	BD0
08H	R	Interrupt Enable Status							
						IDI17EN	IDI16EN	IDI1EN	IDI0EN
	W	Interrupt Enable Register							
						IDI17EN	IDI16EN	IDI1EN	IDI0EN
0CH	R	Interrupt Triggering Status							
						IDI17RF	IDI16RF	IDI1RF	IDI0RF
	W	Interrupt Triggering Register							
						IDI17RF	IDI16RF	IDI1RF	IDI0RF
10H	R	Interrupt Flag							
						IDI17F	IDI16F	IDI1F	IDI0F
	W	Interrupt Clear Register							
						IDI17CLR	IDI16CLR	IDI1CLR	IDI0CLR

Table C-3 PCI-1734 Register Format

Base Addr. +HEX		7	6	5	4	3	2	1	0
0H	R	N/A							
	W	Isolated Digital Output							
		IDO7	IDO6	IDO5	IDO4	IDO3	IDO2	IDO1	IDO0
1H	R	N/A							
	W	Isolated Digital Output							
		IDO15	IDO14	IDO13	IDO12	IDO11	IDO10	IDO9	IDO8
2H	R	N/A							
	W	Isolated Digital Output							
		IDO23	IDO22	IDO21	IDO20	IDO19	IDO18	IDO17	IDO16
3H	R	N/A							
	W	Isolated Digital Output							
		IDO31	IDO30	IDO29	IDO28	IDO27	IDO26	IDO25	IDO24
4H	R	Board ID Register							
						BD3	BD2	BD1	BD0
	W	N/A							

Isolated Digital Input Registers

BASE+0H/1H (/2H/3H)

The PCI-1730U offers 16-ch isolated digital input channels. These channels use the input ports at addresses BASE+0H/1H.

Table C-1 Register for Isolated Digital Input

Read	**Isolated Digital Input**							
Bit #	7	6	5	4	3	2	1	0
BASE + 0H	IDI7	IDI6	IDI5	IDI4	IDI3	IDI2	IDI1	IDI0
BASE + 1H	IDI15	IDI14	IDI13	IDI12	IDI11	IDI10	IDI9	IDI8

The PCI-1733 offers 32-ch isolated digital input channels. These channels use the input ports at addresses BASE+0H/1H/2H/3H.

Table C-2 Register for Isolated Digital Input

Read	**Isolated Digital Input**							
Bit #	7	6	5	4	3	2	1	0
BASE + 0H	IDI7	IDI6	IDI5	IDI4	IDI3	IDI2	IDI1	IDI0
BASE + 1H	IDI15	IDI14	IDI13	IDI12	IDI11	IDI10	IDI9	IDI8
BASE + 2H	IDI23	IDI22	IDI21	IDI20	IDI19	IDI18	IDI17	IDI16
BASE + 3H	IDI31	IDI30	IDI29	IDI28	IDI27	IDI26	IDI25	IDI24

Isolated Digital Output Register

BASE+0H/1H (/2H/3H)

The PCI-1730U offers 16-ch isolated digital output channels. These channels use the registries at addresses BASE+0H/1H.

Table C-3 Register for Isolated Digital Output

Write	Isolated Digital Output							
Bit #	7	6	5	4	3	2	1	0
BASE + 0H	IDO7	IDO6	IDO5	IDO4	IDO3	IDO2	IDO1	IDO0
BASE + 1H	IDO15	IDO14	IDO13	IDO12	IDO11	IDO10	IDO9	IDO8

The PCI-1734 offers 32-ch isolated digital output channels. These channels use the registries at addresses BASE+0H/1H/2H/3H.

Table C-4 Register for Isolated Digital Output

Write	Isolated Digital Output							
Bit #	7	6	5	4	3	2	1	0
BASE + 0H	IDO7	IDO6	IDO5	IDO4	IDO3	IDO2	IDO1	IDO0
BASE + 1H	IDO15	IDO14	IDO13	IDO12	IDO11	IDO10	IDO9	IDO8
BASE + 2H	IDO23	IDO22	IDO21	IDO20	IDO19	IDO18	IDO17	IDO16
BASE + 3H	IDO31	IDO30	IDO29	IDO28	IDO27	IDO26	IDO25	IDO24

Non-isolated Digital Input Registers

BASE+2H/3H

The PCI-1730U offers 16-ch digital input channels. These channels use the input ports at addresses BASE+2H/3H.

Table C-5 Register for Digital Input

Read	Digital Input							
Bit #	7	6	5	4	3	2	1	0
BASE + 2H	DI7	DI6	DI5	DI4	DI3	DI2	DI1	DI0
BASE + 3H	DI15	DI14	DI13	DI12	DI11	DI10	DI9	DI8

Non-isolated Digital Output Register

BASE+2H/3H

The PCI-1730U offers 16-ch digital output channels. These channels use the input ports at addresses BASE+2H/3H.

Table C-6 Register for Digital Output

Write	Digital Output							
Bit #	7	6	5	4	3	2	1	0
BASE + 2H	DO7	DO6	DO5	DO4	DO3	DO2	DO1	DO0
BASE + 3H	DO15	DO14	DO13	DO12	DO11	DO10	DO9	DO8

Board ID — BASE+4H

The PCI-1730U/1733/1734 offers Board ID register BASE+4H. With correct Board ID settings, user can easily identify and access each card during hardware configuration and software programming.

Table C-7 Register for Board ID

Read	Board ID							
Bit #	7	6	5	4	3	2	1	0
BASE + 4H					BD3	BD2	BD1	BD0

BD3 ~ DB0 Board ID

BD0 LSB of the Board ID

BD3 MSB of the Board ID

BD3	BD2	BD1	BD0	Board ID
1	1	1	1	15
1	1	1	0	14
1	1	0	1	13
1	1	0	0	12
1	0	1	1	11
1	0	1	0	10
1	0	0	1	9
1	0	0	0	8
0	1	1	1	7
0	1	1	0	6
0	1	0	1	5
0	1	0	0	4
0	0	1	1	3
0	0	1	0	2
0	0	0	1	1
0	0	0	0	0

Interrupt Status Register

BASE+8H/CH/10H

The PCI-1730U ***Interrupt Status Register*** control the status of four interrupt signal sources (IDI0, IDI1, DI0, DI1).

Table C-8 Register for Interrupt Status

Read	Interrupt Status Register							
Bit #	7	6	5	4	3	2	1	0
BASE + 8H					DI1EN	DI0EN	IDI1EN	IDI0EN
BASE + CH					DI1RF	DI0RF	IDI1RF	IDI0RF
BASE + 10H					DI1F	DI0F	IDI1F	IDI0F

IDI/DI*n*F Interrupt flag bits (*n* = 0 ~ 1)

This bit is a flag indicating the status of an interrupt. User can read this bit to get the status of the interrupt

0 No interrupt

1 Interrupt occurred

IDI/DI*n*EN Interrupt enable control bits (*n* = 0 ~ 1)

Read this bit to Enable/Disable the interrupt.

0 Disable

1 Enable

IDI/DI*n*RF Interrupt triggering control bits (*n* = 0 ~ 1)

The interrupt can be triggered by a rising edge or falling edge of the interrupt signal, as determined by the value in this bit.

0 Rising edge trigger

1 Falling edge trigger

The PCI-1733 ***Interrupt Status Register*** control the status of four interrupt signal sources (IDI0, IDI1, IDI16, IDI17).

Table C-9 Register for Interrupt Status

Read	Interrupt Status Register							
Bit #	7	6	5	4	3	2	1	0
BASE + 8H					IDI17EN	IDI16EN	IDI1EN	IDI0EN
BASE + CH					IDI17RF	IDI16RF	IDI1RF	IDI0RF
BASE + 10H					IDI17F	IDI16F	IDI1F	IDI0F

IDI*n*F **Interrupt flag bits (*n* = 0, 1, 16, 17)**

This bit is a flag indicating the status of an interrupt. User can read this bit to get the status of the interrupt

0 No interrupt

1 Interrupt occurred

IDI*n*EN **Interrupt enable control bits (*n* = 0, 1, 16, 17)**

Read this bit to Enable/Disable the interrupt.

0 Disable

1 Enable

IDI*n*RF **Interrupt triggering control bits (*n* = 0, 1, 16, 17)**

The interrupt can be triggered by a rising edge or falling edge of the interrupt signal, as determined by the value in this bit.

0 Rising edge trigger

1 Falling edge trigger

Interrupt Control Register — BASE+8H/CH/10H

The PCI-1730U ***Interrupt Control Register*** controls the status of four interrupt signal sources (IDI0, IDI1, DI0, DI1). The user can clear the interrupt by writing its corresponding value to the ***Interrupt Control Register***, as shown in below table.

Table C-10 Register for Interrupt Control

Write	**Interrupt Control Register**							
Bit #	7	6	5	4	3	2	1	0
BASE + 8H					DI1EN	DI0EN	IDI1EN	IDI0EN
BASE + CH					DI1RF	DI0RF	IDI1RF	IDI0RF
BASE + 10H					DI1CLR	DI0CLR	IDI1CLR	IDI0CLR

IDI/DI*n*CLR **Interrupt clear control bits (*n* = 0 ~ 1)**

This bit must first be cleared to service the next interrupt.

0 Don’t care

1 Clear the interrupt

IDI/DI*n*EN **Interrupt enable control bits (*n* = 0 ~ 1)**

Read this bit to Enable/Disable the interrupt.

0 Disable

1 Enable

IDI/DI*n*RF **Interrupt triggering control bits (*n* = 0 ~ 1)**

The interrupt can be triggered by a rising edge or falling edge of the interrupt signal, as determined by the value in this bit.

0 Rising edge trigger

1 Falling edge trigger

The PCI-1733 ***Interrupt Control Register*** controls the status of four interrupt signal sources (IDI0, IDI1, IDI16, DI17). The user can clear the interrupt by writing its corresponding value to the ***Interrupt Control Register***, as shown in below table.

Table C-11 Register for Interrupt Control

Write	**Interrupt Control Register**							
Bit #	7	6	5	4	3	2	1	0
BASE + 8H					IDI17EN	IDI16EN	IDI1EN	IDI0EN
BASE + CH					IDI17RF	IDI16RF	IDI1RF	IDI0RF
BASE + 10H					IDI17CLR	IDI16CLR	IDI1CLR	IDI0CLR

IDI*n*CLR **Interrupt clear control bits (*n* = 0, 1, 16, 17)**

This bit must first be cleared to service the next interrupt.

0 Don't care

1 Clear the interrupt

IDI*n*EN **Interrupt enable control bits (*n* =0, 1, 16, 17)**

Read this bit to Enable/Disable the interrupt.

0 Disable

1 Enable

IDI*n*RF **Interrupt triggering control bits (*n* = 0, 1, 16, 17)**

The interrupt can be triggered by a rising edge or falling edge of the interrupt signal, as determined by the value in this bit.

0 Rising edge trigger

1 Falling edge trigger

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