PCI-1758U Series

128-Channel Isolated Digital Input/Output Card

User Manual

Acknowledgements

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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.

CE

All products in the PCI-1758U Series have 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.

Technical Support and Assistance

Step 1. Visit the Advantech web site at **www.advantech.com/support** where you can find the latest information about the product.

Step 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

Packing List

Before setting up the system, check that the items listed below are included and in good condition. If any item does not accord with the table, please contact your dealer immediately.

The PCI-1758U include the following items:

1 x PCI-1758UDI, PCI-1758UDO or PCI-1758UDIO card

1 x Companion CD-ROM (DLL driver included)

1 x User Manual (This manual)

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CHAPTER 1

General Information

This chapter gives background information on the cards in the PCI-1758U Series. It then shows how to configure the cards to match your application and prepare them for installation on your system.

Sections include:

- Introduction
- Installation Guide
- Accessories

Chapter 1 General Information

1.1 Introduction

Thank you for buying a PCI-1758U Series digital input/output card. The PCI-1758U cards enable powerful data acquisition (DAS) for the PCI bus. It features a unique circuit design, and complete functions for data acquisition and control.

The PCI-1758U cards provides specific functions for different user requirements:

PCI-1758UDO	128-channel Isolated Digital **Output** card
PCI-1758UDI	128-channel Isolated Digital **Input** Card
PCI-1758UDIO	64-channel Isolated Digital Input and 64-channel Isolated Output Card

The following sections of this chapter will provide further information about features of the DAS cards.

1.1.1 Features

PCI-1758U cards provide the most requested I/O and control functions as seen below:

PCI-1758UDO

- 128 isolated digital output channels
- High-voltage isolation on output channels (2,500 V DC)
- Wide output range (5 ~ 40 V DC)
- High-sink current for isolated output channels (90 mA max./Channel)
- Current protection for each port
- BoardID Switch
- Output status read-back
- Digital output value retained after hot system reset
- Programmable Power-Up States
- Watchdog Timer

PCI-1758UDI

- 128 isolated digital input channels
- High-voltage isolation for input channels (2,500 VDC)
- Wide input range (5 ~ 25 VDC)
- High ESD Protection (2,000 VDC)
- Digital Filter function
- BoardID Switch
- Interrupt handling capability

PCI-1758UDIO

Digital Output

- 64 isolated digital output channels
- High-voltage isolation on output channels (2,500 VDC)
- Wide output range (5 ~ 40 VDC)
- High-sink current for isolated output channels (90 mA max./Channel)
- Current protection for each port
- Output status read-back
- Digital output value retained after hot system reset
- Programmable Power-Up States
- Watchdog Timer

Digital Input

- 64 isolated digital input channels
- High-voltage isolation for input channels (2,500 VDC)
- Wide input range (5 ~ 25 VDC)
- High ESD protection (2,000 VDC)
- Digital Filter function
- Interrupt handling capability
- Robust isolation
- BoardID switch

Robust Isolation

PCI-1758U cards feature a robust isolation protection for applications in industrial, lab and machinery automation. The PCI-1758U cards can durably withstand a voltage up to 2,500 VDC, preventing your host system from any incidental harms.

Wide Input/Output Range

PCI-1758U cards have a wide range of input voltage and it is suitable for most industrial applications with 12 VDC and 24 VDC input voltage. The PCI-1758U cards also feature a wide output voltage range, suitable for most industrial applications with 12 VDC / 24 VDC output voltage. In the mean time, we are also ready to serve your special needs for specific input/output voltage range.

PCI-1758UDI

- Input range: 5~25 VDC

PCI-1758UDO

- Output range: 5~40 VDC

PCI-1758UDIO

- Input range: 5~25 VDC
- Output range: 5~40 VDC

BoardID Switch

PCI-1758U cards have a built-in DIP switch that helps define each card's ID when multiple cards have been installed on the same PC chassis. The BoardID switch is very useful when you are building a system with multiple PCI-1758U cards. With correct BoardID settings, you can easily identify and access each card during hardware configuration and software programming.

Programmable Power-Up States Function (PCI-1758UDO/UDIO)

When powering up, the output drives on PCI-1758UDO/UDIO are disabled. All output lines are user-configurable for logic high output and logic low output. User-configurable power-up states are useful for ensuring that the PCI-1758UDO/UDIO powers up in a known state. Power-up states are programmed in the EEPROM through the driver. The default settings are all set to 0. For more details, please refer to Appendix C.

Watchdog Timer Function

The watchdog timer is a software-configurable feature used to set critical outputs to safe states in the event of a software failure. It will activate if there is a loss of communication between the application and the PCI-1758U card. If the PCI-1758U card does not receive a watchdog clear software command within the interval time specified for the watchdog timer, the outputs go to a user-defined safe state and remain in that state until the watchdog timer is disabled and new values are written by the software.

After the watchdog timer expires, the PCI-1758U card ignores any writes until the watchdog timer is disabled. Users can set the watchdog timer timeout period through WDT register to specify the amount of time that must elapse before the watchdog timer expires. The counter on the watchdog timer is configurable up to (2^{32-1}) x 100 ns (approximately seven minutes) before it expires.

Reset Protection

If the system has undergone a hot reset (i.e. without turning off the system power), the PCI-1758UDO/UDIO can either retain outputs values of each channel, or return to its default configuration with power up status, depending on its onboard jumper setting. This function protects the system from causing wrong operations during unexpected system resets.

Table 1.1: PCI-1758U Series Features Comparison			
PCI BUS Isolated Digital I/O card	PCI-1758UDIO	PCI-1758UDO	PCI-1758UDI
Isolated Digital Input	Y (64-ch)	Y (128-ch)	-
Isolated Digital Output	Y (64-ch)	-	Y (128-ch)
BoardID	Y	Y	Y
2500 VDC Isolation	Y	Y	Y
Wide Input Range	Y (5~25 VDC)	-	Y (5~25 VDC)
Wide Output Range	Y (5~40 VDC)	Y (5~40 VDC)	-
Keep last status after hot reset	Y	Y	-
High Sink current on IDO channels	Y (90 mA/ch)	Y (90mA/ch)	-
Output status read back	Y	Y	-
Interrupt handling	Y	-	Y
ESD protection	Y (2000VDC)	-	Y (2000VDC)

1.2 Installation Guide

Before you install your PCI-1758U card, please make sure you have the following necessary components:

- PCI-1758UDI, PCI-1758UDO or PCI-1758UDIO isolated digital I/O card
- PCI-1758U Series User Manual
- Driver software: Advantech DLL drivers(included in the companion CD-ROM)
- Wiring cable: 100-pin MINI-SCSI HDRA-E100 cable
- Wiring board: ADAM-39100
- Computer: Personal computer or workstation with a PCI-bus slot (running Windows 98/2000/XP)

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

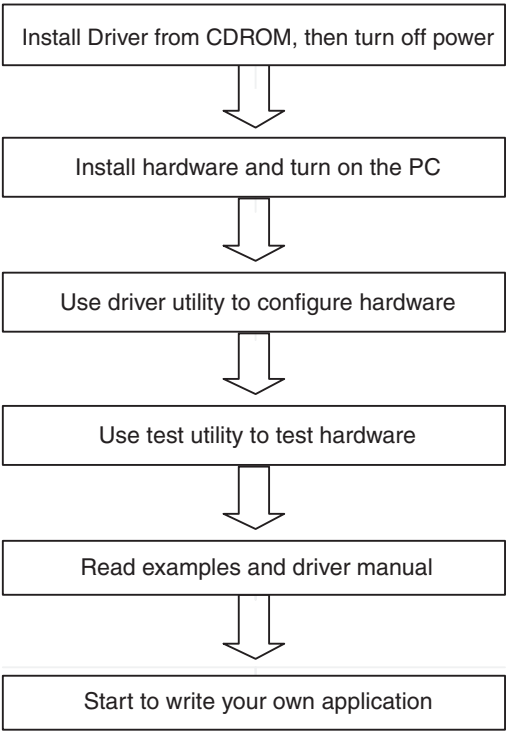


Figure 1.1: Installation Flow Chart

1.3 Accessories

Advantech offers a complete set of accessory products to support the PCI-1758UDI / 1758UDO cards. These accessories include:

1.3.1 PCL-101100S-1 Wiring Cable

The PCL-101100S-1 (1m) shielded cable is specially designed for the PCI-1758UDI/UDO card to provide high resistance to noise.

1.3.2 ADAM-39100 Wiring Terminal Board

ADAM-39100 is a 100-pin SCSI wiring terminal module for DIN-rail mounting. This terminal module can be readily connected to Advantech PC-LabCard products and allow easy and reliable access to individual pin connections for the PCI-1758UDI/UDO card.

CHAPTER 2

Installation

This chapter gives users a package item checklist, proper instructions about unpacking and step-by-step procedures for both driver and card installation.

Sections include:

- Unpacking
- Driver Installation
- Hardware Installation
- Device Setup and Configuration

Chapter 2 Installation

2.1 Unpacking

After receiving your PCI-1758U product package, please inspect its contents first. The package should contain the following items:

- PCI-1758UDI, PCI-1758UDO or PCI-1758UDIO card
- Companion CD-ROM (Device Drivers included)
- User Manual

The PCI-1758U cards harbor 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, you should first:

- 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.*

2.2 Driver Installation

We recommend you to install the driver before you install the PCI-1758U series card into your system, since this will guarantee a smooth installation process.

The Advantech Device Driver Setup program for the PCI-1758U series card is included on the companion CD-ROM that is shipped with your DA&C card package. Please follow the steps below to install the driver software:

1. Insert the companion CD-ROM into your CD-ROM drive.
2. The Setup program will be launched automatically if you have the autoplay function enabled on your system. When the Setup Program is launched, you'll see the following Setup Screen.

Note *If the autoplay function is not enabled on your computer, use Windows Explorer or Windows Run command to execute Autorun.exe on the companion CD-ROM.*

Figure 2.1: The Setup Screen of Advantech Automation Software

3. Select the Individual Drivers option.
4. Select the specific device then just follow the installation instructions step by step to complete your device driver installation and setup.

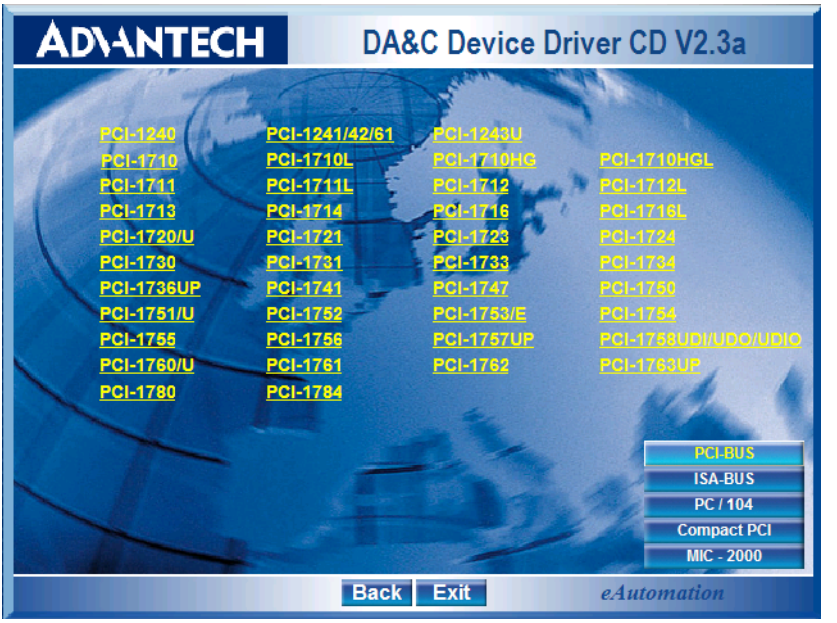


Figure 2.2: Different Options for Driver Installation

For further information on driver-related issues, an online version of the Device Drivers Manual is available by accessing the following path:

Start\Programs\Advantech Automation\Device Manager\Device Driver's Manual

2.3 Hardware Installation

Note *Make sure you have installed the driver before you install the card.*

(please refer to 2.2 Driver Installation)

After the device driver installation is completed, you can now go on to install the PCI-1758U series card in any PCI slot on your computer. But it is suggested that you 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-1758U series 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 rail of the computer with screws.
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 .

Note *In case you installed the card without installing the Device Drivers first,*

Windows 98/2000/XP will recognize your card as an "unknown device" after rebooting, and will prompt you to provide the necessary driver. You should ignore the prompting messages (just click the Cancel button) and set up the driver according to the steps described in 2.4 Driver Installation.

After the PCI-1758U series card is installed, you can verify whether it is properly installed on your system in the Device Manager:

1. Access the Device Manager through Control Panel/System/Device Manager.
2. The device name of the PCI-1758U series should be listed on the Device Manager tab on the System Property Page.

Figure 2.3: The Device Name Listed on the Device Manager

Note *If your card is properly installed, you should see the device name of your card listed on the Device Manager tab. If you do see your device name listed on it but marked with an exclamation sign "!", it means your card has not been correctly installed. In this case, remove the card device from the Device Manager by selecting its device name and press the Remove button. Then go through the driver installation process again.*

After your card is 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. Acomplete 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.

2.4 Device Setup & Configuration

The Advantech Device Manager program is a utility that allows you to set up, configure and test your device, and later stores your settings on the system registry. These settings will be used when you call the APIs of Advantech Device Drivers.

2.4.1 Setting Up the Device

1. To install the I/O device for your card, you must first run the Device Manager program (by accessing Start/Program/Advantech Automation/Device Manager).
2. You can then view the device(s) already installed on your system (if any) on the Installed Devices list box. Since you haven't installed any device yet, you might see a blank list such as the one below (Fig. 2-4).

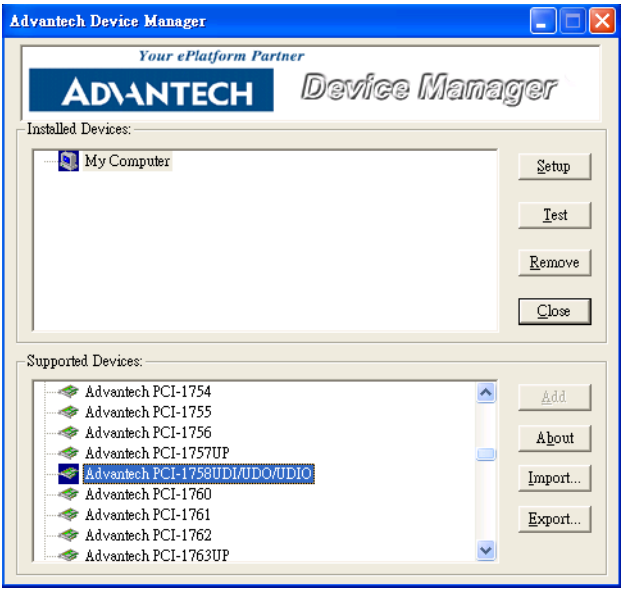


Figure 2.4: The Device Manager Dialog Box

3. Scroll down the *Supported Devices* box to find the device that you wish to install, then click the *Add* button to evoke the existing unconfigured PCI-1758U series dialog box such as one shown in Figure 2.5. The Existing unconfigured PCI-1758U series dialog box. lists all the installed devices on your system. Select the device you want to configure from the list box and press the OK button. After you have clicked OK, you will see a PCI-1758U series Device Setting dialog box such as the one in Fig. 2-6.

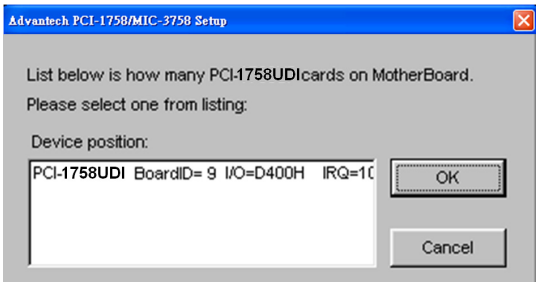


Figure 2.5: The "Device(s) Found" Dialog Box

2.4.2 Configuring the Device

4. On the PCI-1758U series Device Setting dialog box (Fig. 2-6), you can configure the IDI00, IDI01 and DI00, DI01 Interrupt trigger mode either as Rising Edge or Falling Edge, and Enable or Disable the IDI00, IDI01 and DI00, DI01.

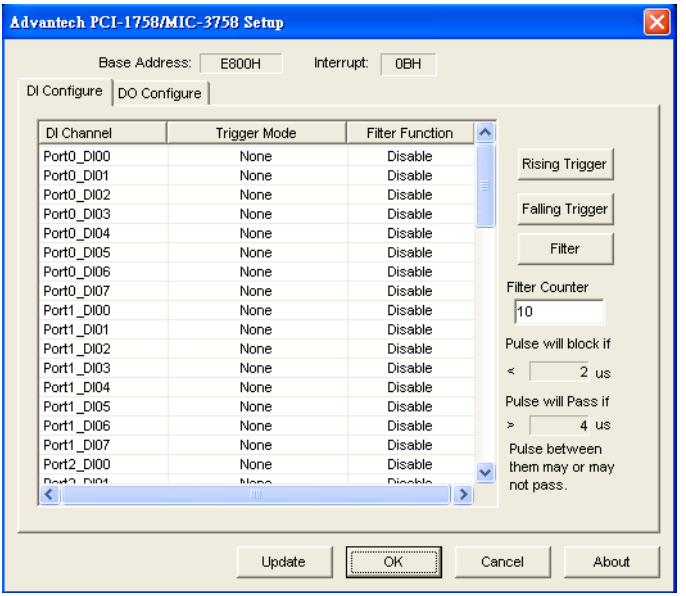


Figure 2.6: The Device Setting Dialog Box

5. After you have finished configuring the device, click OK and the device name will appear in the Installed Devices box as seen below:

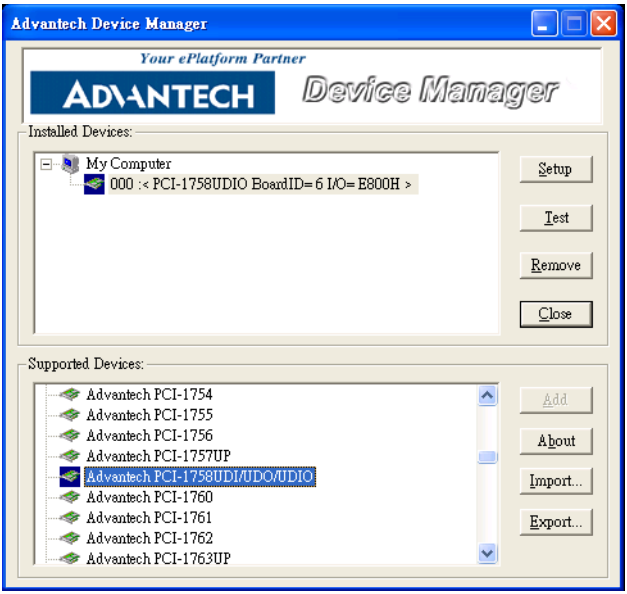


Figure 2.7: The Device Name Appearing on the List of Devices Box

Note: *As we have noted, the device name "**000:<PCI-1758UDI BoardID=6 I/O=800H>**" begins with a device number "000", which is specifically assigned to each card. The device number is passed to the driver to specify which device you wish to control.*

After your card is properly installed and configured, you can click the [**Test…**] button to test your hardware by using the testing utility we supplied. For more detailed information, please refer to Chapter 2 of the Device Drivers Manual.

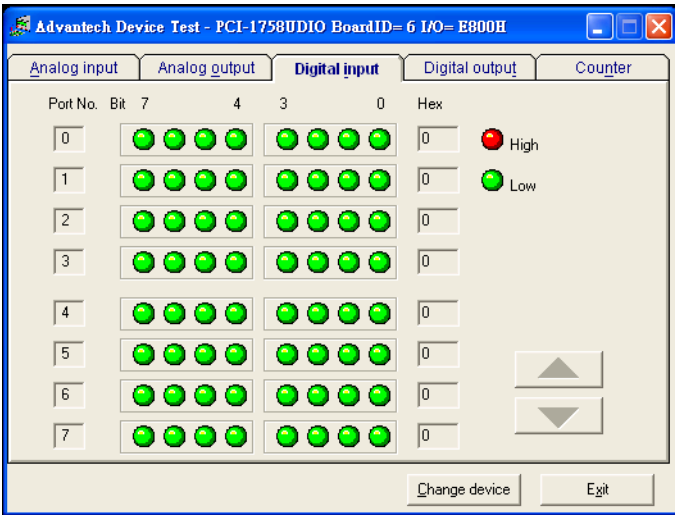


Figure 2.8: The Test Diagram Box for Digital Input

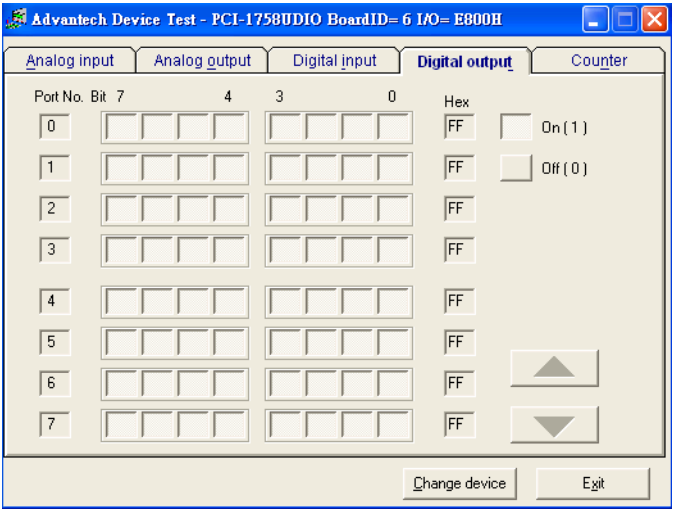


Figure 2.9: The Test Diagram Box for Digital Output

You can also find examples on the CD-ROM to speed up your programming.

CHAPTER 3

Pin Assignments and Jumper Settings

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 system and other hardware devices. This chapter provides useful information about how to connect input and output signals to the PCI-1758U cards via the I/O connector.

Sections include:

- Pin Assignments
- Location of Jumper and DIP Switch
- Isolated Digital Input Connections
- Isolated Digital Output Connections
- Field Wiring Considerations

Chapter 3 Pin Assignments & Jumper Settings

3.1 Pin Assignments

The I/O connector on PCI-1758UDI and PCI-1758UDO is one MINI-SCSI HDRA-E100 Female connector. Figures 3.1, 3.2, 3.3, and 3.4 show the pin assignments for the MINI-SCSI HDRA-E100 Female connector on the PCI-1758UDI and PCI-1758UDO, while Tables 3.1, 3.2, and 3.3 show the connector signal descriptions.

Note: *The PCL-101100S-1 (1m) shielded cable is especially designed for the PCI-1758U series to reduce noise in the analog signal lines. Please refer to section 1.3 Accessories.*

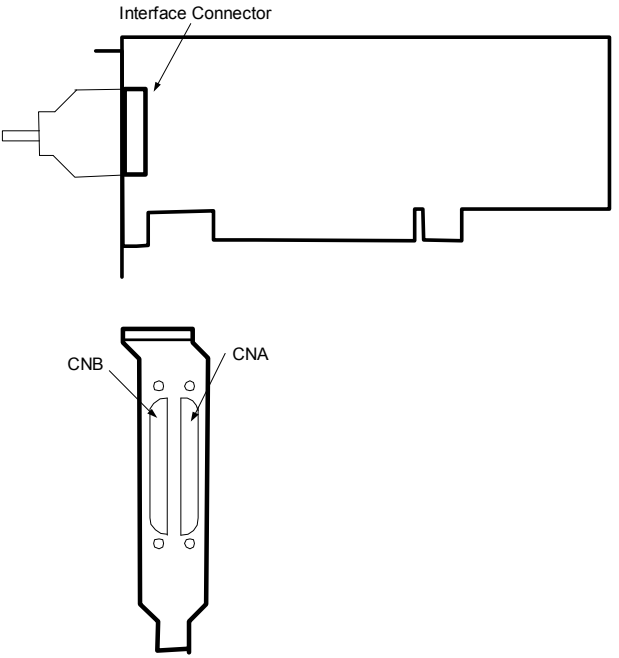


Figure 3.1: Connector

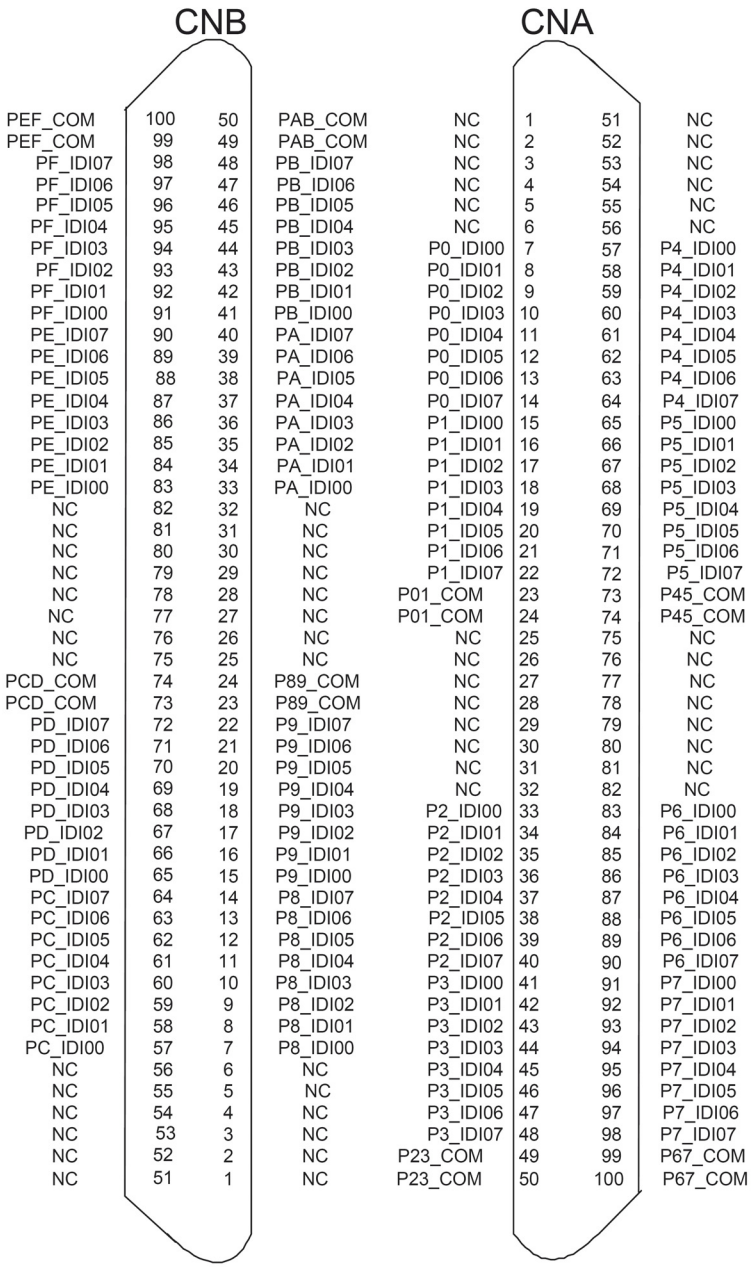


Figure 3.2: I/O Connector Pin Assignment for PCI-1758UDI

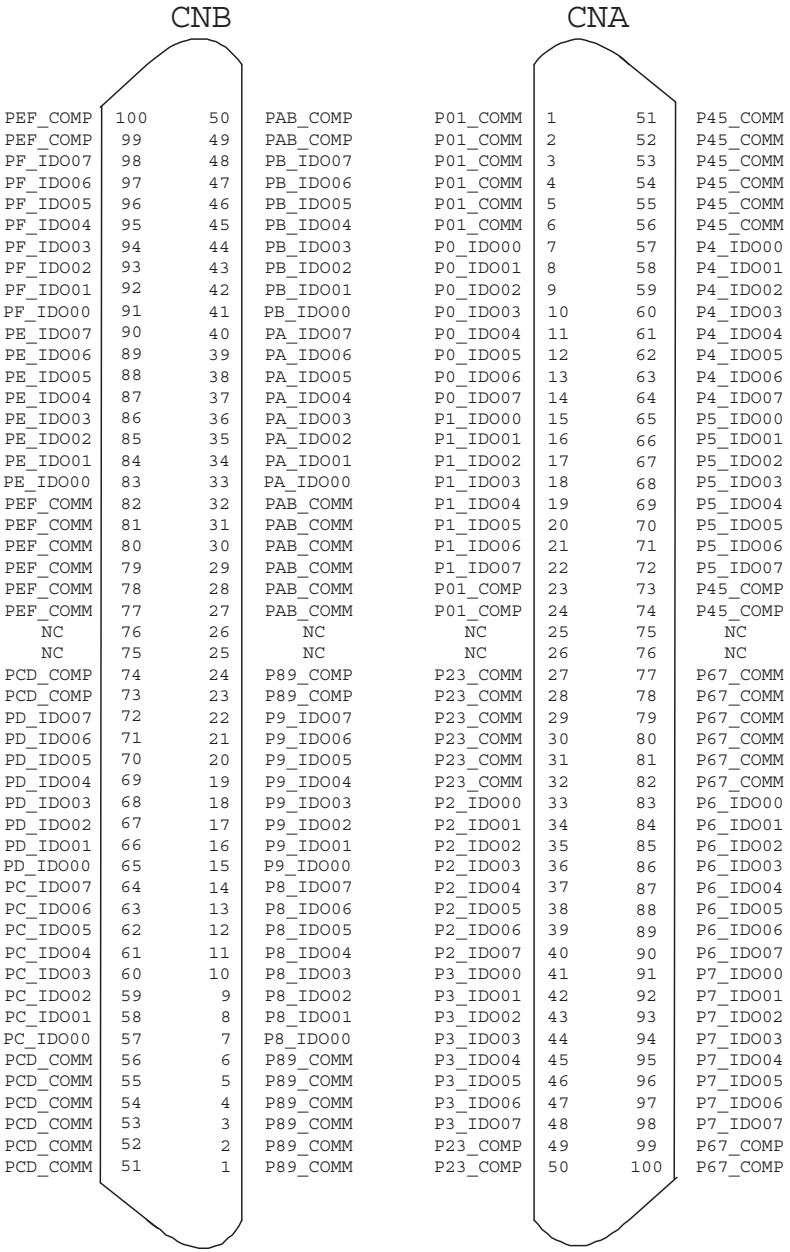


Figure 3.3: I/O Connector Pin Assignment for PCI-1758UDO

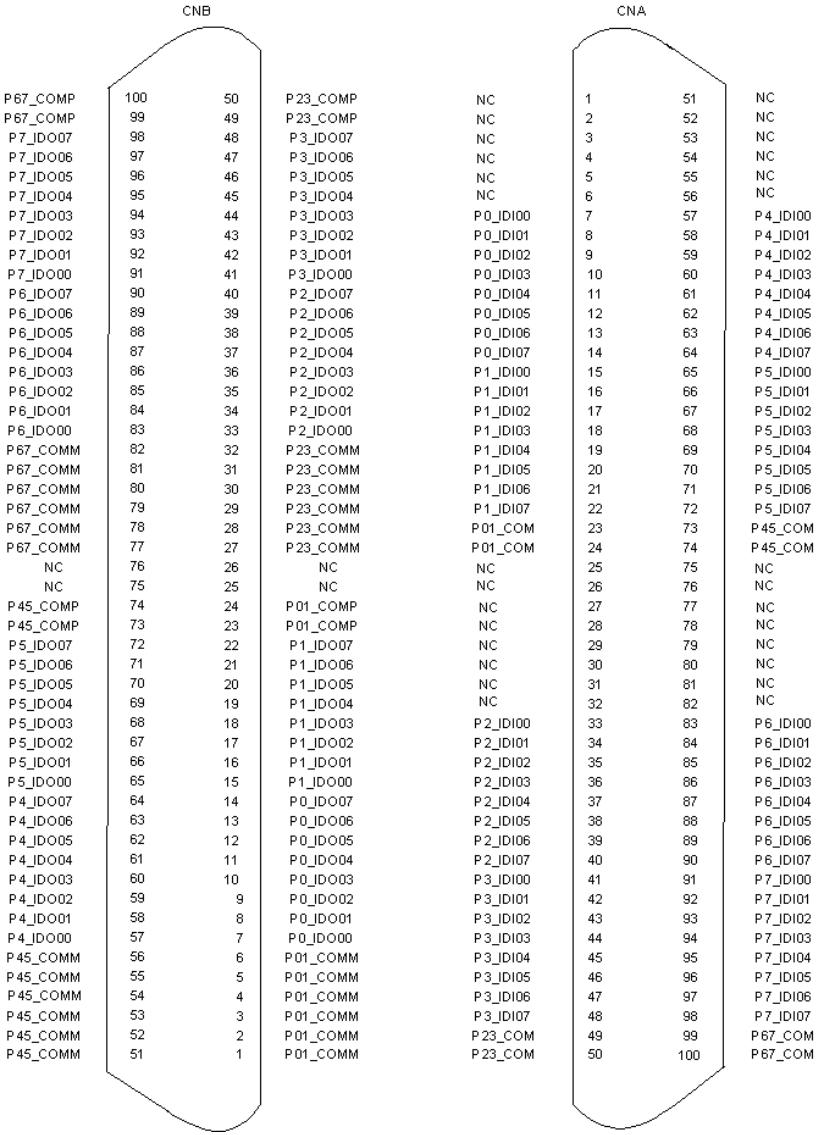


Figure 3.4: I/O Connector Pin Assignment for PCI-1758UDIO

Table 3.1: PCI-1758UDI I/O Connector Signal Description			
Signal Name	**Reference**	**Direction**	**Description**
P0_IDI00~ 07	P01_COM	Input	Isolated Digital Input of port 0
P1_IDI00~ 07	P01_COM	Input	Isolated Digital Input of port 1
P2_IDI00~ 07	P23_COM	Input	Isolated Digital Input of port 2
P3_IDI00~ 07	P23_COM	Input	Isolated Digital Input of port 3
P4_IDI00~ 07	P45_COM	Input	Isolated Digital Input of port 4
P5_IDI00~ 07	P45_COM	Input	Isolated Digital Input of port 5
P6_IDI00~ 07	P67_COM	Input	Isolated Digital Input of port 6
P7_IDI00~ 07	P67_COM	Input	Isolated Digital Input of port 7
P8_IDI00~ 07	P89_COM	Input	Isolated Digital Input of port 8
P9_IDI00~ 07	P89_COM	Input	Isolated Digital Input of port 9
PA_IDI00~ 07	PAB_COM	Input	Isolated Digital Input of port A
PB_IDI00~ 07	PAB_COM	Input	Isolated Digital Input of port B
PC_IDI00~ 07	PCD_COM	Input	Isolated Digital Input of port C
PD_IDI00~ 07	PCD_COM	Input	Isolated Digital Input of port D
PE_IDI00~ 07	PEF_COM	Input	Isolated Digital Input of port E
PF_IDI00~ 07	PEF_COM	Input	Isolated Digital Input of port F
P01_COM	-		Common port of port 0 and port 1
P23_COM	-		Common port of port 2 and port 3
P45_COM	-		Common port of port 4 and port 5
P67_COM	-		Common port of port 6 and port 7
P89_COM	-		Common port of port 8 and port 9
PAB_COM	-		Common port of port A and port B
PCD_COM	-		Common port of port C and port D
PEF_COM	-		Common port of port E and port F
NC	-		Not Used

Table 3.2: PCI-1758UDO I/O Connector Signal Description			
Signal Name	**Reference**	**Direction**	**Description**
P0_IDO00~ 07	P01_COMM	Output	Isolated Digital Output of port 0
P1_IDO00~ 07	P01_COMM	Output	Isolated Digital Output of port 1
P2_IDO00~ 07	P23_COMM	Output	Isolated Digital Output of port 2
P3_IDO00~ 07	P23_COMM	Output	Isolated Digital Output of port 3
P4_IDO00~ 07	P45_COMM	Output	Isolated Digital Output of port 4
P5_IDO00~ 07	P45_COMM	Output	Isolated Digital Output of port 5
P6_IDO00~ 07	P67_COMM	Output	Isolated Digital Output of port 6
P7_IDO00~ 07	P67_COMM	Output	Isolated Digital Output of port 7
P8_IDO00~ 07	P89_COMM	Output	Isolated Digital Output of port 8
P9_IDO00~ 07	P89_COMM	Output	Isolated Digital Output of port 9
PA_IDO00~ 07	PAB_COMM	Output	Isolated Digital Output of port A
PB_IDO00~ 07	PAB_COMM	Output	Isolated Digital Output of port B
PC_IDO00~ 07	PCD_COMM	Output	Isolated Digital Output of port C
PD_IDO00~ 07	PCD_COMM	Output	Isolated Digital Output of port D
PE_IDO00~ 07	PEF_COMM	Output	Isolated Digital Output of port E
PF_IDO00~ 07	PEF_COMM	Output	Isolated Digital Output of port F
P01_COMM	-		Negative external power supply
P23_COMM	-		Negative external power supply
P45_COMM	-		Negative external power supply
P67_COMM	-		Negative external power supply
P89_COMM	-		Negative external power supply
PAB_COMM	-		Negative external power supply
PCD_COMM	-		Negative external power supply
PEF_COMM	-		Negative external power supply
P01_COMP	-		Positive external power supply
P23_COMP	-		Positive external power supply
P45_COMP	-		Positive external power supply
P67_COMP	-		Positive external power supply
P89_COMP	-		Positive external power supply
PAB_COMP	-		Positive external power supply
PCD_COMM	-		Positive external power supply
PEF_COMM	-		Positive external power supply
NC	-	-	Not used

Table 3.3: PCI-1758UDIO I/O Connector Signal Description			
Signal Name	**Reference**	**Direction**	**Description**
P0_IDI00~ 07	P01_COM	Input	Isolated Digital Input of port 0
P1_IDI00~ 07	P01_COM	Input	Isolated Digital Input of port 1
P2_IDI00~ 07	P23_COM	Input	Isolated Digital Input of port 2
P3_IDI00~ 07	P23_COM	Input	Isolated Digital Input of port 3
P4_IDI00~ 07	P45_COM	Input	Isolated Digital Input of port 4
P5_IDI00~ 07	P45_COM	Input	Isolated Digital Input of port 5
P6_IDI00~ 07	P67_COM	Input	Isolated Digital Input of port 6
P7_IDI00~ 07	P67_COM	Input	Isolated Digital Input of port 7
P01_COM	-		Common port of Digital Input port 0 and port 1
P23_COM	-		Common port of Digital Input port 2 and port 3
P45_COM	-		Common port of Digital Input port 4 and port 5
P67_COM	-		Common port of Digital Input port 6 and port 7
P0_IDO00~ 07	P01_COMM	Output	Isolated Digital Output of port 0
P1_IDO00~ 07	P01_COMM	Output	Isolated Digital Output of port 1
P2_IDO00~ 07	P23_COMM	Output	Isolated Digital Output of port 2
P3_IDO00~ 07	P23_COMM	Output	Isolated Digital Output of port 3
P4_IDO00~ 07	P45_COMM	Output	Isolated Digital Output of port 4
P5_IDO00~ 07	P45_COMM	Output	Isolated Digital Output of port 5
P6_IDO00~ 07	P67_COMM	Output	Isolated Digital Output of port 6
P7_IDO00~ 07	P67_COMM	Output	Isolated Digital Output of port 7
P01_COMM	-		Negative external power supply
P23_COMM	-		Negative external power supply
P45_COMM	-		Negative external power supply
P67_COMM	-		Negative external power supply
P01_COMP	-		Positive external power supply
P23_COMP	-		Positive external power supply
P45_COMP	-		Positive external power supply
P67_COMP	-		Positive external power supply

Note: Each COMM pin can tolerate no more than 300 mA. Make sure that every COMM pin is properly connected to the equipment's ground (GND).

3.2 Location of Jumpers and DIP Switch

Figure 3.5, 3.6, and 3.7 show the names and locations of jumpers and DIP switches on the PCI-1758U cards. There is one DIP switch SW1 on PCI-1758UDI, and there is one DIP switch SW1 and one jumper JP1 on the PCI-1758UDO and PCI-1758UDIO.

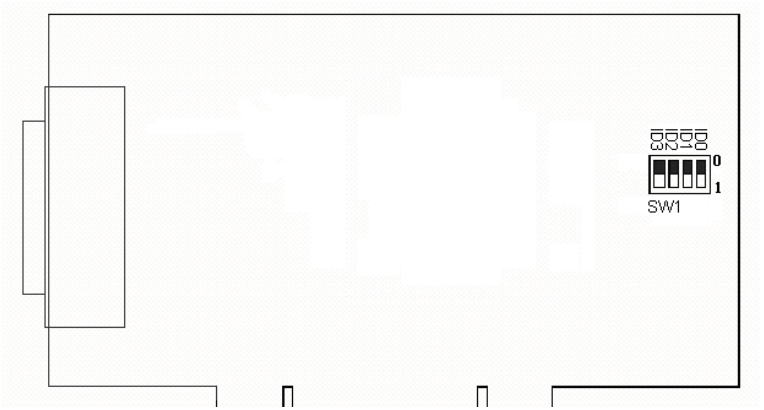


Figure 3.5: Location of DIP Switch on PCI-1758UDI

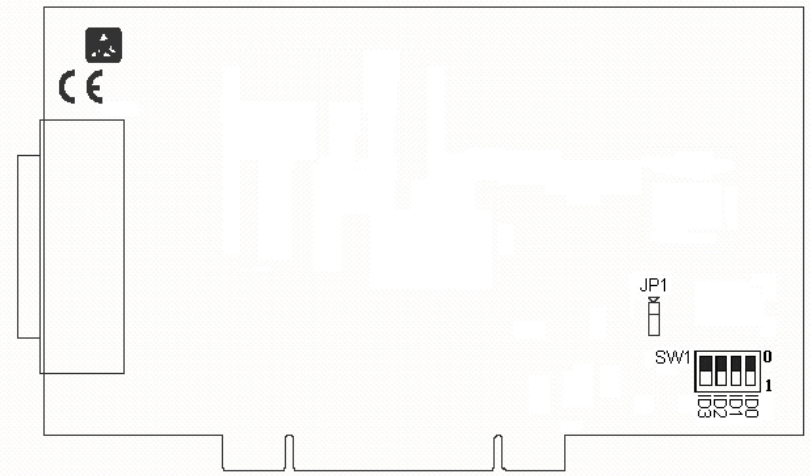


Figure 3.6: Location of DIP Switch and Jumper on PCI-1758UDO

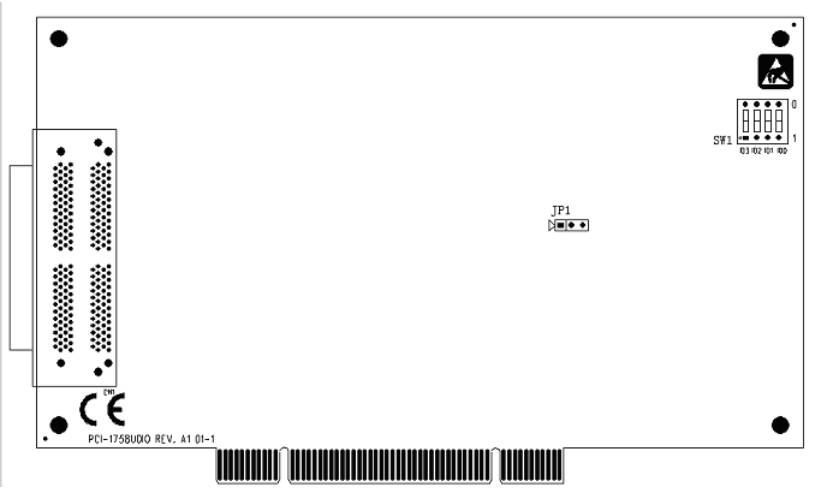


Figure 3.7: Location of DIP Switch and Jumper on PCI-1758UDIO
SW1: BoardID setting, JP1: Power on configuration after hot reset

3.3 Isolated Digital Input Connections

PCI-1758UDI

PCI-1758UDI has 128 isolated digital input channels designated:

P0_IDI00~07, P1_IDI00~07, P2_IDI00~07, P3_IDI00~07,
P4_IDI00~07, P5_IDI00~07, P6_IDI00~07, P7_IDI00~07,
P8_IDI00~07, P9_IDI00~07, PA_IDI00~07, PB_IDI00~07,
PC_IDI00~07, PD_IDI00~07, PE_IDI00~07, PF_IDI00~07

PCI-1758UDIO

PCI-1758UDIO has 64 isolated digital input channels designated
P0_IDI00~07, P1_IDI00~07, P2_IDI00~07, P3_IDI00~07,
P4_IDI00~07, P5_IDI00~07, P6_IDI00~07, P7_IDI00~07.

3.3.1 Interrupt Function of the DI Signals

All channels in PCI-1758UDI/UDIO can be used to generate hardware interrupts. Setup the configuration of interrupts by programming the interrupt control register. For detailed information, please refer to Section 5.1 Interrupt Function.

3.3.2 Isolated Inputs

Each of the isolated digital input channels accepts 5~25 VDC voltage inputs, and also accept bi-directional input. This means that you can apply positive or negative voltage to an isolated input pin. Each group of 16 channels share one common pin. Figure 3.8 shows how to connect an external input source to one of the card's isolated input channels.

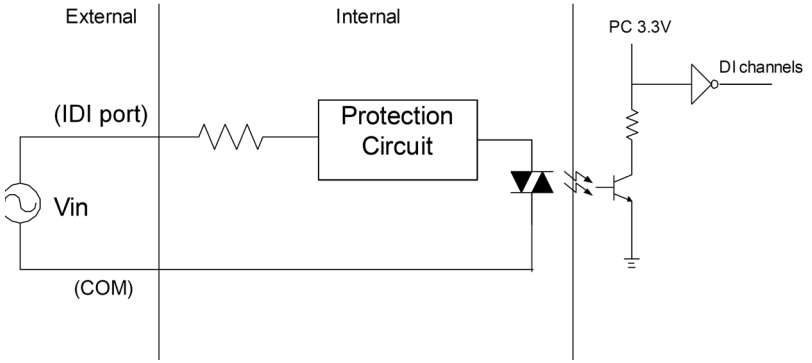


Figure 3.8: Isolated Digital Input Connection

3.4 Isolated Digital Output Connections

PCI-1758UDO

PCI-1758UDO has 128 isolated digital output channels designated P0_IDO00~7, P1_IDO00~7, P2_IDO00~7, P3_IDO00~7, P4_IDO00~7, P5_IDO00~7, P6_IDO00~7, P7_IDO00~7. P8_IDO00~7, P9_IDO00~7, PA_IDO00~7, PB_IDO00~7, PC_IDO00~7, PD_IDO00~7, PE_IDO00~7, and PF_IDO00~7.

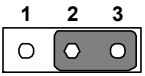
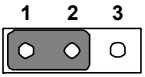
PCI-1758UDIO

PCI-1758UDIO has 64 isolated digital output channels designated P0_IDO00~7, P1_IDO00~7, P2_IDO00~7, P3_IDO00~7, P4_IDO00~7, P5_IDO00~7, P6_IDO00~7, P7_IDO00~7.

3.4.1 Power On Configuration

The default configuration will be set after power is turned on. The hardware reset sets all the isolated output channels to "off" status (The current of the load can not be sink mode). So you do not need to worry about damaging external devices during system startup or reset. When the system is hot reset, the status of the isolated digital output channels can be selected by jumper JP1. Table 3.4 shows the configuration of jumper JP1.

Table 3.4: JP1: Power On Configuration after Hot Reset

JP1 on PCI-1758UDO / UDIO	Power on configuration after hot reset
	Keep the last digital output status after hot reset
	Load default configuration while reset (default)

3.4.2 Isolated Outputs

Each of the isolated output channels is equipped with a Darlington transistor. All of the 16 output channels shares common collectors and integral suppression diodes for induction coil loads.

Figure 3.9 shows how to connect an external output load to the card's isolated outputs..

Note: If an external voltage (5 ~ 40 VDC) is applied to an isolated output channel while it is being used as an output channel, the current will flow from the external voltage source to the card. Please be cautious about that the current flowing through each IDO pin can not exceed 90 mA.

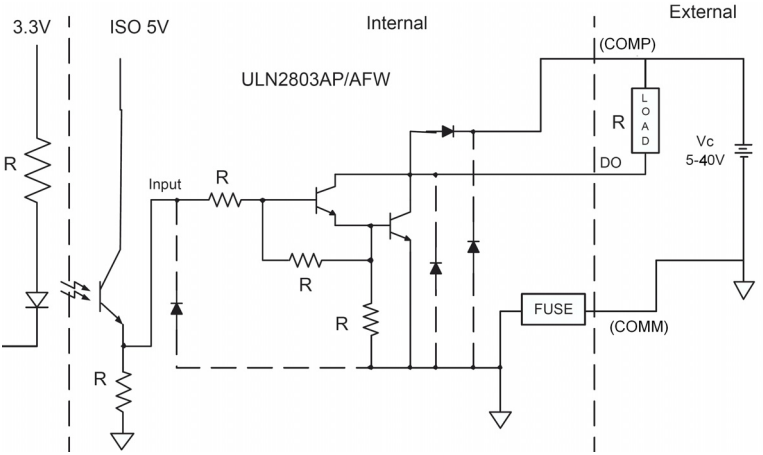


Figure 3.9: Isolated Digital Output Connection

3.5 Field Wiring Considerations

When you use the PCI-1758UDI/UDIO to acquire data from outside, noises in the environment might significantly affect the accuracy of your measurements if due cautions are not taken. The following measures will be helpful to reduce possible interference in the signal wires between signal sources and the PCI-1758UDI/UDIO.

- Keep the signal cables away from strong electromagnetic sources such as power lines, large electric motors, circuit breakers or welding machines, since they may cause strong electromagnetic interference. Keep the analog signal cables away from any video monitor, since it can significantly affect a data acquisition system.
- If the cable travels through an area with significant electromagnetic interference, you should adopt individually shielded, twisted-pair wires as the analog input cable. This type of cable has its signal wires twisted together and shielded with a metal mesh. The metal mesh should only be connected to one point at the signal source ground.
- Avoid running the signal cables through any conduit that might have power lines in it.
- If you have to place your signal cable parallel to a power line that has a high voltage or high current running through it, try to keep a safe distance between them. Or you should place the signal cable at a right angle to the power line to minimize the disturbance.

3.6 Setting the BoardID Switch (SW1)

BoardID settings are used to get the board's unique identifier. The PCI-1758U Series has a built-in DIP switch (SW1), which is used to define each card's unique identifier. You can determine the unique identifier in the register as shown in Table 3.5. When there are multiple identical cards in the same chassis, the BoardID switch helps differentiating the boards by identifying each card's device number with the switch setting. The PCI-1758U Series unique identifier has been set to 0 with the BoardID switch at the factory. If you need to adjust it to other numbers, set SW1 by referring to DIP switch setting.

Table 3.5: Board ID Setting (SW1)

SW1	3	2	1	0
BoardID	ID3	ID2	ID1	ID0
0*	ON	ON	ON	ON
1	ON	ON	ON	OFF
2	ON	ON	OFF	ON
3	ON	ON	OFF	OFF
4	ON	OFF	ON	ON
5	ON	OFF	ON	OFF
6	ON	OFF	OFF	ON
7	ON	OFF	OFF	OFF
8	OFF	ON	ON	ON
9	OFF	ON	ON	OFF
10	OFF	ON	OFF	ON
11	OFF	ON	OFF	OFF
12	OFF	OFF	ON	ON
13	OFF	OFF	ON	OFF
14	OFF	OFF	OFF	ON
15	OFF	OFF	OFF	OFF

*Default Setting is 0

CHAPTER 4

Operation

This chapter describes the operation of PCI-1758U Series. The provided software driver gives you access all of the card's functions without having to do register level programming. If you prefer to implement your own bit-level programming, please refer to the following information.

Sections include:

- Interrupt Function
- Digital Filter Function
- Watchdog Timer Function
- Power-Up States Function
- BoardID

Chapter 4 Operation

4.1 Interrupt Function (PCI-1758UDI/UDIO)

PCI-1758UDI and PCI-1758UDIO provide an interrupt function for every digital input channel. All the isolated digital input channels are connected to the interrupt circuitry. You can disable/enable the interrupt function, and select trigger type by setting the Rising Edge Interrupt Registers and Falling Edge Interrupt Registers of the card. When the interrupt request signals occur, the software will service these interrupt requests by ISR. The multiple interrupt sources provide the card with more capability and flexibility.

4.1.1 IRQ Level

The IRQ level is set automatically by the PCI plug-and-play BIOS and is saved in the PCI controller. There is no need for users to set the IRQ level. Only one IRQ level is used by this card, although it has two or four interrupt sources.

4.1.2 Interrupt Modes for Digital Input

There are four registers that control the function and status of each input interrupt signal source. They give you the ability to select different modes to match different applications. The four registers are: Interrupt State Register, Rising Edge Interrupt Register, Falling Edge Interrupt Register and Port Identify Register. The detailed functions of these registers are described in Appendix C.

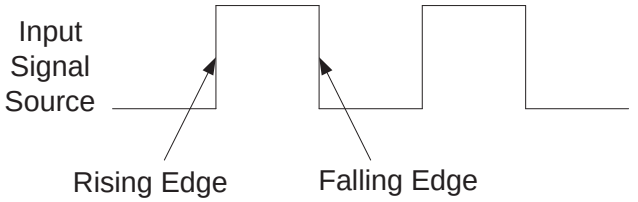


Figure 4.1: Interrupt Mode for Digital Input

4.2 Digital Filter Function (PCI-1758UDI/UDIO)

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 double the length of the specified interval. Intermediate-length pulses—pulses longer than half of the interval but less than the interval, may or may not pass the filter.

The following table lists the pulse widths guaranteed to be passed and blocked.

Table 4.1: Pulse Width Filtering

Filter Interval	**Pulse Width Passed**		**Pulse Width Blocked**	
	Low Pulse	High Pulse	Low Pulse	High Pulse
Tinterval	Tinterval	Tinterval	(Tinterval/2)	(Tinterval/2)

You can enable or disable filtering on every input channel as is necessary for your application. All filtered channels share the same timing interval, which ranges from 200 ns to 400 sec.

There are two clocks in the filter: the sample clock and the filter clock. The sample clock has a period of 100 ns. The filter clock is generated by a counter and has a period equal to one half of the specified timing interval. The input signal is sampled on each rising edge of the sample clock. However, a change in the input signal is recognized only if it maintains its new state for at least two consecutive rising edges of the filter clock.

The filter clock is programmable and allows you to control how long a pulse must last to be recognized by write a value to Filter interval time Preset register high 16 bits.

4.2.1 Digital Filtering Example

The following figure shows a filter configuration with an 800 ns filter interval (400 ns filter clock).

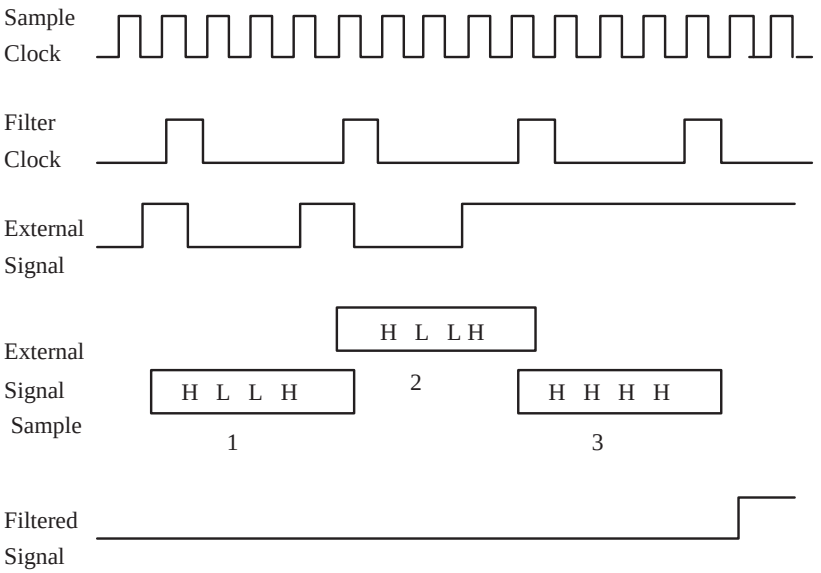


Figure 4.2: Digital Filter Example

In periods 1 and 2, the filter blocks the glitches because the external signal does not remain steadily high from one filter clock to the next. In period 3, the filter passes the transition because the external signal remains steadily high. Depending on when the transition occurs, the filter may require up to two filter clocks—one full filter interval—to pass a transition. The figure shows a rising (0 to 1) transition. The same filtering applies to falling (1 to 0) transitions.

4.2.2 Digital Filter Function Control Register

There are two registers that control the digital filter function and status of each channel: the Digital Filter Function Control Register and the Filter Interval Time Preset Register. For details about their functions, please refer to Appendix C.

4.3 Watchdog Timer Function (PCI-1758UDO/UDIO)

This feature is used to set critical outputs to safe states in the event of a software failure. When the watchdog timer is enabled, PCI-1758UDO and PCI-1758UDIO has to receive a “watchdog clear” software command within the interval time specified for the watchdog timer. If it doesn’t, this is considered a loss of communication between the application and PCI-1758UDO/DIO, and the outputs go to a user-defined safe state and remain in that state until the watchdog timer is disabled and new values are written by software.

After the watchdog timer expires, the PCI-1758UDO/UDIO will ignore any writes until the watchdog timer is disabled. You can set the watchdog timer timeout period through the WDT register to specify the amount of time that must elapse before the watchdog timer expires. The counter on the watchdog timer is configurable up to $(2^{32}-1)$ x 100 ns (approximately seven minutes) before it expires.

For more details about the watchdog timer register operation, please refer to Appendix C.

4.4 Power-Up States Function (PCI-1758UDO/UDIO)

User-configurable power-up states are useful for ensuring that the PCI-1758UDO and PCI-1758UDIO power up in a known state. When the system is powered-up, all output lines of PCI-1758UDO and PCI-1758UDIO are user-configurable for logic high output or logic low output. So you can predefine the outputs. This function ensures the card’s output state can be defined at any time.

Power-up states are programmed in the EEPROM with a driver. In the EEPROM Control Register you can write the predefined output data to EEPROM. The default value from the factory is all set to 0. For more details about register operations, please refer to appendix C.

4.5 BoardID

The PCI-1758U cards have a built-in DIP-switch (SW1), which is used to define each card's BoardID. You can determine the BoardID on the register as shown on Table 4.2. If there are multiple cards on the same chassis, this BoardID setting function is useful for identifying each card's device number through BoardID. We set the PCI-1758U card's BoardID to 0 at the factory. If you need to adjust it to other BoardIDs, set SW1 while referring to Table 4.3.

Table 4.2: BoardID Register of PCI-1758UDI/1758UDO

	BoardID register of PCI-1758UDI			
Base Add.+ 56h	3	2	1	0
Abbreviation	ID3	ID2	ID1	ID0
	BoardID register of PCI-1758UDO			
Base Add.+ 1Ch	3	2	1	0
Abbreviation	ID3	ID2	ID1	ID0
	BoardID register of PCI-1758UDIO			
Base Add.+ 3Eh	3	2	1	0
Abbreviation	ID3	ID2	ID1	ID0

ID0: the least significant bit (LSB) of BoardID

ID3: the most significant bit (MSB) of BoardID

Table 4.3: BoardID Setting (SW1)

Board ID(DEC)	**Switch Position**			
	ID3	**ID2**	**ID1**	**ID0**
0*	ON	ON	ON	ON
1	ON	ON	ON	OFF
2	ON	ON	OFF	ON
3	ON	ON	OFF	OFF
4	ON	OFF	ON	ON
5	ON	OFF	ON	OFF
6	ON	OFF	OFF	ON
7	ON	OFF	OFF	OFF
8	OFF	ON	ON	ON
9	OFF	ON	ON	OFF
10	OFF	ON	OFF	ON
11	OFF	ON	OFF	OFF
12	OFF	OFF	ON	ON
13	OFF	OFF	ON	OFF
14	OFF	OFF	OFF	ON
15	OFF	OFF	OFF	OFF

* : Default

APPENDIX A

Specifications

Appendix A Specifications

A.1 PCI-1758UDI

Model Name		PCI-1758UDI
Number of Input Channels		128
Interrupt Inputs		128
Optical Isolation		2500 VDC
Opto-Isolator Response Time		20 µs
Input Voltage	**VIH(max)**	25 V
	VIH(min)	5 V
	VIL(max)	2.5 V
Input Resistance		3 kΩ

A.2 PCI-1758UDO

Model Name	PCI-1758UDO
Number of Output Channels	128
Optical Isolation	2500 VDC
Opto-Isolator Response Time	20 µs
Supply Voltage	5-40 V
Sink Current	90 mA max./Channel

A.3 PCI-1758UDIO

Isolated Digital Inputs

Number of Input Channels		64
Interrupt Inputs		64
Optical Isolation		2500 VDC
Opto-isolator response time		20 µs
Input Voltage	**VIH(max)**	25 V
	VIH(min)	5 V
	VIL(max)	2.5 V
Input Resistance		3 kΩ

Isolated Digital Output

Number of Output Channels	64
Optical Isolation	2500 VDC
Opto-isolator response time	20 µs
Supply Voltage	5-40 V
Sink Current	90mA max./channel

A.4 General

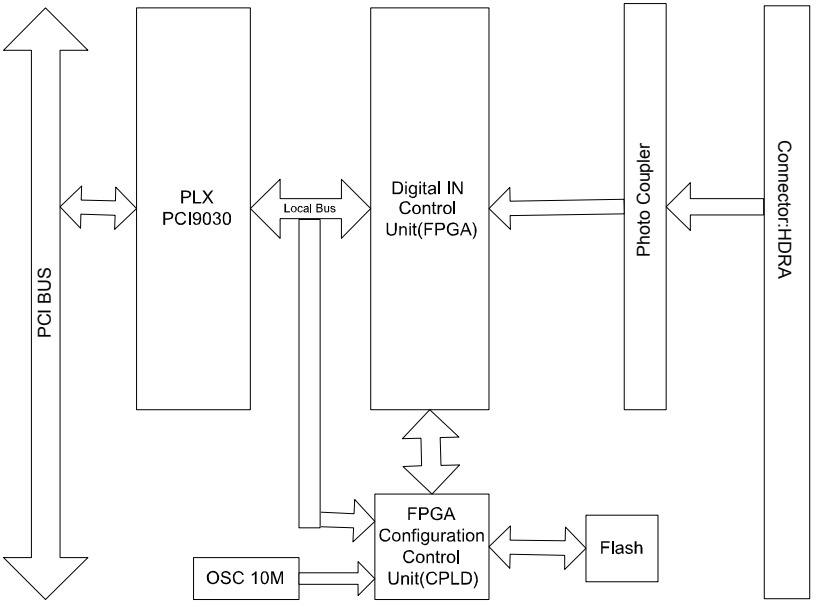
Model Name		PCI-1758UDI	PCI-1758UDO	PCI-1758UDIO
I/O Connector Type		MINI-SCSI HDRA-E100 Female		
Dimensions		175 x 98 mm (6.9” x 3.9”)		
Power Consumption	**Typical**	+5V@ 0.3A	+5V@ 1.1A	+5V@1.2A
	Max.	+5V@ 0.6A	+5V@ 2.2A	+5V@1.8A
Temperature	**Operating**	0 ~ 60° C (32 ~ 140º F) (refer to IEC 68-2-1,2)		
	Storage	-20 ~ 70° C (-4 ~ 158º F)		
Relative Humidity		5 ~ 95 % RH non-condensing (refer to IEC 68-2-3)		

APPENDIX B

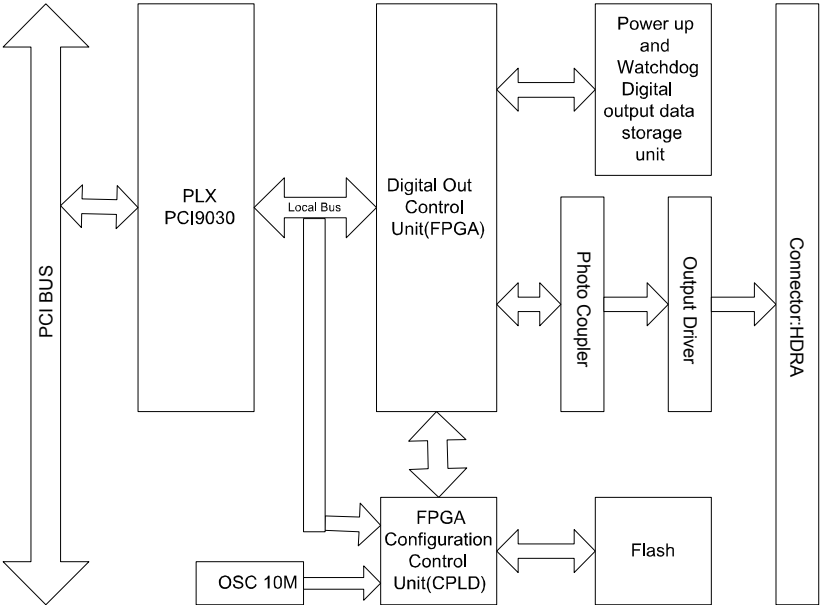
Block Diagram

Appendix B Block Diagram

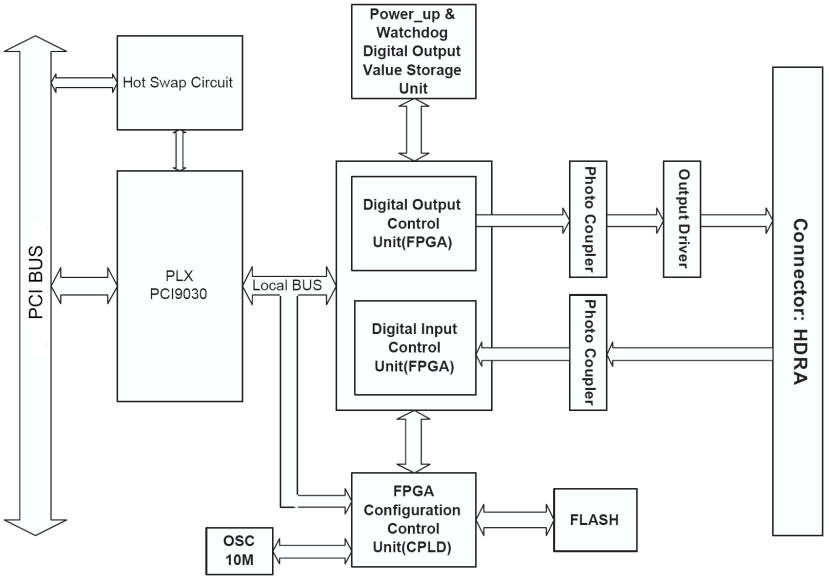
B.1 PCI-1758UDI Block Diagram



B.2 PCI-1758UDO Block Diagram



B.3 PCI-1758UDIO Block Diagram



APPENDIX C

Register Structure and Format

Appendix C Register Structure & Format

C.1 Register Structure

PCI-1758U cards are delivered with an easy-to-use 32-bit DLL driver for user programming under the Windows 98/2000/XP operating systems. You are advised to program the PCI-1758U cards using the 32-bit DLL driver provided by Advantech to avoid the complexity of low-level programming by register.

The most important consideration in programming the PCI-1758U cards at the register level is to understand the function of the card's registers. The information in the following sections is provided only for those who would like to do their own low-level programming.

Note *All registers only support 16-bit data access.*

C.2 PCI-1758UDI Register Format

C.2.1 Register Format

PCI-1758UDI requires 86 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+8 is the base address plus seven bytes.

Address offset (HEX)	Register Description	
	Write	Read
0		Digital Input Port 0 and Port 1
2		Digital Input Port 2 and Port 3
4		Digital Input Port 4 and Port 5
6		Digital Input Port 6 and Port 7
8		Digital Input Port 8 and Port 9
A		Digital Input Port A and Port B
C		Digital Input Port C and Port D
E		Digital Input Port E and Port F
10	DI Port 0 and Port1 Rising Edge Interrupt Register	DI Port 0 and Port1 Rising Edge Interrupt Register

12	DI Port 0 and Port1 Falling Edge Interrupt Register	DI Port 0 and Port1 Falling Edge Interrupt Register
14	DI Port2 and Port3 Rising Edge Interrupt Register	DI Port2 and Port3 Rising Edge Interrupt Register
16	DI Port 2 and Port3 Falling Edge Interrupt Register	DI Port 2 and Port3 Falling Edge Interrupt Register
18	DI Port 4 and Port5 Rising Edge Interrupt Register	DI Port 4 and Port5 Rising Edge Interrupt Register
1A	DI Port4 and Port5 Falling Edge Interrupt Register	DI Port4 and Port5 Falling Edge Interrupt Register
1C	DI Port 6 and Port7 Rising Edge Interrupt Register	DI Port6 and Port7 Rising Edge Interrupt Register
1E	DI Port6 and Port7 Falling Edge Interrupt Register	DI Port6 and Port7 Falling Edge Interrupt Register
20	DI Port 8 and Port9 Rising Edge Interrupt Register	DI Port 8 and Port9 Rising Edge Interrupt Register
22	DI Port8 and Port9 Falling Edge Interrupt Register	DI Port8 and Port9 Falling Edge Interrupt Register
24	DI Port A and Port B Rising Edge Interrupt Register	DI Port A and Port B Rising Edge Interrupt Register
26	DI Port A and Port B Falling Edge Interrupt Register	DI Port A and Port B Falling Edge Interrupt Register
28	DI Port C and Port D Rising Edge Interrupt Register	DI Port C and Port D Rising Edge Interrupt Register
2A	DI Port C and Port D Falling Edge Interrupt Register	DI Port C and Port D Falling Edge Interrupt Register
2C	DI Port E and Port F Rising Edge Interrupt Register	DI Port E and Port F Rising Edge Interrupt Register
2E	DI Port E and Port F Falling Edge Interrupt Register	DI Port E and Port F Falling Edge Interrupt Register
30	Port 0 and Port 1 Interrupt State Register	Port 0 and Port 1 Interrupt State Register
32	Port 2 and Port 3 Interrupt State Register	Port 2 and Port 3 Interrupt State Register
34	Port 4 and Port 5 Interrupt State Register	Port 4 and Port 5 Interrupt State Register
36	Port 6 and Port 7 Interrupt State Register	Port 6 and Port 7 Interrupt State Register
38	Port 8 and Port 9 Interrupt State Register	Port 8 and Port 9 Interrupt State Register
3A	Port A and Port B Interrupt State Register	Port A and Port B Interrupt State Register
3C	Port C and Port D Interrupt State Register	Port C and Port D Interrupt State Register
3E	Port E and Port F Interrupt State Register	Port E and Port F Interrupt State Register
40	Port 0 and Port 1 Digital filter Enable Register	Port 0 and Port 1 Digital filter Enable Register

42	Port 2 and Port 3 Digital filter Enable Register	Port 2 and Port 3 Digital filter Enable Register
44	Port 4 and Port 5 Digital filter Enable Register	Port 4 and Port 5 Digital filter Enable Register
46	Port 6 and Port 7 Digital filter Enable Register	Port 6 and Port 7 Digital filter Enable Register
48	Port 8 and Port 9 Digital filter Enable Register	Port 8 and Port 9 Digital filter Enable Register
4A	Port A and Port B Digital filter Enable Register	Port A and Port B Digital filter Enable Register
4C	Port C and Port D Digital filter Enable Register	Port C and Port D Digital filter Enable Register
4E	Port E and Port F Digital filter Enable Register	Port E and Port F Digital filter Enable Register
50		Interrupt of Port Identify Register
52	Filter interval time preset low 16 bits	Filter interval time preset low 16 bits
54	Filter interval time preset high 16 bits	Filter interval time preset high 16 bits
56		BoardID

C.2.2 Digital Input Register

Base+0x00/02/04/06/08/0A/0C/0E: Digital Input value

Base+0x00 – 0x0E(Read)															
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
P1 IDI 7	P1 IDI 6	P1 IDI 5	P1 IDI 4	P1 IDI 1	P1 IDI 2	P1 IDI 1	P1 IDI 0	P0 IDI 7	P0 IDI 6	P0 IDI 5	P0 IDI 4	P0 IDI 1	P0 IDI 2	P0 IDI 1	P0 IDI 0

Base+0x00 – 0x0E (Write)															
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
N/A															

Bit 15 – Bit 0(Read):

0: The Pn-IDIm input photo couple is inaction

1: The Pn-IDIm input photo couple is active

(n : 0 to F is for Port 0 to Port F, m : 0 to 7 is for IDI0 to IDI7)

Base+0x00 for Port 0 and Port 1

Base+0x02 for Port 2 and Port 3

Base+0x04 for Port 4 and Port 5

Base+0x06 for Port 6 and Port 7

Base+0x08 for Port 8 and Port 9

Base+0x0A for Port A and Port B

Base+0x0C for Port C and Port D

Base+0x0E for Port E and Port F

C.2.3 Digital Input Rising Edge Interrupt Register

Base+0x10/14/18/1C/20/24/28/2C: Digital Input Rising Edge Interrupt setting.

Base+0x10- 0x2C (Write/Read)															
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
P1 IDI7	P1 IDI6	P1 IDI5	P1 IDI4	P1 IDI1	P1 IDI2	P1 IDI1	P1 IDI0	P0 IDI7	P0 IDI6	P0 IDI5	P0 IDI4	P0 IDI1	P0 IDI2	P0 IDI1	P0 IDI0

Bit 15 – Bit 0(Write):

0 : Disable the Pn-IDIm Rising Edge interrupt function

1 : Enable the Pn-IDIm Rising Edge interrupt function

(n : 0 to F is for Port 0 to Port F, m : 0 to 7 is for IDI0 to IDI7)

Bit 15 – Bit 0(Read): Read back the setting value.

Base+0x10 for Port 0 and Port 1

Base+0x14 for Port 2 and Port 3

Base+0x18 for Port 4 and Port 5

Base+0x1C for Port 6 and Port 7

Base+0x20 for Port 8 and Port 9

Base+0x24 for Port A and Port B

Base+0x28 for Port C and Port D

Base+0x2C for Port E and Port F

C.2.4 Digital Input Falling Edge Interrupt Register

Base+0x12/16/1A/1E/22/26/2A/2E: Digital Input Falling Edge Interrupt setting

Base+0x12 – 0x2E (Write/Read)															
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
P1 IDI7	P1 IDI6	P1 IDI5	P1 IDI4	P1 IDI1	P1 IDI2	P1 IDI1	P1 IDI0	P0 IDI7	P0 IDI6	P0 IDI5	P0 IDI4	P0 IDI1	P0 IDI2	P0 IDI1	P0 IDI0

Bit 15 – Bit 0(Write):

0 : Disable the Pn-IDIm Falling Edge interrupt function

1 : Enable the Pn-IDIm Falling Edge interrupt function

(n : 0 to F for Port 0 to Port F, m : 0 to 7 for IDI0 to IDI7)

Bit 15 – Bit 0(Read): Read back the setting value.

Base+0x12 for Port 0 and Port 1

Base+0x16 for Port 2 and Port 3

Base+0x1A for Port 4 and Port 5

Base+0x1E for Port 6 and Port 7

Base+0x22 for Port 8 and Port 9

Base+0x26 for Port A and Port B

Base+0x2A for Port C and Port D

Base+0x2E for Port E and Port F

C.2.5 Interrupt State Register

Base+0x30/32/34/36/38/3A/3C/3E: Interrupt state setting.

Base+0x30 – 0x3E (Write/Read)															
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
P1 IDI7	P1 IDI6	P1 IDI5	P1 IDI4	P1 IDI1	P1 IDI2	P1 IDI1	P1 IDI0	P0 IDI7	P0 IDI6	P0 IDI5	P0 IDI4	P0 IDI1	P0 IDI2	P0 IDI1	P0 IDI0

This register can read and clear the status of the interrupt flag. If an interrupt occurs, users can check the status of 0x50 (refer to C.2.1.5) to identify in which port the interrupt occurred. Then users can read the identified port to the register from 0x30 to 0x3E to know in which bit an interrupt occurs.

If users want to clear the interrupt flag, just identify where the interrupt occurs and then write “1” into that register directly.

Bit 15 – Bit 0(Read): Read the Interrupt Flag Status

1: means an interrupt flag occurs in Pn-IDIm
0: means no interrupt flag occurs in Pn-IDIm

(n : 0 to F for Port 0 to Port F, m : 0 to 7 for IDI0 to IDI7)

To identify in which port an interrupt occurs, please refer to the C.2.1.5

Bit 15 – Bit 0(Write): Clear the Interrupt Flag.

1: Clear the interrupt flag in Pn-IDIm
0: Keep the interrupt flag status in Pn-IDIm

Base+0x30 for Port 0 and Port 1

Base+0x32 for Port 2 and Port 3

Base+0x34 for Port 4 and Port 5

Base+0x36 for Port 6 and Port 7

Base+0x38 for Port 8 and Port 9

Base+0x3A for Port A and Port B

Base+0x3C for Port C and Port D

Base+0x3E for Port E and Port F

C.2.6 Interrupt of Port Identify Register

Address=base address + 50.

Base+0x50 (Read)															
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
PF	PE	PD	PC	PB	PA	P9	P8	P7	P6	P5	P4	P3	P2	P1	P0

Bit0~Bit15 (Read): Identify in which port an interrupt occurs from port 0 to port F.

1: means an interrupt occurs in this port.
0: means no interrupt occurs in this port.

There are two registers which control the digital filter function and status of each channel: **Digital Filter Enable Register** and **Filter Interval Time Preset Register**.

C.2.7 Digital Filter Function Control Register

Base+0x40/42/44/46/48/4A/4C/4E: Digital Filter Function Control Register

Base+0x40- 0x4E (Write/Read)															
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
P1 IDI7	P1 IDI6	P1 IDI5	P1 IDI4	P1 IDI1	P1 IDI2	P1 IDI1	P1 IDI0	P0 IDI7	P0 IDI6	P0 IDI5	P0 IDI4	P0 IDI1	P0 IDI2	P0 IDI1	P0 IDI0

Bit 15 – Bit 0(write):

0: Disable the Pn-IDIm digital filter function

1: Enable the Pn-IDIm digital filter function

Bit 15 – Bit 0(Read):

0: Disable the Pn-IDIm digital filter function

1: Enable the Pn-IDIm digital filter function

(n: 0 to F for Port 0 to Port F, m : 0 to 7 for IDI0 to IDI7)

Base+0x40 for Port 0 and Port 1

Base+0x42 for Port 2 and Port 3

Base+0x44 for Port 4 and Port 5

Base+0x46 for Port 6 and Port 7

Base+0x48 for Port 8 and Port 9

Base+0x4A for Port A and Port B

Base+0x4C for Port C and Port D

Base+0x4E for Port E and Port F

C.2.8 Filter Interval Time Preset Register

Base+0x52 (Write/Read)															
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Filter interval time preset register low 16 bits															

Base+0x54 (Write/Read)															
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Filter interval time preset register high 16 bits															

The filter interval time is preset by writing a 32-bit value to the two registers. The high 16 bits should be written to Filter Interval Time Preset register high 16 bits and the low 16 bits should be written to Filter Interval Time Preset register low 16 bits. The value written to the two registers is calculated by the following formula:

$$T_{interval} = \text{Value} \times 200\ ns$$

For example:

Filter Interval Time Preset register high 16 bits =0x0001;

Filter Interval Time Preset register low 16 bits =0x0000;

Value = 0x00010000;

$$T_{interval} = \text{Value} \times 200ns = 13107200ns;$$

C.3 PCI-1758 UDO Register Format

PCI-1758UDO requires 32 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+8 is the base address plus seven bytes.

Base Address	Register Description	
	Write	**Read**
0	Digital Output Port 0 and Port 1	Digital Output Port 0 and port 1 Read Back
2	Digital Output Port 2 and Port 3	Digital Output Port 2 and Port 3 Read Back
4	Digital Output Port 4 and Port 5	Digital Output Port 4 and Port 5 Read Back
6	Digital Output Port 6 and Port 7	Digital Output Port 6 and Port 7 Read Back
8	Digital Output Port 8 and Port 9	Digital Output Port 8 and Port 9 Read Back
A	Digital Output Port A and Port B	Digital Output Port A and Port B Read Back
C	Digital Output Port C and Port D	Digital Output Port C and Port D Read Back
E	Digital Output Port E and Port F	Digital Output Port E and Port F Read Back
10	Watchdog counter values low 16 bits	Watchdog counter values low 16 bits
12	Watchdog counter values high 16 bits	Watchdog counter values high 16 bits
14	Watchdog timer control Register	Watchdog timer state Register
16	Watchdog timer clear Register	N/A
18	N/A	N/A
1A	EEPROM Control Register	EEPROM DO Status
1C	N\A	Board ID

C.3.1 Digital Output Register

Base+0x00/02/04/06/08/0A/0C/0E: Digital Output Register.

Base+0x00- 0x0E (Write/Read)															
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
P1 IDO7	P1 IDO6	P1 IDO5	P1 IDO4	P1 IDO3	P1 IDO2	P1 IDO1	P1 IDO0	P0 IDO7	P0 IDO6	P0 IDO5	P0 IDO4	P0 IDO1	P0 IDO2	P0 I2DO1	P0 IDO0

Bit 15 – Bit 0(Write):

0 : The Pn-IDOm output photo couple is inaction

1 : The Pn-IDOm output photo couple is active

Bit 15 – Bit 0(Read back):

0 : The Pn-IDOm output photo couple is inaction

1 : The Pn-IDOm output photo couple is active

(n : 0 to F for Port 0 to Port F, m : 0 to 7 for IDO0 to IDO7)

Base+0x00 for Port 0 and Port 1

Base+0x02 for Port 2 and Port 3

Base+0x04 for Port 4 and Port 5

Base+0x06 for Port 6 and Port 7

Base+0x08 for Port 8 and Port 9

Base+0x0A for Port A and Port B

Base+0x0C for Port C and Port D

Base+0x0E for Port E and Port F

C.3.2 Watchdog Counter Value Register

Base+0x10/12: Watchdog Counter Value Register.

Base+0x10 (Write/Read)															
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Watchdog counter values low 16 bits															

Base+0x12 (Write/Read)															
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Watchdog counter values high 16 bits															

Watchdog timer Interval = WDT x 100ns

For example:

Watchdog timer values high 16 bits Register=0x0001;

Watchdog timer values low 16 bits Register=0x0000;

WDT=0x00010000;

Watchdog timer Interval = WDT x 100ns=6553600ns;

C.3.3 Watchdog State/Control Register

Base+0x14 : WDT function setting

Base+0x14 (Write)		
Bit 15 – Bit 2	**Bit 1**	**Bit 0**
N/A	WDT INT EN	WDT En

Bit 0:

0 : Disable WDT function

1 : Enable WDT function

(When the WDT is enable then the watch dog timer (WDT) in PCI-1758UDO start count down from the value set in Base+0x10h and Base+0x12h)

Bit 1:

0 : Disable WDT interrupt function when WDT count down to 0

1 : Enable WDT interrupt function when WDT count down to 0

Base+0x14 (Read)			
Bit 15 – Bit 3	**Bit 2**	**Bit 1**	**Bit 0**
N/A	WDT Timeout flag	WDT INT EN	WDT En

Bit 0: Read the status of WDT En

Bit 1: Read the status of WDT INT EN

Bit 2:

0 : WDT current value is not 0

1 : WDT current value is 0

C.3.4 Watchdog Timer Clear Register

Base+0x16 : Watchdog timer reset Register

Base+0x16 (Write)	
Bit 15 – Bit 1	Bit 0
N/A	WDI

Bit 0:

0 : Reset the Watchdog Timer to pre-set value

1 : Keep the Watchdog Timer current state

Note *It is recommended that you implement the function in base+0x1A through the driver instead of through this register directly.*

C.3.5 EEPROM Control/DO state Register

Base+0x1A : EEPROM DO state Register

Base+0x1A (Read)	
Bit 15 – Bit 1	Bit 0
N/A	DO

Bit 0:

EEPROM DO state

Base+0x1A (Write)				
Bit 15 – Bit 4	**Bit 3**	**Bit 2**	**Bit 1**	**Bit 0**
N/A	CS	CLK	DI	DO

Through this register user can set the power up status and watchdog timer overflow states in the eeprom.

- CS: eeprom select
- CLK: eeprom clk
- DI: eeprom data in
- DO: eeprom data out
- The data format of EEPROM:

Address	Stored data description	Stored data class
0x00	P1_IDO & P0_IDO	Digital output power up values
0x01	P3_IDO & P2_IDO	
0x02	P5_IDO & P4_IDO	
0x03	P7_IDO & P6_IDO	
0x04	P9_IDO & P8_IDO	
0x05	PB_IDO & PA_IDO	
0x06	PD_IDO & PC_IDO	
0x07	PF_IDO & PE_IDO	
0x10	P1_IDO & P0_IDO	Digital output WDT overflow values
0x11	P3_IDO & P2_IDO	
0x12	P5_IDO & P4_IDO	
0x13	P7_IDO & P6_IDO	
0x14	P9_IDO & P8_IDO	
0x15	PB_IDO & PA_IDO	
0x16	PD_IDO & PC_IDO	
0x17	PF_IDO & PE_IDO	

C.4 PCI-1758UDIO Register Format

C.4.1 Register Format

PCI-1758UDIO requires 64 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+8 is the base address plus seven bytes.

Base Address (Hex)	Register Description	
	Write	**Read**
0H	--	Digital Input Port0 and Port1
2H	--	Digital Input Port2 and Port3
4H	--	Digital Input Port4 and Port5
6H	--	Digital Input Port6 and Port7
8H	Digital Output Port0 and Port1	Digital Output Port0 and Port1 Read Back
AH	Digital Output Port2 and Port3	Digital Output Port2 and Port3 Read Back
CH	Digital Output Port4 and Port5	Digital Output Port4 and Port5 Read Back
EH	Digital Output Port6 and Port7	Digital Output Port6 and Port7 Read Back
10H	DI Port0 and Port1 Rising Edge Interrupt Register	DI Port0 and Port1 Rising Edge Interrupt Register
12H	DI Port0 and Port1 Falling Edge Interrupt Register	DI Port0 and Port1 Falling Edge Interrupt Register
14H	DI Port2 and Port3 Rising Edge Interrupt Register	DI Port2 and Port3 Rising Edge Interrupt Register
16H	DI Port2 and Port3 Falling Edge Interrupt Register	DI Port2 and Port3 Falling Edge Interrupt Register
18H	DI Port4 and Port5 Rising Edge Interrupt Register	DI Port4 and Port5 Rising Edge Interrupt Register
1AH	DI Port4 and Port5 Falling Edge Interrupt Register	DI Port4 and Port5 Falling Edge Interrupt Register
1CH	DI Port6 and Port7 Rising Edge Interrupt Register	DI Port6 and Port7 Rising Edge Interrupt Register
1EH	DI Port6 and Port7 Falling Edge Interrupt Register	DI Port6 and Port7 Falling Edge Interrupt Register
20H	DI Port 0 and Port 1 Interrupt State Register	DI Port 0 and Port 1 Interrupt State Register
22H	DI Port 2 and Port 3 Interrupt State Register	DI Port 2 and Port 3 Interrupt State Register
24H	DI Port 4 and Port 5 Interrupt State Register	DI Port 4 and Port 5 Interrupt State Register
26H	DI Port 6 and Port 7 Interrupt State Register	DI Port 6 and Port 7 Interrupt State Register

28H	DI Port 0 and Port 1 Digital filter Enable Register	DI Port 0 and Port 1 Digital filter Enable Register
2AH	DI Port 2 and Port 3 Digital filter Enable Register	DI Port 2 and Port 3 Digital filter Enable Register
2CH	DI Port 4 and Port 5 Digital filter Enable Register	DI Port 4 and Port 5 Digital filter Enable Register
2EH	DI Port 6 and Port 7 Digital filter Enable Register	DI Port 6 and Port 7 Digital filter Enable Register
30H	Digital Filter interval time preset low 16 bits	Digital Filter interval time preset low 16 bits
32H	Digital Filter interval time preset high 16 bits	Digital Filter interval time preset high 16 bits
34H	Watchdog counter values low 16 bits	Watchdog counter values low 16 bits
36H	Watchdog counter values high 16 bits	Watchdog counter values high 16 bits
38H	Watchdog timer Control Register	Watchdog timer State Register
3AH	Watchdog Timer Clear Register	--
3CH	EEPROM Control Register	EEPROM DO Status
3EH	--	BoardID
40H	--	INT of Port Identify Register

C.4.2 Digital input Register

Base+0x00/02/04/06: Digital Input Value

Base+0x00 - 0x06(Read)															
Bit15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
P1 IDI7	P1 IDI6	P1 IDI5	P1 IDI4	P1 IDI3	P1 IDI2	P1 IDI1	P1 IDI0	P0 IDI7	P0 IDI6	P0 IDI5	P0 IDI4	P0 IDI3	P0 IDI2	P0 IDI1	P0 IDI0

Base+0x00 - 0x06(Write)															
Bit15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
N/A															

Bit 15 - Bit 0(Read):

0: The Pn-IDIm input photo couple is inaction

1: The Pn-IDIm input photo couple is active

(n : 0 to 7 is for Port 0 to Port 7, m : 0 to 7 is for IDI0 to IDI7)

Base+0x00 for Port 0 and Port 1

Base+0x02 for Port 2 and Port 3

Base+0x04 for Port 4 and Port 5

Base+0x06 for Port 6 and Port 7

C.4.3 Digital Output Register

Base+0x08/0A/0C/0E: Digital Output Register.

Base+0x08 - 0x0E(Read/Write)															
Bit15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
P1 IDO7	P1 IDO 6	P1 IDO 5	P1 IDO 4	P1 IDO 3	P1 IDO 2	P1 IDO 1	P1 IDO 0	P0 IDO 7	P0 IDO 6	P0 IDO 5	P0 IDO 4	P0 IDO 3	P0 IDO 2	P0 IDO 1	P0 IDO 0

Bit 15 - Bit 0 (Write):

0: The Pn-IDOm output photo couple is inaction

1: The Pn-IDOm output photo couple is active

Bit 15 - Bit 0 (Read back):

0: The Pn-IDOm output photo couple is inaction

1: The Pn-IDOm output photo couple is active

(n : 0 to 7 for Port 0 to Port 7, m : 0 to 7 for IDO0 to IDO7)

Base+0x08 for Port 1 and Port 0

Base+0x0A for Port 3 and Port 2

Base+0x0C for Port 5 and Port 4

Base+0x0E for Port 7 and Port 6

C.4.4 Digital input Ring Edge Interrupt Register

Base+0x10/14/18/1C: Digital Input Rising Edge Interrupt setting.

Base+0x10 - 0x1C(Read/Write)															
Bit15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
P1 IDI7	P1 IDI6	P1 IDI5	P1 IDI4	P1 IDI3	P1 IDI2	P1 IDI1	P1 IDI0	P0 IDI7	P0 IDI6	P0 IDI5	P0 IDI4	P0 IDI3	P0 IDI2	P0 IDI1	P0 IDI0

Bit 15 - Bit 0(Write):

0: Disable the Pn-IDIm Rising Edge interrupt function

1: Enable the Pn-IDIm Rising Edge interrupt function

(n : 0 to F is for Port 0 to Port 7, m : 0 to 7 is for IDI0 to IDI7)

Bit 15 - Bit 0(Read): Read back the setting value.

Base+0x10 for Digital Input Port 0 and Digital Input Port 1

Base+0x14 for Digital Input Port 2 and Digital Input Port 3

Base+0x18 for Digital Input Port 4 and Digital Input Port 5

Base+0x1C for Digital Input Port 6 and Digital Input Port 7

C.4.5 Digital input Falling Edge Interrupt Register

Base+0x12/16/1A/1E: Digital Input Falling Edge Interrupt setting

Base+0x12 - 0x1E(Read/Write)															
Bit15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
P1 IDI7	P1 IDI6	P1 IDI5	P1 IDI4	P1 IDI3	P1 IDI2	P1 IDI1	P1 IDI0	P0 IDI7	P0 IDI6	P0 IDI5	P0 IDI4	P0 IDI3	P0 IDI2	P0 IDI1	P0 IDI0

Bit 15 - Bit 0(Write):

0: Disable the Pn-IDIm Falling Edge interrupt function

1: Enable the Pn-IDIm Falling Edge interrupt function

(n : 0 to F for Port 0 to Port 7, m : 0 to 7 for IDI0 to IDI7)

Bit 15 - Bit 0(Read): Read back the setting value.

Base+0x12 for Port 1 and Port 0

Base+0x16 for Port 3and Port 2

Base+0x1A for Port 5 and Port 4

Base+0x1E for Port 7 and Port 6

C.4.6 Interrupt State Register

Base+0x20/22/24/26: Interrupt state setting.

Base+0x20 - 0x26(Read/Write)															
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
P1 IDI7	P1 IDI6	P1 IDI5	P1 IDI4	P1 IDI3	P1 IDI2	P1 IDI1	P1 IDI0	P0 IDI7	P0 IDI6	P0 IDI5	P0 IDI4	P0 IDI3	P0 IDI2	P0 IDI1	P0 IDI0

This register can read and clear the status of the interrupt flag. If an interrupt occurs, users can check the status of 0x40 (refer to C.7) to identify in which port the interrupt occurred. Then users can read the identified port to the register from 0x20 to 0x26 to know in which bit an interrupt occurs. If users want to clear the interrupt flag, just identify where the interrupt occurs and then write “1” into that register directly.

Bit 15 - Bit 0 (Read): Read the Interrupt Flag Status

1: means an interrupt flag occurs in Pn-IDIm

0: means no interrupt flag occurs in Pn-IDIm

(n : 0 to F for Port 0 to Port 7, m : 0 to 7 for IDI0 to IDI7)

To identify in which port an interrupt occurs, please refer to the C.7

Bit 15 - Bit 0 (Write): Clear the Interrupt Flag.

1: Clear the interrupt flag in Pn-IDIm

0: Keep the interrupt flag status in Pn-IDIm

Base+0x20 for Port 1 and Port 0

Base+0x22 for Port 3 and Port 2

Base+0x24 for Port 5 and Port 4

Base+0x26 for Port 7 and Port 6

C.4.7 Interrupt Of Port Identify Register

Base+0x40: Interrupt Port Identify Register.

Base+0x40(Read)															
Bit15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
--	--	--	--	--	--	--	--	P7	P6	P5	P4	P3	P2	P1	P0

Bit0~Bit7 (Read): Identify in which port an interrupt occurs from Digital Input port 0 to Digital Input port 7.

1: means an interrupt occurs in this port.

0: means no interrupt occurs in this port.

There are two registers which control the digital filter function and status of each channel: **Digital Filter Enable Register** and **Filter Interval Time Preset Register**.

C.4.8 Digital Filter Enable Register

Base+0x28/2A/2C/2E: Digital Filter Function Control Register

Base+0x28 - 0x2E(Read/Write)															
Bit 15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
P1 IDI7	P1 IDI6	P1 IDI5	P1 IDI4	P1 IDI3	P1 IDI2	P1 IDI1	P1 IDI0	P0 IDI7	P0 IDI6	P0 IDI5	P0 IDI4	P0 IDI3	P0 IDI2	P0 IDI1	P0 IDI0

Bit 15 - Bit 0(Write):

0: Disable the Pn-IDIm digital filter function

1: Enable the Pn-IDIm digital filter function

Bit 15 - Bit 0(Read back):

0: Disable the Pn-IDIm digital filter function

1: Enable the Pn-IDIm digital filter function

(n: 0 to F for Port 0 to Port 7, m : 0 to 7 for IDI0 to IDI7)

Base+0x28 for Port 1 and Port 0

Base+0x2A for Port 3 and Port 2

Base+0x2C for Port 5 and Port 4

Base+0x2E for Port 7 and Port 6

C.4.9 Filter Interview Time Preset Register

Base+0x30(Read/Write)															
Bit15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Filter interval time preset register Low 16 bits															

Base+0x32(Read/Write)															
Bit15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Filter interval time preset register High 16 bits															

The filter interval time is preset by writing a 32-bit value to the two registers. The high 16 bits should be written to Filter Interval Time Preset register high 16 bits and the low 16 bits should be written to Filter Interval Time Preset register low 16 bits. The value written to the two registers is calculated by the following formula:

T interval = Value x 200 ns

For example:

Filter Interval Time Preset register high 16 bits =0x0001;

Filter Interval Time Preset register low 16 bits =0x0000;

Value = 0x00010000;

T interval = Value x 200ns=13107200ns;

C.4.10 Watchdog Counter Value Register

Base+0x34/36: Watchdog Counter Value Register.

Base+0x34 (Read/Write)															
Bit15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Watchdog counter values low 16 bits															

Base+0x36 (Read/Write)															
Bit15	Bit 14	Bit 13	Bit 12	Bit 11	Bit 10	Bit 9	Bit 8	Bit 7	Bit 6	Bit 5	Bit 4	Bit 3	Bit 2	Bit 1	Bit 0
Watchdog counter values high 16 bits															

Watchdog timer Interval = WDT x 100ns

For example:

Watchdog timer values high 16 bits Register=0x0001;

Watchdog timer values low 16 bits Register=0x0000;

WDT=0x00010000;

Watchdog timer Interval = WDT x 100ns=6553600ns;

C.4.11 Watchdog State/Control Register

Base+0x38: WDT function setting

Base+0x38 (Write)		
Bit 15-Bit 2	Bit1	Bit0
N/A	WDT INT EN	WDT En

Bit 0:

0 : Disable WDT function

1 : Enable WDT function

(When the WDT is enable then the watch dog timer (WDT) in PCI-1758UDIO start count down from the value set in Base+0x34h and Base+0x36h)

Bit 1:

0: Disable WDT interrupt function when WDT count down to 0

1: Enable WDT interrupt function when WDT count down to 0

Base+0x38 (Read)			
Bit 15-Bit 3	Bit2	Bit1	Bit0
N/A	WDT Timeout flag	WDT INT EN	WDT En

Bit 0: Read the status of WDT En

Bit 1: Read the status of WDT INT EN

Bit 2:

0: WDT current value is not 0

1: WDT current value is 0

C.4.12 Watchdog Time Clear Register

Base+0x3A: Watchdog timer reset Register

Base+0x3A (Write)	
Bit 15 - Bit 1	Bit0
N/A	Clear_WDT

Bit 0:

0: Reset the Watchdog Timer to pre-set value

1: Keep the Watchdog Timer current state

Note: It is recommended that you implement the function in base+0x38 through the driver instead of through this register directly.

C.4.13 EEPROM Control/DO state Register

Base+0x3C: EEPROM DO state Register

Base+0x3C (Read)	
Bit 15 - Bit 1	Bit0
N/A	DO

Bit 0: EEPROM DO state

Base+0x3C (Write)				
Bit 15 - Bit 4	Bit3	Bit2	Bit1	Bit0
	CS	CLK	DI	DO

Through this register user can set the power up status and watchdog timer overflow states in the EEPROM.

CS: EEPROM select

CLK: EEPROM clock

DI: EEPROM data in

DO: EEPROM data out

The data format of EEPROM:

Address	Stored data description	Stored data class
0x00	P1_IDO & P0_IDO	Digital output power up values
0x01	P3_IDO & P2_IDO	
0x02	P5_IDO & P4_IDO	
0x03	P7_IDO & P6_IDO	
0x04	--	
0x05	--	
0x06	--	
0x07	--	
0x10	P1_IDO & P0_IDO	Digital output WDT overflow values
0x11	P3_IDO & P2_IDO	
0x12	P5_IDO & P4_IDO	
0x13	P7_IDO & P6_IDO	
0x14	--	
0x15	--	
0x16	--	
0x17	--	

C.5 BoardID Register

You can determine the BoardID on the register as shown on table below. When there are multiple cards on the same chassis, this BoardID setting function is useful for identifying each card's device number through BoardID. We set the PCI-1758U card's BoardID to 0 at the factory. If you need to adjust it to other BoardID, set the SW1 by referring to the table.

	Board ID register of PCI-1758UDI			
Base Add.+ 56h	3	2	1	0
Abbreviation	ID3	ID2	ID1	ID0
	Board ID register of PCI-1758UDO			
Base Add.+ 1Ch	3	2	1	0
Abbreviation	ID3	ID2	ID1	ID0
	Board ID register of PCI-1758UDIO			
Base Add.+ 3Eh	3	2	1	0
Abbreviation	ID3	ID2	ID1	ID0

ID0: the least significant bit (LSB) of Board ID

ID3: the most significant bit (MSB) of Board ID

Board ID Setting (SW1)				
Board ID(DEC)	**Switch Position**			
	ID3	**ID2**	**ID1**	**ID0**
0*	ON	ON	ON	ON
1	ON	ON	ON	OFF
2	ON	ON	OFF	ON
3	ON	ON	OFF	OFF
4	ON	OFF	ON	ON
5	ON	OFF	ON	OFF
6	ON	OFF	OFF	ON
7	ON	OFF	OFF	OFF
8	OFF	ON	ON	ON
9	OFF	ON	ON	OFF
10	OFF	ON	OFF	ON
11	OFF	ON	OFF	OFF
12	OFF	OFF	ON	ON
13	OFF	OFF	ON	OFF
14	OFF	OFF	OFF	ON
15	OFF	OFF	OFF	OFF
* : Default				