PCI-1752U/ PCI-1752USO

64-Channel Isolated Digital Output PCI Card

User Manual

Copyright

The documentation and the software included with this product are copyrighted 2005 by Advantech Co., Ltd. All rights are reserved. Advantech Co., Ltd. reserves the right to make improvements in the products described in this manual at any time without notice. No part of this manual may be reproduced, copied, translated or transmitted in any form or by any means without the prior written permission of Advantech Co., Ltd. Information provided in this manual is intended to be accurate and reliable. However, Advantech Co., Ltd. assumes no responsibility for its use, nor for any infringements of the rights of third parties, which may result from its use.

Acknowledgements

Intel and Pentium are trademarks of Intel Corporation.

Microsoft Windows and MS-DOS are registered trademarks of

Microsoft Corp.

All other product names or trademarks are properties of their respective owners.

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 merchandise 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.

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.

CE

This product has passed the CE test for environmental specifications. Test conditions for passing included the equipment being operated within an industrial enclosure. In order to protect the product from being damaged by ESD (Electrostatic Discharge) and EMI leakage, we strongly recommend the use of CE-compliant industrial enclosure products.

FCC Class A

Note: This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

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.

FM

The PCI-1752U/PCI-1752USO have passed the FM certification. According to the National Fire Protection Association, work sites are classified into different classes, divisions and groups, based on hazard considerations. PCI-1752U/PCI-1752USO are compliant with the specifications of Class I, Division 2, Groups A, B, C and D indoor hazards.

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

Safety Instructions

1. Read these safety instructions carefully.

2. Keep this User's 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:

a. The power cord or plug is damaged.

b. Liquid has penetrated into the equipment.

c. The equipment has been exposed to moisture.

d. The equipment does not work well, or you cannot get it to work according to the user's manual.

e. The equipment has been dropped and damaged.

f. The equipment has obvious signs of breakage.

15. DO NOT LEAVE THIS EQUIPMENT IN AN ENVIRONMENT WHERE THE STORAGE TEMPERATURE MAY GO BELOW -

20° C (-4° F) OR ABOVE 60° C (140° F). THIS COULD DAM-AGE THE EQUIPMENT. THE EQUIPMENT SHOULD BE IN A CONTROLLED ENVIRONMENT.

16.   CAUTION: DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER, DISCARD USED BATTERIES ACCORD-ING TO THE MANUFACTURER'S INSTRUCTIONS.

The sound pressure level at the operator's position according to IEC 704-1:1982 is no more than 70 dB (A).

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

Safety Precaution - Static Electricity

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

1.   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.

2.   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.

Contents

Introduction

Sections include:

- Features
- Installation Guide
- Accessories

Chapter 1 Introduction

Thank you for buying the Advantech PCI-1752U/PCI-1752USO isolated digital output card. The Advantech PCI-1752U/PCI-1752USO isolated digital output card is a powerful data acquisition card for both 3.3/ 5V PCI bus. It features a unique circuit design and complete functions for data acquisition and control. PCI-1752U/PCI-1752USO provides 64 isolated digital output channels. The following sections of this chapter will provide further information about features of PCI-1752U/PCI-1752USO, a Quick Start for installation, together with some brief information on software and accessories.

1.1 Features

The Advantech PCI-1752U/PCI-1752USO DAS cards provide users with the most requested measurement and control functions as seen below:

PCI-1752 DAS card

❑ 64 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 (200 mA max./ch)

❑ Board ID

❑ Output status read-back

❑ Digital output value retained after hot system reset

❑ *Channel-Freeze* function

The PCI-1752U/PCI-1752USO DAS cards offer the following main features:

Robust Protection

The PCI-1752U/PCI-1752USO features a robust isolation protection for applications in industrial, lab and machinery automation. The PCI-1752U/ USO can durably withstand a voltage up to 2,500 V_{DC}, preventing your host system from any incidental harms.

Wide Output Range

The PCI-1752U/PCI-1752USO also features a wide output voltage range from 5 to 40 V_{DC}, suitable for most industrial applications with 12 V_{DC} / 24 V_{DC} output voltage. In the mean time, we are also ready to serve your special needs for specific output voltage range. Do not hesitate to ask us about tailoring our standard products to meet your specifications. All these merits make PCI-1752U/PCI-1752USO the best choice for industrial applications.
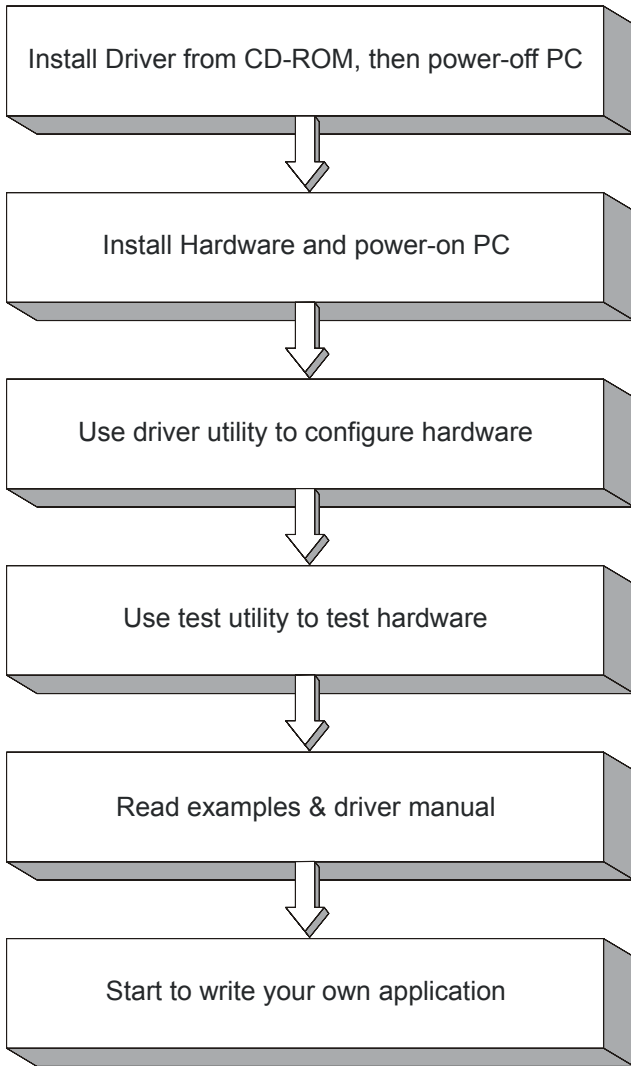
Board ID Setting

The PCI-1752U/PCI-1752USO has a built-in DIP switch that helps define each card's ID when multiple 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-1752U/PCI-1752USO cards. With correct Board ID settings, you can easily identify and access each card during hardware configuration and software programming.

***Channel-Freeze* Function**

The PCI-1752U/PCI-1752USO provides *Channel-Freeze* function, which can be enabled either in dry contact or wet contact mode (selectable by the on-board jumper). When the *Channel-Freeze* function is enabled, the last status of each digital output channel will be safely kept for emergency use. Moreover, you can enable this function through software as it is useful in software simulation and testing program.

Reset Protection

When the system has undergone a hot reset (i.e. without turning off the system power), the PCI-1752U/PCI-1752USO can either retain outputs values of each channel, or return to its default configuration as open status, depending on its on-board jumper setting. This function protects the system from wrong operations during unexpected system resets.

Install Driver from CD-ROM, then power-off PC

Install Hardware and power-on PC

Use driver utility to configure hardware

Use test utility to test hardware

Read examples & driver manual

Start to write your own application

Figure 1.1: Installation Flow Chart

1.2 Installation Guide

Before you install your PCI-1752U/ USO card, please make sure you have the following necessary components:

❑ **PCI-1752U/PCI-1752USO Isolated digital output card**

❑ **PCI-1752U/PCI-1752USO User's Manual**

❑ **Driver software** Advantech DLL drivers (included in CD-ROM)

❑ **Wiring cable** PCL-10250

❑ **Wiring board** ADAM-3951/ADAM-3951B

❑ **Computer** PC or workstation with PCI-bus slot (Win XP/2000)

After you get the necessary components and maybe some accessories for enhanced operation for your DAS 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:

1.3 Accessories

Advantech offers a complete set of accessory products to support the PCI-1752U/PCI-1752USO cards. These accessories include:

Wiring Cable

❑ **PCL-10250** The PCL-10250 shielded cable is specially designed for PCI-1752U/PCI-1752USO card to provide high resistance to noise. To achieve a better signal quality, the signal wires are twisted in such a way as to form a "twisted-pair cable", reducing crosstalk and noise from other signal sources.

Wiring Boards

❑ **ADAM-3951/ADAM-3951B** The ADAM-3951/ADAM-3951B is a 50-pin SCSI wiring terminal module with LED indicators 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-1752U/PCI-1752USO card. (ADAM-3951 can be used with PCI-1752U while ADAM-3951B can be used with both PCI-1752U and PCI-1752USO)

Installation

Sections include:

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

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.

2.1 Unpacking

After receiving your PCI-1752U/PCI-1752USO package, please inspect its contents first. The package should contain the following items:

- ☑   PCI-1752U/PCI-1752USO card
- ☑   Companion CD-ROM (DLL driver included)
- ☑   User Manual

The PCI-1752U/PCI-1752USO card harbors certain electronic components that are 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 antistatic 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 connector pins or the electronic components.

Note: *Keep the antistatic 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-1752U/PCI-1752USO card into your system, since this will guarantee a smooth installation process.

The 32-bit DLL driver Setup program for the PCI-1752U/PCI-1752USO card is included on the companion CD-ROM that is shipped with your DAS card package. Please follow the steps below to install the driver software:

Step 1: Insert the companion CD-ROM into your CD-ROM drive.

Step 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.

Figure 2.1: Advantech Automation Software Setup

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

Step 3: Click Continue, and select the Installation option.

Step 4: Select the specific device and then just follow the installation instructions step by step to complete your device driver installation and setup.

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 \Advantech Device Manager\Device Driver's Manual.*

2.3 Hardware Installation

Note: *Make sure you have installed the driver first*
                       before you install the card (please refer to Sec-
                       tion 2.2 Driver Installation)

After the DLL driver installation is completed, you can now go on to install the PCI-1752U/PCI-1752USO card in any PCI slot on your computer. But it is suggested that you should refer to the computer user manual or related documentations if you have any doubt. Please follow the steps below to install the card on your system.

Step 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.

Step 2: Remove the cover of your computer.

Step 3: Remove the slot cover on the back panel of your computer.

Step 4: Touch the metal part on the surface of your computer to neutralize the static electricity that might be on your body.

Step 5: Adjust DIP switch SW1 on board to set the card's board ID.

Step 6: Insert the PCI-1752U/PCI-1752USO 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.

Step 7: Fasten the bracket of the PCI card on the back panel rail of the computer with screws.

Step 8: Connect appropriate accessories (100-pin cable, wiring termi-nals, etc. if necessary) to the PCI card.

Step 9: Replace the cover of your computer chassis. Re-connect the cables you removed in step 2.

Step10: Plug in the power cord and turn on the computer.

Note: *In case you installed the card without installing the DLL driver first, Windows XP/2000 will rec-ognize your card as an "unknown device" after reboot, and will prompt you to provide neces-sary driver. You should ignore the prompting messages (just click the* **Cancel** *button) and set up the driver according to the steps described in Section 2.2 Driver Installatio*

After the PCI-1752U/PCI-1752USO 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-1752U/PCI-1752USO should be listed on the *Device Manager* tab on the System *Property* Page.
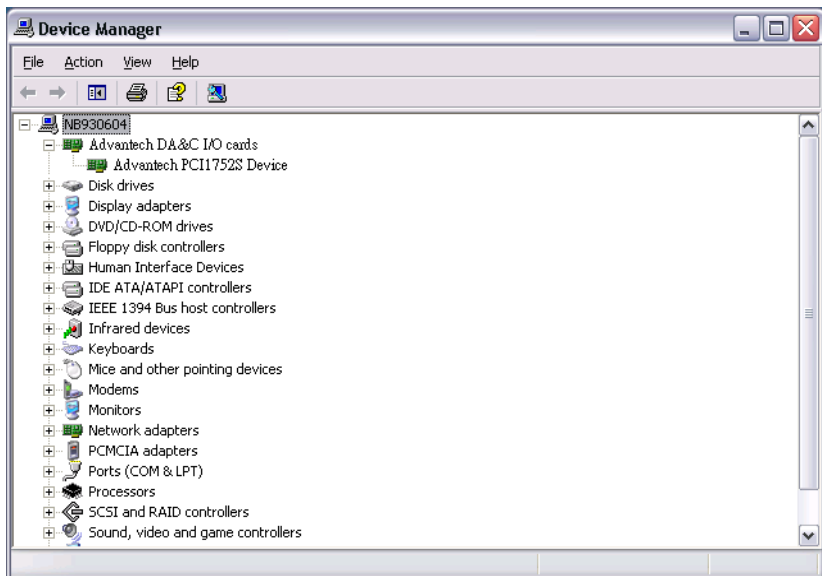
Figure 2.2: Device name listed on Device Manager

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. 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.

2.4 Device Setup & Configuration

On the *Device Setting* dialog box (Fig. 2-3), you can enable/disable the Channel-Freeze function of PCI-1752U/PCI-1752USO.
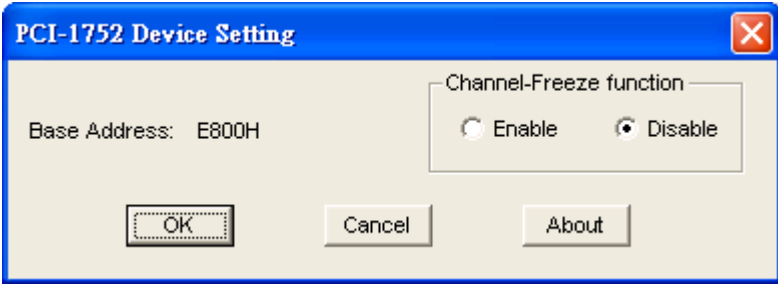
Figure 2.3: Device Setting dialog box of PCI-1752

If you want to test the card device further, go right to the next section on the *Device Testing*.

2.5 Device Testing

Following through the *Setup* and *Configuration* procedures to the last step described in the previous section, you can now proceed to test the device by clicking the ***Test*** Button on the *I/O Device Manager* dialog box (Fig. 2-4).
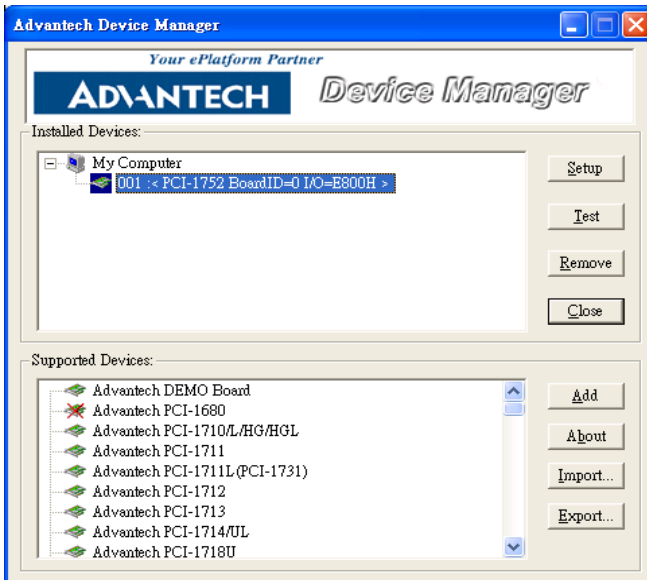
Figure 2.4: Advantech Device Manager

On the *Device Test* dialog box, users are free to test various functions of PCI-1752U/PCI-1752USO on the *Digital output* tab.

Testing Digital Output Function

Click the *Digital Output* tab to bring up the *Digital Output* test panel such as seen on the next page. By pressing the buttons on each tab, users can easily set each digital output channel as *high* or *low* for the corresponding port.
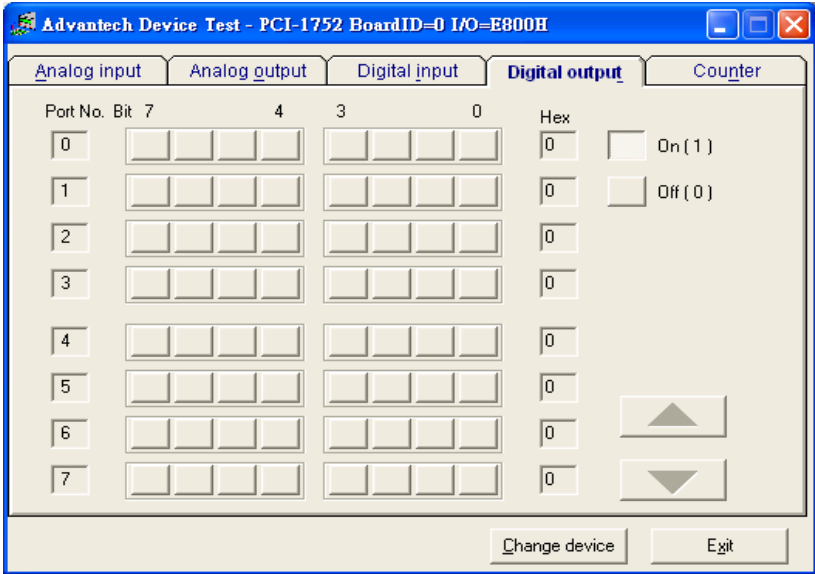
Figure 2.5: Digital Output in Device Test dialog box

Only after your card device is properly set up, configured and tested, can the device installation procedure be counted as complete. After the device installation procedure is completed, you can now safely proceed to the next chapter, Signal Connections.

CHAPTER **3**

Signal Connections

Sections include:

- Location of Jumpers and DIP switch
- I/O Connector Pin Assignment
- Isolated Digital Output Connections
- Field Wiring Considerations

Chapter 3 Signal Connections

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-1752U/PCI-1752USO via the I/O connector.

3.1 Location of Jumpers and DIP switch

Figure 3-2 shows the names and locations of jumpers and DIP switch on the PCI-1752U and PCI-1752USO.

There are two jumpers, JP1 and JP2 on the PCI-1752U/PCI-1752USO. Please refer to *Section 3.3 Isolated Digital Output Connection* and *Section 4.2 Channel-Freeze Function* for more information about JP1 and JP2 configurations.
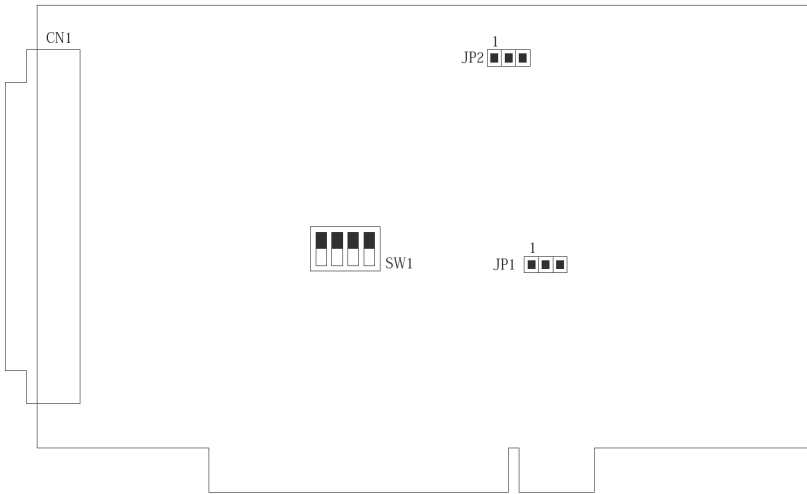
Figure 3.1: Location of Jumpers and DIP switch

3.2 I/O Connector Pin Assignment

The I/O connector on the PCI-1752U/PCI-1752USO is a 100-pin connector that enable you to connect to accessories with the PCL-10250 shielded cable.

Figure 3-1 shows the pin assignments for the 100-pin I/O connector on the PCI-1752U/PCI-1752USO, and Table 3-1 shows its I/O connector signal description.

Note: *The PCL-10250 shielded cable is especially designed for the PCI-1752U/ USO to reduce noise in the analog signal lines. Please refer to Section 1.3 Accessories.*

IDO00 ~ IDO15 : Isolated digital output of Group 0

IDO16 ~ IDO31 : Isolated digital output of Group 1

IDO32 ~ IDO47 : Isolated digital output of Group 2

IDO48 ~ IDO63 : Isolated digital output of Group 3

PCOM0 : External common input of Group 0

PCOM1 : External common input of Group 1

PCOM2 : External common input of Group 2

PCOM3 : External common input of Group 3

IGND : Isolated ground

CH_FRZ_IN : Channel-Freeze input pin

CH_FRZ_COM : Common pin for Channel-Freeze input

IDO00	1	51	IDO01
IDO02	2	52	IDO03
IDO04	3	53	IDO05
IDO06	4	54	IDO07
IDO08	5	55	IDO09
IDO10	6	56	IDO11
IDO12	7	57	IDO13
IDO14	8	58	IDO15
PCOM0	9	59	PCOM0
PCOM0	10	60	PCOM0
IGND	11	61	IGND
IGND	12	62	IGND
IDO16	13	63	IDO17
IDO18	14	64	IDO19
IDO20	15	65	IDO21
IDO22	16	66	IDO23
IDO24	17	67	IDO25
IDO26	18	68	IDO27
IDO28	19	69	IDO29
IDO30	20	70	IDO31
PCOM1	21	71	PCOM1
PCOM1	22	72	PCOM1
IGND	23	73	IGND
IGND	24	74	IGND
CH_FRZ_IN	25	75	CH_FRZ_COM
IDO32	26	76	IDO33
IDO34	27	77	IDO35
IDO36	28	78	IDO37
IDO38	29	79	IDO39
IDO40	30	80	IDO41
IDO42	31	81	IDO43
IDO44	32	82	IDO45
IDO46	33	83	IDO47
PCOM2	34	84	PCOM2
PCOM2	35	85	PCOM2
IGND	36	86	IGND
IGND	37	87	IGND
IDO48	38	88	IDO49
IDO50	39	89	IDO51
IDO52	40	90	IDO53
IDO54	41	91	IDO55
IDO56	42	92	IDO57
IDO58	43	93	IDO59
IDO60	44	94	IDO61
IDO62	45	95	IDO63
PCOM3	46	96	PCOM3
PCOM3	47	97	PCOM3
IGND	48	98	IGND
IGND	49	99	IGND
CH_FRZ_IN	50	100	CH_FRZ_COM

Figure 3.2: I/O Connector Pin Assignments

Table 3.1: I/O Connector Signal Descriptions

Signal Name	Reference	Direction	Description
IDO<00...15>	PCOM0	Output	Isolated digital output of group 0
IDO<16...31>	PCOM1	Output	Isolated digital output of group 1
IDO<32...47>	PCOM2	Output	Isolated digital output of group 2
IDO<48...63>	PCOM3	Output	Isolated digital output of group 3
PCOM0	-	Input	Common pin for inductive loads of isolated output channels IDO00~IDO15
PCOM1	-	Input	Common pin for inductive loads of isolated output channels IDO16~IDO31
PCOM2	-	Input	Common pin for inductive loads of isolated output channels IDO32~IDO47
PCOM3	-	Input	Common pin for inductive loads of isolated output channels IDO48~IDO63
IGND	-	-	Isolated ground
CH_FRZ_IN	CH_FRZ_COM	Input	Channel-Freeze function input pin
CH_FRZ_COM	-	Input	Common pin for Channel-Freeze function input

3.3 Isolated Digital Output Connections

Power On Configuration

Default configuration after power on, and hardware reset is to set all the isolated output channels to open status

(the current of the load can't be sink) so that users need not worry about damaging external devices during system startup or reset.

When the system is hot reset, then the status of isolated digital output channels are selected by jumper JP1. Table 3-2 shows the configuration of jumper JP1.

Table 3.2: Power on configuration after hot reset	
PCI-1752 JP1	Power on configuration after hot reset
1 ○ ◉ ◉	Keep last status after hot reset
1 ◉ ◉ ○	Load default configuration (Default setting)

Isolated Outputs

Each of isolated output channels comes equipped with a Darlington transistor. Every 16 output channels share common collectors and integral suppression diodes for inductive loads.

Note: *If an external voltage (5 ~ 40 V_{DC}) 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 take care that the current through each IDO pin not exceed 200 mA.*

Figure 3-3 shows how to connect an external output load to the card's isolated outputs.
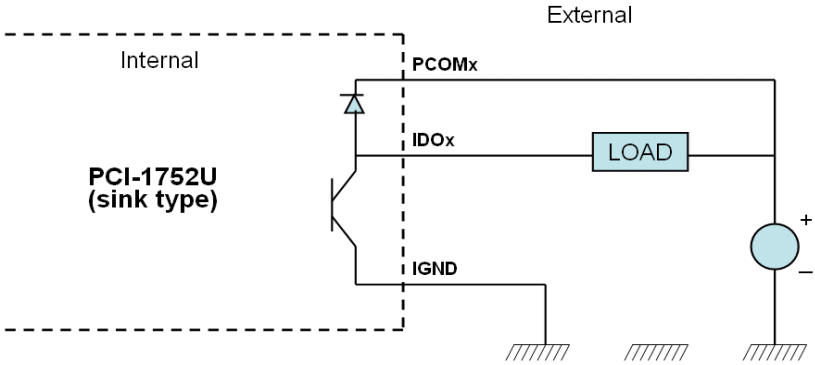
Figure 3.3: Isolated DO: PCI-1752U (sink type)
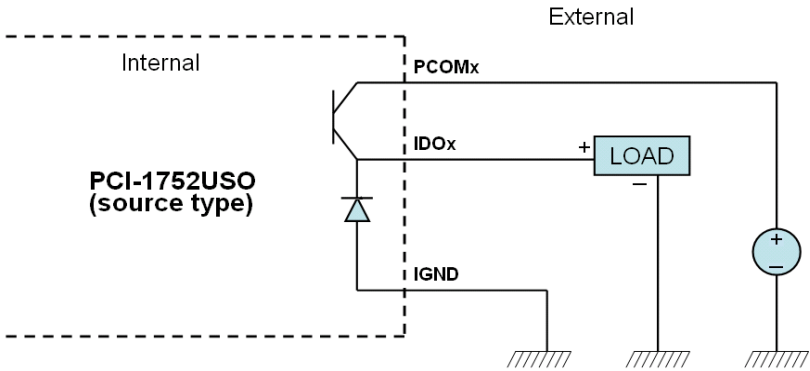
Figure 3.4: Isolated DO: PCI-1752USO (source type)

3.4 Field Wiring Considerations

When you use the PCI-1752U/PCI-1752USO 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 running signal wires between signal sources and the PCI-1752U/PCI-1752USO.

- The signal cables must be kept 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 undesirable effect.

- The signals transmitted on the cable will be directly affected by the quality of the cable. In order to ensure better signal quality, we recommend that you use the PCL-10250 shielded cable.

Operation

Sections include:

- Board ID
- Channel-Freeze Function

Chapter 4 Operation

This chapter describes the operation of the PCI-1752U/PCI-1752USO. The software driver provided allows users to access all of the card's functions without register level programming. For users who prefer to implement their own bit-level programming, please refer to the information in this chapter.

4.1 Board ID

The PCI-1752/PCI-1752USO have a built-in DIP switch (SW1), which is used to define each card's board ID. You can determine the board ID on the register as shown on Table 4-1. When there are multiple cards on the same chassis, this board ID setting function is useful for identifying each card's device number through board ID. We set the PCI-1752/PCI-1752USO board ID as 0 at the factory. If you need to adjust it to other board ID, set the SW1 by referring to the Table 4-2.

Table 4.1: Board ID register				
Base Add.+decimal	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

Table 4.2: Board ID setting					
Board ID(dec)		**Switch Position**			
		3	2	1	0
*0		I	I	I	I
1		I	I	I	○
:					
14		○	○	○	I
15		○	○	○	○
○ = Off	I = On	* = default			

There are two ways to make association of the device number with the corresponding board ID. The first way is to check the content in the

Advantech Device Manager, as shown in Fig. 4-1. The second way is to determine the board ID by its device number through DLL function, *DRV_DeviceGetFeatures( )*. For detailed information, please refer to software manual on CD-ROM.
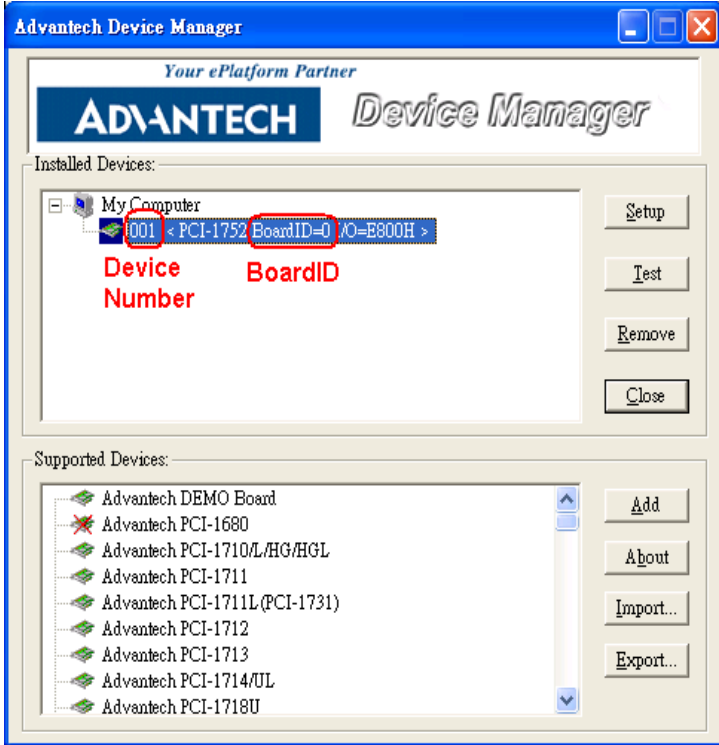
Figure 4.1: Device Number and Board ID

4.2 Channel-Freeze Function

The PCI-1752U/PCI-1752USO provide the channel-freeze function for isolated digital output channels. When *Channel-Freeze* function is enabled, all ports on the card will be locked so that the data transmitted (from the host PC) to the card won't be transferred to the DO ports. Once the *Channel-Freeze* function is enabled, each port status is immediately frozen into its last valid value before the *Channel-Freeze*. Since the value transmitted (from the host PC) to the card is also stored in the buffers on

PC, thus when user calls the *DRV_DioGet CurrentDOByte ( )* function to read back the DO channel value, this function will determine that:

• If Channel-Freeze function is disabled, it will return the DO value on the port;

• If Channel-Freeze function is enabled, it will return the value from the buffers on host PC.

The PCI-1752U/PCI-1752USO provides a digital input channel (CH_FRZ_IN) to enable the channel-freeze function. The channel-freeze function acts when the pin CH_FRZ_IN is activated. Moreover, you can setup the input mode of channel-freeze function input channel CH_FRZ_IN as dry contact input mode or wet contact input mode selected by on-board jumper JP2, as shown in Table 4-3. The wiring in wet contact and dry contact input mode are shown in Figure 4-2. Otherwise, you also can enable the function through software by writing "1" to CFC (Channel-Freeze Function Control) bit on channel-freeze function register, as shown in Table 4-4 and Table 4-5. It's useful in software simulation and testing program.

The CFS (Channel-Freeze Function Status) bit shows the status of Channel-Freeze function:

A value of 1 for the CFS bit indicates an active Channel-Freeze Function; whereas a value of 0 indicates a non-active Channel-Freeze Function.

Table 4.3: JP2: Channel-Freeze function input mode	
1 ⊙⊙○	Channel-Freeze function dry contact input mode
1 ○⊙⊙	Channel-Freeze function wet contact input mode

(a) For Wet Contact   (b) For Dry Contact
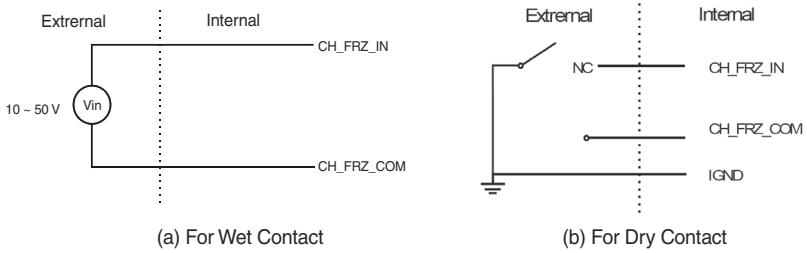
Figure 4.2: Wiring in wet/dry contact input mode

Table 4.4: Channel-Freeze function register				
Base Add.+decimal	3	2	1	0
Abbreviation			CH_FRZ_ON	CH_FRZ_EN

Table 4.5: Channel-Freeze function bit value	
CH_FRZ_EN	Channel-Freeze function control
0	Disable
1	Enable
CH_FRZ_ON	Channel-Freeze function flag
0	OFF
1	ON

Specifications

Appendix A Specifications

Isolated Digital Output

Table A.1: Isolated Digital Output	
Number of Output Channels	64
Optical Isolation	2500 V_{DC}
Throughput	10 kHZ[1]
Supply Voltage	5 ~ 40 V_{DC}
Sink Current	200 mA max/channel

General

Table A.2: General Specifications		
I/O Connector Type	100-pin SCSI-II female	
Dimensions	175 mm x 100 mm (6.9" x 3.9")	
Power Consumption	Typical	+5V @ 230 mA
	Max.	+5V @ 500 mA
Temperature	Operation	0 ~ +60 °C (32 ~ 140 °F) (refer to IEC 68-2-1,2)
	Storage	-20 ~ +70 °C (-4 ~ 158 °F)
Relative Humidity	5 – 95 % RH non-condensing (refer to IEC 68-2-3)	

[1] Throughput rate depends on the computer hardware architecture and software environment. The rates may vary due to programming language, code efficiency, CPU utilization and so on.

Block Diagram

Appendix B Block Diagram

Register Structure and Format
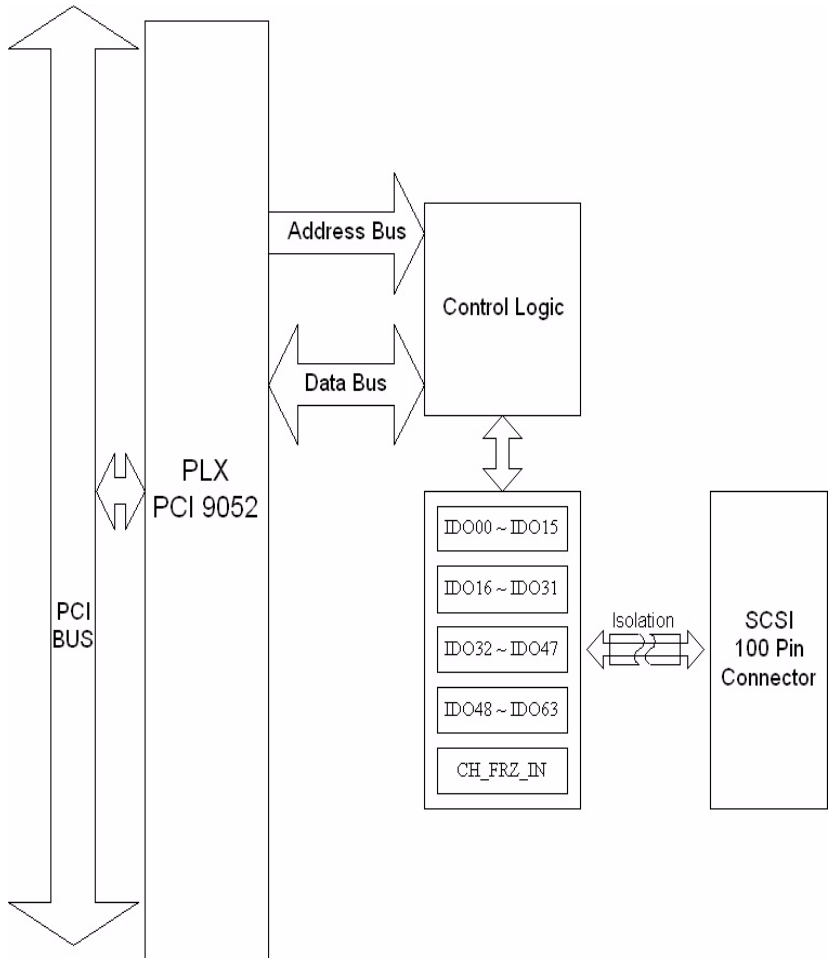
Appendix C Register Structure & Format

C.1 Overview

The PCI-1752U/ USO is delivered with an easy-to-use 32-bit DLL driver for user programming under the Windows XP/2000 operating system. We advise users to program the PCI-1752U/ USO 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-1752U/ USO 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.

C.2 I/O Port Address Map

The PCI-1752U/ USO 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+7 is the base address plus seven bytes.

C.3 PCI-1752 Register Format

Base Add.		15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
0	R	Digital Output Group 0 Read Back															
		DO 15	DO 14	DO 13	DO 12	DO 11	DO 10	DO 9	DO 8	DO 7	DO 6	DO 5	DO 4	DO 3	DO 2	DO 1	DO 0
	W	Digital Output Group 1															
		DO 15	DO 14	DO 13	DO 12	DO 11	DO 10	DO 9	DO 8	DO 7	DO 6	DO 5	DO 4	DO 3	DO 2	DO 1	DO 0
2	R	Digital Output Group 1 Read Back															
		DO 31	DO 30	DO 29	DO 28	DO 27	DO 26	DO 25	DO 24	DO 23	DO 22	DO 21	DO 20	DO 19	DO 18	DO 17	DO 16
	W	Digital Output Group 1															
		DO 31	DO 30	DO 29	DO 28	DO 27	DO 26	DO 25	DO 24	DO 23	DO 22	DO 21	DO 20	DO 19	DO 18	DO 17	DO 16
4	R	Digital Output Group 2 Read Back															
		DO 47	DO 46	DO 45	DO 44	DO 43	DO 42	DO 41	DO 40	DO 39	DO 38	DO 37	DO 36	DO 35	DO 34	DO 33	DO 32
	W	Digital Output Group 2															
		DO 47	DO 46	DO 45	DO 44	DO 43	DO 42	DO 41	DO 40	DO 39	DO 38	DO 37	DO 36	DO 35	DO 34	DO 33	DO 32
6	R	Digital Output Group 3 Read Back															
		DO 63	DO 62	DO 61	DO 60	DO 59	DO 58	DO 57	DO 56	DO 55	DO 54	DO 53	DO 52	DO 51	DO 50	DO 49	DO 48
	W	Digital Output Group 3															
		DO 63	DO 62	DO 61	DO 60	DO 59	DO 58	DO 57	DO 56	DO 55	DO 54	DO 53	DO 52	DO 51	DO 50	DO 49	DO 48
8	R	N/A															
	W	N/A															
A	R	N/A															
	W	N/A															
10	R	Board ID Register															
														ID3	ID2	ID1	ID0
	W	N/A															
12	R	Channel-Freeze Function Control Register															
																CFS	CFC
	W	Channel-Freeze Function Status Register															
																	CFC

**ADAM-3951/
ADAM-3951B
Pin Assignments**

Appendix D ADAM-3951/3951B Pin Assignments

Connect with PCL-10250
CON1

	TB1			TB2	
1	⓪	IDO 00	26	⓪	IDO 16
2	⓪	IDO 01	27	⓪	IDO 17
3	⓪	IDO 02	28	⓪	IDO 18
4	⓪	IDO 03	29	⓪	IDO 19
5	⓪	IDO 04	30	⓪	IDO 20
6	⓪	IDO 05	31	⓪	IDO 21
7	⓪	IDO 06	32	⓪	IDO 22
8	⓪	IDO 07	33	⓪	IDO 23
9	⓪	IDO 08	34	⓪	IDO 24
10	⓪	IDO 09	35	⓪	IDO 25
11	⓪	IDO 10	36	⓪	IDO 26
12	⓪	IDO 11	37	⓪	IDO 27
13	⓪	IDO 12	38	⓪	IDO 28
14	⓪	IDO 13	39	⓪	IDO 29
15	⓪	IDO 14	40	⓪	IDO 30
16	⓪	IDO 15	41	⓪	IDO 31
17	⓪	PCOM0	42	⓪	PCOM1
18	⓪	PCOM0	43	⓪	PCOM1
19	⓪	PCOM0	44	⓪	PCOM1
20	⓪	PCOM0	45	⓪	PCOM1
21	⓪	IGND	46	⓪	IGND
22	⓪	IGND	47	⓪	IGND
23	⓪	IGND	48	⓪	IGND
24	⓪	IGND	49	⓪	IGND
25	⓪	CH_FRZ_IN	50	⓪	CH_FRZ_COM

Connect with PCL-10250
CON2

TB1		TB2	
1	ID O 32	26	IDO 48
2	ID O 33	27	IDO 49
3	ID O 34	28	IDO 50
4	ID O 35	29	IDO 51
5	ID O 36	30	IDO 52
6	ID O 37	31	IDO 53
7	ID O 38	32	IDO 54
8	ID O 39	33	IDO 55
9	ID O 40	34	IDO 56
10	ID O 41	35	IDO 57
11	ID O 42	36	IDO 58
12	ID O 43	37	IDO 59
13	ID O 44	38	IDO 60
14	ID O 45	39	IDO 61
15	ID O 46	40	IDO 62
16	ID O 47	41	IDO 63
17	PCOM2	42	PCOM3
18	PCOM2	43	PCOM3
19	PCOM2	44	PCOM3
20	PCOM2	45	PCOM3
21	IGND	46	IGND
22	IGND	47	IGND
23	IGND	48	IGND
24	IGND	49	IGND
25	CH_FRZ_IN	50	CH_FRZ_COM