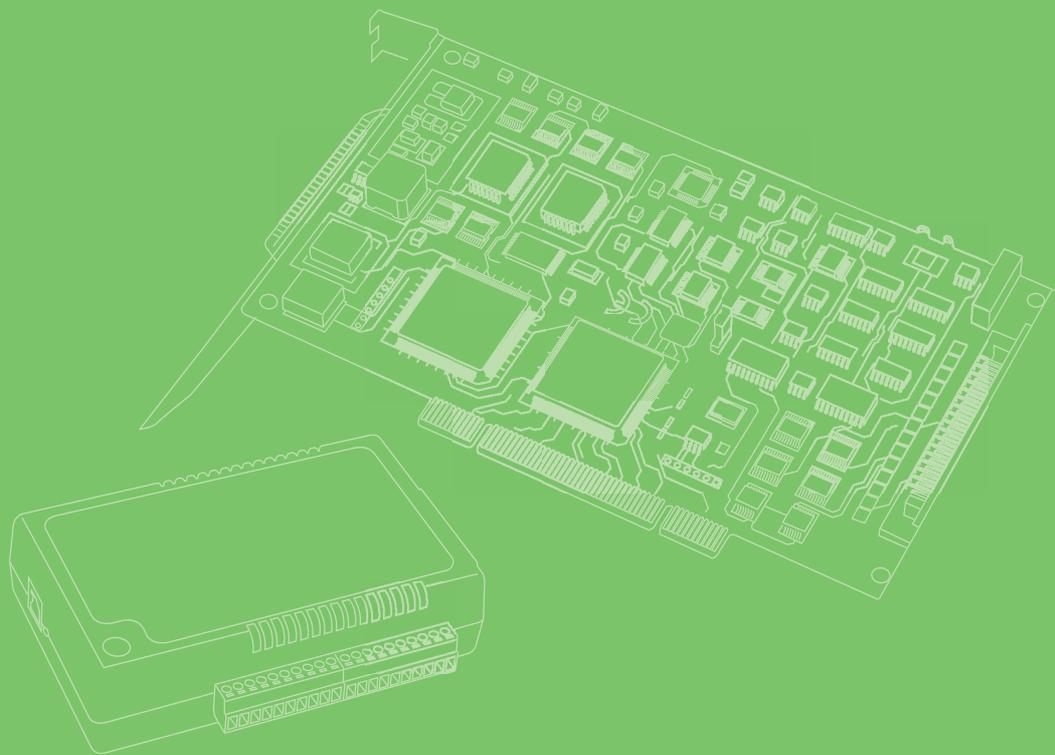


User Manual



# PCIE-1753

96-ch Digital I/O PCI Express  
Card

**ADVANTECH**

eAutomation

---

## Copyright

The documentation and the software included with this product are copyrighted 2013 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 on screen 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 B

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

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

# Technical Support and Assistance

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

---

## Warnings, Cautions and Notes

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



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



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

## Document Feedback

To assist us in making improvements to this manual, we would welcome comments and constructive criticism. Please send all such - in writing to: [support@advantech.com](mailto:support@advantech.com)

## Safety Instructions

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

18. The equipment does not work well, or you cannot get it to work according to the user's manual.
19. The equipment has been dropped and damaged.
20. The equipment has obvious signs of breakage.
21. DO NOT LEAVE THIS EQUIPMENT IN AN ENVIRONMENT WHERE THE STORAGE TEMPERATURE MAY GO BELOW -20° C (-4° F) OR ABOVE 60° C (140° F). THIS COULD DAMAGE THE EQUIPMENT. THE EQUIPMENT SHOULD BE IN A CONTROLLED ENVIRONMENT.
22. CAUTION: DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER, DISCARD USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.
23. The sound pressure level at the operator's position according to IEC 704-1:1982 is no more than 70 dB (A).

## Safety Precaution - Static Electricity

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

**Safety Precaution - Static Electricity**  
Follow these simple precautions to protect yourself from harm and the products from damage.

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



# Contents

<b>Chapter 1</b>	<b>Overview .....</b>	<b>1</b>
1.1	Introduction .....	2
1.2	Features .....	2
1.3	Applications.....	3
1.4	Installation Guide .....	3
1.5	Software Overview .....	3
1.6	Accessories.....	4
<b>Chapter 2</b>	<b>Hardware Installation .....</b>	<b>5</b>
2.1	Installation .....	6
2.2	Unpacking .....	6
2.3	Driver Installation .....	7
2.4	Hardware Installation .....	7
	Figure 2.1 Device Manager .....	8
<b>Chapter 3</b>	<b>Signal Connections .....</b>	<b>9</b>
3.1	Overview .....	10
3.2	Switch and Jumper Settings .....	10
	Figure 3.1 Card Connector, Jumper and Switches.....	10
3.2.1	Jumper JP1 Restores Ports to Their Condition Prior to Reset....	11
	Table 3.1: Summary of Jumper Settings .....	11
	Table 3.2: Board ID setting (SW1).....	11
	Table 3.3: Summary of Jumper Settings .....	12
3.3	Signal Connections .....	13
<b>Appendix A</b>	<b>Specifications .....</b>	<b>15</b>
A.1	Specifications .....	16
A.1.1	PCIE-1753 .....	16
<b>Appendix B</b>	<b>Block Diagram .....</b>	<b>17</b>
B.1	PCIE-1753.....	18



# Chapter 1

Overview

## 1.1 Introduction

The PCIE-1753 is a 96-ch D/I/O card with PCI Express bus. It provides 96 channel of parallel digital input/output compatible with 5V/TTL. It emulates mode 0 of the 8255 PPI chip, but the buffered circuits offer a higher driving capability than the 8255.

The I/O channels are divided into twelve 8-bit ports. Each port can be divided into two nibbles (bit 0 ~ 3 belongs to low nibble, while bit 4 ~ 7 belongs to high nibble). You can configure each nibble as either input or output via software. The interrupt handling capability provides users the flexibility to generate interrupts to a PC. This card uses a high density SCSI 100-pin connector for easy and reliable connections to field devices.

Two other features give the PCIE-1753 practical advantages in an industrial setting. When the system is hot reset (the power is not turned off) PCIE-1753 retains the last I/O port settings and output values if the user has set jumper JP1 to enable this feature. Otherwise, port settings and output values reset to their default state, or to the state determined by other jumper settings. The PCIE-1753's other useful feature is it supports both wet and dry contacts for digital input channels, allowing it to interface with other devices more easily.

The following sections of this chapter will provide further information about features, installation guide, and some brief information on software and accessories for the PCIE-1753 card.

## 1.2 Features

### PCIE-1753

- 96 TTL digital I/O lines
- Emulates mode 0 of 8255 PPI
- Buffered circuits for higher driving capacity than the 8255
- Interrupt handling capability
- Supports both dry and wet contact for digital input channels
- Keeps the I/O port setting and DO state after hot reset
- BoardID switch
- Pattern match interrupt function for DI
- "Change of state" interrupt function for DI
- Programmable digital filter function for DI (available for bit 0 of every port)

The Advantech PCIE-1753 offers the following main features:

### Plug-and-Play Function

The PCIE-1753 is a Plug-and-Play device, which fully complies with PCI Express Specification Rev V1.0. During card installation, there is no need to set jumpers or DIP switches. Instead, all bus-related configurations such as base I/O address and interrupt are automatically done by the Plug-and-Play function.

### Board ID

The PCIE-1753 has a built-in DIP Switch that helps define each card's ID when multiple PCIE-1753 cards have been installed on the same PC chassis. The board ID setting function is very useful when users build their system with multiple PCIE-1753 cards. With correct Board ID settings, you can easily identify and access each card during hardware configuration and software programming.

### Digital Filter for Digital Input Channels

The PCIE-1753 includes a programmable digital filter on channel 0 (bit 0) on each port to eliminate the unexpected signal or noise from the card's inputs. When the digital filter is enabled, the state of the corresponding input channel will not update immediately until the signal is stable for a period of time which is programmed by the user.

### Interrupt Function Ensures Faster System Response

The PCIE-1753 provides a "Pattern Match" interrupt function for the digital input channels. It monitors the state of some or all of the input channels and compares it with a pre-set pattern. When the received state matches the pre-set pattern, PCIE-1753 will generate an interrupt signal to the system. The "Change of Input State" interrupt function means PCIE-1753 monitors the state of the input channels. When any input changes its state, the card interrupts the system to handle this event. The "Triggering Edge" interrupt can be triggered by a rising edge or a falling edge of the digital input signal.

## 1.3 Applications

- Industrial AC/DC I/O devices monitoring and control
- Relay and switch monitoring and control
- Parallel data transfer
- Sensing the signals of TTL, DTL, CMOS logic
- Driving indicator LEDs

## 1.4 Installation Guide

Before installing the PCIE-1753 card, please make sure you have the following necessary components:

- PCIE-1753 card
- PCIE-1753 User's Manual
- Advantech driver DAQNavI (included in the CD-ROM)
- Wiring cable PCL-10268 (optional)
- Wiring board ADAM-3968 (optional)
- Personal computer or workstation with a PCI Express-bus slot

Some other optional components are also available for enhanced operation:

- Application software: Advantech Navigator (Utility) offered by DAQNavI software.

After you get the necessary components and maybe some of the accessories for enhanced operation of your card, you can then begin the Installation procedures.

## 1.5 Software Overview

Advantech offers device drivers, SDKs, third-party driver support and application software to help fully exploit the functions of your PCIE-1753 card. All these software packages are available on the companion CD-ROM or you can browse Advantech website to get the latest update: <http://www.advantech.com/>.

---

## 1.6 Accessories

Advantech offers a complete set of accessory products to support the PCIE-1753 card. These accessories include:

### **Wiring Cable**

The PCL-10268 shielded cable is specially designed for PCIE-1753 cards to provide high resistance to noise. To achieve better signal quality, the signal wires are twisted in such a way as to form a “twisted-pair cable”, reducing cross-talk and noise from other signal sources. Furthermore, its digital lines are separately sheathed and shielded to neutralize EMI/EMC problems.

### **Wiring Boards**

The ADAM-3968 is a 100-pin D-type wiring terminal module for DIN-rail mounting. This terminal module can be readily connected to the Advantech cards and allow easy yet reliable access to individual pin connections for the PCIE-1753 card.

# Chapter 2

Hardware Installation

---

## 2.1 Installation

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

## 2.2 Unpacking

After receiving your PCIE-1753 package, please inspect its contents first. The package should contain the following items:

- PCIE-1753 card
- Companion CD-ROM
- User's Manual

The PCIE-1753 card harbors certain electronic components vulnerable to electrostatic discharge (ESD). ESD could easily damage the integrated circuits and certain components if preventive measures are not carefully paid attention to.

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

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

After taking out the card, first you should:

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

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

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

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



## 2.3 Driver Installation

We recommend you to install the driver before you install the PCIE-1753 card into your system, since this will guarantee a smooth installation process.

The Advantech device driver installation for the PCIE-1753 card is included on the companion CD-ROM that is shipped with your DA&C card package, or you can download it from Advantech official website.

## 2.4 Hardware Installation

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



After the device driver installation is completed, you can now go on to install the PCIE-1753 card in any PCI Express slot on your computer. Follow the steps below to install the card on your system.

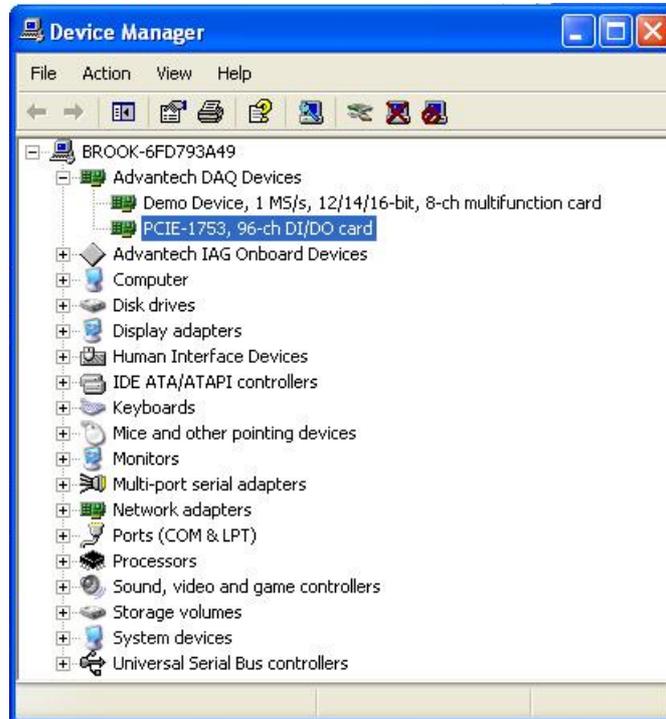
1. Turn off your computer and unplug the power cord and cables. TURN OFF your computer before installing or removing any components on the computer.
2. Remove the cover of your computer.
3. Remove the slot cover on the back panel of your computer.
4. Touch the metal part on the surface of your computer to neutralize the static electricity that might be on your body.
5. Insert the PCIE-1753 card into a PCI Express 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 Express card on the back panel of the computer.
7. Connect appropriate accessories to the PCI Express 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, Win95/98/ME will recognize your card as an "unknown device" after rebooting, and will prompt you to provide the necessary driver. Ignore the prompting messages (just click the Cancel button) and set up the driver according to the steps described in 2.3 Driver Installation.*



After the PCIE-1753 card is installed, you can verify whether it is properly installed on your system through the Device Manager:

1. Access the Device Manager through Control Panel/System/Device Manager.
2. The device name of the PCIE-1753 should be listed on the Device Manager tab as follows.



**Figure 2.1 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 Advantech Navigator after you install DAQNav on your computer.

# Chapter 3

## Signal Connections

## 3.1 Overview

Maintaining signal connections is one of the most important factors in ensuring that your application system is sending and receiving data correctly. A good signal connection can avoid unnecessary and costly damage to your PC and other hardware devices. This chapter provides useful information about how to connect input and output signals to the PCIE-1753 via the I/O connector.

## 3.2 Switch and Jumper Settings

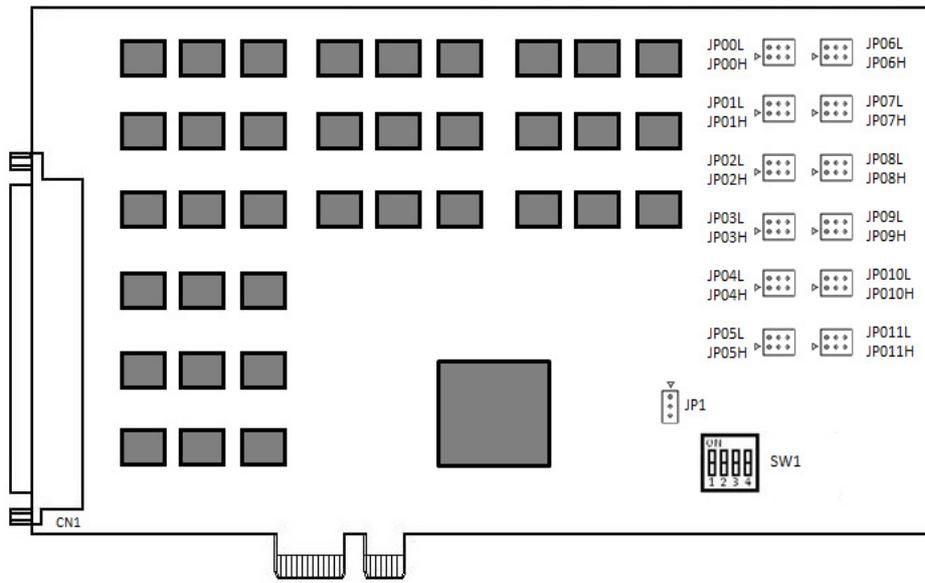
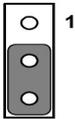
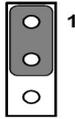


Figure 3.1 Card Connector, Jumper and Switches

### 3.2.1 Jumper JP1 Restores Ports to Their Condition Prior to Reset

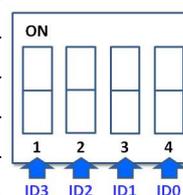
Jumper JP1 gives the PCIE-1753 a new and valuable function. With JP1 enabled, the PCIE-1753 “memorizes” all port I/O settings and output values, and, in the event of a “hot” reset, the settings and output values present at the port just prior to reset are restored to each port following reset. This feature applies to both ports set by software, and to ports configured as output ports via jumper. Depending on the application, this function may allow a card to be reset without requiring a complete shut-down of processes controlled by the card (since port values are left unchanged and are interrupted only momentarily). Complete loss of power to the card clears chip memory. Thus, even if JP1 is enabled, the card’s power-on state will return to the default state or the state of an output port with voltage low output (for jumper-set ports). When jumper JP1 is disabled, power-off or reset results in ports returning to their default state (for software-set ports) or returning to the state of output port with voltage low output (for jumper-set ports).

**Table 3.1: Summary of Jumper Settings**

Jumper Name	Function Description
JP1	 Load default after reset
	 Keeps the last status after reset (enabled)

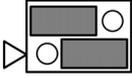
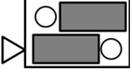
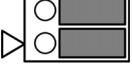
**Table 3.2: Board ID setting (SW1)**

ID3	ID2	ID1	ID0	Board ID
1	1	1	1	0
1	1	1	0	1
1	1	0	1	2
1	1	0	0	3
1	0	1	1	4
1	0	1	0	5
1	0	0	1	6
1	0	0	0	7
0	1	1	1	8
0	1	1	0	9
0	1	0	1	10
0	1	0	0	11
0	0	1	1	12
0	0	1	0	13
0	0	0	1	14
0	0	0	0	15



Note: On: 1, Off: 0

**Table 3.3: Summary of Jumper Settings**

Jumper Name	Operation	Function Description
JPnL n = 0 ~ 11		Set bit 0, 1, 2, 3 of port n as software-configurable input or output (default) Set bit 4, 5, 6, 7 of port n as software-configurable input or output (default)
		Set bit 0, 1, 2, 3 of port n as software-configurable input or output (default) Set bit 4, 5, 6, 7 of port n as output port
		Set bit 0, 1, 2, 3 of port n as output port Set bit 4, 5, 6, 7 of port n as software-configurable input or output (default)
		Set bit 0, 1, 2, 3 of port n as output port Set bit 4, 5, 6, 7 of port n as output port

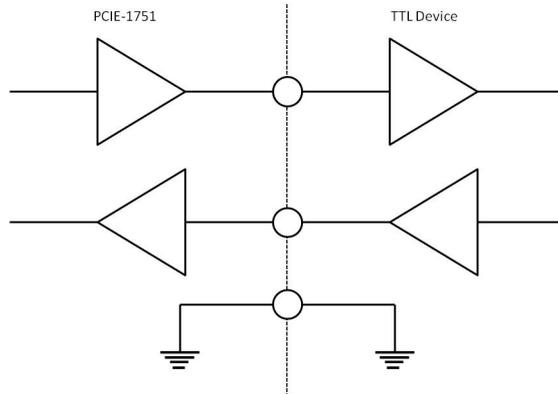
## 3.3 Signal Connections

### PCIE-1753 Pin Assignments

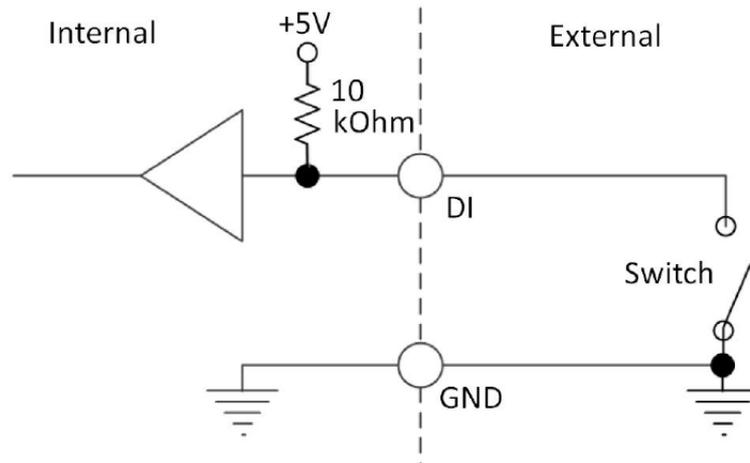
Name	Pin	Description
P0_0	1	51
P0_1	2	52
P0_2	3	53
P0_3	4	54
P0_4	5	55
P0_5	6	56
P0_6	7	57
P0_7	8	58
P1_0	9	59
P1_1	10	60
P1_2	11	61
P1_3	12	62
P1_4	13	63
P1_5	14	64
P1_6	15	65
P1_7	16	66
P2_0	17	67
P2_1	18	68
P2_2	19	69
P2_3	20	70
P2_4	21	71
P2_5	22	72
P2_6	23	73
P2_7	24	74
GND	25	75
P3_0	26	76
P3_1	27	77
P3_2	28	78
P3_3	29	79
P3_4	30	80
P3_5	31	81
P3_6	32	82
P3_7	33	83
P4_0	34	84
P4_1	35	85
P4_2	36	86
P4_3	37	87
P4_4	38	88
P4_5	39	89
P4_6	40	90
P4_7	41	91
P5_0	42	92
P5_1	43	93
P5_2	44	94
P5_3	45	95
P5_4	46	96
P5_5	47	97
P5_6	48	98
P5_7	49	99
VCC	50	100
P6_0		
P6_1		
P6_2		
P6_3		
P6_4		
P6_5		
P6_6		
P6_7		
P7_0		
P7_1		
P7_2		
P7_3		
P7_4		
P7_5		
P7_6		
P7_7		
P8_0		
P8_1		
P8_2		
P8_3		
P8_4		
P8_5		
P8_6		
P8_7		
GND		
P9_0		
P9_1		
P9_2		
P9_3		
P9_4		
P9_5		
P9_6		
P9_7		
P10_0		
P10_1		
P10_2		
P10_3		
P10_4		
P10_5		
P10_6		
P10_7		
P11_0		
P11_1		
P11_2		
P11_3		
P11_4		
P11_5		
P11_6		
P11_7		
VCC		

## TTL Digital Input/Output

The PCIE-1753 has 96 TTL-level digital inputs and outputs. The following figure shows connections to exchange digital signals with other TTL devices:



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



# Appendix **A**

## Specifications

## A.1 Specifications

### A.1.1 PCIE-1753

#### Digital Input

<b>Channels</b>	96 (shared with output)
<b>Compatibility</b>	5V/TTL
<b>Input Voltage</b>	Logic 0: 0.8 V max
	Logic 1: 2 V min
<b>Interrupt Capable Channels</b>	12

#### Digital Output

<b>Channels</b>	96 (shared with output)
<b>Compatibility</b>	5V / TTL
<b>Output Voltage</b>	Logic 0: 0.4 V max
	Logic 1: 2.4 V min
<b>Output Capability</b>	Sink: 0.4 V @ 24mA
	Source: 2.4 V @ 15mA

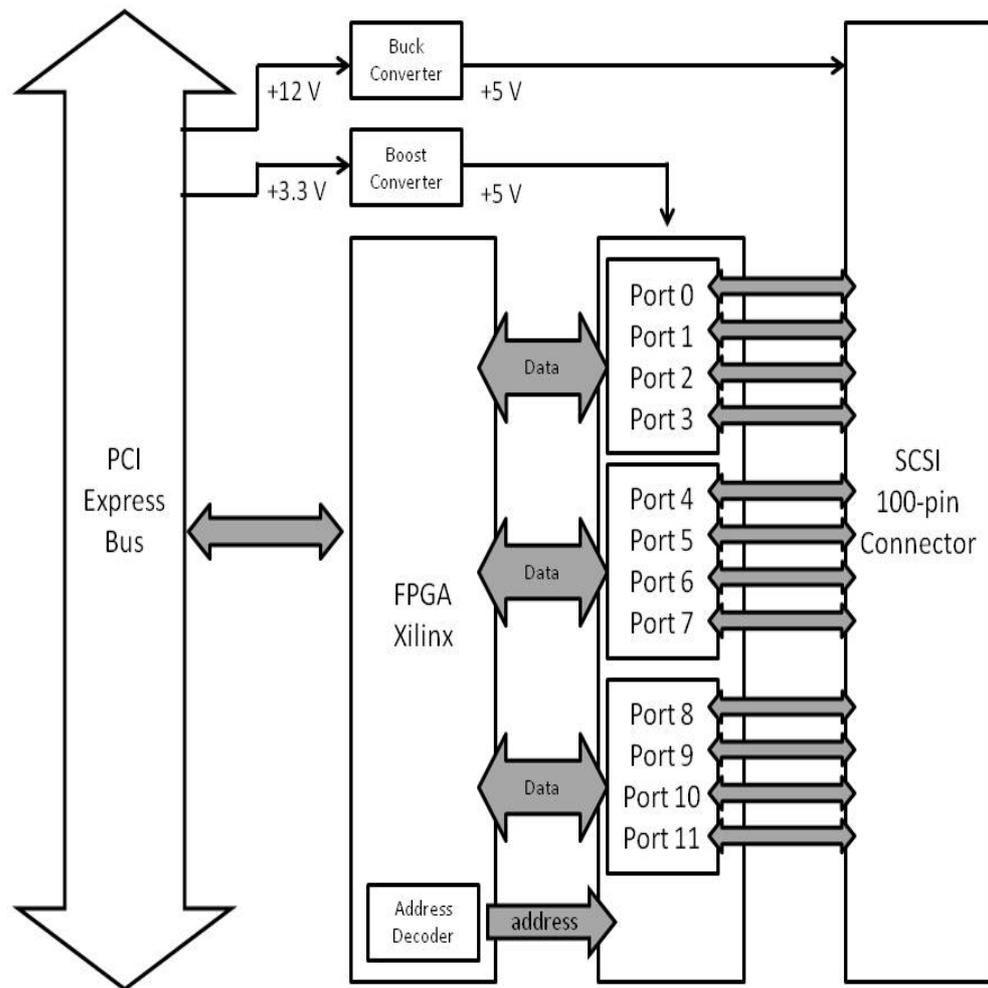
#### General

<b>Bus Type</b>	PCI Express
<b>I/O Connectors</b>	1x100-pin SCSI female connector
<b>Dimensions ( LxH )</b>	167.7 mm x 100 mm (6.6" x 3.9")
<b>Power Consumption</b>	Typical: 3.3V @ 1 A
	Maximum: 3.3 V @ 3 A 12 V @ 0.25 A
<b>Operating Temperature</b>	0~60°C (32~140°F)
<b>Storage Temperature</b>	-25~85°C (-4~185°F)
<b>Storage Humidity</b>	5~95%RH,non-condensing (refer to IEC 68-2-3)

# Appendix **B**

## Block Diagram

## B.1 PCIE-1753





# ADVANTECH

## *e*Automation

[www.advantech.com](http://www.advantech.com)

Please verify specifications before quoting. This guide is intended for reference purposes only.

All product specifications are subject to change without notice.

No part of this publication may be reproduced in any form or by any means, electronic, photocopying, recording or otherwise, without prior written permission of the publisher.

All brand and product names are trademarks or registered trademarks of their respective companies.

© Advantech Co., Ltd. 2013