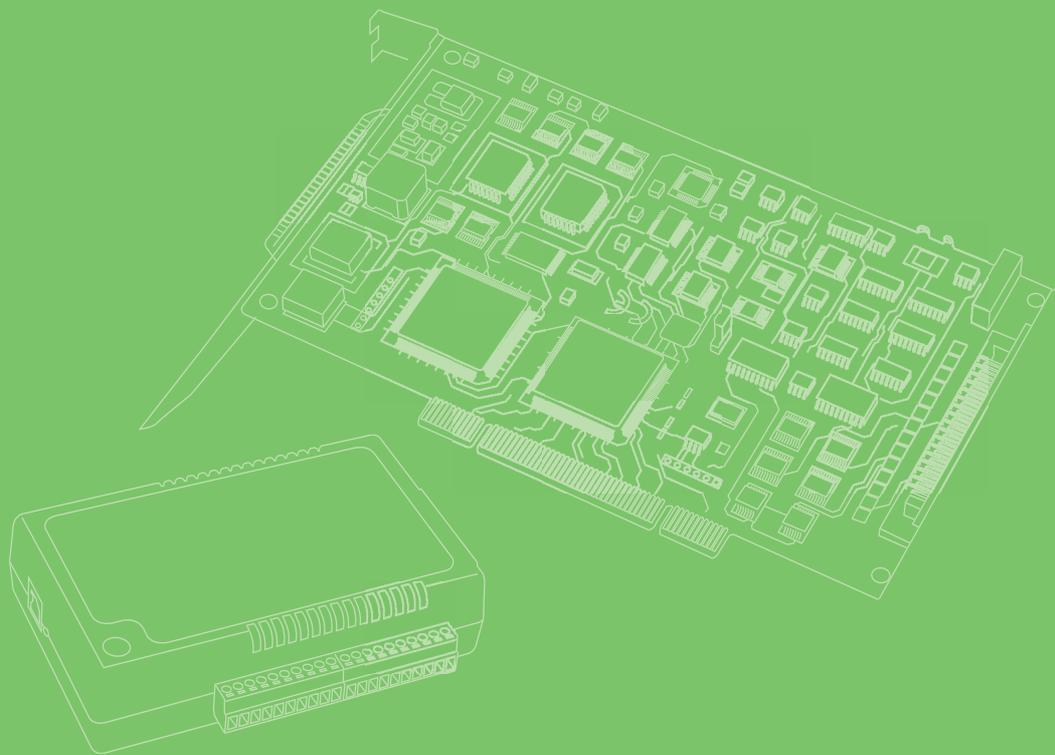


User Manual



PCI-E-1758 Series

128-Channel Isolated Digital I/O
Card

ADVANTECH

Enabling an Intelligent Planet

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Product Warranty (2 years)

Advantech warrants 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 that have been repaired or altered by persons other than repair personnel authorized by Advantech, or products that 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 customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced free of charge during the warranty period. For out-of-warranty repairs, customers are billed according to the cost of replacement materials, service time, and freight. Please consult your dealer for more details.

If you believe that your product is defective, follow the steps outlined below.

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 displayed 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 a return merchandise authorization (RMA) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a completed Repair and Replacement Order Card, and a proof of purchase date (such as a photocopy of your sales receipt) into a shippable container. Products returned without a proof of purchase date are not eligible for warranty service.
5. Write the RMA number visibly on the outside of the package, then ship the package prepaid to your dealer.

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Declaration of Conformity

CE

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

FCC Class A

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 such cases, users are required to correct the interference at their own expense.

Technical Support and Assistance

1. Visit the Advantech web site at www.advantech.com/support to obtain the latest product information.
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 calling:
 - 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 with your product and in good condition. If any item does not accord with the table, please contact your dealer immediately.

- 1 x PCIE-1758 Series DAQ card
- 1 x PCIE-1758 Series user manual

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 the PC chassis before manual handling. Do not touch any internal components, the CPU, or any adapter cards while the PC is powered on.
- Disconnect the power before implementing any configuration changes. A sudden rush of power after connecting a jumper or installing a card may damage sensitive electronic components.

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Chapter 1

Introduction

This chapter introduces the PCIe-1758 series cards and their typical applications.

- Features
- Applications
- Installation Guide
- Software Overview
- Device Driver Roadmap
- Accessories

1.1 Introduction

Thank you for buying the Advantech PCIE-1758 series, 128-channel isolated digital input/output card(s). It is a series of data acquisition card with advanced performance based on PCI Express bus architecture. They feature a unique circuit design and completed functions for data acquisition and control. The following sections in this chapter will provide further information about features of PCIE-1758 series, including Quick Start Guide, and brief information on software and accessories.

1.2 Features

- 128-ch isolated DI/O
- Wide input range (10 ~ 30 V_{DC})
- Either +/- voltage input for IDI by group
- Wide output range (5 ~ 40 V_{DC})
- High sink current on isolated output channels (350 mA max./ch)
- High over-voltage protection (70 V_{DC})
- High-voltage isolation (2,500 V_{DC})
- 2,000 VDC ESD protection
- Output status read-out
- Keeps output settings and values after system hot reset
- Interrupt handling capability for IDI channels
- Board ID

PCIE-1758 series provides the following benefits:

Robust Protection

The PCIE-1758 series features a robust isolation protection for applications in industry, lab and machine automation. The PCIE-1758 series can durably withstand a voltage up to 2,500 VDC, preventing your host system from harm.

Wide Input Range

The PCIE-1758 series accepts a wide range of input voltage, from 10 to 30 V_{DC}, and it is suitable for most industrial applications with 12 V_{DC} and 24 V_{DC} input voltage. We are also ready to serve your special needs for specific input voltage ranges. Do not hesitate to ask us about tailoring our standard products to meet your specifications.

Wide Output Range

The PCIE-1758 series also features a wide output voltage range from 5 to 40 V_{DC}, suitable for most industrial applications of 12 V_{DC}/24 V_{DC} output voltage. Similar to the input voltage offer above, we are 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.

Board ID Setting

The PCIE-1758 series has a built-in DIP switch that defines each card's ID when multiple cards have been installed in the same PC chassis. The board ID setting function is very useful when users build systems with multiple PCIE-1758 series cards. With correct Board ID settings, you can easily identify and access each card during hardware configuration and software programming.

Reset Protection

When the system has undergone a hot reset (i.e., without turning off the system power), the PCIE-1758 series can either retain output 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 incorrect operations during unexpected system resets.

All the above features make PCIE-1758 series cards ideal for industrial applications.

Note! For detailed specifications of the PCIE-1758 series cards, please refer to Appendix A.



1.3 Applications

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

1.4 Installation Guide

Before installing a PCIE-1758 series card, ensure that you have the following necessary components:

- 1 x PCIE-1758 Series DAQ card
- 1 x PCIE-1758 Series user manual
- Advantech DAQNav driver software
- 1 x PCL-101100S-1E/PCL-101100S-2E/PCL-101100S-3E cable (optional)
- 1 x ADAM-39100-BE wiring board (optional)
- 1 x Personal computer or workstation with a PCI Express bus slot

Other optional components are also available for enhanced operation:

- Advantech DAQ tools, LabView, and other third-party software

After obtaining all necessary components and accessories for enhanced operation, you can begin card installation.

1.5 Software Overview

Advantech offers a comprehensive set of DLL drivers and third-party driver support and application software to fully exploit the functions of PCIE-1758 series cards. These include

- DAQNav software
- LabView driver
- Advantech DAQ tools

Programming DA&C Cards

Advantech application software, such as Advantech DAQNav software can be used for programming PCIE-1758 series cards. Advanced users can conduct register-level programming, although this is not recommended due to its laborious and time-consuming nature.

DAQNav Software

Advantech DAQNav software includes device drivers and an SDK that features a complete I/O function library to enhance application performance. This software can be downloaded from the Advantech Support Portal (http://support.advantech.com/support/new_default.aspx). Simply search “DAQNav” to navigate to the download page. The Advantech DAQNav software for Windows XP/Vista/7 works seamlessly with a range of development tools, including Visual Studio.Net, Visual C++, Visual Basic, and Borland Delphi.

Register-Level Programming

Register-level programming is available for experienced programmers wishing to write code directly at the device register level. Because register-level programming requires substantial time and effort, we recommend that you use the Advantech DAQNav software instead. However, if register-level programming is unavoidable, contact the technical support team to obtain any information that may be required.

1.6 DAQNav Device Driver Programming Roadmap

This section provides a roadmap for building an application from the ground up using Advantech DAQNav device drivers combined with your preferred development tools, such as Visual Studio.Net, Visual C++, Visual Basic, and Borland Delphi. Additionally, step-by-step instructions for building unique applications using each development tool are included in the DAQNav SDK manual. A comprehensive set of example source codes is also provided for reference.

1.6.1 Programming Tools

Programmers can develop application programs using their preferred development tools. For example,

- Visual Studio.Net
- Visual C++ and Visual Basic
- Borland Delphi

The Tutorial Chapter in the DAQNav SDK manual provides instructions on how to begin programming using each development tool. Example source codes for each programming tool are also included in this chapter.

The DAQNav SDK manual is located on the accompanying DVD-ROM. Alternatively, if you have already installed the DAQNav SDK on your system, the DAQNav SDK manual can be easily accessed from the Start menu via the following file path:

Start\Programs\Advantech Automation\DAQNav\DAQNav Manuals\DAQNav SDK Manual

The example source codes are located in the corresponding installation folder. The default installation path is as follows:

\\Advantech\DAQNav\Examples

For information about using other function groups or other development tools, refer to the chapter titled “Using DAQNav SDK” in the DAQNav SDK manual or to the video tutorials provided in Advantech Navigator.

1.6.2 Programming with DAQNav Device Drivers Function Library

Advantech DAQNav device drivers offer a comprehensive function library that can be used for various application programs. This function library consists of numerous APIs that support many development tools, such as Visual Studio.Net, Visual C++, Visual Basic, and Borland Delphi.

According to their specific functions or services, APIs can be categorized into the following function groups:

- Analog Input Function Group
- Analog Output Function Group
- Digital Input/Output Function Group
- Counter Function Group

For information regarding the usage and parameters of each function, refer to “Using DAQNav SDK” in the DAQNav SDK manual.

1.6.3 Troubleshooting DAQNav Device Driver Errors

Driver functions will return a status code when they are called to perform a certain task for the application. Sometimes a function is not successful and an error code is returned. To troubleshoot a device driver error, check the error code and error description in the “Error Control” section for the specific function in the DAQNav SDK manual.

1.7 Accessories

Advantech offers a complete range of accessories to support PCIE-1758 series cards. These accessories include

Wiring Cables

- **PCL-101100S-1E, PCL-101100S-2E, PCL-101100S-3E**
PCL-101100S is a 100-pin mini-SCSI shielded cable especially designed for PCIE-1758 series cards. This cable should be used with an ADAM-39100 wiring board.

Wiring Boards

- **ADAM-39100-BE**
ADAM-39100 is a 100-pin SCSI wiring terminal module with DIN-rail mount.

Chapter 2

Installation

This chapter details the packing list, unpacking instructions, and driver and card installation procedures.

- Unpacking
- Driver Installation
- Hardware Installation

2.1 Unpacking

Upon receiving your PCIE-1758 series product, check that the package contains the following items:

- 1 x PCIE-1758 series DAQ card
- 1 x PCIE-1758 series user manual

PCIE-1758 series cards feature certain electronic components that are vulnerable to electrostatic discharge (ESD). ESD can easily damage the integrated circuits and components if preventive measures are ignored.

Before removing the card from the anti-static plastic bag, take the following precautions to avoid potential damage from ESD:

- Touch the metal part of the computer chassis with your hand to discharge any static electricity accumulated in your body. Alternatively, wear a grounding strap.
- Touch the anti-static bag to a metal part of the computer chassis before opening the bag.
- Hold of the DAQ card by the metal bracket only when removing it from the bag.

After taking out the card

- Inspect the card for any signs of external damage (loose or damaged components, etc.). If the card is visibly damaged, notify the Advantech service department or your local sales representative immediately.
- Do not attempt to install a damaged card in your system.

Additionally, pay extra attention to the following during installation:

- Avoid physical contact with materials that may hold static electricity, such as plastic, vinyl, and styrofoam.
- When handling the card, hold it by its edges only. Do not touch the exposed metal connector pins or any electronic components on the card.

Note! *Retain the anti-static bag for future use. The original bag may be needed to store the card when removing or installing the card on another PC.*



2.2 Driver Installation

Driver installation should be completed before the PCIE-1758 series card is installed in the system to ensure problem-free installation.

The Advantech DAQNav drivers for PCIE-1758 series cards can be downloaded from the Advantech Support Portal at http://support.advantech.com/support/new_default.aspx

Simply search “PCIE-1758” to navigate to the product page with relevant download links.

2.3 Hardware Installation

Note! *Ensure that all relevant drivers are installed before installing the card (please refer to Chapter 2.2 Driver Installation).*



After the device drivers are installed, the PCIE-1758 series card can be installed in any slot on the computer. However, we recommend that you refer to the computer's user manual or related documentation for guidance. Follow the steps provided below to install the card in your computer.

1. Power off the computer and unplug the power cord and cables before installing or removing any components.
2. Remove the cover of the computer.
3. Remove the slot cover on the back panel of the computer.
4. Touch a metal surface of the computer to neutralize any static electricity that may be in your body.
5. Insert the PCIE-1758 series card into a PCI Express slot. Hold the card by its edges only and carefully align it with the slot. Push the card firmly to insert the card in the slot. Do not use excessive force to avoid damaging the card.
6. Fasten the bracket of the PCI Express card onto the back panel rail of the computer using screws.
7. Connect any additional accessories (100-pin cable, wiring terminals, etc. if necessary) to the PCIE-1758 series card.
8. Replace the cover of the computer chassis. Reconnect the cables removed in Step 2.
9. Plug in the power cord and turn on the computer.

After the PCIE-1758 series card is successfully installed, users can begin configuring their device using the Advantech Navigator program automatically installed during driver setup.

Chapter 3

Signal Connections

This chapter explains how to connect input and output signals to PCIE-1758 series cards via the I/O connector.

- Overview
- Card Layout
- Switch and Jumper Settings
- Signal Connections
- Field Wiring Considerations

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 PCIE-1758 series cards via the I/O connector.

3.2 Card Layout

Figures 3.1 to 3.3 show the connector, jumper, and switch locations on PCIE-1758 series cards.

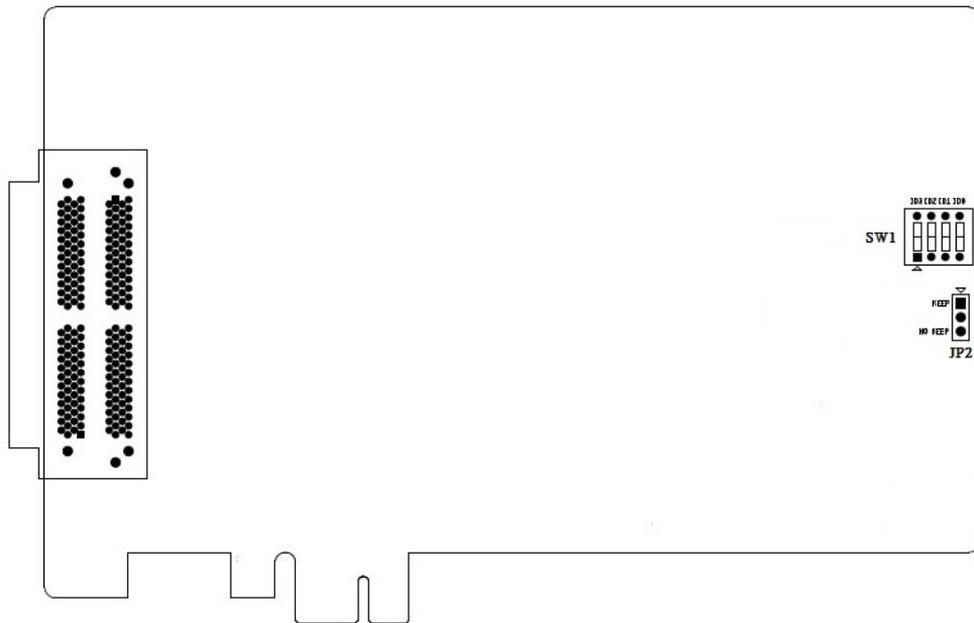


Figure 3.1 PCIE-1758DIO Card Layout

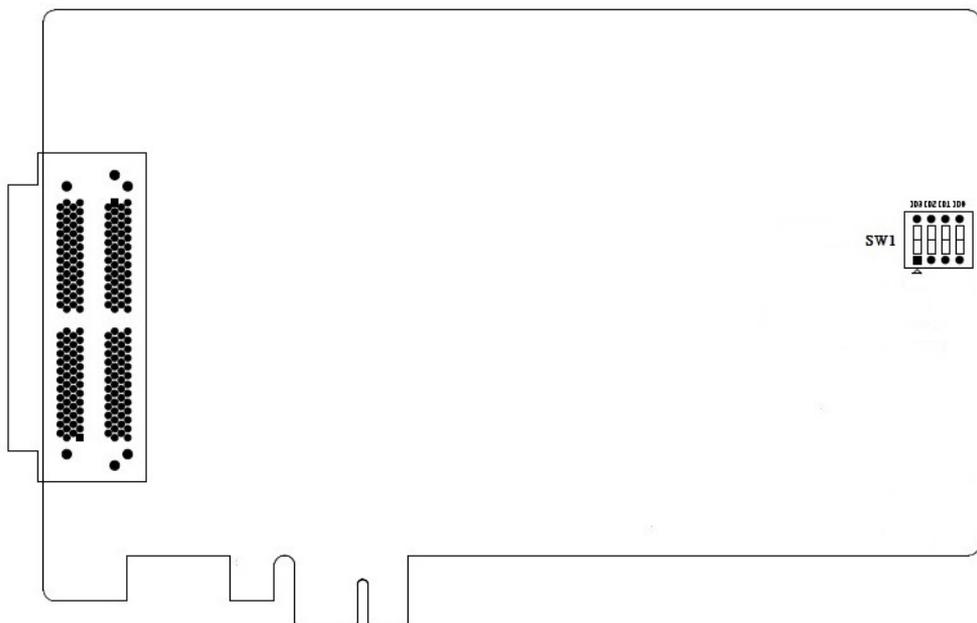


Figure 3.2 PCIE-1758DI Card Layout

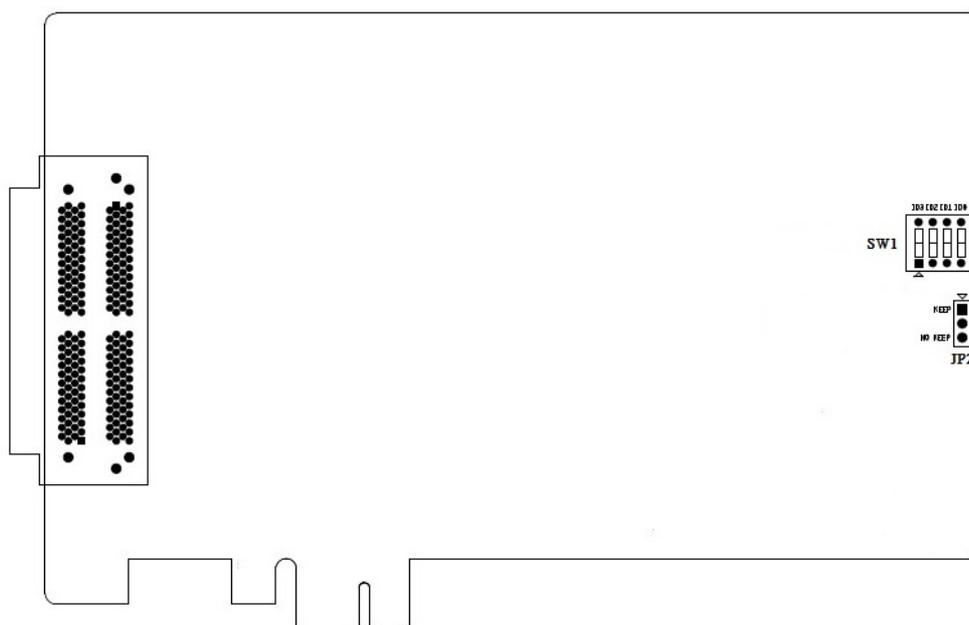


Figure 3.3 PCIE-1758DO Card Layout

3.3 Switch and Jumper Settings

3.3.1 Board ID (SW1)

PCIE-1758 series cards feature a built-in DIP switch (SW1) that is used to define each card's board ID. When multiple cards are installed on the same chassis, the board ID switch is useful for identifying each card's device number. After installing each card, users can differentiate them using their board ID. The available IDs and their corresponding switch combinations are listed in Table 3.1. Refer to this table when changing the ID to a non-zero number.

Table 3.1: Board ID Settings (SW1)

Board ID (dec)	Switch Position			
	1 (ID3)	2 (ID2)	3 (ID1)	4 (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

Table 3.1: Board ID Settings (SW1)

14	OFF	OFF	OFF	ON
15	OFF	OFF	OFF	OFF

Default setting = 0

3.3.2 Power On Configuration (JP2)

The default status of the PCIE-1758 series cards' digital output after a system power on is OPEN to protect external devices from damage. JP2 determines whether the last output value is retained after a hot system reset. Table 3.2 shows the jumper positions for power on configuration.

Table 3.2: Power On Configuration After Hot Resets (JP2)

JP2	Power On Configuration After Hot Resets
	Retain last status after hot reset
	Default configuration (default setting)

3.4 Signal Connections

Pin Assignments

The PCIE-1758 series cards feature two 100-pin connectors that allow users to integrate accessories using a PCL-101100S shielded cable.

Figure 3.4 to 3.6 show the pin assignments of the I/O connectors on the PCIE-1758 series cards. The I/O connector signal descriptions are presented in Table 3.3.

CNB			CNA				
P67_PCOM	100	50	P23_PCOM	GND	1	51	GND
P67_PCOM	99	49	P23_PCOM	GND	2	52	GND
P7_IDO07	98	48	P3_IDO07	GND	3	53	GND
P7_IDO06	97	47	P3_IDO06	GND	4	54	GND
P7_IDO05	96	46	P3_IDO05	GND	5	55	GND
P7_IDO04	95	45	P3_IDO04	GND	6	56	GND
P7_IDO03	94	44	P3_IDO03	P0_IDI00	7	57	P4_IDI00
P7_IDO02	93	43	P3_IDO02	P0_IDI01	8	58	P4_IDI01
P7_IDO01	92	42	P3_IDO01	P0_IDI02	9	59	P4_IDI02
P7_IDO00	91	41	P3_IDO00	P0_IDI03	10	60	P4_IDI03
P6_IDO07	90	40	P2_IDO07	P0_IDI04	11	61	P4_IDI04
P6_IDO06	89	39	P2_IDO06	P0_IDI05	12	62	P4_IDI05
P6_IDO05	88	38	P2_IDO05	P0_IDI06	13	63	P4_IDI06
P6_IDO04	87	37	P2_IDO04	P0_IDI07	14	64	P4_IDI07
P6_IDO03	86	36	P2_IDO03	P1_IDI00	15	65	P5_IDI00
P6_IDO02	85	35	P2_IDO02	P1_IDI01	16	66	P5_IDI01
P6_IDO01	84	34	P2_IDO01	P1_IDI02	17	67	P5_IDI02
P6_IDO00	83	33	P2_IDO00	P1_IDI03	18	68	P5_IDI03
GND	82	32	GND	P1_IDI04	19	69	P5_IDI04
GND	81	31	GND	P1_IDI05	20	70	P5_IDI05
GND	80	30	GND	P1_IDI06	21	71	P5_IDI06
GND	79	29	GND	P1_IDI07	22	72	P5_IDI07
GND	78	28	GND	P01_ECOM	23	73	P45_ECOM
GND	77	27	GND	P01_ECOM	24	74	P45_ECOM
NC	76	26	NC	NC	25	75	NC
NC	75	25	NC	NC	26	76	NC
P45_PCOM	74	24	P01_PCOM	GND	27	77	GND
P45_PCOM	73	23	P01_PCOM	GND	28	78	GND
P5_IDO07	72	22	P1_IDO07	GND	29	79	GND
P5_IDO06	71	21	P1_IDO06	GND	30	80	GND
P5_IDO05	70	20	P1_IDO05	GND	31	81	GND
P5_IDO04	69	19	P1_IDO04	GND	32	82	GND
P5_IDO03	68	18	P1_IDO03	P2_IDI00	33	83	P6_IDI00
P5_IDO02	67	17	P1_IDO02	P2_IDI01	34	84	P6_IDI01
P5_IDO01	66	16	P1_IDO01	P2_IDI02	35	85	P6_IDI02
P5_IDO00	65	15	P1_IDO00	P2_IDI03	36	86	P6_IDI03
P4_IDO07	64	14	P0_IDO07	P2_IDI04	37	87	P6_IDI04
P4_IDO06	63	13	P0_IDO06	P2_IDI05	38	88	P6_IDI05
P4_IDO05	62	12	P0_IDO05	P2_IDI06	39	89	P6_IDI06
P4_IDO04	61	11	P0_IDO04	P2_IDI07	40	90	P6_IDI07
P4_IDO03	60	10	P0_IDO03	P3_IDI00	41	91	P7_IDI00
P4_IDO02	59	9	P0_IDO02	P3_IDI01	42	92	P7_IDI01
P4_IDO01	58	8	P0_IDO01	P3_IDI02	43	93	P7_IDI02
P4_IDO00	57	7	P0_IDO00	P3_IDI03	44	94	P7_IDI03
GND	56	6	GND	P3_IDI04	45	95	P7_IDI04
GND	55	5	GND	P3_IDI05	46	96	P7_IDI05
GND	54	4	GND	P3_IDI06	47	97	P7_IDI06
GND	53	3	GND	P3_IDI07	48	98	P7_IDI07
GND	52	2	GND	P23_ECOM	49	99	P67_ECOM
GND	51	1	GND	P23_ECOM	50	100	P67_ECOM

Figure 3.4 PCIe-1758DIO I/O Connector Pin Assignments

CNB				CNA			
PEF_ECOM	100	50	PAB_ECOM	GND	1	51	GND
PEF_ECOM	99	49	PAB_ECOM	GND	2	52	GND
PF_IDI07	98	48	PB_IDI07	GND	3	53	GND
PF_IDI06	97	47	PB_IDI06	GND	4	54	GND
PF_IDI05	96	46	PB_IDI05	GND	5	55	GND
PF_IDI04	95	45	PB_IDI04	GND	6	56	GND
PF_IDI03	94	44	PB_IDI03	P0_IDI00	7	57	P4_IDI00
PF_IDI02	93	43	PB_IDI02	P0_IDI01	8	58	P4_IDI01
PF_IDI01	92	42	PB_IDI01	P0_IDI02	9	59	P4_IDI02
PF_IDI00	91	41	PB_IDI00	P0_IDI03	10	60	P4_IDI03
PE_IDI07	90	40	PA_IDI07	P0_IDI04	11	61	P4_IDI04
PE_IDI06	89	39	PA_IDI06	P0_IDI05	12	62	P4_IDI05
PE_IDI05	88	38	PA_IDI05	P0_IDI06	13	63	P4_IDI06
PE_IDI04	87	37	PA_IDI04	P0_IDI07	14	64	P4_IDI07
PE_IDI03	86	36	PA_IDI03	P1_IDI00	15	65	P5_IDI00
PE_IDI02	85	35	PA_IDI02	P1_IDI01	16	66	P5_IDI01
PE_IDI01	84	34	PA_IDI01	P1_IDI02	17	67	P5_IDI02
PE_IDI00	83	33	PA_IDI00	P1_IDI03	18	68	P5_IDI03
GND	82	32	GND	P1_IDI04	19	69	P5_IDI04
GND	81	31	GND	P1_IDI05	20	70	P5_IDI05
GND	80	30	GND	P1_IDI06	21	71	P5_IDI06
GND	79	29	GND	P1_IDI07	22	72	P5_IDI07
GND	78	28	GND	P01_ECOM	23	73	P45_ECOM
GND	77	27	GND	P01_ECOM	24	74	P45_ECOM
NC	76	26	NC	NC	25	75	NC
NC	75	25	NC	NC	26	76	NC
PCD_ECOM	74	24	P89_ECOM	GND	27	77	GND
PCD_ECOM	73	23	P89_ECOM	GND	28	78	GND
PD_IDI07	72	22	P9_IDI07	GND	29	79	GND
PD_IDI06	71	21	P9_IDI06	GND	30	80	GND
PD_IDI05	70	20	P9_IDI05	GND	31	81	GND
PD_IDI04	69	19	P9_IDI04	GND	32	82	GND
PD_IDI03	68	18	P9_IDI03	P2_IDI00	33	83	P6_IDI00
PD_IDI02	67	17	P9_IDI02	P2_IDI01	34	84	P6_IDI01
PD_IDI01	66	16	P9_IDI01	P2_IDI02	35	85	P6_IDI02
PD_IDI00	65	15	P9_IDI00	P2_IDI03	36	86	P6_IDI03
PC_IDI07	64	14	P8_IDI07	P2_IDI04	37	87	P6_IDI04
PC_IDI06	63	13	P8_IDI06	P2_IDI05	38	88	P6_IDI05
PC_IDI05	62	12	P8_IDI05	P2_IDI06	39	89	P6_IDI06
PC_IDI04	61	11	P8_IDI04	P2_IDI07	40	90	P6_IDI07
PC_IDI03	60	10	P8_IDI03	P3_IDI00	41	91	P7_IDI00
PC_IDI02	59	9	P8_IDI02	P3_IDI01	42	92	P7_IDI01
PC_IDI01	58	8	P8_IDI01	P3_IDI02	43	93	P7_IDI02
PC_IDI00	57	7	P8_IDI00	P3_IDI03	44	94	P7_IDI03
GND	56	6	GND	P3_IDI04	45	95	P7_IDI04
GND	55	5	GND	P3_IDI05	46	96	P7_IDI05
GND	54	4	GND	P3_IDI06	47	97	P7_IDI06
GND	53	3	GND	P3_IDI07	48	98	P7_IDI07
GND	52	2	GND	P23_ECOM	49	99	P67_ECOM
GND	51	1	GND	P23_ECOM	50	100	P67_ECOM

Figure 3.5 PCIe-1758DI I/O Connector Pin Assignments

CNB			CNA				
PEF_PCOM	100	50	PAB_PCOM	GND	1	51	GND
PEF_PCOM	99	49	PAB_PCOM	GND	2	52	GND
PF_ID007	98	48	PB_ID007	GND	3	53	GND
PF_ID006	97	47	PB_ID006	GND	4	54	GND
PF_ID005	96	46	PB_ID005	GND	5	55	GND
PF_ID004	95	45	PB_ID004	GND	6	56	GND
PF_ID003	94	44	PB_ID003	PO_ID000	7	57	P4_ID000
PF_ID002	93	43	PB_ID002	PO_ID001	8	58	P4_ID001
PF_ID001	92	42	PB_ID001	PO_ID002	9	59	P4_ID002
PF_ID000	91	41	PB_ID000	PO_ID003	10	60	P4_ID003
PE_ID007	90	40	PA_ID007	PO_ID004	11	61	P4_ID004
PE_ID006	89	39	PA_ID006	PO_ID005	12	62	P4_ID005
PE_ID005	88	38	PA_ID005	PO_ID006	13	63	P4_ID006
PE_ID004	87	37	PA_ID004	PO_ID007	14	64	P4_ID007
PE_ID003	86	36	PA_ID003	P1_ID000	15	65	P5_ID000
PE_ID002	85	35	PA_ID002	P1_ID001	16	66	P5_ID001
PE_ID001	84	34	PA_ID001	P1_ID002	17	67	P5_ID002
PE_ID000	83	33	PA_ID000	P1_ID003	18	68	P5_ID003
GND	82	32	GND	P1_ID004	19	69	P5_ID004
GND	81	31	GND	P1_ID005	20	70	P5_ID005
GND	80	30	GND	P1_ID006	21	71	P5_ID006
GND	79	29	GND	P1_ID007	22	72	P5_ID007
GND	78	28	GND	PO1_PCOM	23	73	P45_PCOM
GND	77	27	GND	PO1_PCOM	24	74	P45_PCOM
NC	76	26	NC	NC	25	75	NC
NC	75	25	NC	NC	26	76	NC
PCD_PCOM	74	24	P89_PCOM	GND	27	77	GND
PCD_PCOM	73	23	P89_PCOM	GND	28	78	GND
PD_ID007	72	22	P9_ID007	GND	29	79	GND
PD_ID006	71	21	P9_ID006	GND	30	80	GND
PD_ID005	70	20	P9_ID005	GND	31	81	GND
PD_ID004	69	19	P9_ID004	GND	32	82	GND
PD_ID003	68	18	P9_ID003	P2_ID000	33	83	P6_ID000
PD_ID002	67	17	P9_ID002	P2_ID001	34	84	P6_ID001
PD_ID001	66	16	P9_ID001	P2_ID002	35	85	P6_ID002
PD_ID000	65	15	P9_ID000	P2_ID003	36	86	P6_ID003
PC_ID007	64	14	P8_ID007	P2_ID004	37	87	P6_ID004
PC_ID006	63	13	P8_ID006	P2_ID005	38	88	P6_ID005
PC_ID005	62	12	P8_ID005	P2_ID006	39	89	P6_ID006
PC_ID004	61	11	P8_ID004	P2_ID007	40	90	P6_ID007
PC_ID003	60	10	P8_ID003	P3_ID000	41	91	P7_ID000
PC_ID002	59	9	P8_ID002	P3_ID001	42	92	P7_ID001
PC_ID001	58	8	P8_ID001	P3_ID002	43	93	P7_ID002
PC_ID000	57	7	P8_ID000	P3_ID003	44	94	P7_ID003
GND	56	6	GND	P3_ID004	45	95	P7_ID004
GND	55	5	GND	P3_ID005	46	96	P7_ID005
GND	54	4	GND	P3_ID006	47	97	P7_ID006
GND	53	3	GND	P3_ID007	48	98	P7_ID007
GND	52	2	GND	P23_PCOM	49	99	P78_PCOM
GND	51	1	GND	P23_PCOM	50	100	P78_PCOM

Figure 3.6 PCIe-1758DO I/O Connector Pin Assignments

3.4.1 I/O Connector Pin Definition

Table 3.3: I/O Connector Signal Descriptions

Pin Name	Description
Isolated Digital Input	
Pn_IDI00~07	Isolated digital input of port n (n = 0 ~ 8 for PCIE-1758DIO, 0 ~ F for PCIE-1758DI, hex)
P01_ECOM	Common port of isolated digital input port 0 & port 1
P23_ECOM	Common port of isolated digital input port 2 & port 3
P45_ECOM	Common port of isolated digital input port 4 & port 5
P67_ECOM	Common port of isolated digital input port 6 & port 7
P89_ECOM	Common port of digital input port 8 & port 9
PAB_ECOM	Common port of digital input port A & port B
PCD_ECOM	Common port of digital input port C & port D
PEF_ECOM	Common port of digital input port E & port F
Isolated Digital Output	
Pn_IDO00~07	Isolated digital output of port n (n = 0 ~ 8 for PCIE-1758DIO, 0 ~ F for PCIE-1758DO, hex)
P01_PCOM	Free wheeling common diode for isolated digital output of port 0 & port 1
P23_PCOM	Free wheeling common diode for isolated digital output of port 2 & port 3
P45_PCOM	Free wheeling common diode for isolated digital output of port 4 & port 5
P67_PCOM	Free wheeling common diode for isolated digital output of port 6 & port 7
P89_PCOM	Free wheeling common diode for isolated digital output of port 8 & port 9
PAB_PCOM	Free wheeling common diode for isolated digital output of port A & port B
PCD_PCOM	Free wheeling common diode for isolated digital output of port C & port D
PEF_PCOM	Free wheeling common diode for isolated digital output of port E & port F
GND	Isolated ground

3.4.2 Isolated Digital Input

Each isolated digital input channel accepts bi-directional 10 ~ 30 V_{DC} voltage inputs. This means users can apply positive or negative voltage to an isolated input pin (V_{IN}). Every 16 input channels share one common pin. Figure 3.7 shows how to connect an external input source to one of the card's isolated input channels.

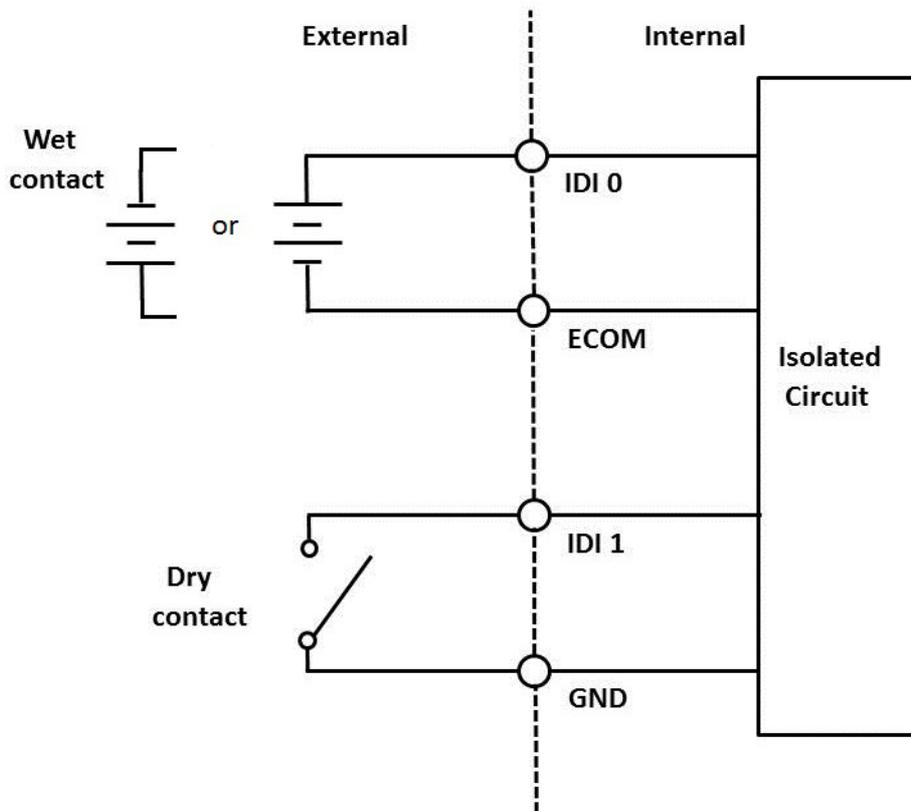


Figure 3.7 Isolated Digital Input Connection

3.4.3 Isolated Digital Output

Each isolated output channel is equipped with a MOSFET, polyswitch (for current protection), and flywheel diode for use with inductive loads and that can be activated by connecting PCOM to V_{DC} . If an external voltage ($5 \sim 40 V_{DC}$) is applied to an isolated output channel, the current will flow from the external voltage source to the card. The current flowing through each IDO channel should not exceed 350 mA.

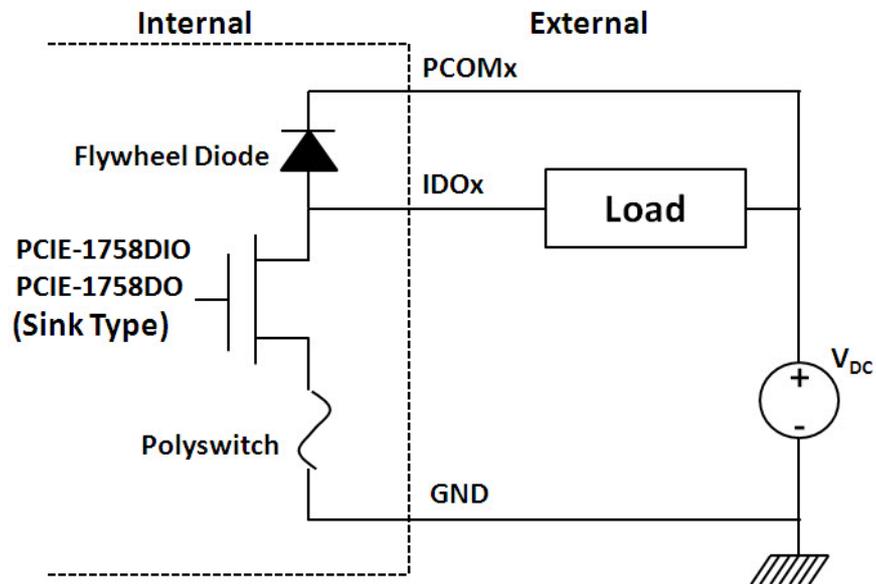


Figure 3.8 Isolated Digital Output Connection

3.5 Field Wiring Considerations

When using PCIe-1758 series cards to acquire data from an outdoor environment, noises in the environment can significantly affect the accuracy of measurements if due cautions are not taken. The following measures can help reduce possible interference on signal wires connecting signal sources to the PCIe-1758 series card.

- Signal cables must be kept away from strong electromagnetic sources, such as power lines, large electric motors, circuit breakers, or welding machines, as these may cause strong electromagnetic interference. Keep analog signal cables away from any video monitors because they can significantly affect data acquisition systems.
- If signal cables are routed through an area with significant electromagnetic interference, users should employ individually shielded, twisted-pair wires as analog input cables. This type of cable features 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 may also contain power lines.
- If the signal cable must be routed parallel to a high-voltage current power line, try to maintain a safe distance between the two cables. Alternatively, the signal cable can be placed at a right angle to the power line to minimize the undesirable effect.

Appendix **A**

Specifications

A.1 Isolated Digital Input (PCIE-1758DI & PCIE-1758DIO)

Number of Input Channels	PCIE-1758DI: 128 PCIE-1758DIO: 64	
Interrupt Inputs	PCIE-1758DI: 128 PCIE-1758DIO: 64	
Digital Filter for Inputs	PCIE-1758DI: 128 PCIE-1758DIO: 64	
Optical Isolation	2500 V _{DC}	
Opto-Isolator Response Time	100 μs	
Over-Voltage Protection	70 V _{DC}	
Input Resistance	3.6KΩ@1W	
Input Voltage	V _{IH} (max.)	30 V _{DC}
	V _{IH} (min.)	10 V _{DC}
	V _{IL} (max.)	3 V _{DC}
Input Current	12 V _{DC} : 3.8mA	
	24 V _{DC} : 7.2mA	

A.2 Digital Filter Time (PCIE-1758DI & PCIE-1758DIO)

Digital Filter Time [sec.] = $2^n/8 \times 10^6$, n = setting data (0 - 20)

Setting Data (n)	Digital Filter Time	Setting Data (n)	Digital Filter Time
7 (07h)	16μsec	14 (0Eh)	2.048msec
8 (08h)	32μsec	15 (0Fh)	4.096msec
9 (09h)	64μsec	16 (10h)	8.192msec
10 (0Ah)	128μsec	17 (11h)	16.384msec
11 (0Bh)	256μsec	18 (12h)	32.768msec
12 (0Ch)	512μsec	19 (13h)	65.536msec
13 (0Dh)	1.024msec	20 (14h)	131.072msec

A.3 Isolated Digital Output (PCIE-1758DO & PCIE-1758DIO)

Number of Output Channels	PCIE-1758DO: 128 PCIE-1758DIO: 64
Optical Isolation	2500 V _{DC}
Opto-Isolator Response Time	100 μs
Supply Voltage	5 ~ 40 V _{DC}
Sink Current	350mA max./channel @25 °C
	250mA max./channel @60 °C

A.4 General

I/O Connector Type	2 x 100-pin mini-SCSI (female)	
Dimensions	168 x 100 mm (6.6 x 3.9 in)	
Temperature	Operating	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 60068-2-3)	
Certification	CE Class A certified	

A.5 Power Consumption

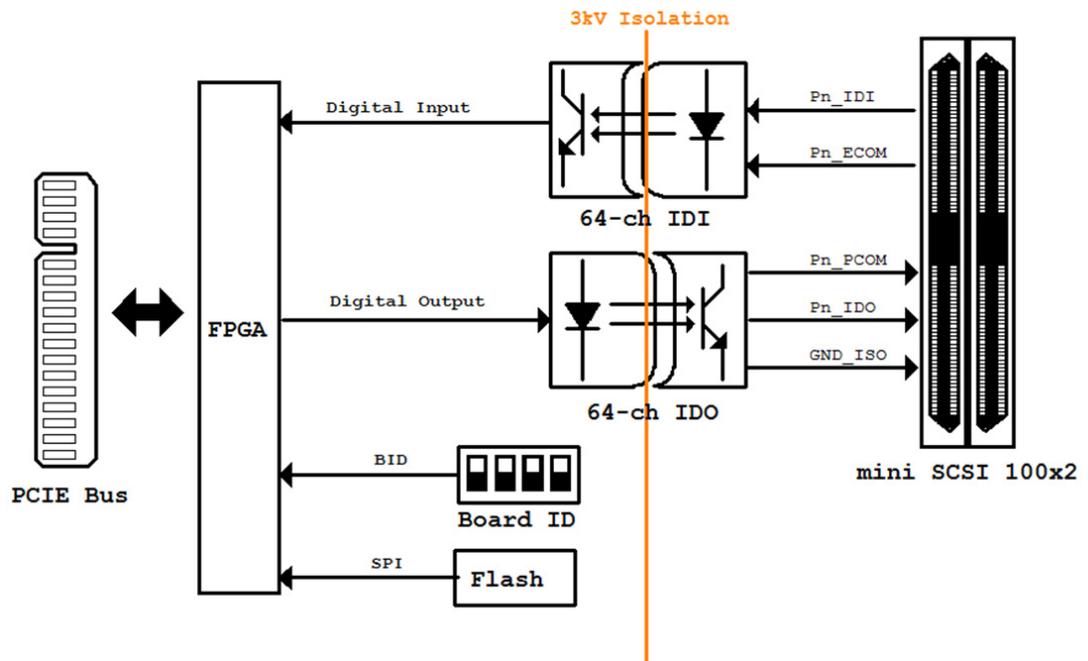
	PCIE-1758DIO	PCIE-1758DI	PCIE-1758DO
Typical	3.3 V@ 250mA	3.3 V@ 270mA	3.3 V@ 250mA
	12 V @ 20mA	12 V @ 30mA	12 V @ 25mA
Max.	3.3 V@ 425mA	3.3 V@ 400mA	3.3 V@ 450mA
	12 V @ 250mA	12 V @ 260mA	12 V @ 235mA

Appendix **B**

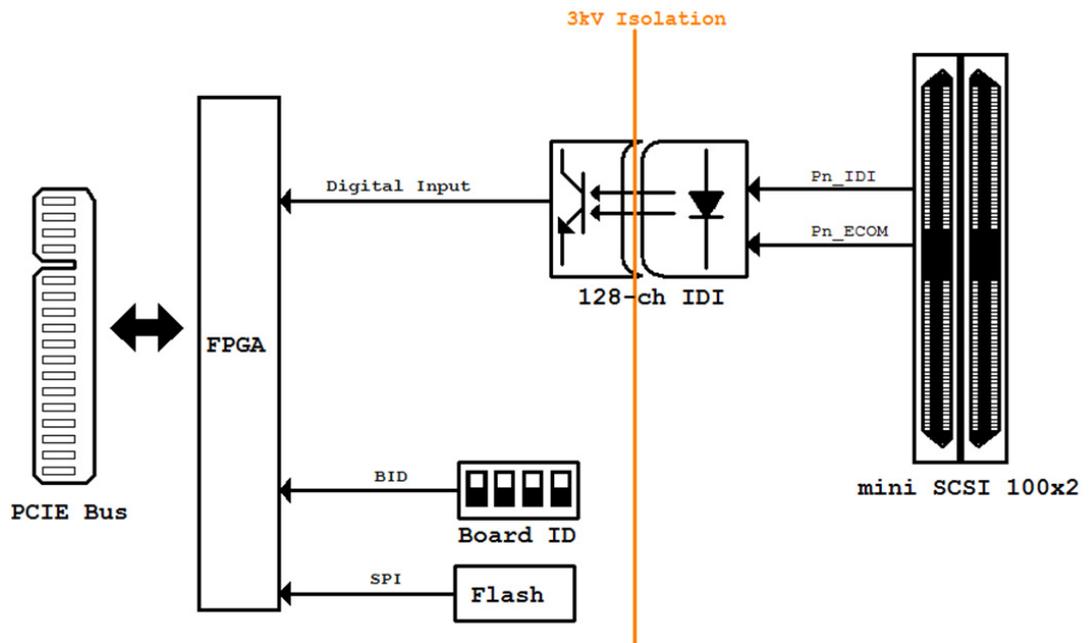
Block Diagrams

B.1 Block Diagrams

PCIE-1758DIO



PCIE-1758DI



PCIE-1758DO



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