

## **PCI E-1763AH**

**16-ch Solid-State Relay Output (AC) and 16-ch Isolated Digital Input w/ Digital Filter & Interrupt PCIe Card**

## **PCI E-1763DH**

**16-ch Solid-State Relay Output (DC) and 16-ch Isolated Digital Input w/ Digital Filter & Interrupt PCIe Card**

**ADVANTECH**

*Enabling an Intelligent Planet*

---

## Copyright

The documentation and the software included with this product are copyrighted 2020 by Advantech Co., Ltd. All rights are reserved. Advantech Co., Ltd. reserves the right to make improvements to 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. The 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 that 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 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 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 will be billed according to the cost of replacement materials, service time, and freight. Please consult your dealer for more details.

If you believe 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 clearly on the outside of the package. Then ship the package prepaid to your dealer.

# Declaration of Conformity

## 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 damage due to electrostatic discharge (ESD) or EMI leakage, we strongly recommend the use of CE-compliant industrial enclosure products.

# Technical Support and Assistance

1. Visit the Advantech website at [www.advantech.com/support](http://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

# Warnings, Cautions, and Notes

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



**Caution!** *Cautions are included to prevent hardware damage and data losses. For example,*



*“Batteries are a risk of exploding if 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.”*

**Note!** *Notes provide additional optional information.*



---

## Safety Instructions

1. Read these safety instructions carefully.
2. Retain this user manual for future reference.
3. Disconnect the equipment from all power outlets before cleaning. Use only a damp cloth for cleaning. Do not use liquid or spray detergents.
4. For pluggable equipment, the power outlet socket must be located near the equipment and easily accessible.
5. Protect the equipment from humidity.
6. Place the equipment on a reliable surface during installation. Dropping 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. Ensure that the voltage of the power source is correct before connecting the equipment to a power outlet.
9. Position the power cord away from high-traffic areas. 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 from transient overvoltage.
12. Never pour 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 occurs, have the equipment checked by service personnel:
  - The power cord or plug is damaged
  - Liquid has penetrated the equipment
  - The equipment has been exposed to moisture
  - The equipment is malfunctioning or does not operate according to the user manual.
  - The equipment has been dropped and damaged.
  - The equipment shows obvious signs of breakage.
15. Do not leave this equipment in an environment with a storage temperature of below -20 °C (-4 °F) or above 60 °C (140 °F) as this may cause damage. The equipment should be kept in a controlled environment.
16. **CAUTION:** Batteries are at risk of exploding if incorrectly replaced. Replace only with the same or equivalent type recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.
17. In accordance with IEC 704-1:1982 specifications, the sound pressure level at the operator's position does not exceed 70 dB (A).

**DISCLAIMER:** These instructions are provided according to IEC 704-1 standards. Advantech disclaims all responsibility for the accuracy of any statements contained herein.

# 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 .....	4
1.6	Accessories.....	4
<b>Chapter 2</b>	<b>Installation</b> .....	<b>5</b>
2.1	Unpacking .....	6
2.2	Switch and Jumper Settings.....	6
	Figure 2.1 Card Connector, Jumper, and Switch Locations .....	6
	Table 2.1: Summary of Jumper Settings .....	7
	Table 2.2: Board ID Settings (SW1) .....	7
2.3	Pin Assignments .....	8
	Figure 2.2 I/O Connector Pin Assignments for PCIE-1763.....	9
<b>Chapter 3</b>	<b>Signal Connections</b> .....	<b>11</b>
3.1	Overview .....	12
3.2	Isolated Digital Input Connections.....	12
	Figure 3.1 Isolated Digital Input Connections .....	12
3.3	Relay Connections .....	13
	Figure 3.2 PCIE-1763AH Relay Output Connections .....	13
	Figure 3.3 PCIE-1763DH Relay Output Connections.....	13
<b>Appendix A</b>	<b>Specifications</b> .....	<b>15</b>
A.1	Isolated Digital Inputs.....	16
A.2	Digital Filter Time .....	16
A.3	Relay Outputs .....	16
A.4	General Specifications .....	17
<b>Appendix B</b>	<b>Block Diagram</b> .....	<b>19</b>
B.1	Block Diagram.....	20



# Chapter 1

Overview

## 1.1 Introduction

The PCIE-1763AH provides 16 solid-state relay (SSR) outputs and 16 isolated digital inputs. The SSRs are classified to semiconductor relays which do not have moving contact and differ from the conventional electro-mechanical relays in many ways. They are superior to electro-mechanical relays in longer lifetime, higher operating speed, less contact problems such as arcs, bounce, and noise. In addition, the zero-crossing (synchronous) trigger effectively reduces inrushing current and electrical noise during SSR turn on. Therefore, they are most suitable for applications which need conducting high voltage ( $> 80$  VAC) AC loads and frequent ON/OFF switching. The PCIE-1763DH provides 16 photoMOS relay outputs and 16 isolated digital inputs. The photoMOS relays are classified to semiconductor relays which do not have moving contact and differ from the conventional electro-mechanical relays in many ways. They are superior to electro-mechanical relays in longer lifetime, higher operating speed, less contact problems such as arcs, bounce, noise, and smaller size. Therefore, they are most suitable for applications which need conducting DC low voltage load ( $< 60$  V) and frequent ON/OFF switching. The isolated digital inputs accept both dry and wet contact configurations. All channels have interrupt capability and are equipped with programmable duration noise filters.

## 1.2 Features

- 16-ch solid-state relay (SSR) output with longer lifetime and higher operating speed compared to electro-mechanical relays.
- Zero-crossing (synchronous) trigger for reduced inrushing current and electrical noise.
- 16-ch photoMOS relay outputs with longer lifetime and higher operating speed compared to electro-mechanical relays.
- Much less contact problems such as arcs, bounce, and noise.
- Suitable for both AC and DC applications with frequent ON/OFF switching.
- LEDs for output state indication.
- 16-ch isolated digital input (IDI) with wet contact configurations.
- Interrupt capability for all IDI channels.
- Programmable duration noise filter for all IDI channels.

Advantech PCIE-1763 card also offers the following main features:

### Robust Protection

The PCIE-1763's digital input channels feature robust isolation protection for industrial, laboratory, and machine automation applications. The card is compatible with voltages of up to  $2,500 V_{DC}$ , protecting the host system from accidental damage. If connected to an external input source with surge protection, PCIE-1763 can offer up to a maximum of  $2,000 V_{DC}$  electrostatic discharge (ESD) protection. Even under an input voltage of  $70 V_{DC}$ , the PCIE-1763 card will still function correctly, but only for short periods of time.

### Wide Input Range

The PCIE-1763 supports a wide input voltage range of 10 to  $30 V_{DC}$  and is suitable for most industrial applications with  $12 V_{DC}$  and  $24 V_{DC}$  input voltage.



### Board ID

The PCIE-1763 features a built-in DIP switch for defining the ID of each card. This is particularly useful for when multiple PCIE-1763 cards are installed on the same PC chassis. With the Board ID function, users can easily identify and access each card during hardware configuration and software programming operations.

### Reset Protection for Industrial Applications

When the system has undergone a hot reset, the PCIE-1763 card can either retain the output values for each channel or return to the default open configuration depending on the on-board jumper settings. This protects the system from malfunctioning during unexpected system resets.

### Plug-and-Play Function

The PCIE-1763 is a plug-and-play device that fully complies with the PCIE Specification, Rev 2.2. During card installation, there is no need to set jumpers or DIP switches. Instead, all bus-related settings, such as base I/O address and interrupt functions are automatically configured through plug-and-play technology.

## 1.3 Applications

- Industrial On/Off control
- Switch status sensing
- Digital I/O control
- Industrial and laboratory automation
- SMT/PCB machinery
- Semi-conductor machinery
- PC-based industrial machinery
- Testing and measurement
- Laboratory and education
- External relay driving

## 1.4 Installation Guide

Before installing the PCIE-1763 card, please ensure that you have the following necessary components:

- PCIE-1763 card
- PCIE-1763 user manual
- Driver software - Advantech DLL drivers (can be downloaded from the Advantech product page)
- Wiring cable - PCL-10162 (optional)
- Wiring board - ADAM-3962 (optional)
- PC or workstation with a PCI Express slot
- Application software - DAQ Navi, LabView, or other third-party software

After confirming that you have all the necessary components and any accessories for enhanced operation, you can begin PCIE-1763 card installation procedures.

---

## 1.5 Software Overview

Advantech offers multiple DLL drivers, third-party driver support, and application software to help customers maximize performance of the PCIE-1763 card.

- Device drivers (can be downloaded from the Advantech product page)
- LabVIEW driver
- Advantech DAQNav

### Programming DAQ Cards

Advantech's application software, such as the Advantech device drivers, can be used with the PCIE-1763 card. Advanced users can also conduct registry-level programming, although this is not recommended due to its laborious and time-consuming nature.

### DAQNav Software

Advantech DAQNav software includes device drivers and a software development kit (SDK) that features a comprehensive I/O function library to enhance application performance. This software comes with all Advantech DAC cards and can be downloaded free of charge from the Advantech website. Advantech DAQNav software for Windows 7/8/10 (desktop mode) works seamlessly with development tools such as Visual Studio .Net, Visual C++, Visual Basic, and Borland Delphi.

## 1.6 Accessories

Advantech offers a complete set of accessories for PCIE-1763 cards. These accessories include

### Wiring Cable

The PCL-10162 shielded cable is designed for PCIE-1763 cards to provide high noise resistance. To enhance signal quality, the signal wires are twisted into a "twisted-pair cable", reducing cross-talk and noise from other signal sources. Furthermore, the analog and digital lines are separately sheathed and shielded to avoid EMI/EMC problems. Advantech provides 1 m and 3 m cables to satisfy various usage requirements.

### Wiring Board

The ADAM-3962 is a D-Sub 62-pin wiring terminal module for DIN-rail mounting. This terminal module can be connected to PCIE-1763 cards for reliable access to individual pin connections.

# Chapter 2

Installation

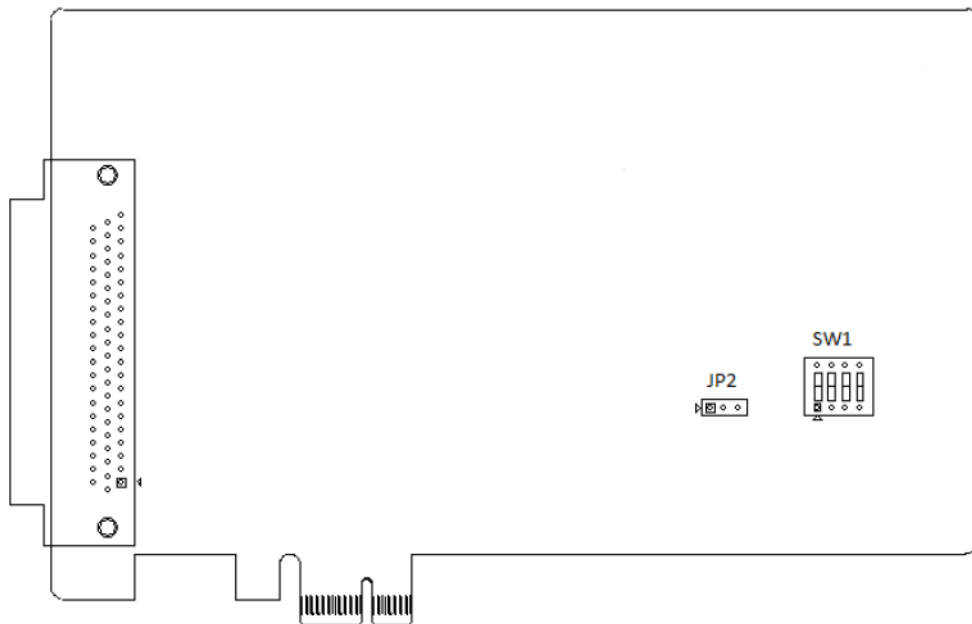
## 2.1 Unpacking

After receiving your PCIE-1763 product, please inspect the contents to ensure that the following items have been included:

- 1 x PCIE-1763 card
- 1 x PCIE-1763 user manual

## 2.2 Switch and Jumper Settings

The PCIE-1763 card is equipped with one function switch and one jumper settings. Information regarding how to configure the card is provided below. Additionally, Figure 2.1 shows the connector, jumper, switch locations to enable users to identify card components.



**Figure 2.1 Card Connector, Jumper, and Switch Locations**


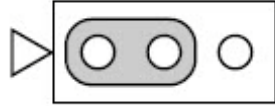
## Setting the Time to Reset Relay Outputs

Certain users may want the ability to clear each relay output when the system issues a reset signal on the PCIE bus, or to clear relays as part of the system power-on process. The PCIE-1763 card satisfies both these needs with the provision of jumper JP2.

Depending on the application, this capability may allow relay outputs to be set as “OFF” without a complete shutdown of processes controlled by the card.

A complete loss of power to the chip will clear the chip memory. Therefore, regardless of how JP2 is configured, if the power to the PCIE-1763 card is disconnected, the relay initial power-on state will be “OFF” (NC or NO, depending on the user’s settings).

**Table 2.1: Summary of Jumper Settings**

Names of Jumpers	Function Description
JP2	 <p>Do not retain the last status after hot reset (default)</p>
	 <p>Retain the last status after hot reset</p>

## Board ID (SW1)

The PCIE-1763 card features 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 by its device number. The default Board ID value is 0. If you need to adjust it to another value, please refer to Table 2.2 for setting SW1.

**Table 2.2: Board ID Settings (SW1)**

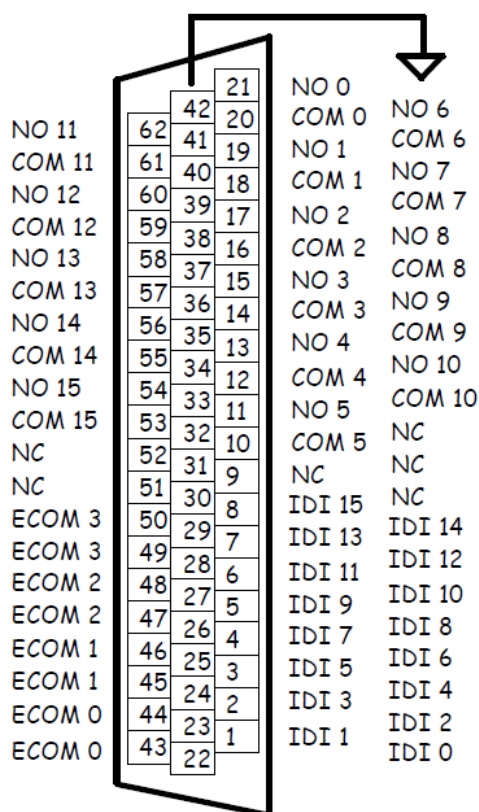
SW1	Position 1	Position 2	Position 3	Position 4
Board ID	ID3	ID2	ID1	ID0
0	ON	ON	ON	ON
1	ON	ON	ON	OFF
2	ON	ON	OFF	ON
3	ON	ON	OFF	OFF
4	ON	OFF	ON	ON
5	ON	OFF	ON	OFF
6	ON	OFF	OFF	ON
7	ON	OFF	OFF	OFF
8	OFF	ON	ON	ON
9	OFF	ON	ON	OFF
10	OFF	ON	OFF	ON
11	OFF	ON	OFF	OFF
12	OFF	OFF	ON	ON
13	OFF	OFF	ON	OFF
14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

\*The default setting is 0

## 2.3 Pin Assignments

Pin Name	Type	Pin#	Description
<b>Isolated Digital Input</b>			
IDI0	I	22	Isolated Digital Input Channel 0 of Group 0
IDI1	I	1	Isolated Digital Input Channel 1 of Group 0
IDI2	I	23	Isolated Digital Input Channel 2 of Group 0
IDI3	I	2	Isolated Digital Input Channel 3 of Group 0
IDI4	I	24	Isolated Digital Input Channel 4 of Group 1
IDI5	I	3	Isolated Digital Input Channel 5 of Group 1
IDI6	I	25	Isolated Digital Input Channel 6 of Group 1
IDI7	I	4	Isolated Digital Input Channel 7 of Group 1
IDI8	I	26	Isolated Digital Input Channel 8 of Group 2
IDI9	I	5	Isolated Digital Input Channel 9 of Group 2
IDI10	I	27	Isolated Digital Input Channel 10 of Group 2
IDI11	I	6	Isolated Digital Input Channel 11 of Group 2
IDI12	I	28	Isolated Digital Input Channel 12 of Group 3
IDI13	I	7	Isolated Digital Input Channel 13 of Group 3
IDI14	I	29	Isolated Digital Input Channel 14 of Group 3
IDI15	I	8	Isolated Digital Input Channel 15 of Group 3
ECOM0	I	43,44	External Common Input of Group 0
ECOM1	I	45,46	External Common Input of Group 1
ECOM2	I	47,48	External Common Input of Group 2
ECOM3	I	49,50	External Common Input of Group 3
<b>Relay Output</b>			
NO 0	O	21	Normally Open pin of relay output 0
COM 0	O	20	Common pin of relay output 0
NO 1	O	19	Normally Open pin of relay output 1
COM 1	O	18	Common pin of relay output 1
NO 2	O	17	Normally Open pin of relay output 2
COM 2	O	16	Common pin of relay output 2
NO 3	O	15	Normally Open pin of relay output 3
COM 3	O	14	Common pin of relay output 3
NO 4	O	13	Normally Open pin of relay output 4
COM 4	O	12	Common pin of relay output 4
NO 5	O	11	Normally Open pin of relay output 5
COM 5	O	10	Common pin of relay output 5
NO 6	O	42	Normally Open pin of relay output 6
COM 6	O	41	Common pin of relay output 6
NO 7	O	40	Normally Open pin of relay output 7
COM 7	O	39	Common pin of relay output 7
NO 8	O	38	Normally Open pin of relay output 8
COM 8	O	37	Common pin of relay output 8
NO 9	O	36	Normally Open pin of relay output 9
COM 9	O	35	Common pin of relay output 9
NO 10	O	34	Normally Open pin of relay output 10

COM 10	O	33	Common pin of relay output 10
NO 11	O	62	Normally Open pin of relay output 11
COM 11	O	61	Common pin of relay output 11
NO 12	O	60	Normally Open pin of relay output 12
COM 12	O	59	Common pin of relay output 12
NO 13	O	58	Normally Open pin of relay output 13
COM 13	O	57	Common pin of relay output 13
NO 14	O	56	Normally Open pin of relay output 14
COM 14	O	55	Common pin of relay output 14
NO 15	O	54	Normally Open pin of relay output 15
COM 15	O	53	Common pin of relay output 15
<b>Other</b>			
NC	-	9,30,31, 32,51,52	No Connection



**Figure 2.2 I/O Connector Pin Assignments for PCIE-1763**





# Chapter 3

## Signal Connections

## 3.1 Overview

Maintaining signal connections is one of the most important factors for ensuring an application/system is sending and receiving data correctly. Good signal connections can avoid unnecessary and costly damage to your PC and other hardware devices. This chapter explains how to connect input and output signals to the PCIE-1763 card via the I/O connector.

## 3.2 Isolated Digital Input Connections

The PCIE-1763 card features 16 isolated digital input channels designated IDI0 ~ IDI15. Each isolated digital input channel accepts 10 ~ 30 V<sub>DC</sub> voltage and bi-directional input. This means users can apply positive or negative voltage to an isolated input pin ( $V_{in}$ ). The figure below shows how to connect an external input source to one of the card's isolated input channels.

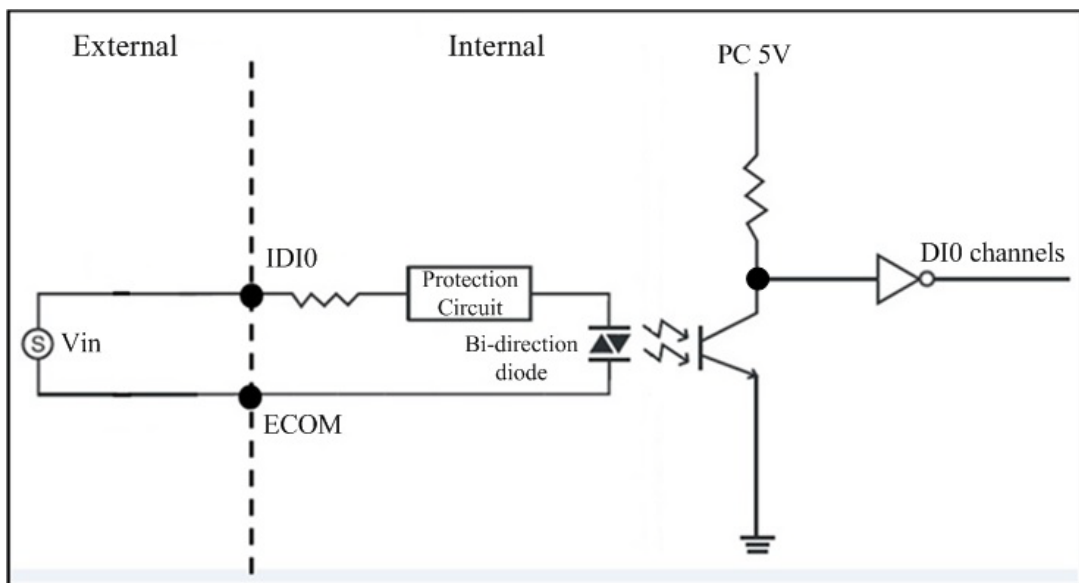


Figure 3.1 Isolated Digital Input Connections

### 3.3 Relay Connections

After power on, the initial relay output status of the PCIE-1763 card should be as shown in Figure 3.2 and 3.3 below

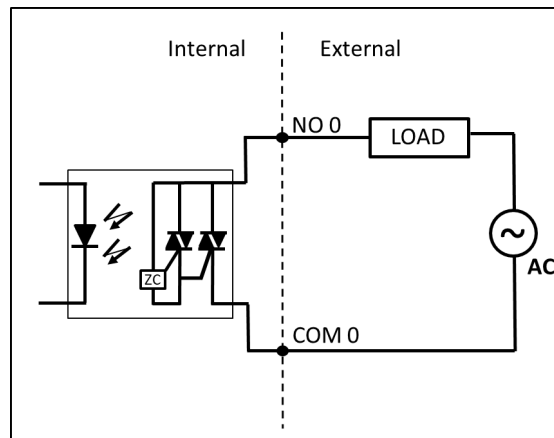


Figure 3.2 PCIE-1763AH Relay Output Connections

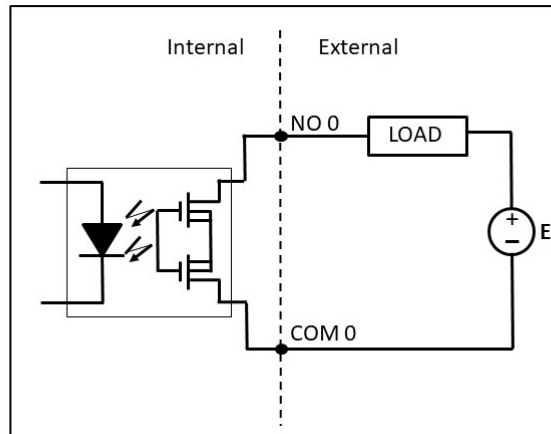


Figure 3.3 PCIE-1763DH Relay Output Connections



# Appendix **A**

## Specifications

## A.1 Isolated Digital Inputs

Channels	16
Isolation protection	2500 V <sub>DC</sub>
Interrupt channels	16 (IDI0 ~ IDI15)
Optical isolator response time	50 μs typ./100 μs max.
Over voltage protection	70 V <sub>DC</sub>
Input resistance	2.7 KΩ@ 1W
Input voltage	Logic 0: 3 V max.(0 V min.) Logic 1: 10 V min. (30 V max.)
Input Current	4.1 mA @ 12 V <sub>DC</sub> 7.7 mA @ 24 V <sub>DC</sub>

## A.2 Digital Filter Time

**Digital Filter Time [sec.] = 2n/(8 x 10<sup>6</sup>) n = setting data (0 ~ 20)**

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

## A.3 Relay Outputs

**Solid-State Relay Output (PICE-1763AH)**

Channels	16
Relay type	Solid-state relay SPST (form A)
Load voltage	400 V max. (AC rms)
Load current	1 Arms max.
Peak load current	12 A (1 cycle @ 60 Hz)
On-state voltage drop	2.5 V max.
Off-state leakage current	100 μA max.
Critical rate of rise of off-state voltage	200 V/μs min.
Holding current	25 mA max.
Zero crossing voltage	50 V max.
Operate time	1/2 cycle of load power source + 100 μs max.
Release time	
Isolation protection	2,500 Vrms

**PhotoMOS Relay Output (PCIE-1763DH)**

Channels	16
Relay type	PhotoMOS SPST (form A)
Load voltage	60 V <sub>DC</sub> max.
Load current	1.2 A max.
Turn-On time	1.0 ms typ.
Turn-Off time	0.6 ms typ.
Isolation protection	1,500 V <sub>DC</sub> max.

**A.4 General Specifications**

I/O Connector Type	62-pin D-type female	
Dimensions	167.7 x 100 mm (6.6 x 3.9 in)	
Power Consumption	+3.3 V @ 300 mA (typical) +3.3 V @ 500 mA (max.)	
Temperature	Operating	0 ~ 60 °C (32 ~ 140 °F)
	Storage	-20 ~ 70 °C (-4 ~ 158 °F)
Relative Humidity	10 - 95% RH non-condensing	
Certifications	CE/FCC	

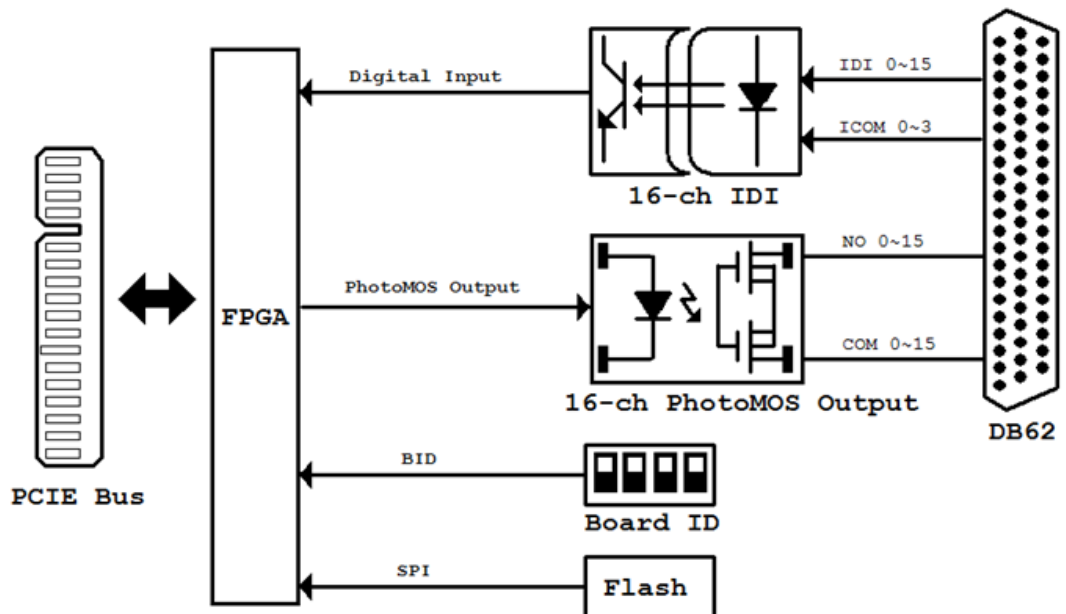
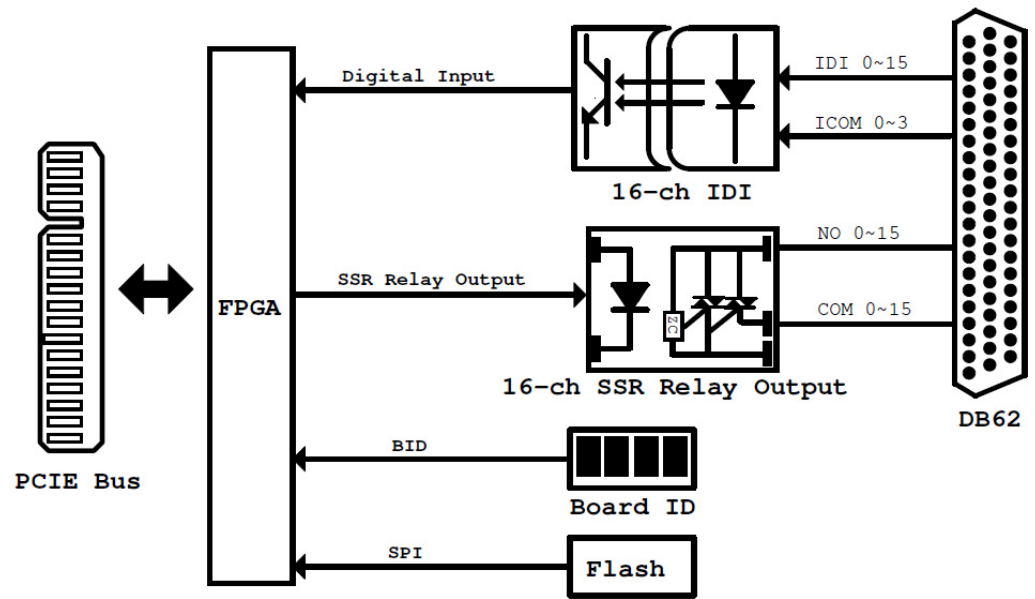




# Appendix **B**

## Block Diagram

## B.1 Block Diagram





## [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, such as electronically, by photocopying, recording, or otherwise, without prior written permission from the publisher.

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

© Advantech Co., Ltd. 2020