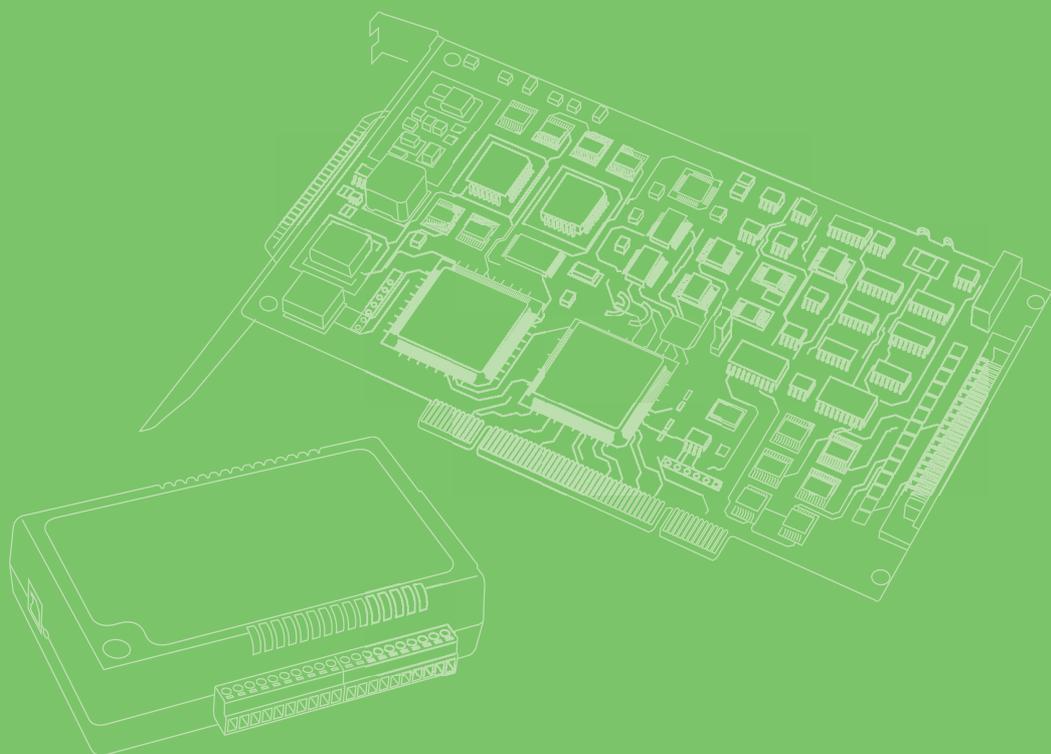


User Manual



PCIE-1761H

**8-Channel Relay and 8-Channel
Isolated Digital Input PCI
Express 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 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 received 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 damaged caused by 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 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

Warnings, Cautions and Notes

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



Caution! *Cautions are included to help avoid hardware damage or data losses. For example,*



“Batteries are at 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.*



Document Feedback

To assist us in improving this manual, we welcome all comments and constructive criticism. Please send all feedback in writing to support@advantech.com.

Safety Instructions

1. Read these safety instructions carefully.
2. Retain this user manual for future reference.
3. Disconnect the equipment from all AC 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 the equipment 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 the 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 or damaged
 - The equipment shows obvious signs of breakage
15. Do not leave the equipment in an environment where the storage temperature fluctuates below $-20\text{ }^{\circ}\text{C}$ ($-4\text{ }^{\circ}\text{F}$) or above $60\text{ }^{\circ}\text{C}$ ($140\text{ }^{\circ}\text{F}$) as this may cause damage. The equipment should be kept in a controlled environment.
16. Batteries are at risk of exploding if incorrectly replaced. Replace only with the same or an equivalent type as recommended by the manufacturer. Discard used batteries according to the manufacturer's instructions.
17. In accordance with the IEC 704-1:1982 standards, the sound pressure level at the operator's position does not exceed 70 dB (A).

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

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Chapter 1

Overview

1.1 Introduction

Advantech's PCIE-1761H is an 8-channel relay actuator and 8-channel isolated digital input card for PCIE bus. Built with 8 on-board SPDT relays, PCIE-1761H is ideal for applications such as device ON/OFF control and power switching. Moreover, to ensure easy monitoring, each relay is equipped with a red LED to show its ON/OFF status.

The PCIE-1761H's 8 optically-isolated digital input channels are ideal for operation in environments with noise or floating potentials. The following sections of this chapter provide further information regarding the PCIE-1761H card features, installation procedures, software, and accessories.

1.2 Features

- 8 x relay output channels and 8 x isolated digital input channels
- LED indicators that show activated relays
- 4 x Form A-type and 4 x Form C-type relay output channels
- Output status read-back
- Retains relay output values when hot system reset
- High-voltage isolation on input channels (2500 V_{DC})
- High ESD protection (2,000 V_{DC})
- High over-voltage protection (70 V_{DC})
- Wide input range (10 ~ 30 V_{DC})
- Interrupt handling capability for IDI channels
- Board ID

Advantech's PCIE-1761H offers the following main features:

Robust Protection

The PCIE-1761H digital input channels feature robust isolation protection for industrial, laboratory, and machinery automation applications. The card can durably withstand voltages of up to 2500 V_{DC}, protecting the host system from incidental harm. If connected to an external input source with surge protection, PCIE-1761H can offer up to a maximum of 2,000 V_{DC} ESD protection. Even with an input voltage of 70 V_{DC}, the PCIE-1761H card can operate properly, albeit only for short period of time.

Wide Input Voltage Range

PCIE-1761H features a wide input voltage range of 10 ~ 30 V_{DC}, making it suitable for most industrial applications that require a 12 V_{DC} and 24 V_{DC} input voltage.

Reset Protection Fulfills Requirement for Industrial Applications

When the system has undergone a hot reset (i.e., without turning off the system power), the PCIE-1761H card can either retain the output values of each channel or return to the open default configuration depending on its onboard jumper settings. This function protects the system from malfunctioning during unexpected system resets.

Plug-and-Play Functionality

PCIE-1761H is a plug-and-play device that complies with the PCIE specifications, Rev. 2.0. 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 completed by the plug-and-play function.

Board ID

The PCIE-1761H has a built-in DIP switch that helps define each card's ID when multiple PCIE-1761H cards are installed on the same PC chassis. The board ID setting function is very useful when users build their system with multiple PCIE-1761H cards. With correct Board ID settings, users can easily identify and access each card during hardware configuration and software programming.

1.3 Applications

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

1.4 Installation Guide

Before installing the PCIE-1761H card, please ensure you have the following necessary components:

- PCIE-1761H card
- PCIE-1761H startup manual
- Driver software - Advantech DAQNav software (can be downloaded from the Advantech product page)
- Wiring cable - PCL-10137 (optional)
- Wiring board - ADAM-3937 (optional)
- PC or workstation with a PCI Express slot
- Optional components for enhanced operation
 - Advantech DAQ tools, LabView or other 3rd-party software

After ensuring all the components are present, including some of the accessories for enhanced operation, you can begin the PCIE-1761H installation procedures.

1.5 Software Overview

Advantech offers multiple DLL drivers, third-party driver support, and application software to assist customers with fully exploiting the functions of the PCIE-1761H card:

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

Regarding programming options for DAQ cards, customers can use Advantech's application software, such as the Advantech DLL driver. Although not recommended due to its laborious and time-consuming nature, advanced users are allowed another option for register-level programming.

DLL Driver

Advantech's DLL drivers software comes with all Advantech DAQ cards and can be downloaded from the Advantech website free of charge. Additionally, the DLL driver features a complete I/O function library for boosting application performance. The Advantech DLL driver for Windows 7/8/10 functions seamlessly with multiple development tools, including Visual C++, Visual Basic, and Visual Studio.Net

Register-Level Programming

Register-level programming is reserved for experienced programmers wanting to write code directly at the device register level. Because register-level programming necessitates substantial time and effort, we recommend using Advantech's DLL driver software instead.

1.6 Accessories

Advantech offers a comprehensive range of accessories to support the PCIE-1761H card. These accessories include the following:

Wiring Cable

The PCL-10137 shielded cable is especially designed to provide high resistance to noise for PCIE-1761H cards. To achieve superior signal quality, the signal wires are twisted to form 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 neutralize EMI/EMC problems.

Wiring Boards

The ADAM-3937 is a 37-pin D-type wiring terminal module for DIN-rail mounting. This terminal module can be connected to Advantech PC-Lab cards and allow easy yet reliable access to individual pin connections for the PCIE-1761H card.

Chapter 2

Installation

2.1 Unpacking

After receiving your PCIE-1761H card, inspect the contents before installation. The package should contain the following items:

- 1 x PCIE-1761H card
- 1 x PCIE-1781 startup manual

2.2 Switch and Jumper Settings

The PCIE-1761H card has a single function switch setting.

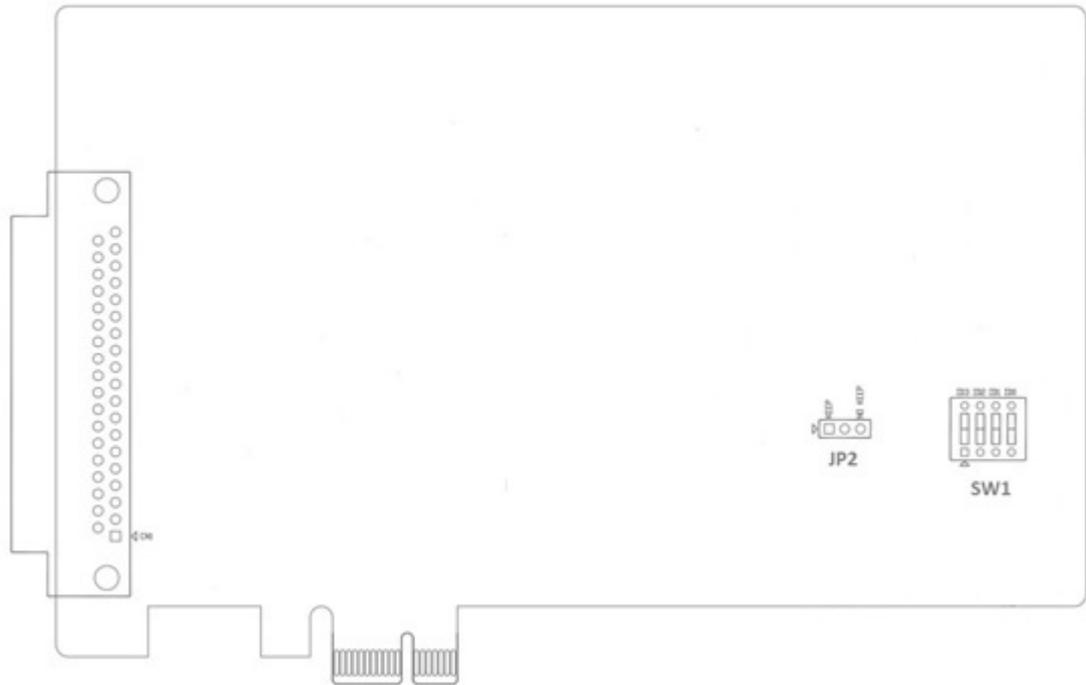
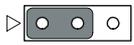


Figure 2.1 Card Connector, Jumper, and Switch Locations

Table 2.1: Summary of Jumper Settings

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

Setting the Time to Reset the Relay Outputs

Users may want the ability to clear each relay output when the system (or PC) issues a reset signal on the PCIE bus, or to clear relays only as part of a system bootup. The PCIE-1761H card satisfies both of these needs with the provision of jumper JP2. Depending on the application, this may allow relay outputs to be configured as “OFF” without requiring a complete shutdown of card-controlled processes.

Board ID (SW1)

The PCIE-1761H card features a built-in DIP switch (SW1) that is used to define the Board ID for each card. When multiple cards are installed on the same chassis, the Board ID switch is useful for identifying each card's device number. After installing PCIE-1761H cards, users can identify each card using their different device numbers. The default Board ID value is 0. When adjusting the Board ID value, refer to Table 2.2 to configure SW1.

Table 2.2: Board ID Settings (SW1)

Board ID (dec)	Switch Position			
	1 (ID3)	2 (ID2)	3 (ID1)	4 (ID0)
* = default				
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

Note: On: 0, Off: 1

2.3 I/O Connectors

Pin Assignments

The pin assignments for the 37-pin I/O connector on the PCIE-1761H card are shown in Figure 2.2.

Description of Pin Use

IDInA* ($n = 0 \sim 7$):

Isolated digital input A

IDInB* ($n = 0 \sim 7$):

Isolated digital input B

NO n ($n = 0 \sim 7$):

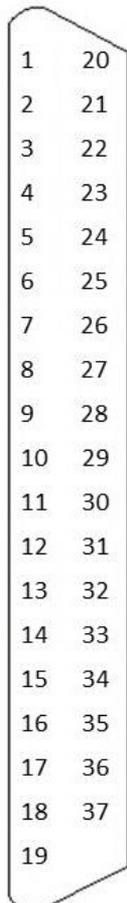
Normally Open pin of relay output

NC n ($n = 0 \sim 3$):

Normally Closed pin of relay output

COM n ($n = 0 \sim 7$):

Common pin of relay output



NO0	1	20	NO3
COM0	2	21	COM3
NC0	3	22	NC3
NO1	4	23	NO4
COM1	5	24	COM4
NC1	6	25	NO5
NO2	7	26	COM5
COM2	8	27	NO6
NC2	9	28	COM6
NO7	10	29	N/A
COM7	11	30	IDI 0B
IDI 0A	12	31	IDI 1B
IDI 1A	13	32	IDI 2B
IDI 2A	14	33	IDI 3B
IDI 3A	15	34	IDI 4B
IDI 4A	16	35	IDI 5B
IDI 5A	17	36	IDI 6B
IDI 6A	18	37	IDI 7B
IDI 7A	19		

Figure 2.2 I/O Connector Pin Assignments

2.4 Device and Configuration

The Advantech Device Manager program is a utility for setting up, configuring, and testing the device. After which, the device settings are stored on the system registry and used when Advantech device driver APIs are employed.

Setting Up the Device

1. To install the I/O device for the PCIE-1761H card, run the Advantech Device Manager program (accessible via Start/Programs/Advantech Automation/Device Manager/Advantech Device Manager).
2. Users can then view the device(s) already installed on the system (if any) via the installed devices list. If the software and hardware installation are complete, you should see the PCIE-1761H card included on the installed devices list.

Configuring the Device

3. Click the Setup button to configure the device. On the Device Setting menu, users can configure the IDI0 ~ IDI7 Interrupt trigger mode either as Rising Edge or Falling Edge.

For further information, please refer to the DAQNav SDK manual or the user manual in the Advantech Navigator.

Chapter 3

Signal Connections

3.1 Overview

Maintaining signal connections is one of the most important factors for ensuring the application system is sending and receiving data correctly. A good signal connection can prevent 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-1761H via the I/O connector.

3.2 Isolated Digital Input Connections

The PCIE-1761H features 8 isolated digital input channels designated IDI0 ~ IDI7. Each isolated digital input channel accepts 10 ~ 30 V_{DC} voltage and bi-directional inputs. This means a positive or negative voltage can be applied 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.

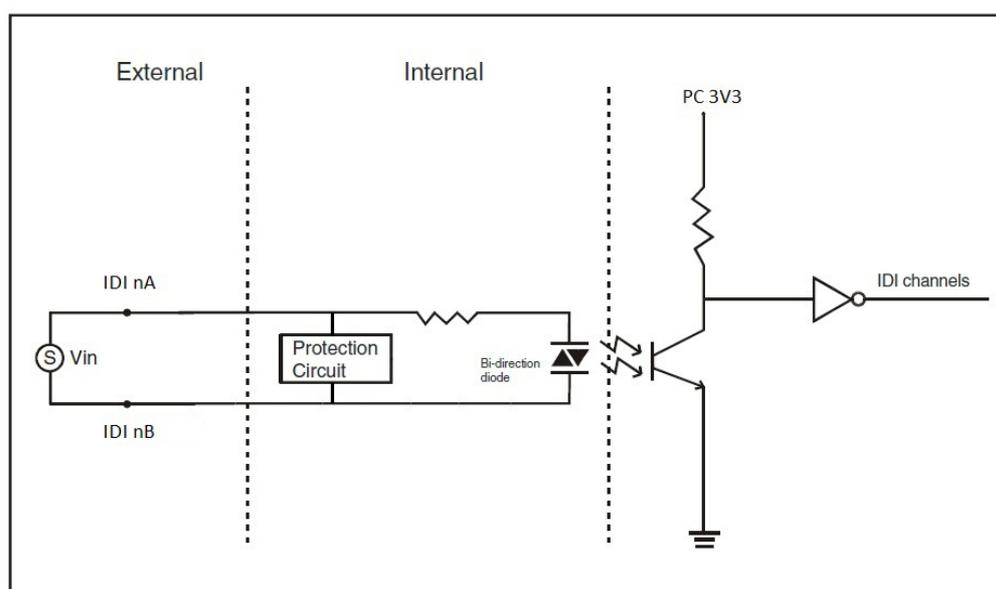


Figure 3.1 Isolated Digital Input Connections

3.3 Relay Connections

After power on, the initial relay output status of the PCIE-1761H card should be as shown below.

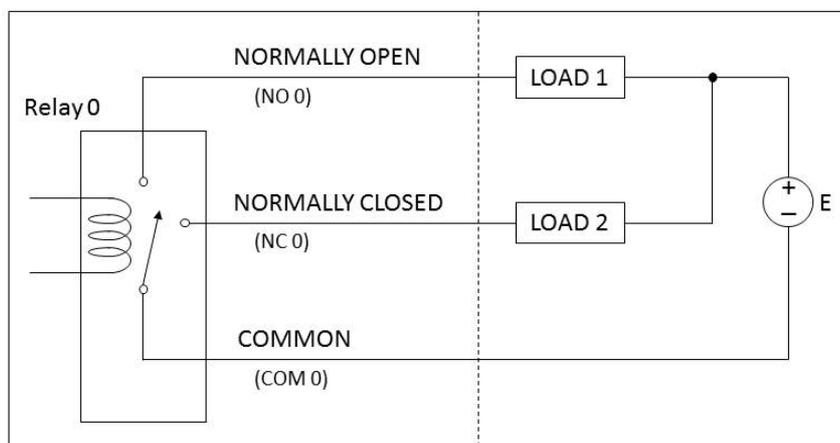


Figure 3.2 Relay Output Connection

Appendix **A**

Specifications

A.1 Isolated Digital Input

Number of Input Channels	8
Interrupt Inputs	8 (IDI0~IDI7)
Optical Isolation	2500 V _{DC}
Optical Isolator Response Time	100 us
Over-Voltage Protection	70 V _{DC}
Input Resistance	2.7KΩ @1W
Input Voltage	VIH (max.) = 30 V _{DC} VIH (min.) = 10 V _{DC} VIL (max.) = 3 V _{DC}
Input Current	4.1 mA @12 V _{DC} 7.7 mA @24 V _{DC}

A.2 Digital Filter Time

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 Relay Output

Number of Output Channels	8
Relay Type	4 x Form C, 4 x Form A
Contact Rating	2A@250 V _{AC} , 2A@30 V _{DC}
Max. Switching Power	500 VA, 60W
Max. Switching Voltage	400 V _{AC} , 30 V _{DC}
Contact Resistance	100mΩ max.
Breakdown Voltage	Between coil and contacts 5000 V _{AC} Between open and contacts 1000 V _{AC}
Operating Time	7ms typical
Release Time	2ms typical
Life Expectancy	30 x 10 ⁶ cycles @2A/250 V _{AC}

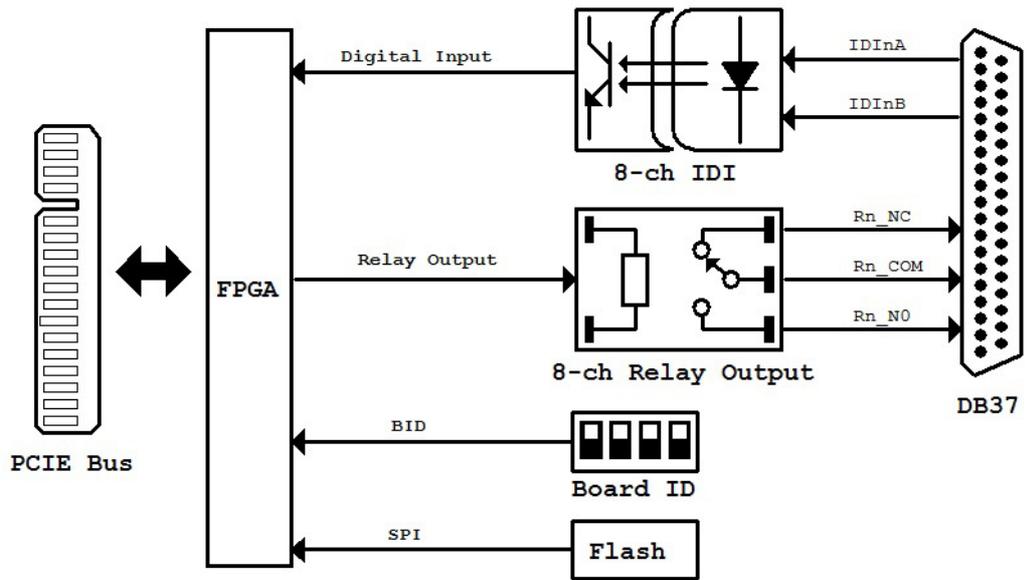
A.4 General Specifications

I/O Connector Type	37-pin D-type female
Dimensions	168 x 100 mm (6.6 x 3.9 in)
Power Consumption	+3.3V @ 250 mA (typical) +3.3V @ 1600mA (max.)
Temperature	Operating: 0 ~ 60 °C (32 ~ 140 °F) Storage: -40 ~ 70 °C (-40 ~158 °F)
Relative Humidity	5 - 95% RH non-condensing (refer to IEC 68-2-3)
Certifications	CE/FCC

Appendix **B**

Block Diagram

B.1 Block Diagram



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

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