

## PCIE-1762H

**16-Channel Relay and 16-  
Channel Isolated Digital Input  
PCIe 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 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.*



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## 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.

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# Chapter 1

Overview

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## 1.1 Introduction

Advantech's PCIE-1762H is a 16-channel relay actuator and 16-channel isolated digital input card for PCI bus.

The 16 onboard SPDT relays are ideal for applications such as device ON/OFF control and power switching. For easy monitoring, each relay is equipped with a single red LED that shows its ON/OFF status. Meanwhile, the 16 optically-isolated digital input channels are ideal for digital input applications in environments with noise or floating potentials.

This chapter provides detailed information about the PCIE-1762H DAS card features, including a quick start installation guide and software and accessory information.

## 1.2 Features

- 16 relay output channels and 16 isolated digital input channels
- LED indicators to show activated relays
- Jumper-selectable Form A/Form B-type relay output channels
- Output status read back
- Retains relay output values after hot system reset
- High-voltage isolation input channels (2,500 V<sub>DC</sub>)
- High ESD protection (2,000 V<sub>DC</sub>)
- High over-voltage protection (70 V<sub>DC</sub>)
- Wide power input range (10 ~ 30 V<sub>DC</sub>)
- Interrupt handling capability
- High-density DB-62 connector
- Board ID

Advantech PCIE-1762H card also offers the following main features:

### Robust Protection

The PCIE-1762H'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<sub>DC</sub>, protecting the host system from accidental damage. If connected to an external input source with surge protection, PCIE-1762H can offer up to a maximum of 2,000 V<sub>DC</sub> electrostatic discharge (ESD) protection. Even under an input voltage of 70 V<sub>DC</sub>, the PCIE-1762H card will still function correctly, but only for short period of time.

### Wide Input Range

The PCIE-1762H supports a wide input voltage range of 10 to 50 V<sub>DC</sub> and is suitable for most industrial applications with 12 V<sub>DC</sub>, 24 V<sub>DC</sub>, and 48 V<sub>DC</sub> input voltage.

### Board ID

The PCIE-1762H features a built-in DIP switch for defining the ID of each card. This is particularly useful for when multiple PCIE-1762H 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-1762H 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-1762H is a plug-and-play device that fully complies with the PCI 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 function, are automatically configured by the 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-1762H card, please ensure that you have the following necessary components:

- PCIE-1762H card
- PCIE-1762H startup manual
- Driver software - Advantech DLL drivers (included in the companion CD-ROM)
- 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 the PCIE-1762H card installation procedures.

## 1.5 Software Overview

Advantech offers multiple DLL drivers, third-party driver support, and application software to help customers maximize the performance of the PCIE-1762H card.

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

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### **Programming DAQ Cards**

Advantech's application software, such as the Advantech device drivers, can be used with the PCIE-1762H card. Advanced users can also conduct registry-level programming, although this is not recommended due to its laborious and time-consuming nature.

### **DAQNavi Software**

Advantech DAQNavi 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 DAQNavi 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-1762H cards. These accessories include

### **Wiring Cable**

The PCL-10162 shielded cable is designed for PCIE-1762H 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, 3 m, and 5 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-1762H cards for reliable access to individual pin connections.

# Chapter 2

## Installation

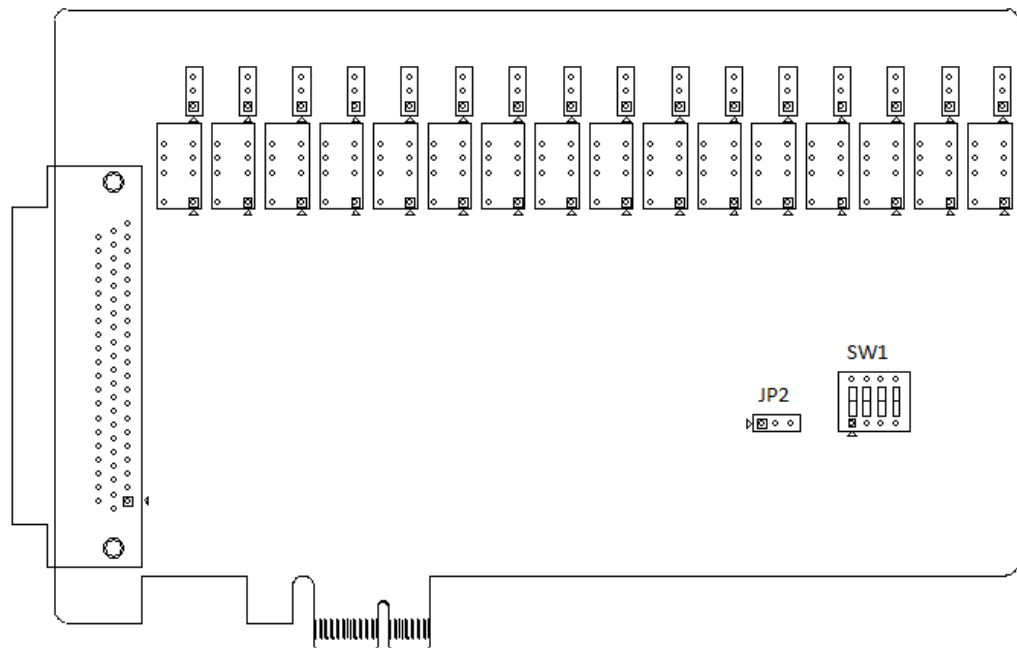
## 2.1 Unpacking

After receiving your PCIe-1762H product, please inspect the contents to ensure that the following items have been included:

- 1 x PCIe-1762H card
- 1 x PCIe-1762H startup manual

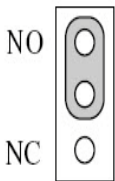
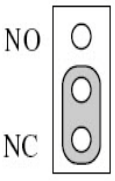

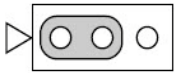
## 2.2 Switch and Jumper Settings

The PCIe-1762H card is equipped with one function switch and two 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**

**Table 2.1: Summary of Jumper Settings**

Jumper Name	Function Description
JP4 ~ 19	 Set relay output to be normally open
	 Set relay output to be normally closed
JP2	 Retain last status after hot reset
	 Default configuration

**Board ID (SW1)**

The PCIE-1762H 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

## Configuring Relay Outputs as NC/NO

The PCIE-1762H card's 16 relay outputs, K0 ~, K15, are single-pole single-throw (SPST) relays that can be set as normally open (NO) or normally close (NC) (see Table 2.3) using a jumper. The default settings for K0 ~ K15 are normally open.

**Table 2.3: Jumper Settings for Relay**

Relay Output Channel	Corresponding Jumper
K0	JP4
K1	JP5
K2	JP6
K3	JP7
K4	JP8
K5	JP9
K6	JP10
K7	JP11
K8	JP12
K9	JP13
K10	JP14
K11	JP15
K12	JP16
K13	JP17
K14	JP18
K15	JP19

## 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 PCI bus, or to clear relays as part of the system power-on process. The PCIE-1762H 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-1762H card is disconnected, the relay initial power-on state will be "OFF" (NC or NO, depending on the user's settings).

## 2.3 I/O Connectors

- IDI n (n= 0 ~ 3): Isolated digital input of Group 0
- IDI n (n= 4 ~ 7): Isolated digital input of Group 1
- IDI n (n= 8 ~ 11): Isolated digital input of Group 2
- IDI n (n= 12 ~ 15): Isolated digital input of Group 3
- ECOM0: External common input of Group 0
- ECOM1: External common input of Group 1
- ECOM2: External common input of Group 2
- ECOM3: External common input of Group 3
- NC: No connection
- RLY\_OUT n(n= 0 ~ 15): Relay output channel
- RLY\_COM n(n= 0 ~ 15): Relay output common channel

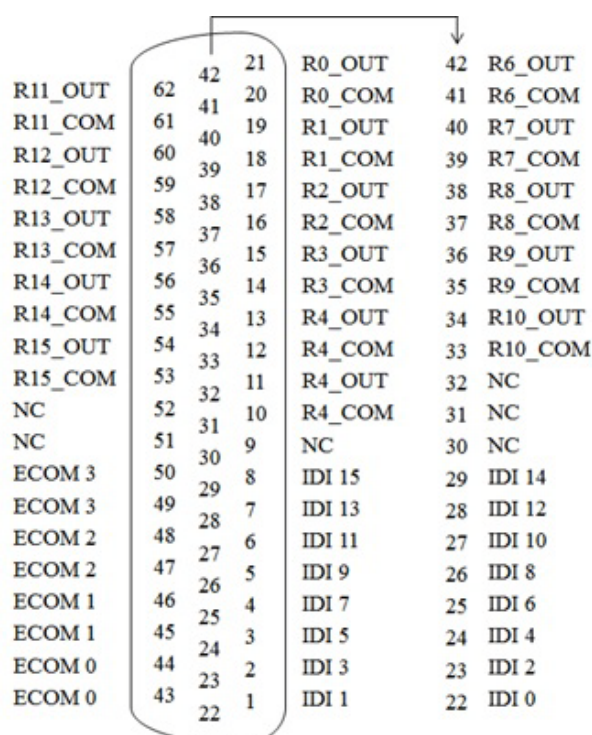


Figure 2.2 I/O Connector Pin Assignments for PCIE-1762H



# 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-1762H card via the I/O connector.

## 3.2 Isolated Digital Input Connections

The PCIe-1762H card features 16 isolated digital input channels designated IDI0 ~ IDI15. Each isolated digital input channel accepts 10 ~ 50 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.

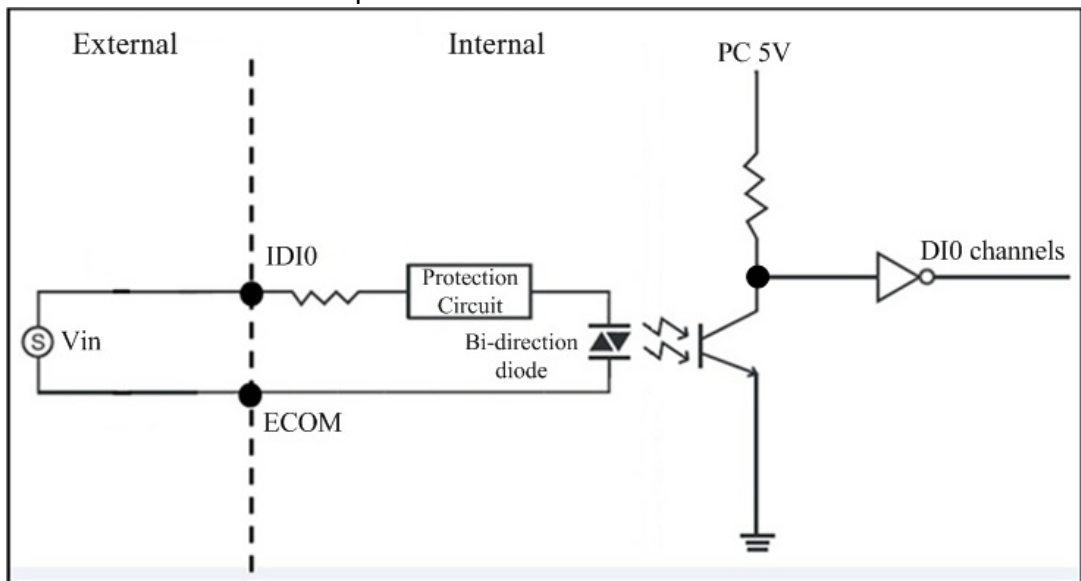
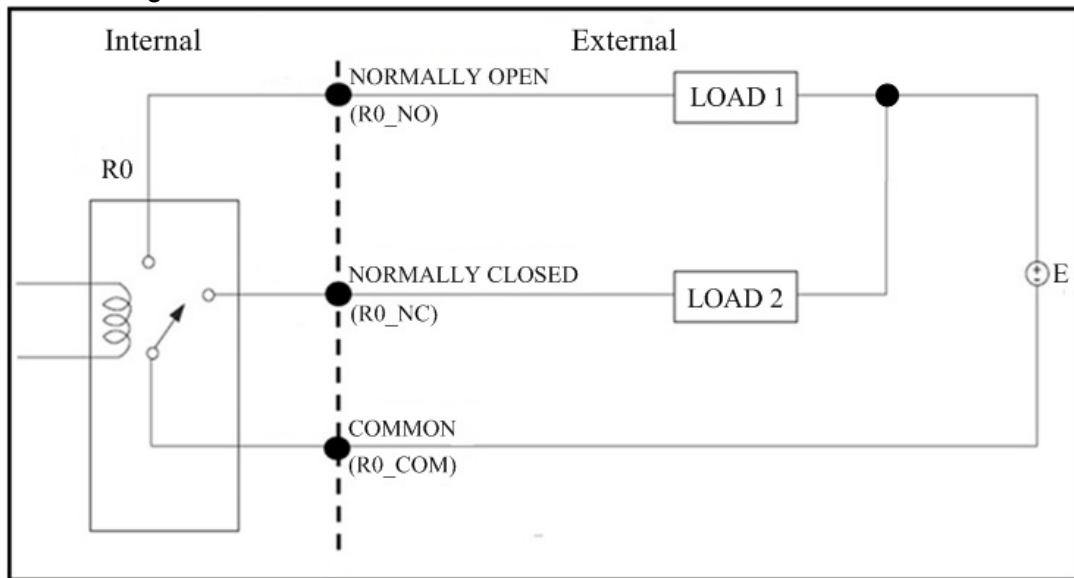


Figure 3.1 Isolated Digital Input Connections

### 3.3 Relay Connections

After power on, the initial relay output status of the PCIE-1762H card should be as shown in Figure 3.2 below.



**Figure 3.2 Relay Output Connections**

A write operation to I/O address, BASE +0, will change the output status of each relay. For example, if Bit 0 of BASE +0 is set to “1” (logic high), relay 0, K0, will switch from the “Normally Closed” position (NC0) to the “Normally Open” position (NO0). This means that LOAD2 will be de-energized, while LOAD1 is energized.

To summarize, the “Common” line connects to the “Normally Closed” line if the corresponding bit is set as 0 (power-on initial status). Otherwise, if the corresponding bit is set as 1, then the “Common” line will connect to the “Normally Open” line.



# Appendix **A**

## Specifications

## A.1 Isolated Digital Inputs

Number of Input Channels	16
Interrupt Inputs	16
Optical Isolation	2500 V <sub>DC</sub>
Optical-Isolator Response Time	100 μs
Input Resistance	5.7KΩ @1W
Over-Voltage Protection	70 V <sub>DC</sub>
Input Voltage	V <sub>IH</sub> (max.) = 30 V <sub>DC</sub>
	V <sub>IH</sub> (min.) = 10 V <sub>DC</sub>
	V <sub>IL</sub> (max.) = 3 V <sub>DC</sub>
Input Current	3.18 mA @12 V <sub>DC</sub> (typical)
	6.71 mA @24 V <sub>DC</sub> (typical)

## A.2 Digital Filter Time

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

Setting Data (n)	Digital Filter Time	Setting Data (n)	Digital Filter Time	Setting Data (n)	Digital Filter Time
0 (00h)	The filter function is not used.	7 (07h)	16 μsec	14 (0Eh)	2.048 msec
1 (01h)	0.25 μsec	8 (08h)	32 μsec	15 (0Fh)	4.096 msec
2 (02h)	0.5 μsec	9 (09h)	64 μsec	16 (10h)	8.192 msec
3 (03h)	1 μsec	10 (0Ah)	128 μsec	17 (11h)	16.384 msec
4 (04h)	2 μsec	11 (0Bh)	256 μsec	18 (12h)	32.768 msec
5 (05h)	4 μsec	12 (0Ch)	512 μsec	19 (13h)	65.536 msec
6 (06h)	8 μsec	13 (0Dh)	1.024 msec	20 (14h)	131.072 msec

## A.3 Relay Outputs

Number of Output Channels		16
Relay Type		SPDT (Form A or Form B, jumper selectable)
Contact Rating (Resistive)		0.25 A @ 250 V <sub>AC</sub> , 0.5 A @ 30 V <sub>DC</sub>
Max. Switching Power		62.5 VA, 15 W
Max. Switching Voltage		250 V <sub>AC</sub> , 220 V <sub>DC</sub>
Resistance		50 mΩ max.
Breakdown Voltage	Between Coil and Contacts	1500 V <sub>AC</sub>
	Between Open Contacts	1500 V <sub>AC</sub>
	Between Adjacent Contacts	1500 V <sub>AC</sub>
Operating Time		Typical: 3 ms, Max.: 5 ms
Release Time		Typical: 2 ms, Max.: 4 ms
Life Expectancy		2 x 10 <sup>6</sup> cycles min. @ 0.5A/30 V <sub>DC</sub>

## A.4 General Specifications

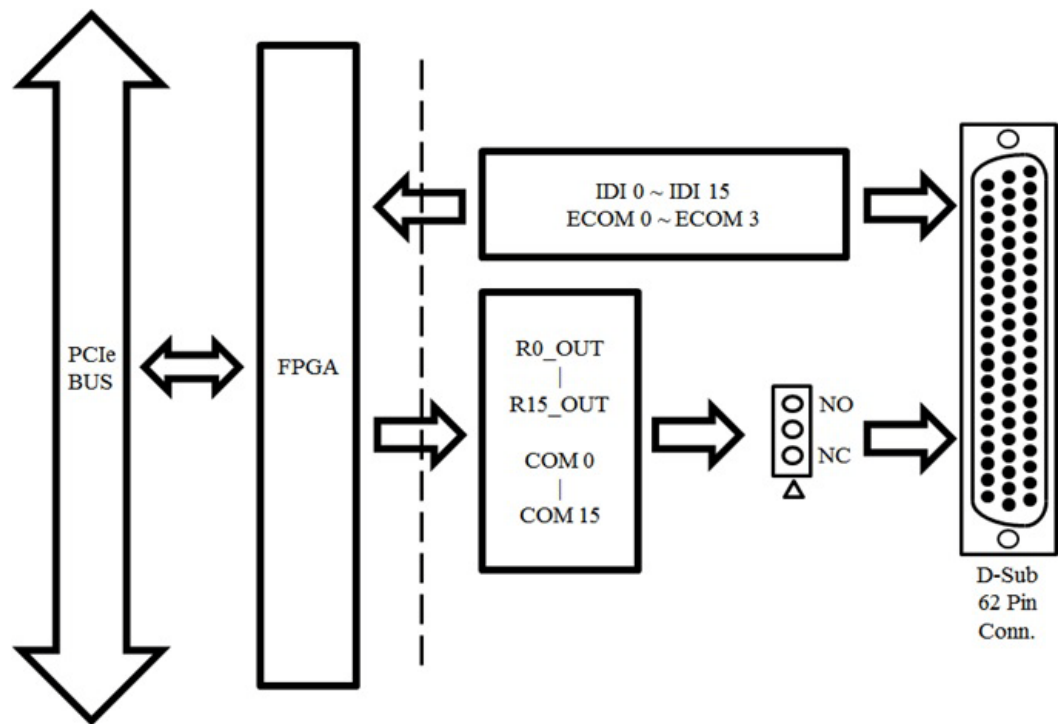
I/O Connector Type	62-pin D-type female	
Dimensions	167.7 x 100 mm (6.6 x 3.9 in)	
Power Consumption	+3.3 V @ 0.5 A (typical) +3.3 V @ 0.7 A (max.)	
Temperature	Operating	0 ~ 60 °C (32 ~ 140 °F)
	Storage	-20 ~ 70 °C (-4 ~ 158 °F)
Relative Humidity	10 - 95% RH non-condensing	
Certifications	CE/FCC	



# Appendix **B**

## Block Diagram

## B.1 Block Diagram





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

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