

User Manual

PCM-37D24DI

24-ch Isolated Digital I/O, M.2 B+M key (3042, PCIe*1), DB37

ADVANTECH

Enabling an Intelligent Planet

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2. Call your dealer and describe the problem. Please have your manual, product, and any helpful information readily available.
3. If your product is diagnosed as defective, obtain an RMA (return merchandize authorization) number from your dealer. This allows us to process your return more quickly.
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5. Write the RMA number visibly on the outside of the package and ship it 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 kind of cable is available from Advantech. Please contact your local supplier for ordering information.

FCC Class A

Note: 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 which case the user will be required to correct the interference at his own expense.

Technical Support and Assistance

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

Warnings, Cations and Notes

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



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



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

Discard used batteries according to the manufacturer's instructions.

Note! *Notes provide optional additional information.*



Document Feedback

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

Packing List

Before setting up the system, check that the items listed below are included and in good condition. If any item does not accord with the table, please contact your dealer immediately.

Safety Instructions

1. Read these safety instructions carefully.
2. Keep this User Manual for later reference.
3. Disconnect this equipment from any AC outlet before cleaning. Use a damp cloth. Do not use liquid or spray detergents for cleaning.
4. For plug-in equipment, the power outlet socket must be located near the equipment and must be easily accessible.
5. Keep this equipment away from humidity.
6. Put this equipment on a reliable surface during installation. Dropping it or letting it fall may cause damage.
7. The openings on the enclosure are for air convection. Protect the equipment from overheating. DO NOT COVER THE OPENINGS.
8. Make sure the voltage of the power source is correct before connecting the equipment to the power outlet.
9. Position the power cord so that people cannot step on it. Do not place anything over the power cord.
10. All cautions and warnings on the equipment should be noted.
11. If the equipment is not used for a long time, disconnect it from the power source to avoid damage by transient overvoltage.
12. Never pour any liquid into an opening. This may cause fire or electrical shock.
13. Never open the equipment. For safety reasons, the equipment should be opened only by qualified service personnel.
14. If one of the following situations arises, get the equipment checked by service personnel:
15. The power cord or plug is damaged.
16. Liquid has penetrated into the equipment.
17. The equipment has been exposed to moisture.
18. The equipment does not work well, or you cannot get it to work according to the user's manual.
19. The equipment has been dropped and damaged.
20. The equipment has obvious signs of breakage.
21. DO NOT LEAVE THIS EQUIPMENT IN AN ENVIRONMENT WHERE THE STORAGE TEMPERATURE MAY GO BELOW -20° C (-4° F) OR ABOVE 60° C (140° F). THIS COULD DAMAGE THE EQUIPMENT. THE EQUIPMENT SHOULD BE IN A CONTROLLED ENVIRONMENT.
22. CAUTION: DANGER OF EXPLOSION IF BATTERY IS INCORRECTLY REPLACED. REPLACE ONLY WITH THE SAME OR EQUIVALENT TYPE RECOMMENDED BY THE MANUFACTURER, DISCARD USED BATTERIES ACCORDING TO THE MANUFACTURER'S INSTRUCTIONS.
23. The sound pressure level at the operator's position according to IEC 704-1:1982 is no more than 70 dB (A).

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

Safety Precaution - Static Electricity

Follow these simple precautions to protect yourself from harm and the products from damage.

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

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Chapter 1

Introduction

This chapter provides a general description of the PCM-37D24DI.

Sections include:

- Description
- Features
- Applications
- Installation Guide
- Software Overview
- Accessories

1.1 Description

The PCM-37D24DI is a 16-channel isolated digital input and 8-channel isolated digital output card for the PCI Express bus.

The PCM-37D24DI's isolated digital input channels are ideal for digital input in noisy environments or with floating potentials.Each isolated digital input supports both dry contact and wet contact, designated by jumper settings, so that it can easily interface with other devices. Moreover.

1.2 Features

- 24 isolated digital I/O lines
- Output driving capacity with 100 mA per channel (maximum)
- High-voltage isolation on isolated I/O channels (2,500VDC)
- Interrupt handling capability
- Timer/Counter interrupt capability
- Supports both dry and wet contact
- Keeps the I/O port setting and IDO state after system reset
- BoardID switch
- Pattern match interrupt function for IDI
- “Change of state” interrupt function for IDI

The Advantech PCM-37D24DI offers the following main features:

Plug-and-Play Function

The PCM-37D24DI is a Plug-and-Play device, which fully complies with PCI Express Specification Rev V1.0. During card installation, there is no need to set jumpers or DIP switches. Instead, all bus-related configurations such as base I/O address and interrupt are automatically done by the Plug-and-Play function.

Board ID

The PCM-37D24DI has a built-in DIP Switch that helps define each card’s ID when multiple PCM-27D24DI cards have been installed on the same PC chassis. The board ID setting function is very useful when users build their system with multiple PCM-37D24DI cards. With correct Board ID settings, you can easily identify and access each card during hardware configuration and software programming.

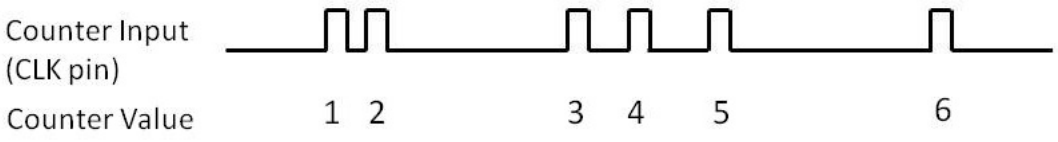
Counter Input

The PCM-37D24DI offers two counter inputs which can perform event counting, frequency measurement and pulse width measurement.

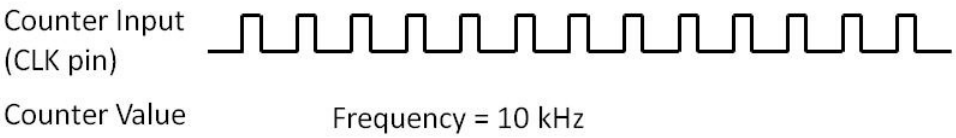
Counters on PCM-37D24DI have a counter value match interrupt function. When this interrupt function is enabled, an interrupt signal will be generated if the counter value reaches a pre-set counter match value. The counter will continue to count until an overflow occurs, then it will go back to its reset value zero and continue the counting process. A user can set each individual counter channel to count either falling edge (high-to-low) or rising edge (low-to-high) signals.

Except measurement functionality, counter input channels to generate single pulse and pulse train. A pulse-width modulated waveform is created when the High and Low periods of a periodic rectangular signal are varied.

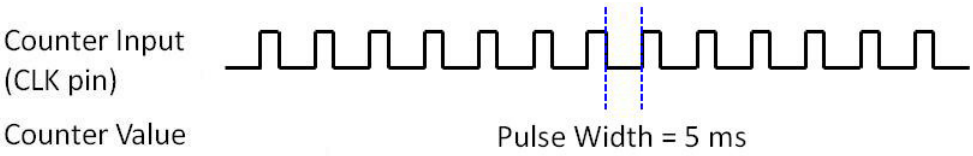
1. Event counter: PCM-27D24DI built-in counter can calculate how many pulse are sent into the input channel.



2. Frequency measurement: PCM-27D24DI built-in counter can measure the frequency value of the signal connected to counter input.



3. Pulse Width measurement: PCM-27D24DI built-in counter can measure the pulse width value of the signal connected to counter input.



Interrupt Function Ensures Faster System Response

The PCM-37D24DI provides a “Pattern Match” interrupt function for the digital input channels. It monitors the state of some or all of the input channels and compares it with a pre-set pattern. When the received state matches the pre-set pattern, PCM-27D24DI will generate an interrupt signal to the system. The “Change of Input State” interrupt function means PCM-27D24DI monitors the state of the input channels. When any input changes its state, the card interrupts the system to handle this event.The”Triggering Edge” interrupt can be triggered by a rising edge or a falling edge of the digital input signal.

1.3 Applications

- Industrial ON/OFF control
- Switch status sensing
- Digital I/O control
- Industrial and lab automation
- Laboratory & Education

1.4 Installation Guide

Before you install your PCM-27D24DI card, please make sure you have the following necessary components:

- PCM-37D24DI card
- I/O Plate card
- Wire cable
- PCM-37D24DI User’s Manual
- Wiring cable PCL-10137 (optional)
- Wiring board PCLD-880, ADAM-3937 (optional)
- Personal computer or workstation with a mini-PCIe slot

Some other optional components are also available for enhanced operation:

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

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

1.5 Software Overview

Advantech offers device drivers, SDKs, third-party driver support and application software to help fully exploit the functions of your PCM-37D24DI card. All these software packages are available on the Advantech website to get the latest update: http://www.advantech.com/.

1.6 Accessories

Advantech offers a complete set of accessory products to support the PCM-37D24DI card. These accessories include:

Wiring Cable

The PCL-10137 shielded cable is specially designed for PCM-37D24DI cards to provide high resistance to noise. To achieve better signal quality, the signal wires are twisted in such a way as to form a “twisted-pair cable”, reducing cross-talk and noise from other signal sources. Furthermore, its digital lines are separately sheathed and shielded to neutralize EMI/EMC problems.

Wiring Boards

The ADAM-3937 is a 37-pin D-type wiring terminal module for DIN-rail mounting. This terminal module can be readily connected to the Advantech cards and allow easy yet reliable access to individual pin connections for the PCM-37D24DI card.

The PCLD-880 is a universal screw-terminal board to be used with any of the PC-LabCards which have 37-pin D-type connectors.

Chapter 2

Hardware Installation

- Installation
- Unpacking
- Driver Installation
- Hardware Installation

2.1 Installation

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

2.2 Unpacking

After receiving your PCM-37D24DI package, please inspect its contents first. The package should contain the following items:

- PCM-37D24DI card
- User's Manual

The PCM-27D24DI card harbors certain electronic components vulnerable to electrostatic discharge (ESD). ESD could easily damage the integrated circuits and certain components if preventive measures are not carefully paid attention to.

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

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

After taking out the card, first you should:

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

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

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

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

2.3 Driver Installation

We recommend you to install the driver before you install the PCM-37D24DI card into your system, since this will guarantee a smooth installation process.

The Advantech device driver installation for the PCM-27D24DI card is included on the companion CD-ROM that is shipped with your DA&C card package, or you can download it from Advantech official website.

2.4 Hardware Installation

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



After the device driver installation is completed, you can now go on to install the PCM-27D24DI card in any mini-PCIe slot on your computer. Follow the steps below to install the card on your system.

1. Turn off your computer and unplug the power cord and cables. TURN OFF your computer before installing or removing any components on the computer.
2. Remove the cover of your computer.
3. Remove the screws from the base plate and lift to remove.
4. Insert the mini-PCIe card and secure the screws.
5. Remove the screws to remove the blanking plate.
6. Insert the PCM Module through the blanking plate hole and secure the screws. Attach the PCM Module to the mini-PCIe card with the cable.
7. Replace the cover of your computer chassis. Re-connect the cables you removed in step 2.
8. Plug in the power cord and turn on the computer.

Note! *In case you installed the card without installing the Device Drivers first, Win95/98/ME will recognize your card as an "unknown device" after rebooting, and will prompt you to provide the necessary driver. Ignore the prompting messages (just click the Cancel button) and set up the driver according to the steps described in 2.3 Driver Installation.*



After the PCM-37D24DI card is installed, you can verify whether it is properly installed on your system through the Device Manager:

1. Access the Device Manager through Control Panel/System/Device Manager.
2. The device name of the PCM-27D24DI should be listed on the Device Manager tab as follows.

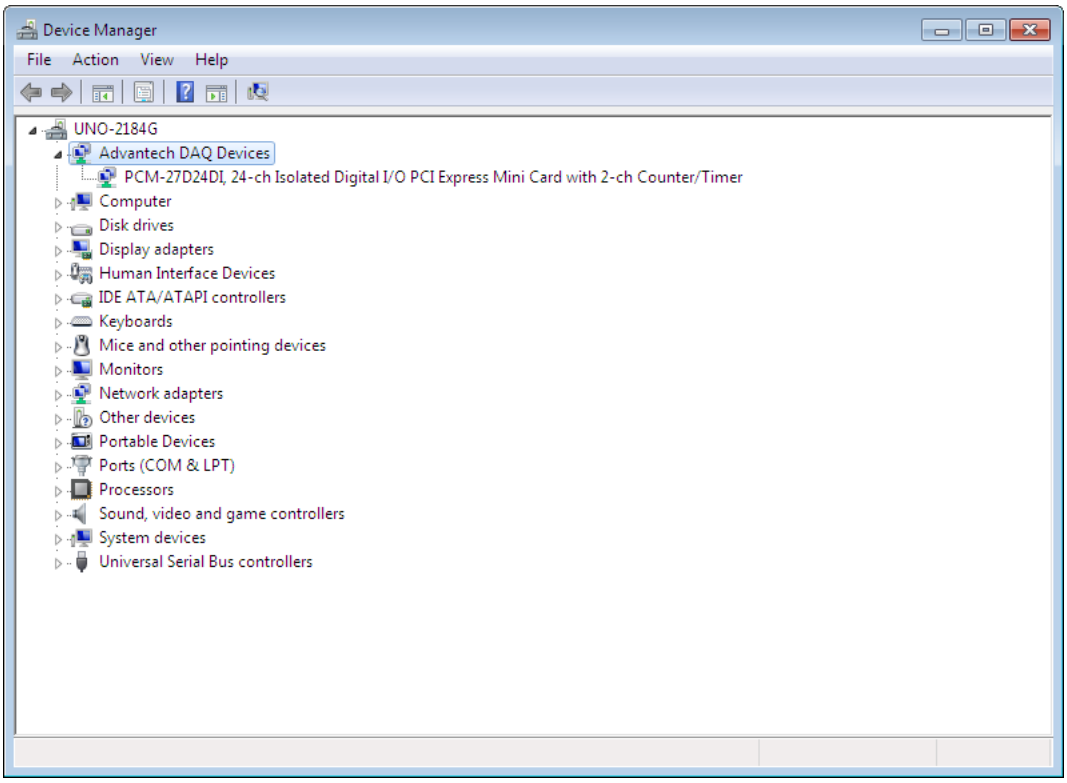


Figure 2.1 Device Manager

Note! *If your card is properly installed, you should see the device name of your card listed on the Device Manager tab. If you do see your device name listed on it but marked with an exclamation sign "!", it means your card has not been correctly installed. In this case, remove the card device from the Device Manager by selecting its device name and press the Remove button. Then go through the driver installation process again.*

After your card is properly installed on your system, you can now configure your device using the Advantech Navigator after you install DAQNavi on your computer.

Chapter 3

Signal Connections

- Overview
- Switch and Jumper Settings
- Signal Connections

3.1 Overview

Maintaining signal connections is one of the most important factors in ensuring that your application system is sending and receiving data correctly. A good signal connection can avoid unnecessary and costly damage to your PC and other hardware devices. This chapter provides useful information about how to connect input and output signals to the PCM-27D24DI via the I/O connector.

3.2 Switch and Jumper Settings

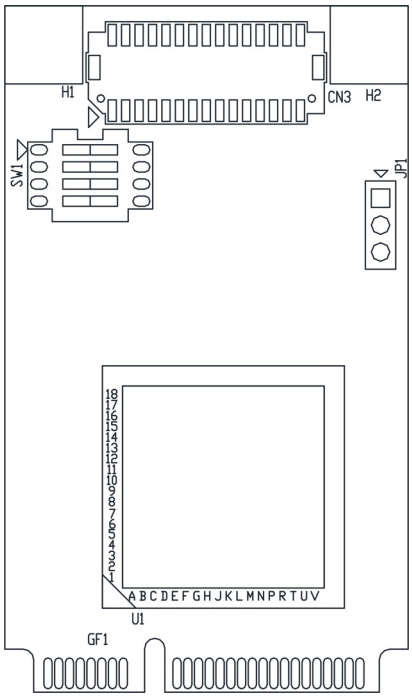


Figure 3.1 Card Connector, Jumper and Switches

Table 3.1: Summary of Jumper Settings

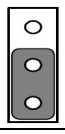
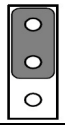
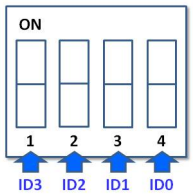
Jumper Name		Function Description
JP1		Load default while reset (default)
		Keeps the last status after reset (enabled)

Table 3.2: Board ID setting (SW1)				
ID3	ID2	ID1	ID0	Board ID
1	1	1	1	0
1	1	1	0	1
1	1	0	1	2
1	1	0	0	3
1	0	1	1	4
1	0	1	0	5
1	0	0	1	6
1	0	0	0	7
0	1	1	1	8
0	1	1	0	9
0	1	0	1	10
0	1	0	0	11
0	0	1	1	12
0	0	1	1	13
0	0	0	1	14
0	0	0	0	15

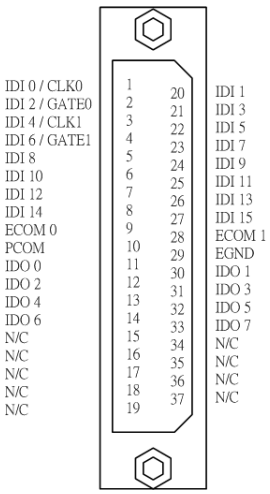


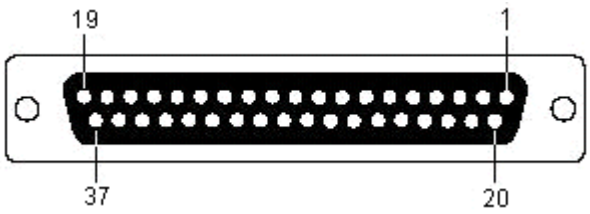
3.3 Signal connections

3.3.1 Pin Assignment

The following tables and figures show the pin assignments of CN1 connector on the bracket to the modular card. If you see two ports or above, it will use the same pin-definition of this one.

Description of PIN Use	
IDIn (n=0 ~ 15):	Isolated digital input
IDOn (n=0 ~ 7):	Isolated digital output
ECOM0:	External common of IDI0~7
ECOM1:	External common of IDI8~15
PCOM:	Free wheeling common diode for IDO
EGND:	External ground
GATEn (n=0 ~ 1):	Counter n gate input
CLKn (n=0~1):	Counter n clock input
NC:	Not Connected





Isolated Digital Input

Each of the 16 isolated digital input channels accept voltages from 0 to 30 V. Every eight input channels share one external common. (Channels 0 ~ 7 use ECOM0. Channels 8 ~ 15 use ECOM1.) The following figure shows how to connect an external input source to the card's isolated inputs.

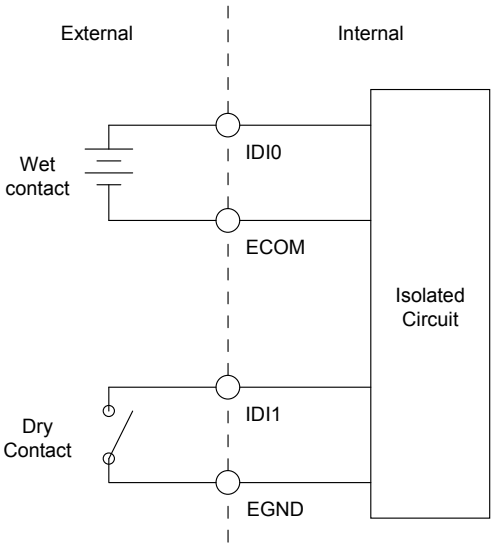


Figure 3.2 Isolated DI Connection

Isolated Digital Output

If the external voltage source (5~40 V) is connected to each isolated output channel (IDO) and its isolated digital output turns on (200 mA max./ch), the card's current will sink from the external voltage source. DB37 provides one EGND pin for IDO connections.The following figure shows how to connect an external output load to the card's isolated outputs.

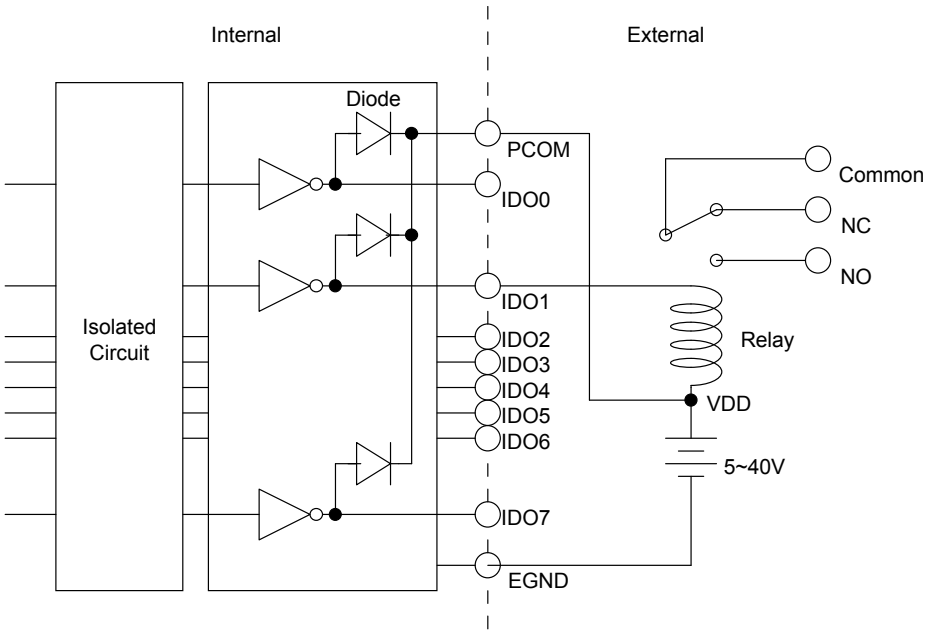


Figure 3.3 Isolated Digital Output Connection

Appendix A

Specifications

A.1 Specifications

Isolated Digital Input

Input Channels	16
Input Voltage	Logic 0: 3 V max. (0 V_{DC} min.)
	Logic 1: 10 V min. (30 V_{DC} max.)
Input Current	10 V_{DC} @ 2.97 mA
	20 V_{DC} @ 6.35 mA
	30 V_{DC} @ 9.73 mA
Interrupt Capable Ch.	2 (IDI0, IDI8)
Isolation Protection	2,500 V_{DC}
Overvoltage Protection	70 V_{DC}
ESD Protection	4KV (Contact), 8KV (Air)
Opto-Isolator Response	50 us

Counter

Channels	2
Resolution	32 bit
Max. Input Frequency	1 KHz

Isolated Digital Output

Output Channels	8
Output Type	MOSFET
Isolation Protection	2,500 V_{DC}
Output Voltage	5 ~ 30 V_{DC}
Sink Current	100 mA max./channel
Opto-isolator Response	50 us

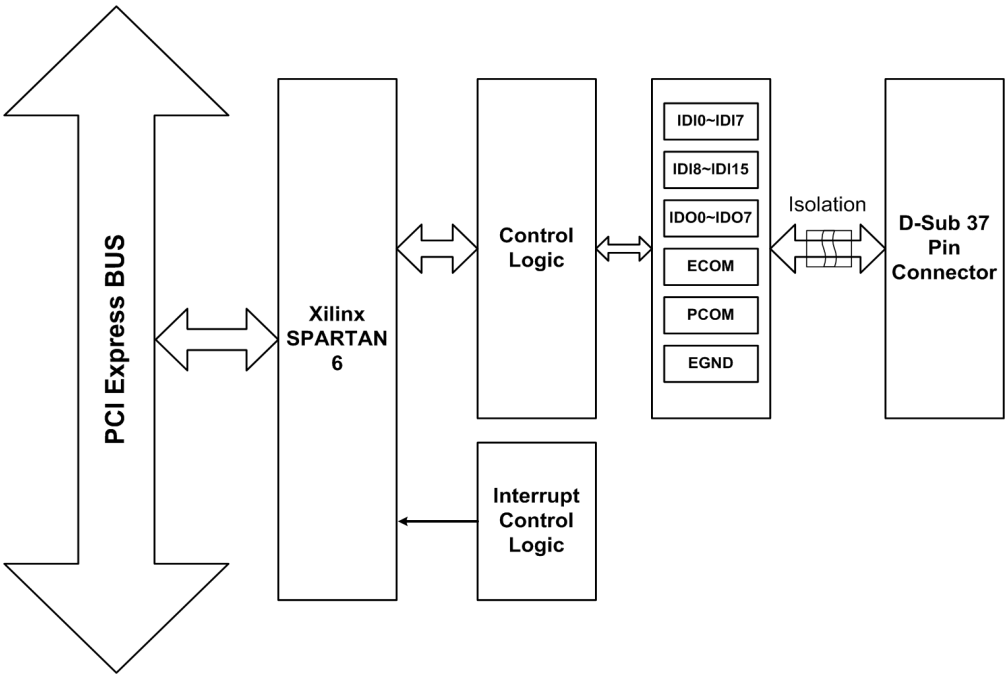
General

I/O Connector Type	37-pin D-Sub female	
Dimensions	Module	51 x 30 x 12.4mm
	I/O Plate	81 x 19.4 x 41mm
Power Consumption	Typical	+3.3V @ 400 mA
	Max	+3.3V @ 520 mA
Temperature	Operation	-20~60°C(-4~140°F)
	Storage	-40~85°C(-40~185°F)
Relative Humidity	5~90%RH non-condensing	
Certification	CE certified	

Appendix B

Block Diagram

B.1 Block Diagram



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