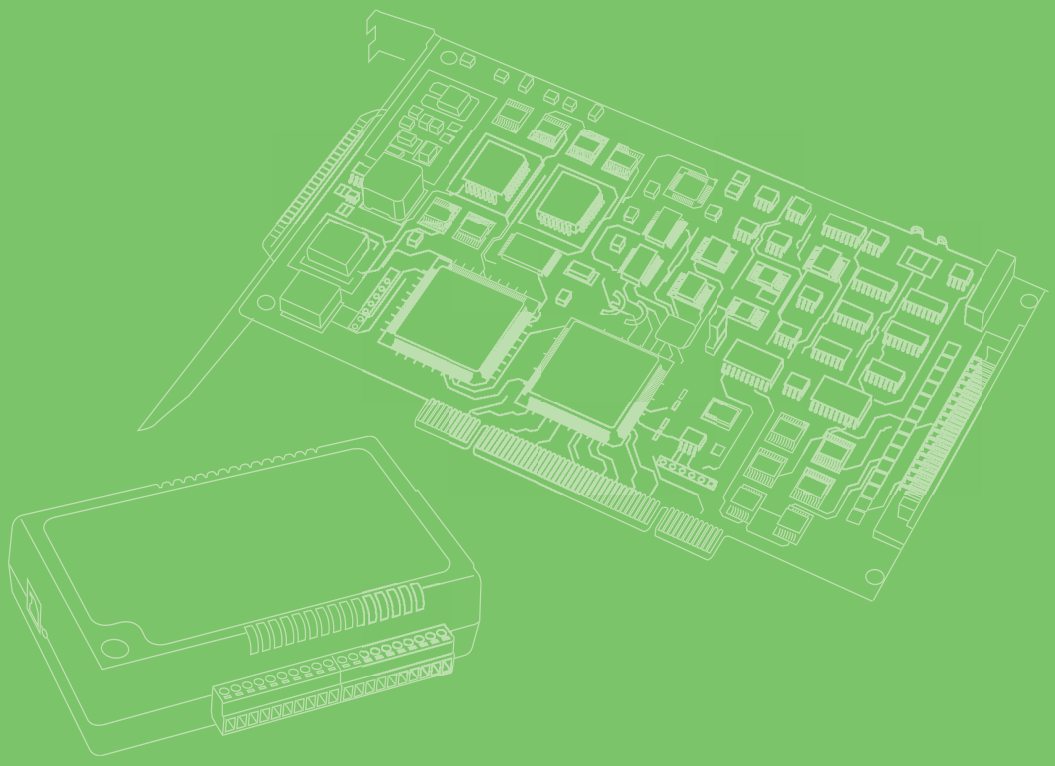

User Manual

PCIE-1765

12-Channel Relay 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 that your product is defective, follow the steps outlined below.

1. Collect all 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 merchandize 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 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 and 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. Test conditions for passing included the equipment being operated within an industrial enclosure. In order to protect the product from damage by electrostatic discharge (ESD) and 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 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 and 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 making improvements to this manual, we welcome all comments and constructive criticism. Please send all such feedback 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 of 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 unused 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 where the storage temperature fluctuates below -20 °C (-4 °F) or above 60 °C (140 °F) as this may cause damage. The equipment should be stored in a controlled environment.
16. Batteries are at risk of exploding if incorrectly replaced. Replace only with the same or equivalent types 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).

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

Contents

Chapter 1 Overview 1

1.1 Introduction 2
1.2 Key Features 2
1.3 Applications 2
1.4 Installation Guide 3
1.5 Software Overview 3
1.6 Accessories 4

Chapter 2 Installation 5

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 6
Table 2.2: Board ID Settings (SW1) 7
2.3 I/O Connectors 8
Figure 2.2 I/O connector pin assignments 8
2.4 Device Setup and Configuration 9

Chapter 3 Signal Connections 11

3.1 Overview 12
3.2 Relay Connections 12
Figure 3.1 Relay output connection 12

Appendix A Specifications 13

A.1 Relay Output 14
A.2 General Specifications 14

Appendix B Block Diagram 15

B.1 Block Diagram 16

Chapter 1

Overview

1.1 Introduction

Advantech's PCIE-1765 is a 12-channel relay actuator card for PCIE bus. Built with 12 onboard SPDT relays, the PCIE-1765 card 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 indicator to show its ON/OFF status.

The following sections of this chapter provide further information regarding the PCIE-1765's features, installation procedures, software, and accessories.

1.2 Key Features

- 12 form C-type relay output channels
- LED indicators to show activated relays
- Output status read back functionality
- Retains relay output values after system hot reset
- Board ID

Reset Protection Fulfills Requirements for Industrial Applications

When the system has undergone a hot reset (i.e., without turning off the system power), the PCIE-1765 card can either retain the output values of each channel or return to its default open configuration depending on its onboard jumper settings. This function protects the system from malfunctioning during unexpected system resets.

Plug-and-Play Functionality

The PCIE-1765 card is a plug-and-play device that fully complies with PCIE Specifications, Rev 2.0. During card installation, there is no need to set jumpers or DIP switches. Instead, all bus-related settings, such as the base I/O address and interrupt lines, are automatically configured with the plug-and-play function.

Board ID

The PCIE-1765 card features a built-in DIP switch that defines each card's ID when multiple PCIE-1765 cards are installed on the same PC chassis. 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
- SMT/PCB machinery
- Semiconductor machinery
- Education and research
- External relay driving
-
-
-

1.4 Installation Guide

Before installing the PCIE-1765 card, please ensure that you have the following items:

- PCIE-1765 card
- PCIE-1765 startup manual
- Driver software - Advantech DAQNavi software (can be downloaded from the product page)
- Wiring cable - PCL-10137 (optional)
- Wiring board - ADAM-3937 (optional)
- PC or workstation with a PCI Express slot
- Other optional components for enhanced operation (for example, Advantech data acquisition tools, LabView, or other third-party software)

After obtaining the above items and optional accessories for enhanced operation, you can begin installing the PCIE-1765 card.

1.5 Software Overview

Advantech offers a wide range of DLL drivers, application software, and third-party driver support to assist you with fully exploiting the functions of the PCIE-1765 card.

- DLL driver (Download from the product page)
- LabVIEW driver
- Advantech DAQNavi

Advantech's application software, such as Advantech DLL Driver, can be used for programming with DAQ cards. Advanced users also have another option for register-level programming, although this option is not recommended because of it laborious and time-consuming nature.

DLL Driver

Advantech's DLL Driver software can be downloaded from the Advantech website free of charge. All Advantech DAQ cards are equipped with this software. DLL Driver also features a complete I/O function library for boosting application performance. The DLL Driver software for Windows 7/8/10 functions seamlessly with diverse development tools such as Visual C++, Visual Basic and Visual Studio.Net.

Register-Level Programming

Register-level programming is reserved for experienced programmers who wish 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-1765 card. These accessories include the following:

Wiring Cable

The PCL-10137 shielded cable is especially designed to provide high resistance to noise for PCIE-1765 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 and reliable access to individual pin connections for the PCIE-1765 card.

Chapter 2

Installation

2.1 Unpacking

After receiving your PCIE-1765 card, please inspect the contents before installation. The package should contain the following items:

- 1 x PCIE-1765 card
- 1 x PCIE-1765 startup manual

2.2 Switch and Jumper Settings

The PCIE-1765 card has a single function switch setting.

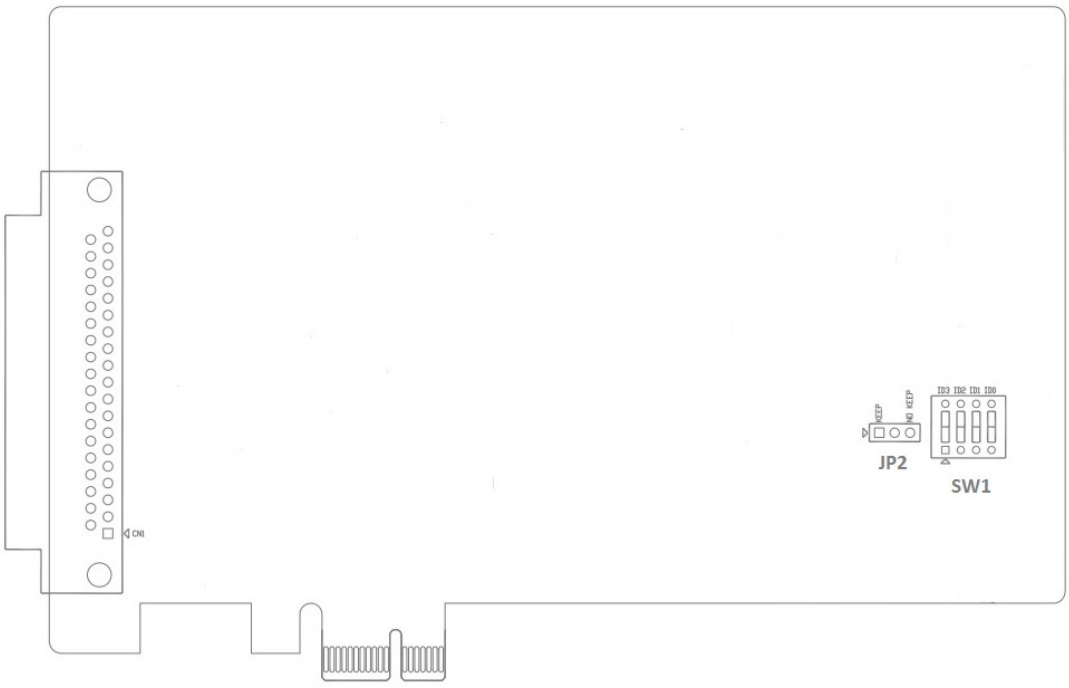
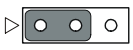


Figure 2.1 Card connector, jumper, and switch locations

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 a 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-1765 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-1765 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-1765 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 the DIP switch.

Table 2.2: Board ID Settings (SW1)

Board ID (dec)	**Switch Position**			
* = default	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
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-1765 card are shown in Figure 2.2.

-NOn (n = 0 ~ 11):
Normally open pin of the relay output

-COMn (n = 0 ~ 11):
Common pin of the relay output

-NCn (n = 0 ~ 11):
Normally closed pin of the relay output

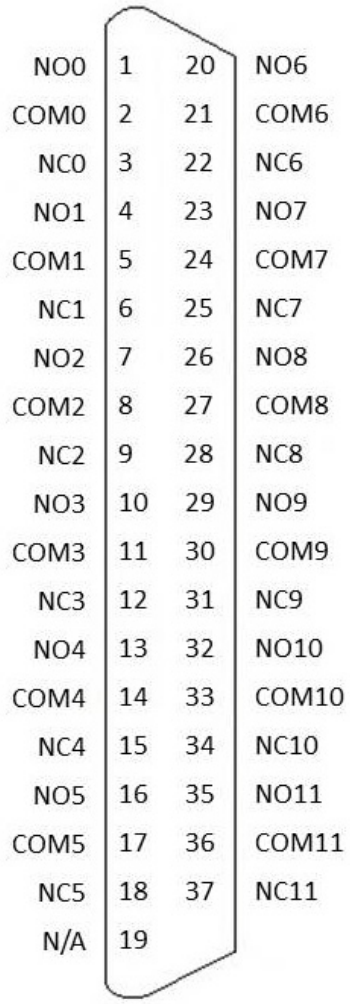


Figure 2.2 I/O connector pin assignments

2.4 Device Setup 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-1765 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-1765 card included on the installed devices list.

For further information, please refer to the DAQNavi SDK manual or the user interface 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.

3.2 Relay Connections

After system power on, the initial relay output status of the PCIE-1765 card should be as shown below:

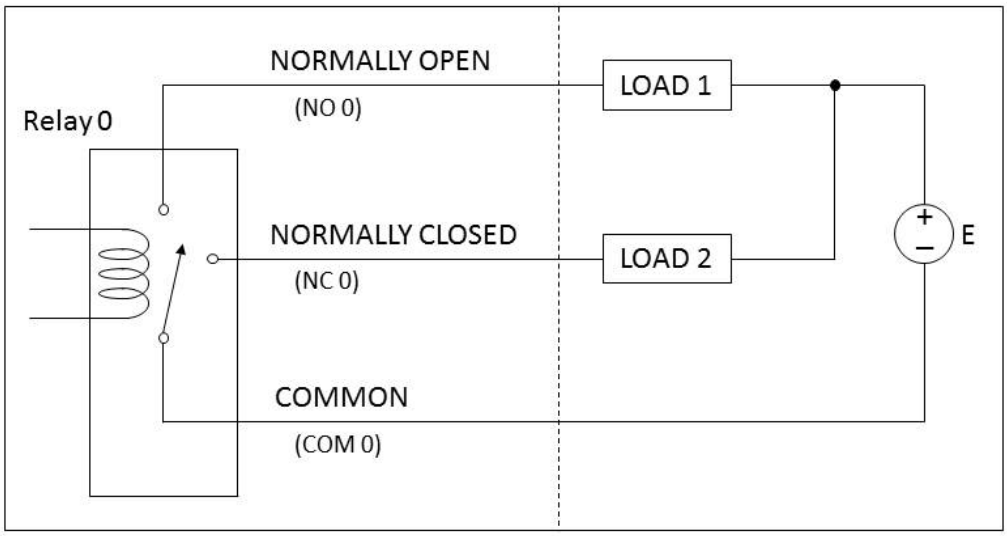


Figure 3.1 Relay output connection

Appendix A

Specifications

A.1 Relay Output

Number of Output Channels	12
Relay Type	12 x Form C
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	100 mΩ max.
Breakdown Voltage	Between coil and contacts 5000 V_{AC} Between open and contacts 1000 V_{AC}
Operating Time	7 ms (typical)
Release Time	2 ms (typical)
Life Expectancy	30 x 10^6 cycles @ 2A/250 V_{AC}

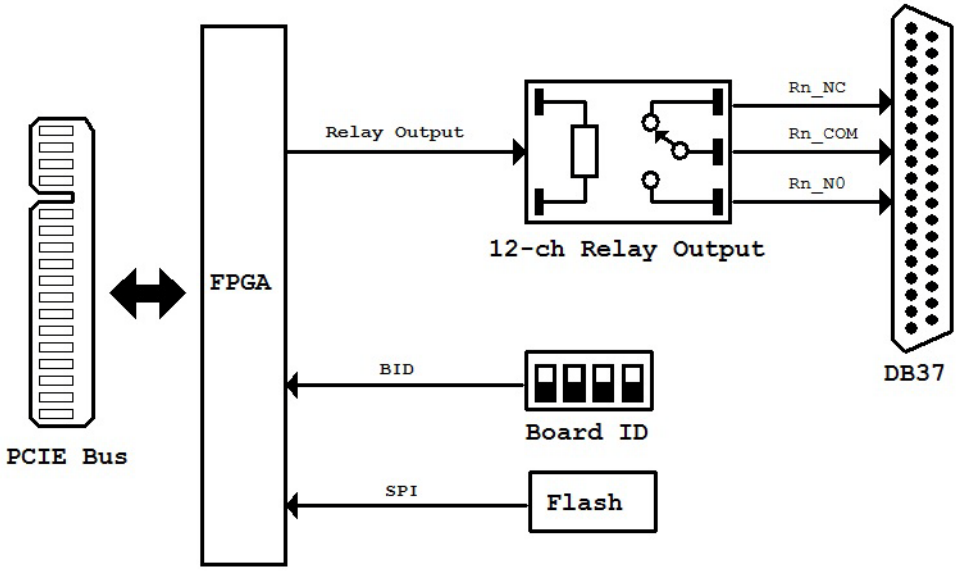
A.2 General Specifications

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 @ 2500mA (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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