

User Manual

# PCM-3730I

32-ch Isolated Digital I/O PCI-104  
Module

**ADVANTECH**  
eAutomation

---

## Copyright

The documentation and the software included with this product are copyrighted 2008 by Advantech Co., Ltd. All rights are reserved. Advantech Co., Ltd. reserves the right to make improvements in 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. 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, which 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 to you, 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 which have been repaired or altered by persons other than repair personnel authorized by Advantech, or which 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 of our customers never need to use our repair service. If an Advantech product is defective, it will be repaired or replaced at no charge during the warranty period. For out-of-warranty repairs, you will be billed according to the cost of replacement materials, service time and freight. Please consult your dealer for more details.

If you think you have a defective product, follow these steps:

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 you get 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 an RMA (return merchandise authorization) number from your dealer. This allows us to process your return more quickly.
4. Carefully pack the defective product, a fully-completed Repair and Replacement Order Card and a photocopy proof of purchase date (such as your sales receipt) in a shippable container. A product returned without proof of the purchase date is not eligible for warranty service.
5. Write the RMA number visibly on the outside of the package and ship it prepaid to your dealer.

# 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.

## 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 being damaged by ESD (Electrostatic Discharge) and EMI leakage, we strongly recommend the use of CE-compliant industrial enclosure products.

## FCC Class B

Note: This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one or more of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

# Technical Support and Assistance

1. Visit the Advantech web site at [www.advantech.com/support](http://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, Cautions 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.*

## 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@advan-tech.com](mailto:support@advan-tech.com)

## 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).

## Safety Precaution - Static Electricity

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.



# 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	Device Driver Programming Roadmap .....	4
<b>Chapter 2</b>	<b>Hardware Installation .....</b>	<b>7</b>
2.1	Installation .....	8
2.2	Unpacking .....	8
2.3	Driver Installation .....	9
	Figure 2.1 Advantech Automation Software Setup Screen .....	9
	Figure 2.2 Different Options for Driver Installation.....	10
2.4	Hardware Installation .....	11
	Figure 2.3 Device Manager .....	12
<b>Chapter 3</b>	<b>Signal Connections .....</b>	<b>13</b>
3.1	Overview .....	14
3.2	Switch and Jumper Settings.....	14
	Figure 3.1 Card Connector, Jumper and Switches.....	14
	Table 3.1: Connector, Jumpers and Switches.....	14
3.2.1	Switch Control.....	15
3.2.2	Jumpers .....	16
3.3	Signal Connections .....	16
	Figure 3.2 Isolated DI Connection .....	17
	Figure 3.3 Isolated Digital Output Connection .....	18
<b>Appendix A</b>	<b>Specifications .....</b>	<b>19</b>
A.1	Specifications .....	20
A.1.1	PCM-3730I.....	20
<b>Appendix B</b>	<b>Block Diagram .....</b>	<b>21</b>
B.1	PCM-3730I .....	22
<b>Appendix C</b>	<b>Register Structure &amp; Format .....</b>	<b>23</b>
C.1	Overview .....	24
C.2	I/O Port Address Map .....	24
C.3	Isolated Digital Input Registers .....	25
C.4	Isolated Digital Output Register .....	25
C.5	Board ID Registers.....	25
C.6	Interrupt Status Registers .....	26
C.7	Interrupt Control Register - BASE+8H/CH/10H.....	27





# Chapter 1

Overview

---

## 1.1 Introduction

PCM-3730I is a 32-channel isolated digital input/output card for the PCI-104 bus. the isolated digital input channels are ideal for digital input in noisy environments or with floating potentials.

The following sections of this chapter will provide further information about features, installation guide, together with some brief information on software and accessories for the PCM-3730I card.

## 1.2 Features

### PCM-3730I

- 32 isolated DIO channels (16 inputs and 16 outputs)
- High output driving capacity
- High-voltage isolation on isolated I/O channels (2,500 VDC)
- Interrupt handling capability
- 2 x 20-pin connectors for isolated DI/O channels
- D-type connector for isolated input and output channels
- High ESD protection (2,500 VDC)
- High over-voltage protection (50 VDC)
- Wide input range (5 ~ 30 VDC)
- Board ID

The Advantech PCM-3730I offers the following main features:

#### For Existing Windows Application Programs:

Users just need to remove the PCM-3730I via the 'Device Manager', then install the PCM-3730I instead (the device number must be the same). After that, the user's original windows application program can work with PCM-3730I properly.

#### Robust Protection

The PCM-3730I digital input channels feature robust isolation protection for industrial, lab and machinery automation applications. It durably withstands voltage up to 2,500 VDC, preventing your host system from any incidental harm. If connected to an external input source with surge-protection, the PCM-3730I can offer up to a maximum of 2,500 VDC ESD (Electrostatic Discharge) protection. Even with an input voltage rising up to 50 VDC, the PCM-3730I can still manage to work properly, albeit only for a short period of time.

#### Wide Input Range

The PCM-3730I has a wide range of input voltage from 5 to 30 VDC, and is suitable for most industrial applications with 12 VDC or 24 VDC input voltage.

#### Plug-and-Play Function

The PCM-3730I is a Plug-and-Play device, which fully complies with PCI-104 Specification 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 done by the Plug-and-Play function.

## Board ID

The PCM-3730I has a built-in DIP Switch that helps define each card's ID when multiple PCM-3730I 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-3730I cards. With correct Board ID settings, you can easily identify and access each card during hardware configuration and software programming.

Note:

--For detailed specifications of the PCM-3730I, please refer to Appendix A, Specifications.

## 1.3 Applications

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

## 1.4 Installation Guide

Before you install your PCM-3730I card, please make sure you have the following necessary components:

- PCM-3730I card
- PCM-3730I User's Manual
- Driver software Advantech DLL drivers  
(Included in the companion CD-ROM)
- Application software: ActiveDAQ, ActiveDAQ Pro or 3rd-party software

After you get the necessary components and maybe some of the accessories for enhanced operation of your Multifunction card, you can then begin the Installation procedures. Figure 1-1 on the next page provides a concise flow chart to give users a broad picture of the software and hardware installation procedures:

---

## 1.5 Software Overview

Advantech offers a rich set of DLL drivers, third-party driver support and application software to help fully exploit the functions of your PCM-3730I card:

- Device Drivers (on the companion CD-ROM)
- LabVIEW driver
- Advantech ActiveDAQ
- Advantech ActiveDAQ Pro

Programming choices for DA&C cards: You may use Advantech application software such as Advantech Device Drivers. On the other hand, advanced users are allowed another option for register-level programming, although not recommended due to its laborious and time-consuming nature.

### Device Drivers

The Advantech Device Drivers software is included on the companion CD-ROM at no extra charge. It also comes with all the Advantech DA&C cards. Advantech's DLL driver features a complete I/O function library to help boost your application performance. The Advantech Device Drivers for Windows XP/ Vista/ CE works seamlessly with development tools such as Visual C++, Visual Basic, Inprise C++Builder and Inprise Delphi.

### Register-level Programming

Register-level programming is reserved for experienced programmers who find it necessary to write code directly at the level of device registers. Since register-level programming requires much effort and time, we recommend that you use the Advantech Device Drivers instead. However, if register-level programming is indispensable, you should refer to the relevant information in Appendix C, Register Structure and Format, or to the example code included on the companion CD-ROM.

## 1.6 Device Driver Programming Roadmap

This section will provide you a roadmap to demonstrate how to build an application from scratch using Advantech Device Drivers with your favorite development tools such as Visual C++, Visual Basic, Delphi and C++ Builder. The step-by-step instructions on how to build your own applications using each development tool will be given in the Device Drivers Manual. Moreover, a rich set of example source codes are also given for your reference.

### Programming Tools

Programmers can develop application programs with their development tools:

- Visual C++, Visual Basic
- Visual .NET
- Delphi
- C++ Builder

For instructions on how to begin programming works in each development tool, Advantech offers a Tutorial Chapter in the Device Drivers Manual for your reference.

Please refer to the corresponding sections in this chapter on the Device Drivers Manual to begin your programming efforts. You can also look at the example source codes provided for each programming tool, since they can help you get familiar quickly.

The Device Drivers Manual can be found on the companion CD-ROM. Or if you have already installed the Device Drivers on your system, The Device Drivers Manual can be readily accessed through the Start button:

*Start/Programs/Advantech Automation/Device Manager/Device Driver's Manual*

The example source codes could be found under the corresponding installation folder such as the default installation path:

*\Program Files\Advantech\ADSAPI\Examples*

For information about using other function groups or other development tools, please refer to the Creating Windows 2000/XP Application with Device Driver chapter and the Function Overview chapter on the Device Drivers Manual.

### **Programming with Device Drivers Function Library**

Advantech Device Drivers offers a rich function library to be utilized in various application programs. This function library consists of numerous APIs that support many development tools, such as Visual C++, Visual Basic, Delphi and C++ Builder.

According to their specific functions or services, those APIs can be categorized into several function groups:

- Digital Input/Output Function Group
- Port Function Group (direct I/O)
- Event Function Group

For the usage and parameters of each function, please refer to the Function Overview chapter in the Device Drivers Manual.

### **Troubleshooting Device Driver Error**

Driver functions will return a status code when they are called to perform a certain task for the application. When a function returns a code that is not zero, it means the function has failed to perform its designated function. To troubleshoot the Device Drivers error, you can pass the error code to DRV\_GetErrorMessage function to return the error message. Or you can refer to the Device Drivers Error Codes Appendix in the Device Drivers Manual for a detailed listing of the Error Code, Error ID and the Error Message.



# Chapter 2

## 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-3730I package, please inspect its contents first.

The package should contain the following items:

- PCM-3730I card
- Companion CD-ROM (Device Drivers included)
- User's Manual

The PCM-3730I 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-3730I card into your system, since this will guarantee a smooth installation process.

The Advantech Device Driver Setup program for the PCM-3730I card is included on the companion CD-ROM that is shipped with your DA&C card package.

Please follow the steps below to install the driver software:

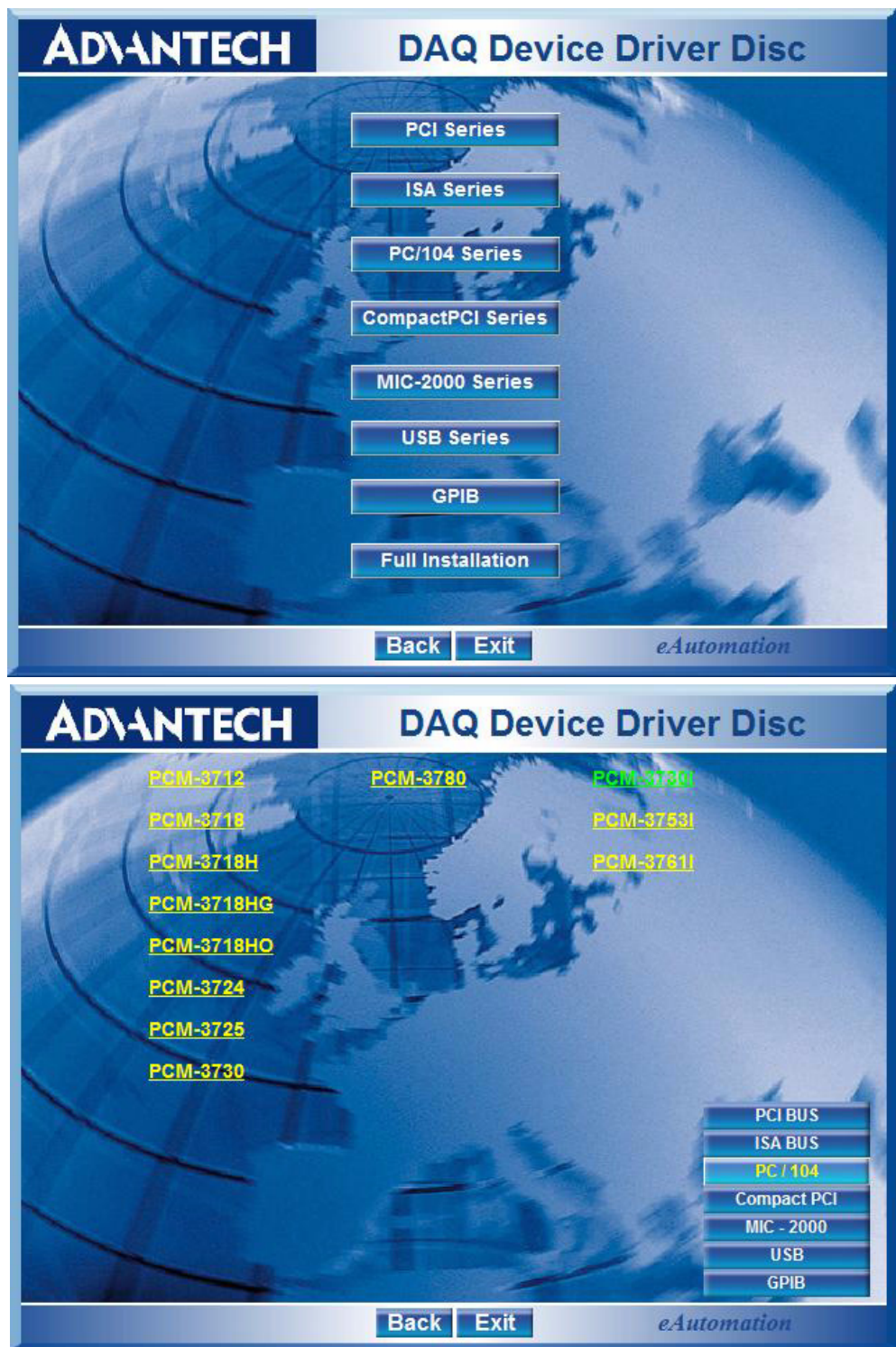
1. Insert the companion CD-ROM into your CD-ROM drive.
2. The Setup program will be launched automatically if you have the autoplay function enabled on your system. When the Setup Program is launched, you'll see the following Setup Screen.

**Note!** *If the autoplay function is not enabled on your computer, use Windows Explorer or Windows Run command to execute SETUP.EXE on the companion CD-ROM.*



Figure 2.1 Advantech Automation Software Setup Screen

3. Select the Individual Drivers option.
4. Select the PC/104 Series
5. Select the specific device then just follow the installation instructions step by step to complete your device driver installation and setup.



**Figure 2.2 Different Options for Driver Installation**

For further information on driver-related issues, an online version of Device Drivers Manual is available by accessing the following path:

***Start/Programs/Advantech Automation/ Device Drivers Manual***

## 2.4 Hardware Installation

**Note!** *Make sure you have installed the driver first before you install the card (please refer to 2.3 Driver Installation)*

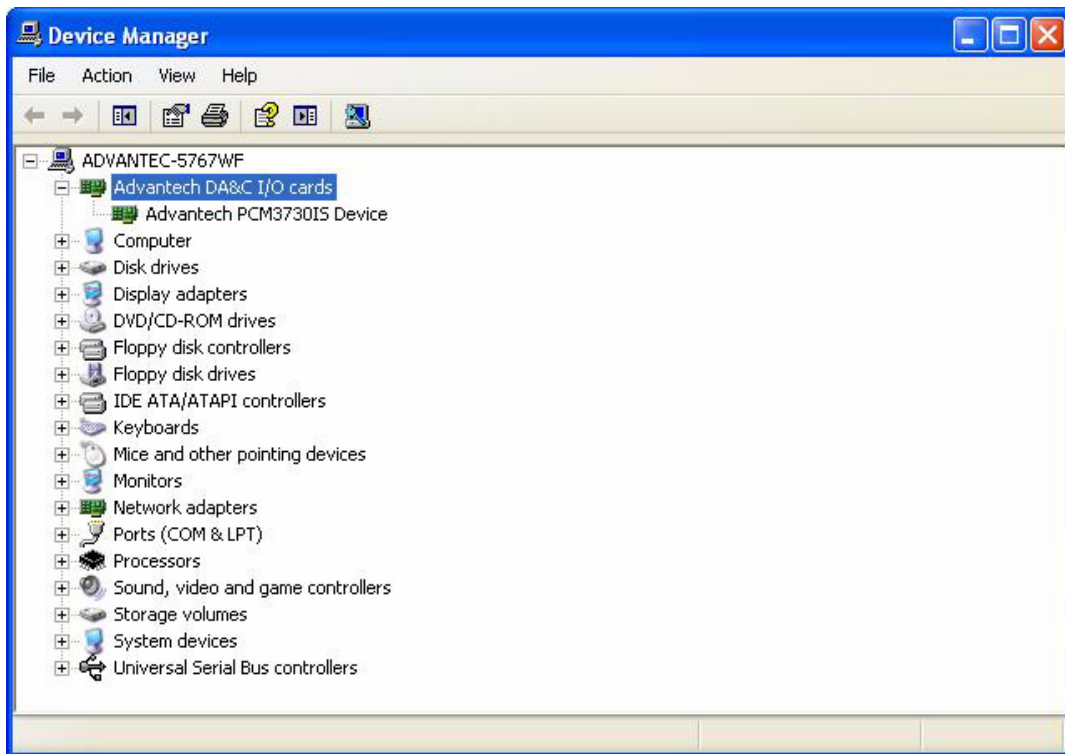


After the device driver installation is completed, you can now go on to install the PCM-3730I card in a PCI-104 slot on your computer. But it is suggested that you should refer to the computer user manual or related documentation if you have any doubt. Please follow the steps below to install the card on your system.

1. Turn the PC's power off. Turn off the power of any peripheral devices such as printers and monitors.
2. Disconnect the power cord and any other cables from the back of the computer.
3. Remove the system unit cover (see the guide for your chassis if necessary).
4. Touch the metal part on the surface of your computer to neutralize the static electricity that might be on your body.
5. Remove the CPU card from the chassis (if necessary) to gain access to the cards PCI-104 connector.
6. Connect connector CN1 of the PCM-3730I card to the PCI-104 connector. Carefully align the pins with the PCI-104 connector. Slide the module into the connector. The module pins may not slide all the way into the connector; do not force the pins into place, or the module may be damaged.
7. Fasten the module to the CPU card by using the included brass screw. Screw the brass spacer into the threaded hole on the CPU card. Do not tighten too much, or the threads may be damaged.
8. Connect appropriate accessories to the PCM-3730I.
9. Reinstall the CPU card and replace the system unit cover. Reconnect the cables you removed in step 2. Plug in and turn on the power. This completes the hardware installation. Install the software driver as described in the previously section.

After the PCM-3730I card is installed, you can verify whether it is properly installed on your system in the Device Manager:

1. Access the Device Manager through Control Panel/System/Device Manager.
2. The device name of the PCM-3730I should be listed on the Device Manager tab on the System Property Page.



**Figure 2.3 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.*



# Chapter 3

## 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-3730I via the I/O connector.

## 3.2 Switch and Jumper Settings

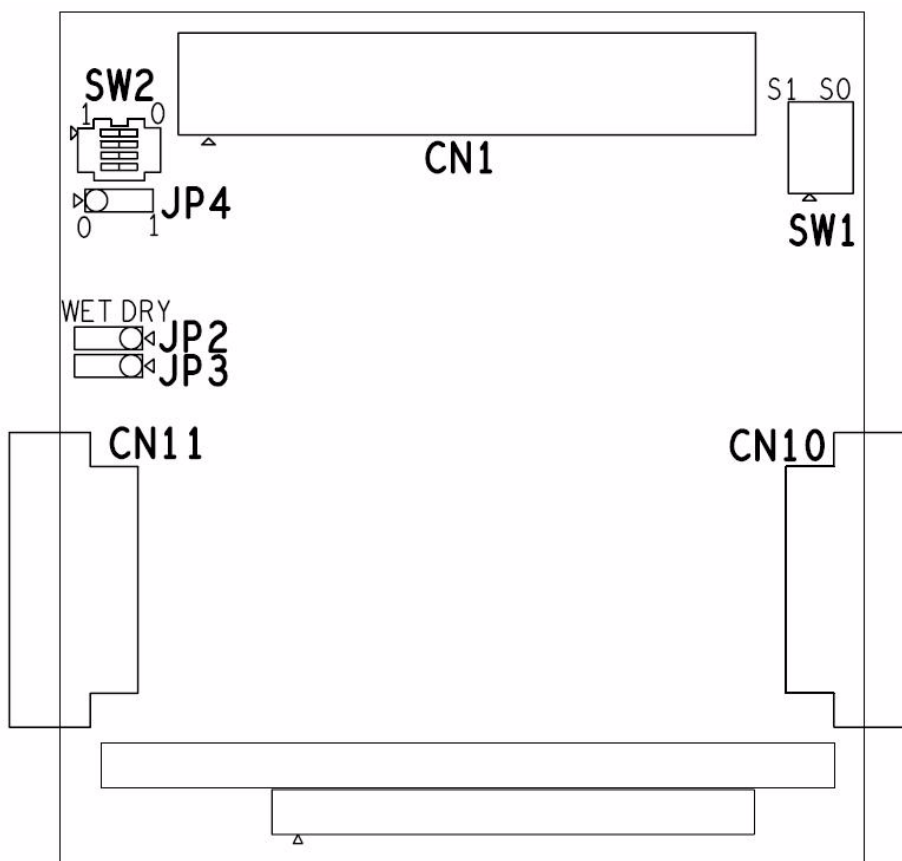


Figure 3.1 Card Connector, Jumper and Switches

Table 3.1: Connector, Jumpers and Switches

Label	Function
CN10	Digital output
CN11	Digital input
JP2	Select wet/ dry contact for IDI7~ IDI0
JP3	Select wet/ dry contact for IDI5~ IDI8
JP4	Select reset signal
SW1	Signal selection
SW2	Board ID selection

### 3.2.1 Switch Control

**SW1:** Select the appropriate REQ#, GNT#, CLK, and INT signals for the module.

Switch Value	Module Slot	REQ#	GNT#	CLK	INT0#
0	0	REQ0#	GNT0#	CLK0	INTA#
1	1	REQ1#	GNT1#	CLK1	INTB#
2	2	REQ2#	GNT2#	CLK2	INTC#
3	3	REQ3#	GNT3#	CLK3	INTD#

**SW2:** Board-ID Selection

Switch Value	Board ID
0000	0
0001	1
0010	2
0011	3
0100	4
0101	5
0110	6
0111	7
1000	8
1001	9
1010	10
1011	11
1100	12
1101	13
1110	14
1111	15

**Note!** *DIP switch setting:*



0 -ON  
1 -OFF

### 3.2.2 Jumpers

**JP2:** Select wet/dry contact for IDI7~IDI0

Switch Value	Function
WET	Wet contact for IDI7~IDI0
DRY	Dry contact for IDI7~IDI0

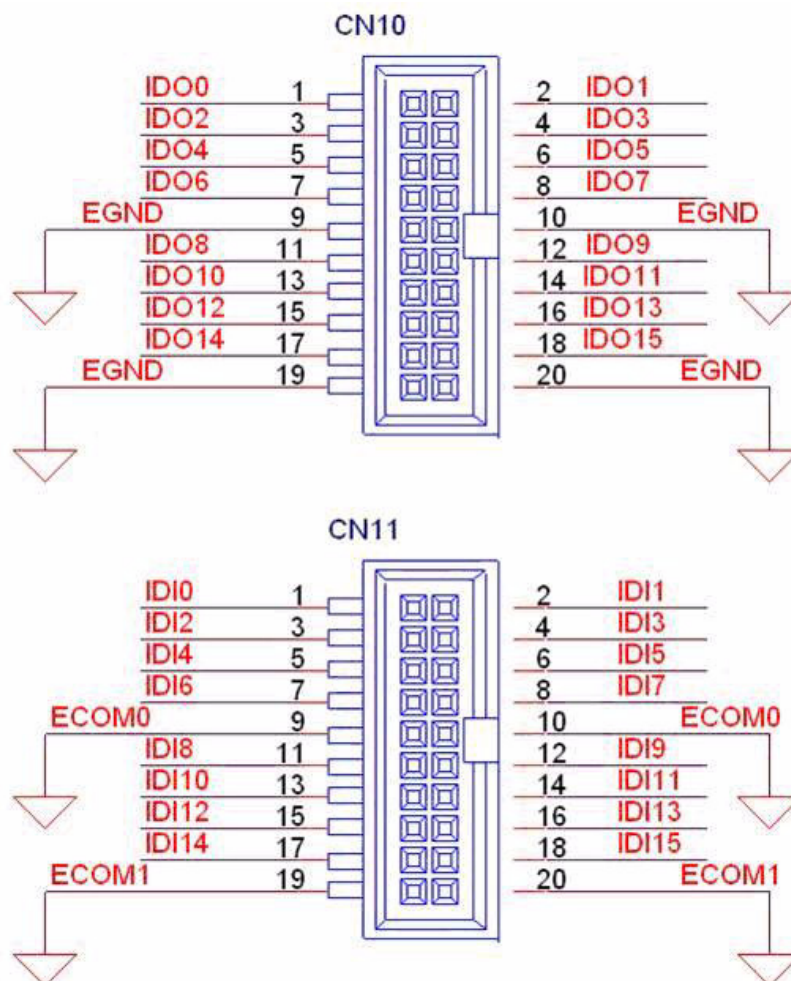
**JP3:** Select wet/dry contact for IDI15~IDI8

Switch Value	Function
WET	Wet contact for IDI15~IDI8
DRY	Dry contact for IDI15~IDI8

**JP4:** Select reset signal

Switch Value	Function
0	Load default status after reset
1	Keep last status after reset

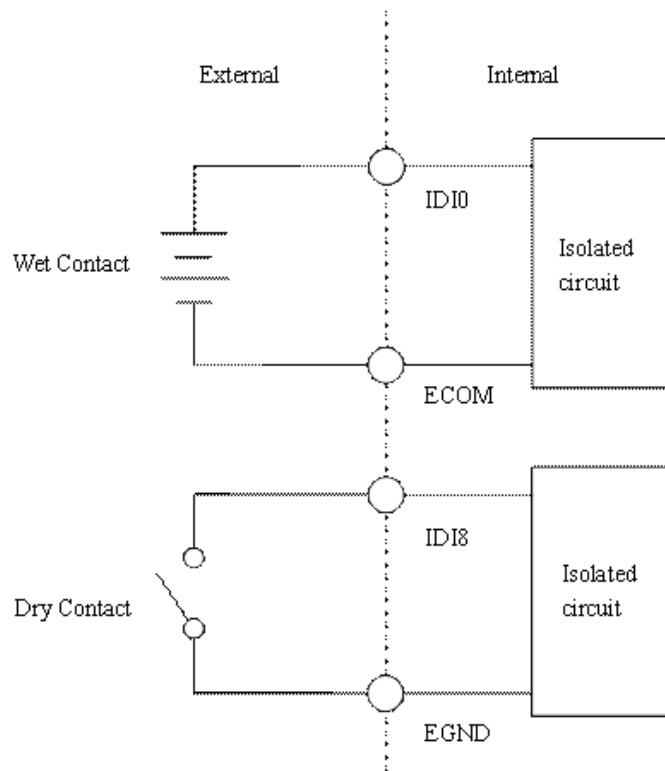
### 3.3 Signal Connections





### Isolated Digital Input

Each of the 16 isolated digital input channels accept voltages from 5 to 30V. 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

PCM-3730I provides 16 isolated DO channels. If the external voltage (5 ~ 40V) is connected to each isolated output channel (IDO) and its isolated digital output turns on (250 mA per channel maximum), the card's current will sink from the external voltage.

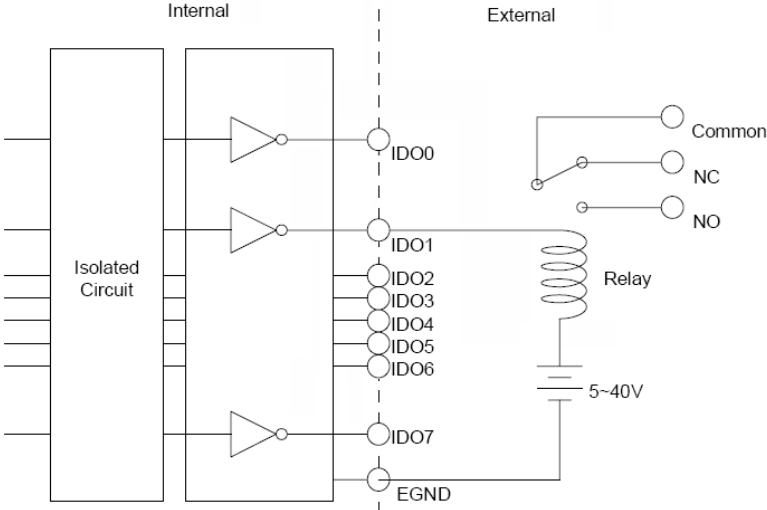


Figure 3.3 Isolated Digital Output Connection

# Appendix **A**

## Specifications

## A.1 Specifications

### A.1.1 PCM-3730I

#### Isolated Digital Input

Number of Channel	16 (bi-directional)	
Optical Isolation	2,500 V <sub>DC</sub>	
Opto-isolator response time	ON: 50μs( max), OFF: 300μs( max)	
Over-voltage Protect	50VDC 1minute	
Input Voltage	V <sub>IH</sub> (max.)	30 V <sub>DC</sub>
	V <sub>IH</sub> (min.)	5 V <sub>DC</sub>
	V <sub>IL</sub> (max.)	2 V <sub>DC</sub>
Input Current	5 V <sub>DC</sub>	1.4 mA (typical)
	12 V <sub>DC</sub>	3.9 mA (typical)
	24 V <sub>DC</sub>	8.2 mA (typical)
	30 V <sub>DC</sub>	10.3 mA (typical)

#### Isolated Digital Output

Number of Channel	16
Optical Isolation	2,500 V <sub>DC</sub>
Output Voltage	Open collector 5 to 40 V <sub>DC</sub>
Sink/Source Current	250 mA max./channel

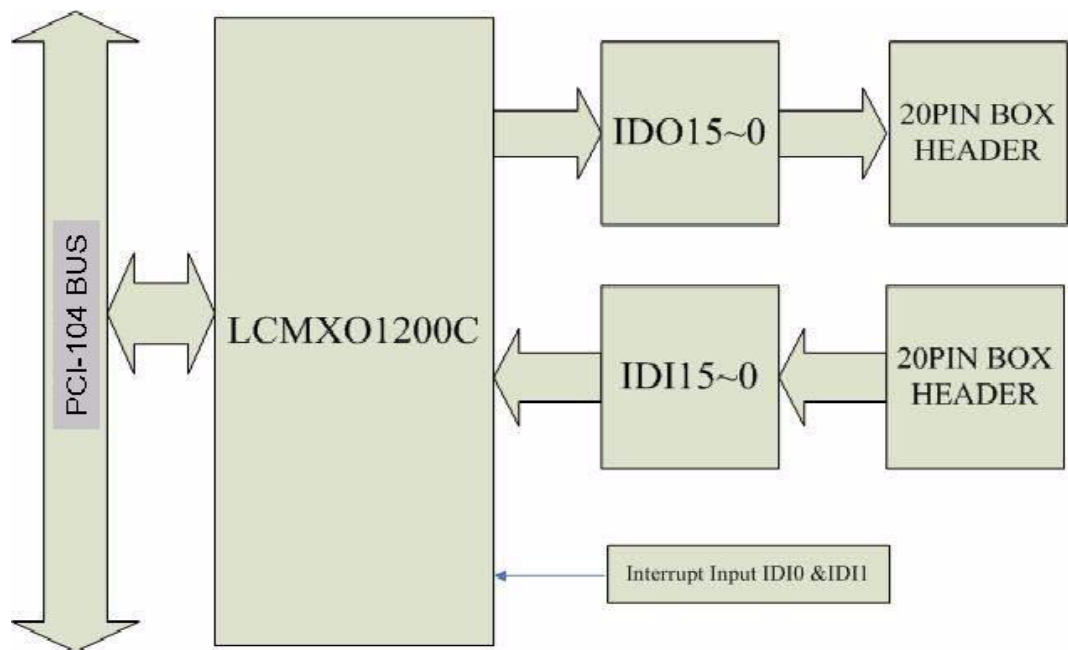
#### General

I/O Connector Type	2 x 20-pin box header for flat cable	
Dimensions	90 x 96 mm( 3.8" x 3.5")	
Power Consumption	Typical	5 V Typical @ 150mA
	Max.	5 V @ 270 mA
Temperature	Operation	0~+60°C (32~140°F) (refer to IEC 68-2-1,2)
	Storage	-20~+85°C (-4~185°F)
Relative Humidity	5~95%RH non-condensing (refer to IEC 68-2-3)	
Certification	CE certified	

# Appendix **B**

## Block Diagram

## B.1 PCM-3730I



# Appendix **C**

Register Structure &  
Format

## C.1 Overview

The most important consideration in programming the PCM-3730I at the register level is to understand the function of the card's registers. The information in the following sections is provided only for users who would like to do their own low-level programming.

## C.2 I/O Port Address Map

The PCM-3730I requires 16 consecutive addresses in the PC's I/O space. The address of each register is specified as an offset from the card's base address. For example, BASE+0 is the card's base address and BASE+6 is the base address plus six bytes. The table C-1 shows the function of each register of the PCM-3730I or driver and its address relative to the card's base address.

Base addr.+ HEX		7	6	5	4	3	2	1	0
00H	R	ISOLATED DIGITAL INPUT							
		IDI7	IDI6	IDI5	IDI4	IDI3	IDI2	IDI1	IDI0
	W	ISOLATED DIGITAL OUTPUT							
		IDO7	IDO6	IDO5	IDO4	IDO3	IDO2	IDO1	IDO0
01H	R	ISOLATED DIGITAL INPUT							
		IDI15	IDI14	IDI13	IDI12	IDI11	IDI10	IDI9	IDI8
	W	ISOLATED DIGITAL OUTPUT							
		IDO15	IDO14	IDO13	IDO12	IDO11	IDO10	IDO9	IDO8
04H	R	BOARD ID REGISTER							
						BID3	BID2	BID1	BID0
08H	R	INTERRUPT ENABLE STATUS							
								IDI1EN	IDI0EN
	W	INTERRUPT ENABLE REGISTER							
								IDI1EN	IDI0EN
0CH	R	INTERRUPT TRIGERRING STATUS							
								IDI1RF	IDI0RF
	W	INTERRUPT TRIGERRING REGISTER							
								IDI1RF	IDI0RF
10H	R	INTERRUPT FLAG							
								IDI1F	IDI0F
	W	INTERRUPT CLEAR REGISTER							
								IDI1CLR	IDI0CLR



## C.3 Isolated Digital Input Registers

### BASE+0H/1H

The PCM-3730I offers 16-ch isolated digital input channels. These channels use the input ports at addresses BASE+0H/1H.

**Table C-1 Register for Isolated Digital Input**

Read	Isolated Digital Input							
Bit #	7	6	5	4	3	2	1	0
BASE + 0H	IDI7	IDI6	IDI5	IDI4	IDI3	IDI2	IDI1	IDI0
BASE + 1H	IDI15	IDI14	IDI13	IDI12	IDI11	IDI10	IDI9	IDI8

## C.4 Isolated Digital Output Register

### BASE+0H/1H

The PCM-3730I offers 16-ch isolated digital output channels. These channels use the registries at addresses BASE+0H/1H.

**Table C-2 Register for Isolated Digital Output**

Write	Isolated Digital Output							
Bit #	7	6	5	4	3	2	1	0
BASE + 0H	IDO7	IDO6	IDO5	IDO4	IDO3	IDO2	IDO1	IDO0
BASE + 1H	IDO15	IDO14	IDO13	IDO12	IDO11	IDO10	IDO9	IDO8

## C.5 Board ID Registers

### BASE+4H

The PCM-3730I offers Board ID register BASE+4H. With correct Board ID settings, user can easily identify and access each card during hardware configuration and software programming.

**Table C-3 Register for Isolated Digital Input**

Read	Board ID							
Bit#	7	6	5	4	3	2	1	0
BASE+4H					BID3	BID2	BID1	BID0

BD3 ~ DB0: Board ID

BD0 LSB of the Board ID

BD3 MSB of the Board ID

## C.6 Interrupt Status Registers

### BASE+8H/CH/10H

The PCM-3730I Interrupt Status Register control the status of four interrupt signal sources (IDI0, IDI1).

**Table C-4 Register for Interrupt Status**

Read	Interrupt Status							
Bit#	7	6	5	4	3	2	1	0
BASE+8H							IDI1EN	IDI0EN
BASE+CH							IDI1RF	IDI0RF
BASE+10H							IDI1F	IDI0F

#### **IDI<sub>n</sub>EN Interrupt enable control bits (n = 0 ~ 1)**

Read this bit to Enable/Disable the interrupt.

- 0** Disable
- 1** Enable

#### **IDI<sub>n</sub>RF Interrupt triggering control bits (n = 0 ~ 1)**

The interrupt can be triggered by a rising edge or falling edge of the interrupt signal, as determined by the value in this bit.

- 0** Rising edge trigger
- 1** Falling edge trigger

#### **IDI<sub>n</sub>F Interrupt flag bits (n = 0 ~ 1)**

This bit is a flag indicating the status of an interrupt. User can read this bit to get the status of the interrupt.

- 0** No interrupt
- 1** Interrupt occurred

## C.7 Interrupt Control Register - BASE+8H/CH/10H

The PCM-3730I Interrupt Control Register controls the status of four interrupt signal sources (IDI0, IDI1). The user can clear the interrupt by writing its corresponding value to the Interrupt Control Register, as shown in below table.

**Table C-5 Register for Interrupt Control**

Read	Interrupt Control							
Bit#	7	6	5	4	3	2	1	0
BASE+8H							IDI1EN	IDI0EN
BASE+CH							IDI1RF	IDI0RF
BASE+10H							IDI1CLR	IDI0CLR

### IDI<sub>n</sub>EN Interrupt enable control bits (n = 0 ~ 1)

Read this bit to Enable/Disable the interrupt.

- 0 Disable
- 1 Enable

### IDI<sub>n</sub>RF Interrupt triggering control bits (n = 0 ~ 1)

The interrupt can be triggered by a rising edge or falling edge of the interrupt signal, as determined by the value in this bit.

- 0 Rising edge trigger
- 1 Falling edge trigger

### IDI<sub>n</sub>CLR Interrupt clear control bits (n = 0 ~ 1)

This bit must first be cleared to service the next interrupt.

- 0 Don't care
- 1 Clear the interrupt

# ADVANTECH

## *eAutomation*

[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, electronic, photocopying, recording or otherwise, without prior written permission of the publisher.

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

© Advantech Co., Ltd. 2007