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PCM-3730
PC/104 16-Channel Isolated Digital I/O Module

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General information

The PCM-3730 offers 16 isolated digital I/O channels (8 DI and 8 DO) and 32 TTL digital I/O channels (16 DI and 16 DO) on a PC/104 module. Providing 2500 V_{DC} isolation, each I/O channels corresponds to a bit in a PC I/O port, making the PCM-3730 very easy to program. The PCM-3730 offers one PC interrupt with jumper-selectable IRQ.

PCM-3730
User's Manual

Features

- 16 isolated DIO channels (8 inputs and 8 outputs)
- 32 TTL-level DIO channels (16 inputs and 16 outputs)
- High output driving capacity
- High-voltage isolation on isolated I/O channels (2500 V_{DC})
- Interrupt capacity
- One 20-pin connectors for isolated input channels and output channels
- High sink current on isolated output channels (200 mA/ channel)

Applications

- Industrial ON/OFF control
- Contact closure monitoring
- Switch status sensing
- BCD interfacing
- Digital I/O control
- Industrial and lab automation

Specifications

Digital input

8 optically-isolated inputs

- **Input voltage**: 5 t o 24 V_{DC}
- **Input resistance**: 2 KW @ 0.5 W
- **Isolation voltage**: 2,500 V_{DC}
- **Throughput**: 10 KHz max.

16 TTL-level inputs

- **Input voltage**:
  Low: 0.8 V max.
  High: 2.0 V min.
- **Input load**:
  Low: 0.4 mA max at 0.5 V
  High: 0.05 mA max at 2.7 V
- **Throughput**: 30 KHz typical

Digital output

8 optically-isolated outputs

- **Output voltage**: Open collector 5 to 40 V_{DC}
- **Sink current**: 200 mA max.
- **Isolation voltage**: 2500 V_{DC}
- **Throughput**: 10 KHz max.

16 TTL-level outputs

- **Output voltage**:
  Low: Sink 8 mA at 0.5 V max.
  High: Source -0.4 mA at 2.4 V min.
- **Throughput**: 30 KHz typical

Interrupt source

Jumper selectable:
Channels 0 and 1 of Isolated DI port or
Channels 0 and 1 of TTL DI port

Register format

BASE+0	Isolated DI/O
BASE+2 and BASE+3	TTL DI/O

Dimensions

95 mm x 90 mm

Connectors

One 20-pin flat-cable connectors for isolated DIO
Two 20-pin flat-cable connectors for TTL DIO

Power consumption

+5 V: 330 mA typical, 500 mA maximum

Daughterboards

The PCM-3730 interfaces with a wide variety of Advantech daughterboards, such as the following:

PCLD-786 AC/DC power SSR and relay driver board

This board holds eight optically-isolated solid state relay modules and provides an additional eight outputs to drive external relays.

PCLD-785B and PCLD-885 relay output boards

These boards let you control relays through the PCM-3730's 16-bit TTL digital output channels. PCLD-785B provides 24 SPDT relays, while the PCLD-885 provides 16 SPST power relays.

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PCLD-782B Isolated D/I Board

This board provides 24 optically-isolated digital input channels and a cable to connect to the PCM-3730's digital input ports.

PCLD-885

The PCLD-885 provides 16 SPST power relay channels with a maximum contact rating of AC: 250 V, 5 A or DC: 20 V, 5 A. The PCLD-885 can be driven directly by the digital outputs of PC-LabCards through 20-pin flat-cable connectors or 50-pin OPTO-22 compatible connectors.

PCLD-780

This wiring terminal board makes analog or digital I/O connections easy.

PCLD-880

The PCLD-880 is a universal screw terminal board for industrial wiring. It can be used with the analog or digital ports of various PC-LabCards via 20-pin flat cables or shielded round cables with DB-37 connectors.

Installation

Initial inspection

We carefully inspected the PCM-3730 both mechanically and electrically before shipment. It should be free of marks and in perfect order on receipt.

As you unpack the PCM-3730, check it for signs of shipping damage (damaged box, scratches, dents, etc.). If it is damaged or fails to meet specifications, notify our service department or your local sales representative immediately. Also, call the carrier immediately and retain the shipping carton and packing material for inspection by the carrier. We will then make arrangements to repair or replace the unit.

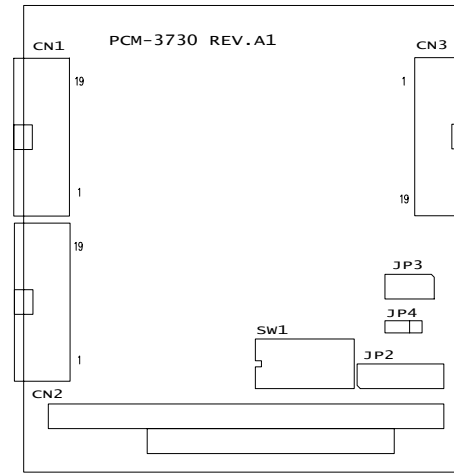
Discharge any static electricity on your body before you touch the board by touching the back of the system unit (grounded metal).

Remove the PCM-3730 module from its protective packaging by grasping the rear metal panel. Handle the card only by its edges to avoid static electric discharge which could damage its integrated circuits. Keep the antistatic package. Whenever you remove the card from the PC, please store the card in this package for protection.

You should also avoid contact with materials that hold static electricity such as plastic, vinyl and styrofoam.

Switch and jumper settings

The PCM-3730 module has one function switch and three jumper settings. The following sections tell how to configure the card. You may want to refer to the figure below for help in identifying module components.



Connectors, Jumpers, and Switches

Label	Function
CN1	Digital output
CN2	Digital input

CN3	Isolated input/output
JP2	Interrupt level
JP3	Interrupt source
JP4	Interrupt trigger
SW1	Card base address

Base address selection (SW1)

You control the PCM-3730's operation by reading or writing data to the PC's I/O (input/output) port addresses. The PCM-3730 requires four consecutive address locations. Switch SW1 sets the card's base (beginning) address. Valid base addresses range from Hex 200 to Hex 3F0. Other devices in your system may, however, be using some of these addresses.

We set the PCM-3730 for a base address of Hex 300 at the factory. If you need to adjust it to some other address range, set switch SW1 as shown in the following table:

Card I/O addresses (SW1)

Range (hex)	Switch position							
	1	2	3	4	5	6	7	8
200 - 203	○	●	●	●	●	●	●	●
204 - 207	○	●	●	●	●	●	●	○
*300 - 303	○	○	●	●	●	●	●	●
3F0 - 3F3	○	○	○	○	○	○	●	●

○ = Off ● = On * = default

Note: Switches 1-6 control the PC bus address lines as shown below:

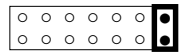
Switch	1	2	3	4	5	6	7	8
Line	A9	A8	A7	A6	A5	A4	A3	A2

Page 6 provides a PC I/O port address map to help you avoid the I/O addresses for standard PC devices.

Interrupt level (JP2)

Jumper JP2 controls the card's IRQ level, as shown below. Position X disables the interrupt.

JP2 Interrupt level



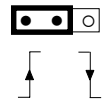
7 6 5 4 3 2 X

(the default)

Interrupt triggering (JP4)

Jumper JP4 selects the trigger edge (rising or falling) on which the card will trigger an interrupt. Jumper settings appear below:

JP4 Trigger method



Rising edge interrupt triggering (Default)



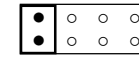
Falling edge interrupt triggering

Interrupt source (JP3)

Jumper JP3 controls the card's IRQ level, as shown below:

JP3 Interrupt source

IDI0 IDI1 DI0 DI1



Setting	Channel	Connector
IDI0	Isolated DI channel 0	CN3 pin11
IDI1	Isolated DI channel 1	CN3 pin12
DI0	TTL DI channel 0	CN2 pin 1
DI1	TTL DI channel 1	CN2 pin 2

Hardware installation

Warning! *TURN OFF your PC power supply whenever you install or remove the PCM-3730 or connect and disconnect cables.*

Installing the card in your computer

1. Turn the computer off. Turn the power off to 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 user's guide for your chassis if necessary).
4. Remove the CPU card from the chassis (if necessary) to gain access to the card's PC/104 connector.
5. Screw the bras spacer (included with the module) into the threaded hole on the CPU card. Do not tighten too much, or the threads may be damaged.
6. Carefully align the pins of the PCM-3730 with the PC/104 connector. Slide the module into the commector. The module pins may not slide all the way into the connector; do not push too hard or the module may be damaged.
7. Secure the module to the CPU card to the threaded hole in the CPU card using the included screw.
8. Attach any accessories to the PCM-3730 using 20 pin flat cables.
9. Reinstall the CPU card and replace the system unit cover. Reconnect the cables you removed in step 2. Turn the power on.

This completes the hardware installation. Install the software driver as described in the following section.

Signal connections

Good signal connections can avoid a lot of unnecessary damage to your valuable PC and other hardware. This chapter gives pin assignments for each of the card's connectors and signal connections for different applications.

Connector pin assignments

The PCM-3730 has three on-board 20-pin flat-cable connectors (insulation displacement, mass termination) See the figure on page 2 for the location of each connector.

Pin assignments for each connector appear in the following sections.

Abbreviations

DO	Digital output
DI	Digital input
D.GND	Digital ground
IDO	Isolated digital output
IDI	Isolated digital input
EO.GND	External ground for isolated output
EI.COM1	External common Vcc/GND for isolated input IDI0~IDI3
EI.COM2	External common Vcc/GND for isolated input IDI4~IDI7
EO.COM	Free wheeling common diode for isolated output IDO0~IDO7

Connector CN1 – Digital output

DO 0	1	2	DO 1
DO 2	3	4	DO 3
DO 4	5	6	DO 5
DO 6	7	8	DO 7
DO 8	9	10	DO 9
DO 10	11	12	DO 11
DO 12	13	14	DO 13
DO 14	15	16	DO 15
D.GND	17	18	D.GND
+5 V	19	20	+12 V

Connector CN2 — Digital input

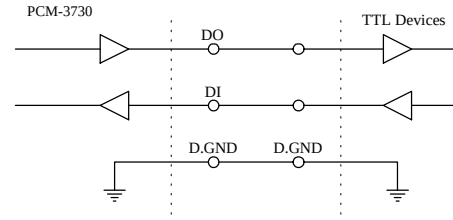
DI 0	1	2	DI 1
DI 2	3	4	DI 3
DI 4	5	6	DI 5
DI 6	7	8	DI 7
DI 8	9	10	DI 9
DI 10	11	12	DI 11
DI 12	13	14	DI 13
DI 14	15	16	DI 15
D.GND	17	18	D.GND
+5 V	19	20	+12 V

Connector CN3 — Isolated input and output

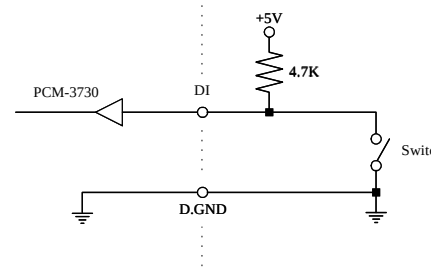
IDO 0	1	2	IDO1
IDO 2	3	4	IDO3
IDO 4	5	6	IDO5
IDO 6	7	8	IDO7
EO.GND	9	10	EO.COM
IDI0	11	12	IDI1
IDI2	13	14	IDI3
IDI4	15	16	IDI5
IDI6	17	18	IDI7
EI.COM1	19	20	EI.COM2

TTL-level I/O

The PCM-3730 has 16 TTL-level digital inputs and 16 TTL-level digital outputs. The following figure shows connections to exchange digital signals with other TTL devices:

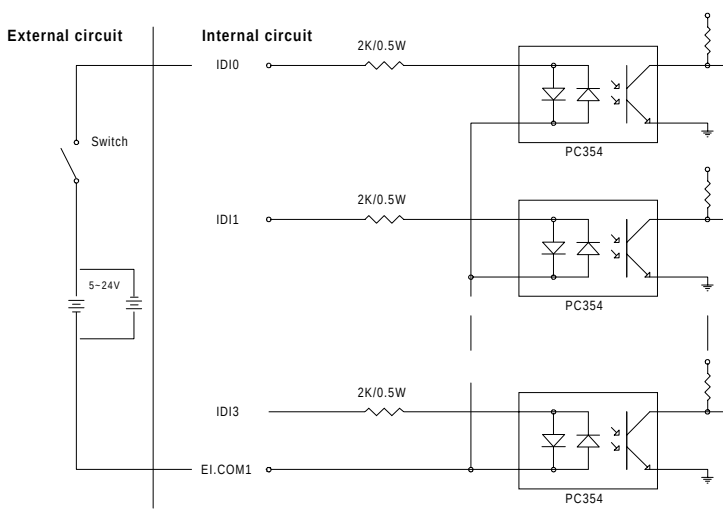


If you want to receive an OPEN/SHORT signal from a switch or relay, add a pull-up resistor to ensure that the input is held at a high level when the contacts are open. See the figure below:



Isolated Input

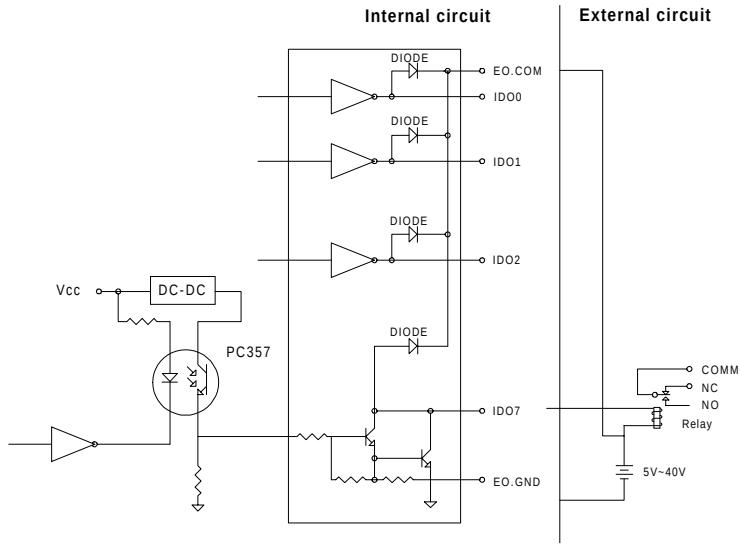
Each of the 8 isolated digital input channels accept voltages from 5 to 24 V and have a resistance of 2.0 kW. Every eight input channels share one external ground. (Channels 0~3 use EI.COM1. Channels 4~7 use EI.COM2.) The following figure shows how to connect an external input source to the card's isolated inputs:



Isolated Output

Each of the 8 isolated digital output channels comes equipped with a darlington transistor. Every eight output channels share common emitters and integral suppression diodes for inductive load, actived by connecting EO.COM to VDD.

If the external voltage (5~40 V)is connected to each isolated output channel (IDO) and its isolated digital output turns on (200 mA per channel maximum), the card's current will sink from the external voltage. The current for all channels combined exceeds 150 mA, The following figure shows how to connect an external output load to the card's isolated outputs.



Register format

Programming the PCM-3730 is extremely simple. Each I/O channel corresponds to a bit in the card's registers. To turn on an output channel you write a "1" to the corresponding bit. To read an input port, you simply read from the register.

The card requires nine I/O register addresses, but you only need to access the first four registers, the data registers. 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+2 is the base address + two bytes. If the card's base address is 300h, the register's address is 302h. See "Switch and jumper settings" for information on setting the card's base address.

Register Assignments

Address	Write	Read
BASE+0	IDO bits 0-7	IDI bits 0-7
BASE+1	NA	NA
BASE+2	DO bits 0-7	DI bits 0-7
BASE+3	DO bits 8-15	DI bits 8-15

PC I/O port address map

PC I/O port address map

Range (hex)	Function
000 - 1FF	Base system
200	Reserved
201	Game control
202 - 277	Reserved
278 - 27F	LPT2: (2nd printer port)
280 - 2F7	Reserved
2F8 - 2FF	COM2:
300 - 377	Reserved
378 - 37F	LPT1: (1st printer port)
380 - 3AF	Reserved
3B0 - 3BF	Mono Display/Print adapter
3C0 - 3CF	Reserved
3D0 - 3DF	Color/Graphics
3E0 - 3EF	Reserved
3F0 - 3F7	Floppy disk drive
3F8 - 3FF	COM1:

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