Digital I/O Board with High-Speed Opto-Isolation for PCI Express

DIO-1616TB-PE

This product is a PCI Express board used to provide a digital signal I/O function on a PC.   This product features TTL level input 16ch, TTL level output 16ch opto-coupler isolated type with an internal 5VDC power supply that does not require external power.   You can use all of the input signals as interrupt inputs. In addition, digital filter function to prevent wrong recognition of input signals is provided.   Windows/Linux driver is bundled with this product.
Possible to be used as a data recording device for LabVIEW, with dedicated libraries.

* Specifications, color and design of the products are subject to change without notice.
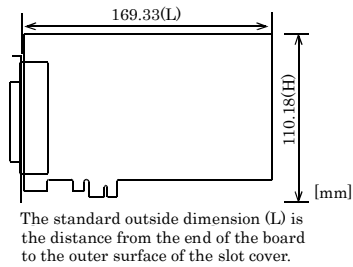
Features

Opto-coupler isolated TTL level input, opto-coupler isolated TTL level output
This product has the opto-coupler isolated TTL level input 16ch and output 16ch whose high speed response speed is 1µsec.

Opto-coupler bus isolation
As the PCI Express bus (PC) is isolated from the input and output interfaces by opto-couplers, this product has excellent noise performance.

Power supply (5VDC 600mA) for driving opto-coupler
Power supply (5VDC 600mA) for driving opto-coupler is equipped.   Whether or not to use the internal power supply can be specified by jumpers in blocks of 16ch.

You can use all of the input signals as interrupt events.
You can use all of the input signals as interrupt events and also disable or enable the interrupt in bit units and select the interrupt edge.

Windows/Linux compatible driver libraries are attached.
Using the attached driver library API-PAC(W32) makes it possible to create applications of Windows/Linux.   In addition, a diagnostic program by which the operations of hardware can be checked is provided.

This product has a digital filter to prevent input signals from carrying noise or a chattering.
This product has a digital filter to prevent input signals from carrying noise or a chattering.   All input terminals can be added a digital filter, and the setting can be performed by software.

Functions and connectors are compatible with PCI compatible board PIO-16/16TB(PCI)H.
The functions same with PCI compatible board PIO-16/16TB(PCI)H are provided.   In addition, as there is compatibility in terms of connector shape and pin assignments, it is easy to migrate from the existing system.

LabVIEW is supported by a plug-in of dedicated library VI-DAQ.
Using the dedicated library VI-DAQ makes it possible to make a LabVIEW application.

Specification

Item		Specification
Input		
	Input format	Opto-isolated TTL level input (Negative logic *1)
	Number of input signal channels	16ch (all available for interrupts) (1 common)
	Input resistance	1.1kΩ
	Interrupt	16 interrupt input signals are arranged into a single output of interrupt signal INTA. An interrupt is generated at the rising edge (HIGH-to-LOW transition) or falling edge (LOW-to-HIGH transition).
	Response time	Within 1µsec
Output		
	Output format	Opto-isolated TTL level output (Negative logic *1)
	Number of output signal channels	16ch (1 common)
Output rating	Output voltage	5VDC (Max.)
	Output current	Average 6.4mA (par channel) (4 TTL loads)
	Response time	Within 1µsec
Common		
	Built-in power	5VDC 600mA *2
	Allowable distance of signal extension	Approx. 5m (depending on wiring environment)
	I/O address	Any 32-byte boundary
	Interruption level	1 level use
	Max. board count for connection	16 boards including the master board
	Isolated Power	500Vrms
	External circuit power supply	5VDC (±10%)
	Power consumption (Max.)	When using the internal power supply : 3.3VDC 550mA, 12VDC 350mA
When using the external power supply : 3.3VDC 550mA
	Operating condition	0 - 50°C, 10 - 90%RH (No condensation)
	Bus specification	PCI Express Base Specification Rev. 1.0a x1
	Dimension (mm)	169.33(L) x 110.18(H)
	Connector	37 pin D-SUB connector [F (female) type]
DCLC-J37SAF-20L9E [mfd by JAE] or equivalent to it
	Weight	140g
	Standard	VCCI Class A, CE Marking (EMC Directive Class A, RoHS Directive), UKCA

*1   Data "0" and "1" correspond to the High and Low levels, respectively.
*2   When using the internal power supply, the input section consumes a maximum of 51mA and the output channel switching section consumes a maximum of 105.6mA.   In this case, therefore, the output current to be supplied from the board is 443.4mA.

Board Dimensions

169.33(L)

110.18(H)

[mm]

The standard outside dimension (L) is
the distance from the end of the board
to the outer surface of the slot cover.

Support Software

Windows version of digital I/O driver API-DIO(WDM)

The API-DIO(98/PC) is the Windows version driver library
software that provides products in the form of Win32 API
functions (DLL).   Various sample programs such as Visual
Basic and Visual C++, etc and diagnostic program useful for
checking operation is provided.
You can download the updated version from the CONTEC's Web
site.   For more details on the supported OS, applicable
language and new information, please visit the CONTEC's Web
site.

Linux version of digital I/O driver API-DIO(LNX)

The API-DIO(LNX) is the Linux version driver software which
provides device drivers (modules) by shared library and kernel
version.   Various sample programs of gcc are provided.
You can download the updated version from the CONTEC's Web
site.   For more details on the supported OS, applicable
language and new information, please visit the CONTEC's Web
site.

Data acquisition VI library for LabVIEW   VI-DAQ

This is a VI library to use in National Instruments LabVIEW.
VI-DAQ is created with a function form similar to that of
LabVIEW's Data Acquisition VI, allowing you to use various
devices without complicated settings.

Packing List

Board [DIO-1616TB-PE] …1
First step guide … 1
Disk *1 [API-PAC(W32)] …1

*1   The Disk contains the driver software and User's Guide.

Cable & Connector

Cable (Option)

Flat cable with both-ends 37-pin D-SUB connector
: PCB37P-1.5 (1.5m)
Shielded cable with two 37-pin D-Type connectors
: PCB37PS-0.5P (0.5m)
: PCB37PS-1.5P (1.5m)
: PCB37PS-3P (3m)
: PCB37PS-5P (5m)

Flat cable with one-ends 37-Pin D-SUB connector
: PCA37P-1.5 (1.5m)
: PCA37P-3 (3m)
Shield cable with one-end 37-pin D-SUB connector
: PCA37PS-0.5P (0.5m)
: PCA37PS-1.5P (1.5m)
: PCA37PS-3P (3m)
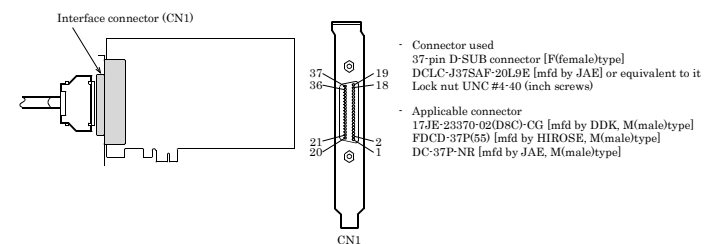: PCA37PS-5P (5m)

Accessories

Accessories (Option)

Screw Terminal (M3 x 37P)	: EPD-37A *1*2
Screw Terminal (M3.5 x 37P)	: EPD-37 *1
General Purpose Terminal	: DTP-3C *1
Screw Terminal	: DTP-4C *1
Signal Monitor for Digital I/O (32Bits)	: CM-32L *1

*1   A PCB37P or PCB37PS optional cable is required separately.
*2   "Spring-up" type terminal is used to prevent terminal screws from falling off.

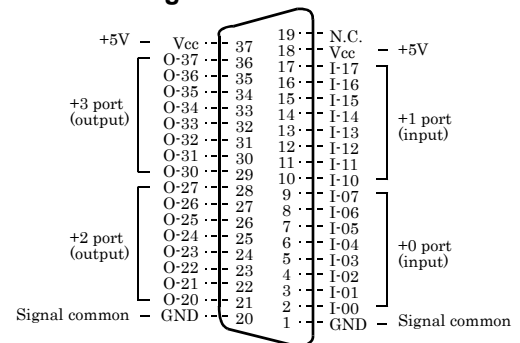*   Check the CONTEC's Web site for more information on these options.

How to connect the connectors

Connector shape

The on-board interface connector (CN1) is used when
connecting this product and the external devices.

Interface connector (CN1)

- Connector used
  37-pin D-SUB connector [F(female)type]
  DCLC-J37SAF-20L9E [mfd by JAE] or equivalent to it
  Lock nut UNC #4-40 (inch screws)

- Applicable connector
  17JE-23370-02(D8C)-CG [mfd by DDK, M(male)type]
  FDCD-37P(55) [mfd by HIROSE, M(male)type]
  DC-37P-NR [mfd by JAE, M(male)type]

CN1

Connector Pin Assignment

+5V	Vcc	37 · 19	N.C.	
	O-37	36 · 18	Vcc	+5V
	O-36	35 · 17	I-17	
+3 port (output)	O-35	34 · 16	I-16	
	O-34	33 · 15	I-15	
	O-33	32 · 14	I-14	+1 port (input)
	O-32	31 · 13	I-13	
	O-31	30 · 12	I-12	
	O-30	29 · 11	I-11	
	O-27	28 · 10	I-10	
	O-26	27 · 9	I-07	
+2 port (output)	O-25	26 · 8	I-06	
	O-24	25 · 7	I-05	
	O-23	24 · 6	I-04	+0 port (input)
	O-22	23 · 5	I-03	
	O-21	22 · 4	I-02	
	O-20	21 · 3	I-01	
Signal common	GND	20 · 2	I-00	
		· 1	GND	Signal common

I-00 - I-17 can be used as interrupt signal.

* The numbers in square brackets [ ] are pin numbers designated by HONDA TSUSHIN KOGYO
CO., LTD.

I-00 - I-17	16 input signal pins. Connect output signals from the external device to these pins.
O-20 - O-37	16 output signal pins. Connect these pins to the input signal pins of the external device.
Vcc	When using the internal power supply, output +5V. When using the external power supply, connect these pins to the positive side.
GND	When using the internal power supply, output GND. When using the external power supply, connect these pins to the negative side.
N.C.	This pin is left unconnected.

Connecting Input Signals

The external digital signal given to the signal input section is TTL level and each input signal is taken into the PC side by negative logic.
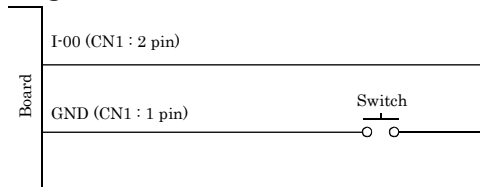
Input Circuit
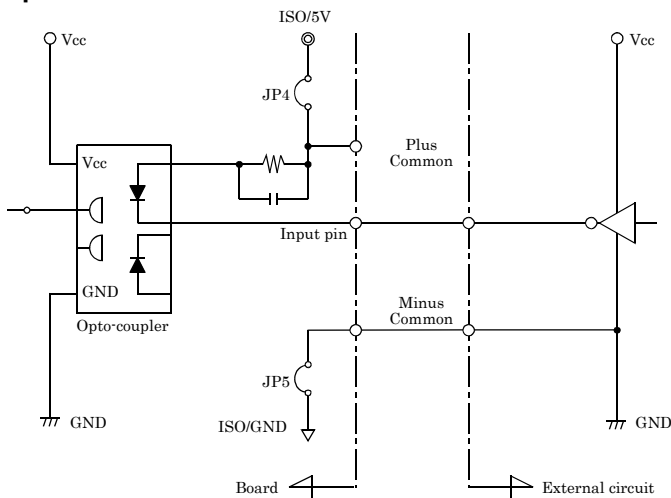
* Input pin represents I-xx.

The input circuits of interface blocks of this product are illustrated in Figure.   The signal inputs are isolated by opto-couplers. This product therefore requires the on-board internal power supply or the external 5VDC power supply to drive the input section of this product.   When using the external power supply, 4.5mA current is requested each channel.

⚠ CAUTION
Please refer to "Selecting Power Supply" and then connect the jumper in accordance with the power supply to be used.
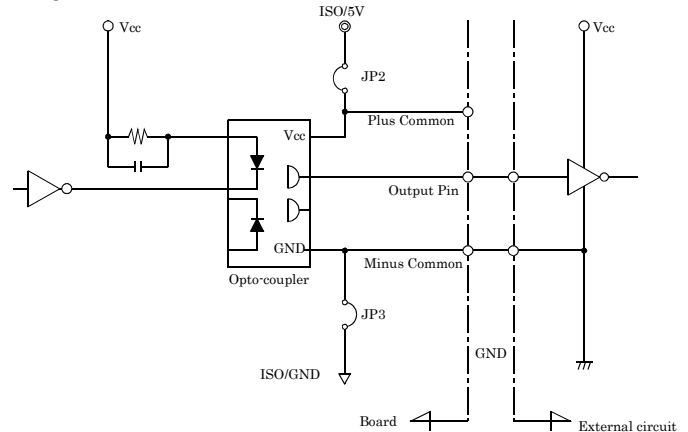
- Connecting a Switch

When the switch is ON, the corresponding bit contains 1.
When the switch is OFF, by contrast, the bit contains 0.

Connecting Output Signals

The signal output section is TTL driver output and each output signal is sent to an external device as negative logic.

Output Circuit

* Output pin represents O-xx.

The output circuits of interface blocks of this product are illustrated in Figure 3.5.   The signal outputs are TTL level signals isolated by opto-couplers.   This product therefore requires the on-board internal power supply or the external 5VDC power supply to drive the output section of this product.

⚠ CAUTION
- The Opto-coupler used on this board, with power turned, feeds low-level output when the primary circuit is not driven.
- Using the external power supply:
  The Opto-coupler keeps on outputting low-level while the external power supply is turned on and the PC is off.
- Using the internal power supply:
  Since the internal power supply ISO/5V is enabled earlier than the PC's Vcc, the opto-coupler outputs the low level for several ms while the PC is off or before the PC is turned on.
- Please refer to "Selecting Power Supply" and then connect the jumper in accordance with the power supply to be used.

Connection to the LED
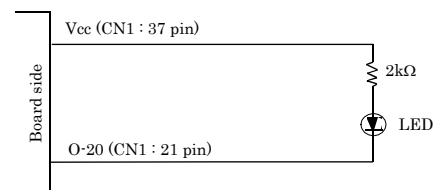
When "1" is output to a relevant bit, the corresponding LED comes on.
When "0" is output to the bit, in contrast, the LED goes out.

Block Diagram

PCI Express bus

Control Circuits

Interrupt Control Circuit

Opto-coupler

External digital input port 0 (8ch, Group 0)

Opto-coupler

External digital input port 1 (8ch, Group 1)

Opto-coupler

External digital output port 0 (8ch, Group 2)

Opto-coupler

External digital output port 1 (8ch, Group 3)

DIO-1616TB-PE