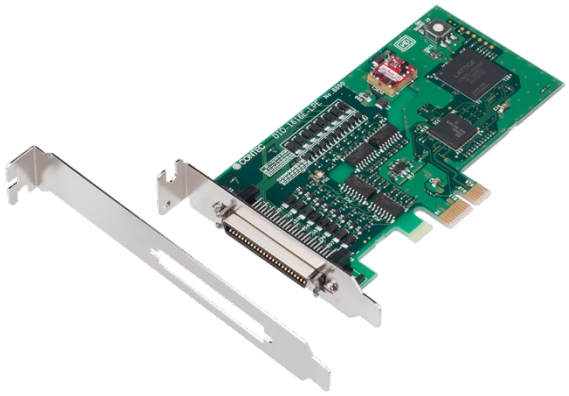
Digital I/O Board with Opto-Isolation (Wide Range) for Low Profile PCI Express

DIO-1616E-LPE



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

This product is a PCI Express bus-compliant interface board that extends the digital signal I/O functions of a PC. This product has opto-coupler isolated input 16ch and opto-coupler isolated open-collector output 16ch and can input and output a wide range signals (5 - 36VDC). You can use all of the input signals as interrupt inputs. Equipped with the digital filter function and protection circuit (surge voltage protection and overcurrent protection). This product supports a Low Profile size slot and if replaced with the supplied bracket, supports a standard size slot, too.

Windows/Linux driver is supported with this product. Using the dedicated library DAQfast makes it possible to create each application for LabVIEW.

* The contents in this document are subject to change without notice.
* Visit the CONTEC website to check the latest details.
* The information in the data sheets is as of July, 2022.

Features

Opto-coupler isolated input (supporting current sink output) and opto-coupler isolated open-collector output (current sink type)
This product has the opto-coupler isolated input 16ch (supporting current sink output) whose response speed is 60 µsec and opto-coupler isolated open-collector output 16ch (current sink type) whose response speed is 60 µsec. Supporting driver voltages of 5 - 36 VDC for I/O

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.

All input signals can be used as interrupt inputs
You can use all of the input signals as interrupt request signals and also disable or enable the interrupt in bit units and select the edge of the input signals, at which to generate an interrupt.

Windows/Linux compatible driver libraries
Using the 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.

Equipped with digital filter to prevent wrong recognition of input signals from carrying noise or a chattering
This product has a digital filter to prevent wrong recognition of 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.

Equipped with the zener diode for surge voltage protection and with the overcurrent protection circuit
Zener diodes are connected to the input and output circuits to protect against surge voltages. In addition, the output circuit, it attaches the overcurrent protection circuit at the output 8-channel unit.

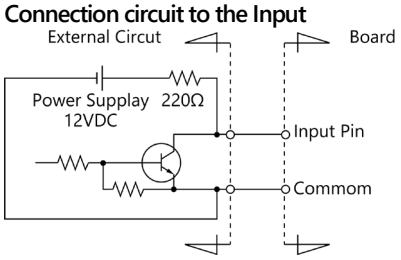
LabVIEW-support data acquisition library DAQfast for LabVIEW
DAQfast is a data collection library with Polymorphic VI to operate seamlessly for use in the LabVIEW by National Instruments.

Function Specifications

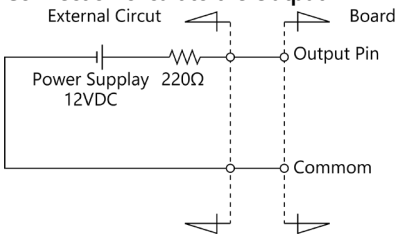
Item		DIO-1616E-LPE
Input	Type	Opto-Isolated Input (for current sinking output) (Negative logic *1)
	Number of Channels	16ch (all available for interrupts) (1 common for all I/O channels)
	Input resistance	Current limiting resistance : 680Ω, Shunt resistance : 1.5kΩ
	Current required to turn ON	6.4mA (TYP.)
	Current required to turn OFF	0.57mA or less
	Input signal voltage	5 - 36VDC
	Interrupts	Combine 16 interrupt signals to one interrupt request signal as the INTA. Either rising edge or falling edge of input signal can generate interrupt.
	Surge protector	Zener diode CMZB47 [TOSHIBA] or equivalent
	Response time *2	Rise time : 8µsec (Max.) Fall time : 60µsec (Max.)
Output	Type	Opto-Isolated Open Collector Output (current sinking type) (Negative logic *1)
	Number of Channels	16ch (1 common for all I/O channels)
	Output recommended operating voltage	5 - 36VDC
	Output rated voltage	36VDC (Max.)
	Output rated current	100mA/channel (Max.)
	Residual voltage with output on	0.5V or less (Output current ≤ 50mA), 1.0V or less (Output current ≤ 100mA)
	Surge protector	Zener diode CMZB47 [TOSHIBA] or equivalent
	Response time *2	Rise time : 8µsec (Max.) Fall time : 60µsec (Max.)
Common	Built-in power supply for driving opt-coupler	Isolated 5VDC
	Connecting distance	50m(Typ.)(depending on wiring environment)
	I/O address	Any 32-byte boundary
	Interruption level	1 level use
	Boards in one system	Maximum of 16 boards can be install in a same system.
	Isolated voltage	1000Vrms
	Connector	50-Pin Mini-Ribbon connector 10250-52A2JL [3M] or equivalent
	Power consumption	3.3VDC 850mA (Max.)
	Operating condition	0 - 50°C, 10 - 90 RH (No condensation)
	Bus specification	PCI Express Base Specification Rev. 2.0 x1
	Dimension (mm)	121.69(L) x 67.90(H)
	Weight	60g

*1 Data "0" and "1" correspond to the High and Low levels, respectively.
*2 Actual value of signal transition time under load conditions (excluding software processing time)

Connection circuit to the Input



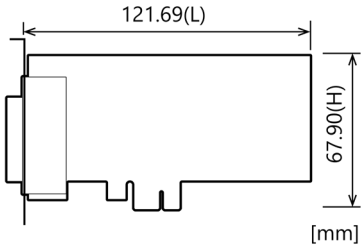
Connection circuit to the Output



Installation Environment Requirements

Item		DIO-1616E-LPE
Operating ambient temperature		0 - +50℃
Operating ambient humidity		10 - 90%RH (No condensation)
Floating dust particles		Not to be excessive
Corrosive gases		None
Line-noise resistance	Line noise	AC Line/±2kV Signal Line /±1kV(IEC61000-4-4 Level 3, EN61000-4-4 Level 3)
	Static electricity resistance	Touch /±4kV(IEC61000-4-2 Level 2, EN61000-4-2 Level 2) Air /±8kV(IEC61000-4-2 Level 3, EN61000-4-2 Level 3)
Vibration resistance	Sweep resistance	10 - 57Hz /semi-amplitude vibration 0.15mm, 57 - 150Hz/2.0G 40minutes each in X, Y, and Z directions (JIS C60068-2-6-compliant, IEC60068-2-6-compliant)
Shock resistance		147m/s^2(15G)/11ms/half-sine shock (JIS C 60068-2-27 -compliant, IEC 60068-2-27 -compliant)
Standard		VCCI Class A, CE Marking (EMC Directive Class A, RoHS Directive) , UKCA

Physical Dimensions



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

Product Configuration List

Product ...1
Setup Guide ... 1
Warranty Certificate ...1
Serial Number Label ...1
Standard size bracket ...1

Support Software

You can use CONTEC support software according to your purpose and development environment. For more details on the supported OS, applicable languages, or to download the latest version of software, visit the CONTEC Web site.

Name	Contents	How to get
Windows Version Digital I/O Driver software API-DIO(WDM)	The API-DIO(WDM) is the Windows version driver 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.	Download from the CONTEC website
Linux Version Digital I/O Driver software 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.	Download from the CONTEC website
LabVIEW-support data acquisition library DAQfast for LabVIEW	This is a data collection library to use in the LabVIEW by National Instruments. With Polymorphic VI, our design enables a LabVIEW user to operate seamlessly. Our aim is that the customers to perform easily, promptly what they wish to do.	Download from the CONTEC website

Download the files from the following URL.
https://www.contec.com/download/

Optional Products

Product Name	Model type	Description
Shield Cable with Two 50-Pin Mini-Ribbon Connector	PCB50PS-0.5P	0.5m
	PCB50PS-1.5P	1.5m
	PCB50PS-3P	3m
Shield Cable with One 50-Pin Mini-Ribbon Connector	PCA50PS-0.5P	0.5m
	PCA50PS-1.5P	1.5m
	PCA50PS-3P	3m
Connection Conversion 0.5m Shield Cable (50-Pin Ribbon->37-Pin D-SUB)	PCE50/37PS-0.5P	0.5m
Screw Terminal Unit (M3 terminal block, 50 points)	EPD-50A	*1 *2
Screw Terminal Unit (M3 terminal block, 37 points)	EPD-37A	*1 *3
Screw Terminal Unit (M3.5 terminal block, 37 points)	EPD-37	*3
Termination Panel (M3)	DTP-3C	*3
Termination Panel	DTP-4C	*3
Signal Monitor for Digital I/O	CM-32L	*3

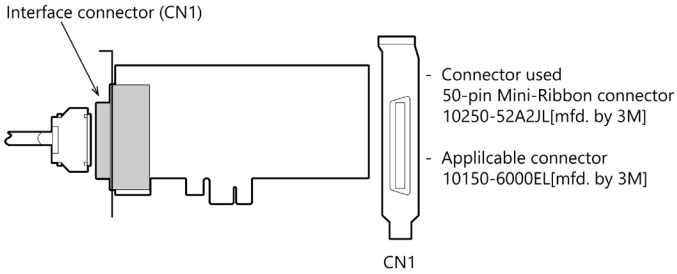
*1 "Spring-up" type terminal is used to prevent terminal screws from falling off.
*2 PCB50PS-*P optional cable is required separately.
*3 PCE50/37PS-0.5P and PCB37P or PCB37PS optional cable is required separately.

Visit the CONTEC website for the latest optional products.

Connecting to an External Device

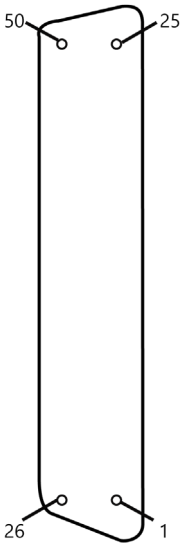
Connecting an Interface Connector

To connect an external device to this product, plug the cable from the device into the interface connector (CN1) shown below.



Layout on the Interface Connector(CN1)

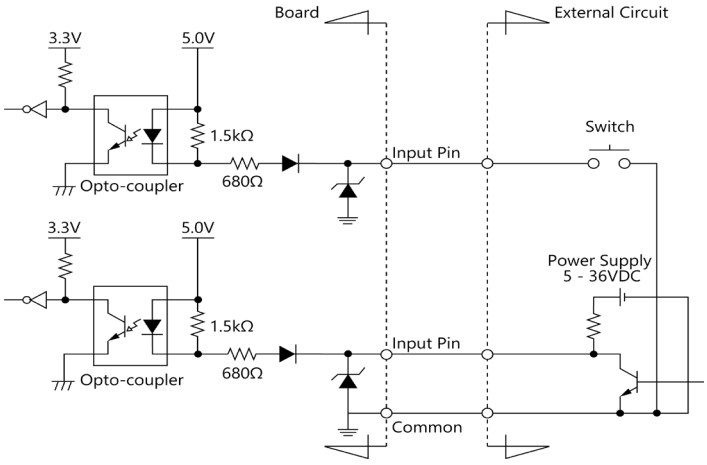
Common pin for I/O	NCOM	50		25	NCOM	Common pin for I/O
	NCOM	49		24	NCOM	
+2 port (output)	O-20	48		23	O-30	+3 port (output)
	O-21	47		22	O-31	
	O-22	46		21	O-32	
	O-23	45		20	O-33	
	O-24	44		19	O-34	
	O-25	43		18	O-35	
	O-26	42		17	O-36	
	O-27	41		16	O-37	
	N.C.	40		15	N.C.	
	N.C.	39		14	N.C.	
	N.C.	38		13	N.C.	
Common pin for I/O	NCOM	37		12	NCOM	Common pin for I/O
	NCOM	36		11	NCOM	
+0 port (input)	I-00	35		10	I-10	+1 port (input)
	I-01	34		9	I-11	
	I-02	33		8	I-12	
	I-03	32		7	I-13	
	I-04	31		6	I-14	
	I-05	30		5	I-15	
	I-06	29		4	I-16	
	I-07	28		3	I-17	
	N.C.	27		2	N.C.	
	N.C.	26		1	N.C.	



Signal name	Description
I-00 – I17	16 input signal pins. Connect output signals from the external device to these pins.
O-20 – O37	16 output signal pins. Connect these pins to the input signal pins of the external device.
NCOM	Connect the negative side of the external power supply. These pins are common to all of input and output signal pins.
N.C.	This pin is left unconnected.

Input Circuit

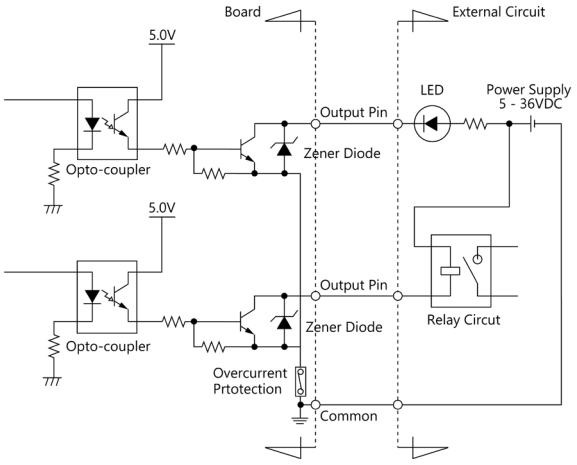
Connect the input signals to a device which can be current-driven, such as a switch or transistor output device. The board inputs the ON/OFF state of the current-driven device as a digital value.



The signal inputs are isolated by opto-couplers (ready to accept current sinking output signals). The current requirement to turn on the input is 6.4mA and a leakage current of less than 0.57mA is required to turn off the input. A zener diode is connected to each input for protection from surge voltages.

Output Circuit

Connect the output signals to a current-driven controlled device such as a relay or LED. The board controls turning on/off the current-driven controlled device using a digital value.



The signal output section is an opto-coupler isolated, open-collector output (current sink type). The rated output current per channel is 100mA at maximum. The output section can also be connected to a TTL level input as it uses a low-saturated transistor for output.

The residual voltage (low-level voltage) between the collector and emitter with the output on is 0.5V or less at an output current within 50mA or at most 1.0V at an output current within 100mA. A zener diode is connected to the output transistor for protection from surge voltages. A overcurrent protection circuit is provided for every 8 output transistors.

CAUTION

- When the PC is turned on, all output are reset to OFF.

Circuit Block Diagram