

Isolated Low price high precision analog output board for Low Profile PCI  
**DAI16-4(LPCI)L**



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

**Features**

Rich set of basic functions

Compact system providing high-precision bus isolation analog Output. This product is a control signal (Isolation TTL level 3 points) of analog output(16bits, 4ch), analog Output.

Digital inputs (Isolation TTL level four points), digital outputs (Isolation TTL level four points), and a counter (32-bit, Isolation TTL level one point) common to the three models.

Bus isolation between PC and external I/O signals by a digital isolator  
 Isolation between PC and external I/O circuit by a digital isolator improves noise tolerance.

Substantial control functions

Capable of analog input/output in either time-based mode or external-signal synchronous mode.

Filter function facilitating external signal connection

Digital filters provided for external control analog I/O signals, preventing chattering

Buffer memory

The analog inputs and outputs each have their own buffer memory. You can also perform analog input and output in the background, independent of software and the current status of the PC.

Software-based calibration function

Calibration of analog input/output can be all performed by software. Apart from the adjustment information prepared before shipment, additional adjustment information can be stored according to the use environment.

Exchangeable Low Profile size and standard size slots

Support for both of Low Profile size and standard size slots (interchangeable with a bundled bracket).

Plug-ins for the dedicated libraries, the board also supports LabVIEW. We offer a dedicated library [DAQfast for LabVIEW], which allows you to use the product on LabVIEW.

This product is a PCI-compliant interface board that incorporates high-precision analog outputs, digital inputs, digital outputs, and a counter function. Noise tolerance is enhanced by the bus isolation.

This product supports a Low Profile size slot and, if replaced with the supplied bracket, supports a standard size slot, too. The board can make your space-saving PC into a cost-effective analog input/output system.

Using the bundled API function library package [API-PAC(W32)], you can create Windows application software for this board in your favorite programming language supporting Win32 API functions, such as Visual Basic or Visual C++.

With plug-ins for the dedicated libraries, the board also supports LabVIEW.

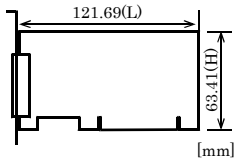
- \* The contents in this document are subject to change without notice.
- \* Visit the CONTEC website to check the latest details in the document.
- \* The information in the data sheets is as of August, 2022.

**Specification**

Item	Specifications
<b>Analog output</b>	
Isolated specification	Bus-Isolated
Number of output channels	4ch
Output range	Bipolar ±10V
Absolute max. output current	+5mA
Output impedance	1Ω or less
Resolution	16bit
Non-Linearity error *1	+5LSB
Conversion speed	10μsec [100KSPS]*2
Buffer memory	1k Word
Conversion start trigger	Software / external trigger
Conversion stop trigger	Number of sampling times / external trigger/software
External start signal	Isolation TTL level (Rising or falling edge can be selected by software) Digital filter (1μsec can be selected by software)
External stop signal	Isolation TTL level (Rising or falling edge can be selected by software) Digital filter (1μsec can be selected by software)
External clock signal	Isolation TTL level (Rising or falling edge can be selected by software) Digital filter (1μsec can be selected by software)
<b>Digital I/O</b>	
Number of input channels	Isolated input 4ch (TTL level positive logic)
Number of output channels	Isolated output 4ch (TTL level positive logic)
<b>Counter</b>	
Number of channels	1ch
Counting system	Up count
Max. count	FFFFFFFF (Binary data,32bit)
Number of external inputs	2 Isolation TTL level (Gate/Up) Gate (positive logic/level), Up (Rising edge)
Number of external outputs	1 Isolation TTL level Count match output (positive logic, pulse output)
Response frequency	1MHz (Max.)
<b>Common section</b>	
I/O address	64 ports
Interruption level	Errors and various factors, One interrupt request line as INTA
Connector	10250-52A2L[3M]
Power consumption	5VDC 800 mA (Max.)
Operating condition	0 - 50°C, 10 - 90%RH (No condensation)
PCI bus specification	32bit, 33MHz, Universal key shapes supported *3
Dimension (mm)	121.69 (L) x 63.41 (H)
Weight	65 g
Standard	VCCI Class A, CE Marking (EMC Directive Class A, RoHS Directive), UKCA

- \*1: The non-linearity error means an error of approximately 0.1% occurs over the maximum range at 0°C and 50°C ambient temperature.
- \*2: SPS = Samplings Per Second. The number of data that can be converted in one second is shown.
- \*3: This board requires power supply at +5V from an expansion slot (it does not work on a machine with a +3.3V power supply alone).

Dimensions



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 analog I/O driver API-AIO(WDM)  
 The API-AIO(WDM) 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 \*1useful for checking operation is provided. For more details on the supported OS, applicable language and new information, please visit the CONTEC's Web site.

Linux version of analog I/O driver API-AIO(LNX)  
 The API-AIO(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. For more details on the supported OS, applicable language and new information, please visit the CONTEC's Web site.

LabVIEW VI Library for Data Acquisition DAQfast for LabVIEW  
 This is a data collection library to use our devices in the LabVIEW by National Instruments. With Polymorphic VI, our design enables a LabVIEW user to operate seamlessly. Our aim is for the customers to perform easily, promptly what they wish to do.

Data Acquisition library for MATLAB ML-DAQ  
 (Available for downloading (free of charge) from the CONTEC web site. Supports R14 - R2012b in MATLAB 32-bit version.)  
 This is the library software which allows you to use our analog I/O device products on MATLAB by the MathWorks. Each function is offered in accordance with the interface which is integrated in MATLAB's Data Acquisition Toolbox. For more details on the supported OS, applicable language and new information, please visit the CONTEC's Web site.

Packing List

- Board [DAI16-4(LPCI)L] ...1
- First step guide ... 1
- Disk \*1 [API-PAC(W32)] ...1
- Standard size bracket ...1
- Warranty Certificate ...1
- Serial Number Label ...1

\*1 The bundled disk contains the driver software and User's Guide.

List of Options

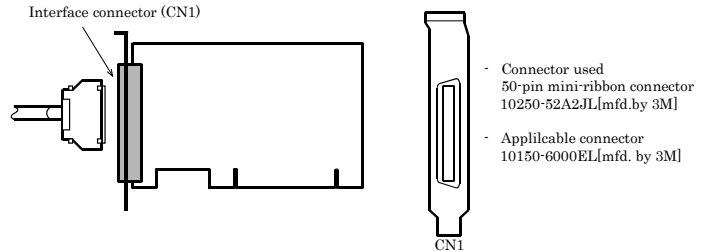
- Shield Cable with 50-Pin Mini-Ribbon Connectors at either Ends :PCB50PS-0.5P (0.5m)  
:PCB50PS-1.5P (1.5m)
- Shield Cable with 50-Pin Mini-Ribbon Connector at one End :PCA50PS-0.5P (0.5m)  
:PCA50PS-1.5P (1.5m)
- Screw Terminal Unit (M3 x 50P) :EPD-50A \*1\*3
- BNC Terminal Unit (for analog input 8ch) :ATP-8L \*1\*2

\*1 PCB50PS-0.5P or PCB50PS-1.5P optional cable is required separately.  
 \*2 Capable of using the analog input of up to 8ch, and analog output of up to 2ch.  
 \*3 "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

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



Connector Pin Assignment

Pin Assignments of DAI16-4(LPCI)L Interface Connector (CN1)

Analog Output 02	AO 02	50	25	-AO 00	Analog Output 00
Analog Ground (for AO)	AGND	49	24	-AGND	Analog Ground (for AO)
Analog Output 03	AO 03	48	23	-AO 01	Analog Output 01
Analog Ground (for AO)	AGND	47	22	-AGND	Analog Ground (for AO)
Non Connect	N.C.	46	21	-N.C.	Non Connect
Non Connect	N.C.	45	20	-N.C.	Non Connect
Non Connect	N.C.	44	19	-N.C.	Non Connect
Non Connect	N.C.	43	18	-N.C.	Non Connect
Reserved	Reserved	42	17	-Reserved	Reserved
Reserved	Reserved	41	16	-Reserved	Reserved
Non Connect	N.C.	40	15	-N.C.	Non Connect
Non Connect	N.C.	39	14	-N.C.	Non Connect
Non Connect	N.C.	38	13	-N.C.	Non Connect
Non Connect	N.C.	37	12	-N.C.	Non Connect
AO External Start Trigger Input	AO START	36	11	-N.C.	Non Connect
AO External Stop Trigger Input	AO STOP	35	10	-N.C.	Non Connect
AO External Sampling Clock Input	AO EXCLK	34	9	-N.C.	Non Connect
Digital Ground	DGND	33	8	-DGND	Digital Ground
Digital Output 00	DO 00	32	7	-DI 00	Digital Input 00
Digital Output 01	DO 01	31	6	-DI 01	Digital Input 01
Digital Output 02	DO 02	30	5	-DI 02	Digital Input 02
Digital Output 03	DO 03	29	4	-DI 03	Digital Input 03
Digital Ground	DGND	28	3	-DGND	Digital Ground
Counter UP Clock Input	CNT UPCLK	27	2	-CNT GATE	Counter Gate Control Input
Reserved	Reserved	26	1	-CNT OUT	Counter Output

Analog Output00 - Analog Output03	Analog output signal. The numbers correspond to channel numbers.
Analog Ground	Common analog ground for analog I/O signals.
AO External Start Trigger Input	External trigger input for starting analog output sampling.
AO External Stop Trigger Input	External trigger input for stopping analog output sampling.
AO External Sampling Clock Input	External sampling clock input for analog output.
Digital Input00 - Digital Input03	Digital input signal.
Digital Output00 - Digital Output03	Digital output signal.
Counter Gate Control Input	Gate control input signal for counter.
Counter Up Clock Input	Count-up clock input signal for counter.
Counter Output	Counter output signal.
Digital Ground	Common digital ground for digital I/O signals, external trigger inputs, external sampling clock inputs, and counter I/O signals.
Reserved	Reserved pin.
N.C.	No connection to this pin.

CAUTION

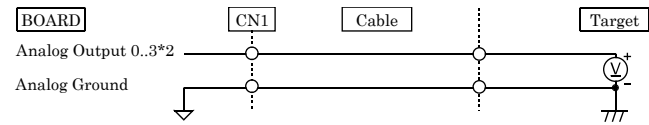
- Do not connect any of the outputs and power outputs to the analog or digital ground. Neither connect outputs to each other. Doing either can result in a fault.
- If analog and digital ground are shorted together, noise on the digital signals may affect the analog signals. Accordingly, analog and digital ground should be separated.
- Leave "Reserved" pins unconnected. Connecting these pins may cause a fault in the board.

### Analog Output Signal Connection

This section shows how to connect the analog output signal by using a flat cable or a shielded cable.

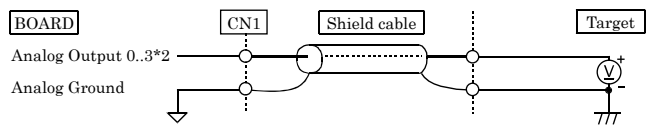
The following figure shows an example of flat cable connection. Connect the signal source and ground to the CN1 analog output.

#### Analog Output Connection (Flat Cable)



The following figure shows an example of shield cable connection. Use shielded cable if the distance between the signal source and board is long or if you want to provide better protection from noise. For each analog input channel on CN1, connect the core wire to the signal line and connect the shielding to ground.

#### Analog Output Connection (Shield Cable)



\*2 The number of channels depends on each board. The DAI16-4(LPCI)L has four channels.

#### CAUTION

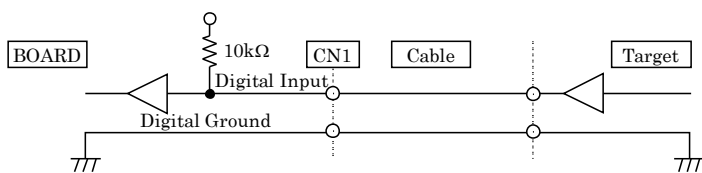
- If the board or the connected wire receives noise, or the distance between the board and the target is long, data may not be outputted properly.
- Do not short the analog output signal to analog ground, digital ground, and/or power line. Doing so may damage the board.
- Do not connect an analog output signal to any other analog output, either on the board or on an external device, as this may cause a fault on the board.
- Analog ground of CN1 is isolated from the ground in the PC.

### Digital I/O signals, Counter signals and Control signals Connection

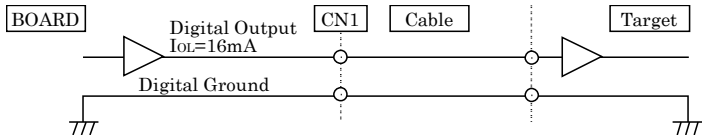
The following sections show examples of how to connect digital I/O signals, counter I/O signals, and other control I/O signals (external trigger input signals, sampling clock input signals, etc.).

All the digital I/O signals and control signals are TTL level signals.

#### Digital Input Connection



#### Digital Output Connection



#### About the counter input control signal

Counter Gate Control Input acts as an input that validate or invalidate the input of an external clock for the counter. This function enables the control of an external clock input for the counter. The external clock for the counter is effective when input is "High", and invalid when input is "Low". If unconnected, it is a pull-up in the board (card) and remains "High". Therefore the external clock for the counter is effective when the counter gate control input is not connected.

#### CAUTION

- Do not short the output signals to analog ground, digital ground, and/or power line. Doing so may damage the board.
- Do not connect a digital output signal to any other digital output, either on the board or on an external device, as this may cause a fault on the board.
- Analog ground of CN1 is isolated from the ground in the PC.

### Block Diagram

