

Non-insulated type high precision multi-channel analog output board for Low Profile PCI

DA16-16(LPCI)L



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

Features

Multi-channels analog output

This product is capable of outputting 16 channels.

Rich set of basic functions

Compact system providing high-precision analog outputs. Analog output control signal (3 channels), digital inputs (TTL level 4 channels), digital outputs (TTL level 4 channels), and a counter (32bit TTL level 1 channel) other than analog output are provided.

Substantial control functions

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

Filter function facilitating external signal connection

Digital filters provided for external control analog output signals, preventing chattering

Safety design to adjust output voltage to 0V when power supply is turned on

To prevent the unstable voltage and the connected device of D/A converter from fault and malfunctions when the power supply is turned on, the circuit is designed to adjust output voltage of the analog output to 0V.

Software-based calibration function

Calibration of analog 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 MATLAB and LabVIEW.

We offer a dedicated library [ML-DAQ], which allows you to use this product on MATLAB by The MathWorks as well as another dedicated library [VI-DAQ], which allows you to use the product on LabVIEW.

These dedicated libraries are available, free of charge (downloadable), on our web site.

This product is a PCI-compliant interface board that incorporates high-precision 16bit analog outputs, digital I/O(TTL level, 4 channels each), and a counter (32bit, 1 channel) function.

This product supports a low-profile size slot and, if replaced with the supplied bracket, supports a standard size slot, too. This product can make your space-saving PC into a cost-effective analog 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 MATLAB and LabVIEW.

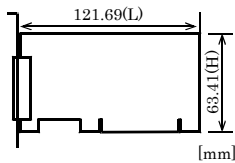
Specification

| Item | Specification |
|------------------------------|---|
| Analog output | |
| Isolated specification | Non-isolation |
| Number of output channels | 16 channels |
| Output range | Bipolar ±10V |
| Absolute max. output current | ±3mA |
| Output impedance | 1Ω or less |
| Resolution | 16bit |
| Non-Linearity error *1 | ±5LSB |
| Conversion speed | 10μ sec [100KSPS] (Max.) |
| Buffer memory | 1K data |
| Conversion start trigger | Software / external trigger |
| Conversion stop trigger | Number of sampling times / external trigger/software |
| External start signal | TTL level (Rising or falling edge can be selected by software) Digital filter (1μ sec can be selected by software) |
| External stop signal | TTL level (Rising or falling edge can be selected by software) Digital filter (1μ sec can be selected by software) |
| External clock signal | TTL level (Rising or falling edge can be selected by software) |
| Digital I/O | |
| Number of input channels | Non-isolated input 4 channels (TTL level positive logic) |
| Number of output channels | Non-isolated output 4 channels (TTL level positive logic) |
| Counter | |
| Number of channels | 1 channel |
| Counting system | Up count |
| Max. count | FFFFFFFFh (Binary data,32bit) |
| Number of external inputs | 2 TTL level (Gate/Up)/ch Gate (High level), Up (Rising edge) |
| Number of external outputs | TTL level Count match output (positive logic, pulse output) |
| Response frequency | 10MHz (Max.) |
| Common section | |
| I/O address | 64 ports |
| Interruption level | Errors and various factors, One interrupt request line as INTA |
| Connector used | 50-pin mini-ribbon connector 10250-52A2JL [mfd. by 3M] or equivalence to it |
| Power consumption (Max.) | 5VDC 1100mA |
| Operating condition | 0 - 50°C, 10 - 90%RH (No condensation) |
| Bus specification | 32bit, 33MHz, Universal key shapes supported *2 |
| Dimension (mm) | 121.69 (L) x 63.41 (H) |
| Weight | 60g |

*1 A linearity error approximately 0.1% of full-range may occur when operated at 0°C or 50°C ambient temperature.

*2 This product requires power supply at +5V from an expansion slot (it does not work on a machine with a +3.3V power supply alone).

Board 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)
[Stored on the bundled CD-ROM driver library API-PAC(W32)]

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 useful for checking operation is provided.

< Operating environment >

OS Windows Vista, XP, Server 2003, 2000
 Adaptation language Visual Basic, Visual C++, Visual C#, Delphi, C++ Builder

For more details on the supported OS, applicable language and how to download the updated version, please visit the CONTEC's Web site (<http://www.contec.com/apipac/>).

Linux version of analog I/O driver API-AIO(LNX)
[Stored on the bundled CD-ROM driver library API-PAC(W32)]

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.

< Operating environment >

OS RedHatLinux, TurboLinux
 (For details on supported distributions, refer to Help available after installation.)

Adaptation language gcc

For more details on the supported OS, applicable language and how to download the updated version, please visit the CONTEC's Web site (<http://www.contec.com/apipac/>).

Data Acquisition library for MATLAB ML-DAQ
(Available for downloading (free of charge) from the CONTEC web site.)

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.

See <http://www.contec.com/mldaq/> for details and download of ML-DAQ.

Data acquisition VI library for LabVIEW VI-DAQ
(Available for downloading (free of charge) from the CONTEC web site.)

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.

See <http://www.contec.com/vidaq/> for details and download of VI-DAQ.

Cable & Connector

Cable (Option)

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)

Accessories (Option)

Screw Terminal Unit (M3 x 50P) : EPD-50A *1 *2

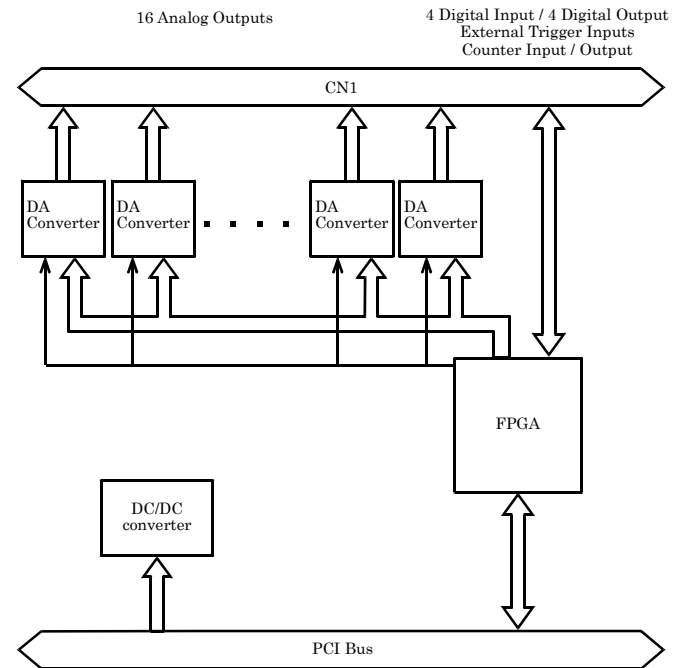
- *1 PCB50PS-0.5P or PCB50PS-1.5P optional cable is required separately.
- *2 "Spring-up" type terminal is used to prevent terminal screws from falling off.
- * Check the CONTEC's Web site for more information on these options.

Packing List

- Board [DA16-16(LPCI)L] ...1
- First step guide ... 1
- CD-ROM *1 [API-PAC(W32)] ...1
- Standard-sized bracket...1

*1 The CD-ROM contains the driver software and User's Guide.

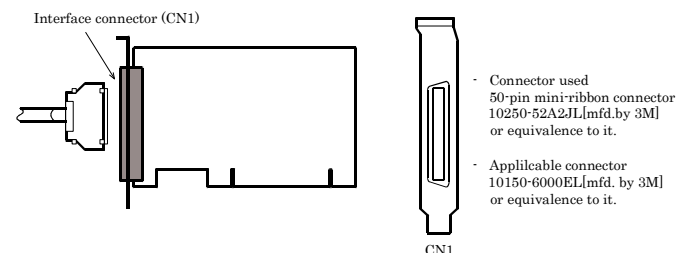
Block Diagram



How to connect the connectors

Connector shape

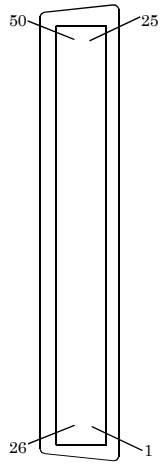
To connect an external device to this product, plug the cable from the device into the interface connector (CN1) shown below.



* Please refer to page 2 for more information on the supported cable and accessories.

Pin Assignments of 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) |
| Analog Output 06 | AO 06 | 46 | 21 | AO 04 | Analog Output 04 |
| Analog Ground (for AO) | AGND | 45 | 20 | AGND | Analog Ground (for AO) |
| Analog Output 07 | AO 07 | 44 | 19 | AO 05 | Analog Output 05 |
| Analog Ground (for AO) | AGND | 43 | 18 | AGND | Analog Ground (for AO) |
| Analog Output 10 | AO 10 | 42 | 17 | AO 08 | Analog Output 08 |
| Analog Ground (for AO) | AGND | 41 | 16 | AGND | Analog Ground (for AO) |
| Analog Output 11 | AO 11 | 40 | 15 | AO 09 | Analog Output 09 |
| Analog Ground (for AO) | AGND | 39 | 14 | AGND | Analog Ground (for AO) |
| Analog Output 14 | AO 14 | 38 | 13 | AO 12 | Analog Output 12 |
| Analog Ground (for AO) | AGND | 37 | 12 | AGND | Analog Ground (for AO) |
| Analog Output 15 | AO 15 | 36 | 11 | AO 13 | Analog Output 13 |
| Analog Ground (for AO) | AGND | 35 | 10 | AGND | Analog Ground (for AO) |
| Output control External Sampling Stop Trigger Input | OCESSPI | 34 | 9 | OCESSSTI | Output Control External Sampling Start Trigger Input |
| Output Control External Sampling Clock Input | OCESSCKI | 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 CKI | 27 | 2 | CNT GCI | Counter Gate Control Input |
| Reserved (Counter Input) | Reserved | 26 | 1 | CNT CPO | Counter Count-up Pulse Output |



| | |
|-------------------------------------|--|
| Analog Output00 - Analog Output15 | Analog output signal. The numbers correspond to channel numbers. |
| Analog Ground *1 | Common analog ground for analog I/O signals. |
| AO External Start Trigger Input *1 | External trigger input for starting analog output sampling. |
| AO External Stop Trigger Input *1 | External trigger input for stopping analog output sampling. |
| AO External Sampling Clock Input *1 | 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 Count-up Pulse Output | Counter output signal. |
| Digital Ground *1 | Common digital ground for digital I/O signals, external trigger inputs, external sampling clock inputs, and counter I/O signals. |
| Reserved (Counter Input) | Reserved pin. |
| N.C. | No connection to this pin. |

*1 Pin Assignments is different from High-Resolution Analog Output Board for Low Profile PCI DA16-4 (LPCI)L.

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.

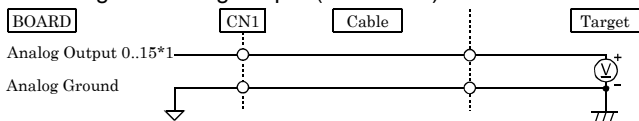
Leave "Reserved" pins unconnected. Connecting these pins may cause a fault in the board.

Connecting the Analog Output Signal

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

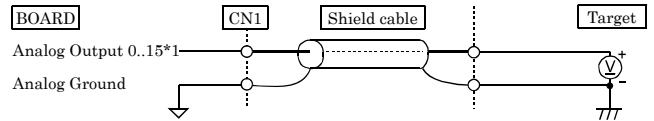
The following figure shows an example of flat cable connection. Connect the signal source and ground to the CN1 analog output.

Connecting the Analog Output (Flat Cable)



The following figure shows an example of shield cable connection. Use shielded cable if the distance between the signal source and this product 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.

Connecting the Analog Output (Shield Cable)



*1 The number of channels depends on each board. This product has 16 channels.

CAUTION

If this product or the connected wire receives noise, or the distance between this product and the target is long, data may not be outputted properly.

For analog output signal, the current capacity is ±3mA (Max.). Check the specification of the connected device before connecting this product.

Do not short the analog output signal to analog ground, digital ground, and/or power line. Doing so may damage this product.

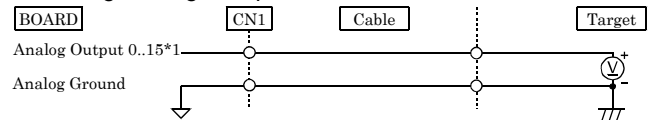
Do not connect an analog output signal to any other analog output, either on this product or on an external device, as this may cause a fault on this product.

Connecting the Digital I/O, Counter and Control Signal

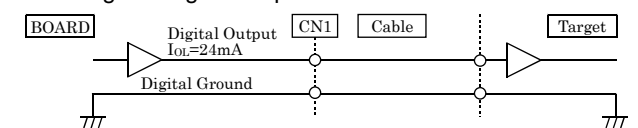
The following sections show examples of how to connect digital I/O signals, counter I/O signals, and other control I/O signals (external trigger input signals, sampling clock input signals, etc.).

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

Connecting the Digital Input



Connecting the Digital Output



About the counter input signal control

Counter Gate Control Input (refer to the page 3 Connector Pin Assignment) allows the input of the external clock for the counter to be enabled and disabled. This function can be used to control the input of the external clock for the counter. When the input level is "High", the input of the external clock for the counter is enabled. It is, on the other hand, disabled, when the input level is "Low". Note that when it is not connected, the input level is set to "High" as the board (card) pins are pulled up. Therefore, the input of the external clock for the counter is enabled when it is not connected.

CAUTION

Do not short the output signals to analog ground, digital ground, and/or power line. Doing so may damage this product.