Digital to Analog Output Board for PCI
4ch type

DA12-4(PCI)

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

These boards are PCI bus compliant interface boards that performs digital-to-analog conversion.

The < DA12-4(PCI) > performs D-A conversion using 4 output channels at a conversion speed of 10µsec [100KSPS] and a resolution of 12bit.

Windows/Linux device driver is supported with this product.

* 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 July, 2024.

Features

- Support for unipolar and bipolar output ranges

An output range can be set for each channel by software.

- Two output modes selectable

The board offers a choice of two output modes selectable. One updates only the output voltage of a specified channel and the other updates the output voltages of all channels.

- Capable of updating the output voltage using a generating clock

The board can update the output voltage periodically using the internal generating clock or in synchronization with external events using an external generating clock.

- 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 adjusts output voltage of the analog output to 0V.

- Optional units

Using optional units facilitates connections.

For more details on the option, please refer to “Optional Products”.

- Windows/Linux support device driver

Using the device driver API-TOOL 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.

Specifications

Function specification

Item		Specification
Analog output		
	Isolated specification	Un-Isolated
	Number of output channels	4ch
	Output range	Bipolar ±10V, ±5V, or Unipolar 0 - +10V (Software setting by channel)
	Absolute max. output current	±5mA
	Output impedance	10Ω or less
	Resolution	12bit
	Non-Linearity error *1	±3LSB
	Conversion speed *2	10µsec [100KSPS]*3 (Max.)
	Generating clock	Internal generating clock : 10,000 - 1,073,741,824,000nsec (Can be set in 250nsec units) External generating clock : TTL level falling edge
	Output mode	Transparent output, Synchronization output
Programmable timer		
	Setting frequency	500 - 1,073,741,824,000nsec (Can be set in 250nsec units)
	Status	Count up, Count up overrun
	Timer output signal	TTL level 250nsec Low pulse
External trigger input		
	External trigger input signal	Un-isolated input 1ch (TTL level falling edge)
	Status	Trigger input, Trigger input overrun
Common section		
	I/O address	32 ports boundary
	Interruption level	Errors and various factors, One interrupt request line as INTA
	Power consumption	+5VDC 600mA (Max.)
	Bus specification	32bit, 33MHz, Universal key shapes supported *4*5
	Dimension (mm)	176.41(L) x 105.68(H) *6
	Weight	130g

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

*2 The minimum clock speed actually available depends on the OS and driver.

*3 SPS = Samplings Per Second. The number of data that can be converted in one second is shown.

*4 This product requires +5V power supply from the expansion slot (it does not work in a +3.3V environment).

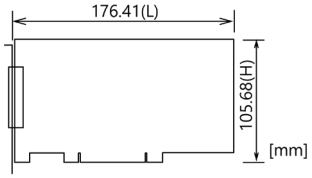
*5 DA12-4(PCI): If the board No. is 7147, PCI bus specification is 32bit, 33MHz, 5V.

*6 Boards with different board numbers are different in these specifications. See "Different by board number" at the end of this document.

Installation Environment Requirements

Item	Description
Operating ambient temperature	0 - 50℃
Operating ambient humidity	10 - 90%RH (No condensation)
Floating dust particles	Not to be excessive
Corrosive gases	None
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 card to the outer surface of the slot cover.

Support Software

Name	Contents	How to get
Windows version High-efficiency Analog I/O Driver API-AIO(WDM)	The API-AIO(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 *1
Analog I/O Driver for Linux API-AIO(LNX)	This is the Linux version driver software provided in API function formats. The software includes various sample programs such as gcc (C, C++) and Python programs.	Download from the CONTEC website *1
Software Development Tool Kits (SDK) and Support Software	In addition to the device drivers, we offer many software programs for using CONTEC devices in an easier manner.	Download from the CONTEC website *2

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

*2 For supported software, search the CONTEC website for this product and view the product page.
https://www.contec.com/

Optional Products

Product Name	Model type	Description
Shield Cable with two 37-pin D-type connectors	PCB37PS-0.5P	0.5m
	PCB37PS-1.5P	1.5m
Flat Cable with 37-Pin D-type Connectors on 2Ends	PCB37P-1.5	1.5m
Shield Cable with One 37pin D-type Connector	PCA37PS-0.5P	0.5m
	PCA37PS-1.5P	1.5m
Flat Cable with a 37Pin D-type Connectors	PCA37P-1.5	1.5m
Coaxial Cable for Single-ended Inputs	PCC16PS-1.5	1.5m
	PCC16PS-3	3m
Screw Terminal (M3 * 37P)	EPD-37A	*1*2
Screw Terminal (M3.5 * 37)	EPD-37	*2
General Purpose Terminal	DTP-3C	*2
Screw Terminal	DTP-4C	*2

*1 "Spring-up" type terminal is used to prevent terminal screws from falling off.

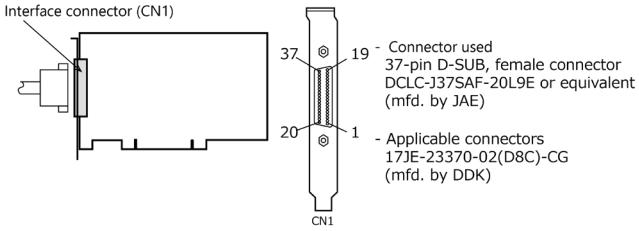
*2 PCB37P or PCB37PS optional cable is required separately.

Visit the CONTEC website for the latest optional products.

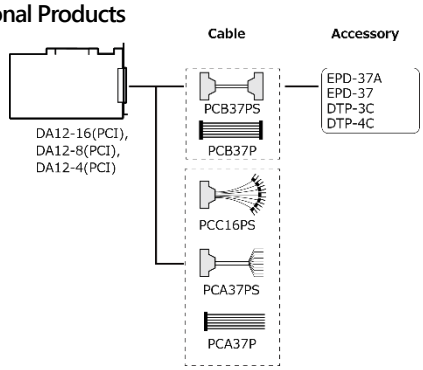
Included Items

Product ...1
Please read the following...1

Connecting an Interface Connector



Adding Optional Products



Layout on the Interface Connector(CN1)

Settling Busy Output	37	37 19	19	Timer Output
Digital Ground	36		18	External Trigger Input
Analog Ground	35		17	External Sampling Clock Input
Analog Ground	34		16	N.C.
Analog Ground	33		15	N.C.
Analog Ground	32		14	N.C.
Analog Ground	31		13	N.C.
Analog Ground	30		12	N.C.
Analog Ground	29		11	N.C.
Analog Ground	28		10	N.C.
Analog Ground	27		9	N.C.
Analog Ground	26		8	N.C.
Analog Ground	25		7	Analog Output 3
Analog Ground	24		6	N.C.
Analog Ground	23		5	Analog Output 2
Analog Ground	22		4	N.C.
Analog Ground	21		3	Analog Output 1
Analog Ground	20	20 1	2	N.C.
			1	Analog Output 0

Signal name	Description
Analog Output 0 - Analog Output 3	Analog output signal. The numbers correspond to channel numbers.
Analog Ground	Common analog ground for analog output signals.
External Trigger Input	External trigger input signal.
External Sampling Clock Input	External sampling clock input signal.
Timer Output	Programmable timer output signal.
Settling Busy Output	Output signal indicating the settling time from the beginning of DA conversion until the analog output reaches a predetermined value.
Digital Ground	Digital ground common to the signals other than the analog output signal, including the external sampling clock input signal.

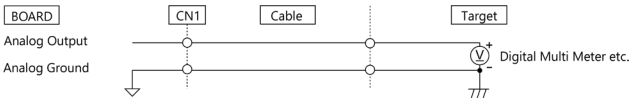
⚠ CAUTION

- Do not short any of the 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.

Analog Output Signal Connection

Analog Output Connection (Flat Cable)

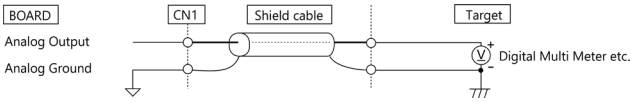
The following figure shows an example of flat cable connection. Connect the signal source and ground to the CN1 analog output.



Analog Output Connection (Shielded Cable)

The following figure shows an example of shielded cable connection. Use shielded cable if the distance between the signal source and product is long or if you want to provide better protection from noise.

For the CN1 analog output, connect the core wire to the signal line and connect the shielding to ground.



⚠ CAUTION

- If this product and the target receive noise or the distance between this product and the signal source is too long, data may not be input properly.
- The maximum output current-carrying capacity of the analog output signal is ±5 mA. Check the specifications of the target before connecting this product to it.
- Do not connect any of the outputs and power outputs to the analog or digital ground.
- Do not connect the analog output signal to the other analog output signal and output signal of external device. Doing so may malfunction.
- Do not plug or unplug the interface connector to or from while the PC or external device power is turned on. Doing so may malfunction.
- The DA converter may cause glitches as it contains no deglitcher.
- The analog output signal may temporarily vary in output voltage when the power is turned on or when the range is switched. If this variation in output voltage is a problem, insert, for example, a relay between this product and the external device.

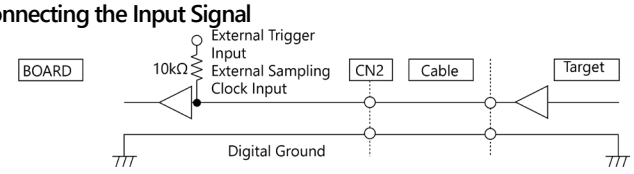
Control signals Connection

This section shows how to connect the control signal(External Trigger Input, Settling Busy Output and so on) by using a flat cable.

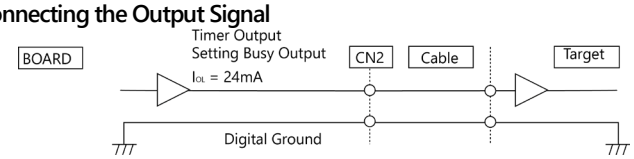
The following sections show examples of how to connect digital I/O signals, counter I/O signals, and other control I/O signals (external trigger input signals, sampling clock input signals, etc.).

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

Connecting the Input Signal



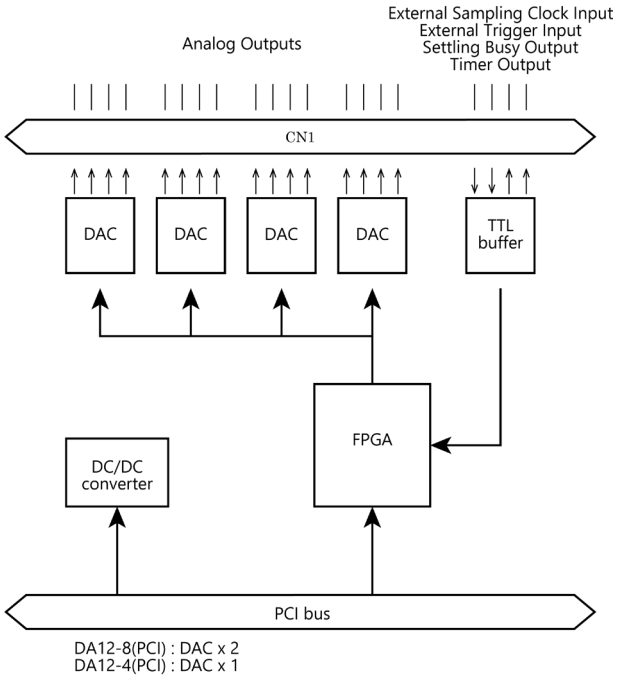
Connecting the Output Signal



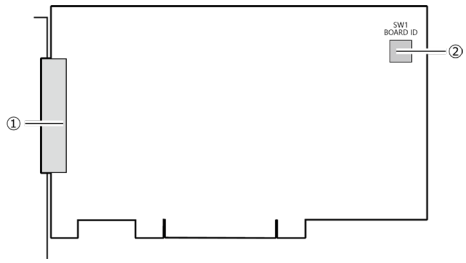
⚠ CAUTION

- Do not short the output signals to analog ground, digital ground, and/or power line. Doing so may damage this product.
- Do not connect the each output signal to the other output signal and output signal of external device. Doing so may malfunction.

Circuit Block Diagram



Component Name



No.	Name
1	Interface Connector (page)
2	Board ID Setting Switch

Different by board number

The DA12-4(PCI) are different in specifications, depending on the board number as listed below.

Different in the specification

Board No.	No.7147	No.7147A	No.7147B
Dimension (mm)	176.41(L)×106.68(H)	176.41(L)×106.68(H)	176.41(L)×105.68(H)