16Ch/12Bit Analog Input Board
for PCI

AD12-16(PCI)

This product is PCI-compliant interface boards that convert analog input signals to digital equivalents (performing analog-to-digital conversion).

This product can perform A-D conversion at a conversion speed of 10µsec[100KSPS] per channel and a resolution of 12bit.

Using the bundled driver library [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++.

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

Features

Multi-channel analog input
This product can perform an analog input of single-ended input 16 channels and differential input 8 channels.
Selection of single-ended input and differential input can be set up by the software.

Input range setup by software
Input range can be selected for each channel from the following ranges and can be set up by the software.
±10V, ±5V, ±2.5V, ±1.25V, 0 - +10V, 0 - +5V, 0 - +2.5V, 0 - +1.25V

Sampling control function
This product can perform sampling either at arbitrary timings under control of software or periodically in synchronization with a sampling clock signal.
The sampling clock signal can be selected between the internal one based on the on-board clock generator and the external one using a digital signal input from an external source.

Digital input/output function
This product has four digital input and four digital output pins for TTL-level signals, allowing an external device to be monitored and controlled.

Optional units
Using optional units facilitates connections.

For more details on the option, please refer to “Cable & Connector” or “Accessories (Option)”.

Specifications

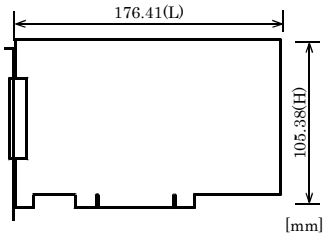
Item		AD12-16(PCI)
Analog input		
	Isolated specification	Non-isolation
	Input Type	Single-Ended Input or Differential Input (Software setup)
	Number of input channels	16 channels (Single-Ended Input), 8 channels (Differential Input)
	Input range	Bipolar ±10V, ±5V, ±2.5V, ±1.25V, or Unipolar 0 - +10V, 0 - +5V, 0 - +2.5V, 0 - +1.25V (Software setup per channel)
	Absolute max. input voltage	±15V
	Input impedance	1MΩ or more
	Resolution	12bit
	Non-Linearity error *1	±2LSB(±10V, ±5V, 0 - 10V, 0 - 5V), 4LSB(±2.5V, ±1.25V, 0 - 2.5V) ±8LSB(0 - 1.25V)
	Conversion speed	10µsec [100KSPS] /ch (Max.)
	Sampling clock	Internal sampling clock: 10,000 - 1,073,741,824,000nsec (Settable in 250 nanoseconds) External sampling clock: TTL level falling edge
Digital I/O		
	Number of output channels	4 TTL levels
	Number of input channels	4 TTL levels
Programmable timer		
	Setting period	500 - 1,073,741,824,000nsec (Settable in 250 nanoseconds)
	Status	Count up, count up over run
	Timer output signal	TTL-level 250nsec Low pulse, Low level output current I_{OL} = 24mA
External trigger input		
	External trigger input signal	Non-isolated input 1 channel (TTL-level falling edge)
	Status	Trigger input, trigger input overrun
I/O address		32 ports boundary
Interrupt level		1 level use
Operating condition		0 - 50°C, 10 - 90%RH (No condensation)
Current consumption *2		+5VDC 700mA (Max.)
Bus specification		32bit, 33MHz, Universal key shapes supported *3*4
Connector		96-pin half pitch connector [M(male)type] PCR-E96LMD+ [HONDA TSUSHIN KOGYO CO., LTD.] or equivalence to it
Dimension (mm)		176.41(L) x 105.68(H) *5
Weight		150g
Standard		VCCI Class A, CE Marking (EMC Directive Class A), RoHS Directive

*1 A linearity error approximately 0.1% of full-range may occur when operated at 0°C or 50°C ambient temperature. The error can be reduced by calibrating under the actual temperature conditions.
*2 If an external device requires this AD12-16(PCI) product to supply +5VDC from the CN1 or CN2 connectors, the power consumption of this product will be bigger than what this specification has defined.
*3 This product requires +5V power supply from expansion slots (it does not operate in the environment of only +3.3V power supply).
*4 AD12-16(PCI): If the board No. is No.7150, PCI bus specification is 32bit, 33MHz, 5V
*5 Boards with different board numbers are different in these specifications. See "Different in the specification" at the end of this document.

Packing List

Board [AD12-16(PCI)] ...1
First step guide ... 1
Disk *1 [API-PAC(W32)] ...1
Product Registration Card & Warranty Certificate ...1
Serial number label ...1

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 digital I/O driver API-AIO(WDM)
[Stored on the bundledmedia 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.

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 digital I/O driver API-AIO(LNX)
[Stored on the bundledmedia 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.

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 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 96-Pin Half-Pitch Connectors at Both Ends
: PCB96PS-0.5P (0.5m), PCB96PS-1.5P (1.5m)

Flat Cable with 96-Pin Half-Pitch Connectors at Both Ends
: PCB96P-1.5 (1.5m)

Shield Cable with 96-Pin Half-Pitch Connectors at One End
: PCA96PS-0.5P (0.5m), PCA96PS-1.5P (1.5m)

Flat Cable with 96-Pin Half-Pitch Connectors at One End
: PCA96P-1.5 (1.5m)

Accessories

Accessories (Option)

Terminal Unit for Cables (M3 x 96P)	: DTP-64A *1
Screw Terminal Unit (M3.5 x 96P)	: EPD-96 *1
Screw Terminal Unit (M3 x 96P)	: EPD-96A *1*4

1 PCB96P- or PCB96PS-* optional cable is required separately.
*2 "Spring-up" type terminal is used to prevent terminal screws from falling off.

Different in the specification

The AD12-16(PCI) is different in specifications, depending on the board number as listed below.

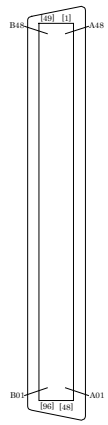
AD12-16(PCI)

Board No.	No.7150	No.7150A	No.7150C
Dimension (mm)	176.41(L)×106.68(H)	176.41(L)×106.68(H)	176.41(L)×105.68(H)

Connector Pin Assignment

Single-Ended Input

N.C.	B48		A48	N.C.
N.C.	B47		A47	N.C.
N.C.	B46		A46	N.C.
N.C.	B45		A45	N.C.
N.C.	B44		A44	N.C.
N.C.	B43		A43	N.C.
N.C.	B42		A42	N.C.
N.C.	B41		A41	N.C.
Analog Ground	B40		A40	Analog Ground
Analog Ground	B39		A39	Analog Ground
N.C.	B38		A38	N.C.
N.C.	B37		A37	N.C.
N.C.	B36		A36	N.C.
N.C.	B35		A35	N.C.
N.C.	B34		A34	N.C.
N.C.	B33		A33	N.C.
N.C.	B32		A32	N.C.
N.C.	B31		A31	N.C.
Analog Ground	B30		A30	Analog Ground
Analog Ground	B29		A29	Analog Ground
N.C.	B28		A28	N.C.
N.C.	B27		A27	N.C.
N.C.	B26		A26	N.C.
N.C.	B25		A25	N.C.
N.C.	B24		A24	N.C.
N.C.	B23		A23	N.C.
N.C.	B22		A22	N.C.
N.C.	B21		A21	N.C.
Analog Ground	B20		A20	Analog Ground
Analog Ground	B19		A19	Analog Ground
Analog Input 15	B18		A18	Analog Input 11
Analog Input 7	B17		A17	Analog Input 3
Analog Input 14	B16		A16	Analog Input 10
Analog Input 6	B15		A15	Analog Input 2
Analog Input 13	B14		A14	Analog Input 9
Analog Input 5	B13		A13	Analog Input 1
Analog Input 12	B12		A12	Analog Input 8
Analog Input 4	B11		A11	Analog Input 0
Analog Ground	B10		A10	Analog Ground
Analog Ground	B09		A09	Analog Ground
+5VDC from PC	B08		A08	External Sampling Clock Input
+5VDC from PC	B07		A07	Digital Ground
Sampling Busy Output	B06		A06	External Trigger Input
Timer Output	B05		A05	Digital Ground
Digital Output 3	B04		A04	Digital Input 3
Digital Output 2	B03		A03	Digital Input 2
Digital Output 1	B02		A02	Digital Input 1
Digital Output 0	B01		A01	Digital Input 0

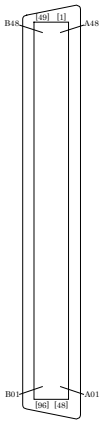


- The numbers in square brackets [ ] are pin numbers designated by HONDA TSUSHIN KOGYO CO,

Analog Input 0 - Analog Input 15	Analog input signal at the time of Single-Ended Input. The numbers correspond to channel numbers.
Analog Ground	Common analog ground for analog input signals.
Digital Input 0 - Digital Input 3	Digital input signal.
Digital Output 0 - Digital Output 3	Digital output signal.
External Trigger Input	External trigger input signal.
External Sampling Clock Input	External Sampling Clock Input signal.
Timer Output	Programmable timer output signal.
Sampling Busy Output	Output signal indicating that the board is performing AD conversion
+5VDC from PC	Output +5V. The total current-carrying capacity that can be supplied from two pins is 1 A
Digital Ground	Digital ground common to those signals other than analog input signals, such as digital I/O signals and external sampling clock input signals, and "+5V DC from PC"
N.C.	No connection to this pin.

Differential Input

N.C.	B48		A48	N.C.
N.C.	B47		A47	N.C.
N.C.	B46		A46	N.C.
N.C.	B45		A45	N.C.
N.C.	B44		A44	N.C.
N.C.	B43		A43	N.C.
N.C.	B42		A42	N.C.
N.C.	B41		A41	N.C.
Analog Ground	B40		A40	Analog Ground
Analog Ground	B39		A39	Analog Ground
N.C.	B38		A38	N.C.
N.C.	B37		A37	N.C.
N.C.	B36		A36	N.C.
N.C.	B35		A35	N.C.
N.C.	B34		A34	N.C.
N.C.	B33		A33	N.C.
N.C.	B32		A32	N.C.
N.C.	B31		A31	N.C.
Analog Ground	B30		A30	Analog Ground
Analog Ground	B29		A29	Analog Ground
N.C.	B28		A28	N.C.
N.C.	B27		A27	N.C.
N.C.	B26		A26	N.C.
N.C.	B25		A25	N.C.
N.C.	B24		A24	N.C.
N.C.	B23		A23	N.C.
N.C.	B22		A22	N.C.
N.C.	B21		A21	N.C.
Analog Ground	B20		A20	Analog Ground
Analog Ground	B19		A19	Analog Ground
Analog Input 7 [-]	B18		A18	Analog Input 3 [-]
Analog Input 7[+]	B17		A17	Analog Input 3 [+]
Analog Input 6 [-]	B16		A16	Analog Input 2 [-]
Analog Input 6[+]	B15		A15	Analog Input 2 [+]
Analog Input 5 [-]	B14		A14	Analog Input 1 [-]
Analog Input 5[+]	B13		A13	Analog Input 1 [+]
Analog Input 4 [-]	B12		A12	Analog Input 0 [-]
Analog Input 4[+]	B11		A11	Analog Input 0 [+]
Analog Ground	B10		A10	Analog Ground
Analog Ground	B09		A09	Analog Ground
+5VDC from PC	B08		A08	External Sampling Clock Input
+5VDC from PC	B07		A07	Digital Ground
Sampling Busy Output	B06		A06	External Trigger Input
Timer Output	B05		A05	Digital Ground
Digital Output 3	B04		A04	Digital Input3
Digital Output 2	B03		A03	Digital Input2
Digital Output 1	B02		A02	Digital Input1
Digital Output 0	B01		A01	Digital Input0



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

Analog Input 0[+] - Analog Input 7[+]	Analog input signal at the time of Differential Input. The numbers correspond to channel numbers.
Analog Input 0[-] - Analog Input 7[-]	Analog input signal at the time of Differential Input. The numbers correspond to channel numbers.
Analog Ground	Common analog ground for analog input signals.
Digital Input 0 - Digital Input 3	Digital input signal.
Digital Output 0 - Digital Output 3	Digital output signal.
External Trigger Input	External trigger input signal.
External Sampling Clock Input	External Sampling Clock Input signal.
Timer Output	Programmable timer output signal.
Sampling Busy Output	Output signal indicating that the board is performing AD conversion
+5VDC from PC	Output +5V. The total current-carrying capacity that can be supplied from two pins is 1 A
Digital Ground	Digital ground common to those signals other than analog input signals, such as digital I/O signals and external sampling clock input signals, and "+5V DC from PC"
N.C.	No connection to this pin.