

**100KSPS 16-bit Analog Input Board
for PCI Express Low Profile
AI-1664LA-LPE**



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

Features

High-precision analog input 64 channels, each 4 channels for digital I/O and counter 1 channel

This product has analog input (10μsec / channel, 16-bit, 64 channels), analog input control signal (LVTTTL level 3 channels), digital I/O (each 4 channels for LVTTTL level) and counter (32-bit, LVTTTL level 1 channel). Capable of setting the analog input at single-ended input 64 channels and differential input 32 channels.

The start/end of sampling can be controlled by software, comparison of conversion data, an external trigger, etc.

You can select from software, comparison of conversion data or an external trigger to control the start of sampling. You can select from completion of sampling for a specified number of sessions, comparison of conversion data, an external trigger or software to control forcibly the end of sampling. The sampling cycle can be selected from the internal clock or an external clock.

Equipped with buffer memory (1K data) that can be used in the FIFO or RING format

The analog input / output block contains buffer memory (1K data) that can be used in the FIFO or RING format. This allows for background analog I/O that does not depend on the operation status of the software or PC.

Digital filter function included to prevent misdetection due to chattering on external signals

A digital filter is included to prevent misdetection due to chattering on the control signal (external trigger input signal, sampling clock input signal, etc.), digital input signal and counter input signal. (except from external clock input signal and counter gate signal)

Functions and connectors are compatible with PCI compatible board AD16-64(LPCI)LA.

The functions same with PCI compatible board AD16-64(LPCI)LA are provided. In addition, as there is compatibility in terms of connector shape and pin assignments, it is easy to migrate from the existing system.

Support for both of low-profile and standard PCI slots (interchangeable with a bundled bracket)

This product has each bracket for both low-profile size slot and standard size slot. If you wish to mount this product in a standard size slot, replace this with the standard size bracket.

Software-based adjustment function

Adjustment of analog input 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.

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.

This product is a Low Profile, PCI Express bus-compliant interface board used to provide an analog signal input function on a PC. This product is multi-channels and multifunction type with 16-bit analog input 64 channels (single-ended input 64 channels or differential input 32 channels), digital I/O and counter function. This product carries buffer memory for 1K of data, allowing sampling to be performed in a variety of trigger / clock conditions.

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 October, 2025.

Specifications

Function specification

	Item	Description
Analog input	Isolated specification	Non-isolated
	Input type	Single-Ended Input or Differential Input (by software)
	Number of input channels	64ch (single-ended input), 32ch (differential input)
	Input range	Bipolar ± 10V
	Absolute max input voltage	±20V
	Input impedance	1MΩ or more
	Resolution	16bit
	Non-Linearity error *1*2	±5LSB
	Conversion speed	10μsec/ch
	Buffer memory	1k Word
	Conversion start trigger	Software / external trigger
	Conversion stop trigger	Number of sampling times / external trigger / software
	External start signal	LVTTTL level (Rising or falling edge can be selected by software) Digital filter (1μsec can be selected by software)
External stop signal	LVTTTL level (Rising or falling edge can be selected by software) Digital filter (1μsec can be selected by software)	
External clock signal	LVTTTL level (Rising or falling edge can be selected by software) Digital filter (1μsec can be selected by software)	
Digital I/O section	Number of input channels	Non-isolated input 4ch (LVTTTL level positive logic)
	Number of output channels	No-isolated output 4ch (LVTTTL level positive logic)
Counter	Number of channels	1ch
	Counting system	Up count
	Max count	FFFFFFFFh (Binary data, 32bit)
	Number of external inputs	2 LVTTTL level (Gate/Up), Gate (High level), Up (Rising edge)
	Number of external outputs	LVTTTL level, Count match output (positive logic, pulse output)
	Frequency response	10MHz (Max)
Common section	I/O address	64 ports boundary
	Interruption level	Errors and various factors, One interrupt request line as INTA
	Connector	68 pin 0.8mm pitch connector HDRA-E68W1LFDT-SL [HONDA] or equivalent to it
	Current consumption	3.3VDC 620mA (Max.)
	Bus specification	PCI Express Base Specification Rev. 1.0a x1
	Dimension (mm)	121.69(L) x 67.90(H)
	Weight	90g

*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 At the time of the source use of a signal which built in the high-speed operational amplifier.

Installation Environment Requirements

Item	Description
Operating ambient temperature	0 - 50°C
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

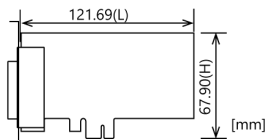
Support Software

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
Development Support Tools and Support Software	In addition to device drivers, we offer a variety of software for convenient use of our devices.	Download from the CONTEC website *2

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

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

Physical Dimensions



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

Included Items

Product [AI-1664LA-LPE] ... 1
 Standard Size Bracket ... 1
 Please read the following ... 1

Optional Products

Product Name	Model type	Description
Screw Terminal	DTP-64A *1*3	
Screw Terminal (M3 * 68)	EPD-68A *2*3*4	
Screw Terminal (M3 * 96)	EPD-96A *1*3*4	
Terminal Unit for Relay Terminal Banks	EPD-96 *1*3	
Termination Panel with BNC connectors for Analog I/O Boards	ATP-32F *1*3 ATP-8 *1*3*5	
68/96-pin conversion shielded cable for analog input/output	ADC-68M/96F *6	0.5m
Cable with 68-Pin D-sub Connector at either Ends (Mold Type)	PCB68PS-05P	0.5m
	PCB68PS-15P	1.5m
Shielded cable with single connector for 68-pin 0.8mm pitch connector	PCA68PS-05P	0.5m
	PCA68PS-15P	1.5m

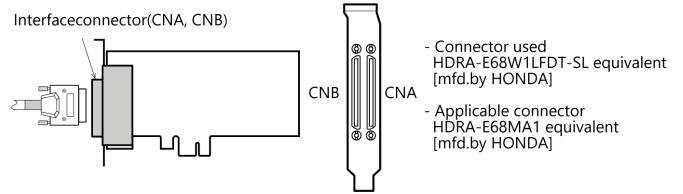
- *1 ADC-68M/96F optional cable is required separately.
- *2 PCB68PS-05P or PCB68PS-15P optional cable is required separately.
- *3 Two sets of cables are required to use both connector CNA and CNB.
- *4 "Spring-up" type terminal is used to prevent terminal screws from falling off.
- *5 Can be used in CNA channels 0 - 7 or CNB channels 32 - 39.
- *6 Two sets of cables are required to use both connector CNA and CNB.

* Visit the CONTEC website for the latest optional products.

Connecting to an External Device

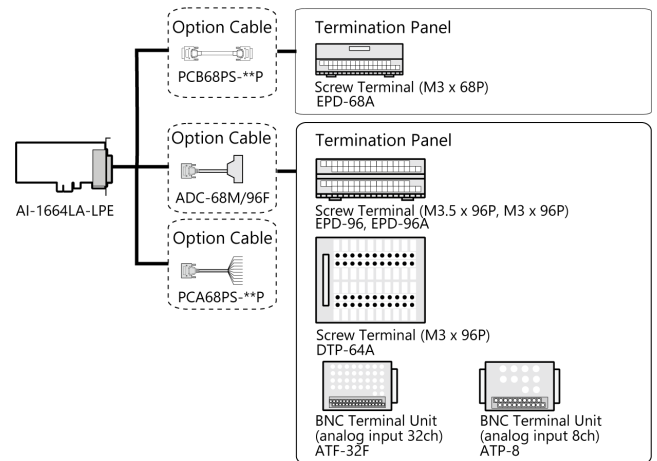
Connecting an Interface Connector

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



Adding Optional Products

Functions can be expanded by adding various dedicated optional products.



Each terminal block accepts the following ranges of channels.

	Connector at board side connection destination	Analog input		Analog input control signal *1	Digital input Digital output	Counter I/O *2
		Single-ended input	Differential input			
EPD-96A EPD-96 EPD-68A DTP-64	Only CNA is used	channel 0 - 31	channel 0 - 15	O	O	O
	Only CNB is used	channel 32 - 63	channel 16 - 31	---	---	---
	CNA/B is used *3	channel 0 - 63	channel 0 - 31	O *4	O *4	O *4
ATP-32F	Only CNA is used	channel 0 - 31	---	O	O	O
	Only CNB is used	channel 32 - 63	---	---	---	---
	CNA/B is used *3	channel 0 - 63	---	O *4	O *4	O *4
ATP-8	Only CNA is used	channel 0 - 7	---	O	O	O
	Only CNB is used	channel 32 - 39 *5	---	---	---	---
	CNA/B is used *3	channel 0 - 7, 32 - 39 *5	---	O *4	O *4	O *4

- *1 AI External Start Trigger Input, AI External Stop Trigger Input, AI External Clock Trigger Input
- *2 Counter Gate Control Input, Counter Up Clock Input, Counter Output
- *3 Two sets of terminal blocks and optional cables are required each.
- *4 Make wiring on the CAN side.
- *5 Two or more only of channel 32 - 39 sampling cannot be done.

Signal Layout on the Interface Connector
Single-Ended Input (CNA, B)

CNB		CNA	
NC 68	34 N.C.	NC 1	35 Analog Ground (for AI)
NC 67	33 N.C.	NC 2	36 Analog Ground (for AI)
NC 66	32 N.C.	Analog Ground (for AI) 3	37 Analog Ground (for AI)
NC 65	31 N.C.	Analog Input 00 4	38 Analog Input 16
NC 64	30 N.C.	Analog Input 01 5	39 Analog Input 17
NC 63	29 N.C.	Analog Input 02 6	40 Analog Input 18
NC 62	28 N.C.	Analog Input 03 7	41 Analog Input 19
Digital Ground 61	27 N.C.	Analog Ground (for AI) 8	42 Analog Ground (for AI)
NC 60	26 N.C.	Analog Input 04 9	43 Analog Input 20
NC 59	25 N.C.	Analog Input 05 10	44 Analog Input 21
Digital Ground 58	24 N.C.	Analog Input 06 11	45 Analog Input 22
NC 57	23 N.C.	Analog Input 07 12	46 Analog Input 23
Analog Input 63 56	22 Analog Input 47	Analog Ground (for AI) 13	47 Analog Ground (for AI)
Analog Input 62 55	21 Analog Input 46	Analog Input 08 14	48 Analog Input 24
Analog Input 61 54	20 Analog Input 45	Analog Input 09 15	49 Analog Input 25
Analog Input 60 53	19 Analog Input 44	Analog Input 10 16	50 Analog Input 26
Analog Ground (for AI) 52	18 Analog Ground (for AI)	Analog Input 11 17	51 Analog Input 27
Analog Input 59 51	17 Analog Input 43	Analog Ground (for AI) 18	52 Analog Ground (for AI)
Analog Input 58 50	16 Analog Input 42	Analog Input 12 19	53 Analog Input 28
Analog Input 57 49	15 Analog Input 41	Analog Input 13 20	54 Analog Input 29
Analog Input 56 48	14 Analog Input 40	Analog Input 14 21	55 Analog Input 30
Analog Ground (for AI) 47	13 Analog Ground (for AI)	Analog Input 15 22	56 Analog Input 31
Analog Input 55 46	12 Analog Input 39	AI External Start Trigger Input 23	57 AI External Stop Trigger Input
Analog Input 54 45	11 Analog Input 38	AI External Sampling Clock Input 24	58 Digital Ground
Analog Input 53 44	10 Analog Input 37	NC 25	59 N.C.
Analog Input 52 43	9 Analog Input 36	NC 26	60 N.C.
Analog Ground (for AI) 42	8 Analog Ground (for AI)	NC 27	61 Digital Ground
Analog Input 51 41	7 Analog Input 35	NC 28	62 N.C.
Analog Input 50 40	6 Analog Input 34	Digital Input 00 29	63 Digital Input 01
Analog Input 49 39	5 Analog Input 33	Digital Input 02 30	64 Digital Input 03
Analog Input 48 38	4 Analog Input 32	Digital Output 00 31	65 Digital Output 01
Analog Ground (for AI) 37	3 Analog Ground (for AI)	Digital Output 02 32	66 Digital Output 03
Analog Ground (for AI) 36	2 N.C.	Counter Gate Control Input 33	67 Counter Output
Analog Ground (for AI) 35	1 N.C.	Counter Up Clock Input 34	68 Reserved (Counter Input)

Signal name	Description
Analog Input00 - Analog Input63	Analog input signal. The numbers correspond to channel numbers.
Analog Ground	Common analog ground for analog input signals.
AI External Start Trigger Input	External trigger input for starting analog input sampling.
AI External Stop Trigger Input	External trigger input for stopping analog input sampling.
AI External Sampling Clock Input	External sampling clock input for analog input.
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	External Up-Clock Input Signal for Counter.
Counter Output	Count 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.

Single-Ended Input (ADC-68M/96F)

CNB		CNA	
NC B01	A01 N.C.	NC A48	B48 N.C.
NC B02	A02 N.C.	Analog Ground (for AI) A47	B47 N.C.
NC B03	A03 N.C.	NC A46	B46 N.C.
NC B04	A04 N.C.	Analog Ground (for AI) A45	B45 N.C.
NC B05	A05 N.C.	Analog Input 00 A44	B44 Analog Input 08
NC B06	A06 N.C.	Analog Input 16 A43	B43 Analog Input 24
NC B07	A07 N.C.	Analog Input 01 A42	B42 Analog Input 09
Digital Ground B08	A08 Digital Ground	Analog Input 17 A41	B41 Analog Input 25
NC B09	A09 N.C.	NC A40	B40 N.C.
NC B10	A10 N.C.	NC A39	B39 N.C.
NC B11	A11 N.C.	Analog Input 02 A38	B38 Analog Input 10
NC B12	A12 N.C.	Analog Input 18 A37	B37 Analog Input 26
NC B13	A13 N.C.	Analog Input 03 A36	B36 Analog Input 11
NC B14	A14 N.C.	Analog Input 19 A35	B35 Analog Input 27
NC B15	A15 N.C.	Analog Ground (for AI) A34	B34 Analog Ground (for AI)
NC B16	A16 N.C.	Analog Ground (for AI) A33	B33 Analog Ground (for AI)
NC B17	A17 N.C.	Analog Input 04 A32	B32 Analog Input 12
NC B18	A18 N.C.	Analog Input 20 A31	B31 Analog Input 28
NC B19	A19 N.C.	Analog Input 05 A30	B30 Analog Input 13
NC B20	A20 N.C.	Analog Input 21 A29	B29 Analog Input 29
Analog Ground (for AI) B21	A21 Analog Ground (for AI)	NC A28	B28 N.C.
Analog Ground (for AI) B22	A22 Analog Ground (for AI)	NC A27	B27 N.C.
Analog Input 63 B23	A23 Analog Input 55	Analog Input 06 A26	B26 Analog Input 14
Analog Input 47 B24	A24 Analog Input 39	Analog Input 22 A25	B25 Analog Input 30
Analog Input 62 B25	A25 Analog Input 54	Analog Input 07 A24	B24 Analog Input 15
Analog Input 46 B26	A26 Analog Input 38	Analog Input 23 A23	B23 Analog Input 31
NC B27	A27 N.C.	Analog Ground (for AI) A22	B22 Analog Ground (for AI)
NC B28	A28 N.C.	Analog Ground (for AI) A21	B21 Analog Ground (for AI)
Analog Input 61 B29	A29 Analog Input 53	NC A20	B20 N.C.
Analog Input 45 B30	A30 Analog Input 37	NC A19	B19 N.C.
Analog Input 60 B31	A31 Analog Input 52	Digital Input 00 A18	B18 Digital Output 00
Analog Input 44 B32	A32 Analog Input 36	Digital Input 01 A17	B17 Digital Output 01
Analog Ground (for AI) B33	A33 Analog Ground (for AI)	Digital Input 02 A16	B16 Digital Output 02
Analog Ground (for AI) B34	A34 Analog Ground (for AI)	Digital Input 03 A15	B15 Digital Output 03
Analog Input 59 B35	A35 Analog Input 51	NC A14	B14 N.C.
Analog Input 43 B36	A36 Analog Input 35	NC A13	B13 N.C.
Analog Input 58 B37	A37 Analog Input 50	NC A12	B12 N.C.
Analog Input 42 B38	A38 Analog Input 34	NC A11	B11 N.C.
NC B39	A39 N.C.	NC A10	B10 N.C.
NC B40	A40 N.C.	NC A09	B09 N.C.
Analog Input 57 B41	A41 Analog Input 49	Digital Ground A08	B08 Digital Ground
Analog Input 41 B42	A42 Analog Input 33	AI External Sampling Clock Input A07	B07 N.C.
Analog Input 56 B43	A43 Analog Input 48	AI External Stop Trigger Input A06	B06 N.C.
Analog Input 40 B44	A44 Analog Input 32	AI External Start Trigger Input A05	B05 N.C.
NC B45	A45 Analog Ground (for AI)	Counter Up Clock Input A04	B04 N.C.
NC B46	A46 N.C.	Reserved (Counter Input) A03	B03 N.C.
NC B47	A47 Analog Ground (for AI)	Counter Gate Control Input A02	B02 N.C.
NC B48	A48 N.C.	Counter Output A01	B01 N.C.

- [] shows the pin No. specified by HONDA TSUSHIN KOGYO CO., LTD.

Signal name	Description
Analog Input00 - Analog Input63	Analog input signal. The numbers correspond to channel numbers.
Analog Ground	Common analog ground for analog input signals.
AI External Start Trigger Input	External trigger input for starting analog input sampling.
AI External Stop Trigger Input	External trigger input for stopping analog input sampling.
AI External Sampling Clock Input	External sampling clock input for analog input.
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	External Up-Clock Input Signal for Counter.
Counter Output	Count 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.

Differential Input (CNA, CNB)

CNB			CNA		
NC	68	34	NC	35	Analog Ground (for AI)
NC	67	33	NC	36	Analog Ground (for AI)
NC	66	32	NC	37	Analog Ground (for AI)
NC	65	31	NC	38	Analog Input 00[-]
NC	64	30	NC	39	Analog Input 01[-]
NC	63	29	NC	40	Analog Input 02[-]
NC	62	28	NC	41	Analog Input 03[-]
Digital Ground	61	27	NC	42	Analog Ground (for AI)
NC	60	26	NC	43	Analog Input 04[-]
NC	59	25	NC	44	Analog Input 05[-]
Digital Ground	58	24	NC	45	Analog Input 06[-]
NC	57	23	NC	46	Analog Input 07[-]
Analog Input 31[-]	56	22	Analog Ground (for AI)	47	Analog Ground (for AI)
Analog Input 30[-]	55	21	Analog Input 31[+]	48	Analog Input 08[-]
Analog Input 29[-]	54	20	Analog Input 30[+]	49	Analog Input 09[-]
Analog Input 28[-]	53	19	Analog Input 29[+]	50	Analog Input 10[-]
Analog Ground (for AI)	52	18	Analog Input 28[+]	51	Analog Input 11[-]
Analog Input 27[-]	51	17	Analog Ground (for AI)	52	Analog Ground (for AI)
Analog Input 26[-]	50	16	Analog Input 27[+]	53	Analog Input 12[-]
Analog Input 25[-]	49	15	Analog Input 26[+]	54	Analog Input 13[-]
Analog Input 24[-]	48	14	Analog Input 25[+]	55	Analog Input 14[-]
Analog Ground (for AI)	47	13	Analog Ground (for AI)	56	Analog Input 15[-]
Analog Input 23[-]	46	12	Analog Input 24[+]	57	AI External Stop Trigger Input
Analog Input 22[-]	45	11	Analog Input 23[+]	58	Digital Ground
Analog Input 21[-]	44	10	Analog Input 22[+]	59	NC
Analog Input 20[-]	43	9	Analog Input 21[+]	60	NC
Analog Ground (for AI)	42	8	Analog Input 20[+]	61	Digital Ground
Analog Input 19[-]	41	7	Analog Ground (for AI)	62	NC
Analog Input 18[-]	40	6	Analog Input 19[+]	63	Digital Input 02
Analog Input 17[-]	39	5	Analog Input 18[+]	64	Digital Input 03
Analog Input 16[-]	38	4	Analog Input 17[+]	65	Digital Output 01
Analog Ground (for AI)	37	3	Analog Input 16[+]	66	Digital Output 03
Analog Ground (for AI)	36	2	Analog Ground (for AI)	67	Counter Output
Analog Ground (for AI)	35	1	NC	68	Reserved (Counter Input)

Signal name	Description
Analog Input00 - Analog Input31	Analog input signal. The numbers correspond to channel numbers.
Analog Ground	Common analog ground for analog input signals.
AO External Start Trigger Input	External trigger input for starting analog input sampling.
AO External Stop Trigger Input	External trigger input for stopping analog input sampling.
AO External Sampling Clock Input	External sampling clock input for analog input.
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	External Up-Clock Input Signal for Counter.
Counter Output	Count 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.

Differential Input (ADC-68M/96F)

CNB			CNA			
NC	B01	A01	NC	A48	B48	NC
NC	B02	A02	Analog Ground (for AI)	A47	B47	NC
NC	B03	A03	NC	A46	B46	NC
NC	B04	A04	Analog Ground (for AI)	A45	B45	NC
NC	B05	A05	Analog Input 00[+]	A44	B44	Analog Input 08[+]
NC	B06	A06	Analog Input 00[-]	A43	B43	Analog Input 08[-]
NC	B07	A07	Analog Input 01[+]	A42	B42	Analog Input 09[+]
Digital Ground	B08	A08	Analog Input 01[-]	A41	B41	Analog Input 09[-]
NC	B09	A09	NC	A40	B40	NC
NC	B10	A10	NC	A39	B39	NC
NC	B11	A11	Analog Input 02[+]	A38	B38	Analog Input 10[+]
NC	B12	A12	Analog Input 02[-]	A37	B37	Analog Input 10[-]
NC	B13	A13	Analog Input 03[+]	A36	B36	Analog Input 11[+]
NC	B14	A14	Analog Input 03[-]	A35	B35	Analog Input 11[-]
NC	B15	A15	Analog Ground (for AI)	A34	B34	Analog Ground (for AI)
NC	B16	A16	Analog Ground (for AI)	A33	B33	Analog Ground (for AI)
NC	B17	A17	Analog Input 04[+]	A32	B32	Analog Input 12[+]
NC	B18	A18	Analog Input 04[-]	A31	B31	Analog Input 12[-]
NC	B19	A19	Analog Input 05[+]	A30	B30	Analog Input 13[+]
NC	B20	A20	Analog Input 05[-]	A29	B29	Analog Input 13[-]
Analog Ground (for AI)	B21	A21	Analog Ground (for AI)	A28	B28	NC
Analog Ground (for AI)	B22	A22	NC	A27	B27	NC
Analog Input 31[-]	B23	A23	Analog Input 06[+]	A26	B26	Analog Input 14[+]
Analog Input 31[+]	B24	A24	Analog Input 06[-]	A25	B25	Analog Input 14[-]
Analog Input 30[-]	B25	A25	Analog Input 07[+]	A24	B24	Analog Input 15[+]
Analog Input 30[+]	B26	A26	Analog Input 07[-]	A23	B23	Analog Input 15[-]
NC	B27	A27	Analog Ground (for AI)	A22	B22	Analog Ground (for AI)
NC	B28	A28	Analog Ground (for AI)	A21	B21	Analog Ground (for AI)
Analog Input 29[-]	B29	A29	NC	A20	B20	NC
Analog Input 29[+]	B30	A30	NC	A19	B19	NC
Analog Input 28[-]	B31	A31	Digital Input 00	A18	B18	Digital Output 00
Analog Input 28[+]	B32	A32	Digital Input 01	A17	B17	Digital Output 01
Analog Ground (for AI)	B33	A33	Digital Input 02	A16	B16	Digital Output 02
Analog Ground (for AI)	B34	A34	Digital Input 03	A15	B15	Digital Output 03
Analog Input 27[-]	B35	A35	NC	A14	B14	NC
Analog Input 27[+]	B36	A36	NC	A13	B13	NC
Analog Input 26[-]	B37	A37	NC	A12	B12	NC
Analog Input 26[+]	B38	A38	NC	A11	B11	NC
NC	B39	A39	NC	A10	B10	NC
NC	B40	A40	NC	A09	B09	NC
Analog Input 25[-]	B41	A41	Digital Ground	A08	B08	Digital Ground
Analog Input 25[+]	B42	A42	AI External Sampling Clock Input	A07	B07	NC
Analog Input 24[-]	B43	A43	AI External Stop Trigger Input	A06	B06	NC
Analog Input 24[+]	B44	A44	AI External Start Trigger Input	A05	B05	NC
NC	B45	A45	Counter Up Clock Input	A04	B04	NC
NC	B46	A46	Reserved (Counter Input)	A03	B03	NC
NC	B47	A47	Counter Gate Control Input	A02	B02	NC
NC	B48	A48	Counter Output	A01	B01	NC

- [] shows the pin No. specified by HONDA TSUSHIN KOGYO CO., LTD.

Signal name	Description
Analog Input00 - Analog Input31	Analog input signal. The numbers correspond to channel numbers.
Analog Ground	Common analog ground for analog input signals.
AI External Start Trigger Input	External trigger input for starting analog input sampling.
AI External Stop Trigger Input	External trigger input for stopping analog input sampling.
AI External Sampling Clock Input	External sampling clock input for analog input.
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	External Up-Clock Input Signal for Counter.
Counter Output	Count 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

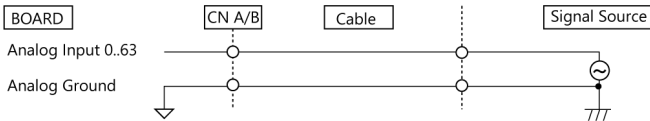
- Do not connect any of the outputs and power outputs to the analog or digital ground. Neither connect outputs to each other. Doing either can result in a fault.
- If analog and digital ground are shorted together, noise on the digital signals may affect the analog signals. Accordingly, analog and digital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

Connecting Analog Input Signal

Single-ended Input

Single-ended Input Connection (Flat Cable)

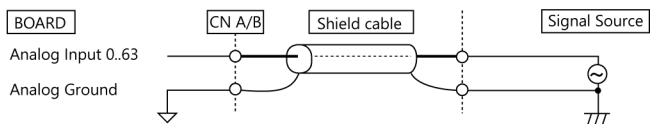
The following figure shows an example of flat cable connection. Each signal source is connected to one analog input channel and the signal common to analog ground pin of CN A/B.



Single-ended Input Connection (Shielded Cable)

The following figure shows an example of shielded cable connection. When the distance between the signal source and the product is long or you want to increase the noise tolerance, a shield cable is suggested.

Connect the signal by the core wire and common signal by the shield braids.



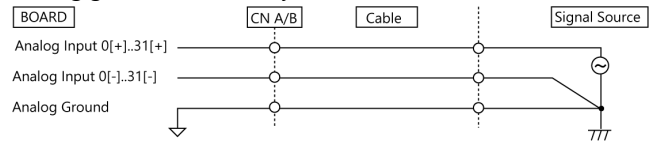
CAUTION

- When a frequency of 1MHz or higher is contained in the source signal, the cross talk between channels may occur.
- If the product and the signal source receive noise or the distance between the product and the signal source is too long, data may not be input properly.
- An input analog signal should not exceed the maximum input voltage (relate to the product analog ground). If it exceeds the maximum voltage, the product may be damaged.
- Connect all the unused analog input channels to analog ground.
- In the channel switching, the multiplexer does the electrical charge and discharge on the internal capacitor according to the signal voltage. Therefore, the voltage from the previous switching state may go into the next channel. It might cause the error of the signal source action. If this occurs, insert a high-speed amplifier as a buffer between the signal source and the analog input pin to reduce the fluctuation.
- An input pin may fail to obtain input data normally when the signal source connected to the pin has high impedance. If this is the case, change the signal source to one with lower output impedance or insert a high-speed amplifier buffer between the signal source and the analog input pin to reduce the effect.

Differential Input

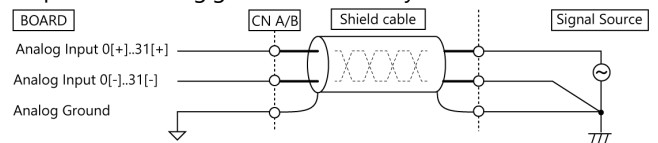
Differential Input Connection (Flat Cable)

The following figure shows an example of flat cable connection. Each signal source is connected to a [+] pin of analog input channel and the signal common of this source to the [-] pin of this input channel of CN A/B. In addition, the signal common must be connected to the pin of the analog ground of CN A/B by a third wire.



Differential Input Connection (Shielded Cable)

The following figure shows an example of shielded cable connection. When the distance between the signal source and the product is long or you want to increase the noise tolerance, a shield cable connection is preferred. Each signal source is connected to a [+] pin of analog input channel and the signal common of this source to the [-] pin of this input channel of CN A/B. In addition, the signal common must be connected to the pin of the analog ground of CN A/B by the shielded braids.



CAUTION

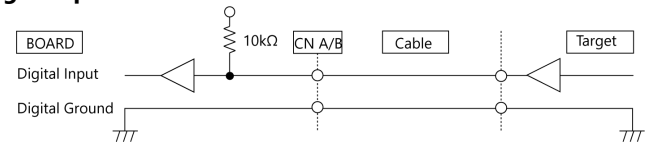
- When a frequency of 1MHz or higher is contained in the source signal, the cross talk between channels may occur.
- The input data would be uncertain if the analog ground is not connected.
- If the product and the signal source receive noise or the distance between the product and the signal source is too long, data may not be input properly.
- The input voltage from the [+] input or [-] input should not exceed the maximum input voltage (based on the product analog ground). If it exceeds the maximum voltage, the product may be damaged.
- Because the input data will be uncertain if the [+] pin or the [-] pin of CN A/B is not connected, all the unused input pins of CN A/B should be connected to the analog ground, AGND.
- In the channel switching, the multiplexer does the electrical charge and discharge on the internal capacitor according to the signal voltage. Therefore, the voltage from the previous switching state may go into the next channel. It might cause the error of the signal source action. If this occurs, insert a high-speed amplifier as a buffer between the signal source and the analog input pin to reduce the fluctuation.
- An input pin may fail to obtain input data normally when the signal source connected to the pin has high impedance. If this is the case, change the signal source to one with lower output impedance or insert a high-speed amplifier buffer between the signal source and the analog input pin to reduce the effect.

Connecting Digital I/O Signals

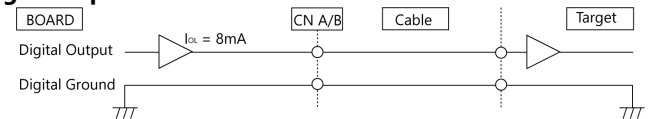
The following sections show examples of how to connect digital I/O signals.

All the I/O signals are LVTTTL level, and input or output can be set in 8-bit units by software.

Digital input



Digital output

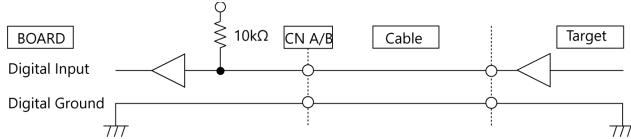


Counter signals and Control signals Connection

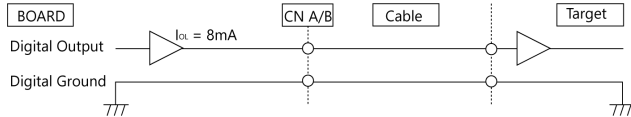
The following sections show examples of how to connect counter I/O signals, and other control I/O signals (external trigger input signals, sampling clock input signals, etc.).

All the counter signals and control signals are LVTTTL.

Counter input and Control input



Counter output and Control output



About the counter input control signal

Counter Gate Control Input acts as an input that validate or invalidate the input of an external up-clock for counter. This function enables the control of an external up-clock for counter. The external up-clock for counter is valid when input is "High", and invalid when input is "Low". If unconnected, it is a pull-up in the product and remains "High". Therefore the external up-clock for counter is valid 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 product.
- Each input accepts 5V TTL signals.

Difference from AD16-64(LPCI)LA

The functions same with conventional product of AD16-64(LPCI)LA are provided with the AI-1664LA-LPE. In addition, as there is compatibility in terms of connector shape and pin assignments, it is easy to migrate from the existing system. So you can use the same operating procedures as AD16-64(LPCI)LA.

There are some differences in specifications as shown below.

Item	AI-1664LA-LPE	AD16-64(LPCI)LA
consumption	+3.3VDC 620 mA (Max)	+5VDC 450 mA (Max)
Bus specification	PCI Express Base Specification Rev. 1.0a x1	PCI (32-bit, 33MHz, Universal key shapes supported)
External start signal	LVTTTL-level	TTL-level
External stop signal	LVTTTL-level	TTL-level
External clock signal	LVTTTL-level	TTL-level
Digital Input/Output	LVTTTL-level positive logic	TTL-level positive logic
External Counter Input/Output	LVTTTL-level	TTL-level
Dimension (mm)	121.69 (L)×67.90(H)	121.69(L)×63.41(H)
Weight	90g	60g

Circuit Block Diagram

