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Bus master transfer/multi-functions Analog I/O board for PCI Express

AIO-163202F-PE



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

This product is a multi-function, PCI Express bus-compliant interface board that incorporates

high-precision 16-bit analog inputs (32ch), high-precision 16-bit analog outputs (2ch), digital inputs/outputs (LVTTL level each 8ch), and a counter (32-bit, 2ch) function.

The board includes an event controller for integrated management of control signals by hardware and a bus master data transfer function for transferring large volumes of data at high speed. Together, these features provide all you need to build a high-performance PC-based measurement and control system.

You can use the driver library (API-PAC(W32)) supplied with the board to write Windows application programs in any programming language (such as Visual Basic, Visual C++, etc.) that supports the calling of Win32 API functions. It can also collect data easily without a program when the data logger software [C-LOGGER] stored on the attached Disk is used. With plug-ins for the dedicated libraries, the board also supports MATLAB and LabVIEW.

Features

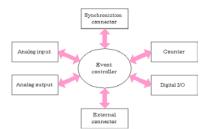
Multi-function

The board contains analog inputs (16-bit, 32ch), analog outputs (16-bit, 2ch), digital inputs (LVTTL level 8ch), digital outputs (LVTTL level 8ch), and counters (32-bit binary, LVTTL level 2ch). Combining all these features on one board allows complex systems to be implemented even on PCs with few spare extension slots.

The event controller can be used to implement a wide range of different sampling control schemes

The board incorporates an event controller for integrated hardware control. The event controller can use the external control signals and the events generated by the board functions to start and stop analog input operation and perform clock control. This enables high-precision synchronization of the various board functions without requiring software. Also, each function can be operated separately.

Overview of event controller



Each I/O function can be synchronized by the operation starting/stopping signal and the clock signal etc. of each I/O function.

Example 1: Synchronize the timing of analog input and analog output based on an external clock signal.

Example 2: Start analog input operation each time the counter value reaches a constant one.

Bus master transfer function and combined data I/O function

Bus master data transfer can be used for the analog inputs and outputs either separately or at the same time. This can be used to transfer large volumes of data to the PC without placing a load on the CPU. When using bus master data transfer for analog input data, you can transfer the analog output, digital input, digital output, and counter data at the same time synchronized with the analog input clock signal.

Buffer memory available for background processing independent of software

The analog inputs and outputs each have their own buffer memory (64k Word) which can be used when not using bus master transfer. The buffer memory can be used as FIFO or RING form.

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.

Equipped with the synchronization control function

The operation of each I/O function can be synchronized with two or more (Max. 16 pieces) boards equipped with the synchronous control function as the analog input is started at the same time.

Filter function for easy connection of external signals

The digital input signals, counter input signals, and the external control signals for analog I/O incorporate a digital filter to prevent problems such as chattering.

Supported to the data logger software [C-LOGGER]

Supporting the data logger software [C-LOGGER] that enables the graph display of recorded signal data, file saving, and dynamic transfer to the spreadsheet software program "Excel"

Plug-ins for the dedicated libraries, the board also supports MATLAB and LabVIEW.

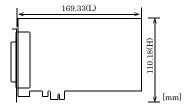
We offer a dedicated library [ML-DAQ], which allows you to use this product on MATLAB by The MathWorks as well as another dedicated library [VI-DAQ], which allows you to use the product on LabVIEW. These dedicated libraries are available, free of charge (downloadable), on our web site.

Specifications

Un-Isolated Single-Ended Input or Differential Input 32ch (Single-Ended Input), 16ch (Differential Input) Bipolar ±10V, ±5V, ±25V or Unipolar 0 - +10V, 0 - +5V, 0 - +25V ±15V
Single-Ended Input or Differential Input 32ch (Single-Ended Input), 16ch (Differential Input) Bipolar ±10V, ±5V, ±25V or Unipolar 0 - +10V, 0 - +5V, 0 - +2.5V
32ch (Single-Ended Input), 16ch (Differential Input) Bipolar ±10V, ±5V, ±2.5V or Unipolar 0 - +10V, 0 - +5V, 0 - +2.5V
Bipolar ±10V, ±5V, ±2.5V or Unipolar 0 - +10V, 0 - +5V, 0 - +2.5V
+15V
I
$1M\Omega$ or more
16bit
±5LSB
2μsec/ch (Max)
64k Word FIFO or 64k Word RING
Software, conversion data compare, external trigger, and event controller output.
Settings include data save complete, conversion data compare, external trigger, event controller output, and software.
LVTTL level (Rising or falling edge can be selected by software)
LVTTL level (Rising or falling edge can be selected by software)
LVTTL level (Rising or falling edge can be selected by software)
2 LVTTL level Sampling clock output
Un-Isolated
2ch
Bipolar ±10V, ±5V, ±2.5V, ±1.25V or Unipolar 0 - +10V, 0 - +5V, 0 - +2.5V
±5mA
1Ω or less
16bit
±3LSB
10µsec (Max.)
64k Word FIFO or 64k Word RING
Software, external trigger, and event controller output.
Settings include data save complete, external trigger, event controller output and software.
LVTTL level (Rising or falling edge can be selected by software)
LVTTL level (Rising or falling edge can be selected by software)
LVTTL level (Rising or falling edge can be selected by software)
2 LVTTL level, Sampling clock output
Un-Isolated input 8ch (LVTTL level positive logic)
Un-Isolated output 8ch (LVTTL level positive logic)
2ch
Up count
FFFFFFFh (Binary data, 32bit)
2 LVTTL level (Gate/Up)/ch, Gate (High level), Up (Rising edge)
LVTTL level output/ch,
Count match output (positive logic, pulse output)
10MHz (Max)
2sh (ann an sh faring shand a 1 a 1)
2ch (one each for input and output)
32bit 9 PCT Words (aposth (May))
8 PCI Words length (Max.)
1K-Word/ch
64M-Byte/ch
Selection of output signal with the software when specifying
a sync master board.
Selection of sync factor with the software when specifying sync slave boards
16 boards including the master board
PS-10PE-D4T1-B1 (JAE) or equivalent x 2
, ,
64 ports x 1, 256 ports x 1 region
Errors and various factors, One interrupt request line as INTA
96-pin half pitch connector [M(male)type]
PCR-96LMD [HONDA TSUSHIN KOGYO CO., LTD.] or equivalent
PCR-96LMD [HONDA TSUSHIN KOGYO CO, LTD.] or equivalent 3.3VDC 500mA, 12VDC 300mA
3.3VDC 500mA, 12VDC 300mA
3.3VDC 500mA, 12VDC 300mA 0 - 50°C, 10 - 90%RH (No condensation)

- *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.

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 bundled disk 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 new information, please visit the CONTEC's Web site.

Linux version of digital I/O driver API-AIO(LNX) [Stored on the bundled disk 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 new information, please visit the CONTEC's Web site.

Data Logger Software C-LOGGER [Stored on the bundled disk driver library API-PAC(W32)]

C-LOGGER is a data logger software program compatible with our analog I/O products. This program enables the graph display of recorded signal data, zoom observation, file saving, and dynamic transfer to the spreadsheet software "Excel". No troublesome programming is required. For more details on the supported OS, applicable language and new information, please visit the CONTEC's Web site.

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.

For more details on the supported OS, applicable language and new information, please visit the CONTEC's Web site.

Data acquisition VI library for LabVIEW VI-DAQ (Available for downloading (free of charge) from the CONTEC web site.)*1

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. For more details on the library and download of VI-DAQ, please visit the CONTEC's Web site.

*1 The bus master transmission (analog input and output), the analog input in-range and out-range function and the event controller function of analog F series are not supported. It is impossible to synchronize the AIO-163202F-PE with another board only when the synchronous connector was used.

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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)

Buffer Amplifier Box for Analog Input Boards (32ch type) : ATBA-32F *1*2

Buffer Amplifier Box for Analog Input Boards (8ch type) : ATBA-8F *1*2*3

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

BNC Terminal Unit (for analog input 32ch) : ATP-32F *1

BNC Terminal Unit (for analog input 8ch) : ATP-8 *1*3*5

- *1 PCB96PS-* optional cable is required separately (0.5mm is recommended).
- An external power supply is necessary (optional AC adaptor POA200-20 prepared.)
- *3 The analog input could have 8 channels to be used.
- *4 "Spring-up" type terminal is used to prevent terminal screws from falling off.
- *5 The digital input can be used up to four points, the digital output up to four points and the counter I/O up to 1 channel.

Packing List

Board [AIO-163202F-PE] ...1

First step guide ... 1

Disk *1 [API-PAC(W32)] ...1

Synchronization Control Cable (10cm) ...1

Warranty Certificate ...1

Serial number label ...1

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

Connector Pin Assignment

Single-Ended Input

Single-Ended Input				
N.C.	B48		A48	Analog Output 00
N.C.	B47		A47	Analog Ground (for AO)
N.C.	B46		A46	Analog Output 01
N.C.	B45		A45	Analog Ground (for AO)
Analog Input 08	B44		A44	Analog Input 00
Analog Input 24	B43		A43	Analog Input 16
Analog Input 09	B42		A42	Analog Input 01
Analog Input 25	B41		A41	Analog Input 17
Analog Ground (for AI)	B40		A40	Analog Ground (for AI)
Analog Ground (for AI)	B39		A39	Analog Ground (for AI)
Analog Input 10	B38		A38	Analog Input 02
Analog Input 26	B37		A37	Analog Input 18
Analog Input 11	B36		A36	Analog Input 03
Analog Input 27	B35		A35	Analog Input 19
Analog Ground (for AI)	B34	_	A34	Analog Ground (for AI)
Analog Ground (for AI)	B33	B48 [49] [1] A48	A33	Analog Ground (for AI)
Analog Input 12	B32		A32	Analog Input 04
Analog Input 28	B31		A31	Analog Input 20
Analog Input 13	B30		A30	Analog Input 05
Analog Input 29	B29		A29	Analog Input 21
Analog Ground (for AI)	B28		A28	Analog Ground (for AI)
Analog Ground (for AI)	B27		A27	Analog Ground (for AI)
Analog Input 14	B26		A26	Analog Input 06
Analog Input 30	B25		A25	Analog Input 22
Analog Input 15	B24		A24	Analog Input 07
Analog Input 31	B23		A23	Analog Input 23
Analog Ground (for AI)	B22		A22	Analog Ground (for AI)
Analog Ground (for AI)	B21		A21	Analog Ground (for AI)
Digital Ground	B20		A20	Digital Ground
N.C.	B19		A19	N.C.
Digital Output 00	B18		A18	Digital Input 00
Digital Output 01	B17	B01 A01	A17	Digital Input 01
Digital Output 02	B16	[96] [48]	A16	Digital Input 02
Digital Output 03	B15		A15	Digital Input 03
Digital Output 04	B14		A14	Digital Input 04
Digital Output 05	B13		A13	Digital Input 05
Digital Output 06	B12		A12	Digital Input 06
Digital Output 07	B11		A11	Digital Input 07
AO Control Signal Output 00	B10		A10	AI Control Signal Output 00
AO Control Signal Output 01	B09		A09	AI Control Signal Output 01
Digital Ground	B08		A08	Digital Ground
AO External Sampling Clock Input	B07		A07	AI External Sampling Clock Input
AO External Stop Trigger Input	B06		A06	AI External Stop Trigger Input
AO External Start Trigger Input	B05		A05	AI External Start Trigger Input
Counter UP Clock Input 01	B04		A04	Counter UP Clock Input 00
Reserved	B03		A03	Reserved
Counter Gate Control Input 01	B02		A02	Counter Gate Control Input 00
Control Output 01	B01		A01	Counter Output 00

The numbers in square brackets [] are pin numbers designated by HONDA TSUSHIIN KOGYO CO., LTD.

Analog Input00 - Analog Input31	Analog input signal. The numbers correspond to channel numbers.				
Analog Output00 - Analog Output01	Analog output signal. The numbers correspond to channel numbers.				
Analog Ground	Common analog ground for analog I/O 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.				
AI Control Signal Output 00	External sampling clock output signal for analog input.				
AI Control Signal Output 01	External output signal for analog input status. Not currently connected.				
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.				
AO Control Signal Output 00	External sampling clock output signal for analog output.				
AO Control Signal Output 01	External output signal for analog output status. Not currently connected.				
Digital Input00 - Digital Input07	Digital input signal.				
Digital Output00 - Digital Output07	Digital output signal.				
Counter Gate Control Input00 - Counter Gate Control Input01	Gate control input signal for counter.				
Counter Up Clock Input00 - Counter Up Clock Input01	Count-up clock input signal for counter.				
Counter Output00 - Counter Output01	Count match output signal for counter.				
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.				

Differential Input

N.C. 848 N.C. 847 N.C. 845 Analog Input 08[+] 844 Analog Input 09[+] 842 Analog Input 09[+] 842 Analog Input 09[+] 842 Analog Ground (for Al) 840 Analog Ground (for Al) 839 Analog Ground (for Al) 838 Analog Input 10[+] 835 Analog Input 10[+] 835 Analog Input 11[+] 836 Analog Input 12[+] 832 Analog Ground (for Al) 833 Analog Input 12[+] 832 Analog Input 12[+] 832 Analog Input 13[-] 839 Analog Input 14[+] 826 Analog Input 14[+] 826 Analog Input 14[+] 826 Analog Input 15[-] 823 Analog Input 15[-] 823 Analog Input 15[-] 824 Analog Input 15[-] 825 Analog Input 15[-] 826 Analog Input 15[-] 827 Analog Input 15[-] 828 Analog Ground (for Al) 820 Analog Input 15[-] 821 Analog Input 15[-] 822 Analog Ground (for Al) 822 Analog Input 15[-] 823 Analog Ground (for Al) 820 Analog Input 15[-] 821 Analog Input 15[-] 823 Analog Input 15[-] 823 Analog Input 15[-] 824 Analog Input 15[-] 825 Analog Input 15[-] 826 Analog Input 15[-] 827 Analog Input 15[-] 828 Analog Ground (for Al) 820 Analog Input 15[-] 821 Analog Input 15[-] 822 Analog Input 15[-] 823 Analog Input 15[-] 824 Analog Input 15[-] 825 Analog Input 15[-] 826 Analog Input 15[-] 827 Analog Input 15[-] 828 Analog Input 15[-] 829 Analog Input 15[-] 821 Analog Input 15[-] 822 Analog Input 15[-] 823 Analog Input 15[-] 824 Analog Input 15[-] 825 Analog Input 15[-] 826 Analog Input 15[-] 827 Analog Input 15[-] 828 Analog Input 15[-] 829 Analog Input 15[-] 829 Analog Input 15[-] 820 Analog Input 15[-] 821 Analog Input 15[-] 822 Analog Input 15[-] 823 Analog Input 15[-] 824 Analog Input 15[-]	Differential Input				
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Analog Input 10[+] B38 Analog Input 10[-] B37 Analog Input 11[+] B35 Analog Input 11[+] B35 Analog Ground (for Al) B34 Analog Ground (for Al) B34 Analog Input 12[+] B35 Analog Input 12[+] B32 Analog Input 12[+] B32 Analog Input 12[+] B31 Analog Input 12[+] B31 Analog Input 12[+] B30 Analog Input 13[-] B39 Analog Ground (for Al) B28 Analog Ground (for Al) B27 Analog Input 14[-] B25 Analog Input 14[-] B25 Analog Input 15[-] B23 Analog Input 15[-] B23 Analog Ground (for Al) B21 Digital Ground B20 N.C. B19 Digital Output 00 B18 Digital Output 01 B17 Digital Output 03 B15 Digital Output 04 B14 Digital Output 05 B15 Digital Output 06 B12 Digital Output 07 B11 AO Control Signal Output 00 B10 AO Control Signal Output 00 B10 AO External Sampling Clock Input AO External Start Tingger Input AO Counter UP Clock Input 00 Reserved B03 Counter Gate Control Input 01 B04 Counter Gate Control Input 01 B05 Counter Gate Control Input 01 B07 AO External Start Tingger Input AO Counter Gate Control Input 00 AO Counter Gate Control Input 01 AO Counter Gate Control Input 00 AO Counter Ga	Analog Ground (for AI)	B40		A40	Analog Ground (for AI)
Analog Input 10[-]	Analog Ground (for AI)	B39		A39	Analog Ground (for AI)
Analog Input 11[+] B36 Analog Ground (for AI) B33 Analog Ground (for AI) B33 Analog Input 12[+] B32 Analog Input 12[+] B33 Analog Input 13[+] B30 Analog Ground (for AI) B27 Analog Ground (for AI) B27 Analog Input 14[+] B26 Analog Input 14[-] B25 Analog Input 14[-] B25 Analog Input 15[-] B23 Analog Input 15[-] B23 Analog Ground (for AI) B27 Analog Input 15[-] B23 Analog Ground (for AI) B22 Analog Ground (for AI) B22 Analog Ground (for AI) B22 Analog Ground (for AI) B21 Digital Ground B20 N.C. B19 Digital Output 00 B18 Digital Output 01 B17 Digital Output 03 B15 Digital Output 04 B14 Digital Output 05 B13 Digital Output 06 B12 Digital Output 07 B11 AO Control Signal Output 00 B10 AO Control Signal Output 00 B10 AO External Sampling Clock Input AO External Sampling Clock Input AO External Sampling Clock Input AO External Start Trigger Input AO Reserved B03 Counter Gate Control Input 01 B02 Counter Gate Control Input 01 B03 Counter Gate Control Input 00 B04 Counter Gate Control Input 01 B05	Analog Input 10[+]	B38		A38	Analog Input 02[+]
Analog Input 11[-] B35	Analog Input 10[-]	B37		A37	Analog Input 02[-]
Analog Ground (for AI) B34 Analog Ground (for AI) B33 Analog Input 12(+) B32 Analog Input 12(+) B31 Analog Input 12(+) B31 Analog Input 13(-) B31 Analog Input 13(-) B32 Analog Ground (for AI) B28 Analog Ground (for AI) B28 Analog Ground (for AI) B28 Analog Ground (for AI) B27 Analog Input 14(+) B26 Analog Input 14(+) B26 Analog Input 15(-) B23 Analog Ground (for AI) B22 Analog Ground (for AI) B22 Analog Ground (for AI) B23 Analog Ground (for AI) B24 Analog Ground (for AI) B25 Analog Ground (for AI) B21 Digital Ground B20 N.C. B19 Digital Output 00 B18 Digital Output 01 B17 Digital Output 02 B16 Digital Output 03 B15 Digital Output 04 B14 Digital Output 05 B13 Digital Output 06 B12 Digital Output 07 B11 AO Control Signal Output 01 B09 Digital Ground B08 AO External Stop Trigger Input Reserved B03 Counter UP Clock Input 01 B04 Reserved B03 Counter Gate Control Input 001 B04 Counter UP Clock Input 01 B05 A02 Counter UP Clock Input 01 A03 Reserved A02 Counter UP Clock Input 00 A02 Counter UP Clock Input 01 A03 Reserved A03 Counter UP Clock Input 00 A04 Counter UP Clock Input 01 A05 A05 Counter UP Clock Input 01 B06 A05 Counter UP Clock Input 01 B07 A06 A07 Counter UP Clock Input 01 A08 Counter UP Clock Input 01 Counter UP Clock Input 01 A09 Counter UP Clock Input 01 A00 A00 Counter UP Clock Input 01 A00 A00 A01 A02 Counter UP Clock Input 00 A02 Counter UP Clock Input 01 A03 Analog Ground (for AI) A31 Analog Input 04(F1 A31 Analog Input 05(F1 A32 Analog Input 05(F1 A24 Analog Input 05(F1 A25 Analog Input 05(F1 A28 Analog Input 05(F1 A28 Analog Input 05(F1 A29 Analog Input 05(F1 A29 Analog Input 05(F1 A29 Analog Input 05(F1 A29 Analog Input 05(F1 A24 Analog Input 05(F1 A24 Analog Input 05(F1 A25 Analog Input 05(F1 A26 Analog Input 05(F1 A27 Analog Input 05(F1 A28 Analog Input 05(F1 A29 Analog Input 05(F1 A29 Analog Input 05(F1 A24 Analog Input 05(F1 A25 Analog Input 06(F1 A26 Analog Input 05(F1 A27 Analog Input 05(F1 A28 Analog Input 06(F1 A29 Analog Input 05(F1 A24 Analog Input 06(F1 A25 Analog Input 06(F1 A26 Analo	Analog Input 11[+]	B36		A36	Analog Input 03[+]
Analog Ground (for AI) B33 Analog Input 12[+] B32 Analog Input 12[-] B31 Analog Input 13[-] B30 Analog Input 13[-] B30 Analog Input 13[-] B29 Analog Ground (for AI) B28 Analog Ground (for AI) B27 Analog Input 14[-] B26 Analog Input 14[-] B25 Analog Input 14[-] B25 Analog Input 15[-] B23 Analog Input 15[-] B23 Analog Ground (for AI) B22 Analog Ground (for AI) B22 Analog Ground (for AI) B21 Digital Ground B20 N.C. B19 Digital Output 00 B18 Digital Output 01 B17 Digital Output 02 B16 Digital Output 03 B15 Digital Output 04 B14 Digital Output 05 B13 Digital Output 06 B12 Digital Output 07 B11 AO Control Signal Output 01 B03 AO External Stop Trigger Input Reserved B03 Counter UP Clock Input 01 B04 Reserved B03 Counter Gate Control Input 00 A02 Counter Gate Control Input 00 A03 Reserved A02 Counter Gate Control Input 00 A02 Counter Gate Control Input 01 A03 Reserved A03 Analog Ground (for AI) A30 Analog Input 04[-] A30 Analog Input 04[-] A30 Analog Ground (for AI) A29 Analog Ground (for AI) A20 Analog Input 06[-] A24 Analog Ground (for AI) A25 Analog Input 07[-] A22 Analog Ground (for AI) A26 Analog Input 06[-] A27 Analog Input 06[-] A28 Analog Input 06[-] A29 Analog Input 06[-] A20 Analog Input 06[-] A24 Analog Ground (for AI) A25 Analog Input 07[-] A22 Analog Ground (for AI) A26 Analog Input 07[-] A27 Analog Ground (for AI) A28 Analog Input 06[-] A29 Analog Input 06[-] A24 Analog Input 06[-] A25 Analog Input 06[-] A24 Analog Ground (for AI) A25 Analog Input 07[-] A22 Analog Ground (for AI) A26 Analog Input 06[-] A27 Analog Ground (for AI) A28 Analog Input 06[-] A29 Analog Input 06[-] A24 Analog Input 06[-] A25 Analog Input 06[-] A24 Analog Input 06[-] A24 Analog Input 06[-] A25 Analog Input 06[-] A24 Analog Input 06[-] A24 Analog Input 06[-] A25 Analog Input 06[-] A24 Analog Input 06[-] A24 Analog Input 06[-] A25 Analog Input 06[-] A24 Analog Input 06[-] A25 Analog Input 06[-] A26 Analog Input 06[-] A27 Analog Input 06[-] A28 Analog Input 06[-] A29 Analog Input 06[-] A20 Digital Output 00 A19 A17 Digital Input 00 A	Analog Input 11[-]	B35		A35	Analog Input 03[-]
Analog Ground (for AI) B33 Analog Input 12[+] B32 Analog Input 12[-] B31 Analog Input 13[-] B30 Analog Input 13[-] B30 Analog Input 13[-] B29 Analog Ground (for AI) B28 Analog Ground (for AI) B27 Analog Input 14[-] B26 Analog Input 14[-] B25 Analog Input 14[-] B25 Analog Input 15[-] B23 Analog Input 15[-] B23 Analog Ground (for AI) B22 Analog Ground (for AI) B22 Analog Ground (for AI) B21 Digital Ground B20 N.C. B19 Digital Output 00 B18 Digital Output 01 B17 Digital Output 02 B16 Digital Output 03 B15 Digital Output 04 B14 Digital Output 05 B13 Digital Output 06 B12 Digital Output 07 B11 AO Control Signal Output 01 B03 AO External Stop Trigger Input Reserved B03 Counter UP Clock Input 01 B04 Reserved B03 Counter Gate Control Input 00 A02 Counter Gate Control Input 00 A03 Reserved A02 Counter Gate Control Input 00 A02 Counter Gate Control Input 01 A03 Reserved A03 Analog Ground (for AI) A30 Analog Input 04[-] A30 Analog Input 04[-] A30 Analog Ground (for AI) A29 Analog Ground (for AI) A20 Analog Input 06[-] A24 Analog Ground (for AI) A25 Analog Input 07[-] A22 Analog Ground (for AI) A26 Analog Input 06[-] A27 Analog Input 06[-] A28 Analog Input 06[-] A29 Analog Input 06[-] A20 Analog Input 06[-] A24 Analog Ground (for AI) A25 Analog Input 07[-] A22 Analog Ground (for AI) A26 Analog Input 07[-] A27 Analog Ground (for AI) A28 Analog Input 06[-] A29 Analog Input 06[-] A24 Analog Input 06[-] A25 Analog Input 06[-] A24 Analog Ground (for AI) A25 Analog Input 07[-] A22 Analog Ground (for AI) A26 Analog Input 06[-] A27 Analog Ground (for AI) A28 Analog Input 06[-] A29 Analog Input 06[-] A24 Analog Input 06[-] A25 Analog Input 06[-] A24 Analog Input 06[-] A24 Analog Input 06[-] A25 Analog Input 06[-] A24 Analog Input 06[-] A24 Analog Input 06[-] A25 Analog Input 06[-] A24 Analog Input 06[-] A24 Analog Input 06[-] A25 Analog Input 06[-] A24 Analog Input 06[-] A25 Analog Input 06[-] A26 Analog Input 06[-] A27 Analog Input 06[-] A28 Analog Input 06[-] A29 Analog Input 06[-] A20 Digital Output 00 A19 A17 Digital Input 00 A	Analog Ground (for AI)	B34	_	A34	Analog Ground (for AI)
Analog Input 12[+] B32 Analog Input 12[-] B31 Analog Input 13[-] B30 Analog Input 13[-] B29 Analog Ground (for AI) B28 Analog Ground (for AI) B27 Analog Input 14[+] B26 Analog Input 14[-] B25 Analog Input 14[-] B25 Analog Input 15[-] B23 Analog Ground (for AI) B24 Analog Input 15[-] B23 Analog Ground (for AI) B21 Analog Ground (for AI) B22 Analog Ground (for AI) B21 Digital Ground B20 N.C. B19 Digital Output 00 B18 Digital Output 01 B17 Digital Output 02 B16 Digital Output 03 B15 Digital Output 04 B14 Digital Output 05 B13 Digital Output 05 B13 Digital Output 06 B12 Digital Output 07 B11 AO Control Signal Output 01 B09 Digital Ground B08 AO External Stop Trigger Input AO External Stop Trigger Input Counter UP Clock Input 01 B03 Counter UP Clock Input 01 B04 Reserved B03 Counter Gate Control Input 01 B05 A03 Analog Input 04[-] A31 Analog Input 04[-] A30 Analog Input 05[-] A29 Analog Ground (for AI) A29 Analog Ground (for AI) A26 Analog Input 06[-] A27 Analog Ground (for AI) A28 Analog Ground (for AI) A27 Analog Ground (for AI) A28 Analog Ground (for AI) A29 Analog Input 06[-] A29 Analog Input 06[-] A29 Analog Ground (for AI) A20 Digital Ground (for AI) A21 Analog Input 07[-] A22 Analog Ground (for AI) A23 Analog Ground (for AI) A24 Analog Input 07[-] A25 Analog Input 06[-] A26 Analog Input 06[-] A27 Analog Ground (for AI) A26 Analog Input 06[-] A27 Analog Ground (for AI) A28 Analog Ground (for AI) A26 Analog Input 06[-] A27 Analog Ground (for AI) A28 Analog Ground (for AI) A27 Analog Ground (for AI) A28 Analog Ground (for AI) A29 Analog Input 06[-] A24 Analog Input 06[-] A24 Analog Input 06[-] A25 Analog Input 06[-] A24 Analog Input 06[-] A24 Analog Input 06[-] A25 Analog Ground (for AI) A26 Analog Input 06[-] A27 Analog Ground (for AI) A20 Analog Input 06[-] A21 Analog Input 07[-] A22 Analog Ground (for AI) A24 Analog Input 06[-] A25 Analog Input 06[-] A26 Analog Input 06[-] A27 Analog Ground (for AI) A27 Analog Input 06[-] A28 Analog Ground (for AI) A29 Analog Input 07[-] A21 Analog Input 09 A17 Digital Input	Analog Ground (for AI)	B33	B48 [49] [1] A48	A33	Analog Ground (for AI)
Analog Input 13[+] B30 Analog Ground (for Al) B28 Analog Ground (for Al) B27 Analog Input 14[+] B26 Analog Input 14[+] B25 Analog Input 15[+] B24 Analog Input 15[+] B23 Analog Ground (for Al) B23 Analog Ground (for Al) B23 Analog Input 15[+] B24 Analog Ground (for Al) B22 Analog Ground (for Al) B22 Analog Ground (for Al) B22 Analog Ground (for Al) B21 Digital Ground B20 N.C. B19 Digital Output 00 B18 Digital Output 01 B17 Digital Output 02 B16 Digital Output 03 B15 Digital Output 04 B14 Digital Output 05 B13 Digital Output 06 B12 Digital Output 07 B11 AO Control Signal Output 01 B10 AO Control Signal Output 01 B09 Digital Ground B08 AO External Sampling Clock Input AO External Stop Trigger Input B04 Reserved B03 Counter Gate Control Input 01 B04 Reserved B03 Counter Gate Control Input 01 B02		B32	11 11	A32	
Analog Input 13[+] B30 Analog Ground (for Al) B28 Analog Ground (for Al) B27 Analog Input 14[+] B26 Analog Input 14[+] B25 Analog Input 14[+] B25 Analog Input 15[+] B24 Analog Input 15[-] B23 Analog Ground (for Al) B21 Analog Ground (for Al) B22 Analog Ground (for Al) B22 Analog Ground (for Al) B22 Analog Ground (for Al) B21 Digital Ground B20 N.C. B19 Digital Output 00 B18 Digital Output 01 B17 Digital Output 02 B16 Digital Output 03 B15 Digital Output 04 B14 Digital Output 05 B13 Digital Output 06 B12 Digital Output 07 B11 AO Control Signal Output 01 B90 AO Control Signal Output 01 B09 Digital Ground B08 AO External Sampling Clock Input AO External Stop Trigger Input B04 Reserved B03 Counter Gate Control Input 01 B04 Reserved B03 Counter Gate Control Input 01 B02	Analog Input 12[-]	B31		A31	Analog Input 04[-]
Analog Ground (for AI) B28 Analog Ground (for AI) B27 Analog Input 14(+) B26 Analog Input 14(+) B25 Analog Input 15(-) B23 Analog Input 15(-) B23 Analog Ground (for AI) B22 Analog Ground (for AI) B22 Analog Ground (for AI) B21 Digital Ground B20 N.C. B19 Digital Output 00 B18 Digital Output 01 B17 Digital Output 02 B16 Digital Output 03 B15 Digital Output 04 B14 Digital Output 05 B13 Digital Output 06 B12 Digital Output 06 B12 Digital Output 07 B11 AO Control Signal Output 01 B19 AO Control Signal Output 01 B09 Digital Ground B08 AO External Stop Trigger Input AO External Stop Trigger Input Reserved B03 Counter UP Clock Input 01 B04 Reserved B03 Counter Gate Control Input 01 B26 Analog Input 06(-) A25 Analog Input 06(-) A26 Analog Input 06(-) A26 Analog Input 06(-) A27 Analog Ground (for AI) A28 Analog Input 07[-] A24 Analog Input 07[-] A24 Analog Ground (for AI) A29 Analog Input 07[-] A21 Analog Input 07[-] A22 Analog Input 07[-] A22 Analog Input 07[-] A23 Analog Input 07[-] A24 Analog Input 07[-] A25 Analog Input 07[-] A22 Analog Input 07[-] A22 Analog Input 07[-] A23 Analog Input 07[-] A22 Analog Input 07[-] A22 Analog Input 07[-] A23 Analog Input 07[-] A22 Analog Input 07[-] A23 Analog Input 07[-] A24 Analog Input 07[-] A25 Analog Input 07[-] A20 Digital Ground A19		B30		A30	
Analog Ground (for AI) B28 Analog Ground (for AI) B27 Analog Input 14(+) B26 Analog Input 14(+) B25 Analog Input 14(+) B25 Analog Input 15(+) B24 Analog Input 15(-) B25 Analog Ground (for AI) B22 Analog Ground (for AI) B22 Analog Ground (for AI) B21 Digital Ground B20 N.C. B19 Digital Output 00 B18 Digital Output 01 B17 Digital Output 02 B16 Digital Output 03 B15 Digital Output 04 B14 Digital Output 05 B13 Digital Output 06 B12 Digital Output 06 B12 Digital Output 07 B11 AO Control Signal Output 01 B09 Digital Ground B08 AO External Stop Trigger Input Reserved B03 Counter UP Clock Input 01 B04 ANAlog Ground (for AI) A26 Analog Ground (for AI) A27 Analog Input 07(-) A28 Analog Input 07(-) A29 Analog Input 07(-) A20 Analog Input 07(-) A21 Analog Input 07(-) A22 Analog Input 07(-) A22 Analog Input 07(-) A23 Analog Input 07(-) A24 Analog Input 07(-) A25 Analog Input 07(-) A26 Analog Input 07(-) A27 Analog Input 07(-) A28 Analog Input 07(-) A29 Digital Input 09 A14 Digital Input 00 A15 Digital Input 05 A16 A17 Digital Input 06 A17 Digital Input 06 A18 Digital Input 07 A10 A1 Control Signal Output 01 A09 A1 External Stappling Clock Input A04 Counter UP Clock Input 01 A05 A1 External Start Trigger Input A06 A1 External Start Trigger Input A07 A1 External Start Trigger Input A08 Counter UP Clock Input 01 A09 A09 Reserved B03 Counter Gate Control Input 01 B04 Counter UP Clock Input 00 A09 Counter Gate Control Input 00	Analog Input 13[-]	B29		A29	Analog Input 05[-]
Analog Ground (for AI) B27 Analog Input 14[+] B26 Analog Input 14[-] B25 Analog Input 14[-] B25 Analog Input 15[-] B23 Analog Ground (for AI) B22 Analog Ground (for AI) B22 Analog Ground (for AI) B21 Digital Ground B20 N.C. B19 Digital Output 00 B18 Digital Output 01 B17 Digital Output 02 B16 Digital Output 03 B15 Digital Output 04 B14 Digital Output 05 B13 Digital Output 06 B12 Digital Output 07 B11 AO Control Signal Output 01 B19 AO Control Signal Output 01 B09 Digital Ground B08 AO External Stop Trigger Input Reserved B03 Counter UP Clock Input 01 B04 Reserved B03 Counter Gate Control Input 00 A02 Counter Gate Control Input 01 B26 Analog Input 06[-] A26 Analog Input 06[-] A25 Analog Input 06[-] A24 Analog Ground (for AI) A22 Analog Ground (for AI) A22 Analog Ground (for AI) A23 Analog Ground (for AI) A24 Analog Input 07[-] A19 N.C. A18 Digital Input 00 A19 A17 Digital Input 03 A14 Digital Input 03 A15 Digital Input 05 A12 Digital Input 06 A13 Digital Input 06 A10		B28		A28	Analog Ground (for AI)
Analog Input 14[+] B26 Analog Input 14[-] B25 Analog Input 15[-] B24 Analog Input 15[-] B23 Analog Ground (for AI) B22 Analog Ground (for AI) B21 Digital Ground B20 N.C. B19 Digital Output 00 B18 Digital Output 01 B17 Digital Output 02 B16 Digital Output 03 B15 Digital Output 04 B14 Digital Output 05 B13 Digital Output 05 B13 Digital Output 06 B12 Digital Output 07 B11 AO Control Signal Output 01 B19 AO Control Signal Output 01 B09 Digital Ground B08 AO External Sampling Clock Input AO External Stop Trigger Input Counter UP Clock Input 01 B04 Reserved B03 Counter Gate Control Input 01 B04 Reserved B03 Counter Gate Control Input 01 B04 A03 Reserved A02 Counter Gate Control Input 00 A03 Reserved A02 Counter Gate Control Input 00 A03 Reserved A02 Counter Gate Control Input 00 A02 Counter Gate Control Input 01 A03 Reserved A04 Counter UP Clock Input 00 A05 Counter Gate Control Input 01 B08 A06 AC External Stop Trigger Input A07 AI External Starp Trigger Input A08 Counter Gate Control Input 00 A09 Reserved A00 Counter Gate Control Input 00 A00 Counter Gate Control Input 00 A00 Counter UP Clock Input 00	Analog Ground (for AI)	B27		A27	Analog Ground (for AI)
Analog Input 15(+) B24 Analog Ground (for AI) B22 Analog Ground (for AI) B21 Digital Ground B20 N.C. B19 Digital Output 00 B18 Digital Output 01 B17 Digital Output 03 B15 Digital Output 04 B14 Digital Output 05 B13 Digital Output 06 B12 Digital Output 07 B11 AO Control Signal Output 01 B10 AO Control Signal Output 01 B09 Digital Ground B08 AO External Sampling Clock Input AO External Start Trigger Input Counter UP Clock Input 01 B04 Reserved B03 Counter Gate Control Input 01 B04 ANALOG AC Sternal Sare Vinger Input Counter Gate Control Input 01 B04 ANALOG AC Counter Gate Control Input 01 B04 ANALOG AC Counter Gate Control Input 01 B03 Counter Gate Control Input 01 B02 ANALOG AC Sternal Sare Vinger Input ANALOG AC Counter Gate Control Input 00		B26		A26	
Analog Input 15[-] B23 Analog Ground (for AI) B22 Analog Ground (for AI) B21 Digital Ground B20 N.C. B19 Digital Output 00 B18 Digital Output 01 B17 Digital Output 02 B16 Digital Output 03 B15 Digital Output 04 B14 Digital Output 06 B12 Digital Output 06 B12 Digital Output 07 B11 AO Control Signal Output 00 B10 AO Control Signal Output 01 B09 Digital Ground B08 AO External Starp Tingger Input B06 AO External Start Tingger Input B04 Reserved B03 Counter Gate Control Input 01 B04 Reserved B03 Counter Gate Control Input 01 B02 A22 Analog Ground (for AI) A21 Analog Ground (for AI) A22 Analog Ground (for AI) A23 Analog Input 07 A14 Digital Ground A19 N.C. A19 N.C. A19 N.C. A10 Digital Input 00 A11 Digital Input 01 A12 Digital Input 03 A13 Digital Input 05 A14 Digital Input 05 A15 Digital Input 06 A11 Digital Input 06 A11 Digital Input 07 A10 AI Control Signal Output 01 A08 Digital Ground A09 AI External Sampling Clock Input A06 AI External Start Tingger Input A07 AI External Start Tingger Input A08 Counter UP Clock Input 01 A09 Reserved A00 Reserved A00 Reserved A01 Reserved A02 Counter Gate Control Input 00	Analog Input 14[-]	B25		A25	Analog Input 06[-]
Analog Input 15[-] B23 Analog Ground (for AI) B21 Digital Ground B20 N.C. B19 Digital Output 00 B18 Digital Output 01 B17 Digital Output 03 B15 Digital Output 04 B14 Digital Output 05 B13 Digital Output 06 B12 Digital Output 07 B11 AO Control Signal Output 01 B09 Digital Ground B08 AO External Starp Tingger Input B05 Counter UP Clock Input 01 B03 Reserved B03 Counter Gate Control Input 01 B04 Analog Ground (for AI) A22 Analog Ground (for AI) A21 Analog Ground (for AI) A22 Digital Ground B19 A23 Analog Input 07[-] A242 Analog Ground (for AI) A21 Analog Ground (for AI) A22 Digital Ground B19 A20 Digital Ground B18 A13 Digital Input 00 A14 Digital Input 01 A15 Digital Input 03 A14 Digital Input 04 A13 Digital Input 04 A13 Digital Input 06 A11 Digital Input 06 A11 Digital Input 07 A10 AI Control Signal Output 01 A09 AI Control Signal Output 01 A09 AI Control Signal Output 01 A06 AI External Starp Tingger Input A07 AI External Starp Tingger Input A08 Counter UP Clock Input 01 A09 Reserved B03 Counter Gate Control Input 01 B04 Counter Gate Control Input 01 B05	Analog Input 15[+]	B24		A24	Analog Input 07[+]
Analog Ground (for AI) Digital Ground N.C. B19 Digital Output 00 B18 Digital Output 01 B17 Digital Output 02 B16 Digital Output 03 B15 Digital Output 04 B14 Digital Output 05 B13 Digital Output 05 B13 Digital Output 06 B12 Digital Output 07 B11 AO Control Signal Output 01 B10 AO Control Signal Output 01 B10 AO External Sampling Clock Input AO External Stop Trigger Input AO External Stop Trigger Input Counter UP Clock Input 01 B04 Reserved B03 Counter Gate Control Input 01 B20 Digital Ground (for AI) A20 Digital Ground (for AI) A20 Digital Ground (for AI) A20 Digital Ground (for AI) A19 N.C. A18 Digital Input 00 A17 A16 Digital Input 01 A16 Digital Input 03 A15 Digital Input 03 A12 Digital Input 05 A12 Digital Input 06 A12 Digital Input 07 A10 AI Control Signal Output 00 A09 AI External Stop Trigger Input A06 AI External Stop Trigger Input A07 AI External Stop Trigger Input A08 Counter UP Clock Input 01 B04 Reserved B03 Counter Gate Control Input 01 B05	Analog Input 15[-]	B23		A23	Analog Input 07[-]
Digital Ground B20 N.C. B19 Digital Output 00 B18 Digital Output 01 B17 Digital Output 02 B16 Digital Output 03 B15 Digital Output 04 B14 Digital Output 05 B13 Digital Output 05 B13 Digital Output 06 B12 Digital Output 07 B11 AO Control Signal Output 01 B10 AO Control Signal Output 01 B09 Digital Ground B08 AO External Stop Trigger Input AO External Stop Trigger Input B06 AO External Stop Trigger Input Counter UP Clock Input 01 B04 Reserved B03 Counter Gate Control Input 01 B09 Dig Reserved B03 Counter Gate Control Input 01 B09 Counter Gate Control Input 00	Analog Ground (for AI)	B22		A22	Analog Ground (for AI)
N.C. B19 Digital Output 01 B17 Digital Output 02 B16 Digital Output 03 B15 Digital Output 04 B14 Digital Output 05 B13 Digital Output 05 B13 Digital Output 06 B12 Digital Output 07 B11 AO Control Signal Output 01 B09 AO Control Signal Output 01 B09 Digital Ground B08 AO External Sampling Clock Input AO External Stop Trigger Input B06 AO External Stop Trigger Input B07 AO External Stop Trigger Input B08 Counter UP Clock Input 01 B09 Reserved B03 Counter Gate Control Input 01 B02 A03 Reserved A02 Counter Gate Control Input 00 B18 A18 Digital Input 00 A16 Digital Input 03 A15 Digital Input 03 A14 Digital Input 05 A12 Digital Input 06 A11 Digital Input 06 A11 Digital Input 06 A11 Digital Input 07 A10 A1 External Sampling Clock Input A06 A1 External Sampling Clock Input A07 A1 External Stop Trigger Input A08 Counter UP Clock Input 01 B09 A09 Reserved A00 A00 Reserved A00 A01 Reserved A02 Counter Gate Control Input 00	Analog Ground (for AI)	B21		A21	Analog Ground (for AI)
Digital Output 00 B18 Digital Output 01 B17 Digital Output 02 B16 Digital Output 03 B15 Digital Output 04 B14 Digital Output 05 B13 Digital Output 06 B12 Digital Output 07 B11 AO Control Signal Output 00 B09 Digital Ground B08 AO External Sampling Clock Input AO External Start Trigger Input AO External Start Trigger Input Counter UP Clock Input 01 B04 Reserved B03 Counter Gate Control Input 01 B02 A18 Digital Input 00 A17 Digital Input 01 A16 Digital Input 02 A15 Digital Input 03 A14 Digital Input 04 A13 Digital Input 05 A12 Digital Input 05 A12 Digital Input 06 A11 Digital Input 07 A10 AI Control Signal Output 00 A09 AI Control Signal Output 00 A09 AI Control Signal Output 01 A08 Digital Ground A07 AI External Sampling Clock Input A06 AI External Start Trigger Input A07 AI External Start Trigger Input A08 A09 AI External Start Trigger Input A09 A10 Counter UP Clock Input 00 A10 Reserved A10 A03 Reserved A03 Reserved A04 Counter Gate Control Input 00	Digital Ground	B20		A20	Digital Ground
Digital Output 01 B17 Digital Output 02 B16 Digital Output 03 B15 Digital Output 04 B14 Digital Output 05 B13 Digital Output 06 B12 Digital Output 07 B11 AO Control Signal Output 01 B09 Digital Ground B08 AO External Sampling Clock Input AO External Start Trigger Input AO External Start Trigger Input Counter UP Clock Input 01 B03 Counter Gate Control Input 01 B04 Reserved B03 Counter Gate Control Input 01 B17 AO External Sampling to B04 Reserved B03 Counter Gate Control Input 01 B04 A05 AD External Start Trigger Input B05 AO External Start Trigger Input B05 Counter Gate Control Input 01 B04 Reserved B03 Counter Gate Control Input 01 B05	N.C.	B19		A19	
Digital Output 02 B16 Digital Output 03 B15 Digital Output 04 B14 Digital Output 05 B13 Digital Output 06 B12 Digital Output 07 B11 AO Control Signal Output 01 B09 Digital Ground B08 AO External Storp Trigger Input AO External Storp Trigger Input AO External Storp Trigger Input Counter UP Clock Input 01 B04 Reserved B03 Counter Gate Control Input 01 B02 A16 Digital Input 02 A15 Digital Input 03 A14 Digital Input 05 A12 Digital Input 06 A13 Digital Input 06 A14 Digital Input 06 A15 Digital Input 07 A10 Al Control Signal Output 01 A09 Al Control Signal Output 01 A09 Al Control Signal Output 01 A07 Al External Sampling Clock Input A08 Digital Ground A08 Digital Ground A09 Al External Storp Trigger Input A06 Al External Storp Trigger Input A07 Al External Storp Trigger Input A08	Digital Output 00	B18		A18	Digital Input 00
Digital Output 03	Digital Output 01	B17	BOIL AOI	A17	Digital Input 01
Digital Output 04 B14 Digital Input 04	Digital Output 02	B16	[96] [48]	A16	Digital Input 02
Digital Output 05 B13 A13 Digital Input 05	Digital Output 03	B15	~	A15	Digital Input 03
Digital Output 06 B12 A12 Digital Input 06	Digital Output 04	B14		A14	Digital Input 04
Digital Output 07 B11 A11 Digital Input 07 AO Control Signal Output 00 B10 A10 A1 Control Signal Output 01 B09 AO Control Signal Output 01 B09 A09 A1 Control Signal Output 01 Digital Ground B08 A08 Digital Ground AO External Sampling Clock Input B07 A07 A1 External Sampling Clock Input A07 External Stop Trigger Input B06 A08 External Stop Trigger Input B05 A08 External Start Trigger Input B05 A1 External Start Trigger Input B05 A07 External Start Trigger Input B08 A08 A1 External Start Trigger Input B09 A08 A1 External Start Trigger Input B09 A09 A1 External Start Trigger Input B09 A09 A09 A1 External Start Trigger Input B09 A09 Counter UP Clock Input 00 A09 Reserved B09 A09 Counter Gate Control Input 01 B09 A09 Counter Gate Control Input 01 B09 A09 Counter Gate Control Input 00	Digital Output 05	B13		A13	Digital Input 05
AO Control Signal Output 00 B10 A10 AI Control Signal Output 01 B09 A09 AI Control Signal Output 01 B09 A09 AI Control Signal Output 01 B08 A08 Digital Ground B08 A08 Digital Ground AO External Sampling Clock Input B07 AO External Stop Trigger Input B06 AO External Start Trigger Input B05 A0 External Start Trigger Input B05 A09	Digital Output 06	B12		A12	Digital Input 06
AO Control Signal Output 01 B09 Digital Ground B08 AO External Sampling Clock Input B07 AO External Stop Trigger Input B06 AO External Stop Trigger Input B06 AO External Start Trigger Input B05 AO External Start Trigger Input B05 AO External Start Trigger Input B04 AO External Start Trigger Input B05 AO External Start Trigger Input B06 Counter UP Clock Input 01 B04 Reserved B03 Counter Gate Control Input 01 B02 AO2 Counter Gate Control Input 00	Digital Output 07	B11		A11	Digital Input 07
Digital Ground B08 AO External Sampling Clock Input B07 AD External Stop Trigger Input B06 AO External Stop Trigger Input B05 AO External Stop Trigger Input B05 AO External Stop Trigger Input B05 AO External Start Trigger Input B05 AO AI External Stop Trigger Input B05 AO AI External Start Trigger Input A00 Counter UP Clock Input 01 B04 Reserved B03 Counter Gate Control Input 01 B02 AO Counter Gate Control Input 00	AO Control Signal Output 00	B10		A10	AI Control Signal Output 00
AO External Sampling Clock Input B07 A07 AI External Sampling Clock Input AO External Stop Trigger Input B06 A06 AI External Stop Trigger Input AO External Start Trigger Input B05 A05 AI External Start Trigger Input Counter UP Clock Input 01 B04 A04 Counter UP Clock Input 00 Reserved B03 A03 Reserved Counter Gate Control Input 01 B02 A02 Counter Gate Control Input 00	AO Control Signal Output 01	B09		A09	AI Control Signal Output 01
AO External Stop Trigger Input B06 A06 AI External Stop Trigger Input AO External Start Trigger Input B05 A05 AI External Start Trigger Input Counter UP Clock Input 01 B04 A04 Counter UP Clock Input 00 Reserved B03 A03 Reserved Counter Gate Control Input 01 B02 A02 Counter Gate Control Input 00	Digital Ground	B08		A08	Digital Ground
AO External Start Trigger Input B05 A05 AI External Start Trigger Input Counter UP Clock Input 01 B04 A04 Counter UP Clock Input 00 Reserved B03 A03 Reserved Counter Gate Control Input 01 B02 A02 Counter Gate Control Input 00	AO External Sampling Clock Input	B07		A07	AI External Sampling Clock Input
Counter UP Clock Input 01 B04 A04 Counter UP Clock Input 00 Reserved B03 A03 Reserved Counter Gate Control Input 01 B02 A02 Counter Gate Control Input 00	AO External Stop Trigger Input	B06		A06	AI External Stop Trigger Input
Reserved B03 A03 Reserved Counter Gate Control Input 01 B02 A02 Counter Gate Control Input 00	AO External Start Trigger Input	B05		A05	AI External Start Trigger Input
Counter Gate Control Input 01 B02 A02 Counter Gate Control Input 00	Counter UP Clock Input 01	B04		A04	Counter UP Clock Input 00
	Reserved	B03		A03	Reserved
Counter Output 01 B01 A01 Counter Output 00	Counter Gate Control Input 01	B02		A02	Counter Gate Control Input 00
	Counter Output 01	B01		A01	Counter Output 00

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

Analog Input00 - Analog Input15	Analog input signal. The numbers correspond to channel numbers.
Analog Output00 - Analog Output01	Analog output signal. The numbers correspond to channel numbers.
Analog Ground	Common analog ground for analog I/O 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.
AI Control Signal Output 00	External sampling clock output signal for analog input.
AI Control Signal Output 01	External output signal for analog input status. Not currently connected.
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.
AO Control Signal Output 00	External sampling clock output signal for analog output.
AO Control Signal Output 01	External output signal for analog output status. Not currently connected.
Digital Input00 - Digital Input07	Digital input signal.
Digital Output00 - Digital Output07	Digital output signal.
Counter Gate Control Input00 - Counter Gate Control Input01	Gate control input signal for counter.
Counter Up Clock Input00 - Counter Up Clock Input01	Count-up clock input signal for counter.
Counter Output00 - Counter Output01	Count match output signal for counter.
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.

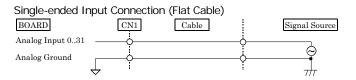
Analog Input Signal Connection

The procedure for connecting analog signals depends on whether the analog input signals are

single-ended or differential. The sections below describe how to connect the signals using flat cable and shielded cable.

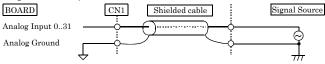
Single-ended Input

The following figure shows an example of flat cable connection. Connect separate signal and ground wires for each analog input channel on CN1



The following figure shows an example of shielded 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.

Single-ended Input Connection (Shielded Cable)



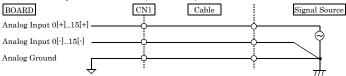
▼CAUTION

- If the signal source contains over 1MHz signals, the signal may effect the cross-talk noise between channels.
- If the board and the signal source receive noise or the distance between the board 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 board analog ground). If
 it exceeds the maximum voltage, the board 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 highspeed amplifier buffer between the signal source and the analog input pin to reduce the effect.

Differential Input

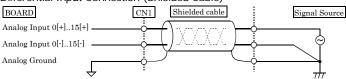
The following figure shows an example of flat cable connection. For each analog input channel on CN1, connect the "+" input to the signal and connect the "-" input to the signal source ground. Also connect the analog ground on the board to the signal source ground.

Differential Input Connection (Flat Cable)



The following figure shows an example of shielded 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 "+" input to the signal and connect the "-" input to the signal source ground. Also connect the analog ground on the board and the signal source ground to the shielding.

Differential Input Connection (Shielded Cable)



▼CAUTION

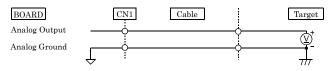
- If the signal source contains over 1MHz signals, the signal may effect the cross-talk noise between channels.
- When the analog ground is not connected, the conversion data is not determined.
- If the board and the signal source receive noise or the distance between the board and the signal source is too long, data may not be input properly.
- An input analog signal should not exceed the maximum input voltage (relate to the board analog ground). If it exceeds the maximum voltage, the board 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 highspeed amplifier buffer between the signal source and the analog input pin to reduce the effect.

Analog Output Signal Connection

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

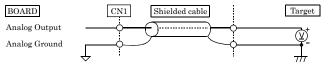
The following figure shows an example of flat cable connection. Connect the signal source and ground to the CN1 analog output.

Analog Output Connection (Flat Cable)



The following figure shows an example of shielded 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 the CN1 analog output, connect the core wire to the signal line and connect the shielding to ground.

Analog Output Connection (Shielded Cable)



▼CAUTION

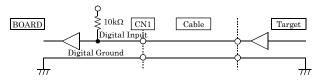
- When a frequency of 1MHz or higher is contained in the source signal, the cross talk between channels may
- If the board or the connected wire receives noise, or the distance between the board and the target is long, data may not be outputted properly.
- For analog output signal, the current capacity is ±5mA (Max.). Check the specification of the connected device before connecting the board.
- 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.
- The signal connected to an input terminal may shake after a multiplexer change. In this case, a shake can be lessened by shortening the cable between the source signal and an analog input board, or inserting highspeed buffer amplifier between the source signal and an analog input board.

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

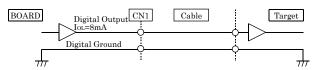
The following sections show examples of how to connect digital I/O signals, counter I/O signals, and other control I/O signals (external trigger input signals, sampling clock input signals, etc.).

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

Digital Input Connection



Digital Output Connection



About the counter input control signal

Counter Gate Control Input (refer to the chapter 3 Connector Pin Assignment) 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.
- If connected to each output, a pull-up resistor must be about 10 k \square to pull up with a 3.3V power source.
- Each input accepts 5V TTL signals.