

4ch 24Bit Differential Up/Down Counter Board for PCI CNT24-4D(PCI)H



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

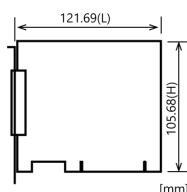
Features

It is equipped with four channels of 24-bit up/down counters. 24-bit up/down count for 4 channels can be performed with one board. The board can count two-phase signals, which can be outputs of some rotary encoders and linear scales. Two-phase signals such as rotary encoders and linear gauges can be counted. You can select either a opto-coupler isolated input or a TTL-level input for each channel by software command. Either differential input or TTL level input can be selected for each channel individually. Each channel can generate an interrupt request signal and a one-pulse output signal when the count data matches a pre-specified value. An interrupt can be generated or a signal can be output externally by matching the count value of each channel with an arbitrarily set value. The board is equipped with a programmable timer to allow interrupts to be generated periodically according to a specified timer value. It has a programmable timer, it is possible to generate interrupts at regular intervals with a set timer value. Each Channel is equipped with a general-purpose input signal (both opto-coupler and TTL-level). Equipped with one general-purpose input signal for each channel. (both Differential and TTL-level).

Included Items

Product [CNT24-4D(PCI)H] ...1
Please read the following ... 1

Physical Dimensions



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

This product is a PCI bus-compliant interface board that counts input pulse signals from external devices.

This product has four channels of 24-bit up/down counters, allowing external devices such as a rotary encoder and a linear scale to be connected.

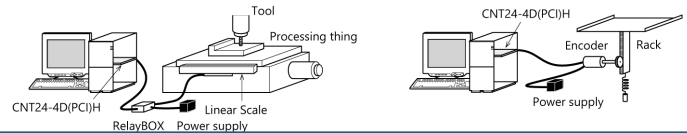
Given below are examples of using the board for "detecting a position of the table of a machine tool" and "detecting a change in weight".

The pulse signal inputting interface is Differential Input or TTL-level input. Windows/Linux device driver is supported with this product.

< Example >

- Detecting a position of the table of a machine tool

- Detecting a change in weight



- * 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 April, 2024.

Specifications

Function specification

Item	Specifications	
Counter Input		
Number of Channels	4 Channels	
Count system	Up/down counting	
Max. count	FFFFFFH (binary data)	
Counter input type	Differential Input or TTL-level input	
Counter input signal	Phase-A/UP Phase-B/DOWN Phase-Z/CLR General-purpose input	1 x 4 channels 1 x 4 channels 1 x 4 channels 1 x 4 channels
Differential Input section	Element in use: Terminating resistance: Receiver input sensitivity: In-phase input voltage range: Signal extension distance:	AM26LS32(T.I) or equivalent 100Ω (Can be disconnected by switch) ±200mV ±7V 1200m (dependent on wiring environment and input frequency) *1
TTL level input section*2	Element in use: Signal extension distance:	74LS541(T.I) or equivalent 1.5m(dependent on wiring environment)
Response frequency	Differential Input TTL-level input	1MHz 50% duty (Max) 1MHz 50% duty (Max)
Digital filter	0.1μsec - 1056.1μsec (can be independently set for each channel)	
Timer	1msec - 200sec	
Match signal output		
Output point	1 x 4 channels	
Output type	Uninsulated open-collector output or TTL-level output (Selectable by a switch.)	
Output rating	50VDC, 90mA (Max.) (per 1 point)	
Output signal width	0 - 104.45msec (All channels)	
Response rate	5μsec (Max.)	
Output protection circuit	None	
Common		
Signal extension distance	1.5m (dependent on wiring environment)	
I/O address	32 ports boundary	
Interrupt	One Generated when each channel count matches or the timer runs out of time.	
Power consumption	5VDC 320mA (Max.) *3	
PCI bus specification	32bit, 33MHz, Universal key shapes supported*4	
Dimension (mm)	121.69(L) x 105.68(H) *5	
Weight	120g	

*1 Please use the shielded cable with a length of less than 30m to meet "CE EMC Directive".

*2 Please use the shielded cable to meet "CE EMC Directive".

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

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

*5 The size of board No.7294, No.7294A, and No.7294B is 176.41 (L) x 105.68 (H) mm.

Installation Environment Requirements

Item	Specifications
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 Counter Driver software API-CNT(WDM)	The Windows device driver is provided as a form of Windows API functions. Various sample programs such as C#, Visual Basic, .NET, Visual C++, Python etc. and diagnostic program useful for checking operation is provided.	Download from the CONTEC website *1
Linux Version Counter Driver software API-CNT(LNX)	The Linux device driver is provided as a shared library. The software includes various sample programs such as gcc (C, C++) and Python programs, as well as a configuration tool to configure the device settings.	Download from the CONTEC website *1
Software Development Tool Kits (SDK) and Support Software	In addition to the device drivers, we offer many software programs for using CONTEC devices in an easier manner.	Download from the CONTEC website *2

*1 Download the files from the following URL.

<https://www.contec.com/download/>

*2 For supported software, search the CONTEC website for this product and view the product page.

<https://www.contec.com/>

Optional Products

Product Name	Model type	Description
Shielded Cable with Two 96-Pin Half-Pitch Connectors	PCB96PS-0.5P	0.5m
	PCB96PS-1.5P	1.5m
	PCB96PS-3P	3m
	PCB96PS-5P	5m
	PCB96P-1.5	1.5m
Flat Cable with 96-pin Half-Pitch Connectors at Both Ends	PCB96P-3	3m
	PCB96P-5	5m
Shielded Cable with One 96-pin Half-Pitch Connector	PCA96PS-0.5P	0.5m
	PCA96PS-1.5P	1.5m
	PCA96PS-3P	3m
	PCA96PS-5P	5m
	PCA96P-1.5P	1.5m
Connection Conversion Shield Cable (96P→37P x 2)	PCB96WS-1.5P	1.5m
	PCB96WS-3P	3m
	PCB96WS-5P	5m
Screw Terminal (M3 * 96)	EPD-96A	*1 *2
Terminal Unit for Relay Terminal Banks	EPD-96	*2
Screw Terminal (M3 * 37P)	EPD-37A	*1 *3
Screw Terminal (M3.5 * 37)	EPD-37	*3
Screw Terminal	DTP-64A	*2
General Purpose Terminal	DTP-3C	*3
Screw Terminal (M3 * 96)	DTP-4C	*3
Connector Conversion Board (96pin→37pinx2)	CCB-96	*4

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

*2 PCB96P or PCB96PS optional cable is required separately.

*3 PCB96WS optional cable is required separately.

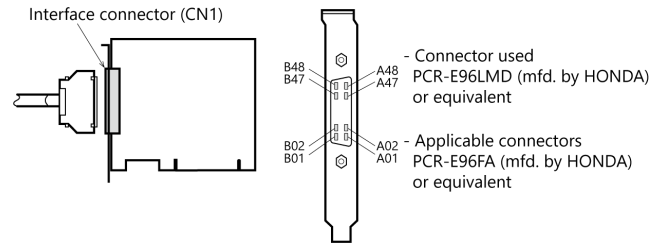
*4 Option cable PCB96P or PCB96PS, and the cable for 37-pin D-SUB are required separately.

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 (CN1) shown below.



Signal Layout of Interface Connector

Layout on the Interface Connector (CN1)

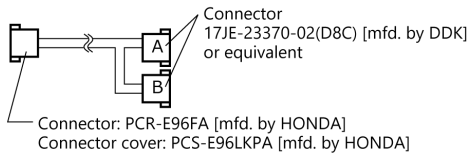
Ground	GND	B48	A48	N.C.	Not connected
	GND	B47	A47	N.C.	
CH3 line receiver general-purpose input-	L3U-	B46	A46	T3U	CH3TTL general-purpose input
CH3 line receiver general-purpose input+	L3U+	B45	A45	T3Z	CH3TTLZ phase input
CH3 line receiver Z phase input-	L3Z-	B44	A44	T3B	CH3TTLB phase input
CH3 line receiver Z phase input+	L3Z+	B43	A43	T3A	CH3TTLA phase input
CH3 line receiver B phase input-	L3B-	B42	A42	GND	Ground
CH3 line receiver B phase input+	L3B+	B41	A41	T2U	CH2TTL general-purpose input
CH3 line receiver A phase input-	L3A-	B40	A40	T2Z	CH2TTLZ phase input
CH3 line receiver A phase input+	L3A+	B39	A39	T2B	CH2TTLB phase input
CH2 line receiver general-purpose input-	L2U-	B38	A38	T2A	CH2TTLA phase input
CH2 line receiver general-purpose input+	L2U+	B37	A37	GND	Ground
CH2 line receiver Z phase input-	L2Z-	B36	A36	OUT3	CH3 one-shot output
CH2 line receiver Z phase input+	L2Z+	B35	A35	OUT2	CH2 one-shot output
CH2 line receiver B phase input-	L2B-	B34	A34	OUT1	CH1 one-shot output
CH2 line receiver B phase input+	L2B+	B33	A33	OUT0	CH0 one-shot output
CH2 line receiver A phase input-	L2A-	B32	A32	N.C.	Not connected
CH2 line receiver A phase input+	L2A+	B31	A31	N.C.	
Ground	GND	B30	A30	N.C.	
	GND	B29	A29	N.C.	
	GND	B28	A28	GND	Ground
	GND	B27	A27	GND	
	GND	B26	A26	GND	
	GND	B25	A25	GND	
	GND	B24	A24	GND	Not connected
	GND	B23	A23	GND	
	GND	B22	A22	GND	
	GND	B21	A21	GND	
	GND	B20	A20	N.C.	Not connected
	GND	B19	A19	N.C.	
CH1 line receiver general-purpose input-	L1U-	B18	A18	T1U	CH1TTL general-purpose input
CH1 line receiver general-purpose input+	L1U+	B17	A17	T1Z	CH1TTLZ phase input
CH1 line receiver Z phase input-	L1Z-	B16	A16	T1B	CH1TTLB phase input
CH1 line receiver Z phase input+	L1Z+	B15	A15	T1A	CH1TTLA phase input
CH1 line receiver B phase input-	L1B-	B14	A14	GND	Ground
CH1 line receiver B phase input+	L1B+	B13	A13	T0U	CH0TTL general-purpose input
CH1 line receiver A phase input-	L1A-	B12	A12	T0Z	CH0TTLZ phase input
CH1 line receiver A phase input+	L1A+	B11	A11	T0B	CH0TTLB phase input
CH0 line receiver general-purpose input-	L0U-	B10	A10	T0A	CH0TTLA phase input
CH0 line receiver general-purpose input+	L0U+	B09	A09	N.C.	Not connected

CH0 line receiver Z phase input-	L0Z-	B08		A08	GND	
CH0 line receiver Z phase input+	L0Z+	B07		A07	GND	
CH0 line receiver B phase input-	L0B-	B06		A06	GND	
CH0 line receiver B phase input+	L0B+	B05		A05	GND	
CH0 line receiver A phase input-	L0A-	B04		A04	GND	
CH0 line receiver A phase input+	L0A+	B03		A03	GND	
Ground	GND	B02		A02	GND	
		B01		A01	N.C.	Not connected

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

Pin Assignments of Optional Connector PCB96WS

* Optional cable PCB96WS-*



CNA for PCB96WS					
Not connected	N.C.	20	1	GND	
	N.C.	21	2	GND	
	N.C.	22	3	GND	
CH0 one-shot output	OUT0	23	4	GND	
CH1 one-shot output	OUT1	24	5	GND	
CH2 one-shot output	OUT2	25	6	GND	
CH3 one-shot output	OUT3	26	7	GND	
Ground	GND	27	8	N.C.	Not connected
CH2TTLA phase input	T2A	28	9	T0A	CH0TTLA phase input
CH2TTLB phase input	T2B	29	10	T0B	CH0TTLB phase input
CH2TTLZ phase input	T2Z	30	11	TOZ	CH0TTLZ phase input
CH2TTL general-purpose input	T2U	31	12	TOU	CH0TTL general-purpose input
Ground	GND	32	13	GND	Ground
CH3TTLA phase input	T3A	33	14	T1A	CH1TTLA phase input
CH3TTLB phase input	T3B	34	15	T1B	CH1TTLB phase input
CH3TTLZ phase input	T3Z	35	16	T1Z	CH1TTLZ phase input
CH3TTL general-purpose input	T3U	36	17	T1U	CH1TTL general-purpose input

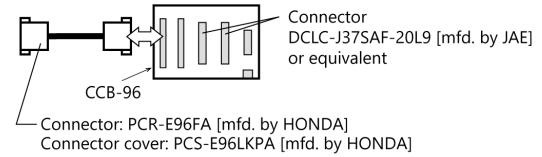
CNB for PCB96WS					
Ground	GND	20	1	GND	Ground
CH2 line receiver A phase input+	L2A+	21	2	L0A+	CH0 line receiver A phase input+
CH2 line receiver A phase input-	L2A-	22	3	L0A-	CH0 line receiver A phase input-
CH2 line receiver B phase input+	L2B+	23	4	L0B+	CH0 line receiver B phase input+
CH2 line receiver B phase input-	L2B-	24	5	L0B-	CH0 line receiver B phase input-
CH2 line receiver Z phase input+	L2Z+	25	6	L0Z+	CH0 line receiver Z phase input+
CH2 line receiver Z phase input-	L2Z-	26	7	L0Z-	CH0 line receiver Z phase input-
CH2 line receiver general-purpose input+	L2U+	27	8	L0U+	CH0 line receiver general-purpose input+
CH2 line receiver general-purpose input-	L2U-	28	9	L0U-	CH0 line receiver general-purpose input-
CH3 line receiver A phase input+	L3A+	29	10	L1A+	CH1 line receiver A phase input+
CH3 line receiver A phase input-	L3A-	30	11	L1A-	CH1 line receiver A phase input-
CH3 line receiver B phase input+	L3B+	31	12	L1B+	CH1 line receiver B phase input+
CH3 line receiver B phase input-	L3B-	32	13	L1B-	CH1 line receiver B phase input-
CH3 line receiver Z phase input+	L3Z+	33	14	L1Z+	CH1 line receiver Z phase input+
CH3 line receiver Z phase input-	L3Z-	34	15	L1Z-	CH1 line receiver Z phase input-
CH3 line receiver general-purpose input+	L3U+	35	16	L1U+	CH1 line receiver general-purpose input+
CH3 line receiver general-purpose input-	L3U-	36	17	L1U-	CH1 line receiver general-purpose input-

Not connected	N.C.	37		18	N.C.	Not connected
				19	N.C.	

Ground	GND	37		18	GND	Ground
				19	N.C.	Not connected

Pin Assignments of Optional Connector CCB-96

* Optional cable PCB96PS-** + connector conversion board CCB-96



** represents the cable length (1.5, 3, or 5m).

CN3(CNA) for CCB-96					
Ground	GND	1	20	N.C.	
	GND	2	21	N.C.	Not connected
	GND	3	22	N.C.	
	GND	4	23	OUT0	CH0 one-shot output
	GND	5	24	OUT1	CH1 one-shot output
	GND	6	25	OUT2	CH2 one-shot output
	GND	7	26	OUT3	CH3 one-shot output
Not connected	N.C.	8	27	GND	Ground
CH0TTLA phase input	T0A	9	28	T2A	CH2TTLA phase input
CH0TTLB phase input	T0B	10	29	T2B	CH2TTLB phase input
CH0TTLZ phase input	TOZ	11	30	T2Z	CH2TTLZ phase input
CH0TTL general-purpose input	TOU	12	31	T2U	CH2TTL general-purpose input
Ground	GND	13	32	GND	Ground
CH1TTLA phase input	T1A	14	33	T3A	CH3TTLA phase input
CH1TTLB phase input	T1B	15	34	T3B	CH3TTLB phase input
CH1TTLZ phase input	T1Z	16	35	T3Z	CH3TTLZ phase input
CH1TTL general-purpose input	T1U	17	36	T3U	CH3TTL general-purpose input
Not connected	N.C.	18	37	N.C.	Not connected

CN4(CNB) for CCB-96					
Ground	GND	1	20	GND	Ground
CH0 line receiver A phase input+	L0A+	2	21	L2A+	CH2 line receiver A phase input+
CH0 line receiver A phase input-	L0A-	3	22	L2A-	CH2 line receiver A phase input-
CH0 line receiver B phase input+	L0B+	4	23	L2B+	CH2 line receiver B phase input+
CH0 line receiver B phase input-	L0B-	5	24	L2B-	CH2 line receiver B phase input-
CH0 line receiver Z phase input+	L0Z+	6	25	L2Z+	CH2 line receiver Z phase input+
CH0 line receiver Z phase input-	L0Z-	7	26	L2Z-	CH2 line receiver Z phase input-
CH0 line receiver general-purpose input+	L0U+	8	27	L2U+	CH2 line receiver general-purpose input+
CH0 line receiver general-purpose input-	L0U-	9	28	L2U-	CH2 line receiver general-purpose input-
CH1 line receiver A phase input+	L1A+	10	29	L3A+	CH3 line receiver A phase input+
CH1 line receiver A phase input-	L1A-	11	30	L3A-	CH3 line receiver A phase input-
CH1 line receiver B phase input+	L1B+	12	31	L3B+	CH3 line receiver B phase input+
CH1 line receiver B phase input-	L1B-	13	32	L3B-	CH3 line receiver B phase input-
CH1 line receiver Z phase input+	L1Z+	14	33	L3Z+	CH3 line receiver Z phase input+
CH1 line receiver Z phase input-	L1Z-	15	34	L3Z-	CH3 line receiver Z phase input-
CH1 line receiver general-purpose input+	L1U+	16	35	L3U+	CH3 line receiver general-purpose input+
CH1 line receiver general-purpose input-	L1U-	17	36	L3U-	CH3 line receiver general-purpose input-
Ground	GND	18	37	GND	Ground

Connection Method to the External device -Differential Input-

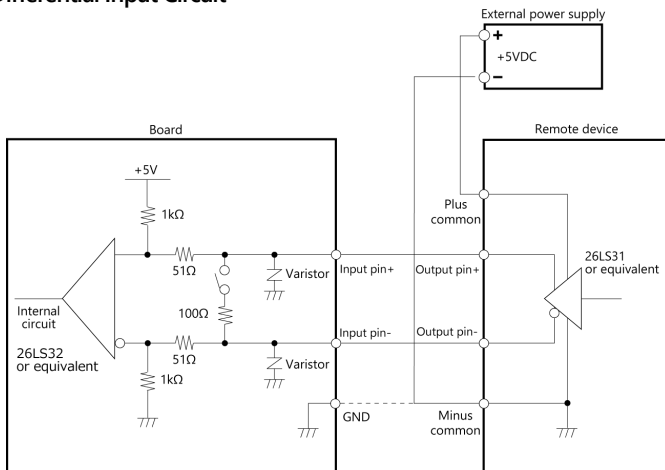
Differential Input Connection

Use the line receiver input to connect to the line receiver output circuit of a rotary encoder or linear scale. The maximum input frequency is 1 MHz.

For a two-phase input, connect both phase A and phase B. For a single phase input, connect to either phase A or phase B. If not using the Z phase, this does not need to be connected.

You can select whether to use the terminator in case of the line receiver input.

Differential Input Circuit



CAUTION

- The general input signal uses the same circuit structure.
- Please use the shielded cable with a length of less than 30m to meet "CE EMC Directive".

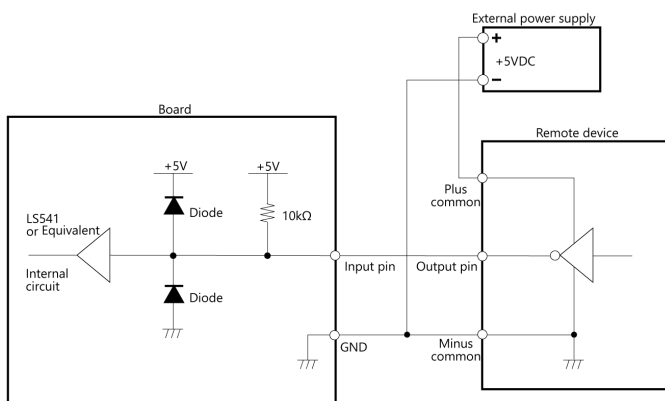
Connection Method to the External device -TTL-Level Input-

TTL-Level Input Connection

Use the TTL-Level Input for the connection with a rotary encoder or a linear scale TTL-level output circuit. The maximum input frequency is 1MHz.

For a two-phase input, connect both phase A and phase B. For a single phase input, connect to either phase A or phase B. If not using the phase Z, this does not need to be connected.

TTL-Level Input Circuit



CAUTION

- The general input signal uses the same circuit structure.
- The connection cable length should be within 1.5 m.
- To prevent malfunction caused by noise, separate the circuit as much as possible from other signal cables and noise sources.
- Please use the shielded cable to meet "CE EMC Directive".

One-shot Pulse Output Connection

One-shot Pulse Output Connection

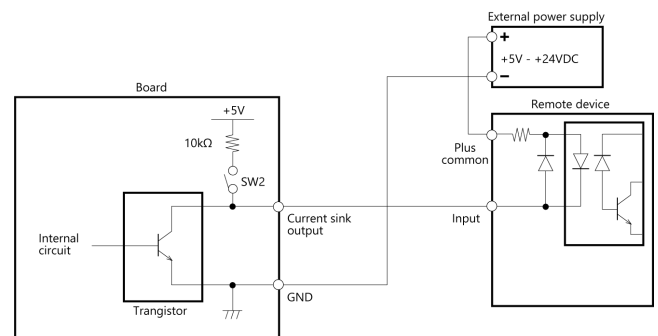
When the count value of each channel and the user set value match, the circuit outputs a matched signal for one shot (1 pulse). The SW2 allows you to select either open-collector output or TTL-level output for the signal output section. If you opt for open-collector output, you need an external power supply source.

For pulse wide settings, refer to "One-shot Pulse" of reference manual.

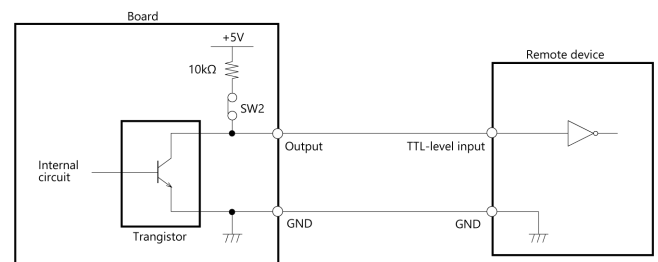
Output Circuit and an Example Connection

When the count value of a channel matches a preset compare value, the transistor of an output circuit turns on only the time of the preset pulse width.

Open Collector Output Circuit



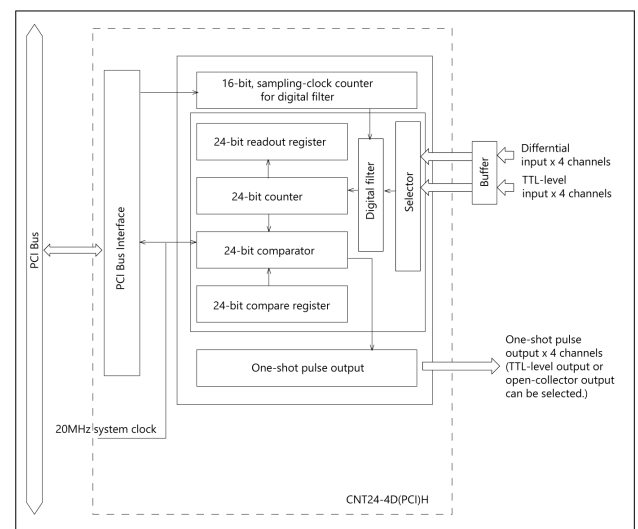
TTL-level Output Circuit



CAUTION

The output of this board has no surge voltage protector. To drive an inductive load such as a relay or lamp using this board, apply surge voltage protection to the load side. For surge voltage protection, see "Surge Voltage Countermeasures" of reference manual.

Circuit Block Diagram



Differences from Conventional Products

Different in the specification

The CNT24-4D(PCI)H different in specifications, depending on the board number as listed below.

Board No.	No.7294	No.7294A	No.7294B	No.7294C later
Power consumption	5VDC 500mA (Max)	5VDC 500mA (Max)	5VDC 670mA (Max)	5VDC 320mA (Max)
Dimension (mm)	176.41(L) x 105.68(H)	176.41(L) x 105.68(H)	176.41(L) x 105.68(H)	176.41(L) x 105.68(H)

Differences between the CNT24-4D(PCI)H and CNT24-4D(PCI)

The CNT24-4D(PCI)H partially enhanced version of the conventional products of CNT24-4D(PCI) and it is upper compatible with CNT24-4D(PCI).

(1) There are difference in the board's external dimension

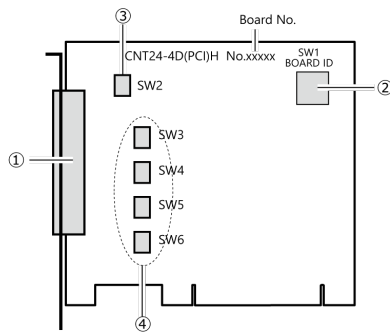
CNT24-4D(PCI): 176.41(L) x 106.68(H) mm

CNT24-4D(PCI)H: 176.41(L) x 105.68(H) mm

(Board No.7294, 7294A, 7294B)

CNT24-4D(PCI)H: 121.69(L) x 105.68(H) mm (Board No.7294C later)

Nomenclature of Product Components



No.	Name	No.	Name
1	Interface Connector (CN1)	3	Switch for Setting One-shot Pulse Output Signal (SW2)
2	Board ID Setting Switch (SW1)	4	Switch for setting terminator (SW3, SW4, SW5, SW6)