PCI Express-compliant
High speed Up/Down Counter (Low Profile)

CNT-3204MT-LPE

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

CNT-3204MT-LPE is a PCI Express bus-compliant interface board for counting the pulses input from the external device.
The 32 bit up-and-down counter could have four channels and up to 10MHz maximum high speed pulse input. Moreover, it can be used to connect a rotary encoder and a linear scale, etc. The pulse signal inputting interface is non-isolated LVTTL-level input that can input pulse signals at high speed. The application for this board can transfer data between the board and the PC at high speed using PCI bus mastering.
This product supports a Low Profile size slot and, if replaced with the supplied bracket, supports a standard size slot, too.
With the included API function library package [API-PAC(W32)], you can create Windows application software for this board in your favorite programming language supporting Win32 API functions, such as Visual Basic and Visual C++.

· Detecting a position of the table of a machine tool

Tool
Processing thing
CNT-3204MT-LPE
RelayBOX Linear Scale
Power supply

· Detecting a change in weight

CNT-3204MT-LPE
Encoder Rack
Power supply

Features

Contains four channels 32 bit up/down counter, up to 10MHz pulse signal input (non-isolated LVTTL level) The minimum distinguishable phase of two-phase input is 25nsec.

Capable of counting two-phase signals from devices like rotary encoders or linear scale

Each channel has one control signal input (counter start/stop, pre-set)

With the bus master transfer feature, count values sampling is available with 20MHz max sampling rate (when using internal clock)

When the count value matches to an arbitrary predefined value, CNT-3204MT-LPE can be used for interruption, external signal output, count value presetting/zero-clearing
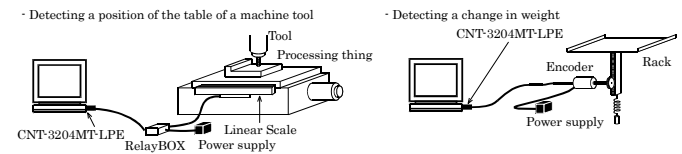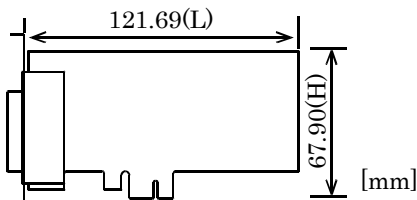
Can be converted into differential input interface by using differential input terminal (CTP-4D) and a connecting cable (CNT-68M/50M) both of which are sold separately

Compatible with Low profile-size slot and standard size-slot (Bracket is included)

Contains same functions as PCI board CNT32-4MT(LPCI) and CardBus CNT32-4MT(CB)

Connector pin assignment to connect I/O signal is compatible with CNT32-4MT(LPCI) and CNT32-4MT(CB)

Specification

Item	Specification
Input	
Counter	
Channel count	4 channels
Count system	Up/down counting (2-phase/Single-phase/Single-phase Input with Gate Control Attached)
Max. count	FFFFFFFFh(binary data, 32Bit)
Input type	Unisolated LVTTL level input
Input signal	Phase-A/UP 1 x 4 channels Phase-B/DOWN 1 x 4 channels Phase-Z/CLR 1 x 4 channels
Response frequency	10MHz 50% duty
Digital filter	0.1μsec - 1.6384msec or not used (can be independently set for each channel.)
Timer	1msec - 6553msec 1msec unit
Counter start trigger	Software/External start input/Sampling start trigger
Counter stop trigger	Software/External stop input/Sampling stop trigger
Sampling	
Sampling start trigger	Software/External start input/Count match
Sampling stop trigger	Software/ External stop input/ Specification number/Bus master transfer error/Count match
Sampling clock	Sampling timer/External clock input
Sampling timer	50nsec - 107sec 25nsec unit (can not be independently set for each channel.)
External sampling start signal	Unisolated LVTTL level input (Select Rise or Fall)
External sampling stop signal	Unisolated LVTTL level input (Select Rise or Fall)
External sampling clock signal	Unisolated LVTTL level input (Fall)
Response frequency	10MHz 50% duty
Input	
Control	
Control input signal type	Unisolated LVTTL level input
Control input channel	1 x 4 channels
Control input signal	Preset (Select Rise or Fall) Zero-clear (Select Rise or Fall) Counter start/stop (Select Rise or Fall) General-purpose input (positive logic) Software-selected from among the above four options
Response time	100nsec (Max.)
Interrupt event	Count match (8 points), Counter error (2 points), Sampling factor (6 points), Carry/Borrow (1 points), Timer (1 points)

Item	Specification
Output	
Control	
Control output signal type	Unisolated LVTTL level output
Control output channel	1 x 4 channels
Control output signal	Count match 0 output(one-shot pulse output) Count match 1 output(one-shot pulse output) Digital filter error output(one-shot pulse output) Abnormal input error output(one-shot pulse output) General-purpose output(Level output) Software-selected from among the above five options (Positive/negative logic is selected with the software.)
One shot output signal amplitude	Selected between 10μsec, 100μsec, 1msec, 10msec and 100 msec (Can be set for each channel, within precision + 1μsec)
Response time	100nsec (Max.)
Rated output current	I_{OL}=8mA(Max.) I_{OH}=-8mA(Max.)
Test pulse	
Test pulse output signal type	Unisolated LVTTL level output
Test pulse output point	One for each of phases-A and B
Output frequency	100kHz fixed
Sampling	
Sampling output signal type	Unisolated LVTTL level output
Output point	Sampling start trigger, sampling stop trigger, Sampling clock trigger 1 point each
One-shot output signal width	Negative logic 100nsec width (fixed)
Response speed	100nsec (Max.)
Rated output current	I_{OL} = 8mA(Max.) I_{OH} = -8mA(Max.)
Bus master	
DMA channel	1 channel
Transfer bus width	32-Bit width
Transfer data length	8 PCI Words length (Max.)
Transfer rate	80MB/sec (Max.133MB/sec)
FIFO	1K-DWord
Scatter/Gather function	64MB
Interrupt event	Bus master event (7 points)
Common	
Max. board count for connection	16 boards including the master board
I/O address	Occupies 2 locations, any 32-bytets and 64-byte boundary
Power consumption	3.3VDC 450mA
Operating condition	0 - 50°C, 10 - 90%RH (No condensation)
Bus specification	PCI Express Base Specification Rev. 1.0a x1
Dimension (mm)	121.69(L) x 67.90(H)
Connector used	68 pin 0.8mm pitch connector HDRA-E68LFDT+[HONDA TSUSHIN KOGYO CO., LTD.] or equivalent to it
Weight	60g
Certification	VCCI

Board Dimensions

121.69(L)

67.90(H)

[mm]

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

Packing List

Board [CNT-3204MT-LPE] …1
First step guide … 1
Disk *1 [API-PAC(W32)] …1
Standard-sized bracket…1
Serial number label…1
Product Registration Card & Warranty Certificate…1

*1 The Disk contains the driver software and User's Guide.

Support Software

Driver Software Package API-PAC(W32) (Included)
API-PAC(W32) is the library software that provides the commands for CONTEC hardware products in the form of Windows standard Win32 API functions (DLL). It makes it easy to create high-speed application software taking advantage of the CONTEC hardware using various programming languages that support Win32 API functions, such as Visual Basic and Visual C++.
This driver can also be used by the installed diagnosis program to check hardware operations. CONTEC provides download services (at http://www.contec.com/apipac/) to supply the updated drivers and differential files.
For details, read Help on the bundled Disk or visit the CONTEC Web site.

Cable & Connector

Cable (Option)
Shielded cable for CardBus counter
input card : CNT-68M/50M (0.5m)

Shielded cable with single connector
for 68-pin 0.8mm pitch connector : PCA68PS-0.5P (0.5m)
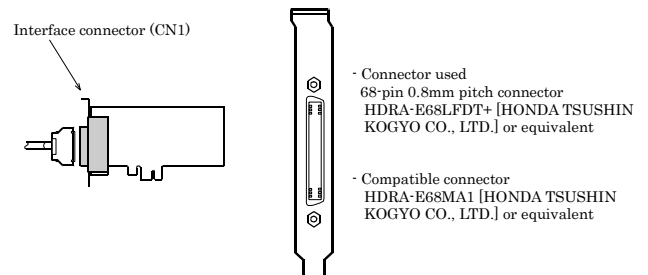: PCA68PS-1.5P (1.5m)

Accessories

Termination Panel with Differential Receivers for Counter Input
: CTP-4D*1
Screw Terminal (M3 x 50P) : EPD-50A *1

*1 CNT-68M/50M optional cable is required separately.
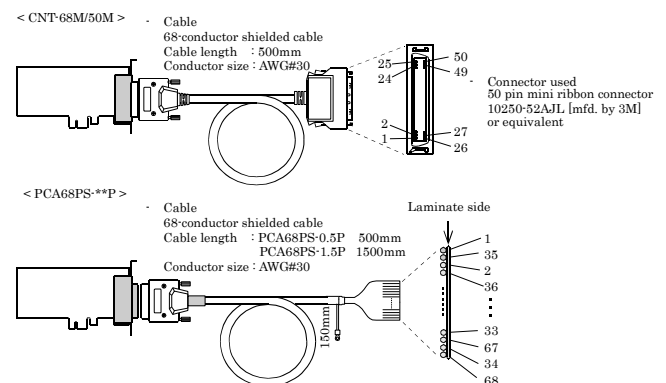* Check the CONTEC's Web site for more information on these options.

Connector Wiring

Connector shape and optional cable connection
The on-board interface connector (CN1) is used when connecting this product and the external devices.

Interface connector (CN1)

- Connector used
68-pin 0.8mm pitch connector
HDRA-E68LFDT+ [HONDA TSUSHIN KOGYO CO., LTD.] or equivalent

- Compatible connector
HDRA-E68MA1 [HONDA TSUSHIN KOGYO CO., LTD.] or equivalent

*Connection example of this product, external device and optional cables (CNT-68M/50M or PCA68PS-**P)

< CNT-68M/50M >
- Cable
68-conductor shielded cable
Cable length : 500mm
Conductor size : AWG#30

Connector used
50 pin mini ribbon connector
10250-52AJL [mfd. by 3M]
or equivalent

< PCA68PS-**P >
- Cable
68-conductor shielded cable
Cable length : PCA68PS-0.5P 500mm
PCA68PS-1.5P 1500mm
Conductor size : AWG#30

Laminate side

Connector Pin Assignment

Pin Assignments of Interface Connector (CN1)

CH0 Phase-A input	A0	1	35	GND	Ground
CH0 Phase-B input	B0	2	36	GND	Ground
CH0 Phase-Z input	Z0	3	37	GND	Ground
CH0 control input *1	DI0	4	38	GND	Ground
Unconnection	N.C.	5	39	N.C.	Unconnection
CH1 Phase-A input	A1	6	40	GND	Ground
CH1 Phase-B input	B1	7	41	GND	Ground
CH1 Phase-Z input	Z1	8	42	GND	Ground
CH1 control input *1	DI1	9	43	GND	Ground
Unconnection	N.C.	10	44	N.C.	Unconnection
CH2 Phase-A input	A2	11	45	GND	Ground
CH2 Phase-B input	B2	12	46	GND	Ground
CH2 Phase-Z input	Z2	13	47	GND	Ground
CH2 control input *1	DI2	14	48	GND	Ground
Unconnection	N.C.	15	49	N.C.	Unconnection
CH3 Phase-A input	A3	16	50	GND	Ground
CH3 Phase-B input	B3	17	51	GND	Ground
CH3 Phase-Z input	Z3	18	52	GND	Ground
CH3 control input *1	DI3	19	53	GND	Ground
Unconnection	N.C.	20	54	N.C.	Unconnection
Sampling clock input	CLKIN	21	55	GND	Ground
Sampling stop input	STOPIN	22	56	STARTIN	Sampling start input
Unconnection	N.C.	23	57	N.C.	Unconnection
Sampling clock output	CLKOUT	24	58	GND	Ground
Sampling stop output	STOPOUT	25	59	STARTOUT	Sampling start output
Unconnection	N.C.	26	60	N.C.	Unconnection
Test pulse Phase-A output	TPOA	27	61	TPOB	Test pulse Phase-B output
Unconnection	N.C.	28	62	N.C.	Unconnection
CH0 control output *2	DO0	29	63	DO1	CH1 control output *2
CH2 control output *2	DO2	30	64	DO3	CH3 control output *2
Unconnection	N.C.	31	65	N.C.	Unconnection
Counter input signal pull up	PUP1	32	66	PUP2	Control input signal pull up
Unconnection	N.C.	33	67	N.C.	Unconnection
+3.3V output *3	Vcc	34	68	Vcc	+3.3V output *3

*1 The control input can serve as the general-input, counter start / stop, preset and zero-clear.
*2 The control output can serve as the general-output, count match, abnormal input error and figital filter error.
*3 Supply-capable current is 500mA (Max.).

Signal assignment with the CNT-68M/50M used (50-pin connector side)

+3.3V Output *3	Vcc	25	50	Vcc	+3.3V Output *3
Counter Input signal pull-up	PUP1	24	49	PUP2	Counter Input signal pull-up
CH2 control output *2	DO2	23	48	DO3	CH3 control output *2
CH0 control output *2	DO0	22	47	DO1	CH1 control output *2
Test pulse Phase-A output	TPOA	21	46	TPOB	Test pulse Phase-B output
Sampling Stop Output	STOPOUT	20	45	STARTOUT	Sampling Start Output
Sampling Clock Output	CLKOUT	19	44	GND	Ground
Sampling Stop Input	STOPIN	18	43	STARTIN	Sampling Start Input
Sampling Clock Input	CLKIN	17	42	GND	Ground
CH3 Control Input *1	DI3	16	41	GND	Ground
CH3 Phase-Z input	Z3	15	40	GND	Ground
CH3 Phase-B input	B3	14	39	GND	Ground
CH3 Phase-A input	A3	13	38	GND	Ground
CH2 Control Input *1	DI2	12	37	GND	Ground
CH2 Phase-Z input	Z2	11	36	GND	Ground
CH2 Phase-B input	B2	10	35	GND	Ground
CH2 Phase-A input	A2	9	34	GND	Ground
CH1 Control Input *1	DI1	8	33	GND	Ground
CH1 Phase-Z input	Z1	7	32	GND	Ground
CH1 Phase-B input	B1	6	31	GND	Ground
CH1 Phase-A input	A1	5	30	GND	Ground
CH0 Control Input *1	DI0	4	29	GND	Ground
CH0 Phase-Z input	Z0	3	28	GND	Ground
CH0 Phase-B input	B0	2	27	GND	Ground
CH0 Phase-A input	A0	1	26	GND	Ground

*1 The control input can serve as the general-input, counter start / stop, preset and zero-clear.
*2 The control output can serve as the general-output, count match, abnormal input error and figital filter error.
*3 Supply-capable current is 500mA (Max.).

How to Connect the Counter Input Signals

You can connect to a rotary encoder or linear scale with a TTL level output circuit, or to an open-collector output circuit. The signal must be an LVTTL level input and can be up to 10MHz
As pull-up resistors are provided on the board, connect the pull-up voltage (3.3V - 5.5V max.) to the pull-up pins if connecting to an open collector output circuit/TTL output circuit. (If using 3.3V, connect to the VCC pin on the board.) Not connecting the pull-up voltage may affect the counter input channel left unconnected.
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.

Remarks

The pull-up pins are PUP1 (pin 32 *1) for the counter input signal and PUP2 (pin 66 *1) for the control input signal.
PUP1 (pin 32) : Pull-up for A, B, and Z phase input signal (A0, B0, Z0, A1, B1, Z1, A2, B2, Z2, A3, B3, Z3).
PUP2 (pin 66) : Pull-up for the control input signals and for the sampling input signals (DI0, DI1, DI2, DI3, CLKIN, STARTIN, STOPIN)
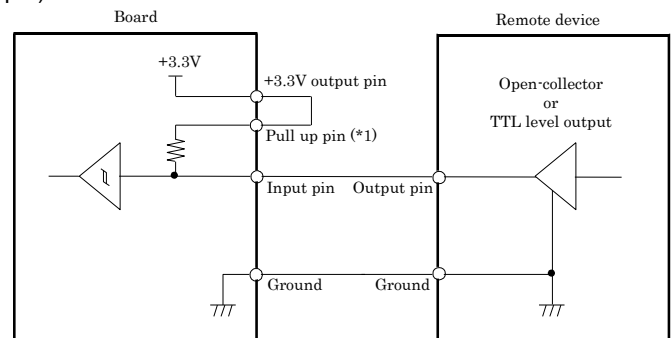
*1: Connector pin number on the board.

Example: Connection to Counter Input Circuit
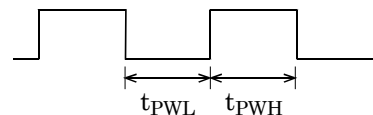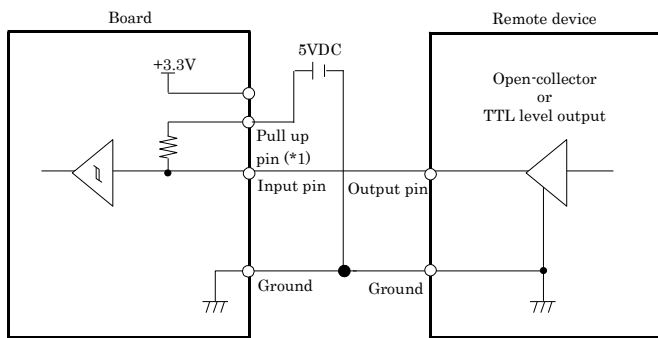Connection pulled up with external 5-V power (Counter Input)
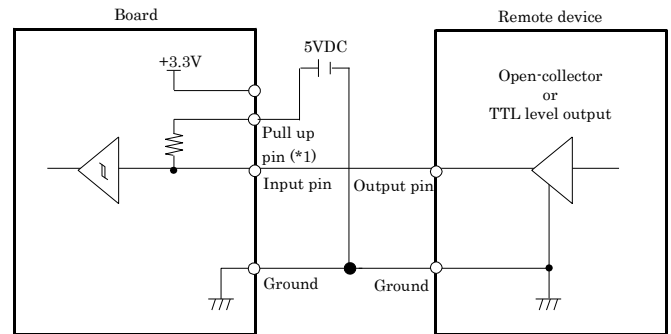
*1: The pull-up pins are PUP1 for the counter input signal and PUP2 for the control input signal.

Connection pulled up with internal 3.3-V output power (Counter Input)

*1: The pull-up pins are PUP1 for the counter input signal and PUP2 for the control input signal.

Input signal

t_{PWH} : High-level count input pulse width 50nsec (Min.)
t_{PWL} : Low-level count input pulse width 50nsec (Min.)

⚠ CAUTION
The connection cable length should be within 1.5 m.
To prevent noise from causing a malfunction, arrange the connection cable as away from any other signal conductor or noise source as possible.

How to Connect the Control Signal I/O

Connection of the control input

The control input signals consist of one pin per channel that can be selected as the channel's counter start/stop or preset, and one pin per board that can be used as the start, stop, and clock for sampling. The signals are LVTTL-level (3.3V) inputs.

As pull-up resistors (10KΩ) are provided on the board, connect the pull-up voltage (3.0V - 5.5V max.) to the pull-up pins if connecting to an open collector output circuit/TTL output circuit. (If using 3.3V, connect to the VCC pin on the board.) Not connecting the pull-up voltage may affect the control input pin left unconnected.

Remarks

The pull-up pins are PUP1 (pin 32 *1) for the counter input signal and PUP2 (pin 66 *1) for the control input signal.
PUP1 (pin 32) : Pull-up for A, B, and Z phase input signal
(A0, B0, Z0, A1, B1, Z1, A2, B2, Z2, A3, B3, Z3).
PUP2 (pin 66) : Pull-up for the control input signals and for the sampling input signals
(DI0, DI1, DI2, DI3, CLKIN, STARTIN, STOPIN)

*1: Connector pin number on the board.

Control input circuit and its sample connection
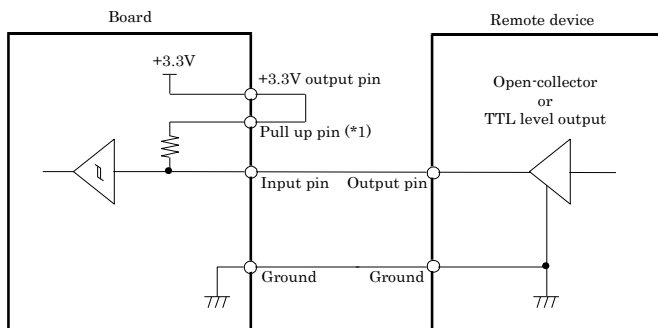
Connection pulled up with external 5-V power
(Control input DI0, DI1, DI2, DI3, CLKIN, STARTIN, STOPIN)

*1 : The pull-up pins are PUP1 for the counter input signal and PUP2 for the control input signal.

Connection pulled up with internal 3.3-V output power
(Control input DI0, DI1, DI2, DI3, CLKIN, STARTIN, STOPIN)

*1 : The pull-up pins are PUP1 for the counter input signal and PUP2 for the control input signal.

⚠ CAUTION
The connection cable length should be within 1.5 m.
To prevent noise from causing a malfunction, arrange the connection cable as away from any other signal conductor or noise source as possible.

External sampling clock signal (EXTCLK)

Pin used to input the external pacer clock. The maximum frequency is 10MHz.
If the external clock input is selected as the sampling clock, sampling occurs on the falling edge of the signal.
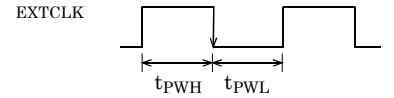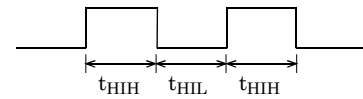

t_{PWH} : High-level clock pulse width 50nsec (Min.)
t_{PWL} : Low-level clock pulse width 50nsec (Min.)

Other control input signals (DI0 - DI3, EXTSTART, EXTSTOP)

These signals are TTL compatible and the trigger edge is software-programmable at either the rising or falling edge. High- and low-level hold times of at least 50 nsec are required to detect an edge of the signal.


t_{HIH} : High-level hold time 50nsec (Min.)
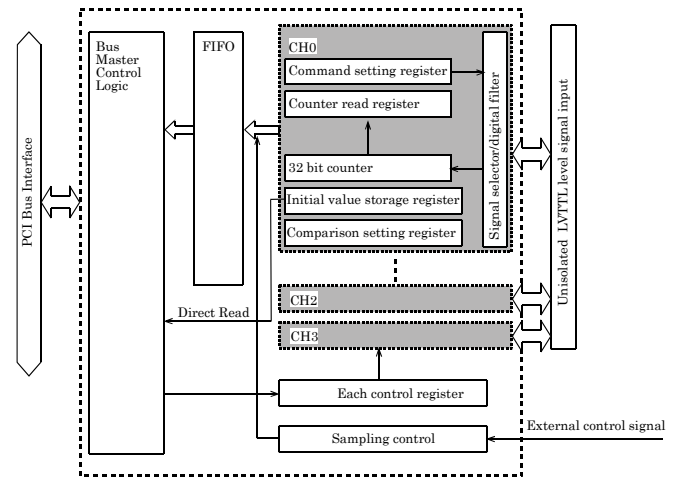t_{HIL} : Low-level hold time 50nsec (Min.)

Connection of the control outputs

This outputs a general-purpose output signal (level output) or a one-shot pulse output to indicate a hardware event such as a count match. The signal is an LVTTL level output and can be set to positive or negative logic by software.

Sample connection to control output circuit
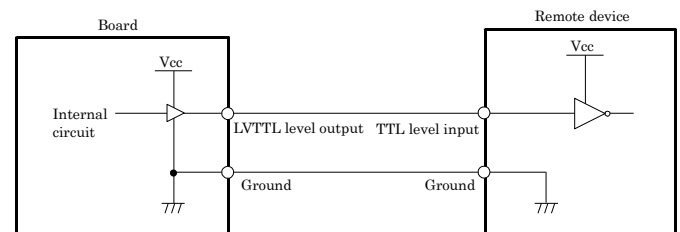
Block Diagram

*Price, specification, color and design of the products may be changed without notice.