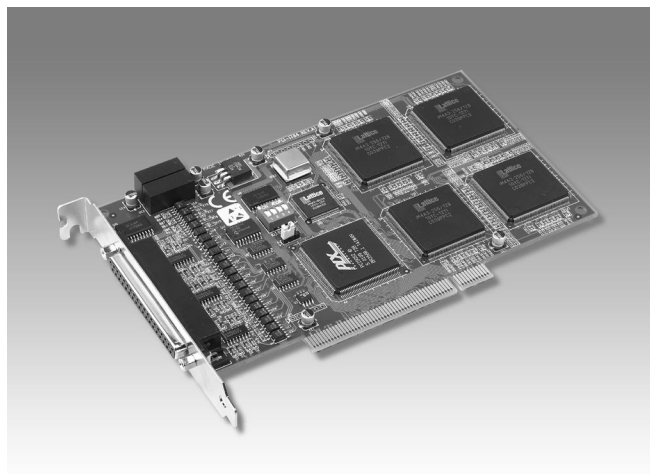# PCI-1784

4-axis Quadrature Encoder and Counter Card

Features

- Four 32-bit up/down counters
- Single ended or differential inputs
- Pulse/direction and up/down counter
- x1, x2, x4 counts for each encoder cycle
- Optically isolated up to 2,500 V_{DC}
- 4-stage digital filter with selectable sampling rate
- On board 8-bit timer with wide range time-base selector
- Multiple interrupt sources for precision application
- 4 isolated digital input
- 4 isolated digital output
- Board ID

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Introduction

The PCI-1784 is a 4-axis quadrature encoder and counter add-on card for PCI bus. The card includes four 32-bit quadruple AB phase encoder counters, 8-bit timer with multi range time-base selector and 4 isolated digital inputs as well as 4 isolated digital outputs. Its flexible interrupt sources are suitable for motor control and position monitoring.

Specifications

Encoder Input

Number of Axis	4 (independent)	
Resolution	32-bit	
Max. Quadrature Input Frequency	w/ Digital Filter	1.0 MHz
	w/o Digital Filter	2.0 MHz
Digital Filter	4 stage	
Drive Type	Single-ended or differential	
Counter Mode	Quadrature, Up/Down, Count/Direction	
Optical Isolation	2,500 V_{DC}	
Max. Input Pulse Frequency	x 1, x 2, x 4	
Sample Clock Frequency	8, 4, 2, or 1 MHz	

Timer

- **Resolution**   8-bit
- **Time Base**   50 K, 5 K, 500, 50, 5 Hz

Isolated Digital Input

Number of Channel	4	
Optical Isolation	2,500 V_{DC}	
Opto-isolator Response Time	25 ms	
Over-voltage Protect	70 V_{DC}	
Input Voltage	VIH (max.)	30 V_{DC}
	VIH (min.)	10 V_{DC}
	VIL (max.)	3 V_{DC}
Input Current	10 V_{DC}	1.7 mA (typical)
	12 V_{DC}	2.1 mA (typical)
	24 V_{DC}	4.4 mA (typical)
	48 V_{DC}	9.0 mA (typical)
	50 V_{DC}	9.4 mA (typical)+

Isolated Digital Output

- **Number of Channel**   4
- **Optical Isolation**   2,500 V_{DC}
- **Response Time**   20 ms (max.)
- **Supply Voltage**   TTL level
- **Sink/Source Current**   50 mA max./channel

Interrupt

- **Source**   Counter overflow, Counter underflow, Index input, Timer, Digital input

Counter Latch

- **Source**   Software, Timer, Index input, Digital input

General

I/O Connector Type	37-pin D-sub female	
Dimensions	175 mm x 100 mm (6.9" x 3.9")	
Power Consumption	Typical	+5 V @ 200 mA
	Max.	+5 V @ 450 mA
Temperature	Operation	0 ~ 60°C (32 ~ 140°F) (refer to IEC 68-2-1,2)
	Storage	-20 ~ 70°C (-4 ~ 158°F)
Relative Humidity	5~95%RH non-condensing (refer to IEC 68-2-3)	
Certification	CE certified	

Ordering Information

- **PCI-1784**   4-Axis Quadrature Encoder and Counter Card
- **PCL-10137H-1**   High-speed DB-37 cable assembly, 1 m
- **PCL-10137H-3**   High-speed DB-37 cable assembly, 3 m
- **ADAM-3937**   DB-37 Wiring Terminal Board for DIN-rail mounting

Feature Details

Encoder Interface

Each channel includes a decoding circuit for incremental quadrature encoding. Inputs accept either single-ended or differential signals. Quadrature input works with or without an index, allowing linear or rotary encoder feedback.

Counters

The PCI-1784 has four independent 32-bit counters. The maximum quadrature input rate is 2 MHz, and the maximum input rate in counter mode is 8 MHz. You can individually configure each counter for quadrature decoding, pulse/direction counting or up/down counting.

Digital Input and Interrupts

The PCI-1784 provides four digital input channels. Each channel accepts digital input as an index input for a rotary encoder or as a home sensor input for a linear encoder. The card can generate an interrupt to the system based on a signal from its digital inputs, overflow/underflow and overcompare/undercompare of its counters, or on a programmed time interval. It can repeatedly generate interrupts at any time interval you specify, from 20 microseconds to 51 seconds. These interrupts let you precisely monitor the speed of a control system.

Flexible Digital Output function

The PCI-1784 provides four digital output channels. Each channel accepts digital output as a normal TTL output for a rotary encoder, or as an indicated output with pulse/level mode for a linear encoder. The PCI-1784 can generate an indicated output based on a signal from overcompare/undercompare of its counters. The pulse width of an indicated output depends on the counter clock or clear interrupt.

Special Shielded Cable for Noise Reduction

The PCL-10137H shielded cable is specially designed for the PCI-1784 for reducing noise. Its wires are all twisted pairs, and the input signals and output signals are separately shielded, providing minimal cross talk between signals and the best protection against EMI/EMC problems.

Board ID

The PCI-1784 has a built-in DIP switch that helps define each card's ID when multiple PCI-1784 cards have been installed on the same PC chassis. The board ID setting function is very useful when users build their system with multiple PCI-1784 cards. With correct Board ID settings, you can easily identify and access each card during hardware configuration and software programming.

Pin Assignments

EGND	1	20	CH0A-
CH0A+	2	21	CH0B-
CH0B+	3	22	CH0Z-
CH0Z+	4	23	CH1A-
CH1A+	5	24	CH1B-
CH1B+	6	25	CH1Z-
CH1Z+	7	26	CH2A-
CH2A+	8	27	CH2B-
CH2B+	9	28	CH2Z-
CH2Z+	10	29	CH3A-
CH3A+	11	30	CH3B-
CH3B+	12	231	CH3Z-
CH3Z+	13	32	EGND
IDI COM	14	33	IDI1
IDI0	15	34	IDI3
IDI2	16	35	EGND
EGND	17	36	IDO1
IDO0	18	37	IDO3
IDO2	19		

Block Diagram