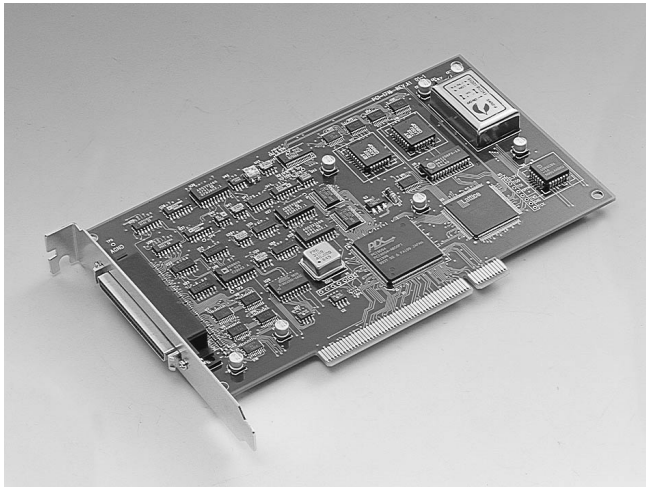


PCI-1716 PCI-1716L

16-bit High-resolution Multifunction Card

16-bit High-resolution Multifunction Card w/o AO function



CE

Features

- 16-bit high resolution
- 250 KS/s sampling rate
- Auto calibration function
- PCI-bus mastering for data transfer
- 16 analog input channels with 1K FIFO
- 16 S.E. or 8 Diff. AI, or a combination
- Unipolar/Bipolar input range
- 2 analog output channels (PCI-1716 only)
- 16 digital input channels
- 16 digital output channels
- One 10 MHz 16-bit resolution counter
- Board ID

Introduction

The PCI-1716/1716L is a powerful high-resolution multifunction card for PCI bus. It features a 250 KS/s 16-bit A/D converter, an on-board 1K sample FIFO buffer for A/D. The PCI-1716/1716L provides a total of up to sixteen single-ended or eight differential A/D input channels or a mixed combination, two 16-bit D/A output channels, 16 digital input/output channels, and one 10 MHz 16-bit counter channel. PCI-1716/1716L provides specific functions for different user requirements:

Specifications

Analog Input

- **Channels** 16 Single-Ended or 8 differential or combination
- **Resolution** 16-bit
- **FIFO Size** 1K samples
- **Sampling Rate*** 250 KS/s max.
- **Conversion Time** 2.5 μ s

Input range and Gain List	Gain	0.5	1	2	4	8
		Unipolar	N/A	0~10	0~5	0~2.5
	Bipolar	± 10	± 5	± 2.5	± 1.25	± 0.625
Small Signal Bandwidth for PGA Gain	Bandwidth	4.0 MHz	4.0 MHz	2.0 MHz	1.5 MHz	0.65 MHz

- **Common Mode Voltage** ± 11 V max. (operational)
- **Max. Input Overvoltage** ± 20 V
- **Input Protection** 30 Vp-p
- **Input Impedance** 100 M Ω /10 pF (Off); 100 M Ω /100pF (On)
- **Trigger Mode** Software, Onboard Programmable Pacer or external

Accuracy	DC	DNLE: ± 1 LSB					
		INLE: ± 1 LSB					
		Zero (Offset) error: Adjustable ± 1 LSB					
	Gain error (%FSR)	Gain	0.5	1	2	4	8
		Gain error	0.15	0.03	0.03	0.05	0.1
AC	SNR: 82 dB						
	ENOB: 13.5 bits						
	THD: -84 dB typical						
Clocking and Trigger Inputs	Trigger Mode	Software, on-board programmable pacer or external					
	A/D pacer clock	250 KHz (max.); 58 μ Hz (min.)					
	External A/D trigger clock	Min. Pulse width: 2 μ s (high); 2 μ s (low) Max. frequency: 250 KHz					

Note:

The sampling rate and throughput depends on the computer hardware architecture and software environment. The rates may vary due to programming language, code efficiency, CPU utilization and other factors.

Digital Input /Output

Input Channels	16	
Input Voltage	Low	0.4 V max.
	High	2.4 V max.
Input Load	Low	0.4 V max.@ -0.2 mA
	High	2.7 V max.@ -0.2 μ A
Output Channels	16	
Output Voltage	Low	0.4 V max.@ 0.8 mA (sink)
	High	2.4 V min.@ -0.4 mA (source)

Counter/Timer

- **Channels** 3 channels, 2 channels are permanently configured as programmable pacers; 1 channel is free for user application
- **Resolution** 16-bit
- **Compatibility** TTL level
- **Base Clock** Channel 2: Takes input from output of channel 1
Channel 1: 10 MHz
Channel 0: Internal 1 MHz or external clock (10 MHz) max Selected by software
- **Max. Input Frequency** 1 MHz

Clock Input	Low	0.8 V max.
	High	2.0 V min.
Gate Input	Low	0.8 V max.
	High	2.0 V min.
Counter Output	Low	0.5 V max. @ +24 mA
	High	2.4 V min. @ -15 mA

General

- **I/O Connector Type** 68-pin SCSI-II female
- **Dimensions** 175 x 100 mm (6.9" x 3.9")
- **Power Consumption** Typical +5 V @ 850 mA, +12 V @ 600 mA
Max. +5 V @ 1 A, +12 V @ 700 mA
- **Operating Temperature** 0 ~ 60° C (32 ~ 158° F) (refer to IEC 68-2-1, 2)
- **Storage Temperature** -20 ~ 85° C (-4 ~ 158° F)
- **Operating Humidity** 5 ~ 85% RH non-condensing (refer to IEC 68-1, -2, -3)
- **Storage Humidity** 5 ~ 95% RH non-condensing (refer to IEC 68-1, -2, -3)
- **Certifications** CE

Analog Output

- **Channels** 2
- **Resolution** 16-bit
- **Operation Mode** Single output
- **Throughput*** 250 KS/s max. per channel (FSR)

Output Range (Internal & External Reference)	Using Internal Reference	0 ~ +5 V, 0 ~ +10 V, -5 ~ +5 V, -10 ~ +10 V
	Using External Reference	0 ~ +x V @ +x V (-10 ≤ x ≤ 10) -x ~ +x V @ +x V (-10 ≤ x ≤ 10)
Accuracy	DC	DNLE: ±1 LSB (monotonic)
		INLE: ±1 LSB
		Zero (Offset) error: Adjustable ±1 LSB
		Gain (Full-scale) error: Adjustable ±1 LSB
Dynamic Performance	Settling Time	5 μs (to 4 LSB of FSB)
	Slew Rate	20 V/μs
Drift		10 ppm/°C
Driving Capability		±20 mA
Output Impedance		0.1 Ω max.

- **Drift** 10 ppm/°C
- **Driving Capability** ±20 mA
- **Output Impedance** 0.1 Ω max.

Ordering Information

- **PCI-1716** 250 KS/s, 16-bit, 16-ch High-resolution Multifunction Card, user's manual and driver CD-ROM. (cable not included)
- **PCI-1716L** 250 KS/s, 16-bit, 16-ch High-resolution Multifunction Card w/o analog output, user's manual and driver CD-ROM. (cable not included)
- **PCLD-8710** Industrial Wiring Terminal Board with CJC circuit for DIN-rail Mounting. (cable not included)
- **PCL-10168** 68-pin SCSI-II cable with male connectors on both ends and special shielding for noise reduction, 1 and 2 m
- **ADAM-3968** 68-pin SCSI-II Wiring Terminal Board for DIN-rail Mounting

Feature Details

PCI-Bus Mastering Data Transfer

The PCI-1716/1716L supports PCI-Bus mastering DMA for high-speed data transfer and gap-free analog input and analog output. By setting aside a block of memory in the PC, the PCI-1716/1716L performs bus-mastering data transfers without CPU intervention, setting the CPU free to perform other more urgent tasks such as data analysis and graphic manipulation. The function allows users to run all I/O functions simultaneously at full speed without losing data.

Auto-calibration Function

The PCI-1716/1716L provides an auto-calibration function by using a calibration utility. The built-in calibration circuitry of the PCI-1716/1716L corrects gain and offset errors in analog input and analog output channels thereby eliminating the need for external equipment and user adjustments.

Board ID

The PCI-1716/1716L has a built-in DIP switch that helps define each card's ID when multiple PCI-1716/1716L 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-1716/1716L cards. With the correct Board ID settings, the user can easily identify and access each card during hardware configuration and software programming.

Plug-and-play Function

The PCI-1716/1716L is a Plug-and-Play device, which fully complies with PCI Specification Rev 2.2. During card installation, there is no need to set jumpers or DIP switches. Instead, all bus-related configurations such as base I/O address and interrupt are automatically done by the Plug-and-Play function.

Automatic Channel/Gain/SD*/BU* Scanning

The PCI-1716/1716L features an automatic channel/gain/SD/BU scanning circuit. This circuit controls multiplexer switching during sampling in a way that is more efficient than software implementation. Onboard SRAM stores different gain, SD and BU values for each channel. This combination lets users perform multi-channel high-speed sampling with different gain, SD and BU values for each channel.

SD: Single-Ended/Differential; BU: Bipolar/Unipolar

On-board FIFO Memory

The PCI-1716/1716L provides 1K sample onboard FIFO (First In First Out) memory buffer for AD. This is an important feature for faster data transfer and more predictable performance under the Windows system.

On-board Programmable Timer/Counter

The PCI-1716/1716L provides a programmable timer counter for generating a pacer trigger for the A/D conversion. The timer/counter chip is 82C54, which includes three 16-bit counter 10 MHz clocks. One counter is used as an event counter for counting events coming from the input channel. The other two are cascaded together to make a 32-bit timer for a pacer trigger time base.

Pin Assignment

A10	68	34	A11
A12	67	33	A13
A14	66	32	A15
A16	65	31	A17
A18	64	30	A19
A110	63	29	A111
A112	62	28	A113
A114	61	27	A115
AIGND	60	26	AIGND
A00_REF	59	25	A01_REF
A00_OUT	58	24	A01_OUT
A0GND	57	23	A0GND
D10	56	22	D11
D12	55	21	D13
D14	54	20	D15
D16	53	19	D17
D18	52	18	D19
D110	51	17	D111
D112	50	16	D113
D114	49	15	D115
DGND	48	14	DGND
DO0	47	13	DO1
DO2	46	12	DO3
DO4	45	11	DO5
DO6	44	10	DO7
DO8	43	9	DO9
DO10	42	8	DO11
DO12	41	7	DO13
DO14	40	6	DO15
DGND	39	5	DGND
CNT0_CLK	38	4	PACER_OUT
CNT0_OUT	37	3	TRG_GATE
CNT0_GATE	36	2	EXT_TRG
+12V	35	1	+5V

*: Pins 23~25 and pins 57~59 are not defined for the PCI-1716L

1
IPPC & AWS

2
TPC

3
FPM

4
ATM

5
DA&C

6
cPCI

7
ADAM-3000

8
eConnectivity

9
ICOM

10
Software

11
UNO-2000/3000

12
VBOX

13
ADAM-4000

14
ADAM-5000

15
ADAM-6000

16
ADAM-8000