

PCI-1710/1710L PCI-1710HG/HGL

100 KS/s, 12-bit, (High-gain),
PCI-bus Multifunction Card



Features

- 16 single-ended or 8 differential analog inputs, or a combination
- 12-bit A/D converter, with up to 100 KHz sampling rate
- Programmable gain for each input channel
- Free combination of single-ended and differential inputs
- On-board 4 K samples FIFO buffer
- Two 12-bit analog output channels
- 16 digital inputs and 16 digital outputs
- Programmable pacer/counter

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Introduction

The PCI-1710/1710HG is a multifunction card for the PCI bus. Its advanced circuit design provides higher quality and more functions, including the five most desired measurement and control functions: 12-bit A/D conversion, D/A conversion, digital input, digital output, and counter/timer.

PCI-1710 series provide specific functions for different user requirements:

- PCI-1710 100 KS/s, 12-bit Multifunction Card
- PCI-1710L 100 KS/s, 12-bit Multifunction Card w/o AO
- PCI-1710HG 100 KS/s, 12-bit High-Gain Multifunction Card
- PCI-1710HGL 100 KS/s, 12-bit High-Gain Multifunction Card w/o AO

Mixed Single-ended or Differential Analog Inputs

The PCI-1710/1710HG features an automatic channel/gain scanning circuit. The circuit, rather than your software, controls multiplexer switching during sampling. The on-board SRAM stores different gain values and configurations for each channel. This design lets you perform multi-channel high-speed sampling (up to 100 KHz) with different gains for each channel and with free combination of single-ended and differential inputs.

On-board FIFO (First In First Out) Memory

The PCI-1710/1710HG has an on-board FIFO buffer which can store up to 4K A/D samples. The PCI-1710/1710HG generates an interrupt when the FIFO is half full. This feature provides continuous high-speed data transfer and more predictable performance on Windows systems.

On-board Programmable Counter

The PCI-1710/1710HG provides a programmable counter for generating a pacer trigger for the A/D conversion. The counter chip is an 82C54 or equivalent, which includes three 16-bit counters on a 10 MHz clock. One counter is used as an event counter for counting events coming from the input channels. The other two are cascaded together to make a 32-bit timer for a pacer trigger.

Special Shielded Cable for Noise Reduction

The PCL-10168 shielded cable is specially designed for the PCI-1710/1710HG for reducing noise in the analog signal lines. Its wires are all twisted pairs, and the analog lines and digital lines are separately shielded, providing minimal cross talk between signals and the best protection against EMI/EMC problems.

Specifications

Analog Input:

- **Channels:** 16 single-ended or 8 differential (software programmable)
- **Resolution:** 12-bit
- **On-board FIFO:** 4 K samples
- **Conversion Time:** 8 ms
- **Input Range:** (V, software programmable)
- **Maximum Input Overvoltage:** ± 30 V

	PCI-1710/1710L	PCI-1710HG/1710HGL
Bipolar	$\pm 10, \pm 5, \pm 2.5, \pm 1.25, \pm 0.625$	$\pm 10, \pm 5, \pm 1, \pm 0.5, \pm 0.1 \pm 0.05, \pm 0.01, \pm 0.005$
Unipolar	0 ~ 10, 0 ~ 5, 0 ~ 2.5, 0 ~ 1.25	0 ~ 10, 0 ~ 1, 0 ~ 0.1, 0 ~ 0.01

Common Mode Rejection Ratio (CMRR):

PCI-1710/1710L		PCI-1710HG/1710HGL	
Gain	CMRR	Gain	CMRR
0.5, 1	75 dB	0.5, 1	75 dB
2	80 dB	10	90 dB
4	84 dB	100	106 dB
8	84 dB	1000	106 dB

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- **Maximum Sample Rate:** (S/s, depending on PGIA settling time)

	Gain	Max. Sampling Rate
PCI-1710/1710L	0.5, 1, 2, 4, 8	100 KS/s
PCI-1710HG/1710HGL	0.5, 1	100 KS/s
	5, 10	35 KS/s
	20, 100	7 KS/s
	500, 1000	770 S/s

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

PCI-1710/1710L		PCI-1710HG/1710HGL		Remark
Gain	Accuracy	Gain	Accuracy	
0.5, 1	0.01% of FSR ± 1 LSB	0.5, 1	0.01% of FSR ± 1 LSB	S.E./D
2	0.02% of FSR ± 1 LSB	5, 10	0.02% of FSR ± 1 LSB	S.E./D
4	0.02% of FSR ± 1 LSB	50, 100	0.04% of FSR ± 1 LSB	D
8	0.04% of FSR ± 1 LSB	500, 1000	0.08% of FSR ± 1 LSB	D

- **Accuracy:** (depends on gain)

* **S.E.:** Single-ended **D:** Differential

- **Linearity Error:** ± 1 LSB
- **Input Impedance:** 1 GW
- **Trigger Mode:** software, on-board programmable pacer or external

Analog Output: (PCI-1710/1710HG only)

- **Channels:** 2
- **Resolution:** 12-bit
- **Relative Accuracy:** $\pm 1/2$ LSB
- **Gain Error:** ± 1 LSB
- **Through:** 38 KS/s (min.)
- **Slow Rate:** 10 V/ms
- **Output range (software programmable):**
 Internal reference: 0 ~ +5 V @ -5 V,
 0 ~ +10 V @ -10 V
 External reference: 0 ~ +x V @ -x V (-10 $\leq x \leq 10$)
- **Driving Capability:** 10 mA

Digital Input:

- **Channels:** 16
- **Input Voltage:** Low: 0.4 V max.
High: 2.4 V min.
- **Input Load:** Low: -0.2 mA @ 0.4 V
High: 20 mA @ 2.7 V

Digital Output:

- **Channels:** 16
- **Output Voltage:** Low: 0.4 V max. @ 8.0 mA (sink)
High: 2.4 V min. @ -0.4 mA (source)

Programmable Timer/Counter

- **Counter Chip:** 82C54 or equivalent
- **Counters:** 3 channels, 16 bits, 2 channels are permanently configured as a 32-bit programmable pacer; 1 channel is free for user applications

- **Input, gate:** TTL/CMOS compatible
- **Time Base:**
 Channel 1: 10 MHz
 Channel 2: Takes input from output of channel 1
 Channel 0: Internal 1 MHz or external clock
 (10 MHz max.) selected by software.

General:

- **CE certified to CISPR 22 class B**
- **I/O Connector:** 68-pin SCSI-II female connector
- **Power Consumption:** +5 V @ 850 mA (Typical),
+5 V @ 1.0 A (Max.)
- **Operating Temperature:** 0° ~ +60° C (32° ~ 140° F)
(refer to IEC 68-2-1, 2)
- **Storage Temperature:** -20° ~ +70° C (-4° ~ 158° F)
- **Operating Humidity:** 5% ~ 95% RH non-condensing
(refer to IEC 68-2-3)
- **Dimensions:** 175 mm (L) x 100 mm (H) (6.9" x 3.9")
- **MTBF:** over 64,770 hrs @ 25° C, grounded-fix environment

Pin Assignments

AI0	68	34	AI1
AI2	67	33	AI3
AI4	66	32	AI5
AI6	65	31	AI7
AI8	64	30	AI9
AI10	63	29	AI11
AI12	62	28	AI13
AI14	61	27	AI15
AI16	60	26	AI17
AI18	59	25	AI19
AI20	58	24	AI21
AI22	57	23	AI23
AI24	56	22	AI25
AI26	55	21	AI27
AI28	54	20	AI29
AI30	53	19	AI31
AI32	52	18	AI33
AI34	51	17	AI35
AI36	50	16	AI37
AI38	49	15	AI39
AI40	48	14	AI41
AI42	47	13	AI43
AI44	46	12	AI45
AI46	45	11	AI47
AI48	44	10	AI49
AI50	43	9	AI51
AI52	42	8	AI53
AI54	41	7	AI55
AI56	40	6	AI57
AI58	39	5	AI59
AI60	38	4	AI61
AI62	37	3	AI63
AI64	36	2	AI65
AI66	35	1	AI67

*: Pins 23-25 and pins 57-59 are not defined for PCI-1710L/1710HGL

Ordering information

- **PCI-1710:** 12-bit, 100 KS/s Multifunction Card, user's manual and driver CD-ROM. (cable not included)
- **PCI-1710L:** 12-bit, 100 KS/s Multifunction Card w/o AO, user's manual and driver CD-ROM. (cable not included)
- **PCI-1710HG:** 12-bit, 100 KS/s High-Gain Multifunction Card, user's manual and driver CD-ROM. (cable not included)
- **PCI-1710HGL:** 12-bit, 100 KS/s High-Gain Multifunction Card w/o AO, 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

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