

PCI Multi-Function DAQ Board

PCI-180X/1602/1202

12/16-bit high performance multi-function DAQ boards



PCI-1800H

Functional Description

The PCI-180X series is a family of high performance data acquisition board for PC with PCI bus. It features a continuous, 330KHz, gap-free data acquisition under DOS and Windows. This family has the same architecture: one 12-bit 330KHz A/D converter, two 12-bit independent D/A converters, 16-channel digital input and 16-channel digital output. The PCI-1800H/L provides 16-channel single-ended or 8-channel differential analog input. The PCI-1802H/L provides 32 channel single-ended or 16-channel differential analog input. The -H means high gain mode and the -L means low gain mode. Two DACs of the multifunction card are independent bipolar voltage output with jumper selectable voltage output range.

The scan function of PCI-180X is so amazing. We call it "MAGIC SCAN". It scans with two modes: "Fix channel scan" and "Variable channel scan". The "Magic scan" mechanism not only scan the different input channels at vastly different rates, but also at different gain. Even in multi-channel scan, both modes can be up to 330K samples per second.

The PCI-180X series also has other outstanding features. For example:

1. The data transfer rate of digital I/O is up to 2.1 M words/second (non-burst mode).
2. The throughput of D/A is up to 2.1MHz throughput max.
3. Provides three flexible external trigger modes, such as post-trigger, pre-trigger, middle trigger.
4. Provides M-function and Continue Capture function.

The PCI-1202H/L is very similar to PCI-1802H/L. The different items between the PCI-1802 and PCI-1202 are given as follows:

- A/D sampling rate is 110K samples/second for PCI-1202.
- FIFOs size is 2K words for PCI-1202.

The PCI-1602 is very similar to PCI-1802L. The

Features

- 32-bit +5V PCI Bus, Plug & Play
- 12/16-bit resolution
- Up to 330KS/s sampling rate
- Single-ended or differential analog input
- On-board FIFOs
- Software programmable gain
- Two 12-bit independent programmable DAC
- 16 digital input / 16 digital output channels

different items between the PCI-1802 and PCI-1602 are given as follows:

- 16-bit A/D converter
- A/D sampling rate is 200K sample/second for PCI-1602F.
- A/D sampling rate is 100K sample/second for PCI-1602.

Applications

- High speed data acquisition system
- Process monitor and control
- Vibration analysis
- Digital pattern generator from digital I/O port
- Continue data capture

"MAGIC SCAN " Function

The "MAGIC SCAN "controller is a innovative design. It has the following features:

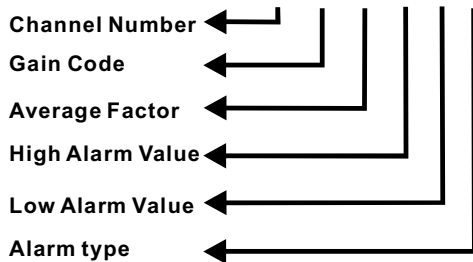
1. Different gain for each scan channel
2. Non-sequential order for channel scan
3. Different sampling rate for each scan channel
4. Programmable different digital filter for each scan channel
5. Programmable high/ low alarm function, provide four different alarm monitor mode for each scan channel
6. The scan sampling rate can maintain at max. sampling rates without sacrifice the speed
7. Provide three external trigger: Pre-trigger, Post-rigger, Middle-trigger
8. Easy programming

The PCI-1800 can measure the high frequency signal and low frequency signal with different sampling rate. In other words, the user doesn't have to waste valuable data memory for low speed channel. It can measure small signal and large signal at the same time. The digital filter can filter out some noisy signal. The programmable high/ low alarm function will be very helpful for some monitor application system.

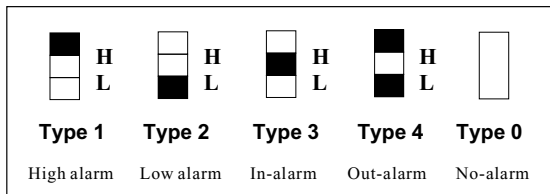
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The Format of Function Call P180X_Add To Scan (N, G, AF, H, L, A)



Alarm type



M_Function

M_Function is used to support simultaneous gap-free A/D, D/A at full-rated throughput. The user can use the D/A channel to send out the pre-defined signal pattern to the external device and measure the output signal simultaneously. The M_Function can be executed under DOS, Windows and Linux. Some programming language (VC/C++, BC++, VB, Delphi), Java and package (LabVIEW) can call the M_Function.

Continue Capture Function

The PCI-180X/1602/1202 provide different continuously capture functions.

1. Continuous Capture at Low speed. The acquired data can be display at the monitor simultaneously. No storage is required. Therefore the user can monitor the data continually.
2. Continuous Capture at high speed. The acquired data should be saved into the DRAM of PC. The capture period should be limited to the Memory size.
3. Continuous Capture at high speed. The acquired data should be saved into the SRAM card of PC. The capture period should be limited to the Memory size. The user should have to calculate the memory size according to the sampling rate and the capture period.

The Continue Capture function can be executed under DOS, Windows and Linux. Continuous Capture function can support multiple boards.

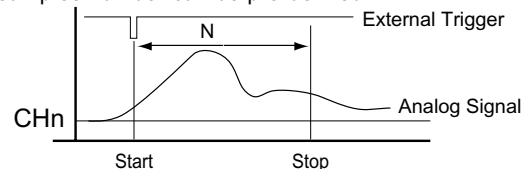
FIFO Size

How many FIFOs is large enough for your application? It depends on your application. You can calculate the time buffer using the following formula. For example, the FIFO size of PCI-1800 is 2 K words. The maximum Sampling rate of the board is 330KS/s . The time buffer you can get is $1\text{sec} / 330\text{K} \times 2\text{K} (\text{FIFO SIZE}) / 2 = 3.1 \text{ ms}$. It is enough for regular application under the DOS. For some complicated multi-tasking applications, the user have to know the FIFO size he needs; otherwise the data might be lost. The PCI-1800 series provide the possibility to upgrade the FIFO size.

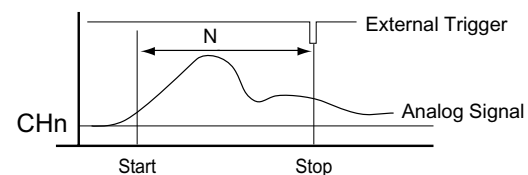
Diverse Trigger Mode

PCI-180X series provide diverse internal and external trigger modes. The internal trigger includes software trigger and pacer timer trigger. The external trigger includes the following trigger modes.

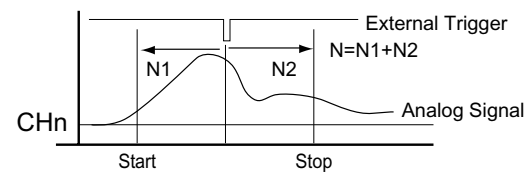
- **Post-trigger mode:** Acquisition begins after an external trigger and continues until the specified number of samples are collected.
- **Pre-trigger mode:** Acquisition occurs before an external trigger occurs.
- **Middle-trigger mode:** Acquisition occurs before and after an external trigger occurs. The samples number can be pre-defined.



Post-trigger Mode



Pre-trigger Mode

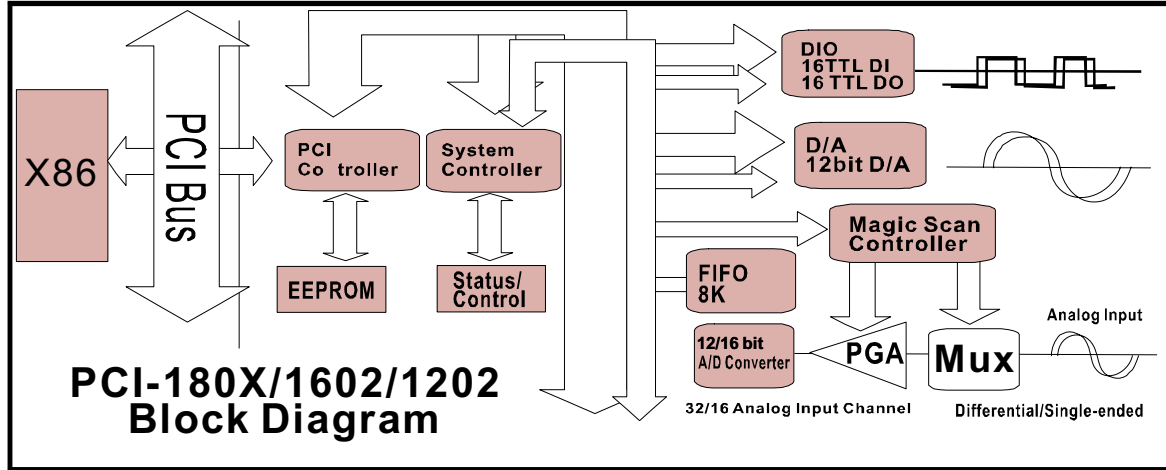


Middle-trigger Mode

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Specifications

Analog Input

- Number of channels:
 - PCI-1802/1602/1202: 32 single-ended or 16 differential
 - PCI-1800: 16 single-ended or 8 differential
- Resolution: PCI-1802/1800/1202: 12-bit
PCI-1602: 16-bit
- ADC conversion rate: PCI-1802/1800: 330 KS/s
PCI-1602F: 200 KS/s
PCI-1602: 100 KS/s
PCI-1202: 110 KS/s
- Input impedance: 10 M Ω //6pF
- Over voltage protection: $\pm 35V$
- Accuracy: 0.01 % of reading , ± 1 bit
- Linearity: ± 1 bit
- On chip sample & hold
- FIFO size: PCI-1202/1800: 2K word (option 8K)
PCI-1802/1602: 8K word

PCI-1602 Input Range

Gain	Bipolar	PCI-1602F Sampling Rate(Max.)	PCI-1602 Sampling Rate(Max.)
1	$\pm 10V$	200KS/s	100KS/s
2	$\pm 5V$	200KS/s	100KS/s
4	$\pm 2.5V$	200KS/s	100KS/s
8	$\pm 1.25V$	200KS/s	100KS/s

PCI-1800H/1802H/1202H Input Range

Gain	Bipolar	Unipolar	Sampling Rate(Max.)
0.5	± 10	X	44KS/s
1	± 5	0~10	44KS/s
5	± 1	X	36KS/s
10	± 0.5	0~1	36KS/s
50	± 0.1	X	7KS/s
100	± 0.05	0~0.1	7KS/s
500	± 0.01	X	0.8KS/s
1000	± 0.005	0~0.01	0.8KS/s

PCI-1800L/1802L/1202L Input Range

Gain	Bipolar	Unipolar	Sampling Rate(Max.)	
			180X	1202
0.5	± 10	X	330KS/s	110KS/s
1	± 5	0~10	330KS/s	110KS/s
2	± 2.5	0~5	330KS/s	110KS/s
4	± 1.25	0~2.5	330KS/s	110KS/s
8	± 0.625	0~1.25	330KS/s	110KS/s

Analog Output

- Number of channels: 2 independent
- Type: 12-bit double buffered
- Linearity: 0.006% FS
- Settling time: 0.4 μ S
- Output range: -5V~5V or -10V~10V
- Output Driving: +/- 5 mA

Timer

- Three 16-bit independent timer, 8MHz input clock
- Timer 0: Internal pacer trigger timer
- Timer 1: External pacer trigger
- Timer 2: Machine independent timer for settling time delay

Digital I/O

- 16 TTL-level input
- Input low $V_{IL} = 0.8V$ max; $I_{IL} = -0.4mA$ max
- Input high $V_{IH} = 2.0V$ min; $I_{IH} = 20 \mu$ A max
- 16 TTL-level output
- Output low $V_{OL} = 0.5V$ max; $@I_{OL} = 8$ mA max
- Output high $V_{OH} = 2.7V$ min; $@I_{OH} = 0.4$ mA max

General Specifications

- I/O connector: one 37-pin D-Sub female
two 20-pin ribbon male

- Power requirements:

Device	PCI-180X	PCI-1602	PCI-1202
+5V	1600 mA	1200 mA	1400 mA

- Operating temperature: 0 ~ 60°C
- Operating humidity: 0 ~ 90% non-condensing
- Storage temperature: -20 ~ 70°C
- Dimensions: 200 mm x 105 mm (PCI-180X)
205 mm x 105 mm (PCI-1202 / 1602)

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PCI-1602



PCI-1202H

Ordering Information

Standard

- PCI-1800H:** 16-channel 12-bit 44KS/s high gain multi-function board
- PCI-1800H/S:** PCI-1800H with DB-8225
- PCI-1800H/NDA:** PCI-1800H without DB-8225
- PCI-1800L:** 16-channel 12-bit 330KS/s low gain multi-function board
- PCI-1800L/S:** PCI-1800L with DB-8225
- PCI-1800L/NDA:** PCI-1800L without DB-8225
- PCI-1802H:** 32-channel 12-bit 44KS/s high gain multi-function board
- PCI-1802H/S:** PCI-1802H with DB-1825
- PCI-1802L:** 32-channel 12-bit 330KS/s low gain multi-function board
- PCI-1802L/S:** PCI-1802L with DB-1825
- PCI-1602F:** 32-channel 16-bit 200 KS/s multi-function board
- PCI-1602F/S :** PCI-1602F with DB-1825
- PCI-1602:** 32-channel 16-bit 100 KS/s multi-function board
- PCI-1602/S:** PCI-1602 with DB-1825
- PCI-1202H:** 32-channel 12-bit 44 KS/s high gain multi-function board
- PCI-1202H/S:** PCI-1202H with DB-1825
- PCI-1202L:** 32-channel 12-bit 110 KS/s low gain multi-function board
- PCI-1202L/S:** PCI-1202L with DB-1825

Optional

- DB-1825:** Screw terminal board with break area for filter circuitry added for PCI-1802/1602/1202
- DB-8225:** Screw terminal board with CJC for PCI-1800
- DB-889D:** 16-channel multiplexer and signal conditioning board for PCI-1800

- DN-37:** DIN-rail mounting terminal board
- DB-37:** Directly connection terminal board
- DN-20:** DIN-rail mounting terminal board
- DB-16P:** 16-channel isolated digital input board
- DB-16R:** 16-channel SPDT relay board
- ADP-20/PCI:** 20-pin extender

Pin Assignment

CN1		CN2	
DI0 1	2	DI 1	DO0 1
DI2 3	4	DI3	DO2 3
DI4 5	6	DI5	DO4 5
DI6 7	8	DI7	DO6 7
DI8 9	10	DI9	DO8 9
DI10 11	12	DI11	DO10 11
DI12 13	14	DI13	DO12 13
DI14 15	16	DI15	DO14 15
D.GND 17	18	D.GND	D.GND 17
+5V 19	20	+12V	+5V 19

PCI-1802/1602/1202 CN3

D.GND 37	19	Ext Trg
DA2 OUT 36	18	DA1 OUT
AI 31 35	17	A.GND
AI 30 34	16	AI 15
AI 29 33	15	AI 14
AI 28 32	14	AI 13
AI 27 31	13	AI 12
AI 26 30	12	AI 11
AI 25 29	11	AI 10
AI 24 28	10	AI 9
AI 23 27	9	AI 8
AI 22 26	8	AI 7
AI 21 25	7	AI 6
AI 20 24	6	AI 5
AI 19 23	5	AI 4
AI 18 22	4	AI 3
AI 17 21	3	AI 2
AI 16 20	2	AI 1
	1	AI 0

PCI-1800 CN3

N.C. 37	19	+5V OUT
N.C. 36	18	N.C.
N.C. 35	17	Ext Trg
N.C. 34	16	N.C.
N.C. 33	15	D.GND
D/A OUT1 32	14	A.GND
N.C. 31	13	+12V OUT
D/A OUT0 30	12	N.C.
A.GND 29	11	N.C.
A.GND 28	10	A.GND
AI15 27	9	A.GND
AI14 26	8	AI 7
AI13 25	7	AI 6
AI12 24	6	AI 5
AI11 23	5	AI 4
AI10 22	4	AI 3
AI 9 21	3	AI 2
AI 8 20	2	AI 1
	1	AI 0