PCL-1800

330 kHz High-speed DAS Card

Features

- 330 kHz 12-bit A/D converter
- 16 single-ended or eight differential inputs
- Built-in 1K samples FIFO buffer
- 16-channel analog comparator
- Pre-trigger and analog-trigger capability
- 330 kHz data transfer rate using FIFO
- 200 kHz data transfer rate using DMA
- 12-bit analog output with DMA
- Unipolar/bipolar input with programmable gain
- 16 digital inputs and 16 digital outputs
- Furnished with menu-driven Scope software package

Introduction

The PCL-1800 is a high-speed, high-performance multifunction plug-in DAS card. It features a 330 kHz 12-bit analog-to-digital converter, on-board 1 K samples FIFO buffer, 16 single-ended or 8 differential analog inputs, two 12-bit D/A output channels, 16 digital input channels, 16 digital output channels and one 16-bit counter channel.

The PCL-1800 also includes a 16-channel, 8-bit analog comparator that you can use as an analog watchdog to monitor the card's 16 analog input signals. If a signal goes above or below a triggering value, the PCL-1800 can generate an interrupt and start data transfer.

The card provides DMA data transfer on one of its two 12-bit D/A output channels. This channel lets you perform synchronous data output at up to 200 kHz: excellent for waveform generation.

All these sophisticated functions make the PCL-1800 an ideal data acquisition system for your laboratory applications that require very high speed and powerful triggering capabilities.

Analog Input

The PCL-1800 features a 12-bit high-speed A/D converter with 2.5 μsec. conversion time. It also includes an on-board sample-and-hold circuit with a software programmable input range. You can trigger the A/D conversion from your program, the on-board programmable pacer or an external trigger.

The PCL-1800 can select either 8 differential or 16 single-ended analog inputs. Like Advantech's other high-performance cards, the PCL-1800 offers auto-channel/gain scanning. This feature allows high-speed multichannel sampling with DMA (up to 200 kHz) and different gains for each channel.

On-board 1K Samples FIFO with Programmable Index

The PCL-1800 includes a 1K samples FIFO (First In First Out) buffer to increase throughput and improve performance under Windows. A programmable index with one-step resolution lets you acquire

anywhere from one to 1024 analog-to-digital-conversion data elements at a time. For example, if you set the FIFO's index to 25, after the card completes 25 A/D conversions, the FIFO will generate an interrupt and transfer just 25 data elements. You do not need to wait until the FIFO is full or half-full to receive your data.

Pre-trigger Capability

The PCL-1800's FIFO with programmable index and analog watchdog (explained below) lets you save data before a trigger event. You can acquire data before, before and after, or after the signal triggers the watchdog. This feature lets you receive data to determine the cause of an alarm condition, to analyze transients, and so on.
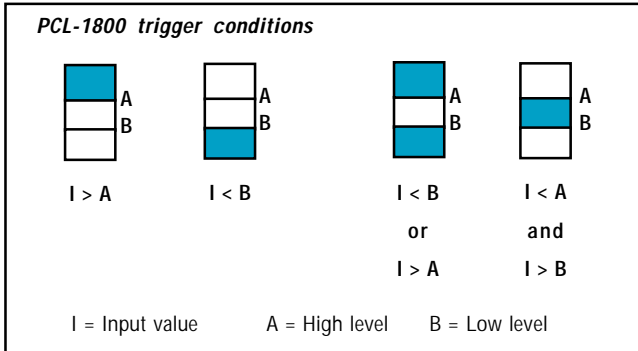
Data Transfer

The PCL-1800 can transfer A/D conversion data in four different ways: software polling, interrupt service routine, DMA and FIFO. The method you use determines the speed of the data transfer, as shown below:

Method	Max. A/D throughput
Software polling	10 ~ 20 kHz
Interrupt	10 ~ 30 kHz
DMA	200 kHz
FIFO w/repeat input string	330 kHz

16-channel Analog Watchdog for Analog Triggering

The PCL-1800's special watchdog circuit lets you precisely monitor the analog input lines. Two 8-bit comparators on each input line store the desired values and compare the values against the reading on the input line. The watchdog circuit reads the result of the comparators and triggers an interrupt. You can set each comparator individually to trigger if the line reading is above or below its desired value, and you can set the watchdog to trigger on any combination of comparator readings.

PCL-1800 trigger conditions

I > A   I < B   I < B   I < A
                    or   and
                    I > A   I > B

I = Input value   A = High level   B = Low level

This control logic (all software programmable) lets you set up complex alarm and triggering conditions. For example, you can set the watchdog to trigger if the input is either above the high-level value or below the low-level value. You can also set the PCL-1800 for rising or falling edge triggering.

The analog watchdog ensures fast and predictable response times for alarms and input levels without the delay of software overhead.

Analog Output

The PCL-1800 provides two 12-bit double buffered analog output channels. One channel has DMA transfer capability for at least 30 kHz throughput in full-sale output range. The card can also perform waveform storage and playback. Analog output ranges are 0 ~ 5 V or 0 ~ 10 V with internal reference and ±10 V max. with external reference.

Applications

• Vibration and transient analysis
• High-speed multichannel data acquisition
• Simultaneous event analysis
• Waveform analysis
• Waveform generation

Specifications

Analog Input

• **Channels**: 16 single-ended or 8 differential
• **Resolution**: 12 bit
• **Conversion time**: 2.5 msec.
• **Input range (programmable)**:
  Bipolar: ±10 V, ±5 V, ±2.5 V, ±1.25 V and ±0.625 V
  Unipolar: 0 ~ 10 V, 0 ~ 5 V, 0 ~ 2.5 V and 0 ~ 1.25 V
• **Automatic channel gain/scan**
• **Trigger mode**: Software, pacer or external trigger
• **Data transfer**: Program transfer; program transfer with FIFO; interrupt transfer (IRQ 2, 4, 5, 7, 10, 11, 12 or 15); dual DMA transfer (DRQ 5 ~ 7)
• **FIFO size**: 1 K samples

• **Data transfer rate**:200 kHz with DMA
  330 kHz with RIS (Repeat Input String)
• **Analog trigger**: Pre-trigger, post-trigger or watchdog comparator for alarm monitoring
• **Watchdog comparator**: Two 8-bit comparators on each analog input, set by software
• **Accuracy**: 0.01% of FSR ±1 LSB
• **Temperature coefficient**: 25 PPM/° C @ 0 ~ 50° C

Analog Output

• **D/A channels**: Two 12-bit channels, one with DMA transfer
• **D/A range**:
  With internal reference: 0 ~ 5 V or 0 ~ 10 V
  With external reference: 0 ~ -x V @ +x V (-10 ≤ x ≤ 10)
• **Settling time**: 5 msec. max
• **D/A pacer rate**: 200 kHz max. (DMA channel only)
• **Output current**: ±5 mA
• **Accuracy**: ±0.01% FSR
• **Linearity**: ½ LSB max.

Digital Input/Output

• 16 input channels and 16 output channels, all TTL level

Counter and A/D pacer rate

• **Device**: 8254 or equivalent
• **Pacer rate**: 2.5 MHz to 0.00023 Hz (one cycle/72 min.), software programmable
• **Counter**: One 16-bit counter with 100-kHz time base

General

• **Power consumption**: +5 V @ 600 mA max.
  +12 V @ 200 mA max.
  -12 V @ 15 mA typical
• **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)
• **I/O port**: 32 consecutive bytes
• **Bus**: 16-bit ISA (AT)
• **Dimensions**: 218 mm (L) x 122 mm (H) (8.6" x 4.8")

Ordering Information

PCL-1800: 330 kHz high-speed DAS card, Scope software, user's manual and utility diskette with C/C++, Pascal and BASIC drivers
PCL-10137: DB-37 cable assembly, 1 m
ADAM-3937: DB-37 Wiring terminal for DIN-rail mounting
PCLD-880: Screw terminal board

Plug-in Data Acquisition and Control

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