Low-Cost Multifunction I/O – 50 kS/s, 12-Bit, 8 Analog Inputs

DAQCard-500

Analog Inputs
8 single-ended
50 kS/s sampling rate
12-bit resolution

Digital I/O
8 (5 V/TTL) lines

Counter/Timers
Two, 16-bit resolution

Driver Software
NI-DAQ
Windows 2000/NT/9x
Mac OS

Application Software
LabVIEW
LabWindows/CVI
ComponentWorks
VirtualBench
Measure
BridgeVIEW
Lookout

Make sure you consider our new low-cost 12-bit E Series products – refer to page 239.

Bus	Analog Inputs	Resolution	Sampling Rate	Input Range	Analog Outputs	Resolution	Output Rate	Output Range	Digital I/O	Counter/ Timers	Triggers
PCMCIA	8 SE	12 bits	50 kS/s	±5V	–	–	–	–	8	2, 16-bit	–

Table 1. DAQCard-500 Channel, Speed, and Resolution Specifications *(refer to page 318 for more detailed specifications)*

Overview

The DAQCard-500 is a low-cost, multifunction I/O device. You get up to 50 kS/s, 12-bit performance on 8 single-ended analog inputs. This device also features two 16-bit, 10 MHz counter/timers and 8 digital I/O lines.

Hardware

Analog Input

The DAQCard-500 has 8 single-ended analog input channels. The input circuitry has input overvoltage protection of ±25 V powered on or powered off. Voltage input range is ±5 V.

The DAQCard-500 has a 12-bit ADC with analog signal resolution of 2.44 mV in the ±5 V range. The output of the ADC is automatically sign-extended to 16 bits. The ADC performs 20 µs conversions with single-channel and multichannel aggregate acquisition sampling rates up to 50 kS/s.

The DAQCard-500 performs both single A/D conversions and multiple A/D conversions of a fixed number of samples. A 16-word deep FIFO buffers the data during multiple A/D conversions to prevent data loss due to bus latency. During continuous, sustained data acquisition, you can achieve throughput rates of 25 kS/s in DOS and 10 kS/s in Windows.

An onboard counter/timer generates the sample interval clock with a resolution of 1 µs and controls the timing of multiple A/D conversions. As an alternative, an external signal can generate timing for the sample interval.

Data acquisition with the DAQCard-500 is available in two modes: 1) continuous acquisition of a single channel, or 2) multichannel acquisition with continuous scanning. In both modes, the number of samples must be counted in software.

You can scan any number of channels between 2 and 8 in the multichannel acquisition mode. These channels are scanned in a round-robin sequence, taking one reading per interval. Scanning always occurs in the same order – from the highest channel specified through channel 0.

You can retrieve a reading from the DAQCard-500 as each A/D conversion is available in the FIFO or periodically, using one of the counter/timer channels.

Digital I/O

The DAQCard-500 has a 4-bit input and a 4-bit output port. These ports can directly drive Darlington transistors for high-current applications. The digital I/O ports are 5 V/TTL compatible. The output port can source or sink 4 mA on each line.

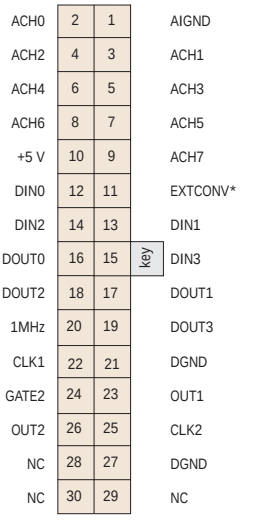

Figure 1. DAQCard-500 I/O Connector

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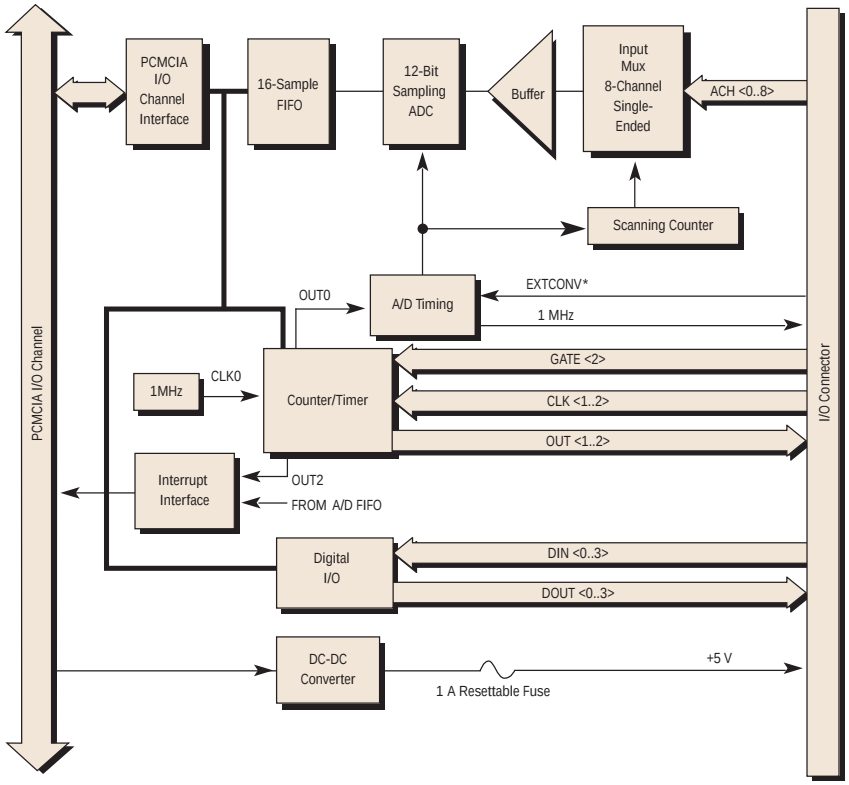

Figure 2. DAQCard-500 Hardware Block Diagram

Counter/Timer

The DAQCard-500 uses an 82C54 programmable interval timer (PIT) for counting and timing. The PIT contains three independent 16-bit counter/ timers. One of the counters (counter 0) is dedicated to A/D timing. You can use the other two counter/timers for general time-related functions, such as clock output, pulse output, and event and frequency measurements. The clock source of counter 0 is tied internally to a 1 MHz clock, so that an external clock is not always required. For applications that require an external clock, this 1 MHz clock is available on the I/O connector for use with other counters.

I/O Connector

The DAQCard-500 uses the CB-27, a 27-pin screw terminal block (see Figure 1). The PR27-30F cable connects to the DAQCard-500 and CB-27. ACH<0..7> are eight analog input channels referenced to AIGND. EXTCONV can control individual A/D conversions externally. CLK<1..2>, GATE<2>, and OUT<1..2> are the counter clock, gate, and output, respectively. DOUT<0..3> are the four digital output lines and DIN<0..3> are the four digital input lines. All digital lines are referenced to digital ground (DGND). The fused +5 VDC line can drive external signal conditioning circuitry.*

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Refer to page 318 for more detailed specifications.

Ordering Information

DAQCard-500 *and NI-DAQ for*

Windows 2000/NT/9x.....777086-01

Mac OS 777086-02

Includes NI-DAQ for Windows 2000/NT/9x on CD unless otherwise noted. See pages 192 and 210.

Example Configurations

DAQ Board	Cable (page 297)	Accessory (page 293)
DAQCard-500	PR27-30F (777131-01)	CB-27 (777100-01)

For more detailed cable and accessory options, refer to pages 286-299.

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Specifications

DAQCard-500

These specifications are typical at 25 °C unless otherwise stated.

Analog Input

Input Characteristics

Number of channels ..... *8 single-ended*
Type of ADC ..... *Successive approximation*
Resolution ..... *12 bits, worst-case code range -2,021 to +2,020 (due to software calibration)*
Maximum sampling rate ..... *50 kS/s; 25 kS/s sustained under DOS, 10 kS/s sustained under Windows*
Input signal ranges ..... *±5 V*
Input coupling ..... *DC*
Overvoltage protection ..... *±25 V powered on, ±25 V powered off*
Inputs protected ..... *ACH<0..7>*
FIFO buffer size ..... *16 samples*
Data transfers ..... *Interrupts, programmed I/O*

Transfer Characteristics

Relative accuracy ..... *±1.5 LSB typical, ±2.5 LSB max*
DNL ..... *±0.7 LSB typical, ±1 LSB max*
INL ..... *±0.7 LSB typical, ±1 LSB max*
No missing codes ..... *12 bits, guaranteed*
Offset error
After software calibration ..... *±1 LSB*
Gain error (relative to calibration reference)
After software calibration ..... *±0.045% of reading typical, ±0.09% max*

Amplifier Characteristics

Input impedance ..... *1 GΩ in parallel with 40 pF*

Dynamic Characteristics

Settling time to ±0.024% (±1 LSB)
for full-scale step ..... *20 µs*
System noise ..... *0.5 LSB_{rms}*

Stability

Recommended warm-up time ..... *15 minutes*
Offset temperature coefficient ..... *10 ppm/°C max*
Gain temperature coefficient ..... *15 ppm/°C max*

Digital I/O

Number of channels ..... *4 input and 4 output*
Compatibility ..... *5 V/TTL*
Digital logic levels

Level	Minimum	Maximum
Input low voltage	0 V	0.8 V
Input high voltage	2 V	5 V
Output low voltage (I_{out} = 4 mA)	–	0.9 V
Output high voltage (I_{out} = 4 mA)	3.3 V	–

Timing I/O

Number of channels ..... *3 counter/timers (1 dedicated to analog input)*
Resolution ..... *16 bits*
Compatibility ..... *5 V/TTL, gate and source pulled high with 100 kΩ resistors*
Base clocks available ..... *1 MHz*
Base clock accuracy ..... *±0.01%*
Maximum source frequency ..... *10 MHz*
Minimum source pulse duration ..... *50 ns*
Minimum gate pulse duration ..... *50 ns*
Data transfers ..... *Programmed I/O*

Bus Interface ..... *Slave*

Power Requirement

+5 VDC (±5%) ..... *60 mA in active mode*
20 mA in stand-by mode
Power available at I/O connector ..... *+5 VDC, 500 mA*

Physical

Dimensions ..... *Type II PC Card*
I/O connector ..... *27-pin male*

Environment

Operating temperature ..... *0 to 50 °C, should not exceed 50 °C while in PCMCIA slot*
Storage temperature ..... *-20 to 70 °C*
Relative humidity ..... *10% to 90% noncondensing*

Certifications and Compliances

CE Mark Compliance CE

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