

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

Driver Software

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

Digital I/O

8 (5 V/TTL) lines

Application Software

LabVIEW
LabWindows/CVI
ComponentWorks
VirtualBench
Measure
BridgeVIEW
Lookout

Counter/Timers

Two, 16-bit resolution



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.

ACH0	2	1	AIGND
ACH2	4	3	ACH1
ACH4	6	5	ACH3
ACH6	8	7	ACH5
+5 V	10	9	ACH7
DINO	12	11	EXTCONV*
DIN2	14	13	DIN1
DOUT0	16	15	DIN3
DOUT2	18	17	DOUT1
1MHz	20	19	DOUT3
CLK1	22	21	DGND
GATE2	24	23	OUT1
OUT2	26	25	CLK2
NC	28	27	DGND
NC	30	29	NC

Figure 1. DAQCard-500 I/O Connector

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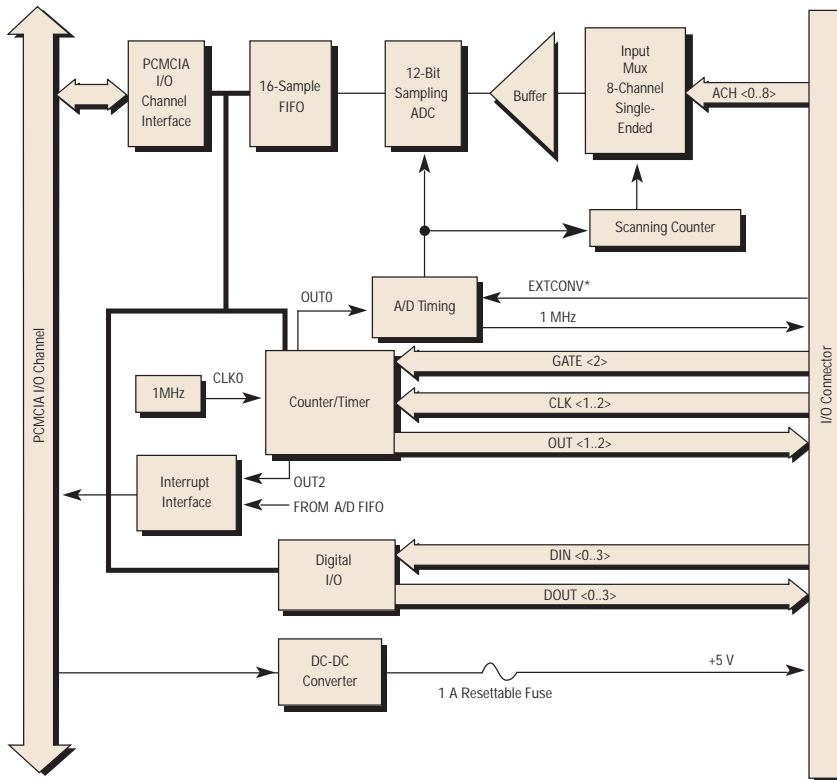


Figure 2. DAQCard-500 Hardware Block Diagram

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 OS777086-02

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.

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
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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 