

Low-Cost Multifunction I/O – 100 kS/s, 12-Bit, 16 Analog Inputs

DAQCard-700

Analog Inputs

16 single-ended, 8 differential channels
100 kS/s sampling rate
12-bit resolution

Digital I/O

16 (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

Calibration Certificate Included!

(refer to page 216)



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	16 SE/8 DI	12 bits	100 kS/s	±10V	–	–	–	–	16	2, 16-bit	–

Table 1. DAQCard-700 Channel, Speed, and Resolution Specifications (refer to page 316 for more detailed specifications)

Overview

The DAQCard-700 is a low-cost, multifunction I/O device. You get up to 100 kS/s, 12-bit performance on 16 single-ended or eight differential analog inputs. This device features two 16-bit, 8 MHz counter/timers and 16 digital I/O lines.

Hardware

Analog Input

The DAQCard-700 has 16 single-ended or 8 differential analog input channels. The voltage input range is software configurable for ±10 V, ±5 V, or ±2.5 V.

The DAQCard-700 has a 12-bit ADC with analog signal resolution of 4.88 mV in the ±10 V range. The output of the ADC is automatically sign-extended to 16 bits.

The ADC performs 10 μs conversions with single-channel and multichannel aggregate acquisition sampling rates up to 100 kS/s. The DAQCard-700 performs both single A/D conversions and multiple A/D conversions of a set number of samples. A 512-word deep FIFO buffers the data during multiple A/D conversions to prevent data loss due to bus latency.

An onboard counter/timer that generates the sample interval clock with resolution of 1 μs 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-700 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 16 in the multichannel acquisition mode. These channels are scanned in a round-robin sequence, taking one reading per interval with scanning always occurring in the same order, from the highest channel specified to channel 0.

You can retrieve readings from the DAQCard-700 as each A/D conversion is available in the FIFO, upon receiving an external signal or periodically, using one of the counter/timer channels.

Digital I/O

The DAQCard-700 has an 8-bit input and an 8-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.

AIGND	1	2	AIGND
ACH0	3	4	ACH8
ACH1	5	6	ACH9
ACH2	7	8	ACH10
ACH3	9	10	ACH11
ACH4	11	12	ACH12
ACH5	13	14	ACH13
ACH6	15	16	ACH14
ACH7	17	18	ACH15
DGND	19	20	NC
NC	21	22	DIN0
DIN1	23	24	DIN2
DIN3	25	26	DIN4
DIN5	27	28	DIN6
DIN7	29	30	DOUT0
DOUT1	31	32	DOUT2
DOUT3	33	34	DOUT4
DOUT5	35	36	DOUT6
DOUT7	37	38	OUT1*
EXTINT*	39	40	EXTCONV*
OUT0	41	42	GATE0
OUT1	43	44	GATE1
CLK1	45	46	OUT2
GATE2	47	48	CLK2
+5 V	49	50	DIGGND

Figure 1. DAQCard-700 I/O Connector

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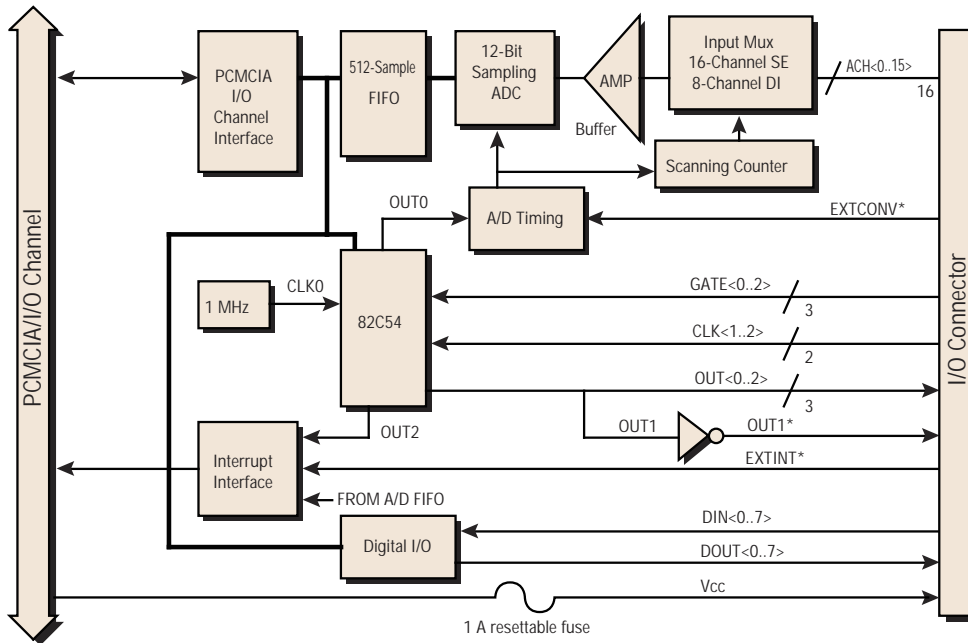


Figure 2. DAQCard-700 Hardware Block Diagram

Counter/Timer

The DAQCard-700 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 measurement. The clock source of counter 0 is tied internally to a 1 MHz clock, so that an external clock is not always required. Complementary outputs from counter 1 are available at the I/O connector for applications requiring inverted output from the counter.

I/O Connector

The I/O connector is a 50-pin male ribbon-cable connector (see Figure 1). ACH<0..15> are 16 analog input channels referenced to AIGND. EXTCONV* can control individual A/D conversions externally. CLK<1..2>, GATE<0..2>, and OUT<0..2> are the counter clock, gate, and output respectively. OUT1* is inverted OUT1. DOUT<0..7> are the eight digital output lines and DIN<0..7> are the eight digital input lines. All digital lines are referenced to digital ground (DIGGND). The fused +5 V lines can drive external signal conditioning circuitry.



Refer to page 316 for more detailed specifications.



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Ordering Information

DAQCard-700 and NI-DAQ for

Windows 2000/NT/9x.....776985-01
 Mac OS776985-02

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

Example Configurations

DAQ Board	Cable (page 297)	Accessory (page 292)
DAQCard-700	PR50-50F (182799-01)	CB-50LP (777101-01)

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

Specifications

DAQCard-700

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

Analog Input

Input Characteristics

Number of channels.....	16 single-ended or 8 differential, software selectable
Type of ADC.....	Successive approximation
Resolution.....	12 bits, worst-case code range -2024 to +2023 (due to software calibration)
Maximum sampling rate.....	100 KS/s
Input signal ranges.....	±10 V, ±5 V, ±2.5 V software selectable
Input coupling.....	DC
Maximum working voltage (signal + common mode).....	Each input should remain within ±9.5 V of AIGND (in DIFF mode)
Overvoltage protection.....	±30 V powered on, ±30 V powered off
Inputs protected.....	ACH<0..15>
FIFO buffer size.....	512 samples
Data transfers.....	Interrupts, programmed I/O

Transfer Characteristics

Relative accuracy.....	±1 LSB typical, ±1.5 LSB max
DNL.....	±0.5 LSB typical, ±1 LSB max
No missing codes.....	12 bits, guaranteed

Offset error

Before software calibration.....	±2 LSB typical, ±9 LSB max
After software calibration.....	±1 LSB

Gain error (relative to calibration reference)

Before software calibration.....	±0.07% typical
After software calibration.....	±0.036% max

Amplifier Characteristics

Input impedance.....	1 GΩ in parallel with 40 pF
CMRR (all input ranges).....	72 dB, DC to 60 Hz

Dynamic Characteristics

Settling time to ±0.024% accuracy (±1 LSB) for full-scale step.....	25 μs max at ±10 V, ±5 V; 10 μs at ±2.5 V (RSE)
System noise.....	0.5 LSB _{rms} at ±5 V range

Stability

Recommended warm-up time.....	15 minutes
Onboard calibration reference Level.....	3.0 V (±0.2 mV)
Temperature coefficient.....	60 ppm/°C max

Digital I/O

Number of channels.....	8 input and 8 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 ($I_{out} = 4 \text{ mA}$)	–	0.45 V
Output high voltage ($I_{out} = 4 \text{ mA}$)	3.7 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 Requirements

+5 VDC (±5 %).....	100 mA
Power available at I/O connector.....	+5 V, 500 mA

Physical

PCMCIA card type.....	Type II
I/O connector.....	50-pin male

Environment

Operating temperature.....	0 to 55 °C, should not exceed 55 °C while in PCMCIA slot
Storage temperature.....	-20 to 70 °C
Relative humidity.....	10% to 90% noncondensing

Certifications and Compliances

CE Mark Compliance **CE**