

NI DAQCard™ -6062E Family Specifications

This document lists the I/O terminal summary and specifications for the NI DAQCard-6062E for PCMCIA.

I/O Terminal Summary



Note With NI-DAQmx, National Instruments revised its terminal names so they are easier to understand and more consistent among NI hardware and software products. The revised terminal names used in this document are usually similar to the names they replace. For a complete list of Traditional NI-DAQ (Legacy) terminal names and their NI-DAQmx equivalents, refer to *Terminal Name Equivalents* of the *E Series Help*.

Table 1. I/O Terminals

Terminal Name	Terminal Type and Direction	Impedance Input/Output	Protection (V) On/Off	Source (mA at V)	Sink (mA at V)	Rise Time (ns)	Bias
AI<0..15>	AI	100 G Ω in parallel with 100 pF	25/10	—	—	—	± 200 pA
AI SENSE	AI	100 G Ω in parallel with 100 pF	25/10	—	—	—	± 200 pA
AI GND	—	—	—	—	—	—	—
AO 0	AO	0.1 Ω	Short-circuit to ground	5 at 10	5 at -10	10 V/ μ s	—
AO 1	AO	0.1 Ω	Short-circuit to ground	5 at 10	5 at -10	10 V/ μ s	—
AO EXT REF	AI	10 k Ω	25/15	—	—	—	—
AO GND	—	—	—	—	—	—	—
D GND	—	—	—	—	—	—	—
+5 V	—	0.45 Ω	Short-circuit to ground	250 at V_{CC}	—	—	—
P0.<0..7>	DIO	—	$V_{CC} + 0.5$	13 at ($V_{CC} - 0.4$)	24 at 0.4	1.1	50 k Ω pu [†]

Table 1. I/O Terminals (Continued)

Terminal Name	Terminal Type and Direction	Impedance Input/ Output	Protection (V) On/Off	Source (mA at V)	Sink (mA at V)	Rise Time (ns)	Bias
AI HOLD COMP	DO	—	—	3.5 at (V _{CC} - 0.4)	5 at 0.4	1.5	50 kΩ pu
EXT STROBE*	DO	—	—	3.5 at (V _{CC} - 0.4)	5 at 0.4	1.5	50 kΩ pu
PFI 0/ (AI START TRIG)	AI/DIO	10 kΩ	V _{CC} + 0.5/±35	3.5 at (V _{CC} - 0.4)	5 at 0.4	1.5	50 kΩ pu, 10 kΩ pd
PFI 1/ (AI REF TRIG)	DIO	—	V _{CC} + 0.5	3.5 at (V _{CC} - 0.4)	5 at 0.4	1.5	50 kΩ pu
PFI 2/ (AI CONV CLK)*	DIO	—	V _{CC} + 0.5	3.5 at (V _{CC} - 0.4)	5 at 0.4	1.5	50 kΩ pu
PFI 3/ CTR 1 SOURCE	DIO	—	V _{CC} + 0.5	3.5 at (V _{CC} - 0.4)	5 at 0.4	1.5	50 kΩ pu
PFI 4/CTR 1 GATE	DIO	—	V _{CC} + 0.5	3.5 at (V _{CC} - 0.4)	5 at 0.4	1.5	50 kΩ pu
CTR 1 OUT	DO	—	—	3.5 at (V _{CC} - 0.4)	5 at 0.4	1.5	50 kΩ pu
PFI 5/ (AO SAMP CLK)*	DIO	—	V _{CC} + 0.5	3.5 at (V _{CC} - 0.4)	5 at 0.4	1.5	50 kΩ pu
PFI 6/ (AO START TRIG)	DIO	—	V _{CC} + 0.5	3.5 at (V _{CC} - 0.4)	5 at 0.4	1.5	50 kΩ pu
PFI 7/ (AI SAMP CLK)	DIO	—	V _{CC} + 0.5	3.5 at (V _{CC} - 0.4)	5 at 0.4	1.5	50 kΩ pu
PFI 8/ CTR 0 SOURCE	DIO	—	V _{CC} + 0.5	3.5 at (V _{CC} - 0.4)	5 at 0.4	1.5	50 kΩ pu
PFI 9/CTR 0 GATE	DIO	—	V _{CC} + 0.5	3.5 at (V _{CC} - 0.4)	5 at 0.4	1.5	50 kΩ pu
CTR 0 OUT	DO	—	—	3.5 at (V _{CC} - 0.4)	5 at 0.4	1.5	50 kΩ pu
FREQ OUT	DO	—	—	3.5 at (V _{CC} - 0.4)	5 at 0.4	1.5	50 kΩ pu

Caution: Exceeding the output limit in the Source and Sink columns can damage the NI DAQCard-6062E.

* Indicates active low.

† P0.<6..7> are also pulled up with a 10 kΩ resistor.

AI = Analog Input DIO = Digital Input/Output pu = pull-up
 AO = Analog Output DO = Digital Output AI/DIO = Analog Input/Digital Input/Output

Note: The tolerance on the 50 kΩ pull-up resistors is large. Actual value might range between 17 kΩ and 100 kΩ.

Specifications

The following specifications are typical at 25 °C unless otherwise noted.

Analog Input

Input Characteristics

Number of channels 16 single-ended,
16 pseudodifferential,
or 8 differential
(software-selectable on
a per-channel basis)

Type of A/D converter (ADC)..... Successive
approximation

Resolution 12 bits, 1 in 4,096

Max sampling rate 500 kS/s

Input signal ranges

Range (Software-Selectable)	Input Range	
	Bipolar	Unipolar
20 V	±10 V	—
10 V	±5 V	0 to 10 V
5 V	±2.5 V	0 to 5 V
2 V	±1 V	0 to 2 V
1 V	±500 mV	0 to 1 V
500 mV	±250 mV	0 to 500 mV
200 mV	±100 mV	0 to 200 mV
100 mV	±50 mV	0 to 100 mV

Accuracy Information

Nominal Range at Full Scale (V)	Absolute Accuracy										Relative Accuracy Resolution (mV)	
	% of Reading		Offset (mV)	Noise + Quantization (mV)		Temp Drift (%/°C)	Absolute Accuracy at Full Scale (mV)	Single Pt.		Averaged	Single Pt.	Averaged
	24 Hours	1 Year		Single Pt.	Averaged							
±10.0	0.0672	0.0714	9.83	6.100	0.975	0.0010	17.945	7.370	1.280	7.370	1.280	
±5.0	0.0272	0.0314	4.92	3.050	0.488	0.0005	6.983	3.680	0.642	3.680	0.642	
±2.5	0.0672	0.0714	2.47	1.530	0.244	0.0010	4.502	1.840	0.321	1.840	0.321	
±1.0	0.0672	0.0714	1.001	0.610	0.098	0.0010	1.813	0.737	0.128	0.737	0.128	
±0.5	0.0672	0.0714	0.511	0.305	0.049	0.0010	0.917	0.368	0.064	0.368	0.064	
±0.25	0.0672	0.0714	0.266	0.208	0.029	0.0010	0.474	0.238	0.039	0.238	0.039	
±0.1	0.0672	0.0714	0.119	0.098	0.012	0.0010	0.203	0.111	0.016	0.111	0.016	
±0.05	0.0672	0.0714	0.070	0.071	0.008	0.0010	0.113	0.082	0.010	0.082	0.010	
10 to 0	0.0272	0.0314	4.920	3.050	0.488	0.0005	8.555	3.68	0.642	3.68	0.642	
5 to 0	0.0672	0.0714	2.470	1.530	0.244	0.0010	6.288	1.84	0.321	1.84	0.321	
2 to 0	0.0672	0.0714	1.001	0.610	0.098	0.0010	2.528	0.737	0.128	0.737	0.128	
1 to 0	0.0672	0.0714	0.511	0.305	0.049	0.0010	1.274	0.368	0.064	0.368	0.064	
0.5 to 0	0.0672	0.0714	0.266	0.208	0.029	0.0010	0.653	0.238	0.039	0.238	0.039	
0.2 to 0	0.0672	0.0714	0.119	0.098	0.012	0.0010	0.274	0.111	0.016	0.111	0.016	
0.1 to 0	0.0672	0.0714	0.070	0.071	0.008	0.0010	0.149	0.082	0.010	0.082	0.010	

Note: Accuracies are valid for measurements following an internal E Series calibration. Averaged numbers assume dithering and averaging of 100 single-channel readings. Measurement accuracies are listed for operational temperatures within ±1 °C of internal calibration temperature and ±10 °C of external or factory-calibration temperature. NI recommends a one-year calibration interval. The Absolute Accuracy at Full Scale calculations were performed for a maximum range input voltage (for example, 10 V for the ±10 V range) after one year, assuming 100 points of averaged data. Go to ni.com/info and enter info code `rdspec` for example calculations.

Transfer Characteristics

Relative accuracy	±0.5 LSB typ dithered, ±1.5 LSB max undithered
Differential nonlinearity (DNL).....	±0.75 LSB typ, -0.9, +1.5 LSB max
No missing codes	12 bits, guaranteed
Offset error	
Pregain error after calibration.....	±16 µV max
Pregain error before calibration	±4 mV max
Postgain error after calibration	±1 mV max
Postgain error before calibration	±265 mV max
Gain error (relative to calibration reference)	
After calibration (gain = 1).....	±0.02% of reading max
Before calibration	±2.5% of reading max
Gain ≠ 1 with gain error adjusted to 0 at gain = 1.....	±0.02% of reading max

Amplifier Characteristics

Input impedance	
Normal powered on	100 GΩ in parallel with 100 pF
Powered off	820 Ω min
Overload	820 Ω min
Input bias current	±200 pA
Input offset current.....	±100 pA
Common-mode rejection ratio (CMRR), DC to 60 Hz	

Range	CMRR
10 to 20 V	85 dB
5 V	95 dB
100 mV to 2 V	100 dB

Dynamic Characteristics

Bandwidth	
Small signal (-3 dB).....	1.3 MHz
Large signal (1% THD).....	250 kHz

Settling time for full-scale step

Range	Accuracy*		
	±0.012% (±0.5 LSB)	±0.024% (±1 LSB)	±0.098% (±4 LSB)
All	2.5 µs typ	2.5 µs typ, 4 µs max	2 µs typ

* Accuracy values are valid for source impedances <1 kΩ. Refer to *Multichannel Scanning Considerations* of the *E Series Help* for more information.

System noise (LSB_{rms}, not including quantization)

Range	Dither On	Dither Off
1 to 20 V	0.25	0.6
500 mV	0.4	0.75
200 mV	0.5	0.8
100 mV	0.8	1.0

Crosstalk (DC to 100 kHz)

Adjacent channels	-75 dB
All other channels	-90 dB

Stability

Offset temperature coefficient	
Pregain	±5 µV/°C
Postgain.....	±240 µV/°C
Gain temperature coefficient	±20 ppm/°C

Analog Output

Output Characteristics

Number of channels	2 voltage
Resolution.....	12 bits, 1 in 4,096

Max update rate, waveform generation

FIFO Mode		Non-FIFO Mode	
Internally Timed	Externally Timed	1 Channel	2 Channels
850 kS/s	850 kS/s	800 kS/s, system-dependent	400 kS/s, system-dependent

Type of D/A converter (DAC)Double-buffered,
multiplying

FIFO buffer size2,048 samples (S)

Data transfers.....Interrupts,
programmed I/O

Accuracy Information

Nominal Range (V)		Absolute Accuracy					Absolute Accuracy at Full Scale (mV)
Positive Full Scale	Negative Full Scale	% of Reading			Offset (mV)	Temp Drift (%/°C)	
		24 Hours	90 Days	1 Year			
10	-10	0.0177	0.0197	0.0219	8.37	0.0005	10.568

Note: Accuracies are valid for measurements following an internal E Series calibration. Averaged numbers assume dithering and averaging of 100 single-channel readings. Measurement accuracies are listed for operational temperatures within ± 1 °C of internal calibration temperature and ± 10 °C of external or factory-calibration temperature. NI recommends a one-year calibration interval. The Absolute Accuracy at Full Scale calculations were performed for a maximum range input voltage (for example, 10 V for the ± 10 V range) after one year, assuming 100 points of averaged data. Go to ni.com/info and enter info code *rdspec* for example calculations.

Transfer Characteristics

Relative accuracy, or integral nonlinearity (INL)
 After calibration ± 0.5 LSB typ,
 ± 1.0 LSB max
 Before calibration ± 4 LSB max

DNL
 After calibration ± 0.5 LSB typ,
 ± 1.0 LSB max
 Before calibration ± 3 LSB max

Monotonicity12 bits, guaranteed
 after calibration

Offset error
 After calibration ± 1.0 mV max
 Before calibration ± 200 mV max

Gain error (relative to internal reference)
 After calibration $\pm 0.01\%$ of output max
 Before calibration $\pm 0.7\%$ of output max

Gain error
 (relative to external reference) $\pm 0.5\%$ of output max,
 not adjustable

Voltage Output

Ranges ± 10 V, \pm AO EXT REF
 (software-selectable)

Output coupling DC

Output impedance 0.1Ω max

Current drive ± 5 mA max

Protection Short-circuit to ground

Power-on state 0 V (± 200 mV)

External reference input
 Range ± 11 V
 Overvoltage protection ± 25 V powered on,
 ± 15 V powered off

Input impedance 10 k Ω

Bandwidth (-3 dB) 50 kHz

Dynamic Characteristics

Settling time for full-scale step $3.5 \mu\text{s}$ to ± 0.5 LSB
 accuracy

Slew rate 10 V/ μs

Noise $200 \mu\text{V}_{\text{rms}}$
 DC to 300 kHz

Glitch energy (at midscale transition)

- Magnitude
 - Reglitching disabled ±80 mV
 - Reglitching enabled ±30 mV
- Duration 3 μs

Stability

- Offset temperature coefficient ±50 μV/°C
- Gain temperature coefficient
 - Internal reference ±25 ppm/°C
 - External reference ±25 ppm/°C

Digital I/O

- Number of channels 8 input/output
- Compatibility 5 V/TTL
- Digital logic levels on P0.<0..7>

Level	Min	Max
Input low voltage	0 V	0.8 V
Input high voltage	2.0 V	5.0 V
Input low current (V _{in} = 0 V)	—	–320 μA
Input high current (V _{in} = 5 V)	—	10 μA
Output low voltage (I _{OL} = 24 mA)	—	0.4 V
Output high voltage (I _{OH} = –13 mA)	4.35 V	—

- Power-on state Input (high-impedance)
- Data transfers Programmed I/O
- Max transfer rate 50 kwords/s, system dependent
- Constant sustainable rate 1 to 10 kwords/s, typ

Timing I/O

- Number of channels 2 up/down counter/timers, 1 frequency scaler
- Resolution
 - Counter/timers 24 bits
 - Frequency scalars 4 bits
- Compatibility 5 V TTL/CMOS

Base clocks available

- Counter/timers 20 MHz, 100 kHz
- Frequency scalars 10 MHz, 100 kHz

Base clock accuracy ±0.01%

Max source frequency

up/down counter/timers 20 MHz

Min source pulse duration 10 ns in edge-detection mode

Min gate pulse duration 10 ns in edge-detection mode

Data transfers Interrupts, programmed I/O

Triggers

Analog Trigger

Source AI <0..15>, external trigger (PFI 0/AI START TRIG)

Purpose

Analog input Start, reference, and pause trigger, sample clock

Analog output Start and pause trigger, sample clock

Counter/timers Source, gate

Level

Internal ±Full-scale

External ±10 V

Slope Positive or negative (software-selectable)

Resolution 8 bits, 1 in 256

Hysteresis Programmable

Bandwidth (–3 dB)

Internal 500 kHz

External 2.5 MHz

External input (PFI 0/AI START TRIG)

Impedance 12 kΩ

Coupling DC

Protection

When configured as a digital signal –0.5 to V_{CC}

When configured as an analog trigger signal or disabled ±35 V

Powered off ±35 V

Digital Trigger

Purpose	
Analog input	Start, reference, and pause trigger, sample clock
Analog output	Start and pause trigger, sample clock
Counter/timers	Source, gate
External sources	PFI <0..9>
Compatibility	5 V TTL
Response	Rising or falling edge
Pulse width	10 ns min

Calibration

Recommended warm-up time	30 minutes
Calibration interval	1 year
External calibration reference	>6 and <9.999 V
Onboard calibration reference	
Level	5.000 V (± 2.5 mV) (actual value stored in EEPROM)
Temperature coefficient	± 5 ppm/ $^{\circ}$ C max
Long-term stability	± 15 ppm/ $\sqrt{1,000}$ h

Power Requirement (from PCMCIA I/O Channel)

+5 VDC ($\pm 5\%$)	340 mA typ, 750 mA max
Power available at I/O connector	+4.65 to +5.25 V at 250 mA



Note These power usage figures do not include the power used by external devices that are connected to the fused supply present on the I/O connector.

Under ordinary operation, the DAQCard has a current requirement of 320–350 mA. The current requirements of the DAQCard might increase to 450 mA in any of the following conditions:

- The analog inputs you are sampling are overdriven at high gains.
- The analog inputs are left floating when the DAQCard is not in use.
- The analog outputs are driving high loads.

Physical

PC card type	Type II
Weight	33 g (1.1 oz)
I/O connector	68-position female VHDCI connector

Environmental

Operating temperature	0 to 40 $^{\circ}$ C
Maximum device temperature	70 $^{\circ}$ C measured by internal temperature sensor
Case temperature	55 $^{\circ}$ C recommended max
Storage temperature	-20 to 70 $^{\circ}$ C
Relative humidity	10 to 90%, noncondensing
Maximum altitude	2,000 m
Pollution Degree (indoor use only)	2

Maximum Working Voltage

Maximum working voltage refers to the signal voltage plus the common-mode voltage.

Channel-to-earth	11 V, Installation Category I
Channel-to-channel	11 V, Installation Category I

Safety

This product is designed to meet the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:

- IEC 60950-1, EN 60950-1
- UL 60950-1
- CAN/CSA-C22.2 No. 60950-1



Note For UL and other safety certifications, refer to the product label, or visit ni.com/certification, search by model number or product line, and click the appropriate link in the Certification column.

Electromagnetic Compatibility

Emissions EN 55011 Class A at 10 m
FCC Part 15A above
1 GHz

Immunity EN 61326:1997
A2:2001, Table 1

CE, C-Tick, and FCC Part 15 (Class A) Compliant



Note For EMC compliance, operate this device with shielded cabling.

CE Compliance

This product meets the essential requirements of applicable European Directives, as amended for CE marking, as follows:

Low-Voltage Directive (safety) 73/23/EEC

Electromagnetic Compatibility
Directive (EMC) 89/336/EEC



Note Refer to the Declaration of Conformity (DoC) for this product for any additional regulatory compliance information. To obtain the DoC for this product, visit ni.com/certification, search by model number or product line, and click the appropriate link in the Certification column.

AI 8	34	68	AI 0
AI 1	33	67	AI GND
AI GND	32	66	AI 9
AI 10	31	65	AI 2
AI 3	30	64	AI GND
AI GND	29	63	AI 11
AI 4	28	62	AI SENSE
AI GND	27	61	AI 12
AI 13	26	60	AI 5
AI 6	25	59	AI GND
AI GND	24	58	AI 14
AI 15	23	57	AI 7
AO 0	22	56	AI GND
AO 1	21	55	AO GND
AO EXT REF	20	54	AO GND
P0.4	19	53	D GND
D GND	18	52	P0.0
P0.1	17	51	P0.5
P0.6	16	50	D GND
D GND	15	49	P0.2
+5 V	14	48	P0.7
D GND	13	47	P0.3
D GND	12	46	AI HOLD COMP
PFI 0/AI START TRIG	11	45	EXT STROBE
PFI 1/AI REF TRIG	10	44	D GND
D GND	9	43	PFI 2/AI CONV CLK
+5 V	8	42	PFI 3/CTR 1 SRC
D GND	7	41	PFI 4/CTR 1 GATE
PFI 5/AO SAMP CLK	6	40	CTR 1 OUT
PFI 6/AO START TRIG	5	39	D GND
D GND	4	38	PFI 7/AI SAMP CLK
PFI 9/CTR 0 GATE	3	37	PFI 8/CTR 0 SRC
CTR 0 OUT	2	36	D GND
FREQ OUT	1	35	D GND

Figure 1. NI DAQCard-6062E Pinout

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