

NI 6023E/6024E/6025E Family Specifications

This document lists the I/O terminal summary and specifications for the devices that make up the NI 6023E/6024E/6025E family of devices. This family includes the following devices:

- NI PCI-6023E
- NI DAQCard-6024E
- NI PCI-6024E
- NI PCI-6025E
- NI PXI-6025E

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 GΩ in parallel with 100 pF	42/35	—	—	—	±200 pA
AI SENSE	AI	100 GΩ in parallel with 100 pF	40/25	—	—	—	±200 pA
AI GND	—	—	—	—	—	—	—
AO 0 [†]	AO	0.1 Ω	Short-circuit to ground	5 at 10	5 at -10	10 V/μs	—
AO 1 [†]	AO	0.1 Ω	Short-circuit to ground	5 at 10	5 at -10	10 V/μs	—
AO GND	—	—	—	—	—	—	—
D GND	—	—	—	—	—	—	—

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
+5 V	—	0.1 Ω	Short-circuit to ground	1 A fused	—	—	—
P0.<0..7> [‡]	DIO	—	V _{CC} + 0.5	13 at (V _{CC} – 0.4)	24 at 0.4	1.1	50 kΩ pu
P1.<0..7> [‡]	DIO	—	V _{CC} + 0.5	2.5 at 3.0 min	2.5 at 0.4	5	100 kΩ pu
P2.<0..7> [‡]	DIO	—	V _{CC} + 0.5	2.5 at 3.0 min	2.5 at 0.4	5	100 kΩ pu
P3.<0..7> [‡]	DIO	—	V _{CC} + 0.5	2.5 at 3.0 min	2.5 at 0.4	5	100 kΩ pu
AI HOLD COMP or AI HOLD	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)	DIO	—	V _{CC} + 0.5	3.5 at (V _{CC} – 0.4)	5 at 0.4	1.5	50 kΩ pu
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

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
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

* Indicates active low.
† NI 6024/6025E only.
‡ NI 6025E only.
AI = Analog Input DIO = Digital Input/Output pu = pull-up
AO = Analog Output DO = Digital 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 or 8 differential (software-selectable per channel)
Type of A/D converter (ADC).....	Successive approximation
Resolution	12 bits, 1 in 4,096

Max sampling rate	200 kS/s guaranteed
Input signal ranges (bipolar only)	

Range	Bipolar
20 V	±10 V
10 V	±5 V
1 V	±500 mV
100 mV	±50 mV

Input coupling	DC
Max working voltage (signal + common mode)	Each input should remain within ±11 V of ground

Overvoltage protection

Signal	Powered On	Powered Off
AI <0..15>	±42	±35
AI SENSE	±40	±25

FIFO buffer size

NI DAQCard-6024E.....	2,048 samples (S)
NI 6023E, NI PCI-6024E,	
NI 6025E.....	512 S

DMA (PCI/PXI only)

Channels.....	1
Data sources/destinations.....	Analog input, analog output, counter/timer 0, or counter/timer 1

Data transfers.....	Direct memory access (DMA), interrupts, programmed I/O
---------------------	--

DMA modes ¹	Scatter-gather (single transfer, demand transfer)
------------------------------	---

Configuration memory size.....	512 words (1 word = 8 bits)
--------------------------------	--------------------------------

¹ DMA is not available on the NI DAQCard-6024E.

Accuracy Information (NI DAQCard-6024E Only)

Nominal Range (V)		Absolute Accuracy				Relative Accuracy Resolution (mV)	
Positive Full Scale	Negative Full Scale	% of Reading		Noise + Quantization (mV)		Temp Drift (%/°C)	Absolute Accuracy at Full Scale (mV)
		24 Hours	1 Year	Offset (mV)	Single Pt.		
10	-10	0.0914	8.830	3.910	1.042	0.0010	19.012
5	-5	0.0272	0.0314	4.420	1.950	0.0005	6.517
0.5	-0.5	0.0872	0.0914	0.462	0.452	0.0010	0.972
0.05	-0.05	0.0872	0.0914	0.066	0.063	0.0010	0.119
						0.073	0.009

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 `rdspc` for example calculations.

Accuracy Information (NI 6023E, NI PCI-6024E, NI 6025E Only)

Nominal Range (V)	Absolute Accuracy						Relative Accuracy Resolution (mV)	
	% of Reading		Noise + Quantization (mV)		Temp Drift (%/°C)	Absolute Accuracy at Full Scale (mV)		
	Negative Full Scale	24 Hours	Offset (mV)	Single Pt.				
10	-10	0.0872	0.0914	6.38	3.91	0.975	0.0010	
5	-5	0.0272	0.0314	3.20	1.95	0.488	0.0005	
0.5	-0.5	0.0872	0.0914	0.340	0.195	0.049	0.0010	
0.05	-0.05	0.0872	0.0914	0.054	0.063	0.006	0.0010	
							0.106	
							0.073	
							0.008	

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

Dithered	± 0.5 LSB typ
Undithered	± 1.5 LSB max
Differential nonlinearity (DNL)	
NI DAQCard-6024E	± 0.75 LSB typ, -0.9 to +1.5 LSB max
NI 6023E, NI PCI-6024E, NI 6025E.....	± 0.5 LSB typ, ± 1.0 LSB max

No missing codes.....12 bits, guaranteed

Offset error

Pregain error after calibration	$\pm 12 \mu V$ max
Pregain error before calibration	$\pm 28 mV$ max
Postgain error after calibration	$\pm 0.5 mV$ max
Postgain error before calibration	$\pm 100 mV$ max
Gain error (relative to calibration reference)	
After calibration (gain = 1)	$\pm 0.02\%$ of reading max
Before calibration	$\pm 2.75\%$ of reading max
Gain $\neq 1$ with gain error adjusted to 0 at gain = 1	
$\pm 0.05\%$ of reading max	

Amplifier Characteristics

Input impedance

Normal powered on	100 G Ω in parallel with 100 pF
Powered off	4.7 k Ω
Overload.....	4.7 k Ω
Input bias current.....	± 200 pA
Input offset current	± 100 pA
Common-mode rejection ratio (CMRR), DC to 60 Hz	
Range 10 to 20 mV	85 dB
Range 100 mV to 1 V	90 dB

Dynamic Characteristics

Bandwidth

Small signal (-3 dB).....	500 kHz
Large signal (1% THD)	
NI DAQCard-6024E.....	265 kHz
NI PCI-6023E, NI PCI-6024E, NI 6025E.....	225 kHz

Settling time for full-scale step 5 μs typ to ± 1.0 LSB
accuracy¹

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

Device	Range	Dither Off	Dither On
NI DAQCard-6024E	10 to 20 V	0.1	0.65
	1 V	0.45	0.65
	100 mV	0.70	0.90
NI 6023E, NI PCI-6024E, NI 6025E	1 to 20 V	0.1	0.6
	100 mV	0.7	0.8

Crosstalk -60 dB, DC to 100 kHz

Stability

Recommended warm-up time

NI DAQCard-6024E	30 minutes
NI 6023E, NI PCI-6024E,	
NI 6025E	15 minutes

Offset temperature coefficient

Pregain.....	$\pm 15 \mu V/\text{°C}$
Postgain	$\pm 240 \mu V/\text{°C}$
Gain temperature coefficient	$\pm 25 \text{ ppm}/\text{°C}$

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

Analog Output (NI 6024E/6025E Only)

Output Characteristics

Number of channels	2 voltage
Resolution	12 bits, 1 in 4,096
Max update rate	
DMA ¹	10 kHz, system dependent
Interrupts	1 kHz, system dependent
Type of D/A converter (DAC).....	Double-buffered, multiplying
FIFO buffer size.....	None
Data transfers	DMA ¹ , interrupts, programmed I/O
DMA modes ¹	Scatter-gather (single transfer, demand transfer)

Accuracy Information (NI DAQCard-6024E Only)

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](http://ni.com/info) and enter info code `rdspec` for example calculations.

Accuracy Information (NI PCI-6024E, NI 6025E Only)

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	5.93	0.0005	8.127	

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](http://ni.com/info) and enter info code `rdspec` for example calculations.

¹ DMA is not available on the NI DAQCard-6024E.

Transfer Characteristics

Relative accuracy, or integral nonlinearity (INL)

After calibration

NI DAQCard-6024E.....±0.5 LSB typ,

±1.0 LSB max

NI PCI-6024E, NI 6025E±0.3 LSB typ,

±0.5 LSB max

Before calibration±4 LSB max

DNL

After calibration

NI DAQCard-6024E.....±0.5 LSB typ,

±1.0 LSB max

NI PCI-6024E, NI 6025E±0.3 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±0.01% of output max

Before calibration±0.75% of output max

Voltage Output

Range±10 V

Output couplingDC

Output impedance0.1 Ω max

Current drive±5 mA max

ProtectionShort-circuit to ground

Power-on state (steady state)±200 mV

Initial power-up glitch

Magnitude

NI DAQCard-6024E.....±1.5 V

NI PCI-6024E, NI 6025E±1.1 V

Duration

NI DAQCard-6024E.....1.0 s

NI PCI-6024E, NI 6025E2.0 ms

Power reset glitch

Magnitude

NI DAQCard-6024E.....±1.5 V

NI PCI-6024E, NI 6025E±2.2 V

Duration

NI DAQCard-6024E1.0 s

NI PCI-6024E, NI 6025E4.2 μs

Dynamic Characteristics

Settling time for full-scale step10 μs to ±0.5 LSB
accuracy

Slew rate10 V/μs

Noise200 μV_{rms}, DC to 1 MHz

Midscale transition glitch

Magnitude

NI DAQCard-6024E±13 mV

NI PCI-6024E, NI 6025E±42 mV

Duration2.0 μs

Stability

Offset temperature coefficient±50 μV/°C

Gain temperature coefficient±25 ppm/°C

Digital I/O

Number of channels

NI DAQCard-6024E, NI 6023E,

NI PCI-6024E8 input/output

NI 6025E32 input/output

Compatibility5 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 stateInput (high-impedance),
50 kΩ pull-up to +5 VDC

Data transfersProgrammed I/O

Digital logic levels on P1.<0..7>, P2.<0..7>, and P3.<0..7>
(NI 6025E Only)

Level	Min	Max
Input low voltage	0 V	0.8 V
Input high voltage	2.2 V	5.0 V
Input low current (V _{in} = 0 V, 100 kΩ pu)	—	-75 μA
Input high current (V _{in} = 5 V, 100 kΩ pu)	—	10 μA
Output low voltage (I _{OL} = 2.5 mA)	—	0.4 V
Output high voltage (I _{OH} = -2.5 mA)	3.0 V	—

Handshaking 2-wire

Power-on state

P1.<0..7> Input (high-impedance),
100 kΩ pull-up to
+5 VDC

P2.<0..7> Input (high-impedance),
100 kΩ pull-up to
+5 VDC

P3.<0..7> Input (high-impedance),
100 kΩ pull-up to
+5 VDC

Data transfers Interrupts,
programmed I/O

Timing I/O

Number of channels 2 up/down
counter/timers,
1 frequency scaler

Resolution

Counter/timers 24 bits
Frequency scalers 4 bits

Compatibility 5 V/TTL

Base clocks available

Counter/timers 20 MHz, 100 kHz
Frequency scalers 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-detect mode

Min gate pulse duration 10 ns in edge-detect mode

Data transfers DMA¹, interrupts,
programmed I/O

DMA modes¹ Scatter-gather (single
transfer, demand transfer)

Triggers

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>, RTSI <0..6>

Compatibility 5 V TTL

Response Rising or falling edge

Pulse width 10 ns min

RTSI (PCI and PXI Only)

Trigger lines 7

Calibration

Recommended warm-up time

NI DAQCard-6024E 30 minutes

NI 6023E, NI PCI-6024E,

NI 6025E 15 minutes

Interval 1 year

External calibration reference Between 6 and 10 V

Onboard calibration reference

Level 5.000 V (±3.5 mV), actual
value stored in EEPROM

Temperature coefficient ±5 ppm/°C max

Long-term stability ±15 ppm/√1,000 h

Power Requirement

+5 VDC (±5%)

NI DAQCard-6024E 270 mA typ, 750 mA max

NI 6023E, NI PCI-6024E,

NI 6025E 0.7 A

¹ DMA is not available on the NI DAQCard-6024E.

Power available at I/O connector		Relative humidity.....10 to 90%, noncondensing
NI DAQCard-6024E	+4.65 to +5.25 VDC at 250 mA	Maximum altitude.....2,000 m
NI 6023E, NI PCI-6024E,		Pollution Degree (indoor use only).....2
NI 6025E.....	+4.65 to +5.25 VDC at 1 A	(NI PXI-6025E Only) Functional shock
 Note	Excludes power consumed through +5 V available at the I/O connector.	MIL-T-28800 E Class 3 (per Section 4.5.5.4.1) half-sine shock pulse, 11 ms duration, 30 g peak, 30 shocks per face
Physical		Operational random vibration.....5 to 500 Hz, 0.31 g _{rms} , 3 axes
Dimensions (not including connectors)		Non-operational random vibration.....5 to 500 Hz, 2.5 g _{rms} , 3 axes
PCI devices	17.5 cm × 10.7 cm (6.9 in. × 4.2 in.)	
PXI devices	16.0 cm × 10.0 cm (6.3 in. × 3.9 in.)	
NI DAQCard-6024E		
PC card type	Type II	
Weight		
NI PCI-6023E, PCI-6024E	115 g (4.1 oz)	 Note Random vibration profiles for the NI PXI-6025E were developed in accordance with MIL-T-28800E and MIL-STD-810E Method 514. Test levels exceed those recommended in MIL-STD-810E for Category 1, Basic Transportation.
NI DAQCard-6024E	32 g (1.1 oz)	
NI PCI-6025E	117 g (4.1 oz)	
NI PXI-6025E.....	202 g (7.1 oz)	
I/O connector		
NI 6023E, NI PCI-6024E.....	68-pin male SCSI-II type	Safety
NI DAQCard-6024E	68-position VHDCI female connector	(NI PCI-6023E/6024E/6025E, NI PXI-6025E Only) The device meets the requirements of the following standards for safety and electrical equipment for measurement, control, and laboratory use:
NI 6025E.....	100-pin female 0.05D type	<ul style="list-style-type: none"> • IEC 61010-1, EN 61010-1 • UL 61010-1 • CAN/CSA-C22.2 No. 61010-1
Maximum Working Voltage		(NI DAQCard-6024E Only) The device meets the requirements of the following standards for safety and electrical equipment for measurement, control, and laboratory use:
Channel-to-earth	11 V, Installation Category I	<ul style="list-style-type: none"> • IEC 60950-1, EN 60950-1 • UL 60950-1 • CAN/CSA-C22.2 No. 60950-1
Channel-to-channel	11 V, Installation Category I	
Environmental		
Operating temperature		 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.
NI DAQCard-6024E	0 to 40 °C with a maximum internal device temperature of 70 °C as measured by onboard temperature sensor; case temperature should not exceed 55 °C	
NI 6023E, NI PCI-6024E,		
NI 6025E.....	0 to 55 °C	
Storage temperature.....	-20 to 70 °C	

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, you must 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:

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
NC	22	56	AI GND
NC	21	55	AO GND
NC	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

NC = No Connect

Figure 1. NI 6023E Pinout

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

NC = No Connect

Figure 2. NI 6024E Pinout

AI GND	1	51	P3.7
AI GND	2	52	D GND
AI 0	3	53	P3.6
AI 8	4	54	D GND
AI 1	5	55	P3.5
AI 9	6	56	D GND
AI 2	7	57	P3.4
AI 10	8	58	D GND
AI 3	9	59	P3.3
AI 11	10	60	D GND
AI 4	11	61	P3.2
AI 12	12	62	D GND
AI 5	13	63	P3.1
AI 13	14	64	D GND
AI 6	15	65	P3.0
AI 14	16	66	D GND
AI 7	17	67	P2.7
AI 15	18	68	D GND
AI SENSE	19	69	P2.6
AO 0	20	70	D GND
AO 1	21	71	P2.5
NC	22	72	D GND
AO GND	23	73	P2.4
D GND	24	74	D GND
P0.0	25	75	P2.3
P0.4	26	76	D GND
P0.1	27	77	P2.2
P0.5	28	78	D GND
P0.2	29	79	P2.1
P0.6	30	80	D GND
P0.3	31	81	P2.0
P0.7	32	82	D GND
D GND	33	83	P1.7
+5 V	34	84	D GND
+5 V	35	85	P1.6
AI HOLD COMP	36	86	D GND
EXT STROBE	37	87	P1.5
PFI 0/AI START TRIG	38	88	D GND
PFI 1/AI REF TRIG	39	89	P1.4
PFI 2/AI CONV CLK	40	90	D GND
PFI 3/CTR 1 SRC	41	91	P1.3
PFI 4/CTR 1 GATE	42	92	D GND
CTR 1 OUT	43	93	P1.2
PFI 5/AO SAMP CLK	44	94	D GND
PFI 6/AO START TRIG	45	95	P1.1
PFI 7/AI SAMP CLK	46	96	D GND
PFI 8/CTR 0 SRC	47	97	P1.0
PFI 9/CTR 0 GATE	48	98	D GND
CTR 0 OUT	49	99	+5 V
FREQ OUT	50	100	D GND

NC = No Connect

Figure 3. NI 6025E Pinout

National Instruments, NI, ni.com, and LabVIEW are trademarks of National Instruments Corporation. Refer to the *Terms of Use* section on ni.com/legal for more information about National Instruments trademarks. Other product and company names mentioned herein are trademarks or trade names of their respective companies. For patents covering National Instruments products, refer to the appropriate location: **Help»Patents** in your software, the *patents.txt* file on your CD, or ni.com/patents.