

# 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 G $\Omega$ in parallel with 100 pF	42/35	—	—	—	$\pm 200$ pA
AI SENSE	AI	100 G $\Omega$ in parallel with 100 pF	40/25	—	—	—	$\pm 200$ pA
AI GND	—	—	—	—	—	—	—
AO 0 <sup>†</sup>	AO	0.1 $\Omega$	Short-circuit to ground	5 at 10	5 at -10	10 V/ $\mu$ s	—
AO 1 <sup>†</sup>	AO	0.1 $\Omega$	Short-circuit to ground	5 at 10	5 at -10	10 V/ $\mu$ s	—
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 $\Omega$	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 k $\Omega$ pu
P1.<0..7> <sup>‡</sup>	DIO	—	$V_{CC} + 0.5$	2.5 at 3.0 min	2.5 at 0.4	5	100 k $\Omega$ pu
P2.<0..7> <sup>‡</sup>	DIO	—	$V_{CC} + 0.5$	2.5 at 3.0 min	2.5 at 0.4	5	100 k $\Omega$ pu
P3.<0..7> <sup>‡</sup>	DIO	—	$V_{CC} + 0.5$	2.5 at 3.0 min	2.5 at 0.4	5	100 k $\Omega$ pu
AI HOLD COMP or AI HOLD	DO	—	—	3.5 at ( $V_{CC} - 0.4$ )	5 at 0.4	1.5	50 k $\Omega$ pu
EXT STROBE*	DO	—	—	3.5 at ( $V_{CC} - 0.4$ )	5 at 0.4	1.5	50 k $\Omega$ 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 k $\Omega$ 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 k $\Omega$ 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 k $\Omega$ 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 k $\Omega$ 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 k $\Omega$ pu
CTR 1 OUT	DO	—	—	3.5 at ( $V_{CC} - 0.4$ )	5 at 0.4	1.5	50 k $\Omega$ 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 k $\Omega$ 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 k $\Omega$ 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 k $\Omega$ 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 k $\Omega$ 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 k $\Omega$ 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 <sub>CC</sub> – 0.4)	5 at 0.4	1.5	50 kΩ pu
FREQ OUT	DO	—	—	3.5 at (V <sub>CC</sub> – 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<sup>1</sup> ..... Scatter-gather (single transfer, demand transfer)

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

<sup>1</sup> 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		Offset (mV)	Noise + Quantization (mV)		Temp Drift (%/°C)	Absolute Accuracy at Full Scale (mV)	Single Pt.	Averaged
		24 Hours	1 Year		Single Pt.	Averaged				
10	-10	-10	0.0914	8.830	3.910	1.042	0.0010	19.012	5.890	1.370
5	-5	0.0272	0.0314	4.420	1.950	0.521	0.0005	6.517	2.950	0.686
0.5	-0.5	0.0872	0.0914	0.462	0.452	0.052	0.0010	0.972	0.516	0.069
0.05	-0.05	0.0872	0.0914	0.066	0.063	0.007	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  $\pm 1^\circ\text{C}$  of internal calibration temperature and  $\pm 10^\circ\text{C}$  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  $\pm 10\text{ V}$  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 6023E, NI PCI-6024E, NI 6025E Only)

Nominal Range (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
Positive Full Scale	Negative Full Scale	24 Hours	1 Year		Single Pt.	Averaged				
10	-10	0.0872	0.0914	6.38	3.91	0.975	0.0010	16.504	5.89	1.28
5	-5	0.0272	0.0314	3.20	1.95	0.488	0.0005	5.263	2.95	0.642
0.5	-0.5	0.0872	0.0914	0.340	0.195	0.049	0.0010	0.846	0.295	0.064
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  $\pm 1$  °C of internal calibration temperature and  $\pm 10$  °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  $\pm 10$  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.

## 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 .....	±12 µV max
Pregain error before calibration .....	±28 mV max
Postgain error after calibration .....	±0.5 mV max
Postgain error before calibration .....	±100 mV max

### Gain error (relative to calibration reference)

After calibration (gain = 1) .....	±0.02% of reading max
Before calibration .....	±2.75% of reading max

Gain ≠ 1 with gain error adjusted

to 0 at gain = 1 .....

±0.05% of reading max
-----------------------

## Amplifier Characteristics

### Input impedance

Normal powered on .....	100 GΩ in parallel with 100 pF
Powered off .....	4.7 kΩ
Overload .....	4.7 kΩ

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 accuracy <sup>1</sup>
--

System noise (LSB<sub>rms</sub>, 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 .....	±15 µV/°C
Postgain .....	±240 µV/°C

Gain temperature coefficient .....

±25 ppm/°C
------------

<sup>1</sup> Accuracy values are valid for source impedances <1 kΩ. 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 <sup>1</sup> .....	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 <sup>1</sup> , interrupts, programmed I/O
DMA modes <sup>1</sup> .....	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  $\pm 1$  °C of internal calibration temperature and  $\pm 10$  °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  $\pm 10$  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  $\pm 1$  °C of internal calibration temperature and  $\pm 10$  °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  $\pm 10$  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.

<sup>1</sup> 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
Monotonicity .....	12 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 coupling.....	DC
Output impedance.....	0.1 Ω max
Current drive.....	±5 mA max
Protection.....	Short-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 6025E .....	2.0 ms

## Power reset glitch

Magnitude	
NI DAQCard-6024E.....	±1.5 V
NI PCI-6024E, NI 6025E.....	±2.2 V
Duration	
NI DAQCard-6024E.....	1.0 s
NI PCI-6024E, NI 6025E.....	4.2 μs

## Dynamic Characteristics

Settling time for full-scale step.....	10 μs to ±0.5 LSB accuracy
Slew rate .....	10 V/μs
Noise .....	200 μV/V <sub>rms</sub> , DC to 1 MHz
Midscale transition glitch	
Magnitude	
NI DAQCard-6024E.....	±13 mV
NI PCI-6024E, NI 6025E.....	±42 mV
Duration.....	2.0 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-6024E.....	8 input/output
NI 6025E .....	32 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), 50 kΩ pull-up to +5 VDC
Data transfers .....	Programmed 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 k $\Omega$ pu)	—	-75 $\mu$ A
Input high current ( $V_{in} = 5$ V, 100 k $\Omega$ pu)	—	10 $\mu$ A
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 k $\Omega$  pull-up to  
+5 VDC

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

P3.<0..7> ..... Input (high-impedance),  
100 k $\Omega$  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 scalars ..... 4 bits

Compatibility ..... 5 V/TTL

Base clocks available

Counter/timers ..... 20 MHz, 100 kHz

Frequency scalars ..... 10 MHz, 100 kHz

Base clock accuracy .....  $\pm 0.01\%$

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 ..... DMA<sup>1</sup>, interrupts,  
programmed I/O

DMA modes<sup>1</sup> ..... 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 ( $\pm 3.5$  mV), actual  
value stored in EEPROM

Temperature coefficient .....  $\pm 5$  ppm/ $^{\circ}$ C max

Long-term stability .....  $\pm 15$  ppm/ $\sqrt{1,000}$  h

## Power Requirement

+5 VDC ( $\pm 5\%$ )

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

NI 6023E, NI PCI-6024E,  
NI 6025E ..... 0.7 A

<sup>1</sup> DMA is not available on the NI DAQCard-6024E.

Power available at I/O connector	
NI DAQCard-6024E .....	+4.65 to +5.25 VDC at 250 mA
NI 6023E, NI PCI-6024E, NI 6025E .....	+4.65 to +5.25 VDC at 1 A



**Note** Excludes power consumed through +5 V available at the I/O connector.

## Physical

Dimensions (not including connectors)	
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)
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
NI DAQCard-6024E .....	68-position VHDCI female connector
NI 6025E .....	100-pin female 0.05D type

## Maximum Working Voltage

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

## Environmental

Operating temperature	
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

Relative humidity .....	10 to 90%, noncondensing
Maximum altitude .....	2,000 m
Pollution Degree (indoor use only) .....	2

### (NI PXI-6025E Only)

Functional shock .....	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
Operational random vibration .....	5 to 500 Hz, 0.31 g <sub>rms</sub> , 3 axes
Non-operational random vibration .....	5 to 500 Hz, 2.5 g <sub>rms</sub> , 3 axes



**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.

## Safety

### (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:

- IEC 61010-1, EN 61010-1
- UL 61010-1
- CAN/CSA-C22.2 No. 61010-1

### (NI DAQCard-6024E Only)

The device meets the requirements of the following standards for safety and 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](http://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, 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](http://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 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
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 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](http://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](http://ni.com/patents).