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**PCI-6070E**

# NI 6070E/6071E Family Specifications

This document lists the I/O terminal summary and specifications for the devices that make up the NI 6070E/6071E family. This family includes the following devices:

- NI DAQPad-6070E
- NI PCI-MIO-16E-1 (NI 6070E)
- NI PXI-6070E
- NI PCI-6071E
- NI PXI-6071E

## 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 <16..63> <sup>†</sup>	AI	100 GΩ in parallel with 100 pF	25/15	—	—	—	±200 pA
AI SENSE, AI SENSE 2 <sup>†</sup>	AI	100 GΩ in parallel with 100 pF	25/15	—	—	—	±200 pA
AI GND	—	—	—	—	—	—	—
AO 0	AO	0.1 Ω	Short-circuit to ground	5 at 10	5 at -10	20 V/μs	—
AO 1	AO	0.1 Ω	Short-circuit to ground	5 at 10	5 at -10	20 V/μs	—
AO EXT REF	AI	10 kΩ	25/15	—	—	—	—
AO 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
D GND	—	—	—	—	—	—	—
+5 V	—	0.1 $\Omega$	Short-circuit to ground	1 A	—	—	—
P0.<0..7>	DIO	—	$V_{CC} + 0.5$	13 at ( $V_{CC} - 0.4$ )	24 at 0.4	1.1	50 k $\Omega$ pu
AI HOLD COMP	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)	AI/DIO	10 k $\Omega$	$V_{CC} + 0.5/\pm 35$	3.5 at ( $V_{CC} - 0.4$ )	5 at 0.4	1.5	9 k $\Omega$ pu, 10 k $\Omega$ 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 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
CTR 0 OUT	DO	—	—	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
FREQ OUT	DO	—	—	3.5 at (V <sub>CC</sub> - 0.4)	5 at 0.4	1.5	50 kΩ pu
<p>* Indicates active low.                      † NI PCI/PXI-6071E only.                      AI = Analog Input      DIO = Digital Input/Output      pd = pull-down                      AO = Analog Output      DO = Digital Output      pu = pull-up                      AI/DIO = Analog Input/Digital Input/Output</p> <p><b>Note:</b> The tolerance on the 50 kΩ pull-up resistors is large. Actual value might range between 17 kΩ and 100 kΩ.</p>							

## Specifications

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

### Analog Input

#### Input Characteristics

Number of channels

NI 6070E .....	16 single-ended or 8 differential (software-selectable per channel)
NI 6071E .....	64 single-ended or 32 differential (software-selectable per channel)

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

Resolution..... 12 bits, 1 in 4,096

Maximum sampling rate..... 1.25 MS/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

Input coupling .....DC

Maximum working voltage (signal and common mode).....Each input should remain within ±11 V of ground

Overvoltage protection

Powered on .....±25 V

Powered off.....±15 V

Inputs protected

NI 6070E.....AI <0..15>, AI SENSE

NI 6071E.....AI <0..63>, AI SENSE, AI SENSE 2

FIFO buffer size	
NI DAQPad-6070E.....	2,048 samples (S)
NI PXI-6070E.....	512 S
NI PCI/PXI-6071E.....	512 S
NI PCI-MIO-16E-1.....	512 S
DMA (PCI and PXI only)	
Channels.....	3
Data sources/destinations.....	Analog input, analog output, counter/timer 0, or counter/timer 1
Data transfers	
NI DAQPad-6070E.....	Interrupts, programmed I/O
NI PXI-6070E.....	DMA, interrupts, programmed I/O
NI PCI/PXI-6071E.....	DMA, interrupts, programmed I/O
NI PCI-MIO-16E-1.....	DMA, interrupts, programmed I/O
DMA modes .....	Scatter-gather (single-transfer, demand-transfer)
Configuration memory size .....	512 words (1 word = 8 bits)

## Accuracy Information

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	0.0672	0.0714	6.38	6.10	0.846	0.0010	14.369	7.37	1.11
5	-5	0.0272	0.0314	3.20	3.05	0.423	0.0005	5.193	3.68	0.557
2.5	-2.5	0.0672	0.0714	1.61	1.53	0.211	0.0010	3.605	1.84	0.278
1	-1	0.0672	0.0714	0.653	0.610	0.085	0.0010	1.452	0.737	0.111
0.5	-0.5	0.0672	0.0714	0.335	0.305	0.042	0.0010	0.735	0.368	0.056
0.25	-0.25	0.0672	0.0714	0.176	0.208	0.024	0.0010	0.379	0.238	0.032
0.1	-0.1	0.0672	0.0714	0.081	0.098	0.011	0.0010	0.163	0.111	0.015
0.05	-0.05	0.0672	0.0714	0.049	0.071	0.007	0.0010	0.091	0.082	0.009
10	0	0.0272	0.0314	3.20	3.05	0.423	0.0005	6.765	3.68	0.557
5	0	0.0672	0.0714	1.61	1.53	0.211	0.0010	5.391	1.84	0.278
2	0	0.0672	0.0714	0.653	0.610	0.085	0.0010	2.167	0.737	0.111
1	0	0.0672	0.0714	0.335	0.305	0.042	0.0010	1.092	0.368	0.056
0.5	0	0.0672	0.0714	0.176	0.208	0.024	0.0010	0.558	0.238	0.032
0.2	0	0.0672	0.0714	0.081	0.098	0.011	0.0010	0.235	0.111	0.015
0.1	0	0.0672	0.0714	0.049	0.071	0.007	0.0010	0.127	0.082	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  $\pm 1$  °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) .....±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 .....±2.5 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 .....±2.5% 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
20 V	95 dB
10 V	100 dB
100 mV to 5 V	106 dB

## Dynamic Characteristics

### Bandwidth

Small signal (−3 dB) ..... 1.6 MHz  
Large signal (1% THD) ..... 1 MHz

Settling time to full-scale step

Device	Range	Accuracy*		
		±0.012% (±0.5 LSB)	±0.024% (±1 LSB)	±0.098% (±4 LSB)
NI 6070E	20 V	2 µS typ, 3 µS max	1.5 µS typ, 2 µS max	1.3 µS typ, 1.5 µS max
	10 V	2 µS typ, 3 µS max	1.5 µS typ, 2 µS max	0.9 µS typ, 1 µS max
	200 mV to 5 V	2 µS typ, 3 µS max	1.5 µS typ, 2 µS max	1 µS typ, 1.5 µS max
	100 mV	2 µS typ, 3 µS max	1.5 µS typ, 2 µS max	1.9 µS typ, 2 µS max
NI 6071E	20 V	3 µS typ, 5 µS max	1.9 µS typ, 2.5 µS max	1.2 µS typ, 1.5 µS max
	10 V	3 µS typ, 5 µS max	1.9 µS typ, 2.5 µS max	1.2 µS typ, 1.3 µS max
	200 mV to 5 V	3 µS typ, 5 µS max	1.9 µS typ, 2.5 µS max	1.2 µS typ, 1.5 µS max
	100 mV	3 µS typ, 5 µS max	1.9 µS typ, 2.5 µS max	1.3 µS typ, 1.5 µS max

\* 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<sub>rms</sub>, not including quantization)

Range	Dither Off	Dither On
1 to 20 V	0.25	0.5
500 mV	0.4	0.6
200 mV	0.5	0.7
100 mV	0.8	0.9

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 outputs  
 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
1 MS/s	950 kS/s	800 kS/s, system dependent	400 kS/s, system dependent

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

FIFO buffer size .....2,048 S

Data transfers.....DMA, interrupts,  
 programmed I/O

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



## 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	±5.93	0.0005	8.127
10	0	0.0177	0.0197	0.0219	±3.49	0.0005	5.685

**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.

### Transfer Characteristics

Relative accuracy, or integral nonlinearity (INL)	
After calibration .....	±0.3 LSB typ, ±0.5 LSB max
Before calibration .....	±4 LSB max
DNL	
After calibration .....	±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 external reference) .....	0 to 0.67% of output max, not adjustable

### Voltage Output

Ranges .....	±10 V, 0 to 10 V, ±AO EXT REF, 0 to AO EXT REF (software-selectable)
Output coupling .....	DC
Output impedance .....	0.1 Ω 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	
Powered on .....	±25 V
Powered off .....	±15 V
Input impedance .....	10 kΩ
Bandwidth (-3 dB) .....	1 MHz

### Dynamic Characteristics

Settling time for full-scale step .....	3 μs to ±0.5 LSB accuracy
Slew rate .....	20 V/μs
Noise .....	200 μV <sub>rms</sub> , DC to 1 MHz
Glitch energy (at mid-scale transition)	
Magnitude	
Reglitching disabled .....	±20 mV
Reglitching enabled .....	±4 mV
Duration .....	1.5 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 $\mu$ A
Input high current ( $V_{in} = 5$ V)	—	10 $\mu$ A
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

Transfer rate (1 word = 8 bits), maximum with NI-DAQ,  
system-dependent

NI DAQPad-6070E ..... 5 kwords/s

NI PXI-6070E..... 50 kwords/s

NI PCI/PXI-6071E ..... 50 kwords/s

NI PCI-MIO-16E-1 ..... 50 kwords/s

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 scaler ..... 4 bits

Compatibility ..... 5 V/TTL

Base clocks available

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

Frequency scaler ..... 10 MHz, 100 kHz

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

Max source frequency ..... 20 MHz

Min source pulse duration ..... 10 ns, edge-detect mode

Min gate pulse duration ..... 10 ns, edge-detect mode

Data transfers ..... DMA, interrupts,  
programmed I/O

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

## Triggers

### Analog Trigger

Source ..... All analog input channels,  
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 .....  $\pm$ Full-scale

External .....  $\pm 10$  V

Slope ..... Positive or negative  
(software-selectable)

Resolution ..... 8 bits, 1 in 256

Hysteresis ..... Programmable

Bandwidth (-3 dB)

Internal ..... 2 MHz

External ..... 7 MHz

External input (PFI 0/AI START TRIG)

Impedance ..... 10 k $\Omega$

Coupling ..... DC

Protection

When configured as  
a digital signal ..... -0.5 to  $V_{CC} + 0.5$  V

When configured as an analog  
trigger signal or disabled .....  $\pm 35$  V

Powered off .....  $\pm 35$  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>, RTSI <0..6>
Compatibility .....	5 V TTL
Response .....	Rising or falling edge
Pulse width .....	10 ns min

## RTSI Trigger

PCI .....	7
DAQPad .....	4

## PXI Trigger Bus (PXI Only)

Trigger lines .....	6
Star trigger .....	1

## Calibration

### Recommended warm-up time

NI DAQPad-6070E .....	30 minutes
NI PXI-6070E .....	15 minutes
NI PCI/PXI-6071E .....	15 minutes
NI PCI-MIO-16E-1 .....	15 minutes

Calibration interval.....1 year

### Onboard calibration reference

Level .....	5.000 V ( $\pm 3.5$ mV), over full operating temperature, actual value stored in EEPROM
Temperature coefficient .....	$\pm 5$ ppm/ $^{\circ}$ C max
Long-term stability .....	$\pm 15$ ppm/ $\sqrt{1,000}$ h

## Bus Interface

Type.....Master, slave

## Power

### Bus Requirement

PCI/PXI-6070E/6071E +5 VDC ( $\pm 5\%$ ) .....	1.1 A
DAQPad-6070E 9 to 25 VDC .....	17 W



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

### I/O Connector Power

Power available at I/O connector.... +4.65 to +5.25 VDC  
at 1 A

Discharge time with BP-1

battery pack DAQPad-6070E ..... 2.5 h

## Physical

Dimensions (not including connectors)

NI DAQPad-6070E .....	30.7 cm $\times$ 25.4 cm $\times$ 4.3 cm (12.1 in. $\times$ 10 in. $\times$ 1.7 in.)
NI PXI-6070E/6071E .....	16 cm $\times$ 10 cm (6.3 in. $\times$ 3.9 in.)
NI PCI-6071E, NI PCI-MIO-16E-1 .....	17.5 cm $\times$ 10.7 cm (6.9 in. $\times$ 4.2 in.)

### Weight

NI DAQPad-6070E .....	1955 g (4 lb 4.9 oz)
NI PXI-6070E .....	203 g (7.1 oz)
NI PCI-6071E/ NI PCI-MIO-16E-1 .....	115 g (4.1 oz)
NI PXI-6071E .....	214 g (7.5 oz)

### I/O connector

NI 6070E .....	68-pin male 0.050 D-type
NI 6071E .....	100-pin female 0.050 D-type

## Maximum Working Voltage

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

NI DAQPad-6070E

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

NI PXI-6070E, NI PCI/PXI-6071E, NI PCI-MIO-16E-1	
Channel-to-earth .....	11 V, Installation Category I
Channel-to-channel .....	11 V, Installation Category I

## Environmental

Operating temperature .....	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 PCI-6071E OEM

Maximum ambient temperature .....	50 °C for use in Class 1, Division 2 hazardous locations
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## Safety

### NI PCI-MIO-16E-1, PXI-6070E, PCI/PXI-6071E

These devices meet the requirements of the following standards of safety for electrical equipment for measurement, control, and laboratory use:

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



**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.

### NI DAQPad-6070E

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, 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](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
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 PXI-6070E/PCI-MIO-16E-1 Pinout

PFI 9	2	1	P0.7
PFI 8	4	3	P0.6
PFI 7	6	5	P0.5
PFI 6	8	7	P0.4
PFI 5	10	9	P0.3
PFI 4	12	11	P0.2
PFI 3	14	13	P0.1
PFI 2	16	15	P0.0
PFI 1	18	17	CTR 1 OUT
D GND	20	19	D GND
USER 2	22	21	USER 1
FREQ OUT	24	23	AI HOLD COMP
+5 V	26	25	EXT STROBE
+5 V	28	27	AI SENSE
D GND	30	29	AI GND

Figure 2. NI DAQPad-6070E BNC Pinout

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

Figure 3. NI 6071E Pinout

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