

# NI 6601/6602 Specifications

This document lists the specifications for the NI 6601/6602 family of devices. This family includes the following devices:

- NI PCI-6601
- NI PCI-6602
- NI PXI-6602

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

## Power

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Device requirement .....	5 VDC ( $\pm 5\%$ ) 6601 devices: 0.4 A to 0.75 A 6602 devices: 0.5 A to 1.5 A (with 1 m shielded cable as load); varies with application, does not include I/O power supplied through I/O connector
Available at I/O connector .....	4.65 to 5.25 VDC, 1 A

## I/O Characteristics

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Compatibility .....	TTL/CMOS
Power-on state .....	Input (high-Z) with weak pull-downs Pull-down current: 10 $\mu$ A (min) to 200 $\mu$ A (max)
Input impedance .....	25 k $\Omega$ to 500 k $\Omega$
Output impedance .....	75 $\Omega$ (56 $\Omega$ from an onboard resistor and 19 $\Omega$ from the TIO ASIC)
Hysteresis .....	300 mV Schmitt triggers

## Digital logic levels

Level	Min	Max
Input low voltage	-0.3 V	0.8 V
Input high voltage	2.0 V	Supply +0.3 V
Input low current ( $V_{in} = 0$ V)	—	-10 $\mu$ A
Input high current ( $V_{in} =$ Supply)	—	200 $\mu$ A
Output low voltage ( $I_{out} = 4$ mA)	—	0.4 V
Output high voltage ( $I_{out} = 4$ mA)	2.4 V	—

## Digital I/O

Number of channels .....32  
 Data transfers .....Static  
 Handshaking .....None

## Timing I/O

Number of channels  
     NI 6601 .....4 up/down counters  
     NI 6602 .....8 up/down counters  
 Resolution .....32 bits  
 Maximum count .....4,294,967,295  
 Rollover times  
     100 kHz timebase .....11.93 hours  
     20 MHz timebase .....214.74 s  
     80 MHz timebase .....53.69 s  
 Prescalers .....X8 or X2 prescaler for each counter  
 Base clocks available  
     6601 devices .....100 kHz and 20 MHz  
     6602 devices .....100 kHz, 20 MHz, and 80 MHz

Base clock accuracy	
NI PCI-6601/6602.....	75 ppm ( $\pm 0.005\%$ ) over temperature
NI PXI-6602 .....	200 ppm ( $\pm 0.005\%$ ) over temperature in a cPCI chassis; 75 ppm ( $\pm 0.005\%$ ) over temperature in a PXI chassis
Maximum source frequency <sup>1</sup>	
NI 6601 <sup>2</sup>	
Without prescaling.....	20 MHz
With prescaling .....	60 MHz
NI 6602	
Without prescaling.....	80 MHz
With prescaling.....	125 MHz
Minimum source pulse duration <sup>3</sup>	
Without prescaling.....	5 ns in edge-detection mode
With prescaling .....	3.5 ns in edge-detection mode
Minimum gate pulse duration ..... 5 ns in edge-detection mode	
Minimum pulse width	
NI 6601 .....	50 ns
NI 6602 .....	200 ns
Minimum edge separation (for two edge separation measurements) ..... 2/maximum timebase	
Data transfers	
NI 6601 .....	DMA (1 channel), interrupts
NI 6602 .....	DMA (up to 3 channels), interrupts
DMA modes..... Scatter-gather	

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<sup>1</sup> Refer to the *Counter Timing Signals* section of the *TIO Series Help*.

<sup>2</sup> Exceeding the maximum frequency specification on the PCI-6601 will cause the TIO device to overheat. This overheating can lead to incorrect operation and/or adversely affect the life of the device.

<sup>3</sup> Refer to the *Counter Timing Signals* section of the *TIO Series Help*.

## RTSI (PCI Only)

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Trigger lines ..... 7 (8 in the absence of RTSI clock)

Minimum pulse width for  
trigger and clock ..... 50 ns

## PXI Trigger Bus (PXI Only)

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Trigger lines ..... 6

Star trigger ..... 1

## Bus Interface

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All devices ..... Master, slave

## Physical

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### Dimensions

NI PCI-6601/6602 ..... 17.5 by 9.9 cm  
(6.9 by 3.9 in.)

NI PXI-6602 ..... 16.0 by 10.0 cm  
(6.3 by 3.9 in.)

I/O connector ..... 68-pin male, SCSI-II type

## Environment

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The NI 6601/6602 devices are intended for indoor use only.

## Operating Environment

Ambient temperature range ..... 0 to 50 °C (tested in accordance  
with IEC-60068-2-1 and  
IEC-60068-2-2)

Relative humidity range ..... 10% to 90%, noncondensing  
(tested in accordance with  
IEC-60068-2-56)

Altitude..... 2,000 m (at 25 °C ambient temperature)

Pollution Degree ..... 2

## Storage Environment

Ambient temperature range..... -20 to 70 °C (tested in accordance with IEC-60068-2-1 and IEC-60068-2-2)

Relative humidity range ..... 5% to 95%, noncondensing (tested in accordance with IEC-60068-2-56)

## Shock and Vibration (PXI Only)

Operational shock ..... 30 g peak, half-sine, 11 ms pulse (Tested in accordance with IEC-60068-2-27. Test profile developed in accordance with MIL-PRF-28800-F.)

Random vibration

Operating ..... 5 to 500 Hz, 0.3 g<sub>rms</sub>

Nonoperating ..... 5 to 500 Hz, 2.4 g<sub>rms</sub> (Tested in accordance with IEC-60068-2-64. Nonoperating test profile exceeds the requirements of MIL-PRF-28800-F, Class 3.)



**Note** Clean the device with a soft, non-metallic brush. Make sure that the device is completely dry and free from contaminants before returning it to service.

## Safety

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This product is designed to 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 3111-1, UL 61010B-1
- CAN/CSA C22.2 No. 1010.1



**Note** For UL and other safety certifications, refer to the product label, or visit [ni.com/hardref.nsf](http://ni.com/hardref.nsf), search by model number or product line, and click the appropriate link in the Certification column.

## Electromagnetic Compatibility

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Emissions .....	EN 55011 Class A at 10 m FCC Part 15A above 1 GHz
Immunity .....	EN 61326:1997 + A2:2001, Table 1
EMC/EMI .....	CE, C-Tick, and FCC Part 15 (Class A) compliant



**Note** For full EMC compliance, you *must* operate this device with shielded cabling.

## CE Compliance

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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/hardref.nsf](http://ni.com/hardref.nsf), search by model number or product line, and click the appropriate link in the Certification column.

