NI 660*x* Specifications

This document lists specifications for the NI 660*x* devices. These specifications are typical at 25 °C unless otherwise noted. Refer to the *NI 660x User Manual* for more information about the NI 660*x* devices.

Power

Power requirement	5 VDC (±5%)
NI 6601	0.4 A to 0.75 A
NI 6602	0.5 A to 1.5 A
NI 6608	1 A to 2.5 A (with 1 m shielded cable as load) varies with application and OCXO warm-up period, does not include I/O power supplied through I/O connector

+5 V power available at I/O connector (pin 1) ...... +4.65 V to +5.25 V; 1 A, maximum

I/O Characteristics

Compatibility	TTL/CMOS
Power-on state	Input (high-Z) with weak pull-downs
Pull-down current	10 µA min to 200 µA max
Input impedance	25 kΩ to 500 kΩ
Output impedance	75 Ω (56 Ω from an onboard resistor and 19 Ω 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_I = 0 V)	—	–10 µA
Input high current (V_I = 5 V) – 0.3 V	—	200 µA
Output low voltage (I_{OL} = 4 mA)	—	0.4 V
Output high voltage (I_{OH} = –4 mA)	2.4 V	—

Digital I/O

Number of channels	32
Data transfer	Static
Handshaking	None

Timing I/O

Number of channels

NI 6601	4 up/down counter/timers
NI 6602	8 up/down counter/timers
NI 6608	8 up/down counter/timers
Resolution	32 bits
Maximum count	4,294,967,295

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Rollover times

    100 kHz timebase.......................11.93 h

    20 MHz timebase ....214.74 s

    80 MHz timebase ....53.69 s

Prescalers...×8 or ×2 prescaler
for each counter

Base clocks available

    NI 6601 ....100 kHz and 20 MHz

    NI 6602 ....100 kHz, 20 MHz, and
80 MHz

    NI 6608 ....100 kHz, 20 MHz, and
80 MHz

Base clock accuracy

Device	Base Clock Accuracy
PCI-6601	100 ppm (±0.01%) over temperature
PCI-6602	100 ppm (±0.01%) over temperature

Device	Base Clock Accuracy	
	PXI Chassis	CompactPCI Chassis
PXI-6602	Base clock accuracy of PXI_CLK10	200 ppm (±0.02%) over temperature
PXI-6608	Base clock accuracy of PXI_CLK10[1]	200 ppm (±0.02%) over temperature

[1] 75 ppb in Slot 2. Refer to the *OCXO (NI 6608 Only)* section of this document for more information. For more information about the OCXO 10 MHz clock, refer to the *NI 660x User Manual*.

Maximum source frequency

    NI 6601

        Without prescaling ....20 MHz

        With prescaling.......................60 MHz

    NI 6602

        Without prescaling ....80 MHz

        With prescaling.......................125 MHz

    NI 6608

        Without prescaling ....80 MHz

        With prescaling.......................125 MHz

Minimum edge separation
(for two edge separation
measurement) ....2/maximum timebase

Data transfers

    NI 6601......................................DMA (1 channel),
interrupts

    NI 6602......................................DMA (up to 3 channels),
interrupts

    NI 6608......................................DMA (up to 3 channels),
interrupts

DMA modes.................................... Scatter-gather

OCXO (NI 6608 Only)

Frequency.. 10.000000 MHz

Warm-up time .... 5 minutes
(to within 20 ppb of operating frequency,
power-off duration < 1 hour)

Frequency stability versus
supply voltage change (±5%) .... ±5 ppb

Temperature stability
(0 °C to 50 °C) .... ±5 ppb, reference to 25 °C

Drift in frequency............................ ±0.45 ppb/day;
±45 ppb/year

Allowed frequency adjustment
(to correct for drift in frequency).... ±500 ppb, typical

RTSI Trigger Lines (PCI Only)

Trigger lines <0..6> 7

RTSI clock 1

Minimum pulse width for Z index on position measurement

    NI 6601...................................... 200 ns

    NI 6602...................................... 50 ns

PXI Trigger Bus (PXI Only)

Trigger lines <0..5> 6

Star trigger 1

Clock.. 1

Bus Interface

All devices .... Master, slave

Physical

Dimensions

    PCI.. 17.5 cm × 9.9 cm
    (6.9 in. × 3.9 in.)

    PXI.. 16.0 cm × 10.0 cm
    (6.3 in. × 3.9 in.)

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

Maximum Working Voltage

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

Channel-to-earth .... ±11 V,
Measurement Category I

Channel-to-channel......................... ±22 V,
Measurement Category I

⚠️ **Caution** Do not use this device for connection to
signals or for measurements within Categories II,
III, or IV. Refer to the *Read Me First: Safety and
Electromagnetic Compatibility* document for more
information about measurement categories.

Environment

The NI 660*x* devices are intended for indoor use only.

Maximum altitude........................... 2,000 meters (at 25 °C
ambient temperature)

Pollution Degree 2

Operating Environment

Ambient temperature range .... 0 °C to 55 °C
(Tested in accordance
with IEC-60068-2-1 and
IEC-60068-2-2.)

Relative humidity range.................. 0% to 90%,
noncondensing
(Tested in accordance
with IEC-60068-2-56.)

Storage Environment

Ambient temperature range .... –20 °C 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-28800F.)

Random vibration

    Operating ....5 Hz to 500 Hz, 0.3 grms
    Nonoperating ....5 Hz to 500 Hz, 2.4 grms
(Tested in accordance
with IEC-60068-2-64.
Nonoperating test profile
exceeds the requirements
of MIL-PRF-28800F,
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

This product meets 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, CSA 61010-1

📝 **Note** For UL and other safety certifications, refer
to the product label or the *Online Product
Certification* section.

Electromagnetic Compatibility

This product meets the requirements of the following EMC
standards for electrical equipment for measurement, control,
and laboratory use:

- EN 61326 (IEC 61326): Class A emissions; Basic
immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- AS/NZS CISPR 11: Group 1, Class A emissions
- FCC 47 CFR Part 15B: Class A emissions
- ICES-001: Class A emissions

📝 **Note** For the standards applied to assess the EMC
of this product, refer to the *Online Product
Certification* section.

📝 **Note** For EMC compliance, operate this device
with shielded cables.

CE Compliance ϵ

This product meets the essential requirements of applicable European Directives as follows:

- 2006/95/EC; Low-Voltage Directive (safety)
- 2004/108/EC; Electromagnetic Compatibility Directive (EMC)

Online Product Certification

Refer to the product Declaration of Conformity (DoC) for additional regulatory compliance information. To obtain product certifications and 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.

Environmental Management

NI is committed to designing and manufacturing products in an environmentally responsible manner. NI recognizes that eliminating certain hazardous substances from our products is beneficial to the environment and to NI customers.

For additional environmental information, refer to the *NI and the Environment* Web page at ni.com/environment. This page contains the environmental regulations and directives with which NI complies, as well as other environmental information not included in this document.

Waste Electrical and Electronic Equipment (WEEE)

EU Customers   At the end of the product life cycle, all products must be sent to a WEEE recycling center. For more information about WEEE recycling centers, National Instruments WEEE initiatives, and compliance with WEEE Directive 2002/96/EC on Waste Electrical and Electronic Equipment, visit ni.com/environment/weee.

电子信息产品污染控制管理办法 （中国 RoHS）

中国客户   National Instruments 符合中国电子信息产品中限制使用某些有害物质指令 (RoHS)。关于 National Instruments 中国 RoHS 合规性信息，请登录 ni.com/environment/rohs_china。(For information about China RoHS compliance, go to ni.com/environment/rohs_china.)

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

RG: Reserved if using an SH68-68-D1 shielded cable. Ground if using an R6868 ribbon cable.

Figure 1. NI 6601 Pinout

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

RG: Reserved if using an SH68-68-D1 shielded
cable. Ground if using an R6868 ribbon cable.

Figure 2. NI 6602/6608 Pinout

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