The following specifications are typical at 25 °C, unless otherwise noted. For more information about the NI USB-6003, refer to the *NI USB-6001/6002/6003 User Guide* available at [ni.com/manuals](http://ni.com/manuals).

## Analog Input

**Number of channels**
- Differential...........................................4
- Single-ended.........................................8

**ADC resolution**...........................................16-bit

**Maximum sample rate (aggregate)**..............100 kS/s

**Converter type**...........................................Successive approximation

**AI FIFO**..................................................2,047 samples

**Trigger sources**..........................................Software, PFI 0, PFI 1
Input range .................................................. ±10 V
Working voltage ................................. ±10 V

Overvoltage protection
  Powered-on ........................................ ±30 V
  Powered-off ...................................... ±20 V

Input impedance .................. >1 GΩ
Input bias current .................. ±200 pA

Absolute accuracy
  Typical at full scale .................. 6 mV
  Maximum over temperature, full scale 26 mV
  System noise ............................. 0.4 mVrms

DNL ................................................................. 16-bit, no missing codes
INL ............................................................... ±1.8 LSB
CMRR .......................................................... 56 dB (DC to 5 kHz)
Bandwidth .............................................. 300 kHz

**Analog Output**

Analog outputs ........................................ 2
DAC resolution ........................................ 16-bit
Output range ........................................... ±10 V

Maximum update rate .......................... 5 kS/s simultaneous per channel, hardware-timed

AO FIFO ...................................................... 2,047 samples
Trigger sources ................................. Software, PFI 0, PFI 1

Output current drive ...................... ±5 mA
Short circuit current ...................... ±11 mA
Slew rate ........................................... 3 V/μs
Output impedance ............................ 0.2 Ω
Absolute accuracy (no load)
   Typical at full scale.................................8.6 mV
   Maximum over temperature, full scale........32 mV

DNL......................................................................16-bit, no missing codes

INL......................................................................±4 LSB

Power-on state.......................................................0 V

Startup glitch......................................................-7 V for 10 µs

**Timebase**

**Note** The following specifications apply to the sampling accuracy for hardware-timed analog input and analog output.

Timebase frequency........................................80 MHz

Timebase accuracy..........................................±100 ppm

Timing resolution...........................................12.5 ns

**Digital I/O**

13 digital lines
   Port 0.........................................................8 lines
   Port 1..........................................................4 lines
   Port 2..........................................................1 lines

Function
   P0.<0..7>......................................................Static digital input/output
   P1.0..............................................................Static digital input/output
   P1.1/PFI 1......................................................Static digital input/output, counter source or digital trigger
P1.<2..3> Static digital input/output
P2.0/PFI 0 Static digital input/output, counter source or
digital trigger

Direction control Each channel individually programmable as
input or output

Output driver type Each channel individually programmable as
open collector or active drive

Absolute maximum voltage range -0.3 V to 5.5 V with respect to D GND
Pull-down resistor 47.5 kΩ to D GND
Power-on state Input

Digital Input

Input voltage range (powered on) 0 to 5 V
Input voltage range (powered off) 0 to 3.3 V
Input voltage protection ±20 V on two lines per port (maximum of five
lines for all ports) for up to 24 hours

Caution Do not leave a voltage above 3.3 V connected on any DIO line for
extended periods of time when the device is powered off. This may lead to long term
reliability issues.

Minimum \( V_{\text{IH}} \) 2.3 V
Maximum \( V_{\text{IL}} \) 0.8 V

Maximum input leakage current
At 3.3 V 0.8 mA
At 5 V 4.5 mA

Digital Output (Active Drive)

Maximum \( V_{\text{OL}} \) (4 mA) 0.7 V
Maximum \( V_{\text{OL}} \) (1 mA) 0.2 V
Minimum \( V_{\text{OH}} \) (4 mA) 2.1 V
Minimum \( V_{\text{OH}} \) (1 mA) 2.8 V
Maximum \( V_{\text{OH}} \) 3.6 V
Maximum output current per line ±4 mA
Digital Output (Open Collector)

Maximum $V_{OL}$ (4 mA) ......................... 0.8 V
Maximum $V_{OL}$ (1 mA) ......................... 0.2 V

**Note** Minimum $V_{OH}$ dependent on user-provided pull-up resistor and voltage source. Recommended pull-up resistor is 1 kΩ.

Using a 1 kΩ pull-up resistor and 5 V voltage source:

- Minimum $V_{OH}$ .................................. 3.5 V
- Typical $V_{OH}$ .................................. 4.5 V

Maximum output (sinking) current per line .... -4 mA

Maximum pull-up voltage .................. 5 V

Maximum leakage current
  - At 3.3 V .................................. 0.8 mA
  - At 5 V .................................. 4.5 mA

Counter

Number of counters .................. 1

Resolution ........................................ 32-bit

Counter measurements .................. Edge counting, rising or falling

Counter direction ........................ Count up

Counter source ........................ PFI 0 or PFI 1

Maximum input frequency .................. 5 MHz

Minimum high pulse width .................. 100 ns

Minimum low pulse width .................. 100 ns
+5 V Power Source

Output voltage.................................................+5 V, ±3%
Maximum current............................................150 mA
Overcurrent protection.........................200 mA
Short circuit current.................................50 mA
Overvoltage protection...............................±20 V

Bus Interface

USB specification.............................USB Full Speed
USB bus speed..........................12 Mb/s

Physical Characteristics

Dimensions
  Without screw terminal connector plugs....75.4 mm × 86.2 mm × 23.6 mm, (2.97 in. × 3.40 in. × 0.93 in.)
  With screw terminal connector plugs........93.2 mm × 86.2 mm × 23.6 mm, (3.67 in. × 3.40 in. × 0.93 in.)
Weight
  Without screw terminal connector plugs...83 g (2.93 oz)
  With screw terminal connector plugs........105 g (3.70 oz)

I/O connectors: USB Micro-B receptacle, (1)
  16-position screw terminal plugs
    Screw-terminal wiring..................................1.31 to 0.08 mm² (16 to 28 AWG)
    Torque for screw terminals.........................0.22 - 0.25 N ⋅ m (2.0 - 2.2 lb. ⋅ in.)

If you need to clean the module, wipe it with a dry towel.

Environmental

Temperature (IEC 60068-2-1 and IEC 60068-2-2)
  Operating.................................................0 to 45 °C
  Storage..................................................−40 to 85 °C

Humidity (IEC 60068-2-56)
  Operating.................................................5 to 95% RH, noncondensing
  Storage..................................................5 to 90% RH, noncondensing
Pollution Degree (IEC 60664)..........................2

Maximum altitude............................................2,000 m

Indoor use only.

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 sensitive electrical equipment for measurement, control, and laboratory use:

- EN 61326-1 (IEC 61326-1): Class A emissions; Basic immunity
- EN 55011 (CISPR 11): Group 1, Class A emissions
- EN 55022 (CISPR 22): Class A emissions
- EN 55024 (CISPR 24): Immunity
- AS/NZS CISPR 11: Group 1, Class A emissions
- AS/NZS CISPR 22: Class A emissions
- FCC 47 CFR Part 15B: Class A emissions
- ICES-001: Class A emissions

Note In the United States (per FCC 47 CFR), Class A equipment is intended for use in commercial, light-industrial, and heavy-industrial locations. In Europe, Canada, Australia, and New Zealand (per CISPR 11) Class A equipment is intended for use only in heavy-industrial locations.

Note Group 1 equipment (per CISPR 11) is any industrial, scientific, or medical equipment that does not intentionally generate radio frequency energy for the treatment of material or inspection/analysis purposes.

Note For EMC declarations and certifications, and additional information, refer to the Online Product Certification section.
CE Compliance

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

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 Minimize Our Environmental Impact 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)

This symbol indicates that waste products should be disposed of separately from municipal household waste according to WEEE Directive 2002/96/EC of the European Parliament and the Council on waste electrical and electronic equipment (WEEE). All products at the end of their life cycle must be sent to a WEEE collection and recycling center. Proper WEEE disposal reduces environmental impact and the risk to human health due to potentially hazardous substances used in such equipment. Your cooperation in proper WEEE disposal will contribute to the effective usage of natural resources. For information about the available collection and recycling scheme in a particular country, go to ni.com/environment/weee.

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