Low-Cost Multifunction DAQ for USB

NI USB-6008, NI USB-6009

- Small, portable multifunction data acquisition devices
- 12 or 14-bit input resolution, at up to 48 kS/s
- Built-in, removable connectors for easier and more cost-effective connectivity
- 2 true DAC analog outputs for accurate output signals
- 12 digital I/O lines (TTL/LVTTL/CMOS)
- 32-bit event counter
- Student kits available

Operating Systems
- Windows 2000/XP
- Mac OS X
- Linux

Recommended Software
- LabVIEW
- LabWindows/CVI

Measurement Services Software (included)
- NI-DAQmx Base
- Ready-to-Run Data Logger

NEW

Product	Bus	Analog Inputs[1]	Input Resolution (bits)	Max Sampling Rate (kS/s)	Input Range (V)	Analog Outputs	Output Resolution (bits)	Output Rate (Hz)	Output Range (V)	Digital I/O Lines	32-bit Counter	Trigger
USB-6009	USB	8 SE/4 DI	14	48	±1 to ±20	2	12	150	0 to 5	12	1	Digital
USB-6008	USB	8 SE/4 DI	12	10	±1 to ±20	2	12	150	0 to 5	12	1	Digital

[1] SE = single ended, DI = differential

Hardware Description

The National Instruments USB-6008 and USB-6009 multifunction data acquisition devices provide reliable data acquisition at a low price. With plug-and-play USB connectivity, these devices are simple enough for quick measurements, but versatile enough for more complex measurement applications.

Software Description

The NI USB-6008 and USB-6009 include a ready-to-run data logger application that acquires and logs up to eight channels of analog data. For more functionality, NI-DAQmx Base software is a multiplatform driver with a subset of the NI-DAQmx programming interface. Use it to develop customized DAQ applications with NI LabVIEW or C-based development environments.

Recommended Accessories

The USB-6008 and USB-6009 have built-in connectivity, so no additional accessories are required.

Common Applications

The USB-6008 and USB-6009 are ideal for a number of applications where economy, small size, and simplicity are essential, such as:

- Data logging – Log environmental or voltage data quickly and easily
- Academic lab use – The low price facilitates student ownership of DAQ hardware for completely interactive lab-based courses. Academic pricing available. Visit **ni.com/academic** for details.
- Embedded OEM applications

Information for Student Ownership

To supplement simulation, measurement, and automation theory courses with practical experiments, NI has developed the USB-6008 and USB-6009 student kits that include LabVIEW Student Edition and a ready-to-run data logger application. These kits are exclusively for students, giving them a powerful, low-cost hands-on learning tool. Visit **ni.com/academic** for more details.

Information for OEM Customers

For information on special configurations and pricing, please visit **ni.com/oem**.

Ordering Information

NI USB-6008[1] 779051-01
NI USB-6009[1] 779026-01
NI USB-6008 Student-kit[1,2] 779320-22
NI USB-6009 Student-kit[1,2] 779321-22
[1] Includes NI-DAQmx Base Software, NI-Ready-to-Run Data Logger Software, and a USB cable.
[2] Includes LabVIEW Student Edition

NATIONAL INSTRUMENTS

Low-Cost Multifunction DAQ for USB

Specifications

Typical at 25 °C unless otherwise noted.

Analog Input

Absolute accuracy, single-ended

Range	Typical at 25 °C (mV)	Maximum (0 to 55 °C) (mV)
±10	14.7	138

Absolute accuracy at full scale, differential[1]

Range	Typical at 25 °C (mV)	Maximum (0 to 55 °C) (mV)
±20	14.7	138
±10	7.73	84.8
±5	4.28	58.4
±4	3.59	53.1
±2.5	2.56	45.1
±2	2.21	42.5
±1.25	1.70	38.9
±1	1.53	37.5

[1] Input voltages may not exceed the working voltage range

Number of channels .... 8 single-ended / 4 differential
Type of ADC .... Successive approximation

ADC resolution (bits)

Device	Differential	Single-Ended
USB-6008	12	11
USB-6009	14	13

Maximum sampling rate (system dependent)

Device	Maximum Sampling Rate (kS/s)
USB-6008	10
USB-6009	48

Input range, single-ended .... ±10 V
Input range, differential .... ±20, ±10, ±5, ±4, ±2.5, ±2, ±1.25, ±1 V
Maximum working voltage .... ±10 V
Overvoltage protection................................... ±35 V
FIFO buffer size .... 512 B
Timing resolution.. 41.67 ns (24 MHz timebase)
Timing accuracy.. 100 ppm of actual sample rate
Input Impedance... 144 kΩ
Trigger source .... Software or external digital trigger
System noise .... 0.3 LSB$_{rms}$ (±10 V range)

Analog Output

Absolute accuracy (no load)............................ 7 mV typical, 36.4 mV maximum at full scale
Number of channels.. 2
Type of DAC.. Successive approximation
DAC resolution .... 12 bits
Maximum update rate...................................... 150 Hz, software-timed
Output range .... 0 to +5 V
Output impedance .... 50 Ω
Output current drive .... 5 mA
Power-on state .... 0 V
Slew rate .... 1 V/μs
Short-circuit current .... 50 mA

Digital I/O

Number of channels .... 12 total
8 (P0.<0..7>)
4 (P1.<0..3>)
Direction control.. Each channel individually programmable as input or output
Output driver type
USB-6008 .... Open-drain
USB-6009 .... Each channel individually programmable as push-pull or open-drain.
Compatibility .... CMOS, TTL, LVTTL
Internal pull-up resistor.................................. 4.7 kΩ to +5 V
Power-on state .... Input (high impedance)
Absolute maximum voltage range .... -0.5 to +5.8 V

Digital logic levels

Level	Min	Max	Units
Input low voltage	-0.3	0.8	V
Input high voltage	2.0	5.8	V
Input leakage current	–	50	μA
Output low voltage (I = 8.5 mA)	–	0.8	V
Output high voltage (Push-pull, I = -8.5 mA)	2.0	3.5	V
Output high voltage (Open-drain, I = -0.6 mA, nominal)	2.0	5.0	V
Output high voltage (Open-drain, I = -8.5 mA, with external pull-up resistor)	2.0	–	V

Counter

Number of counters 1
Resolution.. 32 bits
Counter measurements .... Edge counting (falling edge)
Pull-up Resistor .... 4.7 kΩ to 5 V
Maximum input frequency .... 5 MHz
Minimum high pulse width .... 100 ns
Minimum low pulse width .... 100 ns
Input high voltage .... 2.0 V
Input low voltage .... 0.8 V

Power Available at I/O Connector

+5 V output (200 mA maximum) .... +5 V typical
+4.85 V minimum
+2.5 V output (1 mA maximum) .... +2.5 V typical
+2.5 V output accuracy.................................... 0.25 % max
Voltage reference temperature drift................ 50 ppm/°C max

Physical Characteristics

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

Dimensions (without connectors) .... 6.35 by 8.51 by 2.31 cm
(2.50 by 3.35 by 0.91 in.)
Dimensions (with connectors)......................... 8.18 by 8.51 by 2.31 cm
(3.22 by 3.35 by 0.91 in.)
Weight (without connectors) .... 59 g (2.1 oz.)
Weight (with connectors)................................ 84 g (3 oz.)
I/O Connectors .... USB series B receptacle
(2) 16-position (screw-terminal) plug headers
Screw-terminal wiring .... 16 to 28 AWG
Screw-terminal torque .... 0.22 to 0.25 N•m
(2.0 to 2.2 lb•in.)