

Low-Cost Multifunction DAQ for USB

NI USB-6008, NI USB-6009

- Small and portable
- 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
- OEM versions available

Operating Systems

- Windows 2000/XP
- Mac OS X¹
- Linux[®]1
- Pocket PC
- Win CE

Recommended Software

- LabVIEW
- LabWindows/CVI

Measurement Services Software (included)

- NI-DAQmx
- Ready-to-run data logger

¹Mac OS X and Linux users need to download NI-DAQmx Base.



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/A DI	14	48	±1 to ±20	2	12	150	0 to 5	12	1	Digital
USB-6008	USB	8 SE/A DI	12	10	±1 to ±20	2	12	150	0 to 5	12	1	Digital

¹SE = single ended, DI = differential

Hardware Description

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

Software Description

The NI USB-6008 and USB-6009 use NI-DAQmx high-performance, multithreaded driver software for interactive configuration and data acquisition on Windows OSs. All NI data acquisition devices shipped with NI-DAQmx also include VI Logger Lite, a configuration-based data-logging software package.

Mac OS X and Linux users can download NI-DAQmx Base, a multiplatform driver with a limited NI-DAQmx programming interface. You can use NI-DAQmx Base to develop customized data acquisition applications with National Instruments LabVIEW or C-based development environments. NI-DAQmx Base includes a ready-to-run data logger application that acquires and logs up to eight channels of analog data.

PDA users can download NI-DAQmx Base for Pocket PC and Win CE to develop customized handheld data acquisition applications.

Recommended Accessories

The USB-6008 and USB-6009 have removable screw terminals for easy signal connectivity. For extra flexibility when handling multiple wiring configurations, NI offers the USB-6008/09 Accessory Kit, which includes two extra sets of screw terminals, extra labels, and a screwdriver.

In addition, the USB-6008/09 Prototyping Accessory provides space for adding more circuitry to the inputs of the USB-6008 or USB-6009.

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.



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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, differential¹

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	2.96	45.1
±2	2.21	42.5
±1.25	1.70	38.9
±1	1.53	37.5

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

ADC resolution (bits)

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

Maximum sampling rate (system dependent)

Module	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 k
 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