DEVICE SPECIFICATIONS

NI myDAQ

Student Data Acquisition Device

Definitions

Warranted specifications describe the performance of a model under stated operating conditions and are covered by the model warranty.

The following characteristic specifications describe values that are relevant to the use of the model under stated operating conditions but are not covered by the model warranty.

- *Typical* specifications describe the performance met by a majority of models.
- *Nominal* specifications describe an attribute that is based on design, conformance testing, or supplemental testing.

Specifications are *Typical* unless otherwise noted.

Conditions

Specifications are valid at 25 °C unless otherwise noted.

Analog Input

Number of channels	2 differential or 1 stereo audio input
ADC resolution	16 bits
Maximum sampling rate	200 kS/s
Timing accuracy	100 ppm of sample rate
Timing resolution	10 ns
Range	
Analog input	±10 V, ±2 V, DC-coupled
Audio input	±2 V, AC-coupled

Passband (-3 dB)	
Analog input	DC to 400 kHz
Audio input	1.5 Hz to 400 kHz
Connector type	
Analog input	Screw terminals
Audio input	3.5 mm stereo jack
Input type (audio input)	Line-in or microphone
Microphone excitation (audio input)	5.25 V through 10 kΩ

Table 1. Absolute accuracy

Nominal Range		Typical at 23 °C (mV)	Maximum (18 to 28 °C) (mV)
Positive Full Scale	Negative Full Scale		
10	-10	22.8	38.9
2	-2	4.9	8.6

Figure 1. Settling Time (10 V Range) versus Different Source Impedance

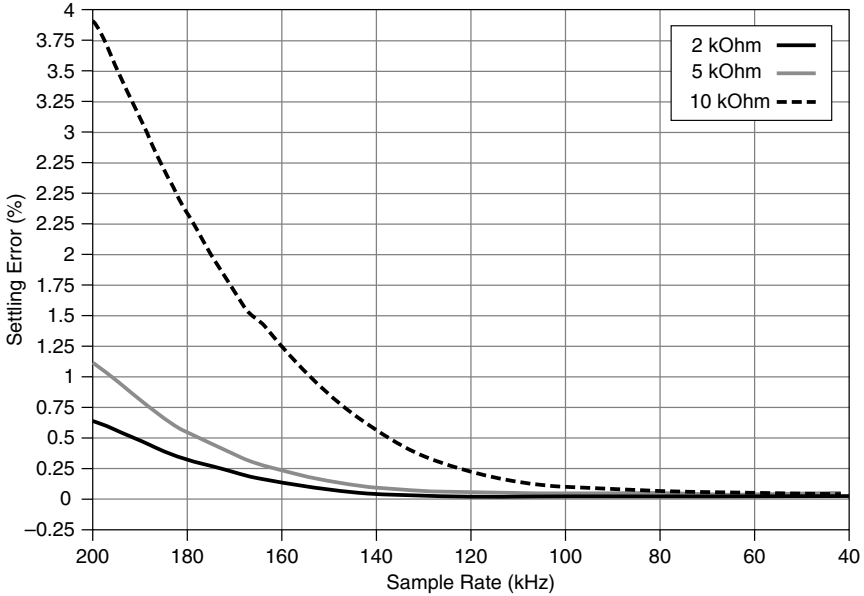
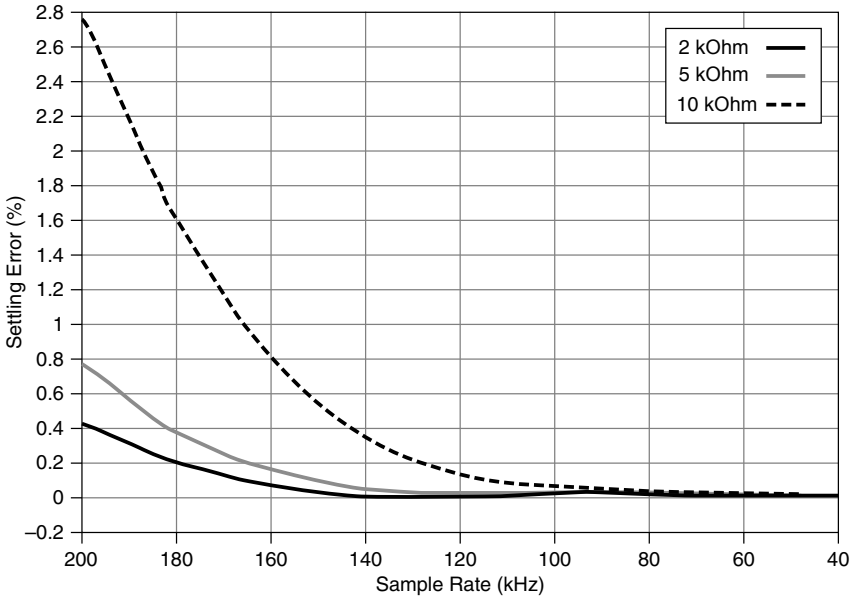


Figure 2. Settling Time (2 V Range) versus Different Source Impedance



Input FIFO size	4,095 samples, shared among channels used
Maximum working voltage for analog inputs (signal + common mode)	±10.5 V to AGND
Common-mode rejection ratio (CMRR) (DC to 60 Hz)	70 dB
Input impedance	
Device on	
AI+ or AI- to AGND	>10 GΩ || 100 pF
AI+ to AI-	>10 GΩ || 100 pF
Device off	
AI+ or AI- to AGND	5 kΩ
AI+ to AI-	10 kΩ
Anti-aliasing filter	None
Overvoltage protection	
AI+ or AI- to AGND	±16 V
Audio input left and right	None

Analog Output

Number of channels	2 ground-referenced or 1 stereo audio output
DAC resolution	16 bits
Maximum update rate	200 kS/s
Range[1]	
Analog output	±10 V, ±2 V, DC-coupled
Audio output	±2 V, AC-coupled

Note Creating a task on an AO channel will set the range for both channels. If a task that was previously running is stopped and a new task is created using the second AO channel, the output on the original channel will scale based on the range of the new task.

Maximum output current (analog output)[2]	2 mA
Output impedance	
Analog output	1 Ω
Audio output	120 Ω
Minimum load impedance (audio output)	8 Ω
Connector type	
Analog output	Screw terminals
Audio output	3.5 mm stereo jack
AC-coupling high-pass frequency (audio output with 32 Ω load)	48 Hz

[1] When outputting from AO 0 and AO 1 concurrently, you must set a common voltage range for both channels.

[2] The total power available for the power supplies, analog outputs, and digital outputs is limited to 500 mW (typical)/100 mW (minimum).

Table 2. Absolute accuracy

Nominal Range		Typical at 23 °C (mV)	Maximum (18 to 28 °C) (mV)
Positive Full Scale	Negative Full Scale		
10	-10	19.6	42.8
2	-2	5.4	8.8

Slew rate	4 V/µs
Timing accuracy	100 ppm of sample rate
Timing resolution	10 ns
Overdrive protection	±16 V to AGND
Maximum power-on voltage[3]	±110 mV
Output FIFO size	8,191 samples, shared among channels used

Related Information

Calculating Power Consumption on page 11

Digital I/O

Number of lines	8; DIO <0..7>
Direction control	Each line individually programmable as input or output
Update mode	Software-timed
Pull-down resistor	75 kΩ
Logic level	5 V compatible LVTTL input; 3.3 V LVTTL output
V_{IH} min	2.0 V

[3] When powered on, the analog output signal is not defined until after USB configuration is complete.

V_{IL} max	0.8 V
Maximum output current per line[4]	4 mA

Related Information

Calculating Power Consumption on page 11

General Purpose Counter/Timer

Number of counter/timers	1
Resolution	32 bits
Internal base clocks	100 MHz
Base clock accuracy	100 ppm
Maximum counting and pulse generation update rate	1 MS/s
Default routing	
CTR 0 SOURCE	PFI 0 routed through DIO 0
CTR 0 GATE	PFI 1 routed through DIO 1
CTR 0 AUX	PFI 2 routed through DIO 2
CTR 0 OUT	PFI 3 routed through DIO 3
FREQ OUT	PFI 4 routed through DIO 4
Data transfers	Programmed I/O
Update mode	Software-timed

Digital Multimeter

Functions[5]	DC voltage, AC voltage, DC current, AC current, resistance, diode, continuity
Isolation level	60 VDC/20 V_{rms}, Measurement Category I

[4] The total power available for the power supplies, analog outputs, and digital outputs is limited to 500 mW (typical)/100 mW (minimum).

[5] All AC specifications are based on sine wave RMS.

Caution Do not connect the system to signals or use for measurements within Measurement Categories II, III, or IV.

Connectivity	Banana jacks
Resolution	3.5 digits
Input coupling	DC (DC Voltage, DC Current, Resistance, Diode, Continuity); AC (AC Voltage, AC Current)

Related Information

Safety Voltages on page 12

Voltage Measurement

DC ranges	200 mV, 2 V, 20 V, 60 V
AC ranges	200 mV_{rms}, 2 V_{rms}, 20 V_{rms}

Note All AC voltage accuracy specifications apply to signal amplitudes greater than 5% of range.

Table 3. Accuracy, DC Voltage Function

Range	Resolution	Accuracy
		± ([% of Reading] + Offset)
200.0 mV	0.1 mV	0.5% + 0.2 mV
2.000 V	0.001 V	0.5% + 2 mV
20.00 V	0.01 V	0.5% + 20 mV
60.0 V	0.1 V	0.5% + 200 mV

Table 4. Accuracy, AC Voltage Function

Range	Resolution	Accuracy	
		± ([% of Reading] + Offset)	
		40 to 400 Hz	400 to 2,000 Hz
200.0 mV	0.1 mV	1.4% + 0.6 mV[6]	-
2.000 V	0.001 V	1.4% + 0.005 V	5.4% + 0.005 V
20.00 V	0.01 V	1.5% + 0.05 V	5.5% + 0.05 V

Input impedance	10 MΩ

Current Measurement

DC ranges	20 mA, 200 mA, 1 A
AC ranges	20 mA_{rms}, 200 mA_{rms}, 1 A_{rms}

Note All AC accuracy specifications within 20 mA and 200 mA ranges apply to signal amplitudes greater than 5% of range. All AC accuracy specifications within the 1 A range apply to signal amplitudes greater than 10% of range.

Table 5. Accuracy, DC Current Function

Range	Resolution	Accuracy
		± ([% of Reading] + Offset)
20.00 mA	0.01 mA	0.5% + 0.03 mA
200.0 mA	0.1 mA	0.5% + 0.3 mA
1.000 A	0.001 A	0.5% + 3 mA

[6] The accuracy for AC Volts 200.0 mV range is in the frequency range of 40 Hz to 100 Hz. For example, for a 10 V using the DC Volts function in the 20.00 V range, calculate the accuracy using the following equation: 10 V × 0.5% + 20 mV = 0.07 V

Table 6. Accuracy, AC Current Function

Range	Resolution	Accuracy	
		± ([% of Reading] + Offset)	
		40 to 400 Hz	400 to 2,000 Hz
20.00 mA	0.01 mA	1.4% + 0.06 mA	5% + 0.06 mA
200.0 mA	0.1 mA	1.5% + 0.8 mA	5% + 0.8 mA
1.000 A	0.001 A	1.6% + 6 mA	5% + 6 mA

Input protection — Internal ceramic fuse, 1.25 A 250 V, fast-acting, 5 × 20 mm, F 1.25A H 250V (Littelfuse part number 02161.25)

Resistance Measurement

Ranges — 200 Ω, 2 kΩ, 20 kΩ, 200 kΩ, 2 MΩ, 20 MΩ

Table 7. Accuracy, Resistance (Ω) Function

Range	Resolution	Accuracy
		± ([% of Reading] + Offset)
200.0 Ω	0.1 Ω	0.8% + 0.3 Ω[7]
2.000 kΩ	0.001 kΩ	0.8% + 3 Ω
20.00 kΩ	0.01 kΩ	0.8% + 30 Ω
200.0 kΩ	0.1 kΩ	0.8% + 300 Ω
2.000 MΩ	0.001 MΩ	0.8% + 3 kΩ
20.00 MΩ	0.01 MΩ	1.5% + 50 kΩ

Diode Measurement

Range — 2 V

[7] Exclusive of lead wire resistance

Power Supplies

Caution Do not mix power from NI myDAQ with power from external power sources. When using external power, remove any connections to the power supply terminals on NI myDAQ.

Related Information

Calculating Power Consumption on page 11

+15V Supply

Output voltage	
Typical (no load)	15.0 V
Maximum voltage (no load)	15.3 V
Minimum voltage (full load)	14.0
Maximum output current[8]	32 mA
Maximum load capacitance	470 µF

-15V Supply

Output voltage	
Typical (no load)	-15.0 V
Maximum voltage (no load)	-15.3 V
Minimum voltage (full load)	-14.0
Maximum output current[9]	32 mA
Maximum load capacitance	470 µF

+5V Supply

Output voltage	
Typical (no load)	4.9 V
Maximum voltage (no load)	5.2 V
Minimum voltage (full load)	4.0

[8] The total power available for the power supplies, analog outputs, and digital outputs is limited to 500 mW (typical)/100 mW (minimum).

[9] The total power available for the power supplies, analog outputs, and digital outputs is limited to 500 mW (typical)/100 mW (minimum).

Maximum output current[10]	100 mA
Maximum load capacitance	33 µF

Calculating Power Consumption

The total power available for the power supplies, analog outputs, and digital outputs is limited to 500 mW (typical)/100 mW (minimum). To calculate the total power consumption of the power supplies, multiply the output voltage by the load current for each voltage rail and sum them together. For digital output power consumption, multiply 3.3 V by the load current. For analog output power consumption, multiply 15 V by the load current. Using audio output subtracts 100 mW from the total power budget.

If you use 50 mA on +5 V, 2 mA on +15 V, 1 mA on -15 V, use four DIO lines to drive LEDs at 3 mA each, and have a 1 mA load on each AO channel, the *total output power consumption* is 364.6 mW

5 V × 50 mA = 250 mW

|+15 V| × 2 mA = 30 mW

|-15 V| × 1 mA = 15 mW

3.3 V × 3 mA x 4 = 39.6 mW

15 V × 1 mA x 2 = 30 mW

Total output power consumption = 250 mW + 30 mW + 15 mW + 39.6 mW + 30 mW = 364.6 mW

Related Information

Analog Output on page 4

Digital I/O on page 5

Power Supplies on page 10

Communication

Bus interface	USB 2.0 Hi-Speed

[10] The total power available for the power supplies, analog outputs, and digital outputs is limited to 500 mW (typical)/100 mW (minimum).

Physical Characteristics

Clean the hardware with a soft, nonmetallic brush. Make sure that the hardware is completely dry and free from contaminants before returning it to service.

Dimensions (without screw terminal connector)	
NI myDAQ device part number 195509D-01L and earlier	14.6 cm × 8.7 cm × 2.2 cm (5.75 in. × 3.43 in. × 0.87 in.)
NI myDAQ device part number 195509E-01L and later	13.6 cm × 8.8 cm × 2.4 cm (5.36 in. × 3.48 in. × 0.95 in.)
Weight	
NI myDAQ device part number 195509D-01L and earlier	175.0 g (6.1 oz)
NI myDAQ device part number 195509E-01L and later	164.0 g (5.8 oz)

Note NI myDAQ device part number (P/N: 195509x-01L) is located on the product label on the bottom of the device.

Screw-terminal wiring	16 to 26 AWG
Torque for screw terminals	0.22-0.25 N · m (2.0-2.2 lb · in.)

Environmental

Temperature (IEC 60068-2-1 and IEC 60068-2-2)	
Operating	0 to 45 °C
Storage	-20 to 70 °C
Humidity (IEC 60068-2-56)	
Operating	10 to 90% RH, noncondensing
Storage	10 to 90% RH, noncondensing
Pollution Degree (IEC 60664)	2
Maximum altitude	2,000 m (at 25 °C ambient temperature)

Indoor use only.

Safety Voltages

Measurement Category I is for measurements performed on circuits not directly connected to the electrical distribution system referred to as MAINS voltage. MAINS is a hazardous live

electrical supply system that powers equipment. This category is for measurements of voltages from specially protected secondary circuits. Such voltage measurements include signal levels, special equipment, limited-energy parts of equipment, circuits powered by regulated low-voltage sources, and electronics.

Caution Do not connect the system to signals or use for measurements within Measurement Categories II, III, or IV.

Note Measurement Categories CAT I and CAT O (Other) are equivalent. These test and measurement circuits are not intended for direct connection to the MAINs building installations of Measurement Categories CAT II, CAT III, or CAT IV.

Related Information

Digital Multimeter on page 6

Safety

This product is designed to meet the requirements of the following electrical equipment safety standards for measurement, control, and laboratory use:

- IEC 61010-1, EN 61010-1
- UL 61010-1, CSA C22.2 No. 61010-1

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

Hazardous Locations

This device is not certified for use in hazardous locations.

Electromagnetic Compatibility

This product meets the requirements of the following EMC standards for 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 CE

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

- 2014/35/EU; Low-Voltage Directive (safety)
- 2014/30/EU; 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 *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)

EU Customers 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*.

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`.)

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