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CSM-10A

NI PCMCIA-4050 Specifications

Portable 5½-Digit Multimeter

このドキュメントには、日本語ページも含まれています。

This document lists the specifications of the NI PCMCIA-4050. These specifications are guaranteed between 15 °C and 35 °C unless otherwise specified.

Electromagnetic Compatibility Guidelines

This product was tested and complies with the regulatory requirements and limits for electromagnetic compatibility (EMC) as stated in the product specifications. These requirements and limits are designed to provide reasonable protection against harmful interference when the product is operated in its intended operational electromagnetic environment. There is no guarantee that interference will not occur in a particular installation. To minimize the potential for the product to cause interference to radio and television reception or to experience unacceptable performance degradation, install and use this product in strict accordance with the instructions in the product documentation.

The following statements contain important information needed before installing and using this product:



Caution This product is intended for use in industrial locations. As a result, this product may cause interference if used in residential areas. Such use must be avoided unless the user takes special measures to reduce electromagnetic emissions to prevent interference to the reception of radio and television broadcasts.



Caution This product may become more sensitive to electromagnetic disturbances in the operational environment when test leads are attached or when connected to a test object.



Caution Emissions that exceed the regulatory requirements may occur when this product is connected to a test object.



Caution Changes or modifications not expressly approved by National Instruments could void the user's authority to operate the hardware under the local regulatory rules.

DC Voltage

Accuracy \pm (% of Reading + Offset)

Range	24 Hour (25 °C \pm 1 °C)	90 Day (25 °C \pm 10 °C)	1 Year (25 °C \pm 10 °C)	Tempco/°C
20 mV	0.0029% + 27 μ V	0.014% + 250 μ V	0.017% + 250 μ V	0.0009% + 25 μ V
200 mV	0.0029% + 27 μ V	0.014% + 250 μ V	0.017% + 250 μ V	0.0009% + 25 μ V
2 V	0.0029% + 37 μ V	0.014% + 260 μ V	0.017% + 260 μ V	0.0009% + 25 μ V
25 V	0.0032% + 4.9 mV	0.021% + 49 mV	0.024% + 49 mV	0.0017% + 4.8 mV
250 V	0.0032% + 4.9 mV	0.021% + 49 mV	0.024% + 49 mV	0.0017% + 4.8 mV

Noise Rejection

NMRR (10 Hz reading rate, 50/60 Hz powerline frequency $\pm 1\%$).....	80 dB
DC ECMRR	140 dB (with a 1 k Ω imbalance in LO lead)
AC ECMR (RDC to 60 Hz)	150 dB (with a 1 k Ω imbalance in LO lead)

Input Characteristics

Input bias current	1 nA max
Input resistance	>1 G Ω (2 V, 200 mV, 20 mV ranges); 1 M Ω (250 V, 25 V)

DC Current with CSM-200mA or CSM-10A Current Shunt

DC current measurements require the use of an external current shunt.

Accuracy \pm (% of Reading + Offset)

Shunt	Recommended NI 4050 DCV Range	Equivalent Current Range	1 Year (25 °C \pm 10 °C)	Tempco /°C
CSM-200mA	20 mV	20 mA	0.15% + 250 μ A	0.035% + 25 μ A
CSM-200mA	200 mV	200 mA	0.15% + 250 μ A	0.035% + 25 μ A
CSM-10A	200 mV	10 A*	0.5% + 26 mA	0.007% + 2.5 mA

Note: Accuracy numbers require a null offset
* The current through the shunt must not exceed 10 A even when half of the voltage range is used.

Input Characteristics

Using CSM-200 mA shunt

Input protection.....	Fuse F 500 mA 250 V Fast-Acting
Shunt resistor	1 Ω
Burden voltage	<400 mV at 200 mA

Using CSM-10 A shunt

Input protection.....	Fuse F 12.5 A 250 V Fast-Acting
Shunt resistor	10 m Ω
Burden voltage	<400 mV at 10 A

AC Voltage

Accuracy \pm (% of Reading + Offset)

Range	24 Hour (25 °C \pm 1 °C)	90 Day (25 °C \pm 10 °C)	1 Year (25 °C \pm 10 °C)	Tempco /°C
20 mV	0.4% + 100 μ V	0.42% + 170 μ V	0.42% + 170 μ V	0.019% + 12 μ V
200 mV	0.3% + 0.22 mV	0.32% + 1.20 mV	0.32% + 1.20 mV	0.007% + 0.11 mV
2 V	0.4% + 3 mV	0.42% + 21 mV	0.42% + 21 mV	0.019% + 2 mV

Range	24 Hour (25 °C ± 1 °C)	90 Day (25 °C ± 10 °C)	1 Year (25 °C ± 10 °C)	Tempco /°C
25 V	0.3% + 30 mV	0.32% + 210 mV	0.32% + 210 mV	0.007% + 20 mV
250 V	0.6% + 500 mV	0.62% + 680 mV	0.62% + 680 mV	0.007% + 20 mV

Note: Accuracy numbers are valid for sine waves ≥10% of the input range and may be affected by source impedance, cable capacitances dielectric absorption, or slew rate.

Noise Rejection

AC CMRR (DC to 60 Hz)>80 dB (with a 1 kΩ imbalance in LO lead)

Input Characteristics

Input resistance 1 MΩ all ranges

Bandwidth 20 Hz to 25 kHz

Additional AC Errors

Frequency-dependent errors

Input Frequency	Additional Error (% of Reading)
20 Hz to 50 Hz	2.5%
50 Hz to 100 Hz	1%
100 Hz to 5 kHz	0%
5 kHz to 10 kHz	1%
10 kHz to 25 kHz*	2.5%

* For the 20 mV range, add 0.5% for every 1 kHz above 16 kHz.

AC Current with a CSM-200mA or CSM-10A Current Shunt

AC current measurements require the use of an external current shunt.

Accuracy ±(% of reading + Offset)

Shunt	Recommended NI 4050 ACV Range	Equivalent Current Range	1 Year (25 °C ± 10 °C)	Tempco/°C
CSM-200mA	20 mV	20 mA	0.43% + 170 μA	0.019% + 0.012 mA
CSM-200mA	200 mV	200 mA	0.47% + 1.2 mA	0.007% + 0.11 mA
CAM-10A	200 mV	10 A*	0.60% + 120 mA	0.026% + 11 mA

Note: Accuracy numbers require a null offset. Refer to the *Additional AC Errors* section for frequency-dependent errors.
* The current through the shunt must not exceed 10 A, even when half of the voltage range is used.

Input Characteristics

Using CSM-200 mA shunt

Input protection.....Fuse F 500 mA 250 V Fast-Acting

Shunt resistor1 Ω

Burden voltage.....<400 mV at 200 mA

Using CSM-10 A shunt

Input protection.....Fuse F 12.5 A 250 V Fast-Acting

Shunt resistor10 m Ω

Burden voltage.....<400 mV at 10 A

Resistance

Accuracy \pm (% of Reading + Offset)

Range	24 Hour (25 °C \pm 1 °C)	90 Day (25 °C \pm 10 °C)	1 Year (25 °C \pm 10 °C)	Tempco/°C
200 Ω	0.006% + 0.4 Ω	0.024% + 4 Ω	0.027% + 4 Ω	0.0020% + 0.40 Ω
2 k Ω	0.006% + 0.4 Ω	0.024% + 4 Ω	0.027% + 4 Ω	0.0020% + 0.40 Ω
20 k Ω	0.006% + 0.5 Ω	0.024% + 4 Ω	0.027% + 4 Ω	0.0020% + 0.40 Ω
200 k Ω	0.012% + 37 Ω	0.077% + 350 Ω	0.080% + 350 Ω	0.0072% + 35 Ω
2 M Ω	0.012% + 55 Ω	0.077% + 370 Ω	0.080% + 370 Ω	0.0072% + 35 Ω
Extended resistance (>2 M Ω)	0.1% + 6 k Ω	0.1% + 60 k Ω	0.1% + 60 k Ω	0.0072% + 6 k Ω

Measurement mode.....2-wire resistance

Test current.....100 μ A for 200 Ω , 2 k Ω ,
20 k Ω ranges;
1 μ A for 2 M Ω and 200 k Ω ranges;
1 μ A and 1 M Ω in parallel for extended resistance
measurements

Diode Testing

Accuracy \pm (% of Reading + Offset)

Range	24 Hour (25 °C \pm 1 °C)	90 Day (25 °C \pm 10 °C)	1 Year (25 °C \pm 10 °C)	Tempco/°C
2 V	0.006% + 60 μ V	0.024% + 400 μ V	0.027% + 400 μ V	0.002% + 40 μ V

Test current.....100 μ A

General Specifications

Settling time	Affected by source impedance and input signal changes
Warm-up time	30 minutes for measurements accurate within specifications
Bus type	PCMCIA, slave
Altitude	Up to 2,000 m
Working voltage	250 V maximum between either input terminal and earth ground
Power requirement	+5 VDC, 45 mA in operational mode
Operating temperature	0 °C to 55 °C
Storage temperature	-20 °C to 70 °C
Relative humidity	10 to 90% noncondensing
Measurement Category	II
Pollution Degree	2

Physical

Dimensions	8.6 × 5.4 cm (3.4 × 2.1 in.) (Type II PC card)
Weight	31 g (1.1 oz)



Note The P4-BJ2 cable connects the NI PCMCIA-4050 to the test probes.

P4-BJ2 cable

Length	0.3 m
End that connects to the NI PCMCIA-4050.....	3.7 × 2.3 cm (1.5 × 0.9 in.)

Compliance and Certifications

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 61326-2-1 (IEC 61326-2-1): 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 EMC declarations and certifications, 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 Declaration of Conformity (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 and Electronic Equipment, visit ni.com/environment/weee.

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