

NI 4065 Specifications

6½-Digit Digital Multimeter



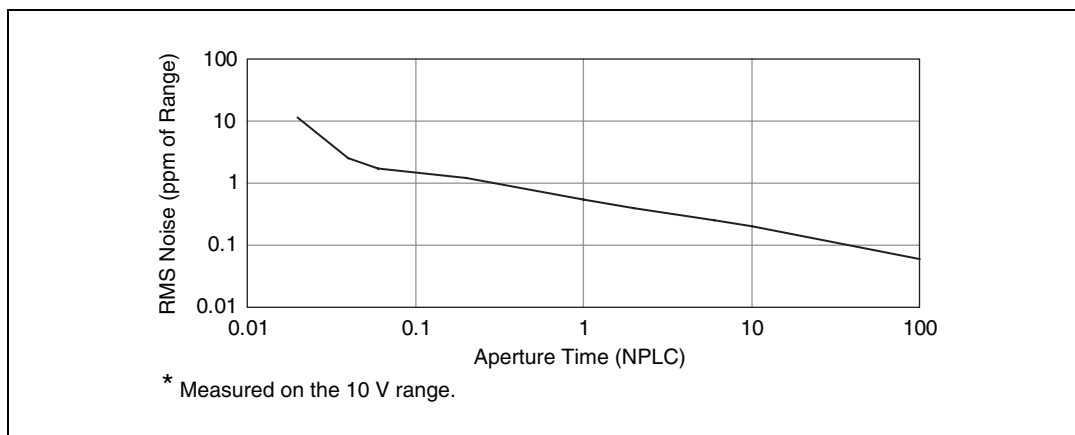
Note All specifications in this document are subject to change without notice. For the most current specifications, visit ni.com/manuals. All accuracy specifications apply to the 6½ digit resolution setting at 6 samples/second (S/s).

DC Specifications

Resolution (Digits)	Reading Rate* (S/s)	Aperture Time (NPLC)	RMS Noise† (ppm of range)
6½	0.6 (0.5)	100	0.06
	6 (5)	10	0.2
	10 (8.33)	6	0.25
5½	30 (25)	2	0.4
	60 (50)	1	0.55
	900	0.06	1.7
	1,500	0.04	2.5
4½	3,000	0.02	11.5

* Specified for 60 Hz (and 50 Hz) operation.
† Measured on the 10 V range.

Noise Performance*



DC System Speeds

Range or function changes10/s

Auto Range time, DC V200 ms

Auto Range time, DC I200 ms

Auto Range time, resistance250 ms

Trigger latency<1 μ s

Maximum trigger rate>2.5 kHz

DC Accuracy Specifications

DC Voltage \pm (ppm* of reading + ppm of range)

Range	Resolution	Input [‡] Resistance	24 Hr.** $T_{cal} \pm 1$ °C	90 Day $T_{cal} \pm 5$ °C	1 Year $T_{cal} \pm 5$ °C	Tempco/°C 0 to 55 °C
100 mV [†]	100 nV	>10 G Ω , 10 M Ω	30 + 30	65 + 35	90 + 35	5 + 2
1 V	1 μ V	>10 G Ω , 10 M Ω	20 + 6	65 + 7	90 + 7	5 + 0.2
10 V	10 μ V	>10 G Ω , 10 M Ω	15 + 5	65 + 6	90 + 6	5 + 0.2
100 V	100 μ V	10 M Ω	20 + 6	75 + 7	110 + 7	6 + 0.2
300 V	1 mV	10 M Ω	20 + 20	75 + 20	110 + 20	6 + 0.5

* 1 part per million (ppm)= 0.0001%.

[‡] Default input resistance is 10 M Ω .

** Relative to external calibration source. DMM must remain powered on.

[†] With offset nulling.

T_{cal} = temperature at which last external calibration was performed. NI factory calibration is 23 °C \pm 1 °C.

Tempco = temperature coefficient.

DC Current \pm (ppm of reading + ppm of range)

Range	Resolution	Typical Burden Voltage	24 Hr $T_{cal} \pm 1$ °C	90 Day $T_{cal} \pm 5$ °C	1 Year $T_{cal} \pm 5$ °C	Tempco/°C 0 to 55 °C
10 mA	10 nA	<60 mV	50 + 100	300 + 200	500 + 200	30 + 20
100 mA	100 nA	<0.6 V	100 + 40	300 + 50	500 + 50	30 + 5
1 A	1 μ A	<0.35 V	500 + 60	800 + 100	1,000 + 100	65 + 10
3 A	3 μ A	<1 V	1,000* + 200	1,200* + 200	1,200* + 200	65 + 20

* Add 650 ppm/A of reading for currents above 1.5 A.

T_{cal} = temperature at which last external calibration was performed. NI factory calibration is 23 °C \pm 1 °C.

Tempco = temperature coefficient.

Resistance* (4-Wire and 2-Wire) ± (ppm of reading + ppm of range)

Range	Resolution	Nominal Test Current	24 Hr [†] T _{cal} ±1 °C	90 Day T _{cal} ±5 °C	1 Year T _{cal} ±5 °C	Tempco/°C 0 to 55 °C
100 Ω	100 μΩ	1 mA	30 + 30	95 + 40	110 + 40	8 + 3
1 kΩ	1 mΩ	1 mA	20 + 6	95 + 10	110 + 10	8 + 1
10 kΩ	10 mΩ	100 μA	20 + 6	95 + 10	110 + 10	8 + 1
100 kΩ	100 mΩ	10 μA	20 + 6	95 + 10	110 + 10	8 + 1
1 MΩ	1 Ω	5 μA	20 + 10	110 + 12	125 + 12	10 + 1
10 MΩ [‡]	10 Ω	500 nA	150 + 10	400 + 12	500 + 12	30 + 2
100 MΩ [‡]	100 Ω	500 nA/10 MΩ	2,000 + 20	6,000 + 40	8,000 + 40	400 + 4

* Specifications are for 4-wire measurements. For 2-wire measurements perform offset nulling or add 200 mΩ to specification.

[†] Relative to external calibration source. DMM must remain powered on.

[‡] 2-wire resistance measurement only.

For relative humidity >80%, add 100 ppm/MΩ.

T_{cal} = temperature at which last external calibration was performed. NI factory calibration is 23 °C ± 1 °C.

Tempco = temperature coefficient.

Diode Test*

Range	Resolution	Nominal Test Current	Accuracy
10 V	10 μV	100 μA, 1 mA [†]	Add 50 ppm of range and 50 ppm of reading to 10 V DC voltage specifications.

* Can be used to test p-n junctions, LEDs, or zener diodes up to 10 V.

[†] Up to 3.5 V measurement for 1 mA test current.

DC Functions General Specifications

Overrange105% of range except
300 V and 3 A range

Maximum 4-wire lead resistance.....Use the lesser of 10% of range
or 1 k Ω

DC voltage input bias current<40 pA at 23 °C (typical)

Effective Common-Mode Rejection Ratio (CMRR)
(1 k Ω resistance in LO lead).....>150 dB* second-order DC noise
rejection, 10 PLC aperture

Normal-Mode Rejection Ratio (NMRR)

Aperture Time (NPLC)	DC Noise Rejection	Normal Mode Rejection
2	Second-order	>90 dB*
10	Normal	60 dB*
1		

* For power-line frequency $\pm 0.1\%$

AC Specifications

Desired Bandwidth	Recommended Reading Rate	Resolution (Digits)
10 Hz to 100 kHz	1 S/s	6½
100 Hz to 100 kHz	10 S/s	5½
500 Hz to 100 kHz	100 S/s	4½

AC System Speeds

Range or function changes 10/s

Trigger latency <1 µs

Maximum trigger rate >2.5 kHz

AC Accuracy Specifications



Note All AC accuracy specifications apply to signal amplitudes greater than 2% of range.

AC Volts (% of reading + % of range)

Range (Peak Voltage)	Frequency	24 Hr T _{cal} ±1 °C	90 Day T _{cal} ±5 °C	1 Year T _{cal} ±5 °C	Tempco/°C 0 to 55 °C
200 mV (±320 mV), 2 V (±3.2 V), 20 V (±32 V), 300 V (±425 V)	10 Hz to 40 Hz	1.5 + 0.04	2 + 0.05	2 + 0.05	0.01 + 0.003
	> 40 Hz to 20 kHz	0.2 + 0.04	0.2 + 0.05	0.2 + 0.05	0.005 + 0.003
	> 20 kHz to 50 kHz	0.3 + 0.04	0.3 + 0.05	0.3 + 0.05	0.01 + 0.003
	> 50 kHz to 100 kHz	1.5 + 0.08	1.5 + 0.08	1.5 + 0.08	0.02 + 0.005
T _{cal} = temperature at which last external calibration was performed. NI factory calibration is 23 °C ± 1 °C. Tempco = temperature coefficient.					

AC Current (% of reading +% of range)

Range (Peak Current)	Frequency	24 Hr $T_{cal} \pm 1 \text{ }^\circ\text{C}$	90 Day $T_{cal} \pm 5 \text{ }^\circ\text{C}$	1 Year $T_{cal} \pm 5 \text{ }^\circ\text{C}$	Tempco $^\circ\text{C}$ 0 to 55 $^\circ\text{C}$
10 mA (± 16 mA), 100 mA (± 160 mA), 500 mA (± 780 mA), 3 A (± 4.25 A)	10 Hz to 40 Hz	1.6 + 0.05	2.1 + 0.05	2.1 + 0.05	0.015 + 0.03
	> 40 Hz to 5 kHz	0.3 + 0.05	0.3 + 0.06	0.3 + 0.06	0.015 + 0.03

T_{cal} = temperature at which last external calibration was performed. NI factory calibration is $23 \text{ }^\circ\text{C} \pm 1 \text{ }^\circ\text{C}$.
Tempco = temperature coefficient.

High Crest Factor Additional Error*

Crest Factor	Additional Error (% of reading)
1–3	0.05%
3–4	0.1%
4–5	1% [†]

* Applicable for non-sinewave signals up to the rated peak voltage/current or bandwidth.
[†] For frequencies above 2 kHz.

AC Functions General Specifications

Input impedance 10 M Ω in parallel with 200 pF

Input coupling AC coupling

Maximum Volt-Hertz product $> 3 \times 10^7$ V-Hz

Maximum DC voltage component 250 V

CMRR

(1 k Ω resistance in LO lead) > 70 dB (DC to 60 Hz)

Overrange 105% of range except
300 V, 3 A range

General Specifications

Maximum common-mode voltage 300 V AC_{rms} or DC

Measurement Category II



Note Refer to the *Read Me First: Safety and Radio-Frequency Interference* document for definitions of Measurement Categories and other safety information.

Input protection

DC I and AC I F 3.15 A 250 V
Fast-Acting user-replaceable fuse

Resistance, Diode Up to 300 V DC

DC V, AC V Up to 300 V DC, 300 V AC_{rms},
450 V AC peak

Input terminals Gold-plated low-thermal EMF
solid copper

Calibration interval 1 year recommended

Triggers

Input triggers

Types Trigger, Sample Trigger
(programmable edge)

Sources Auxiliary connector,
PXI Trigger lines

Minimum pulse width 200 ns

Max samples per trigger 2.1×10^9

Trigger delay 0 to 149 s

Logic level 5 V TTL, LVTTTL

Output Triggers

Types Measurement Complete
(programmable edge)

Destinations Auxiliary connector,
PXI Trigger lines

Pulse width 1 us

Logic level 3.3 V

Power consumption

PXI devices.....<3 W from PXI backplane

PXI Power Consumption

Rail Voltage	Current Consumption	Power Consumption
12 V	10 mA	0.12 W
5.0 V	300 mA	1.50 W
3.3 V	150 mA	0.50 W

PCI/PCI Express devices.....<3 W from PCI/PCI Express motherboard

Warm-up.....30 minutes to rated accuracy

Dimensions

PXI devices.....3U, one slot, PXI/cPCI module;
21.6 cm × 2.0 cm × 13.0 cm
(8.5 in. × 0.8 in. × 5.1 in.)

PCI/PCI Express devices.....One slot, PCI/PCI Express module;
18.3 cm × 2.0 cm × 12.0 cm
(7.2 in. × 0.8 in. × 4.7 in.)

Weight

NI PXI-4065351.5 g (12.4 oz)

NI PCI/PCIe-4065325 g (11.5 oz)

Impulse overvoltage2,500 V

Environment

Maximum altitude.....2,000 m (at 25 °C ambient temperature)

Pollution Degree.....2



Note The AUX I/O connector is not isolated. It is not referenced to your measurement circuit. The connector is referenced to the ground of your computer. The digital signals on this connector should not operate beyond –0.5 to 5.5 V of your computer ground. The trigger signals are TTL-compatible.

Indoor use only.

Operating Environment

Ambient temperature range

PXI devices 0 to 55 °C (Tested in accordance with IEC 60068-2-1 and IEC 60068-2-2.)

PCI/PCI Express devices 0 to 40 °C (Tested in accordance with IEC 60068-2-1 and IEC 60068-2-2.)

Relative humidity range Up to 95% at 40 °C

Storage Environment

Ambient temperature range –40 to 70 °C (Tested in accordance with IEC 60068-2-1 and IEC 60068-2-2.)

Relative humidity range 5% to 95% noncondensing (Tested in accordance with IEC 60068-2-56.)

Shock and Vibration (PXI only)

Operational Shock 30 g peak, half-sine, 11 ms pulse (Tested in accordance with IEC 60068-2-27. Test profile developed in accordance with MIL-PRF-28800F.)

Random Vibration

Operating 5 Hz to 500 Hz, 0.3 g_{rms}

Nonoperating 5 Hz to 500 Hz, 2.4 g_{rms}

(Tested in accordance with IEC 60068-2-64. Nonoperating test profile exceeds the requirements of MIL-PRF-28800F, Class 3.)

Safety

The NI 4065 meets the requirements of the following standards of safety and 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 visit ni.com/certification, search by model number or product line, and click the appropriate link in the Certification column.

Electromagnetic Compatibility

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

- EN 61326 EMC requirements; Minimum Immunity
- EN 55011 Emissions; Group 1, Class A
- CE, C-Tick, ICES, and FCC Part 15 Emissions; Class A



Note For EMC compliance, operate this device according to product documentation.

CE Compliance

This product meets the essential requirements of applicable European Directives, as amended for CE marking, as follows:

- 73/23/EEC; Low-Voltage Directive (safety)
- 89/336/EEC; Electromagnetic Compatibility Directive (EMC)



Note Refer to the Declaration of Conformity (DoC) for this product for any additional regulatory compliance information. To obtain 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.

Waste Electrical and Electronic Equipment (WEEE)



EU Customers At the end of their life cycle, all products *must* be sent to a WEEE recycling center. For more information about WEEE recycling centers and National Instruments WEEE initiatives, visit ni.com/environment/weee.htm.

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