6½-Digit Digital Multimeters and 1.8 MS/s Isolated Digitizers

NI 4070

- 12 built-in measurement functions
- 1.8 MS/s isolated waveform acquisition
- 10- to 23-bit flexible resolution
- Built-in self-calibration
- ±300 VDC/V_{rms} isolation
- 425 V_p AC measurements

Calibration

- Gain, temperature, and offset self-calibration
- 2-year external calibration cycle

Operating Systems

- Windows Vista/XP/2000
- Linux®

Recommended Software

- LabVIEW
- LabVIEW Real-Time Module
- LabWindows™/CVI
- LabVIEW SignalExpress

Driver Software (included)

- NI-DMM
- DMM Express VI for LabVIEW
- DMM Soft Front Panel

Overview

NI 4070 FlexDMM 6½-digit digital multimeters achieve remarkable throughput rates while maintaining precision and stable measurement accuracy. With National Instruments proprietary FlexDMM technology, these DMMs provide a fully isolated, high-voltage digitizer capable of acquiring waveforms at sampling rates up to 1.8 MS/s at all voltage and current values. Using the analysis functions in NI LabVIEW software, you can analyze these waveforms in both the time and frequency domains. NI 4070 DMMs have superior speed, accuracy, and functionality, making them an excellent fit for use in automated tests on both the production floor and in an R&D environment.

Digits	Resolution (Bits)	Max Sampling Rate DC Voltage and Current[1]	Reading Rate[2]
7	23	5 S/s	5 S/s
6½	22	100 S/s	100 S/s
5½	18	5 kS/s	3 kS/s
4½	15	20 kS/s	10 kS/s
3	10	1.8 MS/s	–

[1]Maximum sample rate refers to waveform acquisition.
[2]Auto Zero disabled, except 7 digits, measured on a 10 V and 10 kΩ range.

Table 1. NI 4070 Key Specifications

High-Speed Digital Multimeter

1.8 MS/s Flexible-Resolution Isolated Digitizer

- You can vary the resolution of the FlexDMM from 10 to 23 bits by simply changing the sampling rate, as reflected in Figure 1.
- The unique multi-instrument functionality minimizes overall system cost by eliminating the need to purchase a separate data acquisition device, signal conditioning, fixturing, and so on.

Built-In Self-Calibration and 2-Year Calibration Cycle

- Self-calibration (Self-Cal) improves accuracy by removing errors due to temperature variation and long-term drift.
- Self-Cal ensures accuracy over entire 0 to 55 °C operating range.
- 2-year external calibration cycle reduces downtime and maintenance costs.

Software

- NI-DMM is an IVI-compliant driver that accesses the complete functionality of the DMM through an easy-to-use application programming interface (API).
- Compatible languages include ANSI C/C++, .NET, Visual Basic, LabVIEW, and LabWindows/CVI.

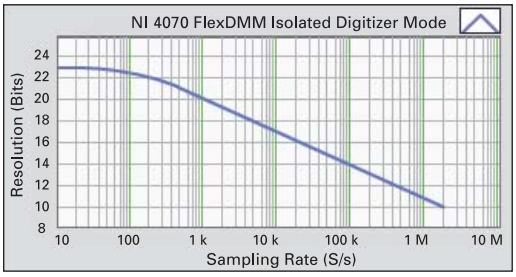

Figure 1. NI 4070 FlexDMM Resolution versus Sample Rate

Ordering Information

NI PCI-4070 778275-01
NI PXI-4070 778274-01
Includes the P-1 Probe Set, NI-DMM, DMM Express VI, and DMM Soft Front Panel.

Recommended Switching and Accessories

NI PXI-2527
300 V multiplexer switch 778572-27
NI PXI-2530
128x1 multiplexer switch 778660-01
P-1 Probe Set (standard probe) 761000-01
P-2 Probe Set (additional probe) 184698-01
P-3 Probe Set (banana plug to bare wire) 185692-01
10 A current shunt, CSM-10A 777488-02

BUY NOW!

For complete product specifications, pricing, and accessory information, call 800 813 3693 (U.S.) or go to **ni.com/dmm.**

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Specifications

Specifications subject to change without notice.
For the most current and complete specifications, visit **ni.com/modularinstruments**.

DC Functions

DC Voltage ±(ppm of reading + ppm of range)

Range	Resolution	Input Resistance	24-Hour T_{cal} ±1 °C	90-Day T_{cal} ±5 °C	2-Year T_{cal} ±5 °C	Tempco/°C Without Self-Cal	Tempco/°C With Self-Cal
100 mV	100 nV	>10 GΩ,10 MΩ	10 + 10	30 + 20	40 + 20	4 + 5	0.3 + 0.3
1 V	1 µV	>10 GΩ,10 MΩ	6 + 2	20 + 6	25 + 6	2 + 1	0.3 + 0.3
10 V	10 µV	>10 GΩ,10 MΩ	4 + 2	20 + 6	25 + 6	1 + 1	0.3 + 0.3
100 V	100 µV	10 MΩ	6 + 2	30 + 6	35 + 6	4 + 1	0.3 + 0.3
300 V	1 mV	10 MΩ	6 + 6	30 + 20	35 + 20	4 + 3	0.3 + 0.3

DC Current ±(ppm of reading + ppm of range)

Range	Resolution	Burden Voltage (typical)	Noise (ppm of range rms)	2-Year	Tempco/°C
20 mA	10 nA	<20 mV	20	400 + 150	8 + 1
200 mA	100 nA	<200 mV	3	400 + 20	8 + 0.2
1 A	1 µA	<800 mV	3	500 + 50	8 + 0.4

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

Range	Resolution	Test Current	Max Test Voltage	24-Hour T_{cal} ±1 °C	90-Day T_{cal} ±5 °C	2-Year T_{cal} ±5 °C	Tempco/°C Without Self-Cal	Tempco/°C With Self-Cal
100 Ω	100 µΩ	1 mA	100 mV	15 + 10	50 + 10	80 + 10	8 + 1	0.8 + 1
1 kΩ	1 mΩ	1 mA	1 V	12 + 2	50 + 3	80 + 3	8 + 0.1	0.8 + 0.1
10 kΩ	10 mΩ	100 µA	1 V	12 + 2	50 + 3	80 + 3	8 + 0.1	0.8 + 0.1
100 kΩ	100 mΩ	10 µA	1 V	15 + 2	50 + 6	80 + 6	8 + 0.5	0.8 + 0.5
1 MΩ	1 Ω	10 µA	10 V	20 + 2	60 + 10	90 + 10	8 + 1	0.8 + 1
10 MΩ	10 Ω	1 µA	10 V	100 + 2	200 + 10	400 + 10	30 + 3	30 + 3
100 MΩ	100 Ω	1 µA II 10 M Ω	10 V	900 + 20	1,800 + 40	2,000 + 40	200 + 10	200 + 10

Diode Test

Range	Resolution	Test Current	Accuracy
10 V	10 µV	1 µA, 10 µA, 100 µA, 1 mA	Add 20 ppm of reading to 10 VDC voltage specifications.

AC Functions

Digits	Reading Rate	Bandwidth
6½	0.25 S/s	1 Hz to 300 kHz
6½	2.5 S/s	10 Hz to 300 kHz
6½	25 S/s	100 Hz to 300 kHz
6½	100 S/s	400 Hz to 300 kHz
5½	1.0 kS/s	20 to 300 kHz

AC Voltage 2-Year ±(% of reading + % of range), 23 °C ±5 °C

Range (rms)	Peak Voltage	Resolution	1 to 40 Hz	40 Hz to 20 kHz	20 to 50 kHz	50 to 100 kHz	100 to 300 kHz
50 mV	±105 mV	100 nV	0.1 + 0.04	0.05 + 0.04	0.09 + 0.04	0.5 + 0.08	3 + 0.1
500 mV	±1.05 V	1 µV	0.1 + 0.01	0.05 + 0.02	0. 09 + 0.02	0.5 ± 0.02	3 + 0.05
5 V	±10.5 V	10 µV					
50 V	±105 V	100 µV					
300 V	±450 V	1 mV					
Tempco/°C			0.001 + 0.001	0.001 + 0.001	0.001 + 0.001	0.001 + 0.001	0.01 + 0.01

AC Current 2-Year ±(% of reading + % of range)

Range (rms)	Peak Current	Resolution	Burden Voltage (rms)	1 Hz to 20 kHz	Tempco/°C
10 mA	±20 mA	10 nA	<10 mV	0.04 + 0.02	0.001 + 0.0001
100 mA	±200 mA	100 nA	<100 mV	0.04 + 0.02	0.001 + 0.0001
1 A	±2 A	1 µA	<800 mV	0.1 + 0.02	0.001 + 0.0001

Frequency and Period

Input Range	Frequency Range	Period Range	Resolution	2-Year Accuracy % of Reading
50 mV to 300 V	1 Hz to 500 kHz	1 s to 2 µs	6½ digits	0.01

Isolated Digitizer Mode

Acquisition System

Available sample rates ..... $\frac{1.8\ \text{MS/s}}{n}$, where n = 1, 2, 3,…1.8 x 10^5
Variable resolution ..... 10 to 23 bits
Available functions ..... Voltage and current
Voltage ranges ..... ±100 mV to ±300 V (DC or AC coupled)
Current ranges ..... 20 mA to 1 A

DC Voltage ±(ppm of reading + ppm of range)

Range	Input Impedance	Flatness Error (20 kHz)	Bandwidth (-3 dB)	THD 1 kHz Signal (-1 dBFS)	THD 1 kHz Signal (-1 dBFS)
100 mV	>10 GΩ,1 MΩ	-0.03 dB	300 kHz	-104 dB	-78 dB
1 V	>10 GΩ,1 MΩ	-0.03 dB	300 kHz	-109 dB	-83 dB
10 V	>10 GΩ,1 MΩ	-0.03 dB	300 kHz	-96 dB	-70 dB
100 V	1 MΩ	-0.03 dB	300 kHz	-96 dB	-70 dB
300 V	1 MΩ	-0.03 dB	300 kHz	-98 dB	-72 dB

DC Current ±(ppm of reading + ppm of range)

Range	Resolution	Burden Voltage (typical)	Flatness Error (20 kHz)	Bandwidth (-3 dB)
20 mA	10 nA	<20 mV	±0.01 dB	430 kHz
200 mA	100 nA	<200 mV	±0.01 dB	430 kHz
1 A	1 µA	<800 mV	±0.01 dB	400 kHz

Certifications and Compliance

Safety

IEC 61010-1; EN 61010-1; UL 61010-1; CSA 61010-1
Installation category II
Pollution degree 2

Electromagnetic Compatibility

This product meets the requirements of the following EMC standards for electrical equipment for measurement, control, and laboratory use:

- EN 61326 (IEC 61326): 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

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