Low cost 6½-digit DMM for portable, bench, and USB-based system applications

DIGITAL MULTIMETERS & SYSTEMS

2100

6½-Digit USB Digital Multimeter

- **High precision 6½-digit DMM for critical measurements at a 5½-digit price**
- **11 measurement functions cover most commonly measured parameters**
- **Fully specified accuracies on all functions for ISO-compliant results**
- **Included PC software utilities for graphing and data sharing in both Microsoft® Word and Excel**
- **Rugged construction for durability in bench/portable applications**
- **Selectable front/rear inputs facilitate bench or rack use**
- **Includes all accessories, such as startup software, USB cable, power cable, and safety test lead, for lowest total cost**
- **CE compliant and UL listed**
- **TMC compliant USB 2.0 interface for use with SCPI test programs**

The Model 2100 USB Digital Multimeter is the newest member of Keithley's family of high performance DMMs. Its high accuracy (38ppm), 6½-digit resolution is ideal for critical measurements. The Model 2100 features 11 measurement functions and 8 math functions to easily accommodate the most commonly measured parameters. All accessories, such as USB cable, probes, and software, are included with the Model 2100. With its unique combination of high precision and low total cost of ownership, the Model 2100 is an unbeatable value for R&D engineers, test engineers, scientists, and students making basic precision measurements on the bench and in system applications.

High Precision, Low Cost

The Model 2100 provides stability, accuracy, and speed at a very low cost. It has 0.0038% 1-year basic DC voltage accuracy on the 10V range and 0.013% 1-year basic resistance accuracy on the 10kΩ range. At 6½ digits, the Model 2100 delivers 50 triggered rdgs/s via the USB remote interface. At the fast 4½ digit setting, it reads over 2000 rdgs/s into its 2000 reading internal buffer.

The Model 2100 provides a wide number of measurement ranges and functions:

- DC voltage: 0.1V, 1V, 10V, 100V, and 1000V
- AC voltage: 0.1V, 1V, 10V, 100V, and 750V
- DC current: 10mA, 100mA, 1A, and 3A
- AC current: 1A and 3A
- Two- and four-wire resistance: 100Ω, 1kΩ, 10kΩ, 100kΩ, 1MΩ, 10MΩ, and 100MΩ
- Frequency: From 3Hz to 300kHz
- Period measurement
- Diode measurement
- Programmable A-D converter and filter settings for signal to noise optimization

Additionally, eight mathematical operations can be performed on measurement readings: RATIO, %, Min/Max, NULL, Limits, mX+b, dB, and dBm testing. Microsoft Office, Word, and Excel add-in tools allow remote storage and recall of the measured values from these applications. A graphing utility enables charting of measurements versus time for trending and noise observations.

The TMC compliant USB remote interface enables control from a PC for consistent test/calibration procedure execution and easy re-use of existing SCPI programs, including Agilent Model 34401A command emulation.

Simple to Use

The Model 2100 can be setup quickly and is very easy to use. It has a high contrast front panel and keypad that are intuitive and user-friendly. An easy to read 5×7 dot matrix, vacuum fluorescent display (VFD) offers three-color annunciators so users can easily distinguish each function symbol by its color.

Strength and Versatility

With its rugged construction and rubber bumpers, the Model 2100 has the durability to withstand bench, portable, or stacking applications. A sturdy carrying handle facilitates transportability.

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Ordering Information

2100/100 6½-digit USB Digital Multimeter (100V)

2100/120 6½-digit USB Digital Multimeter (120V)

2100/220 6½-digit USB Digital Multimeter (220V)

2100/230-240 6½-digit USB Digital Multimeter (230-240V)

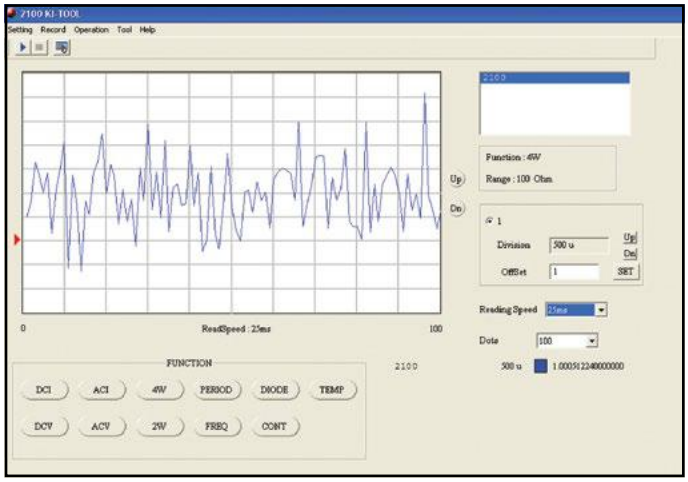
Accessories Supplied

Instruction manual on CD, Specifications, LabVIEW® Driver, Keithley I/O Layer, USB Cable, Power Cable, Safety Test Leads, KI-Tool, and KI-Link Add-in (Both Microsoft Word and Excel versions)

Applications

The Model 2100 USB Digital Multimeter is ideal for applications in: electronic device, circuit, module, and product testing; low cost production testing of electrical and electronic components, sub-assemblies, and end products; and student lab assignments. Typical applications include:

- Test Engineers: Manual and semi-automatic electrical functional test
- Development Engineers: Electrical/electronic circuit and product validation
- Service/Calibration Technicians: Electronic product repair and calibration
- Research Scientists: Electrical and physics experiments testing
- Engineering Students: Electronic device and circuits experiment testing



Startup Software, PC Utilities Included

The KI-Tool application provides charting and graphing capabilities without programming to simplify setup, checkout, and basic measurement applications requiring graphical data representation. Scale, offset, and level can be adjusted to fine tune images for visual evaluation of signal and noise elements over time. It also includes tabular data and SCPI command prompt windows for maximum flexibility. Data sets can also be saved to disk files.

The Microsoft Excel Add-In utility is also included and provides quick data import into a standard Microsoft Excel spreadsheet, including selectable graphing, instrument settings, and number of data points collected. Data can then be analyzed through standard or optional Microsoft Excel functions, including graphical, statistical, and trend charting. A version supporting Microsoft Word is also included for direct data import into reports.

ACCESSORIES AVAILABLE

RACK MOUNT KITS

4299-3	Single Rack Mount Kit
4299-4	Dual Rack Mount Kit
8605	High Performance Modular Test Leads
8606	High Performance Modular Probe Kit

SERVICES AVAILABLE

2100/120-3Y-EW	1 Year Factory Warranty extended to 3 years from date of shipment
C/2100/120-3Y-DATA	3 (Z540-1 compliant) Calibrations within 3 years of purchase for Model 2100/120*
C/2100/120-3Y-ISO	3 (ISO-17025 accredited) Calibrations within 3 years of purchase for Model 2100/120*

*Not available in all countries

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Specifications

DC CHARACTERISTICS: Accuracy[1] ±(% of reading + % of range)

Function	Range	Resolution	Input Resistance	1 Year, 23°C ±5°C
DC Voltage	100.0000 mV	0.1 μV	>10 GΩ	0.0055 + 0.0040
	1.000000 V	1.0 μV	>10 GΩ	0.0045 + 0.0008
	10.00000 V	10 μV	>10 GΩ	0.0038 + 0.0006
	100.0000 V	100 μV	10 MΩ	0.0050 + 0.0007
	1000.000 V	1 mV	10 MΩ	0.0055 + 0.0010

Function	Range	Resolution	Shunt Resistance	1 Year, 23°C ±5°C
DCI (DC Current)	10.00000 mA	10 nA	5.1 Ω	0.055 + 0.025
	100.0000 mA	100 nA	5.1 Ω	0.055 + 0.006
	1.000000 A	1 μA	0.1 Ω	0.120 + 0.015
	3.00000 A	10 μA	0.1 Ω	0.150 + 0.025

Function	Range	Resolution	Test Current	1 Year, 23°C ±5°C
Resistance[2]	100.0000 Ω	100 μΩ	1 mA	0.015 + 0.005
	1.000000 kΩ	1 mΩ	1 mA	0.015 + 0.002
	10.00000 kΩ	10 mΩ	100 μA	0.013 + 0.002
	100.0000 kΩ	100 mΩ	10 μA	0.015 + 0.002
	1.000000 MΩ	1 Ω	5 μA	0.017 + 0.002
	10.00000 MΩ	10 Ω	500 nA	0.045 + 0.002
	100.0000 MΩ	100 Ω	500 nA||10 MΩ	1.00 + 0.020
Diode Test	1.0000 V	10 μV	1 mA	0.040 + 0.020
Continuity	1000.00 Ω	10 mΩ	1 mA	0.024 + 0.030

DC NOTES

1. Specifications valid after two hour warm-up.
   a. ADC set for continuous trigger operation.
   b. Input bias current <30pA at 25°C.
   c. Input protection 1000V all ranges (2W input).
   d. Measurement rate set to 1 PLC.
2. Specifications for 4W ohms mode. For 2W ohms, use zero null or subtract lead resistance from displayed reading.
   a. Maximum lead resistance 10% of range per lead for 100Ω and 1kΩ ranges; add 1kΩ per lead for all other ranges.

MEASUREMENT NOISE REJECTION DC (60Hz/50Hz)

Rate	Digits	CMRR[1]	NMRR[2]
10PLC	6½	140 dB	60 dB
1PLC	5½	140 dB	60 dB

1. For 1kΩ unbalance in LO lead.
2. For line frequency ±0.1%.

TEMPERATURE (RTD)

Range	Resolution	4-Wire Accuracy[1], 1 Year
–100°C to +100°C	0.001°C	±0.1°C
–200°C to +630°C	0.001°C	±0.2°C

RTD TYPE: 100Ω platinum (PT100), D100, F100, PT385, or PT3916.

MAXIMUM LEAD RESISTANCE (each lead): 12Ω (to achieve rated accuracy).

SENSOR CURRENT: 1mA (pulsed).

1. Excluding probe errors. 23°C ±5°C.

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AC CHARACTERISTICS:
Accuracy[1] ±(% of reading + % of range)

Function	Range	Frequency (Hz)	1 Year (% of reading) 23°C ±5°C
Frequency and Period	100 mV to 750 V[2]	3–5	0.10
		5–40	0.05
		40–300k	0.01

Function	Range	Resolution	Frequency (Hz)	1 Year (23°C ±5°C)
ACV (AC TRMS Voltage)	100.0000 mV	0.1 µV	3 – 5	1.15 + 0.05
			5 – 10	0.45 + 0.05
			10 – 20k	0.08 + 0.05
			20k – 50k	0.15 + 0.06
			50k – 100k	0.70 + 0.09
			100k – 300k	4.25 + 0.60
	1.000000 V to 750.000 V[2]	1.0 µV to 1 mV	3 – 5	1.10 + 0.04
			5 – 10	0.4 + 0.04
			10 – 20k	0.08 + 0.04
			20k – 50k	0.14 + 0.06
			50k – 100k	0.70 + 0.08
			100k – 300k	4.35 + 0.50
ACI (AC TRMS Current)	1.000000 A	1 µA	3 – 5	1.10 + 0.05
			5 – 10	0.40 + 0.05
			10 – 5k	0.15 + 0.05
	3.000000 A	10 µA	3 – 5	1.25 + 0.07
			5 – 10	0.45 + 0.07
			10 – 5k	0.20 + 0.07

AC NOTES
1. Specifications valid for two hour warm-up at 6½ digits.
   a. Slow AC filter (3Hz bandwidth).
   b. Pure sine wave input greater than 5% of range.
2. 750VAC range is limited to 100kHz.

GENERAL
AC CMRR: 70dB (for 1kΩ unbalance LO lead).
POWER SUPPLY: 120V/220V/240V.
POWER LINE FREQUENCY: 50/60Hz auto detected.
POWER CONSUMPTION: 25VA max.
DIGITAL I/O INTERFACE: USB-compatible Type B connection.
ENVIRONMENT: For indoor use only.
OPERATING TEMPERATURE: 5° to 40°C.
OPERATING HUMIDITY: Maximum relative humidity 80% for temperature up to 31°C, decreasing linearly to 50% relative humidity at 40°C.
STORAGE TEMPERATURE: –25° to 65°C.
OPERATING ALTITUDE: Up to 2000m above sea level.
BENCH DIMENSIONS (with handles and feet): 112mm high × 256mm wide × 375mm deep (4.4 in. × 10.1 in. × 14.75 in.).
WEIGHT: 4.1kg (9 lbs.).
SAFETY: Conforms to European Union Directive 73/23/ECC, EN61010-1, UL61010-1:2004.
EMC: Conforms to European Union Directive 89/336/EEC, EN61326-1.
WARRANTY: One year.

Model 2100 rear panel