

# Support Information Only

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## 6-1/2 Digit USB Multimeter

### Features

- 6-1/2 Digit Resolution
- + 2,400,000 count A/D  
**+23.999,99V**
- No Latency Measurements
- Selectable Measurement Rates
  - 1/s to 250/s
- Fast function and range changes
- DC Voltage ranges:
  - 240mV, 2.4V, 24V, 240V
- AC Voltage ranges:
  - 240mV, 2.4V, 24V, 240V
- DC Current Ranges:
  - 2.4mA, 24mA, 240mA, 2.4A
- AC Current ranges
  - 2.4mA, 24mA, 240mA, 2.4A
- Resistance Two-Wire Ranges:
  - 240Ω, 2.4kΩ, 24kΩ, 240kΩ, 2.4MΩ, 24MΩ
- Resistance Four-Wire Ranges:
  - 240Ω, 2.4kΩ, 24kΩ, 240kΩ
- Diode Test:
  - 100nA, 1uA, 10uA, 100uA, 1mA
- True RMS AC
- Input Impedance
  - DCV 10GΩ or 10M
  - ACV 1MΩ || 300pF
  - Current Shunts: 0.1Ω and 10 Ω
- Auto Ranging
- Universal Software driver
  - Linux & Windows
  - Fast to install - tiny footprint
  - Compatible with most S/W
  - Stand alone – no dependencies
  - Exel, Word, Matlab, LabView, C, C++, C#, LabWindows, Visual Basic and more

### A Family of Instruments

The SMU2055 joins a long line of offering of PCI, PXI, and USB DMMs and Switching products. Combine a Signametrics DMM and a Switch to form a cost-effective test solution. Hundreds of loyal users consider these to be the best and friendliest instruments to use. Note: Using Switches which are not designed for use with high resolution DMMs will result in significant measurement errors.



Signametrics SMU2055 is a full featured 6-1/2 digit USB Multimeter. It is much smaller more portable and lower cost than other USB DMMs on the market. It is also much faster and versatile. The arrival of the SMU2055 rendered other USB DMMs obsolete. It surpasses any plug-in or bench DMM in its category, having fast measurements and great stability and repeatability.

While most 6-1/2 digit DMM's are limited to 1,100,000 counts, the SMU2055 sports a superb zero-latency A/D with 2,400,000 counts of resolution. The significance of having more than twice the dynamic range is manifested in 6-1/2 digits performance over a much wider range of input values. For instance, measuring a 14V input the SMU2055 will display **14.00000V**, while other DMM's will show **14.0000V** (1/10<sup>th</sup> the resolution). These plug-and-play USB DMMs are very quick and easy to install and run. Expect to start making measurements in a matter of minutes out of the box.

Very high input impedance preserves the DMM accuracy in DC Volts, and a high bandwidth True RMS circuit make it very valuable in AC Volts and Current.

Signametrics did not cut corners to create this DMM. We used innovation and technology, resulting in multiple current sources and low test voltage in resistance measurements, as well as super fast range and function settings. Neither did we skimp on current shunts. Both AC and DC current functions have two built-in current shunts, resulting in highly sensitive measurements and low burden voltage, not normally found in lower cost DMM's.

Signametrics offers a full line of 5-1/2, 6-1/2 and 7-1/2 plug-in DMM's and Switching Modules for PXI, USB, and PCI. Signametrics high precision DMM's and Instrumentation quality relay multiplexers constitute a foundation for your next test system. Their price-performance is unbeatable. We have confidence you will be satisfied with these products. A 30 day no risk trial period comes with any of our instruments.

## DC Voltage Measurement

- **Input Resistance 240mV, 2.4V Ranges:** >10 GΩ
  - **Input Resistance 24V, 240 V Ranges:** 10.00 MΩ
- Accuracy ± (% of reading + Volts) [1]

Range	Full Scale 6-½ Digits	Resolution	One Year 23°C ± 5°C
240 mV	240.0000 mV	100 nV	0.007 + 3.5 μV
2.4 V	2.400000 V	1 μV	0.005 + 10 μV
24 V	24.00000 V	10 μV	0.007 + 300 μV
240 V	240.0000 V	100 μV	0.007 + 1 mV

[1] With measurement rate set to 2rps or lower rate, within one hour from Zero.

For resolution at higher measurement rates, see the following table. Use this table for DC Volts, DC current and Resistance measurements.

## Resolution vs. Measurement rate

Maximum reading rate	Resolution	
1 / second	6-½ digits	21 bits
8 / second	6 digits	20 bits
50 / second	5-½ digits	18 bits
100 / second	5 digits	17 bits
250 / second	4-½ digits	16 bits

## DCV Noise Rejection

Normal Mode Rejection, 50, 60, or 400 Hz ± 0.5%; > 90 dB.  
CMRR, with 1 kΩ lead imbalance; > 100 dB.

## DC Current Measurement

- **Number of shunts** Two
- **Burden Voltage** 300mV max.
- **Protected** with 2.5A Fast blow fuse

Accuracy ± (% of reading + Amps) [1]

Range	Full Scale 5-½ Digits	Resolution	One Year 23°C ± 10°C
2.4 mA	2.40000 mA	10 nA	0.07 + 1 μA
24 mA	24.0000 mA	100 nA	0.08 + 1 μA
240 mA	240.000 mA	1 μA	0.065 + 80 μA
2.4 A	2.40000 A	10 μA	0.45 + 90 μA

[1] With measurement rate set to 2rps or lower rate, within one hour from Zero (Relative control).

## Diode Test

- **Test currents** 100 nA, 1 μA, 10 μA, 100 μA and 1 mA
- **Source Voltage compliance** 4V
- **Voltage measurement range** 0V to 2.4V

Test Current	Full Scale 6-½ Digits	Resolution	One Year 23°C ± 10°C
0.1 μA	2.400000 V	1 μV	0.022 + 15 μV
1 μA			0.018 + 12 μV
10 μA			0.015 + 10 μV
100 μA			0.014 + 8 μV
1 mA			0.014 + 8 μV

[1] With measurement rate set to 2rps or lower rate

## Resistance Measurements

- **Number of Current Sources** Five

### 2-Wire

Accuracy ± (% of reading + Ω) [1]

Range [2]	Full Scale 6-½ Digits	Resolution	Source current	One Year 23°C ± 5°C
240 Ω	240.0000 Ω	0.1 mΩ	1 mA	0.008 + 6 mΩ [2]
2.4 kΩ	2.400000 kΩ	1 mΩ	1 mA	0.007 + 33 mΩ
24 kΩ	24.00000 kΩ	10 mΩ	100 μA	0.007 + 350 mΩ
240 kΩ	240.0000 kΩ	0.1 Ω	10 μA	0.02 + 5 Ω
2.4 MΩ	2.400000 MΩ	1 Ω	1 μA	0.04 + 70 Ω
24 MΩ	24.00000 MΩ	10 Ω	100 nA	0.4 + 600 Ω

[1] With measurement rate set to 2rps or lower rate, within one hour from Zero.

[2] Test voltages at full scale are 2.4V max with the exception of the 240 Ω range which is 240 mV.

### 4-Wire

Accuracy ± (% of reading + Ω) [1]

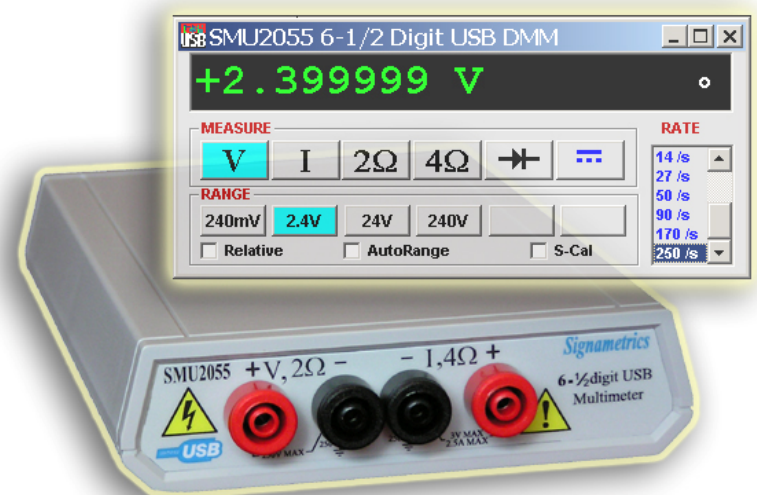
Range [2]	Full Scale 6-½ Digits	Resolution	Source current	One Year 23°C ± 5°C
240 Ω	240.0000 Ω	0.1 mΩ	1 mA	0.008 + 5 mΩ [2]
2.4 kΩ	2.400000 kΩ	1 mΩ	1 mA	0.007 + 33 mΩ
24 kΩ	24.00000 kΩ	10 mΩ	100 μA	0.007 + 350 mΩ
240 kΩ	240.0000 kΩ	0.1 Ω	10 μA	0.02 + 5 Ω

[1] With measurement rate set to 2rps or lower rate, within one hour from Zero

[2] Test voltages are 2.4V max with the exception of the 240 Ω ranges which is 240 mV.

## Selectable Measurement Rates

Rate (1/s)	Symbol	Code	Power line Rejection		
			50Hz	60Hz	400Hz
0.5	RATE_p5	0	√	√	√
1	RATE_1	1	√	√	√
2	RATE_2	2	√	√	√
3	RATE_3	3	√	√	√
7	RATE_7	7	√	√	√
14	RATE_14	14			√
27	RATE_27	27			√
50	RATE_50	50			√
90	RATE_90	90			
170	RATE_170	170			
250	RATE_250	250			



## AC Voltage Measurements

- **Input Resistance** 1 MΩ, shunted by < 300 pF
- **Max. Crest Factor** 4 at Full Scale, 7 near 10% of range
- **AC coupled** 10 Hz to 100 kHz
- **Measured value** True RMS

Range [1]	Full Scale 6-½ Digits	Resolution	Lowest specified Input Voltage
240 mV	240.0000 mV	100 nV	5 mV
2.4 V	2.400000 V	1 μV	20 mV
24 V	24.00000 V	10 μV	200 mV
240 V	240.0000 V	100 μV	2 V

[1] Signal is limited to  $8 \times 10^6$  Volt Hz Product

## AC Volts Accuracy

- **Settling Time:**
  - Signals > 50% of range: 0.5s
  - Signals < 5% of scale 2s

Accuracy ± (% of reading + Volts) [1]

Range	Frequency	One Year 23°C ± 5°C
240 mV	10 Hz - 20 Hz	3.6 + 300 μV
	20 Hz - 47 Hz	0.5 + 200 μV
	47 Hz - 10 kHz	0.16 + 120 μV
	10 kHz - 50 kHz	0.4 + 250 μV
	50 kHz - 200 kHz	2.2 + 600 μV
2.4 V	10 Hz - 20 Hz	3.5 + 2.5 mV
	20 Hz - 47 Hz	0.5 + 1.7 mV
	47 Hz - 10 kHz	0.08 + 1.2 mV
	10 kHz - 50 kHz	0.4 + 2.5 mV
	50 kHz - 200 kHz	2.2 + 5 mV
24 V	10 Hz - 20 Hz	4.5 + 35 mV
	20 Hz - 47 Hz	0.65 + 30 mV
	47 Hz - 10 kHz	0.085 + 23 mV
	10 kHz - 50 kHz	0.3 + 35 mV
	50 kHz - 200 kHz	1.7 + 50 mV
240 V	10 Hz - 20 Hz	3.3 + 400 mV
	20 Hz - 47 Hz	0. + 350 mV
	47 Hz - 10 kHz	0.08 + 250 mV
	10 kHz - 50 kHz	0.3 + 350 mV
	50 kHz - 200 kHz	1.8 + 500 mV

[1] With reading rate set to ≤ 2/Sec

## AC Current Measurement, True RMS

- **Crest Factor** 4 at Full Scale, 10 at Lowest Specified Current
- **Burden Voltage** 300mV RMS max.
- **Protected** with 2.5 A Fast Blow fuse
- **Shunts:** Two, 0.1 Ohm and 10 Ohms

Range	Full Scale 6 1/2 Digits	Lowest Specified	Resolution
2.4 mA	2.400000 mA	60 μA	1 nA
24 mA	24.00000 mA	300 μA	10 nA
240 mA	240.0000 mA	3 mA	100 nA
2.4 A	2.400000 A	30 mA	1 uA

## AC Current Accuracy

- **Settling Time:**
  - Signals > 50% of range: 0.5s
  - Signals < 5% of scale 2s

Accuracy ± (% of reading + Amps)

Range	Frequency [1]	One Year 23°C ± 10°C
2.4 mA	10 Hz - 20 Hz	2.9 + 4 μA
	20 Hz - 47 Hz	1.0 + 4 μA
	47 Hz - 1 kHz	0.12 + 4 μA
	1 kHz - 10 kHz	0.22 + 4 μA
24 mA	10 Hz - 20 Hz	2.8 + 30 μA
	20 Hz - 47 Hz	1.0 + 30 μA
	47 Hz - 1 kHz	0.16 + 30 μA
	1 kHz - 10 kHz	0.4 + 40 μA
240 mA	10 Hz - 20 Hz	2.8 + 400 μA
	20 Hz - 47 Hz	1.0 + 400 μA
	47 Hz - 1 kHz	0.2 + 220 μA
	1 kHz - 10 kHz	0.4 + 400 μA
2.4 A	10 Hz - 20 Hz	2.7 + 5 mA
	20 Hz - 47 Hz	0.9 + 6 mA
	47 Hz - 1 kHz	0.35 + 4 mA
	1 kHz - 10 kHz	0.5 + 5 mA

**ACV Noise Rejection** Common Mode rejection, for 50 Hz or 60 Hz with 1 kΩ imbalance in either lead, is better than 60 dB.

## Additional Specifications

**Temperature Coefficient over 0°C to 50°C Range** Less than 0.1 x accuracy specification per °C At 23C ± 10°C

**Hardware Interface** Single USB port

**Overload Protection** (voltage inputs) 300 VDC, 250 VAC

**Isolation** 300 VDC, 250 VAC from Earth Ground

**Maximum Input (Volt x Hertz)**  $8 \times 10^6$  Volt x Hz normal mode input (across Voltage HI & LO).  $1 \times 10^6$  Volt x Hz Common Mode input (from Voltage HI or LO relative to Earth Ground).

**Safety** Designed to IEC 1010-1, Installation Category II.

**Calibration** Calibrations are performed at ambient temperature of 23°C. All calibration constants are stored on board the DMM and are backed up on a file.

**Temperature Range Operating** -10°C to 65°C

**Temperature Range Storage** -40°C to 85°C

**Size** 5"X7"X1.25" module

**Power** +5 volts, 200 mA from USB cable.