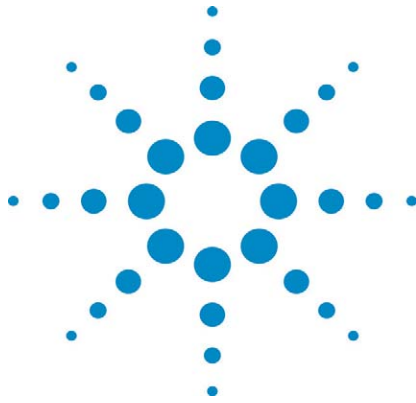


# Agilent 34405A Multimeter

## 5.5 Digit Dual Display, Benchtop DMM More Capabilities at a Value Price

### Data Sheet



#### Features

**120000 counts resolution**

**16 built-in measurement functions including temperature and capacitance**

**0.025% 1-year DC voltage accuracy**

**USB 2.0**

**SCPI compatible**

**Agilent IO Library Suite and DMM Intuilink connectivity software included**

#### Affordable and Feature-Rich Measurement Tool

The 34405A represents the latest member in the Agilent's DMM family and this expands Agilent's offerings in the electronics measurement tools. It provides a broad range of features and measurement functions such as DC voltage, DC current, true-RMS AC voltage and AC current, 2-wire resistance, frequency, diode test and continuity which are designed to meet general industrial needs. Furthermore, it can measure temperature ranging from -80°C to 150°C. The true value is more evident with its capability to measure capacitance ranging from 1000pF to 10000 $\mu$ F. Agilent 34405A also improves efficiency and accuracy with its 6 built-in math operations: Null, dBm, dB, MinMax, Limit and Hold.

#### Quick Connection to the PC with USB 2.0 Interface

For those with a need to control and take preset measurements with a PC, the built-in USB 2.0 interface provides an easy and robust connection between the PC and DMM. The USB interface that is compliant with the TMC-488.2 Standards, works seamlessly with Agilent Connectivity software and can be controlled remotely via industry standard SCPI commands or through DMM Intuilink Connectivity

software. IVI-COM and LabVIEW drivers are included to ensure an easy integration with different programming environments.

#### Bright Display, Fast Reading Speed and Configuration Storage

When high throughput and productivity are the priority, Agilent 34405A VFD dual display feature allows users to take more than one measurement and display them simultaneously on the front panel. For speed critical applications, Agilent 34405A can take up to 19 readings/sec at 4.5 digits resolution directly to the PC. In addition, the user can configure and store complete instrument setups and recall them at anytime from any of the four built-in storing states.

#### Rugged and Reliable

The 34405A is designed and tested according to major Safety and Regulatory Standards. In addition, the shock absorbing bumpers is designed to prevent physical damage from your day-to-day use.



## DC CHARACTERISTICS<sup>[1]</sup>

FUNCTION	RANGE <sup>[2]</sup>	TEST CURRENT OR BURDEN VOLTAGE	INPUT IMPEDENCE <sup>[3]</sup>	ACCURACY ± (% of reading + % of range)	
				1 Year 23 °C ± 5 °C	Temperature Coefficient
					0 °C - 18 °C 28 °C - 55 °C
VOLTAGE	100.000 mV	-	10.0 MΩ ± 2%	0.025+0.008	0.0015+0.0005
	1.00000 V	-	10.0 MΩ ± 2%	0.025+0.006	0.0010+0.0005
	10.0000 V	-	10.1 MΩ ± 2%	0.025+0.005	0.0020+0.0005
	100.000 V	-	10.1 MΩ ± 2%	0.025+0.005	0.0020+0.0005
RESISTANCE	100.000 Ω	1.0 mA	-	0.05+0.008 <sup>[3]</sup>	0.0060+0.0008
	1.00000 kΩ	0.83 mA	-	0.005+0.005 <sup>[3]</sup>	0.0060+0.0005
	10.0000 kΩ	100 μA	-	0.005+0.006 <sup>[3]</sup>	0.0060+0.0005
	100.000 kΩ	10.0 μA	-	0.05+0.007	0.0060+0.0005
	1.00000 MΩ	900 nA	-	0.06+0.007	0.0060+0.0005
	10.0000 MΩ	205 nA	-	0.25+0.005	0.0250+0.0005
	100.000 MΩ	205 nA   10MΩ	-	2.00+0.005	0.3000+0.0005
CURRENT	10.0000 mA	< 0.2 V	-	0.05+0.015	0.0055+0.0005
	100.000 mA	< 0.2 V	-	0.05+0.005	0.0055+0.0005
	1.00000 A	< 0.5 V	-	0.20+0.007	0.0100+0.0005
	10.0000 A	< 0.6 V	-	0.25+0.007	0.0150+0.0005
CONTINUITY	1000 Ω	0.83 mA	-	0.05+0.005	0.0050+0.0005
DIODE TEST <sup>[4]</sup>	1.0000 V	0.83 mA	-	0.05+0.005	0.0050+0.0005

## AC CHARACTERISTICS<sup>[1]</sup>

FUNCTION	RANGE <sup>[5]</sup>	FREQUENCY	ACCURACY ± (% of reading + % of range)	
			1 Year 23 °C ± 5 °C	Temperature Coefficient
				0 °C - 18 °C 28 °C - 55 °C
TRUE-RMS AC VOLTAGE <sup>[6]</sup>	100.000 mV	20 Hz - 45 Hz	1.0+0.1	0.02+0.02
		45 Hz - 10 kHz	0.2+0.1	0.02+0.02
		10 kHz - 30 kHz	1.5+0.3	0.05+0.02
	1.00000 V to 750.00 V	30 kHz - 100 kHz <sup>[7]</sup>	5.0+0.3	0.10+0.02
		20 Hz - 45 Hz	1.0+0.1 <sup>[14]</sup>	0.02+0.02
		45 Hz - 10 kHz	0.2+0.1	0.02+0.02
		10 kHz - 30 kHz	1.0+0.1	0.05+0.02
TRUE-RMS AC CURRENT <sup>[8]</sup>	10.0000 mA 100.000 mA 10.0000 A	30 kHz - 100 kHz <sup>[7]</sup>	3.0+0.2 <sup>[15]</sup>	0.10+0.02
		20 Hz - 45 Hz	1.5+0.1	0.02+0.02
		45 Hz - 1 kHz	0.5+0.1	0.02+0.02
FREQUENCY <sup>[10]</sup>	100 mV to 750 V	1 kHz - 10 kHz <sup>[9]</sup>	2.0+0.2	0.02+0.02
		< 2 Hz	0.18+0.003	0.005
		< 20 Hz	0.04+0.003	0.005
	10 mA to 10 A	20 Hz - 100 kHz <sup>[11]</sup>	0.02+0.003	0.005
		100 kHz ~ 300 kHz <sup>[12]</sup>	0.02+0.003	0.005
		< 2 Hz	0.18+0.003	0.005
		< 20 Hz	0.04+0.003	0.005
		20 Hz ~ 10 kHz <sup>[11]</sup>	0.02+0.003	0.005

## TEMPERATURE and CAPACITANCE CHARACTERISTICS<sup>[1]</sup>

FUNCTION	RANGE	TEST CURRENT, etc.	ACCURACY ± (% of reading + % of range)	
			1 Year 23 °C ± 5 °C	Temperature Coefficient
				0 °C - 18 °C 28 °C - 55 °C
TEMPERATURE	-80 °C - 150 °C	5 kΩ thermistor probe	Probe accuracy + 0.2 °C	0.002 °C
	-110.0 °F - 300.0 °F	5 kΩ thermistor probe	Probe accuracy + 0.4 °F	0.0036 °F
CAPACITANCE	1.000 nF	0.75 μA	2.0+0.8	0.02+0.001
	10.00 nF	0.75 μA	1.0+0.5	0.02+0.001
	100.0 nF	8.3 μA	1.0+0.5	0.02+0.001
	1.000 μF - 100.0 μF	83 μA	1.0+0.5	0.02+0.001
	1000 μF	0.83 mA	1.0+0.5	0.02+0.001
	10.000 μF	0.83 mA	2.0+0.5	0.02+0.001

[1] Specifications are for 30 minutes warm-up, 5 1/2 digit resolution and calibration temperature 18 °C - 28 °C.

[2] 20% over range on all ranges except 1000Vdc.

[3] Specifications are 2-wire ohms using Math Null. If without Math Null, add 0.2Ω additional error.

[4] Specifications are for the voltage measured at the input terminals only.

[5] 20% over range on all range except 750 Vac

[6] Specifications are for sinewave inputs > 5% of range. Maximum crest factor : 3 at full scale.

[7] Additional error to be added as frequency > 30kHz and signal input < 10% of range. 30kHz ~ 100kHz: 0.003% of full scale per kHz.

[8] For 12A terminal, 10A dc or ac rms continuous, > 10A dc or ac rms for 30 seconds ON and 30 seconds OFF.

[9] For 1A and 10A ranges, the frequency is verified for less than 5kHz.

[10] Specifications are for half-hour warm-up, using 0.1 second aperture. The frequency can be measured up 1MHz as 0.5V signal to 100mV/1V ranges.

[11] For 20Hz ~ 10kHz, the sensitivity is AC input current from 10% to 120% of range except where noted.

[12] For 100kHz ~ 300kHz, the sensitivity will be 12% ~ 120% of range except 750V range.

[13] Input Impedance is in paralleled with capacitance < 120 pF.

[14] For input < 200V rms

[15] For input < 300V rms

## OPERATING CHARACTERISTICS

FUNCTION	DIGITS	READING SPEED <sup>[1]</sup>	SYSTEM SPEED			
			FUNCTION CHANGE (sec) <sup>[2]</sup>	RANGE CHANGE (sec) <sup>[3]</sup>	AUTO RANGE (sec) <sup>[4]</sup>	READING SPEED OVER USB <sup>[5]</sup>
DCV, DCI	5 1/2	15/s				8/s
	4 1/2	70/s	0.6	0.7	2.2	19/s
ACV, ACI	5 1/2	2.5/s				
	4 1/2	2.5/s	5.0	2.2	6.1	1/s
FREQUENCY <sup>[6]</sup>	5 1/2	9/s				
	4 1/2	9/s	7.0	2.5	6.1	1/s

[1] Reading rate of the A/D converter.

[2] Time to change from 2-wire resistance to this specified functions and to take at least one reading in 4.5 digit using the SCPI "FUNC" and "READ?" commands.

[3] Time to change one range to the next higher range and to take at least one reading in 4.5 digit using the SCPI "FUNC" and "READ?" commands.

[4] Time to automatically change one range and to take at least one reading in 4.5 digit using SCPI "CONF AUTO" and "READ?" commands.

[5] Number of measurements per second that can be read through USB using SCPI "READ?" command.

[6] Reading rate depend on signal frequency > 10Hz.

## SUPPLEMENTAL MEASUREMENT CHARACTERISTICS

### DC VOLTAGE

Measuring Method:

Sigma Delta A-to-D converter

Input Resistance:

10M $\Omega$   $\pm$  2% range (typical)

Input Protection:

1000V on all ranges

### RESISTANCE

Measuring Method:

2-wire Ohms

Open-circuit voltage:

Limited to < 5V

Input Protection:

1000V on all ranges

### DC CURRENT

Shunt Resistance:

0.1 $\Omega$  to 10 $\Omega$  for 10mA to 1.2A ranges

0.01 $\Omega$  for 12A range

Input Protection:

Front Panel 1.25A, 500V fuse for I terminal

Internal 15A, 600V fuse for 12A terminal

### CONTINUITY/DIODE TEST

Measuring Method:

Uses 0.83mA  $\pm$  0.2% constant current source, < 5V open circuit voltage

Response Time:

70 samples/second with audible tone

Continuity Threshold:

10 $\Omega$  fixed

Input Protection:

1000V

### TEMPERATURE

Measurement Method:

2-wire Ohms measurement of 5k $\Omega$  thermistor sensor (YSI 4407) with computer conversion

Auto-ranging measurement, no manual range selection

Input Protection:

1000V

### MEASUREMENT NOISE REJECTION

CMRR (Common Mode Rejection) for 1k $\Omega$  unbalance LO lead

DC 120 dB

AC 70 dB

NMR (Normal Mode Rejection) For 60 Hz (50Hz)  $\pm$  0.1%

5 1/2 digit 65 dB (55 dB)

4 1/2 digit 0 dB

### AC VOLTAGE

Measurement Method:

AC coupled true-RMS - measure the ac component with up to 400 Vdc bias any range

Crest Factor:

Maximum 5:1 at full scale

Input Impedence:

1M $\Omega$   $\pm$  2% in parallel with < 100pF of all ranges

Input Protection:

750Vrms on all ranges

### AC CURRENT

Measuring Method:

DC coupled to the fuse and current shunt, AC coupled true-RMS measurement (measure the AC component only)

Shunt Resistance:

0.1 $\Omega$  to 10 $\Omega$  for 10mA to 1.2A range

0.1 $\Omega$  for 12A range

Input Protection:

Externally accessible 1.25A, 500V fuse for I terminal

Internally replaceable 15A, 600V fuse for 12A terminal

### FREQUENCY

Measurement Method:

Reciprocal counting technique. AC coupled input using AC voltage function.

Signal Level:

10% of range to full scale input on all ranges

Auto or manual range selection

Gate Time:

0.1 second or 1 period of the input signal, whichever is longer.

Input Protection:

750Vrms on all ranges

### MATH FUNCTIONS

Null, dBm, dB, Min/Max/Avg, Hold, Limit Test

### TRIGGER and MEMORY

Single trigger, 1 reading memory

### REMOTE INTERFACE

USB 2.0 full speed, USBTMC class device (GPIB over USB)

### PROGRAMMING LANGUAGE

SCPI, IEEE-488.1, IEEE-488.2

## GENERAL CHARACTERISTICS

### POWER SUPPLY

100V/120V(127V)/220V(230V)/240V  $\pm$  10%  
AC line frequency 45Hz - 66Hz and (360Hz - 440Hz, 100/120V operation)

### POWER CONSUMPTION

16VA maximum, <11W average

### OPERATING ENVIRONMENT

Full accuracy at 0 °C to 55 °C  
Full accuracy to 80% RH at 30 °C (non-condensing)  
Altitude up to 3000 meters

### STORAGE COMPLIANCE

- 40 °C to 70 °C

### SAFETY COMPLIANCE

Certified to CSA for IEC/EN/CSA/UL 61010-1 2<sup>nd</sup> Edition

### MEASUREMENT CATEGORY

CAT II, 300V: CAT I 1000Vdc, 750Vac rms, 2500Vpk transient over voltage  
Pollution degree 2

### EMC COMPLIANCE

Certified to IEC/EN 61326:2002, CISPR 11, and equivalents for Group 1, Class A

### SHOCK and VIBRATION

Tested to IEC/EN 60086-2

### DIMENSION (HxWxD)

Rack: 88.5mm x 212.6mm x 272.3mm  
Bench: 103.8mm x 261.2mm x 303.2mm

### WEIGHT

3.75 kg, 8.27 lb

### WARM UP TIME

30 minutes

### WARRANTY

1 year

### Accessories included:

- Test lead kit
- Test report
- Power cord
- USB interface cable
- Quick Start Guide
- User's and Service Guide
- Product Reference CD-ROM
- Agilent IO Library Suite CD-ROM

### Options:

Opt. 1CM - Rack mount adapter kit

### Agilent Optional Accessories



34132A Deluxe Test Lead Kits



34133A Precision Electronics Test Leads

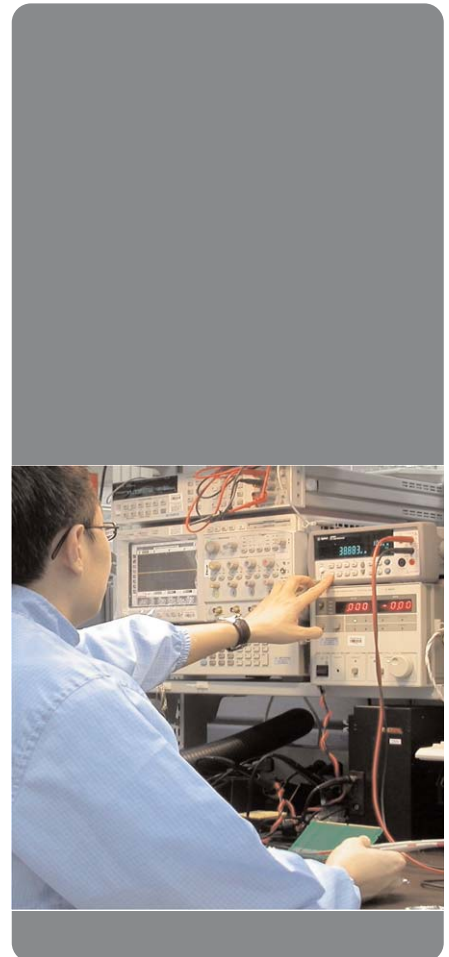
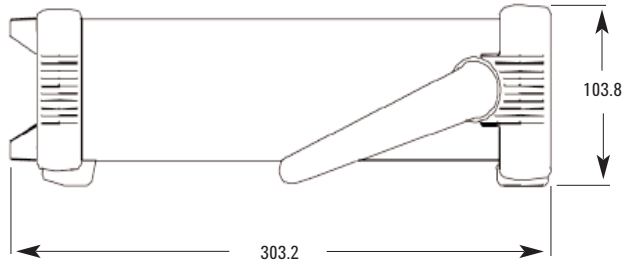
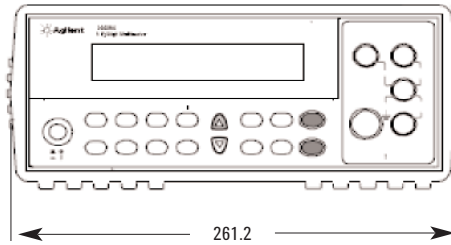


34330A 30A Current Shunt



E2308A Thermistor Probe

## DIMENSIONS



# Agilent 34405A Multimeter: Versatile and low cost solution for benchtop testing.

5.5 digit dual display increases productivity and throughput in troubleshooting.

Use the Up-Down keys to select the desired measurement range. Just press Shift -> Auto key to switch measurement range automatically.

Superior value with a broad range of functions, which includes the temperature and capacitance measurements.



Connect the supplied test leads to the Input Terminals to start your measurements.

Selecting the secondary display measurements.

Math functions and utility menu that allow users to take reference measurements (ie. Min/Max value and etc.) and store the measurement setups from the front panel.