

# Keysight Technologies

## U3400 Series 4½ and 5½ Digit Digital Multimeters

Data Sheet



Basic + Good = Elegant Simplicity

## Simply right for your basic needs, without compromising quality

The U3400 Series digital multimeters (DMMs) come with functions vital for your everyday measurements: DC, AC and AC+ DC voltage and current, 2- and 4-wire resistance, frequency, continuity and diode tests.

Math functions dBm, Min/Max, Relative, Compare, Hold and Percentage\*\* are also available to ease your measurement analysis.

Not only are the U3400 Series built robust for lasting reliability over the long haul, these DMMs also ensure dependable measurements with up to 0.012% basic DCV accuracy.

## Efficient testing with dual display and selectable resolutions\*

Dual display on the U3400 Series lets you view two parameters simultaneously as you measure, and further enhances your troubleshooting tasks. For example, the ability to see both AC voltage and frequency simultaneously would help you to measure the frequency response of amplifier circuits more efficiently and effectively. Refer to Page 3 for more typical dual display combinations and applications.

Up to three measurement speeds are available on the U3402A: Slow, Medium and Fast. This means greater flexibility in catering to different testing needs: a faster measurement speed at lower resolution or a higher resolution at slower measurement speed.

## Physical security

Your instruments may be at risk of theft or misplacement whenever you leave them unattended on the bench. With the U3400 Series' rear Kensington lock slot, you can secure your DMM and be assured that it is where you expect it to be for your continued testing the next day.

### Features

- Up to 120,000 counts resolution
- Up to 0.012% basic DCV accuracy
- 11 basic measurements and up to six built-in math functions
- Dual display on bright VFD
- Selectable resolutions for variable measurement speeds\*
- Kensington lock slot security

\* U3402A only

\*\* U3401A only

## Take a closer look

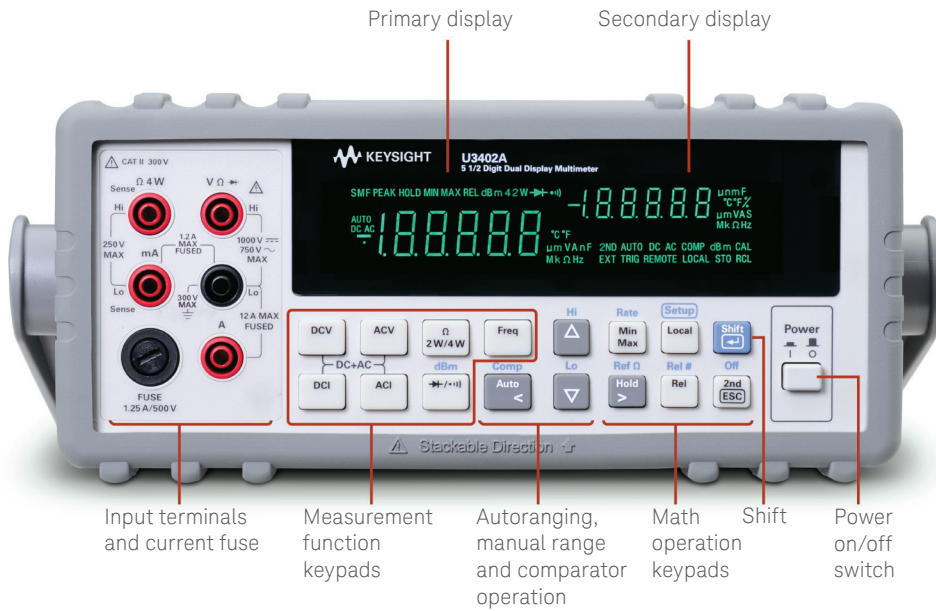


Figure 1 Front panel of the U3402A. The front panel of the U3401A is similar with slight differences in the position of certain functions. Please refer to the U3401A's User's and Service Guide U3401-90001 for details.

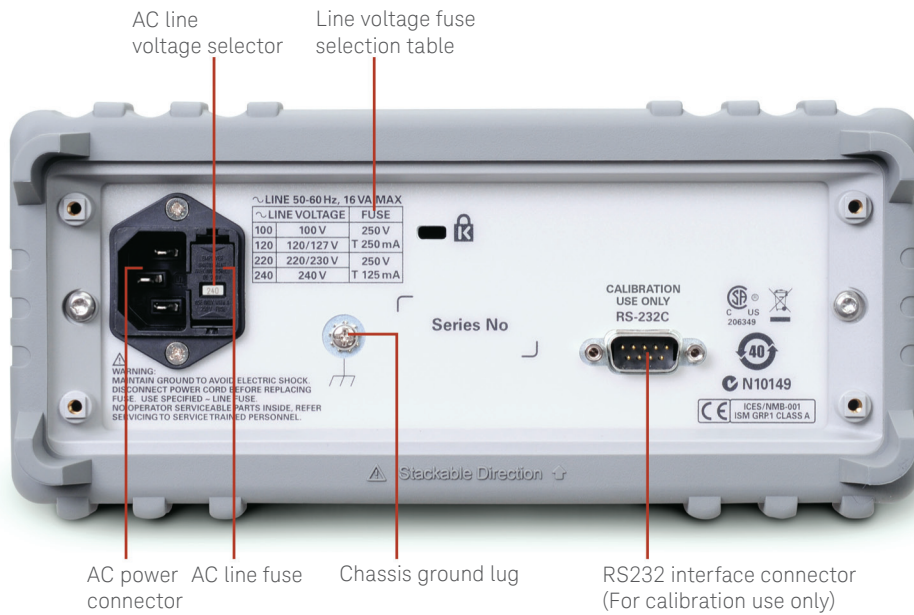


Figure 2 Rear panel of the U3401A/U3402A.

## Typical dual display combinations and applications

Primary display	Secondary display	Application	Available in
DCV	ACV	– Testing of DC-to-AC or AC-to-DC converter circuit	U3402A, U3401A
ACV + DCV	DCV	– Power supply DC level and AC ripple measurement	U3402A, U3401A
DCV	DCI	– Testing of power supply load regulation	U3402A
DCV	ACI	– Loop current and voltage drop level checking	U3402A
ACI + DCI	DCV	– Testing of line and load regulation	U3402A
ACV	DCI	– Testing of AC-to-DC or DC-to-AC converter	U3402A
ACI + DCI	ACV	– Power supply DC level and AC ripple measurement	U3402A
ACV	ACI	– Transformer testing	U3402A
ACV	Hz	– Amplifier circuit's AC frequency response measurement	U3402A, U3401A
ACI	Hz	– Adjustment of AC motor control	U3402A, U3401A
DCI	ACI	– Power supply AC ripple and DC current measurement	U3402A, U3401A
ACI + DCI	DCI	– Current dissipation measurement	U3402A, U3401A
dBm	Reference $\Omega$		U3401A
dBm	DCV	– RF frequency measurement	U3402A, U3401A
dBm	ACV		U3402A, U3401A
dBm	Hz	– Frequency response checking	U3402A

## U3400 Series specifications

### DC voltage

DCV resolution, full-scale reading and accuracy [ $\pm$  (% of reading + count)]

#### U3401A 4.5-digit DMM

Range	Resolution	Maximum reading	Accuracy (1 year; 23 °C $\pm$ 5 °C)	Typical input impedance <sup>1</sup>
500.00 mV	10 $\mu$ V	510.00	0.02% + 4	10.0 M $\Omega$
5.0000 V	100 $\mu$ V	5.1000	0.02% + 4	11.1 M $\Omega$
50.000 V	1 mV	51.000	0.02% + 4	10.1 M $\Omega$
500.00 V	10 mV	510.00	0.02% + 4	10.0 M $\Omega$
1000.0 V	100 mV	1200.0 <sup>2</sup>	0.02% + 4	10.0 M $\Omega$

1. Input impedance is in parallel with capacitance <100 pF.
2. In VDC 1000 V range, 1200 V is readable with audio warning.

Rate	Range	Resolution	Maximum reading	Accuracy (1 year; 23 °C $\pm$ 5 °C)	Typical input impedance <sup>1</sup>
Slow	120.000 mV	1 $\mu$ V	119.999	0.012% + 8 <sup>2</sup>	10.0 M $\Omega$
	1.20000 V	10 $\mu$ V	1.19999	0.012% + 5	10.0 M $\Omega$
	12.0000 V	100 $\mu$ V	11.9999	0.012% + 5	11.1 M $\Omega$
	120.000 V	1 mV	119.999	0.012% + 5	10.1 M $\Omega$
	1000.00 V	10 mV	1000.00 <sup>3</sup>	0.012% + 5	10.0 M $\Omega$
Medium	400.00 mV	10 $\mu$ V	399.99	0.012% + 5	10.0 M $\Omega$
	4.0000 V	100 $\mu$ V	3.9999	0.012% + 5	11.1 M $\Omega$
	40.000 V	1 mV	39.999	0.012% + 5	10.1 M $\Omega$
	400.00 V	10 mV	399.99	0.012% + 5	10.0 M $\Omega$
	1000.0 V	100 mV	1000.0 <sup>3</sup>	0.012% + 5	10.0 M $\Omega$
Fast	400.0 mV	100 $\mu$ V	399.9	0.012% + 2	10.0 M $\Omega$
	4.000 V	1 mV	3.999	0.012% + 2	11.1 M $\Omega$
	40.00 V	10 mV	39.99	0.012% + 2	10.1 M $\Omega$
	400.0 V	100 mV	399.9	0.012% + 2	10.0 M $\Omega$
	1000 V	1 V	1000 <sup>3</sup>	0.012% + 2	10.0 M $\Omega$

1. Input impedance is in parallel with capacitance <120 pF.
2. Relative (REL) operation is used.
3. In VDC 1000 V range, 1050 V is readable.

## AC voltage (true RMS, AC coupling mode)

ACV resolution, full-scale reading and accuracy [ $\pm$  (% of reading + count)]

### U3401A 4.5-digit DMM

Range	Resolution	Maximum reading	Accuracy (1 year; 23 °C $\pm$ 5 °C) <sup>1</sup>			
			30 Hz to 50 Hz	50 Hz to 10 kHz	10 kHz to 30 kHz	30 kHz to 100 kHz
500.00 mV	10 $\mu$ V	510.00	1% + 40	0.05% + 40	2% + 60	3% + 20
5.0000 V	100 $\mu$ V	5.1000	1% + 20	0.35% + 15	1% + 20	3% + 50
50.000 V	1 mV	51.000	1% + 20	0.35% + 15	1% + 20	3% + 50
500.00 V	10 mV	510.00	Not specified	0.5% + 15	1% + 20 <sup>2</sup>	3% + 50 <sup>2</sup>
750.0 V	100 mV	1000.0	Not specified	0.5% + 15 <sup>3</sup>	1% + 20 <sup>2</sup>	Not specified

1. Accuracy specified at input >5% of full scale.
2. Input voltage <200 V RMS.
3. For 5 kHz to 10 kHz, accuracy is 0.7% + 15.
4. In VAC 750 V range, 1000.0 V RMS is readable with audio warning.

### U3402A 5.5-digit DMM

Rate	Range	Resolution	Maximum reading	Accuracy (1 year; 23 °C $\pm$ 5 °C) <sup>1</sup>			
				20 Hz to 45 Hz	45 Hz to 10 kHz	10 kHz to 30 kHz	30 kHz to 100 kHz
Slow	120.000 mV	1 $\mu$ V	119.999	1% + 100	0.2% + 100	1.5% + 100	5% + 300 <sup>2</sup>
	1.20000 V	10 $\mu$ V	1.19999	1% + 100	0.2% + 100	1% + 100	3% + 200 <sup>2</sup>
	12.0000 V	100 $\mu$ V	11.9999	1% + 100	0.2% + 100	1% + 100	3% + 200 <sup>2</sup>
	120.000 V	1 mV	119.999	1% + 100	0.2% + 100	1% + 100	3% + 200 <sup>2</sup>
	750.00 V	10 mV	750.00 <sup>4</sup>	1% + 100	0.2% + 100	1% + 100	3% + 200 <sup>3</sup>
				1% + 100 <sup>2</sup>			
Medium	400.00 mV	10 $\mu$ V	399.99	1% + 40	0.2% + 40	1.5% + 80	5% + 120 <sup>2</sup>
	4.0000 V	100 $\mu$ V	3.9999	1% + 40	0.2% + 40	1% + 40	3% + 80 <sup>2</sup>
	40.000 V	1 mV	39.999	1% + 40	0.2% + 40	1% + 40	3% + 80 <sup>2</sup>
	400.00 V	10 mV	399.99	1% + 40 <sup>2</sup>	0.2% + 40	1% + 40	3% + 80 <sup>2</sup>
	750.0 V	100 mV	750.0	1% + 40 <sup>2</sup>	0.2% + 40	1% + 40	3% + 80 <sup>3</sup>
Fast	400.0 mV	100 $\mu$ V	399.9	1% + 5	0.2% + 5	1.5% + 10	5% + 15 <sup>2</sup>
	4.000 V	1 mV	3.999	1% + 5	0.2% + 5	1% + 5	3% + 10 <sup>2</sup>
	40.00 V	10 mV	39.99	1% + 5	0.2% + 5	1% + 5	3% + 10 <sup>2</sup>
	400.0 V	100 mV	399.9	1% + 5 <sup>2</sup>	0.2% + 5	1% + 5	3% + 10 <sup>2</sup>
	750 V	1 V	750	1% + 5 <sup>2</sup>	0.2% + 5	1% + 5	3% + 10 <sup>3</sup>

1. Accuracy specified at input >5% of full scale.
2. Input voltage <200 V RMS.
3. Input voltage <500 V RMS.
4. In VAC 750 V range, 787.5 V RMS is readable.

## AC voltage (true RMS, AC+DC coupling mode)

AC+DC voltage resolution, full-scale reading and accuracy [ $\pm$  (% of reading + count)]

## U3401A 4.5-digit DMM

Range	Resolution	Maximum reading	Accuracy (1 year; 23 °C $\pm$ 5 °C) <sup>1</sup>		
			50 Hz to 10 kHz	10 kHz to 30 kHz	30 kHz to 100 kHz
500.00 mV	10 $\mu$ V	510.00	0.5% + 50	2% + 70	3% + 130
5.0000 V	100 $\mu$ V	5.1000	0.5% + 25	1% + 30	3% + 60
50.000 V	1 mV	51.000	0.5% + 25	1% + 30	3% + 60
500.00 V	10 mV	510.00	0.5% + 25	1% + 30 <sup>2</sup>	3% + 60 <sup>2</sup>
750.0 V	100 mV	1000.0 <sup>3</sup>	0.5% + 25 <sup>4</sup>	1% + 30 <sup>2</sup>	Not specified

1. Accuracy specified at input >5% of full scale.
2. Input voltage <200 V RMS.
3. In VAC 750 V range, 1000.0 V RMS is readable with audio warning.
4. For 5 kHz to 10 kHz, accuracy is 0.7% + 25.

## U3402A 5.5-digit DMM

Rate	Range	Resolution	Maximum reading	Accuracy (1 year; 23 °C $\pm$ 5 °C) <sup>1</sup>		
				45 Hz to 10 kHz	10 kHz to 30 kHz	30 kHz to 100 kHz
Slow	120.000 mV	1 $\mu$ V	119.999	0.2% + 100	1.5% + 300	5% + 300
	1.20000 V	10 $\mu$ V	1.19999	0.2% + 100	1% + 100	3% + 200
	12.0000 V	100 $\mu$ V	11.9999	0.2% + 100	1% + 100	3% + 200
	120.000 V	1 mV	119.999	0.2% + 100	1% + 100	3% + 200
	750.00 V	10 mV	750.000 <sup>2</sup>	0.2% + 100	1% + 100	3% + 200 <sup>3</sup>
				0.2% + 100		
Medium	400.00 mV	10 $\mu$ V	399.99	0.2% + 45	1.5% + 83	5% + 125
	4.0000 V	100 $\mu$ V	3.9999	0.2% + 43	1% + 43	3% + 83
	40.000 V	1 mV	39.999	0.2% + 43	1% + 43	3% + 83
	400.00 V	10 mV	399.99	0.2% + 43	1% + 43	3% + 83
	750.0 V	100 mV	750.00	0.2% + 43	1% + 43	3% + 83 <sup>3</sup>
Fast	400.0 mV	100 $\mu$ V	399.9	0.2% + 7	1.5% + 12	5% + 18
	4.000 V	1 mV	3.999	0.2% + 7	1% + 7	3% + 12
	40.00 V	10 mV	39.99	0.2% + 7	1% + 7	3% + 12
	400.0 V	100 mV	399.9	0.2% + 7	1% + 7	3% + 12
	750 V	1 V	750.0	0.2% + 7	1% + 7	3% + 12 <sup>3</sup>

1. Accuracy specified at input >5% of full scale.
2. In VAC 750 V range, 787.5 V RMS is readable.
3. Input voltage <500 V RMS.

## DC current

DCI resolution, full-scale reading and accuracy [ $\pm$  (% of reading + count)]

### U3401A 4.5-digit DMM

Range	Resolution	Maximum reading	Accuracy (1 year; 23 °C $\pm$ 5 °C)	Burden voltage <sup>1</sup> and shunt resistor
500.00 $\mu$ A	10 nA	510.00	0.05% + 5	<0.06 V/100 $\Omega$
5.0000 mA	100 nA	5.1000	0.05% + 4	<0.6 V/100 $\Omega$
50.000 mA	1 $\mu$ A	51.000	0.05% + 4	<0.08 V/1 $\Omega$
500.00 mA	10 $\mu$ A	510.00	0.05% + 4	<0.8 V/1 $\Omega$
5.0000 A	100 $\mu$ A	5.1000	0.25% + 5	<0.3 V/0.01 $\Omega$
10.000 A	1 mA	20.000 <sup>2</sup>	0.25% + 5	<0.6 V/0.01 $\Omega$

1. Typical at full-scale reading and voltage across the input terminals.
2. In 10 A range, >10 to 20 ADC is readable for 20 seconds maximum with audio warning.

### U3402A 5.5-digit DMM

Rate	Range	Resolution	Maximum reading	Accuracy (1 year; 23 °C $\pm$ 5 °C)	Burden voltage <sup>1</sup> and shunt resistor
Slow	12.0000 mA	0.1 $\mu$ A	11.9999	0.05% + 15 <sup>2</sup>	<0.15 V/10 $\Omega$
	120.000 mA	1 $\mu$ A	119.999	0.05% + 5	<1.5 V/10 $\Omega$
	1200.00 mA	10 $\mu$ A	1199.99	0.2% + 5	<0.3 V/0.1 $\Omega$
	12.0000 A	100 $\mu$ A	11.9999	0.2% + 5	<0.6 V/0.01 $\Omega$
Medium	40.000 mA	1 $\mu$ A	39.999	0.1% + 6	<0.5 V/10 $\Omega$
	120.00 mA	10 $\mu$ A	119.99	0.1% + 3	<1.5 V/10 $\Omega$
	1200.0 mA	100 $\mu$ A	1199.9	0.2% + 3	<0.3 V/0.1 $\Omega$
	12.000 A	1 mA	11.999	0.2% + 3	<0.6 V/0.01 $\Omega$
Fast	40.00 mA	10 $\mu$ A	39.99	0.1% + 2	<0.5 V/10 $\Omega$
	120.0 mA	100 $\mu$ A	119.9	0.1% + 2	<1.5 V/10 $\Omega$
	1200 mA	1 mA	1199	0.2% + 2	<0.3 V/0.1 $\Omega$
	12.00 A	10 mA	11.99	0.2% + 2	<0.6 V/0.01 $\Omega$

1. Typical at full-scale reading and voltage across the input terminals.
2. Relative (REL) operation is used.



## AC current (true RMS, AC coupling mode)

ACI resolution, full-scale reading and accuracy [ $\pm$  (% of reading + count)]

### U3401A 4.5-digit DMM

Range	Resolution	Maximum reading	Accuracy (1 year; 23 °C $\pm$ 5 °C) <sup>1</sup>				Burden voltage <sup>2</sup> and shunt resistor
			30 Hz to 50 Hz	50 Hz to 2 kHz	2 kHz to 5 kHz	5 kHz to 20 kHz	
500.00 $\mu$ A	10 nA	510.00	1.5% + 50	0.5% + 20	1.5% + 50	3% + 75 <sup>3</sup>	<0.06 V/100 $\Omega$
5.0000 mA	100 nA	5.1000	1.5% + 40	0.5% + 20	1.5% + 40	3% + 60	<0.6 V/100 $\Omega$
50.000 mA	1 $\mu$ A	51.000	1.5% + 40	0.5% + 20	1.5% + 40	3% + 60	<0.08 V/1 $\Omega$
500.00 mA	10 $\mu$ A	510.00	1.5% + 40	0.5% + 20	1.5% + 40	3% + 60	<0.8 V/1 $\Omega$
5.0000 A	100 $\mu$ A	5.1000	2% + 40 <sup>4</sup>	0.5% + 20	Not specified	Not specified	<0.3 V/0.01 $\Omega$
10.000 A	1 mA	20.000 <sup>5</sup>	2% + 40 <sup>4</sup>	0.5% + 30 (<1 kHz)	Not specified	Not specified	<0.6 V/0.01 $\Omega$

1. Accuracy specified at input >5% of full scale and >1 A for 10 A range unless otherwise stated.

2. Typical at full-scale reading and voltage across the input terminals.

3. Input current >35  $\mu$ A RMS.

4. Input current <3 A RMS.

5. In 10 A range, >10 to 20 ADC is readable for 20 seconds maximum with audio warning.

### U3402A 5.5-digit DMM

Rate	Range	Resolution	Maximum reading	Accuracy (1 year; 23 °C $\pm$ 5 °C) <sup>1</sup>			Burden voltage <sup>2</sup> and shunt resistor
				20 Hz to 45 Hz	45 Hz to 2 kHz	2 kHz to 10 kHz	
Slow	12.0000 mA	0.1 $\mu$ A	11.9999	1.5% + 100	0.5% + 100	2% + 200	<0.15 V/10 $\Omega$
	120.000 mA	1 $\mu$ A	119.999	1.5% + 100	0.5% + 100	2% + 200	<1.5 V/10 $\Omega$
	1200.00 mA	10 $\mu$ A	1199.99	1.5% + 100	0.5% + 100	2% + 200	<0.3 V/0.1 $\Omega$
	12.0000 A	100 $\mu$ A	11.9999	1.5% + 100	1% + 100	Not specified	<0.6 V/0.01 $\Omega$
				2% + 100 (<1.2 A)			
Medium	40.000 mA	1 $\mu$ A	39.999	1.5% + 40	0.5% + 40	2% + 80	<0.5 V/10 $\Omega$
	120.00 mA	10 $\mu$ A	119.99	1.5% + 12	0.5% + 12	2% + 30	<1.5 V/10 $\Omega$
	1200.0 mA	100 $\mu$ A	1199.9	1.5% + 12	0.5% + 12	2% + 30	<0.3 V/0.1 $\Omega$
	12.000 A	1 mA	11.999	1.5% + 12 (<1.2 A)	1% + 12	Not specified	<0.6 V/0.01 $\Omega$
Fast	40.00 mA	10 $\mu$ A	39.99	1.5% + 5	0.5% + 5	2% + 10	<0.5 V/10 $\Omega$
	120.0 mA	100 $\mu$ A	119.9	1.5% + 2	0.5% + 2	2.2% + 5	<1.5 V/10 $\Omega$
	1200 mA	1 mA	1199	1.5% + 2	0.5% + 2	2.2% + 5	<0.3 V/0.1 $\Omega$
	12.00 A	10 mA	11.99	2% + 2 (<1.2 A)	1% + 2	Not specified	<0.6 V/0.01 $\Omega$

1. Accuracy specified at input >5% of full scale.

2. Typical at full-scale reading and voltage across the input terminals.

## AC current (true RMS, AC+DC coupling mode)

AC+DC current resolution, full-scale reading and accuracy [ $\pm$  (% of reading + count)]

### U3401A 4.5-digit DMM

Range	Resolution	Maximum reading	Accuracy (1 year; 23 °C $\pm$ 5 °C) <sup>1</sup>			Burden voltage <sup>2</sup> and shunt resistor
			50 Hz to 2 kHz	2 kHz to 5 kHz	5 kHz to 20 kHz	
500.00 $\mu$ A	10 nA	510.00	0.5% + 30	1.5% + 60	3% + 85 <sup>3</sup>	<0.06 V/100 $\Omega$
5.0000 mA	100 nA	5.1000	0.5% + 30	1.5% + 50	3% + 70	<0.6 V/100 $\Omega$
50.000 mA	1 $\mu$ A	51.000	0.5% + 30	1.5% + 50	3% + 70	<0.08 V/1 $\Omega$
500.00 mA	10 $\mu$ A	510.00	0.5% + 30	1.5% + 50	3% + 70	<0.8 V/1 $\Omega$
5.0000 A	100 $\mu$ A	5.1000	0.5% + 30	Not specified	Not specified	<0.3 V/0.01 $\Omega$
10.000 A	1 mA	20.000 <sup>4</sup>	0.5% + 40 (<1 kHz)	Not specified	Not specified	<0.6 V/0.01 $\Omega$

1. Accuracy specified at input >5% of full scale and >1 A for 10 A range unless otherwise stated.
2. Typical at full-scale reading and voltage across the input terminals.
3. Input current >35  $\mu$ A RMS.
4. In 10 A range, >10 to 20 ADC is readable for 20 seconds maximum with audio warning.

### U3402A 5.5-digit DMM

Rate	Range	Resolution	Maximum reading	Accuracy (1 year; 23 °C $\pm$ 5 °C) <sup>1</sup>		Burden voltage <sup>2</sup> and shunt resistor
				45 Hz to 2 kHz	2 kHz to 10 kHz	
Slow	12.0000 mA	0.1 $\mu$ A	11.9999	0.5% + 100	2% + 200	<0.15 V/10 $\Omega$
	120.000 mA	1 $\mu$ A	119.999	0.5% + 100	2% + 200	<1.5 V/10 $\Omega$
	1200.00 mA	10 $\mu$ A	1199.99	0.5% + 100	2% + 200	<0.3 V/0.1 $\Omega$
	12.0000 A	100 $\mu$ A	11.9999	0.5% + 100	Not specified	<0.6 V/0.01 $\Omega$
Medium	40.000 mA	1 $\mu$ A	39.999	1% + 100	Not specified	<0.5 V/10 $\Omega$
	120.00 mA	10 $\mu$ A	119.99	0.5% + 42	2% + 80	<1.5 V/10 $\Omega$
	1200.0 mA	100 $\mu$ A	1199.9	0.5% + 15	2% + 30	<0.3 V/0.1 $\Omega$
	12.000 A	1 mA	11.999	0.5% + 15	2% + 30	<0.6 V/0.01 $\Omega$
Fast	40.00 mA	10 $\mu$ A	39.99	1% + 15	Not specified	<0.5 V/10 $\Omega$
	120.0 mA	100 $\mu$ A	119.9	0.5% + 7	2% + 12	<1.5 V/10 $\Omega$
	1200 mA	1 mA	1199	0.5% + 4	2% + 7	<0.3 V/0.1 $\Omega$
	12.00 A	10 mA	11.99	0.5% + 4	2% + 7	<0.6 V/0.01 $\Omega$
				1% + 4	Not specified	<0.6 V/0.01 $\Omega$

1. Accuracy specified at input >5% of full scale.
2. Typical at full-scale reading and voltage across the input terminals.

## Resistance

Resistance resolution, full scale reading, and accuracy [ $\pm$  (% of reading + count)]

### U3401A 4.5-digit DMM

Range <sup>1</sup>	Resolution	Maximum reading	Test current	Accuracy (1 year; 23 °C ± 5 °C)
500.00 $\Omega$	10 m $\Omega$	510.00	0.5 mA	0.1% + 5 <sup>2</sup>
5.0000 k $\Omega$	100 m $\Omega$	5.1000	0.45 mA	0.1% + 3 <sup>2</sup>
50.000 k $\Omega$	1 $\Omega$	51.000	45 $\mu$ A	0.1% + 3
500.00 k $\Omega$	10 $\Omega$	510.00	4.5 $\mu$ A	0.1% + 3
5.0000 M $\Omega$	100 $\Omega$	5.1000	450 nA	0.1% + 3
50.000 M $\Omega$	1 k $\Omega$	51.000	45 nA	0.3% + 3

1. To reduce noise interference that may be induced by the test leads, we recommend using a shielded test cable for measuring resistances above 500 k $\Omega$ .
2. Relative (REL) operation is used.

### U3402A 5.5-digit DMM

Rate	Range <sup>1</sup>	Resolution	Maximum reading	Test current	Accuracy (1 year; 23 °C ± 5 °C)	
					2-wire	4-wire
Slow	120.000 $\Omega$	1 m $\Omega$	119.999	0.5 mA	0.1% + 82	0.05% + 8 <sup>2</sup>
	1.20000 k $\Omega$	10 m $\Omega$	1.19999	0.5 mA	0.08% + 52	0.05% + 5 <sup>2</sup>
	12.0000 k $\Omega$	100 m $\Omega$	11.9999	100 $\mu$ A	0.06% + 52	0.05% + 5
	120.000 k $\Omega$	1 $\Omega$	119.999	10 $\mu$ A	0.06% + 5	0.05% + 5
	1.20000 M $\Omega$	10 $\Omega$	1.19999	1 $\mu$ A	0.06% + 5	0.05% + 5
	12.0000 M $\Omega$	100 $\Omega$	11.9999	100 nA	0.3% + 5	0.3% + 5
	120.000 M $\Omega$	1 k $\Omega$	119.999	10 nA	3% + 8	3% + 8
Medium	400.00 $\Omega$	10 m $\Omega$	399.99	0.5 mA	0.1% + 5 <sup>2</sup>	0.05% + 5 <sup>2</sup>
	4.0000 k $\Omega$	100 m $\Omega$	3.9999	100 $\mu$ A	0.08% + 3 <sup>2</sup>	0.05% + 3
	40.000 k $\Omega$	1 $\Omega$	39.999	50 $\mu$ A	0.06% + 3	0.05% + 3
	400.00 k $\Omega$	10 $\Omega$	399.99	5 $\mu$ A	0.06% + 3	0.05% + 3
	4.0000 M $\Omega$	100 $\Omega$	3.9999	500 nA	0.15% + 3	0.15% + 3
	40.000 M $\Omega$	1 k $\Omega$	39.999	50 nA	1.5% + 3	1.5% + 3
	300.00 M $\Omega$	10 k $\Omega$	299.99	10 nA	5.0% + 5	5.0% + 5
Fast	400.0 $\Omega$	100 m $\Omega$	399.9	0.5 mA	0.1% + 2 <sup>2</sup>	0.05% + 2
	4.000 k $\Omega$	1 $\Omega$	3.999	100 $\mu$ A	0.08% + 2	0.05% + 2
	40.00 k $\Omega$	10 $\Omega$	39.99	50 $\mu$ A	0.06% + 2	0.05% + 2
	400.0 k $\Omega$	100 $\Omega$	399.9	5 $\mu$ A	0.06% + 2	0.05% + 2
	4.000 M $\Omega$	1 k $\Omega$	3.999	500 nA	0.15% + 2	0.15% + 2
	40.00 M $\Omega$	10 k $\Omega$	39.99	50 nA	1.5% + 2	1.5% + 2
	300.0 M $\Omega$	100 k $\Omega$	299.9	10 nA	5.0% + 2	5.0% + 2

1. To reduce noise interference that may be induced by the test leads, we recommend using a shielded test cable for measuring resistances above 100 k $\Omega$ .
2. Relative (REL) operation is used.

## Diode test/continuity

### U3401A 4.5-digit DMM

Range	Resolution	Maximum reading	Accuracy (1 year; 23 °C ± 5 °C)
2.3000 V	100 µV	2.3000 V	0.05% + 5

### U3402A 5.5-digit DMM

Rate	Resolution	Maximum reading	Accuracy (1 year; 23 °C ± 5 °C)
Slow	1.19999 V	10.0000 µV	0.012% + 5
Medium	2.4999 V	100.00 µV	0.012% + 5
Fast	2.499 V	1.000 mV	0.012% + 2

## Frequency

Frequency resolution, full-scale reading and accuracy [ $\pm$  (% of reading + count)]

### U3401A 4.5-digit DMM

Range	Measurement range	Resolution	Maximum reading	Accuracy (1 year; 23 °C ± 5 °C)
500.00 Hz	5 Hz to 500 Hz	0.01 Hz	510.00	0.01% + 5
5.0000 kHz	500 Hz to 5 kHz	0.1 Hz	5.1000	0.01% + 3
50.000 kHz	5 kHz to 50 kHz	1 Hz	51.000	0.01% + 3
500.00 kHz	50 kHz to 500 kHz	10 Hz	999.99	0.01% + 3

Range	Input sensitivity for voltage measurement (sine-wave)	
	5 Hz to 100 kHz	100 kHz to 500 kHz
500 mV	35 mV RMS	200 mV RMS
5 V	0.25 V RMS	0.5 V RMS
50 V	2.5 V RMS	5 V RMS
500 V	25 V RMS	Not specified
750 V	50 V RMS	Not specified

### U3402A 5.5-digit DMM

Range	Measurement range	Resolution	Maximum reading	Accuracy (1 year; 23 °C ± 5 °C) <sup>1</sup>	Input sensitivity (sine wave)
1200.00 Hz	5 Hz to 1200 Hz	10 mHz	1199.99	0.005% + 3	40 mV RMS
12.0000 kHz	10 Hz to 12 kHz	100 mHz	11.9999	0.005% + 2	40 mV RMS
120.000 kHz	100 Hz to 120 kHz	1 Hz	119.999	0.005% + 2	40 mV RMS
1.0000 MHz	1 kHz to 1 MHz	10 Hz	1.1999	0.005% + 2	0.5 V RMS

1. Specified accuracy at input >5% of full scale.

## Decibel (dB) calculation

Range and accuracy ( $\pm$ dB)

### U3401A 4.5-digit DMM

Voltage range <sup>1,2</sup>	Input voltage	dBm <sup>3</sup> range at 600 $\Omega$ ref	Accuracy (1 year; 23 °C $\pm$ 5 °C)		
			30 Hz to 50 Hz	50 Hz to 10 kHz	10 kHz to 100 kHz
500.00 mV	20 mV to 500 mV	-29.82 to -3.80	0.3	0.3	0.7
5.0000 V	5000 mV to 5 V	-3.80 to 16.20	0.2	0.2	0.5
50.000 V	5 V to 50 V	16.20 to 36.20	0.2	0.2	0.5
500.00 V	50 V to 500 V	36.20 to 56.20	0.2 <sup>4</sup>	0.2	0.5 <sup>4</sup>
1000.0 VDC	500 V to 1000 V	56.20 to 62.22	Not specified	0.2 <sup>5</sup>	Not specified
750.0 VAC	500 V to 750 V	56.20 to 59.72	Not specified	0.2 <sup>5</sup>	Not specified

1. Auto ranging is used when dBm operation is selected.
2. In VDC 1000 V range, 1200 V is readable. In VAC 750 V range, 1000 V is readable.
3. Reading is displayed in dB when relative (REL) operation is used.
4. Input voltage <200 V RMS.
5. For input voltage within the frequency range of 50 Hz to 1 kHz.

### U3402A 5.5-digit DMM

Rate	Voltage range <sup>1,2</sup>	Input voltage	dBm <sup>3</sup> range at 600 $\Omega$ ref	Accuracy (1 year; 23 °C $\pm$ 5 °C)		
				20 Hz to 45 Hz	45 Hz to 10 kHz	10 kHz to 100 kHz
Slow	120.000 mV	6 mV to 120 mV	-42.20 to -16.20	1.0	0.2	1.0
	1.20000 V	120 mV to 1.2 V	-16.20 to 3.80	0.8	0.1	0.8
	12.0000 V	1.2 V to 12 V	3.80 to 23.80	0.8	0.1	0.8
	120.000 V	12 V to 120 V	23.80 to 43.80	0.8	0.1	0.8
	1000.00 VDC	120 V to 1000 V	43.80 to 62.22	0.8	1.0 <sup>4</sup>	Not specified
	750.00 V	120 V to 750 V	43.80 to 59.72	Not specified	1.0 <sup>4</sup>	Not specified
Medium	400.00 mV	20 mV to 400 mV	-31.76 to -5.74	1.0	0.2	1.0
	4.0000 V	400 mV to 4 V	-5.74 to 14.26	0.8	0.1	0.8
	40.000 V	4 V to 40 V	14.26 to 34.26	0.8	0.1	0.8
	400.00 V	40 V to 400 V	34.26 to 54.26	0.8	0.1	0.8
	1000.0 VDC	400 V to 1000 V	54.26 to 62.22	Not specified	1.0 <sup>4</sup>	Not specified
	750.0 V	400 V to 750 V	54.26 to 59.72	Not specified	1.0 <sup>4</sup>	Not specified
Fast	400.0 mV	20 mV to 400 mV	-31.76 to -5.74	1.0	0.2	1.0
	4.000 V	400 mV to 4 V	-5.74 to 14.26	0.8	0.1	0.8
	40.00 V	4 V to 40 V	14.26 to 34.26	0.8	0.1	0.8
	400.0 V	40 V to 400 V	34.26 to 54.26	0.8	0.1	0.8
	400.0 V	400 V to 1000 V	54.26 to 62.22	Not specified	1.0 <sup>4</sup>	Not specified
	1000 VDC	400 V to 750 V	54.26 to 59.72	Not specified	1.0 <sup>4</sup>	Not specified
	750 V					

1. Auto ranging is used when dBm operation is selected.
2. In VAC 750 V range, 5% over-range is readable.
3. Reading is displayed in dB when relative (REL) operation is used.
4. For input voltage within the frequency range of 45 Hz to 1 kHz.

## Supplemental specifications

### Full-scale display counts

Model	Reading rate	Display counts
U3401A	N/A	51,000
U3402A	Slow	120,000
	Medium	40,000
	Fast	4,000

### Supplemental measurement specifications

Measurement		Specification
DC voltage	Measurement method	Sigma Delta A-to-D converter
	Input resistance	10 M $\Omega$ $\pm$ 2% range (typical)
	Maximum input voltage	1000 VDC or PEAK AC on all ranges
	Input protection	1000 V on all ranges
	Response time	Approximately 1.0 second when the displayed reading reaches 99.9% DC value of the tested input signal at the same range
DC current	Shunt resistance	<b>U3401A</b> – 0.01 $\Omega$ to 100 $\Omega$ for 500 $\mu$ A to 10 A ranges
		<b>U3402A</b> – 0.1 $\Omega$ to 10 $\Omega$ for 12 mA to 1.2 A ranges – 0.01 $\Omega$ for 12 A range
	Maximum input and overload protection (U3402A only)	<b>mA input terminal:</b> 1200 mADC or AC RMS. Protected with 1.25 A/500 V, IEC-127 sheet, FB fuse <b>12 A input terminal:</b> 10 ADC or AC RMS continuous; or 12 ADC or AC RMS for 30 seconds maximum. Protected with 15 A/600 V, breaking capacity 10,000 A FB fuse
	Response time	Approximately 1.0 second when the displayed reading reaches 99.9% DC value of the tested input signal at the same range
AC voltage	Measurement method	AC-coupled true RMS: measures the AC component with up to 400 VDC bias on any range
	Crest factor	Maximum 3:0 at full scale
	Input impedance	<b>U3401A:</b> 1 M $\Omega$ in parallel with <100 pF <b>U3402A:</b> 1 M $\Omega$ $\pm$ 2% in parallel with <120 pF
	Maximum input voltage	<b>U3401A:</b> 1000 V RMS/1400 V PEAK <b>U3402A:</b> 750 V RMS/1200 V PEAK 2x10 <sup>7</sup> V-Hz product on any range, normal mode input 1x10 <sup>6</sup> V-Hz product on any range, common mode input
	Overload ranging	Selects higher range if peak input overload is detected during auto range. Overload is reported in manual ranging
	Input protection	<b>U3401A:</b> 1000 V RMS on all ranges <b>U3402A:</b> 750 V RMS on all ranges
	Response time	Approximately 1.5 seconds when the displayed reading reaches 99.9% AC RMS value of the tested input signal at the same range.

## Supplemental measurement specifications (continued)

Measurement	Specification	
AC+DC voltage	Measurement method	AC+DC coupled true RMS: measures the AC component with up to 400 VDC bias on any range
	Crest factor	Maximum 3:0 at full scale
	Input impedance	<b>U3401A:</b> 1 M $\Omega$ in parallel with <100 pF <b>U3402A:</b> 1 M $\Omega$ $\pm$ 2% in parallel with <120 pF
	Maximum input voltage	<b>U3401A:</b> 1000 V RMS/1400 V PEAK <b>U3402A:</b> 750 V RMS/1100 V PEAK 2x10 <sup>7</sup> V-Hz product on any range, normal mode input 1x10 <sup>6</sup> V-Hz product on any range, common mode input
	Overload ranging	Selects higher range if peak input overload is detected during auto range. Overload is reported in manual ranging
	Input protection	<b>U3401A:</b> 1000 V RMS on all ranges <b>U3402A:</b> 750 V RMS on all ranges
	Response time	Approximately 1.5 seconds (2.5 seconds for U3402A) when the displayed reading reaches 99.9% AC RMS value of the tested input signal at the same range
AC current	Measurement method	DC coupled to the fuse and current shunt, AC coupled true rms measurement (measures the AC component only)
	Crest factor	Maximum 3:0 at full scale
	Shunt resistance	<b>U3401A</b> – 0.01 $\Omega$ to 100 $\Omega$ for 500 $\mu$ A to 10 A ranges <b>U3402A</b> – 0.1 $\Omega$ to 10 $\Omega$ for 10 mA to 1.2 A ranges – 0.01 $\Omega$ for 12 A range
	Input protection	<b>U3401A</b> Front panel fuse 630 mA, 500 V; internal 25 A, 440 V <b>U3402A</b> <b>mA input terminal:</b> 1200 mADC or AC RMS. Protected with 1.25 A/500 V, IEC-127 sheet, FH fuse <b>12 A input terminal:</b> 10 ADC or AC RMS continuous; or 12 ADC or AC RMS for 30 seconds maximum. Protected with 15 A/600 V, breaking capacity 10,000 A FH fuse
Response time	Approximately 1.5 seconds when the displayed reading reaches 99.9% AC RMS value of the tested input signal at the same range	
AC+DC current	Measurement method	AC+DC coupled to the fuse and current shunt, AC+DC coupled true rms measurement (measures the AC component only)
	Crest factor	Maximum 3:0 at full scale
	Measurement range	Vdc and Vac are automatically set at the same range
	Response time	Approximately 1.5 seconds when the displayed reading reaches 99.9% AC RMS value of the tested input signal at the same range
Resistance	Measurement method	<b>U3401A:</b> 2-wire ohms <b>U3402A:</b> 2-wire ohms or 4-wire ohms
	Open-circuit voltage	<b>U3401A:</b> Limited to <+6 VDC <b>U3402A:</b> Limited to <+5 VDC
	Zeroing error	0.05 $\Omega$ or less (excluding test lead resistance) in each range when Relative operation is used

## Supplemental measurement specifications (continued)

Measurement		Specification
Resistance	Input protection	500 V
	Response time	<b>U3401A</b> – Approximately 1.5 seconds for 5 M $\Omega$ and ranges below 5 M $\Omega$  <b>U3402A</b> – Approximately 1.5 seconds for 12 M $\Omega$ and ranges below 12 M $\Omega$ – Approximately 5 seconds for 40 M $\Omega$ – Approximately 10 seconds for 120 M $\Omega$ – Approximately 23 seconds for 300 M $\Omega$
Diode/ Continuity	Measurement method	U3401A: 0.5mA +/- 0.2% constant current source, open circuit voltage limited to <6V. U3402A: 0.5mA +/- 0.2% constant current source, open circuit voltage limited to <5V.
	Test current	Approximately 0.5 mADC
	Open-circuit voltage	<b>U3401A:</b> Limited to <+6 VDC <b>U3402A:</b> Limited to <+5 VDC
	Continuity threshold	10 $\Omega$ fixed
	Continuity level	Approximately <+50 mVDC
	Audible tone	Continuous beep for continuity and single tone for normal forward-biased diode or semiconductor junction
	Input protection	500 V
Resistance/ Continuity (U3402A only)	Measurement method	2-wire ohms
	Test current	Approximately 0.5 mADC
	Open-circuit voltage	Limited to <+5 VDC
	Audible tone	Continuous beep for continuity and single tone for normal forward-biased diode or semiconductor junction
	Zeroing error	0.05 $\Omega$ or less (excluding test lead resistances) in each range when Relative operation is used
	Input protection	500 V
Frequency	Measurement method	Reciprocal counting technique. AC coupled input using AC voltage function
	Crest factor	Maximum 3:0 at full scale
	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 impedance	<b>U3401A:</b> 1 M $\Omega$ in parallel with <100 pF <b>U3402A:</b> 1 M $\Omega$ $\pm$ 2% in parallel with <120 pF
	Maximum input voltage	<b>U3401A:</b> 1000 V RMS/1400 V PEAK <b>U3402A:</b> 750 V RMS/1100 V PEAK 2x10 <sup>7</sup> V-Hz product on any range, normal mode input 1x10 <sup>6</sup> V-Hz product on any range, common mode input
	Input protection	750 V RMS on all ranges
	Response time	Approximately 1.5 seconds when the displayed reading reaches 99.9% of frequency value
Noise rejection	Common mode rejection ratio (CMRR) for 1 k $\Omega$ unbalanced LO lead	50/60 Hz $\pm$ 0.1%: DC >90 dB
	Normal mode rejection ratio (NMRR)	50/60 Hz $\pm$ 0.1%: >50 dB

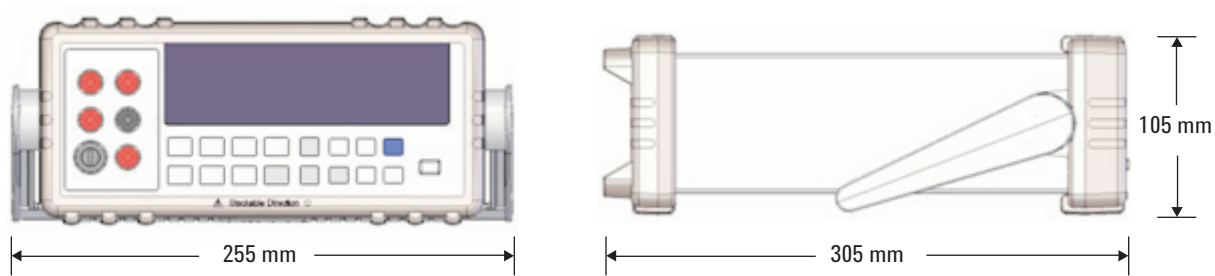


## Supplemental measurement specifications (continued)

Measurement	Specification
dBm operation	0 dBm 1 mW at 600 $\Omega$ reference impedance
Resolution	<b>U3401A</b> 0.01 dB for all ranges  <b>U3402A</b> Slow: 0.01 dB for all ranges Medium: 0.01 dB for all ranges Fast: 0.1 dB for all ranges
Reference impedance <sup>1</sup>	2 $\Omega^2$ , 4 $\Omega^2$ , 8 $\Omega^2$ , 16 $\Omega^2$ , 50 $\Omega$ , 75 $\Omega$ , 93 $\Omega$ , 110 $\Omega$ , 124 $\Omega$ , 125 $\Omega$ , 135 $\Omega$ , 150 $\Omega$ , 250 $\Omega$ , 300 $\Omega$ , 500 $\Omega$ , 600 $\Omega$ , 800 $\Omega$ , 900 $\Omega$ , 1000 $\Omega$ , 1200 $\Omega$ , 8000 $\Omega$
Math operation	<b>U3401A:</b> dBm, Relative, Min/Max, Compare, Hold, Percentage <b>U3402A:</b> dBm, Relative, Min/Max, Compare, Hold
I/O interface	RS-232 (for calibration use only)

1. Reference impedance is displayed on the secondary display.
2. Reading is displayed in watts (audio power).

## General characteristics



### Power supply

- 100 V/120 V/220 V/240 V ± 10%
- AC line frequency 50 Hz to 60 Hz

### Power consumption

16 VA maximum

### Input power option

Manual-ranging (100 VAC to 240 VAC ± 10%)

### Fuse

#### U3401A

Terminal: 25 A, 440 V FB fuse; 0.63 A, 500 V FB fuse

Power line: 0.25 A, 250 V SB fuse, or 0.125 A, 250 V SB fuse

#### U3402A

Terminal: 15 A, 600 V FB fuse; 1.25 A, 500 V FB fuse

Power line: 0.25 A, 250 V SB fuse, or 0.125 A, 250 V SB fuse

### Display

Highly visible vacuum fluorescent display (VFD)

### Operating environment

- Operating temperature from 0 °C to +50 °C
- Relative humidity up to 80% at 28 °C RH
- (non-condensing)
- Altitude up to 2000 meters
- Pollution degree 2
- For indoor use only

### Storage compliance

- -20 °C to 60 °C
- Relative humidity at 5% to 90% RH
- (non-condensing)

### Safety compliance

- IEC 61010-1:2001/EN61010-1:2001
- (2nd Edition)
- Canada: CAN/CSA-C22.2 No. 61010-1-04
- USA: ANSI/UL 61010-1:2004

### EMC compliance

- IEC 61326-1:2005/EN61326-1:2006
- Canada: ICES/NMB-001:2004
- Australia/New Zealand: AS/NZS
- CISPR11:2004

### Shock and vibration

Tested to IEC/EN 60068-2

### I/O connector

Output connectors

### I/O interface

RS-232 (for calibration use only)

### Dimensions (W × H × D)

255 mm × 105 mm × 305 mm (with bumpers)

215 mm × 87 mm × 282 mm (without bumpers)

### Weight

3.44 kg (with bumpers)

### Warranty

Three years for U3401A/U3402A

Three months for standard shipped accessories

### Calibration cycle

One year

### Warm-up time

At least 30 minutes

## Ordering Information

Each U3400 Series includes these standard shipped accessories:

- Quick Start Guide
- Product Reference CD
- Certificate of Calibration
- 34138A Test Lead Kit
- AC Power Cord

## Accessories



**34138A Test Lead Kit**



**U1161A Extended Test Lead Kit**



**34330A Current Shunt (30 A)**



**34133A Precision Electronic Test Leads**



**11059A Kelvin Probe Set**



**U3400A-1CM Rack Mount Kit**

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