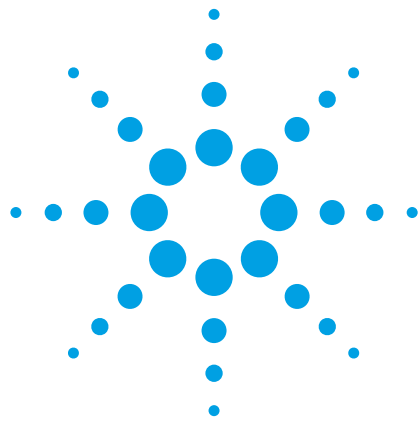




## Agilent Handheld Tools

for electronic, electrical and industrial process testing



- Digital multimeters
- Digital oscilloscopes
- Clamp meters
- Multifunction calibrator meter
- LCR meters
- Capacitance meters



**Agilent Technologies**



## Go Further with Agilent Handheld Tools

Agilent is the world's premier measurement company and a technology leader in communications, electronics, life sciences and chemical analysis. Recognizing the increasing demand for tools that are portable, accurate and yet affordable, Agilent offers handheld instruments which include digital multimeters, oscilloscopes, clamp meters, capacitance and LCR meters and multi-function calibrator/meter for installation and maintenance activities.

These award-winning handheld tools meet critical safety standards while providing a wealth of features and world-class accuracy.

Each handheld comes in vivid orange cases that provide greater visibility and serves to highlight investment protection through feature sets that go beyond those of typical handhelds.

# Digital Multimeters

Whatever your applications are, Agilent's handheld digital multimeters are up to the task. From electronics troubleshooting to installation and maintenance of machinery, our handheld DMMs are designed to withstand the harsh working conditions and improve safety. Our range of handheld DMMs are also equipped with smart features to help you quickly detect problems and obtain accurate measurements.

| Recommend-<br>ed for | Installation and maintenance of<br>power distribution and supplies |        |        | Installation and<br>maintenance of<br>machinery, electrical<br>systems |        | Electronics troubleshooting |        |        | Industrial |        |
|----------------------|--------------------------------------------------------------------|--------|--------|------------------------------------------------------------------------|--------|-----------------------------|--------|--------|------------|--------|
| Model no.            | U1211A                                                             | U1212A | U1213A | U1241B                                                                 | U1242B | U1251B                      | U1252B | U1253B | U1271A     | U1272A |

## DISPLAY

|                             |       |       |       |                                    |                                    |        |        |                 |        |        |
|-----------------------------|-------|-------|-------|------------------------------------|------------------------------------|--------|--------|-----------------|--------|--------|
| Display resolution (counts) | 4,000 | 4,000 | 4,000 | 10,000                             | 10,000                             | 50,000 | 50,000 | 50,000          | 30,000 | 30,000 |
| Dual display                | Yes   | Yes   | Yes   | No                                 | No                                 | Yes    | Yes    | Yes             | Yes    | Yes    |
| Analog bar-graph            | Yes   | Yes   | Yes   | Yes                                | Yes                                | Yes    | Yes    | Yes             | Yes    | Yes    |
| Back-light                  | Yes   | Yes   | Yes   | Yes<br>(two inten-<br>sity levels) | Yes<br>(two inten-<br>sity levels) | Yes    | Yes    | OLED<br>Display | Yes    | Yes    |

## BASIC FEATURES

|                         |        |        |         |       |       |        |         |         |        |         |
|-------------------------|--------|--------|---------|-------|-------|--------|---------|---------|--------|---------|
| AC bandwidth            | 400 Hz | 400 Hz | 2 kHz   | 2 kHz | 2 kHz | 30 kHz | 100 kHz | 100 kHz | 20 kHz | 100 kHz |
| True RMS                | AC     | AC     | AC + DC | AC    | AC    | AC     | AC + DC | AC + DC | AC     | AC + DC |
| Auto manual/<br>Ranging | Yes    | Yes    | Yes     | Yes   | Yes   | Yes    | Yes     | Yes     | Yes    | Yes     |

## MEASUREMENTS

|                             |                                 |                                 |                                  |                                   |                                                    |                                   |                                                      |                                                      |                                   |                                                  |
|-----------------------------|---------------------------------|---------------------------------|----------------------------------|-----------------------------------|----------------------------------------------------|-----------------------------------|------------------------------------------------------|------------------------------------------------------|-----------------------------------|--------------------------------------------------|
| Voltage AC/DC:<br>Range     | 400 V to<br>1000 V              | 400 V to<br>1000 V              | 4 V to<br>1000 V                 | 1 to 1000 V                       | 1 to 1000 V                                        | 50 mV to<br>1000 V                | 50 mV to<br>1000 V                                   | 50 mV to<br>1000 V                                   | 300 mV to<br>1000 V               | 30 mV to<br>1000 V                               |
| Current AC/<br>DC: Range    | ACI: 40 A<br>to 1000 A          | 40 A to<br>1000 A               | 40 A to<br>1000 A                | 1 mA to<br>10 A                   | 1 mA to<br>10 A                                    | 500 $\mu$ A to<br>10 A            | 500 $\mu$ A to<br>10 A                               | 500 $\mu$ A to<br>10 A                               | 300 $\mu$ A to<br>10 A            | 300 $\mu$ A to<br>10 A                           |
| Resistance: Range           | 400 $\Omega$ to<br>4 k $\Omega$ | 400 $\Omega$ to<br>4 k $\Omega$ | 400 $\Omega$ to<br>40 M $\Omega$ | 1 k $\Omega$ to<br>100 M $\Omega$ | 1 k $\Omega$ to<br>100 M $\Omega$                  | 500 $\Omega$ to<br>500 M $\Omega$ | 500 $\Omega$ to<br>500 M $\Omega$                    | 500 $\Omega$ to<br>500 M $\Omega$                    | 300 $\Omega$ to<br>100 M $\Omega$ | 30 $\Omega$ to<br>300 M $\Omega$                 |
| Frequency: Range            | 99.99 Hz<br>to<br>999.9 kHz     | 99.99 Hz<br>to<br>999.9 kHz     | 99.99 Hz<br>to<br>999.9 kHz      | 100 Hz<br>to<br>1000 kHz          | 100 Hz<br>to<br>1000 kHz                           | 99.999 Hz<br>to<br>999.99 kHz     | 99.999 Hz<br>to<br>999.99 kHz                        | 99.999 Hz<br>to<br>999.99 kHz                        | 99.999 Hz<br>to<br>999.99 kHz     | 99.999 Hz<br>to<br>999.99 kHz                    |
| Capacitance:<br>Range       | 400 $\mu$ F to<br>4000 $\mu$ F  | 400 $\mu$ F to<br>4000 $\mu$ F  | 4 $\mu$ F to<br>4000 $\mu$ F     | 1 $\mu$ F to<br>10 mF             | 1 $\mu$ F to<br>10 mF                              | 10 nF to<br>100 mF                | 10 nF to<br>100 mF                                   | 10 nF to<br>100 mF                                   | 10 nF to<br>10 mF                 | 10 nF to 10<br>mF                                |
| Temperature:<br>Type, Range | -                               | K: -200 °C<br>to 1372 °C        | K: -200 °C<br>to 1372 °C         | K: -40 °C<br>to 1000 °C           | K: -40 °C to<br>1000 °C<br>J: -40 °C to<br>1000 °C | K: -200 °C<br>to 1372 °C          | K: -200 °C<br>to 1372 °C<br>J: -210 °C<br>to 1200 °C | K: -200 °C<br>to 1372 °C<br>J: -210 °C<br>to 1200 °C | K: -200°C<br>to 1372°C            | K: -200°C<br>to 1372°C<br>J: -200°C<br>to 1200°C |

| Recom-<br>mended for | Installation and maintenance of<br>power distribution and supplies |        |        | Installation and<br>maintenance of<br>machinery, electrical<br>systems |        | Electronics troubleshooting |        |        | Industrial |        |
|----------------------|--------------------------------------------------------------------|--------|--------|------------------------------------------------------------------------|--------|-----------------------------|--------|--------|------------|--------|
| Model no.            | U1211A                                                             | U1212A | U1213A | U1241B                                                                 | U1242B | U1251B                      | U1252B | U1253B | U1271A     | U1272A |

## MEASUREMENTS

|                           |     |     |     |     |     |     |     |     |     |     |
|---------------------------|-----|-----|-----|-----|-----|-----|-----|-----|-----|-----|
| Continuity with<br>beeper | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Diode test                | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes | Yes |

## DATA MANAGEMENT

|                       |     |     |     |     |     |        |        |        |        |        |
|-----------------------|-----|-----|-----|-----|-----|--------|--------|--------|--------|--------|
| Min/max<br>recording  | Yes | Yes | Yes | Yes | Yes | Yes    | Yes    | Yes    | Yes    | Yes    |
| Display hold          | Yes | Yes | Yes | Yes | Yes | Yes    | Yes    | Yes    | Yes    | Yes    |
| Peak hold             | Yes | Yes | Yes | -   | -   | Yes    | Yes    | Yes    | Yes    | Yes    |
| Manual<br>datalogging | -   | -   | -   | -   | Yes | Yes    | Yes    | Yes    | Yes    | Yes    |
| Null                  | Yes | Yes | Yes | Yes | Yes | Yes    | Yes    | Yes    | Yes    | Yes    |
| PC connectivity       | -   | -   | -   | -   | -   | IR-USB | IR-USB | IR-USB | IR-USB | IR-USB |
| % scale of<br>4-20 mA | -   | -   | -   | Yes | Yes | Yes    | Yes    | Yes    | Yes    | Yes    |

## GENERAL

|                            |                                       |                                       |                                       |                                       |                                                                                                               |                                       |                                                                                     |                                                                                                                   |                                                         |                                                                              |
|----------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------|---------------------------------------------------------------------------------------------------------------|---------------------------------------|-------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------|------------------------------------------------------------------------------|
| Operating<br>temperature   | -10 °C to<br>50 °C, 0 to<br>80% R.H   | -10 °C to<br>50 °C, 0 to<br>80% R.H   | -10 °C to<br>50 °C, 0 to<br>80% R.H   | -10 °C to<br>55 °C, 0 to<br>80% R.H   | -10 °C to<br>55 °C, 0 to<br>80% R.H                                                                           | -20 °C to<br>55 °C, 0 to<br>80% R.H   | -20 °C to<br>55 °C, 0 to<br>80% R.H                                                 | -20 °C to<br>55 °C, 0 to<br>80% R.H                                                                               | -20 °C to<br>55 °C, 0 to<br>80% R.H                     | -20 °C to<br>55 °C, 0 to<br>80% R.H                                          |
| Measurement<br>category    | CAT III<br>1000 V/<br>CAT IV<br>600 V | CAT III<br>1000 V/<br>CAT IV<br>600 V | CAT III<br>1000 V/<br>CAT IV<br>600 V | CAT III<br>1000 V/<br>CAT IV<br>600 V | CAT III<br>1000 V/<br>CAT IV<br>600 V                                                                         | CAT III<br>1000 V/<br>CAT IV<br>600 V | CAT III<br>1000 V/<br>CAT IV<br>600 V                                               | CAT III<br>1000 V/<br>CAT IV<br>600 V                                                                             | CAT III<br>1000 V/<br>CAT IV<br>600 V                   | CAT III<br>1000 V/<br>CAT IV<br>600 V                                        |
| Battery type<br>(included) | 9 V                                   | 9 V                                   | 9 V                                   | 4x AAA                                | 4x AAA                                                                                                        | 9 V                                   | 7.2 V<br>(recharge-<br>able)                                                        | 7.2 V<br>(recharge-<br>able)                                                                                      | 4x AAA                                                  | 4x AAA                                                                       |
| Battery life               | 60 hours                              | 60 hours                              | 60 hours                              | 300 hours                             | 300 hours                                                                                                     | 72 hours                              | 36 hours                                                                            | 8 hours                                                                                                           | 300 hours                                               | 300 hours                                                                    |
| Dimensions<br>(HxWxD)      | 273.0 mm x<br>106.0 mm x<br>43.0 mm   | 260.0 mm x<br>106.0 mm x<br>43.0 mm   | 260.0 mm x<br>106.0 mm x<br>43.0 mm   | 193.8 mm x<br>92.2 mm x<br>58.0 mm    | 193.8 mm x<br>92.2 mm x<br>58.0 mm                                                                            | 203.5 mm x<br>94.4 mm x<br>59.0 mm    | 203.5 mm x<br>94.4 mm x<br>59.0 mm                                                  | 203.5 mm x<br>94.4 mm x<br>59.0 mm                                                                                | 207.0 mm x<br>92.0 mm x<br>59.0 mm                      | 207.0 mm x<br>92.0 mm x<br>59.0 mm                                           |
| Advanced<br>functions      | Clamp<br>Opening<br>of 52 mm<br>/2"   | Clamp<br>Opening<br>of 52 mm<br>/2"   | Clamp<br>Opening<br>of 52 mm<br>/2"   | Switch<br>counter                     | Switch<br>counter,<br>harmonic<br>ratio, dual<br>and<br>differential<br>tem-<br>perature<br>measure-<br>ments | -                                     | 20 MHz<br>frequency<br>counter,<br>program-<br>mable<br>square<br>wave<br>generator | Organic<br>LED<br>display,<br>20 MHz<br>frequency<br>counter,<br>program-<br>mable<br>square<br>wave<br>generator | Low pass<br>filter, AC<br>and/or DC<br>voltage<br>check | Low pass<br>filter, low<br>impedance<br>mode,<br>offset<br>compensa-<br>tion |

## U1270 Series – Handheld Digital Multimeters **NEW!**

### *Shaped to fit, tailored to perform, built to last*

Water and dust resistant. Grip-friendly and feature-packed. That's what you get with an Agilent U1270 series handheld DMM. Designed especially to fulfill the needs of industrial handheld users today, Agilent has reinvented the industrial handheld DMM to provide:



- Feature sets that meet traditional industrial requirements and improve productivity such as low impedance mode, low pass filter, offset compensation
- Both visual and audible continuity indication in noisy environments
- Dust and water resistant casing (certified to IP 54)
- Easy access to fuse for simplified maintenance
- Easy connectivity to PC and internal memory for data logging
- Better grip
- Large knob and buttons

## Applications with U1270 Series Handheld Digital Multimeters

### Key functions

#### Low Pass Filter (LPF)

In alternating current (AC) electric motor related applications such as the temperature control system in chiller rooms or conveyor drives, the efficiency of the motor is very important to reduce operating costs and improve productivity. Therefore, technicians need to perform routine servicing and repairs on the motors and variable-frequency drive (VFD). The VFD is especially important as it controls the rotational speed of the electric motor by regulating the frequency of the electrical power supplied to the motor.

Sometimes, a maintenance check on the motor and VFD reveals that the actual output voltage and frequency from the VFD differs from the readings on the VFD display. This shows that the VFD might be faulty and may therefore need replacement or repair. The difference in voltage readings could also be contributed by harmonics produced by the output of the VFD. This problem must be addressed quickly because if this situation prolongs, the motor may overheat and eventually fail, causing downtime.

It is difficult to identify the root cause of this error using a typical wide bandwidth handheld digital multimeter (DMM). A handheld multimeter with a built-in low pass filter would help technicians to quickly determine if the problem is contributed by unwanted high frequency components generated by the VFD. The Agilent U1270 Series handheld DMMs offer a 1 kHz low pass filter to provide accurate VFD output measurement. This function eliminates unwanted high frequency noise signals and components generated by the VFD. Therefore, a technician would be able to reduce troubleshooting time and ultimately reduce system downtime.



*Comparison of voltage output from industrial motor VFD without and with Low Pass Filter functionality.*

### Low impedance mode ( $Z_{\text{LOW}}$ )

Electrical conduit is commonly found in buildings, from manufacturing plants to residential homes. It provides enclosed conductors protection from moisture, chemical vapors and impact. The use of electrical conduit simplifies wiring changes as existing conductors can be withdrawn and new conductors installed with little disruption along the path of the conduit.

Although convenient and safe, unused wires can sometimes run parallel with energized wiring. This may induce capacitive coupling between these wires, causing an undesirable transfer of energy from the energized wiring to the unused wiring. This complicates installation or maintenance of electrical wiring as voltage may be detected on the unused wiring. This is known as 'stray voltage'. This causes complications for technicians, who would have to spend time troubleshooting or isolating wires in order to determine the source of the voltage.

Multimeters with a low impedance mode are able to identify the presence of stray voltages in non-energized wiring. The low impedance mode eliminates false readings by providing a load to the circuit during voltage testing.

The Agilent U1272A is a dual impedance digital multimeter, offering both high and low impedance modes. The DMM's high impedance function can be used in most electrical measurements in the industrial environment because it will not load the circuit under test. Switching to the low impedance mode allows the U1272A to perform accurate measurements on circuits that may contain stray voltages. This eliminates the need of an additional low impedance multimeter, such as a solenoid tester. If this mode is used when real voltage is present, the Agilent U1272A has a built-in positive temperature coefficient (PTC) thermistor as an overcurrent protection element.

## Smart $\Omega$

In integrated circuit (IC) manufacturing plants, ground continuity measurements on workstations are important to ensure that electrostatic discharge (ESD) is minimized. As electronic components become further miniaturized, these components are more sensitive to ESD. In order to maintain a workstation, the common ground point for continuity to earth or electrical ground should be checked periodically.

During this continuity check, leakage current may be found flowing through the common ground conductor to earth ground. This leakage current causes inaccurate ground continuity measurement.

The Agilent U1272A handheld digital multimeter (DMM) allows you to read the leakage current with its Smart  $\Omega$  function. With the U1272A's dual display and 30 Ohms range, you can obtain accurate resistance measurement and read leakage current simultaneously.

## Specifications of the U1270 Series Digital Multimeters

|                        |                                | U1271A                                                  | U1272A                                                  |
|------------------------|--------------------------------|---------------------------------------------------------|---------------------------------------------------------|
| <b>Basic Features</b>  |                                |                                                         |                                                         |
| Display resolution     |                                | 30,000                                                  | 30,000                                                  |
| Auto/manual ranging    |                                | Yes                                                     | Yes                                                     |
| Analog bar graph       |                                | Yes                                                     | Yes                                                     |
| Backlight              |                                | Yes                                                     | Yes                                                     |
| AC bandwidth           |                                | 20 kHz                                                  | 100 kHz                                                 |
| True RMS               |                                | AC                                                      | AC + DC                                                 |
| <b>Measurements</b>    |                                |                                                         |                                                         |
| Voltage DC             | Range<br>Accuracy              | 300 mV to 1000 V<br>0.05% + 2 cnts                      | 30 mV to 1000 V ★<br>0.05% + 2 cnts                     |
| Voltage AC             | Range<br>Accuracy<br>Bandwidth | 300 mV to 1000 V<br>0.7% + 20 cnts<br>45 Hz to 20 kHz   | 30 mV to 1000 V ★<br>0.6% + 20 cnts<br>45 Hz to 100 kHz |
| Current DC             | Range<br>Accuracy              | 300 $\mu$ A to 10 A<br>0.2% + 5 cnts                    | 300 $\mu$ A to 10 A ★<br>0.2% + 5 cnts                  |
| Current AC             | Range<br>Accuracy<br>Bandwidth | 300 $\mu$ A to 10 A<br>0.9% + 25 cnts<br>45 Hz to 2 kHz | 300 $\mu$ A to 10 A<br>0.6% + 25 cnts<br>45 Hz to 2 kHz |
| Resistance             | Range<br>Accuracy              | 300 $\Omega$ to 100 M $\Omega$<br>0.2% + 5 cnts         | 30 $\Omega$ to 300 M $\Omega$ ★<br>0.2% + 5 cnts        |
| Frequency              | Range<br>Accuracy              | 99.999 Hz to 999.99 kHz<br>0.005% + 5 cnts              | 99.999 Hz to 999.99 kHz<br>0.005% + 5 cnts              |
| Capacitance            | Range<br>Accuracy              | 10 nF to 10 mF<br>1% + 2 cnts                           | 10 nF to 10 mF<br>1% + 2 cnts                           |
| Temperature            | Range<br>Accuracy              | K: -200 to 1372 °C<br>1% + 1 °C                         | K: -200 to 1372 °C<br>J: -200 to 1200 °C<br>1% + 1 °C   |
| Continuity with beeper |                                | Yes                                                     | Yes                                                     |
| Diode test             |                                | Yes                                                     | Yes                                                     |

|                                       | U1271A                        | U1272A                        |
|---------------------------------------|-------------------------------|-------------------------------|
| <b>Data Management</b>                |                               |                               |
| Min/Max Recording                     | Yes                           | Yes                           |
| Display Hold                          | Yes                           | Yes                           |
| Peak Hold                             | Yes                           | Yes                           |
| Manual Datalogging                    | Yes                           | Yes                           |
| Null                                  | Yes                           | Yes                           |
| PC Connectivity                       | IR-USB                        | IR-USB                        |
| % scale of 4-20 mA                    | Yes                           | Yes                           |
| <b>Special Features ★</b>             |                               |                               |
| Beep + Backlight Alert                | Yes                           | Yes                           |
| Low Pass Filter (LPF)                 | Yes                           | Yes                           |
| Z <sub>LOW</sub> - Low impedance mode | -                             | Yes                           |
| Smart Ω                               | -                             | Yes                           |
| Qik-V                                 | Yes                           | -                             |
| <b>Safety and Regulatory</b>          |                               |                               |
| Over-voltage safety protection        | CAT III 1000 V, CAT IV 600 V  | CAT III 1000 V, CAT IV 600 V  |
| EN/IEC 61010-1:2001 compliance        | Yes                           | Yes                           |
| CSA C22.2 No. 61010-1:2004 compliance | Yes                           | Yes                           |
| <b>General</b>                        |                               |                               |
| Operating temperature                 | -20 °C to 55 °C, 0 to 80% R.H | -20 °C to 55 °C, 0 to 80% R.H |
| Battery (included)                    | 4x AAA                        | 4x AAA                        |
| Battery life                          | 300 hours                     | 300 hours                     |
| Warranty                              | 3 years                       | 3 years                       |
| Dimensions (HxWxD)                    | 207.0 mm x 92.0 mm x 59.0 mm  | 207.0 mm x 92.0 mm x 59.0 mm  |

★ represents key specifications/feature

For complete specifications, please refer to data sheet 5990-6425EN

## Recommended Accessories



**U1171A Magnetic hanging kit**



**U1174A Soft carrying case**



**U1173A IR-to-USB cable**



**U1180A Thermocouple adapter/lead kit**

#### Web Link

[www.agilent.com/find/handhelddmm](http://www.agilent.com/find/handhelddmm)



#### How to?

Test for stray voltage using the U1272A

<http://cp.literature.agilent.com/litweb/pdf/5990-6517EN.pdf>

## U1240 Series - Handheld Digital Multimeters

### Check more, fix more, spend less

Installation and maintenance of machinery, electrical systems and more often require numerous quick checks and fixes, sometimes under hazardous conditions. Whether you need to quickly inspect power supplies for harmonics, detect glitches in switch systems or monitor differential temperature, the U1240 Series of handheld digital multimeters (DMMs) is up to the task. With all you need in one portable instrument, you can travel light and finish the day's work with ease. Plus, you'll be glad to know it's easy to own one, even with the DMM's rich capabilities.

#### Features

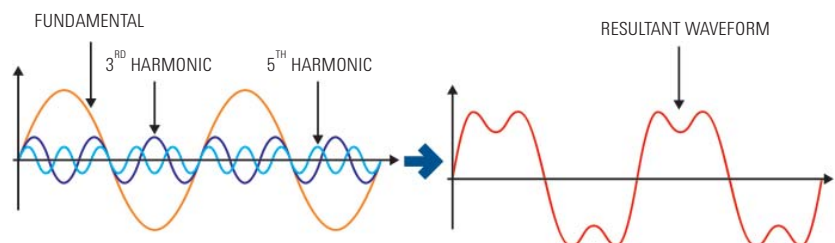
- Low micro-amp and high Mega-ohm ranges
- Switch/Relay counter for glitch detection
- Harmonic ratio measurement in AC supplies
- Dual and differential temperature measurements
- Data logging to instrument on the go



## Applications with U1240 Series Handheld Digital Multimeters

### Harmonic ratio measurement for maintenance of facilities, motors, generators and transformers

Any periodic waveform other than an absolutely pure sine wave has some amount of harmonic content. If these unwanted multiples of the fundamental frequency become too large, they have unwanted side effects: overheating that shortens the lifespan of motors, generators and transformers; premature tripping of circuit breakers; and blown fuses.



*When harmonics are present, the shape of an original sinusoidal waveform becomes distorted, producing a non-zero harmonic ratio.*



Regular maintenance with an accurate, dependable DMM ensures early detection of harmonics in the AC supply. One of the quickest ways to detect and gauge the percentage of distortion due to harmonics is to measure the harmonic ratio of the incoming AC voltage.

The U1240 Series offers a fast one-button check with its harmonic ratio function. The ratio percentage helps you decide if further analysis of the power source is necessary with an oscilloscope or a spectrum analyzer.

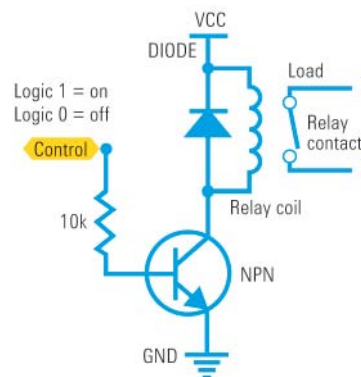
$$\text{Harmonic ratio} = \frac{V_{rms} - V_{avg}}{V_{rms}} \times 100\%$$

$\downarrow$   $V_{rms}$        $\downarrow$   $V_{avg}$

| Measuring Circuit          |                                                                                     | RMS-calculating converter calculates heating value | Multiplies rectified average by 1.1 |
|----------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------|-------------------------------------|
| Response To Sine Wave      |    | Correct                                            | Correct                             |
| Response To Square Wave    |    | Correct                                            | 10% high                            |
| Response To Distorted Wave |  | Correct                                            | Up to 50% low                       |

## Switch counter for detection of glitches on switch and relay systems

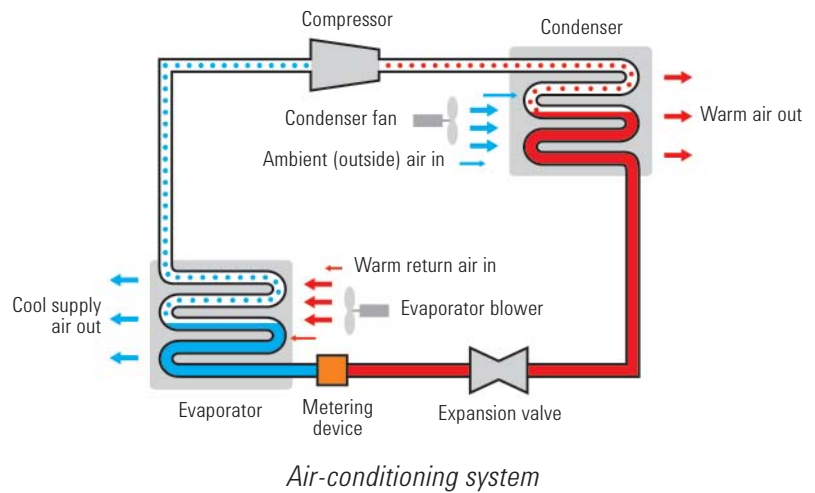
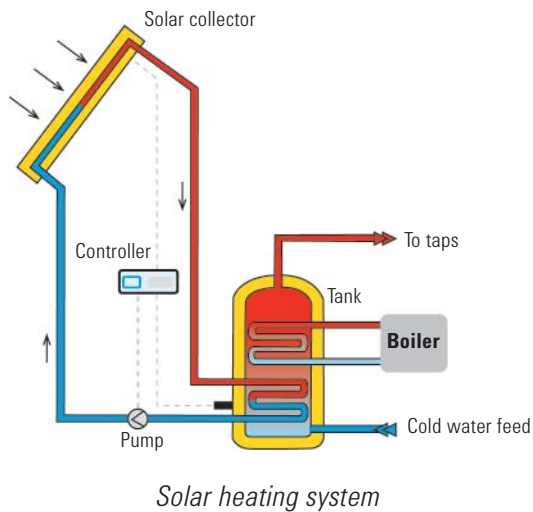
Careful maintenance of the switches and relays used in facilities and machinery helps ensure that they're operating as expected in their OPEN or CLOSED settings. You can check their performance with just one button using the U1240 Series' switch counter function. This function detects intermittent OPEN or CLOSED occurrences across relay/switch contacts in the reversed setting. The total count indicates the extent of relay/switch faults and determines if further troubleshooting is necessary.



## Dual and differential temperature for efficient testing of HVAC systems



Whether you're installing, maintaining or troubleshooting heating, ventilation and air-conditioning (HVAC) systems in cars, offices, factories, stores or homes, temperature measurements are crucial. For example, to ensure boiler temperature meets safety requirements, you'd have to measure boiler and air temperature simultaneously to get accurate real-time readings. With a faulty air conditioning system, viewing the temperature difference between warm return air and cool supply air helps reveal the cooling behavior of the evaporator with respect to time. With the U1240 Series, you need just one instrument for convenient, efficient dual and differential temperature measurements.



# Specifications of the U1240 Series Digital Multimeters

|                                       | U1241A/U1241B                | U1242A/U1242B                               |
|---------------------------------------|------------------------------|---------------------------------------------|
| <b>Display</b>                        |                              |                                             |
| Counts                                | 10,000 ★                     | 10,000 ★                                    |
| Analog bar graph                      | •                            | •                                           |
| Backlight                             | Dual-intensity ★             | Dual-intensity ★                            |
| <b>Back Features</b>                  |                              |                                             |
| True RMS                              | AC                           | AC                                          |
| Basic DCV accuracy                    | 0.09%                        | 0.09%                                       |
| Auto/Manual ranging                   | •                            | •                                           |
| <b>Measurements</b>                   |                              |                                             |
| Voltage AC/DC                         | 1000 V                       | 1000 V                                      |
| Current AC/DC                         | 10 A (down to microamps) ★   | 10 A (down to microamps) ★                  |
| Resistance                            | 100 MΩ                       | 100 MΩ                                      |
| Frequency                             | 200 kHz                      | 200 kHz                                     |
| Capacitance                           | 0.1 nF to 10 mF ★            | 0.1 nF to 10 mF ★                           |
| Temperature                           | 1000 °C, K-type thermocouple | 1000 °C, K-type thermocouple, T1/T2/T1-T2 ★ |
| Continuity with beeper                | •                            | •                                           |
| Diode test                            | •                            | •                                           |
| 4-20 mA % scale                       | •                            | •                                           |
| Harmonic ratio                        | —                            | • ★                                         |
| Switch countert                       | • ★                          | • ★                                         |
| <b>Data management</b>                |                              |                                             |
| Min/Max/Avg recording                 | •                            | •                                           |
| Data Hold                             | •                            | •                                           |
| Null                                  | •                            | •                                           |
| Data logging                          | —                            | 100 manual, 200 interval points ★           |
| <b>Safety and Regulatory</b>          |                              |                                             |
| Over-voltage safety protection        | CAT III 1000 V/CAT IV 600 V  | CAT III 1000 V/CAT IV 600 V                 |
| EN/IEC 61010-1:2001 compliance        | Yes                          | Yes                                         |
| CSA C22.2 No. 61010-1:2004 compliance | Yes                          | Yes                                         |
| <b>General</b>                        |                              |                                             |
| Operating temperature                 | −10 °C to 55 °C              | −10 °C to 55 °C                             |
| Battery (included)                    | 4 x AAA                      | 4 x AAA                                     |
| Battery life                          | 300 hours                    | 300 hours                                   |
| Warranty                              | 3 years                      | 3 years                                     |
| Dimensions (HxWxD)                    | 193.8 mm x 92.2 mm x 58.0 mm | 193.8 mm x 92.2 mm x 58.0 mm                |

★ represents key specifications/features

For complete specifications, please refer to data sheet 5989-7040EN

## Recommended Accessories



U1162A Alligator clips



U1583B AC current clamp



U1169A Test probe leads



U1171A Magnetic hanging kit



U1186A K-type thermocouple and adapter



U1174A Soft carrying case

### Web Link

[www.agilent.com/find/handheldmm](http://www.agilent.com/find/handheldmm)



### How to ?

Detect Harmonics in AC signals

<http://cp.literature.agilent.com/litweb/pdf/5989-7687EN.pdf>

Select a Handheld DMM that is right for you

<http://cp.literature.agilent.com/litweb/pdf/5990-5197EN.pdf>

# U1250 Series - Handheld Digital Multimeters

## Be well equipped from the start

The process of isolating faults is always unpredictable—so it's good to be equipped with a versatile DMM that simplifies analysis, accelerates glitch detection and makes it easier to probe hard-to-reach points. The U1250 Series gets even better with the new U1253A/U1253B DMM and its razor-sharp OLED display: You'll get crystal-clear readings indoors, even in dark, off-angle situations. Optimize electronics troubleshooting with the accuracy, capabilities, and accessories you need to get started in no time.

### Features

- High contrast ratio of 2000:1 and wide viewing angle of 160°\*
- 50,000 counts high resolution and up to 0.025% low error rate
- Built-in square-wave generator and frequency counter
- Includes all essential accessories for electronics troubleshooting
- Smoothing function to stabilize erratic readings\*
- Data logging to instrument and PC

\* with U1253A/U1253B



*A testament to innovation  
and credibility, 2006*



*Best Value Portable  
Test Equipment, 2006*



*General-purpose instruments  
category, 2009*



*Category Winner, EC&M Product  
of the Year competition, 2009*

## Applications with the U1250 Series Handheld Digital Multimeters

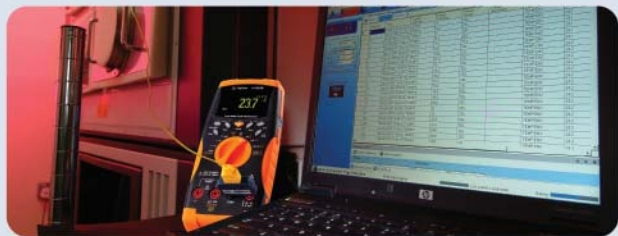
### Automated data logging to PC for long, continuous measurements

Qualification and troubleshooting of a device-under-test (DUT) often require long periods of testing, over either different temperatures or parameter settings. A common test would be voltage measurements at room, hot and cold temperatures. In such cases, it's more convenient and efficient to automate recording of measurements while you perform other tasks that are at hand. It's even better if you can record as many data points as required without worrying about the storage capacity of the measuring equipment.

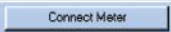
Whatever your measurements, the U1250 Series lets you make easy automated data logging with virtually unlimited saves to PC—so you can be assured that faults are recorded dependably and analyzed sooner.

## Event logging setup in minutes—with bundled GUI data-logging software

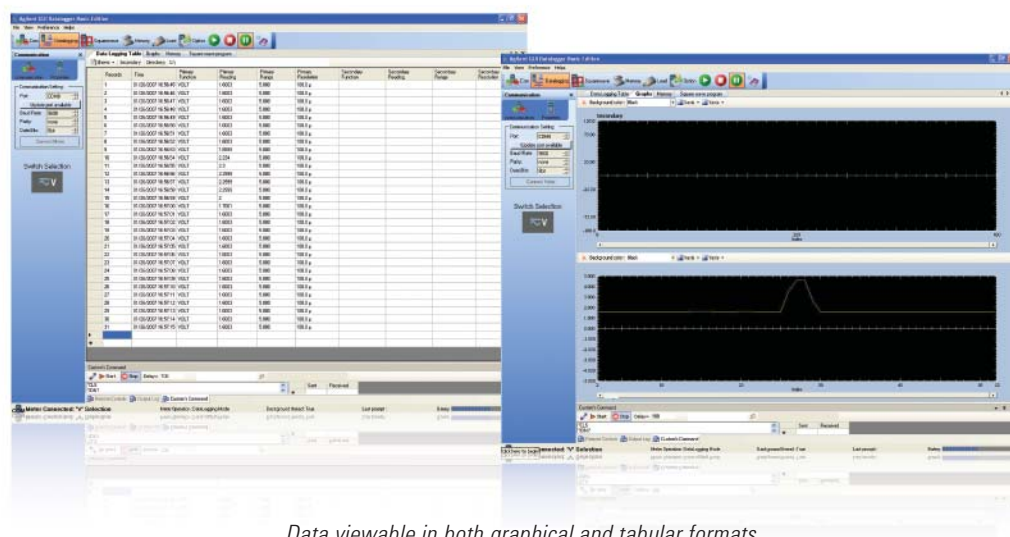
- 1 Connect the optional U1173A IR-USB cable to your U1250 Series DMM and PC



- 2 Open up the GUI data-logging interface

- 3 Click on 

- 4 Click on  and then  to start data logging



Data viewable in both graphical and tabular formats



### What others say

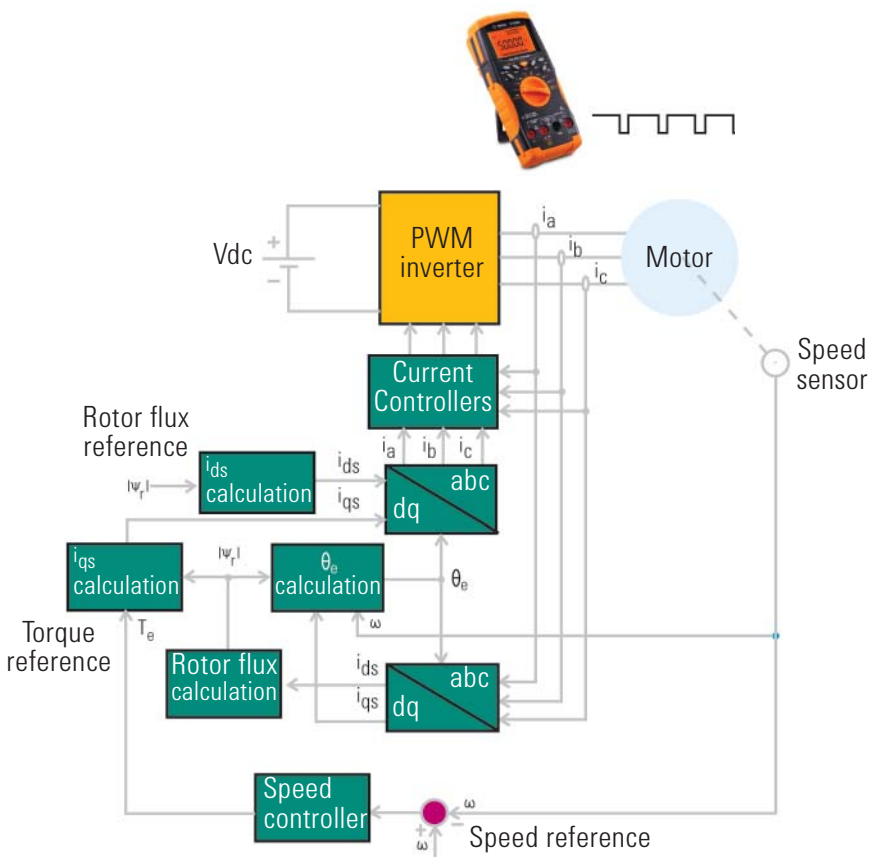
"I can view rapidly changing readings easily with the U1252A's speedy update rate. Its stable voltage/current/resistance readings offer accurate results, particularly for microvolt measurements of load cells."

**James G. DuPuy, Service Engineer, Brechbuler Scales Inc. manufacturer of industrial weighing systems and scales**

## Built-in square-wave generator for designing and troubleshooting motor drivers

In the motor-driver circuit shown, a signal from the pulse-width modulation (PWM) inverter drives the motor and is fed back to the speed controller circuit. In design and troubleshooting applications, these pulses are generated externally—usually with a function generator or pulse generator—and injected into the circuit to simulate actual pulses from the inverter.

With the U1250 Series, you can easily configure the square-wave output of the U1252A/U1252B to generate simple PWM signals—conveniently in one portable, lightweight instrument.



### What others say

*"We used square-wave output from the DMM for operational checks of digital circuits around an FPGA to verify the power source of a satellite tracking device and the reception signal from GPS. The U1252A makes our job easier by providing multiple measurements and very accurate results."*

**Hashiguchi, Engineer, ELM Inc., Japan – developer of satellite tracking and other system devices**

# Specifications of the U1250 Series Digital Multimeters

|                                                                           | U1251A/U1251B                                                                              | U1252A/U1252B                                                                              | U1253A/U1253B                                                                               |
|---------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------|---------------------------------------------------------------------------------------------|
| <b>Display</b>                                                            |                                                                                            |                                                                                            |                                                                                             |
| Organic LED                                                               | —                                                                                          | —                                                                                          | • ★                                                                                         |
| Dual display                                                              | •                                                                                          | •                                                                                          | •                                                                                           |
| Counts                                                                    | 50,000 (both displays) ★                                                                   | 50,000 (both displays) ★                                                                   | 50,000 (both displays) ★                                                                    |
| Analog bar graph                                                          | •                                                                                          | •                                                                                          | •                                                                                           |
| Backlight                                                                 | •                                                                                          | •                                                                                          | N/A                                                                                         |
| <b>Basic features</b>                                                     |                                                                                            |                                                                                            |                                                                                             |
| True RMS                                                                  | AC                                                                                         | AC+DC                                                                                      | AC+DC                                                                                       |
| Basic DCV accuracy                                                        | 0.03%                                                                                      | 0.025%                                                                                     | 0.025%                                                                                      |
| Auto/Manual ranging                                                       | •                                                                                          | •                                                                                          | •                                                                                           |
| <b>Measurements</b>                                                       |                                                                                            |                                                                                            |                                                                                             |
| Voltage AC/DC                                                             | 1000 V                                                                                     | 1000 V                                                                                     | 1000 V                                                                                      |
| Current AC/DC                                                             | 10 A                                                                                       | 10 A                                                                                       | 10 A                                                                                        |
| Resistance                                                                | 50 MΩ                                                                                      | 500 MΩ                                                                                     | 500 MΩ                                                                                      |
| Frequency                                                                 | 1 MHz                                                                                      | 20 MHz                                                                                     | 20 MHz                                                                                      |
| Capacitance                                                               | 0.001 nF to 100 mF                                                                         | 0.001 nF to 100 mF ★                                                                       | 0.001 nF to 100 mF ★                                                                        |
| Temperature                                                               | 1372 °C, K-type thermocouple ★                                                             | 1372 °C, J/K-type thermocouple ★                                                           | 1372 °C, J/K-type thermocouple ★                                                            |
| Continuity with beeper                                                    | •                                                                                          | •                                                                                          | •                                                                                           |
| Diode test                                                                | •                                                                                          | •                                                                                          | •                                                                                           |
| 4-20 mA % scale                                                           | •                                                                                          | •                                                                                          | •                                                                                           |
| dB                                                                        | •                                                                                          | •                                                                                          | •                                                                                           |
| Frequency counter                                                         | —                                                                                          | • ★                                                                                        | • ★                                                                                         |
| Smoothing function                                                        | —                                                                                          | —                                                                                          | • ★                                                                                         |
| <b>Signal generation</b>                                                  |                                                                                            |                                                                                            |                                                                                             |
| Square-wave generator                                                     | —                                                                                          | 0.5 Hz to 4.8 kHz,<br>selectable Hz and % ★                                                | 0.5 Hz to 4.8 kHz,<br>selectable Hz and % ★                                                 |
| <b>Data management</b>                                                    |                                                                                            |                                                                                            |                                                                                             |
| Min/Max/Avg recording                                                     | •                                                                                          | •                                                                                          | •                                                                                           |
| Peak recording                                                            | •                                                                                          | •                                                                                          | •                                                                                           |
| Data Hold                                                                 | •                                                                                          | •                                                                                          | •                                                                                           |
| Null                                                                      | •                                                                                          | •                                                                                          | •                                                                                           |
| Data logging<br>(requires IR-to-USB cable<br>U1173A for connection to PC) | <b>Internal:</b> 100 manual,<br>200 interval points<br><b>To PC:</b> virtually unlimited ★ | <b>Internal:</b> 100 manual,<br>200 interval points<br><b>To PC:</b> virtually unlimited ★ | <b>Internal:</b> 100 manual,<br>1000 interval points<br><b>To PC:</b> virtually unlimited ★ |
| <b>Safety and Regulatory</b>                                              |                                                                                            |                                                                                            |                                                                                             |
| Over-voltage safety protection                                            | CAT III 1000 V/CAT IV 600 V                                                                | CAT III 1000 V/CAT IV 600 V                                                                | CAT III 1000 V/CAT IV 600 V                                                                 |
| EN/IEC 61010-1:2001<br>compliance                                         | Yes                                                                                        | Yes                                                                                        | Yes                                                                                         |
| CSA C22.2 No. 61010-1:2004<br>compliance                                  | Yes                                                                                        | Yes                                                                                        | Yes                                                                                         |
| <b>General</b>                                                            |                                                                                            |                                                                                            |                                                                                             |
| Operating temperature                                                     | –20 °C to 50 °C                                                                            | –20 °C to 50 °C                                                                            | –20 °C to 50 °C                                                                             |
| Battery (included)                                                        | Alkaline 9 V                                                                               | 7.2 V Ni-MH rechargeable ★                                                                 | 7.2 V Ni-MH rechargeable ★                                                                  |
| Battery life                                                              | 72 hours                                                                                   | 36 hours                                                                                   | 8 hours                                                                                     |
| I/O                                                                       | IR-USB                                                                                     | IR-USB                                                                                     | IR-USB                                                                                      |
| Warranty                                                                  | 3 years                                                                                    | 3 years                                                                                    | 3 years                                                                                     |
| Dimensions (HxWxD)                                                        | 203.5 mm x 94.4 mm x 59.0 mm                                                               | 203.5 mm x 94.4 mm x 59.0 mm                                                               | 203.5 mm x 94.4 mm x 59.0 mm                                                                |

★ represents key specifications/features

For complete specifications, please refer to data sheet 5989-5509EN

## Recommended Accessories



**U1174A Soft carrying case**



**U1173A IR-to-USB cable**



**U1180A Thermocouple adapter/lead kit**

### Web Link

[www.agilent.com/find/handhelddmm](http://www.agilent.com/find/handhelddmm)



### How to ?

**Get the Best Out of the U1250 series handheld DMM**

<http://cp.literature.agilent.com/litweb/pdf/5989-7937EN.pdf>

**Generate PWM Waveform Using U1252A DMM**

<http://cp.literature.agilent.com/litweb/pdf/5989-6673EN.pdf>

**Think Safety when Selecting a Handheld Multimeter**

<http://cp.literature.agilent.com/litweb/pdf/5990-4578EN.pdf>

**Select a Handheld DMM that is right for you**

<http://cp.literature.agilent.com/litweb/pdf/5990-5197EN.pdf>

## U1210 Series – Handheld Clamp Meters

### *Handle big currents – safely*

Measurements of electrical distribution cables can be challenging and risky. For cables up to two inches in diameter, the Agilent U1210 Series handheld clamp meters enable high-current measurements without breaking the circuit. Unlike most clamp meters, they also include DMM capabilities—resistance, capacitance, frequency and temperature—to simplify troubleshooting during installation and maintenance. Best of all, they provide an extra layer of protection with CAT IV 600 V and CAT III 1000 V safety ratings.

#### Features

- Large clamp opening of 52 mm or 2 inches
- High measurement capability of up to 1000 A for AC, DC or AC+DC
- CAT III 1000 V/CAT IV 600 V safety rating
- Includes full-featured DMM with resistance, capacitance, frequency and temperature functions
- High resolution measurements - measure current as low as 0.01 A
- Peak hold capability



## Applications with U1210 series Handheld Clamp Meters

### **Large jaw opening and high-current measurement capability - for installation and maintenance of high-current distribution systems and cables**

Current measurements at power distribution sites can be challenging as cables are usually large as they contain high current sources. The need of current measurement methods that are safe and easy add complexity to the task of acquiring accurate current data. Conventionally, a current conductor has to be disconnected to allow probe insertion and this is not only hazardous when high currents are involved, but not convenient as well.



With a two-inch (52 mm) jaw opening, the U1210 Series handheld clamp meters simplify current measurements for thick cables, without breaking the circuit. The clamp meters provide the ability to handle big currents, with current measurement capability of up to 1000 A (AC, DC, AC+DC). This series also enables high resolution measurements, with the ability to measure currents as low as 0.01 mA. You are able to measure in-rush current as well with the clamp meters' peak hold feature.



*4-mm-tip probes*

The U1210 Series clamp meters offer dual-ranging mode – manual and auto, min/max recording capability and large dual display for additional accessibility when it comes to data collection or analysis.

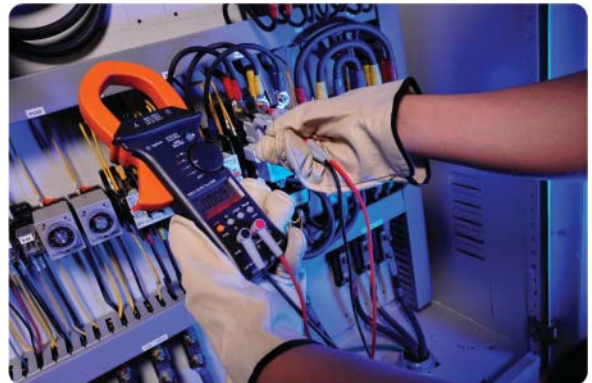
Each clamp meter provides an extra layer of protection with CAT IV 600 V and CAT III 1000 V safety ratings. When performing a measurement with the multimeter, test probes with 4-mm tips (which is bundled with each clamp meter) can be used to further prevent dangerous arc flash if the tips are inadvertently shorted together during probing.

## **Full-featured digital multimeter functions – make more than just current measurements**

The U1210 Series clamp meters are versatile handheld test tools that combine a current clamp with a digital multimeter (DMM).

The U1210 Series provides basic functions of a multimeter with wide measurement ranges to cater for a broad range of applications: ACA, DCV, ACV, OHM, audible continuity, capacitance, diode and frequency tests.

These meters also provide auto-ranging capability, built-in peak hold for in-rush current measurement, temperature and capacitance measurement capability, large backlight display and one-hand operation.



# Specifications of the U1210 Series Clamp Meters

|                                       | U1211A                        | U1212A                        | U1213A                        |
|---------------------------------------|-------------------------------|-------------------------------|-------------------------------|
| <b>Display</b>                        |                               |                               |                               |
| Dual Display                          | •                             | •                             | •                             |
| Counts                                | 4000                          | 4000                          | 4000                          |
| Bar-graph                             | 12 segments                   | 12 segments                   | 12 segments                   |
| Backlit                               | •                             | •                             | •                             |
| Auto power OFF                        | •                             | •                             | •                             |
| <b>Basic Features</b>                 |                               |                               |                               |
| True RMS                              | AC                            | AC                            | AC+DC                         |
| Auto/Manual Ranging                   | •                             | •                             | •                             |
| <b>Measurements</b>                   |                               |                               |                               |
| Voltage DC                            | 0.1 V - 1000 V (0.5%)         | 0.1 V - 1000 V (0.5%)         | 1 mV - 1000 V (0.2%)          |
| Voltage AC                            | 0.1 V - 1000 V (1.0%)         | 0.1 V - 1000 V (1.0%)         | 1 mV - 1000 V (1.0%)          |
| Current DC                            | —                             | 0.01 A - 1000 A (1.5%) ★      | 0.01 A - 1000 A (1.5%) ★      |
| Current AC                            | 0.1 A - 1000 A (1.0%) ★       | 0.1 A - 1000 A (2.0%) ★       | 0.01 A - 1000 A (2.0%) ★      |
| Resistance                            | 4 kΩ (0.5%)                   | 4 kΩ (0.5%)                   | 40 MΩ (0.3%)                  |
| Capacitance                           | 0.1 μF - 4000 μF (2.0%)       | 0.1 μF - 4000 μF (2.0%)       | 1 nF - 4000 μF (1.0%)         |
| Diode                                 | •                             | •                             | •                             |
| Temperature                           | —                             | K-type (-200 to 1372 °C)      | K-type (-200 to 1372 °C)      |
| Frequency                             | •                             | •                             | •                             |
| Duty cycle                            | —                             | —                             | •                             |
| <b>Data Management</b>                |                               |                               |                               |
| Data Hold                             | •                             | •                             | •                             |
| Null                                  | •                             | •                             | •                             |
| MAX/MIN/AVG                           | •                             | •                             | •                             |
| Peak Hold                             | •                             | •                             | •                             |
| <b>Safety and Regulatory</b>          |                               |                               |                               |
| Over-voltage safety protection        | CAT III 1000 V/CAT IV 600 V   | CAT III 1000 V/CAT IV 600 V   | CAT III 1000 V/CAT IV 600 V   |
| EN/IEC 61010-1:2001 compliance        | Yes                           | Yes                           | Yes                           |
| CSA C22.2 No. 61010-1:2004 compliance | Yes                           | Yes                           | Yes                           |
| <b>General</b>                        |                               |                               |                               |
| Operating temperature                 | -10 °C to 50 °C               | -10 °C to 50 °C               | -10 °C to 50 °C               |
| Clamp Opening                         | 2 inches ★                    | 2 inches ★                    | 2 inches ★                    |
| Battery (included)                    | Alkaline 9 V                  | Alkaline 9 V                  | Alkaline 9 V                  |
| Battery life                          | 60 hours                      | 60 hours                      | 60 hours                      |
| Warranty                              | 3 years                       | 3 years                       | 3 years                       |
| Dimensions (HxWxD)                    | 273.0 mm x 106.0 mm x 43.0 mm | 260.0 mm x 106.0 mm x 43.0 mm | 260.0 mm x 106.0 mm x 43.0 mm |

Accuracy information shown in brackets is the best accuracy throughout the range.

★ represents key specifications/features

For complete specifications, please refer to data sheet 5990-3459EN

## Recommended Accessories



U1168A Standard test lead kit



U1180A Thermocouple adapter/lead kit



U1175A Carrying case

### Web Link

[www.agilent.com/find/clampmeter](http://www.agilent.com/find/clampmeter)



### How to ?

Troubleshoot Three-Phase AC Motors with U1210 series Handheld Clamp Meters

<http://cp.literature.agilent.com/litweb/pdf/5990-5192EN.pdf>

## Digital Oscilloscopes

### U1600 Series - Handheld Digital Oscilloscopes

#### *Make high performance measurements on the go*

A scope with a color waveform display. A DMM for basic measurements. A data logger to record DMM readings to a PC. All three capabilities are in one instrument—the U1600 Series of handheld digital oscilloscopes. Designed to address the portability needs of various installation and maintenance applications, these scopes enable clear waveform viewing, easy waveform analysis and quick isolation of signal glitches. With high-performance features loaded into one robust package, mobile troubleshooting is a breeze.

#### Features

- Built-in DMM and data logger
- Large 4.5-inch color display
- 200 MSa/s high sampling rate and deep memory
- Built-in Quick Help, available in multiple languages
- Data logging to instrument and PC
- Convenient data download to USB flash drive\*

\* with Option 001



No. 1 Product of the Year  
as voted by readers—2006



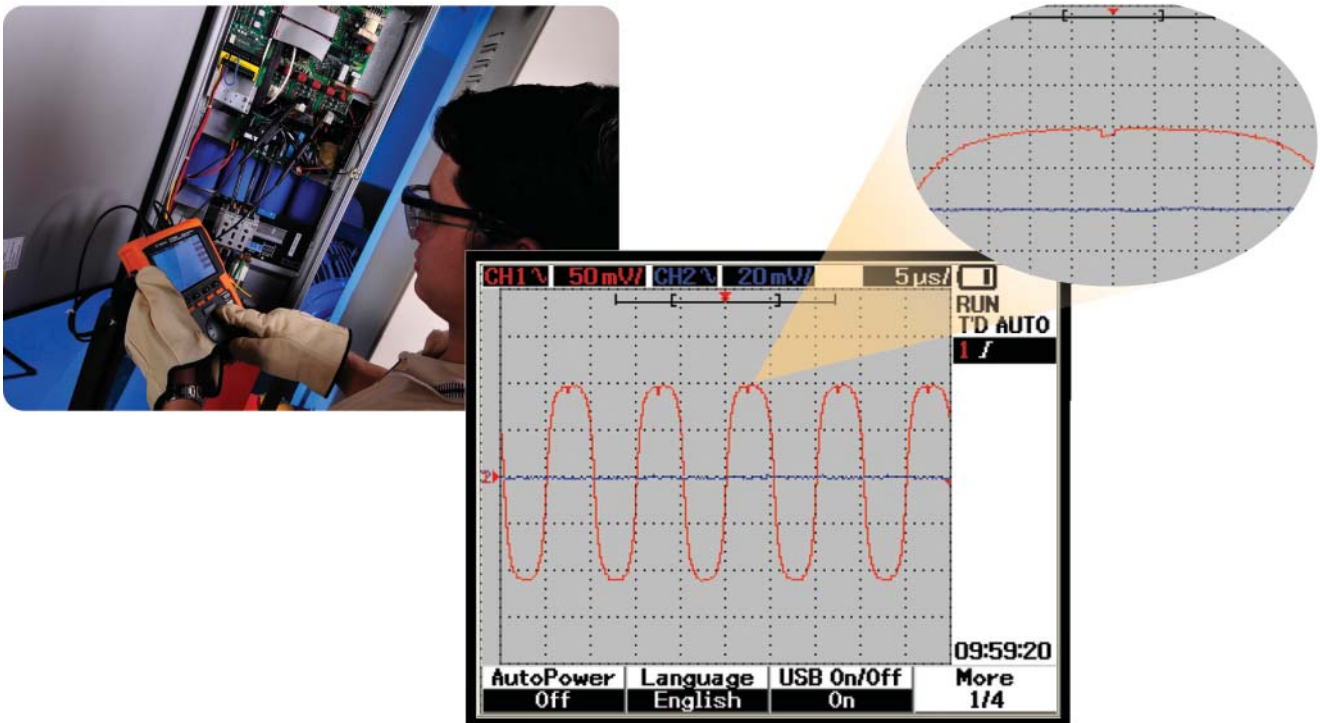
# Applications with the U1600 Series Handheld Digital Oscilloscopes

## Fast sampling, deep memory—so you won't miss a glitch

Whether a machine is down for repair or maintenance, returning it to service as quickly as possible is crucial. With the U1600 Series, you can carry a scope to the problem knowing you can make measurements without an AC outlet.

One common fault in the printed circuit board assembly (PCA) of such machines is glitches caused by factors ranging from component wear-and-tear to an unclear power source. Effectively capturing these glitches requires a scope with a high sampling rate and deep memory.

The U1600 Series provides 20 MHz and 40 MHz bandwidths with up to 200 MSa/s real-time sampling rate. With its deep memory, you can zoom in on a particular segment of a signal to view even the most subtle details. The scopes also offer advanced triggering types such as edge, pulse width, pattern and video to assist in quick isolation of critical events.

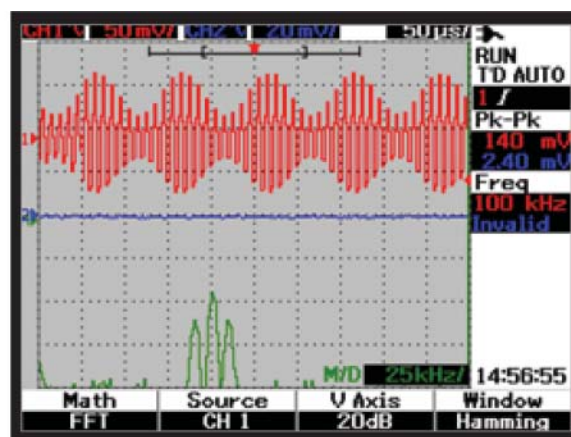


## Advanced FFT and waveform math follow wherever you go

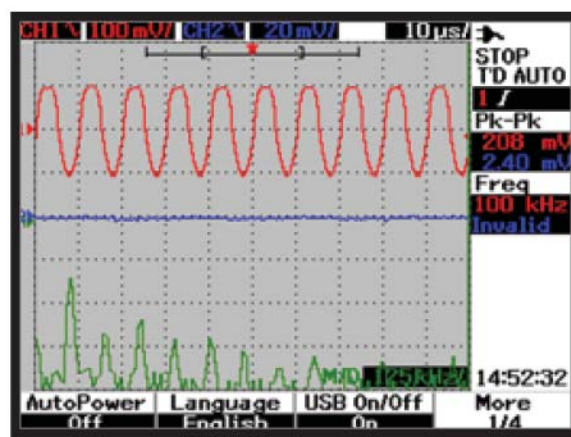
Time is especially precious on the manufacturing line. When a test system fails, quick troubleshooting and analysis is needed to get the line running again as soon as possible.

The portable, lightweight U1600 Series is more convenient than conventional benchtop oscilloscopes. Its small form adds versatility when measuring hard-to-reach points in the test system, and its large color LCD display enables clear viewing of waveforms.

Analysis of complex waveforms is easy with the U1600 Series' dual waveform math (DWM) and fast Fourier transform (FFT) functions. The FFT function provides a frequency-domain view of measurements in four windowing techniques: Rectangular, Hanning, Hamming and Blackman-Harris.



An FFT of the upper waveform reveals three spectral lines that represent the carrier frequency and its sidebands, enabling informative analysis of amplitude-modulated signals.



Although the sine-wave signal seems flawless in the time domain, doing an FFT reveals the presence of harmonic distortion, which is seen as integer-multiple spectral components in the frequency domain.

# Specifications of the U1600 Series Digital Oscilloscopes

|                                                                                  | U1602A/U1602B                                                                                               | U1604A/U1604B                                                                                               |
|----------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------|
| <b>Display</b>                                                                   |                                                                                                             |                                                                                                             |
| General                                                                          | 4.5" color LCD ★                                                                                            | 4.5" color LCD ★                                                                                            |
| Counts (DMM function)                                                            | 6000                                                                                                        | 6000                                                                                                        |
| <b>SCOPE</b>                                                                     |                                                                                                             |                                                                                                             |
| Channels                                                                         | 2                                                                                                           | 2                                                                                                           |
| Bandwidth (–3 dB)                                                                | DC to 20 MHz                                                                                                | DC to 40 MHz                                                                                                |
| Maximum sampling rate                                                            | 100 MSa/s per channel (50 s/div to 250 ns/div) ★<br>200 MSa/s single channel and interleaved (125 ns/div) ★ | 100 MSa/s per channel (50 s/div to 250 ns/div) ★<br>200 MSa/s single channel and interleaved (125 ns/div) ★ |
| Maximum recording length                                                         | 11,100 points for U1602A and 125,000 points for U1602B, viewable on screen with zoom function ★             | 11,100 points for U1604A and 125,000 points for U1604B, viewable on screen with zoom function ★             |
| Cursor and Zoom functions                                                        | •                                                                                                           | •                                                                                                           |
| Waveform math                                                                    | •                                                                                                           | •                                                                                                           |
| FFT                                                                              | –                                                                                                           | Rectangular, Hamming, Hanning, Blackman-Harris ★                                                            |
| Automatic measurements                                                           | Up to 22 measurements                                                                                       | Up to 22 measurements                                                                                       |
| Coupling                                                                         | AC, DC, GND                                                                                                 | AC, DC, GND                                                                                                 |
| Input impedance                                                                  | 1 MΩ    < 20 pF                                                                                             | 1 MΩ    < 20 pF                                                                                             |
| Range                                                                            | 50 ns to 50 s/div                                                                                           | 10 ns to 50 s/div                                                                                           |
| Resolution                                                                       | 2 ns                                                                                                        | 400 ps                                                                                                      |
| Rise time                                                                        | < 17.5 ns                                                                                                   | < 8.8 ns                                                                                                    |
| Trigger types                                                                    | Edge, Pattern, Pulse width, Video                                                                           | Edge, Pattern, Pulse width, Video                                                                           |
| Trigger modes                                                                    | Auto, Normal, Single                                                                                        | Auto, Normal, Single                                                                                        |
| Internal scope storage                                                           | Up to 10 setups and traces                                                                                  | Up to 10 setups and traces                                                                                  |
| <b>DMM</b>                                                                       |                                                                                                             |                                                                                                             |
| True RMS                                                                         | AC+DC                                                                                                       | AC+DC                                                                                                       |
| Voltage AC/DC                                                                    | 600 V                                                                                                       | 600 V                                                                                                       |
| Current AC/DC                                                                    | 600 A                                                                                                       | 600 A                                                                                                       |
| Resistance                                                                       | 60 MΩ                                                                                                       | 60 MΩ                                                                                                       |
| Capacitance                                                                      | 0.01 nF to 300 μF                                                                                           | 0.01 nF to 300 μF                                                                                           |
| Temperature                                                                      | 6000 °C, K-type thermocouple                                                                                | 6000 °C, K-type thermocouple                                                                                |
| Continuity with beeper                                                           | •                                                                                                           | •                                                                                                           |
| Diode test                                                                       | •                                                                                                           | •                                                                                                           |
| <b>DATA LOGGER</b>                                                               |                                                                                                             |                                                                                                             |
| Min/Max/Avg recording                                                            | •                                                                                                           | •                                                                                                           |
| Data logging<br>(requires bundled USB 2.0 full-speed cable for connection to PC) | <b>Internal:</b> 250 points<br><b>To PC:</b> virtually unlimited                                            | <b>Internal:</b> 250 points<br><b>To PC:</b> virtually unlimited                                            |
| Time span                                                                        | 150 seconds to 20 days (auto range)                                                                         | 150 seconds to 20 days (auto range)                                                                         |

|                                       | U1602A/U1602B                                                                                                                                                                                | U1604A/U1604B                                                                                                                                                                                |
|---------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <b>Safety and Regulatory</b>          |                                                                                                                                                                                              |                                                                                                                                                                                              |
| Over-voltage safety protection        | CAT III 300 V                                                                                                                                                                                | CAT III 300 V                                                                                                                                                                                |
| EN/IEC 61010-1:2001 compliance        | Yes                                                                                                                                                                                          | Yes                                                                                                                                                                                          |
| CSA C22.2 No. 61010-1:2004 compliance | Yes                                                                                                                                                                                          | Yes                                                                                                                                                                                          |
| <b>General</b>                        |                                                                                                                                                                                              |                                                                                                                                                                                              |
| Operating temperature                 | 0 °C to 50 °C                                                                                                                                                                                | 0 °C to 50 °C                                                                                                                                                                                |
| Battery (included)                    | Rechargeable Ni-MH                                                                                                                                                                           | Rechargeable Ni-MH                                                                                                                                                                           |
| Battery life                          | 4 hours                                                                                                                                                                                      | 4 hours                                                                                                                                                                                      |
| I/O                                   | <ul style="list-style-type: none"> <li>• USB 2.0 full-speed client for data transfers to PC</li> <li>• USB 2.0 full-speed host for data transfers to USB flash drive (Option 001)</li> </ul> | <ul style="list-style-type: none"> <li>• USB 2.0 full-speed client for data transfers to PC</li> <li>• USB 2.0 full-speed host for data transfers to USB flash drive (Option 001)</li> </ul> |
| Warranty                              | 3 years                                                                                                                                                                                      | 3 years                                                                                                                                                                                      |
| Dimensions (HxWxD)                    | 241.0 mm x 138.0 mm x 66.0 mm                                                                                                                                                                | 241.0 mm x 138.0 mm x 66.0 mm                                                                                                                                                                |

★ represents key specifications/features

For complete specifications, please refer to data sheet 5989-5576EN

## Recommended Accessories



**U1590A Soft carrying case**



**U1561A 10:1 Scope probe**



**U1562A 100:1 Scope probe**



**U1580A DMM terminal test lead set**



**U1571A Ni-MH battery pack**

#### Web Link

[www.agilent.com/find/handheldscope](http://www.agilent.com/find/handheldscope)



#### How to ?

Perform Metal Scrap Sorting Machine Installation with U1600A Series

<http://cp.literature.agilent.com/litweb/pdf/5989-9786EN.pdf>

# Multi-function Calibrator/Meter

## U1401A/U1401B – Handheld Multi-function Calibrator/Meter

### *Calibrate while you measure with just one tool*

More often than not, the calibration of process control parts requires simultaneous measurements with a DMM. Carry two tools in one—and calibrate while you measure—with the Agilent U1401A/U1401B handheld multi-function calibrator/meter. Now you can travel light, whether you're doing calibration for validation, troubleshooting, or service and maintenance. Slip the robust U1401A/U1401B in its sturdy carrying case and you're ready to go.

#### Features

- 50,000-count resolution on dual display
- Simultaneous source and measure capabilities
- Bipolar voltage and current, square-wave, auto scan and ramp outputs
- Full-span DMM measurement and recording functions
- Built-in charging capability



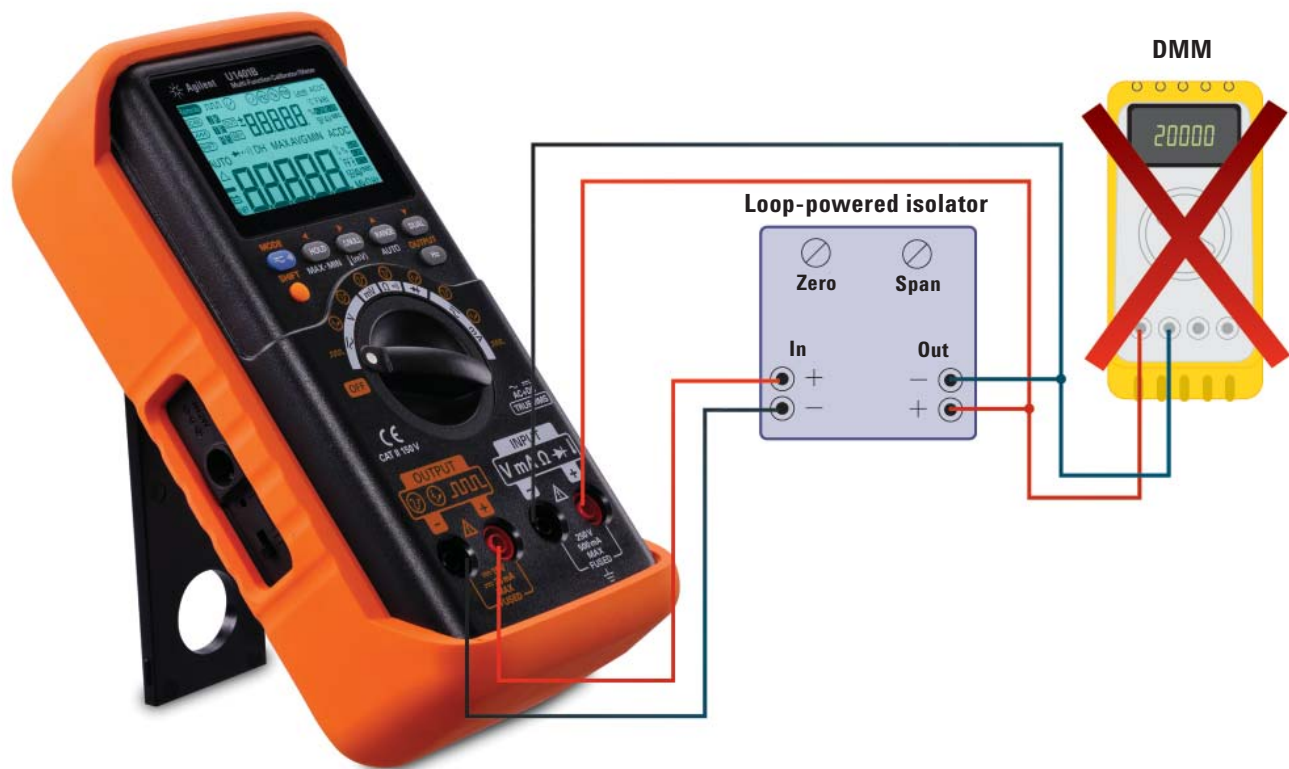
# Applications with the U1401A/U1401B Multi-Function Calibrator/Meter

## Simultaneous source and measure with just one tool

Commonly used in today's process control systems are signal conditioners and loop-powered isolators. These typically involve high-accuracy signals and demand periodic calibration to ensure optimum performance.

Calibration requires sourcing a known signal into the device and measuring its output. For instance, calibration of a loop-powered isolator with 4-20 mA input/output range involves accurately simulating a known mA signal into the isolator and measuring its corresponding mA output to ensure that it is performing well within its specifications. Being well-equipped means you need to carry both a calibrator and digital multimeter (DMM) as you go about your calibration tasks.

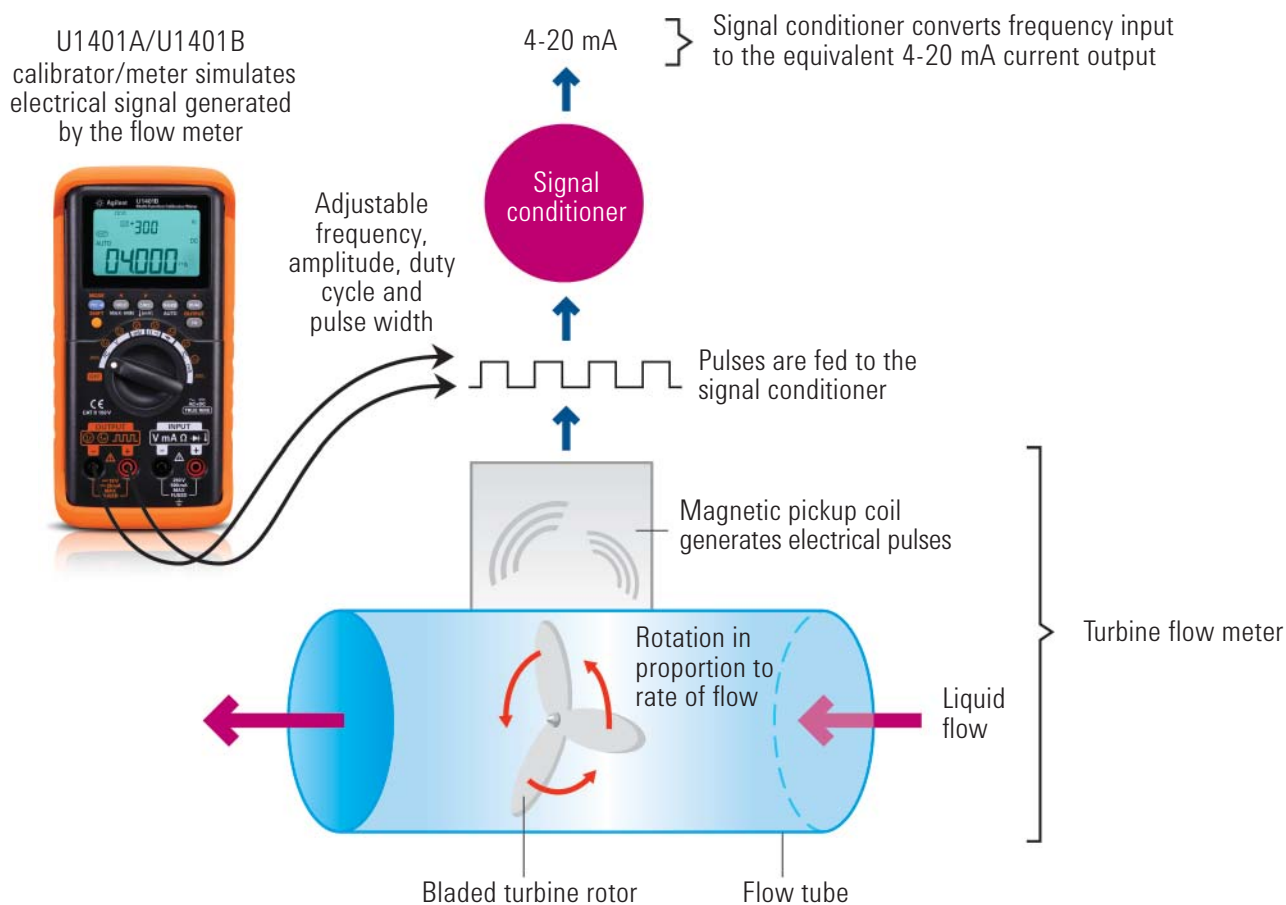
Not so with the U1401A/U1401B calibrator/meter. One tool equips you with both sourcing and measuring capabilities so you no longer need to carry a separate DMM when you're away from the bench.



## Built-in pulse signal generator for calibrating flow meter systems

Flow meters output pulses with frequencies that are proportional to the rate of flow of liquid that passes through its bladed turbine rotor. These pulses are then fed to a signal conditioner. Calibration of the signal conditioner requires injecting known pulse signals into it and checking that the resulting output is what it should be.

Right on site and with the U1401A/U1401B in hand, you can conveniently simulate the flow meter's output pulses into the signal conditioner, without needing a separate function generator.



# Specifications of the U1401A/U1401B Multi-function Calibrator/Meter

|                                                                              | U1401A/U1401B                            |
|------------------------------------------------------------------------------|------------------------------------------|
| <b>Display</b>                                                               |                                          |
| Dual display                                                                 | •                                        |
| Counts                                                                       | 50,000                                   |
| Backlight                                                                    | •                                        |
| <b>Source</b>                                                                |                                          |
| Voltage                                                                      | ± 15 V                                   |
| Current                                                                      | ± 25 mA                                  |
| Square-wave                                                                  | 0.5 Hz to 4.8 kHz, selectable Hz and % ★ |
| Auto scan and ramp                                                           | •                                        |
| Simultaneous operation with MEASURE function                                 | • ★                                      |
| <b>Measure</b>                                                               |                                          |
| True RMS                                                                     | AC+DC                                    |
| Basic DCV accuracy                                                           | 0.03% + 5 counts                         |
| Auto/Manual ranging                                                          | •                                        |
| Voltage AC/DC                                                                | 250 V                                    |
| Current AC/DC                                                                | 500 mA                                   |
| Resistance                                                                   | 50 MΩ                                    |
| Frequency                                                                    | 200 kHz                                  |
| Temperature                                                                  | 1372 °C, K-type thermocouple             |
| Continuity with beeper                                                       | •                                        |
| Diode test                                                                   | •                                        |
| 4-20 mA, 0 to 20 mA % scale                                                  | •                                        |
| Simultaneous operation with SOURCE function                                  | • ★                                      |
| <b>Data management</b>                                                       |                                          |
| Min/Max/Avg recording                                                        | •                                        |
| Peak recording                                                               | •                                        |
| Data Hold                                                                    | •                                        |
| Data logging to PC<br>(requires IR-to-USB cable U5481A for connection to PC) | •                                        |
| <b>Safety and Regulatory</b>                                                 |                                          |
| Over-voltage safety protection                                               | CAT II 150 V                             |
| EN/IEC 61010-1:2001 compliance                                               | Yes                                      |
| CSA C22.2 No. 61010-1:2004 compliance                                        | Yes                                      |
| <b>General</b>                                                               |                                          |
| Operating temperature                                                        | 0 °C to 40 °C                            |
| Battery (included)                                                           | 9.6 V Ni-MH rechargeable                 |
| Battery life                                                                 | 80 hours                                 |
| I/O                                                                          | IR-USB                                   |
| Warranty                                                                     | 3 years                                  |
| Dimensions (HxWxD)                                                           | 192.0 mm x 90.0 mm x 54.0 mm             |

★ represents key specifications/features

For complete specifications, please refer to data sheet 5990-3459EN

## Recommended Accessories



U5481A IR-to-USB cable



U1186A K-type thermocouple and adapter



U1160A Standard test lead kit



U1181A Immersion temperature probe



U1182A Industrial surface temperature probe



U1183A Air temperature probe

### Web Link

[www.agilent.com/find/handheld-calibrator-meter](http://www.agilent.com/find/handheld-calibrator-meter)



### How to ?

Easily Perform Process Control Calibration U1401A

<http://cp.literature.agilent.com/litweb/pdf/5990-3932EN.pdf>

## Capacitance/LCR meters

### U1700 Series – Handheld Capacitance/LCR meters

#### *LCR testing without the wait*

Sharing a bench LCR meter is practical, but isn't always convenient. With Agilent's new line of handheld capacitance and LCR meters, you can perform quick, basic LCR measurements at your convenience. Better yet, our handheld models extend the tradition of our industry-leading benchtop units to a lower price point. Now, everyone on your team can be equipped for passive-component testing—on the bench or on the go—without the wait.

#### Features

- Up to 20,000 counts resolution with dual display
- Wide capacitance measurement up to 199.99 mF\*
- Wide LCR range with up to 4 test frequencies\*\*
- Auto-calculation of phase angle, D and Q factors\*\*
- Compare mode with 25 High/Low limit settings\*
- Relative and Tolerance modes

\*with U1701A/U1701B capacitance meters

\*\*with U1731A, U1731B, U1732A or U1732B LCR meters  
(phase angle calculation only with U1732A/U1732B)



# Applications with the U1700 Series Capacitance/LCR Meters

## SMD tweezer for testing surface-mount devices

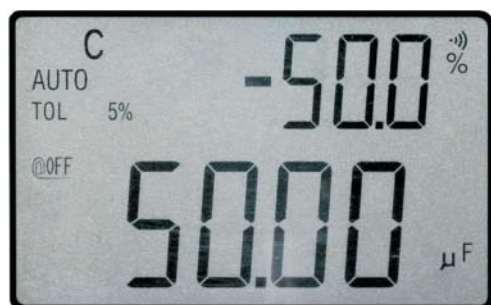


The optional U1782A SMD tweezer enables easy testing of surface-mount devices. The tweezer comes with three shrouded banana plugs and an extended reach of 770 mm. The U1700 Series' guard terminal provides your measurements with better noise immunity and accurate readings.

## Tolerance and compare modes for quick component sorting

On the manufacturing floor, components may come in large batches for quick sorting to pre-defined specifications. Tolerance mode in the U1700 Series lets you zap through sorting of incoming capacitors, inductors or resistors to 1%, 5%, 10% or 20% tolerance of the specified reference value.

Additionally, compare mode in the U1701A/U1701B capacitance meter allows easy memory save/recall of up to 25 High/Low limit settings for convenient Pass/Fail screening of capacitors. This means speedier testing due to reduced set-up time and risk of manual input errors.



*Tolerance mode of 1%, 5%, 10% and 20% are available in capacitance and LCR models.*



*Compare mode in the U1701A/U1701B reduces test set-up time for capacitor sorting.*

# Specifications of the U1700 Series Capacitance/LCR Meters

|                                                                              | U1701A/U1701B                                                     | U1731A/U1731B                                                     | U1732A/U1732B                                                     |
|------------------------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|-------------------------------------------------------------------|
| <b>Display</b>                                                               |                                                                   |                                                                   |                                                                   |
| Dual display                                                                 | •                                                                 | •                                                                 | •                                                                 |
| Counts                                                                       | 11,000                                                            | 20,000                                                            | 20,000                                                            |
| Backlight                                                                    | •                                                                 | –                                                                 | •                                                                 |
| <b>Measurements</b>                                                          |                                                                   |                                                                   |                                                                   |
| Capacitance                                                                  | 0.1 pF to 199.99 mF                                               | 0.1 pF to 19.99 mF                                                | 0.01 pF to 19.99 mF                                               |
| Inductance                                                                   | N/A                                                               | 0.1 $\mu$ H to 999.9 H                                            | 0.1 $\mu$ H to 999.9 H                                            |
| Resistance                                                                   | N/A                                                               | 0.001 $\Omega$ to 9.999 M $\Omega$                                | 0.001 $\Omega$ to 9.999 M $\Omega$                                |
| Dissipation factor (DF)                                                      | N/A                                                               | • ★                                                               | • ★                                                               |
| Quality factor (QF)                                                          | N/A                                                               | • ★                                                               | • ★                                                               |
| Phase angle ( $\theta$ ) measurement                                         | N/A                                                               | –                                                                 | •                                                                 |
| Tolerance mode                                                               | 1%, 5%, 10%, 20% ★                                                | 1%, 5%, 10% ★                                                     | 1%, 5%, 10%, 20% ★                                                |
| Compare mode                                                                 | 25 sets of non-volatile High/Low limit settings ★                 | –                                                                 | –                                                                 |
| Test method/frequency                                                        | DC charge/discharge                                               | Selectable 120 Hz/1 kHz                                           | Selectable 100 Hz/120 Hz/<br>1 kHz/10 kHz                         |
| <b>Data management</b>                                                       |                                                                   |                                                                   |                                                                   |
| Min/Max/Avg recording                                                        | •                                                                 | •                                                                 | •                                                                 |
| Data Hold                                                                    | •                                                                 | •                                                                 | •                                                                 |
| Data logging to PC<br>(requires IR-to-USB cable U5481A for connection to PC) | •                                                                 | •                                                                 | •                                                                 |
| <b>Safety and Regulatory</b>                                                 |                                                                   |                                                                   |                                                                   |
| EN/IEC 61010-1:2001 compliance                                               | Yes                                                               | Yes                                                               | Yes                                                               |
| <b>General</b>                                                               |                                                                   |                                                                   |                                                                   |
| Operating temperature                                                        | 0 °C to 50 °C                                                     | 0 °C to 40 °C                                                     | 0 °C to 40 °C                                                     |
| Battery (included)                                                           | • Alkaline 9 V<br>• AC power adapter and cord available as option | • Alkaline 9 V<br>• AC power adapter and cord available as option | • Alkaline 9 V<br>• AC power adapter and cord available as option |
| Battery life                                                                 | 80 hours                                                          | 7 hours                                                           | 7 hours                                                           |
| I/O                                                                          | IR-USB                                                            | IR-USB                                                            | IR-USB                                                            |
| Warranty                                                                     | 3 years                                                           | 3 years                                                           | 3 years                                                           |
| Dimensions (HxWxD)                                                           | 184.0 mm x 87.0 mm x 41.0 mm                                      | 184.0 mm x 87.0 mm x 41.0 mm                                      | 184.0 mm x 87.0 mm x 41.0 mm                                      |

★ represents key specifications/features

For complete specifications, please refer to data sheets 5990-3525EN (for U1701A/U1701B capacitance meter) and 5990-3458EN (for U1731A/U1731B/U1732A/U1732B LCR meter)

## Recommended Accessories



U1174A Soft carrying case



U5481A IR-to-USB cable



U1782A SMD tweezer



U1780A AC power adapter

### Web Link

[www.agilent.com/find/handheldlcr](http://www.agilent.com/find/handheldlcr)

## Accessories Compatibility Chart

| Ordering Number | Description | Handheld Clamp Meters | Handheld DMMs     |                   |                   |                   |                   |        |        | Handheld Scopes                   | Handheld Calibrator/Meter | Handheld Capacitance Meter | Handheld LCR Meters               |
|-----------------|-------------|-----------------------|-------------------|-------------------|-------------------|-------------------|-------------------|--------|--------|-----------------------------------|---------------------------|----------------------------|-----------------------------------|
|                 |             | U1211A/<br>12A/13A    | U1241A/<br>U1241B | U1242A/<br>U1242B | U1251A/<br>U1251B | U1252A/<br>U1252B | U1253A/<br>U1253B | U1271A | U1272A | U1602A/<br>04A/<br>U1602B/<br>04B | U1401A/<br>U1401B         | U1701A/<br>U1701B          | U1731A/<br>32A/<br>U1731B/<br>32B |

### Kits

|        |                                         |                             |   |   |   |   |   |   |   |   |   |   |   |
|--------|-----------------------------------------|-----------------------------|---|---|---|---|---|---|---|---|---|---|---|
| U1168A | Standard test lead kit                  | •                           | • | • | • | • | • | • | • | • | • | — | — |
| U1161A | Extended test lead kit                  | •                           | • | • | • | • | • | • | • | • | • | — | — |
| U1580A | DMM terminal test lead set              | •                           | • | • | • | • | • | • | • | • | • | — | — |
| U1180A | Thermocouple adapter+lead kit           | •<br>(For U1212A /13A only) | — | • | — | • | • | — | • | — | — | — | — |
| N/A    | Calibrator/Meter standard test lead kit | —                           | • | • | • | • | • | — | — | • | • | — | — |

### Probes/Leads/Clamp

|        |                                    |   |   |   |   |   |   |   |   |   |   |   |   |
|--------|------------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| U1162A | Alligator clips                    | • | • | • | • | • | • | • | • | • | • | — | — |
| U1163A | SMT grabbers                       | • | • | • | • | • | • | • | • | • | • | — | — |
| U1164A | Fine-tip test probes               | • | • | • | • | • | • | • | • | • | • | — | — |
| U1169A | Test probe leads                   | • | • | • | • | • | • | • | • | • | • | — | — |
| U1583B | AC current clamp                   | — | • | • | • | • | • | • | • | • | — | — | — |
| U1781A | Alligator clip leads               | — | — | — | — | — | — | — | — | — | — | • | • |
| U1782A | SMD tweezer                        | — | — | — | — | — | — | — | — | — | — | • | • |
| U5402A | Yellow test lead for mA simulation | — | — | — | — | — | — | — | — | — | • | — | — |
| N/A    | Mini grabber                       | — | • | • | • | — | — | — | — | • | • | — | — |

| Ordering Number | Description | Handheld Clamp Meters | Handheld DMMs     |                   |                   |                   |                   |        |        | Handheld Scopes                   | Handheld Calibrator/Meter | Handheld Capacitance Meter | Handheld LCR Meters               |
|-----------------|-------------|-----------------------|-------------------|-------------------|-------------------|-------------------|-------------------|--------|--------|-----------------------------------|---------------------------|----------------------------|-----------------------------------|
|                 |             | U1211A/<br>12A/13A    | U1241A/<br>U1241B | U1242A/<br>U1242B | U1251A/<br>U1251B | U1252A/<br>U1252B | U1253A/<br>U1253B | U1271A | U1272A | U1602A/<br>04A/<br>U1602B/<br>04B | U1401A/<br>U1401B         | U1701A/<br>U1701B          | U1731A/<br>32A/<br>U1731B/<br>32B |

#### Probes/Leads for Temperature Measurement

|        |                                      |                             |   |   |   |   |   |   |   |   |   |   |   |
|--------|--------------------------------------|-----------------------------|---|---|---|---|---|---|---|---|---|---|---|
| U1181A | Immersion temperature probe          | •<br>(For U1212A /13A only) | • | • | • | • | • | • | • | • | • | — | — |
| U1182A | Industrial surface temperature probe | •<br>(For U1212A /13A only) | • | • | • | • | • | • | • | • | • | — | — |
| U1183A | Air temperature probe                | •<br>(For U1212A /13A only) | • | • | • | • | • | • | • | • | • | — | — |
| U1184A | Temperature probe adapter            | •<br>(For U1212A /13A only) | • | • | • | • | • | • | • | — | • | — | — |
| U1185A | J-type thermocouple and adapter      | —                           | — | • | — | • | • | — | • | — | — | — | — |
| U1186A | K-type thermocouple and adapter      | •<br>(For U1212A /13A only) | • | • | • | • | • | • | • | • | • | — | — |
| U1586B | Temperature module                   | —                           | — | — | — | — | — | — | — | • | — | — | — |

#### Probes/Clips for Scope-only Functions

|        |                         |   |   |   |   |   |   |   |   |   |   |   |   |
|--------|-------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| U1554A | Hook clip for probe tip | — | — | — | — | — | — | — | — | • | — | — | — |
| U1560A | 1:1 scope probe         | — | — | — | — | — | — | — | — | • | — | — | — |
| U1561A | 10:1 scope probe        | — | — | — | — | — | — | — | — | • | — | — | — |
| U1562A | 100:1 scope probe       | — | — | — | — | — | — | — | — | • | — | — | — |

#### Carrying Case/Hanging Kit

|        |                                  |   |   |   |   |   |   |   |   |   |   |   |   |
|--------|----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| U1171A | Magnetic hanging kit             | — | • | • | • | • | • | • | • | — | — | — | — |
| U1172A | Transit case (aluminium-clad)    | — | • | • | • | • | • | • | • | — | — | — | — |
| U1174A | Soft carrying case               | — | • | • | • | • | • | • | • | — | — | • | • |
| U1175A | Soft carrying case               | • | — | — | — | — | — | — | — | — | — | — | — |
| U1590A | Soft carrying case (PVC leather) | — | — | — | — | — | — | — | — | • | — | — | — |
| U5491A | Carrying case (PVC leather)      | — | — | — | — | — | — | — | — | — | • | — | — |

#### Power/Cables

|        |                           |   |   |   |   |   |   |   |   |   |   |   |   |
|--------|---------------------------|---|---|---|---|---|---|---|---|---|---|---|---|
| U1170A | Battery charger adapter   | — | — | — | — | • | • | — | — | — | — | — | — |
| U1173A | IR-to-USB cable           | — | — | — | • | • | • | • | • | — | — | — | — |
| U1570A | AC power adapter and cord | — | — | — | — | — | — | — | — | • | — | — | — |
| U1571A | Ni-MH battery pack        | — | — | — | — | — | — | — | — | • | — | — | — |
| U1780A | AC power adapter and cord | — | — | — | — | — | — | — | — | — | — | • | • |
| U5481A | IR-to-USB cable           | — | — | — | — | — | — | — | — | — | • | • | • |

# Optional accessories



## U1168A Standard test lead kit

- Test leads: CAT III 1000 V, CAT IV 600 V, 15 A
- Test probe (19-mm tips): Cat III 1000 V, CAT IV 600 V, 15 A
- Test probe (4-mm tips): CAT III 1000 V, CAT IV 600 V, 15 A (highly recommended for CAT IV environment)
- Alligator Clips: Cat III 1000 V, 10 A
- Fine tip test probes: Cat II 300 V, 3 A
- SMT grabber: Cat II 300 V, 3 A
- Mini grabber (black only): Cat II 300 V, 3 A



## U1172A Transit case

The robust casing to transport your DMM and accessories

- Aluminum-clad, black panel construction
- Dimension: 18" (H) x 13" (W) x 6" (D)
- Weight: 4 kg



## U1161A Extended test lead kit

Includes two test leads (red and black), two test probes, medium-sized alligator clips and 4-mm banana plugs.

- Test leads: CAT III 1000 V, CAT IV 600 V, 15 A
- Test probes: CAT III 1000 V, 15 A
- Medium-sized alligator clips: CAT III 600 V, 10 A
- 4-mm banana plugs: CAT II 600 V, 10 A



## U1173A IR-to-USB cable

- For remote control and data logging to PC
- Max. baud rate: 19,200 bits per second
- For use with U1250 series DMMs



## U1162A Alligator clips

- One pair of insulated alligator clips (red and black). Recommended for use with Agilent standard test leads.
- Rated CAT III 1000 V, 10 A.



## U1174A Soft carrying case

The convenient way to carry your DMM and essential accessories

- Dimension: 9" (H) x 5" (W) x 3" (D)



## U1163A SMT grabbers

- One pair of SMT grabbers (red and black). Recommended for use with Agilent standard test leads.
- Rated CAT II 300 V, 3 A.



## U1180A Thermocouple adapter/lead kit

Includes thermocouple adapter, thermocouple bead J-type and thermocouple bead K-type.

- T/C adapter J/K-type
- T/C bead J-type: -20 °C to 200 °C
- T/C bead K-type: -20 °C to 200 °C



## U1164A Fine-tip test probes

- One pair of fine-tip test probes (red and black). Recommended for use with Agilent standard test leads.
- Rated CAT II 300 V, 3 A.



## U1181A Immersion temperature probe

- Type-K T/C for use in oil and other liquids
- Measurement range: -50 °C to 700 °C
- Includes adapter U1184A for connection to DMM
- Requires module U1186A for connection to scope



## U1169A Test probe leads

- Test leads: CAT III 1000 V, CAT IV 600 V, 15 A
- Test probe (19-mm tips): Cat III 1000 V, CAT IV 600 V, 15 A
- Test probe (4-mm tips): CAT III 1000 V, CAT IV 600 V, 15 A (highly recommended for CAT IV environment)



## U1182A Industrial surface temperature probe

- Type-K T/C for use on still surfaces
- Measurement range: -50 °C to 400 °C
- Includes adapter U1184A for connection to DMM
- Requires module U1186A for connection to scope



## U1170A Battery charger adapter

- Includes AC power cord based on country
- For use with U1252A/U1253A DMMs



## U1183A Air temperature probe

- Type-K T/C for use in air and non-caustic gas
- Measurement range: -50 °C to 800 °C
- Includes adapter U1184A for connection to DMM
- Requires module U1186A for connection to scope



## U1171A Magnetic hanging kit

- For use with handheld DMMs



## U1184A Temperature probe adapter

- Mini-connector-to-banana-plug adapter for use with DMM



#### U1185A J-type thermocouple and adapter

- T/C adapter J/K-type
- T/C bead J-type:  $-20^{\circ}\text{C}$  to  $200^{\circ}\text{C}$



#### U1186A K-type thermocouple and adapter

- T/C adapter J/K-type
- T/C bead K-type:  $-20^{\circ}\text{C}$  to  $200^{\circ}\text{C}$



#### U1554A Hook clip for probe tip

- Rated CAT II 1000 V, CAT III 600 V



#### U1560A 1:1 Scope probe

- Includes ground alligator clip and hook clip.
- Rated CAT III 300 V



#### U1561A 10:1 Scope probe

- Includes ground alligator clip and hook clip.
- Rated CAT III 600 V



#### U1562A 100:1 Scope probe

- Includes ground alligator clip and hook clip.
- Rated CAT III 600 V



#### U1570A AC power adapter

- Includes AC power cord based on country
- For use with U1600 series scopes



#### U1571A Ni-MH battery pack

- 4500 mA, 7.2 V
- For use with U1600 series scopes



#### U1580A DMM terminal test lead set

- Includes two DMM test leads (red and black), and three DMM alligator clips.
- Rated CAT III 1000 V



#### U1583B AC current clamp

- Dual range: 40 A and 400 A
- Rated CAT III 600 V
- BNC-to-banana-plug adapter provided for use with DMMs



#### U1586B Temperature module

- Measures  $-50^{\circ}\text{C}$  ~  $1000^{\circ}\text{C}$
- K-type bead probe provided for use with DMMs



#### U1590A Soft carrying case

- Dimensions: 9.6" (H) x 13.0" (W) x 4.5" (D)
- PVC leather material
- Ideal for handheld scopes or instruments of similar size



#### U1780A AC power adapter

- Includes AC power cord based on country
- For use with U1700 series handheld capacitance/LCR meters



#### U1781A Alligator clip leads

- For use with handheld capacitance and LCR meters



#### U1782A SMD tweezer

- Tweezer for testing the capacitance/inductance/resistance of SMD components ( $C < 200 \mu\text{F}$ ,  $L < 20 \text{ mH}$ ,  $R < 10 \text{ M}\Omega$ )
- Guard ends for better noise immunity



#### U5402A Yellow test lead for mA simulation

- For use with handheld multi-function calibrator/meter



#### U5481A IR-to-USB cable

- For remote control and data logging to PC
- Max. baud rate: 19,200 bits per second
- For use with U1700 series handheld capacitance/LCR meters and U1401A multi-function calibrator/meter



#### U5491A Carrying case

- Dimensions: 8.9" (H) x 12.2" (W) x 3.1" (D)
- PVC leather material
- Ideal for handheld multi-function calibrator/meter or instruments of similar size



#### U1175A Carrying case

- Ideal for handheld clamp meters
- Dimension: 290 mm (H) x 120 mm (W) x 85 mm (D)



#### U1176A LED Probe Clip Light

- 3 inches in length
- To be clipped onto test probes to increase visibility
- Comes with one AAA battery

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**Other Asia Pacific Countries:**

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(fax) (65) 6755 0042  
(email)  
[tm\\_ap@agilent.com](mailto:tm_ap@agilent.com)



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Printed in USA, November 16, 2010  
5989-7340EN



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