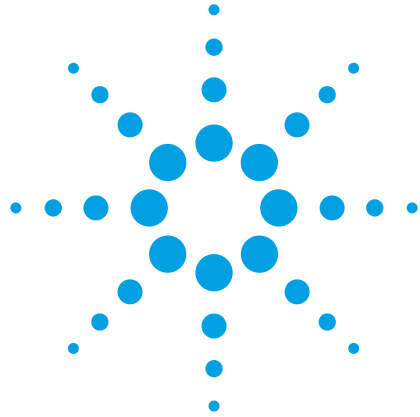


# Agilent Handheld Tools

For Electronic, Electrical and  
Industrial Process Testing



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

*Anticipate — Accelerate — Achieve*



**Agilent Technologies**

# Digital Multimeters

From electronics troubleshooting to installation and maintenance of machinery, Agilent handheld digital multimeters are designed to withstand the harsh working conditions and improve safety. Each DMM is compatible with the U1177A Infrared (IR)-to-*Bluetooth*<sup>®</sup> adapter which offers wireless remote connectivity solution. Our range of handheld DMMs are also equipped with smart features to help you quickly detect problems and obtain accurate measurements.

| Recommended for | Electrical, HVAC and utilities |        |        | Installation and maintenance of machinery, electrical systems |        | Electronics troubleshooting |        |        | Industrial |        |        |         |
|-----------------|--------------------------------|--------|--------|---------------------------------------------------------------|--------|-----------------------------|--------|--------|------------|--------|--------|---------|
| Model no.       | U1231A                         | U1232A | U1233A | U1241B                                                        | U1242B | U1251B                      | U1252B | U1253B | U1271A     | U1272A | U1273A | U1273AX |

## Display

|                             |       |       |       |                            |                            |        |        |              |        |        |              |              |
|-----------------------------|-------|-------|-------|----------------------------|----------------------------|--------|--------|--------------|--------|--------|--------------|--------------|
| Display resolution (counts) | 6,000 | 6,000 | 6,000 | 10,000                     | 10,000                     | 50,000 | 50,000 | 50,000       | 30,000 | 30,000 | 30,000       | 30,000       |
| Dual display                | N/A   | N/A   | N/A   | N/A                        | N/A                        | Yes    | Yes    | Yes          | Yes    | Yes    | Yes          | Yes          |
| Analog bar-graph            | Yes   | Yes   | Yes   | Yes                        | Yes                        | Yes    | Yes    | Yes          | Yes    | Yes    | Yes          | Yes          |
| Back-light                  | Yes   | Yes   | Yes   | Yes (two intensity levels) | Yes (two intensity levels) | Yes    | Yes    | OLED display | Yes    | Yes    | OLED display | OLED display |

## Basic features

|                     |       |       |       |       |       |        |         |         |        |         |         |         |
|---------------------|-------|-------|-------|-------|-------|--------|---------|---------|--------|---------|---------|---------|
| AC bandwidth        | 1 kHz | 1 kHz | 1 kHz | 2 kHz | 2 kHz | 30 kHz | 100 kHz | 100 kHz | 20 kHz | 100 kHz | 100 kHz | 100 kHz |
| True RMS            | AC    | AC    | AC    | AC    | AC    | AC     | AC + DC | AC + DC | AC     | AC + DC | AC + DC | AC + DC |
| Auto/manual ranging | Yes   | Yes   | Yes   | Yes   | Yes   | Yes    | Yes     | Yes     | Yes    | Yes     | Yes     | Yes     |

## Measurements

|                          |                               |                               |                               |                                |                                                            |                                                              |                                                              |                                                              |                                                              |                                                              |                                                              |                                                              |
|--------------------------|-------------------------------|-------------------------------|-------------------------------|--------------------------------|------------------------------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------|--------------------------------------------------------------|
| Voltage AC/DC: Range     | 600 mV to 600 V               | 600 mV to 600 V               | 600 mV to 600 V               | 1 V to 1000 V                  | 1 V to 1000 V                                              | 50 mV to 1000 V                                              | 50 mV to 1000 V                                              | 50 mV to 1000 V                                              | 300 mV to 1000 V                                             | 30 mV to 1000 V                                              | 30 mV to 1000 V                                              | 30 mV to 1000 V                                              |
| Current AC/DC: Range     | N/A                           | 60 $\mu$ A to 10 A            | 60 $\mu$ A to 10 A            | 1 mA to 10 A                   | 1 mA to 10 A                                               | 500 $\mu$ A to 10 A                                          | 500 $\mu$ A to 10 A                                          | 500 $\mu$ A to 10 A                                          | 300 $\mu$ A to 10 A                                          | 300 $\mu$ A to 10 A                                          | 300 $\mu$ A to 10 A                                          | 300 $\mu$ A to 10 A                                          |
| Resistance: Range        | 600 $\Omega$ to 60 M $\Omega$ | 600 $\Omega$ to 60 M $\Omega$ | 600 $\Omega$ to 60 M $\Omega$ | 1 k $\Omega$ to 100 M $\Omega$ | 1 k $\Omega$ to 100 M $\Omega$                             | 500 $\Omega$ to 500 M $\Omega$                               | 500 $\Omega$ to 500 M $\Omega$                               | 500 $\Omega$ to 500 M $\Omega$                               | 300 $\Omega$ to 100 M $\Omega$                               | 30 $\Omega$ to 300 M $\Omega$                                | 30 $\Omega$ to 300 M $\Omega$                                | 30 $\Omega$ to 300 M $\Omega$                                |
| Frequency: Range         | 99.99 Hz to 99.99 kHz         | 99.99 Hz to 99.99 kHz         | 99.99 Hz to 99.99 kHz         | 100 Hz to 1000 kHz             | 100 Hz to 1000 kHz                                         | 99.999 Hz to 999.99 kHz                                      | 99.999 Hz to 999.99 kHz                                      | 99.999 Hz to 999.99 kHz                                      | 99.999 Hz to 999.99 kHz                                      | 99.999 Hz to 999.99 kHz                                      | 99.999 Hz to 999.99 kHz                                      | 99.999 Hz to 999.99 kHz                                      |
| Capacitance: Range       | 1000 nF to 10 mF              | 1000 nF to 10 mF              | 1000 nF to 10 mF              | 1 $\mu$ F to 10 mF             | 1 $\mu$ F to 10 mF                                         | 10 nF to 100 mF                                              | 10 nF to 100 mF                                              | 10 nF to 100 mF                                              | 10 nF to 10 mF                                               | 10 nF to 10 mF                                               | 10 nF to 10 mF                                               | 10 nF to 10 mF                                               |
| Temperature: Type, range | N/A                           | N/A                           | K: -40 to 1372 $^{\circ}$ C   | K: -40 to 1000 $^{\circ}$ C    | K: -40 to 1000 $^{\circ}$ C<br>J: -40 to 1000 $^{\circ}$ C | K: -200 to 1372 $^{\circ}$ C<br>J: -210 to 1200 $^{\circ}$ C | K: -200 to 1372 $^{\circ}$ C<br>J: -210 to 1200 $^{\circ}$ C | K: -200 to 1372 $^{\circ}$ C<br>J: -210 to 1200 $^{\circ}$ C | K: -200 to 1372 $^{\circ}$ C<br>J: -210 to 1200 $^{\circ}$ C | K: -200 to 1372 $^{\circ}$ C<br>J: -210 to 1200 $^{\circ}$ C | K: -200 to 1372 $^{\circ}$ C<br>J: -210 to 1200 $^{\circ}$ C | K: -200 to 1372 $^{\circ}$ C<br>J: -210 to 1200 $^{\circ}$ C |
| Continuity with beeper   | Yes                           | Yes                           | Yes                           | Yes                            | Yes                                                        | Yes                                                          | Yes                                                          | Yes                                                          | Yes                                                          | Yes                                                          | Yes                                                          | Yes                                                          |
| Diode test               | Yes                           | Yes                           | Yes                           | Yes                            | Yes                                                        | Yes                                                          | Yes                                                          | Yes                                                          | Yes                                                          | Yes                                                          | Yes                                                          | Yes                                                          |

## Data management

|                    |                             |                             |                             |                             |                             |                             |                             |                             |                             |                             |                             |                             |
|--------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|-----------------------------|
| Min/max recording  | Yes                         | Yes                         | Yes                         | Yes                         | Yes                         | Yes                         | Yes                         | Yes                         | Yes                         | Yes                         | Yes                         | Yes                         |
| Display hold       | Yes                         | Yes                         | Yes                         | Yes                         | Yes                         | Yes                         | Yes                         | Yes                         | Yes                         | Yes                         | Yes                         | Yes                         |
| Peak hold          | Yes                         | Yes                         | Yes                         | N/A                         | N/A                         | Yes                         | Yes                         | Yes                         | Yes                         | Yes                         | Yes                         | Yes                         |
| Manual datalogging | N/A                         | N/A                         | N/A                         | N/A                         | Yes                         | Yes                         | Yes                         | Yes                         | Yes                         | Yes                         | Yes                         | Yes                         |
| Null               | Yes                         | Yes                         | Yes                         | Yes                         | Yes                         | Yes                         | Yes                         | Yes                         | Yes                         | Yes                         | Yes                         | Yes                         |
| Connectivity       | IR-USB/<br><i>Bluetooth</i> | IR-USB/<br><i>Bluetooth</i> | IR-USB/<br><i>Bluetooth</i> | IR-USB/<br><i>Bluetooth</i> | IR-USB/<br><i>Bluetooth</i> | IR-USB/<br><i>Bluetooth</i> | IR-USB/<br><i>Bluetooth</i> | IR-USB/<br><i>Bluetooth</i> | IR-USB/<br><i>Bluetooth</i> | IR-USB/<br><i>Bluetooth</i> | IR-USB/<br><i>Bluetooth</i> | IR-USB/<br><i>Bluetooth</i> |
| % scale of 4-20 mA | N/A                         | N/A                         | N/A                         | Yes                         | Yes                         | Yes                         | Yes                         | Yes                         | Yes                         | Yes                         | Yes                         | Yes                         |

## Digital Multimeters *Continued*

| Recommended for         | Electrical, HVAC and utilities                                           |                                                                          |                                                                                                                    | Installation and maintenance of machinery, electrical systems |                                                                                | Electronics troubleshooting  |                                                              |                                                                                   | Industrial                                  |                                                          |                                                          |                                                          |
|-------------------------|--------------------------------------------------------------------------|--------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------|---------------------------------------------------------------|--------------------------------------------------------------------------------|------------------------------|--------------------------------------------------------------|-----------------------------------------------------------------------------------|---------------------------------------------|----------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------|
| Model no.               | U1231A                                                                   | U1232A                                                                   | U1233A                                                                                                             | U1241B                                                        | U1242B                                                                         | U1251B                       | U1252B                                                       | U1253B                                                                            | U1271A                                      | U1272A                                                   | U1273A                                                   | U1273AX                                                  |
| <b>General</b>          |                                                                          |                                                                          |                                                                                                                    |                                                               |                                                                                |                              |                                                              |                                                                                   |                                             |                                                          |                                                          |                                                          |
| Operating temperature   | –10 to 55 °C, 0% to 80% RH                                               | –10 to 55 °C, 0% to 80% RH                                               | –10 to 55 °C, 0% to 80% RH                                                                                         | –10 to 55 °C, 0 to 80% RH                                     | –10 to 55 °C, 0 to 80% RH                                                      | –20 to 55 °C, 0 to 80% RH    | –20 to 55 °C, 0 to 80% RH                                    | –20 to 55 °C, 0 to 80% RH                                                         | –20 to 55 °C, 0 to 80% RH                   | –20 to 55 °C, 0 to 80% RH                                | –20 to 55 °C, 0 to 80% RH                                | –40 to 55 °C, 0 to 80% RH                                |
| Altitude                | 2000 m                                                                   | 2000 m                                                                   | 2000 m                                                                                                             | 2000 m                                                        | 2000 m                                                                         | 2000 m                       | 2000 m                                                       | 2000 m                                                                            | 3000 m                                      | 3000 m                                                   | 3000 m                                                   | 3000 m                                                   |
| Measurement category    | CAT III 600 V                                                            | CAT III 600 V                                                            | CAT III 600 V                                                                                                      | CAT III 1000 V/ CAT IV 600 V                                  | CAT III 1000 V/ CAT IV 600 V                                                   | CAT III 1000 V/ CAT IV 600 V | CAT III 1000 V/ CAT IV 600 V                                 | CAT III 1000 V/ CAT IV 600 V                                                      | CAT III 1000 V/ CAT IV 600 V                | CAT III 1000 V/ CAT IV 600 V                             | CAT III 1000 V/ CAT IV 600 V                             | CAT III 1000 V/ CAT IV 600 V                             |
| Battery type (included) | 4 x AAA alkaline                                                         | 4 x AAA alkaline                                                         | 4 x AAA alkaline                                                                                                   | 4 x AAA alkaline                                              | 4 x AAA alkaline                                                               | 9 V                          | 7.2 V (rechargeable)                                         | 7.2 V (rechargeable)                                                              | 4 x AAA alkaline                            | 4 x AAA alkaline                                         | 4 x AAA alkaline                                         | 4 x AAA lithium                                          |
| Battery life            | 500 hours                                                                | 500 hours                                                                | 500 hours                                                                                                          | 300 hours                                                     | 300 hours                                                                      | 72 hours                     | 36 hours                                                     | 8 hours                                                                           | 300 hours                                   | 300 hours                                                | 30-60 hours                                              | 50-100 hours                                             |
| Dimensions (H x W x D)  | 169.0 x 86.0 x 52.0 mm                                                   | 169.0 x 86.0 x 52.0 mm                                                   | 169.0 x 86.0 x 52.0 mm                                                                                             | 193.8 x 92.2 x 58.0 mm                                        | 193.8 x 92.2 x 58.0 mm                                                         | 203.5 x 94.4 x 59.0 mm       | 203.5 x 94.4 x 59.0 mm                                       | 203.5 x 94.4 x 59.0 mm                                                            | 207.0 x 92.0 x 59.0 mm                      | 207.0 x 92.0 x 59.0 mm                                   | 207.0 x 92.0 x 59.0 mm                                   | 207.0 x 92.0 x 59.0 mm                                   |
| Advanced functions      | Built-in flashlight, continuity alert with flashing backlight, $Z_{Low}$ | Built-in flashlight, continuity alert with flashing backlight, $Z_{Low}$ | Built-in flashlight, non-contact voltage detector with Vsense, continuity alert with flashing backlight, $Z_{Low}$ | Switch counter                                                | Switch counter, harmonic ratio, dual and differential temperature measurements | N/A                          | 20 MHz frequency counter, programmable square wave generator | Organic LED display, 20 MHz frequency counter, programmable square wave generator | Low pass filter, AC and/or DC voltage check | Low pass filter, low impedance mode, offset compensation | Low pass filter, low impedance mode, offset compensation | Low pass filter, low impedance mode, offset compensation |

## U1177A Infrared (IR)-to-Bluetooth Adapter

Monitoring multiple measurements simultaneously and wirelessly is now made possible with the U1177A Infrared (IR)-to-Bluetooth adapter. To achieve this, simply install the free software on your Android smart phone or tablet, and connect it to any Agilent handheld digital multimeter (HH DMM) that is attached to a U1177A. With this, you not only get real-time measurement monitoring and data logging, both apply to Android devices and PCs as well.



Agilent U1177A Infrared (IR)-to-Bluetooth adapter

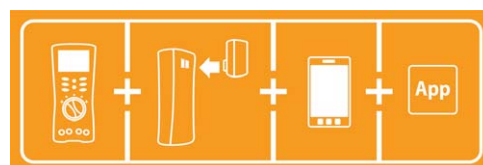
### Features

- Compatible with Agilent U1210 series handheld clamp meters and other handheld digital multimeters such as the U1230 series, U1240 series, U1250 series and U1270 series.
- Monitor up to 3 multimeter measurements at the same time with Agilent Mobile Meter software
- Perform data logging with Agilent Mobile Logger software

### Web link

[www.agilent.com/find/U1177A](http://www.agilent.com/find/U1177A)

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Agilent wireless remote connectivity solution

# Clamp Meters

Our clamp meters are designed to address the toughest electrical challenges without compromising on safety. Certified with safety ratings and equipped with a wealth of features – you are now ready to make measurements with more confidence.

| Recommended for | Installation and maintenance of power distribution and supplies |        |        | Commercial or residential electrical installation and maintenance |        |        |        |
|-----------------|-----------------------------------------------------------------|--------|--------|-------------------------------------------------------------------|--------|--------|--------|
| Model no.       | U1211A                                                          | U1212A | U1213A | U1191A                                                            | U1192A | U1193A | U1194A |

## Display

|                             |       |       |       |       |       |       |       |
|-----------------------------|-------|-------|-------|-------|-------|-------|-------|
| Display resolution (counts) | 4,000 | 4,000 | 4,000 | 6,000 | 6,000 | 6,000 | 6,000 |
| Dual display                | Yes   | Yes   | Yes   | No    | No    | No    | No    |
| Analog bar-graph            | Yes   | Yes   | Yes   | No    | No    | No    | No    |
| Back-light                  | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   | Yes   |

## Basic features

|                     |             |        |         |                    |                    |                   |                   |
|---------------------|-------------|--------|---------|--------------------|--------------------|-------------------|-------------------|
| AC bandwidth        | 400 Hz      | 400 Hz | 2 kHz   | 500 Hz             | 500 Hz             | 500 Hz            | 500 Hz            |
| RMS Method          | True RMS AC | AC     | AC + DC | Average responding | Average responding | True RMS          | True RMS          |
| Auto/manual ranging | Yes         | Yes    | Yes     | Auto ranging only  | Auto ranging only  | Auto ranging only | Auto ranging only |

## Measurements

|                          |                              |                              |                               |                              |                               |                               |                                                      |
|--------------------------|------------------------------|------------------------------|-------------------------------|------------------------------|-------------------------------|-------------------------------|------------------------------------------------------|
| Voltage AC/DC: Range     | 400 to 1000 V                | 400 to 1000 V                | 4 V to 1000 V                 | 600 V                        | 60 to 600 V                   | 60 to 600 V                   | 60 to 600 V                                          |
| Current AC/DC: Range     | ACI: 40 to 1000 A            | 40 to 1000 A                 | 40 to 1000 A                  | ACI: 400 A                   | ACI: 60 to 400 A              | ACI: 60 to 600 A              | ACI: 60 $\mu$ A to 600 A<br>DCI: 60 $\mu$ A to 600 A |
| Resistance: Range        | 400 $\Omega$ to 4 k $\Omega$ | 400 $\Omega$ to 4 k $\Omega$ | 400 $\Omega$ to 40 M $\Omega$ | 600 $\Omega$ to 6 k $\Omega$ | 600 $\Omega$ to 60 k $\Omega$ | 600 $\Omega$ to 60 k $\Omega$ | 600 $\Omega$ to 60 k $\Omega$                        |
| Frequency: Range         | 99.99 Hz to 999.9 kHz        | 99.99 Hz to 999.9 kHz        | 99.99 Hz to 999.9 kHz         | N/A                          | 99.99 Hz to 99.99 kHz         | 99.99 Hz to 99.99 kHz         | 99.99 Hz to 99.99 kHz                                |
| Capacitance: Range       | 400 to 4000 $\mu$ F          | 400 to 4000 $\mu$ F          | 4 to 4000 $\mu$ F             | N/A                          | 600 $\mu$ F to 6 mF           | 600 $\mu$ F to 6 mF           | 600 $\mu$ F to 6 mF                                  |
| Temperature: Type, range | N/A                          | K: –200 to 1372 $^{\circ}$ C | K: –200 to 1372 $^{\circ}$ C  | N/A                          | N/A                           | N/A                           | K-type: –40 to 1200 $^{\circ}$ C                     |
| Continuity with beeper   | Yes                          | Yes                          | Yes                           | Yes                          | Yes                           | Yes                           | Yes                                                  |
| Diode test               | Yes                          | Yes                          | Yes                           | Yes                          | Yes                           | Yes                           | Yes                                                  |

## Data management

|                   |           |           |           |     |     |     |     |
|-------------------|-----------|-----------|-----------|-----|-----|-----|-----|
| Min/max recording | Yes       | Yes       | Yes       | Yes | Yes | Yes | Yes |
| Display hold      | Yes       | Yes       | Yes       | Yes | Yes | Yes | Yes |
| Peak hold         | Yes       | Yes       | Yes       | N/A | N/A | N/A | N/A |
| Null              | Yes       | Yes       | Yes       | Yes | Yes | Yes | Yes |
| Connectivity      | Bluetooth | Bluetooth | Bluetooth | N/A | N/A | N/A | N/A |

## General

|                         |                                     |                                     |                                     |                                     |                                                             |                                                             |                                                             |
|-------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------|-------------------------------------------------------------|-------------------------------------------------------------|-------------------------------------------------------------|
| Operating temperature   | –10 to 50 $^{\circ}$ C, 0 to 80% RH | –10 to 50 $^{\circ}$ C, 0 to 80% RH | –10 to 50 $^{\circ}$ C, 0 to 80% RH | –10 to 50 $^{\circ}$ C, 0 to 80% RH | –10 to 50 $^{\circ}$ C, 0 to 80% RH                         | –10 to 50 $^{\circ}$ C, 0 to 80% RH                         | –10 to 50 $^{\circ}$ C, 0 to 80% RH                         |
| Measurement category    | CAT III 1000 V / CAT IV 600 V       | CAT III 1000 V / CAT IV 600 V       | CAT III 1000 V / CAT IV 600 V       | CAT III 600 V / CAT IV 300 V        | CAT III 600 V / CAT IV 300 V                                | CAT III 600 V / CAT IV 300 V                                | CAT III 600 V / CAT IV 300 V                                |
| Battery type (included) | 9 V                                 | 9 V                                 | 9 V                                 | 1.5 V                               | 1.5 V                                                       | 1.5 V                                                       | 1.5 V                                                       |
| Battery life            | 60 hours                            | 60 hours                            | 60 hours                            | 200 hours                           | 200 hours                                                   | 200 hours                                                   | 200 hours                                                   |
| Dimensions (H x W x D)  | 273.0 x 106.0 x 43.0 mm             | 273.0 x 106.0 x 43.0 mm             | 273.0 x 106.0 x 43.0 mm             | 225.0 x 77.1 x 38.6 mm              | 225.0 x 77.1 x 38.6 mm                                      | 238.0 x 77.1 x 38.6 mm                                      | 238.0 x 77.1 x 38.6 mm                                      |
| Clamp opening           | 52 mm / 2 "                         | 52 mm / 2 "                         | 52 mm / 2 "                         | 31 mm                               | 31 mm                                                       | 37 mm                                                       | 37 mm                                                       |
| Advanced functions      | Auto power off                      | Auto power off                      | Auto power off                      | Wire separator, Auto power off      | Wire separator, built-in flashlight, Vsense, Auto power off | Wire separator, built-in flashlight, Vsense, Auto power off | Wire separator, built-in flashlight, Vsense, Auto power off |

# Oscilloscopes

Our handheld scopes are designed to be used across a wide range of applications and troubleshooting tasks. Each model come with different specifications to tailor to your needs, and are safety certified for safer measurements.

| Model No.                                                                      | U1602B                                                                                                                                                                                                                                               | U1604B            | U1610A                                                                                                                                                                                                                                                                                    | U1620A                                     |
|--------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------|
| Vertical System: Scope Channels                                                |                                                                                                                                                                                                                                                      |                   |                                                                                                                                                                                                                                                                                           |                                            |
| Bandwidth (-3 dB)                                                              | 20 MHz                                                                                                                                                                                                                                               | 40 MHz            | 100 MHz                                                                                                                                                                                                                                                                                   | 200 MHz                                    |
| DC vertical gain accuracy                                                      | 5 mV/div to 20 mV/div: ± 5% full scale<br>50 mV/div to 100 V/div: ± 3% full scale                                                                                                                                                                    |                   | ±2% of full scale<br>Full scale is equivalent to 8 div                                                                                                                                                                                                                                    |                                            |
| Acquisition: Scope Channels                                                    |                                                                                                                                                                                                                                                      |                   |                                                                                                                                                                                                                                                                                           |                                            |
| Maximum sample rate<br>Single Channel Operation<br>Dual Channel Operation      | 200 MSa/s interleave<br>100 MSa/s each channel                                                                                                                                                                                                       |                   | 1 GSa/s interleave<br>500 MSa/s each channel                                                                                                                                                                                                                                              | 2 GSa/s interleave<br>1 GSa/s each channel |
| Vertical resolution                                                            | 8-bits                                                                                                                                                                                                                                               |                   | 8-bits                                                                                                                                                                                                                                                                                    |                                            |
| Maximum recording length<br>Single Channel Operation<br>Dual Channel Operation | 125 Kpts                                                                                                                                                                                                                                             | 125 Kpts          | 120 Kpts interleave<br>60 Kpts each channel                                                                                                                                                                                                                                               | 2 Mpts interleave<br>1 Mpts each channel   |
| Vertical System: Scope Channels                                                |                                                                                                                                                                                                                                                      |                   |                                                                                                                                                                                                                                                                                           |                                            |
| Rise time                                                                      | <17.5 ns                                                                                                                                                                                                                                             | <8.8 ns           | 3.50 ns typical                                                                                                                                                                                                                                                                           | 1.75 ns typical                            |
| Maximum input                                                                  | CAT III 300 Vrms (up to 400 Hz) from terminal to ground                                                                                                                                                                                              |                   | CAT III 600 Vrms (with 10:1 probe)<br>CAT III 300 Vrms (direct / 1:1 probe)                                                                                                                                                                                                               |                                            |
| Bandwith limit                                                                 | N/A                                                                                                                                                                                                                                                  |                   | 10 KHz and 20 MHz (selectable)                                                                                                                                                                                                                                                            |                                            |
| Channel-to-channel isolation                                                   | N/A                                                                                                                                                                                                                                                  |                   | Yes, CAT III 600 V Vrms                                                                                                                                                                                                                                                                   |                                            |
| Probe attenuation factors                                                      | 1x, 10x, 100x                                                                                                                                                                                                                                        |                   | 1x, 10x, 100x                                                                                                                                                                                                                                                                             |                                            |
| Horizontal System                                                              |                                                                                                                                                                                                                                                      |                   |                                                                                                                                                                                                                                                                                           |                                            |
| Range                                                                          | 50 ns to 50 s/div                                                                                                                                                                                                                                    | 10 ns to 50 s/div | 5 ns/div to 50 s/div                                                                                                                                                                                                                                                                      | 2 ns/div to 50 s/div                       |
| Modes                                                                          | Main, XY, roll                                                                                                                                                                                                                                       |                   | Main, zoom, XY, roll                                                                                                                                                                                                                                                                      |                                            |
| Trigger system                                                                 |                                                                                                                                                                                                                                                      |                   |                                                                                                                                                                                                                                                                                           |                                            |
| Sources                                                                        | Channel 1 and Channel 2                                                                                                                                                                                                                              |                   | Channel 1, Channel 2, External                                                                                                                                                                                                                                                            |                                            |
| Modes                                                                          | Auto, normal, single                                                                                                                                                                                                                                 |                   | Normal, Single, Auto                                                                                                                                                                                                                                                                      |                                            |
| Types                                                                          | Edge, Pattern, Pulse Width, Video                                                                                                                                                                                                                    |                   | Edge, Glitch, TV, Nth Edge, CAN, LIN                                                                                                                                                                                                                                                      |                                            |
| Auto measurements                                                              | Peak-to-peak, maximum, minimum, amplitude, top, base, +overshoot, –overshoot, preshoot, RMS, mean and one cycle mean, Frequency, period, +width, –width, and +duty cycle and –duty cycle on any channel. Rise time, fall time, delay and phase shift |                   | Delay, duty cycle (+/–), fall/rise time, frequency, period, phase shift, T-max, T-min, width (+/–), amplitude, average, base, crest, cycle mean, maximum, minimum, overshoot, peak-to-peak, preshoot, standard deviation, top, Vrms (AC/DC), active/apparent/reactive power, power factor |                                            |
| Waveform math functions                                                        | CH1 + CH2, CH1 – CH2, CH2 – CH1                                                                                                                                                                                                                      |                   | CH1 + CH2, CH1 – CH2, CH2 – CH1, CH1 × CH2, CH1 / CH2, CH2/CH1, d/dt (CH1), d/dt (CH2), ∫(CH1)dt, ∫(CH2)dt, FFT                                                                                                                                                                           |                                            |
| Digital Multimeter measurement                                                 |                                                                                                                                                                                                                                                      |                   |                                                                                                                                                                                                                                                                                           |                                            |
| Voltage AC/DC range                                                            | 600 mV to 600 V                                                                                                                                                                                                                                      |                   | 1000 mV to 1000 V                                                                                                                                                                                                                                                                         |                                            |
| Resistance range                                                               | 600 Ω to 60 MΩ                                                                                                                                                                                                                                       |                   | 1000 Ω to 100 MΩ                                                                                                                                                                                                                                                                          |                                            |
| Capacitance range                                                              | 60 nF to 300 uF                                                                                                                                                                                                                                      |                   | 1000 nF to 10 mF                                                                                                                                                                                                                                                                          |                                            |
| Diode range                                                                    | 1 V                                                                                                                                                                                                                                                  |                   | 1 V                                                                                                                                                                                                                                                                                       |                                            |
| Temperature range                                                              | 600 °C                                                                                                                                                                                                                                               |                   | –50 to 1000 °C                                                                                                                                                                                                                                                                            |                                            |
| Frequency                                                                      | N/A                                                                                                                                                                                                                                                  |                   | 100 Hz to 1000 KHz                                                                                                                                                                                                                                                                        |                                            |
| AC Current range                                                               | 60 A                                                                                                                                                                                                                                                 |                   | N/A                                                                                                                                                                                                                                                                                       |                                            |
| Measurement characteristic                                                     |                                                                                                                                                                                                                                                      |                   |                                                                                                                                                                                                                                                                                           |                                            |
| Resolution                                                                     | 6,000 counts                                                                                                                                                                                                                                         |                   | 10,000 counts                                                                                                                                                                                                                                                                             |                                            |
| Continuity                                                                     | Beeper < 60 W in 600 W range                                                                                                                                                                                                                         |                   | Continuous beep when resistance <10 Ω                                                                                                                                                                                                                                                     |                                            |
| Datalogger                                                                     | Yes                                                                                                                                                                                                                                                  |                   | Yes                                                                                                                                                                                                                                                                                       |                                            |

# Oscilloscopes *Continued*

| Model No.             | U1602B                                | U1604B | U1610A                                                                                    | U1620A |
|-----------------------|---------------------------------------|--------|-------------------------------------------------------------------------------------------|--------|
| <b>General</b>        |                                       |        |                                                                                           |        |
| Display               | 4.5" diagonal color                   |        | 5.7" VGA TFT Color LCD (sunlight viewable)                                                |        |
| Resolution            | 320 x 240 pixels                      |        | 640 x 480 pixels                                                                          |        |
| IP rating             | N/A                                   |        | IP41                                                                                      |        |
| Save/Recall           | Up to 10 setups and traces            |        | 10 setups and waveforms can be saved and recalled internally                              |        |
| Battery type          | Ni-MH rechargeable battery pack 7.2 V |        | Li-Ion rechargeable battery pack, 10.8 V                                                  |        |
| Battery life          | 4 hours                               |        | 3 hours                                                                                   |        |
| I/O                   | USB 2.0 full speed client             |        | USB 2.0 full speed host/client port                                                       |        |
| Dimension (H x W x D) | 241 x 138 x 66 mm                     |        | 183 x 270 x 65 mm                                                                         |        |
| Weight                | 1.5 kg                                |        | <2.5 kg                                                                                   |        |
| UI language           | 10 selectable languages               |        | 10 selectable languages                                                                   |        |
| Advanced functions    | CSTN LCD screen                       |        | 3 viewing modes (indoor, outdoor, night-vision),<br>VGA TFT LCD screen, dual windows zoom |        |

## U1230 Series – Handheld Digital Multimeters

Whether it is dark, noisy or even dangerous, the U1230 Series Handheld digital multimeter keeps you equipped with features that anticipate worst-case scenarios. The ergonomic shaped handheld allows you to single-handedly illuminate the test area with a built-in flashlight while selecting measurement functions using the rotary dial. Vsense performs non-contact voltage detection while continuity detection is made easy with the audible beeper alert and flashing backlight display. With the U1230 Series, you work better in the conditions you are in.

### Features

- Built-in LED flashlight to illuminate test area
- Flashing backlight as additional visual alert during continuity tests in noisy areas
- Vsense performs non-contact voltage detection
- Data logging capability (stores up to 10 readings)
- IR-to-USB connectivity to transfer data to PC for record
- *Bluetooth* wireless connectivity (optional U1177A Infrared (IR)-to-*Bluetooth* Adapter required)



## Applications with U1230 Series Handheld Digital Multimeters

In an electrical or industrial work setting, making measurements during power failures or in a poorly lit environment can be a common occurrence.

Working in a dark environment can be cumbersome; you may need to carry multiple test tools- and a flashlight. This is why the U1230 Series is well-designed with a set of features that enable electricians to work better in these environments.

The U1230 Series now comes with a built-in flashlight, allowing electricians to single-handedly illuminate the test area

while troubleshooting circuits in cramped or dark areas. The flashlight is also easily activated with a one push button, allowing measurements and troubleshooting tasks to be performed more efficiently.

The U1230 Series also performs continuity test with a unique combination of beeper alert and flashing backlight display. The flashing backlight display serves as an additional visual alert to the electrician, when performing measurement in a noisy or dim place. Both of these alerts occur simultaneously making them hard-to-miss, thus

allowing continuity tests to be performed quicker and easier.

Performing electrical measurements in a poorly lit or noisy environment can be potentially hazardous. The U1233A handheld digital multimeter comes with Vsense which performs non-contact detection of live voltages. With Vsense, electricians can now perform their tasks more safely by avoiding hot or live voltages. Upon the detection of live voltages, it simultaneously produces a unique combination of two alerts; audible beep alert and blinking LED light.

# Specifications of the U1230 Series Digital Multimeters

|                                          |           | U1231A                        | U1232A                        | U1233A                        |
|------------------------------------------|-----------|-------------------------------|-------------------------------|-------------------------------|
| <b>Basic features</b>                    |           |                               |                               |                               |
| Display resolution                       |           | 6,000                         | 6,000                         | 6,000                         |
| Auto/manual ranging                      |           | Yes                           | Yes                           | Yes                           |
| Analog bar graph                         |           | Yes                           | Yes                           | Yes                           |
| Backlight                                |           | Yes                           | Yes                           | Yes                           |
| AC bandwidth                             |           | 45 Hz to 1 kHz                | 45 Hz to 1 kHz                | 45 Hz to 1 kHz                |
| True RMS                                 |           | Yes                           | Yes                           | Yes                           |
| <b>Measurements</b>                      |           |                               |                               |                               |
| Voltage DC                               | Range     | 600 mV to 600 V               | 600 mV to 600 V               | 600 mV to 600 V               |
|                                          | Accuracy  | 0.5% + 2 cnts                 | 0.5% + 2 cnts                 | 0.5% + 2 cnts                 |
| Voltage AC                               | Range     | 600 mV to 600 V               | 600 mV to 600 V               | 600 mV to 600 V               |
|                                          | Accuracy  | 1.0% + 3 cnts                 | 1.0% + 3 cnts                 | 1.0% + 3 cnts                 |
|                                          | Bandwidth | 45 Hz to 1 kHz                | 45 Hz to 1 kHz                | 45 Hz to 1 kHz                |
| Current DC                               | Range     | N/A                           | 60 $\mu$ A to 10 A            | 60 $\mu$ A to 10 A            |
|                                          | Accuracy  |                               | 1.0% + 2 cnts                 | 1.0% + 2 cnts                 |
| Current AC                               | Range     | N/A                           | 60 $\mu$ A to 10 A            | 60 $\mu$ A to 10 A            |
|                                          | Accuracy  |                               | 1.5% + 3 cnts                 | 1.5% + 3 cnts                 |
|                                          | Bandwidth |                               | 45 to 500 Hz                  | 45 to 500 Hz                  |
| Resistance                               | Range     | 600 $\Omega$ to 60 M $\Omega$ | 600 $\Omega$ to 60 M $\Omega$ | 600 $\Omega$ to 60 M $\Omega$ |
|                                          | Accuracy  | 0.9% + 3 cnts                 | 0.9% + 3 cnts                 | 0.9% + 3 cnts                 |
| Frequency                                | Range     | 99.99 Hz to 99.99 kHz         | 99.99 Hz to 99.99 kHz         | 99.99 Hz to 99.99 kHz         |
|                                          | Accuracy  | 0.1% + 2 cnts                 | 0.1% + 2 cnts                 | 0.1% + 2 cnts                 |
| Capacitance                              | Range     | 1000 nF to 10 mF              | 1000 nF to 10 mF              | 1000 nF to 10 mF              |
|                                          | Accuracy  | 1.9% + 2 cnts                 | 1.9% + 2 cnts                 | 1.9% + 2 cnts                 |
| Temperature                              | Range     | N/A                           | N/A                           | -40 to 1372 $^{\circ}$ C      |
|                                          | Accuracy  |                               |                               | 1% + 1 $^{\circ}$ C           |
| Diode test                               |           | Yes                           | Yes                           | Yes                           |
| <b>Data management</b>                   |           |                               |                               |                               |
| Min/max recording                        |           | Yes                           | Yes                           | Yes                           |
| Trigger hold                             |           | Yes                           | Yes                           | Yes                           |
| Auto hold                                |           | Yes                           | Yes                           | Yes                           |
| Manual datalogging                       |           | N/A                           | N/A                           | N/A                           |
| Null                                     |           | Yes                           | Yes                           | Yes                           |
| Connectivity                             |           | IR-USB/ <i>Bluetooth</i>      | IR-USB/ <i>Bluetooth</i>      | IR-USB/ <i>Bluetooth</i>      |
| % scale of 4-20 mA                       |           | N/A                           | N/A                           | N/A                           |
| <b>Special features</b>                  |           |                               |                               |                               |
| Built-in flashlight                      |           | Yes ★                         | Yes ★                         | Yes ★                         |
| Beep + backlight alert for continuity    |           | Yes ★                         | Yes ★                         | Yes ★                         |
| Vsense for non-contact voltage detection |           | N/A                           | N/A                           | Yes ★                         |
| Z <sub>LOW</sub> - low impedance mode    |           | Yes                           | Yes                           | Yes                           |
| <b>Safety and regulatory</b>             |           |                               |                               |                               |
| IP rating                                |           | IP 42                         | IP 42                         | IP 42                         |
| Over-voltage safety protection           |           | CAT III 600 V                 | CAT III 600 V                 | CAT III 600 V                 |
| EN/IEC 610101-1:2001 compliance          |           | Yes                           | Yes                           | Yes                           |
| CSA C22.2 No. 61010-1:2004 compliance    |           | Yes                           | Yes                           | Yes                           |

★ represents key specifications/feature

# Specifications of the U1230 Series Digital Multimeters *Continued*

|                        | U1231A                     | U1232A                     | U1233A                     |
|------------------------|----------------------------|----------------------------|----------------------------|
| <b>General</b>         |                            |                            |                            |
| Operating temperature  | –10 to 55 °C, 0% to 80% RH | –10 to 55 °C, 0% to 80% RH | –10 to 55 °C, 0% to 80% RH |
| Battery (included)     | 4 x 1.5 V Alkaline battery | 4 x 1.5 V Alkaline battery | 4 x 1.5 V Alkaline battery |
| Battery life           | 500 hours                  | 500 hours                  | 500 hours                  |
| Warranty               | 3 years                    | 3 years                    | 3 years                    |
| Dimensions (H x W x D) | 169 x 86 x 52 mm           | 169 x 86 x 52 mm           | 169 x 86 x 52 mm           |

## Web link

[www.agilent.com/find/U1230DMM](http://www.agilent.com/find/U1230DMM)

For complete specifications, please refer to data sheet 5990-7550EN



## How to?

Select a Handheld DMM that is Right for You

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

Think Safety When Selecting a Handheld Multimeter

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

## U1240 Series - Handheld Digital Multimeters

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

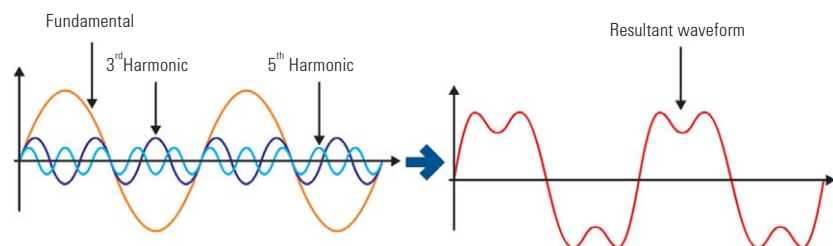
- Low micro-amp and high Mega-ohm ranges
- Switch/Relay counter for glitch detection
- Harmonic ratio measurement in AC supplies
- Dual and differential temperature measurements
- Data logging to instrument on the go
- Bluetooth® wireless connectivity  
(optional U1177A Infrared (IR)-to-Bluetooth Adapter required)



## 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.



**Harmonic ratio**

$$\frac{V_{rms} - V_{avg}}{V_{rms}} \times 100\%$$

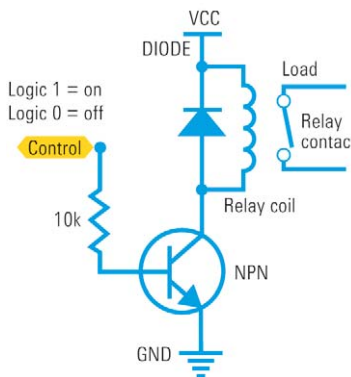
$V_{rms}$

$V_{avg}$

| Measuring circuit                 |                                                                                     | RMS-calculating converter calculates heating value | Multiplies rectified average by 1.1 |
|-----------------------------------|-------------------------------------------------------------------------------------|----------------------------------------------------|-------------------------------------|
| <b>Response to sine wave</b>      |   | Correct                                            | Correct                             |
| <b>Response to square wave</b>    |  | Correct                                            | 10% high                            |
| <b>Response to distorted wave</b> |  | 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.

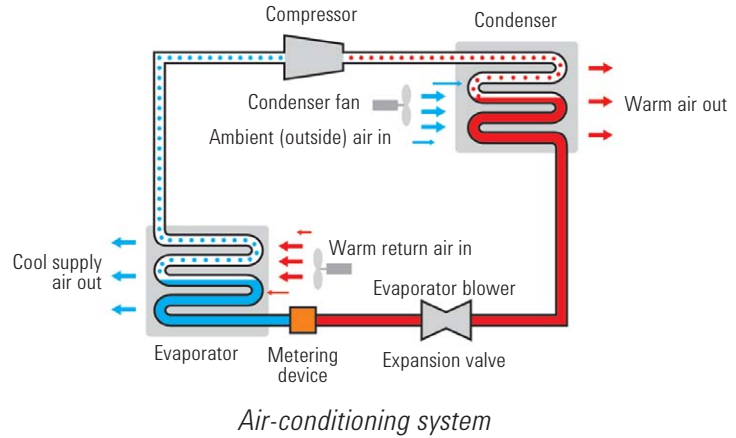
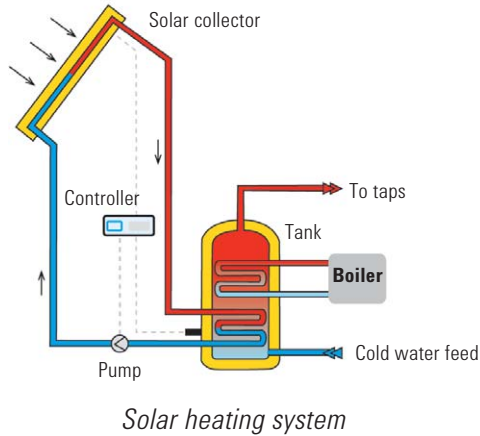


## Dual and differential temperature for efficient testing of HVAC systems



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

|                        | U1241B                       | U1242B                                      |
|------------------------|------------------------------|---------------------------------------------|
| <b>Display</b>         |                              |                                             |
| Counts                 | 10,000 ★                     | 10,000 ★                                    |
| Analog bar graph       | Yes                          | Yes                                         |
| Backlight              | Dual-intensity ★             | Dual-intensity ★                            |
| <b>Back features</b>   |                              |                                             |
| True RMS               | AC                           | AC                                          |
| Basic DCV accuracy     | 0.09%                        | 0.09%                                       |
| Auto/manual ranging    | Yes                          | Yes                                         |
| <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 | Yes                          | Yes                                         |
| Diode test             | Yes                          | Yes                                         |
| 4-20 mA % scale        | Yes                          | Yes                                         |
| Harmonic ratio         | N/A                          | Yes ★                                       |
| Switch counter         | Yes ★                        | Yes ★                                       |
| <b>Data management</b> |                              |                                             |
| Min/Max/Avg recording  | Yes                          | Yes                                         |
| Data hold              | Yes                          | Yes                                         |
| Null                   | Yes                          | Yes                                         |
| Connectivity           | IR-USB/Bluetooth             | IR-USB/Bluetooth                            |
| Data logging           | N/A                          | 100 manual, 200 interval points             |

★ represents key specifications/features

## Specifications of the U1240 Series Digital Multimeters *Continued*

|                                       | U1241B                      | U1242B                      |
|---------------------------------------|-----------------------------|-----------------------------|
| <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 to 55 °C                | –10 to 55 °C                |
| Battery (included)                    | 4 x AAA                     | 4 x AAA                     |
| Battery life                          | 300 hours                   | 300 hours                   |
| Warranty                              | 3 years                     | 3 years                     |
| Dimensions (H x W x D)                | 193.8 x 92.2 x 58.0 mm      | 193.8 x 92.2 x 58.0 mm ★    |

★ represents key specifications/features

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

### Web link

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



### 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

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 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
- *Bluetooth* wireless connectivity (optional U1177A Infrared (IR)-to-*Bluetooth* Adapter required)

\* with 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.

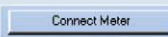
Whatever your measurements, the U1250 Series lets you make easy automated data logging with virtually unlimited saves to PC—so you can be assured that faults are recorded dependably and analyzed sooner.

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

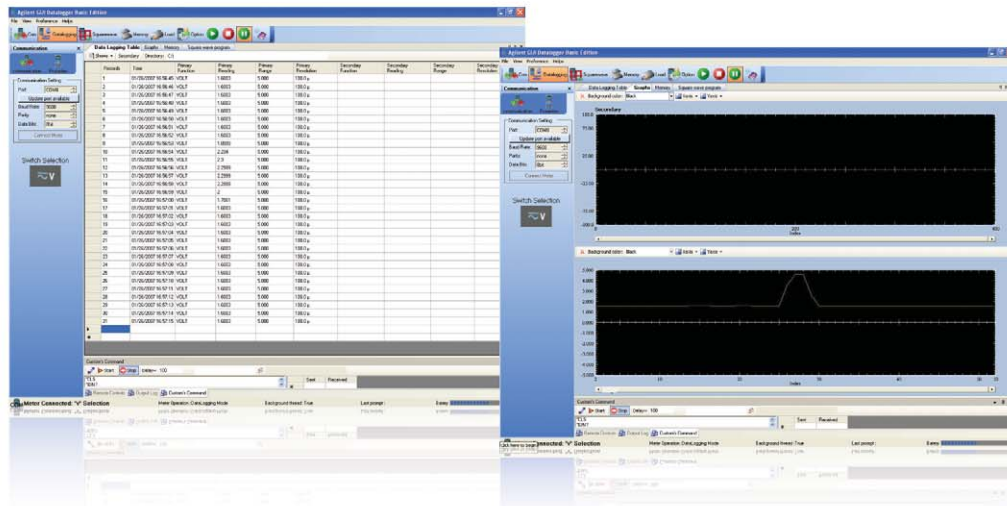
- 1 Connect the optional U1173A IR-USB cable to your U1250 Series DMM and PC



- 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.

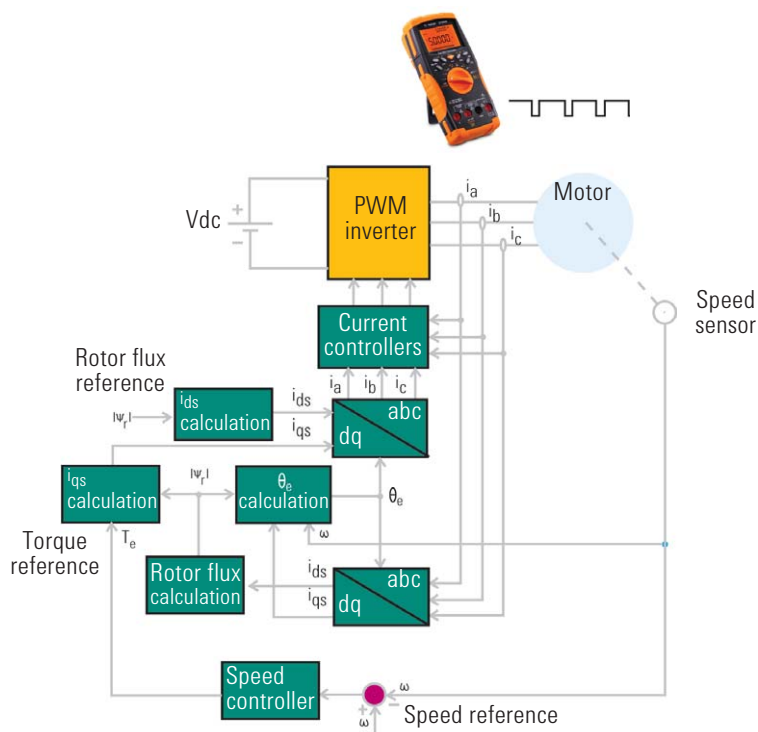
With the U1250 Series, you can easily configure the square-wave output of the U1252B to generate simple PWM signals—conveniently in one portable, lightweight instrument.



### 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

|                        | U1251B                         | U1252B                           | U1253B                           |
|------------------------|--------------------------------|----------------------------------|----------------------------------|
| <b>Display</b>         |                                |                                  |                                  |
| Organic LED            | N/A                            | N/A                              | Yes ★                            |
| Dual display           | Yes                            | Yes                              | Yes                              |
| Counts                 | 50,000 (both displays) ★       | 50,000 (both displays) ★         | 50,000 (both displays) ★         |
| Analog bar graph       | Yes                            | Yes                              | Yes                              |
| Backlight              | Yes                            | Yes                              | 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    | Yes                            | Yes                              | Yes                              |
| <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 | Yes                            | Yes                              | Yes                              |
| Diode test             | Yes                            | Yes                              | Yes                              |
| 4-20 mA % scale        | Yes                            | Yes                              | Yes                              |
| dB                     | Yes                            | Yes                              | Yes                              |
| Frequency counter      | N/A                            | Yes ★                            | Yes ★                            |
| Smoothing function     | N/A                            | N/A                              | Yes ★                            |

★ represents key specifications/features

# Specifications of the U1250 Series Digital Multimeters *Continued*

|                                                                     | U1251B                                                                    | U1252B                                                                    | U1253B                                                                     |
|---------------------------------------------------------------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------|----------------------------------------------------------------------------|
| <b>Signal generation</b>                                            |                                                                           |                                                                           |                                                                            |
| Square-wave generator                                               | N/A                                                                       | 0.5 Hz to 4.8 kHz, selectable Hz and % ★                                  | 0.5 Hz to 4.8 kHz, selectable Hz and % ★                                   |
| <b>Data management</b>                                              |                                                                           |                                                                           |                                                                            |
| Min/Max/Avg recording                                               | Yes                                                                       | Yes                                                                       | Yes                                                                        |
| Peak recording                                                      | Yes                                                                       | Yes                                                                       | Yes                                                                        |
| Data hold                                                           | Yes                                                                       | Yes                                                                       | Yes                                                                        |
| Null                                                                | Yes                                                                       | Yes                                                                       | Yes                                                                        |
| Connectivity                                                        | IR-USB/ <i>Bluetooth</i>                                                  | IR-USB/ <i>Bluetooth</i>                                                  | IR-USB/ <i>Bluetooth</i>                                                   |
| Data logging (requires IR-to-USB cable U1173A for connection to PC) | Internal: 100 manual, 200 interval points ★<br>To PC: virtually unlimited | Internal: 100 manual, 200 interval points ★<br>To PC: virtually unlimited | Internal: 100 manual, 1000 interval points ★<br>To PC: 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 compliance                                      | Yes                                                                       | Yes                                                                       | Yes                                                                        |
| CSA C22.2 No. 61010-1:2004 compliance                               | Yes                                                                       | Yes                                                                       | Yes                                                                        |
| <b>General</b>                                                      |                                                                           |                                                                           |                                                                            |
| Operating temperature                                               | –20 to 50 °C                                                              | –20 to 50 °C ★                                                            | –20 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 (H x W x D)                                              | 203.5 x 94.4 x 59.0 mm                                                    | 203.5 x 94.4 x 59.0 mm                                                    | 203.5 x 94.4 x 59.0 mm                                                     |

★ represents key specifications/features

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

## Web link

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



## How to ?

### Get the Best Out of the U1250 Series Handheld DMM

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

# U1270 Series – Handheld Digital Multimeters

The U1273AX, the latest addition to the U1270 series is capable of operating down to -40°C in temperature. Even in extremely cold conditions, the U1273AX handheld DMM delivers immediate and accurate results—no warm-up time required.

All models are ergonomically-built providing useful functions such as  $Z_{LOW}$  which eliminates stray voltages, and Smart Ohm that minimizes false readings from residual voltage induced by leakage current. All of this is designed into a case that fulfills the needs of today's industrial handheld users.

## Features

- OLED display with 2000:1 contrast ratio and 160 degree viewing angle<sup>1,2</sup>
- 30,000 counts resolution
- Measure up to 1000 V AC and DC
- Measure up to 10 A (20 A for 30 s)
- Resistance, diode test, temperature, capacitance
- Low Impedance mode<sup>1,2,3</sup> and Low Pass Filter
- -40 to 55 °C operating temperature<sup>2</sup>
- Up to 3000 m operating altitude
- Data logging to instrument and PC
- Water and dust resistance (IP 54)
- CAT III 1000 V / CAT IV 600 V safety rating
- *Bluetooth* wireless connectivity with optional U1177A *Bluetooth*

1. U1273A    2. U1273AX    3. U1272A



## 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/U1273A are dual impedance digital multimeters, 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/U1273A 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/U1273A 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/U1273A handheld digital multimeters (DMM) allow you to read the leakage current with its Smart  $\Omega$  function. With the U1272A/U1273A'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                                                  | U1273A                                                  | U1273AX                                                 |
|-----------------------|--------------------------------|---------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|---------------------------------------------------------|
| <b>Basic features</b> |                                |                                                         |                                                         |                                                         |                                                         |
| Display resolution    |                                | 30,000                                                  | 30,000                                                  | 30,000                                                  | 30,000                                                  |
| Display type          |                                | LCD                                                     | LCD                                                     | OLED                                                    | OLED                                                    |
| Auto/manual ranging   |                                | Yes                                                     | Yes                                                     | Yes                                                     | Yes                                                     |
| Analog bar graph      |                                | Yes                                                     | Yes                                                     | Yes                                                     | Yes                                                     |
| Backlight             |                                | Yes                                                     | Yes                                                     | Yes                                                     | Yes                                                     |
| AC bandwidth          |                                | 20 kHz                                                  | 100 kHz                                                 | 100 kHz                                                 | 100 kHz                                                 |
| True RMS              |                                | AC                                                      | AC + DC                                                 | AC + DC                                                 | 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                       | 30 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   | 30 mV to 1000 V<br>0.6% + 20 cnts<br>45 Hz to 100 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                    | 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 | 300 $\mu$ A to 10 A<br>0.6% + 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          | 30 $\Omega$ to 300 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              | 99.999 Hz to 999.99 kHz<br>0.005% + 5 cnts              | 99.999 Hz to 999.99 kHz<br>0.005% + 5 cnts              |

# Specifications of the U1270 Series Digital Multimeters *Continued*

|                                       |                   | U1271A                          | U1272A                                                | U1273A                                                | U1273AX                                               |
|---------------------------------------|-------------------|---------------------------------|-------------------------------------------------------|-------------------------------------------------------|-------------------------------------------------------|
| <b>Measurements</b> <i>Continued</i>  |                   |                                 |                                                       |                                                       |                                                       |
| Capacitance                           | Range<br>Accuracy | 10 nF to 10 mF<br>1% + 2 cnts   | 10 nF to 10 mF<br>1% + 2 cnts                         | 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: -210 to 1200 °C<br>1% + 1 °C | K: -200 to 1372 °C<br>J: -210 to 1200 °C<br>1% + 1 °C | K: -200 to 1372 °C<br>J: -210 to 1200 °C<br>1% + 1 °C |
| Continuity with beeper                |                   | Yes                             | Yes                                                   | Yes                                                   | Yes                                                   |
| Diode test                            |                   | Yes                             | Yes                                                   | Yes                                                   | Yes                                                   |
| <b>Data management</b>                |                   |                                 |                                                       |                                                       |                                                       |
| Min/max recording                     |                   | Yes                             | Yes                                                   | Yes                                                   | Yes                                                   |
| Display hold                          |                   | Yes                             | Yes                                                   | Yes                                                   | Yes                                                   |
| Peak hold                             |                   | Yes                             | Yes                                                   | Yes                                                   | Yes                                                   |
| Manual datalogging                    |                   | Yes                             | Yes                                                   | Yes                                                   | Yes                                                   |
| Null                                  |                   | Yes                             | Yes                                                   | Yes                                                   | Yes                                                   |
| Connectivity                          |                   | IR-USB/ <i>Bluetooth</i>        | IR-USB/ <i>Bluetooth</i>                              | IR-USB/ <i>Bluetooth</i>                              | IR-USB/ <i>Bluetooth</i>                              |
| % scale of 4-20 mA                    |                   | Yes                             | Yes                                                   | Yes                                                   | Yes                                                   |
| <b>Special features</b> ★             |                   |                                 |                                                       |                                                       |                                                       |
| OLED display                          |                   | —                               | —                                                     | Yes ★                                                 | Yes ★                                                 |
| Beep + visual alert                   |                   | Yes                             | Yes                                                   | Yes                                                   | Yes                                                   |
| Low pass filter (LPF)                 |                   | Yes                             | Yes                                                   | Yes                                                   | Yes                                                   |
| Z <sub>LOW</sub> - low impedance mode |                   | N/A                             | Yes                                                   | Yes                                                   | Yes                                                   |
| Smart Ω                               |                   | N/A                             | Yes                                                   | Yes                                                   | Yes                                                   |
| Qik-V                                 |                   | Yes                             | N/A                                                   | N/A                                                   | N/A                                                   |
| <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                          | CAT III 1000 V, CAT IV 600 V                          |
| EN/IEC 61010-1:2001 compliance        |                   | Yes                             | Yes                                                   | Yes                                                   | Yes                                                   |
| CSA C22.2 No. 61010-1:2004 compliance |                   | Yes                             | Yes                                                   | Yes                                                   | Yes                                                   |
| <b>General</b>                        |                   |                                 |                                                       |                                                       |                                                       |
| Operating temperature                 |                   | -20 to 55 °C, 0 to 80% RH       | -20 to 55 °C, 0 to 80% RH                             | -20 to 55 °C, 0 to 80% RH                             | -40 to 55 °C, 0 to 80% RH ★                           |
| Altitude                              |                   | 3000 m                          | 3000 m                                                | 3000 m                                                | 3000 m                                                |
| Battery (included)                    |                   | 4 x AAA alkaline                | 4 x AAA alkaline                                      | 4 x AAA alkaline                                      | 4 x AAA lithium                                       |
| Battery life                          |                   | 300 hours                       | 300 hours                                             | 30-60 hours                                           | 50-100 hours                                          |
| Warranty                              |                   | 3 years                         | 3 years                                               | 3 years                                               | 3 years                                               |
| Dimensions (H x W x D)                |                   | 207.0 x 92.0 x 59.0 mm          | 207.0 x 92.0 x 59.0 mm                                | 207.0 x 92.0 x 59.0 mm                                | 207.0 x 92.0 x 59.0 mm                                |

★ represents key specifications/feature

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

## Web link

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

[www.agilent.com/find/U1273AX](http://www.agilent.com/find/U1273AX)

<http://wireless.agilent.com/videos/u1270/index.html>



## How to?

**Test for Stray Voltage Using the U1272A**

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

**Ground Resistance Measurement with Smart Ohm**

<http://cp.literature.agilent.com/litweb/pdf/5990-7323EN.pdf>

## U1190 Series – Clamp Meters

Agilent's U1190 Series clamp meters are packed with a wealth of features to help you work more efficiently and more safely. Housed in robust cases, each model comes with an innovative wire separator that helps you isolate and measure individual wires in a bundle. The built-in LED flashlight illuminates your test area and Vsense performs non-contact voltage detection. The clamp meters are also certified with both CAT III 600 V and CAT IV 300 V ratings to cover wider measurement categories.

### Features

- Unique wire separator to separate wires from a bundle
- Vsense to perform non-contact voltage detection<sup>1</sup>
- Built-in LED flashlight to illuminate test area<sup>1</sup>
- Current measurement up to 600 A<sup>2</sup>
- Digital multimeter (DMM) with Resistance, Capacitance<sup>1</sup>, DCV, ACV, DCµA<sup>3</sup>, ACµA<sup>3</sup>, Continuity and Diode test measurements
- CAT III 600 V / CAT IV 300 V safety ratings

1. Only for U1192A, U1193A and U1194A
2. Only for U1193A and U1194A
3. Only for U1194A



## Application with U1190 Series Clamp Meters

### Convenient and affordable clamp meters – for electricians in commercial or residential electrical installation and maintenance



Basic current measurement is an essential task for electricians working in commercial or residential electrical installation and maintenance. These electricians need an affordable yet versatile tool to help them conveniently install and troubleshoot various applications such as wire installation at distribution transformers, panel circuit controller, or even troubleshooting electrical motor.

The U1190 Series clamp meters comes with an innovative 'wire separator' design that enables electricians to easily clamp on a targeted wire. Designed with a pointed tip, the wire separator allows users to isolate an individual wire from a bundle. In this way, the user does not have to manually use his hands to isolate the targeted wire for current measurements, hence eliminating the risk of getting into contact with live wires. All models also come with basic digital multimeter functions for electricians that need quick access to basic voltage, resistance, capacitance, continuity, diode and frequency tests.

Integrated with a LED flashlight, the U1190 Series clamp meters allow electricians to illuminate the test area while clamping on the wire. The built-in LED flashlight enables electricians to work safer even in dark or poorly lit environ-



*The built-in flashlight illuminates test area*

ments. Each clamp meter is certified with CAT III 600 V / CAT IV 300 V safety rating to cover wider measurement categories.

# Specifications of the U1190 Series Clamp Meters

|                                       | U1191A                          | U1192A                          | U1193A                          | U1194A                          |
|---------------------------------------|---------------------------------|---------------------------------|---------------------------------|---------------------------------|
| <b>Basic features</b>                 |                                 |                                 |                                 |                                 |
| Counts                                | 6,000                           | 6,000                           | 6,000                           | 6,000                           |
| RMS method                            | Average Responding              | Average Responding              | True RMS                        | True RMS                        |
| <b>Measurement range</b>              |                                 |                                 |                                 |                                 |
| DC voltage                            | 600 V                           | 60 to 600 V                     | 60 to 600 V                     | 60 to 600 V                     |
| AC voltage                            | 600 V                           | 60 to 600 V                     | 60 to 600 V                     | 60 to 600 V                     |
| DC A current                          | N/A                             | N/A                             | N/A                             | 60 to 600 A                     |
| DC $\mu$ A current                    | N/A                             | N/A                             | N/A                             | 60 to 600 $\mu$ A               |
| AC current                            | 400 A                           | 40 to 600 A                     | 60 to 600 A                     | 60 to 600 A                     |
| AC $\mu$ A current                    | N/A                             | N/A                             | N/A                             | 60 to 600 $\mu$ A               |
| Resistance                            | 600 $\Omega$ to 6 k $\Omega$    | 600 $\Omega$ to 60 k $\Omega$   | 600 $\Omega$ to 60 k $\Omega$   | 600 $\Omega$ to 60 k $\Omega$   |
| Capacitance                           | N/A                             | 600 $\mu$ F to 6 mF             | 600 $\mu$ F to 6 mF             | 600 $\mu$ F to 6 mF             |
| Diode                                 | 1.5 V                           | 1.5 V                           | 1.5 V                           | 1.5 V                           |
| Continuity                            | 600 $\Omega$                    | 600 $\Omega$                    | 600 $\Omega$                    | 600 $\Omega$                    |
| Temperature                           | N/A                             | N/A                             | N/A                             | K-type: -40 °C to 1200 °C       |
| Frequency                             | N/A                             | 99.99 Hz to 99.99 kHz           | 99.99 Hz to 99.99 kHz           | 99.99 Hz to 99.99 kHz           |
| <b>Data management</b>                |                                 |                                 |                                 |                                 |
| Data hold                             | Yes                             | Yes                             | Yes                             | Yes                             |
| Null                                  | Yes                             | Yes                             | Yes                             | Yes                             |
| MAX/MIN/AVG                           | Yes                             | Yes                             | Yes                             | Yes                             |
| Auto/Range                            | Yes                             | Yes                             | Yes                             | Yes                             |
| <b>Other features</b>                 |                                 |                                 |                                 |                                 |
| Backlight                             | Yes                             | Yes                             | Yes                             | Yes                             |
| Auto power OFF                        | Yes                             | Yes                             | Yes                             | Yes                             |
| Wire separator                        | Yes ★                           | Yes ★                           | Yes ★                           | Yes ★                           |
| Built-in flashlight                   | No                              | Yes ★                           | Yes ★                           | Yes ★                           |
| Vsense                                | No                              | Yes                             | Yes                             | Yes                             |
| <b>Safety and regulatory</b>          |                                 |                                 |                                 |                                 |
| Over-voltage safety protection        | CAT III 600 V /<br>CAT IV 300 V | CAT III 600 V /<br>CAT IV 300 V | CAT III 600 V /<br>CAT IV 300 V | CAT III 600 V /<br>CAT IV 300 V |
| EN/IEC 61010-1, CE,<br>CSA compliance | Yes                             | Yes                             | Yes                             | Yes                             |
| <b>General</b>                        |                                 |                                 |                                 |                                 |
| Operating temperature                 | -10 to 50 °C,<br>0 to 80% RH    | -10 to 50 °C,<br>0 to 80% RH    | -10 to 50 °C,<br>0 to 80% RH    | -10 to 50 °C,<br>0 to 80% RH    |
| Battery (included)                    | 1.5 V                           | 1.5 V                           | 1.5 V                           | 1.5 V                           |
| Battery life                          | 200 hours                       | 200 hours                       | 200 hours                       | 200 hours                       |
| Warranty                              | 3 years                         | 3 years                         | 3 years                         | 3 years                         |
| Dimensions (H x W x D)                | 225.0 x 77.1 x 38.6 mm          | 225.0 x 77.1 x 38.6 mm          | 238.0 x 77.1 x 38.6 mm          | 238.0 x 77.1 x 38.6 mm          |
| Clamp opening                         | 31 mm                           | 31 mm                           | 37 mm                           | 37 mm                           |
| Clamping diameter                     | 27 mm                           | 27 mm                           | 35 mm                           | 35 mm                           |

★ represents key specifications/features

For complete specifications, please refer to data sheet 5990-8646EN

## Web link

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

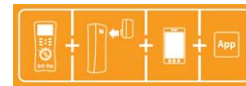
[www.agilent.com/find/U1190clamp](http://www.agilent.com/find/U1190clamp)

## U1210 Series – Handheld Clamp Meters

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 "
- 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
- *Bluetooth* wireless connectivity (optional U1177A Infrared (IR)-to-*Bluetooth* Adapter required)



## Applications with U1210 series Handheld Clamp Meters

### Smooth sailing current measurements even in a distance

Making current measurements can be strenuously demanding due to its complexity and high current involved. Electrical distribution rooms being typically situated at different areas further complicates maintenance and troubleshooting. This is due to the need for electricians to commute back and forth in order to cross check measurement results.

Now you can make high current measurements in a safer and more convenient manner by adding the new Bluetooth capability to your existing U1210 series handheld clamp meters. The U1177A Infrared-to-Bluetooth adapter allows you to easily monitor measurements and log data up 10-metres range across all Android platform devices. Simplify your day to day task with a value added device for maximum efficiency and productivity in all sorts of hard-to-reach environments.



## 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 A. You are able to measure in-rush current as well with the clamp meters' peak hold feature.

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.



*4-mm-tip probes*

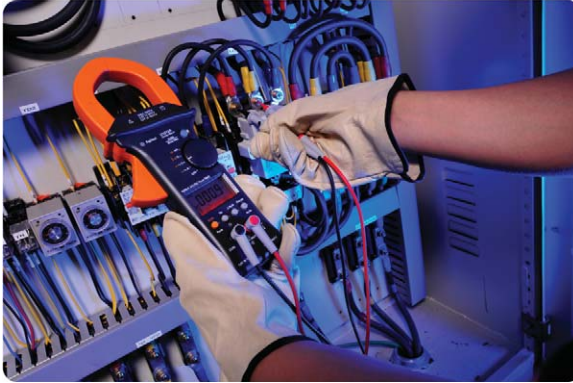
Each clamp meter provides an extra layer of protection with CAT IV 600 V and CAT III 1000 V safety ratings. When performing a measurement with the multimeter, test probes with 4-mm tips (which is bundled with each clamp meter) can be used to further prevent dangerous arc flash if the tips are inadvertently 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          | Yes                   | Yes                      | Yes                      |
| Counts                | 4000                  | 4000                     | 4000                     |
| Bar-graph             | 12 segments           | 12 segments              | 12 segments              |
| Backlit               | Yes                   | Yes                      | Yes                      |
| Auto power OFF        | Yes                   | Yes                      | Yes                      |
| <b>Basic features</b> |                       |                          |                          |
| True RMS              | AC                    | AC/DC                    | AC+DC                    |
| Auto/manual ranging   | Yes                   | Yes                      | Yes                      |
| <b>Measurements</b>   |                       |                          |                          |
| Voltage DC            | 0.1 - 1000 V (0.5%)   | 0.1 - 1000 V (0.5%)      | 1 mV - 1000 V (0.2%)     |
| Voltage AC            | 0.1 - 1000 V (1.0%)   | 0.1 - 1000 V (1.0%)      | 1 mV - 1000 V (1.0%)     |
| Current DC            | N/A                   | 0.01 - 1000 A (1.5%)     | 0.01 - 1000 A (1.5%)     |
| Current AC            | 0.1 - 1000 A (1.0%) ★ | 0.1 - 1000 A (2.0%) ★    | 0.01 - 1000 A (2.0%) ★   |
| Resistance            | 4 kΩ (0.5%)           | 4 kΩ (0.5%) ★            | 40 MΩ (0.3%) ★           |
| Capacitance           | 0.1 - 4000 μF (2.0%)  | 0.1 - 4000 μF (2.0%)     | 1 - 4000 μF (1.0%)       |
| Diode                 | Yes                   | Yes                      | Yes                      |
| Temperature           | N/A                   | K-type (-200 to 1372 °C) | K-type (-200 to 1372 °C) |
| Frequency             | Yes                   | Yes                      | Yes                      |
| Duty cycle            | N/A                   | N/A                      | Yes                      |

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

★ represents key specifications/features

## Specifications of the U1210 Series Clamp Meters *Continued*

|                                       | U1211A                      | U1212A                      | U1213A                      |
|---------------------------------------|-----------------------------|-----------------------------|-----------------------------|
| <b>Data management</b>                |                             |                             |                             |
| Data hold                             | Yes                         | Yes                         | Yes                         |
| Null                                  | Yes                         | Yes                         | Yes                         |
| MAX/MIN/AVG                           | Yes                         | Yes                         | Yes                         |
| Peak hold                             | Yes                         | Yes                         | Yes                         |
| Connectivity                          | <i>Bluetooth</i>            | <i>Bluetooth</i>            | <i>Bluetooth</i>            |
| <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 to 50 °C                | –10 to 50 °C                | –10 to 50 °C                |
| Clamp opening                         | 2 " ★                       | 2 " ★                       | 2 " ★                       |
| 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 (H x W x D)                | 273.0 x 106.0 x 43.0 mm     | 260.0 x 106.0 x 43.0 mm     | 260.0 x 106.0 x 43.0 mm     |

★ represents key specifications/features

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

### 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

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 " 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

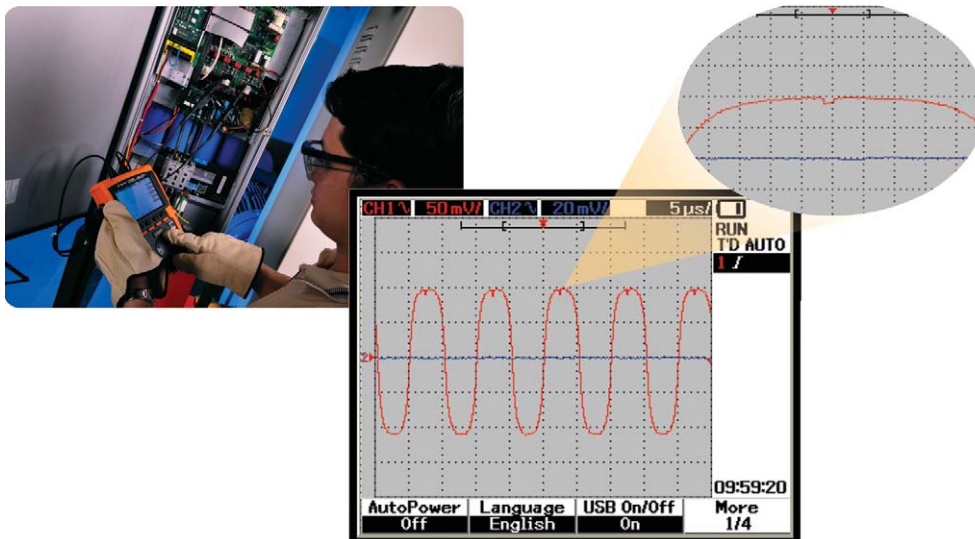
## Applications with the U1600 Series Handheld Digital Oscilloscopes

### 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.

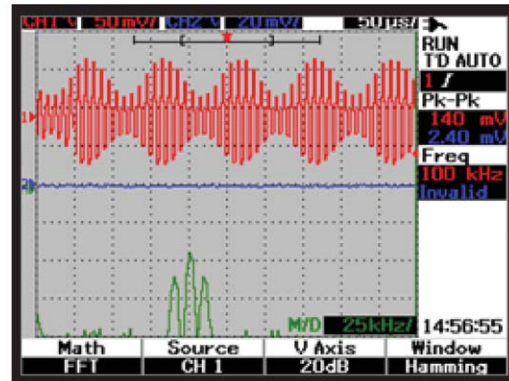


## Advanced FFT and waveform math follow wherever you go

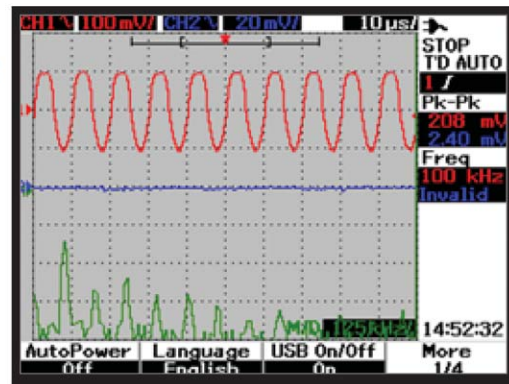
Time is especially precious on the manufacturing line. When a test system fails, quick troubleshooting and analysis is needed to get the line running again as soon as possible.

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

|                                                                                        | U1602B                                             | 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<br>Single Channel Operation<br>Dual Channel Operation            | 200 MSa/s interleave ★<br>100 MSa/s each channel ★ | 200 MSa/s interleave ★<br>100 MSa/s each channel ★ |
| Maximum recording length<br>Single Channel Operation<br>Dual Channel Operation         | 125 Kpts ★                                         | 125 Kpts ★                                         |
| Cursor and zoom functions                                                              | Yes                                                | Yes                                                |
| Waveform math                                                                          | Yes                                                | Yes                                                |
| FFT                                                                                    | N/A                                                | 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                                                                 | Yes                                                | Yes                                                |
| Diode test                                                                             | Yes                                                | Yes                                                |
| <b>Data logger</b>                                                                     |                                                    |                                                    |
| Min/Max/Avg recording                                                                  | Yes                                                | Yes                                                |
| Data logging<br>(requires bundled USB 2.0<br>full-speed cable for<br>connection to PC) | Internal: 250 points<br>To PC: virtually unlimited | Internal: 250 points<br>To PC: virtually unlimited |
| Time span                                                                              | 150 seconds to 20 days (auto range)                | 150 seconds to 20 days (auto range)                |

★ represents key specifications/features

# Specifications of the U1600 Series Digital Oscilloscopes *Continued*

|                                       | U1602B                                                                                                                                                                                       | 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 to 50 °C                                                                                                                                                                                   | 0 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 (H x W x D)                | 241.0 x 138.0 x 66.0 mm                                                                                                                                                                      | 241.0 x 138.0 x 66.0 mm                                                                                                                                                                      |

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

## 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>

## U1610A/U1620A- Handheld Digital Oscilloscopes

Agilent's U1610A/U1620A is the world's first handheld oscilloscope with a VGA display. With a bandwidth of 100/200 MHz, the handheld oscilloscope offers a floating measurement capability with two CAT III 600 V isolated channels. With up to 2 GSa/s sampling rate and 2 Mpts memory depth, it captures more waveforms from signals such as pulse width modulated circuit, in-rush, transient, and motor start up sequences. The benchtop-like display and dual window zoom function allow you to easily identify problem areas and zoom in for more detailed analysis. Now, you can view signals in detail and detect glitches easily.

**NEW**



## Features

- 100/200 MHz bandwidth with two isolated channels
- 5.7 " VGA TFT LCD display with 3 selectable viewing modes (indoor, outdoor and night vision)
- Up to 2 Mpts memory depth and 2 GSa/s sampling rate allows detailed analysis of captured glitches
- 10,000-count resolution on DMM display
- Channel-to-channel isolation with CAT III 600 V safety ratings
- Data logging capability and USB connectivity
- Up to 10 selectable languages on the User Interface (UI)

# Applications with the U1610A/U1620A Handheld Digital Oscilloscope

## View even the most subtle details- with fast sampling rate and deep memory

A good oscilloscope must be accompanied with fast sampling rate and deep memory depth, because these two go hand-in-hand. With deep memory of 2Mpts and sampling rate of 2 GSa/s, non-repeating signals can

be captured over a wider time base, allowing you to zoom into specific areas of interest. What's more, its dual window zoom feature display allows you to work more productively by simultaneously viewing signals

captured over a period of time and zooming into the most subtle details. Other features include advanced triggering types such as edge, pulse width, CAN and video to assist in quick isolation of critical events.

## Three viewing modes for optimized viewing under all lighting conditions

Viewing waveforms in clarity is important, especially for an oscilloscope which is a visual tool. This is why our U1610A/U1620A oscilloscope comes with a 5.7 " VGA

TFT LCD display that enables clear viewing of measurements on-site and on the field. With the option of up to three viewing modes, users can now view signals under all lighting condi-

tions, including in indoor, outdoor or dark environments. All three viewing modes have predefined contrast levels for customized lighting conditions and optimized battery life.

### Indoor mode

The indoor mode has high contrast and brightness levels to clearly distinguish waveforms under the indoor light environment. Furthermore, the TFT LCD technology enables the screen to be viewed across wide viewing angles for more efficient troubleshooting task.



### Outdoor mode

When performing field work in an outdoor environment, users can easily switch to this viewing mode via a set of accessible soft keys. This mode works in an anti-glare mechanism; it filters out excessive sunlight, hence reducing the risk of misreading or misinterpreting measurements under broad day light.



### Night vision mode

The night vision mode is tailored to be viewable under subdued lighting by enabling high contrast of the screen background against waveforms. By switching into this mode, the screen automatically adjust with proper colour correction, making the waveforms viewable. This mode is useful when measuring high speed signals, particularly in non-repetitive signals.



## Specifications of the U1610A/U1620A Digital Oscilloscope

|                                                                                | U1610A                                       | U1620A                                     |
|--------------------------------------------------------------------------------|----------------------------------------------|--------------------------------------------|
| <b>Display</b>                                                                 |                                              |                                            |
| General                                                                        | 5.7 " colour VGA TFT LCD ★                   | 5.7 " colour VGA TFT LCD ★                 |
| Counts (DMM function)                                                          | 10,000                                       | 10,000                                     |
| <b>Scope</b>                                                                   |                                              |                                            |
| Channels                                                                       | 2                                            | 2                                          |
| Bandwidth                                                                      | 100 MHz                                      | 200 MHz                                    |
| Maximum sampling rate<br>Single Channel Operation<br>Dual Channel Operation    | 1 GSa/s interleave<br>500 MSa/s each channel | 2 GSa/s interleave<br>1 GSa/s each channel |
| Maximum recording length<br>Single Channel Operation<br>Dual Channel Operation | 120 Kpts interleave<br>60 Kpts each channel  | 2 Mpts interleave<br>1 Mpts each channel   |
| Cursor and Zoom functions                                                      | Yes                                          | Yes                                        |

★ represents key specifications/features

# Specifications of the U1610A/U1620A Digital Oscilloscope *Continued*

|                                                                               | U1610A                                                                                                         | U1620A                                                                                                         |
|-------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------|
| <b>Scope</b> <i>Continued</i>                                                 |                                                                                                                |                                                                                                                |
| Waveform math                                                                 | CH1 + CH2, CH1 – CH2, CH2 – CH1, CH1 × CH2, CH1/CH2, CH2/CH1, d/dt (CH1), d/dt (CH2), ∫(CH1) dt, ∫(CH2)dt, FFT | CH1 + CH2, CH1 – CH2, CH2 – CH1, CH1 × CH2, CH1/CH2, CH2/CH1, d/dt (CH1), d/dt (CH2), ∫(CH1) dt, ∫(CH2)dt, FFT |
| FFT                                                                           | Yes                                                                                                            | Yes                                                                                                            |
| Automatic measurements                                                        | Up to 24 measurements                                                                                          | Up to 24 measurements                                                                                          |
| Coupling                                                                      | DC, AC                                                                                                         | DC, AC                                                                                                         |
| Input impedance                                                               | 1 MΩ ± 1% ≈ 22 pF ± 3 Pf                                                                                       | 1 MΩ ± 1% ≈ 22 pF ± 3 Pf                                                                                       |
| Range                                                                         | 5 ns/div to 50 s/div                                                                                           | 2 ns/div to 50 s/div                                                                                           |
| Resolution                                                                    | 8-bits                                                                                                         | 8-bits                                                                                                         |
| Rise time                                                                     | 3.50 ns typical                                                                                                | 1.75 ns typical                                                                                                |
| Trigger types                                                                 | Edge, Glitch, TV, Nth Edge, CAN, LIN                                                                           | Edge, Glitch, TV, Nth Edge, CAN, LIN                                                                           |
| Trigger modes                                                                 | Normal, Single, Auto                                                                                           | Normal, Single, Auto                                                                                           |
| Internal scope storage                                                        | 10 setups and waveforms can be saved and recalled internally                                                   | 10 setups and waveforms can be saved and recalled internally                                                   |
| <b>DMM</b>                                                                    |                                                                                                                |                                                                                                                |
| True RMS                                                                      | Yes                                                                                                            | Yes                                                                                                            |
| Voltage AC/DC                                                                 | 1000.0 mV to 1000.0 V                                                                                          | 1000.0 mV to 1000.0 V                                                                                          |
| Current AC/DC                                                                 | 40 A/400 A <sup>1</sup>                                                                                        | 40 A/400 A <sup>1</sup>                                                                                        |
| Resistance                                                                    | 1000.00 Ω to 100.00 MΩ                                                                                         | 1000.00 Ω to 100.00 MΩ                                                                                         |
| Capacitance                                                                   | 1000.0 nF to 10.000 mF                                                                                         | 1000.0 nF to 10.000 mF                                                                                         |
| Temperature                                                                   | –40 to 1000 °C                                                                                                 | –40 to 1000 °C                                                                                                 |
| Continuity with beeper                                                        | Yes                                                                                                            | Yes                                                                                                            |
| Diode test                                                                    | 1 V                                                                                                            | 1 V                                                                                                            |
| <b>Data logger</b>                                                            |                                                                                                                |                                                                                                                |
| Min/Max/Avg recording                                                         | Yes                                                                                                            | Yes                                                                                                            |
| Data logging (requires bundled USB 2.0 full-speed cable for connection to PC) | Yes                                                                                                            | Yes                                                                                                            |
| Time span                                                                     | 8 days                                                                                                         | 8 days                                                                                                         |
| <b>Safety and Regulatory</b>                                                  |                                                                                                                |                                                                                                                |
| Over-voltage safety protection                                                | CAT III 600 Vrms <sup>2</sup>                                                                                  | CAT III 600 Vrms <sup>2</sup>                                                                                  |
| EN/IEC 61010-1:2001 compliance                                                | Yes                                                                                                            | Yes                                                                                                            |
| CSA C22.2 No. 61010-1:2004 compliance                                         | Yes                                                                                                            | Yes                                                                                                            |
| IP rating                                                                     | IP 41                                                                                                          | IP 41                                                                                                          |
| <b>General</b>                                                                |                                                                                                                |                                                                                                                |
| Operating temperature                                                         | 0 to 50 °C (with battery only)<br>0 to 40 °C (with power adapter)                                              | 0 to 50 °C (with battery only)<br>0 to 40 °C (with power adapter)                                              |
| Battery (included)                                                            | Yes                                                                                                            | Yes                                                                                                            |
| Weight                                                                        | <2.5 kgs                                                                                                       | <2.5 kgs                                                                                                       |
| Battery life                                                                  | 3 hours                                                                                                        | 3 hours                                                                                                        |
| I/O                                                                           | USB 2.0 full speed host/client port                                                                            | USB 2.0 full speed host/client port                                                                            |
| Warranty                                                                      | 3 years                                                                                                        | 3 years                                                                                                        |
| Dimensions (H x W x D)                                                        | 183 x 270 x 65 mm                                                                                              | 183 x 270 x 65 mm                                                                                              |
| <b>Special features</b>                                                       |                                                                                                                |                                                                                                                |
| Indoor, outdoor, night vision mode                                            | Yes ★                                                                                                          | Yes ★                                                                                                          |
| UI language                                                                   | 10 selectable languages ★                                                                                      | 10 selectable languages ★                                                                                      |

<sup>1</sup> Use U1583B for current measurement

<sup>2</sup> 10:1 probe for CAT III 600 V

★ represents key specifications/features

For complete specifications, please refer to data sheet 5990-9523EN

## Web Link

[www.agilent.com/find/U1600](http://www.agilent.com/find/U1600)

# Multi-function Calibrator/Meter

## U1401B – Handheld Multi-function Calibrator/Meter

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 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 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 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.

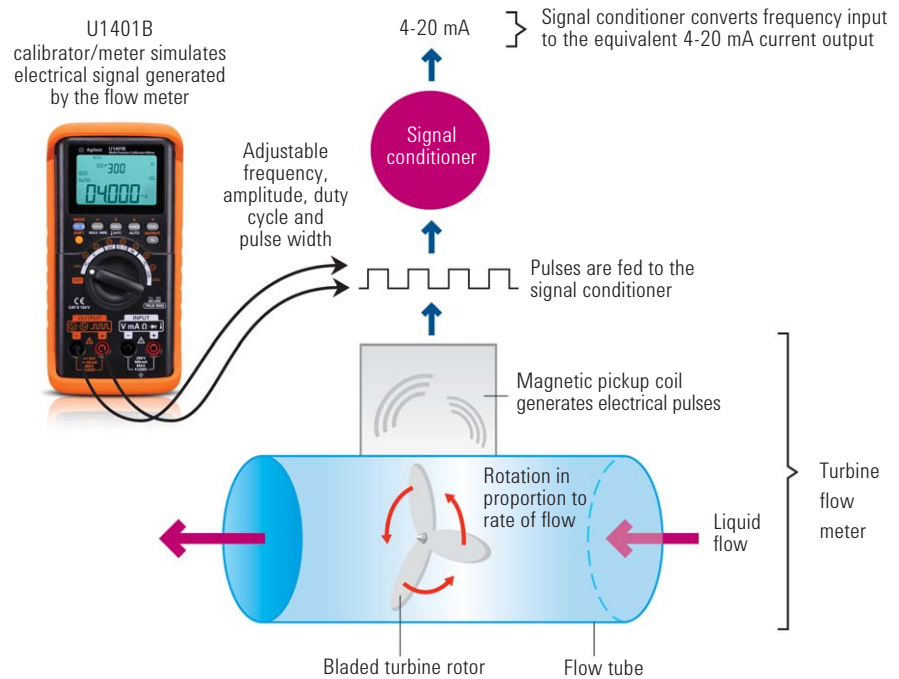
Not so with the U1401B calibrator/meter. One tool equips you with both sourcing and measuring capabilities so you no longer need to carry a separate DMM when you're away from the bench.



## 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 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 U1401B Multi-function Calibrator/Meter

|                                              | U1401B                                   |
|----------------------------------------------|------------------------------------------|
| <b>Display</b>                               |                                          |
| Dual display                                 | Yes                                      |
| Counts                                       | 50,000                                   |
| Backlight                                    | Yes                                      |
| <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                           | Yes                                      |
| Simultaneous operation with MEASURE function | Yes ★                                    |
| <b>Measure</b>                               |                                          |
| True RMS                                     | AC+DC                                    |
| Basic DCV accuracy                           | 0.03% + 5 counts                         |
| Auto/Manual ranging                          | Yes                                      |
| 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                       | Yes                                      |
| Diode test                                   | Yes                                      |
| 4-20 mA, 0 to 20 mA % scale                  | Yes                                      |
| Simultaneous operation with SOURCE function  | Yes ★                                    |

★ represents key specifications/features

## Specifications of the U1401B Multi-function Calibrator/Meter *Continued*

|                                                                              | U1401B                   |
|------------------------------------------------------------------------------|--------------------------|
| <b>Data management</b>                                                       |                          |
| Min/Max/Avg recording                                                        | Yes                      |
| Peak recording                                                               | Yes                      |
| Data hold                                                                    | Yes                      |
| Data logging to PC<br>(requires IR-to-USB cable U5481A for connection to PC) | Yes                      |
| <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 to 40 °C               |
| Battery (included)                                                           | 9.6 V Ni-MH rechargeable |
| Battery life                                                                 | 80 hours                 |
| I/O                                                                          | IR-USB                   |
| Warranty                                                                     | 3 years                  |
| Dimensions (H x W x D)                                                       | 192.0 x 90.0 x 54.0 mm   |

★ represents key specifications/features

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

### 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

Agilent's U1730C Series handheld LCR meters allow you to measure at frequencies as high as 100 kHz—a capability typically found only in benchtop meters. Get measurements done faster using the one-touch automatic identification function button which displays component type and more detailed component analysis such as Z, ESR, and DCR. Ideal for testing on the go, these LCR meters operate on a battery that lasts up to 16 hours. With the U1730C Series that is built for your convenience, you can perform quick and basic LCR measurements at an affordable price.

### Features

- 20,000 counts resolution
- 0.2% basic accuracy
- Wide LCR ranges with three to five selectable test frequencies (up to 100 kHz for U1733C)
- Auto identification (Ai) automatically determines and displays component type and measurements
- Detailed component analysis with DCR, ESR, Z, D, Q, and  $\theta$  functions
- Battery life of 16 hours/AC-powered
- IR-to-USB connectivity for data logging to PC



## Applications with the U1700 Series Capacitance/LCR Meters

The U1730C Series handheld is a LCR meter with a wide range of test frequencies of up to 100 kHz. It also covers wide measurement parameters including Z, L, C, R, DCR, ESR as well as D, Q, and  $\theta$  for more detailed component analysis. These features make the U1730C Series ideal both in component evaluations on the production line and for fundamental impedance testing.

### SMD tweezer for testing surface-mount devices

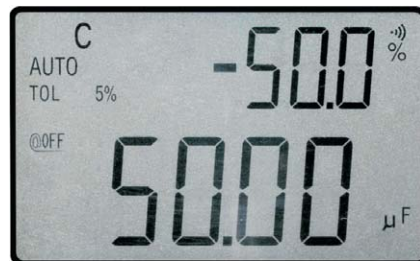
The optional U1782B SMD tweezer enables easy testing of surface-mount devices. The tweezer comes with three shrouded banana plugs and an extended reach of 770 mm. The U1700 Series guard terminal provides your measurements with better noise immunity and accurate readings.



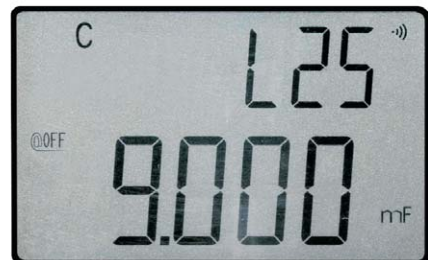
### Tolerance and compare modes for quick component sorting

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 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 U1701B reduces test set-up time for capacitor sorting.*

# Specifications of the U1700 Series Capacitance/LCR Meters

|                                                                           | U1701B                                                        | U1731C                       | U1732C                        | U1733C                                   |
|---------------------------------------------------------------------------|---------------------------------------------------------------|------------------------------|-------------------------------|------------------------------------------|
| <b>Display</b>                                                            |                                                               |                              |                               |                                          |
| Dual display                                                              | Yes                                                           | Yes                          | Yes                           | Yes                                      |
| Counts                                                                    | 11,000                                                        | 20,000                       | 20,000                        | 20,000                                   |
| Backlight                                                                 | Yes                                                           | N/A                          | Yes                           | Yes                                      |
| <b>Measurements</b>                                                       |                                                               |                              |                               |                                          |
| Capacitance                                                               | 1000 pF to 199.99 mF                                          | 200 pF to 20 mF              | 20 pF to 20 mF                | 20 pF to 20 mF                           |
| Inductance                                                                | N/A                                                           | 200 $\mu$ H to 2000 H        | 20 $\mu$ H to 2000 H          | 20 $\mu$ H to 2000 H                     |
| Resistance                                                                | N/A                                                           | 2 $\Omega$ to 200 M $\Omega$ | 2 $\Omega$ to 200 M $\Omega$  | 2 $\Omega$ to 200 M $\Omega$             |
| Dissipation factor (DF)                                                   | N/A                                                           | Yes                          | Yes                           | Yes                                      |
| Quality factor (QF)                                                       | N/A                                                           | Yes                          | Yes                           | Yes                                      |
| Phase angle ( $\theta$ ) measurement                                      | N/A                                                           | Yes                          | Yes                           | Yes                                      |
| Tolerance mode                                                            | 1%, 5%, 10%, 20% ★                                            | 1%, 5%, 10%, 20% ★           | 1%, 5%, 10%, 20% ★            | 1%, 5%, 10%, 20% ★                       |
| Compare mode                                                              | 25 sets of non-volatile High/Low limit settings ★             | N/A                          | N/A                           | N/A                                      |
| Test method/frequency                                                     | DC charge/discharge                                           | 100 Hz, 120 Hz, 1 kHz        | 100 Hz, 120 Hz, 1 kHz, 10 kHz | 100 Hz, 120 Hz, 1 kHz, 10 kHz, 100 kHz ★ |
| <b>Data management</b>                                                    |                                                               |                              |                               |                                          |
| Min/Max/Avg recording                                                     | Yes                                                           | Yes                          | Yes                           | Yes                                      |
| Data hold                                                                 | Yes                                                           | Yes                          | Yes                           | Yes                                      |
| Data logging to PC (requires IR-to-USB cable U5481A for connection to PC) | Yes                                                           | Yes                          | Yes                           | Yes                                      |
| <b>Safety and regulatory</b>                                              |                                                               |                              |                               |                                          |
| EN/IEC 61010-1:2001 compliance                                            | Yes                                                           | Yes                          | Yes                           | Yes                                      |
| <b>General</b>                                                            |                                                               |                              |                               |                                          |
| Operating temperature                                                     | 0 to 50 °C                                                    | –10 to 55 °C, 0 to 80% R.H.  | –10 to 55 °C, 0 to 80% R.H.   | –10 to 55 °C, 0 to 80% R.H.              |
| Battery (included)                                                        | Alkaline 9 V<br>AC power adapter and cord available as option | Yes                          | Yes                           | Yes                                      |
| Battery life                                                              | 80 hours                                                      | 16 hours                     | 16 hours                      | 16 hours                                 |
| I/O                                                                       | IR-to-USB                                                     | IR-to-USB                    | IR-to-USB                     | IR-to-USB                                |
| Warranty                                                                  | 3 years                                                       | 3 years                      | 3 years                       | 3 years                                  |
| Dimensions (H x W x D)                                                    | 184 x 87 x 41 mm                                              | 184 x 87 x 41 mm             | 184 x 87 x 41 mm              | 184 x 87 x 41 mm                         |

★ represents key specifications/features

For complete specifications, please refer to data sheet 5990-7778EN

## 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 | Hand-held scopes | Handheld calibrator/ meter | Handheld capacitance/ LCR meters |
|-----------------|-------------|------------------------|--------------------------------|------------------------|--------|--------|--------|--------|--------|--------|--------|--------|---------|-----------------|------------------|----------------------------|----------------------------------|
|                 |             | U1211A/<br>12A/<br>13A | U1191A/<br>92A/<br>93A/<br>94A | U1231A/<br>32A/<br>33A | U1241B | U1242B | U1251B | U1252B | U1253B | U1271A | U1272A | U1273A | U1273AX | U1602B/<br>04B  | U1610/<br>20A    | U1401B                     | U1701B/<br>U1731C/<br>32C/33C    |

## Kits

|        |                               |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--------|-------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| U1161A | Extended test lead kit        | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | × |
| U1168A | Standard test lead kit        | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | × |
| U1180A | Thermocouple adapter+lead kit | × | × | × | × | ✓ | × | ✓ | ✓ | × | ✓ | ✓ | ✓ | × | × | × | × |
| U1580A | DMM terminal test lead set    | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | × |

## Probes/leads/clamp

|        |                                    |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--------|------------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| U1162A | Alligator clips                    | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | × |
| U1163A | SMT grabbers                       | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | × |
| U1164A | Fine-tip test probes               | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | × |
| U1169A | Test probe leads                   | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | × |
| U1176A | Probe clip light                   | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ |
| U1177A | Infrared (IR)-to-Bluetooth Adapter | ✓ | × | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | × | × | × | × |
| U1583B | AC current clamp                   | × | × | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | × | × |
| U1781A | Alligator clip leads               | × | × | × | × | × | × | × | × | × | × | × | × | × | × | × | ✓ |
| U1782B | SMD tweezer                        | × | × | × | × | × | × | × | × | × | × | × | × | × | × | × | ✓ |
| U5402A | Yellow test lead for mA simulation | × | × | × | × | × | × | × | × | × | × | × | × | × | × | ✓ | × |

## Probes/adapters/leads for temperature measurement

|        |                                      |                                |                           |                           |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--------|--------------------------------------|--------------------------------|---------------------------|---------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|
| U1179A | IR connectivity bracket              | ×                              | ×                         | ×                         | ✓ | ✓ | × | × | × | × | × | × | × | × | × | × | × |
| U1181A | Immersion temperature probe          | ✓<br>(For U1212A/<br>13A only) | ✓<br>(For U1194A<br>only) | ✓<br>(For U1233A<br>only) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | × | × | × |
| U1182A | Industrial surface temperature probe | ✓<br>(For U1212A/<br>13A only) | ✓<br>(For U1194A<br>only) | ✓<br>(For U1233A<br>only) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | × | × | × |
| U1183A | Air temperature probe                | ✓<br>(For U1212A/<br>13A only) | ✓<br>(For U1194A<br>only) | ✓<br>(For U1233A<br>only) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | × | × | × |
| U1184A | Temperature probe adapter            | ✓<br>(For U1212A/<br>13A only) | ✓<br>(For U1194A<br>only) | ✓<br>(For U1233A<br>only) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | × | × | ✓ | × |
| U1185A | J-type thermocouple and adapter      | ×                              | ×                         | ×                         | × | ✓ | × | ✓ | ✓ | × | ✓ | ✓ | ✓ | × | × | × | × |
| U1186A | K-type thermocouple and adapter      | ✓<br>(For U1212A/<br>13A only) | ✓<br>(For U1194A<br>only) | ✓<br>(For U1233A<br>only) | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | × | ✓ | × |
| U1586B | Temperature module                   | ×                              | ×                         | ✓<br>(For U1233A<br>only) | × | × | × | × | × | × | × | × | × | ✓ | ✓ | × | × |

✓ = Compatible

×

= Not Compatible

## Accessories Compatibility Chart *Continued*

| Ordering number | Description | Handheld clamp meters  |                                | Handheld DMMs          |        |        |        |        |        |        |        |        |         | Handheld scopes | Handheld scopes | Handheld calibrator/meter | Handheld capacitance/LCR meters |
|-----------------|-------------|------------------------|--------------------------------|------------------------|--------|--------|--------|--------|--------|--------|--------|--------|---------|-----------------|-----------------|---------------------------|---------------------------------|
|                 |             | U1211A/<br>12A/<br>13A | U1191A/<br>92A/<br>93A/<br>94A | U1231A/<br>32A/<br>33A | U1241B | U1242B | U1251B | U1252B | U1253B | U1271A | U1272A | U1273A | U1273AX | U1602B/<br>04B  | U1610/<br>20A   | U1401B                    | U1701B/<br>U1731C/<br>32C/33C   |

### Probes/clips for scope-only functions

|        |                                 |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--------|---------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| U1554A | Hook clip for probe tip         | × | × | × | × | × | × | × | × | × | × | × | × | ✓ | ✓ | × | × |
| U1560A | Scope probe x 1 CAT III 300 V   | × | × | × | × | × | × | × | × | × | × | × | × | ✓ | ✓ | × | × |
| U1561A | Scope probe x 10 CAT III 600 V  | × | × | × | × | × | × | × | × | × | × | × | × | ✓ | ✓ | × | × |
| U1562A | Scope probe x 100 CAT III 600 V | × | × | × | × | × | × | × | × | × | × | × | × | ✓ | ✓ | × | × |

### Carrying case/hanging kit

|        |                                  |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |   |
|--------|----------------------------------|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| U1171A | Magnetic hanging kit             | × | × | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | × | × | × | × |
| U1172A | Transit case (aluminium-clad)    | × | × | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | × | × | × | × |
| U1174A | Soft carrying case               | × | × | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | ✓ | × | × | × | ✓ |
| U1175A | Soft carrying case               | ✓ | × | × | × | × | × | × | × | × | × | × | × | × | × | × | × |
| U1178A | Soft carrying case               | × | ✓ | × | × | × | × | × | × | × | × | × | × | × | × | × | × |
| U1590A | Soft carrying case (PVC leather) | × | × | × | × | × | × | × | × | × | × | × | × | ✓ | × | × | × |
| U1591A | Soft carrying case               | × | × | × | × | × | × | × | × | × | × | × | × | × | ✓ | × | × |
| 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                    | × | × | × | × | × | × | × | × | × | × | × | × | ✓ | × | × | × |
| U1572A | Li Ion battery pack                   | × | × | × | × | × | × | × | × | × | × | × | × | × | ✓ | × | × |
| U1573A | Desktop charger & Li Ion battery pack | × | × | × | × | × | × | × | × | × | × | × | × | × | ✓ | × | × |
| U1574A | AC/DC adapter                         | × | × | × | × | × | × | × | × | × | × | × | × | × | ✓ | × | × |
| U1575A | Desktop charger                       | × | × | × | × | × | × | × | × | × | × | × | × | × | ✓ | × | × |
| U1577A | USB 2.0 cable                         | × | × | × | × | × | × | × | × | × | × | × | × | × | ✓ | × | × |
| U1780A | AC power adapter and cord             | × | × | × | × | × | × | × | × | × | × | × | × | × | × | × | ✓ |
| U5481A | IR-to-USB cable                       | × | × | × | × | × | × | × | × | × | × | × | × | × | × | ✓ | ✓ |

✓ = Compatible    × = Not Compatible

# Optional Accessories



## U1161A Extended Test Lead Kit

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



## 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, CAT IV 600 V, 15 A



## 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



## 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



## U1168A Standard test lead kit

- Test leads: CAT III 1000 V, CAT IV 600 V, 15 A
- Test probe (19-mm tips): CAT II 1000 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, CAT IV 600 V, 15 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



## U1169A Test probe leads

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



## U1170A Battery charger adapter

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



## U1171A Magnetic hanging kit

- For use with handheld DMMs



## U1173A IR-to-USB cable

- For remote control and data logging to PC
- Max. baud rate: 19,200 bits per second
- Compatible with all Agilent HH DMMs



## U1174A Soft carrying case

The convenient way to carry your DMM and essential accessories

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



## U1175A Carrying case

- Ideal for the U1210 series handheld clamp meters
- Dimension (H x W x D): 290 x 120 x 85 mm



## U1176A LED Probe Clip Light

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



## U1177A Infrared (IR)-to-Bluetooth Adapter

- Dimension (H x W x D): 71 x 39 x 37 mm
- Operated by two 1.5 V AAA batteries
- Compatible with U1210 Series Clamp Meters and all handheld DMMs



## U1178A Soft carrying case

- Ideal for the U1190 series handheld clamp meters
- Dimensions (H x W x D): 245 x 120 x 50 mm



## U1179A IR connectivity bracket

- Compatible only with the U1240 Series handheld digital multimeters
- Enables wireless remote connectivity when paired with the U1177A or to a PC with U1173A



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



## U1181A Immersion temperature probe

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



## U1182A Industrial surface temperature probe

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



## U1183A Air temperature probe

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

# Optional Accessories



## 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 to 200 °C



## U1186A K-type thermocouple and adapter

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



## U1554A Hook clip for probe tip

- Rated CAT II 1000 V, CAT III 600 V



## U1560A – Scope probe x1 CAT III 300 V

- Include ground alligator clip and hook clip, rated CAT III 300 V



## U1561A – Scope probe x10 CAT III 600 V

- Include ground alligator clip and hook clip, rated CAT III 600 V



## U1562A – Scope probe x100 CAT III 600 V

- Include 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 U1602/04B handheld oscilloscopes



## U1571A Ni-MH battery pack

- 4500 mA, 7.2 V
- For use with U1602/04B handheld oscilloscopes



## U1572A Li Ion battery pack

- 4800mAh, 10.8V
- Compatible with U1610A/20A handheld oscilloscope



## U1573A Desktop charger & Li Ion battery pack

- 4,800 mAh, 10.8 V
- For use with U1610A/20A handheld oscilloscope



## U1574A – AC/DC adapter

- Include AC power cord based on country
- For use with U1610A/20A handheld oscilloscope



## U1575A Desktop charger

- 2-output 3 A battery charger
- Dimension (H x W x D): 2.30 x 4.89 x 6.89 inches
- For use with U1610A/20A handheld oscilloscope



## U1577A – USB 2.0 Cable (Type-A Plug to Type-A Plug)

- For remote control and data logging to PC



## U1580A DMM terminal test lead set

- Test leads: 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
- Alligator clips: CAT III 1000 V, CAT IV 600 V, 15 A



## 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 handheld DMMs and oscilloscopes



## U1586B Temperature module

- Measures -50 ~ 1000 °C
- K-type bead probe provided for use with DMMs



## U1590A Soft carrying case

- Dimension (H x W x D): 9.6 x 13.0 x 4.5"
- PVC leather material
- Ideal for the U1602/04B handheld oscilloscope



## U1591A Soft carrying case

- Dimension (H x W x D): 12.6 x 15.7 x 3.9"
- Soft carrying case with backpack and shoulder strap
- Ideal for the U1610/20A handheld oscilloscope



## U1731P Combo Kit

Includes one U1731C handheld and four accessories:

- U5491A soft carrying case
- U5481A IR-USB cable
- U1780A AC adapter
- U1782B SMD tweezer



## U1732P Combo Kit

Includes one U1732C handheld and four accessories:

- U5491A soft carrying case
- U5481A IR-USB cable
- U1780A AC adapter
- U1782B SMD tweezer



## U1733P Combo Kit

Includes one U1733C handheld and four accessories:

- U5491A soft carrying case
- U5481A IR-USB cable
- U1780A AC adapter
- U1782B SMD tweezer

## Optional Accessories *Continued*



### **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



### **U1782B SMD tweezer**

- Measurement Accuracy for Capacitance (Tweezers Open) <0.7pF, Resistance (Tweezers Short) <0.5Ω, Inductance (Tweezers Short) <1.2μH
- Guard ends to be connected to guard terminals of meter 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**

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



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