Agilent U1230 Series Handheld Digital Multimeter (DMM)

Data Sheet

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 environments
- Vsense to perform non-contact voltage detection
- Data logging capability (stores up to 10 readings)
- IR-to-USB connectivity to transfer data to PC for record

Ergonomically shaped with a built-in flashlight

Built for handheld users working in a poorly lit environment, the U1230 Series allows you to single-handedly illuminate your test area while making measurements with its easily activated built-in flashlight. Its ergonomic shape fits your hand, while the easily accessible rotary dial allows selection of measurement functions.

Flashing backlight and beeping alert for continuity detection

The U1230 Series is built for continuity detection in dark and noisy environments. Its audible beep and flashing backlight display provides increased visual and audio alert to indicate continuity.

Non-contact voltage detection with Vsense

The Vsense, a unique feature found in the U1233 Series performs non-contact voltage detection. It delivers more safety while making measurements in dangerous working environments by avoiding any contact with hot or live wires. Upon detection of voltage, it produces a unique combination of beeping alert and blinking LED light to make measurements more efficiently – especially in a dark or noisy environment.

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Take a Closer Look

Flashing light and audible beep during presence of voltage[1]

Bar graph indication and frequency measurement path

Allows flexibility to change measurement range

Freezes and stores current measurement value

Vsense performs non-contact voltage detection[1]

Low input impedance to eliminate ghost voltage measurement

Ease viewing with display backlight or built-in flashlight

Anti-slip rotary dial for easy measurement function selection

Figure 1. U1230 Series front view

Figure 2. The built-in flashlight as illustrated

Notes:
1. Only applicable for the U1233 Series

Electrical Specifications

DC specifications

Function	Range	Resolution	Accuracy ± (% of reading + counts of least significant digit) U1231A/U1232A/ U1233A	Test current Where (applicable)	Burden voltage/ shunt Where (applicable)	Input impedance Where (applicable)
Voltage						
	600 mV[1]	0.1 mV	0.5% + 2	NA	NA	11.18 MΩ
	6 V	0.001 V	0.5% + 2	NA	NA	11.18 MΩ
	60 V	0.01 V	0.5% + 2	NA	NA	10.1 MΩ
	600 V	0.1 V	0.5% + 2	NA	NA	10 MΩ
	600 V (VZ_{LOW})[2]	0.1 V	2% + 3	NA	NA	3 kΩ
Resistance						
	600 Ω[4]	0.1 Ω	0.9% + 3	0.57 mA	NA	NA
	6 kΩ[4]	0.001 kΩ	0.9% + 3	57 µA	NA	NA
	60 kΩ	0.01 kΩ	0.9% + 3	5.7 µA	NA	NA
	600 kΩ	0.1 kΩ	0.9% + 3	570 nA	NA	NA
	6 MΩ[5]	0.001 MΩ	0.9% + 3	100 nA/10 MΩ	NA	NA
	60 MΩ[5]	0.01 MΩ	1.5% + 3	100 nA/10 MΩ	NA	NA
Diode[3]						
	2 V	0.001 V	0.9% + 2	0.57 mA	NA	NA
Current						
	60 µA[1]	0.01 µA	1.0% + 2[4]	NA	< 2.5 V/1 kΩ	NA
	600 µA[1]	0.1 µA	1.0% + 2[4]	NA	< 2.5 V/1 kΩ	NA
	6 A[2]	0.001 A	1.0% + 3[4]	NA	< 0.2 V/0.005 Ω	NA
	10 A[2, 3]	0.01 A	1.0% + 3[4]	NA	< 0.4 V/0.005 Ω	NA

Notes for DC voltage specifications:

1. *The accuracy of the 600 mV range is specified after the Null function is used to subtract the thermal effect (by shorting the test leads).*
2. *For VZ_{LOW} (low input impedance) measurements, auto-ranging is disabled and the multimeter's range is set to 600 V in the manual ranging mode.*

Notes for resistance specifications:

1. *Overload protection: 600 Vrms for short circuits with < 0.3 A current.*
2. *Maximum open voltage is < +3 V.*
3. *Built-in buzzer beeps when the resistance measured is less than 23 Ω ± 10 Ω. The multimeter can capture intermittent measurements longer than 1 ms.*
4. *The accuracy of the 600 Ω to 6 kΩ range is specified after the Null function is used to subtract the test lead resistance and thermal effect (by shorting the test leads).*
5. *For the ranges of 6 MΩ and 60 MΩ, the RH is specified for < 60%.*

Notes for diode specifications:

1. *Overload protection: 600 Vrms for short circuits with < 0.3 A current.*
2. *Built-in buzzer beeps continuously when the voltage measured is less than 50 mV and beeps once for forward-biased diode or semiconductor junctions measured between 0.3 V and 0.8 V (0.3 V ≤ reading ≤ 0.8 V).*
3. *Open voltage for diode: < +3 V DC.*
4. *The maximum display for diode measurements is 2100 counts.*

Notes for DC current specifications:

1. *Overload protection for 60 µA to 600 µA range: 600 Vrms for short circuits with < 0.3 A current.*
2. *Overload protection for 6 A to 10 A range: 11 A/1000 V; 10 × 38 mm fast-acting fuse.*
3. *Specification for 10 A range: 10 A continuous. Add 0.3% to the specified accuracy when measuring signals > 10 A to 20 A for 30 seconds maximum. After measuring currents > 10 A, cool down the multimeter for twice the duration of the measured time before proceeding with low current measurements.*
4. *Only applicable for the U1232/U1233 Series*

Electrical Specifications

AC specifications

True rms AC voltage and AC current specifications

Function	Range	Resolution	Accuracy ± (% of reading + counts of least significant digit)		Burden voltage/ shunt
			45 Hz to 500 Hz	500 Hz to 1 kHz	Where (applicable)
Voltage	600 mV	0.1 mV	1.0% + 3	2.0% + 3	NA
	6 V	0.001 V	1.0% + 3	2.0% + 3	NA
	60 V	0.01 V	1.0% + 3	2.0% + 3	NA
	600 V	0.1 V	1.0% + 3	2.0% + 3	NA
	600 (VZ_{LOW})[3]	0.1 V	2.0% + 3	4.0% + 3	NA
Current[1]	60 µA[2]	0.01 µA	1.5% + 3	NA	< 2.5 V/1 kΩ
	600 µA[2]	0.1 µA	1.5% + 3	NA	< 2.5 V/1 kΩ
	6 A[3]	0.001 A	1.5% + 3	NA	< 0.2 V/0.005 Ω
	10 A[3, 4]	0.01 A	1.5% + 3	NA	< 0.4 V/0.005 Ω

Notes for true rms ac voltage specifications:

1. *Overload protection: 600 Vrms. For millivolt measurements, 600 Vrms for short circuits with < 0.3 A current.*
2. *Input impedance: 10 MΩ (nominal) in parallel with < 100 pF.*
3. *VZ_{LOW} input impedance: 3 kΩ (nominal).*

Notes for ac current specifications:

1. *AC current measurement not available for U1231A model.*
2. *Overload protection for 60 µA to 600 µA range: 600 Vrms for short circuits with < 0.3 A current.*
3. *Overload protection for 6 A to 10 A range: 11 A/1000 V; 10 × 38 mm fast-acting fuse.*
4. *Specification for 10 A range: 10 A continuous. Add 0.3% to the specified accuracy when measuring signals > 10 A to 20 A for 30 seconds maximum. After measuring currents > 10 A, cool down the multimeter for twice the duration of the measured time before proceeding with low current measurements.*

Capacitance specifications

Range	Resolution	Accuracy± (% of reading + counts of least significant digit)	Measuring rate (at full scale)
		U1231A/U1232A/U1233A	
1000 nF	1 nF	1.9% + 2	4 times/second
10 µF	0.01 µF	1.9% + 2	4 times/second
100 µF	0.1 µF	1.9% + 2	4 times/second
1000 µF	1 µF	1.9% + 2	1 time/second
10 mF	0.01 mF	1.9% + 2	0.1 time/second

Notes :

1. *Overload protection: 600 Vrms for short circuits with < 0.3 A current.*
2. *The accuracy of for all ranges is specified based on a film capacitor or better, and after the Null function is used to subtract the test lead resistance and thermal effect (by shorting the test leads).*
3. *The maximum display is 1200 counts.*

Electrical Specifications

Temperature specifications

Thermal type	Range	Resolution	Accuracy± (% of reading + counts of least significant digit) U1233A
K	–40 °C to 1372 °C	0.1 °C	1% + 1 °C
	–40 °F to 2502 °F	0.1 °F	1% + 1.8 °F

Notes:

1. *The specification above is specified after 60 minutes of warm up time. If the unit is exposed during storage in high humidity (condensing) environment, 120 minutes of operating time is required instead.*
2. *The accuracy does not include the tolerance of the thermocouple probe.*
3. *Do not allow the temperature sensor to contact a surface that is energized above 30 Vrms or 60 V DC. Such voltages poses a shock hazard.*
4. *Ensure that the ambient temperature is stable within ±1 °C and that the Null function is used to reduce the test lead's thermal effect and temperature offset. Before using Null function, set the multimeter to measure temperature without ambient compensation (°C) and keep the thermocouple probe as close as possible to the multimeter (avoid contact with any surface that has a different temperature from the ambient temperature).*
5. *When measuring temperature with respect to any temperature calibrator, try to set both the calibrator and multimeter with an external reference (without internal ambient compensation). If both the calibrator and multimeter are set with internal reference (with internal ambient compensation), some deviations may show between the readings of the calibrator and multimeter, This difference is caused from the calibrator and multimeters's ambient compensation. The deviation can be reduced by keeping the multimeter close to the output terminal of calibrator.*
6. *The temperature calculation is specified according to the safety standards of EN/IEC-60548-1and NIST175.*
7. *The approximate ambient temperature (cold-junction compensation) is shown on the display when you have an open thermocouple. The open thermocouple message may be due to broken (open) probe or because no probe is installed into the input jacks of the multimeter.*

Frequency specifications

Range	Resolution	Accuracy± (% of reading + counts of least significant digit) U1231A/U1232A/U1233A	Minimum input frequency
99.99 Hz	0.01 Hz	0.1% + 2	5 Hz
999.9 Hz	0.1 Hz	0.1% + 2	
9.999 kHz	1 Hz	0.1% + 2	
99.99 kHz	10 Hz	0.1% + 2	

Notes:

1. *Overload protection: 600 V; input signal is < 20,000,000 V × Hz (product of voltage and frequency).*

Electrical Specifications

Frequency sensitivity specifications

For voltage measurements

Input range	Minimum sensitivity (rms sine wave) 5 Hz to 50 kHz		
Maximum input for specified accuracy[1]	U1231A	U1232A	U1233A
600 mV in Scale mode	50 mV	50 mV	50 mV
600 mV	120 mV	120 mV	120 mV
6 V	0.6 V	0.6 V	0.6 V
60 V	5.0 V	5.0 V	5.0 V
600 V	50 V	50 V	50 V

Notes:

1. *Maximum input for specified accuracy, refer to "AC specifications" on page 106 of the User Guide.*

For current measurements

Input range	Minimum sensitivity (rms sine wave) 45 Hz to 5 kHz	
Maximum input for specified accuracy[1]	U1232A	U1233A
60 µA	30 µA	30 µA
600 µA	30 µA	30 µA
6 A	0.5 A	0.5 A
10 A	0.5 A	0.5 A

Notes:

1. *Maximum input for specified accuracy, refer to "AC specifications" on page 106 of the User Guide.*

Scale transfer (mV)

		Accuracy ± (% of reading + counts of least significant digit)
Range	Resolution	U1231A/U1232A/U1233A
DC 600 mV	0.1 mV	0.5% + 2[2]
AC 600 mV	0.1 mV	1.0 % + 3 @ 45 Hz to 500 Hz
		2.0 % + 3 @ 500 Hz to 1 kHz

Notes:

1. *Overload protection: 600 Vrms for short circuits with < 0.3 A current.*
2. *The accuracy of the DC 600 mV range is specified after the Null function is used to subtract the thermal effect (by shorting the test leads).*
3. *Input impedance: 10 MΩ (typical).*

Electrical Specifications

Display update rate (approximate)

Function	Times/second	
	U1231A	U1232A/U1233A
AC V (V or mV)	5	5
DC V (V or mV)	5	5
AC V/DC V (VZ_{LOW})	1	1
Scale transfer (mV)	5	5
Ω	5	5
Diode	5	5
Capacitance	4 (< 100 µF)	4 (< 100 µF)
DC A (µA, mA, or A)	NA	5
AC A (µA, mA, or A)	NA	5
Frequency	1 (> 10 Hz)	1 (> 10 Hz)

General Specifications

Parameter	U1231A/U1232A/U1233A	
Power supply	Battery type	• 4 × 1.5 V AAA Alkaline battery (ANSI/NEDA 24A or IEC LR03), or • 4 × 1.5 V AAA Zinc Chloride battery (ANSI/NEDA 24D or IEC R03)
	Battery life	• 500 hours typical (based on new Alkaline batteries) with backlight and flashlight disabled
	Low battery indication	• Low battery indicator will flash when the battery voltage drops below approximately 4.4 V
Power consumption	450 mVA maximum (with backlight and flashlight enabled)	
Fuse	10 × 38 mm 11 A/1000 V fast-acting fuse	
Display	Liquid crystal display (LCD) (with maximum reading of 6600 counts)	
Operating environment	• Operating temperature from –10 °C to 55 °C, 0% to 80% RH • Full accuracy up to 80% RH for temperatures up to 30 °C, decreasing linearly to 50% RH at 55 °C • Altitude up to 2000 meters • Pollution degree II	
Storage compliance	–40 °C to 60 °C, 0% to 80% RH without batteries	
Safety compliance	EN/IEC 61010-1:2001, ANSI/UL 61010-1:2004, and CAN/CSA-C22.2 No. 61010-1-04	
Measurement category	CAT III 600 V	
Electromagnetic compatibility (EMC)	Commercial limits compliance with EN61326-1	
Temperature coefficient	0.1 × (specified accuracy) / °C (from –10 °C to 18 °C, or 28 °C to 55 °C)	
Common Mode Rejection Ratio (CMRR)	> 100 dB at DC, 50/60 Hz (1 kΩ unbalanced)	
Normal Model Rejection Ration (NMRR)	> 60 dB at 50/60 Hz	
Dimensions (H x W x D)	169 mm × 86 mm × 52 mm	
Weight	U1232A and U1233A: 371 grams (with batteries and holster) U1231A: 365 grams (with batteries and holster)	
Warranty	• Three years for product[1] • Three months for product's accessories	
Calibration cycle	One year	

Notes:

1. *Please take note that for the product, the warranty does not cover:*
   - *Damage from contamination*
   - *Normal wear and tear of mechanical components*
   - *Manuals, fuses, and batteries*

Specification assumptions

- *Accuracy is given as ±(% of reading + counts of least significant digit) at 23 °C ± 5 °C, with relative humidity less than 80% RH.*
- *AC V and AC A specifications are AC coupled, true RMS and are valid from 5% of range to 100% of range.*
- *The crest factor may be up to 3.0 at full- scale (4000 counts)*
- *For non- sinusoidal waveforms, add (2% reading + 2% full scale) typical.*
- *After VZ_{LOW} (low input impedance) voltage measurements, wait at least 20 minutes for thermal impact to cool before proceeding with any other measurement.*

Ordering Information

Standard shipped items

Standard U1231A, U1232A and U1233A include:

- Quick Start Guide
- Certificate of Calibration (CoC)
- U1167A 4 mm Tips probes test leads
- 4 x 1.5 V batteries

Recommended accessories

U1174A		Soft carrying case
U1168A		Standard test lead kit
U1173A		IR-to-USB cable
U1171A		Magnetic hanging kit

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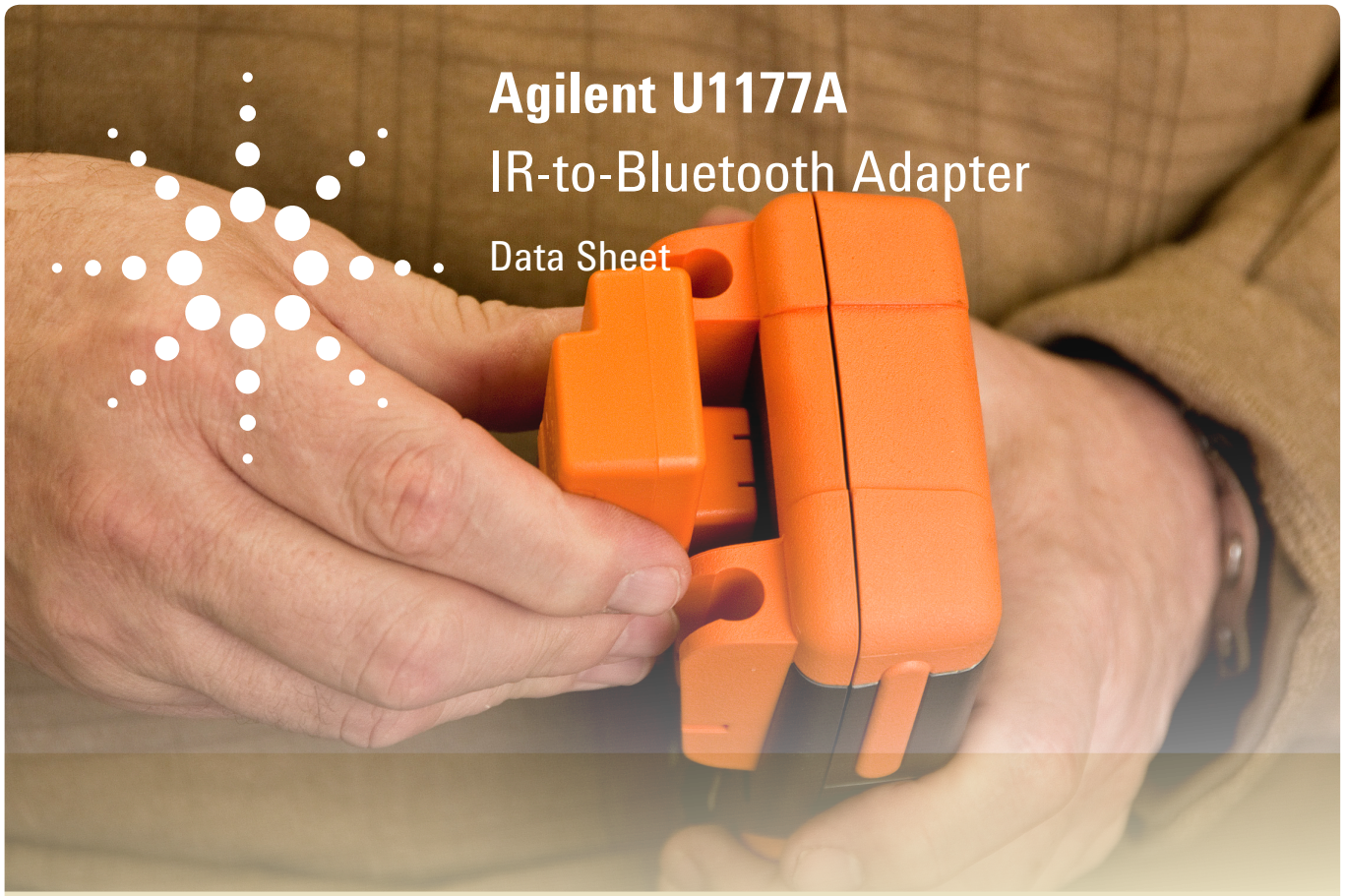

Agilent U1177A
IR-to-Bluetooth Adapter
Data Sheet

Features

- Enables Bluetooth® connection to Agilent handheld digital multimeters
- Easy to install by attaching to Infrared (IR) port located at the back of Agilent handheld digital multimeters
- Compatible with Agilent U1230 series, U1240 series, U1250 series and U1270 series handheld digital multimeters
- Operated by two 1.5 V AAA batteries

Agilent U1177A Infrared (IR)-to-Bluetooth® adapter offers wireless remote connectivity solution via Bluetooth® connection simply by attaching the adapter to the IR port of an Agilent handheld digital multimeter. The wireless remote connectivity is set up when an Agilent handheld digital multimeter is connected to U1177A and an Android device (tablet or smart phone) with the installed software. Every U1177A also has a unique Media Access Control (MAC) address. User can quickly and easily scan for the right U1177A using their Android device and pair up with the U1177A.

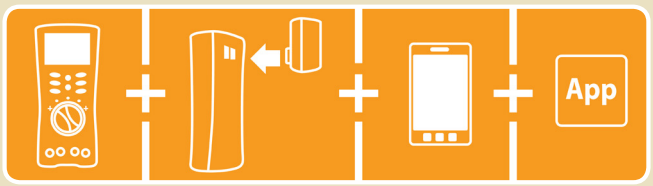

Figure 1. Agilent wireless remote connectivity solution

Take a closer look

Figure 2. The U1177A as illustrated

Perform data logging with multimeters – wirelessly!

Figure 3. Data logging with Agilent Mobile Logger software.

Data logging is an important function for industrial users to capture data streams or plotting trending graphs. These data and graphs are used for analysis to identify intermittent behavior or detect drifts. Agilent Mobile Logger is the free Android application software that logs data and provides trending graphs from Agilent handheld digital multimeters. Agilent Mobile Logger offers an array of extended functions such as sending e-mail or Short Message Service (SMS) automatically, and pan and zoom function via the Android device's touch screen. Alternatively, data logging and monitoring activities can also be performed at the comfort of one's Personal Computer (PC) via a downloadable Agilent GUI data logger software.

Notes:

1. *Agilent Mobile Meter and Agilent Mobile Logger can be downloaded from www.agilent.com/find/hh-Android or from Android Market (https://market.android.com/)*
2. *Agilent GUI Data Logger Software can be www.agilent.com/find/hh-logger*

Perform up to three multimeter measurements at the same time with Agilent Mobile Meter

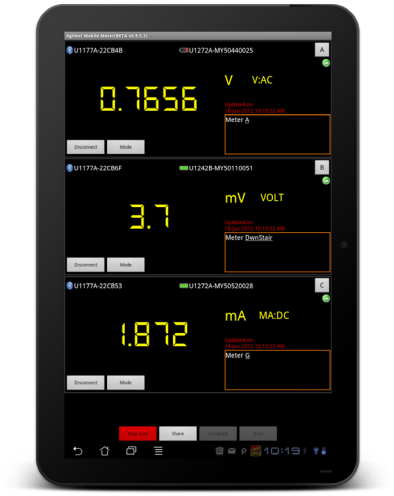

Figure 4. Up to three multimeters measurements with the Agilent Mobile Meter

Agilent Mobile Meter is a free Android application software that allows an Android device to connect, control and perform up to 3 multimeter measurements. Without the need to be physically present at various points, users can now extend their reach to two or three places. This solution allows you to make measurements from a safe distance, eliminates the need to walk back-and-forth between measure target and control points, and monitors multiple measurements simultaneously. Achieve higher work productivity when you use the U1177A with your Agilent handheld digital multimeters.

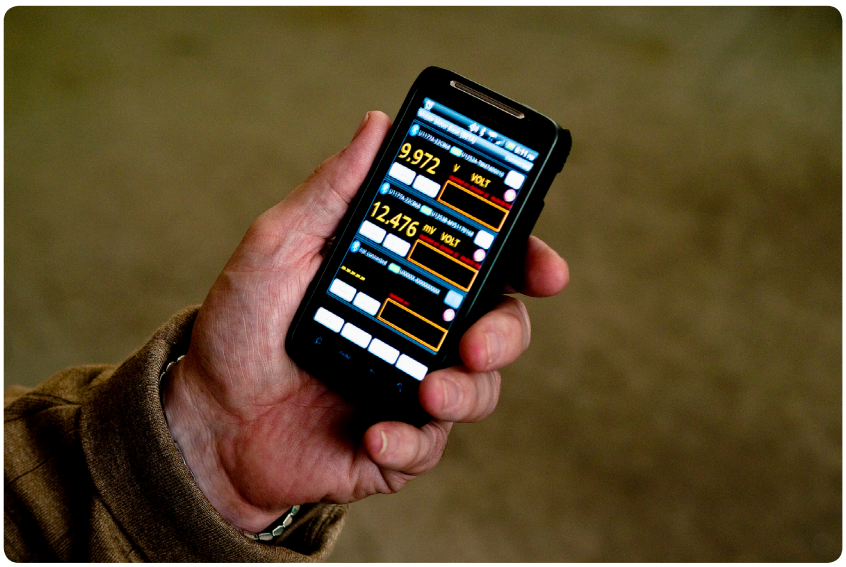

Figure 5. Make measurements with the Agilent Mobile Meter via an Android smart phone

Specifications

Product characteristics	Description
Radio specification	• Frequency: 2402 MHz ~ 2480 MHz • Antenna Power: 1 mW or less • Number of Channels: 79 • Modulation: GFSK / PSK
Operating environment	Operating temperature from –20 to 55 °C
Storage environment	Storage temperature from –40 to 70 °C
Relative humidity (R.H.)	Relative humidity up to 95% at 40 °C (non-condensing)
Power consumption	Maximum 130 mVA for two 1.5 V AAA batteries
Battery life	30 hours typical (based on continuous data transfer)
Battery type	Alkaline 24 A (ANSI/NEDA) and LR03 (IEC), or Zinc Chloride 24 D (ANSI/NEDA) and R03 (IEC)
Dimension (W x H x L)	39.0 × 71.0 × 37.0 mm
Weight	60 g with batteries
Warranty	Three months
Bluetooth	"**Bluetooth**" Version 2.1 + EDR compliant, SPP profile, Class 2 device (with 10 metres connection range)
Safety	The U1177A complies with the requirements of the following safety and regulation standards: • FCC Part15C (Certification) (15.209, 15.247) FCC ID: ZKMAGILENT-U1177A • FCC Part15B (DoC) (15.109) • RSS–210 Issue 8:2010 IC: 6310A–U1177A • ICES–003 Issue 4:2004 • EN 300 328 V1.7.1:2008 • EN 301 489–1V1.8.1:2008/–17 V2.11:2009 • EN 55022:2006+A1:2007/EN55024:1998+A1:2001+A2:2003 • EN 50371:2002 • EN 60950–1:2006/A11:2009/A1:2010 • Complies with IDA Standards (DB 102425) • India Equipment Type Approval (ETA) Certificate No: 1424/2011/WRLO • COFETEL Certificate No: RCPAGU111-1066, registered under Agilent Technologies Mexico S de RL de CV "This telecommunication equipment conforms NTC technical requirement"

Standard shipped items:

- Two 1.5 V AAA batteries
- Operating instructions

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