DATA SHEET

U1230 Series

Handheld Digital Multimeters (DMMs)

Introduction

Retool your expectations with the new Keysight Technologies, Inc. U1230 Series Handheld DMMs — the first to combine a built-in LED flashlight, both audible and visual alerts, and non-contact AC voltage detection in one handheld.

KEYSIGHT TECHNOLOGIES

Features

Whether it is dark, noisy, or even dangerous, the U1230 Series handheld digital multimeters keep you equipped with features that anticipate worst-case scenarios. The ergonomically shaped handheld allows you to single-handedly illuminate the test area with a built-in flashlight while selecting the rotary dial's measurement functions. 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 wherever you are.

Key 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 the 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 provide increased visual and audio alerts to indicate continuity.

Non-contact voltage detection with Vsense

Vsense is a unique feature found in the U1233A model that performs non-contact voltage detection. It delivers more safety while making measurements in dangerous working environments by avoiding contact with hot or live wires. Upon detecting voltage, it produces a unique combination of beeping alert and blinking LED light to make measurements more efficient – especially in a dark or noisy environment.

Take a Closer Look

Bar graph indication and frequency measurement path

Freezes and stores current measurement value

Low input impedance to eliminate ghost voltage measurement

Anti-slip rotary dial for easy measurement function selection

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

Allow flexibility to change measurement range

Vsense performs non-contact voltage detection [1]

Ease viewing with display backlight or built-in flashlight

Figure 1. U1230 Series front view

Figure 2. The built-in flashlight as illustrated

1. Only applicable for the U1233A model.

Overview of Keysight U1230 Series Handheld Digital Multimeters

Key specifications	U1231A	U1232A	U1233A
Display resolutions	6000	6000	6000
Basic DCV accuracy	0.5% + 2 counts	0.5% + 2 counts	0.5% + 2 counts
Auto/manual ranging	Yes	Yes	Yes
Measurement			
DCV	600 mV to 600 V	600 mV to 600 V	600 mV to 600 V
ACV (RMS)	600 mV to 600 V	600 mV to 600 V	600 mV to 600 V
DCI	No	60 µA to 10 A	60 µA to 10 A
ACI	No	60 µA to 10 A	60 µA to 10 A
Resistance	600 Ω to 60 MΩ	600 Ω to 60 MΩ	600 Ω to 60 MΩ
Frequency	99.99 Hz to 99.99 kHz	99.99 Hz to 99.99 kHz	99.99 Hz to 99.99 kHz
Continuity, diode test	Yes	Yes	Yes
Capacitance	1000nF to 10mF	1000nF to 10mF	1000nF to 10mF
Temperature	No	No	40 to 1372 0C
Vsense for non-contact voltage detection	No	No	Yes
Z_{LOW} - low impedance mode	Yes	Yes	Yes
Connectivity (adaptor sold separately)	IR-USB / *Bluetooth*®	IR-USB / *Bluetooth*	IR-USB / *Bluetooth*
Internal memory for data logging	Yes (10 readings only)	Yes (10 readings only)	Yes (10 readings only)
General			
Built-in flashlight	Yes	Yes	Yes
IP rating	IP 42	IP 42	IP 42

Over-voltage safety protection	CAT III 600V	CAT III 600V	CAT III 600V
Battery life	500 hours	500 hours	500 hours
Warranty	3 years	3 years	3 years

Electrical Specifications

DC specifications

Function	Range	Resolution	Accuracy ± (% of reading + counts of least significant digit)	Test current	Burden voltage/shunt	Nominal input impedance
			U1231A/U1232A/ U1233A	Where (applicable)	Where (applicable)	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 [4]						
	60 µA [1]	0.01 µA	1.0% + 2	NA	< 2.5 V/1 kΩ	NA
	600 µA [1]	0.1 µA	1.0% + 2	NA	< 2.5 V/1 kΩ	NA
	6 A [2,5]	0.001 A	1.0% + 3	NA	< 0.2 V/0.005 Ω	NA
	10 A [2,3]	0.01 A	1.0% + 3	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. The 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 measured time duration before proceeding with low current measurements.
4. Only applicable for the U1232A/U1233A model
5. DC current between ± (0.6 mA and 1 mA) is not measurable on the U1232A and U1233A models. Low DC current measurement is restricted by resolution and accuracy specification.

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 (VZLOW) [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 [3,5]	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. VZLOW input impedance: 3 kΩ (nominal).

Notes for AC current specifications:
1. AC current measurement is not available for the 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 measured time duration before proceeding with low current measurements.
5. AC current between 0.6 mA and 300 mA is not measurable on the U1232A and U1233A models

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 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 opening the test leads).
3. The maximum display is 1200 counts.

Temperature specifications [1-7]

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 are required.
2. The accuracy does not include the tolerance of the thermocouple probe.
3. Do not allow the temperature sensor to contact an energized surface above 30 Vrms or 60 V DC. Such voltages pose a shock hazard.
4. The temperature calculation is specified according to the safety standards of EN/IEC-60548-1and NIST175.
5. 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 a broken (open) probe or because no probe is installed into the input jacks of the multimeter.
6. For temperature measurement on U1233A, the type-K thermocouple probe and adapter such as the U1186A (purchase separately) are required.
7. For auxiliary temperature measurement on U1231A & U1232A, a temperature module such as the U1586B (purchase separately) is required

Frequency specifications

Range	Resolution	Accuracy ± (% of reading + counts of least significant digit)	Minimum input frequency
		U1231A/U1232A/U1233A	
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	

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

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

Note:
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

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

Scale transfer (mV)

Range	Resolution	Accuracy ± (% of reading + counts of least significant digit)
		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).

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 (VZLOW)	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	The 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 a maximum reading of 6600 counts)	
Flashlight	Cool white LED (5500 K typical); luminous intensity from 2240 mcd to 5600 mcd	
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	
Measurement category	CAT III 600 V	
Safety & Electromagnetic (EMC)compatibility	Refer to Declaration of Conformity for the latest revisions of regulatory compliance at: www.keysight.com/go/conformity Commercial limits compliance with EN61326-1 Influence of radiated immunity: In RF electromagnetic fields of 3 V/M DC voltage measurement typical accuracy: 600 mV, 6 V, 60 V & 600 V range; ± 1.5% of range DC current measurement typical accuracy: 60 uA & 600uA range; ± 1.2% of range 6 A range; ± 2.0% of range 10 A range; ± 1.1% of range	

	Note: If used in close proximity to an RF transmitter or when subjected to continuously present electromagnetic phenomena, some recoverable degradation of performance may occur.
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:

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 valid from 5% of range to 100% of range.
  - Crest factor ≤ 3 at full scale and decrease reciprocally for over range as 3× Full Scale/Input; except for the 600V range, where this range has a crest factor ≤ 2 at full scale and decreases reciprocally for over range as 2× Full Scale/Input.
  - 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

Recommended accessories		
U1174A		Soft carrying case
U1168A		Standard test lead kit
U1173A		IR-to-USB cable
U1171A		Magnetic hanging kit
U1186A		Thermocouple (K-type) and temperature probe adapter Note: For temperature measurement on the U1233A, a type-K thermocouple probe and adapter such as the U1186A (purchased separately) is recommended. It is only compatible with the U1233A.
U1586B		Temperature module Note: For auxiliary temperature measurement on the U1231A and U1232A, a temperature module such as the U1586B (purchased separately) is recommended.

Learn more at: www.keysight.com

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