

# Agilent U1270 Series Handheld Digital Multimeters

Shaped to fit, tailored to perform, built to last  
Data Sheet

## Features

- Intelligent features:  $Z_{LOW}^*$ , Smart  $\Omega^*$ , Low Pass Filter, Qik-V\*\*
- Visual (Backlight Alert) and audible continuity indication in noisy environments
- Ergonomic shape for better grip
- IP 54 certified – water and dust resistant
- Easy-to-operate large knob and buttons
- 30,000-count dual display
- AC + DC capability\*
- CAT III 1000 V, CAT IV 600 V safety rating
- Easy maintenance – convenient fuse access
- Easy connectivity to PC with optional IR-USB cable
- Internal memory for data logging

\* U1272A only

\*\* U1271A only



## Get a better grip on your DMM

The U1270 series is shaped perfectly to fit in your hand, with or without gloves on. Its non-slip ergonomic shape enables you to carry your DMM and perform measurements on the go easily. Additionally, the controls are easy to operate due to the large knob and buttons.

Continuity detection in noisy and dark places is made easy with the U1270 series' loud beeper and **Backlight Alert** function which flashes the backlight to indicate continuity and improve safety.

When it comes to Variable Frequency Drive (VFD) troubleshooting, the U1270 series has **Low Pass Filter** to handle the job with ease.

## Improve productivity with intelligent features

Designed for maximum efficiency and productivity in industrial settings, these DMMs offer convenient functions such as  $Z_{LOW}$  to eliminate stray voltages, **Smart  $\Omega$**  to minimize false readings due to leakage current and **Qik-V** to determine existence of AC and/or DC voltages.

## Water and dust resistant

The series' tightly sealed design helps protect against water, dust and damage. Each DMM is IP 54 certified so that you can carry out test and measurement with confidence, even in harsh working conditions.



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## Key functions

### Low Impedance ( $Z_{LOW}$ )

The U1272A is a dual input impedance digital multimeter. The DMM's high input impedance is preferred in most electrical measurements because it would not load the circuit under test. However, to obtain accurate measurements on circuits that may contain stray voltages, the U1272A's 2 k $\Omega$  low impedance function comes in handy. Stray voltages are usually found in non-energized electrical wiring adjacent to powered wires due to capacitive or inductive coupling between these wires. When a pair of test leads is placed between the open circuit and neutral conductor, the circuit is then complete and forms a voltage divider in conjunction with the input impedance of the multimeter. High input impedance multimeter is sensitive enough to measure voltage coupled into the disconnected conductor, thus giving an inaccurate indication of a live conductor. The low impedance function serves to eliminate false readings by dissipating the stray voltages, thus improves safety and measurement efficiency during voltage.



Figure 1: U1272A helps you identify the presence of stray voltage on a disconnected wire running parallel with the wire powering up the VFD to an industrial motor. The image on the right shows the U1272A in low impedance mode.

### Low Pass Filter (LPF)

The U1270 series offers a 1 kHz LPF or Low Pass Filter to provide accurate Variable Frequency Drive (VFD) output measurement. This function eliminates high frequency noise and harmonics. This ensures the efficiency of your motor filter as well.



Figure 2: Comparison of voltage output from industrial motor VFD without and with Low Pass Filter functionality.

### Smart $\Omega$

The U1272A provides an additional 30 Ohm range for low resistance measurement. This Smart  $\Omega$  function is available for ranges of 30 Ohm to 300 kOhm. It enhances measurement accuracy with offset compensation by removing residual DC voltages of up to 1000 mV induced by ground current and thermal EMF. This function also enables 'live' resistance measurement without isolating the measurement circuit. With this, you will be able to obtain leakage current using the secondary display.

# Front and back panel description

**Backlight Alert** flashes the backlight to provide visual indication in continuity test

Large buttons

**Peak detect** records transients as fast as 250µs

**Low Pass Filter (LPF)** removes unwanted high frequency signals

**Z<sub>LOW</sub>\*\*** provides both high and low impedance modes to eliminate stray voltages



**Qik-V\*** allows AC+DC measurement to quickly check for energized voltage



Front panel

Dual display

30,000 counts resolution

**Smart Ω\*\*** removes residual voltage of up to 1000 mV

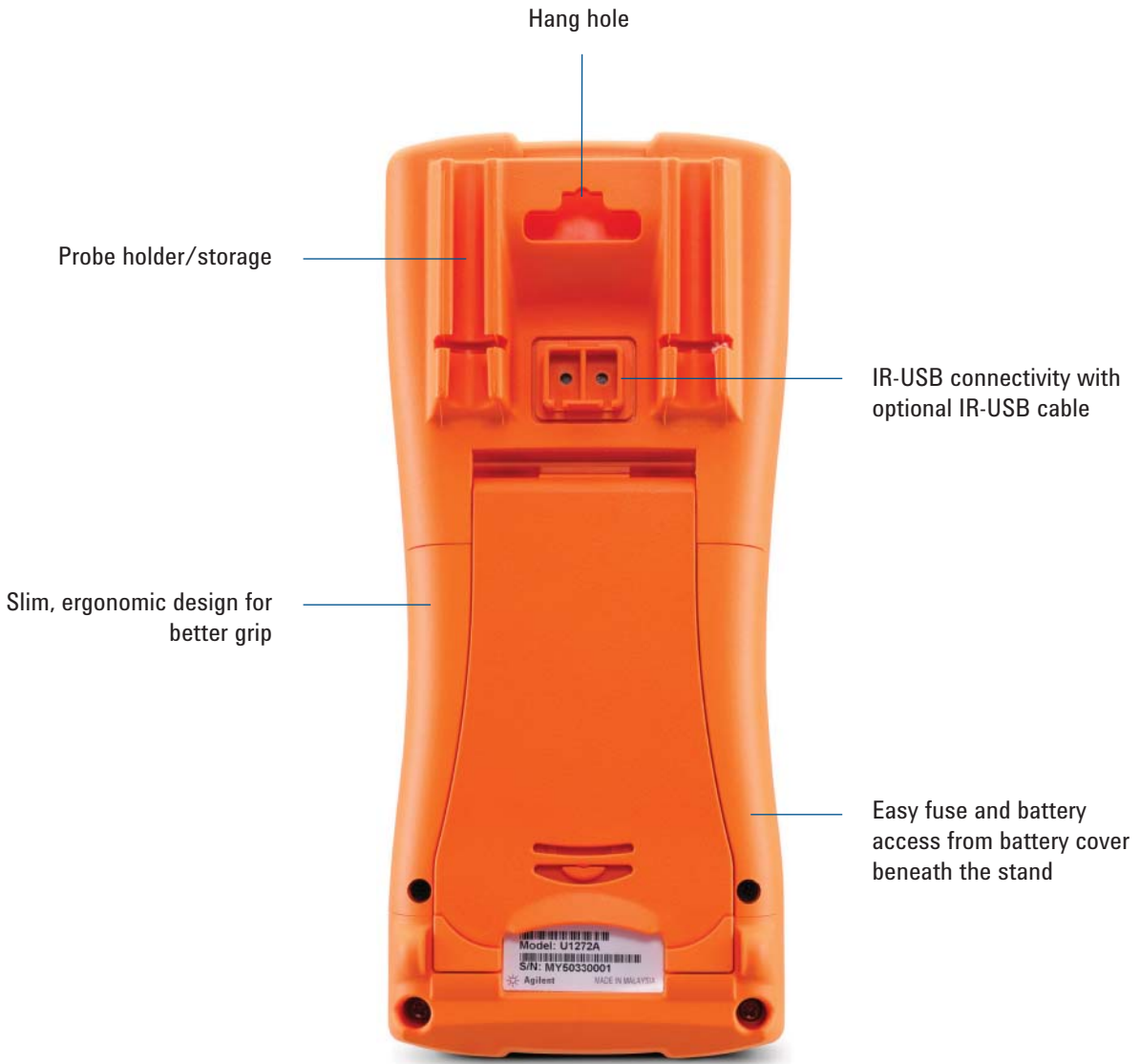
**Auto diode\*\*** automatically determines diode polarity

Temperature measurement: J type thermocouple -200 to 1200 °C\*\*, K type thermocouple -200 to 1732 °C

**AC + DC\*\*** capability

Large knob for ease of use

\* U1271A only  
\*\* U1272A only



Back panel

## Choose between these two models

		U1271A	U1272A
<b>Basic Features</b>			
Display resolution		30,000	30,000
Auto/manual ranging		Yes	Yes
Analog bar graph		Yes	Yes
Backlight		Yes	Yes
AC bandwidth		20 kHz	100 kHz
True RMS		AC	AC + DC
<b>Measurements</b>			
Voltage DC	Range Accuracy	300 mV to 1000 V 0.05% + 2 cnts	30 mV to 1000 V 0.05% + 2 cnts
Voltage AC	Range Accuracy Bandwidth	300 mV to 1000 V 0.7% + 20 cnts 45 Hz to 20 kHz	30 mV to 1000 V 0.6% + 20 cnts 45 Hz to 100 kHz
Current DC	Range Accuracy	300 $\mu$ A to 10 A 0.2% + 5 cnts	300 $\mu$ A to 10 A 0.2% + 5 cnts
Current AC	Range Accuracy Bandwidth	300 $\mu$ A to 10 A 0.9% + 25 cnts 45 Hz to 2 kHz	300 $\mu$ A to 10 A 0.6% + 25 cnts 45 Hz to 2 kHz
Resistance	Range Accuracy	300 $\Omega$ to 100 M $\Omega$ 0.2% + 5 cnts	30 $\Omega$ to 300 M $\Omega$ 0.2% + 5 cnts
Frequency	Range Accuracy	99.999 Hz to 999.99 kHz 0.005% + 5 cnts	99.999 Hz to 999.99 kHz 0.005% + 5 cnts
Capacitance	Range Accuracy	10 nF to 10 mF 1% + 2 cnts	10 nF to 10 mF 1% + 2 cnts
Temperature	Range Accuracy	K: -200 to 1372 $^{\circ}$ C 1% + 1 $^{\circ}$ C	K: -200 to 1372 $^{\circ}$ C J: -200 to 1200 $^{\circ}$ C 1% + 1 $^{\circ}$ C
Continuity with beeper		Yes	Yes
Diode test		Yes	Yes
<b>Data Management</b>			
Min/Max Recording		Yes	Yes
Display Hold		Yes	Yes
Peak Hold		Yes	Yes
Datalogging		Manual: 100 points Interval: 200 points	Manual: 100 points Interval: 10,000 points
Null		Yes	Yes
PC Connectivity		IR-USB	IR-USB
% scale of 4-20 mA		Yes	Yes

	U1271A	U1272A
<b>Special Features</b>		
Beep + Backlight Alert	Yes	Yes
Low Pass Filter (LPF)	Yes	Yes
Z <sub>LOW</sub> - Low impedance mode	-	Yes
Smart Ω	-	Yes
Qik-V	Yes	-
<b>Safety and Regulatory</b>		
Over-voltage safety protection	CAT III 1000 V, CAT IV 600 V	CAT III 1000 V, CAT IV 600 V
EN/IEC 61010-1:2001 compliance	Yes	Yes
<b>General</b>		
Battery	4x AAA	4x AAA
Operating temperature	-20 °C to 55 °C, 0 to 80% R.H	-20 °C to 55 °C, 0 to 80% R.H
Standard Accessories	Standard test leads, test probes with 19-mm and 4-mm tips, K-type thermocouple and adapter, 4x AAA batteries, Certificate of Calibration, test report, Quick Start Guide	Standard test leads, test probes with 19-mm and 4-mm tips, K-type thermocouple and adapter, 4x AAA batteries, Certificate of Calibration, test report, Quick Start Guide

## General Specifications

Display	Liquid crystal display (LCD) (with maximum reading of 33000 counts)
Power consumption	460 mVA maximum (with backlight enabled)
Battery Type	<ul style="list-style-type: none"> <li>• 4 × 1.5 V Alkaline battery (ANSI/NEDA 24A or IEC LR03), or</li> <li>• 4 × 1.5 V Zinc Chloride battery (ANSI/NEDA 24D or IEC R03)</li> </ul>
Battery Life	<ul style="list-style-type: none"> <li>• 300 hours typical (based on new Alkaline batteries for dc voltage measurement)</li> <li>• Low battery indicator will flash when the battery voltage drops below 4.4 V (approximately)</li> </ul>
Fuse	<ul style="list-style-type: none"> <li>• 10 × 35 mm 440 mA/1000 V 30 kA fast-acting fuse</li> <li>• 10 × 38 mm 11 A/1000 V 30 kA fast-acting fuse</li> </ul>
Operating Environment	<ul style="list-style-type: none"> <li>• Operating temperature from –20 to 55 °C, 0 to 80% RH</li> <li>• Full accuracy up to 80% RH for temperatures up to 30 °C, decreasing linearly to 50% RH at 55 °C</li> <li>• Altitude up to 2000 meters</li> <li>• Pollution degree II</li> </ul>
Storage Compliance	–40 to 70 °C, 0 to 80% RH
Safety Compliance	<ul style="list-style-type: none"> <li>• CAN/CSA-C22.2 No. 61010-1-04</li> <li>• EN/IEC 61010-1:2001</li> <li>• ANSI/UL 61010-1:2004</li> </ul>
Measurement Category	CAT III 1000 V/ CAT IV 600 V
Electromagnetic Compatibility (EMC)	Commercial limits compliance with EN61326-1
Ingress Protection Rating	IP-54
Temperature Coefficient	0.05 × (specified accuracy) / °C (from –20 to 18 °C, or 28 to 55 °C)
Common Mode Rejection Ratio (CMRR)	>120 dB at DC, 50/60 Hz ± 0.1% (1 kΩ unbalanced)
Normal Mode Rejection Ratio (NMRR)	>60 dB at 50/60 Hz ± 0.1%
Dimensions (W x H x D)	92 × 207 × 59 mm
Weight	<ul style="list-style-type: none"> <li>• U1271A: 518 grams (with batteries)</li> <li>• U1272A: 520 grams (with batteries)</li> </ul>
Warranty	<ul style="list-style-type: none"> <li>• Three years for product</li> <li>• Three months for product's accessories</li> </ul>
Calibration Cycle	One year

## 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 μA/mA/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 except for the 1000 V range where it is 1.5 at full scale.
- For non- sinusoidal waveforms, add (2% reading + 2% full scale) typical, for crest factors up to 3.
- After Z<sub>LOW</sub> voltage measurements, wait at least 20 minutes for thermal impact to cool before proceeding with any other measurement.

# Electrical specifications

## DC specifications for U1271A and U1272A

Function	Range	Resolution	Accuracy $\pm$ (% of reading + counts of least significant digit)		Test current/ Burden voltage
			U1271A	U1272A	
Voltage <sup>[1]</sup>	30 mV	0.001 mV	-	0.05 + 20	
	300 mV	0.01 mV	0.05 + 5	0.05 + 5	-
	3 V	0.0001 V	0.05 + 5	0.05 + 5	-
	30 V	0.001 V	0.05 + 2	0.05 + 2	-
	300 V	0.01 V	0.05 + 2	0.05 + 2	-
	1000 V	0.1 V	0.05 + 2	0.05 + 2	-
	$Z_{LOW}$ (low input impedance) enabled, applicable for 1000 V range and resolution only.			-	1 + 20
Resistance <sup>[2]</sup>	30 $\Omega$	0.001 $\Omega$	-	0.2 + 10	0.65 mA
	300 $\Omega$	0.01 $\Omega$	0.2 + 5	0.2 + 5	0.65 mA
	3 k $\Omega$	0.0001 k $\Omega$	0.2 + 5	0.2 + 5	65 $\mu$ A
	30 k $\Omega$	0.001 k $\Omega$	0.2 + 5	0.2 + 5	6.5 $\mu$ A
	300 k $\Omega$	0.01 k $\Omega$	0.5 + 5	0.5 + 5	0.65 $\mu$ A
	3 M $\Omega$	0.0001 M $\Omega$	0.6 + 5	0.6 + 5	93 nA//10 M $\Omega$
	30 M $\Omega$	0.001 M $\Omega$	1.2 + 5	1.2 + 5	93 nA//10 M $\Omega$
	100 M $\Omega$	0.01 M $\Omega$	2.0 + 10	-	93 nA//10 M $\Omega$
	300 M $\Omega$	0.01 M $\Omega$	-	2.0 + 10 @ <100 M $\Omega$ 8.0 + 10 @ >100 M $\Omega$	93 nA//10 M $\Omega$
	300 nS	0.01 nS	1 + 10	1 + 10	93 nA//10 M $\Omega$
Current <sup>[3]</sup>	300 $\mu$ A	0.01 $\mu$ A	0.2 + 5	0.2 + 3	<0.04 V/ 100 $\Omega$
	3000 $\mu$ A	0.1 $\mu$ A	0.2 + 5	0.2 + 3	<0.4 V/ 100 $\Omega$
	30 mA	0.001 mA	0.2 + 5	0.2 + 3	<0.08 V/ 1 $\Omega$
	300 mA	0.01 mA	0.2 + 5	0.2 + 3	<1.00 V/ 1 $\Omega$
	3 A	0.0001 A	0.3 + 10	0.3 + 10	<0.1 V/ 0.01 $\Omega$
	10 A	0.001 A	0.3 + 10	0.3 + 10	<0.3 V/ 0.01 $\Omega$
Diode Test <sup>[4]</sup>	3 V	0.0001 V	0.5 + 5	0.5 + 5	Approximately 1 to 2 mA
	Auto	0.0001 V	-	0.5 + 5	Approximately 0.1 to 0.3 mA

1. Notes for voltage specifications:

- The accuracy of the 30 to 300 mV range is specified after the Null function is used to subtract the thermal effect (by shorting the test leads).
- For  $Z_{LOW}$  measurements, autoranging is disabled and the multimeter's range is set to 1000 volts in the manual ranging mode.

2. Notes for resistance specifications:

- Overload protection: 1000 Vrms for short circuits with <0.3 A current.
- Maximum open voltage is <+3.3 V
- Built-in buzzer beeps when the resistance measured is less than 25  $\Omega \pm 10 \Omega$ . The multimeter can capture intermittent measurements longer than 1 ms.
- The accuracy of the 300  $\Omega$  to 3 k $\Omega$  range is specified after the Null function is used to subtract the test lead resistance and thermal effect (by shorting the test leads).
- For the ranges of 30 M $\Omega$  and 100 M $\Omega$ , the RH is specified for <60%.
- The accuracy for ranges <50 nS is specified after the Null function is used on an open test lead.
- The temperature coefficient of the 100 M $\Omega$  and 300 M $\Omega$  range is  $0.1 \times$  (specified accuracy)/ $^{\circ}$ C (from -20  $^{\circ}$ C to 18  $^{\circ}$ C or 28  $^{\circ}$ C to 55  $^{\circ}$ C)



3. Notes for current specifications:

- Overload protection for 300  $\mu$ A to 300 mA range: 0.44 A/1000 V; 10  $\times$  35 mm 30 kA fast-acting fuse
- Overload protection for 3 A to 10 A range: 11 A/1000 V; 10  $\times$  38 mm 30 kA fast-acting fuse
- Specification for 300 mA range: 440 mA continuous.
- Specification for 10 A range: 10 A continuous. Add 0.3% to the specified accuracy when measuring signals >10 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. Notes for diode specifications:

- Overload protection: 1000 Vrms for short circuits with <0.3 A current.
- 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  $\leq$  reading  $\leq$  0.8 V).
- Open voltage for diode: <+3.3 V DC
- Open voltage for Auto diode: <+2.5 V DC and > -1.0 V DC

## AC specifications for U1271A

Function	Range	Resolution	Accuracy $\pm$ (% of reading + counts of least significant digit)			
			45 Hz to 65 Hz	30 Hz to 1 kHz	1 kHz to 5 kHz	5 kHz to 20 kHz
True RMS AC Voltage <sup>[1]</sup>	300 mV	0.01 mV	0.7 + 20	1.0 + 25	2.0 + 25	2.0 + 40
	3 V	0.0001 V	0.7 + 20	1.0 + 25	2.0 + 25	2.0 + 40
	30 V	0.001 V	0.7 + 20	1.0 + 25	2.0 + 25	2.0 + 40
	300 V	0.01 V	0.7 + 20	1.0 + 25	2.0 + 25	-
	1000 V	0.1 V	0.7 + 20	1.0 + 25	-	-
	LPF (low pass filter) enabled, applicable for all voltage ranges and resolution			0.7 + 20	1.0 + 25 @ <200 Hz 5.0 + 25 @ <440 Hz	-

Function	Range	Resolution	Accuracy $\pm$ (% of reading + counts of least significant digit)	Burden voltage/Shunt
			45 Hz to 2 kHz	
True RMS AC Current <sup>[2]</sup>	300 $\mu$ A	0.01 $\mu$ A	0.9 + 25	<0.04 V/ 100 $\Omega$
	3000 $\mu$ A	0.1 $\mu$ A	0.9 + 25	<0.4 V/ 100 $\Omega$
	30 mA	0.001 mA	0.9 + 25	<0.08 V/ 1 $\Omega$
	300 mA	0.01 mA	0.9 + 25	<1.00 V/ 1 $\Omega$
	3A	0.0001 A	1.0 + 25	<0.1 V/ 0.01 $\Omega$
	10 A	0.001 A	1.0 + 25	<0.3 V/ 0.01 $\Omega$

1. Notes for voltage specifications:

- Overload protection: 1000 Vrms. For millivolt measurements, 1000 Vrms for short circuits with <0.3 A current.
- Input impedance: 10 M $\Omega$  (nominal) in parallel with <100 pF.

2. Notes for current specifications:

- Overload protection for 300  $\mu$ A to 300 mA range: 0.44 A/1000 V; 10  $\times$  35 mm 30 kA fast-acting fuse
- Overload protection for 3 A to 10 A range: 11 A/1000 V; 10  $\times$  38 mm 30 kA fast-acting fuse
- Specification for 300 mA range: 440 mA continuous.
- Specification for 10 A range: 10 A continuous. Add 0.3% to the specified accuracy when measuring signals >10 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.

## AC specifications for U1272A

Function	Range	Resolution	Accuracy $\pm$ (% of reading + counts of least significant digit)				
			45 to 65 Hz	20 Hz to 1 kHz	1 kHz to 5 kHz	5 kHz to 20 kHz	20 kHz to 100 kHz
True RMS AC Voltage <sup>[1]</sup>	30 mV	0.001 mV	0.6 + 20	0.7 + 25	1.0 + 25	1.0 + 40	3.5 + 40
	300 mV	0.01 mV	0.6 + 20	0.7 + 25	1.0 + 25	1.0 + 40	3.5 + 40
	3 V	0.0001 V	0.6 + 20	1.0 + 25	1.5 + 25	2.0 + 40	3.5 + 40
	30 V	0.001 V	0.6 + 20	1.0 + 25	1.5 + 25	2.0 + 40	3.5 + 40
	300 V	0.01 V	0.6 + 20	1.0 + 25	1.5 + 25	2.0 + 40	-
	1000 V	0.1 V	0.6 + 20	1.0 + 25	1.5 + 25	-	-
	LPF (low pass filter) enabled, applicable for all voltage ranges and resolution		0.6 + 20	1.0 + 25 @ <200 Hz 5.0 + 25 @ <440 Hz	-	-	-
	$Z_{Low}$ 1000 V		2.0 + 40	2 + 40 @ <440 Hz	-	-	-

Function	Range	Resolution	Accuracy $\pm$ (% of reading + counts of least significant digit)		Burden voltage/ Shunt
			45 to 65 Hz	20 Hz to 2 kHz	
True RMS AC Current <sup>[2]</sup>	300 $\mu$ A	0.01 $\mu$ A	0.6 + 25	0.9 + 25	<0.04 V/ 100 $\Omega$
	3000 $\mu$ A	0.1 $\mu$ A	0.6 + 25	0.9 + 25	<0.4 V/ 100 $\Omega$
	30 mA	0.001 mA	0.6 + 25	0.9 + 25	<0.08 V/ 1 $\Omega$
	300 mA	0.01 mA	0.6 + 25	0.9 + 25	<1.00 V/ 1 $\Omega$
	3 A	0.0001 A	0.8 + 25	1.0 + 25	<0.1 V/ 0.01 $\Omega$
	10 A	0.001 A	0.8 + 25	1.0 + 25	<0.3 V/ 0.01 $\Omega$

### 1. Notes for voltage specifications

- Overload protection: 1000 Vrms. For millivolt measurements, 1000 Vrms for short circuits with <0.3 A current.
- Input impedance: 10 M $\Omega$  (nominal) in parallel with <100 pF.
- $Z_{Low}$  impedance: 2 k $\Omega$  (nominal)
- The input signal is lower than the product of 20,000,000 V $\times$ Hz.
- For 20 to 100 kHz accuracy: Three counts of the LSD per kHz of additional error is to be added for frequencies >20 kHz and signal inputs <10% of range.

### 2. Notes for current specifications

- Overload protection for 300  $\mu$ A to 300 mA range: 0.44 A/1000 V; 10  $\times$  35 mm 30 kA fast-acting fuse
- Overload protection for 3 A to 10 A range: 11 A/1000 V; 10  $\times$  38 mm 30 kA fast-acting fuse
- Specification for 300 mA range: 440 mA continuous.
- Specification for 10 A range: 10 A continuous. Add 0.3% to the specified accuracy when measuring signals >10 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.

## AC + DC specifications for U1272A

Function	Range	Resolution	Accuracy ± (% of reading + counts of least significant digit)				
			45 Hz to 65 Hz	20 Hz to 2 kHz	1 kHz to 5 kHz	5 kHz to 20 kHz	20 kHz to 100 kHz
True RMS AC + DC Voltage <sup>[1]</sup>	30 mV	0.001 mV	0.7 + 40	0.8 + 45	1.1 + 45	1.1 + 60	3.6 + 60
	300 mV	0.01 mV	0.7 + 25	0.8 + 30	1.1 + 30	1.1 + 45	3.6 + 45
	3 V	0.0001 V	0.7 + 25	1.1 + 30	1.6 + 30	2.1 + 45	3.6 + 45
	30 V	0.001 V	0.7 + 25	1.1 + 30	1.6 + 30	2.1 + 45	3.6 + 45
	300 V	0.01 V	0.7 + 25	1.1 + 30	1.6 + 30	2.1 + 45	-
	1000 V	0.1 V	0.7 + 25	1.1 + 30	1.6 + 30	-	-

Function	Range	Resolution	Accuracy ± (% of reading + counts of least significant digit)		Burden voltage/ Shunt
			45 Hz to 65 Hz	20 Hz to 2 kHz	
True RMS AC + DC Current <sup>[2]</sup>	300 µA	0.01 µA	0.8 + 30	1.1 + 30	<0.04 V/100 Ω
	3000 µA	0.1 µA	0.8 + 30	1.1 + 30	<0.4 V/100 Ω
	30 mA	0.001 mA	0.8 + 30	1.1 + 30	<0.08 V/1 Ω
	300 mA	0.01 mA	0.8 + 30	1.1 + 30	<1.00 V/1 Ω
	3 A	0.0001 A	0.9 + 35	1.3 + 35	<0.1 V/0.01 Ω
	10 A	0.001 A	0.9 + 35	1.3 + 35	<0.3 V/0.01 Ω

1. Notes for voltage specifications:

- Overload protection: 1000 Vrms. For millivolt measurements, 1000 Vrms for short circuits with <0.3 A current.
- Input impedance: 10 MΩ (nominal) in parallel with <100 pF.
- For 20 to 100 kHz accuracy: Three counts of the LSD per kHz of additional error is to be added for frequencies >20 kHz and signal inputs <10% of range.

2. Notes for current specifications:

- Overload protection for 300 µA to 300 mA range: 0.44 A/1000 V; 10 × 35 mm 30 kA fast-acting fuse
- Overload protection for 3 A to 10 A range: 11 A/1000 V; 10 × 38 mm 30 kA fast-acting fuse
- Specification for 300 mA range: 440 mA continuous.
- Specification for 10 A range: 10 A continuous. Add 0.3% to the specified accuracy when measuring signals >10 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.

## Temperature specifications <sup>[1] - [6]</sup>

Thermocouple type	Range	Resolution	Accuracy ± (% of reading + counts of least significant digit)	
			U1271A	U1272A
K	-200 to 1372 °C	0.1 °C	1% + 1 °C	1% + 1 °C
	-328 to 2502 °F	0.1 °F	1% + 1.8 °F	1% + 1.8 °F
J	-200 to 1200 °C	0.1 °C	-	1% + 1 °C
	-328 to 2192 °F	0.1 °F	-	1% + 1.8 °F

1. The specifications above is specified after 60 minutes of warm-up time.
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  $\pm 1$  °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 to the multimeter as possible (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, due to differences in ambient compensation between the calibrator and multimeter. Keeping the multimeter close to the output terminal of calibrator will help reduce the deviation.
6. The temperature calculation is specified according to the safety standards of EN/IEC-60548-1 and NIST175.

## Capacitance specifications <sup>[7][8]</sup>

Range	Resolution	Accuracy ± (% of reading + counts of least significant digit)	
		U1271A	U1272A
10 nF	0.001 nF	1 + 5	1 + 5
100 nF	0.01 nF	1 + 2	1 + 2
1000 nF	0.1 nF	1 + 2	1 + 2
10 µF	0.001 µF	1 + 2	1 + 2
100 µF	0.01 µF	1 + 2	1 + 2
1000 µF	0.1 µF	1 + 2	1 + 2
10 mF	0.001 mF	1 + 2	1 + 2

7. Overload protection: 1000 Vrms for short circuits with <0.3 A current.
8. 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 shorting the test leads).

## Frequency specifications <sup>[1][2]</sup>

Range	Resolution	Accuracy $\pm$ (% of reading + counts of least significant digit)	Minimum input frequency
99.999 Hz	0.001 Hz	0.02 + 5	0.5 Hz
999.99 Hz	0.01 Hz	0.005 + 5	
9.9999 kHz	0.1 Hz	0.005 + 5	
99.999 kHz	1 Hz	0.005 + 5	
999.99 kHz	0.01 kHz	0.005 + 5	
>1 MHz	0.1 kHz	0.005 + 5 @ <1 MHz	

1. *Overload protection: 1000 V; input signal is <math> <20,000,000 V \times Hz</math> (product of voltage and frequency).*
2. *The frequency measurement is susceptible to error when measuring low-voltage, low-frequency signals. Shielding inputs from external noise pickup is critical for minimizing measurement errors. Turning on the low pass filter may help you to filter out the noise and achieve a stable reading.*

## Duty Cycle <sup>[3]</sup>

Mode	Range	Accuracy at full scale
DC Coupling	99.99%	0.3 % per kHz + 0.3 %
AC Coupling	99.99%	0.3 % per kHz + 0.3 %

## Pulse Width <sup>[4]</sup>

Range	Resolution	Accuracy at full scale
999.99 ms	0.01 ms	(duty cycle accuracy/frequency) + 0.01 ms
2000.0 ms	0.1 ms	(duty cycle accuracy/frequency) + 0.1 ms

3. *Notes for duty cycle specifications:*
  - *The accuracy for duty cycle and pulse width measurements is based on a 3 V square wave input to the dc 3 V range. For ac couplings, the duty cycle range can be measured within the range of 10% to 90% for signal frequencies >20 Hz.*
  - *The range of the duty cycle is determined by the frequency of the signal:  $\{10 \mu s \times frequency \times 100\%$  to  $\{[1 - (10 \mu s \times frequency)] \times 100\%$ .*
  - *The pulse width (positive or negative) must be >10  $\mu s$ . The range of the pulse width is determined by the frequency of the signal.*
4. *Notes for pulse width specifications:*
  - *The accuracy for duty cycle and pulse width measurements is based on a 3 V square wave input to the dc 3 V range.*
  - *The pulse width (positive or negative) must be >10  $\mu s$ . The range of the pulse width is determined by the frequency of the signal.*

## Frequency sensitivity for voltage measurements <sup>[1][2][3]</sup>

Input range	Minimum sensitivity (RMS sine wave)			Trigger level for dc coupling	
	15 Hz to 100 kHz	0.5 Hz to 200 kHz	Up to 1 MHz	0.5 Hz to 200 kHz	
				U1271A	U1272A
30 mV	3 mV	3 mV	-	-	5 mV
300 mV	6 mV	8 mV	40 mV	10 mV	15 mV
3 V	0.12 V	0.2 V	0.4 V	0.15 V	0.15 V
30 V	0.6 V	0.8 V	2.6 V	1.5 V	1.5 V
300 V	6 V	8 V @ <100 kHz	-	9 V @ <100 kHz	9 V @ <100 kHz
1000 V	50 V	50 V @ <100 kHz	-	90 V @ <100 kHz	90 V @ <100 kHz

1. Maximum input for specified accuracy, refer to "AC specifications" on page 9.
2. 30 mV range applicable for U1272A only.
3. 200 kHz to 1 MHz range applicable for U1272A only.

## Frequency sensitivity for current measurements <sup>[4]</sup>

Input range	Minimum sensitivity (RMS sine wave)
	2 Hz to 30 kHz
300 µA	100 µA
3000 µA	70 µA
30 mA	1.2 mA
300 mA	12 mA
3 A	0.12 A
10 A	1.2 A

4. Maximum input for specified accuracy, refer to "AC specifications" on page 9.

## Peak hold

Signal width	Accuracy for DC Voltage and Current
Single event >1 ms	Specified accuracy + 400
Repetitive >250 µs	Specified accuracy + 1000

## Decibel (dB) for U1272A <sup>[1] - [3]</sup>

dB base	Reference	Default reference
1 mW (dBm)	1 to 9999 $\Omega$	50 $\Omega$
1 V(dBV)	1 V	1 V

1. The reading of dBm is indicated in decibels of power above or below 1 mW, or decibels of voltage above or below 1 V. The formula is calculated according to the voltage measurement and specified reference impedance. Its accuracy is depended on the accuracy of the voltage measurement. See Decibel (dBV) accuracy table below.
2. Auto-ranging mode is used.
3. The bandwidth is according to voltage measurement.

## Decibel (dBV) accuracy

Range	dBV range		Accuracy				
	Minimum	Maximum	45 to 65 Hz	20 Hz to 1 kHz	1 Hz to 5 kHz	5 kHz to 20 kHz	20 Hz to 100 kHz
30 mV	-56.48	-30.46	0.06	0.07	0.09	0.1	0.32
300 mV	-36.48	-10.46	0.06	0.07	0.09	0.1	0.32
3 V	-16.48	+9.54	0.06	0.09	0.14	0.19	0.32
30 V	+3.52	+29.54	0.06	0.09	0.14	0.19	0.32
300 V	+23.52	+49.54	0.06	0.09	0.14	0.19	-
1000 V	+33.98	+60	0.06	0.09	0.14	-	-

## Measurement rate (approximate)

Function	Times/second	
	U1271A	U1272A
ACV	7	7
DCV	7	7
$\Omega$	14	14
$\Omega$ with offset compensation	-	3
Diode	14	14
Auto Diode	-	3
Capacitance	4 (<100 $\mu$ F)	4 (<100 $\mu$ F)
DCI	7	7
ACI	7	7
Temperature	7	7
Frequency	2 (>10 Hz)	2 (>10 Hz)
Duty cycle	1 (>10 Hz)	1 (>10 Hz)
Pulse width	1 (>10 Hz)	1 (>10 Hz)

## Ordering Information



U1271A

U1272A

## Standard Shipped Accessories

Standard test leads, test probes with 19-mm and 4-mm tips, K-type thermocouple and adapter, 4x AAA batteries, Certificate of Calibration, test report, Quick Start Guide

## Optional Accessories

### Measuring Accessories (non-temperature)



#### U1160A Standard test lead kit

Includes two test leads (red and black), alligator clips, fine-tip test probes, SMT grabbers and mini grabber (black).

- Test leads: CAT III 1000 V, 15 A
- Alligator clips: CAT III 1000 V, 10 A
- Fine-tip test probes: CAT II 300 V, 3 A
- SMT grabbers: CAT II 300 V, 3 A
- Mini grabber: CAT II 300 V, 3 A



#### U1161A Extended test lead kit

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

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



#### U1162A Alligator clips

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



#### 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.



#### U1165A Test probe leads

- Rated CAT III 1000 V, 15 A



## Measuring Accessories (non-temperature)



### U1168A Standard test lead kit

Includes two test leads (red and black), 19-mm and 4-mm test probes, alligator clips, fine-tip test probes, SMT grabbers and mini grabber (black).

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



### U1169A Test probe leads

Includes two test leads (red and black), and a pair each of 19-mm and 4-mm test probes.

- Test leads: CAT III 1000 V, CAT IV 600 V, 15 A
- Test probes (19-mm tip): CAT III 1000 V, CAT IV 600 V, 15 A
- Test probes (4-mm tip): CAT III 1000 V, CAT IV 600 V, 15 A (**highly recommended for CAT IV environment**)



### U1583B AC current clamp

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

## Measuring Accessories (temperature)



### U1180A Thermocouple adapter+lead kit, J and K types

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

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



### U1181A Immersion temperature probe

- Type-K T/C for use in oil and other liquids
- Measurement range:  $-50\text{ }^{\circ}\text{C}$  to  $700\text{ }^{\circ}\text{C}$
- Includes adapter U1184A for connection to DMM



### U1182A Industrial surface temperature probe

- Type-K T/C for use on still surfaces
- Measurement range:  $-50\text{ }^{\circ}\text{C}$  to  $400\text{ }^{\circ}\text{C}$
- Includes adapter U1184A for connection to DMM



### U1183A Air temperature probe

- Type-K T/C for use in air and non-caustic gas
- Measurement range:  $-50\text{ }^{\circ}\text{C}$  to  $800\text{ }^{\circ}\text{C}$
- Includes adapter U1184A for connection to DMM



### 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:  $-20\text{ }^{\circ}\text{C}$  to  $200\text{ }^{\circ}\text{C}$



### U1186A K-type thermocouple and adapter

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

## Cable



### U1173A IR-to-USB cable

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



### U1174A Soft carrying case

The convenient way to carry your DMM and essential accessories

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

## Hanging Kit



### U1171A Magnetic hanging kit

For fastening of DMM to a steel surface so both hands are free.

## Probe Clip Light



### U1176A LED Probe Clip Light

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



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