Agilent U1270 Series Handheld Digital Multimeters

Data Sheet

Features

- OLED display for high brightness level and wider viewing angles (up to 160 degrees)[1]
- Intelligent features: Z_{LOW}[1, 2], Smart Ω[1, 2], Low Pass Filter, Qik-V[3]
- Visual (Backlight[3] and Symbol[1] Alert) and audible continuity indication in noisy environments
- Ergonomic shape for better grip
- IP 54 certified – water and dust resistant
- 30,000-count dual display
- AC + DC capability[1, 2]
- 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

1. *U1273A*
2. *U1272A*
3. *U1271A*

OLED for more display clarity

The U1273A, the latest addition to U1270 series, comes with an OLED display that has outstanding contrast levels and high brightness levels. The display also allows wider viewing angles up to 160 degrees to ensure that you get the right readings at the first glance.

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.

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 Ω*** to minimize false readings due to leakage current and ***Qik-V*** to determine existence of AC and/or DC voltages.

Continuity detection in noisy and dark places is made easy with the U1270 series' loud beeper and ***Visual Alert*** function that indicates continuity and improves safety.

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

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 and U1273A are dual input impedance digital multimeters. 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 and U1273A's 2 kΩ 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.

Key Functions

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 Ω

The U1272A and U1273A provide an additional 30 Ohm range for low resistance measurement. This Smart Ω 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

Peak detect records transients as fast as 250 µs

Low Pass Filter (LPF) removes unwanted high frequency signals

Z_{LOW}[1] provides both high and low impedance modes to eliminate stray voltages

OLED display ensures clear and distinct display readings

Smart Ω[1] removes residual voltage of up to 1000 mV

Auto diode[1] automatically determines diode polarity

Temperature measurement: J type thermocouple –210 to 1200 °C[1], K type thermocouple –200 to 1732 °C

AC + DC[1] capability

Large knob for ease of use

Front panel

1. *U1272A and U1273A only*

Front and Back Panel Description

Back panel

Choose Among These Three Models

		U1271A	U1272A	U1273A
Basic Features				
Display resolution		30,000	30,000	30,000
Auto/manual ranging		Yes	Yes	Yes
Analog bar graph		Yes	Yes	Yes
Backlight		Yes	Yes	—
AC bandwidth		20 kHz	100 kHz	100 kHz
True RMS		AC	AC + DC	AC + DC
Measurements				
Voltage DC	Range Accuracy	300 mV to 1000 V 0.05% + 2 cnts	30 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	30 mV to 1000 V 0.6% + 20 cnts 45 Hz to 100 kHz
Current DC	Range Accuracy	300 µA to 10 A 0.2% + 5 cnts	300 µA to 10 A 0.2% + 5 cnts	300 µA to 10 A 0.2% + 5 cnts
Current AC	Range Accuracy Bandwidth	300 µA to 10 A 0.9% + 25 cnts 45 Hz to 2 kHz	300 µA to 10 A 0.6% + 25 cnts 45 Hz to 2 kHz	300 µA to 10 A 0.6% + 25 cnts 45 Hz to 2 kHz
Resistance	Range Accuracy	300 Ω to 100 MΩ 0.2 % + 5 cnts	30 Ω to 300 MΩ 0.2% + 5 cnts	30 Ω to 300 MΩ 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	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	10 nF to 10 mF 1% + 2 cnts
Temperature	Range Accuracy	K: –200 to 1372 °C 1% + 1°C	K: –200 to 1372 °C J: –210 to 1200 °C 1% + 1 °C	K: –200 to 1372 °C J: –210 to 1200 °C 1% + 1 °C
Continuity with beeper		Yes	Yes	Yes
Diode test		Yes	Yes	Yes
Data Management				
Min/Max Recording		Yes	Yes	Yes
Display Hold		Yes	Yes	Yes
Peak Hold		Yes	Yes	Yes
Datalogging		Manual: 100 points Interval: 200 points	Manual: 100 points Interval: 10,000 points	Manual: 100 points Interval: 10,000 points
Null		Yes	Yes	Yes
PC Connectivity		IR-USB	IR-USB	IR-USB
% scale of 4-20 mA		Yes	Yes	Yes

Choose Among These Three Models

	U1271A	U1272A	U1273A
Special Features			
OLED display	—	—	Yes
Alert in continuity test	Beep + Backlight Alert	Beep + Backlight Alert	Beep + Symbol Alert
Low Pass Filter (LPF)	Yes	Yes	Yes
Z_{LOW} - Low impedance mode	—	Yes	Yes
Smart Ω	—	Yes	Yes
Qik-V	Yes	—	—
Safety and Regulatory			
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
General			
Battery	4x AAA	4x AAA	4x AAA
Operating temperature	–20 °C to 55 °C, 0 to 80% RH	–20 °C to 55 °C, 0 to 80% RH	–20 °C to 55 °C, 0 to 80% RH
Standard accessories	Standard test leads, test probes with 4-mm tips, K-type thermocouple and adapter, 4x AAA batteries, Certificate of Calibration, UK 6 (test report), Quick Start Guide	Standard test leads, test probes with 4-mm tips, K-type thermocouple and adapter, 4x AAA batteries, Certificate of Calibration, UK 6 (test report), Quick Start Guide	Standard test leads, test probes with 4-mm tips, K-type thermocouple and adapter, 4x AAA batteries, Certificate of Calibration, UK 6 (test report), Quick Start Guide

General Specifications

Display	• U1271A and U1272A: Liquid crystal display (LCD) (with maximum reading of 33,000 counts) • U1273A: Organic LED (OLED) display (with maximum reading of 33,000 counts)
Power consumption	• U1271A/U1272A: 460 mVA maximum (with backlight enabled) • U1273A: 180 mVA maximum (with maximum brightness)
Battery type	• 4 × 1.5 V Alkaline battery (ANSI/NEDA 24A or IEC LR03), or • 4 × 1.5 V Zinc Chloride battery (ANSI/NEDA 24D or IEC R03)
Battery life	• U1271A and U1272A: 300 hours typical (based on new Alkaline batteries for DC voltage measurement) • U1273A: 30/45/60 hours typical (based on new Alkaline batteries for DC voltage measurement at High/Medium/Low brightness, respectively) • Low battery indicator will flash when the battery voltage drops below 4.4 V (approximately)
Fuse	• 10 × 35 mm 440 mA/1000 V 30 kA fast-acting fuse • 10 × 38 mm 11 A/1000 V 30 kA fast-acting fuse
Operating environment	• Operating temperature from –20 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 to 70 °C, 0 to 80% RH
Safety compliance	• CAN/CSA-C22.2 No. 61010-1-04 • EN/IEC 61010-1:2001 • ANSI/UL 61010-1:2004
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 Ration (NMRR)	> 60 dB at 50/60 Hz ± 0.1%
Dimensions (W x H x D)	92 × 207 × 59 mm
Weight	• U1271A: 518 grams (with batteries) • U1272A: 520 grams (with batteries) • U1273A: 500 grams (with batteries)
Warranty	• Three years for product • Three months for product's accessories
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_{LOW} voltage measurements, wait at least 20 minutes for thermal impact to cool before proceeding with any other measurement.

Electrical Specifications

DC specifications for U1271A, U1272A, and U1273A

Function	Range	Resolution	Accuracy ± (% of reading + counts of least significant digit)			Test current/ Burden voltage
			U1271A	U1272A	U1273A	
Voltage[1]	30 mV	0.001 mV	—	0.05 + 20	0.05 + 20	—
	300 mV	0.01 mV	0.05 + 5	0.05 + 5	0.05 + 5	—
	3 V	0.0001 V	0.05 + 5	0.05 + 5	0.05 + 5	—
	30 V	0.001 V	0.05 + 2	0.05 + 2	0.05 + 2	—
	300 V	0.01 V	0.05 + 2	0.05 + 2	0.05 + 2	—
	1000 V	0.1 V	0.05 + 2	0.05 + 2	0.05 + 2	—
	Z_{LOW} (low input impedance) enabled, applicable for 1000 V range and resolution only	0.1 V	—	1 + 20	1 + 20	—
Resistance[2]	30 Ω	0.001 Ω	—	0.2 + 10	0.2 + 10	0.65 mA
	300 Ω	0.01 Ω	0.2 + 5	0.2 + 5	0.2 + 5	0.65 mA
	3 kΩ	0.0001 kΩ	0.2 + 5	0.2 + 5	0.2 + 5	65 µA
	30 kΩ	0.001 kΩ	0.2 + 5	0.2 + 5	0.2 + 5	6.5 µA
	300 kΩ	0.01 kΩ	0.5 + 5	0.5 + 5	0.5 + 5	0.65 µA
	3 MΩ	0.0001 MΩ	0.6 + 5	0.6 + 5	0.6 + 5	93 nA/10 MΩ
	30 MΩ	0.001 MΩ	1.2 + 5	1.2 + 5	1.2 + 5	93 nA/10 MΩ
	100 MΩ	0.01 MΩ	2.0 +10	—	—	93 nA/10 MΩ
	300 MΩ	0.01 MΩ	—	2.0 + 10 @ < 100 MΩ 8.0 + 10 @ > 100 MΩ	2.0 + 10 @ < 100 MΩ 8.0 + 10 @ > 100 MΩ	93 nA/10 MΩ
	300 nS	0.01 nS	1 + 10	1 + 10	1 + 10	93 nA/10 MΩ
Current[3]	300 µA	0.01 µA	0.2 + 5	0.2 + 3	0.2 + 5	< 0.04 V/100 Ω
	3000 µA	0.1 µA	0.2 + 5	0.2 + 3	0.2 + 5	< 0.4 V/100 Ω
	30 mA	0.001 mA	0.2 + 5	0.2 + 3	0.2 + 5	< 0.08 V/1 Ω
	300 mA	0.01 mA	0.2 + 5	0.2 + 3	0.2 + 5	< 1.00 V/1 Ω
	3 A	0.0001 A	0.3 +10	0.3 +10	0.3 +10	< 0.1 V/0.01 Ω
	10 A	0.001 A	0.3 +10	0.3 +10	0.3 +10	< 0.3 V/0.01 Ω
Diode Test[4]	3 V	0.0001 V	0.5 + 5	0.5 + 5	0.5 + 5	Approximately 1 to 2 mA
	Auto	0.0001 V	—	0.5 + 5	0.5 + 5	Approximately 0.1 to 0.3 mA

See notes on next page.

Electrical Specifications

Notes for DC specifications (previous page)

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 Ω ± 10 Ω. The multimeter can capture intermittent measurements longer than 1 ms.*
   - *The accuracy of the 300 Ω to 3 kΩ 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 MΩ and 100 MΩ, 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 MΩ and 300 MΩ range is 0.1 × (specified accuracy)/°C (from –20 °C to 18 °C or 28 °C to 55 °C).*
3. *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.*
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 ≤ reading ≤ 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.*

Electrical Specifications

AC specifications for U1271A

Function	Range	Resolution	Accuracy ± (% 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[1]	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 ± (% of reading + counts of least significant digit)	Burden voltage/Shunt
			45 Hz to 2 kHz	
True RMS AC Current[2]	300 µA	0.01 µA	0.9 + 25	< 0.04 V/100 Ω
	3000 µA	0.1 µA	0.9 + 25	< 0.4 V/100 Ω
	30 mA	0.001 mA	0.9 + 25	< 0.08 V/1 Ω
	300 mA	0.01 mA	0.9 + 25	< 1.00 V/1 Ω
	3 A	0.0001 A	1.0 + 25	< 0.1 V/0.01 Ω
	10 A	0.001 A	1.0 + 25	< 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.*
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.*

Electrical Specifications

AC specifications for U1272A and U1273A

Function	Range	Resolution	Accuracy ± (% of reading + counts of least significant digit)				
			45 Hz 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[1]	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 ± (% of reading + counts of least significant digit)		Burden voltage/Shunt
			45 Hz to 65 Hz	20 Hz to 2 kHz	
True RMS AC Current[2]	300 µA	0.01 µA	0.6 + 25	0.9 + 25	< 0.04 V/100 Ω
	3000 µA	0.1 µA	0.6 + 25	0.9 + 25	< 0.4 V/100 Ω
	30 mA	0.001 mA	0.6 + 25	0.9 + 25	< 0.08 V/1 Ω
	300 mA	0.01 mA	0.6 + 25	0.9 + 25	< 1.00 V/1 Ω
	3 A	0.0001 A	0.8 + 25	1.0 + 25	< 0.1 V/0.01 Ω
	10 A	0.001 A	0.8 + 25	1.0 + 25	< 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.*
   - *Z_{LOW} impedance: 2 kΩ (nominal).*
   - *The input signal is lower than the product of 20,000,000 V×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 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.*

Electrical Specifications

AC + DC specifications for U1272A and U1273A

Function	Range	Resolution	Accuracy ± (% of reading + counts of least significant digit)				
			45 Hz 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 + DC Voltage[1]	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[2]	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.*

Electrical Specifications

Temperature specifications[1 - 6]

Thermocouple type	Range	Resolution	Accuracy ± (% of reading + counts of least significant digit)		
			U1271A	U1272A	U1273A
K	–200 to 1372 °C	0.1 °C	1% + 1 °C	1% + 1 °C	1% + 1 °C
	–328 to 2502 °F	0.1 °F	1% + 1.8 °F	1% + 1.8 °F	1% + 1.8 °F
J	–210 to 1200 °C	0.1 °C	—	1% + 1 °C	1% + 1 °C
	–346 to 2192 °F	0.1 °F	—	1% + 1.8 °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 pose 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 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[7, 8]

Range	Resolution	Accuracy ± (% of reading + counts of least significant digit)		
		U1271A	U1272A	U1273A
10 nF	0.001 nF	1 + 5	1 + 5	1 + 5
100 nF	0.01 nF	1 + 2	1 + 2	1 + 2
1000 nF	0.1 nF	1 + 2	1 + 2	1 + 2
10 µF	0.001 µF	1 + 2	1 + 2	1 + 2
100 µF	0.01 µF	1 + 2	1 + 2	1 + 2
1000 µF	0.1 µF	1 + 2	1 + 2	1 + 2
10 mF	0.001 mF	1 + 2	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).*

Electrical Specifications

Frequency specifications[1, 2]

Range	Resolution	Accuracy ± (% 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	
10 mF	0.001 mF	1 + 2	

1. *Overload protection: 1000 V; input signal is < 20,000,000 V × Hz (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[3]

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 %

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 µs × frequency × 100%} to {[1 – (10 µs × frequency)] × 100%}.*
   - *The pulse width (positive or negative) must be > 10 µs. The range of the pulse width is determined by the frequency of the signal.*

Pulse Width[4]

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

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 µs. The range of the pulse width is determined by the frequency of the signal.*

Electrical Specifications

U1271A and U1272A frequency sensitivity for voltage measurements[1, 2, 3]

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 11.*
2. *30 mV range applicable for U1272A only.*
3. *200 kHz to 1 MHz range applicable for U1272A only.*

U1273A sensitivity for voltage measurements[4]

Input range	Frequency sensitivity and trigger level			
	Minimum sensitivity (RMS sine wave)			Trigger level for DC coupling
Maximum input for specified accuracy, refer to AC voltage	15 Hz to 100 kHz	0.5 Hz to 200 kHz	Up to 1 MHz	0.5 Hz to 200 kHz
30 mV	3 mV	3 mV	—	5 mV
300 mV	7 mV	8 mV	38 mV	15 mV
3 V	0.12 V	0.12 V	0.48 V	0.15 V
30 V	0.8 V	0.8 V	3.5 V	1.5 V
300 V	6.7 V	8 V < 100 kHz	—	11 V < 100 kHz
1000 V	67 V	67 V < 100 kHz	—	110 V < 100 kHz

4. *Maximum input for specified accuracy, refer to "AC specifications" on page 11.*

Frequency sensitivity for current measurements[5]

Input range	Minimum sensitivity (RMS sine wave)	
	2 Hz to 30 kHz	
	U1271A/U1272A	U1273A
300 µA	100 µA	70 µA
3000 µA	70 µA	120 µA
30 mA	1.2 mA	1.2 mA
300 mA	12 mA	12 mA
3 A	0.12 A	0.12 A
10 A	1.2 A	1.2 A

5. *Maximum input for specified accuracy, refer to "AC specifications" on page 11.*

Peak hold

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

Electrical Specifications

Decibel (dB) for U1272A and U1273A[1, 2, 3]

dB base	Reference	Default reference
1 mW (dBm)	1 to 9999 Ω	50 Ω
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 Hz 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/U1273A
ACV	7	7
DCV	7	7
Ω	14	14
Ω with offset compensation	-	3
Diode	14	14
Auto Diode	-	3
Capacitance	4 (< 100 µF)	4 (< 100 µF)
DCA	7	7
ACA	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

U1273A

Standard shipped accessories

Standard test leads, test probes with 4-mm tips, K-type thermocouple and adapter, 4x AAA batteries, Certificate of Calibration, UK 6 (test report), Quick Start Guide

Optional accessories

Measuring accessories (non-temperature)

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 (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. • 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		Includes two test leads (red and black), 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 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: CAT II 300 V, 3 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 DMMs

Ordering Information

Optional accessories

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 °C to 200 °C • T/C bead K-type: –20 °C to 200 °C
U1181A Immersion temperature probe		• Type-K T/C for use in oil and other liquids • Measurement range: –50 °C to 700 °C • Includes adapter U1184A for connection to DMM
U1182A Industrial surface temperature probe		• Type-K T/C for use on still surfaces • Measurement range: –50 °C to 400 °C • Includes adapter U1184A for connection to DMM
U1183A Air temperature probe		• Type-K T/C for use in air and non-caustic gas • Measurement range: –50 °C to 800 °C • Includes adapter U1184A for connection to DMM
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 °C to 200 °C
U1186A K-type thermocouple and adapter		• T/C adapter J/K-type • T/C bead J-type: –20 °C to 200 °C

Ordering Information

Optional accessories

Cable

U1173A
IR-to-USB cable

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

U1174A
Soft carrying case

The convenient way to carry your DMM and essential accessories
- Dimension: 9 inches (H) x 5 inches (W) x 3 inches (D)

Hanging kit

U1171A
Magnetic hanging kit

For fastening the 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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