

U1280 Series Handheld Digital Multimeters

Trustworthy measurements in the palm of your hand!

Introduction

Gain the confidence to achieve trustworthy measurements thanks to the precision, accuracy and repeatability of the Keysight Technologies, Inc. **U1280 series handheld digital multimeters** (DMMs). Why feel tied to the bench when it comes to the need of troubleshooting electronic circuits in the system? Now you can get accurate and reliable measurement with 60,000-count display resolution and 0.025% basic DCV accuracy for troubleshooting electronic circuits of the system.



Key Features

- 60,000-count dual display
- Up to 0.025% basic DCV accuracy
- Longer battery life up to 800 hours
- Certified to IP 67 for water and dust protection
- Tested to withstand a 3-meter (10-ft) drop
- CAT III 1000 V / CAT IV 600 V overvoltage protection
- Special features ¹
- Vsense for non-contact voltage detection
- Square wave output for generating pulse width modulation (PWM) signal
- Frequency counter
- Low pass filter

Prolonged battery life and rugged

The last thing you want is for your tools to run out of juice when you need it the most. The U1280 series handheld DMMs lets you carry out test and measurements over a longer duration than ever before. With up to 800 hours of battery life, you have a handheld DMM which works for a long time minus the hassle of battery change, especially useful for frequent usage or prolong testing. Put your battery concerns behind and fully focus on your work at hand, as it should be for maximum productivity.

When operating in harsh conditions, you'd need tools which are strong enough to stand up to the task. The U1280 series are housed in robust over mold enclosures and certified to IP 67, providing superior protection to monitor against dust and water immersion. Better yet, it is also designed to absorb the impact of a 3-meter (10 ft) drop.

1. U1282A only

Vsense for non-contact voltage detection

Troubleshooting in most electrical environment is typically dangerous due to the high voltages involved. Now with the unique built in Vsense feature, you get a quick sense of AC voltage presence without the need to probe. When voltage presence is detected, it produces a unique combination of audible beeper alert and blinking LED light to alert users. This is especially useful to safeguard users from exposure to live wires, suspected AC voltage presence or simply an act of safety precaution before initiating a task. Work with a peace of mind knowing your safety comes first with [Keysight's U1280 Series handheld DMM](#).



Figure 1. Large display and backlit keypad allow users to complete their jobs even in subdued lighting conditions.

Comprehensive data logging experience with Keysight Meter Logger software

When it comes to the need to observe measurements over a period of time, Keysight Meter Logger software provides a comprehensive data logging experience with Keysight U1280 Series as well as other Keysight U1200 Series handheld DMMs. The handheld DMM can be easily connected to the Meter Logger software that runs on a PC via Infrared (IR)-to-USB cable, or to do so wirelessly with the optional Keysight Remote Link solution. Keysight Meter Logger software provides users the flexibility and useful configuration to log their measurements, such as the flexibility to select sample interval, enable limit levels on the data log and email notification option for when the limit is exceeded. The data log measurements can be presented either by trend plot or table format for easy interpretation and further analysis — essential for troubleshooting and commissioning tasks. Once the measurements are recorded in the software, users can transfer the logged data into various types of report formats with just a click of the button.



Figure 2. U1282A data log trend plot with markers and limit levels.

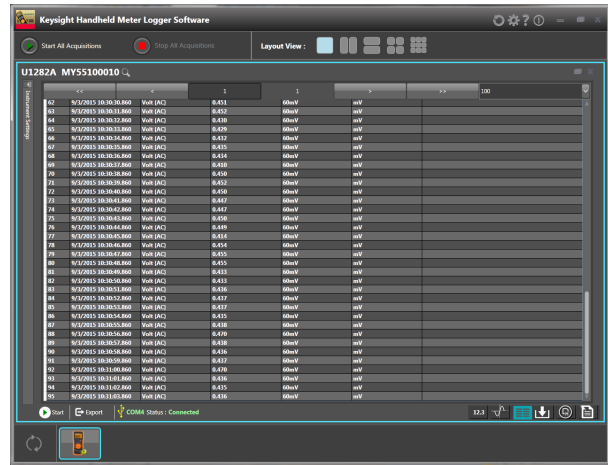


Figure 3. U1282A data log in table format.

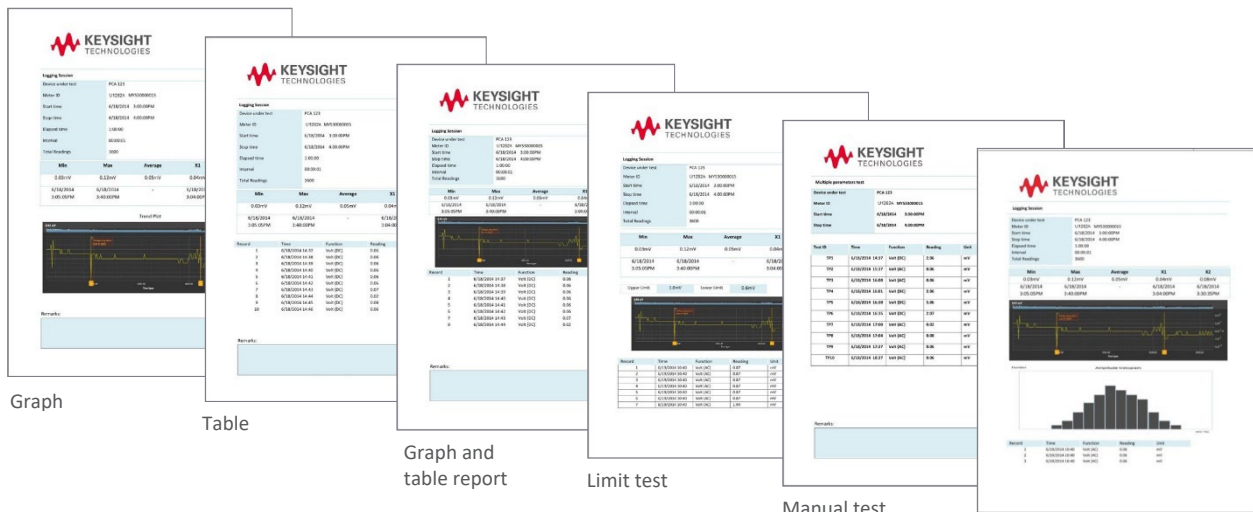


Figure 4. Various test reports formats available for data logging

Manual logging made easy with Hold & Export button

While data logging over a period of time is useful to capture measurements for further observations and analysis, manual data log is just as useful to conveniently record measurements and reduce human error occurrence from conventional manual data entering process. Better yet, users are able to store measurement readings into the handheld DMM's internal memory and at the same time export the measurements to the Keysight Meter Logger software or Keysight Remote Link solution via the DMM's infrared port — all of these by simply pressing the 'Hold & Export' button. When the situation requires users to concentrate on probing, the optional U5404A remote switch probe can be used to perform manual logging by emulating the 'Hold & Export' button of the U1280 Series handheld DMMs.



Figure 5. Hold & Export button—one press for three actions: Measure, save it into handheld DMM's memory and send the measurement out via infrared port. Optional U5404A remote switch probe emulates 'Hold & Export' button.

Built-in low pass filter

Today, three-phase AC electric motors are the most important workhorses in industry and commercial facilities. With the advent of solid state electronics, variable speed drives (VFD) are used to regulate the speed of three-phase AC motors to increase the efficiency of AC motors. However, the increased use of VFDs present challenges to technicians in getting accurate voltage, current and frequency measurements that match with readings shown on the VFD's control panel display. Many true RMS DMMs that have high AC bandwidth are measuring VFD signals up to 20% to 30% higher than the drive's controller display due to the reason that DMMs are measuring the carrier frequency/switching frequency generated by VFDs. Keysight U1280 Series comes with LPF (low pass filter) feature which blocks unwanted high frequency signal from VFDs' switching components. The net result is an accurate measurement of VFD's output signal which helps to expedite the maintenance or troubleshooting tasks of VFDs.



Figure 6. Data logging experience with Keysight Meter Logger software

Programmable

Keysight U1280 Series comes with programmability capability that allows avid programmer to create computer programs to control the handheld DMM. The programmability of Keysight U1280 Series allows users to automate Keysight U1280 Series or even integrate into bigger test systems.



Figure 7. Pair up the U1280 series with Keysight Remote Link solution for wireless measurement option

Front Panel



Back Panel



2. U1282A only

U1280 series comparison

| | | U1281A | U1282A |
|------------------------------------|-------------------|--|-------------------------------|
| Basic features | | | |
| Display resolution | | 60,000 | 60,000 |
| Auto/manual ranging | | Yes | Yes |
| Analog bar graph | | Yes | Yes |
| Backlight | | Yes | Yes |
| AC bandwidth | | 30 kHz | 100 kHz |
| True RMS | | AC + DC | AC + DC |
| Measurements | | | |
| Voltage DC | Range | 60 mV to 1000 V | 60 mV to 1000 V |
| | Accuracy | 0.025% + 5 cnts | 0.025% + 5 cnts |
| Voltage AC | Range | 60 mV to 1000 V | 60 mV to 1000 V |
| | Accuracy | 0.3% + 25 cnts | 0.3% + 25 cnts |
| Current DC | Range | 600 μ A to 10 A | 600 μ A to 10 A |
| | Accuracy | 0.05% + 5 cnts | 0.05% + 5 cnts |
| Current AC | Range | 600 μ A to 10 A | 600 μ A to 10 A |
| | Accuracy | 0.6% + 25 cnts | 0.6% + 25 cnts |
| Resistance | Range | 600 Ω to 60 M Ω | 60 Ω to 600 M Ω |
| | Accuracy | 0.05% + 2 cnts | 0.05% + 2 cnts |
| Frequency | Range | 99.999 Hz to 9.9999 MHz | 99.999 Hz to 9.9999 MHz |
| | Accuracy | 0.005% + 3 cnts | 0.005% + 3 cnts |
| Capacitance | Range | 10 nF to 100 mF | 10 nF to 100 mF |
| | Accuracy | 1% + 5 cnts | 1% + 5 cnts |
| Temperature | Thermocouple type | K-type | J, K-type |
| Continuity with beeper | | Yes | |
| Diode test | | Yes | |
| Data management | | | |
| Min/max recording | | Yes | |
| Display hold | | Yes | |
| Auto hold | | Yes | |
| Null | | Yes | |
| PC-Connectivity | | Infrared (IR)-USB | |
| Special features | | | |
| Square wave output | | | Yes |
| Vsense: non-contact voltage detect | | | Yes |
| Frequency counter | | | Yes |
| Low pass filter | | | Yes |
| Safety and regulatory | | | |
| Over-voltage safety protection | | CAT III 1000 V / CAT IV 600 V | |
| General | | | |
| Operating temperature | | -20 °C to 55 °C 0% to 80% R.H. | |
| Battery (included) | | 4 x 1.5 V AA | |
| Battery life | | 800 hours | |
| Calibration | | One year, or; Two years (with 1.5 times of one year specification) | |
| Dimensions (H x W x D) | | 218 x 96 x 59 mm | |

General Specification

General specification

| | |
|------------------------------------|--|
| Display | 5-digit liquid crystal display (LCD) with maximum reading of 66,000-count Automatic polarity indication. |
| Power consumption | 250 mVA / 330 mVA with backlight |
| Battery type | 4x 1.5 V AA alkaline battery (ANSI/NEDA 15A or IEC LR6), or; 4x 1.5 V AA zinc chloride battery (ANSI/NEDA 15D or IEC R6), or; 4x 1.5 V AA Lithium battery (ANSI/NEDA 15-LF or IEC FR6) |
| Battery life | 800 hours typical based on new alkaline batteries for DC voltage measurement |
| Connectivity | Infrared (IR) port, connect with IR-USB cable |
| Fuse | 10 x 35 mm, 440 mA / 1000 V, 10 kA minimum fast-acting fuse 10 x 38 mm, 11 A / 1000 V, 20 kA minimum fast-acting fuse |
| Operating environment | Full accuracy from -20 °C to 55 °C; and up to 80 % R.H. for temperature up to 30 °C decreasing linearly to 50 % R.H. at 55 °C Pollution Degree II Altitude up to 3000 meters |
| Storage compliance | -40 °C to 70 °C, 0 to 80 % R. H. (with battery removed) |
| Safety & EMC compliance | 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: 60 mV, 600 mV ; ± 0.3% of range 6 V, 60 V, 600 V & 1000 V range; ± 0.23% of range DC current measurement typical accuracy: 600 uA & 6 mA range; ± 1.7% of range 60 mA & 600 mA range; ± 1.8% of range 6 A range; ± 1.0% of range 10 A range; ± 2.0% 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. |
| Measurement category | CAT III 1000 V / CAT IV 600 V |
| Ingression protection rating | IP-67, protected against dust and the effect of immersion between 15 cm and 1 m |
| Temperature coefficient | 0.05 x (specified accuracy) / °C (from -20 °C to 18 °C or 28 °C 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 (H x W x D) | 218 x 96 x 59 mm |
| Weight | 701 grams (with batteries) |
| Calibration cycle | One year, or; Two years (with 1.5 times of one year specification) |

Specification assumptions

- Accuracy is given as \pm (% of reading + counts of least significant digit) at $23\text{ }^{\circ}\text{C} \pm 5\text{ }^{\circ}\text{C}$, with relative humidity less than 80% R.H.
- Accuracy is specified for 1-year after calibration, at operating temperature of room temperature. Multiply 1.5 times of the accuracy for 2-year after calibration.
- Example \pm (1.5 X % of reading + 1.5 X counts of least significant digit).
- AC and AC μA / mA / A specifications are AC coupled.
- True RMS measurement is valid from 5 % of range to 100 % of range.
- For non-sinusoidal waveforms, add (0.1 % of reading + 0.3 % of full scale) typically
- The maximum circuit limitation of peak signal is 300% typically for voltage and current except 250% and 150% typically for range 600 V and 1000 V respectively.
- The crest factor is according to the maximum circuit limitation of peak signal
- Specification is based on 5 times/second of data refresh rate
- CMRR and NMRR are based on 5 times/second of data refresh rate

DC specification for U1281A/U1282A

| Function | Range | Resolution | Accuracy ± (% of reading + counts of least significant digit) | Test current / Burden voltage |
|--|----------------------------|------------|---|-------------------------------|
| Voltage ^{3,4} | 60 mV | 0.001 mV | 0.05 % + 10 ¹ | — |
| | 600 mV | 0.01 mV | 0.025 % + 5 ¹ | — |
| | 6 V | 0.0001 V | 0.025 % + 5 ² | — |
| | 60 V | 0.001 V | 0.025 % + 5 | — |
| | 600 V | 0.01 V | 0.025 % + 5 | — |
| | 1000 V | 0.1 V | 0.025 % + 5 | — |
| Current ^{8,9,10} | 600 μA | 0.01 μA | 0.12 % + 10 | 0.0301 V (50 Ω) |
| | 6 mA | 0.0001 mA | 0.05 % + 5 | 0.312 V (50 Ω) |
| | 60 mA | 0.001 mA | 0.10 % + 20 ⁵ | 0.115 V (0.5 Ω) |
| | 600 mA | 0.01 mA | 0.15 % + 5 ⁵ | 0.896 V (0.5 Ω) |
| | 6 A ⁶ | 0.0001 A | 0.3 % + 10 | 0.240 V (0.01 Ω) |
| | 10 A ⁷ | 0.001 A | 0.3 % + 5 | 0.4 V (0.01 Ω) |
| Diode test ^{11,12,13} | — | 0.0001 V | 0.5 % + 10 | < 1.7 mA |
| Function | Range | Resolution | Accuracy ± (% of reading + counts of least significant digit) | Continuity threshold |
| Resistance/ audible continuity ^{14,15} | 60 Ω ¹⁸ | 0.001 Ω | 0.15 % + 20 ¹⁶ | 5 ± 3 Ω |
| | 600 Ω | 0.01 Ω | 0.05 % + 10 ¹⁶ | 25 ± 11 Ω |
| | 6 kΩ | 0.0001 kΩ | 0.05 % + 2 | 0.123 ± 0.052 kΩ |
| | 60 kΩ | 0.001 kΩ | 0.05 % + 2 | 1.12 ± 0.5 kΩ |
| | 600 kΩ | 0.01 kΩ | 0.05 % + 2 | 12.1 ± 5.2 kΩ |
| | 6 MΩ | 0.0001 MΩ | 0.15 % + 2 | 0.109 ± 0.05 MΩ |
| | 60 MΩ ¹⁷ | 0.001 MΩ | 1.5 % + 3 | 0.109 ± 0.05 MΩ |
| | 600 MΩ ^{17,18,19} | 0.01 MΩ | 3.0 % + 3 (< 100 MΩ) 8.0 % + 3 (< 600 MΩ) | 0.109 ± 0.05 MΩ |
| | 600 nS | 0.01 nS | 1 % + 20 | None |

- The accuracy is specified after NULL function is used to zero out thermal effect (by shorting test leads)
- The temperature coefficient for 6 V range is 0.075 x (specified accuracy)/°C (from -20 °C to 18 °C or 28 °C to 55 °C)
- The accuracy is specified for 10 MΩ (nominal) input impedance
- Overload protection for 60 mV and 600 mV ranges: 1000 Vrms for circuits < 0.3 A short circuit current. Overload protection for other ranges: 1000 Vrms.
- Current can be measured up to 440 mA continuously. Maximum of 20 hours for measuring current more than 440 mA. 60 mA and 600 mA ranges have thermal effect of 0.35 μA/mA to be offset after current applied to these ranges. Cool down the meter for at least 6 seconds if 100 mA was applied, and at least 3 minutes if 600 mA was applied; or alternatively use the NULL function to zero-out thermal effect with open test lead before measuring the signal.
- Specification applies with settling time of (1.2*Current^2) seconds. For example, DCI: 3 A will require 11 s of settling time.
- Current can be measured up to 10 A continuously. Maximum of 30 seconds for measuring current more than 10 A to 20 A, add 0.3 % to specified accuracy. The multimeter needs to be cool down after measuring current that is more than 10 A. Cool down the meter for twice the duration of the measured time and use NULL function to zero-out thermal effect before proceeding with lower current measurement.
- 600 μA to 60 mA ranges (connection with mA terminal) overload protection by 10 x 35 mm, 440 mA/1000 V, 10 kA minimum fast-acting fuse
- 6 A and 10 A ranges (connection with A terminal) overload protection by 10 x 38 mm, 11 A / 1000 V, 20 kA minimum fast-acting fuse
- Ensure good ventilation and no heat element close to the meter
- Overload protection: 1000 Vrms for circuits < 0.3 A short circuit current
- Built-in buzzer sounds when reading is below 0.05 V approximately, and single tone for normal forward-biased diode or semiconductor junction as 0.3 V ≤ reading ≤ 0.8 V.
- The maximum threshold voltage display is less than +3.1 V
- Maximum open voltage: < +2.7 V
- Built-in buzzer sounds as transient when resistance less than 25 ± 11 Ω. It may capture the intermittent for longer than 1 ms
- The accuracy is specified after Math Null, which is used to subtract the test lead resistance and the thermal effect. Ensure good ventilation and no heat element close to the meter.
- For 60 MΩ and 600 MΩ ranges, the R.H. is specified for < 60 % at 30 °C
- Only available in U1282A
- For 600 MΩ range: temperature coefficient is 0.1 x (specified accuracy)/°C (from -20 °C to 18 °C or 28 °C to 55 °C)

AC and AC + DC voltage specification for U1281A / U1282A ^{1,2}

| Function | Range | Resolution | Accuracy ± (% of reading + counts of least significant digit) | | | | |
|-----------------------------|--|------------|---|----------------|--|--------------------------|--------------------------------|
| | | | 20 Hz to 45 Hz | 45 Hz to 1 kHz | 1 kHz to 10 kHz | 10 kHz to 20 kHz | 20 kHz to 100 kHz ⁵ |
| AC voltage True RMS | 60 mV | 0.001 mV | 1.0 % + 60 | 0.3 % + 25 | 0.7 % + 25 | 1.5 % + 60 | 3.5 % + 60 |
| | 600 mV ³ | 0.01 mV | 1.0 % + 60 | 0.3 % + 25 | 0.7 % + 25 | 1.5 % + 60 | 3.5 % + 60 |
| | 6 V | 0.0001 V | 1.0 % + 60 | 0.3 % + 25 | 0.7 % + 25 | 1.5 % + 60 | 3.5 % + 60 |
| | 60 V | 0.001 V | 1.0 % + 60 | 0.3 % + 25 | 0.7 % + 25 | 1.5 % + 60 | 3.5 % + 60 |
| | 600 V | 0.01 V | 1.0 % + 60 | 0.3 % + 25 | 0.7 % + 25 | 1.5 % + 60 ⁴ | 3.5 % + 60 ⁴ |
| | 1000 V | 0.1 V | 1.0 % + 60 | 0.3 % + 25 | 0.7 % + 25 | 1.5 % + 60 ⁴ | N/A |
| | LPF (Low Pass Filter) enabled, applicable for all voltage ranges and resolutions | | | 2.0 % + 60 | 2.0 % + 25 for < 200 Hz 6.0 % + 60 for < 440 Hz | N/A | N/A |
| AC + DC voltage True RMS | 60 mV | 0.001 mV | 1.05 % + 70 | 0.35 % + 35 | 0.75 % + 35 | 1.55 % + 70 | 3.55 % + 70 |
| | 600 mV ³ | 0.01 mV | 1.05 % + 65 | 0.35 % + 30 | 0.75 % + 30 | 1.55 % + 65 | 3.55 % + 65 |
| | 6 V | 0.0001 V | 1.05 % + 65 | 0.35 % + 30 | 0.75 % + 30 | 1.55 % + 65 | 3.55 % + 65 |
| | 60 V | 0.001 V | 1.05 % + 65 | 0.35 % + 30 | 0.75 % + 30 | 1.55 % + 65 | 3.55 % + 65 |
| | 600 V | 0.01 V | 1.05 % + 65 | 0.35 % + 30 | 0.75 % + 30 | 1.55 % + 65 ⁴ | 3.55 % + 65 ⁴ |
| | 1000 V | 0.1 V | 1.05 % + 65 | 0.35 % + 30 | 0.75 % + 30 | 1.55 % + 65 ⁴ | N/A |

1. Overload protection: 1000 Vrms. Overload protection for mV range: 1000 Vrms for short circuits with < 0.3 A current
2. Input impedance: 10 MΩ in parallel with < 100 pF (nominal). The accuracy is specified for 10 MΩ (nominal) input impedance
3. Add additional 2% error as crest factor > 2
4. For voltage that is lower than 300 Vrms, and frequency lower than 30 kHz
5. Additional error when frequency is more than 30 kHz: 0.1 of least significant digit x square of frequency. The bandwidth of U1281A is up to 30 kHz only.

| Frequency | Counts of least significant digit | Formula | Additional error |
|-----------|-----------------------------------|-----------------|------------------|
| 30 kHz | 0.1 | 0.1 x 30 x 30 | 90 |
| 50 kHz | 0.1 | 0.1 x 50 x 50 | 250 |
| 100 kHz | 0.1 | 0.1 x 100 x 100 | 1000 |

The bandwidth for U1281A is up to 30 kHz only.

AC and AC + DC current specification for U1281A / U1282A ^{8,9}

| Function | Range | Resolution | Accuracy ± (% of reading + counts of least significant digit) | | | |
|-----------------------------|---------------------|------------|---|----------------|------------------------------|------------------------------------|
| | | | 20 Hz to 45 Hz | 45 Hz to 1 kHz | 1 kHz to 20 kHz ⁵ | 20 kHz to 100 kHz ^{5,6,7} |
| AC current True RMS | 600 µA ¹ | 0.01 µA | 1.0 % + 40 | 0.6 % + 25 | 1.0 % + 30 | 5 % + 40 |
| | 6 mA | 0.0001 mA | 1.0 % + 40 | 0.6 % + 25 | 1.0 % + 30 | 5 % + 40 |
| | 60 mA | 0.001 mA | 1.0 % + 40 | 0.6 % + 25 | 1.0 % + 30 | 5 % + 40 |
| | 600 mA ² | 0.01 mA | 1.0 % + 40 | 0.6 % + 25 | 1.5 % + 30 | 5 % + 40 |
| | 6 A | 0.0001 A | 1.0 % + 40 ⁴ | 0.6 % + 25 | 1.5 % + 30 ⁶ | N/A |
| | 10 A ³ | 0.001 A | 1.0 % + 40 ⁴ | 0.6 % + 25 | 1.5 % + 30 ⁶ | N/A |
| AC + DC current True RMS | 600 µA ¹ | 0.01 µA | 1.12 % + 50 | 0.72 % + 35 | 1.12 % + 40 | 5.12 % + 50 |
| | 6 mA | 0.0001 mA | 1.05 % + 45 | 0.65 % + 30 | 1.05 % + 35 | 5.05 % + 45 |
| | 60 mA | 0.001 mA | 1.10 % + 60 | 0.70 % + 45 | 1.05 % + 50 | 5.10 % + 60 |
| | 600 mA ² | 0.01 mA | 1.15 % + 45 | 0.75 % + 30 | 1.65 % + 35 | 5.15 % + 45 |
| | 6 A | 0.0001 A | 1.15 % + 50 ⁴ | 0.95 % + 35 | 1.65 % + 40 ⁶ | N/A |
| | 10 A ³ | 0.001 A | 1.15 % + 45 ⁴ | 0.95 % + 30 | 1.65 % + 40 ⁶ | N/A |

1. Typical performance for current ≤ 30 µArms
2. Current can be measured up to 440 mA continuously. Maximum of 20 hours for measuring current more than 440 mA
3. Current can be measured up to 10 A continuously. Maximum of 30 seconds for measuring current more than 10 A to 20 A, add 0.3% to specified accuracy. The multimeter needs to be cool down after measuring current that is more than 10 A. Cool down the meter for twice the duration of the measured time and use NULL function to zero-out thermal effect before proceeding with lower current measurement.
4. Input current < 3 Arms
5. These specifications are for typical performance
6. For current < 3 Arms and < 5 kHz
7. Additional error when Frequency is more than 30 kHz: 0.1 of least significant digit x square of frequency. The bandwidth of U1281A is up to 30 kHz only.
8. 6 A and 10 A ranges (connection with A terminal) overload protection by 10 x 38 mm, 11 A / 1000 V, 20 kA minimum fast-acting fuse. 600 µA to 600 mA ranges (connection with µ.A terminal) overload protection by 10 x 35 mm, 440 mA / 1000 V, 10 kA minimum fast-acting fuse.
9. Ensure good ventilation and no heat element close to the meter

| Frequency | Counts of least significant digit | Formula | Additional error |
|-----------|-----------------------------------|-----------------|------------------|
| 30 kHz | 0.1 | 0.1 x 30 x 30 | 90 |
| 50 kHz | 0.1 | 0.1 x 50 x 50 | 250 |
| 100 kHz | 0.1 | 0.1 x 100 x 100 | 1000 |

The bandwidth for U1281A is up to 30 kHz only.

Temperature specification for U1281A / U1282A ^{2,3,4,5}

| Thermal type | Range | Resolution | Accuracy ± (% of reading + as specified below) |
|----------------|--------------------|------------|--|
| K | -200 °C to 1372 °C | 0.1 °C | 1% + 1 °C |
| | -328 °F to 2502 °F | 0.1 °F | 1% + 1.8 °F |
| J ¹ | -210 °C to 1200 °C | 0.1 °C | 1% + 1 °C |
| | -346 °F to 2192 °F | 0.1 °F | 1% + 1.8 °F |

1. Only for U1282A
2. The specification above is specified after 60 minutes of warm-up time
3. The accuracy does not include the tolerance of the thermocouple probe
4. Do not allow the temperature sensor to contact a surface that is energized about 30 Vrms or 60 V DC. Such voltages pose a shock hazard
5. The temperature calculation is specified according to the safety standards of EN/IEC-60548-1 and NIST 175

Capacitance specification for U1281A / U1282A ^{1,2,3}

| Range | Resolution | Accuracy \pm (% of reading + counts of least significant digit) |
|-------------|----------------|---|
| 10 nF | 0.001 nF | 1.0% + 5 |
| 100 nF | 0.01 nF | 1.0% + 5 |
| 1 μ F | 0.0001 μ F | 1.0% + 5 |
| 10 μ F | 0.001 μ F | 1.0% + 5 |
| 100 μ F | 0.01 μ F | 1.0% + 5 |
| 1 mF | 0.0001 mF | 1.0% + 5 |
| 10 mF | 0.001 mF | 1.0% + 5 |
| 100 mF | 0.01 mF | 2.5% + 10 |

1. Overload protection: 1000 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 / 12000 counts selectable

Frequency specification for U1281A / U1282A

| Range | Resolution | Accuracy \pm (% of reading + as specified below) | Minimum input frequency |
|------------|------------|--|-------------------------|
| 99.999 Hz | 0.001 Hz | 0.02 % + 3 ¹ | 0.5 Hz |
| 999.99 Hz | 0.01 Hz | 0.005 % + 3 | |
| 9.9999 kHz | 0.0001 kHz | 0.005 % + 3 | |
| 99.999 kHz | 0.001 kHz | 0.005 % + 3 | |
| 999.99 kHz | 0.01 kHz | 0.005 % + 3 | |
| 9.9999 MHz | 0.0001 MHz | 0.005 % + 3, < 1 MHz | |

1. 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. For U1282A only, turning on LPF (low pass filter) may help to filter out the noise and achieve a stable reading.

U1281A / U1282A sensitivity ¹ for voltage measurement

| Input range | Minimum sensitivity (RMS sine wave) | | Trigger level for DC coupling | |
|-------------|---|------------------|---------------------------------|------------------|
| | Maximum input ² for specified accuracy | 15 Hz to 100 kHz | Typical bandwidth at full scale | 15 Hz to 100 kHz |
| 60 mV | 2.5 mV | 1 MHz | 4.5 mV | 1 MHz |
| 600 mV | 12 mV | 1 MHz | 15 mV | 1 MHz |
| 6 V | 0.25 V | 900 kHz | 0.45 V | 900 kHz |
| 60 V | 2.5 V | 600 kHz | 4.5 V | 600 kHz |
| 600 V | 25 V | 100 kHz | 45 V | 100 kHz |
| 1000 V | 33 V | 100 kHz | 50 V | 100 Hz |

1. The sensitivity is typical performance.
2. Refer to 'AC Specifications' for specified accuracy of maximum input.

U1281A / U1282A sensitivity ¹ for current measurement

| Input range | Minimum sensitivity (RMS sine wave) | |
|---|-------------------------------------|---------------------------------|
| Maximum input ² for specified accuracy | 15 Hz to 30 kHz | Typical bandwidth at full scale |
| 60 μ A | 38 μ A | 100 kHz |
| 6 mV | 0.38 mA | 100 kHz |
| 60 mV | 3.8 mA | 100 kHz |
| 600 mV | 38 mA | 100 kHz |
| 6 A | 0.38 A | 100 kHz |
| 10 A | 1 A | 100 kHz |

1. The sensitivity is typical performance.
2. Refer to 'AC Specifications' for specified accuracy of maximum input

Duty cycle and pulse width for U1281A / U1282A ^{1,2,3}

| Duty cycle mode | Range | Accuracy at full scale |
|-------------------|------------|-------------------------------------|
| DC coupling | 99.999% | 0.3% per kHz + 0.3 % |
| AC coupling | 99.999% | 0.3% per kHz + 0.3 % |
| Pulse width range | Resolution | Accuracy |
| 99.999 ms | 0.001 ms | Duty cycle accuracy / frequency + 1 |
| 999.99 ms | 0.01 ms | Duty cycle accuracy / frequency + 1 |
| 2000.0 ms | 0.1 ms | Duty cycle accuracy / frequency + 1 |

1. The accuracy for duty cycle and pulse width is based a square wave of full scale input to the 6 V range. For AC coupling, the duty cycle range can be measured within 5% to 95% for signal frequency more than 15 Hz.
2. The pulse width (positive or negative) must be more than 10 μ s. The range of the pulse width is determined by the frequency of the signal.
3. The range of the duty cycle is determined by the frequency of the signal: $\{10 \mu\text{s} \times \text{frequency} \times 100\%\}$ to $\{[1 - (10 \mu\text{s} \times \text{frequency})] \times 100\%\}$

Peak hold for U1281A / U1282A

| Signal width | Accuracy for DC mV / voltage / current |
|--------------------------|--|
| Single event > 1 ms | 2% + 400 for all ranges |
| Repetitive > 250 μ s | 2% + 1000 for all ranges |

dB specification for U1281A / U1282A

| 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.
2. Auto-ranging mode is used
3. The bandwidth is according to voltage measurement.

Frequency counter specification for U1282A ³

| Division | Display Range | Resolution | Accuracy | Sensitivity ¹ | Input frequency range |
|----------|---------------|------------|-------------------------|--------------------------|-----------------------|
| 1 | 99.999 Hz | 0.001 Hz | 0.02% + 5 ² | 30 mV | 0.5 Hz ~ 1 MHz |
| | 999.99 Hz | 0.01 Hz | 0.002% + 5 | 30 mV | |
| | 9.9999 kHz | 0.0001 kHz | 0.002% + 5 | 30 mV | |
| | 99.999 kHz | 0.001 kHz | 0.002% + 5 | 30 mV | |
| | 999.99 kHz | 0.01 kHz | 0.002% + 5 | 200 mV | |
| | 9.9999 MHz | 0.0001 MHz | 0.002% + 5, < 1 MHz | 200 mV | |
| 100 | 9.9999 MHz | 0.0001 MHz | 0.002% + 5, < 20 MHz | 330 mV | 1 MHz ~ 20 MHz |
| | 99.999 MHz | 0.001 MHz | | | |

1. The sensitivity is specified as input with a load of 50 Ω
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. For non-square wave signal, add additional 5 counts.
3. The maximum measurement level is ± 1.8 V_p

Square wave output specification ¹ for U1282A ^{2,3}

| Output | Range | Resolution | Accuracy |
|--------------------------|--|-------------|--------------------|
| | 0.5, 1, 2, 5, 6, 10, 15, 20, 25, 30, 40, 50, 60, 75, 80 Hz | 0.01 Hz | 0.005% + 2 |
| | 100, 120, 150, 200, 240, 300, 400, 480, 600, 800 Hz | 0.1 Hz | |
| | 1200, 1600, 2400, 4800 Hz | 1 Hz | |
| Duty cycle ¹ | 0.390% to 99.609% | 0.390625% | 0.4% at full scale |
| Pulse width ¹ | 1 / frequency | Range / 256 | Range / 256 + 2 μs |
| Amplitude | Fixed + 2.2 V | 0.1 V | 0.2 V |

1. The specification is typical performance
2. The positive or negative pulse width must be greater than 2 μs for adjustment of the duty cycle or pulse width under different frequencies. Otherwise, the accuracy and range will be different from the specification defined.
3. Output impedance: 600 Ω (nominal)

Multimeter data refresh rate

| Function | Slow (times/second) | Fast (times/second) |
|----------------|---------------------|---------------------|
| ACV (V or mV) | 5 | 40 |
| DCV (V or mV) | 5 | 40 |
| Ω | 5 | 40 |
| Diode | 5 | 40 |
| Capacitance | 1 (< 100 μF) | — |
| DC μA, mA or A | 5 | 40 |
| AC μA, mA or A | 5 | 40 |
| Temperature | 5 | 40 |
| Frequency | 1 (> 10 Hz) | — |
| Duty cycle | 1 (> 10 Hz) | — |
| Pulse width | 1 (> 10 Hz) | — |

Ordering Information



Optional accessories

| | |
|---|--|
| <p>U5404A remote switch probe for U1280 Series</p> <ul style="list-style-type: none"> • Measure and save measurement with a single touch of button | |
| <p>U1594A hard carrying case</p> <ul style="list-style-type: none"> • Hard carrying case with two compartments for U1280 Series handheld digital multimeters | |
| <p>U1595A rugged carrying case</p> <ul style="list-style-type: none"> • High quality, water and dust proof carrying case designed to store up to two handheld and accessories | |
| <p>U1583B AC current clamp</p> <ul style="list-style-type: none"> • Dual range 40 A and 400 A • BNC-to-banana plug adapter provided for use with handheld digital multimeters | |

Optional accessories

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 probe (4-mm tips): CAT III 1000 V, CAT IV 600 V, 15 A
- Medium-sized alligator clips: CAT III 1000 V, CAT IV 600 V, 15 A
- 4-mm banana plugs: CAT II 600 V, 10 A



U1168B 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 p[robes: CAT II 300 V, 3 A
- SMT grabber: CAT II 300 V, 3 A
- Mini grabber: CAT II 300 V, 3 A



U1180A temperature sensors and probes

- Includes thermocouple adapter, thermocouple bead J-type and thermocouple bead K-type.
- T/C adapter J/K type
- T/C bead J-type: -20 to 200 °C
- T/C bead K-type: -20 to 200 °C



U1181A immersion temperature probe

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



U1182A industrial surface temperature probe

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



U1183A air temperature probe

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



Optional accessories

U1184A temperature probe adapter

- Mini-connector-to-banana-plug adapter for use with DMM



U1185A thermocouple (J-type) and temperature probe adapter

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



U1186A thermocouple (K-type) and temperature probe adapter

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



For more information about the U1280 series handheld digital multimeters, please visit:

<https://www.keysight.com/us/en/products/digital-multimeters-dmm/handheld-digital-multimeters-dmm/u1280-series-handheld-multimeters.html>

Keysight enables innovators to push the boundaries of engineering by quickly solving design, emulation, and test challenges to create the best product experiences. Start your innovation journey at www.keysight.com.