

U2741A USB Modular Digital Multimeter

Keysight U2741A USB Modular Digital Multimeter (DMM)

The U2741A is a 5.5-digit DMM the size of a typical novel, and flexibly operates as a standalone unit or as a modular unit in the U2781A USB modular product chassis.



Put a Bench in Your Bag

The next time you're called out to solve tough problems in electronic products or processes, leave the bulky transit cases behind. With Keysight Technologies, Inc.'s USB modular instrument (MI) family, you can easily carry powerful test gear in your bag along with your laptop PC. Our line of MIs includes two oscilloscopes, a DMM, a function generator with arbitrary waveform capability, a source/measure unit and a 4x8 switch matrix. All provide USB 2.0 connectivity (with USBTMC-USB488) standard and plug-and-play simplicity for easy use on the go or on the bench.



Figure 1. Keysight's USB Modular Instrument (MI) family



Figure 2. U2741A used as a standalone instrument



Figure 3. U2741A used as a modular instrument

*Note: The U2741A needs to be powered on with an AC adaptor.

Features

- Measures up to 10 different measurements including frequency and temperature
- Fast measurements up to 100 readings/s
- Wide voltage measurement range (DC from 1 μ VDC to 300 VDC, AC from 1 μ Vrms to 250 Vrms)
- Wide current measurement range (DC from 1 μ ADC to 2 ADC, AC from 1 μ Arms to 2 Arms)
- Hi-Speed USB 2.0 connectivity
- Dual-play operation: standalone and modular capability
- NEW! Control, automate and simplify with Keysight BenchVue software. Now included.
- Compatible with a wide range of Keysight Development Environments (KDEs)



Awards & Accolades

Keysight U2700A series USB Modular Instruments won Design News' Golden Mousetrap Award in the 2009 Best Products Category. Design News' Awards program highlights engineering innovation and product design creativity and honors the best designs of the past year.

Control, Automate and Simplify with BenchVue – No Programming Needed (Now Included)

Keysight BenchVue software for the PC eliminates many of the issues around bench testing. By making it simple to connect, control instruments, and automate test sequences, you can quickly move past the test development phase and access results faster than ever before with just a few clicks. Dedicated instrument apps allow you to quickly configure the most commonly used measurements and setups for each instrument family. Rapidly build custom test sequences with the integrated Test Flow app to automate and visualize test results without the need for instrument programming. BenchVue supports hundreds of Keysight instrument types and models all from one easy to use application. Control, Automate, Simplify with BenchVue.

Product Characteristics and General Specifications

| Product Characteristics and General Specifications |
|---|
| Remote Interface |
| <ul style="list-style-type: none">• Hi-Speed USB 2.0*• USBTMC-USB488 1 |
| Power Consumption |
| <ul style="list-style-type: none">• +12 VDC, 2A maximum• Isolated ELV supply source |
| Operating Environment |
| <ul style="list-style-type: none">• Operating temperature from 18°C to +28°C• Relative humidity at 50% RH (non-condensing)• Altitude up to 2000 meters• Pollution Degree 2• For indoor use only |
| Storage Compliance |
| <ul style="list-style-type: none">• Storage temperature from –20°C to 70°C• Relative humidity at 5% to 90% RH (non-condensing) |
| Safety & EMC Compliance |
| Refer to Declaration of Conformity for the latest revisions of regulatory compliance at: www.keysight.com/go/conformity |

| Measurement Compliance |
|---|
| CAT II 300 V Over-voltage protection |
| Common Mode Rejection Ratio (CMRR) |
| <ul style="list-style-type: none"> • DC CMRR > 120 dB with 1k unbalanced load • AC CMRR > 70 dB at 50/60 Hz $\pm 0.1\%$ with 1k unbalanced load |
| Normal Mode Rejection Ratio (NMRR) |
| <ul style="list-style-type: none"> • 60 dB at 50/60 Hz $\pm 0.1\%$ ² • > 0 dB at 50/60 Hz $\pm 0.1\%$ ³ |
| Shock and Vibration |
| Tested to IEC/EN 60068-2 |
| IO Connection |
| Four banana socket terminals |
| Dimension (W x D x H) |
| <p>Module dimension:</p> <ul style="list-style-type: none"> • 117.00 mm x 180.00 mm x 41.00 mm (with bumpers) • 105.00 mm x 175.00 mm x 25.00 mm (without bumpers) |
| Weight |
| <ul style="list-style-type: none"> • 509 g (with bumpers) • 451 g (without bumpers) |
| Calibration |
| Calibration internal of one year is highly recommended |
| <p>Notes:</p> <ol style="list-style-type: none"> 1. Compatible with Microsoft Windows operating systems only. Requires a direct USB connection to the PC so the appropriate driver can be installed in the USB modular instrument. 2. Applicable for NPLC > 1. 3. Applicable for NPLC 0.2 and 0.02. |

Product Outlook and Dimensions

Product Outlook and Dimensions

The diagram illustrates the product from three perspectives: front, rear, and top views. The front view shows a grey rectangular device with four ports on the left side. The rear view shows a similar device with a different set of ports and a fan. The top view shows the device's length and width. Dimensions are indicated with arrows and text: 41.00 mm for height, 117.00 mm for width, 180.00 mm for length, and 8.60 mm for depth.

Front view

Rear view

Top view

41.00 mm

117.00 mm

180.00 mm

8.60 mm

Optional Accessories

- E2308A Thermistor temperature probe
- USB Secure 2-m cable

Product Specifications

DC specifications ¹

| Function | Range | Input impedance | Test current/ Burden voltage, Shunt resistance | Accuracy ±(% of reading + % of range) | Temperature coefficient 0°C to 18°C 28°C to 55°C |
|--|------------|-----------------|--|--|--|
| Voltage ² | 100.000 mV | 10 MΩ | - | 0.015 + 0.008 | 0.002 + 0.0008 |
| | 1.00000 V | 10 MΩ | - | 0.015 + 0.005 | 0.001 + 0.0005 |
| | 10.0000 V | 10 MΩ | - | 0.018 + 0.005 | 0.002 + 0.0005 |
| | 100.000 V | 10 MΩ | - | 0.018 + 0.005 | 0.002 + 0.0005 |
| | 300.000 V | 10 MΩ | - | 0.018 + 0.005 | 0.002 + 0.0005 |
| Current ³ | 10.0000 mA | - | < 0.2 V, 10 Ω | 0.06 + 0.015 | 0.005 + 0.0025 |
| | 100.000 mA | - | < 0.2 V, 1 Ω | 0.06 + 0.005 | 0.008 + 0.002 |
| | 1.0000 A | - | < 0.3 V, 0.1 Ω | 0.15 + 0.007 | 0.005 + 0.002 |
| | 2.0000 A | - | < 0.8 V, 0.1 Ω | 0.15 + 0.007 | 0.005 + 0.002 |
| Resistance ⁴ | 100.000 Ω | - | 1.0 mA | 0.03 + 0.008 | 0.006 + 0.0008 |
| | 1.00000 kΩ | - | 1.0 mA | 0.03 + 0.005 | 0.006 + 0.0005 |
| | 10.0000 kΩ | - | 100 μA | 0.03 + 0.005 | 0.006 + 0.0005 |
| | 100.000 kΩ | - | 10.0 μA | 0.03 + 0.005 | 0.006 + 0.0005 |
| | 1.00000 MΩ | - | 1 μA | 0.06 + 0.005 | 0.01 + 0.0005 |
| | 10.0000 MΩ | - | 225 nA | 0.25 + 0.005 | 0.025 + 0.0005 |
| | 100.000 MΩ | - | 225 nA 10 MΩ | 2.0 + 0.005 | 0.3 + 0.0005 |
| Diode test ⁵ | 1.0000 V | - | 1.00 mA | 0.015 + 0.03 | 0.005 + 0.0005 |
| Continuity test ⁶ | 1.0000 kΩ | - | 1.00 mA | 0.05 + 0.03 | 0.005 + 0.0005 |
| Notes: 1. Specifications are based on 30 minutes warm-up time, NPLC 20 resolution, calibration temperature within 18°C to 28°C, and Null function enabled. For NPLC 0 and 0.025, add 0.01% of range. 2. 120% over range on all ranges except 300 VDC. Input protection up to 300 VDC. 3. Input protected with externally accessible 2 A, 250 V fast blown fuse. 4. Specifications are applicable with Null function enabled. Otherwise, add 0.2 Ω additional error. Input protection up to 300 VDC. Specifications apply for NPLC ≥ 1. 5. Specifications are for the voltage measured at the input terminals only. 6. Continuity threshold is fixed at less than 10 Ω. | | | | | |

AC accuracy for voltage ¹

AC specifications

| Function | Range | Accuracy input \pm (% of reading + % of range) Frequency (Hz) | | | |
|-------------------------|------------------------|--|---|-------------|-------------------------|
| | | 20 ~ 45 | 45 ~ 10k | 10k ~ 30k | 30k ~ 100k ³ |
| Voltage ² | 100.000 mVrms | 1 + 0.1 | 0.2 + 0.1 | 1.5 + 0.3 | 5.0 + 0.3 |
| | 1.00000 V | 1 + 0.1 | 0.2 + 0.1 | 1.0 + 0.1 | 3.0 + 0.2 |
| | 10.0000 V | 1 + 0.1 | 0.3 + 0.1 | 1.0 + 0.1 | 3.0 + 0.2 |
| | 100.000 V | 1 + 0.1 | 0.3 + 0.1 | 1.0 + 0.1 | 3.0 + 0.2 |
| | 250.000 V ⁴ | 1 + 0.1 | 0.3 + 0.1 | 1.0 + 0.1 | 3.0 + 0.2 |
| Function | Range | Frequency (Hz) (% of reading + % of range) | | | |
| | | 20 ~ 45 | 45 ~ 10k | 10k ~ 30k | 30k ~ 100k |
| Temperature coefficient | 100.000 mVrms | 0.02 + 0.02 | 0.02 + 0.02 | 0.05 + 0.02 | 0.1 + 0.02 |
| | 1.00000 V | | | | |
| | 10.0000 V | | | | |
| | 100.000 V | | | | |
| | 250.000 V ⁴ | | | | |
| Function | Range | Burden voltage, Current shunt resistance | Accuracy input \pm (% of reading + % of range) Frequency (Hz) | | |
| | | | 20 ~ 45 | 45 ~ 1k | 1k ~ 10k |
| Current ⁵ | 10.0000 mA | < 0.2 V, 10 Ω | 1.5 + 0.1 | 0.5 + 0.1 | 2 + 0.2 |
| | 100.000 mA | < 0.2 V, 1 Ω | 1.5 + 0.1 | 0.5 + 0.1 | 2 + 0.2 |
| | 1.00000 A | < 0.3 V, 0.1 Ω | 1.5 + 0.1 | 0.5 + 0.1 | 2 + 0.2 |
| | 2.00000 A | < 0.8 V, 0.1 Ω | 1.5 + 0.1 | 0.5 + 0.1 | 2 + 0.2 |
| Function | Range | Accuracy input \pm (% of reading + % of range) Frequency (Hz) | | | |
| | | 20 ~ 45 | 45 ~ 10k | 10k ~ 30k | |
| Temperature coefficient | 10.0000 mA | 0.02 + 0.02 | 0.02 + 0.02 | 0.02 + 0.02 | |
| | 100.000 mA | | | | |
| | 1.00000 A | | | | |
| | 2.00000 A | | | | |

Notes:

To ensure better measurement results and to guard against the change of environment or setup, always enable the Null offset.

1. Specifications are based on 30 minutes warm-up time and calibration temperature within 18°C to 28°C. In manual range, the settling time is 6 seconds while in autorange, the first measurement accuracy is < 1%.
2. Specifications are for sine wave inputs more than 5% of range. 120% over range on all ranges except 250 VAC. Maximum crest factor of 5 at full scale. Input impedance is 1 MΩ in parallel with capacitance less than 120 pF, AC couple with up to 300 VDC.
3. Additional error to be added as frequency more than 30 kHz and signal input less than 10% of range. 30 kHz to 100 kHz: add 0.003% of range per kHz.
4. Input signal has to be more than 50 Vrms.
5. Input protected with externally accessible 2 A, 250 V fast blown fuse.

Frequency Specifications ¹

Frequency accuracy

| Function | Range | Accuracy (% of reading + % of range) | Minimum input frequency | Temperature coefficient (% of range) |
|-----------|------------------|---|----------------------------|--|
| Frequency | 20 Hz to 300 kHz | 0.0200 + 0.003 | 1 Hz | 0.005 |

Frequency sensitivity for AC voltage

| Function | Range | Minimum sensitivity (RMS sine wave) Frequency (Hz) | |
|------------|---------------------|---|-------------|
| | | 20 ~ 100k | 100k ~ 300k |
| AC voltage | 100 mV ₂ | 20 mV | 20 mV |
| | 1 V | 100 mV | 120 mV |
| | 10 V | 1 V | 1.2 V |
| | 100 V | 10 V | 20 V |
| | 250 V | 100 V | 120 V |

Temperature Specifications

Temperature specifications

| Function | Thermistor type | Range | Accuracy | Temperature coefficient |
|-------------|-------------------------|------------------|------------------------|-------------------------|
| Temperature | 5 k Ω thermistor | -80.0°C to 150°C | Probe accuracy + 0.2°C | 0.002°C |

Note:
To ensure better measurement results and to guard against the change of environment or setup, always enable the Null offset.

Typical reading speed (in seconds) characteristics

| Test/Range | 100 mV(20 Hz) | 1V(20 Hz) | 10V(20Hz) | 100V(45 Hz) | 300V(45 Hz) |
|------------|---------------|-----------|-----------|-------------|-------------|
| ACV | 0.979 | 0.979 | 0.978 | 0.979 | 0.979 |

| Test/Range | 10 mA | 100 mA | 1 A | 2 A |
|------------|-------|--------|-------|-------|
| ACI | 0.979 | 0.979 | 0.979 | 0.979 |
| Freq | 1.190 | | | |

Notes:

1. Frequency measurement can only be done in auto range mode. Specifications are for 30 minutes warm-up time, using one second aperture.
2. Measuring method is using reciprocal counting technique with AC coupled input at AC voltage function. Gate time of 0.1 second or 1 second.
3. Only applicable for square wave measurement.

| Test | Range/NPLC | 20 | 10 | 2 | 1 | 0.025 | 0 |
|------|----------------|-------|-------|-------|-------|-------|-------|
| DCV | 100 mV | 0.413 | 0.213 | 0.053 | 0.033 | 0.016 | 0.016 |
| | 1 V | 0.414 | 0.213 | 0.053 | 0.033 | 0.016 | 0.016 |
| | 10 V | 0.413 | 0.213 | 0.053 | 0.033 | 0.016 | 0.016 |
| | 100 V | 0.414 | 0.214 | 0.053 | 0.033 | 0.016 | 0.016 |
| | 300 V | 0.413 | 0.213 | 0.053 | 0.033 | 0.016 | 0.016 |
| DCI | 10 mA | 0.413 | 0.214 | 0.053 | 0.033 | 0.016 | 0.016 |
| | 100 mA | 0.393 | 0.213 | 0.053 | 0.033 | 0.016 | 0.016 |
| | 1 A | 0.414 | 0.213 | 0.053 | 0.033 | 0.016 | 0.016 |
| | 2 A | 0.413 | 0.213 | 0.053 | 0.033 | 0.016 | 0.016 |
| 2W | 100 Ω | 0.414 | 0.214 | 0.053 | 0.033 | 0.016 | 0.016 |
| | 1 k Ω | 0.414 | 0.213 | 0.053 | 0.033 | 0.016 | 0.016 |
| | 10 k Ω | 0.413 | 0.214 | 0.054 | 0.033 | 0.016 | 0.016 |
| | 100 k Ω | 0.413 | 0.213 | 0.053 | 0.033 | 0.016 | 0.016 |
| | 1 M Ω | 0.413 | 0.213 | 0.053 | 0.033 | 0.016 | 0.016 |
| | 10 M Ω | 0.413 | 0.213 | 0.053 | 0.033 | 0.016 | 0.016 |
| | 100 M Ω | 0.413 | 0.214 | 0.053 | 0.033 | 0.016 | 0.016 |

| Test | Range/NPLC | 20 | 10 | 2 | 1 | 0.025 | 0 |
|------|----------------|-------|-------|-------|-------|-------|-------|
| 4W | 100 Ω | 0.863 | 0.461 | 0.141 | 0.102 | 0.063 | 0.062 |
| | 1 k Ω | 0.830 | 0.431 | 0.110 | 0.069 | 0.030 | 0.030 |
| | 10 k Ω | 0.829 | 0.430 | 0.110 | 0.069 | 0.030 | 0.030 |
| | 100 k Ω | 0.830 | 0.430 | 0.110 | 0.069 | 0.030 | 0.030 |
| | 1 M Ω | 0.831 | 0.431 | 0.110 | 0.070 | 0.030 | 0.030 |
| | 10 M Ω | 0.986 | 0.585 | 0.265 | 0.225 | 0.186 | 0.186 |
| | 100 M Ω | 0.986 | 0.585 | 0.265 | 0.225 | 0.186 | 0.186 |

Test Conditions of PC and USB DMM Module

- Processor: Intel Core 2 Duo Processor E8400 3.00 GHz, 6 MB L2 cache, 1333 MHz FSB
- Memory: 2GB DDR2
- Hard Disk Drive (HDD): 160GB
- Microsoft Windows XP
- Professional Version 2002, Service Pack 2.
- The module is loaded with FW revision 1.12 and running with KMM version is 1.8.7.0

USB Modular Digital Multimeter App within BenchVue

BenchVue software for the PC makes it simple to connect, control, capture and view multiple Keysight instruments simultaneously with no additional programming. You can derive answers faster than ever by easily viewing, logging and exporting measurement data and screen images with a few clicks from a single environment.

- Visualize multiple measurements simultaneously
- Easily log data, screen shots and system state
- Rapidly prototype custom test sequences
- Recall past states of your USB Modular to replicate results
- Export measurement data in the desired format fast
- Quickly access manuals, drivers, FAQs and videos

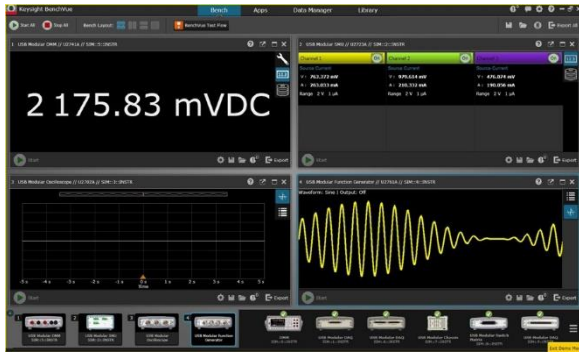


Figure 4. View measurements across USB DAQ, modular and bench instruments all on one BenchVue interface

The USB Modular Digital Multimeter App within BenchVue allows you to quickly configure and control the U2741A DMM to visualize measurements, perform data logging and annotate captured data. With BenchVue, you can display single measurement, charts or tables, from either a single U2741A DMM or multiple U2741A DMMs simultaneously to correlate trends you might otherwise miss. In just a few clicks, you can also record measurements and export results to popular PC-friendly applications such as Microsoft Excel and Microsoft Word for further analysis.

Get started with BenchVue, downloadable at no cost at www.keysight.com/find/benchvue

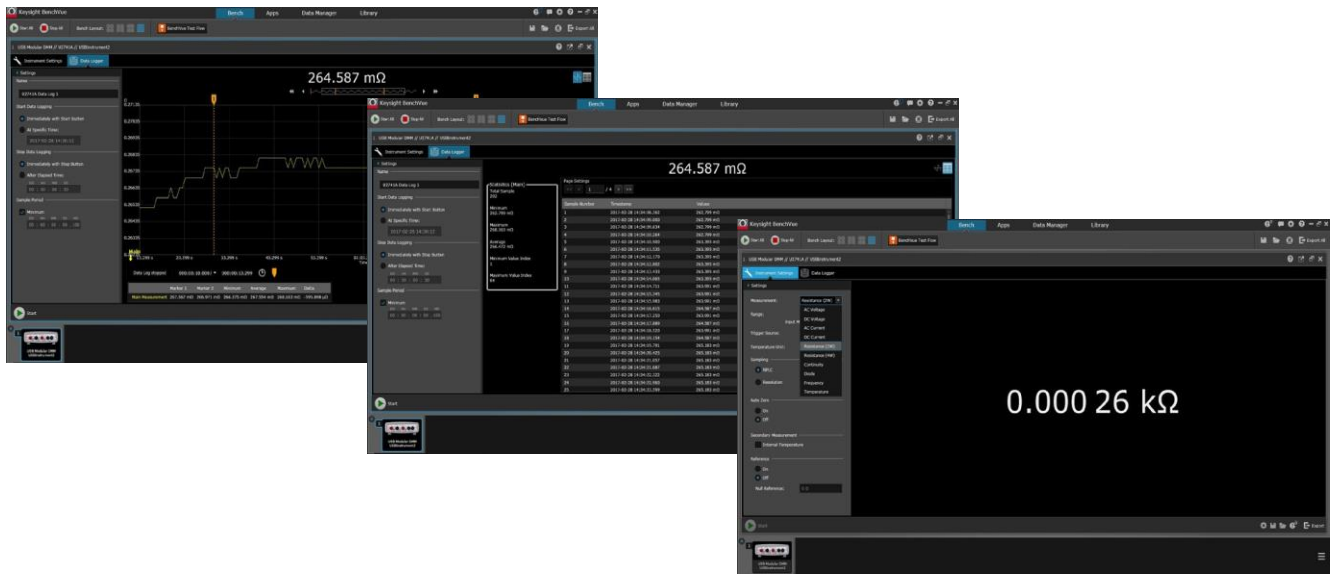


Figure 5. View measurements how you want it. Visualize measurements easily in chart or tabular form, or simply display single measurements.

Other Products in the Keysight USB Modular Test Instruments Family



U2701A/U2702A USB Modular Oscilloscope

Features:

- High sampling rate up to 500 MSa/s, enabling accurate measurement analysis
- Up to 32 MB large memory
- Fast Fourier transfer (FFT) and waveform math functions enables easy waveform calculation

For more information: <http://www.keysight.com/find/usbscope>



U2722A/U2723A USB Modular Source Measure Unit

Features:

- Three-channel SMU with four-quadrant source/measure operation
- High measurement sensitivity of 100 pA with 16-bit resolution for all voltage and current ranges
- 0.1% basic accuracy
- Embedded test scripts (for U2723A)

For more information: <http://www.keysight.com/find/U2722A>

<http://www.keysight.com/find/U2723A>



U2751A USB Modular Switch Matrix

Features:

- Minimal cross-talk of -30 dB at 45 MHz wide bandwidth
- High bandwidth at 45 MHz without terminal block
- Capability to test up to four devices-under-test (DUTs)
- Works with other Keysight instruments for multi-point testing

For more information: <http://www.keysight.com/find/U2751A>



U2761A USB Modular Function/Arbitrary Waveform Generator

Features:

- Direct digital synthesis (DDS) waveform generator
- Pulse generator that can generate pulse signal as stimulus
- Easy customization with Arbitrary Waveform Editor
- Internal modulation capability simplifies test setup

For more information: <http://www.keysight.com/find/U2761A>



U2781A USB Modular Product Chassis

Features:

- Expansion of channels for each modular product
- Multiple instrument synchronization
- Internal and external 10 MHz reference clock
- High-speed USB 2.0
- SSI/Star trigger bus synchronization between external trigger source and modules

For more information: <http://www.keysight.com/find/U2781A>

Ordering Information

| Model | Description |
|--------|--------------------------------|
| U2741A | USB modular digital multimeter |

Optional Accessories

| Model | Description |
|------------|------------------------------|
| 34138A | Test lead set |
| E2308A | Thermistor temperature probe |
| U2921A-101 | USB secure cable 2 m |

Learn more at: www.keysight.com

For more information on Keysight Technologies' products, applications, or services, please contact your local Keysight office. The complete list is available at: www.keysight.com/find/contactus

