Agilent

U2741A USB Modular 5.5 Digits Digital Multimeter

Data Sheet

Agilent Technologies

Features

- **Makes fast measurements with up to 100 readings per second**

- **Measures up to 300 VDC with 5.5 digits resolution**

- **Frequency and temperature measurement capability**

- **Wide voltage measurement range**
  - DC: 1 µVDC to 300 VDC
  - AC: 1 µVrms to 250 Vrms

- **Wide current measurement range**
  - DC: 1 µADC to 2 ADC
  - AC: 1 µArms to 2 Arms

- **Compatibility with Hi-Speed USB 2.0, USBTMC 488.2 standards**

- **Dual-play — standalone and modular capability**

- **Bundled software — Agilent Measurement Manager (AMM)**

- **Wide range of compatible Agilent Development Environments (ADEs)**

Introduction

The Agilent U2741A is a 5.5 digits digital multimeter (DMM), which is the latest addition to the Agilent's USB modular family. It can operate as standalone or as a modular unit when used with the U2781A USB modular instrument chassis. It comes with various features and functions to meet your needs today.
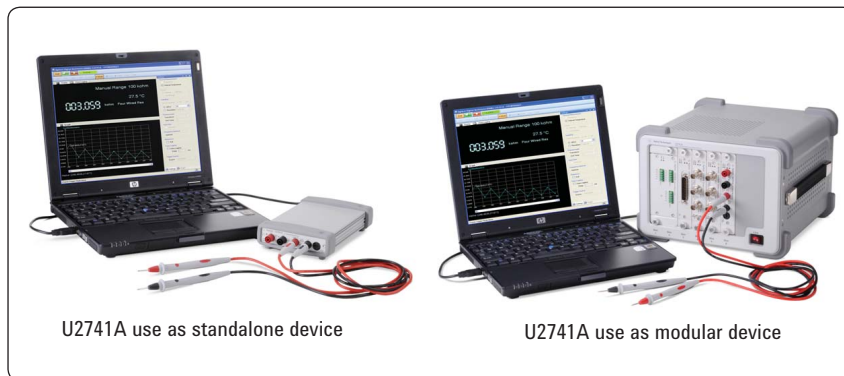

U2741A use as standalone device   U2741A use as modular device

Figure 1. The U2741A DMM showing dual-play capability

Various U2741A features to meet your demands

- Affordable and measures up to ten different measurements

- Quick and easy Hi-Speed USB 2.0 connectivity

- Dual-play capability allowing flexible configuration in simple or sophisticated test environment

- Easy-to-use bundled software to get you started with the DMM without programming

- Compatible with a wide range of ADEs to choose

- Portable, accurate, and reliable

Value for money and feature-rich DMM

The U2741A DMM gives you an accurate 5.5 digits resolution. It offers a wide range of measurement functions and features despite its value price. The U2741A is capable of performing DC voltage, AC voltage, DC current, AC current, 2-wire resistance, 4-wire resistance, continuity, diode, frequency, and temperature measurement to meet the industrial needs.

Quick and easy connectivity

The U2741A allows quick connection to the PC with Hi-Speed USB 2.0. The USB interface is also compliant with USBTMC 488.2 standards. You can easily connect the device using USB cable which makes the setup easy and hassle-free. This simple and easy-to-use device is ideal for design validation and educational teaching labs. Its robust design is also appropriate for manufacturing field, use in consumer electronics and semiconductor.

Dual-play capability

The U2741A has a breakthrough design which gives the users great flexibility to use the device as a standalone or as a modular unit used in the U2781A USB modular instrument chassis. You can use this DMM as standalone for simple test configurations or slot the DMM into the chassis for more sophisticated applications systems that requires connection and triggering of other modular devices.

Supports IVI-COM, SCPI, and compatible with wide range of ADEs

All U2741A purchases are shipped with the IVI-COM drivers. With the offered IVI-COM drivers, you are able to program the U2741A with any popular ADE that is available in the market. The U2741A is compatible with a wide range of ADEs that allows you to set up your devices in different programming environment with minimal effort as they are ready to be programmed directly using SCPI commands.

The popular development environment that is compatible with U2741A is listed below:
- Agilent VEE
- Microsoft® Visual Studio .NET
- C/C++ and Visual Basic®
- LabVIEW

Easy-to-use bundled software

The Agilent measurement manager (AMM) bundled application software is simple and easy to use. This software offers a standard user-friendly graphical user interface (GUI) that allows you to configure and control your U2741A remotely without performing any programming task.

Data logger function with AMM

The AMM software comes with data logger function that allows you to customize your data logging needs. Data can be stored for analysis when this option is enabled. The data capture interval range can be set from 0 s to 100 s. With this feature, you can start the U2741A to take measurement over duration and check your results when the test is completed. Data can be stored to a CSV (comma separated value) file format.
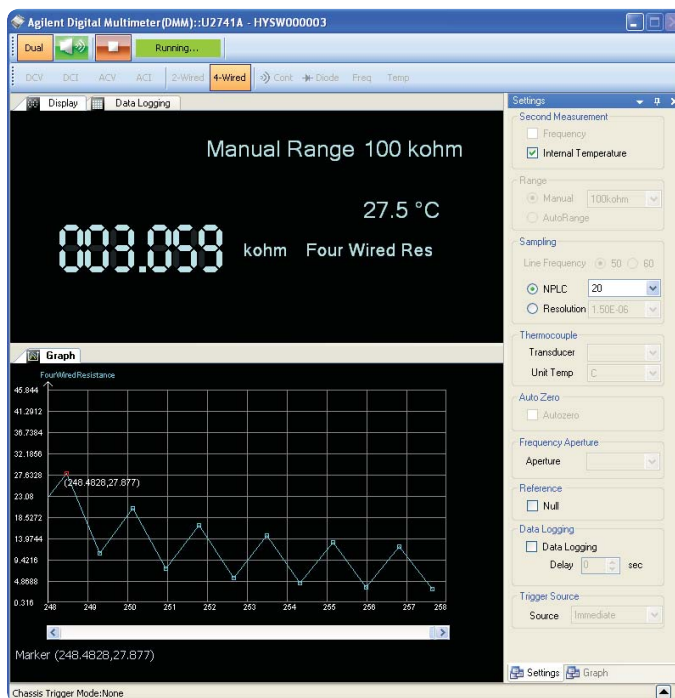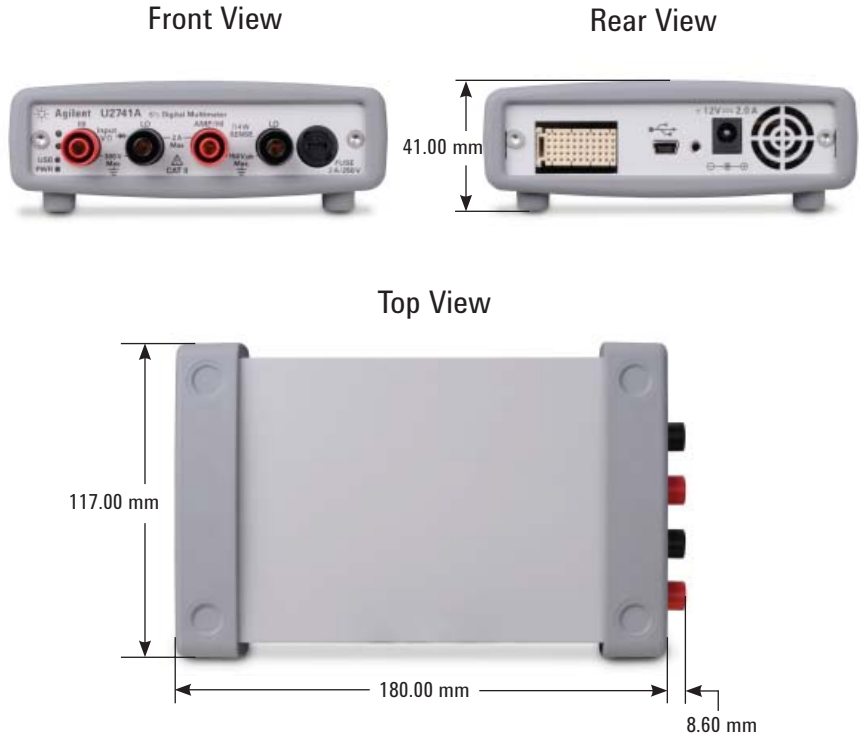

Figure 2. Example of U2741A AMM GUI

Standard Shipped Accessory

- 12 V, 2 A AC/DC adapter

- Power cord

- Standard test lead

- USB Standard-A to Mini-B interface cable

- L-Mount kit (used with the modular instrument chassis)

- Agilent Automation-Ready CD (contains the Agilent IO Libraries Suite)

- Agilent USB Modular Products Quick Start Guide

- Agilent USB Modular Products Reference CD-ROM

- Agilent Measurement Manager Quick Reference Card

- Certificate of Calibration

Product Outlook and Dimensions

Front View

Rear View

41.00 mm

Top View

117.00 mm

180.00 mm

8.60 mm

System Requirements

Processor	1.6 GHz Pentium® IV or higher
Operating system	Windows® XP Professional or Home Edition (Service Pack 1 or later) or Windows® 2000 Professional (Service Pack 4 or later)
Browser	Microsoft® Internet Explorer 5.01 or higher
Available RAM	512 MB or higher recommended
Hard-disk space	1 GB
Video	Super VGA 800×600
Prerequisites	Agilent IO Libraries Suite 14.2 or higher (version 15.0[1] recommended), Agilent T&M Toolkit Runtime version 2.1[2], Agilent T&M Toolkit Redistributable Package 2.1 patch[2], Microsoft® .NET Framework version 1.1 and 2.0[2]

[1] Available on Agilent Automation-Ready CD.
[2] Bundled with Agilent Measurement Manager application software installer.

General Characteristics

Remote interface	• Hi-Speed USB 2.0 • USBTMC 488.2 Class device
Power consumption	• +12 VDC, 2 A maximum • Isolated ELV power source
Operating environment	• One year specifications full accuracy from 18 °C to 28 °C at 50% RH • Altitude up to 2000 meters • Pollution degree 2 • For indoor use only
Storage compliance	• −20 °C to +70 °C • Relative humidity at 5% to 90% RH (non-condensing)
Safety compliance	Certified with: • IEC 61010-1:2001/EN61010-1:2001 (2nd Edition) • Canada: CAN/CSA-C22.2 No. 61010-1-04 • USA: ANSI/UL 61010-1:2004
Measurement compliance	CAT II 300 V Over-voltage Protection
EMC compliance	• IEC 61326-2002/EN61326:1997+A1:1998+A2:2001+A3:2003 • Canada: ICES-001:2004 • Australia/New Zealand: AS/NZS CISPR11:2004
Common mode rejection	• DC CMRR >120 dB with 1k unbalanced load • AC CMRR >70 dB at 50/60 Hz ±0.1% with 1k unbalanced load
Normal mode rejection ratio (NMRR)	• >60 dB at 50/60 Hz ±0.1%[1] • >0 dB at 50/60 Hz ±0.1%[2]
Shock and vibration	Tested to IEC/EN 60068-2
I/O connector	Four banana socket terminals
Dimensions (W × D × H)	• 105.00 mm x 175.00 mm x 11.50 mm (without bumpers) • 117.00 mm x 180.00 mm x 41.00 mm (with bumpers)
Weight	• 451 g (without bumpers) • 509 g (with bumpers)
Warranty	One year
Calibration	Calibration interval of one year is highly recommended

[1] Applicable for NPLC >1.
[2] Applicable for NPLC 0.2 and 0.02.

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 // 10MΩ	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

[1] Specifications are based on 30 minutes warm-up time, NPLC 20 resolution, and calibration temperature within 18 °C to 28 °C. 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 for 4-wire ohm or 2-wire ohms using null function in AMM software. If without null function in AMM software, 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.

DC current settling considerations

Switching current from >1 A to lower current measurement may cause an additional error approximately 0.3% of reading due to self- heating, and will generally dissipate within a minute.

AC specifications[1]

AC accuracy for voltage

Function	Range	Accuracy input ±(% 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

[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 2.6 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.

Temperature coefficient for voltage (0 ºC to 18 ºC, 28 ºC to 55 ºC)

	Range	Frequency (Hz) (% of reading + % of range)			
		20 ~ 45	45 ~ 10k	10k ~ 30k	30k ~ 100k
Temperature coefficient	100.000 mVrms, 1.00000 V, 10.0000 V, 100.000 V, 250.000 V	0.02 + 0.02	0.02 + 0.02	0.05 + 0.02	0.1 + 0.02

AC accuracy for current[1]

Function	Range	Burden voltage / Current shunt	Accuracy input (% of reading + % of range) Frequency (Hz)		
			20 ~ 45	45 ~ 1k	1k ~ 10k
Current[2]	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
	2.0000 A	<0.8 V, 0.1 Ω	1.5 + 0.1	0.5 + 0.1	2 + 0.2

[1] In manual range, the settling time is 2.6 seconds while in autorange, the first measurement accuracy is <1%.

[2] Input protected with externally accessible 2 A, 250 V fast blown fuse.

Temperature coefficient for current (0 ºC to 18 ºC, 28 ºC to 55 ºC)

	Range	Frequency (Hz) (% of reading + % of range)		
		20 ~ 45	45 ~ 10k	10k ~ 30k
Temperature coefficient	10.0000 mA, 100.000 mA, 1.00000 A, 2.0000 A	0.02 + 0.02	0.02 + 0.02	0.02 + 0.02

Frequency specifications[1]

Frequency accuracy

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

Frequency sensitivity for AC voltage

Function	Input range	Minimum sensitivity (RMS sine wave) Frequency (Hz)	
		20 ~ 100 k	100 ~ 300 k
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

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

[2] Only applicable for square wave measurement.

Temperature specifications

Temperature accuracy

Function	Thermistor type	Range	Accuracy	Temperature coefficient
Temperature	5 kΩ thermistor	−80.0 °C to 150 °C −112 °F to 302 °F	Probe accuracy + 0.2 °C	0.002 °C

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