DATA SHEET

U2701A/U2702A
USB Modular Oscilloscope



KEYSIGHT TECHNOLOGIES

Features

- 100 MHz and 200 MHz bandwidths
- Up to 1 GSa/s maximum sampling rate
- 32 Mpts waveform memory to capture data over a longer period
- Advanced triggering including edge, pulse width and TV helps isolate signals
- Fast Fourier Transform (FFT) and Waveform Math (Addition, Subtraction, Multiplication, Division)
- Autoscale function intuitively displays active signals in the shortest time possible
- Hi-Speed USB 2.0 connectivity
- Dual-play operation: standalone and modular capability
- NEW! Control, automate and simplify with Keysight BenchVue software. Now included.

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.



Keysight U2701/2A USB Modular Oscilloscopes

The U2701A and U2702A are 100-MHz and 200-MHz bandwidth oscilloscopes respectively, the size of a typical novel, and flexibly operate as standalone units or as modular units in the U2781A USB modular product chassis.



U2701/2A used as a standalone instrument



U2701/2A used as a modular instrument

2009 design news GOLDEN MOUSETRAP BEST PRODUCT AWARDS Winner

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)

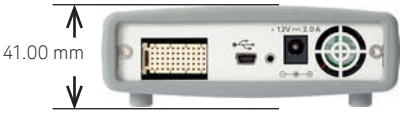
Keysight BenchVue software for the PC eliminates many of the issues around bench testing. By making it simple to connect, control instruments, and automate test sequences, you can quickly move past the test development phase and access results faster than ever before with just a few clicks. Dedicated 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 outlook and dimensions

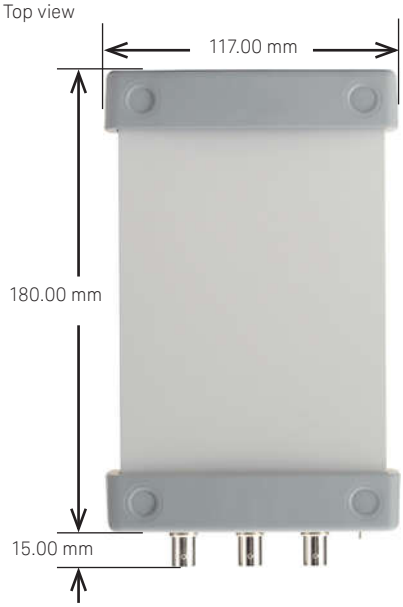
Front view



Rear view



Top view



Standard shipped accessories

- 12 V, 2 A AC/DC Power adapter
- Power cord
- USB Standard A to Mini-B interface cable
- 2 x 10:1 Passive probe 150 MHz 1.2m, N2862A (only applicable for U2701A)
- 2 x 10:1 Passive probe 300 MHz 1.2m, N2863A (only applicable for U2702A)
- L-Mount kit (used with modular product chassis)
- Keysight USB Modular Products Quick Start Guide
- Certificate of Calibration

Product characteristics and general specifications

REMOTE INTERFACE
- Hi-Speed USB 2.0
- USBTMC 488.2 Class device[1]

POWER CONSUMPTION
- +12 VDC, 2 A
- Installation Category III

OPERATING ENVIRONMENT
- Operating temperature from 0 °C to +50 °C
- Operating humidity at 20% to 85% RH (non-condensing)
- Altitude up to 2000 meters
- Pollution Degree 2
- For indoor use only

STORAGE COMPLIANCE
- Storage temperature from –20 °C to 70 °C
- Storage humidity at 5% to 90% RH (non-condensing)

SAFETY COMPLIANCE

Certified with:
- IEC 61010-1:2001/EN 61010-1:2001 (2nd Edition)
- USA: UL61010-1: 2004
- Canada: CSA C22.2 No.61010-1:2004

EMC COMPLIANCE
- IEC 61326-1:2002/EN 61326-1:1998+A2:2001+A3:2003
- Canada: ICES-001:2004
- Australia/New Zealand: AS/NZS CISPR 11:2004

SHOCK AND VIBRATION

Tested to IEC/EN 60068-2

IO CONNECTOR

BNC connector

DIMENSION (W × D × H)

Module dimension:
- 117.00 mm × 180.00 mm × 41.00 mm (with bumpers)
- 105.00 mm × 175.00 mm × 25.00 mm (without bumpers)

WEIGHT
- 534 g (with bumpers)
- 482 g (without bumpers)

Optional accessories

- BNC cable, U2921A-100
- USB Secure cable, U2921A-101
- 1:1 Passive probe 20 MHz, 1.5 m, 10070C (Order no.: U2701A-200)
- 10:1 Passive probe 150 MHz 1.2m, N2862A (only applicable for U2701A)
- 10:1 Passive probe 300 MHz 1.2m, N2863A (only applicable for U2702A)

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.

Performance specifications[1]

Vertical system: oscilloscope channels	
Bandwidth (–3 dB)	U2701A: DC to 100 MHz U2702A: DC to 200 MHz
Scope channel triggering	
Trigger sensitivity	< 10 mV/div: greater of 1 div or 5mV; ≥ 10 mV/div: 0.6 div

Performance characteristics[2]

Acquisition: oscilloscope channels		
Real time sample rate – 2 channels interleaved – Each channel	 1 GSa/s 500 MSa/s	
Standard memory depth – 2 channels interleaved – Each channel	Normal 32 Mpts 16 Mpts	Single-shot 64 Mpts 32 Mpts
Vertical resolution	8 bits	
Peak detection	Yes	
Averaging	Any number from 1 to 999	
Filter	Sin(x)/x interpolation for time base 1 ns to 100 ns	
Sweep modes	Auto, normal, single	
Vertical system: oscilloscope channels		
Scope channels	U2701A/U2702A: Ch 1 and Ch 2 simultaneous acquisition	
AC coupled	U2701A: 3.5 Hz to 100 MHz U2702A: 3.5 Hz to 200 MHz	
Calculated rise time (= 0.35/bandwidth)	U2701A: 3.5 ns U2702A: 1.75 ns	
Single-shot bandwidth	U2701A: 100 MHz U2702A: 200 MHz	
Range	2 mV/div to 5 V/div (1 MΩ)	
Maximum input [3]	CAT I 30 Vrms, 42 Vpk	
Offset range	±4 div Example: ±8 mV on 2 mV/div; ±20 V on 5 V/div	
Dynamic range	±4 div	
Input impedance	1 MΩ: ≈ 16 pF	
Coupling	AC, DC, Ground	
BW limit	≈ 25 MHz	
Standard probes	10:1 Passive probe 150 MHz 1.2 m 10:1 Passive probe 300 MHz 1.2 m	
ESD tolerance	±2 kV	
Noise peak-to-peak	3 mVpp	
DC vertical offset accuracy	≤ 200 mV/div: ±0.1 div ±2.0 mV ±0.5% offset value; > 200 mV/div: ±0.1 div ±2.0 mV ±1.5% offset value	
DC vertical gain accuracy	±4.0% of full scale	

1. All specifications are warranted. specifications are valid after a 30-minute warm-up and within ±100 °C of last calibration temperature.
2. All characteristics are typical performance values and are not warranted. Characteristics are valid after a 30-minute warm-up period and within ±10 °C of last calibration temperature.
3. Under standalone use, you are only allowed to measure up to CAT I 30 Vrms. For high-voltage measurement up to CAT I 300 Vrms, you must install the L-Mount kit on the U2701A/U2702A before plugging it into the product chassis. Ensure that the L-Mount kit installed on your modular oscilloscope is screwed to the product chassis to ensure proper chassis grounding. Note that you are required to use the provided 10:1 probes (N2862A/N2863A) for high-voltage measurements to avoid damaging your instrument.

Performance characteristics[1] (continued)

Vertical system: oscilloscope channels (continued)	
Single-cursor accuracy	±{DC vertical gain accuracy + DC vertical offset accuracy + 0.2% full scale (~1/2 LSB)} Example: For 50 mV signal, scope set to 10 mV/div (80 mV full scale), 5 mV offset, Accuracy = ±{4.0% (80 mV) + 0.1(10 mV) + 2.0 mV + 0.5% (5 mV) + 0.2% (80 mV)} = ±6.385 mV
Dual-cursor accuracy	±{DC vertical gain accuracy + 0.4% full scale (~1 LSB)} Example: For 50 mV signal, scope set to 10 mV/div (80 mV full scale), 5 mV offset, Accuracy = ±{4.0% (80 mV) + 0.4% (80 mV)} = ±3.52 mV
Horizontal	
Range	1 ns/div to 50 s/div
Time base accuracy	20 ppm
Delay range	Pre-trigger: –100 % Post-trigger: +100 %
Modes	Main, roll, XY
XY	Yes
Reference position	Center
Trigger System	
Sources	Ch 1, Ch 2, Ext (not applicable for TV trigger)
Modes	Normal, single, auto trigger
Hold off time	60 ns
Selections	Edge, pulse width, TV
– Edge	Triggers on a rising or falling edge, alternating, or either edge of any source
– Pulse width	Triggers on a pulse width greater than, equal to, or less than a specified time limit, with time limits ranging from 16 ns to 10 s Minimum lower limit: 8 ns Minimum upper limit: 16 ns Maximum pulse width setting: 10 s
– TV	Triggers on one of three standard television waveforms: NTSC, PAL, SECAM TV trigger sensitivity: 0.6 division of sync signal. Modes supported include Field 1, Field 2, all fields, or any line within a field
Autoscale	Single-button automatic setup of all channels
Oscilloscope channel triggering	
Range (internal)	±4 div from center screen
Coupling	AC (< 15 Hz) LF reject (~ 35 kHz) HF reject (~ 35 kHz)
External (EXT) triggering	
Input impedance	1 MW: ≈ 16 pF
Maximum input	CAT I 30 Vrms, 42 Vpk
Range	DC coupling: trigger level ±1.25 V and ±2.5 V
EXT trigger pulse width	> 2.5 ns

1. All characteristics are typical performance values and are not warranted. Characteristics are valid after a 30-minute warm-up period and within ±10 °C of last calibration temperature.

Performance characteristics[1] (continued)

External (EXT) triggering (continued)	
Trigger level sensitivity	For ±1.25 V range setting: DC to 100 MHz: 100 µV > 100 MHz: 200 µV For ±2.5 V range setting: DC to 100 MHz: 250 µV > 100 MHz: 500 µV
Display	
Interpolation	Sin(x)/x
Display types	Dots and vectors
Persistence	Off, infinite
Format	XY, roll
Measurement features	
Automatic measurements	Measurements are continuously updated. Cursors track last selected measurement.
Voltage	Peak-to-peak, maximum, minimum, average, amplitude, top, base, Vrms, overshoot, preshoot, crest, standard deviation, cycle RMS, RMS AC
Time	Frequency, period, +width, –width, +duty cycle, –duty cycle, rise time, fall time, delay, phase
Frequency	Maximum peak
Cursors	– Modes: Manual – Type: Time, voltage and frequency (FFT) – Measurements: DT, DV, frequency, Peak Scan (FFT), DPeak
Math functions	Add, substract, multiply, FFT, divide
FFT	
Points	1250 points (for 500 ns and above)
Source of FFT	Source channels 1 or 2
Window	Hanning, Hamming, Blackman-Harris, Rectangular, Flattop
Noise floor	–50 dB to –90 dB depending on averaging
Amplitude	Display in dBV
Maximum frequency	250 MHz

1. All specifications are warranted. specifications are valid after a 30-minute warm-up and within ±100 °C of last calibration temperature.

USB Modular Oscilloscope 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

The USB Modular Oscilloscope App within BenchVue allows you to quickly configure and control the U2701A/2A Oscilloscope to capture and annotate screen images, record trace data and log measurements. This capability provides you with the insight you need to solve your measurement challenges and detect glitches or bugs in signals. 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. Additionally, you can also export data to HDF5.



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

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



Controlling your oscilloscope is as easy as point and click. You can also flexibly view your signals in both waveform and data logger views.

Ordering Information

Model	Description
U2701A	USB modular oscilloscope (100 MHz)
U2702A	USB modular oscilloscope (200 MHz)

Optional accessories

Model	Description
N2862A	10:1 pas sive probe, 150 MHz, 1.2 m (for U2701A)
N2863A	10:1 passive probe, 300 MHz, 1.2 m (for U2702A)
U2701A-200	10070C 1:1 passive probe, 20 MHz, 1.5 m
U2921A-100	BNC cable, 1.2 m
U2921A-101	USB secure cable, 2 m

Other products in the Keysight USB Modular Test Instruments Family



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



U2741A USB Modular Digital Multimeter (DMM)

Features:

- Fast reading speed (up to 100 Sa/s)
- Wide range of basic measurement functions, including frequency and temperature measurements

For more information: **http://www.keysight.com/find/U2741A**



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**

Other products in the Keysight USB Modular Test Instruments Family



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**

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

KEYSIGHT TECHNOLOGIES

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