

U2761A USB Modular Function/ Arbitrary Waveform Generator



Features

- Sine, Square, Ramp, Triangle and Pulse waveforms as well as DC signal
- 14-bit, 50 MSa/s Arbitrary Waveforms customizable through the arbitrary waveform editor
- Built-in modulation: AM, FM, PM, ASK, FSK and PSK
- Pulse generation up to 5 MHz with variable period, pulse width and amplitude parameters
- 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)

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 U2761A USB Modular Function/Arbitrary Waveform Generator

The U2761A is a 20 MHz function/arbitrary waveform generator 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.



U2761A used as a standalone instrument



U2761A used as a modular instrument



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.

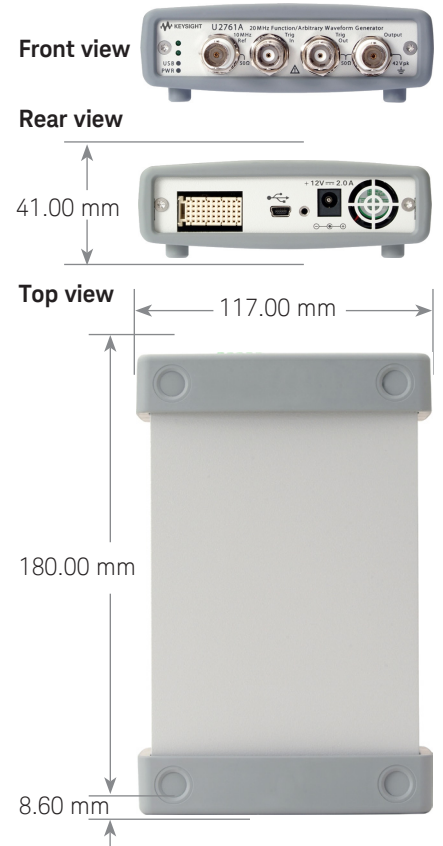
Control, Automate and Simplify with BenchVue – No Programming Needed (Now included)

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

| |
|--|
| 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, 2 A - Isolated ELV power source |
| Operating Environment |
| <ul style="list-style-type: none"> - 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 |
| <ul style="list-style-type: none"> - Storage temperature from -20 °C to 70 °C - Storage humidity at 5% to 90% RH (non-condensing) |
| Safety Compliance |
| Certified with: <ul style="list-style-type: none"> - IEC 61010-1:2001/EN 61010-1:2001 (2nd Edition) - USA: UL61010-1: 2004 - Canada: CSA C22.2 No.61010-1:2004 |
| EMC Compliance |
| <ul style="list-style-type: none"> - 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) |
| <ul style="list-style-type: none"> - > 60 dB at 50/60 Hz ±0.1% - > 0 dB at 50/60 Hz ±0.1% |
| SHOCK AND VIBRATION |
| Tested to IEC/EN 60068-2 |
| IO CONNECTOR |
| Four banana socket terminals |
| Dimension (W × D × H) |
| Module dimension: <ul style="list-style-type: none"> - 117.00 mm × 180.00 mm × 41.00 mm (with bumpers) - 105.00 mm × 175.00 mm × 25.00 mm (without bumpers) |
| Weight |
| <ul style="list-style-type: none"> - 528 g (with bumpers) - 476 g (without bumpers) |

Product outlook and dimensions



Standard shipped accessories

- 12 V, 2 A AC/DC Power adapter
- Power cord
- USB Standard A to Mini-B interface cable
- L-Mount kit (used with modular product chassis)
- Keysight USB Modular Products Quick Start Guide
- Certificate of Calibration

Optional accessories

- 1.5 m BNC coax cable
- USB Secure 2-m cable

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.

Product specifications and measurement characteristics

| Waveforms | | | |
|--|---|-----------------------|--------------|
| Standard | Sine, Square, Ramp, Triangle, Pulse, DC | | |
| Built-in arbitrary | Exponential Rise, Exponential Fall, Negative Ramp | | |
| Waveform characteristics | | | |
| Sine | | | |
| Frequency range | 1 μ Hz to 20 MHz (1 μ Hz resolution) | | |
| Amplitude flatness ^[1] (relative to 1 kHz) | < 100 kHz | 0.2 dB | |
| | 100 kHz to 1 MHz | 0.35 dB | |
| | 1 MHz to 20 MHz | 0.7 dB | |
| Harmonic distortion ^[2] | Frequency range | < 1 Vpp | \geq 1 Vpp |
| | DC to 20 kHz | -70 dBc | -60 dBc |
| | 20 kHz to 100 kHz | -65 dBc | -60 dBc |
| | 100 kHz to 1 MHz | -50 dBc | -45 dBc |
| | 1 MHz to 20 MHz | -40 dBc | -35 dBc |
| Total harmonic distortion ^[2] | DC to 20 kHz | 0.10% | |
| Spurious (Non-harmonic) output ^[3] | DC to 1 MHz | -65 dBc | |
| | 1 MHz to 20 MHz | -65 dBc + 6 dB/octave | |
| Phase noise (10 kHz offset) | -115 dBc/Hz (Typical) | | |
| Square | | | |
| Frequency range | 1 μ Hz to 20 MHz (1 μ Hz resolution) | | |
| Rise/Fall time | < 18 ns, 10 to 90% terminated load (50 W) | | |
| Overshoot | < 2% | | |
| Variable duty cycle | 20% to 80% (up to 10 MHz) | | |
| | 40% to 60% (up to 20 MHz) | | |
| Asymmetry (@ 50% duty) | 1% of period + 5 ns | | |
| Jitter (RMS) | > 50 kHz = 1 ns + 100 ppm of period | | |
| | \leq 50 kHz = 10 ns + 100 ppm of period | | |
| Ramp, Triangle | | | |
| Frequency range | 1 μ Hz to 200 kHz (1 μ Hz resolution) | | |
| Linearity | < 0.2% of peak output | | |
| Programmable symmetry | 0% to 100% | | |
| Pulse | | | |
| Frequency range | 500 μ Hz to 5 MHz (1 μ Hz resolution) | | |
| Pulse width (period \leq 10 s) | 40 ns minimum, 10 ns resolution | | |
| Overshoot | < 3% | | |
| Jitter (RMS) | 300 ps + 0.1 ppm of period | | |

1. Add 1/10th of output amplitude and offset specification per $^{\circ}$ C for operation outside the range of 18 $^{\circ}$ C to 28 $^{\circ}$ C.
2. DC offset set to 0 V.
3. Spurious output at low amplitude is -70 dBm, typical.

| Waveform characteristics (continued) | |
|---|---|
| Arbitrary | |
| Frequency range | 1 μ Hz to 200 kHz (1 μ Hz resolution) |
| Waveform memory depth | 64 kSa ^[1] |
| Amplitude resolution | 14 bits/sample (including sign) |
| Sampling rate | 50 MSa/s |
| Minimum rise/fall time | 36 ns (Typical) |
| Linearity | < 0.2% of peak output |
| Settling Time | < 250 ns to 0.5% of final value |
| Jitter (RMS) | 10 ns + 30 ppm |
| Common characteristics | |
| Amplitude | |
| Range | 40 mVpp to 5 Vpp (Into 50 Ω load) 80 mVpp to 10 Vpp (Into open circuit) |
| Accuracy ^[2] (across 50 Ω load at 1 kHz) | $\pm 1\%$ of setting ± 5 mV (± 10 mV @ Hi-Z) |
| Units | Vpp, Vrms, dBm |
| Resolution | 4 digits |
| DC offset | |
| Range (peak AC + DC) | ± 2.5 V (Into 50 Ω load) ± 5 V (Into open circuit) |
| Accuracy ^[2] (across 50 Ω load) | $\pm 2\%$ of offset setting $\pm 1\%$ of amplitude ± 5 mV (± 10 mV @Hi-Z) |
| Amplitude Limit | Amplitude + Offset limit to within ± 2.5 V range across 50 Ω load or ± 5 V across open circuit |
| Main output | |
| Impedance | 50 Ω load (Typical) |
| Isolation | At least 42 Vpk to earth |
| Protection | Short-circuit protected, overload automatically disables main output |
| Internal frequency reference | |
| Accuracy ^[3] | ± 8 ppm in 1 year |
| External frequency reference | |
| Input | |
| Lock range | 10 MHz ± 170 Hz |
| Amplitude level | 500 mVpp to 5 Vpp |
| Impedance | 50 Ω AC coupled |
| Lock time | < 2 s |
| Output | |
| Frequency | 10 MHz |
| Amplitude Level | 632 mVpp (Typical) |
| Impedance | Return loss 10 dB (Typical) at 10 MHz |
| Phase Offset | |
| Range | +360° to -360° |
| Resolution | 0.01° |
| Accuracy | 20 ns |

1. Maximum at 16 k points for Arbitrary waveforms when using bundled software, Keysight Measurement Manager (KMM) and 64 k points when programmed in compatible application development environments like Keysight VEE, NI LabVIEW, and Microsoft Visual Studio.
2. Add 1/10th of output amplitude and offset specification per °C for operation outside the range of 18 °C to 28 °C.
3. Add 1 ppm/°C (average) for operation outside the range of 18 °C to 28 °C.

| Trigger characteristics | |
|--------------------------------|---|
| Trigger input | |
| Input Level | TTL compatible |
| Slope | Rising and Falling, Selectable |
| Pulse width | > 100 ns |
| Input impedance | > 10 k Ω , DC coupled |
| Latency | < 500 ns |
| Jitter (RMS) | 6 ns (3.5 ns for pulse) |
| Trigger output | |
| Output Level | TTL compatible into ≥ 1 k Ω |
| Pulse width | > 400 ns |
| Output impedance | 50 Ω (Typical) |
| Fanout | 4 TTL |
| Rise time | ≤ 20 ns |
| Modulation | |
| Modulation scheme | Internal, AM, FM, PM, FSK, PSK, ASK |
| AM | |
| Carrier waveforms | Sine, Square, Ramp, Arbitrary |
| Source | Internal |
| Internal modulation | Sine, Square, Ramp, Arbitrary (2 mHz to 20 kHz) |
| Depth | 0.0% to 100.0% |
| FM | |
| Carrier waveforms | Sine, Square, Ramp, Arbitrary |
| Source | Internal |
| Internal modulation | Sine, Square, Ramp, Arbitrary (2 mHz to 20 kHz) |
| Deviation | 1 Hz to 500 kHz |
| PM | |
| Carrier waveforms | Sine, Square, Ramp, Arbitrary |
| Source | Internal |
| Internal modulation | Sine, Square, Ramp, Arbitrary (2 mHz to 20 kHz) |
| Deviation | 0.0° to 360.0° |
| FSK | |
| Carrier waveforms | Sine, Square, Ramp, Arbitrary |
| Source | Internal |
| Internal modulation | 50% duty cycle square (2 mHz to 100 kHz) |
| PSK | |
| Carrier waveforms | Sine, Square, Ramp, Arbitrary |
| Source | Internal |
| Internal modulation | 50% duty cycle square (2 mHz to 100 kHz) |
| Deviation | 0.0° to 360.0° |
| ASK | |
| Carrier waveforms | Sine, Square, Ramp, Arbitrary |
| Source | Internal |
| Internal modulation | 50% duty cycle square (2 mHz to 100 kHz) |
| Sweep Characteristics | |
| Waveforms | Sine, Square, Ramp, Arbitrary |
| Type | Linear or Logarithmic |
| Direction | Up or Down |
| Sweep time | 1 ms to 500 s |
| Trigger | Single, External, or Internal |

USB Modular Function Generator 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.

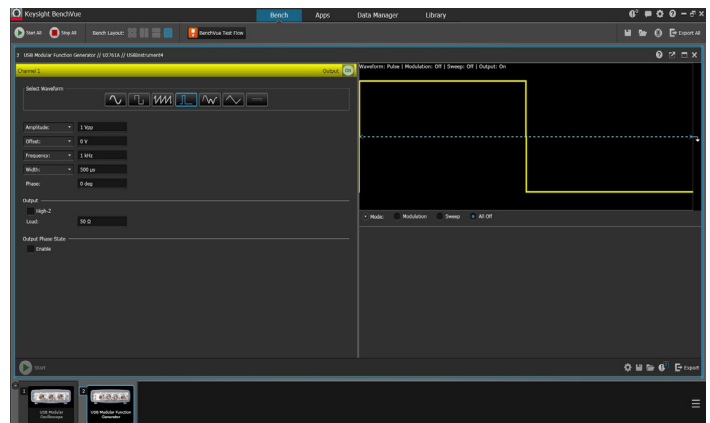
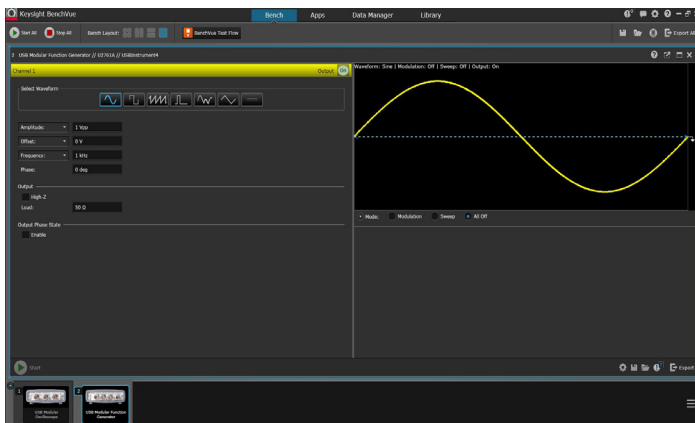
- Visualize multiple measurements simultaneously
- Easily log data, screen shots and system state
- Rapidly prototype custom test sequences
- Recall past states of your USB Modular to replicate results
- Export measurement data in the desired format fast
- Quickly access manuals, drivers, FAQs and videos

The USB Modular Function Generator App within BenchVue allows you to easily configure the U2761A Function/Arbitrary Waveform Generator, set waveform properties and load custom arbitrary waveforms – either from files or simply drag and drop a measured trace from an oscilloscope. Link BenchVue to the Keysight Waveform Builder Pro software will provide you with advanced custom waveform creation capabilities.



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 function generator is as easy as point and click, or drag and drop.

Ordering Information

| Model | Description |
|--------|---|
| U2761A | USB modular function/arbitrary waveform generator |

Optional Accessories

| Model | Description |
|------------|---|
| U2921A-100 | BNC cable |
| U2921A-101 | USB secure cable 2 m |
| U2010A | Arbitrary waveform generation upgrade to 2 MHz |
| U2010A-1FP | Arbitrary waveform generation upgrade bundle purchase with U2761A |

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: www.keysight.com/find/U2722A
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: www.keysight.com/find/U2741A



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: www.keysight.com/find/usbscope



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: www.keysight.com/find/U2751A



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: www.keysight.com/find/U2781A

www.keysight.com/find/U2761A

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

