Keysight Technologies
U2040 X-Series Wide Dynamic Range Power Sensors

Data Sheet

![Keysight Technologies logo]

Accurately measure any modulated signal with the Keysight Technologies, Inc. U2040 X-Series power sensors. With LAN connectivity, a first in the industry, and USB connectivity, the U2040 X-Series comes with the world's widest dynamic range in a power sensor, covering a range of –70 to +26 dBm. And because the U2049XA LAN power sensor is thermal vacuum compliant, you can get the same accuracy and performance even in thermal vacuum chambers.

U2040 X-Series power sensors comparison table

Model	Description	Frequency range / Dynamic range	Supported measurements	Connector type
U2041XA	USB wide dynamic range average power sensor	10 MHz to 6 GHz / –70 to +26 dBm	Average, time selectivity in average mode	N-type (male)
U2042XA	USB peak and average power sensor	10 MHz to 6 GHz / –70 to +26 dBm	Peak, average, peak-to-average power, time-gated and free run mode, pulse parameters analysis, pulse profiling	N-type (male)
U2043XA	USB wide dynamic range average power sensor	10 MHz to 18 GHz / –70 to +26 dBm	Average, time selectivity in average mode	N-type (male)
U2044XA	USB peak and average power sensor	10 MHz to 18 GHz / –70 to +26 dBm	Peak, average, peak-to-average power, time-gated and free run mode, pulse parameters analysis, pulse profiling	N-type (male)
U2049XA	LAN power sensor	10 MHz to 33 GHz / –70 to +20 dBm	Peak, average, peak-to-average power, time-gated and free run mode, pulse parameters analysis, pulse profiling	APC-3.5 mm (male)
U2049XA (Option TVA)	LAN power sensor (with thermal vacuum compliance)	10 MHz to 33 GHz / –70 to +20 dBm	Peak, average, peak-to-average power, time-gated and free run mode, pulse parameters analysis, pulse profiling	APC-3.5 mm (male)

U2040 X-Series selection guide

Measurement types	U2041XA	U2042XA	U2043XA	U2044XA	U2049XA
CW power	Yes	Yes	Yes	Yes	Yes
Wideband average power (example: 100 MHz bandwidth)	Yes	Yes	Yes	Yes	Yes
Time selectivity in average mode	Yes	Yes	Yes	Yes	Yes
Time gated average power	No	Yes	No	Yes	Yes
Peak power or peak-to-average power up to 5 MHz bandwidth	No	Yes	No	Yes	Yes
Peak power or peak-to-average power above 5 MHz bandwidth	No	No	No	No	No
Pulse parameter analysis ≥ 100 ns rise time (example: rise/fall time, duty cycle, pulse width, etc.)	No	Yes	No	Yes	Yes
Pulse parameter analysis < 100 ns rise time (example: rise/fall time, duty cycle, pulse width, etc.)	No	No	No	No	No
Pulse profiling (power vs time display)	No	Yes	No	Yes	Yes

U2040 X-Series Key Features

Widest dynamic range power sensor

With a dynamic range spanning from –70 dBm to +26 dBm, the U2040 X-Series comes with the widest dynamic range found in a power sensor. The 96 dB range enables accurate power measurements of very low signal levels for a broad range of applications such as wireless chipset, power amplifier and module manufacturing, satellite payload testing, test system or instrument calibration, and radar pulse parameter measurements. The U2042XA, U2044XA and U2049XA are able to support up to 4 pairs of gate power measurements.

Super-fast measurement speed

The U2040 X-Series takes up to 10,000 super-fast readings per second (in fast/buffer mode/average mode), a ten times improvement over Keysight's previous sensor offerings, allowing test engineers to increase test throughput capacity and reduce cost of test especially in high volume manufacturing environments such as mobile chipset manufacturing.

This measurement speed is fast enough to measure every continuous pulse without leaving time gaps in between measurement acquisitions. While conventional sensors only provide a snapshot of continuous pulses, leaving dead time where a glitch could slip by unnoticed, the U2040 X-Series measures continuously in real time and keeps pace with very fast pulses, up to 10 kHz PRF. Users are also able to fully control which portion of the signal is measured and what throughput they can expect because the aperture duration precisely defines the maximum measurement speed as 1/aperture duration. For example, setting the aperture duration to 100 µs offers 100 µs of measurement time per reading, equaling a measurement speed of 10,000 readings per second.

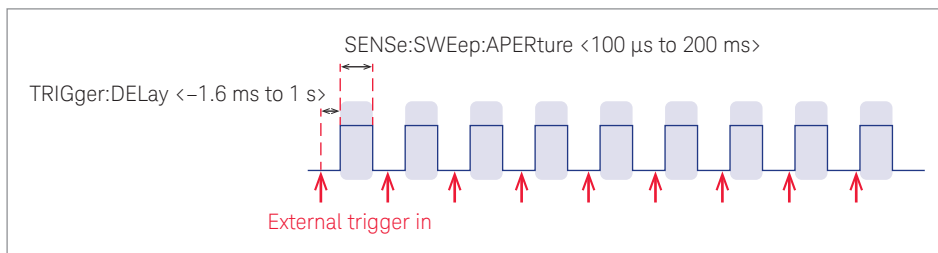## Broadband coverage for any modulated signal formats

Figure 1. The U2040 X-Series offers real time measurement by measuring every consecutive pulse without dead time.

The U2040 X-Series makes accurate average or time-gated average power measurements of any modulated signal, and covers all common wireless signals such as LTE, LTE-Advanced with 100 MHz bandwidth, and WLAN 802.11ac with 80/160 MHz bandwidth. A 4-path diode stack design with parallel data acquisition paths offers seamless range transition with high accuracy and repeatability. This design enables all the diodes to operate in their square law region, allowing the U2040 X-Series to function like thermocouple power sensors to provide accurate average or RMS power for broadband modulated signals.

Advanced list mode / test sequencing

Advanced list mode allows flexible, real time measurement configuration of the U2040 X-Series sensor's settings for different acquisitions, and saves time by removing the need to set up the sensor or device-under-test (DUT)/source between each group of measurements.

For example, users can setup the sensor to measure the GSM timeslot with an aperture size of 500 µs at 900 MHz for the first three acquisitions, then to measure the LTE subframe with an aperture size of 1 ms at 700 MHZ for the next three acquisitions, and finally to measure the WLAN preamble with an aperture size of 192 µs at 2.4 GHz for subsequent acquisitions.
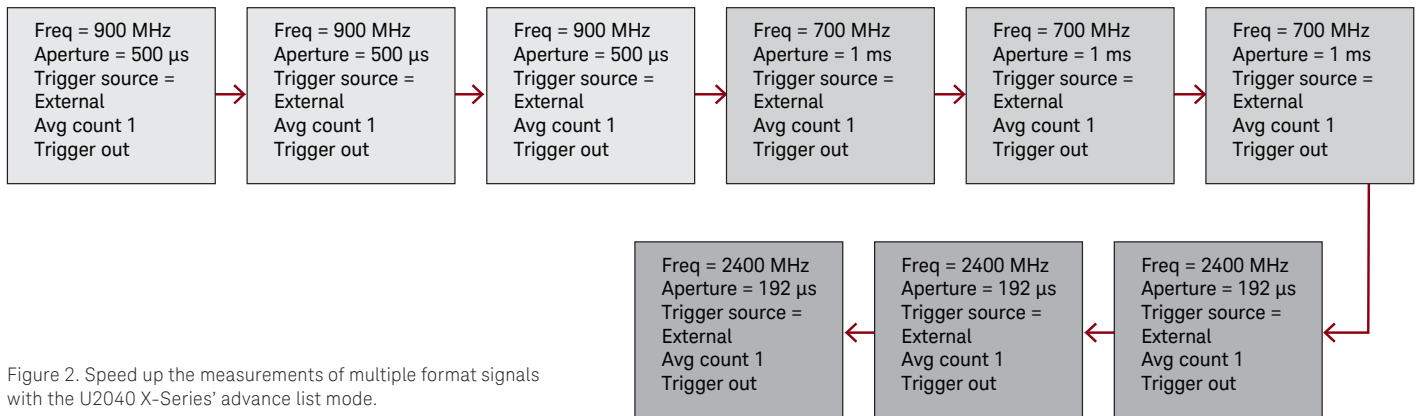

Figure 2. Speed up the measurements of multiple format signals with the U2040 X-Series' advance list mode.

Timing synchronization between the sensor and the DUT/source is achieved through a hardware handshake with the built-in trigger in and trigger out ports of the sensor. With each trigger input signal received, the sensor will perform the measurement capture based on the predefined settings, and save the data into the buffer memory. Once the entire sequence is completed, users can retrieve all the captured measurement data with a single fetch command. The measurement advancement can also be performed through internal trigger.

Time selectivity in average mode with variable aperture duration

The U2040 X-series offers a new feature called average mode time selectivity, whereby users are able to configure the aperture duration of measurement capture with reference to immediate trigger or external trigger. The aperture duration can be set from 100 µs to 200 ms with a resolution of 100 ns, a resolution low enough to cover any radio format.

This new feature allows users to control which portions of the waveform to be measured, giving the same results as time-gated power measurements made in the conventional normal/peak mode. The key benefits of this feature is that it enables the sensor to measure both average and time selectivity average power measurements across the full 96 dB dynamic range, and offers real time measurements of up to 10,000 readings per second. This is a significant improvement when compared to conventional power sensors; a conventional sensor's time gated power dynamic ranges is typically clipped at around 50 dB with maximum speed of 1000 readings per second.

Internal zero and calibration

Save time and reduce measurement uncertainty with the internal zero and calibration function. Each U2040 X-Series sensor comes with technology that integrates a DC reference source and switching circuits into the body of the sensor so you can calibrate the sensor while it is connected to a device-under-test. This feature removes the need for connection and disconnection from an external calibration source, speeding up testing and reducing connector wear and tear.

This internal zero and calibration function allows continuous long distance and remote measurements by maintaining the accuracy of the sensor, and is useful in manufacturing and automated test environments where each second and each connection counts.

Built-in trigger in and out

An external trigger enables accurate triggering of low level signals close to the sensor's noise floor. The U2040 X-series power sensors come with built-in trigger in/out connection, allowing you to connect an external trigger signal from a signal source or the device-under-test in order to achieve precise triggering timing. Once the trigger output is enabled, a TTL trigger output signal will be generated on every triggered measurement. The built-in trigger in and out is particularly useful when users need to synchronize the measurement acquisition of a series of daisy-chain power sensors.


Figure 3. The external trigger input and output ports on the U2044XA.

20 automatic pulse parameter measurements

The U2040 X-Series offers simultaneous pulse parameter characterization of up to 20 pulses within a single capture. Individual pulse duration, period, duty cycle, rise time, fall time and other pulse parameters can be queried through the following SCPI codes: TRACe:MEASurement:PULSe[1-20], and TRACe:MEASurement:TRANsition[1-20].

Together with a system's rise time and fall time of 100 ns and video bandwidth of 5 MHz, the U2040 X-Series enables a minimum measurable pulse width of 250 ns with its sampling interval of 50 ns. Users can quickly and accurately measure the output power and pulse parameters of pulses for radar pulse component design or manufacturing.
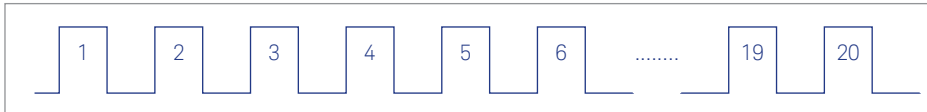
Pulse parameter	SCPI command
Duty cycle	TRAC:MEAS:PULS[1-20]:DCYC?
Pulse duration	TRAC:MEAS:PULS[1-20]:DUR?
Pulse period	TRAC:MEAS:PULS[1-20]:PER?
Pulse separation	TRAC:MEAS:PULS[1-20]:SEP?
Negative transition duration (fall time)	TRAC:MEAS:TRAN[1-20]:NEG:DUR?
Occurrence of a negative transition relative to trigger instant	TRAC:MEAS:TRAN[1-20]:NEG:OCC?
Positive transition duration (rise time)	TRAC:MEAS:TRAN[1-20]:POS:DUR?
Occurrence of a positive transition relative to trigger instant	TRAC:MEAS:TRAN[1-20]:POS:OCC?

Figure 4. The U2040 X-Series offers simultaneous analysis of up to 20 pulses within a single capture.

Auto burst detection

Auto burst detection helps the measurement setup of the trace of gate positions and sizes. This feature also helps set up triggering parameters on a large variety of complex modulated signals by synchronizing to the RF bursts. After a successful auto-scaling, the triggering parameters, such as trigger level, delay and hold-off, are automatically adjusted for optimum operation. The trace settings are also adjusted to align the RF burst to the center of the trace display.

Built-in radar and wireless presets

Begin testing faster; the U2040 X-Series comes with built-in radar and wireless presets for common signals such as DME, GSM, EDGE, WCDMA, WLAN and LTE.

Gamma correction

In an ideal measurement scenario, the reference impedance of the power sensor and device-under-test (DUT) impedance should equal the reference impedance (Z_0); however, this is rarely the case in practice. The mismatch in impedance values results in a portion of the signal voltage being reflected, and this reflection is quantified by the reflection coefficient, gamma.

Using the gamma correction function, users can simply input the DUT's gamma into the USB power sensor using SCPI commands or the Keysight BenchVue software. This will remove the mismatch error, yielding more accurate measurements.

S-parameter correction

Additional errors are often caused by components that are inserted between the DUT and the power sensor, such as in base station testing where a high power attenuator is connected between the sensor and base station to reduce the output power to the measurable power range of the sensor. The S-parameters of these components can be obtained with a vector network analyzer in the touchstone format, and inputted into the sensor using SCPI commands or through the Keysight BenchVue software. This error can now be corrected using the U2040 X-Series's S-parameter correction function. The sensor will behave as though it is connected directly to the DUT, giving users highly accurate power measurements.

Bundled intuitive BenchVue software

The U2040 X-Series power sensors are bundled with the Keysight BenchVue software. A software CD will be shipped together with the U2040 X-Series sensor. Users can also download the software at no charge from **www.keysight.com/find/BenchVue**.

U2049XA: The ideal solution for remote monitoring of satellite systems

Get the same accuracy and performance in thermal vacuum (TVAC) chambers with the world's first TVAC compliant power sensor. With best-in-class long term drift performance, a frequency range of 10 MHz to 33 GHz and a dynamic range spanning 90 dB, the U2049XA LAN power sensor is ideal for fault detection and monitoring of satellite systems. And with LAN/power over Ethernet (PoE) connectivity, a first in the industry, you can perform long distance, remote monitoring of satellite systems with ease and confidence.

LAN/Power over Ethernet connectivity

Overcome the cable length limitations associated with USB connectivity. With Power over Ethernet (PoE)/LAN connectivity, the U2049XA is capable of long distance remote monitoring of up to 100 meters. The PoE connectivity is also compliant to the IEEE 802.3at standard.

Note that the typical LAN port found on a PC or Keysight instruments will not be able to power up the U2049XA sensor. A typical LAN port is only used for data transfer and communication. The U2049XA must connect to a PoE port, which can be used to supply the DC power required to power up the sensor and to transfer data.

Broad frequency coverage

With a broad frequency coverage of 10MHz to 33 GHz, the U2049XA is optimized for satellite and aerospace/defense applications. Together with internal zero and calibration and excellent long term drift performance, the U2049XA enables automated performance monitoring without needing human intervention.

Optional thermal vacuum compliant option

The U2049XA LAN power sensor comes with a thermal vacuum compliant option (Option-TVA) for use within a thermal vacuum chamber, or in space. This option has been meticulously designed by selecting components with minimum outgassing properties. Each of the sensors is also subject to temperature cycling in a vacuum chamber to stabilize the materials and to remove outgassing particles.

Performance specifications

Specification definitions

There are two types of product specifications:
- Warranted specifications are specifications which are covered by the product warranty and apply over a range of 0 to 55 °C unless otherwise noted. Warranted specifications include measurement uncertainty calculated with a 95% confidence
- Characteristic specifications are specifications that are not warranted. They describe product performance that is useful in the application of the product. These characteristics are shown in italics.

Characteristic information is representative of the product. In many cases, it may also be supplemental to a warranted specification. Characteristics specifications are not verified on all units. These are several types of characteristic specifications. They can be divided into two groups:

One group of characteristic types describes 'attributes' common to all products of a given model or option. Examples of characteristics that describe 'attributes' are the product weight and '50-ohm input Type-N connector'. In these examples, product weight is an 'approximate' value and a 50-ohm input is 'nominal'. These two terms are most widely used when describing a product's 'attributes'.

The second group describes 'statistically' the aggregate performance of the population of products. These characteristics describe the expected behavior of the population of products. They do not guarantee the performance of any individual product. No measurement uncertainty value is accounted for in the specification. These specifications are referred to as 'typical'.

Specification definitions

The power sensor will meet its specifications when:
- Stored for a minimum of two hours at a stable temperature of two hours at a stable temperature within the operating temperature range, and turned on for at least 30 minutes
- The power sensor is within its recommended calibration period, and
- Used in accordance to the information provided in the *User's Guide*.

Specifications

Key specifications

	U2041XA/43XA USB average power sensor	U2042XA/44XA USB peak and average power sensor	U2049XA LAN peak and average power sensor
Average power dynamic range (Average only mode)	*−70 dBm to +26 dBm*	*−70 dBm to +26 dBm*	*−70 dBm to +20 dBm*
Normal mode dynamic range (Peak mode)	N/A	*Off: −35 to +26 dBm* *High/5 MHz: −35 to +26 dBm* *Medium/1.5 MHz: −40 to +26 dBm* *Low/300 kHz: −40 to +26 dBm*	*Off: −35 to +20 dBm* *High/5 MHz: −35 to +20 dBm* *Medium/1.5 MHz: −40 to +20 dBm* *Low/300 kHz: −40 to +20 dBm*
Maximum power (Damage level)	Average: +29 dBm Peak: +32 dBm for < 10 µs duration Voltage: ≤ 20 VDC	Average: +29 dBm Peak: +32 dBm for < 10 µs duration Voltage: ≤ 20 VDC	Average: +29 dBm Peak: +32 dBm for < 10 µs duration Voltage: ≤ 20 VDC
Zero and calibration	Internal zero and calibration supported	Internal zero and calibration supported	Internal zero and calibration supported
Rise / fall time	≤ 100 ns	≤ 100 ns	≤ 100 ns
Overshoot	*≤ 5%*	*≤ 5%*	*≤ 5%*
Maximum sampling rate	*20 Msamples/second continuous sampling*	*20 Msamples/second continuous sampling*	*20 Msamples/second continuous sampling*
Power linearity at 5 dB step (−30 to +26 dBm)	25 ± 5 °C: < *1.0%* 0 to 55 °C: < *2.1%*	25 ± 5 °C: < *1.0%* 0 to 55 °C: < *2.1%*	25 ± 5 °C: < *1.0%* 0 to 55 °C: < *2.1%*
Average power measurement accuracy [1]	≤ ±0.2 dB or ±4.5%	≤ ±0.2 dB or ±4.5%	≤ ±0.3 dB or ±6.7%
Signal bandwidth	*Wideband average power*	*VBW for peak power: ≤ 5 MHz* *Wideband average power*	*VBW for peak power: ≤ 5 MHz* *Wideband average power*
Single shot bandwidth	NA	*5 MHz*	*5 MHz*
Minimum pulse width	NA	*250 ns*	*250 ns*
Maximum capture length	NA	*1 s (decimated)* *6.5 ms (at full sampling rate)*	*1 s (decimated)* *6.5 ms (at full sampling rate)*
Maximum pulse repetition rate	NA	*2 MHz (based on 10 samples/period)*	*2 MHz (based on 10 samples/period)*

1. For U2041XA/42XA/43XA/44XA, specification is valid over a range of −45 to +23 dBm, and a frequency range of 0.5 to 10 GHz, DUT Max SWR < 1.27. For U2049XA, specification is valid over a range of −45 to +20 dBm, and a frequency range of 0.5 to 33 GHz, DUT Max SWR < 1.2. For all models, averaging set to 32, in Free Run mode.

Noise and drift

	Zero set	Zero drift	Measurement noise	Noise per sample
Normal mode [2]	< 60 nW	*< 40 nW*	*< 10 nW*	*< 0.5 µW*
Average only mode	< 70 pW	*< 25 pW*	*< 80 pW*	–

2. Only applicable to U2042/44XA

Maximum SWR

Frequency band	Maximum SWR		
	U2041XA/42XA	U2042XA/44XA	U2049XA
10 MHz	< 1.20	< 1.20	< 1.80
> 10 MHz to 40 MHz	< 1.20	< 1.20	< 1.40
> 40 MHz to 6 GHz	< 1.20	< 1.20	< 1.20
> 6 GHz to 18 GHz		< 1.26	< 1.26
> 18 GHz to 26.5 GHz			< 1.30
> 26.5 GHz to 33 GHz			< 1.35

Calibration uncertainty

Definition: Uncertainty resulting from non-linearity in the U2040 series detection and correction process. This can be considered as a combination of traditional linearity, calibration factor and temperature specifications and the uncertainty associated with the internal calibration process.

Frequency band	U2041XA/42XA[1]	U2043XA/44XA[1]	U2049XA
10 MHz to 500 MHz	4.2%	4.2%	4.3%
> 500 MHz to 1 GHz	4.0%	4.0%	4.2%
> 1 GHz to 6 GHz	4.0%	4.0%	4.5%
> 6 GHz to 10 GHz		4.0%	4.5%
> 10 GHz to 18 GHz		4.5%	4.5%
> 18 GHz to 26.5 GHz			5.3%
> 26.5 GHz to 33 GHz			5.8%

1. For power levels above +23 dBm, add 1% to the calibration uncertainty.

Timebase and trigger specifications

Timebase	
Range	*2 ns to 100 ms/div*
Accuracy	*± 25ppm*
Jitter	*≤ 1 ns*

Trigger	
Internal trigger [1]	
Range	*U2041XA/42XA/43XA/44XA: –25 to +26 dBm* *U2049XA: –25 to +20 dBm*
Resolution	*0.1 dB*
Level accuracy	*± 0.5 dB*
Latency	*1200 ns ± 50 ns*
Jitter	*≤ 5 ns rms*
External TTL trigger input	
High	*> 2.4 V*
Low	*< 0.7 V*
Latency	*300 ns ± 50 ns*
Minimum trigger pulse width	*15 ns*
Minimum trigger repetition period	*50 ns*
Maximum trigger voltage input	*5 V EMF from 50 Ω DC (current < 100 mA) or* *5 V EMF from 50 Ω pulse width < 1 s (current < 100 mA)*
Impedance	*100 kΩ (default), 50 Ω*
Jitter	*≤ 15 ns rms*
External TTL trigger output	
High	*> 2.4 V*
Low	*< 0.7 V*
Latency	*75 ns ± 12.5 ns*
Impedance	*50 Ω*
Jitter	*≤ 5 ns rms*
Trigger delay	
Range	*Normal mode:* [2] *± 1.0 s* *Average only mode: –1.6 ms to +1 s*
Resolution	*1% of delay setting, 50 ns minimum*
Trigger hold off	
Range	*1 µs to 400 ms*
Resolution	*1% of selected value (to a minimum of 50 ns)*
Trigger level threshold hysteresis	
Range	*± 3 dB*
Resolution	*0.05 dB*

1. Only applicable to U2042/44XA
2. Only applicable to U2042XA/44XA

General specifications

Inputs / Outputs	
Current requirement	Approximately 400 mA
Trigger input	Input has TTL compatible logic levels and uses a SMB connector
Interface	– U2041XA/42XA/43XA/44XA: USB 2.0 interface USB-TMC compliance – U2049XA: 10/100 Mbps RJ-45 Power Over Ethernet port, transfers data and power on one single cable, 802.3at compliant

Remote programming	
Command language	SCPI standard interface commands, IVI-COM, IVI-C drivers

Maximum measurement speed	
Free run trigger measurement	25,000 readings per second [1]
External trigger time-gated measurement	20,000 readings per second [2]
Average mode real time measurement	10,000 readings per second [3]

1. Tested under normal mode and fast mode, with buffer mode trigger count of 100, output in binary format, unit in watt, auto-zeroing, auto-calibration, and step detect disabled.
2. Tested under normal mode and fast mode, with buffer mode trigger count of 100, pulsed signal with PRF of 20 kHz, and pulse width at 15 µs.
3. Tested under average only mode and fast mode, with buffer mode trigger count of 100, aperture duration of 100 us, data format set to real, external trigger or immediate trigger setting.

General characteristics

Environmental compliance	
Temperature	Operating condition: 0 to 55 °C Storage condition: –40 to 70 °C
Humidity	Operating condition: Maximum 95% at 40 °C (non-condensing) Minimum 15% at 40 °C (non-condensing) Storage condition: Up to 90% at 65 °C (non-condensing)
Altitude	Operating condition: Up to 3000 m (9840 ft) Storage condition: Up to 15420 m (50000 ft)

Regulatory compliance	
The U2040 series complies with the following safety and EMC requirements	IEC 61010-1:2001 / EN61010-1:2001 (2nd edition) IEC 61326:2002 / EN 61326:1997 + A1:1998 +A3:2003 Canada: ICES-001:2004 Australia/New Zealand: AS/NZS CISPR11:2004

Others	U2041XA/42XA/43XA/44XA	U2049XA
Dimensions (Length x Width x Height)	168 mm x 46 mm x 35 mm	197 mm x 40 mm x 24 mm
Weight	Net weight: ≤ 0.3 kg Shipping weight: ≤ 1.3 kg	Net weight: ≤ 0.37 kg Shipping weight: ≤ 1.4 kg
Recommended calibration interval	1 year	1 year
Warranty	3 years	3 years

Additional specifications for U2042/44XA USB Peak and Average Power Sensor

Measured rise time percentage error versus signal-under-test rise time
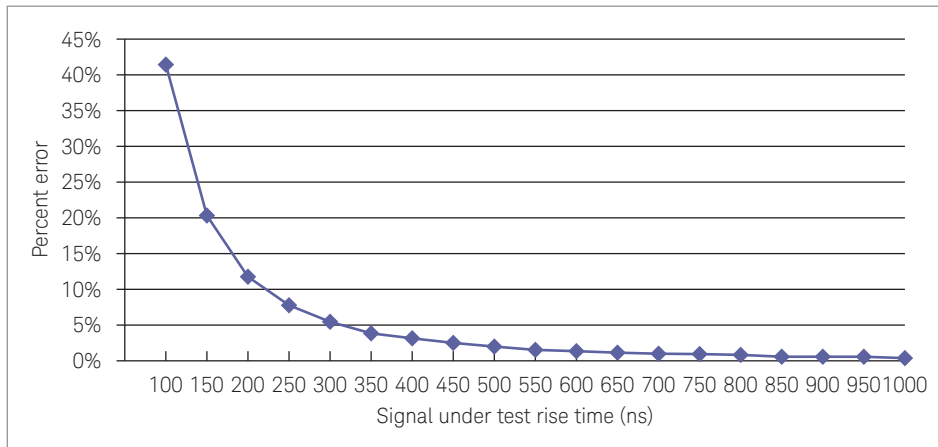

Figure 5.

Although the rise time specification is ≤ 100 ns, this does not mean that the U2040 X-Series can accurately measure a signal with a known rise time of 100 ns. The measured rise time is the root sum squares (RSS) of the signal-under-test (SUT) rise time and the system rise time:

$$\text{Measured rise time} = \sqrt{[(\text{SUT rise time})^2 + (\text{system rise time})^2]}$$

And the % error is:

$$\% \text{ error} = \left[\frac{\text{measured rise time} - \text{SUT rise time}}{\text{SUT rise time}} \right] \times 100$$

Characteristic peak flatness

The peak flatness is the flatness of a peak-to-average ratio measurement for various tone separations of an equal two-tone RF input. Figure 6 below refers to the relative error in peak-to-average ratio measurements as the tone separation is varied. The measurements were performed at –10 dBm.
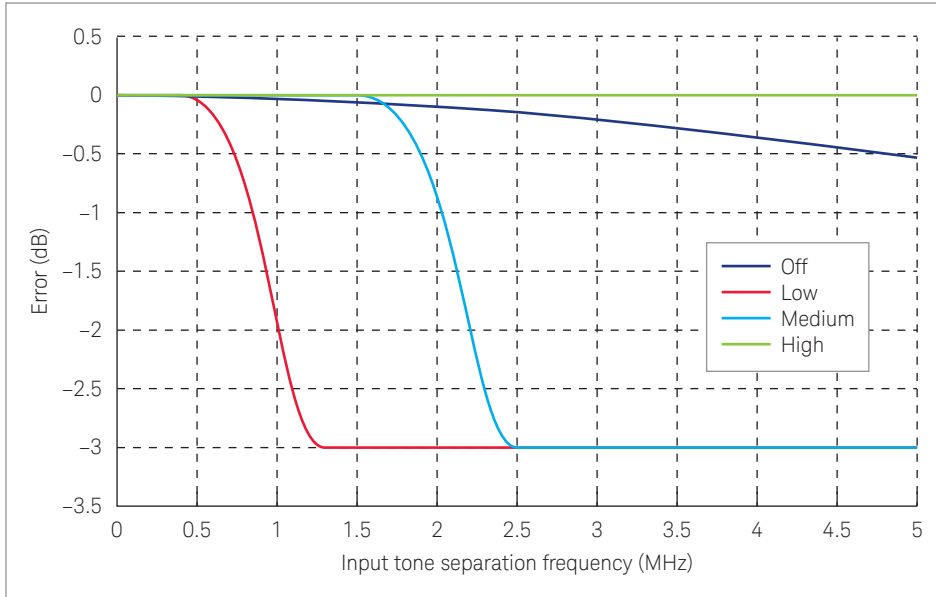

Figure 6. U2040 X-Series error in peak-to-average ratio measurements for a two-tone input
(High, Medium, Low and Off video bandwidth settings)

Using the U2040 X-Series with the BenchVue software

Keysight BenchVue software for the PC accelerates testing by providing intuitive, multiple instrument measurement visibility and data capture with no programming necessary. You can derive answers faster than ever by easily viewing, capturing and exporting measurement data and screen shots.

All models of the U2040 X-Series come with BenchVue software. BenchVue is provided on the Keysight Instrument Control Software disc, E2094-6000. Alternately, users can always download the latest version of the software cost free at www.keysight.com/find/BenchVue.
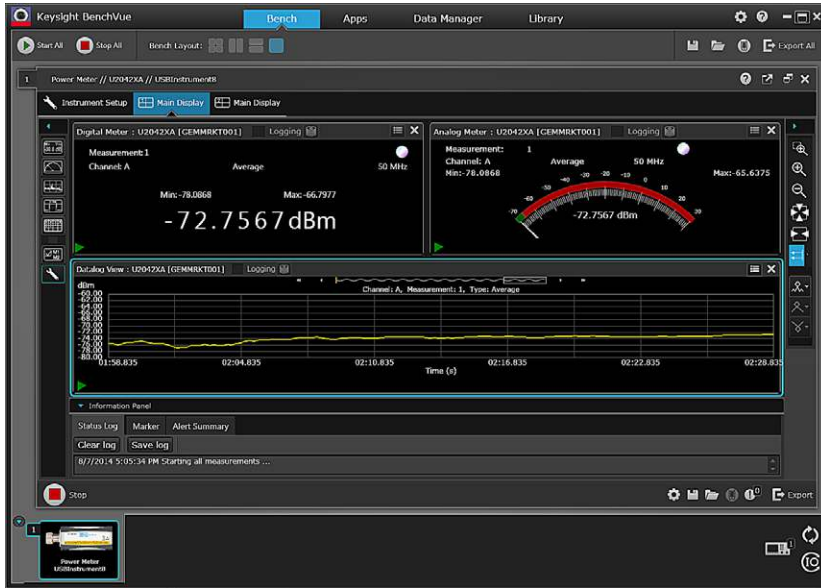

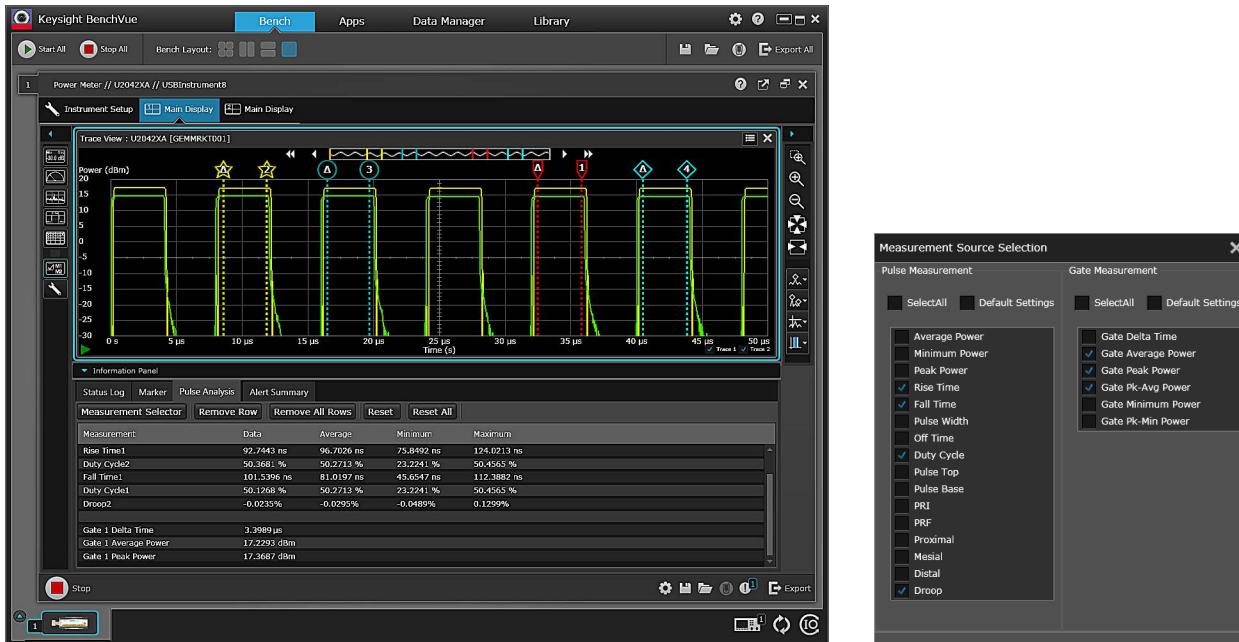Figure 7. Digital meter, analog meter and datalog view.

Figure 8. Multi-channel trace display with 4-pairs of gates and automatic pulse parameters measurement (sample screen shot with U2021XA and U2042XA).
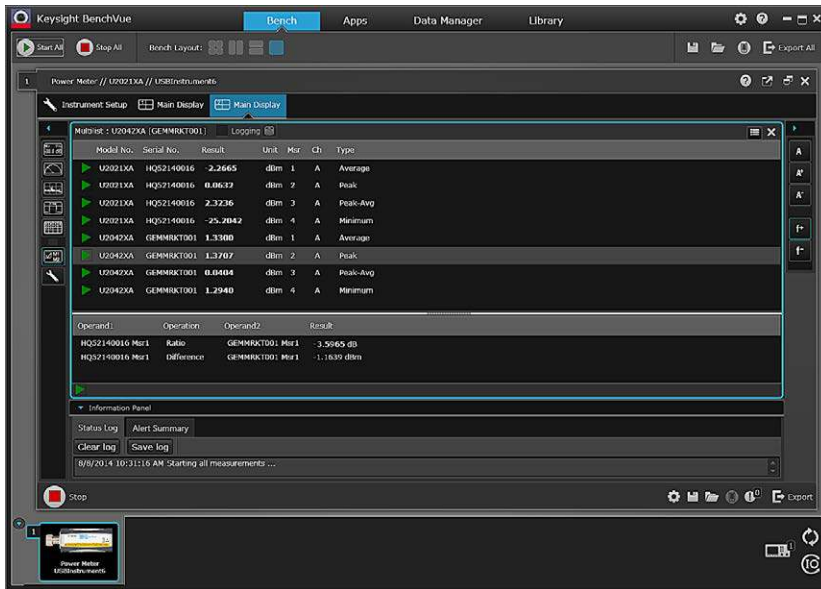
Figure 9. Multi-list view with ratio/difference function.

Supported functionality	
Measurement displays	Digital meter
	Analog meter
	Data log view
	Trace view (up to 4 channels or traces on one graph)
	Multilist with ratio / delta function
	Compact mode display
Graph functions	Single marker (up to 5 markers per graph)
	Dual marker (up to 2 sets of markers per graph)
	Graph autoscaling
	Graph zooming
	Gate measurement analysis (up to 4-pair of gates)
Pulse characterization functions	17-point automatic pulse parameters characterization
Instrument settings	Save and recall instrument state including graph settings
	Instrument preset settings (DME, GSM, WCDMA, WLAN, LTE, etc.)
	FDO tables
	Gamma and S-parameters tables
	Full instrumentation control include frequency/average/trigger settings, zero and calibration, etc.
Limit and alert function	Sensors Limit and alert notification
	Alert summary
Export data or screen shots	Data logging up to 1 hour (HDF5/MATLAB/Microsoft Excel/Microsoft Word/CSV)
	Save screen capture (PNG/JPEG/BMP)
Support models	U2020 series USB peak and average power sensors
	U2040 series wide dynamic range power sensors

System and installation requirements

PC operating system	
Windows 8 and 7	Windows 8 32-bit and 64-bit (Core, Professional, Enterprise)
	Windows 7 SP1 and later 32-bit and 64-bit (Professional, Enterprise, Ultimate)
Computer hardware	Professor: 1 GHz or faster (2 GHz or greater recommended)
	RAM: 1 GB (32-bit) or 2 GB (64-bit) (3 GB or greater recommended)
Windows XP SP3 32-bit (Professional)	Processor: 600 MHz or faster (1 GHz or greater recommended)
	RAM: 1 GB (2 GB or greater recommended)
Interfaces	USB, GPIB, LAN, RS-232
Display resolution	1024 x 768 minimum for single instrument view (higher resolutions are recommended for multiple instrument view)

Additional requirements

Software: BenchVue requires a VISA (Keysight or National Instruments) when used to connect to physical instruments. Keysight IO Libraries, which contains the necessary VISA, will be installed automatically when BenchVue is installed. IO Libraries information is available at: **www.keysight.com/find/iosuite**.

Ordering information

Model	Description
U2041XA	USB wide dynamic range average power sensor, 10 MHz to 6 GHz
U2042XA	USB peak and average power sensor, 10 MHz to 6 GHz
U2043XA	USB wide dynamic range average power sensor, 10 MHz to 18 GHz
U2044XA	USB peak and average power sensor, 10 MHz to 18 GHz
U2049XA, Option 100	LAN power sensor, 10 MHz to 33 GHz
U2049XA, Option TVA	LAN power sensor, 10 MHz to 33 GHz, thermal vacuum compliant
Standard shipped items	
U2041XA/42XA/43XA/44XA USB power sensor	USB cable 5 ft (1.5 m), default cable length BNC male to SMB female trigger cable, 50 Ω, 1.5 m (Quantity: 2) Certificate of calibration CD documentation Keysight Instrument Control Software CD (include BenchVue software)

U2049XA LAN power sensor	LAN cable 5 ft (1.5 m), default cable length
	  – Standard LAN cable for Option 100
	  – Thermal vacuum compliant (TVAC) LAN cable for Option TVA
	BNC male to SMB female trigger cable, 50 Ω, 1.5 m (Quantity: 2)
	Certificate of calibration
	CD documentation
	Keysight Instrument Control Software CD (include BenchVue software)

U2041XA/42XA/43XA/44XA USB power sensor options

Options	Description
Accessories	
U2000A-201	Transit case
U2000A-202	Soft carrying case
U2000A-203	Holster
U2000A-204	Soft carrying pouch
Cables (selectable during sensor purchase)	
U2000A-301	USB cable 5 ft (1.5 m)
U2000A-302	USB cable 10 ft (3 m)
U2000A-303	USB cable 16.4 ft (5 m)
Cables (ordered standalone)	
U2031A	USB cable 5 ft (1.5 m) – default selection
U2031B	USB cable 10 ft (3 m)
U2031C	USB cable 16.4 ft (5 m)
U2032A	BNC male to SMB female trigger cable, 50 ohm, 1.5 m
Calibration	
UK6	Commercial calibration with test data
1A7	ISO17025 compliant calibration and test data
A6J	ANSI Z540 compliant calibration and test data

U2049XA LAN power sensor options

Options	Description
Accessories	
U2035A	U2049XA sensor casing
U2036A	TVAC sensor bracket (for Option TVA only)
Standard LAN cables (selectable during sensor purchase and orderable standalone)	
U2034A	LAN cable 5 ft (1.5 m) – default selection for Option 100
U2034B	LAN cable 10 ft (3 m)
U2034C	LAN cable 16.4 ft (5 m)
U2034D	LAN cable 50 ft (15.2 m)
U2034E	LAN cable 100 ft (30.5 m)
U2034F	LAN cable 200 ft (61 m)
TVAC LAN cables (selectable during sensor purchase and orderable standalone)	
U2037A	LAN cable 5 ft (1.5 m) – default selection for Option TVA
U2037B	LAN cable 10 ft (3 m)
U2037C	LAN cable 16.4 ft (5 m)
U2037D	LAN cable 50 ft (15.2m)
U2037E	LAN cable 100 ft (30.5m)
U2037F	LAN cable 200 ft (61m)
Trigger cable	
U2032A	BNC male to SMB female trigger cable, 50 ohm, 1.5 m
Calibration	
UK6	Commercial calibration with test data
1A7	ISO17025 compliant calibration and test data
A6J	ANSI Z540 compliant calibration and test data

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