Keysight U8480 Series

USB Thermocouple Power Sensors

The World's Fastest USB Thermocouple Power Sensor

Data Sheet

KEYSIGHT TECHNOLOGIES

Improve your power measurement throughput

Improve your power measurement throughput with the world's fastest USB thermocouple power sensors. The Keysight Technologies, Inc. U8480 Series USB thermocouple power sensors come with a measurement speed of 900 readings/second and power linearity of less than 0.8%, providing high accuracy and stability to help you make average power measurements quickly and confidently. With the U8480 Series USB sensors, one of the most cost-effective solutions in Keysight's power meter and sensor portfolio, you get top performance features at costs so affordable that every engineer can carry one in their bags.

Frequency range down to DC

Cover a broad range of test applications with Keysight's first power sensor with the capability to measure down to DC. The U8481A (10 MHz to 18 GHz) and U8485A (10 MHz to 33 GHz) come with Option 200 versions, which expands the frequency range of the sensor from 10 MHz down to DC.

Built-in trigger in function

Synchronize your measurement capture with the built-in trigger in function, without the need of an external module. The trigger-in function allows you to connect an external trigger signal from a signal source or the device-under-test directly to the USB sensor through a standard BNC to SMB cable.

The external trigger input port on the U8481A.

Internal calibration

Save time and reduce measurement uncertainty with the internal calibration function. These sensors come 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. To perform zeroing, simply turn off the device-under-test.

Legacy excellence in a compact and portable form factor

The U8480 Series is based on the same front end design as the Keysight 8480 and N8480 Series power sensors, now equipped with USB capabilities and improved specifications such as a measurement speed ten times faster than the legacy series.

The U8480 Series fits easily in your bag, making the sensors ideal solutions for field applications such as base station testing.

The U8480 Series plugs directly into your PC or USB-enabled Keysight instrument and gives you the capability to measure power without needing an external power meter or power supply. The sensors draw power directly from a USB port and do not need additional triggering modules to operate. Begin measuring immediately when you connect the new USB power sensors to your PC or laptop; the U8480 Series sensors come bundled with the N1918A Power Panel software at no additional cost. The N1918A-100 Power Analyzer, with advanced features such as limit test and long term data logging, is available for purchase separately.

Fast measurement speed

The U8480 Series USB thermocouple power sensors offer a measurement speed of 900 readings/second (in fast mode), making them the world's fastest USB thermocouple power sensors. This feature is especially important in high volume manufacturing, where fast measurement speed is essential to maximize production throughput and increase productivity. By increasing the speed of measurements, test engineers can shorten the design cycle and accelerate the product time-to-market as they would require less time to carry out the same number of tests.

Real time measurement uncertainty

Measurement uncertainty is normally calculated manually by the user. The U8480 Series USB thermocouple power sensors now compute this value in real time and at any given point, removing the need for manual MU calculations, shortening test time and providing highly accurate measurements. Users can also display power measurements and their measurement uncertainty simultaneously.

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 N1918A power analysis manager. 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 measureable 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 N1918A power analysis manager. This error can now be corrected using the U8480 Series USB power sensor's S-parameter correction function. The sensor will behave as though it is connected directly to the DUT, giving users highly accurate power measurements.

Compatibility with other Keysight instruments

The U8480 Series, like all other Keysight USB power sensors, can be used as an accessory for other Keysight instruments, allowing these instruments to perform specific power measurement applications without needing to connect to a PC or laptop.

The U8480 Series power sensors are compatible with the Keysight FieldFox RF analyzers and MXG signal generator, giving them power meter functionalities, and with the MXG signal generator, user flatness correction (UFC) with external leveling as well. The U8480 Series also performs source power calibration with the Keysight PNA, PNA-L and PNA-X network analyzers. Please refer to the application note, *Compatibility of USB Power Sensors with Keysight Instruments* (5989-8743EN) for the latest compatibility information.

Firmware upgrade

The latest firmware for the U8480 Series includes executable file and help file for installing the Firmware Upgrade Utility application in order to upgrade the USB thermocouple power sensors. To download the latest firmware version for the U8480 Series, visit:
www.keysight.com/find/pm_firmware

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 characteristic specifications 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. There 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'.

Conditions

The power sensor will meet its specifications when:

- stored for a minimum 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.

U8480 Series USB Power Sensors Specifications

Key specifications		
Frequency range	U8481A Option 100	10 MHz to 18 GHz
	U8481A Option 200	DC to 18 GHz
	U8485A Option 100	10 MHz to 33 GHz
	U8485A Option 200	DC to 33 GHz
	U8487A Option 100	10 MHz to 50 GHz
	U8488A Option 100	10 MHz to 67 GHz 67 MHz to 70 GHz
Dynamic power range (average power)	–35 dBm to 20 dBm	
Power linearity[1]	–1 to +15 dBm	±0.50% (25 °C ± 10 °C)
		±0.55% (0 to 55 °C)
	+15 to +20 dBm	±0.55% (25 °C ± 10 °C)
		±0.60% (0 to 55 °C)
Zero set (20% to 70% RH)[2]	±25 nW[3]	
Internal calibration accuracy[4]	±0.52% (25 ± 10 °C)	
	±0.59% (0 to 55 °C)	
Zeroing duration	16 s	
Internal calibration duration	1.5 s	
External calibration duration	9 s	
Damage level	AC coupled (option 100)	25 dBm (average power), 50 V (DC) 15 W (2 µs duration) (peak power)
	DC coupled (option 200)	25 dBm (average power), 4 V (DC) 15 W (2 µs duration) (peak power)

1. *After zeroing and calibration at ambient environment conditions. Refer to "Power linearity" on page 5 for more details.*
2. *RH is the abbreviation for relative humidity.*
3. *Tested at 50 MHz.*
4. *The U8480 Series is equipped with an internal calibration capability, which means that it does not require a 1 mW power reference for calibration. This specification applies for the 50 MHz frequency and at least 3 hours of settling time with internal calibration.*

Power linearity

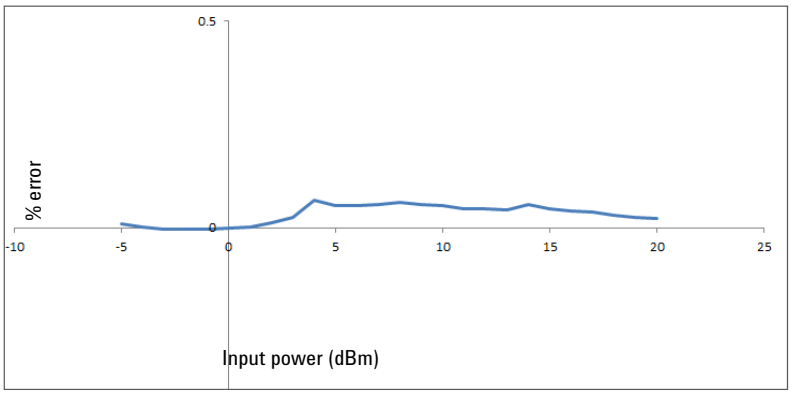


Figure 1. Typical U8480 Series power linearity at 25 °C, after zeroing and calibration with associated measurement uncertainty

Measurement Uncertainty

U8480 Series	–1 to +20 dBm
Measurement uncertainty (%)	±0.21

Maximum SWR

Frequency band	U8481A		Frequency band	U8485A	
	25 °C ± 10 °C	0 °C to 55 °C		25 °C ± 10 °C	0 °C to 55 °C
DC to 10 MHz[1]	1.11	1.14	DC to 10 MHz[1]	1.07	1.07
10 MHz to 30 MHz	1.37	1.57	10 MHz to 50 MHz	1.33	1.53
30 MHz to 50 MHz	1.14	1.16	50 MHz to 100 MHz	1.08	1.11
50 MHz to 2 GHz	1.08	1.11	100 MHz to 2 GHz	1.05	1.07
2 GHz to 12.4 GHz	1.16	1.16	2 GHz to 12.4 GHz	1.14	1.14
12.4 GHz to 18 GHz	1.23	1.25	12.4 GHz to 18 GHz	1.19	1.20
—	—	—	18 GHz to 26.5 GHz	1.26	1.28
—	—	—	26.5 GHz to 33 GHz	1.37	1.45

1. Only applicable for the U8480 Series Option 200 models.

Frequency band	U8487A		Frequency band	U8488A	
	25 °C ± 10 °C	0 °C to 55 °C		25 °C ± 10 °C	0 °C to 55 °C
10 MHz to 50 MHz	1.35	1.64	10 MHz to 100 MHz	1.06	1.06
50 MHz to 100 MHz	1.08	1.10	100 MHz to 2.4 GHz	1.06	1.07
100 MHz to 2 GHz	1.05	1.07	2.4 GHz to 12.4 GHz	1.13	1.14
2 GHz 12.4 GHz	1.10	1.10	12.4 GHz to 18 GHz	1.14	1.14
12.4 GHz to 18 GHz	1.16	1.16	18 GHz to 26.5 GHz	1.20	1.20
18 GHz to 26.5 GHz	1.22	1.22	26.5 GHz to 40 GHz	1.25	1.25
26.5 GHz to 40 GHz	1.30	1.30	40 GHz to 67 GHz	1.42	1.43
40 GHz to 50 GHz	1.34	1.33	67 GHz to 70 GHz	1.36	1.41

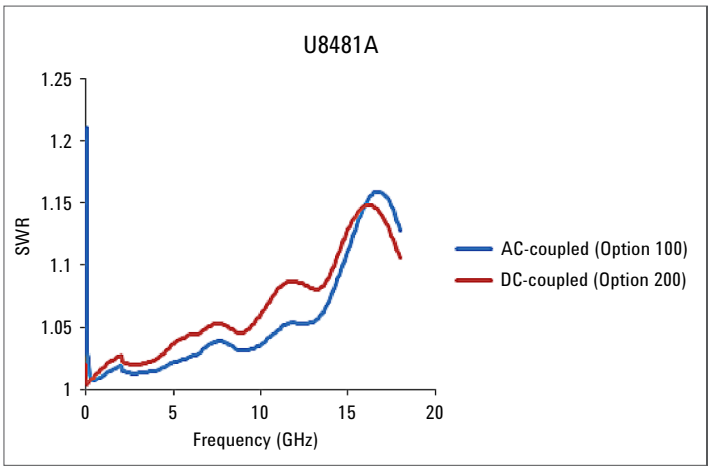


Figure 2. Typical SWR for the AC-coupled U8481A (Option 100) and the DC-coupled U8481A (Option 200)

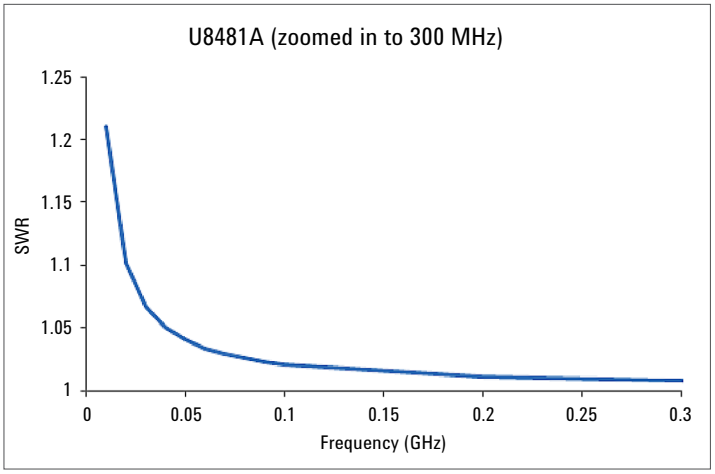


Figure 3. Typical SWR for the AC-coupled U8481A (Option 100) when zoomed in to 300 MHz

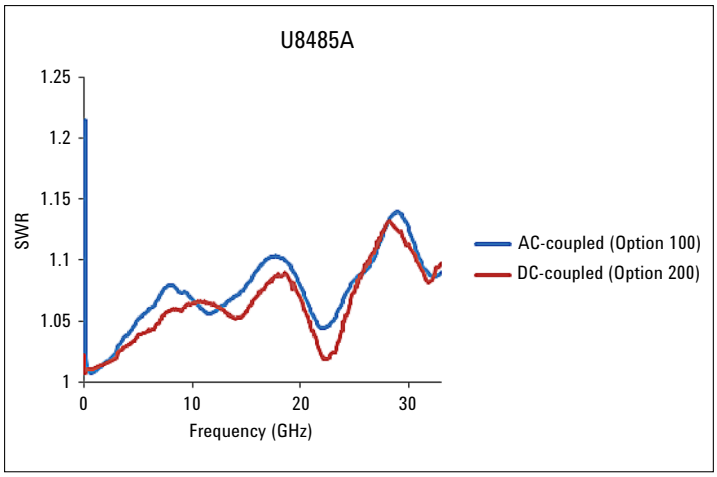


Figure 4. Typical SWR for the AC-coupled U8485A (Option 100) and the DC-coupled U8485A (Option 200)

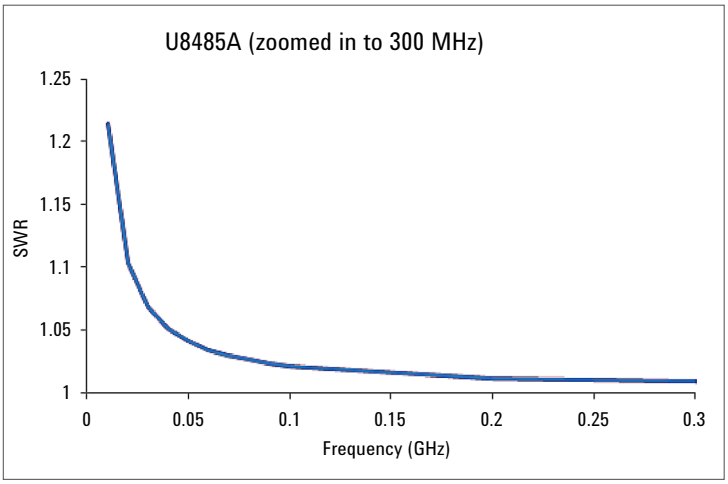


Figure 5. Typical SWR for the AC-coupled U8485A (Option 100) when zoomed in to 300 MHz

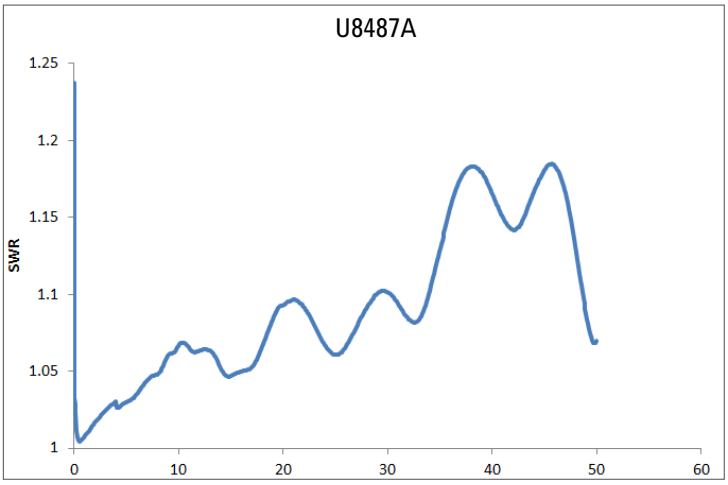


Figure 6. Typical SWR for the AC-coupled U8487A (Option 100)

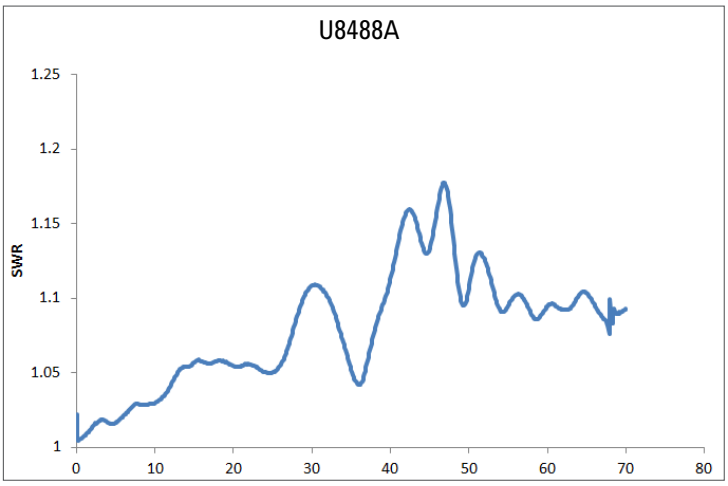


Figure 7. Typical SWR for the AC-coupled U8488A (Option 100)

Zero drift and measurement noise

Conditions (RH)[1]	Zero drift[2, 3]	Measurement noise[2, 4]
20% to 70%	*±5.5 nW*	*±45 nW*

1. *RH is the abbreviation for relative humidity.*
2. *Zero drift and measurement noise specifications are tested at 50 MHz.*
3. *Within 1 hour of warm up and after zeroing, at a constant temperature, taken over a period of 4 hours of the total measurement time. This drift is calculated based on the average of hourly drifts.*
4. *The number of averages at 16 for the normal mode, 32 for the ×2 mode, and 512 for the fast mode, at a constant temperature, measured over a 1-minute interval and two standard deviations.*

Noise multiplier

Number of averages	1	2	4	8	16	32	64	128	256	512	1024
Normal mode	3.17	2.62	2.02	1.54	1.00	0.82	0.60	0.50	0.37	0.27	0.15
×2 mode	4.55	3.76	3.00	2.25	1.59	1.00	0.85	0.63	0.47	0.42	0.23
Fast mode	46.88	33.06	24.00	17.19	12.24	8.39	4.93	4.11	2.48	1.00	0.83

Measurement rate

Measurement speed mode	Measurement speed
Normal	20 readings/s
Double	40 readings/s
Fast1	900 readings/s[2]

1. *To reduce sensor-dependent delay time, use the measurement buffer by setting the trigger count >1.*
2. *The measurement is taken with the averaging state set to off.*

Settling time

Number of averages	1	2	4	8	16	32	64	128	256	512	1024
Settling time(s) (Normal mode)1	0.10	0.15	0.25	0.45	0.85	1.63	3.20	6.36	12.6	25.2	50.4
Settling time(s) (×2 mode)1	0.08	0.10	0.15	0.25	0.45	0.89	1.63	3.20	6.35	12.6	25.2
Settling time(s) (Fast mode)1,2	0.003	0.005	0.007	0.011	0.020	0.036	0.069	0.134	0.265	0.528	1.053

1. *Manual filter, 10 dB decreasing power step.*
2. *Noise measurement in fast mode fluctuates at lower power. Although the averaging count (filter) is initially set to 256, if any of the 256 measurement samples taken are higher than –30 dBm, the firmware automatically changes the averaging count to 128.*

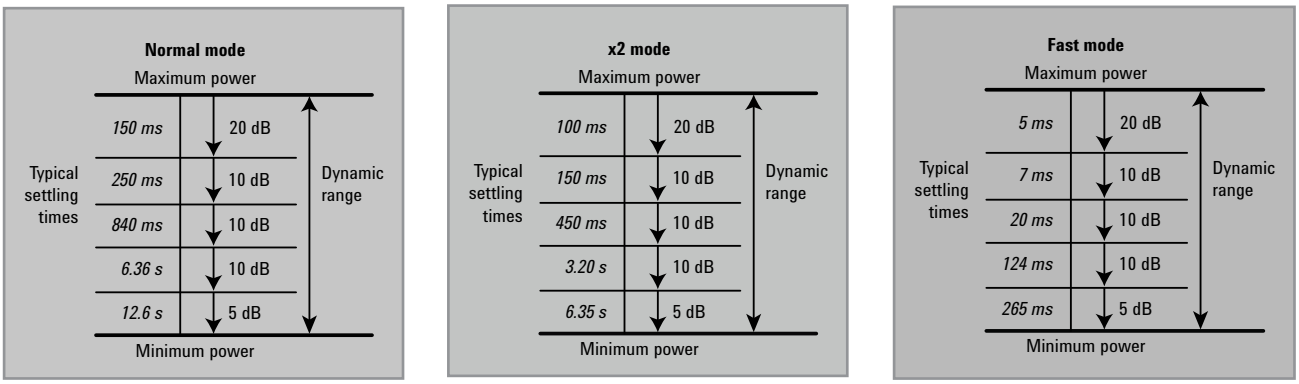


Figure 8. Auto-filter, default resolution, 10 dB decreasing power step

Calibration factor (CF) uncertainty

The typical measurement uncertainties listed are not to be taken as the maximum CF measurement uncertainties.

Note: The CF uncertainty is dependent on the calibration standard's uncertainty provided by Calibration Labs. For the exact uncertainty, refer to the individual sensor calibration report.

U8481A frequency band	25 °C ± 3 °C	25 °C ± 10 °C	0 °C to 55 °C
DC to 10 MHz[1]	2.63%	3.30%	3.44%
10 MHz to 30 MHz	1.05%	1.25%	2.35%
30 MHz to 500 MHz	0.85%	0.89%	1.10%
500 MHz to 1.2 GHz	0.78%	0.87%	0.87%
1.2 GHz to 6 GHz	0.91%	1.10%	1.51%
6 GHz to 14 GHz	1.26%	1.47%	2.04%
14 GHz to 18 GHz	1.59%	1.96%	2.39%

1. Only applicable for the U8480 Series Option 200 models.

U8485A frequency band	25 °C ± 3 °C	25 °C ± 10 °C	0 °C to 55 °C
DC to 10 MHz[1]	2.37%	2.80%	2.88%
10 MHz to 30 MHz	1.50%	1.49%	2.04%
30 MHz to 500 MHz	1.37%	1.46%	1.98%
500 MHz to 1.2 GHz	1.26%	1.52%	2.07%
1.2 GHz to 6 GHz	1.35%	1.68%	2.40%
6 GHz to 14 GHz	1.66%	2.26%	2.99%
14 GHz to 18 GHz	1.83%	2.47%	3.35%
18 GHz to 26.5 GHz	2.67%	3.75%	4.70%
26.5 GHz to 33 GHz	3.32%	4.79%	6.41%

1. Only applicable for the U8480 Series Option 200 models.

U8487A frequency band	25 °C ± 3 °C	25 °C ± 10 °C	0 °C to 55 °C
10 MHz to 30 MHz	1.79%	2.19%	4.15%
30 MHz to 500 MHz	1.78%	1.90%	2.24%
500 MHz to 1.2 GHz	1.79%	1.98%	2.34%
1.2 GHz to 6 GHz	1.82%	2.06%	2.48%
6 GHz to 14 GHz	1.88%	2.27%	2.53%
14 GHz to 18 GHz	1.90%	2.36%	2.71%
18 GHz to 26.5 GHz	2.09%	2.75%	3.23%
26.5 GHz to 33 GHz	2.66%	3.35%	3.92%
33 GHz to 34 GHz	2.66%	3.37%	4.10%
34 GHz to 35 GHz	2.66%	3.39%	4.10%
35 GHz to 40 GHz	2.66%	4.03%	4.69%
40 GHz to 45 GHz	3.73%	4.58%	5.43%
45 GHz to 50 GHz	4.68%	5.71%	6.68%

U8488A frequency band	25 °C ± 3 °C	25 °C ± 10 °C	0 °C to 55 °C
10 MHz to 50 MHz	2.04%	2.14%	2.16%
50 MHz to 100 MHz	1.94%	2.05%	2.05%
100 MHz to 2 GHz	1.98%	2.18%	2.36%
2 GHz to 12.4 GHz	2.13%	2.80%	3.56%
12.4 GHz to 18 GHz	2.24%	3.01%	3.88%
18 GHz to 26.5 GHz	2.52%	3.09%	3.89%
26.5 GHz to 50 GHz	4.66%	5.49%	6.65%
50 GHz to 67 GHz	5.14%	6.06%	7.48%
67 GHz to 70 GHz	5.70%	8.14%	9.16%

External trigger

External TTL trigger input	
High	>1.9 V
Low	<1.1 V
Latency[1]	11 µs ± 2 µs
Minimum trigger pulse width	35 ns
Minimum trigger repetition period	80 ns
Impedance	50 Ω or 1 MΩ
Trigger delay	
Range	0 s to 1 s
Resolution	10 µs

1. *External trigger latency is defined as the delay between the applied trigger crossing the trigger level and the U8480 Series switching into the triggered state.*

General specifications

Acquisition		
Analog-to-digital converter (ADC) sampling rate	192 kHz	
ADC resolution	24 bits	
Integration time1	1.024 ms	
Other		
Current requirement	400 mA (approximately)	
Connector	U8481A	N-Type (m), 50 Ω
	U8485A	3.5 mm (m), 50 Ω
	U8487A	2.4 mm (m), 50 Ω
	U8488A	1.85 mm (m), 50 Ω
Cable	USB 2.0 Type A to 5-pin Mini-B	
Interface	USB 2.0 interface, USB-TMC compliant	
Programmability	SCPI, Keysight VEE, LabVIEW, Microsoft Visual Basic	
Calibration	1 year	

1. *Integration time is the period during which the U8480 Series ADC samples the input signal for a measurement.*

Typical plot

The following typical plot is intended to provide additional information, useful in applying the U8480 Series by giving typical but not warranted performance parameters.

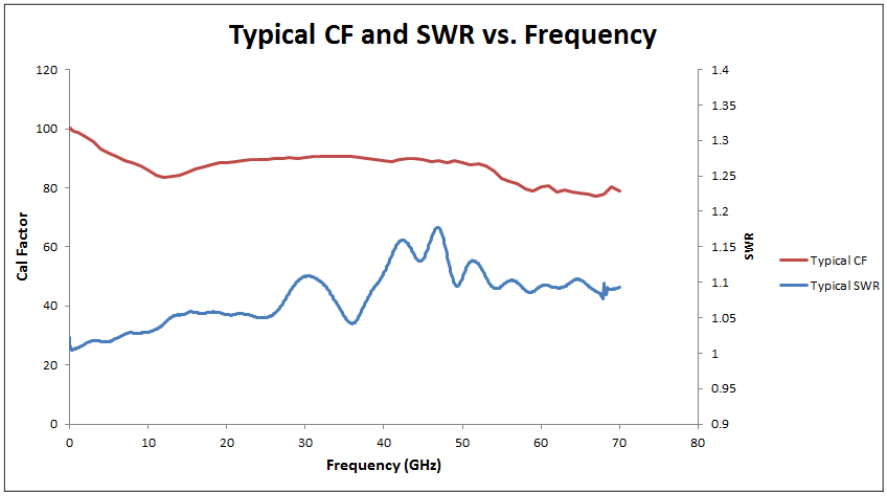


Figure 9. Typical calibration factor (CF) and SWR vs. frequency

General Characteristics

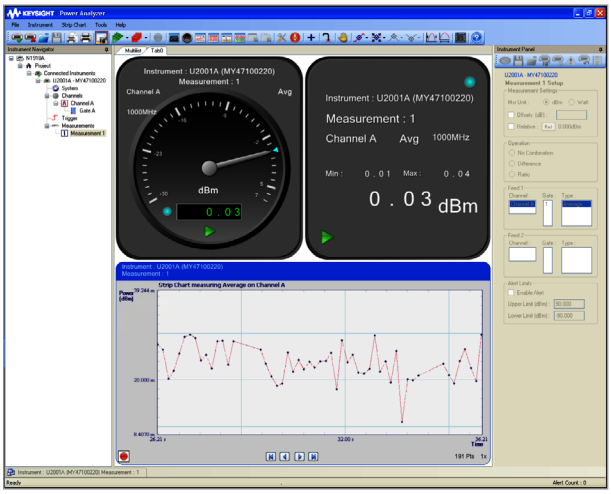
Environmental compliance	
Temperature	Operating condition: 0 °C to 55 °C
	Storage condition: –40 °C to 71 °C
Humidity	Maximum Operating condition: 95% RH at 40 °C (non-condensing) Minimum Operating condition: 15% RH at 25 °C (non-condensing) Storage condition: Up to 90% RH at 65 °C (non-condensing)
Altitude	Operating and storage conditions: Up to 4.6 km (15000 ft)
Regulatory compliance	
The U8480 Series USB thermocouple power sensor complies with the following EMC requirements:	IEC 61326-1:2005 / EN 61326-1:2006 Canada: ICES/NMB-001: Issue 4, June 2006 Australia/New Zealand: AS/NZS CISPR11:2004
(Length × Width × Height)	U8481A: 145 mm × 46 mm × 35.90 mm U8485A: 136.50 mm × 46 mm × 35.90 mm U8487A: 127.70 mm x 4 mm x 35.90 mm U8488A: 128.50 mm x 4 mm x 35.90 mm
Weight	
Net weight:	U8481A: 0.256 kg U8485A: 0.25 kg U8487A: 0.22 kg U8488A: 0.22 kg
Shipping weight:	U8481A: 1.35 kg U8485A: 1.402 kg U8487A: 1.37 kg U8488A: 1.37 kg
Connectivity	
USB 2.0, with the following cable lengths:	Option 301: 1.5 m Option 302: 3 m Option 303: 5 m
Recommended calibration interval	1 year
Pollution	Degree 2
Warranty	3 years

Using the U8480 Series with the N1918A Power Analysis Manager

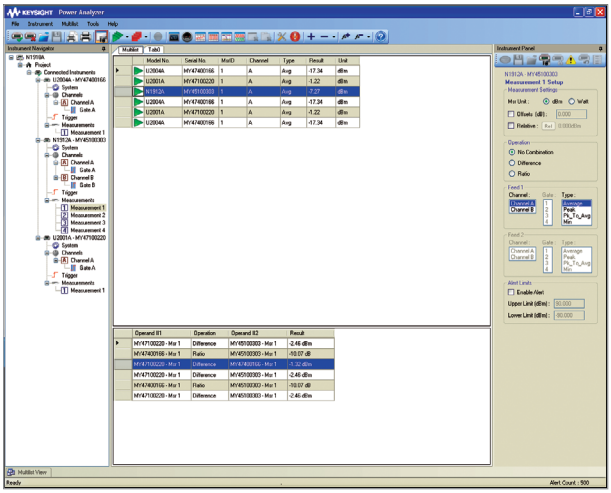
N1918A Power Analysis Manager is a powerful application software that complements the U8480 Series, U2020 X-series and U2000 series USB power sensors, offering easy monitoring and analysis on a PC display.

There are two versions of the N1918A software: the basic Power Panel and the advanced Power Analyzer. Power Analyzer provides full access to the software's complete features and capabilities and its licenses, N1918A-100 (PC license) and N1918A-200 (USB dongle license), are available for purchase separately.

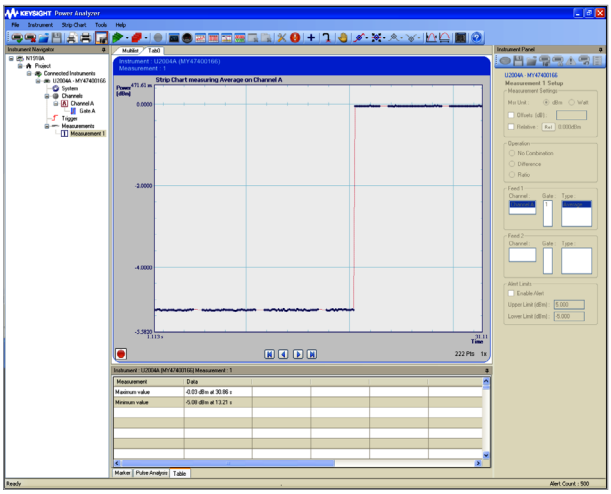
The U8481A and U8485A each come with the N1918A Power Panel software at no additional cost. A N1918A Power Analysis Manager software CD will be shipped together with the USB power sensor. Users can also download the software from www.keysight.com/find/N1918A.



Multiple display types



Data recording with limit and alert settings



Multiple channel list and measurement math

N1918A Power Analysis Manager functions

	Power panel (basic)	Power analyzer (advanced)
Measurement display		
Compact mode display	√	√
Soft panel (digital) display	√	√ (enhanced with limits and alerts notifications)
Gauge (analog) display	√	√ (enhanced with limits and alerts notifications)
Strip chart display	√	√
Multiple tabs	—	√
Multiple display per tab	√	√
Multilist	√	√
Graph functions		
Single marker	√ (up to 2 markers per graph)	√ (up to 10 markers per graph)
Dual marker	√ (one set of markers per graph)	√ (up to 5 sets of markers per graph)
Graph autoscaling	√	√
Graph zooming	√	√
Measurement math (delta, ratio)	√	√
Save/Load file functions		
Save measurement data (with timestamp)	√ (applies to strip chart display; up to 10,000 data points)	√ (applicable in Strip Chart and Trace Graph)
Load measurement data	√ (application in Strip Chart and Trace Graph)	√ (applicable in Strip Chart and Trace Graph)
Data recording (with timestamp)	—	√ (applicable in Trace Graph[1], Soft Panel, Strip Chart and Gauge)
Instrument settings options		
Save and restore instrument setting	√	√
Time-gated measurements	√	√
Instrument preset settings	√	√
FDO table parameters	√	√
Measurement limit and alert functions		
Limit and alert notification	—	√
Alert summary	—	√
Support function		
Print application screen	√	√

1. Recording time for trace graphs may vary based on trace graph settings

N1918A attributes

Other software attributes	
Display units:	Absolute: Watts or dBm Relative: Percent or dB
Display resolution:	Resolution of 1.0, 0.1, 0.01 and 0.001 dB in log mode; one to four digits in linear mode
Default resolution:	0.01 dB in log mode; three digits in linear mode
Zero:	For performing internal and external zeroing
Range:	Sensor-dependent, configurable in 1-kHz steps
Relative:	Displays all successive measurements relative to the last referenced value
Offset:	Allows power measurements to be offset by –100 dB to +100 dB, configurable in 0.001 dB increments, to compensate for external loss or gain
Duty cycle:	Duty cycle values between 0.001% to 99.999% can be entered in increments of 0.01% to display a pulse power representation of measured power. The following equation is used to calculate the displayed pulse power value: Pulse Power = Measured Power/Duty Cycle
Limits:	High and low limits can be set in the range between –150.00 dBm to +230.00 dBm, in 0.001 dBm increments.
Preset default values:	Channel Offset (dB) = 0, Duty Cycle Off, Frequency 50 MHz, AUTO Average, AUTO Range, Free Run Mode, dBm mode

System requirements

Hardware	
Processor	Desktop PC: 1.3 GHz Pentium IV or higher recommended Laptop PC: 900 MHz Pentium M or higher recommended
RAM	512 MB (1.0 GB or higher recommended)
Hard disk space	1.0 GB or more free disk space at runtime
Resolution	800 x 600 or higher (1280 x 1024 recommended)
Operating system and browser	
Operating system	– Windows 7 32-bit and 64-bit – Windows Vista 32-bit and 64-bit – Windows XP Professional 32-bit Service Pack 2 or higher
Browser	Microsoft Internet Explorer 5.1 (6.0 or higher recommended)
Others	Any of the followi ng to be pre-installed: – GPIB IO interface card – LAN interface card – USB/GPIB interface connector
Software	
Keysight IO Libraries Suit	Version 15.5[1] or higher
Microsoft .NET Framework	Runtime version 3.5
Microsoft Visual C++ 2005 Runtime Libraries[2]	Version 1.0 or higher

1. Available on the Keysight Automation-Ready CD-ROM. Keysight IO Libraries Suite 15.5 is required if your PC is running on Windows Vista 32.bit operating system
2. Bundled with N1918A Power Analysis Manager CD

Ordering Information

Model	Description
U8481A	USB thermocouple power sensor (Type-N)
U8481A-100	Standard option - 10 MHz to 18 GHz
U8481A-200	DC couple option - DC to 18 GHz
U8485A	USB thermocouple power sensor (3.5 mm)
U8485A-100	Standard option - 10 MHz to 33 GHz
U8485A-200	DC couple option - DC to 33 GHz
U8487A	USB thermocouple power sensor (2.4 mm)
U8487A-100	Standard option - 10 MHz to 50 GHz
U8488A	USB thermocouple power sensor (1.85 mm)
U8488A-100	Standard option - 10 MHz to 67 GHz
Standard Shipped Items	
	– Power sensor cable 5 ft (1.5 m), default cable length – Trigger cable, BNC male to SMB female, 50 Ω, 1.5 m – Certificate of calibration – Documentation CD-ROM – N1918A Power Analysis Manager software CD-ROM – Keysight IO Libraries Suite Software CD – U8485A: 3.5 mm (f) to N-Type (m) adapter[1] – U8487A/88A: 2.4 mm (f) to N-Type (m) adapter[1]

1. Not applicable to U8481A

Options

	Travel kits	
	U2000A-201	Transit case
	U2000A-202	Soft carrying case
	U2000A-203	Holster
	U2000A-204	Soft carrying pouch
	Cables (selectable during sensor purchase)	
	U2000A-301	Power sensor cable, 5 ft (1.5 m)
	U2000A-302	Power sensor cable, 10 ft (3 m)
	U2000A-303	Power sensor cable, 16.4 ft (5 m)

Options (continued)

Cables	
U2031A	Power sensor cable, 5 ft (1.5 m)
U2031B	Power sensor cable, 10 ft (3 m)
U2031C	Power sensor cable, 16.4 ft (5 m)
U2032A	BNC male to SMB female trigger cable, 50 Ω, 1.5 m
Calibration	
U848xA-1A7	ISO17025 compliant calibration and test data
U848xA-A6J	ANZIZ540 compliant calibration and test data
N1918A Power Analysis Manager software	
N1918A-100	Power Analyzer (with PC license)
N1918A-200	Power Analyzer (with USB license)
Documentation	
U8481A/85A/87A/88A-ABJ	Japan - Japanese user guide; printed
U8481A/85A/87A/88A-0B1	English language user guide; printed
U8481A/85A/87A/88A-ABZ	Italy - Italian language user guide; printed
U8481A/85A/87A/88A-ABE	Spain - Spanish user guide; printed
U8481A/85A/87A/88A-ABD	Germany - German user guide; printed
U8481A/85A/87A/88A-AB2	China - Simplified Chinese user guide; printed
U8481A/85A/87A/88A-ABF	France - French language user guide; printed
U8481A/85A/87A/88A-0BF	English language programming guide; printed
U8481A/85A/87A/88A-0BN	English language service guide; printed

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