

Keysight Technologies

Power Meters and Sensors

Selection Guide

Peak Power Measurement**8990B
peak power analyzer**

- 5 ns rise time/fall time
- 100 MSa/s sampling rate
- 15 inch XGA color and touchscreen display

**N8262A P-Series
modular power meters**

- 1U half-rack size
- 100 MSa/s continuous sampling, single-shot 30 MHz VBW
- Wireless presets include WLAN, radar and MPCA
- Code-compatible with N1912A P-Series power meter

**N1911A/2A P-Series
power meters**

- 100 MSa/s continuous sampling, single-shot 30 MHz VBW
- Includes time-gated and statistical (CCDF) power measurements
- Wireless presets include WiMAX™, HSDPA and DME

**E4416A/7A EPM-P Series
power meters**

- 20 MSa/s continuous sampling, 5 MHz VBW
- Bundled analyzer software for pulse and statistical analysis
- Wireless presets include GSM, Bluetooth® and W-CDMA

Average Power Measurement**N1913A/14A EPM Series power meters**

- Single, dual or four-channel measurements
- Frequency range of 9 kHz to 110 GHz; power range of -70 dBm to +44 dBm (depending on power sensor)
- Fast measurement speed of 400 readings/s
- Code-compatible with legacy E4418B/9B EPM Series, 436A, 437B and 438A power meters (43X compatibility only with option N191xA-200)

N432A thermistor power meters

- High Accuracy ($\pm 0.2\% \pm 0.5 \mu\text{W}$), excellent for 1 mW transfer calibration (with 478A-H75/H76)
- Built-in 6.5-digit ADC eliminates the need for an external DMM
- Digital color LCD display, and user-friendly interface

Portable Power Measurement**V3500A
handheld RF
power meters**

- Broad 10 MHz to 6 GHz frequency range
- Wide dynamic range (-60 dBm to +20 dBm)
- Absolute accuracy up to ± 0.21 dB
- Built-in display with backlight and integrated power sensor
- Internal power reference enables self-calibration before use
- 3-ways power up capability (via AA batteries, USB interface, and AC power adaptor)

**U2000 Series
USB power sensors**

- -60 dBm to +44 dBm, 9 kHz to 26.5 GHz average power measurements without power meters
- Quick and easy set up with USB connectivity
- Internal zeroing without disconnecting from device under-test
- Bundled N1918A Power Analysis Manager software for easy monitoring and troubleshooting

**U8480 Series
USB thermocouple
power sensors**

- DC to 67 GHz (sensor dependent), -35 dBm to +20 dBm
- Measurement speed of 900 readings/second and power linearity of $< 0.8\%$
- Bundled with N1918A Power Panel software
- Real time measurement uncertainty feature

**U2020 X-Series
USB peak and average
power sensors**

- -30 dBm to +20 dBm (peak/gated), -45 dBm to 20 dBm (average only mode), 50 MHz to 18 GHz/40 GHz
- 25,000 readings/second measurement speed (buffer mode)
- Internal zero and calibration
- Built-in trigger in/trigger out

**U2040 X-Series
wide dynamic range
power sensors**

- 10 MHz to 33 GHz (sensor dependant), -70 dBm to +26 dBm
- 50,000 readings/second (fast/buffered mode)
- Bundled with BenchVue software
- World's first LAN sensor with thermal vacuum option

Power Sensors**Peak and Average power sensors**

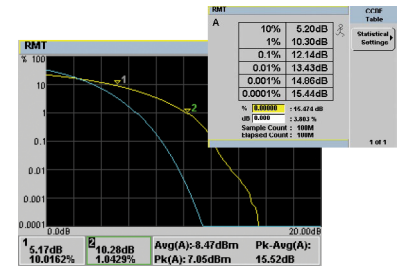
N1921A/22A P-Series power sensors
N1923A/24A wideband power sensors
E9320 E-Series power sensors

Average power sensors

E4410, E9300 E-Series power sensors
N8480 Series thermocouple power sensors
848xD Series, E/V/W8486A diode power sensors
478A, 8478B thermistor power sensors

Designed for Manufacturing

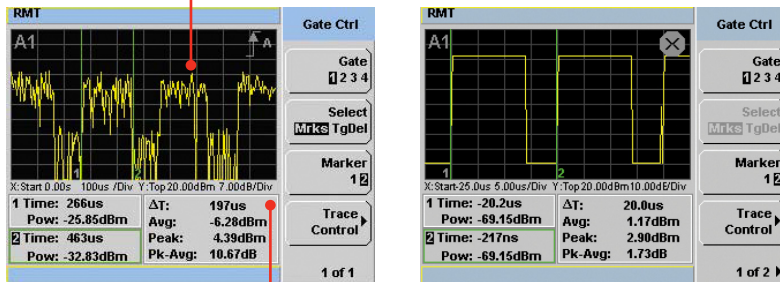
- Up to 100 MSa/s sampling rate and 1500 readings/s for high productivity with P-Series power meters
- Code-compatible with legacy power meter so you save time and effort in developing new codes
- Backward-compatible with all legacy power sensors to protect sensor investment
- Wide selection of average and peak power sensors for various applications
- CCDF statistical measurement in graphical and tabular formats for wireless component manufacturing



Designed for R&D

- Calibration factors in EEPROM ensures accurate measurements
- Intuitive user interface enables quick setup time
- Graphical representation of delta measurements eases visualization and analysis
- Trace zoom helps in investigating glitches, overshoot, and rise/fall time
- Capture wireless burst signals easily with P-Series power meter's WLAN/GSM/LTE/WIMAX preset
- Setting up faster and easier with **radar preset** in the P-Series power meter

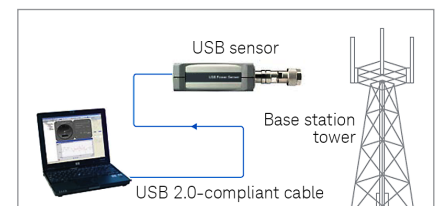
100 MSa/s continuous sampling ensures signal glitches are not missed



Time-gated peak, average and peak-to-average ratio power measurements

Designed for Installation and Maintenance

- Wide dynamic range in E-Series, N8480 Series and 848xD Series power sensors allows high and low power measurements with a single sensor
- Internal rechargeable battery option and operating case add to the EPM Series power meter's portability
- High resolution display with wide viewing angle and split-screen eases reading in subdued lighting conditions
- Light weight and palm size V3500A and the U2020 X-Series, U8480 Series and U2000 Series USB power sensors bring greater convenience in field tasks



When you need to take power measurements on the road or up a base station tower, smaller, lighter and fewer is better. With Keysight Technologies, Inc. USB power sensors, the only other thing you'll need is a laptop with the N1918A Power Analysis Manager installed.



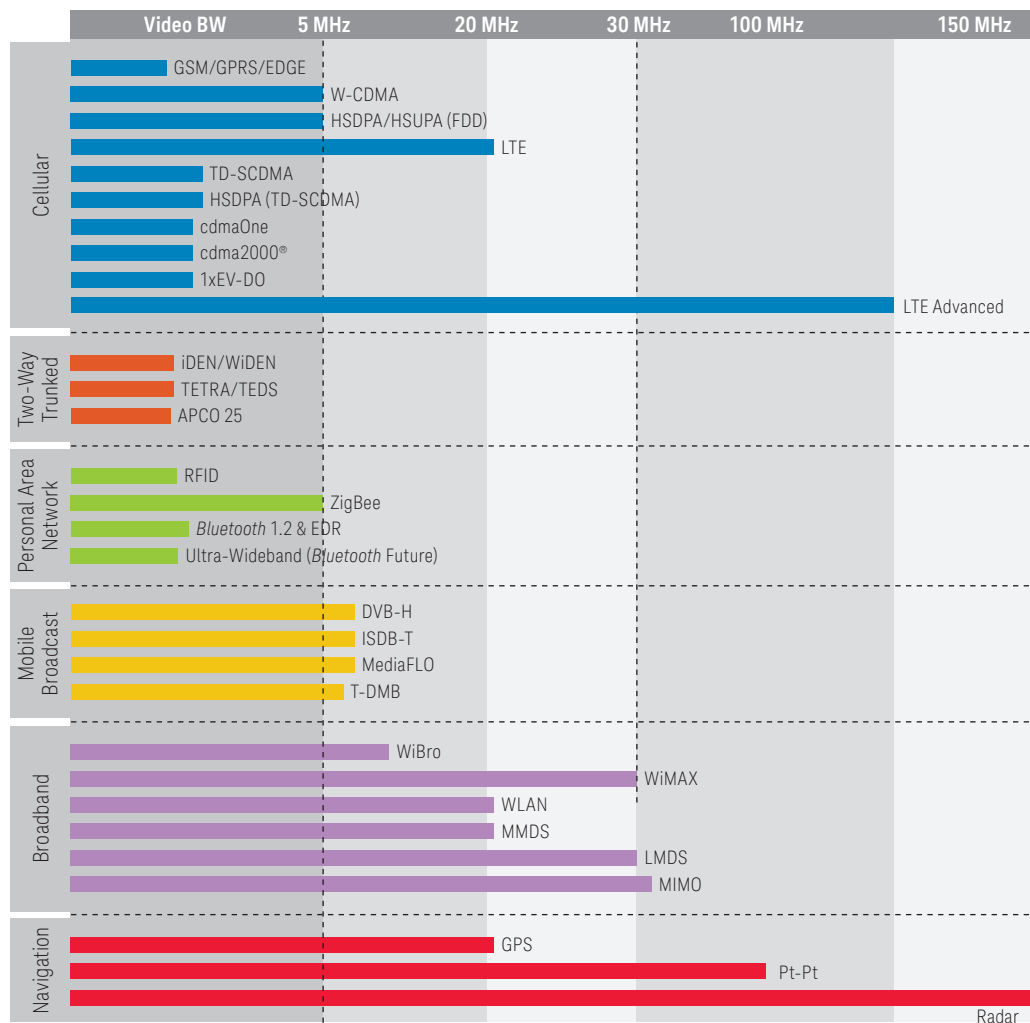
* Also compatible with all average power sensors



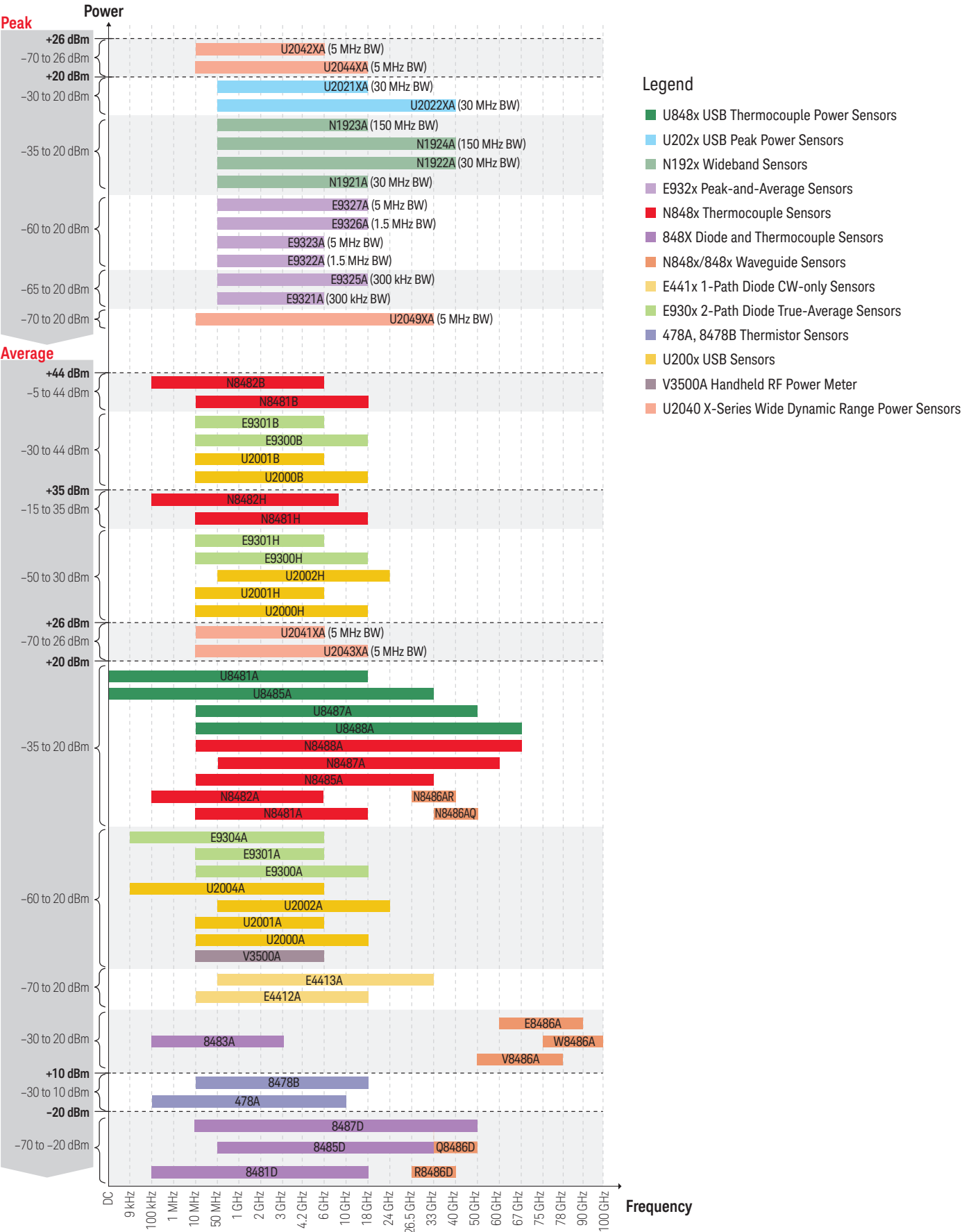
* Also compatible with all average power sensors



- N1923A/24A Wideband Sensors (150 MHz)
- N1921A/22A Wideband Sensors (30 MHz)



Power Sensors Selection Chart for Wireless Communication



Power Meters and Sensors Compatibility Table

		POWER METERS							Product Description/ Sensor Tech.	Frequency Range	Power Range
		N432A/432A ¹	E4416A/17A EPM-P	N1913A/14A E4418B/9B EPM ²	E1416A VXI	N1911A/12A N8262A P-Series	8990B				
POWER SENSORS	U2040 X-Series wide dynamic range power sensors	U2041XA	-	-	-	-	-	√ ⁵	Diode Power Sensor	10 MHz to 6 GHz	-70 dBm (100 pW) to +26 dBm (398 mW)
		U2042XA	-	-	-	-	-	√ ⁵	Diode Power Sensor	10 MHz to 6 GHz	-70 dBm (100 pW) to +26 dBm (398 mW)
		U2043XA	-	-	-	-	-	√ ⁵	Diode Power Sensor	10 MHz to 18 GHz	-70 dBm (100 pW) to +26 dBm (398 mW)
		U2044XA	-	-	-	-	-	√ ⁵	Diode Power Sensor	10 MHz to 18 GHz	-70 dBm (100 pW) to +26 dBm (398 mW)
		U2049XA	-	-	-	-	-	-	Diode Power Sensor	10 MHz to 33 GHz	-70 dBm (100 pW) to +20 dBm (100 mW)
	U8480 Series USB thermocouple sensors	U8481A	-	-	√ ³	-	-	√ ⁴	Thermocouple Power Sensor	DC/10 MHz to 18 GHz	-35 dBm (316 nW) to +20 dBm (100 mW)
		U8485A	-	-	√ ³	-	-	√ ⁴	Thermocouple Power Sensor	DC/10 MHz to 33 GHz	-35 dBm (316 nW) to +20 dBm (100 mW)
		U8487A	-	-	√ ³	-	-	√ ⁴	Thermocouple Power Sensor	10 MHz to 50 GHz	-35 dBm (316 nW) to +20 dBm (100 mW)
		U8488A	-	-	√ ³	-	-	√ ⁴	Thermocouple Power Sensor	10 MHz to 67 GHz	-35 dBm (316 nW) to +20 dBm (100 mW)
	U2020 X-Series USB sensors	U2021XA	-	-	-	-	-	√ ^{4, 5}	Diode Power Sensor	50 MHz to 18 GHz	-35 dBm (316 nW) to +20 dBm (100 mW)
		U2022XA	-	-	-	-	-	√ ^{4, 5}	Diode Power Sensor	50 MHz to 40 GHz	-35 dBm (316 nW) to +20 dBm (100 mW)
	Wideband power sensors	N1923A	-	-	-	-	-	√	Diode Power Sensor	50 MHz to 18 GHz	-35 dBm (316 nW) to +20 dBm (100 mW)
		N1924A	-	-	-	-	-	√	Diode Power Sensor	50 MHz to 40 GHz	-35 dBm (316 nW) to +20 dBm (100 mW)
	P-Series Wideband sensors	N1921A	-	-	-	-	√	√	Diode Power Sensor	50 MHz to 18 GHz	-35 dBm (316 nW) to +20 dBm (100 mW)
		N1922A	-	-	-	-	√	√	Diode Power Sensor	50 MHz to 40 GHz	-35 dBm (316 nW) to +20 dBm (100 mW)
	E-Series Peak-and-Average sensors	E9321A	-	√	-	-	√	-	Diode Power Sensor	50 MHz to 6 GHz	-65 dBm (320 pW) to +20 dBm (100 mW)
		E9322A	-	√	-	-	√	-	Diode Power Sensor	50 MHz to 6 GHz	-60 dBm (1 nW) to +20 dBm (100 mW)
		E9323A	-	√	-	-	√	-	Diode Power Sensor	50 MHz to 6 GHz	-60 dBm (1 nW) to +20 dBm (100 mW)
		E9325A	-	√	-	-	√	-	Diode Power Sensor	50 MHz to 18 GHz	-65 dBm (320 pW) to +20 dBm (100 mW)
		E9326A	-	√	-	-	√	-	Diode Power Sensor	50 MHz to 18 GHz	-60 dBm (1 nW) to +20 dBm (100 mW)
		E9327A	-	√	-	-	√	-	Diode Power Sensor	50 MHz to 18 GHz	-60 dBm (1 nW) to +20 dBm (100 mW)
	E-Series True Average sensors	E9300A	-	√	√	-	√	-	Diode Power Sensor	10 MHz to 18 GHz	-60 dBm (1 nW) to +20 dBm (100 mW)
		E9301A	-	√	√	-	√	-	Diode Power Sensor	10 MHz to 6 GHz	-60 dBm (1 nW) to +20 dBm (100 mW)
		E9304A	-	√	√	-	√	-	Diode Power Sensor	9 kHz to 6 GHz	-60 dBm (1 nW) to +20 dBm (100 mW)
		E9300B	-	√	√	-	√	-	Diode Power Sensor	10 MHz to 18 GHz	-30 dBm (1 μW) to +44 dBm (25 W)
		E9301B	-	√	√	-	√	-	Diode Power Sensor	10 MHz to 6 GHz	-30 dBm (1 μW) to +44 dBm (25 W)
		E9300H	-	√	√	-	√	-	Diode Power Sensor	10 MHz to 18 GHz	-50 dBm (10 nW) to +30 dBm (1 W)
		E9301H	-	√	√	-	√	-	Diode Power Sensor	10 MHz to 6 GHz	-50 dBm (10 nW) to +30 dBm (1 W)
	E-Series CW-only sensors	E4412A	-	√	√	-	√	-	Diode Power Sensor	10 MHz to 18 GHz	-70 dBm (100 pW) to +20 dBm (100 mW)
		E4413A	-	√	√	-	√	-	Diode Power Sensor	50 MHz to 26.5 GHz	-70 dBm (100 pW) to +20 dBm (100 mW)
	N8480 / 8480 Series Thermocouple and Diode sensors	N8481A	-	√	√	-	√	-	Thermocouple Power Sensor	10 MHz to 18 GHz	-35 dBm (316 nW) to +20 dBm (100 mW)
		N8482A	-	√	√	-	√	-	Thermocouple Power Sensor	100 kHz to 6 GHz	-35 dBm (316 nW) to +20 dBm (100 mW)
		8483A	-	√	√	√	√	-	Thermocouple Power Sensor	100 kHz to 2 GHz	-30 dBm (1 μW) to +20 dBm (100 mW)
		N8485A	-	√	√	-	√	-	Thermocouple Power Sensor	10 MHz to 26.5 GHz	-35 dBm (316 nW) to +20 dBm (100 mW)
		N8487A	-	√	√	-	√	-	Thermocouple Power Sensor	50 MHz to 50 GHz	-35 dBm (316 nW) to +20 dBm (100 mW)
		N8488A	-	√	√	-	√	-	Thermocouple Power Sensor	10 MHz to 67 GHz	-35 dBm (316 nW) to +20 dBm (100 mW)

1. The 432A model is superceded by the N432A.

2. The E4418B/19B models are superceded by the N1913A/14A.

3. Only with N1913A/14A.

4. Requires the N1918A Power Analysis Manager software.

5. Requires the BenchVue software (for U2020 X-Series, version 2.5 and above; for U2040 X-Series, version 2.6 and above).

* For the complete list of sensor options, please visit our Web site at www.keysight.com/find/powermeters.

Power Meters and Sensors Compatibility Table

		POWER METERS						Product Description / Sensor Tech.	Frequency Range	Power Range	
		N432A/432A ¹	E4416A/17A EPM-P	N1913A/14A E4418B/9B EPM ²	E1416A VXI	N1911A/12A N8262A P-Series	8990B				
POWER SENSORS	N8480 / 8480 Series Thermocouple and Diode sensors	N8481B	-	✓	✓	-	✓	-	High Power Thermocouple Sensor	10 MHz to 18 GHz	-5 dBm (316 μW) to +44 dBm (25 W)
		N8482B	-	✓	✓	-	✓	-	High Power Thermocouple Sensor	100 kHz to 6 GHz	-5 dBm (316 μW) to +44 dBm (25 W)
		N8481H	-	✓	✓	-	✓	-	High Power Thermocouple Sensor	10 MHz to 18 GHz	-15 dBm (32 μW) to +35 dBm (3 W)
		N8482H	-	✓	✓	-	✓	-	High Power Thermocouple Sensor	100 kHz to 6 GHz	-15 dBm (32 μW) to +35 dBm (3 W)
		8481D	-	✓	✓	✓	✓	-	Diode Power Sensor	10 MHz to 18 GHz	-70 dBm (100 pW) to -20 dBm (10 μW)
		8485D	-	✓	✓	✓	✓	-	Diode Power Sensor	50 MHz to 26.5 GHz	-70 dBm (100 pW) to -20 dBm (10 μW)
		8487D	-	✓	✓	✓	✓	-	Diode Power Sensor	50 MHz to 50 GHz	-70 dBm (100 pW) to -20 dBm (10 μW)
	Waveguide sensors	R8486D	-	✓	✓	✓	✓	-	Waveguide Power Sensor	26.5 GHz to 40 GHz	-70 dBm (100 pW) to -20 dBm (10 μW)
		Q8486D	-	✓	✓	✓	✓	-	Waveguide Power Sensor	33 GHz to 50 GHz	-70 dBm (100 pW) to -20 dBm (10 μW)
		N8486AR	-	✓	✓	-	✓	-	Thermocouple Waveguide Power Sensor	26.5 GHz to 40 GHz	-35 dBm (316 μW) to +20 dBm (100 mW)
		N8486AQ	-	✓	✓	-	✓	-	Thermocouple Waveguide Power Sensor	33 GHz to 50 GHz	-35 dBm (316 μW) to +20 dBm (100 mW)
		V8486A	-	✓	✓	✓	✓	-	V-band Power Sensor	50 GHz to 75 GHz	-30 dBm (1 μW) to +20 dBm (100 mW)
		W8486A	-	✓	✓	✓	✓	-	Waveguide Power Sensor	75 GHz to 110 GHz	-30 dBm (1 μW) to +20 dBm (100 mW)
		E8486A	-	✓	✓	-	✓	-	E-band Power Sensor	60 GHz to 90 GHz	-30 dBm (1 μW) to +20 dBm (100 mW)
	Thermistor mount sensors	478A	✓	-	-	-	-	-	Coaxial Thermistor Mount	10 MHz to 10 GHz	-30 dBm (1 μW) to +10 dBm (10 mW)
		8478B	✓	-	-	-	-	-	Coaxial Thermistor Mount	10 MHz to 18 GHz	-30 dBm (1 μW) to +10 dBm (10 mW)
	USB average sensors	U2000A	-	-	✓ ³	-	-	✓ ⁴	Diode Power Sensor	10 MHz to 18 GHz	-60 dBm (1 nW) to +20 dBm (100 mW)
		U2001A	-	-	✓ ³	-	-	✓ ⁴	Diode Power Sensor	10 MHz to 6 GHz	-60 dBm (1 nW) to +20 dBm (100 mW)
		U2002A	-	-	✓ ³	-	-	✓ ⁴	Diode Power Sensor	50 MHz to 24 GHz	-60 dBm (1 nW) to +20 dBm (100 mW)
		U2004A	-	-	✓ ³	-	-	✓ ⁴	Diode Power Sensor	9 kHz to 6 GHz	-60 dBm (1 nW) to +20 dBm (100 mW)
		U2000B	-	-	✓ ³	-	-	✓ ⁴	Diode Power Sensor	10 MHz to 18 GHz	-30 dBm (1 μW) to +44 dBm (25 W)
		U2001B	-	-	✓ ³	-	-	✓ ⁴	Diode Power Sensor	10 MHz to 6 GHz	-30 dBm (1 μW) to +44 dBm (25 W)
		U2000H	-	-	✓ ³	-	-	✓ ⁴	Diode Power Sensor	10 MHz to 18 GHz	-50 dBm (10 nW) to +30 dBm (1 W)
		U2001H	-	-	✓ ³	-	-	✓ ⁴	Diode Power Sensor	10 MHz to 6 GHz	-50 dBm (10 nW) to +30 dBm (1 W)
		U2002H	-	-	✓ ³	-	-	✓ ⁴	Diode Power Sensor	50 MHz to 24 GHz	-50 dBm (10 nW) to +30 dBm (1 W)
	Discontinued 848x sensors	8481/2/5/7A	-	✓	✓	✓	✓	-	Thermocouple Power Sensor	100 kHz to 50 GHz	-30 dBm (1 μW) to +20 dBm (100 mW)
		848xB/H	-	✓	✓	✓	✓	-	High Power Thermocouple Sensor	100 kHz to 18 GHz	-10 dBm (100 μW) to +44 dBm (25 W)
		R8486A	-	✓	✓	✓	✓	-	Thermocouple Waveguide Power Sensor	26.5 GHz to 40 GHz	-30 dBm (1 μw) to +20 dBm (100 mW)
		Q8486A	-	✓	✓	✓	✓	-	Thermocouple Waveguide Power Sensor	33 GHz to 50 GHz	-30 dBm (1 μw) to +20 dBm (100 mW)

1. The 432A model is superseded by the N432A.

2. The E4418B/19B models are superseded by the N1913A/14A.

3. Only with N1913A/14A.

4. Requires the N1918A Power Analysis Manager software.

* For the complete list of sensor options, please visit our Web site at www.keysight.com/find/powermeters.

Related Keysight Literature

Publication title	Pub number
Specifications	
<i>Keysight N432A Thermistor Power Meter Data Sheet</i>	5990-5740EN
<i>Keysight N8262A P-Series Modular Power Meter and Power Sensors Data Sheet</i>	5989-6605EN
<i>Keysight N1911A/N1912A P-Series Power Meters and N1921A/N1922A Wideband Power Sensors Data Sheet</i>	5989-2471EN
<i>Keysight U2000 Series USB Power Sensors Data Sheet</i>	5989-6278EN
<i>Keysight E4416A/E4417A EPM-P Series Power Meters and E-Series E9320 Peak and Average Power Sensors Data Sheet</i>	5980-1469E
<i>Keysight N1913A and N1914A EPM Series Power Meters Data Sheet</i>	5990-4019EN
<i>Keysight E4418B/E4419B EPM Series Power Meters, E-Series and 8480 Series Power Sensors Data Sheet</i>	5965-6382E
<i>Keysight N8480 Series Thermocouple Power Sensors Data Sheet</i>	5989-9333EN
<i>Keysight V3500A Handheld RF Power Meter Data Sheet</i>	5990-5483EN
<i>Keysight N1918A Power Analysis Manager Data Sheet</i>	5989-6612EN
<i>Keysight 8990B Peak Power Analyzer and N1923A/N1924A Wideband Power Sensors Data Sheet</i>	5990-8126EN
<i>Keysight U2020 X-series Peak and Average Power Sensors Data Sheet</i>	5990-0310EN
<i>Keysight U8480 Series USB Thermocouple Power Sensors Data Sheet</i>	5991-1410EN
<i>Keysight Waveguide Power Sensors Data Sheet</i>	5991-3676EN
<i>Keysight U2040 X-Series Wide Dynamic Range Power Sensors Data Sheet</i>	5992-0040EN
Application Notes	
<i>Keysight Choosing the Right Power Meter and Sensor Product Note</i>	5968-7150E
<i>Keysight Fundamentals of RF and Microwave Power Measurements (Part 1) Application Note</i>	5988-9213EN
<i>Keysight Fundamentals of RF and Microwave Power Measurements (Part 2) Application Note</i>	5988-9214EN
<i>Keysight Fundamentals of RF and Microwave Power Measurements (Part 3) Application Note</i>	5988-9215EN
<i>Keysight Fundamentals of RF and Microwave Power Measurements (Part 4) Application Note</i>	5988-9216EN
<i>Keysight P-Series Power Sensor Internal Zeroing and Calibration for RF Power Sensors Application Note</i>	5989-6509EN
<i>Keysight N1911A/N1912A P-Series Power Meters For WiMAX™ Signal Measurements Demo Guide</i>	5989-6423EN
<i>Keysight 4 Steps for Making Better Power Measurements Application Note</i>	5965-8167E
<i>Keysight EPM-P Series Power Meters Used in Radar and Pulse Applications Application Note</i>	5988-8522EN
<i>Keysight Compatibility of USB Power Sensors with Keysight Instruments Application Note</i>	5989-8743EN
<i>Keysight N1918A Radar Pulse Measurement Application Note</i>	5990-3415EN
<i>Keysight MIMO Measurement Tips with Keysight P-Series Power Meters and U2000 Series USB Power Sensors Application Note</i>	5990-3546EN
<i>Keysight P-Series and EPM-P Power Meters for Bluetooth Testing Technical Overview and Self-Guided Demonstration</i>	5989-8459EN
<i>Keysight Maximizing Measurement Speed Using P-Series Power Meters Application Note</i>	5989-7678EN
<i>Keysight Using Linux® To Control the U2000 Series USB Power Sensors Product Note</i>	5989-8744EN

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**www.lxistandard.org**

LAN eXtensions for Instruments puts the power of Ethernet and the Web inside your test systems. Keysight is a founding member of the LXI consortium.

**www.pxisa.org**

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