

# Agilent N8480 Series Thermocouple Power Sensors

## Data Sheet

The N8480 Series thermocouple power sensors are amongst Agilent's most accurate and reliable sensors. These will eventually replace the 8480 Series thermocouple range — only better with EEPROM *and* extended frequency and power ranges.



### Features

- High accuracy with excellent linearity and noise specifications
- Wide dynamic range in a single sensor
- Auto-download of calibration factor and corrections from EEPROM
- Option CFT of the sensors are available for full code-compatibility with the 8480 Series
- Broad compatibility with existing power meters: P-Series (N1911A/12A), EPM-P Series (E4416A/17A) and EPM Series (N1913A/14A, E4418B/19B)

### Accurate, repeatable measurements

Here's how: Excellent linearity (1% approx.) and noise specifications. The sensors' low SWR further enhances accuracy by minimizing mismatch uncertainty. As if this weren't enough, these sensors also come with dual-range power for greater sensitivity to fluctuating signals, in particular. With high accuracy and stability, the N8480 helps you test confidently, faster.

### Calibration-easy testing

During test, calibrating your sensor is an essential step, yet it shouldn't be taking too much of your time and effort. With the N8480 sensors, there's no need for cumbersome keying-in of calibration factor (CF), nor concern for manual input errors. That's because CF, linearity and temperature corrections are all stored in the sensors' EEPROM—auto-downloaded on calibration. Efficient calibration procedure makes for efficient testing overall, with N8480.

### One sensor, WIDEST range

Pick an N8480 sensor—any one—and you'll see how its wide dynamic range equip you for various applications: metrology labs, radar, mobile radio, TDMA, GSM, W-CDMA and WiMAX™, among others. With up to 55 dBm wide dynamic range, the N8480 Series offers you the widest thermocouple sensor power range in the industry.

### System integration can be a pain, but not with the N8480

The N8480 Series sensors are backward compatible with Agilent's leading range of power meters, including the P-Series, EPM-P Series and EPM Series. All that's needed is a simple firmware upgrade that's downloadable from the website, for free.

Code-wise, 100% of SCPI codes used on the E-Series sensors are re-usable on the N8480, and this includes most of the ones used on the 8480 Series. For code migration from the 8480 Series, CFT options of the N8480 sensors and these will behave much like the 8480 Series sensors they replace.



**Agilent Technologies**

## Specification definitions

There are two types of product specifications:

- Warranted specifications
- Characteristic specifications

### Warranted specifications

Warranted specifications are covered by the product warranty and apply over 0 °C to 55 °C, unless otherwise noted. Warranted specifications include Measurement Uncertainty calculated with 95% confidence.

### Characteristic specifications

Characteristic specifications are not warranted. They describe product performance that is useful in the application of the power sensors by giving typical, but non-warranted performance parameters. These characteristics are shown in *italics* or denoted as “*typical*”, “*nominal*” or “*approximate*”.

Characteristic information is representative of the product. In many cases, it may also be supplemental to a warranted specification.

Characteristic specifications are not verified on all power sensors. The types of characteristic specifications can be placed in two groups:

- The first group of characteristic types describes 'attributes' common to all products of a given model or option. Examples of characteristics that describe 'attributes' are product weight, and 50 W input Type- N connector. In these examples product weight is an *approximate* value and a 50 W input is *nominal*. These two terms are most widely used when describing a product's 'attributes'.
- The second group of characteristic types 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 meter and sensor 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 meter and power sensor are within their recommended calibration periods.
- Used in accordance to the information provided in the power meter's user's guide.

## Performance characteristics

Specifications stated hereon refer to all N8480 Series power sensors, unless otherwise stated. The term “standard” refers to all N8480 Series sensors except Option CFT.

### Frequency and Dynamic Power Range

Sensor Option	Sensor Model	Frequency Range	Dynamic Power Range
Standard	N8481A	10 MHz to 18 GHz	-35 dBm to +20 dBm
	N8482A	100 kHz to 6 GHz	
	N8485A	10 MHz to 26.5 GHz	
	N8485A - Option 33	10 MHz to 33 GHz	
	N8487A	50 MHz to 50 GHz	
	N8486AR	26.5 GHz to 40 GHz	
	N8486AQ	33 GHz to 50 GHz	
	N8481B	10 MHz to 18 GHz	-5 dBm to +44 dBm
	N8482B	100 kHz to 6 GHz	
	N8481H	10 MHz to 18 GHz	-15 dBm to +35 dBm
N8482H	100 kHz to 6 GHz		
Option CFT	N8481A	10 MHz to 18 GHz	-30 dBm to +20 dBm
	N8482A	100 kHz to 6 GHz	
	N8485A	10 MHz to 26.5 GHz	
	N8485A - Option 33	10 MHz to 33 GHz	
	N8487A	50 MHz to 50 GHz	
	N8486AR	26.5 GHz to 40 GHz	
	N8486AQ	33 GHz to 50 GHz	
	N8481B	10 MHz to 18 GHz	0 dBm to +44 dBm
	N8482B	100 kHz to 6 GHz	
	N8481H	10 MHz to 18 GHz	-10 dBm to +35 dBm
N8482H	100 kHz to 6 GHz		

### Damage Level

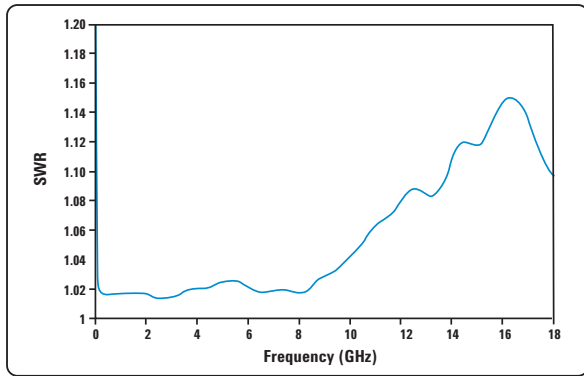
Sensor Model	Damage Level (Average Power)	Damage Level(Peak Power)
N8481A N8482A N8485A N8487A N8486AR N8486AQ	+25 dBm	15 W/2 $\mu$ s
N8481B N8482B	+49 dBm	500 W/1 $\mu$ s
N8481H N8482H	+40 dBm	100 W/1 $\mu$ s

## Maximum SWR

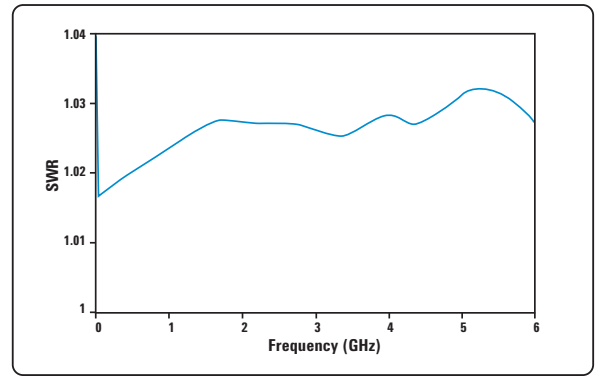
Sensor Model	Frequency Band	Maximum SWR	
		(25 °C ± 10 °C)	(0 °C to 55 °C)
N8481A	10 MHz to 30 MHz	1.37	1.57
	30 MHz to 50 MHz	1.14	1.16
	50 MHz to 2 GHz	1.08	1.11
	2 GHz to 12.4 GHz	1.16	1.16
	12.4 GHz to 18 GHz	1.23	1.25
N8482A	100 kHz to 300 kHz	1.54	1.57
	300 kHz to 1 MHz	1.17	1.17
	1 MHz to 2 GHz	1.06	1.06
	2 GHz to 6 GHz	1.07	1.08
N8485A	10 MHz to 50 MHz	1.33	1.53
	50 MHz to 100 MHz	1.08	1.11
	100 MHz to 2 GHz	1.05	1.07
	2 GHz to 12.4 GHz	1.14	1.14
	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 <sup>1</sup>	1.32	1.36
N8487A	50 MHz to 100 MHz	1.08	1.10
	100 MHz to 2 GHz	1.05	1.07
	2 GHz to 12.4 GHz	1.10	1.10
	12.4 GHz to 18 GHz	1.16	1.16
	18 GHz to 26.5 GHz	1.22	1.22
	26.5 GHz to 40 GHz	1.30	1.30
	40 GHz to 50 GHz	1.34	1.33
N8486AR	26.5 GHz to 40 GHz	1.40	1.40
N8486AQ	33 GHz to 50 GHz	1.50	1.50
N8481B	10 MHz to 2 GHz	1.09	1.10
	2 GHz to 12.4 GHz	1.14	1.18
	12.4 GHz to 18 GHz	1.23	1.28
N8482B	100 kHz to 2 GHz	1.08	1.10
	2 GHz to 6 GHz	1.16	1.18
N8481H	10 MHz to 8 GHz	1.16	1.16
	8 GHz to 12.4 GHz	1.22	1.22
	12.4 GHz to 18 GHz	1.32	1.41
N8482H	100 kHz to 6 GHz	1.13	1.14

1. Only applicable for N8485A Option 033

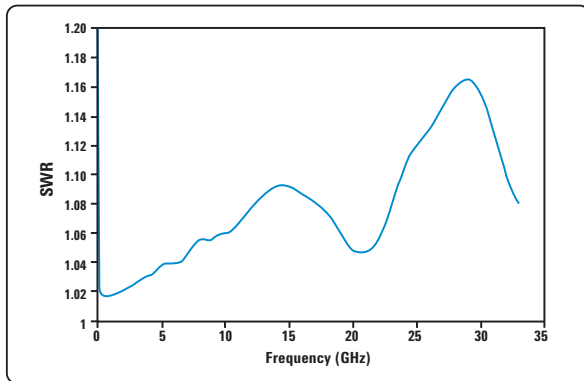
## Performance characteristics (continued)



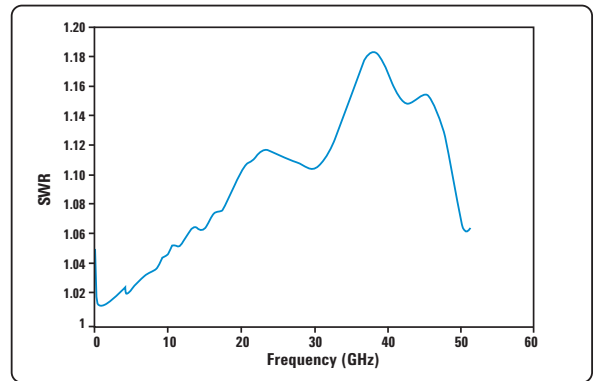
Typical SWR, 10 MHz to 18 GHz (25 °C±10 °C) for N8481A sensor



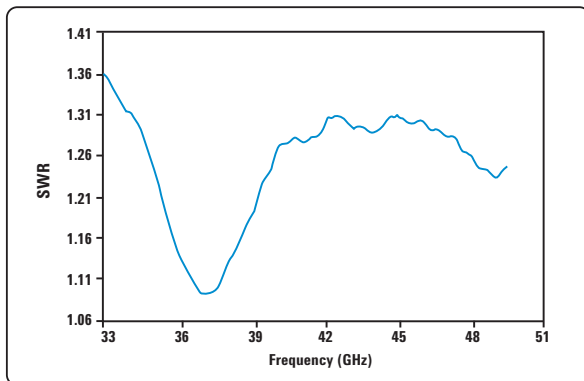
Typical SWR, 100 kHz to 6 GHz (25 °C±10 °C) for N8482A sensor



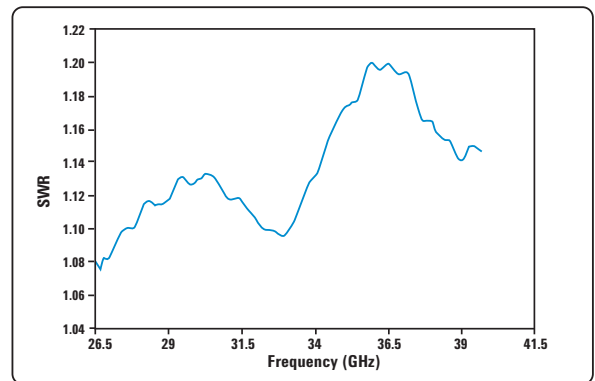
Typical SWR, 10 MHz to 26.5 GHz (25 °C±10 °C) for N8485A sensor



Typical SWR, 50 MHz to 50 GHz (25 °C ±10 °C) for N8487A power sensor

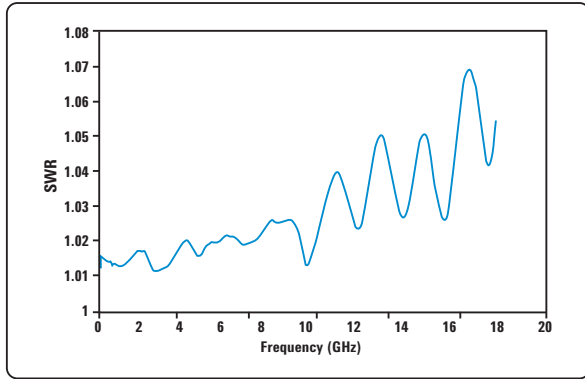


Typical SWR, 33 GHz to 50 GHz (25 °C ±10 °C) for N8486AQ power sensor

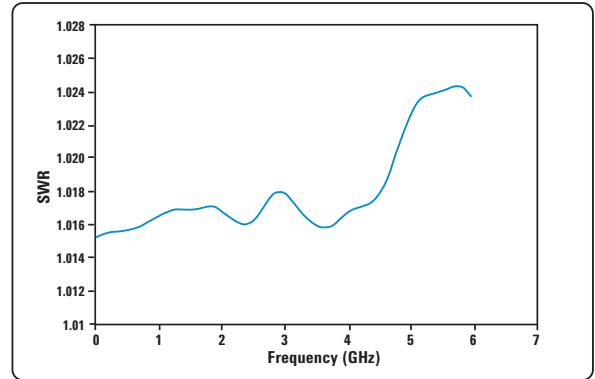


Typical SWR, 26.5 GHz to 40 GHz (25 °C ±10 °C) for N8486AR power sensor

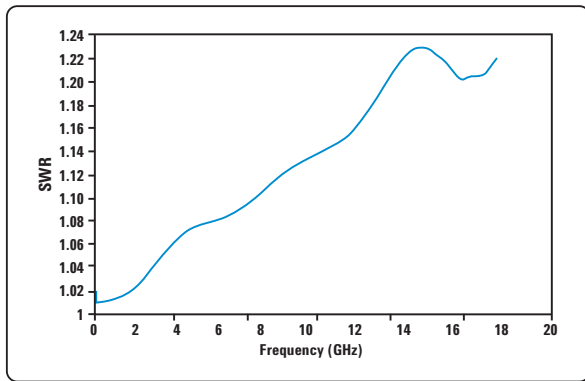
## Performance characteristics (continued)



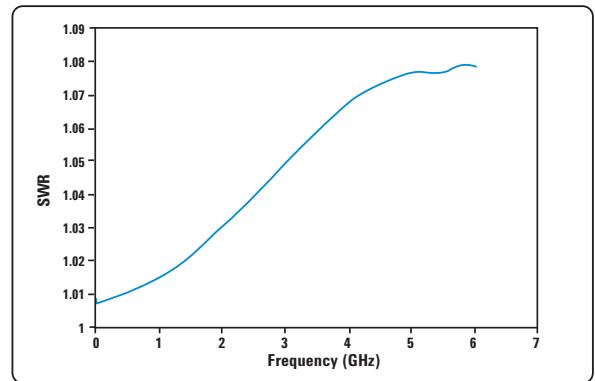
Typical SWR, 10 MHz to 18 GHz (25 °C ±10 °C) for N8481B power sensor



Typical SWR, 100 kHz to 6 GHz (25 °C ±10 °C) for N8482B power sensor



Typical SWR, 10 MHz to 18 GHz (25 °C ±10 °C) for N8481H power sensor



Typical SWR, 100 kHz to 6 GHz (25 °C ±10 °C) for N8482H power sensor

## Performance characteristics (continued)

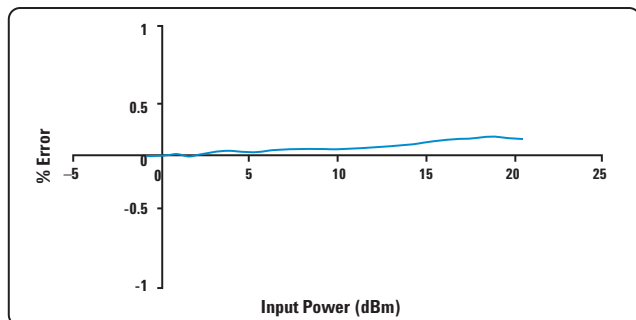
### Power linearity\*

The N8480 Series power sensors' linearity is negligible except for the power range specified in the table below.

Sensor Model	Power Range	Linearity (25 °C ± 10 °C)	Linearity (0 °C to 55 °C)
N8481A N8482A N8485A N8487A	-1 dBm to <+15 dBm	±0.52%	±0.80%
N8486AR N8486AQ	+15 dBm to +20 dBm	±0.80%	±1.90%
N8481B	+29 dBm to <+39 dBm	±0.52%	±0.80%
N8482B	+39 dBm to +44 dBm	±1.66%	±2.75%
N8481H	+17 dBm to <+30 dBm	±0.77%	±1.05%
N8482H	+30 dBm to +35 dBm	±2.84%	±3.93%

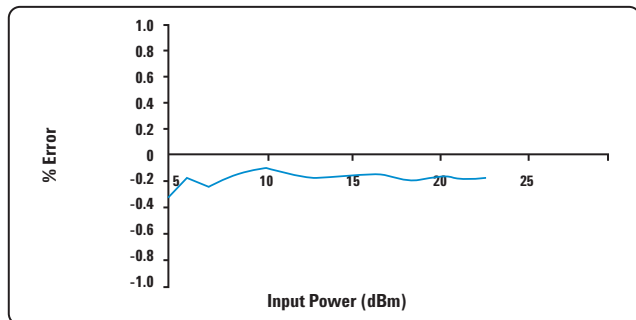
\*after zero and calibration at ambient environment conditions

Typical N8481A/2A/5A and N8486AR/AQ power linearity at 25 °C, after zero and calibration with associated measurement uncertainty



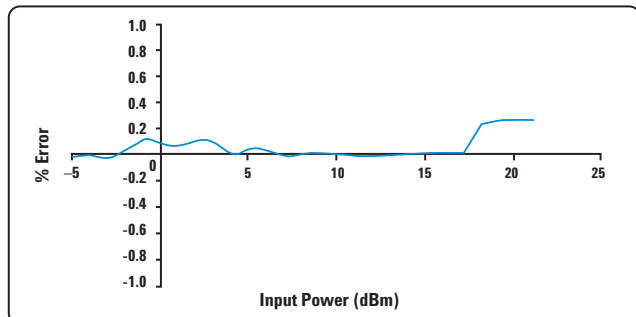
Power level	Measurement uncertainty
-1 dBm to +20 dBm	±0.35%

Typical N8481B/2B power linearity at 25 °C, after zero and calibration with associated measurement uncertainty



Power level	Measurement uncertainty
29 dBm to 40 dBm	±0.35%
40 dBm to 44 dBm	±1.21%

Typical N8481H/2H power linearity at 25 °C, after zero and calibration with associated measurement uncertainty



Power level	Measurement uncertainty
17 dBm to 30 dBm	±0.60%
30 dBm to 35 dBm	±2.39%

## Performance characteristics (continued)

### Zero set, zero drift and measurement noise

Sensor Model	Sensor option	Range	Condition (RH) <sup>1</sup>	Zero set	Zero drift <sup>2</sup>	Measurement noise <sup>3</sup>	
N8481A	Standard	Upper	20% - 70%	+/- 63 nW	< +/- 7 nW	< 114 nW	
N8482A							
N8485A		Lower		20% - 70%	+/- 25 nW	< +/- 3 nW	< 80 nW
N8487A							
N8486AQ							
N8486AR	Option CFT	N/A	20% - 70%	+/- 63 nW	< +/- 7 nW	< 114 nW	
N8481B	Standard	Upper	20% - 70%	+/- 63 uW	< +/- 7 uW	< 114 uW	
		Lower		+/- 25 uW	< +/- 3 uW	< 80 uW	
N8482B	Option CFT	N/A	20% - 70%	+/- 63 uW	< +/- 7 uW	< 114 uW	
N8481H	Standard	Upper	20% - 70%	+/- 6.3 uW	< +/- 0.7 uW	< 11.4 uW	
		Lower		+/- 2.5 uW	< +/- 0.3 uW	< 8 uW	
N8482H	Option CFT	N/A	20% - 70%	+/- 6.3 uW	< +/- 0.7 uW	< 11.4 uW	

**Effects of averaging on noise:** Averaging over 1 to 1024 readings is available for reducing noise. The table below provides the measurement noise for a particular sensor with the number of averages set at 16 (for normal mode) and 32 (for x2 mode). Use the noise multiplier, for the appropriate mode (normal or x2) and number of averages, to determine the total measurement noise value.

**Example:**  
N8481A power sensor, normal mode,  
number of averages = 4

**Measurement noise calculation:**  
 $<80 \text{ nW} \times 2.75 = <220 \text{ nW}$

No. of averages	1	2	4	8	16	32	64	128	256	512	1024
<b>Noise multiplier</b>											
Normal mode	5.5	3.89	2.75	1.94	1	0.85	0.61	0.49	0.34	0.24	0.17
x2 mode	6.5	4.6	3.25	2.3	1.63	1	0.72	0.57	0.41	0.29	0.2

1. RH is the abbreviation for relative humidity.

2. Within one hour after zero set, at a constant temperature, after a 24-hour warm-up of the power meter with sensor connected.

3. The number of averages at 16 for Normal mode and 32 for x2 mode, at a constant temperature, measured over a one-minute interval and two standard deviations.

## Performance characteristics (continued)

### Switching point

The N8480 Series power sensors (standard only, ie. excluding Option CFT) have two measurement ranges: a lower power range and upper power range. The power meter automatically selects the proper power level range. To avoid unnecessary switching when the power level is near the switch point, switching point hysteresis has been added.

### N8481A/82A/85A/87A and N8486AQ/AR power sensors

This hysteresis causes the lower power range to remain selected until approximately  $-0.5$  dBm as the power level is increased. Above this power, the upper power range is selected.

Likewise, the upper power range remains selected until approximately  $-1.5$  dBm as the signal level decreases. Below this power, the lower power range is selected.

### N8481/2B power sensors

This hysteresis causes the lower power range to remain selected until approximately 29.5 dBm as the power level is increased. Above this power, the upper power range is selected.

Likewise, the upper power range remains selected until approximately 28.5 dBm as the signal level decreases. Below this power, the lower power range is selected.

### N8481/2H power sensors

This hysteresis causes the lower power range to remain selected until approximately 17.5 dBm as the power level is increased. Above this power, the upper power range is selected.

Likewise, the upper power range remains selected until approximately 16.5 dBm as the signal level decreases. Below this power, the lower power range is selected.

N8481/2/5//7A and N8486AQ/AR excluding Option CFT	AUTO (default range):	-35 to +20 dBm
	Upper power range:	-1 to +20 dBm
	Lower power range:	-35 to -1 dBm
	Switching point hysteresis:	0.5 dB typical
N8481/2B excluding Option CFT	AUTO (default range):	-5 to +44 dBm
	Upper power range:	+29 to +44 dBm
	Lower power range:	-5 to +29 dBm
	Switching point hysteresis:	0.5 dB typical
N8481/2H excluding Option CFT	AUTO (default range):	-15 to +35 dBm
	Upper power range:	+17 to +35 dBm
	Lower power range:	-15 to +17 dBm
	Switching point hysteresis:	0.5 dB typical

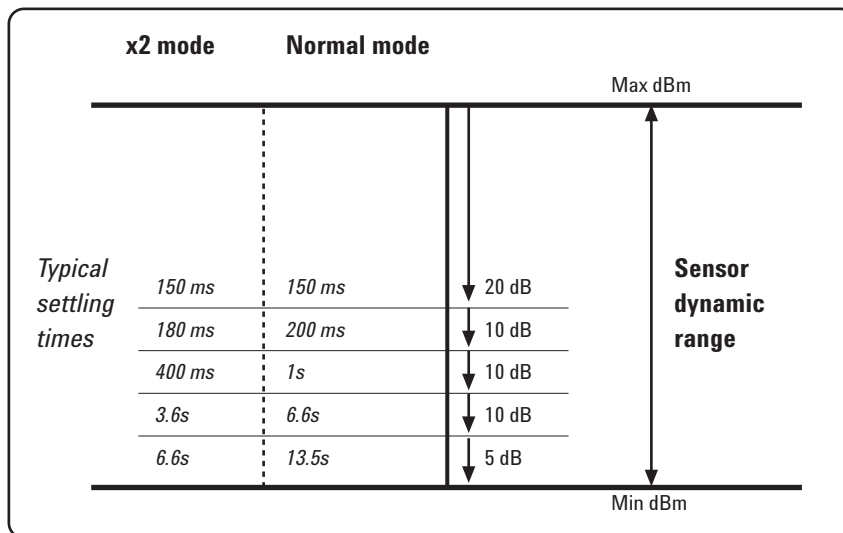
## Performance characteristics (continued)

### Settling time <sup>1</sup>

#### Manual filter, 10-dB decreasing power step for normal and x2 modes (not across switching point)

No. of averages	1	2	4	8	16	32	64	128	256	512	1024
Settling time (s)											
Normal mode	0.15	0.2	0.3	0.5	1.1	1.9	3.4	6.6	13	27	57
x2 mode	0.15	0.18	0.22	0.35	0.55	1.1	1.9	3.5	6.9	14.5	33

#### Auto filter, default resolution, 10-dB decreasing power step for normal and x2 modes (not across switching point)



1. Settling time: 0 to 99% settled readings over the GPIB

### Calibration factor and reflection coefficient

Calibration factor (CF) and reflection coefficient (Rho) data is unique to each sensor. The CF corrects for the frequency response of the sensor. The Agilent EPM Series, EPM-P Series and P-Series power meters automatically read the CF data stored in the sensor's EEPROM and use it to make the corrections.

Reflection coefficient (Rho or  $\rho$ ) relates to the SWR according to the following formula:

$$SWR = \frac{1 + \rho}{1 - \rho}$$

Typical measurement uncertainties of the calibration factor (CF) are listed in the following table. There is only one set of CF data used for both high and low range of each sensor. The typical measurement uncertainty data listed in the table is meant to help users on the measurement uncertainty estimation. These values are only a guideline and are not to be used in any accurate uncertainty calculations. For accurate measurement uncertainty values, please refer to the measurement report <sup>[1]</sup> of the specific sensor

[1] Only applicable with the purchase of Option 1A7 or Option A6J.

## Performance characteristics (continued)

### Calibration factor uncertainty

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

Frequency	25°C ± 3°C									
	N8481A	N8481B	N8481H	N8482A	N8482B	N8482H	N8485A	N8487A	N8486AR	N8486AQ
100 kHz to 10 MHz	-	-	-	0.91	1.48	0.89	-	-	-	-
10 MHz to 30 MHz	0.82	1.42	0.77	0.78	1.43	0.79	0.82	-	-	-
30 MHz to 500 MHz	0.77	1.48	0.89	0.77	1.49	0.89	1.24	1.33	-	-
500 MHz to 1.2 GHz	0.78	1.48	0.89	0.78	1.49	0.89	1.26	1.35	-	-
1.2 GHz to 6 GHz	0.91	1.58	1.06	0.89	1.56	1.02	1.35	1.41	-	-
6 GHz to 14 GHz	1.26	1.77	1.46	-	-	-	1.66	1.61	-	-
14 GHz to 18 GHz	1.59	1.92	1.73	-	-	-	1.83	1.73	-	-
18 GHz to 26.5 GHz	-	-	-	-	-	-	2.67	2.26	-	-
26.5 GHz to 33 GHz	-	-	-	-	-	-	3.32	2.58	2.68	-
33 GHz to 34 GHz	-	-	-	-	-	-	-	2.80	3.19	3.14
34 GHz to 35 GHz	-	-	-	-	-	-	-	2.80	3.19	3.40
35 GHz to 40 GHz	-	-	-	-	-	-	-	2.80	3.19	3.14
40 GHz to 45 GHz	-	-	-	-	-	-	-	3.66	-	3.19
45 GHz to 50 GHz	-	-	-	-	-	-	-	4.23	-	3.26

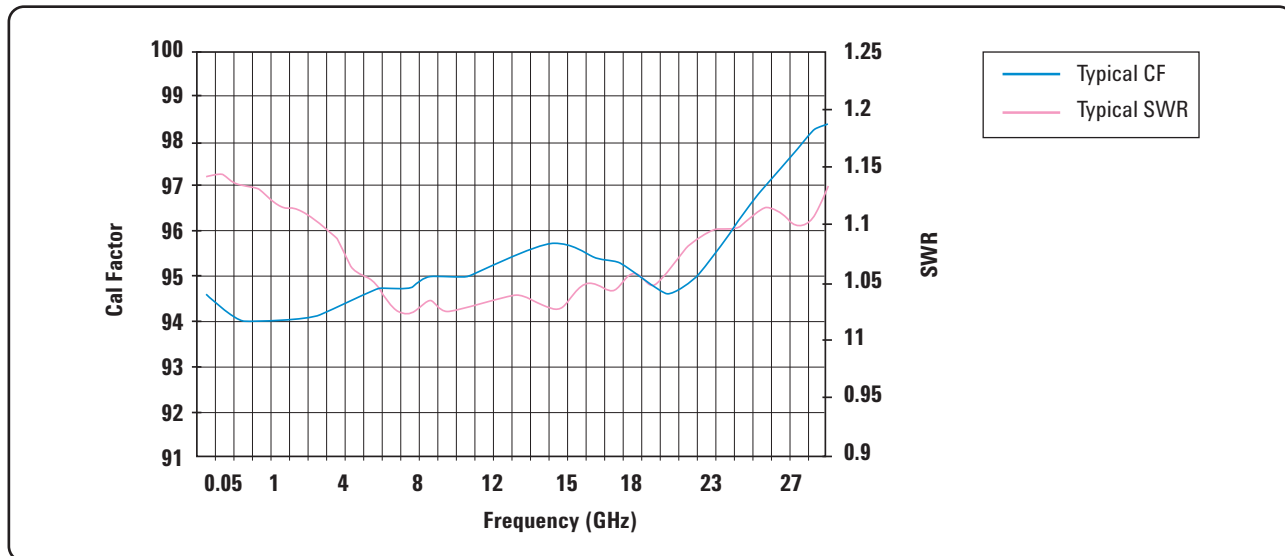
Frequency	25°C ± 10°C									
	N8481A	N8481B	N8481H	N8482A	N8482B	N8482H	N8485A	N8487A	N8486AR	N8486AQ
100 kHz to 10 MHz	-	-	-	1.28	2.40	0.99	-	-	-	-
10 MHz to 30 MHz	1.47	1.98	1.39	1.03	1.84	0.86	0.94	-	-	-
30 MHz to 500 MHz	1.03	1.91	1.10	1.03	1.83	0.98	1.43	1.84	-	-
500 MHz to 1.2 GHz	0.97	1.91	1.15	1.08	1.94	1.00	1.52	2.10	-	-
1.2 GHz to 6 GHz	1.23	1.97	1.42	1.81	2.68	1.19	1.68	2.36	-	-
6 GHz to 14 GHz	1.85	2.69	3.87	-	-	-	2.26	2.87	-	-
14 GHz to 18 GHz	2.17	3.20	7.01	-	-	-	2.47	3.14	-	-
18 GHz to 26.5 GHz	-	-	-	-	-	-	3.75	3.77	-	-
26.5 GHz to 33 GHz	-	-	-	-	-	-	4.79	4.17	3.48	-
33 GHz to 34 GHz	-	-	-	-	-	-	-	4.55	4.07	5.02
34 GHz to 35 GHz	-	-	-	-	-	-	-	4.55	4.07	4.99
35 GHz to 40 GHz	-	-	-	-	-	-	-	4.55	4.07	5.02
40 GHz to 45 GHz	-	-	-	-	-	-	-	5.40	-	5.17
45 GHz to 50 GHz	-	-	-	-	-	-	-	6.02	-	5.20

Frequency	0°C ± 55°C									
	N8481A	N8481B	N8481H	N8482A	N8482B	N8482H	N8485A	N8487A	N8486AR	N8486AQ
100 kHz to 10 MHz	-	-	-	1.59	2.67	1.41	-	-	-	-
10 MHz to 30 MHz	4.46	3.64	2.83	0.91	1.73	0.86	1.25	-	-	-
30 MHz to 500 MHz	1.57	2.22	1.44	1.16	1.77	1.03	1.98	2.14	-	-
500 MHz to 1.2 GHz	1.65	2.49	1.60	1.54	2.12	1.07	2.07	2.45	-	-
1.2 GHz to 6 GHz	2.04	2.85	1.96	1.99	3.91	1.40	2.40	2.65	-	-
6 GHz to 14 GHz	2.62	3.81	4.81	-	-	-	2.99	3.17	-	-
14 GHz to 18 GHz	3.27	4.30	9.74	-	-	-	3.35	3.41	-	-
18 GHz to 26.5 GHz	-	-	-	-	-	-	4.70	4.04	-	-
26.5 GHz to 33 GHz	-	-	-	-	-	-	6.41	4.43	3.76	-
33 GHz to 34 GHz	-	-	-	-	-	-	-	4.84	4.25	6.04
34 GHz to 35 GHz	-	-	-	-	-	-	-	4.84	4.25	6.04
35 GHz to 40 GHz	-	-	-	-	-	-	-	4.84	4.25	6.04
40 GHz to 45 GHz	-	-	-	-	-	-	-	5.70	-	5.86
45 GHz to 50 GHz	-	-	-	-	-	-	-	6.19	-	6.59

## Performance characteristics (continued)

### Typical CF and SWR vs. Frequency

Chart shows supplemental characteristics, intended to provide additional information, useful in applying the power sensor by giving a typical but not warranted performance parameters.



## General specifications

### Dimensions and weight

Dimensions (WxHxL)



**N8481A/2A:** 38 mm W x 30 mm H x 130 mm L

**N8485A:** 38 mm W x 30 mm H x 121 mm L

**N8487A:** 38 mm W x 30 mm H x 121 mm L

**N8486AR:** 38 mm W x 62 mm H x 152 mm L

**N8486AQ:** 38 mm W x 62 mm H x 152 mm L

**N8481B/82B:** 83 mm W x 114 mm H x 283 mm L

**N8481H/82H:** 38 mm W x 30 mm H x 174 mm L

Weight

**N8481A/2A:** Net: 0.181 kg (0.40 lb) Shipping: 0.90 kg (1.98 lb)

**N8485A:** Net: 0.183 kg (0.40 lb) Shipping: 0.90 kg (1.98 lb)

**N8487A:** Net: 0.154 kg (0.34 lb) Shipping: 0.874 kg (1.92 lb)

**N8486AR:** Net: 0.202 kg (0.45 lb) Shipping: 0.922 kg (2.03 lb)

**N8486AQ:** Net: 0.204 kg (0.45 lb) Shipping: 0.924 kg (2.03 lb)

**N8481B/82B:** Net: 0.684 kg (1.51 lb) Shipping: 1.404 kg (3.09 lb)

**N8481H/82H:** Net: 0.234 kg (0.52 lb) Shipping: 0.954 kg (2.10 lb)

### Operating environment

Temperature 0 °C to 55 °C

Humidity Maximum: 95% RH at 40 °C non-condensing  
Minimum: 15% RH at 40 °C non-condensing

Altitude Up to 4600 m (15,000 ft)

### Storage conditions

Temperature -40 °C to 70 °C

Humidity Up to 90% RH at 65 °C non-condensing

Altitude Up to 4600 m (15,000 ft)

## Performance characteristics (continued)

<b>Connector</b> <sup>1</sup>	<b>N8481A/82A:</b> N-type (male) <b>N8485A:</b> 3.5 mm (male) <b>N8487A:</b> 2.4 mm (male) <b>N8481B/82B:</b> N-type (male) <b>N8481H/82H:</b> N-type (male) <b>N8486AR:</b> Waveguide flange UG-599/U <b>N8486AQ:</b> Waveguide flange UG-383/U
<b>Programming language</b>	<b>Standard:</b> SCPI code-compatible to E-Series sensors <b>Option CFT:</b> SCPI code-compatible to 8480 Series sensors
<b>Safety and EMC compliance</b>	IEC 61326-2002/EN 61326:1997+A1:1998+A3:2003 Canada: ICES-001:2004 Australia/New Zealand: AS/NZS CISPR11:2004
<b>Calibration interval</b>	1 year
<b>Warranty</b> <sup>1</sup>	1 year

1. See "Ordering information" for available options

## Ordering information

### Power sensors

Standard power sensors	Description	Frequency range	Power range
N8481A	Standard N8481A model with EEPROM feature	10 MHz – 18 GHz	-35 to +20 dBm
N8482A	Standard N8482A model with EEPROM feature	100 kHz – 6 GHz	-35 to +20 dBm
N8485A	Standard N8485A model with EEPROM feature	10 MHz - 26.5 GHz	-35 to +20 dBm
N8485A-033	Standard N8485A model with EEPROM feature	10 MHz - 33 GHz	-35 to +20 dBm
N8487A	Standard N8487A model with EEPROM feature	50 MHz – 50 GHz	-35 to +20 dBm
N8481B	Standard N8481B model with EEPROM feature	10 MHz – 18 GHz	-5 to +44 dBm
N8482B	Standard N8482B model with EEPROM feature	100 kHz – 6 GHz	-5 to +44 dBm
N8481H	Standard N8481H model with EEPROM feature	10 MHz – 18 GHz	-15 to +35 dBm
N8482H	Standard N8482H model with EEPROM feature	100 kHz – 6 GHz	-15 to +35 dBm
N8486AR	Standard N8486AR model with EEPROM feature	26.5 GHz – 40 GHz	-35 to +20 dBm
N8486AQ	Standard N8486AQ model with EEPROM feature	33 GHz to 50 GHz	-35 to +20 dBm
Other sensor options	Description		
Option CFT	N8480 sensors without EEPROM feature. Calibration factor data is provided on the label attached to the power sensor.		

The following items are shipped as standard with every power sensor:

- Certificate of Calibration
- Operating and Service Guide
- Product Reference CD (contains Migration Guide, Operating and Service Guide, firmware upgrades for EPM, EPM-P and P-Series power meters, and upgrade procedures)

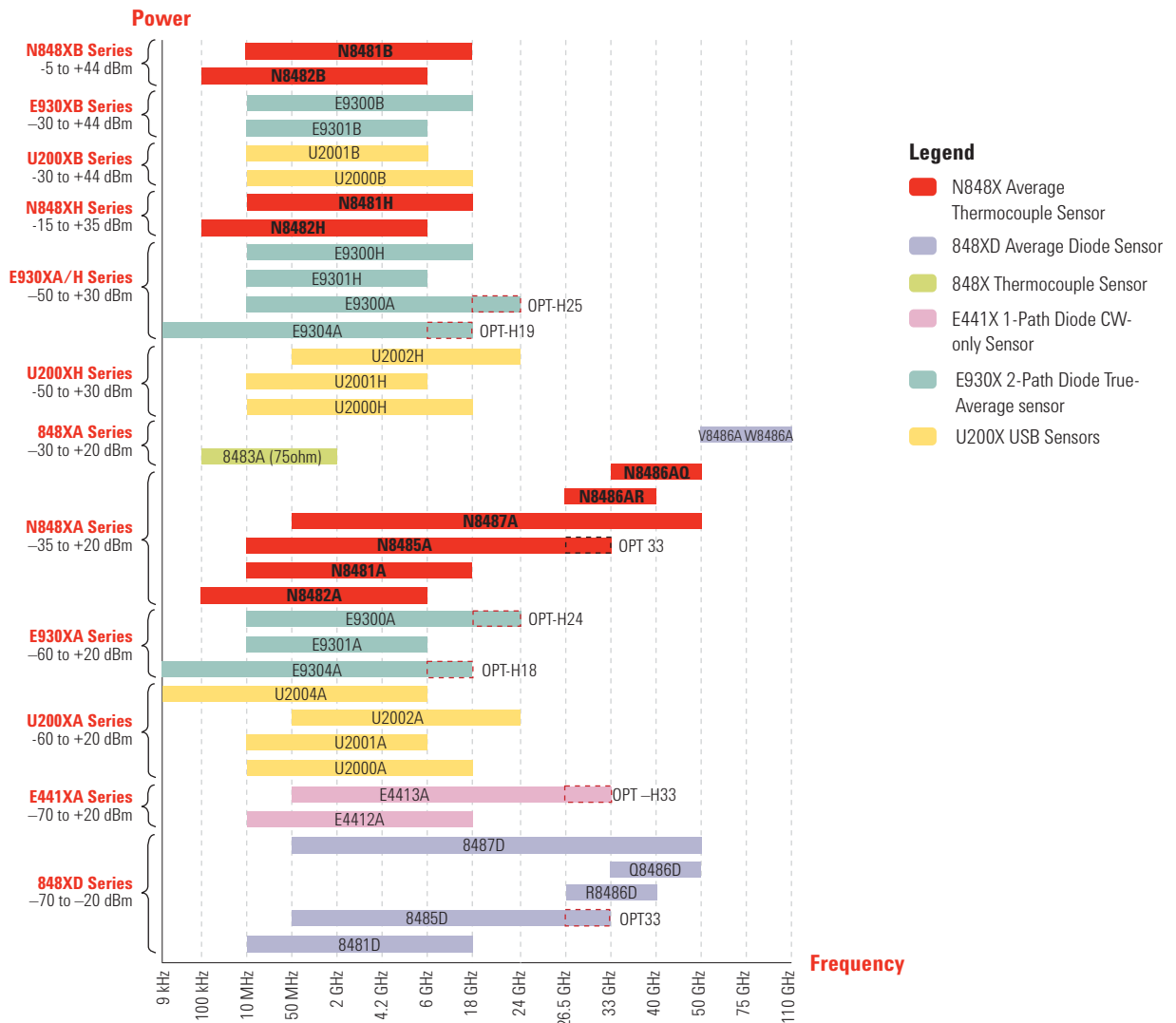
## Ordering information (continued)

### Accessories, calibration and documentation options

<b>Connectors</b>	<b>Description</b>
Option 100	Type-N (male) connector for N8481A/N8482A/N8481B/N8482B/N8481H/N8482H 3.5mm (male) connector for N8485A 2.4mm (male) connector for N8487A Waveguide connector for N8486AR/N8486AQ
Option 200	APC-7 (male) connector for N8481A only
<b>Cables</b>	<b>Description</b>
11730A	For EPM Series power meters: 1.5 m (5 ft), grey
11730B	For EPM Series power meters: 3 m (10 ft), grey
11730C	For EPM Series power meters: 6.1 m (20 ft), grey
11730D	For EPM Series power meters: 15.2 m (50 ft), grey
11730E	For EPM Series power meters: 30.5 m (100 ft), grey
11730F	For EPM Series power meters: 61 m (200 ft), grey *operates up to 45 °C
E9288A	For EPM and EPM-P Series power meters: 1.5 m (5 ft), blue
E9288B	For EPM and EPM-P Series power meters: 3 m (10 ft), blue
E9288C	For EPM and EPM-P Series power meters: 10 m (31 ft), blue
N1917A	For P-Series power meters: 1.5 m (5 ft)
N1917B	For P-Series power meters: 3 m (10 ft)
N1917C	For P-Series power meters: 10 m (31 ft)
<b>Calibration</b>	<b>Description</b>
Option 1A7	ISO 17025 calibration with test data
Option A6J	ANSI Z540 calibration with test data
<b>Warranty</b>	<b>Description</b>
Option R-51B-001-3C	Extension of warranty and service plan from 1 year to 3 years
Option R-51B-001-5C	Extension of warranty and service plan from 1 year to 5 years
<b>Documentation</b>	<b>Description</b>
Option OB1	English language Operating and Service Guide
Option ABJ	Japanese localization Operating and Service Guide

# Where does the N8480 fit in Agilent's average power sensors offering?

Sensor technology	Signal characteristics >		Modulated				
	CW		Pulse/averaged	AM/FM profiled	Wireless standards		
	CW						
	Metrology lab	Radar/navigation	Mobile radio	TDMA GSM EDGE NADC IDEN	cdmaOne Bluetooth®	W-CDMA cdma2000®	802.11a/b/g MCPA HiperLan2 WiMAX
<b>Thermocouple sensors</b> 8480A/B/H, N8480A/B/H, R/Q8486A, N8486AR/AQ	•	•	•	• Avg. only	• Avg. only	• Avg. only	• Avg. only
<b>Diode sensors</b> 8480D, V8486A, W8486A	•	•	•	• Avg. only	• Avg. only	• Avg. only	• Avg. only
<b>Diode sensors compensated for extended range</b> E4412A/3A	•		FM only				
<b>Two-path diode-stack sensors</b> E9300 Series	•	•	•	• Avg. only	• Avg. only	• Avg. only	• Avg. only



## Compatible power meters

The N8480 Series power sensors perform accurate, repeatable average power measurements with the following power meters:



### Agilent N1911A/12A P-Series power meters

- Single (N1911A) and dual (N1912A) channels
- High resolution color display
- 30 MHz video bandwidth
- 100 Msamples/s continuous sampling rate
- Time-gated and free-run measurement modes
- Rise time, fall time, pulse width, time to positive occurrence and time to negative occurrence measurements
- Includes predefined configurations for WiMAX, HSDPA and DME
- GPIB, LAN and USB interfaces
- Code-compatible with EPM-P and EPM Series power meters
- Optimized for peak power measurements and CCDF statistical analysis with the P-Series power sensors
- Also compatible with all E-Series, N8480 Series and 8480 Series power sensors



### Agilent E4416A/17A EPM-P Series power meters

- Single (E4416A) and dual (E4417A) channels
- 5 MHz video bandwidth
- 20 Msamples/s continuous sampling rate
- Time-gated and free-run measurement modes
- Includes predefined configurations for GSM, EDGE, NADC, iDEN, Bluetooth, IS-95 CDMA, W-CDMA and cdma2000
- GPIB, RS-232/422 interfaces
- Code-compatible with EPM Series power meters
- Optimized for peak power measurements with the E9320 E-Series power sensors
- Also compatible with the E9300 and E4410 E-Series, 8480 and N8480 Series power sensors



### Agilent N1913A/14A EPM Series power meters

- Single (N1913A) and dual (N1914A) channels
- Two optional USB channels available for four-channel measurements
- Frequency range of 9 kHz to 110 GHz
- Power range of -70 dBm to +44 dBm (depending on the attached power sensor)
- Fast measurement speed of 400 readings/s
- Industry's first color LCD screen for average power meters
- USB and LAN/LXI-C connectivity on top of the standard GPIB
- Automatic frequency/power sweep measurements with the optional trigger IN/OUT feature
- Code-compatible with 436A, 437B (N1913A only) and 438A (N1914A only) power meters
- Optimized for average power measurements with the U2000, E9300 and E4410, N8480 and 8480 Series power sensors

Note: The N8480 Series is also compatible with the E4418B/19B Series EPM power meters.

To get your existing power meters up-and-running in supporting the N8480 Series, just download their firmware upgrades online at [www.agilent.com](http://www.agilent.com) > Technical Support > Drivers & Software > Firmware Update.

Power meter	Model number	Compatible firmware revision
EPM Series power meters	E4418B	A1.09.01 and above
	E4419B	A2.09.01 and above
	N1913A	A.01.00 and above
	N1914A	
EPM-P Series power meters	E4416A	A1.05.01 and above
	E4417A	A2.05.01 and above
P-Series power meters	N1911A	A.05.02 and above
	N1912A	



### Agilent Email Updates

[www.agilent.com/find/emailupdates](http://www.agilent.com/find/emailupdates)  
Get the latest information on the products and applications you select.



### Agilent Direct

[www.agilent.com/find/agilentdirect](http://www.agilent.com/find/agilentdirect)  
Quickly choose and use your test equipment solutions with confidence.



[www.agilent.com/find/open](http://www.agilent.com/find/open)  
Agilent Open simplifies the process of connecting and programming test systems to help engineers design, validate and manufacture electronic products. Agilent offers open connectivity for a broad range of system-ready instruments, open industry software, PC-standard I/O and global support, which are combined to more easily integrate test system development.

Bluetooth is a trademark owned by Bluetooth SIG, Inc., U.S.A. and licensed to Agilent Technologies, Inc. cdma2000 is a registered certification mark of the Telecommunications Industry Association. Used under license. WiMAX is a trademark of the WiMAX Forum.

## Remove all doubt

Our repair and calibration services will get your equipment back to you, performing like new, when promised. You will get full value out of your Agilent equipment throughout its lifetime. Your equipment will be serviced by Agilent-trained technicians using the latest factory calibration procedures, automated repair diagnostics and genuine parts. You will always have the utmost confidence in your measurements.

Agilent offers a wide range of additional expert test and measurement services for your equipment, including initial start-up assistance onsite education and training, as well as design, system integration, and project management.

For more information on repair and calibration services, go to

[www.agilent.com/find/removealldoubt](http://www.agilent.com/find/removealldoubt)

## www.agilent.com

### [www.agilent.com/find/thermo-couplesensor](http://www.agilent.com/find/thermo-couplesensor)

For more information on Agilent Technologies' products, applications or services, please contact your local Agilent office. The complete list is available at:

[www.agilent.com/find/contactus](http://www.agilent.com/find/contactus)

#### Phone or Fax Americas

Canada	(877) 894-4414
Latin America	305 269 7500
United States	(800) 829-4444

#### Asia Pacific

Australia	1 800 629 485
China	800 810 0189
Hong Kong	800 938 693
India	1 800 112 929
Japan	0120 (421) 345
Korea	080 769 0800
Malaysia	1 800 888 848
Singapore	1 800 375 8100
Taiwan	0800 047 866
Thailand	1 800 226 008

#### Europe & Middle East

Austria	01 36027 71571
Belgium	32 (0) 2 404 93 40
Denmark	45 70 13 15 15
Finland	358 (0) 10 855 2100
France	0825 010 700*
	*0.125€/minute
Germany	07031 464 6333**
	**0.14€/minute
Ireland	1890 924 204
Israel	972-3-9288-504/544
Italy	39 02 92 60 8484
Netherlands	31 (0) 20 547 2111
Spain	34 (91) 631 3300
Sweden	0200-88 22 55
Switzerland	0800 80 53 53
United Kingdom	44 (0) 118 9276201

Other European Countries:

[www.agilent.com/find/contactus](http://www.agilent.com/find/contactus)

Revised: July 17, 2008

Product specifications and descriptions in this document subject to change without notice.

© Agilent Technologies, Inc. 2009  
Printed in USA, May 8, 2009  
5989-9333EN



# Agilent Technologies