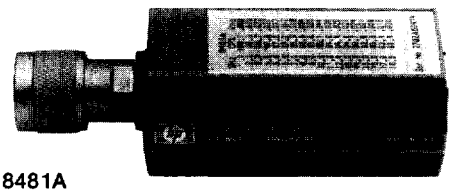
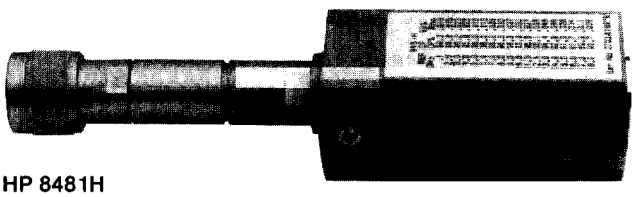
POWER METERS

Power Sensors

Models 8481A/B, 8481H, 8482A/B, 8482H, 8483A, 8484A, 8485A/D, R/Q 8486A/D, 8487A, 11708A



HP 8481A



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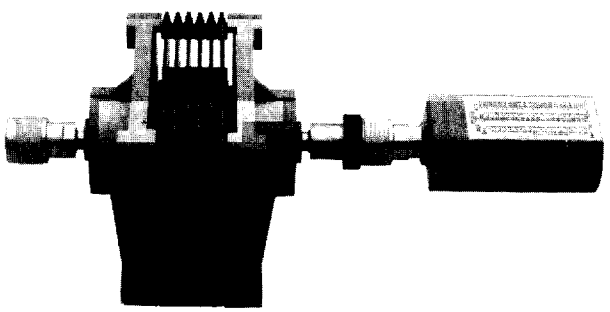
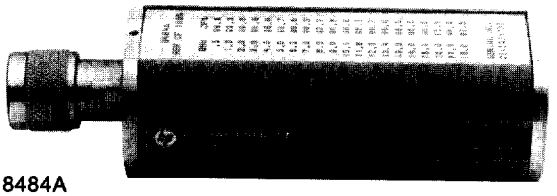
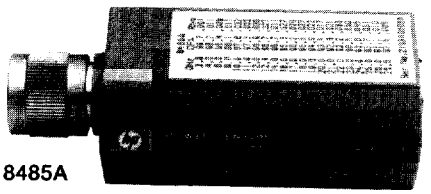


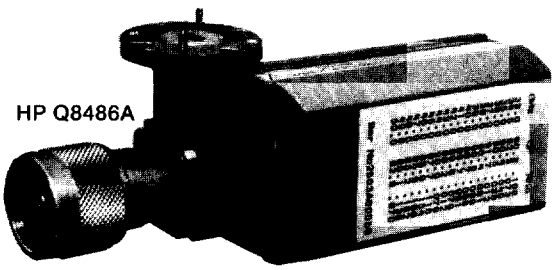
HP 8481B



HP 8484A



HP 8485A



HP Q8486A

HP 8480 Series Power Sensors

The HP 8480 series of Power Sensors have been designed for use with the HP 435B, 436A, 437B and 438A Power Meters. They feature wide frequency and power ranges in addition to very low SWR.

The power measurement range of these sensors is from 0.1 nW to 25 watts. With just three sensors a power measurement range of 114 dB can be achieved.

Wide Frequency Range for Many Applications

Power measurements can be made over a frequency range of 100 kHz to 50 GHz. The seven frequency ranges covered with these units are 10 MHz to 18 GHz, 100 kHz to 4.2 GHz, and 50 MHz to 26.5 GHz, in 50 Ω sensors and 100 kHz to 2 GHz, with the 75-ohm sensor, and 26.5 to 40 GHz and 33 to 50 GHz in Waveguide. The HP 8487A covers the entire 50 MHz to 50 GHz frequency range.

Low SWR for Low Measurement Uncertainty

The HP 8481/82/83/85A/86A/87 series of sensors use a silicon monolithic thermocouple as the sensing element. The small physical size of the thermocouple enables the sensors to have a very low SWR even at 50 GHz. A low SWR reduces mismatch uncertainty error, typically the largest single source of error in power measurements. The HP 8484A, 8485D and R/Q8486D sensors use a diode detector for higher sensitivity and low SWR.

Individually Calibrated for More Confidence in Results

Each sensor is individually calibrated, traceable to the National Bureau of Standards. A control on the meter compensates for power sensor Cal Factor at any frequency. A precise automatic network analyzer printout for Cal Factor and reflection coefficient is supplied with all the sensors. This means you can significantly reduce mismatch uncertainty by calculating the mismatch error.

High Power Sensors to 25 Watts

The HP 8481B and 8482B High Power Sensors both have a power range of 1 mW to 25 watts. The HP 8481B covers a frequency range of 10 MHz to 18 GHz and the HP 8482B has a frequency range of 100 kHz to 4.2 GHz.

Previous methods of measuring high power levels usually required adding a separate attenuator in front of a low power sensor. With the HP 8481/82B power sensors, the attenuator and sensor are combined into one unit. This reduces mismatch uncertainty error and improves accuracy by including the attenuator in the measured Calibration Factor curves. In addition, light-weight, heat-dissipating fins on the attenuator prevent burns.

Medium Power Sensors to 3 Watts

The HP 8481H measures power from 100 μW to 3 watts over a frequency range of 10 MHz to 18 GHz. The HP 8482H measures power from 10 μW to 3 watts over a frequency range of 100 kHz to 4.2 GHz.

Standard Sensors to 100 mW

The HP 8481A, 8482A, 8483A, 8485A and 8487A Power Sensors all measure power over a range of 1 μW to 100 mW. The HP 8481A is a 50-ohm sensor with a frequency range of 10 MHz to 18 GHz. The HP 8482A is a 50-ohm sensor with a frequency range of 100 kHz to 4.2 GHz. The HP 8485A is a 50-ohm sensor with a frequency range of 50 MHz to 26.5 GHz. The HP 8483A is a 75-ohm sensor and covers a frequency range of 100 kHz to 2 GHz. The HP 8487A covers the entire 50 MHz to 50 GHz frequency range using a single 2.4-mm input connector.

High Sensitivity Sensors

The HP 8484A and HP 8485D measure power from 0.1 nW to 10 μW over a frequency range of 10 MHz to 18 GHz and 50 MHz to 26.5 GHz respectively. They are furnished with the HP 11708A 50 MHz reference attenuator for precise calibration with 1 mW power meter reference oscillator. Noise and drift have been reduced to less than 5% of full scale on the 300 pW range (only 15 pW) when it is used with the HP 435B power meter. Noise and drift are even less with the HP 436A, 437B and 438A power meters.

Millimeter-Wave Power Sensors

The HP R8486A and Q8486A Thermocouple Waveguide Power Sensors measure true, average power from 1μW to 100 mW over the frequency ranges of 26.5 to 40 GHz (R-band) and 33 to 50 GHz (Q-band). The HP R8486D and Q8486D diode Waveguide Power Sensors measure true average power from 100pW to 10μW over the same frequency bands.

HP 8480 Series Specifications

HP Model (Nominal Impedance)	Frequency Range	Power Range	Maximum Power	Power Linearity[2]	Maximum SWR (Reflection Coefficient)	Size mm (in.) / Shipping Weight kg (lb)	RF Connector	Price	
8481A (50 Ω)	10 MHz-18 GHz	1 μW to 100 mW	300 mW avg. 15 W peak 30 W • μs (per pulse)	+10 to +20 dBm +2, –4%	10 MHz - 30 MHz: 1.40 (0.166) 30 MHz - 50 MHz: 1.18 (0.083) 50 MHz - 2 GHz: 1.10 (0.048) 2 - 12.4 GHz: 1.18 (0.083) 12.4 - 18 GHz: 1.28 (0.123)	30 x 38 x 105 (1.2 x 1.5 x 4.1) 0.5 (1)	N(m)	$650	☎
Option 001							APC-7	add $25	
8481B (50 Ω)	10 MHz-18 GHz	1 mW to 25W	0-35°C: 30 W avg.[1] 35°C-55°C: 25 W avg. 10 MHz-5.8 GHz 500 W peak 5.8-18 GHz 125 W peak 500 W • μs (per pulse)	+35 to +44 dBm ±4%	10 MHz - 2 GHz: 1.10 (0.048) 2-12.4 GHz: 1.18 (0.083) 12.4-18 GHz: 1.28 (0.123)	83 x 114 x 248 (3.25 x 4.5 x 9.75) 1.5 (3.2)	N(m)	$1500	☎
8481H (50 Ω)	10 MHz-18 GHz	100 μW to 3W	3.5 W avg. 100 W peak 100W • μs (per pulse)	+25 to +35 dBm ±5%	10 MHz - 8 GHz: 1.20 (0.091) 8-12.4 GHz: 1.25 (0.110) 12.4 - 18 GHz: 1.30 (0.130)	30 x 38 x 149 (1.2 x 1.5 x 5.9) 0.5 (1)	N(m)	$825	☎
8482A (50 Ω)	100 kHz-4.2 GHz	1.0 μW to 100 mW	300 mW avg. 15 W peak 30 W • μs (per pulse)	+10 to +20 dBm +2, –4%	100-300 kHz: 1.60 (0.231) 300 kHz - 1 MHz: 1.20 (0.091) 1 MHz - 2 GHz: 1.10 (0.048) 2-4.2 GHz: 1.30 (0.130)	30 x 38 x 105 (1.2 x 1.5 x 4.1) 0.5 (1)	N(m)	$650	☎
8482B (50 Ω)	100 kHz-4.2 GHz	1 mW to 25W	0-35°C: 30 W avg.[1] 35°C-55°C: 25 W avg. 500 W peak 500 W • μs (per pulse)	+35 to +44 dBm ±4%	100 kHz - 2 GHz: 1.10 (0.048) 2 GHz - 4.2 GHz: 1.18 (0.083)	83 x 114 x 248 (3.2 x 4.5 x 9.7) 1.5 (3.2)	N(m)	$1440	☎
8482H (50 Ω)	100 kHz-4.2 GHz	100 μW to 3W	3.5 W avg. 100 W peak 100 W • μs (per pulse)	+25 to +35 dBm ±5%	100 kHz-4.2 GHz: 1.20 (0.091)	30 x 38 x 149 (1.2 x 1.5 x 5.9) 0.5 (1)	N(m)	$800	☎
8483A[3] (75 Ω)	100 kHz-2 GHz	1.0 μW to 100 mW	300 mW avg. 10 W peak 30 W • μs (per pulse)	+10 to +20 dBm +2, –4%	100-600 kHz: 1.80 (0.286) 600 kHz - 2 GHz: 1.18 (0.083)	30 x 38 x 105 (1.2 x 1.5 x 4.1) 0.5 (1)	N(m) 75 Ω	$650	☎
8484A[4] (50 Ω)	10 MHz-18 GHz	0.1 nW to 10 μW	200 mW avg. 200 mW peak	–30 to –20 dBm ±1%	10-30 MHz: 1.40 (0.166) 30 MHz - 4 GHz: 1.15 (0.070) 4-10 GHz: 1.20 (0.091) 10-15 GHz: 1.30 (0.130) 15-18 GHz: 1.35 (0.149)	36 x 44 x 133 (1.4 x 1.7 x 5.2) 0.5 (1)	N(m)	$900	☎
8485A (50 Ω)	50 MHz-26.5 GHz	1 μW to 100 mW	300 mW avg. 15 W peak 30 W • μs (per pulse)	+10 to +20 dBm +2, –4%	50 MHz-100 MHz: 1.15 (0.070) 100 MHz-2 GHz: 1.10 (0.048) 2-12.4 GHz: 1.15 (0.070) 12.4-18 GHz: 1.20 (0.091) 18-26.5 GHz: 1.25 (0.111)	30 x 38 x 95 (1.2 x 1.5 x 3.7) 0.5 (1)	APC-3.5(m)	$950	☎
8485D[4] (50 Ω)	50MHz-26.5 GHz	100 pW to 10 μW	100 mW avg. 100 mW peak	–30 to –20 dBm ±2% (0°C to 55°C) ±1% (15° to 40°C)	50 MHz - 4 GHz: 1.15 (0.069) 4-18 GHz: 1.22 (0.099) 18-26.5 GHz: 1.29 (0.127)	30 x 38 x 102 (1.2 x 1.5 x 4.03) 0.5 (1.0)	APC-3.5(m)	$1,350	
R8486A (Waveguide)	26.5-40 GHz	1 μW to 100 mW	300 mW avg. 15 W peak 30W • μs pulse	+10 to +20 dBm +2, –4%	1.4 (0.167)	30 x 38 x 126 (1.2 x 1.5 x 50) 0.4 (0.9)	Waveguide Flange UG-599/U	$1900	
Q8486A (Waveguide)	33-50 GHz	1μW to 100 mW	300 mW avg. 15 W peak 30W • μs pulse	+10 to +20 dBm +2, –4%	1.5 (0.200)	30 x 38 x 126 (1.2 x 1.5 x 50) 0.4 (0.9)	Waveguide Flange UG-383/U	$2250	
R8486D[4] (Waveguide)	26.5-40 GHz	100 pW to 10 μW	100 mW avg. 100 mW peak	–30 to –25 dBm ±3% –25 to –20 dBm ±5%	1.4 (0.167)	30 x 65 x 126 (1.19 x 2.56 x 4.96) 0.66 (1.3)	Waveguide Flange UG-599/U	$2,500	
Q8486D[4] (Waveguide)	33-50 GHz	100 pW to 10 μW	100 mW avg. 100 mW peak	–30 to –25 dBm ±3% –25 to –20 dBm ±5%	1.4 (0.167)	30 x 65 x 126 (1.19 x 2.56 x 4.96) 0.66 (1.3)	Waveguide Flange UG-383/U	$3,000	
8487A (50 Ω)	50 MHz-50 GHz	1 μW to 100 mW	300 mW avg. 15 W peak 30 W.μS (per pulse)	+10 to +20 dBm +2, –4%	50-100 MHz: 1.15 (0.070) 100 MHz - 2 GHz: 1.10 (0.048) 2-12.4 GHz: 1.15 (0.07) 12.4-18 GHz: 1.20 (0.091) 18-26.5 GHz: 1.25 (0.111) 26.5-40 GHz: 1.30 (0.130) 40-50 GHz: 1.50 (0.200)	30 x 38 x 94 (1.19 x 1.5 x 3.70) 0.48 (1.07)	2.4 mm(m)	$1,800	☎

[1]For pulses greater than 30 W the maximum average power (Pa) is limited by the energy per pulse (E) in W • μs according to Pa = 30–0.02E.
[2]Negligible deviation except for those power ranges noted.
[3]Includes HP 1250-0597 adapter from 75 Ω type N to 50 Ω type N for calibration.
[4]Includes HP 11708A 30 dB attenuator for calibrating against a 0 dBm, 50 MHz power reference.

☎ Fast-Ship product—see page 766.