

POWER & NOISE FIGURE METERS

Thermocouple power meter, range calibrator

Model 435A, 11683A



435A



11683A

435A Power meter

The 435A Power Meter is an analog power meter, compatible with the entire series of 8480 power sensors. Depending on which sensor is used, the 435A can measure power from -65 dBm to $+44$ dBm, full scale, at frequencies from 100 kHz to 18 GHz. This versatile instrument also features $<1\%$ instrumentation uncertainty, low noise and drift, auto-zero, recorder output, optional battery operation, and long cable options (up to 200 ft).

11683A Range calibrator

The 11683A calibrator is specifically designed for use with the 435A and 436A power meters. It allows verification of full-scale meter readings on all ranges, as well as meter tracking. Simply connect the cable between the power meter and calibrator. The CAL ADJ control on the power meter is used to set the meter to full scale on the 1 mW range. The calibrator and meter are then stepped through the other ranges verifying accuracy within $\pm 1\%$ plus noise and drift. The 11683A also has a polarity switch which tests the Auto-Zero circuit.

Specifications

435A Power meter

Frequency range: 100 kHz to 18 GHz (depending on power sensor used).

Power range: (435 calibrated in watts and dB in 5 dB steps).

With 8481A, 8482A, or 8483A: -25 dBm ($3 \mu\text{W}$) to $+20$ dBm (100 mW) full scale.

With 8481B or 8482B: $+5$ dBm (3 mW) to $+44$ dBm (25 W) full scale.

With 8481H or 8482H: -5 dBm (0.3 mW) to $+35$ dBm (3 W) full scale.

With 8484A: -65 dBm (300 pW) to -20 dBm ($10 \mu\text{W}$) full scale.

Accuracy

Instrumentation: $\pm 1\%$ of full scale on all ranges.

Zero: Automatic, operated by front-panel switch.

Zero set: $\pm 0.5\%$ of full scale on most sensitive range, typical.

Zero carryover: $\pm 0.5\%$ of full scale when zeroed on the most sensitive range.

Noise: (typical, at constant temperature, peak change over any one-minute interval); 20 pW (8484A); 40 nW (8481A, 8482A, 8483A); $40 \mu\text{W}$ (8481B, 8482B); $4 \mu\text{W}$ (8481H, 8482H).

Power reference: Internal 50 MHz oscillator with Type N female connector on front panel (or rear panel, Option 003 only).

Power output: 1.00 mW. Factory set to $\pm 0.7\%$ traceable to the National Bureau of Standards.

Accuracy: $\pm 1.2\%$ worst case ($\pm 0.9\%$ rss) for one year (0°C to 55°C).

General

Drift: (1 hour, typical, at constant temperature after 24-hour warm-

up); 40 pW (8484A); 15 nW (8481A, 8482A, 8483A); $15 \mu\text{W}$ (8481B, 8482B); $1.5 \mu\text{W}$ (8481H, 8482H).

Response time: (0 to 99% of reading).

Range 1 (most sensitive range) <10.0 seconds

Range 2 <3.8 seconds

Range 3 <1.3 seconds

Ranges 4 to 10 <500 milliseconds

(Typical, measured at recorder output)

Cal factor: 16-Position switch normalizes meter reading to account for calibration factor. Range 85% to 100% in 1% steps.

Recorder output: proportional to indicated power with 1 volt corresponding to full scale; 1 k Ω output impedance, BNC connector.

RF blanking output: provides a contact closure to ground when auto-zero mode is engaged.

Cal adj: front-panel adjustment provides capability to adjust gain of meter to match power sensor in use.

Power consumption: 110 or 120 V ($+5\%$, -10%), 48 to 66 Hz and 360 to 440 Hz; also 220 or 240 V ($+5\%$, -10%), 48 to 66 Hz only; $<4\text{W}$ ($<10\text{W}$ for option 001 when recharging battery).

Weight: net, 2.6 kg (5 lb, 12 oz). Shipping, 4.2 kg (9 lb, 3 oz).

Size: 155 H x 130 W x 279 mm D (6.1 x 5.1 x 11 in).

Accessories furnished: 1.52 m (5 ft) cable for the power sensor; 2.3 m (7.5 ft) power cable. Mains plug shipped to match destination requirements.

Accessories available

11076A: Carrying case.

5060-8762: Rack adapter frame (holds three instruments the size of the 435A).

Combining cases

1051A: 286 mm (11 $\frac{1}{4}$ " deep.

1052A: 416 mm (16 $\frac{3}{8}$ " deep.

The combining cases accept the $\frac{1}{2}$ -module Hewlett-Packard instruments for bench use or rack mounting. See 1051A data sheet for details.

11683A Range calibrator

Calibration functions: outputs corresponding to meter readings of 3, 10, 30, 100 and 300 μW ; 1, 3, 10, 30, and 100 mW.

Calibration uncertainty: $\pm 0.25\%$ in all ranges.

Power: 115 or 230 V $\pm 10\%$; 50-400 Hz, less than 2 W.

Weight: net, 1.13 kg (2 lb 8 oz). Shipping, 1.9 kg (4 lb 3 oz).

Size: 89 H x 133 W x 216 mm D (3.5 x 5.25 x 8.5 in).

435 Power meter options

001: Rechargeable battery installed provides up to 16 hours of continuous operation Price add \$100

002: Input connector placed on rear panel in parallel with front add \$25

003: Input connector and reference oscillator output on rear panel only add \$10

009: 3.0 m (10-foot) cable for power sensor add \$30

010: 6.1 m (20-foot) cable for power sensor add \$55

011: 15.2 m (50-foot) cable for power sensor add \$105

012: 30.5 m (100-foot) cable for power sensor add \$155

013: 61 m (200-foot) cable for power sensor add \$260

Ordering information

11683A Range calibrator \$575

435A Power meter \$1000