Agilent Technologies

THERMISTOR MOUNT 486A

GENERAL INFORMATION

Introduction

The Hewlett-Packard Model 486A Thermistor Mounts are designed for use with the Hewlett-Packard Model 431 and 432 Power Meters in the measurement of microwave power from 1 μW to 10 mW in the range from 2.6 to 40.0 GHz. Design of power meter and thermistor mount is such that the measurement system is temperature-compensated. This feature permits microwave power measurements that are relatively free of the drift in meter indication that otherwise occurs with changes in ambient temperature.

For improved accuracy of measurement results, Calibration Factor and Efficiency are measured at selected frequencies across the operating range of each mount, and the results recorded on the label of the mount. In addition, each mount is tested on a swept-frequency basis to assure that interpolation between measured points is valid.

NOTE

Do not remove polyfoam insert — damage to the thermistor element may occur.

Each Model 486A Mount is designed to provide a good impedance match (low SWR) over the full frequency range of its waveguide size without external tuning.

Incoming Inspection

Unpack and inspect the Model 486A as soon as it is received. Inspect for mechanical damage such as dents, scratches, etc. Also check it electrically; if the mount was subjected to severe mechanical shock during shipment, the match between the thermistors will be affected. To check thermistor match, proceed as described under MAINTENANCE.

If any damage is found, notify the carrier and your Hewlett-Packard Sales and Service office immediately.

OPERATION

Precautions

Mechanical Shock. DO NOT DROP OR SUBJECT TO SEVERE MECHANICAL SHOCK. SHOCK MAY DESTROY THE MATCH BETWEEN THERMISTORS AND INCREASE SUSCEPTIBILITY TO DRIFT.

CAUTION

Before connecting a 200-ohm thermistor mount (K or R486A) to a power meter, set MOUNT RES switch to 200 ohm position. CONNECTING A 200-OHM MOUNT TO A POWER METER SET FOR A 100—OHM MOUNT CAN RESULT IN THERMISTOR DAMAGE.

Table 1. Specifications

Model	Freq Range (GHz)	Max SWR	Operating Resistance (ohms)	Fits Waveguide Size Nominal OD (inches)	EIA	Equiv Flange JAN Type	Approx Length (inches)	(mm)	Net Weight (oz)	(g)
S486A	2.6 - 3.95	1.35	100	3 x 1-1/2	WR284	UG-53/U	2-7/8	74	24	670
G486A	3.95 - 5.85	1.5	100	2 x 1	WR187	UG-149A/U	3-9/32	83	11	310
J486A	5.3 - 8.2	1.5	100	1-1/2 x 3/4	WR137	UG-344/U	3-5/32	80	8-1/2	240
H486A	7.05 - 10.0	1.5	100	1-1/4 x 5/8	WR112	UG-51/U	2-3/4	70	5-1/4	150
X486A	8.2 - 12.4	1.5	100	1 x 1/2	WR90	UG-39/U	2-1/8	54	3	80
M486A	10.0 - 15.0	1.5	100	0.850 x 0.475	WR75	--	2-1/8	54	3-1/4	90
P486A	12.4 - 18.0	1.5	100	0.702 x 0.391	WR51	UG-419/U	2-3/8	60	3-1/4	90
K486A[1]	18.0 - 26.5	2.0	200	1/2 x 1/4	WR42	UG-595/U	3	76	4-1/2	126
R486A[1]	26.5 - 40.0	2.0	200	0.360 x 0.220	WR28	UG-599/U	3	76	4-1/2	126

Mount Calibration: Calibration Factor and Effective Efficiency furnished at selected frequencies. Maximum uncertainty of data available upon request; contact local Hewlett-Packard Sales and Service office.

Power Range: 1 μW to 10 mW.

Power Sensing Element: Permanently installed thermistor.

Output Connector: 6-pin connector mates with cable furnished with Power Meter.

[1] Circular contact flange adapter available: K-band (UG-425/U) order HP 11515A; R-band (UG-381/U) order HP 11516A.

Maximum Input. The Model 486A / power meter combination responds to the average RF power applied. The maximum signal applied to the thermistor mount should not exceed the limitations for 1) average power, 2) pulse energy, and 3) peak pulse power. Excessive input can permanently damage the Model 486A by altering the match between the RF and compensation thermistors (resulting in excessive drift or zero shift) or cause error in indicated power.

Average Power. The 486A/power meter combination can measure average power up to 10 mW. To measure power in excess of 10 mW, a directional coupler (such as one of the Hewlett-Packard Model 752 series) can be inserted between the mount and the source. UNDER NO CIRCUMSTANCES APPLY MORE THAN 15 mW AVERAGE TO THE MOUNT.

Pulse Energy and Peak Power. In measuring pulse power, there is a limit on the energy per pulse which may be applied to the mount. For a pulse repetition frequency (PRF) less than 1 kHz, energy per pulse can be up to 2.5 Watt-μsec; for a PRF 1 kHz and above, up to 4 Watt-μsec (for lack of space, only the lower limit is shown on the mount name plate). However, this energy limit applies only to pulses shorter than 250 μsec. In Figure 1, the pulse energy limit is translated into a maximum power-meter reading for any PRF. For pulses in this category, allowable peak power is inversely proportional to pulse width but should never exceed 100 Watts.

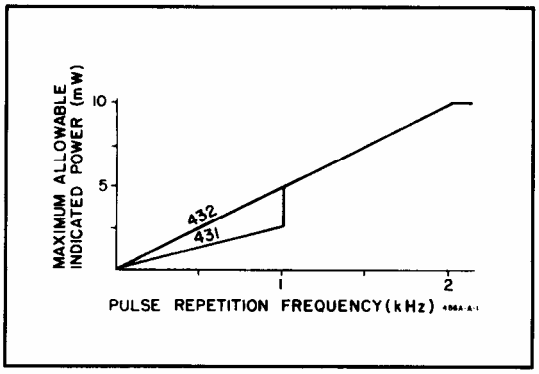

Figure 1. Maximum Power Meter Reading versus PRF for Pulses Shorter than 250 μsec.

For pulses longer than 250 μsec, the peak power limitation can be expressed in terms of PRF: 10 mW for a PRF below 1 kHz, 20 mW for a PRF 1 kHz or above provided 15 mW average is not exceeded. In Figure 2, the peak power limit is translated into power-meter reading versus duty cycle.

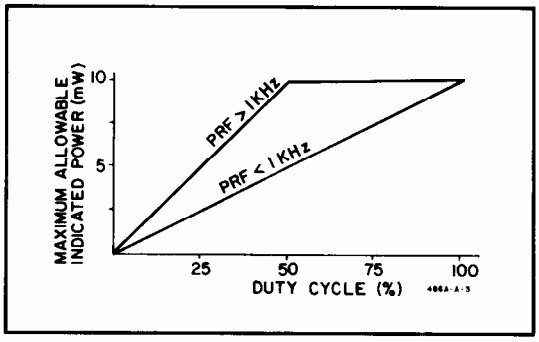

Figure 2. Maximum Power Meter Reading versus Duty Cycle for Pulses Longer than 250 μsec.

Square-wave modulation is a special case of pulse modulation, and maximum power-meter reading versus square-wave frequency is illustrated in Figure 3. This figure also holds for sine-wave modulation.

In the discussions above, the primary consideration is maximum power or energy. However, for modulation frequencies less than 100 Hz, the low repetition frequency itself causes errors in indicated power. These errors may be as large as 2% regardless of range or reading.

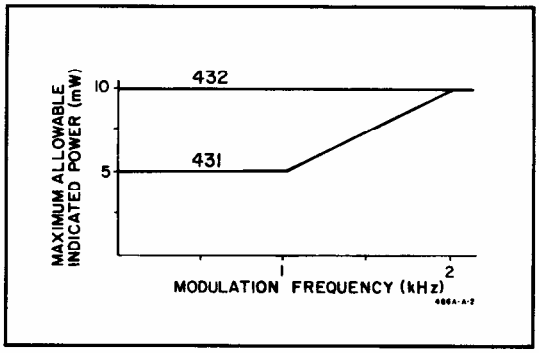

Figure 3. Maximum Power Meter Reading vs. Square- and Sine-Wave Modulation Frequency

Drift

Thermistors are inherently temperature sensitive devices. A cold thermistor mount connected to a warm piece of equipment or vice versa, produces rapid drift. FOR MINIMUM DRIFT ON SENSITIVE RANGES MAKE SURE THAT THE MOUNT AND THE EQUIPMENT CONNECTED TO IT ARE AT NEARLY THE SAME TEMPERATURE BEFORE MAKING A MEASUREMENT.