

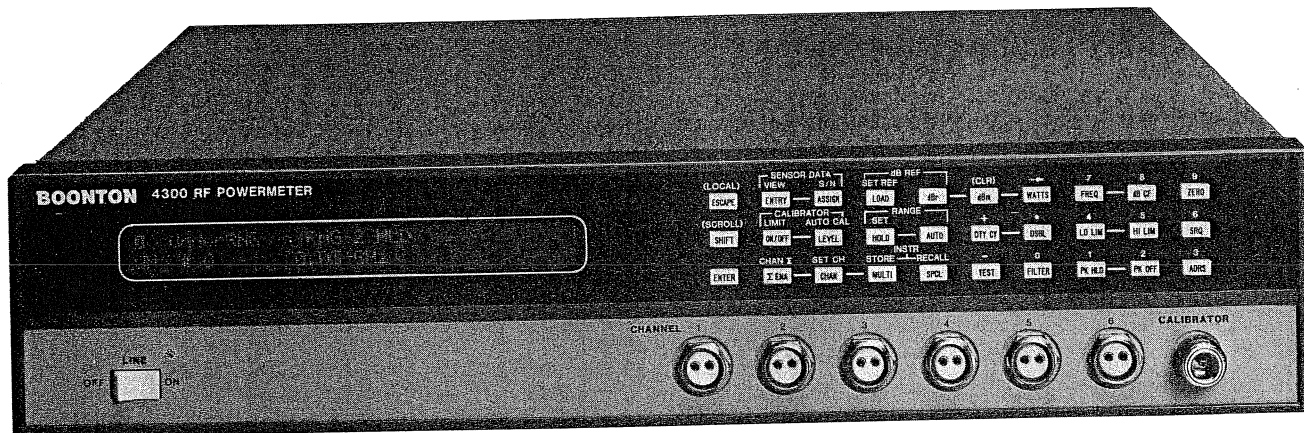
BOONTON

POWER METERS

Power Meter
Model 4300



- Frequency Range, 100 kHz to 100 GHz.
- One to six channel capability.
- Power Range, -70 dB to +37 dBm.
- Up to 90 dB dynamic range with single sensor.
- Complete Series of Coaxial and Waveguide Sensors.
- MATE Compatible.



Description

The Model 4300 is a microprocessor based power meter system that allows configuration to meet virtually any RF/Microwave power measurement requirements.

The 4311 Universal Channel Module is designed to operate with all Boonton Sensors. The 4312 Thermocouple Channel Module is specially designed to operate with thermocouple sensors and expands the dynamic range to 50 dB. The 4311, 4312, and a wide selection of sensors make the 4300 system the ultimate choice in ATE power measuring applications.

If the measurement requirement changes, a prompted 80 character display leads the user in entering sensor calibration data. Individual modules are easily installed and can be set up and running without any special calibration or special tools. Each module represents a complete measurement capability with its own microprocessor and non-volatile memory. The 4300 system is not a multiplexed multiple sensor unit, but is a convenient package for making up to six simultaneous independent power measurements.

Sensitivity and Frequency Range

The 4300 operates with a wide selection of power sensors that can cover the -70 dBm to +37 dBm power range. The frequency range extends from 100 kHz to 100 GHz. The unique DC interface between sensor and meter will allow the 4300 to be compatible with all future sensors. The 4300 covers a wide

level range, -75 dBm to +50 dBm, so it will not limit future sensor developments.

Dynamic Range

The 4311 Universal Channel Module provides the sensitivity and flexibility to allow a high sensitivity coaxial sensor to operate with 90 dB of dynamic range. A single sensor can make the measurement, even if the signal varies between -70 dBm to +20 dBm. Other sensors provide waveguide inputs with up to -60 dBm sensitivity and the new 51071 and 51072 sensors cover the 10 MHz to 26.5 GHz and 30 MHz to 40 GHz ranges respectively, with unprecedented -70 dBm to +20 dBm measurement range.

Measurement Accuracy

The 4300 system offers the 4321/4322 30 MHz Programmable Calibrator to significantly improve the basic measurement accuracy. Instead of relying on the nominal linearity of any given sensor, the programmable calibrator allows the shaping to be customized to reduce linearity (shaping) errors to 0.003 dB. The only other limitations are the low end noise, the high frequency calibration factor uncertainty, and the SWR uncertainties.

For those who need to reference back to 50 MHz standards the 4323/4324 50 MHz reference can be installed. Both the 30 MHz and 50 MHz Calibrators can be installed in the same chassis, one out the front and one out the back.

POWER METERS

RF Power Meter

Model 4300 (Continued)



Specifications

Frequency Range: 100 kHz to 100 GHz, sensor dependent.

Power Range: -75 dBm to +50 dBm, sensor dependent.

Power Sensors: Compatible with all Boonton diode and thermocouple sensors. Refer to the Power Meter Sensor section.

Dynamic Range: 90 dB with diode sensors. 50 dB with thermocouple sensors. Refer to the Power Meter Sensor section.

Inputs: Front and rear panel inputs, standard for each channel module installed. Each channel is an independent measuring unit. One to six channels. Refer to ordering information.

IEEE-488 Bus Connector

Outputs:

Rear Panel Outputs: Type BNC connector(s), one for each channel module installed; the output is front panel/GPIB selectable for linear or logarithmic output of 0 to 10V proportional to function selected (watts or dB). Can also be selected for high/low limit status and zero status.

Measurement Modes: Single Channel; Summation Channel (Ratio); Multiple channel, (all channels displayed simultaneously).

Display Units:

Absolute; watts, dBm.

Ratio (summation); dB or %.

(Channel 1 \pm Channel 2 \pm Channel 3 \pm Channel N).

Relative; dBr.

Display: Alphanumeric backlit LCD, 2 lines of 40 characters each.

Resolution: 4½ digits, watts mode; 0.01 dB, dB modes.

Uncertainty:

The total measurement uncertainty is the sum of instrumentation uncertainty (instrument less sensor), noise (see sensor table), reference frequency/calibrator uncertainty (see sensor tables for the reference frequency uncertainty for waveguide sensors), power linearity uncertainty (see sensor tables, and sensor Cal. Factor uncertainty (see sensor tables). When making multichannel ratio measurements, the total measurement uncertainty is the sum of the individual channels.

Instrument Uncertainty:

Uncertainty	RSS	Worst Case
Single Channel Mode ⁽¹⁾	0.12% (0.005 dB)	0.3% (0.013 dB)
Zeroing	0.03% (0.002 dB)	0.025% of fs
Shaping ⁽²⁾	0.015% (0.007 dB)	0.12% (0.005 dB)
Total Uncertainty	0.14% (0.006 dB)	0.42% + 0.025% of fs

⁽¹⁾Accuracy in Summation (Ratio) mode is $n \times$ single channel when n = number of channels.

⁽²⁾When using the 50 MHz fixed calibrator, or waveguide sensors, add 1% to the stated shaping error. Add 2% for the top 10 dB of the coaxial diode sensors. The 2% also applies when using series 5 and 6 sensors with the 30 MHz calibrator when above +20 dBm.

Power Reference/Calibrator:

50 MHz (0 dBm) Power Reference. Internal 50 MHz source with type N female connector. Set to 0.7% (.03 dB) at 0 dBm. Front or rear panel. (0-55°C). SWR 1.05. The worst case uncertainty for one year is 1.2%. 0-55°C. RSS 0.9% (.04 dB). See ordering information.

30 MHz Programmable Calibrator. Internal 30 MHz source with programmable level between -60 dBm and +20 dBm, 1 dB steps. Front or rear panel. (20-30°C). At 0-20°C and 30-55°C add 0.35% (.015 dB). (See ordering information). SWR < 1.05.

LEVEL	RSS	Worst Case
@ 0 dBm	0.6% (.025 dB)	0.9% (.04 dB)
+20 dBm to -39 dBm	0.7% (.03 dB)	1.4% (.06 dB)
-40 dBm to -60 dBm	0.9% (.04 dB)	2.1% (.09 dB)

Calibration Factors: +3 dB to -3 dB in .01 dB steps. These stored calibration factors are in non-volatile memory. When a frequency other than that stored is used, the 4300 linearly interpolates between the cal. factor above and below the frequency entered to obtain a cal. factor. Cal. factors for up to 20 sensors can be stored with up to 80 frequencies for sensors 1-6 and 35 frequencies for sensors 7-20.

Ranging: Autoranging, set-ranging and hold on range; each channel operating independently. Hold on range has 10% headroom and 25 dB dynamic range on each range (0.2 dB resolution at -25 dB point).

Settling Time: 0-99%, 10 dB power step, hold range, filter set to 20 ms. Read-out over the IEEE Bus.

Diode Sensors: <200 ms.

Thermocouple Sensors: <450 ms.

Output Data Speed: Free run access time is typically 30 ms per channel or 33 readings per second.

Filtering: Filtering is selected by entering the filter time in ms, between 20 ms and 20 s. Filtering is accomplished in 20 ms increments, e.g., selecting 2000 ms selects 100 point, pipe line averaging.

Zeroing: Each range is independently zeroed upon selecting the "ZERO" function either via front panel or over the bus.

Limits: Front panel or bus selectable between +100 dB and -100 dB independently, for each channel.

Power Consumption: 40 VA; 100, 120, 220, 240 V \pm 10%, 50 - 400 Hz.

Operating Temperature: 0-55°C.

Storage Temperature: -55° to +75°C.

Environmental Characteristics: Meets MIL-T 28800D for Type II, Class 5, Style E and F equipment.

Weight: 21 lbs (9.5 kg). With 6 channels and programmable calibrator.

Accessories Included:

Each unit is supplied with rack mounting ears, spare line fuses, extender board for servicing and an extra luminescent panel (for display).

Dimensions: 3.48 in (8.8 cm) high, 17.24 in (43.8 cm) wide, and 17.75 in (45.0 cm) deep.

IEEE-488 Bus: Complies with IEEE-488 and implements; SH1, AH1, T6, L4, SR1, RL1, DC1, and DT1.

Accessories Available:

41-2A/10 Sensor/Probe Interconnecting Cable (10 ft.) (M/M).

41-2A/20 Sensor/Probe Interconnecting Cable (20 ft.) (M/M).

41-2A/50 Sensor/Probe Interconnecting Cable (50 ft.) (M/M).

41-2A/100 Sensor/Probe Interconnecting Cable (100 ft.) (M/M).

950043 Chassis slide rack mounting kit.

950049 Bulkhead connector F/F, 41-2A.

951055 Adapter, type N (M) to APC 3.5 (F).

Ordering Information: The Model 4300 RF Power Meter is a chassis that contains six module slots for installation of the 4300 input modules, and a seventh calibrator slot. The 4300 may be configured as follows:

4300 Chassis.

-06 Internal TMA (Mate) Option.

4311 Universal Channel Module.

4312 Thermocouple Channel Module. (The 4312 cannot be used with diode sensors).

4321 30 MHz Programmable Calibrator Module, (Front output).

4322 30 MHz Programmable Calibrator Module, (Rear output).

4323 50 MHz (0 dBm) Power Reference Module, (Front output).

4324 50 MHz (0 dBm) Power Reference Module, (Rear output).

4300 Sensors. Application dependent. Refer to the Power Meter Sensor section.