# BOONTON

# POWER METERS

## RF POWER METER
## MODEL 4300

GPIB

- **Frequency Range: 10 kHz to 100 GHz**
- **Power Range: -70 dBm to +44 dBm**
- **One to Six Channel Capability**
- **Up to 90 dB Dynamic Range with Single Sensor**
- **Complete Series of Coaxial and Waveguide Sensors**


### Description

The Model 4300 is a microproccessor based power meter that can be configured to meet virtually any RF/Microwave power measurement requirement. Each field installable channel module comprises a complete measurement system with its own microprocessor and non-volatile memory. This permits up to six simultaneous, yet independent, power measurements.

### Sensitivity and Frequency Range

As with all Boonton power meters, the Model 4300 channel modules can operate with all available Boonton power sensors. Frequency range extends from 10 kHz to 100 GHz and power range from -70 to +44 dBm. Also, optional accessory cables allow power sensors to be located as far as 100 feet from the instrument.

### Measurement Accuracy

The Model 4300 can be configured with a 30 MHz programmable calibrator module (Model 4321/4322). This calibrator significantly enhances basic measurement accuracy. Rather than rely on nominal sensor linearity data, the programmable calibrator, together with a firmware calibration routine, reduces linearity errors to 0.003 dB.

In systems where tight linearity tracking is not necessary, or where 50 MHz traceability is required, the Model 4300 can be configured with a 50 MHz, 0 dBm calibrator (Model 4323/4324). It is, in fact, possible to have both calibrators installed in the instrument simultaneously.

### Automatic Test

The Model 4300 has been designed with automatic test systems in mind. The Model 4300 features a standard IEEE-488 bus and very fast measurement speed. IEEE-488 bus compatibility permits the Model 4300 to be connected to a system controller in a network of up to fifteen instruments. All front panel functions can be programmed from the bus controller, with the Model 4300 returning power measurement in 20 milliseconds plus 5 milliseconds per channel, e.g., 25 milliseconds for one channel and 50 milliseconds for six channels.

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# POWER METERS

## RF POWER METER MODEL 4300 (continued)

GPIB

## Specifications

**Frequency Range:** 10 kHz to 100 GHz, sensor dependent.
* See Sensor Data Sheet.

**Power Range:** -70 dBm to +44 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 below.

**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 ouput of 0 to 10 V 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 +/- Channel 2 +/- Channel 3 +/- Channel N).
Relative: dBr.

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

**Resolution:** 4 1/2 digits, watts mode; 0.01 dB, dB modes.

**Uncertainty:**
The total measurement uncertainty is the sum of the 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 table), and sensor Cal. Factor uncertainty (* see Sensor Data Sheet). 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) | 0.25% of fs |
| Shaping [2] | 0.15% (0.007 dB | 0.12% (0.005 dB) |
| Total Uncertainty | 0.14% (0.006 dB) | 0.42% +0.25% of fs |

[1] Accuracy of Summation (ratio) mode is n x 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 sensors.

**Power Reference/Calibrator:**
50 MHz (0 dBm) Power Reference: Internal 50 MHz source with type N female connector. Set to 0.7% (0.03 dB) at 0 dBm. Front or rear panel. (0-55 °C). SWR <1.05. The worst case uncertainty for one year is 1.2%, RSS 0.9% (0.04 dB). see ordering information below.

**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% (0.15 dB). (See ordering information). SWR <1.05.

| Level | RSS | Worst Case |
|---|---|---|
| @ 0 dBm | 0.6% (0.025 dB) | 0.3% (0.04 dB) |
| +20 dBm to -39 dBm | 0.7% (0.03 dB) | 1.4% (0.06 dB) |
| -40 dBm to -60 dBm | 0.9% ).04 dB) | 2.1% (0.09 dB) |

**Calibration Factors:** 3.0 dB to -3.0 dB range in 0.01 dB steps. These stored calibration factors are interpolated linearly and applied automatically to readings when the frequency is entered through front panel keys; up to 20 individual calibration factors for up to 8 power sensors can be stored in non-volatile memory. Alternative key entry.

**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. Readout over the IEEE bus.
Diode Sensors: <200 ms.
Thermocouple Sensors: <450 ms.

**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 the 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 and 240 V +/-10%, 50 to 400 Hz.

**Operating Temperature:** 0 ° to 55 °C.

**Storage Temperature:** -55 ° to +75 °C.

**Environmental Characteristics:** Complies with MIL-STD 28800D Type II, Class 5, Style E and F equipment.

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

**Dimensions:** 17.24 in (43.8 cm) wide, 3.485 in (8.8 cm) high, 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).
**95004901A** Bulkhead connector F/F, 41-2A.
**95402801A** Extender board 4300.

**Ordering Information:** The Model 4300 RF Power Meter has a chassis that contains six module slots for installation of the Model 4300 input modules, and a seventh calibrator slot. The Model 4300 may be configured as follows:
**4300** Chassis.
**4311** Universal Channel Module.
**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. * See Sensor Data Sheet.



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