

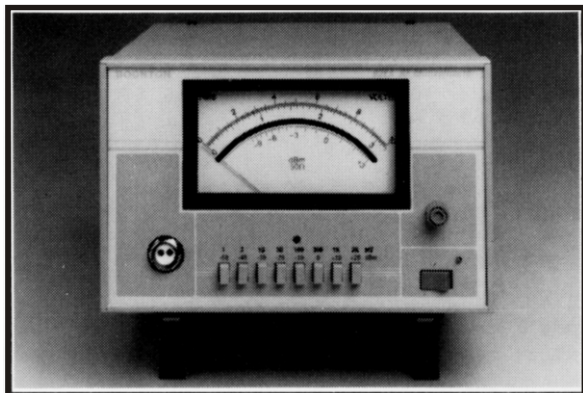
BOONTON

RF/RMS VOLTMETERS

RF Millivoltmeter

Model 92EA

- Voltage Range: 200 μ V to 3 V (to 300 V with optional divider). Indicates down to 100 μ V.
- Frequency Range:
Standard, 10 kHz to 1.2 GHz.
-16 Option, 10 Hz to 100 MHz.
- True RMS response below 30 mV (to 3 V with 100:1 divider).
- Solid -state electronic chopper, high level DC output, and TTL programmable ranges.
- Complete series of probes and adapters for 50 Ω and 75 Ω systems, terminated or through-line.



Description

The 92EA RF Millivoltmeter provides voltage measurements from the low radio frequencies to the gigahertz region, over a range of 200 μ V to 3 volts (to 300 V, up to 700 MHz, with accessory 100:1 divider). It is a range programmable instrument of high sensitivity and accuracy, characterized by high input impedance, excellent stability and low noise. The 92EA includes an RF probe, 50 Ω BNC adapter and probe tip.

Wide Voltage Range

Eight ranges from 1 mV full scale to 3 V full scale are arranged in 1-3-10 sequence. No attenuator attachments are required for measurements up to 3 V. While this range is ample for the majority of RF voltage measurements, voltage capability can be increased to 300 V (up to 700 MHz) by using the accessory 952005 100:1 Voltage Divider. Use of the 100:1 voltage divider also increases the input resistance of the probe by a factor of more than 100.

Frequency Range

The calibrated frequency range extends from 10 kHz to 1.2 GHz, with uncalibrated response to beyond 8 GHz. Relative accuracy above 1.2 GHz is typically ± 0.5 dB.

A 952002 50 Ω Terminated BNC Adapter is supplied as standard for voltage measurements in a 50 Ω system up to 1.2 GHz. For through-line voltage measurements, the optional accessory 952003 Tee Adapter is required. It is designed to compensate for the RF probe capacitance and to present a low insertion loss up to 1.2 GHz. It may be used in conjunction with the 952014 50 Ω Load for terminated voltage measurements. Both adapters exhibit a low SWR up to 1.2 GHz.

When the instrument is ordered with the -16 Option the standard probe is replaced with a 952016 probe, which changes the specified frequency range to 10 Hz to 100 MHz.

True RMS Response

Boonton RF probes use a full-wave rectifying circuit with diodes that have special characteristics, including low capacitance and controlled thermal offsets. Response is true RMS for inputs below 30 mV, allowing accurate voltage measurements with all types of waveforms. As the input voltage increases above 30 mV, the response gradually changes, approaching peak-to-peak at the higher levels. Readings, however, are shaped to indicate RMS voltage, provided that the input is reasonably sinusoidal, as would be the case with CW or FM signals. By using the 952005 100:1 voltage divider, the true RMS range can be extended to 3 V.

Low Noise

Extensive care has been taken throughout the design and construction to hold noise from all sources to a minimum. The probe cable is of special low-noise design and the RF probe is not sensitive to shock or vibration. Amplification takes place at 94 Hz, reducing susceptibility to any 50 Hz or 60 Hz line-frequency-related fields.

Low Zero-Drift

Zero adjustment is not required on the upper five voltage ranges. For measurements on the lower three ranges, the ZERO control is set on the most sensitive range prior to operation. This control balances out small thermal voltages in the probe elements and, once adjusted, requires only infrequent checking during the course of subsequent measurements.

Voltage and dB Scales

The 92EA has a large mirrored meter with two linear 0-3 and 0-10 voltage scales and a dBm scale referred to 1 mW in 50 Ω . Two optional dB scales relative to voltage are available. One is calibrated in dBV and the other in dBmV. The dBm scale is also available for use with 75 Ω input impedance.

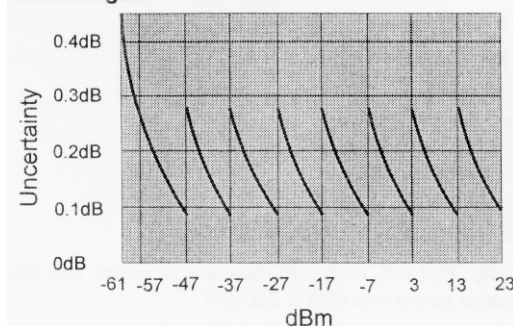
Specifications

Voltage Range: 200 μ V to 3 V (300 V up to 700 MHz with accessory 100:1 voltage divider). Lowest detectable voltage is approximately 100 μ V. Full scale ranges are 1, 3, 10, 30, 100, 300, 1000 and 3000 mV.

dB Range: -61 to +23 dBm in eight ranges (+63 dBm up to 700 MHz with optional accessory 100:1 voltage divider).

Frequency Range: 10 kHz to 1.2 GHz (uncalibrated response to approximately 8 GHz).
10 Hz to 100 MHz with 952016-1 probe.

dBm Ranges:



RF/RMS VOLTMETERS

RF Millivoltmeter

Model 92EA (continued)

Basic Uncertainty: (Voltage Ranges)

Level; 200 μ V - 3000 MV.

Uncertainty; 1% fs.

Frequency Effect: (952001A Probe)

50 Ω measurements using the 952001 Probe with the 952002 BNC Adapter or terminated 952003 Type-N Tee Adapter at 100 mV level.

Frequency	mV	dBm
1 MHz (cal freq)	0	0
10 kHz - 100 MHz	1% rdg	0.09 dB
100 MHz - 1 GHz	3% rdg	0.26 dB
1 GHz - 1.2 GHz	7% rdg	0.63 dB
SWR: <1.05 to 300 MHz; <1.10 to 1 GHz; <1.15 to 1.2 GHz.		

Frequency Effect: (952016 Probe) -16 Option

50 Ω measurements using the 952016 Probe with the 952002 BNC Adapter.

Frequency	mV	dBm
1 MHz (cal freq)	0	0
50 Hz - 20 MHz	1% rdg	0.09 dB
20 Hz - 50 Hz	2% rdg	0.18 dB
10 Hz - 100 MHz	5% rdg	0.45 dB
SWR: <1.05 to 100 MHz.		

Frequency Effect: (952016 Probe) with 952058 100:1 Divider.

Frequency	mV	dBm
1 MHz (cal freq)	1% rdg	0.09 dB
1 MHz - 20 MHz	5% rdg	0.45 dB
50 Hz - 1 MHz	3.5% rdg	0.31 dB
20 Hz - 50 Hz	4.5% rdg	0.40 dB
10 Hz - 20 Hz	7.5% rdg	0.68 dB
SWR: <1.05 to 100 MHz.		

Frequency Effect:

75 Ω measurement using Model 91-12F Probe with Models 952006 BNC Adapter or 952007 Tee Adapter.

Frequency	Model 952006	Model 952007
1 MHz (cal freq.)	0% rdg	0% rdg
10 kHz - 100 MHz	1% rdg	1% rdg
100 MHz - 300 MHz	3% rdg	3% rdg
300 MHz - 500 MHz	---	5% rdg
500 MHz - 750 MHz	---	7% rdg
750 MHz - 1 GHz	---	10% rdg
952006 SWR: <1.10 to 100 MHz, <1.25 to 300 MHz		
952007 SWR: <1.05 to 100 MHz, <1.25 to 300 MHz, <1.5 to 1 GHz		

Waveform Response: RMS to 30 mV, calibrated in RMS of a sine wave above 30 mV (RMS to 3 V and 700 MHz with divider).

Crest Factor:

Direct Input:	Level	300 μ V	1mV	3mV	10mV	30mV
	C.F.	140	42	14	4.2	1.4
With Divider:	Level	30 mV	100mV	300mV	1 V	3 V
	C.F.	140	42	14	4.2	1.4

Maximum AC Input: 10 V, all frequencies and ranges.

Maximum DC Input: 200 V, all ranges.

Meter: 4 $\frac{1}{2}$ -inch taut-band.

Two linear voltage scales.

0 to 3; resolution 0.05/division.

0 to 10; resolution 0.1/division.

One logarithmic dBm scale:

-10 to +3; resolution 0.2/division, max.

Power Sensitivity: 800 pW, minimum measurable power into 50 Ω .
Minimum detectable power into 50 Ω is 200 pW.

DC Output: 0 to 10 VDC, proportional to RF input voltage. Source resistance of 9 k Ω ; will deliver 1 mA into 1 k Ω load. Full scale input step-function response time less than 100 ms on 30 mV fs to 3 V fs ranges, increasing to 1 s on the 1 mV fs range.

Remote Operation: Ranges are selected via rear card-edge connector using logic low (or shorting to common). One line for manual disable; one line for each of the eight ranges.

Power Consumption: 100, 120, 220, 240 V \pm 10%, 50 to 400 Hz.

Operating Temperature: 0° to 55°C.

Storage Temperature: -55° to +75°C.

Environmental Characteristics: Conforms to the requirements of Mil-T-28800D for type III, Class 5 style E equipment.

Weight: 7 lbs. (3.2 kg).

Dimensions: 5.85 in (14.9 cm) high x 8.3 in (21.1 cm) wide and 13.75 in (34.9 cm) deep.

Accessories Included:

952001-2 RF Probe.

952002 50 Ω BNC Adapter (F).

952004 Probe Tip.

Options:

-04 dBV as the uppermost scale on the meter face. The two voltage scales are above and below the mirror. Standard accessories.

-06 75 Ω dBm as the uppermost scale on the meter face. 75 Ω BNC Adapter 952006 supplied instead of standard 50 Ω BNC Adapter 952002.

-08 RF probe input connector duplicated on rear of unit.

-12 dBmV as the uppermost scale on the meter face. 75 Ω BNC Adapter 952006 supplied instead of standard 50 Ω BNC Adapter 952002.

-16 10 Hz to 100 MHz frequency range, the 952016 Probe replaces 952001A.

Accessories Available:

91-6F Underterminated Type F Adapter (F).

91-6G Underterminated BNC Adapter (M).

91-8B/1A 75 Ω Type F Adapter (F).

91-15A/1 75 Ω Termination N (M).

91-16A Underterminated N Adapter (F).

950000 Rack Mtg. Kit, Single.

950001 Rack Mtg. Kit, Dual.

952002 Rack Mtg. Kit, Dual. For older $\frac{1}{2}$ Rack Inst.

950031 Transit Case.

952003 50 Ω Tee Adapter N (F/F).

952005 100:1 Voltage Divider.

952006 75 Ω BNC Adapter (N).

952007 75 Ω Tee Adapter N (F).

952008 Underterminated BNC Adapter (F).

952011-1 50 Ω Accessory Kit.

952012-1 75 Ω Accessory Kit.

952013 Accessory Case.

952016-1 Low Frequency Probe, 10 Hz to 100 MHz.

952058 100:1 Divider (10 Hz to 20 MHz).

950049 Bulkhead adapter F/F.

952001-2 RF Probe.

952002 50 Ω BNC Adapter (F).

952004 Probe Tip.

CE Mark: Declares Conformity to European Community (EC) Council Directives: 89/336/EEC//93/68/EEC, 73/23/EEC//93/68/EEC & Standards: EN55011, EN50082-1, EN61010-1.