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## 85RF II




### High Frequency Probe

### Instruction Sheet

#### Introduction

The 85RF II High Frequency Probe (the Probe) transforms a dc voltmeter into a high frequency (100 kHz to 500 MHz) ac voltmeter. Conversion from ac to dc is done on a one-to-one basis and includes a range of 0.25 V rms to 30 V rms. The Probe's dc output is calibrated to be equal to the rms value of a sine wave input.

#### Safety

Symbol	Description
	See Instruction Sheet.
	Hazardous voltage.
	Do not dispose of this product as unsorted municipal waste. Go to Fluke's website for recycling information.

#### Warning

To prevent possible electrical shock, fire, or personal injury:

- Examine the case before you use the Product. Look for cracks or missing plastic. Carefully look at the insulation around the terminals.
- Limit operation to the specified measurement category, voltage, or amperage ratings.
- Do not touch voltages >30 V ac rms, 42 V ac peak, or 60 V dc.
- Do not use the Product around explosive gas, vapor, or in damp or wet environments.
- Do not use and disable the Product if it is damaged.
- Use the Product only as specified, or the protections supplied by the Product can be compromised.
- Do not exceed the Measurement Category (CAT) rating of the lowest rated individual component of a Product, Probe, or accessory.
- Keep fingers behind the finger guards on the Probes.
- Do not connect directly to mains.

## **Specifications**

**AC to DC ratio:** 1:1

**Ratio accuracy: (at 25 MHz and loaded with 10 M $\Omega$  )**

Above 0.5V:  $\pm 0.5$  dB

Below 0.5V:  $\pm 1.0$  dB

Add  $\pm 0.2$  dB in RF fields of 1 V/m to 3 V/m

**Frequency response: (Relative to 25 MHz)**

100 kHz to 80 MHz  $\pm 0.5$  dB

\*80 MHz to 200 MHz  $\pm 2.0$  dB

\*200 MHz to 300 MHz  $\pm 3.5$  dB

\*300 MHz to 400 MHz  $\pm 4.5$  dB

\*400 MHz to 500 MHz  $\pm 5.5$  dB

\*Referred to high and low inputs at Probe tip.

**Extended frequency response:**

Useful for relative measurements from  
20 kHz to 700 MHz.

**Response:**

Responds to the peak value of an input and is calibrated  
to read rms value of a sine wave.

**Voltage range:** 0.25 V rms to 30V rms

**Maximum input voltage:** 30 V rms, 200 V dc

**Input capacitance:** Approximately 9 pF

**Temperature range:**

Operating:  $+10$   $^{\circ}$ C to  $+35$   $^{\circ}$ C

Storage:  $-40$   $^{\circ}$ C to  $+75$   $^{\circ}$ C

**Humidity:**  $<90$  % R.H.

**Output connector:**

Fits standard 0.75 inch dual banana connectors

**Accessory:**

BNC to Probe Adapter, P/N 574756

**Pollution degree:** 2

**Operating altitude:** 3000 m

**Warranty:** 1 year

## **Voltmeter Compatibility**

The 85RF II can be used with a dc voltmeter that has an input resistance of 10 M $\Omega$ ,  $\pm 10$  %. Voltmeters with higher input resistances are usable if an external shunt is put across the input terminals. The shunt value is set to decrease the input resistance to 10 M $\Omega$ .

## Operation

To operate the 85RF II Probe:

1. Connect the Probe output to a compatible voltmeter with an applicable shunt (if necessary.) The Probe's output low must be connected to voltmeter low.
2. Set a voltage range (1 V dc reading for each 1 V rms Probe input).
3. Connect the input low (clip lead or tip shield) to earth ground.

### Warning

**Input low is intended to be connected to earth ground. To prevent electrical shock, input low (clip lead or tip shield) must be connected to potentials of less than 30 V ac, 42 V peak, or 60 V dc.**

## Frequency Measurements

### Frequencies less than 100 MHz

To measure frequencies less than 100 MHz:

1. Ground the 4-inch clip lead supplied with the Probe.
2. Touch the Probe tip to the circuit under test.

### Frequencies greater than 100 MHz

To measure frequencies greater than 100 MHz:

1. Ground the 4-inch clip lead supplied with the Probe.
2. Touch the Probe tip to the circuit under test.

#### Note

*Measurements above 100 MHz must be made with minimum cable lengths and a terminated 50  $\Omega$  system. One inch or less of non-terminated coaxial cable (such as a BNC adapter and 50  $\Omega$  termination) is required for measurements up to 300 MHz.*

### Frequencies greater than 300 MHz

To measure frequencies greater than 300 MHz:

1. Ground the 4-inch clip lead supplied with the Probe.
2. Touch the Probe tip to the circuit under test.

#### Note

*Measurements above 300 MHz must have the Probe tip and tip shield (input high and low) touch the circuit under test to realize the rated accuracy of the Probe. Lead lengths less than 1-inch can cause substantial errors.*

## ⚠ Caution

To prevent Probe damage, the dc component of the input signal (includes transients) must not be more than 200 V dc. Maximum Probe input is 30 V ac rms and 200 V dc. Measurements of an ac signal riding a dc voltage can be made up to 200 V dc. The input capacitor charges to the peak value of ac plus dc. If the dc level is then changed by more than 200 V dc, the transient can possibly damage the Probe. The chance of damage can be prevented if the input capacitor is discharged at the end of each measurement. Momentarily touch Probe tip to the ground clip to discharge the capacitor.

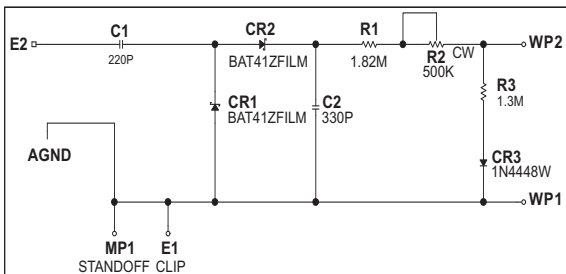
## Performance Test/Calibration

The performance and calibration test is a verification test to make sure that the 85 RF II is functional and correctly calibrated. Use the procedure as an acceptance test and/or calibration procedure (the Probe has one adjustment which is R2). The recommended calibration interval is one year.

### Note

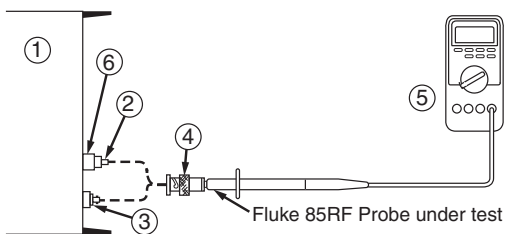
*If the Probe cannot be calibrated to the specifications in this document, the Probe could be damaged and require replacement or repair. Contact Fluke for instructions.*

1. Configure the equipment as shown in Figure 2. Use the leveled sine function of the scope output to set the AC Calibrator signal generator for 1 V rms at 25 MHz and the DMM to measure 1 V dc.



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Figure 1. Schematic Diagram



### Required Equipment List

The following equipment (or equivalent) is required for testing the performance of the 85RF II:

Equipment Type	Recommended Model
① AC Calibrator	Fluke 5520A-SC600
② 50-Ohm Feed Thru Termination	JFW Industries P/N 50L-001
③ BNC Jack to Banana Plug Adapter	Pomona P/N 1269
④ BNC to Probe Adapter	Fluke P/N 574756
⑤ Digital Multimeter, 3-1/2 Digit (DMM)	Fluke 87V
⑥ BNC Jack to Jack Adapter	Pomona 3283

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### Figure 2. Equipment Configuration for Performance Test

- The DMM will read between 0.950 V dc and 1.050 V dc. If the Probe is functional but is not in these limits, disassemble the Probe (refer to the "Probe Disassembly" Section in this Instruction Sheet) and adjust R2 for a DMM measurement between 0.990 V dc and 1.010 V dc. Reassemble the Probe.
- Move the unit in test to the Normal output of the calibrator and decrease the output level to 0.250 V rms and 1 MHz. The DMM will read between 0.223 V dc and 0.280 V dc.
- Set the AC Calibrator to **STDBY**, decrease the frequency to 100 kHz and increase the voltage to 30 V ac rms. (Do not increase the voltage to more than 30 V ac.)
- Set the AC Calibrator switch to **OPER**. The DMM will read between 28.3 V dc and 31.8 V dc.
- Move the unit in test back to the scope output and set the level sine to 1 V rms 160 MHz. The DMM will read between 0.9 V dc and 1.12 V dc. Increase the frequency to 450 MHz. The DMM will read between 0.562 V dc and 1.780 V dc.

## ***Probe Disassembly***

Use this procedure to access the internal components of the Probe which includes the R2 calibration adjustment.

1. Remove the bend relief screw and move it away from the Probe.
2. Remove the Probe cover. You will see the R2 adjustment.
3. Carefully remove the Probe tip from the front of the Probe with pliers.
4. Remove the ground lead screw from the Probe body.
5. Lift the rear of the printed circuit board up ¼-inch and pull it away from the Probe tip.
6. To reassemble the Probe, do the steps in this procedure backwards (start with step five and end with step one.) Make sure that the gold pin on the front of the printed circuit board aligns correctly in the Probe tip and that the ground-lead nut is aligned with the hole in the Probe body.

## ***How to Clean the Probe***

### **Warning**

**For safe operation and maintenance of the product, remove the input signals before you clean the Product.**

Use a soft cloth dampened in a weak solution of detergent and water to clean the 85RF II. Do not use solvents.