

# RF Voltmeter with a linear scale.

One of the necessary devices is a high-frequency voltmeter. The author proposes a device with ampere meter as indicator, in contrast to digital makes it easy to show the value change quantitatively, not by comparing the results. This is especially important when creating a device, where the amplitude of the signal being measured is constantly changing. Despite the obvious simplicity of the RF voltmeter has a linear scale, get rid of the problems with graduations and good options:

- the range of the measured voltage – 10mV up to 20V (8 modes: 10mV, 50mV, 100mV, 500mV, 1V, 5V, 10V, 20V selected by switcher);
- the working frequency band is 100 Hz.. 75 MHz;
- input impedance – not less than 1M $\Omega$  when the input capacitance of a few pF, which is determined by the design of the detector head;
- measurement inaccuracy  $\pm 5\%$ .

## Operation details

The input stage of the RF voltmeter is designed on the chip DA1. The diode VD2 allows to increase the gain of the DC amplifier (DCA) at small values of the input voltage. The capacitors C4 and C5 prevent the self-excitation of DCA and reduce possible interferences. Variable resistor R10 is used to set the arrow of the measuring device PA1 (ampere meter) to the zero before measurements. The entrance detector head should be shorted. The power supply of the RF voltmeter is DC 12-15V. DA3 and DA4 are voltage regulators +12V and -12V to power the operational amplifiers DA1 and DA2

## Assembly details

All parts of the device, with the exception of parts of the measuring probe, mounted on the PCB size 74x64 mm. Ampere meter PA1 with the current full deflection of 1 mA. Switcher SA1 is 8T3P. Variable resistor R10 is 1-2.2K, potentiometers are multi-turn 3296W. The non-standard values of resistors R2, R5 and R11 is composed of two resistors R2-1, R2-2, R5-1, R5-2, R11-1, R11-2 connected in series.

The body of the measuring probe can be made of any material in the form of a tube or to use the right size pens, marker pens, on top of which is covered with a screen of copper foil. Inside the case should be located the Board size 74x9 mm. The screen of the copper foil and the "Ground" wire of probe PCB must be connected. The probe PCB must be connected by a cable impedance of 50 Ohms.

## Adjustment of device and scale calibration

The adjustment of the device starts with the balancing of DA2. For this purpose, the switch SA1 is set to the "5V", the input of the probe should be shorted. Set the arrow of the ampere meter to "Zero" via potentiometer R13.

Then switch the device to position "10 mV" and apply 10mV to the input of the device. Set the arrow of ampere meter to the last scale division. Further apply 5 mV to the input of the voltmeter. The meter pointer should be approximately midway on the scale.

The linearity of the readings is achieved by selection of resistor R3. Also, even better linearity can be achieved by selection of resistor R12, however, it should be borne in mind that this will affect to the gain of the DC amplifier.

Next, calibrate the instrument on all sub-bands via potentiometers.

# RF Voltmeter

