

## **Portable Frequency and Power Meter MFP-8000**

The rapid development of ultra-high frequency technology concerning the increasing of operating frequency determines the development of compact and cheap measuring devices that would make it possible to estimate quickly and objectively power and frequency of vibrations in the extended range of ultra-high frequency.

To satisfy the arisen needs the portable frequency and power meter has been developed (MFP-8000) providing frequency range enhanced up to 8 GHz as well as metrological characteristics that are close to the characteristics of frequency measuring devices.

### **Basic characteristics of MFP-8000**

The portable Frequency and Power Meter MFP-8000 is a universal device that possesses the qualities of several types of measuring devices – power meter, frequency meter, field indicator and signature analyzer.

Manual and automatic modes of MFP-8000 enables the user to:

- Estimate the frequency of the input signal at frequency range from 100 kHz to 8 GHz.
- Measure the power of the input signal from -60 dBm to + 30 dBm.
- Identify the characteristics of communication protocol for cellular and telephone systems (GSM900/1800/1900, DECT) in the input signal.
- Automatically adjust (with the help of the built-in interface) panoramic radio sets and other devices to the measured MFP-8000 signal frequency.
- Use the built-in memory of the device, clock and calendar to protocol and save the measurement results.
- Apply the built-in interface to organize the use of MFP-8000 as measuring element as part of automated computer systems.

### **MFP-8000 power measurement**

The operating principle of the majority of ultra-high frequency vibrations power meter is based on the temperature change measurement or the resistance of elements emerging under the influence of dissipating energy of the examined electromagnetic field. Such devices are usually provided with bridge connection with thermal resistors. One hand of the bridge is energized by the measured ultra-high frequency voltage, the other one – by the common permanent voltage. The absorbed ultra-high frequency power is estimated basing on the power of direct current dissipated in the second hand at full balance of the bridge. Such method was called calorimetric.

This method is easy to apply and can reproduce the results effectively, but unfortunately it has a range of considerable disadvantages: long time of measurement that is needed to heat and stabilize temperature of the operating element as well as the restrictions concerning the dynamic range of the measured power connected with obstacles when measuring small values.

Until recently there has been no practical alternative to the calorimetric method of power measurement at ultra-high frequency range. The well known method applied for lower frequencies that presupposed the direct measurement of signal level with the help of quadratic detection at this frequency range was practically out of use due to the absence of element base needed to implement it.

Till the time the development of the portable power meter MFP-8000 started the new element base appeared to implement precise power measurement in ultra-high frequency range with the help of the direct method applying logarithmic amplification combined with broadband quadratic detection.

Thus the main disadvantages typical for calorimetric method used earlier have been eliminated and there have been achieved high sensitivity and quick response to the power change of the input signal as well as wide dynamic range. For example, the dynamic range of the measured MFP-8000 exceeds 90 dB, at measurement accuracy of  $\pm 0,5$  dB, at frequency range from 100 kHz to 8 GHz.

### **MFP-8000 frequency measurement**

The frequency measurement mode of the portable power meter MFP-8000 can:

- generate frequency of uninterruptible radio radiation supply;
- identify the presence of characteristics in the input signal that correspond to the communication protocols for cellular and telephone systems (GSM 900/1800/1900, DECT);
- set frequency and operating modes "SMS", "Talk" in GSM standard.

### **Use of MFP-8000 as electromagnetic field indicator.**

MFP-8000 completed with aerial can also be used as high-sensitivity indicator of electromagnetic field fixing radio radiation sources with signal power at the input more than  $0,5 \cdot 10^{-8}$  W at frequency range from 100 kHz to 8 GHz. There is a corresponding set of modes from the best representatives of electromagnetic field indicators (for example in MFM-3 (manual frequency meter) etc) in MFP-8000. In ideal conditions the device detects radiation of ultra-high frequency sources with output power about 5 mW at the distance of up to 20 meters.

For application of the mode of "acoustic tying" when identifying radio microphones, MFP-1000 is supplied with the corresponding detector, amplifier and sound radiator. There is also a "near-zone monitoring" mode. In this mode the device gives a signal when the source of radio radiation is detected with the level above threshold value set by the operator. Threshold value can be set by the operator within the range from 3 to 24dBm.

Besides, the measurement protocol (up to 1000 values) can be saved in the built-in memory of the device. With the help of the built-in interface MFP-8000 can automatically control the tuning of panoramic receivers (AOR 8000) or other devices. The interface makes it possible to adjust the settings of MFP-8000 from the external computer as well as to read the measurement results for further processing.

### **Technical characteristics of MFP-8000**

- Dimensions: 115 x 70 x 27 mm
- Operating frequency range: (0,1- 8000) MHz
- Input: 50 Ohm (up to 1 W), connector of "N" type
- Dynamic range of power level: 90 dBm (from  $-60$  dBm up to  $+30$  dBm)
- Power level accuracy:  $\pm 0,5$  dBm
- Maximum of measured power (with built-in attenuator): 1W
- Sensitivity:
  - when measuring frequency no worse than 13 mV ( $-25$  dBm) ranging (0,1 - 8000) MHz and no worse than 1,2 mV ( $-45$  dBm) ranging (300-6000) MHz;
  - when measuring power no worse than  $0,5 \cdot 10^{-8}$  W
- VSWR up to 1,5
- Operating temperature range: from 0 to  $+50$  °C
- Voltage: built-in Li-ion battery 3,6 V with capacity 1,95 A/h. Average current consumption : up to 250 mA