

RF Thermoacoustic Detector TAD-1

Thermoacoustic detector TAD-1 is intended for measurement and registration of the microwave band impulses having duration from 1 to 500 ns within the range of 3÷300 GHz.



Its operation is based on the effect of acoustic signal generation when absorbing microwave impulses in the layered structure.

This detector TAD-1 can be used in combination with the following microwave radiation sources:

- Pulsed magnetron-based generators;
 - Relativistic backward-wave oscillator;
 - Klystrons operating in the millimeter range;
 - other sources.
- Prime cyclotron resonance gyrotrons;
- Gyrotrons with large-scale orbit on the second and third cyclotron harmonics;
- Surface wave relativistic generators of the millimeter range;

The detector allows converting a powerful RF electromagnetic impulse to the acoustic signal of the exactly same shape. In result, basing on oscilloscope response, it is possible to estimate the dependence of the pulse energy to time, and to characterize the pulse envelope shape, its duration and relative value of energy on the device input. An example of the microwave impulse with a wavelength of 8 mm and power of 100 MW registered by means of the thermoacoustic detector TAD-1 is shown on Figure 1.

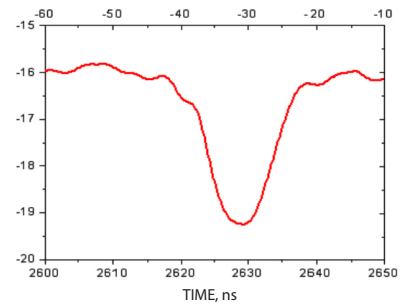


Fig.1 Microwave radiation impulse with a wavelength of 8 mm and power of 100 MW

Parameter	Value
Detector window diameter, mm	20.0
Duration of the registered microwave impulses, ns	1 – 500
Frequency range of the registered microwave impulses, GHz	3 – 300
Repetition frequency of the registered microwave impulses, kHz	up to 5
Microwave impulse peak output, MW	1 – 500
Recommended microwave radiation power flux density, W/cm ²	50 – 1×10 ⁴
Operating temperature, °C	5 – 45
Storage temperature, °C	0 – 60
Air humidity, %	5 – 85
Overall dimensions (L × W × H), mm	105.0×60.0×60.0
Weight, kg	0.35