

**ISTOK ACHIEVEMENTS IN SOLID-STATE
MICROWAVE DEVICES**

**S. A. Zaytsev, V. N. Lebedev, I. A. Ledov, A. S. Negirev,
A. D. Rodyonov, E. I. Ryzhik, and A. M. Temnov**

**RPC ISTOK
141120 Fryazino Moscow Region, Russia**

ABSTRACT

The firm ISTOK has developed and produced a number of solid-state microwave devices for a variety of applications. This paper briefly summarizes the chief design characteristics and performance of a number of these devices.

SUMMARY

Istok has developed and produced a number of solid-state microwave devices for a variety of applications in the CIS. Representative applications include radar, communication, television, electronic countermeasures, space surveillance, missile systems, and industrial electronics. Devices include varactor-tuned IMPATT oscillators, low-noise DRO's, and broad-band transistor oscillators.

A series of IMPATT oscillators have been developed which tune over a 20 % frequency band within the frequency range 25-120 GHz with output powers from 20-5 mW.

Low-noise transistor oscillators have been developed over the 4-18 GHz range. Many of these are DRO's (Dielectric Resonator Oscillators) with Q's of 6000-8000, resulting in oscillators stable with temperature and vibration. These oscillators typically have phase noise levels from -95 to -130 dBc/Hz 10 kHz removed from the carrier. Laser-welded packaging is used to achieve fifteen year lifetimes.

Transistor amplifiers have been developed which consist of discrete transistors and diodes with all of the passive components produced by thin-film technology over a sapphire substrate. The amplifiers cover the frequency range 2-7.5 GHz, have built-in diode input protection devices, and produce output levels from 0.5 to 1 W cw.

The hybrid circuits used many of the ISTOK components are based on a unique suspended coplanar structure with all components and grounding structures located on the same side of a sapphire printed circuit board. The technology achieves +/- 5 um resolution. MOM capacitors (up to 400 pF), resistors (10 ohms to 100k ohms) and inductors (up to 200 nH) can be produced as part of this process.

The state of the art hybrid integrated circuit technology has permitted high performance from small devices. Specifically, Z-quartz produced substrates and composite substrates for millimeter wave circuits, power supply input filters, and sputtered air bridges and capacitors are all available for advanced components.

The paper includes device characteristics and details of the hybrid integrated circuit fabrication techniques used to produce a variety of components.

