Abstracts

Schottky-Barrier Diodes for Submillimeter Heterodyne Detection

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The fabrication and packaging techniques which were used to produce high-reliability mixer diodes for millimeter-wave satellite communications systems have been extended to produce Schottky-barrier mixer diodes for use in the submillimeter-wave region from 1 to 0.1 mm. The influence of material and circuit parameters on the performance of Schottky-barrier diodes as heterodyne detectors in the submillimeter-wave region has been considered. The semiconductor material parameters have been optimized and new packaging concepts have been investigated. A new diode package has been developed which incorporates both an integral stripline filter on 0.05-mm-thick quartz and a section of overmoded waveguide. The new package has the advantage of being replaceable in the mixer circuits, and yet it can provide a low-loss interface between the diode package and the mixer circuit. A new surface-oriented device has been developed in which the contact to the Schottky barrier is formed by photolithographic techniques onto the same surface as the ohmic contact. The surface-oriented devices exhibited heterodyne detection into the submillimeter region.

❑ Return to main document.