Abstracts

Millimeter Wave Diodes for Harmonic Power Generation

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A discussion of the application of point contact, electrically formed semiconductor junctions to harmonic generating applications is presented. Three different combinations of materials are considered. First, the more popular phosphor-bronze point on gallium arsenide combination is discussed. Results with this material combination when used as millimeter wave multipliers are given as a reference point. The combination n-GaAs/Cu is then examined. The slope parameter of these diodes shows that the junction is very close to that of a Schottky barrier. The conversion efficiency measured for these diodes shows a 2 to 4 dB improvement over the n-GaAs/P-Br diodes. The third combination, and by far the most efficient, was the n-GaAs/Zn diode. These are true p-n junctions (as opposed to Schottky barriers) and have measured zero bias cutoff frequencies on the order of 1000 GHz. The efficiency realized with these diodes in doubling from 70 GHx to 140 GHz typically ranged from 20 percent to 30 percent. The highest output power at 140 GHz that was measured was 16 milliwatts.

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