Abstracts

Microwave Amplifier Using Several IMPATT Diodes in Parallel (Short Papers)

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IMPATT diode amplifiers are described that use several packaged diodes in parallel in a coaxial housing. With a pair of GaAs Schottky-barrier diodes, a power output of 8 W (input locking power equals 300 mW) was obtained at 4 GHz without exceeding safe operating temperatures. Similarly, three-diode circuits produced 15 W (locking power equals 3.5 W) at 4 GHz and >10 W (locking power equals 2.7 W) at 6 GHz under safe operating conditions. The maximum power obtained from the pair was 11 W. The maximum power obtained from the 4 GHz three-diode circuit was 21 W. The efficiency of the diodes at the maximum power level was 12-13 percent. The characteristics of the pair are compared with those of the individual diodes and it is concluded that this power-combining scheme is very efficient and should be economically advantageous. The scheme permits the total diode area utilized in a single cavity to be increased significantly beyond that which is practical in a single diode package. The use of parallel operation permits efficient heat sinking of each diode package, which is impractical with series operation. The technique employed has been shown to be suitable for extension to three or more diodes for higher power. It is required that each set of diodes be matched for similar I-V characteristics. With this constraint, the close RF coupling of the diodes in conjunction with appropriate stabilizing resistor(s) assures that the diodes operate cooperatively as a unit capable of being powered from a single current-regulated source.

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