Abstracts

Power and Stability Limitations of Resonant Tunneling Diodes

C. Kidner, I. Mehdi, J.R. East and G.I. Haddad. "Power and Stability Limitations of Resonant Tunneling Diodes." 1990 Transactions on Microwave Theory and Techniques 38.7 (Jul. 1990 [T-MTT]): 864-872.

The existence of negative resistance in double barrier resonant tunneling structures has led to the proposal of various applications for these devices. For many of these applications, stability is an important consideration. Stability criteria for resonant tunneling diodes are investigated in this paper. Details of how extrinsic elements such as series inductance and parallel capacitance affect the stability are presented. A GaAs/AIAs/InGaAs/AIAs/GaAs double barrier diode is then investigated showing the effect of different modes of low-frequency oscillation and the extrinsic circuit required for stabilization. The effect of device stabilization on high-frequency power generation is described. The main results of the paper are (1) stable resonant tunneling diode operation is difficult to obtain and (2) the circuit and device conditions required for stable operation greatly reduce the amount of power that can be produced by these devices.

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