Abstracts

An Analytical Equivalent Circuit Representation for Waveguide-Mounted Gunn Oscillators (Comments and Authors' Reply)

D.N. Singh, C.P. Jethwa and R.L. Gunshor. "An Analytical Equivalent Circuit Representation for Waveguide-Mounted Gunn Oscillators (Comments and Authors' Reply)." 1973 Transactions on Microwave Theory and Techniques 21.8 (Aug. 1973 [T-MTT]): 569-569.

In the above paper, the authors have tried to explain the experimentally observed mode-switching phenomenon in waveguide-mounted Gunn oscillators on the basis of nonlinear behavior of the device. It has been shown in Fig. 6(a) that the device susceptance decreases to zero at 8.18 GHz, as a result of which the condition of oscillation given by (4) cannot be satisfied. This leads to the mode switching observed at this frequency. In our opinion, the device susceptance cannot become zero over the entire frequency band of interest. It is not possible for the dynamic nonlinearities to make the device susceptance go to zero, even at the mode-switching frequency. In fact, the device susceptance will always remain capacitive, while the load susceptance presented to the device chip can become zero, inductive, or capacitive, depending upon the operating frequency and the particular circuit parameters. For steady-state oscillations, the load susceptance presented to the device chip should always be inductive, and the frequency switching may occur once the load susceptance becomes capacitive. However, the load conductance presented to the device chip should also be lower than the device conductance for the steady-state oscillations to build up. It is just possible that the load conductance may be more favorable for lambda g mode of operation rather than for lambda g/2 mode of operation. This may also cause mode switching, as pointed out by Eisenhart and Khan. It is highly probable that the mode switching is caused by this effect, rather than due to the nonlinearity of the device parameter as pointed out by Jethwa and Gunshor.

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