Abstracts

Circuits for High Efficiency Avalanche Diode Oscillators (1969 [MWSYM])

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The purpose of this paper is to describe the characteristics of the circuits used to obtain the high efficiency TRAPATT mode of operation in avalanche diodes. A number of interesting facts about the nature of the TRAPATT mode can be inferred from the circuit analysis. The circuit analysis has also been used for the simulation of a complete 500 MHz TRAPATT oscillator on the computer. A computer-generated movie has been made which shows the operation of the simulated TRAPATT oscillator. The simulation of the complete oscillator is very helpful in identifying the physical phenomena which lead to the TRAPATT mode of oscillation. Unfortunately, obtaining the complete solution of all pertinent equations is not practical for many parameter studies. However, a good deal of information about this mode of operation can be obtained by analyzing the circuit and using the results in connection with experimental measurements. The oscillators to be considered here have been realized in coaxial form, similar to the 500 MHz TRAPATT oscillator shown in figure 1. Typically, the oscillator requires some impedance matching element near the diode (although this is not always necessary) and a bandpass filter

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