

Abstracts

Broad-Band Equivalent-Circuit Determination of Gunn Diodes

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A method has been developed for the direct broad-band measurement of the impedance of a Gunn diode operating at a bias voltage exceeding threshold. This method is based upon determination of an equivalent-circuit model for the diode mount and package, which is found to be valid over the 1- to 20-GHz range. Using this circuit, the low-field diode equivalent circuit is found and takes the form of a parallel RC circuit as expected from the theory. An unusual result is that the low-field capacitance is found to be strongly dependent on the bias voltage; this dependence is presumed due to the free-carrier contribution to the effective dielectric constant. Some direct broad-band measurements are reported for an active Gunn diode biased beyond threshold. These measurements provide additional insight into the conditions under which significant parametric action may occur in a Gunn diode.

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