Abstracts

A Device Characterization and Circuit Design Procedure for Realizing High-Power Millimeter-Wave IMPATT-Diode Amplifiers

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A measurement and characterization technique is presented which allows design and realization of IMPATT amplifiers operating at maximum generation efficiency. Diodes mounted in a stable reduced-height waveguide circuit are characterized by their complex reciprocal scattering coefficient as a function of frequency, dc bias, and RF drive power level. In particular, terminal conditions which correspond to a maximum power exchange between the active one-port network and the source are identified and then used to design and realize controlled-gain maximum generation-efficiency amplifiers. Simple equalization networks are shown to provide a wide range of available amplifier gains between limits set by stability requirements. As an example, the technique is effectively used with silicon diodes at K/sub a/-band (33-40 GHz) to realize a 7-dB gain 250-mW power amplifier with 5-GHz bandwidth.

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