# Abstracts

## Wide-Band Reflection-Type Transferred Electron Amplifiers

*B.S. Perlman, C.L. Upadhyayula and R.E. Marx. "Wide-Band Reflection-Type Transferred Electron Amplifiers." 1970 Transactions on Microwave Theory and Techniques 18.11 (Nov. 1970 [T-MTT] (Special Issue on Microwave Circuit Aspects of Avalanche-Diode and Transferred Electron Devices)): 911-921.*

Stable CW and pulsed linear-reflection-type amplification at C- and X-band frequencies using epitaxial-GaAs transferred electron devices is described. These devices have a doping density-length product (nl) greater than 5 x 10/sup 11/cm/sup -2/. Criteria for avoiding the normal instabilities are discussed with specific regard for the circuit impedance, operating bias-voltage material characteristics, and the device temperature. The active impedance of a stable device has been measured, along with the effects of the package parasitic. These data were utilized to design multiple-tuned wide-band circulator-coupled coaxial-amplifier networks. Instantaneous CW bandwidths of nearly 1 octave have been measured in C-band, and instantaneous bandwidths of 4 GHz have been measured in X-band with single-stage Iinear gains from 6 to 12 dB. A -1-dB gain compression power output of 250 mW, with a saturated power output approaching 1 watt, has been realized from a single device. The noise figure of a single-stage amplifier has been found to be 15 dB. The phase response of a typical amplifier has been found to be linear with a differential phase shift of less than 20° /GHz. The amplitude linearity has been related to third-order intermodulation distortion and found to be comparable to that obtainable from traveling-wave-tube amplifiers (TWTAs). In a two-stage configuration a small-signal gain of 22 dB and a fractional bandwidth of 35 percent have been realized in C-band. A novel scheme for studying the gain response of pulse-biased devices using swept-frequency techniques has been developed. Pulsed amplification has been obtained with a power output of 2 watts at a 5-percent duty cycle with a conversion efficiency of 6 percent and a bandwidth of 1 GHz.

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