SESSION 21: IMPATT AND BIPOLAR OSCILLATORS

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System requirements for microwave solid state amplifiers and oscillators continue to demand improvements in both device and circuit performance. Device parameters such as power, frequency, efficiency, and reliability as well as circuit parameters such as bandwidth, power flatness and noise are under extensive investigation in many laboratories. New developments in these areas pertaining to both IMPATT diodes and bipolar transistors will be presented in this session. Three of the papers deal with IMPATT diodes while the fourth involves bipolar transistors.

Exciting new results on GaAs, double-drift, pulsed IMPATT diodes at 40 GHz will be reported in the first paper. Power levels of 15 watts peak with efficiencies up to 15% illustrate continuing improvements in millimeter wave GaAs IMPATTS. The procedures used to design and optimize these diodes will be presented along with comparisons between theory and experiments.

The second paper will describe a new approach to the determination of large signal equivalent circuits for IMPATT diodes. Accurate modeling of the coax to waveguide transition in the oscillator circuit is coupled with measurements of oscillator power and frequency as functions of diode area to derive an equivalent circuit for a J-Band pulsed diode.

A new ridged waveguide resonant circuit employing an asymmetrical compound coupling iris to improve the bandwidth of IMPATT amplifiers will be described in the third paper. This circuit has achieved an excellent 1 dB bandwidth of 3.5% at X-band.

Bias tuning of an 8 GHz bipolar transistor VCO is described in the fourth paper in order to achieve a very linear frequency tuning with constant output power. This technique is shown to produce a greatly simplified VCO with good noise characteristics.

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