# Abstracts

## AlGaAs/GaAs HBT Linearity Characteristics

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Communication systems require linear power amplifiers with high efficiency and very low intermodulation distortion. AlGaAs/GaAs heterojunction bipolar transistors (HBT's) were found to have very low intermodulation distortion in power operation. Two-tone tests were carried out on both common-emitter (CE) and common-base (CB) power HBT's. At 7 GHz, the CE HBT showed -20 dBc IM/sub 3/ (third-order intermodulation ratio) and 12% power added efficiency (PAE) per tone at the 1 dB gain compression point; IM/sub 3/ dropped to -30 dBc at 1.5 dB output power backoff. The CE HBT has lower intermodulation distortion than CB HBT. Load pull data were collected to aid the understanding of the intermodulation. Parameters of the Gummel-Poon model (as used in SPICE) were derived for HBT's based on dc data and small-signal S parameters at various bias points. The accuracy and validity of the model were confirmed by comparison to experimental two-tone results. SPICE predicts that the emitter and base resistances linearize the HBT and reduce the third-order intermodulation distortion. The excellent third-order intermodulation performance of the CE HBT makes it a very attractive choice for linear power amplifiers.

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