Abstracts

Intermodulation mechanism and linearization of AlGaAs/GaAs HBTs

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The intermodulation (IM) mechanism of heterojunction bipolar transistors (HBTs) has been studied by using an analytical nonlinear equivalent circuit model and Volterra-series analysis of the model. Although the third-order IM intercept point (IP3) does not depend on the emitter parameter, it is appreciably affected by base and collector parameters and has been substantially improved by utilizing punchthrough collector structure. The measured IP3 of punchthrough collector HBTs is 31 dBm with 150-mW dc power, which is higher than that of normal collector HBTs by 3 dB. The investigation of the cancellation effects of nonlinear elements reveals that the output nonlinear current components generated by emitter-base current source and base-collector current source cancel each other almost exactly, resulting in high linear characteristics of HBTs.

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