Abstracts

Optimization of Third-Order Intermodulation Product and Output Power from an X-Band MESFET Amplifier Using Volterra Series Analysis

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A third-order analysis for accurately predicting large-signal power and intermodulation distortion performance for GaAs MESFET amplifiers is presented. The analysis is carried out for both single- and two-tone input signals using the Volterra series representation and is based only on small-signal measurements. Simple expressions for the nonlinear power gain frequency response, the output power, the gain compression factor, and the third-order intermodulation (IM/sub 3/) power are presented. The major sources of gain compression and intermodulation distortion are identified. Based on the developed nonlinear analysis in conjunction with the device nonlinear model, a systematic procedure for designing a MESFET amplifier under large-signal conditions for optimum output power and IM/sub 3/ performance is proposed. The method utilizes out of band computed matching compensation through a nonlinear model of the amplifier. The accuracy of the device large-signal and IM/sub 3/ distortion characterization and the practicability of the proposed method are illustrated through comparison between measured and predicted results.

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