Abstracts

Analysis and Optimization of Third Order Intermodulation Distortion Mechanisms in AiGaAs/GaAs Heterojunction Bipolar Transistors

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In this paper the third order intermodulation distortion (IMD3) mechanisms of HBT's are analyzed using Volterra Series theory. The third order nonlinear currents generated by the device nonlinearities are evaluated for this purpose. Second harmonic loading is addressed in view of IMD3 optimization while, at the same time, maintaining high gain through conjugate matching at the fundamental frequency. It is shown that IMD3 depends on a complex process involving interactions between various nonlinear elements and is highly sensitive to C/sub bc/ generated nonlinear current. The interaction of the latter with the other HBT elements significantly impacts the IMD3. Optimum IMD3 occurs at high second harmonic reflection coefficients corresponding to open load conditions. Up to 27 dBm IMD3 improvement can be obtained by proper loading.

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