Abstracts

An accurate physics-based large-signal model for high power SiGe BJTs

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A physics-based large-signal model is developed to simulate the power performance of SiGe BJTs. The model is a complement to the Gummel-Poon model through the inclusion of three major effects: impact ionization and breakdown, maximum current due to the Kirk effect, and packaging parasitics. The model can be simply implemented in a circuit simulator, can be used to accurately simulate DC and large-signal RF performance of the device, and can be used in circuit design. The model has been validated using a 10 W amplifier at 2 GHz, and the results demonstrate the excellent accuracy of the model in predicting power, efficiency, and linearity. This model is an effective tool in designing power amplifiers for analogue and digital communications applications.

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