Abstracts

Analysis of the large-signal characteristics of power heterojunction bipolar transistors exhibiting self-heating effects

A. Samelis and D. Pavlidis. "Analysis of the large-signal characteristics of power heterojunction bipolar transistors exhibiting self-heating effects." 1997 Transactions on Microwave Theory and Techniques 45.4 (Apr. 1997 [T-MTT]): 534-542.

The large-signal microwave characteristics of AlGaAs/GaAs heterojunction bipolar transistors (HBTs) are modeled using the conventional Gummel-Poon-based bipolar junction transistor (BJT) model and extending it to include self-heating effects. The model is incorporated as a user-defined model in a commercial circuit simulator. The experimental microwave characteristics of HBTs are analyzed using the new model and harmonic balance techniques and the impact of self-heating effects on the device large-signal characteristics is investigated. Use of constant base voltage rather than constant current is more suitable for achieving maximum output power. Self-heating induced by RF drive is reduced under constant base current conditions. Increased thermal capacitance values result in gain enhancement at high power levels.

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