

Abstracts

A 1.8-GHz high-efficiency 34-dBm silicon bipolar power amplifier

F. Carrara, A. Scuderi, T. Biondi and G. Palmisano. "A 1.8-GHz high-efficiency 34-dBm silicon bipolar power amplifier." 2002 Transactions on Microwave Theory and Techniques 50.12 (Dec. 2002 [T-MTT] (Special Issue on 2002 International Microwave Symposium)): 2963-2970.

The low-voltage power capabilities of a low-cost high-performance silicon bipolar process were investigated. By optimizing the emitter finger layout, epilayer thickness, and collector doping level, efficiency values up to 83% were achieved by on-wafer load-pull measurements on a single-cell test device operating at 1.8 GHz and 2.7-V power supply. The detrimental effect of the emitter distributed resistance on the current capability of long-emitter bipolar transistors was also considered.. An analytical model for a proper device design was derived and experimentally validated. Using the optimized unit power device, a 1.8-GHz 2.7-V three-stage monolithic power amplifier was implemented, which provides a 57% power-added efficiency and a 33-dB gain while delivering a 34-dBm output power to the load.

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