Abstracts

Optimum design of very high-efficiency microwave power amplifiers based on time-domain harmonic load-pull measurements

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Due to the large expansion of wireless communications, the need for high-efficiency power amplifiers has emerged. In mobile communication systems, power amplifiers are the most critical elements for the power-dissipation budget. Thus, the operating conditions of active devices have to be optimized using accurate and complementary computer-aided design (CAD) and experimental tools. This paper reports two design methods of high-efficiency power amplifiers. The first one is CAD oriented and based on the substitute generator technique using the nonlinear model of transistors. The second one is based on a specific measurement system of time-domain waveforms using a modified vector network analyzer, coupled with harmonic active load-pull techniques (three active loops). This new setup enables the measurement and optimization of time-domain waveforms at both ports of transistors driven by constant-wave test signals. These two design methodologies are applied to the optimization of an S-band 1-W class-F GaInP/GaAs heterojunction-bipolar-transistor power amplifier.

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