Abstracts

Millimeter-wave monolithic power amplifier for mobile broad-band systems

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For personal communication systems, the highest possible integration into monolithic technology of all RF functions are desirable. A frequency band around 60 GHz is assigned for future mobile communication fourth-generation systems (i.e., mobile broad-band systems concept). In this paper, the design and test of two monolithic class-A power amplifiers with 0.15 /spl mu/m pseudomorphic heterojunction FET (PMHFET) technology is presented. One of the amplifiers is a three-stage cascade 50 /spl Omega/ amplifier and the second is a balanced amplifier based on the previous one, but matched for integration on a waveguide carrier. A study on the accuracy of the passive elements and discontinuities models at 60 GHz was performed. Models for the microstrip discontinuities were obtained from electromagnetic simulation. In order to choose the best FET bias, a nonlinear model for the PMHFETs devices, based on continuous DC and AC measurements, were derived. For comparison purposes, the FET simulation results with a nonlinear model based on pulsed measurements are also presented. To avoid stability problems, at the device level an RC feedback network was introduced. A 1-dB compression point of 18 dBm was measured on-wafer for both amplifiers at 62 GHz with V/sub DSbias/=3.5 V. The three-stage and balanced amplifiers chip sizes are 3 mm/spl times/1.5 mm and 3 mm/spl times/4 mm, respectively.

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