

Design of 900 MHz High Gain SiGe Power Amplifier with Linearity Improved Bias Circuit

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Abstract : A 900 MHz three-stage SiGe power amplifier (PA) with high power gain is presented in this paper. Volterra Series is applied to analyze nonlinearity sources of SiGe HBT device model clearly. Meanwhile, the influence of operating current to IMD3 is discussed. Then a β -helper current mirror bias circuit is applied to improve linearity, since the β -helper current mirror bias circuit can offer stable base biasing voltage. Meanwhile, it can also work as predistortion circuit when biasing voltages of three bias circuits are fine-tuned, by this way, the power gain and operating current of PA are optimized for best linearity. The three power stages which fabricated by 0.18 μm SiGe technology are bonded to the printed circuit board (PCB) to obtain impedances by Load-Pull system, then matching networks are done for best linearity with discrete passive components on PCB. The final measured three-stage PA exhibits 21.1 dBm of output power at 1 dB compression point (OP1dB) with power added efficiency (PAE) of 20.6% and 33 dB power gain under 3.3 V power supply voltage.

Keywords : high gain power amplifier, linearization bias circuit, SiGe HBT model, Volterra series

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