Abstracts

A 44-GHz high IP3 InP-HBT amplifier with practical current reuse biasing

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This paper will discuss the practical design of an InP-based heterojunction bipolar transistor (HBT) Q-band high IP3 monolithic microwave integrated circuit (MMIC) amplifier. The amplifier features a novel "double-balanced" design approach that incorporates a practical "current reuse" biasing scheme. The current reuse biasing results in a 40% reduction in current consumption through a standard 5-V supply and simplifies the MMIC's system integration while the double-balanced design produces wide-band IP3, gain, and excellent out-of-band return loss performance required for practical applications. The three-stage MMIC amplifier achieves 15.4 dB of gain, 28.3 dBm of IP3, and a P/sub sat/ of 16.2 dBm at 44 GHz. An output-stage IP3/P/sub dc/ ratio linearity-figure-of-merit of 5.3 is obtained and is believed to be among the best reported for an InP-HBT amplifier operating at Q-band frequencies. The IP3 performance was optimized using load-pull simulations based on a custom HBT IP3 model, Different device cell configurations such as the common-emitter, common-base, and cascode were also considered. The common emitter amplifier results of this paper demonstrate the promising linearity performance of InP-HBT's and its practical bias and integration capability which is attractive for Q-band receiver applications.

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