Abstracts

Noise Optimization of a GaAs HBT Direct-Coupled Low Noise Amplifier

K.W. Kobayashi, L.T. Tran, A.K. Oki and D.C. Streit. "Noise Optimization of a GaAs HBT Direct-Coupled Low Noise Amplifier." 1996 MTT-S International Microwave Symposium Digest 96.2 (1996 Vol. II [MWSYM]): 815-818.

This work describes a GaAs HBT direct-coupled (inductor-less matched) MMIC LNA which was optimized for noise figure by careful selection of HBT device size, bias, and thorough consideration of its gamma opt characteristics. An optimum HBT device size and bias was determined which offers a device minimum NF (NFmin) of 0.9 dB at 2 GHz. The resulting HBT LNA achieves minimum noise figures of 1.5 dB, 1.6 dB, and 2.1 dB at 1 GHz, 2 GHz, and 3 GHz, respectively, while consuming only 6 mA of dc current through a 5 V supply. These NF's are believed to be the lowest reported for Si-BJT or GaAs HBT-based LNA MMICs in this frequency range. In addition, the LNA also achieves a gain of 22.4 dB, a 3.5 GHz bandwidth, and an IP3 greater than 8 dBm at 2 GHz. The design optimization revealed here gives insight into the noise performance trade-offs associated with GaAs HBT-based MMIC LNAs for low dc power wireless applications.

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