Abstracts

A Novel Monolithic Linearized HEMT LNA Using HBT Tuneable Active Feedback

K.W. Kobayashi, D.C. Streit, A.K. Oki, D.K. Umemoto and T.R. Block. "A Novel Monolithic Linearized HEMT LNA Using HBT Tuneable Active Feedback." 1996 MTT-S International Microwave Symposium Digest 96.3 (1996 Vol. III [MWSYM]): 1217-1220.

For the first time, a novel HBT active feedback circuit is employed with a HEMT LNA which improves linearity (IP3) and gain-bandwidth performance without significantly impacting noise figure. The HEMT and HBT circuits are monolithically integrated using selective molecular beam epitaxy (MBE). The HEMT LNA achieves a nominal gain of 9 dB and noise figure of 2.5-3 dB from 1-11 GHz. By adjusting the bias of the HBT active feedback circuit, positive feedback can be induced which can increase the gain bandwidth from 11 to 16 GHz. In addition, the IP3 can be tuned from less than 20 dBm to > 24 dBm across a 1-11 GHz band with a peak improvement of 10 dB. At S-band, as much as 20 dB reduction in IM3 products has been demonstrated using the HBT active feedback. Compared to an equivalent design which employs resistive feedback only, the active feedback design achieves a 50% improvement in gain-bandwidth and a 4-10 dB improvement in IP3 while maintaining comparable noise figure performance and consuming only 15% additional dc power. This HBT active feedback linearization technique is a cost effective means of improving the linearity of HEMT-based LNA/receiver MMICs for use in multi-carrier wireless communications.

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