Abstracts

A Monolithic HEMT-HBT Direct-Coupled Amplifier with Active Input Matching

K.W. Kobayashi, D.C. Streit, D.K. Umemoto, T.R. Block and A.K. Oki. "A Monolithic HEMT-HBT Direct-Coupled Amplifier with Active Input Matching." 1996 Microwave and Guided Wave Letters 6.1 (Jan. 1996 [MGWL]): 55-57.

We have achieved the first active input matching of a monolithic microwave integrated circuit through the use of a common-gate (CG) HEMT directly coupled to the input of an HBT Darlington feedback amplifier. The HEMT and HBT devices were monolithically integrated on the same chip using selective MBE. This circuit features an active impedance match technique that eliminates the need for large microstrip matching components. The novel amplifier obtains greater than 10-dB gain over a dc-5 GHz band, a maximum IP3 of 27 dBm, and a minimum noise figure of 3.7 dB. In comparison with a HBT-ONLY Darlington feedback design, the employment of the CG HEMT results in a 6-dB improvement in IP3 and a 1.5-2 dB reduction in noise figure. By adjusting the common-gate HEMT bias, the input return-loss can be tuned for near ideal 50 Omega match (>20 dB). The actively matched HEMT-HBT amplifier demonstrates an active circuit technique, which can reduce the chip area and cost of HEMT-HBT MMIC's while improving their performance.

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