Abstracts

A novel monolithic HEMT-HBT Ka-band VCO-mixer design

K.W. Kobayashi, A.K. Oki, D.K. Umemoto, T.R. Block and D.C. Streit. "A novel monolithic HEMT-HBT Ka-band VCO-mixer design." 1997 Radio Frequency Integrated Circuits (RFIC) Symposium 97. (1997 [RFIC]): 83-86.

Here we present a novel demonstration of a HEMT-HBT VCO-mixer which utilizes a unique active topology and is the first Ka-band MMIC demonstrated using GaAs HEMT-HBT IC technology. The MMIC integrates a novel HEMT-HBT cascode active mixer topology which operates similar to a dual-gate mixer. An all active HEMT-HBT VCO is constructed from the HBT of the cascode by providing a HEMT tunable active inductor-resonator. The VCO can be tuned from 28.5 to 29.3 GHz while providing /spl ap/0 dBm of output power. Operated as an upconverter, the HEMT-HBT VCO-mixer achieves 6-9 dB conversion-loss over a 31 to 39 GHz output frequency band. The compact MMIC is 1.44/spl times/0.76 mm/sup 2/ in area due to the use of novel active circuit topologies and relies on minimal use of passive matching. The novel miniature active RF IC techniques demonstrated here have direct implications for future high complexity HEMT-HBT millimeter-wave MMICs.

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