Abstracts

An 18-22-GHz down-converter based on GaAs/AlGaAs HBT-Schottky diode integrated technology

K.W. Kobayashi, L.T. Tran, A.K. Oki, M. Lammert, T.R. Block and D.C. Streit. "An 18-22-GHz down-converter based on GaAs/AlGaAs HBT-Schottky diode integrated technology." 1997 Microwave and Guided Wave Letters 7.4 (Apr. 1997 [MGWL]): 106-108.

Here we report on a K-band AlGaAs/GaAs HBT-Schottky diode down-converter which represents the highest complexity monolithic integrated GaAs HBT-Schottky MMIC so far demonstrated at K-band frequencies. The MMIC integrates a double-balanced Schottky diode mixer with an 18-22 GHz two-stage K-band radio frequency (RF) amplifier, a 6-10 GHz two-stage X-band IF amplifier, and a 12-GHz local oscillator (LO) heterojunction bipolar transistor (HBT) buffer amplifier. The Schottky diodes are constructed from the existing GaAs HBT base and collector vertical epitaxy layers and can be easily fabricated with only one additional mask processing step. The double-balanced Schottky mixer provides high IP3 and high 2-2 spur suppression over a broad band while consuming little dc power. The HBT-Schottky integrated down-converter MMIC achieves >16-dB conversion gain over an RF input band from 18-22 GHz and a corresponding IP3>10 dBm with only +3 dBm of LO drive. The total chip is 3.85/spl times/3.75 mm/sup 2/ and can be self-biased through a single 5.5-V supply while consuming 545 mW of dc power. The use of GaAs HBT vertical-Schottky-diode technology has inherent performance advantages for frequency conversion MMIC's.

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