Abstracts

15 dB gain, DC-20 GHz InP HBT balanced analog mixer and variable gain amplifier with 27 dB of dynamic range

K.W. Kobayashi, A. Gutierrez-Aitken, J. Cowles, B. Tang, R. Desrosiers, V. Medvedev, L.T. Tran, T.R. Block, A.K. Oki and D.C. Streit. "15 dB gain, DC-20 GHz InP HBT balanced analog mixer and variable gain amplifier with 27 dB of dynamic range." 1999 Radio Frequency Integrated Circuits (RFIC) Symposium 99. (1999 [RFIC]): 105-108.

This paper reports on a DC-20 GHz InP HBT active mixer which is believed to benchmark the highest gain-BW product (GBP) so far reported for a direct-coupled analog mixer IC. The InP HBT active mixer is based on the Gilbert cell and integrates RF, LO and IF amplifiers. High speed 70 GHz f/sub T/ and 160 GHz f/sub max/ InP HBT devices along with microwave matching accounts for its record performance. Operated as a down-converter mixer, the MMIC achieves an RF bandwidth from DC-20 GHz with 15.3 dB gain and benchmarks a 10 dB improvement in GBP over state-of-the-art analog mixer ICs. The LO-IF isolation is >17 dB with the LO and IF amplifiers and is >32 dB for the internal mixer cell up to 20 GHz. Excellent 2-2 spur suppression of >20 dBc is also achieved near P/sub 1dB/. The analog multiplier was also operated as a variable gain amplifier and achieved DC-18 GHz BW, 20 dB gain, 12 dBm IP3, and >25 dB of dynamic range. Single-ended peak-to-peak output voltage of 600 mV is obtained with a /spl plusmn/35 mV 15 Gb/s 2/sup 5/-1 PRBS input. The InP-based analog multiplier IC is an attractive building block for future high data rate direct-digital modulator-demodulator and receiver applications for satellite, LMDS, and fiber-telecommunication systems.

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