Abstracts

An actively balanced GaAs HBT-Schottky mixer for 3-V wireless applications

K.W. Kobayashi, L.T. Tran, A.K. Oki, M. Lammert, T.R. Block and D.C. Streit. "An actively balanced GaAs HBT-Schottky mixer for 3-V wireless applications." 1997 Microwave and Guided Wave Letters 7.7 (Jul. 1997 [MGWL]): 181-183.

Here we present a novel low-voltage active mixer topology which enables 3-V double-balanced active mixer operation from wide-bandgap GaAs-based heterojunction bipolar transistors (HBTs). The compact mixer design integrates directly coupled active radio frequency (RF) and local oscillator (LO) transformer baluns with a Schottky-diode ring-quad to form a double-balanced mixer which operates from DC to 5 GHz. Biased with a low 3-V supply and operated as a down-converter with a fixed LO at 800 MHz and 0 dBm, the mixer achieves 9.4-dB conversion gain (CG) at 1 GHz with positive CG out to 4 GHz and an IP3 of -5 dBm. The LO-IF isolation is >20 dB while the 2-2 spur suppression is >20 dB over a broad 1-5 GHz RF input band. The novel 2.1/spl middot/V/sub BE/ supply design topology allows 3-V operation from the high turn-on voltage GaAs HBT's, making them suitable for portable wireless applications, and can enable 1.5-V operation for Si, Si-Ge, and InP BJT/HBT technologies.

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