Abstracts

A Novel HBT Active Transformer Balanced Schottky Diode Mixer

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This paper describes a unique HBT active transformer balun which has been monolithically integrated with a GaAs Schottky diode ring quad to construct a double balanced mixer which can operate from dc to > 2 GHz. The HBT active balun transformer achieves < ± 0.5 dB gain balance and < ± 3° phase balance from dc-5 GHz and provides an in-phase combined IF center-tap output. The HBT actively balanced Schottky mixer achieves positive conversion gain from dc - 2 GHz, and excellent LO-IF and LO-RF isolation in excess of 28 dB across the band. Two-tone input IP3's of -6 dBm and -14 dBm were obtained with an LO drive of +15 dBm and +6 dBm, respectively. The unique HBT active transformer balanced Schottky mixer topology can achieve multi-decade balanced performance, whereas, the passive transformer-balun approach is limited to an octave in frequency bandwidth. Furthermore, the HBT active balanced mixer topology is capable of operating from a minimum voltage supply of /spl ap/ 2 Vbe which is lower than that achieved with conventional active Gilbert cell-based mixers (3 Vbe) making it potentially attractive for low voltage battery powered applications.

❑ Return to main document.