Abstracts

Device Considerations and Modeling for the Design of an InP-Based MODFET Millimeter-Wave Resistive Mixer with Superior Conversion Efficiency

E.W. Lin and W.H. Ku. "Device Considerations and Modeling for the Design of an InP-Based MODFET Millimeter-Wave Resistive Mixer with Superior Conversion Efficiency." 1995 Transactions on Microwave Theory and Techniques 43.8 (Aug. 1995 [T-MTT]): 1951-1959.

We report on the device considerations for resistive FET mixer applications and discuss the design and fabrication of an optimized InP-based 0.1 µm gate length planar-doped pseudomorphic In/sub 0.42/Al/sub 0.58/As/In/sub 0.65/Ga/sub 0.35/As modulation-doped FET (MODFET) well-suited for resistive mixer applications. In addition, we present a general large-signal model suitable for describing the FET in its passive mode of operation to assist in the design and simulation of such mixers. Finally, we discuss the theoretical design of a novel W-band, image-reject resistive mixer based on a large-signal model of our optimized device. The predicted performance of the mixer under +8 dBm of LO drive indicates a minimum conversion loss of 9 dB at 94 GHz, a significant improvement of over 3 dB in comparison to similar GaAs-based mixers, suggesting the potential of InP-based resistive mixer technology to achieve superior conversion loss performance.

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