Abstracts

Improved Intermodulation Rejection in Mixers (Dec. 1966 [T-MTT])

J.H. Lepoff and M. Cowley. "Improved Intermodulation Rejection in Mixers (Dec. 1966 [T-MTT])." 1966 Transactions on Microwave Theory and Techniques 14.12 (Dec. 1966 [T-MTT]): 618-623.

Intermodulation is one of the most pernicious forms of spurious response in superheterodyne receivers. This type of interference cannot be completely eliminated by narrowband filters. Improvements in receiver performance can be made only by improving and making more effective use of the mixing element. Intermodulation results from terms of higher order than two in the v-i power series expansion about the dc operating point of the mixing element. The magnitude of these higher order terms must be reduced in order to improve intermodulation rejection. In the work described in this paper, it has been observed that such a reduction in higher order terms can be obtained by proper design of the mixing element and by a proper choice of dc operating point. More than 80 dB intermodulation rejection was obtained with a single ended hot carrier diode mixer. Best performance is obtained by operating two hot carrier diodes at different operating points in a balanced mixer arrangement. Intermodulation ratios greater than 100 dB have been measured for this operating mode. Optimization of performance for IM rejection has little effect on sensitivity or rejection of other spurious responses. A new mixing element, the space-charge-limited resistor (SCLR), was designed to minimize the higher order terms in the current function. A balanced mixer provided the best performance with these mixing elements also. Intermodulation from +5 dBm inputs can be rejected below the mixer noise level. Early models of this device are not as sensitive as hot carrier mixers, but improvement appears to be possible.

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