Abstracts

A Very Wide-Band Microwave MESFET Mixer Using the Distributed Mixing Principle

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A new theory of distributed (traveling-wave) mixing is presented. A closed-form expression for the conversion gain is derived. Subsequently, the expression is reduced to a very simple form when the mixer approaches the ideal lossless case. A simplified nonlinear model of a GaAs MESFET is also described. Design criteria and considerations are presented. The relative contributions made by circuit parasitic to the conversion gain-bandwidth product are also examined. Experimental verification on a two-section design is described. It exhibits around 4 dB of conversion loss over the signal frequency band from 2 GHz to the cutoff at 10 GHz for an IF of 1.5 GHz. Experimental results obtained corroborate the theoretical predictions. Better performance is expected if more sections are employed.

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