Abstracts

Nonlinear Analysis of the Schottky-Barrier Mixer Diode

D.A. Fleri and L.D. Cohen. "Nonlinear Analysis of the Schottky-Barrier Mixer Diode." 1973 Transactions on Microwave Theory and Techniques 21.1 (Jan. 1973 [T-MTT]): 39-43.

The waveshape of the local-oscillator voltage component that exists across the nonlinear junction of a Shottky-barrier diode is a fundamental determinant of mixer performance. This waveshape significantly differs from that of the total local-oscillator voltage impressed across the diode terminals since it is influenced by parasitic, particularly spreading resistance and contact inductance, which exist in series with the junction. The junction-voltage waveshapes resulting from a 9.375-GHz sinusoidal local-oscillator generator voltage are computed for three common equivalent-circuit models of the diode. In the first model the diode is represented by a nonlinear conductance in series with a fixed spreading resistance. The second model includes the nonlinear capacitance associated with the junction, and the third additionally includes the contact inductance. In each case, the junction-voltage waveshape is significantly nonsinusoidal. It is shown that the contact inductance can induce a peak inverse junction voltage that greatly exceeds the peak voltage impressed across the diode terminals. This parasitic reactance thus can have an important bearing on the burnout properties of the mixer diode.

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