Abstracts

Modeling and design aspects of millimeter-wave and submillimeter-wave Schottky diode varactor frequency multipliers

J. Grajal, V. Krozer, E. Gonzalez, F. Maldonado and J. Gismero. "Modeling and design aspects of millimeter-wave and submillimeter-wave Schottky diode varactor frequency multipliers." 2000 Transactions on Microwave Theory and Techniques 48.4 (Apr. 2000, Part II [T-MTT] (Special Issue on Terahertz Electronics)): 700-711.

Design and optimization of Schottky varactor diode frequency multipliers for millimeter and submillimeter wavelengths are generally performed using harmonic balance techniques together with equivalent-circuit models. Using this approach, it is difficult to design and optimize the device and multiplier circuit simultaneously. The work presented in this paper avoids the need of equivalent circuits by integrating a numerical simulator for Schottky diodes into a circuit simulator. The good agreement between the calculated and published experimental data for the output power and conversion efficiency originates from the accurate physical model. The limiting effects of multiplier performance such as breakdown, forward conduction, or saturation velocity are discussed in view of the optimum circuit conditions for multiplier operation including bias point, input power, and loads at different harmonics. It is shown that the onset of forward or reverse current flow is responsible for the limitation in the conversion efficiency.

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