Abstracts

On the Modeling and Optimization of Schottky Varactor Frequency Multipliers at Submillimeter Wavelengths

J.T. Louhi and A.V. Raisanen. "On the Modeling and Optimization of Schottky Varactor Frequency Multipliers at Submillimeter Wavelengths." 1995 Transactions on Microwave Theory and Techniques 43.4 (Apr. 1995, Part II [T-MTT] (Special Issue on Space Terahertz Technology)): 922-926.

Schottky varactor frequency multipliers are used to generate local oscillator power at millimeter and submillimeter wavelengths. The equivalent circuit of the Schottky varactor contains a junction capacitance, a junction conductance, a series resistance and a model for electron velocity saturation. At millimeter wavelengths the equivalent circuit is affected by the edge effects, which are due to the small-area circular anode. The correction factors due to the edge effect for the junction capacitance and for the series resistance are available in the literature. In this work the electron velocity saturation is modeled by limiting the velocity of the transition front between the depleted and undepleted layer. By using this model the maximum current of the diode is given by the actual area of the transition front between depleted and undepleted layers, and is therefore related to the capacitance correction factor. The new model has been tested by analyzing a two diode balanced doubler for 160 GHz presented earlier in the literature. The agreement between the theoretical results and the measurements is excellent. The new diode model is useful in optimization of varactors for high millimeter and submillimeter wave frequencies.

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