Abstracts

Integrated Back to Back Barrier-N-N/sup +/ Varactor Diode Tripler Using a Split-Waveguide Block

D. Choudhury, P.H. Siegel, R.P. Smith, A.V. Raisanen, S.C. Martin and M.A. Frerking. "Integrated Back to Back Barrier-N-N/sup +/ Varactor Diode Tripler Using a Split-Waveguide Block." 1995 Transactions on Microwave Theory and Techniques 43.4 (Apr. 1995, Part II [T-MTT] (Special Issue on Space Terahertz Technology)): 948-954.

The back-to-back barrier-N-N+ (bbBNN) varactor is a nonlinear device being developed for frequency multiplier applications above 100 GHz. Its symmetrical C-V characteristic, low series resistance, freedom from external bias and suitability to planarization make it an ideal choice for high frequency, low power, odd harmonic generation. In this paper, the performance of a 220-GHz waveguide tripler using, for the first time, a planar GaAs bbBNN device integrated on a quartz microstrip circuit is presented. A new split-waveguide block design has been employed to provide the proper embedding impedances to the device at the input and third harmonic output frequencies. A flange-to-flange tripling efficiency of 7% has been obtained at 220 GHz with an output power in excess of 700 µW. This is believed to be the highest conversion efficiency yet reported for a tripler with an integrated device at this frequency. Theoretical calculations indicate that substantial improvement is possible with modest changes to the device and circuit parameters.

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