Abstracts

A Millimeter-Wave Quadrupler and an Up-Converter Using Planar-Diffused Gallium Arsenide Varactor Diodes

T.P. Lee and C.A. Burrus. "A Millimeter-Wave Quadrupler and an Up-Converter Using Planar-Diffused Gallium Arsenide Varactor Diodes." 1968 Transactions on Microwave Theory and Techniques 16.5 (May 1968 [T-MTT]): 287-296.

A millimeter-wave quadruple, employing planar-diffused GaAs varactor diodes and a tuned second-harmonic idler circuit, is described. This quadruple operated at an output frequency of 50.4 GHz, produced a maximum power output greater than 13 mW, and exhibited a maximum overall conversion efficiency of 12 percent. 2) A millimeter-wave up-converter using similar diffused GaAs diodes has been operated successfully. The input was at 1.3 GHz, the output at 51.7 GHz, and the local oscillator power was supplied at 50.4 GHz. The minimum observed overall conversion loss, 50.4 to 51.7 GHz, was about 2.5 dB at an output power between 1 and 3 mW. 3) The performance of these devices is described as a function of the parameters of the diodes employed, and a comparison of the performance of diffused-junction and Schottky-barrier diodes (of comparable quality) in the two circuits is discussed. 4) The fabrication and characterization of the planar-diffused gallium arsenide varactor diodes used in these circuits is described; zero-bias cutoff frequencies to values in excess of 2000 GHz were achieved.

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