Abstracts

Fixed-tuned submillimeter wavelength waveguide mixers using planar Schottky-barrier diodes

J.L. Hesler, W.R. Hall, T.W. Crowe, R.M. Weikle, B.S. Deaver, R.F. Bradley and Shing-Kuo Pan. "Fixed-tuned submillimeter wavelength waveguide mixers using planar Schottky-barrier diodes." 1997 Transactions on Microwave Theory and Techniques 45.5 (May 1997, Part I [T-MTT]): 653-658.

The design, construction, and evaluation of fixed-tuned submillimeter wavelength waveguide mixers using planar Schottky diodes are presented in this paper. Electromagnetic fields within the planar diode package were analyzed using the finite-element method (FEM). Mixers using the University of Virginia SCIT5 planar diode were designed at both 585 and 690 GHz. A double sideband (DSB) system noise temperature of 2380 K was measured at 585 GHz using 1.16 mW of local oscillator (LO) power, and a system noise temperature of 2970 K DSB was measured at 690 GHz using 1.04 mW of LO power. In addition, the 585 GHz mixer was cooled to both 77 K and 4.2 K, with measured system noise temperatures of 1240 and 880-K DSB using LO powers of 0.47 and 0.14 mW, respectively. The modeling techniques were found to predict the measured conversion loss to within 1 dB. The performance of planar diode mixers is now within a factor of 1.5 of the best whisker-contacted Schottky diode mixers in this frequency range.

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