Abstracts

Monolithic Integration of a Dielectric Millimeter-Wave Antenna and Mixer Diode: An Embryonic Millimeter-Wave IC

C. Yao, S.E. Schwarz and B.J. Blumenstock. "Monolithic Integration of a Dielectric Millimeter-Wave Antenna and Mixer Diode: An Embryonic Millimeter-Wave IC." 1982 Transactions on Microwave Theory and Techniques 30.8 (Aug. 1982 [T-MTT]): 1241-1247.

A monolithic silicon integrated circuit consisting of a mixer diode and an all-dielectric receiving antenna has been built and tested at 85 GHz. Radiation is coupled into the device optically with a coupling loss of 2.7 dB. No external metal structure is required for coupling. The design can be used efficiently at considerably higher frequencies, and can be elaborated into more complex integrated circuits. From measurements of video responsivity the losses of various parts of the device are estimated. A simple theory of conversion efficiency is found to agree well with experiment this theory is then used to predict the performance of improved versions of the device. The conversion efficiency obtained with this demonstration device is low; it is shown, however, that acceptable conversion efficiencies can be obtained with a more advanced diode fabrication technology using epitaxial Si or GaAs. Integrated millimeter-wave receivers of this kind should be suitable for short-path terrestrial communications, in applications where compactness and low cost are required.

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