Abstracts

A Thin Film X-Band Varactor Quadrupler (1967 [MWSYM])

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Microwove integrated circuit components continue to be reported and in many applications have exhibited performance equal to or exceeding existing conventional components. Most of these components fall into the category of single frequency band operation, as is normal for phase shifters, mixers, amplifiers, T-R switches, etc., and single values for wave propogation factor and transmission line loss are adequate for design parameters. Multiplier generation involves two or more frequency bands of operation and consequently poses the additional problems of treating the propogation medium and its microwave circuitry losses over a large frequency range. In microstrip transmission line this problem is particularly severe because of the variatian of the velocity of propogation factor as a function of frequency as well as impedance. This effect has been characterized for ceramic substrate by Vincent, and results indicate that it can be minimized by choosing impedance of 50 ohms or greater. Circuit losses increase rapidly as a function of wavelength, however, and can be minimized only by keeping microstrip line lengths to a minimum. It follows from these considerations that multiplier designs, in particular the multifrequency circuits such as shorted stubs, etc., should contain microstrip lines of 50 ohm or greater where feasible, and should be of minimum length, especially for higher frequencies.

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