Abstracts

Propagation Losses in Dielectric Image Guides (Short Papers)

J. Xia, S.W. McKnight and C. Vittoria. "Propagation Losses in Dielectric Image Guides (Short Papers)." 1988 Transactions on Microwave Theory and Techniques 36.1 (Jan. 1988 [T-MTT]): 155-158.

To evaluate low-loss transmission lines for integrated circuits operating at millimeter wavelengths, we have calculated the propagation losses of a dielectric image guide using the effective dielectric constant (EDC) method to a higher order of approximation than previously reported work. Our results differ significantly from other EDC calculations close to the waveguide cutoff frequency. In this region, we find that there is a minimum in the waveguide attenuation that has not been alluded to in the literature, and also a peak in the imaginary parts of the transverse propagation constants related to dimensional resonances within the waveguide. These results imply that the propagation losses will be lowered and the fields will be more effectively confined within the waveguide at frequencies close to the cutoff. Thus, it may be advantageous when using dielectric image guides for low-loss transmission line applications to operate near cutoff where the corrections included in our calculations are critical.

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