Abstracts

Modal Analysis of a Planar Dielectric Strip Waveguide for Millimeter-Wave Integrated Circuits

T.T. Fong and S.-W. Lee. "Modal Analysis of a Planar Dielectric Strip Waveguide for Millimeter-Wave Integrated Circuits." 1974 Transactions on Microwave Theory and Techniques 22.8 (Aug. 1974 [T-MTT]): 776-783.

A novel planar waveguide which is suitable for guiding electromagnetic (EM) energy in the millimeter-wave and submillimeter- wave regions is studied. By using Wiener-Hopf techniques, we first determine the reflection coefficient at the open ends of the guide. Next, a transverse resonance condition is applied to determine the dispersion relation of the modal field. The propagation constant is found to be complex. Its imaginary part accounts for the edge diffraction loss of the strip through the open ends of the guide. Extensive numerical results are given for the disperson characteristics and modal field distributions for silicon and fuzed quartz substrates. The planar strip waveguide should have the advantages of simplicity in processing, a lower random diffraction loss, and accessibility to monolithic integration techniques.

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