Abstracts

Coupling Characteristics of Nonradiative Dielectric Waveguides

T. Yoneyama, N. Tozawa and S. Nishida. "Coupling Characteristics of Nonradiative Dielectric Waveguides." 1983 Transactions on Microwave Theory and Techniques 31.8 (Aug. 1983 [T-MTT]): 648-654.

An analytical method is presented for predicting coupling characteristics of dielectric strips in the nonradiative dielectric waveguide. Starting with an approximate but very accurate expression for the coupling coefficient between parallel dielectric strips, the scattering coefficients for nonuniform coupling structures are derived in simple closed-form expressions by taking the effect of the field deformation at the curved sections into account. The coupling coefficient of the nonradiative dielectric waveguide is found to be so large compared to those of other dielectric waveguides that complete power transfer can be attained with coupled polystyrene bends having a curvature radius as small as 20 mm at 50 GHz. The theory was verified experimentally for various coupling structures. As an application toward millimeter-wave integrated circuits, 0-dB couplers, quadrature hybrid couplers, and an in-phase power divider were constructed based on the present analysis. A comparison of theory and experimental data of these fabricated coupling circuits suggests that the effect of the nondegenerate modes in the straight and curved guides must be included in the analysis to further improve the theory.

❑ Return to main document.