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Accession Number

12408700

Author

Ye Long-Fang. Xu Rui-Min. Zhang Yong. Lin Wei-Gan.

Author/Editor Affiliation

Ye Long-Fang. Xu Rui-Min. Zhang Yong. Lin Wei-Gan. : Extra High Frequency Key Laboratory of Fundamental Science, University of Electronic Science and Technology of China, Chengdu 611731, China

Title

Transmission Characteristics of a Generalized Parallel Plate Dielectric Waveguide at THz Frequencies

Source

Chinese Physics Letters, vol.28, no.12, Dec. 2011, 124102 (4 pp.). Publisher: Chinese Physical Society, China.

Abstract

A generalized parallel-plate dielectric waveguide (G-PPDW) is proposed as a new guiding medium for terahertz wave. A theoretical analysis of the transmission characteristics for the TE modes of this generalized structure is performed. Equations are presented for the field components, dispersion, power ratio, transmission loss and characteristic impedance as functions of the operating frequencies, dimensions and material constants. In the case of the lowest-order mode  $TE_{10}$ , design curves covering frequencies and dimensions for the given material constants in the THz region are presented. The theoretical results of transmission characteristics obtained from these equations are verified by the finite-element method with a good agreement. The investigation results show that by selecting proper dimensions and dielectric materials, G-PPDW can be used to guide THz waves efficiently with high power confinement and low attenuation. These outstanding properties may open up a way to many important applications for THz integrated circuits and systems. (12 References).