Abstracts

Analysis of three-dimensional embedded transmission lines (ETL's)

A. Darwish, A. Ezzeddine, H.C. Huang and M. Mah. "Analysis of three-dimensional embedded transmission lines (ETL's)." 1999 Microwave and Guided Wave Letters 9.11 (Nov. 1999 [MGWL]): 447-449.

Three-dimensional (3-D) circuits promise a significant reduction in circuit size and cost. In 3-D circuits, a few transmission line configurations are encountered including the offset stripline and the embedded transmission line (ETL), a stripline-like topology with two dielectrics. The ETL may have either two ground planes (similar to an offset stripline) or one ground plane (similar to an inverted microstrip). There is a need for an accurate solution to predict the effective dielectric constant and characteristic impedance of these transmission line structures. This paper provides an accurate (1% maximum error) closed-form empirical formula for the effective dielectric constant and compares it with full-wave simulations. In addition, this letter provides an empirical formula for the characteristic impedance and compares it with full-wave simulations of the structure. Close agreement between the two approaches is observed over a wide range of parameters.

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