Abstracts

Derivation of Equivalent Circuits for Multilayer Printed Circuit Board Discontinuities Using Full Wave Models

E. Pillai and W. Wiesbeck. "Derivation of Equivalent Circuits for Multilayer Printed Circuit Board Discontinuities Using Full Wave Models." 1994 Transactions on Microwave Theory and Techniques 42.9 (Sep. 1994, Part II [T-MTT]): 1774-1783.

Recent advances in increasing transmission rates for digital communication systems necessitates special attention during printed circuit board (PCB) design. This contribution provides a methodology for developing appropriate simple equivalent circuits to describe the discontinuities in multilayer boards. The effects of inhomogeneous substrate material, via holes, crossovers and coupled lines are examined. The incorporation of substrate loss in the difference equation system is additionally treated. The equivalent circuits are intended for system simulation, where minimal computational overhead is desired. The Finite Difference Frequency Domain (FDFD) and Finite Difference Time Domain (FDTD) methods provide in conjunction the basis for calculating the scattering parameters [S] and fields of the discontinuities, from which equivalent circuits are derived. Excellent S parameter agreement between field computation and equivalent circuit is achieved upto 20 GHz for all structures considered. Measurements are indicated where appropriate.

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