

Effects of Various Suspended Mounting Schemes on Mode Characteristics of Coupled Slotlines Considering Conductor Thickness for Wideband MIC Applications

T. Wang and K. Wu. "Effects of Various Suspended Mounting Schemes on Mode Characteristics of Coupled Slotlines Considering Conductor Thickness for Wideband MIC Applications." 1995 Transactions on Microwave Theory and Techniques 43.5 (May 1995 [T-MTT]): 1106-1114.

Propagation characteristics of fundamental and higher-order modes are determined in coupled slotlines with three suspended mounting schemes (pedestal, groove, inverse pedestal) for wideband applications of microwave and millimeter-wave integrated circuits. The analysis is based on a novel enhanced spectral domain approach (ESDA) that combines essentially the conventional spectral domain technique with the power conservation theorem. Numerical results, considering also the influence of finite conductor thickness, are presented for propagation constants and characteristic impedance of the fundamental modes. Effects of different suspended mounting schemes on cutoff frequencies of first higher-order even and odd modes are discussed in detail. Field profiles of the fundamental modes in coupled slotlines with and without pedestals are shown. The inherent mechanism of mode transition is explained with respect to different pedestal sizes, indicating that the monomode bandwidth can be extended by appropriately choosing the dimension of pedestal in coupled slotlines.

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