Abstracts

The finite-element method for modeling circuits and interconnects for electronic packaging

A full-wave finite-element method (FEM) is formulated and applied in the analysis of practical electronic packaging circuits and interconnects. The method is used to calculate S-parameters of unshielded microwave components such as patch antennas, filters, spiral inductors, bridges, bond wires, and microstrip transitions through a via. Although only representative microwave passive circuits and interconnects are analyzed in this paper, the underlined formulation is applicable to structures of arbitrary geometrical complexities including microstrip and coplanar-waveguide transitions, multiple conducting vias and solder bumps, multiple striplines, and multilayer substrates. The accuracy of the finite-element formulation is extensively verified by calculating the respective S-parameters and comparing them with results obtained using the finite-difference time-domain (FDTD) method. Computational statistics for both methods are also discussed.

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