Abstracts

An FDTD-Touchstone hybrid technique for equivalent circuit modeling of SOP electronic packages

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The electromagnetic-field behavior within electronic packages used for high-speed digital-circuit or high-frequency analog-circuit applications often cannot be accurately modeled by using a quasi-static approximation, and a frequency-dependent analysis is sometimes needed for accurate modeling. In this paper, we employ the finite-difference time-domain (FDTD) approach, in conjunction with the commercially available software called Touchstone, to model the generic 24-pin silicon on plastic (SOP) package. The model for the package includes many details, such as the plastic encasement, bonding pads, and wires. The frequency responses of the package are tested against the results obtained with only the FDTD algorithm. It is shown that by extracting the equivalent-circuit elements from the field data, the hybrid FDTD-Touchstone technique allows greater flexibility in deriving a circuit configuration at the expense of fine tuning the circuit to reproduce the response of the package. It is hoped that the technique presented in this paper will lead to more accurate circuit simulations of complex packaging configurations than has been possible up to this point, by using quasi-static analyses.

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