Abstracts

Modeling and characterization of the bonding-wire interconnection

F. Alimenti, P. Mezzanotte, L. Roselli and R. Sorrentino. "Modeling and characterization of the bonding-wire interconnection." 2001 Transactions on Microwave Theory and Techniques 49.1 (Jan. 2001 [T-MTT] (Mini-Special Issue on 2000 Radio-Frequency Integrated Circuits (RFIC) Conference and Automatic Radio Frequency Techniques Group (ARFTG) Meeting)): 142-150.

In this paper, the bonding-wire interconnection has been studied from the points of view of its modeling and electrical characterization. Both singleand double-wire structures have been considered, the latter under the assumption of parallel wires. Two electrical models of the bonding wire are discussed. First, the finite-difference time-domain (FDTD) method is proposed for the rigorous analysis of such structures. This method uses a suitable discretization technique, which accounts for the wire curvature by means of a polygonal approximation. A quasi-static model of the bonding wire, suitable for commercial microwave computer-aided-design tools is then proposed. This model is based on the representation of the structure with four sections of a uniform transmission line and the model parameters are evaluated analytically from the dimensions of the interconnection. Accuracy and applicability of the quasi-static model have been assessed by analyzing several test structures, the reference results being obtained with the FDTD method. Finally, the quasi-static model has been used to provide an extensive electrical characterization of the bonding wire versus its main geometrical parameters. This characterization is given in terms of an equivalent series inductance and two equivalent shunt capacitances forming a /spl pi/ low-pass network. This representation is particularly useful in the matching of the bonding-wire discontinuity.

❑ Return to main document.