

## Electrical Modeling and Design for 3D System Integration: 3D Integrated Circuits and Packaging, Signal Integrity, Power Integrity and EMC

Er-Ping Li

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New advanced modeling methods for simulating the electromagnetic properties of complex threedimensional electronic systems

Based on the author's extensive research, this book sets forth tested and proven electromagnetic modeling and simulation methods for analyzing signal and power integrity as well as electromagnetic interference in large complex electronic interconnects, multilayered package structures, integrated circuits, and printed circuit boards. Readers will discover the state of the technology in electronic package integration and printed circuit board simulation and modeling. In addition to popular full-wave electromagnetic computational methods, the book presents new, more sophisticated modeling methods, offering readers the most advanced tools for analyzing and designing large complex electronic structures.

Electrical Modeling and Design for 3D System Integration begins with a comprehensive review of current modeling and simulation methods for signal integrity, power integrity, and electromagnetic compatibility. Next, the book guides readers through:

- The macromodeling technique used in the electrical and electromagnetic modeling and simulation of complex interconnects in three-dimensional integrated systems
- The semi-analytical scattering matrix method based on the N-body scattering theory for modeling of threedimensional electronic package and multilayered printed circuit boards with multiple vias
- Two- and three-dimensional integral equation methods for the analysis of power distribution networks in three-dimensional package integrations
- The physics-based algorithm for extracting the equivalent circuit of a complex power distribution network in three-dimensional integrated systems and printed circuit boards
- An equivalent circuit model of through-silicon vias
- Metal-oxide-semiconductor capacitance effects of through-silicon vias

Engineers, researchers, and students can turn to this book for the latest techniques and methods for the electrical modeling and design of electronic packaging, three-dimensional electronic integration, integrated circuits, and printed circuit boards.



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