



ESD: Failure Mechanisms and Models

Steven H. Voldman

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Electrostatic discharge (ESD) failure mechanisms continue to impact semiconductor components and systems as technologies scale from micro- to nano-electronics.

This book studies electrical overstress, ESD, and latchup from a failure analysis and case-study approach. It provides a clear insight into the physics of failure from a generalist perspective, followed by investigation of failure mechanisms in specific technologies, circuits, and systems. The book is unique in covering both the failure mechanism and the practical solutions to fix the problem from either a technology or circuit methodology.

Look inside for extensive coverage on:

- failure analysis tools, EOS and ESD failure sources and failure models of semiconductor technology, and how to use failure analysis to design more robust semiconductor components and systems;
- electro-thermal models and technologies; the state-of-the-art technologies discussed include CMOS, BiCMOS, silicon on insulator (SOI), bipolar technology, high voltage CMOS (HVCMOS), RF CMOS, smart power, gallium arsenide (GaAs), gallium nitride (GaN), magneto-resistive (MR), giant magneto-resistors (GMR), tunneling magneto-resistor (TMR), devices; micro electro-mechanical (MEM) systems, and photo-masks and reticles;
- practical methods to use failure analysis for the understanding of ESD circuit operation, temperature analysis, power distribution, ground rule development, internal bus distribution, current path analysis, quality metrics, (connecting the theoretical to the practical analysis);
- the failure of each key element of a technology from passives, active elements to the circuit, sub-system to package, highlighted by case studies of the elements, circuits and system-on-chip (SOC) in today's products.

ESD: Failure Mechanisms and Models is a continuation of the author's series of books on ESD protection. It is an essential reference and a useful insight into the issues that confront modern technology as we enter the Nano-electronic era.

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