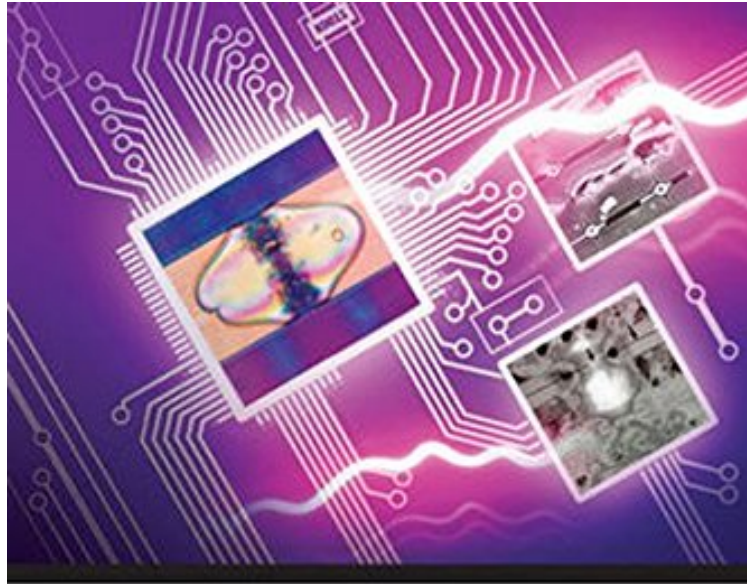


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ESD: Failure Mechanisms and Models

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ESD

FAILURE MECHANISMS AND MODELS

STEVEN H. VOLDMAN

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Steven H. Voldman : ESD: Failure Mechanisms and Models before purchasing it in order to gage whether or not it would be worth my time, and all praised ESD: Failure Mechanisms and Models:

1 of 1 people found the following review helpful. Best book on this topicBy VCI'm an ESD engineer in the semiconductor industry. I have read many of the ESD books published in the past 20 years, but did not find one dedicated to this topic until this book was published. This is a very important topic for ESD and reliability engineering. So I'm sure that there are many engineers like me who have been waiting for such a book for a long time. This book is very well written like all the other books in this series by Dr. Voldman, who is an IEEE fellow and top

expert in the world. The book starts from basic knowledge and then gradually goes into great details. The subject is covered thoroughly and comprehensively. Moreover, there are several reasons that make this book particularly valuable to a wide range of readers from new engineers/students to industry veterans. The best way to learn about failure mechanism is not only by reading the theories, but also studying the pictures from real failure analysis experiments. Such experiments are very specialized and costly, therefore illustrations are more difficult to acquire. In this book, however, there are many high-quality pictures taken from advanced microscopes. Instead of reading the descriptions about how IC fails under ESD and what happens afterward, readers can see what the failure sites look like in reality and learn the failure signatures. While this book is about mechanisms and models, there aren't overwhelmingly complicated equations. Some key equations are included only when absolutely needed. For most readers, especially students and enthusiastic novice readers, the last thing they want is to be discouraged by tedious derivations that don't help directly improve their understanding. With the appropriate number of equations and analysis, reading this book has been a pleasant learning experience. The reference sections are quite complete and very up-to-date. In addition to the carefully chosen classic references, there are many recent references including even papers published in 2008 and 2009, which indicates that the author has made a great effort to keep the materials updated. Many real-world examples in advanced technology nodes are illustrated. This is a big plus considering the discussed field is rapidly advancing. The second half of this book covers many advanced topics in great detail, which is hard to find elsewhere. For example, SOI failures, MEMS, GaAs, Smart Power, Magnetic recording and so on. While some of these topics can be found in conference proceedings, the methodical treatment in this book makes the learning most efficient. I'm glad to have found this book as I realize how critical it is to understand failures mechanisms. Considering the uniqueness of the book's coverage, I believe it is a must-read for ESD and reliability engineers. 0 of 0 people found the following review helpful. I have been looking for it! By Guowei Zhao I am a green hand in this field, though I am a ph.D student now. I changed my field to digital circuit design to my current circuit and device reliability. This book is quite good for me, it contains very basic concept and also helps you to understand deeper. The author write very fluently and with clear logic. Even for me, English is not my first language, it is easy to read. It is really helpful, and I recommend it if you need systematic study. Shuyu.C

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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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, illustrated with 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.

About the Author: Dr. Steven H. Voldman received his B.S. in Engineering Science from the University of Buffalo (1979); M.S. EE (1981) and Electrical Engineering Degree (1982) from M.I.T.; MS Engineering Physics (1986) and Ph.D. EE (1991) from the University of Vermont under IBM's Resident Study Fellow Program. At M.I.T., he worked as a member of the M.I.T. Plasma Fusion Center, and the High Voltage Research Laboratory (HVRL). At IBM, as a reliability device engineer, his work included pioneering work in bipolar/CMOS SRAM alpha particle and cosmic ray SER simulation, MOSFET gate-induced drain leakage (GIDL) mechanism, hot electron, epitaxy/well design, CMOS latchup, and ESD. Since 1986, he has been responsible for defining the IBM ESD/latchup strategy for CMOS, SOI, BiCMOS and RF CMOS and SiGe technologies. He has authored ESD and latchup publications in the area of MOSFET Scaling, device simulations, copper, low-k, MR heads, CMOS, SOI, Sage and SiGeC technology. Voldman served as SEMATECH ESD Working Group Chairman (1996-2000), ESD Association General Chairman and Board of Directors, International Reliability Physics (IRPS) ESD/Latchup Chairman, International Physical and Failure Analysis (IPFA) Symposium ESD Sub-Committee Chairman, ESD Association Standard Development Chairman on Transmission Line Pulse Testing, ESD Education Committee, and serves on the ISQED Committee, Taiwan ESD Conference (T-ESDC) Technical Program Committee. Voldman has provided ESD lectures for universities (e.g. MIT Lecture Series, Taiwan National Chiao-Tung University, and Singapore Nanyang Technical University). He is a recipient of over 125 US patents, over 100 publications, and also provides talks on patenting, and invention. He has been featured in EE Times, Intellectual Property Law and Business and authored the first article on ESD phenomena for the October 2002 edition of Scientific American entitled Lightning Rods for Nanostructures, and Pour La Science, Le Scienze, and Swiat Nauk international editions. Dr. Voldman was recently accepted as the first IEEE Fellow for ESD phenomena in semiconductors for 'contributions to electrostatic discharge protection CMOS, SOI and SiGe technologies'.