

RADIATION EFFECTS AND SOFT ERRORS IN INTEGRATED CIRCUITS AND ELECTRONIC DEVICES

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Radiation Effects And Soft Errors In Integrated Circuits And Electronic Devices

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Radiation Effects And Soft Errors In Integrated Circuits And Electronic Devices:

Radiation Effects and Soft Errors in Integrated Circuits and Electronic Devices Ronald Donald Schrimpf, Dan M. Fleetwood, 2004 This book provides a detailed treatment of radiation effects in electronic devices including effects at the material device and circuit levels The emphasis is on transient effects caused by single ionizing particles single event effects and soft errors and effects produced by the cumulative energy deposited by the radiation total ionizing dose effects Bipolar Si and SiGe metal oxide semiconductor MOS and compound semi conductor technologies are discussed In addition to considering the specific issues associated with high performance devices and technologies the book includes the background material necessary for understanding radiation effects at a more general level **Special Issue: Radiation Effects and Soft Errors in Integrated Circuits and Electronic Devices** D. M. Fleetwood, R. D. Schrimpf, 2004 **Semiconductor Devices in Harsh Conditions** Kirsten Weide-Zaage, Malgorzata Chrzanowska-Jeske, 2016-11-25 This book introduces the reader to a number of challenges for the operation of electronic devices in various harsh environmental conditions While some chapters focus on measuring and understanding the effects of these environments on electronic components many also propose design solutions whether in choice of material innovative structures or strategies for amelioration and repair Many applications need electronics designed to operate in harsh environments Readers will find in this collection of topics tools and ideas useful in their own pursuits and of interest to their intellectual curiosity With a focus on radiation operating conditions sensor systems package and system design the book is divided into three parts The first part deals with sensing devices designed for operating in the presence of radiation commercials of the shelf COTS products for space computing and influences of single event upset The second covers system and package design for harsh operating conditions The third presents devices for biomedical applications under moisture and temperature loads in the frame of sensor systems and operating conditions **Soft Errors** Jean-Luc Autran, Daniela Munteanu, 2017-12-19 Soft errors are a multifaceted issue at the crossroads of applied physics and engineering sciences Soft errors are by nature multiscale and multiphysics problems that combine not only nuclear and semiconductor physics material sciences circuit design and chip architecture and operation but also cosmic ray physics natural radioactivity issues particle detection and related instrumentation Soft Errors From Particles to Circuits addresses the problem of soft errors in digital integrated circuits subjected to the terrestrial natural radiation environment one of the most important primary limits for modern digital electronic reliability Covering the fundamentals of soft errors as well as engineering considerations and technological aspects this robust text Discusses the basics of the natural radiation environment particle interactions with matter and soft error mechanisms Details instrumentation developments in the fields of environment characterization particle detection and real time and accelerated tests Describes the latest computational developments modeling and simulation strategies for the soft error rate estimation in digital circuits Explores trends for future technological nodes and emerging devices Soft Errors From Particles to Circuits

presents the state of the art of this complex subject providing comprehensive knowledge of the complete chain of the physics of soft errors The book makes an ideal text for introductory graduate level courses offers academic researchers a specialized overview and serves as a practical guide for semiconductor industry engineers or application engineers **Ionizing**

Radiation Effects in Electronics Marta Bagatin, Simone Gerardin, 2018-09-03 Ionizing Radiation Effects in Electronics From Memories to Imagers delivers comprehensive coverage of the effects of ionizing radiation on state of the art semiconductor devices The book also offers valuable insight into modern radiation hardening techniques The text begins by providing important background information on radiation effects their underlying mechanisms and the use of Monte Carlo techniques to simulate radiation transport and the effects of radiation on electronics The book then Explains the effects of radiation on digital commercial devices including microprocessors and volatile and nonvolatile memories static random access memories SRAMs dynamic random access memories DRAMs and Flash memories Examines issues like soft errors total dose and displacement damage together with hardening by design solutions for digital circuits field programmable gate arrays FPGAs and mixed analog circuits Explores the effects of radiation on fiber optics and imager devices such as complementary metal oxide semiconductor CMOS sensors and charge coupled devices CCDs Featuring real world examples case studies extensive references and contributions from leading experts in industry and academia Ionizing Radiation Effects in Electronics From Memories to Imagers is suitable both for newcomers who want to become familiar with radiation effects and for radiation experts who are looking for more advanced material or to make effective use of beam time **Soft Error**

Mechanisms, Modeling and Mitigation Selahattin Sayil, 2016-02-25 This book introduces readers to various radiation soft error mechanisms such as soft delays radiation induced clock jitter and pulses and single event SE coupling induced effects In addition to discussing various radiation hardening techniques for combinational logic the author also describes new mitigation strategies targeting commercial designs Coverage includes novel soft error mitigation techniques such as the Dynamic Threshold Technique and Soft Error Filtering based on Transmission gate with varied gate and body bias The discussion also includes modeling of SE crosstalk noise delay and speed up effects Various mitigation strategies to eliminate SE coupling effects are also introduced Coverage also includes the reliability of low power energy efficient designs and the impact of leakage power consumption optimizations on soft error robustness The author presents an analysis of various power optimization techniques enabling readers to make design choices that reduce static power consumption and improve soft error reliability at the same time **Soft Errors in Modern Electronic Systems** Michael Nicolaidis, 2010-09-24 This

book provides a comprehensive presentation of the most advanced research results and technological developments enabling understanding qualifying and mitigating the soft errors effect in advanced electronics including the fundamental physical mechanisms of radiation induced soft errors the various steps that lead to a system failure the modelling and simulation of soft error at various levels including physical electrical netlist event driven RTL and system level modelling and simulation

hardware fault injection accelerated radiation testing and natural environment testing soft error oriented test structures process level device level cell level circuit level architectural level software level and system level soft error mitigation techniques The book contains a comprehensive presentation of most recent advances on understanding qualifying and mitigating the soft error effect in advanced electronic systems presented by academia and industry experts in reliability fault tolerance EDA processor SoC and system design and in particular experts from industries that have faced the soft error impact in terms of product reliability and related business issues and were in the forefront of the countermeasures taken by these companies at multiple levels in order to mitigate the soft error effects at a cost acceptable for commercial products In a fast moving field where the impact on ground level electronics is very recent and its severity is steadily increasing at each new process node impacting one after another various industry sectors as an example the Automotive Electronics Council comes to publish qualification requirements on soft errors research and technology developments and industrial practices have evolve very fast outdating the most recent books edited at 2004

Nanotubes and Nanowires Peter John Burke, 2007 The field of nanotubes and nanowires is evolving at a rapid pace with many potential applications in electronics optics and sensors to name a few In this book various prominent researchers summarize our current understanding of these new materials systems as well as some of these potential applications A snapshot of the state of the art in the field of nanowires and nanotubes the contributions give an instructive mix of experimental theoretical and visionary material to give the reader an indication of where the field is now and where it is going With several points of view represented including academic theoreticians academic experimental device engineers and industry researchers from well known semiconductor companies Nanotubes and Nanowires is an essential source of reference for physicists chemists materials scientists and graduate students interested in keeping abreast of the latest developments in nanotechnology

Terrestrial Radiation Effects in ULSI Devices and Electronic Systems Eishi H. Ibe, 2015-03-02 This book provides the reader with knowledge on a wide variety of radiation fields and their effects on the electronic devices and systems The author covers faults and failures in ULSI devices induced by a wide variety of radiation fields including electrons alpha rays muons gamma rays neutrons and heavy ions Readers will learn how to make numerical models from physical insights to determine the kind of mathematical approaches that should be implemented to analyze radiation effects A wide variety of prediction detection characterization and mitigation techniques against soft errors are reviewed and discussed The author shows how to model sophisticated radiation effects in condensed matter in order to quantify and control them and explains how electronic systems including servers and routers are shut down due to environmental radiation Provides an understanding of how electronic systems are shut down due to environmental radiation by constructing physical models and numerical algorithms Covers both terrestrial and avionic level conditions Logically presented with each chapter explaining the background physics to the topic followed by various modelling techniques and chapter summary Written by a widely recognized authority in soft errors in electronic

devices Code samples available for download from the Companion Website This book is targeted at researchers and graduate students in nuclear and space radiation semiconductor physics and electron devices as well as other areas of applied physics modelling Researchers and students interested in how a variety of physical phenomena can be modelled and numerically treated will also find this book to present helpful methods

Frontiers In Electronics Sorin Cristoloveanu, Michael S Shur, 2009-08-06 Frontiers in Electronics contains the selected best papers presented at the Workshop on Frontiers in Electronics WOFE 07 This meeting was the fifth in the series of WOFE workshops and strongly reinforced the tradition of scientific quality and visionary research The issues addressed ranged from THz and infrared electronics to nanoelectronics and photonics The papers focused on the fabrication characterization and applications of nanodevices wide band gap structures and state of the art FETs The participants also discussed the device physics and processing issues including aspects related to SOI and germanium on insulator technologies TFTs and advanced CMOS and MOSFETs It is this cross pollination between different but related fields that made this conference very special This book which goes beyond the publication of the WOFE Proceedings includes full length invited papers selected at the conference and reviewed by international leaders The book is divided into four distinct sections with the common denominator throughout being the nano device present under various metamorphoses in the wide CMOS and optoelectronics arena a

Radiation Effects And Soft Errors In Integrated Circuits And Electronic Devices Book Review: Unveiling the Magic of Language

In an electronic digital era where connections and knowledge reign supreme, the enchanting power of language has are more apparent than ever. Its power to stir emotions, provoke thought, and instigate transformation is truly remarkable. This extraordinary book, aptly titled "**Radiation Effects And Soft Errors In Integrated Circuits And Electronic Devices**," written by a very acclaimed author, immerses readers in a captivating exploration of the significance of language and its profound affect our existence. Throughout this critique, we shall delve in to the book is central themes, evaluate its unique writing style, and assess its overall influence on its readership.

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