

# Semiconductor Memories

Technology, Testing,  
and Reliability

*ASHOK K. SHARMA*

# Semiconductor Memories Technology Testing And Reliability

**Denis Flandre,Alexei N. Nazarov,Peter  
L.F. Hemment**



## **Semiconductor Memories Technology Testing And Reliability:**

**Semiconductor Memories** Ashok K. Sharma, 2002-09-10 *Semiconductor Memories* provides in depth coverage in the areas of design for testing fault tolerance failure modes and mechanisms and screening and qualification methods including Memory cell structures and fabrication technologies Application specific memories and architectures Memory design fault modeling and test algorithms limitations and trade offs Space environment radiation hardening process and design techniques and radiation testing Memory stacks and multichip modules for gigabyte storage

**Semiconductor Memories** Ashok K. Sharma, 1997

**Advanced Semiconductor Memories** Ashok K. Sharma, 2003 A valuable reference for the most vital microelectronic components in the marketplace DRAMs are the technology drivers of high volume semiconductor fabrication processes for new generation products that in addition to computer markets are finding increased usage in automotive aviation military and space telecommunications and wireless industries A new generation of high density and high performance memory architectures evolving for mass storage devices including embedded memories and nonvolatile flash memories are serving a diverse range of applications Comprehensive and up to date *Advanced Semiconductor Memories Architectures Designs and Applications* offers professionals in the semiconductor and related industries an in depth review of advanced semiconductor memories technology developments It provides details on Static Random Access Memory technologies including advanced architectures low voltage SRAMs fast SRAMs SOI SRAMs and specialty SRAMs multiport FIFOs CAMs High Performance Dynamic Random Access Memory DDRs synchronous DRAM SGRAM features and architectures EDRAM CDRAM Gigabit DRAM scaling issues and architectures multilevel storage DRAMs and SOI DRAMs Applications specific DRAM architectures and designs VRAMs DDR SGRAMs RDRAMs SLDRAMs 3 D RAM Advanced Nonvolatile Memory designs and technologies including floating gate cell theory EEPROM flash memory cell design and multilevel flash FRAMs and reliability issues Embedded memory designs and applications including cache merged processor DRAM architectures memory cards and multimedia applications Future memory directions with megabytes to terabytes storage capacities using RTDs single electron memories etc A continuation of the topics introduced in *Semiconductor Memories Technology Testing and Reliability* the author's earlier work *Advanced Semiconductor Memories Architectures Designs and Applications* offers a much needed reference to the major developments and future directions of advanced semiconductor memory technology

*VLSI Test Principles and Architectures* Laung-Terng Wang, Cheng-Wen Wu, Xiaoqing Wen, 2006-08-14 This book is a comprehensive guide to new DFT methods that will show the readers how to design a testable and quality product drive down test cost improve product quality and yield and speed up time to market and time to volume Most up to date coverage of design for testability Coverage of industry practices commonly found in commercial DFT tools but not discussed in other books Numerous practical examples in each chapter illustrating basic VLSI test principles and DFT architectures

*Memory, Microprocessor, and ASIC* Wai-Kai Chen, 2003-03-26 Timing memory power dissipation testing

and testability are all crucial elements of VLSI circuit design In this volume culled from the popular VLSI Handbook experts from around the world provide in depth discussions on these and related topics Stacked gate embedded and flash memory all receive detailed treatment including their power cons

**Advanced Test Methods for SRAMs** Alberto Bosio, Luigi Dilillo, Patrick Girard, Serge Pravossoudovitch, Arnaud Virazel, 2009-10-08 Modern electronics depend on nanoscaled technologies that present new challenges in terms of testing and diagnostics Memories are particularly prone to defects since they exploit the technology limits to get the highest density This book is an invaluable guide to the testing and diagnostics of the latest generation of SRAM one of the most widely applied types of memory Classical methods for testing memory are designed to handle the so called static faults but these test solutions are not sufficient for faults that are emerging in the latest Very Deep Sub Micron VDSM technologies These new fault models referred to as dynamic faults are not covered by classical test solutions and require the dedicated test sequences presented in this book

**Science and Technology of Semiconductor-On-Insulator Structures and Devices Operating in a Harsh Environment** Denis Flandre, Alexei N. Nazarov, Peter L.F. Hemment, 2006-05-06 This proceedings volume archives the contributions of the speakers who attended the NATO Advanced Research Workshop on Science and Technology of Semiconductor On Insulator Structures and Devices Operating in a Harsh Environment held at the Sanatorium Puschka Ozerna th th Kyiv Ukraine from 25 to 29 April 2004 The semiconductor industry has maintained a very rapid growth during the last three decades through impressive technological achievements which have resulted in products with higher performance and lower cost per function After many years of development semiconductor on insulator materials have entered volume production and will increasingly be used by the manufacturing industry The wider use of semiconductor especially silicon on insulator materials will not only enable the benefits of these materials to be further demonstrated but also will drive down the cost of substrates which in turn will stimulate the development of other novel devices and applications In itself this trend will encourage the promotion of the skills and ideas generated by researchers in the Former Soviet Union and Eastern Europe and their incorporation in future collaborations

**Principles of Testing Electronic Systems** Samiha Mourad, Yervant Zorian, 2000-07-25 A pragmatic approach to testing electronic systems As we move ahead in the electronic age rapid changes in technology pose an ever increasing number of challenges in testing electronic products Many practicing engineers are involved in this arena but few have a chance to study the field in a systematic way learning takes place on the job By covering the fundamental disciplines in detail Principles of Testing Electronic Systems provides design engineers with the much needed knowledge base Divided into five major parts this highly useful reference relates design and tests to the development of reliable electronic products shows the main vehicles for design verification examines designs that facilitate testing and investigates how testing is applied to random logic memories FPGAs and microprocessors Finally the last part offers coverage of advanced test solutions for today s very deep submicron designs The authors take a phenomenological approach to the subject matter while

providing readers with plenty of opportunities to explore the foundation in detail Special features include An explanation of where a test belongs in the design flow Detailed discussion of scan path and ordering of scan chains BIST solutions for embedded logic and memory blocks Test methodologies for FPGAs A chapter on testing system on a chip Numerous references

**ULSI Process Integration III** Electrochemical Society. Meeting, 2003 **Microelectronics Failure Analysis** EDFAS Desk Reference Committee, 2011 Includes bibliographical references and index **Nonvolatile Memory Technologies with Emphasis on Flash** Joe Brewer, Manzur Gill, 2011-09-23 Presented here is an all inclusive treatment of Flash technology including Flash memory chips Flash embedded in logic binary cell Flash and multilevel cell Flash The book begins with a tutorial of elementary concepts to orient readers who are less familiar with the subject Next it covers all aspects and variations of Flash technology at a mature engineering level basic device structures principles of operation related process technologies circuit design overall design tradeoffs device testing reliability and applications **CMOS**

**Memory Circuits** Tegze P. Haraszti, 2007-05-08 CMOS Memory Circuits is a systematic and comprehensive reference work designed to aid in the understanding of CMOS memory circuits architectures and design techniques CMOS technology is the dominant fabrication method and almost the exclusive choice for semiconductor memory designers Both the quantity and the variety of complementary metal oxide semiconductor CMOS memories are staggering CMOS memories are traded as mass products worldwide and are diversified to satisfy nearly all practical requirements in operational speed power size and environmental tolerance Without the outstanding speed power and packing density characteristics of CMOS memories neither personal computing nor space exploration nor superior defense systems nor many other feats of human ingenuity could be accomplished Electronic systems need continuous improvements in speed performance power consumption packing density size weight and costs These needs continue to spur the rapid advancement of CMOS memory processing and circuit technologies CMOS Memory Circuits is essential for those who intend to 1 understand 2 apply 3 design and 4 develop CMOS memories *Photovoltaic Science and Technology* J. N. Roy, D. N. Bose, 2018-03-09 Discusses the principles of operation of photovoltaic devices their limitations choice of materials and maximum efficiencies Dynamic RAM Muzaffer A.

Siddiqi, 2017-12-19 Because of their widespread use in mainframes PCs and mobile audio and video devices DRAMs are being manufactured in ever increasing volume both in stand alone and in embedded form as part of a system on chip Due to the optimum design of their components access transistor storage capacitor and peripherals DRAMs are the cheapest and densest semiconductor memory currently available As a result most of DRAM structure research and development focuses on the technology used for its constituent components and their interconnections However only a few books are available on semiconductor memories in general and fewer on DRAMs *Dynamic RAM Technology Advancements* provides a holistic view of the DRAM technology with a systematic description of the advancements in the field since the 1970s and an analysis of future challenges Topics Include DRAM cells of all types including planar three dimensional 3 D trench or stacked COB or

CUB vertical and mechanically robust cells using advanced transistors and storage capacitors Advancements in transistor technology for the RCAT SCAT FinFET BT FinFET Saddle and advanced recess type and storage capacitor realizations How sub 100 nm trench DRAM technologies and sub 50 nm stacked DRAM technologies and related topics may lead to new research Various types of leakages and power consumption reduction methods in active and sleep mode Various types of SAs and yield enhancement techniques employing ECC and redundancy A worthwhile addition to semiconductor memory research academicians and researchers interested in the design and optimization of high density and cost efficient DRAMs may also find it useful as part of a graduate level course

*Introduction to Advanced System-on-Chip Test Design and Optimization* Erik Larsson, 2006-03-30 SOC test design and its optimization is the topic of Introduction to Advanced System on Chip Test Design and Optimization It gives an introduction to testing describes the problems related to SOC testing discusses the modeling granularity and the implementation into EDA electronic design automation tools The book is divided into three sections i test concepts ii SOC design for test and iii SOC test applications The first part covers an introduction into test problems including faults fault types design flow design for test techniques such as scan testing and Boundary Scan The second part of the book discusses SOC related problems such as system modeling test conflicts power consumption test access mechanism design test scheduling and defect oriented scheduling Finally the third part focuses on SOC applications such as integrated test scheduling and TAM design defect oriented scheduling and integrating test design with the core selection process

*Microelectronics Failure Analysis*, 2004-01-01 For newcomers cast into the waters to sink or swim as well as seasoned professionals who want authoritative guidance desk side this hefty volume updates the previous 1999 edition It contains the work of expert contributors who rallied to the job in response to a committee s call for help the committee was assigned to the update by the Electron

*Microelectronics Failure Analysis Desk Reference, Seventh Edition* Tejinder Gandhi, 2019-11-01 The Electronic Device Failure Analysis Society proudly announces the Seventh Edition of the Microelectronics Failure Analysis Desk Reference published by ASM International The new edition will help engineers improve their ability to verify isolate uncover and identify the root cause of failures Prepared by a team of experts this updated reference offers the latest information on advanced failure analysis tools and techniques illustrated with numerous real life examples This book is geared to practicing engineers and for studies in the major area of power plant engineering For non metallurgists a chapter has been devoted to the basics of material science metallurgy of steels heat treatment and structure property correlation A chapter on materials for boiler tubes covers composition and application of different grades of steels and high temperature alloys currently in use as boiler tubes and future materials to be used in supercritical ultra supercritical and advanced ultra supercritical thermal power plants A comprehensive discussion on different mechanisms of boiler tube failure is the heart of the book Additional chapters detailing the role of advanced material characterization techniques in failure investigation and the role of water chemistry in tube failures are key contributions to the book

CMOS R. Jacob Baker, 2019-05-16 A revised guide to the theory and implementation of CMOS analog and digital IC design The fourth edition of CMOS Circuit Design Layout and Simulation is an updated guide to the practical design of both analog and digital integrated circuits The author a noted expert on the topic offers a contemporary review of a wide range of analog digital circuit blocks including phase locked loops delta sigma sensing circuits voltage current references op amps the design of data converters and switching power supplies CMOS includes discussions that detail the trade offs and considerations when designing at the transistor level The companion website contains numerous examples for many computer aided design CAD tools Using the website enables readers to recreate modify or simulate the design examples presented throughout the book In addition the author includes hundreds of end of chapter problems to enhance understanding of the content presented This newly revised edition Provides in depth coverage of both analog and digital transistor level design techniques Discusses the design of phase and delay locked loops mixed signal circuits data converters and circuit noise Explores real world process parameters design rules and layout examples Contains a new chapter on Power Electronics Written for students in electrical and computer engineering and professionals in the field the fourth edition of CMOS Circuit Design Layout and Simulation is a practical guide to understanding analog and digital transistor level design theory and techniques

*The VLSI Handbook* Wai-Kai Chen, 2019-07-17 Over the years the fundamentals of VLSI technology have evolved to include a wide range of topics and a broad range of practices To encompass such a vast amount of knowledge The VLSI Handbook focuses on the key concepts models and equations that enable the electrical engineer to analyze design and predict the behavior of very large scale integrated circuits It provides the most up to date information on IC technology you can find Using frequent examples the Handbook stresses the fundamental theory behind professional applications Focusing not only on the traditional design methods it contains all relevant sources of information and tools to assist you in performing your job This includes software databases standards seminars conferences and more The VLSI Handbook answers all your needs in one comprehensive volume at a level that will enlighten and refresh the knowledge of experienced engineers and educate the novice This one source reference keeps you current on new techniques and procedures and serves as a review for standard practice It will be your first choice when looking for a solution

Integrated Circuit Test Engineering Ian A. Grout, 2005-08-22 Using the book and the software provided with it the reader can build his her own tester arrangement to investigate key aspects of analog digital and mixed system circuits Plan of attack based on traditional testing circuit design and circuit manufacture allows the reader to appreciate a testing regime from the point of view of all the participating interests Worked examples based on theoretical bookwork practical experimentation and simulation exercises teach the reader how to test circuits thoroughly and effectively

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