

Radio Frequency Integrated Circuits And Systems

Electronic Integrated Circuits and Systems What Are Integrated Circuits? Integrated Circuits and Semiconductor Devices Silicon Destiny Digital Integrated Circuits Analog Integrated Circuits for Communication System Integration Three-Dimensional Integrated Circuit Design Integrated Circuits and Microprocessors Integrated Circuits and Semiconductor Devices Design of Integrated Circuits for Optical Communications Millimeter-Wave Integrated Circuits Polycrystalline Silicon for Integrated Circuit Applications High Performance Integrated Circuit Design A Library on Basic Electronics: Integrated circuits and computer concepts Integrated Circuits and Semiconductor Devices An Introduction to Digital and Analog Integrated Circuits and Applications Power Integrated Circuits Invention of Integrated Circuits Semiconductors Franklin C. Fitchen Patricia Harris, Ph.D. Gordon J. Deboo Rob Walker John E. Ayers Donald O. Pederson Kurt Hoffmann Vasilis F. Pavlidis R. C. Holland Behzad Razavi Mladen Božanić Ted Kamins Emre Salman Sy Levine Gordon J. Deboo Sanjit Kumar Mitra Paolo Antognetti Arjun N. Saxena Artur Balasinski

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in this volume readers learn that early computers were housed in large rooms and each individual circuit and part was separate from the others today thanks to miniaturization a whole computer system can be integrated or combined on a single chip an x ray of a tablet reveals that most of the case is filled with batteries the actual computer board is much smaller than most people would imagine this book traces the development of integrated circuits and shows what they might make possible in the near future

exponential improvement in functionality and performance of digital integrated circuits has revolutionized the way we live and work the continued scaling down of mos transistors has broadened the scope of use for circuit technology to the point that texts on the topic are generally lacking after a few years the second edition of digital integrated circuits analysis and design focuses on timeless principles with a modern interdisciplinary view that will serve integrated circuits engineers from all disciplines for years to come providing a revised instructional reference for engineers involved with very large scale integrated circuit design and fabrication this book delves into the

dramatic advances in the field including new applications and changes in the physics of operation made possible by relentless miniaturization this book was conceived in the versatile spirit of the field to bridge a void that had existed between books on transistor electronics and those covering vlsi design and fabrication as a separate topic like the first edition this volume is a crucial link for integrated circuit engineers and those studying the field supplying the cross disciplinary connections they require for guidance in more advanced work for pedagogical reasons the author uses spice level 1 computer simulation models but introduces bsim models that are indispensable for vlsi design this enables users to develop a strong and intuitive sense of device and circuit design by drawing direct connections between the hand analysis and the spice models with four new chapters more than 200 new illustrations numerous worked examples case studies and support provided on a dynamic website this text significantly expands concepts presented in the first edition

analog integrated circuits for communication principles simulation and design second edition covers the analysis and design of nonlinear analog integrated circuits that form the basis of present day communication systems both bipolar and mos transistor circuits are analyzed and several numerical examples are used to illustrate the analysis and design techniques developed in this book especially unique to this work is the tight coupling between the first order circuit analysis and circuit simulation results extensive use has been made of the public domain circuit simulator spice to verify the results of first order analyses and for detailed simulations with complex device models highlights of the new edition include a new introductory chapter that provides a brief review of communication systems transistor models and distortion generation and simulation addition of new material on mosfet mixers compression and intercept points matching networks revisions of text and explanations where necessary to reflect the new organization of the book spice input files for all the circuit examples that are available to the reader from a website problem sets at the end of each chapter to reinforce and apply the subject matter an instructors solutions manual is available on the book's webpage at springer.com analog integrated circuits for communication principles simulation and design second edition is for readers who have completed an introductory course in analog circuits and are familiar with basic analysis techniques as well as with the operating principles of semiconductor devices this book also serves as a useful reference for practicing engineers

the development of large scale integrated systems on a chip has had a dramatic effect on circuit design methodology recent years have seen an escalation of interest in systems level integration system on a chip and the development of low power high chip density circuits and systems kurt hoffmann sets out to address a wide range of issues relating to the design and integration of integrated circuit components and provides readers with the methodology by which simple equations for the estimation of transistor geometries and circuit behaviour can be deduced the broad coverage of this unique book ranges from field effect transistor design mos transistor modelling and the fundamentals of digital cmos circuit design through to mos memory architecture and design highlights the increasing requirement for information on system on a chip design and integration combines coverage of semiconductor physics digital vlsi design and analog integrated circuits in one volume for the first time written with the aim of bridging the gap between semiconductor device physics and practical circuit design introduces the basic behaviour of semiconductor components for ics and covers the design of both digital and analog circuits in cmos and bicmos technologies broad coverage will appeal to both students and practising engineers alike written by a respected expert in the field with a proven track record of publications in this field drawing upon considerable

experience within both industry and academia hoffmann's outstanding text will prove an invaluable resource for designers practising engineers in the semiconductor device field and electronics systems industry as well as postgraduate students of microelectronics electrical and computer engineering

three dimensional integrated circuit design second edition expands the original with more than twice as much new content adding the latest developments in circuit models temperature considerations power management memory issues and heterogeneous integration 3 d ic experts pavlidis savidis and friedman cover the full product development cycle throughout the book emphasizing not only physical design but also algorithms and system level considerations to increase speed while conserving energy a handy comprehensive reference or a practical design guide this book provides effective solutions to specific challenging problems concerning the design of three dimensional integrated circuits expanded with new chapters and updates throughout based on the latest research in 3 d integration manufacturing techniques for 3 d ics with tsvs electrical modeling and closed form expressions of through silicon vias substrate noise coupling in heterogeneous 3 d ics design of 3 d ics with inductive links synchronization in 3 d ics variation effects on 3 d ics correlation of width variations for intra tier buffers and wires offers practical guidance on designing 3 d heterogeneous systems provides power delivery of 3 d ics demonstrates the use of 3 d ics within heterogeneous systems that include a variety of materials devices processors gpu cpu integration and more provides experimental case studies in power delivery synchronization and thermal characterization

describes the complete range of commonly applied modern electronic circuit building blocks covering all three main categories of integrated circuit digital circuits analogue circuits and microprocessors and their support chips and including a rigorous analysis of fault finding procedures on modern electronic systems supplemented by exercises with answers useful appendices and a glossary of commonly used terms the work assembles all the information necessary to give electronics engineers and students a reference for all types of circuit the text supports the principal electronics and microcomputer elements in all electronics courses

the only book on integrated circuits for optical communications that fully covers high speed ios pll's cdrs and transceiver design including optical communication the increasing demand for high speed transport of data has revitalized optical communications leading to extensive work on high speed device and circuit design with the proliferation of the internet and the rise in the speed of microprocessors and memories the transport of data continues to be the bottleneck motivating work on faster communication channels design of integrated circuits for optical communications second edition deals with the design of high speed integrated circuits for optical communication transceivers building upon a detailed understanding of optical devices the book describes the analysis and design of critical building blocks such as transimpedance and limiting amplifiers laser drivers phase locked loops oscillators clock and data recovery circuits and multiplexers the second edition of this bestselling textbook has been fully updated with a tutorial treatment of broadband circuits for both students and engineers new and unique information dealing with clock and data recovery circuits and multiplexers a chapter dedicated to burst mode optical communications a detailed study of new circuit developments for optical transceivers an examination of recent implementations in cmos technology this text is ideal for senior graduate students and engineers involved in high speed circuit design for optical communications as well as the more general field of wireline communications

this peer reviewed book explores the methodologies that are used for effective research design and innovation in the vast field of millimeter wave circuits and describes how these have to be modified to fit the uniqueness of high frequency nanoelectronics design each chapter focuses on a specific research challenge related to either small form factors or higher operating frequencies the book first examines nanodevice scaling and the emerging electronic design automation tools that can be used in millimeter wave research as well as the singular challenges of combining deep submicron and millimeter wave design it also demonstrates the importance of considering in the millimeter wave context system level design leading to differing packaging options further it presents integrated circuit design methodologies for all major transceiver blocks typically employed at millimeter wave frequencies as these methodologies are normally fundamentally different from the traditional design methodologies used in analogue and lower frequency electronics lastly the book discusses the methodologies of millimeter wave research and design for extreme or harsh environments rebooting electronics the additional opportunities for terahertz research and the main differences between the approaches taken in millimeter wave research and terahertz research

recent years have seen silicon integrated circuits enter into an increasing number of technical and consumer applications until they now affect everyday life as well as technical areas polycrystalline silicon has been an important component of silicon technology for nearly two decades being used first in mos integrated circuits and now becoming pervasive in bipolar circuits as well during this time a great deal of information has been published about polysilicon a wide range of deposition conditions has been used to form films exhibiting markedly different properties seemingly contradictory results can often be explained by considering the details of the structure formed this monograph is an attempt to synthesize much of the available knowledge about polysilicon it represents an effort to interrelate the deposition properties and applications of polysilicon so that it can be used most effectively to enhance device and integrated circuit performance as device performance improves however some of the properties of polysilicon are beginning to restrict the overall performance of integrated circuits and the basic limitations of the properties of polysilicon also need to be better understood to minimize potential degradation of circuit behavior

the latest techniques for designing robust high performance integrated circuits in nanoscale technologies focusing on a new technological paradigm this practical guide describes the interconnect centric design methodologies that are now the major focus of nanoscale integrated circuits high performance integrated circuit design begins by discussing the dominant role of on chip interconnects and provides an overview of technology scaling the book goes on to cover data signaling power management synchronization and substrate aware design specific design constraints and methodologies unique to each type of interconnect are addressed this comprehensive volume also explains the design of specialized circuits such as tapered buffers and repeaters for data signaling voltage regulators for power management and phase locked loops for synchronization this is an invaluable resource for students researchers and engineers working in the area of high performance ics coverage includes technology scaling interconnect modeling and extraction signal propagation and delay analysis interconnect coupling noise global signaling power generation power distribution networks cad of power networks techniques to reduce power supply noise power dissipation synchronization theory and tradeoffs synchronous system characteristics on chip clock generation and distribution substrate noise in mixed signal ics techniques to reduce substrate noise

this book is the first to give an authoritative and comprehensive account of the invention of integrated circuits ics from an insider who had participated and contributed from the beginning of their invention and advancement to the ultra large scale ics ulsics of today it reads like a mystery novel to engross the reader but it is not based on fiction it gives documented facts of the invention of ics analyzes the patents and highlights additional details and clarifications of their history in addition the book clarifies the nobel prize award and raises intriguing questions which as yet remain unanswered even after about half a century since the ics were invented this is the invention which has revolutionized the whole world forever

because of the continuous evolution of integrated circuit manufacturing icm and design for manufacturability dfm most books on the subject are obsolete before they even go to press that s why the field requires a reference that takes the focus off of numbers and concentrates more on larger economic concepts than on technical details semiconductors integrated circuit design for manufacturability covers the gradual evolution of integrated circuit design icd as a basis to propose strategies for improving return on investment roi for icd in manufacturing where most books put the spotlight on detailed engineering enhancements and their implications for device functionality in contrast this one offers among other things crucial valuable historical background and roadmapping all illustrated with examples presents actual test cases that illustrate product challenges examine possible solution strategies and demonstrate how to select and implement the right one this book shows that dfm is a powerful generic engineering concept with potential extending beyond its usual application in automated layout enhancements centered on proximity correction and pattern density this material explores the concept of icd for production by breaking down its major steps product definition design layout and manufacturing averting extended discussion of technology techniques or specific device dimensions the author also avoids the clumsy chapter architecture that can hinder other books on this subject the result is an extremely functional systematic presentation that simplifies existing approaches to dfm outlining a clear set of criteria to help readers assess reliability functionality and yield with careful consideration of the economic and technical trade offs involved in icd for manufacturing this reference addresses techniques for physical electrical and logical design keeping coverage fresh and concise for the designers manufacturers and researchers defining product architecture and research programs

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