

by inspection and building students' design intuition, and it incorporates a host of new pedagogical features that make it easier to teach and learn from, including: application sidebars, self-check problems with answers, simulation problems with SPICE and MULTISIM, and an expanded problem set that is organized by degree of difficulty and more clearly associated with specific chapter sections. **RF Microelectronics** Prentice Hall The Acclaimed RF Microelectronics Best-Seller, Expanded and Updated for the Newest Architectures, Circuits, and Devices Wireless communication has become almost as ubiquitous as electricity, but RF design continues to challenge engineers and researchers. In the 15 years since the first edition of this classic text, the demand for higher performance has led to an explosive growth of RF design techniques. In *RF Microelectronics, Second Edition*, Behzad Razavi systematically teaches the fundamentals as well as the state-of-the-art developments in the analysis and design of RF circuits and transceivers. Razavi has written the second edition to reflect today's RF microelectronics, covering key topics in far greater detail. At nearly three times the length of the first edition, the second edition is an indispensable tome for both students and practicing engineers. With his lucid prose, Razavi now Offers a stronger tutorial focus along with hundreds of examples and problems Teaches design as well as analysis with the aid of step-by-step design procedures and a chapter dedicated to the design of a dual-band WiFi transceiver Describes new design paradigms and analysis techniques for circuits such as low-noise amplifiers, mixers, oscillators, and frequency dividers This edition's extensive coverage includes brand new chapters on mixers, passive devices, integer-N synthesizers, and fractional-N synthesizers. Razavi's teachings culminate in a new chapter that begins with WiFi's radio specifications and, step by step, designs the transceiver at the transistor level. Coverage includes Core RF principles, including noise and nonlinearity, with ties to analog design, microwave theory, and communication systems An intuitive treatment of modulation theory and wireless standards from the standpoint of the RF IC designer Transceiver architectures such as heterodyne, sliding-IF, directconversion, image-reject, and low-IF topologies. Low-noise amplifiers, including cascode common-gate and commonsource topologies, noise-cancelling schemes, and reactance-cancelling configurations Passive and active mixers, including their gain and noise analysis and new mixer topologies Voltage-controlled oscillators, phase noise mechanisms, and various VCO topologies dealing with noise-power-tuning trade-offs All-new coverage of passive devices, such as integrated inductors, MOS varactors, and transformers A chapter on the analysis and design of phase-locked loops with emphasis on low phase noise and low spur levels Two chapters on integer-N and fractional-N synthesizers, including the design of frequency dividers Power amplifier principles and circuit topologies along with transmitter architectures, such as polar modulation and outphasing **Op Amps for Everyone Design Reference** Newnes The operational amplifier ("op amp") is the most versatile and widely used type of analog IC, used in audio and voltage amplifiers, signal conditioners, signal converters, oscillators, and analog computing systems. Almost every electronic device uses at least one op amp. This book is Texas Instruments' complete professional-level tutorial and reference to operational amplifier theory and applications. Among the topics covered are basic op amp physics (including reviews of current and voltage division, Thevenin's theorem, and transistor models), idealized op amp operation and configuration, feedback theory and methods, single and dual supply operation, understanding op amp parameters, minimizing noise in op amp circuits, and practical applications such as instrumentation amplifiers, signal conditioning, oscillators, active filters, load and level conversions, and analog computing. There is also extensive coverage of circuit construction techniques, including circuit board design, grounding, input and output isolation, using decoupling capacitors, and frequency characteristics of passive components. The material in this book is applicable to all op amp ICs from all manufacturers, not just TI. Unlike textbook treatments of op amp theory that tend to focus on idealized op amp models and configuration, this title uses idealized models only when necessary to explain op amp theory. The bulk of this book is on real-world op amps and their applications; considerations such as thermal effects, circuit noise, circuit buffering, selection of appropriate op amps for a given application, and unexpected effects in passive components are all discussed in detail. *Published in conjunction with Texas Instruments *A single volume, professional-level guide to op amp theory and applications *Covers circuit board layout techniques for manufacturing op amp circuits. **Advances in Monolithic Microwave Integrated Circuits for Wireless Systems: Modeling and Design Technologies Modeling and Design Technologies** IGI Global Monolithic Microwave Integrated Circuit (MMIC) is an electronic device that is widely used in all high frequency wireless systems. In developing MMIC as a product, understanding analysis and design techniques, modeling, measurement methodology, and current trends are essential. *Advances in Monolithic Microwave Integrated Circuits for Wireless Systems: Modeling and Design Technologies* is a central source of knowledge on MMIC development, containing research on theory, design, and practical approaches to integrated circuit devices. This book is of interest to researchers in industry and academia working in the areas of circuit design, integrated circuits, and RF and microwave, as well as anyone with an interest in monolithic wireless device development. **Radio Frequency Integrated Circuit Design** Artech House This newly revised and expanded edition of the 2003 Artech House classic, *Radio Frequency Integrated Circuit Design*, serves as an up-to-date, practical reference for complete RFIC know-how. The second edition includes numerous updates, including greater coverage of CMOS PA design, RFIC design with on-chip components, and more worked examples with simulation results. By emphasizing working designs, this book practically transports you into the authors' own RFIC lab so you can fully understand the function of each design detailed in this book. Among the RFIC designs examined are RF integrated LC-based filters, VCO automatic amplitude control loops, and fully integrated transformer-based circuits, as well as image reject mixers and power amplifiers. If you are new to RFIC design, you can benefit from the introduction to basic theory so you can quickly come up to speed on how RFICs perform and work together in a communications device. A thorough examination of RFIC technology guides you in knowing when RFICs are the right choice for designing a communication device. This leading-edge resource is packed with over 1,000 equations and more than 435 illustrations that support key topics." **Design of Analog Integrated Circuits and Systems** McGraw-Hill Science, Engineering & Mathematics It follows with a thorough treatment of design operational and operational transconductance amplifiers, and concludes with a unified presentation of sample-data and continuous-time signal processing systems. **Modern Communications Receiver Design and Technology** Artech House This comprehensive sourcebook thoroughly explores the state-of-the-art in communications receivers, providing detailed practical guidance for constructing an actual high dynamic range receiver from system design to packaging. You also find clear explanations of the technical underpinnings that you need to understand for your work in the field . This cutting-edge reference presents the latest information on modern superheterodyne receivers, dynamic range, mixers, oscillators, complex coherent

synthesizers, automatic gain control, DSP and software radios. You find in-depth discussions on system design, including coverage of all pertinent data and tools. Moreover, the book offers you a solid understanding of packaging and mechanical considerations, as well as a look at tomorrow's receiver technology, including new Bragg-cell applications for ultra-wideband electronic warfare receivers. This one-stop resource is packed with over 300 illustrations that support critical topics throughout." **Analog Integrated Circuits for Communication Principles, Simulation and Design** Springer Science & Business Media 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. **CMOS Analog Design Using All-Region MOSFET Modeling** Cambridge University Press The essentials of analog circuit design with a unique all-region MOSFET modeling approach. **CMOS Circuit Design, Layout, and Simulation** John Wiley & Sons Praise for CMOS: Circuit Design, Layout, and Simulation Revised Second Edition from the Technical Reviewers "A refreshing industrial flavor. Design concepts are presented as they are needed for 'just-in-time' learning. Simulating and designing circuits using SPICE is emphasized with literally hundreds of examples. Very few textbooks contain as much detail as this one. Highly recommended!" --Paul M. Furth, New Mexico State University "This book builds a solid knowledge of CMOS circuit design from the ground up. With coverage of process integration, layout, analog and digital models, noise mechanisms, memory circuits, references, amplifiers, PLLs/DLLs, dynamic circuits, and data converters, the text is an excellent reference for both experienced and novice designers alike." --Tyler J. Gomm, Design Engineer, Micron Technology, Inc. "The Second Edition builds upon the success of the first with new chapters that cover additional material such as oversampled converters and non-volatile memories. This is becoming the de facto standard textbook to have on every analog and mixed-signal designer's bookshelf." --Joe Walsh, Design Engineer, AMI Semiconductor CMOS circuits from design to implementation CMOS: Circuit Design, Layout, and Simulation, Revised Second Edition covers the practical design of both analog and digital integrated circuits, offering a vital, contemporary view of a wide range of analog/digital circuit blocks, the BSIM model, data converter architectures, and much more. This edition takes a two-path approach to the topics: design techniques are developed for both long- and short-channel CMOS technologies and then compared. The results are multidimensional explanations that allow readers to gain deep insight into the design process. Features include: Updated materials to reflect CMOS technology's movement into nanometer sizes Discussions on phase- and delay-locked loops, mixed-signal circuits, data converters, and circuit noise More than 1,000 figures, 200 examples, and over 500 end-of-chapter problems In-depth coverage of both analog and digital circuit-level design techniques Real-world process parameters and design rules The book's Web site, CMOSedu.com, provides: solutions to the book's problems; additional homework problems without solutions; SPICE simulation examples using HSPICE, LTspice, and WinSpice; layout tools and examples for actually fabricating a chip; and videos to aid learning **Quadrature RC-Oscillators The van der Pol Approach** Springer This book presents a tutorial review of van der Pol model, a universal oscillator model for the analysis of modern RC-oscillators in weak and strong nonlinear regimes. A detailed analysis of the injection locking in van der Pol oscillators is also presented. The relation between the van der Pol parameters and several circuit implementations in CMOS nanotechnology is given, showing that this theory is very useful in the optimization of oscillator key parameters, such as: frequency, amplitude and phase relationship. The authors discuss three different examples: active coupling RC-oscillators, capacitive coupling RC-oscillators, and two-integrator oscillator working in the sinusoidal regime. · Provides a detailed tutorial on the van der Pol oscillator model, which can be the basis for the analysis of modern RC-oscillators in weak and strong nonlinear regimes; · Demonstrations the relationship between the van der Pol parameters and several circuit implementations in CMOS nanotechnology, showing that this theory is a powerful tool in the optimization of key oscillator parameters; · Provides three circuit prototypes implemented in modern CMOS nanotechnology in the GHz range, with applications in low area, low power, low cost, wireless sensor network (WSN) applications (e.g. IoT, BLE). **ANALYSIS AND DESIGN OF ANALOG INTEGRATED CIRCUITS, 5TH ED, ISV** John Wiley & Sons Market_Desc: Engineers Special Features: " Updates the coverage of bipolar technologies" Enhances the discussion of biCMOS" Provides a more unified treatment of digital and analog circuit design while strengthening the coverage of CMOS" Removes the chapter on non-linear analog circuits" Adds a new operational amplifier example to chapter 11 About The Book: This is the only comprehensive book in the market for engineers that covers CMOS, bipolar technologies, and biCMOS integrated circuits. The fifth edition retains its completeness, updates the coverage of bipolar technologies, and enhances the discussion of biCMOS. It provides a more unified treatment of digital and analog circuit design while strengthening the coverage of CMOS. The chapter on non-linear analog circuits has been removed and chapter 11 has been updated to include an operational amplifier example. With its streamlined and up-to-date coverage, more engineers can turn to this resource to explore key concepts in the field. **Principles of Data Conversion System Design** Wiley-IEEE Press This advanced text and reference covers the design and implementation of integrated circuits for analog-to-digital and digital-to-analog conversion. It begins with basic concepts and systematically leads the reader to advanced topics, describing design issues and techniques at both circuit and system level. Gain a system-level perspective of data conversion units and their trade-offs with this state-of-the-art book. Topics covered include: sampling circuits and architectures, D/A and A/D architectures; comparator and op amp design; calibration techniques; testing and characterization; and more! **Analog IC Reliability in Nanometer CMOS**

Springer Science & Business Media This book focuses on modeling, simulation and analysis of analog circuit aging. First, all important nanometer CMOS physical effects resulting in circuit unreliability are reviewed. Then, transistor aging compact models for circuit simulation are discussed and several methods for efficient circuit reliability simulation are explained and compared. Ultimately, the impact of transistor aging on analog circuits is studied. Aging-resilient and aging-immune circuits are identified and the impact of technology scaling is discussed. The models and simulation techniques described in the book are intended as an aid for device engineers, circuit designers and the EDA community to understand and to mitigate the impact of aging effects on nanometer CMOS ICs. **Integrated Circuit and System Design. Power and Timing Modeling, Optimization and Simulation 16th International Workshop, PATMOS 2006, Montpellier, France, September 13-15, 2006, Proceedings** Springer Science & Business Media **The Design of CMOS Radio-Frequency Integrated Circuits** Cambridge University Press This book, first published in 2004, is an expanded and revised edition of Tom Lee's acclaimed RFIC text. **CMOS Analog and Mixed-Signal Circuit Design Practices and Innovations** CRC Press The purpose of this book is to provide a complete working knowledge of the Complementary Metal-Oxide Semiconductor (CMOS) analog and mixed-signal circuit design, which can be applied for System on Chip (SOC) or Application-Specific Standard Product (ASSP) development. It begins with an introduction to the CMOS analog and mixed-signal circuit design with further coverage of basic devices, such as the Metal-Oxide Semiconductor Field-Effect Transistor (MOSFET) with both long- and short-channel operations, photo devices, fitting ratio, etc. Seven chapters focus on the CMOS analog and mixed-signal circuit design of amplifiers, low power amplifiers, voltage regulator-reference, data converters, dynamic analog circuits, color and image sensors, and peripheral (oscillators and Input/Output [I/O]) circuits, and Integrated Circuit (IC) layout and packaging. Features: Provides practical knowledge of CMOS analog and mixed-signal circuit design Includes recent research in CMOS color and image sensor technology Discusses sub-blocks of typical analog and mixed-signal IC products Illustrates several design examples of analog circuits together with layout Describes integrating based CMOS color circuit **Performance Optimization Techniques in Analog, Mixed-Signal, and Radio-Frequency Circuit Design** IGI Global Improving the performance of existing technologies has always been a focal practice in the development of computational systems. However, as circuitry is becoming more complex, conventional techniques are becoming outdated and new research methodologies are being implemented by designers. Performance Optimization Techniques in Analog, Mixed-Signal, and Radio-Frequency Circuit Design features recent advances in the engineering of integrated systems with prominence placed on methods for maximizing the functionality of these systems. This book emphasizes prospective trends in the field and is an essential reference source for researchers, practitioners, engineers, and technology designers interested in emerging research and techniques in the performance optimization of different circuit designs. **Simulation and Optimization of Digital Circuits Considering and Mitigating Destabilizing Factors** Springer This book describes new, fuzzy logic-based mathematical apparatus, which enable readers to work with continuous variables, while implementing whole circuit simulations with speed, similar to gate-level simulators and accuracy, similar to circuit-level simulators. The author demonstrates newly developed principles of digital integrated circuit simulation and optimization that take into consideration various external and internal destabilizing factors, influencing the operation of digital ICs. The discussion includes factors including radiation, ambient temperature, electromagnetic fields, and climatic conditions, as well as non-ideality of interconnects and power rails. **Radio Frequency Integrated Circuits and Systems** Cambridge University Press Equips students with essential industry-relevant knowledge through in-depth explanations, practical applications, examples, and exercises. **System and Circuit Design for Biologically-Inspired Intelligent Learning** IGI Global "The objective of the book is to introduce and bring together well-known circuit design aspects, as well as to cover up-to-date outcomes of theoretical studies in decision-making, biologically-inspired, and artificial intelligent learning techniques"--Provided by publisher. **Designing Analog Chips** Virtualbookworm Publishing A comprehensive introduction to CMOS and bipolar analog IC design. The book presumes no prior knowledge of linear design, making it comprehensible to engineers with a non-analog back-ground. The emphasis is on practical design, covering the entire field with hundreds of examples to explain the choices. Concepts are presented following the history of their discovery. Content: 1. Devices Semiconductors, The Bipolar Transistor, The Integrated Circuit, Integrated NPN Transistors, The Case of the Lateral PNP Transistor, CMOS Transistors, The Substrate PNP Transistor, Diodes, Zener Diodes, Resistors, Capacitors, CMOS vs. Bipolar; 2. Simulation, DC Analysis, AC Analysis, Transient Analysis, Variations, Models, Diode Model, Bipolar Transistor Model, Model for the Lateral PNP Transistor, MOS Transistor Models, Resistor Models, Models for Capacitors; 3. Current Mirrors; 4. Differential Pairs; 5. Current Sources; 6. Time Out: Analog Measures, dB, RMS, Noise, Fourier Analysis, Distortion, Frequency Compensation; 7. Bandgap References; 8. Op Amps; 9. Comparators; 10. Transimpedance Amplifiers; 11. Timers and Oscillators; 12. Phase-Locked Loops; 13. Filters; 14. Power, Linear Regulators, Low Drop-Out Regulators, Switching Regulators, Linear Power Amplifiers, Switching Power Amplifiers; 15. A to D and D to A, The Delta-Sigma Converter; 16. Odds and Ends, Gilbert Cell, Multipliers, Peak Detectors, Rectifiers and Averaging Circuits, Thermometers, Zero-Crossing Detectors; 17. Layout. **Operational Amplifier Speed and Accuracy Improvement Analog Circuit Design with Structural Methodology** Springer Science & Business Media Operational Amplifier Speed and Accuracy Improvement proposes a new methodology for the design of analog integrated circuits. The usefulness of this methodology is demonstrated through the design of an operational amplifier. This methodology consists of the following iterative steps: description of the circuit functionality at a high level of abstraction using signal flow graphs; equivalent transformations and modifications of the graph to the form where all important parameters are controlled by dedicated feedback loops; and implementation of the structure using a library of elementary cells. Operational Amplifier Speed and Accuracy Improvement shows how to choose structures and design circuits which improve an operational amplifier's important parameters such as speed to power ratio, open loop gain, common-mode voltage rejection ratio, and power supply rejection ratio. The same approach is used to design clamps and limiting circuits which improve the performance of the amplifier outside of its linear operating region, such as slew rate enhancement, output short circuit current limitation, and input overload recovery. **Fundamentals of Layout Design for Electronic Circuits** Springer Nature This book covers the fundamental knowledge of layout design from the ground up, addressing both physical design, as generally applied to digital circuits, and analog layout. Such knowledge provides the critical awareness and insights a layout designer must possess to convert a structural description produced during circuit design into the physical layout used for IC/PCB fabrication. The book introduces the technological know-how to transform silicon into

functional devices, to understand the technology for which a layout is targeted (Chap. 2). Using this core technology knowledge as the foundation, subsequent chapters delve deeper into specific constraints and aspects of physical design, such as interfaces, design rules and libraries (Chap. 3), design flows and models (Chap. 4), design steps (Chap. 5), analog design specifics (Chap. 6), and finally reliability measures (Chap. 7). Besides serving as a textbook for engineering students, this book is a foundational reference for today's circuit designers. **Statistical Performance Modeling and Optimization** Now Publishers Inc Statistical Performance Modeling and Optimization reviews various statistical methodologies that have been recently developed to model, analyze and optimize performance variations at both transistor level and system level in integrated circuit (IC) design. The following topics are discussed in detail: sources of process variations, variation characterization and modeling, Monte Carlo analysis, response surface modeling, statistical timing and leakage analysis, probability distribution extraction, parametric yield estimation and robust IC optimization. These techniques provide the necessary CAD infrastructure that facilitates the bold move from deterministic, corner-based IC design toward statistical and probabilistic design. Statistical Performance Modeling and Optimization reviews and compares different statistical IC analysis and optimization techniques, and analyzes their trade-offs for practical industrial applications. It serves as a valuable reference for researchers, students and CAD practitioners. **Eighth International Work-Conference on Artificial and Natural Neural Networks** Springer Science & Business Media This book constitutes the refereed proceedings of the 8th International Workshop on Artificial Neural Networks, IWANN 2005, held in Vilanova i la Geltrú, Barcelona, Spain in June 2005. The 150 revised papers presented - including the contribution of three invited speakers - were carefully reviewed and selected from 240 submissions for inclusion in the book and address the following topics: mathematical and theoretical methods, evolutionary computation, neurocomputational inspired models, learning and adaptation, radial basic functions structures, self-organizing networks and methods, support vector machines, cellular neural networks, hybrid systems, neuroengineering and hardware implementations, pattern recognition, perception and robotics and applications in a broad variety of fields. **Noise Analysis of Radio Frequency Circuits** Springer Science & Business Media Predicting noise in RF systems at the design stage is extremely important. This book concentrates on developing noise simulation techniques for RF circuits. The authors present a novel approach of performing noise analysis for RF circuits. **Microelectronics Circuit Analysis and Design** This junior level electronics text provides a foundation for analyzing and designing analog and digital electronics throughout the book. Extensive pedagogical features including numerous design examples, problem solving technique sections, Test Your Understanding questions, and chapter checkpoints lend to this classic text. The author, Don Neamen, has many years experience as an Engineering Educator. His experience shines through each chapter of the book, rich with realistic examples and practical rules of thumb. The Third Edition continues to offer the same hallmark features that made the previous editions such a success. Extensive Pedagogy: A short introduction at the beginning of each chapter links the new chapter to the material presented in previous chapters. The objectives of the chapter are then presented in the Preview section and then are listed in bullet form for easy reference. Test Your Understanding Exercise Problems with provided answers have all been updated. Design Applications are included at the end of chapters. A specific electronic design related to that chapter is presented. The various stages in the design of an electronic thermometer are explained throughout the text. Specific Design Problems and Examples are highlighted throughout as well.