Advances In Analog And Rf Ic Design For Wireless Communication Systems

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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.

Linear CMOS RF Power Amplifiers for Wireless Applications Paulo Augusto Dal Fabbro 2010-06-22 Advances in electronics have pushed mankind to create devices, ranging from - credible gadgets to medical equipment to spacecraft instruments. More than that, modern society is getting used to—if not dependent on—the comfort, solutions, and astonishing amount of information brought by these devices. One ?eld that has continuously bene?tted from those advances is the radio frequency integrated c- cuit (RFIC) design, which in its turn has promoted countless bene?ts to the mankind as a payback. Wireless communications is one prominent example of what the - vances in electronics have enabled and their consequences to our daily life. How could anyone back in the eighties think of the possibilities opened by the wireless local area networks (WLANs) that can be found today in a host of places, such as public libraries, coffee shops, trains, to name just a few? How can a youngster, who lives this true WLAN experience nowadays, imagine a world without it? This book dealswith the design oflinearCMOS RF PowerAmpli?ers(PAs). The RF PA is a very important part of the RF transceiver, the device that enables wireless communications. Two important aspects that are key to keep the advances in RF PA design at an accelerate pace are treated: ef?ciency enhancement and frequen- tunable capability. For this purpose, the design of two different integrated circuits realizedina0. 11µmtechnologyispresented,eachoneaddressingadifferentaspect. With respect to ef?ciency enhancement, the design of a dynamic supply RF power ampli?er is treated, making up the material of Chaps. 2 to 4.

EDA for IC Implementation, Circuit Design, and Process Technology Luciano Lavagno 2018-10-03 Presenting a comprehensive overview of the design automation algorithms, tools, and methodologies used to design integrated circuits, the Electronic Design Automation for Integrated Circuits Handbook is available in two volumes. The second volume, EDA for IC Implementation, Circuit Design, and Process Technology, thoroughly examines real-time logic to GDSII (a file format used to transfer data of semiconductor physical layout), analog/mixed signal design, physical verification, and technology CAD (TCAD). Chapters contributed by leading experts authoritatively discuss design for manufacturability at the nanoscale, power supply network design and analysis, design modeling, and much more. Save on the complete set.

Hybrid ADCs, Smart Sensors for the IoT, and Sub-1V & Advanced Node Analog Circuit Design Pieter Harpe 2017-09-18 This book is based on the 18 tutorials presented during the 26th workshop on Advances in Analog Circuit Design. Expert designers present readers with information about a variety of topics at the frontier of analog circuit design, with specific contributions focusing on hybrid ADCs, smart sensors for the IoT, sub-1V and advanced-node analog circuit design. This book serves as a valuable reference to the state-of-the-art, for anyone involved in analog circuit research and development.

Advanced Methodologies and Technologies in Digital Marketing and Entrepreneurship Khosrow-Pour, D.B.A., Mehdi 2018-11-09 As businesses aim to compete internationally, they must be apprised of new methods and technologies to improve their digital marketing strategy in order to remain ahead of their competition. Trends in entrepreneurship that drive consumer engagement and business initiatives, such as social media marketing, yields customer retention and positive feedback. Advanced Methodologies and Technologies in Digital Marketing and Entrepreneurship provides information on emerging trends in business innovation, entrepreneurship, and marketing strategies. While highlighting challenges such as successful social media interactions and consumer engagement, this book explores valuable information within various business environments and industries such as e-commerce, small and medium enterprises, hospitality and tourism management, and customer relationship management. This book is an ideal source for students, marketers, social media marketers, business managers, public relations professionals, promotional coordinators, economists, hospitality industry professionals, entrepreneurs, and researchers looking for relevant information on new methods in digital marketing and entrepreneurship.

Yield-Aware Analog IC Design and Optimization in Nanometer-scale Technologies António Manuel Lourenço Canelas 2020-03-20 This book presents a new methodology with reduced time impact to address the problem of analog integrated circuit (IC) yield estimation by means of Monte Carlo (MC) analysis, inside an optimization loop of a population-based algorithm. The low time impact on the overall optimization processes enables IC designers to perform yield optimization with the most accurate yield estimation method, MC simulations using foundry statistical device models considering local and global variations. The methodology described by the authors delivers on average a reduction of 89% in the total number of MC simulations, when compared to the exhaustive MC analysis over the full population. In addition to describing a newly developed yield estimation technique, the authors also provide detailed background on automatic analog IC sizing and optimization.

On-Chip ESD Protection for Integrated Circuits Albert Z.H. Wang 2006-04-18 This comprehensive and insightful book discusses ESD protection circuit design problems from an IC designer's perspective. On-Chip ESD Protection for Integrated Circuits: An IC Design Perspective provides both fundamental and advanced materials needed by a circuit designer for designing ESD protection circuits, including: Testing models and standards adopted by U.S. Department of Defense, EIA/JEDEC, ESD Association, Automotive Electronics Council, International Electrotechnical Commission, etc. ESD failure analysis, protection devices, and protection of sub-circuits Whole-chip ESD protection and ESD-to-circuit interactions Advanced low-parasitic compact ESD protection structures for RF and mixed-signal IC's Mixed-mode ESD simulation-design methodologies for design prediction ESD-to-circuit interactions, and more! Many real world ESD protection circuit design examples are provided. The book can be used as a reference book for working IC designers and as a textbook for students in the IC design field.

Advances in Analog and RF IC Design for Wireless Communication Systems William Redman-White 2013-05-13 Mixers are a vital part of any transceiver architecture, and their performance is critical to achieving overall specifications. Although the basic operation is, in principle, a

simple multiplication, in reality the circuit level implementation must be tailored to the specific function in the signal chain, and the technology being used. Starting from some of the basic principles, this chapter aims to identify the physical origins of noise and linearity issues, and lay out the design constraints and choices for the mixer function in a modern fully integrated transceiver. With the current prevalence of CMOS, passive mixers are examined as well as the classical current steering active type and their suitability in receive and transmit functions is considered. Enhanced passive and active mixers are also examined, exploiting the I and Q signal path available in complex receiver architectures.

MOSFET Modeling & BSIM3 User's Guide Yuhua Cheng 2007-05-08 Circuit simulation is essential in integrated circuit design, and the accuracy of circuit simulation depends on the accuracy of the transistor model. BSIM3v3 (BSIM for Berkeley Short-channel IGFET Model) has been selected as the first MOSFET model for standardization by the Compact Model Council, a consortium of leading companies in semiconductor and design tools. In the next few years, many fabless and integrated semiconductor companies are expected to switch from dozens of other MOSFET models to BSIM3. This will require many device engineers and most circuit designers to learn the basics of BSIM3. MOSFET Modeling & BSIM3 User's Guide explains the detailed physical effects that are important in modeling MOSFETs, and presents the derivations of compact model expressions so that users can understand the physical meaning of the model equations and parameters. It is the first book devoted to BSIM3. It treats the BSIM3 model in detail as used in digital, analog and RF circuit design. It covers the complete set of models, i.e., I-V model, capacitance model, noise model, parasitics model, substrate current model, temperature effect model and non quasi-static model. MOSFET Modeling & BSIM3 User's Guide not only addresses the device modeling issues but also provides a user's guide to the device or circuit design engineers who use the BSIM3 model in digital/analog circuit design, RF modeling, statistical modeling, and technology prediction. This book is written for circuit designers and device engineers, as well as device scientists worldwide. It is also suitable as a reference for graduate courses and courses in circuit design or device modelling. Furthermore, it can be used as a textbook for industry courses devoted to BSIM3. MOSFET Modeling & BSIM3 User's Guide is comprehensive and practical. It is balanced between the background information and advanced discussion of BSIM3. It is helpful to experts and students alike.

Advances in Analog and RF IC Design for Wireless Communication Systems Gil Engel 2013-05-13 This chapter discusses the practical application of RF digital-to-analog converters (RF DACs) to communication systems such as cable distribution, wireless communications infrastructure (WIFR) base stations, wireless backhaul, and other such systems. The key specifications that are driving the development of RF DAC technology are reviewed, as are some common radio architectures used to implement those systems. Challenges associated with the design of RF DACs are described, and some trade-offs and possible solutions are discussed. Design considerations of the package and the printed circuit board (PCB) design are reviewed. Measured results of an RF DAC suitable for cable head-end transmitters are presented. The features and performance of RF DACs provide an enabling solution for "Software Defined Radio" (SDR) systems targeted toward multi-carrier, multi-band, multi-standard radio transmitters.

Advances in Analog and RF IC Design for Wireless Communication Systems Michael H. Perrott 2013-05-13 Time-to-digital converter (TDC) circuits are a key component for achieving high-performance digital phase-locked loops (PLLs) which offer lower area and greater flexibility than their analog PLL counterparts. This chapter focuses on a recently developed TDC architecture known as the gated ring oscillator (GRO) which offers first-order shaping of its quantization noise and delay stage mismatch. To provide context for the GRO discussion, background on general TDC implementation techniques is described along with key performance issues related to digital frequency synthesizers. The GRO concept is then presented, followed by implementation details and measured results. Finally, recent variations on the GRO concept are described such as a MASH TDC structure which achieves higher-order noise shaping and a switched ring oscillator (SRO) TDC which improves robustness to dead zones encountered by the GRO TDC.

RF Analog Impairments Modeling for Communication Systems Simulation Lydi Smaini 2012-09-04 With the growing complexity of personal mobile communication systems demanding higher data-rates and high levels of integration using low-cost CMOS technology, overall system performance has become more sensitive to RF analog front-end impairments. Designing integrated transceivers requires a thorough understanding of the whole transceiver chain including RF analog front-end and digital baseband. Communication system engineers have to include RF analog imperfections in their simulation benches in order to study and quantify their impact on the system performance. Here the author explores key RF analog impairments in a transceiver and demonstrates how to model their impact from a communication system design view-point. He discusses the design aspects of the front end of transceivers (both receivers and transmitters) and provides the reader with a way to optimize a complex mixed-signal platform by taking into account the characteristics of the RF/analog front-end. Key features of this book include: Practical examples illustrated by system simulation results based on WiFi and mobile WiMAX OFDM transceivers An overview of the digital estimation and compensation of the RF analog impairments such as power amplifier distortion, quadrature imbalance, and carrier and sampling frequency offsets An exposition of the challenges involved in the design of both RF analog circuits and DSP communication circuits in deep submicron CMOS technology MATLAB® codes for RF analog impairments models hosted on the companion website Uniquely the book bridges the gap between RFIC design specification needs and communication systems simulation, offering readers RF analog impairments modeling knowledge and a comprehensive approach to unifying theory and practice in system modelling. It is of great value to communication systems and DSP engineers and graduate students who design communication processing engines, RF/analog systems and IC design engineers involved in the design of communication platforms.

Advances in Analog and RF IC Design for Wireless Communication Systems Domine Leenaerts 2013-05-13 Radios for cellular wireless infrastructure require low-noise amplifiers (LNAs) with very demanding requirements on noise and linearity performance. So far these amplifiers have been realized in III-V technologies, but for various reasons silicon-based LNAs are needed too. This chapter will explain the challenges in LNA design for this application field.

Advances in Analog and RF IC Design for Wireless Communication Systems Hooman Darabi 2013-05-13 This chapter offers a system-level analysis of advanced RF transceivers intended for use in wireless and particularly mobile applications. An overview of RF cellular standards is presented, followed by a discussion of various radio architectures. The key radio requirements are derived, and translated to circuit specs, giving an overview of a practical top-down radio design. Several radio non-idealities resulting from RF CMOS shortcomings are discussed, and various architectural and calibration techniques are introduced to overcome those. We will also cover more advanced topics such as handset calibration, the evolution to broadband, RF diversity, and next-generation mobile standards and their requirements.

Portable Electronics: World Class Designs John Donovan 2009-03-12 All the design and development inspiration and direction an electronics engineer needs in one blockbuster book! John Donovan, Editor-in Chief, Portable Design has selected the very best electronic design material from the Newnes portfolio and has compiled it into this volume. The result is a book covering the gamut of electronic design from design fundamentals to low-power approaches with a strong pragmatic emphasis. In addition to specific design techniques and practices, this book also discusses various approaches to solving electronic design problems and how to successfully apply theory to actual design tasks. The material has been selected for its timelessness as well as for its relevance to contemporary electronic design issues. Contents: Chapter 1 System Resource Partitioning and Code Optimization Chapter 2 Low Power Design Techniques, Design Methodology, and Tools Chapter 3 System-Level Approach to Energy Conservation Chapter 4 Radio Communication Basics Chapter 5 Applications and Technologies Chapter 6 RF Design Tools Chapter 7 On Memory Systems and Their Design Chapter 8 Storage in Mobile Consumer Electronics Devices Chapter 9 Analog Low-Pass Filters Chapter 10 Class A Amplifiers Chapter 11 MPEG-4 and H.264 Chapter 12 Liquid Crystal Displays *Hand-picked content selected by John Donovan, Editor-in-Chief, Portable Design *Proven best design practices for low-power, storage, and streamlined development *Case histories and design examples get you off and running on your current project

Circuits and Systems Advances in Near Threshold Computing Sanghamitra Roy 2021-05-11 Modern society is witnessing a sea change in ubiquitous computing, in which people have embraced computing systems as an indispensable part of day-to-day existence. Computation, storage, and communication abilities of smartphones, for example, have undergone monumental changes over the past decade. However, global emphasis on creating and sustaining green environments is leading to a rapid and ongoing proliferation of edge computing systems and applications. As a

broad spectrum of healthcare, home, and transport applications shift to the edge of the network, near-threshold computing (NTC) is emerging as one of the promising low-power computing platforms. An NTC device sets its supply voltage close to its threshold voltage, dramatically reducing the energy consumption. Despite showing substantial promise in terms of energy efficiency, NTC is yet to see widescale commercial adoption. This is because circuits and systems operating with NTC suffer from several problems, including increased sensitivity to process variation, reliability problems, performance degradation, and security vulnerabilities, to name a few. To realize its potential, we need designs, techniques, and solutions to overcome these challenges associated with NTC circuits and systems. The readers of this book will be able to familiarize themselves with recent advances in electronics systems, focusing on near-threshold computing.

Advances in Analog and RF IC Design for Wireless Communication Systems Richard Schreier 2013-05-13 Design concepts and an example of bandpass Delta-Sigma ADCs for wireless receivers are described. Delta-Sigma ADC design involves a variety of choices in the system design phase, such as lowpass vs. bandpass loop filter or, feedback vs. feedforward architecture. In the first half of the chapter, such system decisions are compared and discussed in the context of wireless communication applications. The latter half of the Chapter describes an example bandpass Delta-Sigma ADC design based on the aforementioned discussions. Circuit implementations and measurement results are disclosed in details.

Wireless Radio-Frequency Standards and System Design: Advanced Techniques Cornetta, Gianluca 2012-01-31 Radio-frequency (RF) integrated circuits in CMOS technology are gaining increasing popularity in the commercial world, and CMOS technology has become the dominant technology for applications such as GPS receivers, GSM cellular transceivers, wireless LAN, and wireless short-range personal area networks based on IEEE 802.15.1 (Bluetooth) or IEEE 802.15.4 (ZigBee) standards. Furthermore, the increasing interest in wireless technologies and the widespread of wireless communications has prompted an ever increasing demand for radio frequency transceivers. Wireless Radio-Frequency Standards and System Design: Advanced Techniques provides perspectives on radio-frequency circuit and systems design, covering recent topics and developments in the RF area. Exploring topics such as LNA linearization, behavioral modeling and co-simulation of analog and mixed-signal complex blocks for RF applications, integrated passive devices for RF-ICs and baseband design techniques and wireless standards, this is a comprehensive reference for students as well as practicing professionals.

Next-Generation ADCs, High-Performance Power Management, and Technology Considerations for Advanced Integrated Circuits Andrea Baschirotto 2019-10-24 This book is based on the 18 tutorials presented during the 28th workshop on Advances in Analog Circuit Design. Expert designers present readers with information about a variety of topics at the frontier of analog circuit design, including next-generation analog-to-digital converters , high-performance power management systems and technology considerations for advanced IC design. For anyone involved in analog circuit research and development, this book will be a valuable summary of the state-of-the-art in these areas. Provides a summary of the state-of-the-art in analog circuit design, written by experts from industry and academia; Presents material in a tutorial-based format; Includes coverage of next-generation analog-to-digital converters, high-performance power management systems, and technology considerations for advanced IC design.

Advances in Analog and RF IC Design for Wireless Communication Systems Kostas Doris 2013-05-13 This paper reviews recent developments of interleaved Successive Approximation Analog-to-Digital converters (SAR) in deep sub-micron CMOS technologies. The discussion covers design tradeoffs and degrees of freedom related to the impact of extensive interleaving with many SAR units on bandwidth, noise, linearity, and spurious performance. The impact of interleaving mismatches on representative broadband and multi-carrier narrowband signals is also discussed. Next, two examples are given demonstrating how interleaving with many ADCs can be transformed from a weakness to a strength. The first example concerns low spurious performance enabled by redundant SAR converters and randomization of their operation. The second example presents spectral sensing techniques.

Advances in Analog and RF IC Design for Wireless Communication Systems Michael Elliott 2013-05-13 This chapter provides an overview of design techniques and system aspects relevant to the application of high-speed pipelined ADCs in wireless base transceiver stations (BTS). The discussion begins with a derivation of typical ADC specifications for the receive path of a multi-carrier BTS system. Next, we investigate issues pertaining to the interface between the ADC and its driving circuitry, including complications that arise with sample-and-hold-amplifier-less (SHA-less) ADC frontends. Lastly, we summarize recent research results that look into the digital linearization of dynamic nonlinearities at the ADC's frontend.

Advances in Analog and RF IC Design for Wireless Communication Systems Salvatore Levantino 2013-05-13 In less than one decade after their introduction into radio-frequency applications, digital fractional-N phase-locked loops (PLLs) have become a relevant topic in microelectronic research and a practical solution for products. In addition to the well-known advantages, such as their silicon area occupation scaling as technology node and their easier portability to new nodes, digital PLLs enable easy and low-cost implementation of calibration techniques, which substantially reduce spurious tones and remove other major analog impairments. In wideband PLLs, the ultimate level of spur performance is often bounded by the time resolution and the linearity of the time-to-digital converter within the digital PLL. Methods for mitigating its nonlinearity such as those based on element randomization and large-scale dithering are discussed. The use of fractional-N dividers based on digital-to-time converters, as a means to relax the design of the time-to-digital converter, is also reviewed. This concept is extended to the limit case of a single-bit time-to-digital converter, which provides best PLL noise–power trade-off with good spur performance.

Transistor Level Modeling for Analog/RF IC Design Wladyslaw Grabinski 2006-07-01 The editors and authors present a wealth of knowledge regarding the most relevant aspects in the field of MOS transistor modeling. The variety of subjects and the high quality of content of this volume make it a reference document for researchers and users of MOSFET devices and models. The book can be recommended to everyone who is involved in compact model developments, numerical TCAD modeling, parameter extraction, space-level simulation or model standardization. The book will appeal equally to PhD students who want to understand the ins and outs of MOSFETs as well as to modeling designers working in the analog and high-frequency areas.

System-on-Chip Bashir M. Al-Hashimi 2006-01-01 System-on-Chip (SoC) represents the next major market for microelectronics, and there is considerable interest world-wide in developing effective methods and tools to support the SoC paradigm. SoC is an expanding field, at present the technical and technological literature about the overall state-of-the-art in SoC is dispersed across a wide spectrum which includes books, journals, and conference proceedings. The book provides a comprehensive and accessible source of state-of-the-art information on existing and emerging SoC key research areas, provided by leading experts in the field. This book covers the general principles of designing, validating and testing complex embedded computing systems and their underlying tradeoffs. The book has twenty five chapters organised into eight parts, each part focuses on a particular topic of SoC. Each chapter has some background covering the basic principles, and extensive list of references. It is aimed at graduate students, designers and managers working in Electronic and Computer engineering.

Advanced Circuits for Emerging Technologies Krzysztof Iniewski 2012-04-17 The book will address the-state-of-the-art in integrated circuit design in the context of emerging systems. New exciting opportunities in body area networks, wireless communications, data networking, and optical imaging are discussed. Emerging materials that can take system performance beyond standard CMOS, like Silicon on Insulator (SOI), Silicon Germanium (SiGe), and Indium Phosphide (InP) are explored. Three-dimensional (3-D) CMOS integration and co-integration with sensor technology are described as well. The book is a must for anyone serious about circuit design for future technologies. The book is written by top notch international experts in industry and academia. The intended audience is practicing engineers with integrated circuit background. The book will be also used as a recommended reading and supplementary material in graduate course curriculum. Intended audience is professionals working in the integrated circuit design field. Their job titles might be : design engineer, product manager, marketing manager, design team leader, etc. The book will be also used by graduate students. Many of the chapter authors are University Professors.

Advances in Analog and RF IC Design for Wireless Communication Systems Mustafa Acar 2013-05-13 This chapter presents high-efficiency power amplifiers (PAs) for wireless infrastructure. It starts by stating the importance of high efficiency and the historical evolution in base station PA concepts. It then introduces the current solution, the Doherty PA. After explaining the fundamentals of the Doherty PA, a novel implementation

achieving more than 35% drain efficiency across a 6dB power back-off range and up to 20W peak power between 1.7 and 2.3GHz is given. Afterwards, a future PA concept, switch-mode outphasing PA, is introduced. Theory and implementation details of a class-E outphasing PA achieving more than 60% drain efficiency across a 6dB power back-off range and up to 19W peak power between 1800 and 2050MHz is explained. By the end of the chapter, an essential part of switch-mode PAs, high voltage (up to 10V) and high frequency (up to 4GHz) drivers are presented.

Advances in Analog and RF IC Design for Wireless Communication Systems Pascal Philippe 2013-05-13 This chapter presents one of the first integrated Ku-band downconverters with PLL frequency synthesizer that has widely penetrated the market of low noise blocks (LNBs) for reception of satellite television. It starts with a brief description of the general architecture of a LNB and a presentation of the main requirements for the integrated downconverter and frequency synthesizer. The architecture of the integrated circuit and the design of its building blocks are then presented and discussed in detail. The emphasis is put on the design choices made in the downconverter and the synthesizer for competing in cost and performance with discrete implementations at minimal power consumption. By the end of the chapter, measurement results are reported that illustrate the downconverter performance alone or within a demonstration LNB.

Mixed-Signal Circuits Thomas Noulis 2018-09-03 Mixed-Signal Circuits offers a thoroughly modern treatment of integrated circuit design in the context of mixed-signal applications. Featuring chapters authored by leading experts from industry and academia, this book: Discusses signal integrity and large-scale simulation, verification, and testing Demonstrates advanced design techniques that enable digital circuits and sensitive analog circuits to coexist without any compromise Describes the process technology needed to address the performance challenges associated with developing complex mixed-signal circuits Deals with modeling topics, such as reliability, variability, and crosstalk, that define pre-silicon design methodology and trends, and are the focus of companies involved in wireless applications Develops methods to move analog into the digital domain quickly, minimizing and eliminating common trade-offs between performance, power consumption, simulation time, verification, size, and cost Details approaches for very low-power performances, high-speed interfaces, phase-locked loops (PLLs), voltage-controlled oscillators (VCOs), analog-to-digital converters (ADCs), and biomedical filters Delineates the respective parts of a full system-on-chip (SoC), from the digital parts to the baseband blocks, radio frequency (RF) circuitries, electrostatic-discharge (ESD) structures, and built-in self-test (BIST) architectures Mixed-Signal Circuits explores exciting opportunities in wireless communications and beyond. The book is a must for anyone involved in mixed-signal circuit design for future technologies.

Bits on Chips Harry Veendrick 2018-06-21 This book provides readers with a broad overview of integrated circuits, also generally referred to as micro-electronics. The presentation is designed to be accessible to readers with limited, technical knowledge and coverage includes key aspects of integrated circuit design, implementation, fabrication and application. The author complements his discussion with a large number of diagrams and photographs, in order to reinforce the explanations. The book is divided into two parts, the first of which is specifically developed for people with almost no or little technical knowledge. It presents an overview of the electronic evolution and discusses the similarity between a chip floor plan and a city plan, using metaphors to help explain concepts. It includes a summary of the chip development cycle, some basic definitions and a variety of applications that use integrated circuits. The second part digs deeper into the details and is perfectly suited for professionals working in one of the semiconductor disciplines who want to broaden their semiconductor horizon.

EDN 2005

RF Circuit Design Christopher Bowick 2011-04-08 It's Back! New chapters, examples, and insights; all infused with the timeless concepts and theories that have helped RF engineers for the past 25 years! RF circuit design is now more important than ever as we find ourselves in an increasingly wireless world. Radio is the backbone of today's wireless industry with protocols such as Bluetooth, Wi-Fi, WiMax, and ZigBee. Most, if not all, mobile devices have an RF component and this book tells the reader how to design and integrate that component in a very practical fashion. This book has been updated to include today's integrated circuit (IC) and system-level design issues as well as keeping its classic "wire lead" material. Design Concepts and Tools Include •The Basics: Wires, Resistors, Capacitors, Inductors •Resonant Circuits: Resonance, Insertion

Loss •Filter Design: High-pass, Bandpass, Band-rejection •Impedance Matching: The L Network, Smith Charts, Software Design Tools •Transistors: Materials, Y Parameters, S Parameters •Small Signal RF Amplifier: Transistor Biasing, Y Parameters, S Parameters •RF Power Amplifiers: Automatic Shutdown Circuitry , Broadband Transformers, Practical Winding Hints •RF Front-End: Architectures, Software-Defined Radios, ADC's Effects •RF Design Tools: Languages, Flow, Modeling Check out this book's companion Web site at: http://www.elsevierdirect.com/companion.jsp?ISBN=9780750685184 for full-color Smith Charts and extra content! *Completely updated but still contains its classic timeless information *Two NEW chapters on RF Front-End Design and RF Design Tools *Not overly math intensive, perfect for the working RF and digital professional that need to build analog-RF-Wireless circuits

Surrogate Modeling For High-frequency Design: Recent Advances Slawomir Koziel 2022-03-04 Contemporary high-frequency engineering design heavily relies on full-wave electromagnetic (EM) analysis. This is primarily due to its versatility and ability to account for phenomena that are important from the point of view of system performance. Unfortunately, versatility comes at the price of a high computational cost of accurate evaluation. Consequently, utilization of simulation models in the design processes is challenging although highly desirable. The aforementioned problems can be alleviated by means of surrogate modeling techniques, the most popular of which are data-driven models. Although a large variety of methods are available, they are all affected by the curse of dimensionality. This is especially pronounced in high-frequency electronics, where typical system responses are highly nonlinear. Construction of practically useful surrogates covering wide ranges of parameters and operating conditions is a considerable challenge.Surrogate Modeling for High-Frequency Design presents a selection of works representing recent advancements in surrogate modeling and their applications to high-frequency design. Some chapters provide a review of specific topics such as neural network modeling of microwave components, while others describe recent attempts to improve existing modeling methodologies. Furthermore, the book features numerous applications of surrogate modeling methodologies to design optimization and uncertainty quantification of antenna, microwave, and analog RF circuits.

Substrate Noise Edoardo Charbon 2007-05-08 In the past decade, substrate noise has had a constant and significant impact on the design of analog and mixed-signal integrated circuits. Only recently, with advances in chip miniaturization and innovative circuit design, has substrate noise begun to plague fully digital circuits as well. To combat the effects of substrate noise, heavily over-designed structures are generally adopted, thus seriously limiting the advantages of innovative technologies. Substrate Noise: Analysis and Optimization for IC Design addresses the main problems posed by substrate noise from both an IC and a CAD designer perspective. The effects of substrate noise on performance in digital, analog, and mixed-signal circuits are presented, along with the mechanisms underlying noise generation, injection, and transport. Popular solutions to the substrate noise problem and the trade-offs often debated by designers are extensively discussed. Non-traditional approaches as well as semi-automated techniques to combat substrate noise are also addressed. Substrate Noise: Analysis and Optimization for IC Design will be of interest to researchers and professionals interested in signal integrity, as well as to mixed signal and RF designers.

Advances in Monolithic Microwave Integrated Circuits for Wireless Systems: Modeling and Design Technologies Marzuki, Arjuna 2011-08-31 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.

Charge-Based MOS Transistor Modeling Christian C. Enz 2006-08-14 Modern, large-scale analog integrated circuits (ICs) are essentially composed of metal-oxide semiconductor (MOS) transistors and their interconnections. As technology scales down to deep sub-micron dimensions and supply voltage decreases to reduce power consumption,

these complex analog circuits are even more dependent on the exact behavior of each transistor. High-performance analog circuit design requires a very detailed model of the transistor, describing accurately its static and dynamic behaviors, its noise and matching limitations and its temperature variations. The charge-based EKV (Enz-Krummenacher-Vittoz) MOS transistor model for IC design has been developed to provide a clear understanding of the device properties, without the use of complicated equations. All the static, dynamic, noise, non-quasi-static models are completely described in terms of the inversion charge at the source and at the drain taking advantage of the symmetry of the device. Thanks to its hierarchical structure, the model offers several coherent description levels, from basic hand calculation equations to complete computer simulation model. It is also compact, with a minimum number of process-dependant device parameters. Written by its developers, this book provides a comprehensive treatment of the EKV charge-based model of the MOS transistor for the design and simulation of low-power analog and RF ICs. Clearly split into three parts, the authors systematically examine: the basic long-channel intrinsic charge-based model, including all the fundamental aspects of the EKV MOST model such as the basic large-signal static model, the noise model, and a discussion of temperature effects and matching properties; the extended charge-based model, presenting important information for understanding the operation of deep-submicron devices; the high-frequency model, setting out a complete MOS transistor model required for designing RF CMOS integrated circuits. Practising engineers and circuit designers in the semiconductor device and electronics systems industry will find this book a valuable guide to the modelling of MOS transistors for integrated circuits. It is also a useful reference for advanced students in electrical and computer engineering.

CMOS Analog IC Design for 5G and Beyond Sangeeta Singh 2021-02-07 This book is focused on addressing the designs of FinFET-based analog ICs for 5G and E-band communication networks. In addition, it also incorporates some of the contemporary developments over different fields. It highlights the latest advances, problems and challenges and presents the latest research results in the field of mm-wave integrated circuits designing based on scientific literature and its practical realization. The traditional approaches are excluded in this book. The authors cover various design guidelines to be taken care for while designing these circuits and detrimental scaling effects on the same. Moreover, Gallium Nitrides (GaN) are also reported to show huge potentials for the power amplifier designing required in 5G communication network. Subsequently, to enhance the readability of this book, the authors also include real-time problems in RFIC designing, case studies from experimental results, and clearly demarking design guidelines for the 5G communication ICs designing. This book incorporates the most recent FinFET architecture for the analog IC designing and the scaling effects along with the GaN technology as well.

Advanced Integrated Communication Microsystems Joy Laskar 2009-02-10 Learn the fundamentals of integrated communication microsystems Advanced communication microsystems—the latest technology to emerge in the semiconductor sector after microprocessors—require integration of diverse signal processing blocks in a power-efficient and cost-effective manner. Typically, these systems include data acquisition, data processing, telemetry, and power management. The overall development is a synergy among system, circuit, and component-level designs with a strong emphasis on integration. This book is targeted at students, researchers, and industry practitioners in the semiconductor area who require a thorough understanding of integrated communication microsystems from a developer's perspective. The book thoroughly and carefully explores: Fundamental requirements of communication microsystems System design and considerations for wired and wireless communication microsystems Advanced block-level design techniques for communication microsystems Integration of communication systems in a hybrid environment Packaging considerations Power and form factor trade-offs in building integrated microsystems Advanced Integrated Communication Microsystems is an ideal textbook for advanced undergraduate and graduate courses. It also serves as a valuable reference for researchers and practitioners in circuit design for telecommunications and related fields.

Advances in Analog and RF IC Design for Wireless Communication Systems Gabriele Manganaro 2013-05-13 Advances in Analog and RF IC Design for Wireless Communication Systems gives technical introductions to the latest and most significant topics in the area of circuit design of analog/RF ICs for wireless communication systems, emphasizing wireless infrastructure rather than handsets. The book ranges from very high performance circuits for complex wireless infrastructure systems to selected highly integrated systems for handsets and mobile devices. Coverage includes power amplifiers, low-noise amplifiers, modulators, analog-to-digital converters (ADCs) and digital-to-analog converters (DACs), and even single-chip radios. This book offers a quick grasp of emerging research topics in RF integrated circuit design and their potential applications, with brief introductions to key topics followed by references to specialist papers for further reading. All of the chapters, compiled by editors well known in their field, have been authored by renowned experts in the subject. Each includes a complete introduction, followed by the relevant most significant and recent results on the topic at hand. This book gives researchers in industry and universities a quick grasp of the most important developments in analog and RF integrated circuit design. Emerging research topics in RF IC design and its potential application Case studies and practical implementation examples Covers fundamental building blocks of a cellular base station system and satellite infrastructure Insights from the experts on the design and the technology trade-offs, the challenges and open questions they often face References to specialist papers for further reading

Electronic Design Automation for IC Implementation, Circuit Design, and Process Technology Luciano Lavagno 2017-02-03 The second of two volumes in the Electronic Design Automation for Integrated Circuits Handbook, Second Edition, Electronic Design Automation for IC Implementation, Circuit Design, and Process Technology thoroughly examines real-time logic (RTL) to GDSII (a file format used to transfer data of semiconductor physical layout) design flow, analog/mixed signal design, physical verification, and technology computer-aided design (TCAD). Chapters contributed by leading experts authoritatively discuss design for manufacturability (DFM) at the nanoscale, power supply network design and analysis, design modeling, and much more. New to This Edition: Major updates appearing in the initial phases of the design flow, where the level of abstraction keeps rising to support more functionality with lower non-recurring engineering (NRE) costs Significant revisions reflected in the final phases of the design flow, where the complexity due to smaller and smaller geometries is compounded by the slow progress of shorter wavelength lithography New coverage of cutting-edge applications and approaches realized in the decade since publication of the previous edition—these are illustrated by new chapters on 3D circuit integration and clock design Offering improved depth and modernity, Electronic Design Automation for IC Implementation, Circuit Design, and Process Technology provides a valuable, state-of-the-art reference for electronic design automation (EDA) students, researchers, and professionals.

Fundamentals of High Frequency CMOS Analog Integrated Circuits Duran Leblebici 2022-03-25 This textbook is ideal for senior undergraduate and graduate courses in RF CMOS circuits, RF circuit design, and high-frequency analog circuit design. It is aimed at electronics engineering students and IC design engineers in the field, wishing to gain a deeper understanding of circuit fundamentals, and to go beyond the widely-used automated design procedures. The authors employ a design-centric approach, in order to bridge the gap between fundamental analog electronic circuits textbooks and more advanced RF IC design texts. The structure and operation of the building blocks of high-frequency ICs are introduced in a systematic manner, with an emphasis on transistor-level operation, the influence of device characteristics and parasitic effects, and input–output behavior in the time and frequency domains. This second edition has been revised extensively, to expand some of the key topics, to clarify the explanations, and to provide extensive design examples and problems. New material has been added for basic coverage of core topics, such as wide-band LNAs, noise feedback concept and noise cancellation, inductive-compensated band widening techniques for flat-gain or flat-delay characteristics, and basic communication system concepts that exploit the convergence and co-existence of Analog and Digital building blocks in RF systems. A new chapter (Chapter 5) has been added on Noise and Linearity, addressing key topics in a comprehensive manner. All of the other chapters have also been revised and largely re-written, with the addition of numerous, solved design examples and exercise problems.