

Practical Rf Circuit Design For Modern Wireless Systems

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[Microwave Circuit Design Using Linear and Nonlinear Techniques](#) - George D. Vendelin 2005-10-03

The ultimate handbook on microwave circuit design with CAD. Full of tips and insights from seasoned industry veterans, **Microwave Circuit Design** offers practical, proven advice on improving the design quality of microwave passive and active circuits—while cutting costs and time. Covering all levels of microwave circuit design from the elementary to the very advanced, the book systematically presents computer-aided methods for linear and nonlinear designs used in the design and manufacture of microwave amplifiers, oscillators, and mixers. Using the newest CAD tools, the book shows how to design transistor and diode circuits, and also details CAD's usefulness in microwave integrated circuit (MIC) and monolithic microwave integrated circuit (MMIC) technology. Applications of nonlinear SPICE programs, now available for microwave CAD, are described. State-of-the-art coverage includes microwave transistors (HEMTs, MODFETs, MESFETs, HBTs, and more), high-power amplifier design, oscillator design including feedback topologies, phase noise and examples, and more. The techniques presented are illustrated with several MMIC designs, including a wideband amplifier, a low-noise amplifier, and an MMIC mixer. This unique, one-stop handbook also features a major case study of an actual anticollision radar transceiver, which is compared in detail against CAD predictions; examples of actual circuit designs with photographs of completed circuits; and tables of design formulae.

Distributed Power Amplifiers for RF and Microwave Communications - Narendra Kumar 2015-06-01

This new resource presents readers with all relevant information and comprehensive design methodology of wideband amplifiers. This book specifically focuses on distributed amplifiers and their main components, and presents numerous RF and microwave applications including well-known historical and recent architectures, theoretical approaches, circuit simulation, and practical implementation techniques. A great resource for practicing designers and engineers, this book contains numerous well-known and novel practical circuits, architectures, and theoretical approaches with detailed description of their operational principles.

Nonlinear Design: FETs and HEMTs - Peter H. Ladbrooke 2021-11-30

Despite its continuing popularity, the so-called standard circuit model of compound semiconductor field-effect transistors (FETs) and high electron mobility transistors (HEMTs) is shown to have a limitation for nonlinear analysis and design: it is valid only in the static limit. When the voltages and currents are time-varying, as they must be for these devices to have any practical use, the model progressively fails for higher specification circuits. This book shows how to reform the standard model to render it fully compliant with the way FETs and HEMTs actually function, thus rendering it valid dynamically. Proof-of-principle is demonstrated for several practical circuits, including a frequency doubler and amplifiers with demanding performance criteria. Methods for extracting both the reformulated model and the standard model are described, including a scheme for re-constructing from S-parameters the bias-dependent dynamic (or RF) I(V) characteristics along which devices work in real-world applications, and as needed for the design of nonlinear circuits using harmonic-balance and time-domain simulators. The book includes a historical review of how variations on the standard model theme evolved, leading up to one of the most widely used—the Angelov (or Chalmers) model.

RF and Microwave Engineering - Frank Gustrau 2012-06-22

This book provides a fundamental and practical introduction to radio frequency and microwave engineering and physical aspects of wireless communication. In this book, the author addresses a wide range of radio-frequency and microwave topics with emphasis on physical aspects including EM and voltage waves, transmission lines, passive circuits,

antennas, radio wave propagation. Up-to-date RF design tools like RF circuit simulation, EM simulation and computerized Smith charts, are used in various examples to demonstrate how these methods can be applied effectively in RF engineering practice. Design rules and working examples illustrate the theoretical parts. The examples are close to real world problems, so the reader can directly transfer the methods within the context of their own work. At the end of each chapter a list of problems is given in order to deepen the reader's understanding of the chapter material and practice the new competences. Solutions are available on the author's website. Key Features: Presents a wide range of RF topics with emphasis on physical aspects e.g. EM and voltage waves, transmission lines, passive circuits, antennas. Uses various examples of modern RF tools that show how these methods can be applied productively in RF engineering practice. Incorporates various design examples using circuit and electromagnetic (EM) simulation software. Discusses the propagation of waves: their representation, their effects, and their utilization in passive circuits and antenna structures. Provides a list of problems at the end of each chapter. Includes an accompanying website containing solutions to the problems.

(http://www.fh-dortmund.de/gustrau_rf_textbook) This will be an invaluable textbook for bachelor and masters students on electrical engineering courses (microwave engineering, basic circuit theory and electromagnetic fields, wireless communications). Early-stage RF practitioners, engineers (e.g. application engineer) working in this area will also find this book of interest.

Practical Radio-frequency Handbook - Ian Hickman 2002

Includes bibliographical references and index.

[Microwave Transmission Line Circuits](#) - William T. Joines 2013-01-01

Here's an authoritative resource that offers you valuable assistance with your work involving microwave circuit analysis and design. This practical book provides a thorough understanding of the properties of planar transmission lines for integrated circuits. It presents matrix and computer-aided methods for analysis and design of circuit components. You find in-depth details on input, output, and interstage networks, as well as coverage of stability, noise, and signal distortion. Moreover, this unique book is the first to explore and develop the interface between lumped-element circuits and distributed element circuits. Supported with over 580 equations and 100 illustrations, this volume presents the necessary technological underpinnings and all the practical details you need to fully comprehend and work with the material.

Principles of RF and Microwave Design - Matthew A. Morgan 2019-11-30

This comprehensive resource provides a thorough introduction to the principles of electronic circuits operating in the radio, microwave, and millimeter-wave frequency ranges. The book highlights the fundamental physical laws of classical electromagnetics using a foundation of Maxwell's equations to give insight into the operating principles of circuit elements of all kinds, from lumped elements to transmission lines, waveguides, optical fibers, and quasi-optical structures. Standard passive system components like filters, splitters, couplers, hybrids, baluns, and antennas are explained to acclimate the reader to considering multiple technological solutions for common design problems. A basic overview of active circuit designs, such as amplifiers, mixers, and multipliers is also provided, along with discussion of the performance characteristics of electronic systems, including noise and linearity. Emphasis is placed on visualization and understanding of how and why electronic circuits of all frequencies are built and operate the way they do. Readers learn how to match an amplifier for optimum noise performance over the broadest bandwidth with the fewest number of elements and how to visualize the coupling of various modes in a mixed waveguide-type structure and avoid resonances due to trapped, higher-order modes. The book provides the tools needed to design and optimize a launcher from microstrip into

waveguide, and whether the best characteristics can be achieved by incorporating matching elements in the microstrip section, the waveguide section, or both. Packed with references and examples, readers learn not only how to do the math but what the math means. *Microwave Power Amplifier Design with MMIC Modules* - Howard Hausman 2018-06-30

Solid state power amplifiers (SSPA) are a critical part of many microwave systems. Designing SSPAs with monolithic microwave integrated circuits (MMIC) has boosted device performance to much higher levels focused on PA modules. This cutting-edge book offers engineers practical guidance in selecting the best power amplifier module for a particular application and interfacing the selected module with other power amplifier modules in the system. It also explains how to identify and mitigate peripheral issues concerning the PA modules, SSPAs, and microwave systems. This authoritative volume presents the critical techniques and underpinnings of SSPA design, enabling professionals to optimize device and system performance. Engineers gain the knowledge they need to evaluate the optimum topologies for the design of a chain of microwave devices, including power amplifiers. Additionally, the book addresses the interface between the microwave subsystems and the primary DC power, the control and monitoring circuits, and the thermal and EMI paths. Packed with 240 illustrations and over 430 equations, this detailed book provides the practical tools engineers need for their challenging projects in the field.

Radio Frequency Integrated Circuits and Systems - Hooman Darabi 2020-03-12

Equips students with essential industry-relevant knowledge through in-depth explanations, practical applications, examples, and exercises. [Parameter Extraction and Complex Nonlinear Transistor Models](#) - Gunter Kompa 2019-12-31

All model parameters are fundamentally coupled together, so that directly measured individual parameters, although widely used and accepted, may initially only serve as good estimates. This comprehensive resource presents all aspects concerning the modeling of semiconductor field-effect device parameters based on gallium-arsenide (GaAs) and gallium nitride (GaN) technology. Metal-semiconductor field-effect transistors (MESFETs), high electron mobility transistors (HEMTs) and heterojunction bipolar transistors (HBTs), their structures and functions, and existing transistor models are also classified. The Shockley model is presented in order to give insight into semiconductor field-effect transistor (FET) device physics and explain the relationship between geometric and material parameters and device performance. Extraction of trapping and thermal time constants is discussed. A special section is devoted to standard nonlinear FET models applied to large-signal measurements, including static-/pulsed-DC and single-/two-tone stimulation. High power measurement setups for signal waveform measurement, wideband source-/load-pull measurement (including envelope source-/load pull) are also included, along with high-power intermodulation distortion (IMD) measurement setup (including envelope load-pull). Written by a world-renowned expert in the field, this book is the first to cover of all aspects of semiconductor FET device modeling in a single volume.

[RF Bulk Acoustic Wave Filters for Communications](#) - Ken-ya Hashimoto 2009

For years, surface acoustic wave (SAW) filters have been widely used as radio frequency front-end filters and duplexers for mobile communication systems. Recently, bulk acoustic wave (BAW) filters are gaining more popularity for their performance benefits and are being utilized more and more in the design of today's cutting-edge mobile devices and systems. This timely book presents a thorough overview of RF BAW filters, covering a vast range of technologies, optimal device design, filter topologies, packaging, fabrication processes, and high quality piezoelectric thin films. Moreover, the book discusses the integration of BAW filters in RF systems.

[RF Circuit Design](#) - Christopher Bowick 2014-06-28

Essential reading for experts in the field of RF circuit design and engineers needing a good reference. This book provides complete design procedures for multiple-pole Butterworth, Chebyshev, and Bessel filters. It also covers capacitors, inductors, and other components with their behavior at RF frequencies discussed in detail. Provides complete design procedures for multiple-pole Butterworth, Chebyshev, and Bessel filters. Covers capacitors, inductors, and other components with their behavior at RF frequencies discussed in detail.

Practical RF Circuit Design for Modern Wireless Systems - Les Besser 2002-12-31

Annotation In today's globally competitive wireless industry, the design-to-production cycle is critically important. The first of a two-volume set, this leading-edge book takes a practical approach to RF (radio frequency) circuit design, offering a complete understanding of the fundamental concepts practitioners need to know and use for their work in the field.

Microwave Circulator Design, Second Edition - Douglas K. Linkhart 2014-02-01

Circulator design has advanced significantly since the first edition of this book was published 25 years ago. The objective of this second edition is to present theory, information, and design procedures that will enable microwave engineers and technicians to design and build circulators successfully. This resource contains a discussion of the various units used in the circulator design computations, as well as covers the theory of operation. This book presents numerous applications, giving microwave engineers new ideas about how to solve problems using circulators. Design examples are provided, which demonstrate how to apply the information to real-world design tasks.

Substrate Noise Coupling in Analog/RF Circuits - Stephane Bronckers 2010

This book presents case studies to illustrate that careful modeling of the assembly characteristics and layout details is required to bring simulations and measurements into agreement. Engineers learn how to use a proper combination of isolation structures and circuit techniques to make analog/RF circuits more immune to substrate noise. Topics include substrate noise propagation, passive isolation structures, noise couple in active devices, measuring the coupling mechanisms in analog/RF circuits, prediction of the impact of substrate noise on analog/RF circuits, and noise coupling in analog/RF systems.

Introduction to RF and Microwave Passive Components - Richard Wallace 2015-08-01

This authoritative new resource provides an overview and introduction to working with RF, microwave, and high frequency components. From transmission lines, antennas, millimeter waves, ferrites, hybrids, power dividers and filters, this book focuses on practical, time-to-market issues to help with projects in the field. Keeping mathematics to a minimum, this comprehensive volume is packed with over 700 illustrations that help clarify key concepts. The reader will gain an in-depth understanding of the special characteristics exploited in microwave and high frequency design. The book is also used in industrial training courses.

Practical RF Circuit Design for Modern Wireless Systems - Rowan Gilmore 2003

In today's globally competitive wireless industry, the design-to-production cycle is critically important. The first of a two-volume set, this leading-edge book takes a practical approach to RF (radio frequency) circuit design, offering a complete understanding of the fundamental concepts practitioners need to know and use for their work in the field.

Design Methodology for RF CMOS Phase Locked Loops - Carlos Quemada 2008

After a review of PLL essentials, this uniquely comprehensive workbench guide takes you step-by-step through operation principles, design procedures, phase noise analysis, layout considerations, and CMOS realizations for each PLL building block. You get full details on LC tank oscillators including modeling and optimization techniques, followed by design options for CMOS frequency dividers covering flip-flop implementation, the divider by 2 component, and other key factors. The book includes design alternatives for phase detectors that feature methods to minimize jitter caused by the dead zone effect. You also find a sample design of a fully integrated PLL for WLAN applications that demonstrates every step and detail right down to the circuit schematics and layout diagrams. Supported by over 150 diagrams and photos, this one-stop toolkit helps you produce superior PLL designs faster, and deliver more effective solutions for low-cost integrated circuits in all RF applications.

Radio Frequency Integrated Circuit Design - John W. M. Rogers 2003

Focuses mainly on bipolar technology to demonstrate circuits, but CMOS is included as well.

[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

RF Circuits and Applications for Practicing Engineers - Mouqun Dong 2020-10-31

This comprehensive resource explains the theory of RF circuits and systems and the practice of designing them. The fundamentals for linear and low noise amplifier designs, including the S and noise parameters and their applications in amplifier designs and matching network designs using the Smith chart are covered. Theories of RF power amplifiers and high efficiency power amplifiers are also explained. The underpinnings of wireless communications systems as well as passive components commonly used in RF circuits and measurements are discussed. RF measurement techniques and RF switches are also presented. The book explores stability criteria and the invariant property of lossless networks and includes detailed theoretical treatments. The basic concepts and techniques covered in this book are routinely used in today's engineering practice, especially from the perspective of printed circuit board (PCB) based RF circuit design and system integration. Intended for practicing engineers and circuit designers, this book focuses on practical topics in circuit design and measurement techniques. It bridges the gap between academic materials and real circuit designs using real circuit examples and practical tips. Readers develop a numerical feel for RF problems as well as awareness of the concepts of design for cost and design for manufacturing, which is a critical skill set for today's engineers working in an environment of commercial product development.

Frequency Synthesizers - Alexander Chenakin 2011

A frequency synthesizer is an electronic system for generating any of a range of frequencies from a single fixed oscillator. They are found in modern devices like radio receivers, mobile phones, and GPS systems. This comprehensive resource offers RF and microwave engineers a thorough overview of both well-established and recently developed frequency synthesizer design techniques. Professionals find expert guidance on all design aspects, including main architectures, key building blocks, and practical circuit implementation. Engineers learn the development process and gain a solid understanding of how to build a synthesizer from a basic diagram to the final product. Starting with a simple single-loop PLL example, the book progressively examines various alternatives -- fractional-N, DDS, frequency offset, multiloop and more OCO to achieve required performance objectives. This unique volume gathers a collection of block diagrams, clever circuits, design recipes, and other hard-to-find information that is usually treated as OC design secretsOCO. Written in a simple yet rigorous style with numerous illustrations, the book is an all-in-one reference for both beginner and experienced designers.

RF/Microwave Circuit Design for Wireless Applications - Ulrich L. Rohde 2004-04-07

A unique, state-of-the-art guide to wireless integrated circuit design. With wireless technology rapidly exploding, there is a growing need for circuit design information specific to wireless applications. Presenting a single-source guidebook to this dynamic area, industry expert Ulrich Rohde and writer David Newkirk provide researchers and engineers with a complete set of modeling, design, and implementation tools for tackling even the newest IC technologies. They emphasize practical design solutions for high-performance devices and circuitry, incorporating ample examples of novel and clever circuits from high-profile companies. They also provide excellent appendices containing working models and CAD-based applications. *RF/Microwave Circuit Design for Wireless Applications* offers: * Introduction to wireless systems and modulation types * A systematic approach that differentiates between designing

for battery-operated devices and base-station design * A comprehensive introduction to semiconductor technologies, from bipolar transistors to CMOS to GaAs MESFETs * Clear guidelines for obtaining the best performance in discrete and integrated amplifier design * Detailed analysis of available mixer circuits applicable to the wireless frequency range * In-depth explanations of oscillator circuits, including microwave oscillators and ceramic-resonator-based oscillators * A thorough evaluation of all components of wireless synthesizers Planar Microwave Engineering - Thomas H. Lee 2004-08-30

Modern wireless communications hardware is underpinned by RF and microwave design techniques. This insightful book contains a wealth of circuit layouts, design tips, and practical measurement techniques for building and testing practical gigahertz systems. The book covers everything you need to know to design, build, and test a high-frequency circuit. Microstrip components are discussed, including tricks for extracting good performance from cheap materials. Connectors and cables are also described, as are discrete passive components, antennas, low-noise amplifiers, oscillators, and frequency synthesizers. Practical measurement techniques are presented in detail, including the use of network analyzers, sampling oscilloscopes, spectrum analyzers, and noise figure meters. Throughout the focus is practical, and many worked examples and design projects are included. There is also a CD-ROM that contains a variety of design and analysis programs. The book is packed with indispensable information for students taking courses on RF or microwave circuits and for practising engineers.

Microwave and RF Design of Wireless Systems - David M. Pozar 2000-11-29

David Pozar, author of *Microwave Engineering*, Second Edition, has written a new text that introduces students to the field of wireless communications. This text offers a quantitative and, design-oriented presentation of the analog RF aspects of modern wireless telecommunications and data transmission systems from the antenna to the baseband level. Other topics include noise, intermodulation, dynamic range, system aspects of antennas and filter design. This unique text takes an integrated approach to topics usually offered in a variety of separate courses on topics such as antennas and propagation, microwave systems and circuits, and communication systems. This approach allows for a complete presentation of wireless telecommunications systems designs. The author's goal with this text is for the student to be able to analyze a complete radio system from the transmitter through the receiver front-end, and quantitatively evaluate factors. Suitable for a one-semester course, at the senior or first year graduate level. Note certain sections have been denoted as advanced topics, suitable for graduate level courses.

RF Design Guide - Peter Vizmuller 1995

Gain fast access to design information required for any RF communication project using high-frequency circuits and systems with this bestseller. It contains measurement methods, system calculations, statistical procedures, and actual circuit and measurement examples that help you shorten design cycles, improve quality, and reduce design risks. Augmented with 400 equations and 210 figures, the book is an ideal reference for product designers and consultants in the RF and wireless communications industry and an outstanding learning tool for classroom use.

Practical RF Circuit Design for Modern Wireless Systems: Passive circuits and systems - Rowan Gilmore 2003-01-01

The first of a two-volume set, this leading-edge book takes a practical approach to RF circuit design, offering a complete understanding of the fundamental concepts you need to know and use for your work in this industry. The book lays the ground work for efficient RF circuit design in a step-by-step approach, by defining important principles and parameters and progressively introducing critical analytical tools. It helps you distinguish between RF and low frequency circuits, and offers a detailed look at a typical RF system. This is a tested and insightful book that contains answers to most of the questions practical engineers are asking. The first volume reviews various computer-aided simulation, synthesis, and optimization techniques used in modern RF and microwave design, and discusses the practical use of the graphical design tools, such as the Smith Chart.

RF Circuit Design - Richard C. Li 2012-08-24

Summarizes the schemes and technologies in RF circuit design, describes the basic parameters of an RF system and the fundamentals of RF system design, and presents an introduction of the individual RF circuit block design. Forming the backbone of today's mobile and satellite communications networks, radio frequency (RF) components

and circuits are incorporated into everything that transmits or receives a radio wave, such as mobile phones, radio, WiFi, and walkie talkies. *RF Circuit Design, Second Edition* immerses practicing and aspiring industry professionals in the complex world of RF design. Completely restructured and reorganized with new content, end-of-chapter exercises, illustrations, and an appendix, the book presents integral information in three complete sections: Part One explains the different methodologies between RF and digital circuit design and covers voltage and power transportation, impedance matching in narrow-band case and wide-band case, gain of a raw device, measurement, and grounding. It also goes over equipotentiality and current coupling on ground surface, as well as layout and packaging, manufacturability of product design, and radio frequency integrated circuit (RFIC). Part Two includes content on the main parameters and system analysis in RF circuit design, the fundamentals of differential pair and common-mode rejection ratio (CMRR), Balun, and system-on-a-chip (SOC). Part Three covers low-noise amplifier (LNA), power amplifier (PA), voltage-controlled oscillator (VCO), mixers, and tunable filters. *RF Circuit Design, Second Edition* is an ideal book for engineers and managers who work in RF circuit design and for courses in electrical or electronic engineering.

Microwave Network Design Using the Scattering Matrix - Janusz A. Dobrowolski 2010

This authoritative resource provides you with comprehensive and detailed coverage of the wave approach to microwave network characterization, analysis, and design using scattering parameters. For the first time in any book, all aspects and approaches to wave variables and the scattering matrix are explored. The book compares and contrasts voltage waves, travelling waves, pseudo waves, and power waves, and explains the differences between real scattering parameters, pseudo scattering parameters, and power scattering parameters. You find important discussions on standard scattering matrices and wave quantities, mixed mode wave variables, and noise wave variables with noise wave correlation matrices. Moreover, the book presents clear methods for standard single ended multiport network design and noise analysis. This in-depth reference is packed with over 1,100 equations and numerous illustrations.

Complete Wireless Design - Cotter Sayre 2001-02-12

Easily design today's wireless systems and circuits Design an entire radio system from the ground up instead of relying on a simple plug-in selection of circuits to be modified. Avoid an arduous trek through theory and mathematical derivations. Cotter Sayre's *Complete Wireless Design* covers wireless hardware design more thoroughly than any other handbook —and does it without burying you in math. This new guide from today's bestselling wireless author gives you all the skills you need to design wireless systems and circuits. If you want to climb the learning curve with grace, and start designing what you need immediately, this reasonably priced resource is your best choice. It's certain to be the most-used reference in your wireless arsenal for designing cutting-edge filters, amplifiers, RF switches, oscillators, and more. You get: Simplified calculations for impedance matching, analysis of wireless links, and completing a frequency plan Real-world examples of designing with RFIC's and MMIC's Full circuit and electromagnetic software simulations More

Wireless Transceiver Circuits - Woogeun Rhee 2018-09-03

Modern transceiver systems require diversified design aspects as various radio and sensor applications have emerged. Choosing the right architecture and understanding interference and linearity issues are important for multi-standard cellular transceivers and software-defined radios. A millimeter-wave complementary metal-oxide-semiconductor (CMOS) transceiver design for multi-Gb/s data transmission is another challenging area. Energy-efficient short-range radios for body area networks and sensor networks have recently received great attention. To meet different design requirements, gaining good system perspectives is important. *Wireless Transceiver Circuits: System Perspectives and Design Aspects* offers an in-depth look at integrated circuit (IC) design for modern transceiver circuits and wireless systems. Ranging in scope from system perspectives to practical circuit design for emerging wireless applications, this cutting-edge book: Provides system design considerations in modern transceiver design Covers both systems and circuits for the millimeter-wave transceiver design Introduces four energy-efficient short-range radios for biomedical and wireless connectivity applications Emphasizes key building blocks in modern transceivers and transmitters, including frequency synthesizers and digital-intensive phase modulators Featuring contributions from renowned international experts in industry and academia, *Wireless*

Transceiver Circuits: System Perspectives and Design Aspects makes an ideal reference for engineers and researchers in the area of wireless systems and circuits.

RF and Microwave Circuit Design - Charles E. Free 2021-09-14

RF and Microwave Circuit Design Provides up-to-date coverage of the fundamentals of high-frequency microwave technology, written by two leading voices in the field *RF and Microwave Circuit Design: Theory and Applications* is an authoritative, highly practical introduction to basic RF and microwave circuits. With an emphasis on real-world examples, the text explains how distributed circuits using microstrip and other planar transmission lines can be designed and fabricated for use in modern high-frequency passive and active circuits and sub-systems. The authors provide clear and accurate guidance on each essential aspect of circuit design, from the theory of transmission lines to the passive and active circuits that form the basis of modern high-frequency circuits and sub-systems. Assuming a basic grasp of electronic concepts, the book is organized around first principles and includes an extensive set of worked examples to guide student readers with no prior grounding in the subject of high-frequency microwave technology. Throughout the text, detailed coverage of practical design using distributed circuits demonstrates the influence of modern fabrication processes. Filling a significant gap in literature by addressing RF and microwave circuit design with a central theme of planar distributed circuits, this textbook: Provides comprehensive discussion of the foundational concepts of RF and microwave transmission lines introduced through an exploration of wave propagation along a typical transmission line Describes fabrication processes for RF and microwave circuits, including etched, thick-film, and thin-film RF circuits Covers the Smith Chart and its application in circuit design, S-parameters, Mason's non-touching loop rule, transducer power gain, and stability Discusses the influence of noise in high-frequency circuits and low-noise amplifier design Features an introduction to the design of high-frequency planar antennas Contains supporting chapters on fabrication, circuit parameters, and measurements Includes access to a companion website with PowerPoint slides for instructors, as well as supplementary resources Perfect for senior undergraduate students and first-year graduate students in electrical engineering courses, *RF and Microwave Circuit Design: Theory and Applications* will also earn a place in the libraries of RF and microwave professionals looking for a useful reference to refresh their understanding of fundamental concepts in the field.

RF and Microwave Transmitter Design - Andrei Grebennikov 2011-09-19

RF and Microwave Transmitter Design is unique in its coverage of both historical transmitter design and cutting edge technologies. This text explores the results of well-known and new theoretical analyses, while informing readers of modern radio transmitters' practical designs and their components. Jam-packed with information, this book broadcasts and streamlines the author's considerable experience in RF and microwave design and development.

An Engineer's Guide to Automated Testing of High-Speed Interfaces, Second Edition - Jose Moreira 2016-04-30

This second edition of *An Engineer's Guide to Automated Testing of High-Speed Interfaces* provides updates to reflect current state-of-the-art high-speed digital testing with automated test equipment technology (ATE). Featuring clear examples, this one-stop reference covers all critical aspects of automated testing, including an introduction to high-speed digital basics, a discussion of industry standards, ATE and bench instrumentation for digital applications, and test and measurement techniques for characterization and production environment. Engineers learn how to apply automated test equipment for testing high-speed digital I/O interfaces and gain a better understanding of PCI-Express 4, 100Gb Ethernet, and MIPI while exploring the correlation between phase noise and jitter. This updated resource provides expanded material on 28/32 Gbps NRZ testing and wireless testing that are becoming increasingly more pertinent for future applications. This book explores the current trend of merging high-speed digital testing within the fields of photonic and wireless testing.

RF and Microwave Power Amplifier Design - Andrei Grebennikov 2004-09-15

This is a rigorous tutorial on radio frequency and microwave power amplifier design, teaching the circuit design techniques that form the microelectronic backbones of modern wireless communications systems. Suitable for self-study, corporate training, or Senior/Graduate classroom use, the book combines analytical calculations and computer-aided design techniques to arm electronic engineers with every possible method to improve their designs and shorten their design time cycles.

Practical RF System Design - William F. Egan 2004-03-15

The ultimate practical resource for today's RF system design professionals. Radio frequency components and circuits form the backbone of today's mobile and satellite communications networks. Consequently, both practicing and aspiring industry professionals need to be able to solve ever more complex problems of RF design. Blending theoretical rigor with a wealth of practical expertise, *Practical RF System Design* addresses a variety of complex, real-world problems that system engineers are likely to encounter in today's burgeoning communications industry with solutions that are not easily available in the existing literature. The author, an expert in the field of RF module and system design, provides powerful techniques for analyzing real RF systems, with emphasis on some that are currently not well understood. Combining theoretical results and models with examples, he challenges readers to address such practical issues as: * How standing wave ratio affects system gain * How noise on a local oscillator will affect receiver noise figure and desensitization * How to determine the dynamic range of a cascade from module specifications * How phase noise affects system performance and where it comes from * How intermodulation products (IMs) predictably change with signal amplitude, and why they sometimes change differently. An essential resource for today's RF system engineers, the text covers important topics in the areas of system noise and nonlinearity, frequency conversion, and phase noise. Along with a wealth of practical examples using MATLAB(r) and Excel, spreadsheets are available for download from an FTP Web site to help readers apply the methods outlined in this important resource.

Practical RF Circuit Design for Modern Wireless Systems - Les Besser 2003

Nonlinear Microwave Circuits - Stephen A. Maas 1997

This classic text is an excellent resource and time-saver for engineers who need to tackle troublesome nonlinear components that remain in use despite recent advances in microwave technology. NONLINEAR

MICROWAVE CIRCUITS offers detailed, technically substantial coverage of key methods for the analysis, design, and optimization of nonlinear microwave circuits. Using minimal mathematics, it integrates in-depth, "readable" coverage of the underlying theories that guide these methods. This book is replete with valuable "how to" information on a wide range of topics.

High-Frequency Integrated Circuits - Sorin Voinigescu 2013-02-28

A transistor-level, design-intensive overview of high speed and high frequency monolithic integrated circuits for wireless and broadband systems from 2 GHz to 200 GHz, this comprehensive text covers high-speed, RF, mm-wave, and optical fibre circuits using nanoscale CMOS, SiGe BiCMOS, and III-V technologies. Step-by-step design methodologies, end-of chapter problems, and practical simulation and design projects are provided, making this an ideal resource for senior undergraduate and graduate courses in circuit design. With an emphasis on device-circuit topology interaction and optimization, it gives circuit designers and students alike an in-depth understanding of device structures and process limitations affecting circuit performance.

Terahertz Metrology - Mira Naftaly 2015-01-01

This new book describes modern terahertz (THz) systems and devices and presents practical techniques for accurate measurement with an emphasis on evaluating uncertainties and identifying sources of error. This is the first THz book on the market to address measurement methodologies and issues -- perfect for practitioners and aspiring practitioners wishing to learn good measurement practice and avoid pitfalls. This book provides a brief review of different THz systems and devices, followed by chapters detailing the measurement issues encountered in using each of the main types of THz systems, and a guide to performing measurements rigorously. Particular attention is given to evaluating uncertainties, and recognizing potential sources of errors. The main focus is on time-domain spectroscopy, by far the most widely used technique. Readers are also presented with examples of applications with the emphasis on utility, both in research and in industry.