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Fundamentals of RF and Microwave Transistor Amplifiers

John Wiley & Sons

A Comprehensive and Up-to-Date Treatment of RF and Microwave Transistor Amplifiers This book provides state-of-the-art coverage of RF and microwave transistor amplifiers, including low-noise, narrowband, broadband, linear, high-power, high-efficiency, and high-voltage. Topics covered include modeling, analysis, design, packaging, and thermal and fabrication considerations. Through a unique integration of theory and practice, readers will learn to solve amplifier-related design problems ranging from matching networks to biasing and stability. More than 240 problems are included to help readers test their basic amplifier and circuit design skills-and more than half of the problems feature fully worked-out solutions. With an emphasis on theory, design, and everyday applications, this book is geared toward students, teachers, scientists, and practicing engineers who are interested

in broadening their knowledge of RF and microwave transistor amplifier circuit design.

RF and Microwave Power Amplifier Design *McGraw Hill Professional*

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.

Analysis and Design of Microwave Transistor Amplifier Using Computer Program "MATLAB"

Handbook of RF and Microwave Power Amplifiers

Cambridge University Press

This is a one-stop guide for circuit designers and system/device engineers, covering everything from CAD to reliability.

Switchmode RF and Microwave Power Amplifiers *Academic Press*

Switchmode RF and Microwave Power Amplifiers, Third Edition is an essential reference book on developing RF and microwave switchmode power amplifiers. The book combines theoretical discussions with practical examples, allowing readers to design high-efficiency RF and microwave power amplifiers on different

types of bipolar and field-effect transistors, design any type of high-efficiency switchmode power amplifiers operating in Class D or E at lower frequencies and in Class E or F and their subclasses at microwave frequencies with specified output power, also providing techniques on how to design multiband and broadband Doherty amplifiers using different bandwidth extension techniques and implementation technologies. This book provides the necessary information to understand the theory and practical implementation of load-network design techniques based on lumped and transmission-line elements. It brings a unique focus on switchmode RF and microwave power amplifiers that are widely used in cellular/wireless, satellite and radar communication systems which offer major power consumption savings. Provides a complete history of high-efficiency Class E and Class F techniques Presents a new chapter on Class E with shunt capacitance and shunt filter to simplify the design of high-efficiency power amplifier with broader frequency bandwidths Covers different Doherty architectures, including integrated and monolithic implementations, which are and will be, used in modern communication systems to save power consumption and to reduce size and costs Includes extended coverage of multiband and broadband Doherty amplifiers with different frequency ranges and output powers using different bandwidth extension techniques Balances theory with practical implementation, avoiding a cookbook approach and enabling engineers to develop better designs, including hybrid, integrated and monolithic implementations

Microwave Active Circuit Analysis and Design *Academic*

Press

This book teaches the skills and knowledge required by today's RF and microwave engineer in a concise, structured and systematic way. Reflecting modern developments in the field, this book focuses on active circuit design covering the latest devices and design techniques. From electromagnetic and transmission line theory and S-parameters through to amplifier and oscillator design, techniques for low noise and broadband design; This book focuses on analysis and design including up to date material on MMIC design techniques. With this book you will: Learn the basics of RF and microwave circuit analysis and design, with an emphasis on active circuits, and become familiar with the operating principles of the most common active system building blocks such as amplifiers, oscillators and mixers Be able to design transistor-based amplifiers, oscillators and mixers by means of basic design methodologies Be able to apply established graphical design tools, such as the Smith chart and feedback mappings, to the design RF and microwave active circuits Acquire a set of basic design skills and useful tools that can be employed without recourse to complex computer aided design Structured in the form of modular chapters, each covering a specific topic in a concise form suitable for delivery in a single lecture Emphasis on clear explanation and a step-by-step approach that aims to help students to easily grasp complex concepts Contains tutorial questions and problems allowing readers to test their knowledge An accompanying website containing supporting material in the form of slides and software (MATLAB) listings Unique material on negative resistance oscillator design, noise analysis and three-port design techniques Covers the latest developments in

microwave active circuit design with new approaches that are not covered elsewhere

Advanced Techniques in RF Power Amplifier Design *Artech House*

This much-anticipated volume builds on the author's best selling and classic work, *RF Power Amplifiers for Wireless Communications* (Artech House, 1999), offering experienced engineers a more in-depth understanding of the theory and design of RF power amplifiers. An invaluable reference tool for RF, digital and system level designers, the book includes discussions on the most critical topics for professionals in the field, including envelope power management schemes and linearization.

Broadband RF and Microwave Amplifiers *CRC Press*

Broadband RF and Microwave Amplifiers provides extensive coverage of broadband radio frequency (RF) and microwave power amplifier design, including well-known historical and recent novel schematic configurations, theoretical approaches, circuit simulation results, and practical implementation strategies. The text begins by introducing two-port networks to illustrate the behavior of linear and nonlinear circuits, explaining the basic principles of power amplifier design, and discussing impedance matching and broadband power amplifier design using lumped and distributed parameters. The book then: Shows how dissipative or lossy gain-compensation-matching circuits can offer an important trade-off between power gain, reflection coefficient, and operating frequency bandwidth Describes the

design of broadband RF and microwave amplifiers using real frequency techniques (RFTs), supplying numerous examples based on the MATLAB® programming process Examines Class-E power amplifiers, Doherty amplifiers, low-noise amplifiers, microwave gallium arsenide field-effect transistor (GaAs FET)-distributed amplifiers, and complementary metal-oxide semiconductor (CMOS) amplifiers for ultra-wideband (UWB) applications Broadband RF and Microwave Amplifiers combines theoretical analysis with practical design to create a solid foundation for innovative ideas and circuit design techniques.

Microwave Circuit Design Using Linear and Nonlinear Techniques *John Wiley & Sons*

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.

Planar Microwave Engineering

A Practical Guide to Theory, Measurement, and Circuits *Cambridge University Press*

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.

The Load-pull Method of RF and Microwave Power Amplifier Design *John Wiley & Sons*

Using the load-pull method for RF and microwave power amplifier design This new book on RF power amplifier design, by industry expert Dr. John F. Sevic, provides comprehensive treatment of RF PA design using the load-pull method, the most widely used and successful method of design. Intended for the newcomer to load-pull, or the seasoned expert, the book presents a systematic method of generation of load-pull contour data, and matching network design, to rapidly produce a RF PA with first-pass success. The method is suitable from HF to millimeter-wave bands, discrete or integrated, and for high-power applications. Those engaged in design or fundamental research will find this book useful, as will the student new to RF and interested in PA design. The author presents a complete pedagogical methodology for RF PA design, starting with treatment of automated contour generation to identify optimum transistor performance with constant source power load-pull. Advanced methods of contour generation for simultaneous optimization of many variables, such as power, efficiency, and linearity are next presented. This is followed by treatment of optimum impedance identification using contour data to address specific objectives, such as optimum efficiency for a given linearity over a specific bandwidth. The final chapter presents a load-pull specific treatment of matching network design using load-pull contour

data, applicable to both single-stage and multi-stage PA's. Both lumped and distributed matching network synthesis methods are described, with several worked matching network examples. Readers will see a description of a powerful and accessible method that spans multiple RF PA disciplines, including 5G base-station and mobile applications, as well as sat-com and military applications; load-pull with CAD systems is also included. They will review information presented through a practical, hands-on perspective. The book: Helps engineers develop systematic, accurate, and repeatable approach to RF PA design Provides in-depth coverage of using the load-pull method for first-pass design success Offers 150 illustrations and six case studies for greater comprehension of topics

Reliable RF Power Amplifier Design Based on a Partitioning Design Approach *kassel university press GmbH*
Front cover -- Titelseite -- Impressum -- Acknowledgments -- Contents -- List of Abbreviations and Acronyms -- Abstract -- Zusammenfassung -- Chapter 1 Introduction -- 1.1 Principle of the Partitioning Design Approach -- 1.2 Dissertation Organization -- Chapter 2 Investigation of Planar-Interconnection -- 2.1 Active Chip Device Interconnection -- 2.1.1 Die Attach -- 2.1.2 Wire Bonding Pad-To-Microstrip -- 2.2 Microstrip-to-Microstrip Interconnection -- 2.2.1 Soldering -- 2.2.2 Multi-Wire Bonding -- 2.2.3 Copper Ribbon -- 2.2.4 Silver- Painting -- Chapter 3 Analysis and Modeling of Passive SMD Components -- 3.1 SMD Resistor -- 3.2 SMD Capacitor -- 3.3 SMD Inductor -- Chapter 4 Modeling of AlGaAs/GaAs HEMT Chip Device -- 4.1 AlGaAs/GaGa HEMT Chip -- 4.2 Modeling Approach Overview -- 4.3 Small-Signal Modeling --

4.3.1 Extrinsic Parameter Extraction -- 4.3.2 Intrinsic Parameter Extraction -- 4.4 Large-Signal Modeling -- 4.4.1 Gate Current and Charge Models -- 4.4.2 Drain Current Model -- 4.4.3 Model Verification -- Chapter 5 Demonstrator Design of a Class-AB Power Amplifier Following -- 5.1 Micro-Packaged Device Characterization -- 5.1.1 Small-Signal Performance -- 5.1.2 Large-Signal Performance -- 5.2 Bias Network Design -- 5.2.1 Drain Bias Network -- 5.2.2 Gate Bias Network -- 5.3 Matching Network Design -- 5.3.1 Matching Impedance Determination -- 5.4 Power Amplifier Performance Evaluation -- 5.4.1 Small-Signal Performance -- 5.4.2 Large-Signal Performance -- Chapter 6 Conclusions and Outlook -- Appendix -- Appendix A THLR In-Fixture Calibration -- Appendix B Precise Determination of Substrate Permittivity -- Appendix C Schematic Circuit of the Designed Power Amplifier Demonstrator -- Appendix D Power Amplifier Design Following the Conventional Design Approach -- References -- Back cover

Microwave Devices, Circuits and Subsystems for Communications Engineering *John Wiley & Sons*

Microwave Devices, Circuits and Subsystems for Communications Engineering provides a detailed treatment of the common microwave elements found in modern microwave communications systems. The treatment is thorough without being unnecessarily mathematical. The emphasis is on acquiring a conceptual understanding of the techniques and technologies discussed and the practical design criteria required to apply these in real engineering situations. Key topics addressed include: Microwave diode and transistor equivalent circuits

Microwave transmission line technologies and microstrip design Network methods and s-parameter measurements Smith chart and related design techniques Broadband and low-noise amplifier design Mixer theory and design Microwave filter design Oscillators, synthesisers and phase locked loops Each chapter is written by specialists in their field and the whole is edited by experience authors whose expertise spans the fields of communications systems engineering and microwave circuit design. Microwave Devices, Circuits and Subsystems for Communications Engineering is suitable for senior electrical, electronic or telecommunications engineering undergraduate students, first year postgraduate students and experienced engineers seeking a conversion or refresher text. Includes a companion website featuring: Solutions to selected problems Electronic versions of the figures Sample chapter

Solid-State Microwave Amplifier Design

A comprehensive treatment of microwave radio-frequency amplifier design, using solid-state devices such as GaAs FEETs, microwave bipolar transistors, IMPATT and Gunn diodes. Emphasis is on low-noise, high-gain and high-power transistor amplifiers for both wideband and narrowband applications, using scattering parameters as design tools. Includes computer simulation results of amplifier performance in design examples, problems and an extensive bibliography.

Distributed Power Amplifiers for RF and Microwave Communications

Artech House

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.

Microwave Systems Design *Springer Science & Business Media*

The aim of this book is to serve as a design reference for students and as an up-to-date reference for researchers. It also acts as an excellent introduction for newcomers to the field and offers established rf/microwave engineers a comprehensive refresher. The content is roughly classified into two – the first two chapters provide the necessary fundamentals, while the last three chapters focus on design and applications. Chapter 2 covers detailed treatment of transmission lines. The Smith chart is utilized in this chapter as an important tool in the synthesis of matching networks for microwave amplifiers. Chapter 3 contains an exhaustive review of microstrip circuits, culled from various references. Chapter 4 offers practical design information on solid state amplifiers, while Chapter 5 contains topics on the design of modern planar filters, some of which were seldom published

previously. A set of problems at the end of each chapter provides the readers with exercises which are compiled from actual university exam questions. An extensive list of references is available at the end of each chapter to enable readers to obtain further information on the topics covered.

The Design of Low-noise Microwave Bipolar Transistor Amplifiers

Intermodulation Distortion in Microwave and Wireless Circuits *Artech House*

In today's fast-changing, competitive environment, having an up-to-date information system (IS) is critical for all companies and institutions. Rather than creating a new system from scratch, reengineering is an economical way to develop an IS to match changing business needs. Using detailed examples, this practical book gives you methods and techniques for reengineering systems for flexibility and reliability. It helps you reengineer a system to continue to provide for business critical missions as well as achieve a smooth transformation to an up-to-date software technology environment. What's more, it shows you how to redevelop a flexible system that can evolve to meet future business objectives, reduce start time and save money in the reengineering process.

Doherty Power Amplifiers

From Fundamentals to Advanced Design Methods *Academic Press*

Doherty Power Amplifiers: From Fundamentals to Advanced Design Methods is a great resource for both RF and microwave engineers and graduate students who want to understand and implement the technology into future base station and mobile handset systems. The book introduces the very basic operational principles of the Doherty Amplifier and its non-ideal behaviors. The different transconductance requirements for carrier and peaking amplifiers, reactive element effect, and knee voltage effect are described. In addition, several methods to correct imperfections are introduced, such as uneven input drive, gate bias adaptation, dual input drive and the offset line technique. Advanced design methods of Doherty Amplifiers are also explained, including multistage/multiway Doherty power amplifiers which can enhance the efficiency of the amplification of a highly-modulated signal. Other covered topics include signal tracking operation which increases the dynamic range, highly efficient saturated amplifiers, and broadband amplifiers, amongst other comprehensive, related topics. Specifically written on the Doherty Power Amplifier by the world's leading expert, providing an in-depth presentation of principles and design techniques. Includes detailed analysis on correcting non-ideal behaviors of Doherty Power Amplifiers. Presents advanced Doherty Power Amplifier architectures.

Switchmode RF Power Amplifiers *Newnes*

A majority of people now have a digital mobile device whether it be a cell phone, laptop, or blackberry. Now that we have the mobility we want it to be more versatile and dependable; RF power amplifiers accomplish just that. These amplifiers take a

small input and make it stronger and larger creating a wider area of use with a more robust signal. Switching mode RF amplifiers have been theoretically possible for decades, but were largely impractical because they distort analog signals until they are unrecognizable. However, distortion is not an issue with digital signals—like those used by WLANs and digital cell phones—and switching mode RF amplifiers have become a hot area of RF/wireless design. This book explores both the theory behind switching mode RF amplifiers and design techniques for them. *Provides essential design and implementation techniques for use in cma2000, WiMAX, and other digital mobile standards *Both authors have written several articles on the topic and are well known in the industry *Includes specific design equations to greatly simplify the design of switchmode amplifiers

RF Power Amplifiers for Wireless Communications *Artech House Publishers*

This extensively revised edition offers a comprehensive, practical, up-to-date understanding of how to tackle a power amplifier design with confidence and quickly determine the cause of malfunctioning hardware.

High Frequency Techniques

An Introduction to RF and Microwave Design and Computer Simulation *John Wiley & Sons*

This textbook provides a fundamental approach to RF and microwave engineering. It is unusual for the thoroughness with which these areas are presented. The effect is that the reader

comes away with a deep insight not only of the design formulation but answers to how and why those formulations work. This is especially valuable for engineers whose careers involve research and product development, wherein the applicability of the applied principles must be understood. The scope of this book extends from topics for a first course in electrical engineering, in which impedances are analyzed using complex numbers, through the introduction of transmission lines that are analyzed using the Smith Chart, and on to graduate level subjects, such as equivalent circuits for obstacles in hollow waveguides, analyzed using Green's Functions. This book is a virtual encyclopedia of circuit design methods. Despite the complexity, topics are presented in a conversational manner for ease of comprehension. The book is not only an excellent text at the undergraduate and graduate levels, but is as well a detailed reference for the practicing engineer. Consider how well informed an engineer will be who has become familiar with these topics as treated in High Frequency Techniques: (in order of presentation) Brief history of wireless (radio) and the Morse code U.S. Radio Frequency Allocations Introduction to vectors AC analysis and why complex numbers and impedance are used Circuit and antenna reciprocity Decibel measure Maximum power transfer Skin effect Computer simulation and optimization of networks LC matching of one impedance to another Coupled Resonators Uniform transmission lines for propagation VSWR, return Loss and mismatch error The Telegrapher Equations (derived) Phase and Group Velocities The Impedance Transformation Equation for lines (derived) Fano's and Bode's matching limits The Smith Chart (derived) Slotted Line impedance measurement Constant Q

circles on the Smith Chart Approximating a transmission line with lumped L's and C's ABCD, Z, Y and Scattering matrix analysis methods for circuits Statist

Handbook of RF and Microwave Power Amplifiers *Cambridge University Press*

Whether you are an RF transistor designer, an amplifier designer or a system designer, this is your one-stop guide to RF and microwave transistor power amplifiers. A team of expert authors brings you up to speed on every topic, including: devices (Si LDMOS and VDMOS, GaAs FETs, GaN HEMTs), circuit and amplifier design (discrete, hybrid and monolithic), CAD, thermal design, reliability, and system applications/requirements for RF and microwave transistor amplifiers. Covering state-of-the-art developments and emphasising practical communications applications, this is the complete professional reference on the subject.

Radio-Frequency Electronics

Circuits and Applications *Cambridge University Press*

Covering the fundamentals applying to all radio devices, this is a perfect introduction to the subject for students and professionals.

Radio-Frequency and Microwave Communication Circuits

Analysis and Design *John Wiley & Sons*

The products that drive the wireless communication industry, such as cell phones and pagers, employ circuits that operate at

radio and microwave frequencies. Following on from a highly successful first edition, the second edition provides readers with a detailed introduction to RF and microwave circuits. Throughout, examples from real-world devices and engineering problems are used to great effect to illustrate circuit concepts. * Takes a top-down approach, describing circuits in the overall context of communication systems. * Presents expanded coverage of waveguides and FT mixers. * Discusses new areas such as oscillators design and digital communication. *An Instructor's Manual presenting detailed solutions to all the problems in the book is available from the Wiley editorial department.

Microwave De-embedding

From Theory to Applications *Academic Press*

This groundbreaking book is the first to give an introduction to microwave de-embedding, showing how it is the cornerstone for waveform engineering. The authors of each chapter clearly explain the theoretical concepts, providing a foundation that supports linear and non-linear measurements, modelling and circuit design. Recent developments and future trends in the field are covered throughout, including successful strategies for low-noise and power amplifier design. This book is a must-have for those wishing to understand the full potential of the microwave de-embedding concept to achieve successful results in the areas of measurements, modelling, and design at high frequencies. With this book you will learn: The theoretical background of high-frequency de-embedding for measurements, modelling, and design Details on applying the de-embedding concept to the

transistor's linear, non-linear, and noise behaviour The impact of de-embedding on low-noise and power amplifier design The recent advances and future trends in the field of high-frequency de-embedding Presents the theory and practice of microwave de-embedding, from the basic principles to recent advances and future trends Written by experts in the field, all of whom are leading researchers in the area Each chapter describes theoretical background and gives experimental results and practical applications Includes forewords by Giovanni Ghione and Stephen Maas

Modeling and Characterization of RF and Microwave Power FETs *Cambridge University Press*

This book is a comprehensive exposition of FET modeling, and is a must-have resource for seasoned professionals and new graduates in the RF and microwave power amplifier design and modeling community. In it, you will find descriptions of characterization and measurement techniques, analysis methods, and the simulator implementation, model verification and validation procedures that are needed to produce a transistor model that can be used with confidence by the circuit designer. Written by semiconductor industry professionals with many years' device modeling experience in LDMOS and III-V technologies, this was the first book to address the modeling requirements specific to high-power RF transistors. A technology-independent approach is described, addressing thermal effects, scaling issues, nonlinear modeling, and in-package matching networks. These are illustrated using the current market-leading high-power RF technology, LDMOS, as well as with III-V power

devices.

Valve and Transistor Audio Amplifiers *Elsevier*

The audio amplifier is at the heart of audio design. Its performance determines largely the performance of any audio system. John Linsley Hood is widely regarded as the finest audio designer around, and pioneered design in the post-valve era. His mastery of audio technology extends from valves to the latest techniques. This is John Linsley Hood's greatest work yet, describing the milestones that have marked the development of audio amplifiers since the earliest days to the latest systems. Including classic amps with valves at their heart and exciting new designs using the latest components, this book is the complete world guide to audio amp design. John Linsley Hood is responsible for numerous amplifier designs that have led the way to better sound, and has also kept up a commentary on developments in audio in magazines such as *The Gramophone*, *Electronics in Action* and *Electronics and Wireless World*. He is also the author of *The Art of Linear Electronics* and *Audio Electronics* published by Newnes. Complete world guide to audio amp design written by world famous author Covers classic amps to new designs using latest components Includes the best of valves as well as best of transistors

Microwave RF Antennas and Circuits

Nonlinearity Applications in Engineering *Springer*

This book describes a new concept for analyzing RF/microwave circuits, which includes RF/microwave antennas. The book is

unique in its emphasis on practical and innovative microwave RF engineering applications. The analysis is based on nonlinear dynamics and chaos models and shows comprehensive benefits and results. All conceptual RF microwave circuits and antennas are innovative and can be broadly implemented in engineering applications. Given the dynamics of RF microwave circuits and antennas, they are suitable for use in a broad range of applications. The book presents analytical methods for microwave RF antennas and circuit analysis, concrete examples, and geometric examples. The analysis is developed systematically, starting with basic differential equations and their bifurcations, and subsequently moving on to fixed point analysis, limit cycles and their bifurcations. Engineering applications include microwave RF circuits and antennas in a variety of topological structures, RFID ICs and antennas, microstrips, circulators, cylindrical RF network antennas, Tunnel Diodes (TDs), bipolar transistors, field effect transistors (FETs), IMPATT amplifiers, Small Signal (SS) amplifiers, Bias-T circuits, PIN diode circuits, power amplifiers, oscillators, resonators, filters, N-turn antennas, dual spiral coil antennas, helix antennas, linear dipole and slot arrays, and hybrid translinear circuits. In each chapter, the concept is developed from the basic assumptions up to the final engineering outcomes. The scientific background is explained at basic and advanced levels and closely integrated with mathematical theory. The book also includes a wealth of examples, making it ideal for intermediate graduate level studies. It is aimed at electrical and electronic engineers, RF and microwave engineers, students and researchers in physics, and will also greatly benefit all engineers who have had no formal

instruction in nonlinear dynamics, but who now desire to bridge the gap between innovative microwave RF circuits and antennas and advanced mathematical analysis methods.

High Frequency and Microwave Engineering *Newnes*

CD-ROM contains: PUFF 2.1 for construction and evaluation of circuits.

Load-Pull Techniques with Applications to Power Amplifier Design *Springer Science & Business Media*

This first book on load-pull systems is intended for readers with a broad knowledge of high frequency transistor device characterization, nonlinear and linear microwave measurements, RF power amplifiers and transmitters. Load-Pull Techniques with Applications to Power Amplifier Design fulfills the demands of users, designers, and researchers both from industry and academia who have felt the need of a book on this topic. It presents a comprehensive reference spanning different load-pull measurement systems, waveform measurement and engineering systems, and associated calibration procedures for accurate large signal characterization. Besides, this book also provides in-depth practical considerations required in the realization and usage of load-pull and waveform engineering systems. In addition, it also provides procedure to design application specific load-pull setup and includes several case studies where the user can customize architecture of load-pull setups to meet any specific measurement requirements. Furthermore, the materials covered in this book can be part of a full semester graduate course on microwave device characterization and power amplifier design.

Practical RF Circuit Design for Modern Wireless Systems

Active Circuits and Systems, Volume 2 *Artech House*

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.

RF and Microwave Transmitter Design *John Wiley & Sons*

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.

Modern RF and Microwave Measurement Techniques *Cambridge University Press*

A comprehensive, hands-on review of the most up-to-date techniques in RF and microwave measurement, including practical advice on deployment challenges.

Microwave and RF Design of Wireless Systems *John Wiley & Sons*

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.

Nonlinear Microwave Circuits *Wiley-IEEE Press*

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.

Introduction to RF Power Amplifier Design and Simulation

CRC Press

Introduction to RF Power Amplifier Design and Simulation fills a gap in the existing literature by providing step-by-step guidance for the design of radio frequency (RF) power amplifiers, from analytical formulation to simulation, implementation, and measurement. Featuring numerous illustrations and examples of real-world engineering applications, this book: Gives an overview of intermodulation and elaborates on the difference between linear and nonlinear amplifiers Describes the high-frequency model and transient characteristics of metal-oxide-semiconductor field-effect transistors Details active device modeling techniques for transistors and parasitic extraction methods for active devices Explores network and scattering parameters, resonators, matching networks, and tools such as the Smith chart Covers power-sensing devices including four-port directional couplers and new types of reflectometers Presents RF filter designs for power amplifiers as well as application examples of special filter types Demonstrates the use of computer-aided design (CAD) tools, implementing systematic design techniques Blending theory with practice, Introduction to RF Power Amplifier Design and Simulation supplies engineers,

researchers, and RF/microwave engineering students with a valuable resource for the creation of efficient, better-performing, low-profile, high-power RF amplifiers.

Designing Bipolar Transistor Radio Frequency Integrated Circuits

Artech House

If you're looking for an in-depth and up-to-date understanding bipolar transistor RFIC design, this practical resource is a smart choice. Unlike most books on the market that focus on GaAs MESFET or silicon CMOS process technology, this unique volume is dedicated exclusively to RFIC designs based on bipolar technology. Until now, critical GaAs HBT and SiGe HBT process technologies have been largely neglected in reference books. This book fills this gap, offering you a detailed treatment of this increasingly important topic. You discover a wide range of circuit topologies that are optimized for maximum performance with bipolar devices. From discussions of key applications (Bluetooth, UWB, GPS, WiMax) and architectures... to in-depth coverage of fabrication technologies and amplifier design... to a look at performance tradeoffs and production costs, this book arms you with complete design know-how for your challenging work in the field.