Introduction To Microwave Transistors Transistor | b599de67c77b3c9440709eababc33dc


Microwaves : Introduction To Circuits, Devices And AntennasThis book is an introduction to microwave and RF signal modeling and measurement techniques for field effect transistors. It assumes only a basic course in electronic circuits and prerequisite knowledge for readers to apply the results shows how the theories and methods presented can be used in practice. Whether you use transistor models for evaluation of device processing and you need to understand the methods behind the models you use, or you want to develop models for existing and new device types, this is your complete guide to parameter extraction. The first chapters offer a general overview and discussion of microwave signal and noise matrices, and microwave measurement techniques. The following chapters address modeling techniques for field effect transistors and cover models such as small signal, large signal, noise, and the artificial neural network based.

Nonlinear Transistor Model Parameter Extraction TechniquesThe book discusses active devices and circuits for microwave communications. It begins with the basics of device physics and then explores the design of microwave communication systems including analysis and the implementation of different circuits. In addition to classic topics in microwave active devices, such as p-i-n diodes, Schottky diodes, recovery diodes, BJTs, HBTs, MESFETs, HEMTs, and various microwave circuits like switches, phase shifters, attenuators, mixers, and power amplifiers, the book also covers modern areas such as Class F power amplifiers, direct frequency modulators, linearizers, and equalizers. Most of the examples are based on practical devices available in commercial markets and they present operational. The book uses analytical methods to derive values of circuit components without the need for any circuit design tools, in order to explain the theory of the circuits. All the given analytical expressions are also cross verified using commercially available microwave circuit design tools, and each chapter includes relevant diagrams and solved problems. It is intended for scholars in the field of electronic and communication engineering.

Microwave Active Devices : Vacuum And Solid StateThe 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 reference. 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.

Microwave EngineeringThis is a textbook for undergraduate and graduate courses on microwave engineering, written in a student-friendly manner with many diagrams and illustrations. It works towards developing a foundation for further study and research in the field. The book begins with a brief history of microwaves and introduction to core concepts of EM waves and wave guides. It covers equipment and concepts involved in the study and measurement of microwaves. The book also discusses microwave propagation in space, microwave antennas, and all aspects of R & D. Chapter 1, summarizes, supplemented with solved examples, and end-of-chapter exercises. The book also includes a bonus chapter which serves as a lab manual with 15 simple experiments detailed with proper circuits, precautions, sample readings, and quiz/revision questions for each experiment. This book will be useful to instructors and students alike.

Microwave DevicesAchieve accurate and reliable parameter extraction using this complete survey of state-of-the-art techniques and methods. A team of experts from industry and academia provides you with insights into a range of key topics, including parasitics, intrinsic extraction, statistics, extraction uncertainty, nonlinear and DC parameters, self-heating and traps, noise, and package effects. Learn how similar approaches to parameter extraction can be applied to different technologies. A variety of real-world industrial examples and case studies provide you with the theory and methods presented can be used in practice. Whether you use transistor models for evaluation of device processing and you need to understand the methods behind the models you use, or you want to develop models for existing and new device types, this is your complete guide to parameter extraction.

Microwave ElectronicsThis 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.

Modeling and SimulationThe fundamentals of microwave and wireless communications technology are critical to the telecommunications and data acquisition fields. Field devices and mobile telephones involve commonly available equipment such as cellular telephones and satellite dishes, technicians as well as engineers must learn the basics of the technology. Microwave and Wireless Communications Technology offers a practical, device-based approach to the study of microwave and wireless communications. Student objectives,
numerous questions and problems, and end-of-chapter summaries reinforce the theory in each chapter. Answers to odd-numbered questions are provided in the back of the book. Math is kept to the lowest practical level, and the last section of each chapter is a collection of the key equations laid out for the student. A Windows diskette with supplementary instructor material is available on request with adoption. Fundamentals of microwave and wireless communications Written for Electronics Engineering Technicians courses.

Microwave De-embedding A broadly based introduction to high frequency and microwave engineering that covers all the important topics in this field. With the recent expansion in mobile communications and the increasing use of the microwave frequency bands for these wireless applications, attention has become focused on this area. While the treatment is from first principles, due emphasis is placed on practical applications and a number of design examples are included to support the theory.

Microwave Devices, Circuits and Subsystems for Communications Engineering Four leaders in the field of microwave circuit design share their newest insights into the latest aspects of the technology. The third edition of Microcircuit Design Using Linear and Nonlinear Techniques delivers a useful comprehensive analysis of circuit properties to circuit design techniques for maximizing performance in communication and radar systems. This new edition retains what remains relevant from previous editions of this celebrated book and adds brand-new content on CMOS technology, GaN, SiC, frequency range, and feedback power amplifiers in the millimeter range region. The third edition contains over 200 pages of new material. The distinguished engineers, academics, and authors emphasize the commercial applications in telecommunications and cover all aspects of transistor technology. Software tools for design and microwave circuits are included as an accompaniment to the book. In addition to information about small and large-signal amplifier design and power amplifier design, readers will benefit from the book’s treatment of a wide variety of topics, like: A n in-depth discussion of the foundations of RF and microwave systems, including Maxwell’s equations, applications of the technology, analog and digital requirements, and elementary definitions. A treatment of lumped and distributed elements, including a discussion of the parasitic effects on lumped elements. Descriptions of active devices, including diodes, microwave transistors, heterojunction bipolar transistors, and microwave FET. Two-port networks, including S-Parameters from SPICE analysis and the derivation of transducer power gain. Perfect for microwave integrated circuit designers, the third edition of Microcircuit Design Using Linear and Nonlinear Techniques also has a place on the bookshelves of electrical engineering researchers and graduate students. It’s comprehensive take on all aspects of transistors by world-renowned experts in the field places this book at the vanguard of microwave circuit design research.

Modeling and Characterization of RF and Microwave Power FETs We have reached the double conclusion: that invention is choice, and this choice is imperatively governed by the sense of scientific beauty. Hadamard (1945), Princeton University Press, by permission. The great majority of all sources and amplifiers of microwave energy, and all devices for receiving or detecting microwaves, use a semiconductor active element. The development of microwave semiconductor devices, described in this book, has proceeded from the simpler, two-terminal devices such as GUNN or IMPATT devices, which originated in the 1960s, to the sophisticated monolithic circuit MESFET three-terminal active elements, of the 1980s and 1990s. The microwave field has experienced a renaissance in electrical engineering departments in the last few years, and much of this growth has been associated with microwave semiconductor devices. The University of Massachusetts has recently developed a well recognized program in microwave engineering. Much of the momentum for this program has been provided by interaction with industrial companies, and the influx of a large number of industry-supported students. This program had a need for a course in microwave semiconductor devices, which covered the physical aspects, as well as the aspects of interest to the engineer who needed to integrate such devices in his designs. It was also felt that it would be important to introduce the most recently developed devices (HFETs, HBTs, and other advanced devices) as early as possible.

RF & Microwave Design Essentials The recent shift in focus from defense and government work to commercial wireless efforts has caused the job of the typical microwave engineer to change dramatically. The modern microwave and RF engineer is expected to know customer expectations, market trends, manufacturing technologies, and factory models to a degree that is unprecedented in the

Microwave Wireless Communications This work presents an overview of the various facets of microwave device behavioral modeling technology, from the mathematical formulation to the required laboratory extraction, focusing its attention on one of the less covered aspects: the embedding and de-embedding procedures associated with the behavioral model extraction process. The discussion starts with the revision of some of the most important behavioral modeling tools, explaining the three most important types of behavioral model formats (polynomial, artificial neural networks, and table-based models) and their instantiation in the context of microwave transistors. Then, it will evolve to the behavioral model parameter extraction procedures, reviewing the required specific microwave instrumentation and correspondent calibration and de-embedding of measurement data. Finally, this chapter will illustrate the use of embedding and de-embedding procedures in the behavioral modeling context, giving a particular emphasis on the needed behavioral model inversion techniques.

Ferroelectrics in Microwave Devices, Circuits and Systems This book covers the use of devices in microwave circuits and includes such topics as semiconductor theory and transistor performance, CAD considerations, intermodulation, noise figure, signal handling, S- parameter mapping, narrow- and broadband techniques, packaging and thermal considerations.

Modern Microwave Transistors Comprehensive and up-to-date coverage of currently used transistors for commercial and military applications. Authors are recognized experts with previous publications. Updated descriptions of state-of-the-art devices available on Wiley W db site.

Practical Microwave Waves This Book is Intended As An Introductory Text On Microwave Circuits, Devices And A ntennas. It Can Be Used Not Only By The Students Of Physics A nd Engineering AT The Graduate A nd The Postgraduate Levels, But Also By Practicing Engineers, Technicians A nd A n Some I ndustry. It Contains Comprehensive U p-To-Date Text For A Standard Course On Transmission Lines, Guided Waves, Passive Components (Including F initie Devices), Periodic Structures A nd Filters, Microwave Vacuum Tubes, Solid State Devices A nd Their Applications, Strip Lines, Mics A nd A ntennas. It A lso Includes Microwave M easurements A t L ength. The Written T ext Is Supplemented With A Large N umber Of Suitable Diag rams A nd A Good N umber Of Solved Examples For Reinfor ceing Th e K ey A spect s. Each Chapter Has A Select Bibliography/References A nd A Good N umber Of Problems A nd A Review Questions At T he End.


Microwave Engineering CD-ROM contains: PUFF 2.1 for construction and evaluation of circuits.
Microwave Transistor Amplifiers RF & Microwave Design Essentials This is an indispensable tool for the RF/Microwave engineer as well as the scientist in the field working on high frequency circuit applications. You will discover: * Electri...
Fundamentals of RF and Microwave Transistor Amplifiers

This book on Microwave Engineering presents the subject in simplified manner with equal weightage to both introductory and advanced level topics. The book encompasses the entire undergraduate requirements of the microwave engineering course with plentiful pedagogical aids. The students will find this book extremely handy during the course. Salient Features: Demonstration of Monolithic Microwave Integrated Circuits with emphasis on device structure, wafer processing technology, circuit Design and RF performance? Dedicated Chapter on Solid State Semiconductor Devices and Microwave Amplifier Design and Matching? In depth concept analysis supported by stepwise solution of derivations

RF and Microwave Device Handbook: A Comprehensive and Up-to-Date Treatment of RF and Microwave Technology

A modern-day RF and microwave technology book that provides an in-depth coverage of RF and microwave transistor amplifiers, including low-noise, broadband, high-gain, high-power, high-efficiency, and all-voltage topics covered includes 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 in-depth of the problems features 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.

Microwave Systems Design: The ultimate handbook on microwave circuit design with CAD. Full of tips and insights from seasoned industry veterans, this 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 microwave CAD, are described. State-of-the-art coverage includes microwave transistors (HEMTs, MODFETs, MESFETs, HBTs, and more) and 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 receiver, which is compared in detail against CAD predictions; examples of actual circuit designs with photographs of completed circuits; and tables of design formulae.

Microwave Active Circuit Analysis and Design: DC Circuits


Microwave Circuit Design: Using Linear and Nonlinear Techniques

Offering a single-volume reference for high-frequency semiconductor devices, this handbook covers basic circuit characteristics, system level concepts and constraints, simulation and modeling of devices, and packaging. Individual chapters detail the properties and characteristics of each semiconductor device type, including: Varactors, Schottky diodes, transit-time devices, BJT, HBT, MOSFET, MESFET, and HEMTs. Written by leading researchers in the field, the R.F. and Microwave Semiconductor Device Handbook provides an excellent starting point for programs involving development, technology comparison, or acquisition of R.F. and wireless semiconductor devices.

Designing Bipolar Transistor Radio Frequency Integrated Circuits

RF and Microwave Amplifiers is currently in the forefront as a fundamental technology in numerous industrial and commercial applications. As applications of RF and microwave technology continue to evolve as this technology becomes a common factor in the scientific and engineering communities, it is imperative that university students and practicing scientists and engineers become thoroughly familiar with the measurement principles, electronics, and design fundamentals underlying this technology. RF and Microwave Circuit Design is the first step toward mastering this powerful subject, and information contained within the pages of this book will make every key electronic, measurement, and design principle you need a simple task. The book introduces concepts on a wide range of materials and has several advantages over existing texts, including: 1. The presentation of a series of scientific postulates and axioms, which lays the foundation for any of the engineering sciences and is unique to this book compared with similar RF and microwave texts. 2. The presentation of classical laws and principles of electricity and magnetism, all inter-related, conceptually and graphically. 3. There is a shift of emphasis of Maxwell's equations, and instead has been applied place on simple yet fundamental concepts that underlie these equations. This shift of emphasis will promote a deeper understanding of the electronics, particularly at high microwave frequencies. 4. Fundamentals of electronics have been amply treated, which makes an easy transition to RF/Microwave principles and prevents a gap of knowledge in the reader's mind.

MICROWAVE DEVICES AND CIRCUIT DESIGN

Today's wireless communications and information systems are heavily based on microwave technology. Current trends indicate that in the future along with - crowaves, the millimeter wave and Terahertz technologies will be used to meet the growing bandwidth and overall performance requirements. Moreover, motivated by the needs of the society, new industry sectors are gaining ground, such as w- less sensor networks, safety and security systems, automotive, medical, environmental monitoring, and consumer products etc. Furthermore, the rapid growth and acceptance of wireless and mobile technology characterizes the future of these systems to be more user/consumer-friendly, i.e. adaptable, reconfigurable and cost-effective. The mobile phone is a typical example
which today is much more than just a phone; it includes a range of new functionalities such as Internet, GPS, TV, etc. To handle, in a cost effective way, all available and new future standards, the growing number of the channels and bandwidth both the mobile handsets and the associated systems have to be agile (adaptable/reconfigurable). The complex societal needs have initiated considerable activities in the field of cognitive and software-defined radios and triggered extensive research in adequate components and technology platforms. To meet the stringent requirements of these systems, especially in agility and cost, new components with enhanced performances and new functionalities are needed. In this sense the components based on ferroelectrics have greater -tential and already are gaining ground.

Advanced RF & Microwave Circuit Design: Detailing the active and passive aspects of microwaves, Microwave Engineering: Concepts and Fundamentals covers everything from wave propagation to reflection and refraction, guided waves, and transmission lines, providing a comprehensive understanding of the underlying principles at the core of microwave engineering. This encyclopedic text not only

Microwave and Wireless Communications Technology: Microwave transistors are essential for the design of high-frequency nonlinear circuits, such as power amplifiers or mixers. Among the existing modeling techniques, measurement-based approaches have gained huge attention from researchers in the last decades. Especially, nonlinear measurements-driven model extraction is preferred for transistors exploited in the design of power amplifiers and mixers. This chapter mainly deals with the generation of empirical transistor models starting from large-signal time-domain waveforms. Specifically, a widely used model available in commercial CAD tools is adopted, and the extraction procedure of the model parameters is outlined in detail. Moreover, the advantage of using time-domain waveforms at different frequencies is highlighted. More specifically, by making use of time-domain waveforms at frequencies in the kHz-MHz range, one can separately model the behavior of the transistor output current generator, which is more prone to low-frequency dispersive effects. In fact, at low frequencies the effect of the nonlinear transistor capacitance is significantly reduced and, therefore, already “de-embedded” from the measured time-domain waveforms. Once the model of the output current generator is available, one can use high-frequency measurements to determine the nonlinear capacitor (or charge). Several modeling examples of different transistor technologies, such as gallium-arsenide and gallium-nitride, are reported.

Microwave Circuit Design Using Linear and Nonlinear Techniques: 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-parameter 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 MIC 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 A accompany 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

High Frequency and Microwave Engineering: This textbook presents a unified treatment of theory, analysis and design of microwave devices and circuits. It is designed to address the needs of undergraduate students of electronics and communications engineering for a course in microwave engineering as well as those of the students pursuing M.Sc. courses in electronics science. The main objective is to provide students with a thorough understanding of microwave devices and circuits, and to acquaint them with some of the methods used in circuit analysis and design. Several types of planar transmission lines such as stripline, microstrip, slot line and a few other structures have been explained. The important concepts of scattering matrix and Smith chart related to design problems have been discussed in detail. The performance and geometry of microwave transistors—both bipolar and field-effect—have been analyzed. Microwave passive components such as couplers, power dividers, attenuators, phase shifters and circulators have been comprehensively dealt with. Finally, the analysis and design aspects of microwave transistor amplifiers and oscillators are presented using the scattering parameters technique. Numerous solved problems and chapter-end questions are included for practice and reinforcement of the concepts.

The Design of Modern Microwave Oscillators for Wireless Applications

Microwave Field-Effect Transistors

Parameter Extraction and Complex Nonlinear Transistor Models: To design and develop fast and effective microwave wireless systems today involves addressing the three different levels: Device, circuit, and system. This book presents the links and interactions between the three different levels rather than providing just a comprehensive coverage of one specific level. With the aim of overcoming the sectional knowledge of microwave engineers, this will be the first book focused on explaining how the three different levels interact by taking the reader on a journey through the different levels going from the theoretical background to the practical applications. Explains the links and interactions between the three different design levels of wireless communication transmitters: device, circuit, and system Presents state-of-the-art, challenges, and future trends in the field of wireless communication systems Covers all aspects of both mature and cutting-edge technologies for semiconductor devices for wireless communication applications Many circuit designs outlining the limitations derived from the available transistor technologies and system requirements Explains how new microwave measurement techniques can represent an essential tool for microwave modelers and designers.