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Rf Circuit Design Theory Applications 2nd Edition

This newly revised and expanded
edition of the 2003 Artech House

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classic, Radio Frequency Integrated Circuit Design, serves as an up-to-date, practical reference for complete RFIC know-how. The second edition includes numerous updates, including greater coverage of CMOS PA design, RFIC design

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with on-chip components, and more worked examples with simulation results. By emphasizing working designs, this book practically transports you into the authors' own RFIC lab so you can fully understand the function of each

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design detailed in this book. Among the RFIC designs examined are RF integrated LC-based filters, VCO automatic amplitude control loops, and fully integrated transformer-based circuits, as well as image reject mixers and power

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amplifiers. If you are new to RFIC design, you can benefit from the introduction to basic theory so you can quickly come up to speed on how RFICs perform and work together in a communications device. A thorough examination of

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RFIC technology guides you in knowing when RFICs are the right choice for designing a communication device. This leading-edge resource is packed with over 1,000 equations and more than 435 illustrations that support key

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topics."

Some basic knowledge of electronics is assumed, but the essential features of RF are fully described, including the important topic of receiver dynamic which is often overlooked in basic textbooks. The

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theory and circuit descriptions are geared towards genuine design applications rather than the oversimplifications and skeleton circuits of many college texts. During his career, the late Joe Carr was one of the world's leading

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writers on electronics and radio, and an authority on the design and use of RF systems. Whether you are looking for a complete self-study course in RF technology, or a concise reference text to dip into, this book has the solution. A

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complete course in understanding
and designing RF circuits Practical
design knowhow from a world-class
author

The striking feature of this book is
its coverage of the upper GHz
domain. However, the latest

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technologies, applications and broad range of circuits are discussed. Design examples are provided including cookbook-like optimization strategies. This state-of-the-art book is valuable for researchers as well as for engineers

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in industry. Furthermore, the book serves as fruitful basis for lectures in the area of IC design.

This authoritative new resource presents practical techniques for optimizing RF and microwave circuits for applications in radar

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systems design with an emphasis on current and emerging technologies. Professionals learn how to design RF components for radar systems and how to choose appropriate materials and packaging methods. This book explains how to integrate

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components while avoiding higher-level assembly issues and troubleshooting problems on the measurement bench. Theory and practical information are provided while addressing topics ranging from heat removal to digital circuit

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integration. This book is divided into three sections: the first section introduces the basics of microwave design, including transmission line theory and common materials used in RF circuits. The methods for creating accurate device models for

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both passive and active circuits are presented. The second part details the design of power amplifiers, low noise amplifiers, and passive elements. Both conventional and state-of-the-art design techniques are included with ample 'tips and

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tricks.' The last section concludes with a focus on component integration providing details on design methods for military operations, high manufacturing yield, and preventing measurement issues.

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Microwave Circuit Design Using
Linear and Nonlinear Techniques
RF and Microwave Engineering
RF Circuit Design
EMC and the Printed Circuit Board
Circuit Design for RF Transceivers
The ultimate practical resource

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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

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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,

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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,

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*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*

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*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*

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*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*

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*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*

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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

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*FTP Web site to help readers
apply the methods outlined in
this important resource.*

*This second, updated edition of
the best-selling Radio-
Frequency Electronics
introduces the basic concepts*

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and key circuits of radio-frequency systems. It covers the fundamental principles applying to all radio devices, from wireless single-chip data transceivers to high-power broadcast transmitters. This

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new edition is extensively revised and expanded throughout, including additional chapters on radar, digital modulation, GPS navigation, and S-parameter circuit analysis. New worked

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examples and end-of-chapter problems are included to aid and test understanding of the topics covered, as well as numerous extra figures to provide a visual aid to learning. Key topics covered include

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filters, amplifiers, oscillators, modulators, low-noise amplifiers, phase lock loops, transformers, waveguides, and antennas. Assuming no prior knowledge of radio electronics, this is a perfect introduction to

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the subject. It is an ideal textbook for junior or senior courses in electrical engineering, as well as an invaluable reference for professional engineers in this area.

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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

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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

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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

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optimization, it gives circuit designers and students alike an in-depth understanding of device structures and process limitations affecting circuit performance.

RF and Microwave Circuit

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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

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*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*

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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

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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

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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

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technology. Throughout the text, detailed coverage of practical design using distributed circuits demonstrates the influence of modern fabrication processes. Filling a significant gap in

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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

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and microwave transmission lines introduced through an exploration of wave propagation along a typical transmission line Describes fabrication processes for RF and microwave circuits,

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*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*

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*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*

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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

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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

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*looking for a useful reference to
refresh their understanding of
fundamental concepts in the
field.*

*RF Components and Circuits
With Low Noise Oscillators
Radio-Frequency Electronics*

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*Analog/RF and Mixed-Signal
Circuit Systematic Design
Theory and Applications*

This book is intended for senior undergraduate and graduate students as well as practicing engineers who are

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involved in design and analysis of radio frequency (RF) circuits. Detailed tutorials are included on all major topics required to understand fundamental principles behind both the main sub-circuits required

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to design an RF transceiver and the whole communication system. Starting with review of fundamental principles in electromagnetic (EM) transmission and signal propagation, through detailed practical analysis

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of RF amplifier, mixer,
modulator, demodulator, and
oscillator circuit
topologies, all the way to
the basic system
communication theory behind
the RF transceiver
operation, this book

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systematically covers all relevant aspects in a way that is suitable for a single semester university level course. Offers readers a complete, self-sufficient tutorial style textbook; Includes all relevant topics

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required to study and design an RF receiver in a consistent, coherent way with appropriate depth for a one-semester course; The labs and the book chapters are synchronized throughout a 13-week semester so that

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the students first study each sub-circuit and the related theory in class, practice problems, work out design details and then build and test the sub-circuit in the lab, before moving onto the next

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chapter; Includes detailed derivations of all key equations related to new concepts.

Applicable for bookstore catalogue

Modern wireless communications hardware is

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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

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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

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materials. Connectors and cables are also described, as are discrete passive components, antennas, low-noise amplifiers, oscillators, and frequency synthesizers. Practical measurement techniques are

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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

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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

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and for practising
engineers.

This is the first
comprehensive book to
address the design of RF
MEMS-based circuits for use
in high performance wireless
systems. A groundbreaking

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research and reference tool,
the book enables you to
understand the realm of
applications of RF MEMS
technology; become
knowledgeable of the wide
variety and performance
levels of RF MEMS devices;

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and partition the architecture of wireless systems to achieve greater levels of performance. This innovative resource also guides you through the design process of RF MEMS-based circuits, and

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establishes a practical knowledge base for the design of high-yield RF MEMS-based circuits. The book features exercises and detailed case studies on working RF MEMS circuits that help you decide what

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approaches best fit your design constraints. This unified treatment of RF MEMS-based circuit technology opens up a new world of solutions for meeting the unique challenges of low power/portable wireless

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products.

Practical RF Power Design
Techniques

RF Circuit Design Techniques
for MF-UHF Applications

Passive RF and Microwave
Integrated Circuits

RF Circuits and Applications

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for Practicing Engineers
High-Frequency Integrated
Circuits

A much-needed, up-to-date
guide to the rapidly growing
area of RF circuit design, this
book walks readers through a

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whole range of new and improved techniques for the analysis and design of receiver and transmitter circuits, illustrating them through examples from modern-day communications systems. The

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application of MMIC to RF design is also discussed.

Magnetic resonance imaging, semiconductor processing, and RFID are some of the critical applications within the medium frequency (MF) to ultrahigh

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frequency (UHF) range that require RF designers to have a solid understanding of analytical and experimental RF techniques. Designers need to be able to design components and devices cost effectively,

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and integrate them with high efficiency, minimal loss, and required power. Computer-aided design (CAD) tools also play an important part in helping to reduce costs and improve accuracy through optimization.

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RF Circuit Design Techniques for MF-UHF Applications explains how to design, simulate, and implement RF/microwave components and devices for applications within the medium frequency (MF) to ultrahigh

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frequency (UHF) range. The book makes RF design simple by expertly blending theory, simulation, and practical application examples. A Practical Guide to RF Circuit Design in the MF-UHF Range:

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Theory, Simulation, and Real-World Application Examples

After a review of network parameters used in the analysis of RF components and devices, the book examines MF-UHF design techniques in detail.

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These include techniques for designing high-power microstrip circuits, directional couplers, transformers, composite and multilayer inductors, filters, combiners/dividers, and RFID systems. For every device, the

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book gives the required theory and then explains the verification process with CAD tools. In addition, each design is illustrated with real-life implementation examples that use a variety of CAD tools such

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as MATLAB®, Mathcad,
HFSSTM, Ansoft Designer®,
Sonnet®, and PSpice®. Design
tables, curves, and charts are
included to demonstrate an
efficient design process.
Throughout, the book also offers

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practical hints to help engineers shorten the design time. Design MF-UHF Devices More Cost-Effectively The book reflects the optimum design methodology used in RF engineering, from the application of theory, to

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simulation for verification, to experimentation. Packed with useful techniques, tips, and examples, it is an invaluable resource for engineers, researchers, and students working in the MF-UHF range.

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"Do you want to design a wireless transmitter or receiver for hand-held telephones? Have you wondered why the printed circuit wires on high-frequency circuits don't always run in a straight line? This valuable text

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will answer all of your questions regarding component parasitics and circuit characterization for rf/microwave amplifier, oscillator, and filter circuit design and analysis. You will understand why capacitors act

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as inductors and vice versa and why amplifiers work like oscillators, while oscillators for local area networks work more like local area heaters.

Application of the information in
Introduction to Microwave

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Circuits will reduce design-cycle time and costs, markedly increasing the probability of first-time success in printed circuit or monolithic microwave integrated circuit (MMIC) design. Several approaches are taken

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into consideration, such as the effects of currents on the ground plane, bypass and coupling capacitors, and nonlinear effects in linear circuits. Featured topics include:

- * Incorporation of component

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parasitics in the design cycle *
Closed form solution to
oscillator design * Odd mode
stability analysis * PIN diode
analysis for high-power
switching applications An
integrated design example of a

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1.25 GHz amplifier, oscillator, and filter printed circuit is also included, which could be useful in printed circuit board designs from tens of megahertz to tens of gigahertz. Introduction to Microwave Circuits provides the

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tools necessary to analyze or synthesize microwave circuits. This text is an essential reference for undergraduate students, microwave engineers, and administrators. Also, it will assist experienced designers in

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other fields to meet the current rapid expansion of communication system applications and work effectively in microwave circuit design. About the Author Robert J. Weber began his prolific

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career in the Solid State
Research Laboratory at the
Collins Radio Company, later a
part of Rockwell International.
For 25 years, he worked on
advanced development and
applied research in the one- to

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ten-gigahertz frequency range and received several distinguished awards for his valuable contributions to the field. Dr. Weber is involved in ongoing experimental research in integrating microwave

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circuits with other devices such as MEMS, chemical sensors, and electro-optics. Also, he teaches microwave circuit design and fiber-optics communications at the Department of Electrical and Computer Engineering, Iowa

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State University. Dr. Weber is an
IEEE Fellow." Sponsored by:
IEEE Microwave Theory and
Techniques Society.

RF Circuit Design Theory and
Applications Prentice Hall
An Introduction to RF and

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Microwave Design and
Computer Simulation
Wireless Communication
Electronics
Radio Frequency Transistors
Design, Theory, and Layout
Made Simple

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Cellular telephones,
satellite communications and
radar systems are adding to
the increasing demand for
radio frequency circuit
design principles. At the
same time, several
generations of digitally-

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oriented graduates are missing the essential RF skills. This book contains a wealth of valuable design information difficult to find elsewhere. It's a complete 'tool kit' for successful RF circuit

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design. Written by experienced RF design engineers from Motorola's semiconductors product section. Book covers design examples of circuits (e.g. amplifiers; oscillators; switches; pulsed power;

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modular systems; wiring
state-of-the-art devices;
design techniques).

Despite the fact that in the
digital domain, designers
can take full benefits of
IPs and design automation
tools to synthesize and

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design very complex systems, the analog designers' task is still considered as a 'handcraft', cumbersome and very time consuming process. Thus, tremendous efforts are being deployed to develop new design methodologies in

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the analog/RF and mixed-signal domains. This book collects 16 state-of-the-art contributions devoted to the topic of systematic design of analog, RF and mixed signal circuits. Divided in the two parts Methodologies

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and Techniques recent theories, synthesis techniques and design methodologies, as well as new sizing approaches in the field of robust analog and mixed signal design automation are presented for

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researchers and R/D
engineers.

Highlighting the challenges
RF and microwave circuit
designers face in their day-
to-day tasks, RF and
Microwave Circuits,
Measurements, and Modeling

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explores RF and microwave circuit designs in terms of performance and critical design specifications. The book discusses transmitters and receivers first in terms of functional circuit block and then examines each block

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individually. Separate articles consider fundamental amplifier issues, low noise amplifiers, power amplifiers for handset applications and high power, power amplifiers. Additional

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chapters cover other circuit functions including oscillators, mixers, modulators, phase locked loops, filters and multiplexers. New chapters discuss high-power PAs, bit error rate testing, and

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nonlinear modeling of heterojunction bipolar transistors, while other chapters feature new and updated material that reflects recent progress in such areas as high-volume testing, transmitters and

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receivers, and CAD tools. The unique behavior and requirements associated with RF and microwave systems establishes a need for unique and complex models and simulation tools. The required toolset for a

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microwave circuit designer includes unique device models, both 2D and 3D electromagnetic simulators, as well as frequency domain based small signal and large signal circuit and system simulators. This unique

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suite of tools requires a design procedure that is also distinctive. This book examines not only the distinct design tools of the microwave circuit designer, but also the design procedures that must be

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followed to use them
effectively.

**BUILD THE CIRCUITS THAT MAKE
WIRELESS WORK** If you like
hands-on electronics, you'll
love **Secrets of RF Circuit
Design, Third Edition**, by
Popular Electronics writer

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Joe Carr. This update of the favorite RF circuit guide of thousands of electronics enthusiasts takes you inside wireless technology with step-by-step, illustrated directions for dozens of usable projects. This super

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guide demonstrates RF theory as it shows you how to overcome the technical and materials challenges facing those who build real-world electronics. You learn how to design and build receiver circuits, RF bridges,

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amplifiers, receiver
preselectors, simple
spectrum analyzers, and time
domain reflectometers. You
get detailed insights into
simple RF instruments, as
well as UHF and microwave
components...complete

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troubleshooting
guidance...and handy parts
lists and components
sources. This new edition
packs the latest information
on directional and hybrid
couplers, and seven new
chapters on demodulators,

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circuit vectors, measuring L-C circuits, and filtering circuits against EMI. "...a great book on wireless technology for persons starting out in RF electronics, as well as for RF technicians and ham radio

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operators.” ---Cotter W.
Sayre, author of The
Complete RF Technician's
Handbook (Amazon.com review)
RF MEMS Circuit Design for
Wireless Communications
Introduction to Microwave
Circuits

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**Fundamentals of Wireless
Communications**

**Radio Frequency Integrated
Circuits and Systems**

**Radio Frequency Circuit
Design**

This book provides a fundamental and
practical introduction to radio frequency

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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-

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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

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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

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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 the methods can be applied productively in RF engineering practice Incorporates various design examples

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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:\](http://)

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www.fh-

[dortmund.de/gustrau_rf_textbook](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

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practitioners,engineers (e.g. application engineer) working in this area willalso find this book of interest.

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

This accessible, new reference work

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shows how and why RF energy is created within a printed circuit board and the manner in which propagation occurs. With lucid explanations, this book enables engineers to grasp both the fundamentals of EMC theory and signal integrity and the mitigation process needed to prevent an EMC event. Author

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Montrose also shows the relationship between time and frequency domains to help you meet mandatory compliance requirements placed on printed circuit boards. Using real-world examples the book features: Clear discussions, without complex mathematical analysis, off flux minimization concepts Extensive

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analysis of capacitor usage for various applications Detailed examination of components characteristics with various grounding methodologies, including implementation techniques An in-depth study of transmission line theory A careful look at signal integrity, crosstalk, and termination

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The art of RF circuit design made simple...
Radio Frequency circuits are the
fundamental building blocks in a vast
array of consumer electronics and wireless
communication devices. Jeremy Everard's
unique combination of theory and practice
provides insight into the principles of
operation, together with invaluable

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guidance to developing robust and long-lasting circuit designs. Features include: *

- * Simplified approach to RF circuit theory and device modelling using algebraic approximations to illustrate the important underlying principles.
- * A comprehensive design guide to low noise oscillators backed by a full theoretical treatment,

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based on the author's latest research, and including extensive design examples. * Key concepts of broad and narrow band small signal amplifiers, mixers, and high-efficiency broadband power amplifier design. * How to develop large signal circuit models with simulation and tuning in real time. * Charts of performance

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parameters for RF chip components.

Advanced undergraduate and postgraduate students in RF and microwave circuit design will benefit from the practical and highly illustrative approach. Design and research engineers and industrial technical managers, will appreciate the basic and detailed theory, analysis, design and

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operation of RF and microwave circuits.
Introduction to Radio Frequency Design
RF CMOS Power Amplifiers: Theory,
Design and Implementation
Planar Microwave Engineering
Circuits and Applications
A Practical Guide to Theory,
Measurement, and Circuits

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This book provides an insight into techniques that are commonly used in the design of modern RF communications equipment. Although the emphasis is on equipment or circuits that are part of communication

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systems, information is provided on a variety of general electronic design topics. It is assumed that the reader has a general understanding of basic electronic concepts, such as that required to pass the

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U.S. General or the Canadian Advanced Amateur exam. No special mathematical skills should be necessary to make use of the material that is presented - basic Grade 10 algebra will be sufficient. No calculus will be used at

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any time. Some basic trigonometry is required in a few places, but a simple tutorial on the necessary concepts is provided in one of the Appendices. This is not intended to be a formal text book with rigorous

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explanations, derivations,
and difficult mathematics.
It is assumed that the
reader would prefer to get a
good understanding of how
circuits work, with just
enough detail so that
designs can be analyzed in a

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basic manner. Where appropriate, approximations and "rules of thumb" will be disclosed that can often simplify the design process. The book includes several design examples. This practical and

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comprehensive book
introduces RF circuit design
fundamentals while
emphasizing a circuit-based
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explanations, practical applications, examples, and exercises.

The fundamental methods of radio frequency design using mathematics to develop intuition for RF circuits and systems are explained

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here with an emphasis on applications of simple circuit models. The book prepares readers to actually design HF, VHF and UHF equipment.

Radar RF Circuit Design
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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-

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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.

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comprehensive introduction to
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for obtaining the best performance
in discrete and integrated amplifier
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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

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components of wireless synthesizers
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

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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

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filters Covers capacitors, inductors,
and other components with their
behavior at RF frequencies
discussed in detail

This comprehensive resource
explains the theory of RF circuits
and systems and the practice of

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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

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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

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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

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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

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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

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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. The ultimate handbook on microwave circuit design with CAD.

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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.

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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

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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

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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

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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

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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

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photographs of completed circuits;
and tables of design formulae.

RF and Microwave Transmitter
Design

Fundamentals of RF Circuit Design

Radio Frequency Integrated Circuits
and Technologies

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Secrets of RF Circuit Design
Advances in Analog and RF IC
Design for Wireless Communication
Systems

**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**

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**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**

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the complex world of RF design. Completely restructured and reorganized with new content, end-of-chapter exercises, illustrations, and an appendix, the book

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**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**

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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

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**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**

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Edition is an ideal book for engineers and managers who work in RF circuit design and for courses in electrical or electronic engineering.

RF CMOS Power Amplifiers:

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**Theory Design and
Implementation focuses on
the design procedure and
the testing issues of CMOS
RF power amplifiers. This is
the first monograph
addressing RF CMOS power**

**amplifier design for
emerging wireless
standards. The focus on
power amplifiers for short
is distance wireless
personal and local area
networks (PAN and LAN),**

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however the design techniques are also applicable to emerging wide area networks (WAN) infrastructure using micro or pico cell networks. The book discusses CMOS

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**power amplifier design
principles and theory and
describes the architectures
and tradeoffs in designing
linear and nonlinear power
amplifiers. It then details
design examples of RF**

CMOS power amplifiers for short distance wireless applications (e, g., Bluetooth, WLAN) including designs for multi-standard platforms. Design aspects of RF circuits in deep

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submicron CMOS are also discussed. RF CMOS Power Amplifiers: Theory Design and Implementation serves as a reference for RF IC design engineers and RD and R&D managers in

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industry, and for graduate students conducting research in wireless semiconductor IC design in general and with CMOS technology in particular. Useful information on radio-

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frequency circuit design is hard to find. Most of it comes in the form of highly technical manufacturer's literature & bulky math-oriented textbooks, or from oversimplified books for

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**amateurs & hobbyists. So,
most electronics
practitioners end up having
to learn RF techniques by
trial & error. Now, thanks
to Irving Gottlieb's Practical
RF Power Design**

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Techniques, circuit designers can have at their fingertips all the hands-on instruction they need to translate RF theory into functioning hardware. Gottlieb thoroughly

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**explains the theory behind
RF circuit design &
operation. But, unlike other
books, he doesn't stop
there. He supports his
discussion of principles &
formulas with examples**

taken from real-world applications. He uses actual values for electronic components currently on the market, instead of hypothetical figures that are hard for readers to

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visualize. And, by concentrating on general uses that aren't affected by changes in industry standards, Gottlieb ensures that the book will enjoy a long shelf life.

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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

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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

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whose careers involve research and product development, wherein the applicability of the applied principles must be understood. The scope of this book extends from

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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

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book is a virtual encyclopedia of circuit design methods. Despite the complexity, topics are presented in a conversational manner for ease of comprehension. The

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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.

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**Radio Frequency
Allocations Introduction to
vectors AC analysis and
why complex numbers and
impedance are used Circuit
and antenna reciprocity
Decibel measure Maximum**

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**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**

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**lumped L's and C's ABCD,
Z, Y and Scattering matrix
analysis methods for
circuits Statist
RF/Microwave Circuit
Design for Wireless
Applications**

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**An Introduction to RF
Circuit Design for
Communication Systems
Introduction to RF Circuits
and Design Techniques
Principles and practical
applications**

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RF and Microwave Circuit Design

Advances in Analog and RF IC
Design for Wireless
Communication Systems gives
technical introductions to
the latest and most
significant topics in the

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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

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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

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(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

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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

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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

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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

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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

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face References to
specialist papers for
further reading

This updated and greatly
expanded second edition of
the popular text RF Circuit
Design: Theory and
Applications provides a

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comprehensive coverage of the fundamental concepts of high-frequency circuit analysis and design. Each of the 10 chapters includes a Practically Speaking section in which the authors present realistic circuit examples.

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These carefully worked out circuits enable the reader to directly apply the theoretical aspects developed in this text. The text is self-contained and requires only a minimum amount of analog circuit

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design and electromagnetics;
it is well-suited for junior
and senior-level
undergraduates as well as
practicing engineers.
The growth in RF and
wireless/mobile computing
devices that operate at

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microwave frequencies has resulted in explosive demand for integrated circuits capable of operating at such frequencies in order to accomplish functions like frequency division, phase shifting, attenuation, and

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isolators and circulators for antennas. This book is an introduction to such ICs, combining theory and practical applications of those devices. In addition to this combined theory and application approach, the

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author discusses the critical importance of differing fabrication materials on the performance of ICs at different frequencies. This is an area often overlooked when choosing ICs for RF and

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microwave applications, yet it can be a crucial factor in how an IC performs in a given application. Gives reader a solid background in an increasingly important area of circuit design
Emphasis on combination of

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theoretical discussions with
practical application
examples In-depth discussion
of critical, but often
overlooked topic of
different fabrication
material performances at
varying frequencies

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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,

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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

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microwave design and
development.

RF and Microwave Circuits,
Measurements, and Modeling
Radio Frequency and Design
Applications