

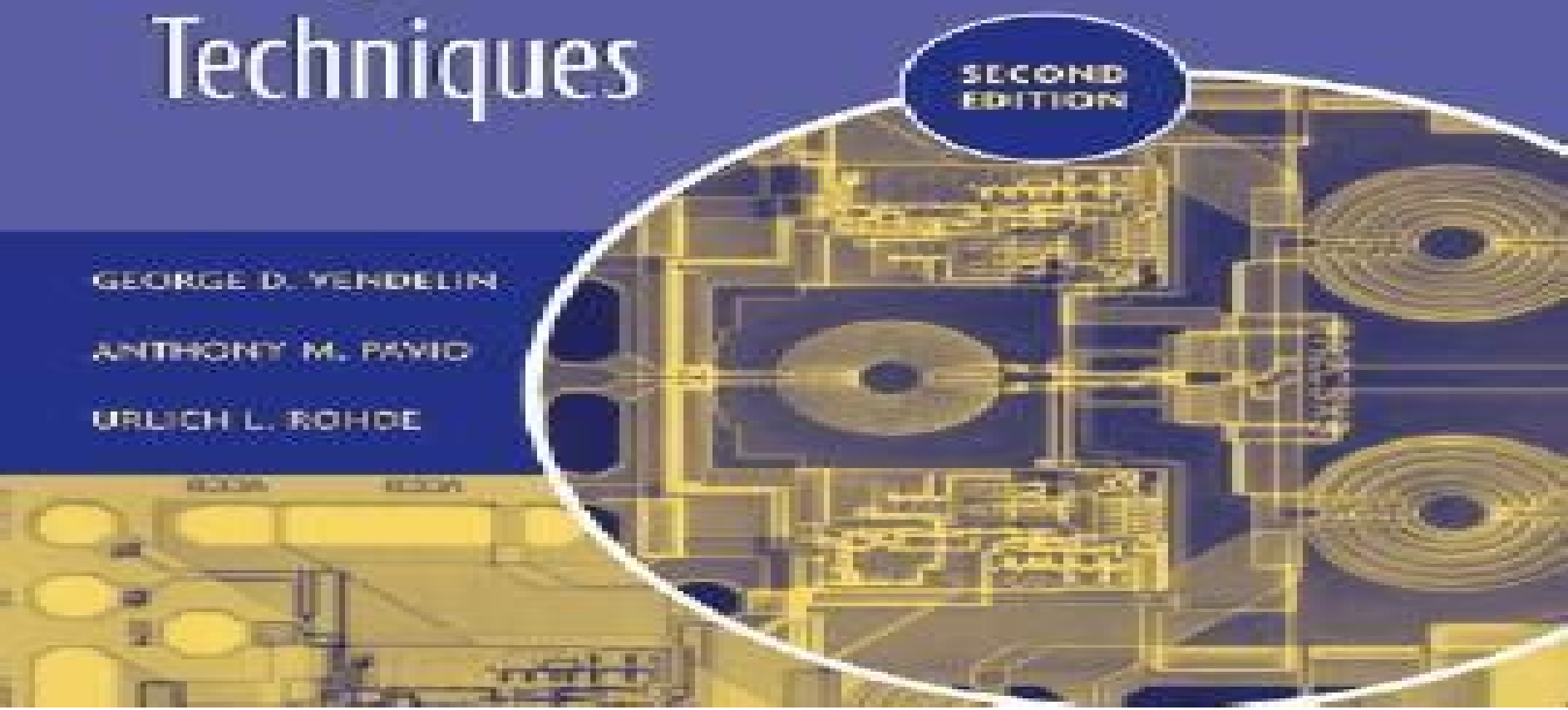
Microwave Circuit Design Using Linear and Nonlinear Techniques

SECOND
EDITION

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Microwave Circuit Design Using Linear And Nonlinear Techniques

Richard C. Dorf



Microwave Circuit Design Using Linear And Nonlinear Techniques:

Microwave Circuit Design Using Linear and Nonlinear Techniques George D. Vend, 2017-07-17 Microwave Circuit Design Using Linear and Nonlinear Techniques By George D Vend *Microwave Circuit Design Using Linear and Nonlinear Techniques* George D. Vendelin, Anthony M. Pavio, Ulrich L. Rohde, 2005-10-03 The ultimate handbook on microwave circuit design with CAD Full of tips and insights from seasoned industry veterans Microwave Circuit Design offers practical proven advice on improving the design quality of microwave passive and active circuits while cutting costs and time Covering all levels of microwave circuit design from the elementary to the very advanced the book systematically presents computer aided methods for linear and nonlinear designs used in the design and manufacture of microwave amplifiers oscillators and mixers Using the newest CAD tools the book shows how to design transistor and diode circuits and also details CAD s usefulness in microwave integrated circuit MIC and monolithic microwave integrated circuit MMIC technology Applications of nonlinear SPICE programs now available for microwave CAD are described State of the art coverage includes microwave transistors HEMTs MODFETs MESFETs HBTs and more high power amplifier design oscillator design including feedback topologies phase noise and examples and more The techniques presented are illustrated with several MMIC designs including a wideband amplifier a low noise amplifier and an MMIC mixer This unique one stop handbook also features a major case study of an actual anticollision radar transceiver which is compared in detail against CAD predictions examples of actual circuit designs with photographs of completed circuits and tables of design formulae **Microwave Circuit Design Using Linear and Nonlinear Techniques** George D. Vendelin, Anthony M. Pavio, Ulrich L. Rohde, Matthias Rudolph, 2021-04-27 Four leaders in the field of microwave circuit design share their newest insights into the latest aspects of the technology The third edition of Microwave Circuit Design Using Linear and Nonlinear Techniques delivers an insightful and complete analysis of microwave circuit design from their intrinsic and 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 An 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 Microwave Circuit 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

Kombinierte Zeit-Frequenzbereichsmethoden zum Entwurf von Mikrowellenoszillatoren Marion Filleböck,1996

Optimiertes Design von Mikrowellen-Leistungstransistoren und Verstärkern im X-Band Harald

Klockenhoff,2010-12-23 Die vorliegende Arbeit beschreibt die Entwicklung einer neuartigen Transistor Peripherie f r Mikrowellen Leistungstransistoren und den Entwurf von monolithischen Gallium Arsenid GaAs und Gallium Nitrid GaN Leistungsverst rker im X Band 8 12 GHz Die neuartige Peripherie der Leistungstransistoren f hrt zu einer gleichm igeren Aussteuerung der einzelnen Transistorzellen Hieraus resultiert eine h here Verst rkung und Effizienz sowie eine bessere Linearit t insbesondere im Frequenzbereich oberhalb von 10 GHz Diese Verbesserung der Transistoreigenschaften kann bei linearen Verst rkern und bei Schaltverst rkern genutzt werden sowohl bei Verwendung von Koplanar als auch von Mikrostreifen Technologie Die hier vorgestellten Leistungsverst rker erreichen eine Ausgangsleistung von bis zu 16 W im X Band bei einer Chipfl che von nur 2 2 mm x 3 3 mm was einen internationalen Rekord in Bezug auf die Leistung pro Chipfl che darstellt Derartige Verst rker erlauben eine kompaktere Gestaltung und ein geringeres Gewicht vieler Mikrowellen Systeme wie beispielsweise weltraumgest tzter Kommunikationseinrichtungen Ebenso sind mit diesen Verst rkern neue Systemkonzepte wie etwa Active Phased Arrays f r luftgest tzte RADAR Anlagen leichter oder erstmals realisierbar **RF and Microwave Circuits, Measurements, and Modeling** Mike Golio,Janet Golio,2018-10-08 Highlighting the challenges RF and microwave circuit designers face in their day to day tasks RF and Microwave Circuits Measurements and Modeling 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 individually Separate articles consider fundamental amplifier issues low noise amplifiers power amplifiers for handset applications and high power power amplifiers Additional 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 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 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 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 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 followed to use them effectively **Optimierung von koplanaren**

GaN-MMIC-Leistungsverstärkern im X-Band Erhan Ersoy, 2020-03-13 Seit seiner Erfindung wurde der Transistor stetig weiterentwickelt und hat die bis dato in Verstärkern verwendeten Elektronenröhren immer mehr verdrängt. Auch bei Radar und Satellitenanwendungen im X-Band 8 bis 12 GHz setzten sich die Halbleiter Bauelemente zunehmend durch. Für derartige Anwendungen werden Leistungsverstärker in Form von monolithisch integrierten Mikrowellenschaltkreisen MMIC mit einer Ausgangsleistung von 10 W benützt. Die vorliegende Arbeit stellt geeignete koplanare X-Band MMIC Leistungsverstärker auf Basis von GaN Transistoren vor. Zudem soll das Potential der koplanaren Variante im Vergleich zur gängigen Mikrostreifenleitungsversion geklärt werden, da Verstärker mit Mikrostreifenleitungen unter sonst gleichen Bedingungen bessere Kennwerte liefern. Drei Optimierungsansätze werden untersucht, um Defizite der Koplanarleitung zu kompensieren. Zwei dieser Ansätze liefern signifikante Verbesserungen, mit denen sich das Leistungspotenzial koplanarer MMICs weiter ausschöpfen lässt. Die Machbarkeit aufgebauter Verstärkermodule wird demonstriert. Es werden koplanare GaN MMIC Verstärker vorgestellt, die eine maximale PAE von 37 %, eine GT von 26 dB und eine maximale Leistung $P_{out, max}$ von 12 W erzielen. Eine State of the Art Betrachtung zeigt, dass die Kennwerte der entworfenen Leistungsverstärker im Mittelfeld der mit Mikrostreifenleitungen realisierten Leistungsverstärker MMIC liegen. Mit diesen MMICs wurden hybride Verstärkermodule aufgebaut. Neben einem Single Ended Verstärker wurden auch balancierte Leistungsverstärker realisiert. Die balancierten Verstärker erreichen bei 10 GHz ein $P_{out, max}$ von 22 W, ein GT von 24 dB und eine PAE von 31 %.

Electronics, Power Electronics, Optoelectronics, Microwaves, Electromagnetics, and Radar Richard C. Dorf, 2018-10-03 In two editions spanning more than a decade, The Electrical Engineering Handbook stands as the definitive reference to the multidisciplinary field of electrical engineering. Our knowledge continues to grow, and so does the Handbook. For the third edition, it has expanded into a set of six books, carefully focused on a specialized area or field of study: Electronics, Power Electronics, Optoelectronics, Microwaves, Electromagnetics, and Radar. This book represents a concise yet definitive collection of key concepts, models, and equations in these areas, thoughtfully gathered for convenient access. Electronics, Power Electronics, Optoelectronics, Microwaves, Electromagnetics, and Radar delves into the fields of electronics, integrated circuits, power electronics, optoelectronics, electromagnetics, light waves, and radar, supplying all of the basic information required for a deep understanding of each area. It also devotes a section to electrical effects and devices and explores the emerging fields of microlithography and power electronics. Articles include defining terms, references, and sources of further information. Encompassing the work of the world's foremost experts in their respective specialties, Electronics, Power Electronics, Optoelectronics, Microwaves, Electromagnetics, and Radar features the latest developments, the broadest scope of coverage, and new material in emerging areas.

HF-Leistungsverstärker in modernen Silizium- und Verbindungshalbleitern-Technologien Daniel Gruner, 2012-11-01 Kurzbeschreibung Diese Dissertation beschäftigt sich

mit HF Leistungsverstärkern auf Basis moderner Transistortechnologien und verfolgt aktuelle Trends im Bereich Silizium und III V Verbindungshalbleiter. Dies umfasst den Entwurf von innovativen HF Leistungstransistoren und Verstärkern, Aspekte zur Charakterisierung und Aufbautechnik sowie den Vergleich zum aktuellen Stand von Wissenschaft und Technik. Im ersten Teil richtet sich der Fokus auf MMIC Leistungsverstärker für 5,6 GHz WLAN Anwendungen. Hierbei wird zunächst auf den Entwurf eines Push Pull PAs in einer 0,25 µm BiCMOS Technologie eingegangen. Mit einer Betriebsspannung von lediglich 1,8 V zeigt dieser Verstärker ein breitbandiges Verhalten und erreicht im Frequenzbereich 5,6–6,2 GHz eine Sättigungsleistung von 24 dBm. Der maximale Wirkungsgrad liegt bei 27 % PAE 18 % mit einer Verstärkung von typischerweise 9 dB. Um diese Performance weiter zu verbessern, wird eine innovative Transformer Combining Topologie vorgestellt. Im Vergleich zum Push Pull Verstärker kann diese eine erhöhte Verstärkung 12 dB sowie einen exzellenten PAE-Maximalwert von 23 % bei sonst ähnlichen Eigenschaften erzielen. Als zweite Zielstellung wird die Steigerung der HF Leistungs-Performance innerhalb moderner BiCMOS Technologien verfolgt. In diesem Rahmen stehen die Analyse der Entwurfs- und die Evaluierung von LDMOS Transistoren für Anwendungen bis in den 6 GHz-Bereich im Mittelpunkt. Der Einfluss von Transistorgröße und Geometrie sowie auch der Stabilitätsnetzwerke wird unter Verwendung HF-optimierter LDMOS-Strukturen untersucht. Die Evaluierung der Source Load Pull Messungen wird mit Hilfe mehrerer hybrider Verstärkermodule durchgeführt. Als eine der ersten Veröffentlichungen kann diese Arbeit eine 6 GHz LDMOS Implementation in einer Standard BiCMOS Technologie mit einer Ausgangsleistung von mehr als 1 W und einem Wirkungsgrad über 40 % demonstrieren. Der dritte Teil beschäftigt sich mit GaN Doherty Verstärkern für das 6 GHz-Band. Die Kombination von Doherty-Konzept mit Strategien zur Harmonischen Terminierung, einem auf Device-Referenzebene optimierten Entwurf und der entwickelten Chip Wire Aufbautechnik erlaubt die Realisierung von einem der ersten 6 GHz Doherty Verstärker mit exzellenter Wirkungsgrad-Leistungs- sowie Linearitäts-Performance. Unter Verwendung zweier GaN Chip Transistoren kann eine maximale Ausgangsleistung von 41,5 dBm mit einem maximalen Wirkungsgrad von 63 % erreicht werden. Im 6 dB Backoff-Punkt wird dabei ein exzellenter Wirkungsgrad von 49 % erzielt.

Description: This work focuses on RF power amplifiers based on modern transistor technologies and investigates current trends in silicon as well as III V semiconductors. This includes the design of innovative RF power devices and amplifiers, characterization and assembling techniques as well as the comparison to other state-of-the-art achievements. The first part focuses on MMIC power amplifiers for WLAN applications in the 5,6 GHz range. Based on a 0,25 µm BiCMOS technology, a low voltage push pull power amplifier using integrated transformers is presented. At a supply voltage of 1,8 V, this fully integrated amplifier achieves a wideband performance showing a maximum output power of 24 dBm across 5,6–6,2 GHz. A maximum efficiency of 27 % PAE 18 % is obtained with a small signal gain of typically 9 dB. To further improve this performance, an innovative transformer combining topology is developed. Compared to the push pull amplifier, this topology achieves an increased gain of 12 dB and an enhanced maximum PAE of up to 23 % with otherwise similar characteristics.

showing state of the art performance The RF power enhancement of Bi CMOS technologies is a second major aim of this work In this context the analysis design and evaluation of medium voltage LDMOS FETs for wireless applications up to 6 GHz is presented Using RF optimized NLD MOS transistors power devices of different sizes were fabricated in a standard 0.25 μ m BiCMOS technology The influences of the finger geometry and the stabilization networks on the RF performance are studied Power evaluation of the LDMOS transistors is carried out by means of hybrid power amplifier modules As one of the first contributions this work shows a 6 GHz LDMOS implementation in a standard BiCMOS technology that achieves an output power of greater than 1 W with a drain efficiency of more than 40 % In the third part a harmonically tuned GaN Doherty amplifier targeted for vehicular applications at 6 GHz is presented The combination of the Doherty concept with harmonic tuning strategies an optimized design approach and the developed chip wire assembly technology results in one of the first Doherty amplifiers implemented for the 6 GHz frequency range with excellent efficiency output power and linearity performance Using two bare die GaN devices a maximum output power of 41.5 dBm with 63% peak drain efficiency is obtained At 6 dB output power back off an excellent drain efficiency of still 49 % can be achieved

Taschenbuch der Hochfrequenztechnik H.H. Meinke, F.W. Gundlach, 2013-11-27 **RF / Microwave Circuit Design for Wireless**

Applications Ulrich L. Rohde, Matthias Rudolph, 2013-01-07 Provides researchers and engineers with a complete set of modeling design and implementation tools for tackling the newest IC technologies Revised and completely updated RF Microwave Circuit Design for Wireless Applications Second Edition is a unique state of the art guide to wireless integrated circuit design that provides researchers and engineers with a complete set of modeling design and implementation tools for tackling even the newest IC technologies It emphasizes practical design solutions for high performance devices and circuitry incorporating ample examples of novel and clever circuits from high profile companies Complete with excellent appendices containing working models and CAD based applications this powerful one stop resource Covers the entire area of circuit design for wireless applications Discusses the complete system for which circuits are designed as well as the device technologies on which the devices and circuits are based Presents theory as well as practical issues Introduces wireless systems and modulation types Takes a systematic approach that differentiates between designing for battery operated devices and base station design RF Microwave Circuit Design for Wireless Applications Second Edition is an indispensable tool for circuit designers engineers who design wireless communications systems and researchers in semiconductor technologies telecommunications and wireless transmission systems

[The Electrical Engineering Handbook - Six Volume Set](#) Richard C. Dorf, 2018-12-14 In two editions spanning more than a decade The Electrical Engineering Handbook stands as the definitive reference to the multidisciplinary field of electrical engineering Our knowledge continues to grow and so does the Handbook For the third edition it has grown into a set of six books carefully focused on specialized areas or fields of study Each one represents a concise yet definitive collection of key concepts models and equations in its respective domain

thoughtfully gathered for convenient access Combined they constitute the most comprehensive authoritative resource available Circuits Signals and Speech and Image Processing presents all of the basic information related to electric circuits and components analysis of circuits the use of the Laplace transform as well as signal speech and image processing using filters and algorithms It also examines emerging areas such as text to speech synthesis real time processing and embedded signal processing Electronics Power Electronics Optoelectronics Microwaves Electromagnetics and Radar delves into the fields of electronics integrated circuits power electronics optoelectronics electromagnetics light waves and radar supplying all of the basic information required for a deep understanding of each area It also devotes a section to electrical effects and devices and explores the emerging fields of microlithography and power electronics Sensors Nanoscience Biomedical Engineering and Instruments provides thorough coverage of sensors materials and nanoscience instruments and measurements and biomedical systems and devices including all of the basic information required to thoroughly understand each area It explores the emerging fields of sensors nanotechnologies and biological effects Broadcasting and Optical Communication Technology explores communications information theory and devices covering all of the basic information needed for a thorough understanding of these areas It also examines the emerging areas of adaptive estimation and optical communication Computers Software Engineering and Digital Devices examines digital and logical devices displays testing software and computers presenting the fundamental concepts needed to ensure a thorough understanding of each field It treats the emerging fields of programmable logic hardware description languages and parallel computing in detail Systems Controls Embedded Systems Energy and Machines explores in detail the fields of energy devices machines and systems as well as control systems It provides all of the fundamental concepts needed for thorough in depth understanding of each area and devotes special attention to the emerging area of embedded systems Encompassing the work of the world's foremost experts in their respective specialties The Electrical Engineering Handbook Third Edition remains the most convenient reliable source of information available This edition features the latest developments the broadest scope of coverage and new material on nanotechnologies fuel cells embedded systems and biometrics The engineering community has relied on the Handbook for more than twelve years and it will continue to be a platform to launch the next wave of advancements The Handbook's latest incarnation features a protective slipcase which helps you stay organized without overwhelming your bookshelf It is an attractive addition to any collection and will help keep each volume of the Handbook as fresh as your latest research

The Electronic Packaging Handbook Glenn R. Blackwell, 2017-12-19 The packaging of electronic devices and systems represents a significant challenge for product designers and managers Performance efficiency cost considerations dealing with the newer IC packaging technologies and EMI RFI issues all come into play Thermal considerations at both the device and the systems level are also necessary The Electronic Packaging Handbook a new volume in the Electrical Engineering Handbook Series provides essential factual information on the design manufacturing and testing of electronic

devices and systems Co published with the IEEE this is an ideal resource for engineers and technicians involved in any aspect of design production testing or packaging of electronic products regardless of whether they are commercial or industrial in nature Topics addressed include design automation new IC packaging technologies materials testing and safety Electronics packaging continues to include expanding and evolving topics and technologies as the demand for smaller faster and lighter products continues without signs of abatement These demands mean that individuals in each of the specialty areas involved in electronics packaging such as electronic mechanical and thermal designers and manufacturing and test engineers are all interdependent on each others knowledge The Electronic Packaging Handbook elucidates these specialty areas and helps individuals broaden their knowledge base in this ever growing field *Physik der Halbleiterbauelemente* Simon M. Sze, Yiming Li, Kwok K. Ng, 2021-10-26 Physik der Halbleiterbauelemente Das Standardwerk zur Physik der Halbleiterbauelemente erstmals auf Deutsch Dieses einzigartige Buch geschrieben von Pionieren auf dem Gebiet behandelt sämtliche Aspekte der Physik der Halbleiterbauelemente die zu deren Verständnis Betrieb Weiter und Neuentwicklung notwendig sind Wie das englische Original ist die deutsche Ausgabe ein unverzichtbares Nachschlagewerk in der industrieorientierten Halbleiterforschung und eignet sich ebenfalls ausgezeichnet als Einstiegsliteratur für Studierende sowie als Unterrichtsmaterial für Vortragende Bei der deutschen Ausgabe wurde besonderer Wert auf eine gute Lesbarkeit gelegt und daher die Übersetzung teilweise unter Rückgriff auf die von den Autoren zitierten Originalquellen so gestaltet dass unnötige Anglizismen vermieden werden Das englische Fachvokabular ist ergänzend an den entsprechenden Stellen im Text eingearbeitet um den Leserinnen und Lesern den Gebrauch der englischsprachigen Fachliteratur zu erleichtern Gelegentliche Anmerkungen im Text und Verweise auf weitere Originalquellen tragen zusätzlich zum besseren Verständnis der Materie bei Als das Referenzwerk schlechthin ist der Sze ein Muss für alle die sich in Forschung Entwicklung und Lehre mit Halbleiterbauelementen beschäftigen Die Inhalte sind kompakt und präzise beschrieben und eignen sich perfekt für den Einstieg in das jeweilige Gebiet komplettiert durch vertiefende Beispiele zu jedem Kapitel Physik der Halbleiterbauelemente bietet eine unerreichte Detailtiefe und ausführliche Informationen über die Physik und den Betrieb aller relevanten Halbleiterbauelemente mit 1000 Literaturangaben 650 technischen Illustrationen sowie 25 Tabellen mit Material- und Bauelementparametern Aus dem Inhalt Halbleiterphysik Grundlagen p-n-Berg-n-Metall-Halbleiter-Kontakte MIS-Kondensatoren Bipolartransistoren MOSFETs Nichtflüchtige Speicher JFETs MESFETs und MODFETs Tunnel-Bauelemente IMPATT-Dioden TE- und RST-Devices Thyristoren und Leistungsbauelemente Photodetektoren und Solarzellen Sensoren

Transistor- und Leitungsmodellierung zum Entwurf von monolithisch integrierten Leistungsverstärkern für den hohen Millimeterwellen-Frequenzbereich Diebold, Sebastian, 2014-03-12 Ziel ist der Entwurf von monolithisch integrierten Leistungsverstärkern für den Frequenzbereich von 200 bis über 250 GHz Dafür sind verlässliche und flexible Leitungs- und Transistormodelle notwendig Sie werden erstellt und ihre Genauigkeit wird bis 325 GHz bestätigt Es wird ein Verstärker

rkerkonzept erarbeitet das ma geschneidert f r den Frequenzbereich und die MMIC Technologie ist Es nutzt einen neuartigen Koppler der kompakte Verst rker mit hoher Bandbreite und Ausgangsleistung erm glicht

Practical RF Circuit Design for Modern Wireless Systems Rowan Gilmore, Les Besser, 2003 A practical approach to RF circuit design this volume covers nonlinear circuits and modelling RF transistor amplifiers oscillators and mixers

The Electronics Handbook Jerry C. Whitaker, 2018-10-03 During the ten years since the appearance of the groundbreaking bestselling first edition of The Electronics Handbook the field has grown and changed tremendously With a focus on fundamental theory and practical applications the first edition guided novice and veteran engineers along the cutting edge in the design production installation operation and maintenance of electronic devices and systems Completely updated and expanded to reflect recent advances this second edition continues the tradition The Electronics Handbook Second Edition provides a comprehensive reference to the key concepts models and equations necessary to analyze design and predict the behavior of complex electrical devices circuits instruments and systems With 23 sections that encompass the entire electronics field from classical devices and circuits to emerging technologies and applications The Electronics Handbook Second Edition not only covers the engineering aspects but also includes sections on reliability safety and engineering management The book features an individual table of contents at the beginning of each chapter which enables engineers from industry government and academia to navigate easily to the vital information they need This is truly the most comprehensive easy to use reference on electronics available

The Electrical Engineering Handbook, Second Edition Richard C. Dorf, 1997-09-26 In 1993 the first edition of The Electrical Engineering Handbook set a new standard for breadth and depth of coverage in an engineering reference work Now this classic has been substantially revised and updated to include the latest information on all the important topics in electrical engineering today Every electrical engineer should have an opportunity to expand his expertise with this definitive guide In a single volume this handbook provides a complete reference to answer the questions encountered by practicing engineers in industry government or academia This well organized book is divided into 12 major sections that encompass the entire field of electrical engineering including circuits signal processing electronics electromagnetics electrical effects and devices and energy and the emerging trends in the fields of communications digital devices computer engineering systems and biomedical engineering A compendium of physical chemical material and mathematical data completes this comprehensive resource Every major topic is thoroughly covered and every important concept is defined described and illustrated Conceptually challenging but carefully explained articles are equally valuable to the practicing engineer researchers and students A distinguished advisory board and contributors including many of the leading authors professors and researchers in the field today assist noted author and professor Richard Dorf in offering complete coverage of this rapidly expanding field No other single volume available today offers this combination of broad coverage and depth of exploration of the topics The Electrical Engineering Handbook will be an invaluable resource for

electrical engineers for years to come **Hocheffiziente frequenzagile Mikrowellen-Leistungsverstärker auf Basis von Verbindungshalbleitern und Ferroelektrika** Sebastian Preis, 2019-05-28 Diese Arbeit beschäftigt sich mit dem Entwurf der Optimierung und Charakterisierung von GaN HEMT Leistungsverstärkern für Mobilfunkanwendungen. Der Fokus liegt hierbei auf steuerbaren Transformationsnetzwerken auf Basis elektronisch anpassbarer Barium Strontium Titanat BST Varaktoren. Dabei konnte die Leistungsverträglichkeit jener BST Varaktoren bis zu 50 W gesteigert werden verbunden mit einer guten Linearität und geringen Temperaturabhängigkeit. Dies zielt darauf den Wirkungsgrad von Leistungsverstärkern bei Leistungen deutlich unterhalb der Sättigung zu verbessern. Die so entwickelten steuerbaren Transformationsnetzwerke sind für integrierte Transistormodule optimiert. Auf diese Weise lassen sich platzsparende und universell flexibel einsetzbare Komponenten für Hochfrequenzanwendungen realisieren. Die Transistormodule erreichen einen hohen Wirkungsgrad von bis zu 72% PAE in der Sättigung. Sie verbessern zudem die PAE bei reduzierter Leistung um mehrere Prozentpunkte gegenüber statisch angepassten Transistoren. Darüber hinaus sind sie über die Frequenz im S-Band nicht nur gut steuerbar sondern lassen sich auch durch Änderung der Steuerspannung auf optimalen Wirkungsgrad oder Linearität bei verschiedenen Leistungspegeln anpassen. Auch hybride Verstärker werden vorgestellt in denen diskret aufgebaute Varaktoren verbaut sind. Dank der verwendeten Modulatoren für welche ebenfalls GaN Transistoren und Dioden genutzt werden bieten die Verstärker das Potenzial zur Lastmodulation. Dadurch steigt die Effizienz beim Betrieb mit modulierten Signalen. Für LTE äquivalente Signale lässt sich die mittlere PAE um mehrere Prozentpunkte erhöhen ohne die Linearität in einem System mit Vorverzerrung zu belasten. *Implantationsfreie Dotierung des Basisanschlusses von Si/SiGe-Heterobipolartransistoren in Einfach-Polysilizium-Technologie* Holger Schmundt, 2000-07-26

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