

Silicogermanium Heterojunction Bipolar Transistors

Handbook of III-V Heterojunction Bipolar Transistors Silicon-germanium Heterojunction Bipolar Transistors Silicon-germanium Heterojunction Bipolar Transistors SiGe, GaAs, and InP Heterojunction Bipolar Transistors [SiGe Heterojunction Bipolar Transistors Heterojunction Bipolar Transistors for Circuit Design Principles and Analysis of AlGaAs/GaAs Heterojunction Bipolar Transistors Silicon-Germanium Heterojunction Bipolar Transistors for mm-Wave Systems: Technology, Modeling and Circuit Applications Understanding Modern Transistors and Diodes Silicon-Germanium Heterojunction Bipolar Transistors for Mm-wave Systems Technology, Modeling and Circuit Applications High-Frequency Bipolar Transistors High-speed InP Heterojunction Bipolar Transistors and Integrated Circuits in Transferred Substrate Technology Model Parameter Extraction for Very Advanced Heterojunction Bipolar Transistors Designing Bipolar Transistor Radio Frequency Integrated Circuits Advanced Modeling of Silicon-Germanium Heterojunction Bipolar Transistors Introduction to Semiconductor Devices Physics-based compact modeling and parameter extraction for InP heterojunction bipolar transistors with special emphasis on material-specific physical effects and geometry scaling Extreme Environment Electronics High-Speed and Lower Power Technologies Gallium Arsenide and Related Compounds 1991, Proceedings of the Eighteenth INT Symposium, 9-12 September 1991, Seattle, USA Physical Limitations of InP/InGaAs Heterojunction-bipolar Transistors Current Trends in Heterojunction Bipolar Transistors GaAs-GaAlAs Heterojunction Bipolar Transistors and Related Integrated Circuits III-V Microelectronics Physics Based Analytical Modeling of SiGe Heterojunction Bipolar Transistors for High Speed Integrated Circuits Study and Realization of InGaP, GaAs "collector Up" Double Heterojunction Bipolar Transistors for High Performance RF Applications Analysis and Simulation of Heterostructure Devices InP Double Heterojunction Bipolar Transistors for Driver Circuits in Fiber Optical Communication Systems Measurement and Modeling of Silicon Heterostructure Devices Sub-micron InP/GaAsSb/InP Double Heterojunction Bipolar Transistors for Ultra High-speed Digital Integrated Circuits Compound Semiconductors 1995, Proceedings of the Twenty-Second INT Symposium on Compound Semiconductors held in Cheju Island, Korea, 28 August-2 September, 1995 Metal Organic Vapour Phase Epitaxy for GaInP-GaAs Heterojunction Bipolar Transistors Introduction to Semiconductor Device Modelling GaAs and Related Materials Women in Microelectronics Fabrication of GaAs Devices Compact Modeling A Box-Integration/Weno Solver for the Boltzmann Transport Equation Its Application to High-Speed Heterojunction Bipolar Transistors Fundamentals of Modern VLSI Devices High-Speed Devices and Circuits with THz Applications](#)

This is likewise one of the factors by obtaining the soft documents of this Silicogermanium Heterojunction Bipolar Transistors by online. You might not require more get older to spend to go to the book launch as competently as search for them. In some cases, you likewise do not discover the declaration Silicogermanium Heterojunction Bipolar Transistors that you are looking for. It will no question squander the time.

However below, afterward you visit this web page, it will be therefore categorically easy to get as competently as download lead Silicogermanium Heterojunction Bipolar Transistors

It will not receive many get older as we explain before. You can reach it even if acquit yourself something else at home and even in your workplace. as a result easy! So, are you question? Just exercise just what we pay for under as competently as review Silicogermanium Heterojunction Bipolar Transistors what you taking into account to read!

Compact Modeling Sep 27 2019 Most of the recent texts on compact modeling are limited to a particular class of semiconductor devices and do not provide comprehensive coverage of the field. Having a single comprehensive reference for the compact models of most commonly used semiconductor devices (both active and passive) represents a significant advantage for the reader. Indeed, several kinds of semiconductor devices are routinely encountered in a single IC design or in a single modeling support group. Compact Modeling includes mostly the material that after several years of IC design applications has been found both theoretically sound and practically significant. Assigning the individual chapters to the groups responsible for the definitive work on the subject assures the highest possible degree of expertise on each of the covered models.

Extreme Environment Electronics May 16 2021 Unfriendly to conventional electronic devices, circuits, and systems, extreme environments represent a serious challenge to designers and mission architects. The first truly comprehensive guide to this specialized field, Extreme Environment Electronics explains the essential aspects of designing and using devices, circuits, and electronic systems intended to operate in extreme environments, including across wide temperature ranges and in radiation-intense scenarios such as space. The Definitive Guide to Extreme Environment Electronics Featuring contributions by some of the world's foremost experts in extreme environment electronics, the book provides in-depth information on a wide array of topics. It begins by describing the extreme conditions and then delves into a description of suitable semiconductor technologies and the modeling of devices within those technologies. It also discusses reliability issues and failure mechanisms that readers need to be aware of, as well as best practices for the design of these electronics. Continuing beyond just the "paper design" of building blocks, the book rounds out coverage of the design realization process with verification techniques and chapters on electronic packaging for extreme environments. The final set of chapters describes actual chip-level designs for applications in energy and space exploration. Requiring only a basic background in electronics, the book combines theoretical and practical aspects in each self-contained chapter. Appendices supply additional background material. With its broad coverage and depth, and the expertise of the contributing authors, this is an invaluable reference for engineers, scientists, and technical managers, as well as researchers and graduate students. A hands-on resource, it explores what is required to successfully operate electronics in the most demanding conditions.

High-Speed Devices and Circuits with THz Applications Jun 24 2019 Presenting the cutting-edge results of new device developments and circuit implementations, High-Speed Devices and Circuits with THz Applications covers the recent advancements of nano devices for terahertz (THz) applications and the latest high-speed data rate connectivity technologies from system design to integrated circuit (IC) design, providing relevant standard activities and technical specifications. Featuring the contributions of leading experts from industry and academia, this pivotal work: Discusses THz sensing and imaging devices based on nano devices and materials Describes silicon on insulator (SOI) multigate nanowire field-effect transistors (FETs) Explains the theory underpinning nanoscale nanowire metal-oxide-semiconductor field-effect transistors (MOSFETs), simulation methods, and their results Explores the physics of the silicon-germanium (SiGe) heterojunction bipolar transistor (HBT), as well as commercially available SiGe HBT devices and their applications Details aspects of THz IC design using standard silicon (Si) complementary metal-oxide-semiconductor (CMOS) devices, including experimental setups for measurements, detection methods, and more An essential text for the future of high-frequency engineering, High-Speed Devices and Circuits with THz Applications offers valuable insight into emerging technologies and product possibilities that are attractive in terms of mass production and compatibility with current manufacturing facilities.

Silicon-Germanium Heterojunction Bipolar Transistors for mm-Wave Systems: Technology, Modeling and Circuit Applications Mar 26 2022 The semiconductor industry is a fundamental building block of the new economy, there is no area of modern life untouched by the progress of nanoelectronics. The electronic chip is becoming an ever-increasing portion of system solutions, starting initially from less than 5% in the 1970 microcomputer era, to more than 60% of the final cost of a mobile telephone, 50% of the price of a personal computer (representing nearly 100% of the functionalities) and 30% of the price of a monitor in the early 2000's. Interest in utilizing the (sub-)mm-wave frequency spectrum for commercial and research applications has also been steadily increasing. Such applications, which constitute a diverse but sizeable future market, span a large variety of areas such as health, material science, mass transit, industrial automation, communications, and space exploration. Silicon-Germanium Heterojunction Bipolar Transistors for mm-Wave Systems Technology, Modeling and Circuit Applications provides an overview of results of the DOTSEVEN EU research project, and as such focusses on key material developments for mm-Wave Device Technology. It starts with the motivation at the beginning of the project and a summary of its major achievements. The subsequent chapters provide a detailed description of the obtained research results in the various areas of process development, device simulation, compact device modeling, experimental characterization, reliability, (sub-)mm-wave circuit design and systems.

Gallium Arsenide and Related Compounds 1991, Proceedings of the Eighteenth INT Symposium, 9-12 September 1991, Seattle, USA Mar 14 2021 Gallium Arsenide and Related Compounds 1991 emphasizes current results on the materials, characterization, and device aspects of a broad range of semiconductor materials, particularly the III-V compounds and alloys. The book is a valuable reference for researchers in physics, materials science, and electronics and electrical engineering who work on III-V compounds.

Physics-based compact modeling and parameter extraction for InP heterojunction bipolar transistors with special emphasis on material-specific physical effects and geometry scaling Jun 16 2021 The trend in modern electronics towards ever higher frequencies of operation and complexity as well as power efficiency requires a whole palette of different technologies to be available to circuit designers for various applications. While MOSFETs dominate the digital world, they have apparently reached their top analogue performance around the 65nm node. Emerging technologies such as CNFETs offer excellent properties such as very high linearity and speed in theory, but have yet to deliver on those promises in practice. Heterojunction bipolar transistors (HBTs), on the other hand, offer a number of key advantages over competing technologies: A very high transconductance and therefore a relatively low impact of a load impedance on the transistor operation, a high transit frequency and maximum frequency of oscillation at a comparatively relaxed feature size and favorable noise characteristics. Like all semiconductor devices, HBTs can be fabricated in different semiconductor materials. The most common are SiGe HBTs, which even today reach values above f_t (fmax) = (300; 500) GHz and are projected to eventually reach the THz range. However, HBTs fabricated in III-V materials offer a versatile alternative. Depending on the materials that are used, III-V HBTs can be the fastest available bipolar transistors (competing only with HEMTs, also fabricated in III-V materials, for the title of fastest available transistors overall), offer very high breakdown voltages and therefore excellent power-handling capability, show good linearity or low noise figures at high frequencies. Typical applications for III-V HBTs include handset PAs, high-efficiency and high-speed amplifiers as well as high-speed oscillators. Overall, III-V based HBTs and especially InP HBTs are excellent candidates for future high-speed communication circuits. The goal of this work is to include important effects occurring in III-V materials in a compact model for circuit design in a physical, yet intuitive way in order to aid deployment of III-V HBTs in prototypes and products. Additionally, the parameter extraction procedure for the compact model is described and analyzed in detail so an accurate, physics-based parameter set can be obtained. Finally, the agreement of the model with measurements is demonstrated for three different III-V HBT processes.

Fundamentals of Modern VLSI Devices Jul 26 2019 Learn the basic properties and designs of modern VLSI devices, as well as the factors affecting performance, with this thoroughly updated second edition. The first edition has been widely adopted as a standard textbook in microelectronics in many major US universities and worldwide. The internationally renowned authors highlight the intricate interdependencies and subtle trade-offs between various practically important device parameters, and provide an in-depth discussion of device scaling and scaling limits of CMOS and bipolar devices. Equations and parameters provided are checked continuously against the reality of silicon data, making the book equally useful in practical transistor design and in the classroom. Every chapter has been updated to include the latest developments, such as MOSFET scale length theory, high-field transport model and SiGe-base bipolar devices.

Women in Microelectronics Nov 29 2019 This book contains stories of women engineers' paths through the golden age of microelectronics, stemming from the invention of the transistor in 1947. These stories, like the biographies of Marie Curie and the National Geographic's stories of Jane Goodall's research that inspired the authors will inspire and guide readers along unconventional pathways to contributions to microelectronics that we can only begin to imagine. The book explores why and how the women writing here chose their career paths and how they navigated their careers. This topic is of interest to a vast audience, from students to professionals to university advisers to industry CEOs, who can imagine the advantages of a future with a diverse work force. Provides insight into women's early contributions to the field of microelectronics and celebrates the challenges they overcame; Presents compelling innovations from academia, research, and

industry into advances, applications, and the future of microelectronics; Includes a fascinating look into topics such as nanotechnologies, video games, analog electronics, design automation, and neuromorphic circuits.

A Box-Integration/Weno Solver for the Boltzmann Transport Equation Its Application to High-Speed Heterojunction Bipolar Transistors Aug 26 2019 The ongoing trend for high-frequency (HF) applications drives the development of high-speed devices. Therefore, trustworthy device simulations are inevitable for understanding and designing future HF devices. During the last decade, the predictive capabilities of Drift-Diffusion (DD) and Hydrodynamic (HD) transport models turned out to be insufficient for state-of-the-art high-frequency transistors. Consequently, a more physics based transport model helps to counter these issues and thus, the Boltzmann transport equation (BTE) comes into focus. In this thesis, a deterministic solution method for the BTE is pursued. First, physical fundamentals and mathematical preconsiderations for the treatment of the BTE are reviewed. This covers the calculation of band structures/dispersion relations, an overview of scattering mechanisms and a detailed description of the coordinate transformations required for analyzing prominent semiconducting materials, such as Silicon-Germanium and III-V compounds, like Indium-Phosphide. The second part focuses on the numerical treatment of the BTE. Besides the employed normalization strategy, the discretization of the BULK BTE is described in detail. Based on the latter, the extensions for the device BTE are specified. A method for the direct calculation of stationary BTE solutions - for the BULK and device case - is introduced and an overview of the WENO method is outlined. The third part is dedicated to the applications of the deterministic solution method and simulation results of the BTE. Recipes for calculating the most important quantities, like current/electron densities, are given. Simulation results for the BULK case and for hetero-junction bipolar transistors are presented and analyzed. Here, the focus is put on both Silicon/Silicon-Germanium and Indium-Phosphide/Indium-Gallium-Arsenide material systems. The part is concluded by a critical review on the current field of application. A summary and an outlook on future extensions

Physics Based Analytical Modeling of SiGe Heterojunction Bipolar Transistors for High Speed Integrated Circuits Oct 09 2020

High-Frequency Bipolar Transistors Dec 23 2021 This modern book-length treatment gives a detailed presentation of high-frequency bipolar transistors in silicon or silicon-germanium technology, with particular emphasis placed on today's advanced compact models and their physical foundations.

Measurement and Modeling of Silicon Heterostructure Devices Jun 04 2020 When you see a nicely presented set of data, the natural response is: "How did they do that; what tricks did they use; and how can I do that for myself?" Alas, usually, you must simply keep wondering, since such tricks-of-the-trade are usually held close to the vest and rarely divulged. Shamefully ignored in the technical literature, measurement and modeling of high-speed semiconductor devices is a fine art. Robust measuring and modeling at the levels of performance found in modern SiGe devices requires extreme dexterity in the laboratory to obtain reliable data, and then a valid model to fit that data. Drawn from the comprehensive and well-reviewed Silicon Heterostructure Handbook, this volume focuses on measurement and modeling of high-speed silicon heterostructure devices. The chapter authors provide experience-based tricks-of-the-trade and the subtle nuances of measuring and modeling advanced devices, making this an important reference for the semiconductor industry. It includes easy-to-reference appendices covering topics such as the properties of silicon and germanium, the generalized Moll-Ross relations, the integral charge-control model, and sample SiGe HBT compact model parameters.

Physical Limitations of InP/InGaAs Heterojunction-bipolar Transistors Feb 10 2021

Analysis and Simulation of Heterostructure Devices Aug 07 2020 The topic of this monograph is the physical modeling of heterostructure devices. A detailed discussion of physical models and parameters for compound semiconductors is presented including the relevant aspects of modern submicron heterostructure devices. More than 25 simulation examples for different types of Si(Ge)-based, GaAs-based, InP-based, and GaN-based heterostructure bipolar transistors (HBTs) and high electron mobility transistors (HEMTs) are given in comparison with experimental data from state-of-the-art devices.

Model Parameter Extraction for Very Advanced Heterojunction Bipolar Transistors Oct 21 2021

Compound Semiconductors 1995, Proceedings of the Twenty-Second INT Symposium on Compound Semiconductors held in Cheju Island, Korea, 28 August-2 September, 1995 Apr 02 2020 **Compound Semiconductors 1995** focuses on emerging applications for GaAs and other compound semiconductors, such as InP, GaN, GaSb, ZnSe, and SiC, in the electronics and optoelectronics industries. The book presents the research and development work in all aspects of compound semiconductors. It reflects the maturity of GaAs as a semiconductor material and the rapidly increasing pool of research information on many other compound semiconductors. Covering the full breadth of the subject, from growth through processing to devices and integrated circuits, this volume provides researchers in materials science, device physics, condensed matter physics, and electrical and electronic engineering with a comprehensive overview of developments in this well-established research area.

Silicon-germanium Heterojunction Bipolar Transistors Oct 01 2022 This informative, new resource presents the first comprehensive treatment of silicon-germanium heterojunction bipolar transistors (SiGe HBTs). It offers you a complete, from-the-ground-up understanding of SiGe HBT devices and technology, from a very broad perspective. The book covers motivation, history, materials, fabrication, device physics, operational principles, and circuit-level properties associated with this new cutting-edge semiconductor device technology. Including over 400 equations and more than 300 illustrations, this hands-on reference shows you in clear and concise language how to design, simulate, fabricate, and measure a SiGe HBT.

Understanding Modern Transistors and Diodes Feb 22 2022 Written in a concise, easy-to-read style, this text for senior undergraduate and graduate courses covers all key topics thoroughly. It is also a useful self-study guide for practising engineers who need a complete, up-to-date review of the subject. Key features: • Rigorous theoretical treatment combined with practical detail • A theoretical framework built up systematically from the Schrödinger Wave Equation and the Boltzmann Transport Equation • Covers MOSFETS, HBTs and HJFETS • Uses the PSP model for MOSFETS • Rigorous treatment of device capacitance • Describes the operation of modern, high-performance transistors and diodes • Evaluates the suitability of various transistor types and diodes for specific modern applications • Covers solar cells and LEDs and their potential impact on energy generation and reduction • Includes a chapter on nanotransistors to prepare students and professionals for the future • Provides results of detailed numerical simulations to compare with analytical solutions • End-of-chapter exercises • Online lecture slides for undergraduate and graduate courses

Silicon-Germanium Heterojunction Bipolar Transistors for Mm-wave Systems Technology, Modeling and Circuit Applications Jan 24 2022 The semiconductor industry is a fundamental building block of the new economy, there is no area of modern life untouched by the progress of nanoelectronics. The electronic chip is becoming an ever-increasing portion of system solutions, starting initially from less than 5% in the 1970 microcomputer era, to more than 60% of the final cost of a mobile telephone, 50% of the price of a personal computer (representing nearly 100% of the functionalities) and 30% of the price of a monitor in the early 2000's. Interest in utilizing the (sub)-mm-wave frequency spectrum for commercial and research applications has also been steadily increasing. Such applications, which constitute a diverse but sizeable future market, span a large variety of areas such as health, material science, mass transit, industrial automation, communications, and space exploration. Silicon-Germanium Heterojunction Bipolar Transistors for mm-Wave Systems Technology, Modeling and Circuit Applications provides an overview of results of the DOTSEVEN EU research project, and as such focusses on key material developments for mm-Wave Device Technology. It starts with the motivation at the beginning of the project and a summary of its major achievements. The subsequent chapters provide a detailed description of the obtained research results in the various areas of process development, device simulation, compact device modeling, experimental characterization, reliability, (sub)-mm-wave circuit design and systems.

Introduction to Semiconductor Device Modelling Jan 30 2020 This book deals mainly with physical device models which are developed from the carrier transport physics and device geometry considerations. The text concentrates on silicon and gallium arsenide devices and includes models of silicon bipolar junction transistors, junction field effect transistors (JFETs), MESFETs, silicon and GaAs MESFETs, transferred electron devices, pn junction diodes and Schottky varactor diodes. The modelling techniques of more recent devices such as the heterojunction bipolar transistors (HBT) and the high electron mobility transistors are discussed. This book contains details of models for both equilibrium and non-equilibrium transport conditions. The modelling Technique of Small-scale devices is discussed and techniques applicable to submicron-dimensioned devices are included. A section on modern quantum transport analysis techniques is included. Details of essential numerical schemes are given and a variety of device models are used to illustrate the application of these techniques in various fields.

Introduction to Semiconductor Devices Jul 18 2021 From semiconductor fundamentals to semiconductor devices used in the telecommunications and computing industries, this 2005 book provides a solid grounding in the most important devices used in the hottest areas of electronic engineering. The book includes coverage of future approaches to computing hardware and RF power amplifiers, and explains how emerging trends and system demands of computing and telecommunications systems influence the choice, design and operation of semiconductors. Next, the field effect devices are described, including MODFETs and MOSFETs. Short channel effects and the challenges faced by continuing miniaturisation are then addressed. The rest of the book discusses the structure, behaviour, and operating requirements of semiconductor devices used in lightwave and wireless telecommunications systems. This is both an excellent senior/graduate text, and a valuable reference for engineers and researchers in the field.

GaAs-GaAlAs Heterojunction Bipolar Transistors and Related Integrated Circuits Dec 11 2020

Principles and Analysis of AlGaAs/GaAs Heterojunction Bipolar Transistors Apr 26 2022 The first book devoted entirely to HBTs, this reference examines the basic concept, standard and advanced structures, noise performance, reliability issues, and simulation. It's main emphasis is on device physics and its mathematical representations, through which the operational characterization of AlGaAs/GaAs HBTs can be understood. It enables device engineers, device researchers, and circuit designers to increase their knowledge of HBT principles and behavior with significantly less literature research time, and to design optimal HBTs with minimal design time. Extensively referenced, with 150 illustrations and 250 equations.

Fabrication of GaAs Devices Oct 28 2019 This book provides fundamental and practical information on all aspects of GaAs processing and gives pragmatic advice on cleaning and passivation, wet and dry etching and photolithography. Other topics covered include device performance for HBTs (Heterojunction Bipolar Transistors) and FETs (Field Effect Transistors), how these relate to processing choices, and special processing issues such as wet oxidation, which are especially important in optoelectronic devices. This book is suitable for both new and practising engineers.

SiGe, GaAs, and InP Heterojunction Bipolar Transistors Jul 30 2022 An up-to-date, comprehensive guide to heterojunction bipolar transistor technology. Owing to their superior performance in microwave and millimeter-wave applications, heterojunction bipolar transistors (HBTs) have become a major force in mobile and wireless communications. This book offers an integrated treatment of SiGe, GaAs, and InP HBTs, presenting a much-needed overview of HBTs based on different materials systems-their fabrication, analysis, and testing procedures. Highly respected expert Jiann S. Yuan discusses in depth the dc and RF performance and modeling of HBT devices, including simulation, thermal instability, reliability, low-temperature and high-temperature performance, and HBT analog and digital circuits. He provides step-by-step presentations of HBT materials-including Si HBTs and III-V and IV-IV compound HBTs, which are rarely described in the literature. Also covered are device and circuit interaction as well as specific high-speed devices in mobile and wireless communications. This immensely useful guide to a rapidly expanding field includes more than 200 figures, tables of different material systems in terms of their physical parameters, and up-to-date experimental results culled from the latest research. An essential resource for circuit and device designers in the semiconductor industry, SiGe, GaAs, and InP Heterojunction Bipolar Transistors is also useful for graduate students in electrical engineering, applied physics, and materials science.

High-Speed and Lower Power Technologies Apr 14 2021 This book explores up-to-date research trends and achievements on low-power and high-speed technologies in both electronics and optics. It offers unique insight into low-power and high-speed approaches ranging from devices, ICs, sub-systems and networks that can be exploited for future mobile devices, 5G networks, Internet of Things (IoT), and data centers. It collects heterogeneous topics in place to catch and predict future research directions of devices, circuits, subsystems, and networks for low-power and higher-speed technologies. Even it handles about artificial intelligence (AI) showing examples how AI technology can be combined with concurrent electronics. Written by top international experts in both industry and academia, the book discusses new devices, such as Si-on-chip laser, interconnections using graphene, machine learning combined with CMOS technology, progresses of SiGe devices for higher-speed electronics for optic, co-design low-power and high-speed circuits for optical interconnect, low-power network-on-chip (NoC) router, X-ray quantum counting, and a design of low-power power amplifiers. Covers modern high-speed and low-power electronics and photonics. Discusses novel nano-devices, electronics & photonic sub-systems for high-speed and low-power

systems, and many other emerging technologies like Si photonic technology, Si-on-chip laser, low-power driver for optic device, and network-on-chip router. Includes practical applications and recent results with respect to emerging low-power systems. Addresses the future perspective of silicon photonics as a low-power interconnections and communication applications.

Metal Organic Vapour Phase Epitaxy for GaInP-GaAs Heterojunction Bipolar Transistors Mar 02 2020

III-V Microelectronics Nov 09 2020 As is well known, Silicon widely dominates the market of semiconductor devices and circuits, and in particular is well suited for Ultra Large Scale Integration processes. However, a number of III-V compound semiconductor devices and circuits have recently been built, and the contributions in this volume are devoted to those types of materials, which offer a number of interesting properties. Taking into account the great variety of problems encountered and of their mutual correlations when fabricating a circuit or even a device, most of the aspects of III-V microelectronics, from fundamental physics to modelling and technology, from materials to devices and circuits are reviewed. Containing contributions from European researchers of international repute this volume is the definitive reference source for anyone interested in the latest advances and results of current experimental research in III-V microelectronics.

Heterojunction Bipolar Transistors for Circuit Design May 28 2022 A highly comprehensive summary on circuit related modeling techniques and parameter extraction methods for heterojunction bipolar transistors Heterojunction Bipolar Transistor (HBT) is one of the most important devices for microwave applications. The book details the accurate device modeling for HBTs and high level IC design using HBTs Provides a valuable reference to basic modeling issues and specific semiconductor device models encountered in circuit simulators, with a thorough reference list at the end of each chapter for onward learning Offers an overview on modeling techniques and parameter extraction methods for heterojunction bipolar transistors focusing on circuit simulation and design Presents electrical/RF engineering-related theory and tools and include equivalent circuits and their matrix descriptions, noise, small and large signal analysis methods

Sub-micron InP/GaAsSb/InP Double Heterojunction Bipolar Transistors for Ultra High-speed Digital Integrated Circuits May 04 2020

SiGe Heterojunction Bipolar Transistors Jun 28 2022 SiGe HBTs is a hot topic within the microelectronics community because of its applications potential within integrated circuits operating at radio frequencies. Applications range from high speed optical networking to wireless communication devices. The addition of germanium to silicon technologies to form silicon germanium (SiGe) devices has created a revolution in the semiconductor industry. These transistors form the enabling devices in a wide range of products for wireless and wired communications. This book features: SiGe products include chip sets for wireless cellular handsets as well as WLAN and high-speed wired network applications Describes the physics and technology of SiGe HBTs, with coverage of Si and Ge bipolar transistors Written with the practising engineer in mind, this book explains the operating principles and applications of bipolar transistor technology. Essential reading for practising microelectronics engineers and researchers. Also, optical communications engineers and communication technology engineers. An ideal reference tool for masters level students in microelectronics and electronics engineering.

GaAs and Related Materials Dec 31 2019 This book covers the various material properties of bulk GaAs and related materials, and aspects of the physics of artificial semiconductor microstructures, such as quantum wells and superlattices, made of these materials. A complete set of the material properties are considered in this book. They are structural properties; thermal properties; elastic and lattice vibronic properties; collective effects and some response characteristics; electronic energy-band structure and consequences; optical, elasto-optic, and electro-optic properties; and carrier transport properties. This book attempts to summarize, in graphical and tabular forms, most of the important theoretical and experimental results on these material properties. It contains a large number of references useful for further study. Timely topics are discussed as well. This book will be of interest to graduate students, scientists and engineers working on semiconductors.

Study and Realization of InGaP, GaAs "collector Up" Double Heterojunction Bipolar Transistors for High Performance RF Applications Sep 07 2020

Handbook of III-V Heterojunction Bipolar Transistors Nov 02 2022 The definitive hands-on guide to heterojunction bipolar transistors In recent years, heterojunction bipolar transistor (HBT) technology has become an intensely researched area in universities and industry worldwide. Boasting superior performance over silicon bipolar transistors with its combined high speed, high linearity, and high power requirements, the III-V HBT is fast becoming a major player in wireless communication, power amplifiers, mixers, and frequency synthesizers. Handbook of III-V Heterojunction Bipolar Transistors presents a comprehensive, systematic reference for this cutting-edge technology. In one self-contained volume, it covers virtually every HBT topic imaginable—introductory and advanced, theoretical and practical—from device physics, to design issues, to HBT performance in digital and analog circuits. It features: A user-friendly, integrated approach to HBTs and circuit design that can be applied in diverse disciplines A discussion of factors determining transistor operation, including thermal properties, failure mechanisms, high-frequency measurements and models, switching characteristics, noise and distortion, and modern device fabrications Over 800 illustrations, showing how to use concepts and equations in the real world An introduction to device physics and semiconductor basics Many worked-out examples and end-of-chapter problem sets Fully developed mathematical derivations Handbook of III-V Heterojunction Bipolar Transistors is an important reference for practicing engineers and researchers in cellular wireless communication and microwave-millimeter electronics as well as for wireless circuit design engineers. It is also extremely useful for advanced undergraduate and graduate students studying advanced semiconductor and microwave circuits.

Designing Bipolar Transistor Radio Frequency Integrated Circuits Sep 19 2021 If you're looking for an in-depth and up-to-date understanding bipolar transistor RFIC design, this practical resource is a smart choice. Unlike most books on the market that focus on GaAs MESFET or silicon CMOS process technology, this unique volume is dedicated exclusively to RFIC designs based on bipolar technology. Until now, critical GaAs HBT and SiGe HBT process technologies have been largely neglected in reference books. This book fills this gap, offering you a detailed treatment of this increasingly important topic. You discover a wide range of circuit topologies that are optimized for maximum performance with bipolar devices. From discussions of key applications (Bluetooth, UWB, GPS, WiMax) and architectures... to in-depth coverage of fabrication technologies and amplifier design... to a look at performance tradeoffs and production costs, this book arms you with complete design know-how for your challenging work in the field.

Silicon-germanium Heterojunction Bipolar Transistors Aug 31 2022 This informative, new resource presents the first comprehensive treatment of silicon-germanium heterojunction bipolar transistors (SiGe HBTs). It offers you a complete, from-the-ground-up understanding of SiGe HBT devices and technology, from a very broad perspective. The book covers motivation, history, materials, fabrication, device physics, operational principles, and circuit-level properties associated with this new cutting-edge semiconductor device technology. Including over 400 equations and more than 300 illustrations, this hands-on reference shows you in clear and concise language how to design, simulate, fabricate, and measure a SiGe HBT.

Advanced Modeling of Silicon-Germanium Heterojunction Bipolar Transistors Aug 19 2021 Silicon-Germanium Heterojunction Bipolar Transistors (SiGe HBTs) are perfectly suited for high-speed electronics. Since the fabrication costs per design cycle are rapidly increasing with progressing frequency and complexity of the systems, accurate compact models are essential in order to enable robust circuit design. This thesis focuses on selected important physical effects in advanced SiGe HBTs, which have been either insufficiently modeled or completely missing in conventional compact models. New compact model equations for the transfer current were derived and successfully applied to a large set of different technologies. Hereby, the "Generalized Integral Charge Control Relation" was used as a foundation. A physics-based model utilizing small-signal parameters obtained from measurements is derived for modeling the current dependent collector charge. A brief chapter about substrate effects in bipolar transistors comprises the derivation of a compact model for the bias-dependent substrate resistance as well as a proper partitioning of the substrate capacitance. New extraction methods for compact model parameters are introduced and the application of existing methods to advanced processes is discussed. The derived joint extraction method for the emitter and thermal resistance as well as a scalable model for the transfer current have been successfully applied to experimental data of fast HBTs. The derived model equations were applied to a selected very advanced SiGe HBT process developed by IHP. Highly accurate models for DC- and small-signal as well as for large-signal characteristics are presented.

InP Double Heterojunction Bipolar Transistors for Driver Circuits in Fiber Optical Communication Systems Jul 06 2020

Current Trends in Heterojunction Bipolar Transistors Jan 12 2021 Recent advances in communication, digital signal processing and computational systems demand very high performance electronic circuits. Heterojunction Bipolar Transistors (HBTs) have the potential of providing a more efficient solution to many key system requirements through intrinsic device advantages. This book reviews the present status of GaAs, InP and silicon-based HBT technologies and their applications to digital, analog, microwave and mixed-signal circuits and systems. It represents the first major effort to cover the complete scope of the HBT technology development in the past decade, starting from the fundamental device physics, material growth, device reliability, scaling, processing, modeling to advanced HBT integrated circuit design for various system applications.

High-speed InP Heterojunction Bipolar Transistors and Integrated Circuits in Transferred Substrate Technology Nov 21 2021