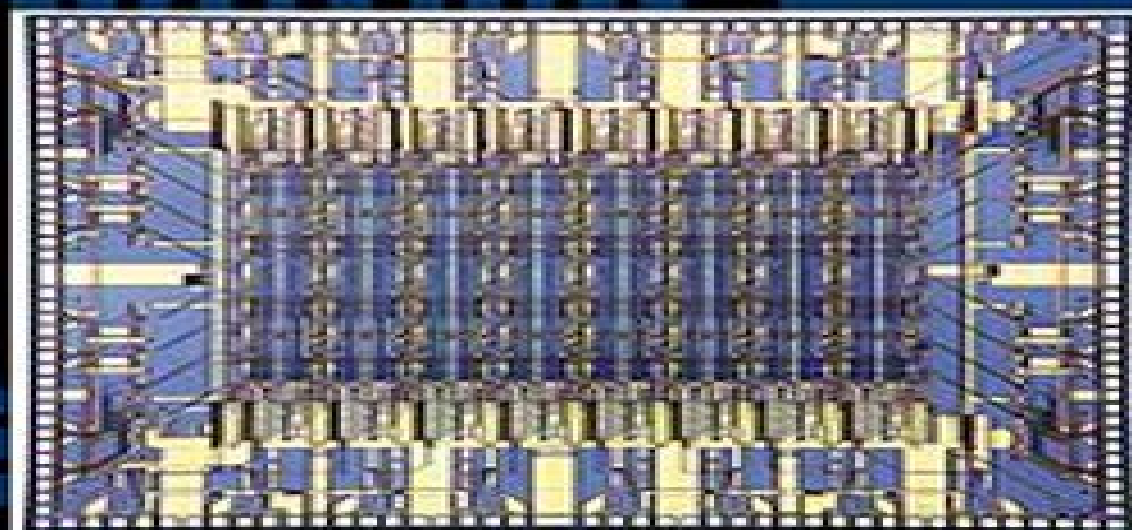


HIGH-SPEED CIRCUITS FOR LIGHTWAVE COMMUNICATIONS

Editor
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World Scientific

High Speed Circuits For Lightwave Communications

**Yoon Soo Park, Michael S Shur, William
Tang**



High Speed Circuits For Lightwave Communications:

High-speed Circuits for Lightwave Communications Keh-Chung Wang, 1999 High speed circuits are crucial for increasing the bandwidth of transmission and switching of voice video data over optical fiber networks The ever increasing demand for bit rates higher than those available due to the explosion of Internet traffic has driven engineers to develop integrated circuits of performance approaching 100 Gb/s Commercial lightwave products using high speed circuits of 10 Gb/s and beyond are readily available High Speed Circuits for Lightwave Communications presents the latest information on circuit design measured results applications and product development It covers electronic and optoelectronic circuits for transmission receiving and cross point switching These circuits were implemented with various state of the art IC technologies including Si BJT GaAs MESFET HEMT HBT as well as InP HEMT and HBT The book written by more than 50 experts will benefit graduate students researchers and engineers who are interested in or work in this exciting and challenging field of optical communications

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High Speed Circuits For Lightwave Communications, Selected Topics In Electronics And Systems, Vol 1 Keh-chung Wang, 1999-01-25 High speed circuits are crucial for increasing the bandwidth of transmission and switching of voice video data over optical fiber networks The ever increasing demand for bit rates higher than those available due to the explosion of Internet traffic has driven engineers to develop integrated circuits of performance approaching 100 Gb/s Commercial lightwave products using high speed circuits of 10 Gb/s and beyond are readily available High Speed Circuits for Lightwave Communications presents the latest information on circuit design measured results applications and product development It covers electronic and optoelectronic circuits for transmission receiving and cross point switching These circuits were implemented with various state of the art IC technologies including Si BJT GaAs MESFET HEMT HBT as well as InP HEMT and HBT The book written by more than 50 experts will benefit graduate students researchers and engineers who are interested in or work in this exciting and challenging field of optical communications

High-speed Integrated Circuit Technology Mark J. W. Rodwell, 2001 This book

reviews the state of the art of very high speed digital integrated circuits Commercial applications are in fiber optic transmission systems operating at 10 40 and 100 Gb/s while the military application is ADCs and DACs for microwave radar The book contains detailed descriptions of the design fabrication and performance of wideband Si SiGe GaAs and InP based bipolar transistors The analysis design and performance of high speed CMOS silicon bipolar and III V digital ICs are presented in detail with emphasis on application in optical fiber transmission and mixed signal ICs The underlying physics and circuit design of rapid single flux quantum RSFQ superconducting logic circuits are reviewed and there is extensive coverage of recent integrated circuit results in this technology

Broadband Circuits for Optical Fiber Communication

Eduard Säckinger, 2005-03-11 An expert guide to the new and emerging field of broadband circuits for optical fiber communication This exciting publication makes it easy for readers to enter into and deepen their knowledge of the new and emerging field of broadband circuits for optical fiber communication The author's selection and organization of material have been developed tested and refined from his many industry courses and seminars Five types of broadband circuits are discussed in detail Transimpedance amplifiers Limiting amplifiers Automatic gain control AGC amplifiers Lasers drivers Modulator drivers Essential background on optical fiber photodetectors lasers modulators and receiver theory is presented to help readers understand the system environment in which these broadband circuits operate For each circuit type the main specifications and their impact on system performance are explained and illustrated with numerical values Next the circuit concepts are discussed and illustrated with practical implementations A broad range of circuits in MESFET HFET BJT HBT BiCMOS and CMOS technologies is covered Emphasis is on circuits for digital continuous mode transmission in the 2.5 to 40 Gb/s range typically used in SONET SDH and Gigabit Ethernet applications Burst mode circuits for passive optical networks PON and analog circuits for hybrid fiber coax HFC cable TV applications also are discussed Learning aids are provided throughout the text to help readers grasp and apply difficult concepts and techniques including Chapter summaries that highlight the key points Problem and answer sections to help readers apply their new knowledge Research directions that point to exciting new technological breakthroughs on the horizon Product examples that show the performance of actual broadband circuits Appendices that cover eye diagrams differential circuits S parameters transistors and technologies A bibliography that leads readers to more complete and in depth treatment of specialized topics This is a superior learning tool for upper level undergraduates and graduate level students in circuit design and optical fiber communication Unlike other texts that concentrate on analog circuits in general or mostly on optics this text provides balanced coverage of electronic optic and system issues Professionals in the fiber optic industry will find it an excellent reference incorporating the latest technology and discoveries in the industry

High-Speed Photonic Devices

Nadir Dagli, 2006-09-29 With the ongoing worldwide installation of 40 Gbit/s fiber optic transmission systems there is an urgency to learn more about the photonic devices supporting this technology Focusing on the components used to generate modulate and receive optical signals High

Speed Photonic Devices presents the state of the art enabling technologies behind h Cmos Rf Modeling, Characterization And Applications M Jamal Deen,Tor A Fjeldly,2002-04-10 CMOS technology has now reached a state of evolution in terms of both frequency and noise where it is becoming a serious contender for radio frequency RF applications in the GHz range Cutoff frequencies of about 50 GHz have been reported for 0.18 μ m CMOS technology and are expected to reach about 100 GHz when the feature size shrinks to 100 nm within a few years This translates into CMOS circuit operating frequencies well into the GHz range which covers the frequency range of many of today's popular wireless products such as cell phones GPS Global Positioning System and Bluetooth Of course the great interest in RF CMOS comes from the obvious advantages of CMOS technology in terms of production cost high level integration and the ability to combine digital analog and RF circuits on the same chip This book discusses many of the challenges facing the CMOS RF circuit designer in terms of device modeling and characterization which are crucial issues in circuit simulation and design Quantum Dots Michael Shur,2002 In this book leading experts on quantum dot theory and technology provide comprehensive reviews of all aspects of quantum dot systems The following topics are covered 1 energy states in quantum dots including the effects of strain and many body effects 2 self assembly and self ordering of quantum dots in semiconductor systems 3 growth structures and optical properties of III nitride quantum dots 4 quantum dot lasers **Frontiers In Electronics: Future Chips, Proceedings Of The 2002 Workshop On Frontiers In Electronics (Wofe-02)** Yoon Soo Park,Michael S Shur,William Tang,2003-01-29 The 2002 Workshop on Frontiers in Electronics was the third in the series of WOFE workshops Over 70 leading experts from academia industry and government agencies reported on the most recent developments in their fields and exchanged views on future trends and directions of the electronics and photonics industry The issues they addressed ranged from system on chip to DNA doping from ultrathin SOI to electrotexiles from photonics integration on the ULSI platform to wide band gap semiconductor devices and solid state lighting The rapid pace of electronic technology evolution compels a merger of different technical areas and WOFE 02 provided a unique opportunity for cross fertilization of the emerging fields of microelectronics photonics and nanoelectronics The workshop was informal and stimulated provocative views visionary outlooks and discussions on controversial issues Current Trends In Heterojunction Bipolar Transistors M F Chang,1996-01-29 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 **Compound Semiconductor Integrated**

Circuits Tho T. Vu, 2003 This is the book version of a special issue of the International Journal of High Speed Electronics and Systems reviewing recent work in the field of compound semiconductor integrated circuits There are fourteen invited papers covering a wide range of applications frequencies and materials These papers deal with digital analog microwave and millimeter wave technologies devices and integrated circuits for wireline fiber optic lightwave transmissions and wireless radio frequency microwave and millimeter wave communications In each case the market is young and experiencing rapid growth for both commercial and military applications Many new semiconductor technologies compete for these new markets leading to an alphabet soup of semiconductor materials described in these papers Contents Present and Future of High Speed Compound Semiconductor IC s T Otsuji Transforming MMIC E J Martinez Distributed Amplifier for Fiber Optic Communication Systems H Shigematsu et al Microwave GaN Based Power Transistors on Large Scale Silicon Wafers S Manohar et al Radiation Effects in High Speed III V Integrated Circuits T R Weatherford Radiation Effects in III V Semiconductor Electronics B D Weaver et al Reliability and Radiation Hardness of Compound Semiconductors S A Kayali and other papers Readership Engineers scientists and graduate students working on high speed electronics and systems and in the area of compound semiconductor integrated circuits SiGe Heterojunction Bipolar Transistors Peter

Ashburn, 2004-02-06 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 *Analog Circuits and Devices* Wai-Kai Chen, 2003-03-26 The

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Infrared Photodetectors Victor Ryzhii, 2003-06-25 Infrared technologies are very important for a wide range of military scientific and commercial applications Devices and systems based on semiconductor heterostructure and quantum well and quantum dot structures open up a new era in infrared technologies This book deals with various topics related to the latest achievements in the development of intersubband infrared photodetectors reviewed by top experts in the field It covers

physical aspects of the operation of the devices as well as details of their design in different applications The papers included in the book will be useful for researchers and engineers interested in the physics of optoelectronic devices as well as their practical design and applications

Advances in Surface Acoustic Wave Technology, Systems and Applications Clemens C. W. Ruppel, Tor A. Fjeldly, 2001 Surface acoustic wave SAW devices are recognized for their versatility and efficiency in controlling and processing electrical signals This has resulted in a multitude of device concepts for a wide range of signal processing functions such as delay lines filters resonators pulse compressors convolvers and many more As SAW technology has found its way into mass market products such as TV receivers pagers keyless entry systems and cellular phones the production volume has risen to millions of devices produced every day At the other end of the scale there are specialized high performance signal processing SAW devices for satellite communication and military applications such as radar and electronic warfare This volume together with Volume 2 presents an overview of recent advances in SAW technology systems and applications by some of the foremost researchers in this exciting field

Quantum-based Electronic Devices And Systems, Selected Topics In Electronics And Systems, Vol 14 Mitra Dutta, 1998-10-23 This volume includes highlights of the theories and experimental findings that underlie essential phenomena occurring in quantum based devices and systems as well as the principles of operation of selected novel quantum based electronic devices and systems A number of the emerging approaches to creating new types of quantum based electronic devices and systems are also discussed

Current Research on Optical Materials, Devices and Systems in Taiwan Sien Chi, Tien-Pei Lee, 1998 The electronics industry in Taiwan has shifted its emphasis from consumer to information based products It is enjoying the bulk of the world market in computer motherboards keyboards scanners and PC monitors Optoelectronics is a growing sub group within information based electronics In addition to the established areas other technologies such as optical storage optical signal processing optical switching and transmission are emerging Research efforts at universities and research institutions are strongly supported by the official bodies of the government The articles collected in this volume are contributed by the most active researchers in the area of optics and photonics in Taiwan The subject areas covered such as Optical Materials Devices and Systems are by no means representative of the breadth nor depth of optical research in Taiwan Instead they offer a snapshot of the ongoing work that will lead to success in the commercial world in future

Frontiers In Electronics: From Materials To Systems, 1999 Workshop On Frontiers In Electronics Serge Luryi, Yoon Soo Park, Michael S Shur, Jimmy Xu, Alexander Zaslavsky, 2000-08-07 The rapid pace of the electronic technology evolution compels a merger of technical areas such as low power digital electronics microwave power circuits optoelectronics etc which collectively have become the foundation of today's electronic technology The 1999 Workshop on Frontiers in Electronics gathered experts from academia industry and government agencies to review the recent exciting breakthroughs and their underlying physical mechanisms The proceedings addresses controversial issues provocative views and visionary outlooks Also included are discussions on the

future trends the directions of electronics technology and the market pulls as well as the necessary policy and infrastructure changes **Advances in Semiconductor Lasers and Applications to Optoelectronics** Mitra Dutta, Michael A.

Strosio, 2000 Foreword by Charles H Townes This volume includes highlights of the theories underlying the essential phenomena occurring in novel semiconductor lasers as well as the principles of operation of selected heterostructure lasers To understand scattering processes in heterostructure lasers and related optoelectronic devices it is essential to consider the role of dimensional confinement of charge carriers as well as acoustical and optical phonons in quantum structures Indeed it is important to consider the confinement of both phonons and carriers in the design and modeling of novel semiconductor lasers such as the tunnel injection laser quantum well intersubband lasers and quantum dot lasers The full exploitation of dimensional confinement leads to the exciting new capability of scattering time engineering in novel semiconductor lasers As a result of continuing advances in techniques for growing quantum heterostructures recent developments are likely to be followed in coming years by many more advances in semiconductor lasers and optoelectronics As our understanding of these devices and the ability to fabricate them grow so does our need for more sophisticated theories and simulation methods bridging the gap between quantum and classical transport **Sensitive Skin** Vladimir Lumelsky, Michael S Shur, Sigurd

Wagner, Mingzhou Ding, 2000-08-28 This book covers the principles methodology and prototypes of sensing skin like devices and related intelligence and software Sensitive Skins are large area and flexible arrays of sensors integrated onto the entire surface of machines Sensitive Skin will endow these machines with the senses of proximity touch pressure temperature and chemical biological agents thus making possible the use of unsupervised machines in unstructured and unpredictable surroundings Sensitive Skin will make machines cautious and thus friendly to their environment It will revolutionize service industries make important contributions to human prosthetics and augment human sensing when fashioned into clothing Being transducers producing massive data flow Sensitive Skin devices will constitute yet another advance in the information revolution

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