

Chapter 3 The Diode Link Springer

A comprehensive survey of advanced multilevel converter design, control, operation and grid-connected applications Advanced Multilevel Converters and Applications in Grid Integration presents a comprehensive review of the core principles of advanced multilevel converters, which require fewer components and provide higher power conversion efficiency and output power quality. The authors – noted experts in the field – explain in detail the operation principles and control strategies and present the mathematical expressions and design procedures of their components. The text examines the advantages and disadvantages compared to the classical multilevel and two level power converters. The authors also include examples of the industrial applications of the advanced multilevel converters and offer thoughtful explanations on their control strategies. Advanced Multilevel Converters and Applications in Grid Integration provides a clear understanding of the gap difference between research conducted and the current industrial needs. This important guide: Puts the focus on the new challenges and topics in related areas such as modulation methods, harmonic analysis, voltage balancing and balanced current injection Makes a strong link between the fundamental concepts of power converters and advances multilevel converter topologies and examines their control strategies, together with practical engineering considerations Provides a valid reference for further developments in the multilevel converters design issue Contains simulations files for further study Written for university students in electrical engineering, researchers in areas of multilevel converters, high-power converters and engineers and operators in power industry, Advanced Multilevel Converters and Applications in Grid Integration offers a comprehensive review of the core principles of advanced multilevel converters, with contributions from noted experts in the field.

Fiber Optic Video Transmission: The Complete Guide is the only comprehensive reference to the techniques and hardware required to transmit video signals over optical fiber. As the broadcast industry moves to HDTV and enhanced television standards become the norm, fiber will become the medium of choice for video transmission, and this book is the essential guide to transmitting video over fiber optic cables. From the most basic video signal to complex multi-channel high definition video, this book details the methods of encoding video signals (including AM, FM, and digital encoding), the advantages and disadvantages of all encoding methods, and the expected performance of each method. A discussion of the the fiber optic components – such as lasers, LEDs, detectors, connectors, and other components – that are best for video transmission applications is also included. A glossary of terms, appendices of standards and publications, and a complete index round out this comprehensive guide.

Broadly tunable lasers continue to have a tremendous impact in many and diverse fields of science and technology. From a renaissance in laser spectroscopy to Bose-Einstein condensation, the one nexus is the tunable laser. Tunable Laser Applications describes the physics and architectures of widely applied tunable laser sources. Fully updated and ex

As the number of cores on a chip continues to climb, architects will need to address both bandwidth and power consumption issues related to the interconnection network. Electrical interconnects are not likely to scale well to a large number of processors for energy efficiency reasons, and the problem is compounded by the fact that there is a fixed total power budget for a die, dictated by the amount of heat that can be dissipated without special (and expensive) cooling and packaging techniques. Thus, there is a need to seek alternatives to electrical signaling for on-chip interconnection applications. Photonics, which has a fundamentally different mechanism of signal propagation, offers the potential to not only overcome the drawbacks of electrical signaling, but also enable the architect to build energy efficient, scalable systems. The purpose of this book is to introduce computer architects to the possibilities and challenges of working with photons and designing on-chip photonic interconnection networks.

Elements of Optical Communication and Opto Electronics

Advances and Trends

Fiber Optic Video Transmission

Low-Power Wireless Infrared Communications

The Revolution in the Lighting Industry

Electronics Devices And Circuits

Arduino Projects to Save the World shows that it takes little more than a few tools, a few wires and sensors, an Arduino board, and a bit of gumption to build devices that lower energy bills, help you grow our own food, monitor pollution in the air and in the ground, even warn you about earth tremors. Arduino Projects to Save the World introduces the types of sensors needed to collect environmental data—from temperature sensors to motion sensors. You'll see projects that deal with energy sources—from building your own power strip to running your Arduino board on solar panels so you can actually proceed to build systems that help, for example, to lower your energy bills. Once you have some data, it's time to put it to good use by publishing it online as you collect it; this book shows you how. The core of this book deals with the Arduino projects themselves: Account for heat loss using a heat loss temperature sensor array that sends probes into every corner of your house for maximum measurement. Monitor local seismic activity with your own seismic monitor. Keep your Arduino devices alive in the field with a solar powered device that uses a smart, power-saving design. Monitor your data and devices with a wireless radio device; place your sensors where you like without worrying about wires. Keep an eye on your power consumption with a sophisticated power monitor that records its data wherever you like. Arduino Projects to Save the World teaches the aspiring green systems expert to build environmentally-sound, home-based Arduino devices. Saving the world, one Arduino at a time. Please note: the print version of this title is black & white; the eBook is full color.

The authors were originally brought together to share research and applications through the international Danfoss Professor Programme at Aalborg University in Denmark. Personal computers would be unwieldy and inefficient without power electronic dc supplies. Portable communication devices and computers would also be impractical. High-performance lighting systems, motor controls, and a wide range of industrial controls depend on power electronics. In the near future we can expect strong growth in automotive applications, dc power supplies for communication systems, portable applications, and high-end converters. We are approaching a time when all electrical energy will be processed and controlled through power electronics somewhere in the path from generation to end use. The most up-to-date information available is presented in the text

Written by a world renowned leader in the field

The book, now in its third edition, is thoroughly revised and updated as per the new syllabi of Optical Fiber Communication of various universities. The material is well-presented and designed for undergraduate and postgraduate students pursuing courses in Electrical Engineering, and Electronics and Telecommunication Engineering. The book offers a completely accessible and in-depth knowledge of the principles and applications of optical fiber communication (OFC). It deals with materials, devices, components, and systems of OFC. The coverage includes key concepts such as properties of light, evolution and elements of OFC, its benefits, along with applications in optical LAN and communication links. The attenuation loss of different types, dispersion mechanism, photon sources (LED and lasers), detectors (PIN and avalanche), analog and digital transmitter and receiver systems, connectorization, OADM, and amplifiers are described. Built-up of long haul OFC links at 8 Mb/s and 2.5 Gb/s, and optical interface are explained with illustrations. It also contains solved numerical problems for better understanding of topics. KEY FEATURES • Includes optical fiber LAN for data centres and industries • Provides detail treatment of LED, semiconductor, lasers, Tx and Rx • Discusses all optical communications links and optical networks • Includes important questions with answers • Provides practice papers and model test papers

Today, wireless infrared transmission has entered our homes, offices, industry and health care, with applications in the field of remote control, telemetry, and local communication. This book is about the underlying technology. As it is an outgrowth of my Ph.D. thesis, the emphasis is on fundamental aspects rather than industrial aspects, like the standardization effort by the IrDA [7]. I guess that this is not a drawback, as, eventually, the laws of physics apply to all of us! As the applied radiation is not necessarily in the infrared, throughout the book we usually prefer the term optical transmission. As most equipment is battery-powered, the emphasis is on power optimization of the optical transmission system. System parameters as well as environmental parameters that determine the eventual transmission quality are identified, to facilitate well-reasoned system design. Many design rules, based on calculations, measurements and simulations are presented to help the designer push the performance close to the limits set by nature and the available technology. The first chapters introduce the subject and the present the scope of the book. Then, the basic transmission link is introduced in chapter 3, and strategies to optimize its signal-to-noise ratio are discussed. Lighting flicker is identified as a possible source of interference. Then, receiver noise and bandwidth are discussed in chapter 4, mainly based on the material presented in [66], [67], [69].

Arduino Projects to Save the World

Fiber Optics Engineering

Analog Optical Links

Multilevel Inverters

On-Chip Photonic Interconnects

Silicon Photonics

The Fundamentals and Applications of Light-Emitting Diodes: The Revolution in the Lighting Industry examines the evolution of LEDs, including a review of the luminescence process and background on solid state lighting. The book emphasizes phosphor-converted LEDs that are based on inorganic phosphors but explores different types of LEDs based on inorganic, organic, quantum dots, perovskite-structured materials, and biomaterials. A detailed description is included about the diverse applications of LEDs in fields such as lighting, displays, horticulture, biomedicine, and digital communication, as well as challenges that must be solved before using LEDs in commercial applications. Traditional light sources are fast being replaced by light-emitting diodes (LEDs). The fourth generation of lighting is completely dominated by LED luminaires. Apart from lighting, LEDs have extended their hold on other fields, such as digital communications, horticulture, medicine, space research, art and culture, display devices, and entertainment. The technological promises offered by LEDs have elevated them as front-runners in the lighting industry. Presents a concise overview of different types of light-emitting diodes (LEDs) based on inorganic phosphors, organic materials, quantum dots, perovskite-structured materials, and biomaterials Includes a discussion of current and emerging applications in lighting, communications, horticulture, and medical fields Addresses fundamentals, luminescence mechanisms, and key optical materials, including synthesis methods

Modern semiconductor devices have reached high current and voltage levels, and their power-handling limits can be extended if they are used in multilevel converter configurations. To create high-performance and reliable control designs, however, engineers need in-depth understanding of the characteristics and operation of these topologies. Multilevel Converters for Industrial Applications presents a thorough and comprehensive analysis of multilevel converters with a common DC voltage source. The book offers a novel perspective to help readers understand the principles of the operation of voltage-source multilevel converters as power processors, and their capabilities and limitations. The book begins with an overview of medium-voltage power converters and their applications. It then analyzes the topological characteristics of the diode-clamped multilevel converter, the flying capacitor multilevel converter, and the asymmetric cascaded multilevel converter. For each topology, the authors highlight particular control issues and design trade-offs. They also develop relevant modulation and control strategies. Numerous graphical representations aid in the analysis of the topologies and are useful for beginning the analysis of new multilevel converter topologies. The last two chapters of the book explore two case studies that analyze the behavior of the cascade asymmetric multilevel converter as a distribution static compensator and shunt active power filter, and the behavior of the diode-clamped topology configured as a back-to-back converter. These case studies demonstrate how to address the associated control problems with advanced control and modulation schemes. Examining recent advances, this book provides deep insight on the design of high-power multilevel converters and their applications. It is a valuable reference for anyone interested in medium-voltage power conversion, which is increasingly being used in industry and in renewable energy and distributed generation systems to improve efficiency and operation flexibility.

This book provides readers a thorough understanding of the applicability of new-generation silicon-germanium (SiGe) electronic subsystems for electronic warfare and defensive countermeasures in military contexts. It explains in detail the theoretical and technical background, and addresses all aspects of the integration of SiGe as an enabling technology for maritime, land, and airborne / spaceborne electronic warfare, including research, design, development, and implementation. The coverage is supported by mathematical derivations, informative illustrations, practical examples, and case studies. While SiGe technology provides speed, performance, and price advantages in many markets, to date only limited information has been available on its use in electronic warfare systems, especially in developing nations. Addressing that need, this book offers essential engineering guidelines that especially focus on the speed and reliability of current-generation SiGe circuits and highlight emerging innovations that help to ensure the sustainable long-term integration of SiGe into electronic warfare systems.

Silicon Photonics, Volume 99 in the Semiconductors and Semimetals series, highlights new advances in the field, with this updated volume presenting interesting chapters on Transfer printing in Silicon Photonics, Epitaxial integration of antimonide-based semiconductor lasers on Si, Photonic crystal lasers and nanolasers on Si, the Evolution of monolithic quantum-dot light source for silicon photonics, III-V on Si nanocomposites, the Heterogeneous integration of III-V on Si by bonding, the Growth of III-V on Silicon compliant substrates and lasers by MOCVD, Photonic Integrated Circuits on Si, Integrated Photonics for Bio- and Environmental sensing, Membrane Lasers/Photodiodes on Si, and more. Provides the authority and expertise of leading contributors from an international board of authors Represents the latest release in the Semiconductors and Semimetals series Updated release includes the latest information on Silicon Photonics

Automotive Wiring

Tunable Laser Applications

TEXTBOOK ON OPTICAL FIBER COMMUNICATION AND ITS APPLICATIONS, THIRD EDITION

The Navy Electricity and Electronics Training Series: Module 24 Introduction To Fiber Optics

The Physical Fundamentals of Electro-Optics

This textbook provides practicing scientists and engineers an advanced treatment of the Atmel AVR microcontroller. This book is intended as a follow-on to a previously published book, titled Atmel AVR Microcontroller Primer: Programming and Interfacing. Some of the content from this earlier text is retained for completeness. This book will emphasize advanced programming and interfacing skills. We focus on system level design consisting of several interacting microcontroller subsystems. The first chapter discusses the system design process. Our approach is to provide the skills to quickly get up to speed to operate the internationally popular Atmel AVR microcontroller line by developing systems level design skills. We use the Atmel ATmega164 as a representative sample of the AVR line. The knowledge you gain on this microcontroller can be easily translated to every other microcontroller in the AVR line. In succeeding chapters, we cover the main subsystems aboard the microcontroller, providing a short theory section followed by a description of the related microcontroller subsystem with accompanying software for the subsystem. We then provide advanced examples exercising some of the features discussed. In all examples, we use the C programming language. The code provided can be readily adapted to the wide variety of compilers available for the Atmel AVR microcontroller line. We also include a chapter describing how to interface the microcontroller to a wide variety of input and output devices. The book concludes with several detailed system level design examples employing the Atmel AVR microcontroller. Table of Contents: Embedded Systems Design / Atmel AVR Architecture Overview / Serial Communication Subsystem / Analog to Digital Conversion (ADC) / Interrupt Subsystem / Timing Subsystem / Atmel AVR Operating Parameters and Interfacing / System Level Design

Over the past decade there have been massive advances in the areas of mobile and optical fiber communications. This unique book shows you how to combine these methods to create new radio over fiber technologies that offer seamless operation and greater multimedia application potential for your current and third generation mobile communication networks.

Within the past few decades, information technologies have been evolving at a tremendous rate, causing profound changes to our world and our ways of life. In particular, fiber optics has been playing an increasingly crucial role within the telecommunication revolution. Not only most long-distance links are fiber based, but optical fibers are increasingly approaching the individual end users, providing wide bandwidth links to support all kinds of data-intensive applications such as video, voice, and data services. As an engineering discipline, fiber optics is both fascinating and challenging. Fiber optics is an area that incorporates elements from a wide range of technologies including optics, microelectronics, quantum electronics, semiconductors, and networking. As a result of rapid changes in almost all of these areas, fiber optics is a fast evolving field. Therefore, the need for up-to-date texts that address this growing field from an interdisciplinary perspective persists. This book presents an overview of fiber optics from a practical, engineering perspective. Therefore, in addition to topics such as lasers, detectors, and optical fibers, several topics related to electronic circuits that generate, detect, and process the optical signals are covered. In other words, this book attempts to present fiber optics not so much in terms of a field of “optics” but more from the perspective of an engineering field within “optoelectronics.

Millimeter-Wave Radio-over-Fiber Links based on Mode-Locked Laser DiodesKIT Scientific PublishingAnalog Optical LinksTheory and PracticeCambridge University Press

Vertical-Cavity Surface-Emitting Lasers

The Complete Guide

Multilevel Converters for Industrial Applications

Radio Over Fiber Technologies for Mobile Communications Networks

Optical Communications

Handbook of Distributed Feedback Laser Diodes, Second Edition

This book, first published in 1999, provides a comprehensive description of the physics, design, fabrication, characterization, and applications of vertical-cavity surface-emitting lasers.

Ideal for aspiring and active automotive professionals, TODAY'S TECHNICIAN: AUTOMOTIVE ELECTRICITY & ELECTRONICS, Seventh Edition, equips readers to confidently understand, diagnose, and repair electrical and electronic systems in today's automobiles. Using a unique two-volume approach to optimize learning in both the classroom and the auto shop, the first volume (Classroom Manual) covers the theory and application of electricity, electronics, and circuitry in modern automobiles, while the second (Shop Manual) focuses on real-world symptoms, diagnostics, and repair information. Known for its comprehensive coverage, accurate and up-to-date technical information, and hundreds of detailed color illustrations and photographs, the text is an ideal resource to prepare for success as an automotive technician or pursue ASE certification. Now updated with extensive information on new and emerging technology and techniques--including telematic systems, LED and adaptive lighting, hybrid and electric vehicles, stop/start technology, lane departure warning, self-park systems, Wi-Fi connectivity, and other modern accessory systems--the Seventh Edition also aligns with the ASE Education Foundation 2017 accreditation model and includes job sheets correlated to all MLR, AST, and MAST tasks. Important Notice: Media content referenced within the product description or the product text may not be available in the ebook version.

Since the first edition of this book was published in 1997, the photonics landscape has evolved considerably and so has the role of distributed feedback (DFB) laser diodes. Although tunable laser diodes continue to be introduced in advanced optical communication systems, DFB laser diodes are still widely applied in many deployed systems. This also includes wavelength tunable DFB laser diodes and DFB laser diode arrays, usually integrated with intensity or phase modulators and semiconductor optical amplifiers. This valuable resource gives professionals a comprehensive description of the different effects that determine the behavior of a DFB laser diode. Special attention is given to two new chapters on wavelength tunable DFB laser diodes and bistable and unstable DFB laser diodes. Among many other updates throughout the reference, semiconductor and electromagnetic professionals are also provided two new appendices. This book fully covers the underlying theory, commercial applications, necessary design criteria, and future direction of this technology.

Multilevel Inverters: Conventional and Emerging Topologies and Their Control is written with two primary objectives: (a) explanation of fundamentals of multilevel inverters (MLIs) with reference to the general philosophy of power electronics; and (b) enabling the reader to systematically analyze a given topology with the possibility of contributing towards the ongoing evolution of topologies. The authors also present an updated status of current research in the field of MLIs with an emphasis on the evolution of newer topologies. In addition, the work includes a universal control scheme, with which any given topology can be modulated. Extensive qualitative and quantitative evaluations of emerging topologies give researchers and industry professionals suitable solutions for specific applications with a systematic presentation of software-based modeling and simulation, and an exploration of key issues. Topics covered also include power distribution among sources, voltage balancing, optimization switching frequency and asymmetric source configuration. This valuable reference further provides tools to model and simulate conventional and emerging topologies using MATLAB®/Simulink® and discusses execution of experimental set-up using popular interfacing tools. The book includes a Foreword by Dr. Frede Blaabjerg, Fellow IEEE, Professor and VILLUM Investigator, Aalborg University, Denmark. Includes a universal control scheme to help the reader learn the control of existing topologies and those which can be proposed in the future Presents three new topologies. Systematic development of these topologies and subsequent simulation and experimental studies exemplify an approach to the development of newer topologies and verification of their working and experimental verification. Contains a systematic and step-by-step approach to modelling and simulating various topologies designed to effectively employ low-power applications

Advanced Laser Diode Reliability

Design, Fabrication, Characterization, and Applications

The Technology and Business of Mobile Communications

Wireless Infrared Communications

The Design and Implementation of a Passive Clamp Resonant DC Link Inverter for High Power Applications

Today's Technician: Automotive Electricity and Electronics, Classroom and Shop Manual Pack, Spiral bound Version

A GUIDE TO THE FUNDAMENTAL THEORY AND PRACTICE OF OPTICAL COMMUNICATION Fiber Optic and Atmospheric Optical Communication offers a much needed guide to characterizing and overcoming the drawbacks associated with optical communication links that suffer from various types of fading when optical signals with information traverse these wireless (atmospheric) or wired (fiber optic) channels. The authors—noted experts on the topic—present material that aids in predicting the capacity, data rate, spectral efficiency, and bit-error-rate associated with a channel that experiences fading. They review modulation techniques and methods of coding and decoding that are useful when implementing communications systems. The book also discusses how to model the channels, including treating distortion due to the various fading phenomena. Light waves and their similarity to radio waves are explored, and the way light propagates through the atmosphere, through materials, and through the boundary between two materials is explained. This important book: Characterizes principal optical sources and detectors, including descriptions of their advantages and disadvantages, to show how to design systems from start to finish Provides a new method of predicting and dealing with the dispersive properties of fiber optic cables and other optical guiding structures in order to increase data stream capacity Highlights effects of material and multimode (multi-ray) dispersion during propagation of optical signals with data through fiber optic channels Presents modulation techniques and methods of coding and decoding that are useful when implementing communications systems Written for professionals dealing with optical and electro-optical communications, Fiber Optic and Atmospheric Optical Communication explores the theory and practice of optical communication both when the optical signal is propagating through the atmosphere and when it is propagating through an optical fiber.

Advanced Laser Diode Reliability focuses on causes and effects of degradations of state-of-the-art semiconductor laser diodes. It aims to provide a tool for linking practical measurements to physical diagnostics. To this purpose, it reviews the current technologies, addressing their peculiar details that can promote specific failure mechanisms. Two sections will support this kernel: a) Failure Analysis techniques, procedures and examples; b) Device-oriented laser modelling and parameter extraction. Talk about Natural continuity with the most widespread existing textbooks, published by Mitsuo Fukuda Present the extension to new failure mechanisms, new technologies, new application fields, new environments Introduce a specific self-consistent model for the physical description of a laser diode, expressed in terms of practically measurable quantities

The long-awaited third edition of this classic textbook provides a genuinely accessible introduction to the principles and technology of optical communication systems. It takes the reader from the fundamentals of light propagation in optical fibre, through materials and fabrication methods, light sources and modulation, to photodiodes and receiver design, and concludes with a chapter looking at system level integration. Updated throughout, major changes for this third edition include: - coverage of advanced semiconductor laser diode structures (VCSELs and DFBs)- an extended section on fibre amplifiers and lasers- updated discussion of avalanche photodiode structures- expanded coverage of transimpedance and optical preamplifiers- new sections on free-space optical links, VLC, ethernet links, coherent detection and terabit systems Enhanced with worked examples and end-of-chapter problem sets, the book is aimed at advanced undergraduate and graduate students in electronic engineering, optical science and applied physics, and is ideally suited for adoption as a course text.

A comprehensive reference of the latest developments in MV drive technology in the area of power converter topologies This new edition reflects the recent technological advancements in the MV drive industry, such as advanced multilevel converters and drive configurations. It includes three new chapters, Control of Synchronous Motor Drives, Transformerless MV Drives, and Matrix Converter Fed Drives. In addition, there are extensively revised chapters on Multilevel Voltage Source Inverters and Voltage Source Inverter-Fed Drives. This book includes a systematic analysis on a variety of high-power multilevel converters, illustrates important concepts with simulations and experiments, introduces various megawatt drives produced by world leading drive manufacturers, and addresses practical problems and their mitigations methods. This new edition: Provides an in-depth discussion and analysis of various control schemes for the MV synchronous motor drives Examines new technologies developed to eliminate the isolation transformer in the MV drives Discusses the operating principle and modulation schemes of matrix converter (MC) topology and multi-module cascaded matrix converters (CMCs) for MV drives, and their application in commercial MV drives Bin Wu is a Professor and Senior NSERC/Rockwell Automation Industrial Research Chair in Power Electronics and Electric Drives at Ryerson University, Canada. He is a fellow of Institute of Electrical and Electronics Engineers (IEEE), Engineering Institute of Canada (EIC), and Canadian Academy of Engineering (CAE). Dr. Wu has published more than 400 papers and holds more than 30 granted/pending US/European patents. He co-authored several books including Power Conversion and Control of Wind Energy Systems and Model Predictive Control of Wind Energy Conversion Systems (both by Wiley-IEEE Press). Mehdi Narimani is a Postdoctoral Research Associate with the Department of Electrical and computer Engineering at Ryerson University, Canada, and Rockwell Automation Canada. He is a senior member of IEEE. Dr. Narimani is author/co-author of more than 50 technical papers and four US/European patents (issued/pending review). His current research interests include power conversion, high power converters, control of power electronics, and renewable energy systems.

Theory and Practice

Components and Systems

ESD Design Challenges and Strategies in Deeply-scaled Integrated Circuits

The Fundamentals and Applications of Light-Emitting Diodes

Fiber Optic and Atmospheric Optical Communication

Introduction to Logic Design

Power Electronics and Motor Drives: Advances and Trends, Second Edition is the perfect resource to keep the electrical engineer up-to-speed on the latest advancements in technologies, equipment and applications. Carefully structured to include both traditional topics for entry-level and more advanced applications for the experienced engineer, this reference sheds light on the rapidly growing field of power electronic operations. New content covers converters, machine models and new control methods such as fuzzy logic and neural network control. This reference will help engineers further understand recent technologies and gain practical understanding with its inclusion of many industrial applications. Further supported by a glossary per chapter, this book gives engineers and researchers a critical reference to learn from real-world examples and make future decisions on power electronic technology and applications. Provides many practical examples of industrial applications Updates on the newest electronic topics with content added on fuzzy logic and neural networks Presents information from an expert with decades of research and industrial experience

This book offers a much-needed practical guide to characterizing difficulties met by designers of electro-optical current devices, such as lasers, laser diodes and photodiodes, and advanced optical devices, such as avalanche and erbium diodes, to overcome drawbacks associated with optical communication links, wireless (for LIDAR applications) and wired (for fiber-optical communication). All these drawbacks suffer from various types of noises inside each element of the devices under analysis and the corresponding fading phenomenon when various types of optical signals with information data transverse these channels. It will appeal to undergraduate and postgraduate students and professionals dealing with optical communication and the design of electro-optic devices. The book explores the theoretical background and practical aspects both when optical signals propagate through a wireless channel (for LIDAR atmospheric applications) and when they propagate through an optical fiber.

Analog Optical Links presents the basis for the design of analog links. Following an introductory chapter, there is a chapter devoted to the development of the small signal models for common electro-optical components used in both direct and external modulation. However this is not a device book, so the theory of their operation is discussed only insofar as it is helpful in understanding the small signal models that result. These device models are then combined to form a complete link. With these analytical tools in place, a chapter is devoted to examining in detail each of the four primary link parameters; gain, bandwidth, noise figure and dynamic range. Of particular interest is the inter-relation between device and link parameters. A final chapter explores some of the trade offs among the primary link parameters.

The demand for wireless access to network services is growing in virtually all communications and computing applications. Once accustomed to unteathered operation, users resent being tied to a desk or a fixed location, but will endure it when there is some substantial benefit, such as higher resolution or bandwidth. Recent technological advances, however, such as the scaling of VLSI, the development of low-power circuit design techniques and architectures, increasing battery energy capacity, and advanced displays, are rapidly improving the capabilities of wireless devices. Many of the technological advances contributing to this revolution pertain to the wireless medium itself. There are two viable media: radio and optical. In radio, spread-spectrum techniques allow different users and services to coexist in the same bandwidth, and new microwave frequencies with plentiful bandwidth become viable as the speed of the supporting low-cost electronics increases. Radio has the advantage of being available ubiquitously indoors and outdoors, with the possibility of a seamless system infrastructure that allows users to move between the two. There are unanswered (but likely to be benign) biological effects of microwave radiation at higher power densities. Optical communications is enhanced by advances in photonic devices, such as semiconductor lasers and detectors. Optical is primarily an indoor technology - where it need not compete with sunlight - and offers advantages such as the immediate availability of a broad bandwidth without the need for regulatory approval.

Selected Problems

SiGe-based Re-engineering of Electronic Warfare Subsystems

High-Power Converters and AC Drives

RF Photonic Technology in Optical Fiber Links

Power Electronics and Motor Drives

An Introduction

It is the main objective of this work to address the scaling and design challenges of ESD protection in deeply scaled technologies. First, the thesis introduces the on-chip ESD events, the scaling and design challenges, and the nomenclatures necessary for later chapters. The ESD design window and the I/O schematics for both rail clamping and local clamping ESD schemes are illustrated. Then, the thesis delves into the investigation of the input and output driver devices and examines their robustness under ESD. The input driver's oxide breakdown levels are evaluated in deeply scaled technologies. The output driver's trigger and breakdown voltages are improved appreciably by applying circuit and device design techniques. The ESD device sections first discuss rail-based clamping, a widely used protection scheme. Two diode-based devices, namely the gated diode and substrate diode, are investigated in detail with SOI test structures. Characterization is based on DC current-voltage (I-V), Very Fast Transmission Line Pulse (VF-TLP), capacitance, and leakage measurements. Improvements in performance are realized. Technology computer aided design (TCAD) simulations help understand the physical effects and design tradeoffs. Then, the following section focuses on the local clamping scheme. Two devices, the field-effect diode (FED) and the double-well FED (DWFED), are developed and optimized in an SOI technology. Trigger circuits are designed to improve the turn-on speed. The advantages of local clamping is highlighted and compared with the rail-based clamping. The results show that the FED is a suitable option for power clamping applications and the DWFED is most suitable for pad-based local clamping. The thesis presents an ESD protection design methodology, which takes advantage of the results and techniques from previous chapters and put each element into a useful format. Based on the correlation of package level and in-lab test results, a design process based on CDM target definition and device optimization, discharge path analysis, parasitic minimization, I/O data rate estimation and finally ESD and performance characterization is used sequentially to systematically realize the overall design goals.

The second edition of this text provides an introduction to the analysis and design of digital circuits at a logic, instead of electronics, level. It covers a range of topics, from number system theory to asynchronous logic design. A solution manual is available to instructors only. Requests must be made on official school stationery.

This Book Provides A Systematic And Thorough Exposition Of Electronic Devices And Circuits. The Various Principles Are Explained In Detail And The Interconnections Between Different Concepts Are Suitably Highlighted.The Book Begins By Explaining The Transition From Physics To Electronic Devices And Highlights The Linkages Between The Two. A Detailed Treatment Of Semiconductor Devices And Circuits Is Then Presented, Followed By A Comprehensive Discussion Of Bipolar Junction Transistor (Bjt). The Next Two Chapters Focus On Field Effect Transistor (Fet). Power Devices And Cathode Ray Oscilloscope Are Then Explained. The Book Includes A Large Number Of Solved Examples To Illustrate The Concepts And Techniques Discussed. Review Questions, Unsolved Problems With Answers And Objective Questions Are Included Throughout The Book.The Book Would Serve As An Excellent Text For Both Degree And Diploma Students Of Electrical, Electronics, Computer And Instrumentation Engineering. Amie Candidates Would Also Find It Extremely Useful.

Provides an introduction to the technical and business aspects of mobile telecommunications, exploring the complete eco-system of the industry with the key segments and how they interact with each other. This industry has seen rapid technical advancements in recent years, yet the basics of providing coverage and capacity to the end users have not changed. The authors introduce these technical basics to the reader and then show how a network is deployed. Technical innovation has been pivotal to the rapid advancement of this industry and the book details some of the main innovations over the years. The book highlights some of the current challenges the industry is facing and how innovation is driven by these challenges. Mobile operators business structures are examined, from the purchasing spectrum to deploying the network and attracting and retaining customers. The role of the regulator is not overlooked, and its role in ensuring a competitive market where consumers have sufficient choice. The authors detail current challenges faced by the operators and how they are using business innovation to overcome these challenges. In describing the changing face of mobile telecoms, the book covers business challenges as well as the technological challenges faced today by the industry. The advent of the Smart phones, which support multiple technologies that compliment and sometimes compete with mobile cellular technology has had a profound impact on the industry, sometimes challenging the role of the mobile operator. A discussion of these yet-unanswered challenges provides some insight into where the industry is heading. The technical aspects of this book are pitched at undergraduate first year mathematics and physics subject levels, making it easily comprehensible to the undergraduate students studying relevant fields. As the title denotes, this book will be at an introductory level, giving a broad coverage to many of the significant technical and business aspects of the industry.

Advanced Multilevel Converters and Applications in Grid Integration

Conventional and Emerging Topologies and Their Control

Power Electronic Control of AC Motors

Operation and Control of Renewable Energy Systems

Current Control of a 3-level Rectifier/inverter Drive System

Control in Power Electronics

A comprehensive reference to renewable energy technologies with a focus on power generation and integration into power systems This book addresses the generation of energy (primarily electrical) through various renewable sources. It discusses solar and wind power—two major resources that are now in use in small as well as large-scale power production—and their requirements for effectively using advanced control techniques.In addition, the book looks at theintegration of renewable energy in the power grid and its ability to work in a micro grid. Operation and Control of Renewable Energy Systems describes the numerous types of renewable energy sources available and the basic principles involving energy conversion, including the theory of fluid mechanics and the laws of thermodynamics. Chapter coverage includes the theory of power electronics and various electric power generators, grid scale energy storage systems, photovoltaic power generation, solar thermal energy conversion technology, horizontal and vertical wind turbines for power generation, and more. Covers integration into power systems with an emphasis on microgrids Introduces a wide range of subjects related to renewable energy systems, including energy storage, microgrids, and battery technologies Includes tutorial materials such as up-to-date references for wind energy, grid connection, and power electronics—plus worked examples and solutions Operation and Control of Renewable Energy Systems is the perfect introduction to renewable energy technologies for undergraduate and graduate students and can also be very useful to practicing engineers.

In many applications, radio frequency (RF) signals need to be transmitted and processed without being digitalized. Optical fiber provides a transmission medium in which RF modulated optical carriers can be transmitted and distributed with very low loss, making it more efficient and less costly than conventional electronic systems. This volume presents a review of RF photonic components, transmission systems, and signal processing examples in optical fibers from leading academic, government, and industry scientists working in this field. It also introduces the reader to various related technologies such as direct modulation of laser sources, external modulation techniques, and detectors. The text is aimed at engineers and scientists engaged in the research and development of optical fibers and analog RF applications. With an emphasis on design, performance and practical application, this book will be of particular interest to those developing systems based on this technology.

A Computer Architect's Perspective

Embedded System Design with the Atmel AVR Microcontroller

Millimeter-Wave Radio-over-Fiber Links based on Mode-Locked Laser Diodes