

Advanced Multilevel Converter Systems Ecpe

Aspencore Guide to Gallium Nitride
 2018 IEEE International Power Electronics and Application Conference and Exposition (PEAC)
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Aspencore Guide to Gallium Nitride CRC Press
 Grid converters are the key player in renewable energy integration. The high penetration of renewable energy systems is calling for new more stringent grid requirements. As a consequence, the grid converters should be able to exhibit advanced functions like: dynamic control of active and reactive power, operation within a wide range of voltage and frequency, voltage ride-through capability, reactive current injection during faults, grid services support. This book explains the topologies, modulation and control of grid converters for both photovoltaic and wind power applications. In addition to power electronics, this book focuses on the specific applications in photovoltaic wind power systems where grid condition is an essential factor. With a review of the most recent grid requirements for photovoltaic and wind power systems, the book discusses these other relevant issues: modern grid inverter topologies for photovoltaic and wind turbines islanding detection methods for photovoltaic systems synchronization techniques based on second order generalized integrators (SOGI) advanced synchronization techniques with robust operation under grid unbalance condition grid filter design and active damping techniques power control under grid fault conditions, considering both positive and negative sequences Grid Converters for Photovoltaic and Wind Power Systems is intended as a coursebook for graduated students with a background in electrical engineering and also for professionals in the evolving renewable energy industry. For people from academia interested in adopting the course, a set of slides is available for download from the website. www.wiley.com/go/grid_converters
 2018 IEEE International Power Electronics and Application Conference and Exposition (PEAC) Springer
 Power converters are at the heart of modern power electronics. From automotive power systems to propulsion for large ships, their use permeates through industrial, commercial, military, and aerospace applications of various scales. Having reached a point of saturation where we are unlikely to see many new and revolutionary technologies, industry no
Transformer Design Principles, Third Edition John Wiley & Sons
 An examination of all of the multidisciplinary aspects of medium- and high-power converter systems, including basic power electronics, digital control and hardware, sensors, analog preprocessing of signals, protection devices and fault management, and pulse-width-modulation (PWM) algorithms, Switching Power Converters: Medium and High Power, Second

Edition discusses the actual use of industrial technology and its related subassemblies and components, covering facets of implementation otherwise overlooked by theoretical textbooks. The updated Second Edition contains many new figures, as well as new and/or improved chapters on: Thermal management and reliability Intelligent power modules AC/DC and DC/AC current source converters Multilevel converters Use of IPM within a "network of switches" concept Power semiconductors Matrix converters Practical aspects in building power converters Providing the latest research and development information, along with numerous examples of successful home appliance, aviation, naval, automotive electronics, industrial motor drive, and grid interface for renewable energy products, this edition highlights advancements in packaging technologies, tackles the advent of hybrid circuits able to incorporate control and power stages within the same package, and examines design for reliability from the system level perspective.

Applications of Power Electronics John Wiley & Sons
 This book introduces readers to cybersecurity and its impact on the realization of the Industry 4.0 vision. It covers the technological foundations of cybersecurity within the scope of the Industry 4.0 landscape and details the existing cybersecurity threats faced by Industry 4.0, as well as state-of-the-art solutions with regard to both academic research and practical implementations. Industry 4.0 and its associated technologies, such as the Industrial Internet of Things and cloud-based design and manufacturing systems are examined, along with their disruptive innovations. Further, the book analyzes how these phenomena capitalize on the economies of scale provided by the Internet. The book offers a valuable resource for practicing engineers and decision makers in industry, as well as researchers in the design and manufacturing communities and all those interested in Industry 4.0 and cybersecurity.

Thermal Measurements in Electronics Cooling Springer
 This book presents the latest cutting-edge technology in high-power converters and medium voltage drives, and provides a complete analysis of various converter topologies, modulation techniques, practical drive configurations, and advanced control schemes. Supplemented with more than 250 illustrations, the author illustrates key concepts with simulations and experiments. Practical problems, along with accompanying solutions, are presented to help you tackle real-world issues.

Wide Bandgap Power Semiconductor Packaging John Wiley & Sons
 Power electronics technology is still an emerging technology, and it has found its way into many applications, from renewable energy generation (i.e., wind power and solar power) to electrical vehicles (EVs), biomedical devices, and small appliances, such as laptop chargers. In the near future, electrical energy will be

provided and handled by power electronics and consumed through power electronics; this not only will intensify the role of power electronics technology in power conversion processes, but also implies that power systems are undergoing a paradigm shift, from centralized distribution to distributed generation. Today, more than 1000 GW of renewable energy generation sources (photovoltaic (PV) and wind) have been installed, all of which are handled by power electronics technology. The main aim of this book is to highlight and address recent breakthroughs in the range of emerging applications in power electronics and in harmonic and electromagnetic interference (EMI) issues at device and system levels as discussed in robust and reliable power electronics technologies, including fault prognosis and diagnosis technique stability of grid-connected converters and smart control of power electronics in devices, microgrids, and at system levels.

Theory, Practice, Management Springer
 Provides comprehensive coverage of the basic principles and methods of electric power conversion and the latest developments in the field This book constitutes a comprehensive overview of the modern power electronics. Various semiconductor power switches are described, complementary components and systems are presented, and power electronic converters that process power for a variety of applications are explained in detail. This third edition updates all chapters, including new concepts in modern power electronics. New to this edition is extended coverage of matrix converters, multilevel inverters, and applications of the Z-source in cascaded power converters. The book is accompanied by a website hosting an instructor's manual, a PowerPoint presentation, and a set of PSpice files for simulation of a variety of power electronic converters. Introduction to Modern Power Electronics, Third Edition: Discusses power conversion types: ac-to-dc, ac-to-ac, dc-to-dc, and dc-to-ac Reviews advanced control methods used in today's power electronic converters Includes an extensive body of examples, exercises, computer assignments, and simulations Introduction to Modern Power Electronics, Third Edition is written for undergraduate and graduate engineering students interested in modern power electronics and renewable energy systems. The book can also serve as a reference tool for practicing electrical and industrial engineers.

Principles and Practice CRC Press
 Renewable Energy Engineering and Technology: Principles and Practice - covers major renewable energy resources and technologies for various applications. The book is conceived as a standard reference book for students, experts, and policy-makers. It has been designed to meet the needs of these diverse groups. While covering the basics of scientific and engineering principles of thermal engineering, heat and mass transfer, fluid dynamics,

and renewable energy resource assessments, the book further deals with the basics of applied technologies and design practices for following renewable energy resources. - Solar (thermal and photovoltaic) - Wind - Bio-energy including liquid biofuels and municipal solid waste- Other renewables such as tidal, wave, and geothermal. The book is designed to fulfil the much-awaited need for a handy, scientific, and easy-to-understand comprehensive handbook for design professionals and students of renewable energy engineering courses. Besides the sheer breadth of the topics covered, what makes this well-researched book different from earlier attempts is the fact that this is based on extensive practical experiences of the editor and the authors. Thus, a lot of emphasis has been placed on system sizing and integration. Ample solved examples using data for India make this book a relevant and an authentic reference.

High-Power Converters and AC Drives Springer Science & Business Media

CMOS DC-DC Converters aims to provide a comprehensive dissertation on the matter of monolithic inductive Direct-Current to Direct-Current (DC-DC) converters. For this purpose seven chapters are defined which will allow the designer to gain specific knowledge on the design and implementation of monolithic inductive DC-DC converters, starting from the very basics. Electric Power Transformer Engineering Springer Science & Business Media

* The first single volume resource for researchers in the field who previously had to depend on separate papers and conference records to attain a working knowledge of the subject. * Brings together the field's diverse approaches into an integrated and comprehensive theory of PWM

principles and practice, Revised International Edition CRC Press An up-to-date, practical guide on upgrading from silicon to GaN, and how to use GaN transistors in power conversion systems design This updated, third edition of a popular book on GaN transistors for efficient power conversion has been substantially expanded to keep students and practicing power conversion engineers ahead of the learning curve in GaN technology advancements. Acknowledging that GaN transistors are not one-to-one replacements for the current MOSFET technology, this book serves as a practical guide for understanding basic GaN transistor construction, characteristics, and applications. Included are discussions on the fundamental physics of these power semiconductors, layout, and other circuit design considerations, as well as specific application examples demonstrating design techniques when employing GaN devices. GaN Transistors for Efficient Power Conversion, 3rd Edition brings key updates to the chapters of Driving GaN Transistors; Modeling, Simulation, and Measurement of GaN Transistors; DC-DC Power Conversion; Envelope Tracking; and Highly Resonant Wireless Energy Transfer. It also offers new chapters on Thermal Management, Multilevel Converters, and Lidar, and revises many others throughout. Written by leaders in the power semiconductor field and industry pioneers in GaN power transistor technology and applications Updated with 35% new material, including three new chapters on Thermal Management, Multilevel Converters, Wireless Power, and Lidar Features practical guidance on formulating specific circuit designs when constructing power conversion systems using GaN transistors A valuable resource for professional engineers, systems designers, and electrical engineering students who need to fully understand the state-of-the-art GaN Transistors for Efficient Power Conversion, 3rd Edition is an essential learning tool and reference guide that enables power conversion engineers to design energy-efficient, smaller, and more cost-effective products using GaN transistors.

Volume 3 IET

GaN is considered the most promising material candidate in next-generation power device applications, owing to its unique material properties, for example, bandgap, high breakdown field, and high electron mobility. Therefore, GaN power device technologies are listed as the top priority to be developed in many countries, including the United States, the European Union, Japan, and China. This book presents a comprehensive overview of GaN power device technologies, for example, material growth, property analysis, device structure design, fabrication process, reliability, failure analysis, and packaging. It provides useful information to both students and researchers in academic and related industries working on GaN power devices. GaN wafer growth technology is from Enkris Semiconductor, currently one of the leading players in commercial GaN wafers. Chapters 3 and 7, on the GaN transistor fabrication process and GaN vertical power devices, are edited by Dr. Zhihong Liu, who has been working on GaN devices for more than ten years. Chapters 2 and 5, on the characteristics of polarization effects and the original

demonstration of AlGaIn/GaN heterojunction field-effect transistors, are written by researchers from Southwest Jiaotong University. Chapters 6, 8, and 9, on surface passivation, reliability, and package technologies, are edited by a group of researchers from the Southern University of Science and Technology of China. Applications, Analysis, and Design from Theory to Practice Elsevier

Industry 4.0 refers to fourth generation of industrial activity characterized by smart systems and internet-based solutions. This book describes the fourth revolution based on instrumented, interconnected and intelligent assets. The different book chapters provide a perspective on technologies and methodologies developed and deployed leading to this concept. With an aim to increase performance, productivity and flexibility, major application area of maintenance through smart system has been discussed in detail. Applicability of 4.0 in transportation, energy and infrastructure is explored, with effects on technology, organisation and operations from a systems perspective.

Wide Bandgap Semiconductor Power Devices Woodhead Publishing

Halbleiter-Leistungsbaulemente sind das Kernstück der Leistungselektronik. Sie bestimmen die Leistungsfähigkeit und machen neuartige und verlustarme Schaltungen erst möglich. In dem Band wird neben den Halbleiter-Leistungsbaulementen selbst auch die Aufbau- und Verbindungstechnik behandelt: von den physikalischen Grundlagen und der Herstellungstechnologie über einzelne Bauelemente bis zu thermomechanischen Problemen, Zerstörungsmechanismen und Störungseffekten. Die 2., überarbeitete Auflage berücksichtigt technische Neuerungen und Entwicklungen.

Renewable Energy Engineering and Technology Elsevier 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

Selected Problems John Wiley & Sons

Due to the increasing world population, energy consumption is steadily climbing, and there is a demand to provide solutions for sustainable and renewable energy production, such as wind turbines and photovoltaics. Power electronics are being used to interface renewable sources in order to maximize the energy yield, as well as smoothly integrate them within the grid. In many cases, power electronics are able to ensure a large amount of energy saving in pumps, compressors, and ventilation systems. This book explains the operations behind different renewable generation technologies in order to better prepare the reader for practical applications. Multiple chapters are included on the state-of-the-art and possible technology developments within the next 15 years. The book provides a comprehensive overview of the current renewable energy technology in terms of system configuration, power circuit usage, and control. It contains two design examples for small wind turbine system and PV power system, respectively, which are useful for real-life installation, as well as many computer simulation models.

Reliability of Power Electronic Converter Systems CRC Press Power Electronics Application Conference and Exposition (PEAC) is an international conference for presentation and discussion of the state of art in power electronics and energy conversion, mainly in power supply and related areas The world's industry, research, and academia are cordially invited to participate in an array of presentations, tutorials, Exhibitions and social activities for the advancement of science, technology, engineering education, and fellowship Technical interests of the conference are included but not limited to Switching Power Supply Inverter and UPS Power Devices and System Integrations High Frequency Magnetic and Integrated Magnetic Modeling, control, Simulation, EMI and Reliability Conversion Technologies for Renewable Energy and Energy Saving Power Electronics Applied to Transmission and Distribution Systems Power Electronics Applied to Electric Vehicles and Railway Systems Lighting electronics

Materials, Physics, Design, and Applications CRC Press Compiles current research into the analysis and design of power electronic converters for industrial applications and renewable

energy systems, presenting modern and future applications of power electronics systems in the field of electrical vehicles With emphasis on the importance and long-term viability of Power Electronics for Renewable Energy this book brings together the state of the art knowledge and cutting-edge techniques in various stages of research. The topics included are not currently available for practicing professionals and aim to enable the reader to directly apply the knowledge gained to their designs. The book addresses the practical issues of current and future electric and plug-in hybrid electric vehicles (PHEVs), and focuses primarily on power electronics and motor drives based solutions for electric vehicle (EV) technologies. Propulsion system requirements and motor sizing for EVs is discussed, along with practical system sizing examples. Key EV battery technologies are explained as well as corresponding battery management issues. PHEV power system architectures and advanced power electronics intensive charging infrastructures for EVs and PHEVs are detailed. EV/PHEV interface with renewable energy is described, with practical examples. This book explores new topics for further research needed world-wide, and defines existing challenges, concerns, and selected problems that comply with international trends, standards, and programs for electric power conversion, distribution, and sustainable energy development. It will lead to the advancement of the current state-of-the-art applications of power electronics for renewable energy, transportation, and industrial applications and will help add experience in the various industries and academia about the energy conversion technology and distributed energy sources. Combines state of the art global expertise to present the latest research on power electronics and its application in transportation, renewable energy and different industrial applications Offers an overview of existing technology and future trends, with discussion and analysis of different types of converters and control techniques (power converters, high performance power devices, power system, high performance control system and novel applications) Systematic explanation to provide researchers with enough background and understanding to go deeper in the topics covered in the book

Epitaxial Silicon Technology CRC Press

As silicon reaches its theoretical performance limits for power electronics, industry is shifting toward wide-bandgap materials like Gallium Nitride (GaN), whose properties provide clear benefits in power converters for consumer and industrial electronics. In over 150 pages covering the technology, its applications, markets and future potential, this book delves into GaN technology and its importance for power electronics professionals engaged with its implementation in power devices. The properties of GaN, such as low leakage current, significantly reduced power losses, higher power density and the ability to tolerate higher operating temperatures, all from a device smaller than its silicon-only equivalent, provide design advantages allowing previously unimaginable application performance. As an alternative to silicon, GaN can provide clear benefits in power converters for consumer and industrial electronics; chargers for wireless devices, including 5G; driver circuits for motor control; and power switches in automotive and space applications. The book also explores why GaN-based devices hold the key to addressing the energy efficiency agenda, a key strategic initiative in increasingly power-reliant industries such as data centers, electric vehicles, and renewable energy systems. Highly efficient residential and commercial energy storage systems using GaN technology will enable distribution, local storage, and on-demand access to renewable energy. Continued progress in the battery market will lead to declining battery costs and the development of smaller batteries that pair with GaN technology-based converters and inverters. Thermal management is critical in power electronics, and high efficiency in higher-power systems is always a focus. With GaN, a 50% reduction in losses can be achieved, reducing the costs and area required to manage heat. The book delves into GaN's electrical characteristics and how these can be exploited in power devices. There are also chapters that cross into the key applications for GaN devices for several markets such as space, automotive, audio, motor control and data centers. Each chapter provides a comprehensive overview of the subject matter for anyone who wants to stay on the leading edge of power electronics.

Medium and High Power Springer Science & Business Media

This book presents recent studies on the power electronics used for the next generation wind turbine system. Some criteria and tools for evaluating and improving the critical performances of the wind power converters have been proposed and established. The book addresses some emerging problems as well as possibilities for the wind power conversion, and may be useful as an inspiring reference for the researchers in this field.