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# Isolated IGBT Gate Drive Push Pull Power Supply With 4

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Using Compact Piezoelectric Transformers to Isolate Integrated Phase Leg Shunt Current Sensors

HVDC, FACTS, and Artificial Intelligence

POWER ELECTRONICS

Medium and High Power, Second Edition

A Vector Control System for an Electric Vehicle A.C. Induction Motor

Solar Technologies for the 21st Century

Analysis, Design, and Measurement

Telecom Power Systems

Physics, Design and Applications of the Insulated Gate Bipolar Transistor

Solar Photovoltaic Power Systems

The Power Electronics Handbook

Fifth International Conference on 'Power Electronics and Variable-Speed Drives', 26-28 October 1994

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## **ISABEL DECKER**

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*Using Compact Piezoelectric Transformers to Isolate Integrated  
Phase Leg Shunt Current Sensors* John Wiley & Sons

In power electronics designs, the evaluation and prediction of potential fault conditions on semiconductors is essential for achieving safe operation and reliability, being short circuit (SC) one of the most probable and destructive failures. Recent improvements on Wide-Bandgap (WBG) semiconductors such as Silicon Carbide (SiC) and Gallium nitride (GaN) enable power electronic designs with outstanding performance, reshaping the power electronics landscape. In comparison to Silicon (Si), SiC and GaN power semiconductors physically present smaller chip

areas, higher maximum internal electric fields, and higher current densities. Such characteristics yield a much faster rise of the devices' internal temperatures, worsening their SC performance. In this way, this dissertation consists of a comprehensive investigation about SC on SiC MOSFETs, GaN HEMT, and GaN E-HEMT transistors, as well as contextualizing their particularities on SC performance by comparison with that of Si IGBTs. Moreover, an investigation towards how to prevent SC occurrences besides a review of available SC protection methods is presented.

HVDC, FACTS, and Artificial Intelligence CRC Press

Less expensive, lighter, and smaller than its electromechanical counterparts, power electronics lie at the very heart of controlling and converting electric energy, which in turn lies at the heart of making that energy useful. From household appliances to space-

faring vehicles, the applications of power electronics are virtually limitless. Until now, however, the same could not be said for access to up-to-date reference books devoted to power electronics. Written by engineers for engineers, The Power Electronics Handbook covers the full range of relevant topics, from basic principles to cutting-edge applications. Compiled from contributions by an international panel of experts and full of illustrations, this is not a theoretical tome, but a practical and enlightening presentation of the usefulness and variety of technologies that encompass the field. For modern and emerging applications, power electronic devices and systems must be small, efficient, lightweight, controllable, reliable, and economical. The Power Electronics Handbook is your key to understanding those devices, incorporating them into controllable circuits, and implementing those systems into applications from virtually every area of electrical engineering.

*POWER ELECTRONICS* Academic Press

This book reflects the latest research trends, methods and experimental results in the field of electrical and information technologies for rail transportation, which covers abundant state-of-the-art research theories and ideas. As a vital field of research that is highly relevant to current developments in a number of technological domains, the subjects it covered include intelligent computing, information processing, communication technology, automatic control, etc. The objective of the proceedings is to provide a major interdisciplinary forum for researchers, engineers, academicians and industrial professionals to present the most innovative research and development in the field of rail transportation electrical and information technologies. Engineers

and researchers in academia, industry and government will also explore an insightful view of the solutions that combine ideas from multiple disciplines in this field. The volumes serve as an excellent reference work for researchers and graduate students working on rail transportation and electrical and information technologies.

**Medium and High Power, Second Edition** Springer Science & Business Media

This book contains selected papers presented at the First International Symposium on Sustainable Energy and Technological Advancements (ISSETA 2021), which was organized by the Department of Electrical Engineering, NIT Meghalaya, Shillong, India, during September 24–25, 2021. The topics covered in the book mainly focuses on the cutting-edge research domain with respect to sustainable energy technologies, smart building, integration, and application of multiple energy sources; advanced power converter topologies and their modulation techniques; and information and communication technologies for smart microgrids.

**A Vector Control System for an Electric Vehicle A.C. Induction Motor** CRC Press

Recent catastrophic blackouts have exposed major vulnerabilities in the existing generation, transmission, and distribution systems of transformers widely used for energy transfer, measurement, protection, and signal coupling. As a result, the reliability of the entire power system is now uncertain, and many blame severe underinvestment, aging technology, and a conservative approach to innovation. Composed of contributions from noted industry experts around the world, *Transformers: Analysis, Design, and*

Measurement offers invaluable information to help designers and users overcome these and other challenges associated with the design, construction, application, and analysis of transformers. This book is divided into three sections to address contemporary economic, design, diagnostic, and maintenance aspects associated with power, instrument, and high-frequency transformers. Topics covered include: Design considerations Capability to withstand short circuits Insulation problems Stray losses, screening, and local excessive heating hazard Shell type and superconducting transformers Links between design and maintenance Component-related diagnostics and reliability Economics of life-cycle cost, design review, and risk-management methods Parameter measurement and prediction This book is an essential tool for understanding and implementing solutions that will ensure improvements in the development, maintenance, and life-cycle management of optimized transformers. This will lead to enhanced safety and reliability and lower costs for the electrical supply. Illustrating the need for close cooperation between users and manufacturers of transformers, this book outlines ways to achieve man

*Solar Technologies for the 21st Century* CRC Press

This derivative volume stemming from content included in our seminal *Power Electronics Handbook* takes its chapters related to renewables and establishes them at the core of a new volume dedicated to the increasingly pivotal and as yet under-published intersection of Power Electronics and Alternative Energy. While this re-versioning provides a corollary revenue stream to better leverage our core handbook asset, it does more than simply re-package existing content. Each chapter will be significantly

updated and expanded by more than 50%, and all new introductory and summary chapters will be added to contextualize and tie the volume together. Therefore, unlike traditional derivative volumes, we will be able to offer new and updated material to the market and include this largely original content in our ScienceDirect Energy collection. Due to the inherently multi-disciplinary nature of renewables, many engineers come from backgrounds in Physics, Materials, or Chemical Engineering, and therefore do not have experience working in-depth with electronics. As more and more alternative and distributed energy systems require grid hook-ups and on-site storage, a working knowledge of batteries, inverters and other power electronics components becomes requisite. Further, as renewables enjoy broadening commercial implementation, power electronics professionals are interested to learn of the challenges and strategies particular to applications in alternative energy. This book will bring each group up-to-speed with the primary issues of importance at this technological node. This content clarifies the juncture of two key coverage areas for our Energy portfolio: alternative sources and power systems. It serves to bridge the information in our power engineering and renewable energy lists, supporting the growing grid cluster in the former and adding key information on practical implementation to the latter. Provides a thorough overview of the key technologies, methods and challenges for implementing power electronics in alternative energy systems for optimal power generation Includes hard-to-find information on how to apply converters, inverters, batteries, controllers and more for stand-alone and grid-connected systems Covers wind and solar applications, as well as ocean and

geothermal energy, hybrid systems and fuel cells  
*Analysis, Design, and Measurement* kassel university press GmbH  
This book examines mechatronics and automatic control systems. The book covers important emerging topics in signal processing, control theory, sensors, mechanic manufacturing systems and automation. The book presents papers from the second International Conference on Mechatronics and Automatic Control Systems held in Beijing, China on September 20-21, 2014. Examines how to improve productivity through the latest advanced technologies Covering new systems and techniques in the broad field of mechatronics and automatic control systems  
*Telecom Power Systems* CRC Press  
High reliability and system lifetimes in the range of 30 years are essential for renewable energy systems such as photovoltaic power plants to minimise costs for the generated electric energy. At the same time such systems are used in regions with high solar irradiance and also harsh environmental conditions. Therefore, designs for photovoltaic inverters need to meet not only the key design criteria of high conversion efficiency but also need to be very robust and at the same time meet challenging cost targets. In this dissertation aspects concerning the lifetime and reliability of power semiconductors in photovoltaic central inverters are investigated. On key topic of the dissertation is the measurement of the voltage dependent failure rate due to cosmic radiation induced single-event-burnout of SiC and Si power semiconductors. The second topic is the development of a system level simulation to quantify the stress on the power semiconductors in a PV central inverters in various regions of the world. Further topics are the investigation of improved control

concepts for the cooling system of PV central inverters and the monitoring of IGBT temperatures during converter operation.  
Physics, Design and Applications of the Insulated Gate Bipolar Transistor Notion Press  
A comprehensive and "state-of-the-art" coverage of the design and fabrication of IGBT. All-in-one resource Explains the fundamentals of MOS and bipolar physics. Covers IGBT operation, device and process design, power modules, and new IGBT structures.  
*Solar Photovoltaic Power Systems* CRC Press  
The IGBT device has proved to be a highly important Power Semiconductor, providing the basis for adjustable speed motor drives (used in air conditioning and refrigeration and railway locomotives), electronic ignition systems for gasolinepowered motor vehicles and energy-saving compact fluorescent light bulbs. Recent applications include plasma displays (flat-screen TVs) and electric power transmission systems, alternative energy systems and energy storage. This book is the first available to cover the applications of the IGBT, and provide the essential information needed by applications engineers to design new products using the device, in sectors including consumer, industrial, lighting, transportation, medical and renewable energy. The author, B. Jayant Baliga, invented the IGBT in 1980 while working for GE. His book will unlock IGBT for a new generation of engineering applications, making it essential reading for a wide audience of electrical engineers and design engineers, as well as an important publication for semiconductor specialists. Essential design information for applications engineers utilizing IGBTs in the consumer, industrial, lighting,

transportation, medical and renewable energy sectors. Readers will learn the methodology for the design of IGBT chips including edge terminations, cell topologies, gate layouts, and integrated current sensors. The first book to cover applications of the IGBT, a device manufactured around the world by more than a dozen companies with sales exceeding \$5 Billion; written by the inventor of the device.

The Power Electronics Handbook John Wiley & Sons

The Industrial Electronics Handbook, Second Edition combines traditional and newer, more specialized knowledge that will help industrial electronics engineers develop practical solutions for the design and implementation of high-power applications.

Embracing the broad technological scope of the field, this collection explores fundamental areas, including analog and digital circuits, electronics, electromagnetic machines, signal processing, and industrial control and communications systems. It also facilitates the use of intelligent systems—such as neural networks, fuzzy systems, and evolutionary methods—in terms of a hierarchical structure that makes factory control and supervision more efficient by addressing the needs of all production components. Enhancing its value, this fully updated collection presents research and global trends as published in the IEEE Transactions on Industrial Electronics Journal, one of the largest and most respected publications in the field. Power Electronics and Motor Drives facilitates a necessary shift from low-power electronics to the high-power varieties used to control electromechanical systems and other industrial applications. This volume of the handbook: Focuses on special high-power semiconductor devices Describes various electrical machines and

motors, their principles of operation, and their limitations Covers power conversion and the high-efficiency devices that perform the necessary switchover between AC and DC Explores very specialized electronic circuits for the efficient control of electric motors Details other applications of power electronics, aside from electric motors—including lighting, renewable energy conversion, and automotive electronics Addresses power electronics used in very-high-power electrical systems to transmit energy Other volumes in the set: Fundamentals of Industrial Electronics Control and Mechatronics Industrial Communication Systems Intelligent Systems

**Fifth International Conference on 'Power Electronics and Variable-Speed Drives', 26-28 October 1994** CRC Press

Recent trends in engineering show increased emphasis on integrated analysis, design, and control of advanced electromechanical systems, and their scope continues to expand. Mechatronics—a breakthrough concept—has evolved to attack, integrate, and solve a variety of emerging problems in engineering, and there appears to be no end to its application. It has become essential for all engineers to understand its basic theoretical standpoints and practical applications.

Electromechanical Systems, Electric Machines, and Applied Mechatronics presents a unique combination of traditional engineering topics and the latest technologies, integrated to stimulate new advances in the analysis and design of state-of-the-art electromechanical systems. With a focus on numerical and analytical methods, the author develops the rigorous theory of electromechanical systems and helps build problem-solving skills. He also stresses simulation as a critical aspect of

developing and prototyping advanced systems. He uses the MATLAB<sup>TM</sup> environment for his examples and includes a MATLAB<sup>TM</sup> diskette with the book, thus providing a solid introduction to this standard engineering tool. Readable, interesting, and accessible, *Electromechanical Systems, Electric Machines, and Applied Mechatronics* develops a thorough understanding of the integrated perspectives in the design and analysis of electromechanical systems. It covers the basic concepts in mechatronics, and with numerous worked examples, prepares the reader to use the results in engineering practice. Readers who master this book will know what they are doing, why they are doing it, and how to do it.

CRC Press

Power electronic converters can be broadly classified as AC to DC, DC to AC, DC to DC and AC to AC converters. AC to AC converters can be further classified as AC Controllers or AC regulators, Cycloconverters and Matrix converters. AC controllers and cycloconverters are fabricated using Silicon Controlled Rectifiers (SCR) whereas matrix converters are built using semiconductor bidirectional switches. This text book provides a summary of AC to AC Converter modelling excluding AC controllers. The software Simulink<sup>®</sup> by Mathworks Inc., USA is used to develop the models of AC to AC Converters presented in this text book. The term model in this text book refers to SIMULINK model. This text book is mostly suitable for researchers and practising professional engineers in the industry working in the area of AC to AC converters. Features Provides a summary of AC to AC Converter modelling excluding AC controllers Includes models for three phase AC to three phase AC matrix converters

using direct and indirect space vector modulation algorithm Presents new applications such as single and dual programmable AC to DC rectifier with derivations for output voltage Displays Hardware-in-the Loop simulation of a three phase AC to single phase AC matrix converter Provides models for three phase multilevel matrix converters, Z-source Direct and Quasi Z-source Indirect matrix converters; a model for speed control and brake by plugging of three phase induction motor and separately excited DC motors using matrix converter; a model for a new single phase and three phase sine wave direct AC to AC Converter without a DC link using three winding transformers and that for a square wave AC to square wave AC converter using a DC link; models for variable frequency, variable voltage AC to AC power supply; models for Solid State Transformers using Dual Active Bridge topology and a new direct AC to AC Converter topology; and models for cycloconverters and indirect matrix converters

*Advanced Solutions in Power Systems* Inst of Engineering & Technology

Building on solid state device and electromagnetic contributions to the series, this text book introduces modern power electronics, that is the application of semiconductor devices to the control and conversion of electrical power. The increased availability of solid state power switches has created a very rapid expansion in applications, from the relatively low power control of domestic equipment, to high power control of industrial processes and very high power control along transmission lines. This text provides a comprehensive introduction to the entire range of devices and examines their applications, assuming only the minimum

mathematical and electronic background. It covers a full year's course in power electronics. Numerous exercises, worked examples and self assessments are included to facilitate self study and distance learning.

**Application Manual Power Semiconductors** CRC Press

This book is a solar energy technical manual - a road-map for solar energy professionals and amateurs. It is also written for the use of engineers & consultants , polytechnic , graduate & post-graduate engineering students, and industry technicians. The reader is introduced to the theoretical concepts of solar cells and also the practical working of solar cells, solar modules, solar panels and solar arrays. Also discussed are the components of a photo-voltaic power system such as MPPT charge controllers , storage battery systems and solar converter circuits. For the benefit of the reader, solar Photovoltaic systems are discussed , along with examples of existing systems . Numerical examples and exercises are not included since it is not designed based on any University curriculum nor meant to be an academic text. If a few solar energy systems professionals and amateurs are benefited by this book , the Authors would be thankful that the purpose of this book has been served ! Salient Features • This book introduces the reader to the theoretical concepts and practical aspects of solar cells • Imparts a working knowledge of solar cells, solar modules, arrays and panels to engineers and technical students • The principles of MPPT charge controllers , storage battery systems , solar converter circuits and solar Photovoltaic systems are discussed , along with examples of existing systems • This book is easy to read and clear to understand • Many drawings and photographs have been used to

make it interesting to read and easier to grasp and apply  
*Electric Renewable Energy Systems* CRC Press

Power and Energy contains 86 selected papers from the International Conference on Power and Energy (CPE 2014, Shanghai, China, 29-30 November 2014), and presents a wide range of topics:- Energy management, planning and policy-making- Energy technologies and environment- Energy prospects- Conventional and renewable power generation- Power system man

Power Electronics and Power Quality Butterworth-Heinemann

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

**Investigation of Reliability Aspects of Power Semiconductors in Photovoltaic Central Inverters for Sunbelt Regions** CRC Press

Despite two decades of massive strides in research and development on control strategies and their subsequent implementation, most books on permanent magnet motor drives still focus primarily on motor design, providing only elementary coverage of control and converters. Addressing that gap with information that has largely been disseminated only in journals and at conferences, Permanent Magnet Synchronous and Brushless DC Motor Drives is a long-awaited comprehensive overview of power electronic converters for permanent magnet synchronous machines and control strategies for variable-speed



operation. It introduces machines, power devices, inverters, and control, and addresses modeling, implementation, control strategies, and flux weakening operations, as well as parameter sensitivity, and rotor position sensorless control. Suitable for both industrial and academic audiences, this book also covers the simulation, low cost inverter topologies, and commutation torque ripple of PM brushless DC motor drives. Simulation of the motor drives system is illustrated with MATLAB® codes in the text. This book is divided into three parts—fundamentals of PM synchronous and brushless dc machines, power devices, inverters; PM synchronous motor drives, and brushless dc motor drives. With regard to the power electronics associated with these drive systems, the author: Explores use of the standard three-phase bridge inverter for driving the machine, power factor correction, and inverter control Introduces space vector modulation step by step and contrasts with PWM Details dead time effects in the inverter, and its compensation Discusses new power converter topologies being considered for low-cost drive

systems in PM brushless DC motor drives This reference is dedicated exclusively to PM ac machines, with a timely emphasis on control and standard, and low-cost converter topologies. Widely used for teaching at the doctoral level and for industrial audiences both in the U.S. and abroad, it will be a welcome addition to any engineer's library.

**Power Electronics and Motor Drives** CRC Press  
Power Electronics Handbook Devices, Circuits and Applications Elsevier

**Switching Power Converters** CRC Press

This book addresses topics specific to the application of power electronics to telecom systems. It follows the power flow from national grid down to the last low-voltage high current requirement of a processor. Auxiliary equipment requirements, such as uninterruptible power supplies, storage energy systems, or charging systems, are explained, along with peculiar classification or suggestions for usage. The presentation of each telecom power system is completed with a large number of practical examples to reinforce new material.

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