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*The extended papers in
this Special Issue cover*

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the topics of smart energy, nuclear systems, and micro energy grids. In “Electrical Loads and Power Systems for the DEMO Nuclear Fusion Project” and “Energy

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*Analysis for the
Connection of the
Nuclear Reactor DEMO to
the European Electrical
Grid”, the authors
introduce a European
DEMO project. In*

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*“Comparison and Design
of Resonant Network
Considering the
Characteristics of a
Plasma Generator” the
authors present a
theoretical analysis and*

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*experimental study on
the resonant network of
the power conditioning
system (PCS). In “Techno-
Economic Evaluation of
Interconnected Nuclear-
Renewable Micro Hybrid*

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*Energy Systems with
Combined Heat and
Power”, the authors
conducted a sensitivity
analysis to identify the
impact of the different
variables on the*

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*investigated systems. In
“Fault Current Tracing
and Identification via
Machine Learning
Considering Distributed
Energy Resources in
Distribution Networks”,*

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the authors propose a current tracing method to model the single distribution feeder as several independent parallel connected virtual lines, with the

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result of tracing the detailed contribution of different current sources to the power line current. From the five extended papers, we observe that the SEGE is

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*actively engaged in
smart grid and green
energy techniques. We
hope that the readers
enjoy this Special
Issue.*

DC/AC inversion

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technology is of vital importance for industrial applications, including electrical vehicles and renewable energy systems, which require a large number

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of inverters. In recent years, inversion technology has developed rapidly, with new topologies improving the power factor and increasing power

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*efficiency. Proposing
many novel approaches,
Advanced DC/AC
Inverters: Applications
in Renewable Energy
describes advanced DC/AC
inverters that can be*

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used for renewable energy systems. The book introduces more than 100 topologies of advanced inverters originally developed by the authors, including more

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than 50 new circuits. It also discusses recently published cutting-edge topologies. Novel PWM and Multilevel Inverters
The book first covers traditional pulse-width-

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*modulation (PWM)
inverters before moving
on to new quasi-
impedance source
inverters and soft-
switching PWM inverters.
It then examines*

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*multilevel DC/AC
inverters, which have
overcome the drawbacks
of PWM inverters and
provide greater scope
for industrial
applications. The*

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*authors propose four
novel multilevel
inverters: laddered
multilevel inverters,
super-lift modulated
inverters, switched-
capacitor inverters, and*

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*switched-inductor
inverters. With simple
structures and fewer
components, these
inverters are well
suited for renewable
energy systems. Get the*

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*Best Switching Angles
for Any Multilevel*

*Inverter A key topic for
multilevel inverters is
the need to manage the
switching angles to
obtain the lowest total*

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harmonic distortion (THD). The authors outline four methods for finding the best switching angles and use simulation waveforms to verify the design. The

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*optimum switching angles
for multilevel DC/AC
inverters are also
listed in tables for
quick reference.*

*Application Examples of
DC/AC Inverters in*

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*Renewable Energy Systems
Highlighting the
importance of inverters
in improving energy
saving and power-supply
quality, the final
chapter of the book*

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*supplies design examples
for applications in wind
turbine and solar panel
energy systems. Written
by pioneers in advanced
conversion and inversion
technology, this book*

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*guides readers in
designing more effective
DC/AC inverters for use
in renewable energy
systems.*

*This book presents a
system-level analysis of*

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inductive wireless power transfer (WPT) links.

The basic requirements, design parameters, and utility of key building blocks used in inductive WPT links are presented,

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*followed by detailed
theoretical analysis,
design, and optimization
procedure, while
considering practical
aspects for various
application domains.*

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Readers are provided with fundamental, yet easy to follow guidelines to help them design high-efficiency inductive links, based on a set of application-

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specific target specifications. The authors discuss a wide variety of recently proposed approaches to achieve the maximum efficiency point, such

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as the use of additional resonant coils, matching networks, modulation of the load quality factor (Q-modulation), and adjustable DC-DC converters.

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Additionally, the attainability of the maximum efficiency point together with output voltage regulation is addressed in a closed-loop power control

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mechanism. Numerous examples, including MATLAB/Octave calculation scripts and LTspice simulation files, are presented throughout the book.

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This enables readers to check their own results and test variations, facilitating a thorough understanding of the concepts discussed. The book concludes with real

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*examples demonstrating
the practical
application of topics
discussed. Covers both
introductory and
advanced levels of
theory and practice,*

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*providing readers with
required knowledge and
tools to carry on from
simple to advanced
wireless power transfer
concepts and system
designs; Provides*

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*theoretical foundation
throughout the book to
address different design
aspects; Presents
numerous examples
throughout the book to
complement the analysis*

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and designs; Includes supplementary material (numerical and circuit simulation files) that provide a "hands-on" experience for the reader; Uses real

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*examples to demonstrate
the practical
application of topics
discussed.*

*Wireless Power Transfer
Algorithms, Technologies
and Applications in Ad*

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Hoc Communication

Networks

Electronics Installation

and Maintenance Book,

Electronics Circuits

Control of Power

Electronic Converters

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and Systems
Handbook for Transistors

In today's globally competitive wireless industry, the design-to-production cycle is critically important. The first of a two-volume

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set, this leading-edge book takes a practical approach to RF (radio frequency) circuit design, offering a complete understanding of the fundamental concepts practitioners need to know and use for their work in the field.

This book provides insight into the

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behavior and design of power distribution systems for high speed, high complexity integrated circuits. Also presented are criteria for estimating minimum required on-chip decoupling capacitance. Techniques and algorithms for computer-aided design of on-chip

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power distribution networks are also described; however, the emphasis is on developing circuit intuition and understanding the principles that govern the design and operation of power distribution systems.

This book constitutes the refereed

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proceedings of the Second International Conference on Advances in Power Electronics and Instrumentation Engineering, PEIE 2011, held at Nagpur, India, in April 2011. The 9 revised full papers presented together with 4 short papers and 7 poster papers were

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carefully reviewed and selected from numerous submissions. The papers address current issues in the field of power electronics, communication engineering, instrumentation engineering, digital electronics, electrical power engineering, electrical machines,

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information technology, control systems, and the like.

Semiconductor Devices for Power Conditioning

Optimizing Wireless/RF Circuits

Applications in Renewable Energy

Advanced Conversion

Technologies, Second Edition

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Power Distribution Networks with
On-Chip Decoupling Capacitors
*Power Electronics Handbook,
Fourth Edition, brings together
over 100 years of combined
experience in the specialist areas
of power engineering to offer a*

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fully revised and updated expert guide to total power solutions. Designed to provide the best technical and most commercially viable solutions available, this handbook undertakes any or all aspects of a project requiring

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specialist design, installation, commissioning and maintenance services. Comprising a complete revision throughout and enhanced chapters on semiconductor diodes and transistors and thyristors, this

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volume includes renewable resource content useful for the new generation of engineering professionals. This market leading reference has new chapters covering electric traction theory and motors and

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wide band gap (WBG) materials and devices. With this book in hand, engineers will be able to execute design, analysis and evaluation of assigned projects using sound engineering principles and adhering to the

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*business policies and
product/program requirements.
Includes a list of leading
international academic and
professional contributors Offers
practical concepts and
developments for laboratory test*

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plans Includes new technical chapters on electric vehicle charging and traction theory and motors Includes renewable resource content useful for the new generation of engineering professionals

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The Brown Boveri Symposia are by now part of firmly established tradition. This is the seventh event in a series which was initiated shortly after Corporate Research was established as a separate entity within our

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Company; the Symposia are held every other year. The themes to date have been 1969 Flow Research on Blading 1971 Real-Time Control of Electric Power Systems 1973 High-Temperature Materials in Gas Turbines 1975

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Nonemissive Electrooptic

Displays 1977 Current

Interruption in High-Voltage

Networks 1979 Surges in High-

Voltage Networks 1981

Semiconductor Devices for

Power Conditioning Why have we

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chosen these titles? At the outset we established certain selection criteria; we felt that a subject for a Symposium should fulfill the following requirements: It should characterize a part of a thoroughly scientific discipline; in

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other words, it should describe an area of scholarly study and research. It should be of current interest in the sense that important results have recently been obtained and considerable research effort is underway in the

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international scientific community.

It should bear some relation to

the scientific and technological

activity of our Company. Let us

look at the requirement "current

interest": Some of the topics on

the list have been the subject of

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research for several decades, some even from the beginning of the century. One might wonder, then, why such fields could be regarded as particularly timely in the 1960s and 1970s. A few remarks on this subject therefore

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are in order.

Energy conversion techniques are key in power electronics and even more so in renewable energy source systems, which require a large number of converters. Renewable Energy

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Systems: Advanced Conversion Technologies and Applications describes advanced conversion technologies and provides design examples of converters and inverters for renewable energy systems—including wind turbine

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and solar panel energy systems.

Learn Cutting-Edge Techniques

for Converters and Inverters

Setting the scene, the book

begins with a review of the basics

of astronomy and Earth physics.

It then systematically introduces

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more than 200 topologies of advanced converters originally developed by the authors, including 150 updated circuits on modern conversion technologies. It also discusses recently published topologies and

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thoroughly analyzes new converter circuits. Novel approaches include split-capacitor and split-inductor techniques that can be applied in super-lift and other converters. Resolve Historic Problems in

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Conversion Technologies Along with offering many cutting-edge techniques, the authors resolve some historic problems, such as the accurate determination of the conduction angle of single-phase rectifiers and power factor

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correction. They also describe a new series—laddered multilevel inverters—that uses few devices to produce more levels, overcoming the drawbacks of the pulse-width-modulation (PWM) inverter and providing great

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*scope for industrial applications.
Tap the Knowledge of Pioneers
in the Field This book is written
by pioneers in advanced
conversion technology who have
created a large number of
converters, including the world-*

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renowned DC/DC Luo-converters and super-lift Luo-converters. Featuring numerous examples and diagrams, it guides readers in designing advanced converters for use in renewable energy systems.

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A Brief Introduction

*Wireless Power Transfer
Technologies for Electric
Vehicles*

*Advanced Conversion
Technologies and Applications
Data and Energy Integrated*

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Communication Networks

Practical RF Circuit Design for

Modern Wireless Systems

Spacecraft Power Technologies

is the first comprehensive text

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spacecraft electrical power systems. The science and engineering of solar, chemical, and nuclear systems are fully examined together with the constraints imposed by the space and thermal

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environments in which the systems must operate. Details of present technology and the history that led to the current state-of-the-art are presented at a level appropriate for the student as a textbook or the

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*practicing engineer as a
reference.*

*This book introduces the most
state-of-the-art wireless power
transfer technologies for electric
vehicles from the fundamental
theories to practical designs and*

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applications, especially on the circuit analysis methods, resonant compensation networks, magnetic couplers, and related power electronics converters. Moreover, some other necessary design

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considerations, such as communication systems, detection of foreign and living objects, EMI issues, and battery charging strategies, are also introduced to provide sufficient insights into the industrial

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applications. Finally, some future points are mentioned in brief. Different from other works, all the WPT technologies in this book are applied in real EV applications, whose effectiveness and reliability

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have been already tested and verified. From this book, readers who are interested in the area of wireless power transfer can have a broad view of modern WPT technologies. Readers who have no experience in the WPT

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area can learn the basic concept, analysis methods, and design principles of the WPT system for EV charging. Even for the readers who are occupied in this area, this book also provides rich knowledge on

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*engineering applications and
future trends of EV wireless
charging.*

*Annotation "Described by the
author as "a crash course" in
wireless/RF circuits, this book
enables experimenters as well*

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as engineers to get peak performance from off-the-shelf integrated circuits (ICs) in wireless and radio frequency (RF) design." "Packed with step-by-step instructions, illustrations, and diagrams, and

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*written by one of the world's
leading electronics authors,
Optimizing Wireless/RF Circuits
is a book that focuses on the
circuits most needed in the
growing number of wireless
consumer products."*--BOOK

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*Second International
Conference, PEIE 2011, Nagpur,
Maharashtra, India, April 21-22,*

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2011. Proceedings

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Conference, ICICCT 2017, New

Delhi, India, May 13, 2017,

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Basics, Simplified Design, Audio-

frequency, Radio-frequency,

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Intermediate Frequency, Video

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amp/OTA, Tests,

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Illustrated Guide to Practical

Solid State Circuits-- with

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Frequency Power Converters
Wireless Power Transfer
Technologies for Electric
Vehicles Springer Nature
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components of a synchrotron light source are usually well versed in their field and in the associated technical literature.

However, with the rapid and continuing growth of synchrotron radiation

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research, and with new facilities coming online and being authorized for design and construction around the world, there is a need for a reference book that describes the various technical components of a

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synchrotron light source in a manner that will be useful to those who lack specialized technical background, but who have responsibility for some part of the design, construction, operation or development of

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such a facility. This would include technicians, engineers and physicists who have technical background in related fields but no specific experience with a synchrotron light source, and also project managers,

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*laboratory directors, and
government officials
involved with synchrotron
light facilities. College
level scientific or
engineering training or the
equivalent experience is
assumed and appropriate*

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mathematics is used throughout. However, the basic concepts in each chapter are given in less technical language and a glossary of terms as well as an index will make the book useful for those with less

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*technical training or
experience. Contents:*

*Introduction and Overview (H
Winick) Lattices (M
Cornacchia) Injector Systems
(G Mülhaupt) RF Systems (D J
Thompson & D M Dykes) Magnet
Design (N Marks) Magnet Power*

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*Supplies (R Richter) Magnetic
Measurements (R P
Walker) Vacuum Systems (J
Noonan & D
Walters) Accelerator Controls
and Modeling (J Corbett & C
Wermelskirchen) Beam
Diagnostics (P Kuske) Magnet*

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*Support and Alignment (R E
Ruland) Beam Instabilities (M
Furman, J Byrd & S
Chattopadhyay) Orbit
Stabilizing and Multibunch
Feedback Systems (J N
Galayda, L-J Chung & R O
Hettel) Wiggler and Undulator*

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*Insertion Devices (R D
Schlueter) Conventional
Facilities (V Saile & J D
Scott) Safety (T Dickinson)
Readership: Scientists and
engineers. Keywords: Accelera
tors; Synchrotron
Radiation; Storage*

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Rings; Synchrotrons; Magnets; Rf Systems; Vacuum Systems; Control Systems; Insertion Devices; Wigglers; Undulators; Power Supplies
Reviews: "Herman Winick is to be commended for organizing and editing a

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*comprehensive selection of
articles (chapters) written
by leading specialists and
covering all aspects of
synchrotron radiation
production in this excellent
new book ... Its swift
publication makes it fully*

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*up-to-date at the time of
going to press ... It is
extremely beneficial in
allowing SR specialists from
specific areas to learn
about related areas. The
level has been carefully
monitored by the editor and*

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*is useful in providing a
sound basis for further
study in each area."*

*Gwyn
Williams Synchrotron*

Radiation News

*Three-Dimensional Integrated
Circuit Design, Second
Edition, expands the original*

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with more than twice as much new content, adding the latest developments in circuit models, temperature considerations, power management, memory issues, and heterogeneous integration. 3-D IC experts

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Pavlidis, Savidis, and Friedman cover the full product development cycle throughout the book, emphasizing not only physical design, but also algorithms and system-level considerations to increase

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speed while conserving energy. A handy, comprehensive reference or a practical design guide, this book provides effective solutions to specific challenging problems concerning the design of

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three-dimensional integrated circuits. Expanded with new chapters and updates throughout based on the latest research in 3-D integration: Manufacturing techniques for 3-D ICs with TSVs Electrical modeling and

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*closed-form expressions of
through silicon vias*

*Substrate noise coupling in
heterogeneous 3-D ICs Design
of 3-D ICs with inductive
links Synchronization in 3-D
ICs Variation effects on 3-D
ICs Correlation of WID*

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*variations for intra-tier
buffers and wires Offers
practical guidance on
designing 3-D heterogeneous
systems Provides power
delivery of 3-D ICs
Demonstrates the use of 3-D
ICs within heterogeneous*

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*systems that include a
variety of materials,
devices, processors, GPU-CPU
integration, and more
Provides experimental case
studies in power delivery,
synchronization, and thermal
characterization*

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The Xvi Rcnp Osaka
International Symposium
Power Electronics Handbook
Practical Guide to
Electronic Amplifiers*

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*Emerging Developments in the
Power and Energy Industry
Active Circuits and Systems,
Volume 2*

***The packaging of electronic
devices and systems
represents a significant
challenge for product***

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***designers and managers.
Performance, efficiency, cost
considerations, dealing with
the newer IC packaging
technologies, and EMI/RFI
issues all come into play.
Thermal considerations at
both the device and the***

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systems level are also necessary. The Electronic Packaging Handbook, a new volume in the Electrical Engineering Handbook Series, provides essential factual information on the design, manufacturing, and testing of

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electronic devices and systems. Co-published with the IEEE, this is an ideal resource for engineers and technicians involved in any aspect of design, production, testing or packaging of electronic products,

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regardless of whether they are commercial or industrial in nature. Topics addressed include design automation, new IC packaging technologies, materials, testing, and safety. Electronics packaging

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continues to include expanding and evolving topics and technologies, as the demand for smaller, faster, and lighter products continues without signs of abatement. These demands mean that individuals in each

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of the specialty areas involved in electronics packaging-such as electronic, mechanical, and thermal designers, and manufacturing and test engineers-are all interdependent on each others knowledge. The

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Electronic Packaging Handbook elucidates these specialty areas and helps individuals broaden their knowledge base in this ever-growing field. Power Electronics is a large size technology, mainly

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covering four categories: the AC/DC rectifiers, DC/DC converters, DC/AC inverters, and AC/AC converters. This book offers approximately 100 novel topologies of all four. The applications are used in sustainable energy

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generation areas, such as distributed generation (DG), micro-grid (MG), smart grid (SG) systems, and electrical vehicles (EV). With case studies from GE, AEG, Simplatroll Ltd, and Chinese Power Manufacturing Co., the

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reader will be exposed to practical applications in industry and real-world settings. This new edition features an entirely new chapter on best switching angles to obtain lowest THD for multilevel DC/AC inverters.

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Additionally, all chapters have been updated and include homework problems throughout.

Control of Power Electronic Converters, Volume Two gives the theory behind power electronic converter control

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and discusses the operation, modelling and control of basic converters. The main components of power electronics systems that produce a desired effect (energy conversion, robot motion, etc.) by controlling

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system variables (voltages and currents) are thoroughly covered. Both small (mobile phones, computer power supplies) and very large systems (trains, wind turbines, high voltage power lines) and their power ranges,

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***from the Watt to the
Gigawatt, are presented and
explored. Users will find a
focused resource on how to
apply innovative control
techniques for power
converters and drives.
Discusses different***

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***applications and their control
Explains the most important
controller design methods,
both in analog and digital
Describes different, but
important, applications that
can be used in future
industrial products Covers***

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***voltage source converters in
significant detail***

***Demonstrates applications
across a much broader
context***

***Radio Control for Model Ships,
Boats and Aircraft***

Smart Energy, Plasma and

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Nuclear Systems

***Fundamental Concepts for
Designing High-efficiency
Wireless Power Transfer Links
Handbook of Practical
Electronic Circuits***

Power Electronics

Continuing advancements in

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electronics creates the possibility of communicating with more people at greater distances. Such an evolution calls for more efficient techniques and designs in radio communications. Emerging Innovations in Microwave and Antenna

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Engineering provides innovative insights into theoretical studies on propagation and microwave design of passive and active devices. The content within this publication is separated into three sections: the design of antennas, the design of the

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**antennas for the RFID system,
and the design of a new structure
of microwave amplifier.**

**Highlighting topics including
additive manufacturing
technology, design application,
and performance characteristics,
it is designed for engineers,**

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**electricians, researchers,
students, and professionals, and
covers topics centered on
modern antenna and microwave
circuits design and theory.
The vast reduction in size and
power consumption of CMOS
circuitry has led to a large**

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research effort based around the vision of wireless sensor networks. The proposed networks will be comprised of thousands of small wireless nodes that operate in a multi-hop fashion, replacing long transmission distances with

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many low power, low cost wireless devices. The result will be the creation of an intelligent environment responding to its inhabitants and ambient conditions. Wireless devices currently being designed and built for use in such

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environments typically run on batteries. However, as the networks increase in number and the devices decrease in size, the replacement of depleted batteries will not be practical. The cost of replacing batteries in a few devices that make up a

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small network about once per year is modest. However, the cost of replacing thousands of devices in a single building annually, some of which are in areas difficult to access, is simply not practical. Another approach would be to use a battery that is

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large enough to last the entire lifetime of the wireless sensor device. However, a battery large enough to last the lifetime of the device would dominate the overall system size and cost, and thus is not very attractive.

Alternative methods of powering

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the devices that will make up the wireless networks are desperately needed. This book presents a comprehensive coverage of the five fundamental yet intertwined pillars paving the road towards the future of connected

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autonomous electric vehicles and smart cities. The connectivity pillar covers all the latest advancements and various technologies on vehicle-to-everything (V2X) communications/networking and vehicular cloud computing, with

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special emphasis on their role towards vehicle autonomy and smart cities applications. On the other hand, the autonomy track focuses on the different efforts to improve vehicle spatiotemporal perception of its surroundings using multiple

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sensors and different perception technologies. Since most of CAVs are expected to run on electric power, studies on their electrification technologies, satisfaction of their charging demands, interactions with the grid, and the reliance of these

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components on their connectivity and autonomy, is the third pillar that this book covers. On the smart services side, the book highlights the game-changing roles CAV will play in future mobility services and intelligent transportation systems. The book

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also details the ground-breaking directions exploiting CAVs in broad spectrum of smart cities applications. Example of such revolutionary applications are autonomous mobility on-demand services with integration to public transit, smart homes, and

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buildings. The fifth and final pillar involves the illustration of security mechanisms, innovative business models, market opportunities, and societal/economic impacts resulting from the soon-to-be-deployed CAVs. This book

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contains an archival collection of top quality, cutting-edge and multidisciplinary research on connected autonomous electric vehicles and smart cities. The book is an authoritative reference for smart city decision makers, automotive

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**manufacturers, utility operators,
smart-mobility service providers,
telecom operators,
communications engineers,
power engineers, vehicle
charging providers, university
professors, researchers, and
students who would like to learn**

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more about the advances in CAEVs connectivity, autonomy, electrification, security, and integration into smart cities and intelligent transportation systems.

Energy Scavenging for Wireless Sensor Networks

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**Spacecraft Power Technologies
Handbook of Modern Solid-state
Amplifiers**

**Proceedings of the 11th Asia-
Pacific Power and Energy
Engineering Conference (APPEEC
2019), April 19-21, 2019, Xiamen,
China**

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**Resonant Behaviour of Pulse
Generators for the Efficient Drive
of Optical Radiation Sources
Based on Dielectric Barrier
Discharges**

This book describes methods for
distributing power in high speed, high
complexity integrated circuits with

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power levels exceeding many tens of watts and power supplies below a volt. It provides a broad and cohesive treatment of power distribution systems and related design problems, including both circuit network models and design techniques for on-chip decoupling

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capacitors, providing insight and intuition into the behavior and design of on-chip power distribution systems. Organized into subareas to provide a more intuitive flow to the reader, this second edition adds more than a hundred pages of new content,

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including inductance models for interdigitated structures, design strategies for multi-layer power grids, advanced methods for efficient power grid design and analysis, and methodologies for simultaneously placing on-chip multiple power

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supplies and decoupling capacitors.

The emphasis of this additional material is on managing the complexity of on-chip power distribution networks.

This book constitutes the refereed proceedings of the Second International Conference on

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Information, Communication and Computing Technology, ICICCT 2017, held in New Delhi, India, in May 2017. The 29 revised full papers and the 5 revised short papers presented in this volume were carefully reviewed and selected from 219 submissions. The

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papers are organized in topical sections on network systems and communication security; software engineering; algorithm and high performance computing.

Power and Energy Engineering are important and pressing topics globally,

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covering issues such as shifting paradigms of energy generation and consumption, intelligent grids, green energy and environmental protection. The 11th Asia-Pacific Power and Energy Engineering Conference (APPEEC 2019) was held in Xiamen,

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China from April 19 to 21, 2019.

APPEEC has been an annual conference since 2009 and has been successfully held in Wuhan (2009 & 2011), Chengdu (2010 & 2017), Shanghai (2012 & 2014), Beijing (2013 & 2015), Suzhou (2016) and

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Guilin (2018), China. The objective of APPEEC 2019 was to provide scientific and professional interactions for the advancement of the fields of power and energy engineering. APPEEC 2019 facilitated the exchange of insights and innovations between

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industry and academia. A group of excellent speakers have delivered keynote speeches on emerging technologies in the field of power and energy engineering. Attendees were given the opportunity to give oral and poster presentations and to interface

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with invited experts.

Connected and Autonomous Vehicles
in Smart Cities
Information, Communication and
Computing Technology
Three-Dimensional Integrated Circuit
Design

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Synchrotron Radiation Sources — A
Primer

Advances in Power Electronics and
Instrumentation Engineering

The material contained in this
handbook has been specially chosen,
and it should encourage and help

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those already enjoying Radio Control to achieve an even higher standard of efficiency and reliability, and arouse the interest of others who have, perhaps, felt that constructing and installing radio equipment in a model might prove a somewhat hazardous job. This book deals with,

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the theory of the main requirements of Radio Control, namely the Transmitter, Receiver, Servo-Mechanisms, Aerials and Frequency Checking, and at the same time covers the practical aspect and numerous details which are so often left to the imagination.

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This volume covers the field of circular accelerators and related technology for the sub-GeV to multi-GeV energy region from the viewpoint of realization of high performance, i.e., performance and perspectives of operating multi-GeV accelerators, future projects in the

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multi-GeV energy region, lattice designs and beam dynamics, electron cooling and stochastic cooling, injection and extraction, beam diagnostics, superconducting and normal magnets, magnet power supplies, RF systems, and internal targets. The contributors include

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leading accelerator physicists from around the world.

Distributing power in high speed, high complexity integrated circuits has become a challenging task as power levels exceeding tens of watts have become commonplace while the power supply is plunging toward one

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volt. This book is dedicated to this important subject. The primary purpose of this monograph is to provide insight and intuition into the behavior and design of power distribution systems for high speed, high complexity integrated circuits. The Electronic Packaging Handbook

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with Special Focus on Vibrations
Advanced DC/AC Inverters
Design Considerations for Low
Harmonic Utility Interfaces, Leading
to a New Clamp Circuit for Resonant
Dc Link Conversion
Emerging Innovations in Microwave
and Antenna Engineering

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This book is the first systematic exposition on the emerging domain of wireless power transfer in ad hoc communication networks. It selectively spans a coherent, large spectrum of fundamental aspects of

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wireless power transfer,
such as mobility management
in the network, combined
wireless power and
information transfer, energy
flow among network devices,
joint activities with
wireless power transfer

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(routing, data gathering and solar energy harvesting), and safety provisioning through electromagnetic radiation control, as well as fundamental and novel circuits and technologies enabling the wide

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application of wireless powering. Comprising a total of 27 chapters, contributed by leading experts, the content is organized into six thematic sections: technologies, communication, mobility, energy flow, joint

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operations, and electromagnetic radiation awareness. It will be valuable for researchers, engineers, educators, and students, and it may also be used as a supplement to academic courses on

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algorithmic applications,
wireless protocols,
distributed computing, and
networking.

The book discusses data and
energy integrated
communication networking
technologies, including the

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latest research contributions in this promising area. It firstly provides an overview of data and energy integrated communication networks (DEINs) and introduces the key techniques for enabling

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integrated wireless energy transfer (WET) and wireless information transfer (WIT) in the radio frequency (RF) band. It then describes the ubiquitous architecture of DEINs and demonstrates the typical DEIN system and

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investigates the core issues in both the physical layer and the medium-access-control (MAC) layer in order to coordinate both the WIT and WET in the same RF band. Lastly, the book addresses a number of emerging research

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topics in the field of DEINs. It promotes joint efforts from both academia and industry to push DEIN a step closer to practical implementation. It is also a valuable resource for students interested in

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studying cutting-edge techniques in this field. Compact and efficient high-frequency power converters and amplifiers are needed in a variety of applications, including base stations, mobile devices, and medical

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equipment. The ever-growing need for a smaller size, longer battery life, and lower cost introduces challenging design considerations for radio-frequency power converters. Today, these radio-frequency

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resonant converters use harmonic tuning to shape the voltage or current waveform of the switching device, with the primary goals of reducing device stress and increasing achievable efficiency. Although

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harmonic-tuned resonant converters can be very compact and efficient for a certain condition, significant challenges remain to widespread adoption, including limited high-efficiency range,

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complicated design procedures, and higher device stress compared with conventional approaches. This thesis presents circuit techniques that can extend the voltage, frequency, and efficiency ranges of radio-

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frequency power converters and provides more straightforward analysis and easy-to-implement design procedures. This thesis first presents a multi-resonant gate driver circuit developed using the harmonic

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wave-shaping technique that significantly reduces the high-frequency gate driving losses for Si and SiC MOSFETs. By controlling different harmonic components of an ideal square wave, we can

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resonantly shape a quasi-square voltage waveform at the gate. This gate driver is simple to control and has a low component count.

Compared with a sine wave gate signal, this method reduces the transition time

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between the MOSFET is fully enhanced and turned-off, driving down the switching losses. Compared with similar multi-resonant drivers that are self-oscillating, this driver reduces the long start-up

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time required to reach steady-state. Intuitive design methodologies based on the frequency-domain plot are introduced. Using this technique, we are able to resonantly drive a Si MOSFET at 20 MHz and recycle 60% of

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the hard-switching gate-driving loss. We also demonstrate this driver on a SiC MOSFET switching at 30 MHz and save 80% of the hard-switching loss. Modern applications demand power converters to maintain a

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constant voltage output with high efficiency across significant load variation. This thesis presents a bidirectional dc-dc converter that enables efficient fixed-ratio voltage conversion at tens

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of megahertz. By selecting a proper matching network for the intermediate gain stage, we address multiple challenges simultaneously;
a) replacing a lossy passive diode with a more efficient active transistor, b)

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maintaining efficient soft-switching operation, and c) a constant voltage conversion ratio over a wide load range. A 64 MHz, 12 W, 36 V-to-12 V prototype converter with 75% peak efficiency verifies the

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operation of the structure.
An interleaved configuration
is then proposed to improve
the efficiency and transient
performance of a single-
phase structure. A 13.56
MHz, 210 V-to-30 V prototype
converter with 90% peak

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efficiency at 200 W demonstrates the advantages of this proposed structure. RF power amplifiers underpin many systems that support our modern infrastructure. The Class EF and E/F family of harmonic-tuned switch-

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mode amplifiers have simple gate drives, reduced voltage stress, and higher output power capabilities than a conventional Class E circuit. To best utilize the performance potential of this family of circuits,

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this thesis presents a novel push-pull Φ^2 (EF2) amplifier using interleaving and series-stacking techniques, denoted as a PPT Φ^2 circuit. This series-stacked PPT Φ^2 circuit combines all of the main

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advantages of different topologies, like the simplicity of gate driving, highest cut-off frequency, lowest voltage stress, and load-invariant operation. A compact 6.78 MHz, 100 V, 300 W prototype converter is

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demonstrated. Using lowcost Si devices, the prototype converter achieves 96% peak total efficiency and maintains above 94.5% drain efficiency across a wide range of voltage and power. This new series-stacked PPT

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F2 RF amplifier doubles the maximum operating frequency and voltage range of a Class EF or E/F amplifier with benefits in many modern applications that require high-frequency high-power RF signals, like wireless

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charging for electric
vehicles, plasma RF drives,
and nuclear magnetic
resonance (NMR)
spectroscopy.

Handbook of Piezoelectric
Crystals for Radio Equipment
Designers

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Renewable Energy Systems
Power Distribution Networks
in High Speed Integrated
Circuits
Proceedings of the National
Seminar on Applied Systems
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Inductive Links for Wireless
Power Transfer