pcim ASIA

29 – 31 August 2023

Hall W2, Shanghai New International Expo Centre, Shanghai, China

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Conference Program

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Contents

PCIM Asia 2023 Conference Welcome Address

Dear PCIM Asia participants,

I am very happy and proud to welcome all of you to the PCIM Asia 2023 Exhibition and Conference in Shanghai.

The PCIM Asia Conference brings together the world's foremost experts and decision makers from industry and academia in the field of power electronics components and systems to discuss future technology trends and new products on the market. Power electronics components and energy conversion systems today are driven by WBG technologies, which contribute to the electrification of all transportation vehicles, renewable energy technologies, communication equipment and artificial intelligence. WBG devices offer new freedom in the design of ultra-high power density converters with high efficiency ratings. Industry experts and leading academics will provide presentations covering new developments in the fields of power devices, advanced packaging technologies with outstanding reliability, future power converters for automotive and renewable energy systems. This year in our technical program we are covering innovations along the power electronics roadmap in addition to three leading experts for keynote presentations, one special session on GaN based high power density supplies and one tutorial on advanced power modules. PCIM Asia is a worldwide hub for designers, engineers and researchers in the field of power electronics as well as decision makers from companies to create new market segments and trigger future avenues of research.

Important innovations in power electronics components and systems will be outlined during this year's PCIM Asia Conference

The technical program for this year's PCIM Asia is highlighting new achievements of power semiconductor devices based on Si and WBG technologies including relevant packaging designs handling ultrafast switching devices with extended lifetime and sensing parameters for predictive diagnostic functions as well as smart digital controlled power conversion concepts for traction and grid applications.

Conference highlights and future milestones in the value-added chain of power electronics

Keynote presentations on the new generation of GaN power devices, packaging designs for high power density and high voltage capabilities as well as dedicated high voltage semiconductor switches for wind power applications together with Special session: GaN based ultra-high power density power supplies will attract many power electronics experts.

Special attention has been paid to research carried out by engineers from industry and academia with their presentations as well as the "Best Paper Award", "Young Engineer Award" and "University Scientist Award" during the PCIM Asia conference 2023 are further.

I wish you an enjoyable and successful conference, open dialogue with all the attending experts and that you gain many new ideas for your future product innovation and business.

Leo Lorey

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Shanghai Jiao Tong University, CN

Conference Agenda

Tuesday, August 29, 2023

MORNING	09:30-10:00	**Room M2** **Conference Opening** Conference Director: Leo Lorenz, ECPE, DE		
	10:00 - 10:40	**Room M2** **Keynote: The New Generation of Gallium Nitride Power Devices; breaking the Limits of Ease-of-Use and Reliability** Speaker: Florin Udrea, Cambridge GaN Devices, UK Chairperson: Leo Lorenz, ECPE, DE		
	10:40 - 10:50	Tea Break		
	10:50 - 12:40	**Room M2** **IGBT and SiC Devices** Chairperson: Gourab Majumdar, Mitsubishi Electric Corporation, JP	**Room M3** **Advanced Control and Associated Hardware** Chairperson: Yongdong Li, Tsinghua University, CN	
AFTERNOON	12:40 – 13:30	Lunch Break		
	13:30 - 14:30	**Poster Gallery** **Power Semiconductor Devices** Chairperson: Meiqin Mao, Hefei University of Technology, CN	**Poster Gallery** **Motion Control** Chairperson: Zhihong Wu, Tongji University, CN	**Poster Gallery** **Power Converters** Chairperson: Guoqiang Zhang, Harbin Institute of Technology, CN
	14:30 - 16:20	**Room M2** **Si and WBG Devices Part I** Chairperson: Ziying Chen, Infineon Technologies, CN	**Room M3** **Converters** Chairperson: Min Chen, Zhejiang University, CN	

Wednesday, August 30, 2023

MORNING	09:30-10:10	**Room M2** **Keynote: Packaging and Integration of Wide-Bandgap Power Semiconductors: Challenges and Opportunities** Speaker: Christina DiMarino, Virginia Polytechnic Institute and State University, USA Chairperson: Lie Xu, Tsinghua University, CN		
	10:10 - 10:20	Tea Break		
	10:20 - 12:10	**Room M2** **Si and WBG Devices Part II** Chairperson: Naoto Fujishima, Fuji Electric, JP	**Room M3** **Automotive Applications** Chairperson: Xuhui Wen, Institute of Electrical Engineering, Chinese Academy of Sciences, CN	
AFTERNOON	12:10 – 13:30	Lunch Break		
	13:30 - 14:30	**Poster Gallery** **Power Semiconductor Modules** Chairperson: Miao Zhu, Shanghai Jiao Tong University, CN	**Poster Gallery** **Packaging Technologies** Chairperson: Gaosheng Song, Great China Mitsubishi Electric Semiconductor, CN	
	14:30 - 16:20	**Room M2** **Packaging and Reliability** Chairperson: Norbert Pluschke, Semikron Danfoss, HKSAR, CN	**Room M3** **High Power and Grid Applications** Chairperson: Dapeng Zheng, Shenzhen Hopewind Electric, CN	

Thursday, August 31, 2023

MORNING	09:30-10:10	**Room M2** **Keynote: Power Semiconductor Devices on Windpower Applications** Speaker: Dapeng Zheng, Shenzhen Hopewind Electric, CN Chairperson: Jinjun Liu, Xi´an Jiaotong University, CN		
	10:10 - 10:20	Tea Break		
	10:20 - 12:00	**Room M2** **Special Session: GaN based High Power Density Supplies** Chairperson: Manfred Schlenk, Dr. Schlenk Consulting, DE	**Room M3** **Tutorial: High-Performance Power Modules and SiC Devices** Speaker: Haihui Luo, Zhuzhou CRRC Times Semiconductor Co., Ltd, CN Speaker: Sideng Hu, Zhejiang University, CN	

研讨会日程

2023年8月29日，星期二

上午	09:30-10:00	**M2 会议室** **开幕致辞** 研讨会主席：Leo Lorenz，欧洲电力电子中心，德国		
	10:00 - 10:40	**M2 会议室** **主题演讲：新一代氮化镓功率器件；突破易用性和可靠性的限制** 演讲人：Florin Udrea，Cambridge GaN Devices，英国 主持人：Leo Lorenz，欧洲电力电子中心，德国		
	10:40 - 10:50	茶歇		
	10:50 - 12:40	**M2 会议室** **IGBT和SiC器件** 主持人：Gourab Majumdar，三菱电机，日本	**M3 会议室** **先进控制及相关硬件** 主持人：李永东，清华大学，中国	
下午	12:40 – 13:30	午餐		
	13:30 - 14:30	**墙报展示廊** **功率半导体器件** 主持人：茆美琴，合肥工业大学，中国	**墙报展示廊** **运动控制** 主持人：吴志红，同济大学，中国	**墙报展示廊** **电源变换器** 主持人：张国强，哈尔滨工业大学，中国
	14:30 - 16:20	**M2 会议室** **Si和宽禁带器件I** 主持人：陈子颖，英飞凌科技，中国	**M3 会议室** **变换器** 主持人：陈敏，浙江大学，中国	

2023年8月30日，星期三

上午	09:30-10:10	**M2 会议室** **主题演讲：宽禁带功率半导体的封装与集成：挑战与机遇** 演讲人：Christina DiMarino，弗吉尼亚理工大学，美国 主持人：许烈，清华大学，中国		
	10:10 - 10:20	茶歇		
	10:20 - 12:10	**M2 会议室** **Si和宽禁带器件II** 主持人：Naoto Fujishima，富士电机，日本	**M3 会议室** **汽车应用** 主持人：温旭辉，中国科学院电工研究所，中国	
下午	12:10 – 13:30	午餐		
	13:30 - 14:30	**墙报展示廊** **功率半导体模块** 主持人：朱淼，上海交通大学，中国	**墙报展示廊** **封装技术** 主持人：宋高升，三菱电机半导体大中国区，中国	
	14:30 - 16:20	**M2 会议室** **封装和可靠性** 主持人：Norbert Pluschke，赛米控丹佛斯，中国香港	**M3 会议室** **大功率和电网应用** 主持人：郑大鹏，深圳禾望电气，中国	

2023年8月31日，星期四

上午	09:30-10:10	**M2 会议室** **主题演讲: 功率半导体器件在风力发电中的应用** 演讲人：郑大鹏，深圳禾望电气，中国 主持人：刘进军，西安交通大学，中国		
	10:10 - 10:20	茶歇		
	10:20 - 12:00	**M2 会议室** **特邀专题报告：基于氮化镓器件的高功率密度电源** 主持人：Manfred Schlenk，Dr. Schlenk Consulting，德国	**M3 会议室** **技术讲座：高性能功率模块与SiC器件** 演讲人：罗海辉，株洲中车时代半导体，中国 演讲人：胡斯登，浙江大学，中国	

Award Finalists

Best Paper Award Finalists

More than an Evolution: a New Power MOSFET Technology for Higher Efficiency of Power Supplies
Owen Song, Infineon Semiconductors Company Ltd., China
Ralf Seimieniec, Simone Mazzer, Cesar Braz, Gerhard Noebauer, Michael Hutzler, David Laforet, Elias Pree, Alessandro Ferrara, Infineon Technologies Austria AG, Austria
Oral Session, 29 August 2023, Tuesday Morning, 11:50-12:15

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Best Paper Award
FINALIST

Impedance Based Beat Suppression Strategy for PMSM Drives With Small DC-Link Capacitors
Dawei Ding, Runfeng Gao, Zekun Ren, Weixin Yue, Gaolin Wang, Dianguo Xu, Harbin Instiute of Technology, China
Oral Session, 29 August 2023, Tuesday Morning, 11:00-11:25

Comprehensive Loss and Thermal Performance Analysis of Three-level T-type Grid-connected Converters
Liangliang Han, Wei Wu, Man Zhang, Helong Li, Zhiqing Yang, Shuang Zhao, Lijian Ding, Hefei University of Technology, China
Shuai Deng, Zhenyang Li, Anhui Hanxing Energy Co., Ltd., China
Oral Session, 30 August 2023, Wednesday Afternoon, 15:30-15:55

Gate Circuit improves p-GaN HEMT V_{TH} reliability
Xinke Liu, Zengfa Chen, Ze Zhong, Qiyan Zhang, Xiaobo Li, Shuangwu Huang, Linfei Gao, College of Materials Science and Engineering, College of Electronics and Information Engineering, Institute of Microelectronics, Guangdong Research Center for Interfacial Engineering, State Key Laboratory of Radio Frequency Heterogeneous Integration, Shenzhen University, China
Feng Qiu, Yong Xu, Gensol (Shenzhen) Tech. Innovation Center Co., Ltd, China
Wenrong Zhuang, Dongguan Sino Nitride Semiconductor Co., Ltd, China
Longkou Chen, Shenzhen Baseus Technology Co., Ltd, China
Oral Session, 30 August 2023, Wednesday Afternoon, 15:55-16:20

This award is sponsored by: MITSUBISHI ELECTRIC *Changes for the Better*

Young Engineer Award Finalists

Accurate Switching Behavior Modeling for SiC MOSFETs Considering Dynamic Output Characteristics
Yimin Zhou, Zhiqiang Wang, Yayong Yang, Guoqing Xin, Xiaojie Shi, Yong Kang, Huazhong University of Science and Technology, China
Oral Session, 29 August 2023, Tuesday Morning, 11:25-11:50

pcim Asia
Young Engineer Award
FINALIST

An Accurate 3D Thermal Simulation Method Based on Neural Network-Aided Power Loss Model
Yayong Yang, Zhiqiang Wang, Yimin Zhou, Guoqing Xin, Xiaojie Shi, Yong Kang, Huazhong University of Science and Technology, China
Poster Session, 30 August 2023, Wednesday Afternoon, 13:30-14:30

Active Power Decoupling Based on Input Current Ripple Control for Single-Phase Voltage Source Inverter
Xun Jiang, Meiqin Mao, Wei Cheng, Research Center for Photovoltaic System Engineering of Ministry of Education, Hefei University of Technology, China
Liuchen Chang, University of New Brunswick, Canada
Oral Session, 30 August 2023, Wednesday Afternoon, 15:55-16:20

This award is sponsored by: SEMIKRON DANFOSS

University Scientist Award Finalists

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University Scientist Award
FINALIST

Analysis of Input Current Distortion in Three-phase Current Source PWM Rectifier
Binghui Li, Shuhan Zhou, Mingzhi He, Yanzi Zhang, School of Electrical Engineering, Sichuan University, China
Gao Liu, Department of Energy Technology, Aalborg University, Denmark
Oral Session, 29 August 2023, Tuesday Morning, 12:15-12:40

A Trench Gate Reverse-Conducting IGBT with a Shallow Oxide Trench and a Floating P-Region
Wuhua Yang, Cailin Wang, Ronghua Cheng, Ruliang Zhang, Xi'an University of Technology, China
Poster Session, 29 August 2023, Tuesday Afternoon, 13:30-14:30

Driver Optimization Method Based on GeneticAlgorithm for IGBT
Chengyang Lin, Mingcheng Ma, Tianlin Sun, Dianguo Xu, Harbin Institute of Technology, China
Poster Session, 29 August 2023, Tuesday Afternoon, 13:30-14:30

A Variable Bypass Current Source Driver Circuit Based on Reference Voltage
Mingcheng Ma, Chengyang Lin, Tianlin Sun, Dianguo Xu, Harbin Institute of Technology, China
Poster Session, 29 August 2023, Tuesday Afternoon, 13:30-14:30

Direct Pressure-tolerant DC Transformer Scheme and Control Method Applied to Subsea Power Supply
Zedong Zheng, Jiye Liu, Department of Electrical Engineering, Tsinghua University, China
Lisha Chen, Chi Li, Energy Internet Innovation Institute of Tsinghua University, China
Poster Session, 29 August 2023, Tuesday Afternoon, 13:30-14:30

Implantation optimization for 1200 V SiC MPS with ultra-low leakage current and high surge current capability
Bo Yi, Yi Xu, Junji Cheng, Hongqiang Yang, University of Electronic Science and Technology of China, China
Keqiang Ma, Siliang Wang, Xingli Jiang, Qiang Hu, Chengdu Semi-Future Technology Co., Ltd., China
Oral Session, 29 August 2023, Tuesday Afternoon, 15:55-16:20

A Control Strategy Enabling Compatible 1-Ph/3-Ph V2L Operations for EV Chargers with Improved Leg Utilizations
Ziheng Yuan, Peng Chen, Zhouyu Wu, Wei Wu, Helong Li, Zhiqing Yang, Shuang Zhao, Zixiang Yu, Lijian Ding, Hefei University of Technology, China
Lijun Wang, Wei Huo, OAKFORESEE INTELLIMOBILE TECH CO., LTD., China
Oral Session, 29 August 2023, Tuesday Afternoon, 15:30-15:55

Optimization of Pinfin Heat Sink for SiC Power Module based on LBM-LES
Jian Cui, Puqi Ning, Xiaoshuang Hui, University of Chinese Academy of Sciences, China
Jian Cui, Puqi Ning, Xiaoshuang Hui, Institute of Electrical Engineering, Chinese Academy of Sciences, China
Jian Cui, State grid Shaoxing Electric Power Company, Ltd, China
Poster Session, 30 August, Wednesday Afternoon, 13:30-14:30

The MMC Based DC Transformer With Reshaped Circulating Current
Wenlong Hou, Xiaodong Zhao, Binbin Li, Dianguo Xu, Harbin Institute of Technology, China
Oral Session, 30 August, Wednesday Afternoon, 15:05-15:30

This award is sponsored by: Infineon

PCIM Asia Conference 2023 – Keynotes, Tutorial and Special Session

Keynote

Speaker:
Florin Udrea,
Cambridge GaN Devices, UK

Tuesday, 29 August, 2023 Morning, 10:00
Room M2

The new generation of Gallium Nitride Power devices; breaking the limits of ease-of-use and reliability

The power devices field has seen tremendous changes in the last decade. The traditional silicon MOSFETs and IGBTs are being replaced by Silicon Carbide and GaN power devices. While SiC offers a mature technology, GaN, in spite of its enhanced potential still needs to address issues such as robustness and ease-of-use. This talk will show that a new generation of GaN devices (ICeGaN) is emerging which addresses ease-of-use and has the potential to outplay both Silicon and Silicon Carbide in terms of reliability. The talk will end with an outline of the challenges for the power electronics future and a vision of different technologies for the next 10 years.

Speaker:
Christina DiMarino,
Virginia Polytechnic Institute and State University, USA

Wednesday, 30 August, 2023 Morning, 9:30
Room M2

Packaging and Integration of Wide-Bandgap Power Semiconductors: Challenges and Opportunities

Wide-bandgap (WBG) power semiconductors are enabling power electronics to meet growing demands for improved efficiency, power density, and reliability. However, new approaches to the packaging and integration of these devices are essential to unleashing their full potential. This presentation will review the challenges of packaging WBG power devices, current solutions and trends, and opportunities for further improvement.

Speaker:
Dapeng Zheng,
Shenzhen Hopewind Electric, CN

Thursday, 31 August, 2023 Morning, 9:30
Room M2

Power Semiconductor Devices on Windpower Applications

Tutorial

Speaker:
Haihui Luo,
Zhuzhou CRRC Times Semiconductor Co., LTD, China

Speaker:
Sideng Hu,
Zhejiang University, CN

Thursday, 31 August, 2023 Morning, 10:20-12:20, Room M3

High-Performance Power Modules and SiC Devices

This course aims to introduce the key concepts, principles, and applications of power modules, SiC (Silicon Carbide) devices, and discrete components. Participants will gain a deep understanding of the latest technologies and trends in the field of power electronics and learn how to design and apply high-performance power modules and SiC devices to meet the requirements of modern power conversion and energy management systems.

Performance Improvement Strategies for Discrete and Modular Wide Bandgap Devices

This tutorial is planned to include a comprehensive and in-depth overview of the Discrete and Modular discrete. Discrete package has the advantages of flexibility, scalability and reduced cost; however, challenges of severe switching oscillations and limited current capacity are associated with it. This tutorial encompasses the switching oscillations and limited current capacity issues of discrete devices. The performance improvement strategies discussed in this tutorial can assist researchers to better use the discrete package and can stimulate them to come up with new solutions. For the Modular Wide Bandgap Devices, the busbar design and optimization are presented. The underlying oscillation mechanisms are explored in detail. Besides, the most recent techniques to extract stray parameters in commutation loop, including device, busbar and capacitor are also explored.
Part of this work has been published in the review paper Performance Improvement Strategies for Discrete Wide Bandgap Devices: A Systematic Review.

Special Session

Speaker:
Pierrick Ausseresse,
Infineon Technologies AG, Deutschland

Speaker:
Ionel Jitaru,
Rompower Energy Systems Inc., USA

Speaker:
Dong Li,
Infineon Technologies Asia Pacific Pte. Ltd., Singapore

Thursday, 31 August, 2023 Morning, 10:20-12:00, Room M2

GaN based High Power Density Supplies

10:30

GaN switches enable high performance architecture for USB-PD EPR Adaptors

The new USB-PD EPR standard aims at universal power adaptor able to work with wide input voltage range (100Vac to 240Vac) and provide output voltages ranging from 5V to 48V. Nevertheless, such wide operation voltage ranges challenges the power converter topologies used up to now. In this paper an innovative architecture using GaN switches is presented. It consists of an active boost power factor correction (PFC) followed by an asymmetrical half-bridge flyback converter (well-known as hybrid-flyback). Its advantages with respect to state-of-the-art solutions are analyzed and the interaction between both stages to achieve optimum efficiency is described. The benefits of GaN switches in the hybrid flyback stage are explained. Finally, the results are demonstrated with a 240W prototype.

11:00

EMI suppression techniques for very high efficiency and very high power density medium power AC-DC adapters

These novel suppression techniques reduce the additional leakage inductance associated with traditional shielding techniques and can double the EMI attenuation. The reduction of the leakage inductance leads to an increase in efficiency resulting in higher power density. The experimental results are derived from a 250W AC-DC adapter using the Hybrid Flyback Technology.

11:30

Value Proposition of Integrated GaN Solutions for Low to Medium Range Power Applications

This presentation will introduce the GaN power device technology, its advantage for high power density supplies. The hybrid Flyback converter is one excellent topology for high power density USB PD charger together with GaN switches. Infineon has broad GaN product portfolio and the new iGaN product with integrated current sense will further improve system efficiency and power density for charger adapter.

Oral Session Tuesday, 29 August, 2023 Morning, 09:30-12:40

09:30 - 10:00

Room M2
Conference Opening
Conference Director: Leo Lorenz, ECPE, DE

10:00 - 10:40

Room M2
Keynote: The new generation of Gallium Nitride Power devices; Breaking the limits of ease-of-use and reliability

Speaker:
Florin Udrea,
Cambridge GaN Devices, UK

Chairperson:
Leo Lorenz,
ECPE, DE

10:40 - 10:50 Coffee break and room change

Room M2
IGBT and SiC Devices

Chairperson: Gourab Majumdar,
Mitsubishi Electric Corporation, JP

10:50
Chair's opening speech

11:00
A Snapback-Free Reverse-Conducting LIGBT with P floating region at Collector
Wuhua Yang, Cailin Wang, Wanting Du, Chao Zhang, Xi'an University of Technology, China

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11:25
Accurate Switching Behavior Modeling for SiC MOSFETs Considering Dynamic Output Characteristics
Yimin Zhou, Zhiqiang Wang, Yayong Yang, Guoqing Xin, Xiaojie Shi, Yong Kang, Huazhong University of Science and Technology, China

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11:50
More than an Evolution: a New Power MOSFET Technology for Higher Efficiency of Power Supplies
Owen Song, Infineon Semiconductors Company Ltd., China
Ralf Seimieniec, Simone Mazzer, Cesar Braz, Gerhard Noebauer, Michael Hutzler, David Laforet, Elias Pree, Alessandro Ferrara, Infineon Technologies Austria AG, Austria

12:15
Modeling and Validation of a Silicon-Carbide Power Module
Lizhen Zhang, Roveendra Paul, James Victory, Bo Tian, onsemi, USA
Dylan Cho, onsemi, South Korea

Room M3
Advanced Control and Associated Hardware

Chairperson: Yongdong Li,
Tsinghua University, CN

10:50
Chair's opening speech

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11:00
Impedance Based Beat Suppression Strategy for PMSM Drives with Small DC-Link Capacitors
Dawei Ding, Runfeng Gao, Zekun Ren, Weixin Yue, Gaolin Wang, Dianguo Xu, Harbin Instiute of Technology, China

11:25
Reducing steady state losses in High performance Charger Topologies with easy to use GaN HEMTs
Martin Cheung, Cambridge GaN Devices, UK

11:50
Discussion on Power Module Solutions for 200kW Power Converter System in Energy Storage System
Jie Dong, Xin Hao, Industry Power Control Infineon Science and Technology (China) Company Limited, China

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12:15
Analysis of Input Current Distortion in Three-phase Current Source PWM Rectifier
Binghui Li, Shuhan Zhou, Mingzhi He, Yanzi Zhang, School of Electrical Engineering, Sichuan University, China
Gao Liu, Department of Energy Technology, Aalborg University, Denmark

Poster Session Tuesday, 29 August, 2023 Afternoon, 13:30-14:30

Power Semiconductor Devices

Chairperson: Meiqin Mao, Hefei University of Technology, CN

PP001
A Trench Gate Reverse-Conducting IGBT with a Shallow Oxide Trench and a Floating P-Region
Wuhua Yang, Cailin Wang, Ronghua Cheng, Ruliang Zhang, Xi'an University of Technology, China

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PP002
The Research on Influencing Factors of 650V IGBT's Turn-off dV_{ce}/dt Controllability
Rui Li, Keqiang Ma, Siliang Wang, Yi Xiang, Liangkai Liu, Ke Yang, Chengdu Semi-Future Technology Co., Ltd., China

PP003
Research on discrete IGBT7 H7 1200 V in inverter for Solar and UPS applications
Ming Zhou, Infineon Semiconductor (Shenzhen) Co. Ltd., China
Liwei Zhou, Infineon Technologies China Co. Ltd., China

PP004
Driver Optimization Method Based on GeneticAlgorithm for IGBT
Chengyang Lin, Mingcheng Ma, Tianlin Sun, Dianguo Xu, Harbin Institute of Technology, China

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PP005
A Variable Bypass Current Source Driver Circuit Based on Reference Voltage
Mingcheng Ma, Chengyang Lin, Tianlin Sun, Dianguo Xu, Harbin Institute of Technology, China

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PP006
Research on the Full Temperature Range Characteristics of IGBT
Tianlin Sun, Chengyang Lin, Mingcheng Ma, Dianguo Xu, Harbin Institute of Technology, China

PP007
Gate oxide degradation of SiC IGBT induced by non-constant thermal-electrical coupled-stresses
Rongde Luo, Fugen Wu, State Key Laboratory of Precision Electronic Manufacturing Technology and Equipment, Guangdong University of Technology, China
Rongde Luo, Fugen Wu, School of Materials and Energy, Guangdong University of Technology, China
Shaodong Yang, Xia Luo, Hao Niu, Xianjun Kuang, Zongbei Dai, No.5 Electronics Research Institute of the Ministry of Industry and Information Technology, China
Xiaowei Xu, Three Gorges Intelligent Industrial Control Technology Company, China
Huafeng Dong, School of Physics and Optoelectronic Engineering, Guangdong University of Technology, China

Motion Control

Chairperson: Zhihong Wu, Tongji University, CN

PP008
Direct Pressure-tolerant DC Transformer Scheme and Control Method Applied to Subsea Power Supply
Zedong Zheng, Jiye Liu, Department of Electrical Engineering, Tsinghua University, China
Lisha Chen, Chi Li, Energy Internet Innovation Institute of Tsinghua University, China

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PP009
A New Parameter-free Predictive Current Control for PMSM
Guofu Zhang, Xiaoguang Zhang, North China University of Technology, China

PP010
Multi-stage model predictive current control with parameters-free for PMSM drives
Zhen Wu, Xiaoguang Zhang, North China University of Technology, China

PP011
An improved four-vector model for predictive current control used for PMSM drives
Shujun Fang, Xiaoguang Zhang, Ji Li, North China University of Technology, China

PP012
Derivation of DC Servo Driver Current Loop Model
Qiyang Zeng, Ming Yang, Harbin Institute of Technology, China
Bin Han, Jing Qiu, Lian Yungang JARI Electronics Co., Ltd., China

PP013
Self-tuning Technique of PMSM Current Loop Based on Active Damping
Pengcheng Lan, Ming Yang, Harbin Institute of Technology, China
Qiu Jing, Yuchen Song, Lian Yungang JARI Electronics Co., Ltd., China

Power Converters

Chairperson: Guoqiang Zhang, Harbin Institute of Technology, CN

PP014
Development of algorithm to control switched-mode power supply for charging battery based on extended Kalman filter
Nikolai Kalugin, Aleksei Chernyshov, EnerGet LLC, Russia

PP015
Universal mathematical model of single-phase DC-DC bridge converter for different control algorithms
Yury Skorokhod, Dmitriy Sorokin, Transconverter, Russian Federation
Sergey Volskiy, Moscow Aviation Institute (Technical University), Russian Federation

PP016
Development of the control algorithm for the two-unit fast-charging stations
Nikolay Volskiy, Mikhail Krapivnoi, Charge Evolution ltd, Russian Federation
Darja Barkovska, Internic ltd, Latvia

PP017
Panoramic co-simulation technology for large-scale offshore wind power
Junyang Zhang, Xiaojiang Guo, Zheng Li, China Huaneng Clean Energy Research Institute, China

PP018
A Cooperative Control Strategy for AC Fault Ride through of Offshore Wind Power Based on AC Voltage Fluctuation
Chunhua Li, Yijing Chen, Xiaojiang Guo, Xuhui Shen, Sun Xu, China Huaneng Group Clean Energy Research Institute, China

Oral Session Tuesday, 29 August, 2023 Afternoon, 14:30-16:20

Room M2
Si and WBG Devices Part I

Chairperson: Ziying Chen, Infineon Technologies, CN

14:30
Chair's opening speech

14:40
2.3kV Si and SiC devices development for renewable energy system
Song Chen, Fuji Electric Co. Ltd., China
Shuangching Chen, Yusuke Sekino, Taku Takaku, Keiji Okumura, Takafumi Uchida, Kaname Mitsuzuka, Yuichi Onozawa, Yoshiyuki Kusunoki, Yasuyuki Kobayashi, Fuji Electric Co. Ltd., Japan

15:05
Wide Bandgap Semiconductors - a foundry perspective
Heming Wei, X-FAB Sarawak Sdn. Bhd., Malaysia
Agnes Jahnke, X-FAB Global Services GmbH, Germany

15:30
Using Test-to-Fail Methodology to Predict How GaN Devices Can Last More than 25 Years in Solar Applications
Shengke Zhang, Siddhesh Gajare, Ricardo Garcia, Efficient Power Conversion Corporation, USA

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15:55
Implantation optimization for 1200 V SiC MPS with ultra-low leakage current and high surge current capability
Bo Yi, Yi Xu, Junji Cheng, Hongqiang Yang, University of Electronic Science and Technology of China, China
Keqiang Ma, Siliang Wang, Xingli Jiang, Qiang Hu, Chengdu Semi-Future Technology Co., Ltd., China

Room M3
Converters

Chairperson: Min Chen, Zhejiang University, CN

14:30
Chair's opening speech

14:40
The Power loss reduction from continuous PWM to discontinuous PWM in a 3L ANPC converter
Yixuan Wang, Infineon China Technologies, China
Heng Wang, Infineon Integrated Circuit (Beijing) Co., Ltd., China

15:05
A SiC Based 3.6kW High Efficiency and High Power Density PFC Converter for Off-line Switching Mode Power Supplies
Ying Liu, Kevin Xie, Wolfspeed, China
Yuequan Hu, Anuj Narain, Wolfspeed, USA

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15:30
A Control Strategy Enabling Compatible 1-Ph/3-Ph V2L Operations for EV Chargers with Improved Leg Utilizations
Ziheng Yuan, Peng Chen, Zhouyu Wu, Wei Wu, Helong Li, Zhiqing Yang, Shuang Zhao, Zixiang Yu, Lijian Ding, Hefei University of Technology, China
Lijun Wang, Wei Huo, OAKFORESEE INTELLIMOBILE TECH CO., LTD., China

15:55
3MHz GaN DC-DC 48Vin direct to 0.6Vout realized by ultra-short pulse (5ns) using Virtual Peak Current Mode control technique
Isao Takobe, Hiroshi Yamashita, Junki Otani, Akihiro Kawano, Toshiyuki Zaitsu, ROHM CO., LTD., Japan

Oral Session Wednesday, 30 August, 2023 Morning, 09:30-12:10

9:30 - 10:10

Room M2
Keynote: Packaging and Integration of Wide-Bandgap Power Semiconductors: Challenges and Opportunities

Speaker:
Christina DiMarino,
Virginia Polytechnic Institute and State University, USA

Chairperson:
Lie Xu,
Tsinghua University, CN

10:10 - 10:20 Coffee break and room change

Room M2
Si and WBG Devices Part II

Chairperson: Naoto Fujishima,
Fuji Electric, JP

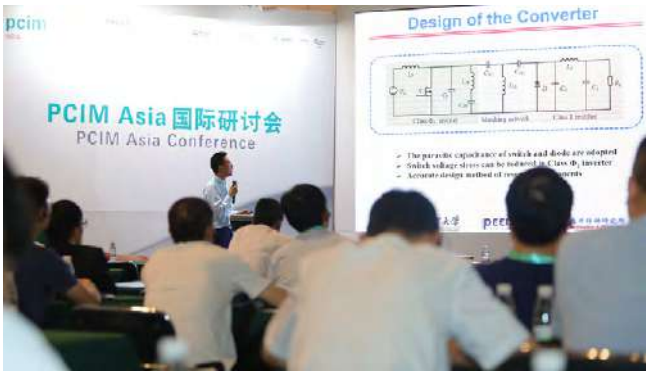
10:20
Chair's opening speech

10:30
A Full SiC 60kW Three Phase LLC Converter for Fast Charger
Chen Wei, Zongzeng Hu, Jianlong Chen, Fulin Zhang, Wolfspeed, China
Anuj Narain, Wolfspeed, USA

10:55
Tuning GaN switching performance and operation in parallel within a bridge topology
Peter Comiskey, Cambridge GaN Devices, UK

11:20
1.2 KV SOI level-shift gate driver with miller clamp and short circuit clamp to drive SiC MOSFETs
Weidong Chu, Infineon Technologies Americas Corp., USA

11:45
A four-chip parallel IGBT module based on the latest generation technology used in Photovoltaic Centralized Inverter
Tao Zhang, Wang Xuanxuan, Rong Rui, Cao Shuai, Miao Shuo, Chen Guokang, Macmic science & technology Co., Ltd., China



Room M3
Automotive Applications

Chairperson: : Xuhui Wen,
Institute of Electrical Engineering,
Chinese Academy of Sciences, CN

10:20
Chair's opening speech

10:30
Low loss and High-cooling-performance automotive power module for 160 kW EV application
Yoshihisa Ebuchi, Naoya Shimada, Yoshihiko Kawakami, Youichiro Seki, Manabu Watanabe, Souichi Yoshida, Yuuta Takeuchi, Yoshihiro Tateishi, Fuji Electric Co., Ltd, Japan

10:55
An advanced SiC power module designated for automotive
Hideo Komo, Rei Yoneyama, Shoichi Orita, Gourab Majumdar, Mitsubishi Electric Corporation, Japan

11:20
Fast-Charging Commercial Vehicles - A Megawatt Application Similar to Electrolysis
Martin Schulz, Littelfuse Europe GmbH, Germany

11:45
New Generation 750V IGBT modules for automotive application
Zhihong Liu, Yi Tang, Jinchun Yan, Fu Yong, Songlin Zheng, Jiajie Ma, Ye Chen, Xi Ling, Lijun Yao, StarPower Semiconductor Ltd., China

Poster Session Wednesday, 30 August, 2023 Afternoon, 13:30-14:30

Power Semiconductor Modules

Chairperson: Miao Zhu,
Shanghai Jiao Tong University, CN

PP019
60kW Dual Active Bridge Converter based on 4-in-1 SiC MOSFET Module for PET Application
Jian Sun, Bo Hu, Gaosheng Song, Mitsubishi Electric & Electronics (Shanghai) Co., Ltd., China

PP020
Thermal model of fully-molded, multi-chip power modules
Sungmo Young, Taejin Lee, Hyukdong Kwon, Infineon Technologies Korea, South Korea

PP021
Introduction of RC-IGBT Based Transfer Mold SOPIPM™
Xiaoling Wang, Mitsubishi Electric & Electronics (Shanghai) Co., Ltd., China
Jian Chen, Mitsubishi Electric GEM Power Device (Hefei) Co., Ltd., China
Akiko Goto, Power Device Works, Mitsubishi Electric Corporation, Japan

PP022
30A/600V RC-IGBT Based Transfer Molded IPM for Home Appliance Application
Kai Jiang, Hongguang Huang, Mitsubishi Electric & Electronics (Shanghai) Co., Ltd, China
Motonobu Joko, Power Device Works, Mitsubishi Electric Corporation, Japan

PP023
An 820A 750V IGBT Module with Excellent Performance for Inverter of Electric Vehicle
Shuo Miao, Rui Rong, Chao Chen, Tao Zhang, Shuai Cao, Guokang Chen, Yadong Meng, MACMIC SCIENCE&TECHNOLOGY CO., LTD, China

PP024
3rd Generation RC-IGBT for Automotive Application
Kentaro Yoshida, Shintaro Araki, Tsuyoshi Osaga, Seiichiro Inokuchi, Power Device Works, Mitsubishi Electric Corp., Japan

PP025
3-level T-type 4-in-1 Module for Active Front End Solution
Haruki Murakami, Nobuya Nishida, Mitsubishi Electric Corporation, Japan
Siqing Lu, Yuancheng Zhang, Mitsubishi Electric & Electronics (Shanghai) Co., Ltd., China

Packaging Technologies

Chairperson: Gaosheng Song,
Great China Mitsubishi Electric Semiconductor, CN

PP026
Study on Microstructure and Mechanical Properties of Copper-Copper Bonding by Ultrasonic Welding
Xiankun Zhang, Xiaofei Pang, Xiaodong Zhang, Jianning Zhang, China Resources Runan Chongqing Co., Ltd., China

PP027
Study on harmonic response of wirebond in high power IGBT module under ultrasonic welding process
Xingfeng Li, Jianxin Huang, Zhangzhen Luo, Guiqin Chang, Tinchang Shi, Haihui Luo, Qiang Xiao, Zhuzhou CRRC Times Semiconductor Co.,Ltd., China
Xingfeng Li, Jianxin Huang, Zhangzhen Luo, Guiqin Chang, Tinchang Shi, Haihui Luo, Qiang Xiao, State Key Laboratory of Power Semiconductor and Integration Technology, China

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PP028
Optimization of Pinfin Heat Sink for SiC Power Module based on LBM-LES
Jian Cui, Puqi Ning, Xiaoshuang Hui, University of Chinese Academy of Sciences, China
Jian Cui, Puqi Ning, Xiaoshuang Hui, Institute of Electrical Engineering, Chinese Academy of Sciences, China
Jian Cui, State grid Shaoxing Electric Power Company, Ltd, China

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PP029
An Accurate 3D Thermal Simulation Method Based on Neural Network-Aided Power Loss Model
Yayong Yang, Zhiqiang Wang, Yimin Zhou, Guoqing Xin, Xiaojie Shi, Yong Kang, Huazhong University of Science and Technology, China

PP030
Research on the improvement of IGBT module surge capability
Chao Fang, Guiqin Chang, Xi Zou, Haihui Luo, Qiang Xiao, Yangang Wang, Zhuzhou CRRC Times Semiconductor Ltd., China
Chao Fang, Guiqin Chang, Xi Zou, Haihui Luo, Qiang Xiao, Yangang Wang, State Key Laboratory of Power Semiconductor and Integration Technology, China

PP031
A 1200V 600A Full SiC Half-Bridge Power Module with Low Inductance and Good Current Balancing Performance
Wenbo Wang, Jingru Dai, Yangang Wang, Dynex Semiconductor Ltd., UK

PP032
Low-loss molding inductors analysis
Kunming Tsuo, Bourns, Taiwan, China
David Wiest, Bourns, USA

Oral Session Wednesday, 30 August, 2023 Afternoon, 14:30-16:20

Room M2
Packaging and Reliability

Chairperson: Norbert Pluschke, Semikron Danfoss, HKSAR, CN

14:30
Chair's opening speech

14:40
Application benefits of TO-247 PLUS package reflow soldering in vehicle traction inverter
Zhenbo Zhao, Hao Zhang, Infineon Technologies Center of Competence (Shanghai) Co., Ltd, China

15:05
Method of avoiding plastic IGBT module's torque loss in harsh application environment
Cao Shuai, Chao Chen, Rui Rong, Tao Zhang, Shuo Miao, MACMIC SCIENCE&TECHNOLOGY CO., LTD, China

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15:30
Comprehensive Loss and Thermal Performance Analysis of Three-level T-type Grid-connected Converters
Liangliang Han, Wei Wu, Man Zhang, Helong Li, Zhiqing Yang, Shuang Zhao, Lijian Ding, Hefei University of Technology, China
Shuai Deng, Zhenyang Li, Anhui Hanxing Energy Co., Ltd., China

pcim Asia Best Paper Award FINALIST

15:55
Gate Circuit improves p-GaN HEMT V_{TH} reliability
Xinke Liu, Zengfa Chen, Ze Zhong, Qiyan Zhang, Xiaobo Li, Shuangwu Huang, Linfei Gao, College of Materials Science and Engineering, College of Electronics and Information Engineering, Institute of Microelectronics, Guangdong Research Center for Interfacial Engineering, State Key Laboratory of Radio Frequency Heterogeneous Integration, Shenzhen University, China
Feng Qiu, Yong Xu, Gensol (Shenzhen) Tech. Innovation Center Co., Ltd, China
Wenrong Zhuang, Dongguan Sino Nitride Semiconductor Co., Ltd, China
Longkou Chen, Shenzhen Baseus Technology Co., Ltd, China

Room M3
High Power and Grid Applications

Chairperson: : Dapeng Zheng, Shenzhen Hopewind Electric, CN

14:30
Chair's opening speech

14:40
Distributed Real-Time Simulation System for Power Converter-Dominated Grid
Peilin Zhang, Zhiyu Cao, Avasition Electric Co. Ltd., China
Yilong Cao, Haoyang Cui, Shanghai University of Electric Power, China

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15:05
The MMC Based DC Transformer with Reshaped Circulating Current
Wenlong Hou, Xiaodong Zhao, Binbin Li, Dianguo Xu, School of Electrical Engineering, Harbin Institute of Technology, China

15:30
New generation high power semiconductors for 8GW VSC-HVDC applications
Evgeny Tsyplakov, Gaurav Gupta, Jeremy Jones, B.Boksteen, L.D. Michelis, Christian Winter, Makan Chen, Hitachi Energy Switzerland Ltd. Semiconductors, Switzerland
Jan Vobecky, Hitachi Energy s.r.o. Semiconductors, Czech Republic

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15:55
Active Power Decoupling Based on Input Current Ripple Control for Single-Phase Voltage Source Inverter
Xun Jiang, Meiqin Mao, Wei Cheng, Research Center for Photovoltaic System Engineering of Ministry of Education, Hefei University of Technology, China
Liuchen Chang, University of New Brunswick, Canada

Keynote, Special Session & Tutorial

Thursday, 31 August, 2023 Morning, 09:30- 12:00

9:30 - 10:10

Room M2

Keynote: Power Semiconductor Devices on Windpower Applications

Speaker : Dapeng Zheng,
Shenzhen Hopewind Electric, CN

Chairperson:
Jinjun Liu,
Xi´an Jiaotong University, CN

10:10 - 10:20 Coffee break and room change

Room M2

Special Session: GaN based High Power Density Supplies

Chairperson: Manfred Schlenk,
Dr. Schlenk Consulting, Germany

10:20
Chair's opening speech

10:30
GaN switches enable high performance architecture for USB-PD EPR Adaptors
Pierrick Ausseresse, Alfredo Medina-Garcia, Josef Daimer, Infineon Technologies AG, Germany
Manfred Schlenk, Dr. Schlenk Consulting, Germany

11:00
EMI suppression techniques for very high efficiency and very high-power density medium power AC-DC adapters
Ionel Jitaru, Rompower Energy Systems Inc., USA
Andrei Savu, Rompower International SRL, Romania
Constantin Radoi, Polyethnic University of Bucharest, Romania

11:30
Value proposition of integrated GaN solutions for low to medium range power applications
Li Dong, Infineon Technologies Asia Pacific Pte. Ltd., Singapore

Room M3

Tutorial: High-Performance Power Modules and SiC Devices

10:20-12:20
High-Performance Power Modules and SiC Devices
Haihui Luo, Zhuzhou CRRC Times Semiconductor Co., LTD, China

Performance Improvement Strategies for Discrete and Modular Wide Bandgap Devices
Sideng Hu, Zhejiang University, China

*Please refer to the agenda on site

Prominent Conference Speakers in 2023

Not in specific order

Registration Information 2023

For Speaker

Speakers (Industry) Full Conference	1500 CNY
Speakers (University/Academia) Full Conference	750 CNY

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For Audience

3 Days Full Ticket	3,200 CNY
1 Day Ticket	1,600 CNY

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Conference Proceedings

E-Proceedings of PCIM Asia 2023 (USB)	2,000 CNY
E-Proceedings of PCIM Asia 2022 (USB)	800 CNY
E-Proceedings of PCIM Asia 2015-2021 (USB)	750 CNY

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Important Dates

Submission of abstracts	4 March 2024
Notification of acceptance	May 2024
Submission of full paper	20 June 2024

Selection Process

All submitted abstracts will be reviewed to ensure a high quality conference. Submitted abstracts maybe selected for oral or poster presentation. Notification of acceptance will be announced in May 2024.

Submission

Please find detailed information instructions on submitting your synopsis/abstract online at

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Conference language

- Abstract and paper written in English only.
- Oral presentations conducted in English.
- Presenter's PowerPoint presentation can be compiled in English or bilingual (English and Chinese).

Topics of Interest

1. Advanced Power Semiconductors
1.1 High Power Semiconductors
1.2 MOSFETs, IGBTs, FREDs & Schottkys
1.3 Power Modules and Power Hybrids
1.4 SiC Devices
1.5 GaN Devices
1.6 Other Wide Bandgap Devices
1.7 Power Supply Control IC and Power Management ICs
1.8 Gate Driver and Device Protection
1.9 IPM and Power Electronic Building Blocks

2. Packaging and Reliability
2.1 Packaging and Interface Technologies
2.2 Advanced Cooling Systems
2.3 Thermal Management and Simulations
2.4 Power Electronic Components Reliability and Life Time Prediction
2.5 Power Embedding
2.6 High Power Density Designs
2.7 Design Automation and Methodology

3. Passive Components and Integration
3.1 Higher Frequency and Low Loss Materials & Techniques for Inductors and Capacitors
3.2 Planar Inductors and Transformers and Thin Film Magnetic Component
3.3 Filters and Passive Integration

4. AC/DC Converter
4.1 High Efficiency/High Density Power Converters/Inverters
4.2 Resonant and Quasi Resonant Topologies for Power Supplies
4.3 Stand-alone Power Supplies (Adapters) and on Board Supplies
4.4 New Topologies (Single Switch, Phase Shift, ZVS, ZCS, ZVZCS)

5. DC/DC Converter
5.1 DC/DC Converter Topologies for Enhanced Efficiency and Control
5.2 Synchronous Rectification
5.3 Smart Battery Management Concepts
5.4 Point of Load Converters
5.5 New Topologies for Distributed Power Supply Systems (Single or Multi-Stage Architecture, ZVS, ZCS, ZVZCS)

6. Digital Power Conversion
6.1 PMBus and other Digital Power Control Protocols
6.2 Digital Control for Power Converters
6.3 Advantages of Digital Power Conversion and Associated Challenges
6.4 System on a Chip (SOC)
6.5 Energy Harvesting

7. Motor Drive & Motion Control
7.1 Home Appliances
7.2 Small Power Motor "General Purpose Drive" with Highly Sophisticated Control Strategies and Low Cost Solutions
7.3 New Converter/Inverter Types for Single- and Three Phase Systems
7.4 Advanced Motor Concepts for Industrial Application and Traction Drives
7.5 New Control Architectures DSP, Microcontroller or FPGA
7.6 Advanced Sensor Concepts for Motor Drives
7.7 Intelligent Motion Control and Architecture

8. High Frequency Power Electronic Converters and Inverters
8.1 Thermal Design, Packaging and EMI Issues
8.2 Sensors Specific to Power Electronics (e.g. Voltage, Current, Power, Frequency, Phase, Temperature)
8.3 Techniques to Reduce Switching Losses to Improve Efficiency and Reduce Size and Weight
8.4 Wireless Power Transfer

9. Automotive Power Electronics and Electrified Transportation
9.1 Hybrid / Electric Vehicle
9.2 MOSFET, IGBT and SiC Modules in Motor Traction and Propulsion Applications
9.3 DC/DC Conversion in Transportation Systems
9.4 Bidirectional DC/DC Converters
9.5 Electronics for Powertrain and Power Management
9.6 Energy Storage and Management, including Battery Types, Super Capacitors and Fly Wheels
9.7 DC Circuit Breaker
9.8 Charging Station Technology

10. System Reliability
10.1 Reliability and Health Management of Power Electronic Components and Systems
10.2 Fail-safe and Fault-tolerant Applications
10.3 Redundancy Concepts in Power Electronics
10.4 Life Cycle Design and Cost Analysis

11. Power Quality Solutions
11.1 UPS Systems and Inverters
11.2 Active Power Filter (APF), DVR, SVG
11.3 Energy Storage System (Battery Technologies, Flywheel, Super (ultra) Capacitors)
11.4 Harmonics and Power Factor Correction
11.5 Electromagnetic Compatibility and Immunity

12. Smart Grid Power Electronics
12.1 Grid Inverter Control
12.2 Battery Charging and V2G
12.3 Energy Storage System and Control
12.4 Micro-Grid
12.5 Solid State Transformers
12.6 Medium Voltage Multilevel Converters
12.7 Modular Multilevel Converters
12.8 Novel Converter Topologies
12.9 Wind Energy Systems
12.10 Solar and Photovoltaic Energy Systems
12.11 Communication, Cyber Security and Artificial Intelligence

13. Power Electronics in Transmission Systems
13.1 FACTS
13.2 Converters for Offshore/Onshore HVDC Links
13.3 Power Generation, Transmission and Distribution
13.4 DC Grids
13.5 HVDC Systems
13.6 Digital Twin for Transmission Equipment

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