

pcim
ASIA

电力电子、智能运动、可再生能源
上海国际电力元件、可再生能源管理展览会
International Exhibition and Conference
for Power Electronics, Intelligent Motion,
Renewable Energy and Energy Management

Conference Program

26 – 28 June 2019

Shanghai World Expo Exhibition and Convention Center
Shanghai, China

www.pcimasia-expo.com



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Welcome Address

Dear PCIM Asia participants,

It's a great honor for us to welcome you to the PCIM Asia Conference and Exhibition 2019 in Shanghai.

The PCIM is the leading Power Electronics Conference worldwide for discussing future technologies in this technical discipline and offering a competent forum for introducing the next generation of components and power electronic building blocks in the market. For almost 10 years power electronics industry is having a positive economic development trend. Within the last decade power electronics technology has become the driving forces for many new fields of applications such as all electric transportation systems, future renewable energy technologies and factory automation systems. The PCIM Asia Conference and Exhibition serves as a technical and scientific platform for engineers and researchers engaged in all fields of power electronics starting from power components, power converter technologies, and future SMART control systems.

Technology transfer of next generation products

The technical program of this year's PCIM is covering the latest research results on new power devices, advanced power converters for Industry and Automotive applications. It highlights the next generation of semiconductor devices based on Silicon and Wide Bandgap materials including advanced packaging technologies.

New development trends in power electronics

In the keynote presentations this year we are highlighting development trends for Electric Vehicle Charging and Powertrains for Electrified Vehicles. Distinguished speakers will be discussing Renewable Energy Technologies and Power Electronics Systems in Electric Vehicle in detail during Special Sessions. As a further Highlight this year we implemented 4 Tutorials on future Control Concepts for Multilevel Converters, New Technologies for Inductive Heating Systems and advanced Magnetic Materials.

I am convinced that with this high level technical program and discussion platform, this year's PCIM Asia Conference will provide you with an overview of the key technology development trends in power electronics and inspire you to pursue new business opportunities.

I wish you an enjoyable and successful conference in shanghai.



Advisory Board and Technical Committee PCIM Asia 2019

Chairman



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E



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Meiqin Mao, Hefei University of Technology, CN

Abhijit D. Pathak, International Rectifier, USA

Tianhao Tang, Shanghai Maritime University, CN

Patrick Wang, ON Semiconductor, F

Xuhui Wen, Chinese Academy of Science, CN

James Yin-Chin Wu, Hosonic Electronic Corporation Group, TW, CN

Lie Xu, Tsinghua University, CN

Xing Zhang, Hefei University of Technology, CN

Guoqiang Zhang, Harbin Institute of Technology, CN

PCIM Asia 2019 Award

Winner of Best Paper Award



Title An Integrated Gate Driver Solution for Silicon Carbide Semiconductor Applications

Authors Hao Wang, Power Integrations, China; Karsten Fink, Power Integrations GmbH, Germany



pcim Asia
Best Paper Award
WINNER

Short Biography of Speaker

Hao Wang was born in 1985, received his Master degree in Power Electronic Engineering from Shanghai Maritime University (China). Since 2011 he had the opportunity to make experiences in R&D position designing converter systems for Solar, UPS, and Medium Voltage Drives at Emerson Network Power Company. Since 2016 he is working as an application engineer at the Gate Drivers department of Power Integrations in Shenzhen (China).

Short Description of Presentation

A gate driver solution for Silicon Carbide (SiC) semiconductors based on SIC1182K gate driver IC, a new member of SCALE-iDriver™ family by Power Integrations, is presented in this paper. Due to Advanced Active Clamping and Short-Circuit Detection that are achieved using only one input pin, the proposed SIC1182K solution not only allows full SiC power modules to be safely turned off without experiencing excessive Drain-Source voltages but, also ensures that the semiconductor can be turned off in case of a short-circuit event within the typical shortcircuit time. A application circuit of SIC1182K is presented and has been verified based on two full SiC power modules from different manufactures.

Presentation Time

Session "Advanced Power Semiconductors: WBG & New Devices",
26th June 2019, Wednesday Afternoon,
15:30 hrs. Room1



Award sponsored by:

Changes for the Better

Winner of Young Engineer Award



Title A High-Power Miniaturized Wireless EV Charger with a New SiC- VMOSFET driven Single-Ended Inverter

Authors Yuki Tono, Hideki Omori, Taichi Iwanaga, Osaka Institute of Technology, Japan
Hisato Michikoshi, Kunihiro Sakamoto, National Institute of Advanced Industrial Science and Technology, Japan



pcim Asia
Young Engineer Award
WINNER

Short Biography of Speaker

Yuki Tono is currently a senior student in Osaka Institute of Technology, Japan, and belongs to power electronics laboratory.

He presently studies bidirectional WPT for wireless V2H system, and development of SiC-MOSFET for single-ended converters.

Short Description of Presentation

In this paper, a high- power and high-frequency single-ended wireless EV charger with a newly developed SiC- VMOSFET is described. Power losses of SiC-MOSFET and Si-IGBT under the international standard high-frequency operation are discussed and it is described that SiC-MOSFET is suitable for the high frequency wireless EV charging system. Then, development of a 3kW high-power single-ended wireless EV charger is discussed. Since a high voltage devise of 1700V is necessary for the high-power wireless charger, very high conduction loss of the high voltage MOSFET makes the implementation of the inverter difficult in actual application. Indicated is a newly developed high voltage SiC-VMOSFET (V-groove trench) with very low on resistance to be the solution of the problem. In addition, FWD (Fly Wheel Diode) constructions are comparatively studied and a Body diode type of FWD is indicated to be best in a practical point of view.

Presentation Time

Session " Electrification of Automotive",
27th June 2019, Thursday Morning,
09:30 hrs. Room 2



Award sponsored by:

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Conference Program at a Glance

26th June 2019, Wednesday

MORNING	09:30	Conference Welcome Speech	
	10:00 - 12:00	Room 1 Special Session Electric Vehicle	Room 2 Oral Session Environmental Friendly and Renewable Energy Technologies
	12:00 - 12:40	Room 1 Keynote Electric Vehicles Charging – An Ultrafast Overview	
AFTERNOON	12:40 - 14:00	Poster Gallery Poster session	
	14:00 - 16:00	Room 1 Oral Session Advanced Power Semiconductors: WBG & New Devices	Room 2 Oral Session Power Converters

27th June 2019, Thursday

MORNING	09:30-12:00	Room 1 Oral Session Advanced Power Semiconductors: Silicon IGBTs & Silicon Devices	Room 2 Oral Session Electrification of Automotive
	12:00-12:40	Room 1 Keynote Traction Motors and Power Electronic Drives of Electric Powertrains for Electrified Vehicles	
AFTERNOON	12:40-14:00	Poster Gallery Poster session	
	13:00-16:30	Room 1 Tutorial Topology and Control of 3-level/ multi-level Converters	Room 2 Tutorial Power Converter Technology for Industrial Induction Heating

28th June 2019, Friday

MORNING	09:30-12:30	Room 1 Tutorial Basics of IGBT Modules Application in Power Stack Design	Room 2 Tutorial Advances in Planar Magnetics for High Frequency Switched Mode Power Supply
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PCIM Asia Conference 2019 – Keynotes



Speaker: Prof. Drazen Dujic, Power Electronics Laboratory, EPFL, CH

Electric Vehicles Charging – An Ultrafast Overview

12:00-12:40, 26th June 2019, Wednesday

The keynote will cover the broad topic of electric vehicles charging and provide an overview of the past and present developments as well as future trends in this field. With slowly but steadily increasing numbers of electrical vehicles on the roads, mobility transition is already happening and it requires significant support from various technology and policy makers. While the charging of the battery is not necessarily very technically demanding problem for power electronics specialists, automotive sector has branched out into many directions, creating confusing technological landscape outside. There are varieties of the electrical vehicles charging technologies, standards, requirements, different technological approaches and different charging levels (both in power and time). Technological bottleneck is still a battery technology used on-board of a vehicle impacting the driving range, while various legislative and administrative issues may be observed on the system level related to installation of the charging stations. Charging infrastructure, its cost, availability and performances, is very important factor that will directly impact smoothness of mobility transition and is wider deployment. Various V2X (e.g. Vehicle-to-Grid) concepts are envisioned and technologically demonstrated, but not deployed in reality due to lack of quantifiable incentives, supporting policies or strong business case. There are differences between approaches taken in different parts of the world as well between different automotive makers that further add complexity to the field of electric vehicles charging.

At the level to technology, power electronic converters are essential part of the system, both in AC and DC charging approaches, on-board and off-board chargers, providing regulated power flow and ensuring safe charging without battery degradation. Yet, implementations are different for different charging levels (L1, L2, L3), contact versus contactless (IPT), different speed of charging (slow, fast, ultra-fast), and type of vehicles (car, bus).

Developments in the wide-band gap semiconductor area offer new conversion possibilities with improved performances over state-of-the-art counterparts. The keynote will address these issues and provide an ultra-fast overview while highlighting the role, impact and opportunities for power electronics technologies and community as whole.



Speaker: Dr. William Cai, Jing-Jin Electric (JJE), CN

Traction Motors and Power Electronic Drives of Electric Powertrains for Electrified Vehicles

12:00-12:40, 27th June 2019, Thursday

Traction motor and power electronic drives are called electric machine system, which has decisive impacts on energy consumption for HEV, PHEV and BEV etc. Different electric powertrains and the energy consumption of their corresponding vehicles are compared. The induction motors (IM) and interior permanent magnet (IPM) motors for the application of powertrains are discussed. This presentation is focus on IPM motor design, manufacturing and validation & testing etc. The state of arts and their forward development trends of key components and materials for the PM motors are summarized. Different inverters from a verity of suppliers and OEMs are compared, based on their power density and capacity. The NVH of e-motors and the EMC/EMI of motor system with power electronics inverter are drawing more and more attention of vehicular electrification applications. High efficiency, more compact, low vibration and noise, safety and comfortability as well as the high ratio of performance to cost are compound requirements, which drive the integration of e-motor, power electronics and speed reducer/transmission, i.e., "3-in-1". The comparison is made between "3-in-1" e-powertrain system and separate-component system. The algorithm and software on system performance are also discussed, and some conclusions and useful suggestions are given finally.



Conference

Wednesday, 26 June 2019 Morning Oral Sessions

Room 1

Special Session
Electric Vehicle



Chairperson: **Prof. Yongdong Li**,
Tsinghua University, China



10:00
**Silicon Carbide Goes Mass
Production: the Dawn of a New Era for
Semiconductors in EV**
Laurent Beurenaut, Infineon Technologies AG,
Germany



10:25
**High Speed Electrical Machines for
Vehicle Applications**
Jianxin Shen, College of Electrical Engineering
Zhejiang University, China

10:50 Coffee Break



11:05
**Analysis and Suppression of Common
Mode Voltage for Motor Drive in EV**
Haifeng Lu, Tsinghua University, China



11:30
**Key Technologies of Multi-Port Power
Conversion Systems for the More
Electric Aircraft**
Chunyang Gu, University of Nottingham Ningbo
China, China

Room 2

Environmental Friendly and Renewable
Energy Technologies



Chairperson: **Prof. Meiqin Mao**,
Hefei University of Technology, China



10:00
3-Level NPC Topology in Wind Inverter
Xiangfei Meng, Jun Lian, Zhigang Zeng, Danfoss
Silicon Power, China



10:25
3 level Topologies for Windmill Converter
Fengjie Zhu, Semikron Electronics (Zhuhai)
Co., Ltd, China

10:50 Coffee Break



11:05
**Paralleling of Medium-power IGBT
Modules in Windmill Converter to Reduce
Size and Cost**
Xiaoming Liu, Semikron Electronics (Zhuhai)
Co., Ltd, China
Norbert Pluschke, SEMIKRON (Hong Kong)
Co., Ltd, HKSAR, CN



11:30
**Control Strategy of Parallel Unidirectional
Controlled Rectifiers for Reactive Power
Compensation**
Changgeng Tian, Cong Wang, Hong Cheng,
Zihao Zhao, China University of Mining &
Technology, China

Room 1

12:00-12:40

Keynote
Electric Vehicles Charging – An Ultrafast Overview



Speaker: **Prof. Drazen Dujic**, Power Electronics
Laboratory, EPFL, Switzerland



Chairperson: **Prof. Dr. Enrique J. Dede**, ETSE
University of Valencia, Spain

Conference

Wednesday, 26 June 2019 Afternoon Oral Session

Room 1

Advanced Power Semiconductors:
WBG & New Devices



Chairperson: **Dr. Gourab Majumdar**,
Mitsubishi Electric Corporation, Japan



14:00
A practical example of hard paralleling SiC MOSFET modules
Ziqing Zheng, Minda Zhang, Infineon China, China
Andre Lenze, Krzysztof Mainka, Infineon Germany, Germany
David Levett, Infineon USA, USA



14:25
2nd Generation Trench Gate SiC MOSFETs for All-SiC Module
Jun Li, Fuji Electric (China) Co., Ltd., China
Mikiya Chonabayashi, Keiji Okumura, Yusuke Sekino, Susumu Iwamoto, Masaaki Miyajima, Keishirou Kumada, Takashi Shiigi, Hiroshi Kimura, Yasuhiko Onishi, Makoto Isozaki, Takahito Harada, Soichi Okita, Yasuyuki Kobayashi, Fuji Electric Co., Ltd, Japan



14:50
High Voltage GaN Power HEMTs Reliability
Likun Shen, Ronald Barr, Ken Shono, Peter Smith, Rakesh Lal, Yifeng Wu, Transphorm Inc., USA

15:15 Coffee Break



15:30
An Integrated Gate Driver Solution for Silicon Carbide Semiconductor Applications
Hao Wang, Power Integrations, China
Karsten Fink, Power Integrations GmbH, Germany



15:55
Gate Driver Design Consideration and Optimization for Noninverting Buck-Boost Converters
Wenjing Zhang, Chengjun (Ryan) Zhou, ON Semiconductor, China
Fei Xue, ON Semiconductor, USA

Room 2

Power Converters



Chairperson: **Prof. Min Chen**,
Zhejiang University, China



14:00
Analysis the Reverse Conduction Characteristic and Influence of Anti-parallel SiC SBD of eGaN HEMT
Haihong Qin, Zihe Peng, Ying Zhang, Wenlu Wang, Nanjing University of Aeronautics and Astronautics, China
Qian Xun, Chalmers University of Technology, Sweden



14:25
Crosstalk Mechanism and Suppression Methods for Enhancement-Mode GaN HEMTs in A Phase-Leg Topology
Zihe Peng, Haihong Qin, Jiayan Gong, Ying Zhang, Nanjing University of Aeronautics and Astronautics, China
Qian Xun, Chalmers University of Technology, Sweden



14:50
A Novel 20MHz DC/DC Resonant Converter with Soft-Switching Characteristics and Small Volume
Yueshi Guan, Xihong Hu, Yijie Wang, Wei Wang, Dianguo Xu, Harbin Institute of Technology, China

15:15 Coffee Break



15:30
A Novel Type of Phase-Shift Controlled Wireless V2H with Dual-Active Single-Ended Converters
Aoto Yamamoto, Hideki Omori, Noriyuki Kimura, Toshimitsu Morizane, Osaka Institute of Technology, Japan
Masahito Tsuno, Nichicon Corporation, Japan

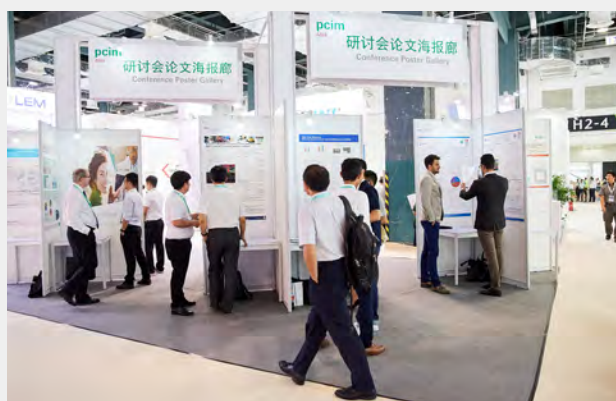
Conference

Wednesday, 26 June 2019, Poster Session
12:40-14:00



Chairperson: **Dr. Yan Zhang**,
Xi'an Jiaotong University, China

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|-------|---|-------|---|
| PP001 | Power Module Application Test System Setup in 3 Levels ANPC Solar Inverter
Elvis Zeng , Qingyang Zhang, Zhiping Hu, ON Semiconductor, China
Richard Whitcomb, Seok Hong, ON Semiconductor, USA
Simon Mei, Solatric New Energy technology Co., Ltd., China
Zhufeng Jin, Zhejiang University, China | PP007 | Rectifier Design for Frequency Converters using Thyristor or Diode Modules in Parallel Connection
Stefan Wettengel , Lars Lindenmüller, Florian Läßig, Steffen Bernet, TU Dresden, Germany
Michael Stelte, Christof Drilling, Matthias Leifeld, Jürgen Schiele, Mario Schenk, Infineon Technologies Bipolar GmbH & Co. KG, Germany |
| PP002 | Using IGBT with antiparallel diode in SOT-223
Bryan Tian , Infineon Technologies, China
Mitja Rebec, Bernd Schmoelzer, Infineon Technologies Austria AG, Austria | PP008 | Research on SiC MOSFET Application in 1MW PV inverter
Bo Hu , Xiankui Ma, Gaosheng Song, Mitsubishi Electric& Electronics (Shanghai) Co., Ltd, China |
| PP003 | pH neutral Cleaning Agents – Market Expectation & Field Performance
Jianguang Ji , ZESTRON China, China
Umut Tosun, Jigar Patel, Kalyan Nukala, Fernando Gazcon, ZESTRON Americas, USA | PP009 | A Prospect of Hybrid Planar Power Module
Tianshu Yuan , Puqi Ning, Han Cao, Xuhui Wen, Institute of Electrical Engineering Chinese Academy of Sciences, China |
| PP004 | Research on Current Balance of MOSFET Multi – tube Parallel Connection
Ming Gao , Tianhao Tang, Shanghai Maritime University, China
Quan Li, Alpha & Omega Semiconductor, China | PP010 | New HVIC circuit topology to improve FTB immunity with 650 V/50 A IGBT IPM for Industrial Applications
Hidetomo Ohashi , Masaharu Yamaji, Masashi Akahane, Hitoshi Sumida, Tadanori Yamada, Yasuyuki Kobayashi, Fuji Electric Co.,Ltd., Japan
Song Chen, Fuji Electric (China) Co.,Ltd., China
Takahide Sato, University of Yamanashi, Japan |
| PP005 | Electromagnetic analysis of Press Pack IEGT with Transient Skin and Proximity Effects
Siyang Dai , Xueguan Song, Guofeng Li, Dalian University of Technology, China
Bing Ji, University of Leicester, UK
Volker Pickert, Newcastle University, UK | PP011 | Introduction of Automotive Smart Power Module series for up to 7.5kW Automotive High Voltage Auxiliary Motor Drive Applications
Kangyoon Lee , Bumseung Jin, Choonbae Park, Thomas Yim, ON Semiconductor, South Korea
Allan Zhou, ON Semiconductor, China |
| PP006 | A 1200V/400A Hybrid Module with Si-IGBT and SiC-MOSFET Development
Han Cao , Puqi Ning, Tianshu Yuan, Xuhui Wen, Institute of Electrical Engineering Chinese Academy of Sciences, China | | |



PCIM Asia 国际研讨会

PCIM Asia Conference



Conference

Thursday, 27 June 2019 Morning Oral Sessions

Room 1

Advanced Power Semiconductors: Silicon IGBTs & Silicon Devices



Chairperson: **Dr. Naoto Fujishima**,
Fuji Electric, Japan



09:30
A New Fast Reverse Recovery Super-Junction MOSFET for high efficiency and reliable EV charging applications
Sungnam Kim, Wonsuk Choi, Dongwook Kim, Dongkook Son, ON Semiconductor, Republic of Korea



09:55
Reliability evaluation of IGCT based on demanding long-term application
Evgeny Tsyplakov, Makan Chen, Thomas Stiasny, Christian Winter, Olivier Quittard, Florian Weber, Jörg Berner, ABB Switzerland Ltd., Switzerland

10:20 Coffee Break



10:35
High power IGBT modules with new compact package
Xiankui Ma, Gaosheng Song, Mitsubishi Electric & Electronics (Shanghai) Co., Ltd, China
Xing Zhang, Hefei University of Technology, China



11:00
Evaluation of the Square-Root-t Method in Junction Temperature Measurement
Haiyang Cao, Delta Power Electronic Center, China
Guang Zeng, Chemnitz University of Technology, Germany



11:25
Enhancement of maximum current rating with 1,700V 7th-Generation "X Series" RC-IGBT Modules for Industrial Applications
Song Chen, Fuji Electric (China) Co., Ltd., China
A. YAMANO, H. ICHIKAWA, T. AJIKI, Y. ONOZAWA, S. TAKAHASHI, M. ISOZAKI, S. OKITA, S. YOSHIWATARI, Y. KOBAYASHI, Fuji Electric Co. Ltd., Japan

Room 2

Electrification of Automotive



Chairperson: **Dr. Puqi Ning**, Institute of Electrical Engineering, Chinese Academy of Sciences, China



09:30
A High-Power Miniaturized Wireless EV Charger with a New SiC-VMOSFET driven Single-Ended Inverter
Yuki Tono, Hideki Omori, Taichi Iwanaga, Osaka Institute of Technology, Japan
Hisato Michikoshi, Kunihiro Sakamoto, National Institute of Advanced Industrial Science and Technology, Japan



09:55
Reliable High-temperature SiC Power Module for Automotive Traction Inverter
Chunlei Liu, Jürgen Schuderer, Niko Pavlicek, Giovanni Salvatore, Jean-Yves Loisy, Arne Schröder, Daniele Torresin, Thomas Gradinger, David Baumann, Fabian Mohn, ABB Corporate Research, Switzerland
Andreas Apelsmeier, AUDI AG, Germany

10:20 Coffee Break



10:35
Light Load Efficiency Optimization for Synchronous Converter in Passenger Vehicle
Mengyu Li, Rui Rong, Infineon Integrated Circuit (Beijing) Co.,Ltd., China



11:00
High Efficiency Cooling Technology for High Power Density Automotive IGBT Module
Kohei Yamauchi, Hiromichi Gohara, Kenshi Kai, Kenichiro Satou, Souichi Yoshida, Eiji Mochizuki, Kazuyoshi Shiohara, Tomoyuki Yamazaki, Fuji Electric Co., Ltd, Japan



11:25
Hardware-in-Loop Real-Time Test Bed for Microgrid Systems with Multi-Level Control
Xun Jiang, Meiqin Mao, Yong Ding, Jian Hu, Hefei University of Technology, China

Room 1

12:00-12:40

Keynote

Traction Motors and Power Electronic Drives of Electric Powertrains for Electrified Vehicles



Speaker: **Dr. William Cai**,
Jing-Jin Electric(JJE), China



Chairperson: **Prof. Yongdong Li**,
Tsinghua University, China

Conference

Thursday, 27 June 2019, Poster Session
12:40-14:00



Chairperson: **Norbert Pluschke**,
Semikron, Hongkong, China

- PP012 **A new, intelligent power module with higher power density and smallest package size**
Sungmo Young, Taejin Lee, Byoungcho Choo, Joonseo Son, Infineon Technologies Korea, South Korea
Zhou Chen, Infineon Technologies Americas, United States
- PP013 **Application introduction of a small IPM for inverter washing machine**
Xiaoling Wang, Mitsubishi Electric & Electronics (Shanghai) Co., Ltd, China
Yongbao Zhang, Qingle Zhu, Nidec Motor (Qingdao) Corporation, China
- PP014 **Increasing discrete IGBTs power density performance by improving thermal design in welding machines**
Liwei Zhou, Infineon Technologies China Co.,Ltd, China
Blaz Klobucar, Jorge Cerezo, Infineon Technologies AG, Austria
- PP015 **Sintered Silver Interconnects for Traction Inverter Assembly**
Gyan Dutt, Jeffrey Durham, Paul Koep, Monnir Boureghda, Oscar Khaselev, Ranjit Pandher, Jeffrey Arouh, Mike Marcz, MacDermid Alpha Electronics Solutions, United States
- PP016 **A Quick PCB Thermal Calculation for Power Electronic Devices with Exposed Pad Packages**
Wenjing Zhang, ON Semiconductor, China
George Feng, ON Semiconductor, USA
- PP017 **Highly Reliable Protection of Power Module for Automotive Inverter Application**
Baoqi Wang, Hongtao He, Mitsubishi Electric & Electronics (Shanghai) Co., Ltd, China
Zihao Song, University of Wisconsin-Madison, USA
- PP018 **Reactive Power Sharing using modified Virtual Impedance and Local load measurement for Islanded Microgrid**
Akhtar Hussain Javed, CYG SUNRI Co., Ltd, China
Xin Meng, Jinjun Liu, Xian Jiaotong University, China
- PP019 **IGBT Failure Analysis in the Praxis**
Dan Zhu, SEMIKRON Electronics (Zhuhai) Co., Ltd, China



Tutorial Thursday Afternoon, 27 June 2019

Room 1

14:00 - 15:30

Topology and control of 3-level/multi-level converters

Prof. Yongdong Li, Tsinghua University, China

Muhammad Attique Qamar, Tsinghua University, Pakistan

About the Instructor



Prof. Yongdong Li's research interests include high voltage power electronic converters and their applications in variable speed drives for energy saving, digital control, sensor-less drives of AC motors and their applications in NC machine-tools, traction drives for high speed train and propulsion drives for ships, renewable energy generation, like wind, solar...etc. He's accomplished several NSF projects and lot of other projects with success. He is author of 3 Monographs, more than 300 papers in national and international conferences and journals, including more than 100 papers indexed by SCI and EI.



Muhammad Attique Qamar was born in Faisalabad, Pakistan, in 1988. He received the B.Sc degree in electronics engineering from COMSATS Institute of Information Technology, Abbottabad, Pakistan, in 2012, and M.Sc degree in control science and engineering from Beijing Institute of Technology, Beijing, China, in 2016. He is currently pursuing the Ph.D. degree in electrical engineering at Tsinghua University, Beijing, China. His research interests include multilevel inverters and pulse width modulation techniques.

Content

Generally speaking, the selection of an appropriate modulation scheme plays a vital role to assure the performance of multilevel inverters. Space vector pulse width modulation (SVPWM) is more efficient among all other pulse width modulation (PWM) techniques due to its key characteristics like better DC voltage utilization, switching losses reduction and easiness in digital implementation. The conventional SVPWM scheme presents some computational complexities due to redundant switching states and large number of space vectors. This tutorial summarizes five different SVPWM techniques for multilevel inverters which are α - β frame, g-h frame, K-L frame, α '- β ' frame and SVPWM based on imaginary coordinate system. g-h frame and K-L frame are based on 60° and 120° coordinates system respectively. To compare the result of these SVPWM schemes, the complex calculations of conventional SVPWM are converted into simplified line voltages form. The comparison results validate all the SVPWM techniques, but the SVPWM based on imaginary coordinate is found more simple in duty ratio calculations, easier to understand and provides a better control for zero-sequence component for any level of inverter.

Multilevel diode-clamped converters with a large number of levels cannot achieve voltage balance for some operating conditions that involve large modulation indices and active load currents when using conventional space vector pulse width modulation (CSVPWM) technique. In order to break the theoretical limits and improve the voltage balancing ability, a virtual vector based pulse width modulation (VVPWM) for a 4L-NPC is proposed in literature. Each virtual vector can be generated by more than one switching state to guarantee that the average neutral-point currents equal zero in every switching period.

By using virtual space vector PWM, a full control of dc-link capacitor voltage balancing is achieved, moreover a novel simplified virtual vector based PWM (SVVPWM) method is proposed. It can be ascertained that the difference of the two neutral-point currents of 4L-NPC converter with proposed technique is zero in a carrier period and the sum of the two neutral-point currents in a fundamental period is also zero, which means proposed virtual vector PWM technique has the natural voltage balance ability for 4L-NPC converters.

Tutorial Thursday Afternoon, 27 June 2019

Room 2

13:00 - 16:30

Power Converter Technology for Industrial Induction Heating

Prof. Dr. Enquire J. Dede, ETSE University of Valencia, Spain

About the Instructor



Prof. Dr. Enquire J. Dede is a Full Professor in Power Electronics (University of Valencia) and Founder and Chairman of the company Smart Induction Converter Technologies S.L. He has more than 30 years' experience in the field of Power Electronics and particularly in the design of high frequency inverters for induction heating and holds several international patents on the subject.

Content

The aim of the Seminar is to highlight the present technology in converter design for induction heating applications from the fundamentals to the state-of-the-art, covering the following subjects:

- 1) The Heating Inductor
- 2) The Heating Resonant Tank
- 3) Basics on Power Switches in Resonant Inverters and its Classification
- 4) Commutation Cells & Parasitic Elements
- 5) Voltage-fed Resonant Inverters
- 6) Current-fed Resonant Inverters



Tutorial

 Friday Morning, 28 June 2019

Room 1

09:30 - 12:30

Basics of IGBT Modules Application in Power Stack Design

Mr. Jun Li, Fuji Electric (China) Co., Ltd., China

Mr. Song Chen, Fuji Electric (China) Co., Ltd., China

About the Instructor



Mr. Jun Li received B.S. degree in mechanical engineering from South China University of Technology, China in 2003. From 2003 to 2009, he engaged in development of switching power supply products in Sumida Electric (China) Co., Ltd. Since 2009, he joined Fuji Electric (China) Co., Ltd as a design engineer of general inverter. His current responsibilities include various power ranges of power semiconductor module for industry, renewable energy and electrical vehicle applications.



Mr. Song Chen Graduated in School of Electronic Information and Electrical Engineering from Shanghai Jiao Tong University in 2008 and started working in Fuji Electric (China) Co., Ltd in 2010. Worked in R&D department for evaluating of inverter during 2010~2011 and for designing of power stack for wind power during 2011~2012. And now works as application engineer for IGBT application design and technical support.

Content

Power electronics are used not only in power-consuming applications, but also in the fields of power generation, transmission and power supply. This tutorial will focus on application of IGBT modules, and present from modules selection to power stack design for medium capacity motor drive systems as an introduction of basic design of power electronic systems. Outline of the tutorial includes Module Selection, Gate Drive Design, Snubber Circuits Design, Loss Calculation, Cooling Design, and Stack Structure. This seminar is of interest to entrance level of power electronic engineers and students.



Tutorial Friday Morning, 28 June 2019

Room 2

09:30 - 12:30

Advances in Planar Magnetics for High Frequency Switched Mode Power Supply

Prof. Ziwei Ouyang, Technical University of Denmark, Denmark

Prof. William Gerard Hurley, Tianjin University of Technology, Ireland

About the Instructor



Prof. Ziwei Ouyang received his PhD degree from Technical University of Denmark (DTU) in 2011. From 2011 to 2013, he was a postdoc researcher at DTU. From 2013 to 2016, he was appointed as an assistant professor at the same department. Since from April 2016, he is an associate professor at DTU. His research areas focus on high-frequency planar magnetics modeling and integration, high-density high-efficiency power converters, PV battery energy storage system, and wireless charging etc.



Prof. William Gerard Hurley received the B.E. degree in Electrical Engineering from the National University of Ireland, Cork in 1974, the M.S. degree in Electrical Engineering from the Massachusetts Institute of Technology, Cambridge MA, in 1976 and the PhD degree at the National University of Ireland, Galway in 1988. He is professor emeritus of Electrical Engineering at the National University of Ireland, Galway. He is a visiting professor at Tianjin University of Technology. His research interests include high frequency magnetics, power quality, and renewable energy systems.

Content

Today, high efficiency and high power density converters are fundamental to the continued profitable growth of the telecommunications, automotive, aerospace and data processing industries. High-frequency operation can lead to a reduction in magnetics size and an increase in power density. The momentum towards high efficiency, high frequency, and high power density in power supplies limits wide use of conventional wire-wound magnetic component structures.

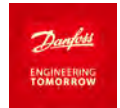
Planar magnetics fabrication and assembly processes have several advantages over conventional magnetics:

- Low profile — planar magnetic components has a lower profile than their wire wound counterparts due to the fabrication process;
- Automation — based on advanced computer aided manufacturing techniques;
- High power densities — planar inductors and transformers are spread out and this gives them a bigger surface-to-volume ratio than conventional components, this enhances the thermal performance;
- Predictable parasitics — with planar magnetics, the windings are precise and consistent, yielding magnetic designs with highly controllable and predictable characteristic parameters.

Planar magnetic components take advantage of microelectronic processing. In general the number of turns in planar device tends to be limited by the manufacturing process. The low profile tends to lead to a larger footprint compared with its conventional counterpart. Planar magnetic components are particularly suited to wireless power transfer because of their low profile. In multilayer devices the interlayer capacitance introduces resonance at high frequencies. This seminar covers the basic analytical model of planar structures based on impedance method, and also includes several design considerations such as high frequency winding resistance, high frequency leakage inductance, winding capacitance and magnetic core loss etc.

Conference Speakers' Company

PCIM Asia has been the leading international meeting point for specialists in the Chinese power electronics market for over ten years, in 2019, we have 53 excellent speakers from China, USA, Germany, UK, Denmark, Spain, Switzerland, Japan and South Korea, which 30 form industry and 23 from academia.



英飞凌



Registration Information

Registration

These are per named delegate as follows:	Fee
3-Day Full Conference Ticket (proceeding inclusive)	3,200 CNY
One Day Ticket (Wednesday, 26 June 2019 Only)	1,200 CNY
Session Ticket (half day, no proceeding inclusive)	800 CNY
Tutorial Ticket (per tutorial)	1,000 CNY

Conference Proceedings

E-Proceedings of PCIM Asia 2019 (USB)	RMB 2,000
E-Proceedings of PCIM Asia 2018 (USB)	RMB 800
E-Proceedings of PCIM Asia 2015-2017 (USB)	RMB 750



Registration Terms

Registration for the PCIM Asia Conference from 26 - 28 June 2019 is binding. Participation fees are due on registration with payment by bank transfer. An invoice covering the fees will be issued by mail.

Once the registration process is complete, you will receive an e-mail booking confirmation including an entry voucher to the Shanghai World Exhibition and Convention Center; please make sure to bring this along. Your conference documents will be issued on site at the conference counter.

Cancellations will be accepted in writing only. Cancellation received by Guangzhou Guangya Messe Frankfurt Co., Ltd. by 23 May 2019 will incur a processing fee of 100 RMB. Thereafter if the participant does not attend, the full fee will be due. If a participant is unable to attend, a substitute may be nominated.

Guangzhou Guangya Messe Frankfurt Co., Ltd. has the right to create videos, photographs, sound recordings, and drawings of the conference for documentation purposes or for publication, on the Internet and for advertising purposes in particular, or have them created. This right also applies to the persons photographed or recorded.

Guangzhou Guangya Messe Frankfurt Co., Ltd. reserves the right to cancel the conference due to poor bookings or other reasons beyond our control. No further claims beyond the reimbursement of participation fees already paid will be accepted. The program or speakers are subject to change and no claims may be made in this respect.

The conference language and presentations are in English.

Visa Application: All foreigners must obtain an entry visa before proceeding to China. It is strongly recommended to process the application latest one month before departure from the country of origin.

Payment of fees entitles you to following services:

→ Conference:

Participation at the conference units as booked, keynotes, poster sessions, special sessions, tutorials, *proceedings on USB flash drive, free admission to the PCIM Asia Exhibition (3 day ticket), exhibition catalogue, break beverages.

* Session ticket (half day) and Tutorial ticket (per tutorial) are not including the proceedings.

Note

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Exhibition

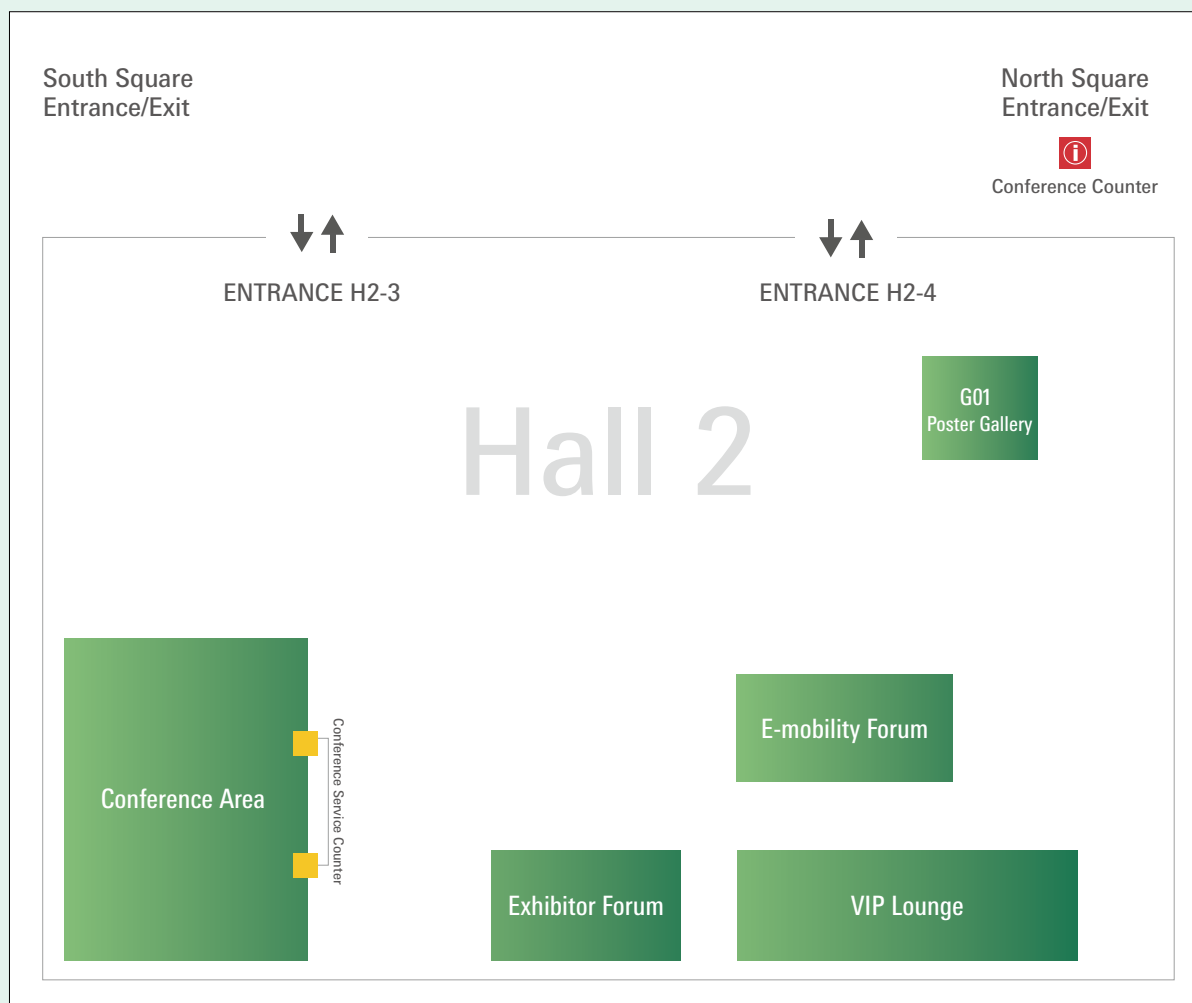
PCIM Asia exhibition is a perfect expert platform which covers the whole range of power electronics and is essential for decision makers from industry and science. As a PCIM Asia visitor you can expect not only the most important companies of the power electronics industry, latest trends and developments of the power electronics industry but also an exciting supporting program.

List of Exhibitors

AkzoNobel (China) Investment Co., Ltd.
 AVX Corporation
 Bonfiglioli Drives (Shanghai) Co., Ltd.
 Beijing Victory Electric Co., Ltd
 Bronze Technologies Ltd.
 CeramTec GmbH
 Chengdu Common Cooling Co., Ltd.
 CRRC Corporation Limited
 Danfoss Silicon Power GmbH
 Delta
 DMAX technology Co., Ltd
 EBG Shenzhen LTD
 Fuji Electric (CHINA) Co., Ltd.
 GaNPower International Inc.
 GMC-Instruments (Tianjin) Co., Ltd.
 GTS Flexible Materials Ltd.
 Guangzhou Nagase Trading Ltd.
 Hangzhou Firststack Technology Co., Ltd.
 Hangzhou Silan Microelectronic Co., Ltd.
 HARTING (Zhuhai) Sales Ltd.
 Hefei Shengda Electronics Technology Industry Co., Ltd.
 Heraeus Materials Technology Shanghai Ltd
 Hitachi Metals (China), Ltd.
 Huizhou BYD Battery Co., Ltd.
 Infineon Technologies China Co., Ltd.
 Isabellenhütte Heusler
 Isahaya Electronics Sales Asia Ltd
 IWATSU TEST INSTRUMENTS CORP.
 ISK International Limited
 Jentech Precision Industrial Co.,Ltd
 KEMET Electronics Corporation
 LEM Electroincs (China) Co., Ltd.
 MacDermid Alpha Electronics Solutions
 Mitsubishi Electric & Electronics (Shanghai) Co., Ltd.
 OMICRON Lab
 Pico Technology
 Power Intergrations Inc.
 Rohde & Schwarz (China) Technology Co., Ltd.
 ROHM Semiconductor (Shanghai) Co., Ltd.
 SABIC IP US LLC
 Sansonic Electronic S&T (Shanghai) Co., Ltd.
 SDI Corporation
 SEMIKRON Electronics (Zhuhai) Co., Ltd.
 Shaanxi Kelvin Measurement & Control Technology Co., Ltd.
 Shanghai Howcore Electrics Co.,Ltd
 Shanghai Eagtop Electronic Technology Co., Ltd.
 Shanghai Linecore Electronic Technology Co., Ltd
 Shenzhen BASiC Semiconductor Ltd.
 Shanghai Maritime University
 Shenzhen Jenkent Electronics Technology Co.,Ltd
 Shenzhen Pourleroi Technology Co., Ltd.
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 SHENZHEN SANRISE TECHNOLOGY CO., LTD
 Shenzhen XETAR Technology Co., Ltd.
 Tektronix
 Topstek Inc.
 Toshiba Electronics (China) Co., Ltd.
 Tsinghua University
 Vacuumschmelze China Magnetics Shenyang Co., Ltd.
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 UTILITY Electrical Co., Ltd
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 Zhejiang Muze Elec Tech Co., Ltd.
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 ZIER Limited
 YOI TECHNOLOGIES (SHANGHAI) CO., LTD.



Room Plan



Shanghai World Expo Exhibition and Convention Center (SWECC)

Address:

No. 1099, Guozhan road,
Pudong New Area, Shanghai 200126, P.R.China

How to get there

By Metro

Exit No. 4, Yaohua Road Station, Metro Line 7 & Line 8

Exit No. 4, China Art Palace Station, Metro Line 8

By Bus

A number of bus lines run through SWECC, fixing stations nearby: 314, 787, 815, 610, 786 etc.

By Taxi

from Pudong Int's Airport: about 50 minutes

from Hongqiao Int'l Airport: about 40 minutes

from downtown (Pu Xi): about 20 minutes

from Shanghai Railway Station: about 20 minutes

Location Information

Dear visitors, please noted that we have separate registration counter for Exhibition and Conference, which are locating at the 1st floor of the fair ground. And the conference meeting room will be at the Exhibition Hall 2. Please be sure that you have already got your conference badge at Conference Counter.

Venue

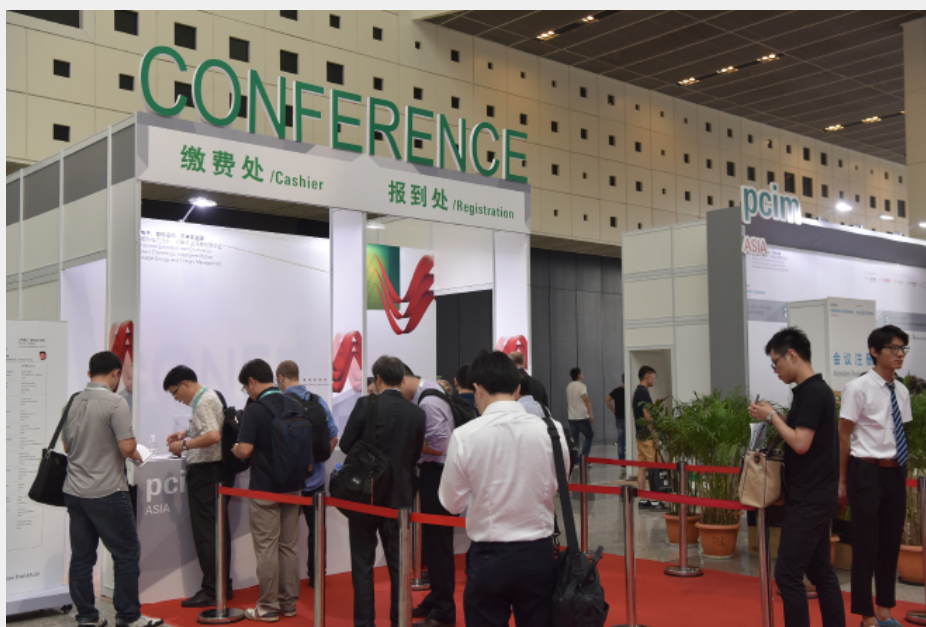
Shanghai World Expo Exhibition and Convention Center
1199 Guozhan Rd, Pudong, Shanghai, China

Conference Registration Counter

1st Floor, entrance of exhibition hall 2

Conference room & Conference Poster Session Gallery

Exhibition Hall 2



General Information

Registration Counter Opening Hours

Wednesday, 26 June 2019	08:15 - 16:30 hrs
Thursday, 27 June 2019	08:30 - 16:30 hrs
Friday, 28 June 2019	08:30 - 13:00 hrs

Questions?

International Contact

Mesago Messe Frankfurt GmbH
 Phone: +49 711 61946-0
 Fax: +49 711 61946-91
 E-mail: info@mesago.com

China Contact

Keys Liang
 Tel: +86 20 3825 1558 Ext.288
 Fax: +86 20 3825 1400
 E-mail: pcim-con@china.messefrankfurt.com

City Information about Shanghai

Shanghai, Hu for short, is a multi-cultural metropolis with both modern and traditional Chinese features. The city has a status equivalent to a province, and reports directly to the central government. Serving as the largest base of Chinese industrial technology, one of the most important seaports and China's largest commercial and financial center, Shanghai draws the attention of the whole world. Shanghai is one of the most populated cities in China. It has a permanent resident population of 23,019,200, of which 12.21 million live in the urban areas.

Due to the deep influences of foreign culture for years, Shanghai may be China's most international city. Tourists coming here can visit the Art and History Museum, learning the ancient Chinese history, and also enjoy the magnificent Chinese architecture from temples and buildings.



The Bund

The bund occupies a large area of Huangpu River. Here is the center of Shanghai overseas business organizations and as well as the symbol of this modern city.



Pudong New Area

Over a decade ago, Pudong New Area was just one side of the Huangpu drain farmland. Pudong Special Economic Zone area is even larger than the old Shanghai. As the Asian Wall Street, Pudong is the economic and business center of Shanghai, and many multinational corporations and international banking headquarters are located here.



Huxinting Teahouse

The Huxinting Teahouse in Shanghai China is an attractive pagoda style building located in Old Shanghai. Built on stilts in the middle of a pond, the teahouse is accessible via a zigzagged bridge designed to keep bad spirits away.

PCIM Asia 2020 Call for Papers

Be part of conference as a presenter

Benefits

- Publish your paper in the proceedings



- Exchange experiences with power electronics experts and expand your knowledge on current and upcoming industry trends.
- Establish new contacts and take advantage of networking opportunities with global leading industry brands.

Chance to Win One of the Awards

The papers for the awards will be selected upon the paper submissions by the Advisory Board, and will be granted at PCIM Asia 2020 Conference. The winners will receive prize money of RMB 8,000 each.



pcim Asia
Best Paper Award



pcim Asia
Young Engineer Award

Important Dates

Submission of abstracts	31 December 2019
Notification of acceptance	March 2020
Submission of full paper	April 2020

Online Submission

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

www.pcimasia-expo.com

Format pdf-file with 2 - 3 pages

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 February 2020.

Conference language

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

PCIM Asia 2020 Call for Papers

Conference Topics

Highlighted Topic in 2020: E-Mobility and Infrastructure

1. Environmental Friendly and Renewable Energy Technologies

- 1.1 Power Electronics Architecture for Clean and Renewable Energy
- 1.2 Wind Power Generators and Converters / Inverters
- 1.3 Solar Power Generators and Converters / Inverters
- 1.4 Energy Harvesting

2. Advanced Power Semiconductors

- 2.1 High Power Semiconductors
- 2.2 MOSFETs, IGBTs, FREDs & Schottkys
- 2.3 Power Modules and Power Hybrids
- 2.4 SiC, GaN and Wide Gap Devices and Their Applications
- 2.5 Advanced Packaging Technologies
- 2.6 Power Supply Control IC and Power Management ICs
- 2.7 Gate Driver and Device Protection
- 2.8 IPM and System Integrated Module

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 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)

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

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

- 9.1 Hybrid / Electric Vehicle
- 9.2 MOSFET and IGBT Modules in Motor Traction Applications
- 9.3 DC / DC Conversion in Automobiles
- 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

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 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

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

13. Power Electronics in Transmission Systems

- 13.1 FACTS
- 13.2 Converters for Offshore / Onshore HVDC Links

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Guangzhou Guangya Messe Frankfurt Co Ltd.
Room A2001, Center Plaza, No.161 Linhe Road
West, Tianhe District, Guangzhou
Phone: +86 20 38251558
Fax: +86 20 38251400
pcimasia@china.messefrankfurt.com
pcim-con@china.messefrankfurt.com

Partner

mesago

Messe Frankfurt Group

Mesago Messe Frankfurt GmbH
Rotebuehlstr. 83-85
70178 Stuttgart
Mesago Messe Frankfurt GmbH
Phone: +49 711 61946-0
Fax: +49 711 61946-91
pcim@mesago.com
pcim-europe.com

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