

Programme

Chairmen's Welcome Message

In the next decades, power electronic system development will be driven by energy saving systems, intelligent energy management, power quality, system miniaturization and high reliability. Monolithic and hybrid system integration will include advanced device concepts including wide bandgap devices, new packaging technologies and the overall integration of actuators/drives (mechatronic integration).

CIPS is consequently focused on the following main aspects:

- **assembly and interconnect technology for power electronic devices and converters**
- **integration of hybrid systems and mechatronic systems with high power density**
- **systems' and components' operational behavior and reliability**

Basic technologies for integrated power electronic systems as well as upcoming new important applications will be presented in interdisciplinary invited papers.

In 2018 the successful story of CIPS will continue as the conference focus is today more important than ever – increasing functionality, energy efficiency and system reliability while decreasing cost.

We invite all engineers coming from industry and academia engaged in power electronics-related

- system development
- component development
- reliability engineering
- research

to share their research and technical achievements joining CIPS 2018.

General Chairs

Leo Lorenz

ECPE e.V.

Thomas Harder

ECPE e.V.



Leo Lorenz



Thomas Harder

Technical Chairs

Andreas Lindemann

Otto-von-Guericke-University Magdeburg

Nando Kaminski

University of Bremen



Andreas Lindemann



Nando Kaminski

Chairs

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Technical Chairs

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Organised by

VDE

Association for Electrical, Electronic & Information Technologies

VDE is one of the largest technical and scientific associations in Europe with more than 36 000 members.

www.vde.com/en/

ECPE

European Center for Power Electronics e.V.

The industry-driven research network for power electronics in Europe with more than 170 member organisations is promoting research, education, training and public relations in power electronics.

www.ecpe.org

Co-sponsored by

IEEE PELS

Power Electronics Society

The IEEE Power Electronics Society (PELS) helps in the development and effective application of power electronics technology. Activities within PELS include conferences and workshops to provide a forum for the latest advances in power electronics research. PELS also publishes the Transactions on Power Electronics and further publications for the welfare of its members.

www.ieee-pels.org

ZVEI

the German Electrical and Electronic Manufacturers' Association

www.zvei.org/en/

www.cips-conference.de

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Wolfgang Wondrak, Daimler AG, Germany
Dehong Xu, Zhejiang University, P.R. China
Peter Zacharias, Universität Kassel, Germany
Stefan Zudrell-Koch, BRUSA Elektronik AG, Switzerland

Topic Chairs

Components to be integrated & Mechatronic systems and their applications

Jan Vobecký, ABB, Switzerland

Regine Mallwitz, Technische Universität Braunschweig, Germany

Reliability

Norbert Seliger, FH Rosenheim, Germany

Eckhard Wolfgang, ECPE e.V., Germany

General aspects of packaging & Power packages and modules

Guo-Quan Lu, Virginia Techm, USA

Jürgen Wilde, Albert-Ludwigs-Universität Freiburg, Germany

Clean switching, electromagnetic compatibility (EMC)

Reinhold Bayerer, Infineon Technologies AG, Germany

Jean-Luc Schanen, Grenoble Electrical Engineering Laboratory, France

Organizing Committee

Hatice Altintas, VDE Conference Services, Germany

Ingrid Bollens, ECPE e.V., Germany

Thomas Harder, ECPE e.V., Germany

Andreas Lindemann, Otto-von-Guericke-University Magdeburg, Germany

Nando Kaminski, University of Bremen, Germany

Thomas Raphael, VDE ETG, Germany

General Informations

Registration hours on-site

The registration on-site desk will be in the lobby of the Maritim Hotel Stuttgart.

Tuesday, March 20, 2018 08:00 h to 19:00 h

Wednesday, March 21, 2018 07:30 h to 18:00 h

Thursday, March 22, 2018 07:30 h to 15:00 h

Social Programme

- The Dialogue Session and Get Together will take place on Tuesday, March 20, 2018 at 19:00 h in the Exhibition hall and lobby of the Maritim Hotel.
- The conference dinner will take place on Wednesday, March 21, 2018 at 19:30 h in the Kursaal Cannstatt. Departure by bus at 19:15 h. The meeting point for departure will be in the hotel lobby.
www.kursaal-cannstatt.de

The attendance to these events is included in the full conference fee. Additional tickets for accompanying persons may be ordered upon availability at the registration desk.

The recommended dress for all social events is business casual.

Awards

During the Closing Ceremony on March 22, 2018, the Best Poster Award, ECPE Young Engineer Award for the Best Paper as well as the Semikron Innovation & Young Engineer Award will be granted.

Insurance

The organisers may not be held responsible for any injury to participants or damage, theft and loss of personal belongings. Participants should therefore make their own insurance arrangements.

Venue

Maritim Hotel Stuttgart

Seidenstraße 34

70174 Stuttgart – Germany

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Contact

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Stuttgart is a city where people from over 170 nations live together. A city with many parks and green areas, a great cultural life, iconic city districts with a bustling club scene, vineyards in the heart of the city, mineral baths for relaxation and much more – in short: the city is all about a high quality of life. Stuttgart is modern, urban, cosmopolitan, sustainable and sometimes also a little edgy. Discover more at www.stuttgart.de/en.



TUESDAY, MARCH 20

10:00–10:20 ROOM: REITHALLE

10:00 Introduction

Chairs: Leo Lorenz (ECPE e.V., Germany), Nando Kaminski (University of Bremen, Germany), Andreas Lindemann (University of Magdeburg, Germany)

10:20–12:00 ROOM: REITHALLE

Session 1: Clean Switching, Electromagnetic Compatibility (EMC)

Chairs: Andreas Lindemann (University of Magdeburg, Germany), Régis Meuret (Safran Electrical & Power, France)

Keynote

10:20 **Integration Solutions for Clean and Safe Switching of High Speed Devices**
Jean-Luc Schanen (Grenoble Electrical Engineering Laboratory, France); Pierre-Olivier Jeannin (Grenoble Université, France)

Invited Paper

11:00 **Review of Parasitic Minimization Techniques for High Frequency Power Conversion**
David Reusch (Efficient Power Conversion (EPC), USA)

Invited Paper

11:30 **A Fully-Isolated Robust Common-Mode Hybrid Filter**
Stefan Mollov (Mitsubishi Electric R&D Centre Europe, France); Luc Rambaud (MERCÉ, France)

12:00–13:20 Lunch Break + Exhibition

13:20–15:00 ROOM: REITHALLE

Session 2: EMC, Components to be Integrated

Chairs: Leo Lorenz (ECPE e.V., Germany), David Reusch (Efficient Power Conversion (EPC), USA)

Keynote

13:20 **Electromagnetic Noise Induced by Novel High Voltage fast Switching Device**
Tsuyoshi Funaki (Osaka University, Japan)

Invited Paper

14:00 **Future Requirements for PE – Silicon Versus GaN Versus SiC Based Power Devices , Comparison of Key Parameters with Respect to use in Power Electronics**
Gerald Deboy (Infineon Technologies Austria AG, Austria)

Invited Paper

14:30 **Frequency Optimum of Semiconductor Technologies and State-of-the-Art Magnetic Components in SMPS**
Tobias Reimann (Technical University of Ilmenau, Germany)

15:00–15:30 Tea Break + Exhibition

15:30–17:00 ROOM: REITHALLE

Session 3: Reliability (1)

Chairs: Uwe Scheuermann (Semikron Elektronik GmbH & Co. KG, Germany), Katsuaki Sukanuma (Osaka University, Japan)

Invited Paper

15:30 **Test Strategy in Industrial Product Development**
Lars Rimestad (Grundfos A/S, Denmark)

Invited Paper

16:00 **Automotive Qualification Routines for Power Electronics Components in Electrified Power-trains**
Martin Rittner (Robert Bosch GmbH, Germany); Markus Thoben (Infineon Technologies AG, Germany); Kai Kriegel (Siemens AG, Germany)

Invited Paper

16:30 **Condition and Health Monitoring in Power Electronics**
Stefan Mollov (Mitsubishi Electric R&D Centre Europe, France); Frede Blaabjerg (Aalborg University, Denmark)

17:00–17:20 Tea Break

17:20–18:30

ROOM: REITHALLE

Session 4: Reliability (2)

Chairs: Lars Rimestad (Grundfos AVS, Denmark), Eckhard Wolfgang (ECPE e.V., Germany)

Invited Paper

- 17:20 **Analytics for Power Electronic Components – Methods to Figure out Root Causes of Failures**
Sandy Klengel, Bianca Boettge, Matthias Petzold (Fraunhofer Institute for Microstructure of Materials and Systems IMWS, Germany)

Keynote

- 17:50 **Limitation of Power Module Lifetime Derived from Active Power Cycling Tests**
Uwe Scheuermann, Marion Junghänel (Semikron Elektronik GmbH & Co. KG, Germany)

19:00–22:00

Get Together + Dialogue Session

Award Chair: Regine Mallwitz, (TU Braunschweig, Germany)

P1: COMPONENTS TO BE INTEGRATED

- P1.1 Optimizing integrated common and differential mode chokes with the PermeabilityLink method**
Jörn Schliewe, Matthias Koeppen, August Gauss, Detlef Lange, Stefan Weber (EPCOS AG, Germany)
- P1.2 Thermistor Die for Power Module Applications**
Sophie Schuurman, Erik Mattens, Bruno Van Beneden (Vishay Resistors Belgium, Belgium); Emilio Mattiuzzo, Marcello Turnaturi (Vishay Semiconductor Italiana, Italy)
- P1.3 Benchmarks of the gate driver supplies' architectures for the power devices in series connection**
Van Sang Nguyen (Grenoble Institute of Technology & G2ELab, France); Pierre Lefranc (University of Grenoble Alpes, France); Jean-Christophe Crebier (Grenoble Université, France)
- P1.4 SMPS electromagnetic noise in System-on-Chip: Resonant frequency and amplitude dependencies**
Eric Feltrin (Ecole Centrale de Lyon & STMicroelectronics, France); David Chesneau (STMicroelectronics, France); Christian Vollaire (Ampere Lab, France); Bruno Allard (INSA Lyon, France)

- P1.5 C-V Characterization Technique for Four-Terminal GaN-on-Si HEMTs Based on 3-Port S-Parameter Measurements**

Cristino Salcines (University of Stuttgart, Germany); Stefan Moench (Institute of Robust Power Semiconductor Systems, University of Stuttgart, Germany); Ingmar Kallfass (University of Stuttgart, Germany); Boris Spudic (Institute of Robust Power Semiconductor Systems (ILH), University of Stuttgart, Germany)

- P1.6 Ferrite embedding for Power SiPs – a packaging view**

Tina Thomas (Technical University of Berlin, Germany); Stefan Hoffmann, Karl-Friedrich Becker, Hans Walter, Volker Bader, Tanja Braun (Fraunhofer IZM, Germany); Eckart Hoene (Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration IZM, Germany); Martin Schneider-Ramelow (Fraunhofer IZM & TU Berlin, Germany)

- P1.7 Power Loss Analysis of 60 V Trench Field-Plate MOSFETs utilizing Structure Based Capacitance Model for Automotive Application**

Kenya Kobayashi, Masaki Sudo, Ichiro Omura (Kyushu Institute of Technology, Japan)

P2: GENERAL ASPECTS OF PACKAGING

- P2.1 A SiC MOSFET Power Module with Integrated Gate Drive for 2.5 MHz Class E Resonant Converters**
Asger Jørgensen (Aalborg University, Denmark); Unnikrishnan Nair (Universitat Politecnica de Catalunya, Spain); Stig Munk-Nielsen, Christian Uhrenfeldt (Aalborg University, Denmark)
- P2.2 Pressure Less Sintering of Large dies by Infrared Radiation**
Wolfgang Schmitt (Heraeus Materials Technology GmbH & Co. KG, Germany); Ly May Chew (Heraeus Deutschland GmbH & Co. KG, Germany); Robert Miller (Hochschule Aschaffenburg, University of Applied Sciences, Germany)
- P2.3 Simulation of the Thermal Transient Behaviour of Silicon Carbide Modules Using Liquid Convection Cooling**
Ulf Müter (Helmut Schmidt University, Germany); Jens Radvan (Philips Medical Systems, Germany); Stefan Richter (Philips Medical Systems, United Kingdom); Klaus Hoffmann (Helmut-Schmidt-University, Germany)

P2.4 Vias in DBC Substrates for Embedded Power Modules

Hoang Linh Bach, Zechun Yu, Sebastian Letz, Christoph Friedrich Bayer, Uwe Waltrich, Andreas Schletz, Martin März (Fraunhofer Institute for Integrated Systems and Device Technology IISB, Germany)

P2.5 Fabrication of PCB Embedded 1200V/50A Power Module and Benchmarking with Commercial DBC Based Package

Ankit Bhushan Sharma, Johann Schnur, Niko Haag, Thomas Kuwan, Armin Stogel and Till Huesgen (Hochschule Kempten – University of Applied Science, Germany)

P2.6 Influence of Dielectric Constant on Partial Discharge Inception Voltage of Ceramic Insulating Substrate under High Temperature

Tsuyoshi Abe, Michiya Suenaga, Akihiro Imakiire, Masahiro Kozako, Masayuki Hikita (Kyusyu Institute of Technology, Japan); Takashi Nishimura, Hiroki Shiota, Hiroataka Muto (Mitsubishi Electric Corporation, Japan)

P2.7 Electrochemical Corrosion on Ceramic Substrates for Power Electronics – Causes, Phenomenological Description, and Outlook

Christoph Friedrich Bayer, Antonia Diepgen, Thomas Filippi, Carmen Fuchs, Sophie Wüstefeld, Simon Kellner, Uwe Waltrich, Andreas Schletz (Fraunhofer Institute for Integrated Systems and Device Technology IISB, Germany)

P2.8 On the Reliability of Stacked Metallized Ceramic Substrates under Thermal Cycling

Bassem Mouawad, Jianfeng Li, Alberto Castellazzi, C Mark Johnson (University of Nottingham, United Kingdom)

P2.9 Thermal Characteristic Evaluation and Transient Thermal Analysis of Next-generation SiC Power Module at 250 °C

Akihiro Imakiire, Masahiro Kozako, Masayuki Hikita (Kyusyu Institute of Technology, Japan); Kohei Tatsumi, Masakazu Inagaki, Tomonori Iizuka (Waseda University, Japan); Hiroaki Narimatsu, Nobuaki Sato, Koji Shimizu, Kazutoshi Ueda (Mitsui High-tec Inc., Japan); Kazuhiko Sugiura, Kazuhiro Tsuruta, Makio Iida (DENSO Corporation, Japan); Keiji Toda (TOYOTA MOTOR Corporation, Japan)

P2.10 Die-Bonding Performance of Micron Ag Particle Paste for High Power Devices

Tetsu Takemasa (Osaka University, Japan); Minoru Ueshima, Jiu Jinting, Junko Seino (Senju Metal Industry Co., Ltd., Japan); Katsuaki Suganuma (Osaka University, Japan)

P2.11 Integrated LED Driver based on 800V Si L-IGBTs

Attahir Murtala Aliyu (University of Nottingham, United Kingdom); Alwyn Elliott (Imperial College, United Kingdom); Vasantha Pathirana, Nishad Udugampola (University of Cambridge, United Kingdom); Pushparajah Rajaguru (University of Greenwich, United Kingdom); Alberto Castellazzi (University of Nottingham & Power Electronics, Machines and Control Group, United Kingdom); Paul Mitcheson (Imperial College London, United Kingdom); Tanya Trajkovic (Camutronics, United Kingdom); Florin Udrea (University Of Cambridge, United Kingdom); Christopher Bailey (University of Greenwich, United Kingdom)

P2.12 Novel PD Location Algorithm for Next Generation Power Module using Small Loop Sensors

Jyunya Maki, Yuya Akinaga, Masahiro Kozako, Masayuki Hikita (Kyusyu Institute of Technology, Japan); Yoko Nakamura, Yoshinari Ikeda, Katsumi Taniguchi, Kenji Okamoto (Fuji Electric Co., Ltd, Japan)

P3: POWER PACKAGES AND MODULES**P3.1 Surge Current Capability of IGBTs Used in Low Voltage DC/AC Hybrid Circuit Breaker**

Kenan Askan, Michael Bartonek (Eaton Industries GmbH, Austria); Klaus Sobe (Infineon Technologies Austria AG, Austria)

P3.2 Direct Copper Bonding (DCB) Alumina Substrates with Pre-Applied Solder Pads for Simplified Die Soldering and Improved Manufacturing Yield

Hans-Jürgen Richter, Pan Liu, Michael Schaefer (Heraeus Electronics, Germany); Dieter Watzal (Heraeus Deutschland, Germany); Sebastian Fritzsche (Heraeus Materials Technology GmbH & Co. KG, Germany); Christophe Féry (Heraeus Electronics, Germany); Aarief Syed-Khaja (Heraeus Deutschland GmbH & Co. KG & Heraeus Electronics, Germany)

P3.3 A High Efficiency and Power Density, High Step-Up, Non-isolated DC-DC Converter Based on Multicell Approach

André Andreta (Université Grenoble Alpes, France); Yves Lembeye (Grenoble Electrical Engineering Laboratory, France); Lyubomir Kerachev (Université Grenoble Alpes, France); Farshid Sarrafin (University of Grenoble Alpes & G2Elab, France); Luiz Fernando Villa (Universite de Toulouse, France); Jean Christophe Crebier (Université Grenoble Alpes, France)

P3.4 Comparison of Thermal and Reliability Performance Between a SiC MOSFET Module with Embedded Decoupling Capacitors and Commercial Si IGBT Power Modules

Li Yang, Pearl A Agyakwa, Martin Corfield, C Mark Johnson (University of Nottingham, United Kingdom); Anne Harris, Matthew Packwood (Dynex Semiconductor Ltd, United Kingdom); Krzysztof Paciura (Cummins Inc, United Kingdom)

P3.5 Reliability Design of Dual Sided Cooled Power Semiconductor Module for Hybrid and Electric Vehicles

Yangang Wang, Yun Li (Dynex Semiconductor, United Kingdom); Xiaoping Dai, Yibo Wu, Guoyou Liu (CRRC, P.R. China)

P3.6 A High Performance 1200V/120A SiC Power Module Based On a Novel Multi-DBC's Hybrid Packaging Structure

Yuxiong Li, Cai Chen, Zhizhao Huang, Lichuan Chen (Huazhong University of Science and Technology, P.R. China); Kaifeng Zou (Naval Aeronautical Engineering University Qingdao Branch, P.R. China); Yong Kang (Huazhong University of Science and Technology, P.R. China); Fang Luo (University of Arkansas, P.R. China); Sichao Li (Huazhong University of Science and Technology, P.R. China)

P3.7 A Novel Double Sided Cooled Leadframe Power Module for Automotive Application based on ceramic-free Substrates

Bao Ngoc An (Karlsruhe Institute of Technology (KIT), Germany); Johannes Kolb (SHARE at KIT, Germany); Thomas Blank, Benjamin Leyrer, Marc Weber, Dorit Nötzel, Thomas Hanemann, Horst Demattio, Peter Kästner, Michael Meisser, Torsten Scherer, Matthias Mail (Karlsruhe Institute of Technology (KIT), Germany)

P3.8 How Asymmetric Busbar Design Causes Symmetric Switching Behavior of Paralleled IGBT Modules

Matthias Wissen (Infineon Technologies AG, Germany); Daniel Domes (Infineon Technologies AG, Germany); Waleri Brekel, Koray Yilmaz (Infineon Technologies AG, Germany)

P3.9 Effects of Different Working Frequencies on the Joint Formation in Copper Wire Bonding

Reinhard Schemmel, Simon Althoff (University of Paderborn, Germany); Michael Brökelmann, Andreas Unger, Matthias Hunstig (Hesse GmbH, Germany); Walter Sextro (University of Paderborn, Germany)

P5: RELIABILITY

P5.1 Vibrational Resistance Investigation of an IGBT Gate Driver Utilizing Frequency Response Analysis and highly accelerated Life Test (HALT)

Thomas Schriefer (University of Erlangen-Nuremberg & Chair of Electron Devices, Germany); Maximilian Hofmann, Martin März (Fraunhofer Institute for Integrated Systems and Device Technology IISB, Germany)

P5.2 FEM Based Enhancement of System Lifetime by Improvement of the Die Top Connection of Power Electronic Semiconductors

Andreas Klein (Heraeus Deutschland GmbH & Co. KG, Germany); Martin Becker (Danfoss Silicon Power GmbH, Germany); Anton Miric, Benjamin Fabian, Andreas Hinrich, Marko Kalajica (Heraeus Deutschland GmbH & Co. KG, Germany); Wolfgang Schmitt (Heraeus Materials Technology GmbH & Co. KG, Germany)

P5.3 In-situ Condition Monitoring System to Study the Ageing of Power Semi-Conductor Devices in Photovoltaic Inverters

Mouhannad Dbeiss (CEA-INES, France); Yvan Avenas (Grenoble Université, France); Henri Zara (CEA-INES, France); Laurent Dupont (IFSTTAR, France)

P5.4 Investigations on the Evolution of Dynamic Ron of GaN Power Transistors During Switching Cycles

Malika Elharizi, Richard Lallemand, Zoubir Khatir, Jean-Pierre Ousten (IFSTTAR, France)

P5.5 An Investigation of Frequency Response Analysis Method for Junction Temperature Estimation of SiCs Power Device

Xiang Lu, Cuili Chen (Newcastle University, United Kingdom); Maher Al-Greer (Teesside University, United Kingdom); Volker Pickert, Charalampos C. Tsimenidis (Newcastle University, United Kingdom)

P5.6 Lifetime Testing Method for Ceramic Capacitors for Power Electronics Applications

Fabian Dresel, Nils Tham, Tobias Erlbacher, Andreas Schletz (Fraunhofer Institute for Integrated Systems and Device Technology IISB, Germany)

P5.7 Analysis of Transient Thermal-Mechanical Stresses in Power Devices Using Test Chips and Optical Techniques

Markus Feisst, Eike Möller, Jürgen Wilde (University of Freiburg – IMTEK, Germany)

P5.8 Solder Layer Degradation Measurement for SiC-MOSFET Modules under Accelerated Power Cycling Conditions

Haoze Luo, Francesco Iannuzzo, Frede Blaabjerg (Aalborg University, Denmark)

P5.9 A Correlative Approach to Observing the Thermo-mechanically Driven Microstructural Evolution of Ultrasonically Bonded Copper Wires

Bassem Mouawad, Pearl A Agyakwa, Martin Corfield, C Mark Johnson (University of Nottingham, United Kingdom)

P5.10 Novel Specimen Design to Test Engineering Plastics for Power Electronic Applications

Bianca Boettge, Rico Bernhardt, Sandy Klengel (Fraunhofer Institute for Microstructure of Materials and Systems IMWS); Sebastian Wels, Albert Claudi (University of Kassel, Germany)

P6: CLEAN SWITCHING, ELECTROMAGNETIC COMPATIBILITY (EMC)

P6.1 A mitigation Solution for Bifurcations in a Low-Power 4-Switch Buck-Boost Converter (4SBB)

Amokrane Malou (University of Lyon & ON Semiconductor, France); Bruno Allard, Xuefang Lin-Shi, Alaa Hijazi (INSA Lyon, France); Berengere Le Men (ON Semiconductor, France)

P6.2 Identifying the Stray Elements of the Experimental Setup Used in the Semiconductor Datasheets

Mylene Delhommiais, Jean-Luc Schanen, Yvan Avenas, Frédéric Wurtz (Université Grenoble Alpes, France); Cecile Rigaud, Sylvain Chardon (Tronico, France)

P6.3 A Novel Gate Driving Approach to Balance the Transient Current of Parallel-Connected GaN-HEMTs

Jonathan Hackel, Michael Ebli, Martin Pfost (TU Dortmund, Germany)

P6.4 Impedance Analysis in a Co-Planar Power Bus Interconnect Prototype for Low Inductance Switching

Xi Lin, Jianfeng Li, C Mark Johnson (University of Nottingham, United Kingdom)

WEDNESDAY, MARCH 21

08:30 – 10:10

ROOM: REITHALLE

Session 5: General Aspects of Packaging (1/2)

Chairs: Shiori Idaka (Mitsubishi Electric Europe B. V., Germany), Jürgen H. Wilde (University of Freiburg – IMTEK, Germany)

08:30 Thermo-Mechanical Stress and Deformation Behaviour of Joined Semiconductor Devices Using Different die Attach Technologies

Falk Naumann, Bianca Boettge, Georg Lorenz, Michael Bernasch (Fraunhofer Institute for Microstructure of Materials and Systems IMWS, Germany); Christina Ebensperger, Stefan Oehling (SEMIKRON Elektronik GmbH & Co. KG, Germany)

08:50 Silver Sinter Paste Optimized for Pressure Sintering Under Air Atmosphere on Precious and Non-Precious Metal Surfaces with High Reliable Sintered Joints

Ly May Chew (Heraeus Deutschland GmbH & Co. KG, Germany); Wolfgang Schmitt (Heraeus Materials Technology GmbH & Co. KG, Germany); Jens Nachreiner, Stefan Gunst (Heraeus Deutschland GmbH & Co. KG, Germany)

09:10 Improvement of Power Module System Solders by Directional Solidification

Aaron Hutzler, Christoph Oetzel, Emil Friker (PINK GmbH Thermosysteme, Germany)

09:30 Power Chip Interconnections Based on TLP, Sintering and CTE-Matched Conductors

Markus Feisst, Philip Schaetzle, Jürgen Wilde (University of Freiburg – IMTEK, Germany)

09:50 Additive Manufacturing of 3D-Copper-Metallizations on alumina by means of Selective Laser Melting for Power Electronic Applications

Thomas Stoll (Friedrich-Alexander-Universität Erlangen-Nürnberg & Lehrstuhl für Fertigungsautomatisierung und Produktionssystematik (FAPS), Germany)

08:30–10:10 ROOM: KÖLN/BONN/HAMBURG

Session 6: Mechatronic Systems and Their Applications

Chairs: Regine Mallwitz (Technische Universität Braunschweig, Germany), Tsuyoshi Funaki (Osaka University, Japan)

- 08:30 **Parasitic Extraction Procedures for SiC Power Modules**
Ivana Kovacevic-Badstuebner, Roger Stark (Advanced Power Semiconductor Laboratory, ETH Zurich, Switzerland); Mattia Guacci (Power Electronic Systems Laboratory, ETH Zurich, Switzerland); Johann. W. Kolar (ETH Zurich, Switzerland); Ulrike Grossner (Advanced Power Semiconductor Laboratory, ETH Zurich, Switzerland)
- 08:50 **Applying Magnetoresistive Current Sensors in Difficult Operating Environments**
Rolf Slatter, Matthias Brusius, Claudia Glenske (Sensitec GmbH, Germany)
- 09:10 **Comparison of the Surge Current Ruggedness between the Body Diode of SiC MOSFETs and Si Diodes for IGBT**
Patrick Hofstetter, Mark Bakran (University of Bayreuth, Germany)
- 09:30 **Integration Concept for a Traction Inverter with 3D-Printed Embedded Cooling Technology realizing Highest Power Density**
Jasper Schnack, Ulf Schumann, Dominik Hilper, Ronald Eisele (Fachhochschule Kiel, Germany); Thomas Ebel (FTCAP GmbH, Germany); Frank Osterwald, Holger Beer (Danfoss Silicon Power GmbH, Germany)
- 09:50 **Grid-Connected Three-Phase H-Bridge Inverter with Level Doubling Network Controlled by Staircase Modulation Techniques**
Milan Srndovic, Aleksandr Viatkin, Gabriele Grandi (University of Bologna, Italy)

10:10–10:40 Tea Break + Exhibition

10:40–12:20

ROOM: REITHALLE

Session 7: General Aspects of Packaging (2/2)

Chairs: Sandy Klengel (Fraunhofer Institute for Microstructure of Materials and System, Germany), Stefan Mollov (Mitsubishi Electric R&D Centre Europe, France)

- 10:40 **Full SiC Integrated Power Converter Module with Replaceable Building Blocks**
Attahir Murtala Aliyu (University of Nottingham, United Kingdom); Alberto Castellazzi (University of Nottingham & Power Electronics, Machines and Control Group, United Kingdom); Philippe Lasserre (Primes Association, France); Nicola Delmonte, Paolo Cova (University of Parma, Italy)
- 11:00 **Making Thermal Grease Obsolete: Fully Isolated Discrete Power Package with High Thermal and Electrical Performance**
Thomas Basler, Christian Kasztelan, Daniel Pedone, Edward Fürgut, Matthias Schmidt (Infineon Technologies AG, Germany)
- 11:20 **Transfer Molding for Power Semiconductor Modules**
Jürgen Schuderer, Viktor Lindström, Chunlei Liu, Fabian Mohn (ABB Corporate Research, Switzerland)
- 11:40 **Thermal and Thermo-Mechanical Design of an Integrated Substrate and Heat Sink for Planar Power Module**
Jianfeng Li, Xi Lin, Jingru Dai, Bassem Mouawad, C Mark Johnson (University of Nottingham, United Kingdom)
- 12:00 **Design and Fabrication of PCB Embedded Power Module with Integrated Heat Exchanger for Dielectric Coolant**
Johann Schnur, Ankit Bhushan Sharma, Niko Haag, Thomas Kuwan, Armin Stogel, Till Huesgen (Hochschule Kempten – University of Applied Science, Germany)

10:40–12:20 ROOM: KÖLN/BONN/HAMBURG

Session 8: Condition Monitoring

Chairs: Nicolas Degrenne (Mitsubishi Electric R&D Centre Europe, France), Andreja Rojko (ECPE e.V., Germany)

- 10:40 **Signal Sweeping Technique to Decouple the Influence of Junction Temperature and Bond Wire Lift-off in Condition Monitoring for Multi-chip IGBT Modules**
Cuili Chen, Volker Pickert (Newcastle University, United Kingdom); Maher Al-Greer (Teesside University, United Kingdom); Charalampos C. Tsimenidis, Thillainathan Logenthiran, Xiang Lu (Newcastle University, United Kingdom); Ng Chong, Chunjiang Jia (ORE Catapult, United Kingdom)
- 11:00 **Real-time Condition Monitoring of IGBT Modules in PV Inverter Systems**
Uimin Choi, Frede Blaabjerg (Aalborg University, Denmark)
- 11:20 **Investigation of the Usage of a Chip Integrated Sensor to Determine Junction Temperature During Power Cycling Tests**
Carsten Kempiak, Andreas Lindemann (Otto-von-Guericke-Universität Magdeburg); Eckhard Thal, Shiori Idaka (Mitsubishi Electric Europe B. V., Germany)
- 11:40 **On-line Virtual Junction Temperature Measurement via DC Gate Current Injection**
Julio Brandelero, Jeffrey Ewanchuk, Stefan Mollov (Mitsubishi Electric R&D Centre Europe, France)
- 12:00 **Current Filament Monitoring under Unclamped Inductive Switching Conditions on real IGBT Interconnection**
Masanori Tsukuda (Green Electronics Research Institute, Kitakyushu, Japan); Takaaki Arimoto, Ichiro Omura (Kyushu Institute of Technology, Japan)

12:20–13:50 Lunch Break + Exhibition

13:50–15:30 ROOM: REITHALLE

Session 9: Components to be Integrated (1/2)

Chairs: Andreas Schletz (Fraunhofer Institute for Integrated Systems and Device Technology IISB, Germany), Jan Vobecký (ABB, Switzerland)

- 13:50 **Direct Pressed Die (DPD) Technology – a Novel Packaging Solution for Power Modules**
Christian Goebel (Semikron Elektronik GmbH, Germany)

- 14:10 **PCB-Embedding for GaN-on-Si Power Devices and ICs**

Richard Reiner, Beatrix Weiss, Dirk Meder, Patrick Waltereit (Fraunhofer IAF, Germany); Christian Vockenberger (AT&S Austria Technologie & Systemtechnik, Austria); Thomas Gerrer, Rüdiger Quay (Fraunhofer IAF, Germany); Oliver Ambacher (Fraunhofer IAF & IMTEK, University Freiburg, Germany)

- 14:30 **The M-Shunt Structure Applied to Printed Circuit Boards**

Christian Bödeker, Melanie Adelmund, Nando Kaminski (University of Bremen, Germany)

- 14:50 **An Investigation of the Parasitic Impedance on the DC-Link Capacitor of EV Drive Inverters**

Stefan Piepenbreier (Fraunhofer Institute for Integrated Systems and Device Technology IISB, Germany); Albert Käß (Chair of Electrical Engineering, University of Erlangen-Nuremberg, Germany); Martin März (Fraunhofer Institute for Integrated Systems and Device Technology IISB, Germany)

- 15:10 **Volumetric Evaluation of Passive Components in Multilevel Three-Phase Active Front-End AC-DC Converters**

Friedrich Schultheiß (BMW Group, Germany); Martin März (Fraunhofer Institute for Integrated Systems and Device Technology IISB, Germany)

13:50–15:30 ROOM: KÖLN/BONN/HAMBURG

Session 10: Degradation of Interconnects

Chairs: Martin Rittner (Robert Bosch GmbH, Germany), Norbert Seliger (FH Rosenheim, Germany)

- 13:50 **On-time Dependency on the Power Cycling Capability of Al Bond Wires Measured by Shear Test**

Nan Jiang (Chemnitz University of Technology, Germany); Marko Kalajica (Heraeus Deutschland GmbH & Co. KG, Germany); Josef Lutz (Chemnitz University of Technology, Germany)

- 14:10 **Power Cycling Reliability of Time-Reduced Sintering for Attaching SiC Diodes Using Nanosilver Film**

Jingru Dai, Jianfeng Li, Pearl Agyakwa, Christopher Johnson (University of Nottingham, United Kingdom)

- 14:30 **Experimentally-Validated Models of On-State Voltage for Remaining Useful Life Estimation and Design for Reliability of Power Modules**
Nicolas Degrenne, Stefan Mollov (Mitsubishi Electric R&D Centre Europe, France)
- 14:50 **Interpretation of Power Cycling Data derived from Transient Cooling Curves**
Martin Bayer, Samuel Hartmann, Marianne Berg, Robert Moody, Gontran Paques (ABB Switzerland Ltd., Switzerland)
- 15:10 **Trends in SiC MOSFET Threshold Voltage and ON-Resistance Measurements from Thermal Cycling and Electrical Switching Stresses**
Joseph Kozak (Virginia Tech, USA); Douglas DeVoto, Joshua Major (National Renewable Energy Laboratory, USA); Khai D.T. Ngo (Virginia Tech, USA)

15:30–16:00 **Tea Break + Exhibition**

16:00–16:20 **ROOM: REITHALLE**

Session 11: Components to be Integrated (2/2)

Chairs: C Mark Johnson (University of Nottingham, United Kingdom), Gerald Deboy (Infineon Technologies Austria AG, Austria)

- 16:00 **Double Chips Low Side – High Side Configurable Full Gate Driver Circuits for a High Speed Inverter Leg**
Van Sang Nguyen (Grenoble Institute of Technology & G2ELab, France); Pierre Lefranc (University of Grenoble Alpes, France); Jean-Christophe Crebier (Grenoble Université, France)

16:20–17:20 **ROOM: REITHALLE**

Session 11: Power Packages and Modules (1/2)

Chairs: C Mark Johnson (University of Nottingham, United Kingdom), Gerald Deboy (Infineon Technologies Austria AG, Austria)

- 16:20 **Fabrication and Characterization of a High-Power-Density, Planar 10 kV SiC MOSFET Power Module**
Christina DiMarino (Virginia Tech & Center for Power Electronics Systems (CPES), USA); Christopher Johnson, Bassem Mouawad, Jianfeng Li, Robert Skuriat (University of Nottingham, United Kingdom); Meiyu Wang, Yansong Tan (Tianjin University, P.R. China); Guo-Quan Lu (Virginia Tech & NBE Technologies, LLC, USA); Dushan Boroyevich, Rolando Burgos (Virginia Tech, USA)

- 16:40 **A 3.3 kV SiC MOSFET Half-Bridge Power Module**
Bassem Mouawad, Abdallah Hussein (University of Nottingham, United Kingdom); Alberto Castellazzi (University of Nottingham & Power Electronics, Machines and Control Group, United Kingdom)
- 17:00 **Towards Wafer Level 3D Power Integration**
Dominique Bergogne (CEA Leti University of Grenoble, France); Jean Charbonnier, Venceslass Rat (CEA Leti, France)

16:00–17:20 **ROOM: KÖLN/BONN/HAMBURG**

Session 12: EMI (Clean Switching, Electromagnetic Compatibility (1/2))

Chairs: Eckart Hoene (Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration IZM, Germany), Jean-Luc Schanen (Grenoble Electrical Engineering Laboratory, France)

- 16:00 **Characterization of Ferrite Core Properties for FM-Band Filtering in Automotive Applications**
Sven Bönisch (Brandenburg University of Technology, Germany); Stefan Hoffmann, Eckart Hoene (Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration IZM, Germany); Michael Schmidhuber (Sumida Components GmbH, Germany)
- 16:20 **Suppression of Electromagnetic Interference using Multi-Stage Inte-grated Filtering with Screening and Partitioning**
Zhe Zhang (University of Nottingham & Power Electronics, Machines and Control Group, United Kingdom); C Mark Johnson (University of Nottingham, United Kingdom)
- 16:40 **Improving 9-150 kHz EMI Performance of Single-Phase PFC Rectifier**
Pooya Davari (Aalborg University, Denmark); Eckart Hoene (Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration IZM, Germany); Firuz Zare (University of Queensland, Australia); Frede Blaabjerg (Aalborg University, Denmark)
- 17:00 **Advantages of Gallium Nitride over Silicon Transistors in Soft-Switched Resonant Switched Capacitor Converters**
Diego Serrano, Víctor Toral, Miroslav Vasic, Pedro Alou, Jesus Oliver, Jose A. Cobos (Universidad Politécnica de Madrid (UPM), Spain)

17:20–17:40 **Tea Break**

17:40–19:00

ROOM: REITHALLE

Session 13: Power Packages and Modules (2/2)

Chairs: Guo-Quan Lu (Virginia Tech & NBE Technologies, LLC, USA), Josef Lutz (Chemnitz University of Technology, Germany)

- 17:40 **A Transfer-Molded High Temperature SiC Power Module Withstanding up to 250 °C**
Kazuhiro Mitamura (Advanced Industrial Science And Technology (AIST) & Renesas Electronics Corporation, Japan); Yui Ozaki (Sumitomo Bakelite Co., Ltd., Japan); Yoshinori Murakami (National Institute of Advanced Industrial Science and Technology, Japan); Hiroki Takahashi (FUJI ELECTRIC CO., LTD., Japan); Hidekazu Tanisawa, Kenichi Kouji, Fumiki Kato, Shinji Sato, Hiroshi Yamaguchi, Hiroshi Sato (National Institute of Advanced Industrial Science and Technology, Japan)
- 18:00 **High Reliable Power Modules by Pressureless Sintering**
Uwe Waltrich, Christoph Friedrich Bayer, Stephanie Zötl, Sigrid Zischler, Adam Tokarski, Andreas Schletz, Martin März (Fraunhofer Institute for Integrated Systems and Device Technology IISB, Germany)
- 18:20 **Pressureless Silver Nanopowder Sintered Bonds for Liquid Cooled IGBT Power Modules**
Namjee Kim, Rophina Li (University of Toronto, Canada); Meinrad Machler, John Brugers, Sooky Winkler (Dana, Canada); Wai Tung Ng (University of Toronto, Canada)
- 18:40 **Low Temperature Silver Sinterprocesses on (EN)EPEAg Surfaces for High Temperature SiC Power Modules**
Thomas Blank, Bao Ngoc An, Benjamin Leyrer, Michael Bruns, Michael Meisser, Torsten Scherer, Dai Isikawa, Jessica Helber, Helge Wurst, Marc Weber (Karlsruhe Institute of Technology (KIT), Germany)

17:40–19:00

ROOM: KÖLN/BONN/HAMBURG

Session 14: Clean Switching, Electromagnetic Compatibility (2/2)

Chairs: Reinhold Bayerer (Infineon Technologies AG, Germany), Martin März (Fraunhofer Institute for Integrated Systems and Device Technology IISB, Germany)

- 17:40 **Design of a Low Inductive Switching Cell Dedicated to SiC Based CSI Converter**
Guillaume Lefèvre (CEA – INES, France)
- 18:00 **Novel SiC Module Design – Optimised for Low Switching Losses, Efficient Cooling Path and Low Inductance**
Thomas Huber, Alexander Kleimaier (University of Applied Sciences Landshut, Germany)
- 18:20 **Switching Characteristics of Low Inductance SiC Module with Integrated Capacitors for Aircraft Applications**
Bernardo Cougo, Hans Sathler, Raphael Riva (IRT Saint-Exupery, France)
- 18:40 **Benefits of New CoolSiC™ MOSFET in Hybrid-PACK™ Drive package for Electrical Drive Train Applications**
Waldemar Jakobi, Andre Uhlemann, Christian Schweikert, Christian Strenger, Ajay Poonjal Pai, Laurent Beurenaut, Markus Thoben, Mark Niels Münzer (Infineon Technologies AG, Germany)

19:30–22:00

Conference Dinner
Kursaal Cannstadt

THURSDAY, MARCH 22

08:30–10:10

ROOM: REITHALLE

Session 15: Mechatronic Systems and Their Applications

Chairs: Sibylle Dieckerhoff (TU Berlin, Germany), Klaus Hoffmann (Helmut-Schmidt-Universität, Germany)

Keynote

08:30 **Google Little Box Reloaded**

Johann. W. Kolar (ETH Zurich, Switzerland)

Invited Paper

09:10 **Little Box Winner Team**

Paul Bleus (CET Power, Belgium)

Invited Paper

09:40 **Power Conversion needs for High Tech Systems**

Korneel Wijnands (Eindhoven University of Technology, The Netherlands)

10:10–10:40

Tea Break + Exhibition

10:40–12:20

ROOM: REITHALLE

Session 16: Packaging

Chairs: Cyril Buttay (Supergrid Institute, France), Francesco Iannuzzo (Aalborg University, Denmark)

Keynote

10:40 **Advanced Joining by Metal-powder Sintering: the Science, Practice, and Recent Development**

Guo-Quan Lu (Virginia Tech & NBE Technologies, LLC, USA); Meiyu Wang, Yun-Hui Mei, Xin Li (Tianjin University, P.R. China)

Invited Paper

11:20 **10 kV SiC Power Module Packaging**

C Mark Johnson (University of Nottingham, United Kingdom); Christina DiMarino (Virginia Tech & Center for Power Electronics Systems (CPES), USA); Bassem Mouawad, Jianfeng Li, Robert Skuriat (University of Nottingham, United Kingdom); Meiyu Wang, Yansong Tan (Tianjin University, P.R. China); Guo-Quan Lu (Virginia Tech & NBE Technologies, LLC, USA); Dushan Boroyevich, Rolando Burgos (Virginia Tech, USA)

Invited Paper

11:50 **Power Electronic Integration and Packaging for Aeronautic Application in Harsh Environment**

Régis Meuret, Donatien Martineau, Toni Youssef (Safran Electrical & Power, France); Christian Martin, Ousseynou Yade (Université de Lyon Laboratoire Ampere CNRS, France)

12:20–13:40

Lunch Break + Exhibition

13:40–14:20

ROOM: REITHALLE

Session 17: EU Projects

Chairs: Thomas Harder (ECPE e.V., Germany), Nando Kaminski (University of Bremen, Germany)

13:40 **Innovative Reliable Nitride based Power Devices and Applications The EU Public Funded Project 'InRel-NPower'**

Martin Rittner, Ulrich Kessler (Robert Bosch GmbH, Germany); Joerg Naundorf, Kai Kriegel, Martin Schulz (Siemens AG, Germany); Gaudenzio Meneghesso (University of Padova, Italy)

Invited Paper

14:00 **Silicon Carbide PowerTechnology for Energy Efficient Devices (SPEED) – Objectives and Main Results**

Peter Friedrichs (Infineon Technologies AG, Germany)

14:20–14:30

ROOM: REITHALLE

Closing Remarks

Chairs: Thomas Harder (ECPE e.V., Germany), Nando Kaminski (University of Bremen, Germany), Andreas Lindemann (University of Magdeburg, Germany), Leo Lorenz (ECPE e.V., Germany), Eckhard Wolfgang (ECPE e.V., Germany)

14:30–14:45

ROOM: REITHALLE

Ceremony: ECPE Young Engineer Award, CIPS Best Poster Award

Chairs: Jochen Koszescha (ECPE e.V., Germany), Regine Mallwitz (Technische Universität Braunschweig, Germany)

14:45–15:15

ROOM: REITHALLE

Ceremony: Semikron Innovation and Young Engineer Award

Chair: Leo Lorenz (ECPE e.V., Germany)

Exhibitors' List

We are pleased to welcome the following exhibitors:

Bs&T Frankfurt am Main GmbH BOOTH 8

Bs&T is specialist for measuring technique of soft magnetic materials under high excitation (sinusoidal and pulse), for non linear behavior of hysteresis loop for material development, inductive component design. BsT-x BH Analyzer concept is compliant to IEC62044-3, BsT-Pro is capable of measuring non linear soft magnetic properties under high excitation under biased condition. BsT-pulse based on Thyristor Technology, driving power magnetic components bipolar in saturation, the demagnetization provides essential information as loss. BsT-SQ is designed for AC loss of inductor under repetitive pulse condition.



www.powerlosstester.de

DOWA HD Europe GmbH BOOTH 5

The DOWA group was founded in 1884 in Akita/Japan.



By harnessing in technologies and operational experiences in mining and smelting, we today operates unique businesses that range extensively from production of metals to materials for electronic devices.

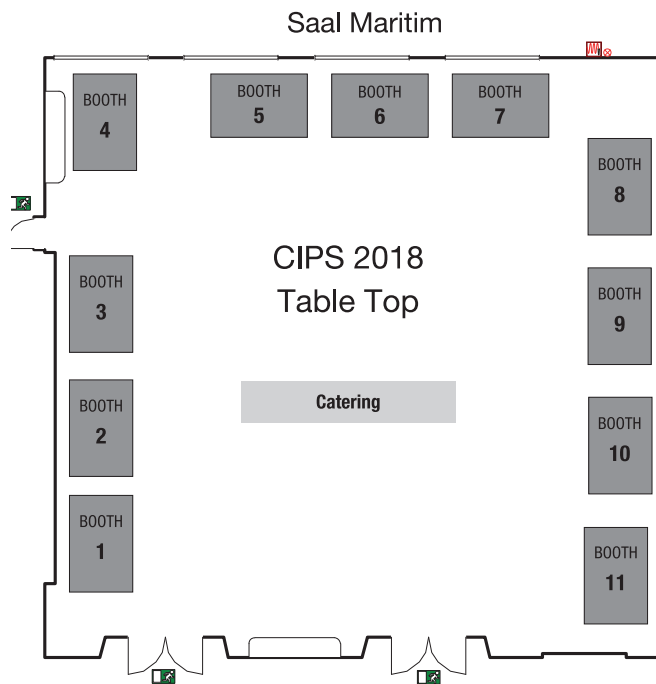
For power electronics applications we, DOWA, have developed and manufacture high-performance metal-ceramics substrates as well as baseplate materials for over 20 years.

For inventors of industrial machinery, for highspeed railway, for solar and wind power, we are producing AMB substrates with superior heat dissipation and high voltage endurance.

For automotive applications which require superb heat cycles endurance under severer conditions, ALMIC (DAB substrates) and Integrated Substrates, developed our own MCB process, have been selected.

In additions, we are producing Cu baseplate materials which are an effective combination of high thermal conductivity, high softening resistance and high tensile strength for the usage as heatsink bases, head spreaders, high current terminals, bus bars, lead frames.

www.dowa.co.jp



ECPE – The Industrial and Research Network for Power Electronics in Europe BOOTH 3

The industry-driven research network for power electronics in Europe with more than 170 member organisations is promoting research, education, training and public relations in power electronics.



www.ecpe.org

Fraunhofer IISB BOOTH 7

The research field is packaging of power electronics. The drivers are performance, volume and weight per cost depending on the application. The goal is reached by investigations of different concepts of the electrical, mechanical and thermal design such as single and double sided die attach, single and double sided cooling, materials with minimized or matched coefficient of thermal expansion (CTE). By use of intelligent setups and application relevant measures of the electrical and thermal interconnections the bill of material is minimized.



Work is done on joining technologies as well. There is a long experience in silver sintering as an alternative to the state of the art. Meanwhile a process is established to manufacture multichip power modules with high yield. Especially a selective sintering process brings big pace to electronic packaging, especially on printed circuit board. The chips sizes meet the power electronics requirements. While the sintering improvements are ongoing the soldering technology is still covered for new high performance or high temperature materials.

www.iisb.fraunhofer.de

Fraunhofer IZM**BOOTH 2**

As part of the Fraunhofer-Gesellschaft, Fraunhofer IZM specializes in applied and industrial contract research. Fraunhofer IZM's focus is on packaging technology and the integration of multifunctional electronics into systems.



The four Fraunhofer IZM departments promote internationally cutting-edge technology development. The departments jointly work on application areas and key development topics, ensuring the research is advanced across technologies. In key development topics, the Fraunhofer IZM researchers monitor and develop highly promising research questions, paving the way for future projects with industry.

Here, Fraunhofer IZM benefits from its close cooperation with the Technischen Universität Berlin and other scientific institutes. Fraunhofer IZM has cooperated on highly productive preliminary research with the TU Berlin since its establishment, and the close relationship between the institute and university is best illustrated by the current practice of appointing a joint IZM institute head and TU university professorship.

Therefore the Fraunhofer IZM has a great expertise in research into power electronic systems. At the CIPS 2018 we are looking forward to present our concepts for solutions of embedded power electronics as well as examples for manufacturing and analyzing ultra-sonic bond connections. A model of the mechanical stress within a bond wire will depict how simulation can help increasing the reliability of power electronic modules.

www.izm.fraunhofer.de

Heraeus Deutschland GmbH & Co. KG**BOOTH 4**

Heraeus Electronics – a Global Business Unit of the Heraeus Group – is one of the leading manufacturer



of materials for the assembly and packaging of devices in the electronics industry. The company deals with sophisticated materials solutions for consumer electronics and computing, automotive, LED, industrial – power electronics as well as communications.

Core competences include bonding wires, assembly materials, thick film pastes as well as roll clad strips and substrates

www.heraeus-electronics.com

ISP System**BOOTH 6**

ISP System is a leading manufacturer of fully automated high precision mechatronics systems and manufacturing equipments.



The offering includes laser selective soldering machine, adhesive die bonder, and together with our partners we have developed an innovative sintering process allowing high thermal conductivity assembly for power packaging.

www.isp-system.fr

Plexim GmbH**BOOTH 1**

PLECS, the Simulation Platform for Power Electronic Systems



www.plexim.com

Tektronix**BOOTH 11**

Headquartered in Beaverton, Oregon, Tektronix delivers innovative, precise and easy-to-operate test, measurement and monitoring solutions that solve problems, unlock insights and drive discovery. Tektronix has been at the forefront of the digital age for over 70 years. Join us on the journey of innovation at TEK.COM.

**ISE MAGNETICS****BOOTH 10**

ISE MAGNETICS™ is a manufacturer and design house of inductive components; having production and (sales) offices in western and eastern Europe, we also subcontract production in Asia which we strictly prescribe, control and inspect.



The ISE staff consists of 50 people. ISE's headquarters is located in the renowned Dutch High Tech area Brainport in the Netherlands.

ISE Magnetics presents on the CIPS 2018 the latest development in planar transformers and inductors for switch mode power supply applications.

www.isemagnetics.com

Mentor, a Siemens Business**BOOTH 9**

The Mechanical Analysis Division of Mentor, a Siemens business, provides 1D thermo-fluid & 3D CAD-embedded general-purpose CFD software, electronics cooling software, electromagnetic and motor design software, electronics thermal characterization hardware, and active power cycling equipment for failure-in-progress diagnosis for power electronics components including diodes, IGBTs, and MOSFETs.



Mentor's solutions help customers in a wide range of industries worldwide to eliminate mistakes, reduce costs and accelerate their engineering design and development processes. Engineers use our solutions to optimize designs involving heat transfer, fluid flow and electromagnetic effects before physical prototypes are built, as well as thermally characterize and test electronic components and systems.

www.mentor.com/mechanical

CIPS 2018 Programme Overview

REITHALLE

KÖLN / BONN / HAMBURG

TUESDAY, MARCH 20

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12:00–13:20	Lunch Break + Exhibition	
13:20–15:00	Session 2: EMC, Components to be Integrated	p.4
15:00–15:30	Tea Break + Exhibition	
15:30–17:00	Session 3: Reliability (1)	p.4
17:00–17:20	Tea Break	
17:20–18:30	Session 4: Reliability (2)	p.5
19:00–22:00	Get Together + Dialogue Session, P1: Components to be integrated, P2: General aspects of packaging, P3: Power packages and modules, P5: Reliability, P6: Clean switching, electromagnetic compatibility (EMC)	

WEDNESDAY, MARCH 21

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10:10–10:40	Tea Break + Exhibition			
10:40–12:20	Session 7: General Aspects of Packaging (2/2)	p.9	Session 8: Condition Monitoring	p.10
12:20–13:50	Lunch Break + Exhibition			
13:50–15:30	Session 9: Components to be Integrated (1/2)	p.10	Session 10: Degradation of Interconnects	p.10
15:30–16:00	Tea Break + Exhibition			
16:00–16:20	Session 11: Components to be Integrated (2/2)	p.11	Session 12: EMI (Clean Switching, Electromagnetic Compatibility (1/2))	p.11
16:20–17:20	Session 11: Power Packages and Modules (1/2)	p.11		
17:20–17:40	Tea Break			
17:40–19:00	Session 13: Power Packages and Modules (2/2)	p.12	Session 14: Clean Switching, Electromagnetic Compatibility (2/2)	p.12
19:30–22:00	Conference Dinner (Kursaal Cannstadt)			

THURSDAY, MARCH 22

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10:40–12:20	Session 16: Packaging	p.13
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14:20–14:30	Closing Remarks	
14:30–14:45	Ceremony: ECPE Young Engineer Award, CIPS Best Poster Award	
14:45–15:15	Ceremony: Semikron Innovation and Young Engineer Award	