Program

Picture: Sarah Rugen + (center module) Semikron

CIPS 2022

12th International Conference on Integrated Power Electronics Systems

March, 15 – 17, 2022,
Berlin, Germany and Online

The given times in the program schedule are according to the German Local Time (CET)

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VDE ETG

Welcome to CIPS 2022 – 12th International Conference on Integrated Power Electronics Systems

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 2022 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.

For those of you who cannot attend the conference in Berlin, we will provide a **live streaming** as well.

We are looking forward to welcoming you in Berlin or online!

Thomas Harder,
ECPE e.V.

Leo Lorenz,
ECPE e.V.

General Chairmen

Nando Kaminski,
University of Bremen

Andreas Lindemann,
Otto-von-Guericke University Magdeburg

Technical Program Chairmen

Committee

General Chairmen

Thomas Harder, ECPE e.V.
Leo Lorenz, ECPE e.V.

Technical Program Chairmen

Nando Kaminski, University of Bremen
Andreas Lindemann, Otto-von-Guericke-University Magdeburg

Honorary Chairs

Johann Walter Kolar, ETH Zentrum
Dieter Silber, University of Bremen
Eckhard Wolfgang, ECPE e.V.

Topic Chairs

Components to be integrated & Mechatronic systems and their applications
Regine Mallwitz, Technical University of Braunschweig, DE
Cyril Buttay, Université de Lyon, FR

General aspects of packaging & Power packages and modules
Guo-Quan Lu, Virginia Tech, USA
Jürgen Wilde, University of Freiburg, DE

Reliability
Norbert Seliger, Rosenheim Technical University of Applied Sciences, DE
Eckhard Wolfgang, ECPE e.V., DE

Clean switching, electromagnetic compatibility (EMC)
Reinhold Bayerer, DE
Jean-Luc Schanen, Grenoble Electrical Engineering Laboratory, FR

Award Chairs

CIPS Best Poster Award

Regine Mallwitz, Technical University of Braunschweig

ECPE Young Engineer Award

Chris R. Gould, ECPE e.V.

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Bruno Allard, INSA Lyon, FR
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Frede Blaabjerg, Aalborg University, DK
Giovanni Breglio, University Naples, IT
Giovanni Busatto, University of Cassino, IT
Cyril Buttay, Université de Lyon, FR
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Hans-Peter Feustel, Conti Temic Microelectronic GmbH, DE
Peter Friedrichs, Infineon, DE
Michael Frisch, Vincotech GmbH, DE
Chris Gould, ECPE European Center for Power Electronics e. V, DE
Thomas Harder, ECPE e.V., DE
Marcel Hendrix, Signify, NL
Magnar Hernes, SINTEF Energy Research, NO
Eckart Hoene, Fraunhofer IZM, DE
Bing Ji, University of Leicester, GB
Nando Kaminski, University of Bremen, DE
Holger Kapels, Fraunhofer Institute for Silicon Technology, DE
Ralph Kennel, Technical University of Munich, DE
Zoubir Khatir, Gustave Eiffel University, FR
Johann. W. Kolar, ETH Zurich, CH
Kai Kriegel, Siemens AG, DE
Andreas Lindemann, University of Magdeburg, DE
Leo Lorenz, ECPE, DE
Guo-Quan Lu, Virginia Tech, US
Fang Luo, University of Arkansas, US
Josef Lutz, Chemnitz University of Technology, DE
Regine Mallwitz, Technische Universität Braunschweig, DE
Martin März, FhG Erlangen, DE
Phil Mawby, University of Warwick, GB
Patrick McCluskey, University of Maryland, US
Herve Morel, Université de Lyon, FR
Jean Michel Morelle, VALEO, FR
Mark Niels Münzer, Infineon Technology, DE
Khai Ngo, Virginia Tech, US
Mihai Nica, AVL List GmbH, AT
Ichiro Omura, Kyushu Institute of Technology, JP
Frank Osterwald, Danfoss Silicon Power GmbH, DE
Martin Pfost, TU Dortmund, DE
Volker Pickert, Newcastle University, GB
Robert Plikat, Volkswagen AG, DE
Volker Rischmüller, Robert Bosch GmbH, DE
Martin Rittner, Robert Bosch GmbH, DE
Jean-Luc Schanen, Grenoble Electrical Engineering Laboratory, FR
Uwe Scheuermann, Semikron Elektronik GmbH & Co. KG, DE
Oliver Schilling, Infineon AG, DE
Andreas Schlögl, Infineon, DE
Ralf Schmidt, Siemens AG, DE
Roland Schmidt, Siemens AG, DE
Martin Schneider-Ramelow, Fraunhofer IZM, DE
Jürgen Schuderer, Hitachi ABB Power Grids Research, CH
Hans-Joachim Schulze, Infineon Technologies AG, DE
Norbert Seliger, Technische Hochschule Rosenheim, DE
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Association for Electrical, Electronic & Information Technologies

VDE is one of the largest technical and scientific associations in Europe with more than 32.000 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 190 member organisations is promoting research, education, training and public relations in power electronics.

www.ecpe.org

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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/

General Informations

Currently in Berlin

To get access to the conference the 3G regulation (vaccinated, recovered or tested) and wearing a FFP2 mask is mandatory during the whole conference.

Exception: The mask may be removed when consuming food and drinks in the catering area.

Senate's Measures Ordinance:
https://www.berlin.de/corona/en/measures/directive/

Corona test center directly in the hotel ground floor:
https://corona-test-mitte.de/moa.html

Registration hours on-site

The registration on-site desk will be in the lobby of the Mercure Hotel MOA Berlin.

Tuesday, March 15, 2022	08:00 h to 19:00 h
Wednesday, March 16, 2022	07:30 h to 18:00 h
Thursday, March 17, 2022	07:30 h to 15:00 h

Contact

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Conference Venue

Mercure Hotel MOA Berlin

Stephanstrasse 41
10559 Berlin

Tel. +49 30 3940430
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www.hotel-moa-berlin.de

Distances

- Main railway station: 2.5 km
- Motorway: 2.5 km
- Airport BER: 39 km

- Airport Berlin-Schönefeld: 26 km
- From airport Berlin BER: approx. 45 min. (BER>RE Ostkreuz/Gesundbrunnen)
- From main station: approx. 55 min. (BER>RE/RB/S, Zoologischer Garten, U9 Birkenstraße)

Public transport

From main station

There are several possibilities:

1. From Berlin main station take bus 123 towards Saatwinkler Damm/Mäckeritzwiesen to Stendaler Straße. From there it is about 500 m to the hotel.
   or
2. Take bus 245 towards S+U Bahn Zoologischer Garten to Turmstraße. From Turmstraße take the U9 towards Osloer Straße to Birkenstraße.
   From there it is about 240 m to the hotel.

You need a ticket from 3,00 € single price.
Please validate the ticket.

From Berlin Airport BER

There are several possibilities:

1. From the BER take the FEX towards the main station to the S+U Bahn Gesundbrunnen. From S+U Gesundbrunnen take the S42 to S+U Bahn Westhafen.
   From there it is about 500 m to the hotel.
   or
2. Take the S9 towards S Spandau to S+U Zoologscher Garten. From S+U Zoologscher Garten take the U9 towards Osloer Straße to Birkenstraße.
   From there it is about 240 m to the hotel.

You need a ticket ABC 3,80 € single price.
Please validate the ticket.

Car

In "Mercure Hotel MOA Berlin" there is a parking space with a capacity of 550 places.

Access via Birkenstraße 21, 10559 Berlin.

Online participation

This is a hybrid conference where the lecture sessions will be live streamed and the posters will be presented online as well for attendees who participate via the hopin conference system. This also allows to interact with the presenters, e. g. to ask questions. To access the system please refer to the mail with the credentials which has been sent to you.

Social Program

- The Get Together will take place on Tuesday, March 15, 2022, starting 18:30 h in the Atrium (the Exhibition Hall).
- The conference dinner will take place on Wednesday, March 16, 2022 starting at 19:00 h in the Classic Remise Berlin, Wiebestr. 36 – 37, 10553 Berlin (www.remise.de/berlin)

  Departure by bus at 18:30 h. The meeting point for departure will be in the hotel lobby.

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 17, 2022, the Best Poster Award, the ECPE Young Engineer Award for the Best Paper as well as the Semikron Innovation & Young Engineer Award will be granted.

Time

Photo: www.pixabay

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Discover Berlin

Berlin is a city of both, the past and the future, – managing to perfectly combine old Prussian traditions and the pulsating trends of a modern metropolis. Historical landmarks, such as the Reichstag (House of Parliament), Brandenburg Gate, the Red Town Hall, the Fernsehturm (television tower) have a story to tell. Additionally numerous parts of the city such as the 'Unter den Linden' boulevard, Alexanderplatz, Museum Island, Potsdamer Platz with the Sony-Center or the Hackeschen Höfe (boutique courtyards) attract tourists from every part of the world.

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.

Tuesday, March 15

10:30–10:40 ROOM: MOA 3–5

Welcome Greetings - Introduction

Chairs: *Thomas Harder (European Center for Power Electronics (ECPE e.V.), DE), Nando Kaminski (University of Bremen, DE), Andreas Lindemann (University of Magdeburg, DE), Leo Lorenz (ECPE, DE)*

10:40–12:20 ROOM: MOA 3–5

S01: From Components to Systems

Chair: *Cyril Buttay (Université de Lyon Laboratoire Ampere CNRS UMR 5005 & Insa de Lyon, FR)*

10:40 *Invited Paper*
Automotive multi-port-converter (galavanically insulated by only one transformer)/EV-chargers wihtout galvanic insulation*
Jannik Schäfer and Johann. W. Kolar (ETH Zurich, CH)

11:10 ***Keynote:***
AI and Long-term Performance of Smart Power Electronic Systems*
Frede Blaabjerg (Aalborg University, DK)

11:50 *Invited Paper*
Electric Drive Technologies and Highly Integrated Packaging*
Burak Ozpineci (National Transportation Research Center, USA)

12:20–13:50 **Lunch Break**

13:50–15:10 ROOM: MOA 3–5

S02: The Quadrilemma of Packaging: Cooling, Parasitics, Insulation and Cost

Chairs: *Yvan Avenas (Grenoble Université, FR), Guo-Quan Lu (Virginia Tech, USA)*

13:50 *Invited Paper*
Power Embedding*
Thomas Gottwald (Schweizer Elektronik AG, DE)

14:20 *Invited Paper*
Review of Electric Field Reduction Methods for Medium-Voltage Power Modules*
Christina DiMarino (Virginia Tech & Center for Power Electronics Systems (CPES), USA); Mark Cairnie (Virginia Tech, USA)

14:50 **Power module packaging comprising direct pressed substrate with superior thermal performance and reliability**
Matthias Tauer (Vincotech GmbH); Tiago Jappe (Vincotech GmbH, DE); Tamás Panyik, Gyimóthy Zsolt and Máté Buza (Vincotech Kft, HU)

15:10–15:40 **Tea Break**

15:40–17:20 ROOM: MOA 3–5

S03: Double-Side Cooled Modules

Chairs: *Holger Borcherding (FH Ostwestfalen-Lippe, Germany), Martin Rittner (Robert Bosch GmbH, Germany)*

15:40 **Efficiency improvement potential of fast switching with new 1200V SiC-DSC-module for automotive traction inverters up to 300kW**
Jordan Sorge (Fraunhofer IISB, DE); Adrian Lis (Infineon Technologies AG, DE)

16:00 **SiC automotive power module with laser welded, ultra low inductive terminals and up to 900Arms phase current**
Peter Beckedahl (SEMIKRON International GmbH, DE); Ingo Bogen and Juergen Steger (Semikron Elektronik GmbH & Co. KG, DE)

16:20 **Advanced cooling concept based on standard power modules significantly improves lifetime**
Stefan Buschhorn, Krzysztof Mainka and Klaus Vogel (Infineon Technologies AG, DE)

16:40 **Pareto front system optimization on the example of a motor drive**
Stefan Hoffmann (Fraunhofer IZM, DE); Eckart Hoene (Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration IZM, DE)

17:00 **Evaluation of a Nonlinear Resistive Polymer-Nanoparticle Composite for Field-Grading in a Double-Side Cooled 10-kV Silicon Carbide Rectifier Module**
Zichen Zhang and Khai Ngo (Virginia Tech, USA); Woongje Sung (SUNY Poly, USA); Guo-Quan Lu (Virginia Tech, USA)

18:30–21:30 **Get Together (Atrium MOA Mercure Hotel)**

Wednesday, March 16

08:30–10:10 ROOM: MOA 3–4

S04: Components to be Integrated

Chair: *Cyril Buttay (Université de Lyon Laboratoire Ampere CNRS UMR 5005 & Insa de Lyon, FR)*

08:30 **Influence of non-Stoichiometric Silicon Nitride Layer Thickness on Electrical Properties and Manufacturability of 900 V Silicon RC-Snubbers**
Tom Becker (Fraunhofer Institute for Integrated Systems and Device Technology IISB, DE); Norman Boettcher (Fraunhofer Institute for Integrated Systems and Device Technology IISB, DE); Tobias Erlbacher (Fraunhofer IISB, DE)

08:50 **GaN-HEMT Based Test Setup for Measurement of Core Losses Under DC-Bias**
Benedikt Kohlhepp, Daniel Kübrich and Thomas Dürbaum (Friedrich-Alexander University Erlangen-Nürnberg (FAU), DE)

09:10 **3-D Electrothermal Modeling of SiC Multichip Power Modules for a More Accurate Reliability Assessment**
Salvatore Race, Roger Stark, Ivana Kovacevic-Badstuebner, Michel Nagel, Thomas Ziemann, Alexander Tsibizov and Ulrike Grossner (Advanced Power Semiconductor Laboratory, ETH Zurich, CH)

09:30 **Substrate Bias Effects up to 400 V of Normally-On GaN-on-AlN/SiC HEMTs in Static and Dynamic Tests**
Soeren Heucke (Technische Universität Berlin, DE); Oliver Hilt (FBH, DE); Xiaomeng Geng and Carsten Kuring (Technische Universität Berlin, DE); Joachim Würfl (FBH, Berlin,, DE); Sibylle Dieckerhoff (TU Berlin, DE)

09:50 **Design and optimization of the driver circuit for non-insulating gate GaN-transistors enabling fast switching and high-frequency operation**
Xiaomeng Geng and Carsten Kuring (Technische Universität Berlin, DE); Oliver Hilt (FBH, DE); Mihaela Wolf (Ferdinand-Braun-Institut Leibniz-Institut für Höchstfrequenztechnik, DE); Joachim. Wuerfl (Ferdinand-Braun-Institut, DE); Sibylle Dieckerhoff (TU Berlin, DE)

08:30–10:10 ROOM: MOA 5

S05: Reliability (1)

Chairs: *Ichiro Omura (Kyushu Institute of Technology, JP), Eckhard Wolfgang (ECPE e. V., DE)*

08:30 **Reliability assessment and thermal characterization of automotive power module package based on novel thick copper-ceramic substrate and hard epoxy encapsulation**
Mario Sprenger, Freerik Forndran, Bettina Ottinger and Tobias Braun (Vitesco Technologies Germany GmbH, DE); Jörg Franke (FAU Erlangen-Nuremberg, DE)

08:50 **Accelerated Lifetime Testing and Failure Analysis for Advanced Automotive Grade Ceramic Capacitors (MLCC)**
Andreas Schletz (Fraunhofer Institute for Integrated Systems and Device Technology IISB, DE); Sandy Klengel (Fraunhofer Institute for Microstructure of Materials and System, DE); Bianca Boettge (Fraunhofer Institute for Mechanics of Materials IWM, DE); Jürgen Leib (Fraunhofer-Institut für Integrierte Systeme und Bauelementetechnologie, DE); Fabian Dresel (Fraunhofer IISB, DE)

09:10 **Aging of Insulation Materials under Repetitive Impulse Voltage Stress with high dv/dt**
Albert Claudi (University of Kassel, DE); Gerrit Braun (SMA Solar Technology AG, DE); Sandy Klengel (Fraunhofer Institute for Microstructure of Materials and System, DE); Robert Klengel (Fraunhofer Institute for Microstructure of Materials and Systems IMWS, DE); Peter Zacharias and Xiao Yu (Universität Kassel, DE)

09:30 **In-situ Detection of Degradation in Power Electronic Modules During Lifetime Testing using Lock-in Thermography**
Alexander Schiffmacher and Shreyas Malasani (University of Freiburg - IMTEK, DE); Mario Prescher and Lutz Kirste (Fraunhofer Institute for Applied Solid State Physics, DE); Jürgen H. Wilde (Universität Freiburg - IMTEK & Microsystems Engineering, DE)

09:50 **Thermal grease pump-out visualizing system for power modules using 3D digital image correlation method**
Issei Manzen and Ichiro Omura (Kyushu Institute of Technology, JP)

10:10–10:40 **Tea Break**

10:40–12:20 ROOM: MOA 3–4

S06: Bonding Materials and Processes

Chairs: Christina DiMarino (Virginia Tech & Center for Power Electronics Systems (CPES), USA), Alexander Schiffmacher (University of Freiburg - IMTEK, DE)

10:40 **Silver free thick film copper bonding for highly reliable metal ceramic substrates**
André Schwoebel (Heraeus Deutschland GmbH & Co. KG, DE); Benjamin Fabian (Heraeus Deutschland GmbH &Co. KG, DE); Daniel Schnee and Miriam Rauer (Heraeus Deutschland GmbH & Co. KG, DE); Anton Miric (Heraeus Deutschland GmbH &Co. KG, DE); Stefan Gunst (Heraeus Deutschland GmbH & Co. KG, DE)

11:00 **Investigation of element enrichment in silicone gels used to encapsulate inverter modules for renewable power generation**
Elisabeth Giebel (Fraunhofer Institute for Microstructure of Materials and Systems IMWS, DE); Bianca Boettge (Fraunhofer Institute for Mechanics of Materials IWM, DE); Sandy Klengel (Fraunhofer Institute for Microstructure of Materials and System, DE)

11:20 **Self-healing encapsulation material for auto-repairable power module architectures**
Baptiste Arati (Laplace, University of Toulouse, UT3 Paul Sabatier & Mitsubishi Electric R&D Centre Europe, FR); Vincent Bley (Université de Toulouse UPS INPT LAPLACE, FR); Julio Brandelero (Mitsubishi Electric R&D Centre Europe, FR); Gilbert Teyssedre (LAPLACE, CNRS, Paul Sabatier University, FR)

11:40 **Experimental investigation of the influence of different bond tool grooves on the bond quality for ultrasonic thick wire bonding**
Oliver Hagedorn (Paderborn University, DE); Marian Broll and Olaf Kirsch (Infineon Technologies AG Warstein, DE); Tobias Hemsel (Paderborn University, DE); Walter Sextro (Universität Paderborn, DE)

12:00 **Design and Evaluation of Building Block for a 100kW DC/DC Converter Based on PCB Process**
Johan Le Leslé and Rémi Perrin (Mitsubishi Electric R&D Centre Europe, FR); Guillaume Lefèvre (CEA-INES, FR); Julien Morand (Mitsubishi Electric R&D Centre Euope, FR)

10:40–12:20 ROOM: MOA 5

S07: Reliability (2)

Chairs: Peter Friedrichs (Infineon, DE), Zoubir Khatir (Gustave Eiffel University, FR)

10:40 **Condition monitoring and evaluation of Ron degradation during power cycling of SiC-Mosfets power modules**
Zoubir Khatir and Ali Ibrahim (Gustave Eiffel University, FR); Richard Lallemand (IFSTTAR, FR); Mounira Berkani (Satie, FR); Damien Ingrosso (Gustave Eiffel University, FR)

11:00 **The limited usability of a ZTC-point in tracking IGBT degradation**
Gerd Schlottig (ABB Corporate Research, CH); Marcin Firla (ABB Corporate Technology Center, Poland); Helton Goncalves de Medeiros (ABB Corporate Research, CH); Arttu Halonen, Jonny Ingman and Aleksi Vulli (ABB Drives, FI); Elena Mengotti (ABB Corporate Research, CH); Enea Bianda (ABB Corporate Research Centre, CH)

11:20 **Investigation of long-term drift effects of SiC MOSFETs under power cycling like gate conditions**
Carsten Kempiak and Andreas Lindemann (University of Magdeburg, DE)

11:40 **Power Cycling Lifetime of Shunt Resistors in IGBT Modules**
Ralf Schmidt, Michael Kaesbauer and Michael Endres (Siemens AG, DE); Marcel Sippel (Friedrich-Alexander-Universität Erlangen-Nürnberg & Siemens AG, DE); Pietro Botazzoli (Siemens AG, DE)

12:00 **The Effect of Parallel-Connected Varistor on UIS Robustness of SiC MOSFETs for Solid-State Circuit Breakers Application**
Zaiqi Lou, Yunjie Zhu, Shin-ichi Nishizawa and Wataru Saito (Kyushu University, JP)

12:20–13:50 **Lunch Break**

13:50–15:10 ROOM: MOA 3–4

S08: Thermal Management

Chair: Peter Beckedahl (SEMIKRON International GmbH, DE)

13:50 **Packaged β-Ga2O3 Schottky Diodes with Reduced Thermal Resistance by Substrate Thinning to 200 µm**
Florian Wilhelmi (University of Magdeburg & ZF Friedrichshafen AG, DE); Yuji Komatsu (ZF Japan Co., Ltd., JP); Shinya Yamaguchi, Yuki Uchida and Ryoichi Nemoto (Novel Crystal Technology, Inc., JP); Andreas Lindemann (University of Magdeburg, DE)

14:10 **Improved Thermal Impedance Measurement for Power Modules based on Thermal Imaging of the Baseplate**
Marcel Sippel (Friedrich-Alexander-Universität Erlangen-Nürnberg & Siemens AG, DE); Ralf Schmidt (Siemens AG, DE); Fabian Rau, Daniel Bretscher and Reinhardt Seidel (Friedrich-Alexander-Universität Erlangen-Nürnberg, DE); Jörg Franke (FAU Erlangen-Nuremberg, DE)

14:30 **Module concept for more sustainability without compromising performance: New EconoDUALTM 3 Black Series**
Klaus Vogel (Infineon Technologies AG, DE)

14:50 **Development of an over temperature detection method via internal and emulated gate resistance**
Chihiro Kawahara and Shinichi Izuo (Mitsubishi Electric Corporation, JP); Julio Brandelero and Nicolas Degrenne (Mitsubishi Electric R&D Centre Europe, FR)

13:50 – 15:10 ROOM: MOA 5

S09: Advanced Packaging Concepts

Chairs: Jean-Luc Schanen (Grenoble Electrical Engineering Laboratory, FR), Martin Schneider-Ramelow (Fraunhofer IZM & TU Berlin, DE)

13:50 **Presentation of a Reliable Molded Power-PrePackage**
Tina Thomas, Thanh Duy Nguyen and Olaf Raemer (Fraunhofer IZM, DE); Eckart Hoene (Fraunhofer-Institut für Zuverlässigkeit und Mikrointegration IZM, DE); Chunlei Liu and Niko Pavliček (Hitachi Energy Research, CH); Tanja Braun (Fraunhofer IZM, DE)

14:10 **Feedback Controlled IPM Inverter with Single PCB Rogowski Coil Sensor**
Battuvshin Bayarkhuu, Bat-Otgon Bat-Ochir and Ichiro Omura (Kyushu Institute of Technology, JP)

14:30 **Deep Learning assisted Assessment of the Porosity in Ag-Sinter joints based on non-destructive acoustic inspection**
Sebastian Brand (Fraunhofer Institute for Microstructure of Materials and Systems, IMWS, DE); Michael Kögel (Fraunhofer Institute for Microstructure of Materials and Systems, IMWS, DE); Frank Altmann (Fraunhofer Institute for Microstructure of Materials and Systems IMWS, DE)

14:50 **Patterning and CTE-matching of contacts to optimize thermomechanical stress in power semiconductor pre-packages**
Niko Pavliček, Chunlei Liu and Patrick Stalder (Hitachi Energy Research, CH); Giovanni Salvatore (Ca' Foscari University of Venice, IT); Till Huesgen (Hochschule Kempten - University of Applied Science, DE); Tina Thomas (Fraunhofer IZM, DE); Fabian Mohn (Hitachi Energy Research, CH)

15:10 – 16:10

Online Poster Sessions

These posters will be presented by authors attending the conference online. You can login in hopin via the link sent to you and also interact with the authors.

PO1: General aspects of packaging / Power packages and modules

PO1.1 **An Integrated IGBT Module for Dual Inverter Applications**
Jianfeng Li, Jiayi Yan and Yuekang Du (Zhuzhou CRRC Times Electric UK Innovation Center, GB)

PO1.2 **Direct / indirect impinging air jet cooling for power devices and application to power electronics system**
Shunichiro Nakata (Kyushu Institute of Technology & Omura Lab, JP); Ichiro Omura (Kyushu Institute of Technology, JP)

PO1.3 **Model reduction for sensitivity analysis of solder joint fracture in power electronic modules**
Louis Schuler (Mitsubishi Electric R&D Centre Europe, FR); Ludovic Chamoin (Université Paris-Saclay, ENS Paris-Saclay, CNRS, LMT, FR); Zoubir Khatir (Gustave Eiffel University, FR); Mounira Berkani (Satie, FR); Merouane Ouhab (Mitsubishi Electric R&D Centre Europe (MERCE), FR); Nicolas Degrenne (Mitsubishi Electric R&D Centre Europe, FR)

PO1.4 **Development of High Reliability Power SiC Module Platform Packaging for Low Carbon Vehicles**
Yangang Wang and Anne Harris (Dynex Semiconductor Ltd, GB); Guoyou Liu (CRRC, CN)

PO1.5 **Reliability Enhancement of High Power Semi-conductor Module with Insulated Metal Base-plate and Epoxy Encapsulation**
Yangang Wang and Muhammad Morshed (Dynex Semiconductor Ltd, GB); Guoyou Liu (CRRC, CN)

PO1.6 **Stability Modeling for SiC MOSFET Power Modules**
Yanfeng Shen, Xiaoting Dong, Tobias Schuetz and Robert Roesner (Danfoss Silicon Power GmbH, DE)

PO2: Clean switching, electromagnetic compatibility

PO2.1 **Self-turn-on-free criteria for MOS gate power device and circuit**
Takanao Nishio and Ichiro Omura (Kyushu Institute of Technology, JP)

PO2.2 **PCB-Embedded Packaging for Ultra-Fast Switching of SiC MOSFETs**
Raffael Risch and Jürgen Biela (ETH Zurich, CH)

PO2.3 Automatic Model Generation for PCB-based Power Electronics
Bahaeddine Ben Hamed (Mitsubishi Electric R&D Centre Europe, Laboratoire Ampère, FR); Guillaume Regnat and Guillaume Lefevre (Mitsubishi Electric R&D Centre Europe, FR); Cyril Buttay (Université de Lyon Laboratoire Ampere CNRS UMR 5005 & Insa de Lyon, FR)

PO2.4 Electromagnetic switching cell design for fast switching semiconductors
Kirill Klein (Fraunhofer IZM, DE)

PO3: Reliability

PO3.1 A gate driver for on-line heat-treatment to extend the lifetime of multichip power modules
Vincent Quemener, Johan Le Leslé, Pierre-Yves Pichon, Julio Brandelero and Nicolas Degrenne (Mitsubishi Electric R&D Centre Europe, FR)

PO3.2 PWM power cycling of a multichip power module with active die temperature equalization
Julio Brandelero (Mitsubishi Electric R&D Centre Europe, FR)

PO3.3 Use of a SPICE-based Transfer Function to Model the Absolute Humidity in a Power Semiconductor Module
Olivier Quittard (Hitachi Energy, CH); Edoardo Ceccarelli (Hitachi Energy, Semiconductors, CH)

PO3.4 Comparison of Different Methods for the Characterization of Online Junction Temperature of a Gallium-Nitride Power Transistor
Kanuj Sharma, Jan Hückelheim, Kevin Muñoz Barón, Johannes Ruthardt and Ingmar Kallfass (University of Stuttgart, DE)

PO3.5 Chemical Substrate Treatment for Improved Pressureless Silver Sintering Adhesion of Power Electronics Dies
Felix Steiner, Helge Wurst and Thomas Blank (Karlsruhe Institute of Technology, DE)

PO4: Components to be integrated & Mechatronic systems and their applications / System and Applications aspects

PO4.1 Rugged and fast short circuit detection method for GaN HEMT based on saturation detection
Jan Schmitz, Markus Meißner and Steffen Bernet (Dresden University of Technology, DE)

PO4.2 Design of a high-to-low voltage, low-power integrated isolated DC/DC converters for automotive applications
Etienne Foray (University of Lyon & Laboratoire Ampère, FR); Bruno Allard (INSA Lyon, FR); Christian Martin (Univ Lyon, UCB Lyon 1, CNRS, AMPERE, FR)

PO4.3 Inverter Integration Strategy for a Modern Compact Motor Drive based on SiC
Jan Philipp Gördes, Jasper Schnack, Jan Stolley and Ulf Schümann (University of Applied Sciences Kiel, DE); Ronald Eisele (FH Kiel, DE)

PO4.4 Algorithmic Optimisation of Chip Dimensions and Layout Pattern in Press-Pack IGBT Devices
Robin Simpson (Dynex Semiconductor, GB); Yangang Wang (Dynex Semiconductor Ltd, GB); Michael Nicholson and Daniel Bell (Dynex Semiconductor, GB)

16:10 – 17:30 **Tea Break**

16:10 – 17:30

Onsite Poster Sessions

PB1: Components to be integrated & Mechatronic systems and their applications / System and Applications aspects

Chair: Regine Mallwitz (Technische Universität Braunschweig, DE)

PB1.1 Characterization of 25V GaN d-HEMT Device through Large Signal Gate Charge Measurements and In-Converter Testing
Brendan O'Sullivan and Seamus O'Driscoll (Tyndall National Institute, IE); Norbert Fiebig (IHP Microelectronics, DE); Fouad Benkhelifa (IAF Fraunhofer, DE); Paul McCloskey and Cian Ó Mathúna (Tyndall National Institute, IE)

PB1.2 High-Voltage, Low ESR Solid Electrolyte E-Caps for Automotive applications
Steffen Buhrkal-Donau (University of Southern Denmark, DK); Mihaela Gruia (Universty of Southern Denmark, DK); Thomas Ebel (University of Southern Denmark, DK)

PB1.3 Thermal Performance of an Integrated Heat Spreader for GaN HEMT devices
Faheem Ahmad, Thore Aunsborg, Szymon Beczkowski, Stig Munk-Nielsen and Asger Jørgensen (Aalborg University, DK)

PB2: General aspects of packaging / Power packages and modules

Chair: Peter Friedrichs (Infineon, DE)

PB2.1 Cooling Concept and Molding Packaging for PV Module Integrated Micro-Inverters
Tobias Manthey (Leibniz University Hannover, DE); Paul Ranft (OptiMel Schmelzgußtechnik GmbH, DE); Jens Friebe (Leibniz University Hannover, DE)

PB2.2 Evaluation of the thermal contact resistance between bulk copper and metal foam using transient measurements
Goulven Janod (Grenoble INP - UGA, FR); Yvan Avenas and Didier Bouvard (Grenoble Université, FR); Rabih Khazaka (Safran SA, Safran Tech, FR)

PB2.3 Laser welding of copper terminals on ceramic substrates for power module packaging
Armin Dellert, Stefan Schirmer, Nadja Kolb and Michael Kimmel (SEMIKRON Elektronik GmbH & Co. KG, DE); Christian Goebl (Semikron Elektronik GmbH, DE); Kurt-Georg Besendörfer (SEMIKRON Elektronik GmbH & Co. KG, DE)

PB2.4 An Embedded Power Section with GaN HEMTs
Tianyu Li (Otto Von Guericke University, DE); Christian Voigt and Eugen Erhardt (Technische Universität Berlin, DE); Andreas Lindemann (University of Magdeburg, DE); Lars Böttcher (Fraunhofer IZM, DE)

PB2.5 Substrate Integrated Temperature Sensing for Bondless Power Modules
Manuel Riefer (Robert Bosch GmbH, Reutlingen & University of Stuttgart, DE); Jonathan Winkler and Sebastian Strache (Robert Bosch GmbH, Reutlingen, DE); Ingmar Kallfass (University of Stuttgart, DE)

PB3: Reliability

Chairs: Norbert Seliger (Technische Hochschule Rosenheim, DE), Eckhard Wolfgang (ECPE e. V., DE)

PB3.1 Reliability investigation of SiC MOSFETs under switching operation in various packages
Christian Schwabe and Nick Thönelt (Technical University of Chemnitz, DE); Thomas Basler (Chemnitz University of Technology, DE)

PB3.2 Active Thermal Cycling of Discrete Power Semiconductors for Applications with strong ΔT-Profiles
Daniel Kostynski (KAI GmbH, AT); Steffen Sack (Infineon Technologies, Villach, AT); Markus Sievers (KAI GmbH, AT)

PB3.3 An evaluation of Cu-to-Cu ultrasonic welding bond through thermal cycling
Meghna De (Littelfuse & University of Nottingham, GB); Pearl A Agyakwa (University of Nottingham, GB); Elaheh Arjmand (Littelfuse, GB); Nigel Neate (University of Nottingham, GB); Stefan Steinhoff (Littelfuse, GB); C Mark Johnson and Bassem Mouawad (University of Nottingham, GB)

PB3.4 Corrosion in Power Electronics
Markus R. Meier and Helmut Schweigart (ZESTRON Europe, DE)

PB3.5 AlON gate dielectric and gate trench cleaning for improved reliability of vertical GaN MOSFET
Walter Goncalez Filho (Ghent University & IMEC, BE); Matteo Borga, Karen Geens, Deepthi Cingu and Urmimala Chatterjee (Imec, BE); Shuzhen You (IMEC, BE); Benoit Bakeroot (Ghent University, BE); Stefaan Decoutere (Imec, BE); Werner Knaepen, Panagiota Armou and Pia Homm (Asm, BE)

PB3.6 Large surface area substrate attach in power module applications
Battist Rabay and Adrian Stelzer (Nano-Join GmbH, DE)

PB3.7 Change in SiC MOSFET body diode voltage drop in TO-247 packages during inverse mode and forward mode power cycling test
Bhanu Pratap Singh and Amin Farjah (KTH Royal Institute of Technology, SE); Khaled Choudhury (GE Renewable Energy, GB); Staffan Norrga (KTH, Royal Institute of Technology, SE); Hans-Peter Nee (KTH Royal Institute of Technology & EES/E2C, SE)

PB3.8 Potential failure modes of cement-based encapsulation concepts for reliable power electronics
Falk Naumann (Fraunhofer Institute for Microstructure of Materials and Systems IMWS, DE); Sandy Klengel (Fraunhofer Institute for Microstructure of Materials and System, DE); Bianca Boettge (Fraunhofer Institute for Mechanics of Materials IWM, DE)

PB3.9 Investigation of reliability issues in sintered silver interconnected power devices and its lifetime prediction by FEM and experiment
Anu Mathew (Technische Universität Chemnitz & Zentrum Für Mikrotechnologien, DE)

PB3.10 Measuring the carriers' multiplication in Si and SiC power devices by alpha and gamma radioactive sources
Marco Pocaterra and Mauro Ciappa (ETH Zurich, CH)

19:00 – 22:00 **Conference Dinner (at the Classic Remise, transfer by bus)**

**Departure by bus at 18:30.
The meeting point for departure will be in the hotel lobby.**

Thursday, March 17

08:30–10:10 ROOM: MOA 3–5

S10: Reliability (3)

Chairs: Nando Kaminski (University of Bremen, DE), Norbert Seliger (Technische Hochschule Rosenheim, DE)

08:30 ***Keynote:***
GaN Reliability and Lifetime Projections*
Alexander Lidow (Efficient Power Conversion Corporation, USA)

09:10 *Invited Paper*
Qualifying a Silicon Carbide Power Module: Reliability Testing Beyond the Standards of Silicon Devices*
Paul Salmen (Infineon Technologies AG, DE); Peter Friedrichs (Infineon, DE)

09:40 *Invited Paper*
Perspective on Condition and Health Monitoring of Power Electronic Converters*
Huai Wang, Yingzhou Peng and Xing Wei (Aalborg University, DK)

10:10–10:40 **Tea Break**

10:40–12:00 ROOM: MOA 3–5

S11: Clean Switching, Electromagnetic Compatibility

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

10:40 **Sub-Nanosecond Transient Analysis of SiC MOSFET Switching: "Sensor Gap TLP" as a Versatile Characterization Method with Very High Temporal Resolution**
Gerhard Groos (University of the Federal Armed Forces Munich, DE); Dennis Helmut (University of the Federal Armed Forces Munich, DE & Technische Universität München, DE); Gerhard Wachutka and Gabriele Schrag (Technische Universität München, DE)

11:00 **EMI mitigation by substrate integrated common mode filter**
Norbert Seliger and Eduard Dechant (Technische Hochschule Rosenheim, DE); Ralph Kennel (Technical University of Munich, DE)

11:20 **Study of parasitic oscillations in trench IGBT during short-circuit type II based on signal flow graph model**
Hiroshi Kono and Ichiro Omura (Kyushu Institute of Technology, JP)

11:40 **Temperature compensated M-shunts for fast transient and low inductive current measurements**
Hauke Lutzen (University of Bremen, DE); Vladimir Polezhaev and Keshar Bahadur Rawal (Hochschule Kempten, DE); Kayesar Ahmmed (University of Bremen, DE); Till Huesgen (Hochschule Kempten - University of Applied Science, DE); Nando Kaminski (University of Bremen, DE)

12:00–13:20 **Lunch Break**

13:20–14:20 ROOM: MOA 3–5

S12: Inverter Design and Integration

Chairs: Regine Mallwitz (Technische Universität Braunschweig, DE), Christina DiMarino (Virginia Tech & Center for Power Electronics Systems (CPES), USA)

13:20 *Invited Paper*
Integration of power electronic circuits using Coated Metal Interconnect Devices (CMID)*
Holger Borcherding (Ostwestfalen-Lippe University of Applied Sciences and Arts & Lenze SE, DE); André Springer, Patrick Ehlert and Tobias Mueller (Ostwestfalen-Lippe University of Applied Sciences and Arts, DE); Andreas Tolksdorf (Lenze SE, DE)

13:50 *Invited Paper*
Performance Evaluation of a GaN Flying Capacitor Multilevel Inverter for Industrial Applications*
Hartwig Raphael and Alexander Hensler (Siemens AG, DE); Thomas Ellinger (TU Ilmenau, DE)

14:20–15:20 ROOM: MOA 3–5

Closing Remarks and Awards Ceremony

Chairs: Thomas Harder (European Center for Power Electronics (ECPE e.V.), DE), Leo Lorenz (ECPE, DE)

During the closing ceremony following awards will be granted:

- The Best Poster Award
- The ECPE Young Engineer Award for the Best Paper
- The Semikron Innovation & Young Engineer Award

Exhibitors' List

We are pleased to welcome the following exhibitors:

budatec GmbH — BOOTH 02

budatec GmbH is a plant manufacturer for the semiconductor and solar industry based in Berlin. The main business areas are thermal systems and products related to electronics manufacturing.

The focus here is on vacuum soldering systems, ranging from small batch plants to fully automated production systems. We have had experience in this field for over 20 years. Our vacuum soldering systems are developed, manufactured and distributed worldwide in Berlin. In this segment, budatec GmbH is one of the technological market leaders, especially in the use of hydrogen and plasma gases.

The company was founded in 2009 and now employs a team of experienced engineers and software developers.

Our customers include well-known technology companies, research and development departments of renowned institutes as well as universities and technical colleges.

http://www.budatec.de

Nano-Join GmbH develops, produces and distributes patented sinter pastes, based on silver and copper. Sinter pastes are the key to robust, efficient and cost-effective (power) modules with high power densities even at elevated operating temperatures. The resulting superior thermal management significantly improves the performance, lifetime and reliability of power electronics components.

In addition to standard silver sinter solutions, Nano-Join also offers customized R&D projects in a wide variety of applications.

https://www.nano-join.de

ECPE – The Industrial and Research Network for Power Electronics in Europe — BOOTH 01

ECPE European Center for Power Electronics e.V. The industry-driven research network for power electronics in Europe with more than 200 member organisations is promoting research, education, training and public relations in power electronics.

https://www.ecpe.org

Fraunhofer IISB — BOOTH 05

The Fraunhofer Institute for Integrated Systems and Device Technology IISB conducts applied research and development in the field of electronic systems for application in, e.g., electric mobility, aerospace, Industry 4.0, power grids or energy technology. In this connection, the institute uniquely covers the entire value chain - from basic materials to whole power electronic systems.

As part of the Fraunhofer-Gesellschaft, the IISB does contract research for industry as well as public authorities. On that note it is the institute's main objective to provide excellent research for its industrial partners and to set technological benchmarks as one of the leading research institutions in electronic systems. A tightly woven network build out of local and international partnerships and cooperations helps to carry these aims into effect.

https://www.iisb.fraunhofer.de

Fraunhofer IZM – Intelligent Interconnection Solutions — BOOTH 07

Intelligent electronic systems – available everywhere and to everyone! In order to make this possible, components need to have exceptional properties. Depending on the application, they need to function reliably at high temperatures, be extremely miniaturized and moldable to individual build spaces or even flexible.

Fraunhofer IZM helps companies around the world develop and assemble robust and reliable electronics to the very cutting edge and then integrate them into the required application. To this end Fraunhofer IZM develops adapted system integration technologies on wafer-, chip- and board level. Our research continues to improve reliability and helps customers confidently predict a product's lifetime.

At CIPS 2022 we will be showcasing Fraunhofer IZM's expertise in the realms of system design, advanced packaging concepts and reliability and test for power electronics.

https://www.izm.fraunhofer.de

Indium Corporation of Europe BOOTH 06

Indium Corporation is a premier materials refiner, smelter, manufacturer, and supplier to the global electronics, semiconductor, thin-film, and thermal management markets. Products include solders and fluxes; brazes; thermal interface materials; sputtering targets; indium, gallium, germanium, and tin metals and inorganic compounds; and NanoFoil® . Founded in 1934, the company has global technical support and factories located in China, Germany, India, Malaysia, Singapore, South Korea, the United Kingdom, and the U.S.

https://www.indium.com

OPAL-RT Germany GmbH BOOTH 10

OPAL-RT Technologies was founded in 1997 with the mission of exploiting commercial off-the-shelf (COTS) PC and FPGA technology to develop high-performance real-time simulators for hardware-in-the-loop (HIL) testing and rapid control prototyping. Its technological focus is on simulation of power systems and power electronics, with applications in the energy, aerospace, and automotive sectors. OPAL-RT serves over 1000 customers in 40 countries through subsidiaries and distributors across the world.

https://www.opal-rt.com

PACK LitzWire BOOTH 08

PACK LitzWire is an experienced specialist for HF litz wires and high-performance fine wires with a broad product portfolio, high consulting competence, top service, and personal commitment. PACK Litz Wire supports its customers as an innovation partner in the development of new technologies and the technical optimisation of existing solutions.

The entire value chain of Litz production is implemented in-house. Specialised mechanical engineering expertise enables us to permanently improve our products and processes. For more than fifteen years now, Pack has been investing specifically in research projects in collaboration with customers and universities to systematically incorporate basic research and new power electronics requirements into the production of HF litz wires.

Customers in the areas of research, development and production come from the following industries, among others:

- Medical Technology
- Automotive
- Renewable energies
- Aerospace industry
- Railway technology
- Automation / Industrial Robotics

As a family business, PACK LitzWire is firmly anchored nationally and stands for quality - Made in Germany. With its sales offices worldwide, PACK is also represented internationally and speaks the language of its customers.

As a development partner for our customers, we offer the best service from the very first minute - for example, many developers use our online sample service at https://www.packlitzwire.de/sofortlieferung to request immediately available samples and small quantities.

Pack is also a valued partner for volume series production. Modern production and many years of trustful cooperation with our suppliers allow a high delivery capacity even for large quantities. Digitalised execution processes accompany the completion of orders. Of course, we offer barcode-supported integration of your article and project data with the ordering process.

https://www.packlitzwire.com

PINK GmbH Thermosysteme BOOTH 09

PINK GmbH Thermosysteme produces customized systems for vacuum-supported soldering, sintering, low-pressure plasma as well as systems for drying technology.

PINK is a global supplier for (power) electronics manufacturing equipment within automotive industry and their suppliers as well as the chemical/pharmaceutical industry and other companies that rely on the qualitative and innovative products.

Plants and systems for void-free soldering with vacuum
e.g. of large power modules, with preform solders and/or pastes in a continuous process.

Sintering technology by PINK
Patented sintering system SIN 200+, a highly flexible system, which is suitable for various production demands from laboratory up to series production.

PINK application and R&D services
PINK supports its customers from the very beginning of developments to series production. Starting with demonstration and soldering/sintering trials, feasibility studies of new packaging concepts and assembling of customer samples. After that PINK evaluates and optimizes UPH, yield and quality.

https://www.pink.de/de

Plexim GmbH — BOOTH 03

PLECS, the Simulation Platform for Power Electronic Systems

https://www.plexim.com

TAMURA Corporation — BOOTH 04

Tamura-Europe Limited is a subsidiary of Tamura Corporation and is supporting their European customers with magnetic components (transformers and reactors), current sensors, gate driver module solutions, flux and soldering materials and eventually soldering systems.

The company that would eventually become the Tamura Group came into being in 1924, one year before the start of radio broadcasting in Japan, as the Tamura Radio Store. Its main business was radio repair and the manufacture of original radios. In the process of pursuing superior sound, the firm came to handle the manufacture of the key component, the transformer.

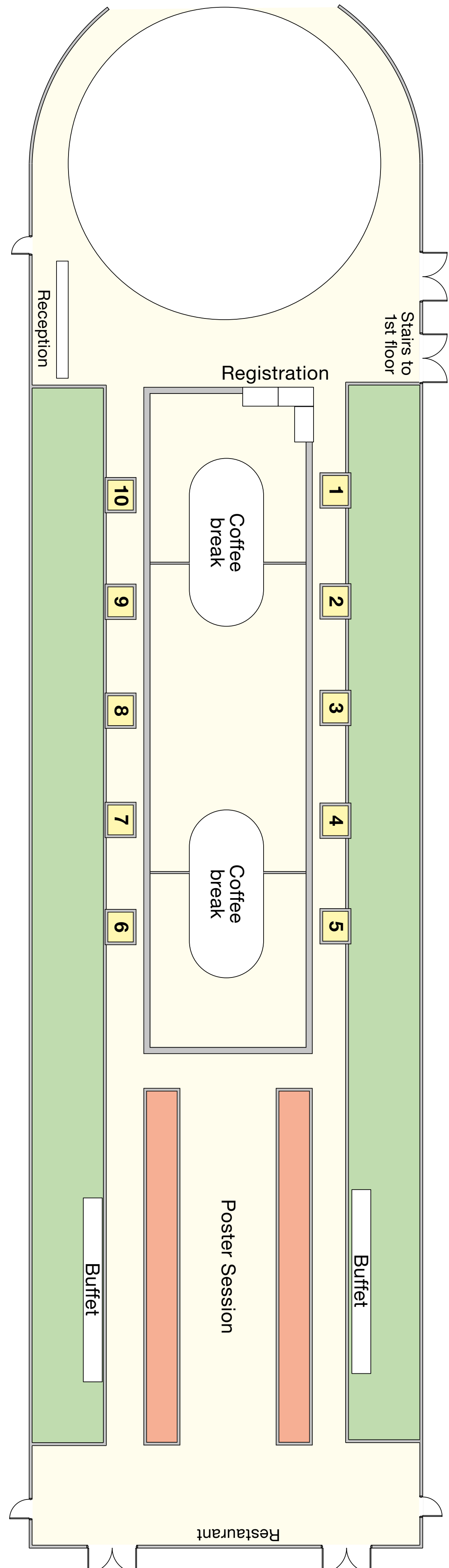
Its reputation as the "Tamura of transformers" created a foundation on which to expand its businesses, including various electronic components related to transformers; flux and soldering materials that were born out of the pursuit of quality joining materials for the manufacture of transformers; soldering systems; and even broadcast audio equipment and communication systems, based on achievements in the manufacture of transformers for broadcasting and communication.

Currently, Tamura Corporation conducts business operations in three areas: electronic components, electronic chemical mounting, and information equipment, to develop and supply products that meet the needs of new markets, such as the environment and energy markets.

Tamura's products have been supporting various industries and social infrastructure as "materials," "components," and "devices" that range from consumer products, such as automobiles and electronic equipment, to devices at manufacturing sites and natural-energy-related and aerospace fields. From raw materials to complete systems, Tamura's technologies have contributed to safety and comfort as well as energy savings.

With the aim of continuously providing safe and secure high-quality products and services that satisfy customers from all over the world, the Tamura Group has been working on resolving social issues by promoting business activities while taking social and environmental impacts into account in all processes ranging from R&D, procurement, and production to sales.

https://www.tamuracorp.com



	ROOM MOA 3 – 5	ROOM MOA 3 – 4	ROOM MOA 5
	Tuesday, March 15		
10:30	Welcome Greetings – Introduction (p. 6)		
10:40	**S01: From Components to Systems** (p. 6)		
12:20	Lunch Break		
13:50	**S02: The Quadrilemma of Packaging: Cooling, Parasitics, Insulation and Cost** (p. 6)		
15:10	Tea Break		
15:40 – 17:20	**S03: Double-Side Cooled Modules** (p. 6)		
18:30 – 21:30	Get Together (Atrium MOA Mercure Hotel)		
	Wednesday, March 16		
08:30		**S04: Components to be Integrated** (p. 7)	**S05: Reliability (1)** (p. 7)
10:10	Tea Break		
10:40		**S06: Bonding Materials and Processes** (p. 8)	**S07: Reliability (2)** (p. 8)
12:20	Lunch Break		
13:50		**S08: Thermal Management** (p. 8)	**S09: Advanced Packaging Concepts** (p. 9)
15:10	**Online Poster Sessions** (p. 9) **PO1:** General aspects of packaging / Power packages and modules **PO2:** Clean switching, electromagnetic compatibility · **PO3:** Reliability · **PO4:** Components to be integrated & Mechatronic systems and their applications / System and Applications aspects		
16:10 – 17:30	Tea Break **Onsite Poster Sessions** (p. 10) **PB1:** Components to be integrated & Mechatronic systems and their applications / System and Applications aspects **PB2:** General aspects of packaging / Power packages and modules · **PB3:** Reliability		
19:00 – 22:00	Conference Dinner (at the Classic Remise, transfer by bus)		
	Thursday, March 17		
08:30	**S10: Reliability (3)** (p. 12)		
10:10	Tea Break		
10:40	**S11: Clean Switching, Electromagnetic Compatibility** (p. 12)		
12:00	Lunch Break		
13:20	**S12: Inverter Design and Integration** (p. 12)		
14:20 – 15:20	Closing Remarks and Awards Ceremony (p. 12)		

VDE