

## Conference Program PCIM Europe digital days 2020

**Tuesday, 7 July 2020**

### Stream 1

**09:00 Welcome Speech**

### Stream 1

**09:10 Keynote**

**Chairperson:** Leo Lorenz, ECPE, D

### **Trends in Automotive Power Electronics Discussed at Audi's first full Electric Drive Train**

Robert Plikat, Head of Subdepartment Power Electronics, Volkswagen, D

**09:30** Live 20-minute Q&A Session with the Keynote Speaker

### Stream 1

#### **SiC Devices**

**Chairperson:** Hans-Günter Eckel, University of Rostock, D

**09:50 Improved Reliability of 1.2kV SiC MOSFET by Preventing the Intrinsic Body Diode Operation**

Masaru Furukawa, Hiroshi Kono, Kenya Sano, Masakazu Yamaguchi, Hisashi Suzuki, Tadashi Misao, Toshiba Electronic Devices & Storage, J; Georges Tchouangue, Toshiba Electronics Europe, D

**10:00 Parasitic Turn-On of SiC MOSFETs - Turning a Bug into a Feature**

Patrick Hofstetter, Robert W. Maier, Mark-M. Bakran, University of Bayreuth, D

**10:10 Threshold Voltage Stability of 1200 V SiC MOSFETs**

Oriol Lopez Sanchez, Elena Mengotti, Jason Bettega, Enea Bianda, ABB Switzerland, CH; Stephan Wirths, Giovanni Antonio Salvatore, ABB Power Grids, CH

**10:20 750V, 10.5mOhm SiC Power MOSFET for Use in Electric Vehicles**

Jeffrey Casady, Sei-Hyung Ryu, Brett Hull, Shadi Sabri, Anri Mikirtichev, Satyavrat Laud, Amy Romero, Wolfspeed, A Cree Company, USA; Alexander Streibel, Norbert Apfel, Ole Mühlfeld, Danfoss Silicon Power, D

**10:30** Live 15-minute Q&A Session with the Speakers

### Stream 2

#### **Power Cycling**

**Chairperson:** Uwe Scheuermann, Semikron Elektronik, D

**09:50 Improvement of Power Cycling Life under Typical Operating Conditions of a Power Semiconductor Module by Sn-Based Solder Die Bonding**

Yu Harubeppu, Hisashi Tanie, Osamu Ikeda, Takaaki Miyazaki, Hitachi, J; Daisuke Kawase, Toshiaki Morita, Koji Sasaki, Hitachi Power Semiconductor Device, J

**10:00 SiC Module Operational at 200 °C with High Power-Cycling Capability Using Fatigue-Free Chip Surface Packaging Technologies**

So Tanaka, Hiroshi Notsu, Hisato Michikoshi, Jiro Shinkai, Hiroshi Sato, Kunihiro Sakamoto, AIST, J; Yasuki Mikamura, Sumitomo Electric Industries, J



- 10:10 Investigation of the Threshold Voltage Shift of SiC MOSFETs During Power Cycling Tests**  
Carsten Kempiak, Andreas Lindemann, Otto-von-Guericke-University, D
- 10:20 Power Cycling Test Bench Topology with Alternating Load Current and Online Temperature Measurement for Thyristor Devices**  
Maximilian Goller, Josef Lutz, Technical University of Chemnitz, D; Tom Simon, Semikron, D; Norbert Reichenbach, Gerhard Mitic, Siemens, D; Christian Herold, Valeo Siemens eAutomotive, D
- 10:30** Live 15-minute Q&A Session with the Speakers

### Stream 3

#### Transducers and Sensors

Chairperson: Eric Favre, IMI Precision Engineering, CH

- 09:50 Practical Implementation and Verification of Simple-To-Implement Digital Current Observer for Half-Bridge Topologies**  
Mohsin Ejaz Ahmad, Frank Schafmeister, Joachim Böcker, University of Paderborn, D
- 10:00 Indirect DC Link Current Measurement Technique Using an Op-Amp Circuit in an Automotive DC Converter with Coupled Inductors**  
Arturs Bogdanovs, Riga Electric Machine Building Works, LV; Oskars Krievs, Riga Technical University, LV; Johannes Pforr, University of Applied Sciences Ingolstadt, D
- 10:10 Current Sensing by Means of Parasitic Inductances – Method Investigation and Inverter Application**  
Frank Lautner, Mark-M. Bakran, University of Bayreuth, D
- 10:20 Simplifying the Calibration of On-State Voltage Drop for Online Junction Temperature Estimation in an Industrial Context**  
Angus Bryant, Amantys Power Electronics, GB
- 10:30** Live 15-minute Q&A Session with the Speakers

### Stream 1

#### Sintering Technologies

Chairperson: Frank Osterwald, Danfoss Silicon Power, D

- 10:45 Bonding with Copper Paste for Pressure Sintering Process**  
Shinichi Yamauchi, Kei Anai, Jung-Lae Jo, Takahiko Sakaue, Mitsui Mining & Smelting, J; J.Y. Chang, S.Y. Fun, H.W. Cheng, T.C. Chang, ITRI Industrial Technology Research Institute, TWN
- 10:55 Superior Bonding Reliability of Sintered Cu Bonding at Power Cycle Test**  
Hideo Nakako, Michiko Natori, Dai Ishikawa, Motohiro Negishi, Yuki Kawana, Yoshinori Ejiri, Hitachi Chemical, J
- 11:05 Study of POL Tile Using Ag Sintering Material**  
Kei Murayama, Mitsuhiro Aizawa, Shingo Hayashibe, Kiyoko Tajima, Kiyoshi Oi, Shinko Electric Industries, J
- 11:15 3.3kV All SiC Module with 1st Generation Trench Gate SiC MOSFETs for Traction Inverters**  
Yusuke Sekino, Takashi Tsuji, Ryosuke Usui, Makoto Utsumi, Yoshiyuki Kusunoki, Susumu Iwamoto, Takashi Shiigi, Manabu Takei, Yasuyuki Kobayashi, Yasuhiko Onishi, Hiroshi Kimura, Fuji Electric, J
- 11:25** Live 15-minute Q&A Session with the Speakers

## Stream 2

### Control Techniques in Electrical Drives

Chairperson: Manfred Schrödl, Vienna University of Technology, A

- 10:45**            **Online Compensation of Rotor Position Errors of Resolvers in PMSMs for EVs: A Novel FxLMS Adaptive Filter Based Approach with Stabilized V/f Control**  
Yuping Chen, Gunther Götting, Robert Bosch, D; Jian Xie, University of Ulm, D
- 10:55**            **Influence of the Current Sensor Characteristics on the INFORM method**  
Mario Nikowitz, Richard Spießberger, Manfred Schrödl, Technical University of Vienna, A
- 11:05**            **Compensation of Torque Deviation Caused by Magnet Temperature Variation for a Flux Based IPMSM Core Control**  
Felix Bertele, Ulrich Ammann, Christoph Cheshire, Tobias Rösner, University of Applied Sciences Esslingen, D
- 11:15**            **Investigation of Shifted PWM Methods for a Dual Three-Phase System to Reduce Capacitor RMS Current**  
Bernhard Hopfensperger, Andreas Daubner, Fabian Herrmann, OTH Regensburg, D; Andrew Hopkins, Phil Mellor, University of Bristol, GB
- 11:25**            Live 15-minute Q&A Session with the Speakers

## Stream 3

### Thermal Management and Inductance Design

Chairperson: Katsuaki Saito, Hitachi Power Semiconductor Device, J

- 10:45**            **Development of Directly Liquid Cooled Integrated Substrate for Power Modules**  
Hideyo Osanai, Akio Yamamoto, Koji Kobayashi, Dowa Power Device, J; Bernd Medick, Dowa HD Europe, D; Akira Sugawara, Dowa Metaltech, J
- 10:55**            **Fourth Generation Aluminum Direct Water Cooling Structure with High Reliability for Automotive Electric System**  
Steffen Ewald, Fuji Electric Europe, D; Yuuta Tamai, Hiromichi Gohara, Tomoyuki Yamazaki, Ryoichi Kato, Kohei Yamauchi, Fuji Electric, J
- 11:05**            **Spatial Thermal Frequency Response Measurement of Power Semiconductor Equipment**  
Timothy Polom, Silicon Austria Labs, A; Robert Lorenz, University of Wisconsin-Madison, USA
- 11:15**            **Ultra-Fast Switching 3.3kV SiC High-Power Module**  
Slavo Kicin, Ralph Burkart, Jean-Yves Loisy, ABB Power Grids Research, CH; Francisco Canales, ABB Corporate Research, CH; Muhammad Nawaz, ABB Power Grids Research, S; Gernot Stampf, Pauline Morin, Tobias Keller, ABB Semiconductors, CH
- 11:25**            Live 15-minute Q&A Session with the Speakers



**11:40 Lunch Break**

**Stream 1**

**13:00 Keynote**

**Chairperson:** Silvio Colombi, ABB, CH

**Battery Energy Storage Systems: Past, Present and Future**

Ahmed Elasser, Principal Systems Engineer, GE Global Research Center, USA

**13:20** Live 20-minute Q&A Session with the Keynote Speaker

**Stream 1**

**Special Session: Reliability and Safety of Energy Storage Systems**

**Chairperson:** Silvio Colombi, ABB, CH

**13:40 Safety and Reliability of Li-Ion Batteries**

Daniel Chartouni, Minglong He, ABB, CH; Anna-Mikaela Andersson, ABB, S

**13:50 Current Developments of Battery Management Systems**

Priscilla Caliendo, Christian Vöggtli, Andrea Vezzini, Daniel Luder, Bern University of Applied Sciences, CH

**14:00 Battery Energy Storage System Safety: Critical Steps for the Maturing Storage Market**

Ahmed Elasser, GE Global Research Center, USA; Kenneth Rush, General Electric, USA

**14:10** Live 15-minute Q&A Session with the Speakers

**Stream 2**

**Automotive DC-DC Converters**

**Chairperson:** Johann Walter Kolar, ETH Zürich, CH

**13:40 A 3,6 kW Single-Stage LLC Converter Operating in Half-Bridge, Full-Bridge and Phase-Shift Mode for Automotive Onboard DC-DC Conversion**

Philipp Rehlaender, Joachim Böcker, University of Paderborn, D; Frank Schafmeister, Tobias Grote, Sergey Tikhonov, Delta Energy Systems, D

**13:50 Two-Stage Automotive DC-DC Converter Design with Wide Voltage-Transfer Range Utilizing Asymmetric LLC Operation**

Tobias Rüschenbaum, Phuong Ha, Tobias Grote, Delta Energy Systems, D; Philipp Rehlaender, Frank Schafmeister, Joachim Böcker, University of Paderborn, D

**14:00 AC or DC Fast Charging Solutions**

Laurent Garnier, Daniel Chatroux, CEA, F

**14:10** Live 15-minute Q&A Session with the Speakers

**Stream 3**

**GaN Applications**

**Chairperson:** Marc Hiller, Karlsruhe Institute of Technology, D

**13:40 Impact of the Dynamic On-State Resistance Increase in a Phase-Shifted GaN Low Voltage Converter**


Tino Kahl, Carsten Kuring, Sibylle Dieckerhoff, Technical University of Berlin, D; Christopher Fromme, Marvin Tannhäuser, Siemens, D

- 13:50**            **Comprehensive Comparison of 99% Efficient Totem-Pole PFC with Fixed (PWM) or Variable (TCM) Switching Frequency**  
Maximilian Nitzsche, Siyuan Lu, Matthias Zehelein, Johannes Ruthardt, Jörg Roth-Stielow, University of Stuttgart, D
- 14:00**            **High Frequency Investigation of Wide Bandgap-Based PFC and LLC Converters in PSU**  
Jimmy Liu, Lyubov Yushyna, GaN Systems, CDN
- 14:10**            Live 15-minute Q&A Session with the Speakers

### Stream 1

#### High Voltage IGBT Modules

Chairperson: Josef Lutz, Chemnitz University of Technology, D


- 14:25**            **XHP 2 – The Low Inductive, Multi-Package Housing for the Next Generation of High-Power Applications**  
Walerei Brekel, Wilhelm Rusche, Alexander Höhn, Wolfgang Bücken, Infineon Technologies, D
-  **14:35**            **Rugged 4500V HiPak Module with 1500A Current Rating and 150°C Capability for Traction Application**  
Luca De Michielis, Maxi Andenna, Boni Boksteen, Daniel Prindle, Virgiliu Botan, Evgeny Tsyplakov, Gontran Paques, ABB Power Grids, CH
- 14:45**            **Latest IGBT4 Chip Technology Enables the First 2000 A 3300 V Module in IHV Package**  
Vishal Jadhav, Sergio Mansueto, Matthias Buerger, Ulrich Schwarzer, Diana Car, Hans-Peter Felsl, Infineon Technologies, D; Thomas Soellradl, Thomas Kurzmann, Infineon Technologies, A
- 14:55**            **Exploring the RBSOA Boundaries of a 6.5kV/1000A Trench Gate IGBT Module at Different Temperatures**  
Luther-King Ngwendson, Ian Deviny, Lee Coulbeck, Arthur Su, Ariful Islam, Dynex Semiconductor, GB
- 15:05**            **2.3 kV – A New Voltage Class for Si IGBT and Si FWD**  
Frank Umbach, Philip Brandt, Sergio Mansueto, Wilhelm Rusche, Andreas Korzenietz, Infineon Technologies, D; Ute Queitsch, Infineon Technologies Dresden, D; Damiano Cassese, Infineon Technologies, A
- 15:15**            Live 15-minute Q&A Session with the Speakers

### Stream 2

#### Gate Drivers and Control Methodologies

Chairperson: Ulrich Kirchenberger, STMicroelectronics, D



- 14:25**            **Driving GaN HEMT High-Voltage Half-Bridge with a Single-Channel Non-Isolated Gate Driver with Truly Differential Inputs**  
Diogo Varajao, Infineon Technologies, D; Thomas Ferianz, Vincent Chi Zhang, Carmen Menditti Matrisciano, Infineon Technologies, A;

- 14:35**      **Influence of the Gate Resistance on the Short Circuit Type II & III Behavior of IGBT Modules and Protection**  
Xing Liu, Jens Kowalsky, Clemens Herrmann, Thomas Basler, Josef Lutz, Technical University of Chemnitz, D
- 14:45**      **Scalable Marine Bus-Tie Switch for Switchboard Interconnections**  
Gabriele Ulissi, Drazen Dujic, Power Electronics Laboratory, EPFL, CH; Seong-Yong Lee, Hyundai Electric & Energy Systems, ROK
- 14:55**      **dV/dt Control Methods for UnitedSiC SiC FETs with Internal Cascode Structure**  
Zhongda Li, Anup Bhalla, Pete Losee, Ke Zhu, United Silicon Carbide, USA
-  **15:05**      **Threshold Voltage Stability Study on Power SiC MOSFETs Using High-k Dielectrics**  
Stephan Wirths, Jason Bettega, Manuel Belanche-Guadas, Andrei Mihaila, Yulieth Arango, Marco Bellini, Gianpaolo Romano, Lars Knoll, ABB Power Grids, CH; Elena Mengotti, Oriol Lopez Sanches, Enea Bianda, ABB Switzerland, CH
- 15:15**      Live 15-minute Q&A Session with the Speakers

### Stream 3

#### Energy Storage Technologies

Chairperson: Giuseppe Tomasso, University of Cassino and Southern Lazio, I

- 14:25**      **A Fault Tolerant Reconfigurable Battery System for Stationary Applications Utilizing 2nd Life Batteries**  
Simon Bischof, Thomas Blank, Marc Weber, Karlsruhe Institute of Technology, D
-  **14:35**      **Performance Analysis of Active and Passive Equalizer Circuits for Lithium-Ion Cells**  
Francesco Porpora, Umberto Abronzini, Mauro Di Monaco, Vito Nardi, Giuseppe Tomasso, University of Cassino and Southern Lazio, I; Ciro Attaianese, University of Naples Federico II, I; Matilde D'Arpino, The Ohio State University, USA
- 14:45**      **Characterization, Modeling and Simulation of a New High Longevity and High Power Density Energy Storage System**  
Daniel Evans, Nicolas Sockeel, Jim Gafford, Somasundaram Essakiappan, Madhav Manjrekar, Mike Mazzola, University North Carolina at Charlotte, USA; Marco Verlohner, Karlsruhe Institute of Technology, D
- 14:55**      **Multi-Level Flying Capacitor ZVS Clamp-Switch Boost Converter**  
Burkhard Ulrich, Baden-Wuerttemberg Cooperative State University Stuttgart, D
-  **15:05**      **Design and Optimization of a GaN-Based High-Voltage Waveform Generator for Industrial and Biomedical Applications**  
Oscar Lucia, Hector Sarnago, Ignacio Alvarez-Gariburo, Jose M. Burido, University of Zaragoza, E
- 15:15**      Live 15-minute Q&A Session with the Speakers

## 15:30 Dialogue Sessions with the Poster Presenters

During the dialogue sessions, the poster presenters will be available exclusively for live discussion and questions in a webinar. The dialogue session is scheduled for one hour and a half. Please note, that the presentations can be viewed beforehand or during this period on-demand.

### Magnetics

Chairperson: Jan Abraham Ferreira, Delft University of Technology, NL

- PP001**      **Influence of the Battery Inductance and Battery Resistance on the DC-Link Voltage Ripple in Battery-Fed PWM Inverter Systems: A Detailed Normalized Investigation**  
Panagiotis Mantzanas, Daniel Kübrich, Thomas Dürbaum, Friedrich-Alexander-University Erlangen-Nuremberg, D; Alexander Bucher, Alexander Pawellek, Christian Hasenohr, Harald Hofmann, Valeo Siemens eAutomotive, D
- PP002**      **Quantification of Ansys Q3D Extractor for Inductive Extraction of Power Modules**  
Florian Sawallich, Hans-Günter Eckel, University of Rostock, D
- PP003**      **High-Frequency Models for the Prediction of Transient Effects in Motor Windings Under Fast Rising Impulse Voltages**  
Ting Helmholdt-Zhu, Lenze, D; Benjamin Knebusch, Leibniz University Hannover, D; Holger Borcharding, Technical University of Ostwestfalen-Lippe, D
- PP004**      **Comprehensive Analysis of Filter Inductor Topology on Common-Mode Conducted Emissions in Buck and Boost Converters**  
Jared Helton, Andrew Lemmon, University of Alabama, USA; Aaron Brovont, PC Krause and Associates, USA
- PP005**      **Metrological Loss Separation to Determine the Influence of Power Electronic Currents on the Static Hysteresis Losses of Passive Magnetic Components**  
Michael Owzareck, Ömer Akbas, Sascha Langfermann, BLOCK Transformatoren-Elektronik, D; Nejila Parspour, University of Stuttgart, D
- PP006**      **Design of a 40 kHz Inverse Coupled Inductor for an Inverter System**  
Sascha Langfermann, Michael Owzareck, BLOCK Transformatoren-Elektronik, D

### Modeling, Optimization and Virtual Prototyping

Chairperson: Andreas Lindemann, Otto-von-Guericke-University Magdeburg, D

- PP007**      **A Closed-Loop Power-Hardware-in-the-Loop Testbed for Low Voltage Modular Multilevel Converter Design Validation**  
Marc René Lotz, Martin Könemund, Ostfalia University of Applied Sciences, D; Melanie Hoffmann, Technical University of Braunschweig, D
- PP008**      **An Analytical Model of the DC-Link Current Ripple in Multiphase PWM Inverter**  
Nasreddine Kesbia, Hadi Alawieh, VEDECOM Institute, F; Jean-luc Schanen, Lauric Garbuio, G2elab, F

- PP009**      **Finite Element Method Integration on Mission Profile for Silicon Carbide (SiC) MOSFET Power Module Used in the EV Traction Inverter**  
Alessandra Manzitto, Vittorio Giuffrida, Daniela Cavallaro, Gaetano Bazzano, STMicroelectronics, I
- PP010**      **Designing a Battery Emulator/Tester from Scratch to Prototyping to Automated Testing within a HIL Digital Twin Environment**  
Selimcan Deda, Alexander Eder, Vinodkumar K. Mhetre, Aaron Kuchling, Roland Greul, Oliver König, AVL List, A
- PP011**      **Electrical Modeling of an Interrupting Topology Solid-State DC Breaker**  
Renan Pillon Barcelos, Marcelo Lobo Heldwein, Federal University of Santa Catarina, BR
- PP012**      **Design Procedure of DC-DC Multi-Port Active-Bridge Converters**  
Soleiman Galeshi Mooziraji, David Frey, Yves Lembeye, G2Elab, F

### High Power Devices

Chairperson: Stéphane Lefebvre, CNAM - SATIE, F

- PP013**      **Reverse-Switched Dynistor with Integrated Control**  
Alexey Khapugin, Alexander Plotnikov, Alexey Grishanin, Valentin A. Martynenko, PJSC Electroprivyamitel, RUS
- PP014**      **Improved Double-Pulse Tests for Medium-Voltage Devices**  
Johann Asam, Max-Josef Kell, Jorge Mari, Stefan Schröder, Tobias Schütz, Danfoss Silicon Power, D
- PP015**      **A 6500 A, 4500V, 94 mm Assymmetric IGCT**  
Tobias Wikström, ABB Power Grids, Semiconductor, CH; Didier Cottet, ABB Power Grids, Corporate Research, CH
- PP016**      **Asymmetric Dynamic Avalanche During Turn-Off in Paralleled IGBT Chips Under Long Term Testing Conditions**  
Julian da Cunha, Robin Werner, Hans-Günter Eckel, University of Rostock, D
- PP017**      **7th Generation High Reliability HPnC Module for Traction Applications**  
Deborah Schneider, Junya Kawabata, Fuji Electric Europe, D; Keniti Yoshida, Hiroaki Ichikawa, Shuangching Chen, Taku Takaku, Yasuyuki Kobayashi, Souichi Okita, Yuichi Onozawa, Fuji Electric, J
- PP018**      **Small Standard Components Strategy, Twenty Years Later**  
Daniel Chatroux, Yvan Lausenaz, CEA, F
- PP019**      **10 kA Switch with MOSFET in Avalanche for Lithium-Ion Battery Short-Circuit Tests**  
Daniel Chatroux, Julien Chauvin, CEA, F

### Advanced Power Semiconductor Devices and Hybrid Combinations

Chairperson: Stefan Linder, Alpiq, CH

- PP020**      **Breaking the IGBT Eloss/VCEsat Trade Off Relationship by Wedding Si IGBT + SiC MOSFET**  
Sara Kochoska, Thomas Neyer, ON Semiconductor, D; Kyeongseok Park, ON Semiconductor, ROK



- PP021**      **Silicon and SiC Hybrid Switch Performance in the Advanced Neutral Point Clamp (ANPC) Topology Based Power Module**  
Hadiuzzaman Syed, Matthias Tauer, Vincotech, D; Ernő Temesi, Vincotech, H
- PP022**      **Transient Current Imbalances of Multiple Paralleled IGBTs**  
Robin Werner, Julian da Cunha, Hans-Günter Eckel, University of Rostock, D
- PP023**      **Investigation of Extended IGBT Desaturation in the Context of a Si SiC Hybrid Switch for Inverters with Resonant Load**  
Michael Meissner, Klaus Hoffmann, Helmut Schmidt University, D
- PP024**      **Investigation on the Physics Mechanism of Implanted Proton for 1200V FRD Application**  
Zhonghua Zhang, Haihui Luo, Pengfei Liu, Zhihui Tang, Qiang Xiao, Bin Yuan, Canjian Tan, Yao Yao, Guoyou Liu, State key Laboratory of Advanced Power Semiconductor Devices, CN; Ian Deviny, Dynex Semiconductor, GB
- PP025**      **Benchmarking of a Novel SiGe Diode Technology for the Usage in High Frequency 48V/12V Converter Applications**  
Ali Aneissi, Michael Meissner, Klaus Hoffmann, Helmut Schmidt University, D; Reza Behtash, Jan Fischer, Sebastian Fahlbusch, Nexperia, D

#### **SiC Devices I**

Chairperson: Hans Ertl, Technical University of Vienna, A

- PP026**      **Physics-Based Device Model for a Silicon Carbide Trench MOSFET**  
Takeshi Horiguchi, Takashi Masuhara, Katsutoshi Sugawara, Yasushige Mukunoki, Mitsubishi Electric, J
- PP027**      **Fast and Reliable Switching of Parallel SiC MOSFET Chips in a Half-Bridge Module**  
Athanasios Mesemanolis, Milad Maleki, Samuel Hartmann, Antoni Ruiz, David Weiss, Gontran Paques, Tobias Keller, ABB Power Grids, CH
- PP028**      **An Economic Evaluation of SiC-MOSFET Modules in Wind Turbine Converters**  
Till-Mathis Plötz, Christian Neumann, Robin Schmidtke, Hans-Günter Eckel, University of Rostock, D
- PP029**      **SiC MOSFET Body Diode Qualification Testing Platform with Repetitive Switching Current Stressing**  
Gin Sheh, Xuning Zhang, In-Hwan Ji, Littelfuse, USA
- PP030**      **Comparative Study of Packaging Effects of SiC MOSFETs on their Performances in a 10kW Boost Converter**  
Yuequan Hu, Teik Siang Ong, Cree, USA; Jianwen Shao, Julius Rice, James Solovey, Wolfspeed, A Cree Company, USA

#### **SiC Devices II**

Chairperson: Serge Bontemps, Microsemi Power Module Products, F

- PP031**      **SiC MOSFETs Applications and Technology Robustness Evaluation Under Avalanche Conditions**  
Salvatore La Mantia, STMicroelectronics, D; Mario Pulvirenti, Angelo Giuseppe Sciacca, Massimo Nania, STMicroelectronics, I

- PP032**      **Comparative Study of Electrical Characteristics Between Conventional and SBD-Embedded MOSFETs for Next Generation 3.3kV SiC Modules**  
Takeshi Murakami, Koji Sadamatsu, Masayuki Imaizumi, Eisuke Suekawa, Shiro Hino, Mitsubishi Electric, J
- PP033**      **Experimental Investigation of SiC MOSFET Performance Using Different Gate Driving Strategies**  
Anselmo Gianluca Liberti, Maurizio Melito, Giuseppe Catalisano, STMicroelectronics, I
- PP034**      **Parametric Optimisation of New SiC Power MOSFET Model Using Experimental Performance Data**  
Ali Alhoussein, Hadi Alawiyeh, VEDECOM Institute, F; Zouheir Riah, Yacine Azzouz, ESIGELEC, F

#### **GaN Devices**

Chairperson: Klaus Marahrens, SEW-Eurodrive, D

- PP035**      **Not All GaN Transistors are Built Equal: The Benefits of Vertical GaN-on-GaN**  
Dinesh Ramanathan, Charles Coles, Wolfgang Meier, NexGen Power Systems, USA
- PP036**      **Impact of Negative Turn-Off Voltage On Turn-On Losses in GaN E-HEMTs**  
Lukas Will, Sebastian Sprunck, Peter Zacharias, University of Kassel, D
- PP037**      **Performances Evaluation of ST's New HEMT GaN vs SJ Si MOSFETs in Resonant Converters**  
Domenico Nardo, Agatino Palermo, Filadelfo Fusillo, Rosario Scollo, Simone Buonomo, STMicroelectronics, I
- PP038**      **Static and Dynamic Characterization of a Monolithic Integrated Temperature Sensor in a 600 V GaN Power IC**  
Dominik Koch, Jan Hückelheim, Kevin Muñoz Barón, Ingmar Kallfass, University of Stuttgart, D; Stefan Mönch, Richard Reiner, Patrick Waltereit, Fraunhofer Institute IAF, D
- PP039**      **Novel GaN Half-Bridge Configuration for the Measurement of Core Losses Under Rectangular Voltages and DC-bias**  
Erika Stenglein, Benedikt Kohlhepp, Daniel Kübrich, Manfred Albach, Thomas Dürbaum, Friedrich-Alexander-University Erlangen-Nuremberg, D

#### **Packaging Technologies**

Chairperson: Frank Osterwald, Danfoss Silicon Power, D

- PP040**      **Design and Characterization of PCB-Embedded Power Dies Using Solderless Pressed Metal Foam**  
Said Bensebaa, SATIE-ENS Paris Saclay, F; Stéphane Lefebvre, Mickael Petit, CNAM - SATIE, F; Mounira Berkani, SATIE - UPEC, F
- PP041**      **Wafer Level Silver Sintering Die Attach for Power Discrettes**  
Gyan Dutt, Oscar Khaselev, Monnir Bouregghda, Julien Jouget, MacDermid Alpha Electronic Solutions, USA; Maurizio Fenech, MacDermid Alpha Electronic Solutions, D
- PP042**      **Electroplating of Aluminium and Copper for Reliable Electrical Connections for Power Electronics**  
Gerald Metge, Arno Marto, Inovon, D

**PP043 Thermal Study on Leadframe Dimensioning for High Power Dissipation and Low Inductance Commutation Cells**

Julian Weimer, Dominik Koch, Ingmar Kallfass, University of Stuttgart, D; Ankit Bhushan Sharma, Till Huesgen, University of Applied Science Kempten, D

**PP044 Design Limitations of Heat Spreaders for Gallium Nitride Power Modules**

Björn Pelle Weiler, Bas Vermulst Maurice Roes, Korneel Wijnands, Eindhoven University of Technology, NL

**PP045 Analysis of Warpage Behavior of Electrochemical Deposited Thick Copper on Silicon**

Alessandro Sitta, Antonio Landi, Brunella Cafra, Marco Renna, Michele Calabretta, STMicroelectronics, I

**Power Module Design**

Chairperson: Klaus Hoffmann, Helmut Schmidt University, D

**PP046 Design and Development of High Voltage and High Current SiC MOSFET Modules**

Puqi Ning, Yuhui Kang, Tianshu Yuan, Chinese Academy of Sciences, CN

**PP047 Packaging for Multi-Die Integration of GaN Transistors in Application Under 1kW**

Johan Delaine, Christine Laurant, Dominique Bergogne, Venceslass Rat, Frederic Rothan, Gilles Simon, CEA, F; Thierry Bouchet, LETI, F

**PP048 High Temperature Packaging for Sensor Elements**

Lars Rebenklau, Paul Gierth, Henry Barth, Fraunhofer Institute IKTS, D

**PP049 Novel Joining Technologies in Traction Power Semiconductor Modules for Fulfillment of Roll2Rail Requirements**

Harald Beyer, Milad Maleki, Martin Bayer, Fabian Fischer, Gontran Pâques, ABB Power Grids Switzerland, Semiconductors, CH

**PP050 The Development of High Performance in Hybrid SiC Power Integrated Module (PIM)**

Jing-Yao Chang, Su-Yu Fun, Sheng-Tsai Wu, Fang-Jun Leu, Yuan-Yin Lo, Po-Kai Chiu, Tai-Jyun Yu, Han-Lin Wu, Wei-Kuo Han, Chih-Ming Tzeng, Shi-Feng Hsu, Kuo-Shu Kao, Hsin-Han Lin, Tao-Chih Chang, Industrial Technology Research Institute, RC; Shinichi Yamauchi, Kei Anai, Jung-Lae Jo, Takahiko Sakaue, Mitsui Mining & Smelting, J

**PP051 A Power Loss Modeling Approach to Mosfet Selection**

Shishir Rai, DiscoverEE, USA

**PP052 Thermal Solutions for Surface Mount Power Devices**

Jianwen Shao, James Solovey, Wolfspeed, A Cree Company, USA; Frank Wei, Wolfspeed, A Cree Company, CN; Xin Zhao, University of Texas, USA

**Reliability**

Chairperson: Peter Zacharias, University of Kassel, D

**PP053 Artificial Intelligence-Based Approach for Damage Estimation of Power IGBTs from Real Mission Profiles**

Francesco Iannuzzo, Martin Bendix Fogsgaard, Jacob Bitsch Nørgaard, Aalborg University, DK

- PP054**      **H3TRB-Test on 1200 V SiC Schottky Diodes After Previous Operation**  
Felix Hoffmann, Nando Kaminski, University of Bremen, D; Peter Friedrichs, Infineon Technologies, D
- PP055**      **Power Cycle Test with Switching Losses and Integrated Hot-Spot Measurement**  
Alexey Krupin, Jan Fuhrmann, Hans-Günter Eckel, University of Rostock, D
- PP056**      **Finding Solder Cavities in High Power Modules with Temperature-Sensitive Parameters**  
Jan Fuhrmann, Hans-Günter Eckel, University of Rostock, D; Sebastian Klauke, Infineon Technologies, D
- PP057**      **Power Cycling Capability of High Power IGBT Modules for Flexible HVDC System**  
Erping Deng, Jie Chen, Yushan Zhao, Zixuan Zhao, Yongzhang Huang, North China Electric Power University, CN
- PP058**      **Experimental Evaluation of Oxide Current on a Low Voltage Trench Gate Power MOS Under Mechanical Bending Conditions**  
Lorenzo Maurizio Selgi, Michele Calabretta, Alessandro Sitta, STMicroelectronics, I; Antonella Sciuto, Giuseppe D'Arrigo, CNR-IMM, I
- PP059**      **Simulation and Verification of a Lifetime Model Based on Front Side Metal Degradation of Sintered Die Top Systems (DTS®) in Power Cycling Tests (PCT)**  
Benjamin Fabian, Sven Thomas, Marko Kalajica, Andreas Hinrich, Anna Wolf, Stefan Gunst, Heraeus, D

#### **High Power Converters I**

Chairperson: Philip C. Kjaer, Vestas Wind Systems, DK

- PP060**      **Volume and Efficiency Optimization of an Industrial Flying Capacitor GaN Multilevel Inverter**  
Raphael Hartwig, Alexander Hensler, Siemens, D; Thomas Ellinger, Technical University of Ilmenau, D
- PP061**      **Analysis of Short Circuit Impact on Solid State Transformers**  
Dirk Fischer, Regine Mallwitz, Technical University of Braunschweig, D
- PP062**      **Improvement of ZVS Range in Dual Active Bridge Converters Using Nonlinear Inductors by Ferrite Block Insertion**  
Erik Smailus, Gerd Griepentrog, Technical University of Darmstadt, D; Marcel Lutze, Markus Pfeifer, Siemens, D
- PP063**      **Improvement of Dynamic Characteristics of Discrete 1200V SiC MOSFETs through Kelvin Source Connection**  
Jiri Smutka, Jan Svetlik, Jakub Hajek, STMicroelectronics, CZ; Vladimir Scarpa, STMicroelectronics, D
- PP064**      **Characterization of Phase Shifted Full Bridge Converter Along with GaN Devices and Series-Connected Hybrid Transformers for Medium Power Applications**  
Muhammad Abu Bakar, Muhammad Farhan Alam, Rasoul Shalchi Alishah, Kent Bertilsson, Mid Sweden University, S
- PP065**      **Mega Hertz SEPIC with Planar Integration of Magnetic Elements GaN-Based and Soft-Switching Operation**  
Joao Oliveira, VEDECOM Institute, F; Montie Vitorino, Mauricio Correa, Adalberto Filho, Federal University of Campina Grande, BR

- PP066**      **A High Power Density Inverter Utilizing SiC-MOSFET and Fair Comparison Method of the Same Kind of Power Converters**  
Akio Toba, Ikuya Sato, Motohito Hori, Takaaki Tanaka, Ryuji Yamada, Fuji Electric, J

#### **High Power Converters II**

Chairperson: Hubert Schierling, Siemens, D

- PP067**      **Power Factor Corrector for Bipolar Unbalanced Load and Asymmetrical Three-Phase Power Supply**  
Dmitriy Sorokin, Sergey Volskiy, Moscow Aviation Institute, RUS; Yury Skorokhod, Transconverter, RUS
- PP068**      **Argon ICP Plasma Torch at Atmospheric Pressure Driven by a SiC Based Resonant Converter Operating in MHz Range**  
Santiago Eizaguirre, Tim Gehring, Christoph Simon, Rainer Kling, Karlsruhe Institute of Technology, D; Fabian Denk, Ushio, D
- PP069**      **Design Verification of a High-Peak-Current Multi-Leg Sine-Wave Inverter**  
Christoph Friedrich, Thomas Fuchslueger, Hans Ertl, Technical University of Vienna, A; Markus Vogelsberger, Bombardier Transportation, A
- PP070**      **A New Seven-Level Grid-Connected Converter Using Model Predictive Controller**  
Rasoul Shalchi Alishah, Muhammad Abu Bakar, Kent Bertilsson, Mid Sweden University, S
- PP071**      **Experimental Evaluation of a High Power Medium Voltage Converter for a DC Grid Connected Agricultural Machine**  
Hafiz Kashif Iqbal, Jawad Ismail, Yun Wan, Pedro Leal dos Santos, Steven Liu, Technical University of Kaiserslautern, D

#### **Power Grid Stabilization and Security**

Chairperson: Pavol Bauer, Delft University of Technology, NL

- PP072**      **Low Commutation Inductance Using Standard Half Bridge IGBT Modules in High Power 3-Level (A)-NPC Inverters**  
Thomas Radke, Narender Lakshmanan, Daniel He, Mitsubishi Electric Europe, D; Satoshi Miyahara, Mitsubishi Electric, J
- PP073**      **Thermal Study of a Modular Multilevel Converter Submodule**  
Ignacio Polanco, Drazen Dujic, Power Electronics Laboratory, EPFL, CH
- PP074**      **1-MW Full-Bridge MMC for High-Current Low-Voltage (100V-400V) DC-Applications**  
Roland Unruh, Frank Schafmeister, Norbert Fröhleke, Joachim Böcker, University of Paderborn, D
- PP075**      **Measures to Increase the Efficiency of a Half-Bridge MMC**  
Fabian Hohmann, Mark-M. Bakran, University of Bayreuth, D; Dominik Schuster, Siemens, D
- PP076**      **NetProsum2030: A Contribution to the Solution for Distributed Energy Supply in 2030**  
Tobias Fricke, Cengiz Uzlu, Regine Mallwitz, Jonathan Ries, Jonas Wussow, Julia Brockschmidt, Michael Kurrat, Bernd Engel, Technical University of Braunschweig, D; Philipp Jungklass, Folkhart Grieger, IAV, D

- PP077**      **Definition of Attack Vectors to Detect Possible Cyber-Attacks on Electrical Machines**  
Lisa Ilsenstein, Manfred Koch, Heinrich Steinhart, University of Aalen, D
- PP078**      **Application of Technologies from the Telecommunication Networks for the Protection of Data Generated from Power Electronic Devices**  
Ivan Nedyalkov, Alexey Stefanov, South - West University "Neofit Rilski", BG; Georgi Georgiev, Union of Electronics, Electrical Engineering and Telecommunications, BG

**Converters for Renewable Energy Applications**  
Chairperson: Mike Meinhardt, SMA Solar Technology, D

- PP079**      **Direct Model Predictive Control for Grid-Connected Four-Leg Quasi-Z-Source Converter Under Unbalanced Conditions**  
Mohamed Abdelrahem, Ümit Degmez, Ralph Kennel, Technical University of Munich, D; Jose Rodriguez, Andrés Bello National University, RCH
- PP080**      **Wind Energy Powered Electricity Grids**  
David Matthies, Alexander Ernst, Bernd Orlik, University of Bremen, D
- PP081**      **Real-Time Hardware-in-the-Loop Rotor for a Wind Turbine Nacelle Test Bench**  
Sören Behrens, Wilfried Holzke, Holger Raffel, Bernd Orlik, University of Bremen, D
- PP082**      **A Compact High-Efficiency GaN Based 400W Solar Micro Inverter in ZVS Operation**  
Van Sang Nguyen, Stephane Catellani, Anthony Bier, Jeremy Martin, Henri Zara, Jeremie Aime, CEA Tech, F
- PP083**      **Modular Research Platform with Bidirectional Converter Techniques for Investigation of Novel Control Strategies in Converter-Based Grids**  
Gerrit Bremer, Holger Behrends, Vanessa Beutel, Michael Kröner, Stefan Geißendörfer, Karsten von Maydell, DLR Institute of Networked Energy Systems, D

## Wednesday 8 July 2020

### Stream 1

**09:00 Welcome Words**

### Stream 1

**09:10 Keynote**

**Chairperson:** Josef Lutz, Chemnitz University of Technology, D

#### **Innovative Data Center Power Solutions**

Roland Hümpfner, Vice President UPS and Inverter Product Line, Huawei Technologies, D

**09:30** Live 20-minute Q&A Session with the Keynote Speaker

### Stream 1

#### **Special Session: Rail Traction Power Supplies**

**Chairperson:** Philippe Ladoux, University of Toulouse, F

- 09:50**            **Static Frequency Converters for Railway Power Supply Based on IGCT High Power Semiconductors**  
Tobias Thurnherr, Philippe Maibach, Beat Buchmann, Eugen Bärlocher, ABB Power Grids, CH
- 10:00**            **Long-Horizon Direct Model Predictive Control for a Series-Connected Modular Rectifier**  
Mattia Rossi, Francesco Castelli-Dezza, Polytechnic University of Milan, I; Petros Karamanakos, Tampere University of Technology, FIN; Eyke Liegmann, Ralph Kennel, Technical University of Munich, D
- 10:10**            **Fixed Energy Storage System and High Voltage System for DC Electrified Railway**  
Takeshi Konishi, Hiroaki Morimoto, Tsurugi Yoshii, Tamanosuke Oide, Railway Technical Research Institute, J
- 10:20**            **Scalable Solid State Transformers (SSTs) for DC Railway Substations**  
Caroline Stackler, Diego Velazco, François Wallart, Piotr Dworakowski, SuperGrid Institute, F
- 10:30**            **Towards a Unified Low Frequency Stability Criterion for 15 kV/16.7 Hz and 25 kV/50 Hz Railway Power System**  
Yosr Hachicha, David Cypers, Sébastien Belin, Maxime Meli, Alstom Transport, F; Philippe Ladoux, Nicolas Roux, University of Toulouse, F
- 10:40**            Live 15-minute Q&A Session with the Speakers

## Stream 2

### Module Design

Chairperson: Peter Kanschat, Infineon Technologies, D

- 09:50**            **Wiring Technology for Upcoming Generation Power Module**  
Yoshihisa Uchida, Shinichi Izuo, Kiyoshi Arai, Masao Kikuchi, Mitsubishi Electric, J
- 10:00**            **New Solderless Structure Power Module for High Reliability**  
Yuji Sato, Yusaku Ito, Ken Sakamoto, Koji Yamazaki, Takeshi Ijima, Ryuichiro Hanada, Tetsu Negishi, Hiroshi Kobayashi, Shinnosuke Soda, Kazuyasu Nishikawa, Mitsubishi Electric, J
- 10:10**            **2000V Class IGBT Concept for Renewable Energy Converter**  
Satoshi Miyahara, Koichi Masuda, Masaomi Miyazawa, Kenji Suzuki, Hidenori Fujii, Mitsubishi Electric, J
- 10:20**            **Low Inductive Full Ceramic SiC Power Module for High-Temperature Automotive Applications**  
Kirill Klein, Olaf Ramer, Eckart Hoene, Fraunhofer Institute IZM, D; Yusuke Yasuda, Hitachi Metals Europe, D; Hiroyuki Ito, Fumi Kurita, Masato Enoki, Hideyuki Nakamura, Kenji Okishiro, Hitachi Metals, J
- 10:30**            **Automotive High Power Module with Spacer on Die Bottom (Flip Chip) or Die Top (Wire Bond)**  
Yusheng Lin, Yong Liu, ON Semiconductor, USA
- 10:40**            Live 15-minute Q&A Session with the Speakers



## Stream 3

### Design Tools and Applications I

Chairperson: Enrique Dede, University of Valencia, E

- 09:50**            **Analytical Modeling of Ripple Currents in a Drive Inverter with a LC Sine Wave Filter**  
Thorben Schobre, Niklas Langmaack, Regine Mallwitz, Technical University of Braunschweig, D
- 10:00**            **Development of an Accurate SPICE Model for a New 1.2-kV SiC-MOSFET Device**  
Takashi Masuhara, Takeshi Horiguchi, Yasushige Mukunoki, Tomohide Terashima, Naochika Hanano, Eisuke Suekawa, Mitsubishi Electric, J
- 10:10**            **Modeling and Loss Simulation of Magnetic Components in Power Electronic Circuit by Impedance Measurement**  
Lukas Bohning, Ulf Schwalbe, University of Applied Sciences Fulda, D
- 10:20**            **Integrated Simulation Approach to Loss Calculations of Power Converter Systems**  
Nikolina Djekanovic, Drazen Dujic, Power Electronics Laboratory, EPFL, CH; Min Luo, Plexim, CH
- 10:30**            **Simulation of a Vienna Rectifier Using a Fixed State-Space Approach**  
Axel Kiffe, Katrin Witting, Frank Puschmann, dSPACE, D
- 10:40**            Live 15-minute Q&A Session with the Speakers



### Stream 1

#### Si and GaN Integration

Chairperson: Gourab Majumdar, Mitsubishi Electric, J

- 10:55 Optimization of Monolithic RC Snubber in a 100V Shielded-Gate MOSFET**  
Hrach Amirkhanian, Kapil Kelkar, Infineon Technologies , USA
- 11:05 A Low Voltage BLDC Motor Drive Inverter Using a Monolithic GaN ePower Stage**  
Michael de Rooij, Brandon Perez, Yuanzhe Zhang, Efficient Power Conversion, USA;  
Henry Qiu, Efficient Power Conversion, CN
- 11:15 300 A Solid State Circuit Breaker Using Parallel Connected GaN Bidirectional Switch**  
Asamira Suzuki, Takashi Ichiryu, Yusuke Kinoshita, Hidetoshi Ishida, Hiroyuki Handa,  
Tsuguyasu Hatsuda, Panasonic, J
- 11:25 Super Low Loss Diode (SLLD) for Automotive Alternator Generators**  
Yutaka Senzaki, Masato Nakamura, Junichi Sakano, Takeshi Terakawa, Tomohiro  
Onda, Shinya Sakita, Minoru Kanno, Hideyuki Sakai, Jun Takaku, Shinichi Kurita,  
Atsushi Numata, Hitachi Power Semiconductor Device, J; Kenya Kawano, Masaki  
Shiraishi, Yu Harubeppu, Hitachi, J
- 11:35** Live 15-minute Q&A Session with the Speakers

### Stream 2

#### Passive Components I

Chairperson: Manfred Schlenk, Dr. Schlenk-Consulting, D

- 10:55 Losses in Ferroelectric Dielectric Ceramic Capacitors due to Electromechanical Resonances**  
Hermann Haag, Florian Hämmerle, OMICRON Lab, A; André Mitterbacher, University  
of Applied Sciences Vorarlberg, A
- 11:05 Using Amorphous Iron Cores in 50 Hz Net Transformers – A Technique to Save Cost and Energy**  
Paul Winkler, Frank Tajo, Wulf Günther, Acal BFi, D
- 11:15 Electrical Energy Storage Protection by Fuses, Enabler for Safety**  
Jean-Francois de Palma, Mersen, F
- 11:25 Parameter Analysis and Synthesis of Assessment-Based Flux Trajectory Optimization Algorithm Using Virtual Prototyping**  
Marcel Gladen, WIL0, D; Volker Staudt, Axel Rothstein, Ruhr-University Bochum, D
- 11:35** Live 15-minute Q&A Session with the Speakers

### Stream 3

#### Design Tools and Applications II

Chairperson: Andreas Lindemann, Otto-von-Guericke-University Magdeburg, D

- 10:55 From Device Modeling to Characterization: A Complete End to End Design Flow for SiC Devices Half Bridge Design**  
Simon Muff, Abby Shih, Ludwig Eichinger, Bernhard Holzinger, Keysight  
Technologies, D; Hiroaki Tanigawa, Keysight Technologies, J



**11:05**      **Advanced Physics-Based Compact Models for New IGBT Technologies**  
Arnab Biswas, Maria Cotorogea, Infineon Technologies, D

**11:15**      **Behavioral Compact Models of IGBTs and Si-Diodes for Data Sheet Simulations Using a Machine Learning Based Calibration Strategy**  
Daniel Ludwig, Maria Cotorogea, Arnab Biswas, Infineon Technologies, D; Gazmend Alia, University of the Federal Armed Forces Munich, D



**11:25**      **Potential and Challenges of Additive Manufactured Substrates and Auxiliary Material for Electronics**  
Michael Schleicher, Semikron, D; Michael Matthes, Wittenstein cyber motor, D; Hanno Platz, GED Gesellschaft für Elektronik und Design, D

**11:35**      Live 15-minute Q&A Session with the Speakers

### **11:50 Lunch Break**

#### **Stream 1**

##### **Power Quality and EMC**

Chairperson: Jacques Laeuffer, Dtalents, F

**13:00**      **Effect of Voltage Ringing in SiC Power Modules on Conducted EMI of Traction Inverters**  
Andreas Apelsmeier, Cornelius Rettner, Martin März, Friedrich-Alexander-University Erlangen-Nuremberg, D

**13:10**      **Investigation of Different Piezoelectric Ceramics for Utilization in Piezoelectric EMI Filters**  
Florian Hubert, Philipp Dorsch, Thomas Dürbaum, Stefan J. Rupitsch, Friedrich-Alexander-University Erlangen-Nuremberg, D

**13:20**      **New EMI Filter Design Procedure and Device for the Diagnosis of Conducted Emission Noise in Electric and Electronic Equipment**  
Marco Chiadò Caponet, University of Applied Sciences Wismar, D

**13:30**      **Combining Time and Frequency Domain Design in Current Control to Optimize Command and Disturbance Response**  
Christoph van der Broeck, Rik W. De Doncker, RWTH Aachen University, D; Marc Petit, Bulent Sarlioglu, University of Wisconsin-Madison, USA

**13:40**      Live 15-minute Q&A Session with the Speakers

#### **Stream 2**

##### **Passive Components II**

Chairperson: Wolfram Teppan, LEM Intellectual Property, CH

**13:00**      **A Frequency Dependent Magnetic Material Model Based on the Adapted Jiles Atherton Model**  
Jörn Schlieuwe, Stefan Scheffler, Matthias Köppen, Stefan Weber, TDK Electronics, D

- 13:10**      **Analysis of the Effectiveness of the Series Inductor Integration Into the MFT for SST Applications**  
Marko Mogorovic, Drazen Dujic, Power Electronics Laboratory, EPFL, CH
- 13:20**      **Method for Accurately Predicting Core Losses Using Deep Learning**  
Miguel Ángel Carmona, Juan Gallego, Alfonso Martinez, Frenetic, E
- 13:30**      **Fast Hybrid Design Approach for Optimization of Inductors**  
André Furlan, Marcelo Lobo Heldwein, Federal University of Santa Catarina, BR;  
Thierry Meynard, University of Toulouse, F; Alvaro Morentin, Guillaume Fontes, Power Design Technologies, F
- 13:40**      Live 15-minute Q&A Session with the Speakers

### Stream 3

#### Ruggedness and Reliability

Chairperson: Nando Kaminski, University of Bremen, D

- 13:00**      **A Comprehensive Review of High-Frequency Short-Circuit Oscillation Modes in IGBT Applications**  
Paula Diaz Reigosa, University of Applied Sciences Windisch, CH; Francesco Iannuzzo, Aalborg University, DK; Munaf Rahimo, MTAL, CH
- 13:10**      **Influence of Repetitive Short Circuit Events on the Power Cycling Capability of IGBTs in a Molded Package**  
Christian Schwabe, Christian Bäuml, Shuang Yuan, Jens Kowalsky, Josef Lutz, Technical University of Chemnitz, D
- 13:20**      **Enhanced Lifetime and Power-Cycling Modeling for PrimePACK .XT Power Modules**  
Torsten Methfessel, Frank Sauerland, Krzysztof Mainka, Oliver Schilling, Infineon Technologies, D
- 13:30**      **Challenges in Humidity Tests on GaN-Devices**  
Alexander Brunko, Marvin Gloth, Nando Kaminski, University of Bremen, D
- 13:40**      Live 15-minute Q&A Session with the Speakers

### Stream 1

#### Special Session: Battery Management in Automotive Applications

Chairperson: Daniel-Ioan Stroe, Aalborg University, DK

- 13:55**      **A Pulse-Current Implementation Using Phase-Shift Modulation in Smart Battery**  
Xinrong Huang, Anirudh Budnar Acharya, Daniel-Ioan Stroe, Remus Teodorescu, Aalborg University, DK
- 14:05**      **foxBMS - Free and Open BMS Platform Focused on Functional Safety and AI**  
Stefan Waldhör, Steffen Bockrath, Martin Wenger, Radu Schwarz, Vincent Lorentz, Fraunhofer Institute IISB, D
- 14:15**      **Verification of an Automotive ASIL C Battery Management System Slave Unit**  
David Marcos, Maitane Garmendia, Jon Crego, Ikerlan, E; Ole Tidemann, Lithium Balance, DK; Jose Antonio Cortajarena, University of the Basque Country, E
- 14:25**      Live 15-minute Q&A Session with the Speakers

## Stream 2

### EV Chargers

Chairperson: Gianmario Pellegrino, Polytechnic University of Turin, I

- 13:55**            **Two-Stage 50kW DC-Charger with Output Voltage Range from 200V to 940V**  
Martin Nießen, Patrick Deck, Christian Peter Dick, Cologne University of Applied Sciences, D; Marcus Conrad, AixControl, D
- 14:05**            **A SiC-Based 22kW Bi-Directional CLLC Resonant Converter with Flexible Voltage Gain Control Scheme for EV On-Board Charger**  
Chen Wei, Dongfeng Zhu, Haitao Xie, Ying Liu, Wolfspeed, A Cree Company, CN; Jianwen Shao, Wolfspeed, A Cree Company, USA
- 14:15**            **Application of SiC MOSFETs in 6.6kW High-Frequency High-Power-Density Power Converter**  
Yuequan Hu, Teik Siang Ong, Cree, USA; Jianwen Shao, Wolfspeed, A Cree Company, USA
- 14:25**            Live 15-minute Q&A Session with the Speakers

## Stream 3

### GaN Devices and Reliability

Chairperson: Mark M. Bakran, University of Bayreuth, D



- 13:55**            **Experimental Evaluation and Analysis of Dynamic On-Resistance in Hard- and Soft-Switching Operation of a GaN GIT**  
Xiaomeng Geng, Carsten Kuring, Sibylle Dieckerhoff, Technical University of Berlin, D; Marvin Tannhäuser, Siemens, D
- 14:05**            **The Effect of Dynamic On-State Resistance to System Losses in GaN-Based Hard-Switching Half-Bridge Applications**  
Ruoyu Hou, Juncheng Lu, GaN Systems, CDN
- 14:15**            **Reliability of GaN GIT Devices in Power Cycling Tests with RDS(on)(T) and VGS(T) for Junction Temperature Calculation**  
Roman Boldyrjew-Mast, Josef Lutz, Technical University of Chemnitz, D
- 14:25**            Live 15-minute Q&A Session with the Speakers

## 15:00 Dialogue Sessions with the Poster Presenters

During the dialogue sessions, the poster presenters will be available exclusively for live discussions and questions in a webinar. The dialogue session is scheduled for one hour and a half. Please note, that the presentations can be viewed beforehand or during this period on-demand.

### Advances in Sensing, Testing, Modeling and Control

Chairperson: Eric Favre, IMI Precision Engineering, CH

- PP084**      **Effect Investigations of Double Pulse Test on the Wide Bandgap Power Devices**  
Jian-Zhi Fu, Giorgio Kapino, Wulf-Toke Franke, University of Southern Denmark, DK
- PP085**      **Machine Learning for Grey Box Modeling of Electrical Components for Circuit- and EMC-Simulation**  
Jan-Philipp Roche, KEB Automation, D; Jens Friebe, Leibniz University Hannover, D; Oliver Niggemann, Helmut Schmidt University, D
- PP086**      **Cost and Volume Efficient Current Measurement for Fast Switching Inverters**  
Lukas Fräger, BLOCK Transformatoren-Elektronik, D
- PP087**      **Digital Clock Recovery Phase-Locked Loop for Sigma-Delta Current Sensors**  
Jens Onno Krah, Malte Katz, Cologne University of Applied Sciences, D
- PP088**      **Influence of Current Sensing Equipment and DC-Link Capacitor on the Performance of a Low Inductive SiC Switching Cell**  
Alexander Sewergin, Severin Delhey, David Bündgen, ISEA RWTH Aachen University, D; Alexander Stippich, Rik W. De Doncker, RWTH Aachen University, D
- PP089**      **Influence of the PWM Voltage Waveform on Partial Discharge Occurrence in Motor Windings**  
Markus Fürst, Mark-M. Bakran, University of Bayreuth, D
- PP090**      **Hardware Accelerated Decoupled Current Control in Active Front End Converters for V2G Applications**  
Giuseppe Aiello, Francesco Gennaro, Natale Aiello, STMicroelectronics, I; Mario Cacciato, Giacomo Scelba, University of Catania, I

### Modules, Thermal Management

Chairperson: Daniel Chatroux, CEA, F

- PP091**      **New ST's Package TO-LL and MDmesh DM6: The Right Choice for High Level SMPS**  
Domenico Nardo, Alfio Scuto, Giuseppe Sorrentino, Rosario Scollo, Simone Buonomo, STMicroelectronics, I
- PP092**      **Semiconductor Loss Estimation in an Innovative Global Power Converter Designer**  
Guillaume Fontes, François Boige, Alvaro Morentin, Guillaume Delamare, Nicolas Videau, Power Design Technologies, F; Thierry Meynard, LAPLACE, F
- PP093**      **Optimization of Properties Thermal Compensators from MMC AISiC for Thyristors and IGBT Modules**  
Konstantin Nishchev, Mikhail Novopoltsev, Ogarev Mordovia State University, RUS; Mikhail Malygin, Evgeny Nesterov, Evgenia Osipova, Denis Pyshkov, PJSC Electrovipryamitel, RUS

- PP094**      **Thermal Conductivity Measurement Setup for Pad and Paste Thermal Interface Materials**  
Sebastian Sprunck, Raoul Mitze, Christian Nöding, Peter Zacharias, University of Kassel, D
- PP095**      **Evaluation of IGBT with Integrated Temperature Sensor for On-line Junction Temperature Monitoring**  
Radoslava Mitova, Abdelaziz Bel Hadj, Alain Dentella, Schneider Electric, F
- PP096**      **Low Loss Motor Terminal Filter Crushing du/dt Limitations**  
Robert W. Maier, Mark-M. Bakran, University of Bayreuth, D
- PP097**      **Increasing Power Density in Power Modules with Baseplate Width of 60 mm**  
Dmitry Titushkin, Alexey Surma, Sergey Antonov, JSC Proton-Electrotex, RUS

#### **Modeling of WBG Devices**

Chairperson: Thomas Neyer, ON Semiconductor, D

- PP098**      **Heat Dissipation Strategies for Silicon Carbide Power SMDs and Their Use in Different Applications**  
Benjamin Strothmann, Till Piepenbrock, Frank Schafmeister, Joachim Böcker, University of Paderborn, D
- PP099**      **Experimental Evaluation of Simulation Model for Power Losses Estimation using 1200V SiC MOSFET**  
Tiago Kommers Jappe, Dionisis Voglitsis, On Semiconductor, D; Samir Ahmad Mussa, Federal University of Santa Catarina, BR
- PP100**      **A New Analog Behavioral SPICE Macro Model with Self-Heating Effects and 3rd Quadrant Behavior for Silicon Carbide Power MOSFETs**  
Alessandra Manzitto, Alessandra Raffa, Pier Paolo Veneziano, Gaetano Bazzano, STMicroelectronics, I
- PP101**      **Online Junction-Temperature Sensing of SiC MOSFETs with Minimal Calibration Effort**  
Sven Kalker, Christoph van der Broeck, Rik W. De Doncker, RWTH Aachen University, D
- PP102**      **Experimental Estimation of PCB Thermal Resistance for Different Configurations and Types of Vias**  
Nikolay Kalugin, Mikhail Firsov, Andrey Matveev, KW Systems, RUS
- PP103**      **Accurate Losses Multipoint Non Adiabatic Calorimetric Measurement Technique for WBG Power Converters**  
Martin Schiestl, Maurizio Incurvati, Ronald Stärz, Management Center Innsbruck, A; Andreas Lösch, Alpitronic, I
- PP104**      **Measurement of Temperature-Sensitive Parameters of SiC Power Semiconductors During Turn-Off Using a Time-To-Digital Converter**  
Victor Golev, Jasper Schnack, Jan Philipp Gördes, Sönke Fleck, Ulf Schümann, University of Applied Sciences Kiel, D

### **Drivers and Integration**

Chairperson: Bernhard Strzalkowski, Analog Devices, D

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