pcim
EUROPE

International Exhibition and Conference
for Power Electronics, Intelligent Motion,
Renewable Energy and Energy Management

Nuremberg, 10 – 12 May 2022
pcim-europe.com

Conference Program

On-site & digital

Let's power on!

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Table of Content

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Giuseppe Tomasso, University of Cassino and South Lazio, Italy
Peter Wallmeier, Delta Energy Systems, Germany
Peter Zacharias, University of Kassel, Germany

Conference Program at a Glance

Tuesday, 10 May 2022

08:30	Foyer Room Brüssel **Morning Coffee** *Reunited*				
09:00	Room Brüssel 1 **Conference Opening and Award Ceremony**				
09:45	Room Brüssel 1 **Keynote »Hydrogen – Key Element to Achieve Net Zero CO^2«**				
10:30	**Coffee Break**				
11:00	Room Brüssel 1 **Special Session:** **Advanced GaN Power Electronics**	Room Brüssel 2 **Special Session:** **Cognitive Power Electronics**	Room München 1 **Special Session:** **Advanced Measurement Technology in Power Electronics**	Room München 2 **DC-DC Converters**	Room Mailand **Battery Chargers**
12:20	Hall 10.1 NCC Mitte **Lunch Break**				
14:00	Room Brüssel 1 **Packaging Technologies**	Room Brüssel 2 **High Voltage Si Devices**	Room München 1 **SiC Devices in Transportation**	Room München 2 **Advanced IGBTs**	Room Mailand **Converter Control**
15:05-17:00	Foyer Entrance NCC Mitte **Poster / Dialogue Sessions & Coffee Time**				
17:15	NCC Ost **Welcome Back Evening**				

Wednesday, 11 May 2022

08:30	Foyer Room Brüssel **Morning Coffee** *Reunited*				
08:45	**Keynote »Power Electronics for a Future Sustainable Society«**				
09:30	**Coffee Break**				
09:50	Room Brüssel 1 **Behavior and Reliability of SiC Devices**	Room Brüssel 2 **Renewable Energy Systems and Optimization**	Room München 1 **Advanced Gate Drivers**	Room München 2 **Passive Components**	Room Mailand **Measurement Techniques and EMC**
11:50	Hall 10.1 NCC Mitte **Lunch Break**				
14:00	Room Brüssel 1 **Power Module Technology**	Room Brüssel 2 **Sintering Technologies**	Room München 1 **System Reliability**	Room München 2 **GaN Switches in Mission Critical Applications**	Room Mailand **Low Power Converters using WBG Materials**
15:05-17:00	Foyer Entrance NCC Mitte **Poster / Dialogue Sessions & Coffee Time**				
16:30-18:00	Depending on the weather: Foyer Entrance NCC Mitte / Messepark **After Work Beer** *Reunited*				

Thursday, 12 May 2022

08:45	Room Brüssel 1 **Keynote »From State of the Art to Future Development Trends of Power Supply«**			
09:30	**Coffee Break**			
9:50	Room Brüssel 1 **SiC Devices**	Room München 1 **Reliability**	Room München 2 **Converter Design**	Room Mailand **Motors and Electric Drives**
11:50	Hall 10.1 NCC Mitte **Lunch Break**			
14:00	Room Brüssel 1 **Thermal Management**	Room München 1 **Design and Optimization**	Room München 2 **Wireless Power Transfer**	
15:00 – 17:00	Depending on the weather: Foyer Entrance NCC Mitte / Messepark **After Work Beer** *Reunited*			

As of April 2022 / subject to change without notice

In room Brüssel 1 and 2: send in your questions online!

Ask questions from any device during and after the presentation or vote for the most interesting ones to be asked to speakers.

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Keynotes

Speaker:
Jürgen Rechberger, AVL, AT
Chairperson:
Drazen Dujic, Power Electronics Laboratory, EPFL, Switzerland

Tuesday, 10 May 2022, Room Brüssel 1, 09:45 a.m.

Hydrogen – Key Element to Achieve Net Zero CO^2

The energy transition to a net zero CO2 society is widely recognized as a monumental challenge. Austria is in the preferred condition to have already a renewable energy production of 70% but only related to electricity. If the complete primary energy demand is considered, only about 30% are from renewable resources (incl. biogenic and geothermal). For all developed countries around the world, mobility and industry are the main challenges for decarbonization. AVL has created a study for energy end-use in a fully decarbonized energy scenario towards 2050. In this scenario, the electricity consumption will more than double compared to 2019 levels. This electricity demand can not be met by locally harvested renewables and as today Austria will stay an energy importer. In an optimistic scenario for energy import hydrogen could be available for as low as 2€/kg (equivalent to 6 cent(€)/kWh). In such a scenario hydrogen production will be a key technology for decarbonization.
AVL is since 2002 heavily involved in hydrogen technologies development from PEM stacks and systems for automotive, marine, rail and aviation applications to SOFC power-generation solutions to hydrogen production technologies based on PEM and Solid Oxide electrolysis. Various of these developments will be shown, together with industry trends and the role of hydrogen in the future mobility & energy system.

Speaker:
Ichiro Omura, Kyushu Institute of Technology, Japan
Chairperson:
Josef Lutz, Chemnitz University of Technology, Germany

Wednesday, 11 May 2022, Room Brüssel 1, 08:45 a.m.

Power Electronics for a Future Sustainable Society

Fifty years after 'The Limits to Growth' the famous report from the Club of Rome, we are now forced to recognize 'the dimensions of our finite planet' in terms of CO2 emissions. In this presentation, we will explore the critical boundary in the relationship between economic growth and CO2 emissions by introducing simple model, and recognize the gap between the net zero emission scenario and the current situation. We will then discuss the role that power electronics technology development should play in bridging this gap.

Speaker:
Peter Wallmeier, Delta Energy Systems, Germany
Chairperson:
Leo Lorenz, ECPE, Germany

Thursday, 12 May 2022, Room Brüssel 1, 08:45 a.m.

From State of the Art to Future Development Trends of Power Supply

The application of Switched Mode Power Conversion technology started in consumer electronics and information technology more than 40 years ago. It spread out to almost all industries over the past decades to benefit from higher power conversion efficiency, lighter weight and increased power density at lower costs. The presentation will review the technology innovations increasing the conversion efficiency from below 75% to now 98% at power densities from initial 0.2kW/l to now 6kW/l over the past decades. It will outline future trends to achieve ultra-efficient and ultra-dense power conversion technology. This "innovation-ralley" from past to future is detailed out showing the persistent conflict between higher conversion frequency to reduce the size of passives and magnetics and at the same time increased switching losses, ZVS/ZCS circuit losses, eddy current and hysteresis losses in the magnetics.

Conference Tuesday, 10 May 2022

Morning Oral Sessions

08:30	Foyer Room Brüssel	**Morning Coffee** *Reunited*
09:00	Room Brüssel 1	**Opening / Award Ceremony**
09:45	Room Brüssel 1	**Keynote »Hydrogen – Key Element to Achieve Net Zero CO^2«** Jürgen Rechberger, Vice President Hydrogen & Fuel Cell, AVL List, A
10:30	Foyer Room Brüssel	**Coffee Break**

Room Brüssel 1

Special Session: Advanced GaN Power Electronics

Chairperson: Elison Matioli, EPFL, CH

11:00
New Technologies for Efficient and Integrated GaN Power Devices
Luca Nela, Nirmana Perera, Remco van Erp, Taifang Wang, Elison Matioli, EPFL, CH

11:20
GaN Power Electronics: From Device to System
Alex Huang, University of Texas at Austin, USA

11:40
Practical Challenges in the Design of High Density GaN-Based Power Converters
Robert Pilawa-Podgurski, University of California, Berkeley, USA

12:00
Next Generation GaN-Based Architectures: From 240W USB-C Adapters to 11kW EV On-Board Chargers with Ultra-High Power Density and Wide Output Voltage Range
Matthias Kasper, Jon Azurza Anderson, Gerald Deboy, Infineon Technologies, A; Michael Haider, Power Electronic Systems Laboratory, CH

Room Brüssel 2

Special Session: Cognitive Power Electronics

Chairperson: Bernd Eckardt, Fraunhofer IISB, D

11:00
The Interplay between Silicon Capability and System Architecture for Cognitive Power Systems
Nicolas Lehment, Florian Kälber, Frieder Jespers, NXP Semiconductors, D

11:20
Cognitive Power Electronics 4.0 – An Enabler for Smart Systems
Martin Schellenberger, Bernd Eckardt, Vincent Lorentz, Fraunhofer Institute IISB, D

11:40
Cognitive Power Electronics for Smart Drives in Unmanned Aerial Vehicles
Tobias Huf, Georg Roeder, Martin Schellenberger, Fraunhofer Institute IISB, D; Harm-Friedrich Steinmetz, mdGroup, D

12:00
Modular Ultra-Low-Power IoT-Core - Bridging the Gap Between Power Electronics and Distributed Sensor Networks
Samer Al-Magazachi, Technical University of Berlin, D; Carsten Brockmann, Alireza Rezaei, Jan Hefer, Applikationszentrum am Fraunhofer IZM, D; Frank Oehler, Markus Eppel, Heinrich Milosiu, Fraunhofer Allianz Vision, D; Jan Hager, Holger Gerstner, Bernd Eckardt, Stefan Matlok, Fraunhofer IISB, D

Room München 1

Special Session: Advanced Measurement Technology in Power Electronics

Chairperson: Bernard H. Stark, University of Bristol, GB

11:00
Common-Mode / Differential-Mode Noise Separation Using Oscilloscopes for More Efficient EMC Filter Design
Marcus Sonst, Markus Herdin, Rohde & Schwarz International, D

11:20
Probing Techniques for GaN Power Electronics: How to Obtain 400+ MHz Voltage and Current Measurement Bandwidths without Compromising PCB Layout
Harry Dymond, Bernard Stark, Saeed Jahdi, Yushi Wang, University of Bristol, GB

11:40
Using Near Field Probes in Electronic Circuits
Arturo Mediano, University of Zaragoza, E

12:00
How IsoVu Probe Breaks the Barrier of Wide Bandgap Dynamic Testing
Pierre Dupont, Tektronix, F

Room München 2

DC-DC Converters

Chairperson: Francisco Javier Azcondo, University of Cantabria, E

11:00
Beyond 4 kW/in3 Power-Density for 48 V to 12 V Conversion using eGaN FETs in an LLC DC-DC Bus Converter
Michael de Rooij, Amir Negahdari, Efficient Power Conversion (EPC), USA

11:20
500 kHz SiC- and GaN-Based Dual Active Bridge with Voltage Conversion Between 48 V and 650 V
Patrick Lenzen, Martin Pfost, TU Dortmund University, D

11:40
Clamped Topology Morphing of the Isolated Full-Bridge Converter for Reduced Rectifier Semiconductor Blocking Voltages and Transformer Volume
Philipp Rehlaender, Joachim Böcker, Frank Schafmeister, Paderborn University, D

12:00
Three-Level Switched Capacitor Resonant Converter-Based DCX
Marcelo Lobo Heldwein, Technical University, of Munich, D; Francisco Jose Viglus, Federal University of Santa Catarina, BR

Room Mailand

Battery Chargers

Chairperson: Stéphane Lefebvre, SATIE, F

11:00
Tiny Power Box - Exploiting Multi-port Series Resonant Topologies for High Power Density Onboard Chargers
Franz Vollmaier, Ismail Recepi, Thomas Langbauer, Milan Pajnic, Werner Konrad, Christian Mentin, Silicon Austria Labs, A; Alexander Connaughton, Graz University of Technology, A

11:20
50 kW Modular V2G SiC Charger Station in Energy Island Microgrids: a Real Use-Case in Madeira Island
Jesús Muñoz-Cruzado, Erika Laporta Puyal, Antonio Miguel Muñoz Gómez, Miguel Angel Alonso Tejedor, Javier Ballestín Fuertes, Fundación Circe, E; José Francisco Sanz Osorio, University of Zaragoza, E

11:40
Ultra-Compact Single-Stage Bidirectional Wireless Battery Charger for Electric Vehicles
Asier Garcia-Bediaga, Ander Avila, Iñigo Zubitur, Alex Sanchez, Alejandro Rujas, Ikerlan Technology Research Centre, E

12:00
Single-Phase Bidirectional ZVZCS AC-DC Converter for MV-Connected Ultra-Fast Chargers
Kaveh Pouresmaeil, Jorge Duarte, Korneel Wijnands, Maurice Roes, Nico Baars, Eindhoven University of Technology, NL

12:20	Hall 10.1 NCC Mitte	**Lunch Break**

Conference Tuesday, 10 May 2022

Afternoon Oral Sessions

Room Brüssel 1
Packaging Technologies

Chairperson: Peter Kanschat, Infineon Technologies, D

14:00
A New High Power Density 6-in-1 IGBT Module Enabling Acceleration of Vehicle Electrification
Yujiro Takeuchi, Takayuki Kushima, Seiichi Hayakawa, Tetsuo Oda, Masaki Shiraishi, Takayuki Ouchi, Takashi Wada, Hisayuki Tsuruoka, Hisada Kenichi, Masayuki Kamikawa, Toshiki Tanimura, Yukihiro Kumagai, Yutaka Kato, Hitachi Power Semiconductor Device; J

14:20
Design of Wire Bondless Double-Sided Cooled Power Module Using Ceramic Heat Sink and Multilayer Silver Sintering
Rabih Khazaka, Safran, F; Didier Bouvard, Jean Michel Missiaen, SIMAP Laboratory, F; Yvan Avenas, Nicolas Botter, G2Elab, F

14:40
Maskless Electroplating Patterning Process using Selective Electrochemical Additive Manufacturing Method for Forming of CuPillar Bump, Spacer and Ag Plating on Ceramic Substrate
Sung-Bin Kim, Andrea Kim, Kun-Woong Ko, AnyCasting, ROK; Bongyoung Yoo, Hanyang University, ROK

Room Brüssel 2
High Voltage Si Devices

Chairperson: Peter Zacharias, University of Kassel, D

14:00
A 4.5kV RC-IGCT with Diode Segmentation for MMC Inverters
Tobias Wikström, Umamaheswara Reddy Vemulapati, Bjoern Oedegard, Hitachi Energy, CH

14:20
Effects of On-State Snap-Back Characteristics on the Current Sharing of Parallel RC-IGBTs
Munaf T. Rahimo, MTAL, CH; Paula Diaz Reigosa, ABB, CH; Francesco Iannuzzo, Aalborg University, DK

14:40
2000 V Class LV100 IGBT Module Enabling Higher Power Density and Design Simplification in Renewable 1500 V Inverter Systems
Thomas Radke, Eugen Wiesner, Mitsubishi Electric Europe, D; Masaomi Miyazawa, Satoshi Miyahara, Koichi Masuda, Mitsubishi Electric, J

Room München 1
SiC Devices in Transportation

Chairperson: Philippe Ladoux, University of Toulouse, F

14:00
SiC-MOSFET Inverter in High-Performance PHEV Applications
Maximilian Hofmann, Christian Sültrop, Fraunhofer Institute IISB, D; Maximilian Barkow, Thomas Hubert, Michael Reinlein, Porsche, D

14:20
Benefits of SiC in On-Board Charger Applications
Lisa Holzmann, Ben Rosam, Marco Schmidt, Mark Münzer, Andreas Hürner, Infineon Technologies, D

14:40
A SiC Based 30kW Three Phases Interleaved LLC Converter for EV Fast Charger
Jianwen Shao, Anui Narain, Wolfspeed, USA; Chen Wei, Zongzeng Hu, Fulin Zhang, Wolfspeed, CHN

Room München 2
Advanced IGBTs

Chairperson: Katsuaki Saito, Hitachi Power Semiconductor Device, J

14:00
A New Level of Performance: Best-in-Class 900 A and 750 A 1700 V Econo-DUAL 3 Modules with TRENCHSTOP IGBT7
Aleksei Gurvich, Klaus Vogel, Andreas Schmal, Philipp Ross, Jan Baurichter, Infineon Technologies, D

14:20
Next Generation LV Trench IGBT Design Featuring Plasma-Flow Control for Improved Switching Losses and Turn-on dV/dt Controllability
Gaurav Gupta, Elizabeth Buitrago, Nick Schneider, Wolfgang Vitale, Luca De Michielis, Hitachi Energy, CH

14:40
Next Generation 1.7 kV Chipset: Fine-Pattern Trench IGBT and Ultra-Thin FSA Diode for Traction Applications
Wolfgang Amadeus Vitale, Gontran Pâques, Boni Boksteen, Gaurav Gupta, Antoni Ruiz, Nicolò Oliva, Luca De Michielis, Elizabeth Buitrago, Nick Schneider, Hitachi Energy, CH

15:00
New SIPOX-JTE (SIPOS/Oxide) Edge Termination Shows Excellent Robustness and 50% Lower Leakage at Tj=150 °C for 6.5kV IGBTs
Luther-King Ngwendson, Arthur Su, Yangang Wang, Lee Coulbeck, Dynex Semiconductor, GB

Room Mailand
Converter Control

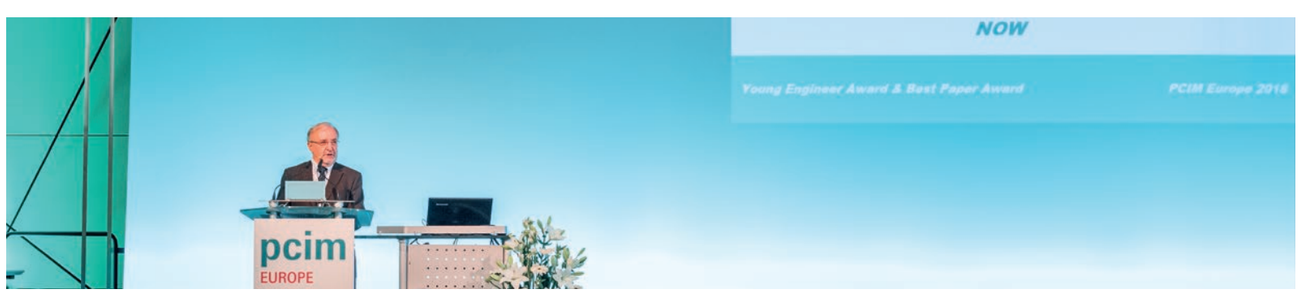
Chairperson: Ilknur Colak, Schneider Electric, F

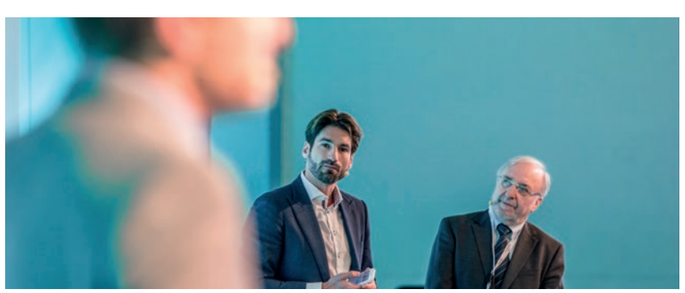
14:00
Flexible Operation of Variable Speed Direct-MMC in Hydropower Applications
Philippe Bontemps, EPFL, CH; Drazen Dujic, Power Electronics Laboratory, EPFL, CH

14:20
Frequency Control and Inertia Provision with UPS
Mario Schweizer, Nicola Notari, ABB, CH; Silvio Colombi, ABB Industrial Solutions, CH; Ivan Furlan, University of Applied Sciences and Arts of Southern Switzerland, CH

14:40
Sensorless Control and Synchronization for Solid-StateTransformers Based on Active Unity Power Factor Modules
Francisco Freijedo, Miroljub Bakic, Thiwanka Wijekoon, Diego Lopez, Huawei Technologies, D

15:05-17:00	Foyer Ground Floor NCC Mitte **Poster/Dialogue Sessions & Coffee Time**





Conference Tuesday, 10 May 2022, Poster / Dialogue Sessions

15:05-17:00, Foyer Ground Floor NCC Mitte

SiC Modules, Characteristics and Applications

Chairperson: Mario Pacas, University of Siegen, D

PP001 **Challenges of Paralleling 3.3 kV SiC MOSFET Modules in HVDC Converter Submodules**
Lukas Bergmann, Mark-M. Bakran, University of Bayreuth, D; Marcus Wahle, Siemens, D

PP002 **Experimental Study on Turn-off Process of Medium Voltage SiC MOSFET Modules**
Jacek Rabkowski, Mariusz Zdanowski, Warsaw University of Technology, PL; Fernando Gonzalez-Hernando, Irma Villar, Ikerlan Technology Research Centre, E; Uxue Larrañaga, CAF POWER & AUTOMATION, E

PP003 **Short-Circuit Protection of a Power Module with Trench-SiC-MOSFET. Can DESAT be Fast Enough?**
Vikneswaran Thayumanasamy, Kevin Lenz, Carlos Fuentes, ROHM Semiconductor, D; Ingo Rabl, Jürgen Engstler, SEMIKRON Elektronik, D

PP004 **Full SiC Phase-leg Power Module for Airborne DC/AC Power Conversion Applications**
Thomas Guillemet, Sébastien Oge, Solenne Hameau, Timothée Frappé, Sylvie Loiseau, Richard Morisse, Thales DMS, F

PP005 **Experimental Evaluation of a SiC MOSFET in Surface Mount Power Device Package**
MD Rishad Ahmed, Ahmed Topkil, Qinlong Chen, University of Nottingham, GB

PP006 **Comparison of Dissipation Loss Reduction Rates of 1.2KV and 1.7KV All-SiC Modules Against Si-IGBT Module for PWM Inverters**
Ben Bradel, Fuji Electric, D; Susumu Iwamoto, Aiko Takasaki, Takafumi Uchida, Makoto Isozaki, Yoshiyuki Kusunoki, Yasuyuki Kobayashi, Fuji Electric, J

PP007 **Using a 4-leg Three Phase Inverter to Connect the AC Grid with a Bipolar DC Grid**
Peter van Duijsen, Casper Grootes, Diego Zuidervliet, The Hague University of Applied Sciences, NL

Power Module Reliability

Chairperson: Anton Z. Miric, Heraeus, D

PP008 **Influence of Magnetic Coupling Effects between Load and Gate Commutation Loop on the Short Circuit Behavior**
Christian Bäumler, Thomas Basler, Tobias Konstantin Vogel, Bo Zhang, Chemnitz University of Technology, D

PP009 **Over Temperature Protection of Power Module under Electric Water Pump Failure Condition in EV**
JeHwan Lee, YoungJoo Ko, SungMin Lee, JungHong Joo, SangChul Shin, Hyundai Motor, ROK

PP010 **Extend Power Density and Lifetime of Latest SiC and 7th Gen IGBT Power Module thru Transfer Molded Technology**
Jonathan Harper, Jinchang Zhou, ON Semiconductor, USA; Chee Hiong Chew, ON Semiconductor, MAL; Joji Corbillon, Silnore Sabando, ON Semiconductor, VN

PP011 **Determination of Ideal Magnetic Sensor Arrangements for Health Monitoring of Power Electronic Modules**
Haosu Huai, Juergen Wilde, Nasibeh Naserizaker, University of Freiburg, D; Michael Wolff, Gerd Griepentrog, Elena Ehret, Technical University of Darmstadt, D

PP012 **Impact of Thermal Cycling Frequency on IGBT Power Module Lifetime**
Guillaume Pellecuer, Olivier Arnould, André Chrysochoos, François Forest, Jean-Jacques Huselstein, Thierry Martiré, University of Montpellier, F

PP013 **Detecting Soldering Quality in Power Modules with Zth in the Loading Phase**
Hao Wang, Hans-Günter Eckel, Jan Fuhrmann, University of Rostock, D

PP014 **The Impact of Power Cycling Induced Degradation Mechanisms on the Magnetic Field Signature of IGBTs**
Michael Wolff, Gerd Griepentrog, Technical University of Darmstadt, D

Thermal Design

Chairperson: Manfred Schrödl, Vienna University of Technology, A

PP015 **Design Tool for Temperature Estimation on PCB**
Bernd Schroeder, Bernd Stube, Technical University of Berlin, D; Olaf Mueller, AEconversion, D; Eckart Hoene, Stefan Hoffmann, Fraunhofer Institute IZM, D

PP016 **Thermal Analytical Modelling of the Heat Transfer Through a Power PCB Dedicated to a High Current Density Modular Converter**
Gaël Pongnot, Fabien Adam, Denis Labrousse, Clement Mayet, Mickaël Petit, Marie-Christine Duluc, SATIE Laboratory, F

PP017 **Improving the Performance of DC-DC Converters by Using SMD Packages with Top-Side Cooling**
Marco Papaserio, Daniela Cavallaro, Cristiano Gianluca Stella, Domenico Nardo, Stefano Orlando, STMicroelectronics, I

PP018 **Optimization of Thermal Performance of Top-Side Cooled Discrete Power Semiconductors**
Severin Kampl, Stefan Vassilev Mollov, Infineon Technologies, A

PP019 **Design of Thermal Management for Double-Sided Cooled SiC-Power Semiconductors**
Simon Cepin, Holger Borcherding, University of Applied Sciences and Arts Ostwestfalen-Lippe, D; Ruediger Kusch, Christian Schnückel, Volkswagen Group Innovation, D; Adrian Lis, Infineon Technologies, D

Advanced Si Devices

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

PP020 **Usability of Three-Level ANPC Converters after Short-Circuit Failure**
David Hammes, Nastaran Hammes, Sidney Gierschner, Hans-Günter Eckel, University of Rostock, D; Dietmar Krug, Siemens, D

PP021 **3.3 kV IGBT4 and EC4 Technology with High Electrical Robustness for Current Density Increase in IHV B Modules**
Evgeny Obzherin, Matthias Buerger, Jens Czichon, Infineon Technologies, D

PP022 **A New Platform for High Power Phase Controlled Thyristors (PCT) and Rectifier Diodes**
Nino Degiampietro, Chiara Corvasce, Christian Winter, Hitachi Energy, CH; Zuzana Ptáková, Hitachi Energy, CZ

PP023 **The Relevance of Boundary Conduction Mode for High Pulse Power DC-DC Converters Using GCTs and IGCTs**
Fabian Albrecht, Felix Haag, Klaus F. Hoffmann, Helmut-Schmidt-University, D; Volker Brommer, Oliver Liebfried, French-German Research Institute of Saint-Louis (ISL), F

PP024 **10 kV Reverse-Conducting Integrated Gate-Commutated Thyristors for HVDC Power Transmission**
Davin Guedon, Philippe Ladoux, University of Toulouse, F; Umamaheswara Reddy Vemulapati, Thomas Stiasny, Christian Winter, Hitachi Energy, CH; Sebastien Sanchez, Icam, F; Sebastien Cornet, EDF, F

PP025 **Your 15 V Zener and TVS Diodes are Avalanche Diodes**
Daniel Chatroux, CEA-Liten, F

GaN Devices

Chairperson: Martin März, Fraunhofer IISB, D

PP026 **Potential of GaN Semiconductors in Electric Vehicle Inverters**
Maximilian Hepp, Leonhard Hertenstein, Alexander Nisch, Wolfgang Wondrak, Marcus Heller, Felix Bertele, Mercedes-Benz, D

PP027 **A Breakthrough Step in Power Conversion Design: 650V STi2GaN IC Family to Boost the DC-DC Converter Performance**
Filippo Scrimizzi, Federica Cammarata, Nadia Lecci, Giuseppe Longo, STMicroelectronics, I

PP028 **Fast Switching of High Current WBG Power Devices**
Edward Shelton, Dan Rogers, Jack Bruford, Aleksandar Ristic-Smith, University of Oxford, GB; Lathom Louco, BorgWarner, USA; Jeff Carter, BorgWarner, GB; Mike Beadman, Cambridge Design Partnership, GB; Patrick Palmer, Simon Fraser University, CDN

PP029 **Re-inventing Power Electronics: NexGen Power Systems with Vertical GaN™**
Dinesh Ramanathan, NexGen Power Systems, USA

PP030 **Precise Determination of Dynamic RDSon in AlGaN/GaN Power HEMTs under Soft Switching Condition**
Maximilian Goller, Thomas Basler, Josef Lutz, Nick Thönelt, Christian Schwabe, Gengqi Li, Chemnitz University of Technology, D

Packaging I

Chairperson: Steffan Hansen, Danfoss Silicon Power, D

PP031 **Innovative and Integrated Production Technology Allows Effective Packaging**
Benjamin Hertweck, Heiko Müller, KERN-LIEBERS, D; Andreas Altmann, psm protech, D

PP032 **First 650V 60A GaN Power Module in a Compact SP1 Package**
Pierre-Laurent Doumergue, Serge Bontemps, Microchip Technology, F

PP033 **Coreless Current Sensing for xEV Traction Inverters with HybridPACK Drive G2 Power Modules**
Tomas Reiter, Infineon Technologies, D

PP034 **First Aerospace Qualified Baseless SiC Power Module Family Improves High Reliability Systems Efficiency**
Alain Calmels, Serge Bontemps, Pierre-Laurent Doumergue, Edouard Petrequin, Maxime Barrière, Microchip Technology, F; Shane O'Donnell, Bernard McAvinue, Vincent Walsh, Microchip Technology, IRL

PP035 **Ultra-Compact Automotive Power Module for 100 kW xEV Application**
Shinichiro Adachi, Tomoyuki Obata, Nobuhide Arai, Nobuhiro Higashi, Yoshihiro Tateishi, Fuji Electric, J

PP036 **Reflow Soldering of TO-247PLUS Discrete Package in Commercial, Construction and Agricultural Vehicle Application**
Omar Harmon, Lukas Hein, Infineon Technologies, A; Zhenbo Zhao, Infineon Technologies Center of Competence, CHN

PP037 **HV LinPak, High Voltage Half Bridge IGBT Power Module with Balanced Switching Behavior for Easy Paralleling**
Roman Ehrbar, Andreas Rösch, Gontran Pâques, Antoni Ruiz, Wolfgang Amadeus Vitale, Andreas Baschnagel, Vinoth Sundaramoorthy, Fabian Fischer, Virgiliu Botan, Hitachi Energy, CH; Giovanni Antonio Salvatore, University of Venice, I

PP038 **Additive Manufacturing in Electronics – Filament Overview and Special Focus on Carbon Black Filament Properties Investigation**
Andre Schuhl, Ulf Schwalbe, Katharina J. Schiffhauer, Emanuel Lemnitz, Fulda University of Applied Sciences, D

SiC Devices

Chairperson: Klaus F. Hoffmann, Helmut-Schmidt-University, D

PP039 **A 3.6kV Multi-Level SiC MOSFET Power Module with 3D Integrated Driver and Passive Components for Pulsed Load Applications**
Frank Hoeven, Paul Ervine, Thomas Gerrits, Joost van Straalen, Lars Peters, Prodrive Technologies, NL

PP040 **Threshold Voltage Drift and On-Resistance of SiC Symmetrical and Asymmetrical Double-trench MOSFETs Under Gate Bias Stress**
Juefei Yang, Saeed Jahdi, Bernard Stark, Phil Mellor, University of Bristol, GB; Ruizhu Wu, Olayiwola Alatise, Jose Ortiz-Gonzalez, University of Warwick, GB

PP041 **Performance Evaluation of SiC MOSFET-Based Half-Bridge Converters Under Dynamic Voltage Clamp Limits**
Luciano Salvo, Mario Pulvirenti, Fabio Occhipinti, Alessandra Raffa, Angelo Sciacca, Massimo Nania, Gionatan Montoro, STMicroelectronics, I

PP042 **1.2 kV Trench IGBT with SiC JBS Diode for High Frequency Switching Applications**
Nick Schneider, Elizabeth Buitrago, Yulieth Arango, Nicolo Oliva, Toni Ruiz, Luca De Michielis, Lars Knoll, Gontran Pâques, Hitachi Energy, CH

PP043 **Analytical Circuit Model for Coss Losses in SiC Junction Termination Extensions**
Jia Zhuang, Zikang Tong, Juan Rivas, Stanford University, USA; James Victory, Alexander Bolotnikov, Kan Jia, ON Semiconductor, USA; Jaume Roig, ON Semiconductor, B

PP044 **Research of SiO2 Thin Film Deposition by PECVD in SiC Power Device Manufacturing**
Songlin Yang, Yangang Wang, Kongjing Li, Dynex Semiconductor, GB; Chengzhan Li, Haihui Luo, Zhuzhou CRRC Times Semiconductor, CHN

PP045 **Understanding the Switching Behavior of Fast SiC MOSFETs**
Paul Sochor, Andreas Huerner, Qing Sun, Rudolf Elpelt, Infineon Technologies, D

PP046 **Efficient and Robust 750V SiC MOSFETs for Electric Vehicles**
Ranbir Singh, Sumit Jadav, Siddarth Sundaresan, Jaehoon Park, Vamsi Mulpuri, GeneSiC Semiconductor, USA

Measurement Methods

Chairperson: Serge Bontemps, Microchip Technology, F

PP047 **Modular Dynamic Characterization Bench for Wide Bandgap Power Semiconductors**
Sergio Jimenez, Andrew Lemmon, Christopher New, University of Alabama, USA; Blake Nelson, Wolfspeed, USA

PP048 **Static and Dynamic Measurements for GaN Integrated Switches**
Dominique Bergogne, Grégory Calabro, Srivathsan Hariharan, Cédric Reymond, Thanh Hai Phung, Sebastian Gaviria-Duque, Plinio Bau, Johan Delaine, Wise-Integration, F

PP049 **Noise Reduction in Open-Loop Hall-Effect-Based Current Sensing for Current-Controlled Three-Phase AC-DC Converters**
Alexis Gómez, Francisco Azcondo, Alberto Pigazo, Christian Brañas, Rosario Casanueva, Francisco J. Díaz, University of Cantabria, E

PP050 **Assessment of State-of-the-Art Current Sensors for Fast Switching**
Florian Wilhelmi, Andreas Schmid, ZF Friedrichshafen, D; Andreas Lindemann, Otto-von-Guericke-University, D

PP051 **Advantages of Rogowski Coil over Desaturation Method for Leg Short Circuit Detection in Inverters**
Ali Mutlu, Akim Metal, TR; Bahaeddin Avni Kürüm, Turkish-German University, TR; Deniz Yildirim, Istanbul Technical University, TR

PP052 **Wireless Position Sensor to Determine the Wind Turbine Blade Tip Clearance for Higher Efficiency and New Wind Turbines**
Wilke Philipps, Henning Sauerland, Holger Groke, Bernd Orlik, University of Bremen, D; Michael Beyer, Marcel Krüger, Windrad Engineering, D

PP053 **Minimization of a VSD Multilevel Inverter Output Filter through a Systemic Modeling Approach**
Marcelo Lobo Heldwein, Technical University of Munich, D; Lucio Steckling, WEG Drives and Controls, BR

Advanced Packaging and Reliability

Chairperson: Marco Liserre, Christian-Albrechts-University of Kiel, D

PP054 **A Review of Short Circuit Performance in 650 V Power Devices: SiC MOSFETs, Silicon Super-Junction MOSFETs, SiC Cascode JFETs, Silicon MOSFETs and Silicon IGBTs**
Jose Ortiz Gonzalez, Erfan Bashar, Nereus Agbo, Ruizhu Wu, Simon Mendy, Jose Ortiz Gonzalez, Olayiwola Alatise, University of Warwick, GB; Saeed Jahdi, University of Bristol, GB; Gareth Davies, Andrew Withey, Jana Demitrova, Sam Evans, Nexperia Newport, GB; Mike Jennings, University of Swansea, GB

PP055 **Radiation Hardness of Si- and SiC-Power-MOSFETs in Particle Accelerator Environments**
Milad Khani, Gerd Griepentrog, Technical University of Darmstadt, D; Ekaterina Kozlova, Alexey Sokolov, GSI Helmholtz Centre for Heavy Ion Research, D

PP056 **Impact of Forward-Recovery Losses on Tvj, Max and Lifetime in ANPC-Topology for Si IGBTs and Diodes**
Alexander Philippou, Andressa Colvero Schittler, Ainhoa Puyadena Mier, Christian Müller, Franz-Josef Niedernostheide, Infineon Technologies, D

PP057 **Overvoltage Transients in Wide Bandgap-Based Inverter-Fed Variable Speed Electrical Drives**
Svetomir Stevic, Kay Hameyer, Andreas Thul, Maximilian Lauerburg, Yusa Tombul, RWTH Aachen University, D

Conference Tuesday, 10 May 2022, Poster / Dialogue Sessions

15:05-17:00, Foyer Ground Floor NCC Mitte

PP058 **Improving the Power Efficiency of Welding Machines Using 1200 V CoolSiC MOSFET Discrete with .XT Interconnection Technology**
Jorge Cerezo, Infineon Technologies, A

PP059 **Design Tool for Rapid 3D Modelling of SiC Power Modules and Simulation of Parasitic Inductances with Experimental Verification**
Christoph Lüdecke, Rik W. De Doncker, Jonas Winkelhake, RWTH Aachen University, D

Design Tools

Chairperson: Christina DiMarino, Virginia Tech, USA

PP060 **Extraction of Parasitic Elements of a Printed Circuit Board applied to a GaN Half-Bridge**
Benedikt Kohlhepp, Thomas Dürbaum, Daniel Kübrich, Jeremias Kaiser, Samuel Faber, Friedrich-Alexander-University Erlangen-Nuremberg, D

PP061 **A Novel Analytical Time-Domain Calculation Method for the Weighted Total Harmonic Distortion (WTHD) in PWM Inverters**
Panagiotis Mantzanas, Thomas Dürbaum, Friedrich-Alexander-University Erlangen-Nuremberg, D

PP062 **Investigation on Blanking Time Effects Regarding Cross Currents in Time-Staggered Switching Mode**
David Reiff, Simon Johannliemke, Volker Staudt, Ruhr-University of Bochum, D

PP063 **A High-Speed and High-Accuracy Power Device Waveform Simulation Method**
Felipe Filsecker, ROHM Semiconductor, D; Makoto Murata, Asuma Imamura, Shimpei Fujita, Naotaka Kuroda, Yohei Nakamura, Atsushi Yamaguchi, ROHM, J

PP064 **Flexible and Cost-Effective HiL System for Module-Based VSC Simulation - Part I: Fundamental System Architecture and Operation**
Julian Lange, Tobias Barth, Benjamin Hinrichs, Siemens Energy Global, D

PP065 **Flexible and Cost-Effective HiL System for Module-Based VSC Simulation - Part II: A Fast and Tunable FPGA Based Circuit Simulation Model**
Tobias Barth, Julian Lange, Siemens Energy Global, D

PP066 **High-Fidelity Real-Time Simulation of Dual-Active Bridge Converters**
Marija Stevic, Ravinder Venugopal, OPAL-RT, D

PP067 **Rapid Prototyping Framework for Integrated Modular Motor Drives: Modelling, Simulation and Automated Code Generation**
Lukas Wild, Martin Schiestl, Maurizio Incurvati, Ronald Stärz, MCI The Entrepreneurial University, A

PP068 **Thermal Modeling of PCB Magnetic Components Based on Finite Element 2D Thermal Networks**
Lucia Clavero Ordonez, Miroljub Bakic, Thiwanka Wijekoon, Huawei Technologies, D; Pedro Alou Cervera, Alberto Delgado Expósito, UPM, E

Power Converters: Design and Control Method Optimization

Chairperson: Bernhard Strzalkowski, Analog Devices, D

PP069 **High-Pass Design in Active Filter Damping**
Sabrina Ulmer, Gernot Schullerus, Ertugrul Sönmez, Reutlingen University, D

PP070 **Reduced Order Modelling for Solid-State Transformers Based on Active Unity Power Factor Modules**
Francisco Freijedo, Alvaro Rubinos Sicre, Miroljub Bakic, Thiwanka Wijekoon, Mauro Valente, Huawei Technologies, D

PP071 **Analysis and Control of Active Ripple Energy Storage for Single-Phase PFC Converters**
Alex Rossi, Alessandro Pevere, Infineon Technologies, A; Roberto Petrella, University of Udine, I

PP072 **Low-Cost Microcontroller Based Implementation of Finite Control Set Model Predictive Control for Front-End Power Converters**
Giuseppe Aiello, Francesco Gennaro, Filiberto Mancuso, Vincenzo Mormina, STMicroelectronics, I; Giacomo Scelba, Mario Cacciato, Giovanni Antonio Muscato, University of Catania, I

PP073 **Quadratic Buck-Boost Single Switch Converter in Low Power SSL Applications: Pros and Cons Analysis**
Matteo Sucameli, STMicroelectronics, I

PP074 **Extending Output Power of Unified AC Input Light Industrial Applications by SiC MOSFET**
Simon Kim, Infineon Technologies, ROK; Kwok Wai Ma, Infineon Technologies, SGP

PP075 **Operation of a SiC-based Three-Phase PFC Converter in an Industrial DC Conductor System with Distributed DC Link Capacitors**
Jan-Niklas Koch, Raphael Otte, Holger Borcherding, University of Applied Sciences and Arts Ostwestfalen-Lippe, D

PP076 **An Automotive High-Frequency Coreless Transformer in 11kW Dual Active Bridge Converter**
Valentin Rigot, Daniel Sadarnac, Jihen Sakly, VEDECOM Institute, F; Tanguy Phulpin, GeePs, F

Control Methods

Chairperson: Klaus Rigbers, SMA Solar Technology, D

PP077 **Decentralized Control with Submodule Temperature Balancing for Modular Multilevel Converter**
Le Nam Pham, Quoc Dung Phan, Ho Chi Minh City University of Technology, VN

PP078 **Current Limitation Methods during Grid Faults for Power Converters with Fictitious Synchronous Generator Control**
Florian Redmann, Alexander Ernst, Bernd Orlik, University of Bremen, D

PP079 **Validation of a Converter Control Based on a Generator Model as Voltage Source**
Alexander Ernst, Wilfried Holzke, Dawid Koczy, Bernd Orlik, University of Bremen, D

PP080 **Dual Active Bridge Converter: Simple Peak Current Limitation by Dual Phase Shift Control**
Lukas Fräger, Niklas Badenhop, Dennis Kampen, Sascha Langfermann, Michael Owzareck, BLOCK Transformatoren-Elektronik, D; Jens Friebe, Leibniz University Hannover, D

PP081 **Multi-Objective Analysis of Pulse-Width Modulation Techniques for Five-Phase Inverters**
Ander DeMarcos, Unai Ugalde, Jon Andreu, Markel Fernández, Edorta Ibarra, University of the Basque Country, E

PP082 **Robust Hysteresis Control for Full-Bridge LLC Resonant ConvertersUsing an Isolated Measurement Scheme**
Lukas Keuck, Joachim Böcker, Frank Schafmeister, Paderborn University, D

PP083 **Economical Implementation of Model Predictive Control for Minimization of Current and Torque Distortions in Induction Machines**
Morris Fuller, Gerd Griepentrog, Haoran Wang, Technical University of Darmstadt, D; Oliver König, AVL LIST, A

PP084 **Software-Based Power Factor Correction by Using Iterative Learning Control for Battery Chargers with LLC Resonant Converter Topology**
Alessio Cavaterra, Ulf Schwalbe, Steven Lambeck, Fulda University of Applied Sciences, D; Martin Wattenberg, Infineon Technologies, A

Conference Wednesday, 11 May 2022

Morning Oral Sessions

08:30	Foyer Room Brüssel **Morning Coffee** *Reunited*
08:45	Room Brüssel 1 **Keynote »Power Electronics for a Future Sustainable Society«** Ichiro Omura, Professor, Kyushu Institute of Technology, J
09:30	Foyer Room Brüssel **Coffee Break**

Room Brüssel 1
Behavior and Reliability of SiC Devices

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

09:50
Characterization of 3.3 kV Discrete SiC MOSFETs in Synchronous Rectification Mode for PV Current Source Inverter Applications
Louis-Alexis Gomez, Luis Gabriel Alves Rodrigues, CEA Tech, F; Sébastien Sanchez, Guillaume Gateau, University of Toulouse, F

10:10
Influence of Turn-Off Gate-Voltage Undershoots on the Turn-On Behavior of SiC MOSFETs
Andreas Hürner, Paul Sochor, Rudolf Elpelt, Maximilian Wolfgang Feil, Qing Sun, Infineon Technologies, D

10:30
Transfer IV and Threshold Voltage Drift of GaN and SiC Cascode Discrete Devices Under Gate Bias Stress
Yasin Gunaydin, Saeed Jahdi, Xibo Yuan, Phil Mellor, Bernard Stark, University of Bristol, GB; Erfan Bashar, Olayiwola Aletise, Jose Ortiz Gonzalez, University of Warwick, GB

Room Brüssel 2
Renewable Energy Systems and Optimization

Chairperson: Frede Blaabjerg, Aalborg University, DK

09:50
Investigation of Innovative Cooling Systems for a Direct Driven Lightweight PMSG for Wind Power Applications
Jonas Steffen, Sebastian Lengsfeld, Axel Seibel, Fraunhofer Institute IEE, D; Klaus Schleicher, Mercedes Herranz Gracia, Aristide Spagnolo, Markus Klöpzig, Siemens, D; Joachim Krämer, Krämer Energietechnik, D

10:10
Performance Evaluation of SiC MOSFETs for Isolated DC-DC Conversion in Medium Voltage Photovoltaic Power Plants
Minh Nhut Ngo, Jérémy Martin, Anthony Bier, CEA, F; Philippe Ladoux, University of Toulouse, F; Sébastien Sanchez, Icam, F

10:30
Reliability of Inverters in Photovoltaic Power Systems – A Detailed Field Data Analysis
Felix Kulenkampff, Sebastian Franz, Klaus Kiefer, Lennart Sans, Fraunhofer ISE, D

Room München 1
Advanced Gate Drivers

Chairperson: Petar J. Grbovic, University of Innsbruck, A

09:50
SOFTGATE – An IGCT Gate Unit for Soft-Switching
Jakub Kucka, Drazen Dujic, Power Electronics Laboratory, EPFL, CH

10:10
A Self-Regulating Gate Control Based on the Parasitic Turn-On Effect for Low Losses and Low EMI of SiC MOSFET
Zheming Li, Mark-M. Bakran, Robert Maier, Michael Walter, University of Bayreuth, D

10:30
An Improved Monitoring of Gate Leakage Current on SiC Power MOSFETs using Source Driver Topology
Antoine Laspeyres, Loreine Makki, Anne-Sophie Descamps, Christophe Batard, Corentin Darbas, Nicolas Ginot, University of Nantes, F; Stéphane Azzopardi, Thanh Long Le, Toni Youssef, Safran, F

Room München 2
Passive Components

Chairperson: Wolfram Teppan, LEM INTERNATIONAL, CH

09:50
Layer-by-Layer Printed Dielectrics: Scalable Nanocomposite Capacitor Fabrication for the Green Transition
William Greenbank, Thomas Ebel, Jacek Fiutowski, Prince Gupta, University of Southern Denmark, DK

10:10
Trans-Inductor Voltage Regulator (TLVR): Circuit Operation, Power Magnetic Construction, Efficiency and Cost Trade-offs
Shreyankh Krishnamurthy, Pulse Electronics, D; David Wiest; John Gallagher, Pulse Electronics, USA; Yosef Zhou, Pulse Electronics, CHN

10:30
Optimization of Magnetic Components for an ACQR Flyback: Characterizations, Simulations, Manufacturing
Cédric Colonna, Thomas Harmand, 3D PLUS, F; Patrick Dubus, POWERLOGY, F

Room Mailand
Measurement Techniques and EMC

Chairperson: Jacques Laeuffer, Dtalents, F

09:50
Highly Dynamic Power Estimation and Efficiency Mapping Based on the Inverter's Switching Cycle as Averaging Interval
Alexander Stock, Hottinger Brüel & Kjaer, D

10:10
Analysis of Fixture Design for Impedance Characterization of Multi-Chip Power Modules
Brian DeBoi, Andrew Lemmon, Chris New, University of Alabama, USA

10:30
Common Mode of Inverters: Survey and Study of Filter Placement on Grid and Load Side
Benedikt Kohlhepp, Thomas Dürbaum, Daniel Kübrich, Julian Dobusch, Friedrich-Alexander-University Erlangen-Nuremberg, D

10:50	Foyer Room Brüssel **Coffee Break**

11:10
Power Cycling SiC MOSFETs: Study on Threshold Voltage Behavior and Solder-Void Decrease
Elena Mengotti, Helton Goncalves de Medeiros, Enea Bianda, David Baumann, Gerd Schlottig, ABB, CH; Joni Jormanainen, Jonny Ingman, ABB Drives, FIN; Roman Furrer, Bastian Rheingans, Empa, CH; Ulrike Grossner, Shweta Tiwari, Thomas Ziemann, ETH Zurich, CH

11:30
Improving the VF-IR Trade-Off in 650-V/1200-V SiC SBD by Development of Schottky Metal and Optimization of Device Structure
Kei Tanihira, Yoichi Hori, Yoko Yamamoto, Yuto Adachi, Takahiro Ogata, Shunsuke Asaba, Masakazu Kobayashi, Hiroshi Kono, Hideki Hayakawa, Akihiro Tsuyuguchi, Toshiba Electronic Devices & Storage, J; Georges Tchouangue, Toshiba Electronic Europe, D

11:10
Ideal Transformer Method Optimization for Power Hardware-in-the-Loop Simulations of Grid Connected Inverters
Marija Stevic, Ravinder Venugopal, OPAL-RT, D; Gayathri Tanuku, Amit Kumar KS, Jean-Nicolas Paquin, Syed Ahmed Raza Naqvi, OPAL-RT, CDN

11:30
Influence of Link Capacitor Outsourcing and Reduction of Capacitors in DC fed Drive Inverters
Simon Puls, Lenze, D; Holger Borcherding, Jan-Niklas Koch, Slavi Warkentin, University of Applied Sciences and Arts Ostwestfalen-Lippe, D

11:10
Real-Time Adjustable Voltage-Source Gate Driver with Resistance Emulation for Automated SiC MOSFET Characterization
Helge Wurst, Thomas Blank, Karlsruhe Institute of Technology, D; Bao Ngoc An, Schaeffler Automotive, D

11:30
Use of an NSGA-II Genetic Algorithm and Active Gate Driving to Improve Simulated GaN Power Electronic Switching Waveforms
Sergejs Leonovs, Harry Dymond, Saeed Jahdi, Bernard Stark, University of Bristol,GB

11:10
Sizing Compact Transformers with Integrated Serial Inductance Suitable for a 1 MHz DC/DC LLC Converter
Ulrich Soupremanien, Marc Bohnke, Gerard Delette, CEA-Liten, F; Pierre Demumieux, CEA, F; Pierre Perichon, CEA-Leti, F; Samuel Marek-Favarel, Capgemini Engineering, F; Thierry Sutto, Exagan, F

11:30
Novel Developments in Magnetics that Enable the High-Power High Frequency Power Conversion
Kapila Warnakulasuriya, Murata Power Solutions, GB

11:10
Special Effects of Junction Temperature Measurement Based on the Internal Gate Resistance
Michael Gleissner, Mark-M. Bakran, University of Bayreuth, D

11:30
High Bandwidth Solenoidal PCB Rogowski Coil
Tianqi Zhang, Luke Shillaber, Teng Long, University of Cambridge, GB

Conference Wednesday, 11 May 2022

Afternoon Oral Sessions

11:50	Hall 10.1 NCC Mitte **Lunch Break**

Room Brüssel 1
Power Module Technology

Chairperson: Ulrike Grossner, ETH Zurich, CH

14:00
Fabrication of a Double-Sided Cooled Half-Bridge Silicon Carbide Power Module for Electric Vehicles
Riya Paul, Rayna Alizadeh, Ahmed Rahouma, Homer Alan Mantooth, University of Arkansas at Fayetteville, USA

14:20
Impact of Technical Cleanliness on HV Automotive Applications
Michael Schleicher, Nesrine Damak, Semikron Elektronik, D

14:40
The 7th Generation "X Series" Intelligent Power Module and Its Control IC Technology
Massimo Caprioli, Fuji Electric, I; Yuki Kumazawa, Takahiro Mori, Kaname Mitsuzuka, Kenichiro Satou, Kiyoshi Sekigawa, Yasuyuki Kobayashi, Fuji Electric, J

Room Brüssel 2
Sintering Technologies

Chairperson: Frank Osterwald, Gesellschaft für Energie und Klimaschutz Schleswig-Holstein, D

14:00
Bonding Properties and Reliability Evaluation of Cu Paste in Low Temperature Pressureless Sintering
Takashi Hattori, Shinichi Yamauchi, Kei Anai, Satoshi Konno, Mitsui Mining & Smelting, J

14:20
Bonding Between a Ceramic Wiring Board and Cooling Plate Using Copper Sintering Paste
Hideo Nakako, Michiko Natori, Dai Ishikawa, Yoshinori Ejiri, Showa Denko Materials, J; Kazuhiko Minami, Seiji Matsushima, Showa Denko, J

14:40
Characterization of Sinter Materials and Processes by Scratch Test
Nicolas Heuck, Christian Thomas, Marcel Lawniczak, Michael Curkin, Hamm-Lippstadt University of Applied Sciences, D; Kurt-Georg Besendörfer, Pavel Vozdecky, SEMIKRON Elektronik, D

Room München 1
System Reliability

Chairperson: Silvio Colombi, ABB Industrial Solutions, CH

14:00
Estimating Auxiliary Power Supply Consumption of the Modular Multilevel Converter Submodule for the Condition Health Monitoring
Ignacio Polanco Lobos, Drazen Dujic, Power Electronics Laboratory, EPFL, CH

14:20
System Consideration for Large Copper Wire and Ribbon Bonding in Mass Production
Tao Xu, Omid Niayesh, Jason Fu, Raymond Chen, Cristian Cionea, Kulicke & Soffa Industries, USA

14:40
Fault-Tolerant Operation Algorithm for a Multi-Phase DC Converter with Coupled Inductors
Arturs Bogdanovs, Oskars Krievs, Riga Technical University, LV; Johannes Pforr, University of Applied Sciences Ingolstadt, D

Room München 2
GaN Switches in Mission Critical Applications

Chairperson: Thomas Neyer, ON Semiconductor, D

14:00
Design and Characterization of an Interleaved GaN Half-Bridge IC with Matrix Layout for 48 V Applications
Richard Reiner, Michael Mikulla, Patrick Waltereit, Michael Basler, Stefan Mönch, Rüdiger Quay, Fouad Benkhelifa, Fraunhofer Institute IAF, D

14:20
Experimental Evaluation of Dead Time Reverse Conduction Losses in Motor Drives Applications
Marco Palma, Efficient Power Conversion (EPC), I; Vincenzo Barba, Fabio Mandrile, Salvatore Musumeci, Polytechnic University of Turin, I

14:40
All-Copper-Package (ACP) High-Power GaN HEMT Module Platform for xEV Traction Inverter and High-Speed DC Charger
Kongjing Li, Yangang Wang, Muhammad Morshed, Dynex Semiconductor, GB

Room Mailand
Low Power Converters using WBG Materials

Chairperson: Ulrich Kirchenberger, STMicroelectronics, D

14:00
Minimum Loss Operation of the Synchronous Buck Converter Using Si, SiC, and GaN Transistors
Reinhold Elferich, Christian Hattrup, Signify, NL

14:20
ZVS Solutions for Flyback Topology and the Impact of GaN Utilization
Manfred Schlenk, Dr. Schlenk-Consulting, D; Ionel Dan Jitaru, Rompower, USA; Constantin Radoi, Polytechnic Institute of Bucharest, RO

14:40
Analysis of Interleaved Series Capacitor Tapped Buck Topologies for Adjustable Output Voltage Range
Alberto Otero Olavarrieta, Iñigo Martínez de Alegría, Estefanía Planas, Asier Matallana, Edorta Ibarra, University of the Basque Country, E

15:05-17:00	Foyer Ground Floor NCC Mitte **Poster/Dialogue Sessions & Coffee Time**
16:30-18:00	Depending on the weather: Foyer Entrance NCC Mitte / Messepark **After Work Beer** *Reunited*

Conference Wednesday, 11 May 2022, Poster / Dialogue Sessions

15:05-17:00, Foyer Ground Floor NCC Mitte

Power Converters

Chairperson: Klaus F. Hoffmann, Helmut-Schmidt-University, D

PP085 **Comparison of Three-Level Grid-Forming Inverter Topologies for Unbalanced and Nonlinear Load Conditions in Microgrids**
Daniel Stracke, Fabian Schnabel, Marco Jung, Sebastian Sprunck, Fraunhofer Institute IEE, D

PP086 **Solutions for Reducing and Controlling Voltage Unbalance in HERIC Inverters**
Domenico Nardo, Simone Buonomo, Alfio Scuto, STMicroelectronics, I

PP087 **Hardware-in-the-Loop Development of a 30 kV / 100 kW / >150 kHz SiC-Based Resonant Converter**
Tobias Strittmatter, Ishan Pendharkar, Marco Thommen, Nicola Schulz, University of Applied Sciences and Arts Northwestern Switzerland, CH

PP088 **Detailed Simulation and Efficiency Analysis of Deadtime Behavior in Dual Active Bridge DC-DC Converters**
Manuel Häußermann, Heinrich Steinhart, Aalen University of Applied Sciences, D

PP089 **Design and Control of a 1 MHz DC-DC Soft-Switching LLC Converter with Wide Band Gap GaN Components**
Emmanuel Marcault, Pierre Demumieux, Mathieu Gavelle, CEA, F; Pierre Perichon, CEA-Leti, F; Samuel Marek-Favarel, Capgemini Engineering, F; Thierry Sutto, STMicroelectronics, F

PP090 **SiC & GaN Comparison for High Switching Frequency, High Efficiency 7 kW Boost Converter**
Florent Loiselay, Leyla Arioua Habarek, Joao Oliveira, Ali Ahoussein, VEDECOM Institute, F

Power Supplies

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

PP091 **A Study on the Influence of the Transformer on Cross-Regulation in DCM Multi-Output Flybacks**
Denis Motte-Michellon, Bruno Cogitore, Exxelia, F; Yves Lembeye, Brahim Ramdane, G2elab, F

PP092 **Modified d(2-d)/(1-d)2-Converter**
Helmut Votzi, Felix Himmelstoss, University of Applied Sciences Technikum Vienna, A

PP093 **High Frequency DCDC GaN HEMT USB Type-C PD EPR Four-Switch Buck-Boost Converter**
Martin Schiestl, Andreas Albrecht, Ronald Stärz, Maurizio Incurvati, MCI The Entrepreneurial University, A; Manuel Hollfelder, Infineon Technologies, D

PP094 **High Efficiency Digital Centric DCDC with Low Complexity Analog Circuit**
Lionel Cimaz, STMicroelectronics, F

PP095 **A Comparison among Wide Bandgap Devices using a CLLLC Bidirectional Resonant Converter**
Alejandro Llop, Inigo Pena, Susana Apinaniz, Salvador Ceballos, Kepa Mendibil, Tecnalia Research, E

PP096 **Very Wide Input Voltage Converter with Custom Planar Magnetics Components for a Space Application**
Cédric Colonna, 3D Plus, F; Denis Labrousse, ENS Cachan - SATIE, F; Patrick Dubus, POWERLOGY, F

PP097 **Grid-Tied ACDC Converters and Protection in the DC Grid**
Peter van Duijsen, Diego Zuidervlie, The Hague University of Applied Sciences, NL

Passive Components

Chairperson: Daniel Chatroux, CEA-LITEN, F

PP098 **Study of Combined Solutions for Thermal Management and Electromagnetic Shielding: Shielding Cabinets, EMI Absorbers and Thermal Gap Fillers**
Antonio Alcarria, Jorge Victoria, Victor Martinez, Sebastian Mirasol, Ivan Valcarcel Bustos, Antonio Agapito Tebar, Würth Elektronik eiSos, D; Adrian Suarez, Pedro Martínez, Jose Torres, University of Valencia, E

PP099 **Frequency and Temperature Dependence of the Electrical Resistivity of High Frequency MnZn Ferrites**
Bernd Ackermann, Signify Research, NL; Herbert Jungwirth, Michael Schmidhuber, SUMIDA Components & Modules, D

PP100 **A Smart Low-Cost Power Generator for Upcoming Isolation Material Stress Tests**
Paul Aspalter, Hans Ertl, Technical University of Vienna, A; Markus Vogelsberger, Alstom Austria, A

PP101 **K-TEM: Online Power Can Thermal Simulation Tool**
Dario Zuffi, Massimiliano Abbenante, Walter Bruno, Evangelista Boni, Massimo Totaro, KEMET Electronics, I; Lachezar Zhivkov, KEMET Electronics, BG

PP102 **New Generation Capacitor Films for 150°C High Voltage AC-DC Inverter Applications**
Adel Bastawros, Matt Niemeyer, James Mahood, Andrew Pingitore, SABIC, USA; Fumio Yu, Takamune Sugawara, SABIC, J

PP103 **Losses of Nanocrystalline Core Materials for High Power, High Frequency Applications**
Jakob Vellinger, Simon Schramm, Daniel Goldmann, Munich University of Applied Sciences, D; Jörg Metzger, Inductron Inductive Electronic Components, D

PP104 **A Simple SPICE Modeling Strategy for Common-Mode Chokes**
Maurizio Tranchero, Paolo Santero, Ideas & Motion, I

Motor and Inductors

Chairperson: Hubert Schierling, Siemens, D

PP105 **A Novel Single-Tooth Winding Induction Machine**
Arthur Grün, Vlado Ostovic, HTW Saar University of Applied Sciences, D; Mario Pacas, University of Siegen, D

PP106 **Investigation of Open-Loop Predictor Implementation Methods for Online Parameter Estimation of IPMSM**
Aravinda Perera, Roy Nilsen, Thomas Haugan, Norwegian University of Science and Technology, N

PP107 **Torque Control of Induction Machines Using QRM-MPC Approach**
Kristóf Gábor Bándy, Péter Pál Stumpf, Budapest University of Technology and Economics, H

PP108 **Parameter Sensitivity of MRAS-Based Sensorless Control for PMSM Considering Speed Accuracy and Dynamic Response at Low Stator Frequencies**
Michael Brüns, Tankred Müller, Christian Rudolph, Hamburg University of Applied Sciences, D

PP109 **I-F Start-Up Procedure of an Induction Machine with Smooth Transition to Sensorless Vector Control**
Stefan Hüll, Jochen Staiger, Heinrich Steinhart, Swen Bosch, Aalen University of Applied Sciences, D

PP110 **Knowledge-Based Engineering for System Optimization of Power Electronics including the Electric Motor Design**
Max Kolletzki, Friedemann Ohl, Marco Denk, Brose Fahrzeugteile, D

PP111 **A Survey on Adjustable Inductances for Power Electronic Circuits**
Sönke Brandt, Guido Schierle, Michael Meissner, Klaus F. Hoffmann, Noah Polap, Helmut-Schmidt-University, D

PP112 **Optimum Design of High Current Power Planar Inductors with Flat Winding**
Todor Filchev, Himag Planar Magnetics, GB; Alex Van den Bossche, Ghent University, B

Intelligent Gate Drives

Chairperson: Klaus Marahrens, SEW-EURODRIVE, D

PP113 **Hardware Development of an Active Gate Driver to Mitigate Oscillations of SiC MOSFET Switching Process**
Michael Walter, Mark-M. Bakran, Robert Maier, Zheming Li, University of Bayreuth, D

PP114 **Advanced Overcurrent Detection with Digital Controllable Blanking Time for Fast SiC-Switch Protection**
Bernhard Strzalkowski, Analog Devices, D

PP115 **Two-Level, Slew-Rate Control Reduces the Temperature Stress of Power Semiconductors in Power Modules**
Wolfgang Frank, Michael Ebli, Niclas Thon, Infineon Technologies, D

PP116 **Design and Performance Assessment of a Digital Gate Driving Solution for Silicon Carbide Power Modules**
Yue Zhao, Fei Diao, Yuheng Wu, University of Arkansas, USA; Rob Weber, Nitesh Satheesh, Avinash Kashyap, Microchip Technology, USA; Vipin Gaonkar, Microchip Technology, IND

PP117 **femtoCore: An Open Source Processor Architecture for Power Electronics Controls**
Filippo Savi, Davide Barater, Giovanni Franceschini, University of Modena and Reggio Emilia, I; Giampaolo Buticchi, University of Nottingham, CHN

PP118 **Precision Gate Drive Featuring High Dead Time Resolution for Soft Switched Converters**
Martin Nießen, Georg Jöntgen, Christian Peter Dick, Cologne University of Applied Sciences, D

PP119 **Digitally Adjustable Gate Resistor Concept for Automated and Time-Saving Gate-Resistor Selection - Improvement by Reduction of Parasitic Inductances**
Michael Meissner, Aaron Meyer Herrmann, Norman Landskron, Klaus F. Hoffmann, Helmut-Schmidt-University, D

PP120 **Evaluation of the Driving Characteristics of Electric Commercial Vehicles by the Use of Inertial Measurement Units**
Mathias Herget, Ulf Schwalbe, Lukas Böhning, Fulda University of Applied Sciences, D

Charging

Chairperson: Peter Wallmeier, Delta Energy Systems, D

PP121 **The Potential of SiC Semiconductors for High Power Electric Vehicle Charging Stations**
Katharina Machtinger, Markus Makoschitz, AIT Austrian Institute of Technology, A

PP122 **AC and DC Charging for Electric Vehicles with a Battery Modular Multilevel Management (BM3) Converter System**
Johannes Buberger, Julian Estaller, Wolfgang Grupp, Florian Schwitzgebel, Andreas Wiedenmann, Ali Mashayekh, Manuel Kuder, Richard Eckerle, Thomas Weyh, Universität der Bundeswehr München, D

PP123 **Efficiency Investigation of a Battery Modular Multilevel Management Converter System**
Nina Sorokina, Julian Estaller, Manuel Kuder, Wolfgang Grupp, Anton Lesnicar, Richard Eckerle, Thomas Weyh, Universität der Bundeswehr München, D

PP124 **Direct Charging of Electric Vehicle Using Photovoltaic System with Minimum Power Loss**
Martin Kröninger, Mohammad Vedadi, Otto Kreutzer, Fabian Weiß, Deggendorf Institute of Technology, D

PP125 **Analysis of Magnetic Flux Density in a Model of an Inductive-Resonance Energy Transfer System**
Desislav Iliev, Nikolay Madzharov, Technical University of Gabrovo, BG

PP126 **The Resurrection of GTOs and Thyristors as Core Components in MW-Charger-Application and Railway/Mining Refurbishment**
Martin Schulz, Daniel Hoffmann, Michael Ketterer, Littelfuse Europe, D

PP127 **Four-Leg EV Chargers for Grid Supporting**
Antonio-Miguel Muñoz-Gómez, Ricardo Igea, Javier Ballestín Fuertes, Gregorio Fernandez, Daniel Marquina, Fundación Circe, E

Transformers and Passive Components

Chairperson: Hans Ertl, Vienna University of Technology, A

PP128 **Mathematical Model of the Temperature Rise of a Wireless Power Transfer Coil in DC Operation**
Christian Merz, Daniel Gückelhorn, Würth Elektronik eiSos, D; Cem Som, Würth Electronic Midcom EU, D

PP129 **Analysis of Decoupling Capacitor Effectiveness for Multi-Chip Power Modules**
Christopher New, Brian DeBoi, Andrew Lemmon, University of Alabama, USA

PP130 **Wireless Power Transfer Losses Redefined by C0G Capacitors**
Damien Lemaitre, Benoît Sarrazin, Thierry Brincourt, Alexis Derbey, Yves Lembeye, G2elab, F; Yohan Wanderoild, EDF, F

PP131 **Class Phi2 Amplifier Using GaN HEMTs at 13.56MHz with Tuned Transformer for Wireless Power Transfer**
Sabrina Ulmer, Klaus-Dieter Kächele, Kathrin Kocher, Ertugrul Sönmez, Gernot Schullerus, Reutlingen University, D

PP132 **Prediction of Stray Capacitance of CM Chokes and its Influence on EMI Filters**
Mohammad Ali, Rehnuma Bushra, Jens Friebe, Axel Mertens, Leibniz University Hannover, D; Mathias Magdowski, Ralf Vick, Otto-von-Guericke-University, D

PP133 **Non-Inductive Highly Efficient Power Transfer System, a New Approach**
Michael Zenkner, Heinz Zenkner, WPT-Systems, D

PP134 **A Novel Design for a 22KW Transformer for a 3 Phase Full Bridge LLC EV Onboard Charger for Smaller Size, Lower Cost and Improved Performance**
Gerard Healy, Pulse Electronics, IRL

PP135 **Common Mode DGS EMI Filter Integrated into a GaN Half Bridge Switching Cell**
Eduard Dechant, Norbert Seliger, Rosenheim University of Applied Sciences, D; Ralph Kennel, Technical University of Munich, D

PP136 **Capacitance- and Thermally-Wise Optimized Transformers**
Christian Dietmann, Tobias Appel, Daniel Benner, STS Spezial-Transformatoren-Stockach, D; Klaus F. Hoffmann, Michael Meissner, Norman Landskron, Christian Bödeker, Helmut-Schmidt-University, D

Renewable Energies

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

PP137 **Experimental Design of Solar DC Microgrid for the Rural Electrification of Africa**
Lucas Richard, Marie-Cecile Alvarez-Herault, Bertrand Raison, David Frey, Alexis Derbey, G2elab, F

PP138 **Generation of Encoder Signals for the Coupling of a Wind Turbine Converter to Model-Based Controlled Converter**
Dawid Koczy, Alexander Ernst, Wilfried Holzke, Bernd Orlik, University of Bremen, D

PP139 **Magnetic Design for Three Phase PV Inverters with DC-Link Referenced Output Filter**
Asier Garcia-Bediaga, Itsasne Landaburu, Victor Lopez, Alejandro Rujas, Luis Mir, Ikerlan, E

PP140 **Development of a Distributed Measurement System for the Digitalisation of a Wind Turbine**
René Reimann, Alexander Ernst, Wilfried Holzke, Steffen Menzel, Holger Raffel, Bernd Orlik, University of Bremen, D; Arne Schulz, Axtrion, D

PP141 **Provision of Power Plant Equal Ancillary Services by Wind Turbines: From Maximum to Grid-demanded Power Point Tracking**
David Matthies, Alexander Ernst, Henning Sauerland, René Reimann, Wilfried Holzke, Bernd Orlik, University of Bremen, D

PP142 **Impact of 1200V SiC Modules in an Industrial PV Power Unit**
Victor Lopez, Luis Mir, Alejandro Rujas, Ikerlan, E; Carlos Martinez de Guereñu, AEG Power Solutions, E; Aritz Egea, Mondragon University, E; Jose M. Bermejo, Ingeteam Power Technology, E

PP143 **A GaN-Based DC-DC Converter with Zero Voltage Switching and Hysteretic Current Control for 99% Efficient Bidirectional Charging of Electrocaloric Capacitive Loads**
Stefan Mönch, Michael Basler, Kareem Mansour, Rüdiger Quay, Richard Reiner, Patrick Waltereit, Fraunhofer Institute IAF, D; David Bach, Kilian Bartholome, Roland Binninger, Fraunhofer Institute IPM, D; Sylvia Gebhardt, Christian Molin, Fraunhofer Institute IKTS, D

PP144 **Magnetic Component Design for Medium Voltage Photovoltaic Application**
Michael Schmidhuber, Christoph Drexler, Jonas Pfeiffer, SUMIDA Components & Modules, D; David Derix, Michael Geiss, Jürgen Thoma, Fraunhofer Institute ISE, D

Conference Wednesday, 11 May 2022, Poster / Dialogue Sessions

15:05-17:00, Foyer Ground Floor NCC Mitte

Multilevel Converter

Chairperson: Peter Steimer, Hitachi Energy, CH

PP145 **Novel Approach to Characterize Li-ion Battery Cells for the Purpose of Battery Emulation by Fitting of the Isolated Cell Dynamics**
Julian Estaller, Ali Mashayekh, Johannes Buberger, Tobias Högerl, Mahdiye Khorasani, Manuel Kuder, Richard Eckerle, Thomas Weyh, Universität der Bundeswehr München, D

PP146 **Derating Strategies for a Modular Multilevel Converter**
Raul Santiago Munoz-Aguilar, Ilknur Colak, Shan Jiang, Maschinenfabrik Reinhausen, D

PP147 **Model Predictive Control for 17-Levels Inverter in PV systems**
Mohamed Abdelrahem, Mostafa Ahmed, Ralph Kennel, Ibrahim Harbi, Technical University of Munich, D; M. Saad Bin Arif, Aligarh Muslim University, IND

PP148 **Three-Level ANPC Converter as an Input Stage of an EV Charging System with Bipolar DC Link**
Michal Harasimczuk, Jacek Rabkowski, Bartosz Lasek, Rafal Kopacz, Krzysztof Kalinowski, Rafal Miskiewicz, Warsaw University of Technology, PL

PP149 **A Fast and Safe Discharging Method for MMC Submodule Capacitors**
Ilknur Colak, Maschinenfabrik Reinhausen, D; Mohammad Abu-Ali, Technical University of Munich, D

PP150 **Investigation of Different Driver Topologies for Application in Modular Multilevel Systems**
Wolfgang Grupp, Tobias Högerl, Andreas Wiedenmann, Julian Estaller, Nina Sorokina, Manuel Kuder, Richard Eckerle, Thomas Weyh, Universität der Bundeswehr München, D

PP151 **Modeling and Estimation of the Losses of a Multi-Level Inverter with Integrated Battery for Electric Vehicles**
Gaël Pongnot, Clément Mayet, Denis Labrousse, SATIE Laboratory, F

Energy Storage and Grids

Chairperson: Gianmario Pellegrino, Polytechnic University of Turin, I

PP152 **Design and Limit of a 4 Legs Inverter with Unbalanced Grid Injection Operation Connected to a Quad Active Bridge Converter**
Antoine Bulteau, Yves Lembeye, David Frey, G2elab, F

PP153 **Online State of Health Diagnostic Method of Battery cells in a Reconfigurable Battery System or Multilevel Inverter**
Ali Mashayekh, Mahdiye Khorasani, Julian Estaller, Johannes Buberger, Richard Eckerle, Manuel Kuder, Thomas Weyh, Universität der Bundeswehr München, D

PP154 **Dynamic Study of Resonant Converters for Lithium-Ion Battery Charger Applications**
Christian Branas, Francisco Azcondo, Francisco J. Díaz, Rosario Casanueva, Alberto Pigazo, University of Cantabria, E; Juan C. Viera, University of Oviedo, E

PP155 **Monitoring Considerations of Second Life Lithium Ion Batteries in Battery Energy Storage Systems**
Mussab Najeeb, Technical University of Ilmenau, D; Ulf Schwalbe, Fulda University of Applied Sciences, D

PP156 **Test Bench for the Investigation of Resonances in Low-Voltage Grids**
Swen Bosch, Jochen Staiger, Heinrich Steinhart, Aalen University of Applied Sciences, D

PP157 **Improved Predictive Energy Management for Stationary Energy Storage Systems - Multi-Use of Different Applications**
Lukas Böhning, Ulf Schwalbe, Mathias Herget, Fulda University of Applied Sciences, D

PP158 **Interconnection of Point-to-Point HVDC Links to Form a Multi-Terminal HVDC Grid**
Steffen Menzel, Alexander Ernst, René Reimann, Wilfried Holzke, Holger Raffel, Bernd Orlik, University of Bremen, D

PP159 **Toward the Deployment of Low-Voltage DC Distribution Grids: Review on the Influence of Voltage Levels, Protection Schemes and Power Quality Aspects**
César Augusto Slongo, Alvaro Llaria, ESTIA Institute of Technology, F; Geoffrey Auran, EDF, F; Florian Perrotton, Enedis, F

PP160 **Comparative Implementation of a two-stage DC-Link**
Dirk Fischer, Regine Mallwitz, Robert Rohn, Technical University of Braunschweig, D

E-Mobility and other Transportations

Chairperson: Pavol Bauer, Delft University of Technology, NL

PP161 **Comprehensive Performance Evaluation of Discrete 1200V IGBT7 S7 for Drives Application**
Andrea Piccioni, Infineon Technologies, A

PP162 **Design and Control of a Power Electronics Load Emulator based on Industrial Inverters**
Christian Sack, Fabian Mink, THM University of Applied Sciences, D; Stephan Beineke, Matthias Bachmann, Alexander Bähr, KEBA Industrial Automation, D

PP163 **Benefits of Using the New 1200V Si IGBT and SiC MOSFET Modules for E-Bus Application**
Miroslav Hruska, Siemens Advanta Development, CZ Vladislav Damec, VSB-Technical University of Ostrava, CZ; Martin Kozak, Siemens Digital Industries, CZ

PP164 **Saliency-Based Dynamic Encoderless Operation of Two Induction Machines in Parallel Configuration**
Markus Vogelsberger, Alstom, A; Hans Ertl, Eduardo Rodriguez Montero, Thomas Wolbank, Technical University of Vienna, A; Wolfram Teppan, LEM INTERNATIONAL, CH

PP165 **Fault-Tolerant Regenerative Sensorless Braking of PMAC Motors Enables Degraded Mode of Operation for Functional Safety**
Tobias Schmidt, Jens Onno Krah, Cologne University of Applied Sciences, D; Joachim Holtz, University of Wuppertal, D; Freddy Heinzelmann, SEW-EURODRIVE, D

PP166 **Low Power, High Isolation Voltage Transformer Testing: Energy Storage, Charging Systems and EV**
Shreyankh Krishnamurthy, Pulse Electronics, D

PP167 **On-Board Power Management in a Marine Autonomous Surface Vehicle (ASV): Multi-Port Transformer Design**
Thierry Martiré, Guillaume Pellecuer, University of Montpellier, F; Mickaël Petit, Benjamin Loyer, SATIE Laboratory, F

Packaging II

Chairperson: Geraldo Nojima, Eaton Corporation, USA

PP168 **The Smart Chip Package Concept of Possehl Electronics**
Dietmar Kurzeja, Volker Berg, Possehl Electronics, D

PP169 **On the Importance of Thermo-Mechanical Properties Mismatch Management on Power Module to Cooler System Attachment**
Francois Le Henaff, Allan Borja, Huawei Technologies, D

PP170 **Thick Film Copper Bonding for Highly Reliable Ag Free Metal Ceramic Substrates**
André Schwöbel, Daniel Schnee, Heraeus, D

PP171 **Modeling and Thermal Analysis of the ACEPACK SMIT Package in H-Bridge High Voltage Circuits**
Marco Papaserio, Angelo Giuseppe Sciacca, Gaetano Bazzano, Ludovica Longo, Alessandra Cascio, STMicroelectronics, I; Giacomo Scelba, Mario Cacciato, Arjun Sujeeth, Andrea Cusumano, University of Catania, I

PP172 **New Die Attach Materials: Silver and Silver/ Copper Sintering Pastes**
Battist Rábay, Adrian Stelzer, Nano-Join, D

PP173 **Novel Material Technology Reduces Tool and Fixturing Complexity for Solder Preforms in Power Module Assembly**
Joseph Hertline, Andreas Karch, Indium, USA; Aaron Hutzler, Bond Pulse, D

PP174 **Compact Half-Bridge Module for a Charger Application Utilizing GaN Power Devices with Integrated Driver**
Julian Weimer, Dominik Koch, Ingmar Kallfass, University of Stuttgart, D

PP175 **Influence of TIM and Encapsulation on Power Cycling Capability of Discrete Devices**
Erping Deng, Yushan Zhao, Luhong Xie, Jianhui Liu, Yongzhang Huang, North China Electric Power University, CHN

Conference Thursday, 12 May 2022

Morning Oral Sessions

08:45	Room Brüssel 1 **Keynote »From State of the Art to Future Development Trends of Power Supply«** Peter Wallmeier, Senior Director, Delta Energy Systems, D
09:30	Foyer Room Brüssel **Coffee Break**

Room Brüssel 1
SiC Devices

Chairperson: Nando Kaminski, University of Bremen, D

09:50
650-V and 1200-V SiC MOSFETs with Low RonA and Strong Reduction in Switching Losses
Masaru Furukawa, Toshiba Electronic Devices & Storage, J; Georges Tchouangue, Toshiba Electronics Europe, D; Yasuhiro Shimizu, Katsuhisa Tanaka, Kotani Yosuke, Masakazu Kobayashi, Hiroshi Kono, Hideki Hayakawa, Akihiro Tsuyuguchi, Toshiba, J

10:10
High Temperature Performance of Next Generation 1200V SiC MOSFET die with Advanced Packaging Technology
Amy Romero, Adam Barkley, Jeffrey Casady, Satyavrat Laud, Anri Mikirtichev, Wolfspeed, USA; Dieter Liesabeths, Wolfspeed, D; Christophe Féry, Stefan Gunst, Andreas Hinrich, Sven Thomas, Heraeus, D; Habib Mustain, Heraeus, USA

10:30
Dynamic Characteristics and SOA of the RoadPak SiC Module at Multiple Operating Conditions
Athanasios Mesemanolis, Tobias Keller, Milad Maleki, Hitachi Energy, CH

Room München 1
Reliability

Chairperson: Josef Lutz, Chemnitz University of Technology, D

09:50
3.3kV 800A Next High Power Density Dual Si IGBT Module with High Power Cycle Durability
Taiga Arai, Kanta Makabe, Tsubasa Moritsuka, Isamu Yoshida, Akitoyo Konno, Koji Sasaki, Toshihito Tabata, Akiyoshi Tadano, Kan Yasui, Katsuaki Saito, Daisuke Kawase, Takayuki Kushima, Hitachi Power Semiconductor Device, J; Tomoyasu Furukawa, Hitachi, J

10:10
Enhancing Voltage Rating of Standard Power Modules for Harsh Environment Applications
Hugo Reynes, Martin Guillet, SuperGrid Institute, F; Cyril Buttay, Eric Vagnon, University of Lyon, F

10:30
Silver Sintering on PCBs – Methods and Reliability
Fabian Dresel, Jonas Müller, Jürgen Leib, Andreas Schletz, Fraunhofer Institute IISB, D

Room München 2
Converter Design

Chairperson: Marcelo Lobo Heldwein, Technical University of Munich, D

09:50
Designing the ANPC Inverter to Increase the Starting Torque in Traction Applications
Johannes Häring, Mark-M. Bakran, University of Bayreuth, D; Wolfgang Wondrak, Maximilian Hepp, Mercedes-Benz, D

10:10
Design and Demonstration of A 75kW Grid-Tied Inverter Using Low-Inductance 1.7kV Silicon Carbide Modules
Yue Zhao, Fei Diao, Yuheng Wu, University of Arkansas, USA; Serge Bontemps, Microchip Technology, F; Avinash Kashyap, Microchip Technology, USA

10:30
Self-Powered Synchronous Rectifying Active Bridge Compatible with Diode Bridge for Commercial Rectification
Yoshihiro Miwa, Hiroyuki Shoji, Hitachi, J; Takahiro Higuchi, Junichi Sakano, Tomoyuki Utsumi, Hitachi Power Semiconductor Device, J

Room Mailand
Motors and Electric Drives

Chairperson: Eric Favre, IMI Precision Engineering, CH

09:50
Comparative Evaluation of Four-Pole Planetary Motor Variants
Andreas Brunner, Manfred Schrödl, Richard Spießberger, Technical University of Vienna, A

10:10
Scalable Axial Flux Permanent Magnet Synchronous Machine for a Gearless In-Wheel Drive
Vanessa Linda Claus, Tankred Müller, Christian Rudolph, Hamburg University of Applied Sciences, D

10:30
Comparison of Losses in Permanent Magnet Synchronous Machines fed with 2-level- or 3-level-NPC Converter
Tobias Knapp, Wilfried Hofmann, Ludwig Schlegel, Technical University of Dresden, D

10:50	Foyer Room Brüssel **Coffee Break**

11:10
3.3kV All SiC Module with 2nd Generation Trench Gate SiC MOSFETs for Traction Inverters
Yusuke Sekino, Sayaka Yamamoto, Yasuyuki Kobayashi, Takashi Shiigi, Hiroshi Kimura, Yuichi Onozawa, Takafumi Uchida, Keiji Okumura, Yoshiyuki Kusunoki, Susumu Iwamoto, Fuji Electric, J, Steffen Ewald, Fuji Electric, D

11:30
Proven Power Cycling Reliability of Smart Cut SiC Substrate for Power Devices
Eric Guiot, Gonzalo Picun, Frédéric Allibert, Alexis Drouin, Walter Schwarzenbach, Jean-Marc Bethoux, Séverin Rouchier, SOITEC, F; Jürgen Leib, Tom Becker, Tobias Erlbacher, Fraunhofer Institute IISB, D; Julie Widiez, CEA, F

11:10
On Superior Power Cycling Capability of a High Power Density SiC Power Module for eMobility Application
Biwei Zhang, Antoni Ruiz, Milad Maleki, Hitachi Energy, CH

11:30
Consequences of Temperature Imbalance for the Interpretation of Virtual Junction Temperature Provided by the VCE(T)-Method
Fabian Nehr, Uwe Scheuermann, SEMIKRON Elektronik, D

11:10
High Voltage Power Supply for Industrial X-Ray Application
Serge Gavin, Simon Kissling, Mauro Carpita, University of Applied Sciences and Arts Western Switzerland, CH; Marco Fontana, Alexandre Bapst, Thermo Fisher Scientific, CH

11:30
Highly Efficient PFC Topology Using Constant Power Control Enabling Higher Power Density and Cost Savings in Passives
David Chilachava, Vincotech, D; Ernö Temesi, Marton Vazsonyi, Gabor Ipach, Vincotech, H

11:10
Synchronized MPTC Scheme for High Frequency PMSM Drives Using Dynamic Weighting Factor Calculation
Kristóf Gábor Bándy, Péter Pál Stumpf, Tóth-Katona Tamás, Budapest University of Technology and Economics, H

11:30
Modular System Architecture for Large Multi-Axis Motion Control Systems in Automation
Timo Wilkening, Jens Onno Krah, Joschka Randerath, Miguel Avendano, Cologne University of Applied Sciences, D; Joachim Holtz, University of Wuppertal, D

Conference Thursday, 12 May 2022

Afternoon Oral Sessions

11:50 — Hall 10.1 NCC Mitte
Lunch Break

Room Brüssel 1
Thermal Management

Chairperson: Uwe Scheuermann, Semikron Elektronik, D

14:00
Direct-Liquid-Cooled Next High Power Density Dual (nHPD2) Using Copper Base Plate
Hitoshi Nishimori, Norio Nakazato, Hitachi, J; Katsuaki Saito, Takayuki Kushima, Kouji Sasaki, Hitachi Power Semiconductor Device, J

14:20
A Reliability Study of Phase Change Thermal Interface Materials for Power Semiconductor Modules
Anwesha Fernandes, Yangang Wang, Muhammad Morshed, Robin Simpson, Dynex Semiconductor, GB

14:40
ShowerPower 3D - Highest Power Density for Future Generation of SiC Power Modules
Henning Ströbel-Maier, Fabio Carastro, Alexander Streibel, Klaus Kristen Olesen, Danfoss Silicon Power, D

15:00
New Dimensions in Lock-In Thermography for Failure Classification in Electronics with New Thermographic Cameras in HD Resolution
Marco Liepelt, Steffen Sturm, InfraTec, D

Room München 1
Design and Optimization

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

14:00
Design Optimization of a MW-level Medium Frequency Transformer
Nikolina Djekanovic, Drazen Dujic, Power Electronics Laboratory, EPFL, CH

14:20
Over Voltage due to Cable Reflections at SiC Converters - Basic Effects and Countermeasures
Simon Johannliemke, David Reiff, Volker Staudt, Ruhr-University of Bochum, D

14:40
An Open-Source FEM Magnetics Toolbox for Power Electronic Magnetic Components
Nikolas Förster, Till Piepenbrock, Philipp Rehlaender, Oliver Wallscheid, Frank Schafmeister, Joachim Böcker, Paderborn University, D

15:00
Towards Digital Twins for the Optimization of Power Electronic Switching Cells with Discrete SiC Power MOSFETs
Salvatore Race, Ivana Kovacevic-Badstuebner, Michel Nagel, Thomas Ziemann, Ulrike Grossner, ETH Zurich, CH

Room München 2
Wireless Power Transfer

Chairperson: Enrique J. Dede, University of Valencia, E

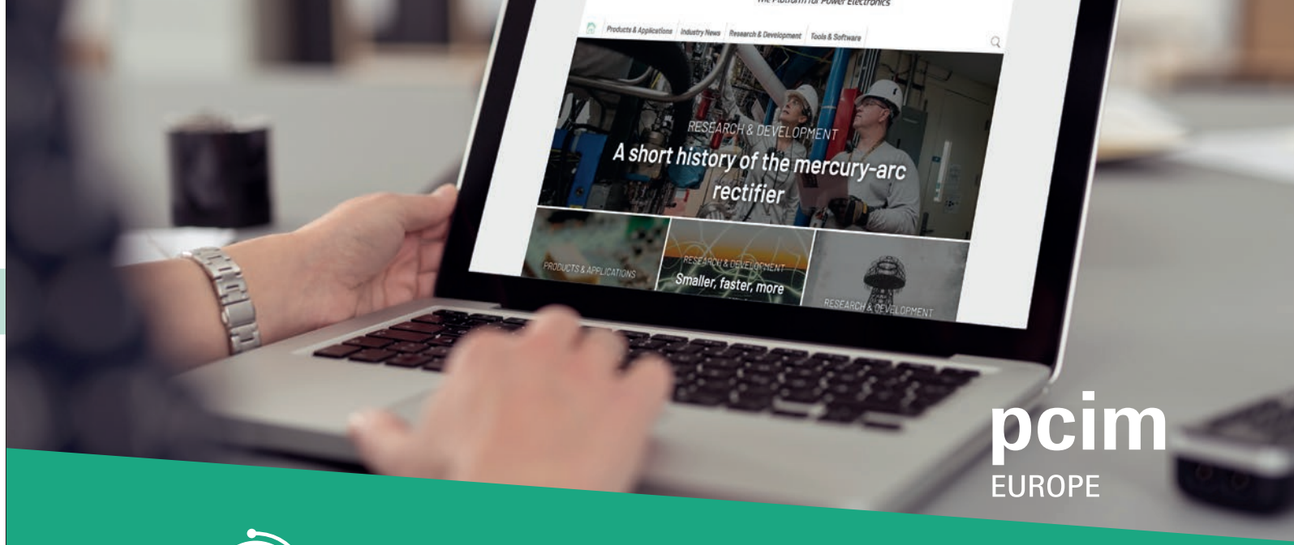
14:00
Inductive Power Transfer System for Auxiliary Power Supply in Medium Voltage Converters
Xiaotong Du, Chengmin Li, Drazen Dujic, Power Electronics Laboratory, EPFL, CH

14:20
Optimization of a 2 MHz 500 W Compact Wireless Power Transfer System with a Large Voltage Conversion Ratio
Tim Krigar, Martin Pfost, TU Dortmund University, D

14:40
ZVS Class E2 Wireless Power Transfer System with Self-Resonant Transmission Coils for the Biomedical Application
Hannes Schwan, Gordon Elger, Johannes Pforr, University of Applied Sciences Ingolstadt, D

15:00
Method to Increase WPTS Robustness to Frequency Splitting and Bifurcation Phenomena
Damien Lemaitre, Benoit Sarrazin, Thierry Brincourt, Alexis Derbey, G2Elab, F; Yohan Wanderoild, Yves Lembeye, EDF, F

15:00 – 17:00 — Depending on the weather: Foyer Entrance NCC Mitte / Messepark
After Work Beer *Reunited*



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Breaking science news and articles on power electronics

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Current market trends and innovative business models

Tools & Software
Information on smart tools and power electronics software

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power-and-beyond.com/registration

General Information

Conference counter opening hours

Arvena Park Hotel
Sunday, 8 May 2022 from 13.00 until 17.00
Monday, 9 May 2022 from 8.00 until 14.00

NCC Mitte, NürnbergMesse
9 May 2022 from 16.00 until 18.00
10 – 12 May 2022 from 8.00 until 17.00

Register online
pcim-europe.com/registration

PCIM Europe digital

The PCIM Europe 2022 is complemented by a digital offering. With the digital event platform, you can network prior to the on-site event at the PCIM Europe digital warm-up on 4 May 2022 and afterwards at the PCIM Europe digital follow-up on 18 May 2022. Take advantage of the wide-ranging opportunities for interaction.

4 May 2022: PCIM Europe digital warm-up
- Digital networking opportunities, contact initiation
- Digital preparation for the on-site event

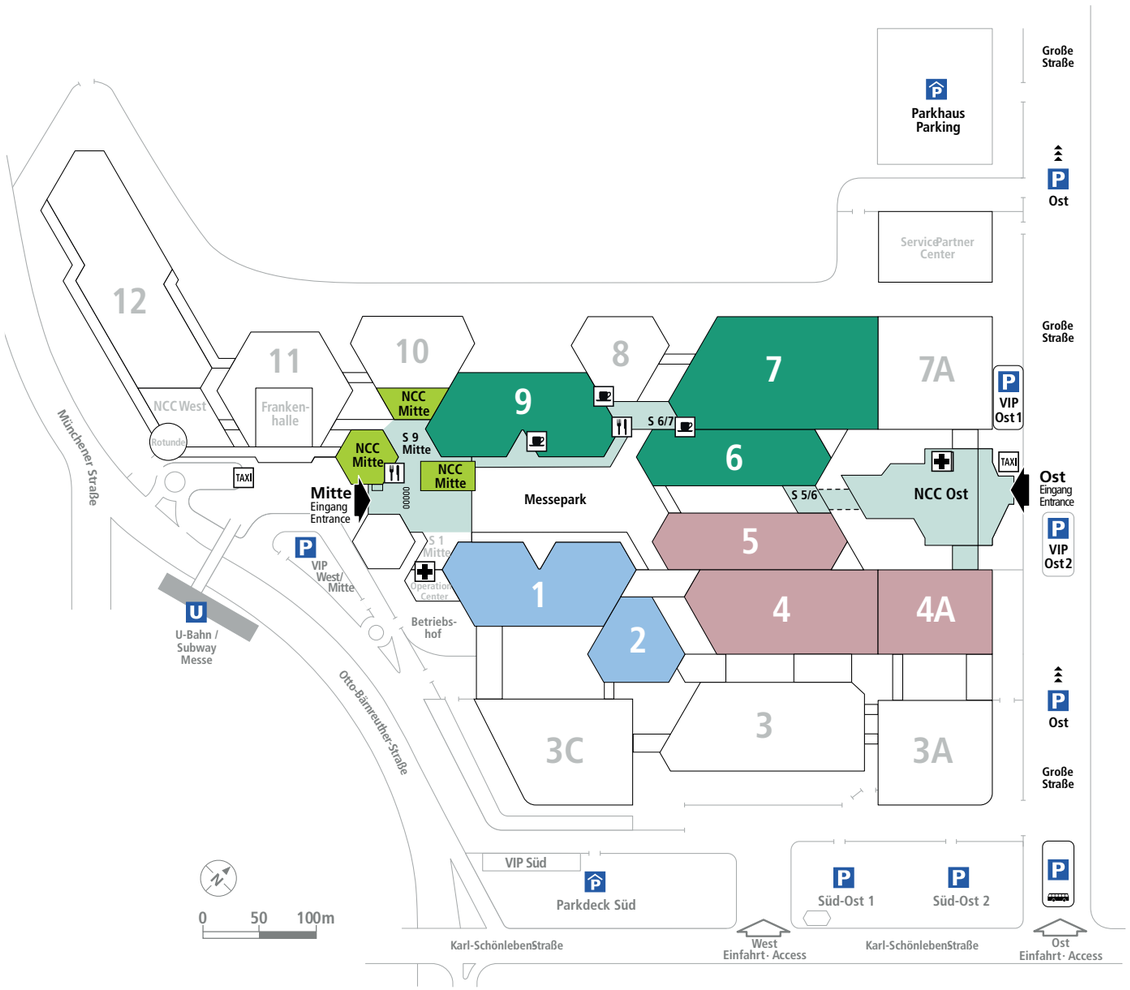
10 – 12 May: PCIM Europe in Nuremberg & digital
- Parallel to the PCIM Europe in Nuremberg, the conference and the forum presentations are available on demand

18 May 2022: PCIM Europe digital follow-up
- Conference presentations on demand
- Extended exchange and networking opportunities

Free Wifi

- Connect to the network »NürnbergMesse_Wi-fi«
- Confirm the terms and conditions
- You are now connected

Room plan



PCIM Europe 2022

Entrances and Services

Conference

SMTconnect 2022

SENSOR + TEST 2022

pcim
EUROPE

International Exhibition and Conference
for Power Electronics, Intelligent Motion,
Renewable Energy and Energy Management

Save the date:
9 – 11 May 2023

Call for Papers

You are an expert in the field of power electronics and would like to present your latest developments and research findings to a highly-qualified audience?

Take the chance and become a speaker at PCIM Europe 2023!

Your benefits

- Present your solutions to an international audience
- Publish your paper in the PCIM Europe proceedings, IET Inspec-Direct, Compendex, Scopus and IEEExplore
- Win one of the attractive Awards
- Seize plenty of networking opportunities

Call for Papers Deadlines

Submission of abstracts **18 October 2022**
Notification of acceptance **January 2023**
Submission of full manuscript **1 March 2023**

The call for papers will be online at pcim-europe.com from mid June 2022.

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