



**Final Program**

**CIPS 2008**

5<sup>th</sup> International Conference on Integrated Power Electronics Systems

- March, 11-13, 2008
- Nuremberg / Germany

<http://www.cips-conference.de>



**Organized by**

- The Power Engineering Society within VDE (ETG)
- The European Center for Power Electronics e. V. (ECPE)

**Supported by:**

- ZVEI Trade Association Electronic Components and Systems

**General Chairs**

- J. Daan van Wyk, South Africa
- Leo Lorenz, Infineon Technologies, China

**Technical Chairs**

- Eckhard Wolfgang, Munich, Germany
- Dieter Silber, University of Bremen, Germany

**Conference Venue**

Georg-Simon-Ohm Fachhochschule  
Bahnhofstrasse 87  
90489 Nürnberg

**Program Overview**

Tuesday, March 11, 2008		Wednesday, March 12, 2008			Thursday, March 13, 2008	
Time	Audimax	Time	Audimax	Room T01	Time	Audimax
09:30	Welcome Coffee	08:30	Session 4: Packaging (Part 1)		08:30	Session 9: System Integration (Part 1)
10:30	Opening	10:00	Session 4: Packaging (Part 2)	Session 5: Gate Drive and Control	10:30	Coffee Break
10:50	Session 1: Robustness Validation	11:00	Coffee Break		11:00	Session 9: System Integration (Part 2)
12:10	Lunch Break	11:30	Session 6: Passives	Session 7: Power Electronics (Part 1)	12:20	Lunch Break
13:30	Session 2: Power Module Reliability	12:50	Lunch Break		13:40	Session 10: ECPE Roadmap
15:50	Coffee Break	14:00	Session 8: SiC and Silicon Integrated Power (Part 1)		15:20	Closing - Best Poster Paper Award
16:20	Session 3: EMC and Thermal Management	15:20	Coffee Break			
20:00	Conference Dinner	15:50	Session 8: SiC and Silicon Integrated Power (Part 2)	Session 7: Power Electronics (Part 2)		
-22:30		17:40	Panel Discussion			
		19:00	Dialog Session - Poster			
		-21:30				

**Tuesday, March 11, 2008**

**(10:30) Opening (Audimax)**

J. D. van Wyk, South Africa  
L. Lorenz, Infineon Technologies, China  
E. Wolfgang, ECPE, Munich, Germany

**(Audimax) Session 1: Robustness Validation**

Chairmen: E. Wolfgang, ECPE, Germany; H.-P. Feustel, Continental Automotive, Germany

**(10:50) 1.1 Robustness Validation – An Improved Qualification Method for Semiconductor Devices in Automotive (Invited paper)**

H. Keller, ZVEI, Frankfurt/Main, International Work Group Robustness Validation, SAE-ZVEI-JSAE-AEC, Detroit, Frankfurt/Main

**(11:30) 1.2 Predictive Reliability, Prognostics and Risk Assessment for Power Modules (Invited paper)**

C. Bailey, H. Lu, C. Yin, S. Ridout, University of Greenwich, London, United Kingdom

**12:10-13:30 Lunch Break**

**(Audimax) Session 2: Power Module Reliability**

Chairmen: M. Mermet-Guyennet, Alstom, France; J. Lutz, Chemnitz University of Technology, Germany

**(13:30) 2.1 Lifetime Modeling and Prediction of Power Devices (Invited paper)**

M. Ciappa, ETH Zürich, Switzerland

**(14:10) 2.2 Model for Power Cycling lifetime of IGBT Modules – various factors influencing lifetime**

R. Bayerer, T. Licht, Infineon Technologies, Warstein; T. Herrmann, J. Lutz, M. Feller, Chemnitz University of Technology, Germany

**(14:30) 2.3 Proposition of IGBT modules assembling technologies for aeronautical applications**

A. Zéanh, A. Bouzourene, J. Casutt, ThalesAvionics Electrical Systems, Chatou; O. Dalverny, M. Karama, ENI de Tarbes – (LGP), Tarbes; S. Azzopardi, E. Woïrgard,

Université Bordeaux, Talence, M. Mermet-Guyennet, PEARL, Alstom Transport Tarbes, Séméac, France

**(14:50) 2.4 Test System for Reliability Management of Power Modules**

T. Wernicke, A. Middendorf, S. Dieckerhoff, H.Reichl, Technical University of Berlin, S. Guttowski, Fraunhofer Institute for Reliability and Microintegration, Berlin, Germany

**(15:10) 2.5 Power cycling induced failure mechanisms in the viewpoint of rough temperature environment**

J. Lutz, T. Herrmann, M. Feller, Chemnitz University of Technology; R. Bayerer, T. Licht, Infineon Technologies, Germany; R. Amro, Palestine Polytechnic University, Hebron, Palestine

**(15:30) 2.6 DBC substrate based EMC Transfer Molded Power Module**

K. H. Lee, O.-S. Jeon, S.-W. Lim, S.-M. Park, B.-Ok Lee, T.-K. Lee, Fairchild Semiconductor, Bucheon, Korea

**15:50-16:20 Coffee Break**

**(Audimax) Session 3: EMC and Thermal Management**

Chairmen: K. Ngo, CPES, U.S.A.M. Stoisiek, University Erlangen, Germany

**(16:20) 3.1 Built-in EMC for Integrated Power Electronics Systems (Invited paper)**

J.-L. Schanen, J. Roudet, Institut National Polytechnique de Grenoble, St Martin d'Herès, France

**(17:00) 3.2 EMC in Power Electronics (Invited paper)**

E. Hoene, Fraunhofer IZM, Berlin, Germany

**(17:40) 3.3 Design and Assembly of Power semiconductors with double-sided water cooling**

M. Schneider-Ramelow, T. Baumann, E. Hoene, Fraunhofer IZM, Berlin, Germany

**(18:00) 3.4 Compact thermal model for the analysis of power devices thermal interactions**

B. Allard, S. M'Rad, INSA-Lyon, Villeurbanne, France; X.

Jordà, X. Perpinya, Centre Nacional de Microelectrònica, Barcelona, Spain

**(18:20) 3.5 Thermal Power Density Barriers of Converter Systems**

U. Drofenik, J. W. Kolar, ETH Zurich, Switzerland

**(18:40) End**

**(20:00-22:00) Conference Dinner (City Hall Nuremberg)**

**Wednesday, March 12, 2008**

**(Audimax) Session 4: Packaging (Part 1)**

Chairmen: J. Daan van Wyk, South Africa; A. Hamidi, ABB, Switzerland

**(08:30) 4.1 Review on Highly Integrated Solutions for Power Electronic Devices (Invited paper)**

J. Schulz-Harder, Electrovac Curamik GmbH, Regensburg, Germany

**(09:10) 4.2 The Road to the Next Generation Power Module – 100% Solder free Design (Invited paper)**

U. Scheuermann, P. Beckedahl, SEMIKRON Elektronik GmbH & Co. KG, Nürnberg, Germany

**(Audimax) Session 4: Packaging (Part 2)**

**(10:00) 4.3 Low-Temperature Sintering of Nanoscale Silver Paste for High-Temperature Power Chip Attachment**

G.-Q. Lu, J. N. Calata, T. G. Lei, Virginia Polytechnic Institute and State University, Blacksburg, USA

**(10:20) 4.4 3D Integration of Power Semiconductor Devices based on Surface Bump Technology**

M. Mermet-Guyennet, P. Lasserre, J. Saiz, ALSTOM Transport (PEARL), Semeac, France; A. Castellazzi, Swiss Federal Institute of Technology (ETH Zurich), Switzerland

**(10:40) 4.5 A Study of Pressed Contact Technology on IGBT Devices between –40 °C and +200 °C**

G. Banckaert, M. Mermet-Guyennet, ALSTOM- Transport, Power Electronics Associated Research Laboratory (PEARL), France; A. Castellazzi, Swiss Federal Institute of

Technology (ETH Zurich), Switzerland

#### 11:00-11:30 Coffee Break

#### (Room T01) Session 5: Gate Drive and Control

Chairmen: D. Bergogne, INSA Lyon, France, M. Arpilliere, Schneider-Electric, France

#### (10:00) 5.1 An Investigation of Gate Drive Circuits and Losses in Power Devices of Multilevel Converters for Circuit Integration to Realize High Output Power Density

M. Kamaga, Y. Sato, Chiba University; K. Sung, Y. Hayaishi, National Institute of Advanced Industrial Science and Technology, H. Ohashi, Y. Hayashi, Ibaraki National College of Technology, Ibaraki, Japan

#### (10:20) 5.2 High Efficiency Isolated Half-Bridge Gate Driver with PCB Integrated Transformer

S. Zeltner, Fraunhofer Institute of Integrated Systems and Device Technology, Erlangen, Germany

#### (10:40) 5.3 Low-cost Digital Control for SMPS Integration

X. Lin-Shi, B. Allard, INSA-Lyon; France; S. Guo, Y. Gao, Shanghai University, Shanghai, China

#### 11:00-13:30 Coffee Break

#### (Audimax) Session 6: Passives

Chairmen: J.-P. Sommer, Fraunhofer IZM, Germany; J.D. van Wyk, South Africa

#### (11:30) 6.1 Optimisation of DC-link capacitors

K. Kriegel, J. Otto, Siemens AG; J. Rackles, Munich University of Applied Sciences, Germany

#### (11:50) 6.2 Duplex pulse controlled inverter with a film capacitor DC-link

A. Kleimaier, B. Hoffmann, A. Scherer, Compact Dynamics GmbH, Starnberg, Germany

#### (12:10) 6.3 Polymer bonded soft magnetic particles for planar inductive devices

S. Egelkraut, H. Ryssel, University of Erlangen-Nuremberg, M. März, Fraunhofer Institute for Integrated Systems and Device Technology (IISB), Erlangen, Germany

#### (12:30) 6.4 Printed circuit board integrated multi-output transformer

E. Waffenschmidt, Philips Research, Aachen, Germany

#### (Room T01) Session 7: Power Electronics (Part 1)

Chairmen: H.-G. Eckel, Siemens, Germany; G. Busatto, University Cassino, Italy

#### (11:30) 7.1 DCDC Converter for Hybrid Vehicle

W. Schmidt, Continental Automotive Systems Division, Nürnberg, Germany

#### (11:50) 7.2 Modularity bridging future Power Electronics in automotive volume applications – speeding up HEV applications

A. Rekofsky, R. Brey, Siemens VDO Automotive AG, Regensburg, Germany; M. Thoben, Infineon Technologies AG, Germany; C. Mertens, Volkswagen AG, Germany; G. Löcher, EPCOS AG, Germany

#### (12:10) 7.3 Automotive DC-DC Converter Designed for High Power-Density and High Efficiency

M. Pavlovsky, Y. Tsuruta, A. Kawamura, Yokohama National University, Yokohama, Japan

#### (12:30) 7.4 Influence of Parasitic Elements on the Commutation of a Resonant Matrix Converter

S. Schulz, A. Ecklebe, A. Lindemann, Otto-von-Guericke University, Magdeburg, Germany

#### 12:50-14:00 Lunch Break

#### (Audimax) Session 8: SiC and Silicon Integrated Power (Part 1)

Chairmen: H. Ohashi, A.I.S.T., Japan; D. Silber, University Bremen, Germany

#### (14:00) 8.1 Compact Power Electronics due to SiC Devices (Invited paper)

P. Friedrichs, SiCED Electronics Development GmbH & Co.

KG, a Siemens Company, Erlangen, Germany

#### (14:40) 8.2 Normally-On devices and circuits, SiC and high temperature: using SiC JFETs in power converters (Invited Paper)

D. Bergogne, H. Morel, D. Tournier, B. Allard, D. Planson, C. Raynaud, M. Lazar, AMPERE INSA de Lyon, Villeurbanne, France

#### 15:20-15:50 Coffee Break

#### (Audimax) Session 8: SiC and Silicon Integrated Power (Part 2)

#### (15:50) 8.3 Issues and Options for Planar Packaging of High-Voltage SiC Diodes

J. Xu, K.D.T. Ngo, Center for Power Electronics System (CPES), Virginia Polytechnic Institute and State University Blacksburg, USA; J. D. van Wyk, University of Johannesburg, South Africa

#### (16:10) 8.4 SiC JFET for high temperature power switches

D. Bergogne, D. Tournier, R. Mousa, M. Shafiee Koor, D. Planson, H. Morel, B. Allard, INSA-Lyon, France

#### (16:30) 8.5 Current limiting with SiC JFET structures

D. Tournier, D. Bergogne, A. Hamoud, D. Planson, R. Mousa, H. Morel, B. Allard, O. Brevet, INSA-Lyon, France

#### (16:50) 8.6 600V Converter/Inverter/Brake (CIB) Module with Integrated SOI Gate Driver IC for Medium Power Applications .

B. Vogler, TU Ilmenau; M. Roßberg, R. Herzer, L. Reußner, T. Wurm, SEMIKRON Elektronik GmbH & Co. KG, Nürnberg, Germany

#### (17:10) 8.7 Life Time Prediction and Design for Reliability of Smart Power Devices for Automotive Exterior Lighting

R. Letor, S. Russo, R. Crisafulli, STMicroelectronics, Catania, Italy

#### 17:40-19:00 Panel Discussion (Audimax)

### **(Room T01) Session 7: Power Electronics (Part 2)**

Chairmen: T. Salzmann, Siemens, Germany; G. Busatto, University Cassino, Italy

#### **(15:50) 7.5 System Design of Compact Low-Power Inverters for the Application in Photovoltaic AC-Modules**

B. Sahan, N. Henze, A. Engler, P. Zacharias, Institut für Solare Energieversorgungstechnik, ISET e.V., Kassel; T. Licht, Infineon Technologies AG, Warstein, Germany

#### **(16:10) 7.6 Cost Reduction of PV-Inverters with SiCD-MOSFETs**

B. Burger, D. Kranzer, O. Stalter, Fraunhofer Institute for Solar Energy Systems (ISE), Freiburg, Germany

#### **(16:30) 7.7 Two-Stage Power Architecture for Voltage Regulator Application based on Coupled Magnetic Structure**

M. C. Gonzalez, P. Alou, O. García, J. A. Cobos, Universidad Politécnica de Madrid, Spain; H. Visairo, Systems Research Center, México, Intel Corporation, Mexico

#### **(16:50) 7.8 VHDL-AMS simulation of integrated power systems: a unified solution for multi-domain multi-level abstraction analysis**

A. Castellazzi, M. Ciappa, W. Fichtner, Swiss Federal Institute of Technology (ETH Zurich), Switzerland; M. Mermet-Guyennet, ALSTOM Transport (PEARL), France

### **17:40-19:00 Panel Discussion: (Audimax)**

#### **Intelligent Power Electronics for Energy Efficiency – Research Needs and Opportunities**

Chairman: Thomas Harder, ECPE e.V.

M. Sanchez-Jimenez, European Commission, ICT for Sustainable Growth

D. Boroyevich, CPES/Virginia Tech (the Power Electronics Network in the US)

H. Ohashi, AIST/PERC (the Power Electronics Network in Japan)

B. Rauscher, STMicroelectronics

J. A. Cobos, Universidad Politécnica de Madrid

B. Ferreira, TU Delft

L. Lorenz, Infineon Technologies

### **Foyer Session 11: Dialog Session – Posters**

**19:00-21:30 Franconian snacks and beverages will be Served**

#### **Best Poster Paper Award Committee**

H.-J. Schulze, Infineon Technologies, Germany; S. Azzopardi, University Bordeaux, France; A. Consoli, University Catania, Italy; S. Jun, Siemens, China; F. Osterwald, Danfoss, Germany

#### **P2.7 Base Plate Shape Optimisation for High-Power IGBT Modules**

J.-P. Sommer, B. Michel, Fraunhofer Institute for Reliability and Micro Integration (IZM), Berlin; R. Bayerer, R. Tschirbs, Infineon Technologies AG, Warstein, Germany

#### **P2.8 Non-Destructive Experimental Investigation about RBSOA in High Power IGBT Modules**

G. Busatto, C. Abbate, B. Abbate, F. Iannuzzo, University of Cassino, Italy

#### **P3.6 Extraction of Efficient Thermal Models for Life Limiting Interfaces in Power Modules**

M. Musallam, C. M. Johnson, University of Nottingham, United Kingdom

#### **P3.7 Direct Substrate Cooling of Power Electronics**

R. Skuriat, C. M. Johnson, The University of Nottingham, United Kingdom

#### **P3.8 Cooling of Insulated Assemblies**

S. Förster, A. Lindemann, Otto-von-Guericke University Magdeburg, Germany

#### **P5.4 A digital control technique for high-performances DC-DC converters**

V. Boscaïno, G. Capponi, G. M. Di Blasi, P. Livreri, Università degli Studi di Palermo; F. Marino, STMicroelectronics, Catania, Italy

#### **P6.5 Comparative study of three transformer concepts for high current dual active bridge converters**

Y. Wang, B. Roodenburg, S.W H. de Haan, Technical University Delft, The Netherlands

#### **P6.9 Adjustable speed generation system with axial flux permanent magnet generator**

W. Koczara, Warsaw University of Technology, Poland; Neil L. Brown, J. Al-Tayie, N. Al Khayat, R. Seliga, E. Ernest, A. Krasnodebski, Cummins Generator Technologies, Stamford, United Kingdom

#### **P6.10 EMS Analysis on Digital Pulse Width Modulators**

E. Orietto, G. Spiazzi, P. Mattavelli, Università di Padova; S. Saggini, Università di Udine, Italy

#### **P6.11 Robustness Analysis of DC Distributed Power Systems by Means of Behavioral DC-DC Converter Models**

J. A. Oliver, R. Prieto, L. Laguna, J. A. Cobos, Universidad Politécnica de Madrid (UPM), Spain

#### **P8.8 The ESBT® (Emitter-Switched Bipolar Transistor): a new monolithic power actuator technology devoted to high voltage and high frequency applications**

C. Ronsisvalle, V. Enea, STMicroelectronics, Catania, Italy

#### **P8.9 Trade-off between Energy Savings and Execution Time Applying DVS to a Microprocessor**

M. Vasić, O. García, P. Alou, J. A. Oliver, J. A. Cobos, Universidad de Politécnica en Madrid, Spain

#### **P8.10 Analysis of STI Thin-SOI LDMOS transistors for Smart Power and high frequency applications**

I. Cortes, P. Fernandez-Martinez, D. Flores, S. Hidalgo, J. Rebollo, Centro Nacional de Microelectrónica, Barcelona, Spain

#### **P9.8 Performance Comparison of a Buck Converter Using Shielded-Substrate and Co-Packaged Planar Inductors**

M. H. F. Lim, D. Gilham, F. C. Lee, K. D. T. Ngo, Virginia Polytechnic Institute and State University, J. D. van Wyk, University of Johannesburg, South Africa

#### **P9.9 PEEC-Based Numerical Optimization of Compact Radial Position Sensors for Active Magnetic Bearings**

A. Müsing, C. Zingerli, P. Imoberdorf, J. W. Kolar, ETH Zürich, Switzerland



**P10.6 High Temperature and Power Electronics Systems in Automotive Applications –The Approach of the ZVEI Working Group ‘High Temperature Electronics’**  
M. Rittner, Robert Bosch GmbH, Schwieberdingen, Germany

**Thursday, March 13, 2008**

**(Audimax) Session 9: System Integration (Part 1)**

Chairmen: D. Boroyevich, CPES, U.S.A.G. Wachutka, TU Munich, Germany

**(08:30) 9.1 System Integration Using Advanced Power Semiconductors (Invited paper)**

G. Deboy, Infineon Technologies Austria AG, Villach, Austria

**(09:10) 9.2 A High Number of Phases Enables High Frequency Techniques and a better Thermal Management in Medium Power Converters**

O. Garcia, P. Alou, J. A. Oliver, J. A. Cobos, Universidad Politécnica de Madrid (UPM); P. Zumel, Universidad Carlos III de Madrid, Spain

**(09:30) 9.3 System Integration Approach for High Power Density Drives**

J. Popović Gerber, European Centre for Power Electronics (ECPE), Nuremberg; M. Gerber, J. A. Ferreira, Delft University of Technology, Delft, The Netherlands

**(09:50) 9.4 An Integrated Electronic Ballast for High Intensity Discharge (HID) Lamps**

Y. Jiang, F. C. Lee, Y. Liang, Virginia Polytechnic Institute and State University, USA; J. D. van Wyk, University of Johannesburg, South Africa; W. Liu, International Rectifier, El Segundo, USA

**(10:10) 9.5 Current Sensor Dedicated for High Temperature Integrated Power Electronics**

F. Grecki, W. Koczara, G. Iwanski, J. Lastowiecki, Warsaw University of Technology, Poland

**10:30-11:00 Coffee Break**

**(Audimax) Session 9: System Integration (Part 2)**

**(11:00) 9.6 Advanced Power Electronics Systems (Invited paper)**

H. Ohashi, Tokyo Institute of Technology, Japan

**(11:40) 9.7 IPEM-Based Power Electronics System Integration (Invited paper)**

D. Boroyevich, F. C. Lee, J. D. Van Wyk, G.-Q. Lu, E. P. Scott, M. Xu, R. Burgos, F. Wang, CPES, Virginia Tech, Blacksburg, VA, USA; T. M. Jahns, T. A. Lipo, R. D. Lorenz, University of Wisconsin-Madison, WI, USA; T. P. Chow, Rensselaer Polytechnic Institute, Troy, NY, USA

**12:20-13:40 Lunch Break**

**(Audimax) Session 10: ECPE Roadmap**

Chairmen: L. Lorenz, Infineon Technologies, China, T. Harder, ECPE, Germany

**(13:40) 10.1 The ECPE Roadmap Initiative**

T. Harder, L. Lorenz, ECPE European Center for Power Electronics e.V., Nuremberg, Germany

**(14:00) 10.2 Power Electronics Technology Roadmaps – a Bottom-up Approach**

E. Wolfgang, T. Harder, ECPE, Nürnberg, Germany

**(14:20) 10.3 Automotive Power Electronics Roadmap**

J. Kolar, ETH Zurich, Switzerland; M. März, Fraunhofer IISB, Germany, E. Wolfgang, Germany

**(14:40) 10.4 Power Electronics Technology Roadmap: High Frequency Power Supplies (P<1kW)**

José A. Cobos, UPM, Spain, Cian O’Mathuna, Tyndall, Ireland

**(15:00) 10.5 ECPE Power Electronics Research and Technology Roadmaps: Team No. 5: High Frequency Power Conversion > 1kW**

T. Reimann, ISLE GmbH, Ilmenau, Germany

**(15:20) Closing - Best Poster Paper Award**

J. Daan van Wyk, South Africa; E. Wolfgang, Munich, Germany

**(15:40) End of CIPS 2008**