## Organisational Information

**Sign up at:** [www.ecpe.org/events](www.ecpe.org/events)

**Registration Deadline**:

**17 September 2024**

**Participation Fee:**

| | |
|---|---|
| **€ 345,–** * | for industry |
| **€ 305,–** * | for universities/institutes |
| **€ 135,–** * | for students/PhD student (limited spaces; copy of students ID required) |

* plus VAT

- The online participation fee includes remote access via the meeting software Webex and digital proceedings.
- Digital proceedings will be provided by download link latest one day before start of the event.
- Upon receipt of registration confirmation via email you are signed-up for the event. The invoice will be sent via email.
- ECPE members are able to register 1 participant free of charge, 25% discount for further participants.
- 10% discount on university/institute fee for participants from ECPE competence centres.
- Dial in information for attending by Webex will be provided with the confirmation of registration.
- Cancellation policy: Full amount will be refunded in case of cancellation upon to 2 weeks prior to the event. After this date 50 % of the fee is non-refundable (replacement is possible).



## Organisational Information

**Organiser** ECPE e.V.
Ostendstrasse 181
90482 Nuremberg, Germany
www.ecpe.org

**Organisation** Ingrid Bollens, ECPE e.V.
+49 911 81 02 88 – 10
ingrid.bollens@ecpe.org

**Course Instructors:**

Prof. Dr. Uwe Scheuermann
FAU Erlangen-Nürnberg (DE)
**Chair of tutorial**

Dr. Thomas Dütemeyer
Infineon Technologies (DE)

Dr. Karsten Guth
Infineon Technologies (DE)

Dr. Max H. Poech
Senior Scientist (DE)

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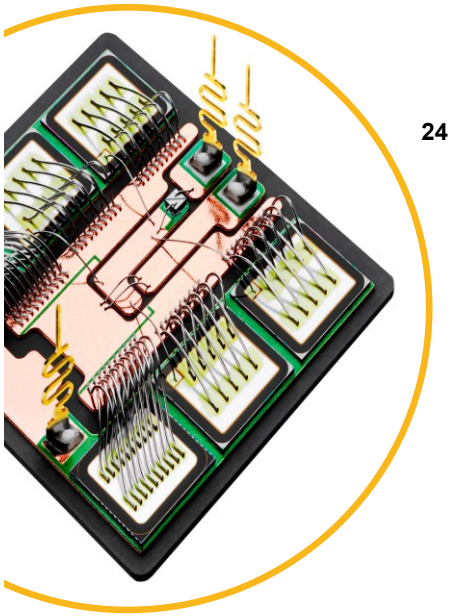
European Center for Power Electronics e.V.

# Online Event

## ECPE Tutorial

## Power Electronics Packaging



**24 - 25 September 2024**

## ECPE Online Tutorial

# Power Electronics Packaging

**24 - 25 September 2024**

In addition to the conventional electronics packaging functions, in Power Electronics one has to deal with further requirements such as handling high voltages and currents as well as handling electrical losses with the required heat dissipation.

The tutorial starts with the presentation of the basic features of power electronics packaging including functions, materials and thermal management as one of the key issues.

The packaging of components and modules as well as the converter level packaging is covered starting from low power discrete and monolithic solutions up to hundreds of kW converters. Power electronics packaging is discussed in a system environment focussing on cooling techniques and thermal interface materials.

Since there is a dominant impact of packaging on the reliability of components and systems, one session is devoted to failure mechanisms and reliability testing.

The current drivers in power electronic systems are power density, manufacturability, reliability and costs. The shortcomings and bottlenecks of state-of-the-art packaging will be discussed and the emerging interconnection and integration technologies that aim to address these challenges will be reviewed.

This tutorial is aimed at engineers who are engaged in power electronics and want to improve their knowledge and understanding of power electronics packaging including ongoing developments and future trends.

**The workshop is chaired by:**

Prof. Dr. Uwe Scheuermann, FAU Erlangen-Nürnberg (DE)
Dr. Thomas Dütemeyer, Infineon Technologies (DE)
Dr. Karsten Guth, Infineon Technologies (DE)
Dr. Max H. Poech, Senior Scientist (DE)

**All presentations and discussions will be in English.**

## Programme

### Tuesday, 24 September 2024

**08:30** **Webex started**

**09:00** **Welcome, Opening and Introduction into the Topic**
Gudrun Feix, ECPE

**Introduction and Basics**

**09:10** **Introduction to Power Electronics Packaging**
Basics and functions | features of PE packaging | basic structure of PE packaging world
Karsten Guth, Infineon Technologies (DE)

**09:55** **Short Break**

**10:00** **Packaging Materials**
Properties of materials | materials classification | substrate materials and technologies | thermal interface materials and applications
Max H. Poech, Senior Scientist (DE)

**11:00** **Short Break**

**11:05** **Materials Properties and Reliability Aspects**
Loads and thermo-mechanical behaviour | degradation mechanisms
Max H. Poech, Senior Scientist (DE)

**11:55** **Lunch break**

**12:50** **Backside Interconnect Technologies**
Soldering | diffusion soldering | sintering
Karsten Guth, Infineon Technologies (DE)

**14:05** **Short break**

**14:10** **Frontside Interconnect Technologies**
Wire bonding | pressure contacts | welded interconnects
Karsten Guth, Infineon Technologies (DE)

**15:20** **Break**

**15:35** **Encapsulation and Housing**
Transfer molding of discretes and modules | module potting and housing | conformal coating
Karsten Guth, Infineon Technologies (DE)

**16:20** **Short Break**

**Components and Modules**

**16:25** **Discrete Power Semiconductors & System Integration**
Through-hole SMD and CSP packages | assembly and interconnection technologies | multichip packages
Karsten Guth, Infineon Technologies (DE)

**17:05** **Questions and Final Discussion 1st Day**

**17:15** **End of 1st Day**

## Programme

### Wednesday, 25 September 2024

**08:00** **Webex started**

**08:30** **Power Modules**
Function | design | characteristics | reliability
Thomas Dütemeyer, Infineon Technologies (DE)

**10:00** **Short Break**

**10:05** **Basics of Thermal Management**
Power losses and cooling | Rth and Zth | thermal models and simulation
Thomas Dütemeyer, Infineon Technologies (DE)

**11:30** **Short Break**

**Converter Level Packaging**

**11:35** **Cooling of High Power Systems**
Air cooling | liquid cooling | advanced cooling solution
Uwe Scheuermann, FAU Erlangen (DE)

**12:45** **Lunch Break**

**13:40** **Low and Medium Power Systems**
PCB assemblies with through-hole and SMT | packaging aspects of passive components | thermal management on PCB level | high current PCBs and IMS substrates
Max H. Poech, Senior Scientist (DE)

**14:35** **Short Break**

**Robustness and Reliability**

**14:40** **Failure Mechanisms**
Overstress mechanisms and wearout mechanisms | random failures | end-of-life failure | mission profiles and condition monitoring
Uwe Scheuermann, FAU Erlangen (DE)

**15:30** **Short Break**

**15:35** **Lifetime and Reliability Testing**
Qualification according to standards | thermo-mechanical stress | lifetime models
Uwe Scheuermann, FAU Erlangen (DE)

**16:45** **Questions and Final Discussion**

**17:00** **End of Workshop**