

## Organisational Information

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

### Registration Deadline:

20 September 2021

### Participation Fee:

- € 320,- \* for industry
- € 290,- \* for universities/institutes
- € 120,- \* for students/PhD students (limited spaces; copy of students required)

\* plus VAT

- The participation fee includes lectures and digital proceedings (provided 1 day prior to the event by email).
- Participation by web conference tool (Webex). Access data will be provided by email.
- Upon receipt of registration confirmation via email you are signed-up for the event. The invoice will be sent by email.
- ECPE members are able to register 1 participant free of charge, 25 % discount for further participants.
- 10 % discount for participants from ECPE competence centres.
- Cancellation policy: Full amount will be refunded in case of cancellation up to 1 week prior to the event. After this date and in case of no-show 50 % of the fee is non-refundable (substitutes are accepted anytime).

## Organisational Information

**Organiser** ECPE e.V.  
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### Course Instructors:



Dr. Anton Mauder  
Infineon Technologies (DE)  
Chairman of the tutorial



Prof. Dr. Nando Kaminski  
University of Bremen (DE)  
Chairman of the tutorial



Dr. Reinhard Herzer  
Semikron Elektronik (DE)



Dr. Peter Türkes  
Consultant Compact Power Devices  
Models (DE)



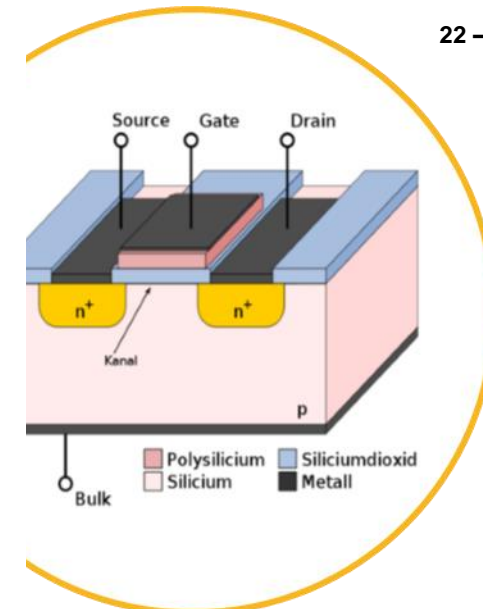
European Center for  
Power Electronics e.V.

## Digital Event

### ECPE Online Tutorial

## Power Semiconductor Devices & Technologies

22 – 23 September 2021



## ECPE Online Tutorial

# Power Semiconductor Devices & Technologies

22 – 23 September 2021

The tutorial is aimed at engineers who are engaged in power electronics and want to improve their knowledge and understanding of power devices including the developments expected in near future.

The course starts with a general overview on required power device properties and a very basic treatment of semiconductor material and device physics.

Blocking capability of the devices, unipolar and bipolar current transport and gate control will be discussed. Diodes, MOS transistors (including compensated super-junction MOS) and Insulated Gate Bipolar Transistors (IGBT) will be treated in detail including their dynamical properties, safe operation and temperature limits.

The wide bandgap semiconductor materials silicon carbide and gallium nitride have become important competitors to silicon. Their superior properties for application and the expectations for the next years will be discussed. Also, issues concerning control, packaging and integration will be treated in the corresponding contributions.

The following chapters demonstrate basic principles of power electronic systems and the basics of intelligent IGBT / MOSFET control circuits. MOS transistor and IGBT gate drivers for various fields of application are discussed in detail.

Finally a short overview of hybrid power electronic integration and the most relevant aspects (cooling, reliability and EMC problems) will be presented.

### Course Instructors:

Dr. Anton Mauder, Infineon Technologies (DE)  
Prof. Nando Kaminski, University of Bremen (DE)  
Dr. Reinhard Herzer, Semikron Elektronik (DE)  
Dr. Peter Türkes, Consultant Compact Power Devices Models (DE)

All presentations and discussions will be in English.

## Programme

Wednesday, 22 September 2021

08:00 Webex will be started

08:30 **Welcome and tutorial opening**  
Gudrun Feix, ECPE

08:40 **Introduction: From Power Electronic Applications to Power Devices**  
Anton Mauder

09:20 **Short Break**

09:30 **Basics of Semiconductor & Device Physics**  
Nando Kaminski

11:10 **Short Break**

11:20 **Basics of Power Semiconductor Devices**  
Anton Mauder

12:20 **Lunch**

13:20 **Power Diodes and Thyristors**  
Anton Mauder

13:50 **Si Power MOSFETs and Super Junction Devices**  
Anton Mauder

14:35 **Short Break**

14:50 **Insulated Gate Bipolar Transistor (IGBT)**  
Anton Mauder

15:35 **Unipolare Wide Bandgap Devices (SiC, GaN)**  
Nando Kaminski

16:50 **End of 1<sup>st</sup> Day**

## Programme

Thursday, 23 September

08:00 Webex will be started

08:30 **Packaging of Power Devices and Modules I:**  
- Technologies  
- Thermal Management  
- Reliability  
Nando Kaminski

09:30 **Packaging of Power Devices and Modules II:**  
- Parasitics  
Anton Mauder

10:05 **Short Break**

10:20 **Modelling and Virtual Prototyping**  
Peter Türkes

11:35 **Short Break**

11:45 **Basics of Gate Drivers**  
Reinhard Herzer

12:45 **Lunch**

13:45 **Gate Drivers with Galvanic Isolation (Medium and High Power), Integration in Smart Power Technologies**  
Reinhard Herzer

14:15 **Fully Integrated Gate Drivers (Low Power)**  
Reinhard Herzer

14:45 **Multi Chip Gate Drivers and Technologies; IPM and Single Chip Inverter; Gate Drivers for SiC- and GaN Devices**  
Reinhard Herzer

15:15 **Open discussion**

15:30 **End of Tutorial**