

Organisational Information

Sign up at: www.ecpe.org/events

Registration Deadline:

13 May 2026

Participation Fee:

- € 670,- * for industry
 - € 520,- * for universities/institutes
 - € 180,- * for students/PhD student
(limited spaces; copy of students ID required)
- * plus VAT

- The participation includes dinner, lunches, coffee/soft drinks and digital proceedings. The reduced (PhD) students fee includes all except for dinner (can be booked for an extra fee of € 50,-*)
- Digital proceedings will be provided by download link latest one day before start of the event. A printed handout is available on request (€ 50,-*).
- Upon receipt of registration confirmation via email you are signed-up for the event. The invoice will be sent via email.
- 15 % discount for participants from ECPE member companies.
- 10% discount on university/institute fee for participants from ECPE competence centres.
- Further information (hotel list and maps) will be provided after registration and can be found on the ECPE web page.
- 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).
- The number of participants is limited to 35 attendees

Organisational Information

Organiser ECPE e.V.
Ostendstrasse 181
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Venue Sala Multimedia
2nd Floor - Door 3
Dipartimento Energia "Galileo Ferraris"
Politecnico di Torino
Corso Montevecchio 71

Italy



Source picture : Politecnico di Torino
Source frontpage: Fraunhofer IZM

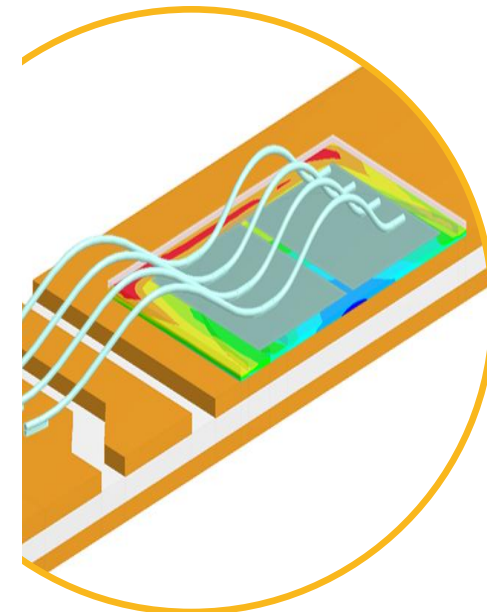


European Center for
Power Electronics e.V.

ECPE Tutorial

Reliability of Power Electronics - Part 1: Fundamentals

20 - 21 May 2026
Turin
Italy



ECPE Tutorial

Reliability of Power Electronics - Part 1: Fundamentals

20 - 21 May 2026
Turin, Italy

Electrifying the world is one of the pragmatic solutions for reducing carbon footprint. Electric transportation, renewable energy generation, electric storage, smart and micro grid technologies, as well as digitalization are essential parts of sustainable electricity systems. These technologies are supported by power electronics as the core of their energy conversion process. The overall performance of modern energy systems relies on the reliable operation of power electronics which needs accurate and optimized design, planning and control of power converters.

This tutorial is divided into two parts: The part "Reliability in Power Electronics Part I" introduces fundamentals of reliability terminology and failure mechanisms. Statistical aspects of reliability will be introduced, both theoretical and with practical examples.

The "mission profile" incorporates the combination of loads and their duration to which the electronic system will be subjected. They determine depending on the construction (design) the physical processes and thus the lifetime of the system. Most common test standards will be introduced and procedures on how to plan reliability tests are shown.

Further on, typical failure mechanisms which can occur within power electronic converters and discreties are discussed. This ranges from the power devices itself to assembly aspects like chip interconnects and material fatigue in potting materials, PCBs and adhesives.

As an outlook and preparation for part two, basic concepts of risk assessment techniques are presented, which can be applied on process and technology as well as converter and system level.

This tutorial covers comprehensive concepts of reliability modelling, analysis, and enhancement in power electronic devices. Therefore, it would be fruitful for graduate students and senior researchers both from industry and academia who are interested in converter design, reliability modelling and enhancement in power electronics systems.

All presentations and discussions will be in English.

Programme

Wednesday, 20 May 2026

08:30 Registration & Welcome Coffee

09:00 Welcome
Gudrun Feix, ECPE e.V.

09:10 Introduction to Reliability
- Terms and Definitions
- Overview
Olaf Wittler

11:10 Coffee Break

11:30 Statistical Aspects – Theory
- Basic statistical terms
- Distribution functions (Exponential, Weibull,...)
Olaf Wittler

12:35 Lunch Break

13:35 Statistical Aspects of Reliability – Practical Part
- Analysis of example test case
Olaf Wittler

14:35 Functional Requirements and Test Planning
- Mission profiles
- Multiple Stresses
- Accelerated test planning
Olaf Wittler

15:35 Coffee Break

15:55 Reliability Assessment at System Level
- System Reliability Models
- Case Study – Physics-of-Failure approach
Francesco Iannuzzo

17:05 Failure Mechanisms and Models
- Device Reliability (Si, SiC and GaN)
Francesco Iannuzzo

18:00 End of 1st Day

20:00 Dinner

Programme

Thursday, 21 May 2026

08:30 Start of 2nd Day

08:30 Failure Mechanisms and Models
- Interconnects (Wire bond and die attach)
- Polymers (EMC, adhesive, PCB)
Olaf Wittler

09:45 Failure Mechanisms and Models
- Passive components
- Higher order models for modules
Huai Wang

11:00 Coffee Break

11:30 Introduction to Basic Concepts of Risk Assessment Techniques - Process and Technologies
- Introduction to FMEA
Olaf Wittler

12:30 Lunch Break

13:30 Introduction to Basic Concepts of Risk Assessment Techniques - Converter and System Level
- FMEA Case Study
- Quantification of risk of failure Case Study
- Parameter uncertainty analysis
Huai Wang

14:30 Reliability Simulation Techniques – Case Studies
- Influence analysis for power modules (Ceramic Substrates, EMC encapsulated module, ...)
Olaf Wittler

16:00 Wrap up 2nd Day, Final Discussion, Feedback

16:15 End of Tutorial

Course instructors:

Dr. Olaf Wittler, Fraunhofer IZM (DE)
Prof. Francesco Iannuzzo, Politecnico di Torino (IT)
Prof. Huai Wang, Aalborg University (DK)