Organisational Information

Sign up at: www.ecpe.org/events

Registration Deadline:

13 November 2024

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.
- 25 % 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.

04/07/24

Organisational Information

Organiser	ECPE e.V. Ostendstrasse 181 90482 Nuremberg, Germany www.ecpe.org
Technical Chair	Dr. Martin Rittner, Robert Bosch Chairman of the AQG 324 Working Group
Technical Contact	Thomas Harder, ECPE
Organisation	Ingrid Bollens, ECPE e.V. +49 911 81 02 88 – 10 Ingrid.bollens@ecpe.org
Venue	Arcotel Kaiserwasser Wagramer Straße 8 1220 Vienna | Austria

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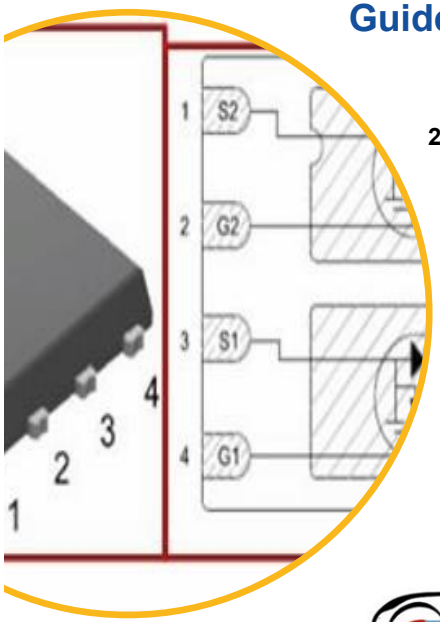
Source graph front page: STMicroelectronics

European Center for Power Electronics e.V.

ECPE Tutorial

Testing Automotive Power Modules according to the ECPE Guideline AQG 324



20 - 21 November 2024
Vienna, Austria

AQG324

ECPE Tutorial

Testing Automotive Power Modules according to the ECPE Guideline AQG 324

20 - 21 November 2024
Vienna, Austria

The ECPE Guideline AQG 324 is prepared and released by the ECPE Working Group ´Automotive Power Module Qualification´ comprising ECPE member companies from the automotive supply chain. The original version is based on the supply specification LV 324 which has been developed by German automotive OEMs together with representatives from the power electronics supplier industry.
The described tests concern the module design as well as the qualification of devices on module level (i.e. the assembly) but not the qualification of semiconductor chips or manufacturing processes. The requirements, test conditions and tests presented in the tutorial essentially refer to Release 03.1/2021 of the AQG 324 Guideline dated 31.05.2021 which addresses power modules based on Si power semiconductors in the main document and SiC-based modules in a specific annex.
The Tutorial with speakers from the AQG 324 Core Team will give practical information and advice how to test power modules according to the AQG 324 Guideline under comparable conditions. It aims at direct users from beginners to senior experts coming from power module suppliers, automotive tier 1 suppliers or test service and equipment providers.

Course instructors:

Dr. Martin Rittner, Robert Bosch
Peter Dietrich, Richardson RFPD Germany
Waldemar Jakobi, Infineon Technologies
Dr. Gábor Farkas, Siemens Digital Industries
Frank Heidemann, Mathias Gebhardt, SET
Stefan Schmitt, Semikron Elektronik
Marc Tuellmann, Infineon Technologies
Prof. Dr. Markus Thoben, Fachhochschule Dortmund
Dr. Stefan Thiemann, Valeo eAutomotive Germany

All presentations and discussions will be in English.

Programme

Wednesday, 20 November 2024

09:15 **Registration & Welcome Coffee**

09:45 **Welcome, Opening**
Thomas Harder, ECPE

09:55 **Introduction and Motivation**
Martin Rittner / Peter Dietrich
- Background of LV 324 and motivation
- Definition of terms
- Scope of AQG 324 and module definition

10:35 **SiC-Based Power Modules in AQG 324**
Mark Tuellmann
- SiC MOSFET characteristics
- Impact of SiC on qualification of power modules

11:15 **Coffee Break**

11:30 **Mapping of Relevant Standards**
Frank Heidemann
- Overview on relevant standards
- Different understandings (Europe, Asia, US)

12:00 **Characterizing Module Testing**
Waldemar Jakobi (electrical testing) / Gábor Farkas (thermal testing)
- Overview on chapters 6 and 7 of AQG 324

12:45 **Lunch**

13:45 **Lifetime Testing: Power Cycling**
Markus Thoben / Marc Tuellmann
- Chapter 9.2: QL-01 Power cycling (PC_{sec})
- Chapter 9.3: QL-02 Power cycling (PC_{min})
- Power cycling of SiC-based power modules

15:30 **Coffee Break**

16:00 **Lifetime Testing: Temperature Tests**
Stefan Schmitt
- Chapter 9.4: QL-03 High-temp. storage (HTS)
- Chapter 9.5: QL-04 Low-temp. storage (LTS)
- Chapter 8.2: QE-01 Thermal shock test (TST)

17:00 **Open Discussion on Lifetime Testing**

17:30 **End of 1st Day**

19:30 **Dinner**

Programme

Thursday, 21 November 2024

09:00 **Start of 2nd Day**

09:00 **Lifetime Testing: HTRB and HTGB**
Mathias Gebhardt
- Chapter 9.6: QL-05 High-temperature Reverse Bias (HTRB) incl. HTRB for SiC modules
- Chapter 9.7: QL-06 High-temperature Gate Bias (HTGB) incl. HTGB for SiC modules
- QL-05a Dynamic Reverse Bias (DRB) and QL-06a Dynamic Gate Stress (DGS)

10:45 **Coffee Break**

11:15 **Lifetime Testing: H3TRB**
Stefan Schmitt
- Chapter 9.8: QL-07 High-Humidity, High-temp. Reverse Bias incl. H3TRB for SiC modules
- QL-07a Dynamic High-Humidity, High-temp. Reverse Bias (dyn. H3TRB)

12:15 **Next Steps and Open Discussion**
High-temp. Forward Bias (HTFB) and outlook on dynamic testing

12:45 **Lunch**

13:45 **Mechanical Tests**
Stefan Thiemann
- Chapter 8.4: QE-03 Vibration (V)
- Chapter 8.5: QE-04 Mechanical Shock (MS)

14:15 **Test Documentation**
Stefan Schmitt
- Example of a documentation set
- Number of samples/modules for the test

14:45 **Outlook**
Peter Dietrich
- Further WBG challenges in AQG 324
- Adv. Module packages e.g. PCB embedding

15:15 **Wrap up, Final Discussion**

15:45 End of Tutorial