Universität Stuttgart
Institut für Robuste Leistungshalbleitersysteme

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Bachelor Thesis
Research Thesis
Master Thesis

PE

Temperature- and Degradation-Sensitive Parameters for SiC MOSFETs

Contact Tutor

In the evolving electric vehicle market there is a need for highly efficient, power dense and reliable power electronics. In the project frame of KDT Archimedes 1200 V SiC devices used in traction inverters are investigated with respect to reliability. In the frame of the project ultra high operating hours of 120,000 h and more should be verified within a reasonable labor time frame, thereby requiring large acceleration factors without changing the underlying failure mechanisms. While for mature technology of Silicon power devices sophisticated life time models exist such models are only limited applicable for SiC due to the different technology and physics due to higher electric field and current densities.

In this work, degradation sensitive electrical parameters for SiC MOSFETs are to be investigated. For this new measurement circuits based on existing methods are to be developed.

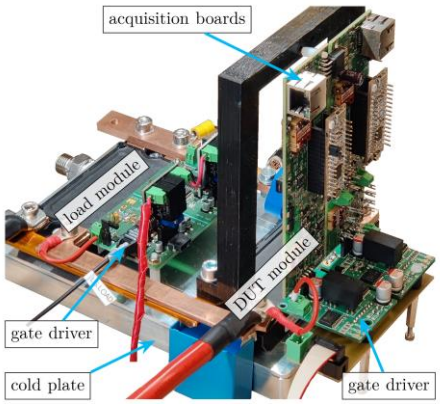
The acquisition of data will be performed in power cycling test benches. Based on the stresses induced during the power cycling tests, the State-of-Health of the semiconductor device is to be determined a posteriori based on the in-situ measurements taken.

Helpful previous knowledge:

- RPSS 2
- PE 2/LE 2
- Sensor and measurement technology
- Microcontroller programming (STM32)

Timeplan (exemplary) **:**

- Familiarization & literature research (10%)
- Overview of degradation sensitive electrical parameters and their sensitivity (20%)
- Development implementation and characterization of a measurement circuit for selected degradation sensitive parameters (35%)
- Analysis of the measurements and a posteriori State-of-Health estimation (20%)
- Thesis writing and presentation (15%)



K. M. Barón, K. Sharma, M. Nitzsche and I. Kallfass, "Characterization of Electrical Parameters for Health Monitoring in SiC MOSFETs during AC Power Cycling," *2021 IEEE 8th Workshop on Wide Bandgap Power Devices and Applications (WiPDA)*

Hiwi Positions

More Info

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