

University of Stuttgart



Institute of Robust Power Semiconductor Systems

Contact: Lixi Yan
Pfaffenwaldring 47, Raum 3.278
Lixi.yan@ilh.uni-stuttgart.de
+49 (0)711 / 685 68607

Power Electronics

Modeling and Validation of SiC Power MOSFETs based on Standard Models

Study Thesis / Master Thesis

Introduction:

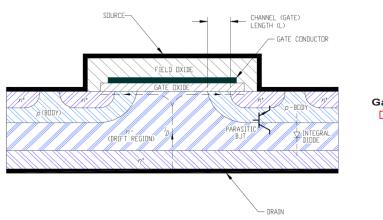
Silicon Carbide is a wide bandgap material and becoming a very attractive choice of semiconductor for high density and high efficiency power electronics in high voltage Range. Power MOSFETs are one of the most commonly used power devices due to their low gate drive power, small device size, fast switching speed and superior paralleling capability. Therefore, there is an increasing need for accurate and compact models for SiC power MOSFETs which can be used for CAD tools for circuit designers.

The structure of a power SiC MOSFET can be similar as the vertical Si power MOSFETs, but the different properties of the materials and the fabrication technology cause their quite different characteristics.

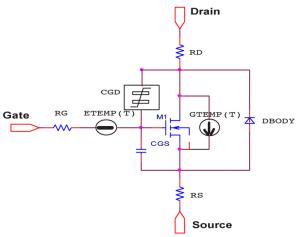
The aim of this research is to evaluate requirements of the specific definitions of SiC power MOSFET model. The standard compact model used in silicon industry can be adopted as a foundation to build the model for SiC MOSFET

Tasks:

- Study the requirements and definitions of SiC power transistor models
- Understand the static and dynamic characteristics of a power MOSFET
- Understand different modeling approaches for SiC power transistors
- Contribute to the improvement and development of modeling in the field of power transistors based on the standard model.



Power MOSFET structure



Equivalent subcircuit of a SiC power DMOSFET