

University of Stuttgart

Institute of Robust Power
Semiconductor Systems

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For the operation of power electronic circuits, the knowledge of the temperature in the devices is an important indicator to control the performance of the cooling system, to detect asymmetric load cases and to detect faults with different time constants.

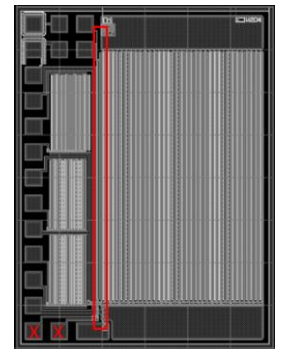
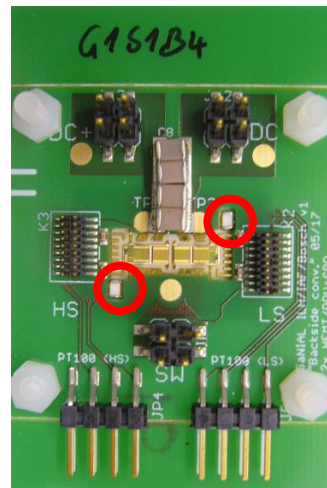
In many conventional power modules, diodes or resistive temperature sensors are positioned as discrete components next to the power transistors, so that the reaction time of the sensors to a temperature change in the power semiconductors is relatively large (ms...s).

The lateral structure of GaN transistors allows the monolithic integration of sensor and logic circuit components directly next to the power transistor, which has already led to a significant reduction of the reaction time for temperature measurements in initial experiments. In this thesis a measurement circuit is to be developed which further reduces the reaction time of the monolithically integrated temperature sensor and thus improves the general error detection for the power electronic components.

Research thesis (FA)
Master thesis (MA)
to be awarded

PE

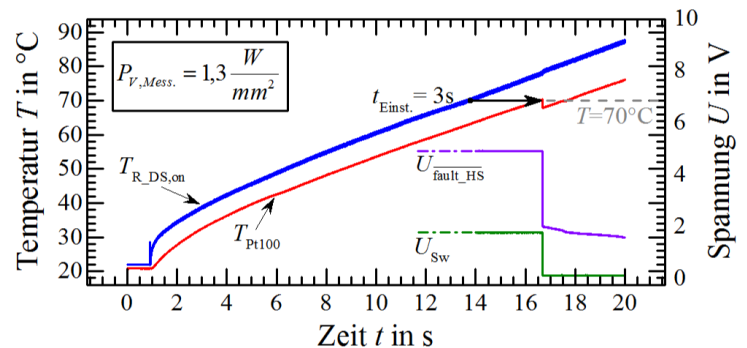
Reduction of reaction times in the temperature measurement process of power transistors



GaN power module with discrete Pt100 sensors (left) and monolithically integrated temperature sensor (right)

Subject areas:

- Temperature protection circuits:
 - Types of protection circuits
 - Simulation possibilities of temperature measurement
 - Possibilities of measured value processing
- Circuit design of an temperature detection circuit
- Evaluation of the developed concept



Shutdown process for over temperature protection

