

## **University of Stuttgart**

Institute of Robust Power Semiconductor Systems

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One of the main objectives in the development of power electronic circuits is to increase efficiency and thus reduce energy losses. This allows the cooling of the system to be dimensioned smaller and the space requirement of components to be reduced, which leads to material savings and in the end to cost reduction and a resource-saving production of the power electronic assembly.

The topic of this thesis is to show the limits in which Peltier elements in power electronic circuits can be usefully used for energy recovery. In this context, it is to be analysed under which electrical and thermal conditions the Peltier element has to be operated, at which point in the heat dissipation path it can be best integrated and how the generated electrical energy can be transferred to the gate control circuit.

## Subject areas:

- · Peltier elements:
  - Simulation possibilities
  - Energy generation through TEGs
  - limits?
- Losses in gate driver circuits
- Possibility of energy recovery in the gate driver circuit
- Circuit design for efficiency testing



PE

Energy recuperation with thermoelectric generators "TEGs"



Schematic structure of a Peltier element[1]



8,4W Peltier element [2]





[1] https://www.bine.info/fileadmin/content/Publikationen/Themen-Infos/I\_2016/themen\_0116\_10.jpg
[2] httpswww.reichelt.dethermo-modul-peltierelement-15x15x3-6mm-tb-31-1-0p149026.htmlPROVID
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