

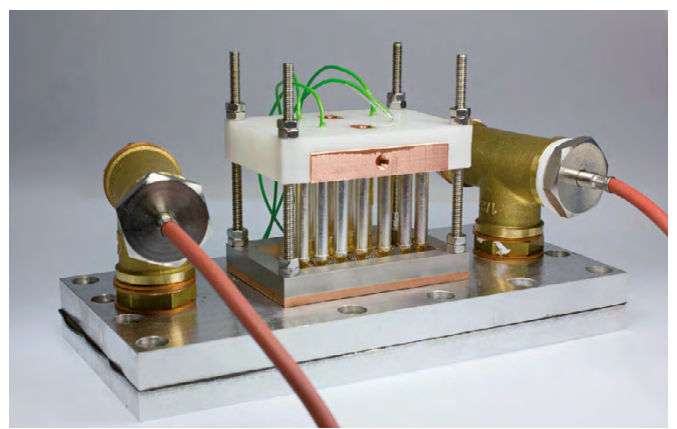
Resistance R_{TH} and Impedance Z_{TH} Measurements

Thermal Characterization

Thermal characterization of power modules mounted on a water-glycol cooled heat sink © Fraunhofer IISB

Fields of research and service

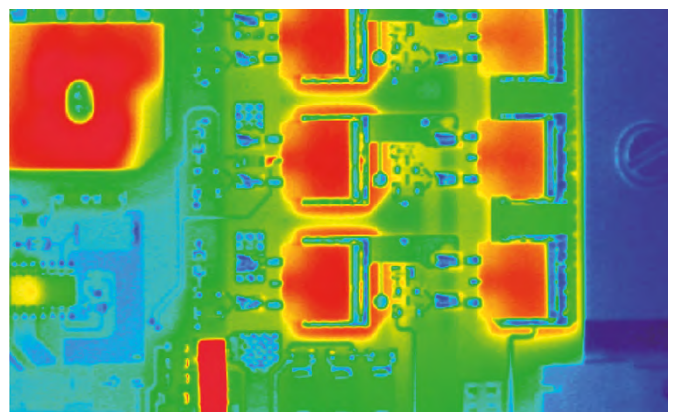
- Thermal characterization of new packaging concepts, materials, devices, and technologies for power electronic devices
- Power module characterization acc. to AQG 324
- Static and dynamic thermal measurements (R_{th} , Z_{th})
- Heat sinks for single and multi devices (up to 20 samples per heat sink)
- Design and assembly of power modules for testing (silver sintering, soldering, wire bonding)
- FEM-simulation of thermal behavior from semiconductor to coolant
- Workshops for test result interpretation



Power module during thermal impedance measurement © Fraunhofer IISB

Measurement system

- Temperature acquisition via device under test (indirect measurement principle)
- Direct temperature measurement by thermography, PT100 and thermo-couples
- Heating current from 0.1 A up to 2000 A
- Heating voltage up to 35 V
- Heating and cooling power up to 20 kW
- Coolant temperatures from -60 up to +350 °C possible
- Coolant flow up to 25 l/min
- Maximum pressure: 8 bar



Thermography © Fraunhofer IISB

Devices for testing

- IGBTs, MOSFETs, JFETs, thyristors
- Resistors
- Schottkydiodes, pn-diodes
- Si, SiC, and GaN devices

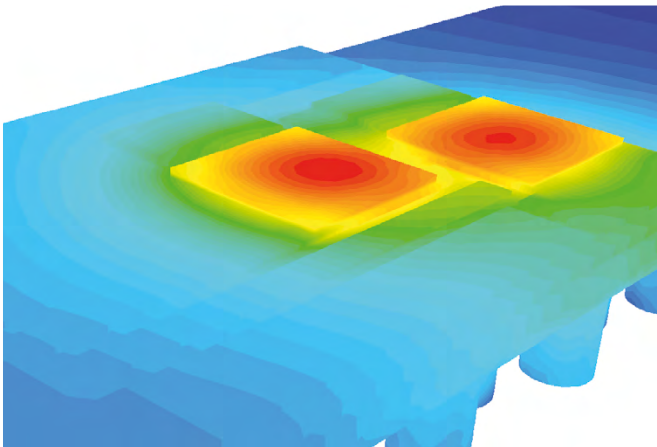
Packaging for testing

- Power modules with or without baseplate
- PCB-boards with discretes (To-devices, D2Paks, etc.)
- Direct or indirect water cooled systems

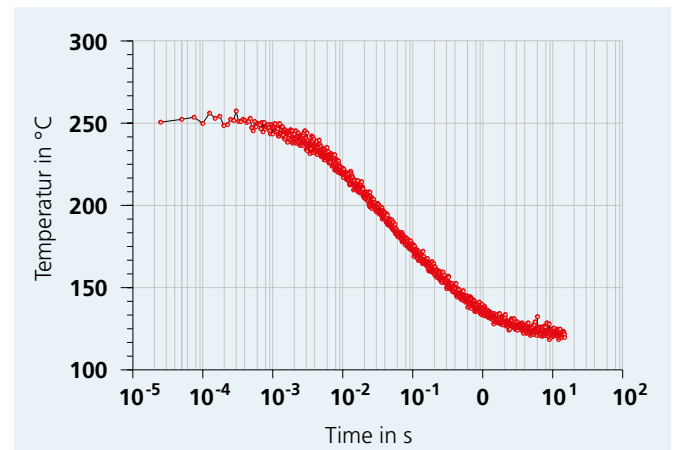
- Liquid and air cooled devices
- With or without housing or molding
- In-house test layouts and samples
- Packaging services

Additional services

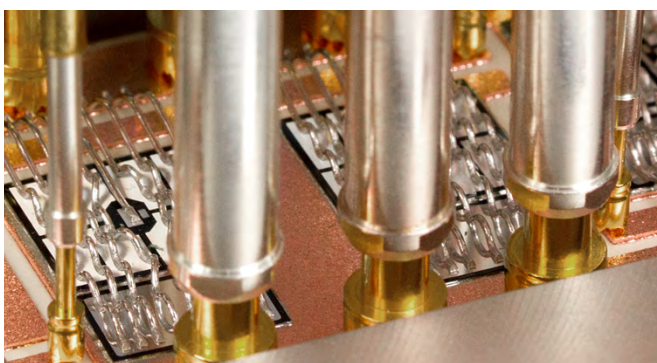
- Foster/Cauer network calculation and parameter extraction
- Thermal management consulting
- FEM simulations
- Statistical analysis



FEM simulation © Fraunhofer IISB



Example of thermal impedance measurement © Fraunhofer IISB



Power module during thermal impedance measurement
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