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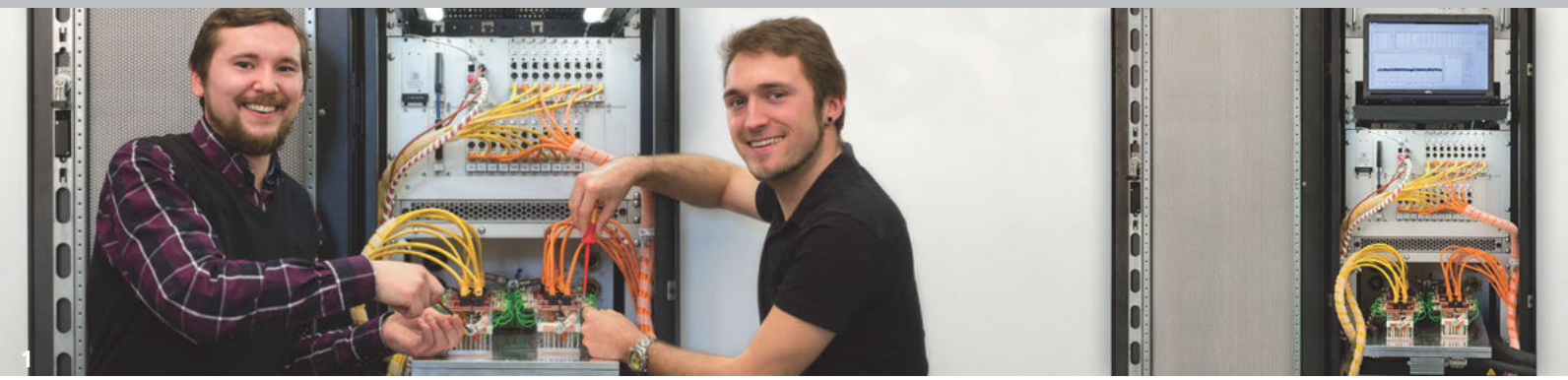

1 *Mounting samples on a cold plate*

ACTIVE POWER CYCLING TEST

Lifetime Characterization of Power Module Technologies

Fields of research and service

- Design and assembly of power modules for testing (silver sintering, soldering, wire bonding)
- Generation of lifetime data
- Statistical analysis and interpretation of measured lifetime data
- Lifetime modelling for die attach technologies and power modules
- Long time experience on power cycling tests and analyzing of failure mechanisms
- Consultancy on test planning, failure modes and result interpretation

Special features

- 5 independent test benches available
- Up to 20 devices in one test run
- On-line measurement and control system for each device under test (indirect measurement principle)
- Thermal impedance Z_{th} measurement during each cycle and all samples
- Individual setting of gate-voltage for every device under test
- Automatic end-of-life-detection
- Heating current from 0.1A up to 2000A
- Heating voltage up to 35V
- Heating and cooling power up to 20kW
- Coolant temperatures from -60.. +350°C possible

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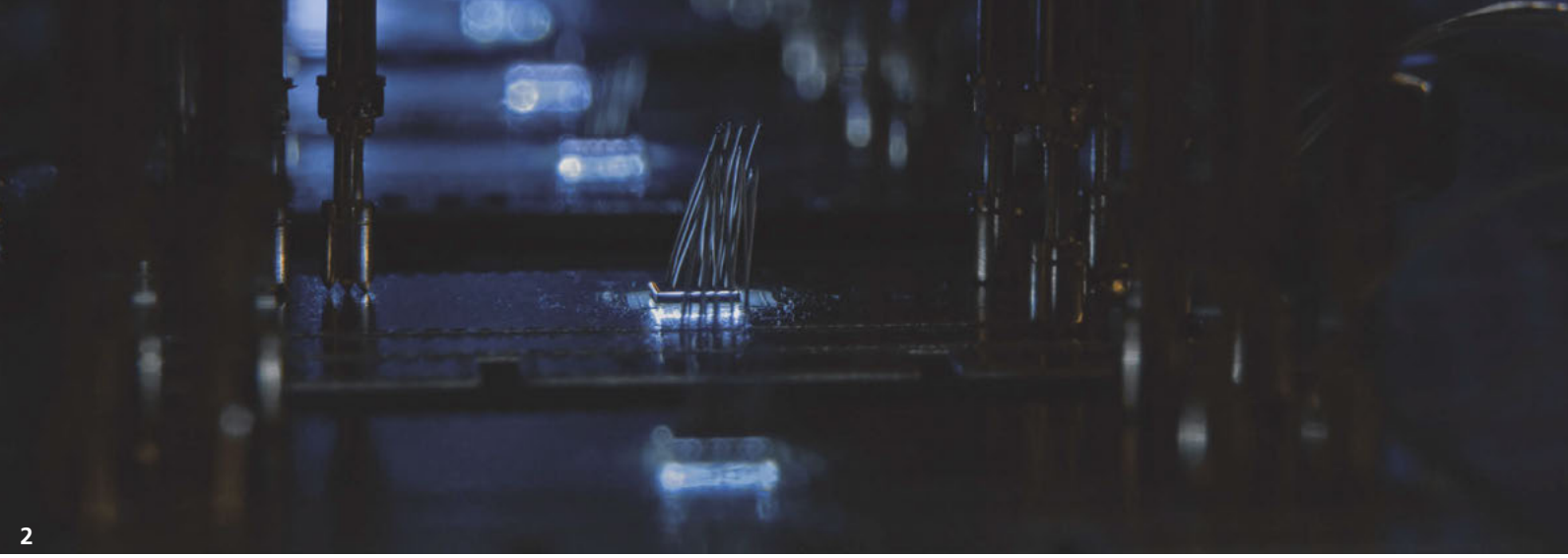

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Description of test principle

- Active temperature cycling is an accelerated lifetime test for power electronic devices
- Reliability characterization of new packaging concepts, materials, devices and technologies
- The device is heated up via DC-current by semiconductor power losses
- After heating the samples are cooled down by the heat sink coolant

Devices for testing

- IGBTs, MOSFETS, JFEB, thyristors
- Resistors
- Schottky-diodes, pn-diodes
- Si, SiC and GaN devices

Packaging for testing

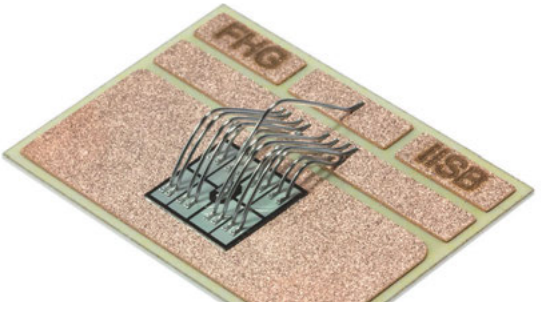
- Power modules with or without baseplate
- PCB-Boards with discretes (to-devices, D^2Paks, etc.)
- In-house test layouts and samples

Coolant strategies

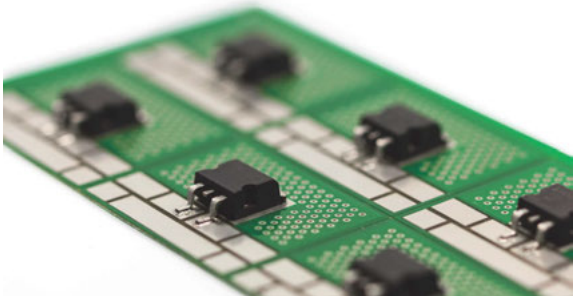
- Liquid and air cooling
- Coolant temperatures from -60.. +350°C possible
- Coolant pressure up to 8 bar possible
- Various coolants possible
- Interaction of power cycling with temperature or pressure swings in coolant possible

Test procedures

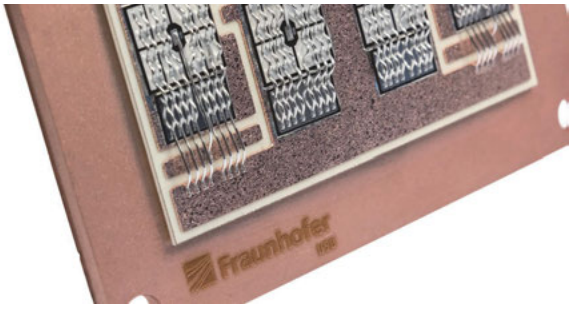
- Constant heating current (application near)
- Constant temperature swing (academic by adjusting the gate voltage)
- Constant heating power



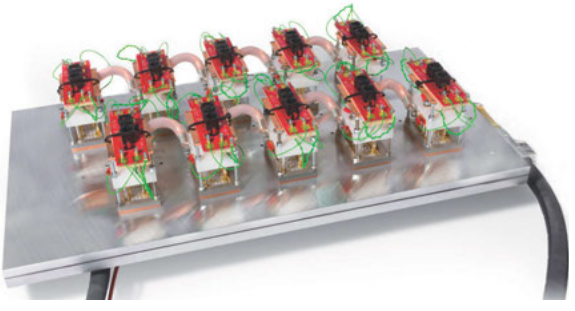
In-house test layout



Discrete on PCB



Power modules



Heat sink for 10 power modules

2 *SiC devices during the active power cycling test emitting blue light*