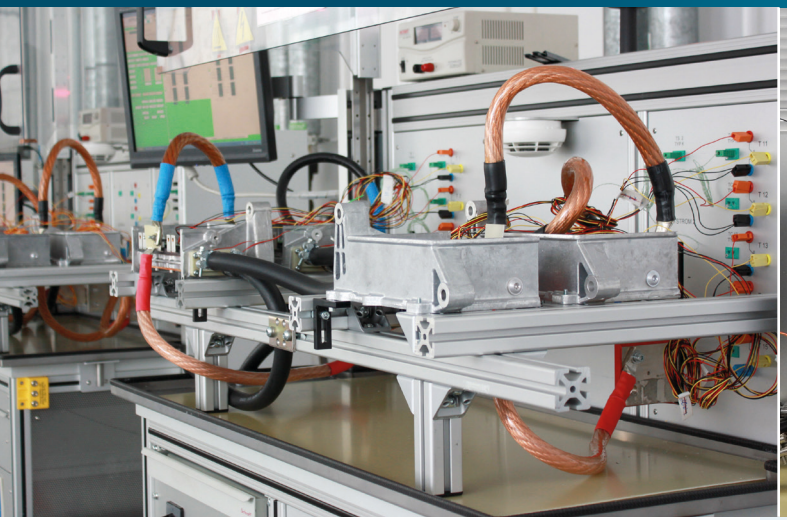
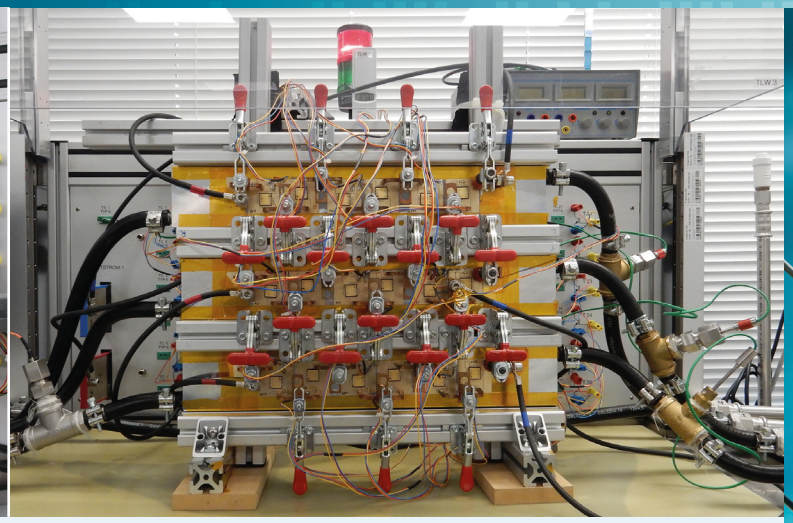
APC stand with customer-specific set-up





Services

Fraunhofer IZM meets its customers' special requirements with highly individual solutions. Monitoring of additional parameters with measurements in MHz range is possible over a period of several months. Additionally, infrared thermal visualization of open modules' chips surface temperature is also possible.

Superimposed failure mechanisms can be tested at Fraunhofer IZM by advanced test set-ups. Combined testing of active power cycling with humidity and temperature is also available.

In addition to APC, Fraunhofer IZM offers additional AQG 324 tests such as H3TRB, HTRB, TST, HTGB, DGS, etc. More advanced analytics such as scanning acoustic microscopy (SAM) or scanning electron microscopy (SEM) complete the range of analytical tools.

The institute also provides support and expert advice in the design, simulation and assembly of power electronics.

Contact

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Fraunhofer IZM

Power Electronics Qualification

Lifetime Characterization by Active Power Cycling

Panoramic view of Active Power Cycling Lab

The Suitable Test Method

Quality assurance of power electronics is an essential factor in product reliability. The active power cycling test provides instant lifetime data for power modules. The corresponding area of application (e.g. wind energy, photovoltaics, automotive) determines the corresponding test parameters and procedures. We offer comprehensive consultation to find the right test method with regard to the specific mission profiles.

Life Time Of Power Electronics

Based on the active power cycling tests we are able to create lifetime models of the power modules and give you advice on the correct design for the power devices and the interconnection technology (e. g. wire/ribbon bonds, die-attach).

Powerlab

For the tests of power components or overall systems we design client-specific test conditions and settings. Automated test systems are used to carry out life-time studies by active power cycling in accordance with automotive standard AQG 324.

In order to reach a certain temperature swing the DUTs are actively loaded with direct current while taking measurements of the forward voltage as well as of other thermal and electrical parameters. The heat sink temperatures are controlled with several adjustable tempering devices.

It is also possible to implement combined tests of active power cycling with different temperature profiles for heat sinks and ambient air with defined humidity in the climate chamber. Thus long-term tests can be conducted under precisely defined ambient conditions.

In addition to the industry test standards very individual test scenarios are also possible. For example, modules, prepackages and even individual connection technologies can be tested and characterized as well.

Key Data

Devices:

- IGBTs/MOSFETs/Diodes
- Semiconductors: Si, SiC und GaN
- Modules/Prepackages/Discrete components

Test system 1 to 4:

- 3 load strands with 6 measurement stations each
- Up to 30 V at 800 A / 120 V at 200 A
- 3 NTC measuring points per strand
- R_{th} and Z_{th} measurement
- Recording of cooling curves

Test system 5:

- Independent tests with constant temperature swing
- 48 measurement/load stations
- 30 V constant with max. 10 A per sample

Temperature control:

- Air- or liquid-cooling
- Different coolant mediums depending on application
- Heat sink temperatures from -40 °C to +200 °C
- Flow measurement and pressure monitoring

Calibration:

- IR-camera
- Climate chamber
- Coolant