



1 - 3 Examples of  
power electronic damages

# Troubleshooting

## In Power Electronics From System to Chip Level

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### Fraunhofer Institute for Integrated Systems and Device Technology IISB

Landgrabenstraße 94  
90443 Nürnberg  
Germany

#### Contact:

Markus Billmann  
Phone: +49 911 23568 20  
Fax: +49 911 23568 12  
markus.billmann@iisb.fraunhofer.de

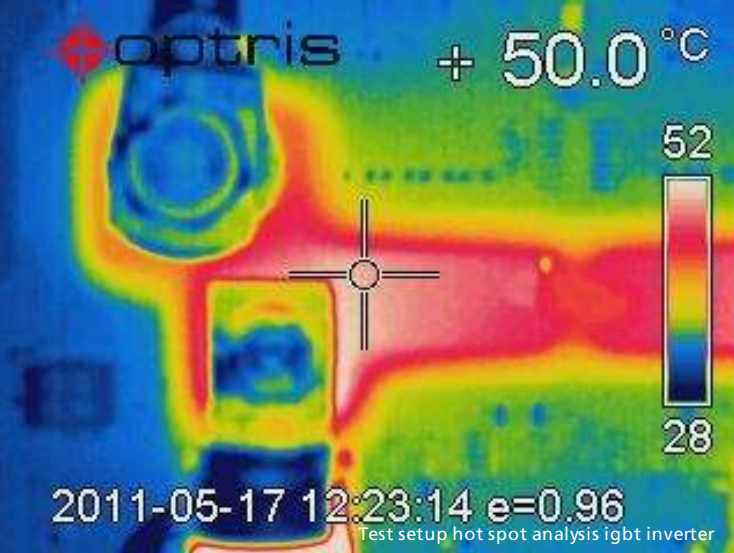
[www.iisb.fraunhofer.de](http://www.iisb.fraunhofer.de)

### 1. Your situation

- Zero-hour failures after launched volume production
- Products with life-time problems
- Products with sporadic or difficult to detect failures
- Unclear destroyed or fragmented returns
- Problems with sub-supplier systems & components
- Financial conflicts that require an independent technical advice

### 2. Our service

- On Site Measurements
  - Test & Measurement in target application
  - Get an inside view and better understanding of the application
- System context analysis
  - Understand & consider peripherals
  - Identify of application specific differences
  - Study of environmental dependencies
  - Check system to subsystem interface impact
  - System and subsystem simulation
- Failure Analysis (destructive and non-destructive)
  - System – Circuit – Layout – Component Reviews
  - Optical, thermal, ultrasonic, x-ray, REM inspection
  - Disassembling from electromechanical system level down to smallest subcomponents, demolding, micrograph polished sections



## Your Benefit

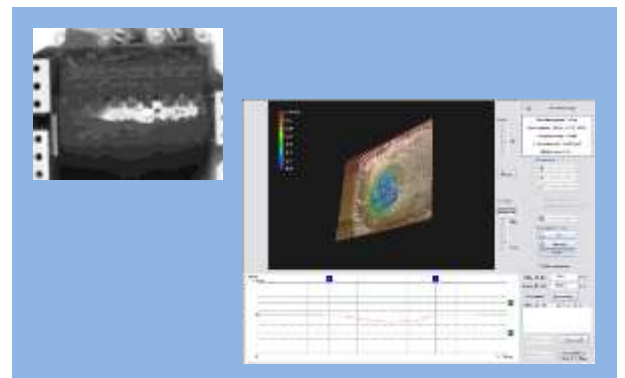
- Large expert team with many years of industrial background
- Independent system related point of view
- Regardless of manufacturer → objective
- In-house experts in many disciplines
- Modern and well-equipped laboratories with a wide range of analysis devices



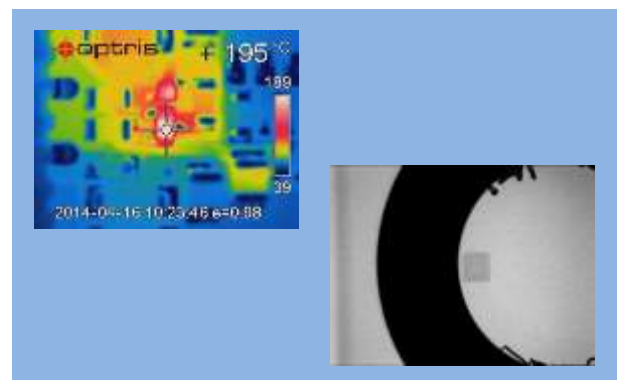
Switching behavior check on power semiconductors

## Testing & Service - Some Examples

- Long term system check with data-logging
- Electrical performance under applied stress: temperature, humidity, overvoltage, overcurrent, ESD, burst, RF-radiation, partial discharge
- Electrical behavior under critical conditions as power-up, power-down, brown out, ...
- Characteristic curves of electrical components with state of art curve tracer
- Contamination check - chemical spectral analysis
- 3D surface analysis with ultrasonic scanning SAM
- Short circuit / overload detection with standard thermography
- Short circuit, ESD-damage, oxid damage, edge termination defects, avalanche breakdown detection of IGBT's, MOSFET's, diodes, resistors with Lock-In thermography
- Static electrical characterization
- Dynamic electrical characterization of power modules / systems up to 10 kV / 100kA
- Active power cycling
- Passive temperature cycling



Chip-level Lock-In Thermography, supersonic analysis solder thickness



Thermography gate-driver, x-ray transformer