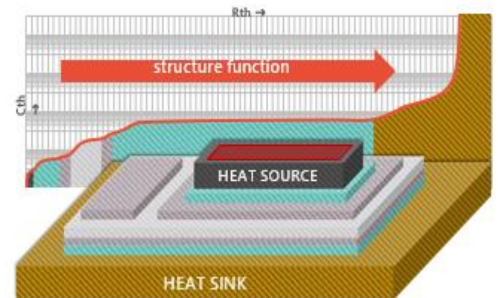
TIMA®pulse
Transient Thermal System Analyzer

Lightweight transient thermal testing

Feasible samples | Electronic packages & modules | | Thermoelectric systems | Custom thermal setups |

Output

» Thermal impedance curve
» Thermal junction-to-case resistance
» Time constant spectrum
» Structure function
» Thermal equivalent RC networks

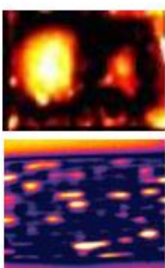


TIFAS® IR lab
Thermal imaging-based failure analysis system

Contactless failure analysis in a nutshell

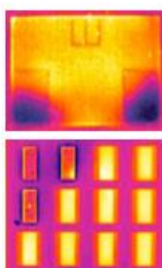
Features

» Complete infrared thermography-based failure analysis setup
» Contactless and non-destructive
» Short testing times, high throughput
» Great variety of detectable defects
» Comprehensive analysis software
» Adaptable to special needs



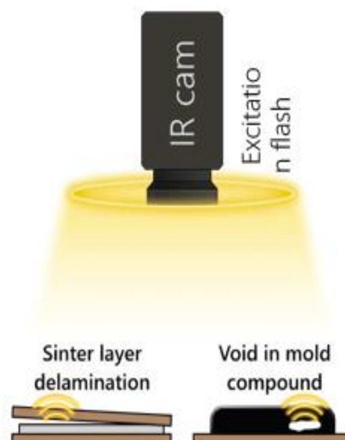
Voids in solder die attach layer

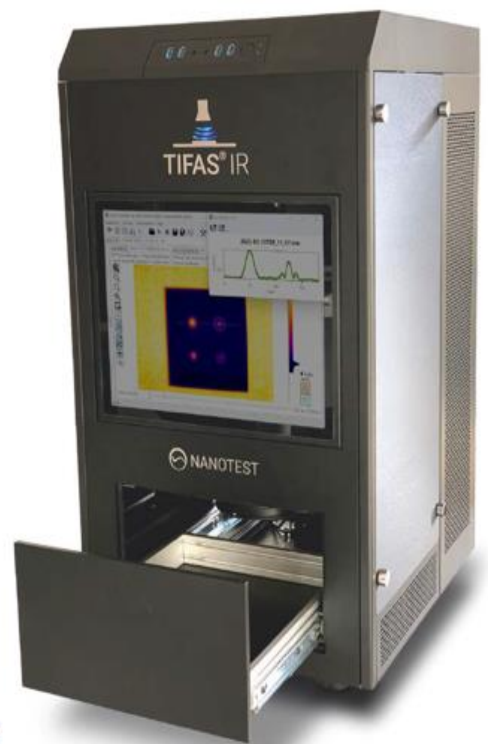
Voids in carbon fiber reinforced polymer



Delamination in sintered power module

Voids in molding compound





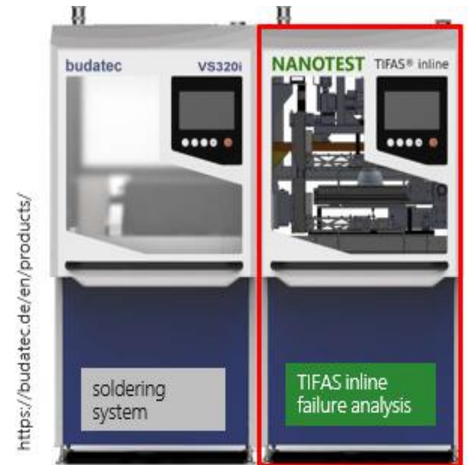
TIFAS® IR inline

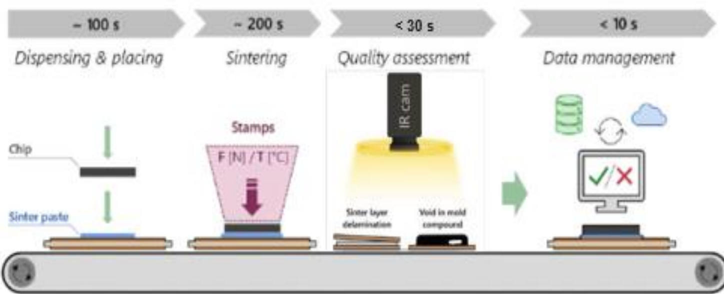
Thermal imaging failure analysis system for production lines

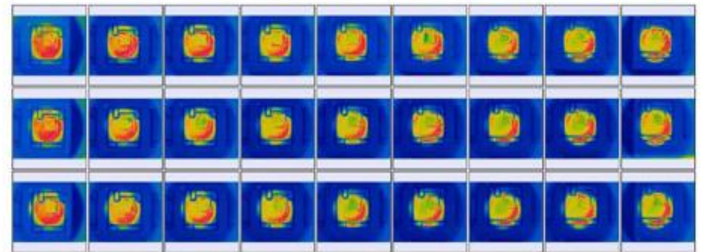
Intelligent non-destructive 100% inline failure analysis

Features

- 100% inspection in production lines, full automation
- Short testing times, high throughput
- Complete infrared thermography-based failure analysis setup
- Contactless and non-destructive
- Great variety of detectable defects







3x9 Measurements in a system tray

TIFAS® IR mobile

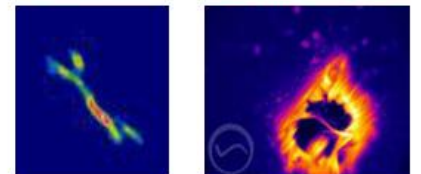
Mobile thermal imaging failure analysis system

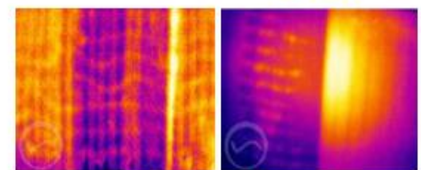
Contactless failure analysis in a nutshell for mobile applications

Features

- Mobile infrared thermography-based failure analysis setup
- Contactless and non-destructive maintenance of components
- Great variety of detectable defects
- Comprehensive analysis software
- Example: non-destructive testing of fiber composites and bonded joints

Impact defect   Lightning strike defect





Inner structure of a wind turbine blade

© Bladecare-academy.de

© Deutsche Bahn AG

ZfP heute | Berlin 2020 p 54-55
M. Kaczmarek, M. Müller, Zerstörungsfreie

AMB
Advanced Mixed-mode Bending Test

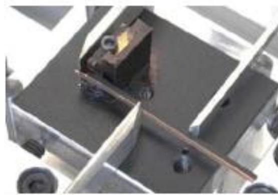
Rapid, inexpensive and effective interfacial adhesion strength characterization

Material parameters

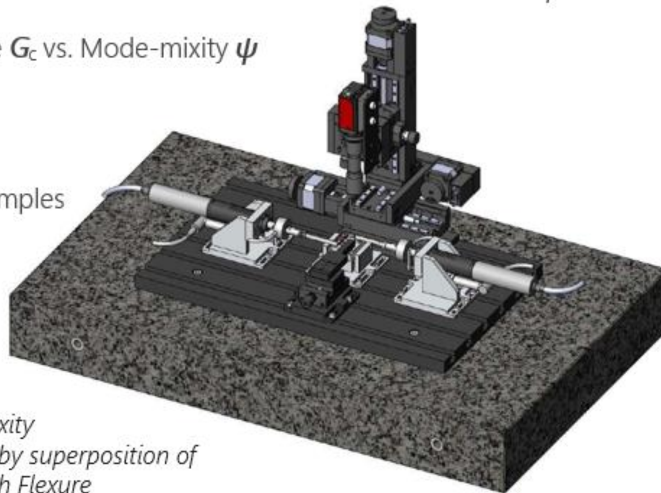
- Critical Energy Release Rate G_c vs. Mode-mixity ψ

Feasible samples

- Artificially manufactured samples
- Bi- or multi-layered beams
- Package origin cut-outs

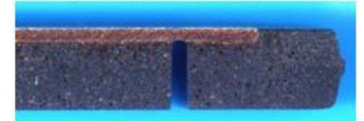


Mode-mixity variation by superposition of End Notch Flexure and Double Cantilever Beam tests

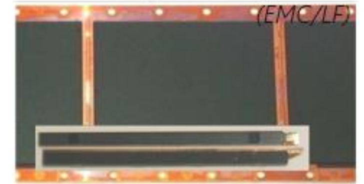


*Specimen is **simply fixated** in the detachable sample holder.*

Package origin cut-out (No chip)



Artificial manufactured (EMC/LF)

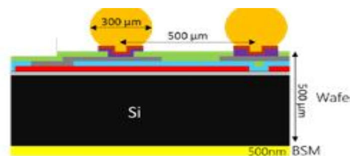


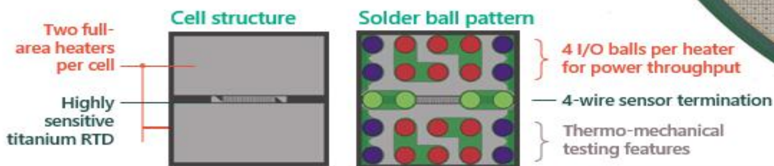
Thermal Test Chip (TTC)

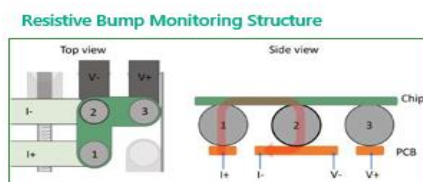
NT20-3k thermal test chip

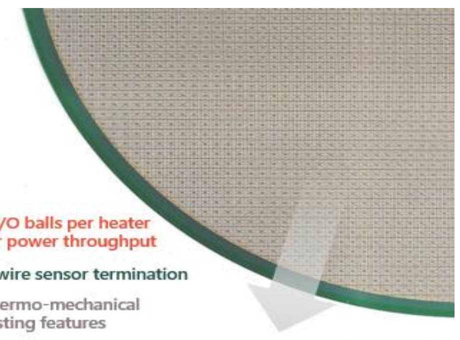
- 200 mm (8") Si wafer
- Titanium thin-film structures
  - 1 × 3.3 kΩ RTD
  - 2 × 15 Ω heaters
  - 4 x Monitoring Bumps
- Versatile & customizable
- Different BSM
- Up to
  - 50 × 50 mm² die size
  - 200°C chip temperature
  - 10 W/mm²

Ready for your custom TTV design









2.5×2.5 mm² unit cells

- 10 W/mm² heating
- 82% area coverage
- 300 µm solder bumps
- 500 µm pitch
- 4000+ cells per wafer

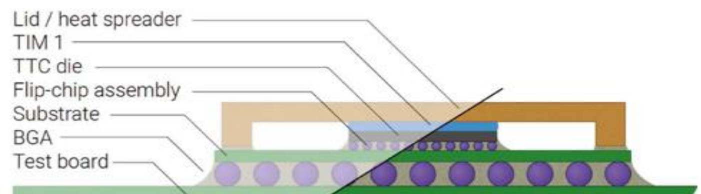
Thermal Test Vehicles (TTV)

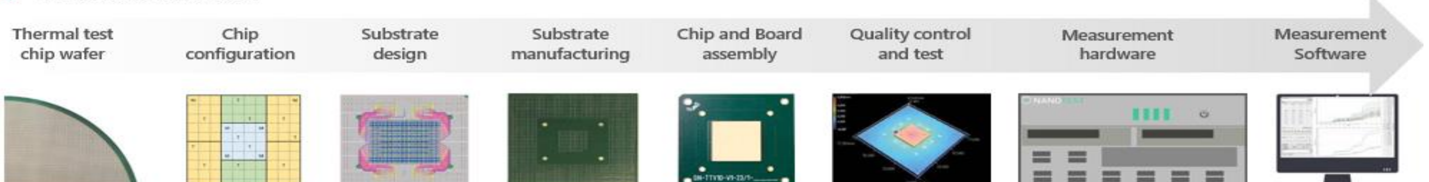
Design the TTV you need. No Compromise

We support our customers to verify their prospective package, TIMs and cooling solutions by offering TTV solution

We offer:

- Thermal test chips wafer
- Concept and feasibility
- Interposer and test board
- Assembly and quality assessment
- Measurement hardware
- Measurement and control software
- Calibration and test





Thermal Characterization

Failure Analysis

Material Level

System Level

TOCS®

- Liquids and pastes
- Slurries & resins

- Thermal conductivity
- Thermal diffusivity

- Compact & versatile
- Very quick testing

Features

- Quick measurement
- Curing and in-situ testing
- Multi-use test chips
- Integrated heating

TIMA®

- Pastes to solids
- TIM1 & TIM2

- Thermal conductivity
- Interface resistance

- Automated testing
- Aging investigation

Features

- ASTM D 5470 complete
- Curing and in-situ testing
- Customizable test heads

LaTIMA®

- Solids
- Substrates & metals

- Thermal conductivity
- Thermal diffusivity

- Two-in-one system
- Dog-bone samples

Features

- High conductivities
- Industrial sample compatibility
- Integrated sample integrity validation

TIMA®pulse

- Active devices
- FETs & IGBTs

- Thermal impedance
- Structure function

- Compact & low-cost
- Versatile software

Features

- Complete thermal path reconstruction
- Non-destructive
- Structural information
- Thermal modeling
- Thermal frequency spectrum

TIFAS®

- Systems & joints
- Packages & modules

- Buried defects
- Thermal obstruction

- Full-scale FA system
- Compact & low-cost

Features

- Non-destructive & contactless
- Fast and thermovisual
- Heat flow-correct

Characterization

Lab-Scale Products & Services

- Thermal characterization of material, components and systems
- Fracture mechanical characterization of interfaces
- Material aging investigation
- Standalone benchtop solutions

Failure Analysis

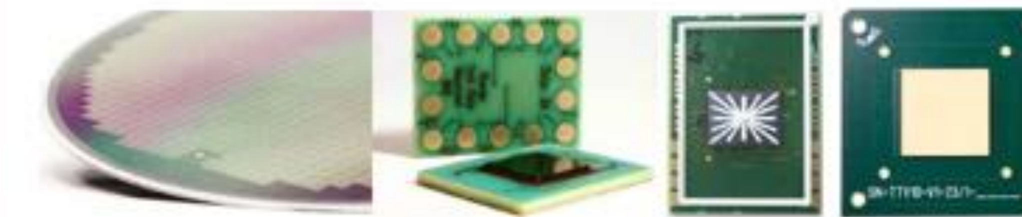
Multi-Scale Solutions & Scientific Services

- Thermal imaging
- Failure detection and localization
- Quality management solutions
  - Contactless & non-destructive
  - Lab-scale to inline

TTV

All-round Thermal Test Vehicle Supply

- Thermal test chip wafers
- Thermal test vehicle design and assembly
- Measurement hard and software



TOCS®

Three Omega Characterization System

Fast-paced thermal material characterization

Material parameters

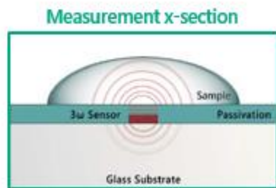
- Bulk thermal conductivity
- Thermal diffusivity

Feasible samples

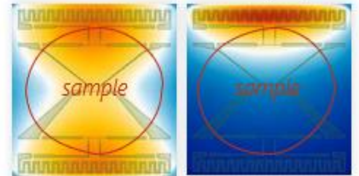
- Liquids
- Gels
- Pastes
- Soft solids

*Sample material is **simply applied** on the test chip and tested with a **mere buttonpress**.*

Measurement x-section



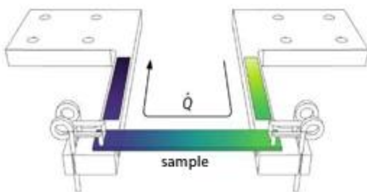
Custom temperature profiles

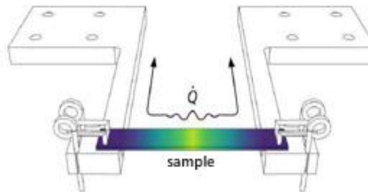


LaTIMA®

In-Plane Thermal Material Analyzer

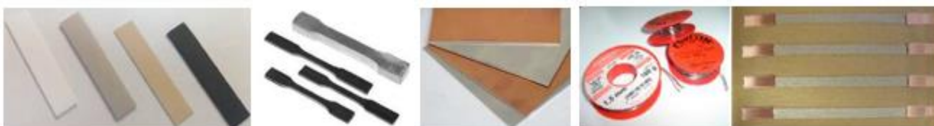
LaTIMA base	TIMA*wave* add-on
» Thermal conductivity	» Thermal diffusivity

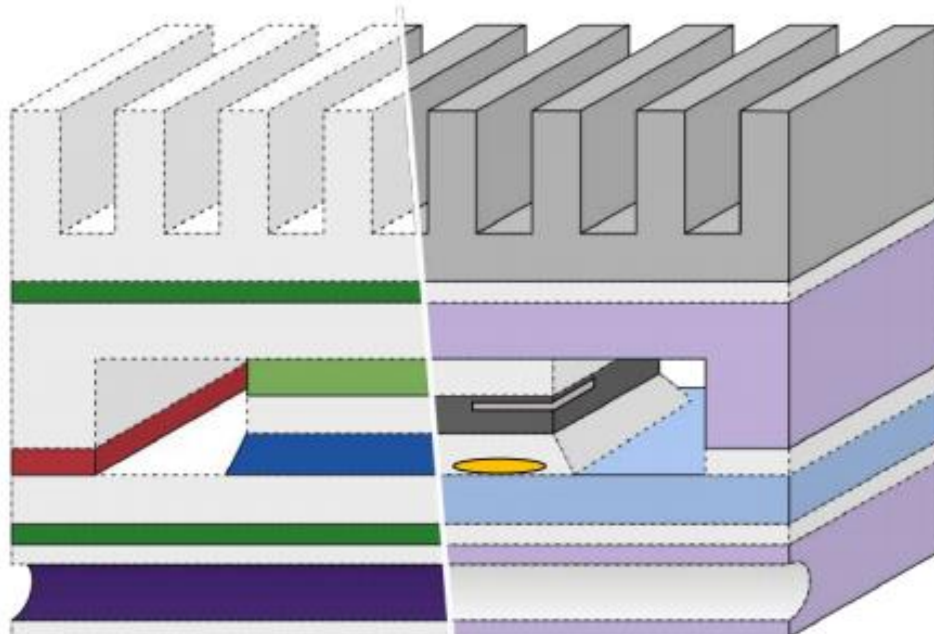




For highly conductive materials

Feasible samples | Metals | Alloys | Substrates | Ceramics | | Solder | Sintered material | Semiconductors | FRP |





TIMA®

- TIMs
- Sealant
- Underfill
- Die attach
- Substrate

LaTIMA®

- Metals
- Alloys
- Die material
- Substrate
- Die attach

TOCS®

- TIMs
- Sealant
- Underfill
- Coolant

TIFAS® IR

- Delamination
- Buried defects

TIMA®pulse