Berliner Nanotest und Design GmbH

Company Portfolio

Origin

» Founded in 2004 as a Fraunhofer spin-off, we've refined our focus to specialize in thermal management and characterization.

» Today, we're trusted partner to major **international electronic industries**, offering full-scale solutions for **thermal characterization** and **reliability analysis**

» Our agile team of physicists, mathematicians, programmers, and engineers drives creativity and innovation.

» We're **co-founders** of the Joint Lab Berlin (**JLB**) for Thermal Management and the International Semiconductor Alliance (**ISA**), shaping the future of technology.

NANOTEST in numbers

» 21 years of experience

» 30+ research projects

» 43 motivated employees

» 200+ satisfied customers

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Thermal Characterization of Materials (liquids → TIM → solids)

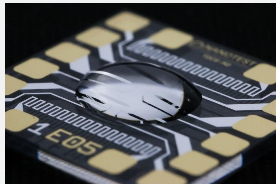
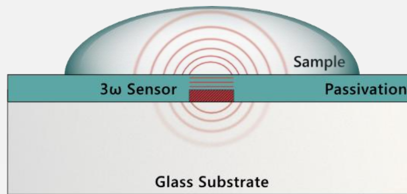
TOCS®

- 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

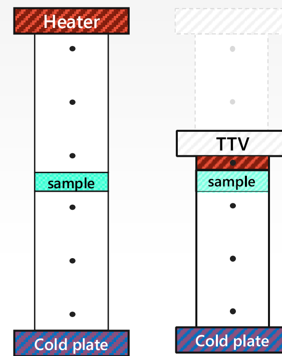
TIMA®

- 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



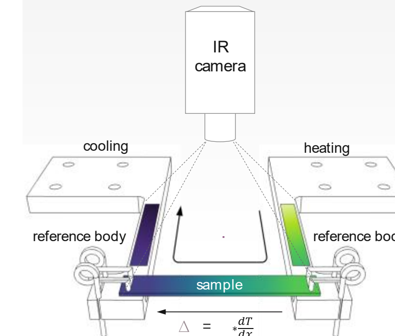
LaTIMA®

- Solids
- Substrates & metals

- Thermal conductivity
- Thermal diffusivity

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

Features
- » High conductivities
- » Industrial sample compatibility



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NANOTEST

Fast-paced thermal material characterization

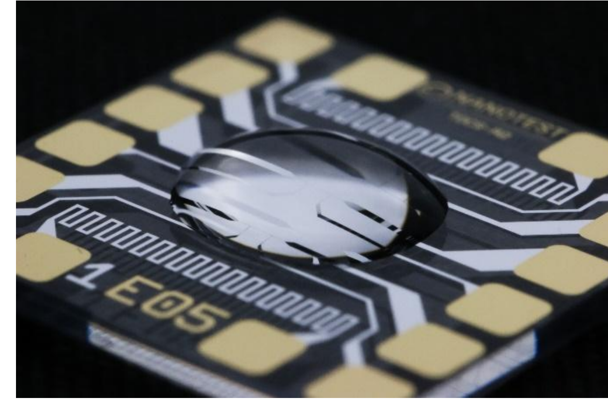
Material parameters

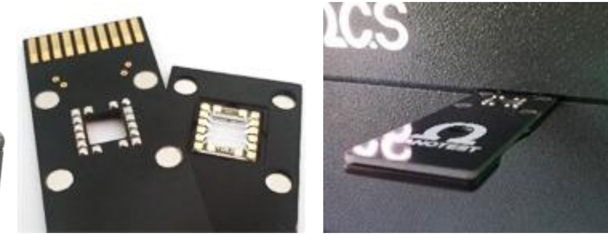
- Bulk thermal conductivity
- Thermal diffusivity

Feasible samples

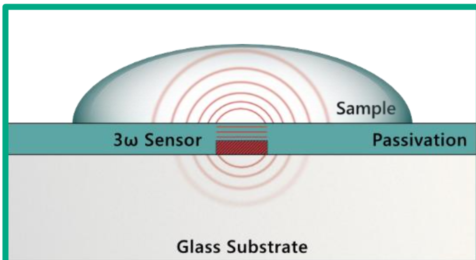
- Liquids
- Gels
- Pastes
- Soft solids

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

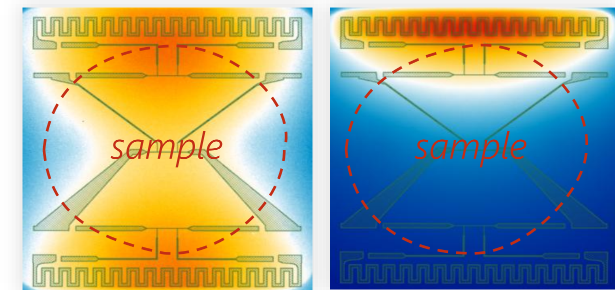




Measurement x-section



Custom temperature profiles



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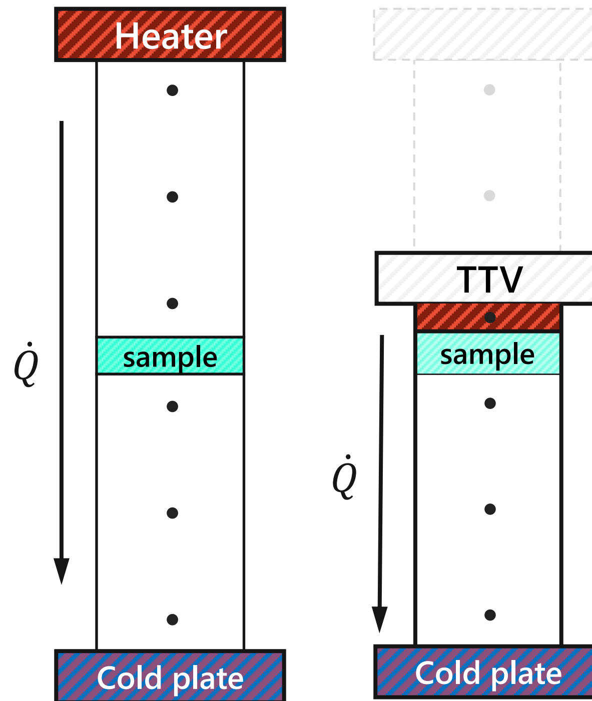
Beyond ASTM D5470

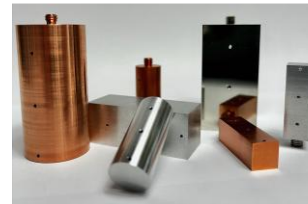
- Effective and bulk thermal conductivity
- Thermal effective and interface resistance
- Temperature and pressure dependency
- Aging and reliability testing
- Compact all-in-one system

Feasible samples

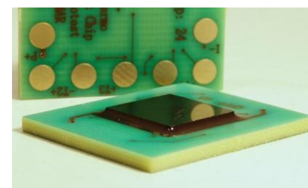
- Thermal interface material
- Die attach materials
- Underfill materials
- Molding compound
- Substrates
- Multilayer samples



examples of feasible material samples


selection of available test heads

Assembly and curing tool adhesive


Thermal test chip

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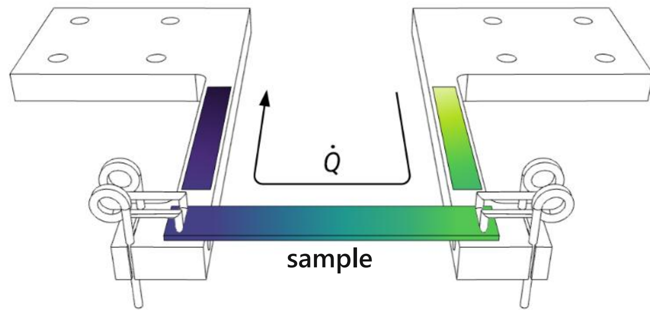
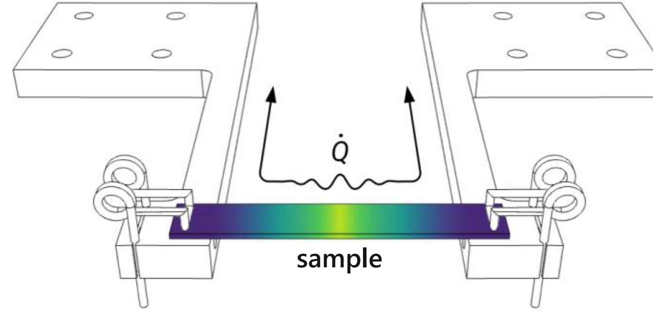
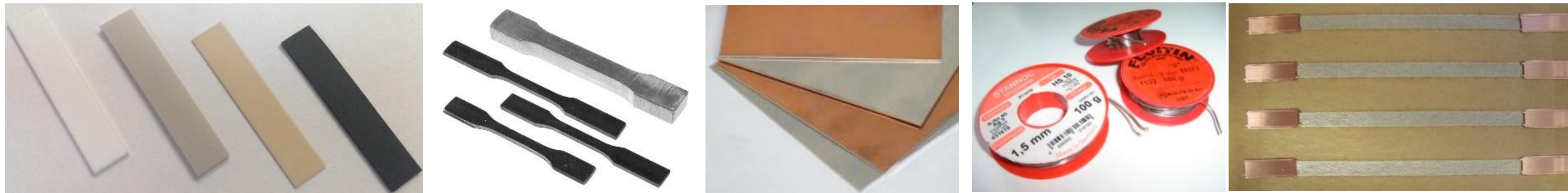
LaTIMA base	TIMA*wave* add-on
» Thermal conductivity	» Thermal diffusivity





For highly conductive materials

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



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Development steps of Thermal Test Vehicles (TTV)

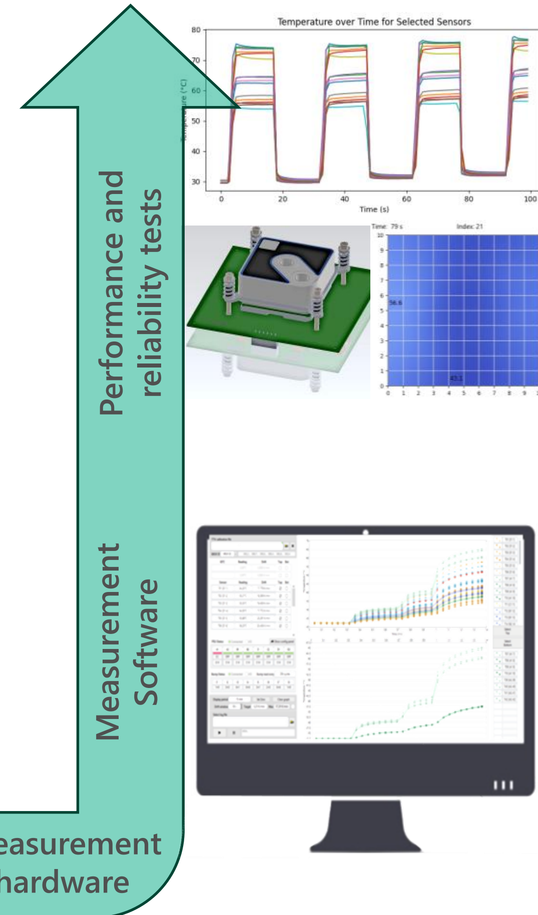
Design of customized TTV

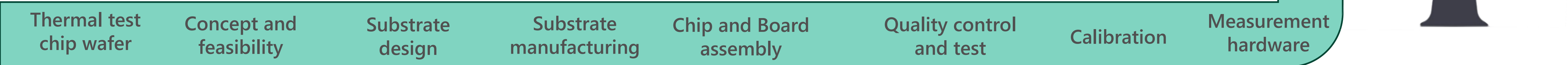
We support our customers to verify their prospective package, TIMs and cooling solutions by offering TTV solutions

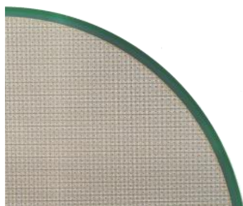
This includes:

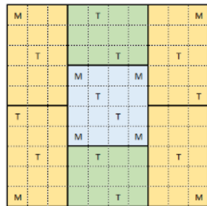
- Chip design and fabrication → Thermal test chips wafer
- Chip configuration → Concept and feasibility
- Design and manufacturing of substrate and ETB
- Assembly and quality assessment
- Measurement hardware
- Measurement and control software
- Calibration and qualification
- Performance and reliability tests

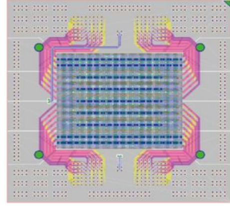
ALL-IN-ONE SERVICE: FROM CHIP TO TTV, WITH FULL EQUIPMENT AND TESTING SUPPORT

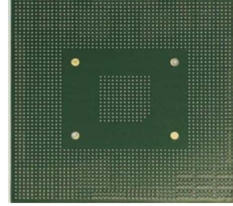


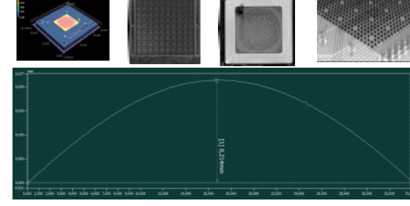












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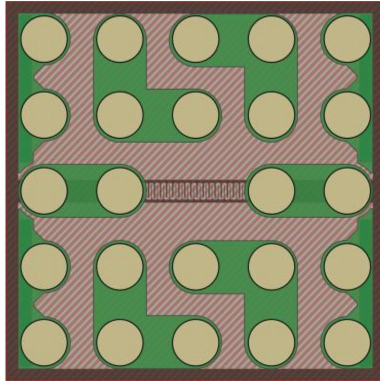
Available Thermal Test Chips (8″ wafer)

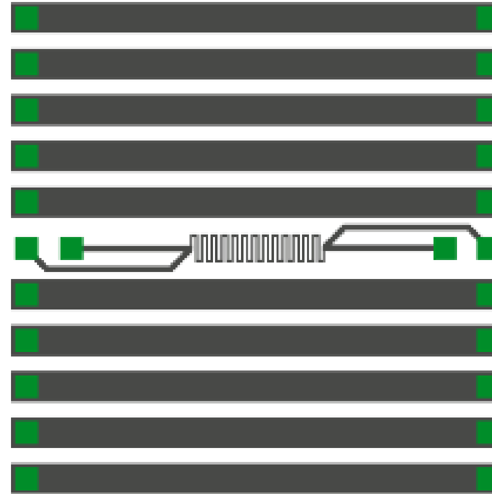
NT20-3k FC



Bumps

- 2.4 x 2.4 mm^2 unit cells
- 2 heaters, one RTD and 4 monitoring bumps
- 8″ wafer / > 4000 cells per wafer
- Power Density: 10 W/mm^2
- Wafer thickness: 500 µm or 725 µm undoped silicon
- Flip-chip assembly
- 300 µm SAC bumps with 500 µm pitch
- BSM
  - Ti-NiV-Au (100nm-300nm-200nm)
  - NiV-Pt-Au (300nm-100nm-200nm)
  - Pure silicon

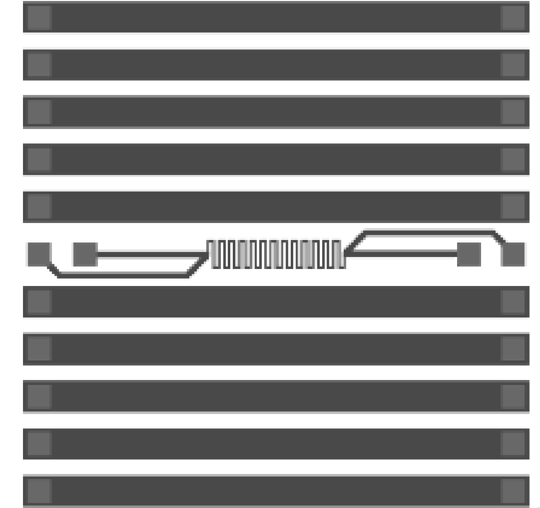
NT16-3k FC



Cu-pillar

- 3.2 x 3.2 mm^2 unit cells
- 10 heaters and one RTD
- 8″ wafer / > 2400 cells per wafer
- Power Density: 10 W/mm^2
- Wafer thickness: 620 µm undoped silicon
- Flip-chip assembly
- 80 µm Cu-pillars with 300 µm pitch
- without BSM

NT16-3k WB



Wire bond

- 3.2 x 3.2 mm^2 unit cells
- 10 heaters and one RTD
- 8″ wafer / > 2400 cells per wafer
- Power Density: 10 W/mm^2
- Wafer thickness: 400 µm undoped silicon
- Wire-bond assembly
- 150µm Aluminum pads
- BSM: Ti-NiV-Au (100nm-300nm-200nm)

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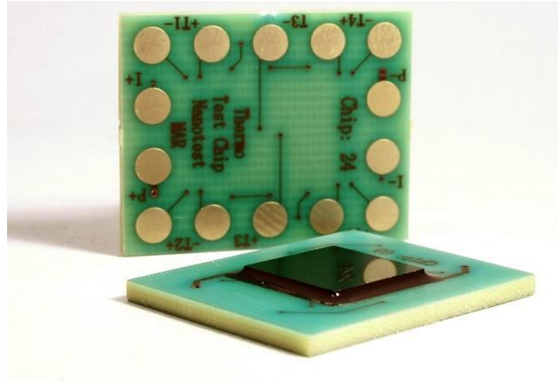
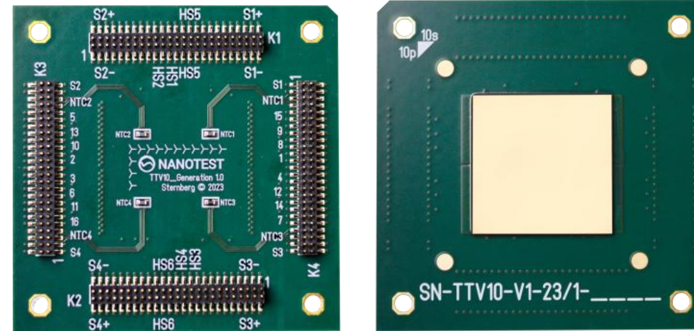
TTV5



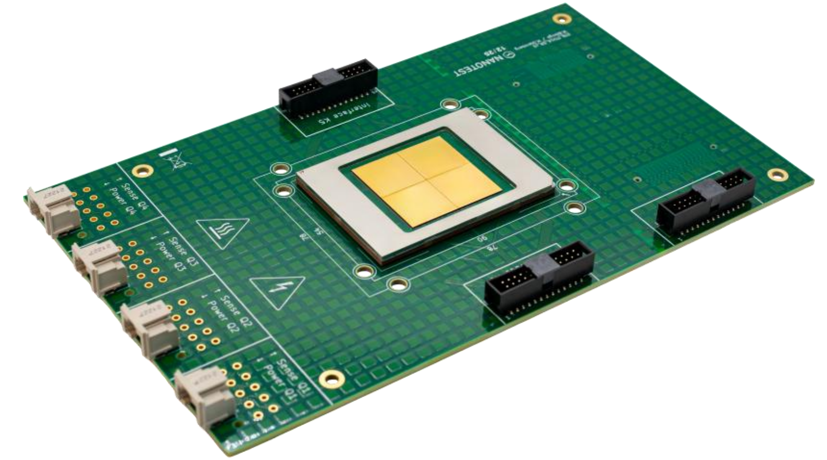
» Based on the NT16-3k-FC
» Chip size: 9.8 × 9.8 mm²
» Substrate Size: 25 × 20 mm²
» Blank silicon surface
» 5 Temperature sensors (RTDs)
» Uniform resistor heater
» **Total power: 140W**

TTV10



» Based on the NT20-3k-FC
» Chip size: 24.9 × 24.9 mm²
» Substrate size: 60 × 60 mm²
» Chip BSM: NiV-Pt-Au
» 16 Temperature sensors (RTDs)
» 4 Independent heater zones
» **Total package power: 2000 W**

TTV16



» Based on the NT20-3k-FC
» Chip size: 39.9 × 39.9 mm²
» Available as single die or 4-dies chiplet
» Substrate Size: 78 × 57 mm²
» 56 Temperature sensors (RTDs)
» 24 Independent heater zones
» **Total package power: 4000 W**

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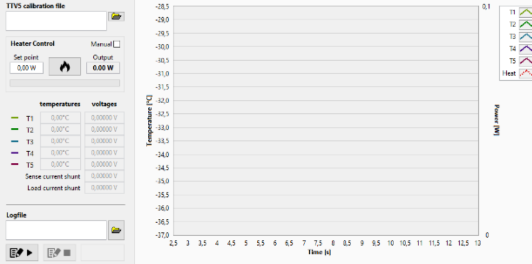
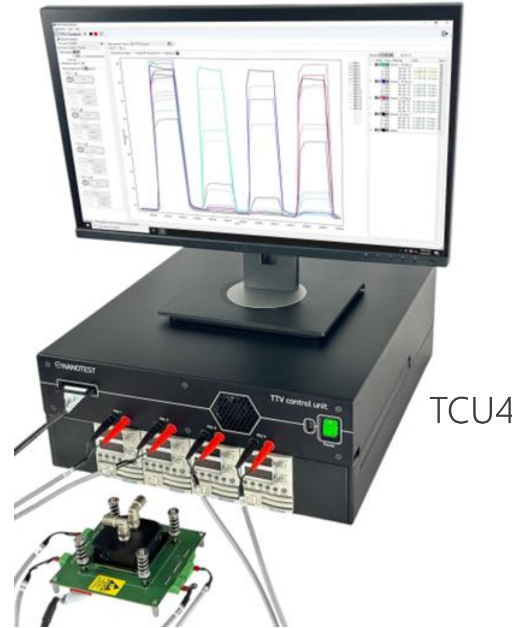
Control unit for TTV5



- Hardware-software combination
- Designed for NT16-TTV5
- Features:
  - Heater control (automatic / manual)
  - Temperature monitoring
  - Data Logging

Control unit for TTV10



- Controlling of power suppliers
- Measurement and visualisation of RTDs
- Scheduling for active power cycles
- 19″ case (stand-alone and integrable)
- 4 Programmable PSU
- DAQ with 8 Analog channels

Control units for TTV16

Different TCUs are available for TTV16:

- TCU6 with 6 PSUs for up to 2.5 kW (core load)
- TCU9 with 9 PSUs for up to 4.8 kW (homogeneous load)
- TCU24 with 24 PSUs for up to 5.0 kW (flex load)

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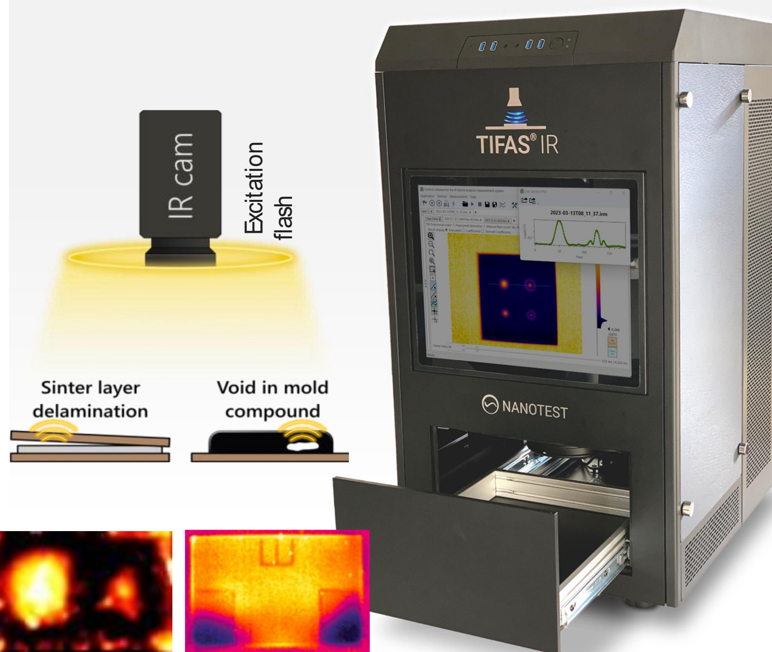
Failure Analysis by Thermal Imaging (Lab → Inline → Mobile)

TIFAS® IR Lab

Lab device for contactless failure analysis

Features

- Complete IR 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

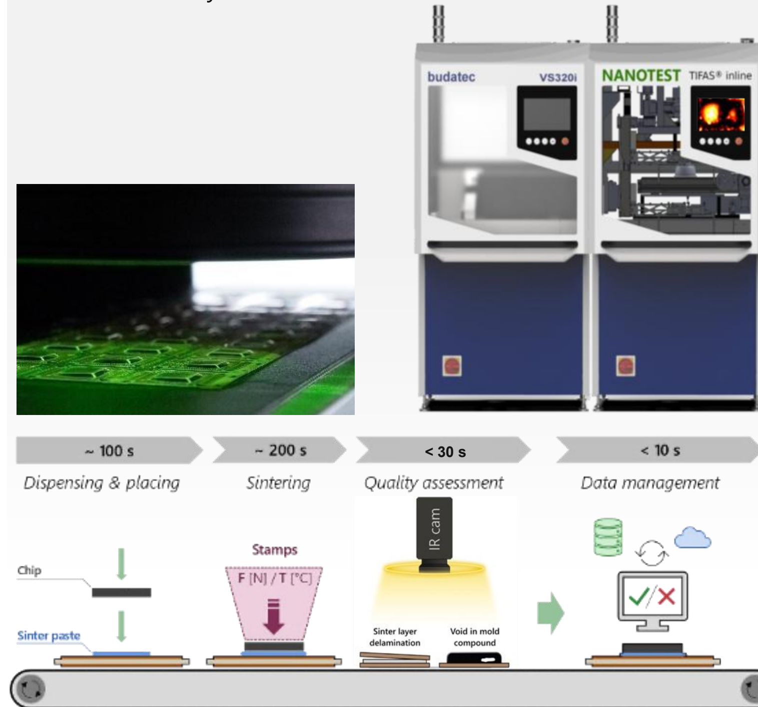


TIFAS® IR inline

Intelligent inline failure analysis

Features

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



TIFAS® IR mobile

Mobile failure analysis for field applications

Features

- Mobile IR thermography-based failure analysis setup
- Contactless and non-destructive
- Great variety of detectable defects
- Comprehensive analysis software
- testing of fiber composites and bonded joints

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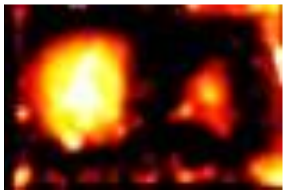
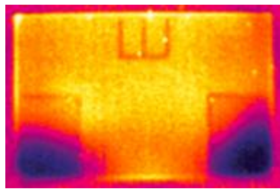
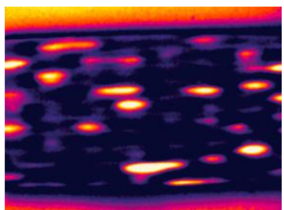
Contactless failure analysis in a nutshell

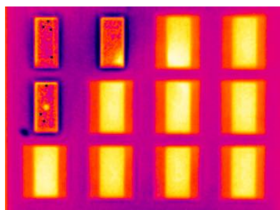
Features

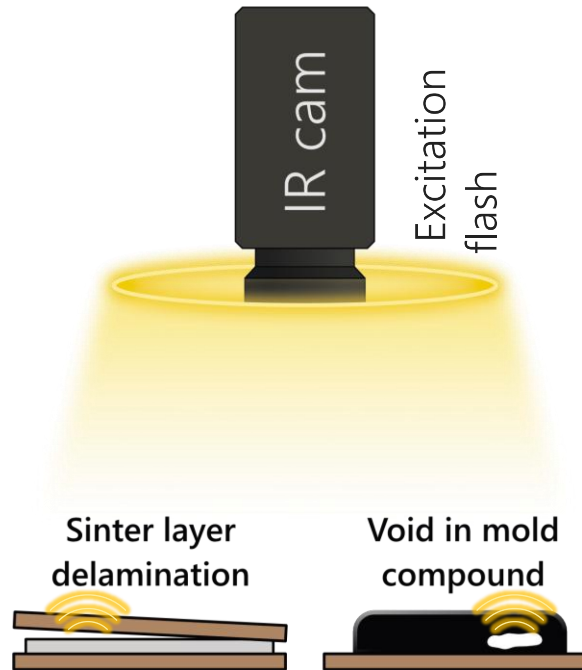
- Complete pulsed infrared thermography-based failure analysis setup
- Contactless and non-destructive
- Short testing times, high throughput
- Great variety of detectable defects
- Comprehensive analysis software
- Adaptable to special needs

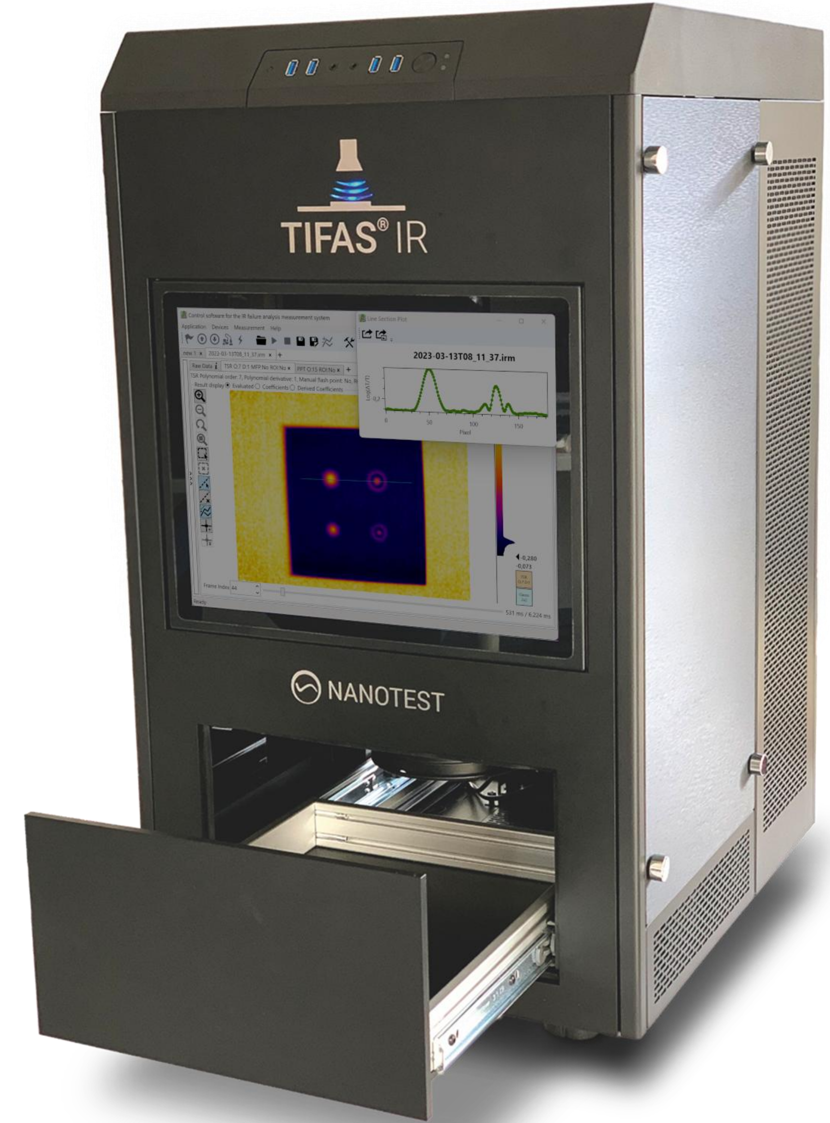

Voids in solder die attach layer


Delamination in sintered power module


Voids in carbon fiber reinforced polymer


Voids in molding compound





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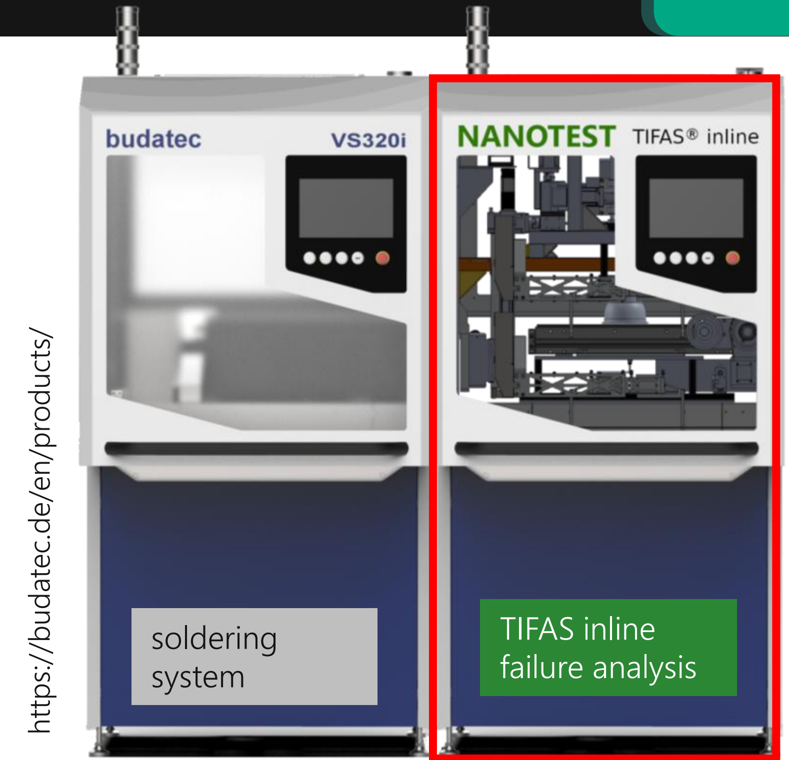
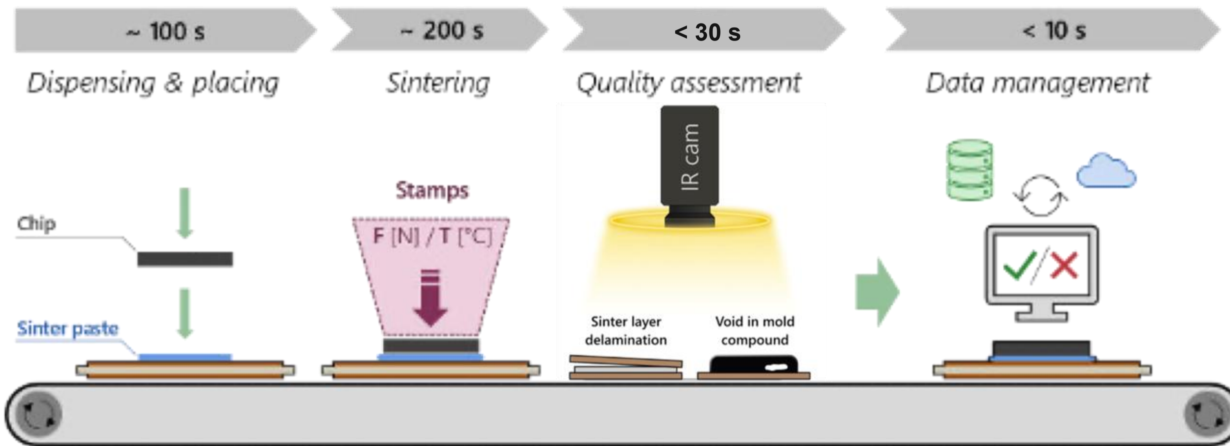
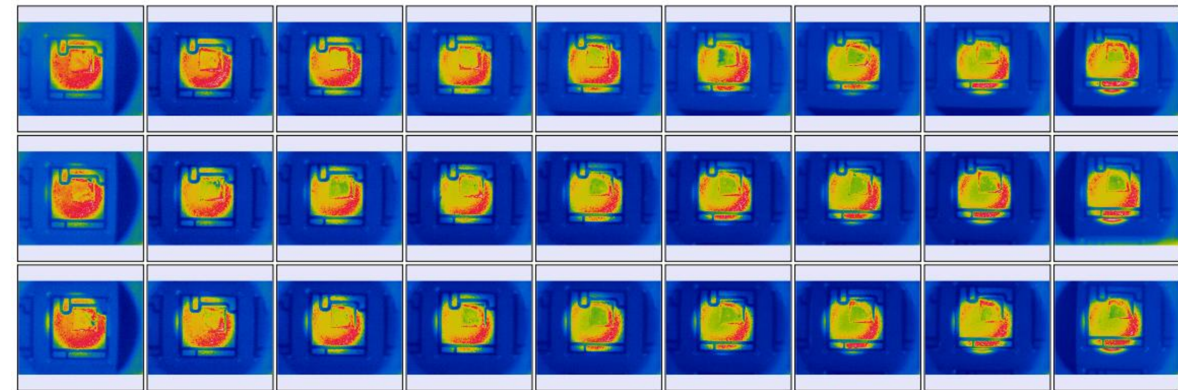
Intelligent non-destructive 100% inline failure analysis

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

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Contactless failure analysis in a nutshell for mobile applications

Features

» Mobile infrared thermography-based failure analysis setup

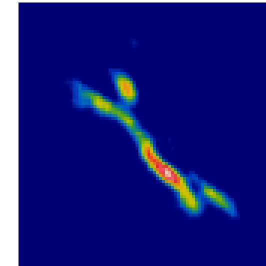
» Contactless and non-destructive maintenance of components

» Great variety of detectable defects

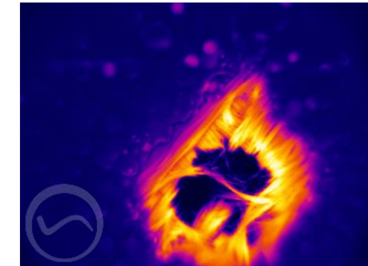
» Comprehensive analysis software

» Example: non-destructive testing of fiber composites and bonded joints

Impact defect



Lightning strike defect



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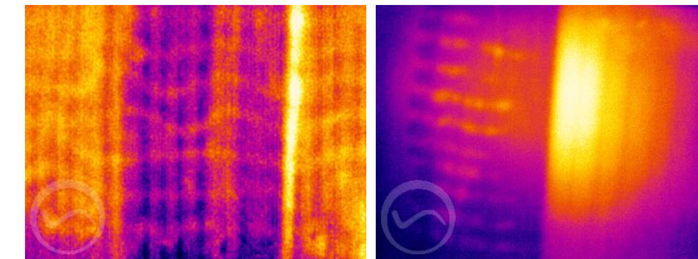
ZfP heute | Berlin 2020 p 54-55
M. Kaczmarek, M. Müller, Zerstörungsfreie Bauteilprüfung von großflächigen, glasfaserverstärkten Schienenfahrzeug-Komponenten



Inner structure of a wind turbine blade

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NANOTEST

Rapid, inexpensive and effective interfacial adhesion strength characterization

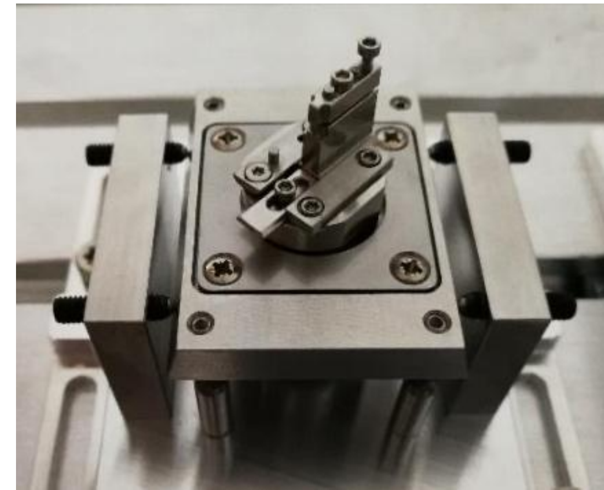
Material parameters

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

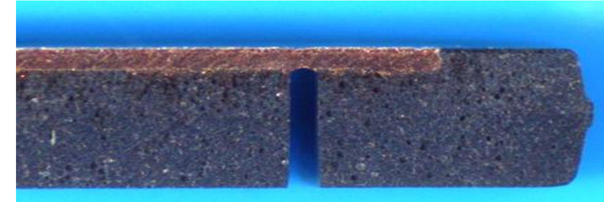
Samples

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

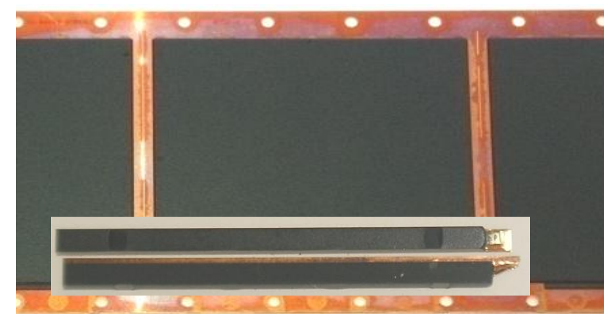
*Specimen is **simply fixated** in the detachable sample holder.*



Package origin cut-out (No chip)



Artificial manufactured (EMC/LF)



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

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Why Nanotest

Our Offering

- Thermal expertise
  - 21 years of R&D experience
  - 100+ scientific publications
  - World-wide industrial network
- Holistic lab services
  - Material & package characterization
  - Aging and reliability testing
  - Failure detection and analysis
  - TTV design, manufacturing and testing
  - Adhesion strength characterization
- High-end laboratory products
  - Focused on user-friendliness
  - At maximum versatility
  - Ensuring high scientific accuracy

Our Promise

- Transparency
  - About our measurement results
- Fairness
  - In pricing and conditions
- Free technical and scientific services
  - Zero-cost requirements analysis
  - Zero-cost scientific discussion
- You learn - we learn.

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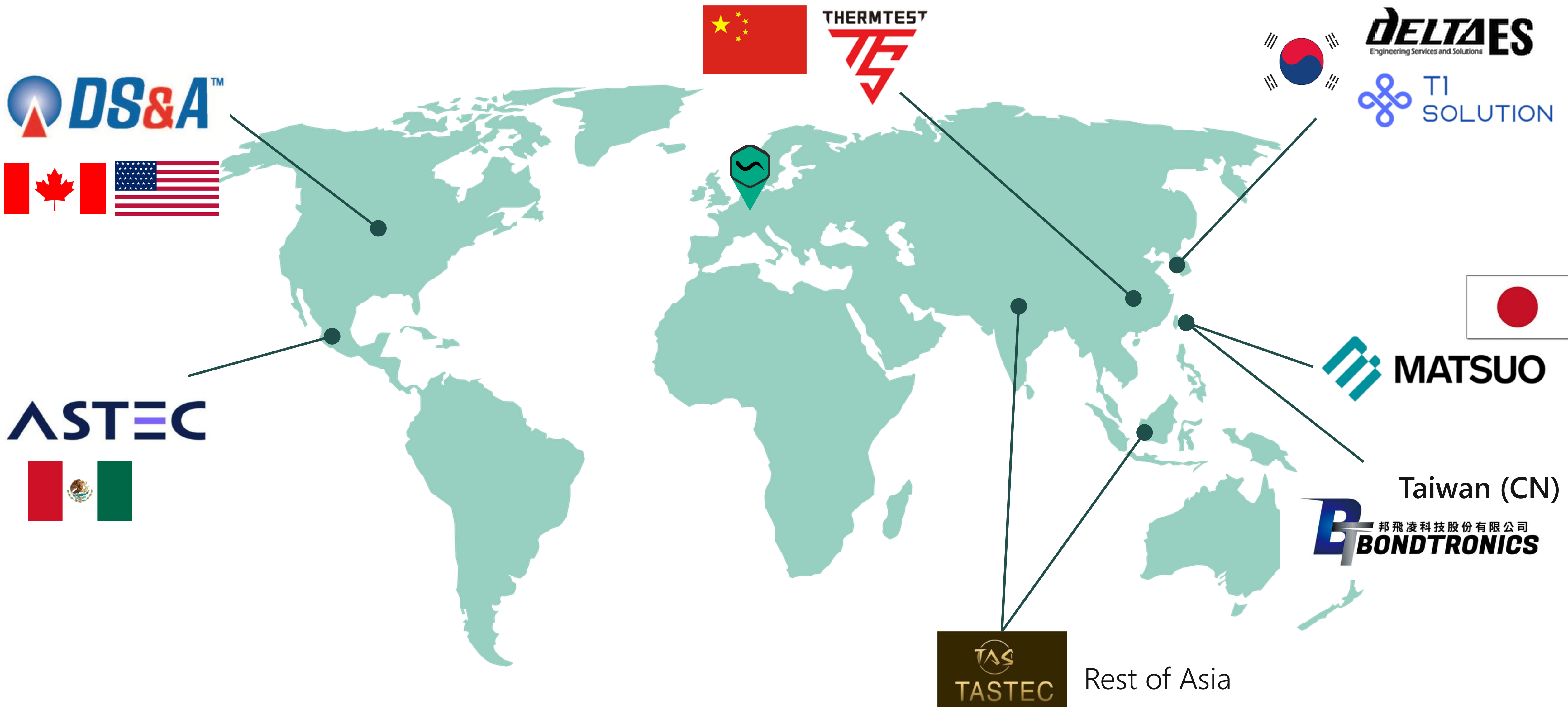
Worldwide Distributors – Made in Germany to the World



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New Facility from April 2026

1300 m² space

- 700 m² office area
- 270 m² production
- 130 m² labs
- 200 m² meeting and social rooms

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Thank you

NANOTEST

simply measured

ISO 9001 certified

Certified for in-house R&D

nanotest.eu

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