SIMCENTER QUALITY TESTER

Solution guide | Using Simcenter to test the thermal performance of electronics

Once the electronics go into mass production, you need to make sure that what is coming off your production line meets the requirements. High throughput automatic thermal testing or EoL testing can help you find production defects before your customers, and it can guarantee a near-zero percent defect production quality. We offer high flexibility and customization options of a Quality Tester that fits the customer need, whether it is a pushbutton T3STER operated by personnel or patch testing automized by a robotic handler or even EoL that is fully atomized and integrated to the production line. EoL testing can help you detect assembly errors and alarm on changing production parameters or materials so your team can make go/no-go decisions or sort the produced samples into quality ranges or bins. Given high production rates, EoL testing must be quick, fully automated and integrated with the production line.

The Simcenter Micred Quality Tester hardware and software picks and places every produced item from the production line, applies a short power pulse to verify the junction-to-case thermal resistance and qualifies each sample into a predefined set of quality bins. You can integrate the Simcenter Micred Quality Tester on an existing production line, or it can be useful for NPI when you are defining and optimizing the manufacturing parameters between the prototype and mass production phase.

Using Simcenter Micred Quality Tester enables packaged power semiconductor manufacturers to elevate their quality assurance practices, advancing from basic quality to consistent quality. The Simcenter Micred Quality Tester software is customizable to support various communication protocols, including SECS/GEM, OPC UA and Modbus.

Challenges

- Guarantee zero-defect production
- Test all produced samples at high production rates
- Detect deviations in material quality and production parameters

Solutions

- Test thermal quality quickly
- Integrate with the production line via a robot handler

Results

- Tested 100 percent of the produced samples quickly and accurately
- Automized go/no-go or quality binning
- Detected changes in production parameters

Elinter Vertriebs GmbH - Germany
* e-mail elinter@elinter.de
* phone +49 7153 978 91 98

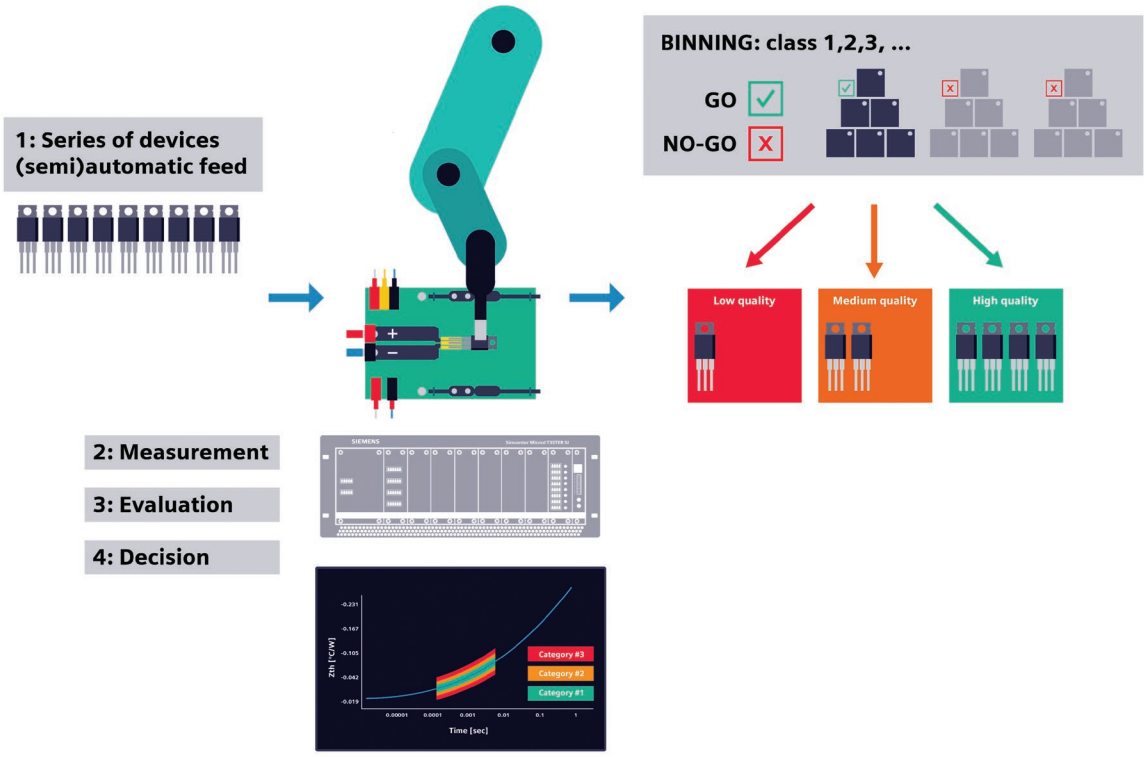
Assure quality with automated thermal testing

Enhance semiconductor package thermal quality assurance with a test solution combining precise thermal impedance measurement with high-throughput automatic binning.

Base system for end of line thermal quality testing
Simcenter Micred Quality Tester hardware
Simcenter Micred Quality Tester control software

Key features

- High throughput rate
- Quality boundary settings based on simulation models
- Automatic accept/reject or quality binning
- Integrates with the test bench or handler



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* e-mail elinter@elinter.de
* phone +49 7153 978 91 98

Build accurate thermal simulation models

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Thermal simulation models can evaluate a lot of design alternatives quickly without the need for building prototypes, but they are only helpful if the results accurately predict what is happening in the real world. Improving the accuracy of the thermal models based on thermal measurement data boosts the accuracy of your thermal simulation results.

Simcenter includes thermal testing and simulation tools to help you correlate your electronics' thermal models more easily. Using tools like Simcenter FLOEFD™ software and Simcenter Flotherm™ software provides automatic calibration procedures based on the data measured with Simcenter Micred. With a unique combination of Simcenter tools, you can find the best design of electronic components and packages accurately and efficiently.

Challenges

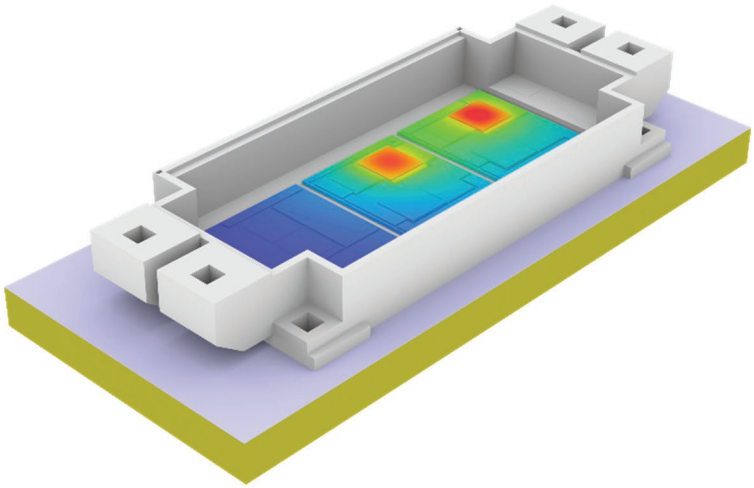
- Optimize material designs and geometry thickness
- Optimize the internal heat flow and cooling correctly
- Decide which properties to use for new materials

Solutions

- Combine thermal testing and simulation tools for higher accuracy
- Calibrate simulation models in Simcenter Flotherm and Simcenter FLOEFD automatically

Results

- Achieved over 99 percent accuracy of temperatures in space and time, creating a true digital twin
- Validated the thermal model for any operating point
- Validated thermal model for static and time transient conditions
- Achieved accurate thermal model behavior for every component in the design
- Enabled boundary condition independent reduced order model (BCI-ROM) sharing of models safeguarding intellectual property (IP)
- Maximized the computational fluid dynamics (CFD) simulation models' accuracy



Build accurate thermal simulation models

Facilitates creating a true digital twin, enhancing the simulation accuracy of Simcenter Flotherm and Simcenter FLOEFD using calibrated models based on Simcenter Micred T3STER measurements.

Key features

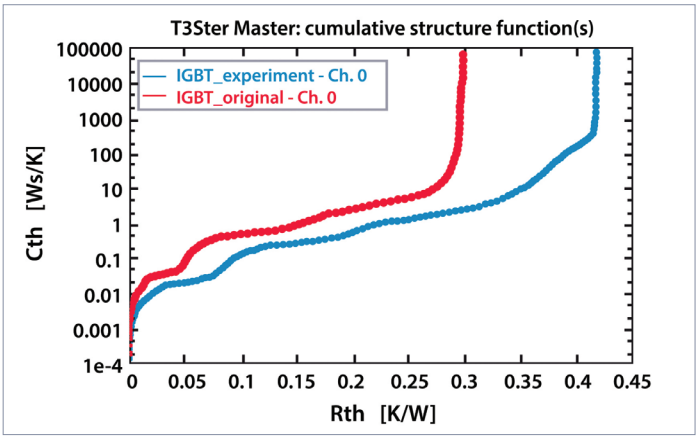
- Generates detailed thermal resistance-thermal capacity R-C network models for accurate 1D thermal behavior analysis and 3D CFD simulation integration
- Supports a wide range of semiconductor types and materials, including diodes, MOSFETs, IGBTs, digital very large-scale integration (VLSI) ICs and SiC and GaN devices
- Easily import structure functions into Simcenter FLOEFD and Simcenter Flotherm
- Automates design exploration to find the optimal parameters, making the model match the thermal testing structure function results
- Creates BCI-ROMs for steady-state and transient applications, supporting multiple dies and cores and hiding the IP

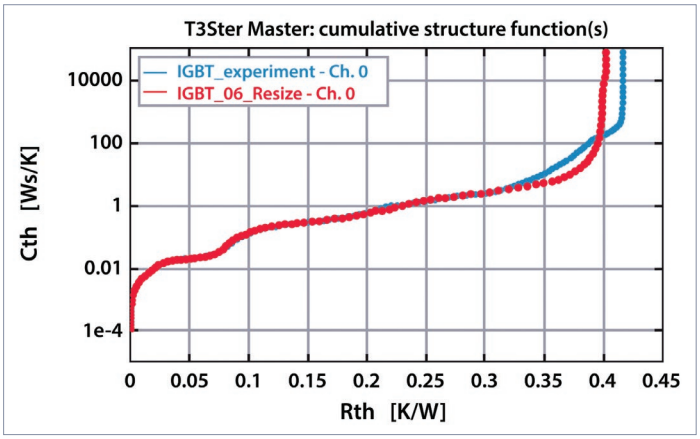
Simcenter Micred T3STER SI for accurate thermal simulation models
Product
Simcenter Micred T3STER SI
Simcenter Micred T3STER SI control software
Simcenter Micred T3STER master postprocessing tool

Options
Product
Simcenter Micred T3STER boosters

Simcenter Flotherm for thermal simulation models
Product name/description
Simcenter Flotherm parallel application software
Simcenter T3STER auto calibration option

Simcenter FLOEFD for thermal simulation models
Product name/description
Simcenter FLOEFD standalone application software
Simcenter FLOEFD electronics option





Automatic calibration: non-calibrated (left) and calibrated (right).

Siemens Digital Industries Software
siemens.com/software

Americas 1 800 498 5351

Europe 00 800 70002222

Asia-Pacific 001 800 03061910

For additional numbers, click here.

Elinter Vertriebs GmbH - Germany
* e-mail elinter@elinter.de
* phone +49 7153 978 91 98

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