

Simcenter POWERTESTER

Lifetime testing and failure diagnosis of high-power semiconductors

The Simcenter POWERTESTER supports automatic testing and diagnosis of possible failure causes of power components on the manufacturing floor. The energy demands of both consumer and industrial electronic systems are increasing, and power electronics component suppliers as well as OEMs are faced with the challenge of providing the highly reliable systems needed for aviation, electric vehicles, trains, power generation, and reusable energy production. The Simcenter POWERTESTER can power the modules through tens of thousands, potentially millions, of cycles while simultaneously providing real-time failure-in-progress diagnosis.

Real-time failure diagnosis

The Simcenter POWERTESTER is the only machine built for manufacturing as well as laboratory environments that does automated power cycling while producing analytical data for real-time failure-in-progress diagnosis. It's designed to perform lifetime testing to test the reliability of applications that use power electronic modules.

The Simcenter POWERTESTER is the industrial implementation of the Simcenter T3STER™ thermal measurement and characterization technology

to enhance the capabilities from electronic parts, LEDs, and systems to high power electronics. The Simcenter POWERTESTER is unique in that it provides fully automated power testing and cycling at the same time, on the same machine, without having to remove the device under test during the process. A simple touch-screen interface allows a technician to use it on the manufacturing floor and/or failure analysis engineer to use it in the lab.

The Simcenter POWERTESTER senses current, voltage, and die temperature while it uses structure function analysis to record changes or failures in the package structure. The machine can be used to enhance and speed up package development, reliability testing, and batch checking of incoming parts before production.

While running power cycles, the real-time structure function analysis shows the failure in progress, the number of cycles, and the cause of the failure, eliminating the need for a lab post-mortem. Conducting lengthy cycling measurements on multiple samples to estimate the cycle count range corresponding to degradation is no longer necessary.

Also there's no need for an excess number of thermal measurements in this range to ensure degradation is captured. The device under test only has to be mounted and connected once; cycling and configuration are defined at the start.

With the Simcenter POWERTESTER, power electronics suppliers will be able to design a more reliable power electronics package and supply reliability specifications to their customers.

The testing and characterization data produced by the Simcenter POWERTESTER can be used to calibrate and validate detailed models in Simcenter Flotherm™ and Simcenter FLOEFD™ thermal simulation software.



Technical highlights

Field-Tested Technology: Based on the Simcenter T3STER advanced thermal testing hardware solution used in industries worldwide for accurate thermal characterization.

Test a wide range of power electronics: Includes metaloxide semiconductor field-effect transistors (MOSFETs), insulated-gate bipolar transistors (IGBTs), and power diodes.

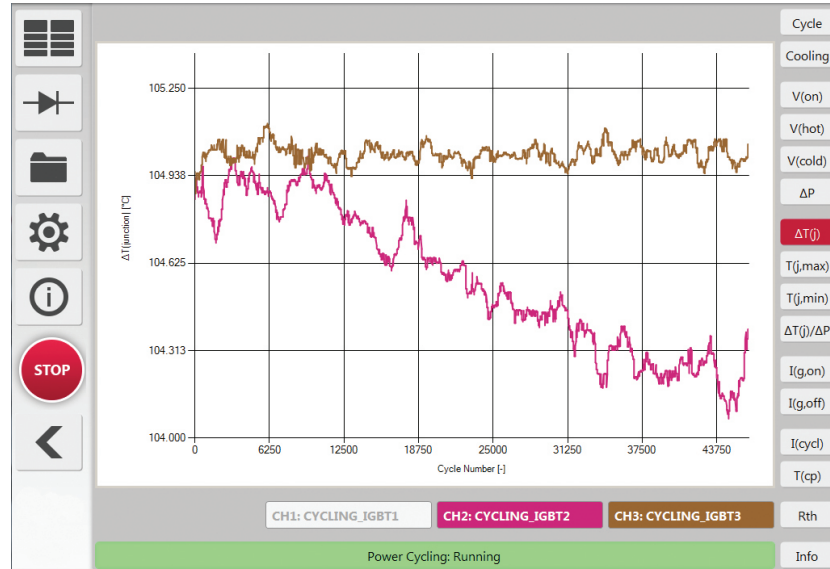
Conduct continuous power cycling until failure: Save time because the component doesn't need to be removed, taken for lab testing, then back to tester for more cycles.

User-friendly touch-screen interface: Can record a broad range of information during test, such as current, voltage, and die temperature sensing; and detailed structure function analysis to record changes in the package's thermal structure.

Apply different powering strategies during operation: Constant power on/off time, constant case temperature swing, constant junction temperature rise, and constant applied power.

"Real-time" structure function diagnostics: Obtain results such as failure in progress, number of cycles, and failure cause quickly.

No lab post-mortem or destructive failure analysis: Eliminate the need for x-ray, ultrasonic, or visual and costly destructive failure analysis.



The Simcenter POWERTESTER product displays how the in-cycle junction temperature difference changes during power cycling.

Maximum load current	Up to 3600A*
Number of heating channels	Up to 4*
Number of devices tested per power tester	Up to 16*
Pulse current duration	PCsec PCmin type supported
Control strategies	Constant current, Constant power, Constant dTj, Constant dTc
Automated failure detection based on	UCE, ΔT_j , T_{jmax} , R_{th} increase
Data recording	UCE before and after switching, ΔT_j , T_{jmax} , T_{jmin} , ΔP , $\Delta T_j/\Delta P$, structure functions, Igate
Output for failure analysis	Structure functions, Thermal transients

*Depending on configuration

Easy to operate: Can be used by both specialists and production personnel.

Enhanced safety features: Over-temperature, smoke, and coolant leakage detection ensure safe operation of the system even if it is left standalone.

Remote monitoring during operation: follow progress on a tablet or computer.

Industrial construction: Fully automated operation with safety functions, multiple systems can be grouped, control of external thermostats.