NXP-Semiconductors Use *T3Ster* to Develop Thermal Models of Chip Packages

T3Ster®

Design Challenge

End-users of chip packages need reliable, calibrated thermal models from semiconductor manufacturers in order to predict junction temperatures accurately and ensure proper cooling of the package in the end-user application. NXP-Semiconductors (formerly Philips Semiconductors) – together with Mentor Graphics Mechanical Analysis Division – has long been a pioneer in the development of "compact" thermal models and has assisted the JEDEC Thermal Standards Committee (JC15) to develop guidelines for their creation. Recently, customers have been demanding Dynamic Compact Thermal Models (DCTMs) which are capable of predicting both steady-state and transient thermal behavior in chip packages.

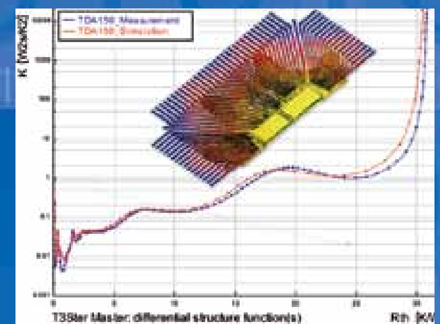
Solution and Benefits

The *T3Ster* from the MicReD Division of Mentor Graphics (www.mentor.com/micred) is a piece of test and measurement equipment designed specifically to measure the transient thermal response of a package quickly and simply. NXP based its decision to purchase the *T3Ster* on its high measurement accuracy, 1 micro-second time resolution, and high signal-to-noise ratio, making it the best thermal characterization equipment available on the market, especially for transient measurements. NXP has now gained a very high level of confidence in its ability to create CTMs that closely match the part's actual thermal behaviour under real operating conditions.The *T3Ster* measurements are applied to confirm the material property values used during the model creation are correct. The resulting CTMs are validated by comparing the model predictions against the measurements. To date, NXP has developed models for more than three hundred of its own chip packages.

Customer Testimonial

"In our lab today the T3Ster is mainly used to measure the thermal resistance of our packages in customer-specific environments. Thanks to the T3Ster, these measurements are very quick and easy to perform. With the help of the T3Ster-Master software we are not only able to give customers strong confidence that our compact thermal models are correct, but also give them insights into how the heat can be dissipated to the environment and the impact of possible faults that may occur during board assembly. Furthermore, for determining the properties of SOI materials, we also measure special test chips with T3Ster, yielding reliable data for thermal simulations of our own SOI chips. T3Ster is a highly versatile piece of equipment. I am sure that we will find other application areas in the near future."

ir John H.J. Janssen,
Manager Virtual Prototyping,
Senior Principal, NXP-Semiconductors,
Nijmegen, The Netherlands



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www.mentor.com/micred

Mentor Graphics
MicReD Division
Infopark D,
Gábor Dénes utca 2. fszt. 1.
Budapest XI. H-1117 Hungary
Tel: +36 1 815 4200
Fax: +36 1 815 4299
micred_info@mentor.com

Mentor Graphics
Mechanical Analysis
81 Bridge Road
Hampton Court
Surrey KT8 9HH, UK
Tel: +44 (0)20 8487 3000
Fax: +44 (0)20 8487 3001
info-mechanical@mentor.com

North American
Thermal Test Facility
880 Ridder Park Drive
San Jose, CA95131
USA
Tel: +1 (408) 436 1500
Fax: +1 (408) 487 7001
info-mechanical@mentor.com

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