

# T3Ster Thermal Transient Tester Helps Design and Manufacture Better High-Performance Light-Emitting Diodes (LEDs)

# T3Ster®

## Design Challenge

LEDs have become important for lighting in a diverse set of applications such as traffic lights, outdoor displays and car headlamps. Lighting applications deliver high light output, requiring far higher electrical input power, exceeding 10W per LED in some cases. The design challenge is to achieve highly efficient light output having the required photometric, colorimetric and radiometric characteristics, coupled with effective removal of the generated heat. Unlike conventional incandescent bulbs where radiative heat losses dominate, LEDs need to operate at much lower temperatures to ensure high light output and quality, so the LED package's thermal performance is critical: good conductive cooling through multiple thermal interfaces has to be provided in a stable, reliable product.



## Solution and Benefits

MicReD's thermal transient tester, T3Ster and the associated results evaluation software provide an unparalleled solution for LED thermal characterization. LEDs have very small thermal time-constants, and T3Ster's ability to measure transient temperature change with high accuracy and high data density from 1  $\mu$ s allows the most relevant part of the junction temperature transient below 100  $\mu$ s to be captured. All thermal interfaces in the heat flow path can be precisely quantified including the LED die-attach.

To obtain exact thermal metrics that correctly account for the emitted optical power, T3Ster can be combined with the TERALED system to provide a full radiometric characterization of the LED during the thermal transient testing. OSRAM have tested a large number of samples with T3Ster and used acoustic microscopy to verify T3Ster's measurement capabilities.



## Customer Testimonial

*"As LEDs become more powerful, more attention should be paid to thermal management, which is essential to ensure stable LED performance and long lifetime. This is why OSRAM is devoting considerable attention to thermal design. T3Ster's accuracy and repeatability enable us to verify our thermal designs and confirm the stability and reliability of our products. By testing in bulk we get increased statistical confidence in the measurement results. The structure functions built into the T3Ster software are extremely powerful for identifying different thermal attach issues during our extensive reliability testing."*

Dr. Thomas Zahner, Quality Manager  
Osram Opto Semiconductors GmbH,  
Regensburg, Germany



[www.mentor.com/micred](http://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](mailto: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](mailto:info-mechanical@mentor.com)

North American  
Thermal Test Facility  
880 Ridder Park Drive  
San Jose, CA 95131  
USA  
Tel: +1 (408) 436 1500  
Fax: +1 (408) 487 7001  
[info-mechanical@mentor.com](mailto:info-mechanical@mentor.com)

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