

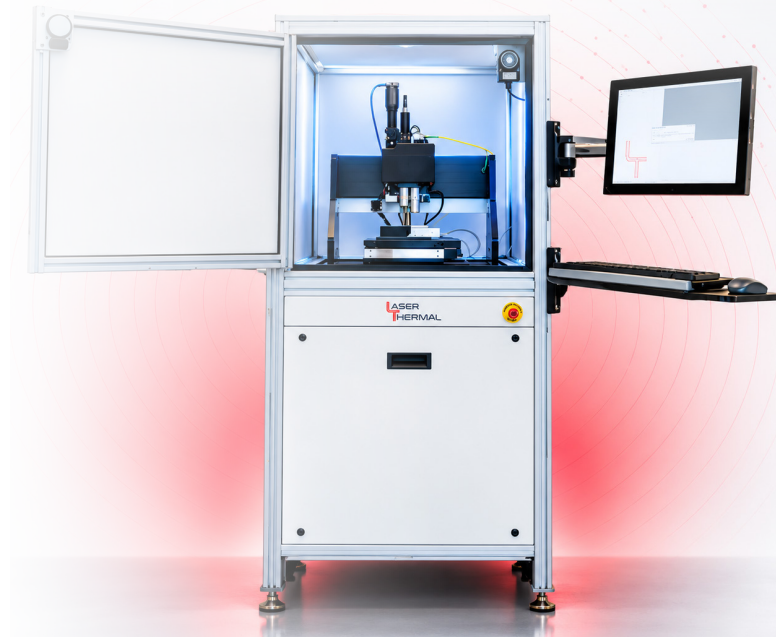
FASTR

PUMP-PROBE METROLOGY

The direct path to complete thermal characterization

**SSTR AND FDTR, TOGETHER.
REPEATABLE RESULTS.
EXTRAORDINARY THROUGHPUT.**

FASTR is a thermal metrology platform designed to characterize thin films, multi-layer interfaces, and bulk materials at the length scales where thermal properties matter. It is the first platform of its kind to offer a turnkey dual-mode configuration, pairing direct steady-state measurement with frequency-dependent thermal modeling. Everything runs automated, from system alignment and calibration through analysis, so high-quality characterization does not come at the cost of throughput.



K Thermal Conductivity
 $0.05-3000+Wm^{-1}K^{-1}$

R_{th} Thermal Boundary Resistance

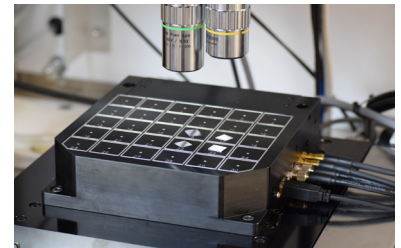
C_v Volumetric Heat Capacity

< 0.5 % Dynamic Repeatability

< 1 s Cycle Time
SSTR MODE

20 Mapping
ms/pixel

< 90 s Cycle Time
FDTR MODE



PRECISION AND THROUGHPUT WITHOUT COMPROMISES

Thin films and coatings · Multilayer interfaces · High-k and low-k dielectric stacks · Wide bandgap semiconductors (AlN, GaN, SiC) · Metals, nitrides, and alloys · Semiconductor wafers.

Separate in-plane from cross-plane

FASTR resolves in-plane conductivity, cross-plane conductivity, and both interface resistances. This matters most for AlN, GaN, h-BN, layered chalcogenides, and other highly oriented films, where in-plane and cross-plane conductivity can differ by an order of magnitude or more.

Eliminate the manual steps

FASTR's removes the manual alignment and calibration step entirely. Everything is automated, computer-controlled, and logged, with the reference sample built into the stage. FDTR and SSTR run together, on the same spot, with the same transducer, in one automated sequence, a real force multiplier that significantly improves both throughput and repeatability over conventional setups.

Detect features other platforms miss

FASTR resolves lateral features down to 2 μm , and detects features as small as 100 nm, at penetration depths up to 10 μm . It measures actual thin film directly, from single nanometers to bulk, without relying on a bulk-equivalent assumption.

AUTOMATE EVERYTHING. TEST FASTER. TRUST THE DATA.



AUTOMATED FROM END-TO-END.

Automated alignment, calibration, measurement, and multi-sample and multi-point testing turn what used to be a day of manual setup into a single unattended run for extraordinary throughput.



ONE SYSTEM INSTEAD OF A WORKAROUND.

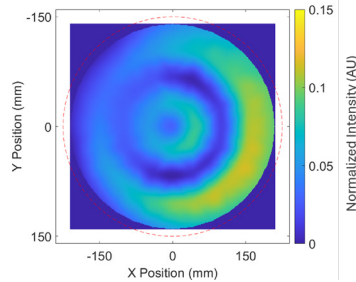
No juggling a separate in-plane setup and a separate contact-resistance measurement. One stack, one queue, one defensible answer.



TRUST THE NUMBER, NOT THE OPERATOR.

<0.5% dynamic repeatability across runs, regardless of who is running the test.

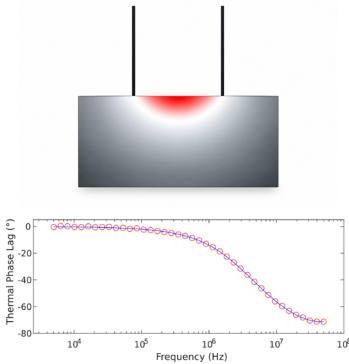
THERMAL PROPERTY IMAGING



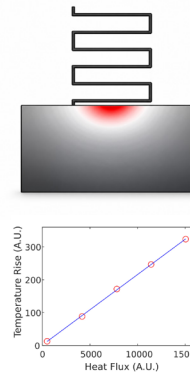
FASTR maps thermal properties spatially across a sample, from $10 \times 10 \mu\text{m}^2$ up to $150 \times 150 \text{ mm}^2$, revealing local variation, inclusions, and process defects that a single point measurement can't see.

HOW IT WORKS

SSTR and FDTR are a force multiplier together. Paired in one automated platform, they measure anisotropic thermal conductivity (in-plane and cross-plane), thermal boundary resistance, and volumetric heat capacity, from the same stack, in a single sequence. These three parameters determine whether a device overheats. Two laser beams do the work: a pump that heats the surface and a probe that reads the temperature through the resulting change in reflectivity.



In FDTR mode, it sweeps modulation frequency to separate conductivity, heat capacity, and interface resistance in a single measurement, in under 90 seconds. That's essential when interfaces dominate heat flow, as they often do in power electronics, RF devices, and advanced packaging.



In SSTR mode, FASTR operates at steady state and extracts thermal conductivity directly, in under 1 second per spot, with no heat capacity assumption. That makes it ideal for mapping k across a wafer or characterizing a film stack quickly.

For anisotropic materials like AlN, SSTR and FDTR combine to resolve cross-plane conductivity, interface resistance, and inplane conductivity, giving the full directional picture that governs both heat extraction and lateral spreading in the device stack.

THERMAL PROPERTIES MEASURED

- Thermal conductivity range (cross-plane and in-plane): 0.05 to $3000+ \text{ W m}^{-1} \text{ K}^{-1}$
- Thermal boundary resistance (TBR): $>1 \text{ m}^2 \text{ K W}^{-1}$
- Volumetric heat capacity: $1\text{--}4 \text{ MJ m}^{-3} \text{ K}^{-1}$
- Temperature range: RT to 300°C

SOFTWARE SUITE

Fully developed software package for data acquisition and automated data analysis. No optics expertise or manual post-processing required.

LASER CLASS I OR III