Datasheet

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ELITE DX System

Non-destructive 3D electrical fault localization with exceptional sensitivity

The ELITE System uses lock-in thermography for high-signal-to-noise, 3D fault isolation with high capture rates, an ideal first step for failure analysis workflows. Options include LSM+OBIRCH, thermal mapping, and backside probing.

From board-level assemblies to advanced packaged devices and die-level structures, defects are increasingly buried within dense interconnects and stacked architectures. The Thermo Scientific™ ELITE™ DX System uses high-resolution lock-in thermography (LIT) to localize electrical faults in X, Y, and Z without de-capsulation, delayering, or destructive preparation. With exceptional signal-to-noise performance, the ELITE DX System offers among the best capture rates for electrical defects, accelerating learning cycles and enabling confident root cause analysis.

The ELITE DX System is among the first fully integrated systems to offer dynamic non-destructive real-time LIT for both 2D and 3D devices. As the market leader, the ELITE System is designed with a proprietary, high-sensitivity InSb camera and optimized optics to enable exceptional performance and a quick time to results, with expandable options to address your specific configuration needs while maintaining flexibility.

Workflow applications

The ELITE DX System is commonly deployed as the first non-destructive localization step in electrical fault isolation workflows. Using CAD connectivity (Synopsys Avalon and NEXS) or laser marking, precise defect coordinates can be transferred to downstream tools to reduce iteration and accelerate root cause confirmation of a broad range of defect types and device form factors.

ELITE DX System supports a wide spectrum of device types and configurations:

- PCB and PCBA assemblies
- System-level modules and testers
- Conventional wire-bond and lead-frame packages
- Advanced 2.5D and 3D stacked devices
- Chiplet and heterogeneous integration architectures
- Thin films and specialty electronics
- Frontside and backside probing supported

Key features
Fault isolation using lock-in thermography (LIT) Non-destructive localization of electrically active defects
Exceptional signal-to-noise ratio High capture rate of low-power and resistive defects
High-resolution 3D localization Lateral resolution down to 1 µm; Z-phase depth localization down to 20 µm
Designed for flexible FA workflows Precise X / Y / Z coordinate transfer to downstream analysis tools

Defect types

- Shorts
- Leakage
- Resistive opens
- Electromigration hotspots
- Interconnect and oxide damage

Additionally, the ELITE DX System can be combined with other nondestructive techniques, such as scanning acoustic microscopy (SAM) and 2D/3D X-ray imaging, to accelerate time to results and improve localization success. By transferring precise X-, Y-, and Z-coordinate fault-location data to X-ray and SAM workflows, the system significantly narrows the search area and reduces inspection time, especially when depth information is required or features are very small. The ELITE DX System also offers high-resolution optics with solid immersion lens (SIL) and S-LSM options, delivering exceptional resolution and image quality.

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Expand capabilities

The ELITE DX System offers modular enhancements to increase flexibility, sensitivity, and workflow efficiency.

Laser scanning microscopy (LSM) with OBIRCH

- Higher sensitivity redetection of electrical defects
- Improved spatial resolution for challenging failure sites
- OBIRCH detectability down to 3 pA
- Lock-in OBIRCH amplifier improves SNR >1.5× over standard OBIRCH
- 1.6 µm resolution with 50× LSM configuration

Thermal mapping

- Absolute temperature mapping of boards, sockets, and testers
- Enables system-level thermal characterization
- No heated chuck required when tester is used
- Correlates electrical activity with thermal performance

Backside probing package (BPP)

- Enables backside probing configurations
- Expands accessibility for advanced device structures
- Supports complex failure isolation scenarios

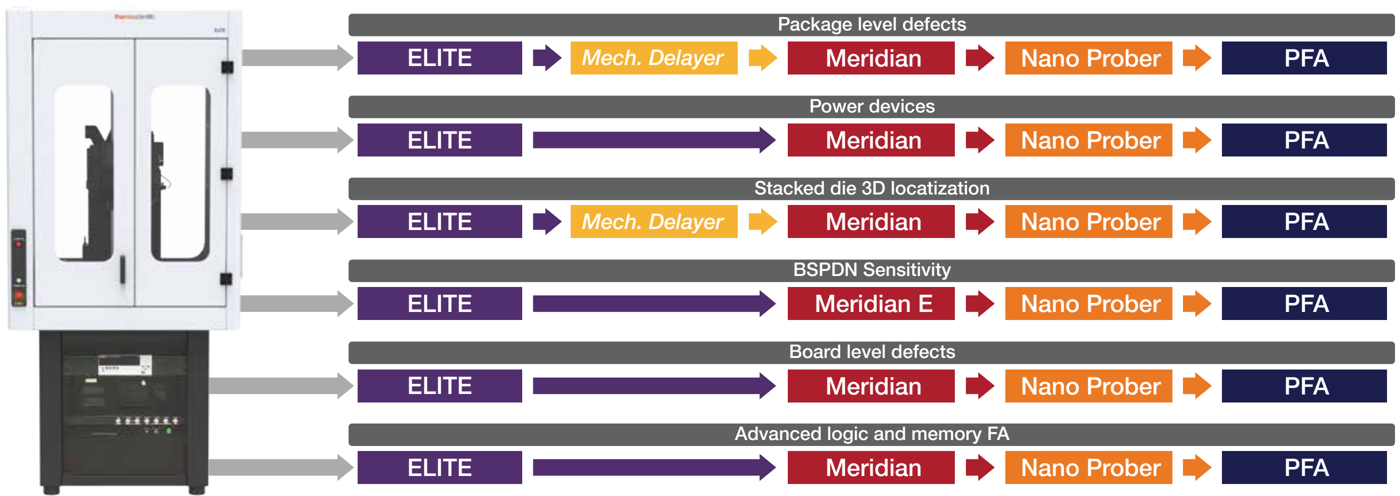


Figure 1. ELITE System is the starting point for fault isolation and failure analysis for a range of technologies. Use NEXS or laser marker to provide defect coordinates to the next system.

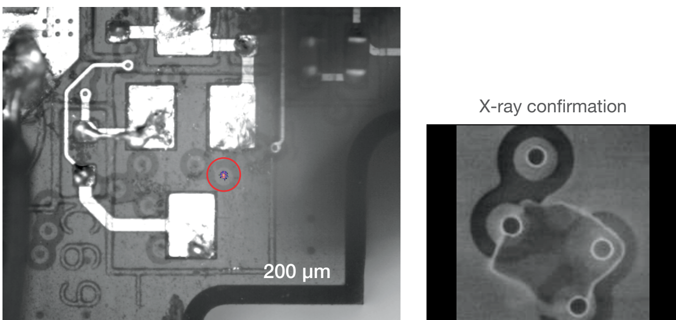


Figure 2. Debris caused shorts inside motherboard - On motherboard (left), ELITE observed a hot spot in a through hole within 5 minutes. X-ray measurements (right) concluded that foreign matter between through holes caused the short failure.

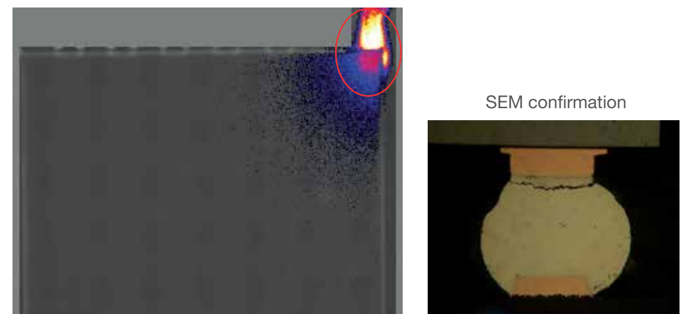
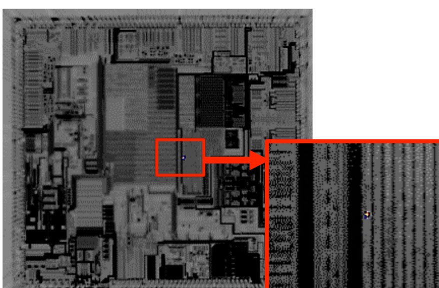
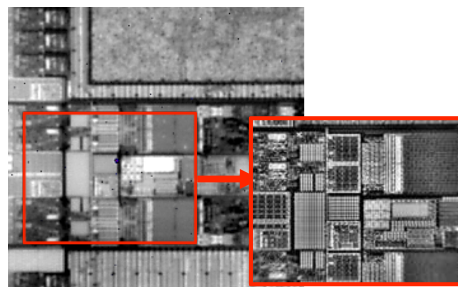


Figure 3. WLCSP drop test resulted in cracked solder ball - After drop test qualification of WLCSP JEDEC board, chain resistance increased from < 1 Ω to 6 Ω. ELITE System found a hot spot on the WLCSP in 4 minutes and SEM confirmed a crack in the solder ball.

10x MWIR Lens



10x SIL



S-LSM

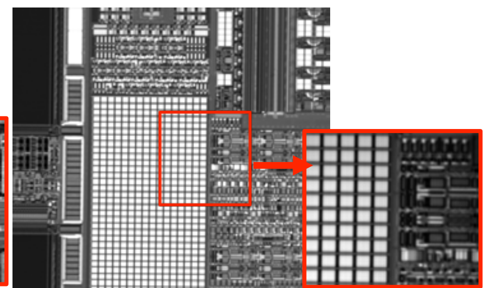


Figure 4: Die level analysis with 10x MWIR lens, SIL and S-LSM options with superior imaging and highest resolution for precise navigation and localization.

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ELITE DX System specifications

IR wavelength range	3–5 µm
Camera	ELITE InSb 640 camera, high-speed (HS) >300 Hz full frame >1,000 Hz available in sub frame
Camera image resolution	3.6 µm with 10× lens @ 4 µm wavelength 2.7 µm @ 3 µm wavelength 1.6 µm resolution with SIL
Number of lenses	Up to 6
Lenses	Auto rotating turret, 6-position with following options available for configuration: • Custom MWIR 28 mm • Custom MWIR 0.25× • Custom MWIR 1× • Custom MWIR 5× • Custom MWIR 10× • SIL Adapter (for 10×) • High NA SIL (~30×) for 650 µm (full thickness) • High NA SIL (~30×) for 100 µm
Field of view	180x150 mm with WA lens
Sample stage X, Y motion	X/Y travel range 150 mm
Sample chuck	Isolated 6” chuck
Sample type	Boards, packaged parts, up to 150 mm parts
Power supply options (up to two)	Keithley 2401 (20 V) kit Keithley 2601B (40 V) kit Keithley 2651A (10, 20, 40 V / 20, 10.5 A) kit Keithley 2400 (200 V) kit Keithley 2611B (200 V) kit
System software	Sierra (navigation, measurement)
CAD connectivity options	Supports Synopsys Avalon and NEXS
Laser marking options	Using 532 nm laser
LSM option	SLED and high-power 1,340 nm laser
LSM image resolution	1.6 µm resolution with 50×
OBIRCH option	3 pA detectability (calculated)
Lock-in OBIRCH option	Amplifier improves SNR >1.5× over standard OBIRCH
Microprobing	Front- and backside supported

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