ELITE VX System

Non-destructive 3D electrical fault localization for high voltage applications

The ELITE VX System pairs advanced 10 kV high-voltage capability with fully featured user and DUT safety mechanisms, enabling uncompromised thermal sensitivity for fast time to results. It also supports laser marking with a direct-view objective, making it ideal for power devices such as IGBTs, power MOSFETs, and other high-voltage components.

Power devices and high-voltage components present unique failure analysis challenges. Elevated operating voltages, high current densities, and large device geometries require electrical stimulation conditions that conventional fault isolation systems cannot safely support.

The Thermo Scientific™ ELITE™ VX System extends lock-in thermography (LIT) fault localization into high-voltage environments, enabling electrical defect isolation under realistic operating conditions up to 10 kV. Designed with fully integrated user and device-under-test (DUT) safety mechanisms, the ELITE VX System offers uncompromised thermal sensitivity while supporting demanding power device applications.

The ELITE VX System is a fully integrated system that offers dynamic, non-destructive, real-time LIT for both 2D and 3D devices. Widely used in the market, the ELITE System is designed with a proprietary, high-sensitivity, InSb camera and optimized optics to enable high performance and rapid time to results, with expandable options to address your specific configuration needs while maintaining flexibility

Workflow applications

The ELITE VX 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 FA tools to reduce destructive iteration and accelerate root cause confirmation of a broad range of defect types and device form factors.

ELITE VX System is optimized for:

- Power devices
- IGBT analysis
- Power MOSFET failure isolation
- High-voltage semiconductor components
- HV packaged devices and modules

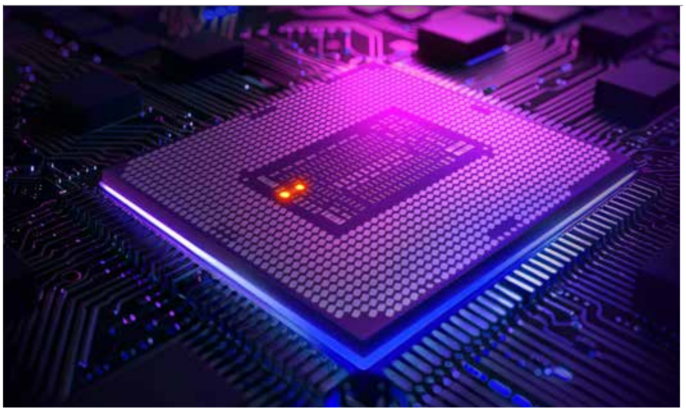
Key features

Innovative 10 kV high-voltage capability
Supports Keithley and Matsusada high-voltage kits up to 10,000 V

Fully featured user and DUT safety mechanisms
Engineered for safe operation in high-energy FA environments

Uncompromised thermal sensitivity
High signal-to-noise performance to support rapid time to results

Laser marking with direct view objective
Precise defect marking for downstream analysis workflows



Designed for power device failure analysis

High-voltage semiconductor devices introduce complex failure mechanisms:

- Junction breakdowns
- Gate oxide failures
- High-field leakage paths
- Electromigration under high current stress
- Resistive shorts in large-area interconnects

The ELITE VX System enables electrical stimulation at realistic voltage levels while preserving non-destructive defect localization.

Defect types

- Shorts)
- Leakage
- Resistive opens
- Electrically active breakdown sites

Additionally, the ELITE VX 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 VX System also offers high-resolution optics with solid immersion lens (SIL) and S-LSM options, delivering exceptional resolution and image quality.

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
- 1.6 µm resolution with 50× LSM configuration
- OBIRCH detectability down to 3 pA (calculated)
- Lock-in OBIRCH amplifier improves SNR >1.5× over standard OBIRCH

CAD connectivity and workflow integration

- Sierra system software (navigation, measurement)
- Supports Synopsys Avalon and NEXS
- Laser marking (532 nm) for coordinate transfer
- Frontside and backside microprobing supported

Broad sample support

- Boards and packaged parts up to 150 mm
- High-voltage modules
- Power electronics assemblies
- Large-format device structures

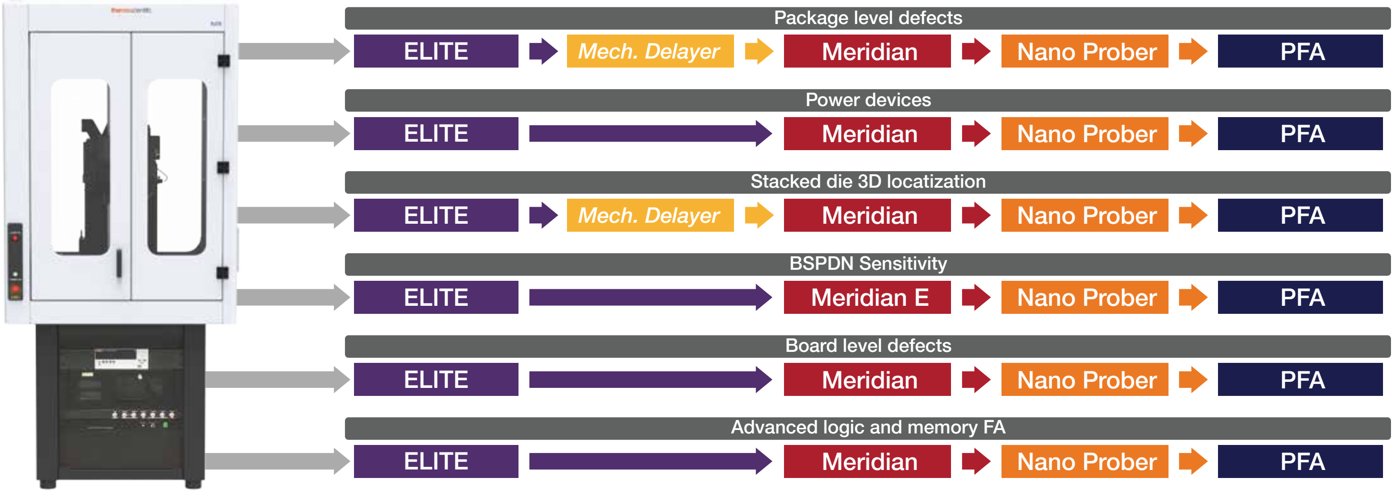
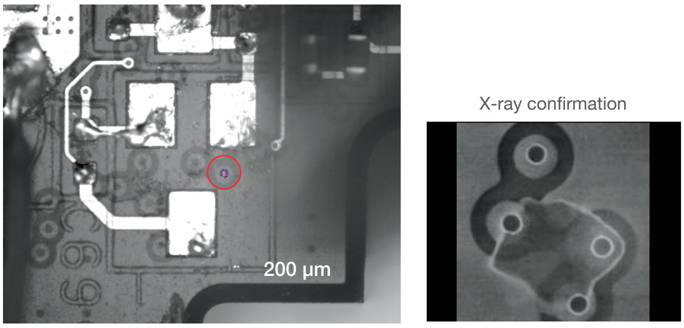
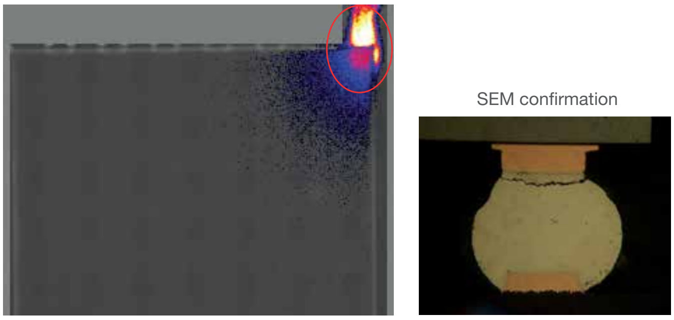


Figure 1. Use NEXS or laser marker to provide defect coordinates to the next system.



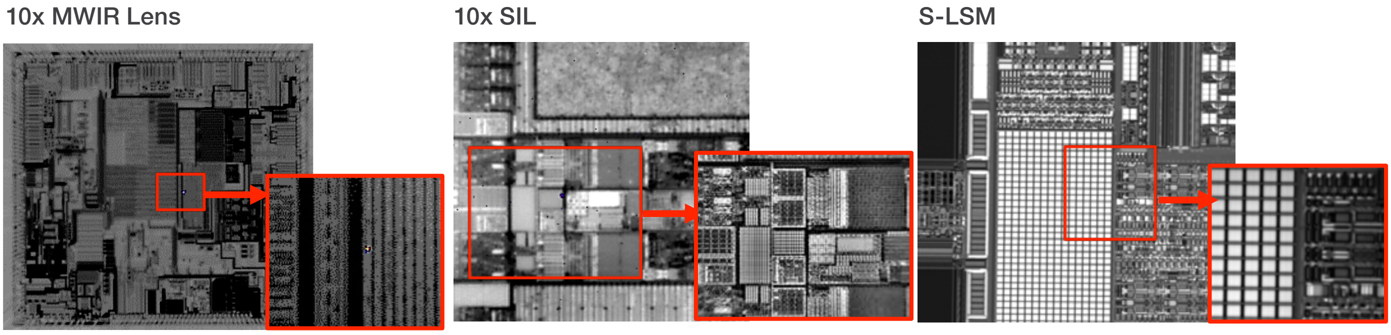
X-ray confirmation

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.



SEM confirmation

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.

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 2410 (1,100 V) kit Keithley 2657A (3,000 V) kit Matsusada (10,000 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

Learn more at **thermofisher.com/elite**

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