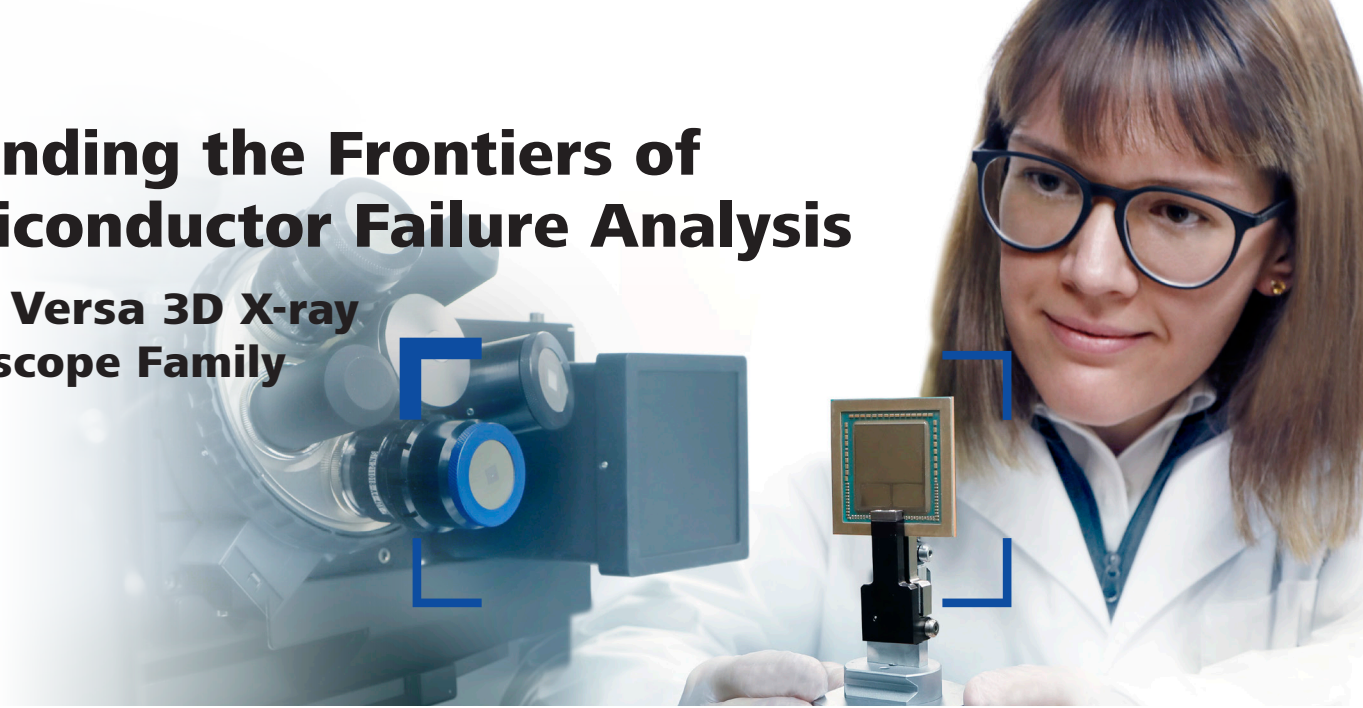


Extending the Frontiers of Semiconductor Failure Analysis

ZEISS Versa 3D X-ray Microscope Family



ZEISS Versa family of 3D X-ray microscopes (XRM) are the next-generation non-destructive imaging solution in failure analysis and process development for semiconductor packages, components, and devices, including:

- Heterogenous integration devices and chiplets
- 2.5D/3D packages with TSVs
- Fan-out wafer level packages with redistribution layers
- High bandwidth memory and V-NAND
- Flip-chip C4 bumps and microbumps
- Smartphones and components

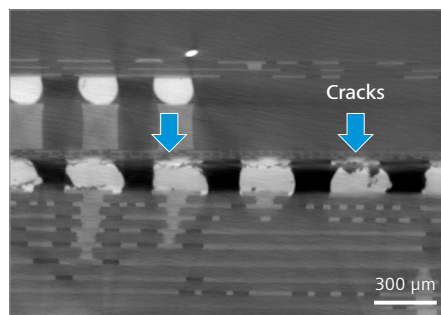
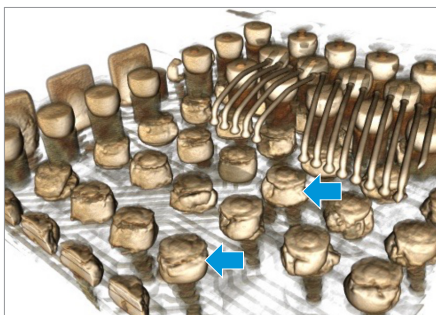
ZEISS VersaXRM® 730 extends the limits of submicron-resolution 3D imaging and analysis, enabling unprecedented 450 nm spatial resolution. Through hardware and software innovations, it accelerates productivity and root cause analysis with faster scans and shorter time-to-results. ZEN navx™ delivers effortless data acquisition workflows and sample intelligence for all level of users.

Highest-resolution 3D X-ray Imaging in All Dimensions

- Achieve industry-leading 450 nm spatial resolution, maintaining 500 nm spatial resolution even at high energies.
- Experience unsurpassed high-resolution performance across all three dimensions for large-sized packages, circuit boards, and electronic devices with ZEISS's unique Resolution at a Distance technology.
- Visualize virtual cross-section images of fault locations and buried features without cutting the samples.

Fast Throughput & Superior Imaging

- Fast acquisition scanning technology (FAST) mode enables quick 3D navigation of samples and precise localization of deeply embedded structures and defects, allowing ~1 minute fast scans with the flat panel detector (FPX).
- Broader length scales of sample sizes and fields of view (FOV) with the optional FPX.
- AI-enabled DeepRecon Pro module is included in the base model to improve scan speed and image quality.
- Award-winning optional DeepScout module allows scanning of large fields of view with recovered resolution and faster throughput.
- High Aspect Ratio Tomography (HART) for faster imaging of semiconductor packages and electronic samples.



Non-destructive visualization and characterization of solder fatigue cracks in a thermal cycled smartphone control board at 2.5 μm voxel resolution.



Seeing beyond

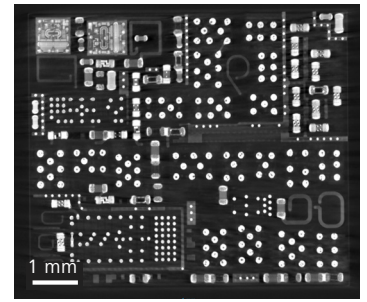
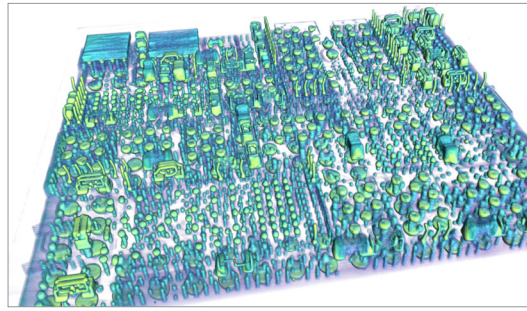
Enhanced Productivity & Usability

- ZEN navx data acquisition system uses Human-Centered Design (HCD) principles. It improves scan setup efficiency and reduces learning curves for all users.
- Infographic mental models and guidance provide instant and easy access to procedural suggestions and feedback, eliminating the need for costly training.
- Integrated new Volume Scout workflow streamlines user interactions during scan setting and delivers instant access to regions of interest through submicron navigation.
- ZEN navx enables high-productivity data acquisition and improves the success rate of root cause analyses.

Benefits

- Highest resolution and contrast for a multitude of package applications: failure analysis, process development, construction analysis and production validation.
- Unprecedented 0.45 µm spatial resolution, 40 nm minimum voxel size.
- Uncomplicated scan operations with the intuitive ZEN navx user interface and streamlined workflows.
- FAST mode allows fast access to deeply buried ROI with an optional flat panel detector.
- Flexible system configurations and upgradable path.

ZEISS VersaXRM 615 and Xradia 515 Versa models offer benefits of RaaD and sample diversity but without all of the features configured in the VersaXRM 730. Refer to the specifications.



Left: 3D view of a high/mid-band power amplifier package in a smartphone acquired at 5.5 µm voxel resolution with FAST mode acquisition for 90 second scan. Right: a virtual cross-section shows the planar view of the package layout.

Specifications

Imaging	ZEISS VersaXRM 730	ZEISS VersaXRM 615	ZEISS Xradia 515 Versa
Spatial Resolution ^[a]	0.45 µm	0.5 µm	0.7 µm
Resolution Performance (ZEISS resolution target at 160 kV/LE6)	0.5 µm		
Resolution at a Distance (RaaD) ^[b] (at 50 mm working distance)	0.7 µm	1.0 µm	1.0 µm
Resolution at a Distance (RaaD) ^[b] (at 100 mm working distance)	0.75 µm		
Minimum Achievable Voxel ^[c]	40 nm	40 nm	70 nm
X-ray Source			
Architecture	Sealed transmission, fast activation		
Voltage Range	Spot size stable, 30-160 kV		
Maximum Power Output	25 W	25 W	10 W
Detector System			
ZEISS X-ray microscopes feature an innovative detector turret with multiple objectives at different magnifications. Each objective features optimized scintillators that deliver the highest absorption contrast details.			
Standard Objectives	0.4x, 4x, 20x	0.4x, 4x, 20x	0.4x, 4x, 20x
Optional Objectives	FPX, 40x-P ^[d]	40x, FPX	40x, FPX
Flat Panel Detector	Optional, FAST or Step Mode		Optional, Step Mode
Stages			
Sample Stage, load capacity	25 kg		
Sample Stage Travel, X, Y, Z	50 mm, 100 mm, 50 mm		
Stage Travel, rotation	360°		
Source Travel, Z direction	190 mm		
Detector Travel, Z direction	290 mm		
Versa Features			
Scout-and-Scan Control System	ZEN navx	ZEN navx	■
SmartShield	SmartShield (Lite)	SmartShield (Lite)	SmartShield
Automated Filter Changer	■		
High Aspect Ratio Tomography (HART)	■		
Autoloader	Optional	Optional	Optional
Wide Field Mode	4x	4x	
GPU CUDA-based Reconstruction	Dual	Dual	Dual
Advanced Reconstruction Toolbox			
DeepRecon Pro (2-year license)	■	■	Optional 1 year or perpetual license
High Performance Workstation	■	■	Optional

[a] Spatial resolution measured with ZEISS XRM 2D resolution target, normal field mode, optional 40x or 40x-Prime objective.

[b] RaaD working distance defined as clearance around axis or rotation.

[c] Voxel is a geometric term that contributes to but does not determine resolution, and is provided here only for comparison. ZEISS specifies resolution via spatial resolution, the true overall measurement of instrument resolution.

[d] 40x-Prime objective



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