High performance X-ray inspection solution

with non-destructive planarCT board inspection

Microme|x neo 160
Microme|x neo 180
Nanome|x neo 180

Phoenix Microme|x Neo and Nanome|x Neo

High resolution 160/180 kV micro- / nanofocus X-ray inspection systems with 3D CT option

The Phoenix Micromelx neo and Nanomelx neo series combines high-resolution 2D X-ray technology and 3D CT in one system. Innovative and unique features and an extreme high positioning accuracy make both systems the effective and reliable solution for a wide spectrum of 2D and 3D offline inspection tasks: R&D, failure analysis, process and quality control.

The Phoenix|x-ray X|act technology offers easy to program CAD based µAXI ensuring automated inspection in the micrometer range. Another unique benefit is Waygate Technologies' rich options of DXR-HD flat panel detector fleet. There's definitely a perfect match of image chain serving your particular application.

Unique features

- Superior pixel resolution (85/100 µm) new detectors more competent to semiconductors and tiny electronics components inspection
- Ease of use: inspection report to be automatically generated after inspection
- X|act package for CAD based µAXI programming and automatic inspection
- Diamond|window for up to 2 times faster data acquisition at the same high image quality level
- Optionally 3D computed tomography scans within 10 seconds
- Dose|manager combined with Shadow|target to prevent sensitive devices from radiation damage by reducing unnecessary dose
- Optical and X-ray navigation map for fast positioning and easy programming
- Proprietary OVHM technology enables synchronised motion and ergonomic set up for easy view configuration
- Flash!Electronics™, Waygate Technolgies' best ever image processing technology specially optimized for Electronics inspection
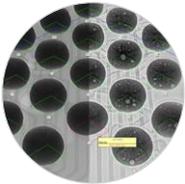

Open BGA ball with live CAD data overlay and FLASH!™ image optimization

3D Computed Tomography of an USB flash drive
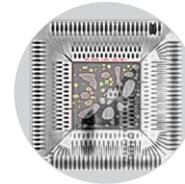
Advanced PlanarCT evaluation (left) without overlaying features in the X-ray image
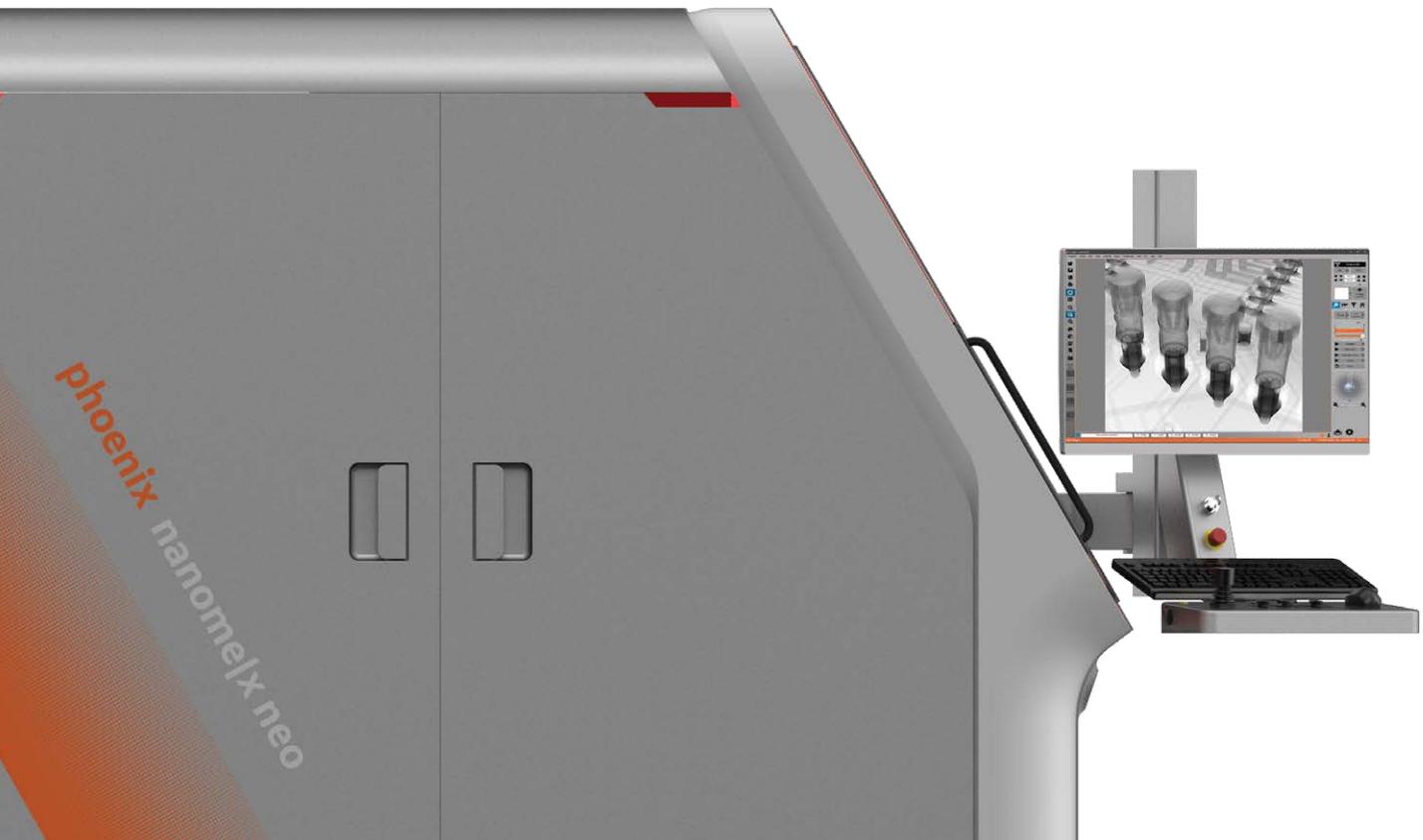
Waygate Technologies brilliant DXR-HD detector fleet
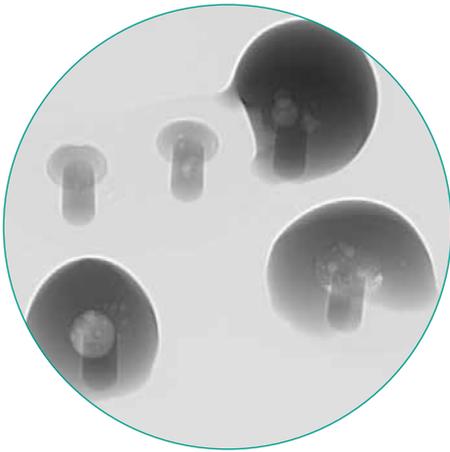
FLASH!™ processed voids in an open µBGA ball: 1,970x geometric zoom for extreme high magnification

Newest large-size DXR S100 Pro detector in combination with superior pixel resolution defines industry-leading imaging technology:

- Provides superior 100 µm pixel resolution and frame rates up to 30 frames per second which combines outstanding detectability with high efficiency
- 300 mm x 250 mm large active area significantly expands the vision and redefines inspection efficiency
- Suitable for a wide range of X-ray energies and customer applications

Exclusive high dynamic DXR250RT detector with enhanced scintillator technology introduces a new industry standard for efficient live inspection:

- Full frame rate of 30 frames per second at 1000x1000 pixels offers low noise coupled with brilliant image quality ensuring fast and detailed live inspection
- Active temperature stabilization for precise and reliable inspection results
- Extremely fast data acquisition in 3D CT mode

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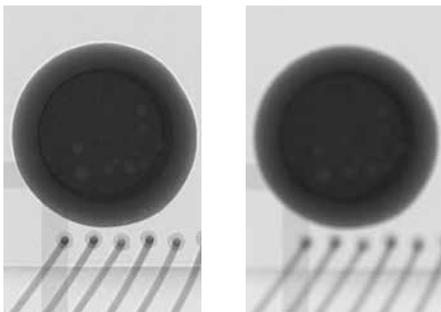
(same X-ray tube parameter: 130 kV, 11.4 W)

High output with high-resolution: Diamond|window

Compared to conventional beryllium targets, the Diamond|window allows higher power at a smaller focal spot. This ensures high-resolution even at a high output.

- Up to 2 times faster CT data acquisition at the same high image quality level
- High output with high-resolution
- Non-toxic target
- Improved focal spot position stability within long term measurements
- Increased target lifetime due to less degradation with higher power density

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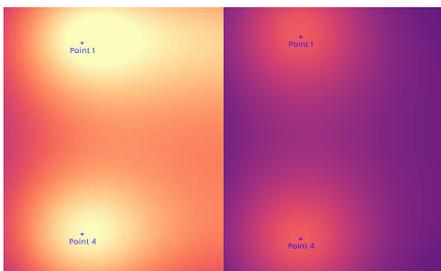
Shadow|target off   Shadow|target on

Exposure parameters: 100 kV, 100 uA, 400 ms x 16 integration

Rainbow coloring is visualizing the projected X-ray dose in real time. Shadow target saves 20% dose during this 4-views inspection

Smart dose management

Waygate Technologies´ proprietary Shadow|target inside the X-ray tube enables a reduction of unnecessary radiation dose compared to conventional x-ray tubes during a typical inspection. Combined in a low-dose bundle together with the brand new Dose|manager tool, it enables real-time dose monitoring and controlling. This solution protects radiation sensitive inspected components from aging to worst case damage.

- The Shadow|target is linked with the Dose|manager tool
- Shadow|target prevents frequent generator start & stop to reduce unwanted radiation
- Fast and stable X-ray recovering. No delay of energy running up
- Dose measurement: real time visualization of projected dose through "dose map" overlaid with navigation map
- Cumulated dose counting per inspection
- Multi-position dose measurement well integrated into inspection program

High-resolution 3D computed tomography

For advanced inspection and 3D analysis of smaller samples, Phoenix|x-ray's proprietary 3D CT technology is optionally available.

- 180 kV high power X-ray technology, fast image acquisition with DXR detector and Diamond|window combined with Phoenix|x-ray's fast reconstruction software deliver high quality inspection results

- Maximum voxel resolution down to 2 microns; the nanoCT® capability of the Nanome|x allows even a higher image sharpness

nanoCT® of TSVs in an electronic package. The voids in the copper filling are clearly visible.

Virtual board slicing with PlanarCT
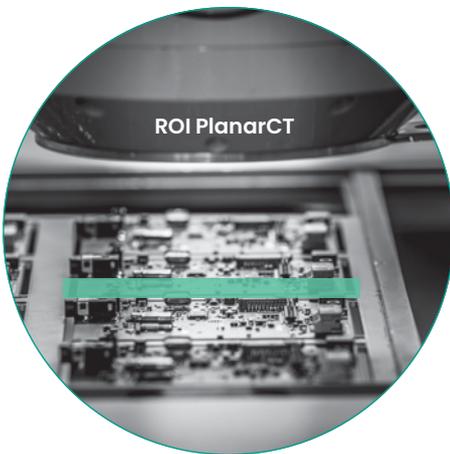
- Easy 2D slice or 3D volume evaluation of large complex boards

- No board cutting, no overlaying structures as in X-ray images
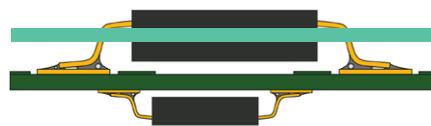
PlanarCT inspection plane

PlanarCT slice or multislice views allow exact inspection results of a single plane or a whole package
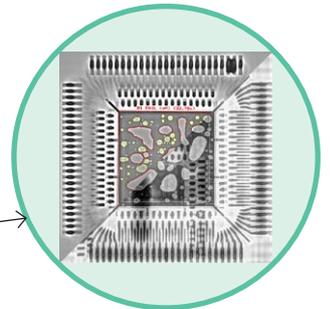
Advanced PlanarCT evaluation without overlaying features in the X-ray image
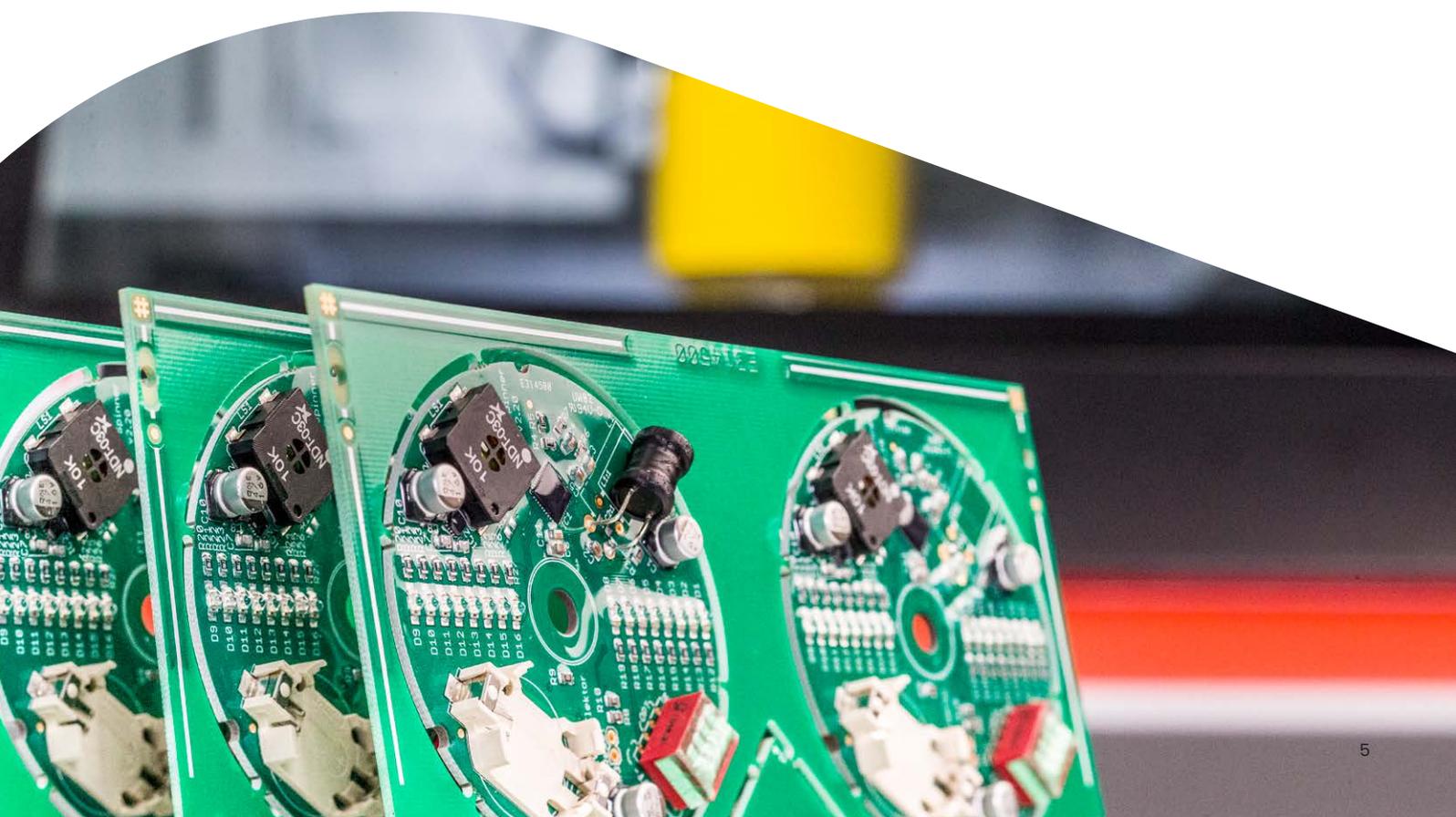
X|act – CAD based inspection:

high resolution μAXI for extremely high defect coverage

As a solution for μAXI with extremely high defect coverage, Phoenix|x-ray provides its high precision systems Microme|x neo and Nanome|x neo including the unique X|act software package for fast and easy offline CAD programming.

Its intuitive new GUI with improved outstanding precision and repeatability, small views with resolutions of only a

few micrometers, 360º rotation and oblique viewing up to 70º ensures meeting highest quality standards – even for inspection of components with a pitch of just 100 microns.

Besides automated inspection, X|act ensures an easy pad identification by its live CAD data overlay function even in manual inspection while FLASH!™ image optimization ensures high defect coverage.

Efficient CAD programming

X|act provides not only a minimal setup time compared with conventional view based AXI – once programmed, the inspection program is portable to all X|act compatible systems.
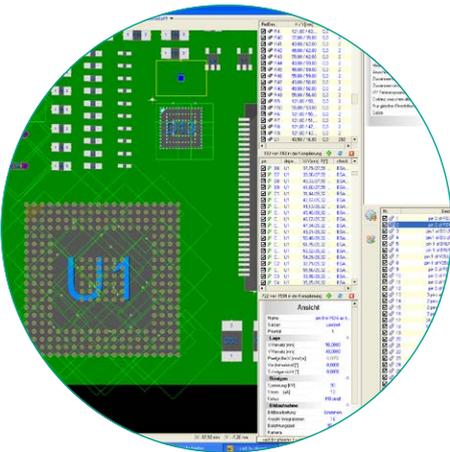
- Easy pad-based offline programming
- Specific inspection strategies for different pad types
- Fully automated inspection program generation
- Extremely high positioning accuracy even at oblique viewing and rotation
- Easy pad identification in manual X-ray inspection
- High reproducibility on large PCBs

Fast and easy programming: just assign the inspection strategies and let X|act generate the automated inspection program

Navigation map – Clear overview and fast positioning


Easy sample map orientation
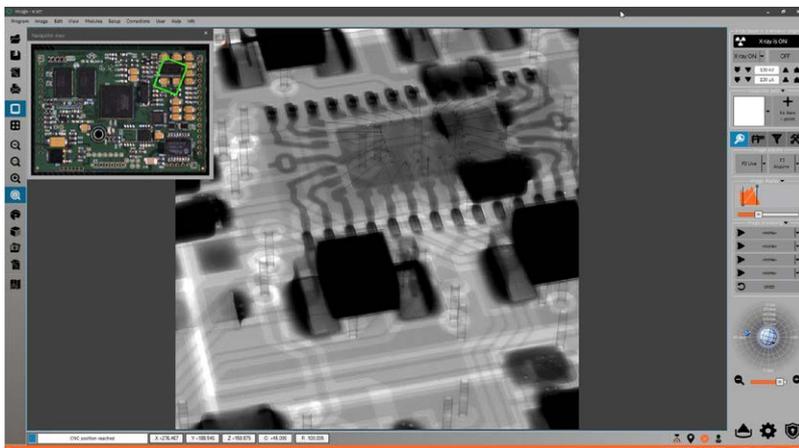
- Optical camera image or X-ray overview image for whole sample as navigation map
- Fast manipulation by clicking on the map
- Inspection program can be set up based on the optical navigation map
- Sample map and view positions saved in test report

Your advantages
Phoenix Microme|x and Nanome|x neo

- Brilliant live inspection images due to high dynamic Waygate Technologies DXR-HD digital detector fleet

- Unique high power 180 kV / 20 W micro- or nanofocus tube for even high absorbing electronic samples

- Minimized setup time due to highly efficient automated CAD programming

- Live overlay of CAD and inspection results even in rotated oblique inspection views

- Extremely high defect coverage and repeatability

- Best detail detectability 0.5 µm or even 0.2 µm with nanofocus

- Optional Flash!Electronics™ image processing optimizes digital images quickly and constantly

- Optional advanced failure analysis with high resolution 3D micro- or nanoCT® or large board PlanarCT

- Optional 3D CT scans up to 10 seconds

- Comprehensive and industry leading dose control technology to protect radiation sensitive devices

- Optical or X-ray image based navigation map to make multi-position inspection easier and faster

- OPC-UA interface to export process and machine data for statistical analysis, improved efficiency and minimized downtime
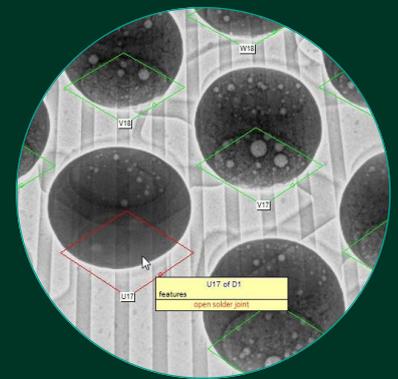
X|act provides **live CAD overlay** and inspection results in the X-ray live image – at **any time**, at **any viewing angle**.

Waygate Technologies exclusive **FLASH!**™ technology option enables **faster**, **more reliable** failure detection.

Technical specifications and configurations

	Nanome|x Neo 180	Microme|x Neo 180	Microme|x Neo 160
X-ray detector	Option 1: High dynamic detector DXR250RT with active cooling, 200µm pixel resolution, 20cm x 20cm active area — Option 2: Larger size detector DXR S100 Pro with superior detectability 100µm pixel resolution, 30cm x 25cm active area		High performance detector DXR S85, 85µm pixel resolution, 13cm x 13cm active area
Magnification	DXR250RT: max. 1,970x; DXR S100 Pro: max. 2,185x		max. 1,970x
Total magnification 27" 2K monitor	DXR250RT: max. 36,800x; DXR S100 Pro: max. 40,700x		DXR S85: max. 84,800x; CMOS: max. 96,000x
Detail detectability	up to 0.2 µm	up to 0.5 µm	
X-ray tube type	Low maintenance open nanofocus tube with unlimited lifetime, transmission type, 170° cone angle, collimated	Low maintenance open microfocus tube with unlimited lifetime, transmission type, 170° cone angle, collimated	
Max. tube voltage/power on target	180 kV / 20 W	180 kV / 20 W	160 kV / 20 W
	Diamond|window for up to 3 times faster data acquisition at the same high image quality level		
Filament	Tungsten hairpin, pre-adjusted in plug-in cartridges for fast and easy exchange		
Manipulator	high-precision vibration-free synchronized 5-axes manipulation		
Max. inspection area	460 mm x 360 mm (18" x 14"), 610 mm x 510 mm (24" x 20") without rotation table		
Max. sample size / weight	680 mm x 635 mm (27" x 25") / 10 kg (22 lbs.)		
ovhm – oblique view rotation	continuously adjustable view angle up to 70°, rotation 0° – 360°		
Control	Joystick or mouse control (manual mode) and CNC (automatic mode)		
Manipulation aids	Sample navigation map based on camera or X-ray overview image, click'n-move-to function, click'n-zoom-to function, automatic isocentric manipulator movement		
Positioning aid	laser crosshair	laser crosshair optional	
Anti-Collision System	may be deactivated for maximum magnification (tube touching the sample)		
System dimensions (D x H x W)	2,160 mm x 1,958 mm x 1,590 mm (85" x 77" x 62.6"), (without control console) — 2,772 mm x 1,958 mm x 1,770 mm (109" x 77" x 69.7"), (with control console)		
Min. transportation width:	1,770 mm (69.7") (with control console)		
Max. weight	appr. 3,250 kg / 7165 lbs		
Radiation safety	The radiation safety cabinet is a full protective installation without type approval according to the German StrSchG/StrSchV and the US Performance Standard 21 CFR, Subchapter J. For operation, other official licenses may be necessary. Exposure rate < 1 µSv/h emission limit, measured at 10 cm distance from accessible surfaces.		
Dose Reduction	Dose|manager – combined with Shadow|target inside the X-ray tube, the low-dose bundle enables real-time dose management protecting sensitive samples from radiation damage. Dose|manager is also available without Shadow|target		
Image processing software	Phoenix X|act: comprehensive CAD based X-ray inspection software comprising image enhancement functions, measuring functions and fast and easy automated CAD based programming for automatic inspection — BGA|module (standard): Intuitive automatic view based BGA solder-joint evaluation incl. automatic wetting analysis — VC|module (standard): Intuitive automatic view based voiding calculation software package incl. capability of multiple die attach voiding evaluation — C4|module: view based evaluation of round solder joints with background structure, such as C4 bumps — ML|module: view based registration of multilayer printed circuit boards		
Software Configuration (Option)	X|act BGA check strategy: automated CAD based analysis of BGA solder joints — X|act PTH check strategy: automated CAD based analysis of PTH solder joints — XE2 package – Automated solder joint evaluation package: ▪ QFP|module: automated QFP solder joint evaluation ▪ QFN|module: automated inspection of QFN / MLF solder joints ▪ PTH|module: automated pin-through-hole solder joint evaluation — X|act review: visual interface for rework and failure indication — FLASH!™: Waygate's exclusive image optimization technology		
Hardware Configuration (Option)	Tilt / rotate unit: tilt ± 45° and rotation n x 360° for samples up to 2 kg — Manual bar code reader: for product identification		
PlanarCT (Option)	PlanarCT module: Non destructive 2D slice and 3D volume board evaluation incl. 3D|viewer software		
Computed Tomography (Option)	Volume acquisition / reconstruction software: Phoenix datos|x — Upgrade package for combined 2D / 3D (computed tomography) operation CT-unit: precision rotation axis — Max. geom. magnification: 100 x (CT) — Max. voxel resolution: down to 2 µm, resolution depending on the sample size. The nanoCT® function of the Nanome|x allows a higher image sharpness.		

For more detailed information or to request a demo, please visit our website or contact us.

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