![Nikon]

XT V Series

XT V 130

XT V 160

X-ray and CT technology
for electronics inspection

NIKON METROLOGY I VISION BEYOND PRECISION

X-ray electronics inspection made easy

Today there is a growing demand for flexible, high-resolution and cost-effective inspection systems to cope with the demands of ever-smaller electrical components and comply with tighter quality standards. With the XT V series, you can get the inside view of printed circuit boards, in a smooth non-destructive process.

The XT V 130 and XT V 160 X-ray inspection systems are flexible high-precision solutions that facilitate defect analysis of loaded PCB boards. Designed for 100% BGA and μBGA inspection, multi-layer board inspection and PCB solder joint inspection, these compact, easy-to-use and cost-effective inspection systems are indispensable in any electronics production area.

XT V series in a nutshell

- Highly flexible system
    - Interactive visualization,
    - Fully automatic inspection and reporting
- High magnification at unrivalled angles
- High, 16-bit resolution imaging reveals all defects
- Fast operation with intuitive joystick navigation
- Low cost of ownership and maintenance with open-tube technology
- Inherently safe system, does not require special precautions or badges
- CT ready

Insight into the inside

Tracing hidden defects and internal imperfections

With the advent of many newer type components, optical inspection is no longer an option because the majority of connections remain hidden for the eye. This underlines the importance of premium real-time X-ray imaging for quality assurance and troubleshooting purposes. Today, any OEM and subsystem supplier active in electronics, consumer, automotive, aerospace and medical markets can take advantage of X-ray inspection technology to get the job done!
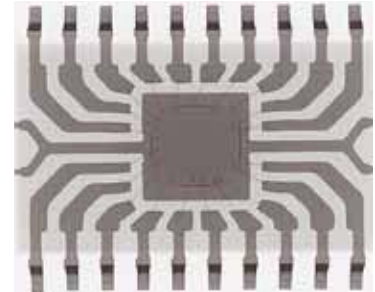
Automation increases throughput rates

Automated inspection functions and automatic board identification ensure high inspection throughput rates. Inspection reports compliant with MRP systems facilitate tight integration into customer-specific manufacturing processes.

An enabling X-ray imaging concept

A micro-focus source emits X-rays that penetrate the internal structure of the specimen. An image intensifier and digital camera combination, or an optional flat panel, capture the patterns of X-rays that pass through the specimen, showing different shades of gray depending on material and geometry. Thicker or denser material – such as iron, copper and lead – represent darker areas than areas highlighting thin or light materials – such as plastic, paper or air. Achieve optimized imaging conditions by moving the sample closer to the source or the detector to establish the desired magnification and field of view.
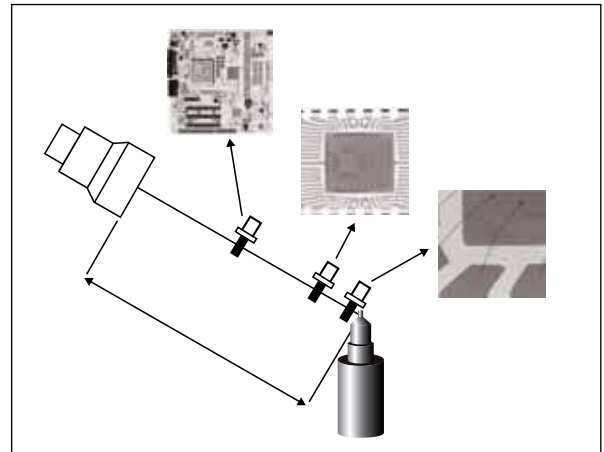
Moving the sample closer to the X-ray source increase the magnification of the resulting image

Computer Tomography (CT)

CT offers that extra dimension to X-ray technology. Based on a large number of X-ray images captured around a single axis of rotation, CT reconstructs an accurate 3D volume dataset that represents the internal structure of your sample. Viewed as slices in any orientation or as a 3D scene, the inner part is visualized and enables you to explore all the details of the object.
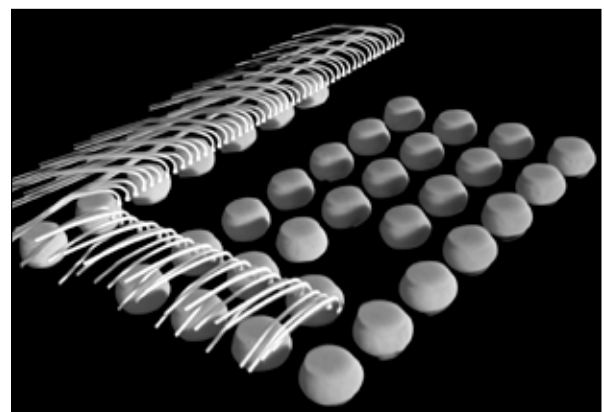
The component is rotated around its axis to take X-ray images from all around, resulting in a 3D volume dataset

# Electronics X-ray systems delivering premium quality and economics

The XT V 160 can be selected with a choice of premium components throughout the system to optimize the performance for your needs. With today's miniaturized and increasing complex arrays, it is necessary to have the correct system whose performance is matched to the sample size to give the required resolution on the boards. In the XT V 160 not only can these images be produced manually, but it is also possible to fully automate the inspection process for any board that can be inspected.

XT V 160 - A high-quality PCB inspection system

The XT V 160 is specifically designed for use in production lines and failure analysis laboratories. With a precision joystick, system users control the 5-axis sample manipulator. Real-time X-ray allows them to intuitively navigate complex printed circuit boards and electronic components and quickly trace defects. In automated inspection mode, samples can be inspected at highest throughput.

- Proprietary NanoTech 160kV source with submicron spot size
- Flat panel option
- Large tray to load multiple boards
- Samples up to 510mm in length
- True 75° manipulator tilting angle for easy inspection of internal features
- Region of interest consistently locked into the center of the field of view
- Small system footprint
- Ready for CT applications (option)
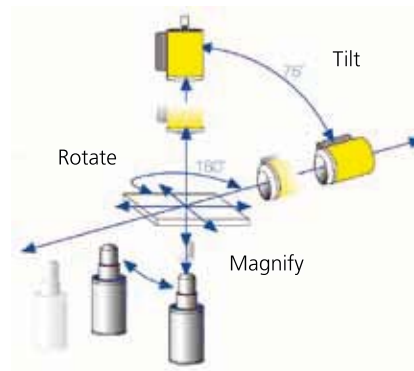
Under any combination of rotate, tilt and magnification, true concentric imaging ensures that the region of interest remains completely locked into the center of the field of view.
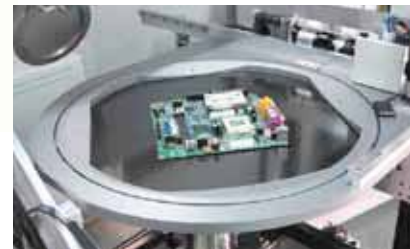
Flexibility to build a system that meets your specific requirements

High-quality images

- Leading proprietary micro-focus source technology
- Accurate control of the power and direction of the emitted X-ray beams
- Qualitative real time X-ray imager (25 frames per second)

Intuitive to use

- Large horizontal collision-free sample tray
- Intuitive joystick navigation drives real-time X-ray image generation
- Dual display for combined measurement and real-time analysis
- Short learning curve – operational within 1 day
- Local language support
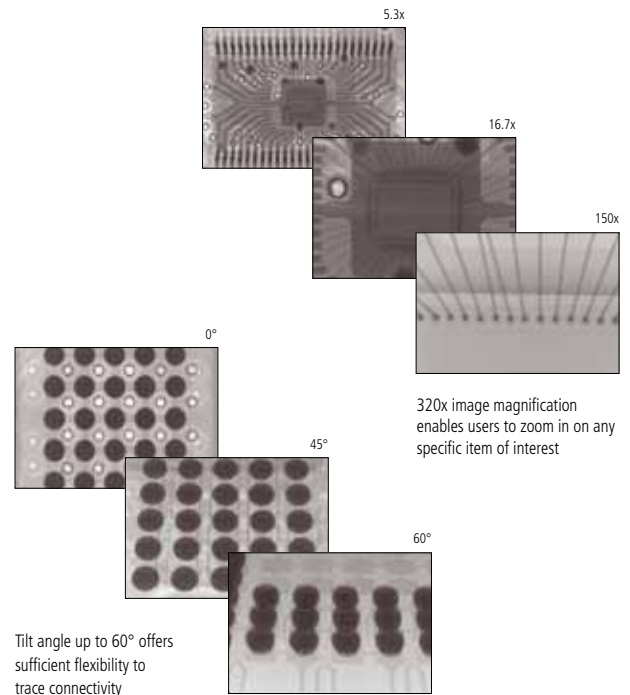
Focus on productivity

- Large door with automatic interlocked X-ray off function
- Fast automated component inspection through customizable macros
- Bar code reader for automatic recognition of specimen serial number (optional)

Safety as a design criterion

- Designed for collision-free manipulation
- Continuous fail-to-safe monitoring
- Full protective enclosure requires no special badges or protective clothing
- Lead-lined cabinet fully complies to DIN 54113 radiation safety standards and CE regulation

## XT V 130 - An affordable and compact QA X-ray system

The XT V 130 is an affordable, compact and low-weight X-ray system executing automated QA on serial-produced electronic samples. Intuitive control software and automated inspection functions are ideal for operators manually or automatically inspecting multilayer boards, PCB solder joints, ball grid arrays (BGA) and μBGAs. As a result, samples are inspected and assigned pass/fail status based on user-definable criteria.

5.3x

16.7x

150x

320x image magnification enables users to zoom in on any specific item of interest

0°

45°

60°

Tilt angle up to 60° offers sufficient flexibility to trace connectivity

- Proprietary 30-130kV micro-focus with 3μm spot size
- Measurement volume of 40x35cm
- True 60° manipulator tilting angle for easy inspection of internal features
- A hinged door providing easy access to the inspection area
- Compact and low weight for easy installation
- Serviceable components installed in an easily accessible drawer
- Ready for CT applications (option)

Low cost of ownership

- Compact design fits double-door entries
- Easily maneuverable through 3-wheel transportation
- No special floor treatment required
- Open X-ray tube design allows for easy maintenance of internal tube components and replacement of low-cost filaments
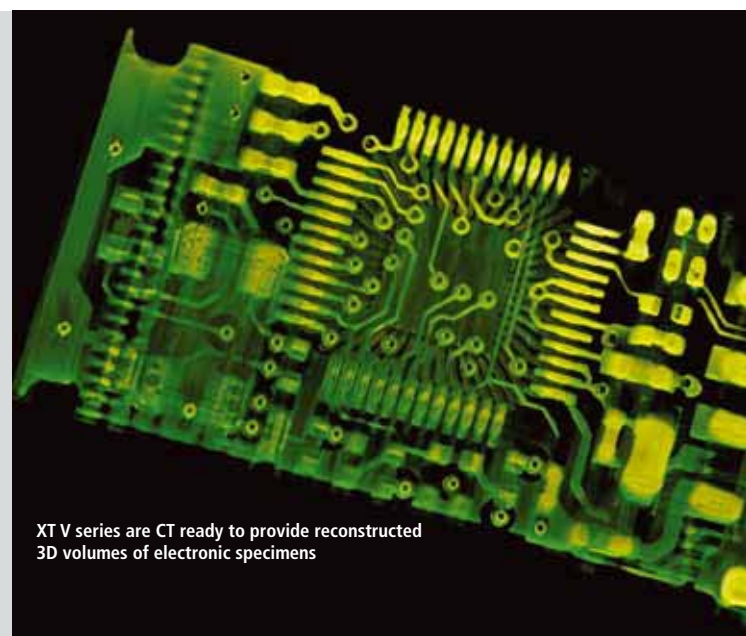
XT V series are CT ready to provide reconstructed 3D volumes of electronic specimens

Inspect-X application software

Interactive and user-friendly software is essential in evaluating the complex internal structure of samples and performing accurate inspection. Inspect-X provides all the means to guide you in retrieving the required information, using the most advanced visualization and analysis capabilities. Developed to streamline the process of inspection and measurement, it runs first-article inspection in minutes, instead of hours or days


Real time X-ray inspection

- Intuitive joystick control for interactive part positioning
- Lock in on BGA or region of interest (ROI)
- Ultra-fast acquisition of X-ray scans
- Integrated display and analysis tools
- Measure on screen and annotate data

Image analysis / enhancement

- User-configurable multi-point tone adjustment
- Image processing filters (sharpen, smooth, edge detect, emboss, background subtract, etc.)
- Image histogram
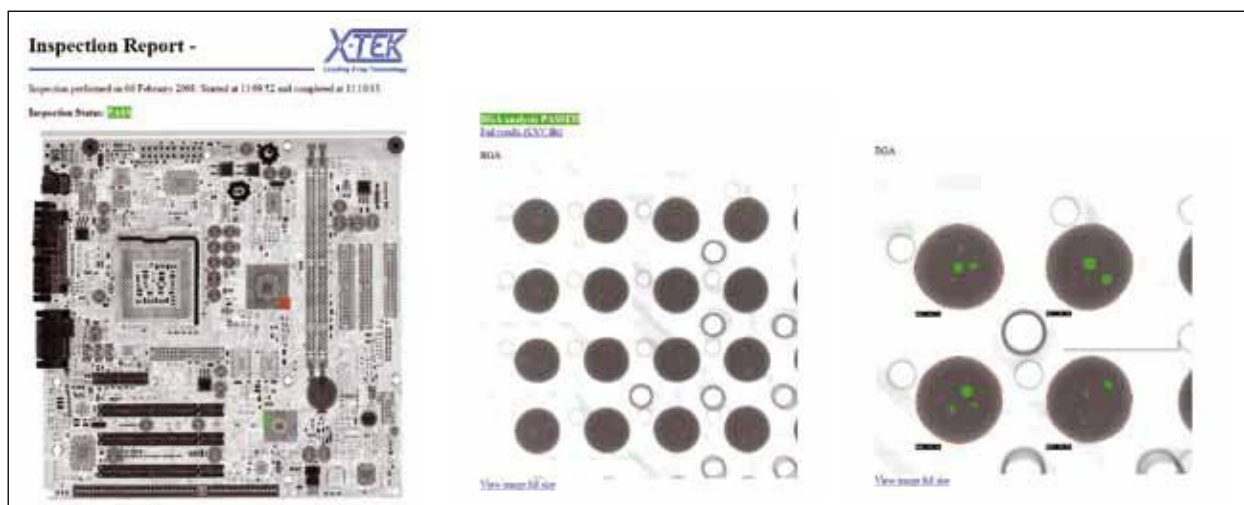- Electronics inspection tools (e.g. BGA void recognition) as standard
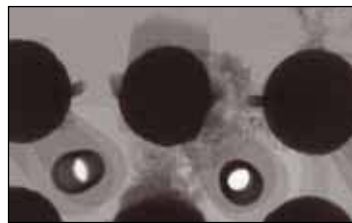
Minuscule solder dendrites and voids

Integrated CT acquisition

- Easy-to-use data collection
- 3D volume reconstruction function
- CT data ready for industry standard post-processing applications

Damaged wirebond in IC

Voiding at board level

High software productivity and versatility

Maximum productivity

- Component-specific automated pass/fail analysis
- Redo analysis on off-line visualization station
- Parameter locking organizes operator and supervisor rights
- Macro-based automation requires no programming skills
- Automatic HTML report generation
- Ready to automate complex tasks with Visual Basic for Applications (VBA)

Wide range of applications

- Flexibility combined in a single system: X-ray for quick visual inspection, CT for in-depth analysis
- Fast data capture and high-quality images
- High-resolution digital imaging and processing
- Safe system requiring no special precautions or batches

Electronic and electrical components
Inspection/Detection of broken wedge bonds, lifted ball bonds, wire sweep, die attach, dry joints, bridging/shorts, voiding, etc.

**Populated and unpopulated PCBs**
- View surface mount defects i.e. misaligned devices, solder joint porosity, bridging
- Detailed inspection of vias, through-hole plating and multi-layer alignment
- Wafer-level chip scale packages (WLCSP)
- BGA and CSP inspection.
- Non-lead solder inspection.

Micro-electro-mechanical systems (MEMS, MOEMS)
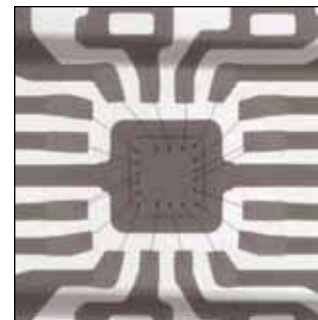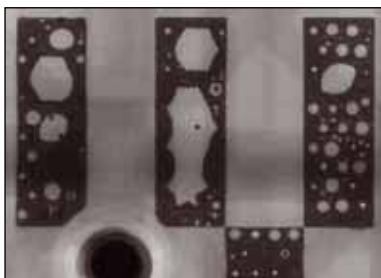
Cables, harnesses, plastics and many more
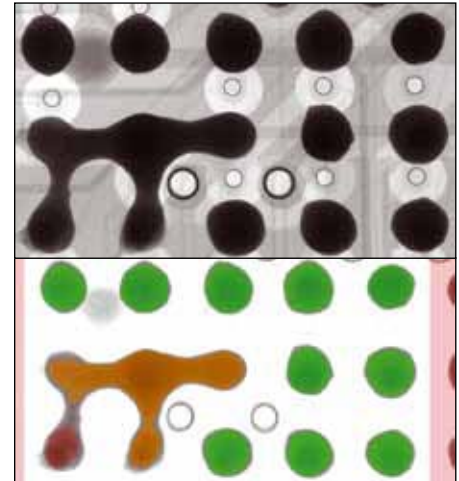
Bridging/Shorts due to surplus solder
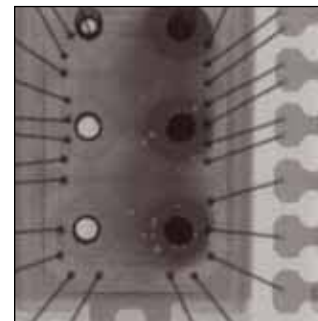
Via issues and voiding

Wire bond verification

Voiding at board level

System specifications

	XT V 160	XT V 130
Max kV	160 kV	130 kV
Max. electron beam power	20W	10W
X-ray spot size	1μm	3μm
Defect recognition capability	500nm	2μm
Geometric magnification	2x - 2400x	2x-1560x
System magnification	36.000x system magnification	30.000x system magnification
Imaging system (Standard)	16 bit 1Mpixel dual field imaging	16 bit 1Mpixel dual field imaging
Imaging system (Option)	Varian 1313 or 2520 Digital flat panel	None
Manipulator	5 axes	4-axis (X, Y, Z, T)
Rotate axis	Included	Optional
Tilt	0 - 75 degrees	0- 60 degrees
Measuring volume	In single map 406x406mm (16x16") Absolute max 711x762mm (28x30")	355x405mm (14x16″)
Max. sample weight	5kg (11lbs)	2.5kg (5.5lbs)
Dimensions (BxWxH)	930x2231x1975mm (37x88x78")	1060x1800x2070mm (42x71x82") (incl control PCs)
Weight	1935kg (4265lbs)	1150kg (2425lbs)
Radiation safety	<1μSv/hr at 5cm from cabinet surface	<1μSv/hr at 5cm from cabinet surface
Control	Inspect-X control and analysis software	Inspect-X control and analysis software
Automation ready	yes	yes
CT ready	yes, field upgrade required	yes, field upgrade required
Applications	Automated inspection of BGA, μBGA, flip-chip and (loaded) PCB boards	Real-time radiography of individual components and loaded PCB boards

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