Non-Destructive TSV Inspection System – SP8000S

Non-Destructive: Effective Alternative to SEM Imaging
Industry First: Quantitative Inspection in TSV Process

- Exclusive optical scanning technology with patented non-destructive defect inspection enables real-time analysis without making physical cross sections.
- AI-assisted precision inspection of TSV side walls ensures accurate defect detection, supporting both blind and through vias.
- TSV quality assessment across the entire functional die on the wafer enables precise quantified evaluation for the die qualification and classification.

Features

■ **TSV Inner Wall Defect Inspection:**
Defects such as striations, scallops, and cracks can compromise the insulation layer and lead to leakage currents.

■ **Defect Data Collection and AI Database Development:**
Systematic collection and organization of large defect datasets, combined with AI technology to build an intellectual database, enables accurate analysis through quantitative defect inspection standards, optimizing process parameters to enhance product yield and manufacturing efficiency.

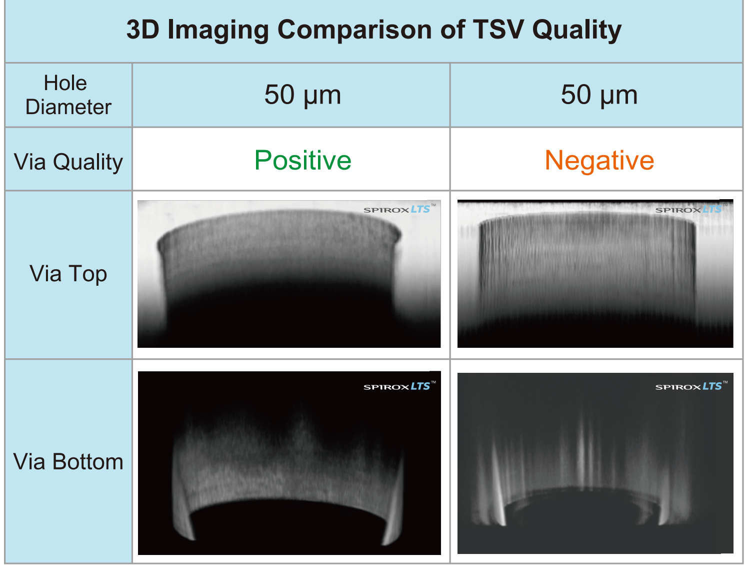
- Multi-Mode Automatic Inspection with Flexibility
  - ROI (Region of Interest) inspection modes
  - Script scanning workflow
  - Coordinate-based inspection mode
  - Random inspection mode
- AI-Assisted Detection for TSV Defect Identification
- Intuitive User Interface
- Automated Loading and Unloading

Advantages

■ **Non-Destructive Inspection:**
Non-linear optical inspection and patented SpiroxLTS technology enables precise, quantitative defect evaluation without sample destruction.

■ **Quick Sample Inspection:**
SP8000S offers a faster and more efficient inspection process compared to traditional cross-sectional scanning electron microscopy (SEM).

■ **Precise Defect Positioning:**
Precise localization of TSV defects across wafer dies, identifying critical regions and providing essential data for process optimization.

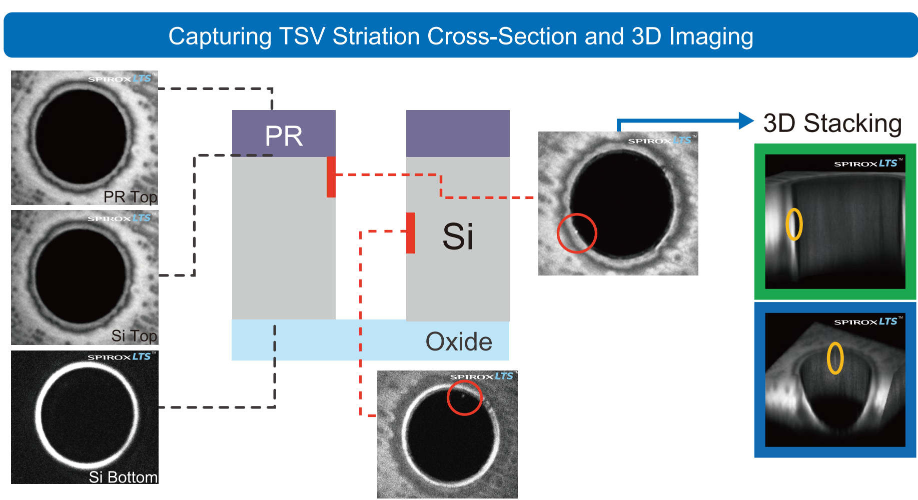


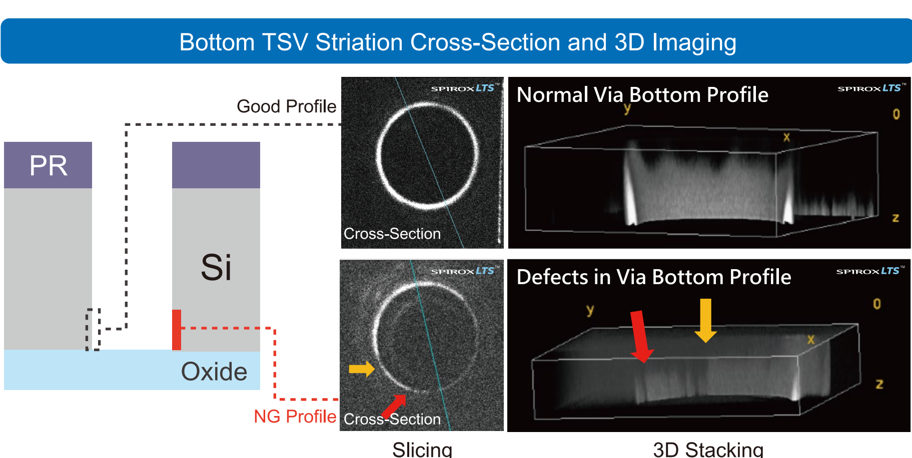
3D Imaging Comparison of TSV Quality

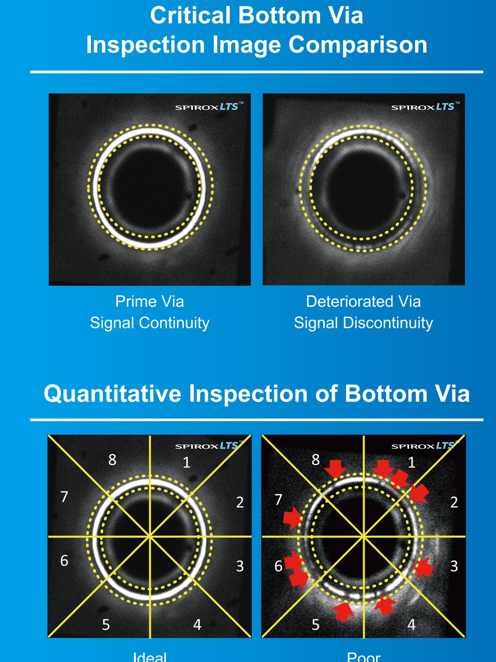
Hole Diameter	50 μm	50 μm
Via Quality	Positive	Negative
Via Top		
Via Bottom		

Benefits

- **Improving Efficiency and Yield:** Online automated inspection with big data collection reduces SEM sampling, accelerates process optimization, and significantly improves product quality and yield.
- **Reducing Production Costs:** Reducing defect rates and rework times, thus lowering material waste and production costs.
- **Enhancing Process Optimization:** Using AI analysis to continuously optimize processes, improving stability and performance.
- **Increasing Market Competitiveness:** Enhancing product reliability and consistency, attracting more customers and collaboration opportunities.
- **Data-Driven Decision Making:** Providing precise data analysis to optimize process parameters, enabling quick response to market changes and customer demands.







The integrity of the bottom via is highly affected by TSV defects, exhibiting a strong correlation. Measurements with the SP8000S indicate that when the measured result of via bottom fractures, the probability of striation throughout the via increases. The severity of striation is closely correlated with the inspected extent of the bottom structure.

Specifications

Model Number	SP8000S
Model Name	SP8000S Non-Destructive TSV Inspection System
Key Optical Technology	Nonlinear Optical Inspection (Applicable wavelength range: 1200~1800 nm)
Applicable Sample Size	8" & 12" Wafers
Measurement Items	Inspection of various TSV wall defects: striations, scallops, cracks, and evaluation of hole wall quality.
Measurement Accuracy	X/Y Axis Accuracy: < 1.5 μm, Z Axis Accuracy: < 2 μm (@ 20x objective lens, numerical aperture 0.8)
FOV / Measurement Time	FOV 400 μm x 400 μm*; 3.5 seconds per frame**
Inspection Modes	Micro-area imaging, automatic region-based measurement, coordinate value automatic measurement, random automatic measurement, and customizable scanning process.
Dimensions and Weight (Tentative)	L 2.4 m x W 1.8 m x H 1.8 m (Weight: 2600 kg) Automated loading and unloading
Electrical Specification	220V 60Hz AC 2000W

* At 20x objective magnification ** Scanning resolution: 512 x 512 pixels

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