UHR-2001™

Scanning Acoustic Microscopy (SAM), a non-destructive inspection method, locates internal discontinuities in semiconductor packages, and verifies package reliability.

Flip chip packaging challenges current inspection methods. Smaller, harder-to-find anomalies such as opens, cracking and non-bonding require detection and verification. Also, process problems like underfill and overfill as well as solder ball bond quality and location have become critical. Conventional inspection methods, including x-ray and micro-sectioning, are not always adequate to locate these defects, and more manufacturers are turning to SAM to verify the reliability of their packages.

The UHR-2001 Meets the Challenge

Sonix' UHR-2001, designed to accommodate single components and JEDEC trays, responds to the challenge of high-resolution imaging applications and generates sharp, clear images. For exceptional spatial resolution, the UHR-2001 uses a 0.5 micron encoder on the scan axis and an improved ball screw for greater positioning accuracy.

The UHR-2001's state-of-the-art linear servo motor provides smooth and repeatable motion at high speeds. The transducer is directly coupled to the servo forcer and eliminates vibration often present in belt drives. The unique focusing system eliminates bulky mechanisms from the scan axis shuttle. These advancements have considerably reduced the mass that the servo is required to transport, significantly reducing vibration and providing a finely controlled focusing mechanism.

The UHR-2001 is SEMI S2 and CE Certified and offers the user new features that improve the flexibility and ease of use of the system. These features include:

- **DPR-500** - The DPR-500 offers improved bandwith and is completely software controlled. Total control under software includes applied voltage, gain, damping, energy, low pass filters, high pass filters, acquisition mode (E/T), and triggering. Modular in design it allows for multiple configurations within a single unit. The design also improves cable management and was designed for easy operation.
- **Search Tube Interlock and Scale** - The search tube interlock allows the user to adjust the search tube into position and keep it in position “hands free” until locked in place for scanning. The search tube also has a scale allowing for easy positioning and repositioning.
- **Stainless Steel Tray** - A stainless steel tray is provided which offers exceptional flatness for scanning parts at very short focal lengths. Additionally, pressure clips help reduce problems with warpage common to JEDEC trays.
- **Fully Integrated ESD Protection** - Offering two ground plug locations, the dual static ground plug allows for either right or left handed static plug positioning.
- **Transducer Holder** - A transducer holder is included that was designed for easy storage and identification of transducers and offers ventilation and water drainage.

Flip Chip: The image to the right was generated using the UHR-2001. Note the superior image quality and image resolution. The dark areas represent increased density of filler particles in the underfill material. Shown in red is voiding in the underfill. Notice the image also shows open solder ball connection between the ball and the die.

Specifications

Scan Axis

- Positioning device: Linear servo motor
- Servo Max Velocity: 830 mm/s
- Servo Repeatability: +/- 0.5 micron
- Linear Encoder Resolution: 0.5 micron
- Max Travel: 315mm

Step Axis

- Positioning device: Low-EMI microstep motor with zero-backlash lead screw
- Step Axis Resolution: 0.25 micron
- Max Travel: 160mm

Focus Axis

- Positioning device: Low-EMI microstep motor with zero-backlash lead screw
- Focus Axis Resolution: .5 micron
- Max Travel: 14.5mm

Fixtures

- JEDEC tray fixture
- Scan Platform
- Optional: Collision-proof through-transmission transducer fixture

Immersion Tank

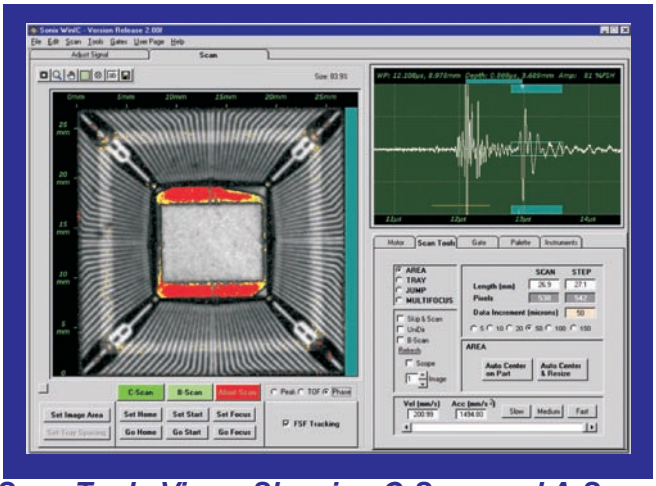
- Removable acrylic tank with pump and 30 micron filter, plus tank bottom fitting for complete draining

Ultrasonic Instruments

- DPR500 Receiver with LF/HF pulser
- Optional UHF pulser with expanded bandwidth receiver and UHF transducer

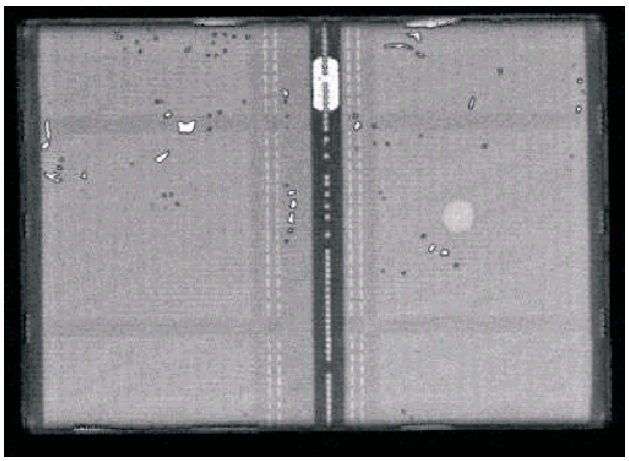
Enclosure

- Includes base cabinet for computer and instrumentation, with casters and leveling feet
- Approved emergency off and safety interlock
- Ergonomic design of load/unload area and user controls



Scan Tools View - Showing C-Scan and A-Scan

The combination of the UHR-2001 hardware and WinIC™ software provides the user with a powerful, easy to use analysis tool . WinIC is the innovative new software developed for Sonix' scanning acoustic microscopes. WinIC takes advantage of the robust features of Windows® platforms and operating systems (Windows 95/98/NT). WinIC provides advanced image analysis features to aid in quantitative and qualitative interpretation of image data. WinIC uses extensive graphics and on-screen guides to help all users, novice to expert, inspect devices without worrying about the intricacies and details of the tool.



Chip Scale Package: With CTE mismatch present between the elastomer layer and substrate layer, electrical overstressing caused delamination in the elastomer layer.

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