

# Automotive Applications

## **Application Overview:**

A large variety of uses for Scanning Acoustic Microscopes can be found in the automotive industry. One of the more common uses of SAM systems in the automotive industry is inspection of microelectronic devices. Switches to sensors are inspected primarily in a failure analysis, vendor qualification, reliability and process control role. Devices can be board mounted or loose components. Automated procedures can be developed to make SAM equipment have relatively high throughput. Fully automated SAM systems can inspect 1000's of parts per day.

## **Package Types:**

Switches, sensors, power devices, and miscellaneous

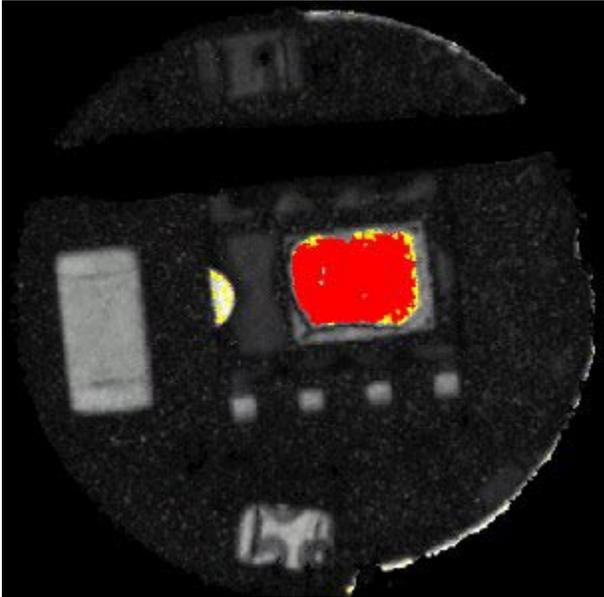
## **Inspection Standards:**

-none-

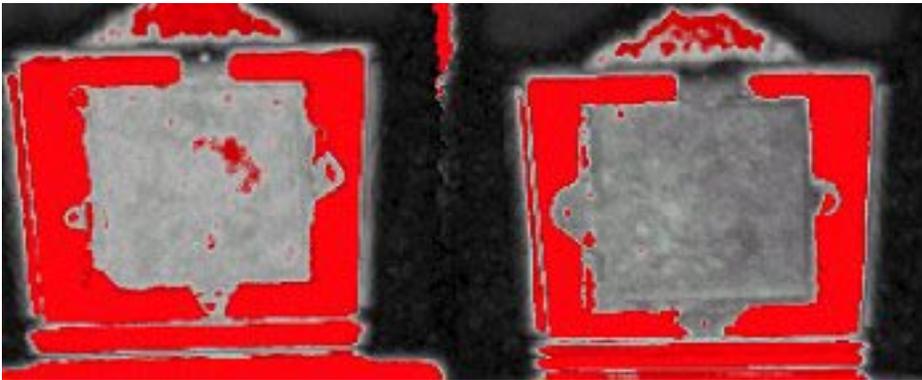
## **Failure Types Commonly Detected:**

Non-bonding  
Cracking  
Porosity  
Missing devices  
Heat dissipating quality  
Voiding in hermetic seals

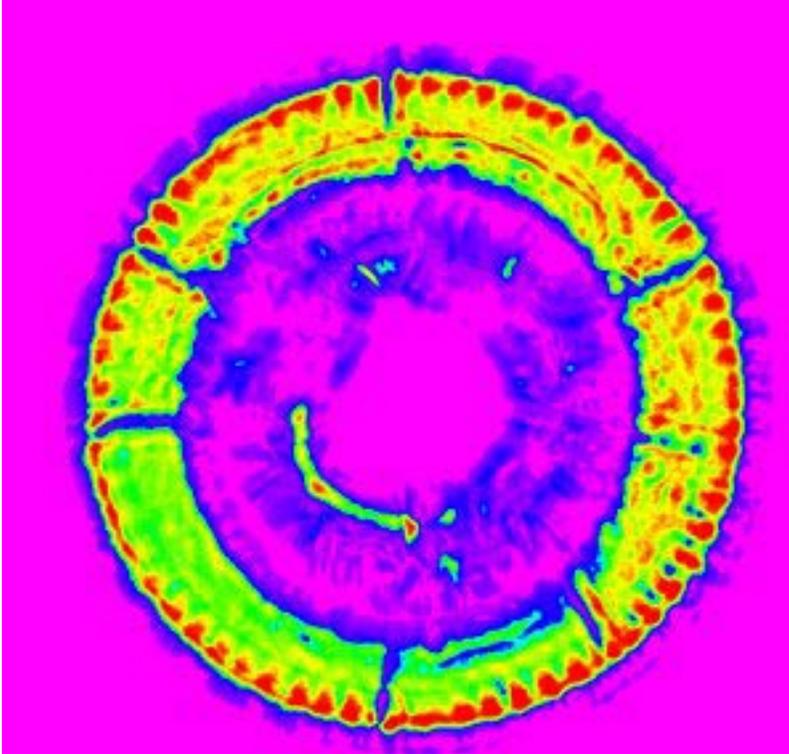
## Images:



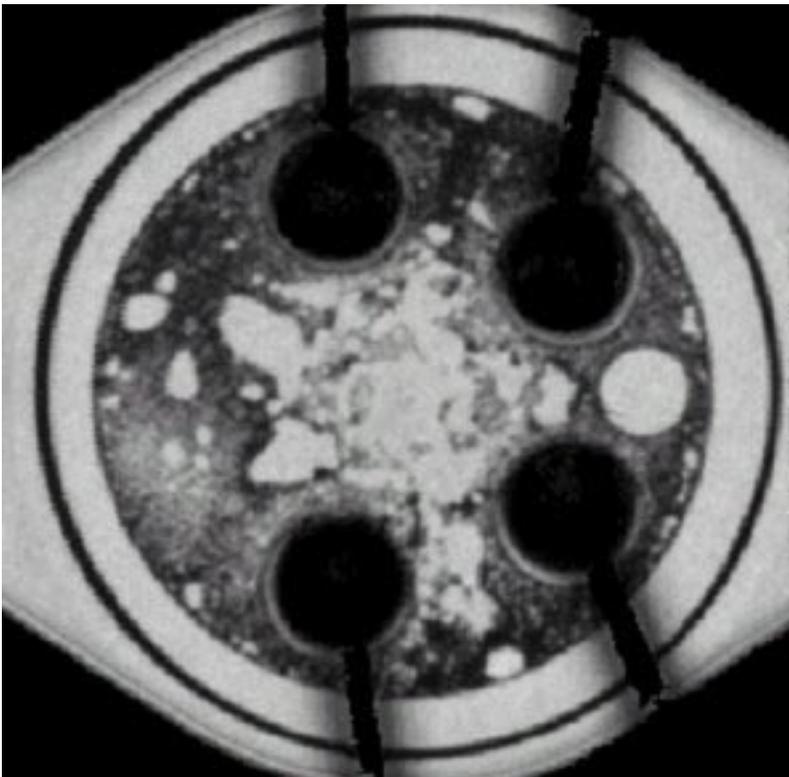
This is a pulse-echo image of several ceramic capacitors and a plastic integrated circuit that was encapsulated in plastic for an automotive switch. The red and yellow areas signify a delamination between the surface of the plastic IC and the outer encapsulant. This poor adhesion can allow the IC to move around inside the switch and shear off any electrical conditions upon stressing. In addition, disbonding can allow contaminants from outside to enter the device.



This is a pulse-echo image of two air bag sensors. In these samples, the silicon sensor was soldered to a tungsten carbide heat sink with a preform prepreg. The red areas signify delaminations between the sensor and a tungsten carbide baseplate. These delaminations may cause the sensor to heat up beyond a tolerable level causing failure.



This is a pulse-echo mode image of a ceramic composite disk brake. Dark blue and purple areas within the ring of the device signify cracks propagating from the inside of the ring. These cracks were likely caused by thermal overstress of the composite material.



This is a pulse-echo image of a plastic injected sensor. Electrical leads can be seen coming out of the bottom of the device. White areas signify voids within the encapsulant. Excessive voiding may indicate a break in the sealant of the device leading to possible corrosion or electrical failure.