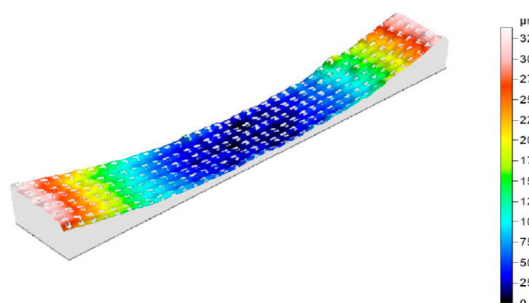


# In-situ Warpage & Deformation Measurements During Thermal Stresses

As industries innovate and develop increasingly complex products, understanding the temperature-dependent behavior of material structures is crucial for effective design. For example, a mismatch in the coefficient of thermal expansion (CTE) in electronic devices or printed circuit boards (PCBs) can cause excessive deformation during the reflow assembly process or thermal expansion during normal operation, potentially leading to interconnect failures like solder defects, delamination, or cracking. With better characterization of the thermal performance of the various aspects of the assembly/construction, suitable design changes can be made to improve the manufacturing quality and long-term reliability of a product.

EAG utilizes an advanced, phase shifting projection moiré system to perform characterization, warpage, and deformation measurement of products subjected to thermal stresses. This in-situ, contactless technique incorporates a precision fringe pattern projector, high-resolution camera, and high homogeneity temperature chamber to produce 3D topographical imaging, as well as 2D profiles and vector diagrams. This data helps designers choose the best materials, durable designs, and temperature management solutions for products that perform in harsh environments and high-reliability applications.



## Capabilities

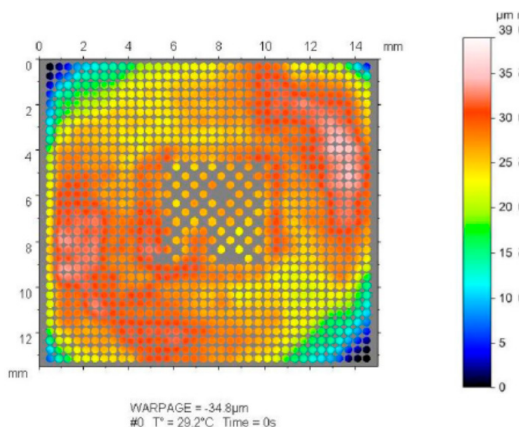
- 3D topography measurements over varying temperature profiles
- Submicron resolution
- Temperature range from -65°C to 400°C using high homogeneity IR and convection sources
- Samples from 0.5x0.5 to 400x400 mm with multiscale FOV
- Able to measure discontinuous surfaces (e.g. multiple components on PCBA)

## Support Product Life Cycle

- R&D
- Process control
- Design of manufacturing
- Quality control
- Failure analysis

## Applications

- CTE mismatch
- Characterization of complex assemblies
- Reliability of lead-free interconnects
- solder assemblies
- Extreme environment stress

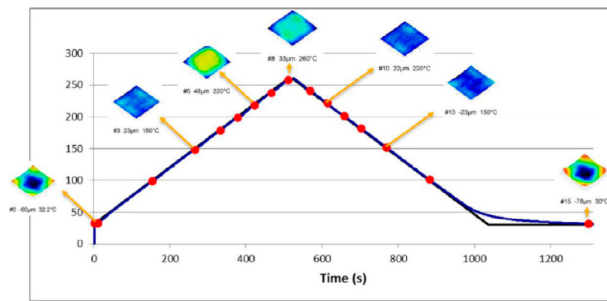


- Coplanarity and flatness
- Thermal mechanical analysis
- Conforms with JEDEC 22B112

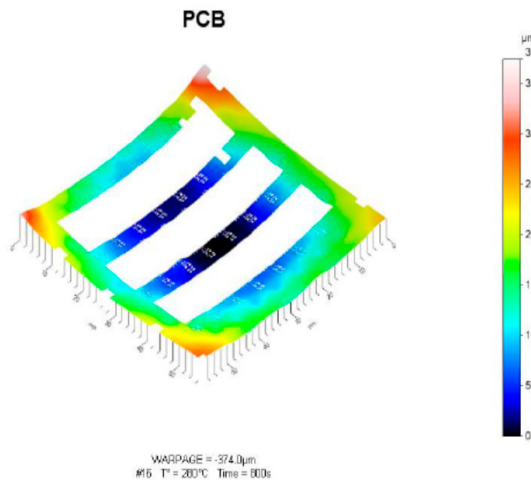
## Samples

- IC packages (BGA, WLCSP, MCM, PoP, etc.)
- Wafers
- PCBA
- High power devices, IGBTs, AI and Quantum technology, CPU
- Large, complex assemblies
- Panels, connectors, sockets, plates, laminates
- Thin film, stacked construction

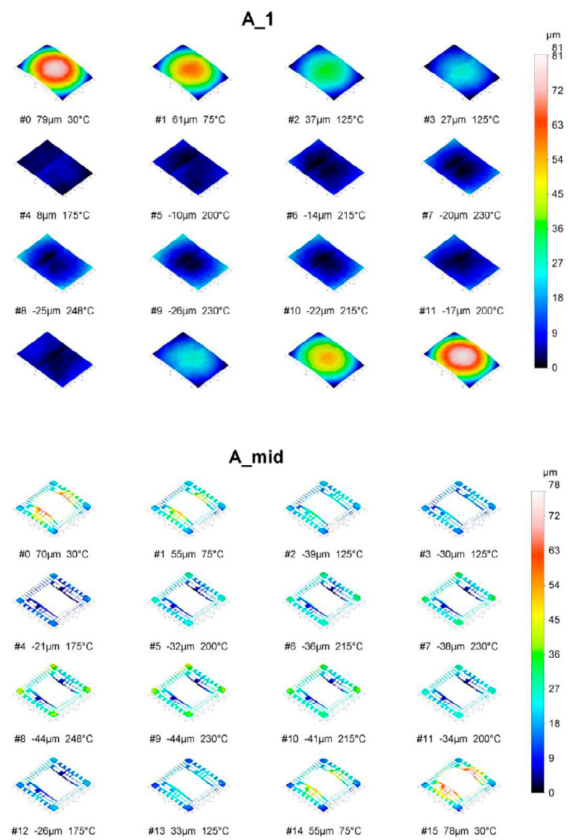
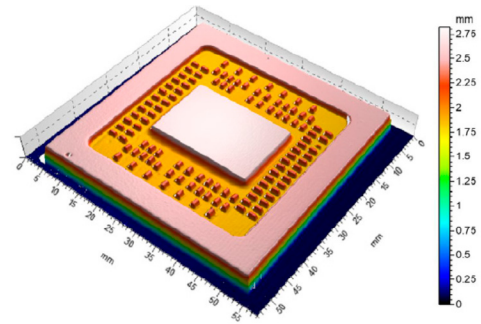
## 3D Measurements Over Temperature Profiles



## Printed Circuit Board



## Multi-Area Analysis



## Contact EAG

Through multidisciplinary expertise in materials and engineering sciences, EAG helps companies innovate and improve products, ensure quality and safety, strengthen supply chains, protect intellectual property and comply with evolving global regulations. Contact us to learn more.

