

2.5D/3D IC Packaging

Process Flow

FRT
Measuring Applications

FEOL



Wafer Topography, Step Height and Width, Thickness and TTV, Roll-Off Amount, Nanotopography, Roughness, Bow, Warpage, Defect Inspection (Particles and Holes)

Patterning



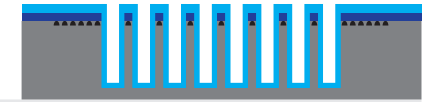
Photoresist Thickness and TTV, Litho CD, Overlay, Defect Inspection (Particles and Holes)

TSV etching



TSV Etching Depth, Width and Pitch, CD Metrology, Sidewall Angle, Defect Inspection (Photoresist Residuals)

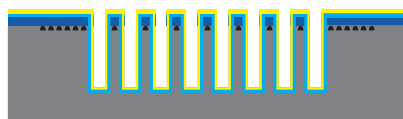
TSV isolation



Dielectric Thickness, Layer Coverage and Uniformity, Defect Inspection (Layer Cracking and Delamination)

FRT
Measuring Applications

Seed/barrier



Barrier Thickness, Layer Coverage and Uniformity, CD Metrology, Defect Inspection (Layer Cracking, Delamination and Voids)

TSV filling



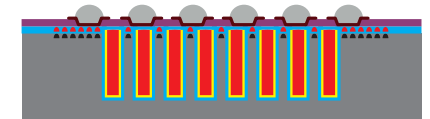
Cu Deposition Thickness, CD Metrology, Defect Inspection (Seams, Voids, Dimples, Recesses and Cu-protrusion) Strain around TSVs

CMP



Cu Filled TSVs Topography, Flatness, Uniformity and CD Metrology, Defect Inspection (Dishings and Erosions), Wafer Thickness and TTV

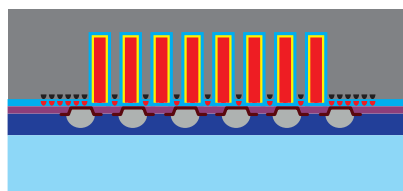
RDL/UBM/bumping



Line Metallization Thickness, Width and Roughness; Polymer Thickness, Slope Angle and Stress; RDL Final Package Warpage; UBM Height and Roughness; Solder Bump Height, Width, Pitch, Coplanarity and Defect Inspection

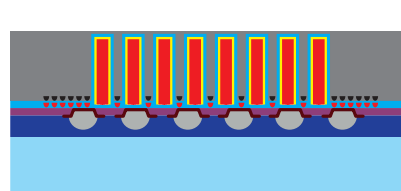
FRT
Measuring Applications

Temporary carrier bonding



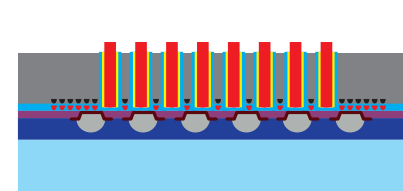
Carrier/Adhesive Thickness, TTV and Uniformity, Bonded Wafer Thickness, Bow, Warpage and Stress, Alignment Control, Wafer Edge Inspection (Edge Trim), Void Detection

Backside thinning



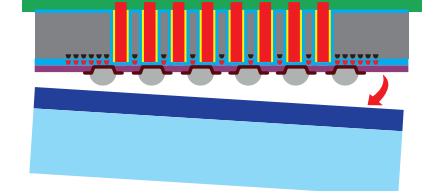
Remaining Si Thickness (RST) and Roughness after Grinding, Wafer Edge Inspection (Edge Trim), Defect Inspection (Cracks)

Nailing



Remaining Si Thickness (RST) after Etching, Cu Nail Height, Uniformity, Width, Pitch, Coplanarity and Defect Inspection

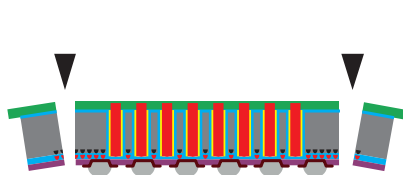
Carrier debonding



Solder Bump Height, Width, Pitch, Coplanarity and Defect Inspection (Adhesive Residuals, Cracks and Delamination), Isolation Layer Thickness and Uniformity

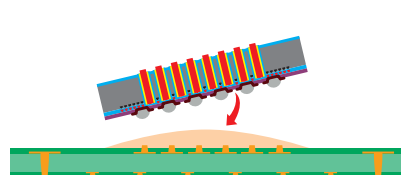
FRT
Measuring Applications

Dicing



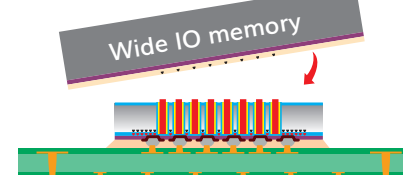
Groove Depth, Width and Uniformity, Protective Film Thickness, Defect Inspection (Edge Chipping and Cracks)

Logic to BGA



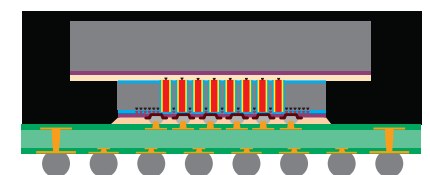
Stacking Overlay, Packaging Topography, Flatness and Planarity, Thermal Load, Warpage, Deformation, Global and Local Strain

C2C stacking



Stacking Overlay, Final Packaging Topography, Flatness and Planarity, Thermal Load, Warpage, Deformation, Global and Local Strain

Molding



Mold Topography, Flatness, Roughness and Thickness, Thermal Load, Warpage, Deformation, Global and Local Strain