

Failure and Yield Analysis

Course Outline and Training Schedule

Day 1 (8 hours)

1. Introduction
2. Failure Analysis Principles/Procedures
 - a. Philosophy of Failure Analysis
 - b. Flowcharts
3. Gathering Information
4. Package Level Testing
 - a. Optical Microscopy
 - b. Acoustic Microscopy
 - c. X-Ray Radiography
 - d. Hermetic Seal Testing
 - e. Residual Gas Analysis
5. Electrical Testing
 - a. Basics of Circuit Operation
 - b. Curve Tracer/Parameter Analyzer Operation
 - c. Quiescent Power Supply Current
 - d. Parametric Tests (Input Leakage, Output voltage levels, Output current levels, etc.)
 - e. Timing Tests (Propagation Delay, Rise/Fall Times, etc.)
 - f. Automatic Test Equipment
 - g. Basics of Digital Circuit Troubleshooting
 - h. Basics of Analog Circuit Troubleshooting

Day 2 (8 hours)

1. Decapsulation/Backside Sample Preparation
 - a. Mechanical Delidding Techniques
 - b. Chemical Delidding Techniques
 - c. Backside Sample Preparation Techniques
2. Die Inspection
 - a. Optical Microscopy
 - b. Scanning Electron Microscopy
3. Microprobing
 - a. Standard
 - b. AFM Probing
 - c. Nanoprobing



4. Photon Emission Microscopy
 - a. Mechanisms for Photon Emission
 - b. Instrumentation
 - i. Frontside
 - ii. Backside
 - c. Interpretation

Day 3 (8 Hours)

1. Electron Beam Tools
 - a. Voltage Contrast
 1. Passive Voltage Contrast
 2. Static Voltage Contrast
 3. Capacitive Coupled Voltage Contrast
 4. Introduction to Electron Beam Probing
 - b. Electron Beam Induced Current
 - c. Resistive Contrast Imaging
 - d. Charge-Induced Voltage Alteration
2. Optical Beam Tools
 - a. Optical Beam Induced Current
 - b. Light-Induced Voltage Alteration
 - c. Thermally-Induced Voltage Alteration
 - d. Seebeck Effect Imaging
 - e. Electro-optical Probing
 - f. Laser Voltage Probe (IDS-2K)
3. Soft Defect Localization
4. Thermal Detection Techniques
 - a. Infrared Thermal Imaging
 - b. Liquid Crystal Hot Spot Detection
 - c. Fluorescent Microthermal Imaging

Day 4 (8 Hours)

1. Chemical Unlayering
 - a. Wet Chemical Etching
 - b. Reactive Ion Etching
 - c. Parallel Polishing
2. Scanned Probe Techniques
 - a. Atomic Force Microscopy
 - b. Scanning Capacitance Microscopy
 - c. SQUID Microscopy
3. Analytical Techniques
 - a. TEM
 - b. EDS/WDS



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- c. ESCA/XPS
- d. Auger
- e. SIMS
- 4. Focused Ion Beam Technology
 - a. Physics of Operation
 - b. Instrumentation
 - c. Examples
 - d. Gas-Assisted Etching
 - e. Insulator Deposition
 - f. Electrical Circuit Effects
- 5. Case Histories