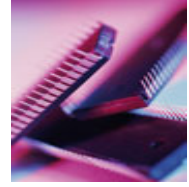


Semiconductor Reliability Services by Life Cycle Phase



1. Development Phase:

1.1 BIR (Built In Reliability) during wafer fabrication process development.

- Each vertical process module (i.e. oxide growth, plasma etch, etc.) should have reliability metrics, measured on test structures (i.e. gate oxide capacitors, poly resistors, metal traces, etc.). This is not an issue using a wafer foundry with an established qualified process, but getting the “due diligence” information from the foundry and auditing the process is an important reliability engineering task.
- Evaluation of the wafer process qualification results, process control results, ongoing quality/reliability monitor data.
- Deprocessing/cross sectioning of sample product or wafers to analyze potential reliability issues.

1.2 DFR (Design For Reliability)

- Participate in the technology vs. design development process, working with Design Engineering to ensure a reliable final product.
- Develop Special Reliability Test Chips if needed to test/stress critical circuit features and/or design concepts for reliability including ESD (Electrostatic Discharge) and latchup immunity.

1.3 DFT (Design For Testability) for both volume production pass/fail testing and during HTOL (High Temp. Operating Life test) to ensure very high fault coverage and toggle rate coverage of gates (for over 90 % gate toggle coverage during dynamic burn-in).

2. Product Qual/Volume Production Ramping Phase:

2.1 Develop Reliability Qualification Plan

2.2 Develop Highly Accelerated Lifetime Testing procedure to find weaknesses.

2.3 Design all Hardware for Product Reliability Qualification, i.e. dynamic life test burn in board, HAST (Highly Accelerated Temperature/Humidity Stress Test) board, etc.

2.4 Direct the Reliability Qualification Process.

2.5 Conduct Failure Analysis of qualification test rejects, directing development of corrective action plans, close on corrective actions.

2.6 Develop SBLC (Statistical Bin Limit Control) procedures to remove the “outliers” from the normal distribution of product. This is a very powerful tool to enhance product reliability and reduce field failure rate.

3. Product Maturity Phase:

3.1 Review/Direct/Manage Ongoing Reliability Monitors from wafer fabrication and based on finished product reliability testing.

3.2 Direct Failure Analysis/Corrective Actions based on reliability monitor failures and customer returns.

3.3 Propose Design Changes to address field-and monitor failures.

3.4 Evaluate proposed fabrication process changes.