

How to navigate and successfully get a part qualified for AEC Q100

Four Sections of AEC Q100

Reliability

Test Program Development

Production How to get to one temperature testing

Compliance

All of these are contained in the PPAP

Reliability: Wafer Foundry

- From your foundry (wafer sort)
 - This are all Items your foundry should provide for you technology
- Electromigration JESD61
- Time Dependent Dielectric Breakdown
- Hot Carrier Injection JESD60 & 28
- Negative Bias Temperature Instability JESD90
- Stress Migration JESD61, 87 and 202

Reliability: Packaging House

- These are all Items that your packing house should have for the technology you are using.
 - My last Contract switched from Gold to Copper wires so we had to all of these test with the new package
- Wire Bond Shear Test AEC-Q100-001 AEC-Q003
- Wire Bond Pull AEC-Q003
- Solderability JESD22 B102 JSTD-002D
- Physical DimensionsmHESD22 B102, B108 AEC-Q003

Reliability: Packaging House

- Solder Ball Shear AEC-Q100-010 AEC-Q003
- Lead Integrity JESD22 B015

Reliability: Environmental

- ▶ Temperature Humidity Bias JESD22 A101 or Highly Accelerated Stress Test JESD22 A110
- ▶ Autoclave JESD22 A102 or Unbiased Highly Accelerated Stress Test JESD22 A118 or Temperature Humidity with out Bias JESD22 – A1101
- ▶ Temperature Cycle JESD22 A105
- ▶ Power Temperature Cycle JESD22 A105
- ▶ High Temperature Storage Life Test

Reliability: Electrical Verification

- Electrostatic Discharge HBM AEC-Q100-002
- Electrostatic Discharge CDM AEC-A100-11
 - 750V corners 500 all other pins
- Latch Up AEC-Q100-004

Reliability: Accelerated Life Time

- ▶ High Temperature Operating life
- ▶ ELFR Early Life Failure Rate
 - also done after every lot
- ▶ NVM Endurance and Data Retention
 - We did this as par of the wafer sort

Test Program Development

- ▶ Fault Grading AEC-Q100-007
 - To be reviewed every quarter
- ▶ Characterization Hot, Room, Cold
 - On test and or Bench
- ▶ Stress Test the part is run at 110% of Max VDD
 - Must run for 100us
 - This test is not a go / no go test no faults recorded
- ▶ IDD test is run before and after

Test Program Development

- ▶ Leakage test to be run after IDD Stress Test
 - To confirm no damage to device
- ▶ A third leakage test was required at the end of the test flow to confirm nothing was damaged during the testing of the device.

Production: How to get to single temperature testing

- ▶ Safe Launch is the process of qualifying single temperature testing
- ▶ Requirements
 - 3 lots
 - Total of 10,000 units plus 240 unit for ELF
 - All three lots must tested at Hot first
 - After Hot test you can have no failure at either room or cold.
 - Exception is continuity failure where parts are re tested

Production how to get to single temperature testing

- ▶ Test need to guard band the test at hot so nothing fails at room or cold test.
 - This will take several weeks to get through

Compliance

- Electromagnetic Compatibility SAE J1752-3 and CISPR 25
 - This will have to be done at a out side lab.
 - Will Need experienced Engineer to do this work