Q104 Qualification Test Plan

**Automotive Grade Level =**  **MSL =**

|  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- |
| **Supplier Name:** |  | | **General Specification:** | AEC-Q104 Rev. - | |
| **Supplier Code:** |  | | **Supplier Wafer Fabrication:** |  | |
| **Supplier Part Number:** |  | | **Supplier Wafer Test:** |  | |
| **Supplier Contact:** |  | | **Supplier Assembly Site:** |  | |
| **Supplier Family Type:** |  | | **Supplier Final Test Site:** |  | |
| **Device Description:** |  | | **Supplier Reliability Signature:** |  | |
| **PPAP Submission Date:** |  | | **Customer Test ID:** |  | |
| **Reason for Qualification:** |  | | **Customer Part Number:** |  | |
| **Prepared by Signature:** |  | Date: | **Customer Approval Signature:** |  | Date: |

| **Test** | **#** | **Reference** | **Test Conditions** | | **Lots** | **S.S.** | **Total** | **Results**  **Lot/Pass/Fail** | **Comments:**  **(N/A =Not Applicable)** |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Test Group A – Accelerated Environment Stress Tests** | | | | | | | | | |
| PC | A1 | JESD22 A113  J-STD-020 | Preconditioning: (Test @ Rm)  SMD only; Moisture Preconditioning for THB/HAST, AC/UHST, TC, & PTC; Peak Reflow Temp = | | Min. MSL = 3 | | | MSL = |  |
| THB  or  HAST | A2 | JESD22 A101  JESD22 A110 | Temperature Humidity Bias: (Test @ Rm/Hot)    Highly Accelerated Stress Test: (Test @ Rm/Hot/) | |  |  |  | of |  |
| AC or  UHST  or TH | A3 | JESD22 A102  JESD22 A118  or JESD22-A101 | Autoclave: (Test @ Rm)  Unbiased Highly Accelerated Stress Test: (Test @ Rm)  Temperature Humidity without Bias: (Test @ Rm) | |  |  |  | of |  |
| TC | A4 | JESD22 A104 | Temperature Cycle: (Test @ Hot) | |  |  |  | of |  |
| PTC | A5 | JESD22 A105 | Power Temperature Cycle: (Test @ Rm/Hot) | |  |  |  | of |  |
| HTSL | A6 | JESD22 A103 | High Temperature Storage Life: (Test @ Rm/Hot) | |  |  |  | of |  |
| **Test Group B – Accelerated lifetime simulation tests** | | | | | | | | | |
| HTOL | B1 | JESD22 A108 | High Temp Operating Life: (Test @ Rm/Cold/Hot) | |  |  |  | of |  |
| ELFR | B2 | AEC-Q104  Appendix 2 | Early Life Failure Rate: (Test @ Rm/Hot) | |  |  |  | of |  |
| EDR | B3 | AEC-Q100-005 | NVM Endurance & Data Retention Test: (Test @ Rm/Hot) | |  |  |  | of |  |
| **TEST GROUP C – PACKAGE ASSEMBLY INTEGRITY TESTS** | | | | | | | | | |
| WBS | C1 | AEC-Q100-001  AEC-Q003 | Wire Bond Shear Test: (Cpk > 1.67) | 30 bonds | | 5 MCMs  Min. | bonds | of |  |
| WBP | C2 | Mil-STD-883,  Method 2011  AEC-Q003 | Wire Bond Pull: (Cpk > 1.67); Each bonder used | 30 bonds | | 5 MCMs  Min. | bonds | of |  |
| SD | C3 | JESD22 B102  JSTD-002D | Solderability: (>95% coverage)  8hr steam aging prior to testing |  | |  |  | of |  |
| PD | C4 | JESD22 B100, JESD22 B108  AEC-Q003 | Physical Dimensions: (Cpk > 1.67) |  | |  |  | of |  |
| SBS | C5 | AEC-Q100-010  AEC-Q003 | Solder Ball Shear: (Cpk > 1.67); 5 balls from min. of 10 MCMs |  | | balls | balls | of |  |
| LI | C6 | JESD22 B105 | Lead Integrity: (No lead cracking or breaking); Through-hole only; 10 leads from each of 5 MCMs |  | | leads | leads | of |  |
| XRAY | C7 |  | X-ray: |  | |  |  |  |  |
| AM | C8 |  | Acoustic Microscopy: |  | |  |  |  |  |
| **TEST GROUP D – DIE FABRICATION RELIABILITY TESTS** | | | | | | | | | |
| EM | D1 | JEP001 | Electromigration: | | - | - | - |  | Data Available |
| TDDB | D2 | JEP001 | Time Dependant Dielectric Breakdown: | | - | - | - |  | Data Available |
| HCI | D3 | JEP001 | Hot Carrier Injection: | | - | - | - |  | Data Available |
| NBTI | D4 | JEP001 | Negative Bias Temperature Instability: | | - | - | - |  | Data Available |
| SM | D5 | JEP001 | Stress Migration: | | - | - | - |  | Data Available |
| TEST GROUP E- ELECTRICAL VERIFICATION | | | | | | | | | |
| TEST | E1 | User/Supplier Specification | Pre and Post Stress Electrical Test: | | All | All | All | of |  |
| HBM | E2 | AEC-Q100-002  ANSI/ESDA/JEDEC JS-001 | Electrostatic Discharge, Human Body Model:  (Test @ Rm/Hot); (1KV HBM / Class 1C or better) | |  |  |  | of  ESD Level = |  |
| CDM | E3 | AEC-Q100-011  ANSI/ESDA/JEDEC JS-002 | Electrostatic Discharge, Charged Device Model:  (Test @ Rm/Hot); (500V / Class C4A or better) | |  |  |  | of  ESD Level = |  |
| LU | E4 | AEC-Q100-004 | Latch-Up: (Test @ Rm/Hot) | |  |  |  | of |  |
| ED | E5 | AEC-Q100-009  AEC-Q003 | Electrical Distributions: (Test @ Rm/Hot/Cold)  (where applicable, Cpk >1.67) | |  |  |  | of |  |
| FG | E6 | AEC-Q100-007 | Fault Grading: | | - | - | - | Fault Grade |  |
| CHAR | E7 | AEC-Q003 | Characterization: (Test @ Rm/Hot/Cold) | | - | - | - |  |  |
| EMC | E8 | SAE J1752/3 | Electromagnetic Compatibility (Radiated Emissions) | |  |  |  |  |  |
| SER | E9 | JESD89-1  JESD89-2  JESD89-3 | Soft Error Rate | |  |  |  |  |  |
| LF | E10 | AEC-Q005 | Lead (Pb) Free: (see AEC-Q005) | | - | - | - |  |  |
| **TEST GROUP F – DEFECT SCREENING TESTS** | | | | | | | | | |
| PAT | F1 | AEC-Q001 | Process Average Testing: (see AEC-Q001) | | All | All | All | Reject units outside Avg. |  |
| SBA | F2 | AEC-Q002 | Statistical Bin/Yield Analysis: (see AEC-Q002) | | All | All | All | Reject units outside criteria |  |
| **TEST GROUP G – CAVITY MODULE INTEGRITY TESTS** | | | | | | | | | |
| MS | G1 | JESD22 B110 | Mechanical Shock: (Test @ Rm) | |  |  |  | of |  |
| VFV | G2 | JESD22 B103 | Variable Frequency Vibration: (Test @ Rm) | |  |  |  | of |  |
| CA | G3 | MIL-STD-883  Method 2001 | Constant Acceleration: (Test @ Rm) | |  |  |  | of |  |
| GFL | G4 | MIL-STD-883  Method 1014 | Gross and Fine Leak: | |  |  |  | of |  |
| DROP | G5 | JESD22-B110 | Mechanical Shock Cavity Drop Test: (Test @ Rm) | |  |  |  | of |  |
| LT | G6 | MIL-STD-883  Method 2024 | Lid Torque: | |  |  |  | of |  |
| DS | G7 | MIL-STD-883  Method 2019 | Die Shear: | |  |  |  | of |  |
| IWV | G8 | MIL-STD-883  Method 1018 | Internal Water Vapor: | |  |  |  | of |  |
| **TEST GROUP H – MODULE SPECIFIC TESTS** | | | | | | | | | |
| BLR | H1 | IPC-9701 | Board Level Reliability: | |  |  |  | of |  |
| LTSL | H2 | JESD22 A119 | Low Temperature Storage Life: (Test @ Rm/Hot/Cold) | |  |  |  | of |  |
| STEP | H3 | ISO 16750-4 | Start Up and Temperature Steps: | |  |  |  | of |  |
| MCM DROP | H4 | JESD22-B111 | MCM Drop Test: | |  |  |  | of |  |
| DPA | H5 | MIL-STD-1580 | Destructive Physical Analysis: | |  |  |  |  |  |
| XRAY | H6 |  | X-ray: | |  |  |  |  |  |
| AM | H7 |  | Acoustic Microscopy: | |  |  |  |  |  |