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 A113J-STD-020 | Preconditioning: (Test @ Rm)SMD only; Moisture Preconditioning for THB/HAST, AC/UHST, TC, & PTC; Peak Reflow Temp =       | Min. MSL = 3 | MSL =       |       |
| THBorHAST | A2  | JESD22 A101JESD22 A110 | Temperature Humidity Bias: (Test @ Rm/Hot)     Highly Accelerated Stress Test: (Test @ Rm/Hot/)      |  |  |  |       of       |       |
| AC orUHSTor TH | A3  | JESD22 A102JESD22 A118or 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-Q104Appendix 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-Q100-001AEC-Q003 | Wire Bond Shear Test: (Cpk > 1.67)      | 30 bonds | 5 MCMsMin. |       bonds |       of       |       |
| WBP | C2 | Mil-STD-883,Method 2011AEC-Q003 | Wire Bond Pull: (Cpk > 1.67); Each bonder used      | 30 bonds | 5 MCMsMin. |       bonds |       of       |       |
| SD | C3 | JESD22 B102JSTD-002D | Solderability: (>95% coverage)8hr steam aging prior to testing      |  |  |  |       of       |       |
| PD | C4 | JESD22 B100, JESD22 B108AEC-Q003 | Physical Dimensions: (Cpk > 1.67)      |  |  |  |       of       |       |
| SBS | C5 | AEC-Q100-010AEC-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-Q100-002ANSI/ESDA/JEDEC JS-001 | Electrostatic Discharge, Human Body Model:(Test @ Rm/Hot); (1KV HBM / Class 1C or better)      |  |      |       |       of      ESD Level =  |       |
| CDM | E3 | AEC-Q100-011ANSI/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-Q100-009AEC-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 | JESD89-1JESD89-2JESD89-3 | 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-883Method 2001 | Constant Acceleration: (Test @ Rm)      |  |  |  |       of       |       |
| GFL | G4 | MIL-STD-883Method 1014 | Gross and Fine Leak:      |  |  |  |       of       |       |
| DROP | G5 | JESD22-B110 | Mechanical Shock Cavity Drop Test: (Test @ Rm)      |  |  |  |       of       |       |
| LT | G6 | MIL-STD-883Method 2024 | Lid Torque:      |  |  |  |       of       |       |
| DS | G7 | MIL-STD-883Method 2019 | Die Shear:      |  |  |  |       of       |       |
| IWV | G8 | MIL-STD-883Method 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:      |  |  |  |       |       |