

Q100 Qualification Test Plan

Automotive Grade Level = {Select Grade} MSL = {Select MSL}

| | | | | |
|----------------------------------|-----------------|--|-------------------------------------|-------|
| Supplier Name: | | General Specification: | AEC-Q100 Rev. G | |
| 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: | {Select Reason} | 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/) | 3 | 77 | 231 | of | |
| AC or UHST | A3 | JESD22 A102 or JESD22 A118 | Autoclave: (Test @ Rm) Unbiased Highly Accelerated Stress Test: (Test @ Rm) | 3 | 77 | 231 | of | |
| TC | A4 | JESD22 A104 | Temperature Cycle: (Test @ Hot) | 3 | 77 | 231 | of | |
| PTC | A5 | JESD22 A105 | Power Temperature Cycle: (Test @ Rm/Hot) | 1 | 45 | 45 | of | |
| HTSL | A6 | JESD22 A103 | High Temperature Storage Life: (Test @ Rm/Hot) | 1 | 45 | 45 | of | |

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|------|---|-----------|-----------------|------|------|-------|--------------------------|------------------------------------|

TEST GROUP B – ACCELERATED LIFETIME SIMULATION TESTS

| | | | | | | | | |
|------|----|--------------|--|---|-----|------|----|--|
| HTOL | B1 | JESD22 A108 | High Temp Operating Life: (Test @ Rm/Hot/Cold) | 3 | 77 | 231 | of | |
| ELFR | B2 | AEC-Q100-008 | Early Life Failure Rate: (Test @ Rm/Hot) | 3 | 800 | 2400 | of | |
| EDR | B3 | AEC-Q100-005 | NVM Endurance & Data Retention Test: (Test @ Rm/Hot) | 3 | 77 | 231 | of | |

TEST GROUP C – PACKAGE ASSEMBLY INTEGRITY TESTS

| | | | | | | | | |
|-----|----|-----------------------------|---|-------------|--------------------|-------|----|--|
| WBS | C1 | AEC-Q100-001 | Wire Bond Shear Test: (Ppk > 1.67 and Cpk > 1.33) | 30 bonds | 5 parts Min. | bonds | of | |
| WBP | C2 | Mil-STD-883 Method 2011 | Wire Bond Pull: (Ppk > 1.67 and Cpk > 1.33); Each bonder used | 30 bonds | 5 parts Min. | bonds | of | |
| SD | C3 | JESD22 B102 | Solderability: (>95% coverage) | 3 | 15 | 45 | of | |
| PD | C4 | JESD22 B100, JESD22 B108 | Physical Dimensions: (Ppk > 1.67 and Cpk > 1.33) | 3 | 10 | 30 | of | |
| SBS | C5 | AEC-Q100-010 | Solder Ball Shear: (Ppk > 1.67 and Cpk > 1.33) | 50 balls | 3 | | of | |
| LI | C6 | JESD22 B105 | Lead Integrity: (No lead cracking or breaking); Through-hole only | 50 leads | 1 | | of | |

TEST GROUP D – DIE FABRICATION RELIABILITY TESTS

| | | | | | | | | |
|------|----|-------------|--|---|---|---|--|----------------|
| EM | D1 | JESD61 | Electromigration: | - | - | - | | Data Available |
| Tddb | D2 | JESD35 | Time Dependant Dielectric Breakdown: | - | - | - | | Data Available |
| HCI | D3 | JESD60 & 28 | Hot Carrier Injection: | - | - | - | | Data Available |
| NBTI | D4 | JESD90 | Negative Bias Temperature Instability: | - | - | - | | Data Available |

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|------|----|-------------------|-------------------|------|------|-------|--------------------------|------------------------------------|
| SM | D5 | JESD61, 87, & 202 | 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 / MM | E2 | AEC-Q100-002 AEC-Q100-003 | Electrostatic Discharge, Human Body Model / Machine Model: (Test @ Rm/Hot); (2KV HBM / 200V MM) At least one of these models must be performed. | 1 | | | of ESD Level = {Select HBM Level} / {Select MM Level} | |
| CDM | E3 | AEC-Q100-011 | Electrostatic Discharge, Charged Device Model: (Test @ Rm/Hot); (750V corner leads, 500V all other leads) | 1 | | | of ESD Level = {Select CDM Level} | |
| LU | E4 | AEC-Q100-004 | Latch-Up: (Test @ Rm/Hot) | 1 | 6 | 6 | of | |
| ED | E5 | AEC-Q100-009 | Electrical Distributions: (Test @ Rm/Hot/Cold) | 3 | 30 | 90 | of | |
| FG | E6 | AEC-Q100-007 | Fault Grading: | - | - | - | Fault Grade {Select Level} | |
| CHAR | E7 | AEC-Q003 | Characterization: (Test @ Rm/Hot/Cold) | - | - | - | {Select Data} | |
| GL | E8 | AEC-Q100-006 | Electro-Thermally Induced Gate Leakage: (Test @ Rm) | 1 | 6 | 6 | of | For information only |
| EMC | E9 | SAE J1752/3 | Electromagnetic Compatibility (Radiated Emissions) | 1 | 1 | 1 | | |
| SC | E10 | AEC Q100-012 | Short Circuit Characterization | 3 | 10 | 30 | | |
| SER | E11 | JESD89-1 JESD89-2 JESD89-3 | Soft Error Rate | 1 | 3 | 3 | | |

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|------|---|-----------|-----------------|------|------|-------|--------------------------|------------------------------------|

TEST GROUP F – DEFECT SCREENING TESTS

| | | | | | | | | |
|-----|----|----------|---|-----|-----|-----|-------------------------------|--|
| PAT | F1 | AEC-Q001 | See AEC-Q001. This is highly recommended by Automotive Electronic Council to institute. | All | All | All | Reject units outside Avg. | |
| SBA | F2 | AEC-Q002 | See AEC-Q002. This is highly recommended by Automotive Electronic Council to institute. | All | All | All | Reject units outside criteria | |

TEST GROUP G – CAVITY PACKAGE INTEGRITY TESTS (for Ceramic Package testing only)

| | | | | | | | | |
|------|----|-------------------------|---|---|----|-----|----|--|
| MS | G1 | JESD22 B104 | Mechanical Shock: (Test @ Rm) | 3 | 39 | 117 | of | |
| VFV | G2 | JESD22 B103 | Variable Frequency Vibration: (Test @ Rm) | 3 | 39 | 117 | of | |
| CA | G3 | MIL-STD-883 Method 2001 | Constant Acceleration: (Test @ Rm) | 3 | 39 | 117 | of | |
| GFL | G4 | MIL-STD-883 Method 1014 | Gross and Fine Leak: | 3 | 39 | 117 | of | |
| DROP | G5 | ----- | Drop Test: (Test @ Rm) MEMS cavity parts only. Drop part on each of 6 axes once from a height of 1.2m onto a concrete surface. | 1 | 5 | 5 | of | |
| LT | G6 | MIL-STD-883 Method 2004 | Lid Torque: | 1 | 5 | 5 | of | |
| DS | G7 | MIL-STD-883 Method 2019 | Die Shear: | 1 | 5 | 5 | of | |
| IWV | G8 | MIL-STD-883 Method 1018 | Internal Water Vapor: | 1 | 3 | 3 | of | |