

RENESAS SEMICONDUCTOR RELIABILITY REPORT

SERIES : RL78/F24

DEVICE : R7F124FBJxANP-C(x=3/4)

APPLICATION : Automobile

Quality Assurance Div.
Renesas Electronics Corporation

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Q100 Qualification Test Results for R7F124FBJxANP-C(x=3/4)

[Note : Basically qualification tests were performed using a representative product with the same wafer process and the same package structure .]

| Test | # | Reference | Test Conditions | Lots | S.S. | Total | Results (Fail of Total) | 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 ; Peak Reflow Temp=260°C | Min.MSL=3 | | | MSL=3 | - |
| THB or HAST | A2 | JESD22 A101 | Highly Accelerated Stress Test: (Test @ Rm/Hot) Ta=110°C, RH=85%, 264hrs | 3 | 77 | 231 | 0 of 231 | - |
| AC or UHST or TH | A3 | JESD22 A118 | Unbiased Highly Accelerated Stress Test: (Test @ Rm) Ta=110°C, RH=85%, 264hrs | 3 | 77 | 231 | 0 of 231 | - |
| TC | A4 | JESD22 A104 | Temperature Cycle: (Test@Hot) Ta=-55°C to 150°C 1000cyc | 3 | 77 | 231 | 0 of 231 0 Fails after TC (WBP) | - |
| PTC | A5 | JESD22 A105 | Power Temperature Cycle: (Test @ Rm/Hot) - | - | - | - | - | N/A |
| HTSL | A6 | JESD22 A103 | High Temp Storage Life: (Test@Rm/Hot) Ta=175°C, 500hrs | 1 | 45 | 45 | 0 of 45 | - |

TEST GROUP B – ACCELERATED LIFETIME SIMULATION TESTS

| | | | | | | | | | |
|------|----|--------------|---|----------|-----|------|-----------|----------|---|
| HTOL | B1 | JESD22 A108 | High Temp Operating Life: (Test@Rm/Hot/Cold) Ta=125°C, 1000hrs | 3 | 77 | 231 | 0 of 231 | - | |
| ELFR | B2 | AEC-Q100-008 | Early Life Failure Rate: (Test@Rm/Hot) Ta=125°C, 48hrs | 3 | 800 | 2400 | 0 of 2400 | - | |
| EDR | B3 | AEC-Q100-005 | NVM Endurance & Data Retention Test: (Test @ Rm/Hot) | For HTOL | 3 | 77 | 231 | 0 of 231 | - |
| | | | | For HTSL | 1 | 45 | 45 | 0 of 45 | - |

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| Test | # | Reference | Test Conditions | Lots | S.S. | Total | Results (Fail of Total) | Comments: (N/A =Not Applicable) |
|------|---|-----------|-----------------|------|------|-------|----------------------------|------------------------------------|
|------|---|-----------|-----------------|------|------|-------|----------------------------|------------------------------------|

TEST GROUP C – PACKAGE ASSEMBLY INTEGRITY TESTS

| | | | | | | | | |
|-----|----|---|--|-------------|-----------------|-------------|---------------|----------|
| WBS | C1 | AEC-Q100-001 AEC-Q003 | Wire Bond Shear Test: (Cpk > 1.67) | 30 bonds | 5 parts Min. | 30 bonds | 0 of 30 bonds | Cpk>1.67 |
| WBP | C2 | Mil-STD-883 Method 2011 AEC-Q003 | Wire Bond Pull: (Cpk > 1.67); Each bonder used | 30 bonds | 5 parts Min. | 30 bonds | 0 of 30 bonds | Cpk>1.67 |
| SD | C3 | JESD22 B102 JSTD-002D | Solderability: (>95% coverage) 8 hr steam aging prior to testing | 1 | 15 | 15 | 0 of 15 | - |
| PD | C4 | JESD22 B100, JESD22 B108 AEC-Q003 | Physical Dimensions: (Cpk > 1.67) | 3 | 10 | 30 | 0 of 30 | Cpk>1.67 |
| SBS | C5 | AEC-Q100-010 AEC-Q003 | Solder Ball Shear: (Cpk > 1.67); 5 balls from min. of 10 devices | - | - | - | - | N/A |
| LI | C6 | JESD22 B105 | Lead Integrity: (No lead cracking or breaking); Through-hole only; 10 leads from each of 5 devices | - | - | - | - | N/A |

TEST GROUP D – DIE FABRICATION RELIABILITY TESTS

| | | | | | | | | |
|------|----|-----------------|--|---|---|---|------|--------------------------|
| EM | D1 | JESD61 | Electromigration: | - | - | - | Pass | Confirmed by process TEG |
| TDDB | D2 | JESD35 | Time Dependent Dielectric Breakdown: | - | - | - | Pass | Confirmed by process TEG |
| HCI | D3 | JESD60 & 28 | Hot Carrier Injection: | - | - | - | Pass | Confirmed by process TEG |
| NBTI | D4 | JESD90 | Negative Bias Temperature Instability: | - | - | - | Pass | Confirmed by process TEG |
| SM | D5 | JESD61,87 & 202 | Stress Migration: | - | - | - | Pass | Confirmed by process TEG |

| Test | # | Reference | Test Conditions | Lots | S.S. | Total | Results (Fail of Total) | Comments: (N/A =Not Applicable) |
|------|---|-----------|-----------------|------|------|-------|----------------------------|------------------------------------|
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TEST GROUP E- ELECTRICAL VERIFICATION

| | | | | | | | | |
|------|-----|----------------------------------|--|-----|-----|-----|---------------------------------|--|
| TEST | E1 | User/Supplier Specification | Pre and Post Stress Electrical Test: | All | All | All | 0 of All | - |
| HBM | E2 | AEC-Q100-002 | Electrostatic Discharge, Human Body Model: (Test @ Rm/Hot); (2KV HBM / Class 2 or better) | 1 | 3 | 3 | 0 of 3 ESD Level= HBM:2 | HBM>2KV |
| CDM | E3 | AEC-Q100-011 | Electrostatic Discharge, Charged Device Model: (Test @ Rm/Hot); (750V corner pins, 500V all other pins / Class C2A or better) | 1 | 3 | 3 | 0 of 3 ESD Level= CDM:C2A | Corner pins: 750V Pass All other pins:500V Pass |
| LU | E4 | AEC-Q100-004 | Latch-Up: (Test @ Rm/Hot) | 1 | 6 | 6 | 0 of 6 | - |
| ED | E5 | AEC-Q100-009 AEC-Q003 | Electrical Distributions: (Test @ Rm/Hot/Cold) (where applicable, Cpk>1.67) | 3 | 30 | 90 | 0 of 90 | Cpk>1.67 |
| FG | E6 | AEC-Q100-007 | Fault Grading: | - | - | - | >98% | - |
| CHAR | E7 | AEC-Q003 | Characterization: (Test @ Rm/Hot/Cold) | - | - | - | Pass | According to Renesas standard procedure |
| EMC | E9 | SAE J1752/3 | Electromagnetic Compatibility (Radiated Emissions) | 1 | 1 | 1 | 0 of 1 | - |
| SC | E10 | AEC Q100-012 | Short Circuit Characterization | - | - | - | - | N/A |
| SER | E11 | JESD89-1 JESD89-2 JESD89-3 | Soft Error Rate | - | - | - | - | - |
| LF | E12 | AEC-Q005 | Lead (Pb) Free: (see AEC-Q005) | - | - | - | Pass | Solderability: See SD (C3) result. Solder heat resistance: N/A (Wave Solder is Not recommended.) Whisker: N/A (Non-leaded package) |

| Test | # | Reference | Test Conditions | Lots | S.S. | Total | Results (Fail of Total) | Comments: (N/A =Not Applicable) |
|------|---|-----------|-----------------|------|------|-------|----------------------------|------------------------------------|
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TEST GROUP F – DEFECT SCREENING TESTS

| | | | | | | | | |
|-----|----|----------|--|-----|-----|-----|---------------------------------|--|
| PAT | F1 | AEC-Q001 | Process Average Testing: (see AEC-Q001) | All | All | All | Reject units outside PAT limits | Apply to mass production according to Renesas standard procedure |
| SBA | F2 | AEC-Q002 | Statistical Bin/Yield Analysis: (see AEC-Q002) | All | All | All | Reject units outside criteria | Apply to mass production according to Renesas standard procedure |

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

| | | | | | | | | |
|------|----|-------------------------|---|---|---|---|---|-----|
| MS | G1 | JESD22 B104 | Mechanical Shock: (Test @ Rm) | - | - | - | - | N/A |
| VFV | G2 | JESD22 B103 | Variable Frequency Vibration: (Test @ Rm) | - | - | - | - | N/A |
| CA | G3 | MIL-STD-883 Method 2001 | Constant Acceleration: (Test @ Rm) | - | - | - | - | N/A |
| GFL | G4 | MIL-STD-883 Method 1014 | Gross and Fine Leak: | - | - | - | - | N/A |
| 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. | - | - | - | - | N/A |
| LT | G6 | MIL-STD-883 Method 2004 | Lid Torque: | - | - | - | - | N/A |
| DS | G7 | MIL-STD-883 Method 2019 | Die Shear: | - | - | - | - | N/A |
| IWV | G8 | MIL-STD-883 Method 1018 | Internal Water Vapor: | - | - | - | - | N/A |

Product list

Report No. MCR-25-0276

| No | Group | Product part number | Package code | No | Group | Product part number | Package code |
|----|----------|---------------------|--------------|-----|-------|---------------------|--------------|
| 1 | RL78/F24 | R7F124FBJ3ANP-C | PWQN0032KF-B | 51 | | | |
| 2 | RL78/F24 | R7F124FBJ4ANP-C | PWQN0032KF-B | 52 | | | |
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