

RENESAS SEMICONDUCTOR RELIABILITY REPORT

GROUP : RA6T2
DEVICE : R7FA6T2XXX
APPLICATION : Consumer / Industry

Quality Assurance Div.
Renesas Electronics Corporation

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Table. Reliability test results (QFP)

| Test Items | Reference | Test Conditions | Results Failure/Size | Comment |
|--|------------------------|--------------------------------------|----------------------|-----------|
| High Temperature Operating Life (HTOL) | JESD22-A108 | Ta=125 °C, Vccmax, 1000 hrs | 0/22 | |
| High Temperature Storage Life (HTSL) | JESD22-A103 | Ta=150 °C, 1000 hrs | 0/22 | |
| Temperature Humidity bias (THB) (*1) | JESD22-A101 | Ta=85 °C, RH=85 %, Vccmax, 1000 hrs | 0/22 | |
| Temperature Cycling (TC) (*1) | JESD22-A104 | Ta=-65 °C to 150 °C , 300 cycles | 0/22 | |
| Latch-Up (LU) | JESD78 | Pulse Current Injection, I=+/-150 mA | 0/3 | |
| Electrostatic discharge (ESD-HBM) | JS-001 | 1.5 kΩ, 100 pF, +/-2000 V, 1 time | 0/3 | Class: 2 |
| Electrostatic discharge (ESD-CDM) | JESD22-C101 | +/-500V,1time | 0/3 | Class: C2 |
| Solderability (SD) | J-STD-002 | 245 °C, 5 s, Solder coverage ≥95 % | 0/5 | |
| Resistance to Soldering Heat (PC) | JESD22-A113, J-STD-020 | MSL3(Moisture Sensitivity Level 3) | 0/22 | |

*1) With preconditioning per JESD22-A113, MSL 3

·It is tested to confirm that all the samples are satisfied with an individual product specification.

Note :

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

Table. Reliability test results (QFN)

| Test Items | Reference | Test Conditions | Results Failure/Size | Comment |
|--|------------------------|--------------------------------------|----------------------|-----------|
| High Temperature Operating Life (HTOL) | JESD22-A108 | Ta=125 °C, Vccmax, 1000 hrs | 0/22 | |
| High Temperature Storage Life (HTSL) | JESD22-A103 | Ta=150 °C, 1000 hrs | 0/22 | |
| Temperature Humidity bias (THB) (*1) | JESD22-A101 | Ta=85 °C, RH=85 %, Vccmax, 1000 hrs | 0/22 | |
| Temperature Cycling (TC) (*1) | JESD22-A104 | Ta=-65 °C to 150 °C , 300 cycles | 0/22 | |
| Latch-Up (LU) | JESD78 | Pulse Current Injection, I=+/-150 mA | 0/3 | |
| Electrostatic discharge (ESD-HBM) | JS-001 | 1.5 kΩ, 100 pF, +/-2000 V, 1 time | 0/3 | Class: 2 |
| Electrostatic discharge (ESD-CDM) | JESD22-C101 | +/-500V,1time | 0/3 | Class: C2 |
| Solderability (SD) | J-STD-002 | 245 °C, 5 s, Solder coverage ≥95 % | 0/5 | |
| Resistance to Soldering Heat (PC) | JESD22-A113, J-STD-020 | MSL3(Moisture Sensitivity Level 3) | 0/22 | |

*1) With preconditioning per JESD22-A113, MSL 3

•It is tested to confirm that all the samples are satisfied with an individual product specification.

Note :

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

The failure rate of the device in an actual use condition can be estimated by the below procedure.

•Equation for the failure rate estimation (λ)

$$\lambda = \lambda_b \times \pi T \text{ (FIT)}$$

① Unique failure rate (λ_b)

$$\lambda_b = 0.08 \text{ FIT}$$

Unique failure rate at $T_a = 55 \text{ }^\circ\text{C}$ using 60 % confidence level.

② Temperature term (πT)

$$\pi T = \exp\{11600 \times E_a \times (1/(273+55) - 1/(273+T_a))\}$$

E_a : Activation energy (eV)

T_a : Ambient temperature ($^\circ\text{C}$)

πT simplified chart as $E_a = 0.7 \text{ eV}$

| T_a ($^\circ\text{C}$) | 40 | 50 | 55 | 60 | 65 | 70 | 75 | 80 | 85 | 90 | 100 | 110 |
|-------------------------------|------|------|----|------|------|------|------|------|------|-------|-------|-------|
| πT | 0.31 | 0.68 | 1 | 1.45 | 2.08 | 2.95 | 4.15 | 5.77 | 7.96 | 10.88 | 19.82 | 34.99 |

•MTTF (Mean Time To Failure)

$$MTTF = 1/\lambda$$

Reference about Renesas package code

| Package type | | Package code *1 |
|---------------------------------|-----|-----------------|
| Lead type plastic package | QFP | PxQP |
| Non-lead type plastic package | QFN | PxQN |
| Grid array type plastic package | BGA | PxBG |
| | LGA | PxLG |

*1. First four digit

Table. Product list

| No | Group | Product part number | Package code | No | Group | Product part number | Package code |
|----|-------|---------------------|--------------|-----|-------|---------------------|--------------|
| 1 | RA6T2 | R7FA6T2AB3CFL | PLQP0048K* | 51 | | | |
| 2 | RA6T2 | R7FA6T2AD3CFL | PLQP0048K* | 52 | | | |
| 3 | RA6T2 | R7FA6T2BB3CFL | PLQP0048K* | 53 | | | |
| 4 | RA6T2 | R7FA6T2BD3CFL | PLQP0048K* | 54 | | | |
| 5 | RA6T2 | R7FA6T2AB3CFM | PLQP0064K* | 55 | | | |
| 6 | RA6T2 | R7FA6T2AD3CFM | PLQP0064K* | 56 | | | |
| 7 | RA6T2 | R7FA6T2BB3CFM | PLQP0064K* | 57 | | | |
| 8 | RA6T2 | R7FA6T2BD3CFM | PLQP0064K* | 58 | | | |
| 9 | RA6T2 | R7FA6T2AB3CFP | PLQP0100K* | 59 | | | |
| 10 | RA6T2 | R7FA6T2AD3CFP | PLQP0100K* | 60 | | | |
| 11 | RA6T2 | R7FA6T2BB3CFP | PLQP0100K* | 61 | | | |
| 12 | RA6T2 | R7FA6T2BD3CFP | PLQP0100K* | 62 | | | |
| 13 | RA6T2 | R7FA6T2AB3CNB | PWQN0064L* | 63 | | | |
| 14 | RA6T2 | R7FA6T2AD3CNB | PWQN0064L* | 64 | | | |
| 15 | RA6T2 | R7FA6T2BB3CNB | PWQN0064L* | 65 | | | |
| 16 | RA6T2 | R7FA6T2BD3CNB | PWQN0064L* | 66 | | | |
| 17 | RA6T2 | R7FA6T2AB3CNE | PWQN0048K* | 67 | | | |
| 18 | RA6T2 | R7FA6T2AD3CNE | PWQN0048K* | 68 | | | |
| 19 | RA6T2 | R7FA6T2BB3CNE | PWQN0048K* | 69 | | | |
| 20 | RA6T2 | R7FA6T2BD3CNE | PWQN0048K* | 70 | | | |
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