

RENESAS SEMICONDUCTOR RELIABILITY REPORT

GROUP : RX220
DEVICE : R5F5220XXX
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) | JEITA ED-4701/302 | +/-1000V,1time | 0/3 | Class: Equivalent to C2b |
| 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)

$$\lambda_b = 2.3 \text{ FIT}$$

Unique failure rate at $T_a = 55^\circ\text{C}$ 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 $E_a = 0.5 \text{ eV}$ | | | | | | | | | | | | |
|--|------|------|----|------|------|------|------|------|------|------|------|-------|
| T_a ($^\circ\text{C}$) | 40 | 50 | 55 | 60 | 65 | 70 | 75 | 80 | 85 | 90 | 100 | 110 |
| πT | 0.43 | 0.76 | 1 | 1.30 | 1.69 | 2.17 | 2.76 | 3.50 | 4.40 | 5.50 | 8.44 | 12.67 |

•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 | RX220 | R5F52201BDFK | PLQP0064G* | 51 | | | |
| 2 | RX220 | R5F52201BGFK | PLQP0064G* | 52 | | | |
| 3 | RX220 | R5F52203BDFK | PLQP0064G* | 53 | | | |
| 4 | RX220 | R5F52203BGFK | PLQP0064G* | 54 | | | |
| 5 | RX220 | R5F52205BDFK | PLQP0064G* | 55 | | | |
| 6 | RX220 | R5F52205BGFK | PLQP0064G* | 56 | | | |
| 7 | RX220 | R5F52206BDFK | PLQP0064G* | 57 | | | |
| 8 | RX220 | R5F52206BGFK | PLQP0064G* | 58 | | | |
| 9 | RX220 | R5F52201BDFL | PLQP0048K* | 59 | | | |
| 10 | RX220 | R5F52201BGFL | PLQP0048K* | 60 | | | |
| 11 | RX220 | R5F52203BDFL | PLQP0048K* | 61 | | | |
| 12 | RX220 | R5F52203BGFL | PLQP0048K* | 62 | | | |
| 13 | RX220 | R5F52205BDFL | PLQP0048K* | 63 | | | |
| 14 | RX220 | R5F52205BGFL | PLQP0048K* | 64 | | | |
| 15 | RX220 | R5F52206BDFL | PLQP0048K* | 65 | | | |
| 16 | RX220 | R5F52206BGFL | PLQP0048K* | 66 | | | |
| 17 | RX220 | R5F52201BDFM | PLQP0064K* | 67 | | | |
| 18 | RX220 | R5F52201BGFM | PLQP0064K* | 68 | | | |
| 19 | RX220 | R5F52203BDFM | PLQP0064K* | 69 | | | |
| 20 | RX220 | R5F52203BGFM | PLQP0064K* | 70 | | | |
| 21 | RX220 | R5F52205BDFM | PLQP0064K* | 71 | | | |
| 22 | RX220 | R5F52205BGFM | PLQP0064K* | 72 | | | |
| 23 | RX220 | R5F52206BDFM | PLQP0064K* | 73 | | | |
| 24 | RX220 | R5F52206BGFM | PLQP0064K* | 74 | | | |
| 25 | RX220 | R5F52203BDFF | PLQP0100K* | 75 | | | |
| 26 | RX220 | R5F52203BGFF | PLQP0100K* | 76 | | | |
| 27 | RX220 | R5F52205BDFF | PLQP0100K* | 77 | | | |
| 28 | RX220 | R5F52205BGFF | PLQP0100K* | 78 | | | |
| 29 | RX220 | R5F52206BDFF | PLQP0100K* | 79 | | | |
| 30 | RX220 | R5F52206BGFF | PLQP0100K* | 80 | | | |
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