

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)

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

①Unique failure rate (λ_b)

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

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

②Temperature 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	R5F52201BDL	PLQP0048K*	59			
10	RX220	R5F52201BDL	PLQP0048K*	60			
11	RX220	R5F52203BDL	PLQP0048K*	61			
12	RX220	R5F52203BDL	PLQP0048K*	62			
13	RX220	R5F52205BDL	PLQP0048K*	63			
14	RX220	R5F52205BDL	PLQP0048K*	64			
15	RX220	R5F52206BDL	PLQP0048K*	65			
16	RX220	R5F52206BDL	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	R5F52203BDFP	PLQP0100K*	75			
26	RX220	R5F52203BGFP	PLQP0100K*	76			
27	RX220	R5F52205BDFP	PLQP0100K*	77			
28	RX220	R5F52205BGFP	PLQP0100K*	78			
29	RX220	R5F52206BDFP	PLQP0100K*	79			
30	RX220	R5F52206BGFP	PLQP0100K*	80			
31				81			
32				82			
33				83			
34				84			
35				85			
36				86			
37				87			
38				88			
39				89			
40				90			
41				91			
42				92			
43				93			
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46				96			
47				97			
48				98			
49				99			
50				100			