

RENESAS SEMICONDUCTOR RELIABILITY REPORT

GROUP : RX130
DEVICE : R5F5130XXX
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 .

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)	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)

$$\lambda_b = 3.8 \text{ FIT}$$

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	RX130	R5F51303ADFK	PLQP0064G*	51	RX130	R5F51305BDFP	PLQP0100K*
2	RX130	R5F51303AGFK	PLQP0064G*	52	RX130	R5F51305BGFP	PLQP0100K*
3	RX130	R5F51305ADFK	PLQP0064G*	53	RX130	R5F51306ADFP	PLQP0100K*
4	RX130	R5F51305AGFK	PLQP0064G*	54	RX130	R5F51306AGFP	PLQP0100K*
5	RX130	R5F51306ADFK	PLQP0064G*	55	RX130	R5F51306BDFP	PLQP0100K*
6	RX130	R5F51306AGFK	PLQP0064G*	56	RX130	R5F51306BGFP	PLQP0100K*
7	RX130	R5F51306BDFK	PLQP0064G*	57	RX130	R5F51307ADFP	PLQP0100K*
8	RX130	R5F51306BGFK	PLQP0064G*	58	RX130	R5F51307AGFP	PLQP0100K*
9	RX130	R5F51307ADFK	PLQP0064G*	59	RX130	R5F51308ADFP	PLQP0100K*
10	RX130	R5F51307AGFK	PLQP0064G*	60	RX130	R5F51308AGFP	PLQP0100K*
11	RX130	R5F51308ADFK	PLQP0064G*	61	RX130	R5F51303ADNE	PWQN0048K*
12	RX130	R5F51308AGFK	PLQP0064G*	62	RX130	R5F51303AGNE	PWQN0048K*
13	RX130	R5F51303ADFL	PLQP0048K*	63	RX130	R5F51305ADNE	PWQN0048K*
14	RX130	R5F51303AGFL	PLQP0048K*	64	RX130	R5F51305AGNE	PWQN0048K*
15	RX130	R5F51305ADFL	PLQP0048K*	65	RX130	R5F51306BDNE	PWQN0048K*
16	RX130	R5F51305AGFL	PLQP0048K*	66	RX130	R5F51306BGNE	PWQN0048K*
17	RX130	R5F51306ADFL	PLQP0048K*	67	RX130	R5F51307ADNE	PWQN0048K*
18	RX130	R5F51306AGFL	PLQP0048K*	68	RX130	R5F51307AGNE	PWQN0048K*
19	RX130	R5F51306BDFL	PLQP0048K*	69	RX130	R5F51308ADNE	PWQN0048K*
20	RX130	R5F51306BGFL	PLQP0048K*	70	RX130	R5F51308AGNE	PWQN0048K*
21	RX130	R5F51307ADFL	PLQP0048K*	71			
22	RX130	R5F51307AGFL	PLQP0048K*	72			
23	RX130	R5F51308ADFL	PLQP0048K*	73			
24	RX130	R5F51308AGFL	PLQP0048K*	74			
25	RX130	R5F51303ADFM	PLQP0064K*	75			
26	RX130	R5F51303AGFM	PLQP0064K*	76			
27	RX130	R5F51305ADFM	PLQP0064K*	77			
28	RX130	R5F51305AGFM	PLQP0064K*	78			
29	RX130	R5F51306ADFM	PLQP0064K*	79			
30	RX130	R5F51306AGFM	PLQP0064K*	80			
31	RX130	R5F51306BDFM	PLQP0064K*	81			
32	RX130	R5F51306BGFM	PLQP0064K*	82			
33	RX130	R5F51307ADFM	PLQP0064K*	83			
34	RX130	R5F51307AGFM	PLQP0064K*	84			
35	RX130	R5F51308ADFM	PLQP0064K*	85			
36	RX130	R5F51308AGFM	PLQP0064K*	86			
37	RX130	R5F51303ADFN	PLQP0080K*	87			
38	RX130	R5F51303AGFN	PLQP0080K*	88			
39	RX130	R5F51305ADFN	PLQP0080K*	89			
40	RX130	R5F51305AGFN	PLQP0080K*	90			
41	RX130	R5F51306ADFN	PLQP0080K*	91			
42	RX130	R5F51306AGFN	PLQP0080K*	92			
43	RX130	R5F51306BDFN	PLQP0080K*	93			
44	RX130	R5F51306BGFN	PLQP0080K*	94			
45	RX130	R5F51307ADFN	PLQP0080K*	95			
46	RX130	R5F51307AGFN	PLQP0080K*	96			
47	RX130	R5F51308ADFN	PLQP0080K*	97			
48	RX130	R5F51308AGFN	PLQP0080K*	98			
49	RX130	R5F51305ADFP	PLQP0100K*	99			
50	RX130	R5F51305AGFP	PLQP0100K*	100			