Report No. MCR-22-0323
April 26,2022

RENESAS SEMICONDUCTOR RELIABILITY REPORT

GROUP : RX72N

DEVICE : R5F572NXXX

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 ℃, Vccmax, 1000 hrs	0/22	
High Temperature Storage Life (HTSL)	JESD22-A103	Ta=150 ℃, 1000 hrs	0/22	
Temperature Humidity bias (THB) (*1)	JESD22-A101	Ta=85 ℃, RH=85 %, Vccmax, 1000 hrs	0/22	
Temperature Cycling (TC) (*1)	JESD22-A104	Ta=-65 ℃ to 150 ℃ , 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 ℃, 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 .

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Table. Reliability test results (BGA)

Test Items	Reference	Test Conditions	Results Failure/Size	Comment
High Temperature Operating Life (HTOL)	JESD22-A108	Ta=125 ℃, Vccmax, 1000 hrs	0/22	
High Temperature Storage Life (HTSL)	JESD22-A103	Ta=150 ℃, 1000 hrs	0/22	
Temperature Humidity bias (THB) (*1)	JESD22-A101	Ta=85 ℃, RH=85 %, Vccmax, 1000 hrs	0/22	
Temperature Cycling (TC) (*1)	JESD22-A104	Ta=-55 ℃ to 125 ℃ , 500 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
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 .

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Table. Reliability test results (LGA)

Test Items	Reference	Test Conditions	Results Failure/Size	Comment
High Temperature Operating Life (HTOL)	JESD22-A108	Ta=125 ℃, Vccmax, 1000 hrs	0/22	
High Temperature Storage Life (HTSL)	JESD22-A103	Ta=150 ℃, 1000 hrs	0/22	
Temperature Humidity bias (THB) (*1)	JESD22-A101	Ta=85 ℃, RH=85 %, Vccmax, 1000 hrs	0/22	
Temperature Cycling (TC) (*1)	JESD22-A104	Ta=-55 ℃ to 125 ℃ , 500 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
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 .

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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)

$$\lambda = \lambda b \times \pi T \quad (FIT)$$

①Unique failure rate (λb)

λb= 0.08 FIT

Unique failure rate at Ta=55 ℃ using 60 % confidence level.

②Temperature term (πT)

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

Ea : Activation energy (eV)
Ta : Ambient temperature (℃)

πT simplified chart as Ea=0.7 eV												
Ta (℃)	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)

$$MTTF = 1/\lambda$$

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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
1	RX72N	R5F572NDDDBD	PLBG0224G*
2	RX72N	R5F572NDDGBD	PLBG0224G*
3	RX72N	R5F572NDHDBD	PLBG0224G*
4	RX72N	R5F572NDHGBD	PLBG0224G*
5	RX72N	R5F572NNDDBD	PLBG0224G*
6	RX72N	R5F572NNDGBD	PLBG0224G*
7	RX72N	R5F572NNHDBD	PLBG0224G*
8	RX72N	R5F572NNHGBD	PLBG0224G*
9	RX72N	R5F572NDDDBG	PLBG0176G*
10	RX72N	R5F572NDDGBG	PLBG0176G*
11	RX72N	R5F572NDHDBG	PLBG0176G*
12	RX72N	R5F572NDHGBG	PLBG0176G*
13	RX72N	R5F572NNDDBG	PLBG0176G*
14	RX72N	R5F572NNDGBG	PLBG0176G*
15	RX72N	R5F572NNHDBG	PLBG0176G*
16	RX72N	R5F572NNHGBG	PLBG0176G*
17	RX72N	R5F572NDDDFB	PLQP0144K*
18	RX72N	R5F572NDDGFB	PLQP0144K*
19	RX72N	R5F572NDHDFB	PLQP0144K*
20	RX72N	R5F572NDHGFB	PLQP0144K*
21	RX72N	R5F572NNDDFB	PLQP0144K*
22	RX72N	R5F572NNDGFB	PLQP0144K*
23	RX72N	R5F572NNHDFB	PLQP0144K*
24	RX72N	R5F572NNHGFB	PLQP0144K*
25	RX72N	R5F572NDDDFC	PLQP0176K*
26	RX72N	R5F572NDDGFC	PLQP0176K*
27	RX72N	R5F572NDHDFC	PLQP0176K*
28	RX72N	R5F572NDHGFC	PLQP0176K*
29	RX72N	R5F572NNDDFC	PLQP0176K*
30	RX72N	R5F572NNDGFC	PLQP0176K*
31	RX72N	R5F572NNHDFC	PLQP0176K*
32	RX72N	R5F572NNHGFC	PLQP0176K*
33	RX72N	R5F572NDDDFP	PLQP0100K*
34	RX72N	R5F572NDDGFP	PLQP0100K*
35	RX72N	R5F572NDHDFP	PLQP0100K*
36	RX72N	R5F572NDHGFP	PLQP0100K*
37	RX72N	R5F572NNDDFP	PLQP0100K*
38	RX72N	R5F572NNDGFP	PLQP0100K*
39	RX72N	R5F572NNHDFP	PLQP0100K*
40	RX72N	R5F572NNHGFP	PLQP0100K*
41	RX72N	R5F572NDDDLK	PTLG0145K*
42	RX72N	R5F572NDDGLK	PTLG0145K*
43	RX72N	R5F572NDHDLK	PTLG0145K*
44	RX72N	R5F572NDHGLK	PTLG0145K*
45	RX72N	R5F572NNDDLK	PTLG0145K*
46	RX72N	R5F572NNDGLK	PTLG0145K*
47	RX72N	R5F572NNHDLK	PTLG0145K*
48	RX72N	R5F572NNHGLK	PTLG0145K*
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No	Group	Product part number	Package code
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