Report No. MCR-22-0322
April 26,2022

RENESAS SEMICONDUCTOR RELIABILITY REPORT

GROUP : RX72M

DEVICE : R5F572MXXX

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 .

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 .

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)

$$MTTF = 1/\lambda$$

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	RX72M	R5F572MDDDBD	PLBG0224G*	51			
2	RX72M	R5F572MDDGBD	PLBG0224G*	52			
3	RX72M	R5F572MDHDBD	PLBG0224G*	53			
4	RX72M	R5F572MDHGBD	PLBG0224G*	54			
5	RX72M	R5F572MNDDBD	PLBG0224G*	55			
6	RX72M	R5F572MNDGBD	PLBG0224G*	56			
7	RX72M	R5F572MNHDBD	PLBG0224G*	57			
8	RX72M	R5F572MNHGBD	PLBG0224G*	58			
9	RX72M	R5F572MDDDBG	PLBG0176G*	59			
10	RX72M	R5F572MDDGBG	PLBG0176G*	60			
11	RX72M	R5F572MDHDBG	PLBG0176G*	61			
12	RX72M	R5F572MDHGBG	PLBG0176G*	62			
13	RX72M	R5F572MNDDBG	PLBG0176G*	63			
14	RX72M	R5F572MNDGBG	PLBG0176G*	64			
15	RX72M	R5F572MNHDBG	PLBG0176G*	65			
16	RX72M	R5F572MNHGBG	PLBG0176G*	66			
17	RX72M	R5F572MDDDFB	PLQP0144K*	67			
18	RX72M	R5F572MDDGFB	PLQP0144K*	68			
19	RX72M	R5F572MDHDFB	PLQP0144K*	69			
20	RX72M	R5F572MDHGFB	PLQP0144K*	70			
21	RX72M	R5F572MDYDFB	PLQP0144K*	71			
22	RX72M	R5F572MDYGFB	PLQP0144K*	72			
23	RX72M	R5F572MDZDFB	PLQP0144K*	73			
24	RX72M	R5F572MDZGFB	PLQP0144K*	74			
25	RX72M	R5F572MNDDFB	PLQP0144K*	75			
26	RX72M	R5F572MNDGFB	PLQP0144K*	76			
27	RX72M	R5F572MNHDFB	PLQP0144K*	77			
28	RX72M	R5F572MNHGFB	PLQP0144K*	78			
29	RX72M	R5F572MDDDFC	PLQP0176K*	79			
30	RX72M	R5F572MDDGFC	PLQP0176K*	80			
31	RX72M	R5F572MDHDFC	PLQP0176K*	81			
32	RX72M	R5F572MDHGFC	PLQP0176K*	82			
33	RX72M	R5F572MNDDFC	PLQP0176K*	83			
34	RX72M	R5F572MNDGFC	PLQP0176K*	84			
35	RX72M	R5F572MNHDFC	PLQP0176K*	85			
36	RX72M	R5F572MNHGFC	PLQP0176K*	86			
37	RX72M	R5F572MDDDFP	PLQP0100K*	87			
38	RX72M	R5F572MDDGFP	PLQP0100K*	88			
39	RX72M	R5F572MDHDFP	PLQP0100K*	89			
40	RX72M	R5F572MDHGFP	PLQP0100K*	90			
41	RX72M	R5F572MNDDFP	PLQP0100K*	91			
42	RX72M	R5F572MNDGFP	PLQP0100K*	92			
43	RX72M	R5F572MNHDFP	PLQP0100K*	93			
44	RX72M	R5F572MNHGFP	PLQP0100K*	94			
45				95			
46				96			
47				97			
48				98			
49				99			
50				100			