Report No. MCR-22-0315
April 26,2022

RENESAS SEMICONDUCTOR RELIABILITY REPORT

GROUP : RX64M

DEVICE : R5F564MXXX

APPLICATION : Consumer / Industry

Quality Assurance Div.
Renesas Electronics Corporation

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(Rev.5.0-2 October 2020)

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)	JEITA ED-4701/302	+/-1000V,1time	0/3	Class: Equivalent to C2b
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)	JEITA ED-4701/302	+/-1000V,1time	0/3	Class: Equivalent to C2b
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 (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)	JEITA ED-4701/302	+/-1000V,1time	0/3	Class: Equivalent to C2b
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= 0.04 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
1	RX64M	R5F564MFCDBG	PLBG0176G*
2	RX64M	R5F564MFDDBG	PLBG0176G*
3	RX64M	R5F564MFGDBG	PLBG0176G*
4	RX64M	R5F564MFHDBG	PLBG0176G*
5	RX64M	R5F564MGCDBG	PLBG0176G*
6	RX64M	R5F564MGDDBG	PLBG0176G*
7	RX64M	R5F564MGGDBG	PLBG0176G*
8	RX64M	R5F564MGHDBG	PLBG0176G*
9	RX64M	R5F564MJCDBG	PLBG0176G*
10	RX64M	R5F564MJDDBG	PLBG0176G*
11	RX64M	R5F564MJGDBG	PLBG0176G*
12	RX64M	R5F564MJHDBG	PLBG0176G*
13	RX64M	R5F564MLCDBG	PLBG0176G*
14	RX64M	R5F564MLDDBG	PLBG0176G*
15	RX64M	R5F564MLGDBG	PLBG0176G*
16	RX64M	R5F564MLHDBG	PLBG0176G*
17	RX64M	R5F564MFCDFB	PLQP0144K*
18	RX64M	R5F564MFCGFB	PLQP0144K*
19	RX64M	R5F564MFDDFB	PLQP0144K*
20	RX64M	R5F564MFDGFB	PLQP0144K*
21	RX64M	R5F564MFGDFB	PLQP0144K*
22	RX64M	R5F564MFGGFB	PLQP0144K*
23	RX64M	R5F564MFHDFB	PLQP0144K*
24	RX64M	R5F564MFHGFB	PLQP0144K*
25	RX64M	R5F564MGCDFB	PLQP0144K*
26	RX64M	R5F564MGCGFB	PLQP0144K*
27	RX64M	R5F564MGDDFB	PLQP0144K*
28	RX64M	R5F564MGDGFB	PLQP0144K*
29	RX64M	R5F564MGGDFB	PLQP0144K*
30	RX64M	R5F564MGGGFB	PLQP0144K*
31	RX64M	R5F564MGHDFB	PLQP0144K*
32	RX64M	R5F564MGHGFB	PLQP0144K*
33	RX64M	R5F564MJCDFB	PLQP0144K*
34	RX64M	R5F564MJCGFB	PLQP0144K*
35	RX64M	R5F564MJDDFB	PLQP0144K*
36	RX64M	R5F564MJDGFB	PLQP0144K*
37	RX64M	R5F564MJGDFB	PLQP0144K*
38	RX64M	R5F564MJGGFB	PLQP0144K*
39	RX64M	R5F564MJHDFB	PLQP0144K*
40	RX64M	R5F564MJHGFB	PLQP0144K*
41	RX64M	R5F564MLCDFB	PLQP0144K*
42	RX64M	R5F564MLCGFB	PLQP0144K*
43	RX64M	R5F564MLDDFB	PLQP0144K*
44	RX64M	R5F564MLDGFB	PLQP0144K*
45	RX64M	R5F564MLGDFB	PLQP0144K*
46	RX64M	R5F564MLGGFB	PLQP0144K*
47	RX64M	R5F564MLHDFB	PLQP0144K*
48	RX64M	R5F564MLHGFB	PLQP0144K*
49	RX64M	R5F564MFCDFC	PLQP0176K*
50	RX64M	R5F564MFCGFC	PLQP0176K*

No	Group	Product part number	Package code
51	RX64M	R5F564MFDDFC	PLQP0176K*
52	RX64M	R5F564MFDGFC	PLQP0176K*
53	RX64M	R5F564MFGDFC	PLQP0176K*
54	RX64M	R5F564MFGGFC	PLQP0176K*
55	RX64M	R5F564MFHDFC	PLQP0176K*
56	RX64M	R5F564MFHGFC	PLQP0176K*
57	RX64M	R5F564MGCDFC	PLQP0176K*
58	RX64M	R5F564MGCGFC	PLQP0176K*
59	RX64M	R5F564MGDDFC	PLQP0176K*
60	RX64M	R5F564MGDGFC	PLQP0176K*
61	RX64M	R5F564MGGDFC	PLQP0176K*
62	RX64M	R5F564MGGGFC	PLQP0176K*
63	RX64M	R5F564MGHDFC	PLQP0176K*
64	RX64M	R5F564MGHGFC	PLQP0176K*
65	RX64M	R5F564MJCDFC	PLQP0176K*
66	RX64M	R5F564MJCGFC	PLQP0176K*
67	RX64M	R5F564MJDDFC	PLQP0176K*
68	RX64M	R5F564MJDGFC	PLQP0176K*
69	RX64M	R5F564MJGDFC	PLQP0176K*
70	RX64M	R5F564MJGGFC	PLQP0176K*
71	RX64M	R5F564MJHDFC	PLQP0176K*
72	RX64M	R5F564MJHGFC	PLQP0176K*
73	RX64M	R5F564MLCDFC	PLQP0176K*
74	RX64M	R5F564MLCGFC	PLQP0176K*
75	RX64M	R5F564MLDDFC	PLQP0176K*
76	RX64M	R5F564MLDGFC	PLQP0176K*
77	RX64M	R5F564MLGDFC	PLQP0176K*
78	RX64M	R5F564MLGGFC	PLQP0176K*
79	RX64M	R5F564MLHDFC	PLQP0176K*
80	RX64M	R5F564MLHGFC	PLQP0176K*
81	RX64M	R5F564MFCDFP	PLQP0100K*
82	RX64M	R5F564MFCGFP	PLQP0100K*
83	RX64M	R5F564MFDDFP	PLQP0100K*
84	RX64M	R5F564MFDGFP	PLQP0100K*
85	RX64M	R5F564MFGDFP	PLQP0100K*
86	RX64M	R5F564MFGGFP	PLQP0100K*
87	RX64M	R5F564MFHDFP	PLQP0100K*
88	RX64M	R5F564MFHGFP	PLQP0100K*
89	RX64M	R5F564MGCDFP	PLQP0100K*
90	RX64M	R5F564MGCGFP	PLQP0100K*
91	RX64M	R5F564MGDDFP	PLQP0100K*
92	RX64M	R5F564MGDGFP	PLQP0100K*
93	RX64M	R5F564MGGDFP	PLQP0100K*
94	RX64M	R5F564MGGGFP	PLQP0100K*
95	RX64M	R5F564MGHDFP	PLQP0100K*
96	RX64M	R5F564MGHGFP	PLQP0100K*
97	RX64M	R5F564MJCDFP	PLQP0100K*
98	RX64M	R5F564MJCGFP	PLQP0100K*
99	RX64M	R5F564MJDDFP	PLQP0100K*
100	RX64M	R5F564MJDGFP	PLQP0100K*

Table. Product list

No	Group	Product part number	Package code
101	RX64M	R5F564MJGDFP	PLQP0100K*
102	RX64M	R5F564MJGGFP	PLQP0100K*
103	RX64M	R5F564MJHDFP	PLQP0100K*
104	RX64M	R5F564MJHGFP	PLQP0100K*
105	RX64M	R5F564MLCDFP	PLQP0100K*
106	RX64M	R5F564MLCGFP	PLQP0100K*
107	RX64M	R5F564MLDDFP	PLQP0100K*
108	RX64M	R5F564MLDGFP	PLQP0100K*
109	RX64M	R5F564MLGDFP	PLQP0100K*
110	RX64M	R5F564MLGGFP	PLQP0100K*
111	RX64M	R5F564MLHDFP	PLQP0100K*
112	RX64M	R5F564MLHGFP	PLQP0100K*
113	RX64M	R5F564MFCDLC	PTLG0177K*
114	RX64M	R5F564MFDDLC	PTLG0177K*
115	RX64M	R5F564MFGDLC	PTLG0177K*
116	RX64M	R5F564MFHDLC	PTLG0177K*
117	RX64M	R5F564MGCDLC	PTLG0177K*
118	RX64M	R5F564MGDDLC	PTLG0177K*
119	RX64M	R5F564MGGDLC	PTLG0177K*
120	RX64M	R5F564MGHDLC	PTLG0177K*
121	RX64M	R5F564MJCDLC	PTLG0177K*
122	RX64M	R5F564MJDDLC	PTLG0177K*
123	RX64M	R5F564MJGDLC	PTLG0177K*
124	RX64M	R5F564MJHDLC	PTLG0177K*
125	RX64M	R5F564MLCDLC	PTLG0177K*
126	RX64M	R5F564MLDDLC	PTLG0177K*
127	RX64M	R5F564MLGDLC	PTLG0177K*
128	RX64M	R5F564MLHDLC	PTLG0177K*
129	RX64M	R5F564MFCDLJ	PTLG0100J*
130	RX64M	R5F564MFDDLJ	PTLG0100J*
131	RX64M	R5F564MFGDLJ	PTLG0100J*
132	RX64M	R5F564MFHDLJ	PTLG0100J*
133	RX64M	R5F564MGCDLJ	PTLG0100J*
134	RX64M	R5F564MGDDLJ	PTLG0100J*
135	RX64M	R5F564MGGDLJ	PTLG0100J*
136	RX64M	R5F564MGHDLJ	PTLG0100J*
137	RX64M	R5F564MJCDLJ	PTLG0100J*
138	RX64M	R5F564MJDDLJ	PTLG0100J*
139	RX64M	R5F564MJGDLJ	PTLG0100J*
140	RX64M	R5F564MJHDLJ	PTLG0100J*
141	RX64M	R5F564MLCDLJ	PTLG0100J*
142	RX64M	R5F564MLDDLJ	PTLG0100J*
143	RX64M	R5F564MLGDLJ	PTLG0100J*
144	RX64M	R5F564MLHDLJ	PTLG0100J*
145	RX64M	R5F564MFCDLK	PTLG0145K*
146	RX64M	R5F564MFDDLK	PTLG0145K*
147	RX64M	R5F564MFGDLK	PTLG0145K*
148	RX64M	R5F564MFHDLK	PTLG0145K*
149	RX64M	R5F564MGCDLK	PTLG0145K*
150	RX64M	R5F564MGDDLK	PTLG0145K*
151	RX64M	R5F564MGGDLK	PTLG0145K*
152	RX64M	R5F564MGHDLK	PTLG0145K*
153	RX64M	R5F564MJCDLK	PTLG0145K*
154	RX64M	R5F564MJDDLK	PTLG0145K*
155	RX64M	R5F564MJGDLK	PTLG0145K*
156	RX64M	R5F564MJHDLK	PTLG0145K*
157	RX64M	R5F564MLCDLK	PTLG0145K*
158	RX64M	R5F564MLDDLK	PTLG0145K*
159	RX64M	R5F564MLGDLK	PTLG0145K*
160	RX64M	R5F564MLHDLK	PTLG0145K*

No	Group	Product part number	Package code
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