Report No. MCR-22-0480-B
March 01,2023

RENESAS SEMICONDUCTOR RELIABILITY REPORT

GROUP : RL78/G23

DEVICE : R7F100GXXX

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)	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 (QFN)

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 (SOP)

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 .

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= 4.1 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
	SOP	PxSP
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	RL78/G23	R7F100GBF2DFP	PLQP0032G*
2	RL78/G23	R7F100GBF3CFP	PLQP0032G*
3	RL78/G23	R7F100GBG2DFP	PLQP0032G*
4	RL78/G23	R7F100GBG3CFP	PLQP0032G*
5	RL78/G23	R7F100GGF2DFB	PLQP0048K*
6	RL78/G23	R7F100GGF3CFB	PLQP0048K*
7	RL78/G23	R7F100GGG2DFB	PLQP0048K*
8	RL78/G23	R7F100GGG3CFB	PLQP0048K*
9	RL78/G23	R7F100GLF2DFB	PLQP0064K*
10	RL78/G23	R7F100GLF3CFB	PLQP0064K*
11	RL78/G23	R7F100GLG2DFB	PLQP0064K*
12	RL78/G23	R7F100GLG3CFB	PLQP0064K*
13	RL78/G23	R7F100GGK2DFB	PLQP0048K*
14	RL78/G23	R7F100GGK3CFB	PLQP0048K*
15	RL78/G23	R7F100GGL2DFB	PLQP0048K*
16	RL78/G23	R7F100GGL3CFB	PLQP0048K*
17	RL78/G23	R7F100GGN2DFB	PLQP0048K*
18	RL78/G23	R7F100GGN3CFB	PLQP0048K*
19	RL78/G23	R7F100GLK2DFB	PLQP0064K*
20	RL78/G23	R7F100GLK3CFB	PLQP0064K*
21	RL78/G23	R7F100GLL2DFB	PLQP0064K*
22	RL78/G23	R7F100GLL3CFB	PLQP0064K*
23	RL78/G23	R7F100GLN2DFB	PLQP0064K*
24	RL78/G23	R7F100GLN3CFB	PLQP0064K*
25	RL78/G23	R7F100GPG2DFB	PLQP0100K*
26	RL78/G23	R7F100GPG3CFB	PLQP0100K*
27	RL78/G23	R7F100GPH2DFB	PLQP0100K*
28	RL78/G23	R7F100GPH3CFB	PLQP0100K*
29	RL78/G23	R7F100GPJ2DFB	PLQP0100K*
30	RL78/G23	R7F100GPJ3CFB	PLQP0100K*
31	RL78/G23	R7F100GPK2DFB	PLQP0100K*
32	RL78/G23	R7F100GPK3CFB	PLQP0100K*
33	RL78/G23	R7F100GPL2DFB	PLQP0100K*
34	RL78/G23	R7F100GPL3CFB	PLQP0100K*
35	RL78/G23	R7F100GPN2DFB	PLQP0100K*
36	RL78/G23	R7F100GPN3CFB	PLQP0100K*
37	RL78/G23	R7F100GGH2DFB	PLQP0048K*
38	RL78/G23	R7F100GGH3CFB	PLQP0048K*
39	RL78/G23	R7F100GGJ2DFB	PLQP0048K*
40	RL78/G23	R7F100GGJ3CFB	PLQP0048K*
41	RL78/G23	R7F100GLH2DFB	PLQP0064K*
42	RL78/G23	R7F100GLH3CFB	PLQP0064K*
43	RL78/G23	R7F100GLJ2DFB	PLQP0064K*
44	RL78/G23	R7F100GLJ3CFB	PLQP0064K*
45	RL78/G23	R7F100GMG2DFB	PLQP0080K*
46	RL78/G23	R7F100GMG3CFB	PLQP0080K*
47	RL78/G23	R7F100GMH2DFB	PLQP0080K*
48	RL78/G23	R7F100GMH3CFB	PLQP0080K*
49	RL78/G23	R7F100GMJ2DFB	PLQP0080K*
50	RL78/G23	R7F100GMJ3CFB	PLQP0080K*
51	RL78/G23	R7F100GMG2DFA	PLQP0080J*
52	RL78/G23	R7F100GMG3CFA	PLQP0080J*
53	RL78/G23	R7F100GMH2DFA	PLQP0080J*
54	RL78/G23	R7F100GMH3CFA	PLQP0080J*
55	RL78/G23	R7F100GMJ2DFA	PLQP0080J*
56	RL78/G23	R7F100GMJ3CFA	PLQP0080J*
57	RL78/G23	R7F100GBH2DFP	PLQP0032G*
58	RL78/G23	R7F100GBH3CFP	PLQP0032G*
59	RL78/G23	R7F100GBJ2DFP	PLQP0032G*
60	RL78/G23	R7F100GBJ3CFP	PLQP0032G*
61	RL78/G23	R7F100GJH2DFA	PLQP0052J*
62	RL78/G23	R7F100GJH3CFA	PLQP0052J*
63	RL78/G23	R7F100GJJ2DFA	PLQP0052J*
64	RL78/G23	R7F100GJJ3CFA	PLQP0052J*
65	RL78/G23	R7F100GMK2DFA	PLQP0080J*
66	RL78/G23	R7F100GMK2DFB	PLQP0080K*
67	RL78/G23	R7F100GMK3CFA	PLQP0080J*
68	RL78/G23	R7F100GMK3CFB	PLQP0080K*
69	RL78/G23	R7F100GML2DFA	PLQP0080J*
70	RL78/G23	R7F100GML2DFB	PLQP0080K*
71	RL78/G23	R7F100GML3CFA	PLQP0080J*
72	RL78/G23	R7F100GML3CFB	PLQP0080K*
73	RL78/G23	R7F100GMN2DFA	PLQP0080J*
74	RL78/G23	R7F100GMN2DFB	PLQP0080K*
75	RL78/G23	R7F100GMN3CFA	PLQP0080J*
76	RL78/G23	R7F100GMN3CFB	PLQP0080K*
77	RL78/G23	R7F100GJK2DFA	PLQP0052J*
78	RL78/G23	R7F100GJK3CFA	PLQP0052J*
79	RL78/G23	R7F100GJL2DFA	PLQP0052J*
80	RL78/G23	R7F100GJL3CFA	PLQP0052J*
81	RL78/G23	R7F100GJN2DFA	PLQP0052J*
82	RL78/G23	R7F100GJN3CFA	PLQP0052J*
83	RL78/G23	R7F100GFK2DFP	PLQP0044G*
84	RL78/G23	R7F100GFK3CFP	PLQP0044G*
85	RL78/G23	R7F100GFL2DFP	PLQP0044G*
86	RL78/G23	R7F100GFL3CFP	PLQP0044G*
87	RL78/G23	R7F100GFN2DFP	PLQP0044G*
88	RL78/G23	R7F100GFN3CFP	PLQP0044G*
89	RL78/G23	R7F100GLK2DFA	PLQP0064J*
90	RL78/G23	R7F100GLK3CFA	PLQP0064J*
91	RL78/G23	R7F100GLL2DFA	PLQP0064J*
92	RL78/G23	R7F100GLL3CFA	PLQP0064J*
93	RL78/G23	R7F100GLN2DFA	PLQP0064J*
94	RL78/G23	R7F100GLN3CFA	PLQP0064J*
95	RL78/G23	R7F100GPG2DFA	PLQP0100J*
96	RL78/G23	R7F100GPG3CFA	PLQP0100J*
97	RL78/G23	R7F100GPH2DFA	PLQP0100J*
98	RL78/G23	R7F100GPH3CFA	PLQP0100J*
99	RL78/G23	R7F100GPJ2DFA	PLQP0100J*
100	RL78/G23	R7F100GPJ3CFA	PLQP0100J*

Table. Product list

No	Group	Product part number	Package code
101	RL78/G23	R7F100GPK2DFA	PLQP0100J*
102	RL78/G23	R7F100GPK3CFA	PLQP0100J*
103	RL78/G23	R7F100GPL2DFA	PLQP0100J*
104	RL78/G23	R7F100GPL3CFA	PLQP0100J*
105	RL78/G23	R7F100GPN2DFA	PLQP0100J*
106	RL78/G23	R7F100GPN3CFA	PLQP0100J*
107	RL78/G23	R7F100GBF2DNP	PWQN0032K*
108	RL78/G23	R7F100GBF3CNP	PWQN0032K*
109	RL78/G23	R7F100GBG2DNP	PWQN0032K*
110	RL78/G23	R7F100GBG3CNP	PWQN0032K*
111	RL78/G23	R7F100GEF2DNP	PWQN0040K*
112	RL78/G23	R7F100GEF3CNP	PWQN0040K*
113	RL78/G23	R7F100GEG2DNP	PWQN0040K*
114	RL78/G23	R7F100GEG3CNP	PWQN0040K*
115	RL78/G23	R7F100GGF2DNP	PWQN0048K*
116	RL78/G23	R7F100GGF3CNP	PWQN0048K*
117	RL78/G23	R7F100GGG2DNP	PWQN0048K*
118	RL78/G23	R7F100GGG3CNP	PWQN0048K*
119	RL78/G23	R7F100GBH2DNP	PWQN0032K*
120	RL78/G23	R7F100GBH3CNP	PWQN0032K*
121	RL78/G23	R7F100GBJ2DNP	PWQN0032K*
122	RL78/G23	R7F100GBJ3CNP	PWQN0032K*
123	RL78/G23	R7F100GEH2DNP	PWQN0040K*
124	RL78/G23	R7F100GEH3CNP	PWQN0040K*
125	RL78/G23	R7F100GEJ2DNP	PWQN0040K*
126	RL78/G23	R7F100GEJ3CNP	PWQN0040K*
127	RL78/G23	R7F100GGH2DNP	PWQN0048K*
128	RL78/G23	R7F100GGH3CNP	PWQN0048K*
129	RL78/G23	R7F100GGJ2DNP	PWQN0048K*
130	RL78/G23	R7F100GGJ3CNP	PWQN0048K*
131	RL78/G23	R7F100GGK2DNP	PWQN0048K*
132	RL78/G23	R7F100GGK3CNP	PWQN0048K*
133	RL78/G23	R7F100GGL2DNP	PWQN0048K*
134	RL78/G23	R7F100GGL3CNP	PWQN0048K*
135	RL78/G23	R7F100GGN2DNP	PWQN0048K*
136	RL78/G23	R7F100GGN3CNP	PWQN0048K*
137	RL78/G23	R7F100GJF2DFA	PLQP0052J*
138	RL78/G23	R7F100GJF3CFA	PLQP0052J*
139	RL78/G23	R7F100GJG2DFA	PLQP0052J*
140	RL78/G23	R7F100GJG3CFA	PLQP0052J*
141	RL78/G23	R7F100GFF2DFP	PLQP0044G*
142	RL78/G23	R7F100GFF3CFP	PLQP0044G*
143	RL78/G23	R7F100GFG2DFP	PLQP0044G*
144	RL78/G23	R7F100GFG3CFP	PLQP0044G*
145	RL78/G23	R7F100GLF2DFA	PLQP0064J*
146	RL78/G23	R7F100GLF3CFA	PLQP0064J*
147	RL78/G23	R7F100GLG2DFA	PLQP0064J*
148	RL78/G23	R7F100GLG3CFA	PLQP0064J*
149	RL78/G23	R7F100GAF2DSP	PLSP0030J*
150	RL78/G23	R7F100GAF3CSP	PLSP0030J*
151	RL78/G23	R7F100GAG2DSP	PLSP0030J*
152	RL78/G23	R7F100GAG3CSP	PLSP0030J*
153	RL78/G23	R7F100GAH2DSP	PLSP0030J*
154	RL78/G23	R7F100GAH3CSP	PLSP0030J*
155	RL78/G23	R7F100GAJ2DSP	PLSP0030J*
156	RL78/G23	R7F100GAJ3CSP	PLSP0030J*
157	RL78/G23	R7F100GFH2DFP	PLQP0044G*
158	RL78/G23	R7F100GFH3CFP	PLQP0044G*
159	RL78/G23	R7F100GFJ2DFP	PLQP0044G*
160	RL78/G23	R7F100GFJ3CFP	PLQP0044G*

No	Group	Product part number	Package code
161	RL78/G23	R7F100GLH2DFA	PLQP0064J*
162	RL78/G23	R7F100GLH3CFA	PLQP0064J*
163	RL78/G23	R7F100GLJ2DFA	PLQP0064J*
164	RL78/G23	R7F100GLJ3CFA	PLQP0064J*
165	RL78/G23	R7F100GSJ2DFB	PLQP0128K*
166	RL78/G23	R7F100GSJ3CFB	PLQP0128K*
167	RL78/G23	R7F100GSK2DFB	PLQP0128K*
168	RL78/G23	R7F100GSK3CFB	PLQP0128K*
169	RL78/G23	R7F100GSL2DFB	PLQP0128K*
170	RL78/G23	R7F100GSL3CFB	PLQP0128K*
171	RL78/G23	R7F100GSN2DFB	PLQP0128K*
172	RL78/G23	R7F100GSN3CFB	PLQP0128K*
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