

RENESAS SEMICONDUCTOR RELIABILITY REPORT

GROUP : RL78/G23
DEVICE : R7F100GXXX
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)	JESD22-C101	+/-500V,1time	0/3	Class: C2
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)	JESD22-C101	+/-500V,1time	0/3	Class: C2
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 (SOP)

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)	JESD22-C101	+/-500V,1time	0/3	Class: C2
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 (LGA)

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=-55 °C to 125 °C , 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)

$$\lambda = \lambda_b \times \pi T \text{ (FIT)}$$

① Unique failure rate (λ_b)

$$\lambda_b = 4.1 \text{ FIT}$$

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
	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	No	Group	Product part number	Package code
1	RL78/G23	R7F100GBF2DFP	PLQP0032G*	51	RL78/G23	R7F100GMG2DFA	PLQP0080J*
2	RL78/G23	R7F100GBF3CFP	PLQP0032G*	52	RL78/G23	R7F100GMG3CFA	PLQP0080J*
3	RL78/G23	R7F100GBG2DFP	PLQP0032G*	53	RL78/G23	R7F100GMH2DFA	PLQP0080J*
4	RL78/G23	R7F100GBG3CFP	PLQP0032G*	54	RL78/G23	R7F100GMH3CFA	PLQP0080J*
5	RL78/G23	R7F100GGF2DFB	PLQP0048K*	55	RL78/G23	R7F100GMJ2DFA	PLQP0080J*
6	RL78/G23	R7F100GGF3CFB	PLQP0048K*	56	RL78/G23	R7F100GMJ3CFA	PLQP0080J*
7	RL78/G23	R7F100GGG2DFB	PLQP0048K*	57	RL78/G23	R7F100GBH2DFP	PLQP0032G*
8	RL78/G23	R7F100GGG3CFB	PLQP0048K*	58	RL78/G23	R7F100GBH3CFP	PLQP0032G*
9	RL78/G23	R7F100GLF2DFB	PLQP0064K*	59	RL78/G23	R7F100GBJ2DFP	PLQP0032G*
10	RL78/G23	R7F100GLF3CFB	PLQP0064K*	60	RL78/G23	R7F100GBJ3CFP	PLQP0032G*
11	RL78/G23	R7F100GLG2DFB	PLQP0064K*	61	RL78/G23	R7F100GJH2DFA	PLQP0052J*
12	RL78/G23	R7F100GLG3CFB	PLQP0064K*	62	RL78/G23	R7F100GJH3CFA	PLQP0052J*
13	RL78/G23	R7F100GGK2DFB	PLQP0048K*	63	RL78/G23	R7F100GJJ2DFA	PLQP0052J*
14	RL78/G23	R7F100GGK3CFB	PLQP0048K*	64	RL78/G23	R7F100GJJ3CFA	PLQP0052J*
15	RL78/G23	R7F100GGL2DFB	PLQP0048K*	65	RL78/G23	R7F100GMK2DFA	PLQP0080J*
16	RL78/G23	R7F100GGL3CFB	PLQP0048K*	66	RL78/G23	R7F100GMK2DFB	PLQP0080K*
17	RL78/G23	R7F100GGN2DFB	PLQP0048K*	67	RL78/G23	R7F100GMK3CFA	PLQP0080J*
18	RL78/G23	R7F100GGN3CFB	PLQP0048K*	68	RL78/G23	R7F100GMK3CFB	PLQP0080K*
19	RL78/G23	R7F100GLK2DFB	PLQP0064K*	69	RL78/G23	R7F100GML2DFA	PLQP0080J*
20	RL78/G23	R7F100GLK3CFB	PLQP0064K*	70	RL78/G23	R7F100GML2DFB	PLQP0080K*
21	RL78/G23	R7F100GLL2DFB	PLQP0064K*	71	RL78/G23	R7F100GML3CFA	PLQP0080J*
22	RL78/G23	R7F100GLL3CFB	PLQP0064K*	72	RL78/G23	R7F100GML3CFB	PLQP0080K*
23	RL78/G23	R7F100GLN2DFB	PLQP0064K*	73	RL78/G23	R7F100GMN2DFA	PLQP0080J*
24	RL78/G23	R7F100GLN3CFB	PLQP0064K*	74	RL78/G23	R7F100GMN2DFB	PLQP0080K*
25	RL78/G23	R7F100PGP2DFB	PLQP0100K*	75	RL78/G23	R7F100GMN3CFA	PLQP0080J*
26	RL78/G23	R7F100PGP3CFB	PLQP0100K*	76	RL78/G23	R7F100GMN3CFB	PLQP0080K*
27	RL78/G23	R7F100GPH2DFB	PLQP0100K*	77	RL78/G23	R7F100GJK2DFA	PLQP0052J*
28	RL78/G23	R7F100GPH3CFB	PLQP0100K*	78	RL78/G23	R7F100GJK3CFA	PLQP0052J*
29	RL78/G23	R7F100GPJ2DFB	PLQP0100K*	79	RL78/G23	R7F100GJL2DFA	PLQP0052J*
30	RL78/G23	R7F100GPJ3CFB	PLQP0100K*	80	RL78/G23	R7F100GJL3CFA	PLQP0052J*
31	RL78/G23	R7F100GPK2DFB	PLQP0100K*	81	RL78/G23	R7F100GJN2DFA	PLQP0052J*
32	RL78/G23	R7F100GPK3CFB	PLQP0100K*	82	RL78/G23	R7F100GJN3CFA	PLQP0052J*
33	RL78/G23	R7F100GPL2DFB	PLQP0100K*	83	RL78/G23	R7F100GJFK2DFP	PLQP0044G*
34	RL78/G23	R7F100GPL3CFB	PLQP0100K*	84	RL78/G23	R7F100GFK3CFP	PLQP0044G*
35	RL78/G23	R7F100GPN2DFB	PLQP0100K*	85	RL78/G23	R7F100GFL2DFP	PLQP0044G*
36	RL78/G23	R7F100GPN3CFB	PLQP0100K*	86	RL78/G23	R7F100GFL3CFP	PLQP0044G*
37	RL78/G23	R7F100GGH2DFB	PLQP0048K*	87	RL78/G23	R7F100GFN2DFP	PLQP0044G*
38	RL78/G23	R7F100GGH3CFB	PLQP0048K*	88	RL78/G23	R7F100GFN3CFP	PLQP0044G*
39	RL78/G23	R7F100GGJ2DFB	PLQP0048K*	89	RL78/G23	R7F100GLK2DFA	PLQP0064J*
40	RL78/G23	R7F100GGJ3CFB	PLQP0048K*	90	RL78/G23	R7F100GLK3CFA	PLQP0064J*
41	RL78/G23	R7F100GLH2DFB	PLQP0064K*	91	RL78/G23	R7F100GLL2DFA	PLQP0064J*
42	RL78/G23	R7F100GLH3CFB	PLQP0064K*	92	RL78/G23	R7F100GLL3CFA	PLQP0064J*
43	RL78/G23	R7F100GLJ2DFB	PLQP0064K*	93	RL78/G23	R7F100GLN2DFA	PLQP0064J*
44	RL78/G23	R7F100GLJ3CFB	PLQP0064K*	94	RL78/G23	R7F100GLN3CFA	PLQP0064J*
45	RL78/G23	R7F100GMG2DFB	PLQP0080K*	95	RL78/G23	R7F100GPG2DFA	PLQP0100J*
46	RL78/G23	R7F100GMG3CFB	PLQP0080K*	96	RL78/G23	R7F100GPG3CFA	PLQP0100J*
47	RL78/G23	R7F100GMH2DFB	PLQP0080K*	97	RL78/G23	R7F100GPH2DFA	PLQP0100J*
48	RL78/G23	R7F100GMH3CFB	PLQP0080K*	98	RL78/G23	R7F100GPH3CFA	PLQP0100J*
49	RL78/G23	R7F100GMJ2DFB	PLQP0080K*	99	RL78/G23	R7F100GPJ2DFA	PLQP0100J*
50	RL78/G23	R7F100GMJ3CFB	PLQP0080K*	100	RL78/G23	R7F100GPJ3CFA	PLQP0100J*

Table. Product list

MCR-22-0480-C

No	Group	Product part number	Package code	No	Group	Product part number	Package code
101	RL78/G23	R7F100GPK2DFA	PLQP0100J*	161	RL78/G23	R7F100GLH2DFA	PLQP0064J*
102	RL78/G23	R7F100GPK3CFA	PLQP0100J*	162	RL78/G23	R7F100GLH3CFA	PLQP0064J*
103	RL78/G23	R7F100GPL2DFA	PLQP0100J*	163	RL78/G23	R7F100GLJ2DFA	PLQP0064J*
104	RL78/G23	R7F100GPL3CFA	PLQP0100J*	164	RL78/G23	R7F100GLJ3CFA	PLQP0064J*
105	RL78/G23	R7F100GPN2DFA	PLQP0100J*	165	RL78/G23	R7F100GSJ2DFB	PLQP0128K*
106	RL78/G23	R7F100GPN3CFA	PLQP0100J*	166	RL78/G23	R7F100GSJ3CFB	PLQP0128K*
107	RL78/G23	R7F100GBF2DNP	PWQN0032K*	167	RL78/G23	R7F100GSK2DFB	PLQP0128K*
108	RL78/G23	R7F100GBF3CNP	PWQN0032K*	168	RL78/G23	R7F100GSK3CFB	PLQP0128K*
109	RL78/G23	R7F100GBG2DNP	PWQN0032K*	169	RL78/G23	R7F100GSL2DFB	PLQP0128K*
110	RL78/G23	R7F100GBG3CNP	PWQN0032K*	170	RL78/G23	R7F100GSL3CFB	PLQP0128K*
111	RL78/G23	R7F100GEF2DNP	PWQN0040K*	171	RL78/G23	R7F100GSN2DFB	PLQP0128K*
112	RL78/G23	R7F100GEF3CNP	PWQN0040K*	172	RL78/G23	R7F100GSN3CFB	PLQP0128K*
113	RL78/G23	R7F100GEG2DNP	PWQN0040K*	173	RL78/G23	R7F100GCF2DLA	PWLG0036K*
114	RL78/G23	R7F100GEG3CNP	PWQN0040K*	174	RL78/G23	R7F100GCF3CLA	PWLG0036K*
115	RL78/G23	R7F100GGF2DNP	PWQN0048K*	175	RL78/G23	R7F100GG2DLA	PWLG0036K*
116	RL78/G23	R7F100GGF3CNP	PWQN0048K*	176	RL78/G23	R7F100GCG3CLA	PWLG0036K*
117	RL78/G23	R7F100GGG2DNP	PWQN0048K*	177	RL78/G23	R7F100GLF2DLA	PWLG0064K*
118	RL78/G23	R7F100GGG3CNP	PWQN0048K*	178	RL78/G23	R7F100GLF3CLA	PWLG0064K*
119	RL78/G23	R7F100GBH2DNP	PWQN0032K*	179	RL78/G23	R7F100GLG2DLA	PWLG0064K*
120	RL78/G23	R7F100GBH3CNP	PWQN0032K*	180	RL78/G23	R7F100GLG3CLA	PWLG0064K*
121	RL78/G23	R7F100GBJ2DNP	PWQN0032K*	181	RL78/G23	R7F100GCH2DLA	PWLG0036K*
122	RL78/G23	R7F100GBJ3CNP	PWQN0032K*	182	RL78/G23	R7F100GCH3CLA	PWLG0036K*
123	RL78/G23	R7F100GEH2DNP	PWQN0040K*	183	RL78/G23	R7F100GCJ2DLA	PWLG0036K*
124	RL78/G23	R7F100GEH3CNP	PWQN0040K*	184	RL78/G23	R7F100GCJ3CLA	PWLG0036K*
125	RL78/G23	R7F100GEJ2DNP	PWQN0040K*	185	RL78/G23	R7F100GLH2DLA	PWLG0064K*
126	RL78/G23	R7F100GEJ3CNP	PWQN0040K*	186	RL78/G23	R7F100GLH3CLA	PWLG0064K*
127	RL78/G23	R7F100GGH2DNP	PWQN0048K*	187	RL78/G23	R7F100GLJ2DLA	PWLG0064K*
128	RL78/G23	R7F100GGH3CNP	PWQN0048K*	188	RL78/G23	R7F100GLJ3CLA	PWLG0064K*
129	RL78/G23	R7F100GGJ2DNP	PWQN0048K*	189	RL78/G23	R7F100GLK2DLA	PWLG0064K*
130	RL78/G23	R7F100GGJ3CNP	PWQN0048K*	190	RL78/G23	R7F100GLK3CLA	PWLG0064K*
131	RL78/G23	R7F100GGK2DNP	PWQN0048K*	191	RL78/G23	R7F100GLL2DLA	PWLG0064K*
132	RL78/G23	R7F100GGK3CNP	PWQN0048K*	192	RL78/G23	R7F100GLL3CLA	PWLG0064K*
133	RL78/G23	R7F100GGL2DNP	PWQN0048K*	193	RL78/G23	R7F100GLN2DLA	PWLG0064K*
134	RL78/G23	R7F100GGL3CNP	PWQN0048K*	194	RL78/G23	R7F100GLN3CLA	PWLG0064K*
135	RL78/G23	R7F100GGN2DNP	PWQN0048K*	195			
136	RL78/G23	R7F100GGN3CNP	PWQN0048K*	196			
137	RL78/G23	R7F100GJF2DFA	PLQP0052J*	197			
138	RL78/G23	R7F100GJF3CFA	PLQP0052J*	198			
139	RL78/G23	R7F100GJG2DFA	PLQP0052J*	199			
140	RL78/G23	R7F100GJG3CFA	PLQP0052J*	200			
141	RL78/G23	R7F100GFF2DFP	PLQP0044G*	201			
142	RL78/G23	R7F100GFF3CFP	PLQP0044G*	202			
143	RL78/G23	R7F100GFG2DFP	PLQP0044G*	203			
144	RL78/G23	R7F100GFG3CFP	PLQP0044G*	204			
145	RL78/G23	R7F100GLF2DFA	PLQP0064J*	205			
146	RL78/G23	R7F100GLF3CFA	PLQP0064J*	206			
147	RL78/G23	R7F100GLG2DFA	PLQP0064J*	207			
148	RL78/G23	R7F100GLG3CFA	PLQP0064J*	208			
149	RL78/G23	R7F100GAF2DSP	PLSP0030J*	209			
150	RL78/G23	R7F100GAF3CSP	PLSP0030J*	210			
151	RL78/G23	R7F100GAG2DSP	PLSP0030J*	211			
152	RL78/G23	R7F100GAG3CSP	PLSP0030J*	212			
153	RL78/G23	R7F100GAH2DSP	PLSP0030J*	213			
154	RL78/G23	R7F100GAH3CSP	PLSP0030J*	214			
155	RL78/G23	R7F100GAJ2DSP	PLSP0030J*	215			
156	RL78/G23	R7F100GAJ3CSP	PLSP0030J*	216			
157	RL78/G23	R7F100GFH2DFP	PLQP0044G*	217			
158	RL78/G23	R7F100GFH3CFP	PLQP0044G*	218			
159	RL78/G23	R7F100GFJ2DFP	PLQP0044G*	219			
160	RL78/G23	R7F100GFJ3CFP	PLQP0044G*	220			