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RENESAS SEMICONDUCTOR RELIABILITY REPORT

GROUP : RL78/G12

DEVICE : R5F102XXX

APPLICATION : Consumer / Industry

Quality Assurance Div.
Renesas Electronics Corporation

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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= 3.8 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	No	Group	Product part number	Package code
1	RL78/G12	R5F10266ASM	PTSP0020J*	51			
2	RL78/G12	R5F10266ASP	PLSP0020J*	52			
3	RL78/G12	R5F10266DSP	PLSP0020J*	53			
4	RL78/G12	R5F10266GSM	PTSP0020J*	54			
5	RL78/G12	R5F10266GSP	PLSP0020J*	55			
6	RL78/G12	R5F10267ASM	PTSP0020J*	56			
7	RL78/G12	R5F10267ASP	PLSP0020J*	57			
8	RL78/G12	R5F10267DSP	PLSP0020J*	58			
9	RL78/G12	R5F10267GSM	PTSP0020J*	59			
10	RL78/G12	R5F10267GSP	PLSP0020J*	60			
11	RL78/G12	R5F10268ASM	PTSP0020J*	61			
12	RL78/G12	R5F10268ASP	PLSP0020J*	62			
13	RL78/G12	R5F10268DSP	PLSP0020J*	63			
14	RL78/G12	R5F10268GSM	PTSP0020J*	64			
15	RL78/G12	R5F10268GSP	PLSP0020J*	65			
16	RL78/G12	R5F10269ASM	PTSP0020J*	66			
17	RL78/G12	R5F10269ASP	PLSP0020J*	67			
18	RL78/G12	R5F10269DSP	PLSP0020J*	68			
19	RL78/G12	R5F10269GSM	PTSP0020J*	69			
20	RL78/G12	R5F10269GSP	PLSP0020J*	70			
21	RL78/G12	R5F1026AASM	PTSP0020J*	71			
22	RL78/G12	R5F1026AASP	PLSP0020J*	72			
23	RL78/G12	R5F1026ADSP	PLSP0020J*	73			
24	RL78/G12	R5F1026AGSM	PTSP0020J*	74			
25	RL78/G12	R5F1026AGSP	PLSP0020J*	75			
26	RL78/G12	R5F10277ANA	PWQN0024K*	76			
27	RL78/G12	R5F10277DNA	PWQN0024K*	77			
28	RL78/G12	R5F10277GNA	PWQN0024K*	78			
29	RL78/G12	R5F10278ANA	PWQN0024K*	79			
30	RL78/G12	R5F10278DNA	PWQN0024K*	80			
31	RL78/G12	R5F10278GNA	PWQN0024K*	81			
32	RL78/G12	R5F10279ANA	PWQN0024K*	82			
33	RL78/G12	R5F10279DNA	PWQN0024K*	83			
34	RL78/G12	R5F10279GNA	PWQN0024K*	84			
35	RL78/G12	R5F1027AANA	PWQN0024K*	85			
36	RL78/G12	R5F1027ADNA	PWQN0024K*	86			
37	RL78/G12	R5F1027AGNA	PWQN0024K*	87			
38	RL78/G12	R5F102A7ASP	PLSP0030J*	88			
39	RL78/G12	R5F102A7DSP	PLSP0030J*	89			
40	RL78/G12	R5F102A7GSP	PLSP0030J*	90			
41	RL78/G12	R5F102A8ASP	PLSP0030J*	91			
42	RL78/G12	R5F102A8DSP	PLSP0030J*	92			
43	RL78/G12	R5F102A8GSP	PLSP0030J*	93			
44	RL78/G12	R5F102A9ASP	PLSP0030J*	94			
45	RL78/G12	R5F102A9DSP	PLSP0030J*	95			
46	RL78/G12	R5F102A9GSP	PLSP0030J*	96			
47	RL78/G12	R5F102AAASP	PLSP0030J*	97			
48	RL78/G12	R5F102AADSP	PLSP0030J*	98			
49	RL78/G12	R5F102AAGSP	PLSP0030J*	99			
50				100			