

RENESAS SEMICONDUCTOR RELIABILITY REPORT

GROUP : RX671
DEVICE : R5F5671XXX
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 (BGA)

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 .

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)

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

①Unique failure rate (λ_b)

$$\lambda_b = 0.08 \text{ FIT}$$

Unique failure rate at $T_a=55^\circ\text{C}$ using 60 % confidence level.

②Temperature 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
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	RX671	R5F56719DDBP	PTBG0064K*	51	RX671	R5F56719HDLE	PTLG0145J*
2	RX671	R5F56719DGBP	PTBG0064K*	52	RX671	R5F56719HGLE	PTLG0145J*
3	RX671	R5F56719HDBP	PTBG0064K*	53	RX671	R5F5671CDDLE	PTLG0145J*
4	RX671	R5F56719HGBP	PTBG0064K*	54	RX671	R5F5671CDGLE	PTLG0145J*
5	RX671	R5F5671CDDBP	PTBG0064K*	55	RX671	R5F5671CHDLE	PTLG0145J*
6	RX671	R5F5671CDGBP	PTBG0064K*	56	RX671	R5F5671CHGLE	PTLG0145J*
7	RX671	R5F5671CHDBP	PTBG0064K*	57	RX671	R5F5671EDDLE	PTLG0145J*
8	RX671	R5F5671CHGBP	PTBG0064K*	58	RX671	R5F5671EDGLE	PTLG0145J*
9	RX671	R5F5671EDDBP	PTBG0064K*	59	RX671	R5F5671EHDLE	PTLG0145J*
10	RX671	R5F5671EDGBP	PTBG0064K*	60	RX671	R5F5671EHGLE	PTLG0145J*
11	RX671	R5F5671EHDBP	PTBG0064K*	61	RX671	R5F56719DDLJ	PTLG0100J*
12	RX671	R5F5671EHGBP	PTBG0064K*	62	RX671	R5F56719DGLJ	PTLG0100J*
13	RX671	R5F56719DDFB	PLQP0144K*	63	RX671	R5F56719HDLJ	PTLG0100J*
14	RX671	R5F56719DGFB	PLQP0144K*	64	RX671	R5F56719HGLJ	PTLG0100J*
15	RX671	R5F56719HDFB	PLQP0144K*	65	RX671	R5F5671CDDLJ	PTLG0100J*
16	RX671	R5F56719HGFB	PLQP0144K*	66	RX671	R5F5671CDGLJ	PTLG0100J*
17	RX671	R5F5671CDDFB	PLQP0144K*	67	RX671	R5F5671CHDLJ	PTLG0100J*
18	RX671	R5F5671CDGFB	PLQP0144K*	68	RX671	R5F5671CHGLJ	PTLG0100J*
19	RX671	R5F5671CHDFB	PLQP0144K*	69	RX671	R5F5671EDDLJ	PTLG0100J*
20	RX671	R5F5671CHGFB	PLQP0144K*	70	RX671	R5F5671EDGLJ	PTLG0100J*
21	RX671	R5F5671EDDFB	PLQP0144K*	71	RX671	R5F5671EHD LJ	PTLG0100J*
22	RX671	R5F5671EDGFB	PLQP0144K*	72	RX671	R5F5671EHGLJ	PTLG0100J*
23	RX671	R5F5671EHDFB	PLQP0144K*	73	RX671	R5F56719DDLK	PTLG0145K*
24	RX671	R5F5671EHGFB	PLQP0144K*	74	RX671	R5F56719DGLK	PTLG0145K*
25	RX671	R5F56719DDFM	PLQP0064K*	75	RX671	R5F56719HDLK	PTLG0145K*
26	RX671	R5F56719DGFM	PLQP0064K*	76	RX671	R5F56719HGLK	PTLG0145K*
27	RX671	R5F56719HDFM	PLQP0064K*	77	RX671	R5F5671CDDLK	PTLG0145K*
28	RX671	R5F56719HGFM	PLQP0064K*	78	RX671	R5F5671CDGLK	PTLG0145K*
29	RX671	R5F5671CDDFM	PLQP0064K*	79	RX671	R5F5671CHDLK	PTLG0145K*
30	RX671	R5F5671CDGFM	PLQP0064K*	80	RX671	R5F5671CHGLK	PTLG0145K*
31	RX671	R5F5671CHDFM	PLQP0064K*	81	RX671	R5F5671EDDLK	PTLG0145K*
32	RX671	R5F5671CHGFM	PLQP0064K*	82	RX671	R5F5671EDGLK	PTLG0145K*
33	RX671	R5F5671EDDFM	PLQP0064K*	83	RX671	R5F5671EHDLK	PTLG0145K*
34	RX671	R5F5671EDGFM	PLQP0064K*	84	RX671	R5F5671EHGLK	PTLG0145K*
35	RX671	R5F5671EHDFM	PLQP0064K*	85	RX671	R5F56719DDNE	PWQN0048K*
36	RX671	R5F5671EHGFM	PLQP0064K*	86	RX671	R5F56719DGNE	PWQN0048K*
37	RX671	R5F56719DDFP	PLQP0100K*	87	RX671	R5F56719HDNE	PWQN0048K*
38	RX671	R5F56719DGFP	PLQP0100K*	88	RX671	R5F56719HGNE	PWQN0048K*
39	RX671	R5F56719HDFP	PLQP0100K*	89	RX671	R5F5671CDDNE	PWQN0048K*
40	RX671	R5F56719HGFP	PLQP0100K*	90	RX671	R5F5671CDGNE	PWQN0048K*
41	RX671	R5F5671CDDFP	PLQP0100K*	91	RX671	R5F5671CHDNE	PWQN0048K*
42	RX671	R5F5671CDGFP	PLQP0100K*	92	RX671	R5F5671CHGNE	PWQN0048K*
43	RX671	R5F5671CHDFP	PLQP0100K*	93	RX671	R5F5671EDDNE	PWQN0048K*
44	RX671	R5F5671CHGFP	PLQP0100K*	94	RX671	R5F5671EDGNE	PWQN0048K*
45	RX671	R5F5671EDDFP	PLQP0100K*	95	RX671	R5F5671EHDNE	PWQN0048K*
46	RX671	R5F5671EDGFP	PLQP0100K*	96	RX671	R5F5671EHGNE	PWQN0048K*
47	RX671	R5F5671EHDFP	PLQP0100K*	97			
48	RX671	R5F5671EHGFP	PLQP0100K*	98			
49	RX671	R5F56719DDLE	PTLG0145J*	99			
50	RX671	R5F56719DGLE	PTLG0145J*	100			