

RENESAS SEMICONDUCTOR RELIABILITY REPORT

GROUP : RX66N
DEVICE : R5F566NXXX
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 °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	RX66N	R5F566NDDDBD	PLBG0224G*	51			
2	RX66N	R5F566NDDGBD	PLBG0224G*	52			
3	RX66N	R5F566NDHDBD	PLBG0224G*	53			
4	RX66N	R5F566NDHGBD	PLBG0224G*	54			
5	RX66N	R5F566NNDDDBD	PLBG0224G*	55			
6	RX66N	R5F566NNDDGBD	PLBG0224G*	56			
7	RX66N	R5F566NNHDBD	PLBG0224G*	57			
8	RX66N	R5F566NNHGBD	PLBG0224G*	58			
9	RX66N	R5F566NDDDBG	PLBG0176G*	59			
10	RX66N	R5F566NDDGBG	PLBG0176G*	60			
11	RX66N	R5F566NDHDBG	PLBG0176G*	61			
12	RX66N	R5F566NDHGBG	PLBG0176G*	62			
13	RX66N	R5F566NNDDBG	PLBG0176G*	63			
14	RX66N	R5F566NNDDGBG	PLBG0176G*	64			
15	RX66N	R5F566NNHDBG	PLBG0176G*	65			
16	RX66N	R5F566NNHGBG	PLBG0176G*	66			
17	RX66N	R5F566NDDDFB	PLQP0144K*	67			
18	RX66N	R5F566NDDGFB	PLQP0144K*	68			
19	RX66N	R5F566NDHDFB	PLQP0144K*	69			
20	RX66N	R5F566NDHGFB	PLQP0144K*	70			
21	RX66N	R5F566NNDDFB	PLQP0144K*	71			
22	RX66N	R5F566NNDGFB	PLQP0144K*	72			
23	RX66N	R5F566NNHDFB	PLQP0144K*	73			
24	RX66N	R5F566NNHGFB	PLQP0144K*	74			
25	RX66N	R5F566NDDDFC	PLQP0176K*	75			
26	RX66N	R5F566NDDGFC	PLQP0176K*	76			
27	RX66N	R5F566NDHDFC	PLQP0176K*	77			
28	RX66N	R5F566NDHGFC	PLQP0176K*	78			
29	RX66N	R5F566NNDDFC	PLQP0176K*	79			
30	RX66N	R5F566NNDGFC	PLQP0176K*	80			
31	RX66N	R5F566NNHDFC	PLQP0176K*	81			
32	RX66N	R5F566NNHGFC	PLQP0176K*	82			
33	RX66N	R5F566NDDDFP	PLQP0100K*	83			
34	RX66N	R5F566NDDGFP	PLQP0100K*	84			
35	RX66N	R5F566NDHDFP	PLQP0100K*	85			
36	RX66N	R5F566NDHGFP	PLQP0100K*	86			
37	RX66N	R5F566NDUDFP	PLQP0100K*	87			
38	RX66N	R5F566NNDDFP	PLQP0100K*	88			
39	RX66N	R5F566NNDGFP	PLQP0100K*	89			
40	RX66N	R5F566NNHDFP	PLQP0100K*	90			
41	RX66N	R5F566NNHGFP	PLQP0100K*	91			
42	RX66N	R5F566NNUDFP	PLQP0100K*	92			
43	RX66N	R5F566NDDDLK	PTLG0145K*	93			
44	RX66N	R5F566NDDGLK	PTLG0145K*	94			
45	RX66N	R5F566NDHDLK	PTLG0145K*	95			
46	RX66N	R5F566NDHGLK	PTLG0145K*	96			
47	RX66N	R5F566NDDDLK	PTLG0145K*	97			
48	RX66N	R5F566NNDGLK	PTLG0145K*	98			
49	RX66N	R5F566NNHDLK	PTLG0145K*	99			
50	RX66N	R5F566NNHGLK	PTLG0145K*	100			