

RENESAS SEMICONDUCTOR RELIABILITY REPORT

GROUP : 78K0RHx3
DEVICE : Refer to Product List
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 .

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)

$$\lambda_b = 8.19 \text{ FIT}$$

Unique failure rate at $T_a = 55^\circ\text{C}$ 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	78K0RHx3	UPD78F1031AGA-GAM-G	PLQP0048*	51	78K0RHx3	UPD78F1039AGBR-XXX-GAH-G	PLQP0064*
2	78K0RHx3	UPD78F1031AGAR-GAM-G	PLQP0048*	52	78K0RHx3	UPD78F1039AGBS-GAH-G	PLQP0064*
3	78K0RHx3	UPD78F1031AGAR-XXX-GAM-G	PLQP0048*	53	78K0RHx3	UPD78F1039AGBS-XXX-GAH-G	PLQP0064*
4	78K0RHx3	UPD78F1031AGAS-GAM-G	PLQP0048*	54	78K0RHx3	UPD78F1039AGB-XXX-GAH-G	PLQP0064*
5	78K0RHx3	UPD78F1031AGAS-XXX-GAM-G	PLQP0048*	55	78K0RHx3	UPD78F1040AGB-GAH-G	PLQP0064*
6	78K0RHx3	UPD78F1031AGA-XXX-GAM-G	PLQP0048*	56	78K0RHx3	UPD78F1040AGBR-GAH-G	PLQP0064*
7	78K0RHx3	UPD78F1032AGA-GAM-G	PLQP0048*	57	78K0RHx3	UPD78F1040AGBR-XXX-GAH-G	PLQP0064*
8	78K0RHx3	UPD78F1032AGAR-GAM-G	PLQP0048*	58	78K0RHx3	UPD78F1040AGBS-GAH-G	PLQP0064*
9	78K0RHx3	UPD78F1032AGAR-XXX-GAM-G	PLQP0048*	59	78K0RHx3	UPD78F1040AGBS-XXX-GAH-G	PLQP0064*
10	78K0RHx3	UPD78F1032AGAS-GAM-G	PLQP0048*	60	78K0RHx3	UPD78F1040AGB-XXX-GAH-G	PLQP0064*
11	78K0RHx3	UPD78F1032AGAS-XXX-GAM-G	PLQP0048*	61	78K0RHx3	UPD78F1040GBR-GAH-G	PLQP0064*
12	78K0RHx3	UPD78F1032AGA-XXX-GAM-G	PLQP0048*	62	78K0RHx3	UPD78F1041AGK-GAK-G	PLQP0080*
13	78K0RHx3	UPD78F1033AGA-GAM-G	PLQP0048*	63	78K0RHx3	UPD78F1041AGKR-GAK-G	PLQP0080*
14	78K0RHx3	UPD78F1033AGAR-GAM-G	PLQP0048*	64	78K0RHx3	UPD78F1041AGKR-XXX-GAK-G	PLQP0080*
15	78K0RHx3	UPD78F1033AGAR-XXX-GAM-G	PLQP0048*	65	78K0RHx3	UPD78F1041AGKS-GAK-G	PLQP0080*
16	78K0RHx3	UPD78F1033AGAS-GAM-G	PLQP0048*	66	78K0RHx3	UPD78F1041AGKS-XXX-GAK-G	PLQP0080*
17	78K0RHx3	UPD78F1033AGAS-XXX-GAM-G	PLQP0048*	67	78K0RHx3	UPD78F1041AGK-XXX-GAK-G	PLQP0080*
18	78K0RHx3	UPD78F1033AGA-XXX-GAM-G	PLQP0048*	68	78K0RHx3	UPD78F1042AGK-GAK-G	PLQP0080*
19	78K0RHx3	UPD78F1034AGA-GAM-G	PLQP0048*	69	78K0RHx3	UPD78F1042AGKR-GAK-G	PLQP0080*
20	78K0RHx3	UPD78F1034AGAR-GAM-G	PLQP0048*	70	78K0RHx3	UPD78F1042AGKR-XXX-GAK-G	PLQP0080*
21	78K0RHx3	UPD78F1034AGAR-XXX-GAM-G	PLQP0048*	71	78K0RHx3	UPD78F1042AGKS-GAK-G	PLQP0080*
22	78K0RHx3	UPD78F1034AGAS-GAM-G	PLQP0048*	72	78K0RHx3	UPD78F1042AGKS-XXX-GAK-G	PLQP0080*
23	78K0RHx3	UPD78F1034AGAS-XXX-GAM-G	PLQP0048*	73	78K0RHx3	UPD78F1042AGK-XXX-GAK-G	PLQP0080*
24	78K0RHx3	UPD78F1034AGA-XXX-GAM-G	PLQP0048*	74	78K0RHx3	UPD78F1043AGK-GAK-G	PLQP0080*
25	78K0RHx3	UPD78F1035AGA-GAM-G	PLQP0048*	75	78K0RHx3	UPD78F1043AGKR-GAK-G	PLQP0080*
26	78K0RHx3	UPD78F1035AGAR-GAM-G	PLQP0048*	76	78K0RHx3	UPD78F1043AGKR-XXX-GAK-G	PLQP0080*
27	78K0RHx3	UPD78F1035AGAR-XXX-GAM-G	PLQP0048*	77	78K0RHx3	UPD78F1043AGKS-GAK-G	PLQP0080*
28	78K0RHx3	UPD78F1035AGAS-GAM-G	PLQP0048*	78	78K0RHx3	UPD78F1043AGKS-XXX-GAK-G	PLQP0080*
29	78K0RHx3	UPD78F1035AGAS-XXX-GAM-G	PLQP0048*	79	78K0RHx3	UPD78F1043AGK-XXX-GAK-G	PLQP0080*
30	78K0RHx3	UPD78F1035AGA-XXX-GAM-G	PLQP0048*	80	78K0RHx3	UPD78F1044AGK-GAK-G	PLQP0080*
31	78K0RHx3	UPD78F1036AGB-GAH-G	PLQP0064*	81	78K0RHx3	UPD78F1044AGKR-GAK-G	PLQP0080*
32	78K0RHx3	UPD78F1036AGBR-GAH-G	PLQP0064*	82	78K0RHx3	UPD78F1044AGKR-XXX-GAK-G	PLQP0080*
33	78K0RHx3	UPD78F1036AGBR-XXX-GAH-G	PLQP0064*	83	78K0RHx3	UPD78F1044AGKS-GAK-G	PLQP0080*
34	78K0RHx3	UPD78F1036AGBS-GAH-G	PLQP0064*	84	78K0RHx3	UPD78F1044AGKS-XXX-GAK-G	PLQP0080*
35	78K0RHx3	UPD78F1036AGBS-XXX-GAH-G	PLQP0064*	85	78K0RHx3	UPD78F1044AGK-XXX-GAK-G	PLQP0080*
36	78K0RHx3	UPD78F1036AGB-XXX-GAH-G	PLQP0064*	86	78K0RHx3	UPD78F1045AGK-GAK-G	PLQP0080*
37	78K0RHx3	UPD78F1037AGB-GAH-G	PLQP0064*	87	78K0RHx3	UPD78F1045AGKR-GAK-G	PLQP0080*
38	78K0RHx3	UPD78F1037AGBR-GAH-G	PLQP0064*	88	78K0RHx3	UPD78F1045AGKR-XXX-GAK-G	PLQP0080*
39	78K0RHx3	UPD78F1037AGBR-XXX-GAH-G	PLQP0064*	89	78K0RHx3	UPD78F1045AGKS-GAK-G	PLQP0080*
40	78K0RHx3	UPD78F1037AGBS-GAH-G	PLQP0064*	90	78K0RHx3	UPD78F1045AGKS-XXX-GAK-G	PLQP0080*
41	78K0RHx3	UPD78F1037AGBS-XXX-GAH-G	PLQP0064*	91	78K0RHx3	UPD78F1045AGK-XXX-GAK-G	PLQP0080*
42	78K0RHx3	UPD78F1037AGB-XXX-GAH-G	PLQP0064*	92	78K0RHx3	UPD78F1046AGCR-UEU-G	PLQP0100*
43	78K0RHx3	UPD78F1038AGB-GAH-G	PLQP0064*	93	78K0RHx3	UPD78F1046AGCR-XXX-UEU-G	PLQP0100*
44	78K0RHx3	UPD78F1038AGBR-GAH-G	PLQP0064*	94	78K0RHx3	UPD78F1046AGCS-UEU-G	PLQP0100*
45	78K0RHx3	UPD78F1038AGBR-XXX-GAH-G	PLQP0064*	95	78K0RHx3	UPD78F1046AGCS-XXX-UEU-G	PLQP0100*
46	78K0RHx3	UPD78F1038AGBS-GAH-G	PLQP0064*	96	78K0RHx3	UPD78F1046AGC-UEU-G	PLQP0100*
47	78K0RHx3	UPD78F1038AGBS-XXX-GAH-G	PLQP0064*	97	78K0RHx3	UPD78F1046AGC-XXX-UEU-G	PLQP0100*
48	78K0RHx3	UPD78F1038AGB-XXX-GAH-G	PLQP0064*	98	78K0RHx3	UPD78F1047AGCR-UEU-G	PLQP0100*
49	78K0RHx3	UPD78F1039AGB-GAH-G	PLQP0064*	99	78K0RHx3	UPD78F1047AGCR-XXX-UEU-G	PLQP0100*
50	78K0RHx3	UPD78F1039AGBR-GAH-G	PLQP0064*	100	78K0RHx3	UPD78F1047AGCS-UEU-G	PLQP0100*

Table. Product list

MCR-22-0656

No	Group	Product part number	Package code	No	Group	Product part number	Package code
101	78K0RHx3	UPD78F1047AGCS-XXX-UEU-G	PLQP0100*	161			
102	78K0RHx3	UPD78F1047AGC-UEU-G	PLQP0100*	162			
103	78K0RHx3	UPD78F1047AGC-XXX-UEU-G	PLQP0100*	163			
104	78K0RHx3	UPD78F1048AGCR-UEU-G	PLQP0100*	164			
105	78K0RHx3	UPD78F1048AGCR-XXX-UEU-G	PLQP0100*	165			
106	78K0RHx3	UPD78F1048AGCS-UEU-G	PLQP0100*	166			
107	78K0RHx3	UPD78F1048AGCS-XXX-UEU-G	PLQP0100*	167			
108	78K0RHx3	UPD78F1048AGC-UEU-G	PLQP0100*	168			
109	78K0RHx3	UPD78F1048AGC-XXX-UEU-G	PLQP0100*	169			
110	78K0RHx3	UPD78F1049AGCR-UEU-G	PLQP0100*	170			
111	78K0RHx3	UPD78F1049AGCR-XXX-UEU-G	PLQP0100*	171			
112	78K0RHx3	UPD78F1049AGCS-UEU-G	PLQP0100*	172			
113	78K0RHx3	UPD78F1049AGCS-XXX-UEU-G	PLQP0100*	173			
114	78K0RHx3	UPD78F1049AGC-UEU-G	PLQP0100*	174			
115	78K0RHx3	UPD78F1049AGC-XXX-UEU-G	PLQP0100*	175			
116	78K0RHx3	UPD78F1050AGCR-UEU-G	PLQP0100*	176			
117	78K0RHx3	UPD78F1050AGCR-XXX-UEU-G	PLQP0100*	177			
118	78K0RHx3	UPD78F1050AGCS-UEU-G	PLQP0100*	178			
119	78K0RHx3	UPD78F1050AGCS-XXX-UEU-G	PLQP0100*	179			
120	78K0RHx3	UPD78F1050AGC-UEU-G	PLQP0100*	180			
121	78K0RHx3	UPD78F1050AGC-XXX-UEU-G	PLQP0100*	181			
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