

RENESAS SEMICONDUCTOR RELIABILITY REPORT

GROUP : 78K0RKG3
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 $T_a = 55 \text{ }^\circ\text{C}$ 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	78KORKG3	UPD78F1162AGF(R)-XXX-GAS-AX	PLQP0100*	51	78KORKG3	UPD78F1162AGC(R)-XXX-UEU-AX	PLQP0100*
2	78KORKG3	UPD78F1162AGF(S)-GAS-AX	PLQP0100*	52	78KORKG3	UPD78F1162AGC(S)-UEU-AX	PLQP0100*
3	78KORKG3	UPD78F1162AGF(S)-XXX-GAS-AX	PLQP0100*	53	78KORKG3	UPD78F1162AGC(S)-XXX-UEU-AX	PLQP0100*
4	78KORKG3	UPD78F1162AGF-GAS-AX	PLQP0100*	54	78KORKG3	UPD78F1162AGC-UEU-AX	PLQP0100*
5	78KORKG3	UPD78F1162AGF-XXX-GAS-AX	PLQP0100*	55	78KORKG3	UPD78F1162AGC-XXX-UEU-AX	PLQP0100*
6	78KORKG3	UPD78F1163AGF(R)-XXX-GAS-AX	PLQP0100*	56	78KORKG3	UPD78F1163AGC(R)-UEU-AX	PLQP0100*
7	78KORKG3	UPD78F1163AGF(S)-GAS-AX	PLQP0100*	57	78KORKG3	UPD78F1163AGC(R)-XXX-UEU-AX	PLQP0100*
8	78KORKG3	UPD78F1163AGF(S)-XXX-GAS-AX	PLQP0100*	58	78KORKG3	UPD78F1163AGC(S)-UEU-AX	PLQP0100*
9	78KORKG3	UPD78F1163AGF-GAS-AX	PLQP0100*	59	78KORKG3	UPD78F1163AGC(S)-XXX-UEU-AX	PLQP0100*
10	78KORKG3	UPD78F1163AGF-XXX-GAS-AX	PLQP0100*	60	78KORKG3	UPD78F1163AGC-UEU-AX	PLQP0100*
11	78KORKG3	UPD78F1164AGF(R)-GAS-AX	PLQP0100*	61	78KORKG3	UPD78F1163AGC-XXX-UEU-AX	PLQP0100*
12	78KORKG3	UPD78F1164AGF(R)-XXX-GAS-AX	PLQP0100*	62	78KORKG3	UPD78F1164AGC(R)-UEU-AX	PLQP0100*
13	78KORKG3	UPD78F1164AGF(S)-GAS-AX	PLQP0100*	63	78KORKG3	UPD78F1164AGC(R)-XXX-UEU-AX	PLQP0100*
14	78KORKG3	UPD78F1164AGF(S)-XXX-GAS-AX	PLQP0100*	64	78KORKG3	UPD78F1164AGC(S)-UEU-AX	PLQP0100*
15	78KORKG3	UPD78F1164AGF-GAS-AX	PLQP0100*	65	78KORKG3	UPD78F1164AGC(S)-XXX-UEU-AX	PLQP0100*
16	78KORKG3	UPD78F1164AGF-XXX-GAS-AX	PLQP0100*	66	78KORKG3	UPD78F1164AGC-UEU-AX	PLQP0100*
17	78KORKG3	UPD78F1165AGF(R)-GAS-AX	PLQP0100*	67	78KORKG3	UPD78F1164AGC-XXX-UEU-AX	PLQP0100*
18	78KORKG3	UPD78F1165AGF(R)-XXX-GAS-AX	PLQP0100*	68	78KORKG3	UPD78F1165AGC(R)-UEU-AX	PLQP0100*
19	78KORKG3	UPD78F1165AGF(S)-GAS-AX	PLQP0100*	69	78KORKG3	UPD78F1165AGC(R)-XXX-UEU-AX	PLQP0100*
20	78KORKG3	UPD78F1165AGF(S)-XXX-GAS-AX	PLQP0100*	70	78KORKG3	UPD78F1165AGC(S)-UEU-AX	PLQP0100*
21	78KORKG3	UPD78F1165AGF-GAS-AX	PLQP0100*	71	78KORKG3	UPD78F1165AGC(S)-XXX-UEU-AX	PLQP0100*
22	78KORKG3	UPD78F1165AGF-XXX-GAS-AX	PLQP0100*	72	78KORKG3	UPD78F1165AGC-UEU-AX	PLQP0100*
23	78KORKG3	UPD78F1166AGF(R)-GAS-AX	PLQP0100*	73	78KORKG3	UPD78F1165AGC-XXX-UEU-AX	PLQP0100*
24	78KORKG3	UPD78F1166AGF(R)-XXX-GAS-AX	PLQP0100*	74	78KORKG3	UPD78F1166AGC(R)-UEU-AX	PLQP0100*
25	78KORKG3	UPD78F1166AGF(S)-GAS-AX	PLQP0100*	75	78KORKG3	UPD78F1166AGC(R)-XXX-UEU-AX	PLQP0100*
26	78KORKG3	UPD78F1166AGF(S)-XXX-GAS-AX	PLQP0100*	76	78KORKG3	UPD78F1166AGC(S)-UEU-AX	PLQP0100*
27	78KORKG3	UPD78F1166AGF-GAS-AX	PLQP0100*	77	78KORKG3	UPD78F1166AGC(S)-XXX-UEU-AX	PLQP0100*
28	78KORKG3	UPD78F1166AGF-XXX-GAS-AX	PLQP0100*	78	78KORKG3	UPD78F1166AGC-UEU-AX	PLQP0100*
29	78KORKG3	UPD78F1167AGF(R)-GAS-AX	PLQP0100*	79	78KORKG3	UPD78F1166AGC-XXX-UEU-AX	PLQP0100*
30	78KORKG3	UPD78F1167AGF(R)-XXX-GAS-AX	PLQP0100*	80	78KORKG3	UPD78F1167AGC(R)-UEU-AX	PLQP0100*
31	78KORKG3	UPD78F1167AGF(S)-GAS-AX	PLQP0100*	81	78KORKG3	UPD78F1167AGC(R)-XXX-UEU-AX	PLQP0100*
32	78KORKG3	UPD78F1167AGF(S)-XXX-GAS-AX	PLQP0100*	82	78KORKG3	UPD78F1167AGC(S)-UEU-AX	PLQP0100*
33	78KORKG3	UPD78F1167AGF-GAS-AX	PLQP0100*	83	78KORKG3	UPD78F1167AGC(S)-XXX-UEU-AX	PLQP0100*
34	78KORKG3	UPD78F1167AGF-XXX-GAS-AX	PLQP0100*	84	78KORKG3	UPD78F1167AGC-UEU-AX	PLQP0100*
35	78KORKG3	UPD78F1168AGF(R)-GAS-AX	PLQP0100*	85	78KORKG3	UPD78F1167AGC-XXX-UEU-AX	PLQP0100*
36	78KORKG3	UPD78F1168AGF(R)-XXX-GAS-AX	PLQP0100*	86	78KORKG3	UPD78F1168AGC(R)-UEU-AX	PLQP0100*
37	78KORKG3	UPD78F1168AGF(S)-GAS-AX	PLQP0100*	87	78KORKG3	UPD78F1168AGC(R)-XXX-UEU-AX	PLQP0100*
38	78KORKG3	UPD78F1168AGF(S)-XXX-GAS-AX	PLQP0100*	88	78KORKG3	UPD78F1168AGC(S)-UEU-AX	PLQP0100*
39	78KORKG3	UPD78F1168AGF-GAS-AX	PLQP0100*	89	78KORKG3	UPD78F1168AGC(S)-XXX-UEU-AX	PLQP0100*
40	78KORKG3	UPD78F1168AGF-XXX-GAS-AX	PLQP0100*	90	78KORKG3	UPD78F1168AGC-UEU-AX	PLQP0100*
41	78KORKG3	UPD78F1164GF(R)-GAS-AX	PLQP0100*	91	78KORKG3	UPD78F1168AGC-UEU-E2-AX	PLQP0100*
42	78KORKG3	UPD78F1164GF(S)-GAS-AX	PLQP0100*	92	78KORKG3	UPD78F1168AGC-XXX-UEU-AX	PLQP0100*
43	78KORKG3	UPD78F1164GF(S)-XXX-GAS-AX	PLQP0100*	93	78KORKG3	UPD78F1168AGC-XXX-UEU-E2-AX	PLQP0100*
44	78KORKG3	UPD78F1164GF-GAS-AX	PLQP0100*	94	78KORKG3	UPD78F1162GC(S)-UEU-AX	PLQP0100*
45	78KORKG3	UPD78F1165GF(R)-GAS-AX	PLQP0100*	95	78KORKG3	UPD78F1162GC(S)-XXX-UEU-AX	PLQP0100*
46	78KORKG3	UPD78F1165GF(S)-GAS-AX	PLQP0100*	96	78KORKG3	UPD78F1162GC-UEU-AX	PLQP0100*
47	78KORKG3	UPD78F1165GF(S)-XXX-GAS-AX	PLQP0100*	97	78KORKG3	UPD78F1163GC(R)-UEU-AX	PLQP0100*
48	78KORKG3	UPD78F1166GF(S)-GAS-AX	PLQP0100*	98	78KORKG3	UPD78F1164GC(R)-UEU-AX	PLQP0100*
49	78KORKG3	UPD78F1166GF-GAS-AX	PLQP0100*	99	78KORKG3	UPD78F1164GC(S)-UEU-AX	PLQP0100*
50	78KORKG3	UPD78F1162AGC(R)-UEU-AX	PLQP0100*	100	78KORKG3	UPD78F1165GC(R)-UEU-AX	PLQP0100*

Table. Product list

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No	Group	Product part number	Package code	No	Group	Product part number	Package code
101	78K0RKG3	UPD78F1165GC(R)-XXX-UEU-AX	PLQP0100*	161			
102	78K0RKG3	UPD78F1165GC(S)-UEU-AX	PLQP0100*	162			
103	78K0RKG3	UPD78F1165GC-UEU-AX	PLQP0100*	163			
104	78K0RKG3	UPD78F1166GC(R)-UEU-AX	PLQP0100*	164			
105	78K0RKG3	UPD78F1166GC(S)-UEU-AX	PLQP0100*	165			
106	78K0RKG3	UPD78F1166GC-UEU-AX	PLQP0100*	166			
107	78K0RKG3	UPD78F1166GC-XXX-UEU-AX	PLQP0100*	167			
108	78K0RKG3	UPD78F1167GC(R)-UEU-AX	PLQP0100*	168			
109	78K0RKG3	UPD78F1167GC(S)-UEU-AX	PLQP0100*	169			
110	78K0RKG3	UPD78F1167GC-UEU-AX	PLQP0100*	170			
111	78K0RKG3	UPD78F1168GC(R)-UEU-AX	PLQP0100*	171			
112	78K0RKG3	UPD78F1168GC(S)-UEU-AX	PLQP0100*	172			
113	78K0RKG3	UPD78F1168GC-UEU-AX	PLQP0100*	173			
114	78K0RKG3	UPD78F1168GC-UEU-E2-AX	PLQP0100*	174			
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