Report No. MCR-22-0658
Oct. 03,2022

RENESAS SEMICONDUCTOR RELIABILITY REPORT

GROUP : 78K0RKF3

DEVICE : Refer to Product List

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 ℃, 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= 8.19 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
1	78K0RKF3	UPD78F1152AGC(R)-GAD-AX	PLQP0080*
2	78K0RKF3	UPD78F1152AGC(R)-XXX-GAD-AX	PLQP0080*
3	78K0RKF3	UPD78F1152AGC(S)-GAD-AX	PLQP0080*
4	78K0RKF3	UPD78F1152AGC(S)-XXX-GAD-AX	PLQP0080*
5	78K0RKF3	UPD78F1152AGC-GAD-AX	PLQP0080*
6	78K0RKF3	UPD78F1152AGC-XXX-GAD-AX	PLQP0080*
7	78K0RKF3	UPD78F1153AGC(R)-GAD-AX	PLQP0080*
8	78K0RKF3	UPD78F1153AGC(R)-XXX-GAD-AX	PLQP0080*
9	78K0RKF3	UPD78F1153AGC(S)-XXX-GAD-AX	PLQP0080*
10	78K0RKF3	UPD78F1153AGC-GAD-AX	PLQP0080*
11	78K0RKF3	UPD78F1153AGC-XXX-GAD-AX	PLQP0080*
12	78K0RKF3	UPD78F1154AGC(R)-GAD-AX	PLQP0080*
13	78K0RKF3	UPD78F1154AGC(R)-XXX-GAD-AX	PLQP0080*
14	78K0RKF3	UPD78F1154AGC(S)-XXX-GAD-AX	PLQP0080*
15	78K0RKF3	UPD78F1154AGC-GAD-AX	PLQP0080*
16	78K0RKF3	UPD78F1154AGC-XXX-GAD-AX	PLQP0080*
17	78K0RKF3	UPD78F1155AGC(R)-GAD-AX	PLQP0080*
18	78K0RKF3	UPD78F1155AGC(R)-XXX-GAD-AX	PLQP0080*
19	78K0RKF3	UPD78F1155AGC(S)-XXX-GAD-AX	PLQP0080*
20	78K0RKF3	UPD78F1155AGC-GAD-AX	PLQP0080*
21	78K0RKF3	UPD78F1155AGC-XXX-GAD-AX	PLQP0080*
22	78K0RKF3	UPD78F1156AGC(R)-GAD-AX	PLQP0080*
23	78K0RKF3	UPD78F1156AGC(R)-XXX-GAD-AX	PLQP0080*
24	78K0RKF3	UPD78F1156AGC(S)-GAD-AX	PLQP0080*
25	78K0RKF3	UPD78F1156AGC(S)-XXX-GAD-AX	PLQP0080*
26	78K0RKF3	UPD78F1156AGC-GAD-AX	PLQP0080*
27	78K0RKF3	UPD78F1156AGC-XXX-GAD-AX	PLQP0080*
28	78K0RKF3	UPD78F1152GC(S)-GAD-AX	PLQP0080*
29	78K0RKF3	UPD78F1152GC-GAD-AX	PLQP0080*
30	78K0RKF3	UPD78F1154GC(S)-GAD-AX	PLQP0080*
31	78K0RKF3	UPD78F1154GC(S)-XXX-GAD-AX	PLQP0080*
32	78K0RKF3	UPD78F1154GC-GAD-AX	PLQP0080*
33	78K0RKF3	UPD78F1155GC(S)-GAD-AX	PLQP0080*
34	78K0RKF3	UPD78F1156GC-GAD-AX	PLQP0080*
35	78K0RKF3	UPD78F1152AGK(R)-GAK-AX	PLQP0080*
36	78K0RKF3	UPD78F1152AGK(R)-XXX-GAK-AX	PLQP0080*
37	78K0RKF3	UPD78F1152AGK(S)-XXX-GAK-AX	PLQP0080*
38	78K0RKF3	UPD78F1152AGK-GAK-AX	PLQP0080*
39	78K0RKF3	UPD78F1152AGK-XXX-GAK-AX	PLQP0080*
40	78K0RKF3	UPD78F1153AGK(R)-GAK-AX	PLQP0080*
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51	78K0RKF3	UPD78F1154AGK-XXX-GAK-AX	PLQP0080*
52	78K0RKF3	UPD78F1155AGK(R)-GAK-AX	PLQP0080*
53	78K0RKF3	UPD78F1155AGK(R)-XXX-GAK-AX	PLQP0080*
54	78K0RKF3	UPD78F1155AGK(S)-GAK-AX	PLQP0080*
55	78K0RKF3	UPD78F1155AGK(S)-XXX-GAK-AX	PLQP0080*
56	78K0RKF3	UPD78F1155AGK-GAK-AX	PLQP0080*
57	78K0RKF3	UPD78F1155AGK-XXX-GAK-AX	PLQP0080*
58	78K0RKF3	UPD78F1156AGK(R)-GAK-AX	PLQP0080*
59	78K0RKF3	UPD78F1156AGK(R)-XXX-GAK-AX	PLQP0080*
60	78K0RKF3	UPD78F1156AGK(S)-GAK-AX	PLQP0080*
61	78K0RKF3	UPD78F1156AGK(S)-XXX-GAK-AX	PLQP0080*
62	78K0RKF3	UPD78F1156AGK-GAK-AX	PLQP0080*
63	78K0RKF3	UPD78F1156AGK-XXX-GAK-AX	PLQP0080*
64	78K0RKF3	UPD78F1153GK(R)-GAK-AX	PLQP0080*
65	78K0RKF3	UPD78F1154GK(R)-GAK-AX	PLQP0080*
66	78K0RKF3	UPD78F1154GK(R)-XXX-GAK-AX	PLQP0080*
67	78K0RKF3	UPD78F1154GK-GAK-AX	PLQP0080*
68	78K0RKF3	UPD78F1155GK(S)-GAK-AX	PLQP0080*
69	78K0RKF3	UPD78F1156GK(R)-GAK-AX	PLQP0080*
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