

# RENESAS SEMICONDUCTOR RELIABILITY REPORT

GROUP : 78K0KY2-L  
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 °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 ( $\lambda$ )**

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

① Unique failure rate ( $\lambda_b$ )

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

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

② Temperature term ( $\pi T$ )

$$\pi T = \exp\{11600 \times E_a \times (1/(273+55) - 1/(273+T_a))\}$$

$E_a$  : Activation energy (eV)

$T_a$  : Ambient temperature ( $^\circ\text{C}$ )

$\pi T$  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
$\pi T$	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	78K0KY2-L	UPD78F0550MA(R)-FAA-AX	PLQP0044*	51	78K0KY2-L	UPD78F0556MA(R)-XXX-FAA-E2-AX	PLQP0044*
2	78K0KY2-L	UPD78F0550MA(R)-FAA-E1-AX	PLQP0044*	52	78K0KY2-L	UPD78F0556MA(S)-XXX-FAA-AX	PLQP0044*
3	78K0KY2-L	UPD78F0550MA(R)-XXX-FAA-AX	PLQP0044*	53	78K0KY2-L	UPD78F0556MA(S)-XXX-FAA-E1-AX	PLQP0044*
4	78K0KY2-L	UPD78F0550MA(R)-XXX-FAA-E1-AX	PLQP0044*	54	78K0KY2-L	UPD78F0556MA(S)-XXX-FAA-E2-AX	PLQP0044*
5	78K0KY2-L	UPD78F0550MA(R)-XXX-FAA-E2-AX	PLQP0044*	55	78K0KY2-L	UPD78F0556MA-FAA-AX	PLQP0044*
6	78K0KY2-L	UPD78F0550MA(S)-FAA-AX	PLQP0044*	56	78K0KY2-L	UPD78F0556MA-XXX-FAA-AX	PLQP0044*
7	78K0KY2-L	UPD78F0550MA(S)-XXX-FAA-AX	PLQP0044*	57	78K0KY2-L	UPD78F0556MA-XXX-FAA-E1-AX	PLQP0044*
8	78K0KY2-L	UPD78F0550MA(S)-XXX-FAA-E1-AX	PLQP0044*	58	78K0KY2-L	UPD78F0556MA-XXX-FAA-E2-AX	PLQP0044*
9	78K0KY2-L	UPD78F0550MA(S)-XXX-FAA-E2-AX	PLQP0044*	59	78K0KY2-L	UPD78F0557MA(R)-FAA-AX	PLQP0044*
10	78K0KY2-L	UPD78F0550MA-FAA-AX	PLQP0044*	60	78K0KY2-L	UPD78F0557MA(R)-XXX-FAA-AX	PLQP0044*
11	78K0KY2-L	UPD78F0550MA-XXX-FAA-AX	PLQP0044*	61	78K0KY2-L	UPD78F0557MA(R)-XXX-FAA-E1-AX	PLQP0044*
12	78K0KY2-L	UPD78F0550MA-XXX-FAA-E1-AX	PLQP0044*	62	78K0KY2-L	UPD78F0557MA(R)-XXX-FAA-E2-AX	PLQP0044*
13	78K0KY2-L	UPD78F0550MA-XXX-FAA-E2-AX	PLQP0044*	63	78K0KY2-L	UPD78F0557MA(S)-FAA-AX	PLQP0044*
14	78K0KY2-L	UPD78F0551MA(R)-FAA-AX	PLQP0044*	64	78K0KY2-L	UPD78F0557MA(S)-XXX-FAA-AX	PLQP0044*
15	78K0KY2-L	UPD78F0551MA(R)-FAA-E1-AX	PLQP0044*	65	78K0KY2-L	UPD78F0557MA(S)-XXX-FAA-E1-AX	PLQP0044*
16	78K0KY2-L	UPD78F0551MA(R)-XXX-FAA-AX	PLQP0044*	66	78K0KY2-L	UPD78F0557MA(S)-XXX-FAA-E2-AX	PLQP0044*
17	78K0KY2-L	UPD78F0551MA(R)-XXX-FAA-E1-AX	PLQP0044*	67	78K0KY2-L	UPD78F0557MA-FAA-AX	PLQP0044*
18	78K0KY2-L	UPD78F0551MA(R)-XXX-FAA-E2-AX	PLQP0044*	68	78K0KY2-L	UPD78F0557MA-FAA-E2-AX	PLQP0044*
19	78K0KY2-L	UPD78F0551MA(S)-FAA-AX	PLQP0044*	69	78K0KY2-L	UPD78F0557MA-XXX-FAA-AX	PLQP0044*
20	78K0KY2-L	UPD78F0551MA(S)-XXX-FAA-AX	PLQP0044*	70	78K0KY2-L	UPD78F0557MA-XXX-FAA-E1-AX	PLQP0044*
21	78K0KY2-L	UPD78F0551MA(S)-XXX-FAA-E1-AX	PLQP0044*	71	78K0KY2-L	UPD78F0557MA-XXX-FAA-E2-AX	PLQP0044*
22	78K0KY2-L	UPD78F0551MA(S)-XXX-FAA-E2-AX	PLQP0044*	72			
23	78K0KY2-L	UPD78F0551MA-FAA-AX	PLQP0044*	73			
24	78K0KY2-L	UPD78F0551MA-XXX-FAA-AX	PLQP0044*	74			
25	78K0KY2-L	UPD78F0551MA-XXX-FAA-E1-AX	PLQP0044*	75			
26	78K0KY2-L	UPD78F0551MA-XXX-FAA-E2-AX	PLQP0044*	76			
27	78K0KY2-L	UPD78F0552MA(R)-FAA-AX	PLQP0044*	77			
28	78K0KY2-L	UPD78F0552MA(R)-XXX-FAA-AX	PLQP0044*	78			
29	78K0KY2-L	UPD78F0552MA(R)-XXX-FAA-E1-AX	PLQP0044*	79			
30	78K0KY2-L	UPD78F0552MA(R)-XXX-FAA-E2-AX	PLQP0044*	80			
31	78K0KY2-L	UPD78F0552MA(S)-FAA-AX	PLQP0044*	81			
32	78K0KY2-L	UPD78F0552MA(S)-XXX-FAA-AX	PLQP0044*	82			
33	78K0KY2-L	UPD78F0552MA(S)-XXX-FAA-E1-AX	PLQP0044*	83			
34	78K0KY2-L	UPD78F0552MA(S)-XXX-FAA-E2-AX	PLQP0044*	84			
35	78K0KY2-L	UPD78F0552MA-FAA-AX	PLQP0044*	85			
36	78K0KY2-L	UPD78F0552MA-XXX-FAA-AX	PLQP0044*	86			
37	78K0KY2-L	UPD78F0552MA-XXX-FAA-E1-AX	PLQP0044*	87			
38	78K0KY2-L	UPD78F0552MA-XXX-FAA-E2-AX	PLQP0044*	88			
39	78K0KY2-L	UPD78F0555MA(R)-XXX-FAA-AX	PLQP0044*	89			
40	78K0KY2-L	UPD78F0555MA(R)-XXX-FAA-E1-AX	PLQP0044*	90			
41	78K0KY2-L	UPD78F0555MA(R)-XXX-FAA-E2-AX	PLQP0044*	91			
42	78K0KY2-L	UPD78F0555MA(S)-XXX-FAA-AX	PLQP0044*	92			
43	78K0KY2-L	UPD78F0555MA(S)-XXX-FAA-E1-AX	PLQP0044*	93			
44	78K0KY2-L	UPD78F0555MA(S)-XXX-FAA-E2-AX	PLQP0044*	94			
45	78K0KY2-L	UPD78F0555MA-FAA-AX	PLQP0044*	95			
46	78K0KY2-L	UPD78F0555MA-XXX-FAA-AX	PLQP0044*	96			
47	78K0KY2-L	UPD78F0555MA-XXX-FAA-E1-AX	PLQP0044*	97			
48	78K0KY2-L	UPD78F0555MA-XXX-FAA-E2-AX	PLQP0044*	98			
49	78K0KY2-L	UPD78F0556MA(R)-XXX-FAA-AX	PLQP0044*	99			
50	78K0KY2-L	UPD78F0556MA(R)-XXX-FAA-E1-AX	PLQP0044*	100			