Report No. MCR-23-0450-A
June 11,2026

RENESAS SEMICONDUCTOR RELIABILITY REPORT

GROUP : RX26T

DEVICE : R5F526TXXX

QUALITY GRADE : Standard

Quality Assurance Div.
Renesas Electronics Corporation

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(Rev.5.0-2 October 2020)

Summary of Reliability Test Results for QFP Package (MSL3)

Test Item	Reference	Test Conditions	Results Failure/Size	Comment
High Temperature Operating Life (HTOL)	JESD22-A108	Ta=125 ℃, Vccmax, 1000 hrs	0/231	3 lots or more
High Temperature Storage Life (HTSL)	JESD22-A103	Ta=150 ℃, 1000 hrs	0/75	3 lots or more
Temperature Humidity bias (THB) (*1)	JESD22-A101	Ta=85 ℃, RH=85 %, Vccmax, 1000 hrs	0/75	3 lots or more
Temperature Humidity bias (HAST) (*1)	JESD22-A110	Ta=110 ℃, RH=85 %, Vccmax, 264 hrs	0/75	3 lots or more
Temperature Cycling (TC) (*1)	JESD22-A104	Ta=-65 ℃ to 150 ℃ , 500 cycles	0/75	3 lots or more
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	+/-500 V,1 time	0/3	Class: C2
Solderability (SD)	J-STD-002	245 ℃, 5 s, Solder coverage ≥95 %	0/5	
Resistance to Soldering Heat (MSL3)	JESD22-A113, J-STD-020	MSL3(Moisture Sensitivity Level 3) Peak Reflow Temp=260 ℃	Pass	Verified after MSL preconditioning; applied to applicable reliability tests (*1).

Note :
- (*1) With preconditioning per JESD22-A113, MSL 3
- It is tested to confirm that all the samples are satisfied with an individual product specification.
- Basically qualification tests were performed using a representative product with the same wafer process and the same package structure .

Summary of Reliability Test Results for QFN Package (MSL3)

Test Item	Reference	Test Conditions	Results Failure/Size	Comment
High Temperature Operating Life (HTOL)	JESD22-A108	Ta=125 ℃, Vccmax, 1000 hrs	0/231	3 lots or more
High Temperature Storage Life (HTSL)	JESD22-A103	Ta=150 ℃, 1000 hrs	0/75	3 lots or more
Temperature Humidity bias (THB) (*1)	JESD22-A101	Ta=85 ℃, RH=85 %, Vccmax, 1000 hrs	0/25	
Temperature Humidity bias (HAST) (*1)	JESD22-A110	Ta=110 ℃, RH=85 %, Vccmax, 264 hrs	0/75	3 lots or more
Temperature Cycling (TC) (*1)	JESD22-A104	Ta=-65 ℃ to 150 ℃ , 500 cycles	0/75	3 lots or more
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	+/-500 V,1 time	0/3	Class: C2
Solderability (SD)	J-STD-002	245 ℃, 5 s, Solder coverage ≥95 %	0/5	
Resistance to Soldering Heat (MSL3)	JESD22-A113, J-STD-020	MSL3(Moisture Sensitivity Level 3) Peak Reflow Temp=260 ℃	Pass	Verified after MSL preconditioning; applied to applicable reliability tests (*1).

Note :
- (*1) With preconditioning per JESD22-A113, MSL 3
- It is tested to confirm that all the samples are satisfied with an individual product specification.
- 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)

$\lambda = \lambda b \times \pi T$ *(FIT)*

①Unique failure rate (λb)

λb= 0.004 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
Wafer level chip scale package	WLCSP	SxBG

*1. First four digit

Table. Product list

No	Product part number	Package code	MSL
1	R5F526T8ADFL	PLQP0048K*	MSL3
2	R5F526T8AGFL	PLQP0048K*	MSL3
3	R5F526T9ADFL	PLQP0048K*	MSL3
4	R5F526T9AGFL	PLQP0048K*	MSL3
5	R5F526T9BDFL	PLQP0048K*	MSL3
6	R5F526T9BGFL	PLQP0048K*	MSL3
7	R5F526TAADFL	PLQP0048K*	MSL3
8	R5F526TAAGFL	PLQP0048K*	MSL3
9	R5F526TACDFL	PLQP0048K*	MSL3
10	R5F526TACGFL	PLQP0048K*	MSL3
11	R5F526TBADFL	PLQP0048K*	MSL3
12	R5F526TBAGFL	PLQP0048K*	MSL3
13	R5F526TBBDFL	PLQP0048K*	MSL3
14	R5F526TBBGFL	PLQP0048K*	MSL3
15	R5F526TBCDFL	PLQP0048K*	MSL3
16	R5F526TBCGFL	PLQP0048K*	MSL3
17	R5F526TBDDFL	PLQP0048K*	MSL3
18	R5F526TBDGFL	PLQP0048K*	MSL3
19	R5F526TFADFL	PLQP0048K*	MSL3
20	R5F526TFAGFL	PLQP0048K*	MSL3
21	R5F526TFBDFL	PLQP0048K*	MSL3
22	R5F526TFBGFL	PLQP0048K*	MSL3
23	R5F526TFCDFL	PLQP0048K*	MSL3
24	R5F526TFCGFL	PLQP0048K*	MSL3
25	R5F526TFDDFL	PLQP0048K*	MSL3
26	R5F526TFDGFL	PLQP0048K*	MSL3
27	R5F526T8ADFM	PLQP0064K*	MSL3
28	R5F526T8AGFM	PLQP0064K*	MSL3
29	R5F526T9ADFM	PLQP0064K*	MSL3
30	R5F526T9AGFM	PLQP0064K*	MSL3
31	R5F526T9BDFM	PLQP0064K*	MSL3
32	R5F526T9BGFM	PLQP0064K*	MSL3
33	R5F526TAADFM	PLQP0064K*	MSL3
34	R5F526TAAGFM	PLQP0064K*	MSL3
35	R5F526TACDFM	PLQP0064K*	MSL3
36	R5F526TACGFM	PLQP0064K*	MSL3
37	R5F526TBADFM	PLQP0064K*	MSL3
38	R5F526TBAGFM	PLQP0064K*	MSL3
39	R5F526TBBDFM	PLQP0064K*	MSL3
40	R5F526TBBGFM	PLQP0064K*	MSL3
41	R5F526TBCDFM	PLQP0064K*	MSL3
42	R5F526TBCGFM	PLQP0064K*	MSL3
43	R5F526TBDDFM	PLQP0064K*	MSL3
44	R5F526TBDGFM	PLQP0064K*	MSL3
45	R5F526TFADFM	PLQP0064K*	MSL3
46	R5F526TFAGFM	PLQP0064K*	MSL3
47	R5F526TFBDFM	PLQP0064K*	MSL3
48	R5F526TFBGFM	PLQP0064K*	MSL3
49	R5F526TFCDFM	PLQP0064K*	MSL3
50	R5F526TFCGFM	PLQP0064K*	MSL3
51	R5F526TFDDFM	PLQP0064K*	MSL3
52	R5F526TFDGFM	PLQP0064K*	MSL3
53	R5F526T9ADFN	PLQP0080K*	MSL3
54	R5F526T9AGFN	PLQP0080K*	MSL3
55	R5F526T9BDFN	PLQP0080K*	MSL3
56	R5F526T9BGFN	PLQP0080K*	MSL3
57	R5F526TBADFN	PLQP0080K*	MSL3
58	R5F526TBAGFN	PLQP0080K*	MSL3
59	R5F526TBBDFN	PLQP0080K*	MSL3
60	R5F526TBBGFN	PLQP0080K*	MSL3
61	R5F526TBCDFN	PLQP0080K*	MSL3
62	R5F526TBCGFN	PLQP0080K*	MSL3
63	R5F526TBDDFN	PLQP0080K*	MSL3
64	R5F526TBDGFN	PLQP0080K*	MSL3
65	R5F526TFADFN	PLQP0080K*	MSL3
66	R5F526TFAGFN	PLQP0080K*	MSL3
67	R5F526TFBDFN	PLQP0080K*	MSL3
68	R5F526TFBGFN	PLQP0080K*	MSL3
69	R5F526TFCDFN	PLQP0080K*	MSL3
70	R5F526TFCGFN	PLQP0080K*	MSL3
71	R5F526TFDDFN	PLQP0080K*	MSL3
72	R5F526TFDGFN	PLQP0080K*	MSL3
73	R5F526T9ADFP	PLQP0100K*	MSL3
74	R5F526T9AGFP	PLQP0100K*	MSL3
75	R5F526T9BDFP	PLQP0100K*	MSL3
76	R5F526T9BGFP	PLQP0100K*	MSL3
77	R5F526TBADFP	PLQP0100K*	MSL3
78	R5F526TBAGFP	PLQP0100K*	MSL3
79	R5F526TBBDFP	PLQP0100K*	MSL3
80	R5F526TBBGFP	PLQP0100K*	MSL3
81	R5F526TBCDFP	PLQP0100K*	MSL3
82	R5F526TBCGFP	PLQP0100K*	MSL3
83	R5F526TBDDFP	PLQP0100K*	MSL3
84	R5F526TBDGFP	PLQP0100K*	MSL3
85	R5F526TFADFP	PLQP0100K*	MSL3
86	R5F526TFAGFP	PLQP0100K*	MSL3
87	R5F526TFBDFP	PLQP0100K*	MSL3
88	R5F526TFBGFP	PLQP0100K*	MSL3
89	R5F526TFCDFP	PLQP0100K*	MSL3
90	R5F526TFCGFP	PLQP0100K*	MSL3
91	R5F526TFDDFP	PLQP0100K*	MSL3
92	R5F526TFDGFP	PLQP0100K*	MSL3
93	R5F526T9ADND	PWQN0064K*	MSL3
94	R5F526T9AGND	PWQN0064K*	MSL3
95	R5F526T9BDND	PWQN0064K*	MSL3
96	R5F526T9BGND	PWQN0064K*	MSL3
97	R5F526TBADND	PWQN0064K*	MSL3
98	R5F526TBAGND	PWQN0064K*	MSL3
99	R5F526TBBDND	PWQN0064K*	MSL3
100	R5F526TBBGND	PWQN0064K*	MSL3

Note: MSL stands for Moisture Sensitivity Level.

Table. Product list

No	Product part number	Package code	MSL	No	Product part number	Package code	MSL
101	R5F526TBCDND	PWQN0064K*	MSL3	161			
102	R5F526TBCGND	PWQN0064K*	MSL3	162			
103	R5F526TBDDND	PWQN0064K*	MSL3	163			
104	R5F526TBDGND	PWQN0064K*	MSL3	164			
105	R5F526TFADND	PWQN0064K*	MSL3	165			
106	R5F526TFAGND	PWQN0064K*	MSL3	166			
107	R5F526TFBDND	PWQN0064K*	MSL3	167			
108	R5F526TFBGND	PWQN0064K*	MSL3	168			
109	R5F526TFCDND	PWQN0064K*	MSL3	169			
110	R5F526TFCGND	PWQN0064K*	MSL3	170			
111	R5F526TFDDND	PWQN0064K*	MSL3	171			
112	R5F526TFDGND	PWQN0064K*	MSL3	172			
113	R5F526T9ADNE	PWQN0048K*	MSL3	173			
114	R5F526T9AGNE	PWQN0048K*	MSL3	174			
115	R5F526T9BDNE	PWQN0048K*	MSL3	175			
116	R5F526T9BGNE	PWQN0048K*	MSL3	176			
117	R5F526TBADNE	PWQN0048K*	MSL3	177			
118	R5F526TBAGNE	PWQN0048K*	MSL3	178			
119	R5F526TBBDNE	PWQN0048K*	MSL3	179			
120	R5F526TBBGNE	PWQN0048K*	MSL3	180			
121	R5F526TBCDNE	PWQN0048K*	MSL3	181			
122	R5F526TBCGNE	PWQN0048K*	MSL3	182			
123	R5F526TBDDNE	PWQN0048K*	MSL3	183			
124	R5F526TBDGNE	PWQN0048K*	MSL3	184			
125	R5F526TFADNE	PWQN0048K*	MSL3	185			
126	R5F526TFAGNE	PWQN0048K*	MSL3	186			
127	R5F526TFBDNE	PWQN0048K*	MSL3	187			
128	R5F526TFBGNE	PWQN0048K*	MSL3	188			
129	R5F526TFCDNE	PWQN0048K*	MSL3	189			
130	R5F526TFCGNE	PWQN0048K*	MSL3	190			
131	R5F526TFDDNE	PWQN0048K*	MSL3	191			
132	R5F526TFDGNE	PWQN0048K*	MSL3	192			
133				193			
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160				220			

Note: MSL stands for Moisture Sensitivity Level.