

RENESAS SEMICONDUCTOR RELIABILITY REPORT

GROUP : RX631
DEVICE : R5F5631XXX
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)	JEITA ED-4701/302	+/-1000V,1time	0/3	Class: Equivalent to C2b
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 .

Table. Reliability test results (BGA)

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=-55 °C to 125 °C , 500 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)	JEITA ED-4701/302	+/-1000V,1time	0/3	Class: Equivalent to C2b
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 .

Table. Reliability test results (LGA)

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=-55 °C to 125 °C , 500 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)	JEITA ED-4701/302	+/-1000V,1time	0/3	Class: Equivalent to C2b
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)

$$\lambda_b = 0.03 \text{ FIT}$$

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
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	RX631	R5F56316CDBG	PLBG0176G*	51	RX631	R5F5631JDGFB	PLQP0144K*
2	RX631	R5F56316DDBG	PLBG0176G*	52	RX631	R5F5631KDDFB	PLQP0144K*
3	RX631	R5F56316SDBG	PLBG0176G*	53	RX631	R5F5631KDGFB	PLQP0144K*
4	RX631	R5F56317CDBG	PLBG0176G*	54	RX631	R5F5631WDDFB	PLQP0144K*
5	RX631	R5F56317DDBG	PLBG0176G*	55	RX631	R5F5631WDGFB	PLQP0144K*
6	RX631	R5F56317SDBG	PLBG0176G*	56	RX631	R5F5631WHDFB	PLQP0144K*
7	RX631	R5F56318CDBG	PLBG0176G*	57	RX631	R5F5631YDDFB	PLQP0144K*
8	RX631	R5F56318DDBG	PLBG0176G*	58	RX631	R5F5631YDGFB	PLQP0144K*
9	RX631	R5F56318SDBG	PLBG0176G*	59	RX631	R5F5631YHDFB	PLQP0144K*
10	RX631	R5F5631ACDBG	PLBG0176G*	60	RX631	R5F56316CDFC	PLQP0176K*
11	RX631	R5F5631ADDBG	PLBG0176G*	61	RX631	R5F56316DDFC	PLQP0176K*
12	RX631	R5F5631BCDBG	PLBG0176G*	62	RX631	R5F56316DGFC	PLQP0176K*
13	RX631	R5F5631BDDBG	PLBG0176G*	63	RX631	R5F56316SDFC	PLQP0176K*
14	RX631	R5F5631DCDBG	PLBG0176G*	64	RX631	R5F56316SGFC	PLQP0176K*
15	RX631	R5F5631DDDBG	PLBG0176G*	65	RX631	R5F56317CDFC	PLQP0176K*
16	RX631	R5F5631ECDBG	PLBG0176G*	66	RX631	R5F56317DDFC	PLQP0176K*
17	RX631	R5F5631EDDBG	PLBG0176G*	67	RX631	R5F56317DGFC	PLQP0176K*
18	RX631	R5F56316CDFB	PLQP0144K*	68	RX631	R5F56317SDFC	PLQP0176K*
19	RX631	R5F56316DDFB	PLQP0144K*	69	RX631	R5F56317SGFC	PLQP0176K*
20	RX631	R5F56316DGFB	PLQP0144K*	70	RX631	R5F56318CDFC	PLQP0176K*
21	RX631	R5F56316SDFB	PLQP0144K*	71	RX631	R5F56318DDFC	PLQP0176K*
22	RX631	R5F56316SGFB	PLQP0144K*	72	RX631	R5F56318DGFC	PLQP0176K*
23	RX631	R5F56317CDFB	PLQP0144K*	73	RX631	R5F56318SDFC	PLQP0176K*
24	RX631	R5F56317DDFB	PLQP0144K*	74	RX631	R5F56318SGFC	PLQP0176K*
25	RX631	R5F56317DGFB	PLQP0144K*	75	RX631	R5F5631ACDFC	PLQP0176K*
26	RX631	R5F56317SDFB	PLQP0144K*	76	RX631	R5F5631ADDFC	PLQP0176K*
27	RX631	R5F56317SGFB	PLQP0144K*	77	RX631	R5F5631ADGFC	PLQP0176K*
28	RX631	R5F56318CDFB	PLQP0144K*	78	RX631	R5F5631BCDFC	PLQP0176K*
29	RX631	R5F56318DDFB	PLQP0144K*	79	RX631	R5F5631BDDFC	PLQP0176K*
30	RX631	R5F56318DGFB	PLQP0144K*	80	RX631	R5F5631BDGFC	PLQP0176K*
31	RX631	R5F56318SDFB	PLQP0144K*	81	RX631	R5F5631CDFC	PLQP0176K*
32	RX631	R5F56318SGFB	PLQP0144K*	82	RX631	R5F5631DDDFC	PLQP0176K*
33	RX631	R5F5631ACDFB	PLQP0144K*	83	RX631	R5F5631DDGFC	PLQP0176K*
34	RX631	R5F5631ADDFB	PLQP0144K*	84	RX631	R5F5631ECDFC	PLQP0176K*
35	RX631	R5F5631ADGFB	PLQP0144K*	85	RX631	R5F5631EDDFC	PLQP0176K*
36	RX631	R5F5631BCDFB	PLQP0144K*	86	RX631	R5F5631EDGFC	PLQP0176K*
37	RX631	R5F5631BDDFB	PLQP0144K*	87	RX631	R5F5631FDDFC	PLQP0176K*
38	RX631	R5F5631BDGFB	PLQP0144K*	88	RX631	R5F5631FDGFC	PLQP0176K*
39	RX631	R5F5631DCDFB	PLQP0144K*	89	RX631	R5F5631FHDFC	PLQP0176K*
40	RX631	R5F5631DDDFB	PLQP0144K*	90	RX631	R5F5631KDDFC	PLQP0176K*
41	RX631	R5F5631DDGFB	PLQP0144K*	91	RX631	R5F5631KDGFC	PLQP0176K*
42	RX631	R5F5631ECDFB	PLQP0144K*	92	RX631	R5F5631WDDFC	PLQP0176K*
43	RX631	R5F5631EDDFB	PLQP0144K*	93	RX631	R5F5631WDGFC	PLQP0176K*
44	RX631	R5F5631EDGFB	PLQP0144K*	94	RX631	R5F5631WHDFC	PLQP0176K*
45	RX631	R5F5631FDDFB	PLQP0144K*	95	RX631	R5F5631YDDFC	PLQP0176K*
46	RX631	R5F5631FDGFB	PLQP0144K*	96	RX631	R5F5631YDGFC	PLQP0176K*
47	RX631	R5F5631FHDFB	PLQP0144K*	97	RX631	R5F5631YHDFC	PLQP0176K*
48	RX631	R5F5631GDDFB	PLQP0144K*	98	RX631	R5F5631MCDFL	PLQP0048K*
49	RX631	R5F5631GDGFB	PLQP0144K*	99	RX631	R5F5631MDDFL	PLQP0048K*
50	RX631	R5F5631JDDFB	PLQP0144K*	100	RX631	R5F5631MDGFL	PLQP0048K*

Table. Product list

MCR-22-0311

No	Group	Product part number	Package code	No	Group	Product part number	Package code
101	RX631	R5F5631NCDFL	PLQP0048K*	161	RX631	R5F5631DDDFR	PLQP0176L*
102	RX631	R5F5631NDDFL	PLQP0048K*	162	RX631	R5F5631DDGFR	PLQP0176L*
103	RX631	R5F5631NDGFL	PLQP0048K*	163	RX631	R5F5631ECDFR	PLQP0176L*
104	RX631	R5F5631PCDFL	PLQP0048K*	164	RX631	R5F5631EDDFR	PLQP0176L*
105	RX631	R5F5631PDDFL	PLQP0048K*	165	RX631	R5F5631EDGFR	PLQP0176L*
106	RX631	R5F5631PDGFL	PLQP0048K*	166	RX631	R5F56316CDLC	PTLG0177K*
107	RX631	R5F5631MCDFM	PLQP0064K*	167	RX631	R5F56316DDLJ	PTLG0177K*
108	RX631	R5F5631MDDFM	PLQP0064K*	168	RX631	R5F56316SDLC	PTLG0177K*
109	RX631	R5F5631MDGFM	PLQP0064K*	169	RX631	R5F56317CDLC	PTLG0177K*
110	RX631	R5F5631NCDFM	PLQP0064K*	170	RX631	R5F56317DDLJ	PTLG0177K*
111	RX631	R5F5631NDDFM	PLQP0064K*	171	RX631	R5F56317SDLC	PTLG0177K*
112	RX631	R5F5631NDGFM	PLQP0064K*	172	RX631	R5F56318CDLC	PTLG0177K*
113	RX631	R5F5631PCDFM	PLQP0064K*	173	RX631	R5F56318DDLJ	PTLG0177K*
114	RX631	R5F5631PDDFM	PLQP0064K*	174	RX631	R5F56318SDLC	PTLG0177K*
115	RX631	R5F5631PDGFM	PLQP0064K*	175	RX631	R5F5631ACDLC	PTLG0177K*
116	RX631	R5F56316CDFP	PLQP0100K*	176	RX631	R5F5631ADDLC	PTLG0177K*
117	RX631	R5F56316DDFP	PLQP0100K*	177	RX631	R5F5631BCDLC	PTLG0177K*
118	RX631	R5F56316DGFP	PLQP0100K*	178	RX631	R5F5631BDDLJ	PTLG0177K*
119	RX631	R5F56317CDFP	PLQP0100K*	179	RX631	R5F5631DCDLC	PTLG0177K*
120	RX631	R5F56317DDFP	PLQP0100K*	180	RX631	R5F5631DDDLJ	PTLG0177K*
121	RX631	R5F56317DGFP	PLQP0100K*	181	RX631	R5F5631ECDLC	PTLG0177K*
122	RX631	R5F56318CDFP	PLQP0100K*	182	RX631	R5F5631EDDLJ	PTLG0177K*
123	RX631	R5F56318DDFP	PLQP0100K*	183	RX631	R5F56318QDLD	PTLG0085J*
124	RX631	R5F56318DGFP	PLQP0100K*	184	RX631	R5F5631ACDLD	PTLG0085J*
125	RX631	R5F56318QDFP	PLQP0100K*	185	RX631	R5F5631ADDLD	PTLG0085J*
126	RX631	R5F5631ACDFP	PLQP0100K*	186	RX631	R5F5631BCDLD	PTLG0085J*
127	RX631	R5F5631ADDFP	PLQP0100K*	187	RX631	R5F5631BDDLJ	PTLG0085J*
128	RX631	R5F5631ADGFP	PLQP0100K*	188	RX631	R5F56316CDLE	PTLG0145J*
129	RX631	R5F5631BCDFP	PLQP0100K*	189	RX631	R5F56316DDLE	PTLG0145J*
130	RX631	R5F5631BDDFP	PLQP0100K*	190	RX631	R5F56316SDLE	PTLG0145J*
131	RX631	R5F5631BDGFP	PLQP0100K*	191	RX631	R5F56317CDLE	PTLG0145J*
132	RX631	R5F5631DCDFP	PLQP0100K*	192	RX631	R5F56317DDLE	PTLG0145J*
133	RX631	R5F5631DDDFP	PLQP0100K*	193	RX631	R5F56317SDLE	PTLG0145J*
134	RX631	R5F5631DDGFP	PLQP0100K*	194	RX631	R5F56318CDLE	PTLG0145J*
135	RX631	R5F5631ECDFP	PLQP0100K*	195	RX631	R5F56318DDLE	PTLG0145J*
136	RX631	R5F5631EDDFP	PLQP0100K*	196	RX631	R5F56318SDLE	PTLG0145J*
137	RX631	R5F5631EDGFP	PLQP0100K*	197	RX631	R5F5631ACDLE	PTLG0145J*
138	RX631	R5F5631FDDFP	PLQP0100K*	198	RX631	R5F5631ADDLE	PTLG0145J*
139	RX631	R5F5631FDGFP	PLQP0100K*	199	RX631	R5F5631BCDLE	PTLG0145J*
140	RX631	R5F5631FHDFP	PLQP0100K*	200	RX631	R5F5631BDDLE	PTLG0145J*
141	RX631	R5F5631GDDFP	PLQP0100K*	201	RX631	R5F5631DCDLE	PTLG0145J*
142	RX631	R5F5631GDGFP	PLQP0100K*	202	RX631	R5F5631DDDLJ	PTLG0145J*
143	RX631	R5F5631JDDFP	PLQP0100K*	203	RX631	R5F5631ECDLE	PTLG0145J*
144	RX631	R5F5631JDGFP	PLQP0100K*	204	RX631	R5F5631EDDLJ	PTLG0145J*
145	RX631	R5F5631KDDFP	PLQP0100K*	205	RX631	R5F5631MFDLH	PTLG0064J*
146	RX631	R5F5631KDGFP	PLQP0100K*	206	RX631	R5F5631PFDLH	PTLG0064J*
147	RX631	R5F5631SQDFP	PLQP0100K*	207	RX631	R5F56316CDLJ	PTLG0100J*
148	RX631	R5F5631WDDFP	PLQP0100K*	208	RX631	R5F56316DDLJ	PTLG0100J*
149	RX631	R5F5631WDGFP	PLQP0100K*	209	RX631	R5F56317CDLJ	PTLG0100J*
150	RX631	R5F5631WHDFP	PLQP0100K*	210	RX631	R5F56317DDLJ	PTLG0100J*
151	RX631	R5F5631YDDFP	PLQP0100K*	211	RX631	R5F56318CDLJ	PTLG0100J*
152	RX631	R5F5631YDGFP	PLQP0100K*	212	RX631	R5F56318DDLJ	PTLG0100J*
153	RX631	R5F5631YHDFP	PLQP0100K*	213	RX631	R5F5631ACDLJ	PTLG0100J*
154	RX631	R5F5631ACDFR	PLQP0176L*	214	RX631	R5F5631ADDLJ	PTLG0100J*
155	RX631	R5F5631ADDFR	PLQP0176L*	215	RX631	R5F5631BCDLJ	PTLG0100J*
156	RX631	R5F5631ADGFR	PLQP0176L*	216	RX631	R5F5631BDDLJ	PTLG0100J*
157	RX631	R5F5631BCDFR	PLQP0176L*	217	RX631	R5F5631DCDLJ	PTLG0100J*
158	RX631	R5F5631BDDFR	PLQP0176L*	218	RX631	R5F5631DDDLJ	PTLG0100J*
159	RX631	R5F5631BDGFR	PLQP0176L*	219	RX631	R5F5631ECDLJ	PTLG0100J*
160	RX631	R5F5631DCDFR	PLQP0176L*	220	RX631	R5F5631EDDLJ	PTLG0100J*

Table. Product list

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No	Group	Product part number	Package code	No	Group	Product part number	Package code
221	RX631	R5F56316CDLK	PTLG0145K*				
222	RX631	R5F56316DDLK	PTLG0145K*				
223	RX631	R5F56316SDLK	PTLG0145K*				
224	RX631	R5F56317CDLK	PTLG0145K*				
225	RX631	R5F56317DDLK	PTLG0145K*				
226	RX631	R5F56317SDLK	PTLG0145K*				
227	RX631	R5F56318CDLK	PTLG0145K*				
228	RX631	R5F56318DDLK	PTLG0145K*				
229	RX631	R5F56318SDLK	PTLG0145K*				
230	RX631	R5F5631ACDLK	PTLG0145K*				
231	RX631	R5F5631ADDLK	PTLG0145K*				
232	RX631	R5F5631BCDLK	PTLG0145K*				
233	RX631	R5F5631BDDLK	PTLG0145K*				
234	RX631	R5F5631DCDLK	PTLG0145K*				
235	RX631	R5F5631DDDLK	PTLG0145K*				
236	RX631	R5F5631ECDLK	PTLG0145K*				
237	RX631	R5F5631EDDLK	PTLG0145K*				
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