

# RENESAS SEMICONDUCTOR RELIABILITY REPORT

GROUP : RX630  
DEVICE : R5F5630XXX  
APPLICATION : Consumer / Industry

Quality Assurance Div.  
Renesas Electronics Corporation

## Notice

1. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation or any other use of the circuits, software, and information in the design of your product or system. Renesas Electronics disclaims any and all liability for any losses and damages incurred by you or third parties arising from the use of these circuits, software, or information.
  2. Renesas Electronics hereby expressly disclaims any warranties against and liability for infringement or any other claims involving patents, copyrights, or other intellectual property rights of third parties, by or arising from the use of Renesas Electronics products or technical information described in this document, including but not limited to, the product data, drawings, charts, programs, algorithms, and application examples.
  3. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.
  4. You shall be responsible for determining what licenses are required from any third parties, and obtaining such licenses for the lawful import, export, manufacture, sales, utilization, distribution or other disposal of any products incorporating Renesas Electronics products, if required.
  5. You shall not alter, modify, copy, or reverse engineer any Renesas Electronics product, whether in whole or in part. Renesas Electronics disclaims any and all liability for any losses or damages incurred by you or third parties arising from such alteration, modification, copying or reverse engineering.
  6. Renesas Electronics products are classified according to the following two quality grades: "Standard" and "High Quality". The intended applications for each Renesas Electronics product depends on the product's quality grade, as indicated below.  
 "Standard": Computers; office equipment; communications equipment; test and measurement equipment; audio and visual equipment; home electronic appliances; machine tools; personal electronic equipment; industrial robots; etc.  
 "High Quality": Transportation equipment (automobiles, trains, ships, etc.); traffic control (traffic lights); large-scale communication equipment; key financial terminal systems; safety control equipment; etc.  
 Unless expressly designated as a high reliability product or a product for harsh environments in a Renesas Electronics data sheet or other Renesas Electronics document, Renesas Electronics products are not intended or authorized for use in products or systems that may pose a direct threat to human life or bodily injury (artificial life support devices or systems; surgical implantations; etc.), or may cause serious property damage (space system; undersea repeaters; nuclear power control systems; aircraft control systems; key plant systems; military equipment; etc.). Renesas Electronics disclaims any and all liability for any damages or losses incurred by you or any third parties arising from the use of any Renesas Electronics product that is inconsistent with any Renesas Electronics data sheet, user's manual or other Renesas Electronics document.
  7. No semiconductor product is absolutely secure. Notwithstanding any security measures or features that may be implemented in Renesas Electronics hardware or software products, Renesas Electronics shall have absolutely no liability arising out of any vulnerability or security breach, including but not limited to any unauthorized access to or use of a Renesas Electronics product or a system that uses a Renesas Electronics product. RENESAS ELECTRONICS DOES NOT WARRANT OR GUARANTEE THAT RENESAS ELECTRONICS PRODUCTS, OR ANY SYSTEMS CREATED USING RENESAS ELECTRONICS PRODUCTS WILL BE INVULNERABLE OR FREE FROM CORRUPTION, ATTACK, VIRUSES, INTERFERENCE, HACKING, DATA LOSS OR THEFT, OR OTHER SECURITY INTRUSION ("Vulnerability Issues"). RENESAS ELECTRONICS DISCLAIMS ANY AND ALL RESPONSIBILITY OR LIABILITY ARISING FROM OR RELATED TO ANY VULNERABILITY ISSUES. FURTHERMORE, TO THE EXTENT PERMITTED BY APPLICABLE LAW, RENESAS ELECTRONICS DISCLAIMS ANY AND ALL WARRANTIES, EXPRESS OR IMPLIED, WITH RESPECT TO THIS DOCUMENT AND ANY RELATED OR ACCOMPANYING SOFTWARE OR HARDWARE, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE.
  8. When using Renesas Electronics products, refer to the latest product information (data sheets, user's manuals, application notes, "General Notes for Handling and Using Semiconductor Devices" in the reliability handbook, etc.), and ensure that usage conditions are within the ranges specified by Renesas Electronics with respect to maximum ratings, operating power supply voltage range, heat dissipation characteristics, installation, etc. Renesas Electronics disclaims any and all liability for any malfunctions, failure or accident arising out of the use of Renesas Electronics products outside of such specified ranges.
  9. Although Renesas Electronics endeavors to improve the quality and reliability of Renesas Electronics products, semiconductor products have specific characteristics, such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Unless designated as a high reliability product or a product for harsh environments in a Renesas Electronics data sheet or other Renesas Electronics document, Renesas Electronics products are not subject to radiation resistance design. You are responsible for implementing safety measures to guard against the possibility of bodily injury, injury or damage caused by fire, and/or danger to the public in the event of a failure or malfunction of Renesas Electronics products, such as safety design for hardware and software, including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult and impractical, you are responsible for evaluating the safety of the final products or systems manufactured by you.
  10. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. You are responsible for carefully and sufficiently investigating applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive, and using Renesas Electronics products in compliance with all these applicable laws and regulations. Renesas Electronics disclaims any and all liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
  11. Renesas Electronics products and technologies shall not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations. You shall comply with any applicable export control laws and regulations promulgated and administered by the governments of any countries asserting jurisdiction over the parties or transactions.
  12. It is the responsibility of the buyer or distributor of Renesas Electronics products, or any other party who distributes, disposes of, or otherwise sells or transfers the product to a third party, to notify such third party in advance of the contents and conditions set forth in this document .
  13. This document shall not be reproduced or duplicated in any form or disclosed to any third party, in whole or in part, without prior written consent of Renesas Electronics.
  14. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products.
- (Note 1) "Renesas Electronics" as used in this document means Renesas Electronics Corporation and also includes its directly or indirectly controlled subsidiaries.
- (Note 2) "Renesas Electronics product(s)" means any product developed or manufactured by or for Renesas Electronics.

(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)	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 ( $\lambda$ )**

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

① Unique failure rate ( $\lambda_b$ )

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

Unique failure rate at  $T_a = 55^\circ\text{C}$  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
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	RX630	R5F56308CDBG	PLBG0176G*	51	RX630	R5F56306CDFN	PLQP0080K*
2	RX630	R5F56308DDBG	PLBG0176G*	52	RX630	R5F56306DDFN	PLQP0080K*
3	RX630	R5F5630ACDBG	PLBG0176G*	53	RX630	R5F56307CDFN	PLQP0080K*
4	RX630	R5F5630ADDBG	PLBG0176G*	54	RX630	R5F56307DDFN	PLQP0080K*
5	RX630	R5F5630BCDBG	PLBG0176G*	55	RX630	R5F56307DGFN	PLQP0080K*
6	RX630	R5F5630BDDBG	PLBG0176G*	56	RX630	R5F56308CDFN	PLQP0080K*
7	RX630	R5F5630DCDBG	PLBG0176G*	57	RX630	R5F56308DDFN	PLQP0080K*
8	RX630	R5F5630DDDBG	PLBG0176G*	58	RX630	R5F56308DGFN	PLQP0080K*
9	RX630	R5F5630ECDBG	PLBG0176G*	59	RX630	R5F56303CDFP	PLQP0100K*
10	RX630	R5F5630EDDBG	PLBG0176G*	60	RX630	R5F56303DDFP	PLQP0100K*
11	RX630	R5F56306CDFB	PLQP0144K*	61	RX630	R5F56305CDFP	PLQP0100K*
12	RX630	R5F56306DDFB	PLQP0144K*	62	RX630	R5F56305DDFP	PLQP0100K*
13	RX630	R5F56307CDFB	PLQP0144K*	63	RX630	R5F56306CDFP	PLQP0100K*
14	RX630	R5F56307DDFB	PLQP0144K*	64	RX630	R5F56306DDFP	PLQP0100K*
15	RX630	R5F56308CDFB	PLQP0144K*	65	RX630	R5F56307CDFP	PLQP0100K*
16	RX630	R5F56308DDFB	PLQP0144K*	66	RX630	R5F56307DDFP	PLQP0100K*
17	RX630	R5F56308JDFB	PLQP0144K*	67	RX630	R5F56307DGFP	PLQP0100K*
18	RX630	R5F5630ACDFB	PLQP0144K*	68	RX630	R5F56308CDFP	PLQP0100K*
19	RX630	R5F5630ADDFB	PLQP0144K*	69	RX630	R5F56308DDFP	PLQP0100K*
20	RX630	R5F5630ADGFB	PLQP0144K*	70	RX630	R5F56308DGFP	PLQP0100K*
21	RX630	R5F5630BCDFB	PLQP0144K*	71	RX630	R5F56308JDFP	PLQP0100K*
22	RX630	R5F5630BDDFB	PLQP0144K*	72	RX630	R5F56308MDFP	PLQP0100K*
23	RX630	R5F5630BDGFB	PLQP0144K*	73	RX630	R5F5630ACDFP	PLQP0100K*
24	RX630	R5F5630DCDFB	PLQP0144K*	74	RX630	R5F5630ADDFP	PLQP0100K*
25	RX630	R5F5630DDDFB	PLQP0144K*	75	RX630	R5F5630ADGFP	PLQP0100K*
26	RX630	R5F5630DJDFB	PLQP0144K*	76	RX630	R5F5630BCDFP	PLQP0100K*
27	RX630	R5F5630ECDFB	PLQP0144K*	77	RX630	R5F5630BDDFP	PLQP0100K*
28	RX630	R5F5630EDDFB	PLQP0144K*	78	RX630	R5F5630BDGFP	PLQP0100K*
29	RX630	R5F5630KCDFB	PLQP0144K*	79	RX630	R5F5630DCDFP	PLQP0100K*
30	RX630	R5F5630KDDFB	PLQP0144K*	80	RX630	R5F5630DDDFP	PLQP0100K*
31	RX630	R5F5630NJDFB	PLQP0144K*	81	RX630	R5F5630ECDFP	PLQP0100K*
32	RX630	R5F5630QJDFB	PLQP0144K*	82	RX630	R5F5630EDDFP	PLQP0100K*
33	RX630	R5F5630SDDFB	PLQP0144K*	83	RX630	R5F5630LJDFP	PLQP0100K*
34	RX630	R5F5630SJDFB	PLQP0144K*	84	RX630	R5F5630NJDFP	PLQP0100K*
35	RX630	R5F5630TJDFB	PLQP0144K*	85	RX630	R5F5630QJDFP	PLQP0100K*
36	RX630	R5F56308CDFC	PLQP0176K*	86	RX630	R5F5630ACDFR	PLQP0176L*
37	RX630	R5F56308DDFC	PLQP0176K*	87	RX630	R5F5630ADDFR	PLQP0176L*
38	RX630	R5F5630ACDFC	PLQP0176K*	88	RX630	R5F5630BCDFR	PLQP0176L*
39	RX630	R5F5630ADDFC	PLQP0176K*	89	RX630	R5F5630BDDFR	PLQP0176L*
40	RX630	R5F5630BCDFC	PLQP0176K*	90	RX630	R5F5630DCDFR	PLQP0176L*
41	RX630	R5F5630BDDFC	PLQP0176K*	91	RX630	R5F5630DDDFR	PLQP0176L*
42	RX630	R5F5630DCDFC	PLQP0176K*	92	RX630	R5F5630ECDFR	PLQP0176L*
43	RX630	R5F5630DDDFC	PLQP0176K*	93	RX630	R5F5630EDDFR	PLQP0176L*
44	RX630	R5F5630ECDFC	PLQP0176K*	94	RX630	R5F56303CDLA	PTLG0100K*
45	RX630	R5F5630EDDFC	PLQP0176K*	95	RX630	R5F56303DDLA	PTLG0100K*
46	RX630	R5F5630TJDFC	PLQP0176K*	96	RX630	R5F56305CDLA	PTLG0100K*
47	RX630	R5F56303CDFN	PLQP0080K*	97	RX630	R5F56305DDLA	PTLG0100K*
48	RX630	R5F56303DDFN	PLQP0080K*	98	RX630	R5F56306CDLA	PTLG0100K*
49	RX630	R5F56305CDFN	PLQP0080K*	99	RX630	R5F56306DDLA	PTLG0100K*
50	RX630	R5F56305DDFN	PLQP0080K*	100	RX630	R5F56307CDLA	PTLG0100K*

Table. Product list

MCR-22-0310

No	Group	Product part number	Package code	No	Group	Product part number	Package code
101	RX630	R5F56307DDLA	PTLG0100K*	161			
102	RX630	R5F56308CDLA	PTLG0100K*	162			
103	RX630	R5F56308DDLA	PTLG0100K*	163			
104	RX630	R5F56308CDLC	PTLG0177K*	164			
105	RX630	R5F56308DDLC	PTLG0177K*	165			
106	RX630	R5F5630ACDLC	PTLG0177K*	166			
107	RX630	R5F5630ADDLC	PTLG0177K*	167			
108	RX630	R5F5630BCDLC	PTLG0177K*	168			
109	RX630	R5F5630BDDLC	PTLG0177K*	169			
110	RX630	R5F5630DCDLC	PTLG0177K*	170			
111	RX630	R5F5630DDDL	PTLG0177K*	171			
112	RX630	R5F5630ECDLC	PTLG0177K*	172			
113	RX630	R5F5630EDDL	PTLG0177K*	173			
114	RX630	R5F56306CDLE	PTLG0145J*	174			
115	RX630	R5F56306DDLE	PTLG0145J*	175			
116	RX630	R5F56307CDLE	PTLG0145J*	176			
117	RX630	R5F56307DDLE	PTLG0145J*	177			
118	RX630	R5F56308CDLE	PTLG0145J*	178			
119	RX630	R5F56308DDLE	PTLG0145J*	179			
120	RX630	R5F5630ACDLE	PTLG0145J*	180			
121	RX630	R5F5630ADDLE	PTLG0145J*	181			
122	RX630	R5F5630BCDLE	PTLG0145J*	182			
123	RX630	R5F5630BDDLE	PTLG0145J*	183			
124	RX630	R5F5630DCDLE	PTLG0145J*	184			
125	RX630	R5F5630DDDL	PTLG0145J*	185			
126	RX630	R5F5630ECDLE	PTLG0145J*	186			
127	RX630	R5F5630EDDL	PTLG0145J*	187			
128	RX630	R5F56303CDLJ	PTLG0100J*	188			
129	RX630	R5F56303DDLJ	PTLG0100J*	189			
130	RX630	R5F56305CDLJ	PTLG0100J*	190			
131	RX630	R5F56305DDLJ	PTLG0100J*	191			
132	RX630	R5F56306CDLJ	PTLG0100J*	192			
133	RX630	R5F56306DDLJ	PTLG0100J*	193			
134	RX630	R5F56307CDLJ	PTLG0100J*	194			
135	RX630	R5F56307DDLJ	PTLG0100J*	195			
136	RX630	R5F56308CDLJ	PTLG0100J*	196			
137	RX630	R5F56308DDLJ	PTLG0100J*	197			
138	RX630	R5F5630ACDLJ	PTLG0100J*	198			
139	RX630	R5F5630ADDLJ	PTLG0100J*	199			
140	RX630	R5F5630BCDLJ	PTLG0100J*	200			
141	RX630	R5F5630BDDLJ	PTLG0100J*	201			
142	RX630	R5F5630DCDLJ	PTLG0100J*	202			
143	RX630	R5F5630DDDLJ	PTLG0100J*	203			
144	RX630	R5F5630ECDLJ	PTLG0100J*	204			
145	RX630	R5F5630EDDLJ	PTLG0100J*	205			
146	RX630	R5F56306CDLK	PTLG0145K*	206			
147	RX630	R5F56306DDLK	PTLG0145K*	207			
148	RX630	R5F56307CDLK	PTLG0145K*	208			
149	RX630	R5F56307DDLK	PTLG0145K*	209			
150	RX630	R5F56308CDLK	PTLG0145K*	210			
151	RX630	R5F56308DDLK	PTLG0145K*	211			
152	RX630	R5F5630ACDLK	PTLG0145K*	212			
153	RX630	R5F5630ADDLK	PTLG0145K*	213			
154	RX630	R5F5630BCDLK	PTLG0145K*	214			
155	RX630	R5F5630BDDLK	PTLG0145K*	215			
156	RX630	R5F5630DCDLK	PTLG0145K*	216			
157	RX630	R5F5630DDDLK	PTLG0145K*	217			
158	RX630	R5F5630ECDLK	PTLG0145K*	218			
159	RX630	R5F5630EDDLK	PTLG0145K*	219			
160				220			