

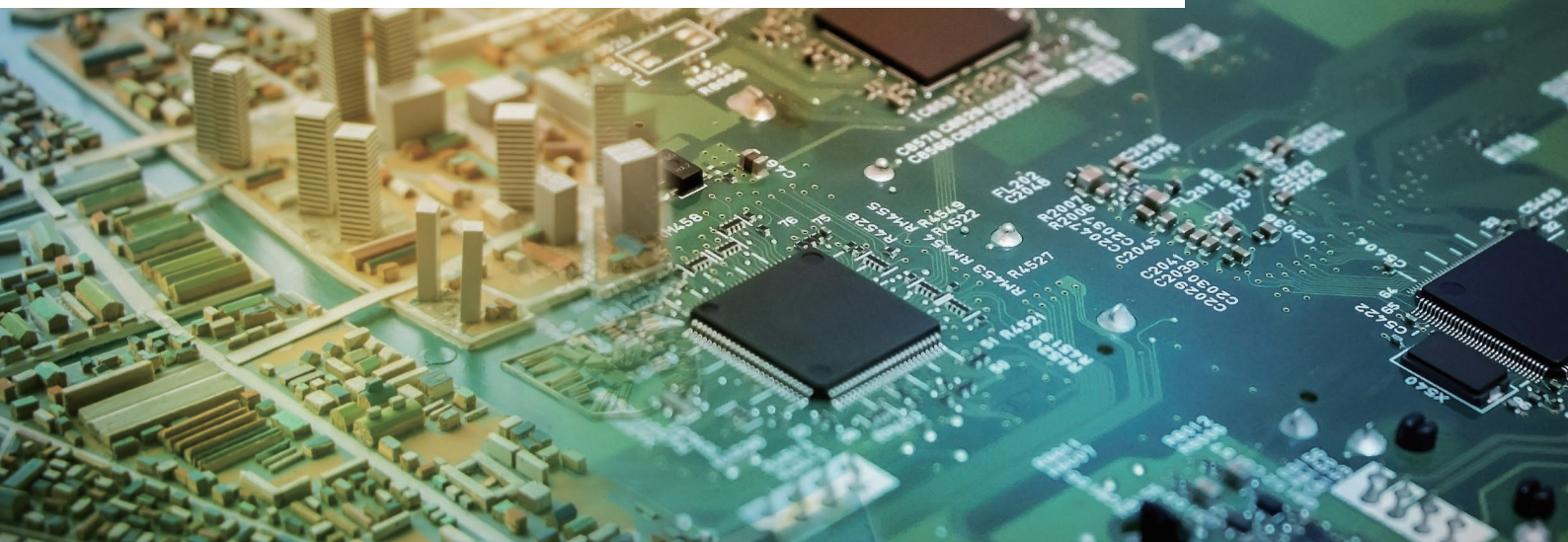
LOW POWER SRAMs

Advanced technology with superior performance
and industry-leading support



HIGH PERFORMANCE AND
HIGH RELIABILITY USING
RENESAS'S ORIGINAL TECHNOLOGY

LOW POWER SRAMs



Contents

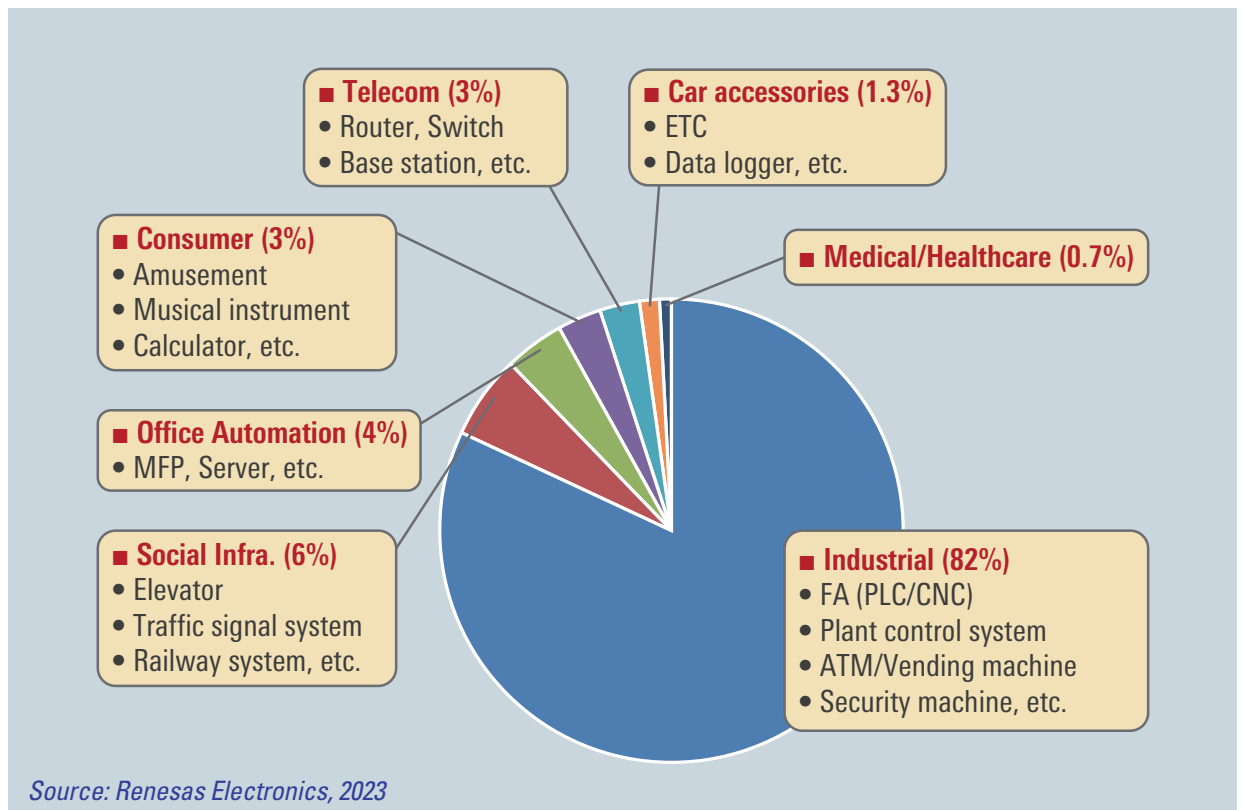
Low Power SRAM Roadmap	03
Industry-Leading Support, Application of Renesas Low Power SRAM.....	03
Advanced Low Power SRAM Technology with Superior Performance and Reliability.....	04
Product Differentiation	04
Product Benchmark	04
Soft Error Rate Comparison.....	05
Package Lineup for Low Power SRAM.....	05
Product List	06
Low Power SRAM Part Name Decoder	06

Low Power SRAM Roadmap

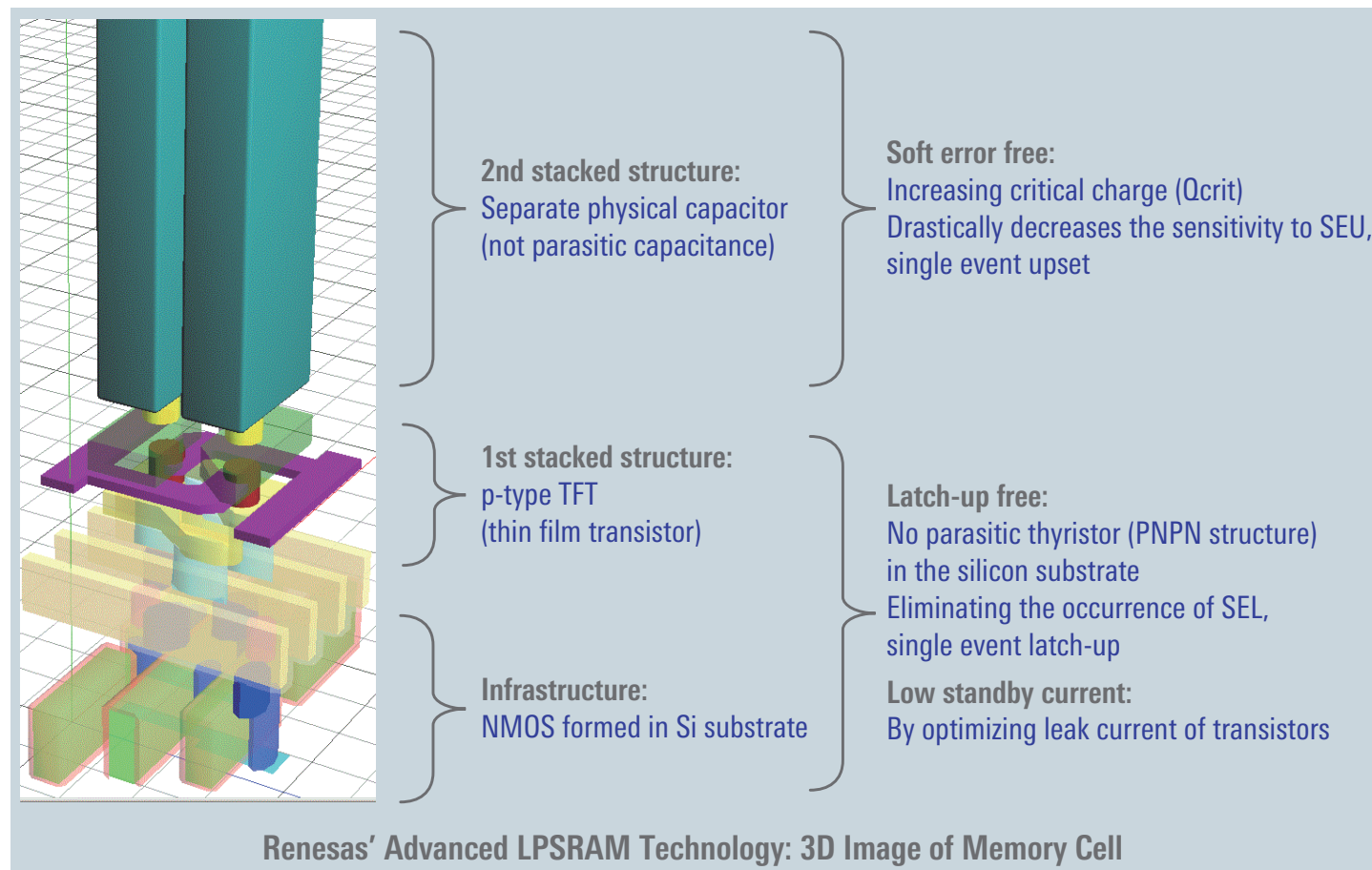
		Mass Production				Under Development	
SRAM Type	Density (Voltage)	~2023	2024	2025	2026	2027	2028~
Low Power SRAM	256Kb, 1Mb (5V/3V)	0.15μm Advanced LPSRAM					
	2Mb (3V)						
	4Mb (5V)						
	4Mb (3V)	0.11μm Advanced LPSRAM					
	8Mb, 16Mb (3V)						
	32Mb, 64Mb (3V)						
	16Mb (3V) R1LV1616H series <EOL products>	0.13μm (ECC embedded)					
	16Mb (3V) RMLV1616A-U series Alternative to R1LV1616H series		MP: Now				
						0.11μm Advanced LPSRAM	

- Widest product lineup from 256Kbit to 64Mbit
- Long term and stable support
- Highest quality with Renesas core advanced technology
- Easy switch to higher density in the same package

Industry-Leading Support, Application of Renesas Low Power SRAM



Advanced Low Power SRAM Technology with Superior Performance and Reliability



Product Differentiation

Renesas supports soft error free products for entire lineup of 256Kbit to 64Mbit

✓ Production Soft error countermeasure: **Yes** **No**

Vendor	Process	256Kb	1Mb	2Mb	4Mb	8Mb	16Mb	32Mb	64Mb
Renesas	0.15μm Advanced	✓	✓	✓	✓ (5V)	Change to 0.11μm Advanced			
	0.11μm Advanced				✓ (3V)	✓	✓	✓	✓
Competitor	90nm CMOS no ECC	✓	✓	✓	✓	✓	✓	✓	✓
	65nm CMOS ECC embedded				✓	✓	✓	✓	✓

Product Benchmark

Only Renesas supports unique products that realize both lowest standby current and soft error free

vs.	Renesas 0.11μm Advanced LPSRAM	Competitor's 65nm LPSRAM (with ECC)
Standby current	0.3μA (4Mb, typ.)	3.5μA (4Mb, typ.)
vs.	Renesas 0.11μm Advanced LPSRAM	Competitor's 90nm LPSRAM (no ECC)
Soft error rate	< 0.04 FIT / Mbit	500 to 5,000 FIT / Mbit

Soft Error Rate Comparison

Advanced LPSRAM has superior Soft Error Immunity to ECC-embedded SRAMs

Product Family	Countermeasure against soft error?	By what?	Soft error rate (Measured)
Advanced LPSRAM series (0.11 μ m / 0.15 μ m)	YES	Increasing Critical Charge (Qcrit) by the proprietary technology	< 0.04 FIT/Mb [0.11 μ m] < 0.06 FIT/Mb [0.15 μ m]
R1LV1616H series <EOL> (0.13 μ m CMOS 16Mb)	YES	Embedded ECC	< 5.5 FIT/Mb

RMLV1616A series, etc.

Renesas 0.11/0.15 μ m
Advanced LP-SRAMs

< 0.1 FIT/Mb

R1LV1616H series

Renesas 0.13 μ m
16Mb LP-SRAM

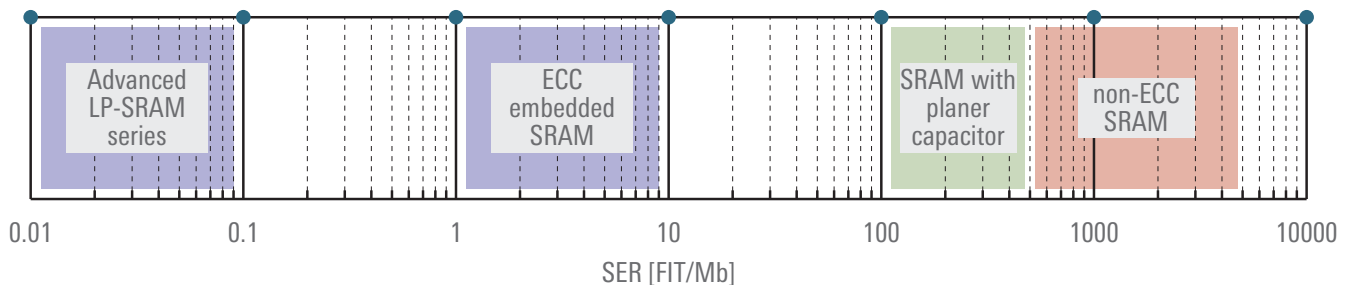
< 10 FIT/Mb

Renesas 0.18 μ m
4Mb Fast SRAM

100 to 500 FIT/Mb

Conventional SRAMs

500 to 5,000 FIT/Mb,
typically ~ 1,000 FIT/Mb



Package Lineup for Low Power SRAM

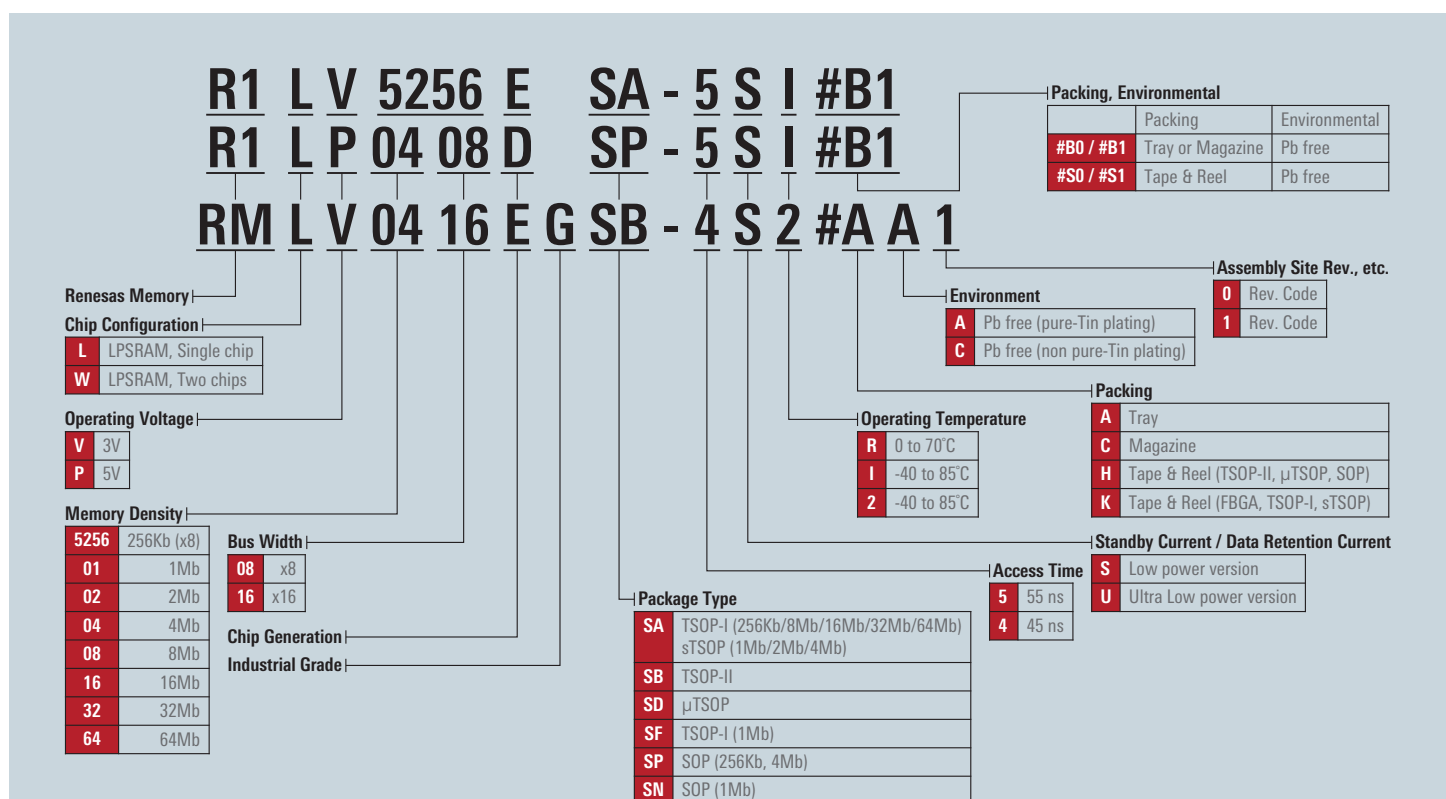
	SOP	TSOP-I	sTSOP	TSOP-II	μ TSOP	FBGA
28-pin						
32-pin						
44-pin						x8 / x16 config.
48-pin (48-ball)						
52-pin						

■ Renesas provides 6 kinds of common packages, which are upward compatible, making it easy to expand density without changing the PCB.

Product List

Product Series	Density	Org.	Supply Voltage (V)	Access Time (ns)	Standby Current (typ.)	Temp. Range	TSOP	SOP	FBGA	µTSOP
R1LP5256E	256 Kb	x8	4.5 - 5.5	55	0.6 µA	-40°C to 85°C	✓	✓		
R1LP0108E	1 Mb	x8	4.5 - 5.5	55	0.6 µA	-40°C to 85°C	✓	✓		
R1LP0408D	4 Mb	x8	4.5 - 5.5	55	0.8 µA	-40°C to 85°C	✓	✓		
R1LV5256E	256 Kb	x8	2.7 - 3.6	55	0.6 µA	-40°C to 85°C	✓	✓		
R1LV0108E	1 Mb	x8	2.7 - 3.6	55	0.6 µA	-40°C to 85°C	✓	✓		
R1LV0208BSA	2 Mb	x8	2.7 - 3.6	55	1 µA	-40°C to 85°C	✓			
R1LV0216BSB	2 Mb	x16	2.7 - 3.6	55	1 µA	-40°C to 85°C	✓			
RMLV0408E	4 Mb	x8	2.7 - 3.6	45	0.3 µA	-40°C to 85°C	✓	✓		
RMLV0414E	4 Mb	x16	2.7 - 3.6	45	0.3 µA	-40°C to 85°C	✓			
RMLV0416E	4 Mb	x16	2.7 - 3.6	45	0.3 µA	-40°C to 85°C	✓		✓	
RMLV0808BGSB	8 Mb	x8	2.4 - 3.6	45	0.45 µA	-40°C to 85°C	✓			
RMLV0816BGBG	8 Mb	x16	2.4 - 3.6	45	0.45 µA	-40°C to 85°C			✓	
RMLV0816BGSA	8 Mb	x16	2.4 - 3.6	45	0.45 µA	-40°C to 85°C	✓			
RMLV0816BGSB	8 Mb	x16	2.4 - 3.6	45	0.45 µA	-40°C to 85°C	✓			
RMLV0816BGSD	8 Mb	x16	2.4 - 3.6	45	0.45 µA	-40°C to 85°C				✓
RMLV1616A-S	16 Mb	x16	2.7 - 3.6	55	0.5 µA	-40°C to 85°C	✓		✓	✓
RMLV1616A-U	16 Mb	x16	2.7 - 3.6	45, 55	0.4 µA	-40°C to 85°C	✓		✓	
RMLV3216A	32 Mb	x16	2.7 - 3.6	55	0.6 µA	-40°C to 85°C	✓		✓	✓
RMWV6416A	64 Mb	x16	2.7 - 3.6	55	1.2 µA	-40°C to 85°C	✓		✓	✓

Low Power SRAM Part Name Decoder



MEMO

[illegible]

Renesas Electronics Corporation TOYOSU FORESIA, 3-2-24 Toyosu, Koto-ku, Tokyo 135-0061, Japan

Notice

- 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.
 - 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.
 - No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.
 - 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.
 - 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.
 - 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.
 - 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.
 - 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.
 - 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.
 - 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.
 - 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.
 - 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.
 - This document shall not be reprinted, reproduced or duplicated in any form, in whole or in part, without prior written consent of Renesas Electronics.
 - 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.5.0-1 2020.10)

■Contact Us
<https://www.renesas.com/contact-us>



Renesas Electronics Corporation

www.renesas.com