RX66N Group

Handbook for RX66N

Introduction

This document compiles useful information for each stage of device selection, development, and Mass production. You can also select what you need for your application from our rich selection of application notes that describe how to use a peripheral function, example applications, how to create a program, and more.

Please utilize these information, materials and application notes as a handbook when developing.

This handbook incorporates information available as of its publication date. For the most up-to-date details, please refer to the product page on our official website: <www.renesas.com/RX66N>

Target Device

RX66N Group

Contents

1. The table of information and materials needed for Device Selection, Development and Mass production 2
1.1 Step1: Device Selection 2
1.1.1 Step1-1: Preliminary survey phase 2
1.1.2 Step1-2: Evaluation phase of device performance and features 3
1.2 Step2: Product Design Development 5
1.3 Step3: Mass Production 5
1.4 Supportive information 5
2. Highlighted Application Notes 7

1. The table of information and materials needed for Device Selection, Development and Mass production

1.1 Step1: Device Selection

This section summarizes the information that is useful for the preliminary survey phase (Step1-1) and for the evaluation phase of device performance and features (Step1-2) when selecting the device.

1.1.1 Step1-1: Preliminary survey phase

#	Item	Content	Link
1	Hardware information	Datasheet	Doc
2		RX Family Brochure	Doc
3	Products & Solutions	Video & blog	Web site
4		Product deatures, Application block diagram(Winning combination)	Web site
5	Product longevity program (PLP)	Overview of product longevity program (PLP)	Web site
6		Product selection (product selector) Note: Refer to Longevity column in the chart.	Web site
7	Product Specification Comparison	RX Family Product Selector	Web site
8		Differences of specification among RX products	Doc
9		[SH/H8/H8S/H8SX/M16C/V850] → RX microcontroller migration guide	Doc
10		Design guide for migration between RX family differences in package external form	Doc

1.1.2 Step1-2: Evaluation phase of device performance and features

#	Item	Content	Link
User's Manual / Documentation			
1	Hardware information	User's manual: Hardware	Doc
2		RX family hardware manual guidance - electrical characteristics (how to read user's manual: hardware)	Doc
3		RX family hardware manual guidance - peripheral functions (how to read user's manual: hardware)	Doc
4		Technical update (errata information)	Web site
5		Product change notice (PCN)	Web site
6		Part number guide for RX family product (the meaning of character in part number)	Doc
7		Semiconductor reliability handbook	Doc
8		RELIABILITY REPORT	Doc
9		RoHS Note: Please refere to "RoHS" colmun on the respective part number of the product options.	Web site
10	Software information	Instruction set for RXv3 core architecture (user's manual)	Doc
Evaluation board			
11	Evaluation board (for general purpose)	Renesas starter kit (all functions could be evaluated)	Web site
12		RX66N の場合、以下注釈追加 Note: By setting the operating frequency to 120MHz or less, it is possible to evaluate it as an equivalent product to RX66N. When using Ethernet, it is necessary to use Ch0 side for RX66N (Ch1 is used for RSK+ for RX72N)	* 注釈あり
13		Target board (low-cost model)	Web site
Evaluation environment (set up method)			
14	Setup method	Getting started with the RX family development environment	Web site
15	Software tool	Development tools for RX family	Web site
16		Software environment (OS, middleware, drivers)	Web site
17		RX smart configurator user's guide (tools for code generation)	Doc
Solution			
18	Cloud	RX cloud connectivity solution	Web site
19	Security	RX Family Security Solutions	Web site

#	Item	Content	Link
20		Security key management tool manual	Web site
21	GUI	Graphical user interface (GUI) solutions	Web site
22	Functional safety	Functional safety solutions for Industrial automation	Web site
23		Functional safety solution for industrial automation	Doc
24		Introduction to Renesas functional safety for industrial appliance(video)	Web site
25		Functional safety solution for home appliances	Web site
26		Introduction to Renesas functional safety for home appliance (video)	Web site
Training			
27	Training information	Smart configurator tutorial - create a LED blinking program using RX family MCU	Web site
28		How to use tools and solutions (video clips)	Web site
Partner			
29	Partner information	Partner products (trusted technology partners that deliver commercial-grade building blocks)	Web site

1.2 Step2: Product Design Development

This section summarizes useful information for product design and development.

#	Item	Content	Link
1	Board Design	Hardware design guide	Doc
2		Design guide for main clock circuit and Sub-Clock circuit	Doc
3		Notes regarding high-temperature operation	Doc
4		Guidelines for full-speed USB2.0 board design	Doc
5		Ethernet hardware design guide	Doc
6		CAD Model Note: When you click the link in the CAD model column in the "Product Options" table on the product page, the CAD model information for each part# is displayed.	Web site
7		board simulation model (IBIS) *	Web site
8		Setting pins function in Smart configurator Note: Please refer to the "Pin Settings" section of RX Smart Configurator User's Guide: e² studio	Web site
9		Resonator and matching circuit information	Doc
10		Package information (package outline information, mount manual, etc.)	Web site
11		Board design guideline for BGA products	Doc

* It requires My Renesas account to access the content.

1.3 Step3: Mass Production

#	Item	Content	Link
1	Writing a program	PG-FP6	Web site
2		Renesas flash programmer (GUI tool for PC)	Web site
3	Firmware update	Firmware update module using firmware integration technology Application note	Doc
4		Firmware update module using firmware integration technology Sample code	Sample
5		MCUboot Firmware Integration Technology Application note	Doc
6		MCUboot Firmware Integration Technology Sample code	Sample
7	Memory protection	How to manage the access control for flash memory	Doc
8	Inspection	Boundary Scan Description Language (BSDL) file *	Web site

1.4 Supportive information

Get help from our technical staff and community.

#	Item	Content	Link
1	Support information	FAQ (frequently asked inquiries)	Website

#	Item	Content	Link
2		RX forum (community)	Website
3		Ask technical/sales support(support tickets)	Website

2. Highlighted Application Notes

This part presents the main application notes for this product. In addition to this list, many more application notes and sample codes are available on the product website <www.renesas.com/RX66N> for your reference. (Note: To access the content of sample code, My Renesas account is required.)

#	Item	Content	Link
1	System design	Examples of transitioning to low power consumption modes Application note	Doc
2		Examples of transitioning to low power consumption modes Sample code	Sample
3	Motor and Inverter Control	PMBus Master-Slave communication using I2C bus interface (RIIC/I3C) Application note	Doc
4		PMBus Master-Slave communication using I2C bus interface (RIIC/I3C) sample code	Sample
5	GUI	GUI development sample using QE for display [RX] Application note	Doc
6		GUI development sample using QE for display [RX] Sample code	Sample
7		QE for display [RX] user's manual Application note	Doc
8		QE for display [RX] user's manual Sample code	Sample
9		WVGA display sample program using GLCDC Application note	Doc
10		WVGA display sample program using GLCDC Sample code	Sample
11		WQVGA display sample program using GLCDC Application note	Doc
12		WQVGA display sample program using GLCDC Sample code	Sample
13		Module for image rendering (emWin) Application note	Doc
14		Module for image rendering (emWin) Sample code	Sample
15	Security	TSIP (Trusted Secure IP) driver Application note	Doc
16		TSIP (Trusted Secure IP) driver Sample code	Sample

General Precautions in the Handling of Microprocessing Unit and Microcontroller Unit Products

The following usage notes are applicable to all Microprocessing unit and Microcontroller unit products from Renesas. For detailed usage notes on the products covered by this document, refer to the relevant sections of the document as well as any technical updates that have been issued for the products.

1. Precaution against Electrostatic Discharge (ESD)

   A strong electrical field, when exposed to a CMOS device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop the generation of static electricity as much as possible, and quickly dissipate it when it occurs. Environmental control must be adequate. When it is dry, a humidifier should be used. This is recommended to avoid using insulators that can easily build up static electricity. Semiconductor devices must be stored and transported in an anti-static container, static shielding bag or conductive material. All test and measurement tools including work benches and floors must be grounded. The operator must also be grounded using a wrist strap. Semiconductor devices must not be touched with bare hands. Similar precautions must be taken for printed circuit boards with mounted semiconductor devices.
2. Processing at power-on

   The state of the product is undefined at the time when power is supplied. The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the time when power is supplied. In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the time when power is supplied until the reset process is completed. In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the time when power is supplied until the power reaches the level at which resetting is specified.
3. Input of signal during power-off state

   Do not input signals or an I/O pull-up power supply while the device is powered off. The current injection that results from input of such a signal or I/O pull-up power supply may cause malfunction and the abnormal current that passes in the device at this time may cause degradation of internal elements. Follow the guideline for input signal during power-off state as described in your product documentation.
4. Handling of unused pins

   Handle unused pins in accordance with the directions given under handling of unused pins in the manual. The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of the LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible.
5. Clock signals

   After applying a reset, only release the reset line after the operating clock signal becomes stable. When switching the clock signal during program execution, wait until the target clock signal is stabilized. When the clock signal is generated with an external resonator or from an external oscillator during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Additionally, when switching to a clock signal produced with an external resonator or by an external oscillator while program execution is in progress, wait until the target clock signal is stable.
6. Voltage application waveform at input pin

   Waveform distortion due to input noise or a reflected wave may cause malfunction. If the input of the CMOS device stays in the area between V_{IL} (Max.) and V_{IH} (Min.) due to noise, for example, the device may malfunction. Take care to prevent chattering noise from entering the device when the input level is fixed, and also in the transition period when the input level passes through the area between V_{IL} (Max.) and V_{IH} (Min.).
7. Prohibition of access to reserved addresses

   Access to reserved addresses is prohibited. The reserved addresses are provided for possible future expansion of functions. Do not access these addresses as the correct operation of the LSI is not guaranteed.
8. Differences between products

   Before changing from one product to another, for example to a product with a different part number, confirm that the change will not lead to problems. The characteristics of a microprocessing unit or microcontroller unit products in the same group but having a different part number might differ in terms of internal memory capacity, layout pattern, and other factors, which can affect the ranges of electrical characteristics, such as characteristic values, operating margins, immunity to noise, and amount of radiated noise. When changing to a product with a different part number, implement a system-evaluation test for the given product.

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 reprinted, reproduced or duplicated in any form, 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.

(Note1) “Renesas Electronics” as used in this document means Renesas Electronics Corporation and also includes its directly or indirectly controlled subsidiaries.

(Note2) “Renesas Electronics product(s)” means any product developed or manufactured by or for Renesas Electronics.

(Rev.5.0-1 October 2020)

Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,
Koto-ku, Tokyo 135-0061, Japan
www.renesas.com

Trademarks

Renesas and the Renesas logo are trademarks of Renesas Electronics Corporation. All trademarks and registered trademarks are the property of their respective owners.

Contact information

For further information on a product, technology, the most up-to-date version of a document, or your nearest sales office, please visit:
www.renesas.com/contact/.

© 2026 Renesas Electronics Corporation. All rights reserved.