

RX65N Group

Renesas Starter Kit+ Sample Code (CS+ for CC-RX)

R01AN3500EJ0100 Rev.1.00

Sep 30, 2016

APPLICATION NOTE

Introduction

Renesas Starter Kits+ (RSK+) are supplied as complete development systems for the selected microcontroller. The kit includes an evaluation board, portable On-Chip Debugger, and a set of peripheral sample code.

Target Device

RX65N Group

Development Environment

IDE: CS+ v4.01.00 Compiler: CC-RX v2.05.00 Hardware: Renesas Starter Kit+ for RX65N

Contents

1.	Installation	2
2.	Opening the sample projects	2
3.	Opening the Sample Code and Source Files	3
4.	Source Code Functionality	4



1. Installation

The CS+ IDE should already be installed on the user's personal computer (PC). It is assumed that the following software and versions are installed:

- Renesas CS+ Version v4.01.00
- CC-RX Tool Chain Version v2.05.00

Create a new folder, for example 'C:\Renesas\Workspace\RSK\RSK+RX65N'. Copy the application note zip package 'an-r01an3500ej0100-rx65n-rsk.zip' downloaded from the website to this folder and extract it here.

2. Opening the sample projects

Open CS+ from the Windows Start button by selecting 'All Programs > Renesas Electronics CS+ > CS+ for CC(RL78,RX,RH850)'.

🔘 CS+ for CC - [Start]		
<u>File Edit View Project Build Debug Tool</u>	<u>Window</u> <u>Help</u>	â
🤅 🚳 Start 🔒 🔛 🗿 🗄 🔏 🗠 🖄	♥ 第章 ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ●	
- 6 🔮 🐟 🛋 🛤 💷 1 🕅 🔍 🗿 🍜	() () () () () () () () () () () () () (
Project Tree 📮 🗙	(i), Start	- x
2 🕜 🙎 🔳	CLearn About CS+	
	GO We recommend reading the tutorial to find out what can be done in CS+. The tutorial contains the information on how to effectively use CS+.	
	Create New Project A new project can be created. A new project can also be created by reusing the file configuration registered to an existing project.] =
	Create New Multi-core Project	g_ U
	Open Existing Project Loads the project of CS+. Can also be opened directly from the following link.	Ĩ
Drop here to open the project file(*.mtpj).	GO Recent Projects Favorite Projects 1. RSK+RX65N_Tutorial Nothing 2. RSKRX24T_Tutorial	
	Open Existing e ² studio/CubeSuite/High-performance Embedded Workshop/PM+ Project	3
	Support version:	-
	Output	ąχ
	(207)	
	All Messages	-
F1 F2 F3	FY F5 F6 F7 F8 F9 F9 F9 F0 F1 F2	
	and Discont	VECT

To open the project select 'Project > Open Project...' from the menu bar.

CS+ for CC - [Start]					
File Edit View	Project Build Debug Tool Window Help				
i 🙉 Start 🛛 🛃	Create New Project				
i 🖓 🖓 🛞 🖪	🛃 Open Project				
Project Tree	Favorite Projects				



Select Tutorial project as an example.

Navigate to 'C:\Renesas\Workspace\RSK\RSK+RX65N\Tutorial' folder and select the file 'RSK+RX65N_Tutorial.mtpj'. Click <Open>.

Open Project							×
😋 🔾 🔻 🐌 🔸 Computer 🔸 Local Disk	(C:) • Workspace • RSK • RSK+RX65N • Tuto	orial 🕨		🛨 🐓 Se	arch Tutorial		Q
Organize 🔻 New folder							?
Workspace ^	Name	Date modified	Туре	Size			
ksk RSK+RX65N	\mu cg_src	9/30/2016 3:02 PM	File folder				
	📕 doc	9/30/2016 3:02 PM	File folder				
Application	SK+RX65N_Tutorial.mtpj	9/30/2016 2:51 PM	MTPJ File	16,935 KB			
Low_Power_Mode							
🐌 RTC							
System_BootLoader							
📕 System_BootLoader_Appli							
System_Input_Capture							
🐌 Timer_PWM							
🌗 Tutorial 🗸							
File <u>n</u> ame: RSK+RX6	5N Tutorial.mtpj				ject File (*.mtpj)	_	•
						Cancel	

3. Opening the Sample Code and Source Files

Once the Tutorial project is open, the source code and all dependent files can be opened in the editor by expanding the folders in the 'Project Tree' and double clicking the files listed. Files are grouped according to type. A number of separate projects are provided. Each project contains sample code for a specific peripheral.

SK+RX65N_Tutorial - CS+ for CC - [Project Tr	Tree]
<u>File Edit View Project Build D</u> ebug <u>T</u> ool <u>V</u>	Window Help
🗄 🚳 Start 🚚 🔛 🗿 🧮 🔏 🖻 🥬	(*) 옮 쓴 쓴, · · · · · · · · · · · · · · · · ·
- 🔂 🖄 🦦 🔜 📰 😰 💯 🔍 🌒 🚑 5	🧟 📾 📾 🐔 🕤 🖬 💋 Solution List 📜 💭 🗣 🖓 🗗
Project Tree 🛛 📮 🗙	I regmaine
2 🕜 🙎 🗷	
RSK+RX65N Tutorial (Project)	33 33 ⇒) ⊂, ⊂, Columns*
R5F565N9AxFB (Microcontroller)	
🗄 📲 Code Generator (Design Tool)	2 * DISCLAIMER
	3 * This software is supplied by Renesas Electronics Corporation and is only intended for use with Renesas products.
	4 * No other uses are authorized. This software is owned by Renesas Electronics Corporation and is protected under al 5 * applicable laws, including copyright laws.
File	 * applicable laws, including copyright laws. * THIS SOFTWARE IS PROVIDE "AS IS" AND RENESAS MAKES NO WARRANTIESREGARDING THIS SOFTWARE. WHETHER EXPRESS. IMPLIE
C Source Files	7 * OR STATUTORY, INCLUDING BUT NOT LIMITED TO WARRANTIES OF MERCHANTABILITY, FINESS FOR A PARTICULAR PURPOSE AND
Dependencies	8 * NON-INFRINGEMENT. ALL SUCH WARRANTIES ARE EXPRESSLY DISCLAIMED. TO THE MAXIMUM EXTENT PERMITTED NOT PROHIBITED BY
iodefine.h	9 * LAW, NEITHER RENESAS ELECTRONICS CORPORATION NOR ANY OF ITS AFFILIATED COMPANIES SHALL BE LIABLE FOR ANY DIRECT,
Code Generator	10 * INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES FOR ANY REASON RELATED TO THIS SOFTWARE, EVEN IF RENESAS C 11 * ITS AFFLIATES HAVE BEEN ADVISED OF THE POSSIBLILITY OF SUCH DAMAGES.
r cq cqc.c =	12 * Reneas reserves the right, without notice, to make on this software and to discontinue the availability
r_cg_cgc.h	13 * of this software. By using this software, you agree to the additional terms and conditions found by accessing the
r_cg_cgc_user.c	14 * following link:
- 🔄 r_cg_cmt.c	15 * http://www.renesas.com/disclaimer
	17 * Copyright (C) 2015, 2016 Renesas Electronics Corporation. All rights reserved.
r_cg_hardware_setup.c	
	21 * File Name : r_cg_main.c
	22 * Version : Code Generator for RX65N V1.00.00.08 [25 Aug 2016]
r_cg_icu_user.c	23 * Device(s) : R5F565N9AxFB 24 * Tool-Chain : CCRX
	25 * Description : This file implements main function.
	26 * Creation Date: 9/6/2016
<mark>} r_cg_main.c</mark> } r_cq_port.c	
r_cg_port.c	Output # >
r_cg_port.n	
r cq resetprq.c	
r_cq_s12ad.c	All Messages /
	🖾 Outuat 🖗 Smart Browser 🔄 Error List
F1 F2 F3	F4 F5 F6 F7 F8 F9 F9 F9 F0 screen F7 F2
	A DISCONNECT



4. Source Code Functionality

Each project is specifically written to run on the appropriate RSK+. However, this source code can be useful as an example of peripheral initialization even without the RSK+.

Each project includes a Description.txt file that describes the functionality of that sample. There will also be a C source file that includes "main" in the name, for example "r_cg_main.c". This source file includes the C function main().



Website and Support

Renesas Electronics Website

https://www.renesas.com/

Inquiries

https://www.renesas.com/contact/

Product Information

https://www.renesas.com/rskrx65n

All trademarks and registered trademarks are the property of their respective owners.



Revision History

		Description		
Rev.	Date	Page	Summary	
1.00	Sep 30, 2016	-	First edition issued	

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. 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 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. Unused pins should be handled as described under Handling of Unused Pins in the manual.

2. Processing at Power-on

The state of the product is undefined at the moment 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 moment 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 moment 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 moment when power is supplied until the power reaches the level at which resetting has been specified.

3. Prohibition of Access to Reserved Addresses

Access to reserved addresses is prohibited.

The reserved addresses are provided for the possible future expansion of functions. Do not
access these addresses; the correct operation of LSI is not guaranteed if they are accessed.

4. Clock Signals

After applying a reset, only release the reset line after the operating clock signal has become stable. When switching the clock signal during program execution, wait until the target clock signal has 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. Moreover, 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.
- 5. Differences between Products

Before changing from one product to another, i.e. to a product with a different part number, confirm that the change will not lead to problems.

 The characteristics of Microprocessing unit or Microcontroller unit products in the same group but having a different part number may differ in terms of the 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

- 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 of these circuits, software, and information in the design of your equipment. Renesas Electronics assumes no responsibility for any losses incurred by you or third parties arising from the use
 of these circuits, software, or information.
- Renesas Electronics has used reasonable care in preparing the information included in this document, but Renesas Electronics does not warrant that such information is error free. Renesas Electronics assumes no liability whatsoever for any damages incurred by you resulting from errors in or omissions from the information included herein.
- Renesas Electronics does not assume any liability for infringement of 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. 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 should not alter, modify, copy, or otherwise misappropriate any Renesas Electronics product, whether in whole or in part. Renesas Electronics assumes no responsibility for any losses incurred by you or third parties arising from such alteration, modification, copy or otherwise misappropriation of Renesas Electronics product.
- 5. Renesas Electronics products are classified according to the following two quality grades: "Standard" and "High Quality". The recommended 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; and industrial robots etc.

"High Quality": Transportation equipment (automobiles, trains, ships, etc.); traffic control systems; anti-disaster systems; anti-crime systems; and safety equipment etc.

Renesas Electronics products are neither intended nor 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 damages (nuclear reactor control systems, military equipment etc.). You must check the quality grade of each Renesas Electronics product before using it in a particular application. You may not use any Renesas Electronics product for any application for which it is not intended. Renesas Electronics shall not be in any way liable for any damages or losses incurred by you or third parties arising from the use of any Renesas Electronics product for which the product is not intended by Renesas Electronics.

- 6. You should use the Renesas Electronics products described in this document within the range specified by Renesas Electronics, especially with respect to the maximum rating, operating supply voltage range, movement power voltage range, heat radiation characteristics, installation and other product characteristics. Renesas Electronics shall have no liability for malfunctions or damages arising out of the use of Renesas Electronics products beyond such specified ranges.
- 7. Although Renesas Electronics endeavors to improve the quality and reliability of its products, semiconductor products have specific characteristics such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Further, Renesas Electronics products are not subject to radiation resistance design. Please be sure to implement safety measures to guard them against the possibility of physical injury, and injury or damage caused by fire in the event of the failure of a Renesas Electronics product, such as safety design for hardware and software including but not limited to redundancy, fire control and malfunction, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult, please evaluate the safety of the final products or systems manufactured by you.
- 8. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. Please use Renesas Electronics products in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive. Renesas Electronics assumes no liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
- 9. Renesas Electronics products and technology may 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 should not use Renesas Electronics products or technology described in this document for any purpose relating to military applications or use by the military, including but not limited to the development of weapons of mass destruction. When exporting the Renesas Electronics products or technology described in this document, you should comply with the applicable export control laws and regulations and follow the procedures required by such laws and regulations.
- 10. It is the responsibility of the buyer or distributor of Renesas Electronics products, who distributes, disposes of, or otherwise places the product with a third party, to notify such third party in advance of the contents and conditions set forth in this document, Renesas Electronics assumes no responsibility for any losses incurred by you or third parties as a result of unauthorized use of Renesas Electronics products.
- 11. This document may not be reproduced or duplicated in any form, in whole or in part, without prior written consent of Renesas Electronics.
- 12. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products, or if you have any other inquiries. (Note 1) "Renesas Electronics" as used in this document means Renesas Electronics Corporation and also includes its majority-owned subsidiaries.
- (Note 1) "Renesas Electronics" as used in this document means Renesas Electronics Corporation and also includes its majority-owned subs

(Note 2) "Renesas Electronics product(s)" means any product developed or manufactured by or for Renesas Electronics.

Refer to "http://www.renesas.com/" for the latest and detailed information

RENESAS

SALES OFFICES

Renesas Electronics Corporation

http://www.renesas.com

Renesas Electronics America Inc. 2801 Scott Boulevard Santa Clara, CA 95050-2549, U.S.A. Tel: +1-408-588-6000, Fax: +1-408-588-6130 Renesas Electronics Canada Limited 2251 Yonge Street, Suite 8309 Richmond Hill, Ontario Canada L4C 9T3 Tel: +1-905-237-2004 Renesas Electronics Europe Limited Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K Tel: +44-1628-585-100, Fax: +44-1628-585-900 Renesas Electronics Europe GmbH Arcadiastrasse 10, 40472 Düsseldorf, Germany Tel: +49-211-6503-0, Fax: +49-211-6503-1327 Renesas Electronics (China) Co., Ltd. Room 1709, Quantum Plaza, No.27 ZhiChunLu Haidian District, Beijing 100191, P.R.China Tel: +86-10-8235-1155, Fax: +86-10-8235-7679 Renesas Electronics (Shanghai) Co., Ltd. Unit 301, Tower A, Central Towers, 555 Langao Road, Putuo District, Shanghai, P. R. China 200333 Tel: +86-21-2226-0888, Fax: +86-21-2226-0999 Renesas Electronics Hong Kong Limited Unit 1601-1611, 16/F., Tower 2, Grand Century Place, 193 Prince Edward Road West, Mongkok, Kowloon, Hong Kong Tel: +852-2265-6688, Fax: +852 2886-9022 Renesas Electronics Taiwan Co., Ltd. 13F, No. 363, Fu Shing North Road, Taipei 10543, Taiwan Tel: +886-2-8175-9600, Fax: +886 2-8175-9670 Renesas Electronics Singapore Pte. Ltd. 80 Bendemeer Road, Unit #06-02 Hyflux Ini Tel: +65-6213-0200, Fax: +65-6213-0300 Innovation Centre, Singapore 339949 Renesas Electronics Malaysia Sdn.Bhd. Unit 1207, Block B, Menara Amcorp, Amcorp Trade Centre, No. 18, Jln Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia Tel: +60-3-7955-9390, Fax: +60-3-7955-9510 Renesas Electronics India Pvt. Ltd. No.777C, 100 Feet Road, HALII Stage, Indiranagar, Bangalore, India Tel: +91-80-67208700, Fax: +91-80-67208777 Renesas Electronics Korea Co., Ltd. 12F., 234 Teheran-ro, Gangnam-Gu, Seoul, 135-080, Korea Tel: +82-2-558-3737, Fax: +82-2-558-5141