CS+ RX Simulator V3.02.00

Release Note

R20UT4555EJ0100
Rev.1.00
Jun.10.19

Thank you for using the CS+ integrated development environment.

This document describes restrictions on and points for caution regarding the simulator. Read this document before using the product.

Contents

Chapter 1. Target Devices

CS+ Simulator for RX supports simulation of timer in addition to simulation of the RX CPU core.
A list below shows devices supported by this simulator.

Known as	Device name
RX700	RX700 series
RX600	RX600 series
RX200	RX200 series
RX100	RX100 series

Chapter 2. User's Manuals

Please read the following user’s manuals together with this document.

Manual Name	Document Number
CS+ V8.02.00 RX Debug Tool	R20UT4528EJ0100

Chapter 3. Supported Function

This section describes the scope of the supported functions of the RX simulator debugger.

(1) The simulator debugger supports the following items:

- All CPU instructions
- Exception processing
- Registers
- All address space
- Trigonometric function calculator
- Peripheral module (timer and memory protection unit)

(2) The simulator debugger does not support the following RX functions.

No.	Item	Remarks
1	Low power consumption state	Simulation is stopped on the execution of a WAIT instruction.
2	Non-maskable interrupt (NMI)	
3	Reception of an interrupt during execution of any of the following instructions: (RMPA, SCMPU, SMOVF, SMOVB, SMOVU, SSTR, SUNTIL, and SWHILE)	The interrupt is accepted when execution of the instruction is completed.
4	Values in memory and registers that become undefined after the execution of instructions	
5	Lower-order 16 bits of the accumulator (ACC) Notes: RXv1 core	The simulator debugger returns 0.

Chapter 4. Simulation of Peripheral Modules

This section describes support for peripheral modules by the simulator debugger.

4.1 Timer

(1) Supported Range

The simulator debugger supports compare match timer (CMT) units with two 16-bit timer channels.

RX700, RX600 and RX200 - two units (unit 0 and unit 1), four channels in total.
RX100 - one unit(unit0) , two channels in total.

(2) Control Registers

The registers supported by this simulator are listed below.

Note: In access to control registers, make sure that the unit of access corresponds to the size of the register.

Unit	Supported Control Register	Support
Unit0	CMSTR0	YES
	CMCR0 and CMCR1	YES
	CMCNT0 and CMCNT1	YES
	CMCOR0 and CMCOR1	YES
Unit1	CMSTR1	YES
	CMCR2 and CMCR3	YES
	CMCNT2 and CMCNT3	YES
	CMCOR2 and CMCOR3	YES

Note: YES indicates support for the corresponding register.

4.2 Interrupt Controller

(1) Supported Range

The simulator debugger supports the interrupt controller unit (ICU) in relation to the CMT and double-precision floating-point exception. Only interrupts for the CPU are supported; that is, activation of the DTC and DMAC is not supported.

(2) Control Registers
The simulator supports the registers listed below.

Note: In access to control registers, make sure that the unit of access corresponds to the size of the register.

Supported Control Register	Support
IRn (n = 028 to 029)	YES
IER03	NO
IPRm (m = 04 to 07)	YES
FIR	YES

Note: YES indicates support for the corresponding register; NO indicates that only the CMT-related functions are supported.

(3) Control Registers (for products that support the software configurable interrupt function)

The simulator supports the registers listed below.

Note: In access to control registers, make sure that the unit of access corresponds to the size of the register.

Supported Control Register	Support
IRn (n=028, 029, 128 to 207)	YES
IERm (m = 03, 10 to 19)	NO
IPRn (n=004, 005, 128 to 207)	YES
FIR	YES
PIBRm (m = 00)	NO
SLIBXRn (n = 128 to 143) SLIBRn (n = 144 to 207)	NO
SLIPRCR	YES

Note: YES indicates support for the corresponding register. NO indicates that only the CMT-related functions are supported.

(4) Control Registers (for products equipped with double-precision floating-point coprocessor)

The simulator supports the registers listed below.

Note: In access to control registers, make sure that the unit of access corresponds to the size of the register.

Supported Control Register	Support
IRn (n = 017, 028, 029, 128 to 207)	YES
IERm (m = 02, 03, 10 to 19)	NO
IPRn (n = 000, 004, 005, 128 to 207)	YES
FIR	YES
NMISR	NO
NMIER	NO
NMICLR	NO
EXNMISR	NO
EXNMIER	NO
EXNMICLR	NO
GPRIE0	NO
GENIE0	NO
GCRIE0	NO
PIBRm (m = 00)	NO
SLIBXRn (n = 128 to 143) SLIBRn (n = 144 to 207)	NO
SLIPRCR	YES

Note: YES indicates support for the corresponding register. NO indicates that only functions related to CMT and double-precision floating-point exception are supported.

4.3 Memory Protection Unit

(1) Scope of Support

The simulator debugger supports the memory protection unit (MPU).

(2) Control Registers

Below is a list of registers supported by this simulator.

Note: In access to control registers, make sure that the unit of access corresponds to the size of the register.

Supported Control Register	Support
RSPAGEn (n = 0 to 7)	YES
REPAGEn (n = 0 to 7)	YES
MPEN	YES
MPBAC	YES
MPECLR	YES
MPESTS	YES
MPDEA	YES
MPSA	YES
MPOPS	YES
MPOPI	YES
MHITI	YES
MHITD	YES

Note: YES indicates the corresponding register is supported

Chapter 5. Changes

This chapter describes changes from V3.01.00 to V3.02.00 of RX simulator.

5.1 Support for double-precision floating-point processing instructions

The programs using double-precision floating-point processing instructions can be simulated.

These instructions are available in products that have double-precision floating-point coprocessor.

5.2 Support for the trigonometric function calculator

The programs using the trigonometric function calculator can be simulated.

This function is available in products that have the trigonometric function calculator.

Chapter 6. Cautions

This section describes points for caution when using the RX simulator debugger.

6.1 Caution on time measurement results on return out

(1) Run-Break timer

The displayed total execution time and numbers of cycles for execution and of instructions executed may be incorrect.

(2) Trace

When use of the trace function is selected by specifying [Yes] in [Accumulate trace time], displayed trace times may be incorrect.

6.2 Caution on tracing within desired ranges

When tracing is started by an execution-related event, the simulator collects execution history from the address of the instruction immediately before the location for which execution was set as an event to start tracing. When tracing ends with an execution-related event, the simulator collects execution history up to the address of the instruction immediately before the location for which execution was set as an event to end tracing.

6.3 Caution on measuring execution time within desired ranges

When time measurement ends with an execution-related event, the simulator measures execution time up to the address of the instruction immediately before the location for which execution was set as an event to end tracing

6.4 Caution on access to the external area

Different types of memory in the external area are not supported. If you are using the external area with a ROM-less device, for example, add either [Emulation ROM area] or [Emulation RAM area] to [Memory Mappings] as a substitute for the actual type of memory on the Property panel.
Access (both reading and writing) to the emulation ROM and RAM areas takes one cycle.

6.5 Caution on Python functions while a program is being executed

Do not call the Python functions listed below while a program is being executed.

- debugger.Option.Coverage
- debugger.Option.Trace
- debugger.XTrace.Addup
- debugger.Map.Set

Calls of the Python functions listed above while a program is being executed change the state of the contents of the Property panel and status bar to which has been set. The state of the simulator, however, is still that before the change to the Property panel and status bar.
When this cautionary note becomes applicable, stop the program and return the changed settings to their original states.

6.6 Caution on cycle accuracy of products equipped with RXv2 or RXv3 core

There may be a difference between the numbers of cycles measured by the simulator and actual numbers of cycles on the CPU.

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 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.
5. 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.
6. 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.
7. 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.
8. 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.
9. 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.
10. 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.
11. This document shall not be reprinted, 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.

(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.4.0-1 November 2017)

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/.