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SuperH™ Family E10A-USB Emulator

User's Manual
(HS0005KCU01H, HS0005KCU02H)

SuperH™ Family
E10A-USB H0005KCU01HE

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EN 55022:2010 Class A

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EN 55024:2010

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- Authorised representative

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- Person responsible for placing on the market

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Address: Arcadiastrasse 10, 40472 Dusseldorf, Germany

- Trademark and Type name

Trademark: Renesas
Product name: E10A-USB Emulator
Type name: HS0005KCU01H / HS0005KCU02H

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This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions:

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IMPORTANT INFORMATION

READ FIRST

- **READ this user's manual before using this emulator product.**
- **KEEP the user's manual handy for future reference.**

Do not attempt to use the emulator product until you fully understand its mechanism.

Emulator Product:

Throughout this document, the term "emulator product" shall be defined as the following products produced only by Renesas Electronics Corp. excluding all subsidiary products.

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Figures:

Some figures in this user's manual may show items different from your actual system.

Device names:

This user's manual uses SHxxxx as an example of the device names.

Limited Anticipation of Danger:

Renesas cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this user's manual and on the emulator product are therefore not all inclusive. Therefore, you must use the emulator product safely at your own risk.

SAFETY PAGE

READ FIRST

- **READ** this user's manual before using this emulator product.
- **KEEP the user's manual handy for future reference.**

Do not attempt to use the emulator product until you fully understand its mechanism.

DEFINITION OF SIGNAL WORDS



This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.



DANGER indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.



WARNING indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.



CAUTION used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

NOTE emphasizes essential information.

WARNING

Observe the precautions listed below. Failure to do so will result in a FIRE HAZARD and will damage the user system and the emulator product or will result in PERSONAL INJURY. The USER PROGRAM will be LOST.

- 1. Do not repair or remodel the emulator product by yourself for electric shock prevention and quality assurance.**
- 2. Always switch OFF the host computer and user system before connecting or disconnecting any CABLES or PARTS.**
- 3. Connect the connectors in the user system and in the user interface cable by confirming the correct direction.**

CAUTION

Caution to Be Taken for Disposal:



Penalties may be applicable for incorrect disposal of this waste, in accordance with your national legislation.

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Renesas Electronics Europe GmbH can take back end of life equipment, register for this service at “ <http://www.renesas.eu/wEEE> ”.

Warnings on Emulator Usage

Be sure to read and understand the warnings below before using this emulator. Note that these are the main warnings, not the complete list.

WARNING

Always switch OFF the host computer and user system before connecting or disconnecting any CABLES or PARTS. Failure to do so will result in a FIRE HAZARD and will damage the user system and the emulator product or will result in PERSONAL INJURY. The USER PROGRAM will be LOST.

CAUTION

Place the host computer and user system so that no cable is bent or twisted. A bent or twisted cable will impose stress on the user interface leading to connection or contact failure.

Make sure that the host computer and the user system are placed in a secure position so that they do not move during use nor impose stress on the user interface.

Introduction

The High-performance Embedded Workshop is a powerful development environment for embedded applications targeted at Renesas microcontrollers. The main features are:

- A configurable build engine that allows you to set-up compiler, assembler and linker options via an easy to use interface.
- An integrated text editor with user customizable syntax coloring to improve code readability.
- A configurable environment to run your own tools.
- An integrated debugger which allows you to build and debug in the same application.
- Version control support.

The High-performance Embedded Workshop has been designed with two key aims; firstly to provide you, the user, with a set of powerful development tools and, secondly, to unify and present them in a way that is easy to use.

About This Manual

This manual describes preparation before using the emulator, emulator functions, debugging functions specific to the emulator, tutorial, and emulator's hardware and software specifications.

Refer to the High-performance Embedded Workshop User's Manual for details on the information on the basic usage of the High-performance Embedded Workshop, customization of the environment, build functions, and debugging functions common to each High-performance Embedded Workshop product.

This manual does not intend to explain how to write C/C++ or assembly language programs, how to use any particular operating system or how best to tailor code for the individual devices. These issues are left to the respective manuals.

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Table 1 **Typographic Conventions**

Convention	Meaning
[Menu->Menu Option]	Bold text with '->' is used to indicate menu options (for example, [File->Save As...]).
FILENAME.C	Uppercase names are used to indicate filenames.
" <u>enter this string</u> "	Used to indicate text that must be entered (excluding the "" quotes).
Key + Key	Used to indicate required key presses. For example, CTRL+N means press the CTRL key and then, whilst holding the CTRL key down, press the N key.
↪ (The "how to" symbol)	When this symbol is used, it is always located in the left hand margin. It indicates that the text to its immediate right is describing "how to" do something.

User Registration

When you install debugger software, a text file for user registration is created on your PC. Fill it in and email it to your local distributor. If you have replaced an emulator main unit or emulation probe, rewrite an emulator name and serial number in the text file you filled in earlier to register your new hardware products.

Your registered information is used for only after-sale services, and not for any other purposes. Without user registration, you will not be able to receive maintenance services such as a notification of field changes or trouble information. So be sure to carry out the user registration.

For more information about user registration, please contact your local distributor.

Table of Contents

Regulatory Compliance Notices	1
Section 1 Overview	1
1.1 Warnings	3
1.2 Environmental Conditions	4
1.3 Components	5
Section 2 Emulator Functions	7
2.1 Overview	7
2.2 Trace Functions	9
2.2.1 Internal Trace Function	9
2.2.2 AUD Trace Function	10
2.2.3 Memory Output Function of Trace Data	14
2.2.4 Useful Functions of the [Trace] Window	14
2.3 Break Function	15
2.4 Performance Measurement Function	16
2.4.1 Function for Measuring the Number of Cycles from Point to Point	16
2.4.2 Profiling Function	16
2.5 Memory Access Functions	17
2.6 Stack Trace Function	19
2.7 Function for Releasing Interrupts to the User during User Program Breaks	19
2.8 Online Help	19
Section 3 Preparation before Use	21
3.1 Emulator Preparation	21
3.2 Emulator Hardware Configuration	22
3.3 CD-R	27
3.4 Installing Emulator's Software	27
3.5 Connecting the Emulator to the Host Computer	28
3.6 Connecting the Emulator to the User System	30
3.7 Connecting System Ground	34
3.8 Setting the DIP Switches	35
3.9 Interface Circuits in the Emulator	41
3.10 Setting up the Emulator	46
3.10.1 Setting up at Purchasing the Emulator or Updating the Version of Software	47
3.10.2 Setting up the Emulator by Using the License Tool to Add a Device Group	52
3.11 System Check	57
Section 4 Preparations for Debugging	69
4.1 Method for Activating High-performance Embedded Workshop	69
4.1.1 Creating the New Workspace (Toolchain Not Used)	70
4.1.2 Creating the New Workspace (Toolchain Used)	74

4.1.3	Selecting an Existing Workspace.....	79
4.2	Setting at Emulator Activation	81
4.2.1	Setting at Emulator Activation.....	81
4.2.2	Downloading a Program	83
4.2.3	Setting the Writing Flash Memory Mode	84
4.3	Debug Sessions.....	91
4.3.1	Selecting a Session	91
4.3.2	Adding and Removing Sessions	93
4.3.3	Saving Session Information	96
4.4	Connecting the Emulator	97
4.5	Reconnecting the Emulator	98
4.6	Ending the Emulator.....	98
 Section 5 Debugging.....		 99
5.1	Setting the Environment for Emulation.....	99
5.1.1	Opening the [Configuration] Dialog Box	99
5.1.2	[General] Page	100
5.1.3	Downloading to the Flash Memory	102
5.2	Downloading a Program.....	104
5.2.1	Downloading a Program	104
5.2.2	Viewing the Source Code	105
5.2.3	Viewing the Assembly-Language Code	108
5.2.4	Modifying the Assembly-Language Code	109
5.2.5	Viewing a Specific Address.....	110
5.2.6	Viewing the Current Program Counter Address	110
5.3	Displaying Memory Contents in Realtime	111
5.3.1	Opening the [Monitor] Window	111
5.3.2	Changing the Monitor Settings	113
5.3.3	Temporarily Stopping Update of the Monitor	113
5.3.4	Deleting the Monitor Settings.....	113
5.3.5	Monitoring Variables.....	114
5.3.6	Hiding the [Monitor] Window	114
5.3.7	Managing the [Monitor] Window.....	115
5.4	Viewing the Current Status.....	116
5.5	Using the Event Points	117
5.5.1	PC Breakpoints	117
5.5.2	Event Conditions	117
5.5.3	Opening the [Event] Window	118
5.5.4	Setting PC Breakpoints.....	119
5.5.5	Add	120
5.5.6	Edit.....	120
5.5.7	Enable	120
5.5.8	Disable	120
5.5.9	Delete.....	120
5.5.10	Delete All.....	120

5.5.11	Go to Source	120
5.5.12	[Breakpoint] Dialog Box	121
5.5.13	Setting Event Conditions	122
5.5.14	Edit.....	123
5.5.15	Enable	123
5.5.16	Disable	123
5.5.17	Delete.....	123
5.5.18	Delete All.....	123
5.5.19	Go to Source	123
5.5.20	[Combination action(Sequential PtoP)]	123
5.5.21	Editing Event Conditions.....	123
5.5.22	Modifying Event Conditions	123
5.5.23	Enabling Event Conditions	124
5.5.24	Disabling Event Conditions	124
5.5.25	Deleting Event Conditions.....	124
5.5.26	Deleting All Event Conditions.....	124
5.5.27	Viewing the Source Line for Event Conditions	124
5.6	Viewing the Trace Information	125
5.6.1	Opening the [Trace] Window	125
5.6.2	Acquiring Trace Information	125
5.6.3	Specifying Trace Acquisition Conditions	129
5.6.4	Searching for a Trace Record	137
5.6.5	Clearing the Trace Information.....	144
5.6.6	Saving the Trace Information in a File	144
5.6.7	Viewing the [Editor] Window	144
5.6.8	Trimming the Source	144
5.6.9	Temporarily Stopping Trace Acquisition	144
5.6.10	Extracting Records from the Acquired Information	144
5.6.11	Analyzing Statistical Information	152
5.6.12	Extracting Function Calls from the Acquired Trace Information	154
5.7	Analyzing Performance	155
5.7.1	Opening the [Performance Analysis] Window	155
5.7.2	Setting Conditions for Measurement	156
5.7.3	Starting Performance Data Acquisition	156
5.7.4	Deleting a Measurement Condition	156
5.7.5	Deleting All Measurement Conditions	156
5.8	Viewing the Profile Information.....	157
5.8.1	Stack Information Files.....	157
5.8.2	Profile Information Files.....	159
5.8.3	Loading Stack Information Files	160
5.8.4	Enabling the Profile	161
5.8.5	Specifying Measuring Mode.....	161
5.8.6	Executing the Program and Checking the Results	161
5.8.7	[List] Sheet.....	162
5.8.8	[Tree] Sheet	163

5.8.9	[Profile-Chart] Window	166
5.8.10	Types and Purposes of Displayed Data.....	167
5.8.11	Creating Profile Information Files	168
5.8.12	Notes.....	169
5.9	Using Multiple Debugging Platforms.....	171
5.9.1	Distinguishing Two Emulators	171
5.10	Start/Stop Function.....	173
Section 6 Tutorial		177
6.1	Introduction	177
6.2	Running the High-performance Embedded Workshop.....	178
6.3	Setting up the Emulator	178
6.4	Setting the [Configuration] Dialog Box	179
6.5	Checking the Operation of the Target Memory for Downloading.....	180
6.6	Downloading the Tutorial Program.....	182
6.6.1	Downloading the Tutorial Program	182
6.6.2	Displaying the Source Program	183
6.7	Setting a PC Breakpoint	184
6.8	Setting Registers.....	186
6.9	Executing the Program	188
6.10	Reviewing Breakpoints	191
6.11	Referring to Symbols.....	192
6.12	Viewing Memory.....	193
6.13	Watching Variables	194
6.14	Displaying Local Variables	197
6.15	Stepping Through a Program.....	198
6.15.1	Executing [Step In] Command.....	198
6.15.2	Executing [Step Out] Command.....	200
6.15.3	Executing [Step Over] Command.....	201
6.16	Forced Breaking of Program Executions.....	202
6.17	Break Function	203
6.17.1	PC Break Function.....	203
6.18	Hardware Break Function.....	208
6.18.1	Setting the Sequential Event Condition	213
6.19	Trace Functions	218
6.19.1	Displaying the Trace Window	220
6.19.2	Internal Trace Function.....	220
6.19.3	AUD Trace Function	223
6.19.4	Memory Output Trace Function	225
6.19.5	MMU Support.....	228
6.20	Stack Trace Function.....	231
6.21	Performance Measurement Function.....	233
6.21.1	Performance Measurement Function	233
6.21.2	Profiling Function	235
6.22	Downloading to the Flash Memory Area	241

6.23	What Next?.....	248
Section 7 Maintenance and Guarantee		249
7.1	User Registration	249
7.2	Maintenance	249
7.3	Guarantee.....	249
7.4	Repair Provisions	250
7.4.1	Repair with Extra-Charge	250
7.4.2	Replacement with Extra-Charge	250
7.4.3	Expiration of the Repair Period	250
7.4.4	Transportation Fees at Sending Your Product for Repair	250
7.5	How to Make a Request for Repair	251
Appendix A Troubleshooting		253
Appendix B Menus		255
Appendix C Command-Line Functions.....		259
Appendix D Notes on High-performance Embedded Workshop		261
Appendix E I/O File Format		267
E.1	File Format (Bit Field Not Supported)	267
E.2	File Format (Bit Field Supported)	269
Appendix F Diagnostic Test Procedure.....		273
Appendix G Repair Request Sheet		275

Section 1 Overview

The E10A-USB emulator (hereafter referred to as the emulator) is a support tool for developing application systems to run on Renesas original microcomputers.

The main unit of the emulator is connected, through the dedicated debugging interface, to the user system. The user system can be debugged under the conditions similar to the actual application conditions. The emulator enables debugging anywhere indoors or out. The host computer for controlling the emulator must be an IBM PC compatible machine with USB 1.1/2.0 (Full-Speed).

Figure 1.1 shows the configuration of a system where the emulator is in use.

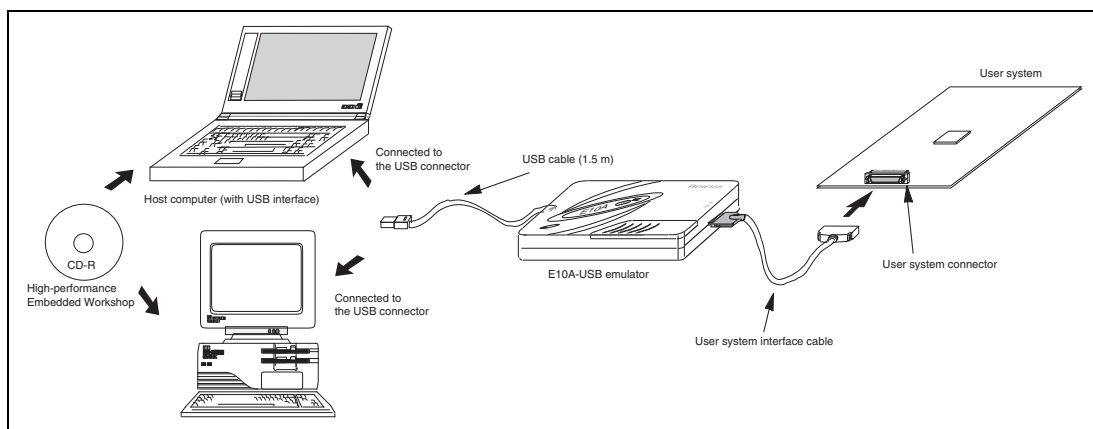


Figure 1.1 System Configuration with the Emulator

The emulator provides the following features:

- Excellent cost-performance emulator
Compactness and connection to the USB are implemented.
- Realtime emulation
Realtime emulation of the user system is enabled at the maximum operating frequency of the CPU.
- Excellent operability
Using the High-performance Embedded Workshop enables user program debugging using a pointing device such as a mouse. The High-performance Embedded Workshop enables high-speed downloading of load module files.
- Various debugging functions
Various break and trace functions enable efficient debugging. Breakpoints and break conditions can be set by the specific window, trace information can be displayed on a window, and command-line functions can be used.
- Debugging of the user system in the final development stage
The user system can be debugged under conditions similar to the actual application conditions.
- Compact debugging environment
When the emulator is used, a laptop computer can be used as a host computer, creating a debugging environment in any place.
- AUD trace function*
The AUD trace function enables realtime trace.

Note: The AUD is an abbreviation of the Advanced User Debugger. Support for the AUD varies with the product.

1.1 Warnings

CAUTION

READ the following warnings before using the emulator product. Incorrect operation will damage the user system and the emulator product. The USER PROGRAM will be LOST.

1. Check all components against the component list after unpacking the emulator.
2. Never place heavy objects on the casing.
3. Protect the emulator from excessive impacts and stresses. For details, refer to section 1.2, Environmental Conditions.
4. When moving the host computer or user system, take care not to vibrate or damage it.
5. After connecting the cable, check that it is connected correctly. For details, refer to section 3, Preparation before Use.
6. Supply power to the connected equipment after connecting all cables. Cables must not be connected or removed while the power is on.

1.2 Environmental Conditions

CAUTION

Observe the conditions listed in tables 1.1 and 1.2 when using the emulator. Failure to do so will cause illegal operation in the user system, the emulator product, and the user program.

Table 1.1 Environmental Conditions

Item	Specifications
Temperature	Operating: +10°C to +35°C Storage: -10°C to +50°C
Humidity	Operating: 35% RH to 80% RH, no condensation Storage: 35% RH to 80% RH, no condensation
Vibration	Operating: 2.45 m/s ² max. Storage: 4.9 m/s ² max. Transportation: 14.7 m/s ² max.
Ambient gases	No corrosive gases may be present

Table 1.2 lists the acceptable operating environments.

Table 1.2 Operating Environments

Item	32-Bit Editions of Windows® XP	32-Bit Editions of Windows Vista® or 32-Bit or 64-Bit Editions of Windows® 7
Host computer	Built-in Pentium® III or higher-performance CPU (1 GHz or higher recommended); IBM PC or compatible machine with USB 1.1/2.0 (Full-Speed).	
CPU	Pentium® III (1 GHz) or higher recommended	Pentium® 4 (3 GHz), Core™ 2 Duo (1 GHz), or higher recommended
Minimum memory capacity	1 Gbyte or more recommended (at least 10 times the size of the load module file)	1.5 Gbyte or more recommended (at least 10 times the size of the load module file)
Hard-disk capacity	Installation disk capacity: 600 Mbytes or more. (Prepare an area at least double the memory capacity (four-times or more recommended) as the swap area.)	
Pointing device such as mouse	Connectable to the host computer; compatible with Windows® XP, Windows Vista®, or Windows® 7	
Display	Monitor resolution: 1024 x 768 or higher	
Power voltage	5.0 ± 0.25 V (USB-bus power type)	
Current consumption	HS0005KCU01H: 260 mA (max.) HS0005KCU02H: 420 mA (max.)	
CD-ROM drive	Required to install the High-performance Embedded Workshop for the emulator or refer to the emulator user's manual.	

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1.3 Components

Check that all of the components are present when unpacking the product. For details on the emulator components, refer to section 1.1 in the additional document, Supplementary Information on Using the SHxxxx. If all of the components are not present, contact your nearest Renesas sales office.

Section 2 Emulator Functions

This section describes the emulator functions. They differ according to the device supported by the emulator. For the usage of each function, refer to section 6, Tutorial.

2.1 Overview

Table 2.1 gives a functional overview of the emulator.

For details on the functions of each product, refer to the online help.

Table 2.1 Emulator Functions

No.	Item	Function
1	User program execution function	<ul style="list-style-type: none"> • Executes a program with the operating frequency within a range guaranteed by devices. • Reset emulation • Step functions: <ul style="list-style-type: none"> Single step (one step: one instruction) Source-level step (one step: one-line source) Step over (a break did not occur in a subroutine) Step out (when the PC points to a location within a subroutine, execution continues until it returns to the calling function)
2	Reset function	<ul style="list-style-type: none"> • Issues a power-on reset from the High-performance Embedded Workshop to the device during break.
3	Trace functions	<ul style="list-style-type: none"> • Trace function incorporated in the device • AUD trace function: <ul style="list-style-type: none"> Branch trace or memory access trace • Memory output function of trace data
4	Break functions	<ul style="list-style-type: none"> • Hardware break function (conditions and the number of conditions differ according to the device) • PC break function (255 points) • Forced break function