

To our customers,

---

## Old Company Name in Catalogs and Other Documents

---

On April 1<sup>st</sup>, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

Renesas Electronics website: <http://www.renesas.com>

April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (<http://www.renesas.com>)

Send any inquiries to <http://www.renesas.com/inquiry>.

## Notice

1. All information included in this document is current as of the date this document is issued. Such information, however, is subject to change without any prior notice. Before purchasing or using any Renesas Electronics products listed herein, please confirm the latest product information with a Renesas Electronics sales office. Also, please pay regular and careful attention to additional and different information to be disclosed by Renesas Electronics such as that disclosed through our website.
2. 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.
3. You should not alter, modify, copy, or otherwise misappropriate any Renesas Electronics product, whether in whole or in part.
4. 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.
5. When exporting the 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. You should not use Renesas Electronics products or the 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. 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.
6. 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.
7. Renesas Electronics products are classified according to the following three quality grades: "Standard", "High Quality", and "Specific". The recommended applications for each Renesas Electronics product depends on the product's quality grade, as indicated below. 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 categorized as "Specific" without the prior written consent of Renesas Electronics. Further, you may not use any Renesas Electronics product for any application for which it is not intended without the prior written consent of Renesas Electronics. 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 an application categorized as "Specific" or for which the product is not intended where you have failed to obtain the prior written consent of Renesas Electronics. The quality grade of each Renesas Electronics product is "Standard" unless otherwise expressly specified in a Renesas Electronics data sheets or data books, etc.

"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.

"High Quality": Transportation equipment (automobiles, trains, ships, etc.); traffic control systems; anti-disaster systems; anti-crime systems; safety equipment; and medical equipment not specifically designed for life support.

"Specific": Aircraft; aerospace equipment; submersible repeaters; nuclear reactor control systems; medical equipment or systems for life support (e.g. artificial life support devices or systems), surgical implantations, or healthcare intervention (e.g. excision, etc.), and any other applications or purposes that pose a direct threat to human life.
8. 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.
9. 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 prevention, 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 system 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. 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.
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 2) "Renesas Electronics product(s)" means any product developed or manufactured by or for Renesas Electronics.

# H8S Family E10A Emulator

Additional Document for User's Manual

H8S/2158F E10A

HS2158KCM01HE-U2

Renesas Microcomputer

Development Environment

System

H8S Family / H8S/2100 Series

Specific Guide for the H8S/2158F

E10A Emulator



## Cautions

Keep safety first in your circuit designs!

1. Renesas Technology Corp. puts the maximum effort into making semiconductor products better and more reliable, but there is always the possibility that trouble may occur with them. Trouble with semiconductors may lead to personal injury, fire or property damage. Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.

Notes regarding these materials

1. These materials are intended as a reference to assist our customers in the selection of the Renesas Technology Corp. product best suited to the customer's application; they do not convey any license under any intellectual property rights, or any other rights, belonging to Renesas Technology Corp. or a third party.
2. Renesas Technology Corp. assumes no responsibility for any damage, or infringement of any third-party's rights, originating in the use of any product data, diagrams, charts, programs, algorithms, or circuit application examples contained in these materials.
3. All information contained in these materials, including product data, diagrams, charts, programs and algorithms represents information on products at the time of publication of these materials, and are subject to change by Renesas Technology Corp. without notice due to product improvements or other reasons. It is therefore recommended that customers contact Renesas Technology Corp. or an authorized Renesas Technology Corp. product distributor for the latest product information before purchasing a product listed herein. The information described here may contain technical inaccuracies or typographical errors. Renesas Technology Corp. assumes no responsibility for any damage, liability, or other loss rising from these inaccuracies or errors. Please also pay attention to information published by Renesas Technology Corp. by various means, including the Renesas Technology Corp. Semiconductor home page (<http://www.renesas.com>).
4. When using any or all of the information contained in these materials, including product data, diagrams, charts, programs, and algorithms, please be sure to evaluate all information as a total system before making a final decision on the applicability of the information and products. Renesas Technology Corp. assumes no responsibility for any damage, liability or other loss resulting from the information contained herein.
5. Renesas Technology Corp. semiconductors are not designed or manufactured for use in a device or system that is used under circumstances in which human life is potentially at stake. Please contact Renesas Technology Corp. or an authorized Renesas Technology Corp. product distributor when considering the use of a product contained herein for any specific purposes, such as apparatus or systems for transportation, vehicular, medical, aerospace, nuclear, or undersea repeater use.
6. The prior written approval of Renesas Technology Corp. is necessary to reprint or reproduce in whole or in part these materials.
7. If these products or technologies are subject to the Japanese export control restrictions, they must be exported under a license from the Japanese government and cannot be imported into a country other than the approved destination. Any diversion or reexport contrary to the export control laws and regulations of Japan and/or the country of destination is prohibited.
8. Please contact Renesas Technology Corp. for further details on these materials or the products contained therein.



# Contents

Section 1	Connecting the Emulator with the User System .....	1
1.1	Components of the E10A Emulator .....	1
1.2	Connecting the E10A Emulator with the User System .....	2
1.3	Pin Assignments of the E10A Connector.....	3
1.4	Example of E10A Emulator Connection.....	4
Section 2	Specification of the E10A Emulator's Software.....	9
2.1	Differences between the H8S/2158F and the E10A Emulator .....	9
2.2	The H8S/2158F E10A Emulator Functions .....	10
2.2.1	E10A Emulator Driver Selection .....	10
2.2.2	Hardware Break Functions.....	10
2.2.3	Notes on Setting the [Breakpoint] Dialog Box .....	12
2.2.4	Note on Using the JTAG Clock (TCK).....	12
2.2.5	Trace Function .....	12



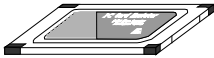
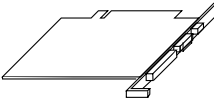
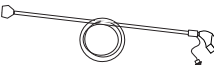
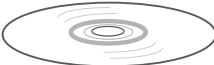


# Section 1 Connecting the Emulator with the User System

## 1.1 Components of the E10A Emulator

The H8S/2158F E10A emulator supports the H8S/2158F. Table 1.1 lists the components of the H8S/2158F E10A emulator.

**Table 1.1 Components of the E10A Emulator (HS2158KCM01H or HS2158KCI01H)**

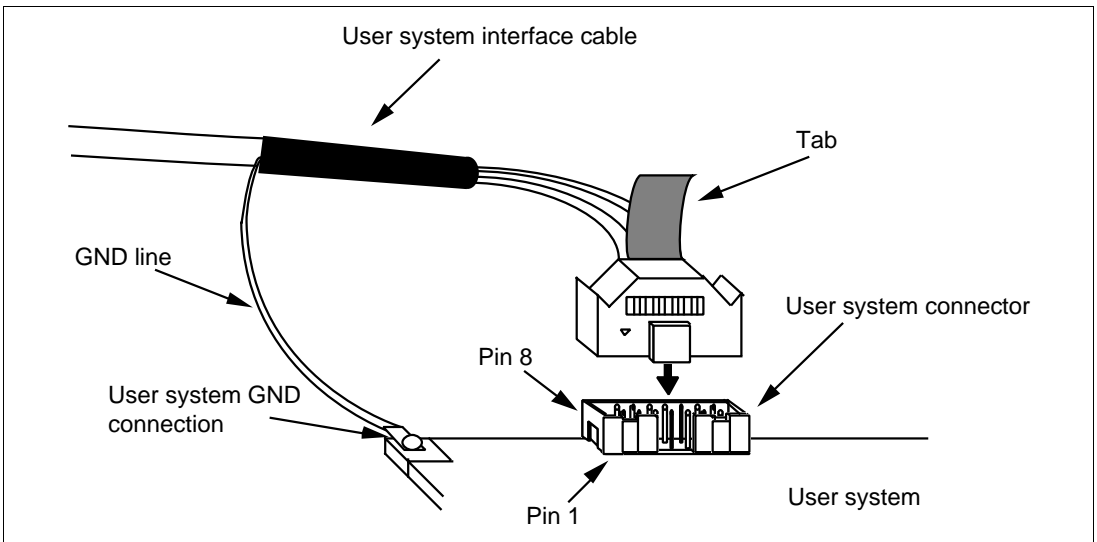
Classification	Component	Appearance	Quantity	Remarks
Hardware	Card emulator HS2158KCM01H (Model: HS0005KCM05H), HS2158KCI01H (Model: HS0005KCI05H)	 (PCMCIA)	1	HS2158KCM01H (PCMCIA: 14-pin type): Depth: 85.6 mm, Width: 54.0 mm, Height: 5.0 mm, Mass: 30.0 g
		 (PCI)		HS2158KCI01H (PCI: 14-pin type): Depth: 122.0 mm, Width: 96.0 mm, Mass: 80.0 g
	User system interface cable		1	HS2158KCM01H (PCMCIA: 14-pin type): Length: 80.0 cm, Mass: 46.0 g  HS2158KCI01H (PCI: 14-pin type): Length: 150.0 cm, Mass: 90.0 g
Software	H8S/2158F E10A emulator setup program, H8S Family E10A Emulator User's Manual, and Specific Guide for the H8S/2158F E10A Emulator		1	HS2158KCM01SR,  HS0005KCM01HJ, HS0005KCM01HE,  HS2158KCM01HJ-U2, and HS2158KCM01HE-U2 (provided on a CD-R)

## 1.2 Connecting the E10A Emulator with the User System

Before connecting an E10A emulator with the user system, a connector must be installed in the user system so that an user system interface cable can be connected. When designing the user system, refer to the connector and recommended circuits shown in this manual.

Before designing the user system, be sure to read the E10A emulator user's manual and the hardware manual for related MCUs.

Connect pins 8, 9, 10, 12, 13, and 14 of the user system connector to GND firmly on the PCB. These pins are used as electrical GND and to monitor the connection of the user system connector. Note the pin assignments of the user system connector.

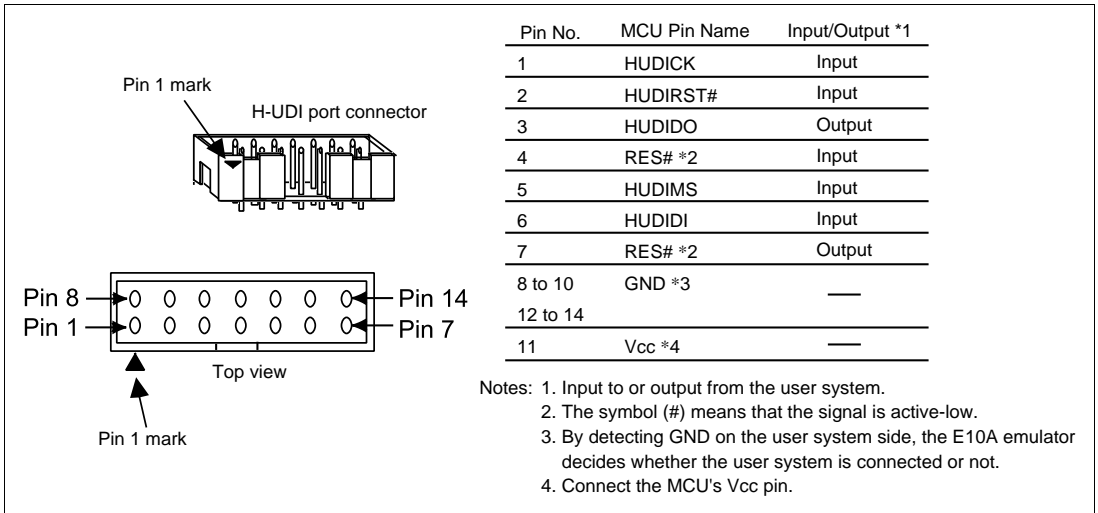


**Figure 1.1 Connecting the User System Interface Cable to the User System**

- Notes:
1. The pin number assignments of the 14-pin connector differ from those of the E10T emulator; however, the physical location is the same.
  2. When the connector is used, do not install any components within 3 mm of the connector.

### 1.3 Pin Assignments of the E10A Connector

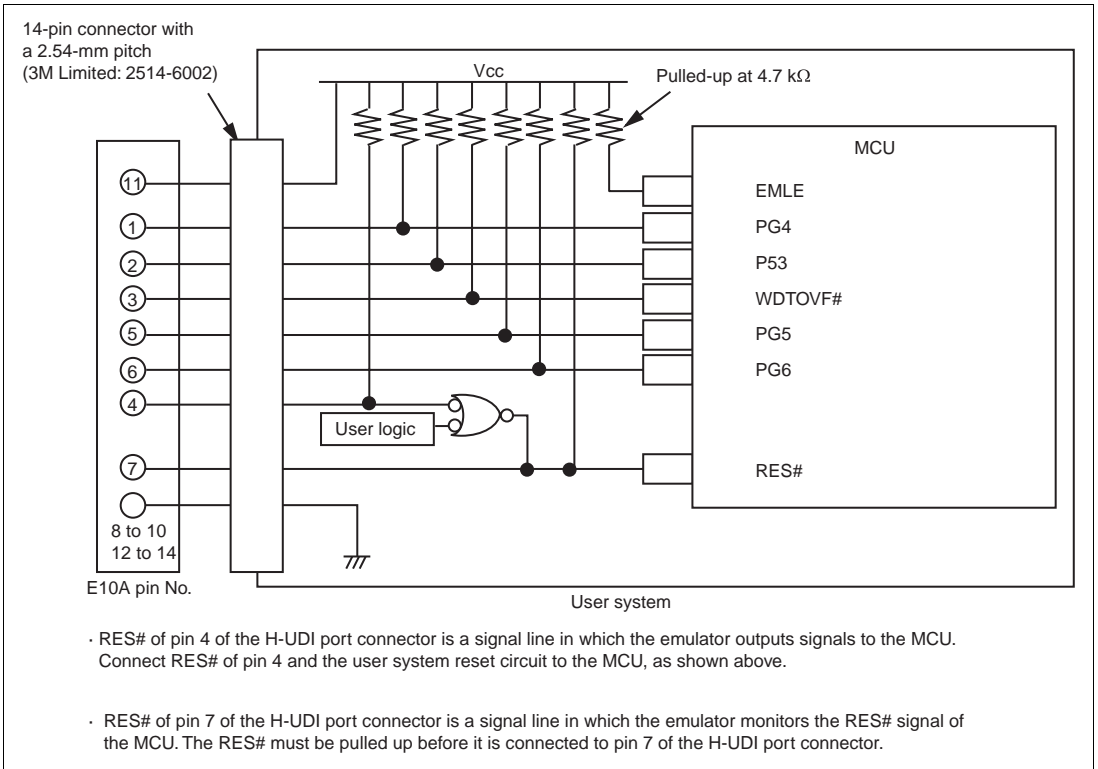
Figure 1.2 shows the pin assignments of the H-UDI port connector.



**Figure 1.2 Pin Assignments of the H-UDI Port Connector**

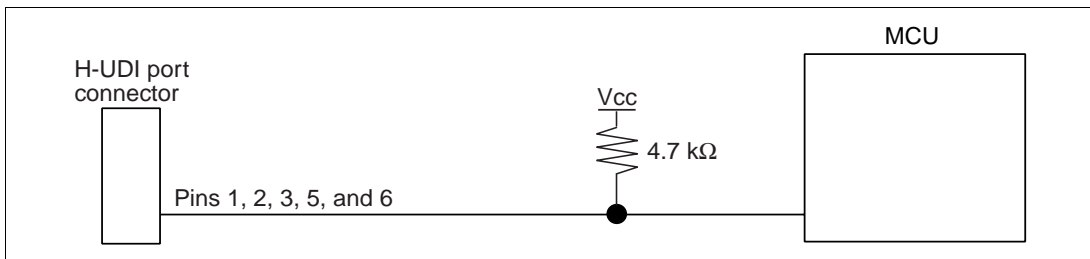
## 1.4 Example of E10A Emulator Connection

The figure shown below is an example of connecting the user system to the E10A emulator.



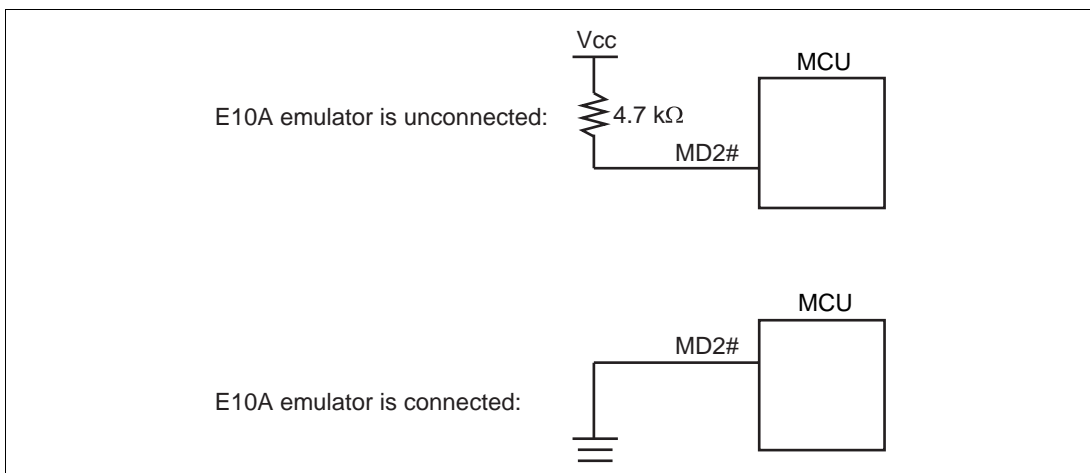
**Figure 1.3 Example of E10A Emulator Connection**

Notes: 1. The E10A emulator uses ETRST#, ETCK, ETMS, ETDO, ETDI, and RES# pins. Pull up the E10A emulator and MCU pins and connect them to the user system connector.



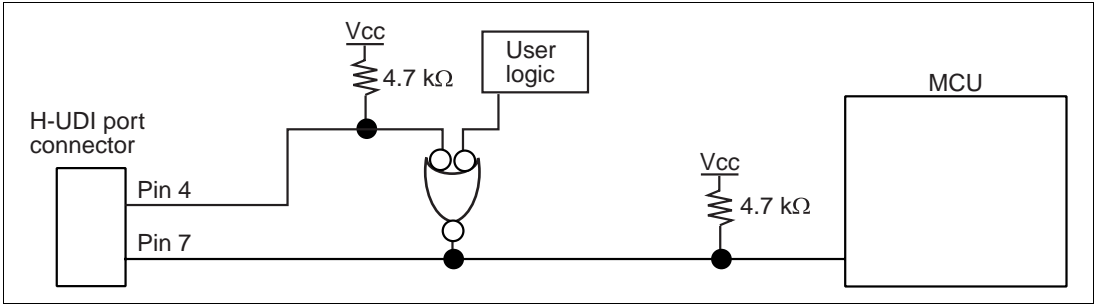
**Figure 1.4 Connection of E10A Emulator and the MCU**

2. The MD2# pin in the MCU must be pulled up when not connecting with the E10A emulator, and connected to ground when connecting with the E10A emulator.



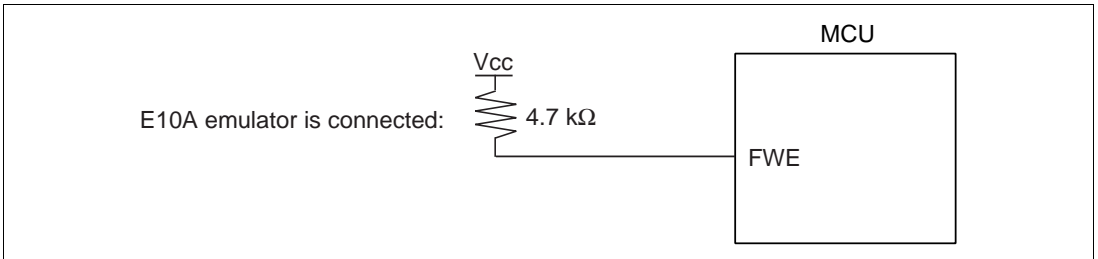
**Figure 1.5 MD2# Pin and E10A Emulator**

- RES# of pin 4 of the H-UDI port connector is a signal line in which the emulator outputs signals to the MCU. RES# of pin 4 and the user system reset circuit must be connected to the MCU, as shown in figure 1.6. RES# of pin 7 of the H-UDI port connector is a signal line in which the emulator monitors the RES# signal of the MCU. The RES# must be pulled up before it is connected to pin 7 of the H-UDI port connector.



**Figure 1.6 Connection of the RES# Pin**

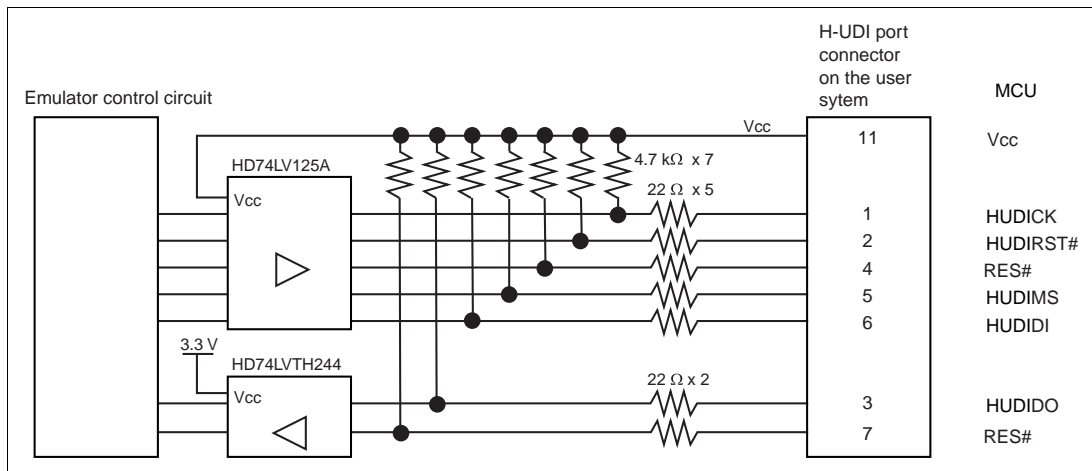
- The FWE pin in the MCU must be pulled up when connecting with the E10A emulator.



**Figure 1.7 Connection of the FWE Pin**

- Connect GND of pins 8 to 10 and 12 to 14 in the H-UDI port connector to ground in the user system.
- Connect Vcc, pin 11 of the H-UDI port connector, to the power supply (Vcc) in the user system. The input voltage, Vcc, is within the range of guaranteed operation of the microcomputer.

7. Figure 1.8 shows the interface circuit in the emulator. Use this figure as a reference when determining the pull-up resistance value.



**Figure 1.8 Interface Circuit in the Emulator (Reference)**





# Section 2 Specification of the E10A Emulator's Software

## 2.1 Differences between the H8S/2158F and the E10A Emulator

1. When the E10A emulator system is initiated, it initializes the general registers and part of the control registers as shown in table 2.1.

**Table 2.1 Register Initial Values at E10A Emulator Power-On**

Register	Initial Value
PC	Reset vector value in the vector address table
ER0 to ER6	H'0
ER7 (SP)	H'10
CCR	1 for I mask, and others undefined
EXR	H'07

### 2. System Control Register

In the E10A emulator, the internal I/O registers can be accessed from the [IO] window. However, be careful when accessing the system control register. The E10A emulator saves the register value of the system control register at a break and returns the value when the user program is executed. Since this is done during a break, do not rewrite the system control register in the [IO] window.

### 3. Memory Access during Emulation

If the memory contents are referenced or modified during emulation, realtime emulation cannot be performed because the user program is temporarily halted.

### 4. The E10A emulator communicates with the H8S/2158F by using the RES#, ETRST#, ETCK, ETMS, ETDO, and ETDI pins. These pins cannot be used.

### 5. The power consumed by the MCU can reach several mA. This is because the user power supply drives one HD74LV125A to make the communication signal level match the user-system power-supply voltage.

### 6. Do not use an MCU that has been used for debugging.

If the flash memory is rewritten many times, and the MCU is left for a few days, data may be lost due to retention problems.

If the flash memory is rewritten many times, the data will not be erased. If an error message is displayed, exchange the MCU for a new one.

## 2.2 The H8S/2158F E10A Emulator Functions

- Notes:
1. Do not use an MCU that has been used for debugging.
  2. If the flash memory is rewritten many times, and the E10A emulator is left for a few days, data may be lost due to retention problems.
  3. If the flash memory is rewritten many times, the data will not be erased. If an error message is displayed, exchange the MCU for a new one.

### 2.2.1 E10A Emulator Driver Selection

Table 2.2 shows drivers which can be selected in the [E10A Driver Details] dialog box.

**Table 2.2 Type Name and Driver**

Type Name	Driver
HS2158KCM01H	E10A PC Card Driver 5
HS2158KCI01H	E10A PCI Card Driver 5

### 2.2.2 Hardware Break Functions

**Hardware Break Conditions:** In the H8S/2158F E10A emulator, eight conditions of Break Condition can be set. Table 2.3 lists the items that can be specified.

**Table 2.3 Hardware Break Condition Specification Items**

Items	Description
Address bus condition	Breaks when the MCU address bus value matches the specified value.
Data bus condition	Breaks when the MCU data bus value matches the specified value. High or low byte or word can be specified as the access data size.
Read or write condition	Breaks in the read or write cycle.

Table 2.4 lists the combinations of conditions that can be set in the [Break condition] dialog box.

**Table 2.4 Conditions Set in [Break condition] Dialog Box**

Dialog Box	Condition		
	Address Bus Condition	Data Condition	Read or Write Condition
[Break condition 1]	○	○	○
[Break condition 2]	○	○	○

Note: ○: Can be set by checking the radio button in the dialog box.

Table 2.5 lists the combinations of conditions that can be set by the BREAKCONDITION\_SET command.

**Table 2.5 Conditions Set by BREAKCONDITION\_SET Command**

Channel	Condition		
	Address Bus Condition (<addropt> option)	Data Condition (<dataopt> option)	Read or Write Condition (<r/wopt> option)
Break condition 1	○	○	○
Break condition 2	○	○	○

Note: ○: Can be set by the BREAKCONDITION\_SET command.

## Notes on Setting the Break Condition:

1. When [Go to cursor], [Step In], [Step Over], or [Step Out] is selected, the settings of Break Condition are disabled.
2. The settings of Break Condition are disabled when an instruction to which a software breakpoint has been set is executed.
3. When step over function is used, the settings of software breakpoint and Break Condition are disabled.

### 2.2.3 Notes on Setting the [Breakpoint] Dialog Box

1. When an odd address is set, the address is rounded down to an even address.
2. A BREAKPOINT is accomplished by replacing instructions. Accordingly, it can be set only to the flash memory or the RAM area. However, a BREAKPOINT cannot be set to the following addresses:
  - An area other than flash memory or RAM
  - An area occupied by the E10A emulator program
  - An instruction in which Break Condition is satisfied
3. During step execution, a BREAKPOINT is disabled.
4. A condition set at Break Condition is disabled immediately after starting execution when an instruction at a BREAKPOINT is executed. A break does not occur even if a condition of Break Condition is satisfied immediately after starting the execution.
5. When execution resumes from the breakpoint address after the program execution stops at the BREAKPOINT, single-step execution is performed at the address before execution resumes. Therefore, realtime operation cannot be performed.
6. Settings of BREAKPOINT and Break Condition are invalid while the STEP OVER function is being used.

### 2.2.4 Note on Using the JTAG Clock (TCK)

When the JTAG clock (TCK) is used, set the frequency to lower than that of the system clock.

### 2.2.5 Trace Function

The trace function in the H8S/2158F E10A emulator uses the branch-instruction trace function in the MCU. It displays the branch-source address or the mnemonic, and operand can be acquired in realtime.

---

**H8S Family E10A Emulator**  
**Additional Document for User's Manual**  
**Specific Guide for the H8S/2158F E10A Emulator**

Publication Date: Rev.1.00, October 6, 2003

Published by: Sales Strategic Planning Div.  
Renesas Technology Corp.

Edited by: Technical Documentation & Information Department  
Renesas Kodaira Semiconductor Co., Ltd.

---

# H8S Family E10A Emulator Additional Document for User's Manual



**Renesas Electronics Corporation**

1753, Shimonumabe, Nakahara-ku, Kawasaki-shi, Kanagawa 211-8668 Japan

REJ10B0030-0100H