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April 1st, 2010
Renesas Electronics Corporation

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User's Manual

H8S Family E10A Emulator

Additional Document for User's Manual

H8S/2168F E10A HS2168KCM01HE-U2 Renesas Microcomputer Development Environment System H8S Family / H8S/2100 Series Specific Guide for the H8S/2168F, H8S/2167F, H8S/2166F E10A Emulator

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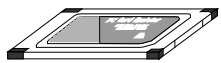
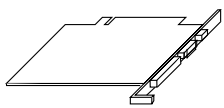
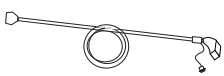
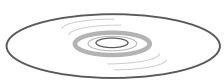
Contents

Section 1 Connecting the Emulator with the User System

1.1 Components of the E10A Emulator

The H8S/2168F E10A emulator supports the H8S/2168F, H8S/2167F, and H8S/2166F (hereafter referred to as the MCU unless the description is specific to any of them). Table 1.1 lists the components of the H8S/2168F E10A emulator.

Table 1.1 Components of the E10A Emulator (HS2168KCM01H or HS2168KCI01H)

Classi-fication	Component	Appearance	Quan-tity	Remarks
Hard-ware	Card emulator HS2168KCM01H (Model: HS0005KCM05H), HS2168KCI01H (Model: HS0005KCI05H)	 (PCMCIA) or  (PCI)	1	HS2168KCM01H (PCMCIA: 14-pin type): Depth: 85.6 mm, Width: 54.0 mm, Height: 5.0 mm, Mass: 30.0 g HS2168KCI01H (PCI: 14-pin type): Depth: 122.0 mm, Width: 96.0 mm, Mass: 80.0 g
	User system interface cable		1	HS2168KCM01H (PCMCIA: 14-pin type): Length: 80.0 cm, Mass: 46.0 g HS2168KCI01H (PCI: 14-pin type): Length: 150.0 cm, Mass: 90.0 g
Soft-ware	H8S/2168F E10A emulator setup program, H8S Family E10A Emulator User's Manual, and Specific Guide for the H8S/2168F, H8S/2167F, H8S/2166F E10A Emulator		1	HS2168KCM01SR, HS0005KCM05HJ, HS0005KCM05HE, HS2168KCM01HJ-U2, and HS2168KCM01HE-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.

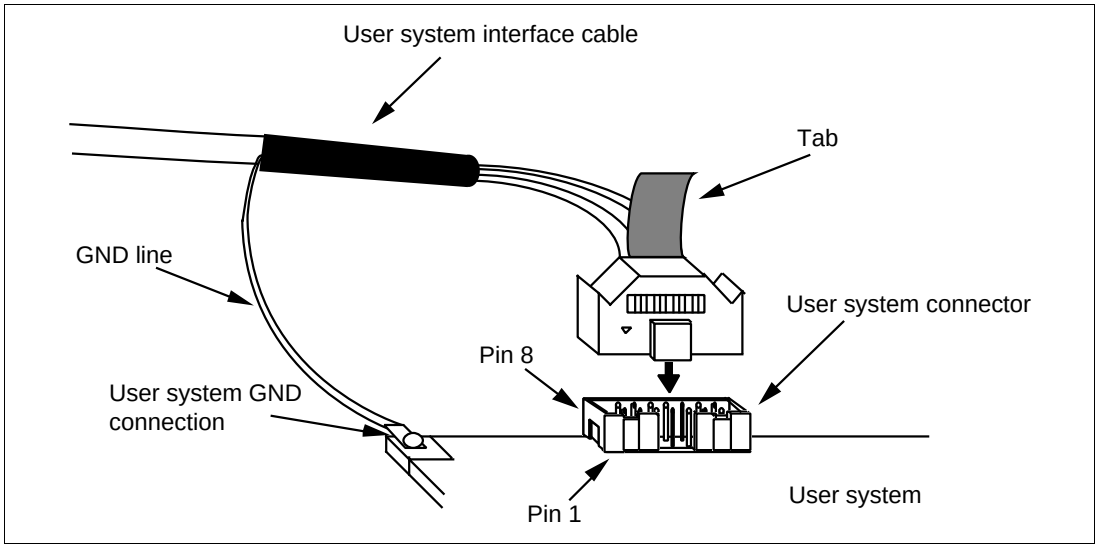
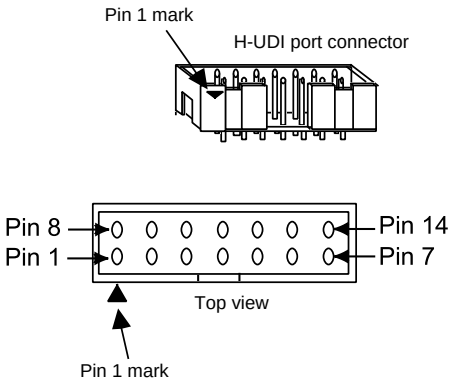


Figure 1.1 Connecting the User System Interface Cable to the User System

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.



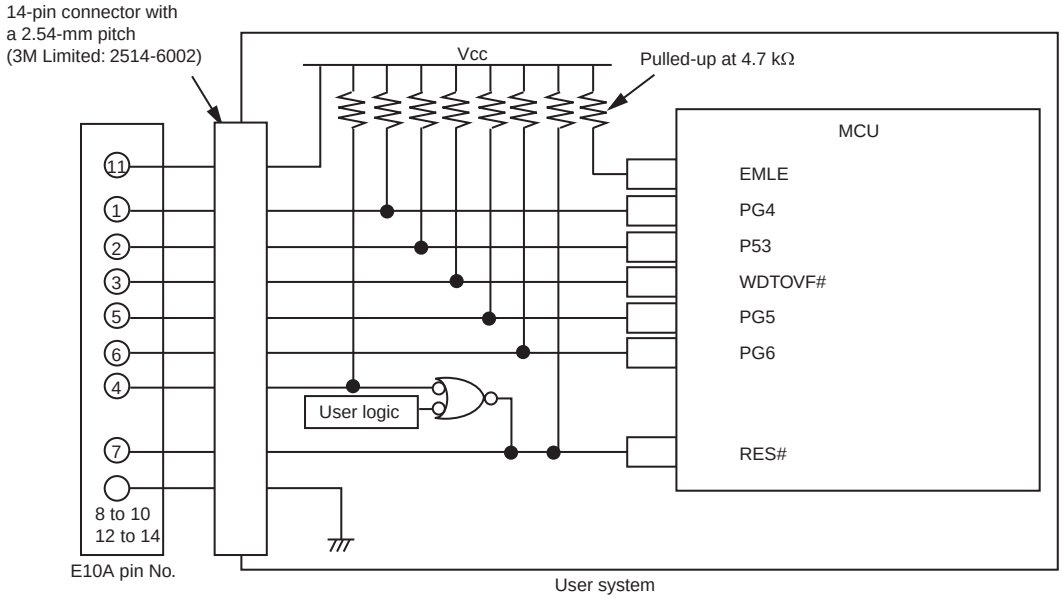
Pin No.	MCU Pin Name	Input/Output *1
1	ETCK	Input
2	ETRST#	Input
3	ETDO	Output
4	RES# *2	Input
5	ETMS	Input
6	ETDI	Input
7	RES# *2	Output
8 to 10 12 to 14	GND *3	—
11	Vcc *4	—

Notes: 1. Input to or output from the user system.
2. The symbol (#) means that the signal is active-low.
3. By detecting GND on the user system side, the E10A emulator decides whether the user system is connected or not.
4. Connect the MCU's Vcc pin.

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.



· RES# of pin 4 of the H-UDI port connector is a signal line in which the emulator outputs signals to the MCU. Connect RES# of pin 4 and the user system reset circuit to the MCU, as shown above.

· 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 1.3 Example of E10A Emulator Connection

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

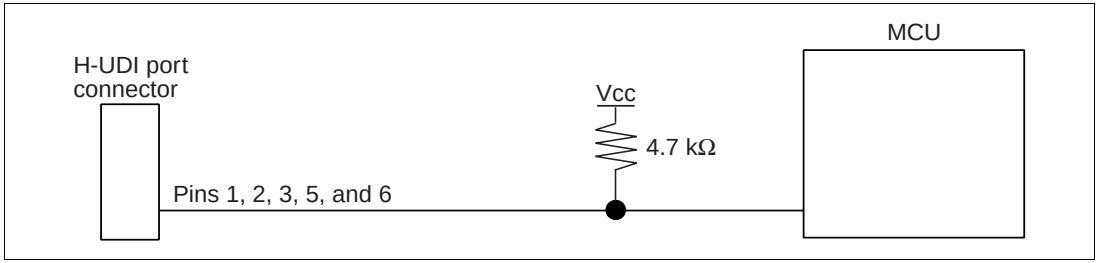


Figure 1.4 Connection of E10A Emulator and the MCU

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.

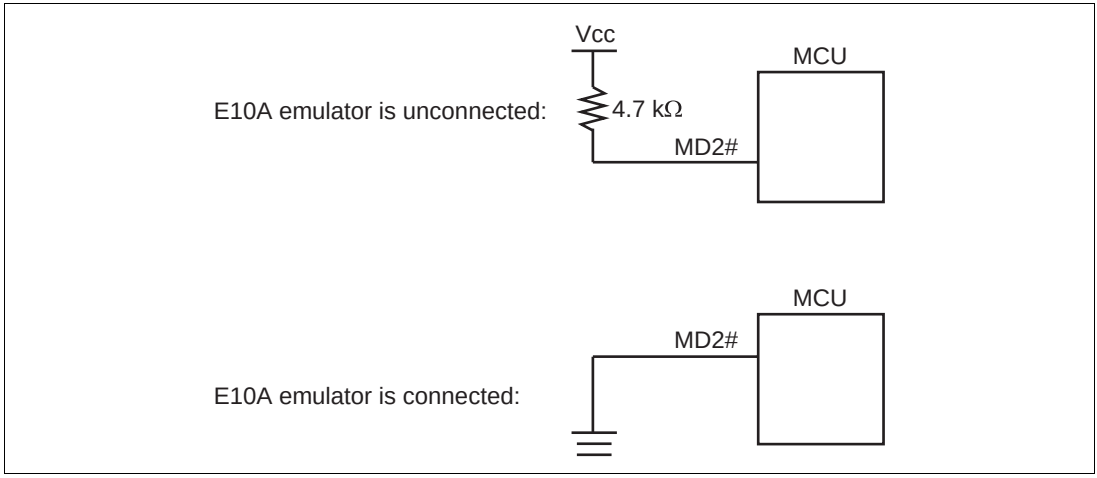


Figure 1.5 MD2# Pin and E10A Emulator

3. 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.

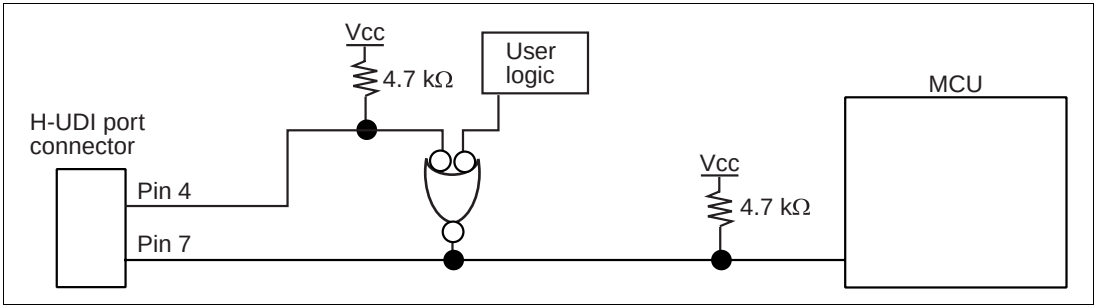


Figure 1.6 Connection of the RES# Pin

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

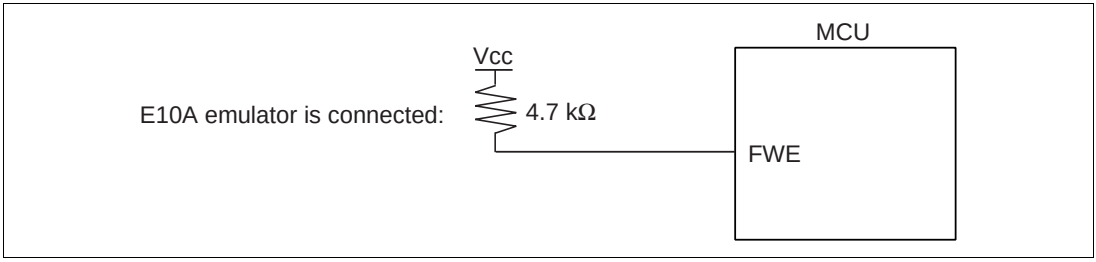


Figure 1.7 Connection of the FWE Pin

5. Connect GND of pins 8 to 10 and 12 to 14 in the H-UDI port connector to ground in the user system.
6. 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.

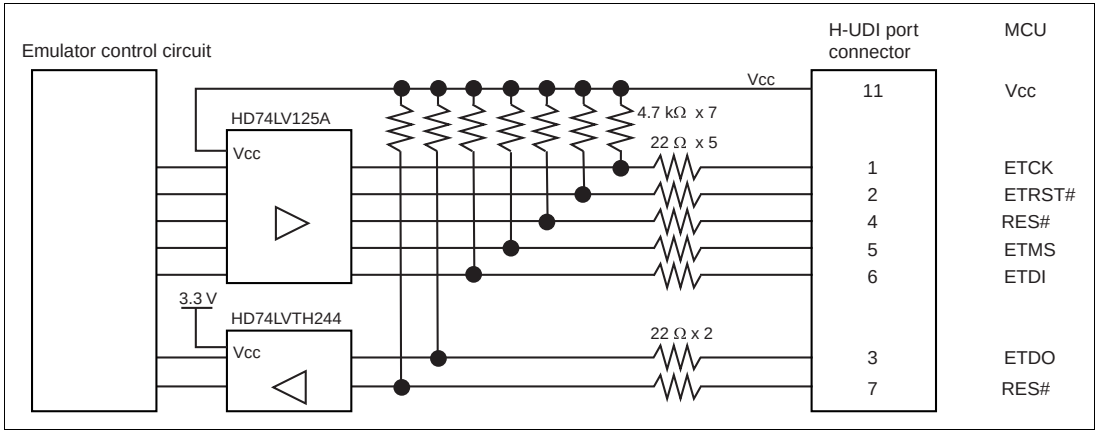


Figure 1.8 Interface Circuit in the Emulator (Reference)

Section 2 Specification of the E10A Emulator's Software

2.1 Differences between the H8S/2168F, H8S/2167F, H8S/2166F, 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'7F

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 MCU 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/2168F 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
HS2168KCM01H	E10A PC Card Driver 5
HS2168KCI01H	E10A PCI Card Driver 5

2.2.2 Hardware Break Functions

Hardware Break Conditions: In the H8S/2168F 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

	Condition		
Dialog Box	**Address Bus Condition**	**Data Condition**	**Read or Write Condition**
[Break condition 1]	O	O	O
[Break condition 2]	O	O	O
[Break condition 3]	O	×	O
[Break condition 4]	O	×	O
[Break condition 5]	O	×	O
[Break condition 6]	O	×	O
[Break condition 7]	O	×	O
[Break condition 8]	O	×	O

Note: O: 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

	Condition		
Channel	**Address Bus Condition (<addropt> option)**	**Data Condition (<dataopt> option)**	**Read or Write Condition (<r/wopt> option)**
Break condition 1	O	O	O
Break condition 2	O	O	O
Break condition 3	O	×	O
Break condition 4	O	×	O
Break condition 5	O	×	O
Break condition 6	O	×	O
Break condition 7	O	×	O
Break condition 8	O	×	O

Note: O: 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 BREAKPOINT has been set is executed.
3. When step over function is used, the settings of 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/2168F 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/2168F, H8S/2167F, H8S/2166F
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