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User's Manual

H8SX Family E10A Emulator

Additional Document for User's Manual

H8SX/1527F E10A HS1527KCI01HE-U2 Renesas Microcomputer Development Environment System H8SX Family / H8SX/1500 Series Specific Guide for the H8SX/1527F, H8SX/1525F E10A Emulator

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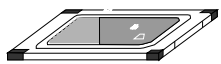
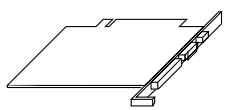
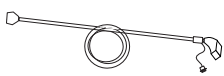
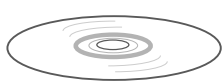
Section 1 Connecting the Emulator with the User System

1.1 Components of the E10A Emulator

The H8SX/1527F E10A emulator supports the H8SX/1527F and H8SX/1525F (hereafter referred to as the MCU unless the description is specific to any of them). Table 1.1 lists the components of the H8SX/1527F E10A emulator.

Table 1.1 Components of the E10A Emulator (HS1527KCM01H or HS1527KCI01H)

Classi-fication	Component	Appearance	Quan-tity	Remarks
Hard-ware	Card emulator HS1527KCM01H (Model: HS0005KCM05H), HS1527KCI01H (Model: HS0005KCI05H)	 (PCMCIA) or  (PCI)	1	HS1527KCM01H (PCMCIA: 14-pin type): Depth: 85.6 mm, Width: 54.0 mm, Height: 5.0 mm, Mass: 30.0 g HS1527KCI01H (PCI: 14-pin type): Depth: 122.0 mm, Width: 96.0 mm, Mass: 80.0 g
	User system interface cable		1	HS1527KCM01H (PCMCIA: 14-pin type): Length: 80.0 cm, Mass: 46.0 g HS1527KCI01H (PCI: 14-pin type): Length: 150.0 cm, Mass: 90.0 g
Soft-ware	H8SX/1527F E10A emulator setup program, H8SX Family E10A Emulator User's Manual, and Specific Guide for the H8SX/1527F, H8SX/1525F E10A Emulator		1	HS1527KCM01SR, HS0005KCI01HJ, HS0005KCI01HE, HS1527KCI01HJ-U2, and HS1527KCI01HE-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.

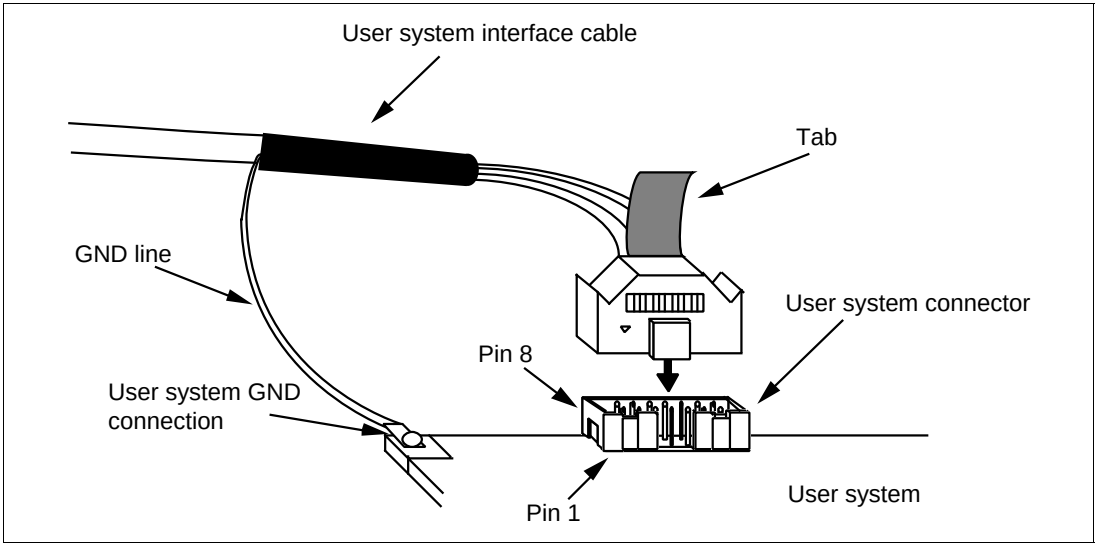


Figure 1.1 Connecting the User System Interface Cable to the User System

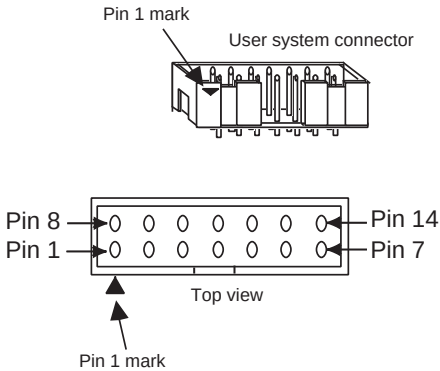
Notes:
1. The pin number assignments of the 14-pin connector differ from those of the E10T emulator; however, the physical location is the same.
2. Do not place any components within 3 mm of the connector.

⚠ WARNING

Be sure to place the GND line of the user system interface cable on the GND of the user system with a screw, etc. Failure to do so will result in a FIRE HAZARD due to an overcurrent and will damage the user system, the emulator product, and the host computer.

1.3 Pin Assignments of the E10A Connector

Figure 1.2 shows the pin assignments of the user system connector.



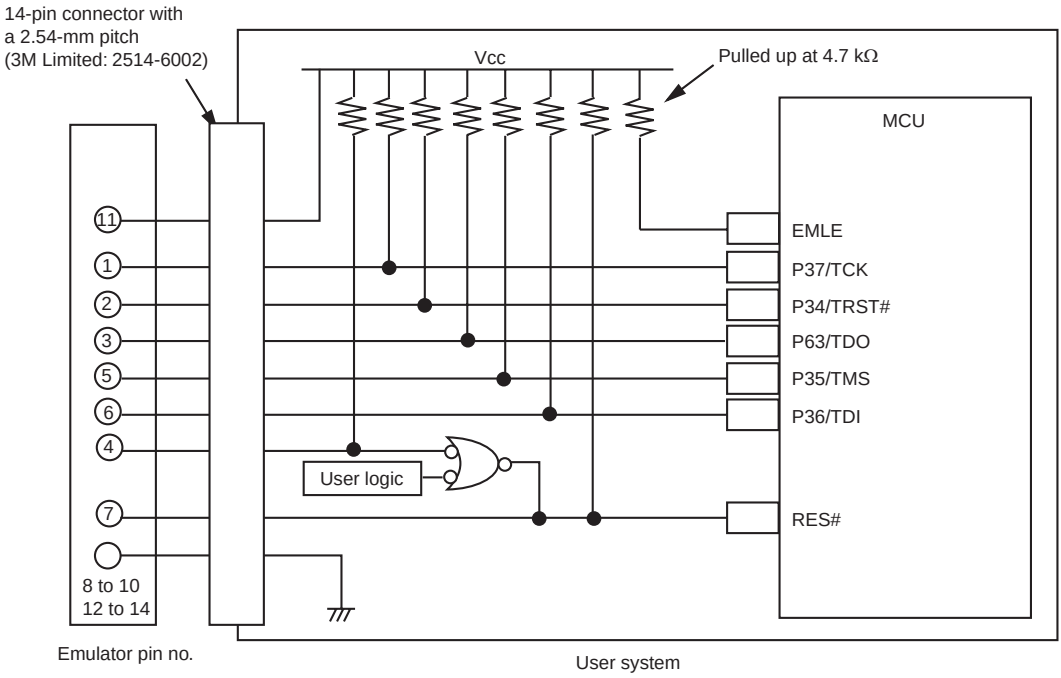
Pin No.	MCU Pin Name	Input/Output *1
1	P37/TCK	Input
2	P34/TRST#	Input
3	P63/TDO	Output
4	RES(in)# *2 *5	Input
5	P35/TMS	Input
6	P36/TDI	Input
7	RES(out)# *2	Output
8 to 10 12 to 14	GND *3	—
11	Vcc *4	—

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, the emulator decides whether the user system is connected or not.
4. Connect Vcc with the Vcc of the MCU.
5. RES(in) is not the pin name of the MCU. It cannot be directly connected to the MCU pins.

Figure 1.2 Pin Assignments of the User System Connector

1.4 Example of Emulator Connection

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



· RES(in)# of pin 4 of the user system connector is a signal line in which the emulator outputs signals to the MCU. RES(in)# (pin 4) and the user logic reset circuit for the signal line must be connected to the MCU as shown above.

· RES(out)# of pin 7 of the user system 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 user system connector.

Figure 1.3 Example of Emulator Connection

Notes: 1. P34/TRST#, P37/TCK, P35/TMS, P63/TDO, and P36/TDI are used by the emulator. Pull up and connect the emulator and the MCU pins.

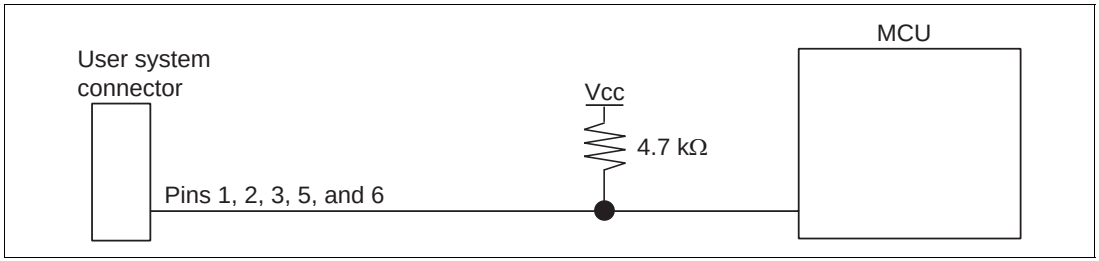


Figure 1.4 Connection of Emulator and MCU

2. If the emulator is connected to the user system, pull up pin EMLE of the MCU, and when the emulator is not connected to the user system, ground the EMLE.

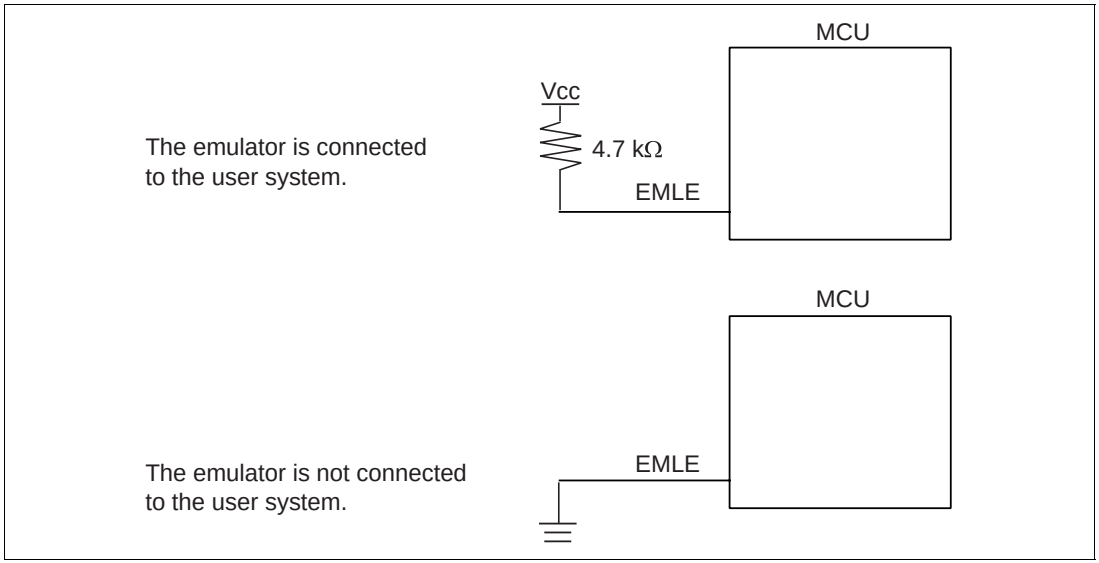


Figure 1.5 Emulator and Pin EMLE

3. RES(in)# of pin 4 of the user system connector is a signal line in which the emulator outputs signals to the MCU. RES(in)# of pin 4 and the user logic reset circuit for the signal line must be connected to pin RES# of the MCU as shown in figure 1.6. RES(out)# of pin 7 of the user system connector is a signal line in which the emulator monitors pin RES# of the MCU.
   The RES# must be pulled up before it is connected to pin 7 of the user system connector.

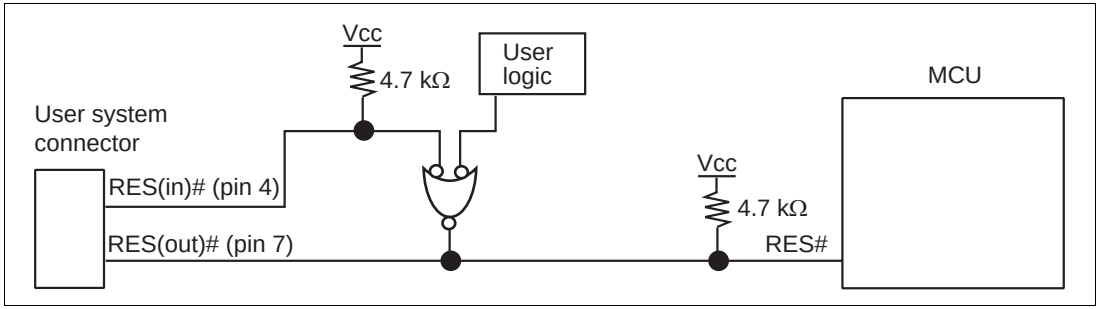


Figure 1.6 Connection of Pin RES#

4. Ground pins 8, 9, 10, 12, 13, and 14 of the user system connector.
5. Pin 11 of the user system connector must be connected to the user system Vcc (power supply). The amount of voltage permitted to input to the user system connector must be within the guaranteed range of the MCU.

6. Figure 1.7 shows the interface circuit in the emulator. Use this figure as a reference to decide the pull-up resistance value.

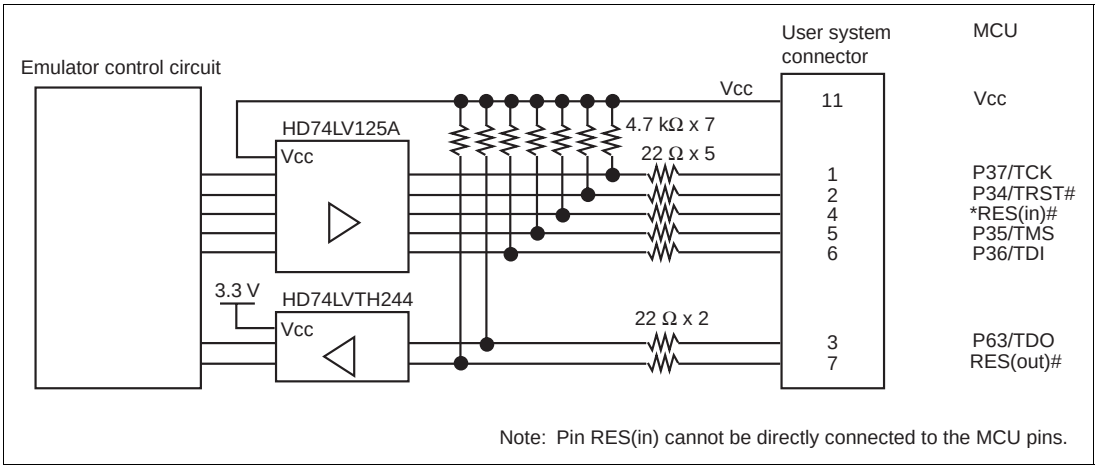


Figure 1.7 Interface Circuit in the Emulator (Reference)

7. When the MCU in use is connected to the emulator, the pin functions listed below are not available.

Table 1.2 Pin Functions Not Available

H8SX/1527F	H8SX/1525F
P63 and P34 to P37	P63 and P34 to P37
IRQ11-B#	IRQ11-B#
PO12 to PO15	—
TIOCA1 to TIOCA2, TIOCB1 to TIOCB2, TCLKC, and TCLKD	—

The symbol (#) means that the signal is active-low.

Section 2 Specification of the E10A Emulator's Software

2.1 Differences between the H8SX/1527F or H8SX/1525F 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 P34/TRST#, P37/TCK, P35/TMS, P63/TDO, and P36/TDI 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 reprogrammed many times, and the MCU is left for a few days, data may be lost due to retention problems.

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

7. MCU Operating Mode
   Use the E10A emulator in mode 3 (single-chip mode).

8. Sum Data Displayed in the Writing Flash memory Mode
   Sum data, which is displayed in the 'Writing Flash memory' mode, is a value that data in the whole ROM areas has been added by bytes.

9. Note on Executing the User Program
   The set value is rewritten since the emulator uses flash memory and watchdog timer registers during programming (Go, Step In, Step Out, or Step Over) of the flash memory.

10. Note on Software Standby
    The [STOP] button is disabled during software standby mode.

11. Note on Reprogramming the Flash Memory
    While the flash memory is reprogrammed during Go operation, actual reprogramming will not be performed if the flash memory is reprogrammed on the [Memory] window. Therefore, the contents will not be displayed correctly on the [Memory] window.

2.2 The H8SX/1527F E10A Emulator Functions

Notes: 1. Do not use an MCU that has been used for debugging.
2. If the flash memory is reprogrammed 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 reprogrammed 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
HS1527KCM01H	E10A PC Card Driver 5
HS1527KCI01H	E10A PCI Card Driver 5

2.2.2 Hardware Break Functions

Hardware Break Conditions: In the H8SX/1527F E10A emulator, conditions of Break Condition 1,2,3,4 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. It is possible to select whether a break is generated before or after prefetched address execution. When [User mask] is selected, a value to be masked '*' can be set. For masked bits, the condition is satisfied for any values.
Data bus condition	Breaks when the MCU data bus value matches the specified value. Byte, word, or longword can be specified as the access data size. When [User mask] is selected, a value to be masked '*' can be set. For masked bits, the condition is satisfied for any values.
Bus master condition	Breaks when the values of DATA, DTC, and DMA cycles match the specified values.
Read or write condition	Breaks in the read or write cycle.
Execution count condition	The condition specified with Break Condition 1 breaks after the execution count condition specified here has been satisfied.

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	Bus Master Condition	Read or Write Condition	Execution Count Condition
[Break condition 1]	O	O	O	O	O
[Break condition 2]	O	X	O	O	X
[Break condition 3]	O	X	O	O	X
[Break condition 4]	O	X	O	O	X

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 (option <addropt>)**	**Data Condition (option <dataopt>)**	**Bus Master Condition (option <accessopt>)**	**Read or Write Condition (option <r/wopt>)**	**Execution Count Condition (option <countopt>)**
Break condition 1	O	O	O	O	O
Break condition 2	O	X	O	O	X
Break condition 3	O	X	O	O	X
Break condition 4	O	X	O	O	X

Note: O: Can be set by the BREAKCONDITION_SET command.

Notes on Setting the Break Condition:

1. When [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 Sequential Break Function

The user program is halted when conditions of the Break Condition for channels 2 to 4 are matched. This function can be set in the [Emulation mode] drop-down list box of the [Configuration] dialog box.

Table 2.6 Sequential Break Condition Specification Items

Items	Description
Sequential break Condition 2-1	Halts a program when a condition is satisfied in the order of Break Condition 2, 1. Break Condition 1, 2 must be set.
Sequential break Condition 3-2-1	Halts a program when a condition is satisfied in the order of Break Condition 3, 2, 1. Break Condition 1, 2, 3 must be set.
Sequential break Condition 4-3-2-1	Halts a program when a condition is satisfied in the order of Break Condition 4, 3, 2, 1. Break Condition 1, 2, 3, 4 must be set.

2.2.5 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.

2.2.6 Trace Function

The trace function in the H8SX/1527F E10A emulator uses the eight-branch-instruction trace function in the MCU, and acquires a trace by operating the user program in realtime. The branch-instruction trace function displays the branch-source address, the mnemonic, and the operand.

H8SX Family E10A Emulator
Additional Document for User's Manual
Specific Guide for the H8SX/1527F, H8SX/1525F E10A Emulator

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