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User's Manual

Tiny/Super Low Power E7 Emulator

Additional Document for User's Manual Notes on Connecting the H8/38602RF

Renesas Microcomputer Development Environment System
H8 Family / H8/300H Tiny Series
Tiny/Super Low Power E7 HS0007TCU01HEP8

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Rev.3.00 2006.09

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Contents

Section 1 Connecting the Emulator with the User System

Before connecting an E7 emulator (hereafter referred to as 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 E7 emulator user's manual and the hardware manual for related MCUs.

Table 1.1 shows the recommended connector for the emulator.

Table 1.1 Recommended Connector

Type Number	Manufacturer	Specifications
2514-6002	3M Limited	14-pin straight type

Connect pins 2, 4, 6, 10, 12, 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.

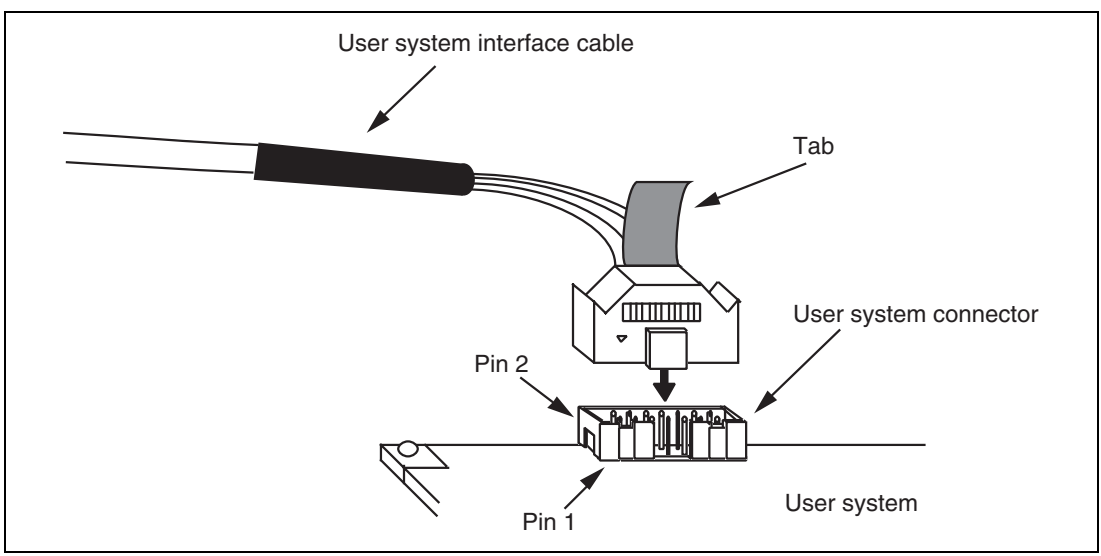
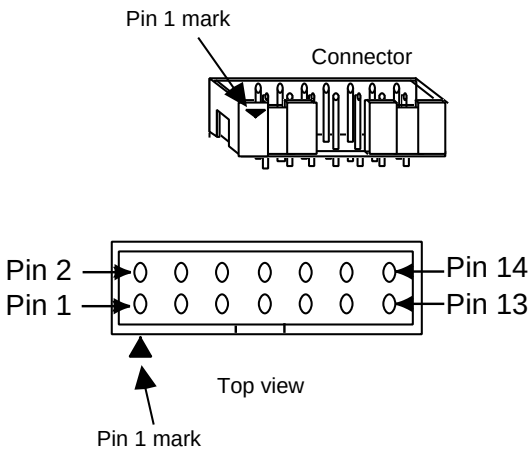


Figure 1.1 Connecting the User System Interface Cable to the User System

Notes: 1. The pin number assignments of the 14-pin connector differ from those of the E10A emulator; however, the physical location is the same.
2. Do not place any components within 3 mm of the connector.
3. When the emulator is used in the writer mode, connect the emulator similarly to the user system.

Section 2 Pin Assignments of the E7 Connector

Figure 2.1 shows the pin assignments of the connector.



Pin No.	MCU Signal
1	E7_2
2	Vss
3	N.C.
4	Vss
5	E7_1
6	Vss
7	NMI# *
8	Vcc
9	N.C.
10	Vss
11	E7_0
12	Vss
13	RES#*
14	Vss

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

Figure 2.1 Pin Assignments of the Connector

Section 3 Example of Emulator Connection

Figures 3.1 shows an example of emulator connection to the MCU.

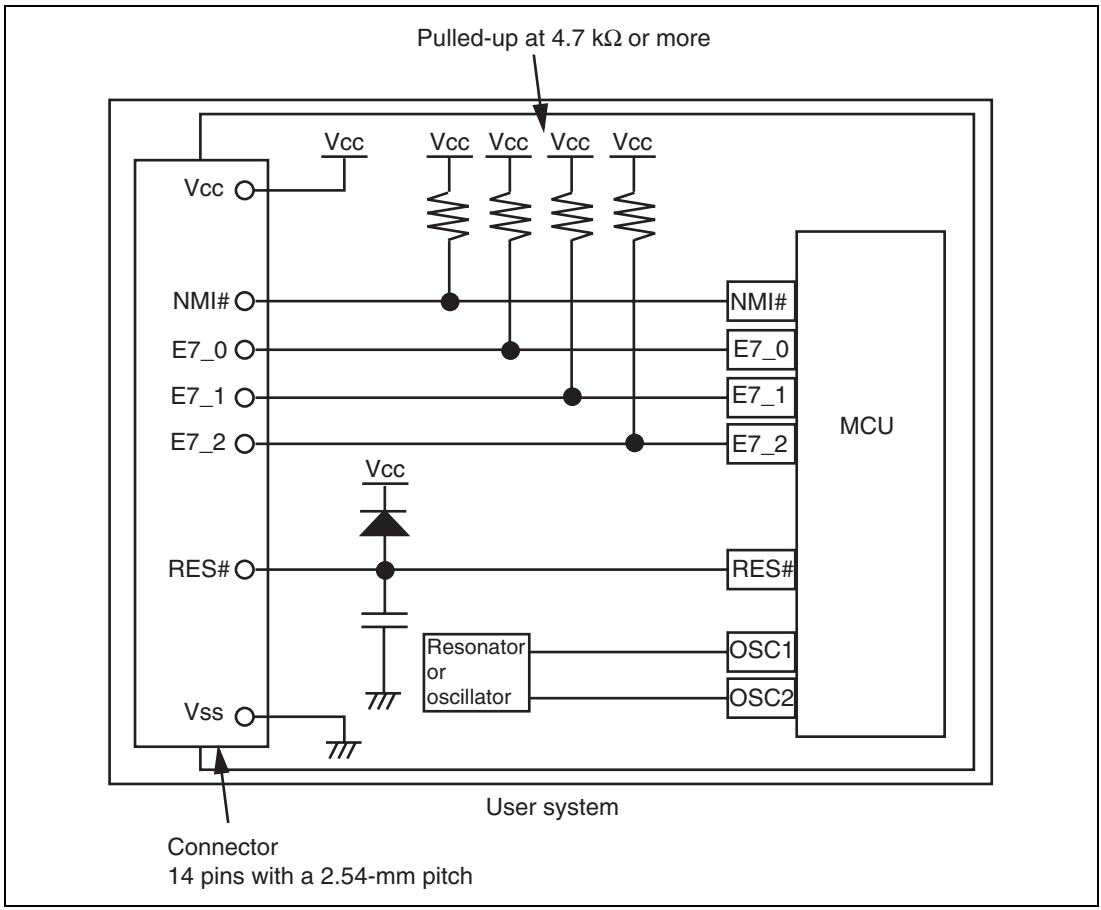


Figure 3.1 Example of Emulator Connection

Notes: 1. E7_0 to E7_2 pins are used by the emulator. Pull up and connect the emulator and MCU pins.

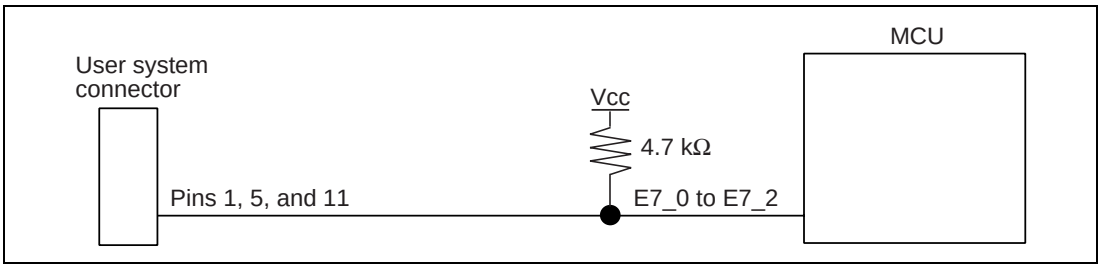


Figure 3.2 Connection of Emulator and MCU

2. The NMI# signal is used for forced break control by the emulator. Connect the emulator and MCU pins directly. In debugging without forced break control, change the mode with the HEW. Then, when the user logic is connected with the open-collector output buffer, the NMI# pin can be used in the user system (however, at power-on, the NMI# pin is used by the emulator).

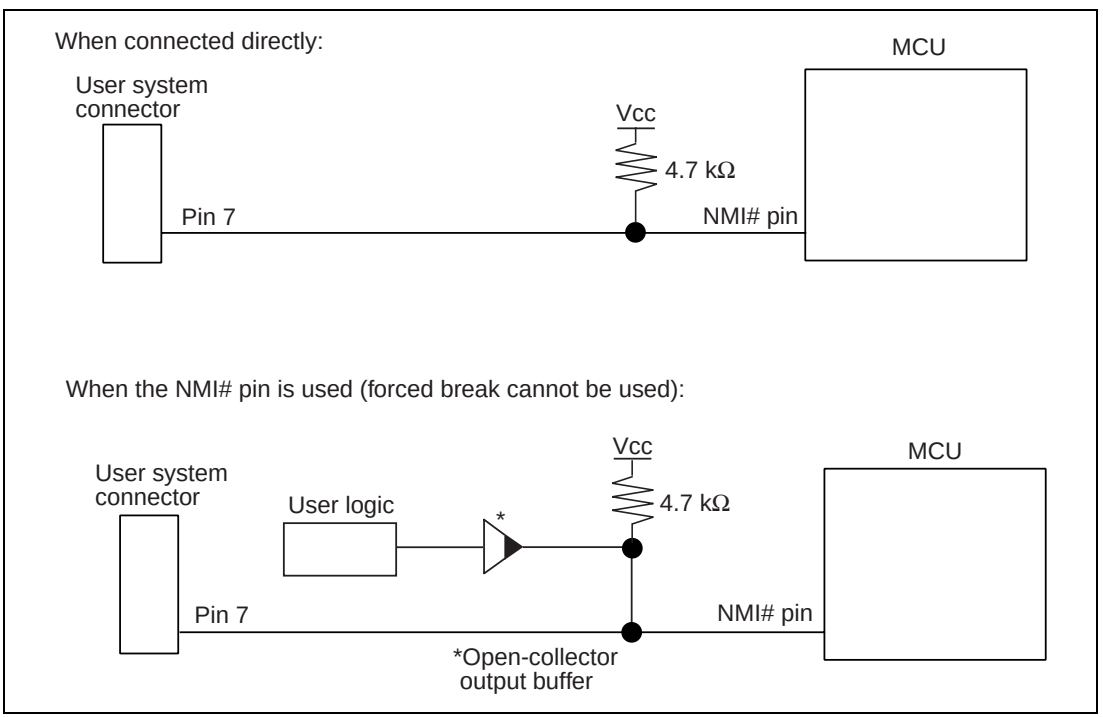


Figure 3.3 Connection of Emulator and NMI# Pin

3. The RES# pin is used by the emulator. Create the following circuit by connecting the open-collector output buffer so that reset input can be accepted from the emulator.

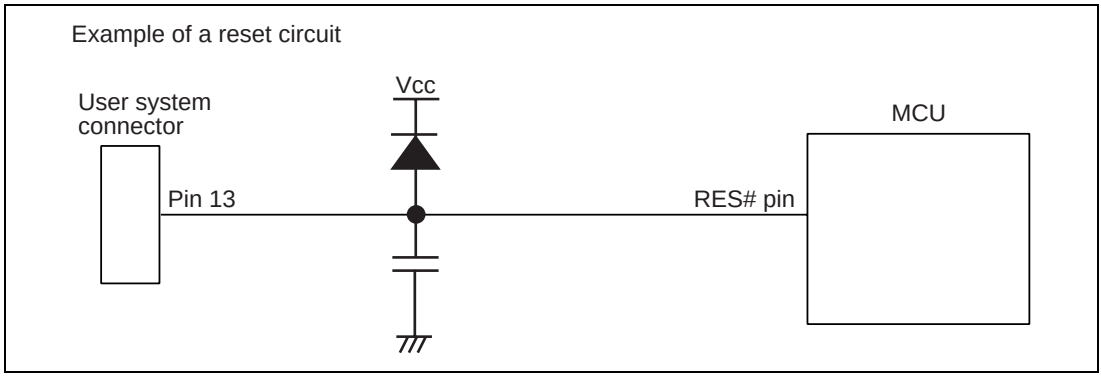


Figure 3.4 Example of a Reset Circuit

4. Connect Vss and Vcc with the Vss and Vcc of the MCU, respectively.
5. Connect nothing with N.C.
6. The input voltage, Vcc, must be connected to the user system Vcc (power supply). The amount of voltage permitted to input to Vcc must be within the guaranteed range of the microcomputer.
7. Refer to the hardware manual for the recommended capacitance of the capacitor that is connected to the RES# pin.
8. Use of the internal oscillator circuit is available in the H8/38602RF. However, a resonator or an oscillator must be connected to OSC1 and OSC2 pins when the emulator is connected.

9. Figure 3.5 shows the interface circuit in the emulator. Use this figure as a reference when determining the pull-up resistance value.

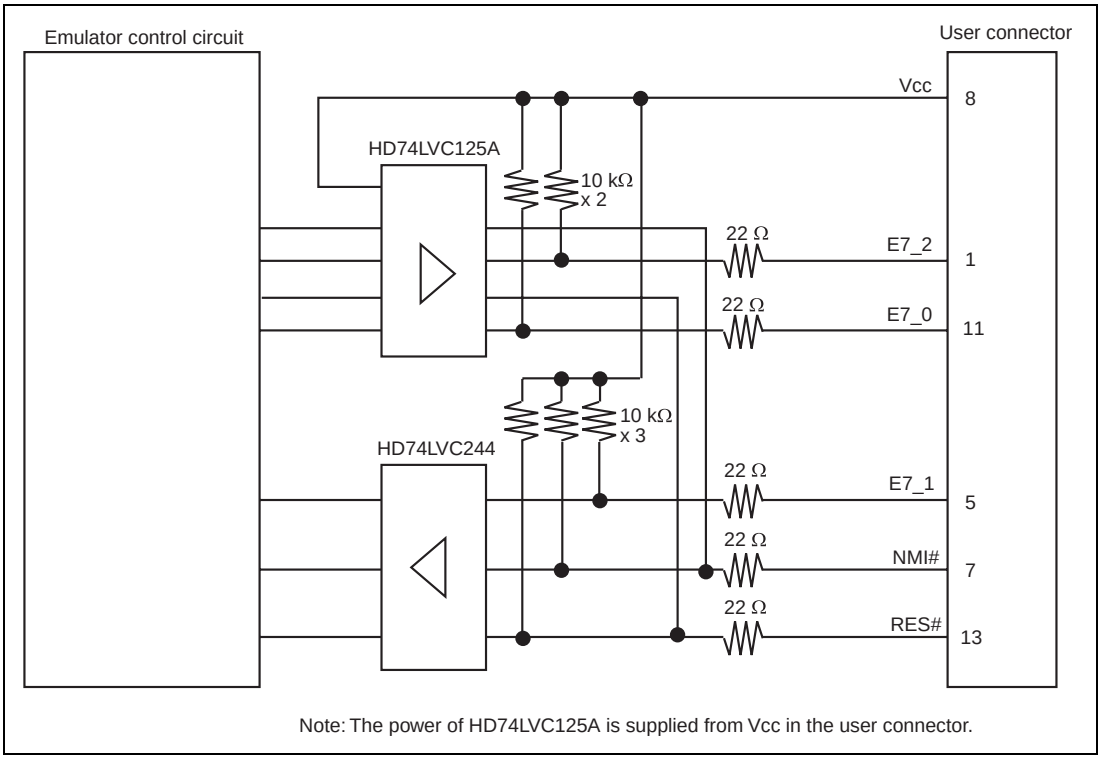


Figure 3.5 Interface Circuit in the Emulator (Reference)

Section 4 Differences between the MCU (H8/38602RF) and the Emulator

1. When the emulator system is initiated, it initializes the general registers and part of the control registers as shown in table 4.1.

Table 4.1 Register Initial Values at Emulator Power-On

Register	Initial Value
PC	Reset vector value in the vector address table
ER0 to ER6	H'0000
ER7 (SP)	H'FF80
CCR	H'80

2. Low-Power Mode

   During a user program break, the CPU operating frequency is forced to a system clock (ϕ) for high-speed operation.

3. RES# Signal

   The MCU signals are only valid during user program execution started with clicking the GO or STEP-type button. During a user program break, the RES# signal is not sent to the MCUs.

Note: Do not start user program execution or access the memory while control input signal (RES#) is being low. A TIMEOUT error will occur.

4. System Control Register

   In the emulator, the internal I/O registers can be accessed from the [IO] window. However, be careful when accessing the system control register. The 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.

5. 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.

6. The emulator communicates with the MCUs by using the NMI#, RES#, and E7_2 to E7_0 pins. These pins cannot be used, however, the NMI# pin can be used by changing the setting of the [NMI signal] group box in the [Configuration] dialog box.

7. 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 byte.

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

9. The power consumed by the MCU can reach several milliamperes. This is because the user power supply drives one HD74LVC125A to make the communication signal level match the user-system power-supply voltage. The power consumed rises little during user program execution since the emulator does not perform communication; it rises more during a break.

10. Program Area for the Emulator
    Do not access a part of areas in the flash memory or the internal RAM since the emulator program uses these areas. If the contents of the program area for the emulator are changed, the emulator will not operate normally. In this case, restart the emulator with the Download emulator firmware mode.

Table 4.2 Program Area for the E7 Emulator

MCU Name	Program Area
H8/38602RF	Flash memory: H'4000 to H'4FFF
	Internal RAM: H'F780 to H'FB7F
	Vector, etc.: H'0002 to H'000F, H'0018 to H'0019, H'4FF8 to H'4FF9

11. The emulator uses a two-word stack pointer for values stored on a user program break. Therefore, the stack area must accept two-word addresses.

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

13. Forced Break Function

    When the NMI# signal is used for a forced break in the emulator, the vector address of NMI# is rewritten by the emulator program. An error will occur if a file in the host computer and the flash memory contents are verified. Do not use the flash memory contents as the ROM data for the mask ROM after it has been saved.

14. Setting the Usage of the NMI# Signal

    In the [Configuration] dialog box, when the NMI# signal is changed as it is used in the user program, the vector address of NMI# is not recovered. Reload the user program.

15. Initializing the Internal I/O Register with the Reset_CPU Function

    Be sure to initialize the following internal I/O registers by the user program since they are not initialized by selecting [Debug] – [Reset CPU] or using the RESET command:
    SYSCR1, SYSCR2, IEGR, IENR1, and IRR1

16. Step Execution of the SLEEP Instruction

    When the interrupt mask bit (I) in the condition code register (CCR) is 1, do not perform step execution of the SLEEP instruction. If the step execution is performed and not finished correctly, restart the emulator.

17. Use of the internal oscillator circuit is available in the H8/38602RF. However, a resonator or an oscillator must be connected to OSC1 and OSC2 pins when the emulator is connected.

18. Processing at Emulator Activation

    When the emulator is activated, the watchdog timer is not active; the operation of the emulator differs from that of the actual MCU.

19. Hardware Break Functions

    - In the H8/38602RF E7 emulator, conditions of Break Condition 1,2 can be set. Table 4.3 lists the items that can be specified.

20. Restriction on Software Write Enable (SWE) Bit

    If the SWE bit is set to 1 during execution of the user program, a communication timeout error will occur. Do not set this bit to 1.

Table 4.3 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 4.4 lists the combinations of conditions that can be set in the [Break condition] dialog box.

Table 4.4 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	X	X

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

Table 4.5 lists the combinations of conditions that can be set by the BREAKCONDITION_SET command.

Table 4.5 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	X	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.
4. Do not satisfy Break Condition 2 and another break source (BREAKPOINT or Break Condition 1) simultaneously. A break will occur with an illegal value.

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Additional Document for User's Manual
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