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User's Manual

H8S, H8SX Family E10A-USB Emulator
Additional Document for User's Manual
Supplementary Information on Using the H8S/2378F, H8S/2377F, H8S/2367F, H8S/2368F, H8S/2378RF, and H8S/2377RF

Renesas Microcomputer Development Environment System
H8S Family / H8S/2300 Series

E10A-USB for H8S/2378F HS2378KCU01HE

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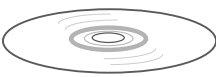
Contents

Section 1 Connecting the Emulator with the User System

1.1 Components of the Emulator

The H8S/2378F E10A-USB emulator supports the H8S/2378F, H8S/2377F, H8S/2367F, H8S/2368F, H8S/2378RF, and H8S/2377RF. Table 1.1 lists the components of the emulator.

Table 1.1 Components of the Emulator

Classi-fication	Component	Appearance	Quan-tity	Remarks
Hard-ware	Emulator box		1	HS0005KCU01H: Depth: 65.0 mm, Width: 97.0 mm, Height: 20.0 mm, Mass: 72.9 g or HS0005KCU02H: Depth: 65.0 mm, Width: 97.0 mm, Height: 20.0 mm, Mass: 73.7 g
	User system interface cable		1	14-pin type: Length: 20 cm, Mass: 33.1 g
	USB cable		1	Length: 150 cm, Mass: 50.6 g
Soft-ware	H8S/2378F E10A-USB emulator setup program, H8S, H8SX Family E10A-USB Emulator User's Manual, Supplementary Information on Using the H8S/2378F, H8S/2377F, H8S/2368F, H8S/2367F, H8S/2378RF, and H8S/2377RF*, and Test program manual for HS0005KCU01H and HS0005KCU02H		1	HS0005KCU01SR, HS0005KCU01HJ-H8S, HS0005KCU01HE-H8S, HS2378KCU01HJ, HS2378KCU01HE, HS0005TM01HJ, and HS0005TM01HE (provided on a CD-R)

Note: Additional document for the MCUs supported by the emulator is included. Check the target MCU and refer to its additional document.

1.2 Connecting the E10A-USB Emulator with the User System

Before connecting an E10A-USB emulator (hereafter referred to as the 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 an example of recommended connection between the connector and the MCU shown in this manual.
Before designing the user system, be sure to read the E10A-USB emulator user's manual and the hardware manual for related MCUs.

The H8S/2378F, H8S/2377F, H8S/2368F, H8S/2367F, H8S/2378RF, and H8S/2377RF supported by this emulator are referred to as the MCU unless the description is specific to either of them.

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.

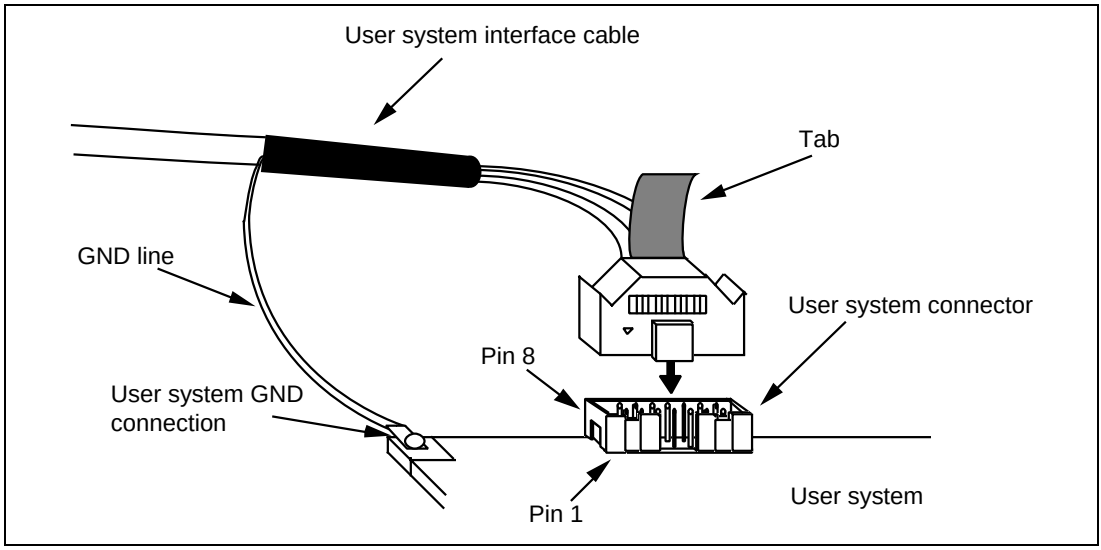


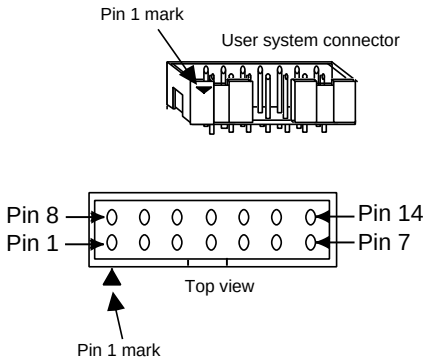
Figure 1.1 Connecting the User System Interface Cable to the User System

Notes: 1. The pin number assignments of the 14-pin connector differ from those of the E7 emulator; however, the physical location is the same.

2. When designing the user system connector layout on the user board, do not place any components within 3 mm of the connector.

1.3 Pin Assignments of the User System Connector

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



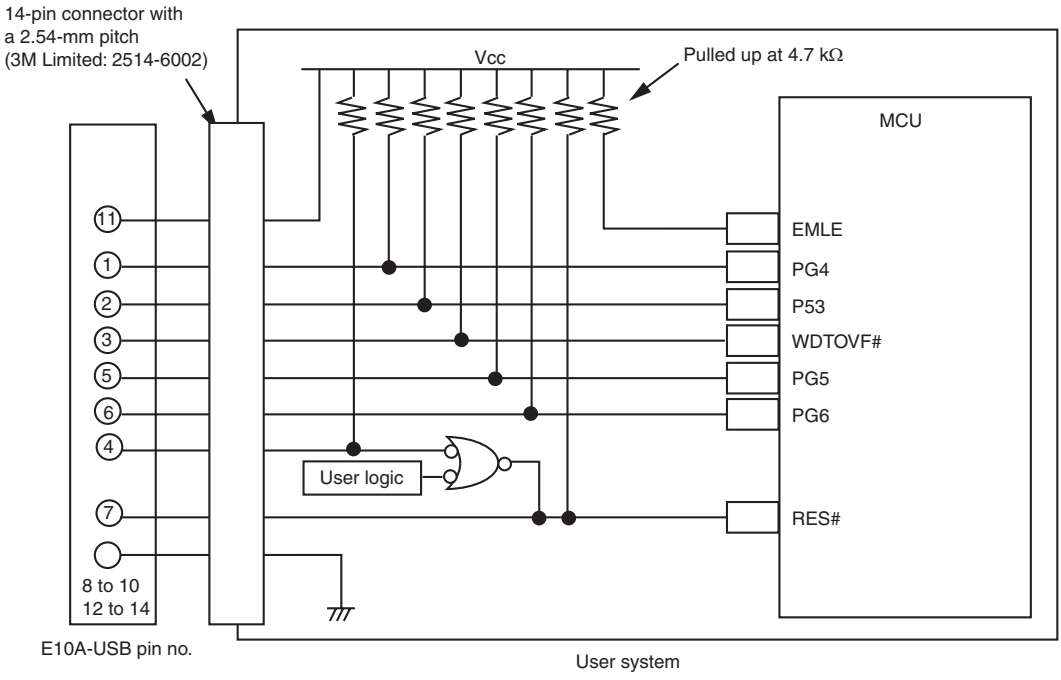
Pin No.	MCU Pin Name *5	Input/Output *1
1	PG4	Input
2	P53	Input
3	WDTOVF#	Output
4	RES(in)# *2 *6	Input
5	PG5	Input
6	PG6	Input
7	RES(out)# *2	Output
8 to 10 12 to 14	GND *3	—
11	Vcc *4	—

Notes: 1. Input to or output from the user system connector.
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. The PG4 to PG6 and P53 port functions, their multiplexed functions, and the WDTOVF# pin cannot be used.
6. 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. WDTOVF#, P53, and PG4 to PG6 are used by the emulator. Pull up and connect the emulator and the MCU pins.

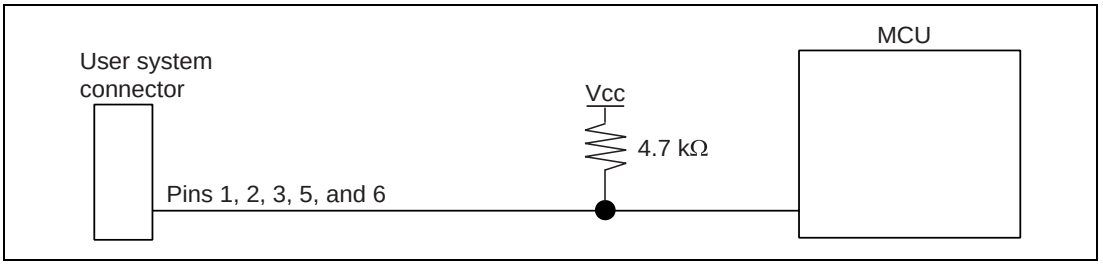


Figure 1.4 Connection of Emulator and MCU

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

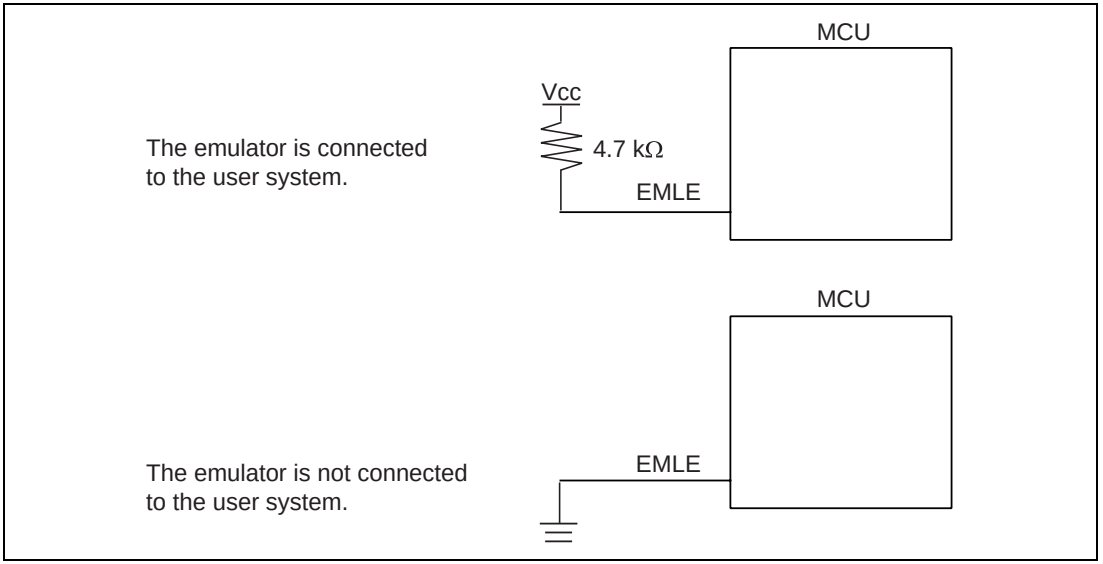


Figure 1.5 Emulator and Pin EMLE

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.

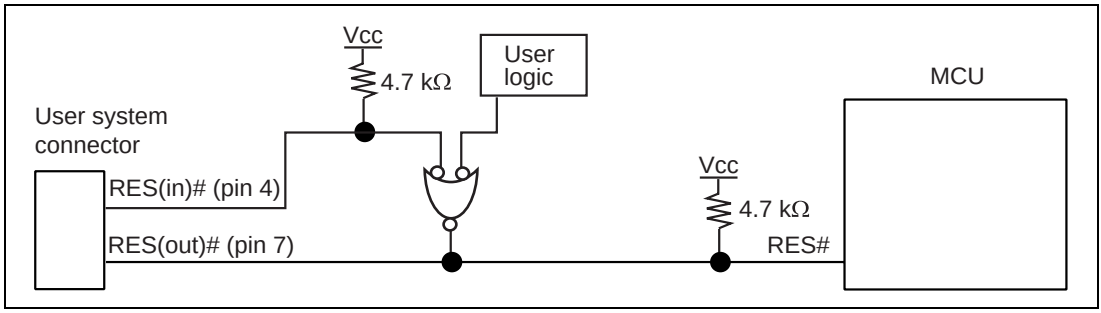
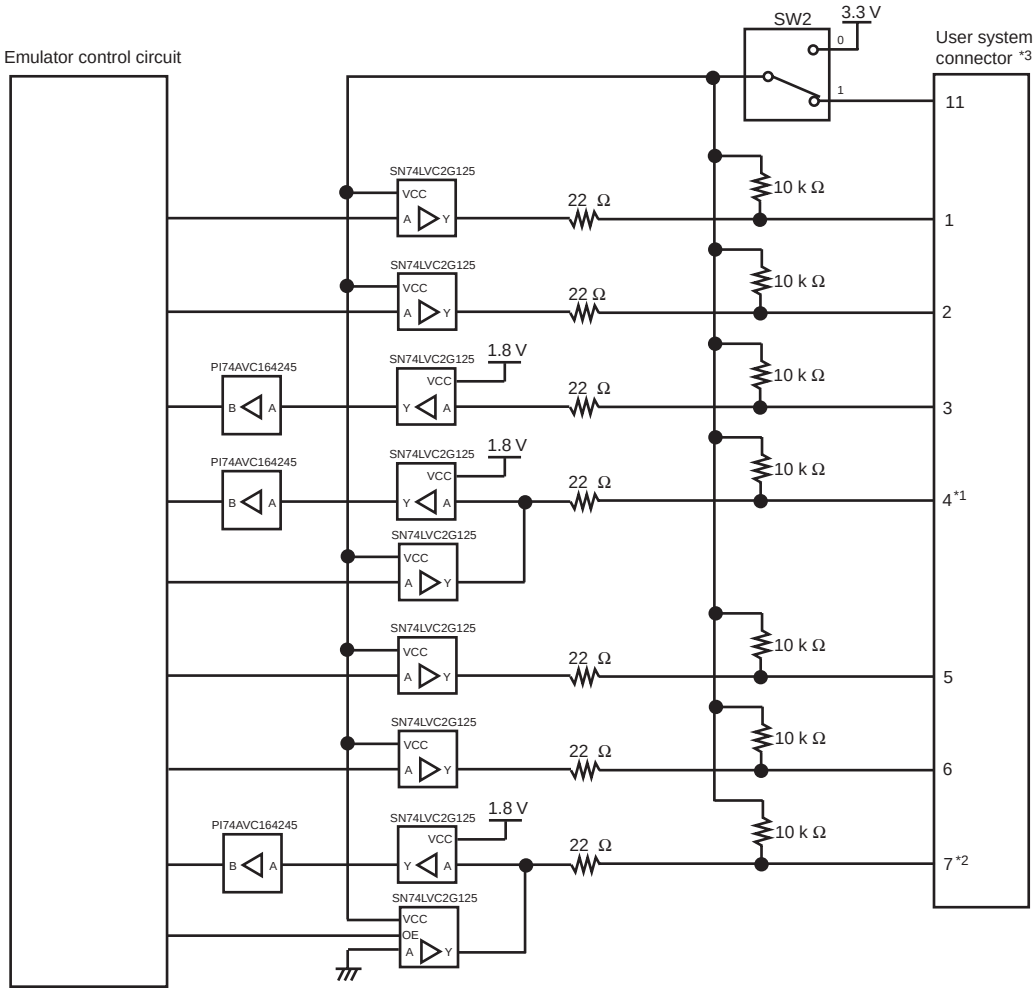


Figure 1.6 Connection of Pin RES#

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.



Notes: 1. The emulator outputs the reset signal to pin 4. Therefore, pin 4 cannot be directly connected to pin RES# of the MCU.
2. The emulator only monitors pin 7.
3. The pin numbers and corresponding MCU pin names are listed below.

Pin No.	H8S/2378F, H8S/2377F, H8S/2378RF, and H8S/2377RF	H8S/2368F and H8S/2367F
1	PG4/BREQ0#	PG4/CS4#/BREQ0#
2	P53/ADTRG#/IRQ3#	P53/ADTRG#/IRQ3#
3	WDTOVF#	WDTOVF#
4	RES(in)#*1	RES(in)#*1
5	PG5/BACK#	PG5/BACK#
6	PG6/BREQ#	PG6/BREQ#
7	RES#	RES#
11	Vcc*2	Vcc*2

Figure 1.7 Interface Circuit in the Emulator (Reference)

7. When the emulator is used, the pin functions listed below are not available.

Table 1.2 Pin Functions Not Available

H8S/2378F, H8S/2377F, H8S/2378RF, and H8S/2377RF	H8S/2368F and H8S/2367F
P53 and PG4 to PG6	P53 and PG4 to PG6
WDTOVF#	WDTOVF#
IRQ3#	IRQ3#
ADTRG#	ADTRG#
BREQ#, BACK#, or BREQ0#	BREQ#, BACK#, or BREQ0#
—	CS4#

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

Section 2 Specifications of the Emulator′s Software

2.1 Differences between the H8S/2378F, H8S/2377F, H8S/2368F, H8S/2367F, H8S/2378RF, H8S/2377RF, 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 2.1. The initial value of the MCU is undefined. When the emulator is initiated from the workspace, a value to be entered is saved in a session.
   For the registers shown in table 2.1, values other than PC or CCR are not changed even if the CPU reset command is issued. If ER7 (SP) is changed as an odd value, it must be modified in the [Register] window.

Table 2.1 Register Initial Values at 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 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.

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 emulator communicates with the H8S/2378F by using the PG4, P53, WDTOVF#, RES#, PG5, and PG6 pins. These pins cannot be used.

5. When the emulator is used, the power consumed by the MCU can reach several mA. This is because the user power supply drives ICs 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.

7. MCU Operating Mode
   The emulator does not support modes 1 and 2 (expanded mode with on-chip ROM disabled mode). Use the emulator in mode 4 (expanded mode with on-chip ROM enabled) or mode 7 (single-chip mode).

8. Sum Data Displayed in the Program Flash Mode
   Sum data, which is displayed in the 'Program Flash' 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 Using the WDT
    If a reset occurs by an overflow of the WDT during user program halting, the emulator will not operate correctly. Do not use the reset function by the overflow of the WDT.

11. Programming Flash Memory during Debugging
    The flash memory is programmed in the following functions because they use breakpoints:
    - When executing [Go to cursor]
    - When stepping over the subroutine
    - When executing the subroutine at step-out operation

12. Loading Sessions
    Information in [JTAG clock] of the [Configuration] dialog box cannot be recovered by loading sessions. Thus the TCK value will be as follows:
    - When HS0005KCU01H or HS0005KCU02H is used: TCK = 5 MHz

13. Value Set in the [System Clock] Dialog Box when Connecting the Emulator

    Input the frequency of the oscillator in use in the [System Clock] dialog box (this also applies when the MCU is multiplied by the PLL circuit).

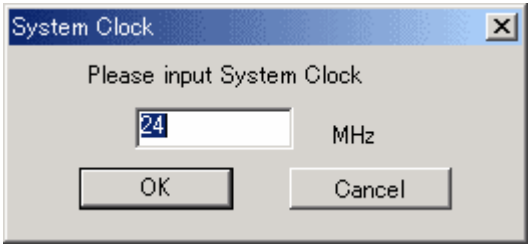


Figure 2.1 [System Clock] Dialog Box

14. Emulation on Programming or Erasing the Internal Flash Memory

    A break cannot be generated while the program for programming or erasing the internal flash memory is being called. Note that the following processing also cannot be performed:

    - Execution of the [STOP] button
    - Auto-update of the watch function and use of the tool-chip watch function
    - Memory operation during executing emulation

2.2 The H8S/2378F E10A-USB Emulator Specific Functions and Notes

Notes: 1. Do not use an MCU that has been used for debugging.
2. If the flash memory is rewritten many times, and the 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 Emulator Driver Selection

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

Table 2.2 Type Name and Driver

Type Name	Driver
HS0005KCU01H, HS0005KCU02H	Renesas E-Series USB Driver

2.2.2 Hardware Break Functions

Hardware Break conditions: In the H8S/2378F E10A-USB emulator, two break conditions (Break condition 1,2) 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

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 Break condition_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

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. A BREAKPOINT cannot be set to the following addresses:
   - An area other than flash memory or RAM
   - An area occupied by the 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. The value of the JTAG clock (TCK) becomes the initial value at execution of [Reset CPU] or [Reset Go].

2.2.5 Trace Function

The emulator uses the branch-instruction trace and bus trace functions 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. The bus trace function displays and searches the information on the address bus, data bus, memory access, interrupt, and bus cycle, the mnemonic, and the operand. The acquisition conditions can also be set.

Note: The bus trace function is supported by H8S/2367F, H8S/2377F, and H8S/2377RF; it is not supported by H8S/2378F, H8S/2368F, H8S/2378RF and H8S/2377RF.

(1) Setting Acquisition

The acquisition condition on the trace information is set.

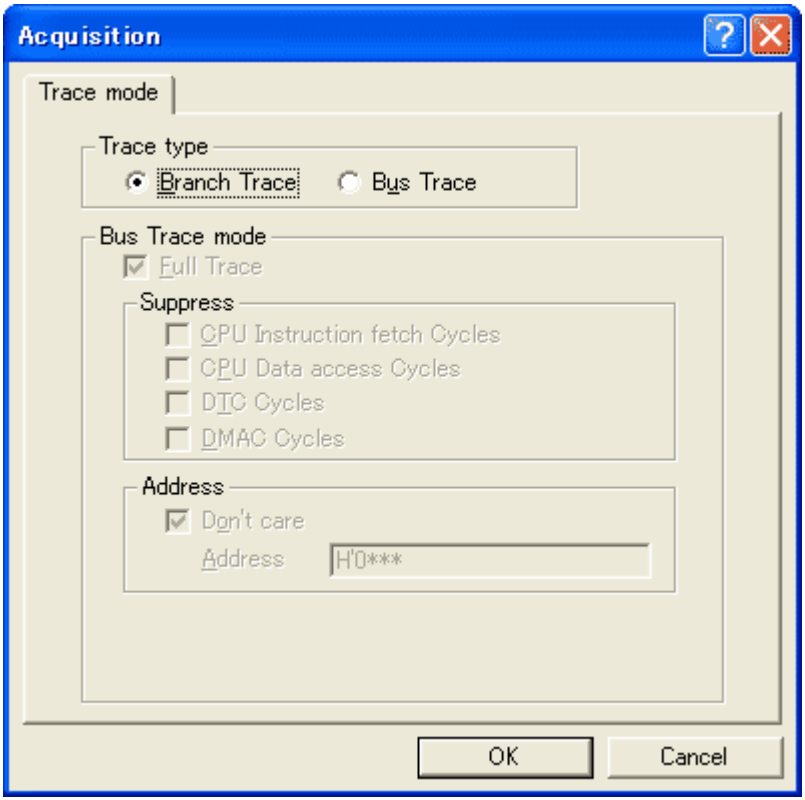


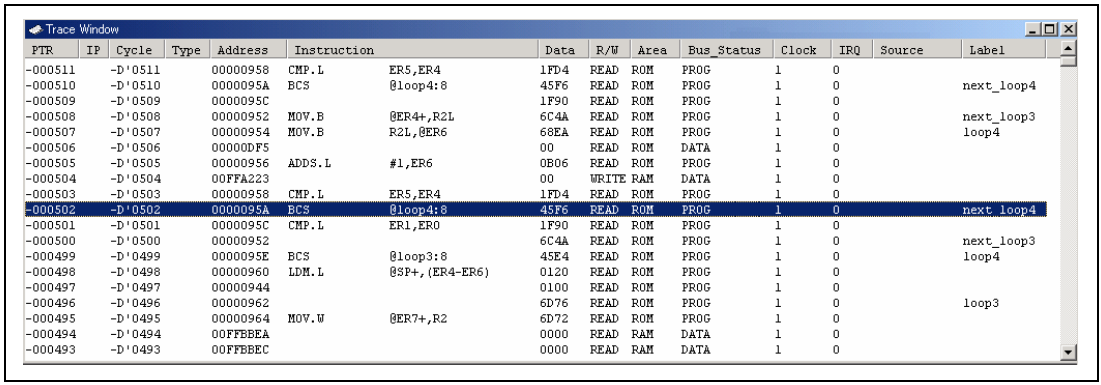
Figure 2.2 [Trace mode] Page

Table 2.6 Setting Acquisition

Acquisition Condition	Description
Trace type	Sets the trace information for acquisition and display. Branch trace: Acquires and displays the branch-instruction trace information. Bus trace: Acquires and displays the bus trace information.
Bus Trace mode	Sets the trace acquisition condition when Bus Trace is selected as Trace type. This is not set when Branch Trace is selected. • [Full Trace] check box Indicates that all cycles are acquired. • [Suppress] group box Sets a cycle to suppress acquisition. CPU Instruction fetch Cycles: Suppresses acquiring the CPU-instruction fetch cycle. CPU Data access Cycles: Suppresses acquiring the CPU-data access cycle. DTC Cycles: Suppresses acquiring the DTC cycle. DMAC Cycles: Suppresses acquiring the DMAC cycle. • [Address] group box Sets the address condition to be acquired. (* means that the value is maskable.)

(2) Displaying a Trace in the Bus Trace Function

The contents of the trace buffer in table 2.7 are displayed in the [Trace] window.



PTR	IP	Cycle	Type	Address	Instruction		Data	R/W	Area	Bus_Status	Clock	IRQ	Source	Label
-000511		-D'0511		00000958	CMP.L	ER5,ER4	1FD4	READ	ROM	PROG	1	0		
-000510		-D'0510		0000095A	BCS	@loop4:8	45F6	READ	ROM	PROG	1	0		next_loop4
-000509		-D'0509		0000095C			1F90	READ	ROM	PROG	1	0		
-000508		-D'0508		00000952	MOV.B	@ER4+,R2L	6C4A	READ	ROM	PROG	1	0		next_loop3
-000507		-D'0507		00000954	MOV.B	R2L,@ER6	68EA	READ	ROM	PROG	1	0		loop4
-000506		-D'0506		00000DF5			00	READ	ROM	DATA	1	0		
-000505		-D'0505		00000956	ADDS.L	#1,ER6	0B06	READ	ROM	PROG	1	0		
-000504		-D'0504		00FFA223			00	WRITE	RAM	DATA	1	0		
-000503		-D'0503		00000958	CMP.L	ER5,ER4	1FD4	READ	ROM	PROG	1	0		
-000502		-D'0502		0000095A	BCS	@loop4:8	45F6	READ	ROM	PROG	1	0		next_loop4
-000501		-D'0501		0000095C	CMP.L	ER1,ER0	1F90	READ	ROM	PROG	1	0		
-000500		-D'0500		00000952			6C4A	READ	ROM	PROG	1	0		next_loop3
-000499		-D'0499		0000095E	BCS	@loop3:8	45E4	READ	ROM	PROG	1	0		loop4
-000498		-D'0498		00000960	LDM.L	@SP+,(ER4-ER6)	0120	READ	ROM	PROG	1	0		
-000497		-D'0497		00000944			0100	READ	ROM	PROG	1	0		
-000496		-D'0496		00000962			6D76	READ	ROM	PROG	1	0		loop3
-000495		-D'0495		00000964	MOV.W	@ER7+,R2	6D72	READ	ROM	PROG	1	0		
-000494		-D'0494		00FFBBEA			0000	READ	RAM	DATA	1	0		
-000493		-D'0493		00FFBBEC			0000	READ	RAM	DATA	1	0		

Figure 2.3 [Trace] Window

Table 2.7 Items in the [Trace] Window

Item	Description
[PTR]	Pointer to a location in the trace buffer (+0 for the last executed instruction) (signed decimal)
[IP]	Instruction pointer
[Cycle]	Cycle
[Type]	Type of trace information BRANCH: Branch source instruction
[Address]	Address value
[Instruction]	Instruction mnemonic
[Data]	Data value
[R/W]	Read or write access
[Area]	Access area
[Bus_Status]	Bus cycle states
[Clock]	Bus cycle counts
[IRQ]	IRQ pins
[Source]	The C/C++ or assembly-language source program in which the trace is acquired
[Label]	Label information

For branch trace, items [Cycle], [Data], [R/W], [Area], [Bus_Status], [Clock], and [IRQ] are not displayed. For bus trace, items [IP] and [Type] are not displayed.

The column width of the [Trace] window can be adjusted by clicking and dragging the vertical separate line between columns. When the window is closed, the new column width is automatically saved.

The capacity of the trace buffer is limited. When the buffer becomes full, the oldest trace information is overwritten.

(3) Trace Filter Function

The emulator displays all the information that matches the specified conditions for all the trace data. The information is displayed by selecting [Filter…] from the popup menu that is displayed with the right-hand mouse button on the [Trace] window.

The filter condition is set to restrict the cycle to be displayed on the trace buffer.

(i) [General] Page Options

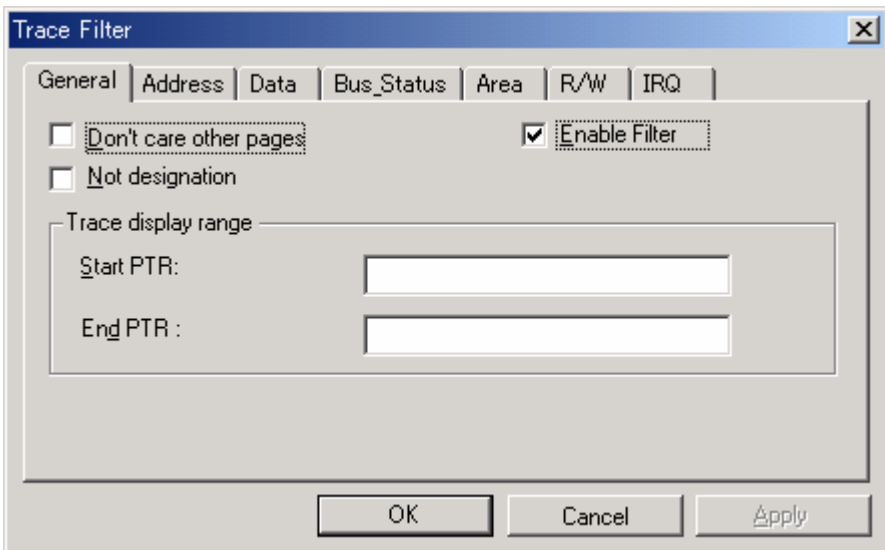


Figure 2.4 [General] Page

Table 2.8 [General] Page Options

Option	Description
[Don't care other pages] check box	Disables settings on other pages than the [General] page.
[Enable Filter] check box	Enables filter conditions.
[Not designation] check box	Designates no conditions.
[Start PTR] edit box	Enters the start pointer in the range that is displayed on the [Trace] window.
[End PTR] edit box	Enters the end pointer in the range that is displayed on the [Trace] window.

(ii) [Address] Page Options

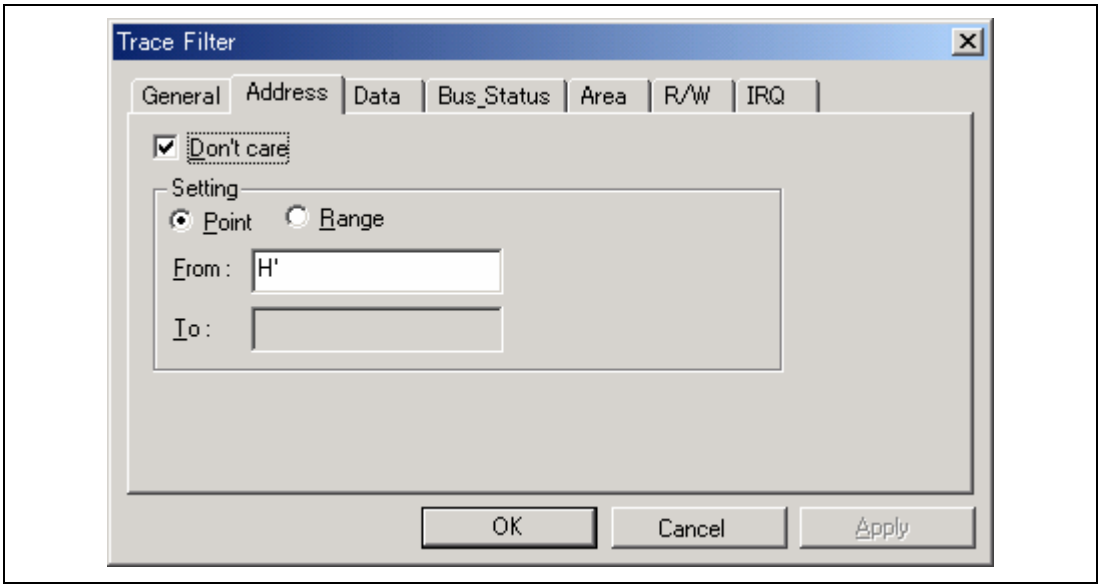


Figure 2.5 [Address] Page

Table 2.9 [Address] Page Options

Option	Description
[Don't care] check box	Indicates that no address condition is set.
[Point] radio button	Specifies the single address.
[Range] radio button	Sets an address range as a display condition.
[From] edit box	Sets the start value of the address range.
[To] edit box	Sets the end value of the address range.

(iii) [Data] Page Options

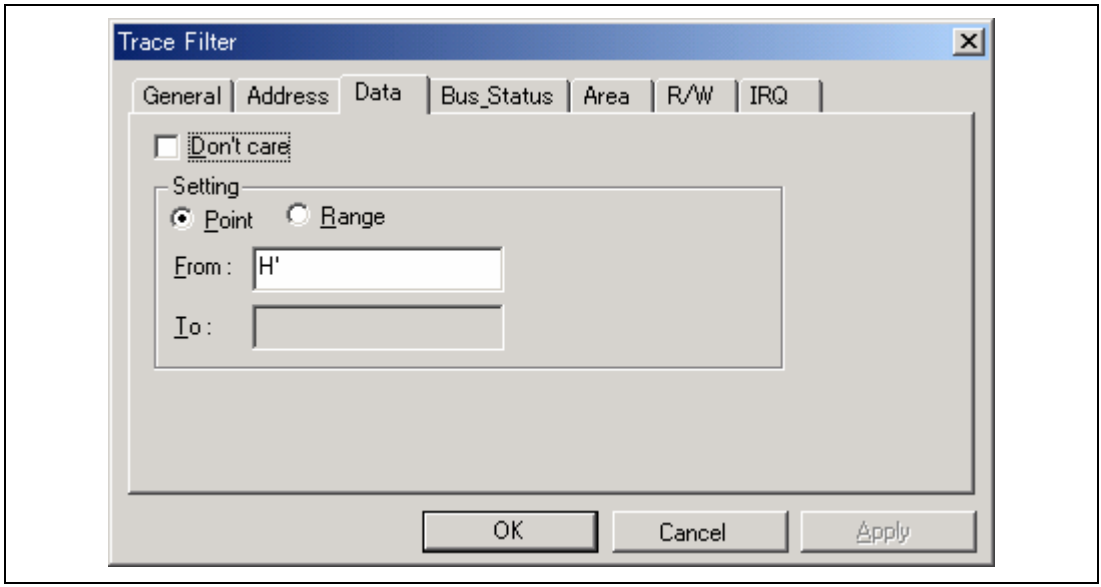


Figure 2.6 [Data] Page

Table 2.10 [Data] Page Options

Option	Description
[Don't care] check box	Indicates that no data condition is set.
[Point] radio button	Specifies the single data value.
[Range] radio button	Sets a range of the data value as a display condition.
[From] edit box	Sets the start value of the data value.
[To] edit box	Sets the end value of the data value.

(iv) [Bus_Status] Page Options

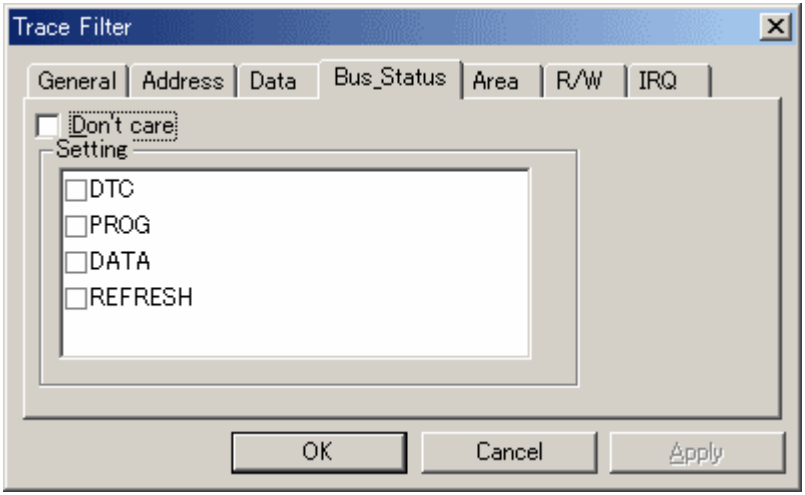


Figure 2.7 [Bus_Status] Page

Table 2.11 [Bus_Status] Page Options

Option	Description
[Don't care] check box	Indicates that no bus-status condition is set.
[Setting] group box	Specifies the bus status. DMAC: DMAC bus cycle DTC: DTC bus cycle PROG: CPU-instruction fetch cycle DATA: CPU-data access cycle REFRESH: Refresh cycle

(v) [Area] Page Options

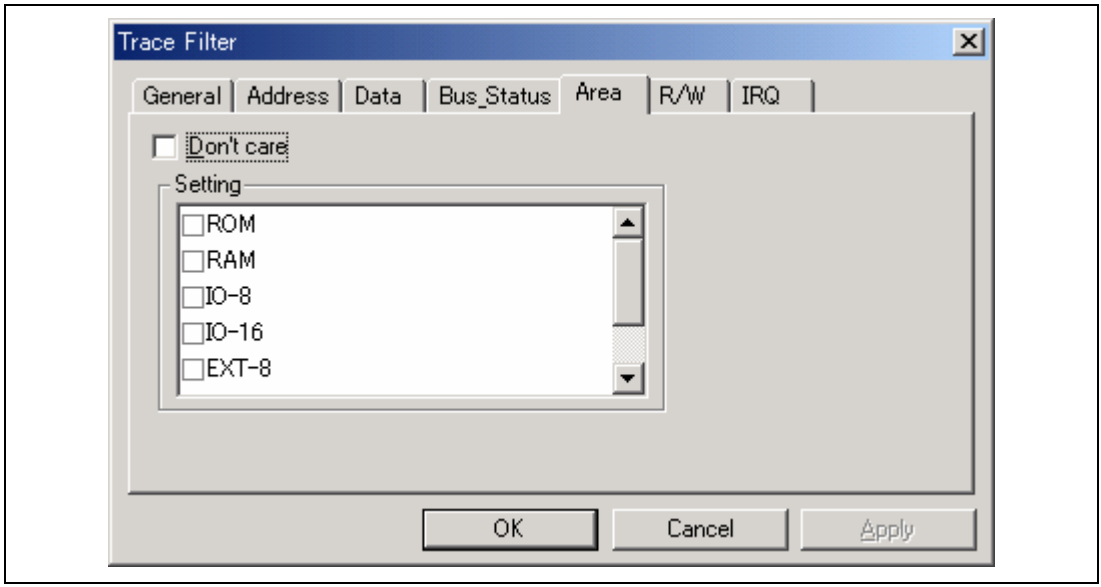


Figure 2.8 [Area] Page

Table 2.12 [Area] Page Options

Option	Description
[Don't care] check box	Indicates that no area condition is set.
[Setting] group box	Specifies the area. ROM: ROM area RAM: RAM area IO-8: IO-8 area IO-16: IO-16 area EXT-8: EXT-8 area EXT-16: EXT-16 area DTC: DTC area

(vi) [R/W] Page Options

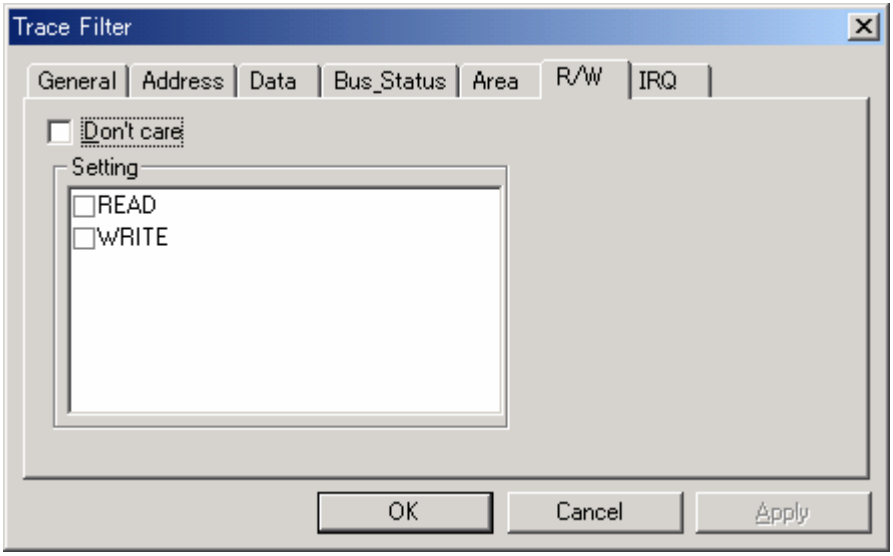


Figure 2.9 [R/W] Page

Table 2.13 [R/W] Page Options

Option	Description
[Don't care] check box	Indicates that no read/write condition is set.
[Setting] group box	Specifies the read/write. READ: Read cycle WRITE: Write cycle

(vii) [IRQ] Page Options

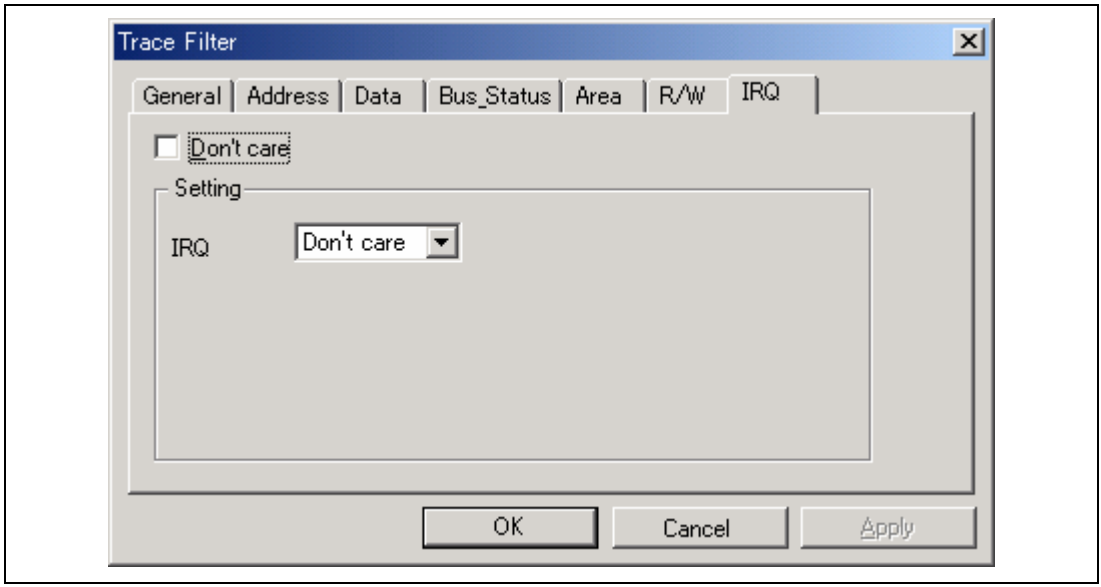


Figure 2.10 [IRQ] Page

Table 2.14 [IRQ] Page Options

Option	Description
[Don't care] check box	Indicates that no IRQ condition is set.
[IRQ] drop-down list	Specifies the IRQ. Don't care: Detects no IRQ. High: IRQ is high. Low: IRQ is low.

(4) Trace Find Function

The emulator jumps to the information that matches the conditions specified by all the trace data on the [Trace] window. The search condition is set in the [Trace Filter] dialog box. The information is displayed by selecting [Find…] from the popup menu that is displayed with the right-hand mouse button on the [Trace] window.

(i) [General] Page Options

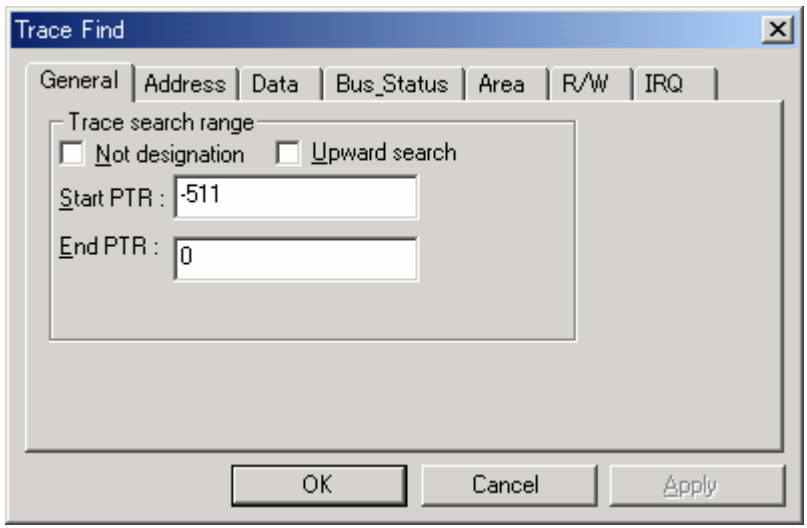


Figure 2.11 [General] Page

Table 2.15 [General] Page Options

Option	Description
[Not designation] check box	Designates no conditions.
[Upward search] check box	Performs upward search.
[Start PTR] edit box	Enters the pointer to start searching conditions.
[End PTR] edit box	Enters the pointer to end searching conditions.

(ii) [Address] Page Options

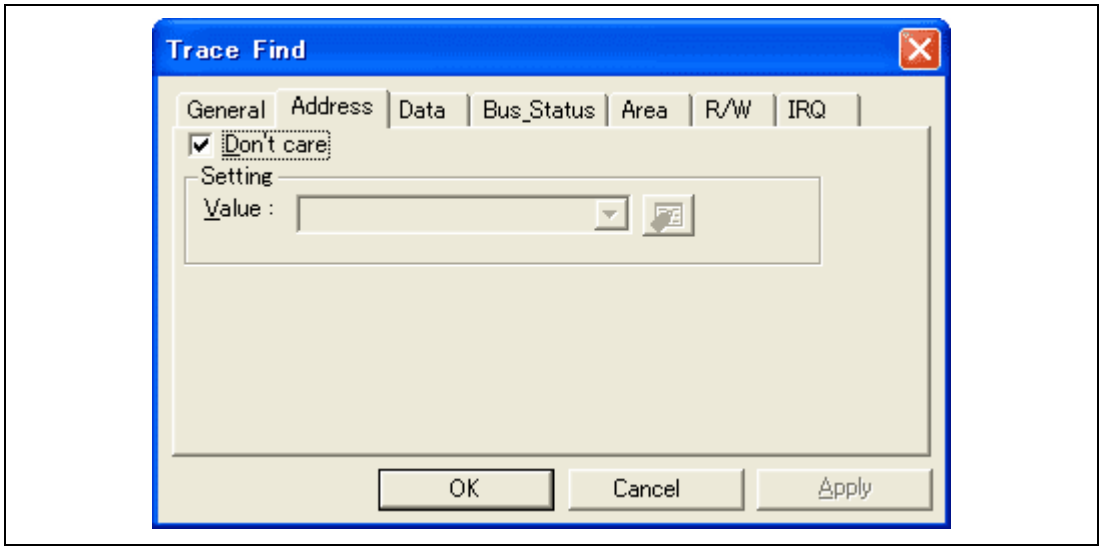


Figure 2.12 [Address] Page

Table 2.16 [Address] Page Options

Option	Description
[Don't care] check box	Indicates that no address condition is set.
[Value] edit box	Enters the address value.

(iii) [Data] Page Options

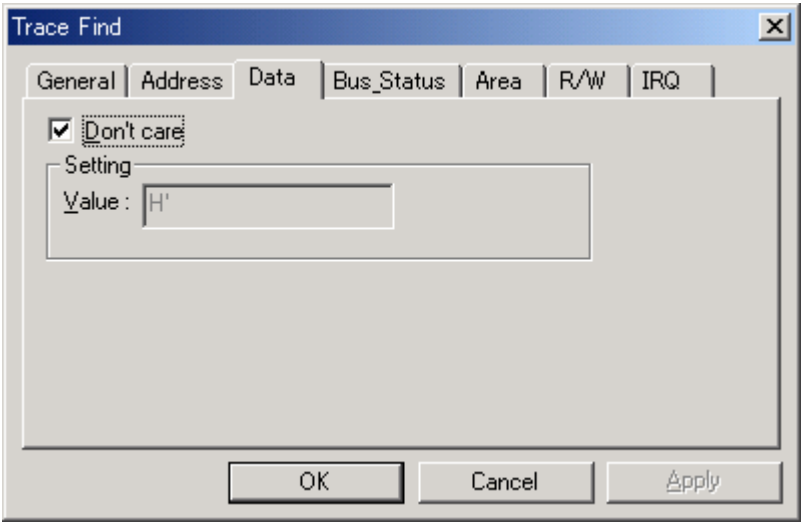


Figure 2.13 [Data] Page

Table 2.17 [Data] Page Options

Option	Description
[Don't care] check box	Indicates that no data condition is set.
[Value] edit box	Enters the data value.

(iv) [Bus_Status] Page Options

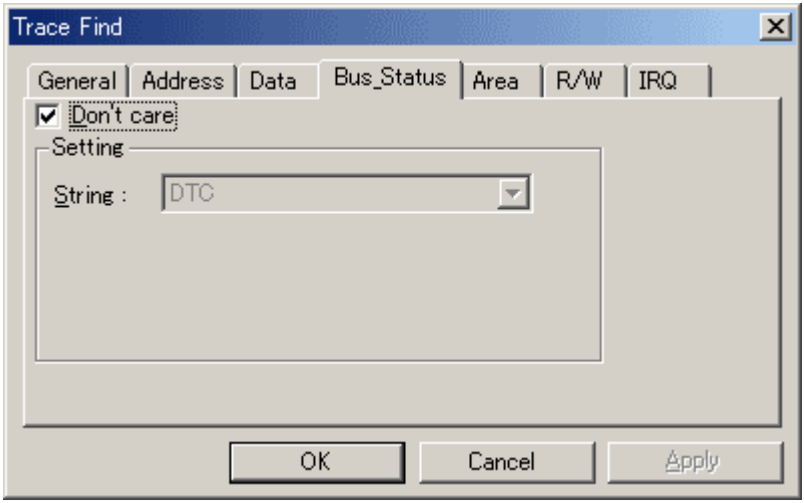


Figure 2.14 [Bus_Status] Page

Table 2.18 [Bus_Status] Page Options

Option	Description
[Don't care] check box	Indicates that no bus-status condition is set.
[String] drop-down list	Specifies the bus status. DMAC: DMAC bus cycle DTC: DTC bus cycle PROG: CPU-instruction fetch cycle DATA: CPU-data access cycle REFRESH: Refresh cycle

(v) [Area] Page Options

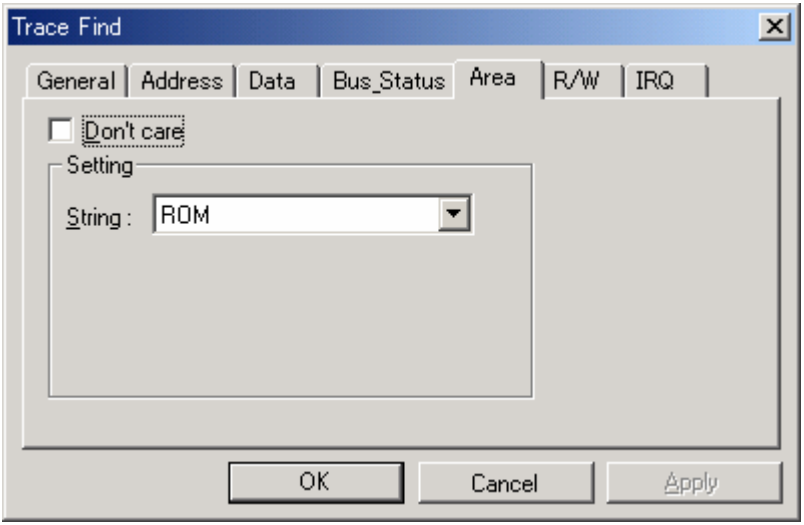


Figure 2.15 [Area] Page

Table 2.19 [Area] Page Options

Option	Description
[Don't care] check box	Indicates that no area condition is set.
[String] drop-down list	Specifies the area. ROM: ROM area RAM: RAM area IO-8: IO-8 area IO-16: IO-16 area EXT-8: EXT-8 area EXT-16: EXT-16 area DTC: DTC area

(vi) [R/W] Page Options

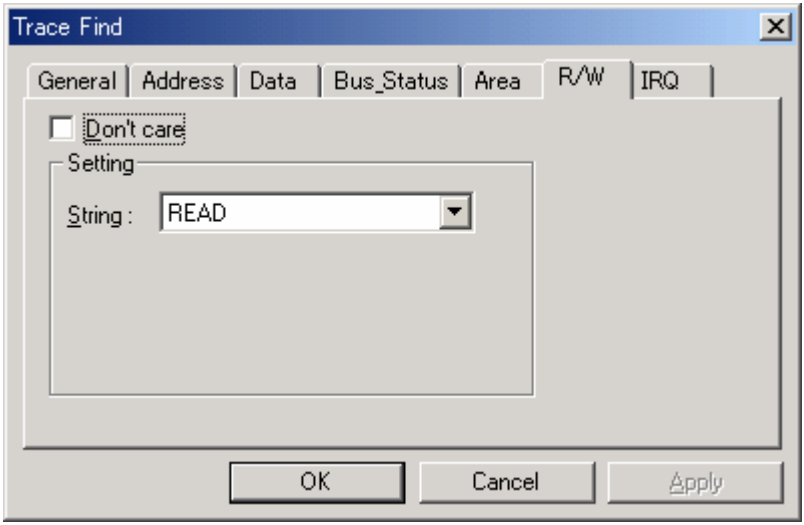


Figure 2.16 [R/W] Page

Table 2.20 [R/W] Page Options

Option	Description
[Don't care] check box	Indicates that no read/write condition is set.
[String] drop-down list	Specifies the read/write. READ: Read cycle WRITE: Write cycle

(vii) [IRQ] Page Options

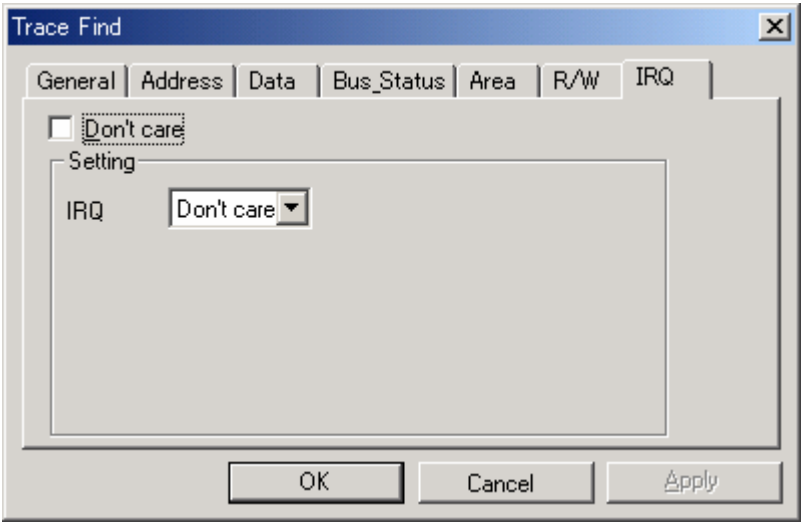


Figure 2.17 [IRQ] Page

Table 2.21 [IRQ] Page Options

Option	Description
[Don't care] check box	Indicates that no IRQ condition is set.
[IRQ] drop-down list	Specifies the IRQ. Don't care: Detects no IRQ. High: IRQ is high. Low: IRQ is low.

2.2.6 Debugging in the External Flash Memory

This emulator supports debugging in the external flash memory, which is the function to allow downloading of programs to the external flash memory area. Settings for the external flash memory should be made in the [External Flash memory setting] dialog box opened at initiation of the emulator. To display the [External Flash memory setting] dialog box, check [Use External Flash memory setting] in the [Select Emulator mode] dialog box. Debugging function equivalent to that in the H8SX E10A-USB system becomes available in the external flash memory area by specifying the initialization, write, or erase module* and filling information on the external flash memory. Settings made in the [External Flash memory setting] dialog box are retained. Next time this dialog box is launched, the previous settings are displayed. Clicking the [Save] button saves the contents that have been set. The file to be saved (*.EFF: external flash memory data setting file) is loaded by clicking the [Browse…] button for [Select External Flash setting file]. When the file has been set, it is registered as the history (recent 10 files) in the combo box and selected to be loaded. Up to 256 blocks can be specified for the external flash memory via the [External Flash memory setting] dialog box of the emulator. The maximum size allowed between the start address and the end address of the external flash memory is 4 Mbytes. Since this function forcibly changes the device settings in the emulator when the initialization, write, or erase module is called, the emulator operates differently with the contents of the user program. To verify the operation of the user program, disable the [Use External Flash memory] check box and activate the emulator.

Notes: 1. Prepare initialization, write, and erase modules that are suitable for the external flash memory being used.
2. Debugging in the external flash memory is available for the H8S/2378F, H8S/2368F, or H8S/2378RF. The H8S/2377F, H8S/2367F, or H8S/2377RF does not support debugging in the external flash memory.

Table 2.18 lists the items contained in the [External Flash memory setting] dialog box.

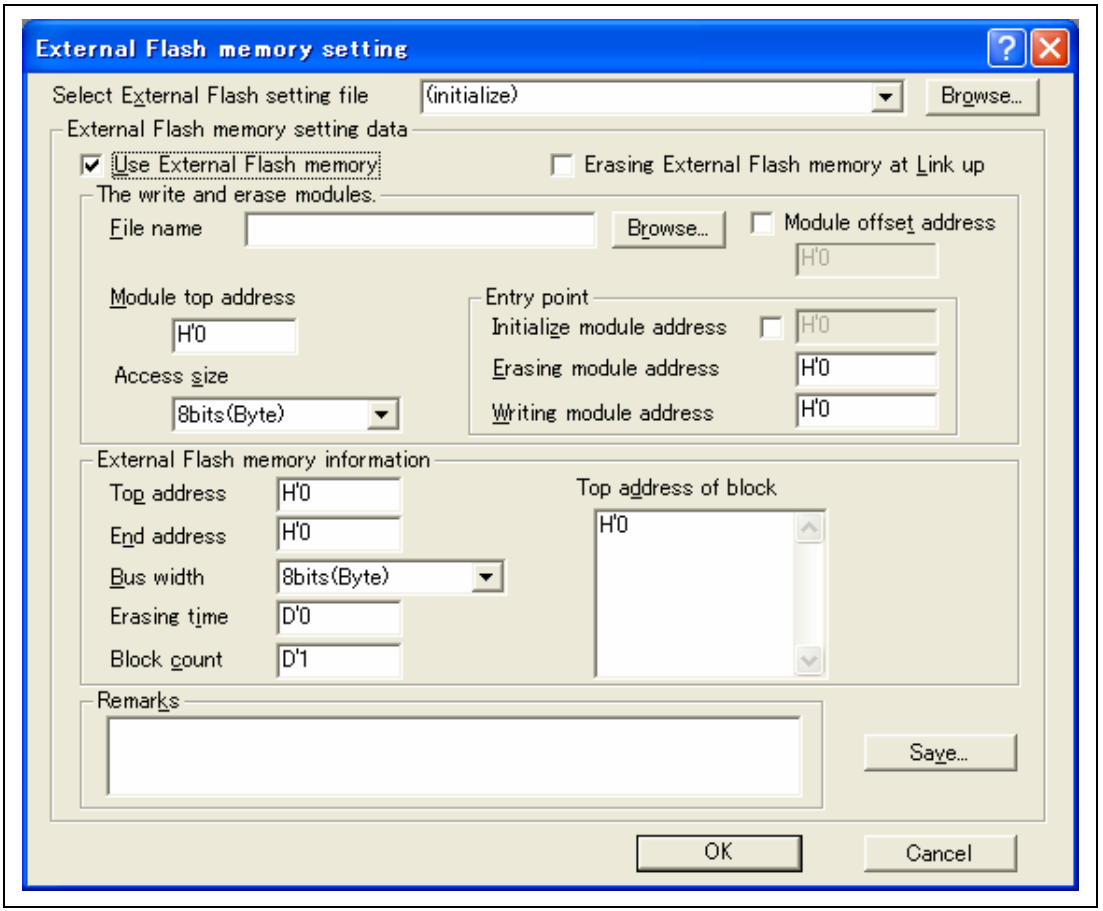


Figure 2.18 [External Flash memory setting] Dialog Box

Table 2.22 Items in [External Flash memory setting] Dialog Box

No.	Item	Description
1	Select External Flash setting file	Specify the data file (*.EFF) for setting the external flash memory. If not specified, select the setting of [recent setting data] (data previously changed) in the combo box. To make a new setting, select [initialize] and input data.
2	Use External Flash memory	Enable or disable use of the external flash memory debugging function. Checked: Enabled Not checked: Disabled (default)
3	Erasing External Flash memory at Link up	Select whether or not to erase the contents of the flash memory at initiation of the emulator. Checked: Erases the contents of the flash memory at initiation of the emulator. Not checked: Reads the contents of the flash memory at initiation of the emulator (default).
4	File name	Specify the file of initialization, write, and erase modules. A program file must be specified for programming the flash memory. Prepare a file suitable for the flash memory being used.
5	Module offset address	Specify the top address by an offset where the initialization, write, erasing modules are to be expanded. (Initial value is H'0). If not specified, disable offset. Checked: Enables offset. Not checked: Disables offset (default). (If the address exceeds H'FFFFFFFF, it will become H'0.)
6	Module top address	Specify the start address where the initialization, write, and erase modules are to be expanded. (The 4-kbyte address areas starting from that address are saved by the emulator; it is possible to expand the initialization, write, and erase modules without affecting on the user program.)
7	Initialize module address	Entry address of the initialization module The initialization module is used to set the device that is required for accessing the external flash memory. If not specified, disable entry. Checked: Enables entry. Not checked: Disables entry (default).
8	Erasing module address	Entry address of the erase module

Table 2.22 Items in [External Flash memory setting] Dialog Box (cont)

No.	Item	Description
9	Writing module address	Entry address of the write module
10	Access size	Select the unit of accesses for transfer of the programs. 8bits(Byte): Bytes 16bits(Word): Words 32bits(Long): Longwords
11	Top address	Start address of the flash memory
12	End address	End address of the flash memory
13	Bus width	Select the unit of accesses to the flash memory. 8bits(Byte): Bytes 16bits(Word): Words 32bits(Long): Longwords
14	Erasing time	Waiting time for erasure (in seconds) (Specification of a decimal or hexadecimal value is recommended.)
15	Block count	Number of blocks in the flash memory (Specification of a decimal or hexadecimal value is recommended. Up to 256 blocks can be specified.)
16	Top address of block	Define the start addresses of all blocks. If the flash memory has D'10 blocks, the definition will be as shown below. Press the Return key between the definitions for each of the blocks. Example: H'0 H'1000 H'2000 H'3000 H'4000 H'5000 H'6000 H'7000 H'8000 H'9000
17	Remarks	Use for writing a text. Contents of data that has been set can be entered. If not specified, setting is not needed.

2.2.7 Interface with Initialization, Write, and Erase Modules and Emulator Firmware

The initialization, write, and erase modules must be branched from the firmware when the emulator is initiated and the external flash memory is written or read*.

Note: The modules are not called if the external flash memory data is not updated.

To branch from the emulator firmware to the initialization, write, and erase modules, or to return from the initialization, write, and erase modules to the emulator firmware, the following conditions must be observed:

- The size of each initialization, write, or erase module must be consecutive 4 kbytes or less (including work areas and stack areas).
- Save and return all the general register values and control register values before and after calling the initialization, write, or erase module.
- Return the initialization, write, or erase module to the calling source after processing.
- The initialization, write, and erase modules must be Motorola S-type files.
- For the write module, write data ER1(L) to address ER0(L) and store the top address of flash memory ER2(L) then the result in ER0(L).
- For the erase module, erase the block of address ER0(L) and store the top address of flash memory ER1(L) then the result in ER0(L).
- Set the write size of the write module as described in No. 13 ‘Bus width’ in table 2.22 (byte, word, or longword).
- The initialization module is used to set the device that is required for accessing the external flash memory. Store the result in ER0(L).

The module interface must be as follows to correctly pass the information that is required for accessing flash memory.

Table 2.23 Module Interface

Module Name	Argument	Return Value
Write module	ER0(L): Write address ER1(L): Write data ER2(L): Top address of the flash memory	ER0(L): Result (OK = 0, NG ≠ 0)
Erase module	ER0(L): Address of the block to be erased ER1(L): Top address of the flash memory	ER0(L): Result (OK = 0, NG ≠ 0)
Initialization module	-	ER0(L): Result (OK = 0, NG ≠ 0)

Notes: 1. The (L) means the longword size.
2. The initialization module is not always set.

H8S, H8SX Family E10A-USB Emulator
Additional Document for User's Manual
Supplementary Information on Using the H8S/2378F, H8S/2377F, H8S/2367F, H8S/2368F, H8S/2378RF, and H8S/2377RF

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H8S, H8SX Family E10A-USB Emulator

Additional Document for User's Manual Supplementary Information on Using the H8S/2378F, H8S/2377F, H8S/2367F, H8S/2368F, H8S/2378RF, and H8S/2377RF

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