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Renesas Electronics Corporation

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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/2218 Group and H8S/2212 Group

Renesas Microcomputer Development Environment System
H8S Family / H8S/2200 Series

E10A-USB for H8S/2218F HS2218KCU01HE

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- EMC Directive 2004/108/EC

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  EN 55024

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  Name: Renesas Solutions Corp.

  Address: Nippon Bldg., 2-6-2, Ote-machi, Chiyoda-ku, Tokyo 100-0004, Japan
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CAUTION:	Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

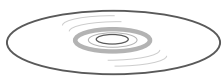
Contents

Section 1 Connecting the Emulator with the User System

1.1 Components of the Emulator

The H8S/2218F E10A-USB emulator supports the H8S/2218 group (H8S/2218F, H8S/2218UF, H8S/2218CUF, H8S/2217CUF) and H8S/2212 group (H8S/2212F, H8S/2212UF, H8S/2212CUF, H8S/2211F, H8S/2211UF, H8S/2211CUF, H8S/2210CUF). 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/2218F E10A-USB emulator setup program, H8S, H8SX Family E10A-USB Emulator User's Manual, Supplementary Information on Using the H8S/2218 group and H8S/2212 group*, and Test program manual for HS0005KCU01H and HS0005KCU02H		1	HS0005KCU01SR, HS0005KCU01HJ-H8S, HS0005KCU01HE-H8S, HS2218KCU01HJ, HS2218KCU01HE, 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 the connector and recommended circuits 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/2218 group and H8S/2212 group 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.

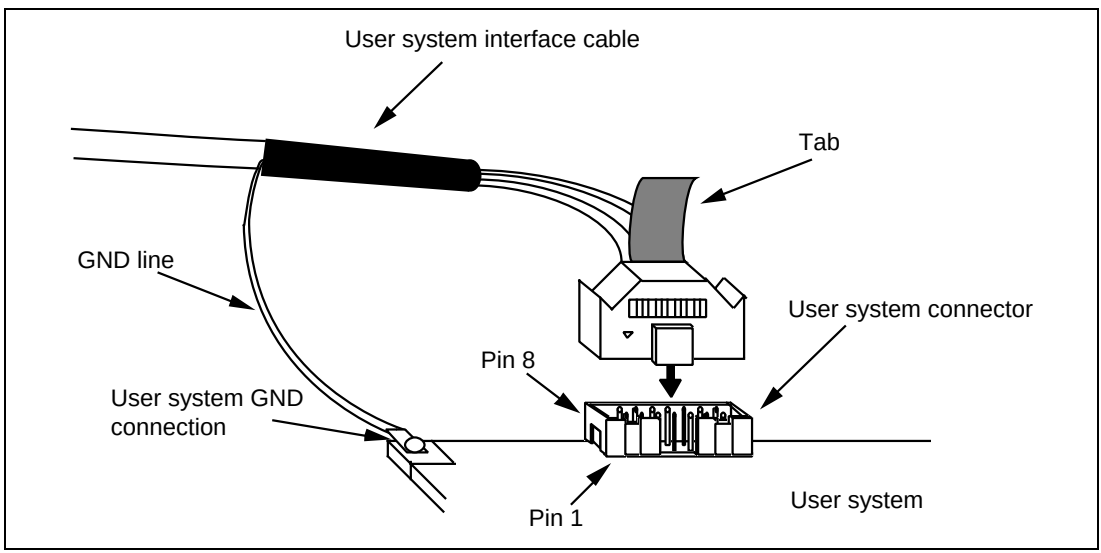
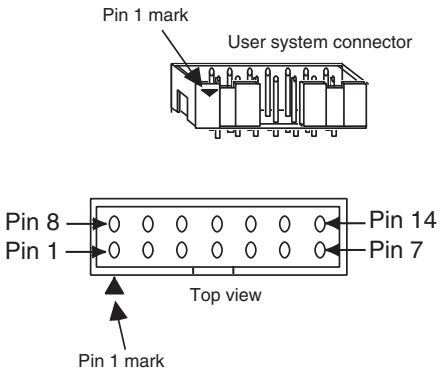


Figure 1.1 Connecting the User System Interface Cable to the User System

Notes: 1. The pin number assignments of the 14-pin connector differ from those of the E8a emulator; however, the physical location is the same.
2. When designing the 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.



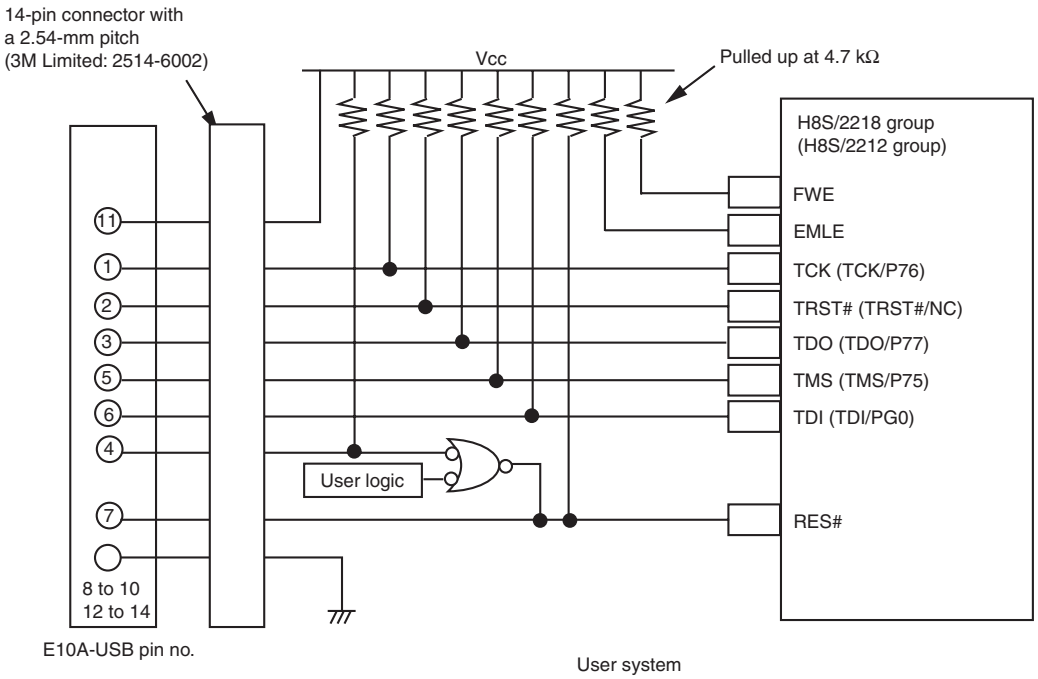
Pin No.	MCU Pin Name H8S/2218 group	MCU Pin Name *5 H8S/2212 group	Input/Output *1
1	TCK	TCK/P76	Input
2	TRST#	TRST#/NC	Input
3	TDO	TDO/P77	Output
4	RES(in)# *2 *6	RES(in)# *2 *6	Input
5	TMS	TMS/P75	Input
6	TDI	TDI/PG0	Input
7	RES(out)# *2	RES(out)# *2	Output
8 to 10 12 to 14	GND *3	GND *3	—
11	Vcc *4	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. The P75 to P77 and PG0 port functions of the H8S/2212 group 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 H-UDI port connector.

· Alphanumerics in parentheses indicate the signals of the H8S/2212 group.

Figure 1.3 Example of Emulator Connection

Notes: 1. TRST#, TCK, TMS, TDO, and TDI are used by the emulator for the H8S/2218 group. TRST#/NC, TCK/P76, TMS/P75, TDO/P77, and TDI/PG0 are used by the emulator for the H8S/2212 group. Pull up and connect the emulator and the MCU pins.

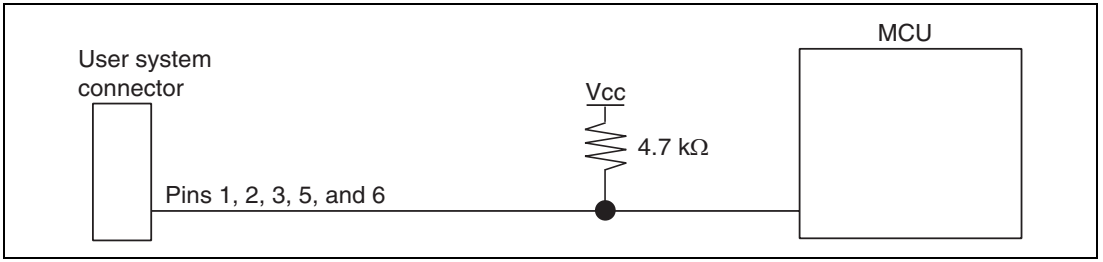


Figure 1.4 Connection of Emulator and MCU

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.

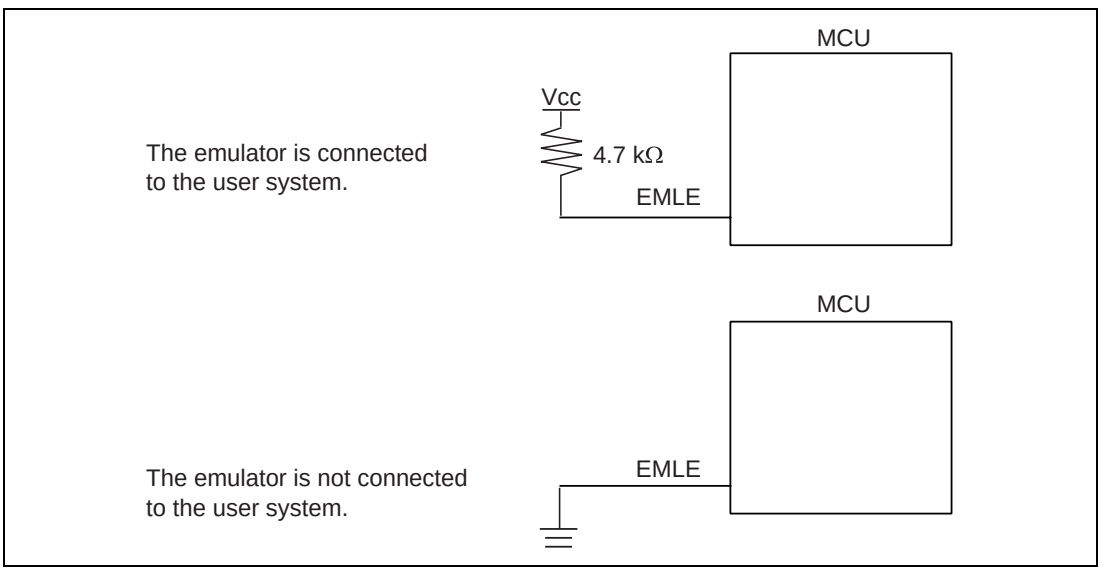


Figure 1.5 Emulator and Pin EMLE

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.

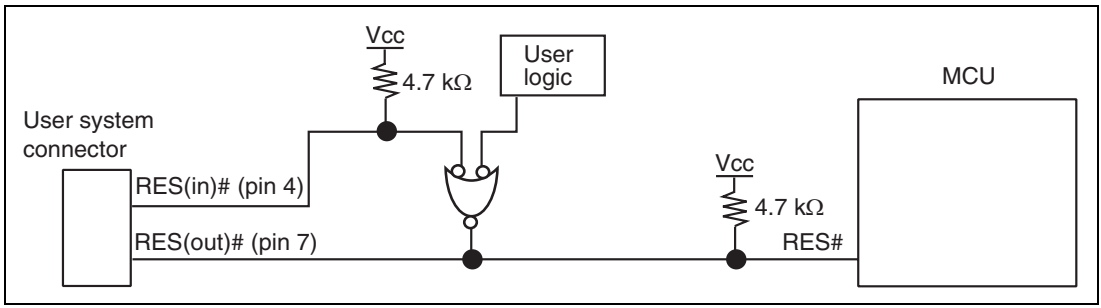


Figure 1.6 Connection of Pin RES#

4. Pin FWE must be pulled up if the emulator is connected to the user system.

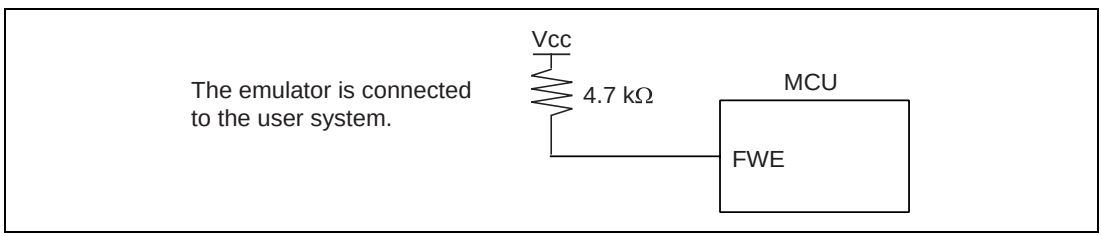


Figure 1.7 Connection of Pin FWE

5. Ground pins 8 to 10, and 12 to 14 of the user system connector.
6. 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.
7. When the H8S/2212 group in use is connected to the emulator, the pin functions listed below are not available.

Table 1.2 Pin Functions Not Available

H8S/2212 Group
P75 to P77 and PG0

8. The H8S/2218 group incorporates a boundary scan function. When the H8S/2218 group and the H8S/2212 group are used without connecting the emulator, refer to the description in section 13.5, Usage Notes, in the hardware manual of the MCU, and connect the MCU to the emulator.

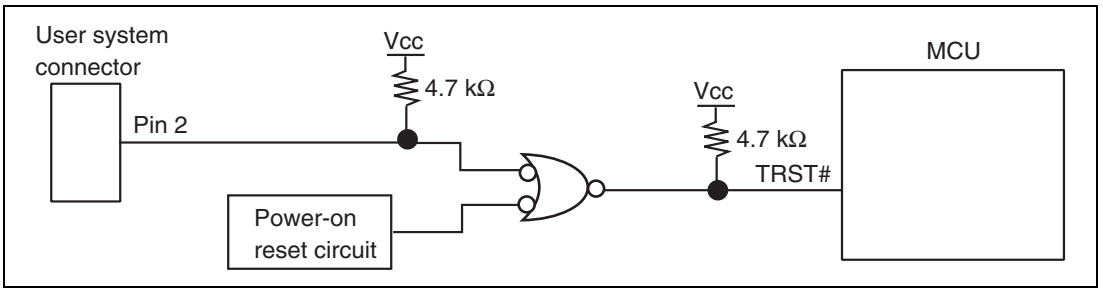


Figure 1.8 TRST# of the H8S/2218 Group (Reference)

Section 2 Specifications of the Software when Using the H8S/2218 Group and H8S/2212 Group

2.1 Differences between the H8S/2218 group, H8S/2212 group, 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 MCU by using the RES#, TRST#, TCK, TMS, TDO, and 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 IC 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 emulator 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. 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.
8. Note on Executing the User Program
   The initial value is rewritten since the emulator uses flash memory and registers during programming (Go, Step In, Step Out, or Step Over) of the flash memory.
9. MCU Operating Mode
   The emulator does not support modes 4 and 5 (expanded mode with on-chip ROM disabled mode). Use the emulator in mode 6 (expanded mode with on-chip ROM enabled) or mode 7 (single-chip mode).
10. Loading Sessions
    Information for [JTAG clock] in the [Configuration] dialog box cannot be recovered by loading a session. Thus, the initial value after booting up will invariably be TCK.
11. 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).

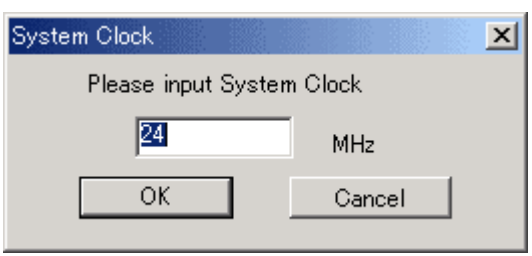


Figure 2.1 [System Clock] Dialog Box

12. 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

13. Initial Value of the JTAG Clock (TCK)

    The initial value for the JTAG Clock (TCK) is set as a suitable TCK value according to the frequency input to the [System Clock] dialog box when the emulator was connected.

14. Table 2.2 shows a list of devices supported by the H8S/2218 group and H8S/2212 group emulator.

Table 2.2 A List of Devices Supported by the Emulator

Project Target	Device
H8S/2218 E10A-USB SYSTEM (CPU2000)	H8S/2218F, H8S/2218UF, H8S/2218CUF, H8S/2217CUF, H8S/2212F, H8S/2212UF, H8S/2212CUF, H8S/2211F, H8S/2211UF, H8S/2211CUF, H8S/2210CUF

15. Medium-speed mode, low-power-consumption mode

    During a break in user program execution in medium-speed or a low-power-consumption mode, the CPU is forcibly switched to the high-speed mode so that it performs operations at high speed.

2.2 The H8S/2218F 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/2218F E10A-USB emulator, conditions of 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 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

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 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 function in the MCU. It displays the branch-source address or the mnemonic, and operand can be acquired in realtime.

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