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R0E436640CPE00

User's Manual

Compact Emulator for H8/300H Tiny Series

User's Manual

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Renesas Technology
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Preface

The R0E436640CPE00 is a compact emulator for H8/300H Tiny Series MCUs which has a real-time trace function.
This user's manual mainly describes specifications of the R0E436640CPE00 compact emulator and how to setup it. For details on the integrated development environment High-performance Embedded Workshop, emulator debugger, and evaluation version C/C++ Compiler Package for H8, H8S, H8SX Families, which are included with the R0E436640CPE00, refer to the online manual.

All the components of this product are shown in "1.1 Package Components" (page 14). If there is any question or doubt about this product, contact your local distributor.

The related manuals for using this product are listed below. You can download the latest manuals from the Renesas Tools homepage (http://www.renesas.com/tools).

Related manuals

Item	Manual
Accessory Tools	R0E436640CFG20 User's Manual
	R0E436640CFJ20 User's Manual
	R0E436049CFJ10 User's Manual
Integrated development environment	High-performance Embedded Workshop User's Manual
Emulator debugger	H8/300H Tiny Compact Emulator/Emulator Debugger User's Manual
C compiler Assembler	C/C++ Compiler Package for H8, H8S, H8SX Families, Assembler, Optimizing Linkage Editor User's Manual

Important

Before using this product, make sure to read this user's manual carefully.
Keep this user's manual, and refer to this when you have questions about this product.

Emulator:

The emulator in this document refers to the following products that are manufactured by Renesas Technology Corp.:

(1) Compact emulator main unit
(2) Package converter board for connecting the user system

The emulator herein does not include your user system and host machine.

Purpose of use of the emulator:

This emulator is a device to support the development of a system that uses the H8/300H Tiny Series of Renesas 16-bit single-chip MCUs. It provides support for system development in both software and hardware.
Make sure to use this emulator correctly according to said purpose of use. Please avoid using this emulator for other than its intended purpose of use.

For those who use this emulator:

This emulator can only be used by those who have carefully read the user's manual and know how to use it.
Use of this emulator requires the basic knowledge of electric circuits, logical circuits, and MCUs.

When using the emulator:

(1) This product is a development supporting unit for use in your program development and evaluation stages. In mass-producing your program you have finished developing, be sure to make a judgment on your own risk that it can be put to practical use by performing integration test, evaluation, or some experiment else.

(2) In no event shall Renesas Solutions Corp. be liable for any consequence arising from the use of this product.

(3) Renesas Solutions Corp. strives to renovate or provide a workaround for product malfunction at some charge or without charge. However, this does not necessarily mean that Renesas Solutions Corp. guarantees the renovation or the provision under any circumstances.

(4) This product has been developed by assuming its use for program development and evaluation in laboratories. Therefore, it does not fall under the application of Electrical Appliance and Material Safety Law and protection against electromagnetic interference when used in Japan.

(5) Renesas Solutions Corp. cannot predict all possible situations or possible cases of misuse where a potential danger exists. Therefore, the warnings written in this user's manual and the warning labels attached to this emulator do not necessarily cover all of such possible situations or cases. Please be sure to use this emulator correctly and safely on your own responsibility.

(6) This product is not qualified under UL or other safety standards and IEC or other industry standards. This fact must be taken into account when taking this product from Japan to some other country.

Usage restrictions:

This emulator has been developed as a means of supporting system development by users. Therefore, do not use it as a device used for equipment-embedded applications. Also, do not use it for developing the systems or equipment used for the following purposes either:

(1) Transportation and vehicular
(2) Medical (equipment where human life is concerned)
(3) Aerospace
(4) Nuclear power control
(5) Undersea repeater

If you are considering the use of this emulator for one of the above purposes, please be sure to consult your local distributor.

About product changes:

We are constantly making efforts to improve the design and performance of this emulator. Therefore, the specification or design of this emulator or its user's manual may be changed without prior notice.

About the rights:

(1) We assume no responsibility for any damage or infringement on patent rights or any other rights arising from the use of any information, products or circuits presented in this user's manual.
(2) The information or data in this user's manual does not implicitly or otherwise grant a license for patent rights or any other rights belonging to us or third parties.
(3) This user's manual and this emulator are copyrighted, with all rights reserved by us. This user's manual may not be copied, duplicated or reproduced, in whole or part, without prior written consent of us.

About diagrams:

The diagrams in this user's manual may not all represent exactly the actual object.

Precautions for Safety

Definitions of Signal Words

In both the user's manual and on the product itself, several icons are used to insure proper handling of this product and also to prevent injuries to you or other persons, or damage to your properties.

This chapter describes the precautions which should be taken in order to use this product safely and properly. Make sure to read this chapter before using this product.

⚠	This symbol represents a warning about safety. It is used to arouse caution about a potential danger that will possibly inflict an injury on persons. To avoid a possible injury or death, please be sure to observe the safety message that follows this symbol.
⚠ **DANGER**	**DANGER** indicates an imminently dangerous situation that will cause death or heavy wound unless it is avoided. However, there are no instances of such danger for the product presented in this user's manual.
⚠ **WARNING**	**WARNING** indicates a potentially dangerous situation that will cause death or heavy wound unless it is avoided.
⚠ **CAUTION**	**CAUTION** indicates a potentially dangerous situation that will cause a slight injury or a medium-degree injury unless it is avoided.
CAUTION	**CAUTION** with no safety warning symbols attached indicates a potentially dangerous situation that will cause property damage unless it is avoided.
IMPORTANT	This is used in operation procedures or explanatory descriptions to convey exceptional conditions or cautions to the user.

In addition to the five above, the following are also used as appropriate.

△means WARNING or CAUTION.

Example:  CAUTION AGAINST AN ELECTRIC SHOCK

⃠means PROHIBITION.

Example:  DISASSEMBLY PROHIBITED

●means A FORCIBLE ACTION.

Example:  UNPLUG THE POWER CABLE FROM THE RECEPTACLE.

⚠ WARNING

Warnings for AC Power Supply:

- If the attached AC power cable does not fit the receptacle, do not alter the AC power cable and do not plug it forcibly. Failure to comply may cause electric shock and/or fire.
- Use an AC power cable which complies with the safety standard of the country.
- Do not touch the plug of the AC power cable when your hands are wet. This may cause electric shock.
- This product is connected signal ground with frame ground. If your developing product is transformless (not having isolation transformer of AC power), this may cause electric shock. Also, this may give an unrepairable damage to this product and your developing one.
  While developing, connect AC power of the product to commercial power through isolation transformer in order to avoid these dangers.
- If other equipment is connected to the same branch circuit, care should be taken not to overload the circuit.
- Use the power supply which complies with CE marking requirements.

- When installing this equipment, insure that a reliable ground connection is maintained.

- If you smell a strange odor, hear an unusual sound, or see smoke coming from this product, then disconnect power immediately by unplugging the AC power cable from the outlet.
  Do not use this as it is because of the danger of electric shock and/or fire. In this case, contact your local distributor.
- Before setting up this emulator and connecting it to other devices, turn off power or remove a power cable to prevent injury or product damage.

Warnings to Be Taken for This Product:

- Do not disassemble or modify this product. Personal injury due to electric shock may occur if this product is disassembled and modified. Disassembling and modifying the product will void your warranty.
- Make sure nothing falls into the cooling fan on the top panel, especially liquids, metal objects, or anything combustible.

Warning for Installation:

- Do not set this product in water or areas of high humidity. Make sure that the product does not get wet. Spilling water or some other liquid into the product may cause unrepairable damage.

Warning for Use Environment:

- This equipment is to be used in an environment with a maximum ambient temperature of 35°C. Care should be taken that this temperature is not exceeded.

⚠ CAUTION

Cautions to Be Taken for Connecting the Power Supply:

- Do not use any power cable other than the one that is included with the product.
- The power cable included with the product has its positive and negative poles color-coded by red and black, respectively.
- Pay attention to the polarities of the power supply. If its positive and negative poles are connected in reverse, the internal circuit may be broken.
- Do not apply any voltages exceeding the product's rated power supply voltage (5.0 V ±5%). Extreme voltages may cause a burn due to abnormal heat or cause the internal circuit to break down.

Cautions to Be Taken for Turning On the Power:

- Turn ON the power of the emulator and user system as simultaneously as possible. Turn OFF the power of the emulator and user system as simultaneously as possible.
- Do not leave either the emulator or user system powered on, because of leakage current the internal circuits may be damaged.
- When turning ON the power again after shutting OFF the power, wait about 10 seconds.

Cautions to Be Taken for Handling This Product:

- Use caution when handling the main unit. Be careful not to apply a mechanical shock.
- Do not touch the connector pins of the emulator main unit and the target MCU connector pins directly. Static electricity may damage the internal circuits.
- Do not pull this emulator by the communications interface cable or the cable for connecting the user system. And, excessive flexing or force may break conductors.

Caution to Be Taken for System Malfunctions:

- If the emulator system malfunctions because of interference like external noise, do the following to remedy the trouble.
  (1) Press the RESET switch of the emulator.
  (2) If normal operation is not restored after step (1), shut OFF power to the emulator once and then reactivate it.

Contents

User Registration

When you have purchased the emulator presented in this user's manual, please make sure to register it. As the H/W Tool Customer Registration Sheet is included with this manual, fill it in and FAX it to your local distributor or email the same contents to the following address. Your registered information is used for only after-sale services, and not for any other purposes. Without user registration, you will not be able to receive maintenance services such as a notification of field changes or trouble information. So be sure to carry out the user registration.
For more information about user registration, please email to the following address.

regist_tool@renesas.com

Terminology

Some specific words used in this user's manual are defined as follows:

Emulator R0E436640CPE00
This means a compact emulator for H8/300H Tiny Series (this product).

MCU board R0E436640EPBM0
The MCU board R0E436640EPBM0 with an evaluation MCU.

Emulator system
This means an emulator system built around the compact emulator R0E436640CPE00. The emulator system is configured with an emulator main unit, compact emulator R0E436640CPE00, emulator debugger (Debugger Package for H8/300H Tiny Series) and host machine.

Emulator debugger Debugger Package for H8/300H Tiny Series
This means a software tool which starts up in the integrated development environment High-performance Embedded Workshop to control the emulator.

Integrated development environment High-performance Embedded Workshop
This tool provides powerful support for the development of embedded applications for Renesas microcomputers. It has an emulator debugger function allowing for the emulator to be controlled from the host machine via an interface. Furthermore, it permits a range of operations from editing a project to building and debugging it to be performed within the same application. What's more, it supports version management.

Firmware
This means a program stored in the flash ROM of the emulator. It analyzes contents of communication with the emulator debugger and controls the compact emulator R0E436640CPE00. This program is downloadable from the emulator debugger to upgrade firmware or to support other MCUs.

Host machine
This means a personal computer used to control the emulator main unit and compact emulator.

Target MCU
This means the MCU you are going to debug.

User system
This means a user's application system using the microcomputer to be debugged.

User program
This means the program you are going to debug.

Evaluation MCU
This means the MCU mounted on the compact emulator which is operated in the specific mode for tools.

#
In this user's manual, this symbol is used to show active Low. (e.g. RESET#: Reset signal)

1. Outline

This chapter describes the package components, the system configuration, the specifications of the emulator functions and the operating environment.

1.1 Package Components

The R0E436640CPE00 package consists of the following items. When unpacking it, check to see if your R0E436640CPE00 contains all of these items.

Table 1.1 Package components

Item	Quantity
R0E436640CPE00 compact emulator	1
OSC-3 (20MHz) oscillator circuit board (pre-mounted)	1
OSC-2 oscillator circuit bare board	1
USB interface cable for connecting host machine and emulator	1
Power supply cable	1
Ferrite core for connecting power supply cable	1
H/W Tool Customer Registration Sheet (English)	1
H/W Tool Customer Registration Sheet (Japanese)	1
R0E436640CPE00 User's Manual (this manual)	1
R0E436640CPE00 User's Manual (Japanese)	1
R0E436640CPE00 Release Notes (English)	1
R0E436640CPE00 Release Notes (Japanese)	1
CD-ROM: Emulator debugger Renesas Debugger Package for H8/300H Tiny Series Evaluation version C/C++ Compiler Package for H8, H8S, H8SX Families	1

* Please keep the R0E436640CPE00's packing box and cushion material in your place for reuse at a later time when sending your product for repair or other purposes. Always use these packing box and cushion material when transporting this product.
* If there is any question or doubt about the packaged product, contact your local distributor.

1.2 System Configuration

1.2.1 System Configuration

Figure 1.1 shows a configuration of the R0E436640CPE00 system.

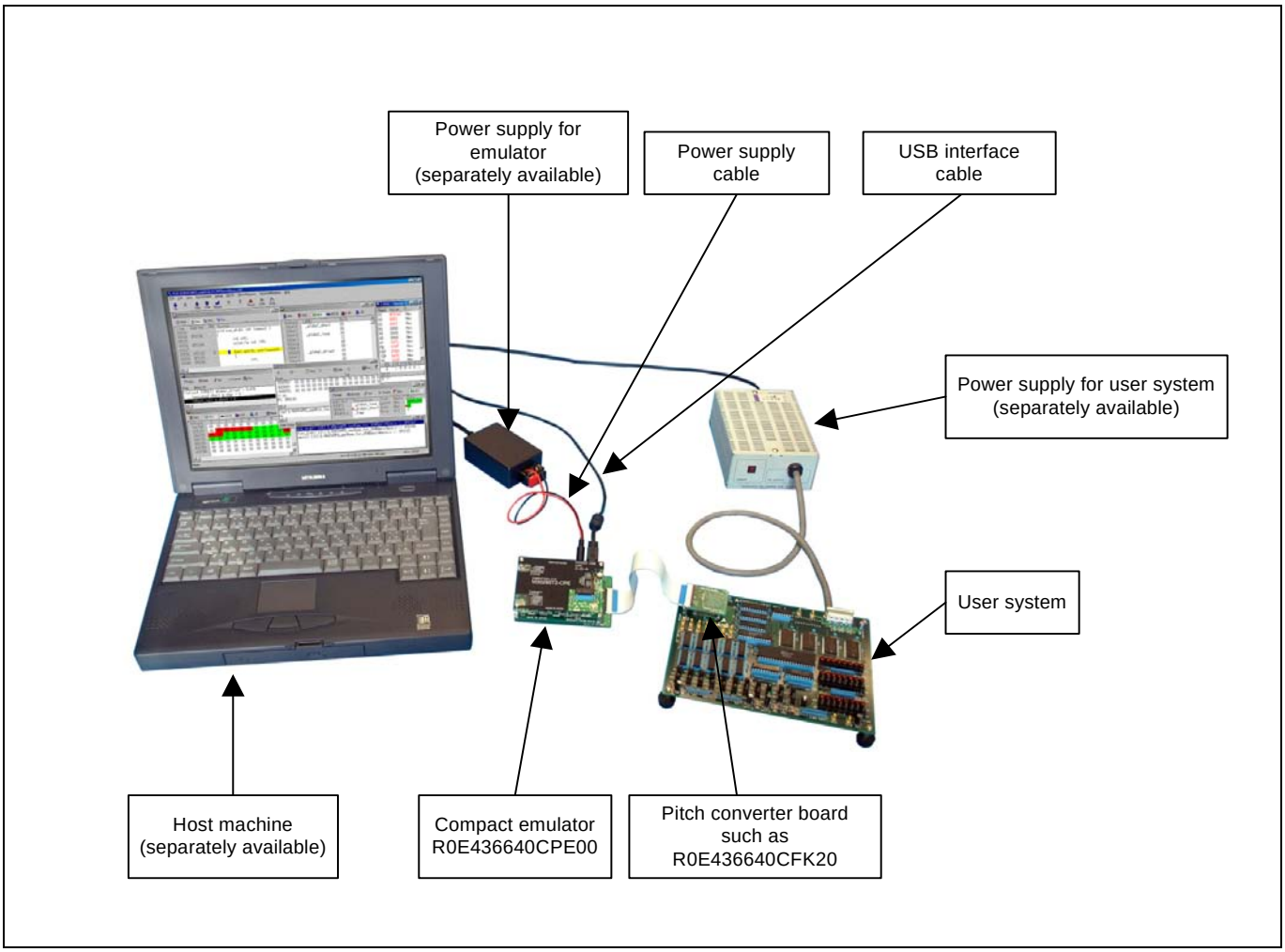


Figure 1.1 System configuration

(1) Compact emulator R0E436640CPE00 (this product)

This compact emulator contains for the H8/300H Tiny Series which has a real-time trace function.

This is described as emulator hereafter. It is configured with a compact emulator control board (upper board) and an MCU board R0E436640EPBM0 (lower board) contains an evaluation MCU.

(2) USB interface cable (included)

This is an interface cable for connecting the host machine and emulator.

(3) Power supply for emulator

This is a power supply for the emulator. Supply 5.0 V ±5% (DC).

Prepare a power supply which complies with CE marking requirements separately. The power cable is included with this product.

Note: Be aware that there are some AC adapters whose power supply voltage varies rather widely with its load. You are recommended to use an AC adapter with a switching power supply or a stabilized power supply.

(4) User system

This is your application system.

This product can be used when not connecting the user system.

(5) Power supply for the user system

This is a power supply for the user system. As this emulator cannot supply the power to the user system, supply the power to the user system separately from the emulator.

(6) Host machine

This is a personal computer for controlling the emulator.

(7) Pitch converter board such as R0E436640CFG20

This is a pitch converter board for connecting to an MCU foot pattern on the user system. For details, refer to "2.8 Connecting the User System" (page 31).

1.2.2 Names and Functions of each part of the Emulator

Figure 1.2 shows the names of the LEDs on the upper panel of the emulator.

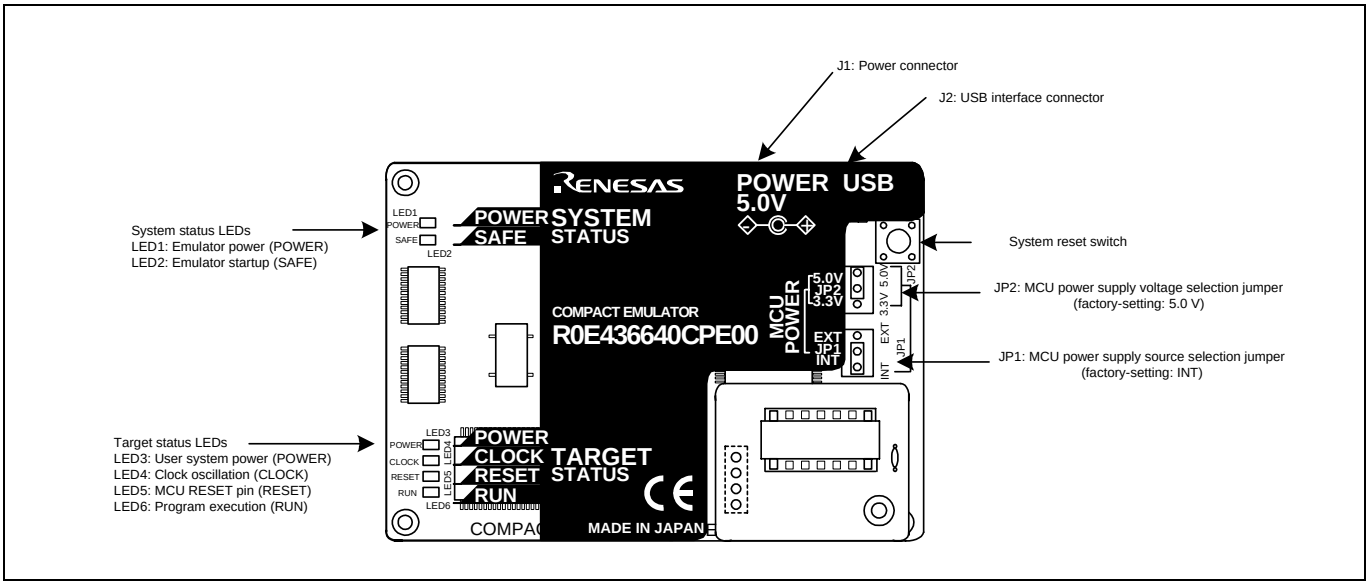


Figure 1.2 Names of the LEDs on the upper panel of the R0E436640CPE00

(1) System Status LEDs

The system status LEDs indicate the emulator's power supply, and operating status, etc. Table 1.2 lists the definition of each system status LED.

Table 1.2 Definitions of the system status LEDs

Name	Number	Color	Status	Meaning
POWER	LED1	Orange	ON	Power is supplied to the emulator.
			OFF	Power is not supplied to the emulator.
SAFE	LED2	Green	ON	Emulator system has started normally.
			OFF	Emulator system has not started normally.

(2) Target Status LEDs

The target status LEDs indicate the target MCU's operating status and power supply. Table 1.3 lists the definition of each target status LED.

Table 1.3 Definitions of the target status LEDs

Name	Number	Color	Status	Meaning
POWER	LED3	Orange	ON	Power is supplied to the target MCU.
			OFF	Power is not supplied to the target MCU.
CLOCK	LED4	Green	ON	The target MCU internal clock is oscillating.
			OFF	The target MCU internal clock is not oscillating.
RESET	LED5	Red	ON	Target MCU is being reset, or reset signal of the user system is held low.
			OFF	Target MCU is not being reset.
RUN	LED6	Green	ON	User program is being executed.
			OFF	User program is not being executed.

(3) System Reset Switch

By pressing the system reset switch, you can initialize the emulator system. Table 1.4 shows the functions of the system reset switch depending on the state of the emulator.

Table 1.4 Functions of the system reset switch

State of Emulator	Function
When the user's program is halted	Initializes the emulator and waits for a command from the emulator debugger
When the user's program is executed	Stops the user's program, initializes the emulator, and waits for a command from the emulator debugger.

IMPORTANT

Notes on a System Reset:

- After pressing the system reset switch, restart the emulator debugger. Otherwise the display of emulator debugger and the actual value (in the emulator) may not match.
- When the emulator debugger does not start up normally even after rebooting, turn off the emulator and then turn on again.

(4) Power Connector (J1)

This is a connector for connecting the power supply to this product. For details, refer to "2.4 Connecting the Power Supply for the Emulator" (page 23).

(5) USB Cable Connector (J2)

This is a USB cable connector for connecting the host machine to this product. For details, "2.5 Connecting the Host Machine" (page 24).

(6) MCU Power Supply Source Selection Jumper (JP1)

This is a jumper switch to set the power supply source to the MCU. For details on this switch, see "2.6.1 MCU Power Supply Source Selection Jumper/MCU Power Supply Voltage Selection Jumper" (page 25).

(7) MCU Power Supply Voltage Selection Jumper (JP2)

This is a jumper switch to set the power supply voltage of the MCU. This setting is valid when the MCU power supply source selection jumper is set to INT only. For details on this switch, see "2.6.1 MCU Power Supply Source Selection Jumper/MCU Power Supply Voltage Selection Jumper" (page 25).

1.3 Specifications

Table 1.5 lists the specifications of the R0E436640CPE00.

Table 1.5 R0E436640CPE00 specifications

Applicable MCUs	The applicable 64-pin MCUs for the H8/300H Tiny Series are shown below. - H8/3664 Group - H8/3694 Group - H8/3687 Group - H8/3672 Group - H8/36014 Group - H8/36064 Group - H8/36094 Group - H8/36087 Group - H8/36077 Group - H8/36079 Group The following 80-pin MCU is available by using with the converter board R0E436049CFJ10. - H8/36049 Group	
Usable mode	Normal mode, advanced mode	
Maximum operating frequency	20 MHz at 2.7--5.5 V	
Applicable power supply	User system connected (JP1=EXT)	2.7--5.5 V
	User system not connected (JP1=INT)	3.3 V or 5.0 V (supplied from the emulator, set by JP2)
Basic debugging functions	- Download - Software break (max. 64 points) - Program execution/stop (allows free-run execution supporting software breaks) - Memory reference/setting (reference/setting C-variables, run-time execution) - Register reference/setting - Disassemble display - C-level debugging, etc.	
Real-time trace function	- 64K-cycle bus information recordable (Address: 20 bits, Data: 16 bits, MCU status: 12 bits) - 5 trace modes supported (Break/Before/About/After/Full) - Can be recorded ON/OFF by events	
Real-time RAM monitor function	- 1,024 bytes (256 bytes x4) - Data/last access result	
Hardware break function	2 points (Address match, bus match, max. 255 pass counts)	
Execution time measurement function	Time between program start and stop	
Connection to user system (see "2.8 Connecting the User System")	For 64-pin 0.8mm pitch QFP (PRQP0064GB-A): R0E436640CFG20 For 64-pin 0.5mm pitch LQFP (PLQP0064KC-A): R0E436640CFK20	
Power supply for emulator	DC 5.0 V±5%/(2A) externally supplied (Prepare a power supply which complies with CE marking requirements separately.)	
Host machine interface	USB (USB 1.1 full-speed*, mini-B standard connector)	

* Can be connected to the USB2.0 port of the host machine.
With the USB interface of this product, not all hardware (such as host machine, USB devices, USB hub) combination will work and guaranteed.

1.4 Operating Environment

Be sure to use this emulator with the operating environmental of the emulator and host machine listed in Tables 1.6 and 1.7.

Table 1.6 Operating environmental conditions

Item	Description
Operating temperature	5 to 35°C (no dew)
Storage temperature	-10 to 60°C (no dew)

Table 1.7 Operating environment of the host machine

Item	Description
Host machine	IBM PC/AT compatibles
OS	Windows 98SE *1 Windows Me Windows XP Windows 2000
CPU	Pentium III 600 MHz or more recommended
Interface	USB 1.1 full-speed *2
Memory	128 MB or more recommended
Pointing device such as mouse	Mouse or any other pointing device usable with the above OS that can be connected to the main body of the host machine.
CD drive	Needed to install the emulator debugger or refer to the user's manual

*1 Windows is either registered trademarks or trademarks of Microsoft Corporation in the United States and other countries.

*2 Can be connected to the USB2.0 port of the host machine.
With the USB interface of this product, not all hardware (such as host machine, USB devices, USB hub) combination will work and guaranteed.

2. Setup

This chapter describes the preparation for using this product, the procedure for starting up the emulator and how to change settings.

2.1 Flowchart of Starting Up the Emulator

The procedure for starting up the emulator is shown in Figure 2.1. For details, refer to each section hereafter. And, when the emulator does not start up normally, refer to "5. Troubleshooting" (page 95).

Check the package components.	Refer to "1.1 Package Components" (page 14).
▼	
User registration	Refer to "User Registration" (page 12).
▼	
Install or upgrade the C compiler and emulator debugger.	Install it from the included CD-ROM.
▼	
Set the MCU power voltage selection jumper (JP2).	Select a power voltage supplied to the target MCU.
▼	
Connect the USB interface cable.	Connect the USB interface cable to the USB interface connector (J2) of the emulator and the USB port of the host machine.
▼	
Connect the power supply for the emulator.	Connect a power supply to the power connector (J1). Power supply should be 5.0 V ±5%, 2 A.
▼	
Connect the user system.	Connect the user system as occasion demands.
▼	
Turning on the power supply.	Turn on the power to the emulator and the user system as simultaneously as possible.
▼	
Check the LED display of the emulator.	Check that the system status LED, and POWER and RESET of target status LED are lighting. When the user system is not connected, the POWER LED does not light up.
▼	
Start up the emulator debugger from the High-performance Embedded Workshop.	Start up the High-performance Embedded Workshop and the emulator debugger.
▼	
Set the operating environment of the emulator debugger.	Set the INIT dialog box and MCU Setting dialog box of the emulator debugger.
▼	
Debug a program with various functions of the emulator debugger.	For how to use the emulator debugger, refer to the online manual of the High-performance Embedded Workshop and emulator debugger.

Figure 2.1 Flowchart of starting up the emulator

2.2 Installing the Included Software

If the OS used in your host machine is Windows XP or 2000, this installation must be executed by a user with administrator rights. Be aware that users without administrator rights cannot complete the installation.

The "auto_run.exe" starts up by inserting the included CD into the CD-ROM drive, and the HTML page for installation will open. Install the C compiler, emulator debugger and USB driver as occasion demands.

In process of installation, "user information" dialog box to enter the user information (contractor, section, contact address, and host machine) will open. The supplied information will be turned into a format by which technical support will be provided by e-mail.

2.3 Attaching the Ferrite Core

Attach the ferrite core included with this product close to the DC plug of the power cable. Without the ferrite core it may cause interference.
The power cable should be wound around the ferrite core as shown in the figure, and close the ferrite core until it clicks.

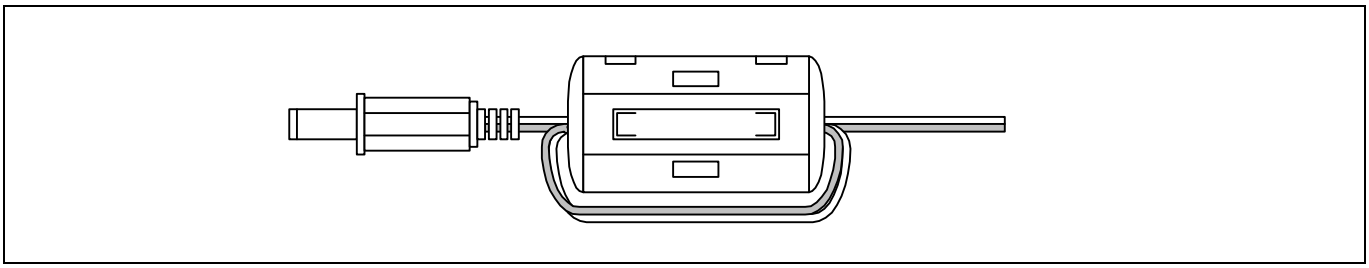


Figure 2.2 Attaching the ferrite core

2.4 Connecting the Power Supply for the Emulator

Connect the power supply for the emulator to the power connector (J1). The specification of the power supply for the emulator is listed in Table 2.1.

Table 2.1 Specification of power supply of the emulator

Power supply voltage	DC 5.0 V±5%/2 A

Figures 2.3 and 2.4 show the specifications of the power connector (J1) and an applicable plug, respectively.

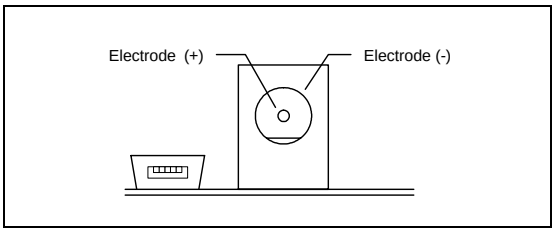


Figure 2.3 Power connector specifications

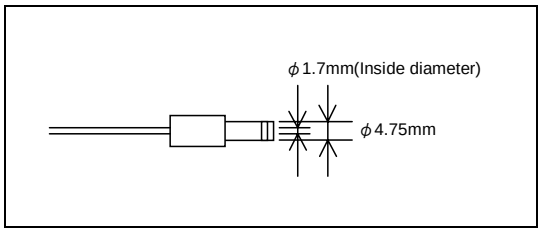


Figure 2.4 Applicable plug specifications

⚠ CAUTION

Notes on Connecting a Power Supply of the Emulator:

- The power cable included in this product package is colored red (+) and black (-).
- Be careful about the polarity of the power supply. Connecting to the wrong electrode could destroy internal circuits.
- Do not apply a voltage exceeding the specified voltage of the product (5.0 V ±5%), because it may cause burn injuries and the failure of internal circuits.
- Use the power supply which complies with CE marking requirements.

2.5 Connecting the Host Machine

Connect the emulator and the host machine with the USB interface cable.

Connect the USB interface cable (included) to the USB interface connector (J2) and the USB port of the host machine (see Figure 2.5).

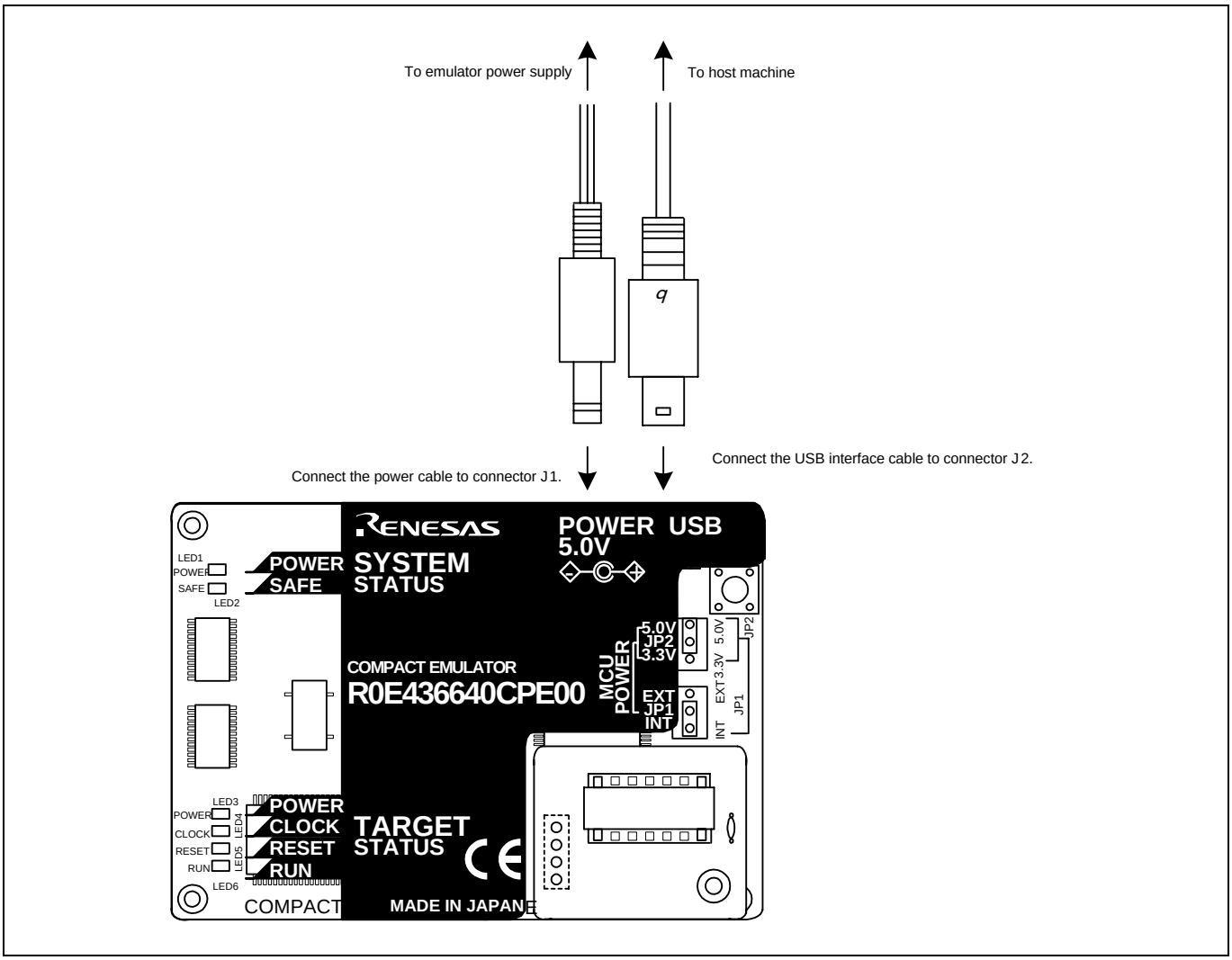


Figure 2.5 Connecting the emulator system

2.6 Turning ON the Power

2.6.1 MCU Power Supply Source Selection Jumper/MCU Power Supply Voltage Selection Jumper

Set the MCU power supply source selection jumper and the MCU power supply voltage selection jumper of the emulator according to conditions of use (see Figure 2.6).

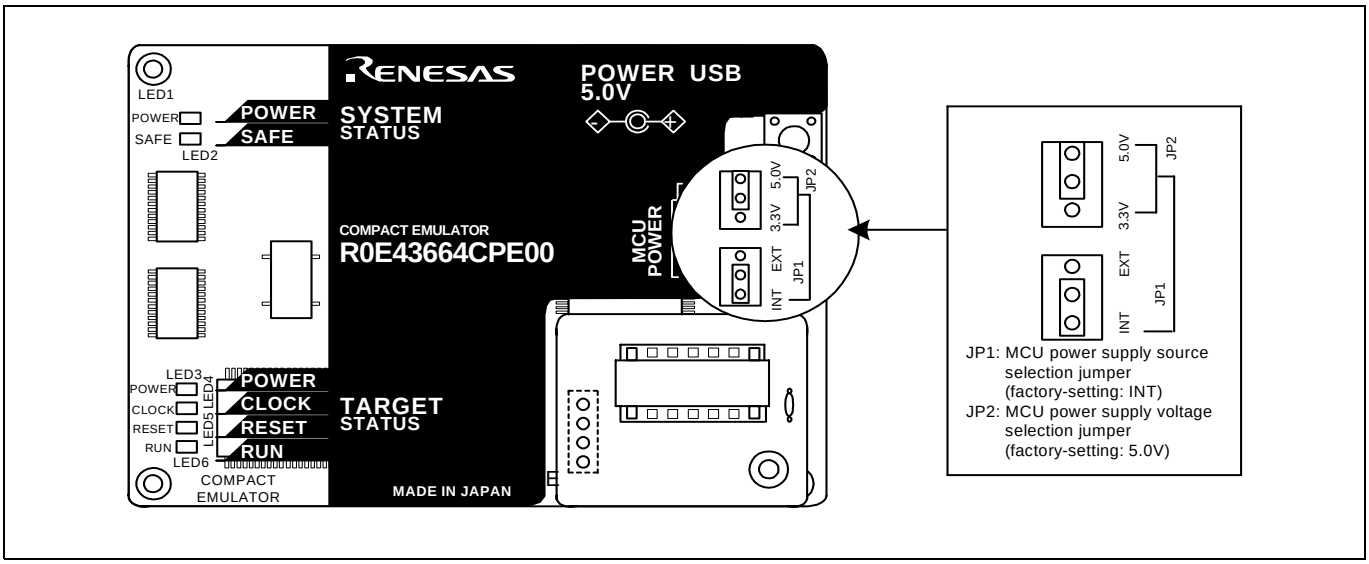


Figure 2.6 Jumper switch locations

These are the jumper switches to select power supply to the MCU and its power voltage. As shown in Table 2.2 below, set the switch according to the connection to the user system.

Table 2.2 Setting jumper switches

Connection to the user system	MCU power supply source selection jumper (JP1)	MCU power supply voltage selection jumper (JP2)	Description
Not connected	INT	3.3 V	Supplied from the emulator. The MCU operating voltage is 3.3 V.
		5.0 V	Supplied from the emulator. The MCU operating voltage is 5.0 V.
Connected	EXT	Invalid	Supplied from the user system. This emulator consumes max. 500 mA of electrical current from the user system.

⚠ CAUTION

Note on Jumper Switch Settings:

- Always shut OFF the emulator before changing the setting of the jumper switches, and connecting the cable. Otherwise the internal circuit may cause a break.

2.6.2 Checking Connections of the Emulator System

Before turning the power ON, check the connection of the interface cable to the host machine, emulator, and user system.

2.6.3 Turning ON/OFF the Power

Turn ON/OFF the power of the emulator and user system as simultaneously as possible.
Do not leave either the emulator or user system powered on, because of leakage current the internal circuits may be damaged.
When turning ON the power again after shutting OFF the power, wait for about 10 seconds.

2.6.4 Power Supply to the User System

This emulator cannot supply the power to the user system. Therefore design your system so that the user system is powered separately. This product consumes max. 500 mA of electrical current from the user system. Please consider the capacity of the power supply of the user system.
The voltage of the user system should be 2.7 V ≤ Vcc ≤ 5.5 V. Do not change the voltage of the user system after turning on the power. To change the power supply voltage of the user system, set the POWER select jumper to the EXT POWER side. For details about the POWER select jumper, refer to "2.9.2 Setting the Jumpers of the R0E436640EPBM0 Board" (page 34).

2.6.5 LED Display When the Emulator Starts Up Normally

After the emulator starts up, check the status of the LEDs to see whether the emulator operation is enabled or not. Figure 2.7 shows the positions of the emulator status LEDs.

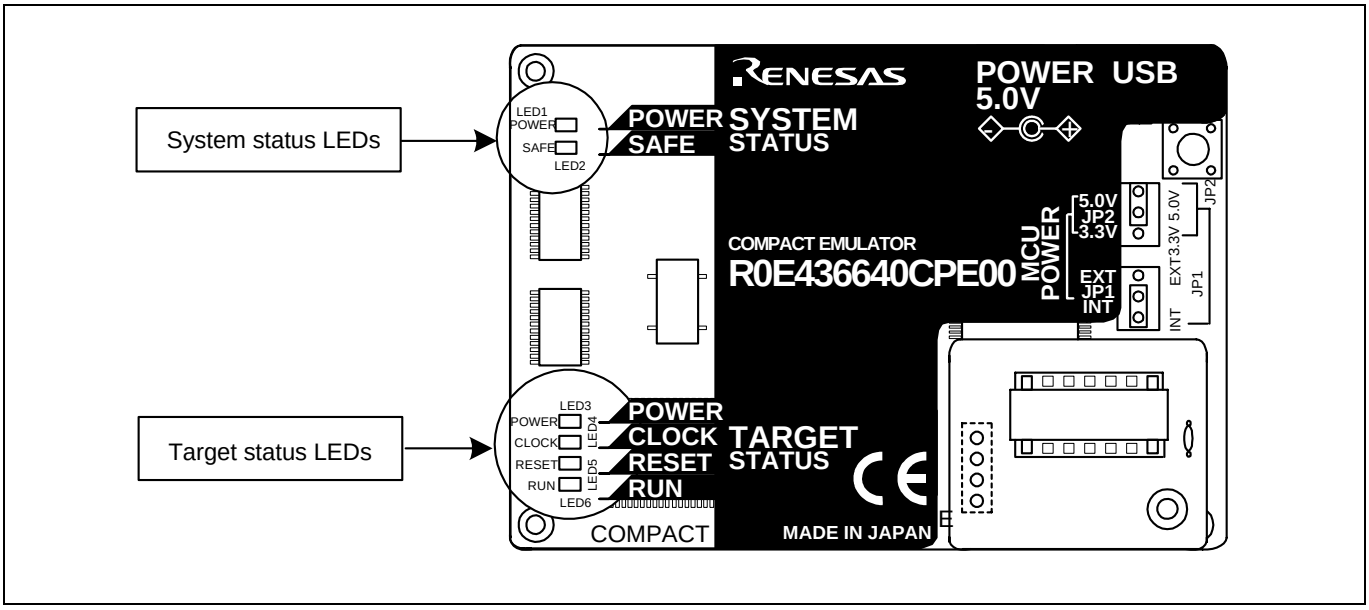


Figure 2.7 Positions of the system status LEDs and target status LEDs

(1) System status LEDs

Check that the LED1 and LED2 of the system status LEDs are lit immediately after the power is activated. If it is not lit, shut off the emulator and check the power supply for the emulator is properly connected.

(2) Target status LEDs

Target status LEDs light as shown in Figure 2.8 when the user system is not connected and as shown in Figure 2.9 when a user system is connected. **After turning on the power, only the LED5 (RESET) lights on. Check the target status LEDs display normally after starting up the emulator debugger.**

When the target status LEDs do not display as shown in Figures 2.8 and 2.9, refer to "5. Troubleshooting" (page 95).

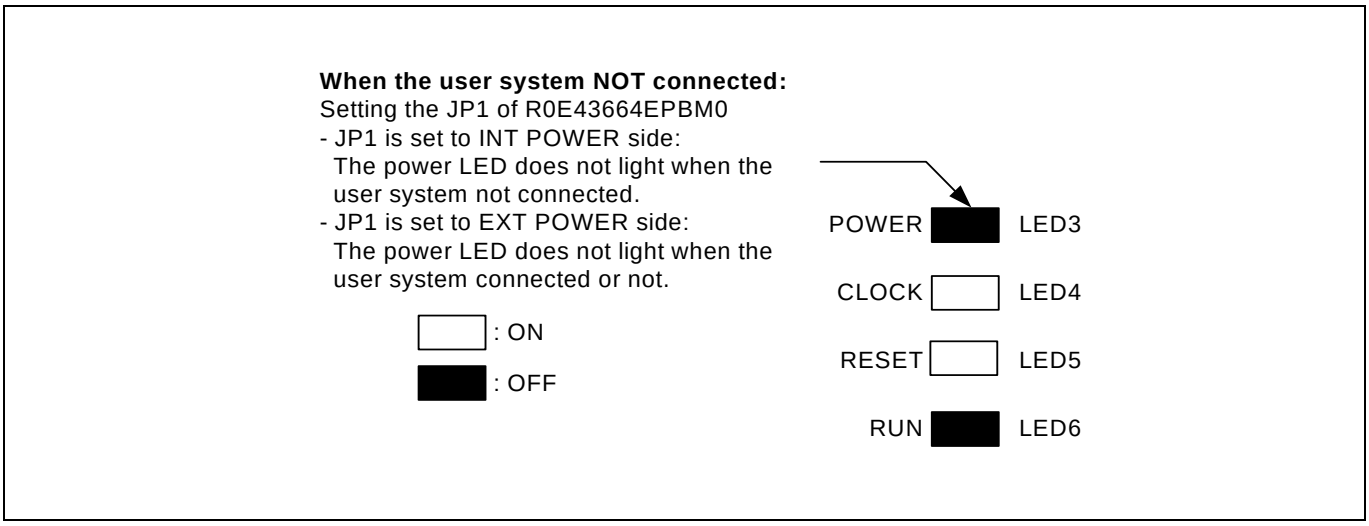


Figure 2.8 Target status LEDs display when the emulator starts up normally (when user system not connected)

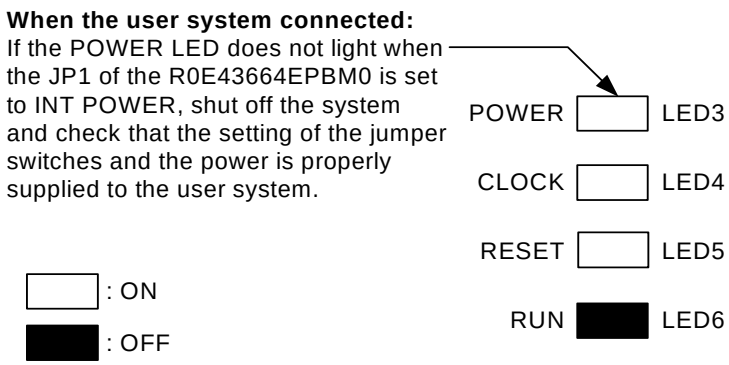


Figure 2.9 Target status LEDs display when the emulator starts up normally (when user system connected)

IMPORTANT

Note on the Target Status CLOCK LED:

- If the LED is not turned on, check the following.
  (1) After powering on the emulator (before starting up the emulator debugger):
  Make sure that the oscillator circuit board is properly installed in the emulator and it is oscillating normally.
  (2) After the emulator debugger is started up (after the Init dialog box settings are completed):
  Make sure that the oscillator selected in the Init dialog box is oscillating normally.

2.7 Self-check

2.7.1 Self-check Procedure

To run the self-check of the emulator, do so as explained here below. While the self-check is in progress, the LEDs will change as shown in Figure 2.10.

(1) If the user system is connected, disconnect it.
(2) Set the jumper as the factory-settings to execute the self-check (see Table 2.3).
(3) Within 2 seconds of activating power to the emulator, press the system reset switch on the emulator upper panel.
(4) Check the SAFE LED starts flashing and then press the system reset switch again.
(5) The self-check will start. If the normal result is displayed in about 20 seconds, the self-check terminated normally.

Table 2.3 Jumper settings for the self-check

Switch	Setting
MCU power supply source selection jumper (JP1)	INT
MCU power supply voltage selection jumper (JP2)	5V
POWER jumper	INT

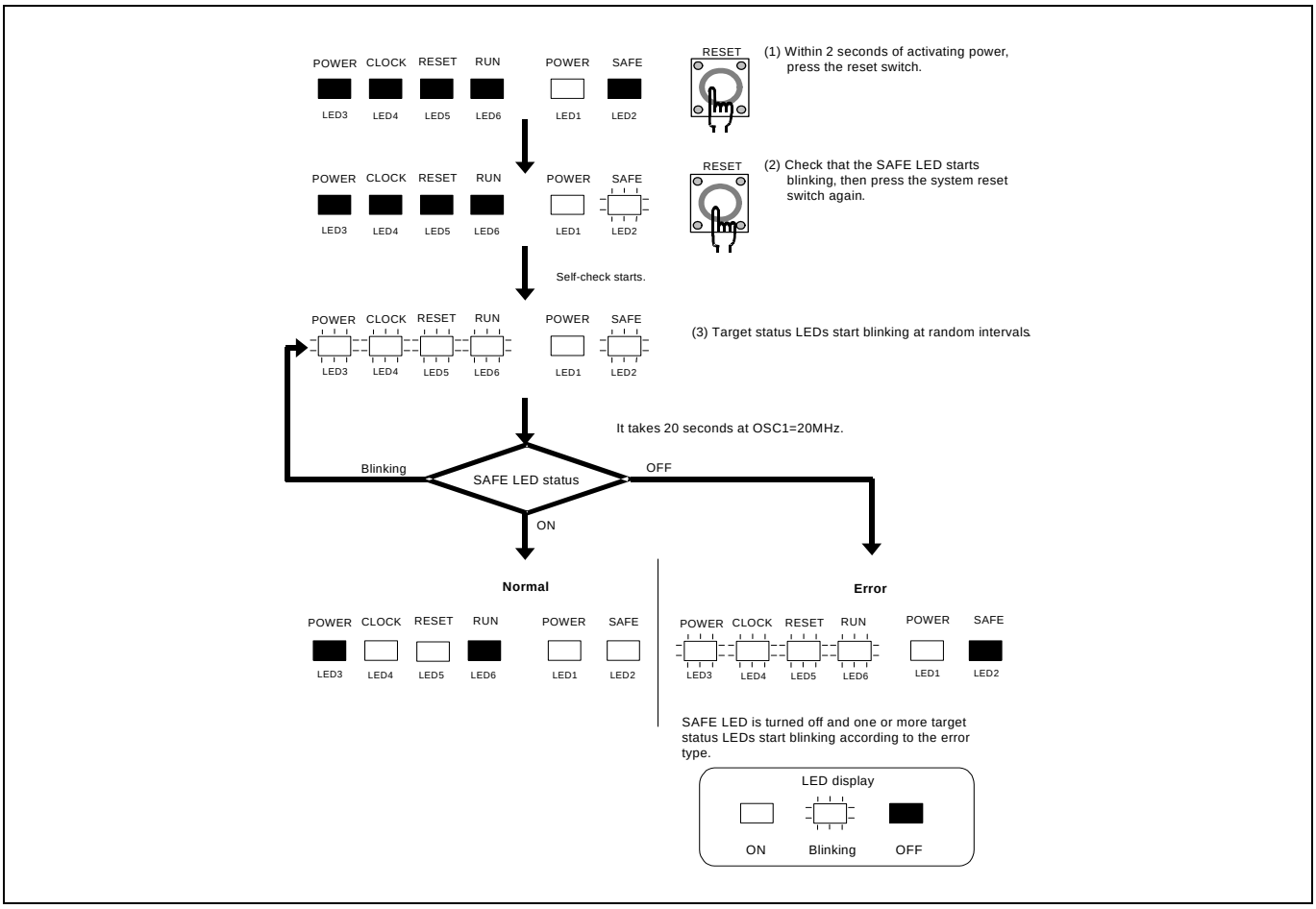


Figure 2.10 Self-check procedure

2.7.2 If an Error is Detected in the Self-check

Table 2.4 lists how to remedy the troubles if the target status LED display is abnormal in the self-check. When an error is detected, shut off the emulator and the user system and follow the steps in the Table 2.4.

Table 2.4 Error display in the self-check and how to remedy it

LED display (Blinking / OFF)				Problem & Remedy
POWER	CLOCK	RESET	RUN	
OFF	OFF	OFF	OFF	The emulator system is not working properly. - Check that power is supplied to the emulator. - The emulator may be damaged. Contact your local distributor.
OFF	OFF	OFF	Blinking	
OFF	OFF	Blinking	OFF	A clock is not supplied to the emulator. - Check that the oscillator circuit board (OSC-3) is attached.
OFF	OFF	Blinking	Blinking	
OFF	Blinking	OFF	OFF	The power is not supplied to the emulator. - Check that the power supply cable is connected properly. - Check of jumper switch settings (see Table 2.3).
OFF	Blinking	OFF	Blinking	The emulator system is not working properly. - The emulator may be damaged. Contact your local distributor.
OFF	Blinking	Blinking	OFF	
OFF	Blinking	Blinking	Blinking	
Blinking	OFF	OFF	OFF	
Blinking	OFF	OFF	Blinking	
Blinking	OFF	Blinking	OFF	
Blinking	OFF	Blinking	Blinking	
Blinking	Blinking	OFF	OFF	
Blinking	Blinking	OFF	Blinking	
Blinking	Blinking	Blinking	OFF	
Blinking	Blinking	Blinking	Blinking	

IMPORTANT

Notes on the Self-check:

- **Be sure to disconnect the user system** before executing the self-check.
  Use the preinstalled oscillator circuit board OSC-3 (20 MHz) to execute the self-check.
- If the self-check does not result normally (excluding target status errors), the emulator may be damaged. Then, contact your local distributor.

2.8 Connecting the User System

Figure 2.11 shows the connection of the R0E436640CPE00 and the user system.

As for the connections of other than the 64-pin MCU below, refer to the user's manual for the converter board.

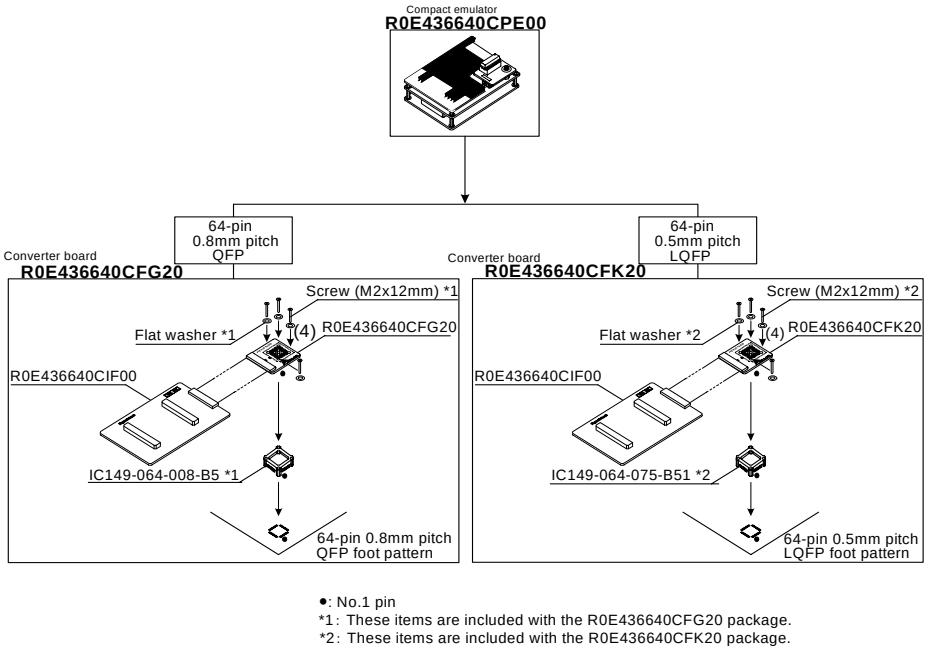


Figure 2.11 Connection of the R0E436640CPE00 and user system

⚠ CAUTION

Note on Connecting the User System:

- Take care not to attach the converter board in a wrong direction. It may cause a fatal damage to the emulator.

*IC149-064-008-B5 and IC149-064-075-B51 are trademarks of Yamaichi Electronics Co., Ltd.

2.8.1 Connecting to a 64-pin 0.8mm pitch Foot Pattern

Here following is a procedure of connecting to a 64-pin 0.8mm pitch foot pattern on the user system using the R0E436640CFG20. For details on the R0E436640CFG20, refer to its user's manual.

(1) Mount the IC149-064-008-B5 included with the R0E436640CFG20 to the user system.
(2) Attach the R0E436640CFG20 to the J3 and J4 of the R0E436640CPE00.
(3) Attach the R0E436640CFG20 to the IC149-064-008-B5, and secure it with the screws (M2x12mm).

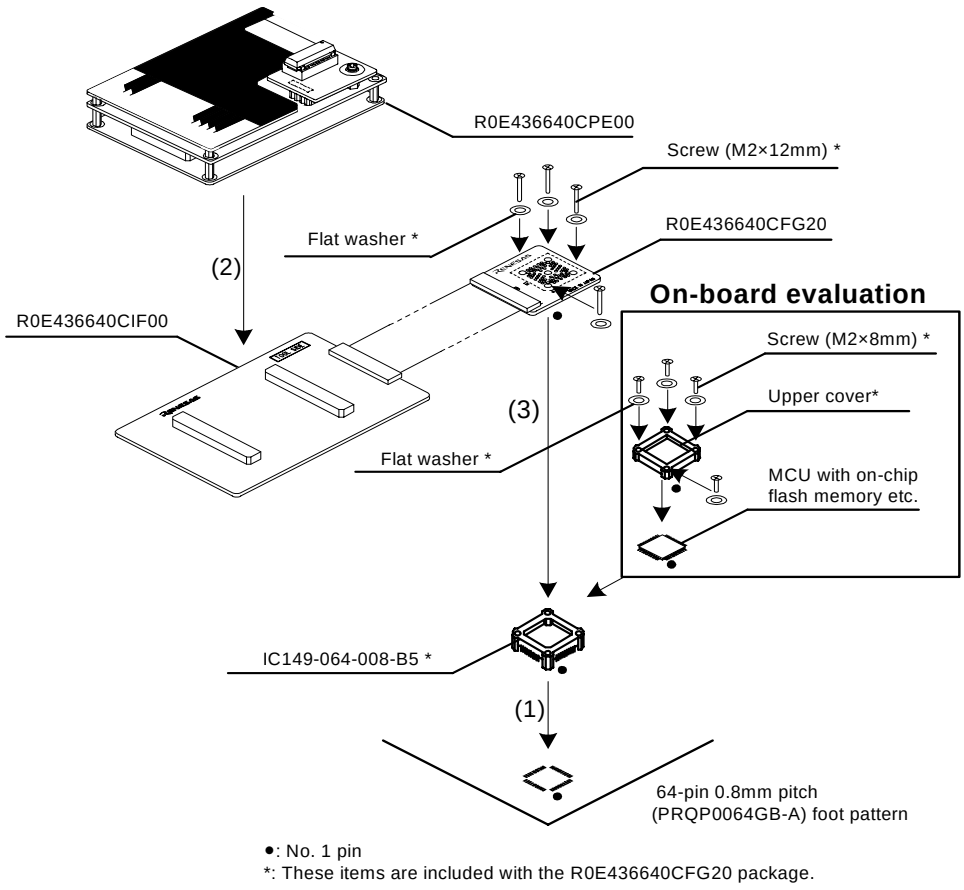


Figure 2.12 Connecting to a 64-pin 0.8mm pitch foot pattern

⚠ CAUTION

Notes on Connecting the User System:

- Take care not to attach a converter board in a wrong direction. It may cause a fatal damage to the emulator and user system.
- The connectors of the R0E436640CPE00 and R0E436640CFG20 are guaranteed for only 50 insertion/removal iterations.

2.8.2 Connecting to a 64-pin 0.5mm pitch Foot Pattern

Here following is a procedure of connecting to a 64-pin 0.5mm pitch foot pattern on the user system using the R0E436640CFK20. For details on the R0E436640CFK20, refer to its user's manual.

(1) Mount the IC149-064-075-B51 included with the R0E436640CFK20 to the user system.
(2) Attach the R0E436640CFK20 to the J3 and J4 of the R0E436640CPE00.
(3) Attach the R0E436640CFK20 to the IC149-064-075-B51, and secure it with the screws (M2x12mm).

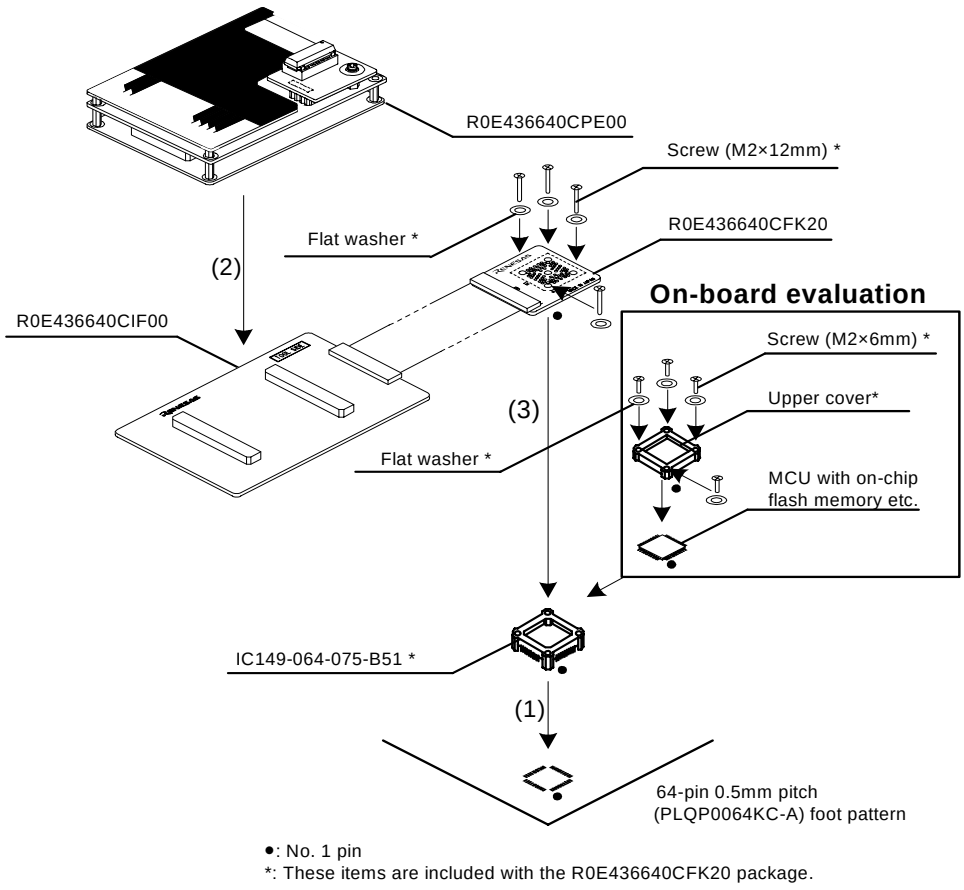


Figure 2.13 Connecting to a 64-pin 0.5mm pitch foot pattern

⚠ CAUTION

Notes on Connecting the User System:

- Take care not to attach a converter board in a wrong direction. It may cause a fatal damage to the emulator and user system.
- The connectors of the R0E436640CPE00 and R0E436640CFK20 are guaranteed for only 50 insertion/removal iterations.

2.9 Changing Settings

2.9.1 MCU Power Supply Source Selection Jumper/MCU Power Supply Voltage Selection Jumper

These are the jumper switches to select power supply to the MCU and its power voltage. Set the jumpers according to the use conditions before turning on power, referring to "2.6.1 MCU Power Supply Source Selection Jumper/MCU Power Supply Voltage Selection Jumper" (page 25).

2.9.2 Setting the Jumpers on the R0E436640EPBM0 Board

Figure 2.14 shows the location of jumper switches on the R0E436640EPBM0 board and their factory-settings.

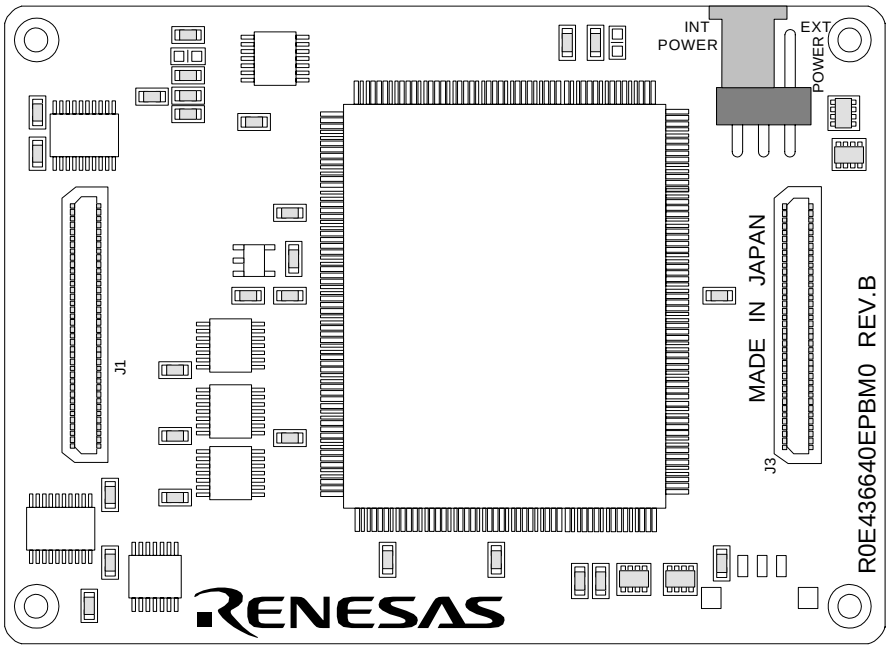
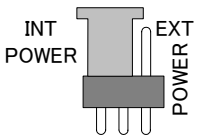
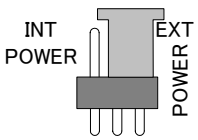


Figure 2.14 Jumper switches on the R0E436640EPBM0

Table 2.5 Setting jumper switches on the R0E436640EPBM0

Switch No.	Switch name	How to set	Description
JP1	POWER select jumper	 (Factory-setting)	- Connects the Vcc pin of the evaluation MCU to the internal power supply (same voltage as Vcc on the MCU) of the emulator. - Use this setting for ordinary debug
			- Connects the Vcc pin of the evaluation chip to the user system. - Use this setting for power-on emulation when you want to turn the target power supply on or off or change the power supply voltage.

⚠ CAUTION

Note on Setting Jumper Switches:

- Always shut OFF the emulator before changing the setting of the jumper switches, and connecting the cable. Otherwise the internal circuit may cause a break.

2.9.3 Selecting Clock Supply

You can choose a clock supplied to the evaluation MCU by the Emulator tab in the Init dialog box of the emulator debugger. Table 2.6 shows the clocks and their initial settings.

Table 2.6 Clock supply to the MCU

Clock	Emulator debugger display	Description	Initial setting
Main (OSC1-OSC2)	Internal	Internal oscillator circuit board (OSC-3 or OSC-2)	Yes
	External	Oscillator circuit on the user system	-
Sub (X1-X2)	Internal	Internal oscillator circuit (32.768 kHz)	-
	External	Oscillator circuit on the user system	Yes

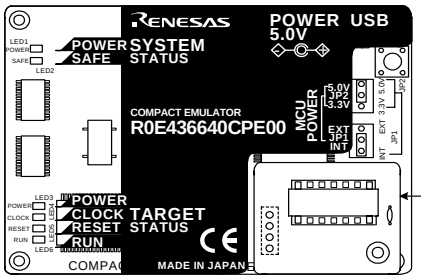
(1) Using an Internal Oscillator Circuit Board

1. Kinds of Oscillator Boards

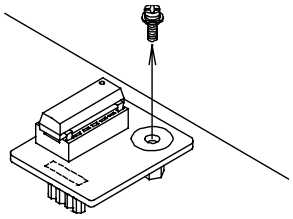
The R0E436640CPE00 comes with an oscillator circuit board OSC-3 (20 MHz). And an oscillator circuit bare board OSC-2 is included with this product. If you use an internal oscillator circuit board of the emulator as a main clock, choose "Internal" in the emulator debugger after replacing oscillator circuit boards to change a clock supplied to an MCU.

2. Replacing Oscillator Circuit Boards

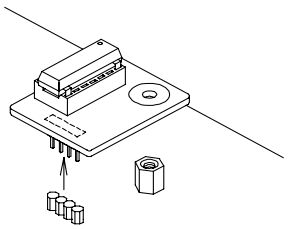
Figure 2.15 shows how to replace the oscillator circuit boards.



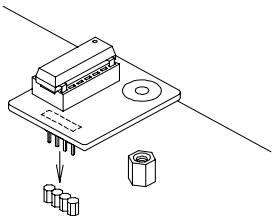
The oscillator circuit board of the emulator is in the lower right corner of the board.



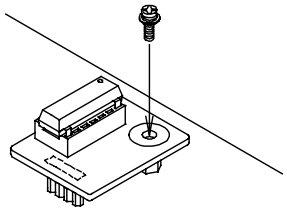
Unscrew the screw securing the oscillator circuit board.



Lift off the oscillator circuit board.



Attach the oscillator circuit board for replacement to the connector of the emulator.



Secure the new oscillator circuit board with the screw.

Figure 2.15 Replacing oscillator circuit boards

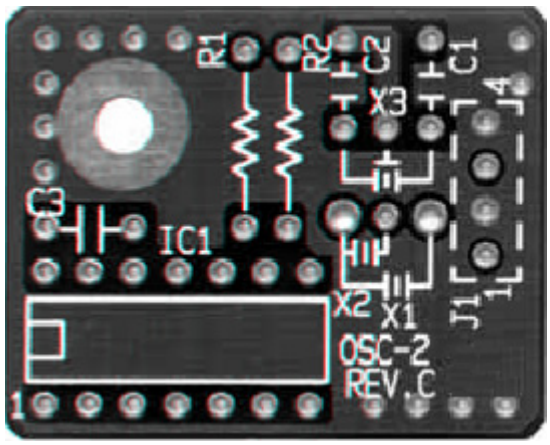
⚠ CAUTION

Note on Replacing the Oscillator Circuit Board:

- When removing the upper cover or replacing the oscillator circuit boards, be sure to shut OFF the power supply. Otherwise the internal circuit may cause a break.

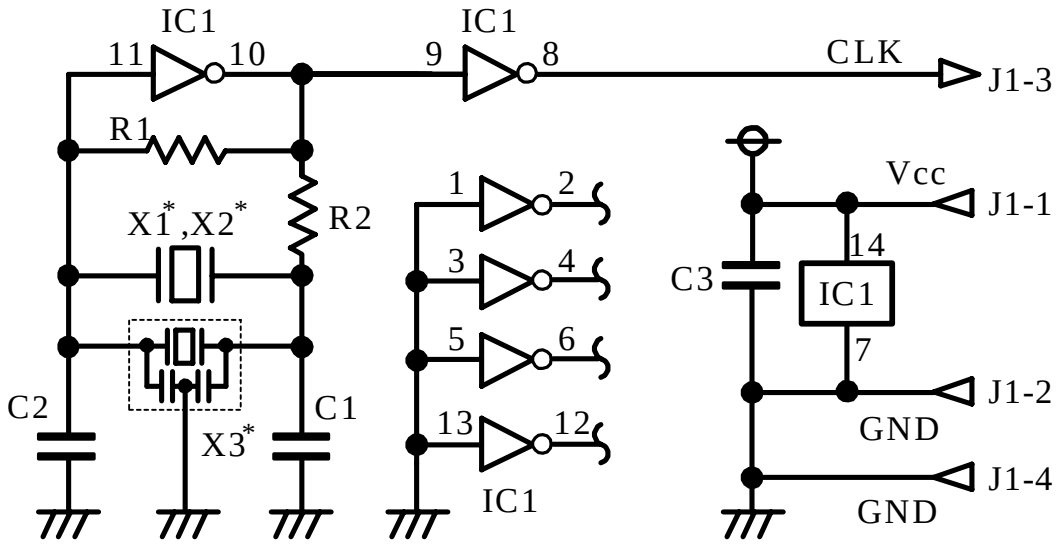
3. Using the Internal Oscillator Circuit Bare Board

To use this product at a frequency you like, build a desired oscillator circuit on the included OSC-2 oscillator circuit bare board. Figure 2.16 shows an external view of the OSC-2 oscillator circuit bare board and the connector pin locations. Figure 2.17 shows the circuitry of the oscillator circuit bare board OSC-2. Use the number of oscillator circuits recommended by the oscillator manufacturer.



J1-4: GND
J1-3: Oscillation output
J1-2: GND
J1-1: VCC

Figure 2.16 External view of the oscillator circuit board OSC-2 and its connector pin locations



*X1:5.08-mm-pitch 2-pin oscillator
X2:2.54-mm-pitch 2-pin oscillator
X3:2.54-mm-pitch 3-pin oscillator

IC1:Inverter (Unbuffer)

Figure 2.17 Circuits of the oscillator circuit bare board OSC-2

(2) Using an Oscillator Circuit on the User System

To operate this product with an external clock, construct an oscillator circuit as shown in Figure 2.18 in the user system and input the oscillator output at 50% duty (within the operating range of the evaluation MCU) into pin OSC1. And pin OSC2 should be open. Choose "External" in the emulator debugger to use this clock.

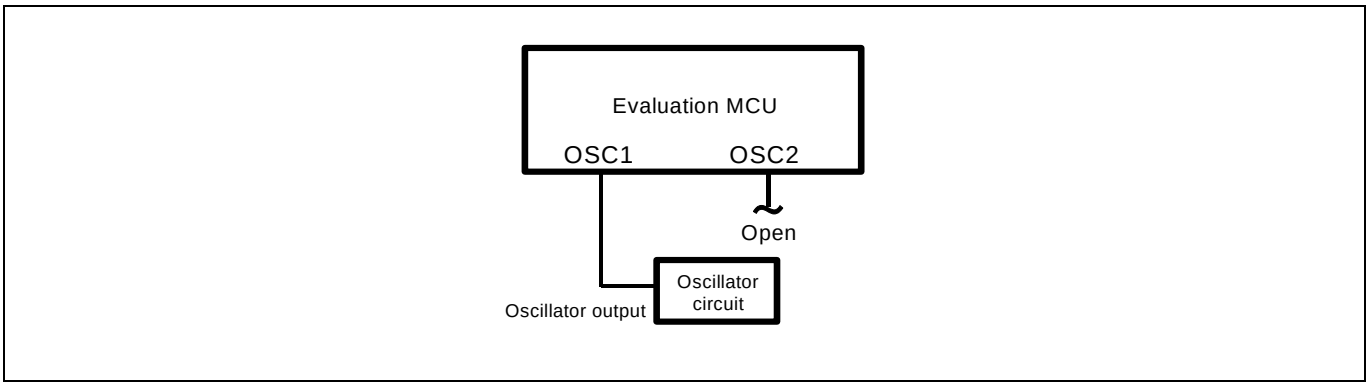


Figure 2.18 External oscillator circuit

Make note that in the oscillator circuit shown in Figure 2.19 where a resonator is connected between pins OSC1 and OSC2, oscillation does not occur because a converter board and other devices are used between the evaluation MCU and the user system. It is same for sub-clock oscillator circuits (X1 and X2).

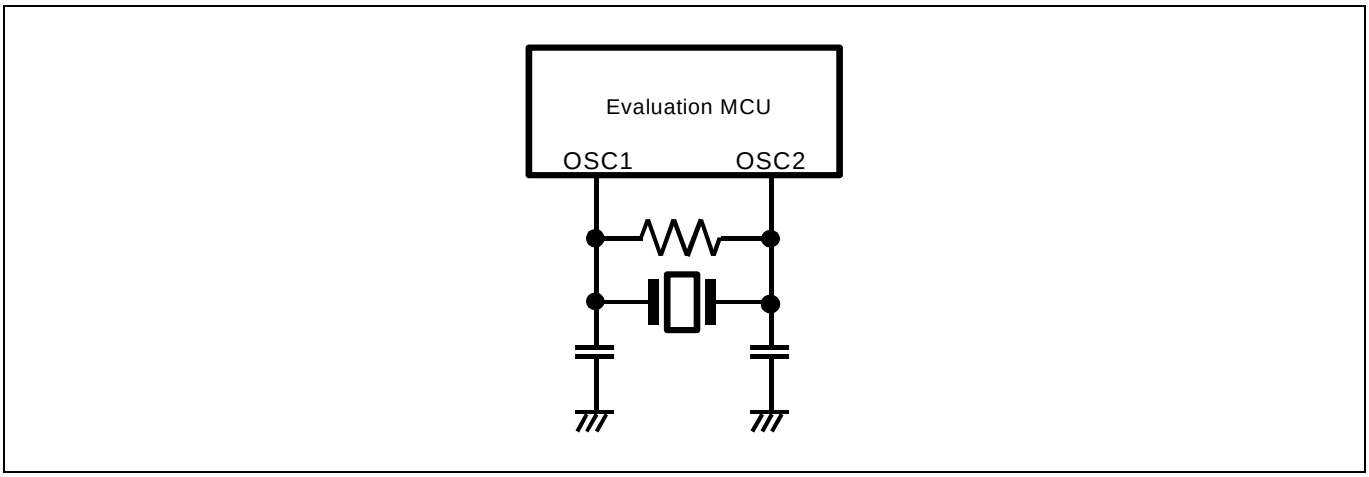


Figure 2.19 Circuit in which oscillation does not occur

2.9.4 A/D Conversion Bypass Capacitors

There is a foot pattern on the R0E436640EPBM0 board for mounting bypass capacitors for an A/D conversion circuit near the MCU. Mount suitable bypass capacitors as occasion demands. Figure 2.20 shows where they are installed and the configuration of this product.

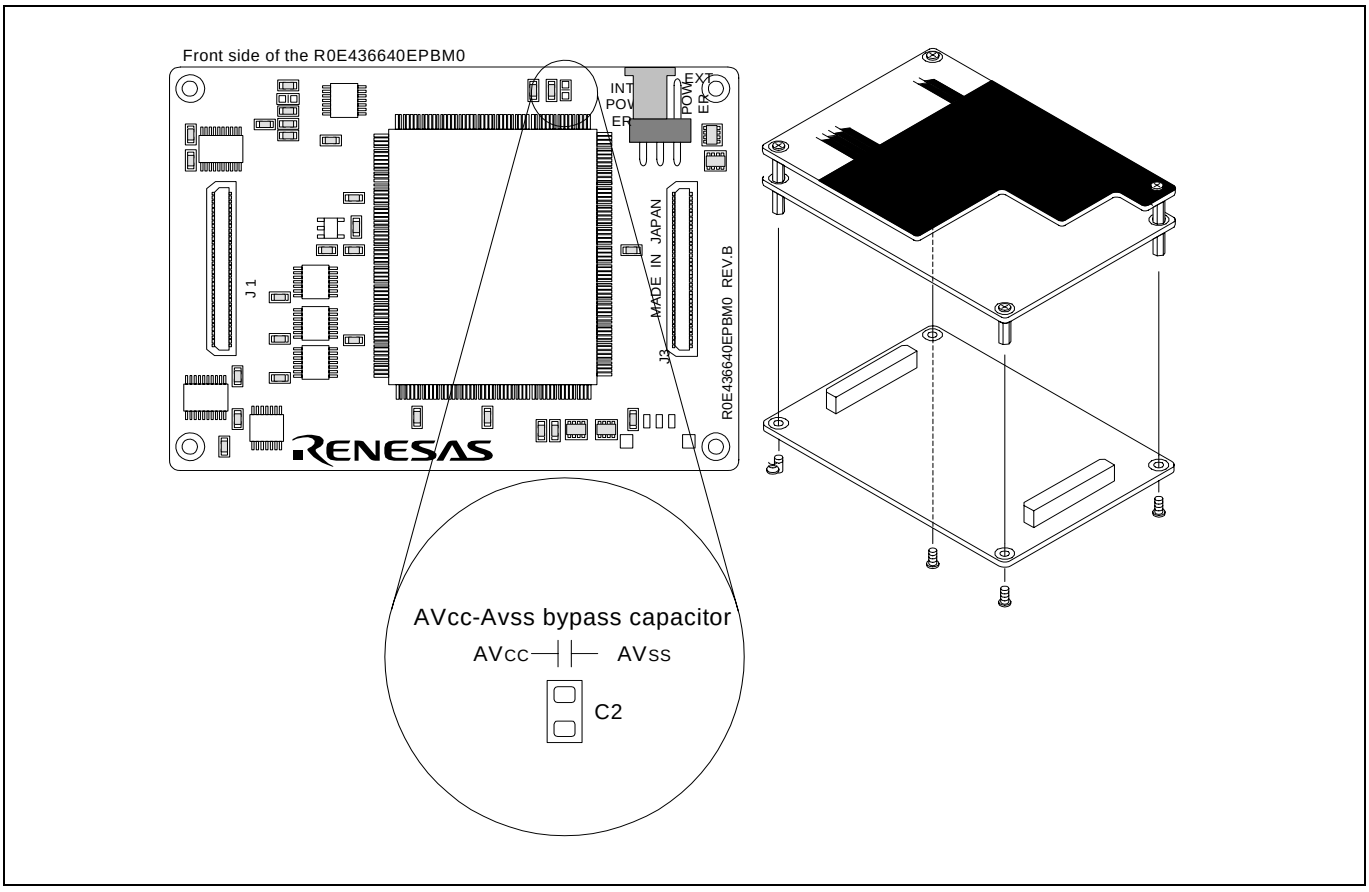


Figure 2.20 Foot pattern for A/D conversion bypass capacitors and the configuration of this product

IMPORTANT

Note on the A/D Converter Function:

- Because a converter board and other devices are used between the evaluation MCU and the user system, the A/D converter operates differently from that of an actual MCU. Make the final evaluation of the A/D converter with an actual MCU.

3. Usage (Emulator Debugger)

This chapter describes how to start up the emulator debugger from the High-performance Embedded Workshop.

3.1 Starting Up the Emulator Debugger

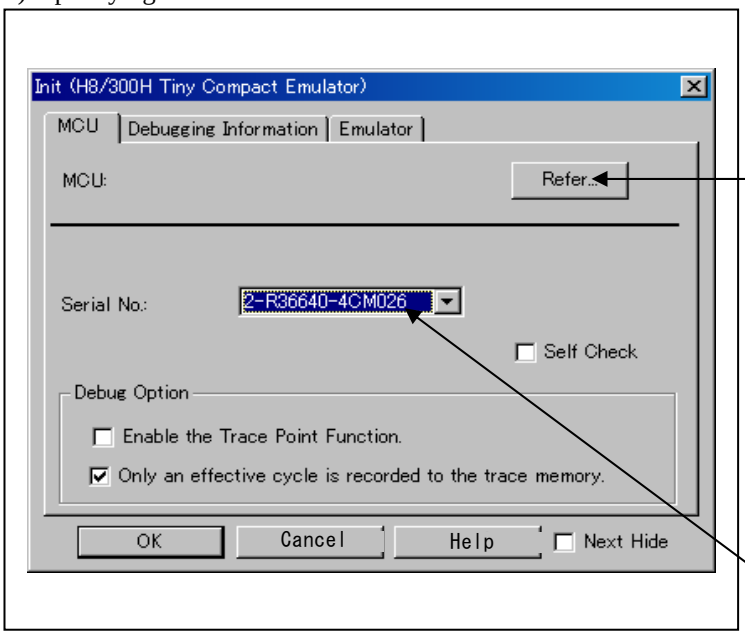
When debugging the completed programs, switch the session. The session can be changed by the drop down list of the tool bar shown below.

You will have as many sessions created as the number of targets you selected when creating a project, so select the session that corresponds to the target to be connected from the drop-down list. To connect to the H8/300H Tiny Compact Emulator, select "H8/300H Tiny Compact Emulator."

3.2 Starting Up the Emulator Debugger (Init Dialog Box)

(1) MCU tab

1). Specifying the MCU file



Specifying the MCU file

Click the "Refer..." button.

A file selection dialog box will be displayed, so select the desired MCU file. The MCU file is stored in the directory in which you installed the HEW.

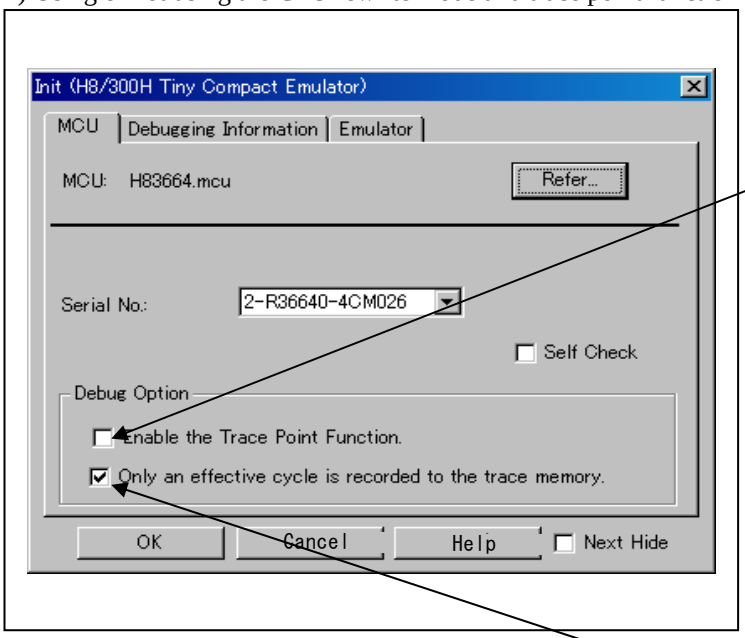
(Example: C:\Hew4\Tools\Renesas\DebugComp\Platform\PDTarget\H8TinyCPE\McuFiles)

- The MCU file contains the information specific to the target MCU.
- The MCU file you have selected is displayed in the MCU section of the MCU tab.

Serial No.

Shows the currently connected emulators in list form. Select the serial No. of the emulator you want to be connected.

2) Using or not using the CPU rewrite mode and trace point function



Using or not using the trace point function

The emulator has two-point events, which are shared by the trace function and the hardware break function. Specify whether or not to use the trace point function.

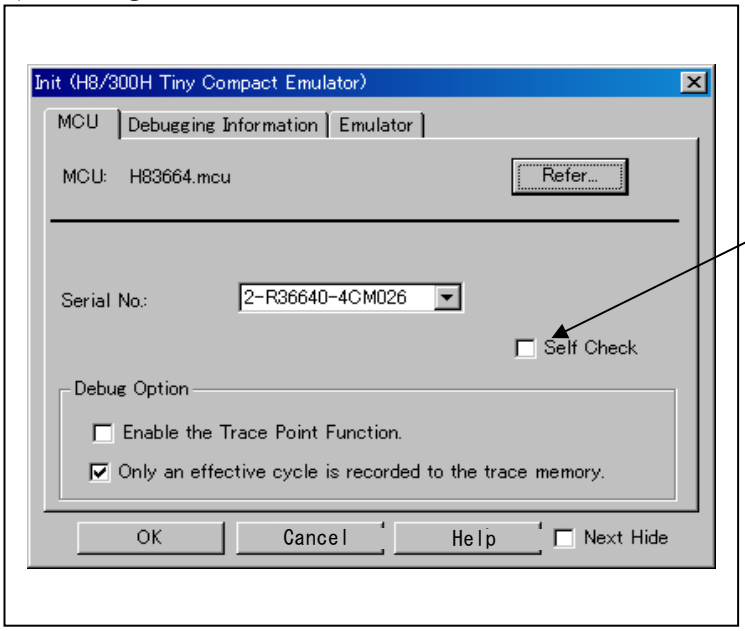
- When not using the trace point function (default), deselect the check box. In this case, the events are used for the hardware break function.
- To use the trace point function, select the check box. In this case, the events are used for the trace point function. The hardware break function is disabled.

Getting trace data for valid cycles or all cycles

With this emulator you can choose to get trace data for only valid cycles or for all cycles.

- To get data for only valid cycles (default),
  Select this check box. Trace data will be acquired for only valid cycles.
- To get data for all cycles
  Deselect this check box. Trace data will be acquired for all cycles

3) Executing the self-check



Executing the self-check

Enable this function when you want the emulator to be self-checked at startup. Be sure to select the check box only when you want the emulator to be self-checked at startup.

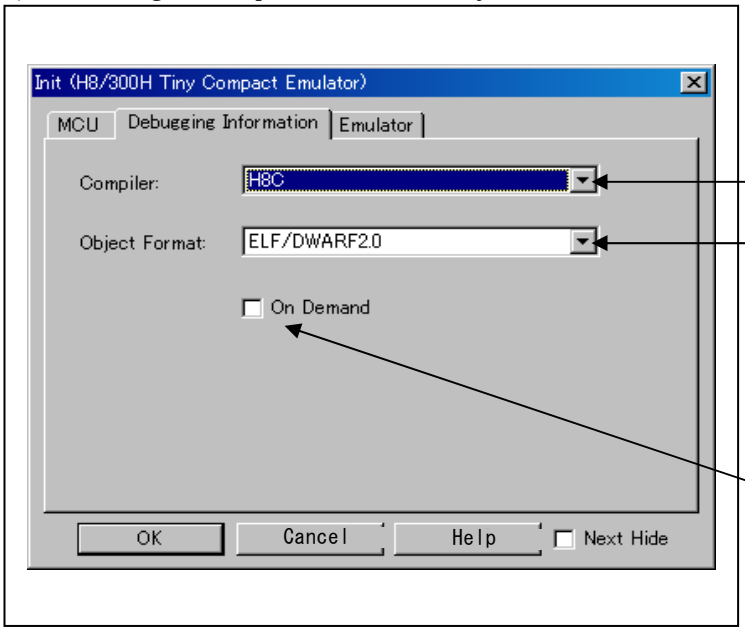
This function may be enabled in the following cases:

- When you are using the emulator you have just purchased
- When you fail to download the firmware.
- When you successfully download the firmware, but fail to start up the emulator
- When you want to confirm whether the emulator is operating normally because, for example, the MCU runs out of control or something is wrong with the trace results

This function can be enabled only when you are starting up the emulator debugger.

(2) Debugging Information tab

1) Referencing the compiler used and the object format



Specifying the compiler used and the object format

Specify the compiler you are using and the format of the object file output by the compiler.

- Compiler

  Select the compiler you are using.

  (By default, the C compiler from Renesas is selected.)
- Object Format

  Select the format of the object file that is output by the compiler you are using.

Specifying the method for storing debug information

There are two methods for storing debug information: on-memory method where data is held in memory and an on-demand method where data is held in a temporary file.

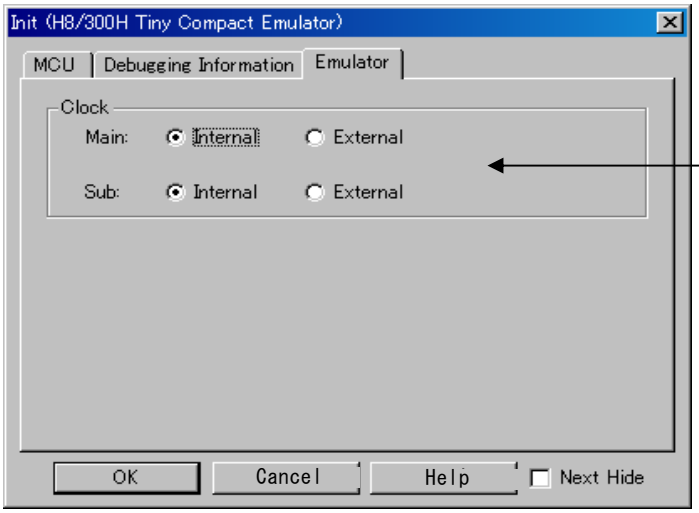
- On Memory

  This method helps to speed up processing if your computer has sufficient memory.
- On Demand

  This method helps to reduce the amount of memory needed. To use this method, select the "On Demand" check box.

(3) Emulator tab

1) Specifying the target clock



Specifying the target clock

Specify the clock sources supplied to the MCU (main clock and sub clock). Select the appropriate clock sources according to the clock used by your target MCU.

- Internal

  Emulator's internal clock
- External

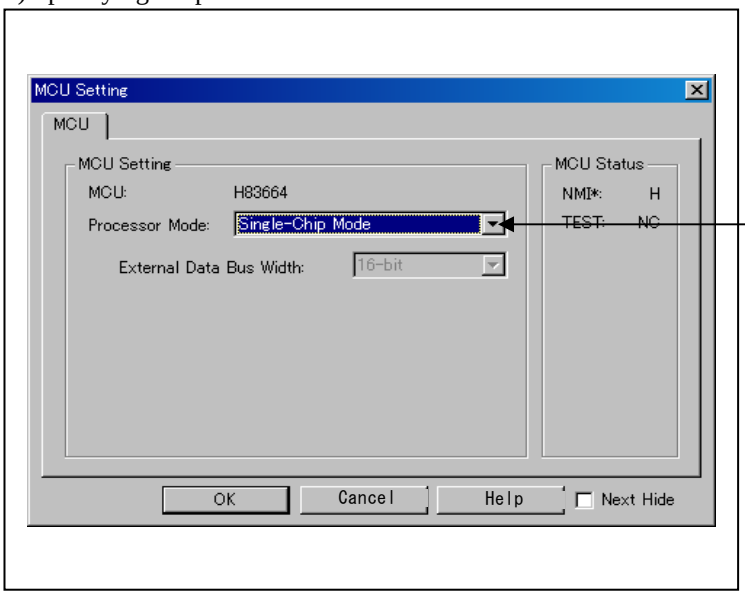
  Emulator's internal clock

The option you have specified here remains effective the next time you start up.

3.3 Starting Up the Emulator Debugger (MCU Setting Dialog Box)

(1) MCU tab

1) Specifying the processor mode

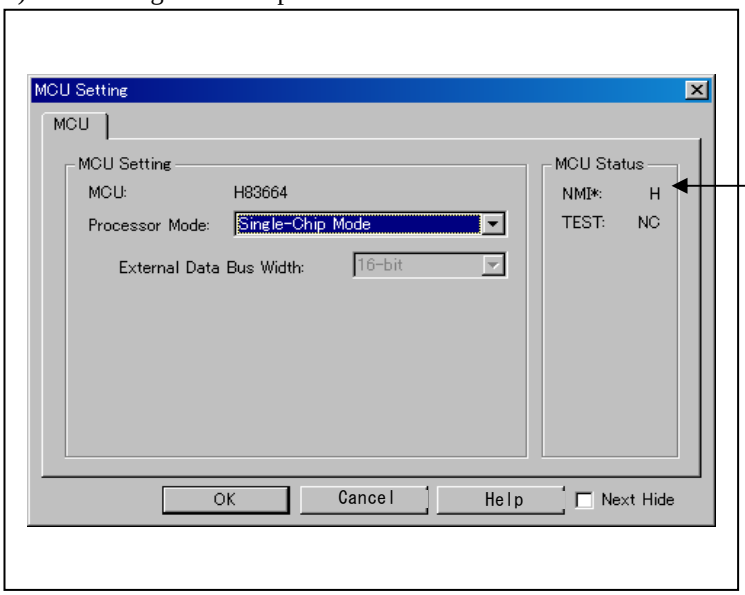


Specifying the processor mode

Select the appropriate processor mode that suits your system. For the H8/300H Series, you can specify only the following processor mode.

- Single-chip Mode

2) Referencing the MCU pin status



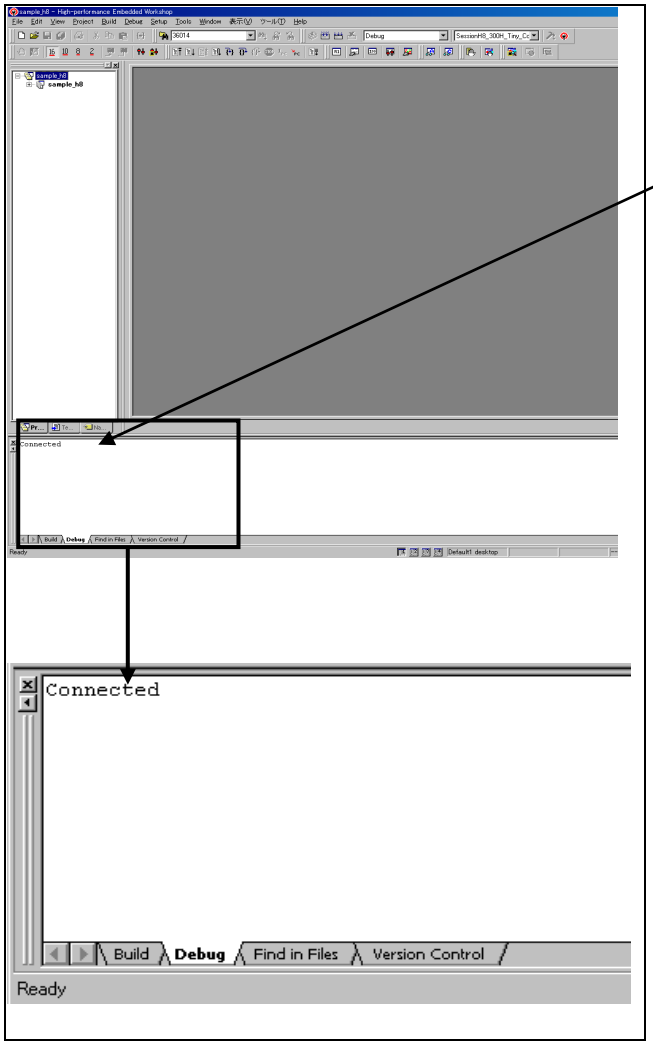
Referencing the MCU pin status

This column shows the state of each MCU pin.

"NC" means that the value is indeterminate.

3.4 Checking Connections of the Emulator System

Check to see that the emulator debugger has been connected correctly to the emulator.



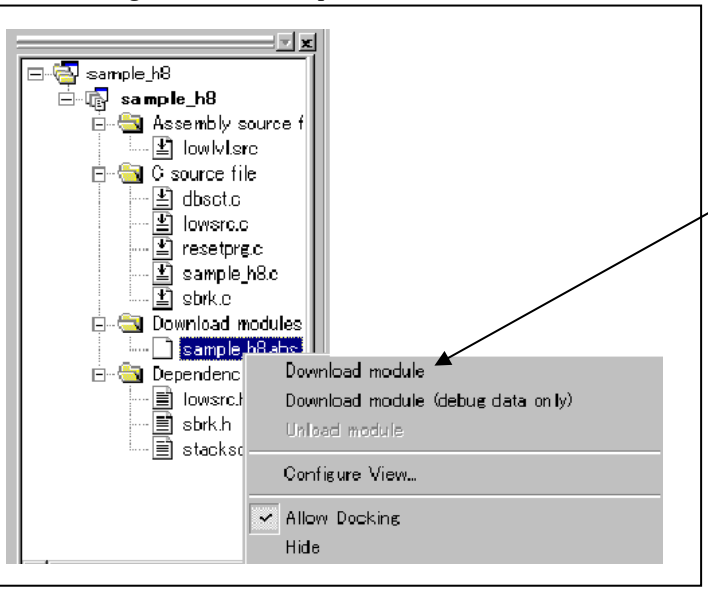
Checking connections of the emulator system

When the emulator debugger is connected correctly to the emulator after you have finished setting up the Init dialog box and the MCU Setting dialog box, you will see a message "Connected" displayed on the "Debug" tab of the Output window.

3.5 Program Execution

(1) Downloading the program

1) Downloading from the work space window

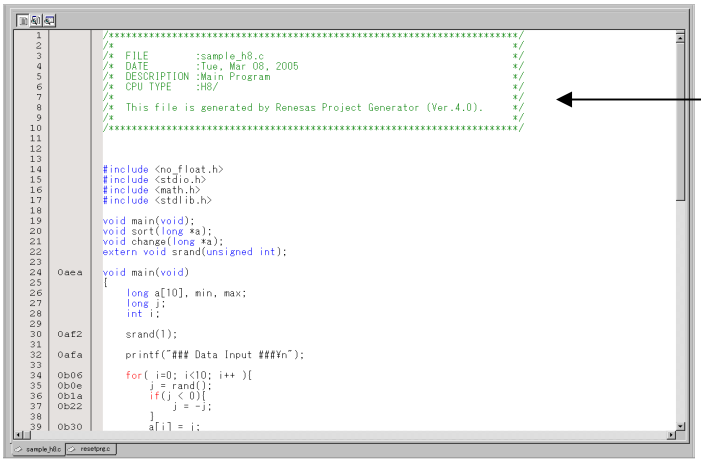


Downloading the program

Download the object program you want to debug.

Select Download from "xxx.abs" of "Download module".

Or you can select "Download" from the "Debug" menu for the same effect.

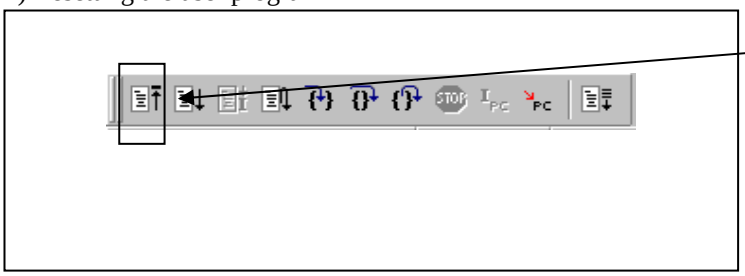


Showing the source program

Double-click the "xxx.c" of "C source file". The Editor (Source) window will be displayed, showing the content of the "xxx.c" file.

(2) Program execution

1) Resetting the user program

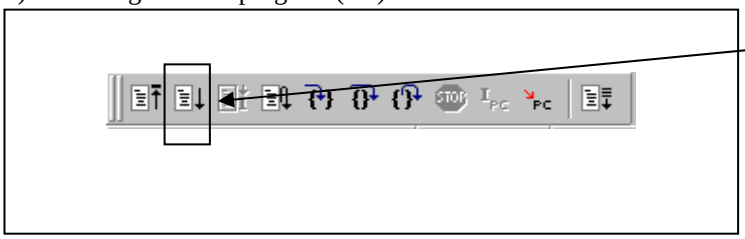


CPU reset

Resets the program.

Or you can select "CPU Reset" from "Debug" menu for the same effect.

2) Executing the user program (Go)

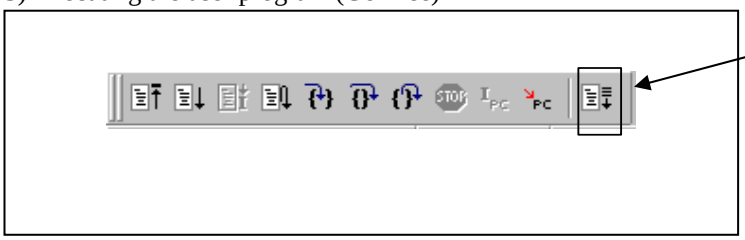


Go

Runs the program beginning with the current PC position.

Or you can select "Run" from "Debug" menu for the same effect.

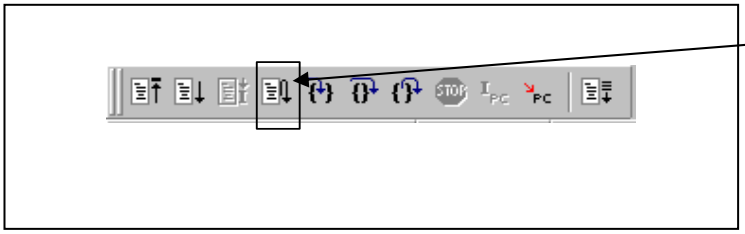
3) Executing the user program (Go Free)



Go Free

Runs the program beginning with the current PC position. The software and hardware breaks set in it are ignored.

4) Executing the user program (Reset Go)

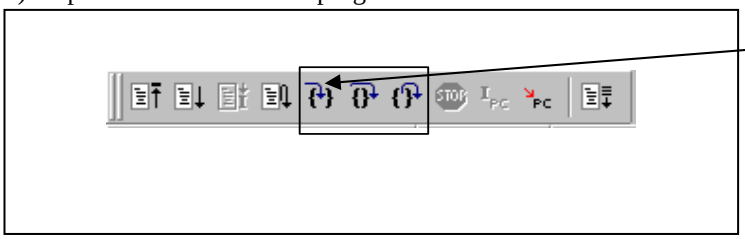


Reset Go

Runs the program after reset.

Or you can select "Reset Go" from "Debug" menu for the same effect.

5) Step execution of the user program



Step In

Single-steps the program executing each statement (including those in functions).

Step Over

Single-steps the program executing each function call as one step.

Step Out

Exists a function and stops at a statement in the program next to the one that called the function.

Or you can select "Step In" or other corresponding commands from "Debug" menu for the same effect.

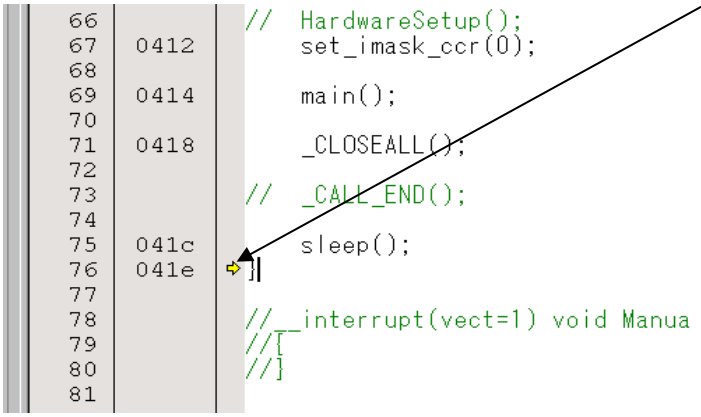
6) Stopping the user program

HALT

Stops the program.

Or you can select "Halt" from "Debug" menu for the same effect.

7) Editor (Source) window after you have stopped the user program

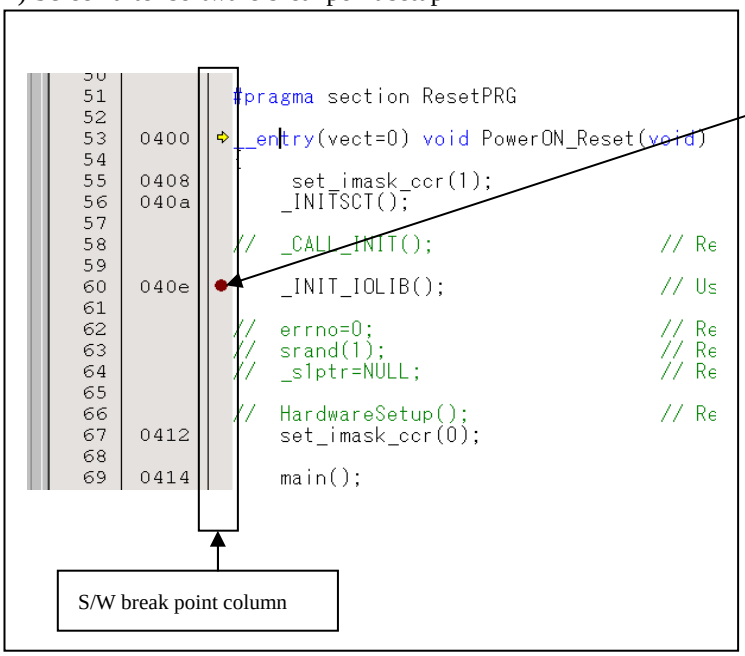


Editor (Source) window

The position at which the user program has stopped is marked by a yellow arrow.

(3) Setting software break points

1) Screen after software breakpoint setup



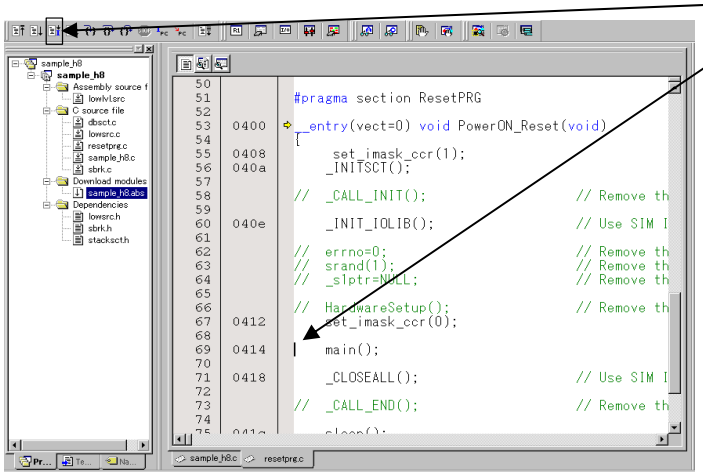
Screen after software break point setup

- Software break point (B)
  A software break point can be set or cleared by double-clicking the break point display area.
  This is rewritten to a break instruction, and program execution starts.

Or you can select "S/W Break Points" button of the tool bar, or select "S/W Break Points" from "Break" of "View" menu for the same effect.

(4) Executing up to the cursor position

1) Setup procedure for running the program up to the cursor position



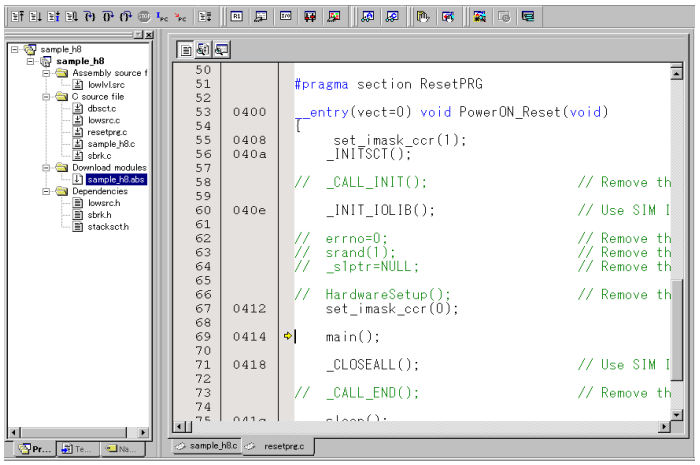
Setup procedure for running the program up to the cursor position

(1) Click the line in the text area that you want to be executed.

(2) Click the execution button to the cursor position.

Or you can select "Go to Cursor" from "Debug" menu for the same effect.

2) After the execution has finished



3.6 Hardware Break Point Setting Window

(1) Break event setup dialog box

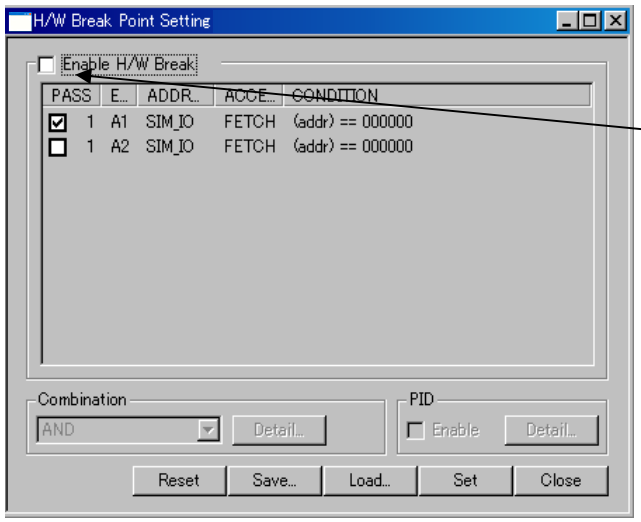
1) Opening the hardware break point setup dialog box

Hardware Break Point

Clicking this button opens the hardware break point setup dialog box.

Or you can select "H/W Break points" from "Break" of "View" menu for the same effect.

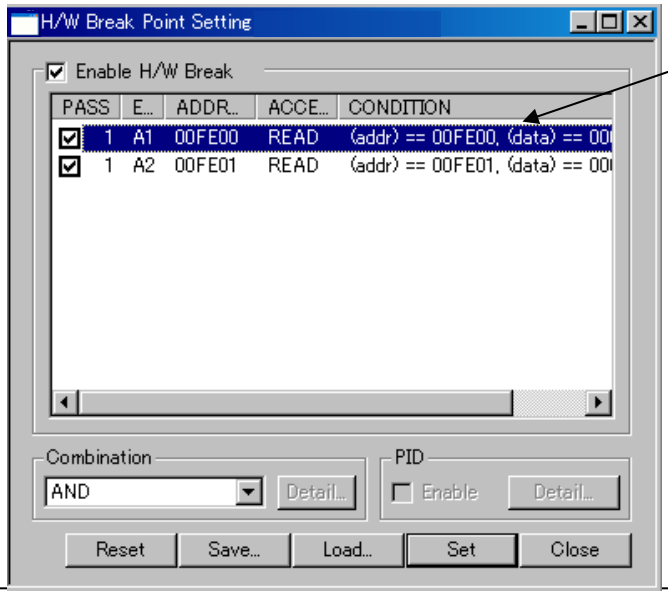
2) Hardware Break Point Setting Window in initial state



H/W break point Setting Window in initial state

Select the "Enable H/W Break" check box, and this break function will be enabled, allowing you to set hardware break points.

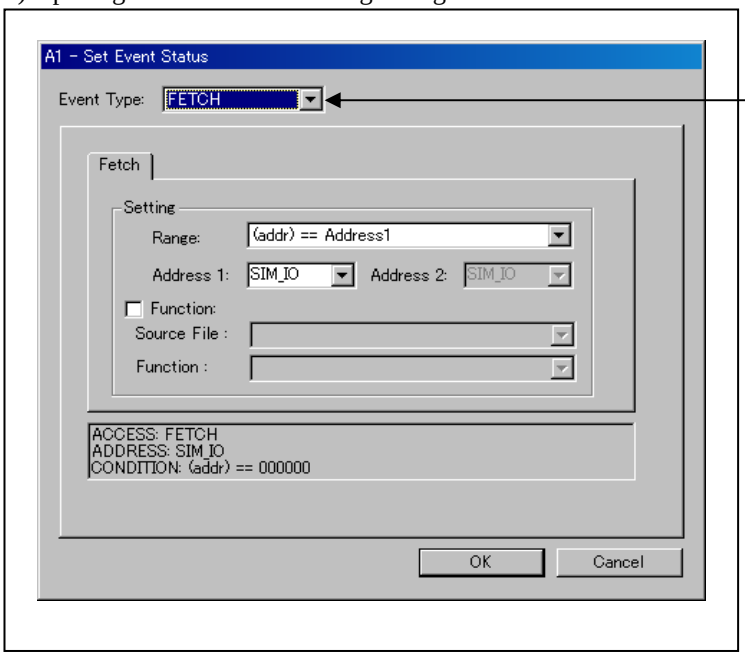
3) Opening the break event setting dialog box



Setting Break Event

Click the event line at which you want set a break event.

4) Opening the break event setting dialog box



Specifying the event type

Click to select the event type you want to set.

- FETCH

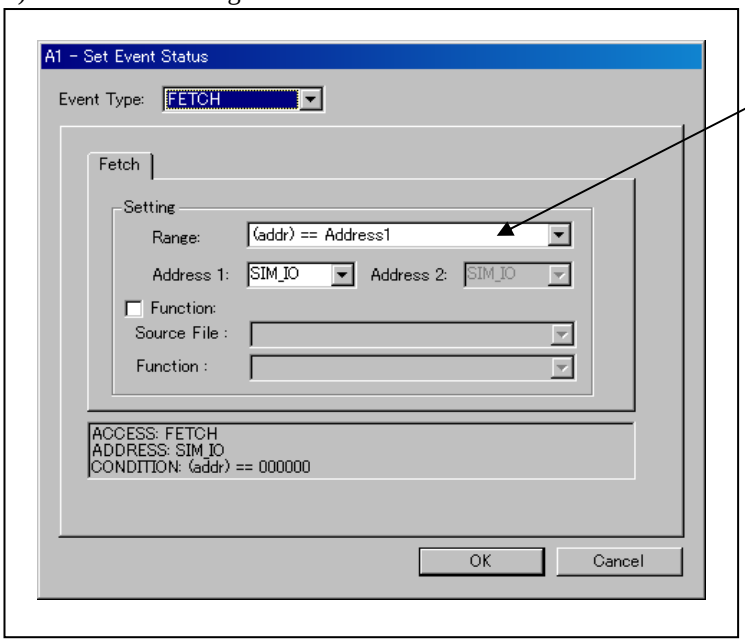
  Detects an instruction prefetch.

- DATA ACCESS

  Detects a memory access.

(2) When FETCH is selected

1) Window for setting addresses

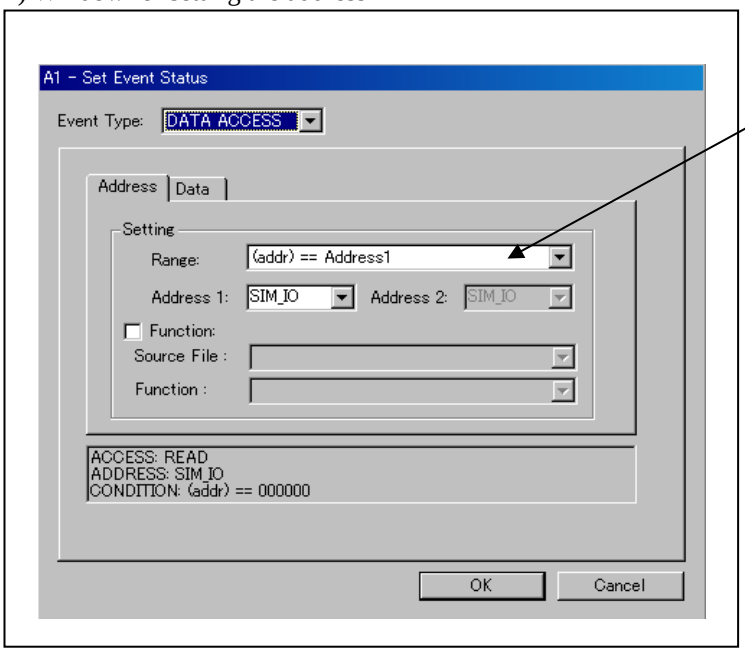


Setting the address

You can set eight conditions, e.g., a specified address, a specified address range, etc. When you have finished setting the address, click OK.

(3) When DATA ACCESS is selected

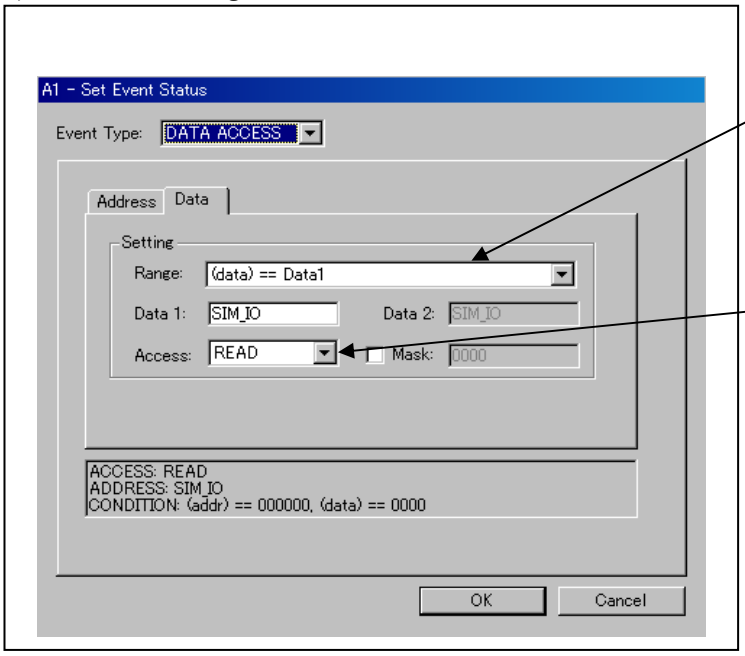
1) Window for setting the address



Setting the address

You can set eight conditions, e.g., a specified address, a specified address range, etc.

2) Window for setting data



Setting data

You can set two conditions, e.g., specified data or not to compare data.

Setting the access condition

You can set three conditions, e.g., read, write, and read/write. When you have finished setting the data and access condition, click OK.

3) Example Data Settings

The R0E436640CPE00 requires that events be set according to the bus operation.

Make sure the even-address data is set on the upper side and the odd-address data is set on the lower side.

Setting events for wordwise accesses to the 8-bit bus area of the internal I/O

MOV.W R0,H'FFDE (R0=H'0001)

Write access to H'FFDE is performed in two separate writes.

Make sure that events are set for the even and odd addresses separately.

Cycle	Label	Address	Data	R/W	RWT	AREA	STATUS	MODE
-000015	PDRC	00FFDE	00--	WR	1	I/O-8	DATA	ACT
-000014	PDRC	00FFDE	00--	WR	0	I/O-8	DATA	ACT
-000013		00FFDF	--01	WR	1	I/O-8	DATA	ACT
-000012		00FFDF	--01	WR	0	I/O-8	DATA	ACT

Even-address high-order data effective

Odd-address low-order data effective

Setting a break event

A1		A2	
Address 1	:00FFDE	Address 1	:00FFDF
Data 1	:0000	Data 1	:0001
MASK	:FF00	MASK	:00FF
Access	:WRITE	Access	:WRITE

Set the combinatorial events to AND.

Setting events for wordwise accesses to the 16-bit bus areas of the ROM, RAM and internal I/O

MOV.W R2,H'E002 (R2=H'AA55)

Cycle	Label	Address	Data	R/W	RWT	AREA	STATUS	MODE
-000057		00E002	AA55	WR	1	RAM	DATA	ACT
-000056		00E002	AA55	WR	0	RAM	DATA	ACT

High-order and low-order data effective

Setting a break event

A1

Address 1 :00E002

Data 1 :AA55

MASK :FFFF

Access :WRITE

Setting events for bytewise accesses to the ROM, RAM and internal I/O

MOV.B R0L,H'E000 (R0L=H'04)

MOV.B R0H,H'E001 (R0H=H'08)

Cycle	Label	Address	Data	R/W	RWT	AREA	STATUS	MODE
-000069	RAM_TOP	00E000	04--	WR	1	RAM	DATA	ACT
-000068	RAM_TOP	00E000	04--	WR	0	RAM	DATA	ACT
-000067		001140	E001	RD	1	ROM	PROG	ACT
-000066		001140	E001	RD	0	ROM	PROG	ACT
-000065		001142	6B82	RD	1	ROM	PROG	ACT
-000064		001142	6B82	RD	0	ROM	PROG	ACT
-000063		00E001	--08	WR	1	RAM	DATA	ACT
-000062		00E001	--08	WR	0	RAM	DATA	ACT

Even-address high-order data effective

Odd-address low-order data effective

Setting a break event

A1

Address 1 :00E000

Data 1 :0400

MASK :FF00

Access :WRITE

Setting a break event

A1

Address 1 :00E001

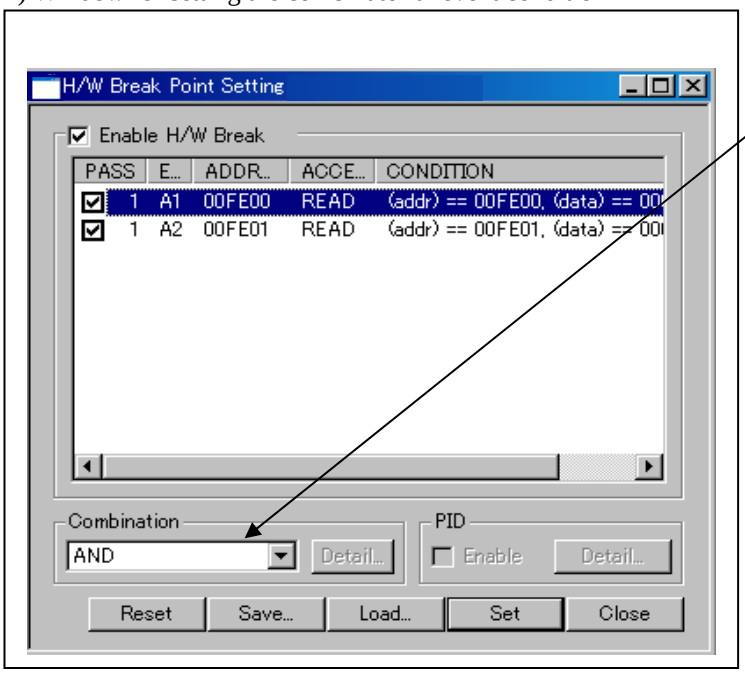
Data 1 :0008

MASK :00FF

Access :WRITE

(4) Setting the combinatorial event condition for the hardware break point

1) Window for setting the combinatorial event condition



Setting the combinatorial event condition

There are following three conditions that you can choose for the combinatorial events.

- OR

  The program breaks when one of the specified events occurs.

- AND

  The program breaks when all of the specified events occur.

- AND (Same Time)

  The program breaks when the specified events occur at the same time.

When you have finished setting the combinatorial event condition, click the "Set" button.

3.7 Trace Window

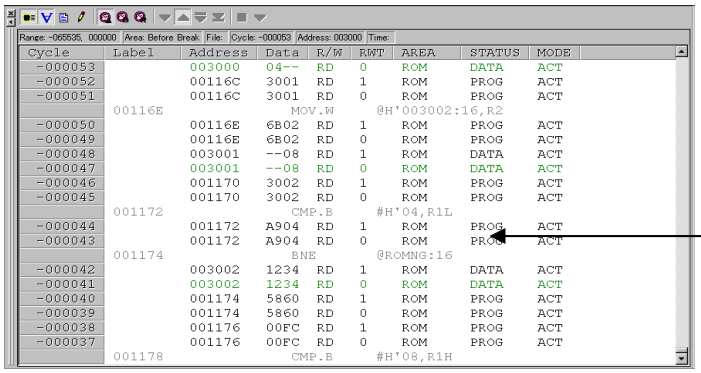
(1) Trace window

1) Opening the trace window

Trace window

Clicking this button opens the trace window.

Or you can select "Trace" from "Trace" of "View" menu for the same effect.



Cycle	Label	Address	Data	R/W	RWT	AREA	STATUS	MODE
-000053		003000	04--	RD	0	ROM	DATA	ACT
-000052		00116C	3001	RD	1	ROM	PROG	ACT
-000051		00116C	3001	RD	0	ROM	PROG	ACT
	00116E		MOV.W		@H'003002:16,R2			
-000050		00116E	6B02	RD	1	ROM	PROG	ACT
-000049		00116E	6B02	RD	0	ROM	PROG	ACT
-000048		003001	--08	RD	1	ROM	DATA	ACT
-000047		003001	--08	RD	0	ROM	DATA	ACT
-000046		001170	3002	RD	1	ROM	PROG	ACT
-000045		001170	3002	RD	0	ROM	PROG	ACT
	001172		CMP.B		#H'04,R1L			
-000044		001172	A904	RD	1	ROM	PROG	ACT
-000043		001172	A904	RD	0	ROM	PROG	ACT
	001174		BNE		@ROMNG:16			
-000042		003002	1234	RD	1	ROM	DATA	ACT
-000041		003002	1234	RD	0	ROM	DATA	ACT
-000040		001174	5860	RD	1	ROM	PROG	ACT
-000039		001174	5860	RD	0	ROM	PROG	ACT
-000038		001176	00FC	RD	1	ROM	PROG	ACT
-000037		001176	00FC	RD	0	ROM	PROG	ACT
	001178		CMP.B		#H'08,R1H			

Trace window

The trace window is used to show the results of real-time trace measurements. It has the following four display modes:

- Bus mode

  Bus information per cycle can be inspected. The contents are displayed in order of execution paths.

- Disassemble mode

  The execution paths of the executed instructions can be inspected. The contents are displayed in order of execution paths.

- Source mode

  The execution paths of the source program can be inspected.

  Operating buttons of the tool bar can reference the execution paths.

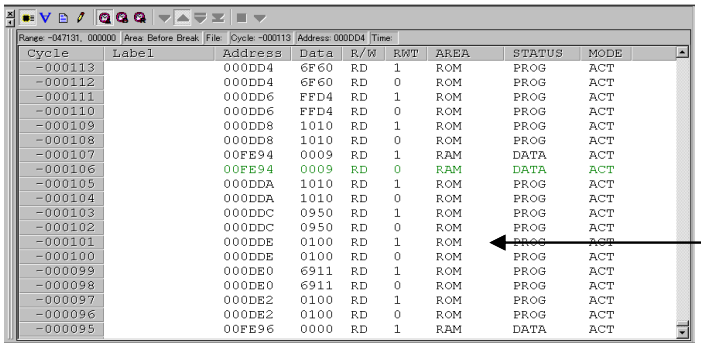
- Data access mode

  Data read/write cycles can be inspected. In addition to the data access information, the window can display the source line information in combination with it.

The trace window shows the measurement result when a real-time trace measurement has finished. The trace window remains blank until the real-time trace measurement in progress finishes.

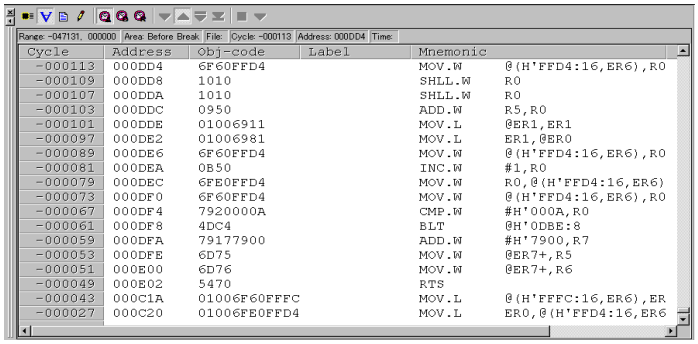
2) Trace window

Bus display



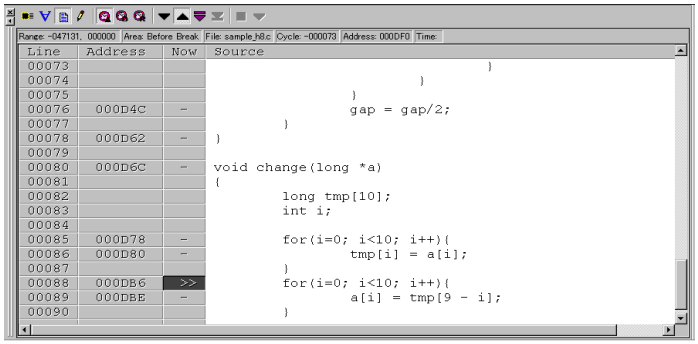
Cycle	Label	Address	Data	R/W	RWT	AREA	STATUS	MODE
-000113		000DD4	6F60	RD	1	ROM	PROG	ACT
-000112		000DD4	6F60	RD	0	ROM	PROG	ACT
-000111		000DD6	FFD4	RD	1	ROM	PROG	ACT
-000110		000DD6	FFD4	RD	0	ROM	PROG	ACT
-000109		000DD8	1010	RD	1	ROM	PROG	ACT
-000108		000DD8	1010	RD	0	ROM	PROG	ACT
-000107		00FE94	0009	RD	1	RAM	DATA	ACT
-000106		00FE94	0009	RD	0	RAM	DATA	ACT
-000105		000DDA	1010	RD	1	ROM	PROG	ACT
-000104		000DDA	1010	RD	0	ROM	PROG	ACT
-000103		000DDC	0950	RD	1	ROM	PROG	ACT
-000102		000DDC	0950	RD	0	ROM	PROG	ACT
-000101		000DDE	0100	RD	1	ROM	PROG	ACT
-000100		000DDE	0100	RD	0	ROM	PROG	ACT
-000099		000DE0	6911	RD	1	ROM	PROG	ACT
-000098		000DE0	6911	RD	0	ROM	PROG	ACT
-000097		000DE2	0100	RD	1	ROM	PROG	ACT
-000096		000DE2	0100	RD	0	ROM	PROG	ACT
-000095		00FE96	0000	RD	1	RAM	DATA	ACT

Disassemble display



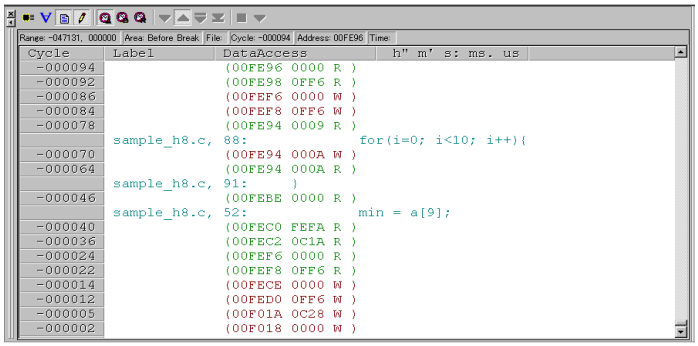
Cycle	Address	Obj-code	Label	Mnemonic	
-000113	000DD4	6F60FFD4		MOV.W	@(H'FFD4:16,ER6),R0
-000109	000DD8	1010		SHLL.W	R0
-000107	000DDA	1010		SHLL.W	R0
-000103	000DDC	0950		ADD.W	R5,R0
-000101	000DDE	01006911		MOV.L	@ER1,ER1
-000097	000DE2	01006981		MOV.L	ER1,@ER0
-000089	000DE6	6F60FFD4		MOV.W	@(H'FFD4:16,ER6),R0
-000081	000DEA	0B50		INC.W	#1,R0
-000079	000DEC	6FE0FFD4		MOV.W	R0,@(H'FFD4:16,ER6)
-000073	000DF0	6F60FFD4		MOV.W	@(H'FFD4:16,ER6),R0
-000067	000DF4	7920000A		CMP.W	#H'000A,R0
-000061	000DF8	4DC4		BLT	@H'0DBE:8
-000059	000DFA	79177900		ADD.W	#H'7900,R7
-000053	000DFE	6D75		MOV.W	@ER7+,R5
-000051	000E00	6D76		MOV.W	@ER7+,R6
-000049	000E02	5470		RTS	
-000043	000C1A	01006F60FFFC		MOV.L	@(H'FFFC:16,ER6),ER
-000027	000C20	01006FE0FFD4		MOV.L	ER0,@(H'FFD4:16,ER6

Source display



Line	Address	Now	Source
00073			}
00074			}
00075			}
00076	000D4C	-	gap = gap/2;
00077			}
00078	000D62	-	}
00079			
00080	000D6C	-	void change(long *a)
00081			{
00082			long tmp[10];
00083			int i;
00084			
00085	000D78	-	for(i=0; i<10; i++){
00086	000D80	-	tmp[i] = a[i];
00087			}
00088	000DB6	>>	for(i=0; i<10; i++){
00089	000DBE	-	a[i] = tmp[9 - i];
00090			}

Data access display



Cycle	Label	DataAccess	h" m' s: ms. us
-000094		(00FE96 0000 R)	
-000092		(00FE98 0FF6 R)	
-000086		(00FEF6 0000 W)	
-000084		(00FEF8 0FF6 W)	
-000078		(00FE94 0009 R)	
	sample_h8.c, 88:	for(i=0; i<10; i++){	
-000070		(00FE94 000A W)	
-000064		(00FE94 000A R)	
	sample_h8.c, 91:	}	
-000046		(00FEBE 0000 R)	
	sample_h8.c, 52:	min = a[9];	
-000040		(00FEC0 FEFA R)	
-000036		(00FEC2 0C1A R)	
-000024		(00FEF6 0000 R)	
-000022		(00FEF8 0FF6 R)	
-000014		(00FECE 0000 W)	
-000012		(00FED0 0FF6 W)	
-000005		(00F01A 0C28 W)	
-000002		(00F018 0000 W)	

Explanation of the trace window (bus display)

The following explains the displayed contents, from left to right.

- Address
  Shows the status of the address bus.
- Data
  Shows the status of the data bus.
- R/W
  Shows the status of the data bus.
  Displayed as "RD" for Read, "WR" for Write, and "–" for no access.
- RWT
  This is the signal to indicate a valid bus cycle. When valid, RWT = 0. The Address and Data signals are effective when this signal is 0.
- AREA
  Shows the target of bus access.

Type	Status
ROM	: ROM area
RAM	: RAM area
I/O-8	: Internal I/O area in 8-bit bus width
I/O-16	: Internal I/O area in 16-bit bus width

- STATUS
  Shows the operating status of the MCU.

Type	Status
PROG	: Instruction fetch cycle
DATA	: Data access cycle
SLEEP	: Sleep mode
SUBSLEEP	: Subsleep mode
OTHER	: No change

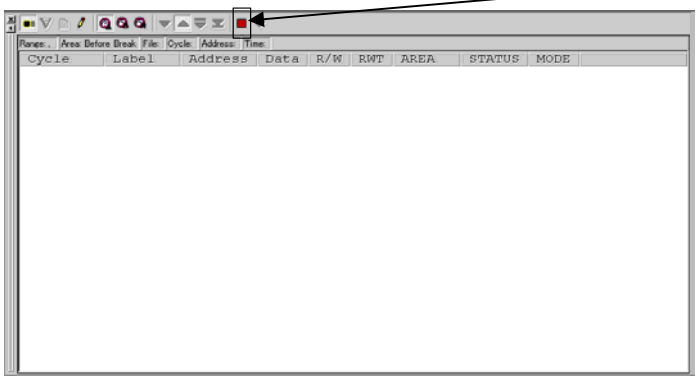
- MODE
  Shows the operation mode of the MCU.

Type	Status
ACT	: Active mode
SUB	: Subactive mode

Note: If modes are changed from subactive to standby modes in STATUS, some displayed cycles may be marked "DMAC." Note, however, that no DMAC accesses have actually been performed.

(2) Suspending and resuming trace measurement

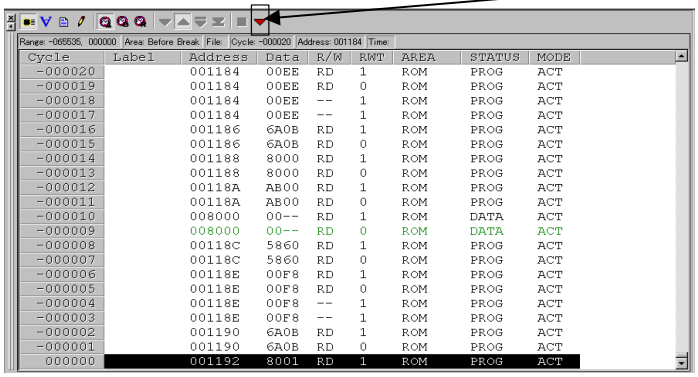
1) Suspending trace measurement



Stop

Click this toolbar button to suspend the trace measurement in progress.

2) Resuming trace measurement

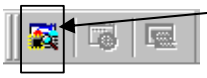


Re-Start

Click this toolbar button to resume the trace measurement in progress.

(3) Trace point setup window

1) Opening the trace point setup window

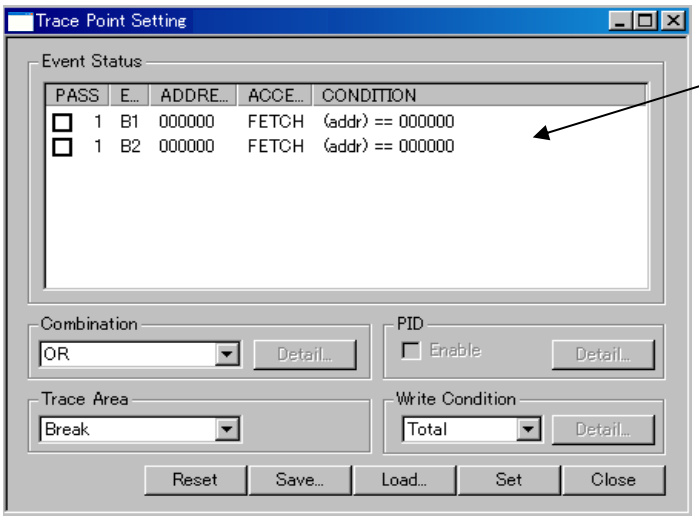


Trace Point

Clicking this toolbar button opens the trace point setting window.

Or you can select "Trace" from "Trace" of "View" menu for the same effect.

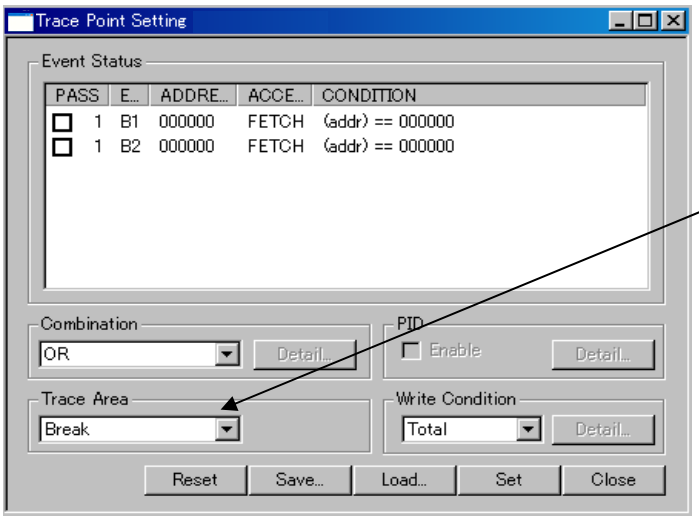
2) Trace Point Setting Window in initial state



Trace Point Setting Window in initial state

Be sure to enable the trace point function in the Init dialog box before you set up in this window. Here, you can set events in the same way as for the hardware breakpoints.

3) Specifying a trace area

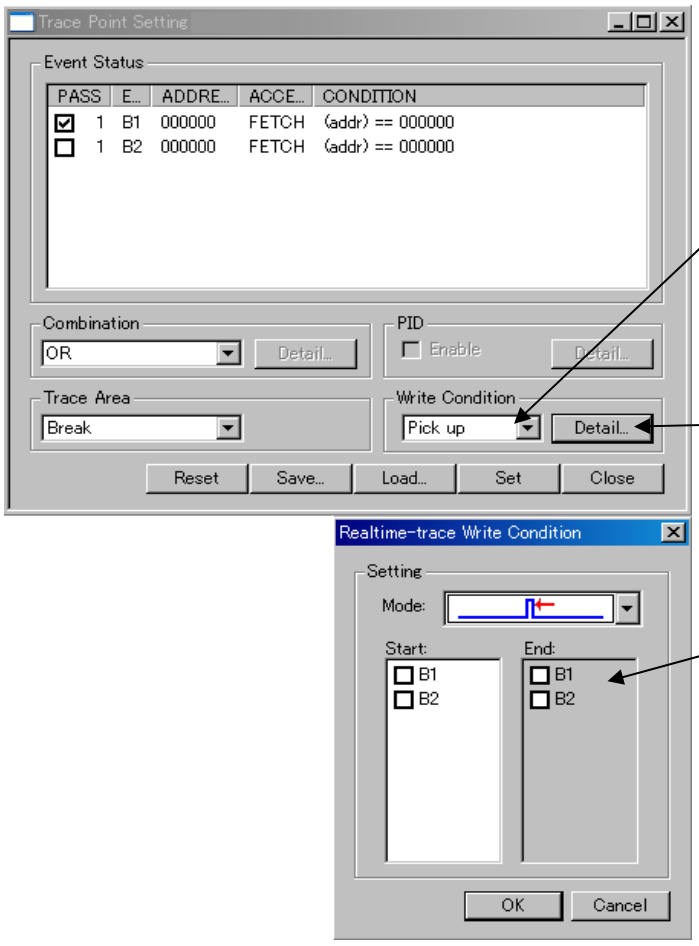


Specifying a trace area

You can specify a trace range for the trace event.

- Break
  64K cycles of instruction execution before the user program stopped is recorded.
- Before
  64K cycles of instruction execution before a trace point condition was met is recorded.
- About
  64K cycles of instruction execution before and after a trace point condition was met is recorded.
- After
  64K cycles of instruction execution after a trace point condition was met is recorded.
- Full
  64K cycles of instruction execution after a trace began is recorded.

4) Setting trace write conditions



Setting trace write conditions

You can specify a condition for the cycles to be written into the trace memory.

- Total
  All cycles are written into memory.
- Pick up
  Only the cycles in which the specified condition was met are written into memory.
- Exclude
  Only the cycles in which the specified condition was not met are written into memory.

When you have finished setting the trace write condition, click this button. The Realtime-trace Write Condition dialog box shown below will appear.

Write mode

Only the cycle in which the specified Start event occurred

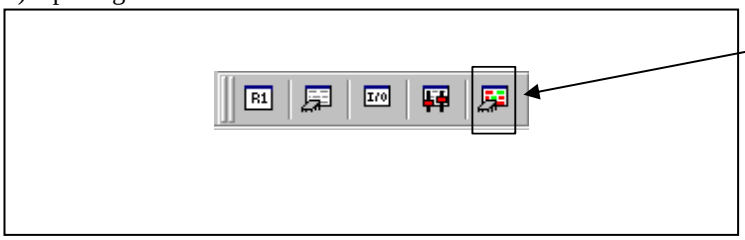
A range of cycles from when the specified Start event occurred to when the specified Start event became nonexistent

A range of cycles from when the specified Start event occurred to when the specified End event occurred

3.8 RAM Monitor Window

(1) RAM monitor window

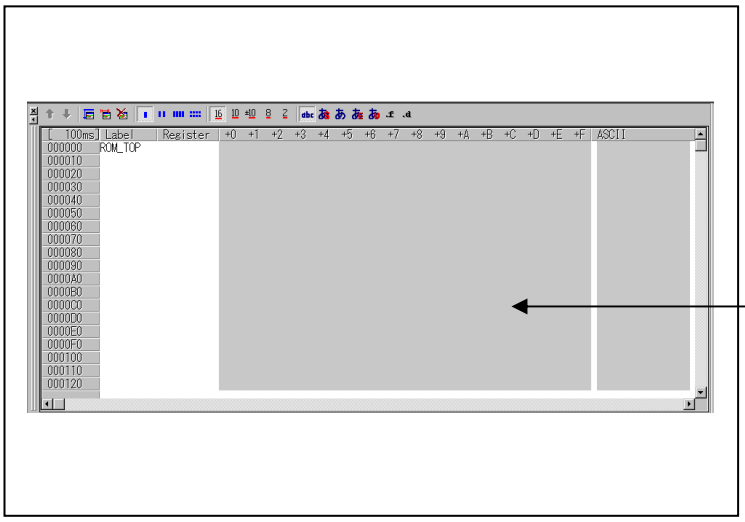
1) Opening the RAM monitor window



RAM monitor

Clicking this button opens the RAM monitor window.

Or you can select "RAM monitor" from "CPU" of "View" menu for the same effect.

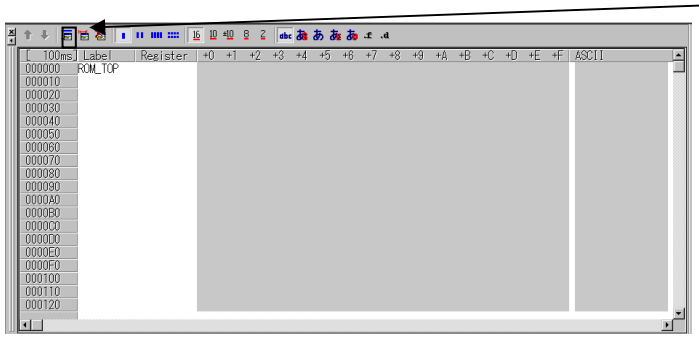


RAM monitor window

This window shows changes of memory contents while the user program is executed. This is accomplished by using the real-time RAM monitor function, and the memory contents corresponding to the RAM monitor area are displayed in dump form. The memory contents displayed here are updated at given intervals (by default, every 100 ms) during user program execution.

(2) RAM monitor area setting window

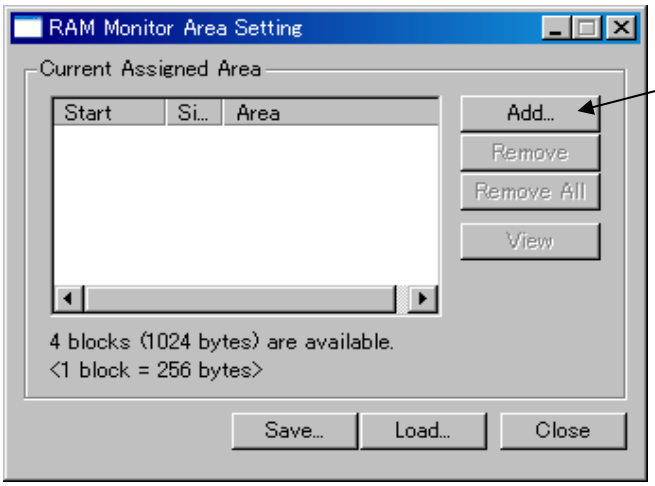
1) Opening RAM monitor area setting window



RAM monitor area setting

Clicking this button opens the RAM monitor setting window.

2) RAM monitor area setting window in initial state

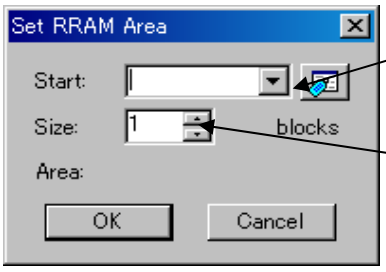


RAM Monitor Area Setting Window in initial state

No settings by default.

To set a RAM monitor area, click the "Add..." button. The RAM Monitor Area Setting window will be displayed.

3) RAM monitor area setting dialog box



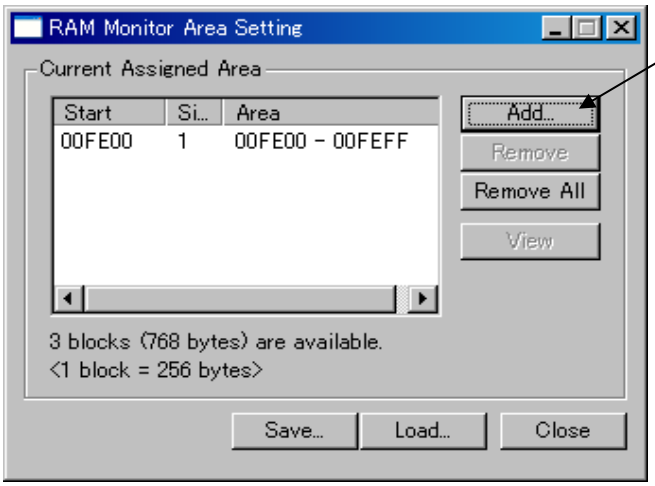
Specifying the start address

You can set the start address of the RAM area to be monitored.

Specifying the size

You can set the size to be monitored by specifying the number of blocks from the start address. One block is 256 bytes in size.

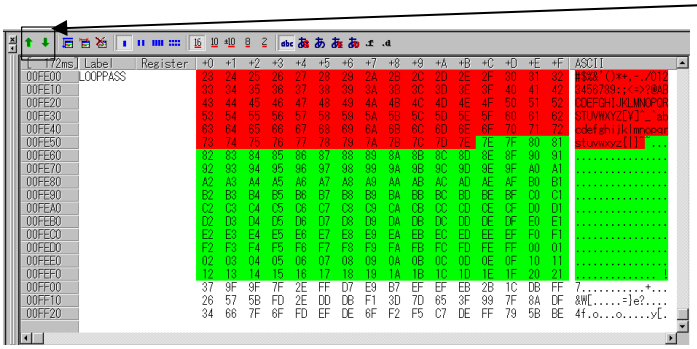
4) RAM monitor area setting dialog box when RAM monitor area is changed from H'FE00 to 1 block



Specifying the start address

You can set the start address of the RAM area to be monitored. To add a RAM monitor area, click the "Add..." button. The RAM Monitor Area Setting window will be displayed.

5) RAM monitor area setting dialog box



Changing the RAM monitor display area

You can change the manner in which the RAM monitor area you have set in the above dialog box is displayed.

- Up Shows the blocks at the preceding addresses.
- Down Shows the blocks at the following addresses.

The background colors of the data display and the code display sections change with the access attribute as described below.

- Green Addresses accessed for read
- Red Addresses accessed for write
- White Addresses not accessed

The background colors can be changed as necessary.

4. Hardware Specifications

This chapter describes specifications of this product.

4.1 Target MCU Specifications

Table 4.1 lists the specifications of target MCUs which can be debugged with this product.

Table 4.1 Specifications of target MCUs for the R0E436640CPE00

Item	Description
Applicable MCU	The applicable 64-pin MCUs for the H8/300H Tiny Series are shown below. - H8/3664 Group - H8/36064 Group - H8/3694 Group - H8/36094 Group - H8/3687 Group - H8/36087 Group - H8/3672 Group - H8/36077 Group - H8/36014 Group - H8/36079 Group The following 80-pin MCU is available by using with the converter board R0E436049CFJ10. - H8/36049 Group
Applicable MCU mode	Normal mode Advanced mode
Maxi. ROM/RAM capacity	1. Internal flash ROM:128KB Normal mode: 0000h--DFFFh Advanced mode: 000000h--01FFFFh 2. Internal RAM: 6KB Normal mode: E000h--EFFFh, F780h--FF7Fh Advanced mode: FFE000h--FFEFFFh, FFF780h--FFFF7Fh
Operating voltage/frequency	20MHz at 2.7--5.5 V

4.2 Differences between the Actual MCU and Emulator

Differences between the actual MCU and emulator are shown below. When debugging the MCU using this product, be careful about the following precautions.

IMPORTANT

Notes on Internal Memory (ROM, RAM):

- The evaluation MCU mounted on this product has RAM of 6 KB and flash ROM of 128 KB. For this reason, the nonexistent ROM or RAM area of the target MCU may be accessed.
- With this product, the flash ROM area of target MCU is cleared at "0000h (NOP instruction)" when starting up the emulator.

Note on Unused Area:

- You cannot use unused areas. Write signals to the areas will be ignored, and values read will be undefined.

Notes on RESET# Input:

- A low input to pin RESET# from the user system is accepted only when a user program is being executed (when the RUN status LED on the emulator's upper panel is lit).
- The time for starting up (0.2 Vcc to 0.8 Vcc) and falling edge (0.8 Vcc to 0.2 Vcc) for RESET# pin should be set to 1 µs or less.

Note on NMI* Input:

- A low input to pin NMI* from the user system is accepted only when a user program is being executed (only while the RUN status LED on the emulator's upper panel is lit).

Notes on Maskable Interrupts:

- Even if a user program is not being executed (including when run-time debugging is being performed), the evaluation MCU keeps running so as to control the emulator. Therefore, timers and other components do not stop running. If a maskable interrupt is requested when the user program is not being executed (including Internal I/O access when run-time debugging is being performed), the maskable interrupt request cannot be accepted, because the emulator disables interrupts. The interrupt request is accepted immediately after the user program execution is started.
- Take note that when the user program is not being executed (including Internal I/O access when run-time debugging is being performed), a peripheral I/O interruption is not accepted.

Note on Oscillator Circuit:

- Make note of the fact that in the oscillator circuit where a resonator is connected between OSC1 and OSC2, oscillation does not occur because a converter board is used between the evaluation MCU and the user system. For notes on when using the oscillator circuit on the user system, refer to "2.9.3 Selecting Clock Supply " (page 35). It is same for a sub-clock oscillator (X1 and X2).
- On-chip oscillator function is not supported.

Note on A/D Converter:

- Because a converter board and other devices are used between the evaluation MCU and the user system, the A/D converter operates differently from that of the actual MCU.

Note on Power-on Reset & Low-voltage Detection Circuit Functions:

- These functions are not supported.

IMPORTANT

Note on exception handling:

- Because the compact emulator emulates several target MCUs with a single evaluation MCU, the exception handling factors of the actual MCU and those of the evaluation MCU are not always the same. Use only exception handling factors which the hardware manual describes that it is available.
  In addition, the low-voltage detection interrupt that an evaluation MCU does not have and the exception handling related to an on-chip oscillator are not supported.

Note on the I/O registers:

- Since the compact emulator emulates several target MCUs using a single evaluation MCU, the I/O registers of the actual MCU and those of the evaluation MCU are not always the same. Therefore, do not access the reserved I/O registers of the target MCU. Note also that accesses to the registers listed below that are associated with power-on reset & low-voltage detection circuit functions, on-chip oscillator and flash memory control are invalid.

  - Low-voltage-detection Control Register (LVDCR: H'F730)
  - Low-voltage-detection Status Register (LVDSR: H'F731)
  - Reset Source Decision Register (LVDRF: H'F732)
  - Clock Control/Status Register (CKCSR: H'F734)
  - RC Control Register (RCCR: H'F735)
  - RC Trimming Data Protect Register (RCTRMDPR: H'F736)
  - RC Trimming Data Register (RCTRMDR: H'F737)
  - Flash Memory Control Register 1 (FLMCR1: H'FF90)
  - Flash Memory Control Register 2 (FLMCR2: H'FF91)
  - Flash Memory Power Control Register (FLPWCR: H'FF92)
  - Block Specification Register 1 (EBR1: H'FF93)
  - Flash Memory Enable Register (FENR: H'FF9B)

  For details, refer to notes on each MCUs in "Notes on Using This Product (2)" (page 75).

Note on Clock Supply to the MCU:

- A clock supplied to the evaluation MCU is selected by the Clock tab in the Init dialog box of the emulator debugger.
  (1) When "Internal" is selected:
  A clock generated by the oscillation circuit in the emulator is supplied to the evaluation MCU. The clock is continually supplied to the evaluation MCU regardless of a status of user system clock and a status of user program execution.
  (2) When "External" is selected:
  Clock supply to the evaluation MCU depends on oscillation state (oscillate/off) of the user system.

Notes on Software Breaks:

- Software breaks change the instruction at a specified address to a BRK (H'5770). Therefore, take note that when you reference the result of a trace in bus mode, " H'5770" is displayed.
- As the BRK instruction is used for the emulator, do not use it in a user program.

IMPORTANT

Notes on mode transition:

- Mode transition is initiated by an interrupt. However, because the emulator generates an emulation-only interrupt when one of the following operations is performed, it is possible that an unexpected mode transition will occur while no interrupts have ever been generated in the user program itself.
  - Forcible break (caused by entering the Esc key or pressing the Halt toolbar button)
  - Break specified in an event detection system
  - Single-stepping (Step In, Step Over, or Step Out)
  - Program is run by Go from the SLEEP instruction address to which a software break has been set

Notes on the reserved areas:

- In the actual MCU, the reserved areas are not guaranteed of program operation. When debugging a program that resides partly in the reserved area for reasons of memory size, we recommend selecting the MCU that has the largest ROM size available.
- Since the compact emulator emulates multiple target MCUs using a single evaluation MCU, it occurs that the compact emulator has I/O registers other than those of the target MCU. Therefore, be careful not to access the unused addresses in the I/O register area. The values read or written to those addresses cannot be guaranteed. Note also that the addresses H'F000 to H'F0FF comprise an area used by the compact emulator, so do not access this area. The values read or written to those addresses cannot be guaranteed.

Notes on EEPROM:

- To permit the H8/36xxN (with built-in EEPROM) to be evaluated, this product has a serial EEPROM mounted directly in the conversion boards R0E436640CFG20 and R0E436640CFK20, one in each. When evaluating the H8/36xxN, be sure to select the MCU file "H836xxN.mcu" in the emulator debugger. Note that although the H8/36xxN permits the slave address code of its internal EEPROM to be rewritten to H'00–H'07, the slave address of the serial EEPROM mounted on the conversion board is fixed to H'00 (default for the internal EEPROM of the H8/36xxN). Note also that this EEPROM can be rewritten up to 100,000 times. When this rewrite limit is exceeded, please purchase a new conversion board.
- The serial EEPROM mounted on the conversion board has P57/SCL and P56/SDA connected to it, with 10 kΩ pullup resistors included. Pay careful attention when you select pullup resistor values for the target system. The pullup resistors of the target system affect the rise and fall times of signals depending on their selected values. In the worst case, the serial EEPROM cannot be accessed correctly.

Note on DC Characteristics:

- Because a protective serial resistance, analog switches and other devices are used between the ports, the DC characteristics are different from those of an actual MCU. Make note on this when using this product.

Note on Final Evaluation:

- Be sure to evaluate your system with an evaluation MCU. Before starting mask production, evaluate your system and make final confirmation with a CS (Commercial Sample) version MCU.

4.3 Connection Diagrams

Figures 4.1 to 4.3 show the connection diagrams of the R0E436640CPE00. These connection diagrams mainly show the interface section. The signals not shown in the figures connect the evaluation MCU and the user system directly. The circuits not connected to the user system such as the emulator's control system are omitted. Table 4.2 shows IC electric characteristics of this product for reference purposes.

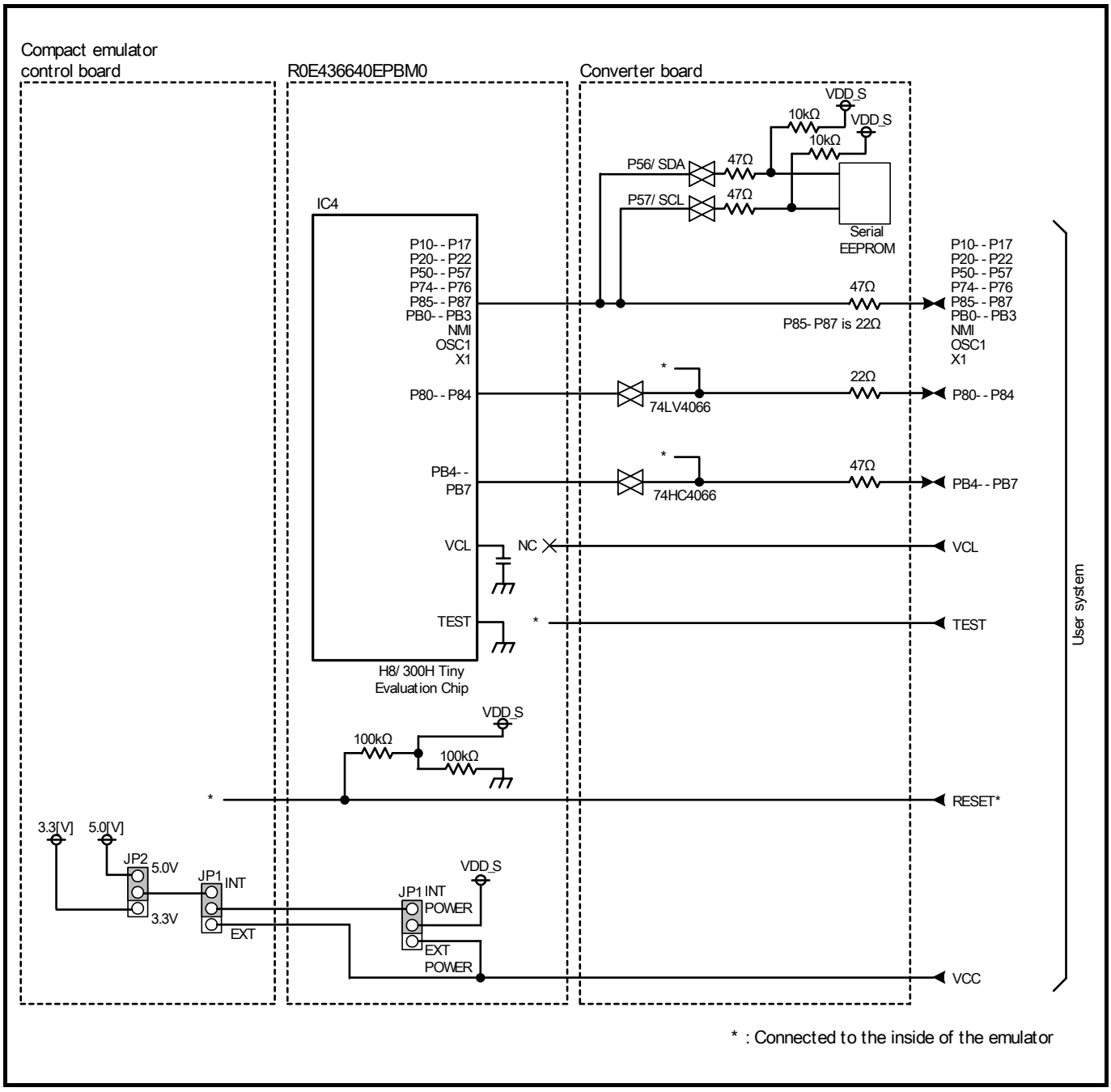


Figure 4.1 Connection diagrams of R0E436640CPE00 (H8/3664, 3694, 36094, 3672, etc.)

⚠ CAUTION

Note on DC Characteristics:

- Because a protective serial resistance, analog switches and other devices are used between the ports, the DC characteristics are different from those of an actual MCU. Make note on this when using this product.

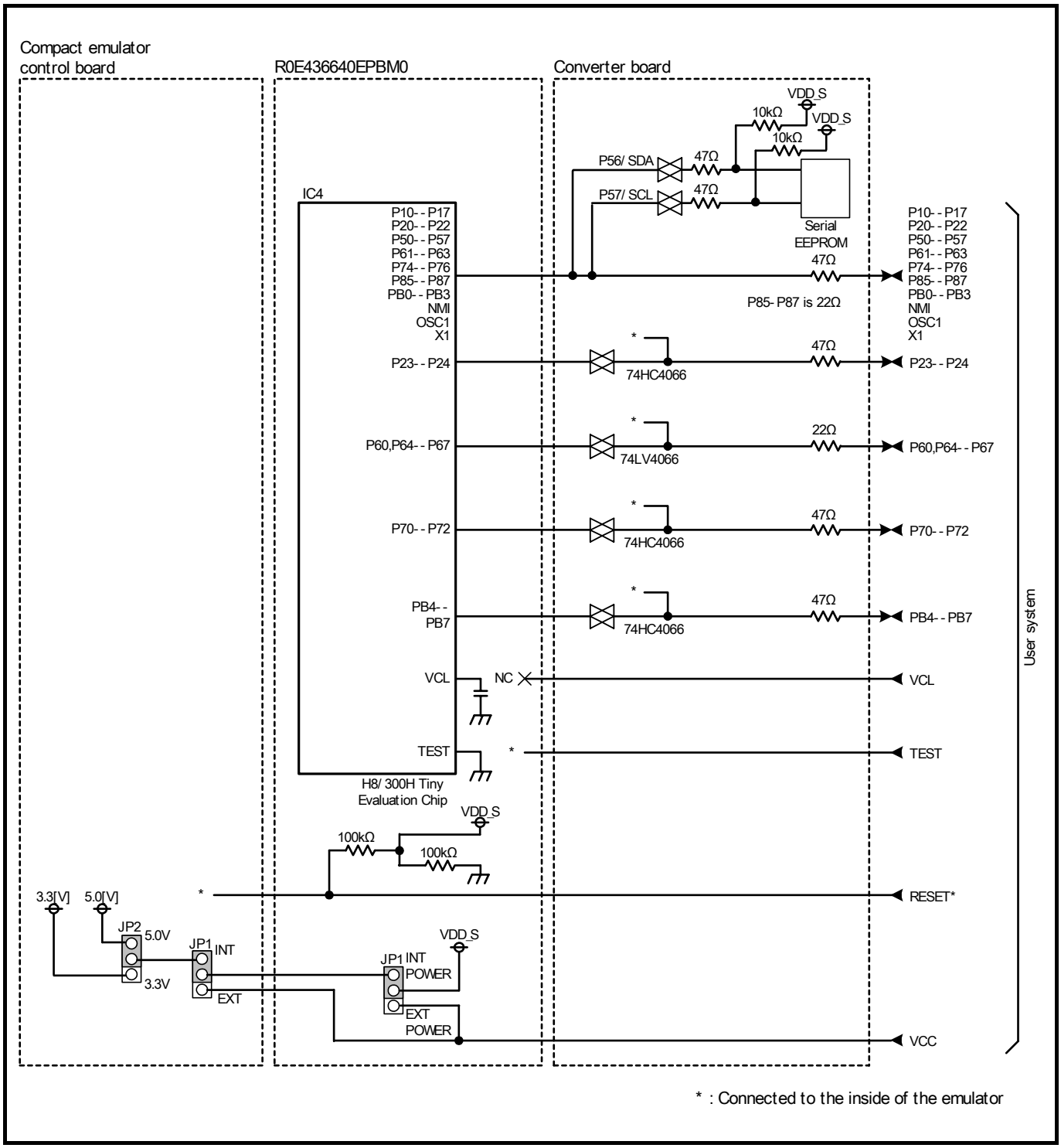


Figure 4.2 Connection diagrams of R0E436640CPE00 (H8/3687, 36087, 36064, 36077 and 36079 etc.)

⚠ CAUTION

Note on DC Characteristics:

- Because a protective serial resistance, analog switches and other devices are used between the ports, the DC characteristics are different from those of an actual MCU. Make note on this when using this product.

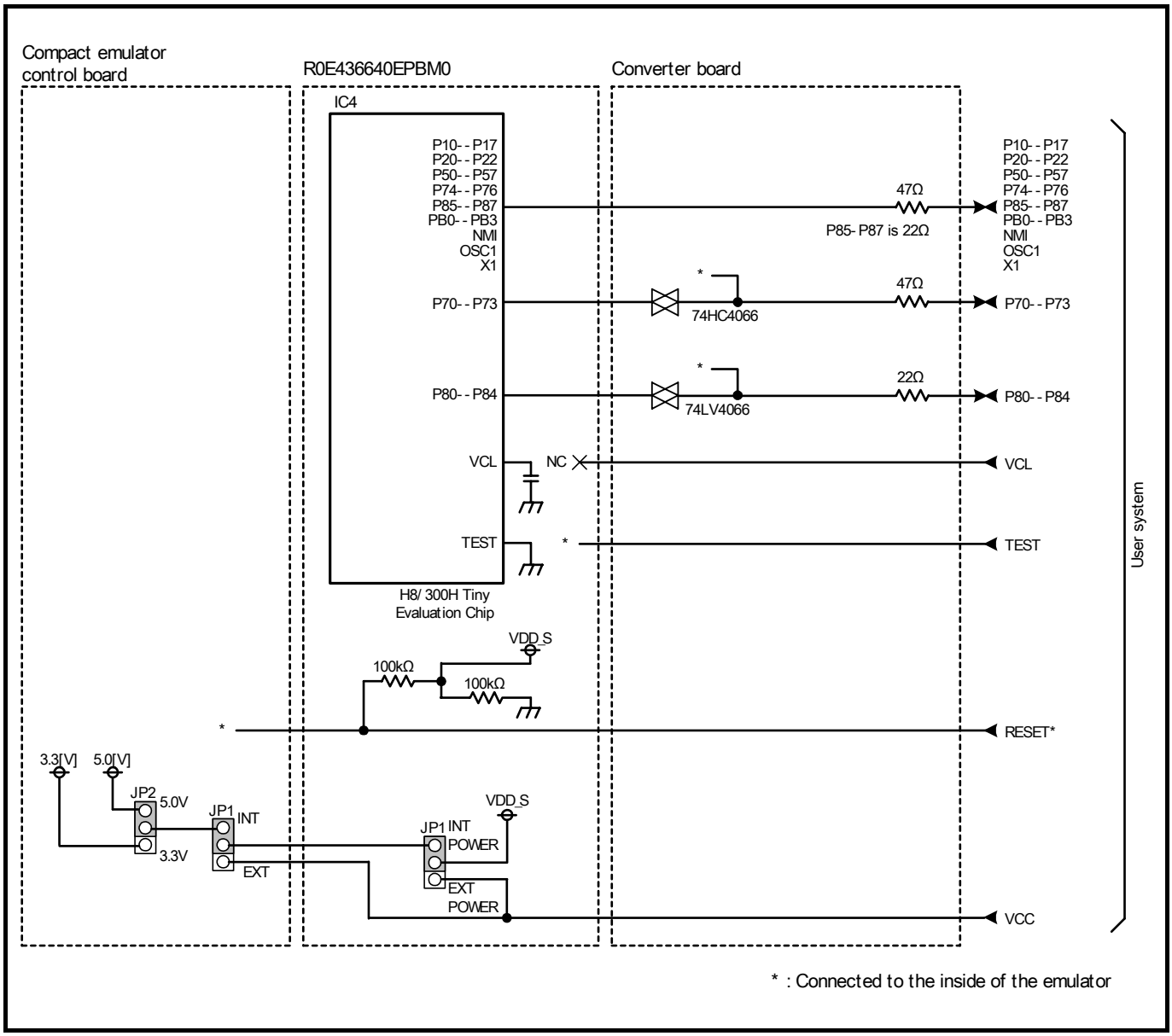


Figure 4.3 Connection diagrams of R0E436640CPE00 (H8/36014, etc.)

Table 4.2 Electrical characteristics of the 74LV4066 and 74HC4066

Symbol	Item	Condition	LV4066 Standard values			HC4066 Standard values			Unit
			Min.	Standard	Max.	Min.	Standard	Max.	
RON	ON resistor	Vcc=4.5V	-	21	100	-	96	200	Ω
ΔRON	ON resistor difference	Vcc=4.5V	-	2	20	-	10	-	
IOFF	Leak current (Off)	Vcc=12.0V	-	-	±1	-	-	±1	μA
IIZ	Leak current (On, output: open)	Vcc=12.0V	-	-	±1	-	-	±1	

⚠ CAUTION

Note on DC Characteristics:

- Because a protective serial resistance, analog switches and other devices are used between the ports, the DC characteristics are different from those of an actual MCU. Make note on this when using this product.

4.4 External Dimensions

4.4.1 External Dimensions of the Compact Emulator

Figure 4.4 shows external dimensions of the R0E436640CPE00 connected with the converter.

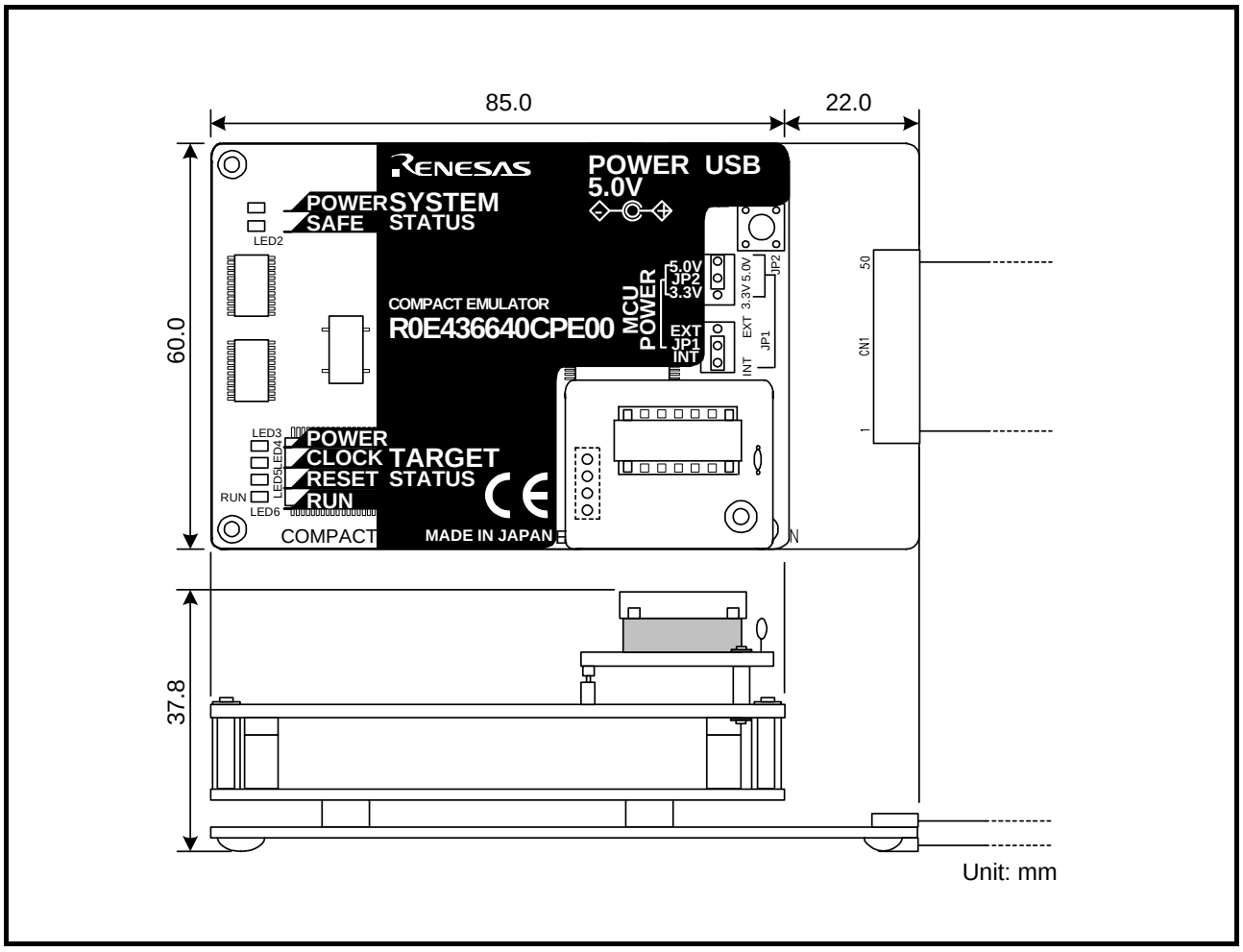


Figure 4.4 External dimensions of the compact emulator

4.4.2 External Dimensions of the Converter Board R0E436640CFG20

Figure 4.5 shows external dimensions and a sample foot pattern of the converter board R0E436640CFG20 for a 64-pin 0.8mm pitch QFP.

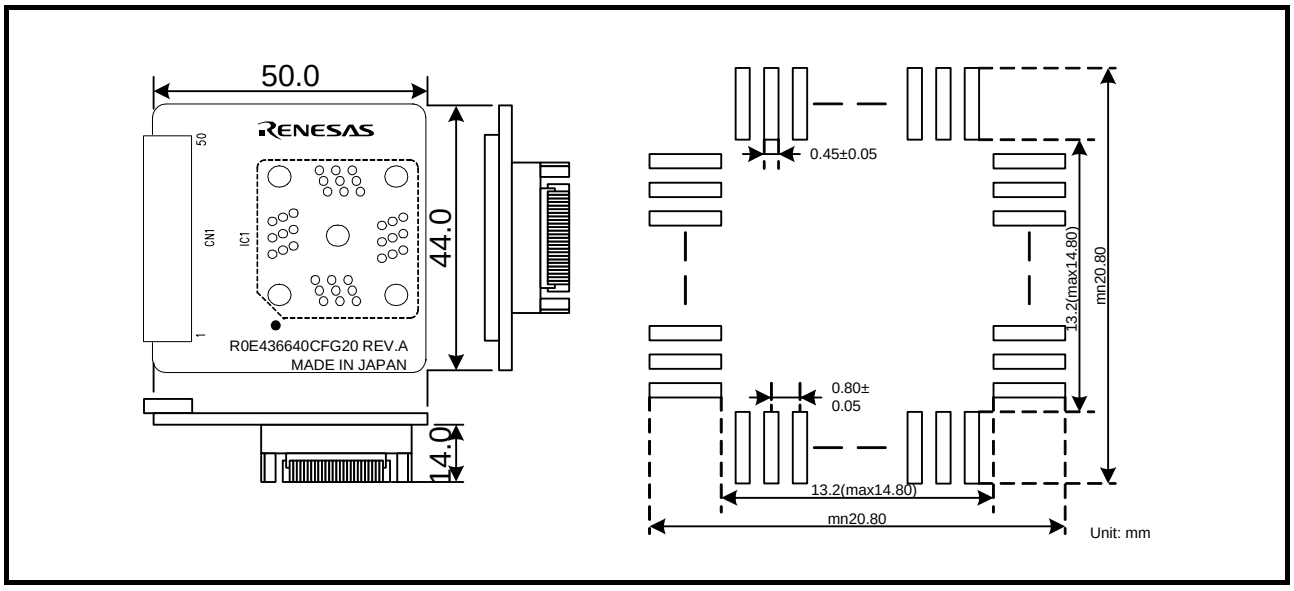


Figure 4.5 External dimensions of the converter board R0E436640CFG20 and a sample foot pattern

4.4.3 External Dimensions of the Converter Board R0E436640CFK20

Figure 4.6 shows external dimensions and a sample foot pattern of the converter board R0E436640CFK20 for a 64-pin 0.5mm pitch LQFP.

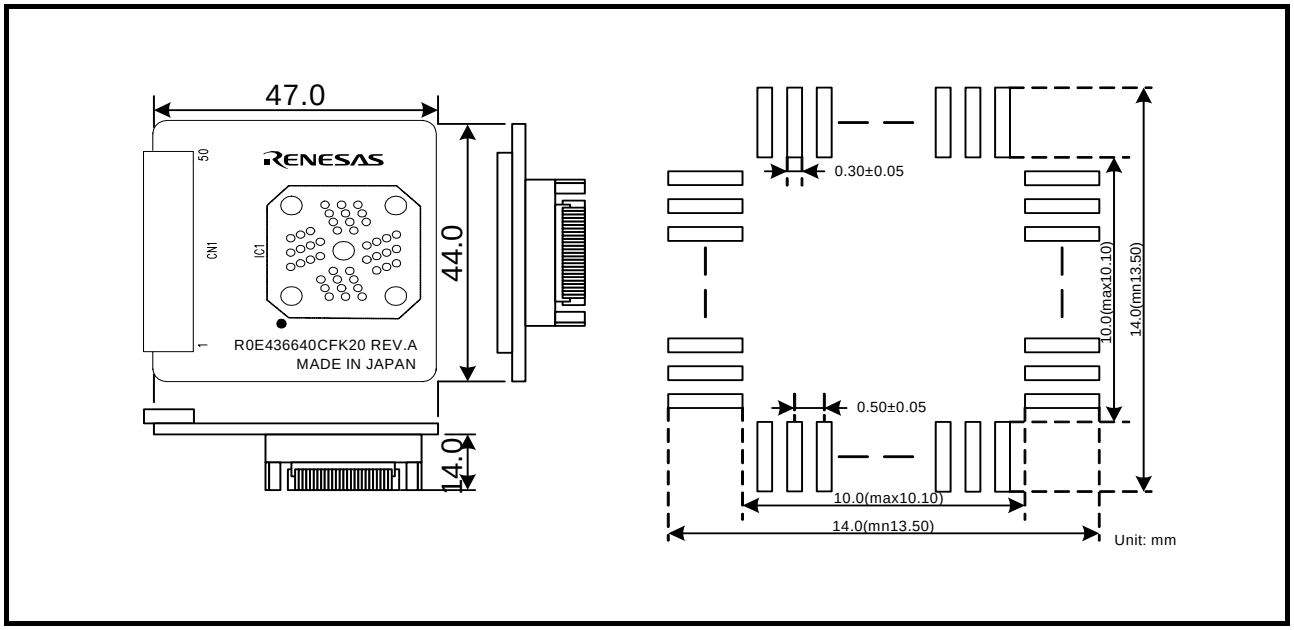


Figure 4.6 External dimensions of the converter board R0E436640CFK20 and a sample foot pattern

4.5 Notes on Using This Product (1)

Notes on using this product are listed below. Be sure to read these notes before using this product.

IMPORTANT

Note on Downloading Firmware:

- Do not shut off the power while downloading the firmware. If this happens, the product will not start up properly. If power is shut off unexpectedly, redownload the firmware.

Notes on the Self-check:

- If the self-check does not result normally, the emulator may be damaged. Then contact your local distributor.
- Run the self-check with the user system not connected.

Note on Quitting the Emulator Debugger:

- To restart the emulator debugger after it ends, always shut power to the emulator module off once and then on again.

Notes on the User System (Power Supply, Order of Powering On):

- When the user system is connected, be sure to set the JP1 of the control board (upper board) to "EXT".
- This emulator cannot supply the power to the user system. Therefore design your system so that the user system is powered separately.
- This emulator consumes max. 500 mA of electric current from the user system.
- The voltage of the user system should be as follows.

  $2.7\ V \leq Vcc \leq 5.5\ V$
- Do not change the voltage of the user system after turning on the power. When you change the voltage of the user system, be sure to set the JP1 of the R0E436640EPBM0 to the "EXT POWER" side
- Before powering on your emulator system, check that the host machine, the emulator, the converter board and user system are all connected correctly. Next, turn on the power to each equipment following the procedure below.
  (1) Turn ON/OFF the user system and the emulator as simultaneously as possible.
  (2) When the emulator debugger starts up, check the target status LEDs on the emulator to see if this product is ready to operate.
  Is the power supplied? Check that target status LED (POWER) is ON.*1
  Is the Φ supplied? Check that target status LED (CLOCK) is ON.
  *1 When the user system is not connected the target status LED (POWER) does not light. Note that the target status LED (POWER) light when the JP1 of the R0E436640EPBM0 is set to the "EXT POWER" side.

IMPORTANT

Note on Clock Supply to the MCU:

- A clock supplied to the evaluation MCU is selected by the Clock tab in the Init dialog box of the emulator debugger.
  (1) When "Internal" is selected:
  A clock generated by the oscillation circuit in the emulator is supplied to the evaluation MCU. The clock is continually supplied to the evaluation MCU regardless of a status of user system clock and a status of user program execution.
  (2) When "External" is selected:
  Clock supply to the evaluation MCU depends on oscillation state (oscillate/off) of the user system.

Note on Reset of a User System:

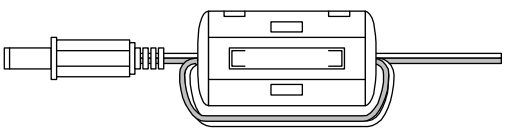
- During a program execution, if a user reset or watchdog timer reset occurs while it is accessing to an odd-address by byte access, RAM monitor and event detection do not operate properly.
  - RAM monitor
    RAM monitor access attribute in the next address is displayed.
  - Event detection
    An event of the next address is detected.

Notes on Software Breaks:

- Software breaks change the instruction at a specified address to a BRK (H'5770). Therefore, take note that when you reference the result of a trace in bus mode, "H'5770" is displayed.
- As the BRK instruction is used for the emulator, do not use it in a user program.

Notes on CE Declaration of Conformity:

- This product complies with CE marking (EN55022 Class A : 1998 + A1 : 2000 + A2 : 2003, EN55024 : 1998 + A1 : 2001+ A2 : 2003). Please use it with care described below.
  * Electrostatic Discharge Precautions must be taken when handling the product.
  * Must not be used within 30 meters of a domestic radio or television receiver.
  * For correct operation of this product, it is recommended that Mobile phones are not used within 10 meters of this product system.
  * This product should be powered down when not in use.
- This product generates, uses, and can radiate radio frequency energy and may cause harmful interference to radio communications.
- If this product causes harmful interference to radio or television reception, which can be determined by turning this product off or on, you are encouraged to try to correct the interference by one or more of the following methods;
  * Ensure attached cables do not lie across the probe board and converter board.
  * Reorient the receiving antenna.
  * Increase the distance between the product and the receiver.
  * Connect the product into an outlet on a circuit different from that to which the receiver is connected.
  * Consult the dealer or experienced radio/TV technician for help.
- Attach the ferrite core included with this product close to the DC plug of the power cable. Without the ferrite core it may cause interference.
  The power cable should be wound around the ferrite core as shown in the figure, and close the ferrite core until it clicks.



4.6 Notes on Using This Product (2)

4.6.1 Precautions for the H8/3664 Series

(1) The hardware manual says "Initial value = 1. These are reserved bits. When read, they always show the value 1." On the other hand, the compact emulator stipulates that **these bits must always be set to 0, and that when read, these bits show the set value**.

H'FFE0	Port Mode Register 1	Bits 3, 2

(2) The hardware manual says "Initial value = 0. These are reserved bits. When read, they always show the value 0." On the other hand, the compact emulator stipulates that **these bits must always be set to 0, and that when read, these bits show the set value.**

H'FFE1	Port Mode Register 5	Bits 7, 6
H'FFF9	Module Standby Control Register 1	Bit 7

(3) Although these bits in the hardware manual are reserved bits, the compact emulator stipulates that **these bits must always be set to 0, and that when read, these bits show the set value.**

H'FFE2	Port Mode Register 3	Bits 7--3
H'FFF5	Interrupt Enable Register 2	Bits 7--5
H'FFFA	Module Standby Control Register 2	Bits 7--0
H'FFFB	Module Standby Control Register 3	Bit 0

(4) Although the hardware manual says that registers are located at the addresses shown below, the compact emulator stipulates that **writing to the addresses has no effect, and that when read, they show indeterminate values.** This is because no registers exist at these addresses in the compact emulator.

H'FF90	Flash Memory Control Register 1	Bits 7--0
H'FF91	Flash Memory Control Register 2	Bits 7--0
H'FF92	Flash Memory Power Control Register	Bits 7--0
H'FF93	Block Specification Register 1	Bits 7--0
H'FF9B	Flash Memory Enable Register	Bits 7--0

	Address	Register	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Evaluation chip	H'F790	-	-	-	-	-	-	-	-	-
	H'F791	-	-	-	-	-	-	-	-	-
	H'F792	-	-	-	-	-	-	-	-	-
	H'F793	-	-	-	-	-	-	-	-	-
	H'F79B	-	-	-	-	-	-	-	-	-
	H'FFE0	PMR1	IRQ3	IRQ2	IRQ1	IRQ0	TXD2	PWM	TXD	TMOW
	H'FFE1	PMR5	POF57	POF56	WKP5	WKP4	WKP3	WKP2	WKP1	WKP0
	H'FFE2	PMR3	POF27	POF26	POF25	POF24	POF23	-	-	-
	H'FFF5	IENR2	IENTB3	IENTB2	IENTB1	-	-	-	-	-
	H'FFF9	MSTCR1	MSTS4	MSTIIC	MSTS3	MSTAD	MSTWD	MSTTW	MSTTV	MSTTA
	H'FFFA	MSTCR2	MSTS3_2	MSTTB3	MSTTB2	MSTTB1	MSTTX	-	MSTTZ	MSTPWM
	H'FFFB	MSTCR3	-	-	-	-	-	-	-	MSTS4_2

	Address	Register	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
H8/3664	H'F790	FLMCR1	-	SWE	ESU	PSU	EV	PV	E	P
	H'F791	FLMCR2	FLER	-	-	-	-	-	-	-
	H'F792	FLPWCR	PDWND	-	-	-	-	-	-	-
	H'F793	EBR1	-	-	-	EB4	EB3	EB2	EB1	EB0
	H'F79B	FENR	FLSHE	-	-	-	-	-	-	-
	H'FFE0	PMR1	IRQ3	IRQ2	IRQ1	IRQ0	-	-	TXD	TMOW
	H'FFE1	PMR5	-	-	WKP5	WKP4	WKP3	WKP2	WKP1	WKP0
	H'FFE2	-	-	-	-	-	-	-	-	-
	H'FFF5	-	-	-	-	-	-	-	-	-
	H'FFF9	MSTCR1	-	MSTIIC	MSTS3	MSTAD	MSTWD	MSTTW	MSTTV	MSTTA
	H'FFFA	-	-	-	-	-	-	-	-	-
	H'FFFB	-	-	-	-	-	-	-	-	-

4.6.2 Precautions for the H8/3672 Series

(1) The hardware manual says "Initial value = 1. These are reserved bits. When read, they always show the value 1." On the other hand, the compact emulator stipulates that **these bits must always be set to 0, and that when read, these bits show the set value.**

H'FFE0	Port Mode Register 1	Bit 3

(2) The hardware manual says "Initial value = 0. These are reserved bits. When read, they always show the value 0." On the other hand, the compact emulator stipulates that **these bits must always be set to 0, and that when read, these bits show the set value.**

H'FFE0	Port Mode Register 1	Bits 6, 5, 2, 0
H'FFF1	System Control Register 2	Bits 5, 1, 0
H'FFF2	Interrupt Edge Select Register 1	Bits 7, 2, 1
H'FFF4	Interrupt Enable Register 1	Bits 6, 2, 1
H'FFF9	Module Standby Control Register 1	Bits 7, 0

(3) Although these bits in the hardware manual are reserved bits, the compact emulator stipulates that **these bits must always be set to 0, and that when read, these bits show the set value.**

H'FFE2	Port Mode Register 3	Bits 7--3
H'FFF5	Interrupt Enable Register 2	Bits 7--5
H'FFFA	Module Standby Control Register 2	Bits 7--0
H'FFFB	Module Standby Control Register 3	Bit 0

(4) Although the hardware manual says that registers are located at the addresses shown below, the compact emulator stipulates that **writing to the addresses has no effect, and that when read, they show indeterminate values.** This is because no registers exist at these addresses in the compact emulator.

H'FF90	Flash Memory Control Register 1	Bits 7--0
H'FF91	Flash Memory Control Register 2	Bits 7--0
H'FF93	Block Specification Register 1	Bits 7--0
H'FF9B	Flash Memory Enable Register	Bits 7--0

	Address	Register	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Evaluation chip	H'F790	-	-	-	-	-	-	-	-	-
	H'F791	-	-	-	-	-	-	-	-	-
	H'F793	-	-	-	-	-	-	-	-	-
	H'F79B	-	-	-	-	-	-	-	-	-
	H'FFE0	PMR1	IRQ3	IRQ2	IRQ1	IRQ0	TXD2	PWM	TXD	TMOW
	H'FFE2	PMR3	POF27	POF26	POF25	POF24	POF23	-	-	-
	H'FFF1	SYSCR2	SMSEL	LSON	DTON	MA2	MA1	MA0	SA1	SA0
	H'FFF2	IEGR1	NMIEG	-	-	-	IEG3	IEG2	IEG1	IEG0
	H'FFF4	IENR1	IENDT	IENTA	IENWP	-	IEN3	IEN2	IEN1	IEN0
	H'FFF5	IENR2	IENTB3	IENTB2	IENTB1	-	-	-	-	-
	H'FFF9	MSTCR1	MSTS4	MSTIIC	MSTS3	MSTAD	MSTWD	MSTTW	MSTTV	MSTTA
	H'FFFA	MSTCR2	MSTS3_2	MSTTB3	MSTTB2	MSTTB1	MSTTX	-	MSTTZ	MSTPWM
	H'FFFB	MSTCR3	-	-	-	-	-	-	-	MSTS4_2

	Address	Register	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
H8/3672	H'F790	FLMCR1	-	SWE	ESU	PSU	EV	PV	E	P
	H'F791	FLMCR2	FLER	-	-	-	-	-	-	-
	H'F793	EBR1	-	-	-	EB4	EB3	EB2	EB1	EB0
	H'F79B	FENR	FLSHE	-	-	-	-	-	-	-
	H'FFE0	PMR1	IRQ3	-	-	IRQ0	-	-	TXD	-
	H'FFE2	-	-	-	-	-	-	-	-	-
	H'FFF1	SYSCR2	SMSEL	-	DTON	MA2	MA1	MA0	-	-
	H'FFF2	IEGR1	-	-	-	-	IEG3	-	-	IEG0
	H'FFF4	IENR1	IENDT	-	IENWP	-	IEN3	-	-	IEN0
	H'FFF5	-	-	-	-	-	-	-	-	-
	H'FFF9	MSTCR1	-	MSTIIC	MSTS3	MSTAD	MSTWD	MSTTW	MSTTV	-
	H'FFFA	-	-	-	-	-	-	-	-	-
	H'FFFB	-	-	-	-	-	-	-	-	-

4.6.3 Precautions for the H8/3687 Series

(1) The hardware manual says "Initial value = 0. These are reserved bits. When read, they always show the value 0." On the other hand, the compact emulator stipulates that **these bits must always be set to 0, and that when read, these bits show the set value.**

H'FFE2	Port Mode Register 3	Bits 7, 6, 5
H'FFF5	Interrupt Enable Register 2	Bits 7, 6
H'FFF9	Module Standby Control Register 1	Bits 7, 2
H'FFFA	Module Standby Control Register 2	Bits 6, 5, 3

(2) Although these bits in the hardware manual are reserved bits, the compact emulator stipulates that **these bits must always be set to 0, and that when read, these bits show the set value.**

H'FFFB	Module Standby Control Register 3	Bit 0

(3) The hardware manual says "Initial value = 0. These are reserved bits. When read, they always show the value 0." On the other hand, the compact emulator stipulates that **these bits must always be set to 0.**

H'FFF7	Interrupt Flag Register 2	Bits 7, 6

(4) Although these bits in the hardware manual are reserved bits, the compact emulator stipulates that **these bits must always be set to 0.**

H'FFE4	Port Control Register 1	Bit 3
H'FFE5	Port Control Register 2	Bits 7, 6, 5
H'FFEA	Port Control Register 7	Bits 7, 3
H'FFEB	Port Control Register 8	Bits 4--0

(5) Although the hardware manual says that registers are located at the addresses shown below, the compact emulator stipulates that **writing to the addresses has no effect, and that when read, they show indeterminate values.** This is because no registers exist at these addresses in the compact emulator.

H'F730	Low-voltage-detection Control Register	Bits 7--0
H'F731	Low-voltage-detection Status Register	Bits 7--0
H'FF90	Flash Memory Control Register 1	Bits 7--0
H'FF91	Flash Memory Control Register 2	Bits 7--0
H'FF92	Flash Memory Power Control Register	Bits 7--0
H'FF93	Block Specification Register 1	Bits 7--0
H'FF9B	Flash Memory Enable Register	Bits 7--0

	Address	Register	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Evaluation chip	H'F730	-	-	-	-	-	-	-	-	-
	H'F731	-	-	-	-	-	-	-	-	-
	H'F790	-	-	-	-	-	-	-	-	-
	H'F791	-	-	-	-	-	-	-	-	-
	H'F792	-	-	-	-	-	-	-	-	-
	H'F793	-	-	-	-	-	-	-	-	-
	H'F79B	-	-	-	-	-	-	-	-	-
	H'FFE2	PMR3	POF27	POF26	POF25	POF24	POF23	-	-	-
	H'FFE4	PCR1	PCR17	PCR16	PCR15	PCR14	PCR13	PCR12	PCR11	PCR10
	H'FFE5	PCR2	PCR27	PCR26	PCR25	PCR24	PCR23	PCR22	PCR21	PCR20
	H'FFEA	PCR7	PCR77	PCR76	PCR75	PCR74	PCR73	PCR72	PCR71	PCR70
	H'FFEB	PCR8	PCR87	PCR86	PCR85	PCR84	PCR83	PCR82	PCR81	PCR80
	H'FFF5	IENR2	IENTB3	IENTB2	IENTB1	-	-	-	-	-
	H'FFF7	IRR2	IRRTB3	IRRTB2	IRRTB1	-	-	-	-	-
	H'FFF9	MSTCR1	MSTS4	MSTIIC	MSTS3	MSTAD	MSTWD	MSTTW	MSTTV	MSTTA
	H'FFFA	MSTCR2	MSTS3_2	MSTTB3	MSTTB2	MSTTB1	MSTTX	—	MSTTZ	MSTPWM
	H'FFFB	MSTCR3	-	-	-	-	-	-	-	MSTS4_2

	Address	Register	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
H8/3687	H'F730	LVDCR	LVDE	-	-	-	LVDSEL	LVDRE	LVDDE	LVDUE
	H'F731	LVDSR	-	-	-	-	-	-	LVDDF	LVDUF
	H'F790	FLMCR1	-	SWE	ESU	PSU	EV	PV	E	P
	H'F791	FLMCR2	FLER	-	-	-	-	-	-	-
	H'F792	FLPWCR	PDWND	-	-	-	-	-	-	-
	H'F793	EBR1	-	EB6	EB5	EB4	EB3	EB2	EB1	EB0
	H'F79B	FENR	FLSHE	-	-	-	-	-	-	-
	H'FFE2	PMR3	-	-	-	POF24	POF23	-	-	-
	H'FFE4	PCR1	PCR17	PCR16	PCR15	PCR14	-	PCR12	PCR11	PCR10
	H'FFE5	PCR2	-	-	-	PCR24	PCR23	PCR22	PCR21	PCR20
	H'FFEA	PCR7	-	PCR76	PCR75	PCR74	-	PCR72	PCR71	PCR70
	H'FFEB	PCR8	PCR87	PCR86	PCR85	-	-	-	-	-
	H'FFF5	IENR2	-	-	IENTB1	-	-	-	-	-
	H'FFF7	IRR2	-	-	IRRTB1	-	-	-	-	-
	H'FFF9	MSTCR1	-	MSTIIC	MSTS3	MSTAD	MSTWD	-	MSTTV	MSTTA
	H'FFFA	MSTCR2	MSTS3_2	-	-	MSTTB1	-	—	MSTTZ	MSTPWM
	H'FFFB	MSTCR3	-	-	-	-	-	-	-	-

4.6.4 Precautions for the H8/36087 Series

(1) The hardware manual says "Initial value = 0. These are reserved bits. When read, they always show the value 0." On the other hand, the compact emulator stipulates that **these bits must always be set to 0, and that when read, these bits show the set value.**

H'FFE2	Port Mode Register 3	Bits 7, 6, 5
H'FFF5	Interrupt Enable Register 2	Bits 7, 6
H'FFF9	Module Standby Control Register 1	Bits 7, 2
H'FFFA	Module Standby Control Register 2	Bits 6, 5, 3

(2) Although these bits in the hardware manual are reserved bits, the compact emulator stipulates that **these bits must always be set to 0, and that when read, these bits show the set value.**

H'FFFB	Module Standby Control Register 3	Bit 0

(3) The hardware manual says "Initial value = 0. These are reserved bits. When read, they always show the value 0." On the other hand, the compact emulator stipulates that **these bits must always be set to 0.**

H'FFF7	Interrupt Flag Register 2	Bits 7, 6

(4) Although these bits in the hardware manual are reserved bits, the compact emulator stipulates that **these bits must always be set to 0.**

H'FFE4	Port Control Register 1	Bit 3
H'FFE5	Port Control Register 2	Bits 7, 6, 5
H'FFEA	Port Control Register 7	Bits 7, 3
H'FFEB	Port Control Register 8	Bits 4--0

(5) Although the hardware manual says that registers are located at the addresses shown below, the compact emulator stipulates that **writing to the addresses has no effect, and that when read, they show indeterminate values.** This is because no registers exist at these addresses in the compact emulator.

H'FF90	Flash Memory Control Register 1	Bits 7--0
H'FF91	Flash Memory Control Register 2	Bits 7--0
H'FF92	Flash Memory Power Control Register	Bits 7--0
H'FF93	Block Specification Register 1	Bits 7--0
H'FF9B	Flash Memory Enable Register	Bits 7--0

	Address	Register	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Evaluation chip	H'F790	-	-	-	-	-	-	-	-	-
	H'F791	-	-	-	-	-	-	-	-	-
	H'F792	-	-	-	-	-	-	-	-	-
	H'F793	-	-	-	-	-	-	-	-	-
	H'F79B	-	-	-	-	-	-	-	-	-
	H'FFE2	PMR3	POF27	POF26	POF25	POF24	POF23	-	-	-
	H'FFE4	PCR1	PCR17	PCR16	PCR15	PCR14	PCR13	PCR12	PCR11	PCR10
	H'FFE5	PCR2	PCR27	PCR26	PCR25	PCR24	PCR23	PCR22	PCR21	PCR20
	H'FFEA	PCR7	PCR77	PCR76	PCR75	PCR74	PCR73	PCR72	PCR71	PCR70
	H'FFEB	PCR8	PCR87	PCR86	PCR85	PCR84	PCR83	PCR82	PCR81	PCR80
	H'FFF5	IENR2	IENTB3	IENTB2	IENTB1	-	-	-	-	-
	H'FFF7	IRR2	IRRTB3	IRRTB2	IRRTB1	-	-	-	-	-
	H'FFF9	MSTCR1	MSTS4	MSTIIC	MSTS3	MSTAD	MSTWD	MSTTW	MSTTV	MSTTA
	H'FFFA	MSTCR2	MSTS3_2	MSTTB3	MSTTB2	MSTTB1	MSTTX	-	MSTTZ	MSTPWM
	H'FFFB	MSTCR3	-	-	-	-	-	-	-	MSTS4_2

	Address	Register	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
H8/36087	H'F790	FLMCR1	-	SWE	ESU	PSU	EV	PV	E	P
	H'F791	FLMCR2	FLER	-	-	-	-	-	-	-
	H'F792	FLPWCR	PDWND	-	-	-	-	-	-	-
	H'F793	EBR1	-	EB6	EB5	EB4	EB3	EB2	EB1	EB0
	H'F79B	FENR	FLSHE	-	-	-	-	-	-	-
	H'FFE2	PMR3	-	-	-	POF24	POF23	-	-	-
	H'FFE4	PCR1	PCR17	PCR16	PCR15	PCR14	-	PCR12	PCR11	PCR10
	H'FFE5	PCR2	-	-	-	PCR24	PCR23	PCR22	PCR21	PCR20
	H'FFEA	PCR7	-	PCR76	PCR75	PCR74	-	PCR72	PCR71	PCR70
	H'FFEB	PCR8	PCR87	PCR86	PCR85	-	-	-	-	-
	H'FFF5	IENR2	-	-	IENTB1	-	-	-	-	-
	H'FFF7	IRR2	-	-	IRRTB1	-	-	-	-	-
	H'FFF9	MSTCR1	-	MSTIIC	MSTS3	MSTAD	MSTWD	-	MSTTV	MSTTA
	H'FFFA	MSTCR2	MSTS3_2	-	-	MSTTB1	-	-	MSTTZ	MSTPWM
	H'FFFB	MSTCR3	-	-	-	-	-	-	-	-

4.6.5 Precautions for the H8/36077 Series

(1) The hardware manual says "Initial value = 0. These are reserved bits. When read, they always show the value 0." On the other hand, the compact emulator stipulates that **these bits must always be set to 0, and that when read, these bits show the set value.**

H'FFE2	Port Mode Register 3	Bits 7, 6, 5
H'FFF5	Interrupt Enable Register 2	Bits 7, 6
H'FFF9	Module Standby Control Register 1	Bits 7, 2
H'FFFA	Module Standby Control Register 2	Bits 6, 5, 3

(2) Although these bits in the hardware manual are reserved bits, the compact emulator stipulates that **these bits must always be set to 0, and that when read, these bits show the set value.**

H'FFFB	Module Standby Control Register 3	Bit 0

(3) The hardware manual says "Initial value = 0. These are reserved bits. When read, they always show the value 0." On the other hand, the compact emulator stipulates that **these bits must always be set to 0.**

H'FFF7	Interrupt Flag Register 2	Bits 7, 6

(4) Although these bits in the hardware manual are reserved bits, the compact emulator stipulates that **these bits must always be set to 0.**

H'FFE4	Port Control Register 1	Bit 3
H'FFE5	Port Control Register 2	Bits 7, 6, 5
H'FFEA	Port Control Register 7	Bits 7, 3
H'FFEB	Port Control Register 8	Bits 4--0

(5) Although the hardware manual says that registers are located at the addresses shown below, the compact emulator stipulates that **writing to the addresses has no effect, and that when read, they show indeterminate values.** This is because no registers exist at these addresses in the compact emulator.

H'F730	Low-voltage-detection Control Register	Bits 7--0
H'F731	Low-voltage-detection Status Register	Bits 7--0
H'F732	Reset Source Decision Register	Bits 7--0
H'F734	Clock Control/Status Register	Bits 7--0
H'F735	RC Control Register	Bits 7--0
H'F736	RC Trimming Data Protect Register	Bits 7--0
H'F737	RC Trimming Data Register	Bits 7--0
H'FF90	Flash Memory Control Register 1	Bits 7--0
H'FF91	Flash Memory Control Register 2	Bits 7--0
H'FF92	Flash Memory Power Control Register	Bits 7--0
H'FF93	Block Specification Register 1	Bits 7--0
H'FF9B	Flash Memory Enable Register	Bits 7--0
H'FFDE	Port Data Register C	Bits 7--0
H'FFEE	Port Control Register C	Bits 7--0

(6) Although the hardware manual describes the functions shown below, they are not available on the compact emulator, because the evaluation MCU does not have them.
- power-on reset & low-voltage detection circuit
- on-chip oscillator
- The watchdog timer starts operating in the initial state after the reset
- clock output
- Port C

(7) Although the hardware manual says "Initial value = 1", the initial value is **0** in the compact emulator. **When the watchdog timer counts up, these bits must always be set to 1.**

H'FFC0	Timer Control/Status Register WD	Bit 2

	Address	Register	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Evaluation chip	H'F730	-	-	-	-	-	-	-	-	-
	H'F731	-	-	-	-	-	-	-	-	-
	H'F732	-	-	-	-	-	-	-	-	-
	H'F734	-	-	-	-	-	-	-	-	-
	H'F735	-	-	-	-	-	-	-	-	-
	H'F736	-	-	-	-	-	-	-	-	-
	H'F737	-	-	-	-	-	-	-	-	-
	H'F790	-	-	-	-	-	-	-	-	-
	H'F791	-	-	-	-	-	-	-	-	-
	H'F792	-	-	-	-	-	-	-	-	-
	H'F793	-	-	-	-	-	-	-	-	-
	H'F79B	-	-	-	-	-	-	-	-	-
	H'FFC0	TCSRWD	B6WI	TCWE	B4WI	TCSRWE	B2WI	WDON	B0WI	WRST
	H'FFDE	-	-	-	-	-	-	-	-	-
	H'FFE2	PMR3	POF27	POF26	POF25	POF24	POF23	-	-	-
	H'FFE4	PCR1	PCR17	PCR16	PCR15	PCR14	PCR13	PCR12	PCR11	PCR10
	H'FFE5	PCR2	PCR27	PCR26	PCR25	PCR24	PCR23	PCR22	PCR21	PCR20
	H'FFEA	PCR7	PCR77	PCR76	PCR75	PCR74	PCR73	PCR72	PCR71	PCR70
	H'FFEB	PCR8	PCR87	PCR86	PCR85	PCR84	PCR83	PCR82	PCR81	PCR80
	H'FFEE	-	-	-	-	-	-	-	-	-
	H'FFF5	IENR2	IENTB3	IENTB2	IENTB1	-	-	-	-	-
	H'FFF7	IRR2	IRRTB3	IRRTB2	IRRTB1	-	-	-	-	-
	H'FFF9	MSTCR1	MSTS4	MSTIIC	MSTS3	MSTAD	MSTWD	MSTTW	MSTTV	MSTTA
	H'FFFA	MSTCR2	MSTS3_2	MSTTB3	MSTTB2	MSTTB1	MSTTX	-	MSTTZ	MSTPWM
	H'FFFB	MSTCR3	-	-	-	-	-	-	-	MSTS4_2

	Address	Register	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
H8/36077	H'F730	LVDCR	-	-	VDDII	-	LVDSEL	-	LVDDE	LVDUE
	H'F731	LVDSR	-	-	-	-	-	-	LVDDF	LVDUF
	H'F732	LVDRF	-	-	-	-	-	-	PRST	WRST
	H'F734	CKCSR	PMRC1	PMRC0	OSCBAKE	OSCSEL	CKSWIE	CKSWIF	OSCHLT	CKSTA
	H'F735	RCCR	RCSTP	FSEL	VCLSEL	-	-	-	RCPSC1	RCPSC0
	H'F736	RCTRMDPH	WRI	PRWRE	LOCKDW	TRMDRWE	-	-	-	-
	H'F737	RCTRMDR	TRMD7	TRMD6	TRMD5	TRMD4	TRMD3	TRMD2	TRMD1	TRMD0
	H'F790	FLMCR1	-	SWE	ESU	PSU	EV	PV	E	P
	H'F791	FLMCR2	FLER	-	-	-	-	-	-	-
	H'F792	FLPWCR	PDWND	-	-	-	-	-	-	-
	H'F793	EBR1	-	EB6	EB5	EB4	EB3	EB2	EB1	EB0
	H'F79B	FENR	FLSHE	-	-	-	-	-	-	-
	H'FFC0	TCSRWD	B6WI	TCWE	B4WI	TCSRWE	B2WI	WDON	B0WI	WRST
	H'FFDE	PDRC	-	-	-	-	-	-	PDRC1	PDRC0
	H'FFE2	PMR3	-	-	-	POF24	POF23	-	-	-
	H'FFE4	PCR1	PCR17	PCR16	PCR15	PCR14	-	PCR12	PCR11	PCR10
	H'FFE5	PCR2	-	-	-	PCR24	PCR23	PCR22	PCR21	PCR20
	H'FFEA	PCR7	-	PCR76	PCR75	PCR74	-	PCR72	PCR71	PCR70
	H'FFEB	PCR8	PCR87	PCR86	PCR85	-	-	-	-	-
	H'FFEE	PCRC	-	-	-	-	-	-	PCRC1	PCRC0
	H'FFF5	IENR2	-	-	IENTB1	-	-	-	-	-
	H'FFF7	IRR2	-	-	IRRTB1	-	-	-	-	-
	H'FFF9	MSTCR1	-	MSTIIC	MSTS3	MSTAD	MSTWD	-	MSTTV	MSTTA
	H'FFFA	MSTCR2	MSTS3_2	-	-	MSTTB1	-	-	MSTTZ	MSTPWM
	H'FFFB	MSTCR3	-	-	-	-	-	-	-	-

4.6.6 Precautions for the H8/36079 Series

(1) The hardware manual says "Initial value = 0. These are reserved bits. When read, they always show the value 0." On the other hand, the compact emulator stipulates that **these bits must always be set to 0, and that when read, these bits show the set value.**

H'FFFFE2	Port Mode Register 3	Bits 7, 6, 5
H'FFFFF5	Interrupt Enable Register 2	Bits 7, 6
H'FFFFF9	Module Standby Control Register 1	Bits 7, 2
H'FFFFFA	Module Standby Control Register 2	Bits 6, 5, 3

(2) Although these bits in the hardware manual are reserved bits, the compact emulator stipulates that **these bits must always be set to 0, and that when read, these bits show the set value.**

H'FFFFFB	Module Standby Control Register 3	Bit 0

(3) The hardware manual says "Initial value = 0. These are reserved bits. When read, they always show the value 0." On the other hand, the compact emulator stipulates that **these bits must always be set to 0.**

H'FFFFF7	Interrupt Flag Register 2	Bits 7, 6

(4) Although these bits in the hardware manual are reserved bits, the compact emulator stipulates that **these bits must always be set to 0.**

H'FFFFE4	Port Control Register 1	Bit 3
H'FFFFE5	Port Control Register 2	Bits 7, 6, 5
H'FFFFEA	Port Control Register 7	Bits 7, 3
H'FFFFEB	Port Control Register 8	Bits 4--0

(5) Although the hardware manual says that registers are located at the addresses shown below, the compact emulator stipulates that **writing to the addresses has no effect, and that when read, they show indeterminate values.** This is because no registers exist at these addresses in the compact emulator.

H'FFF730	Low-voltage-detection Control Register	Bits 7--0
H'FFF731	Low-voltage-detection Status Register	Bits 7--0
H'FFF732	Reset Source Decision Register	Bits 7--0
H'FFF734	Clock Control/Status Register	Bits 7--0
H'FFF735	RC Control Register	Bits 7--0
H'FFF736	RC Trimming Data Protect Register	Bits 7--0
H'FFF737	RC Trimming Data Register	Bits 7--0
H'FFFF90	Flash Memory Control Register 1	Bits 7--0
H'FFFF91	Flash Memory Control Register 2	Bits 7--0
H'FFFF92	Flash Memory Power Control Register	Bits 7--0
H'FFFF93	Block Specification Register 1	Bits 7--0
H'FFFF9B	Flash Memory Enable Register	Bits 7--0
H'FFFFDE	Port Data Register C	Bits 7--0
H'FFFFEE	Port Control Register C	Bits 7--0

(6) Although the hardware manual describes the functions shown below, they are not available on the compact emulator, because the evaluation MCU does not have them.

- power-on reset & low-voltage detection circuit
- on-chip oscillator
- The watchdog timer starts operating in the initial state after the reset
- clock output
- Port C

(7) Although the hardware manual says "Initial value = 1", the initial value is 0 in the compact emulator. **When the watchdog timer counts up, these bits must always be set to 1.**

H'FFFFC0	Timer Control/Status Register WD	Bit 2

	Address	Register	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Evaluation chip	H'FFF730	-	-	-	-	-	-	-	-	-
	H'FFF731	-	-	-	-	-	-	-	-	-
	H'FFF732	-	-	-	-	-	-	-	-	-
	H'FFF734	-	-	-	-	-	-	-	-	-
	H'FFF735	-	-	-	-	-	-	-	-	-
	H'FFF736	-	-	-	-	-	-	-	-	-
	H'FFF737	-	-	-	-	-	-	-	-	-
	H'FFF790	-	-	-	-	-	-	-	-	-
	H'FFF791	-	-	-	-	-	-	-	-	-
	H'FFF792	-	-	-	-	-	-	-	-	-
	H'FFF793	-	-	-	-	-	-	-	-	-
	H'FFF79B	-	-	-	-	-	-	-	-	-
	H'FFFFC0	TCSRWD	B6WI	TCWE	B4WI	TCSRWE	B2WI	WDON	B0WI	WRST
	H'FFFFDE	-	-	-	-	-	-	-	-	-
	H'FFFFE2	PMR3	POF27	POF26	POF25	POF24	POF23	-	-	-
	H'FFFFE4	PCR1	PCR17	PCR16	PCR15	PCR14	PCR13	PCR12	PCR11	PCR10
	H'FFFFE5	PCR2	PCR27	PCR26	PCR25	PCR24	PCR23	PCR22	PCR21	PCR20
	H'FFFFEA	PCR7	PCR77	PCR76	PCR75	PCR74	PCR73	PCR72	PCR71	PCR70
	H'FFFFEB	PCR8	PCR87	PCR86	PCR85	PCR84	PCR83	PCR82	PCR81	PCR80
	H'FFFFEE	-	-	-	-	-	-	-	-	-
	H'FFFFF5	IENR2	IENTB3	IENTB2	IENTB1	-	-	-	-	-
	H'FFFFF7	IRR2	IRRTB3	IRRTB2	IRRTB1	-	-	-	-	-
	H'FFFFF9	MSTCR1	MSTS4	MSTIIC	MSTS3	MSTAD	MSTWD	MSTTW	MSTTV	MSTTA
	H'FFFFFA	MSTCR2	MSTS3_2	MSTTB3	MSTTB2	MSTTB1	MSTTX	-	MSTTZ	MSTPWM
	H'FFFFFB	MSTCR3	-	-	-	-	-	-	-	MSTS4_2

	Address	Register	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
H8/36079	H'FFF730	LVDCR	-	-	VDDII	-	LVDSEL	-	LVDDE	LVDUE
	H'FFF731	LVDSR	-	-	-	-	-	-	LVDDF	LVDUF
	H'FFF732	LVDRF	-	-	-	-	-	-	PRST	WRST
	H'FFF734	CKCSR	PMRC1	PMRC0	OSCBAKE	OSCSEL	CKSWIE	CKSWIF	OSCHLT	CKSTA
	H'FFF735	RCCR	RCSTP	FSEL	VCLSEL	-	-	-	RCPSC1	RCPSC0
	H'FFF736	RCTRMDPR	WRI	PRWRE	LOCKDW	TRMDRWE	-	-	—	—
	H'FFF737	RCTRMDR	TRMD7	TRMD6	TRMD5	TRMD4	TRMD3	TRMD2	TRMD1	TRMD0
	H'FFF790	FLMCR1	-	SWE	ESU	PSU	EV	PV	E	P
	H'FFF791	FLMCR2	FLER	-	-	-	-	-	-	-
	H'FFF792	FLPWCR	PDWND	-	-	-	-	-	-	-
	H'FFF793	EBR1	-	EB6	EB5	EB4	EB3	EB2	EB1	EB0
	H'FFF79B	FENR	FLSHE	-	-	-	-	-	-	-
	H'FFFFC0	TCSRWD	B6WI	TCWE	B4WI	TCSRWE	B2WI	WDON	B0WI	WRST
	H'FFFFDE	PDRC	-	-	-	-	-	-	PDRC1	PDRC0
	H'FFFFE2	PMR3	-	-	-	POF24	POF23	-	-	-
	H'FFFFE4	PCR1	PCR17	PCR16	PCR15	PCR14	-	PCR12	PCR11	PCR10
	H'FFFFE5	PCR2	-	-	-	PCR24	PCR23	PCR22	PCR21	PCR20
	H'FFFFEA	PCR7	-	PCR76	PCR75	PCR74	-	PCR72	PCR71	PCR70
	H'FFFFEB	PCR8	PCR87	PCR86	PCR85	-	-	-	-	-
	H'FFFFEE	PCRC	-	-	-	-	-	-	PCRC1	PCRC0
	H'FFFFF5	IENR2	-	-	IENTB1	-	-	-	-	-
	H'FFFFF7	IIR2	-	-	IRRTB1	-	-	-	-	-
	H'FFFFF9	MSTCR1	-	MSTIIC	MSTS3	MSTAD	MSTWD	-	MSTTV	MSTTA
	H'FFFFFA	MSTCR2	MSTS3_2	-	-	MSTTB1	-	-	MSTTZ	MSTPWM
	H'FFFFFB	MSTCR3	-	-	-	-	-	-	-	-

4.6.7 Precautions for the H8/36064 Series

(1) The hardware manual says "Initial value = 0. These are reserved bits. When read, they always show the value 0." On the other hand, the compact emulator stipulates that **these bits must always be set to 0, and that when read, these bits show the set value.**

H'FFE0	Port Mode Register 1	Bit 0
H'FFE1	Port Mode Register 5	Bits 7, 6
H'FFE2	Port Mode Register 3	Bits 7, 6, 5
H'FFF0	System Control Register 1	Bit 3
H'FFF1	System Control Register 2	Bit 6
H'FFF4	Interrupt Enable Register 1	Bit 6
H'FFF5	Interrupt Enable Register 2	Bits 7, 6
H'FFF9	Module Standby Control Register 1	Bits 7, 2, 0
H'FFFA	Module Standby Control Register 2	Bits 6, 5, 3

(2) Although these bits in the hardware manual are reserved bits, the compact emulator stipulates that **these bits must always be set to 0, and that when read, these bits show the set value.**

H'FFFB	Module Standby Control Register 3	Bit 0

(3) Although the hardware manual says that registers are located at the addresses shown below, the compact emulator stipulates that **writing to the addresses has no effect, and that when read, they show indeterminate values.** This is because no registers exist at these addresses in the compact emulator.

H'F730	Low-voltage-detection Control Register	Bits 7--0
H'F731	Low-voltage-detection Status Register	Bits 7--0
H'FF90	Flash Memory Control Register 1	Bits 7--0
H'FF91	Flash Memory Control Register 2	Bits 7--0
H'FF92	Flash Memory Power Control Register	Bits 7--0
H'FF93	Block Specification Register 1	Bits 7--0
H'FF9B	Flash Memory Enable Register	Bits 7--0

(4) Although the hardware manual says that an initial value is 1, the compact emulator's initial value is "0". **These bits must always be set to 1, when counting up the watchdog timer.**

H'FFC0	Timer Control/Status Register WD	Bit 2

(5) Although these bits in the hardware manual are reserved bits, the compact emulator stipulates that **these bits must always be set to 0.**

H'FFFFE4	Port Control Register 1	Bit 3
H'FFFFE5	Port Control Register 2	Bits 7, 6, 5
H'FFFFEA	Port Control Register 7	Bits 7, 3
H'FFFFEB	Port Control Register 8	Bits 4--0

(6) Although the hardware manual says that the allowable output high current is 5.0 mA, it is 2.0 mA in the compact emulator.

	Address	Register	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Evaluation chip	H'F730	-	-	-	-	-	-	-	-	-
	H'F731	-	-	-	-	-	-	-	-	-
	H'F790	-	-	-	-	-	-	-	-	-
	H'F791	-	-	-	-	-	-	-	-	-
	H'F792	-	-	-	-	-	-	-	-	-
	H'F793	-	-	-	-	-	-	-	-	-
	H'F79B	-	-	-	-	-	-	-	-	-
	H'FFE0	PMR1	IRQ3	IRQ2	IRQ1	IRQ0	TXD2	PWM	TXD	TMOW
	H'FFE1	PMR5	POF57	POF56	WKP5	WKP4	WKP3	WKP2	WKP1	WKP0
	H'FFE2	PMR3	POF27	POF26	POF25	POF24	POF23	-	-	-
	H'FFE4	PCR1	PCR17	PCR16	PCR15	PCR14	PCR13	PCR12	PCR11	PCR10
	H'FFE5	PCR2	PCR27	PCR26	PCR25	PCR24	PCR23	PCR22	PCR21	PCR20
	H'FFEA	PCR7	PCR77	PCR76	PCR75	PCR74	PCR73	PCR72	PCR71	PCR70
	H'FFEB	PCR8	PCR87	PCR86	PCR85	PCR84	PCR83	PCR82	PCR81	PCR80
	H'FFF0	SYSCR1	SSBY	STS2	STS1	STS0	NESEL	-	-	-
	H'FFF1	SYSCR2	SMSEL	LSON	DTON	MA2	MA1	MA0	SA1	SA0
	H'FFF4	IENR1	IENDT	IENTA	IENWP	-	IEN3	IEN2	IEN1	IEN0
	H'FFF5	IENR2	IENTB3	IENTB2	IENTB1	-	-	-	-	-
	H'FFF6	IRR1	IRRDT	IRRTA	-	-	IRRI3	IRRI2	IRRI1	IRRI0
	H'FFF7	IRR2	IRRTB3	IRRTB2	IRRTB1	-	-	-	-	-
	H'FFF9	MSTCR1	MSTS4	MSTIIC	MSTS3	MSTAD	MSTWD	MSTTW	MSTTV	MSTTA
	H'FFFA	MSTCR2	MSTS3_2	MSTTB3	MSTTB2	MSTTB1	MSTTX	-	MSTTZ	MSTPWM
	H'FFFB	MSTCR3	-	-	-	-	-	-	-	MSTS4_2

	Address	Register	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
H8/36064	H'F730	LVDCR	LVDE	-	-	-	LVDSEL	LVDRE	LVDDE	LVDUE
	H'F731	LVDSR	-	-	-	-	-	-	LVDDF	LVDUF
	H'F790	FLMCR1	-	SWE	ESU	PSU	EV	PV	E	P
	H'F791	FLMCR2	FLER	-	-	-	-	-	-	-
	H'F792	FLPWCR	PDWND	-	-	-	-	-	-	-
	H'F793	EBR1	-	-	-	EB4	EB3	EB2	EB1	EB0
	H'F79B	FENR	FLSHE	-	-	-	-	-	-	-
	H'FFE0	PMR1	IRQ3	IRQ2	IRQ1	IRQ0	TXD2	PWM	TXD	-
	H'FFE1	PMR5	-	-	WKP5	WKP4	WKP3	WKP2	WKP1	WKP0
	H'FFE2	PMR3	-	-	-	POF24	POF23	-	-	-
	H'FFE4	PCR1	PCR17	PCR16	PCR15	PCR14	-	PCR12	PCR11	PCR10
	H'FFE5	PCR2	-	-	-	PCR24	PCR23	PCR22	PCR21	PCR20
	H'FFEA	PCR7	-	PCR76	PCR75	PCR74	-	PCR72	PCR71	PCR70
	H'FFEB	PCR8	PCR87	PCR86	PCR85	-	-	-	-	-
	H'FFF0	SYSCR1	SSBY	STS2	STS1	STS0	-	-	-	-
	H'FFF1	SYSCR2	SMSEL	-	DTON	MA2	MA1	MA0	-	-
	H'FFF4	IENR1	IENDT	-	IENWP	-	IEN3	IEN2	IEN1	IEN0
	H'FFF5	IENR2	-	-	IENTB1	-	-	-	-	-
	H'FFF6	IRR1	IRRDT	-	-	-	IRRI3	IRRI2	IRRI1	IRRI0
	H'FFF7	IRR2	-	-	IRRTB1	-	-	-	-	-
	H'FFF9	MSTCR1	-	MSTIIC	MSTS3	MSTAD	MSTWD	-	MSTTV	-
	H'FFFA	MSTCR2	MSTS3_2	-	-	MSTTB1	-	-	MSTTZ	MSTPWM
	H'FFFB	MSTCR3	-	-	-	-	-	-	-	-

4.6.8 Precautions for the H8/3694 Series

(1) The hardware manual says "Initial value = 1. These are reserved bits. When read, they always show the value 1." On the other hand, the compact emulator stipulates that **these bits must always be set to 0, and that when read, these bits show the set value.**

H'FFE0	Port Mode Register 1	Bits 3, 2

(2) The hardware manual says "Initial value = 0. These are reserved bits. When read, they always show the value 0." On the other hand, the compact emulator stipulates that **these bits must always be set to 0, and that when read, these bits show the set value.**

H'FFE1	Port Mode Register 5	Bits 7, 6
H'FFF9	Module Standby Control Register 1	Bit 7

(3) Although these bits in the hardware manual are reserved bits, the compact emulator stipulates that **these bits must always be set to 0, and that when read, these bits show the set value.**

H'FFE2	Port Mode Register 3	Bits 7--3
H'FFF5	Interrupt Enable Register 2	Bits 7--5
H'FFFA	Module Standby Control Register 2	Bits 7--0
H'FFFB	Module Standby Control Register 3	Bit 0

(4) Although the hardware manual says that registers are located at the addresses shown below, the compact emulator stipulates that **writing to the addresses has no effect, and that when read, they show indeterminate values.** This is because no registers exist at these addresses in the compact emulator.

H'F730	Low-voltage-detection Control Register	Bits 7--0
H'F731	Low-voltage-detection Status Register	Bits 7--0
H'FF90	Flash Memory Control Register 1	Bits 7--0
H'FF91	Flash Memory Control Register 2	Bits 7--0
H'FF92	Flash Memory Power Control Register	Bits 7--0
H'FF93	Block Specification Register 1	Bits 7--0
H'FF9B	Flash Memory Enable Register	Bits 7--0

	Address	Register	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Evaluation chip	H'F730	-	-	-	-	-	-	-	-	-
	H'F731	-	-	-	-	-	-	-	-	-
	H'F790	-	-	-	-	-	-	-	-	-
	H'F791	-	-	-	-	-	-	-	-	-
	H'F792	-	-	-	-	-	-	-	-	-
	H'F793	-	-	-	-	-	-	-	-	-
	H'F79B	-	-	-	-	-	-	-	-	-
	H'FFE0	PMR1	IRQ3	IRQ2	IRQ1	IRQ0	TXD2	PWM	TXD	TMOW
	H'FFE1	PMR5	POF57	POF56	WKP5	WKP4	WKP3	WKP2	WKP1	WKP0
	H'FFE2	PMR3	POF27	POF26	POF25	POF24	POF23	-	-	-
	H'FFF5	IENR2	IENTB3	IENTB2	IENTB1	-	-	-	-	-
	H'FFF9	MSTCR1	MSTS4	MSTIIC	MSTS3	MSTAD	MSTWD	MSTTW	MSTTV	MSTTA
	H'FFFA	MSTCR2	MSTS3_2	MSTTB3	MSTTB2	MSTTB1	MSTTX	-	MSTTZ	MSTPWM
	H'FFFB	MSTCR3	-	-	-	-	-	-	-	MSTS4_2

	Address	Register	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
H8/3694	H'F730	LVDCR	LVDE	-	-	-	LVDSEL	LVDRE	LVDDE	LVDUE
	H'F731	LVDSR	-	-	-	-	-	-	LVDDF	LVDUF
	H'F790	FLMCR1	-	SWE	ESU	PSU	EV	PV	E	P
	H'F791	FLMCR2	FLER	-	-	-	-	-	-	-
	H'F792	FLPWCR	PDWND	-	-	-	-	-	-	-
	H'F793	EBR1	-	-	-	EB4	EB3	EB2	EB1	EB0
	H'F79B	FENR	FLSHE	-	-	-	-	-	-	-
	H'FFE0	PMR1	IRQ3	IRQ2	IRQ1	IRQ0	-	-	TXD	TMOW
	H'FFE1	PMR5	-	-	WKP5	WKP4	WKP3	WKP2	WKP1	WKP0
	H'FFE2	-	-	-	-	-	-	-	-	-
	H'FFF5	-	-	-	-	-	-	-	-	-
	H'FFF9	MSTCR1	-	MSTIIC	MSTS3	MSTAD	MSTWD	MSTTW	MSTTV	MSTTA
	H'FFFA	-	-	-	-	-	-	-	-	-
	H'FFFB	-	-	-	-	-	-	-	-	-

4.6.9 Precautions for the H8/36094 Series

(1) The hardware manual says "Initial value = 1. These are reserved bits. When read, they always show the value 1." On the other hand, the compact emulator stipulates that **these bits must always be set to 0, and that when read, these bits show the set value.**

H'FFE0	Port Mode Register 1	Bits 3, 2

(2) The hardware manual says "Initial value = 0. These are reserved bits. When read, they always show the value 0." On the other hand, the compact emulator stipulates that **these bits must always be set to 0, and that when read, these bits show the set value.**

H'FFE1	Port Mode Register 5	Bits 7, 6
H'FFF9	Module Standby Control Register 1	Bit 7

(3) Although these bits in the hardware manual are reserved bits, the compact emulator stipulates that **these bits must always be set to 0, and that when read, these bits show the set value.**

H'FFE2	Port Mode Register 3	Bits 7--3
H'FFF5	Interrupt Enable Register 2	Bits 7--5
H'FFFA	Module Standby Control Register 2	Bits 7--0
H'FFFB	Module Standby Control Register 3	Bit 0

(4) Although the hardware manual describes the functions shown below, they are not available on the compact emulator, because the evaluation MCU does not have them.

- power-on reset & low-voltage detection circuit
- on-chip oscillator
- The watchdog timer starts operating in the initial state after the reset
- clock output
- Port C

(5) Although the hardware manual says that registers are located at the addresses shown below, the compact emulator stipulates that **writing to the addresses has no effect, and that when read, they show indeterminate values.** This is because no registers exist at these addresses in the compact emulator.

H'F730	Low-voltage-detection Control Register	Bits 7--0
H'F731	Low-voltage-detection Status Register	Bits 7--0
H'F732	Reset Source Decision Register	Bits 7--0
H'F734	Clock Control/Status Register	Bits 7--0
H'F735	RC Control Register	Bits 7--0
H'F736	RC Trimming Data Protect Register	Bits 7--0
H'F737	RC Trimming Data Register	Bits 7--0
H'FF90	Flash Memory Control Register 1	Bits 7--0
H'FF91	Flash Memory Control Register 2	Bits 7--0
H'FF92	Flash Memory Power Control Register	Bits 7--0
H'FF93	Block Specification Register 1	Bits 7--0
H'FF9B	Flash Memory Enable Register	Bits 7--0
H'FFDE	Port Data Register C	Bits 7--0
H'FFEE	Port Control Register C	Bits 7--0

(6) Although the hardware manual says "Initial value = 1.", the initial value is 0 in the compact emulator. **When the watchdog timer counts up, these bits must always be set to 1.**

H'FFC0	Timer Control/Status Register WD	Bit 2

	Address	Register	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Evaluation chip	H'F730	-	-	-	-	-	-	-	-	-
	H'F731	-	-	-	-	-	-	-	-	-
	H'F732	-	-	-	-	-	-	-	-	-
	H'F734	-	-	-	-	-	-	-	-	-
	H'F735	-	-	-	-	-	-	-	-	-
	H'F736	-	-	-	-	-	-	-	-	-
	H'F737	-	-	-	-	-	-	-	-	-
	H'F790	-	-	-	-	-	-	-	-	-
	H'F791	-	-	-	-	-	-	-	-	-
	H'F792	-	-	-	-	-	-	-	-	-
	H'F793	-	-	-	-	-	-	-	-	-
	H'F79B	-	-	-	-	-	-	-	-	-
	H'FFC0	TCSRWD	B6WI	TCWE	B4WI	TCSRWE	B2WI	WDON	B0WI	WRST
	H'FFDE	-	-	-	-	-	-	-	-	-
	H'FFE0	PMR1	IRQ3	IRQ2	IRQ1	IRQ0	TXD2	PWM	TXD	TMOW
	H'FFE1	PMR5	POF57	POF56	WKP5	WKP4	WKP3	WKP2	WKP1	WKP0
	H'FFE2	PMR3	POF27	POF26	POF25	POF24	POF23	-	-	-
	H'FFEE	-	-	-	-	-	-	-	-	-
	H'FFF5	IENR2	IENTB3	IENTB2	IENTB1	-	-	-	-	-
	H'FFF9	MSTCR1	MSTS4	MSTIIC	MSTS3	MSTAD	MSTWD	MSTTW	MSTTV	MSTTA
	H'FFFA	MSTCR2	MSTS3_2	MSTTB3	MSTTB2	MSTTB1	MSTTX	-	MSTTZ	MSTPWM
	H'FFFB	MSTCR3	-	-	-	-	-	-	-	MSTS4_2

	Address	Register	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
H8/36094	H'F730	LVDCR	-	-	-	-	LVDSEL	-	LVDDE	LVDUE
	H'F731	LVDSR	-	-	-	-	-	-	LVDDF	LVDUF
	H'F732	LVDRF	-	-	-	-	-	-	PRST	WRST
	H'F734	CKCSR	PMRC1	PMRC0	OSCBAKE	OSCSEL	CKSWIE	CKSWIF	OSCHLT	CKSTA
	H'F735	RCCR	RCSTP	FSEL	VCLSEL	-	-	-	RCPSC1	RCPSC0
	H'F736	RCTRMDPR	WRI	PRWRE	LOCKDW	TRMDRWE	-	-	-	-
	H'F737	RCTRMDR	TRMD7	TRMD6	TRMD5	TRMD4	TRMD3	TRMD2	TRMD1	TRMD0
	H'F790	FLMCR1	-	SWE	ESU	PSU	EV	PV	E	P
	H'F791	FLMCR2	FLER	-	-	-	-	-	-	-
	H'F792	FLPWCR	PDWND	-	-	-	-	-	-	-
	H'F793	EBR1	-	-	-	EB4	EB3	EB2	EB1	EB0
	H'F79B	FENR	FLSHE	-	-	-	-	-	-	-
	H'FFC0	TCSRWD	B6WI	TCWE	B4WI	TCSRWE	B2WI	WDON	B0WI	WRST
	H'FFDE	PDRC	-	-	-	-	-	-	PDRC1	PDRC0
	H'FFE0	PMR1	IRQ3	IRQ2	IRQ1	IRQ0	-	-	TXD	TMOW
	H'FFE1	PMR5	-	-	WKP5	WKP4	WKP3	WKP2	WKP1	WKP0
	H'FFE2	-	-	-	-	-	-	-	-	-
	H'FFEE	PCRC	-	-	-	-	-	-	PCRC1	PCRC0
	H'FFF5	-	-	-	-	-	-	-	-	-
	H'FFF9	MSTCR1	-	MSTIIC	MSTS3	MSTAD	MSTWD	MSTTW	MSTTV	MSTTA
	H'FFFA	-	-	-	-	-	-	-	-	-
	H'FFFB	-	-	-	-	-	-	-	-	-

4.6.10 Precautions for the H8/36014 Series

(1) The hardware manual says "Initial value = 0. These are reserved bits. When read, they always show the value 0." On the other hand, the compact emulator stipulates that **these bits must always be set to 0, and that when read, these bits show the set value.**

H'FFE0	Port Mode Register 1	Bits 6, 5, 2, 0
H'FFF1	System Control Register 2	Bits 6, 1, 0
H'FFF2	Interrupt Edge Select Register 1	Bits 7, 2, 1
H'FFF4	Interrupt Enable Register 1	Bits 6, 2, 1
H'FFF9	Module Standby Control Register 1	Bits 7, 0
H'FFFA	Module Standby Control Register 2	Bits 6--3, 1, 0

(2) Although these bits in the hardware manual are reserved bits, the compact emulator stipulates that **these bits must always be set to 0, and that when read, these bits show the set value.**

H'FFE2	Port Mode Register 3	Bits 7--3
H'FFF5	Interrupt Enable Register 2	Bits 7--5
H'FFFB	Module Standby Control Register 3	Bit 0

(3) Although the hardware manual says that registers are located at the addresses shown below, the compact emulator stipulates that **writing to the addresses has no effect, and that when read, they show indeterminate values.** This is because no registers exist at these addresses in the compact emulator.

H'F730	Low-voltage-detection Control Register	Bits 7--0
H'F731	Low-voltage-detection Status Register	Bits 7--0
H'FF90	Flash Memory Control Register 1	Bits 7--0
H'FF91	Flash Memory Control Register 2	Bits 7--0
H'FF92	Flash Memory Power Control Register	Bits 7--0
H'FF93	Block Specification Register 1	Bits 7--0
H'FF9B	Flash Memory Enable Register	Bits 7--0

	Adress	Register	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
Evaluation chip	H'F730	-	-	-	-	-	-	-	-	-
	H'F731	-	-	-	-	-	-	-	-	-
	H'F790	-	-	-	-	-	-	-	-	-
	H'F791	-	-	-	-	-	-	-	-	-
	H'F792	-	-	-	-	-	-	-	-	-
	H'F793	-	-	-	-	-	-	-	-	-
	H'F79B	-	-	-	-	-	-	-	-	-
	H'FFE0	PMR1	IRQ3	IRQ2	IRQ1	IRQ0	TXD2	PWM	TXD	TMOW
	H'FFE2	PMR3	POF27	POF26	POF25	POF24	POF23	-	-	-
	H'FFF1	SYSCR2	SMSEL	LSON	DTON	MA2	MA1	MA0	SA1	SA0
	H'FFF2	IEGR1	NMIEG	-	-	-	IEG3	IEG2	IEG1	IEG0
	H'FFF4	IENR1	IENDT	IENTA	IENWP	-	IEN3	IEN2	IEN1	IEN0
	H'FFF5	IENR2	IENTB3	IENTB2	IENTB1	-	-	-	-	-
	H'FFF9	MSTCR1	MSTS4	MSTIIC	MSTS3	MSTAD	MSTWD	MSTTW	MSTTV	MSTTA
	H'FFFA	MSTCR2	MSTS3_2	MSTTB3	MSTTB2	MSTTB1	MSTTX	-	MSTTZ	MSTPWM
	H'FFFB	MSTCR3	-	-	-	-	-	-	-	MSTS4_2

	Adress	Register	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
H8/36014	H'F730	LVDCR	LVDE	-	-	-	LVDSEL	LVDRE	LVDDE	LVDUE
	H'F731	LVDSR	-	-	-	-	-	-	LVDDF	LVDUF
	H'F790	FLMCR1	-	SWE	ESU	PSU	EV	PV	E	P
	H'F791	FLMCR2	FLER	-	-	-	-	-	-	-
	H'F792	FLPWCR	-	-	-	-	-	-	-	-
	H'F793	EBR1	-	-	-	EB4	EB3	EB2	EB1	EB0
	H'F79B	FENR	FLSHE	-	-	-	-	-	-	-
	H'FFE0	PMR1	IRQ3	-	-	IRQ0	TXD2	-	TXD	-
	H'FFE2	-	-	-	-	-	-	-	-	-
	H'FFF1	SYSCR2	SMSEL	LSON	DTON	MA2	MA1	MA0	-	-
	H'FFF2	IEGR1	-	-	-	-	IEG3	-	-	IEG0
	H'FFF4	IENR1	IENDT	-	IENWP	-	IEN3	-	-	IEN0
	H'FFF5	-	-	-	-	-	-	-	-	-
	H'FFF9	MSTCR1	-	MSTIIC	MSTS3	MSTAD	MSTWD	MSTTW	MSTTV	-
	H'FFFA	MSTCR2	MSTS3_2	-	-	-	-	-	-	-
	H'FFFB	-	-	-	-	-	-	-	-	-

5. Troubleshooting

This chapter describes how to troubleshoot when this product does not work properly.

5.1 Flowchart to Remedy the Troubles

Figure 5.1 shows the flowchart to remedy the troubles from when power to the emulator is activated until the emulator debugger starts up. Check this while the user system is disconnected. For the latest FAQs visit the Renesas Tools Homepage.

http://www.renesas.com/tools

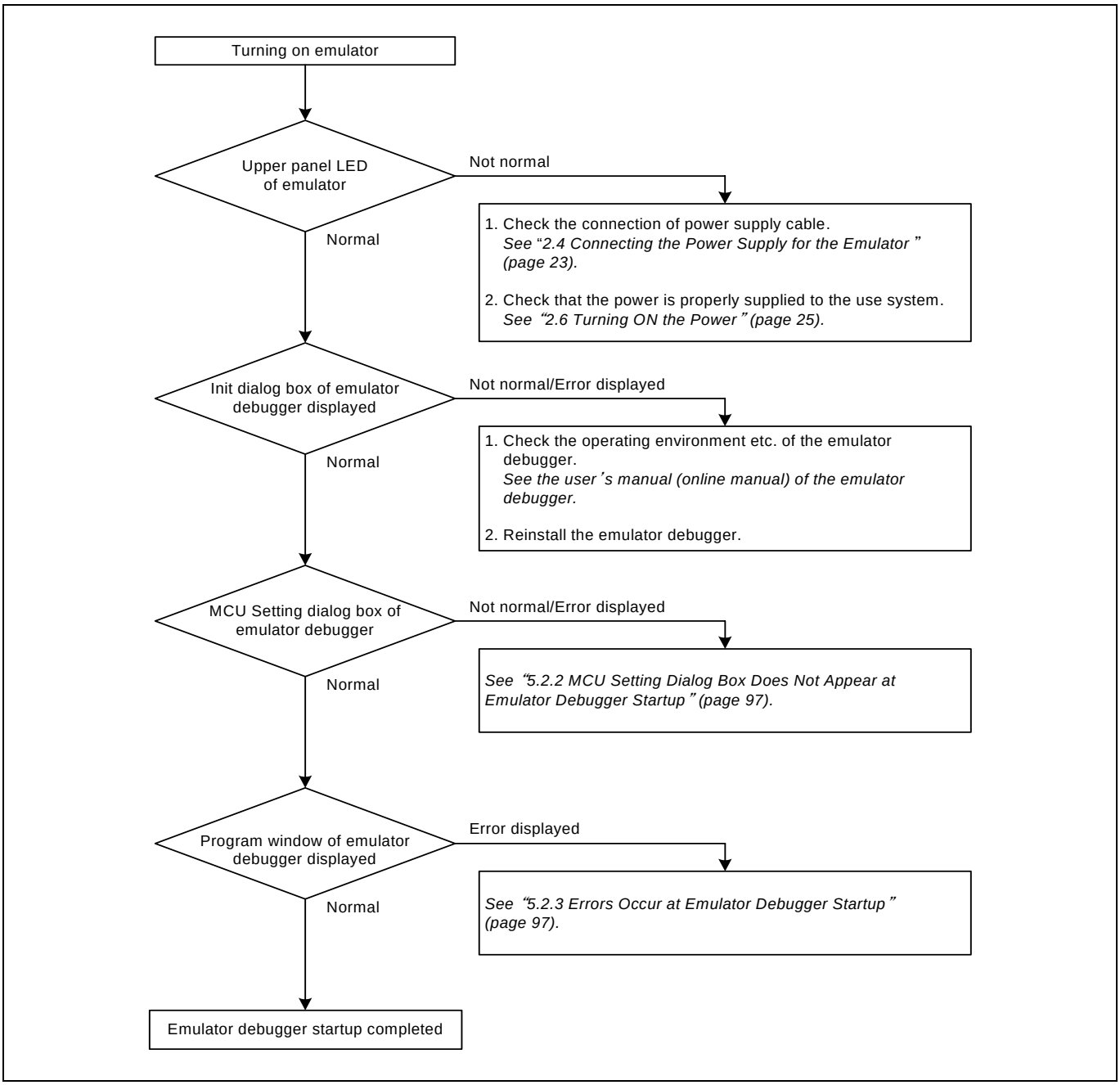


Figure 5.1 Flowchart to remedy the troubles

5.2 When the Emulator Debugger Does Not Start Up Properly

5.2.1 When the LEDs of the Emulator Do Not Display Normally

Table 5.1 Errors LEDs show and their checkpoints

Error	Connection to the user system	Checkpoint
LEDs do not light up.	-	Check that the power cable is connected. *See "2.4 Connecting the Power Supply for the Emulator" (page 23).*
Target Status POWER LED does not light up.	Connected	Check that power (Vcc and GND) is properly supplied to the user system.
Target Status CLOCK LED does not light up.	Not connected	(1) Check that both the main and sub clocks of the emulator debugger are not set to "EXT". *See the CLK command of the emulator debugger.* (2) Check that the oscillator circuit board is properly installed in the emulator and is oscillating. *See "2.9.3 Selecting Clock Supply" (page 35).*
	Connected	When the clock is supplied from an external oscillator, check that the oscillator circuit in the user system is oscillating properly.
Target Status RESET LED does not go out.	Connected	Check that the reset pin of the user system is held high.

5.2.2 MCU Setting Dialog Box Does Not Appear at Emulator Debugger Startup

Table 5.2 Checkpoints of errors at emulator debugger startup

Error	Checkpoint
Communication error occurred. Data was not sent to the target.	Check that the USB cable is connected properly. *See "2.5 Connecting the Host Machine" (page 24).*
Not compact emulator.	Check that an emulator other than the compact emulator (such as PC4701, PC7501) is not connected.
Target MCU is in the reset state.	Check that the reset pin of the user system is held high.
Target clock is stopped.	When the clock is supplied from an external oscillator, check that the oscillator circuit in the user system is oscillating properly.

5.2.3 Errors Occur at Emulator Debugger Startup

Table 5.3 Checkpoints of errors at debugger startup

Error	Checkpoint
Target MCU is uncontrollable.	(1) Check that the IC socket etc. mounted on the user system is soldered properly. (2) Check that the connector is installed properly to the user system.

5.3 How to Request for Support

After checking the items in "5 Troubleshooting", fill in the text file the installer of the emulator debugger generates in the following directory and email to your local distributor.

http://tool-support.renesas.com/eng/toolnews/registration/support.txt

For prompt response, please specify the following information:

(1) Operating environment
- Operating voltage: _____ [V]
- Operating frequency: _____ [MHz]
- Clock supply to the MCU: Internal oscillator/External oscillator

(2) Condition
- The emulator debugger starts up/does not start up
- The error is detected/not detected in the self-check
- Frequency of errors: always/frequency ( )

(3) Problem

6. Maintenance and Guarantee

This chapter describes how to perform maintenance, warranty information, repair provisions and the procedures for requesting a repair.

6.1 User Registration

When you purchase our product, be sure register as a user. For user registration, refer to "User registration" (page 12) of this user's manual.

6.2 Maintenance

(1) If dust or dirt collects on any equipment of your emulation system, wipe it off with a dry soft cloth. Do not use thinner or other solvents because these chemicals can cause the equipment's surface coating to separate.

(2) When you do not use this product for a long period, for safety purposes, disconnect the power cable from the power supply.

6.3 Guarantee

If your product becomes faulty within one year after its purchase while being used under good conditions by observing "IMPORTANT" and "Precautions for Safety" described in this user's manual, we will repair or replace your faulty product free of charge. Note, however, that if your product's fault is raised by any one of the following causes, we will repair it or replace it with new one with extra-charge:

- Misuse, abuse, or use under extraordinary conditions
- Unauthorized repair, remodeling, maintenance, and so on
- Inadequate user's system or misuse of it
- Fires, earthquakes, and other unexpected disasters

In the above cases, contact your local distributor. If your product is being leased, consult the leasing company or the owner.

6.4 Repair Provisions

(1) repairs not covered by warranty

The products elapsed more than one year after purchase is not covered by warranty.

(2) Replacement with extra-charge

If your product's fault falls in any of the following categories, the fault will be corrected by replacing the entire product instead of repair, or you will be advised to purchase new one, depending on the severity of the fault.

- Faulty or broken mechanical portions
- Flaw, separation, or rust in coated or plated portions
- Flaw or cracks in plastic portions
- Faults or breakage caused by improper use or unauthorized repair or modification
- Heavily damaged electric circuits due to overvoltage, overcurrent or shorting of power supply
- Cracks in the printed circuit board or burnt-down patterns
- Wide range of faults that makes replacement less expensive than repair
- Unlocatable or unidentified faults

(3) Expiration of the repair period

When a period of one year elapses after the model was dropped from production, repairing products of the model may become impossible.

(4) Transportation fees at sending your product for repair

Please send your product to us for repair at your expense.

6.5 How to Make Request for Repair

If your product is found faulty, fill in the Repair Request Sheet included with this product, then send it along with this product for repair to your local distributor. Make sure that information in the Repair Request Sheet is written in as much detail as possible to facilitate repair.

⚠ CAUTION

Note on Transporting the Product:

- When sending your product for repair, use the packing box and cushion material supplied with this product when delivered to you and specify handling caution for it to be handled as precision equipment. If packing of your product is not complete, it may be damaged during transportation. When you pack your product in a bag, make sure to use conductive polyvinyl supplied with this product (usually a blue bag). When you use other bags, they may cause a trouble on your product because of static electricity.

Compact Emulator for H8/300H Tiny Series
R0E436640CPE00 User's Manual

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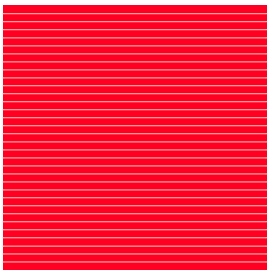
User's Manual



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