To our customers,

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April 1st, 2010
Renesas Electronics Corporation

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User's Manual

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R0E521000CPE00

User's Manual

Compact Emulator for R8C Family

Renesas Electronics
www.renesas.com

Rev.6.00 2009.08

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European Union regulatory notices on Electromagnetic compatibility

CE Certifications:

This product complies with the following European EMC standards.

・EMC Directive 2004/108/EC

EN 55022 Class A

WARNING: This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures.

EN 55024

Information for traceability:

・Authorised representative

Name: Renesas Technology Corp.
Address: Nippon Bldg., 2-6-2, Ote-machi, Chiyoda-ku, Tokyo 100-0004, Japan

・Manufacturer

Name: Renesas Solutions Corp.
Address: Nippon Bldg., 2-6-2, Ote-machi, Chiyoda-ku, Tokyo 100-0004, Japan

・Person responsible for placing on the market

Name: Renesas Technology Europe Limited European Headquaters
Address: Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K.

United States Regulatory notices on Electromagnetic compatibility

FCC Certifications:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

CAUTION: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Preface

The R0E521000CPE00 is a compact emulator for R8C Family MCUs which has a real-time trace function.
This user's manual mainly describes specifications of the R0E521000CPE00 compact emulator and how to setup it. For details on the emulator debugger and C compiler M3T-NC30WA (evaluation version), which are included with each product, 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	R0E521134CFG00 User's Manual
	R0E521174CSJ00 User's Manual
	R0E521174CDB00 User's Manual
	R0E521237CFK00 User's Manual
	R0E521258CFJ00 User's Manual
	R0E521276CFG00 User's Manual
	R0E5212BACFG00 User's Manual
	R0E5212BACFK00 User's Manual
	R0E5212DACFK00 User's Manual
	R0E5212L4CFG00 User's Manual
Integrated development environment	High-performance Embedded Workshop User's Manual
Emulator debugger	M16C R8C Compact Emulator Debugger User's Manual
C compiler	C Compiler Package for M16C Series and R8C Family C Compiler User's Manual
Assembler	C Compiler Package for M16C Series and R8C Family Assembler User's Manual

Important

Before using this product, be 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 the customer's 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 R8C Family of Renesas 16-bit single-chip MCUs. It provides support for system development in both software and hardware.
Be 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.

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:

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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. Be 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:

- 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 only the 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 flexible cable for connecting the user system. And, excessive flexing or force may break conductors.

Caution to Be Taken for System Malfunctions:

- If the emulator 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

Page

User Registration

When you install debugger software, a text file for user registration is created on your PC. Fill it in and email it to your local distributor. If you have replaced an emulator main unit or emulation probe, rewrite an emulator name and serial number in the text file you filled in earlier to register your new hardware products.

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 contact your local distributor.

Terminology

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

Emulator R0E521000CPE00
This means a compact emulator for R8C Family (this product).

Emulator system
This means an emulator system built around the compact emulator R0E521000CPE00. The emulator system is configured with compact emulator R0E521000CPE00, power supply for the emulator, emulator debugger and host machine.

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.

Emulator debugger
This means a software tool which starts up in the integrated development environment High-performance Embedded Workshop to control the emulator and enable debugging.

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 R0E521000CPE00. 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 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 and the operating environment of this product.

1.1 Package Components

The R0E521000CPE00 package consists of the following items. When unpacking it, check to see if your R0E521000CPE00 contains all of these items.

Table 1.1 Package components

Item	Quantity
R0E521000CPE00 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
R0E521000CPE00 Release Notes (English)	1
R0E521000CPE00 Release Notes (Japanese)	1
H/W Tool Customer Registration Sheet (English)	1
H/W Tool Customer Registration Sheet (Japanese)	1
Repair Request Sheet (English)	1
Repair Request Sheet (Japanese)	1
R0E521000CPE00 User's Manual (this manual)	1
R0E521000CPE00 User's Manual (Japanese)	1
CD-ROM: Emulator debugger M16C R8C Compact Emulator Debugger C compiler package M3T-NC30WA (evaluation version)	1

* Please keep the R0E521000CPE00'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 R0E521000CPE00 system.

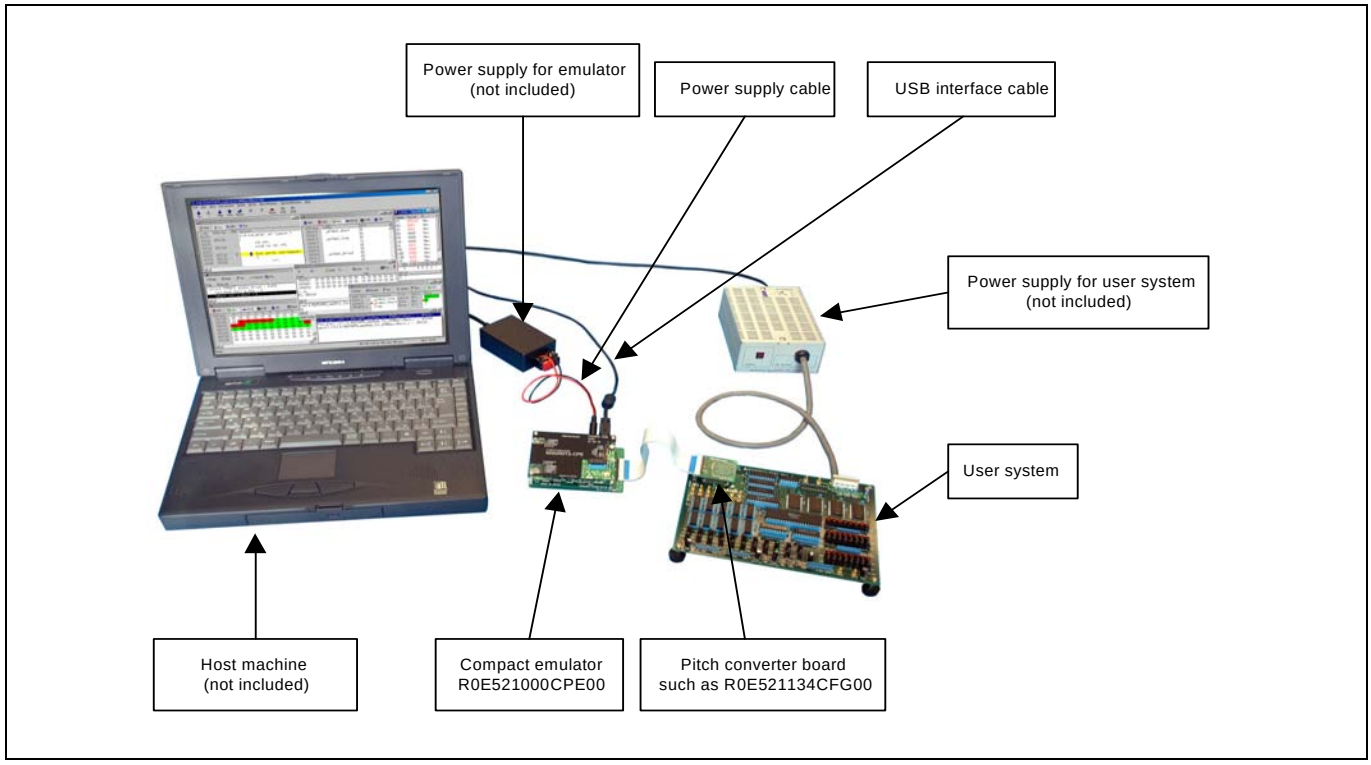


Figure 1.1 System configuration

(1) Compact emulator R0E521000CPE00 (this product)

This compact emulator contains for the R8C Family which has a real-time trace function.

This is described as emulator hereafter. An evaluation MCU is mounted on the R0E521000CPE00.

(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 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. Attach the ferrite core included with this product close to the DC plug of the power cable. For details, refer to "2.4 Attaching the Ferrite Core" (page 30).

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 R0E521134CFG00

This is a pitch converter board for connecting to an MCU foot pattern on the user system. For details, refer to "2.9 Connecting the User System" (page 37).

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.

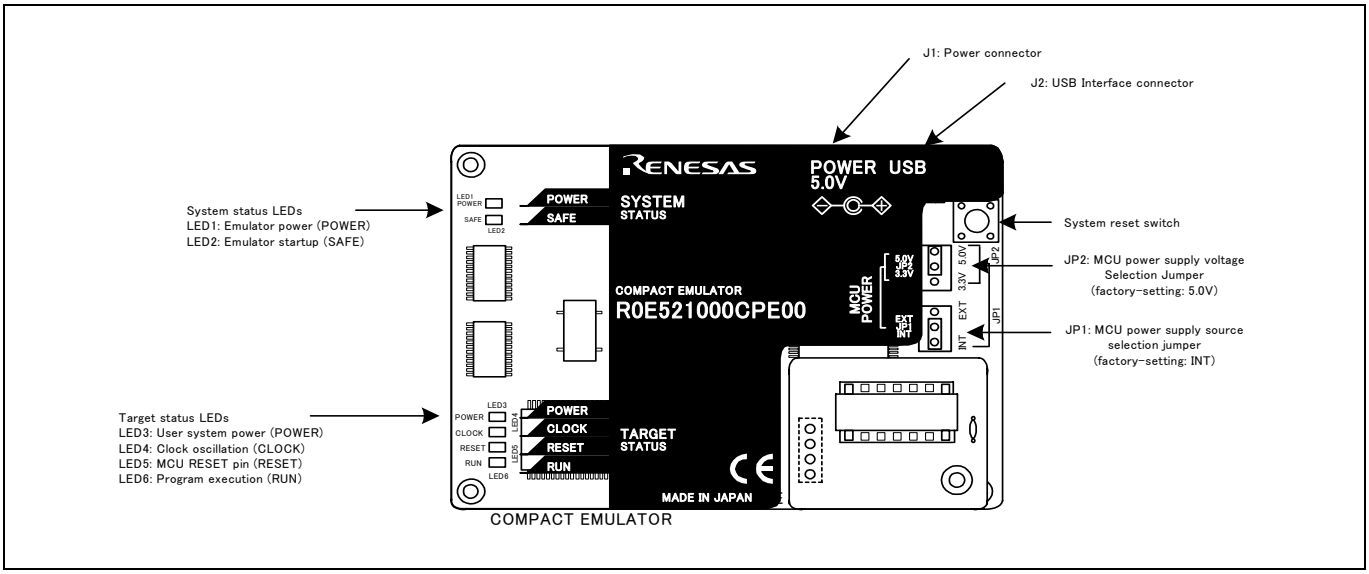


Figure 1.2 Names of the LEDs on the upper panel of the R0E521000CPE00

(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 "2.5 Connecting the Power Supply for the Emulator" (page 30).

(5) USB Cable Connector (J2)

This is a USB cable connector for connecting the host machine to this product. For details, "2.6 Connecting the Host Machine" (page 31).

(6) MCU Power Supply Source Selection Jumper (JP1)/MCU Power Supply Voltage Selection Jumper (JP2)

These are the jumper switches to select power supply to the MCU and its power voltage. For details on these switches, see "2.3.1 MCU Power Supply Source Selection Jumper/MCU Power Supply Voltage Selection Jumper" (page 22).

1.3 Specifications

Tables 1.5 and Table 1.6 list the specifications of the R0E521000CPE00.

Table 1.5 R0E521000CPE00 specifications (1)

Applicable MCUs	R8C Family MCUs	
Usable mode	Single-chip mode	
Maximum ROM/RAM capacity	ROM capacity: 112KB (04000h--1FFFFh) + 4KB (02000h--02FFFh) RAM capacity: 8KB (00300h--012FFh, 03000h--03FFFh)	
Maximum operating frequency	20 MHz at 3.0--5.5 V 10 MHz at 2.7--5.5 V 5 MHz at 2.2--5.5 V	
Applicable power supply	User system connected (JP1 of the M30290T2-CPEA=EXT)	2.2--5.5 V*1 (supplied from the user system)
	User system not connected (JP1 of the M30290T2-CPEA=INT)	3.3 V or 5.0 V (supplied from the emulator, depends on JP2 of the M30290T2-CPEA)
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) *2	
Execution time measurement function	Time between program start and stop	
Connection to user system (see "2.9 Connecting the User System" on page 37)	For 32-pin 0.8mm pitch LQFP (PLQP0032GB-A): R0E521134CFG00 (included with the R0E521134CPE00) R0E521276CFG00 (included with the R0E521276CPE00) R0E5212L4CFG00 (included with the R0E5212L4CPE00) For 20-pin 0.65mm pitch LSSOP (PLSP0020JB-A): R0E521174CSJ00 (included with the R0E521174CPE00) For 20-pin 1.778mm pitch SDIP (PRDP0020BA-A): R0E521174CDB00 (included with the R0E521174CPE10) For 48-pin 0.5mm pitch LQFP (PLQP0048KB-A): R0E521237CFK00 (included with the R0E521237CPE00) For 52-pin 0.65mm pitch LQFP (PLQP0052JA-A): R0E521258CFJ00 (included with the R0E521258CPE00) For 64-pin 0.8mm pitch LQFP (PLQP0064GA-A): R0E5212BACFG00 (included with the R0E5212BACPE00) For 64-pin 0.5mm pitch LQFP (PLQP0064KB-A): R0E5212BACFK00 (included with the R0E5212BACPE10) For 80-pin 0.5mm pitch LQFP (PLQP0080KB-A): R0E5212DACFK00 (included with the R0E5212DACPE00)	

*1: If using this product when the voltage is less than 2.7V, the JP1 of the R0E521000EPBM0 should be set to EXT.
For details, refer to "2.3.3 Setting the POWER Selection Jumper" (page 24).

*2: The hardware break function and trace point settings of the realtime trace function cannot be used at the same time.

Table 1.6 R0E521000CPE00 specifications (2)

Power supply for emulator	DC5.0V±5%/(2A) externally supplied (Prepare a power supply which complies with CE marking requirements separately.)
Host machine interface	USB*3 (USB 1.1 full-speed, mini-B standard connector)

*3: If using this product when the voltage is less than 2.7V, the JP1 of the R0E521000EPBM0 should be set to EXT.

1.4 Operating Environment

Be sure to use this emulator with the operating environmental of the emulator and host machine listed in Tables 1.7 and 1.8.

Table 1.7 Operating environmental conditions

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

Table 1.8 Operating environment of the host machine

Item	Description
Host machine	IBM PC/AT compatibles
OS	Windows® XP, Windows® 2000 *1
CPU	Pentium III 600 MHz or more recommended
Interface	USB 1.1 full-speed*2
Memory	128 MB or greater (more than 10 times the file size of the load module) recommended
Hard disk	Emulator debugger installation needs 100 MB or more free space. (In view of swap area, keep another free space which is more than twice the memory capacity. (More than four times the memory capacity recommended.))
Display resolution	1024 × 768 or greater 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 a registered trademark or trademark 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 84).

Check the package components.	Refer to "1.1 Package Components" (page 14).
▼	
User registration	Refer to "User Registration" (page 12).
▼	
Install the included software.	Install it from the included CD-ROM.
▼	
Changing settings.	Select a power voltage supplied to the target MCU or clock supply according to conditions of use.
▼	
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 form 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 Windows® 2000, this installation must be executed by a user with administrator rights. Be aware that users without administrator rights cannot complete the installation.

Install the software as instructed by the displayed messages by inserting the included CD into the CD-ROM drive.

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 user registration will be provided by e-mail.

2.3 Changing Settings

2.3.1 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 2.2).

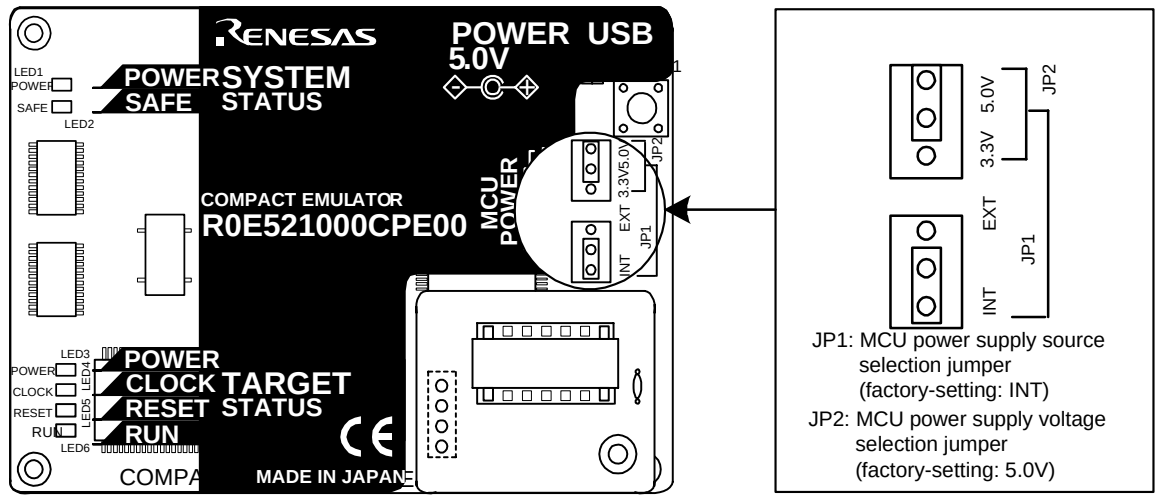


Figure 2.2 Jumper switch locations

These are the jumper switches to select power supply to the MCU and its power voltage. As shown in Table 2.1 below, set the switch according to the connection to the user system.

Table 2.1 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 Changing Jumper Switch Settings:

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

2.3.2 Setting the Jumpers on the R0E521000EPBM0 Board

Figure 2.3 shows the location of jumper switches on the R0E521000EPBM0 board and their factory-settings.

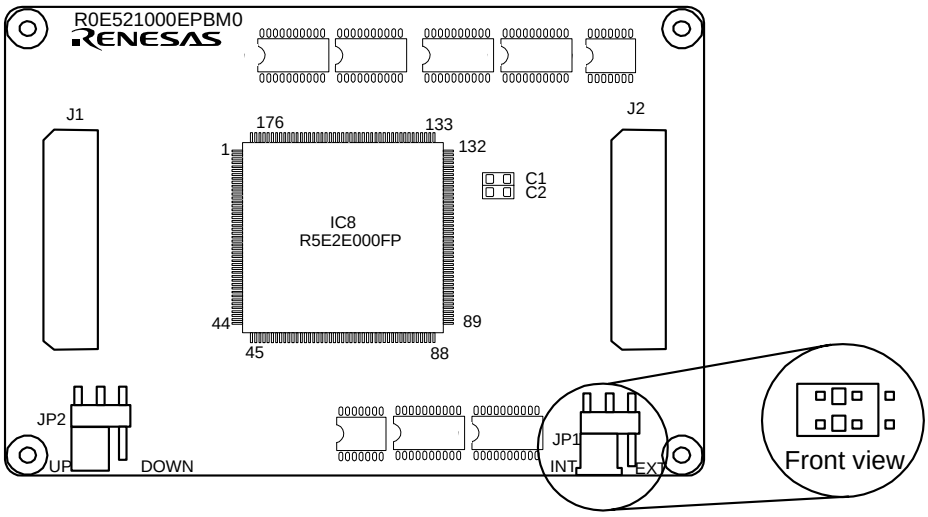
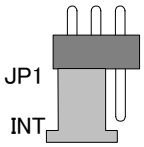
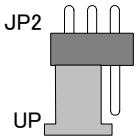


Figure 2.3 Jumper switches on the R0E521000EPBM0

Table 2.2 Setting jumper switches on the R0E521000EPBM0

Switch No.	Switch name	How to set	Description
JP1	POWER selection jumper		Settings of this jumper need to be changed according to the power supply voltage and power supply condition of the user system. For details, refer to "2.3.3 "Setting the POWER Selection Jumper" (page 24).
JP2	RESET pin pullup jumper		This jumper pulls the user system's RESET pin high with 510 kΩ. **Although settings of this jumper do not normally need to be changed,** if the 510 kΩ pullup presents a problem when the user system is connected, the board may be used without this resistor pullup.

⚠ CAUTION

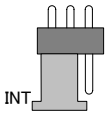
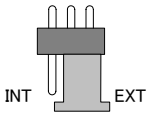
Note on Changing Setting Jumper Switches:

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

2.3.3 Setting the POWER Selection Jumper

The POWER select jumper needs to be set depending on the user system's power supply voltage and power supply condition. If the system is used with power supply voltages in the range 2.7 to 5.5 [V], leave the POWER select jumper as set to the INT side, which is the default setting. If the system is used with power supply voltages less than 2.7 [V], change the POWER select jumper's setting to the EXT side. If the board is used with its POWER select jumper switched to the EXT side, always make sure a user system is connected to the board, and that the MCU power supply source selection jumper is set to the EXT side. Table 2.3 shows the POWER selection jumper switch settings.

Table 2.3 Setting jumper switches on the R0E521000EPBM0

Switch No.	Switch name	How to set	Description
JP1	POWER selection jumper	 (Factory-setting)	When using this system with power supply voltages in the range 2.7 to 5.5 V.
			Set the jumper to this position when the user system's power supply voltage is less than 2.7 [V] and the user system's power supply is to be turned on/off. (Also be sure to set the MCU power supply source selection jumper to the EXT side.)

When the POWER selection jumper is changed to the EXT side, following operations can be performed from the debugger while the user system's power supply is turned off:

(1) Starting up the debugger while the user system's power supply is turned off, as well as downloading a program and referencing or altering memory contents

(2) Starting program execution (by causing the program to run from an idle state, with the MCU in a reset state) while the user system's power supply is turned off, and then executing the program from a reset vector read phase when the user system is powered up.

Furthermore, if the CPU clock is supplied by an on-chip oscillator, the following user system power on/off operations can also be performed:

(3) Turning the user system's power supply off during program execution and stopping the user program (by causing the program to stop from the RUN state) while the power supply is turned off (the MCU in a reset state)

(4) Turning the user system's power supply on or off while the user program is running or idle
Note, however, that since the reset pin is controlled from the emulator side, the high-going transitions of the VCC and RESET pins for user system power-on occur with different timing, the power-on reset function of the MCU cannot be debugged.

⚠ CAUTION

Note on Setting the POWER Selection Jumper:

- The user system's power supply can be turned on/off only when the POWER selection jumper is set to the EXT side. If an attempt is made to turn the user system's power supply on or off while the jumper is set to the INT side, the internal circuit of the emulator or the user system may break down. Therefore, such an operation is strictly prohibited.

IMPORTANT

Notes on the EXT Setting of the POWER Selection Jumper:

- With this product, the MCU's power-on reset function for user system power-on cannot be emulated.
- The user system's power supply can be turned on/off only when the system is operating with an on-chip oscillator, and cannot be turned on or off when operating with XIN or XCIN.

2.3.4 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 2.4 shows the clocks and their initial settings.

Table 2.4 Clock supply to the MCU

Clock	Emulator debugger display	Description	Initial setting
Main (X_{IN}-X_{OUT})	Internal	Internal oscillator circuit board (OSC-3 or OSC-2)	Yes
	External	Oscillator circuit on the user system	-
Sub (X_{CIN}-X_{COUT})	Internal	Internal oscillator circuit (32.768 kHz)	-
	External	Oscillator circuit on the user system	Yes

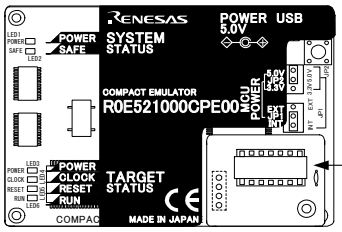
(1) Using an Internal Oscillator Circuit Board

1. Kinds of Oscillator Boards

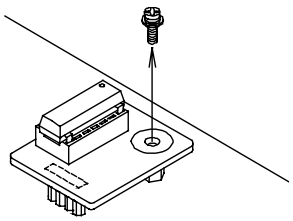
The R0E521000CPE00 comes with an oscillator circuit board OSC-3 (20 MHz). And an oscillator circuit bare board OSC-2 is included with this product. If you use an internal oscillator circuit board of the emulator as a main clock, choose "Internal" in the emulator debugger after replacing oscillator circuit boards to change a clock supplied to an MCU.

2. Replacing Oscillator Circuit Boards

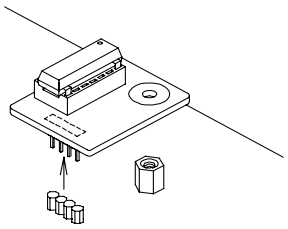
Figure 2.4 shows how to replace the oscillator circuit boards.



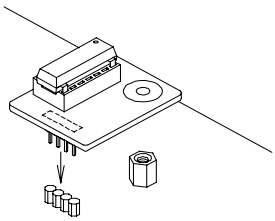
The oscillator circuit board of the emulator is in the lower right corner of the board.



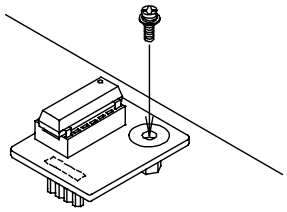
Unscrew the screw securing the oscillator circuit board.



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 2.4 Replacing oscillator circuit boards

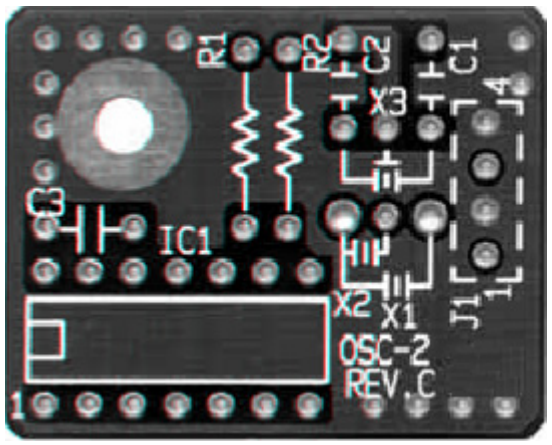
⚠ CAUTION

Note on Replacing the Oscillator Circuit Board:

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

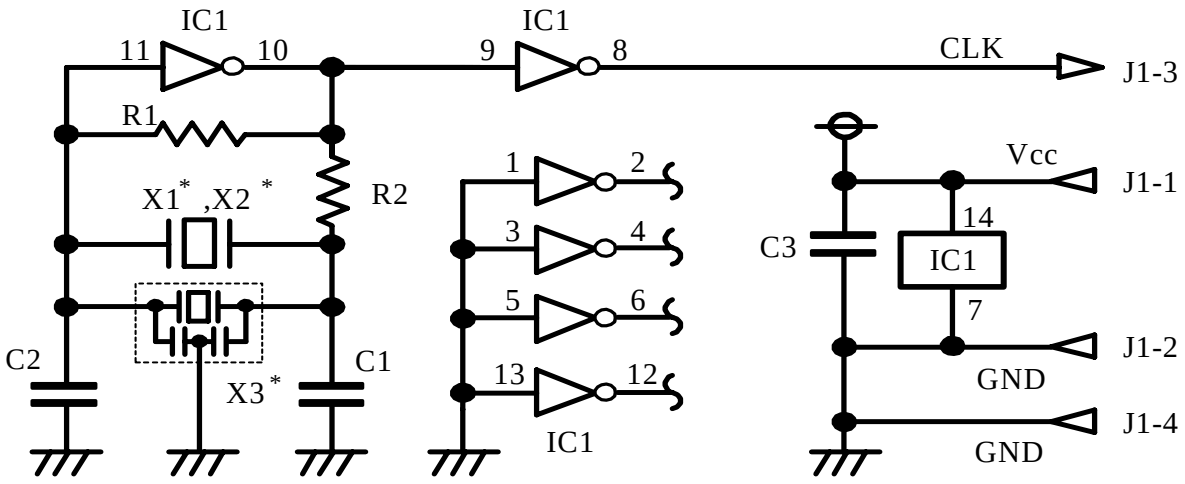
3. Using the Internal Oscillator Circuit Bare Board

To use this product at a frequency you like, build a desired oscillator circuit on the included OSC-2 oscillator circuit bare board. Figure 2.5 shows an external view of the OSC-2 oscillator circuit bare board and the connector pin locations. Figure 2.6 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 2.5 External view of the oscillator circuit board OSC-2 and its connector pin locations



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

IC1:Inverter (Unbuffer)

Figure 2.6 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 2.7 in the user system and input the oscillator output at 50% duty (within the operating range of the evaluation MCU) into pin X_{IN}. And pin X_{OUT} should be open. Choose "External" in the emulator debugger to use this clock.

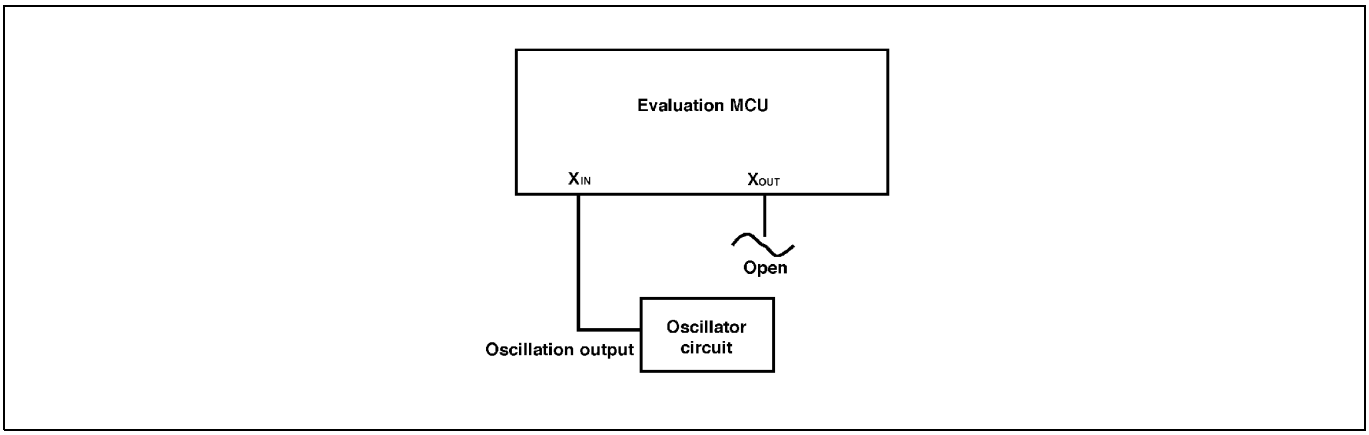


Figure 2.7 External oscillator circuit

Make note that in the oscillator circuit shown in Figure 2.8 where a resonator is connected between pins X_{IN} and X_{OUT}, 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 (X_{CIN} and X_{COUT}).

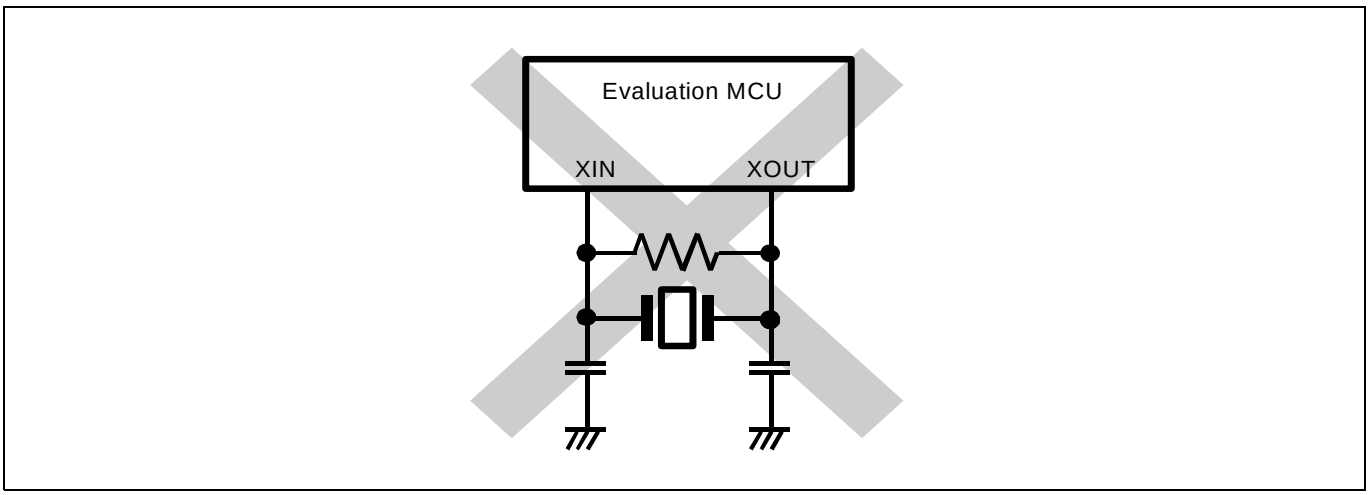


Figure 2.8 Circuit which is not be usable with the emulator

2.3.5 A/D Conversion Bypass Capacitors

There is a foot pattern on the R0E521000EPBM0 board for mounting bypass capacitors for an A/D conversion circuit near the MCU. Mount suitable bypass capacitors as occasion demands. Figure 2.9 shows where they are installed and the configuration of this product.

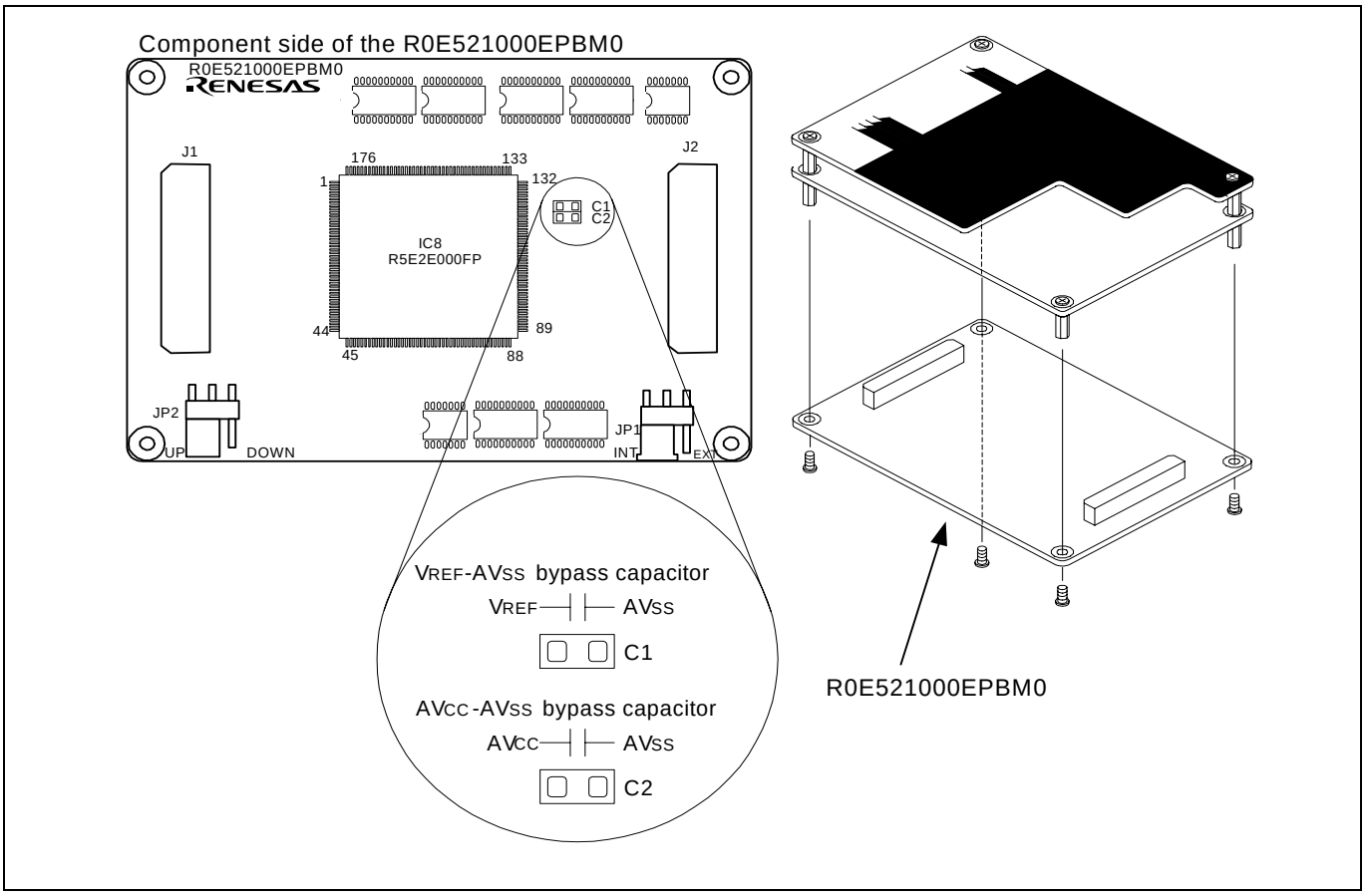


Figure 2.9 Foot pattern for A/D conversion bypass capacitors and the configuration of this product

IMPORTANT

Note on the 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 an actual MCU. Make the final evaluation of the A/D converter with an actual MCU.

2.4 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 Figure 2.10, and close the ferrite core until it clicks.

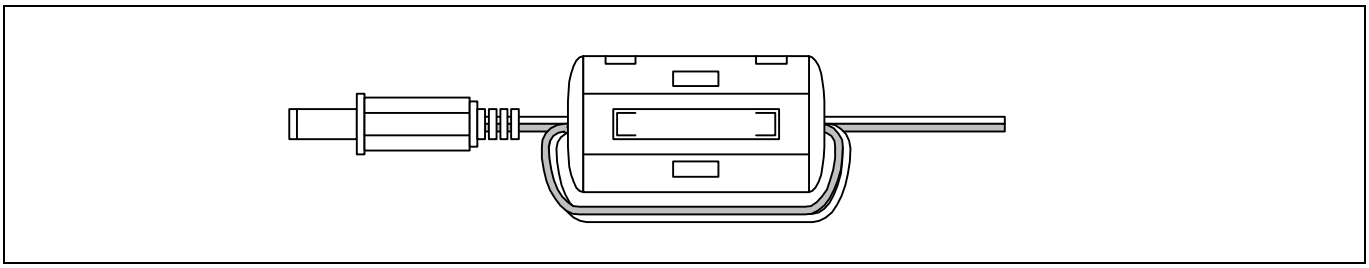


Figure 2.10 Attaching the ferrite core

2.5 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 2.5.

Table 2.5 Specification of power supply of the emulator

Power supply voltage	DC 5.0 V±5%/2 A

Figures 2.11 and 2.12 show the specifications of the power connector (J1) and an applicable plug, respectively.

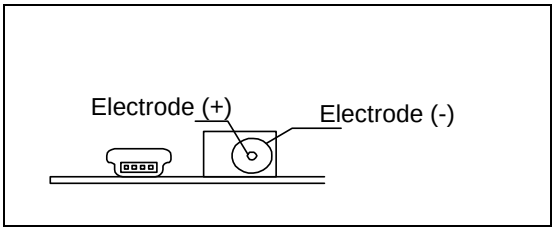


Figure 2.11 Power connector specifications

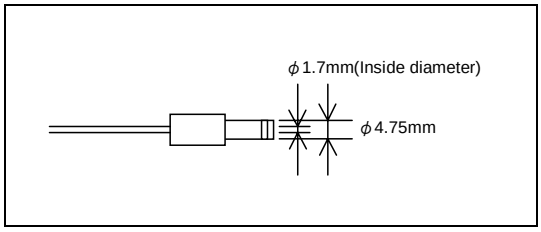


Figure 2.12 Applicable plug specifications

⚠ 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.

2.6 Connecting to 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 2.13).

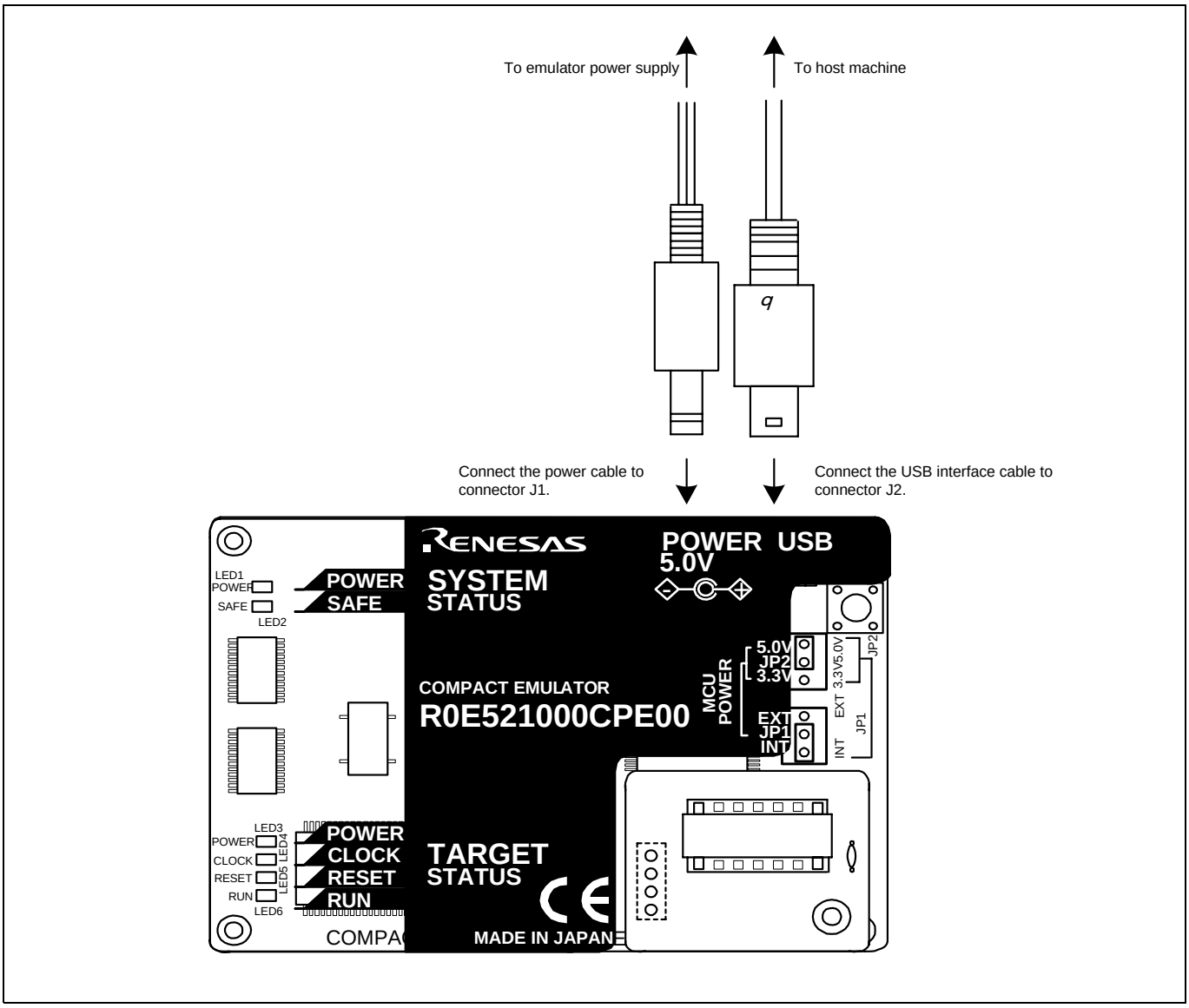


Figure 2.13 Connecting to the emulator system

2.7 Turning ON the Power

2.7.1 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.

2.7.2 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 when the POWER selection jumper is set to the INT POWER side. Do not change the voltage of the user system after turning on the power. To change the power supply voltage of the user system, and the voltage of the user system is 2.2 V to 2.7 V, set the POWER selection jumper to the EXT POWER side. For details about the POWER selection jumper, refer to "2.3.3 Setting the POWER Selection Jumper" (page 24).

2.7.3 Turning ON/OFF the Power

Turn ON the power of the emulator and user system as simultaneously as possible when the POWER selection jumper the INT POWER side. 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.

The user system's power supply can be turned on/off only when the system is operating with an on-chip oscillator and the POWER selection jumper is set to the EXT.

When turning ON the power again after shutting OFF the power, wait for about 10 seconds.

2.7.4 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 2.14 shows the positions of the emulator status LEDs.

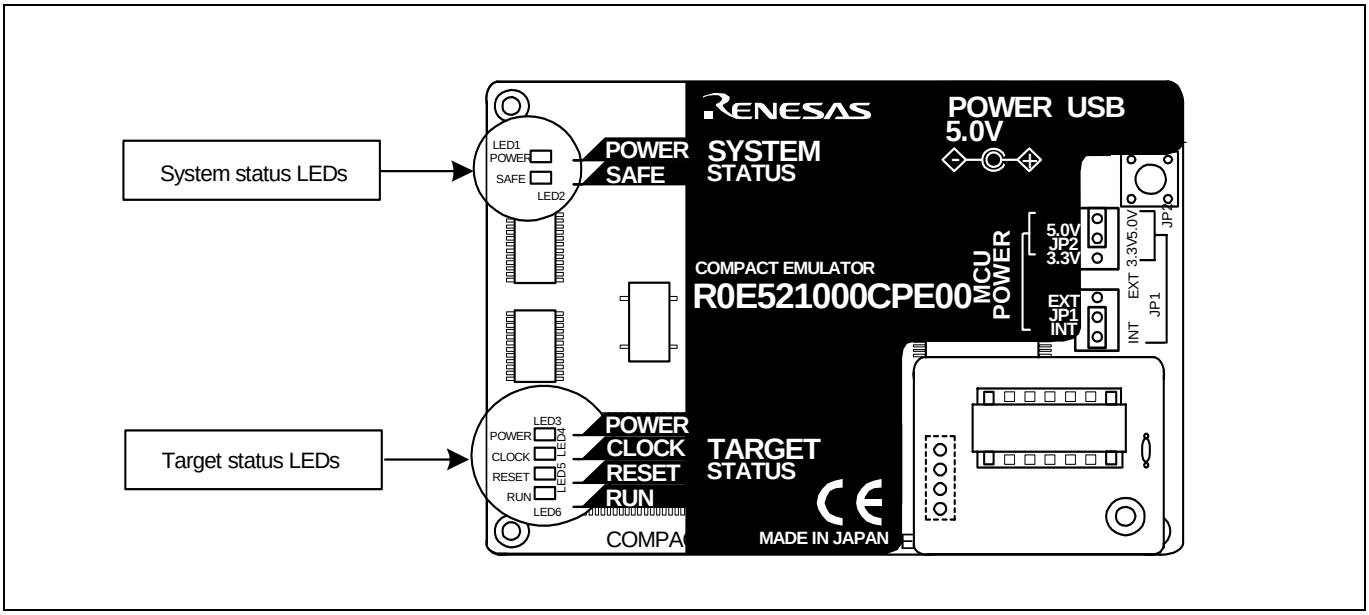


Figure 2.14 Positions of the system status LEDs and target status LEDs

(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 2.15 when the user system is not connected and as shown in Figure 2.16 when a user system is connected. **After turning on the power, the LED4 (CLOCK) and LED5 (RESET) light 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 2.15 to 2.17, refer to "5. Troubleshooting" (page 84).

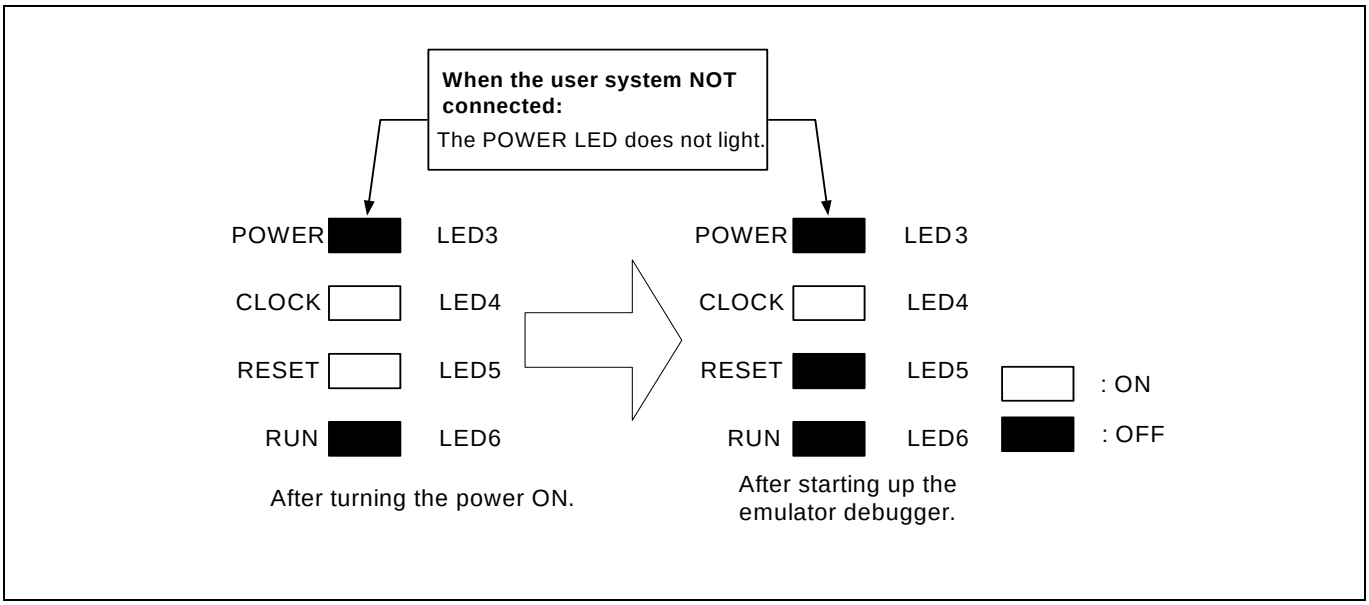


Figure 2.15 Target status LEDs display when the emulator starts up normally (when user system not connected)

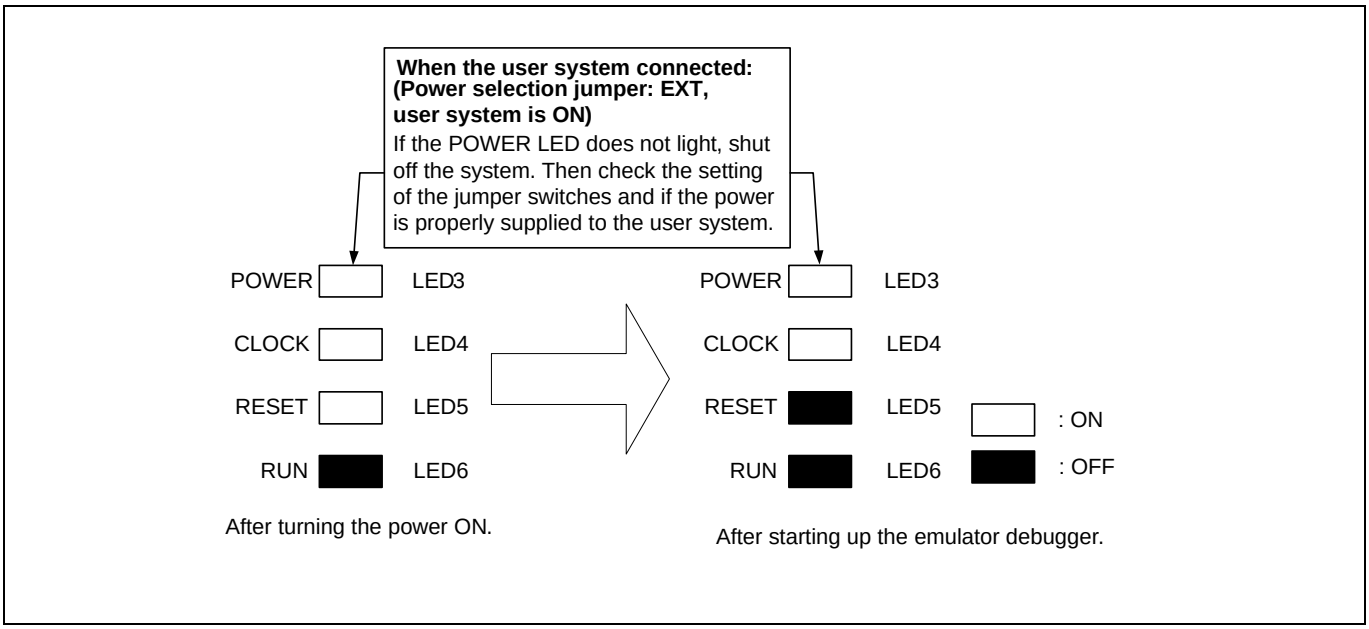


Figure 2.16 Target status LEDs display when the emulator starts up normally
(when user system connected: setting the POWER selection jumper to EXT POWER side and use system is ON)

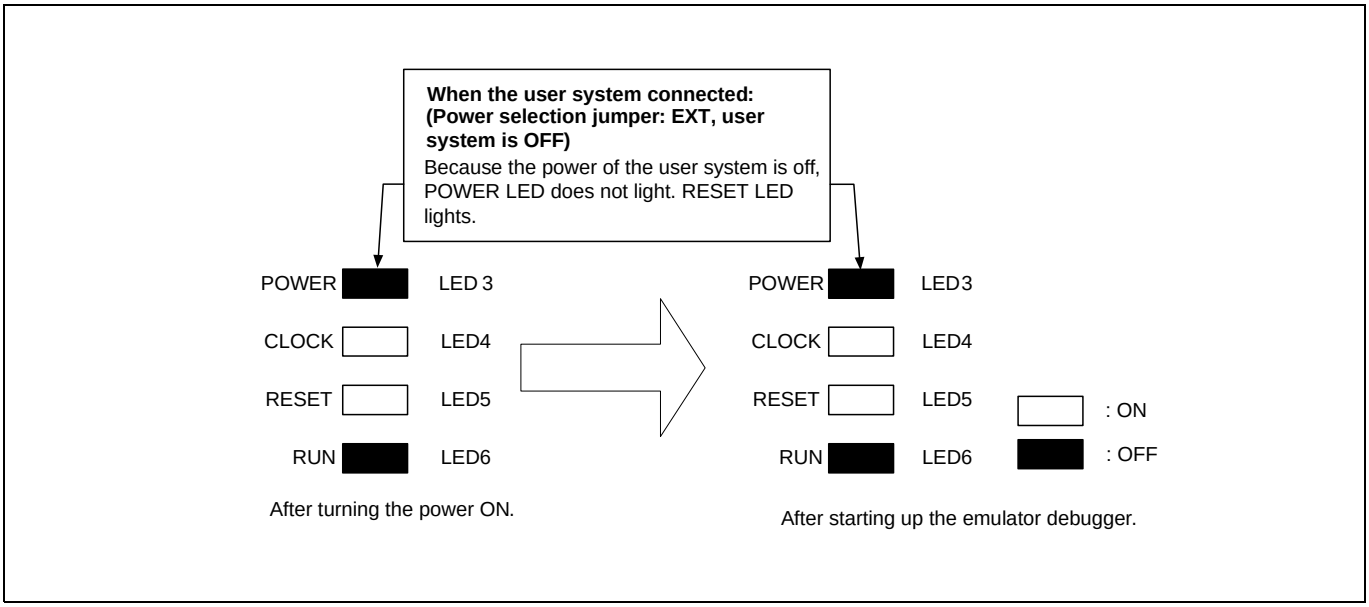


Figure 2.17 Target status LEDs display when the emulator starts up normally
(when user system connected: setting the POWER selection jumper to EXT POWER side and use system is OFF)

2.8 Self-check

2.8.1 Self-check Procedure

Self-check is used to verify the emulator function works properly. 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 2.18.

(1) If the user system is connected, disconnect it.
(2) Set the jumpers as the factory-settings to execute the self-check (see Table 2.6).
(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 2.6 Jumper settings for the self-check

Jumper	Setting
MCU power supply source selection jumper (JP1)	INT
MCU power supply voltage selection jumper (JP2)	5V
POWER jumper	INT
RESET pin pullup jumper	UP

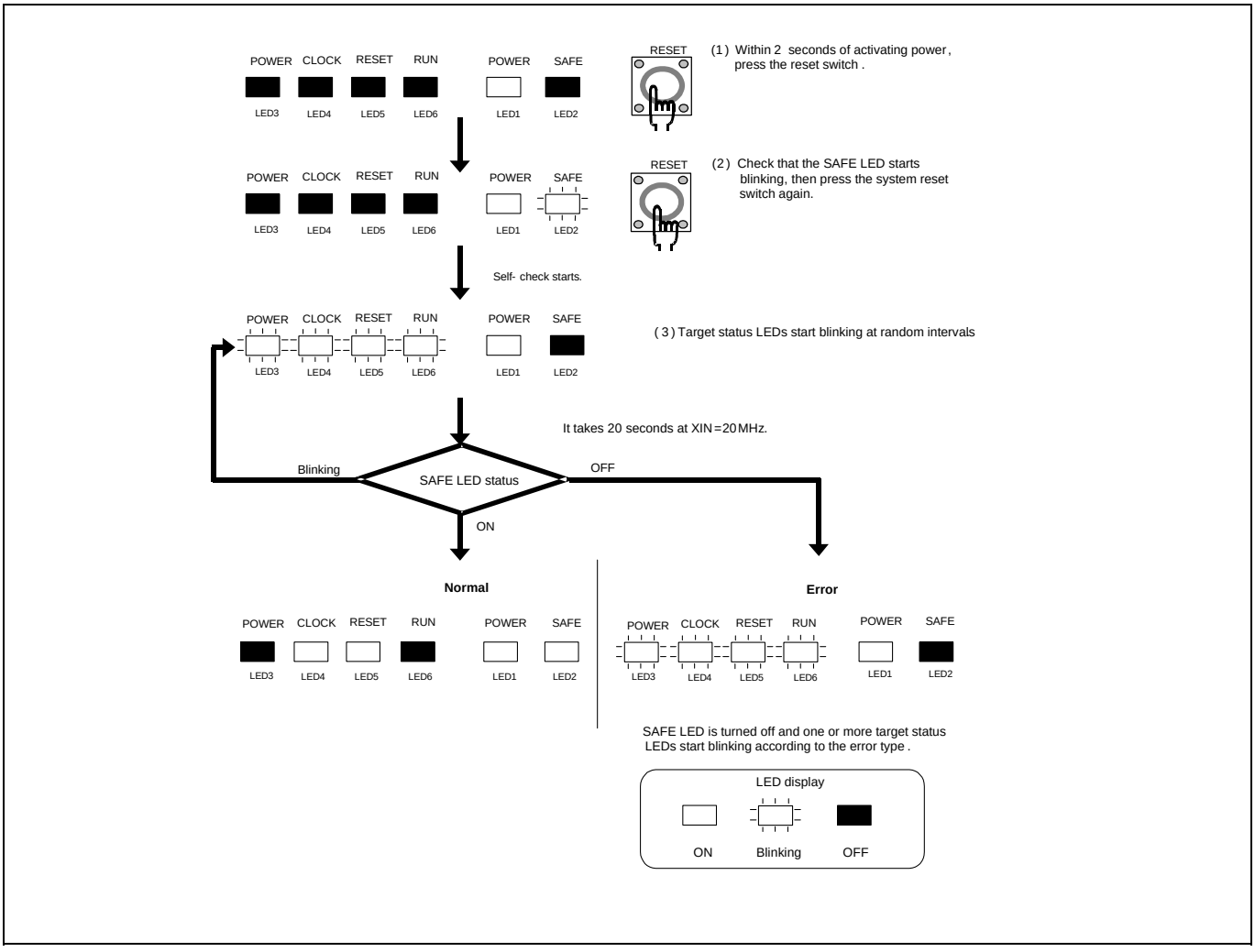


Figure 2.18 Self-check procedure

2.8.2 If an Error is Detected in the Self-check

Table 2.7 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 2.7.

Table 2.7 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 settings (see Table 2.6).
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.

2.9 Connecting to the User System

Figure 2.19 shows the connection of the R0E521000CPE00 and the user system.

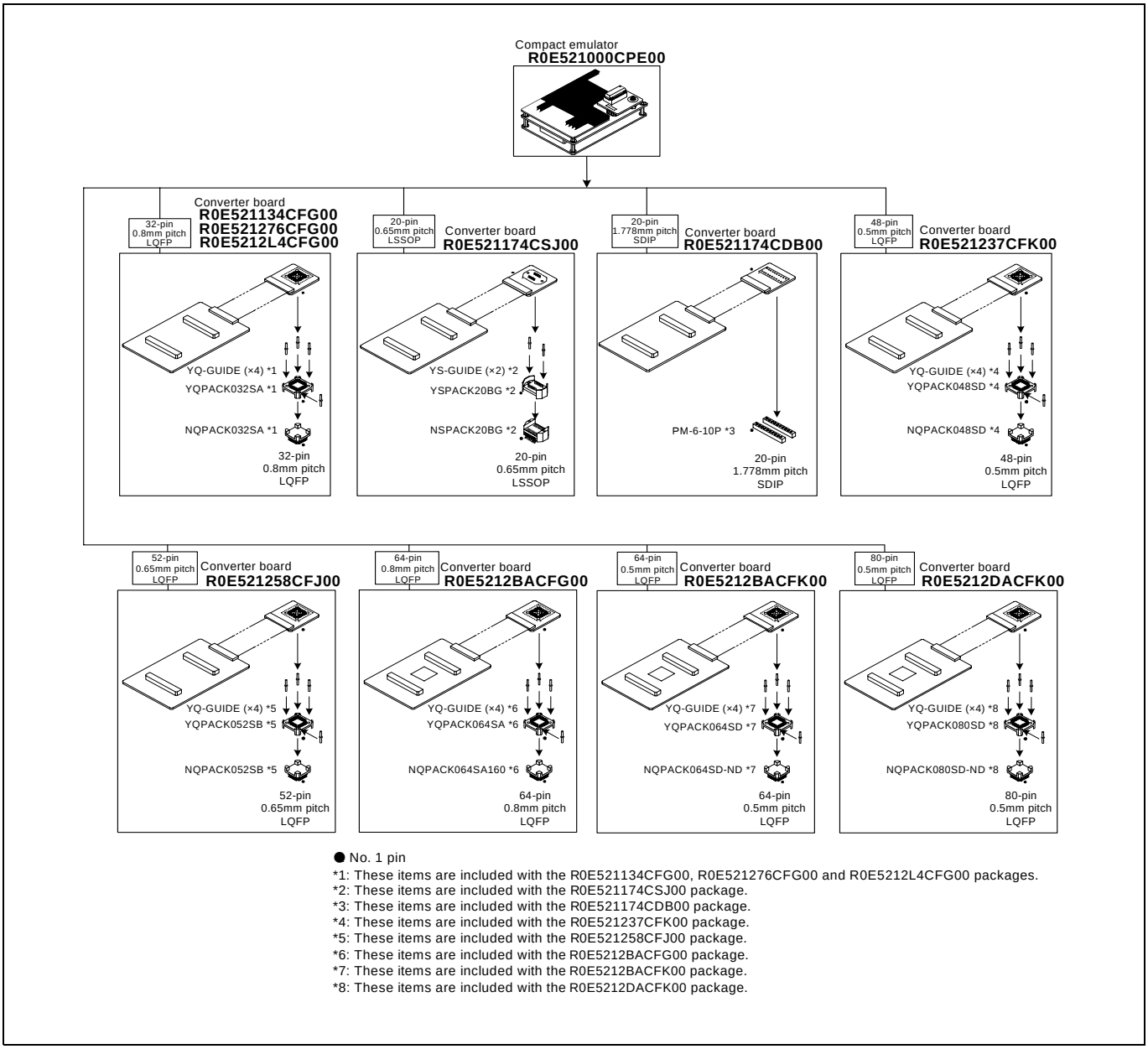


Figure 2.19 Connection of the R0E521000CPE00 and user system

⚠ CAUTION

Note on Connecting to the User System:

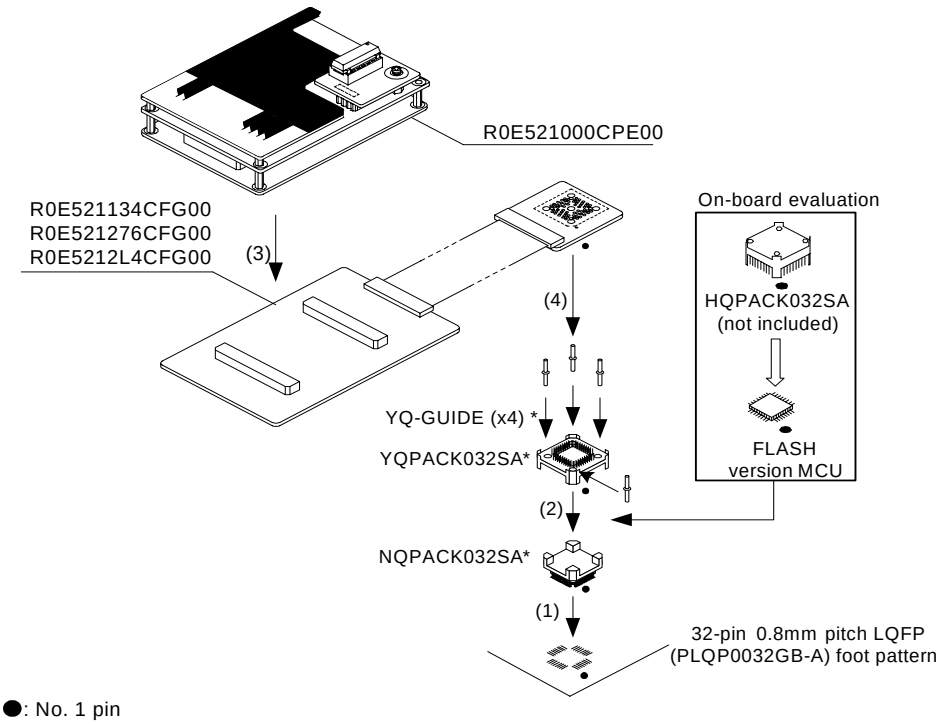
- Take care not to attach a converter board in a wrong direction. It may cause a fatal damage to the emulator and user system.

* NQPACK, YQPACK, YQSOCKET, YQ-GUIDE, HQPACK, TQPACK, TQSOCKET, NSPACK, YSPACK, YSSOCKET and YS-GUIDE are trademarks of Tokyo Eletech Corporation.

2.9.1 Connecting to a 32-pin 0.8mm pitch LQFP Foot Pattern

Figure 2.20 shows a procedure of connecting to a 32-pin 0.8mm pitch LQFP foot pattern on the user system using the R0E521134CFG00 (included with the R0E521134CPE00), R0E521276CFG00 (included with the R0E521276CPE00) or R0E5212L4CFG00 (included with the R0E5212L4CPE00). For details on the R0E521134CFG00, R0E521276CFG00 and R0E5212L4CFG00, refer to each user's manual.

(1) Mount the NQPACK032SA included with the R0E521134CFG00, R0E521276CFG00 or R0E5212L4CFG00 to the user system.
(2) Attach the YQPACK032SA included with the R0E521134CFG00, R0E521276CFG00 or R0E5212L4CFG00 to the NQPACK032SA and secure it with the YQ-GUIDE's.
(3) Attach the R0E521134CFG00, R0E521276CFG00 or R0E5212L4CFG00 to the J3 and J4 of the R0E521000CPE00.
(4) Attach the R0E521134CFG00, R0E521276CFG00 or R0E5212L4CFG00 to the YQPACK032SA.



●: No. 1 pin
*: These items are included with the R0E521134CFG00, R0E521276CFG00 and R0E5212L4CFG00 packages.

Figure 2.20 Connecting to a 32-pin 0.8mm pitch LQFP foot pattern

⚠ CAUTION

Note on Connecting to 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.

IMPORTANT

Notes on Connectors of the Converter Board:

- The connectors of the R0E521000CPE00 and R0E521134CFG00, R0E521276CFG00 or R0E5212L4CFG00 are guaranteed for only 50 insertion/removal iterations.
- The connectors of the R0E521134CFG00, R0E521276CFG00 or R0E5212L4CFG00 and YQPACK032SA are guaranteed for only 100 insertion/removal iterations.

2.9.2 Connecting to a 20-pin 0.65mm pitch LSSOP Foot Pattern

Figure 2.21 shows a procedure of connecting to a 20-pin 0.65mm pitch LSSOP foot pattern on the user system using the R0E521174CSJ00 (included with the R0E521174CPE00). For details on the R0E521174CSJ00, refer to its user's manual.

(1) Mount the NSPACK20BG included with the R0E521174CSJ00 to the user system.
(2) Attach the YSPACK20BG included with the R0E521174CSJ00 to the NSPACK20BG, and secure it with the YS-GUIDE's.
(3) Attach the R0E521174CSJ00 to the J3 and J4 of the R0E521000CPE00.
(4) Attach the R0E521174CSJ00 to the YSPACK20BG.

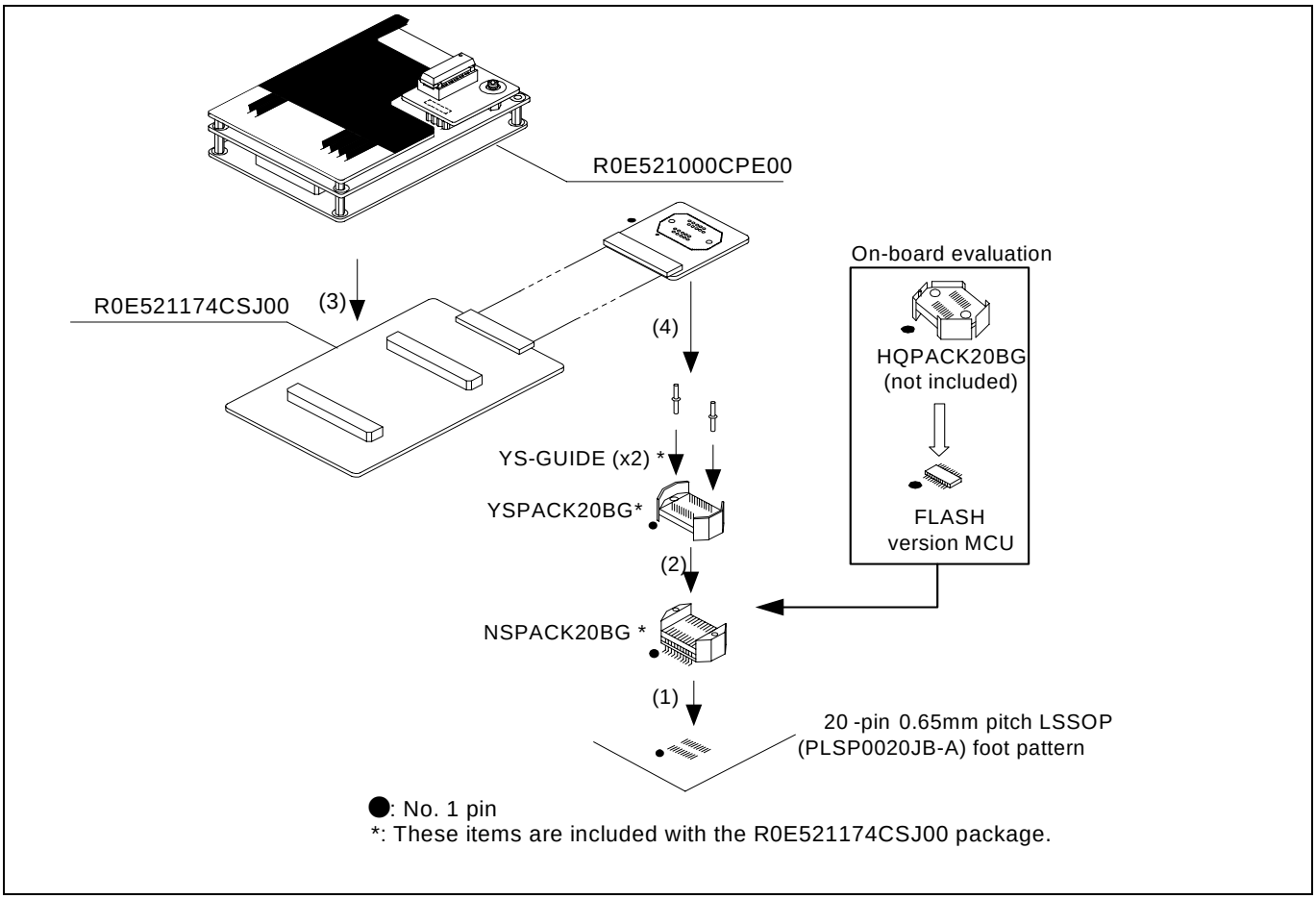


Figure 2.21 Connecting to a 20-pin 0.65mm pitch LSSOP foot pattern

⚠ CAUTION

Note on Connecting to 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.

IMPORTANT

Notes on Connectors of the Converter Board:

- The connectors of the R0E521000CPE00 and R0E521174CSJ00 are guaranteed for only 50 insertion/removal iterations.
- The connectors of the R0E521174CSJ00 and YSPACK20BG are guaranteed for only 100 insertion/removal iterations.

2.9.3 Connecting to a 20-pin 1.778mm pitch SDIP Foot Pattern

Figure 2.22 shows a procedure of connecting to a 20-pin 1.778mm pitch SDIP foot pattern on the user system using the R0E521174CDB00 (included with the R0E521174CPE10). For details on the R0E521174CDB00, refer to its user's manual.

(1) Mount the two pieces of PM-6-10P (10-conductor) included with the R0E521174CDB00 to the user system.
(2) Attach the R0E521174CDB00 to the J3 and J4 of the R0E521000CPE10.
(3) Attach the R0E521174CDB00 to the PM-6-10P.

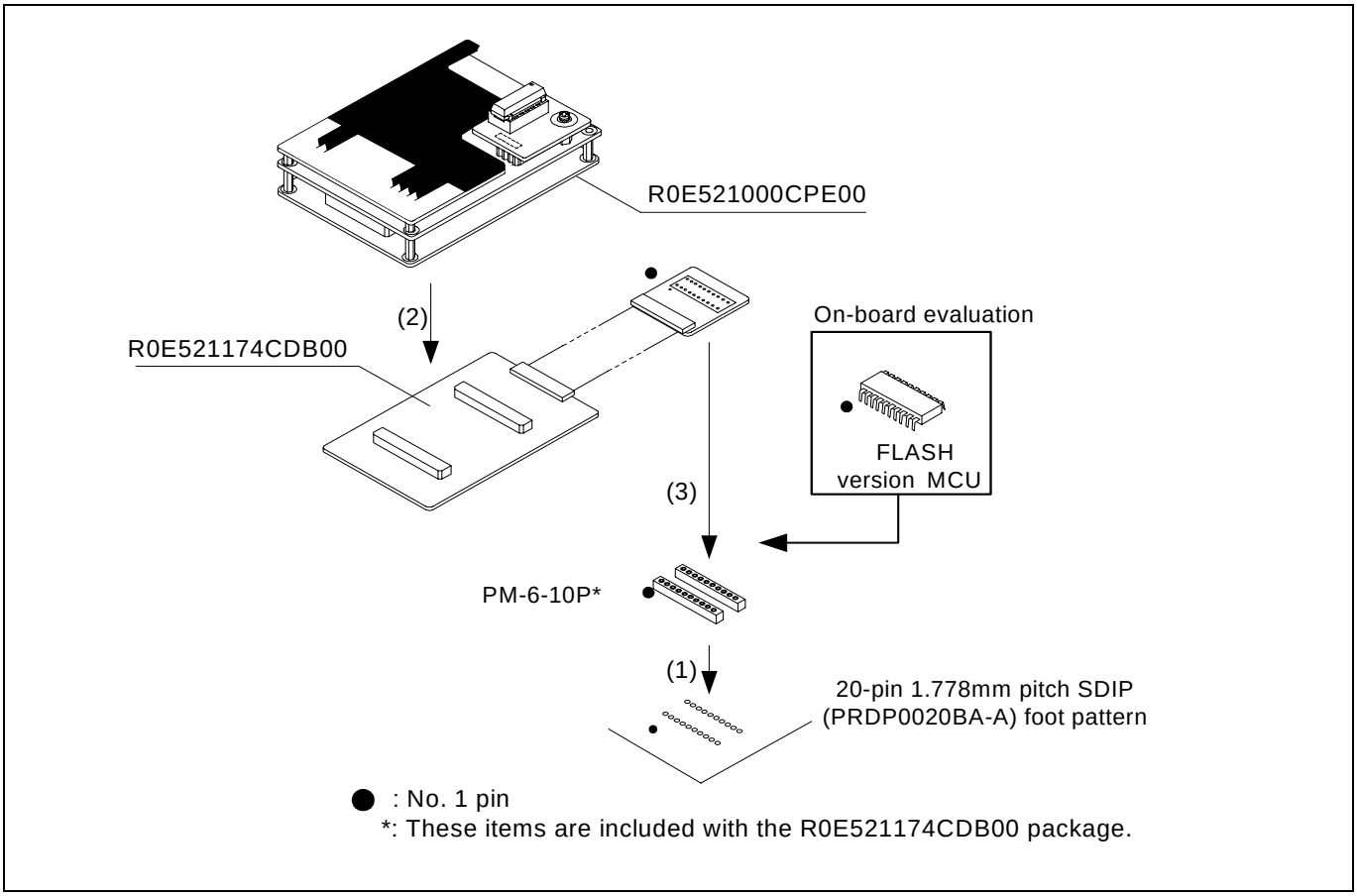


Figure 2.22 Connecting to a 20-pin 1.778mm pitch SDIP foot pattern

⚠ CAUTION

Note on Connecting to 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.

IMPORTANT

Notes on Connectors of the Converter Board:

- The connectors of the R0E521000CPE00 and R0E521174CDB00 are guaranteed for only 50 insertion/removal iterations.
- The connectors of the R0E521174CDB00 and PM-6-10P are guaranteed for only 100 insertion/removal iterations.

2.9.4 Connecting to a 48-pin 0.5mm pitch LQFP Foot Pattern

Figure 2.23 shows a procedure of connecting to a 48-pin 0.5mm pitch LQFP foot pattern on the user system using the R0E521237CFK00 (included with the R0E521237CPE00). For details on the R0E521237CFK00, refer to its user's manual.

(1) Mount the NQPACK048SD included with the R0E521237CFK00 to the user system.
(2) Attach the YQPACK048SD included with the R0E521237CFK00 to the NQPACK048SD and secure it with the YQ-GUIDE's.
(3) Attach the R0E521237CFK00 to the J3 and J4 of the R0E521000CPE00.
(4) Attach the R0E521237CFK00 to the YQPACK048SD.

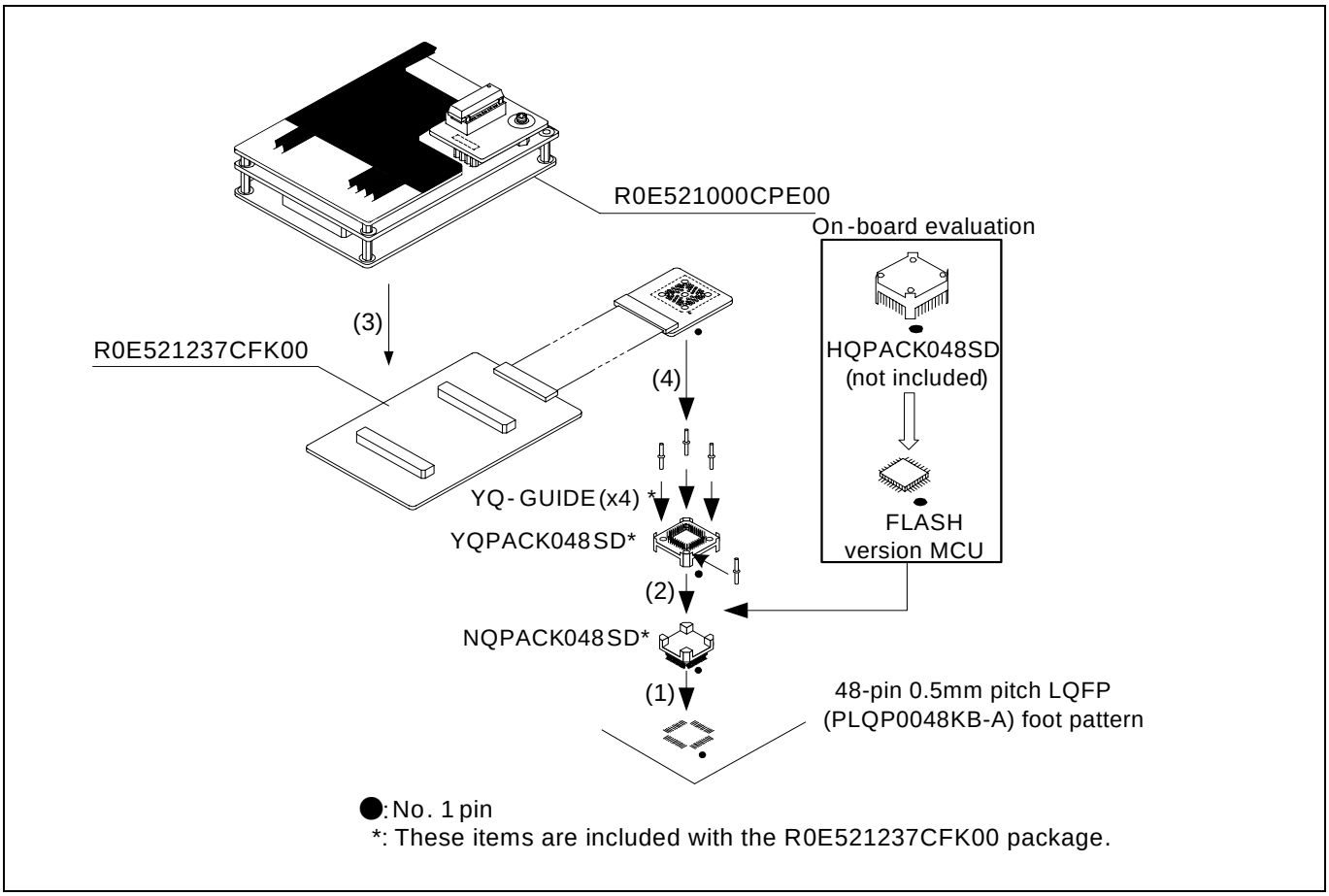


Figure 2.23 Connecting to a 48-pin 0.5mm pitch LQFP foot pattern

⚠ CAUTION

Note on Connecting to 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.

IMPORTANT

Notes on Connectors of the Converter Board:

- The connectors of the R0E521000CPE00 and R0E521237CFK00 are guaranteed for only 50 insertion/removal iterations.
- The connectors of the R0E521237CFK00 and YQPACK048SD are guaranteed for only 100 insertion/removal iterations.

2.9.5 Connecting to a 52-pin 0.65mm pitch LQFP Foot Pattern

Figure 2.24 shows a procedure of connecting to a 52-pin 0.65mm pitch LQFP foot pattern on the user system using the R0E521258CFJ00 (included with the R0E521258CPE00). For details on the R0E521258CFJ00, refer to its user's manual.

(1) Mount the NQPACK052SB included with the R0E521258CFJ00 to the user system.
(2) Attach the YQPACK052SB included with the R0E521258CFJ00 to the NQPACK052SB and secure it with the YQ-GUIDE's.
(3) Attach the R0E521258CFJ00 to the J3 and J4 of the R0E521000CPE00.
(4) Attach the R0E521258CFJ00 to the YQPACK052SB.

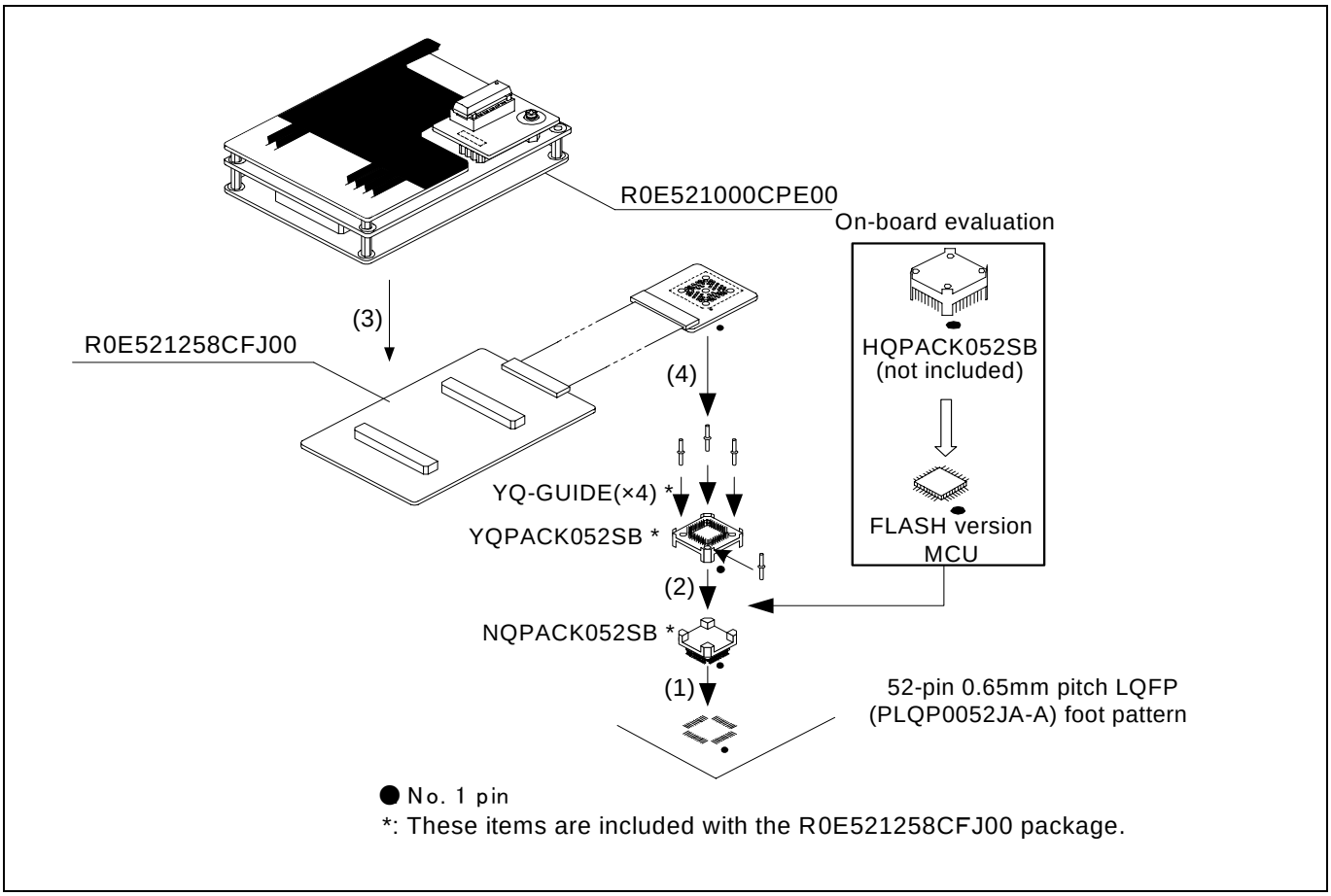


Figure 2.24 Connecting to a 52-pin 0.65mm pitch LQFP foot pattern

⚠ CAUTION

Note on Connecting to 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.

IMPORTANT

Notes on Connectors of the Converter Board:

- The connectors of the R0E521000CPE00 and R0E521258CFJ00 are guaranteed for only 50 insertion/removal iterations.
- The connectors of the R0E521258CFJ00 and YQPACK052SB are guaranteed for only 100 insertion/removal iterations.

2.9.6 Connecting to a 64-pin 0.8mm pitch LQFP Foot Pattern

Figure 2.25 shows a procedure of connecting to a 64-pin 0.8mm pitch LQFP foot pattern on the user system using the R0E5212BACFG00 (included with the R0E5212BACPE00). For details on the R0E5212BACFG00, refer to its user's manual.

(1) Mount the NQPACK064SA160 included with the R0E5212BACFG00 to the user system.
(2) Attach the YQPACK064SA included with the R0E5212BACFG00 to the NQPACK064SA160 and secure it with the YQ-GUIDE's.
(3) Attach the R0E5212BACFG00 to the J3 and J4 of the R0E521000CPE00.
(4) Attach the R0E5212BACFG00 to the YQPACK064SA.

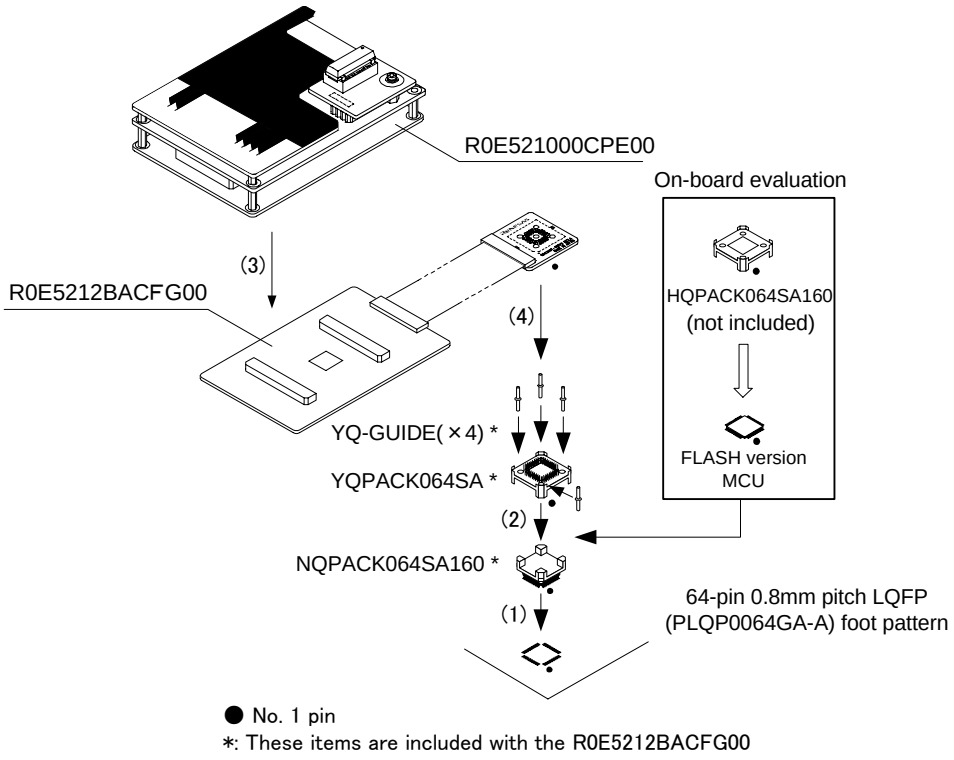


Figure 2.25 Connecting to a 64-pin 0.8mm pitch LQFP foot pattern

⚠ CAUTION

Note on Connecting to 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.

IMPORTANT

Notes on Connectors of the Converter Board:

- The connectors of the R0E521000CPE00 and R0E5212BACFG00 are guaranteed for only 50 insertion/removal iterations.
- The connectors of the R0E5212BACFG00 and YQPACK064SA are guaranteed for only 100 insertion/removal iterations.

2.9.7 Connecting to a 64-pin 0.5mm pitch LQFP Foot Pattern

Figure 2.26 shows a procedure of connecting to a 64-pin 0.5mm pitch LQFP foot pattern on the user system using the R0E5212BACFK00 (included with the R0E5212BACPE10). For details on the R0E5212BACFK00, refer to its user's manual.

(1) Mount the NQPACK064SD-ND included with the R0E5212BACFK00 to the user system.
(2) Attach the YQPACK064SD included with the R0E5212BACFK00 to the NQPACK064SD-ND and secure it with the YQ-GUIDE's.
(3) Attach the R0E5212BACFK00 to the J3 and J4 of the R0E521000CPE00.
(4) Attach the R0E5212BACFK00 to the YQPACK064SD.

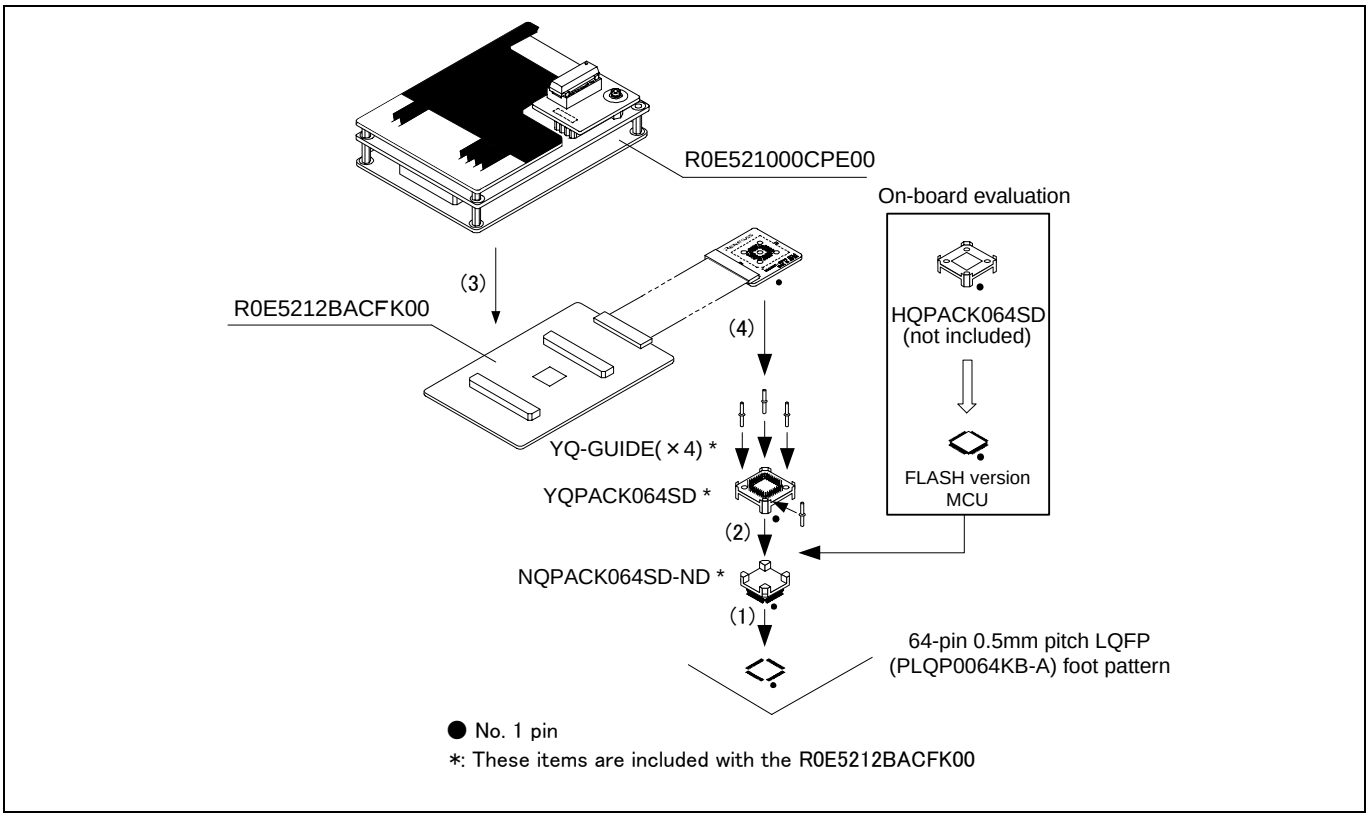


Figure 2.26 Connecting to a 64-pin 0.5mm pitch LQFP foot pattern

⚠ CAUTION

Note on Connecting to 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.

IMPORTANT

Notes on Connectors of the Converter Board:

- The connectors of the R0E521000CPE00 and R0E5212BACFK00 are guaranteed for only 50 insertion/removal iterations.
- The connectors of the R0E5212BACFK00 and YQPACK064SD are guaranteed for only 100 insertion/removal iterations.

2.9.8 Connecting to an 80-pin 0.5mm pitch LQFP Foot Pattern

Figure 2.27 shows a procedure of connecting to an 80-pin 0.5mm pitch LQFP foot pattern on the user system using the R0E5212DACFK00 (included with the R0E5212DACPE00). For details on the R0E5212DACFK00, refer to its user's manual.

(1) Mount the NQPACK080SD-ND included with the R0E5212DACFK00 to the user system.
(2) Attach the YQPACK080SD included with the R0E5212BACFK00 to the NQPACK080SD-ND and secure it with the YQ-GUIDE's.
(3) Attach the R0E5212DACFK00 to the J3 and J4 of the R0E521000CPE00.
(4) Attach the R0E5212DACFK00 to the YQPACK080SD.

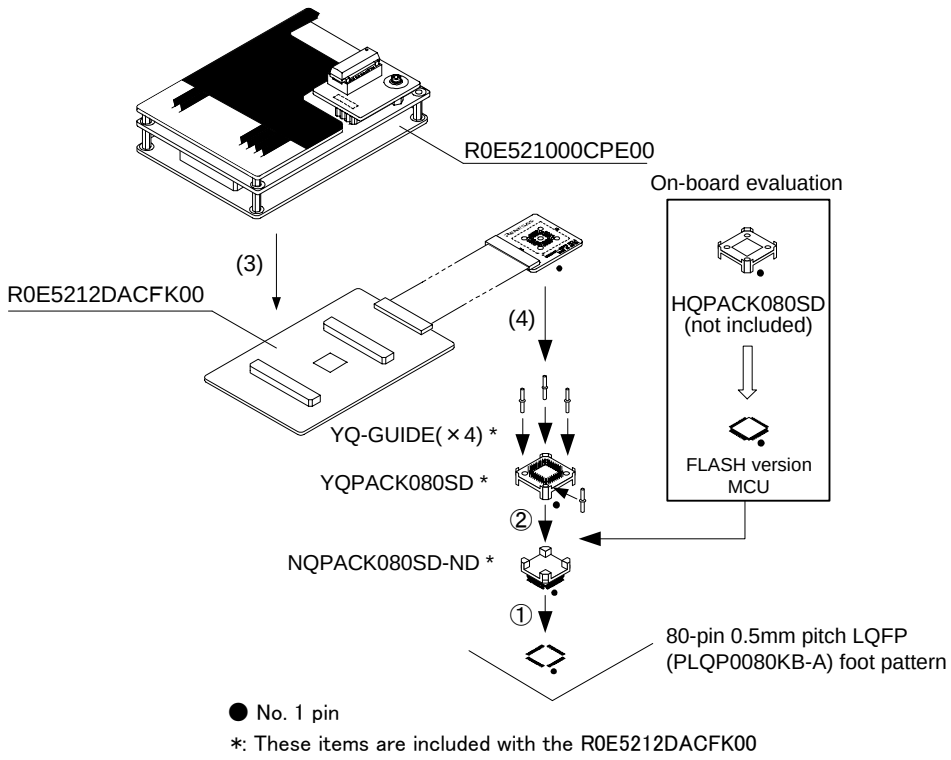


Figure 2.27 Connecting to an 80-pin 0.5mm pitch LQFP foot pattern

⚠ CAUTION

Note on Connecting to 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.

IMPORTANT

Notes on Connectors of the Converter Board:

- The connectors of the R0E521000CPE00 and R0E5212DACFK00 are guaranteed for only 50 insertion/removal iterations.
- The connectors of the R0E5212DACFK00 and YQPACK080SD are guaranteed for only 100 insertion/removal iterations.

3. Usage (How to Use the Emulator Debugger)

This chapter describes how to start up the emulator debugger and operate the major windows.

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.

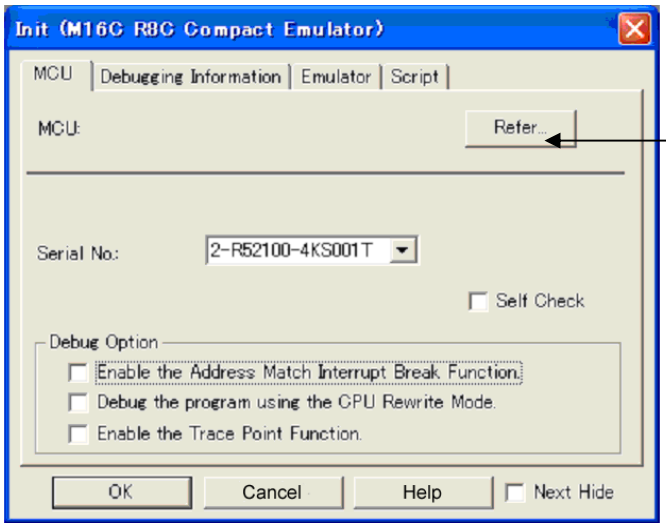
You will have as many sessions created as the number of targets you selected when creating a project, so select the session that corresponds to the target to be connected from the drop-down list. To connect to the Compact Emulator for the R8C Family, select "SessionM16C_R8C_Compact_Emulator."

3.1.1 Init Dialog Box

The Init dialog box is used to set the items that need to be set when the emulator debugger starts up. The contents set in this dialog box remain effective the next time you start the debugger.

(1) MCU tab

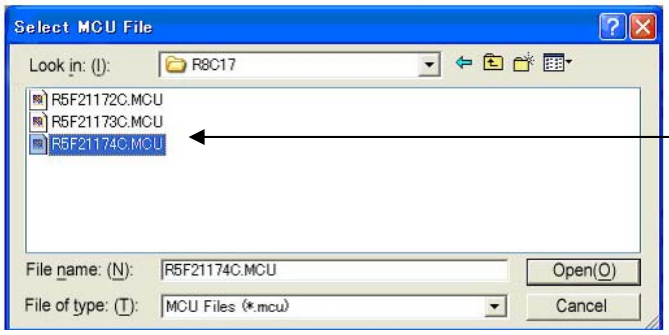
1) Specifying the MCU file and Serial No., using or not using the address match break function



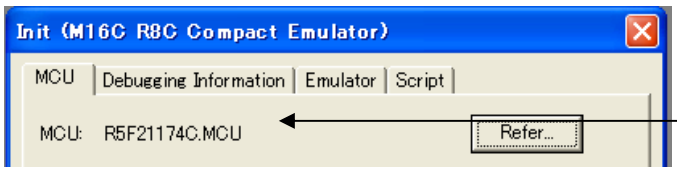
Specifying the MCU file

Click the "Refer..." button.
"Select MCU File" dialog box will be displayed, so select the desired MCU file.

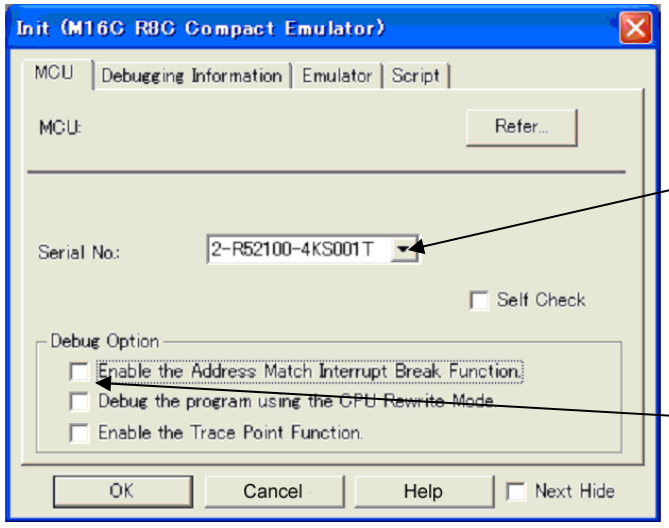
- The MCU file contains the information specific to the target MCU.



The "Select MCU File" dialog box will be displayed, so select the MCU file for the target MCU in this dialog box.
(In the example here, the MCU for the R8C/17 group is selected.)



The specified MCU file is displayed at the MCU area field of MCU tab.



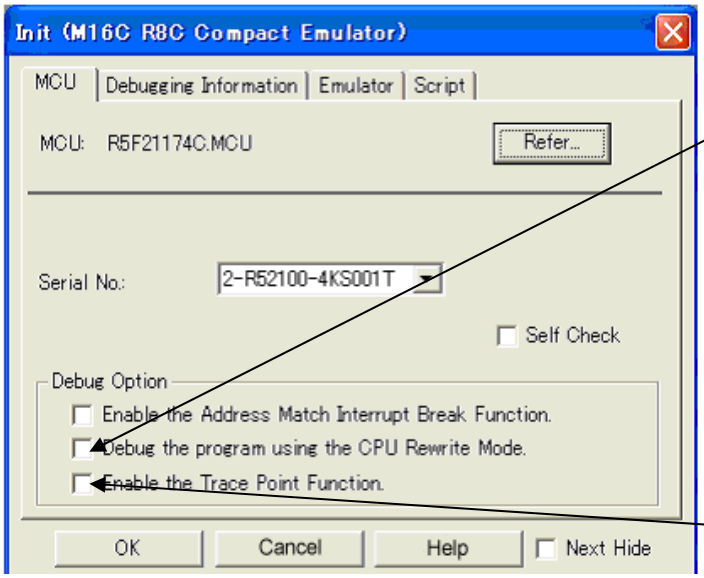
Serial No.

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

Using or not using the address match break function

With this product, the address match break function cannot be used. Therefore be sure to deselect the check box.

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



Using or not using CPU rewrite mode

Specify whether or not to debug in CPU rewrite mode.

To debug the user program that uses CPU rewrite mode, select the check box. This option can be selected or deselected only when you are starting up the emulator debugger.

[Supplementary explanation]

When debugging in CPU rewrite mode is enabled, the following functions cannot be used:

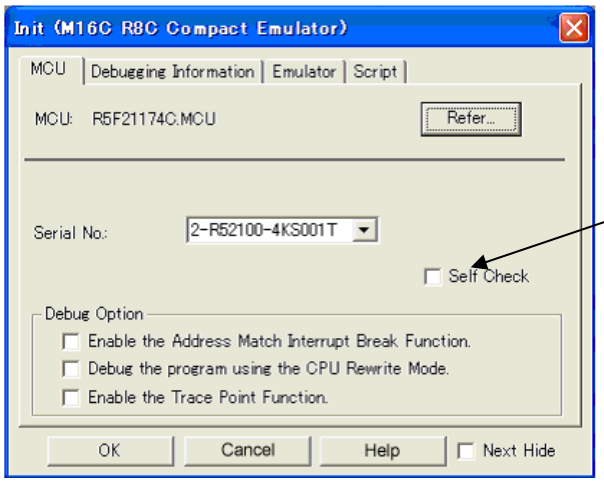
- Software breakpoint setting in the internal ROM area
- Data or program rewriting in the internal ROM area
- Event (hardware break, trace point) setting

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.

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.

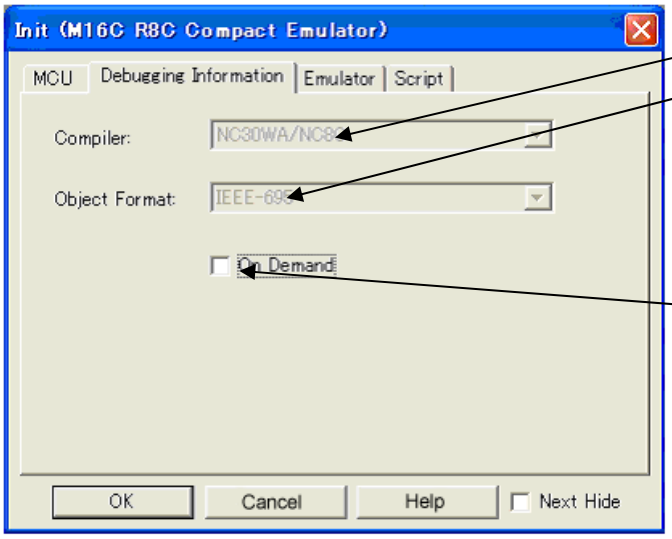
This function may be enabled in the following cases:

- When you are using the emulator you have just purchased
- When you 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



Referencing the compiler used and the object format

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

Check the current setting in this dialog box.

This dialog box allows you to check the contents currently set in it. To alter any item here, use the dialog box that will be brought up by selecting "Debug" and then "Debug Settings..." from the menu.

Specifying the method for storing debug information

There are two methods for storing debug information: on memory method and an on demand method.

Select the method for storing debug information.

(By default, the on memory is selected)

When selecting the on demand method, check the [On Demand] check box.

- On Memory

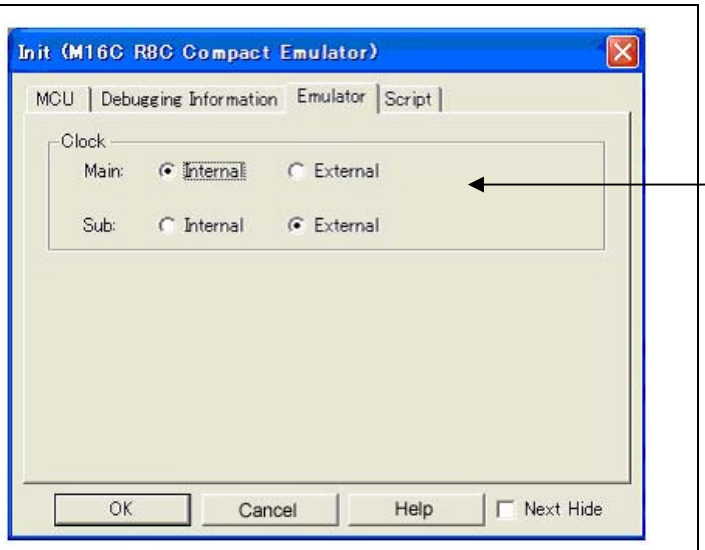
  The debug information is stored in the memory of your computer. This method is suitable when the size of the load module (user program) is small.

- On Demand

  The debug information is saved to a reusable temporary file. When you download the same load module for a second time on, the saved debug information will be reused and the load module can therefore be downloaded fast. This method is suitable when the size of the load module (user program) is large.

(3) Emulator tab

1) Specifying the target clock



Specifying the target clock

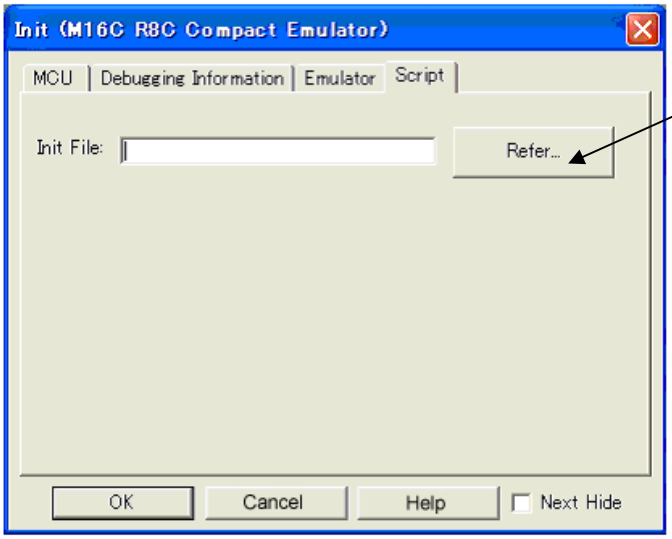
Specify the clock sources supplied to the MCU (main clock and sub clock). Select the appropriate clock sources according to the clock used by your target MCU.

- Internal
  Emulator's internal clock
- External
  User system clock

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

(4) Script tab

1) Automatically executing a script command



Automatically executing a script command

To automatically execute a script command when starting up the debugger, click the "Refer..." button and specify the script file to be executed.

Clicking the "Refer..." button brings up a file selection dialog box. The script file you have selected is displayed in the Init File: section of the dialog box shown here. If you do not want to automatically execute a script command, delete the character string displayed in the Init File: section of the dialog box.

What you specify here is reflected at only startup. If you specify back again in the Init dialog box after startup, whatever you specified has no effect (restart the emulator debugger).

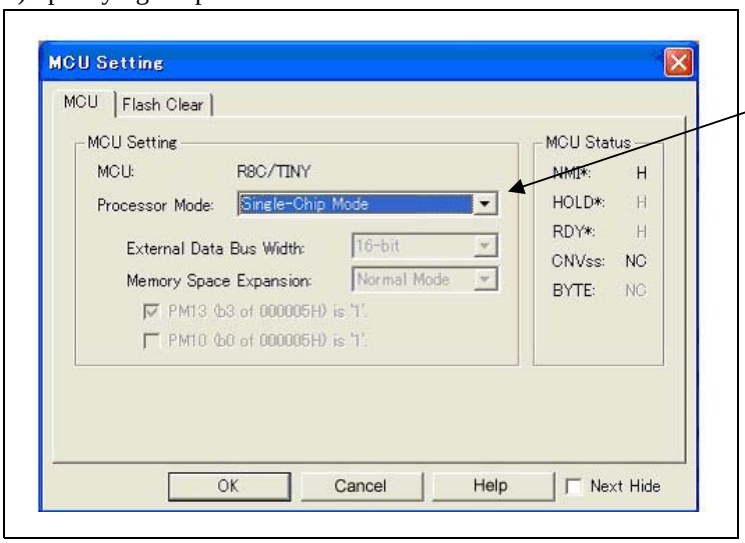
When the tab settings (1) to (4) above are completed, click OK button.

3.1.2 MCU Setting Dialog Box

The MCU Setting dialog box is used to set the user target information. It is displayed after you closed the Init dialog box.

(1) MCU tab

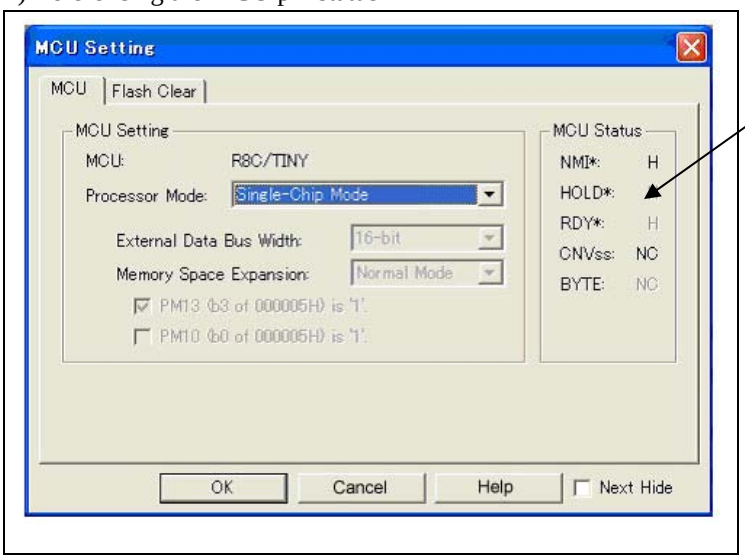
1) Specifying the processor mode



Specifying the processor mode

Select the appropriate processor mode that suits your system. For the R8C Family, you can specify only the Single-chip Mode.

2) Referencing the MCU pin status

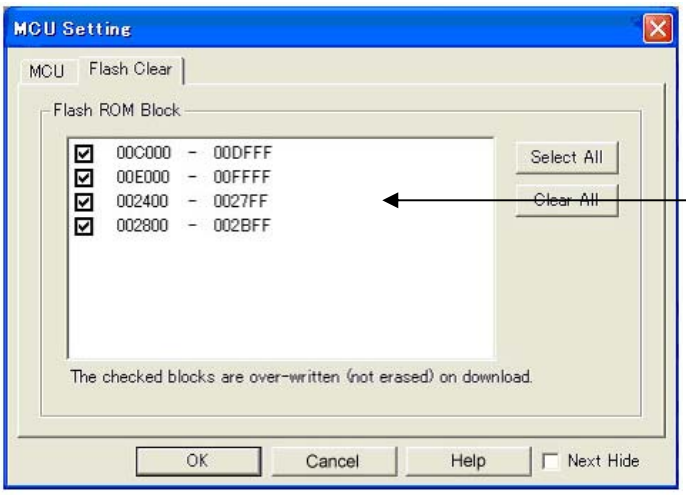


Referencing the MCU pin status

This column shows the state of each MCU pin. For the R8C Family, however, it does not show the MCU pin state.

(2) Flash Clear tab

1) Setting to clear the MCU's internal flash ROM



Setting to clear the MCU's internal flash ROM

Specify whether or not you want the MCU's internal flash ROM to be cleared when downloading the user program or data. (When cleared, the content of the flash ROM is initialized to 0xFF.) The MCU's internal flash ROM is listed in block units (The size and number of the area of the Flash ROM varies depending on the selected MCU file).

- Any block which has had its check box selected is not cleared when downloading. The memory content of this block remains intact unless overwritten by downloading.

  Note:

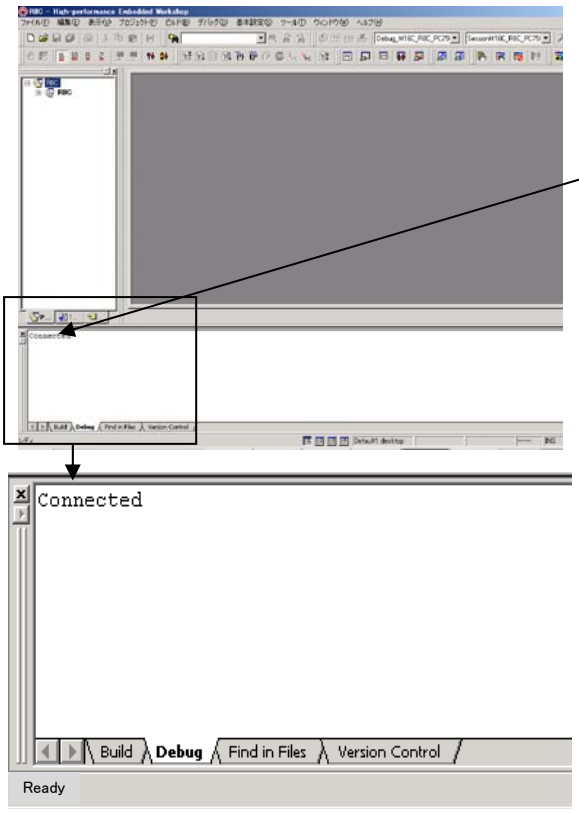
  When this product starts up, the internal flash ROM area is cleared with "0x04" [NOP instruction], so that the selected blocks (flagged by a check mark) retain "0x04" [NOP instruction], and not cleared to "0xFF."
- Any block which has had its check box deselected is cleared when downloading.
- Click the Select All button, or the Clear All button, all blocks will be selected or deselected

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

When the tab settings (1) to (2) above are completed, click OK button.

3.1.3 Checking Connections of the Emulator System

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



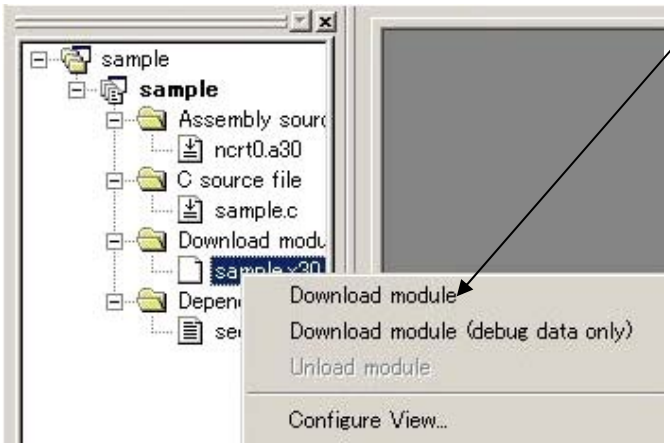
Checking connections of the emulator system

When the emulator debugger is connected correctly to the emulator after you've 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.

3.2 Downloading the Program

Download the program to be debugged.

1) Downloading from the work space window



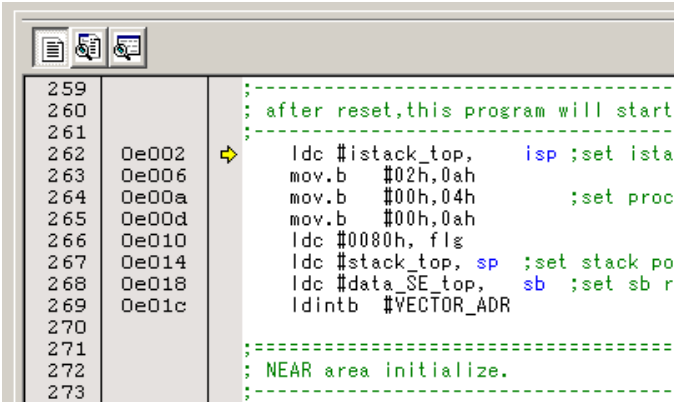
Downloading the program

Download the object program you want to debug.

Select Download from "xxx.x30" of "Download module".

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

2) Showing the program



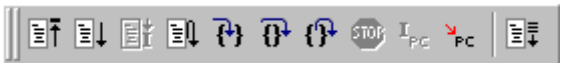
Editor (source) window

The editor (source) window is a window that always shows the content of the source file corresponding to the current position of the program counter (PC, hereafter).

The PC position is marked by a yellow arrow. Here, you can execute the program up to the cursor position, and set or clear software breakpoints.

3.3 Program Execution

(1) Program execution




CPU reset
Resets the target MCU. You can select "CPU reset" from the "Debug" menu for the same effect.


Go
Runs the program beginning with the current PC position. You can select "Go" from the "Debug" menu.


Reset Go
Runs the program after reset. You can select "Reset Go" from the "Debug" menu.


Step In
Single-steps the program executing each statement (including those in functions). You can select "Step In" from the "Debug" menu.


Step Over
Single-steps the program executing each function call as one step. You can select "Step Over" from the "Debug" menu.

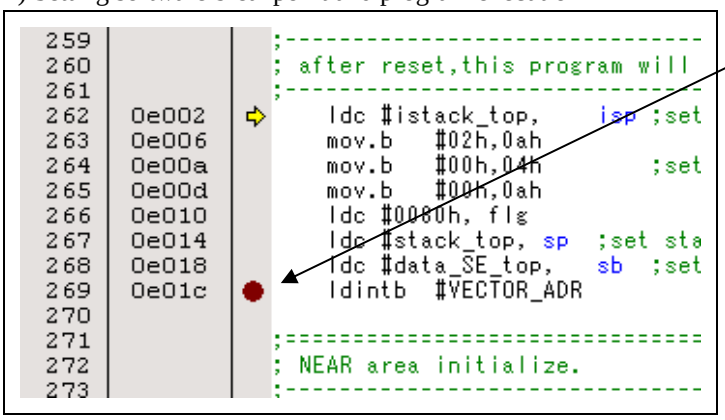

Step Out
Exists a function and stops at a statement in the program next to the one that called the function. You can select "Step Out" from the "Debug" menu.


STOP
Stops the program. You can select "STOP" from the "Debug" menu.


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

(2) Setting software breakpoints

1) Setting software breakpoint and program execution

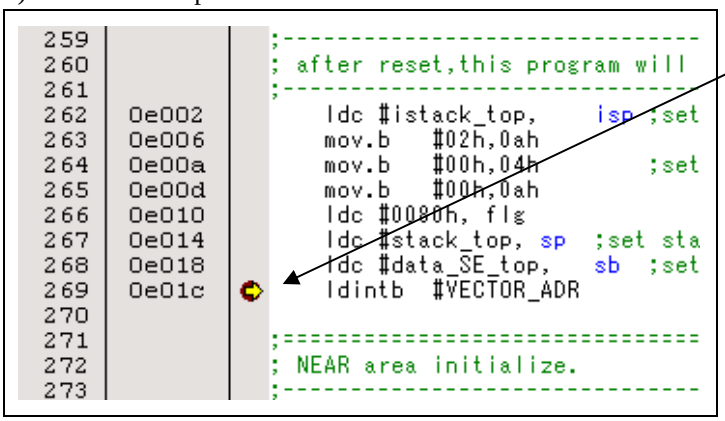


Program execution with software breakpoint

- A software breakpoint can be set or cleared by double-clicking the software breakpoint display area in the editor (source) window (A red circle is displayed at the setting line).
-  Click the execution button.

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

2) Execution completed with software break

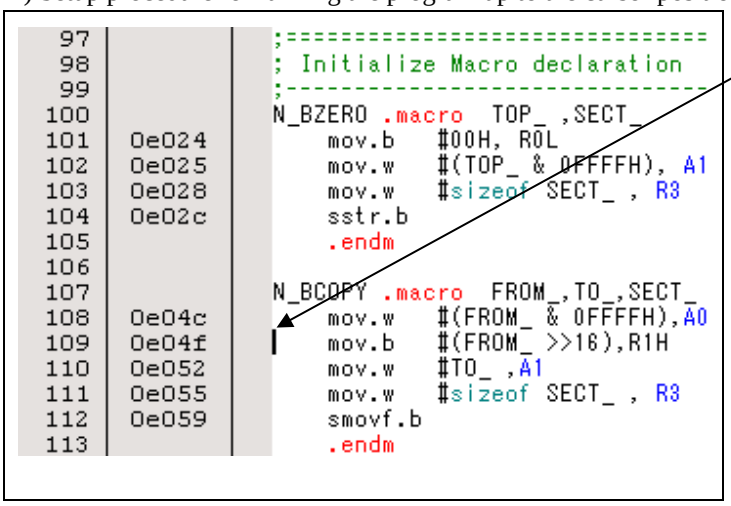


The cursor stops in the position where the software break was set up. The statement in which the software break was set up is not executed.

If the program is started to run from a PC position at which a software breakpoint is set, instructions at that PC position are stepped over automatically, and the program is executed from the next instruction on.

(3) Executing up to the cursor position

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



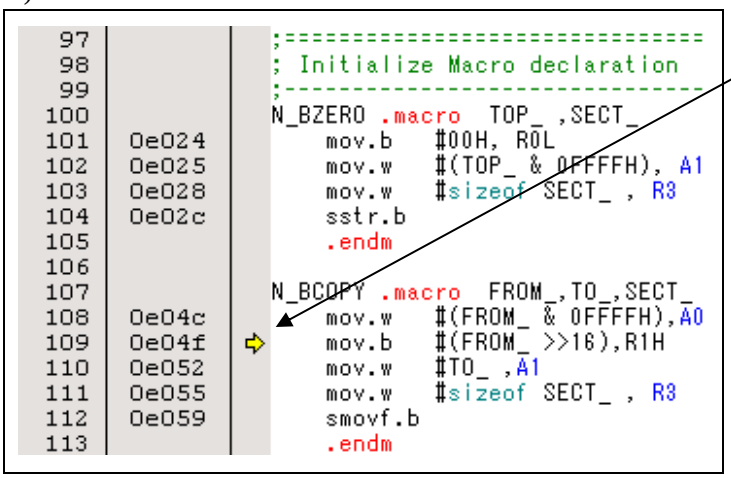
Setup procedure for running the program up to the cursor position

(1) Click the line in the editor (source) window 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



The cursor stops in the specified position.

The statement specified with the execution up to the cursor position is not executed.

3.4 Hardware Breakpoint

Hardware break is set by event condition such as FETCH or DATA ACCESS, etc. If the breakpoint you set is a hardware breakpoint, the program stops after executing the instruction at the set breakpoint (after several cycles).

(1) Breakpoint setup dialog box

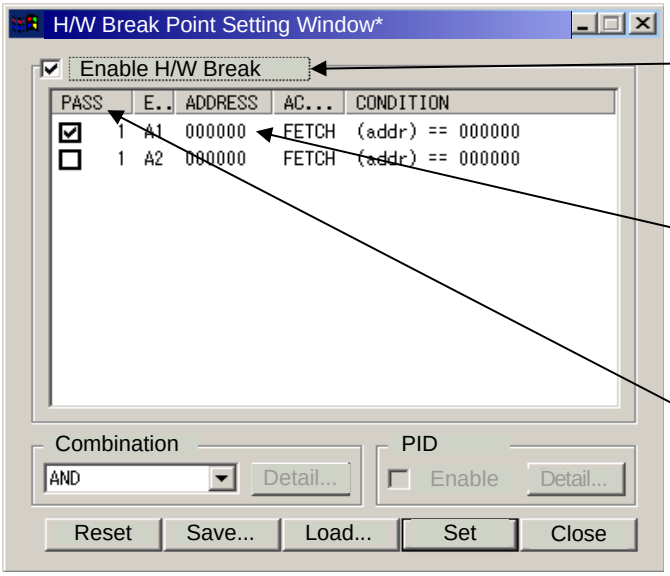
1) Opening the hardware breakpoint setup dialog box

Hardware Breakpoint

Clicking this button opens the hardware breakpoint setup dialog box.

Or you can select the "H/W break point (H)" of "Break (B)" from "View (V)" menu for the same effect.

2) H/W Break Point Setting Window



H/W Break Point Setting Window

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

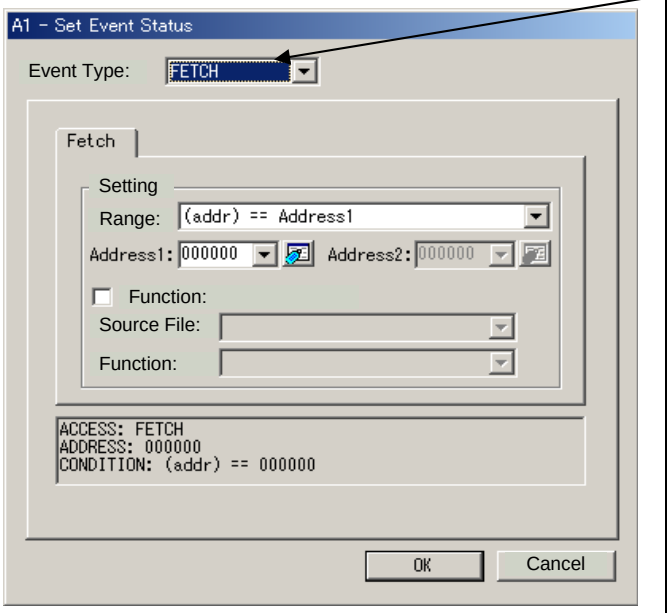
Setting Break Event

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

Setting Path Count

For each event, a pass count (number of passing) is specifiable (1--255). When "AND" (same time) is specified for Combination, you can not specify the pass count (fixed to one).

3) Opening the break event setting dialog box



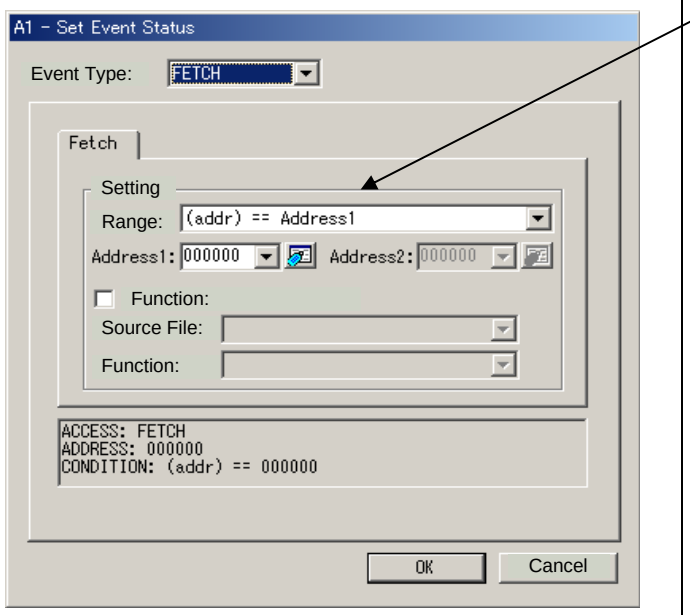
Specifying the event type

Click to select the event type you want to set.

- FETCH
  Detects an instruction prefetch.
- DATA ACCESS
  Detects a memory access.
- BIT SYMBOL
  Detects a bit access.

(2) When FETCH is selected

1) Setting addresses

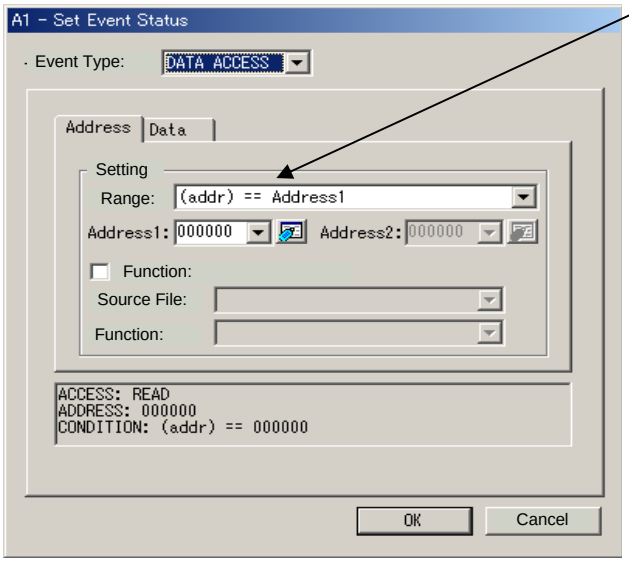


Setting the address

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

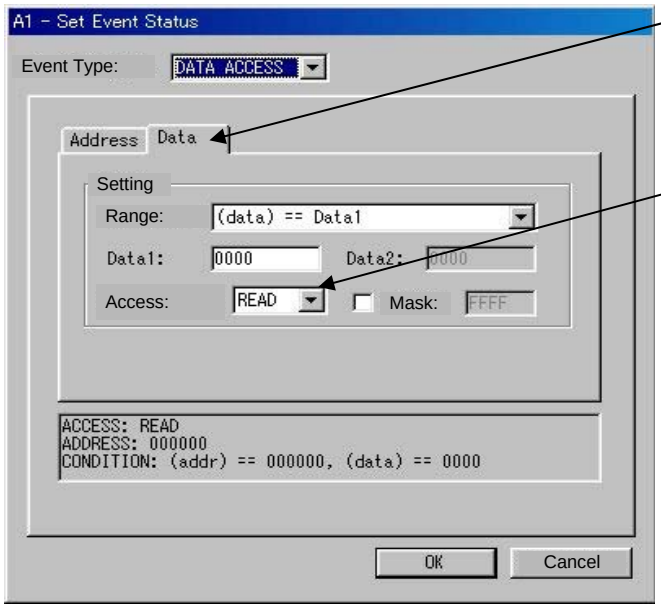
1) Setting the address



Setting the address

Specified in the Address tab. You can set eight conditions, e.g., a specified address, a specified address range, etc.
After the address setting completion, set the data.

2) Setting data



Setting data

Specified in the Data tab.
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

Event setting for even-address word access (16-bit bus width)

STE.W A0,126h(A0=5423h)

Cycle	Label	Address	Data	BUS	BHE	BIU	R/W	RWT	CPU
-000012		000126	5423	16b	0	DW	W	0	--

16-bit bus width area (High-order and low-order data effective)

Setting a break event

A1
Address 1 :000126
Data 1 :5423
MASK :FFFF
Access :WRITE

Event setting for even-address word access (8-bit bus width)

STE.W A0,400h(A0=5423h)

Cycle	Label	Address	Data	BUS	BHE	BIU	R/W	RWT	CPU
-000013		000400	0023	8b	1	DW	W	0	--
-000012		000401	0054	8b	0	DW	W	0	--

8-bit bus width area (Only Low-order data effective)

Setting a break event

A1
Address 1 :000400
Data 1 :5423
MASK :00FF
Access :WRITE

Event setting for odd-address word access

STE.W A0,401h(A0=AB79h)

Cycle	Label	Address	Data	BUS	BHE	BIU	R/W	RWT	CPU
-000013		000401	0079	8b	0	DW	W	0	--
-000012		000402	00AB	8b	1	DW	W	0	--

8-bit bus width area (Only Low-order data effective)

Setting a break event (using 2 events)

A1		A2	
Address 1	:000401	Address 1	:000402
Data 1	:0079	Data 1	:00AB
MASK	:00FF	MASK	:00FF
Access	:WRITE	Access	:WRITE

Set the combinatorial events to AND.

Event setting for even-address byte access

STE.B R0L,[A1A0](R0L=E5h,A1=0000h,A0=0402h)

Cycle	Label	Address	Data	BUS	BHE	BIU	R/W	RWT	CPU
-000013		000402	00E5	8b	1	DB	W	0	--

8-bit bus width area (Only Low-order data effective)

Setting a break event

A1
Address 1 :000402
Data 1 :00E5
MASK :00FF
Access :WRITE

Event setting for odd-address byte access

STE.B R0L,[A1A0](R0L=E6h,A1=0000h,A0=0403h)

Cycle	Label	Address	Data	BUS	BHE	BIU	R/W	RWT	CPU
-000013		000403	00E6	8b	0	DB	W	0	--

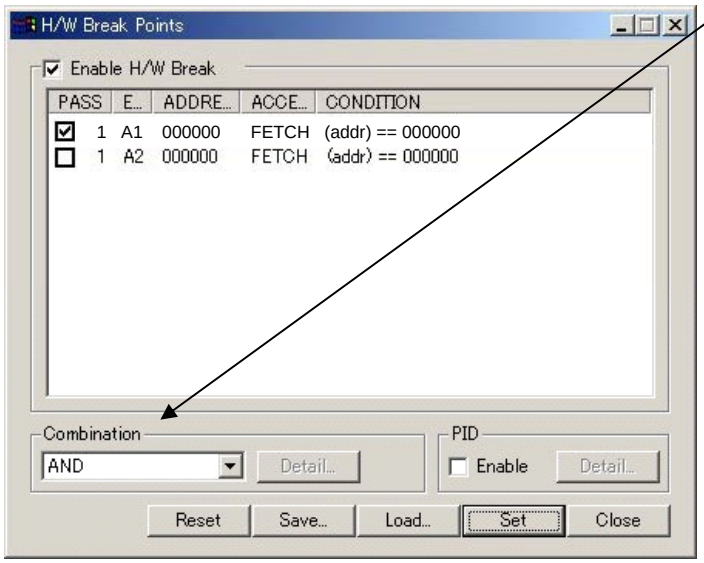
8-bit bus width area (Only Low-order data effective)

Setting a break event

A1
Address 1 :000403
Data 1 :00E6
MASK :00FF
Access :WRITE

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

1) Window for setting the combinatorial condition



Setting the combinatorial condition

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

- 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.
- OR
  The program breaks when one of the specified events occurs.

For each event, a pass count (number of passing) is specifiable (1--255). When "AND" (same time) is specified for Combination, you can not specify the pass count (fixed to one).

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

3.5 Trace Window

The trace window is used to show the results of real-time trace measurements.

(1) Trace window

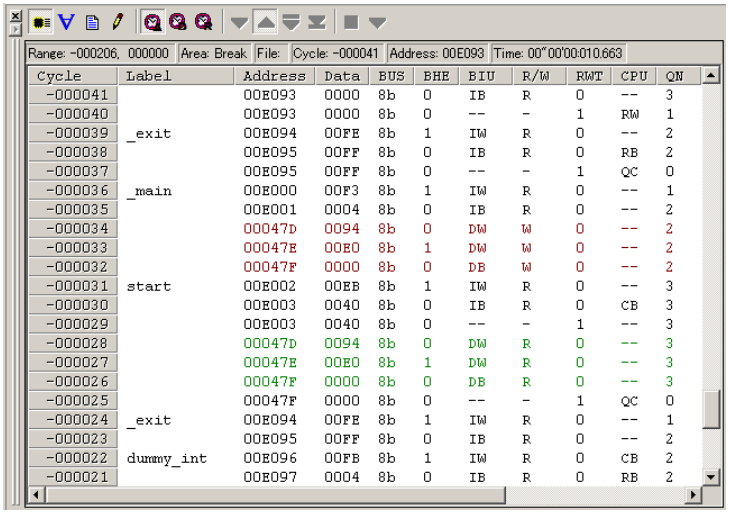
1) Opening the trace window

Trace

Clicking this button opens the trace window.

Or you can select "Trace (T)" from "Trace (T)" of "View (V)" menu for the same effect.

2) Trace window



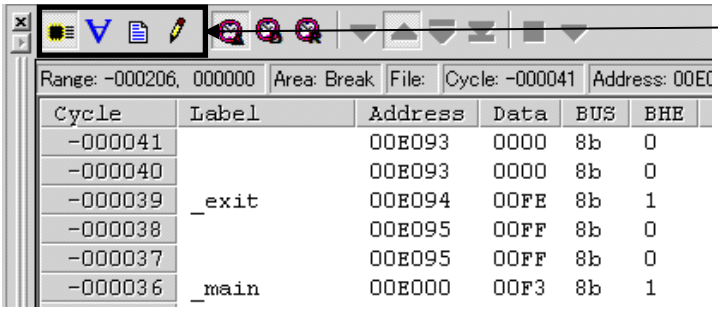
Cycle	Label	Address	Data	BUS	BHE	BIU	R/W	RWT	CPU	QN
-000041		00E093	0000	8b	0	IB	R	0	--	3
-000040		00E093	0000	8b	0	--	-	1	RW	1
-000039	_exit	00E094	00FE	8b	1	IW	R	0	--	2
-000038		00E095	00FF	8b	0	IB	R	0	RB	2
-000037		00E095	00FF	8b	0	--	-	1	QC	0
-000036	_main	00E000	00F3	8b	1	IW	R	0	--	1
-000035		00E001	0004	8b	0	IB	R	0	--	2
-000034		00047D	0094	8b	0	DW	W	0	--	2
-000033		00047E	00E0	8b	1	DW	W	0	--	2
-000032		00047F	0000	8b	0	DB	W	0	--	2
-000031	start	00E002	00EB	8b	1	IW	R	0	--	3
-000030		00E003	0040	8b	0	IB	R	0	CB	3
-000029		00E003	0040	8b	0	--	-	1	--	3
-000028		00047D	0094	8b	0	DW	R	0	--	3
-000027		00047E	00E0	8b	1	DW	R	0	--	3
-000026		00047F	0000	8b	0	DB	R	0	--	3
-000025		00047F	0000	8b	0	--	-	1	QC	0
-000024	_exit	00E094	00FE	8b	1	IW	R	0	--	1
-000023		00E095	00FF	8b	0	IB	R	0	--	2
-000022	dummy_int	00E096	00FB	8b	1	IW	R	0	CB	2
-000021		00E097	0004	8b	0	IB	R	0	RB	2

Trace window

The trace window is used to show the results of real-time trace measurements. It has the following four display modes. Mixed mode also can be displayed.

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.

3) Trace display mode



Cycle	Label	Address	Data	BUS	BHE
-000041		00E093	0000	8b	0
-000040		00E093	0000	8b	0
-000039	_exit	00E094	00FE	8b	1
-000038		00E095	00FF	8b	0
-000037		00E095	00FF	8b	0
-000036	_main	00E000	00F3	8b	1

Trace display mode

- 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

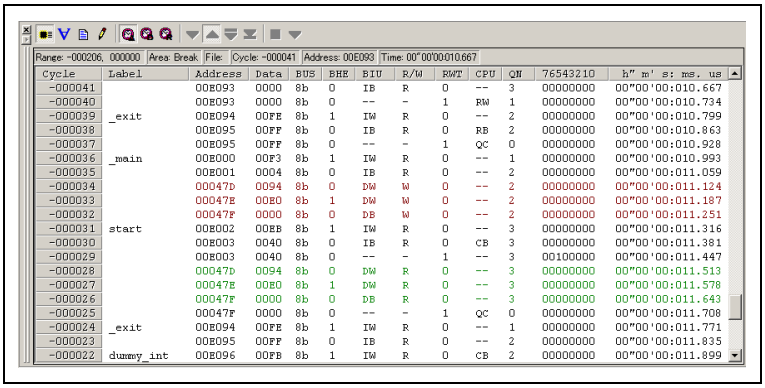
  The execution paths of the source program can be inspected.

- Data access mode

  Data read/write cycles can be inspected. The contents are displayed in order of execution paths.

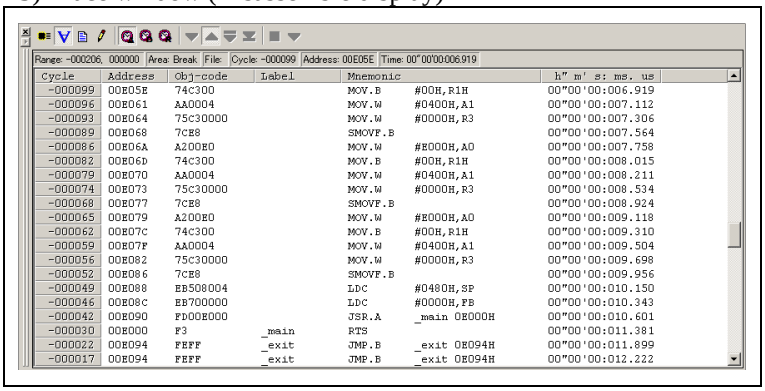
Mixed mode also can be displayed.

4) Trace window (bus information display)



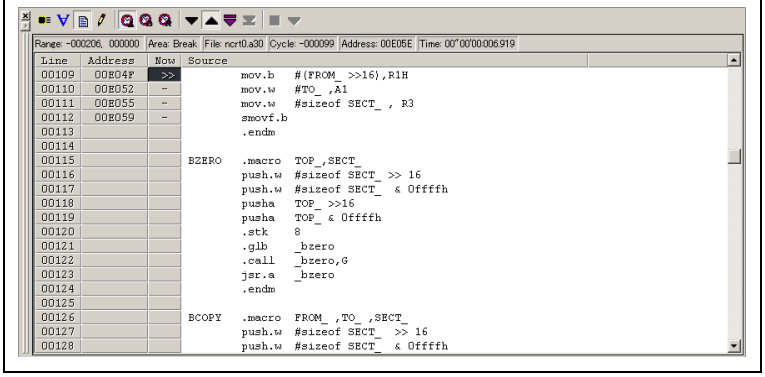
Cycle	Label	Address	Data	BUS	BHE	BIU	R/W	RWT	CPU	QN	76543210	h" m' s: ms. us
-000041		00E093	0000	8b	0	IB	R	0	--	3	00000000	00"00'00:010.667
-000040		00E093	0000	8b	0	--	-	1	RW	1	00000000	00"00'00:010.734
-000039	_exit	00E094	00FE	8b	1	IW	R	0	--	2	00000000	00"00'00:010.799
-000038		00E095	00FF	8b	0	IB	R	0	RB	2	00000000	00"00'00:010.863
-000037		00E095	00FF	8b	0	--	-	1	QC	0	00000000	00"00'00:010.928
-000036	_main	00E000	00F3	8b	1	IW	R	0	--	1	00000000	00"00'00:010.993
-000035		00E001	0004	8b	0	IB	R	0	--	2	00000000	00"00'00:011.059
-000034		00047D	0094	8b	0	DW	W	0	--	2	00000000	00"00'00:011.124
-000033		00047E	00E0	8b	1	DW	W	0	--	2	00000000	00"00'00:011.187
-000032		00047F	0000	8b	0	DB	W	0	--	2	00000000	00"00'00:011.251
-000031	start	00E002	00EB	8b	1	IW	R	0	--	3	00000000	00"00'00:011.316
-000030		00E003	0040	8b	0	IB	R	0	CB	3	00000000	00"00'00:011.381
-000029		00E003	0040	8b	0	--	-	1	--	3	00100000	00"00'00:011.447
-000028		00047D	0094	8b	0	DW	R	0	--	3	00000000	00"00'00:011.513
-000027		00047E	00E0	8b	1	DW	R	0	--	3	00000000	00"00'00:011.578
-000026		00047F	0000	8b	0	DB	R	0	--	3	00000000	00"00'00:011.643
-000025		00047F	0000	8b	0	--	-	1	QC	0	00000000	00"00'00:011.708
-000024	_exit	00E094	00FE	8b	1	IW	R	0	--	1	00000000	00"00'00:011.771
-000023		00E095	00FF	8b	0	IB	R	0	--	2	00000000	00"00'00:011.835
-000022	dummy_int	00E096	00FB	8b	1	IW	R	0	CB	2	00000000	00"00'00:011.899

5) Trace window (Disassemble display)



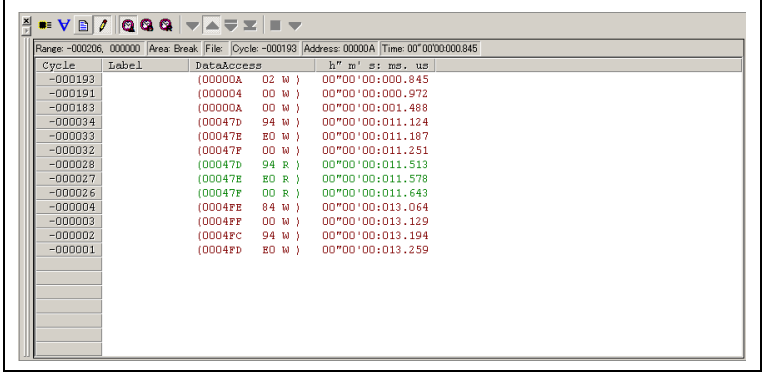
Cycle	Address	Obj-code	Label	Mnemonic	h" m' s: ms. us
-000099	00E05E	74C300		MOV.B #00H,R1H	00"00'00:006.919
-000096	00E061	AA0004		MOV.W #0400H,A1	00"00'00:007.112
-000093	00E064	75C30000		MOV.W #0000H,R3	00"00'00:007.306
-000089	00E068	7CE8		SMOVF.B	00"00'00:007.564
-000086	00E06A	A200E0		MOV.W #E000H,A0	00"00'00:007.758
-000082	00E06D	74C300		MOV.B #00H,R1H	00"00'00:008.015
-000079	00E070	AA0004		MOV.W #0400H,A1	00"00'00:008.211
-000074	00E073	75C30000		MOV.W #0000H,R3	00"00'00:008.534
-000068	00E077	7CE8		SMOVF.B	00"00'00:008.924
-000065	00E079	A200E0		MOV.W #E000H,A0	00"00'00:009.118
-000062	00E07C	74C300		MOV.B #00H,R1H	00"00'00:009.310
-000059	00E07F	AA0004		MOV.W #0400H,A1	00"00'00:009.504
-000056	00E082	75C30000		MOV.W #0000H,R3	00"00'00:009.698
-000052	00E086	7CE8		SMOVF.B	00"00'00:009.956
-000049	00E088	EB508004		LDC #0480H,SP	00"00'00:010.150
-000046	00E08C	EB700000		LDC #0000H,FB	00"00'00:010.343
-000042	00E090	FD00E000		JSR.A _main 0E000H	00"00'00:010.601
-000030	00E000	F3	_main	RTS	00"00'00:011.381
-000022	00E094	FEFF	_exit	JMP.B _exit 0E094H	00"00'00:011.899
-000017	00E094	FEFF	_exit	JMP.B _exit 0E094H	00"00'00:012.222

6) Trace window (Source display)



Line	Address	Now	Source
00109	00E04F	>>	mov.b #(FROM_ >>16),R1H
00110	00E052	-	mov.w #TO_ ,A1
00111	00E055	-	mov.w #sizeof SECT_ , R3
00112	00E059	-	smovf.b
00113			.endm
00114			
00115			BZERO .macro TOP_,SECT_
00116			push.w #sizeof SECT_ >> 16
00117			push.w #sizeof SECT_ & 0ffffh
00118			pusha TOP_ >>16
00119			pusha TOP_ & 0ffffh
00120			.stk 8
00121			.glb _bzero
00122			.call _bzero,G
00123			jsr.a _bzero
00124			.endm
00125			
00126			BCOPY .macro FROM_ ,TO_ ,SECT_
00127			push.w #sizeof SECT_ >> 16
00128			push.w #sizeof SECT_ & 0ffffh

7) Trace window (Data access display)



Cycle	Label	DataAccess	h" m' s: ms. us
-000193		(00000A 02 W)	00"00'00:000.845
-000191		(000004 00 W)	00"00'00:000.972
-000183		(00000A 00 W)	00"00'00:001.488
-000034		(00047D 94 W)	00"00'00:011.124
-000033		(00047E E0 W)	00"00'00:011.187
-000032		(00047F 00 W)	00"00'00:011.251
-000028		(00047D 94 R)	00"00'00:011.513
-000027		(00047E E0 R)	00"00'00:011.578
-000026		(00047F 00 R)	00"00'00:011.643
-000004		(0004FE 84 W)	00"00'00:013.064
-000003		(0004FF 00 W)	00"00'00:013.129
-000002		(0004FC 94 W)	00"00'00:013.194
-000001		(0004FD E0 W)	00"00'00:013.259

Explanation of the trace window (bus information display)

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

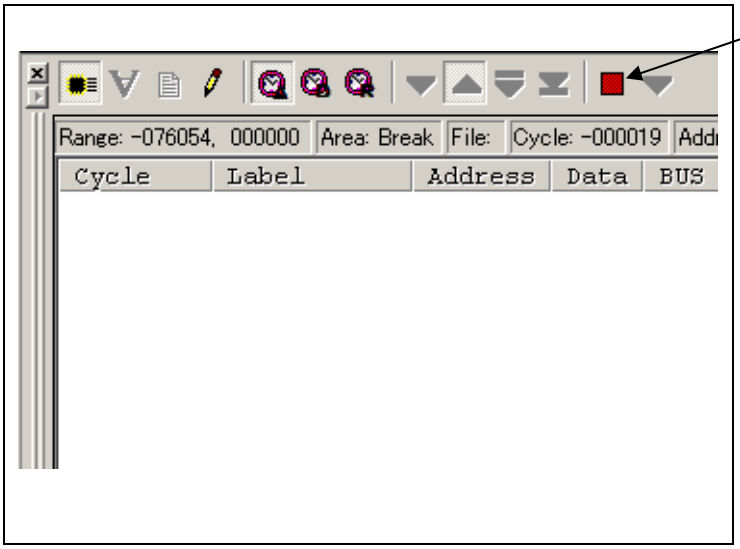
- Address
  Shows the status of the address bus.
- Data
  Shows the status of the data bus.
- BUS
  Shows the width of the internal data bus. For the R8C Family, only "8b" for 8 bits wide bus is displayed, excluding a part of the SFR area (00126h to 0012Fh, 00146h to 0014Fh and 00156h to 0015Fh)
- BHE
  Shows the status (0 or 1) of the BHE (Byte High Enable) signal. If this signal = 0, the odd-address data is valid.
- BIU
  Shows the status between the BIU (Bus Interface Unit) and memory or I/O.

  Symbol Status
  - : Non-active
  DMA : Data access except for CPU
  With this product, "DMA" is displayed in a cycle in which an emulator-only data access is performed.
  INT : Interrupt acknowledge cycle
  IB : Instruction code read (bytes) by CPU
  DB : Data access (bytes) by CPU
  IW : Instruction code read (words) by CPU
  DW : Data access (words) by CPU
- R/W
  Shows the status of the data bus. Displayed as "R" for Read, "W" for Write, and "-" for no access.
- RWT
  This is the signal to indicate a valid bus cycle. When valid, RWT = 0. The Address, Data, and the BIU signals are effective when this signal is 0.
- CPU
  Shows the status between the CPU and BIU (Bus Interface Unit).

  Symbol Status
  - : Non-active
  CB : Op-code read (bytes)
  RB : Operand read (bytes)
  QC : Clears instruction queue buffer
  CW : Op-code read (words)
  RW : Operand read (words)

(2) Suspending and resuming trace measurement

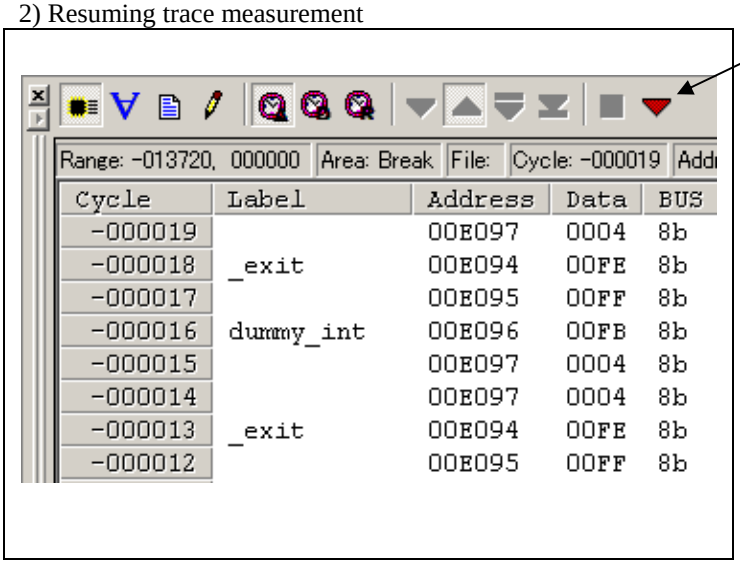
1) Suspending trace measurement



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.

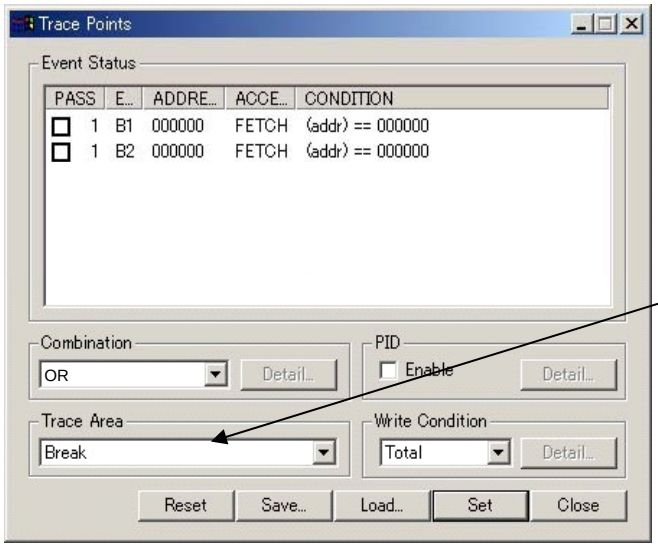
(3) Trace point setup window

1) Opening the trace point setup window

Trace point

Clicking this toolbar button opens the trace point setting window. Or you can select "Trace point" from "Trace (T)" of "View (V)" menu for the same effect.

2) Trace point setting window



Trace point setting window

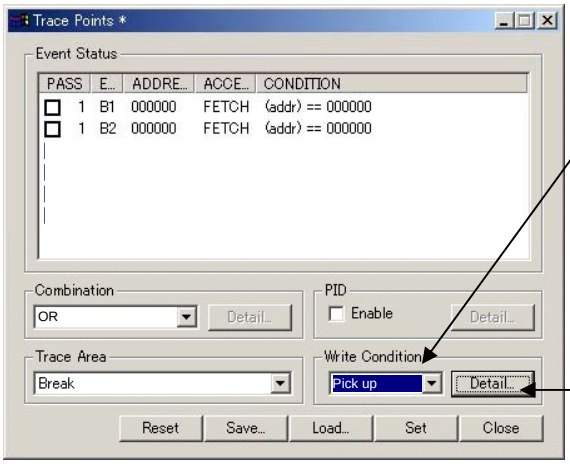
Select "Enable the trace point function" in the Init dialog box. The trace point setup is the same for the hardware breakpoint setting.

Specifying a trace measurement 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
  32K 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.

3) Setting trace write conditions



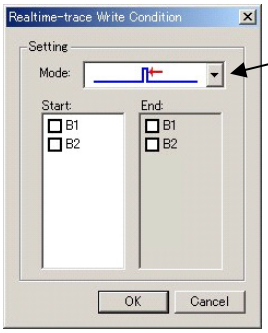
Setting trace write conditions

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 selected "Pick up" or "Exclude" for the trace write condition, click this button. The Realtime-trace Write Condition dialog box shown below will appear.

4) Realtime-trace Write Condition dialog box



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

3.6 RAM Monitor Window

This function makes it possible to make reference to the changes in memory contents without impairing the real-time performance for user program execution. The compact emulator system is provided with the 1K-byte RAM monitoring area, which can be arranged in the 1K-byte space from any continuous address, or can be divided into four blocks in terms of 256 bytes.

(1) RAM monitor window

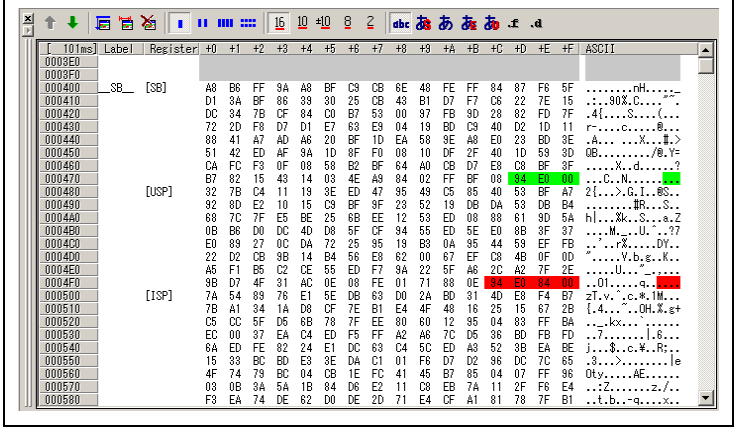
1) Opening the RAM monitor window

RAM monitor

Clicking this button opens the RAM monitor window.

Or you can select "RAM Monitor (R)" from "CPU (C)" of "View (V)" menu for the same effect.

2) RAM monitor display area



Changing the RAM monitor display area

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.

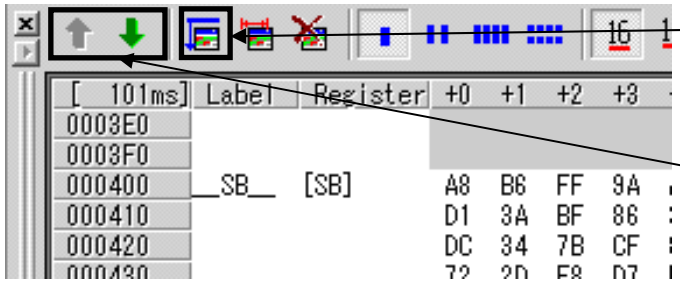
The background colors of the data display and the code display sections change with the access attribute as described below.

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

The background colors can be changed as necessary.

(2) Modifying the RAM monitor display area

1) RAM Monitor window



Modifying the RAM monitor display area

Clicking this button opens the RAM monitor setting window.

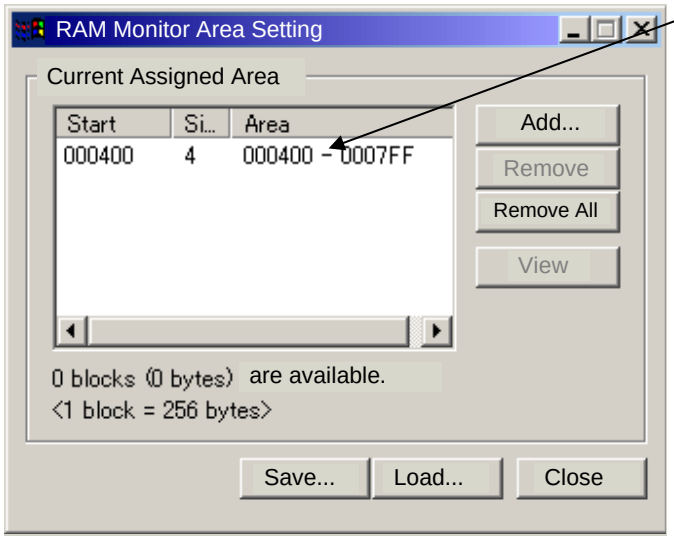
: Shows the RAM monitor area setting window.

To change the displayed area, click the following buttons.

: Shows the blocks at the preceding addresses.

: Shows the blocks at the following addresses.

2) RAM Monitor Area Setting window



RAM Monitor Area Setting Window

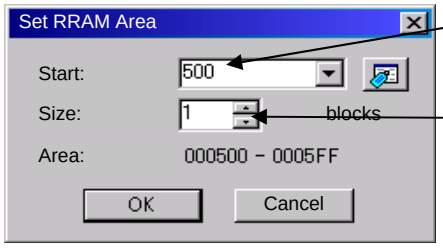
By default, the monitor area is set to 000400h through 0007FFh.

It is possible to add, delete and change the RAM monitor area.

You can change the start address, size (number of blocks) of the RAM monitor area by selecting the desired RAM monitor area from the list.

To add 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. Hardware Specifications

This chapter describes the 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 R0E521000CPE00

Item	Description
Applicable MCU	R8C Family
Applicable MCU mode	Single-chip mode
Maxi. ROM/RAM capacity	1. Internal flash ROM: 112KB (programming area) +4KB (data area) Programming area: 04000h--1FFFFh, Data area: 02000h--02FFFh 2. Internal RAM: 8KB 00300h--012FFh, 03000h--03FFFh
Operating voltage/frequency	20MHz at 3.0--5.5V 10MHz at 2.7--5.5V 5MHz at 2.2--5.5V*1

*1 The voltage of the user system is less than 2.7V, set the POWER selection jumper to the EXT POWER side. For details about the POWER selection jumper, refer to "2.3.3 Setting the POWER Selection Jumper" (page 24).

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 8 KB (00300h--012FFh, 03000h--03FFFh) and flash ROM of 4 KB (02000h--02FFFh) and 112 KB (04000h--1FFFFh). 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 "04h (NOP instruction)" when starting up the emulator. If you want the MCU's internal flash ROM to be cleared when starting up the debugger, (when cleared, the content of the flash ROM is initialized to 0FFh.), select the flash ROM block you want to clear in the Flash Clear tab of the MCU setting dialog box.

Note on Access Prohibited Area:

- You cannot use internally reserved areas. Because an evaluation MCU is operated in the special mode for the emulator, a function which does not support the target MCU may run.

Notes on RESET# Input:

- A low input to RESET# of the dedicated evaluation MCU 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 Power-on Reset Function:

- This product emulates inputs to the VCC and RESET# pins for the purpose of emulator function control. For this reason, the power-on reset function cannot be used.

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 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 when run-time debugging is being performed), a peripheral I/O interruption is not accepted.

Notes on Oscillator Circuit:

- Make note that in the oscillator circuit where a resonator is connected between pins P4_6/XIN and P4_7/XOUT, oscillation does not occur because a flexible cable, buffer IC and other devices are used between the evaluation MCU and the user system. It is same for sub-clock oscillators (pins P4_3/XCIN and P4_4/XCOUT).
- For notes on when using the oscillator circuit on the user system, refer to "2.3.4 (2) Using an Oscillator Circuit on the User System" (page 28).

Note on Pin P4_4/XCOUT:

- Make note that the pin P4_4/XCOUT of evaluation MCU used with this product does not have an XCOUT output function.

IMPORTANT

Note on A/D Converter:

- Because a flexible cable 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.

Notes on Stack Area:

- With this product, the interrupt stack pointer (ISP) is set to 00500h and used as stack area after the reset is released.
- With this product, a maximum 8 bytes of the user stack is consumed as a work area. Therefore, ensure the +8 byte maximum capacity used by the user program as the user stack area. If the user stack does not have enough area, do not access these areas which cannot be used as stack (SFR area, RAM area which stores data, or ROM area) as work area. Accessing these areas like this is a cause of user program crashes and destabilized emulator control.

Note on Accessing Addresses 00000h and 00001h:

- With the R8C Family MCUs, when a maskable interrupt is generated, the interrupt data (interrupt number and interrupt request level) stored in addresses 00000h and 00001h are read out. Also, the interrupt request bit is cleared when address 00000h or 00001h is read out. Consequently, when the address 00000h or 00001h readout instruction is executed or when address 00000h or 00001h is read out in the cause of a program runaway, a malfunction occurs in that the interrupt is not executed despite the interrupt request, because the request bit of the highest priority interrupt factor enabled is cleared.

Note on the Watchdog Function:

- Although this product emulates the watchdog timer function of the target MCU, note that the count value does not always match that of the actual MCU. For this reason, when the program is single-stepped successively as in the case of overstep operation, a watchdog timer interrupt may be generated.

Note on the block 0 rewrite disabled bit (FMR15) and block 1 rewrite disabled bit (FMR16):

- The functions associated with bit 5 (FMR15) and bit 6 (FMR16) of Flash Memory Control Register 1 (FMR1 at address 001B5h) cannot be used. When writing to FMR15 and FMR16, always be sure to write a 0. These bits read as 0 when read out.

Note on Final Evaluation:

- Be sure to evaluate your system with an actual MCU.

4.3 Connection Diagrams

4.3.1 Connection diagrams of R0E521000CPE00

Figure 4.1 shows the connection diagrams of the R0E521000CPE00. These connection diagrams mainly show the interface section. The signals not shown in Figure 4.1 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.

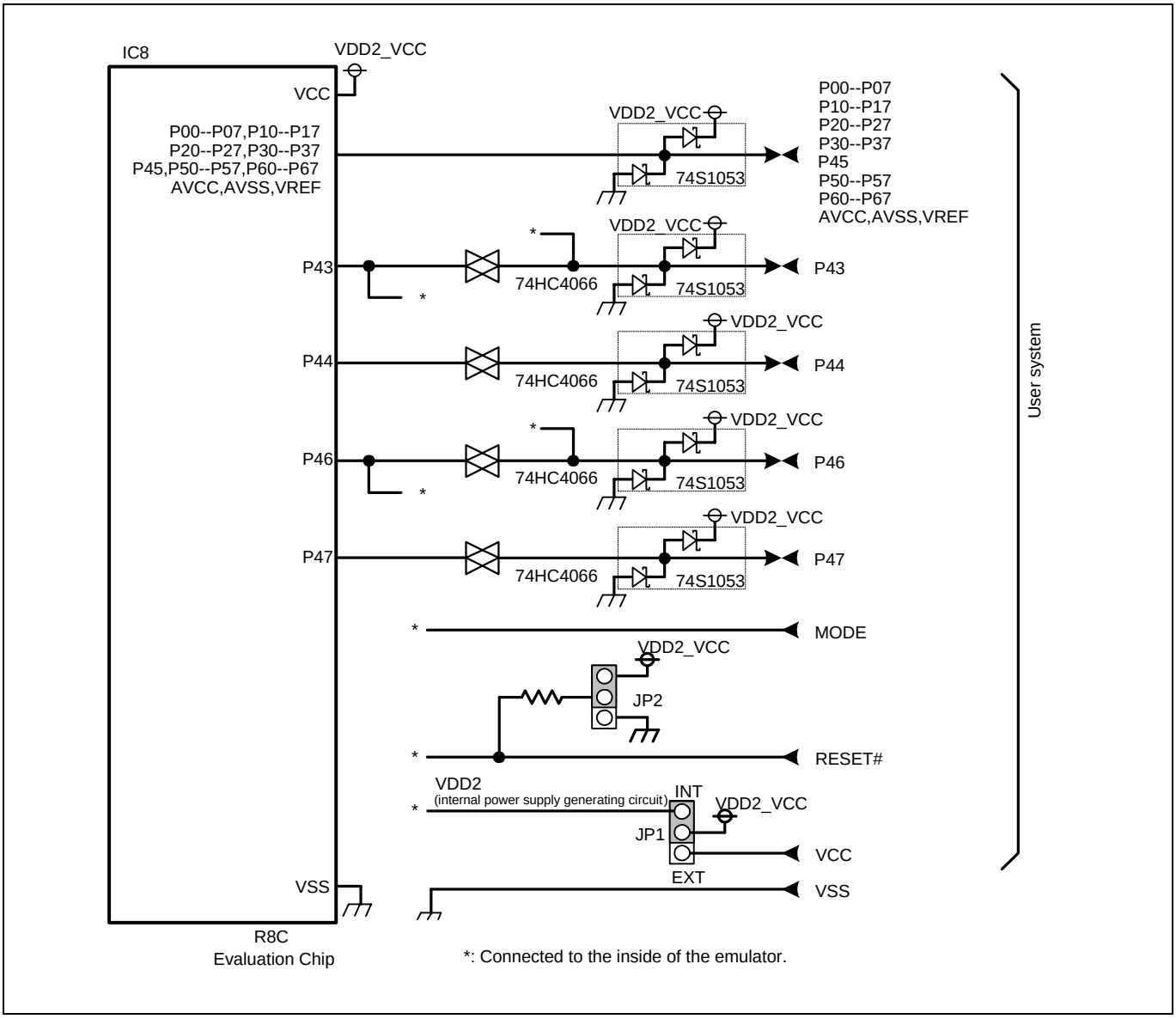


Figure 4.1 Connection diagrams of R0E521000CPE00

Table 4.2 Electrical characteristics of the 74HC4066

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

4.3.2 Connection diagrams of R0E5212BACFG00, R0E5212BACFK00 and R0E5212DACFK00

Figure 4.2 shows the connection diagrams of the R0E5212BACFG00, R0E5212BACFK00 and R0E5212DACFK00. These connection diagrams mainly show the interface section. The signals not shown in Figure 4.2 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.

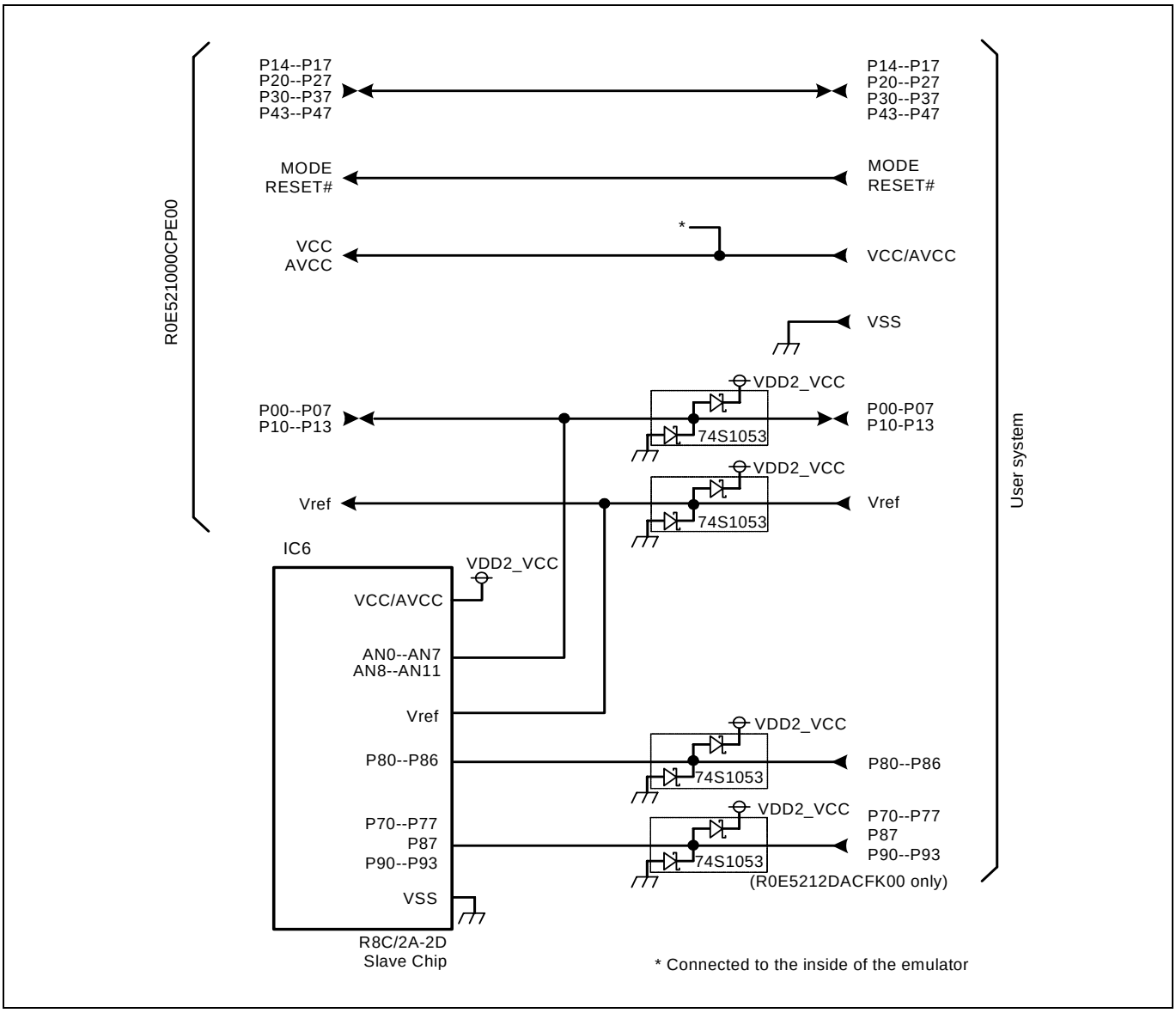


Figure 4.2 Connection diagrams of R0E5212BACFG00, R0E5212BACFK00 and R0E5212DACFK00

4.4 External Dimensions

4.4.1 External Dimensions of the Compact Emulator

Figure 4.3 shows external dimensions of the R0E521000CPE00 connected with the converter.

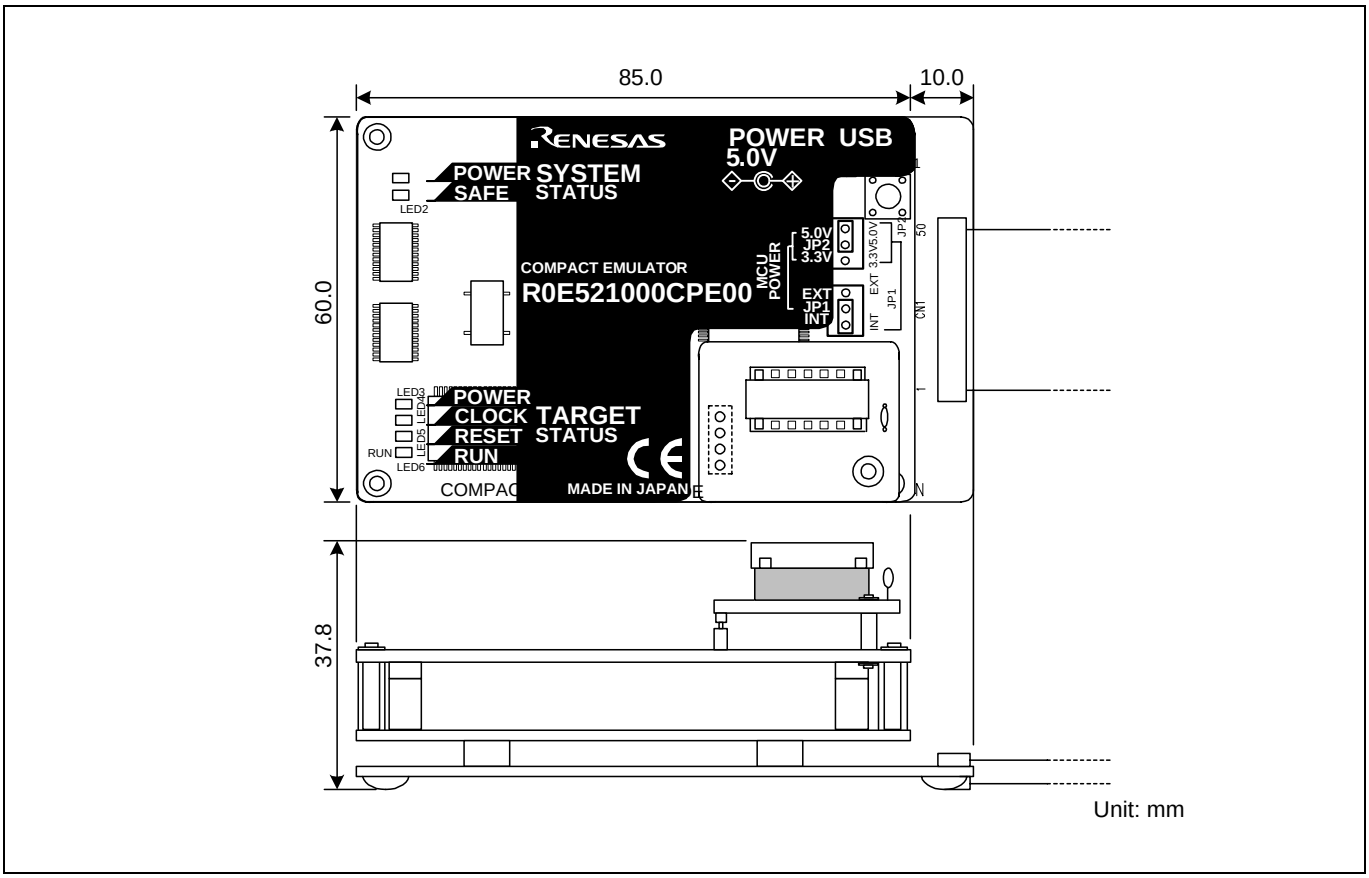


Figure 4.3 External dimensions of the compact emulator

4.4.2 External Dimensions of the Converter Board R0E521134CFG00

Figure 4.4 shows external dimensions and a sample foot pattern of the converter board R0E521134CFG00 (included with the R0E521134CPE00) for a 32-pin 0.8mm pitch LQFP.

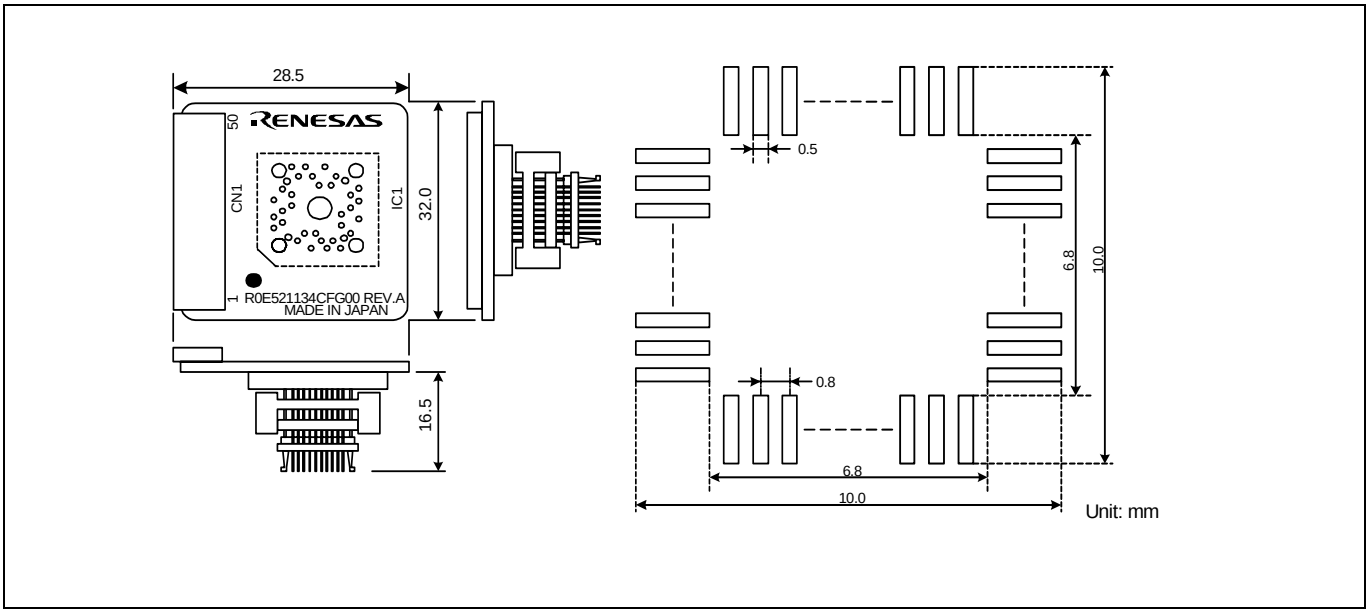


Figure 4.4 External dimensions and a sample foot pattern of the R0E521134CFG00

4.4.3 External Dimensions of the Converter Board R0E521174CSJ00

Figure 4.5 shows external dimensions and a sample foot pattern of the converter board R0E521174CSJ00 (included with the R0E52117CPE00) for a 20-pin 0.65mm pitch LSSOP.

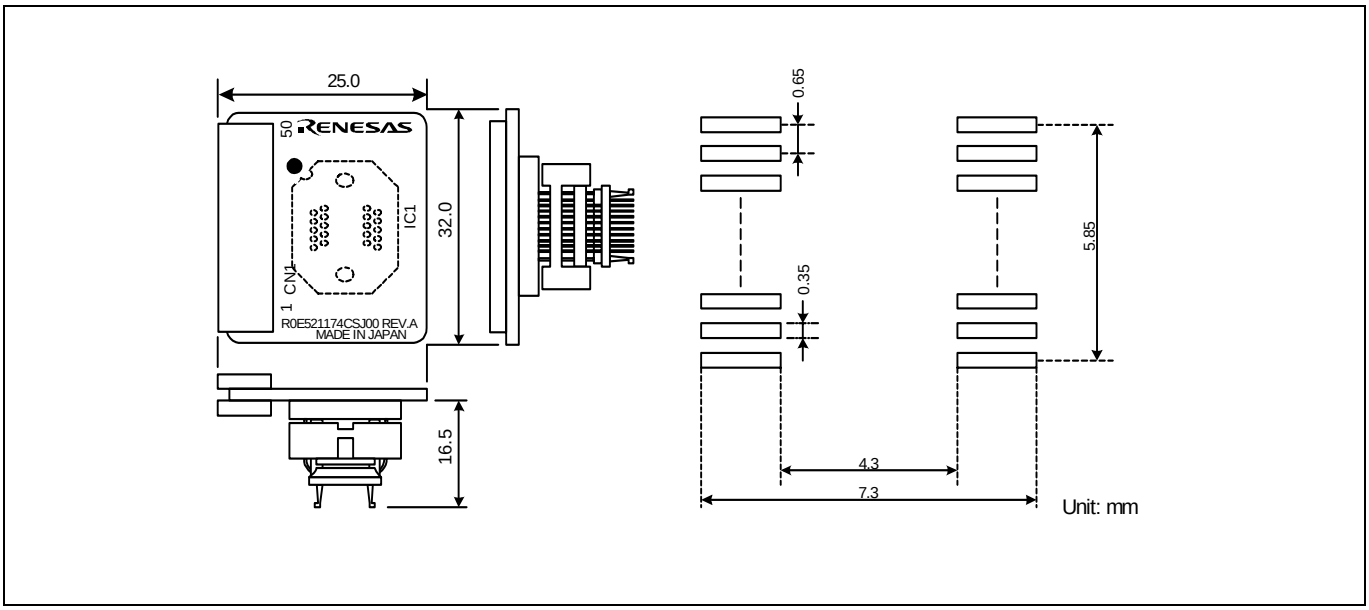


Figure 4.5 External dimensions and a sample foot pattern of the R0E521174CSJ00

4.4.4 External Dimensions of the Converter Board R0E521174CDB00

Figure 4.6 shows external dimensions and a sample foot pattern of the converter board R0E521174CDB00 (included with the R0E521174CPE10) for a 20-pin 1.778mm pitch SDIP.

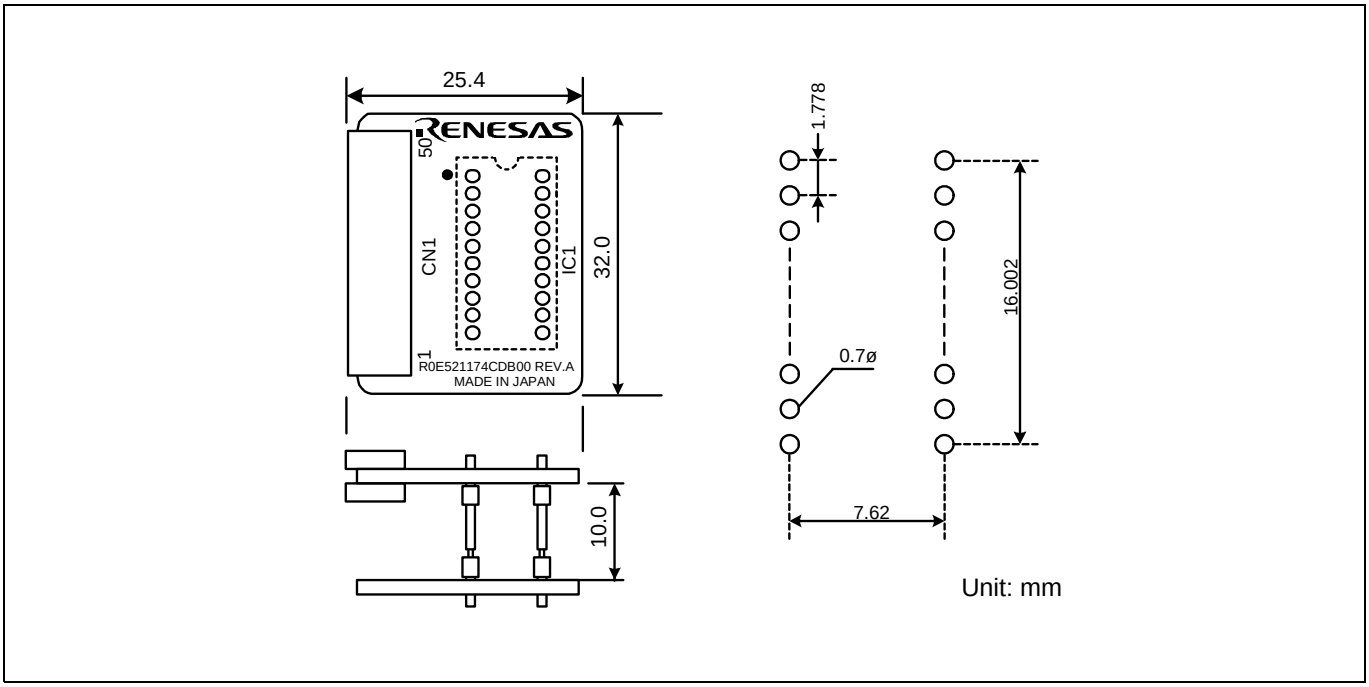


Figure 4.6 External dimensions and a sample foot pattern of the R0E521174CDB00

4.4.5 External Dimensions of the Converter Board R0E521237CFK00

Figure 4.7 shows external dimensions and a sample foot pattern of the converter board R0E521237CFK00 (included with the R0E521237CPE00) for a 48-pin 0.5mm pitch LQFP.

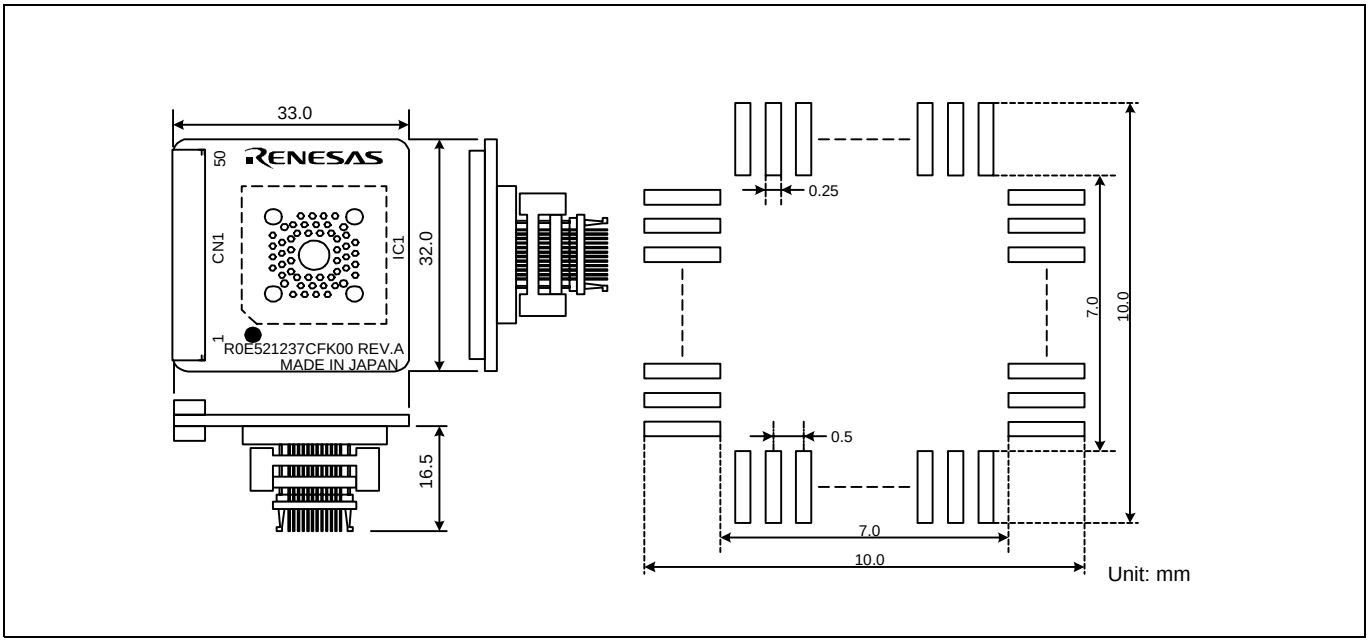


Figure 4.7 External dimensions and a sample foot pattern of the R0E521237CFK00

4.4.6 External Dimensions of the Converter Board R0E521258CFJ00

Figure 4.8 shows external dimensions and a sample foot pattern of the converter board R0E521258CFJ00 (included with the R0E521258CPE00) for a 52-pin 0.65mm pitch LQFP.

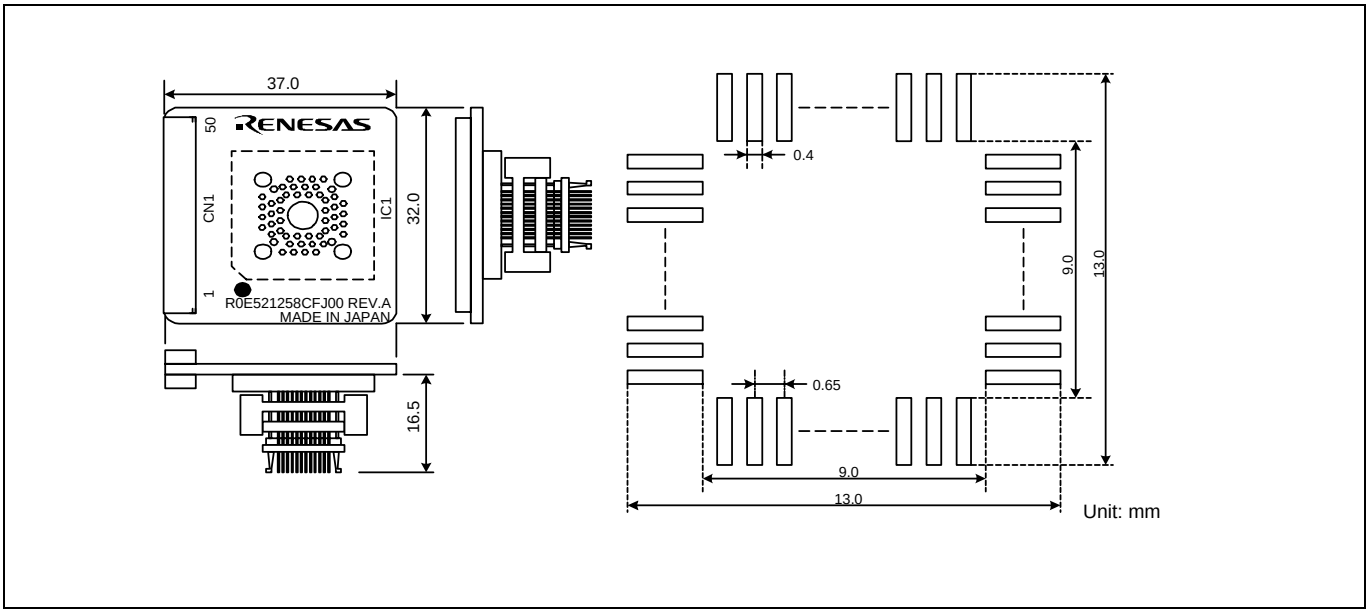


Figure 4.8 External dimensions and a sample foot pattern of the R0E521258CFJ00

4.4.7 External Dimensions of the Converter Board R0E521276CFG00

Figure 4.9 shows external dimensions and a sample foot pattern of the converter board R0E521276CFG00 (included with the R0E521276CPE00) for a 32-pin 0.8mm pitch LQFP.

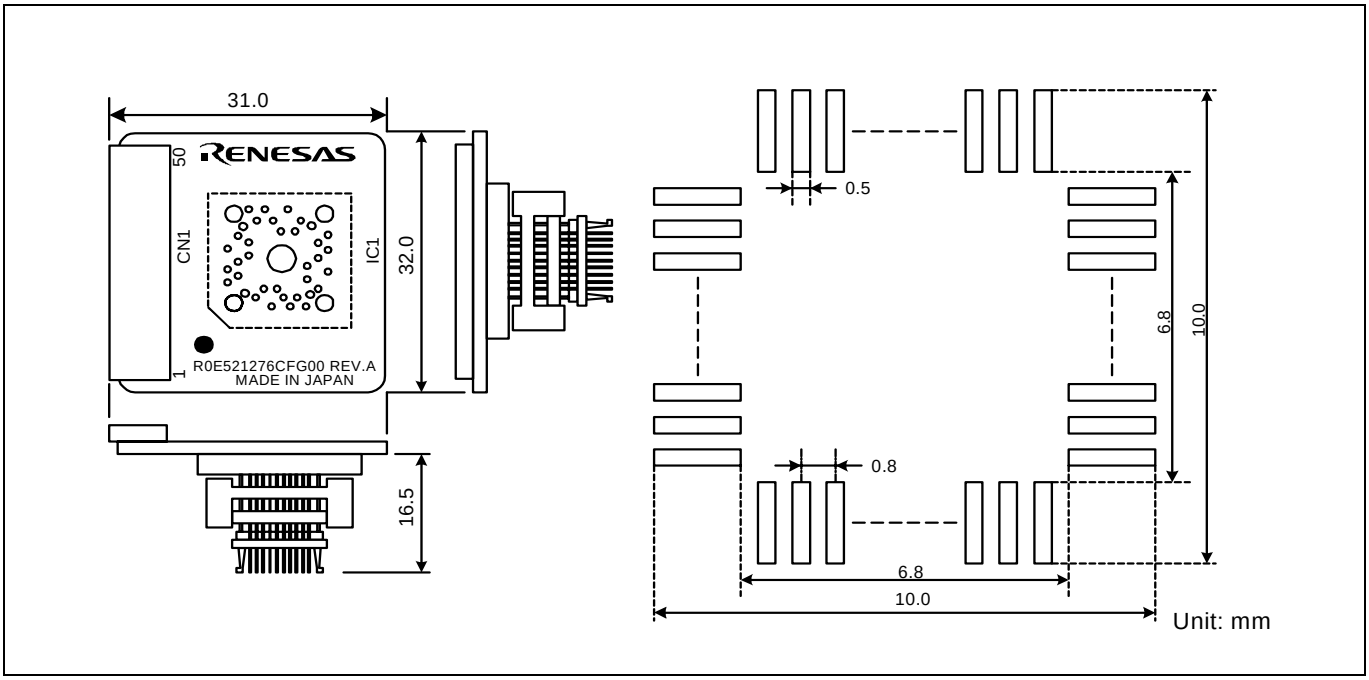


Figure 4.9 External dimensions and a sample foot pattern of the R0E521276CFG00

4.4.8 External Dimensions of the Converter Board R0E5212BACFG00

Figure 4.10 shows external dimensions and a sample foot pattern of the converter board R0E5212BACFG00 (included with the R0E5212BACPE00) for a 64-pin 0.8mm pitch LQFP.

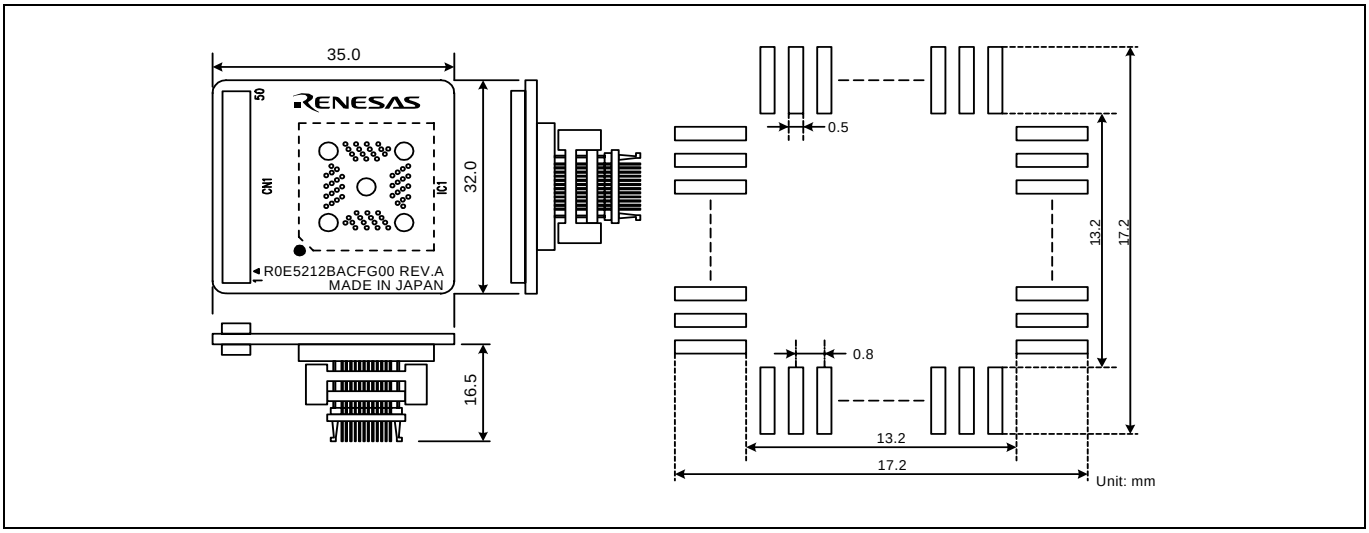


Figure 4.10 External dimensions and a sample foot pattern of the R0E5212BACFG00

4.4.9 External Dimensions of the Converter Board R0E5212BACFK00

Figure 4.11 shows external dimensions and a sample foot pattern of the converter board R0E5212BACFK00 (included with the R0E5212BACPE10) for a 64-pin 0.5mm pitch LQFP.

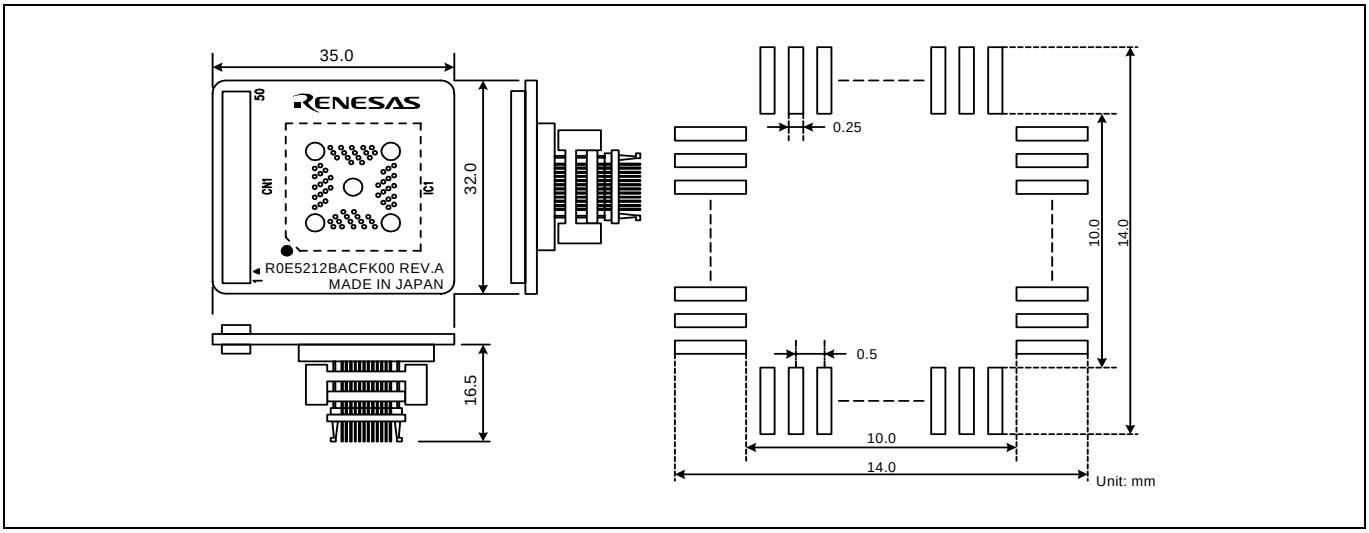


Figure 4.11 External dimensions and a sample foot pattern of the R0E5212BACFK00

4.4.10 External Dimensions of the Converter Board R0E5212DACFK00

Figure 4.12 shows external dimensions and a sample foot pattern of the converter board R0E5212DACFK00 (included with the R0E5212DACPE00) for an 80-pin 0.5mm pitch LQFP.

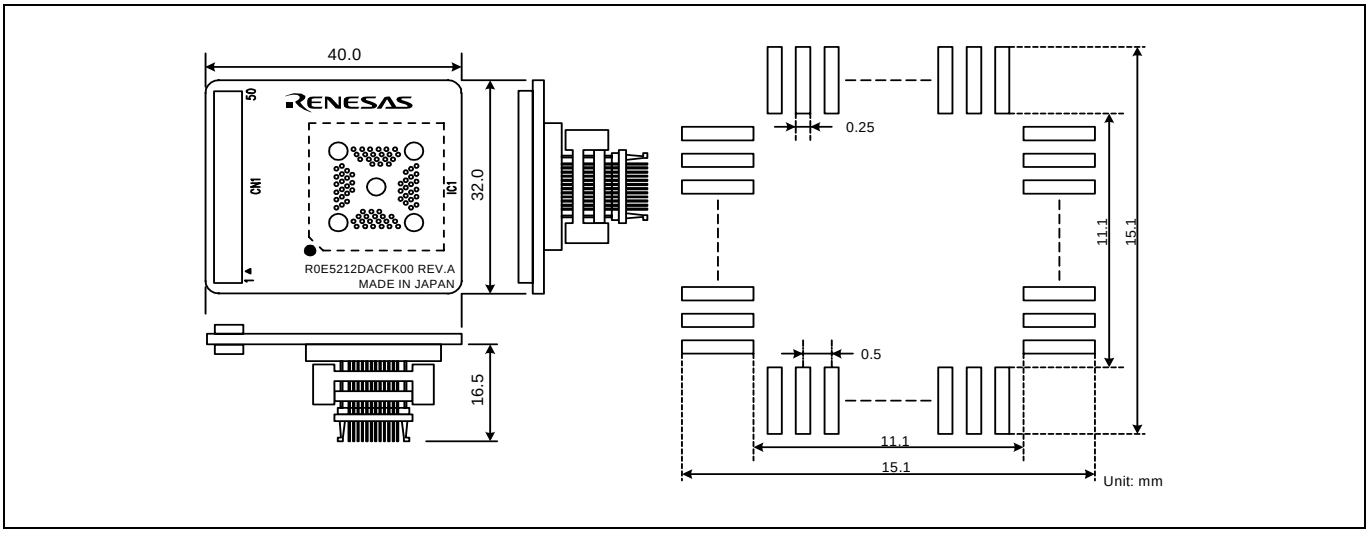


Figure 4.12 External dimensions and a sample foot pattern of the R0E5212DACFK00

4.4.11 External Dimensions of the Converter Board R0E5212L4CFG00

Figure 4.13 shows external dimensions and a sample foot pattern of the converter board R0E5212L4CFG00 (included with the R0E5212L4CPE00) for a 32-pin 0.8mm pitch LQFP.

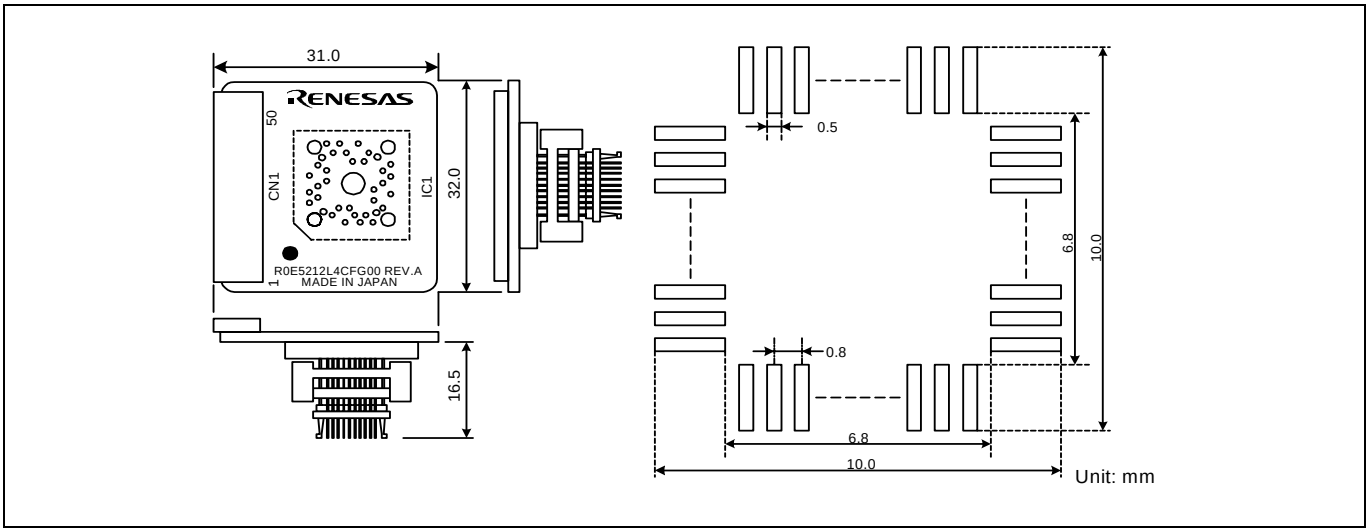


Figure 4.13 External dimensions and a sample foot pattern of the R0E5212L4CFG00

4.5 Notes on Using This Product

Notes on using this product are listed below. When debugging the MCU using this product, be careful about the following precautions.

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 (excluding target status errors), 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):

- The emulator's pin VCC is connected to the user system in order to monitor user system voltage. For this reason, the emulator cannot supply power to the user system. Therefore, provide the user system with a separate power supply from that of the emulator.
- Settings of the POWER selection jumper need to be changed according to the power supply voltage and power supply condition of the user system.
  (1) The voltage of the user system should be 2.7V≤VCC≤5.5V when the POWER selection jumper is set to the INT POWER side. Turn ON/OFF the user system and the emulator as simultaneously as possible.
  (2) The voltage of the user system is less than 2.7 V, set the POWER selection jumper to the EXT POWER side. For details about the POWER selection jumper, refer to "2.3.3 Setting the POWER Selection Jumper" (page 24).
- Before powering on your emulator system, check that the host machine, the emulator, the converter board and user system are all connected correctly.
- When the emulator debugger starts up, check the target status LEDs on the emulator to see if this product is ready to operate.

IMPORTANT

Note on Clock Supply to an MCU:

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

Note on Stop and Wait Modes:

- Do not single step an instruction shifting to stop or wait mode. It may cause communications errors.

Notes on Software Breaks:

- Software breaks change the instruction at a specified address to a BRK (00h). Therefore, take note that when you reference the result of a trace in bus mode, "00h" is displayed.
- As the BRK instruction is used for the emulator, do not use it in a user program.

Note on the Watchdog Timer:

- If the reset circuit of the user system has a watchdog timer, disable it when using the emulator.

Notes on Address-Match Interrupt:

- Do not set a software break at the address for which an address-match interrupt will be generated, because it will cause the user program to go wild. Make sure software and hardware breaks are set at the beginning of the address-match interrupt processing.
- If the address for which an address-match interrupt will be generated is single-stepped, the user program is halted when the address-match interrupt processing is executed and the first instruction after return from the interrupt is executed.

Note on Protect Register:

- The protect is not canceled when bit 2 of protect register PRCR (PRC2), which enables writing into the port P0 direction register, is changed with the below procedure.
  (1) Single-step execution of an instruction setting PRC2 to "1"
  (2) Execution from the instruction setting "1" to PRC2 where a software breakpoint is set
  (3) Setting a break point between an instruction setting PRC2 to "1" and a point where the port P0 direction register is set
  (4) Setting PRC2 to "1" by the memory window or script window

Note on Debugging Operations After Releasing a Reset from the User System:

- Do not execute debugging operations (stopping program by a software or hardware break, or run-time debugging, etc.), after releasing a reset from the user system until an interrupt stack pointer (ISP) is set in the user program.

IMPORTANT

Note on Debugging in CPU Rewrite Mode:

- When you debug a program in CPU rewrite mode, check "Debug the program using CPU Rewrite Mode" in the MCU tab of the Init dialog box of the emulator debugger.

Notes on Restrictions on Debugging in CPU Rewrite Mode:

- If you check "Debug the program using CPU Rewrite Mode" in the MCU tab of the Init dialog box of the emulator debugger, you cannot use the following functions.
  (1) Setting or releasing software breakpoints in an internal ROM area while executing the user program
  (2) Program and data rewriting in an internal ROM area while executing the user program
  (3) Setting or releasing event breakpoints in an internal ROM area while executing the user program
- If the user program is halted by the Stop button or a break when block erasing or programming the flash ROM, the block erase or program operation is stopped. Once this occurs, the user program may not operate as expected when it is reexecuted from where it stopped. If the user program is stopped accidentally, redownload and reexecute the program. If when the user program is halted no block erase or program operation is in progress, the user program can be executed normally from where it stopped.

Note on Data Display during Debugging in CPU Rewrite Mode:

- In the read status register mode of CPU rewrite mode, the read values displayed in the memory window, etc. when the user program is running show the status register values. Note that when the user program is halting, the read values show data values.

Running/idle	Mode	Window display
User program running	Read status register mode of CPU rewrite mode	Status register values are displayed.
	Other	Data values are displayed.
User program halting	Read status register mode of CPU rewrite mode	Data values are displayed.
	Other	Data values are displayed.

Be aware, however, that the values displayed in the memory window or the RAM monitor window are retained intact unless you press the Refresh or the Clear button.

Note on Data Write to the Internal ROM Area in CPU Rewrite Mode:

- When writing data to the internal ROM area in CPU rewrite mode, this product permits the data bits to be set to either 1 or 0. This is different from the actual MCU, because in the actual MCU you only can set the data bits to 0.

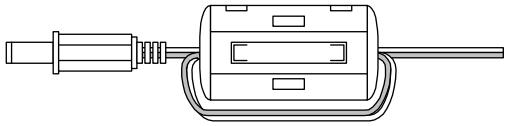
Note on Trace Data Display When Rewriting the Flash ROM in EW1 Mode:

- For data display in the trace window when using EW1 mode, be sure to select source mode or bus mode. If disassemble mode or data access mode is selected, the debugger will take time for analysis of the trace data to be displayed.

IMPORTANT

Notes on CE Declaration of Conformity:

- Please use this product with care as described below.
  (1) Electrostatic Discharge Precautions must be taken when handling the product.
  (2) Must not be used within 30 meters of a domestic radio or television receiver.
  (3) For correct operation of this product, it is recommended that Mobile phones are not used within 10 meters of this product system.
  (4) This product should be powered down when not in use.
  (5) Use the power supply which complies with CE marking requirements.
- 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;
  (1) Ensure attached cables do not lie across the emulator main unit and converter board.
  (2) Reorient the receiving antenna.
  (3) Increase the distance between the product and the receiver.
  (4) Connect the product into an outlet on a circuit different from that to which the receiver is connected.
  (5) 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.



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

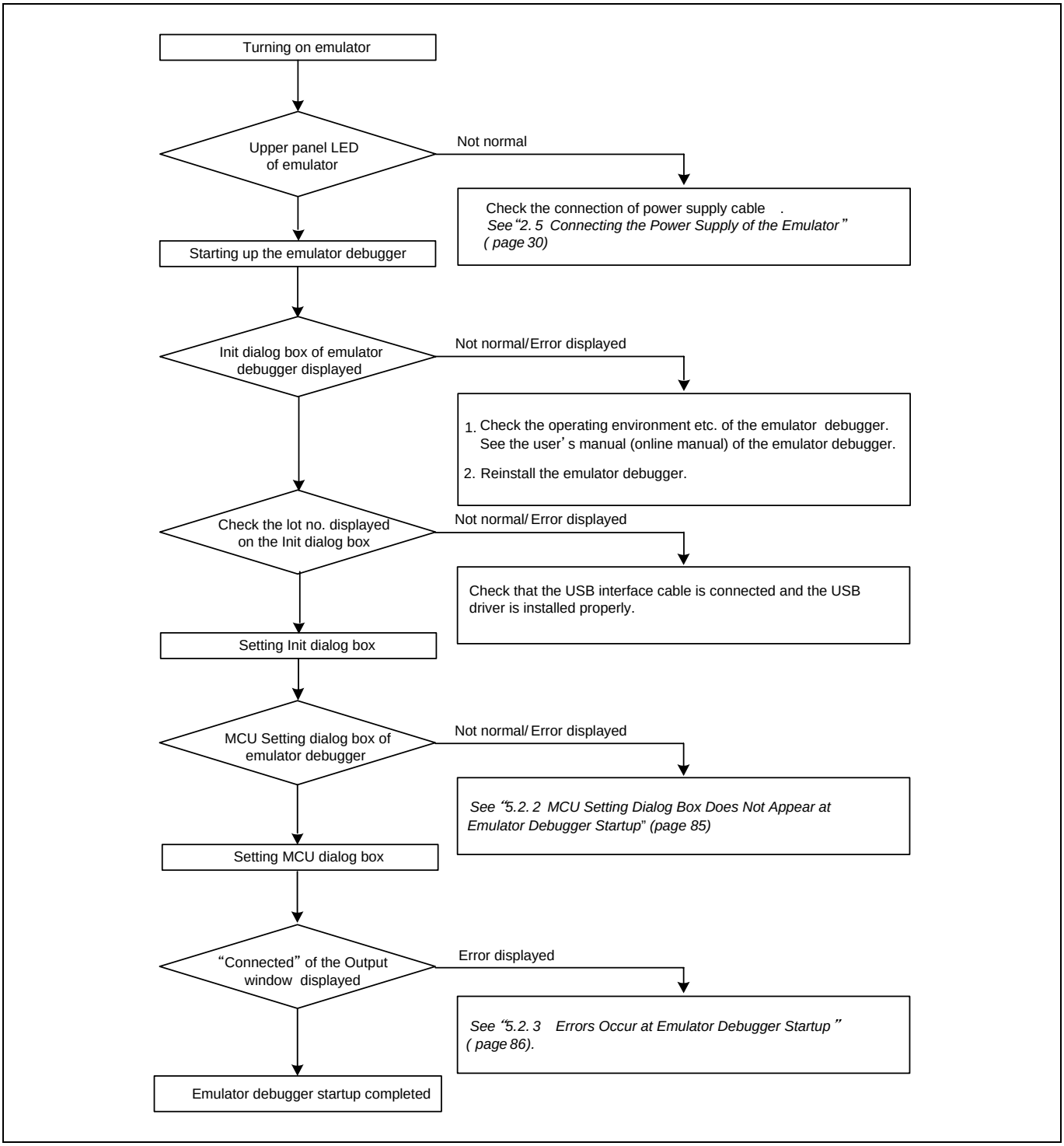


Figure 5.1 Flowchart to remedy the troubles

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 "2.5 Connecting a Power Supply" (page 30).*
Target Status POWER LED does not light up.	Connected	Check that power is properly supplied to the user system and that the user system is properly grounded.
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 "2.3.4 Selecting Clock Supply" (page 25).*
	Connected	(1) When the clock is supplied from an external oscillator, check that the oscillator circuit in the user system is oscillating properly. (2) Check that the switches in the emulator main unit are set properly. *"2.3.2 Setting the Jumpers on the R0E521000EPBM0 Board" (page 23).*
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 "2.6 Connecting the Host Machine" (page 31).*
Not compact emulator.	Check that an emulator other than the compact emulator (such as PC4701, PC7501) is not connected.

5.2.3 Errors Occur at Emulator Debugger Startup

Table 5.3 Checkpoints of errors at debugger startup

Error	Checkpoint
Target MCU is in the reset state.	Check that the reset pin of the user system is held high.
Target MCU cannot be reset.	(1) If the reset circuit of the user system has a watchdog timer, disable the timer. (2) Check that power is properly supplied to the user system and that the user system is properly grounded.
Target is in "HOLD" state.	The MCU is either in stop mode or wait mode. Either reset the MCU or cancel the mode with an interrupt. *See MCU specifications.*
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.
Target MCU is not receiving power.	Check that power is properly supplied to the user system and that the user system is properly grounded.
Target MCU is uncontrollable.	(1) Check that the NQPACK 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 which is downloaded from the following URL, then send the information 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 are not covered by warranty.

(2) Replacement not covered by warranty

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 a Repair Request Sheet downloadable from the following URL. And email the sheet and send the product to your local distributor.

http://www.renesas.com/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.

[MEMO]

Compact Emulator for R8C Family
R0E521000CPE00 User's Manual

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User's Manual

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