User's Manual

Emulation Adapter for the RH850/U2B

RTE7702500EAB00000J

RTE7702500EAB0K000J

User's Manual

Renesas Electronics
www.renesas.com

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Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,
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Preface

The emulation adapter is an emulation board which is designed for use with RH850 family MCUs from Renesas Electronics Corporation.

All components that come with the emulation adapter are listed under “1.1 Package Components”. If you have any questions about the emulation adapter, contact your local distributor.

This user’s manual is mainly to describe the specifications of the emulation adapter. For the specifications of the exchange adapters, refer to appendix A, Specifications of the Exchange Adapters, in this document.

For information on emulator debuggers and related products, please see the user’s manuals, additional documents for user’s manuals, and application notes provided for the individual products. When you use an emulator from another company for debugging, be sure to read the user’s manual for the given emulator.

Related Documents

Name of Document	Document No.
IE850A Emulator RTE0T0850AKCT00000J User’s Manual	R20UT4461E
E2 Emulator RTE0T00020KCE00000R User’s Manual	R20UT3538E
E2 Emulator, IE850A Emulator Additional Document for User’s Manual (Notes on Connection of RH850/U2B)	R20UT5052E

Note: The contents of the related documents listed above may be changed without prior notice. Be sure to use the latest versions of the documents, which can be downloaded from “Software and Tools” on the Renesas Web page.
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Important

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Keep this user’s manual, and refer to it when you have questions about this product.

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This product is for the support of the development of systems that use RH850-family MCUs from Renesas. It provides support for system development in both software and hardware.

Be sure to use this product correctly according to said purpose of use. Please avoid using this product other than for its intended purpose of use.

For those who use this product:

This product can only be used by those who have carefully read the user’s manual and know how to use it.

Use of this product requires basic knowledge of electric circuits, logical circuits, and MCUs.

When using the product:

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(1) Transportation and vehicular
(2) Medical (equipment that has an involvement in human life)
(3) Aerospace
(4) Nuclear power control
(5) Undersea repeaters

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⚠ 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.

To avoid a possible danger, the following diagrammatic symbols are used to call your attention.

△ 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 repair or remodel the emulator product by yourself in order to prevent danger such as an electric shock or fire and for the sake of quality assurance. For after-sale services in case of a mechanical or electrical fault, please contact your local distributor.

Always switch off the user system before connecting or disconnecting any connectors or cables. Neglecting to take this precaution may result in an electric shock or in this product emitting smoke or catching fire. Also, a user program being debugged may be destroyed.

Make sure that the connectors and cables are connected in the correct directions.

Neglect of this precaution will result in getting an electric shock or will result in this product emitting smoke or catching fire.

Warning for Modification:

Do not modify this product. Personal injury due to electric shock may occur if the product is modified. Modifying the product will void your warranty.

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 un-repairable damage.

Warning for Use Temperature:

This product is to be used in an environment with a maximum ambient temperature of 40°C.

Care should be taken that this temperature is not exceeded.

⚠ CAUTION

Cautions to Be Taken for Handling This Product:

Use caution when handling this product. Be careful not to apply a mechanical shock.

Do not operate switches before removing static electricity from the operator's body. Doing so may lead to the discharge of static electricity and so damage the internal circuits. Also, do not directly touch connector pins.

When attaching and removing the cable, hold a fixture (such as a connector) to avoid pulling the cable.

Caution to Be Taken for System Malfunctions:

If this product malfunctions because of interference like external noise, do the following to remedy the trouble.

(1) Exit the emulator debugger, and turn off the emulator and the target system.

(2) After a lapse of 10 seconds, turn on the power of this product again, then launch the emulator debugger.

Caution to Be Taken for Disposal:

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Renesas Electronics Europe GmbH can take back end of life equipment, register for this service at "http://www.renesas.eu/weee".

Contents

Terminology

Some specific words used in this user's manual are defined below.

Target device

This means the device to be emulated or debugged.

Debug chip

This means the device that emulates the operation of the target device and implements debugging facilities such as tracing.

Aurora tracing

Aurora is a high-speed communications protocol from Xilinx Inc. The debug chip is capable of using Aurora as a trace interface.

Target system

This means the user-created system which is to be debugged. This includes both hardware and software created by the user.

Emulation adapter

This is a board which emulates the device to be debugged. A debug chip is mounted on the board.

Base board

This board is for operating the emulation adapter as a stand-alone unit.

Exchange adapter

This is a board that exchanges the connections of the emulation adapter to suit the package of the target device.

1. Outline

This product is an emulation adapter for the RH850/U2B of MCUs from Renesas Electronics Corporation. Using this product with the separately sold exchange adapter enables emulation of the target device.

Features:

- This product includes a debug chip for the RH850/U2B. The debug chip to be mounted differs with the product type name of the target for debugging.
  - RTE7702500EAB00000J: R7F702Z20ADBG debug chip (performance configuration)
  - RTE7702500EAB0K000J: R7F702Z2KADBG debug chip (safety configuration)
- The combination of the emulation adapter connected to the base board included in the package is usable as a simple evaluation board.
- Using the emulation adapter with the exchange adapter allows connection to the target system and enables emulation of the target device.
- Using the attached 34-pin to 46-pin conversion connector enables connecting emulators which support Aurora tracing, such as the IE850A emulator (type name: RTE0T0850AKCT00000J) from Renesas, and debugging.
- Using the attached 14-pin to 46-pin conversion connector enables connecting the emulation adapter to on-chip debugging emulators such as the E2 emulator (type name: RTE0T00020KCE00000R) from Renesas and flash programmers.
- The emulation adapter can operate as a stand-alone unit, i.e. without connection to an emulator.

1.1 Package Components

The package of this product consists of the following items. After you have unpacked the box, check if your emulation adapter contains all of these items.

Table 1-1 Package Components for the Emulation Adapter

Item	Quantity
Emulation adapter: RTE7702500EAB00000J or RTE7702500EAB0K000J	1
Base board: RTE7702500EABBB000J	1
14-pin to 46-pin conversion adapter: RTE0T00020KCA40000J	1
34-pin to 46-pin conversion adapter: RTE0T0850AKCA00000J	1
Power-supply cable	1
Demounting lever	1
Jumper blocks for pin headers (for JP7 and JP8 of the emulation adapter and JP22 and JP23 of the base board)	4

1.2 Product Specifications

Table 1-2 lists the specifications of this product.

Table 1-2 Product Specifications

Item	Specification
Device to be emulated	468-pin BGA: RH850/U2B24, U2B10 373-pin BGA: RH850/U2B24, U2B10 292-pin BGA: RH850/U2B10, U2B6*
Power supply for the emulation adapter	4.5 V min., 5.0 V typ., 5.5 V max.
External dimension	Emulation adapter: 61 mm x 55 mm Base board: 110 mm x 120 mm
Weight	Emulation adapter: 32 g Base board: 90 g
Operating temperature	0 to 40°C (no condensation)
Storage temperature	−15 to 60°C (no condensation)
EMC	EU: EN55032 Class A, EN55035 USA: FCC part 15 Class A

Note: The RTE7702500EAB0K000J does not support emulation of the RH850/U2B6. Only the RTE7702500EAB00000J supports this.

1.3 Regulatory Compliance Notices

- European Union regulatory notices

This product complies with the following EU Directives. (These directives are only valid in the European Union.)

CE Certifications:

This product complies with the following European EMC standards.

- EMC Directive (2014/30/EU)

EN 55032:2015/A11:2020 Class A

WARNING: This is a Class A product. This equipment can cause radio frequency noise when used in the residential area. In such cases, the user/operator of the equipment may be required to take appropriate countermeasures under his responsibility.

EN 55035:2017/A11:2020

Information for traceability:

- Authorised representative & Manufacturer

Name: Renesas Electronics Corporation

Address: TOYOSU FORESIA, 3-2-24, Toyosu, Koto-ku, Tokyo, 135-0061, Japan

- Person responsible for placing on the market

Name: Renesas Electronics Europe GmbH

Address: Arcadiastrasse 10, 40472 Dusseldorf, Germany

- Trademark and Type name

Trademark: Renesas

Product name: RH850/U2B Emulation adapter + Base board

Type name: RTE7702500EAB0x000J

Environmental Compliance and Certifications:

- Waste Electrical and Electronic Equipment (WEEE) Directive 2012/19/EU

- United States Regulatory notices on Electromagnetic compatibility

This product complies with the following EMC regulation. (This is only valid in the United States.)

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.

2. Names and Functions of Hardware

This chapter describes the names and functions of each part of the emulation adapter and of the other items included with it. You can avoid damaging the product and affecting the system by reading this chapter with reference to the actual hardware.

Chapter 3 shows a list of the settings of hardware according to the system configuration (type of usage).

2.1 Emulation Adapter (RTE7702500EAB00000J or RTE7702500EAB0K000J)

An emulation adapter is an emulation board on which the debug chip is mounted. Using the emulation adapter with the exchange adapter allows connection to the target system. The emulation adapter can also be used as a simple evaluation board in combination with the attached base board.

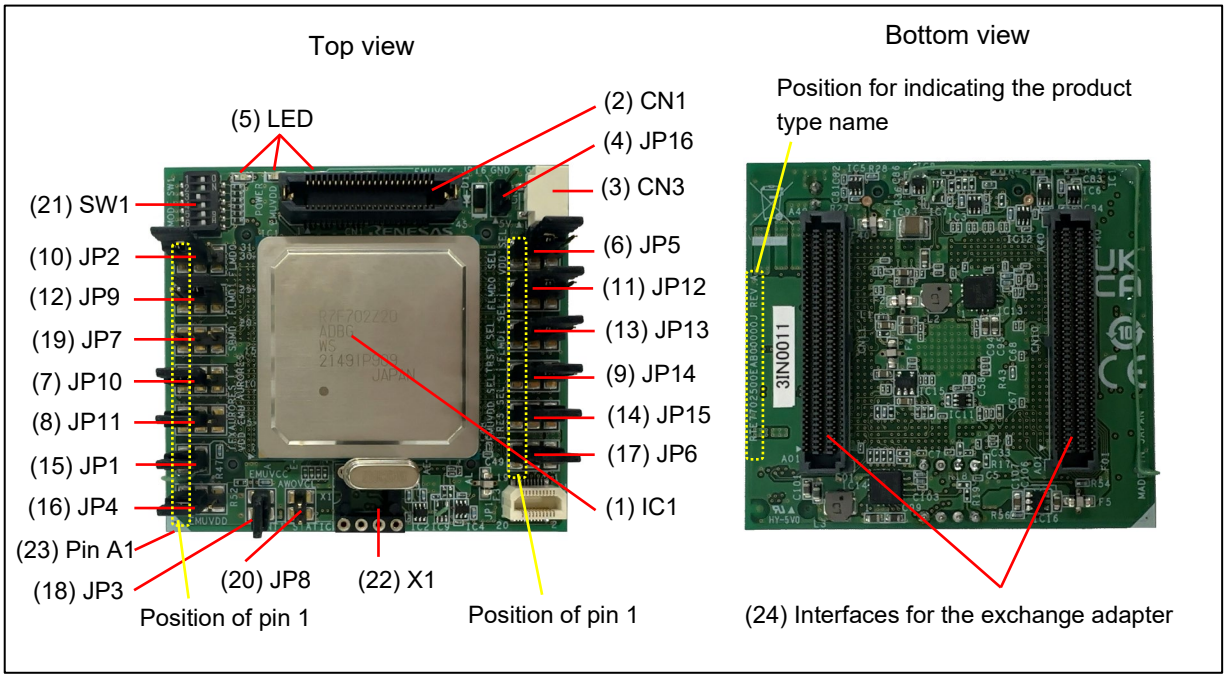


Figure 2-1 Names of the Parts of the Emulation Adapter (RTE7702500EAB0x000J)

(1) Debug chip: IC1

IC1 is the debug chip which can emulate target devices of the RH850/U2B.

(2) Connector for external tracing: CN1

CN1 is a connector for connection to emulators. It is connected to the JP0-pin group of the debug chip and uses a 46-pin connector from SAMTEC, the type name of which is ASP-130368-01. The table below lists the pin assignments.

Connecting the 14-pin to 46-pin conversion adapter (RTE0T00020KCA40000J) or the 34-pin to 46-pin conversion adapter (RTE0T0850AKCA00000J) enables connection of the existing emulators.

Read the user's manual for the emulator you will be using and connect the emulator with this connector.

Table 2-1 Pin Assignments of the Connector for External Tracing

Signal Name	Pin No.		Signal Name
GND	Latch		GND
TODP0	1	2	TVCC
TODN0	3	4	TCK/LPDCLK
GND	5	6	FPMD1 (FLMD1)
TODP1	7	8	AURORES
TODN1	9	10	EMUVDD
GND	11	12	TRST/LPDRST
TODP2	13	14	FPMD0 (FLMD0)
TODN2	15	16	EVTI
GND	17	18	EVTO
TODP3	19	20	MSYNZ
TODN3	21	22	RESET
GND	23	24	GND
N.C.	25	26	CICREFP
N.C.	27	28	CICREFN
GND	29	30	GND
N.C.	31	32	N.C.
N.C.	33	34	RESETOUT
GND	35	36	GND
N.C.	37	38	TMS
N.C.	39	40	TDI/LPDI
GND	41	42	GND
N.C.	43	44	TDO/LPDO
N.C.	45	46	DRDY/LPDCLKO
GND	Latch		GND

(3) Power-supply connector: CN3

CN3 is connected to the power-supply cable that comes with this product or that comes with the IE850A. When a base board is connected and emulation RAM (ERAM) or external tracing (Aurora tracing) is used, be sure to connect the power-supply cable to CN3 and supply +5 V.

When disconnecting the power-supply cable from the emulation adapter, press the tabs on both sides of the CN1 connector of the power-supply cable to unlock the connector.

⚠ CAUTION

Applied voltage:

Make sure that the voltage applied to CN3 is within the specified range (4.5 V to 5.5 V).

An applied voltage out of the range may cause the emulation adapter to emit smoke or catch fire or otherwise be damaged.

⚠ CAUTION

Unlocking the connector:

Do not press the tabs for unlocking the connector too hard as this may lead to them being stuck in this position. Take care on this point.

(4) Power-supply pin header: JP16

JP16 is a pin header which allows the monitoring of +5 V and GND that are supplied from CN3.

(5) Status LEDs

Name of LED	Specification
POWER	Illuminated: CN3 is supplying power. Not illuminated: CN3 is not supplying power.
EMUVDD	Illuminated: VDD for debugging (EMUVDD) = ON Not illuminated: VDD for debugging (EMUVDD) = OFF This specification depends on the settings of JP1 or JP4.
EMUVCC	Illuminated: VCC for debugging (EMUVCC) = ON Not illuminated: VCC for debugging (EMUVCC) = OFF This specification depends on the settings of JP3.

(6) Jumper block: JP5 (VDD_SEL)

JP5 (VDD_SEL)	Specification
Open-circuit	Setting prohibited.
1-2 short-circuit (default)	The VDD power generated from the emulation adapter is supplied to the VDD power for the debug chip.
2-3 short-circuit	The VDD power on the target system is supplied to the VDD power for the debug chip.

(7) Jumper block: JP10 (AURORES)

JP10 (AURORES)	Specification
Open-circuit	This setting is made when external tracing (Aurora tracing) is not to be used. The AURORES pin for the debug chip is set to the low level.
1-2 short-circuit (default)	This setting is made when external tracing (Aurora tracing) is to be used. The AURORES pin for the debug chip is controlled in combination with the operation of the TRST pin of the CN1 connector for external tracing.
2-3 short-circuit	This setting is made when external tracing (Aurora tracing) is to be used. The AURORES pin for the debug chip is controlled by pin 8 of the CN1 connector for external tracing or by the target system. This specification depends on the settings of JP11.

(8) Jumper block: JP11 (EXAURORES)

JP11 (EXAURORES)	Specification
Open-circuit	Setting prohibited.
1-2 short-circuit (default)	This setting is made when external tracing (Aurora tracing) is to be used. The AURORES pin for the debug chip is controlled by the target system.
2-3 short-circuit	This setting is made when external tracing (Aurora tracing) is to be used. The AURORES pin for the debug chip is controlled by pin 8 of the CN1 connector for external tracing.

(9) Jumper block: JP14 (TRST_SEL)

JP14 (TRST_SEL)	Specification
Open-circuit	Setting prohibited.
1-2 short-circuit (default)	The TRST pin for the debug chip is controlled by the emulator (CN1 connector for external tracing).
2-3 short-circuit	Setting prohibited.

(10) Jumper block: JP2 (FLMD0)

JP2 (FLMD0)	Specification
Open-circuit	Setting prohibited.
1-2 short-circuit (default)	The FLMD0 pin for the debug chip is controlled by the emulator (CN1 connector for external tracing).
2-3 short-circuit	The FLMD0 pin for the debug chip is controlled by the target system.

(11) Jumper block: JP12 (FLMD0_SEL)

JP12 (FLMD0_SEL)	Specification
Open-circuit	Setting prohibited.
1-2 short-circuit (default)	The FLMD0 pin for the debug chip is controlled by the emulator (CN1 connector for external tracing).
2-3 short-circuit	Setting prohibited.

(12) Jumper block: JP9 (FLMD1)

JP9 (FLMD1)	Specification
Open-circuit	Setting prohibited.
1-2 short-circuit	The FLMD1 pin for the debug chip is controlled by the emulator (CN1 connector for external tracing).
2-3 short-circuit (default)	The FLMD1 pin for the debug chip is controlled by the target system.

(13) Jumper block: JP13 (FLMD1_SEL)

JP13 (FLMD1_SEL)	Specification
Open-circuit	Setting prohibited.
1-2 short-circuit (default)	The FLMD1 pin for the debug chip is controlled by the emulator (CN1 connector for external tracing).
2-3 short-circuit	Setting prohibited.

(14) Jumper block: JP15 (RES_SEL)

JP15 (RES_SEL)	Specification
Open-circuit	Setting prohibited.
1-2 short-circuit (default)	The RESET pin for the debug chip is controlled by the emulator (CN1 connector for external tracing).
2-3 short-circuit	Setting prohibited.

(15) Jumper block: JP1 (VDD_EMU)

JP1 (VDD_EMU)	Specification
Open-circuit	When the SYSVCC power for the debug chip is 2.5 V or more, the VDD power or EMUVDD power is generated from the emulation adapter.
Short-circuit (default)	When the PWRCTL pin for the debug chip is high, the VDD power or EMUVDD power is generated from the emulation adapter. When the PWRCTL pin for the debug chip is in the high-impedance state and the SYSVCC power is 2.5 V or more, the VDD power or EMUVDD power is generated from the emulation adapter.

(16) Jumper block: JP4 (EMUVDD)

JP4 (EMUVDD)	Specification
Open-circuit	Setting prohibited.
1-2 short-circuit (default)	When the PWRCTL pin for the debug chip is high or the SYSVCC power is 2.5 V or more, the EMUVDD power is generated from the emulation adapter. This specification depends on the settings of JP1.
2-3 short-circuit	The EMUVDD power is always generated from the emulation adapter.

(17) Jumper block: JP6 (EMUVDD_SEL)

JP6 (EMUVDD_SEL)	Specification
Open-circuit	This setting is made when neither ERAM nor external tracing (Aurora tracing) is to be used. VDD (EMUVDD) for debugging is not supplied.
1-2 short-circuit (default)	Power is supplied as the EMUVDD power for the debug chip. This specification depends on the settings of JP1 or JP4.
2-3 short-circuit	The VDD power is supplied as the EMUVDD power for the debug chip. This specification depends on the settings of JP1.

(18) Jumper block: JP3 (EMUVCC)

JP3 (EMUVCC)	Specification
Open-circuit	This setting is made when neither ERAM nor external tracing (Aurora tracing) is to be used. VCC (EMUVCC) for debugging is not supplied.
Short-circuit (default)	This setting is made when ERAM or external tracing (Aurora tracing) is to be used. VCC (EMUVCC) for debugging is supplied.

(19) Jumper block: JP7 (SBMD)

JP7 (SBMD)	Specification
Open-circuit (default)	The SBMD pin for the debug chip is set to the high level in deep stop mode for a U2B24.
1-2 short-circuit	The SBMD pin for the debug chip is controlled by the target system.
2-3 short-circuit	The SBMD pin for the debug chip is set to the low level in power-off standby mode.

(20) Jumper block: JP8 (AWOVCL)

JP8 (AWOVCL)	Specification
Open-circuit (default)	The VDD power is not supplied to the AWOVCL pin for the debug chip. This specification depends on the settings of JP7. The setting is made when the SBMD pin is at high level.
Short-circuit	The VDD power is supplied to the AWOVCL pin for the debug chip. This specification depends on the settings of JP7. The setting is made when the SBMD pin is at low level.

(21) Mode setting switch: SW1

<table>
<tr><th>SW1 (mode setting switch)</th><th>Specification</th></tr>
<tr><td>SW1-1: DBGSEL0
SW1-2: DBGSEL1</td><td>This sets the levels on the DBGSEL0 and DBGSEL1 pins for the debug chip.
Changing from the default setting is prohibited.
<table>
<tr><th>DBGSEL1 Pin</th><th>DBGSEL0 Pin</th><th>JP0-pin Group (CN1)</th></tr>
<tr><td>Turned on: low (default)</td><td>Turned on: low (default)</td><td>E2 emulator
IE850A</td></tr>
<tr><td>Turned on: low</td><td>Turned off: high</td><td rowspan="3">Setting prohibited.</td></tr>
<tr><td>Turned off: high</td><td>Turned on: low</td></tr>
<tr><td>Turned off: high</td><td>Turned off: high</td></tr>
</table></td></tr>
<tr><td>SW1-3: PEMD0</td><td>This sets the level on the PEMD0 pin for the debug chip.*
Turned on: low
Turned off: high (default)</td></tr>
<tr><td>SW1-4: PEMD1</td><td>This sets the level on the PEMD1 pin for the debug chip.*
Turned on: low (default)
Turned off: high</td></tr>
<tr><td>SW1-5: PEMD2</td><td>This sets the level on the PEMD2 pin for the debug chip.*
Turned on: low (default)
Turned off: high</td></tr>
<tr><td>SW1-6</td><td>Fixed as turned on. (Changing from the default setting is prohibited.)</td></tr>
</table>

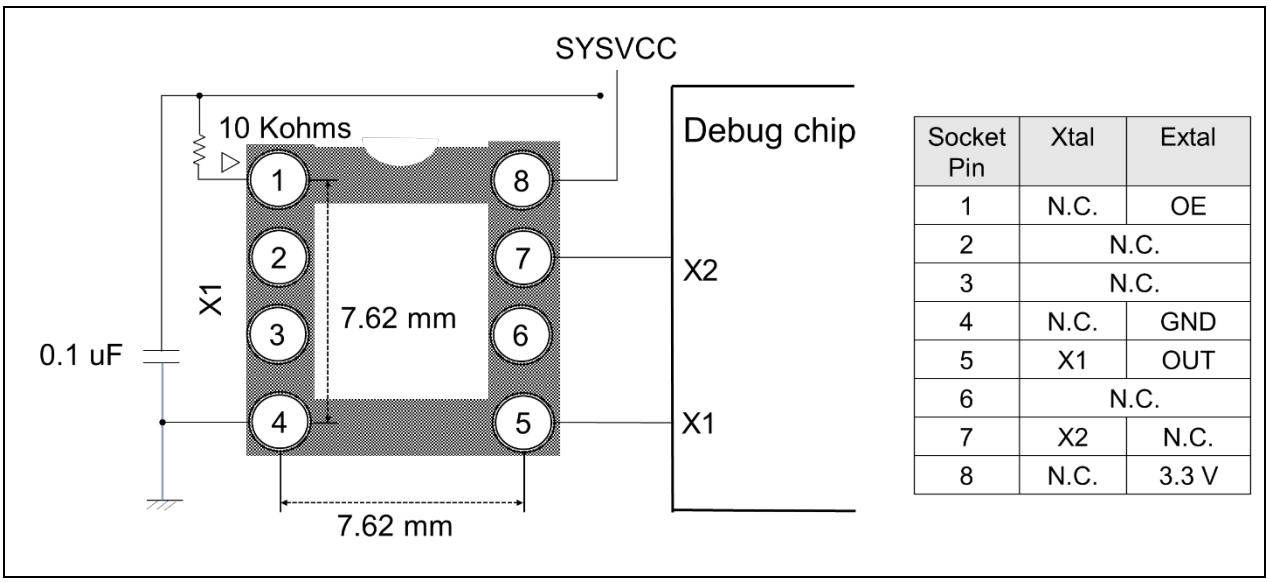
Note: For more information, refer to section 5.2 of chapter 5, Operating Mode Table, in the RH850/U2B Group User's Manual: Hardware.

(22) Clock socket: X1

X1 is the socket for the main oscillator. A 20-MHz resonator is mounted upon the board as shipped.

Taking the oscillation characteristics into consideration, an oscillator on the target system is not used; the oscillator in this socket of the emulation adapter is used instead. Change the crystal resonator (Xtal) in the socket if this is required. Mounting a crystal oscillator (Extal) is also possible. Figure 2-2 shows the clock socket and peripheral circuits.

When mounting a crystal resonator upon the clock socket, insert an insulating sheet between the crystal resonator and clock socket, i.e. mount it in the same way as the 20-MHz resonator is mounted on the product as shipped, to avoid a short-circuit between the pins of the crystal resonator.



Socket Pin	Xtal	Extal
1	N.C.	OE
2	N.C.	
3	N.C.	
4	N.C.	GND
5	X1	OUT
6	N.C.	
7	X2	N.C.
8	N.C.	3.3 V

Figure 2-2 Clock Socket and Peripheral Circuits

⚠ CAUTION

Insulating sheet:

Make sure that an insulating sheet is inserted between a crystal resonator and clock socket. If this is not the case, the crystal resonator may be short-circuited to pin 8 of the clock socket. This may cause the emulation adapter to emit smoke or catch fire or otherwise damage it.

(23) Silk-screened mark for aligning the position of pin A1

This mark indicates the position of pin A1 in the connection of an exchange adapter to the emulation adapter.

(24) Interfaces for the exchange adapter: CN10 and CN11

These connectors are used to connect an exchange adapter or the base board.

2.2 Base Board (RTE7702500EABBB000J)

The base board allows use as a simple target system in combination with the emulation adapter.

The signals to or from each pin of the debug chip are brought out on CN1 to CN8 on the board, which enables simple checking.

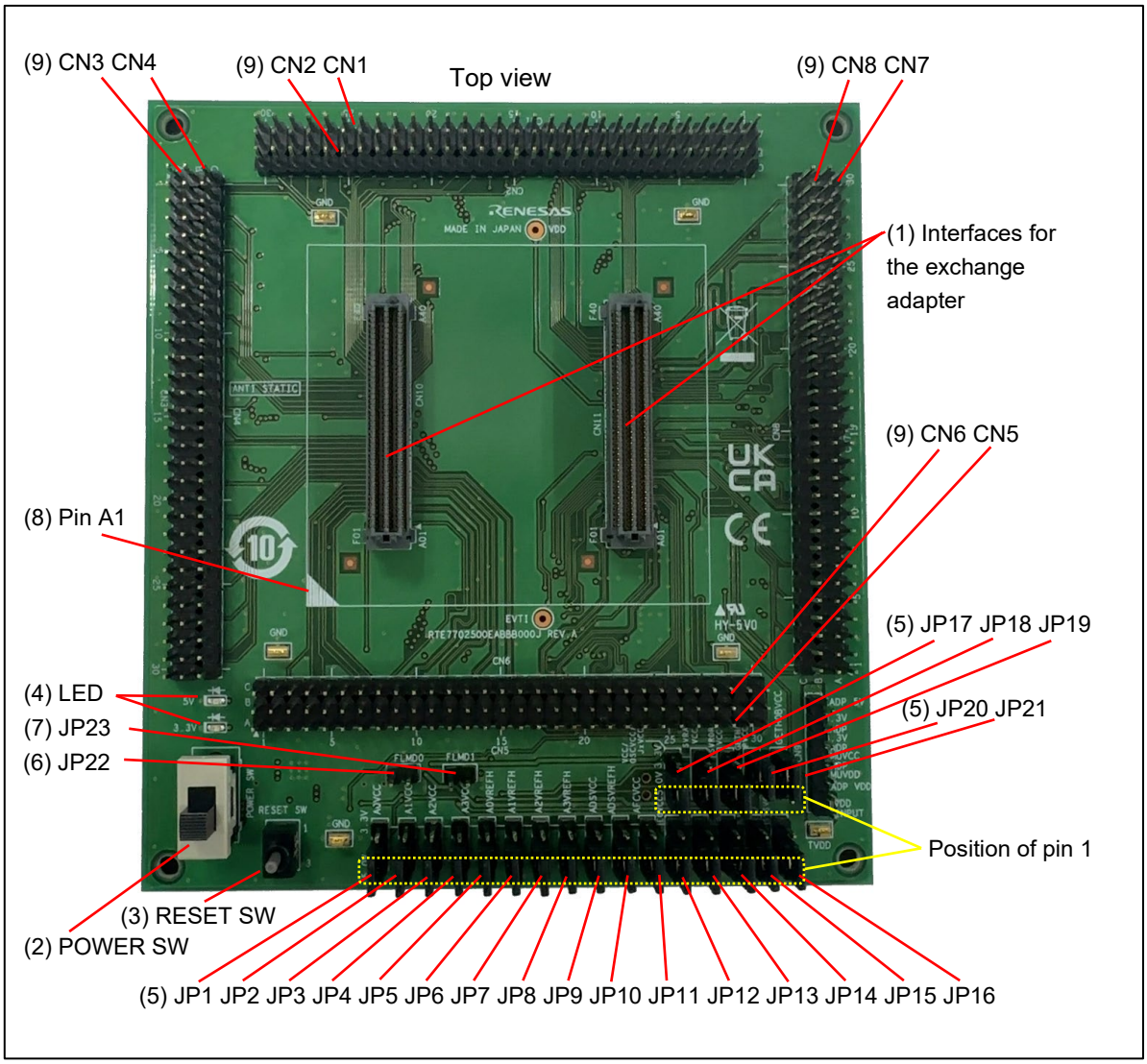
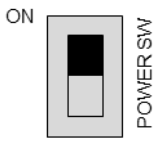
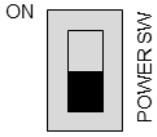


Figure 2-3 Names of the Parts of the Base Board (RTE7702500EABBB000J)

(1) Interfaces for the exchange adapter: CN10 and CN11

These connectors are used for connection to the emulation adapter and connected to CN10 and CN11 of the emulation adapter.

(2) Switch: POWER SW

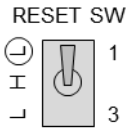
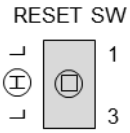
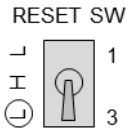
POWER SW	Specification
ON 	This switch turns on the power supply of the base board. Turn this switch on after connecting the emulation adapter and starting the supply of power from CN3 of the emulation adapter.
OFF  **(default)**	This switch turns off the power supply of the base board.

⚠ CAUTION

Operating the switch:

Do not operate a switch before removing static electricity from the operator's body. Doing so may lead to the discharge of static electricity and so damage the internal circuits.

(3) Switch: RESET SW

RESET SW	Specification
L  	Reset state. The reset pin of the debug chip is in the “L” state.
H  **(default)**	Reset released state. The reset pin of the debug chip is in the “H” (pulled up) state.
(L)  	This position starts release from the reset state after the debug chip has been reset. The switch returns to the “H” position a moment after it stops being pressed. The state of the reset pin of the debug chip changes from “L” to “H” (pulled up).

⚠ CAUTION

Operating the switch:

Do not operate a switch before removing static electricity from the operator’s body. Doing so may lead to the discharge of static electricity and so damage the internal circuits.

(4) Status LEDs: LED1 (3.3 V) and LED2 (5 V)

Name of LED	Specification
LED1 (3.3 V)	Illuminated: The 3.3-V power supply on the base board is on. Not illuminated: The 3.3-V power supply on the base board is off.
LED2 (5 V)	Illuminated: The 5-V power supply on the base board is on. Not illuminated: The 5-V power supply on the base board is off.

(5) Jumper blocks: JP1 to JP21 (selecting each of the power-supply voltages)

The target power-supply voltages for each of these jumper blocks are listed below.

JP	Target Power-Supply Voltage
JP1	A0VCC
JP2	A1VCC
JP3	A2VCC
JP4	A3VCC
JP5	A0VREFH
JP6	A1VREFH
JP7	A2VREFH
JP8	A3VREFH
JP9	ADSVCC
JP10	ADSVREFH
JP11	AFCVCC
JP12	E0VCC
JP13	E1VCC
JP14	E2VCC
JP15	LVDVCC
JP16	SYSVCC
JP17	VCC/OSCVCC/J0VCC/J1VCC
JP18	SVRVCC
JP19	SVRDRVCC
JP20	GETH0PVCC
JP21	GETH0BVCC

Each jumper block has common specifications as shown in the following table.

JP1 to JP19	Specification
Open-circuit	The target power-supply voltage is off.
1-2 short-circuit (default) 	5 V is supplied as the target power-supply voltage.
2-3 short-circuit 	3.3 V is supplied as the target power-supply voltage.

The specifications of the JP20 jumper block are shown in the following table.

JP20	Specification
Open-circuit	The target power-supply voltage is off.
Short-circuit (default)	3.3 V is supplied as the target power-supply voltage.

The specifications of the JP21 jumper block are shown in the following table.

JP21	Specification
Open-circuit	The target power-supply voltage is off.
1-2 short-circuit	GND is connected to the target power-supply voltage via a 10-kΩ resistor.
2-3 short-circuit (default)	3.3 V is supplied as the target power-supply voltage.

(6) Jumper block: JP22 (FLMD0)

JP22 (FLMD0)	Specification
Open-circuit (default)	FLMD0 pin = “L” (pulled down)
Short-circuit	FLMD0 pin = “H” (pulled up)

(7) Jumper block: JP23 (FLMD1)

JP23 (FLMD1)	Specification
Open-circuit (default)	FLMD1 pin = “L” (pulled down)
Short-circuit	FLMD1 pin = “H” (pulled up)

(8) Silk-screened mark for aligning the position of pin A1

This mark indicates the position of pin A1 in the connection of an emulation adapter to the base board. Align the silk-screened mark for the position of pin A1 on the emulation adapter such that the marks are facing in the same direction.

(9) Pin headers for controlling and monitoring the pins of the debug chip (CN1 to CN8)

Figure 2-4 shows the assignment of pin headers for each pin of the debug chip.

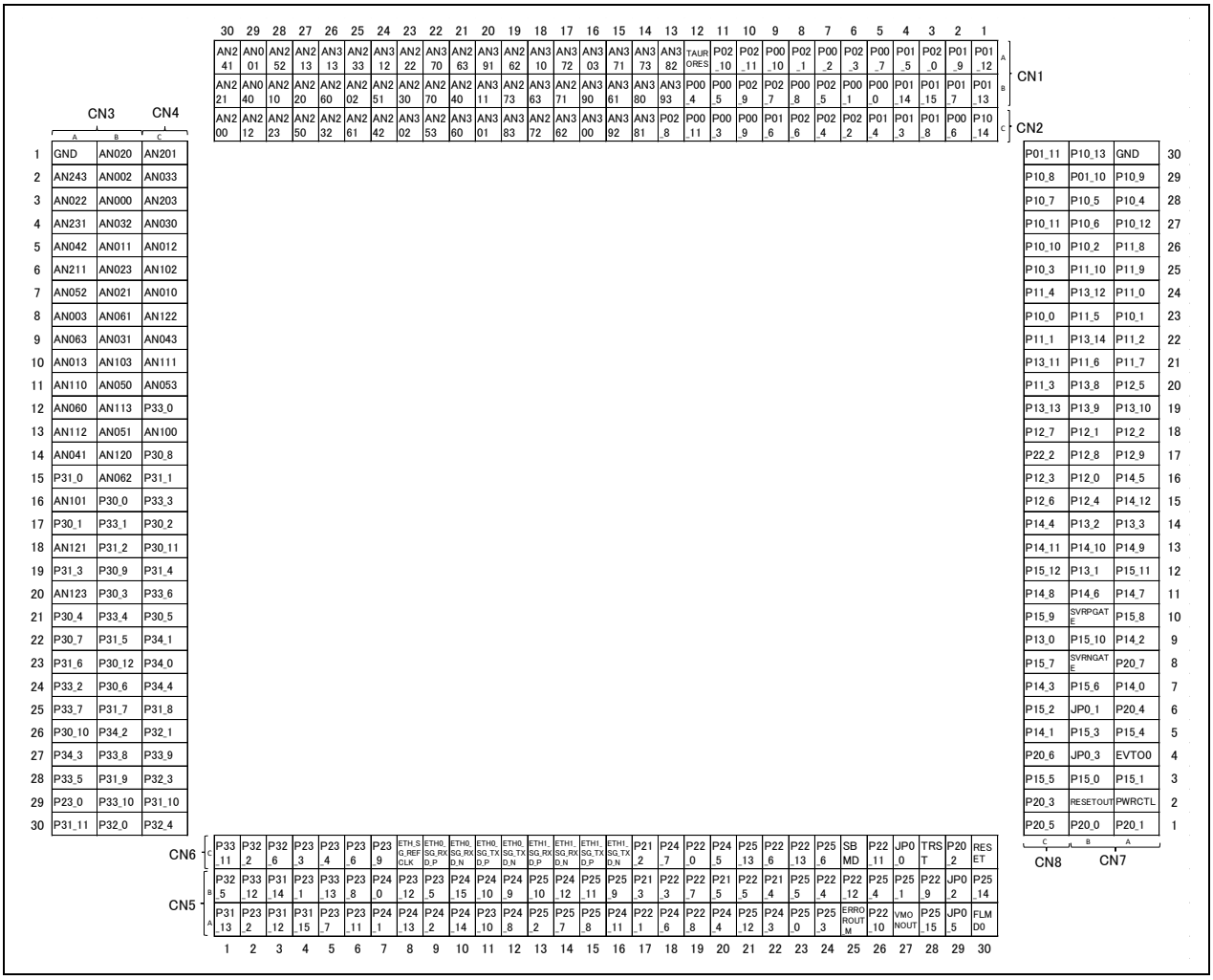


Figure 2-4 Assignment of Pin Headers

2.3 14-Pin to 46-Pin Conversion Adapter (RTE0T00020KCA40000J)

Connecting this conversion adapter to the CN1 connector for external tracing enables connection of an emulator with a 14-pin connector.

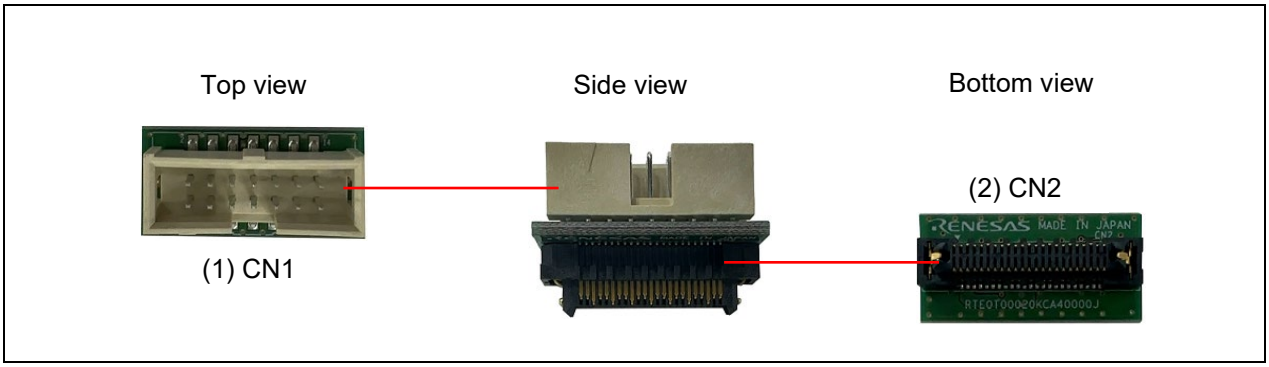


Figure 2-5 Names of the Parts of the 14-Pin to 46-Pin Conversion Adapter (RTE0T00020KCA40000J)

(1) Connector: CN1 (14-pin side)

CN1 is a 14-pin connector that is defined as a connector for the RH850 emulators. This connector can be connected to on-chip debugging emulators such as the E2 emulator (type name: RTE0T00020KCE00000R) from Renesas and flash programmers that support the 14-pin connector.

The following shows pin assignments of CN1. Read the user's manual for the emulator you will be using and connect the emulator with this connector.

Table 2-2 Pin Assignments of the 14-Pin Connector (CN1)

Signal Name	Pin No.		Signal Name
TCK/LPDCLK	1	2	GND
TRST	3	4	FPMD0 (FLMD0)
TDO/LPDO	5	6	FPMD1 (FLMD1)
TDI/LPDIO	7	8	TVDD (E0VCC)
TMS	9	10	EVTO
DRDY/LPDCLKO	11	12	GND
RESET	13	14	GND

(2) Connector: CN2 (46-pin side)

CN2 is connected to CN1 for external tracing through the emulation adapter.

2.4 34-Pin to 46-Pin Conversion Adapter (RTE0T0850AKCA00000J)

Connecting this conversion adapter to the CN1 connector for external tracing enables connection of an emulator with a 34-pin connector.

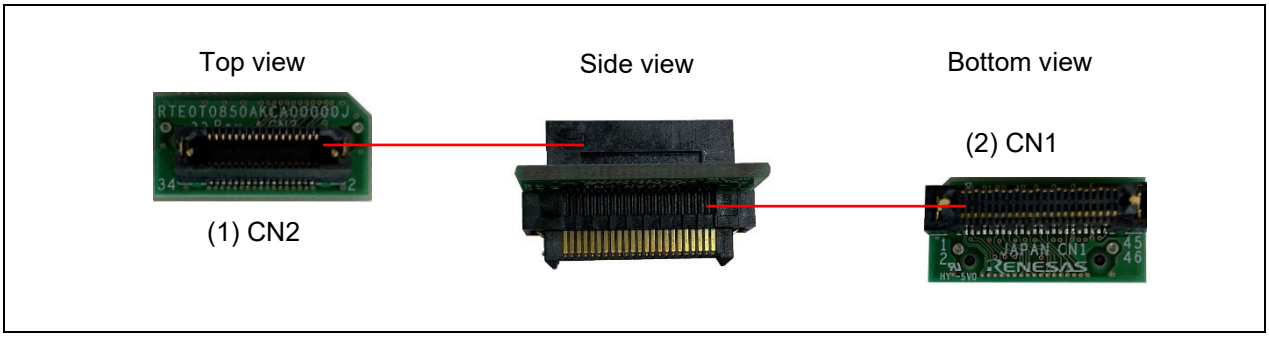


Figure 2-6 Names of the Parts of the 34-Pin to 46-Pin Conversion Adapter (RTE0T0850AKCA00000J)

(1) Connector: CN2 (34-pin side)

CN2 is a 34-pin connector that is defined as a connector for the RH850 emulators. This connector can be connected to emulators supporting Aurora tracing such as the IE850A emulator (type name: RTE0T0850AKCT00000J) from Renesas that support the 34-pin connector.

The following shows pin assignments of CN2. Read the user's manual for the emulator you will be using and connect the emulator with this connector.

Table 2-3 Pin Assignments of the 34-Pin Connector (CN2)

Signal Name	Pin No.		Signal Name
GND	Latch		
TODP0	1	2	TVCC
TODN0	3	4	TCK/LPDCLK
GND	5	6	TMS
TODP1	7	8	TDI/LPDI
TODN1	9	10	TDO/LPDO
GND	11	12	TRST/LPDRST
TODP2	13	14	FPMD0 (FLMD0)
TODN2	15	16	EVTI
GND	17	18	EVTO
TODP3	19	20	FPMD1 (FLMD1)
TODN3	21	22	RESET
GND	23	24	GND
MSYNZ	25	26	CICREFP
N.C.	27	28	CICREFN
GND	29	30	GND
N.C.	31	32	DRDY/LPDCLKO
N.C.	33	34	RESOUT
GND	Latch		GND

(2) Connector: CN1 (46-pin side)

CN1 is connected to CN1 for external tracing through the emulation adapter.

2.5 Power-Supply Cable

The power-supply cable (about 300-mm long) supplies power to the emulation adapter.

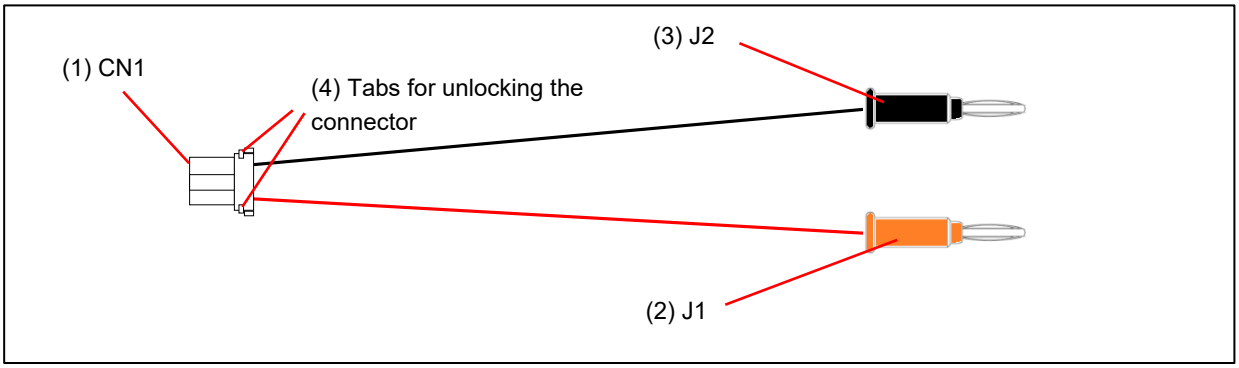


Figure 2-7 Names of the Parts of the Power-Supply Cable

(1) Connector: CN1

CN1 is a connector (LEAR-02V-S from JST) for connection to CN3 of the emulation adapter.

(2) Power jack: J1 (red)

Supply 5 V from a stabilized power supply.

(3) Power jack: J2 (black)

Connect J2 to GND.

(4) Tabs for unlocking the connector

When disconnecting the power-supply cable from the emulation adapter, press the tabs on both sides of the CN1 connector of the power-supply cable to unlock the connector.

⚠ CAUTION

Unlocking the connector:

Do not press the tabs for unlocking the connector too hard as this may lead to them being stuck in this position. Take care on this point.

2.6 Demounting Lever

The demounting lever which comes with this product is used to remove the emulation adapter from the base board or exchange adapter.

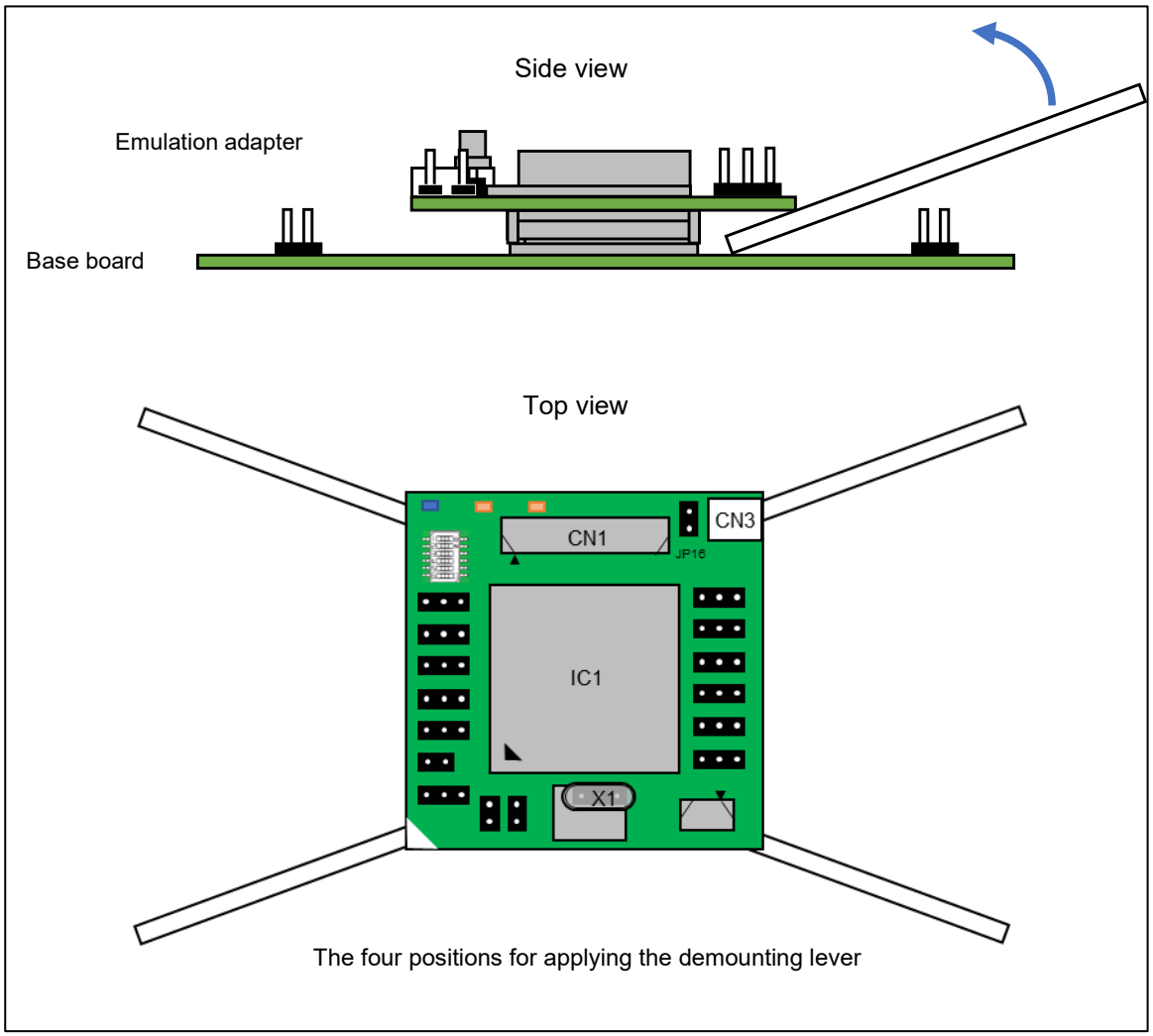


Figure 2-8 Demounting Lever

To remove the emulation adapter from the base board or exchange adapter, insert the demounting lever alternately below all four corners of the emulation adapter and gradually pull the emulation adapter out.

⚠ CAUTION

Point for caution on removing the emulation adapter:

When you remove the emulation adapter from the base board or exchange adapter, take care not to damage or deform peripheral components.

3. System Configuration and Setup

The system configurations of this emulation adapter are as follows according to your intentions in using it.

- A simple evaluation board (See section 3.1.)
- An emulation board (See section 3.2.)

⚠ CAUTION

Supplying power to the emulation adapter:

Be sure to use the power-supply cable connected to the CN3 power-supply connector to supply power to the emulation adapter.

Supplying power from the CN1 connector for external tracing by using the power-supply function of the emulator may cause the emulation adapter to emit smoke or catch fire or otherwise be damaged.

3.1 System Configuration as a Simple Evaluation Board

Figure 3-1 shows a system configuration when the emulation adapter is connected to the base board for use as a simple evaluation board. Connection of an emulator is not essential.

Using the pin headers on the base board enables the control and monitoring of each pin of the target device.

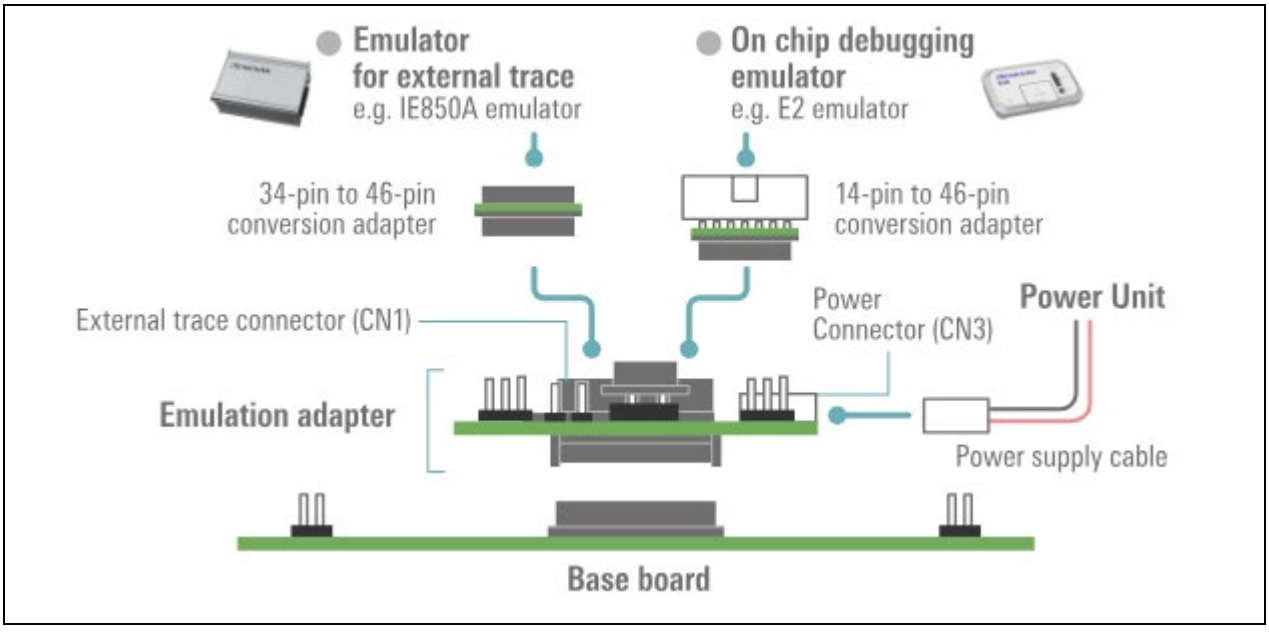


Figure 3-1 System Configuration (Simple Evaluation Board)

3.1.1 Settings for Use as a Simple Evaluation Board

Table 3-1 and Table 3-2 show lists of the recommended settings for this system configuration. For details on each item, refer to chapter 2.

Table 3-1 Recommended Settings for Use as a Simple Evaluation Board (Emulation Adapter)

Item	Description
Debug chip: IC1	Set an option byte. Refer to section 4.1.
Connector for external tracing: CN1	When an emulator is in use: Connect the cable for the emulator, the 14-pin to 46-pin conversion adapter, or the 34-pin to 46-pin conversion adapter.
	When an emulator is not in use: Leave the connector open-circuit.
Power-supply connector: CN3	Set up a +5-V supply through the attached power-supply cable. If you are using the IE850A, power can be supplied from the power-supply cable attached to the IE850A.
Clock socket: X1	A crystal resonator is mounted (20 MHz as shipped). Changing the frequency of the crystal resonator to a different frequency or replacing the crystal resonator with a crystal oscillator requires that you purchase the crystal resonator with a different frequency or the crystal oscillator.
Jumper block: JP5 (VDD_SEL)	1-2 short-circuit (default)
Jumper block: JP10 (AURORES)	1-2 short-circuit (default)
Jumper block: JP11 (EXAURORES)	1-2 short-circuit (default)
Jumper block: JP14 (TRST_SEL)	1-2 short-circuit (default)
Jumper block: JP2 (FLMD0)	1-2 short-circuit (default)
Jumper block: JP12 (FLMD0_SEL)	1-2 short-circuit (default)
Jumper block: JP9 (FLMD1)	2-3 short-circuit (default)
Jumper block: JP13 (FLMD1_SEL)	1-2 short-circuit (default)
Jumper block: JP15 (RES_SEL)	1-2 short-circuit (default)
Jumper block: JP1 (VDD_EMU)	Short-circuit (default)
Jumper block: JP4 (EMUVDD)	1-2 short-circuit (default)
Jumper block: JP6 (EMUVDD_SEL)	1-2 short-circuit (default)
Jumper block: JP3 (EMUVCC)	Short-circuit (default)
Jumper block: JP7 (SBMD)	Select the connection on this jumper block according to the emulation mode to be used. Refer to (19) in section 2.1.
Jumper block: JP8 (AWOVCL)	Select the connection on this jumper block according to the emulation mode to be used. Refer to (20) in section 2.1.
Interfaces for the exchange adapter: CN10 and CN11	Connect these connectors to the base board.

Table 3-2 Recommended Settings for Use as a Simple Evaluation Board (Base Board)

Item	Description
Interfaces for the exchange adapter: CN10 and CN11	Connect these connectors to the emulation adapter.
Switch: POWER SW	Refer to (2) in section 2.2.
Switch: RESET SW	Refer to (3) in section 2.2.
Jumper blocks: JP1 to JP21 (selecting each of the power-supply voltages)	The voltage of each power supply is selected according to the conditions to be evaluated or the specifications of the target device. Refer to (5) in section 2.2.
Jumper block: JP22 (FLMD0)	Open-circuit (default)
Jumper block: JP23 (FLMD1)	Open-circuit (default)

3.1.2 Procedure for Setting the Emulation Adapter up as a Simple Evaluation Board

This section describes the procedure for setting the emulation adapter up for use as a simple evaluation board.

(1) Settings on the boards

Make settings for the emulation adapter and base board according to the statements in section 3.1.1. Turn off the power switch (POWER SW) on the base board and set the reset switch (RESET SW) for the low level.

(2) Connecting the power-supply cable

Connect the power-supply cable which comes with this product to the CN3 power-supply connector of the emulation adapter then connect a power-supply unit such as a stabilized power supply. Do not turn the power on.

If you are using an IE850A emulator, it can be used to supply power by connecting the power-supply cable that comes with the IE850A.

(3) Connecting the emulation adapter to the base board

Connect the two boards so that the sticker and silk-screened mark for aligning the positions of pin A1 of the emulation adapter and base board are in the same position.

(4) Connecting the emulator (only if you are using an emulator)

Connect the emulator to the CN1 connector for external tracing from the emulation adapter. If you are using an emulator (e.g. an IE850A) that supports external tracing (Aurora tracing), connect the emulator cable via the 34-pin to 46-pin conversion adapter. If you are using an emulator (e.g. an E2 emulator) that supports a 14-pin connector, connect the emulator via the 14-pin to 46-pin conversion adapter.

⚠ CAUTION

Connecting the emulator:

Confirm the direction with the notch on the connector and connect the emulator while taking care that the direction of insertion is correct.

(5) Turning on the emulator (only if you are using an emulator)

Turn on the emulator. For details, refer to the manuals for the emulator you are using.

(6) Turning on the emulation adapter and base board and release from reset

Output 5 V from the power-supply unit that is connected to the CN3 power-supply connector of the emulation adapter. When the IE850A is connected to CN3, output 5 V by turning on the emulator as described in step (5) above. Then, turn on the power switch (POWER SW) on the base board and set the reset switch (RESET SW) for the high level.

Accordingly, if an emulator is not connected, the debug chip will start executing a program.

When the emulator is connected, the debug chip will be kept in the reset state before execution of a program is started by the debugger after the debugger has been launched, although this depends on the specifications of the emulator.

⚠ CAUTION

Applied voltage:

Make sure that the voltage applied to the CN3 power-supply connector is within the specified range (4.5 V to 5.5 V).

An applied voltage out of the range may cause the emulation adapter to emit smoke or catch fire or otherwise be damaged.

(7) Launching the debugger (only if you are using an emulator)

Launch the debugger to start debugging. The first time this is done, an option byte must be set according to the target device to be emulated.

3.1.3 Procedure for Closing a Session of Use as a Simple Evaluation Board

This section describes the procedure for closing a session of using the emulation adapter as a simple evaluation board.

(1) Closing the debugger (only if you are using an emulator)

Close the debugger.

(2) Turning off and resetting the emulation adapter and base board

Set the reset switch (RESET SW) of the base board for the low level. Turn off the power switch (POWER SW) on the base board. Turn off the output from the power-supply unit that is connected to the CN3 power-supply connector of the emulation adapter. When the IE850A is connected to CN3, turn off the emulation adapter and base board by turning off the emulator as described in step (3) below.

(3) Turning off the emulator (only if you are using an emulator)

Turn off the emulator. For details, refer to manuals for the emulator you are using.

Take the steps below as required.

(4) Disconnecting the emulator (only if you are using an emulator)

Disconnect the emulator from the emulation adapter.

(5) Disconnecting the emulation adapter from the base board

To disconnect the emulation adapter from the base board, insert the demounting lever which comes with this product into alternate corners among the four corners between the two boards and gradually pull the emulation adapter out. Take care of the positions where you insert the demounting lever so that you do not accidentally tear off components on the boards. For details, refer to section 2.6.

(6) Disconnecting the power-supply cable

Disconnect the power-supply cable from the CN3 power-supply connector of the emulation adapter. When disconnecting the power-supply cable from the emulation adapter, press the tabs on both sides of the CN1 connector of the power-supply cable to unlock the connector.

⚠ CAUTION

Unlocking the connector:

Do not press the tabs for unlocking the connector too hard as this may lead to them being stuck in this position. Take care on this point.

3.2 System Configuration as an Emulation Board

Figure 3-2 shows a system configuration when the emulation adapter is to be connected to the exchange adapter then connected to a target board (the base board is not used). When the emulation adapter is to be used as an emulation board, 5-V power must also be supplied through CN3.

For the specifications of the exchange adapters, refer to appendix A, Specifications of the Exchange Adapters.

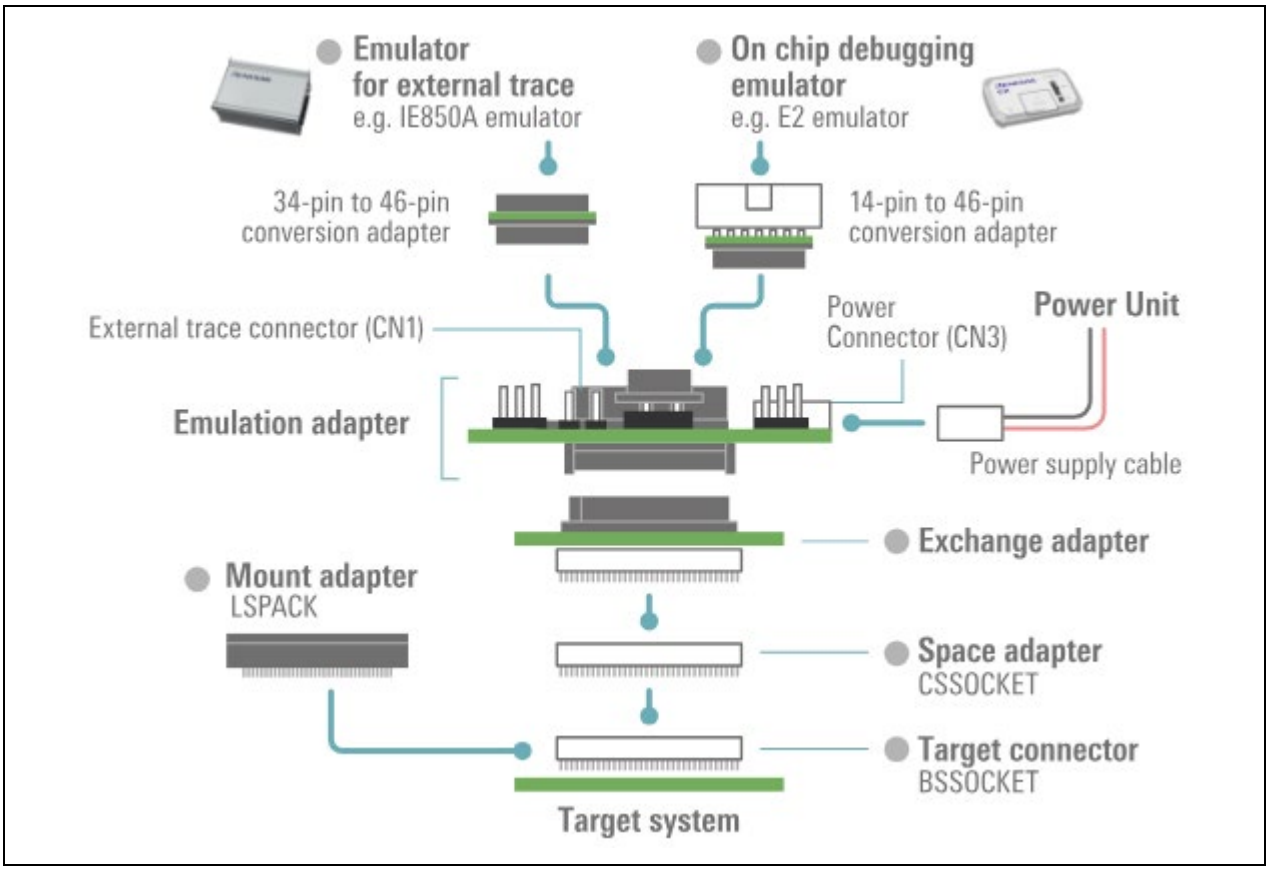


Figure 3-2 System Configuration (Emulation Board)

3.2.1 List of Exchange Adapters and Sockets

Table 3-3 lists the exchange adapters and sockets for the target devices. They are sold separately from this product. For the BGA packages, the BSSOCKET target connectors, CSSOCKET space adapters, and LSPACK mount adapters can be purchased from Tokyo Eletech Corporation. The exchange adapters can be purchased from Renesas Electronics Corporation. If you particularly require details on the CSSOCKET space adapter, contact Tokyo Eletech Corporation.

Table 3-3 Exchange Adapters and Sockets

Package Device	Exchange Adapter	Target Connector	Space Adapter	Mount Adapter
FCBGA-468 RH850/U2B24	RTE7702510CBG468T000J	BSSOCKET468A3025RE21N	CSSOCKET468A3025RE03 CSSOCKET468A3025RE04	LSPACK468A3025RE02
FBGA-468 RH850/U2B10	RTE7702540CBG468T000J			
FCBGA-373 RH850/U2B24	RTE7702510CBG373T000J	BSSOCKET373A2521RE21N	CSSOCKET373A2521RE03 CSSOCKET373A2521RE04	LSPACK373A2521RE02
FBGA-373 RH850/U2B10	RTE7702540CBG373T000J			
FBGA-292 RH850/U2B10	RTE7702540CBG292T000J	BSSOCKET292A2017RE22N	CSSOCKET292A2017RE23 CSSOCKET292A2017RE24	LSPACK292A2017RE22
FBGA-292 RH850/U2B6*				

Note: Only the RTE7702500EAB00000J supports the RH850/U2B6.

BSSOCKET target connector (required for emulation):

This connector is for mounting on the target system.

Exchange adapter (required for emulation):

This conversion adapter is for connecting the emulation adapter to the target connector.

CSSOCKET space adapter (optional):

This adapter is used to adjust the height. It is an optional product which is available for use if the components around the target connector would otherwise touch the exchange adapter or emulation adapter.

LSPACK mount adapter (optional):

When the target device is mounted on the target connector, this adapter is required as a cover.

3.2.2 Settings for Use as an Emulation Board

Table 3-4 shows a list of the recommended settings of the emulation adapter for this system configuration.

Table 3-4 Recommended Settings for Use as an Emulation Board

Item	Description
Debug chip: IC1	Set an option byte. Refer to section 4.1.
Connector for external tracing: CN1	When an emulator is in use: Connect the cable for the emulator, the 14-pin to 46-pin conversion adapter, or the 34-pin to 46-pin conversion adapter.
	When an emulator is not in use: Leave the connector open-circuit.
Power-supply connector: CN3	Set up a +5-V supply through the attached power-supply cable. If you are using the IE850A, power can be supplied from the power-supply cable attached to the IE850A.
Clock socket: X1	A resonator is mounted (20 MHz as shipped). When you are evaluating the emulation adapter with a different frequency or with a crystal oscillator as the main oscillator, change the resonator or exchange it for an oscillator.
Jumper block: JP5 (VDD_SEL)	1-2 short-circuit (default)
Jumper block: JP10 (AURORES)	1-2 short-circuit (default)
Jumper block: JP11 (EXAURORES)	1-2 short-circuit (default)
Jumper block: JP14 (TRST_SEL)	1-2 short-circuit (default)
Jumper block: JP2 (FLMD0)	1-2 short-circuit (default)
Jumper block: JP12 (FLMD0_SEL)	1-2 short-circuit (default)
Jumper block: JP9 (FLMD1)	2-3 short-circuit (default)
Jumper block: JP13 (FLMD1_SEL)	1-2 short-circuit (default)
Jumper block: JP15 (RES_SEL)	1-2 short-circuit (default)
Jumper block: JP1 (VDD_EMU)	Short-circuit (default)
Jumper block: JP4 (EMUVDD)	1-2 short-circuit (default)
Jumper block: JP6 (EMUVDD_SEL)	1-2 short-circuit (default)
Jumper block: JP3 (EMUVCC)	Short-circuit (default)
Jumper block: JP7 (SBMD)	Select the connection on this jumper block according to the emulation mode to be used. Refer to (19) in section 2.1.
Jumper block: JP8 (AWOVCL)	Select the connection on this jumper block according to the emulation mode to be used. Refer to (20) in section 2.1.
Interfaces for the exchange adapter: CN10 and CN11	Connect these connectors to the base board.

3.2.3 Procedure for Setting the Emulation Adapter up as an Emulation Board

This section describes the procedure for setting the emulation adapter up for use as an emulation board.

(1) Settings on the boards

Make settings for the emulation adapter according to the statements in section 3.2.2.

(2) Connecting the power-supply cable (when the power is supplied from CN3)

Connect the power-supply cable which comes with this product to the CN3 power-supply connector of the emulation adapter then connect a power-supply unit such as a stabilized power supply. Do not turn the power on.

If you are using an IE850A emulator, power can be supplied by connecting the power-supply cable that comes with the IE850A.

(3) Connecting the emulation adapter to the exchange adapter

Connect the two boards so that the positions of pin 1 of the emulation adapter and of the exchange adapter are in the same position.

(4) Connecting the exchange adapter to the target system

The target connector (BSSOCKET) must be mounted on the pad pattern for the target device of the target system in advance.

After that, connect the exchange adapter to the target connecter mounted on the target system.

⚠ CAUTION

Connecting the exchange adapter:

Connect the exchange adapter to the target system by aligning the positions of pin 1 of the target connector and of the exchange adapter and confirming that the contact pins of the exchange adapter are not bent.

(5) Connecting the emulator (only if you are using an emulator)

Connect the emulator to the CN1 connector for external tracing from the emulation adapter. If you are using an emulator (e.g. an IE850A) that supports external tracing (Aurora tracing), connect the emulator cable via the 34-pin to 46-pin conversion adapter. If you are using an emulator (e.g. an E2 emulator) that supports a 14-pin connector, connect the emulator via the 14-pin to 46-pin conversion adapter.

⚠ CAUTION

Connecting the emulator:

Confirm the direction with the notch on the connector and connect the emulator while taking care that the direction of insertion is correct.

(6) Turning on the emulator (only if you are using an emulator)

Turn on the emulator. For details, refer to the manuals for the emulator you are using.

(7) Turning on the emulation adapter

Output 5 V from the power-supply unit that is connected to the CN3 power-supply connector of the emulation adapter. When the IE850A is connected to CN3, output 5 V by turning on the emulator as described in step (6) above.

⚠ CAUTION

Applied voltage:

Make sure that the voltage applied to CN3 is within the specified range (4.5 V to 5.5 V).

An applied voltage out of the range may cause the emulation adapter to emit smoke or catch fire or otherwise be damaged.

(8) Turning on the target system

Turn on the target system.

(9) Launching the debugger (only if you are using an emulator)

Launch the debugger to start debugging. The first time this is done, an option byte must be set according to the target device to be emulated.

3.2.4 Procedure for Closing a Session of Use as an Emulation Board

This section describes the procedure for closing a session of using the emulation adapter as an emulation board.

(1) Closing the debugger (only if you are using an emulator)

Close the debugger.

(2) Turning off the target system

Turn off the target system.

(3) Turning off the emulation adapter

Stop the 5-V output from the power-supply unit that is connected to the CN3 power-supply connector of the emulation adapter. When the IE850A is connected to CN3, turn off the emulation adapter by turning off the emulator as described in step (4) below.

(4) Turning off the emulator (only if you are using an emulator)

Turn off the emulator. For details, refer to manuals for the emulator you are using.

Take the steps below as required.

(5) Disconnecting the emulator (only if you are using an emulator)

Disconnect the emulator from the emulation adapter.

(6) Disconnecting the emulation adapter from the exchange adapter

To disconnect the emulation adapter from the exchange adapter, insert the demounting lever which comes with this product into alternate corners among the four corners between the two boards and gradually pull the emulation adapter out. Take care of the positions where you insert the demounting lever so that you do not accidentally tear off components on the boards. For details, refer to section 2.6.

(7) Disconnecting the exchange adapter from the target system

Disconnect the exchange adapter from the target system.

For details, refer to appendix A, Specifications of the Exchange Adapters.

(8) Disconnecting the power-supply cable

Disconnect the power-supply cable from the CN3 power-supply connector of the emulation adapter. When disconnecting the power-supply cable from the emulation adapter, press the tabs on both sides of the CN1 connector of the power-supply cable to unlock the connector.

⚠ CAUTION

Unlocking the connector:

Do not press the tabs for unlocking the connector too hard as this may lead to them being stuck in this position. Take care on this point.

4. Notes

4.1 Setting Option Bytes

Although the specifications of the option bytes of the debug chip which is mounted on the emulation adapter are the same as those of the target device, the actual settings at the time of shipment may differ.

Use a debugger or flash programmer to specify appropriate values for the option bytes of the debug chip according to the user's manual for the target device.

In particular, the values of the following option bytes must be specified to suit the device to be emulated.

4.1.1 OPBT3 (PEx_DISABLE)

OPBT3 defines the CPUs which are to be enabled. Since the debug chip has six CPUs, disable the unnecessary CPUs (set the PEx_DISABLE bit to 1) through the setting of OPBT3 according to the number of CPUs in the device to be emulated.

4.1.2 OPBT16 (SVRENABLE)

When pins 1-2 of JP5 are short-circuited (default) so that VDD which has been generated by the power-supply IC on the emulation adapter is supplied to the debug chip, set OPBT16[31] (SVRENABLE) to 0 to disable the switching voltage regulator (SVR).

4.2 Notes on Differences between the Actual Device and the Emulation Adapter

4.2.1 Current Drawn

When the emulation adapter is in use, current drawn may differ from that for the actual device. Thus, the customer should use the actual device in a final evaluation before mass production and judge the suitability of adopting the product on that basis.

4.2.2 Oscillator

The emulation adapter does not support clock input from an oscillator on the target system. The main clock oscillator on the emulation adapter is used as the main clock.

Proceed with final evaluation to confirm operation of the target system after mounting the actual device and while using the oscillator on the target system.

4.2.3 Power-Supply Voltages

The debug chip mounted on the emulation adapter basically operates with the power supplied from the target system. However, note that there are differences in the following power-supply voltages.

- EMUVDD and EMUVCC are generated on the emulation adapter.
- Whether the power-supply voltage generated on the emulation adapter or that for the target system is used for VDD is selectable by the setting of JP5 on the emulation adapter.
  When you use the power supply from the target system, note that transient drops in the power-supply voltage may occur.

4.2.4 VSS Pins for Each Power-Supply Voltage

AxVSS, ADSVSS, AFCVSS, SVRAVSS, SVRDRVSS, and VSS are connected to a common GND in the emulation adapter.

4.2.5 AWOVCL, ADSVCL, GETH0VCL, GETH1VCL, and RAMSVCL Pins

Stabilizing capacitors are connected to the stabilizing capacitor connection pins (AWOVCL, ADSVCL, GETH0VCL, GETH1VCL, and RAMSVCL) on the emulation adapter. These pins are not connected on the target system.

4.2.6 A/D Converter

Results from the A/D converter may differ from those on the actual device because of the exchange adapter etc. between the debug chip and the target system.

4.2.7 Emulation of the SVR

The emulation adapter mounts the power-supply IC which is used to generate VDD for the debug chip. When VDD that has been generated in the SVR circuit on the user system is to be supplied to the debug chip, short-circuit pins 2-3 of jumper block JP5. Since SVRPGATE and SVRNGATE signals are supplied through the exchange adapter and the characteristics of these signals will differ from those of the signals when the actual device is connected, reviewing the SVR parameters may be required or operation of the SVR circuit may not be correct.

4.2.8 Emulation of the Ethernet TSN (ETN)

The Ethernet TSN (ETN) may not operate normally due to the delay or load produced by the wiring pattern on the user system.

4.3 Note on Debugging

4.3.1 Enabling C&R Authentication

If the ICU-M core of the debug chip on the emulation adapter is enabled and C&R authentication of the debug chip is enabled for a program that fails C&R authentication, note that starting the debugger and disabling C&R authentication will not be possible.

5. Characteristics of Target Interface

The target interface behaves as if the actual device is connected in terms of functionality. However, in terms of characteristics, the behavior of the target interface sometimes differs from the behavior when the actual device is connected. Figure 5-1 and Figure 5-2 show an equivalent circuit of this product.

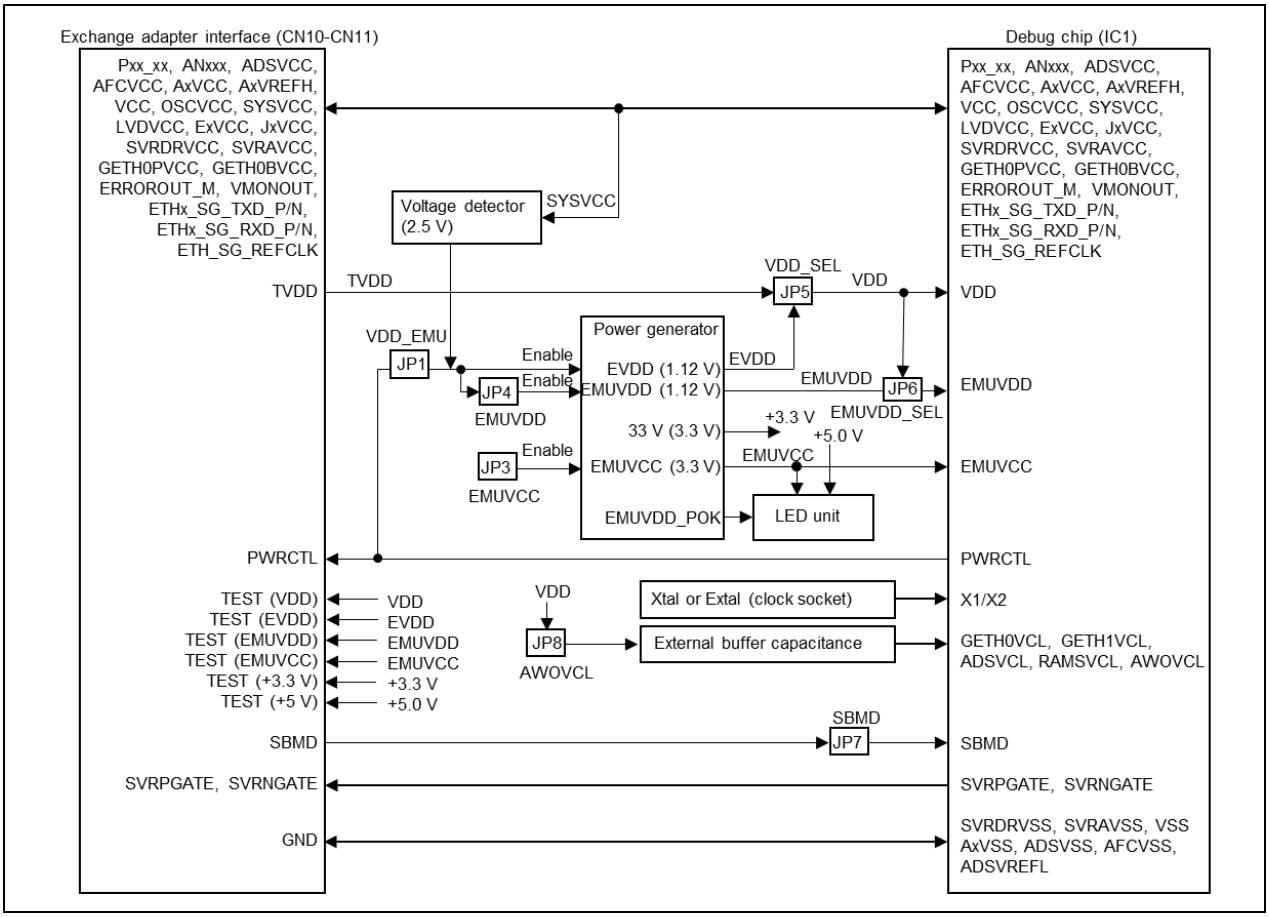


Figure 5-1 Equivalent Circuit of the Emulation Adapter

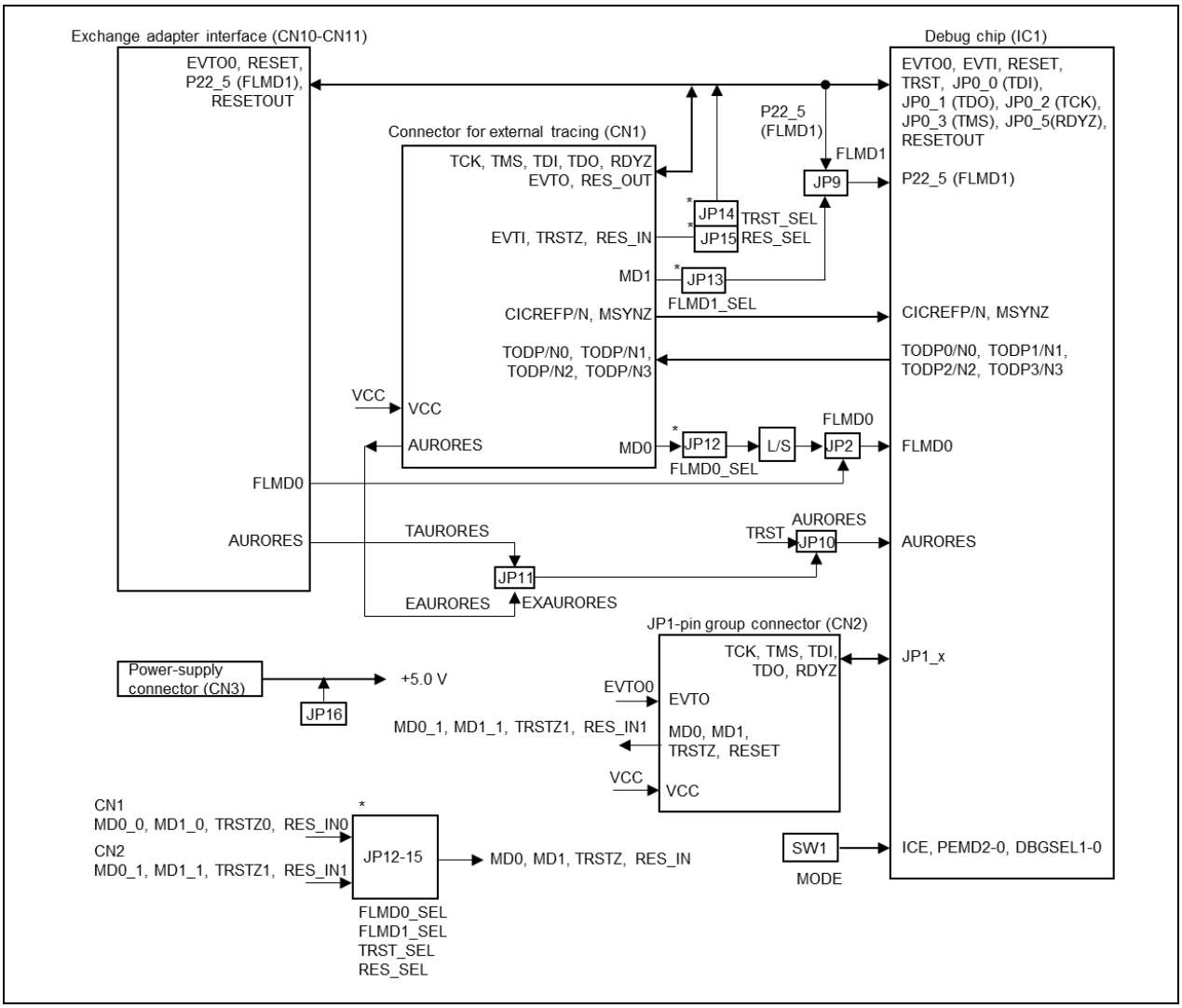


Figure 5-2 Equivalent Circuit of the Emulation Adapter (cont.)

6. Maintenance and Warranty

This chapter covers basic maintenance, warranty information, provisions for repair and the procedures for requesting a repair. For information on the exchange adapter and socket products, refer to appendix A, Specifications of the Exchange Adapters.

6.1 Maintenance

(1) If dust or dirt collects on this product, wipe it off with a dry soft cloth. Do not use thinner or other solvents because these chemicals can cause the surface coating to separate.

(2) When you do not use this product for a long period, disconnect it from the power supply, host machine, and target system.

6.2 Warranty

(1) This product comes with a one-year warranty after purchase.

Should the product break down or be damaged while you're using it under normal conditions in accord with its user's manual, it will be repaired or replaced free of cost.

(2) However, if the following types of failure or damage to the product occur during the term of the warranty, repairing or replacing the product will incur a cost.

a) Failure or damage attributable to the misuse or abuse of the product or its use under other abnormal conditions.

b) Failure or damage attributable to improper handling of the product after purchase, such as dropping the product while it is being transported or otherwise moved.

c) Failure or damage to the product caused by other pieces of equipment connected to it.

d) Failure or damage attributable to fire, earthquakes, thunderbolts, floods, or other natural disasters, or to abnormal voltages, etc.

e) Failure or damage attributable to modifications, repairs, adjustments, or other acts in relation to the product by parties other than Renesas Electronics Corp.

(3) Consumables (e.g., sockets and adapters) are beyond the scope of repair and replacement.

In the above cases, contact your local distributor. If you are renting the product, consult the company you are renting it from or the owner.

6.3 Repair Provisions

(1) Repairs not covered by warranty

Problems arising in products for which more than one year has elapsed since purchase are not covered by warranty.

(2) Replacement not covered by warranty

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

— Faulty or broken mechanical portions

— Flaws, separation, or rust in coated or plated portions

— Flaws 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
— A wide range of faults that make replacement less expensive than repair
— Faults that are not locatable or identifiable

(3) Expiration of the repair period
— We accept requests for repairs up to three years after production of a given model has ceased.
— Repairing a given model may become impossible even during the above period if the parts required for the repairs are no longer available.

(4) Carriage fees for sending your product to be repaired
Carriage fees for sending your product to us for repair are at your own expense.

6.4 How to Request Repairs

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 cushioning material supplied with the MCU unit when it was delivered to you and specify caution in handling (handling 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 the conductive plastic bag supplied with the MCU unit (usually a blue bag). If you use a different bag, it may lead to further trouble with your product due to static electricity.

Appendix A Specifications of the Exchange Adapters

(1) Overview

An exchange adapter is an adapter board that connects the emulation adapter to the pad pattern for the target device.

The following describes the specifications of the RTE7702510CBG468T000J or RTE7702540CBG468T000J exchange adapter for the 468-pin BGA package, the RTE7702510CBG373T000J or RTE7702540CBG373T000J exchange adapter for the 373-pin BGA package, and the RTE7702540CBG292T000J exchange adapter for the 292-pin BGA package.

(2) List of Packages and Sockets

Refer to Table 3-3 for the exchange adapters and type names of sockets for the packages of the target devices. The BSSOCKET target connector, CSSOCKET space adapter, and LSPACK mount adapter can be purchased from Tokyo Eletech Corporation. If you particularly require details on the CSSOCKET space adapter, contact Tokyo Eletech Corporation.

(3) Number of insertions and removals of the connector

The connector is guaranteed for correct insertion and removal 100 times.

(4) How to use the emulation adapter

The emulation adapter can be connected to the target system via the exchange adapter through the following procedure. Align the positions of pin 1 as shown in Figure A-1.

1. Mount the target connector (BSSOCKET) on the target system.
2. Connect the exchange adapter to the emulation adapter.
3. Connect the exchange adapter to the target connector (BSSOCKET).
   - If adjustment of the height is required, use the space adapter (CSSOCKET).
   - Confirm that the contact pins are not bent.

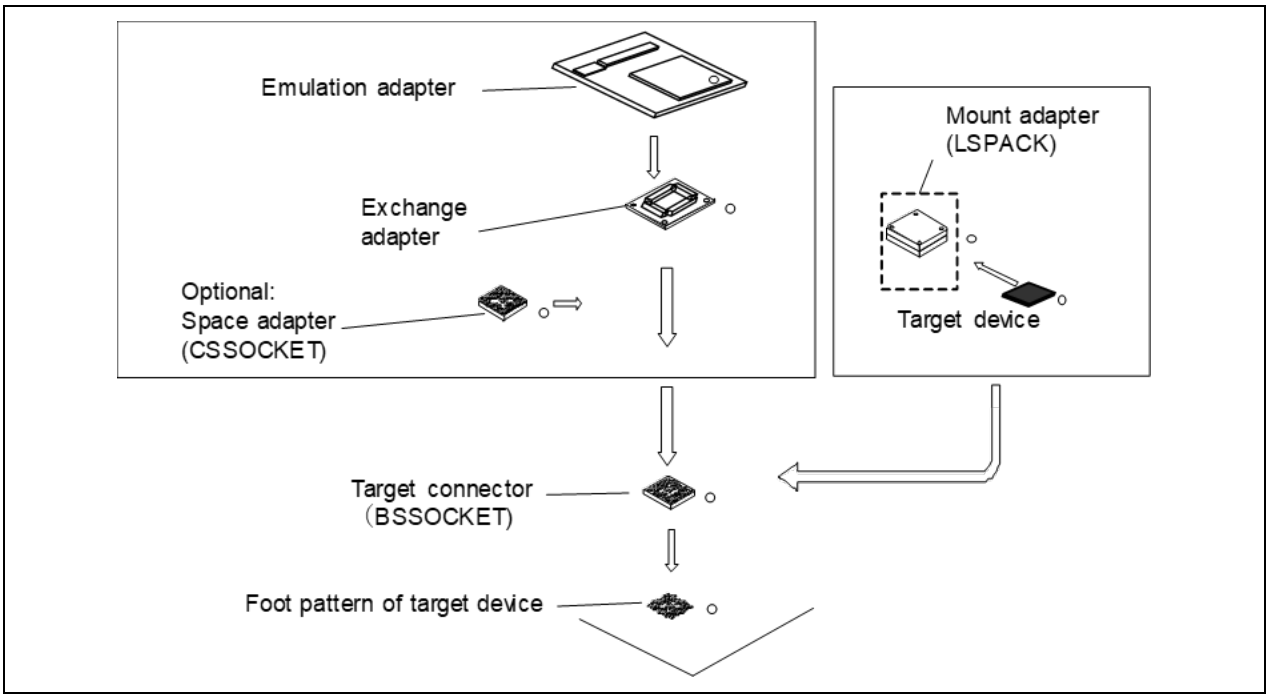


Figure A-1 Connecting the Emulation Adapter

(5) Dimensions

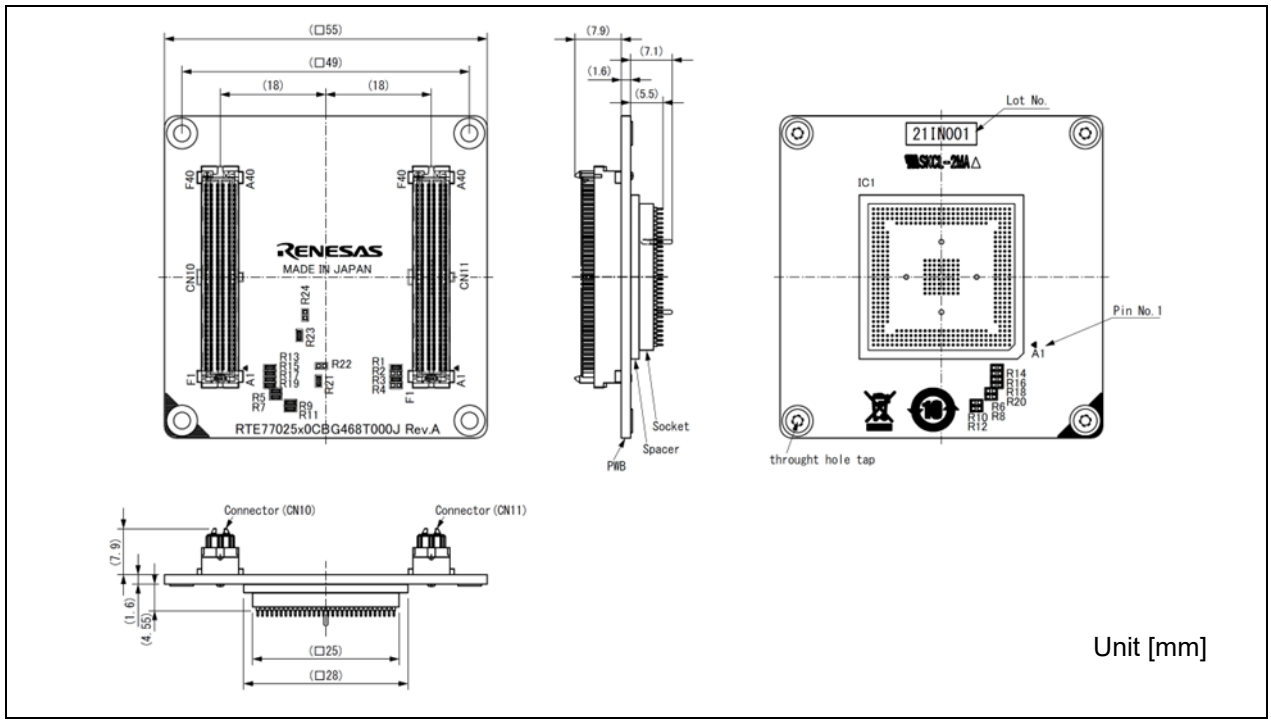


Figure A-2 Dimensions of the RTE77025x0CBG468T000J (468 Pins)

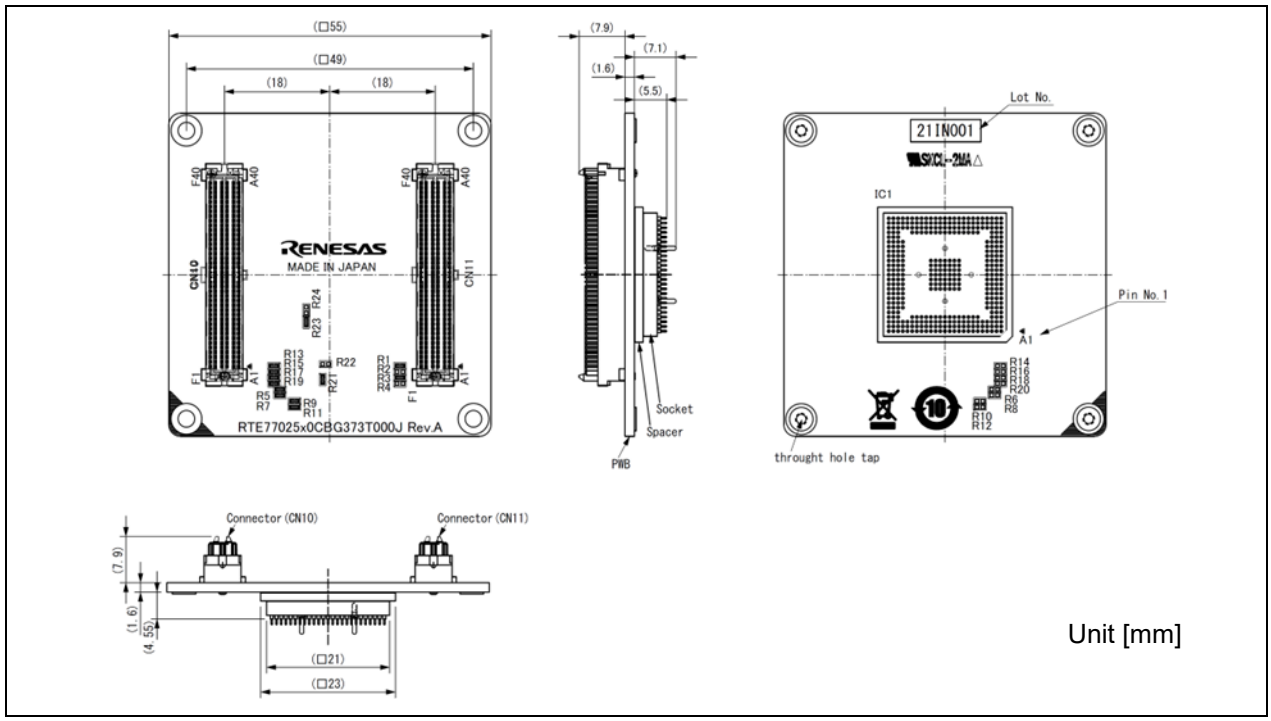


Figure A-3 Dimensions of the RTE77025x0CBG373T000J (373 Pins)

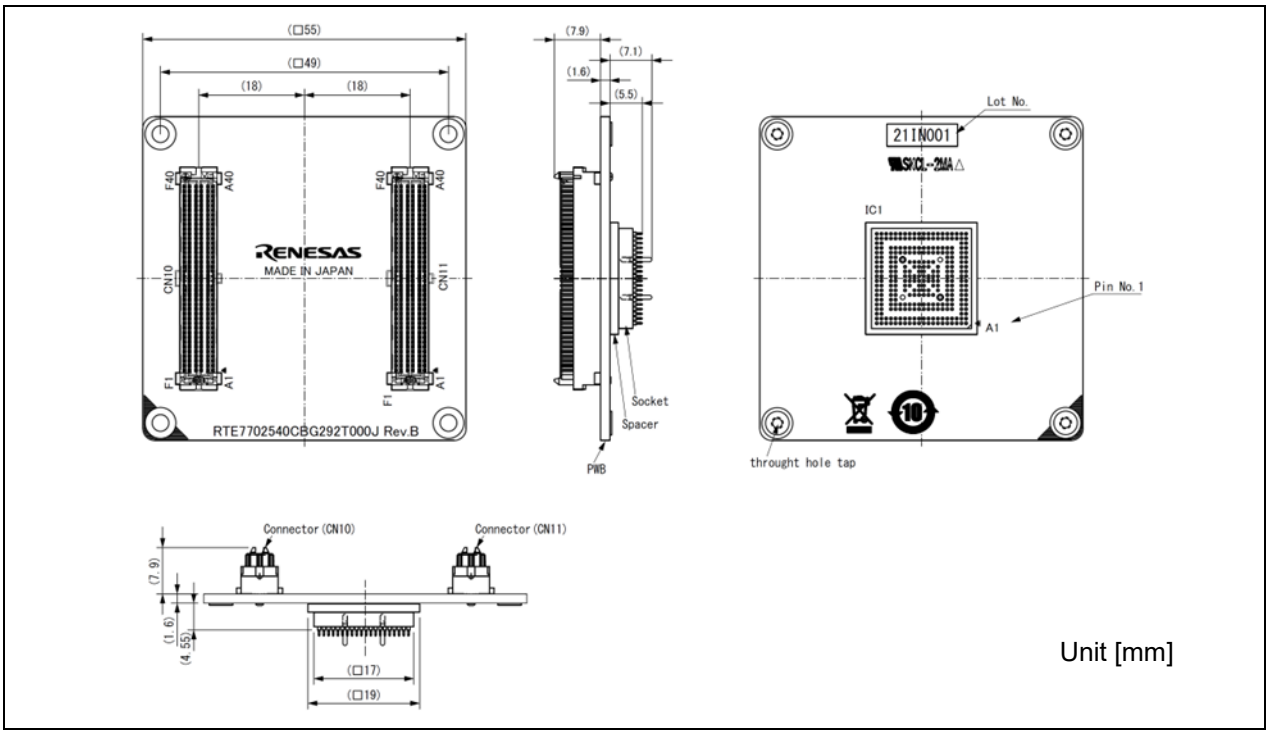


Figure A-4 Dimensions of the RTE7702540CBG292T000J (292 Pins)

(6) Drawing of the assembly

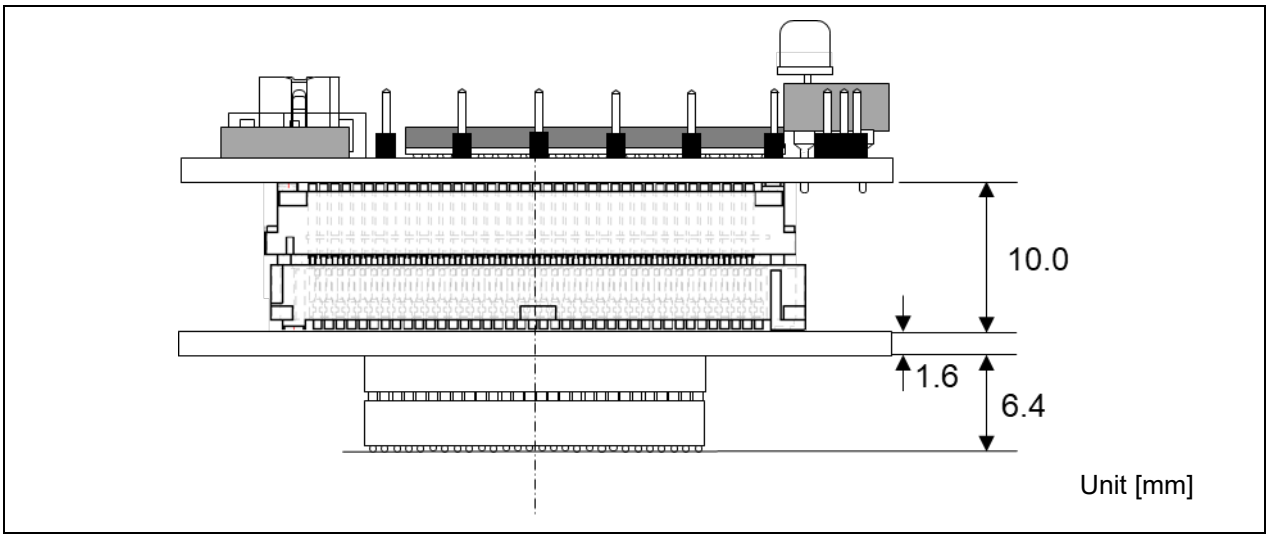


Figure A-5 Drawing of the Assembly for the RTE77025x0CBG468T000J (468 Pins)

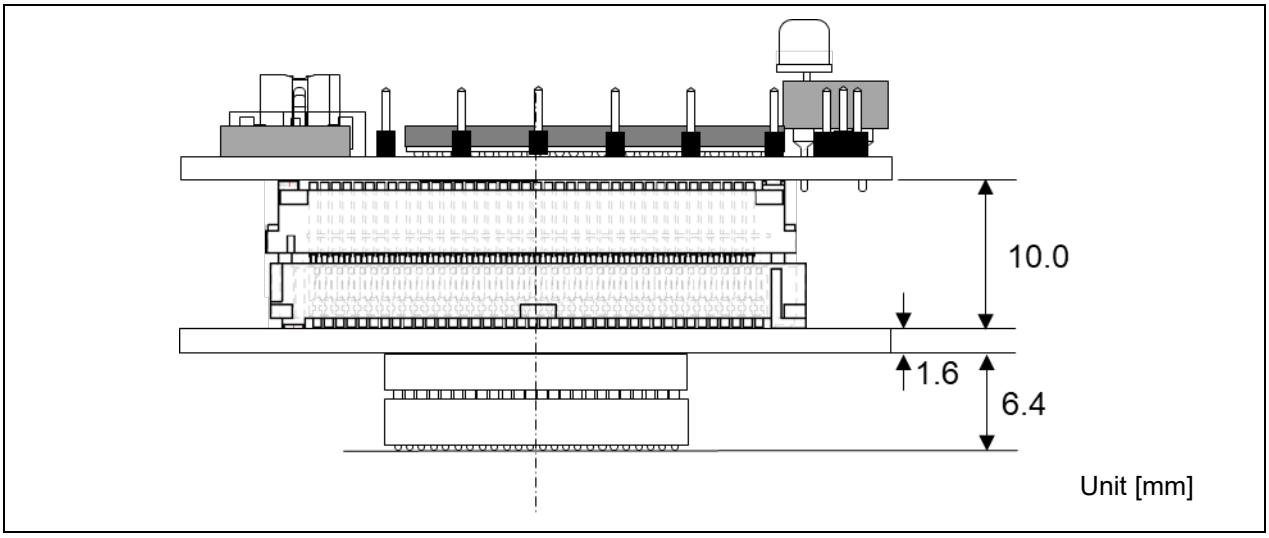


Figure A-6 Drawing of the Assembly for the RTE77025x0CBG373T000J (373 Pins)

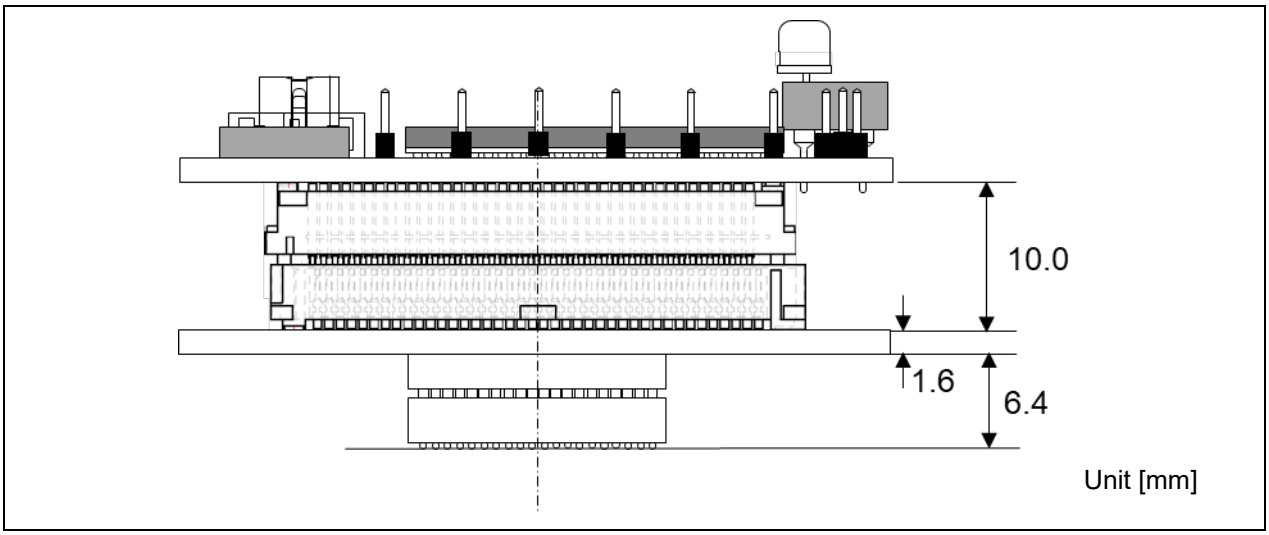


Figure A-7 Drawing of the Assembly for the RTE7702540CBG292T000J (292 Pins)

(7) Characteristics of the target interface

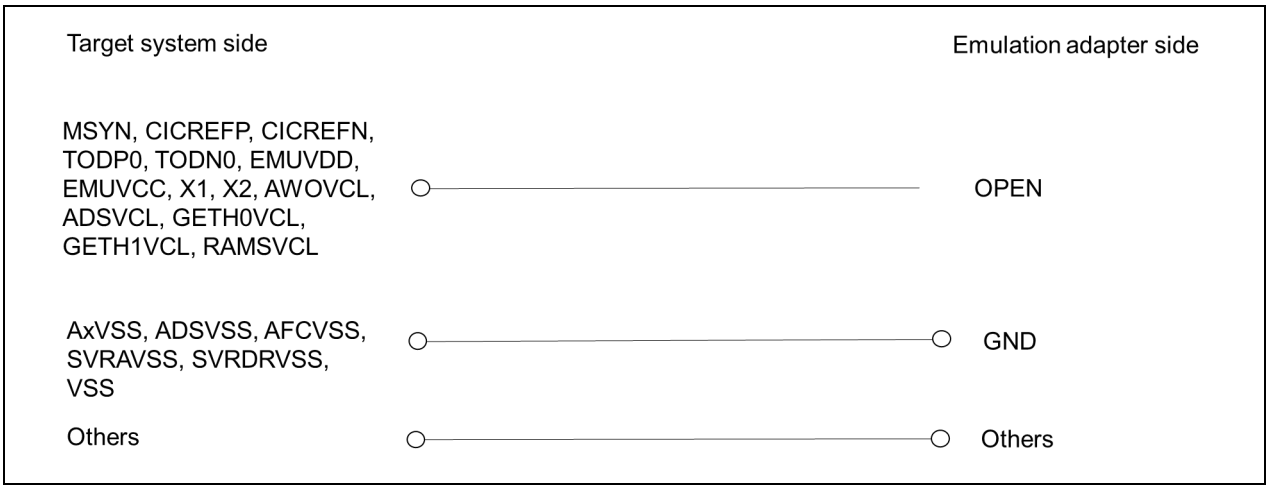


Figure A-8 Equivalent Circuit for the RTE77025x0CBG468T000J

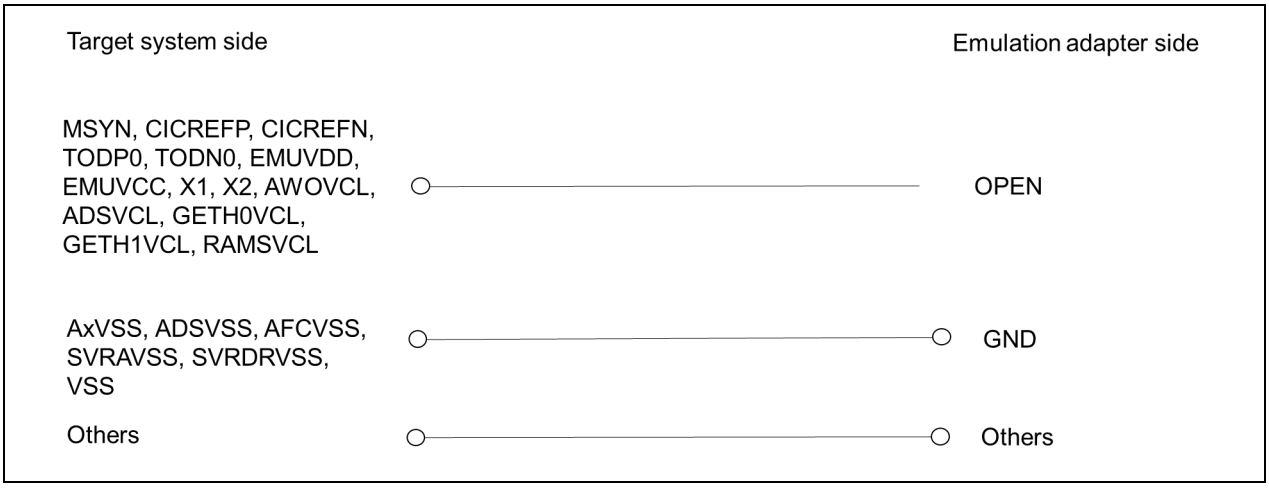


Figure A-9 Equivalent Circuit for the RTE77025x0CBG373T000J

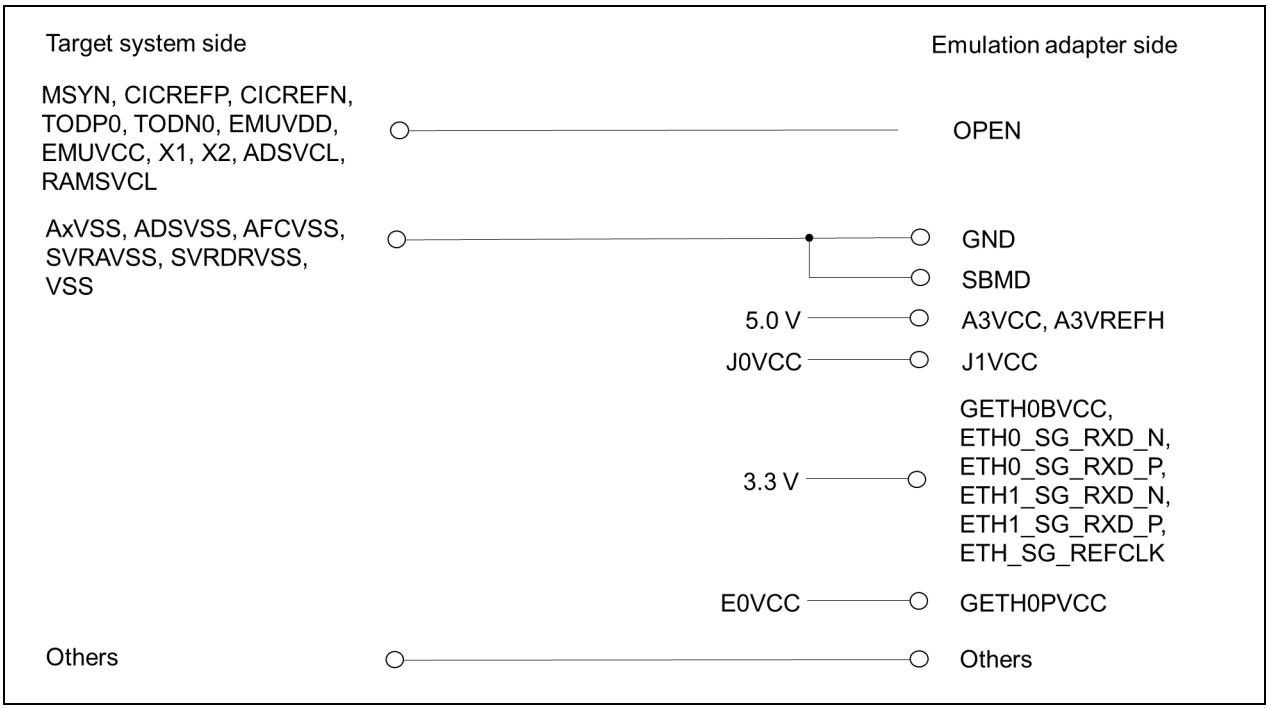


Figure A-10 Equivalent Circuit for the RTE7702540CBG292T000J

(8) Precautions and WEEE directive

CAUTION If the requirements shown in the "CAUTION" sentences are ignored, the equipment may cause personal injury or damage to the products.

⚠ CAUTION

Cautions to be Taken for This Product:

- Inquiries regarding CSSOCKET used for adjusting the height of the assembly, please send an email to the address below.

  Tokyo Eletech Corporation http://www.tetc.co.jp/e_index.htm

IMPORTANT

Note on This Product:

- The exchange adapter is not reparable.
- Inquiries regarding the purchase of BSSOCKET, CSSOCKET, and LSPACK, please send an email to the address below.

  Tokyo Eletech Corporation http://www.tetc.co.jp/e_index.htm

Caution to Be Taken for Disposal:

Penalties may be applicable for incorrect disposal of this waste, in accordance with your national legislation.

European Union Regulatory Notices:

The WEEE (Waste Electrical and Electronic Equipment) regulations put responsibilities on producers for the collection and recycling or disposal of electrical and electronic waste. Return of WEEE under these regulations is applicable in the European Union only. This equipment (including all accessories) is not intended for household use. After use the equipment cannot be disposed of as household waste, and the WEEE must be treated, recycled and disposed of in an environmentally sound manner.
Renesas Electronics Europe GmbH can take back end of life equipment, register for this service at "http://www.renesas.eu/weee".

Revision History	Emulation Adapter for the RH850/U2B User's Manual

Rev.	Date	Description	
		Page	Summary
1.00	Aug.10.22	—	First Edition issued
1.10	Sep.12.22	6	The description on "Connector for external tracing: CN1" was modified.
		11	A functional description was added to "Mode setting switch: SW1".
1.20	Aug.25.23	All	Type names of RTE7702500EAB0B000J and RTE7702500EAB0L000J were deleted.
		2	U2B6 was added as a device to be emulated.
		30	U2B6 was added to table 3-3, Exchange Adapters and Sockets. The type name of the target connector for FBGA-292 was changed.
1.30	Oct.27.23	5	The photo of the emulation adapter was changed.
		10	U2B20 was deleted from the statements under (19), Jumper block: JP7 (SBMD), in section 2.1.
		13	The photo of the base board was changed.
		19	The photo of the 14-pin to 46-pin conversion adapter was changed.

Emulation Adapter for the RH850/U2B User's Manual

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Emulation Adapter for the RH850/U2B

RTE7702500EAB00000J

RTE7702500EAB0K000J

User's Manual

Renesas Electronics Corporation

R20UT5180EJ0130