



Emulation Adapter for the RH850/U2C

Manual

All information contained in these materials, including products and product specifications, represents information on the product at the time of publication and is subject to change by Renesas Electronics Corp. without notice. Please review the latest information published by Renesas Electronics Corp. through various means, including the Renesas Electronics Corp. website (<http://www.renesas.com>).

Notice

1. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation or any other use of the circuits, software, and information in the design of your product or system. Renesas Electronics disclaims any and all liability for any losses and damages incurred by you or third parties arising from the use of these circuits, software, or information.
2. Renesas Electronics hereby expressly disclaims any warranties against and liability for infringement or any other claims involving patents, copyrights, or other intellectual property rights of third parties, by or arising from the use of Renesas Electronics products or technical information described in this document, including but not limited to, the product data, drawings, charts, programs, algorithms, and application examples.
3. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.
4. You shall be responsible for determining what licenses are required from any third parties, and obtaining such licenses for the lawful import, export, manufacture, sales, utilization, distribution or other disposal of any products incorporating Renesas Electronics products, if required.
5. You shall not alter, modify, copy, or reverse engineer any Renesas Electronics product, whether in whole or in part. Renesas Electronics disclaims any and all liability for any losses or damages incurred by you or third parties arising from such alteration, modification, copying or reverse engineering.
6. Renesas Electronics products are classified according to the following two quality grades: "Standard" and "High Quality". The intended applications for each Renesas Electronics product depends on the product's quality grade, as indicated below.

"Standard": Computers; office equipment; communications equipment; test and measurement equipment; audio and visual equipment; home electronic appliances; machine tools; personal electronic equipment; industrial robots; etc.

"High Quality": Transportation equipment (automobiles, trains, ships, etc.); traffic control (traffic lights); large-scale communication equipment; key financial terminal systems; safety control equipment; etc.

Unless expressly designated as a high reliability product or a product for harsh environments in a Renesas Electronics data sheet or other Renesas Electronics document, Renesas Electronics products are not intended or authorized for use in products or systems that may pose a direct threat to human life or bodily injury (artificial life support devices or systems; surgical implantations; etc.), or may cause serious property damage (space system; undersea repeaters; nuclear power control systems; aircraft control systems; key plant systems; military equipment; etc.). Renesas Electronics disclaims any and all liability for any damages or losses incurred by you or any third parties arising from the use of any Renesas Electronics product that is inconsistent with any Renesas Electronics data sheet, user's manual or other Renesas Electronics document.

7. No semiconductor product is absolutely secure. Notwithstanding any security measures or features that may be implemented in Renesas Electronics hardware or software products, Renesas Electronics shall have absolutely no liability arising out of any vulnerability or security breach, including but not limited to any unauthorized access to or use of a Renesas Electronics product or a system that uses a Renesas Electronics product. RENESAS ELECTRONICS DOES NOT WARRANT OR GUARANTEE THAT RENESAS ELECTRONICS PRODUCTS, OR ANY SYSTEMS CREATED USING RENESAS ELECTRONICS PRODUCTS WILL BE INVULNERABLE OR FREE FROM CORRUPTION, ATTACK, VIRUSES, INTERFERENCE, HACKING, DATA LOSS OR THEFT, OR OTHER SECURITY INTRUSION ("Vulnerability Issues"). RENESAS ELECTRONICS DISCLAIMS ANY AND ALL RESPONSIBILITY OR LIABILITY ARISING FROM OR RELATED TO ANY VULNERABILITY ISSUES. FURTHERMORE, TO THE EXTENT PERMITTED BY APPLICABLE LAW, RENESAS ELECTRONICS DISCLAIMS ANY AND ALL WARRANTIES, EXPRESS OR IMPLIED, WITH RESPECT TO THIS DOCUMENT AND ANY RELATED OR ACCOMPANYING SOFTWARE OR HARDWARE, INCLUDING BUT NOT LIMITED TO THE IMPLIED WARRANTIES OF MERCHANTABILITY, OR FITNESS FOR A PARTICULAR PURPOSE.
8. When using Renesas Electronics products, refer to the latest product information (data sheets, user's manuals, application notes, "General Notes for Handling and Using Semiconductor Devices" in the reliability handbook, etc.), and ensure that usage conditions are within the ranges specified by Renesas Electronics with respect to maximum ratings, operating power supply voltage range, heat dissipation characteristics, installation, etc. Renesas Electronics disclaims any and all liability for any malfunctions, failure or accident arising out of the use of Renesas Electronics products outside of such specified ranges.
9. Although Renesas Electronics endeavors to improve the quality and reliability of Renesas Electronics products, semiconductor products have specific characteristics, such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Unless designated as a high reliability product or a product for harsh environments in a Renesas Electronics data sheet or other Renesas Electronics document, Renesas Electronics products are not subject to radiation resistance design. You are responsible for implementing safety measures to guard against the possibility of bodily injury, injury or damage caused by fire, and/or danger to the public in the event of a failure or malfunction of Renesas Electronics products, such as safety design for hardware and software, including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult and impractical, you are responsible for evaluating the safety of the final products or systems manufactured by you.
10. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. You are responsible for carefully and sufficiently investigating applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive, and using Renesas Electronics products in compliance with all these applicable laws and regulations. Renesas Electronics disclaims any and all liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
11. Renesas Electronics products and technologies shall not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations. You shall comply with any applicable export control laws and regulations promulgated and administered by the governments of any countries asserting jurisdiction over the parties or transactions.
12. It is the responsibility of the buyer or distributor of Renesas Electronics products, or any other party who distributes, disposes of, or otherwise sells or transfers the product to a third party, to notify such third party in advance of the contents and conditions set forth in this document.
13. This document shall not be reprinted, reproduced or duplicated in any form, in whole or in part, without prior written consent of Renesas Electronics.
14. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products.

(Note1) "Renesas Electronics" as used in this document means Renesas Electronics Corporation and also includes its directly or indirectly controlled subsidiaries.

(Note2) "Renesas Electronics product(s)" means any product developed or manufactured by or for Renesas Electronics.

(Rev.5.0-1 October 2020)

Corporate Headquarters

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

www.renesas.com

Trademarks

Renesas and the Renesas logo are trademarks of Renesas Electronics Corporation. All trademarks and registered trademarks are the property of their respective owners.

Contact information

For further information on a product, technology, the most up-to-date version of a document, or your nearest sales office, please visit:

www.renesas.com/contact/

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 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 manuals, Supplementary Manuals, and application notes provided for the individual products. When you use an emulator from another company for debugging, be sure to read the manual for the given emulator.

Related Documents

Name of Document	Document No.
IE850A Emulator RTE0T0850AKCT00000J Manual	R20UT4461E
E2 Emulator RTE0T00020KCE00000R Manual	R20UT3538E
E2 Emulator, E2 Emulator Lite, IE850A Supplementary Manual (Connection of RH850/U2x Series)	R20UT5829E

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.

<https://www.renesas.com/>

Important

Before using this product, be sure to read this manual carefully.

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

Purpose of use of this product:

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 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:

- (1) This product is a development-support unit for use in your program development and evaluation stages. When a program you have finished developing is to be incorporated in a mass-produced product, the judgment as to whether it can be put to practical use is entirely your own responsibility, and should be based on evaluation of the device on which it is installed and other experiments.
- (2) In no event shall Renesas Electronics Corp. be liable for any consequence arising from the use of this product.
- (3) Renesas Electronics Corp. strives to provide workarounds for and correct trouble with products malfunctions, with some free and some incurring charges. However, this does not necessarily mean that Renesas Electronics Corp. guarantees the provision of a workaround or correction under any circumstances.
- (4) The product covered by this document has been developed on the assumption that it will be used for program development and evaluation in laboratories. Therefore, it does not fall within the scope of applicability of the Electrical Appliance and Material Safety Law and protection against electromagnetic interference when used in Japan.
- (5) Renesas Electronics Corp. cannot predict all possible situations and possible cases of misuse that carry a potential for danger. Therefore, the warnings in this manual and the warning labels attached to the product do not necessarily cover all such possible situations and cases. The customer is responsible for correctly and safely using this product.
- (6) The product covered by this document has been through the process of checking conformance with the standards indicated in section 1.3, Regulatory Compliance Notices. This fact must be taken into account when the product is taken from Japan to another country.
- (7) Renesas Electronics Corp. will not assume responsibility for direct or indirect damage caused by an accidental failure or malfunction of this product.

When disposing of the product:

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

Usage restrictions:

The product has been developed as a means of supporting system development by users. Therefore, do not use it as an embedded device in other equipment. Also, do not use it to develop systems or equipment for use in the following fields.

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

If you are considering the use of the product 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 product. Therefore, the specification or design of this product, or this manual, may be changed without prior notice.

About rights:

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

About diagrams:

Some diagrams in this manual may differ from the objects they represent.

Precautions for Safety

This chapter describes the precautions which should be taken in order to use this product safely and properly. Be sure to read and understand this chapter before using this product. Contact your local distributor if you have any questions about the precautions described here.



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 user 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:



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

WEEE Directive (2012/19/EU)

The Waste Electrical and Electronic Equipment Regulations 2013

For customers in the UK & European Union



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 UK and European Union. 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;

<https://www.renesas.com/eu/en/support/regional-customer-support/weee>

Contents

1. Outline	1
1.1 Package Components.....	2
1.2 Product Specifications	3
1.3 Regulatory Compliance Notices	4
2. Names and Functions of Hardware	6
2.1 Emulation Adapter (RTE7702600EAB00000J)	6
2.2 Base Board (RTE7702600EABBB000J).....	14
2.3 14-Pin to 46-Pin Conversion Adapter (RTE0T00020KCA40000J).....	19
2.4 34-Pin to 46-Pin Conversion Adapter (RTE0T0850AKCA00000J)	20
2.5 Power-Supply Cable	21
2.6 GND Cable.....	22
2.7 Demounting Lever.....	23
3. System Configuration and Setup	24
3.1 System Configuration as a Simple Evaluation Board	24
3.2 System Configuration as an Emulation Board	30
4. Notes	39
4.1 Setting Option Bytes	39
4.2 Notes on Differences between the Actual Device and the Emulation Adapter.....	39
4.3 Note on Debugging	40
5. Characteristics of Target Interface.....	41
6. Maintenance and Warranty.....	43
6.1 Maintenance	43
6.2 Warranty.....	43
6.3 Repair Provisions	43
6.4 How to Request Repairs	44
Appendix A Specifications of the Exchange Adapters	45

Terminology

Some specific words used in this 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.

User 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/U2C of MCUs from Renesas Electronics Corporation. Using this product with the separately sold exchange adapter enables emulation of the target device.

Features:

- This product (RTE7702600EAB00000J) includes an R7F702Z32AFDBF-C debug chip for the RH850/U2C.
- 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 user 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), and flash programmers from Renesas.
- 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

Item		Quantity
Emulation adapter	RTE7702600EAB00000J	1
Base board	RTE7702600EABBB000J	1
14-pin to 46-pin conversion adapter	RTE0T00020KCA40000J	1
34-pin to 46-pin conversion adapter	RTE0T0850AKCA00000J	1
Power-supply cable		1
GND cable		1
Demounting lever		1
Jumper block for pin header	(For JP3 and JP4 of the emulation adapter) (For JP11 and JP12 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	FBGA292: RH850/U2C8, U2C4 HLQFP144: RH850/U2C4, U2C2 HLQFP100: RH850/U2C4, U2C2
Power supply for the emulation adapter	4.5 V min., 5.0 V typ., 5.5 V max.
External dimension	Emulation adapter: 52 mm x 52 mm Base board: 110 mm x 120 mm
Weight	Emulation adapter: 19 g Base board: 79 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

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/U2C Emulation adapter + Base board

Type name: RTE7702600EAB00000J

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 (RTE7702600EAB00000J)

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 user system. The emulation adapter can also be used as a simple evaluation board in combination with the attached base board.

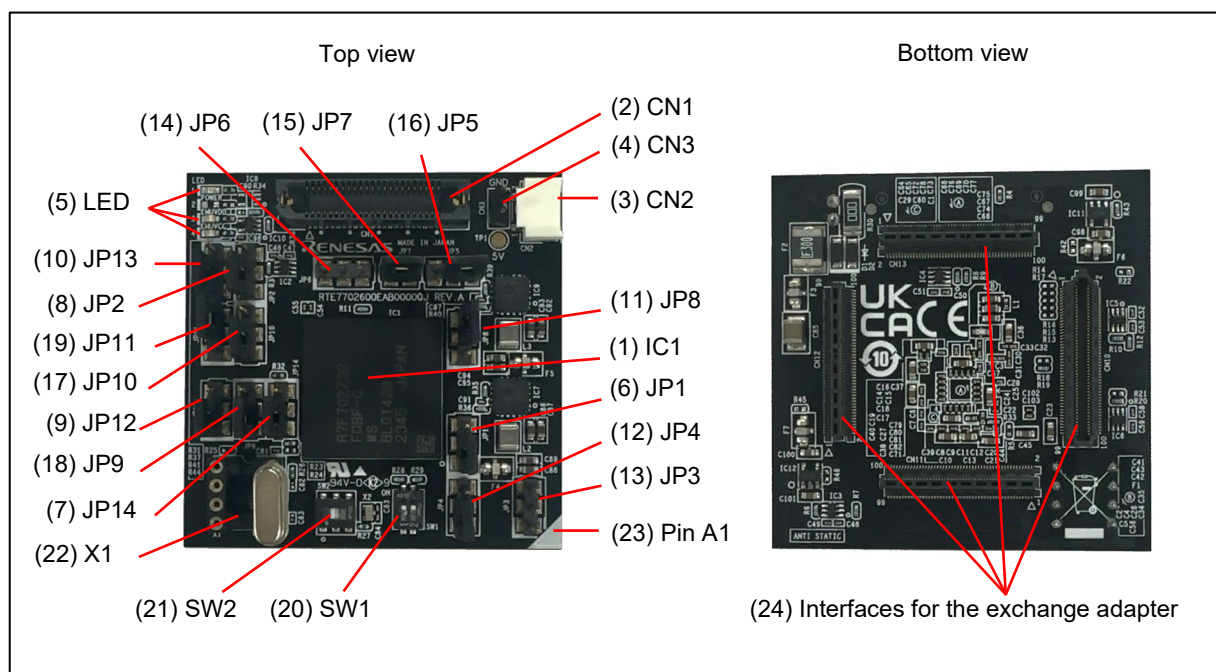


Figure 2-1 Names of the Parts of the Emulation Adapter (RTE7702600EAB00000J)

(1) Debug chip: IC1

IC1 is a debug chip which can emulate target devices of the RH850/U2C.

(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 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	AUORES
TODN1	9	10	EMUVDD
GND	11	12	TRST/LPDRST
N.C.	13	14	FPMD0 (FLMD0)
N.C.	15	16	EVTI
GND	17	18	EVTO
N.C.	19	20	MSYNZ
N.C.	21	22	RESET
GND	23	24	GND
N.C.	25	26	CICREFP
N.C.	27	28	CICREFN
GND	29	30	GND
HSIFD_REFCLK	31	32	N.C.
N.C.	33	34	RESETOUT
GND	35	36	GND
HSIFD_RXDP	37	38	TMS
HSIFD_RXDN	39	40	TDI/LPDI
GND	41	42	GND
HSIFD_TXDP	43	44	TDO/LPDO
HSIFD_RXDN	45	46	DRDY/LPDCLKO
GND	Latch		GND

(3) Power-supply connector: CN2

CN2 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 external tracing (Aurora tracing) is used, be sure to connect the power-supply cable to CN2 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 CN2 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, 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) GND pin header: CN3

CN3 is connected to the GND cable that comes with this product. When an exchange adapter for the QFP package is to be used, be sure to connect CN3 to GND of the user system via the GND cable.

 CAUTION	
GND cable:	 Since the exposed pad of the QFP package cannot be connected to the GND line of the emulation adapter, the GND of the user system and the emulation adapter shall be connected using a GND cable as an alternative. Connection without using the GND cable may cause the emulation adapter to emit smoke, catch fire, or otherwise be damaged.

(5) Status LEDs

Name of LED	Specification
POWER	Illuminated: CN2 is supplying power. Not illuminated: CN2 is not supplying power.
EMUVDD	Illuminated: VDD for debugging (EMUVDD) = ON Not illuminated: VDD for debugging (EMUVDD) = OFF
EMUVCC	Illuminated: VCC for debugging (EMUVCC) = ON Not illuminated: VCC for debugging (EMUVCC) = OFF

(6) Jumper block: JP1 (VDD_SEL)

JP1 (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 user system is supplied to the VDD power for the debug chip.

(7) Jumper block: JP14 (VDD_CTRL)

JP14 (VDD_CTRL)	Specification
Open-circuit	Setting prohibited.
1-2 short-circuit (default)	The VDD power to be generated from the emulation adapter is always supplied.
2-3 short-circuit	The VDD power to be generated from the emulation adapter is controlled by the PWRCTL signal for the debug chip.

(8) Jumper block: JP2 (AURORES)

JP2 (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.

(9) Jumper block: JP12 (FLMD0)

JP12 (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 user system.

(10) Jumper block: JP13 (FLMD1)

JP13 (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 user system.

(11) Jumper block: JP8 (HSFD0VCC_SEL)

JP8 (HSFD0VCC_SEL)	Specification
Open-circuit	Setting prohibited.
1-2 short-circuit	3.3 V is supplied to the HSFD0VCC pin of the debug chip.
2-3 short-circuit (default)	5.0 V is supplied to the HSFD0VCC pin of the debug chip.

(12) Jumper block: JP4 (EVTO_SEL1)

JP4 (EVTO_SEL1)	Specification
Open-circuit	EVTO of the CN1 connector for external tracing is fixed at the high level.
1-2 short-circuit	The signal selected on JP3 (EVTO_SEL2) is output to EVTO of the CN1 connector for external tracing.
2-3 short-circuit (default)	P06_5 is output to EVTO of the CN1 connector for external tracing.

(13) Jumper block: JP3 (EVTO_SEL2)

JP3 (EVTO_SEL2)	Specification
Open-circuit (default)	Neither P20_12 nor P10_14 is selected for EVTO.
1-2 short-circuit	P20_12 is selected for EVTO.
2-3 short-circuit	P10_14 is selected for EVTO.

(14) Jumper block: JP6 (EVTI_SEL)

JP6 (EVTI_SEL)	Specification
Open-circuit (default)	EVTI of the CN1 connector for external tracing is not used. Set JP6 as open-circuit when P06_4 and P10_13 pins are used as GPIO.
1-2 short-circuit	The EVTI signal is connected to the P10_13 pin.
2-3 short-circuit	The EVTI signal is connected to the P06_4 pin.

(15) Jumper block: JP7 (P06_4_SEL)

JP7 (P06_4_SEL)	Specification
Open-circuit	The EVTI signal is connected to the P06_4 pin.
Short-circuit (default)	The P06_4 pin is used as GPIO (set JP6 (EVTI_SEL) as open-circuit).

(16) Jumper block: JP5 (P10_13_SEL)

JP5 (P10_13_SEL)	Specification
Open-circuit	Setting prohibited.
1-2 short-circuit (default)	The P10_13 pin is used as GPIO (set JP6 (EVTI_SEL) as open-circuit).
2-3 short-circuit	The EVTI signal is connected to the P10_13 pin.

(17) Jumper block: JP10 (MSYN_SEL)

JP10 (MSYN_SEL)	Specification
Open-circuit	Setting prohibited.
1-2 short-circuit	The MSYN signal of the CN1 connector for external tracing is connected to the P10_12 pin.
2-3 short-circuit (default)	The MSYN signal for the CN1 connector for external tracing is connected to the P06_3 pin.

(18) Jumper block: JP9 (P10_12_SEL)

JP9 (P10_12_SEL)	Specification
Open-circuit	Setting prohibited.
1-2 short-circuit	The MSYN signal of the CN1 connector for external tracing is connected to the P10_12 pin.
2-3 short-circuit (default)	The P10_12 pin is used as GPIO.

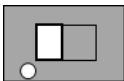
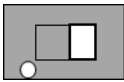
(19) Jumper block: JP11 (P06_3_SEL)

JP11 (P06_3_SEL)	Specification
Open-circuit	Setting prohibited.
1-2 short-circuit	The MSYN signal of the CN1 connector for external tracing is connected to the P06_3 pin.
2-3 short-circuit (default)	The P06_3 pin is used as GPIO.

(20) Mode setting switch: SW1

SW1 (mode setting switch)	Specification		
SW1-1: DBGSEL1	This sets the levels on the DBGSEL0 and DBGSEL1 pins for the debug chip.		
	DBGSEL1 Pin	DBGSEL0 Pin	JP0-pin Group (CN1)
	Turned on: low (default)	Turned on: low (default)	E2 emulator IE850A
SW1-2: DBGSEL0	Turned on: low	Turned off: high	Setting prohibited.
	Turned off: high	Turned on: low	RHSIFD enabled (JTAG)
	Turned off: high	Turned off: high	RHSIFD enabled (LPD)

(21) IP0 setting switch: SW2

SW2 (IP0 setting switch)	Specification
 (default)	The IP0_0 and IP0_1 pins are used as GPIO.
	The IP0_0 and IP0_1 pins are respectively used as XT1 and XT2. SW2 is connected to the sub-OSC crystal oscillator (32.768 kHz) on the emulation adapter.

2.2 Base Board (RTE7702600EABBB000J)

The base board allows use as a simple evaluation board 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.

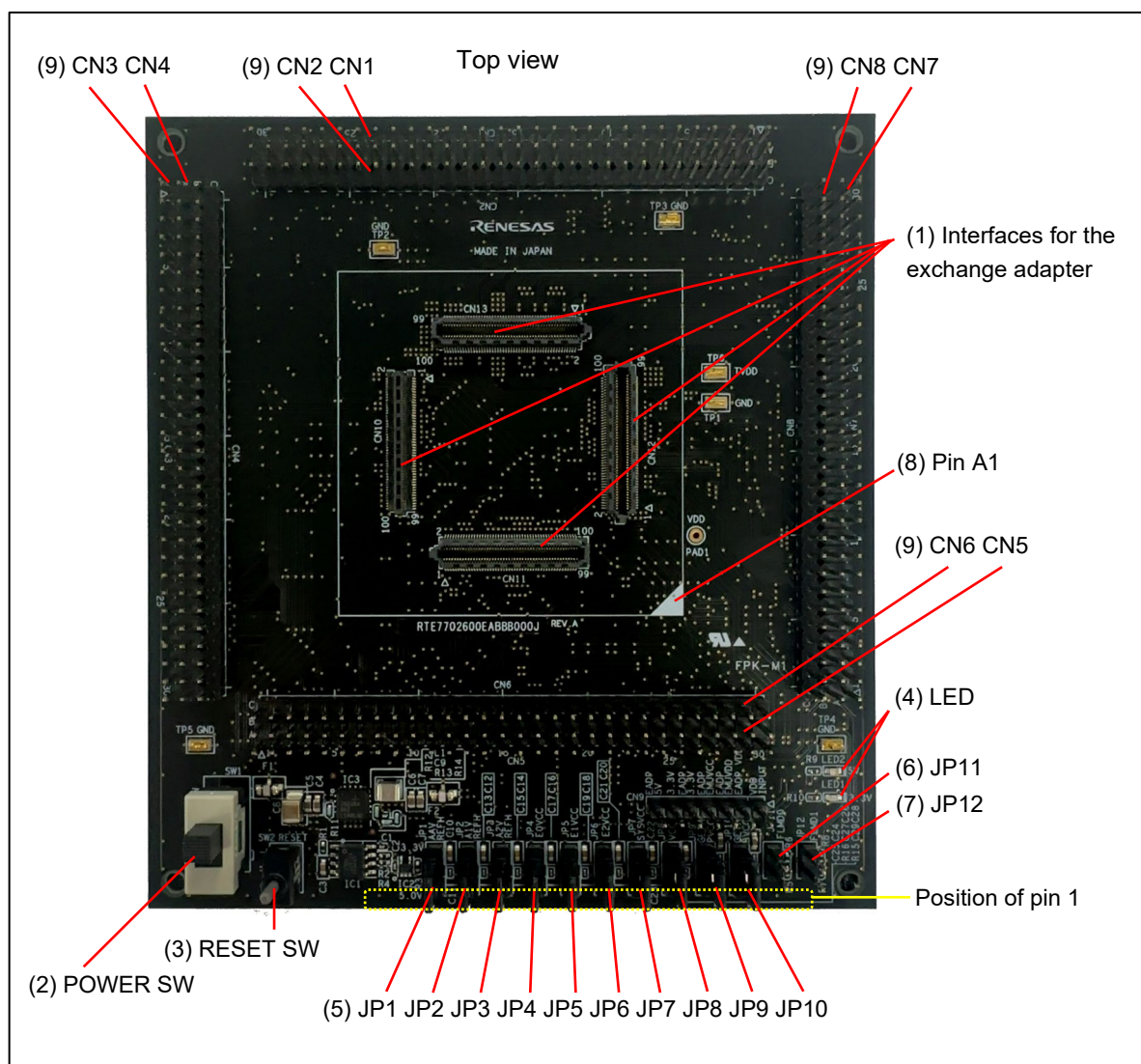
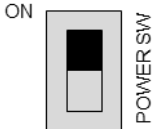
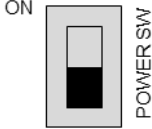


Figure 2-3 Names of the Parts of the Base Board (RTE7702600EABBB000J)

(1) Interfaces for the exchange adapter: CN10, CN11, CN12, and CN13

These connectors are used for connection to the emulation adapter and are connected to CN10, CN11, CN12, and CN13 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 CN2 of the emulation adapter.
OFF  (default)	This switch turns off the power supply of the base board.

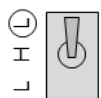
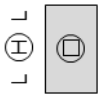
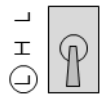
 CAUTION

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 JP10 (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	AAVREFH
JP2	A1VREFH
JP3	A2VREFH
JP4	E0VCC
JP5	E1VCC
JP6	E2VCC
JP7	SYSVCC
JP8	VCC
JP9	GETH0PVCC
JP10	GETH0BVCC

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

JP1 to JP9	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 JP10 jumper block are as shown in the following table.

JP10	Specification
Open-circuit	The target power-supply voltage is off.
1-2 short-circuit	GND is connected to the target power-supply voltage through a 10-kΩ resistor.
2-3 short-circuit (default)	3.3 V is supplied as the target power-supply voltage.

(6) Jumper block: JP11 (FLMD0)

JP11 (FLMD0)	Specification
Open-circuit (default)	FLMD0 pin = "L" (pulled down)
Short-circuit	FLMD0 pin = "H" (pulled up)

JP12 (FLMD1)	Specification
Open-circuit (default)	FLMD1 pin = “L” (pulled down)
Short-circuit	FLMD1 pin = “H” (pulled up)

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.

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

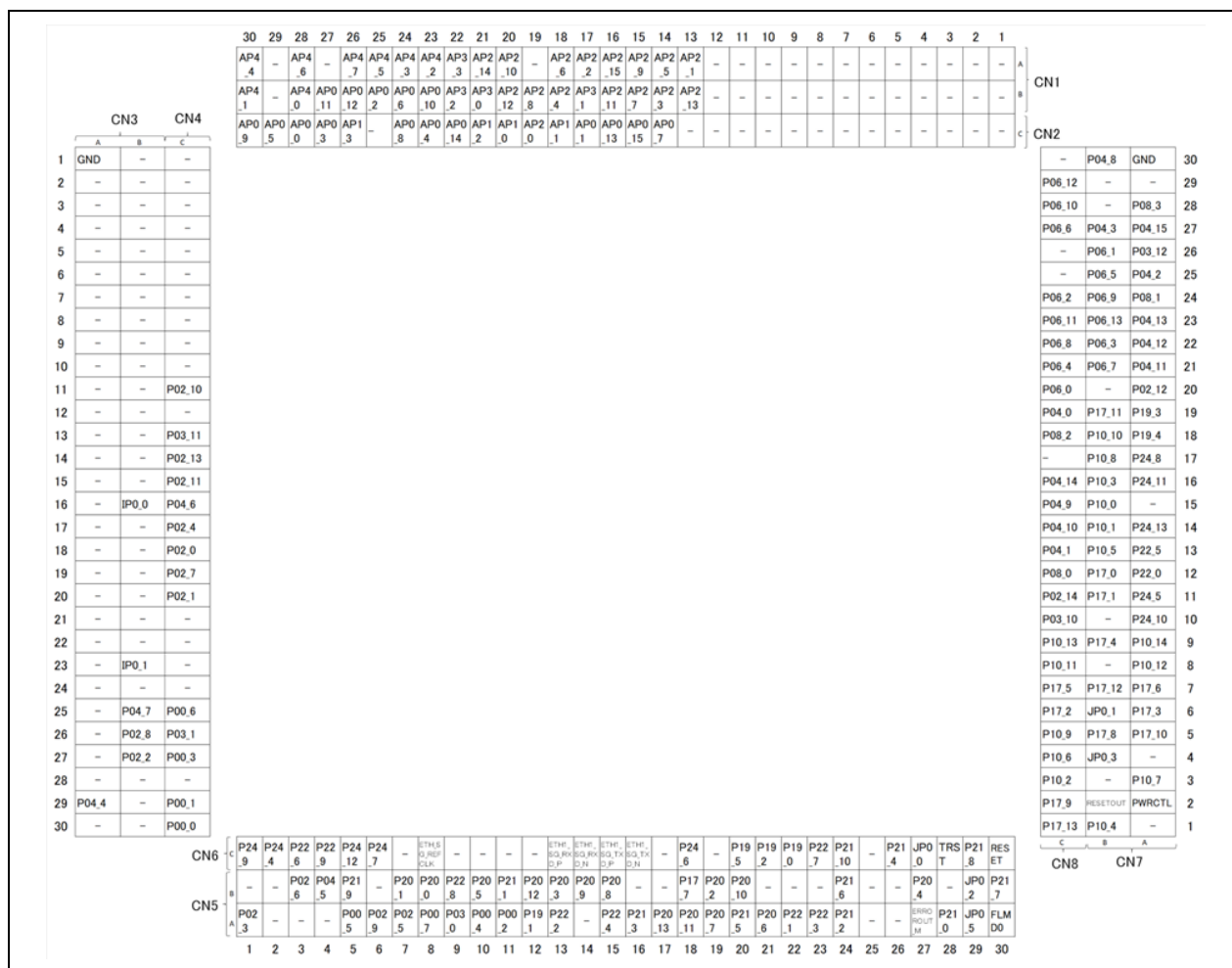


Figure 2-4 Assignment of Pin Headers

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.

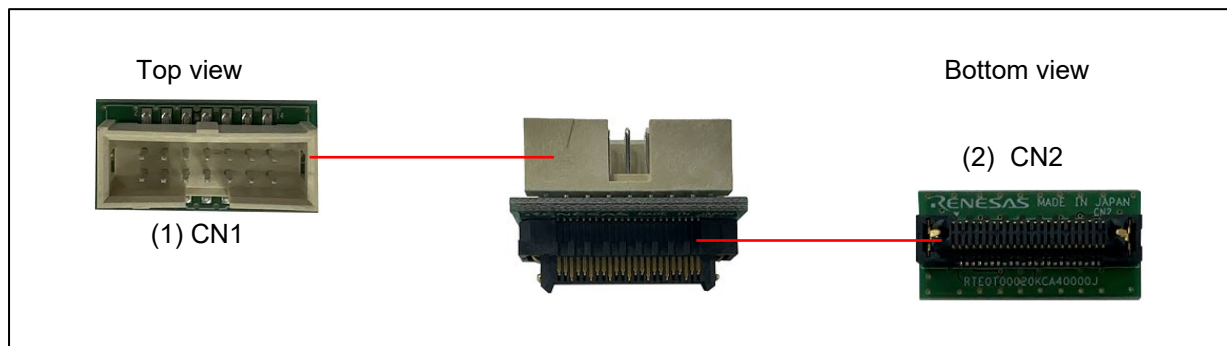


Figure 2-5 Names of the Parts of the 14-Pin to 46-Pin Conversion Adapter (RTE0T00020KCA40000J)

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

This 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 that support the 14-pin connector and flash programmers.

The following shows pin assignments of CN1. Read the 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)

This is connected to the CN1 connector 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.

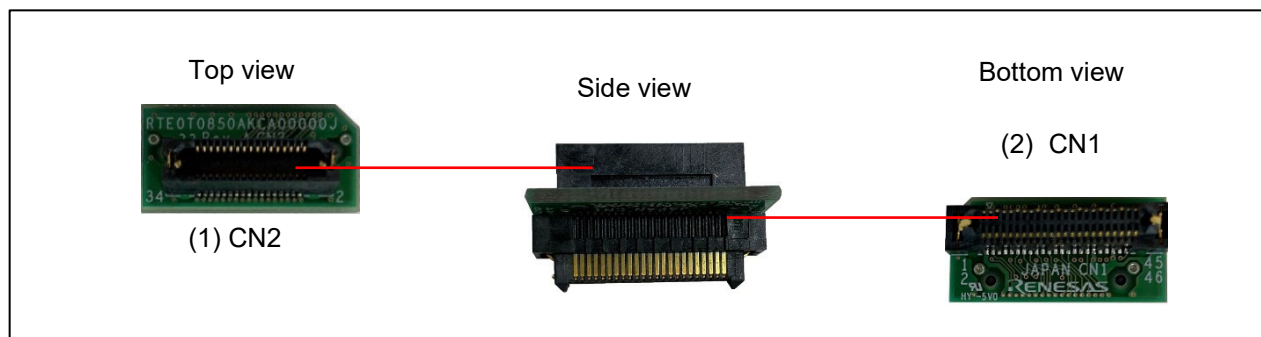


Figure 2-6 Names of the Parts of the 34-Pin to 46-Pin Conversion Adapter (RTE0T0850AKCA00000J)

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

This 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 (type name: RTE0T0850AKCT00000J) from Renesas that support the 34-pin connector.

The following shows pin assignments of CN2. Read the 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 (N.C.)	13	14	FPMD0 (FLMD0)
TODN2 (N.C.)	15	16	EVTI
GND	17	18	EVTO
TODP3 (N.C.)	19	20	FPMD1 (FLMD1)
TODN3 (N.C.)	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)

This is connected to the CN1 connector 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.

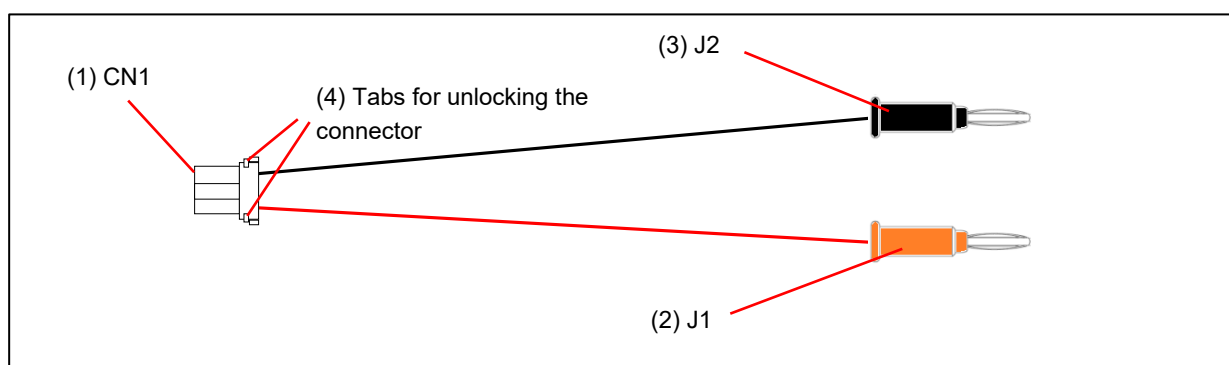


Figure 2-7 Names of the Parts of the Power-Supply Cable

(1) Connector: CN1

CN1 is a connector (LEAR-02V-S from JST) for connection to CN2 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 GND Cable

The GND cable (about 300-mm long) connects GND of the emulation adapter to GND of the user system.

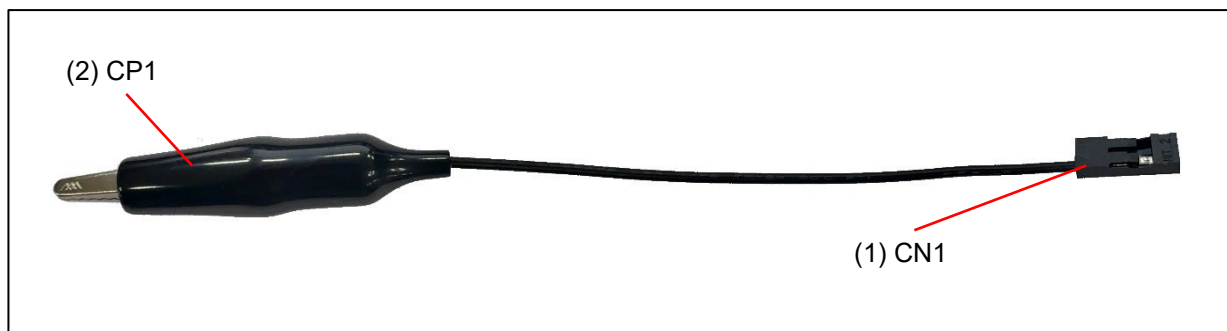


Figure 2-8 Names of the Parts of the GND Cable

(1) Connector: CN1

This is a connector for connection to CN3 of the emulation adapter.

(2) Clip: CP1

Connect this clip to GND of the user system.

CAUTION

Connection to the user system:



Be sure to connect the GND cable to GND of the user system. Connecting the GND cable to a non-GND point may cause the emulation adapter to emit smoke, catch fire, or otherwise be damaged.

2.7 Demounting Lever

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

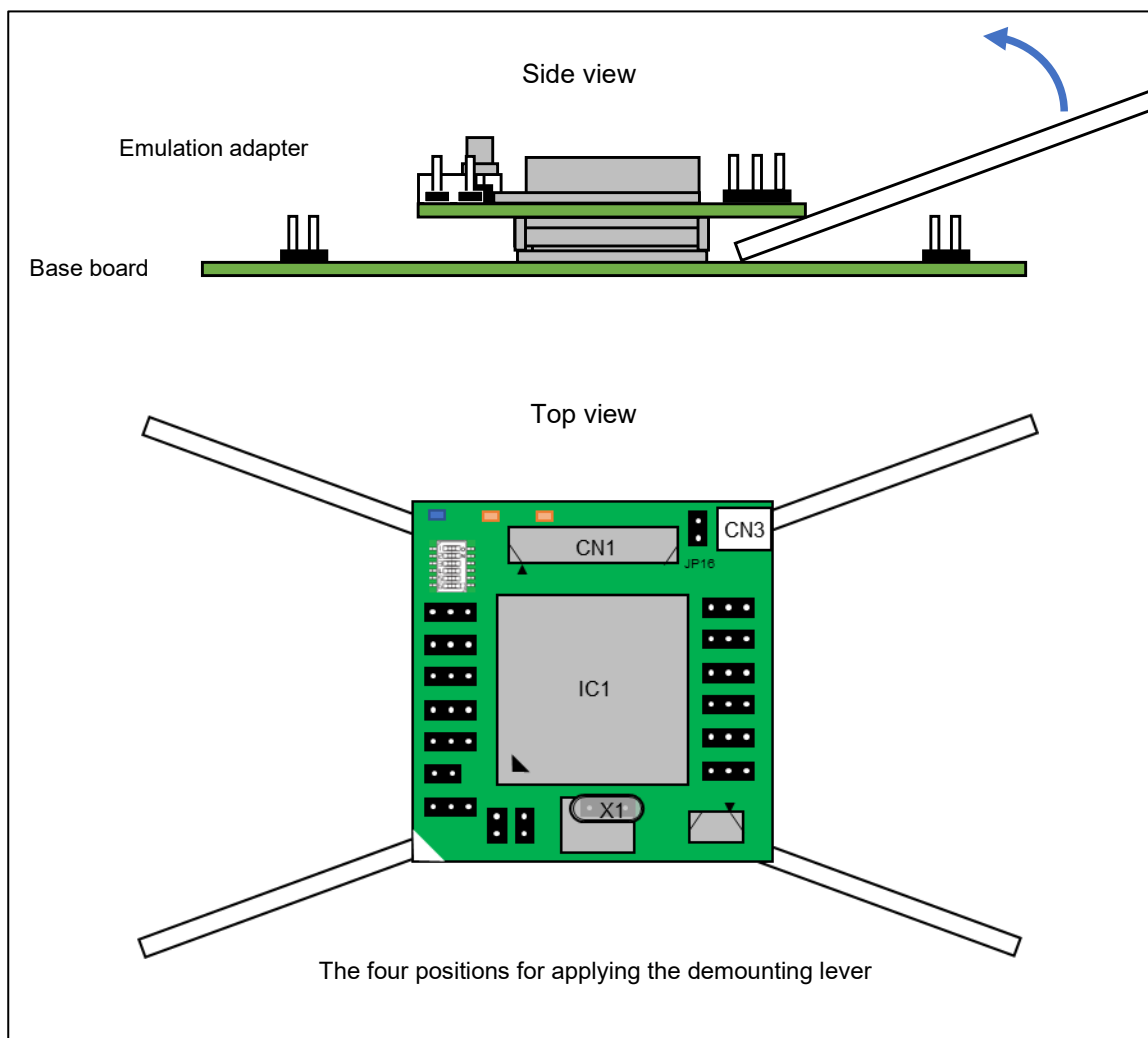


Figure 2-9 Demounting Lever

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 CN2 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, 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.

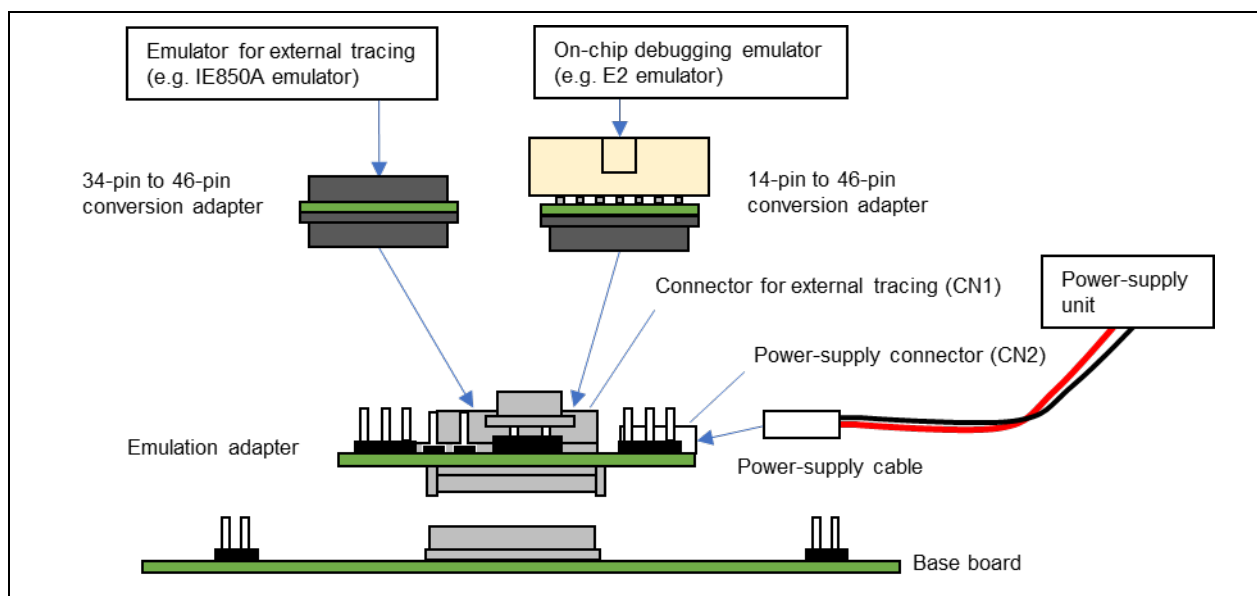


Figure 3-1 System Configuration (Simple Evaluation Board)

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: CN2	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: JP1 (VDD_SEL)	1-2 short-circuit (default)
Jumper block: JP14 (VDD_CTRL)	1-2 short-circuit (default)
Jumper block: JP2 (AURORES)	1-2 short-circuit (default)
Jumper block: JP12 (FLMD0)	1-2 short-circuit (default)
Jumper block: JP13 (FLMD1)	2-3 short-circuit (default)
Jumper block: JP8 (HSFD0VCC_SEL)	2-3 short-circuit (default)
Jumper block: JP4 (EVTO_SEL1)	2-3 short-circuit (default)
Jumper block: JP3 (EVTO_SEL2)	Open-circuit (default)
Jumper block: JP6 (EVTI_SEL)	Open-circuit (default)
Jumper block: JP7 (P06_4_SEL)	1-2 short-circuit (default)
Jumper block: JP5 (P10_13_SEL)	1-2 short-circuit (default)
Jumper block: JP10 (MSYN_SEL)	2-3 short-circuit (default)
Jumper block: JP9 (P10_12_SEL)	2-3 short-circuit (default)
Jumper block: JP11 (P06_3_SEL)	2-3 short-circuit (default)
Switch: SW1	SW1-1 = ON (default), SW1-2 = ON (default)
Switch: SW2	Set to the "●" side (default).
Interfaces for the exchange adapter: CN10, CN11, CN12, and CN13	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, CN11, CN12, and CN13	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 JP10 (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: JP11 (FLMD0)	Open-circuit (default)
Jumper block: JP12 (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 power 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 CN2 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

Align the silk-screened marks for aligning the position of pin A1 on the emulation adapter and the base board so that they are oriented in the same direction, and then connect the two boards.

(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 the base board and release from the reset state

Output 5 V from the power-supply unit that is connected to the CN2 power-supply connector of the emulation adapter. When the IE850A is connected to CN2, 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 CN2 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, 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 the emulation adapter and the base board and release from the reset state

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 CN2 power-supply connector of the emulation adapter. When the IE850A is connected to CN2, 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 2.7.

(6) Disconnecting the power-supply cable

Disconnect the power-supply cable from the CN2 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 and Figure 3-3 respectively show system configurations for the BGA and QFP packages. When the emulation adapter is to be connected to the exchange adapter then connected to a user system, 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 CN2.

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

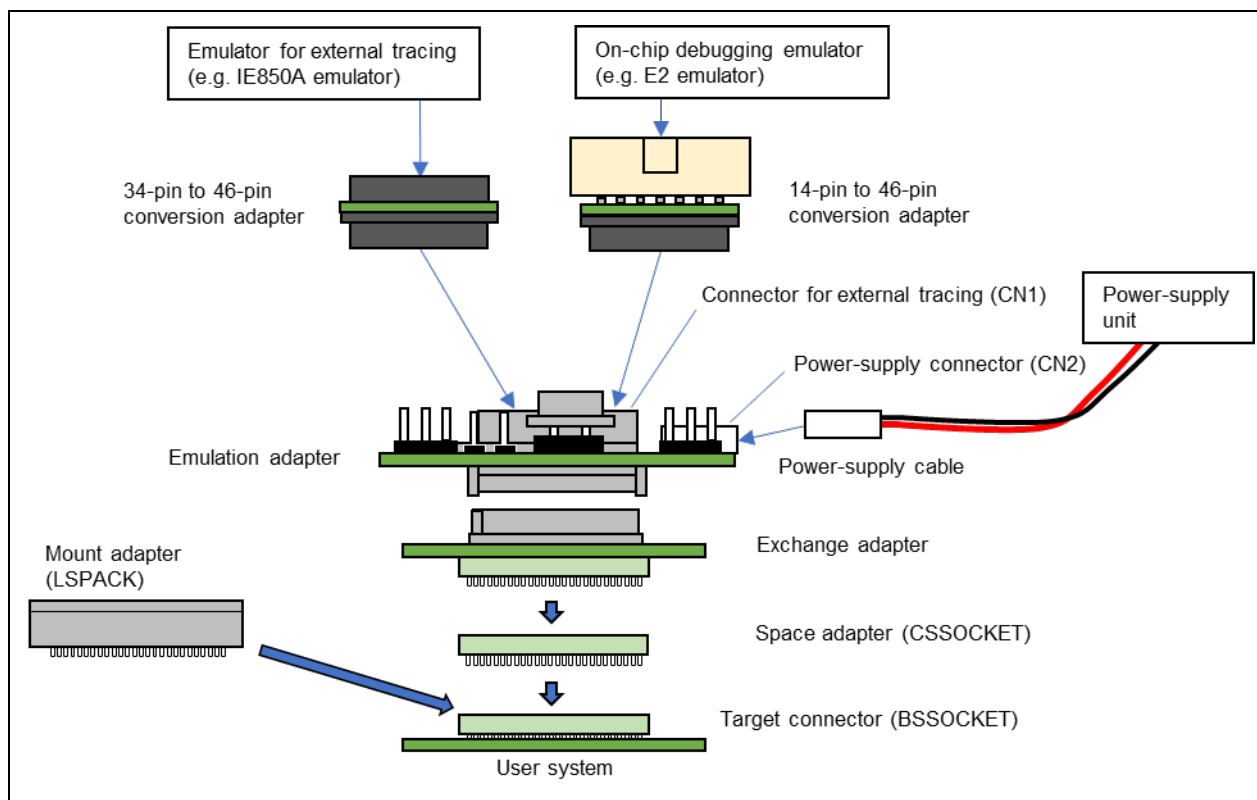


Figure 3-2 System Configuration for the BGA Package (Emulation Board)

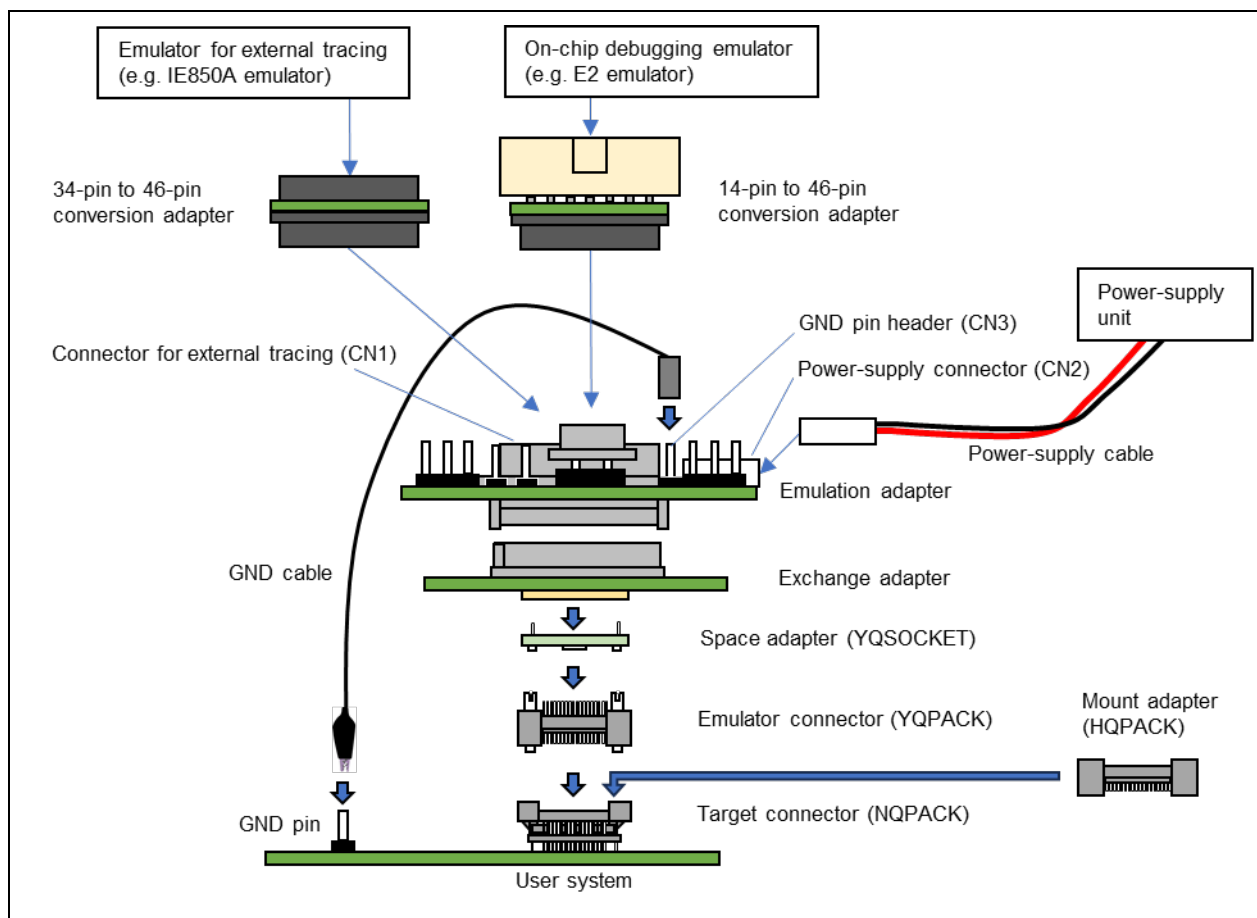


Figure 3-3 System Configuration for the QFP Package (Emulation Board)

3.2.1 List of Exchange Adapters and Sockets for the BGA Package

Table 3-3 lists the exchange adapters and sockets for the BGA package.

Table 3-3 Exchange Adapters and Sockets for the BGA Package

Package Device	Exchange Adapter	Target Connector BSSOCKET	Space Adapter CSSOCKET	Mount Adapter LSPACK
FBGA292 RH850/U2C8	RTE7702600CBG292T000J	BSSOCKET292A2017RE22N (from Tokyo Eletech Corporation)	CSSOCKET292A2017RE23	LSPACK292A2017RE22 (from Tokyo Eletech Corporation)
FBGA292 RH850/U2C4	RTE7702606CBG292T000J		CSSOCKET292A2017RE24 (from Tokyo Eletech Corporation)	

Target connector (BSSOCKET):

This connector is for mounting on the user system.

Exchange adapter:

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

Space adapter (CSSOCKET) (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.

Mount adapter (LSPACK) (optional):

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

3.2.2 List of Exchange Adapter and Sockets for the QFP Package

Table 3-4 lists the exchange adapter and sockets for the QFP package.

Table 3-4 Exchange Adapter and Sockets for the QFP Package

Package Device	Exchange Adapter	Target Connector NQPACK	Emulator Connector YQPACK	Space Adapter YQSOCKET	Mount Adapter LSPACK
HLQFP144 RH850/U2C4 RH850/U2C2	RTE7702614CFL144T000J	NQPAC144SE-G (from Tokyo Eletech Corporation)	YQPACK144SE (from Tokyo Eletech Corporation)	YQSOCKET144SEF (from Tokyo Eletech Corporation)	HQPACK144SE (from Tokyo Eletech Corporation)
HLQFP100 RH850/U2C4 RH850/U2C2	RTE7702613CFL100T000J	NQPAC100SE-G (from Tokyo Eletech Corporation)	YQPACK100SE (from Tokyo Eletech Corporation)	YQSOCKET100SEF (from Tokyo Eletech Corporation)	HQPACK100SE (from Tokyo Eletech Corporation)

Target connector (NQPAC):

This connector is for mounting on the user system.

Emulator connector (YQPACK):

This connector is for connecting the target connector to the exchange adapter.

Exchange adapter:

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

Space adapter (YQSOCKET) (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.

Mount adapter (HQPACK) (optional):

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

3.2.3 Settings for Use as an Emulation Board

Table 3-5 shows a list of the recommended settings of the emulation adapter for this system configuration.

Table 3-5 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: CN2	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: JP1 (VDD_SEL)	1-2 short-circuit (default)
Jumper block: JP14 (VDD_CTRL)	1-2 short-circuit (default)
Jumper block: JP2 (AURORES)	1-2 short-circuit (default)
Jumper block: JP12 (FLMD0)	1-2 short-circuit (default)
Jumper block: JP13 (FLMD1)	2-3 short-circuit (default)
Jumper block: JP8 (HSFD0VCC_SEL)	2-3 short-circuit (default)
Jumper block: JP4 (EVTO_SEL1)	2-3 short-circuit (default)
Jumper block: JP3 (EVTO_SEL2)	Open-circuit (default)
Jumper block: JP6 (EVTI_SEL)	Open-circuit (default)
Jumper block: JP7 (P06_4_SEL)	1-2 short-circuit (default)
Jumper block: JP5 (P10_13_SEL)	1-2 short-circuit (default)
Jumper block: JP10 (MSYN_SEL)	2-3 short-circuit (default)
Jumper block: JP9 (P10_2_SEL)	2-3 short-circuit (default)
Jumper block: JP11 (P06_3_SEL)	2-3 short-circuit (default)
Switch: SW1	SW1-1 = ON (default), SW1-2 = ON (default)
Switch: SW2	Set to the "●" side (default).
Interfaces for the exchange adapter: CN10, CN11, CN12, and CN13	Connect these connectors to the base board.

3.2.4 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 3.2.3.

(2) Connecting the power-supply cable (when the power is supplied from CN2)

Connect the power-supply cable which comes with this product to the CN2 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 and 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 user system

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

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

 CAUTION	
	Connecting the exchange adapter: Connect the exchange adapter to the user 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 GND cable (only for the QFP package)

Connect the emulation adapter to the user system with the GND cable.

 CAUTION	
	GND cable: Connect the GND cable to strengthen the GND connection because the exposed pad of the QFP package cannot be connected to the emulation adapter. Connection without using the GND cable may cause the emulation adapter to emit smoke, catch fire, or otherwise be damaged.

(6) 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.

(7) 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.

(8) Turning on the emulation adapter

Output 5 V from the power-supply unit that is connected to the CN2 power-supply connector of the emulation adapter. When the IE850A is connected to CN2, output 5 V by turning on the emulator as described in step (6) above.

 CAUTION	
	Applied voltage: Make sure that the voltage applied to CN2 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, catch fire, or otherwise be damaged.

(9) Turning on the user system

Turn on the user system.

(10) 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.

3.2.5 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 user system

Turn off the user system.

(3) Turning off the emulation adapter

Stop the 5-V output from the power-supply unit that is connected to the CN2 power-supply connector of the emulation adapter. When the IE850A is connected to CN2, 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 GND cable (only for the QFP package)

Disconnect the GND cable from the emulation adapter and user system.

(7) 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 2.7.

(8) Disconnecting the exchange adapter from the user system

Disconnect the exchange adapter from the user system.

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

(9) Disconnecting the power-supply cable

Disconnect the power-supply cable from the CN2 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 hardware manual for the target device.

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 user system. The main clock oscillator on the emulation adapter is used as the main clock.

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

4.2.3 Power-Supply Voltages

The debug chip mounted on the emulation adapter basically operates with the power supplied from the user 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 user system is used for VDD is selectable by the setting of JP1 on the emulation adapter.

When you use the power supply from the user system, note that transient drops in the power-supply voltage may occur.

4.2.4 VSS Pins for Each Power-Supply Voltage

AxVSS, AAVSS, and VSS are connected to a common GND in the emulation adapter.

4.2.5 AWOVCL and GETH0VCL Pins

Stabilizing capacitors are connected to the stabilizing capacitor connection pins (AWOVCL and GETH0VCL) on the emulation adapter. These pins are not connected to the user 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 user system.

4.2.7 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.

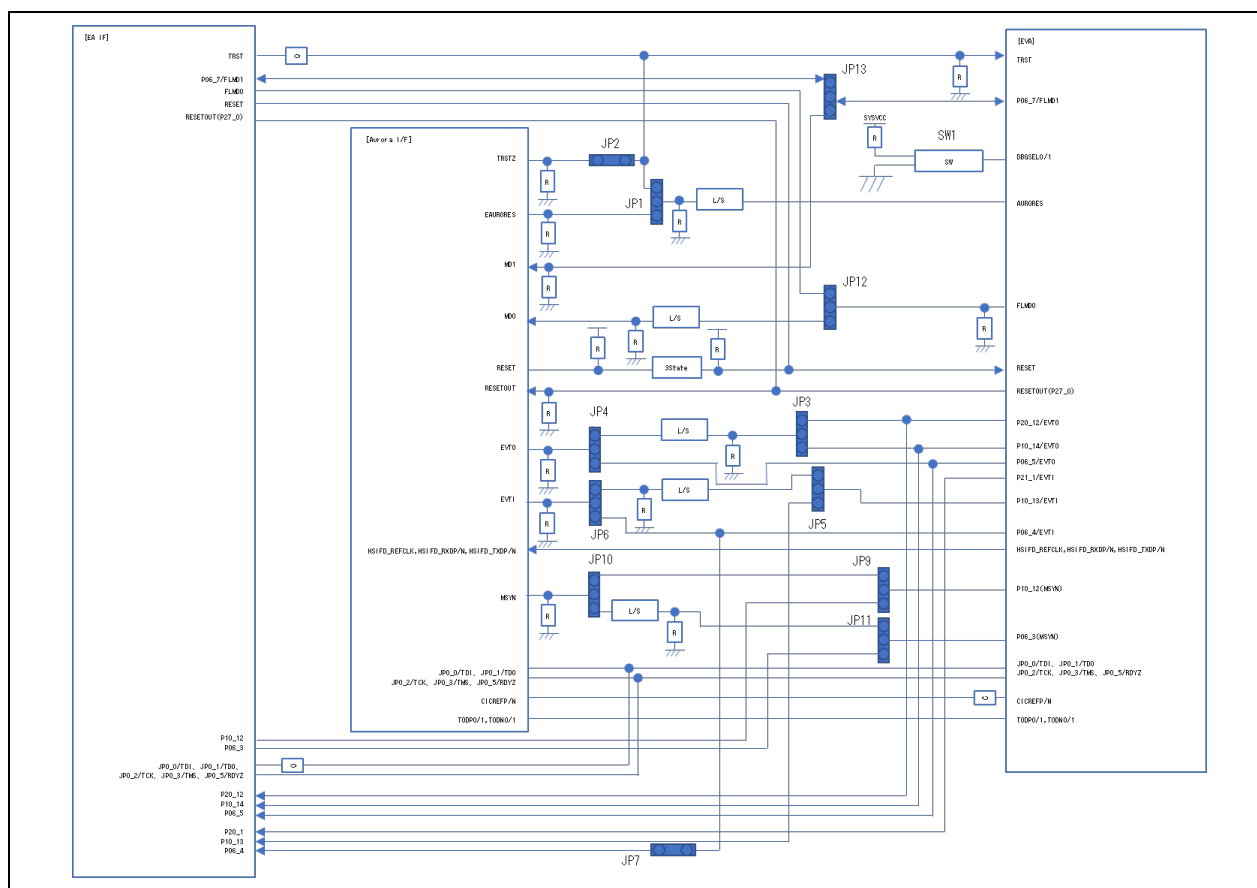


Figure 5-1 Equivalent Circuit of the Emulation Adapter

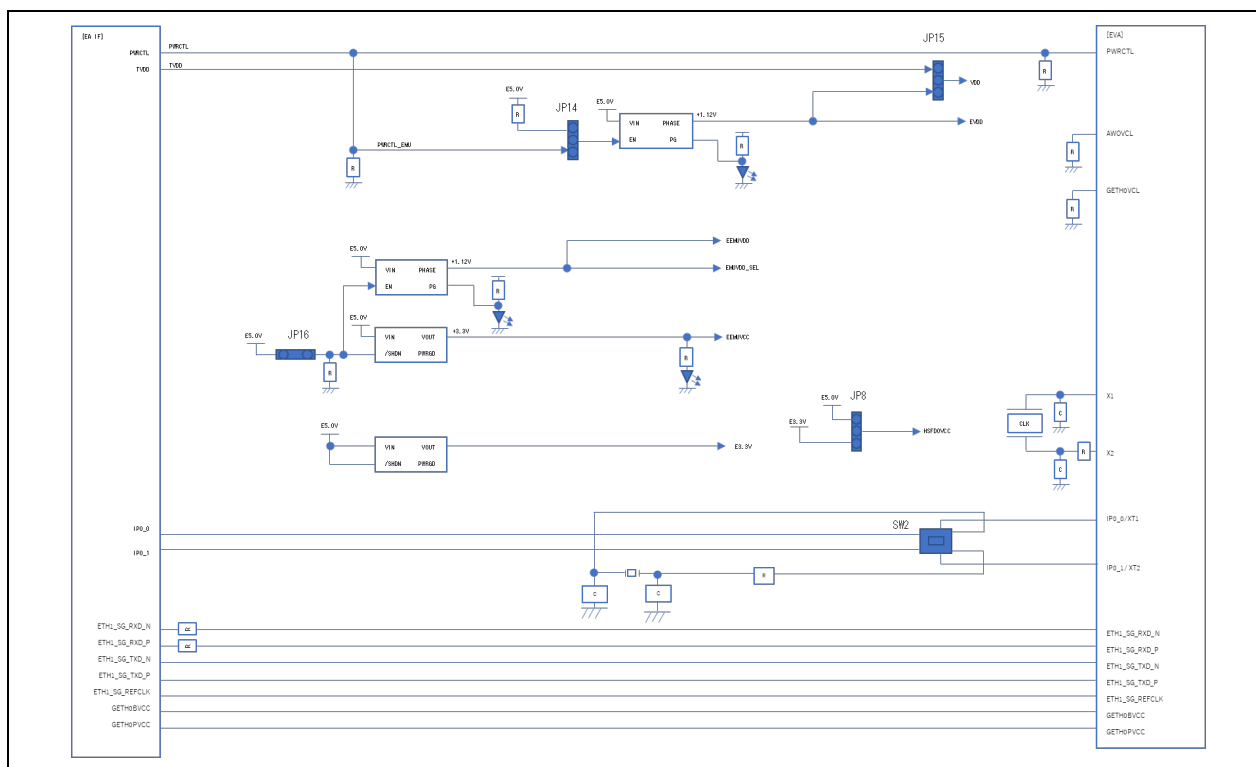


Figure 5-2 Equivalent Circuit of the Emulation Adapter (cont.)

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 user 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 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

A.1 Overview

An exchange adapter is an adapter board that connects the emulation adapter to the IC socket for the target device.

The following describes the specifications of the RTE7702600CBG292T000J and RTE7702606CBG292T000J exchange adapters for the FBGA292 package, the RTE7702614CFL144T000J exchange adapter for the HLQFP144 package, and the RTE7702613CFL100T000J exchange adapter for the HLQFP100 package.

For details, refer to Table 3-3 and Table 3-4.

A.2 Number of insertions and removals of the connector

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

A.3 How to use the emulation adapter

The emulation adapter can be connected to the user system via the exchange adapter through the following procedure. For the BGA package, align the positions of pin 1 as shown in Figure A-1.

1. Mount the target connector (BSSOCKET) on the user 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.

For the QFP package, align the positions of pin 1 as shown in Figure A-2.

1. Mount the target connector (NQPACK) on the user system.
2. Connect the emulator connector (YQPACK) to the target connector (NQPACK).
3. Affix the emulator connector (YQPACK) and the target connector (NQPACK) to each other by using four YQGUIDE screws.
4. Connect the exchange adapter to the emulator connector (YQPACK).
 - If adjustment of the height is required, use the space adapter (YQSOCKET).
 - Confirm that the contact pins are not bent.

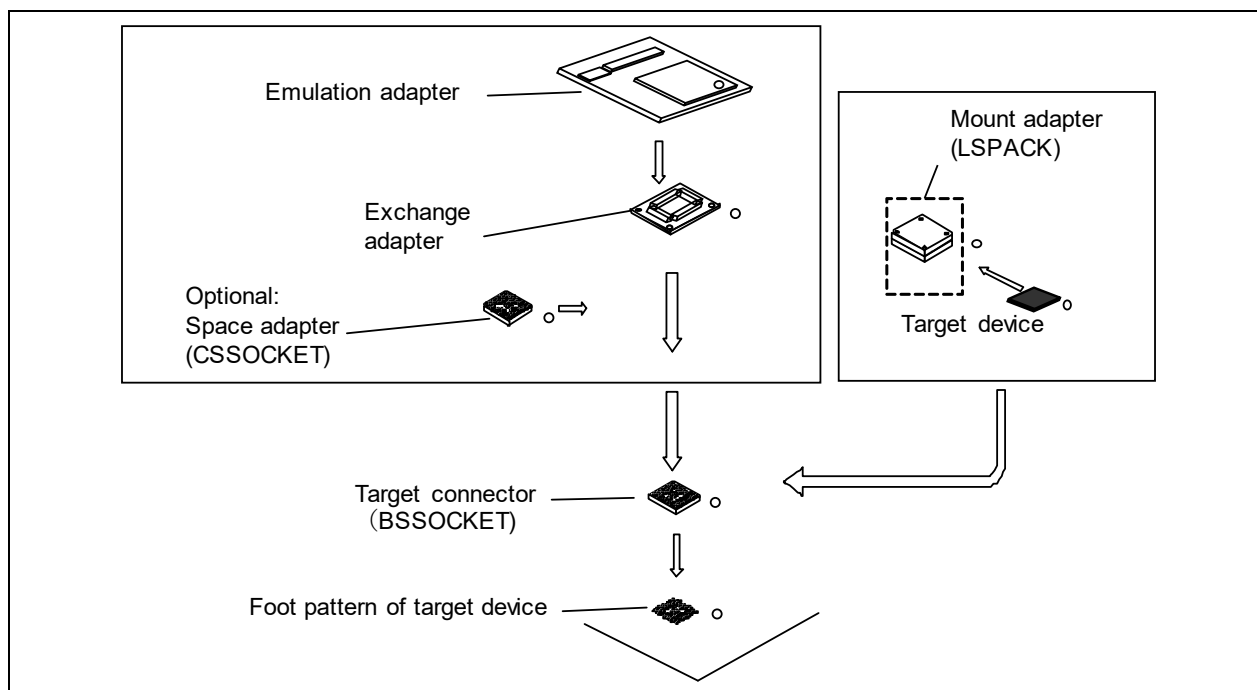


Figure A-1 Connecting the Emulation Adapter for the BGA Package

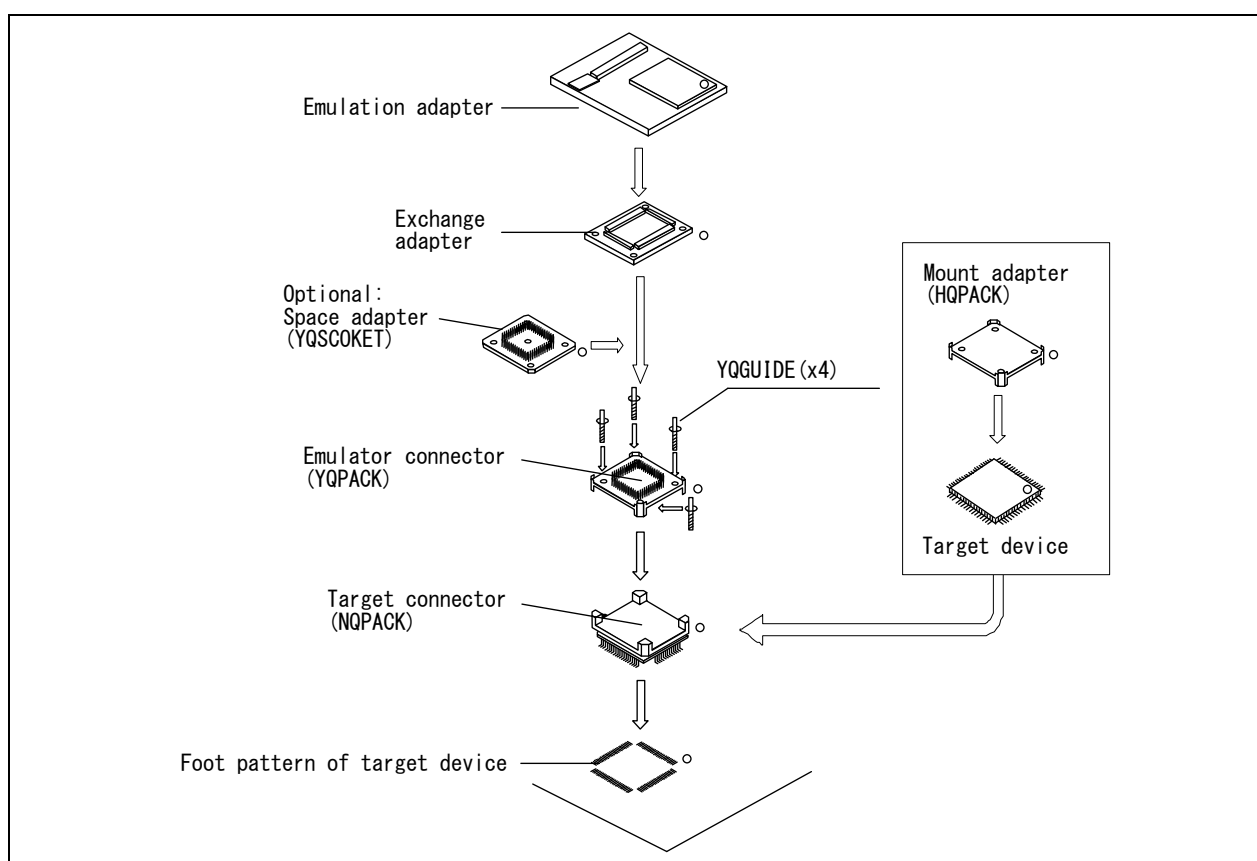


Figure A-2 Connecting the Emulation Adapter for the QFP Package

A.4 Switch and Jumper Settings

Set the switches and jumpers on the exchange adapter and emulation adapter according to Table A-1.

When JP1 (VDD_SEL) is set to 2–3 short, the VDD of the debug chip is connected to the VDD power supply of the user system.

However, since the connection is made through the connectors and PCBs of the emulation adapter and exchange adapter, a voltage drop may occur on VDD, which may prevent the debug chip from operating properly.

If the debug chip does not operate properly, set JP1 (VDD_SEL) to 1–2 short.

Table A-1 Switch and Jumper Settings for the Exchange Adapter and Emulation Adapter

Exchange Adapter	Device Core Power Supply	Exchange Adapter SW1	Emulation Adapter JP1(VDD_SEL)
RTE7702600CBG292T000J RTE7702606CBG292T000J	DPS	None	1-2 short-circuit or 2-3 short-circuit
	eVR	None	1-2 short-circuit
RTE7702614CFL144T000J	DPS	DPS(VDD) side	1-2 short-circuit or 2-3 short-circuit
	eVR	eVR(VCC) side	1-2 short-circuit
RTE7702613CFL100T000J	DPS	DPS(VDD) side	1-2 short-circuit or 2-3 short-circuit
	eVR	eVR(VCC) side	1-2 short-circuit

CAUTION

Switch SW1 and Jumper JP1 (VDD_SEL) Settings:



The VDD supplied to the debug chip is determined by the settings of switch SW1 and jumper JP1 (VDD_SEL).
Incorrect settings may cause damage to the emulation adapter and may result in smoke or fire.
Ensure that the settings are correct before use.

A.5 Dimensions

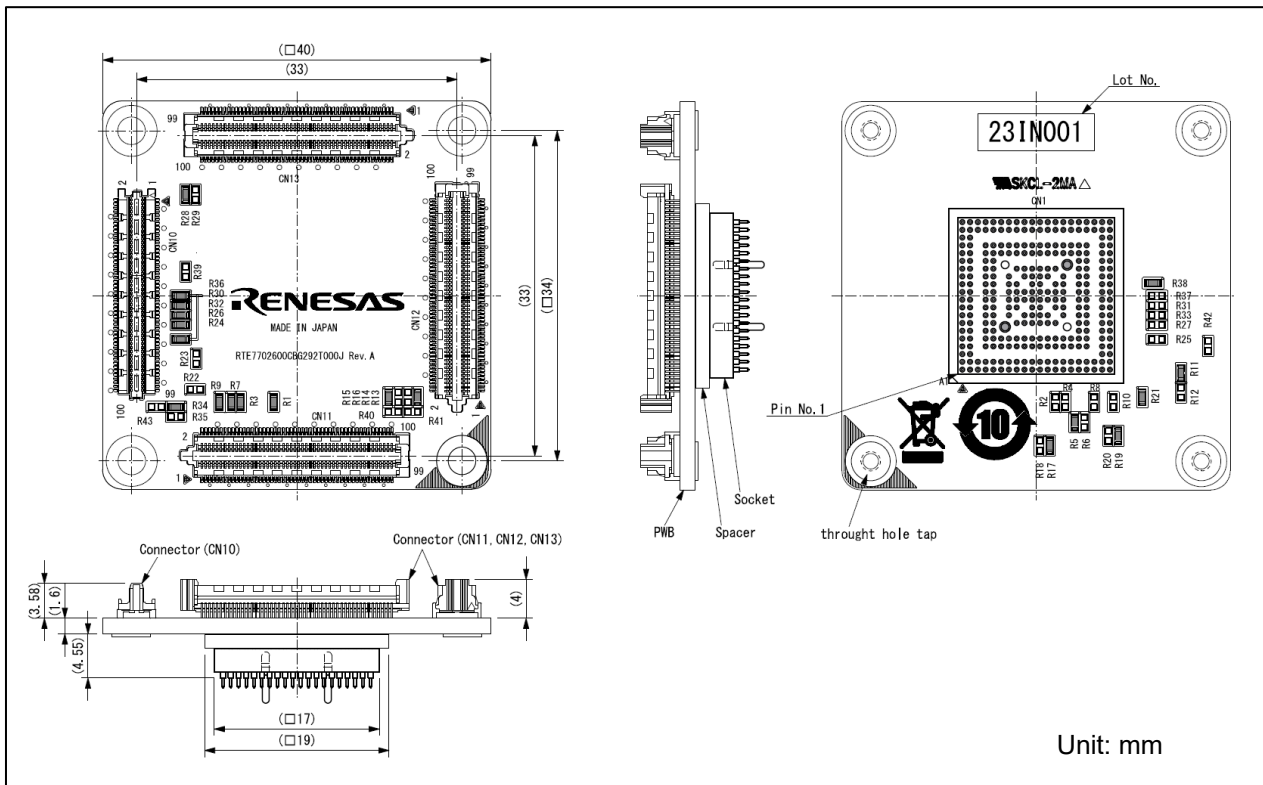


Figure A-3 Dimensions of RTE7702600CBG292T000J and RTE7702606CBG292T000J (FBGA292)

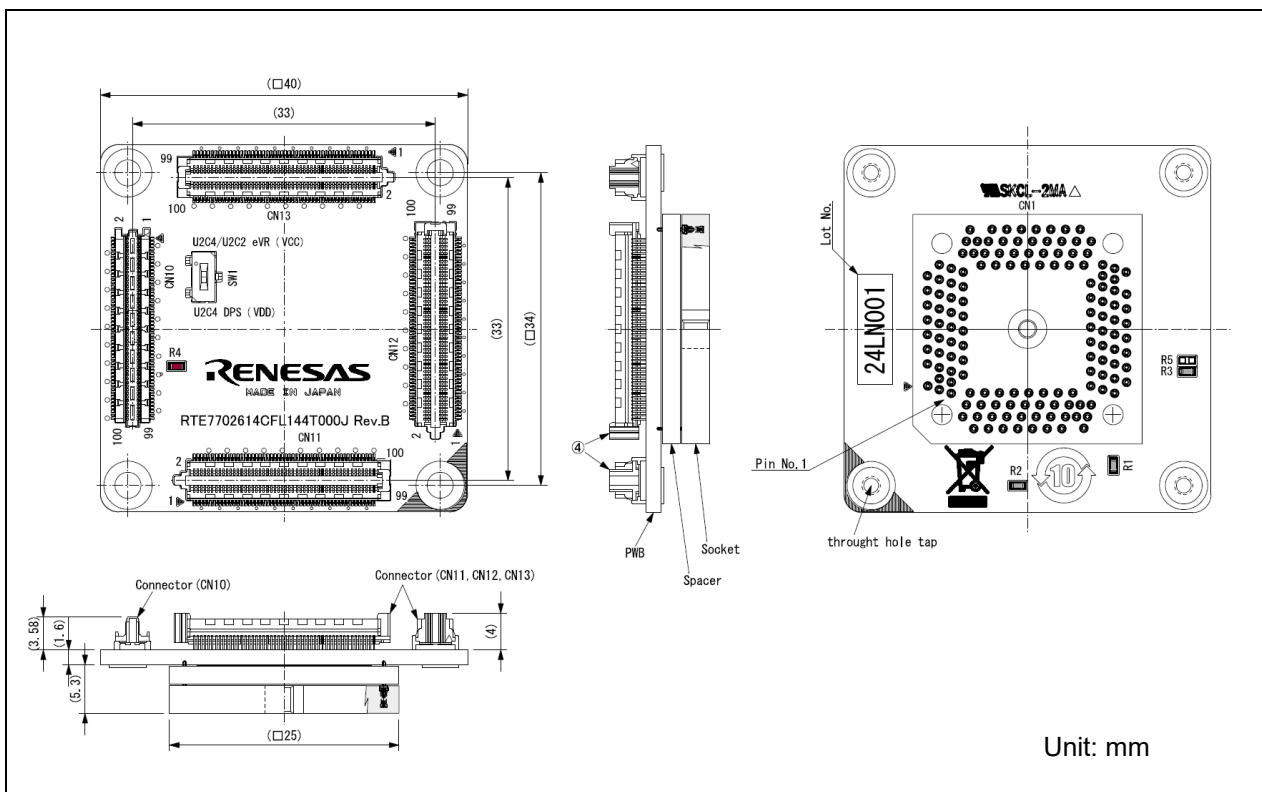


Figure A-4 Dimensions of RTE7702614CFL144T000J (HLQFP144)

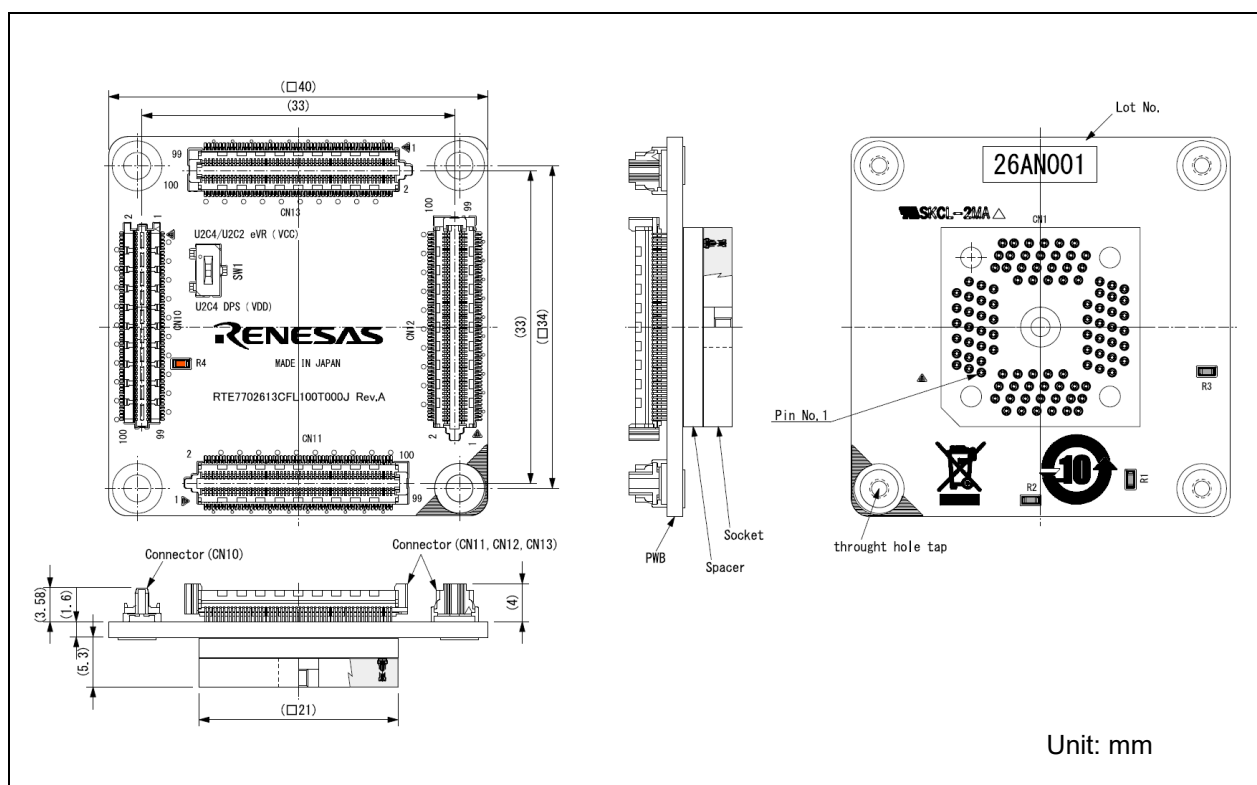


Figure A-5 Dimensions of RTE7702613CFL100T000J (HLQFP100)

A.6 Equivalent circuits

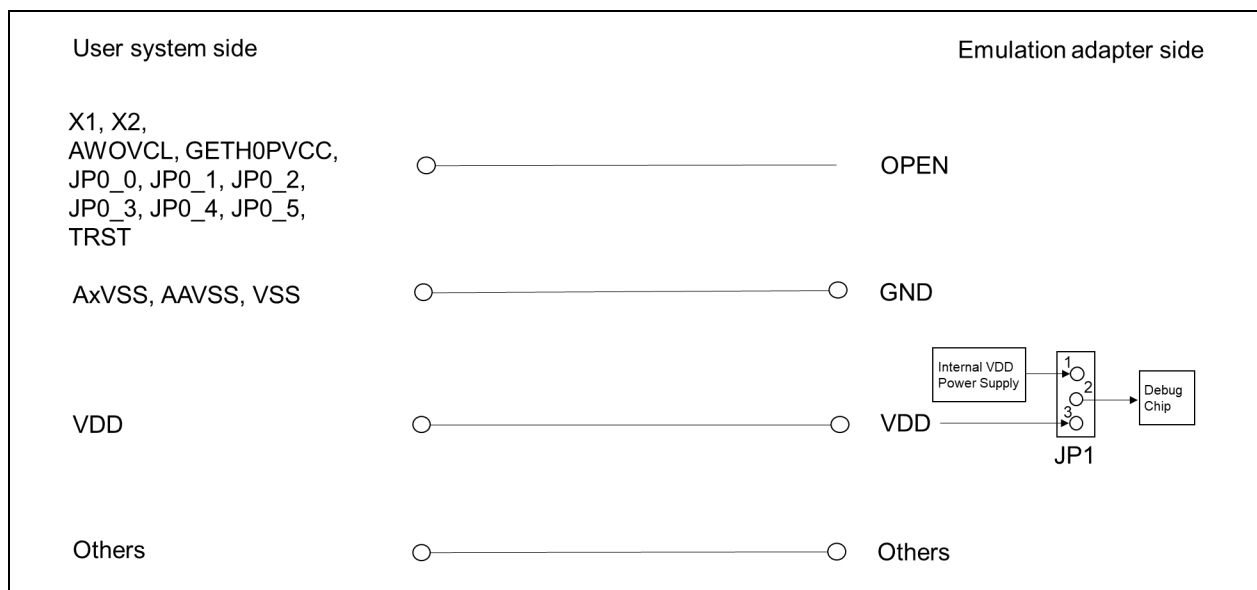


Figure A-6 Equivalent Circuit for RTE7702600CBG292T000J

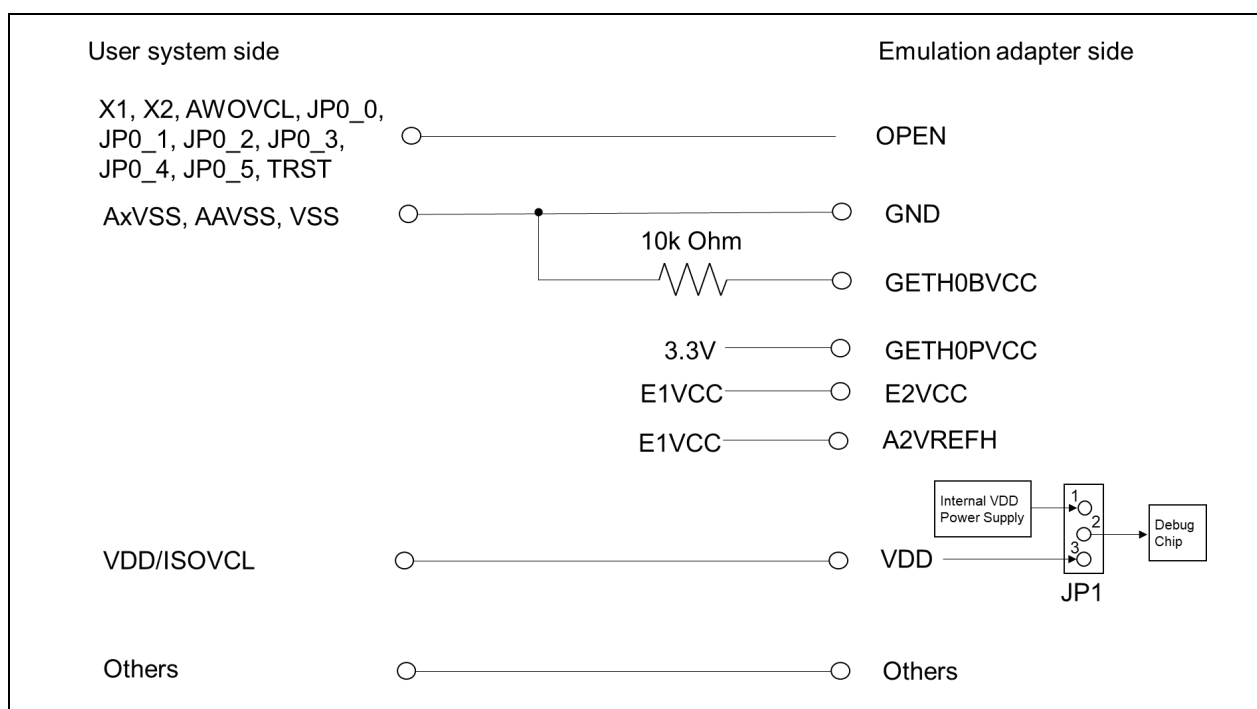


Figure A-7 Equivalent Circuit for RTE7702606CBG292T000J

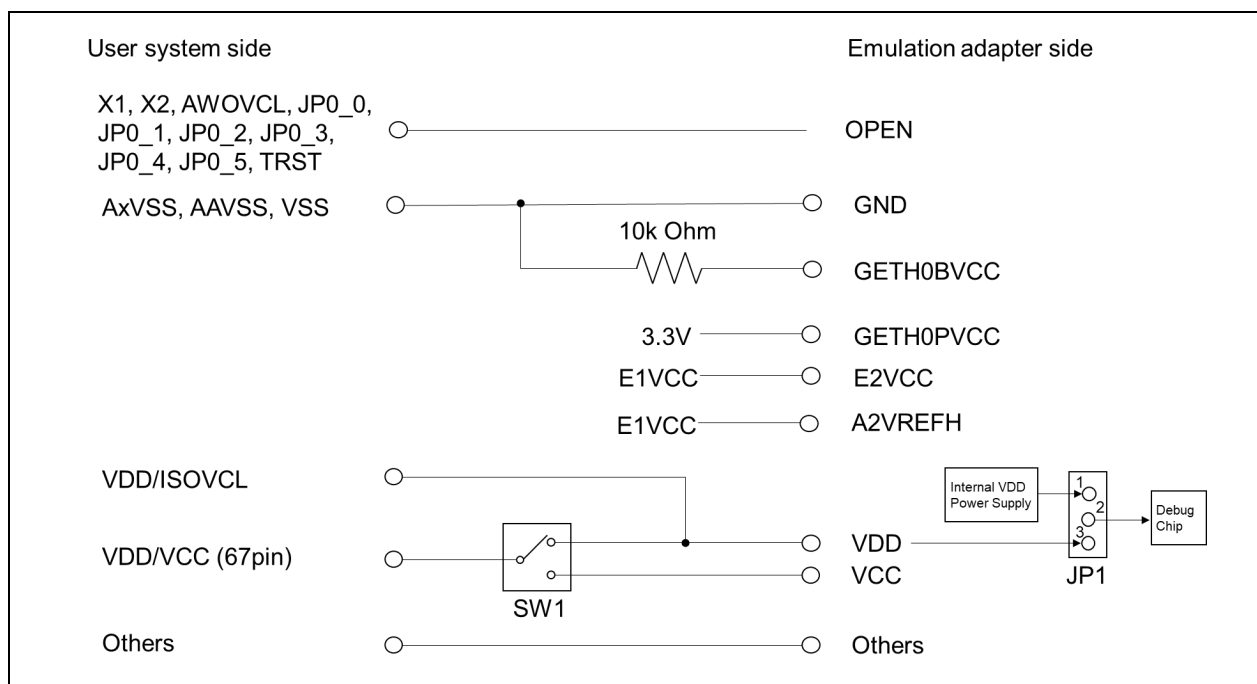


Figure A-8 Equivalent Circuit for RTE7702614CFL144T000J

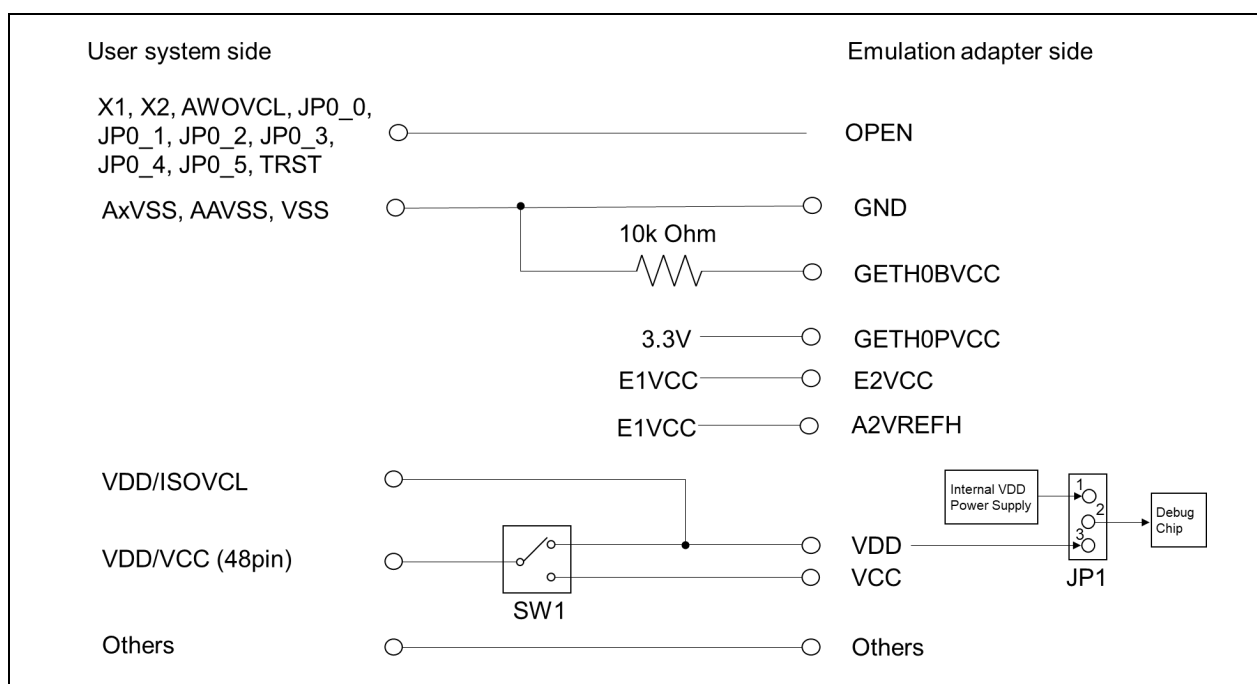


Figure A-9 Equivalent Circuit for RTE7702613CFL100T000J

Revision History	Emulation Adapter for the RH850/U2C Manual
------------------	--

Rev.	Date	Description	
		Page	Summary
0.90	Jul.31.25	—	First Edition issued
1.00	Jun.30.26	—	Appendix A Added RTE7702613CFL100T000J.

Emulation Adapter for the RH850/U2C Manual

Publication Date: Rev.1.00 Jun.30.26

Published by: Renesas Electronics Corporation

Emulation Adapter for the RH850/U2C

Manual



Renesas Electronics Corporation

R20UT5482EJ0100