To our customers,

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April 1st, 2010
Renesas Electronics Corporation

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User's Manual

SH72531 SH72531FCC User-System Interface Converter Board

R0E572531CFK10 User's Manual

Renesas Microcomputer Development Environment System

SuperH™ Family / SH72531 SH72531FCC

Renesas Electronics
www.renesas.com

Rev.1.00 2008.11

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IMPORTANT INFORMATION

READ FIRST

• READ this user's manual before using this emulator product.

• KEEP the user's manual handy for future reference.

Do not attempt to use the emulator product until you fully understand its mechanism.

Emulator Product:

Throughout this document, the term "emulator product" shall be defined as the following products produced only by Renesas Technology Corp. and Renesas Solutions Corp. excluding all subsidiary products.

- E200F main unit
- Expansion AUD trace unit
- Evaluation-chip unit
- Emulation memory unit
- User-system interface converter board
- Trace cable

The user system or a host computer is not included in this definition.

Purpose of the User-System Interface Converter Board:

The user-system interface converter board is used to connect the evaluation chip unit to the user system. This user-system interface converter board must only be used for the above purpose.

Limited Applications:

This emulator product is not authorized for use in transportation, vehicular, medical (where human life is potentially at stake), aerospace, nuclear, or undersea repeater applications. Buyers of this emulator product must notify Renesas Technology Corporation, Renesas Solutions Corporation or an authorized Renesas Technology product distributor before planning to use the product in such applications.

Improvement Policy:

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Target User of the Emulator Product:

This emulator product should only be used by those who have carefully read and thoroughly understood the information and restrictions contained in the user's manual. Do not attempt to use the emulator product until you fully understand its mechanism.

It is highly recommended that first-time users be instructed by users that are well versed in the operation of the emulator product.

Users are required to be familiar with the basic knowledge for the electric circuits, logic circuits, and microcomputers.

Precautions to be Taken when Using This Product:

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

2. In no event shall Renesas Solutions Corporation be liable for any consequence arising from the use of this emulator.

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

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

5. This emulator does not conform to safety standards such as UL or IEC. Be careful when you take this emulator overseas.

6. Renesas cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this user's manual and on the emulator product are therefore not all inclusive. Therefore, you must use the emulator product safely at your own risk.

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The Warranty is Void in the Following Cases:

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Figures:

Some figures in this user's manual may show items different from your actual system.

SAFETY PAGE

READ FIRST

• READ this user's manual before using this emulator product.

• KEEP the user's manual handy for future reference.

Do not attempt to use the emulator product until you fully understand its mechanism.

DEFINITION OF SIGNAL WORDS

Either in the user's manual or on the product, several icons are used to insure proper handling of this product and also to prevent injuries to you or other persons, or damage to your properties. Their graphic images and meanings are given in this safety page. Be sure to read this chapter before using the product.

This is the safety alert symbol. It is used to alert you to potential personal injury hazards. Obey all safety messages that follow this symbol to avoid possible injury or death.

⚠ DANGER **DANGER** indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING **WARNING** indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION **CAUTION** indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

CAUTION **CAUTION** used without the safety alert symbol indicates a potentially hazardous situation which, if not avoided, may result in property damage.

NOTE emphasizes essential information.

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

 means WARNING or CAUTION.

Example:  CAUTION AGAINST AN ELECTRIC SHOCK

 means PROHIBITION.

Example:  DISASSEMBLY PROHIBITED

 means A FORCIBLE ACTION.

Example:  UNPLUG THE POWER CABLE FROM THE RECEPTACLE.

⚠ WARNING

Warnings for AC Power Supply:

• If the attached AC power cable does not fit the receptacle, do not alter the AC power cable and do not plug it forcibly. Failure to comply may cause electric shock and/or fire.

• Use an AC power cable which complies with the safety standard of the country.

• Do not touch the plug of the AC power cable when your hands are wet. This may cause electric shock.

• This product is connected signal ground with frame ground. If your developing product is transformless (not having isolation transformer of AC power), this may cause electric shock. Also, this may give an unrepairable damage to this product and your developing one.

While developing, connect AC power of the product to commercial power through isolation transformer in order to avoid these dangers.

• If other equipment is connected to the same branch circuit care should be taken not to overload the circuit. Refer to nameplate for electrical ratings.

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

⚠ WARNING

• If you smell a strange odor, hear an unusual sound, or see smoke coming from this product, then disconnect power immediately by unplugging the AC power cable from the outlet.

Do not use this as it is because of the danger of electric shock and/or fire. In this case, contact your local distributor.

• When installing or connecting this product with other equipment, shut down AC power or disconnect the AC power cord from the equipment to prevent personal injury or damage to the equipment.

Warnings to Be Taken for This Product:

• Do not disassemble or modify this product. Personal injury due to electric shock may occur if this product is disassembled and modified.

• Make sure nothing falls into the cooling fan on the top panel, especially liquids, metal objects, or anything combustible.

Warning for Installation:

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

Warning for Use Environment:

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

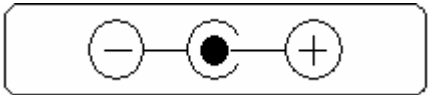
⚠ CAUTION

Cautions for AC Adapter:

• Use only the AC adapter included in this product package.

• The included AC adapter is for this emulator. Do not use it for other product.

• The DC plug on the included AC adapter has the below polarity.



• The included AC adapter has no power supply switch. The AC adapter is always active while connecting the AC power cable. Check if the power is supplied by the LED of AC adapter.

Cautions to Be Taken for This Product:

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

• Do not pull the main unit by the probe of the emulation probe or the flexible cable which are connected to this product. Excessive flexing or force of the flexible cable for connecting this product to the emulation probe may break connector.

Caution for Installation:

• When in use do not place the emulator on its side.

⚠ WARNING

Observe the precautions listed below. Failure to do so will result in a FIRE HAZARD and will damage the user system and the emulator product or will result in PERSONAL INJURY. The USER PROGRAM will be LOST.

1. **Do not repair or remodel the emulator product by yourself for electric shock prevention and quality assurance.**
2. **Always switch OFF the E200F emulator and user system before connecting or disconnecting any CABLES or PARTS.**
3. **Always before connecting any CABLES, make sure that pin 1 on both sides are correctly aligned.**

Preface

The R0E572531CFK10 is a user-system interface converter board that connects a user system for the SH72531, SH72531FCC PLQP0176KB-A package (former package: QFP-176) to the SH72546RFCC, SH72544R, SH72543R, SH72531, and SH72531FCC E200F emulator (R0E0200F1EMU00 or R0E572546VKK00).

Contents

Section 1 Configuration

Figure 1 and table 1 show the external appearance and components, respectively, of the user-system interface converter board. Please make sure you have all of these components when you unpack the product.

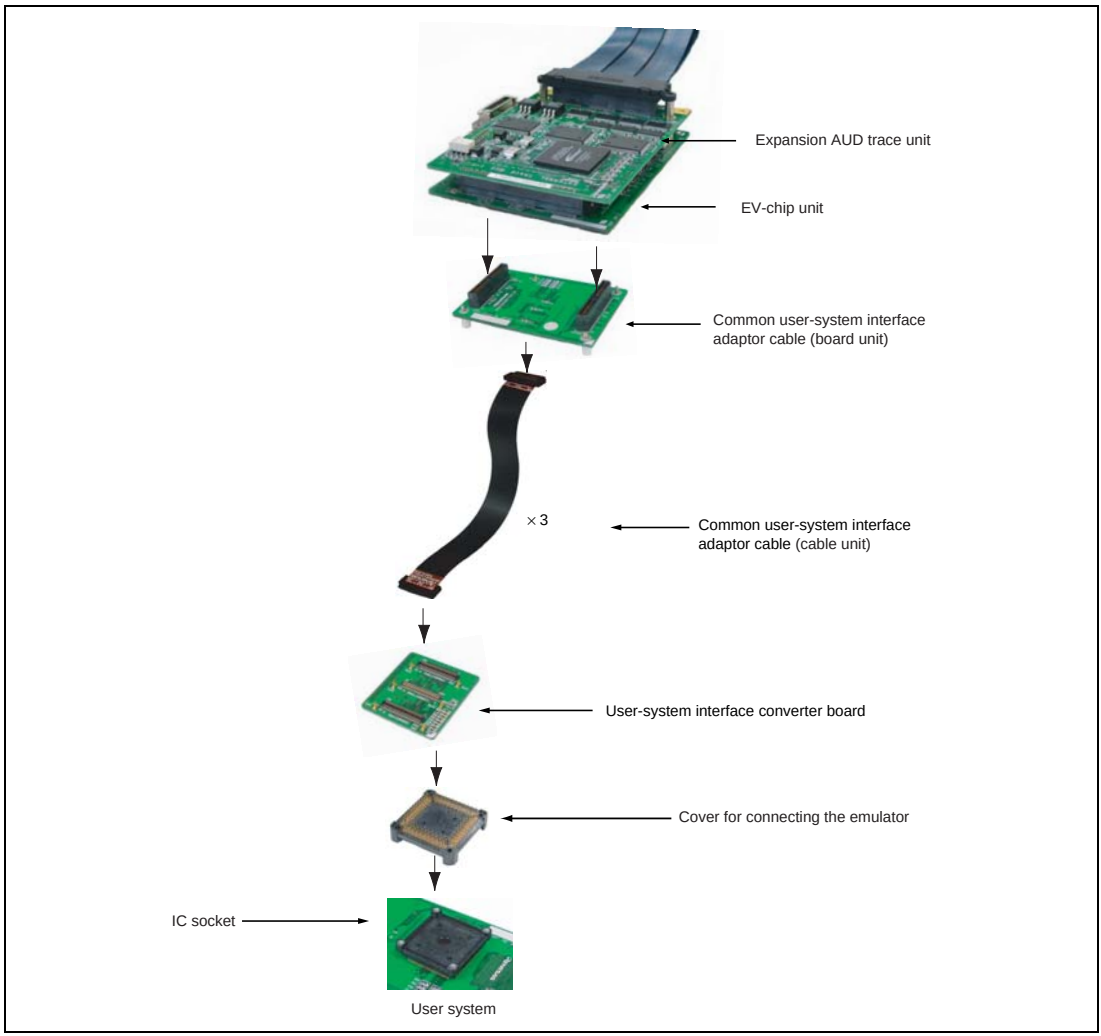


Figure 1 External Appearance of the User-System Interface Converter Board

CAUTION

Use an NQPACK176SD-ND socket (manufactured by Tokyo Eletech Corporation), and a YQPACK176SD cover (manufactured by Tokyo Eletech Corporation) for the PLQP0176KB-A package for the IC socket and the cover for connection with the emulator, respectively, on the user system.

The common user-system interface adaptor cable required to connect the user-system interface converter board to the emulator (R0E200F1CKL10) must be provided separately.

Table 1 R0E572531CFK10 Components

No.	Component	Quantity	Remarks
1	User-system interface converter board	1	R0E572531CFK10
2	IC socket	1	NQPACK176SD-ND For the PLQP0176KB-A package (to be mounted on the user system) Accessories: NQ-Guide × 3 Screwdriver × 1 Positioning seal × 1
3	Cover for connecting the emulator	1	YQPACK176SD For the PLQP0176KB-A package (for connecting the user system) Accessories: 10-mm M2 screws × 4 (not used in this product)
4	IC socket top cover	1	HQPACK176SD For the PLQP0176KB-A package (for installing the MCU) Accessories: 6-mm M2 screws× 4
5	YQGUIDE-S1	4	Screws for affixing the cover for use in connection with the emulator
6	Slotted screwdriver	1	
7	User's manual	1	User's manual for R0E572531CFK10 (this manual)

Section 2 Environmental Conditions

Maintain the conditions in table 2 when using the emulator.

Table 2 Environmental Conditions

Item	Specifications
Temperature	Operating: +10 to +35°C Storage: -10 to +35°C
Humidity	Operating: 35 to 80% RH, no condensation Storage: 35 to 80% RH, no condensation
Vibration	Operating: 2.45 m/s^2 max. Storage: 4.9 m/s^2 max. Transportation: 14.7 m/s^2 max.
Ambient gases	There must be no corrosive gases present.

Section 3 Connection Procedures

3.1 Connecting User System Interface Cable to User System

⚠ WARNING

Always switch OFF the user system and the emulator product before the USER SYSTEM INTERFACE CABLE is connected to or removed from any part. Before connecting, make sure that pin 1 on both sides are correctly aligned. Failure to do so will result in a FIRE HAZARD and will damage the user system and the emulator product or will result in PERSONAL INJURY. The USER PROGRAM will be LOST.

3.1.1 Installing the IC Socket

Solder the IC socket (NQPACK176SD-ND) to the user system.

CAUTION

Check the location of pin 1 and mount it.

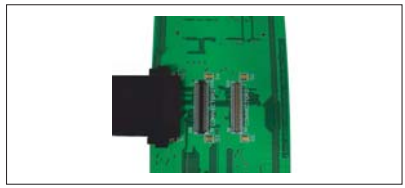
3.1.2 Assembling the user system interface cable

CAUTION

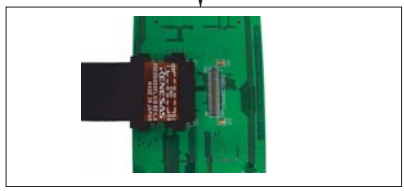
Check the location of pin 1 and the connector number before insertion.

Connecting the user system interface cable

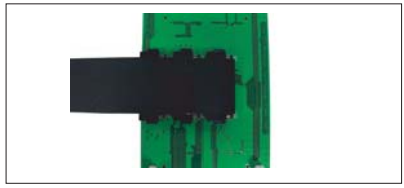
Connect the common user-system interface adaptor cable (board unit) for the user-system interface converter board via the common user-system interface adaptor cable (cable unit), as shown in Figure 2.



Connect the common user-system interface adaptor cable (cable unit)
to CONNECTOR1 of the common user-system interface adaptor cable (board unit) as shown below.



Then connect the common user-system interface adaptor cable (cable unit) to CONNECTOR2.

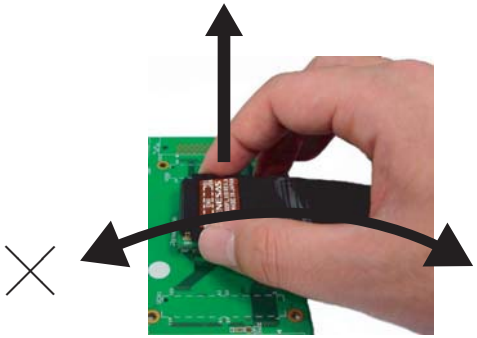


Connect the common user-system interface adaptor cable (cable unit) to CONNECTOR3.

Connect the common user-system interface adaptor cable (cable unit) with the user-system interface converter board via the common user-system interface adaptor cable (board unit) by aligning the connector numbers on those boards.

Figure 2 Assembling the User System Interface Cable

Removing the common user-system interface adaptor cable (cable unit)



When removing the common user-system interface adaptor cable (cable unit) from a converter board or an adaptor board, keep the board in place, hold both sides of the connector at the head of the cable, and apply vertical force to pull the cable away. If the join is stiff so that the cable is dificult to remove, pull the cable head up from the right or left side. Do not apply pressure in the direction marked "X", since this will damage the connector.

Figure 3 Removing the Common User-System Interface Adaptor Cable (Cable Unit)

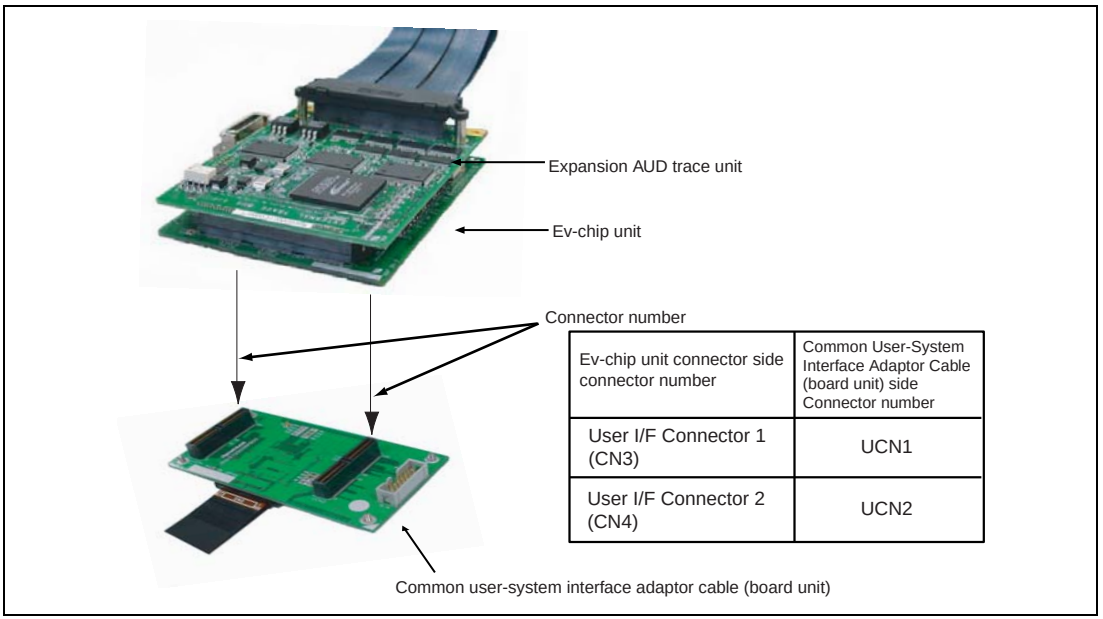
3.1.3 Connecting Common User-System Interface Adaptor Cable (Board Unit) to the EV-Chip Unit

⚠ WARNING

Observe the precautions listed below. Failure to do so will result in a FIRE HAZARD and will damage the user system and the emulator product or will result in PERSONAL INJURY. The USER PROGRAM will be LOST.

1. **Always switch OFF the user system and the emulator product before the USER SYSTEM INTERFACE CABLE is connected to or removed from any part. Before connecting, make sure that pin 1 on both sides are correctly aligned.**
2. **The user system interface cable dedicated to the emulator must be used.**

1. Make sure the user system and emulator are turned off.
2. Align the connectors on the common user-system interface adaptor cable (board unit) with those on the EV-chip unit according to their numbers (figure 4).
3. Use the spacers attached to the common user-system interface adaptor cable (board unit) to adjust the height to match the situation of the user system.



Ev-chip unit connector side connector number	Common User-System Interface Adaptor Cable (board unit) side Connector number
User I/F Connector 1 (CN3)	UCN1
User I/F Connector 2 (CN4)	UCN2

Figure 4 Connecting Common User-System Interface Adaptor Cable (Board Unit) to EV-Chip Unit

3.1.4 Installing to the IC Socket

CAUTION

1. **Check the location of pin 1 before insertion.**
2. **Use the provided screwdriver to tighten screws. Do not use the screw (M2, 10mm) that are provided with the cover for connecting the emulator.**
3. **The tightening torque must be 0.054 N·m or less. If accurate measurement of the applied torgue is not possible, stop tightening when the force required to turn the screw becomes significantly greater than for the initial tightening. If a screw is tightened too much, the screw head may break or a faulty contact may be caused by cracks in the IC socket solder.**
4. **If the MCU does not operate correctly, the solder might have been cracked. Check conduction with a tester and re-solder the IC socket if this is required.**

Use the provided cover for connecting the emulator to fasten the user-system interface converter board to the IC socket for a PLQP0176KB-A package on the user system. Apply vertical force to fasten the parts together. Take particular care to align the positions of pin 1 and the guide pin and to avoid the application of twisting force that might damage the soldered IC socket.

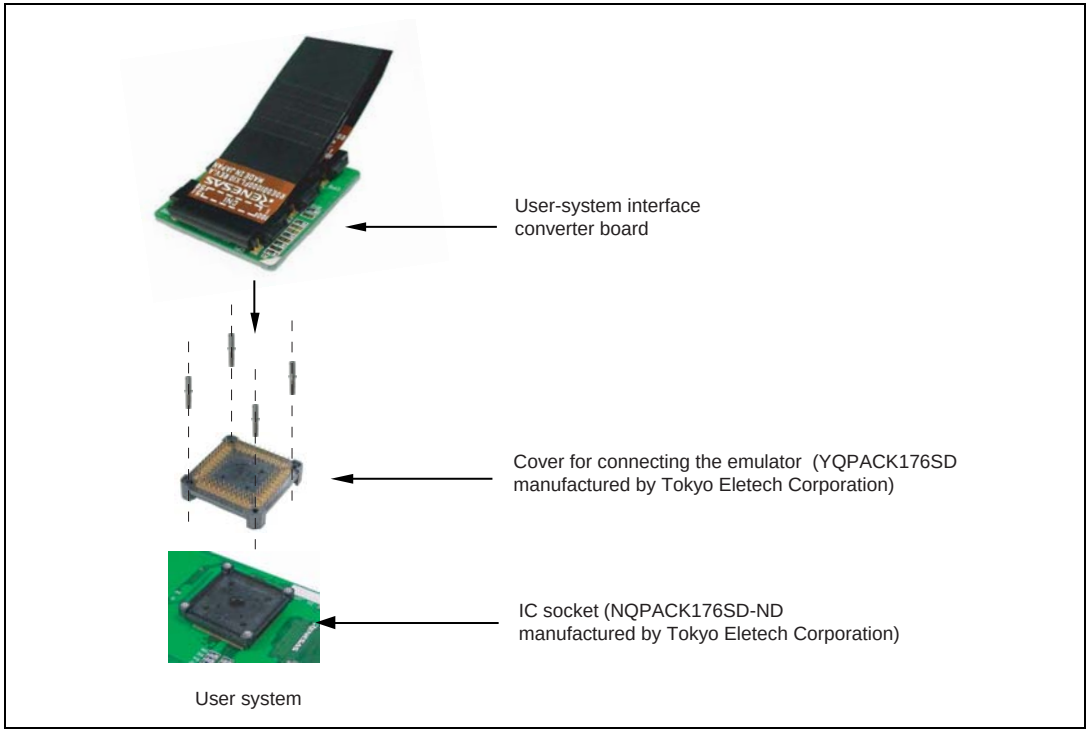


Figure 5 Connecting the User System and User-system Interface Converter Board

3.1.5 Mounting MCU on the IC Socket

CAUTION

1. **Check the location of pin 1 before insertion.**
2. **Use the screw (M2, 6mm) and screwdriver provided with the IC socket to mount the MCU in the IC socket.**
3. **The tightening torque must be 0.054 N·m or less. If accurate measurement of the applied torque is not possible, stop tightening when the force required to turn the screw becomes significantly greater than for the initial tightening. If a screw is tightened too much, the screw head may break or a faulty contact may be caused by cracks in the IC socket solder.**
4. **If the MCU does not operate correctly, the solder might have been cracked. Check conduction with a tester and re-solder the IC socket if this is required.**

When mounting the MCU in the IC socket on the user system, confirm that pin 1 of the MCU is in the correct position and then fasten the cover with screws. Use the cover provided for connecting the emulator to fasten the user-system interface converter board to the IC socket for a PLQP0176KB-A package on the user system. Take particular care to align the positions of pin 1 and the guide pin and to avoid the application of twisting force that might damage the soldered IC socket.

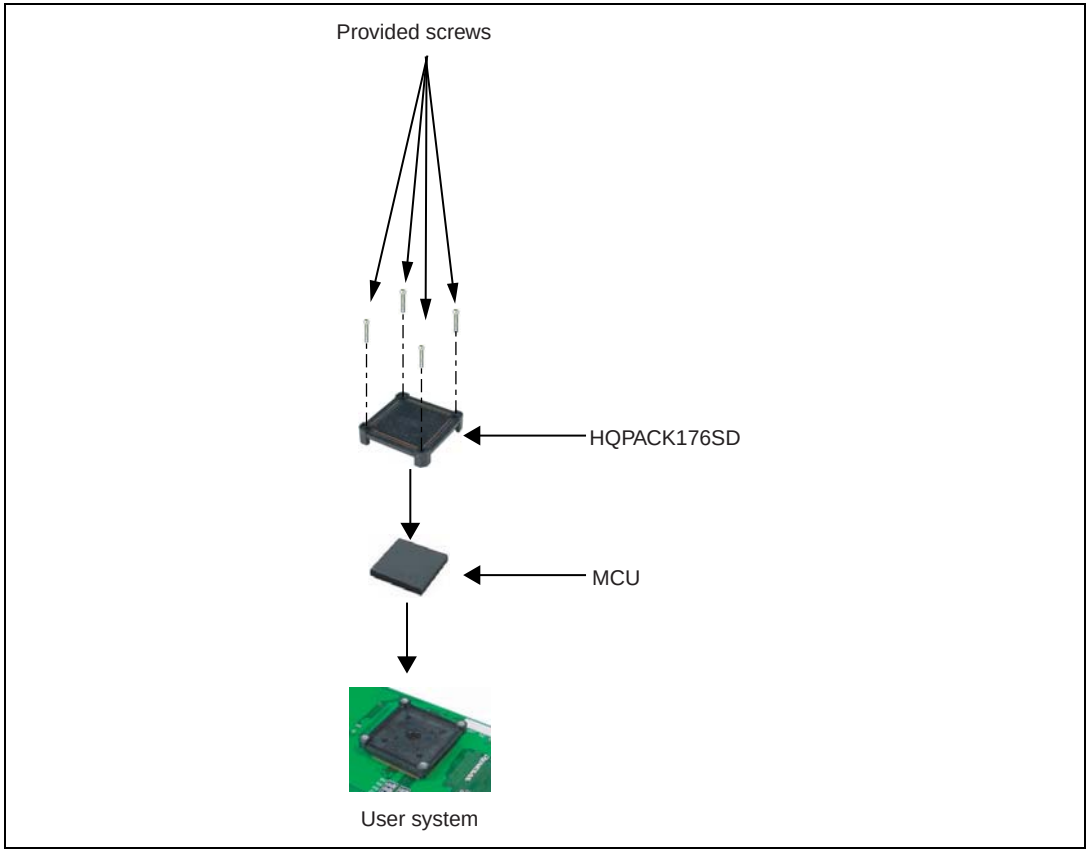
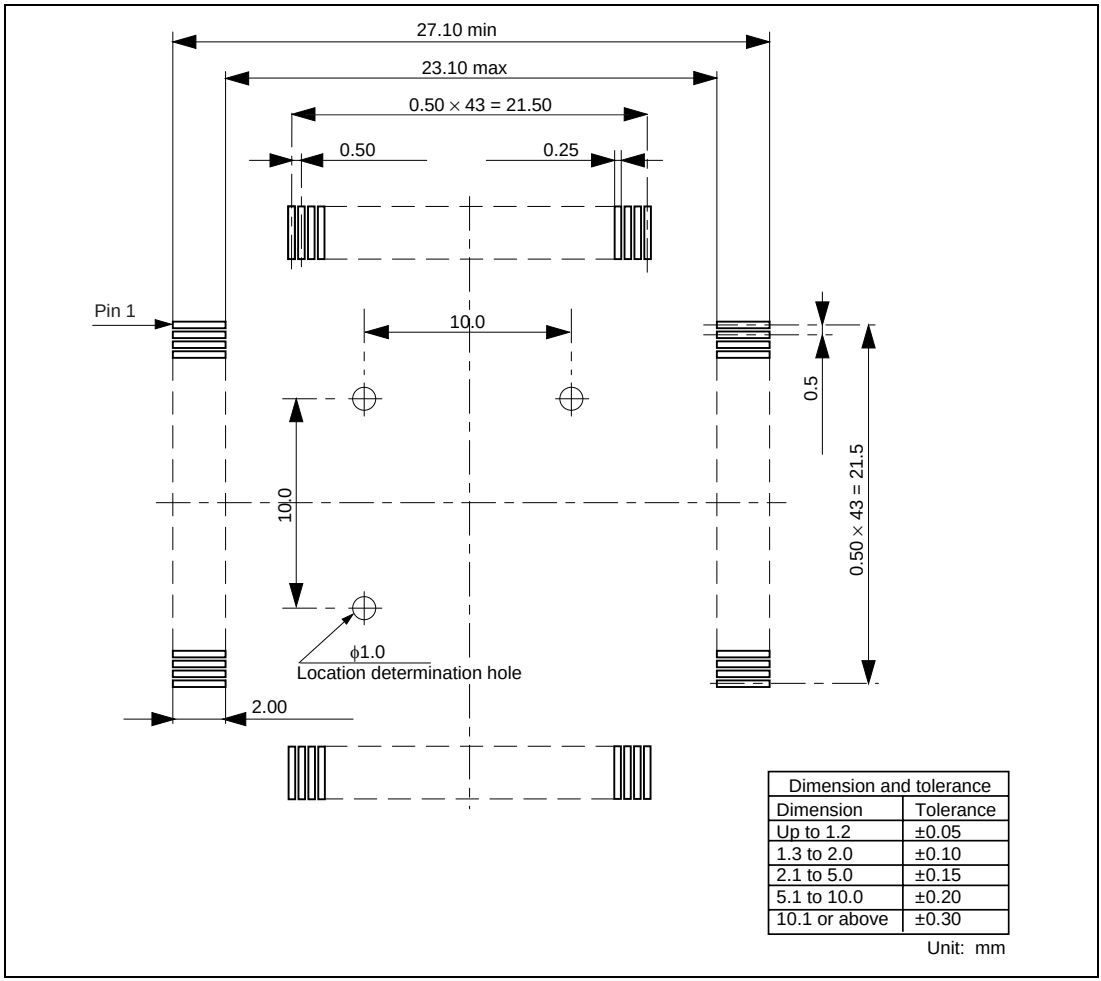


Figure 6 Mounting the MCU on the IC socket

3.2 Dimensions

3.2.1 Recommended Dimensions for User System Mount Pad (Footprint)

Figure 7 shows the recommended dimensions for the mount pad (footprint) for the user system with an IC socket for a PLQP0176KB-A package (NQPACK176SD-ND: manufactured by Tokyo Eletech Corporation).



Dimension and tolerance	
Dimension	Tolerance
Up to 1.2	±0.05
1.3 to 2.0	±0.10
2.1 to 5.0	±0.15
5.1 to 10.0	±0.20
10.1 or above	±0.30

Unit: mm

Figure 7 Recommended Dimensions for Mount Pad

3.2.2 External Dimensions

The external dimensions of the expansion AUD trace unit, emulation memory unit, EV-chip unit, common user-system interface adaptor cable (board unit), common user-system interface adaptor cable (cable unit), and the user-system interface converter board are shown in figure 8.

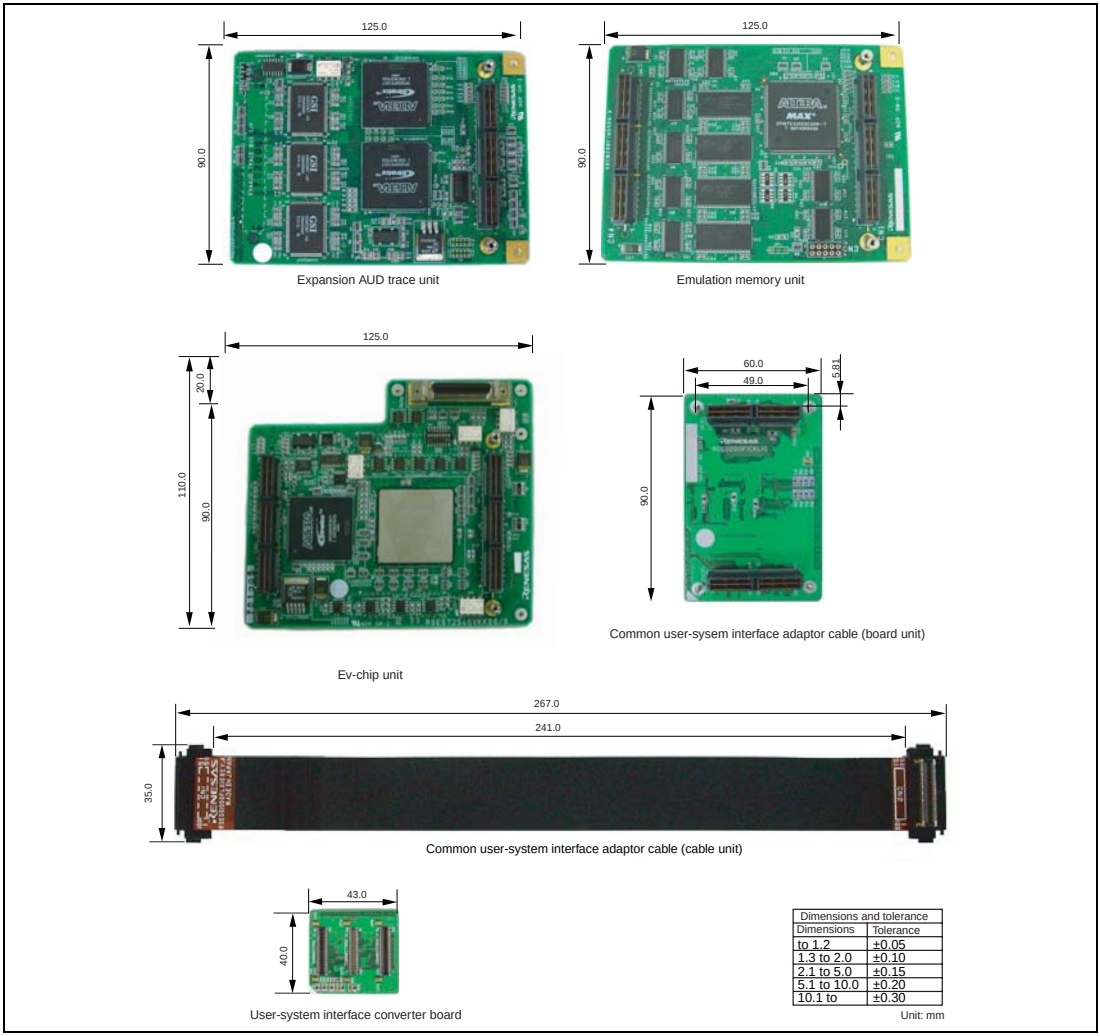
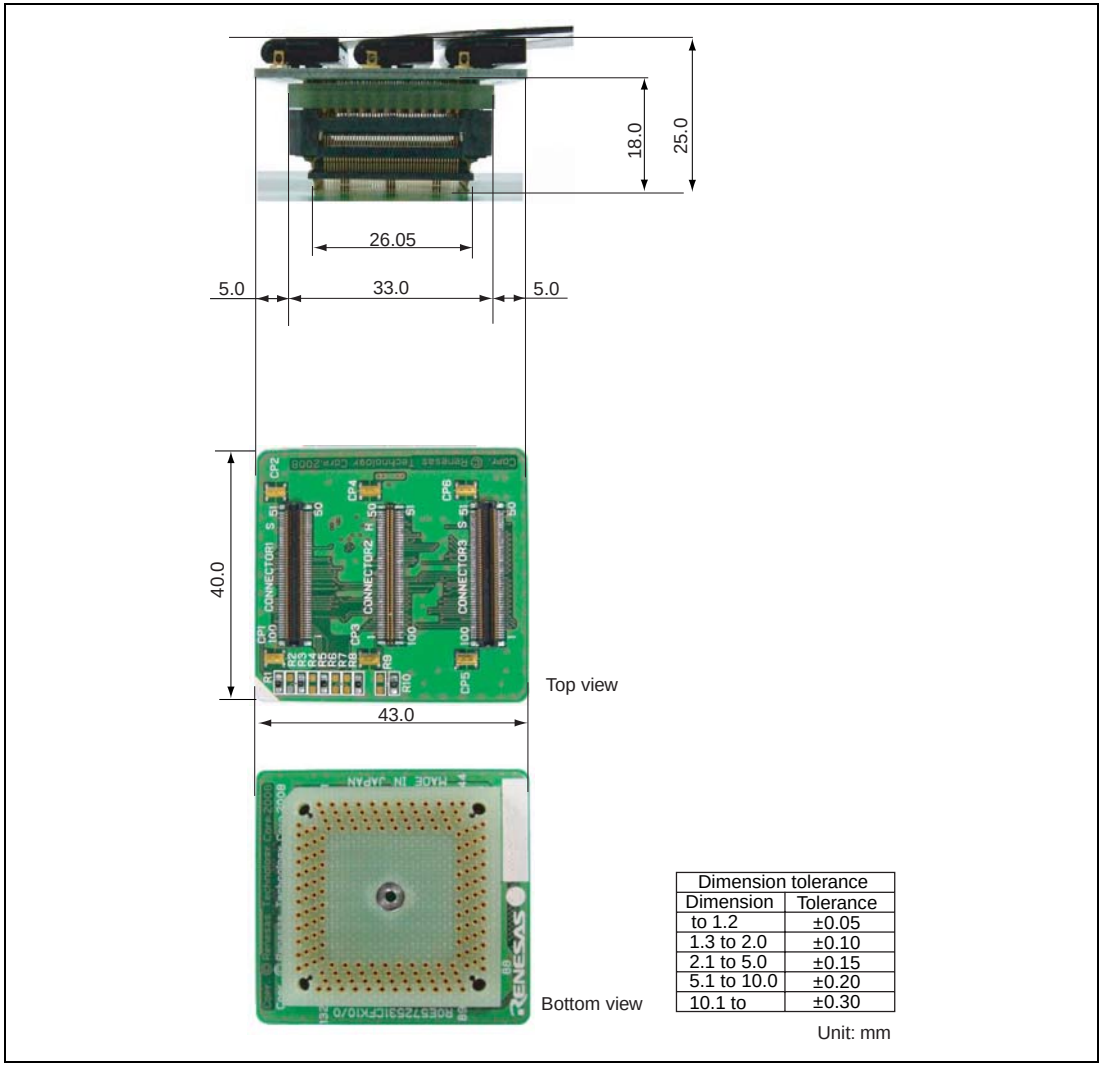


Figure 8 External Dimensions of the Expansion AUD Trace Unit, Emulation Memory Unit, EV-Chip Unit, Common User-System Interface Adaptor Cable (Board Unit), Common User-System Interface Adaptor Cable (Cable Unit), and the User-System Interface Converter Board

3.2.3 Dimensions of the User-system interface converter board when Connected

Dimensions of the user-system interface converter board when it is connected to the user system are shown in figure 9.



Dimension tolerance	
Dimension	Tolerance
to 1.2	±0.05
1.3 to 2.0	±0.10
2.1 to 5.0	±0.15
5.1 to 10.0	±0.20
10.1 to	±0.30

Figure 9 Dimensions for the User-System Interface Converter Board When Connected to the User System

3.3 Verifying Operation

1. Turn on the emulator according to the procedures described in the SH-2A, SH-2 E200F Emulator User's Manual, Supplementary Information on Using the SH72546RFCC, SH72544R, SH72543R, SH72531, and SH72531FCC (R0E0200F1EMU00E or R0E572546VKK00E).
2. The emulator connected to this user-system interface converter board supports two kinds of clock sources as the MPU clock. For details, refer to the Emulator User's Manual (R0E0200F1EMU00E).
   - To use the emulator internal clock

     Select the clock in the emulator by the CLOCK command (emulator command).
   - To use the external clock on the user system

Supply the external clock from the user system to the emulator by inputting the EXTAL pin (pin 104) on the user-system interface converter board. For details, refer to section 3, Clock Pulse Generator, in the SH72531 Hardware Manual.

Section 4 Notice

1. Before connecting any parts or cables, make sure that pin 1 on the both sides are correctly aligned.
2. Do not apply excessive force to the user-system interface converter board while it is connected to the user system.
3. The dimensions of the recommended mount pad for the IC socket for this user-system interface converter board are different from those of the MPU.
4. This user-system interface converter board is specifically designed for the SH72546RFCC, SH72544R, SH72543R, SH72531, and SH72531FCC E200F Ev-chip unit (R0E572546VKK00). Do not use this board with any other emulator.
5. When power is not supplied to the Vcc pin on the user-system interface converter board, the emulator displays ** VCC DOWN. The emulator will not operate correctly.

SH72531 SH72531FCC
User-System Interface Converter Board
User's Manual

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SH72531 SH72531FCC
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