

**SH7216 Group PLQP0176KB-A  
User System Interface Converter Board**

R0E572167CFK10 User's Manual

Renesas Microcomputer Development Environment System

SuperH™ Family / SH7216 Series

R0E572167CFK10E

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Renesas Technology

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Users Manual



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## 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
- External bus trace unit
- Evaluation-chip unit
- Profiling expansion unit
- Emulation memory unit
- Common user-system interface adaptor cable
- 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.

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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.
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**Figures:**

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



# SAFETY PAGE

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



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



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



**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 unreparable 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 the E200F emulator and user system OFF before connecting or disconnecting any CABLES or PARTS.**
- 3. Always before connecting any CABLES, make sure that the pin 1 positions on both sides are correctly aligned.**

# Preface

The R0E572167CFK10 is a user system interface converter board that connects a user system for the SH7216 in the PLQP0176KB-A package (Former package code: FP-176EV) to the SH7216 E200F emulator (R0E0200F1EMU00 or R0E572160VKK00).





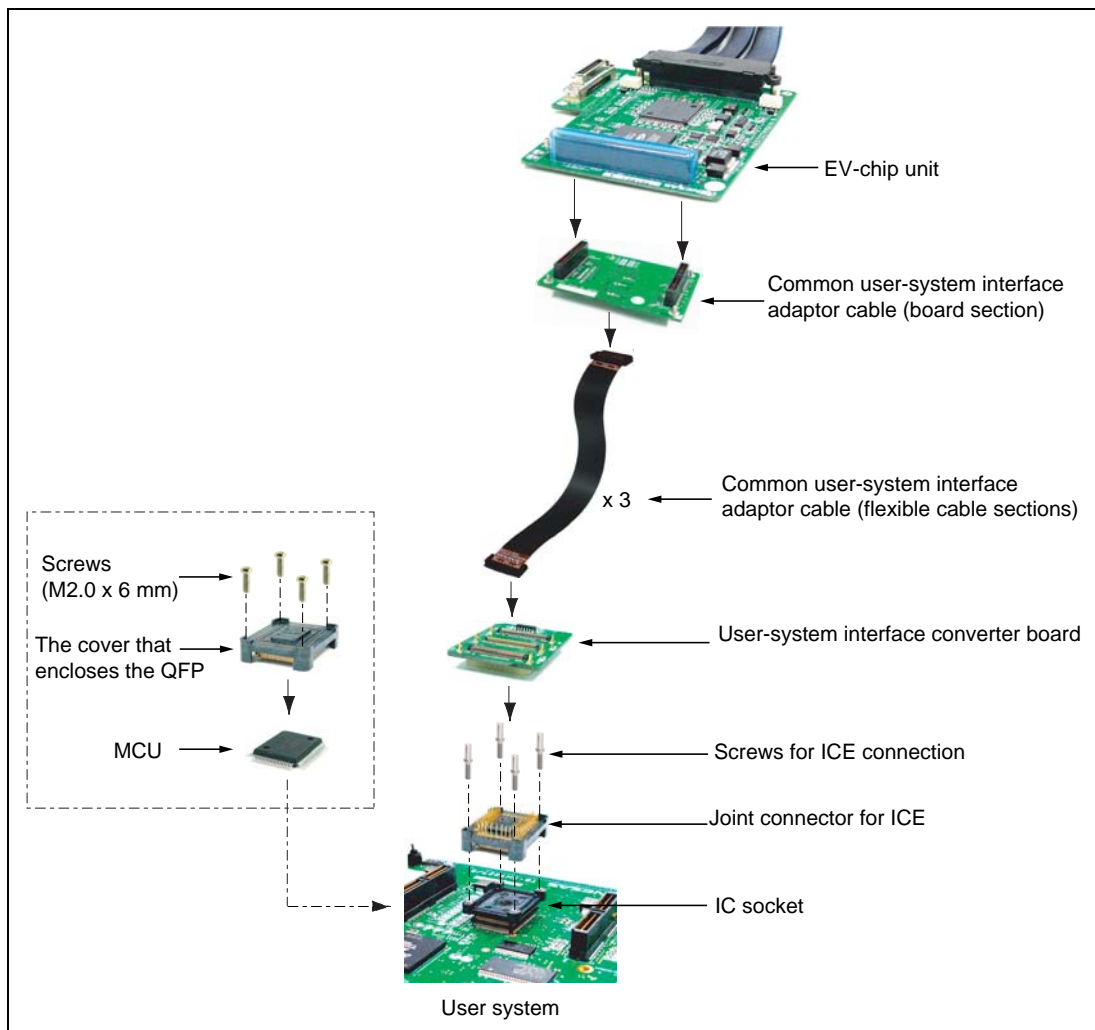
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# Section 1 Configuration

Figure 1 and table 1 show the external appearance and components, respectively, of the user system interface converter board for the PLQP0176KB-A. Please make sure you have all of these components when you unpack the product.



**Figure 1 Appearance of the User-System Interface Converter Board for SH7216 Group Products in the PLQP0176KB-A Package**

## **CAUTION**

**Use the following items with the IC socket for the PLQP0176KB-A package on the user system:**

**On the user system, use an NQPACK176SD-ND IC socket and HQPACK176SD and cover that encloses the QFP (both manufactured by Tokyo Eletech Corporation), and a YQPACK176SD joint connector for ICE and YQGUIDE-S1 screws for ICE connection (also both manufactured by Tokyo Eletech).**

**To connect the emulator with the user-system interface converter board for the PLQP0176KB-A, the common adaptor cable (R0E200F1CKL11) for the interface board must be obtained separately.**

**Table 1 R0E572167CFK10 Components**

<b>No.</b>	<b>Component</b>	<b>Quantity</b>	<b>Remarks</b>
1	User-system interface PLQP0176KB-A converter board	1	R0E572167CFK10
2	IC socket	1	NQPACK176SD-ND PLQP0176KB-A package (mounted on the user system) Phillips-head screwdriver × 1, Guide pin × 3
3	The cover that encloses the QFP	1	HQPACK176SD PLQP0176KB-A package (mounted on the user system) Screws (M2.0 × 6mm) × 4
4	Joint connector for ICE	1	YQPACK176SD PLQP0176KB-A package (mounted on the user system) Screws (M2.0 × 10mm) × 4 (not used with this product)
5	Screws for ICE connection	1	YQGUIDE-S1 (a set of four)
6	Standard screwdriver	1	For YQGUIDE-S1
7	User's manual	1	User's manual for R0E572167CFK10 (this manual)



## Section 2 Environmental Conditions

Maintain the conditions in table 2 when using the emulator.

**Table 2 Environmental Conditions**

<b>Item</b>	<b>Specifications</b>
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 <sup>2</sup> max. Storage: 4.9 m/s <sup>2</sup> max. Transportation: 14.7 m/s <sup>2</sup> max.
Ambient gases	There must be no corrosive gases present.





## Section 3 Connection Procedures

### 3.1 Connecting User System Interface Board to User System

#### **WARNING**

**Always switch OFF the user system and the emulator product before the USER-SYSTEM INTERFACE CONVERTER BOARD 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) for PLQP0176KB-A package to the user system.

#### **CAUTION**

**Before soldering, use an epoxy-resin adhesive to affix the guide section on the bottom surface of the IC socket to the user system. Ensure that the leads are soldered so that the solder wets the leads and forms solder fillets on their edges (use slightly more solder than usual).**

After checking the position of pin 1, insert the joint connector for ICE (YQPACK176SD) to IC socket (NQPACK176SD-ND) for PLQP0176KB-A package on the user system.

#### **CAUTION**

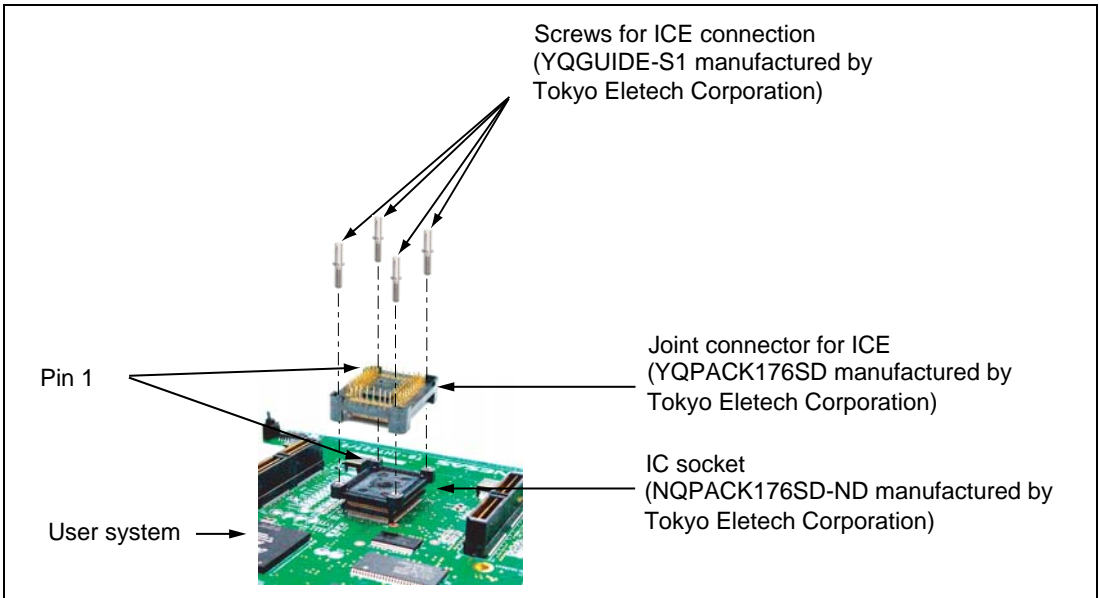
**Only connect the parts after checking that the positions of pin 1 match.**

### 3.1.2 Assembling the IC Socket

## CAUTION

- 1. Use a standard screwdriver whose head matches the screw head.**
- 2. The tightening torque must be 0.054 Nom or less. If the applied torque cannot be accurately measured, stop tightening when the force required to turn the screw becomes significantly greater than that needed when first tightening. If a screw is tightened too much, the screw head may break or an IC socket contact error may be caused by a crack in the IC socket solder.**
- 3. If the emulator does not operate correctly, cracks might have occurred in the solder. Check conduction with a tester and re-solder the IC socket if necessary.**

Use the four screws for ICE connection (YQGUIDE-S1) to affix the cover for ICE connection (YQPACK176SD) to the IC socket (NQPACK176SD-ND) for the PLQP0176KB-A package on the user system. When securing the screws, tighten each a little at a time, alternating between the screws in opposing corners. Take special care, such as manually holding the soldered portion of the IC socket in place, to prevent the application of twisting force by overtightening the screws etc.



**Figure 2 Connecting User System Interface Board to User System**

## 3.2 Connection to the User System When the Flexible Cable is in Use

The IC socket on the user system is connected with the emulator in either of two ways according to whether or not the flexible cable section of the common cable for the user system interface is in use. Refer to this section (section 3.2, Connection with the Flexible Cable) or section 3.3, Connection without the Flexible Cable according to whether or not the flexible cable is in use.

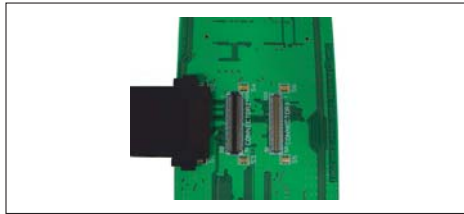
While the flexible cable leads to longer delay times for generated signals to reach the device from the IC socket, the area taken up on the emulator board for the user system is smaller. This form of connection is thus applicable to a wider variety of layouts for the user system. Refer to point 3 of section 5 for details on the delay time.

### 3.2.1 Assembling the User System Interface Cable

## CAUTION

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

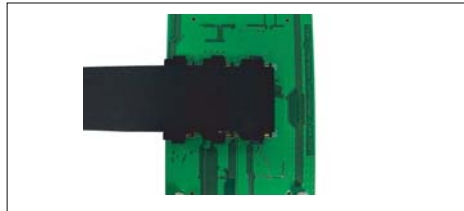
- Connecting the user system interface cable  
Use the flexible cable section of the common cable for the user system interface to connect the board section of the common cable for the user system interface with the user-system interface converter board (see figure 3).



Connect the flexible cable to CONNECTOR1 mounted on the board section of the common user-system interface adaptor cable as shown below.



After that, connect the flexible cable to CONNECTOR2.

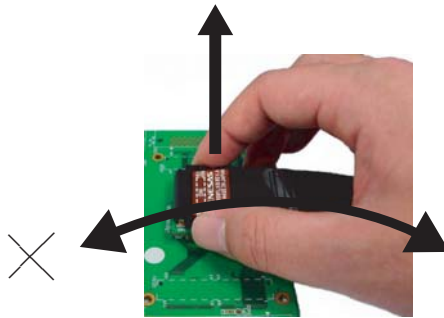


Connect the flexible cable to CONNECTOR3.



Connect the common user-system interface adaptor cable with the user-system interface PLQP0176KB-A converter board, with each of the three flexible cable sections of the adaptor cable connected to the corresponding connector ([CONNECTOR1], [CONNECTOR2], or [CONNECTOR3]) on the converter board.

**Figure 3 Assembling the User System Interface Cable**



When removing the flexible cable from a converter board or a board section of the adaptor cable, 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 joint is stiff so that the cable is difficult 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.

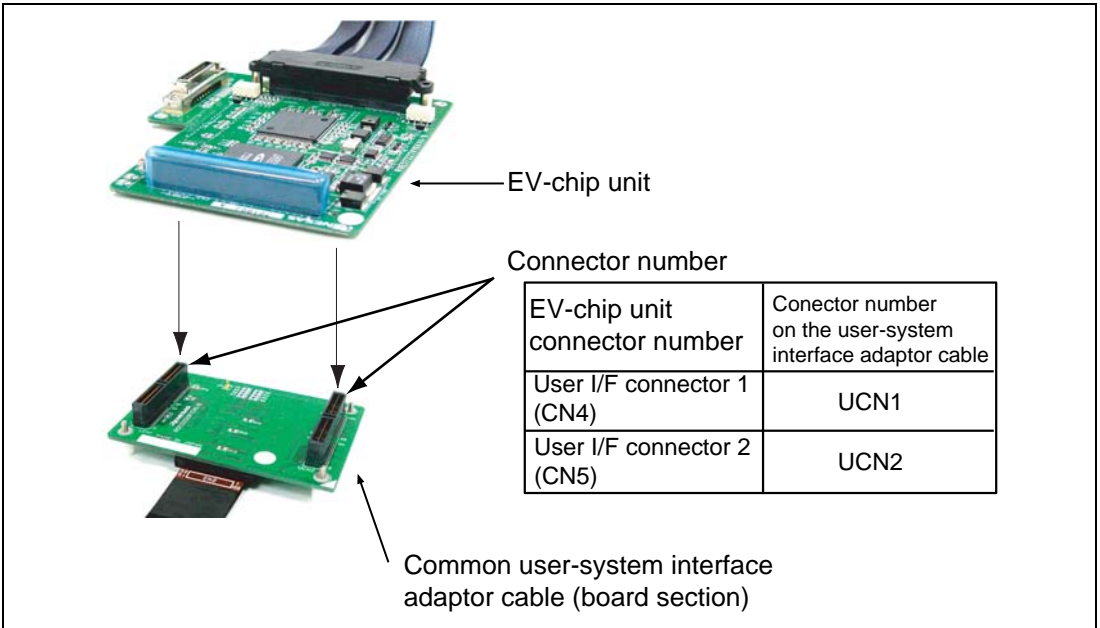
**Figure 4 Removing the Flexible Cable**

### 3.2.2 Connecting User System Interface Board to 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 connecting the COMMON USER-SYSTEM INTERFACE ADAPTOR CABLE to or removing it from any part. Before connecting the cable, make sure that the pin 1 positions on both sides are correctly aligned.**
  - 2. Use the common user-system interface adaptor cable that is specifically for the emulator.**
1. Make sure the user system and emulator are turned off.
  2. Align the connectors on the board with those on the EV-chip unit according to their numbers (figure 5).

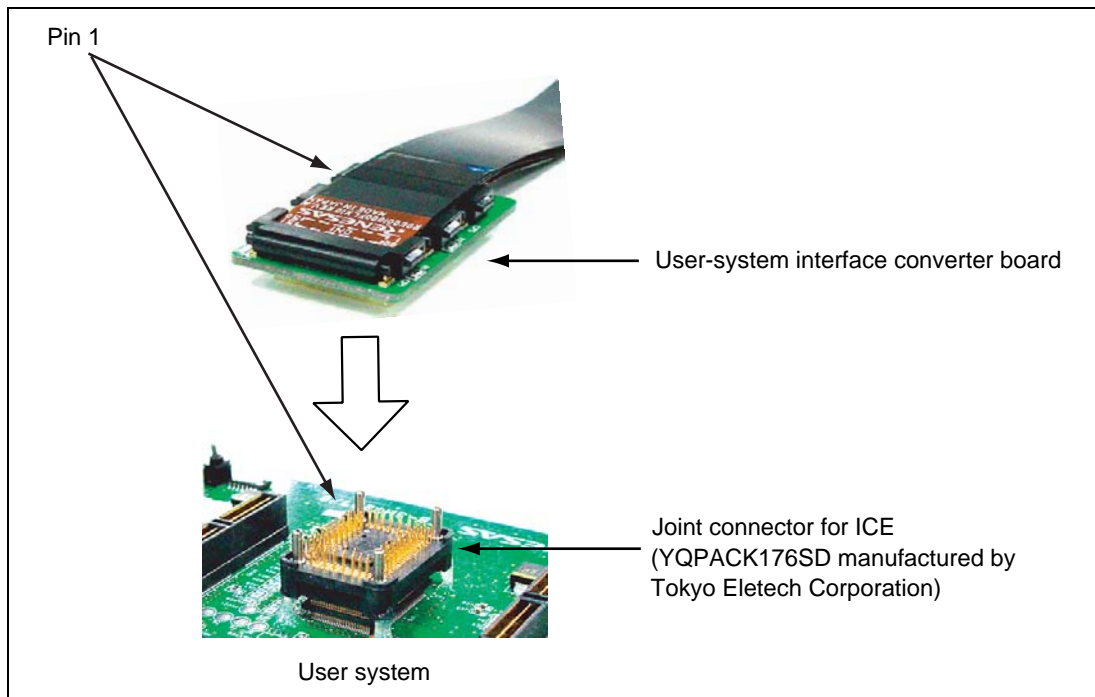


**Figure 5 Connecting the User System Interface Board to the EV-Chip Unit**



### 3.2.3 Installing to the IC Socket

Connect and fasten the user system interface converter board to the joint connector for ICE (YQPACK176SD) 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 joint connector for ICE.



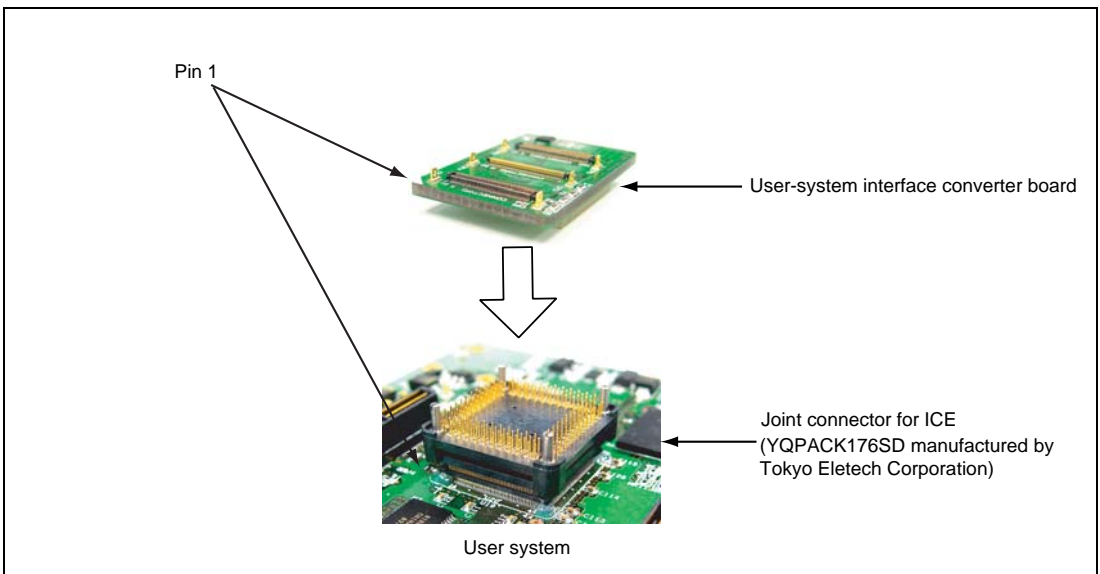
**Figure 6 Connecting the User System and User System Interface Board**

### 3.3 Connection to the User System When the Flexible Cable is Not in Use

While the connection takes up a larger area on the emulator board for the user system when the flexible cable is not in use, delay times for generated signals to reach the device from the IC socket are shorter. This form of connection is thus applicable when the cable connection is leading to insufficient timing margins. Refer to point 3 of section 5, Verifying Operation, for details on the delay time.

#### 3.3.1 Mounting on the IC Socket

Connect and fasten the user system interface converter board to the joint connector for ICE (YQPACK176SD) 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 joint connector for ICE.



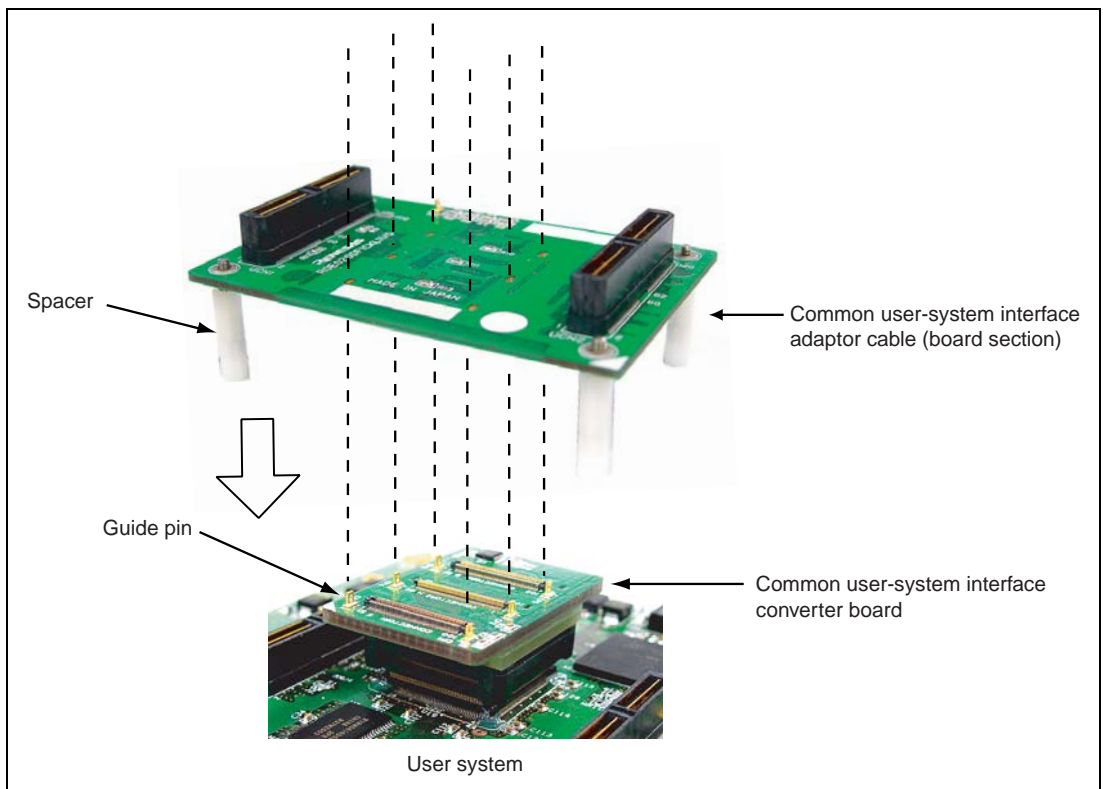
**Figure 7 Connecting the User System and User System Interface Board**

### 3.3.2 Connecting the Common User-System Interface Adaptor Cable (Board Section)

## CAUTION

**Check the position of pin 1 and the connector number before insertion.**

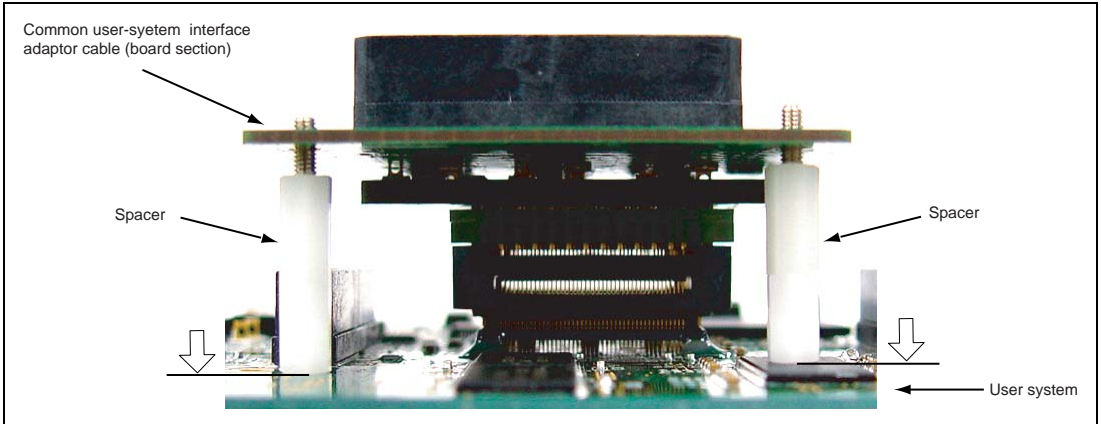
Ensure that the positions of [CONNECTOR1], [CONNECTOR2], or [CONNECTOR3] on the common user-system interface adaptor cable match the positions of [CONNECTOR1], [CONNECTOR2], or [CONNECTOR3] on the user-system interface converter board, and connect the cable to the board. When they are correctly connected, the six guide pins on the user-system interface converter board will enter the holes on the board section of the common user-system interface adaptor cable.



**Figure 8 Connecting the Common User-System Interface Adaptor Cable (Board Section)**

### 3.3.3 Adjusting the Spacer Position

Adjust the positions of the spacers mounted on the four corners of the common user- system interface adaptor board so that they are in contact with the user system.



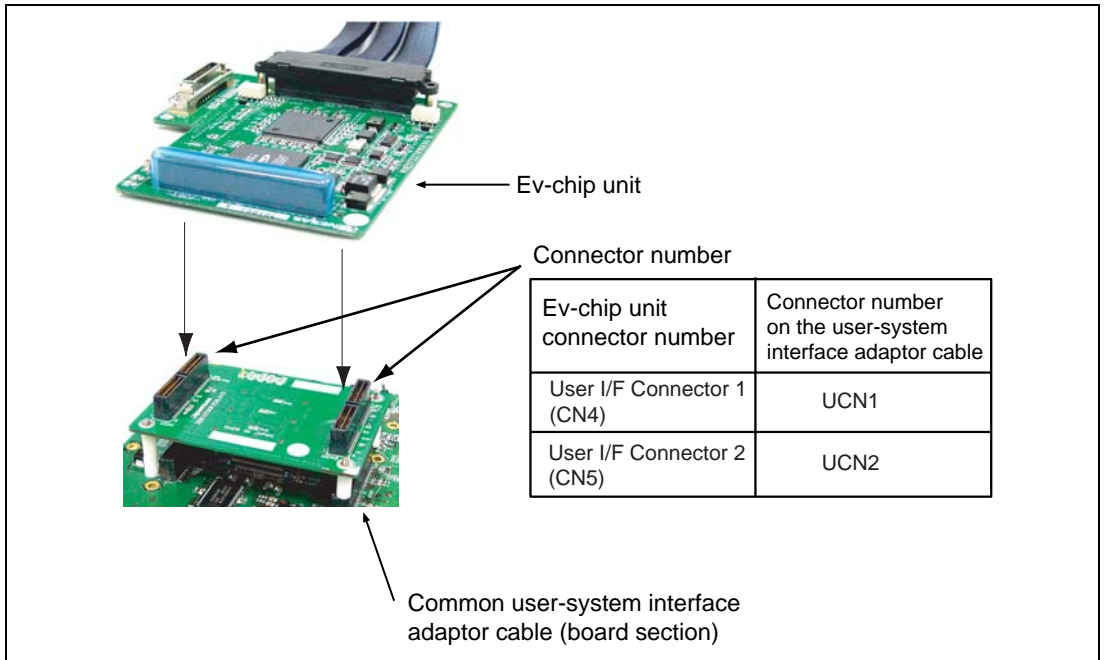
**Figure 9 Adjusting the Spacer Position**

### 3.3.4 Connecting the User System Interface Board to 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 connecting the COMMON USER-SYSTEM INTERFACE ADAPTOR CABLE to or removing it from any part. Before connecting the cable, make sure that the pin 1 positions on both sides are correctly aligned.**
  - 2. Use the common user-system interface adaptor cable that is specifically for the emulator.**
1. Make sure the user system and emulator are turned off.
  2. Align the connectors on the board with those on the EV-chip unit according to their numbers (figure 10).

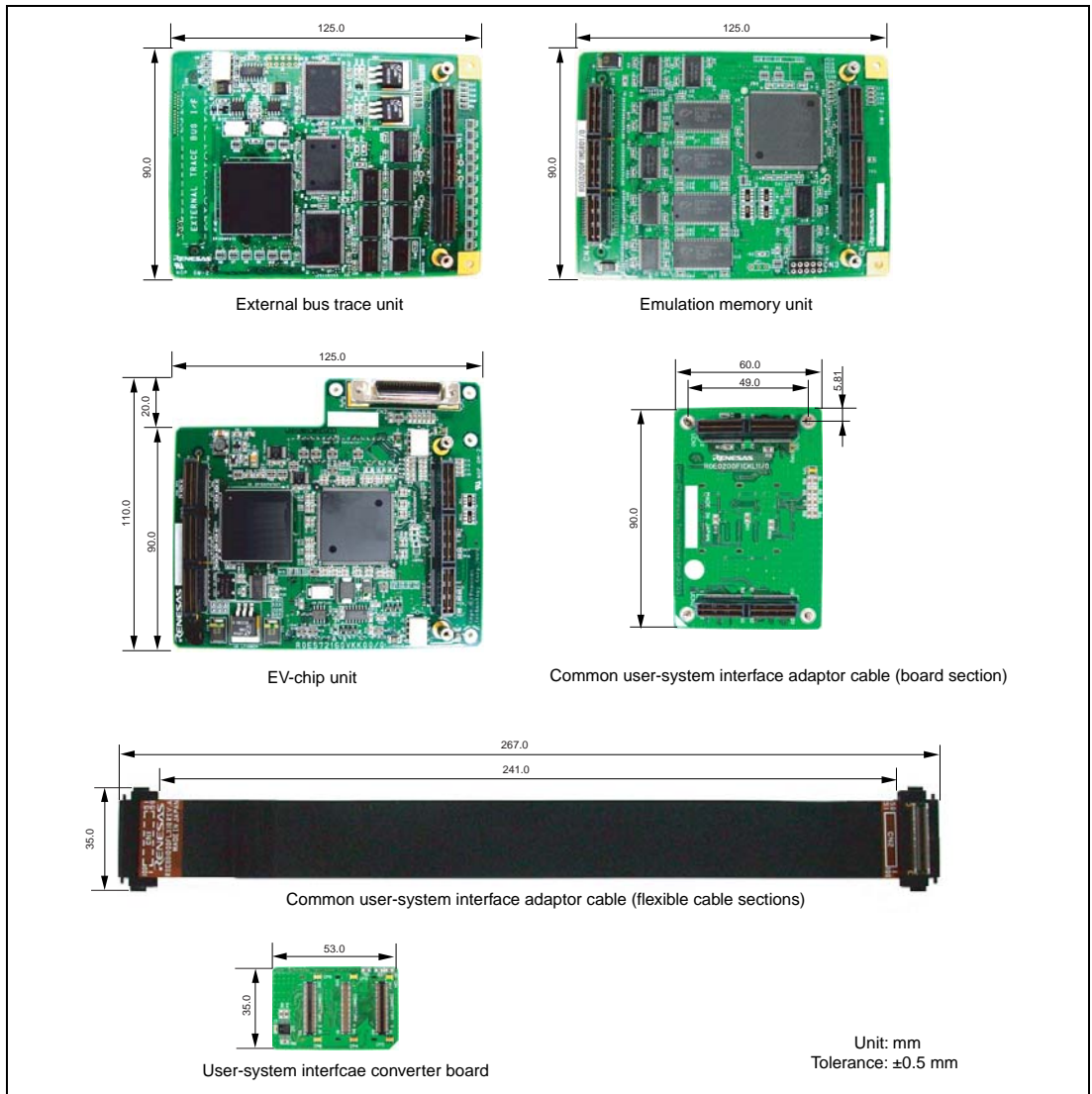


**Figure 10 Connecting the User System Interface Board to the EV-Chip Unit**



### 3.4.2 External Dimensions

The external dimensions of the EV-chip unit, common user-system interface adaptor cable, and user-system interface converter board are shown in figure 12.

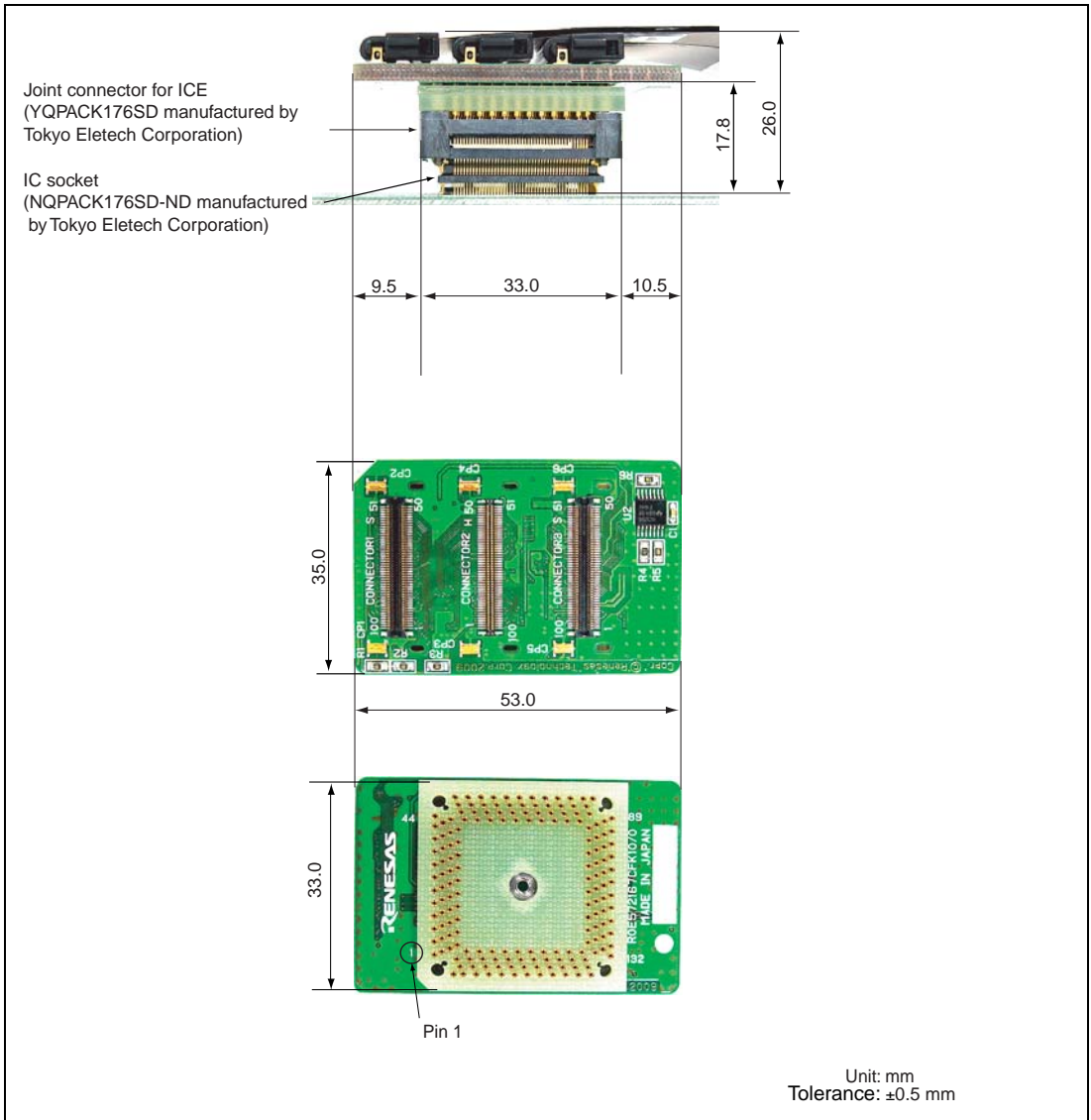


**Figure 12 External Dimensions of the External Bus Trace Unit, Emulation Memory Unit, EV-Chip Unit, Common User-System Interface Adaptor Cables, and the Converter Board**

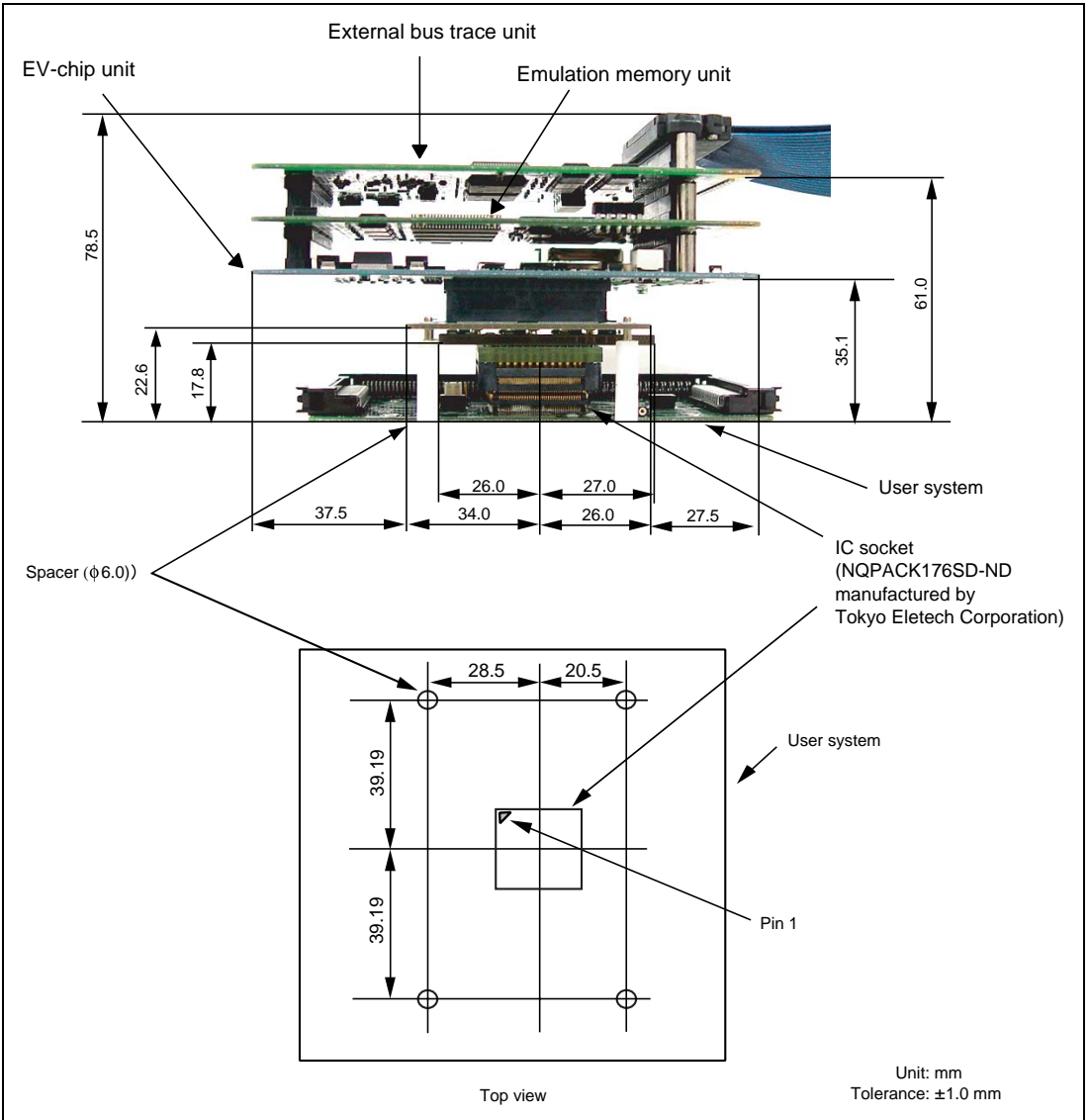


### 3.4.3 Dimensions of User System Interface Converter Board when Connected

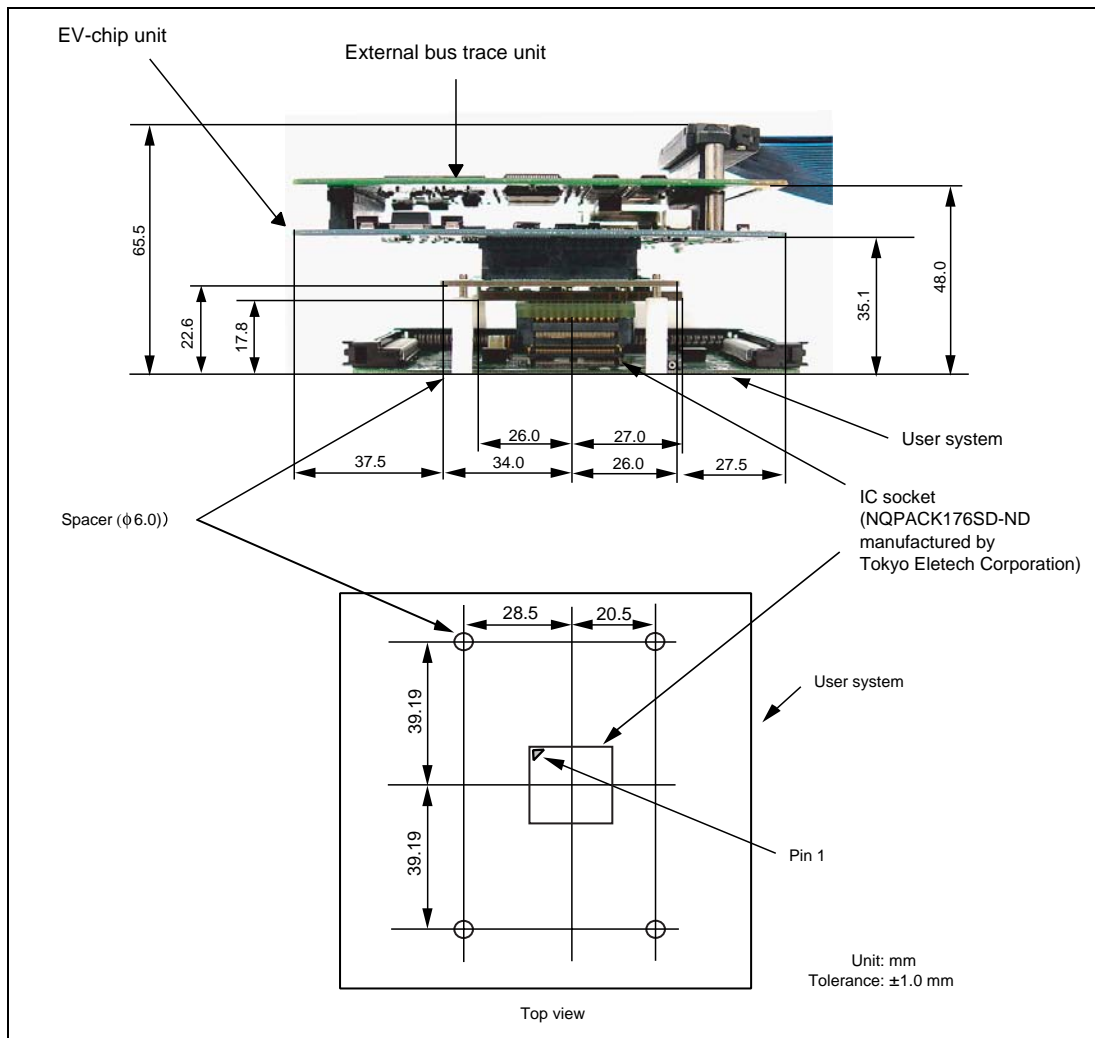
Dimensions of the user system interface converter board when it is connected to the user system are shown in figure 13, figure 14, figure 15, and figure 16.



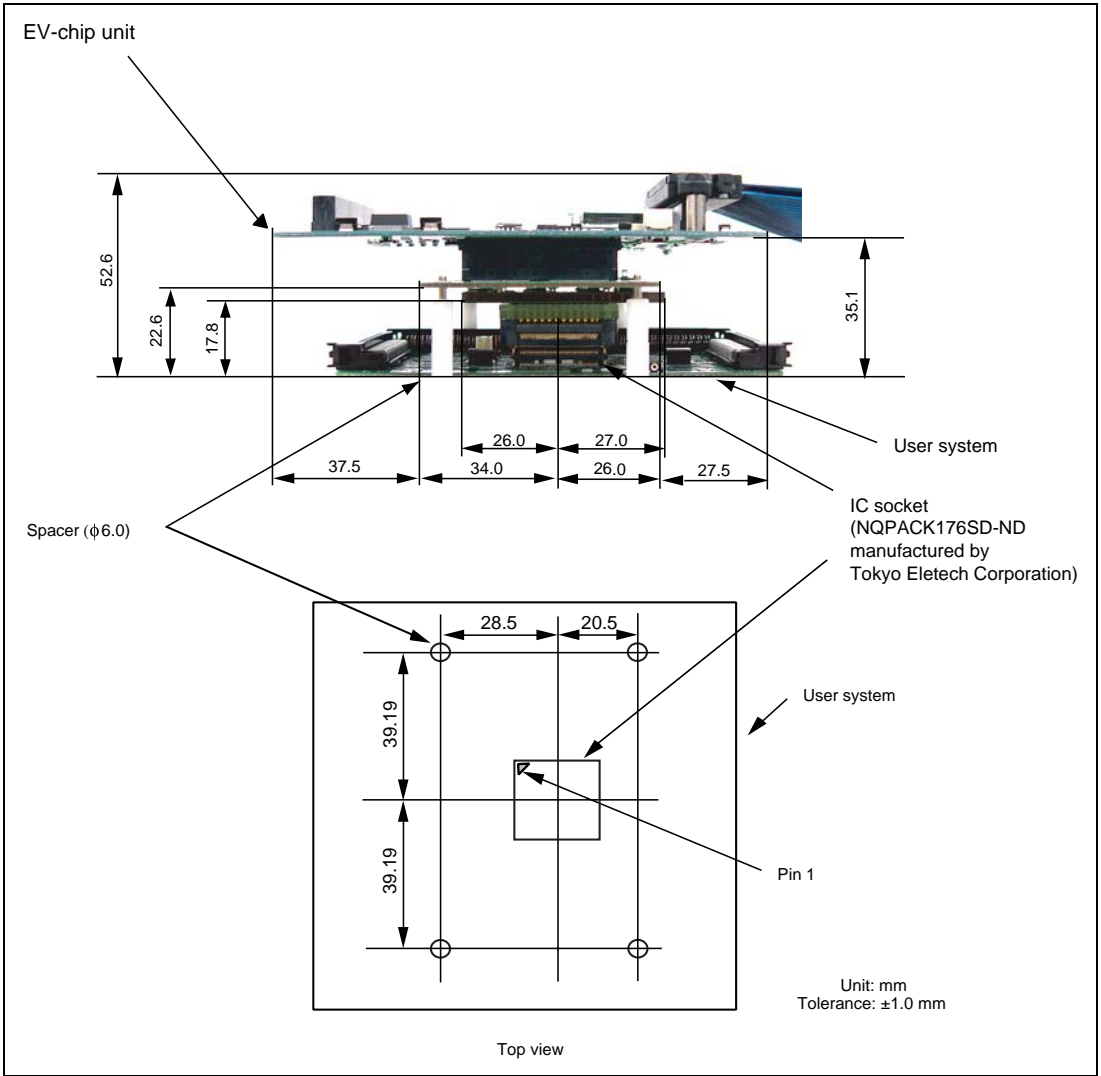
**Figure 13 Dimensions of the User-System Interface Converter Board when Connected to the User System (Connection Includes the Flexible Cable)**



**Figure 14 Dimensions of the User System and Connected User-System Interface Converter Board (with the External Bus Trace Unit, Emulation Memory Unit, and EV-chip Unit also Connected)**



**Figure 15 Dimensions of the User System and Connected User-System Interface Converter Board (with the External Bus Trace Unit and EV-chip Unit also Connected)**



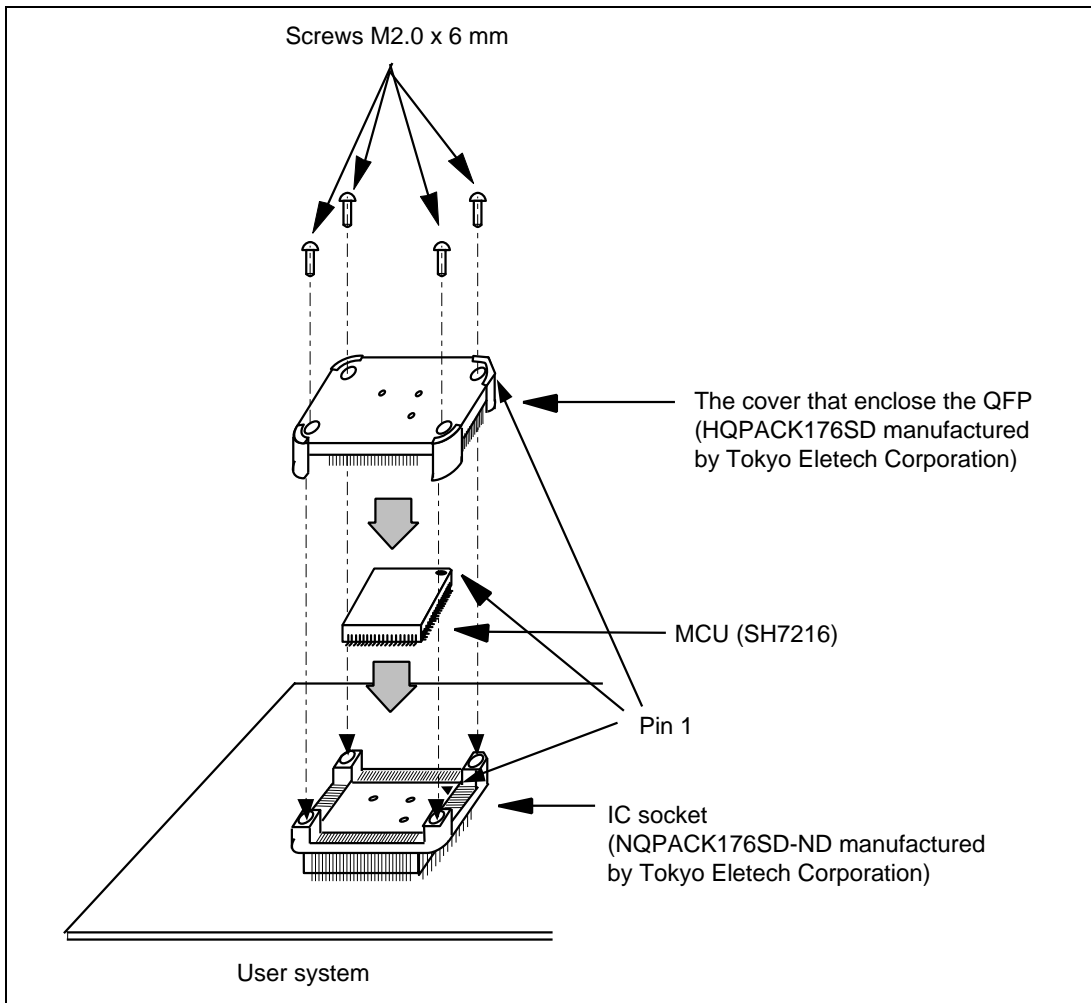
**Figure 16 Dimensions of the User System and Connected User-System Interface Converter Board (with the EV-chip Unit also Connected)**

## Section 4 Installing the MCU to the User System

### CAUTION

1. Check the location of pin 1 before inserting.
2. Use a Phillips-head screwdriver whose head matches the screw head.
3. The tightening torque must be 0.054 Nom or less. If the applied torque cannot be accurately measured, stop tightening when the force required to turn the screw becomes significantly greater than that needed when first tightening. If a screw is tightened too much, the screw head may break or an IC socket contact error may be caused by a crack in the IC socket solder.
4. If the MCU does not operate correctly, cracks might have occurred in the solder. Check conduction with a tester and re-solder the IC socket if necessary.

Check the location of pin 1 before inserting the MCU into the IC socket (NQPACK176SD-ND) on the user system, as shown in figure 17. After inserting the MCU, use the four provided screws (M2.0 x 6 mm) to fasten the top cover for the IC package (HQPAC176SD). Take special care, such as manually holding the soldered portion of the IC socket in place, to prevent the application of twisting force by overtightening the screws etc.



**Figure 17** Installing MCU to User System

## Section 5 Verifying Operation

1. Turn on the emulator according to the procedures described in the SH7216 E200F Emulator User's Manual (R0E0200F1EMU00J or R0E572160EMU00J).
2. The emulator connected to this user-system interface converter board supports two kinds of clock sources as the MCU clock. For details, refer to the SH7216 E200F Emulator User's Manual (R0E0200F1EMU00J).

— To use the emulator internal clock

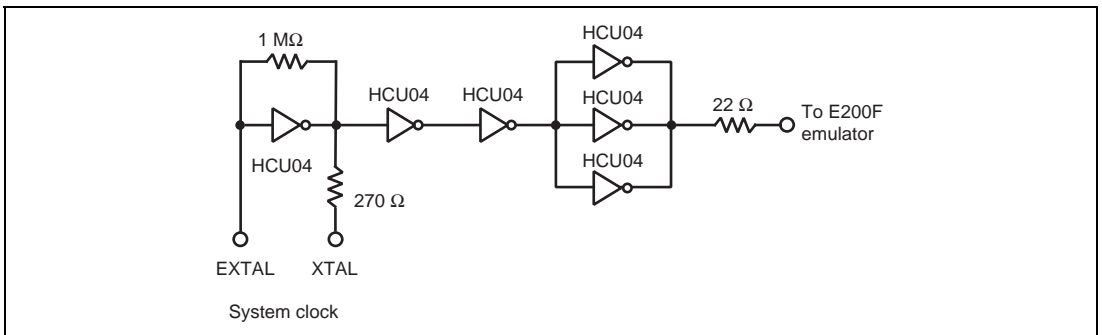
Select the [Emulator Internal Clock] in the [Select Emulation] dialog displayed when connecting to the emulator.

— To use the external clock on the user system

Select the [User System Clock] in the [Select Emulation] dialog displayed when connecting to the emulator.

Supply the external clock from the user system to the emulator by inputting the EXTAL pin (pin 121) on the user-system interface converter board or connecting the crystal oscillator to the XTAL (pin 119) and EXTAL pins. For details, refer to section 4, Clock Pulse Generator, in the SH7216 Group Hardware Manual.

Figure 18 shows the clock oscillator on the user system interface board.



**Figure 18 Clock Oscillator**

3. When connecting the E200F emulator and the user system with the common user-system interface adaptor cable and the user system converter board, the wiring of the circuit between the IC socket pins and pins of the devices on the user system leads to delay times for the signals.

— When the connection includes the flexible cable

Table 3 gives the delay times when the common user-system interface cable is used with the supplied flexible cable.

**Table 3 Delay Times Created by Connection with the Flexible Cable**

No.	Signal Name	Delay Time (ns)
1	_RES	22
2	NMI	19
3	Other signals	6

— When the connection does not include the flexible cable

Table 4 shows the delay time generated when the supplied flexible cable has been removed from the common user-system interface adaptor cable.

**Table 4 Delay Times Created by Connection without the Flexible Cable**

No.	Signal Name	Delay Time (ns)
1	_RES	19
2	NMI	16
3	Other signals	3



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## Section 6 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 MCU.
4. This user-system interface converter board is specifically designed for the SH7216 E200F EV-chip unit (R0E572160VKK00). Do not use this board with any other emulator.
5. When power is not supplied to the VCCQ pin on the user-system interface converter board, the emulator displays \*\* VCC DOWN. The emulator will not operate correctly.



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**SH7216 Group PLQP0176KB-A**  
**User System Interface Board**  
**User's Manual**

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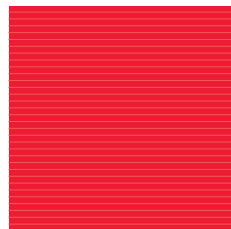
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