

SH7086 Group PLQP0176KB-A User System Interface Board

User's Manual

Renesas Microcomputer Development Environment System

SuperH™ Family / SH7080 Series

R0E570860CFK00

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Renesas Technology
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User's Manual

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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
- External bus trace unit
- Evaluation-chip unit
- Expansion profiling unit
- Emulation memory unit
- User system interface board
- Trace cable

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

Purpose of the User System Interface Board:

This user system interface board is used to connect the evaluation-chip unit to the user system. This user system interface 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.
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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 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 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.

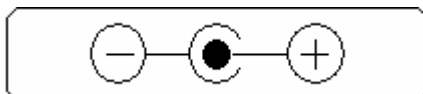
Warning for Use Environment:

- 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.

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:

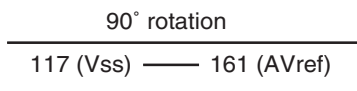
- ❗ • When in use do not place the emulator on its side.



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.
4. If cables are connected incorrectly, the power pins will be short circuited in the following way:



Preface

The R0E570860CFK00 is a user system interface board that connects a user system for the SH7086 PLQP0176KB-A (former code: FP-176EV) package to the SH7080 E200F emulator (R0E0200F1EMU00 or R0E570800VKK00).

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Section 1 Configuration

Figure 1 and table 1 show the configuration and components of the user system interface board for the PLQP0176KB-A (former code: FP-176EV) package. Please make sure you have all of these components when unpacking.

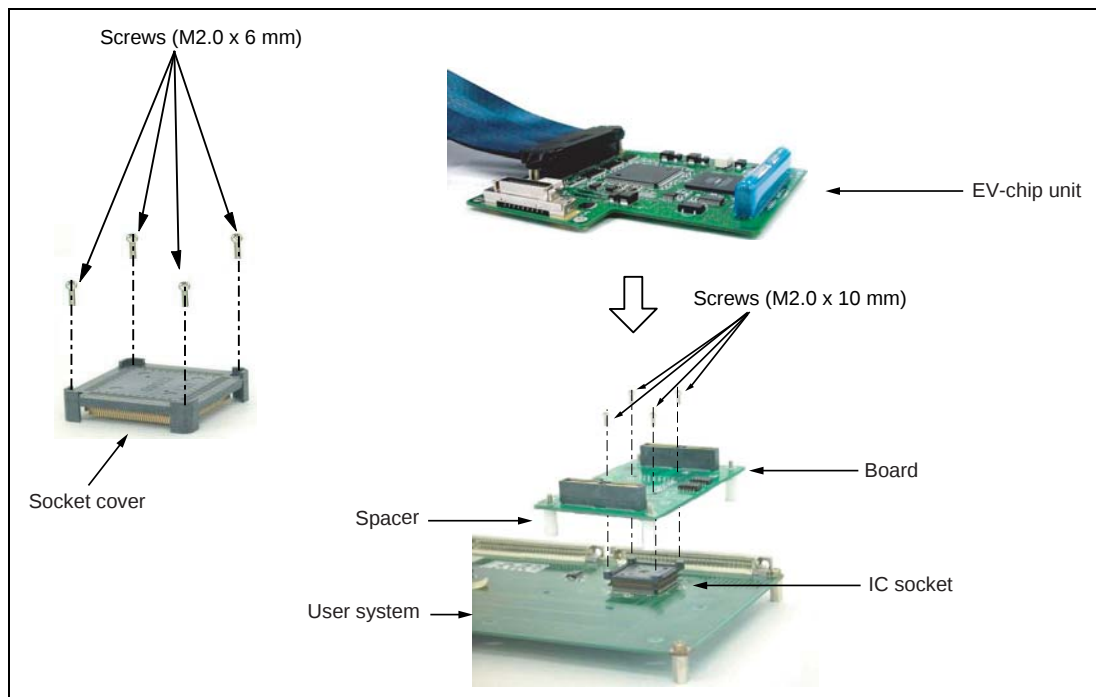


Figure 1 User System Interface Board for the SH7086 PLQP0176KB-A (Former Code: FP-176EV) Package

CAUTION

Use a NQPACK176SD socket (manufactured by Tokyo Eletech Corporation) and a HQPACK176SD (manufactured by Tokyo Eletech Corporation) for the PLQP0176KB-A (former code: FP-176EV) package IC socket and socket cover, respectively, on the user system.

Table 1 R0E570860CFK00 Components

No.	Component	Quantity	Remarks
1	Board	1	With four spacers (2.6MP x 11 mm)
2	IC socket	1	For the PLQP0176KB-A (former code: FP-176EV) package (to be mounted on the user system)
3	Socket cover	1	For the PLQP0176KB-A (former code: FP-176EV) package (for installing MCU)
4	Screws (M2.0 x 10 mm)	4	For fastening board
5	Screws (M2.0 x 6 mm)	4	For installing a PLQP0176KB-A (former code: FP-176EV)-packaged MCU
6	Guide pins	3	
7	Screwdriver	1	
8	User's manual	1	User's manual for R0E570860CFK00 (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 User Interface Specifications

This user system interface board has the function that masks the chip select signals (CS0 to CS8), bus request signal (BREQ), and wait input signal (WAIT) depending on the setting of a switch.

To use the mask function, set switches (SW1 to SW3) on the user system interface board (figure 2), according to tables 3 to 5, and mask pins.

Note: When the emulation memory function is used, the output of the chip select signals to the user system is controlled. Be sure to mask the chip select signals (CS0 to CS8) that correspond to the address area to which the emulation memory has been allocated.



Figure 2 Switch for Masking Signals



WARNING

Always switch OFF the user system and the emulator product before the switches are set. Failure to do so will result in a FIRE HAZARD and will damage the user system, the user system interface board, and the emulator product or will result in PERSONAL INJURY. The USER PROGRAM will be LOST.

Table 3 Setting a Switch (SW1)

SW1 No.	PLQP0176KB-A (Former Code: FP-176EV) Socket Pin No.	Signal Name	Switch Setting	
			On	Off
1	80	PA6/_CS2/TCLKA	Mask canceled	Mask enabled
2	79	PA7/_CS3/TCLKB	Mask canceled	Mask enabled
3	76	PA10/_CS0/_POE4	Mask canceled	Mask enabled
4	75	PA11/_CS1/_POE5	Mask canceled	Mask enabled
5	42	PA18/_BREQ/TEND0	Mask canceled	Mask enabled
6	38	PA20/_CS4/_RASU	Mask canceled	Mask enabled

Table 4 Setting a Switch (SW2)

SW2 No.	PLQP0176KB-A (Former Code: FP-176EV) Socket Pin No.	Signal Name	Switch Setting	
			On	Off
1	47	PB7/A19/_BREQ/IRQ5/TXD0	Mask canceled	Mask enabled
2	49	PB8/A20/_WAIT/IRQ6/SCK0	Mask canceled	Mask enabled
3	82	PD28/D28/_CS2/TIOC3DS	Mask canceled	Mask enabled
4	81	PD29/D29/_CS3/TIOC3BS	Mask canceled	Mask enabled
5	164	PA0/_CS4/RXD0	Mask canceled	Mask enabled
6	165	PA1/_CS5/_CE1A/TXD0	Mask canceled	Mask enabled

Table 5 Setting a Switch (SW3)

SW2 No.	PLQP0176KB-A (Former Code: FP-176EV) Socket Pin No.	Signal Name	Switch Setting	
			On	Off
1	125	PA17/_WAIT/DACK2	Mask canceled	Mask enabled
2	6	PA21/_CS5/_CE1A/_CASU/TIC5U	Mask canceled	Mask enabled
3	139	PE5/_CS6/_CE1B/TIOC1B/TXD3	Mask canceled	Mask enabled
4	140	PE6/_CS7/TIOC2A/SCK3	Mask canceled	Mask enabled
5	9	PE16/_CS8/TIOC3BS	Mask canceled	Mask enabled
6	-	Unused	-	-

Figure 3 shows a circuit for masking signals on the user system interface board.

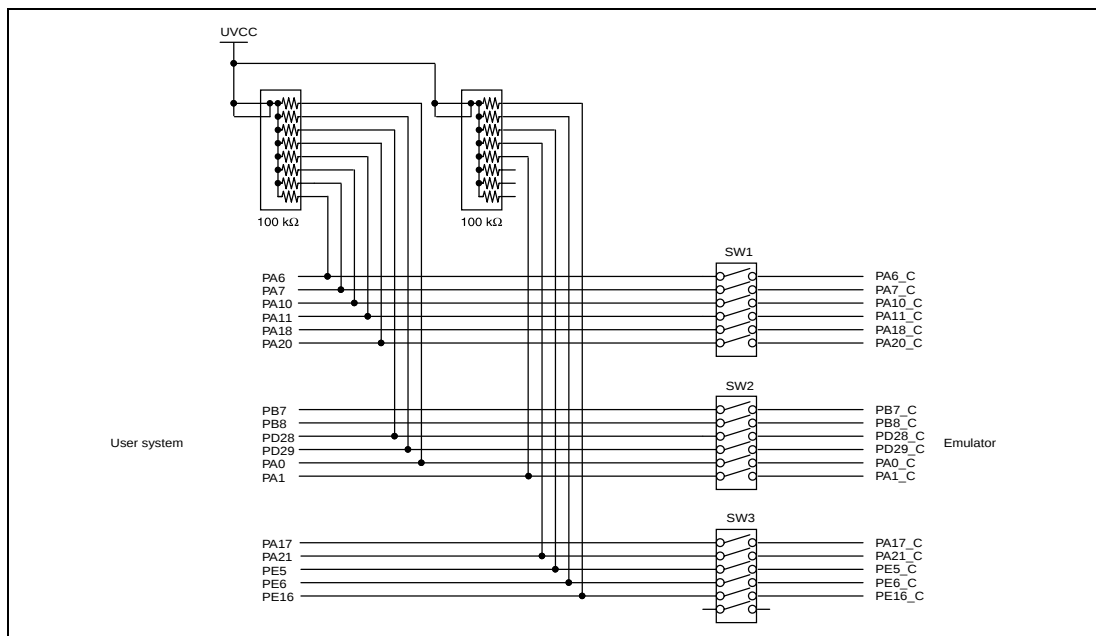


Figure 3 Circuit for Masking Signals

Note: The UVcc is the Vcc in the user system.

Section 4 Connection Procedures

4.1 Connecting User System Interface Board to User System

WARNING

Always switch OFF the user system and the emulator product before the USER SYSTEM INTERFACE 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.

To connect the cable head to the user system, follow the instructions below.

4.1.1 Installing IC Socket

Solder the IC socket for a PLQP0176KB-A (former code: FP-176EV) package to the user system.

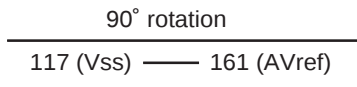
CAUTION

Be sure to completely solder the leads so that the solder slopes gently over the leads and forms solder fillets. (Use slightly more solder than the MCU.)

4.1.2 Installing Cable Head

CAUTION

**Check the location of pin 1 before inserting.
If the IC socket is not connected properly, the power-supply pins will be shorted as shown below.**



Align pin 1 on the IC socket for a PLQP0176KB-A (former code: FP-176EV) package on the user system with pin 1 on the user system interface board, and insert the user system interface board into the IC socket on the user system, as shown in figure 4.

4.1.3 Fastening Cable Head

CAUTION

- 1. Use a Phillip-type screwdriver whose head matches the screw head.**
- 2. The tightening torque must be 0.054 N•m 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.**

Fasten the user system interface board to the IC socket for a PLQP0176KB-A (former code: FP-176EV) package on the user system with the four screws (M2.0 x 10 mm) provided. Each screw should be tightened a little at a time, alternating between screws on opposing corners. Take special care, such as manually securing the IC socket soldered area, to prevent the soldered IC socket from being damaged by overtightening the screws or twisting the components.

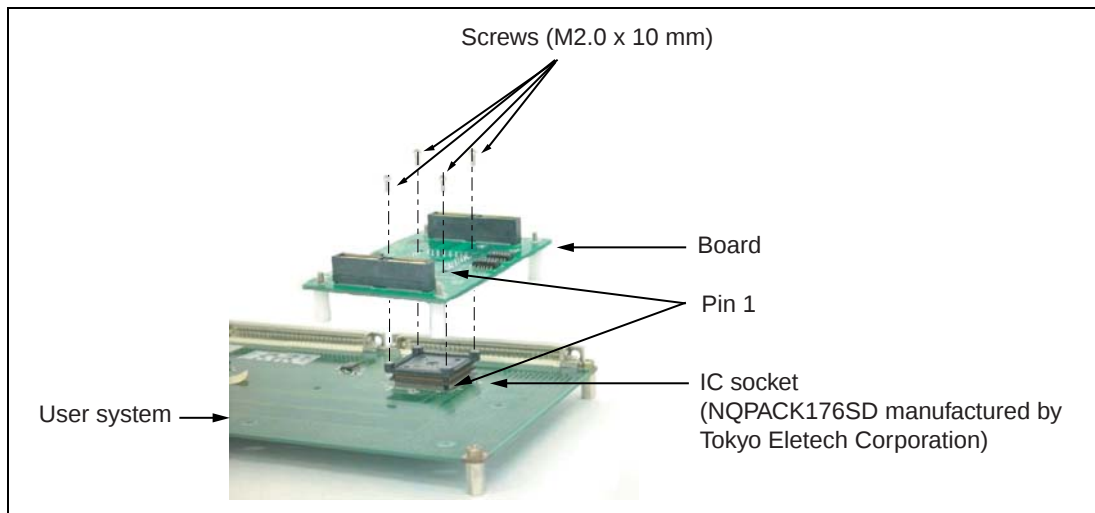


Figure 4 Connecting User System Interface Board to User System

4.2 Connecting User System Interface Board to EV-Chip Board



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 BOARD 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 board dedicated to the emulator must be used.**

1. Make sure the user system and emulator are turned off.
2. Align the connectors on the board with those on the EV-chip board according to their numbers (figure 5).
3. Adjust the height of the spacer attached to the board with the user system.

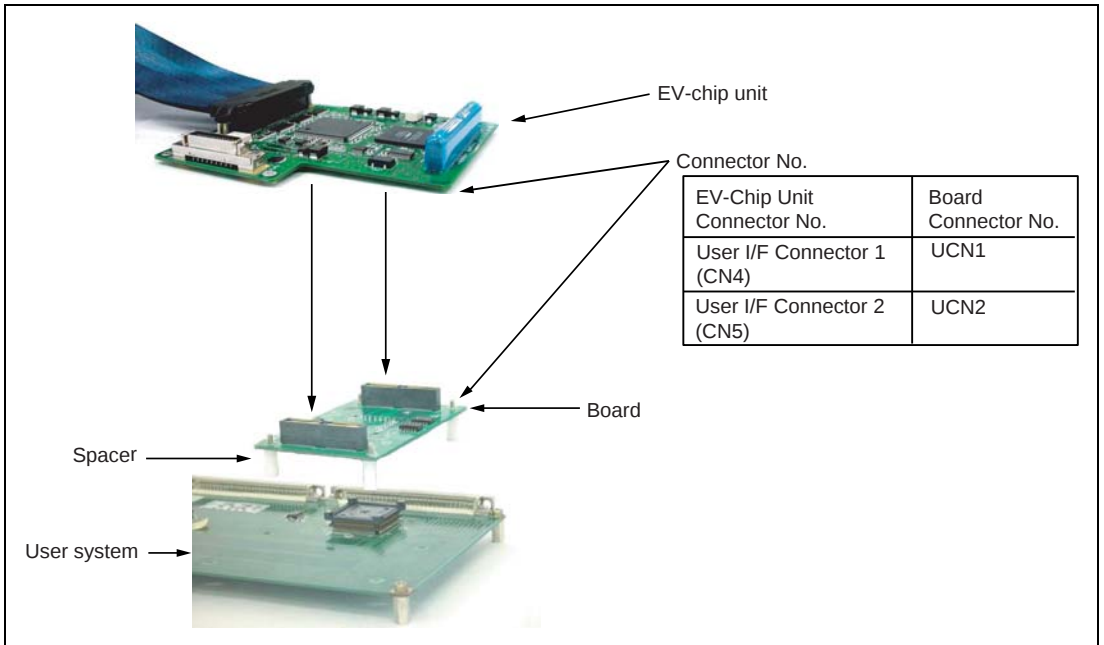
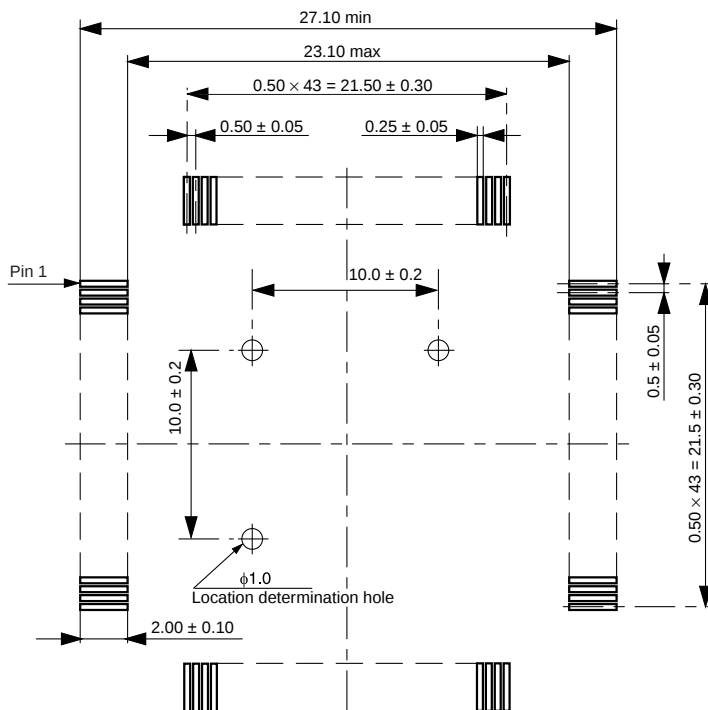


Figure 5 Connecting User System Interface Board to EV-Chip Board

4.3 Recommended Dimensions for User System Mount Pad (Footprint)

Figure 6 shows the recommended dimensions for the mount pad (footprint) for the user system with an IC socket for a PLQP0176KB-A (former code: FP-176EV) package (NQPACK176SD: manufactured by Tokyo Eletech Corporation). Note that the dimensions in figure 6 are somewhat different from those of the actual chip's mount pad.



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 6 Recommended Dimensions for Mount Pad

4.4 Dimensions for External Bus Trace Unit, Emulation Memory Unit, EV-Chip Unit, and User System Interface Board

The dimensions for the external bus trace unit, emulation memory unit, EV-chip unit, and the user system interface board are shown in figure 7.

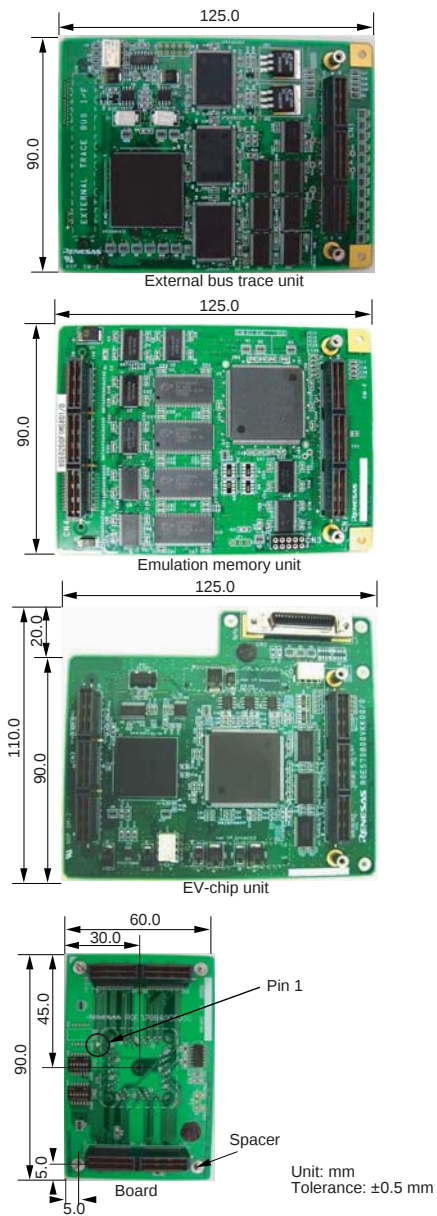


Figure 7 Dimensions for External Bus Trace Unit, Emulation Memory Unit, EV-Chip Unit, and User System Interface Board

4.5 Resulting Dimensions after Connecting User System Interface Board

The resulting dimensions, after connecting the user system interface board to the user system, are shown in figures 8, 9, and 10.

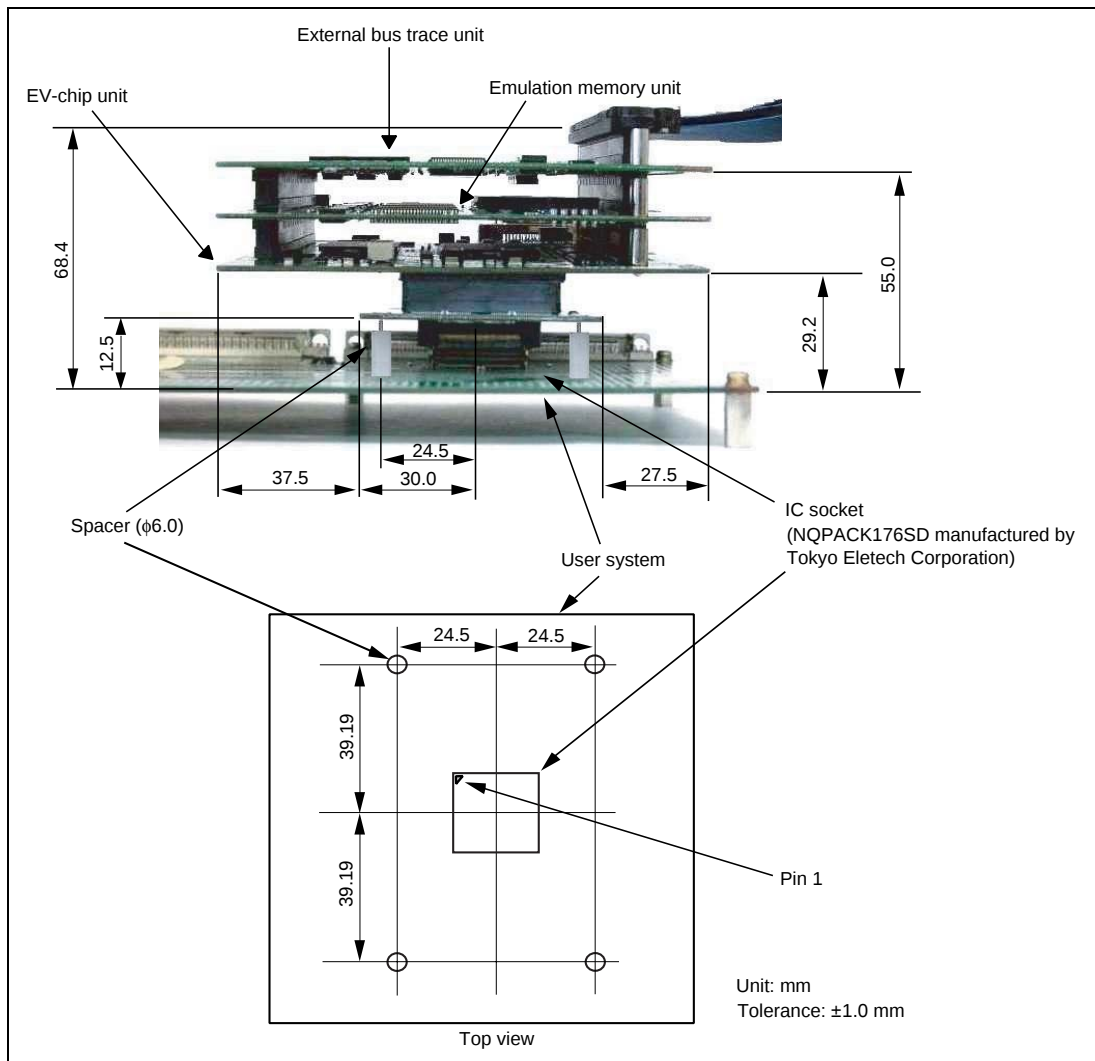


Figure 8 Resulting Dimensions after Connecting User System Interface Board (when Connecting External Bus Trace Unit, Emulation Memory Unit, and EV-Chip Unit)

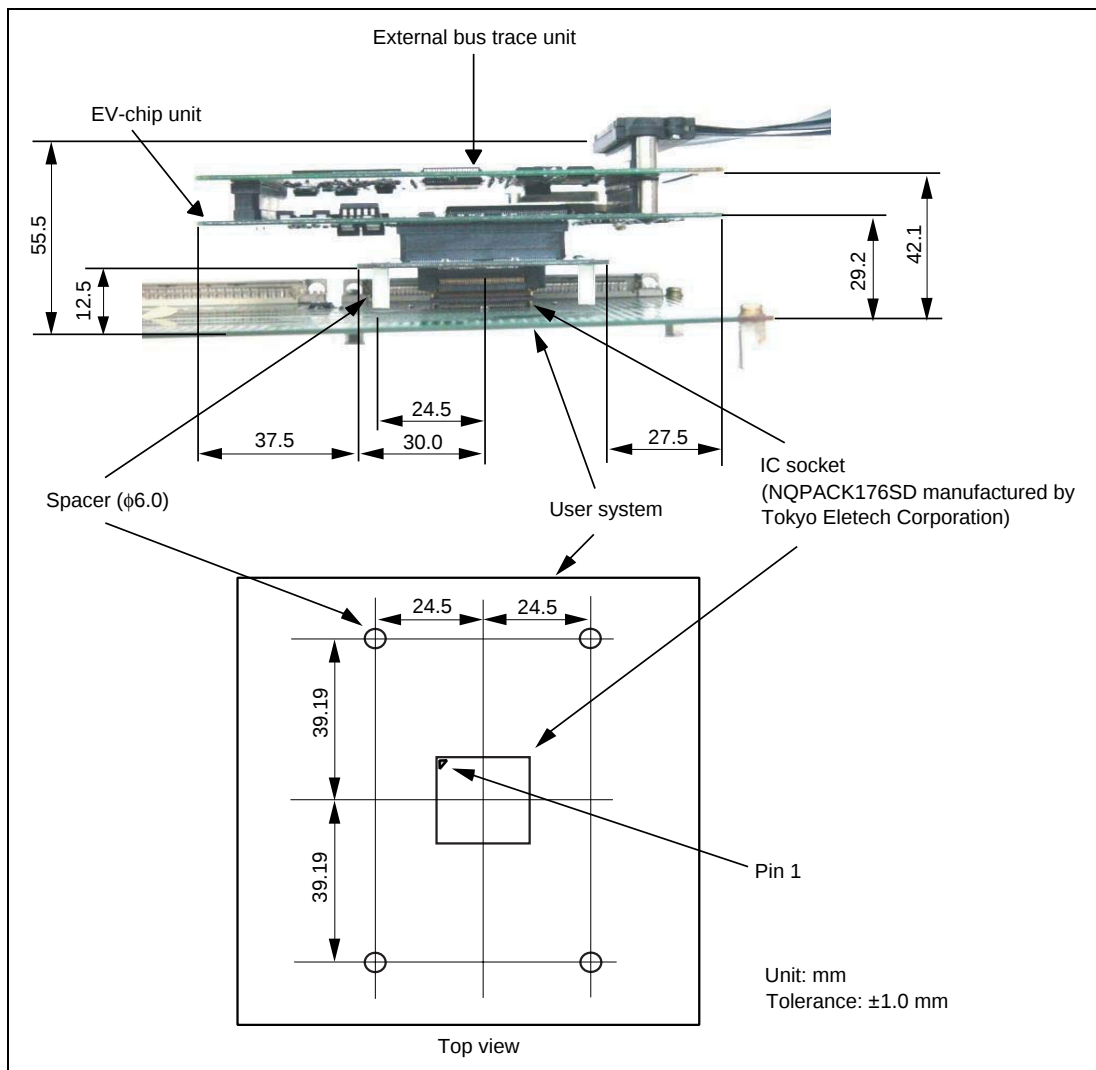


Figure 9 Resulting Dimensions after Connecting User System Interface Board (when Connecting External Bus Trace Unit and EV-Chip Unit)

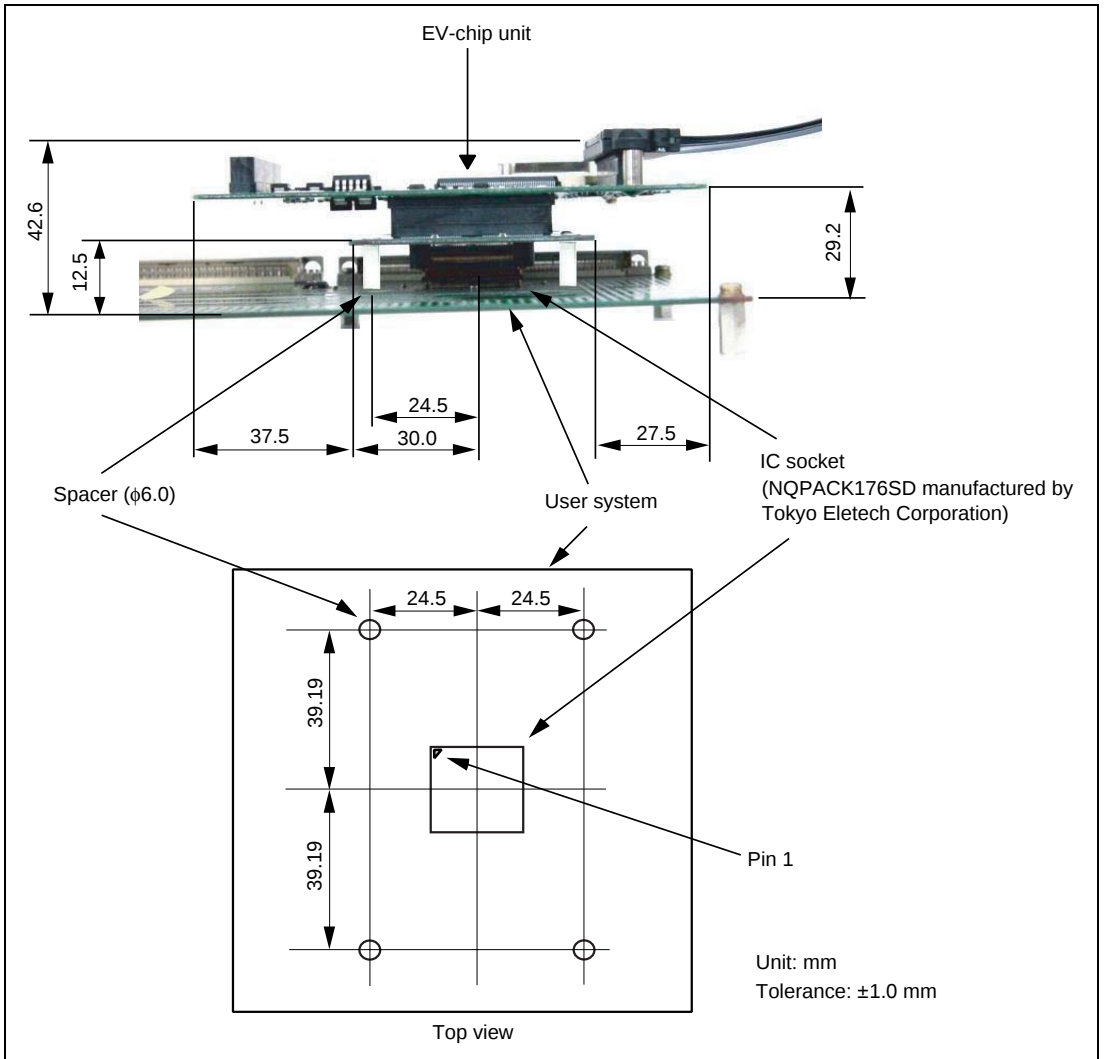


Figure 10 Resulting Dimensions after Connecting User System Interface Board (when Connecting EV-Chip Unit)

Section 5 Installing the MCU to the User System

CAUTION

1. Check the location of pin 1 before inserting.
2. Use a Philips-type screwdriver whose head matches the screw head.
3. The tightening torque must be 0.054 N•m 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 on the user system, as shown in figure 11. After inserting the MCU, fasten the socket cover with the provided four screws (M2.0 x 6 mm). Take special care, such as manually securing the IC socket soldered area, to prevent the IC socket from being damaged by overtightening the screws or twisting the components.

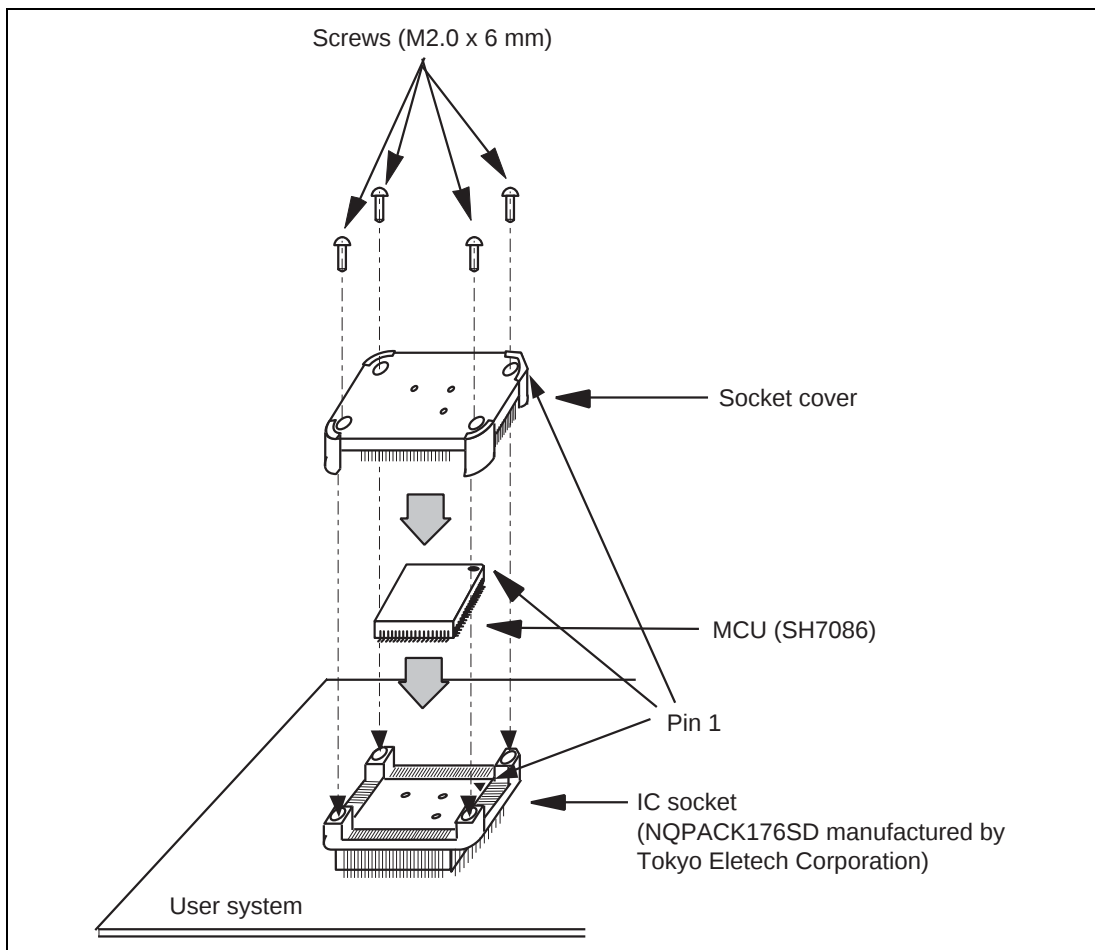


Figure 11 Installing MCU to User System

Section 6 Verifying Operation

1. Turn on the emulator according to the procedures described in the SH-2A, SH-2 E200F Emulator User's Manual (R0E0200F1EMU00E or R0E570800EMU00E).
2. The emulator connected to this user system interface board supports three kinds of clock sources as the MCU clock. For details, refer to the SH7080 E200F 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 120) on the user system interface board or connecting the crystal oscillator to the **XTAL** (pin 118) and **EXTAL** pins. For details, refer to section 4, Clock Pulse Generator, in the SH7080 Group Hardware Manual.

Figure 12 shows the clock oscillator on the user system interface board.

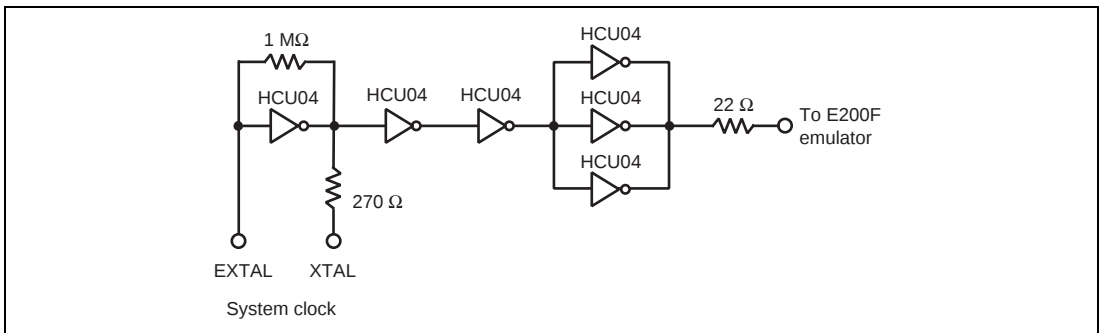


Figure 12 Clock Oscillator

Section 7 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 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 board are different from those of the MCU.
4. This user system interface board is specifically designed for the SH7080 E200F EV-chip unit (R0E570800VKK00). Do not use this board with any other emulator.
5. When power is not supplied to the Vcc pin on the user system interface board, the emulator displays ** VCC DOWN. The emulator will not operate correctly.

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User System Interface Board
User's Manual

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