IMPORTANT INFORMATION

READ FIRST

• READ this user's manual before using this user system interface cable.

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

Do not attempt to use the user system interface cable until you fully understand its mechanism.

User System Interface Cable:

Throughout this document, the term "user system interface cable" shall be defined as the following product produced only by Hitachi, Ltd. excluding all subsidiary products.

- User system interface cable (HS2212ECH61H)

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

Purpose of the User System Interface Cable:

This user system interface cable is for connecting the emulator station and user system. This user system interface cable must only be used for the above purpose.

Improvement Policy:

Hitachi, Ltd. (including its subsidiaries, hereafter collectively referred to as Hitachi) pursues a policy of continuing improvement in design, performance, functions, and safety of the user system interface cable. Hitachi reserves the right to change, wholly or partially, the specifications, design, user's manual, and other documentation at any time without notice.

Target User of the User System Interface Cable:

This user system interface cable 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 user system interface cable 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 user system interface cable.

LIMITED WARRANTY

Hitachi warrants its user system interface cables to be manufactured in accordance with published specifications and free from defects in material and/or workmanship. Hitachi will repair or replace any user system interface cables determined to be defective in material and/or workmanship. User system interface cables are wearing parts which Hitachi will not repair or replace if damaged and/or worn through use. The foregoing shall constitute the sole remedy for any breach of Hitachi's warranty. This warranty extends only to you, the original Purchaser. It is not transferable to anyone who subsequently purchases the user system interface cable from you. Hitachi is not liable for any claim made by a third party or made by you for a third party.

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The Warranty is Void in the Following Cases:

Hitachi shall have no liability or legal responsibility for any problems caused by misuse, abuse, misapplication, neglect, improper handling, installation, repair or modifications of the user system interface cable without Hitachi's prior written consent or any problems caused by the user system.

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Figures:

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

Limited Anticipation of Danger:

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

SAFETY PAGE

READ FIRST

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Do not attempt to use the user system interface cable until you fully understand its mechanism.

DEFINITION OF SIGNAL WORDS

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.

⚠ 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 E6000 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.**

H8S/2212 Series
FP-64E
User System Interface Cable
(HS2212ECH61H)
for E6000 Emulator

User's Manual

HITACHI

ADE-xxx-xxx
Rev. 1.0
2/4/03
Hitachi, Ltd.

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Preface

Thank you for purchasing this user system interface cable (HS2212ECH61H) for the Hitachi's original microcomputer H8S/2212 Series.

The HS2212ECH61H is a user system interface cable that connects an H8S/2214 series E6000 emulator (HS2214EPI62H; hereinafter referred to as the emulator) to the IC socket for a FP-64E package for the H8S/2212 series MCU on the user system.

The user system interface cable should be used with H8S/2214 series E6000 emulator (HS2214EPI62H: hereinafter referred to as the emulator).

Contents

Section 1 Configuration

CAUTION

Use an IC149-064-175-B51 socket (manufactured by YAMAICHI ELECTRONICS Co., Ltd.) for the FP-64E package IC socket on the user system.

Figure 1 shows the configuration of the HS2212ECH61H user system interface cable for the FP-64E package.

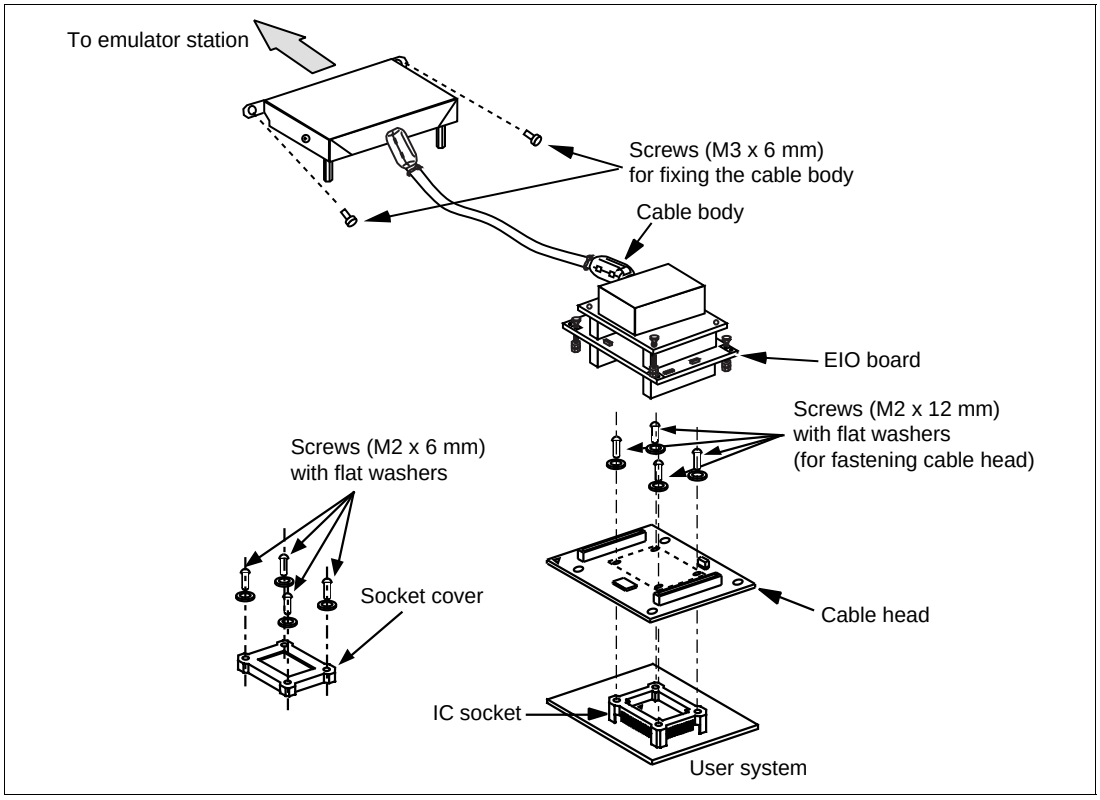

Figure 1 HS2212ECH61H User System Interface Cable

Table 1 lists the HS2212ECH61H components. Please make sure you have all of these components when unpacking.

Table 1 HS2212ECH61H Components

No.	Component	Quantity	Remarks
1	Cable body	1	Includes coaxial cable
2	Cable head	1	Consisting of two printed circuit boards
3	IC socket	1	For the FP-64E package
4	Socket cover	1	For installing a FP-64E packaged MCU
5	Screws (M2 x 12 mm)	4	For fastening cable head (with four flat washers)
6	Screws (M2 x 6 mm)	4	For installing a FP-64E packaged MCU (with four flat washers)
7	CTS screws (M3 x 6 mm)	2	For fixing the cable body
8	Documentation	1	User's manual for HS2212ECH61H (this manual)

Section 2 Connection Procedures

2.1 Connecting User System Interface Cable to Emulator Station

⚠ 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.**

To connect the cable body to the emulator station, follow the instructions below.

1. Make sure the user system and emulator station are turned off.

CAUTION

When connecting or removing the user system interface cable, apply force only in the direction suitable for connection or removal, while making sure not to bend or twist the cable or connectors. Otherwise, the connectors will be damaged.

2. After making sure the direction of the cable body connector is correct, firmly insert the cable body connector into the emulator station socket (figure 2).

3. If the emulator has holes for fastening screws, fasten the cable body to the emulator station by using the attached screws for fixing the cable body.

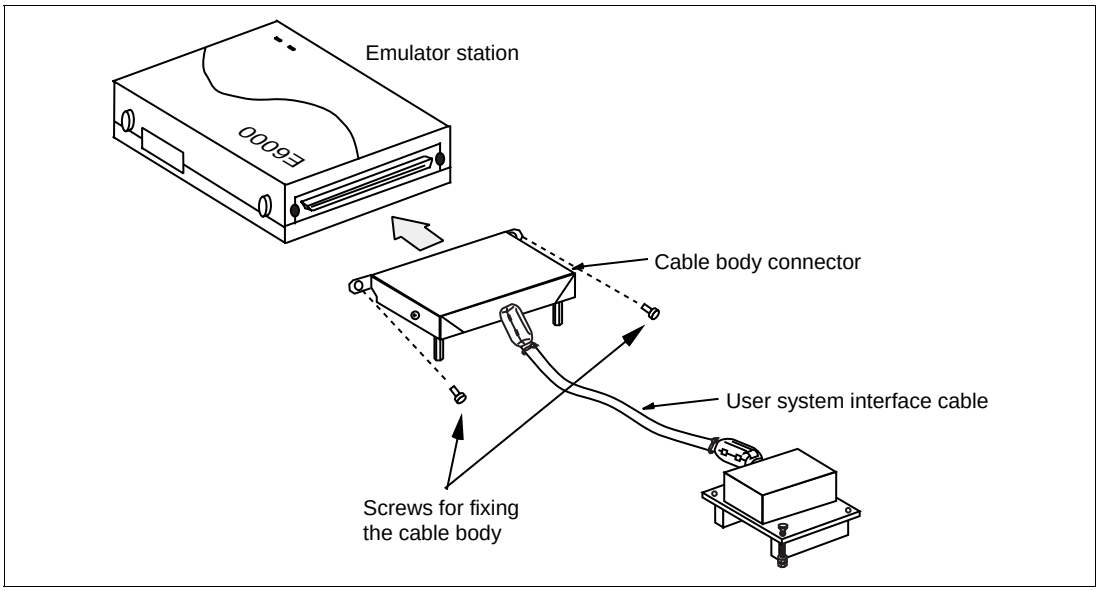

Figure 2 Connecting User System Interface Cable to Emulator Station

2.2 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.

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

2.2.1 Installing IC Socket

After checking the location of pin 1 on the IC socket, apply epoxy resin adhesive to the bottom of the IC socket for a FP-64E package, and fasten it to the user system before soldering.

2.2.2 Soldering IC Socket

After fastening, solder the IC socket for a FP-64E package to the user system. Be sure to completely solder the leads so that the solder slops gently over the leads and forms solder fillets. (Use slightly more solder than the MCU.)

2.2.3 Inserting Cable Head

CAUTION

Check the location of pin 1 before inserting.

Align pin 1 on the IC socket for a FP-64E package on the user system with pin 1 on the user system interface cable head, and insert the user system interface cable head into the IC socket on the user system, as shown in figure 3.

2.2.4 Fastening Cable Head

CAUTION

1. **Use a screwdriver whose head matches the screw head.**
2. **The tightening torque must be 0.13 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 cable head to the IC socket for a FP-64E package on the user system with the four screws (M2 x 12 mm; with four flat washers) 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.

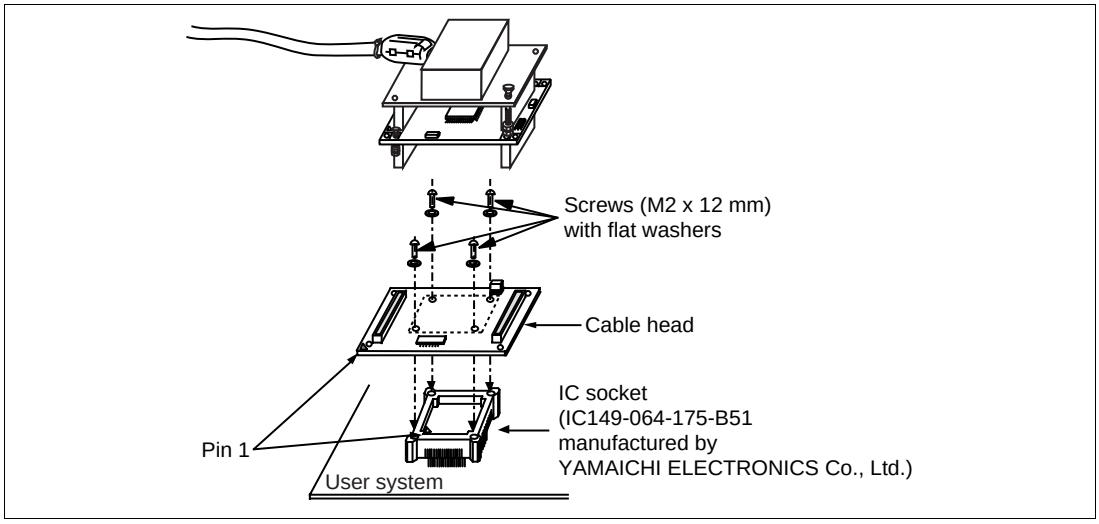

Figure 3 Connecting User System Interface Cable to User System

2.2.5 Fastening Cable Body

Connect the cable body to the cable head.

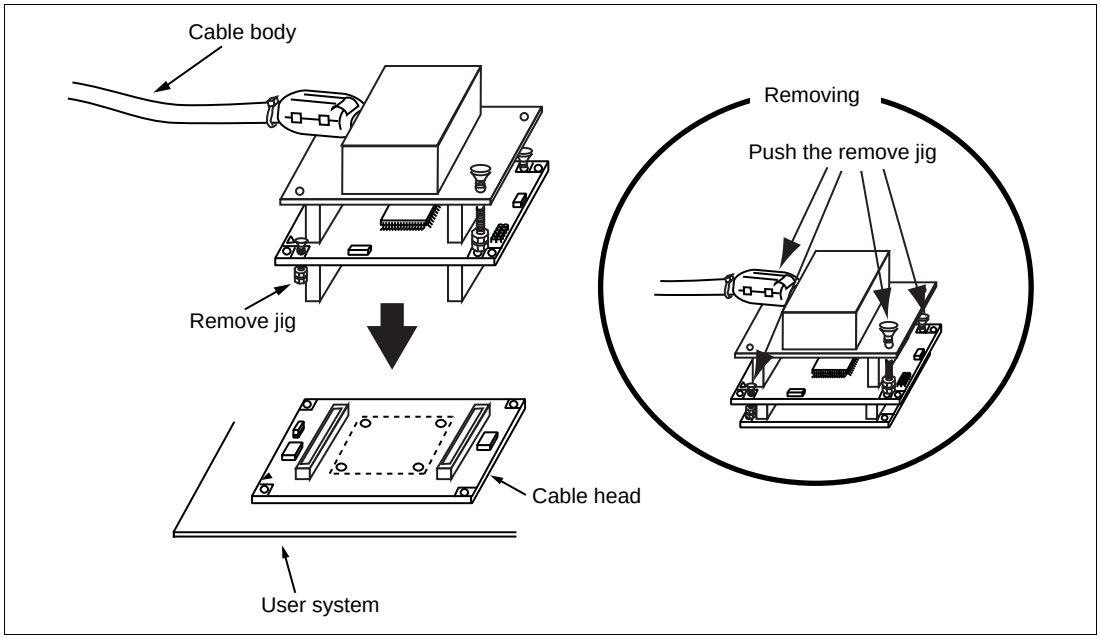

Figure 4 Fastening Cable Body

2.3 Recommended Dimensions for User System Mount Pad

Figure 5 shows the recommended dimensions for the mount pad (footprint) for the user system with an IC socket for a FP-64E package (IC149-064-175-B51: manufactured by YAMAICHI ELECTRONICS Co., Ltd.). Note that the dimensions in figure 5 are somewhat different from those of the actual chip's mount pad.

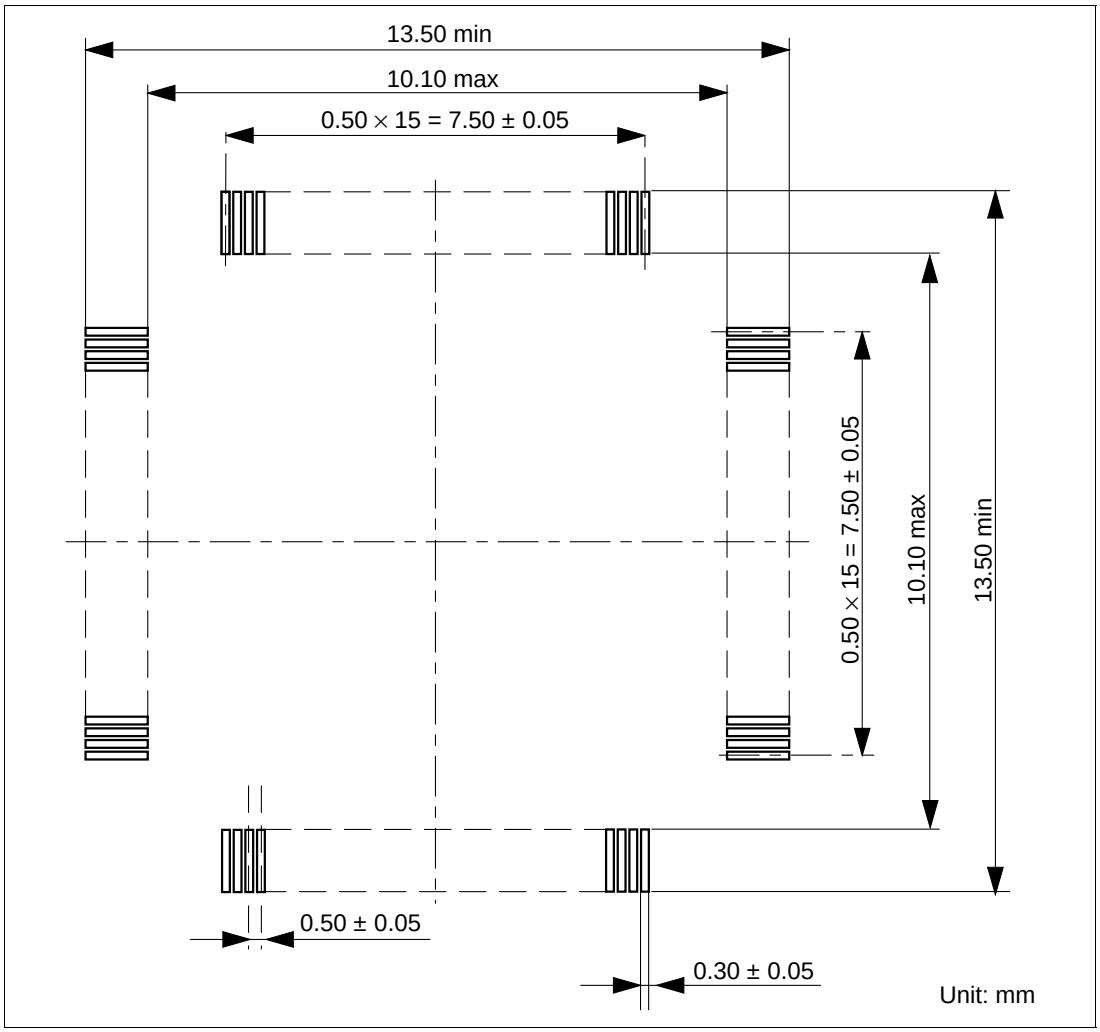

Figure 5 Recommended Dimensions for Mount Pad

2.4 Dimensions for User System Interface Cable Head

The dimensions for the user system interface cable head are shown in figure 6.

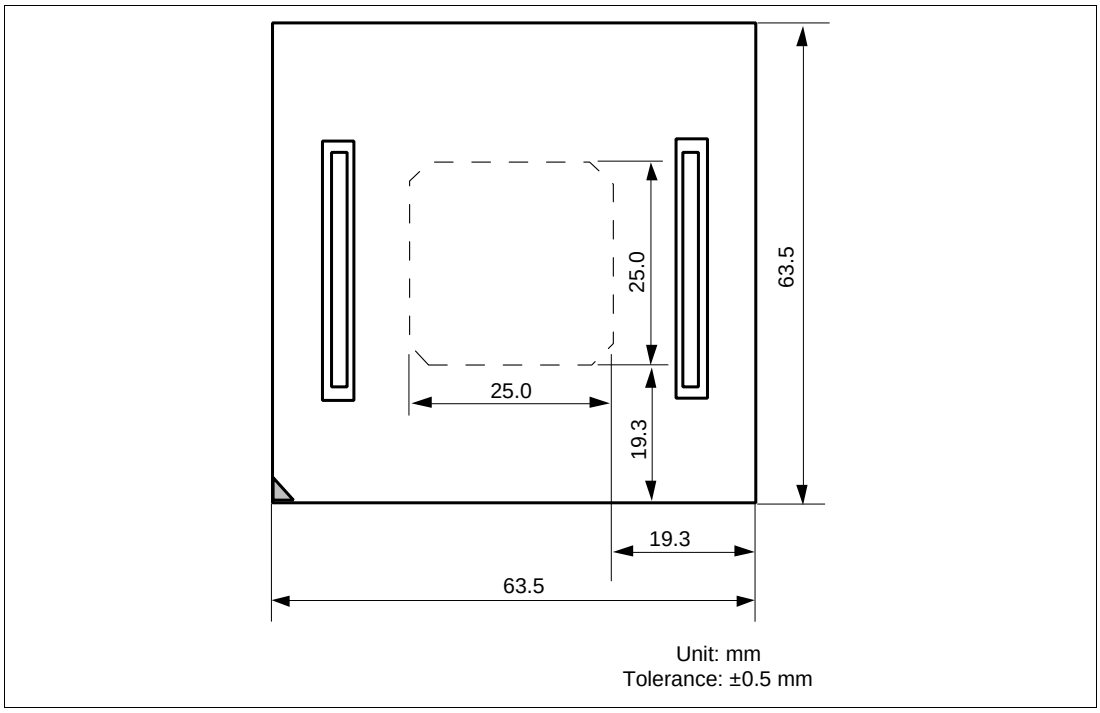

Figure 6 Dimensions for User System Interface Cable Head

2.5 Resulting Dimensions after Connecting User System Interface Cable

The resulting dimensions, after connecting the user system interface cable head to the user system, are shown in figure 7.

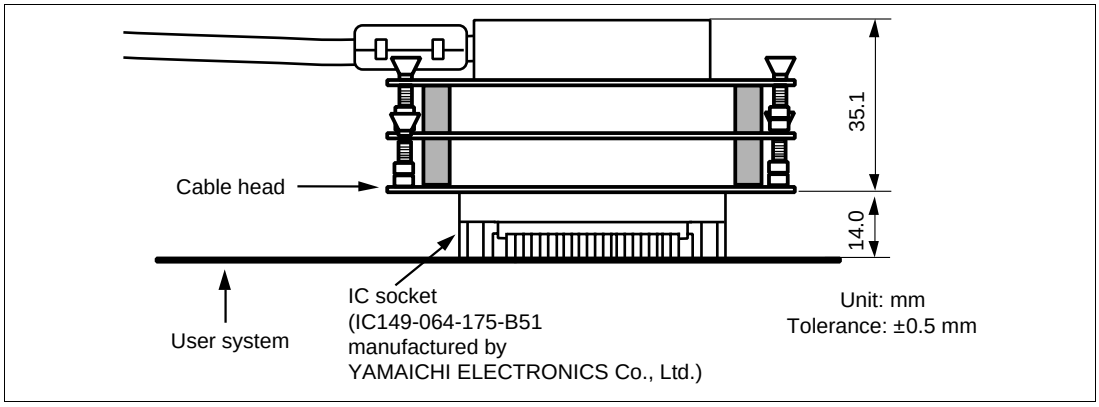

Figure 7 Resulting Dimensions after Connecting User System Interface Cable

Section 3 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 0.29 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 8. After inserting the MCU, fasten the socket cover with the provided four screws (M2 x 6 mm; with four flat washers). 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.

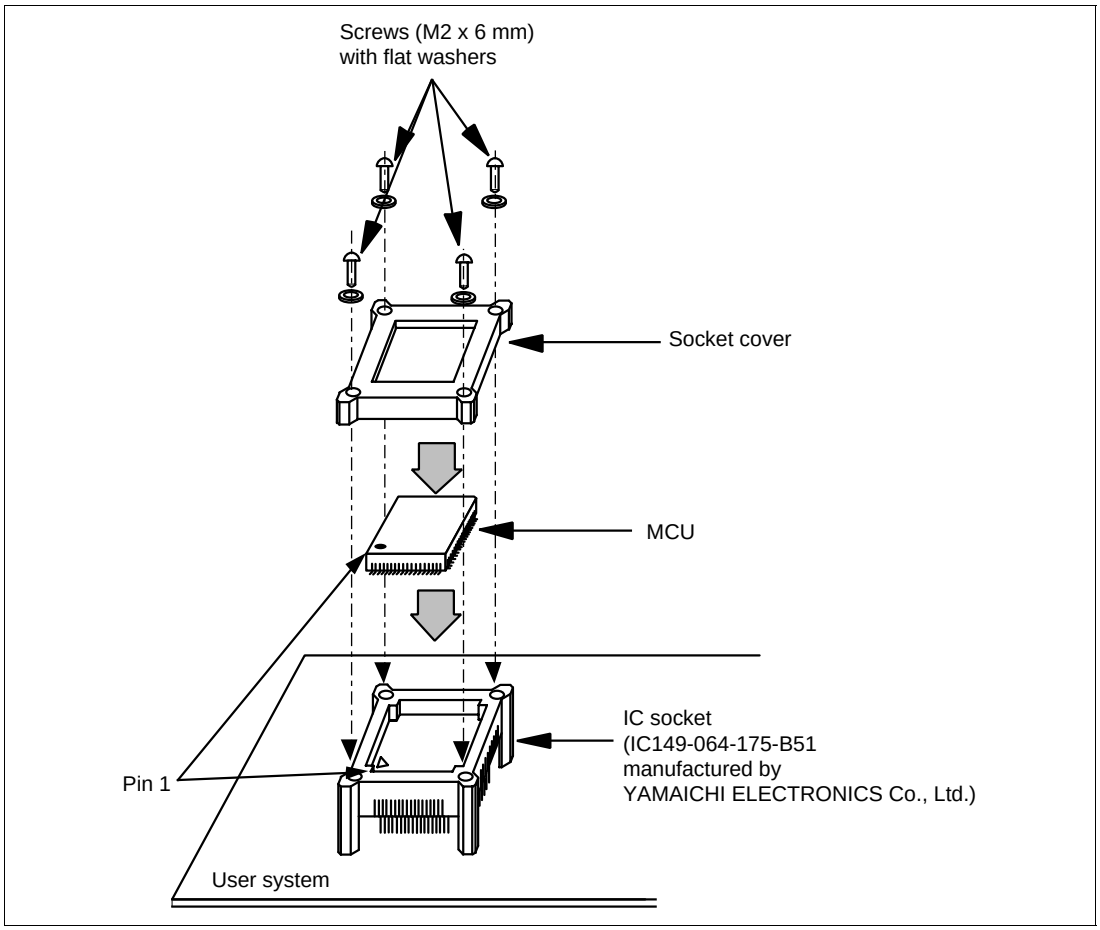

Figure 8 Installing MCU to User System

Section 4 User Interface Circuit

The user system interface cable includes the H8S/2218 microcomputer to emulate the USB function. The H8S/2212 user interface signal includes a interface circuit as shown in figure 9.

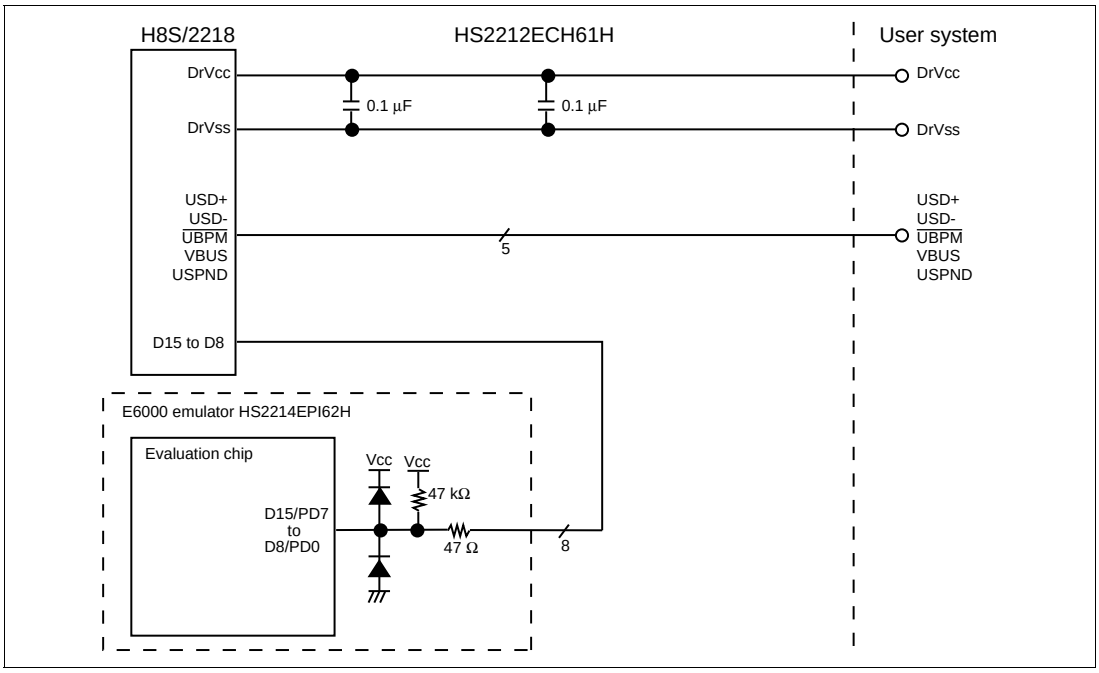

Figure 9 User Interface Signal

Section 5 Verifying Operation

1. When using the H8S/2214 E6000 emulator for the H8S/2212 Series, turn on the emulator according to the procedures described in the H8S/2214 E6000 Emulator User's Manual (HS2214EPI62HE).
2. Verify the user system interface cable connections by accessing the ports to check the bus states of the pins. If an error is detected, recheck the soldered IC socket and the location of pin 1.
3. The emulator connected to this user system interface cable supports two kinds of clock sources as the MCU clock: an emulator internal clock and an external clock on the user system. For details, refer to the H8S/2214 E6000 Emulator User's Manual (HS2214EPI62HE).
   - To use the emulator internal clock
     Select the clock in the emulator station with the [CLOCK] option in the [Configuration Properties] dialog box.
   - To use the external clock on the user system
     Select external clock (target or target/2) with the [CLOCK] option in the [Configuration Properties] dialog box, and supply the external clock from the user system to the emulator. Supply the external clock to the system clock by inputting the external clock from the EXTAL terminal on the cable head or connecting a crystal oscillator to the EXTAL and XTAL terminals. To supply the external clock to the subclock, connect the 32.768-kHz crystal oscillator to the OSC1 and OSC2 terminals. For details, refer to section 19, Clock Pulse Generator, in the H8S/2212 Series Hardware Manual.
     The user system interface cable has the oscillator circuits shown in figure 10. This circuit is located on the lower board of the HS2212ECH61H.

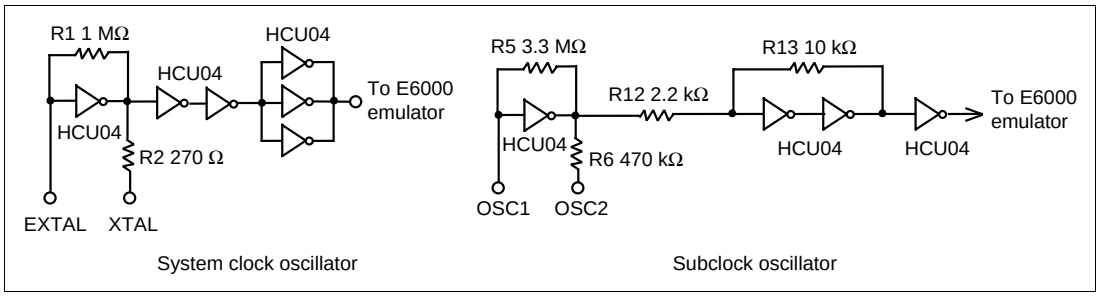

Figure 10 Clock Oscillator Circuits

Section 6 Notice

1. Make sure that pin 1 on the user system IC socket is correctly aligned with pin 1 on the cable head before inserting the cable head into the user system IC socket.
2. The dimensions of the recommended mount pad for the user system IC socket are different from those of the MCU.
3. This user system interface cable is specifically designed for the HS2214EPI62H emulators. Do not use this cable with any other emulator station.
4. To prevent breaking of wires in the cable body, do not place heavy or sharp metal objects on the user system interface cable.
5. While the emulator station is connected to the user system with the user system interface cable, force must not be applied to the cable head. Place the emulator station, user system interface cable, and user system as shown in the example in figure 11.

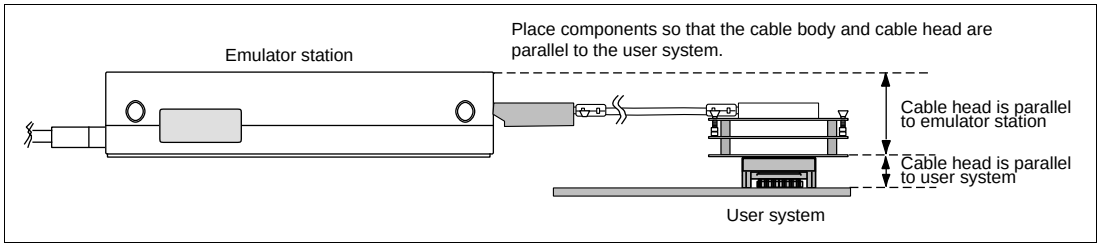

Figure 11 User System Interface Cable Location Example

6. The P1 jumper socket on the cable head is used for testing. Do not remove the inserted jumper pin.

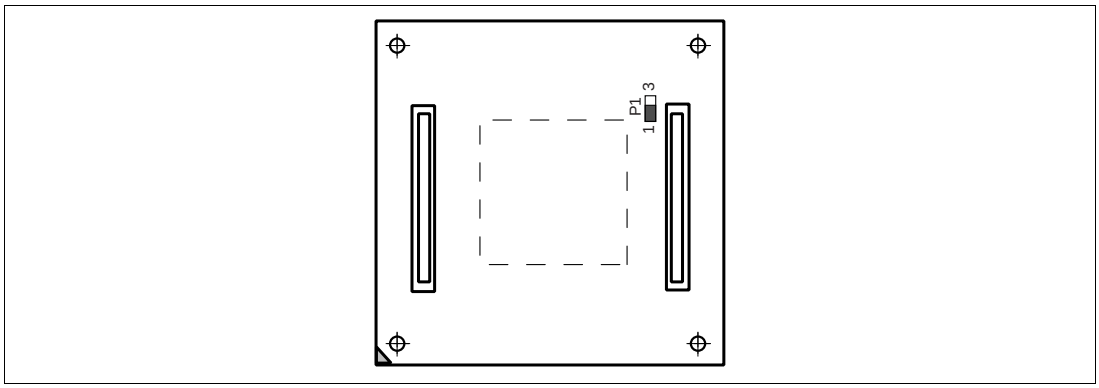

Figure 12 P1 Jumper Socket

7. In the H8S/2212 series, the USB control register and the RTC control register are allocated to external bus areas of area 6 (H'C00000 to H'DFFFFF) and area 7 (H'E00000 to H'FFFFFF), respectively.
   To access these registers, a bus controller must be set. For details, refer to section 3, MCU Operating Mode, section 6, Bus Controller, and section 14, Universal Serial Bus (USB), in the H8S/2212 Series Hardware Manual.

When using the emulator, the following register settings are required:

Pin function control register (PFCR: H'FDEB): H'02

Bit 2 of the port 7 data direction register (P7DDR: H'FE36): 1

Port C data direction register (PCDDR: H'FE3B): H'FF