

To our customers,

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April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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**H8S/2215 Series TFP-120  
User System Interface Cable  
(HS2215ECN61H) for E6000 Emulator  
User's Manual**

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- **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.**

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- User system interface cable (HS2215ECN61H)

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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

- **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.

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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.



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**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.

# **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.**

# Preface

Thank you for purchasing this user system interface cable (HS2215ECN61H) for the Hitachi's original microcomputer H8S/2215 series.

The HS2215ECN61H is a user system interface cable that connects an H8S/2214 series E6000 emulator (HS2214EPI61H; hereinafter referred to as the emulator) to the IC socket for a TFP-120 package for the H8S/2215 series MCU on the user system.

The user system interface cable should be used with H8S/2214 series E6000 emulator (HS2214EPI61H; hereinafter referred to as the emulator). HDI HS2214EPI61SR V1.01 or later is necessary.

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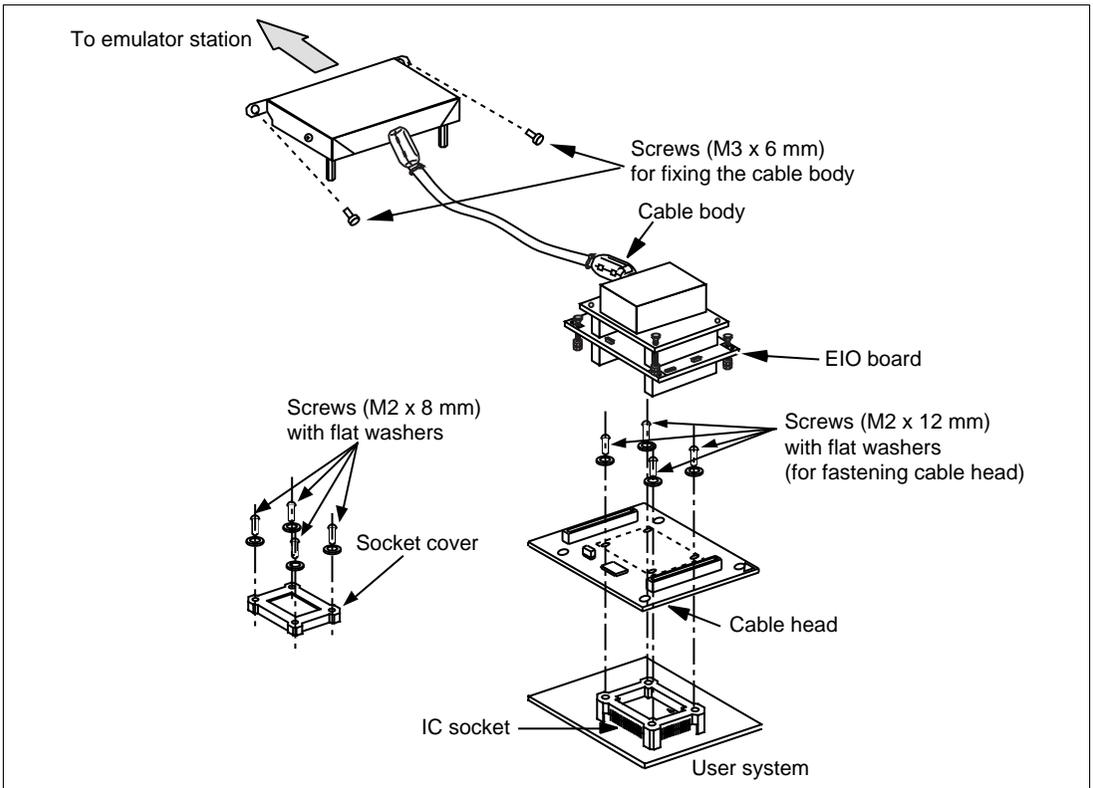
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## Section 1 Configuration

# CAUTION

Use an IC149-120-043-B5 socket (manufactured by YAMAICHI ELECTRONICS Co., Ltd) for the TFP-120 package IC socket on the user system.

Figure 1 shows the configuration of the HS2215ECN61H user system interface cable for the TFP-120 package.



**Figure 1 HS2215ECN61H User System Interface Cable**

Table 1 lists the HS2215ECN61H components. Please make sure you have all of these components when unpacking.

**Table 1 HS2215ECN61H Components**

<b>No.</b>	<b>Component</b>	<b>Quantity</b>	<b>Remarks</b>
1	Cable body	1	Includes coaxial cable
2	Cable head	1	Consisting of two printed circuit boards
3	IC socket	1	For the TFP-120 package
4	Socket cover	1	For installing an TFP-120 packaged MCU
5	Screws (M2 x 12 mm)	4	For fastening cable head (with four flat washers)
6	Screws (M2 x 8 mm)	4	For installing an TFP-120 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 HS2215ECN61H (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.**

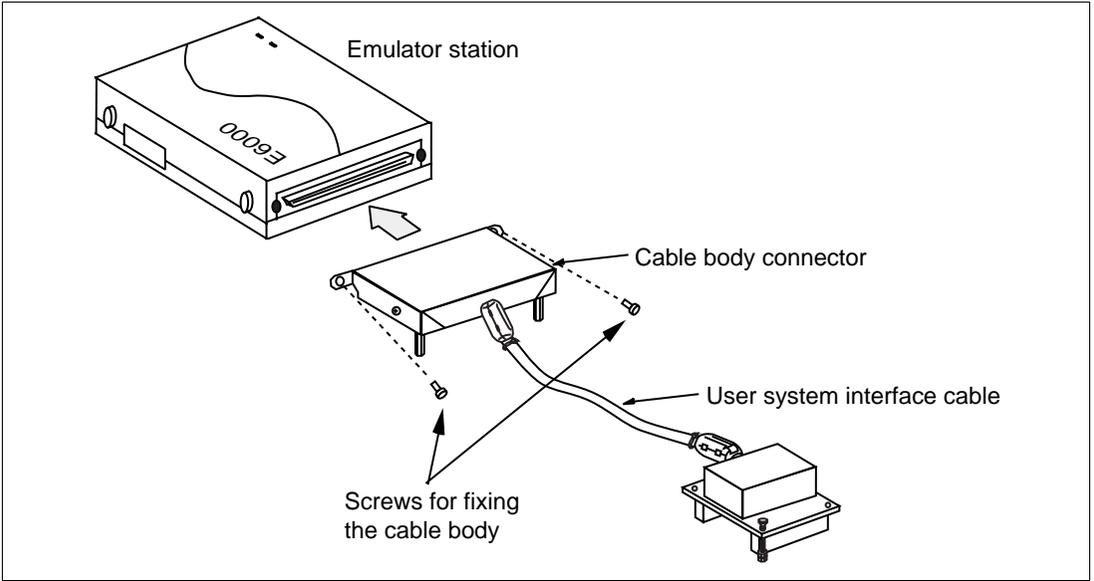
To connect the cable body to the emulator station, follow the instructions below.

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 TFP-120 package, and fasten it to the user system before soldering.

### 2.2.2 Soldering IC Socket

After fastening, solder the IC socket for a TFP-120 package to the user system. 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.)

### 2.2.3 Inserting Cable Head

## CAUTION

**Check the location of pin 1 before inserting.**

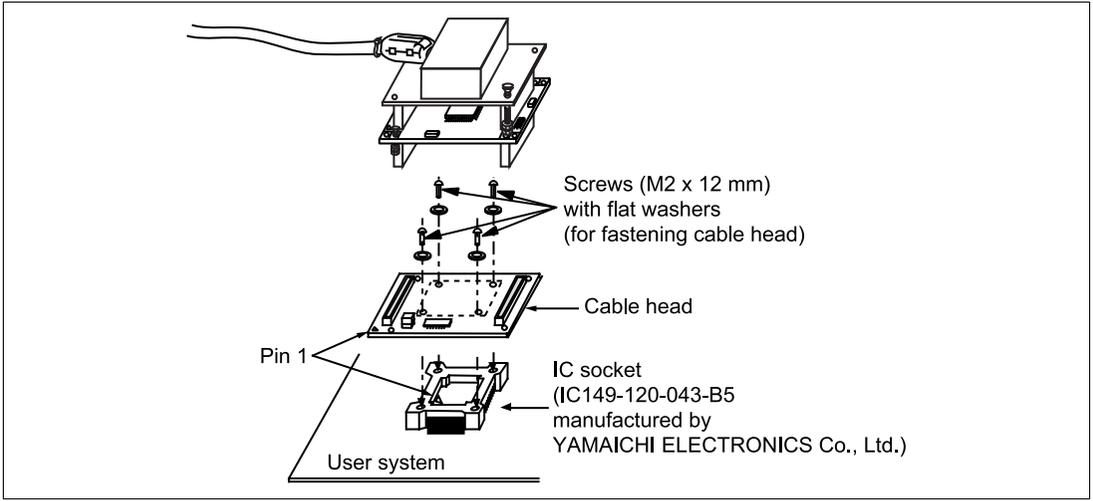
Align pin 1 on the IC socket for an TFP-120 package on the user system with pin 1 on the user system interface cable head, and insert the user system interface cable head into the IC socket on the user system, as shown in figure 3.

### 2.2.4 Fastening Cable Head

## CAUTION

- 1. Use the screwdriver provided for tightening screws.**
- 2. The tightening torque must be 0.098 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.**

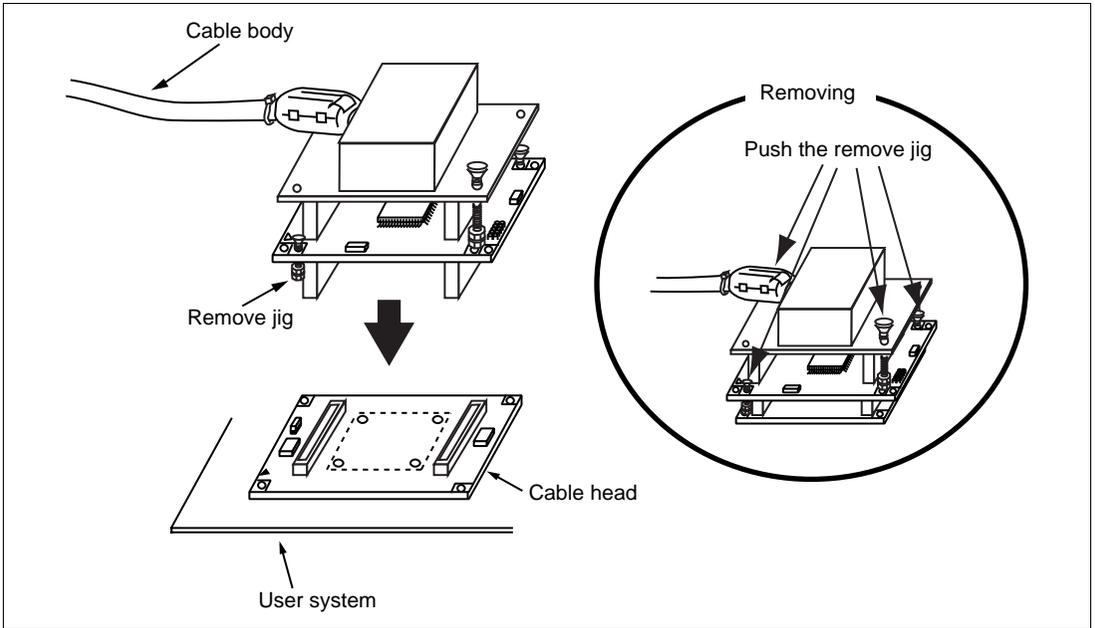
Fasten the user system interface cable head to the IC socket for an TFP-120 package on the user system with the four screws (M2 x 12 mm; with flat washers) provided. Each screw should be tightened a little at a time, alternating between screws on opposing corners. Take special care, such as manually 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**

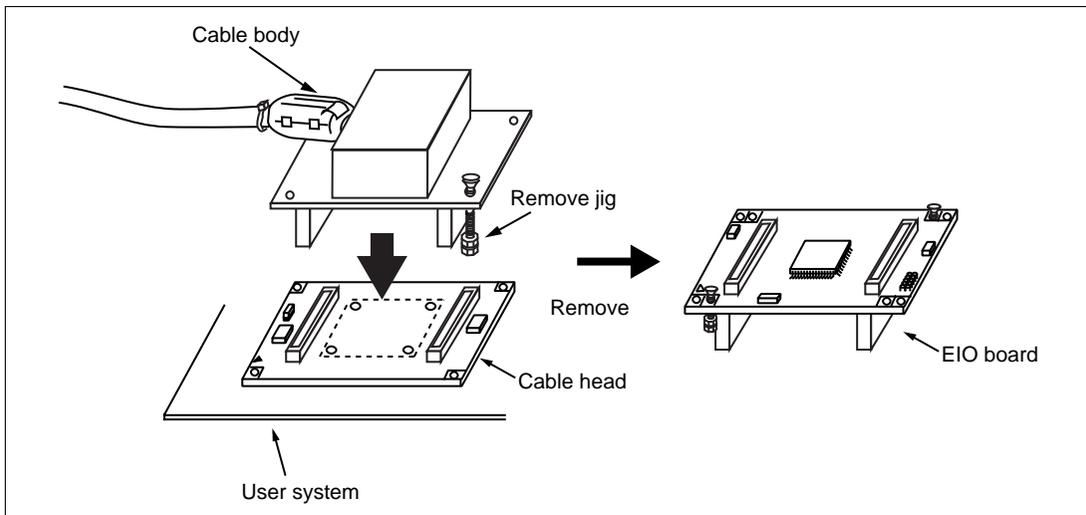
## 2.2.5 Fastening Cable Body

Connect the cable body to the cable head.



**Figure 4 Fastening Cable Body**

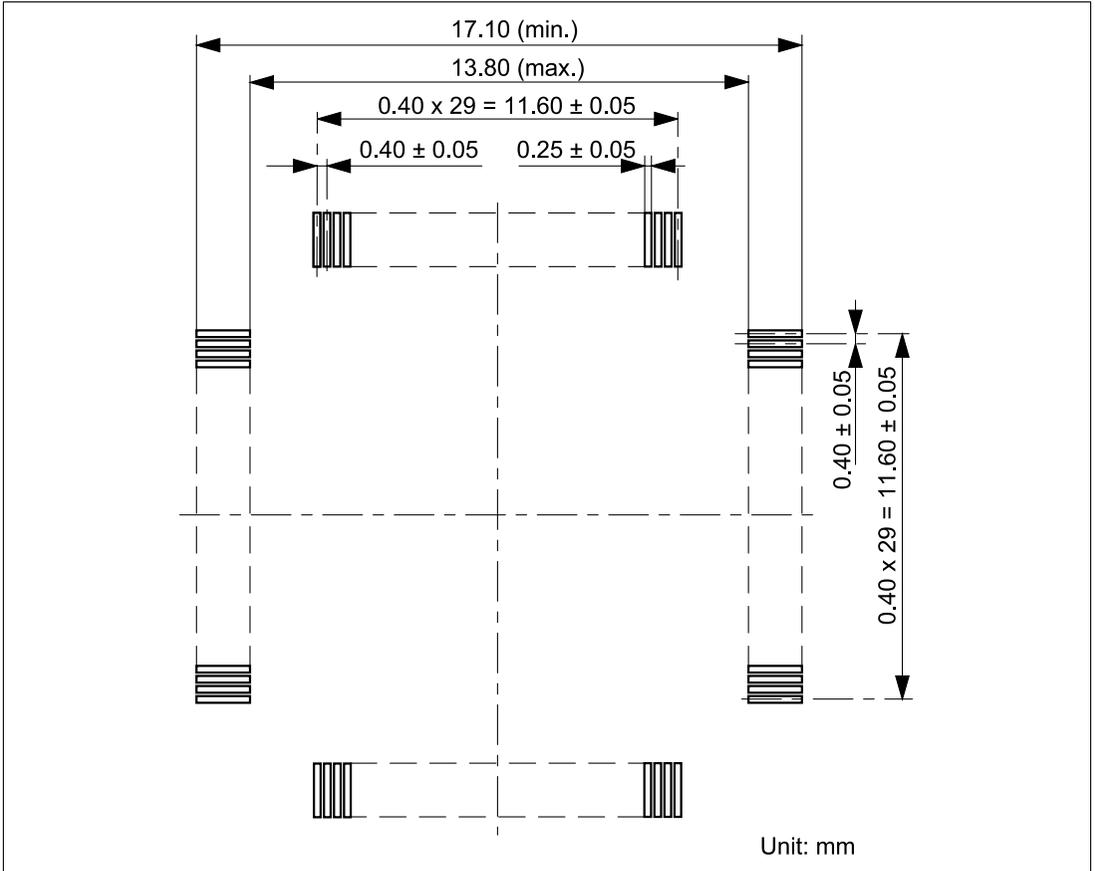
To use the single-chip mode (without USB function) for the H8S/2215 operating mode, remove the EIO board and connect the cable body to the cable head as shown in figure 5.



**Figure 5 Cable Configuration in Single-Chip Mode**

### 2.3 Recommended Dimensions for User System Mount Pad

Figure 6 shows the recommended dimensions for the mount pad (footprint) for the user system with an IC socket for an TFP-120 package (IC149-120-043-B5: manufactured by YAMAICHI ELECTRONICS Co., Ltd). Note that the dimensions in figure 6 are somewhat different from those of the actual chip's mount pad.

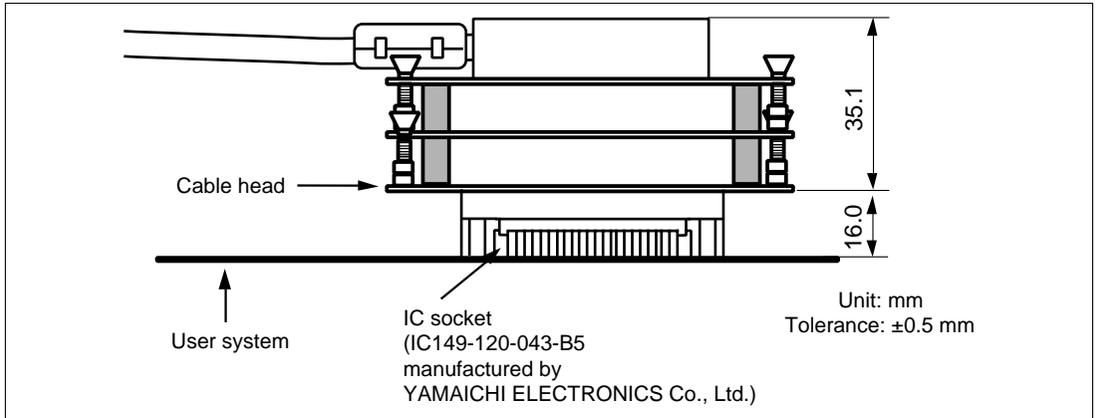


**Figure 6 Recommended Dimensions for Mount Pad**



## 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 8.



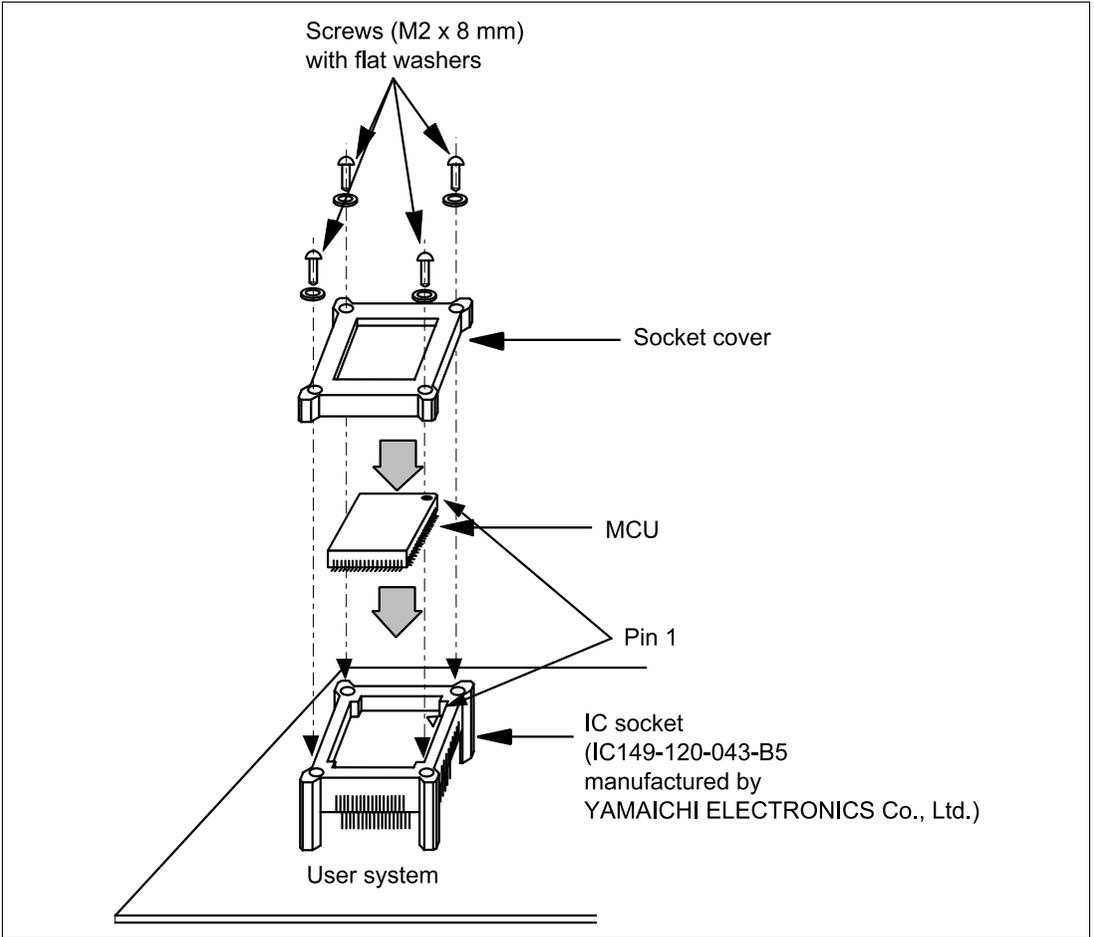
**Figure 8 Resulting Dimensions after Connecting User System Interface Cable**

## Section 3 Installing the MCU to the User System

### **CAUTION**

- 1. Check the location of pin 1 before inserting.**
- 2. Use the screwdriver provided for tightening screws.**
- 3. The tightening torque must be 0.098 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 9. After inserting the MCU, fasten the socket cover with the provided four screws (M2 x 8 mm; with 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 9 Installing MCU to User System**

## Section 4 User Interface Circuit

The user system interface cable includes the H8S/2215 microcomputer to emulate the USB function. The H8S/2215 user interface signal includes a interface circuit as shown in figure 10. Table 2 shows how to select user interface circuit.

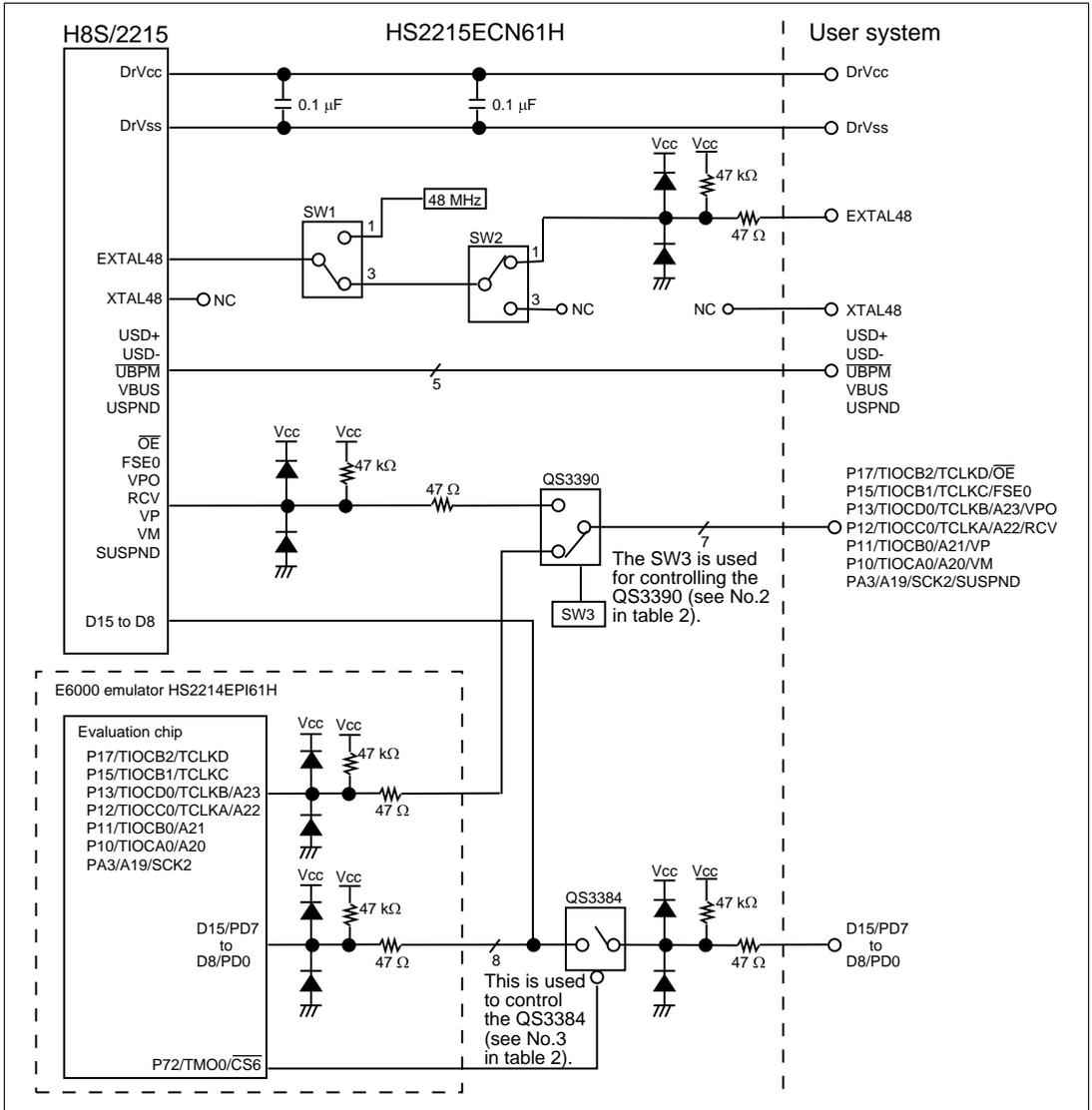
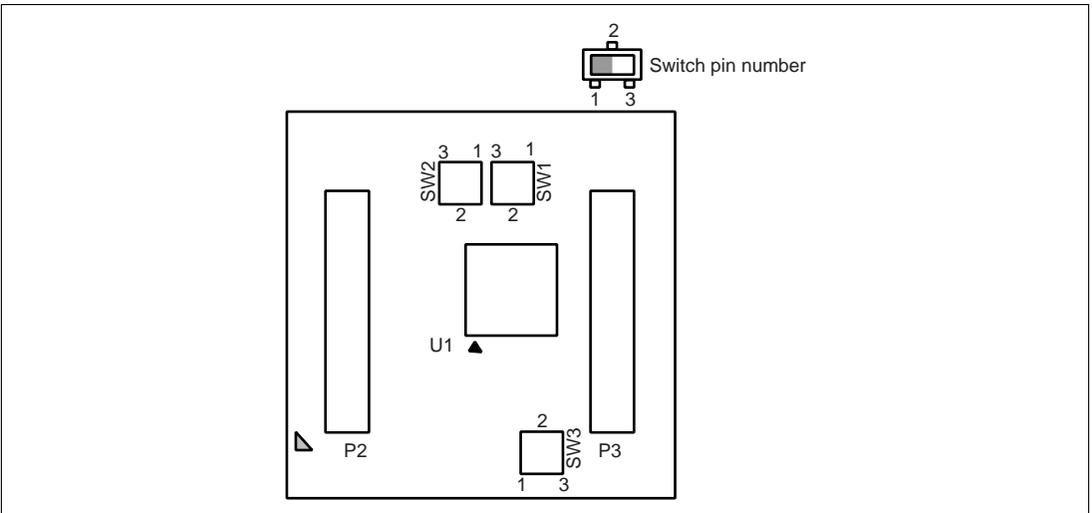


Figure 10 User Interface Signal

**Table 2 Selecting User Interface Signal**

No.	Function	Switch Setting	Selected Function
1	Selects EXTAL48 input	SW1 = 1	48 MHz emulation clock
		SW1 = 3, SW2 = 1	EXTAL48 TTL clock input
		: Setting at shipment	
2	Selects USB external transceiver connection signal or port function	SW1 = 3, SW2 = 3	—: Cannot be used
		SW3 = 1	P17/TIOCB2/TCLKD P15/TIOCB1/TCLKC P13/TIOCD0/TCLKB/A23 P12/TIOCC0/TCLKA/A22 P11/TIOCB0/A21 P10/TIOCA0/A20 PA3/A19/SCK2
		: Setting at shipment	
		SW3 = 3	OE FSE0 VPO RCV VP VM SUSPND
3	Data bus control	-	When CS6 = 'L', data bus is HighZ (Same as H8S/2215)

SW1 to SW3 are located on the EIO board of HS2215ECN61H. Figure 11 shows the location of SW1 to SW3.



**Figure 11 Location of SW1 to SW3 on the EIO Board**

## Section 5 Verifying Operation

1. When using the E6000 emulator for the H8S/2215 series, turn on the emulator according to the procedures described in the H8S Series E6000 Emulator User's Manual (HS2000EPI61HE).
2. Verify the user system interface cable connections by accessing the external memory and ports to check the bus states of the pins with the MEMORY\_FILL command (emulator command). 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 Emulator Supplementary Information (HS2214EPI61HE).

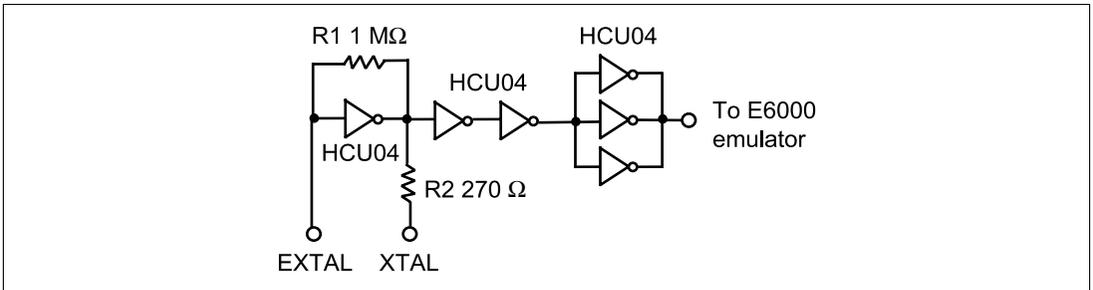
— To use the emulator internal clock

Select the clock in the emulator station as the system clock ( $\phi$ ), by using the CLOCK command (emulator command).

— To use the external clock on the user system

Select external clock t or t2 with the CLOCK command (emulator command). Supply the external clock from the user system to the emulator by inputting the external clock from the EXTAL terminal on the cable head or connecting a crystal oscillator to the EXTAL and XTAL terminals. For details, refer to section 21, Clock Pulse Generator, H8S/2215 Series Hardware Manual.

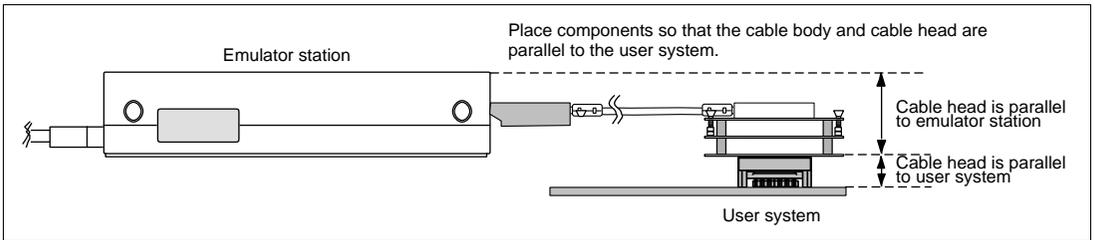
The user system interface cable has the oscillator circuits shown in figure 12. This circuit is located on the lower board of the HS2215ECN61H.



**Figure 12 Clock Oscillator Circuits**

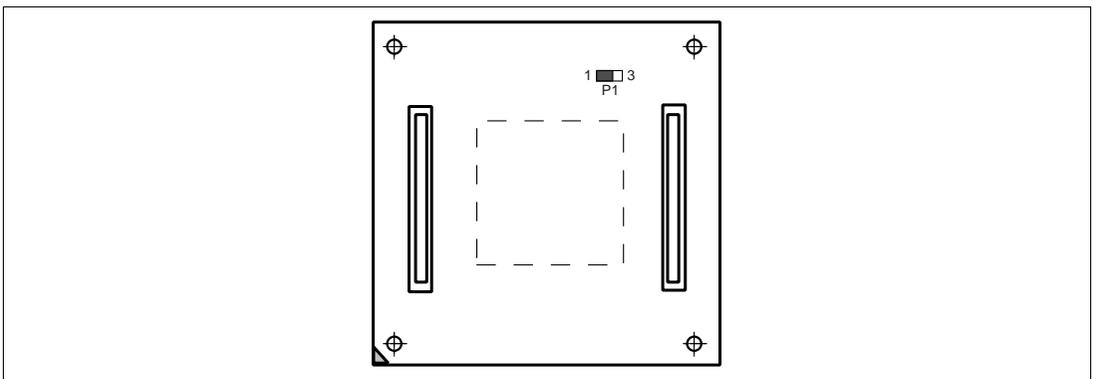
## Section 6 Notice

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 HS2214EPI61H 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 13.



**Figure 13 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 14 P1 Jumper Socket**