

To our customers,

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April 1<sup>st</sup>, 2010  
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H8/3687 Series FP-64A  
User System Interface Cable  
(HS3687ECH62H) for E6000 Emulator  
User's Manual



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- **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:**

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- User system interface cable (HS3687ECH62H)

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**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

- **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.

## 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** 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.



## **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 (HS3687ECH62H) for the Hitachi's original microcomputer H8/3687 Series.

The HS3687ECH62H is a user system interface cable that connects an H8/3687 Series E6000 emulator (HS3664EPI61H; hereinafter referred to as the emulator) to the IC socket for a FP-64A package for the H8/3687 Series MCU on the user system.

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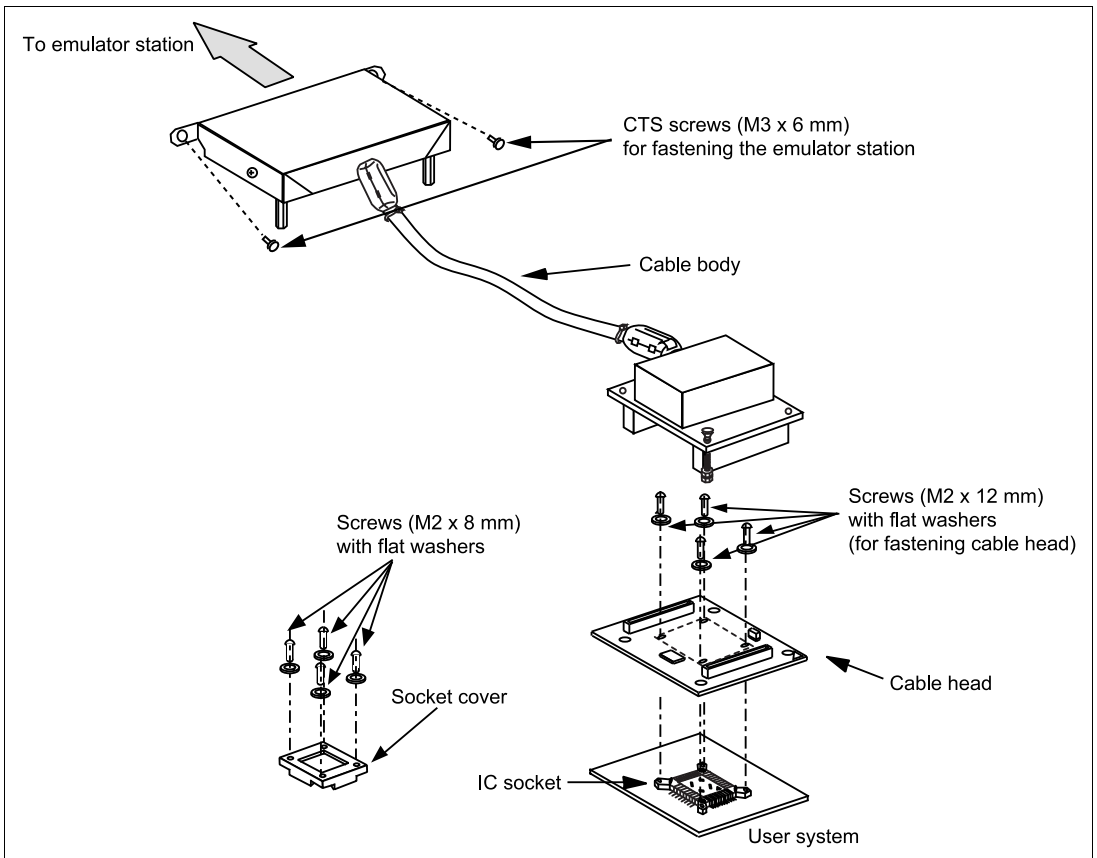
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## Section 1 Configuration

# CAUTION

**Use an IC149-064-008-B5 socket (manufactured by YAMAICHI ELECTRONICS Co., Ltd.) for the FP-64A package IC socket on the user system.**

Figure 1 shows the configuration of the HS3687ECH62H user system interface cable for the FP-64A package.



**Figure 1 HS3687ECH62H User System Interface Cable**



Table 1 lists the HS3687ECH62H components. Please make sure you have all of these components when unpacking.

**Table 1      HS3687ECH62H Components**

<b>No.</b>	<b>Component</b>	<b>Quantity</b>	<b>Remarks</b>
1	Cable body	1	Coaxial cable
2	Cable head	1	
3	IC socket	1	For the FP-64A package
4	Socket cover	1	For installing an FP-64A-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 FP-64A-packaged MCU (with four flat washers)
7	CTS screws (M3 x 6 mm)	2	For fastening the emulator station
8	Documentation	1	User's manual for HS3687ECH62H (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.**

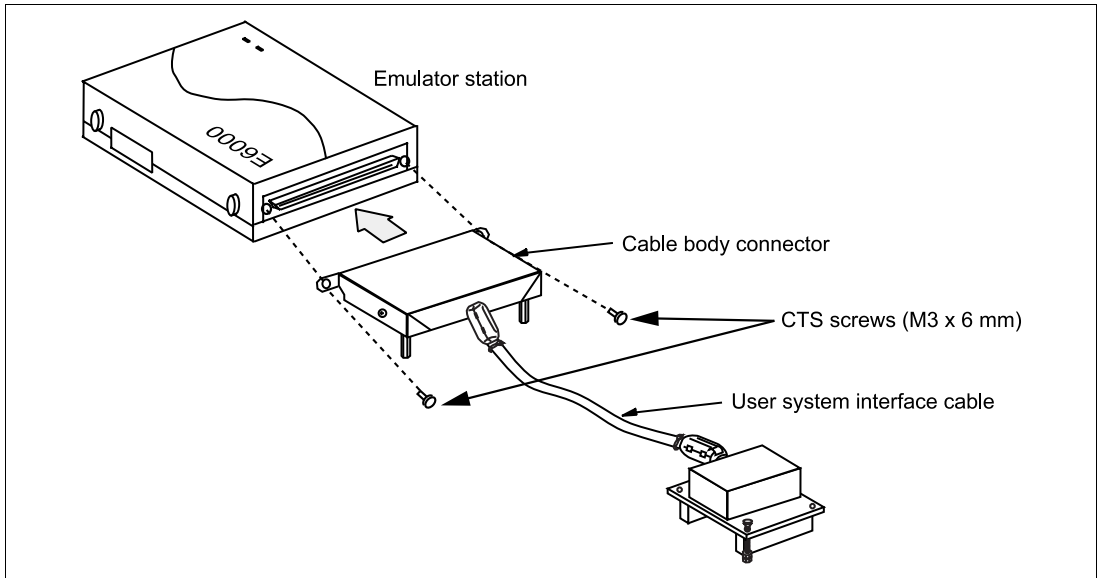
To connect the cable body to the emulator station, follow the instructions below.

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, and fasten the emulator station with two CTS screw (M3 x 6 mm). (figure 2)



**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 an FP-64A package, and fasten it to the user system before soldering.

### 2.2.2 Soldering IC Socket

After fastening, solder the IC socket for an FP-64A 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.**

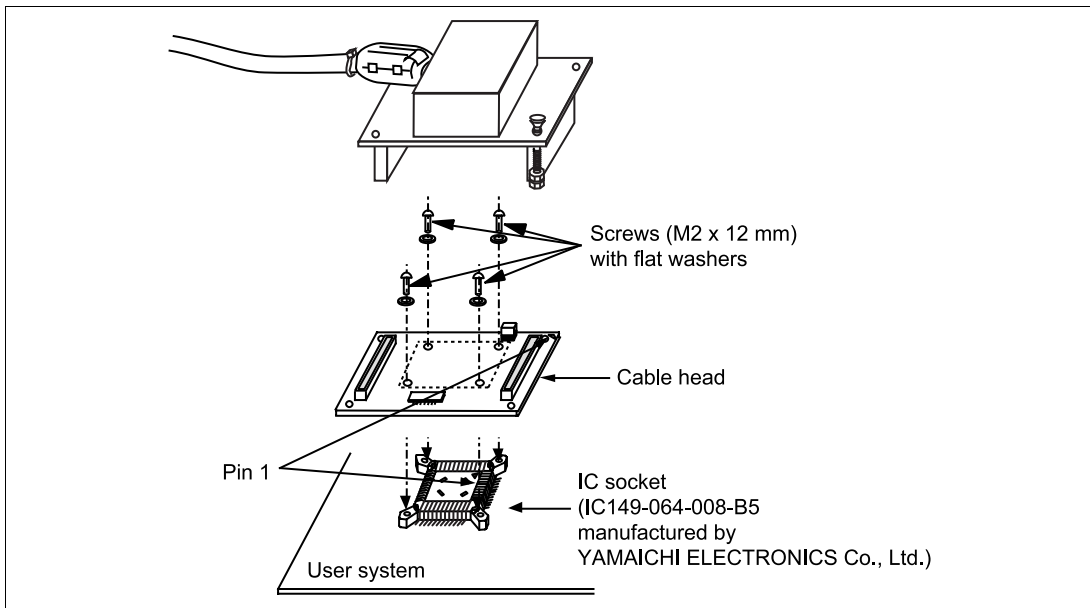
Align pin 1 on the IC socket for an FP-64A package on the user system with pin 1 on the user system interface cable head, and insert the user system interface cable head into the IC socket on the user system, as shown in figure 3.

### 2.2.4 Fastening Cable Head

## CAUTION

1. **Use a Philips-type screwdriver whose head matches the screw head.**
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.**

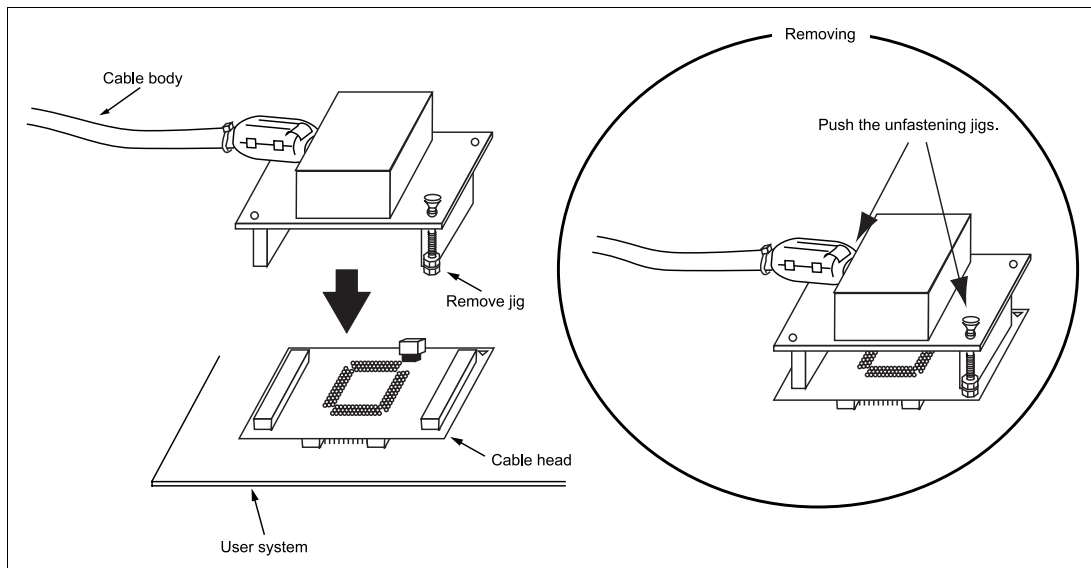
Fasten the user system interface cable head to the IC socket for an FP-64A package on the user system with the four screws (M2 x 12 mm; with four flat washers) provided. Each screw should be tightened a little at a time, alternating between screws on opposing corners. Take special care, such as manually 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 an FP-64A package (IC149-064-008-B5: 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.

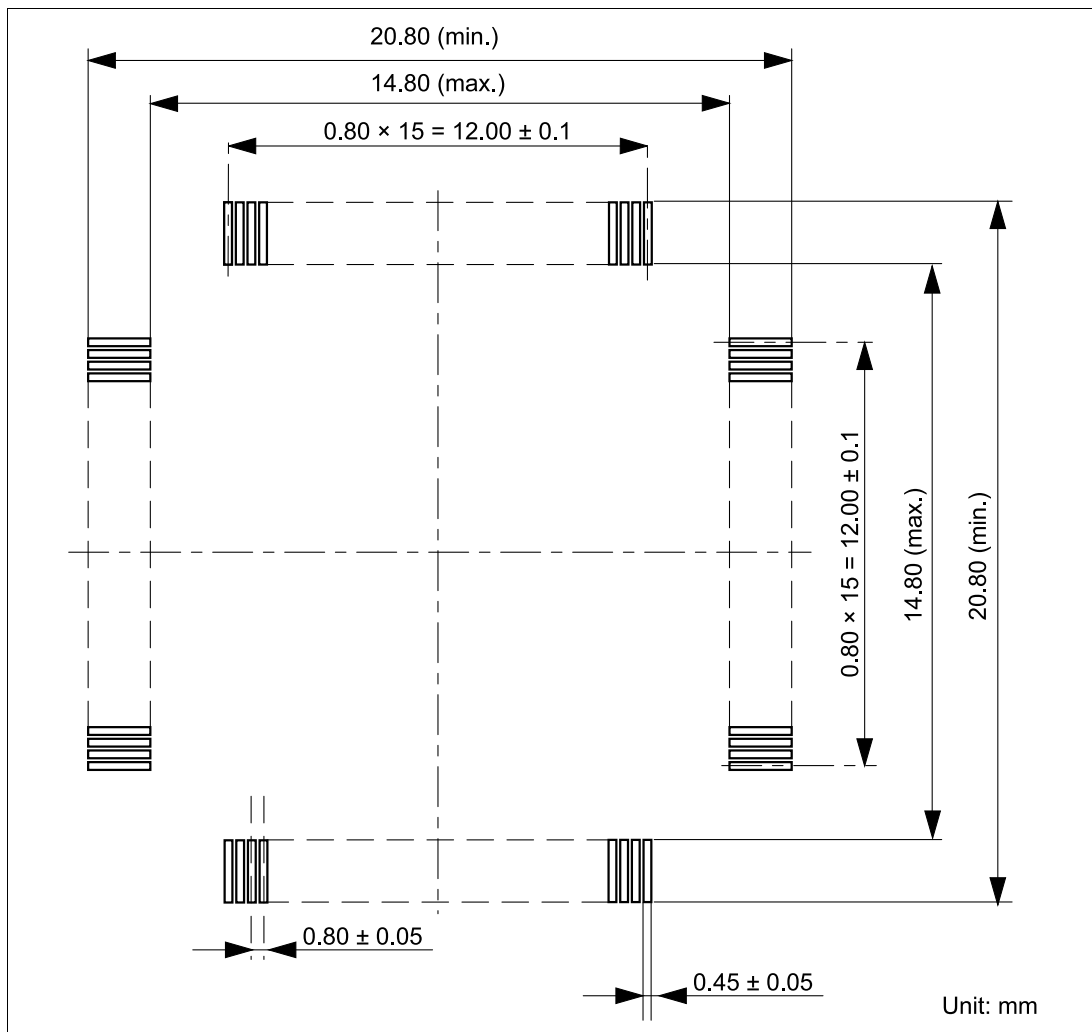
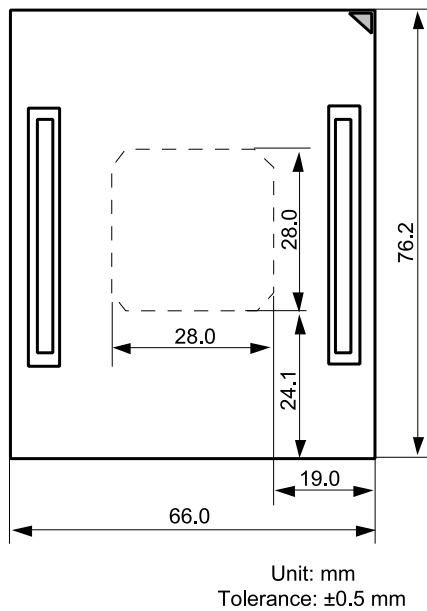


Figure 5 Recommended Dimensions for Mount Pad



## 2.4 Dimensions for User System Interface Cable Head

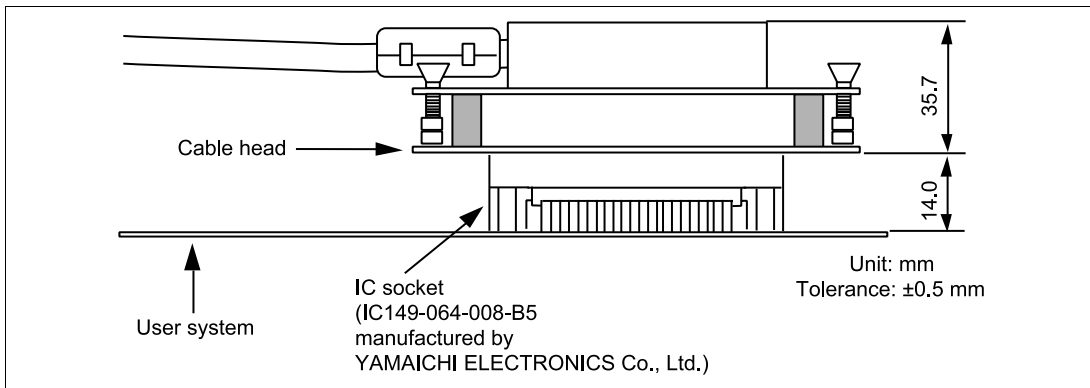
The dimensions for the user system interface cable head are shown in figure 6.



**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.



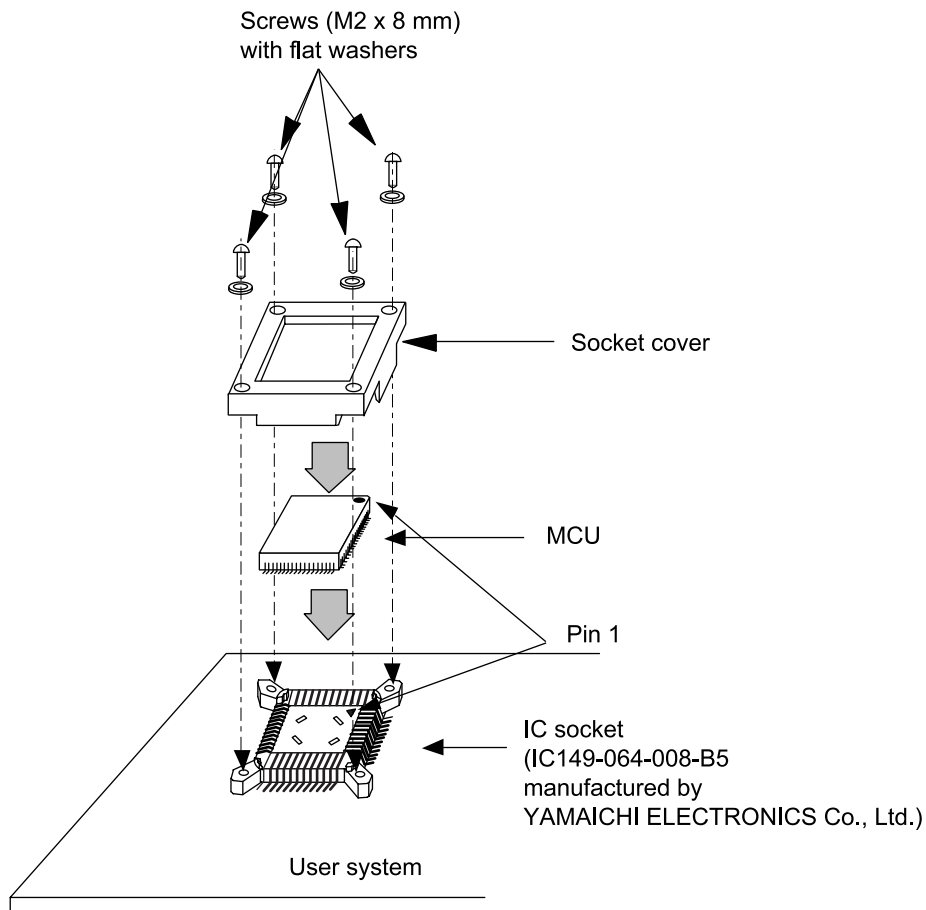
**Figure 7 Resulting Dimensions after Connecting User System Interface Cable**

## 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 0.098 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 8. After inserting the MCU, fasten the socket cover with the provided four screws (M2 x 8 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 Verifying Operation

1. When using the H8/3687 Series E6000 emulator (HS3664EPI61H), turn on the emulator according to the procedures described in the H8/300H Series E6000 Emulator User's Manual (HS300HEPI61HE).
2. Verify the user system interface cable connections by accessing ports and checking 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: an emulator internal clock and an external clock on the user system, for the MCU clock and subclock. For details, refer to the H8/3687 Series E6000 Emulator Supplementary Information (HS3664EPI61HE).

— To use the emulator internal clock

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

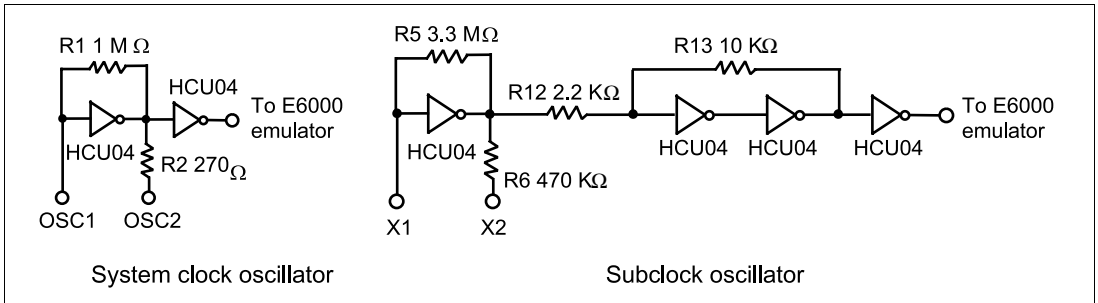
— To use the external clock on the user system as the system clock

Select target clock t with the CLOCK command (emulator command). Supply the external clock from the user system to the emulator by inputting the external clock from the OSC1 terminal on the cable head or connecting a crystal oscillator to the OSC1 and OSC2 terminals. When a crystal oscillator is inserted into the OSC1 and OSC2 terminals for the system clock, the clock is generated by the oscillator circuits shown in figure 9. To input an external clock from the user system, input clock pulses satisfying the specifications described in the MCU hardware manual into the OSC1 terminal. The system clock ( $\phi$ ) frequency is the same as the external clock frequency.

— To use the external clock on the user system as the subclock

Select target clock sub t with the CLOCK command (emulator command). Supply the external clock from the user system to the emulator. Supply the external clock from the user system to the emulator by inputting the external clock from the X1 terminal on the cable head or connecting a crystal oscillator to the X1 and X2 terminals. When a crystal oscillator is inserted into the X1 and X2 terminals for the subclock, the clock is generated by the oscillator circuits shown in figure 9. To input an external clock from the user system, input clock pulses satisfying the specifications described in the MCU hardware manual into the X1 terminal. The subclock ( $\phi_w$ ) frequency is the same as the external clock frequency.

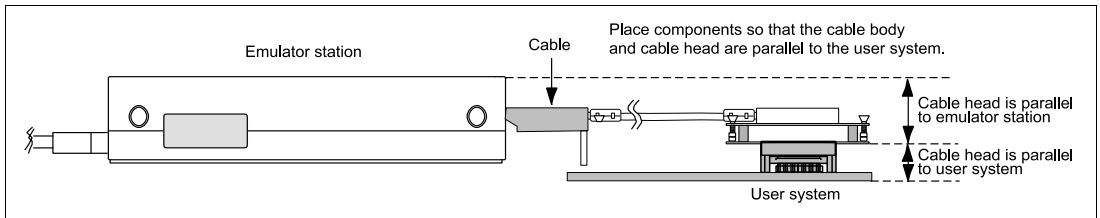
Figure 9 shows the system clock oscillator on the user system interface cable and the subclock input specifications.



**Figure 9 System Clock and Subclock Oscillators**

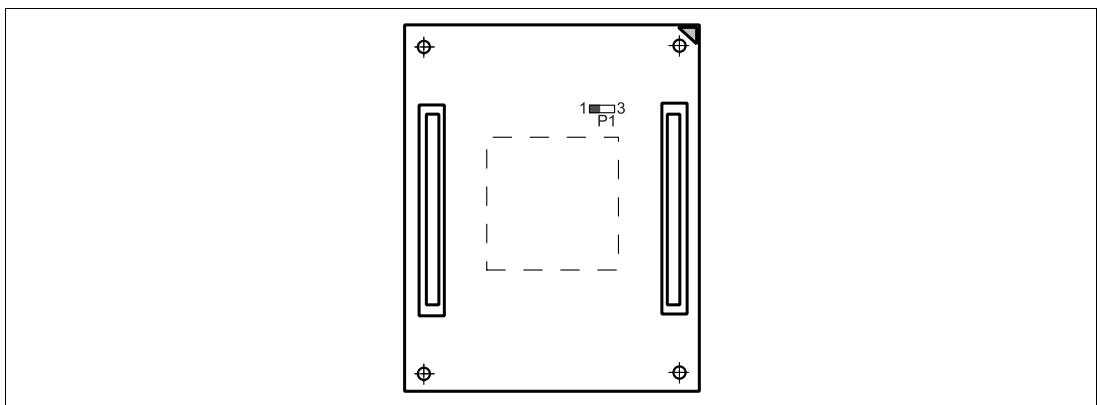
## Section 5 Notice

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 HS3664EPI61H emulator. 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 10.



**Figure 10 User System Interface Cable Location Example**

6. The P1 short connector is used for testing. Do not remove the inserted jumper pin.



**Figure 11 P1 Short Connector**