RENESAS
Renesas Technology Corp.

# H8S/2128 Series
# TQFP-80C
# User System Interface Cable
# (HS2128ECN61H)
# for E6000 Emulator

## User's Manual

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## READ FIRST

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

**• <u>KEEP the user's manual handy for future reference.</u>**

**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 (HS2128ECN61H)

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.

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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.

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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.

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# 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

**DANGER** indicates an **imminently** hazardous situation which, **if not avoided, will result in DEATH** or **SERIOUS INJURY** to you or other people.

**WARNING** indicates a **potentially** hazardous situation which, **if not avoided, could result in DEATH** or **SERIOUS INJURY** to you or other people.

**CAUTION** indicates a hazardous situation which, **if not avoided**, may result in **minor or moderate injury** to you or other people, or may result in **damage to the machine** or **loss of the user program**. It may also be used to alert against unsafe usage.

**NOTE** emphasizes essential information.

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## ⚠ WARNING

**Observe the precautions listed below. Failure to do so will result in a FIRE HAZARD and will damage the user system, emulator, and user system interface cable or will result in PERSONAL INJURY. The USER PROGRAM will be LOST.**

1. **Always switch OFF the emulator and the user system before connecting or disconnecting any CABLES, the user system interface cable connector, or the user system IC socket.**

2. **When connecting the user system interface cable connector to the user system IC socket, ensure that pin 1 on both sides are correctly aligned.**

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# Preface

Thank you for purchasing this user system interface cable (HS2128ECN61H) for the Hitachi's original microcomputer H8S/2128 series.

The HS2128ECN61H is a user system interface cable that connects an H8S/2148, H8S/2138, H8S/2128 series E6000 emulator (HS2148EPI60H; hereinafter referred to as the emulator) to the IC socket for a TQFP-80C package (package code: TFP-80C) for the H8S/2128 series MCU on the user system.

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# Contents

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# Section 1   Configuration

<table>
<tr><td>

# CAUTION

**Use an IC149-080-058-B51 socket (manufactured by YAMAICHI ELECTRONICS Co., Ltd.) for the TFP-80C package IC socket on the user system.**

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</table>

Figure 1 shows the configuration of the HS2128ECN61H user system interface cable for the TFP-80C package.



To emulator station

Cable body

Screws (M2.6 x 12 mm)
with flat washers
(for fastening cable head)

Screws (M2.6 x 8 mm)
with flat washers

Socket cover

Cable head
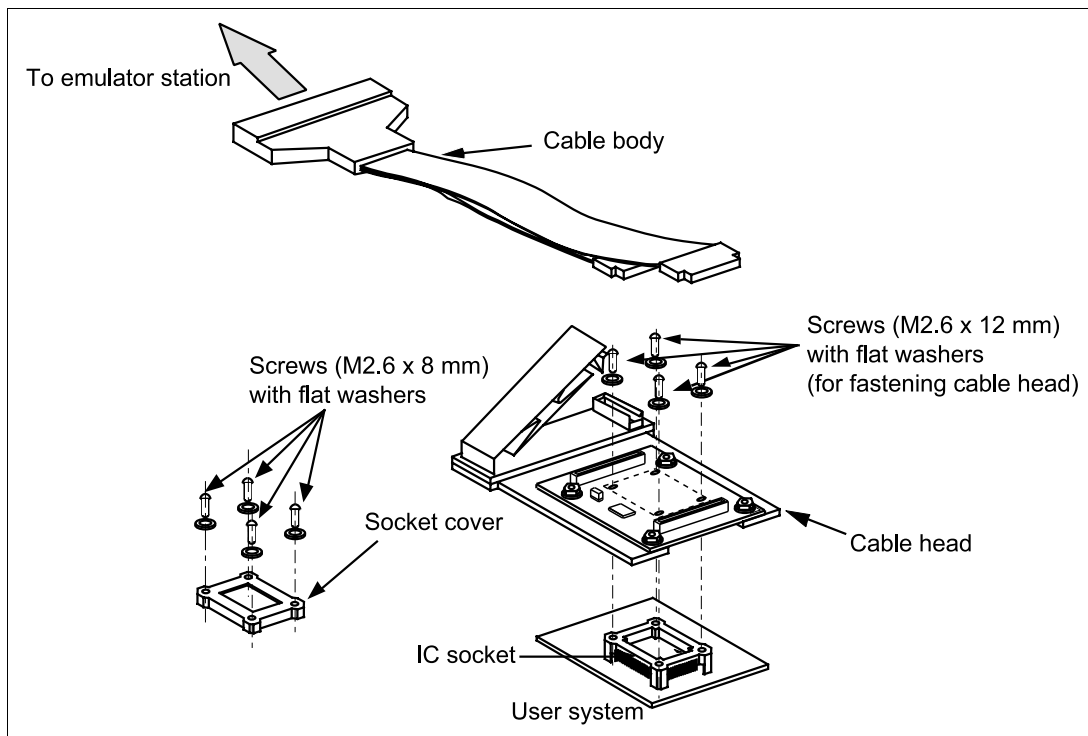
IC socket

User system

**Figure 1   HS2128ECN61H User System Interface Cable**

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Table 1 lists the HS2128ECN61H components. Please make sure you have all of these components when unpacking.

**Table 1     HS2128ECN61H Components**

| No. | Component | Quantity | Remarks |
|-----|-----------|----------|---------|
| 1 | Cable body | 1 | Includes two flat cables |
| 2 | Cable head | 1 | Includes a ⊐ shaped board |
| 3 | IC socket | 1 | For the TFP-80C package |
| 4 | Socket cover | 1 | For installing an TFP-80C packaged MCU |
| 5 | Screws (M2.6 x 12 mm) | 4 | For fastening cable head (with four flat washers) |
| 6 | Screws (M2.6 x 8 mm) | 4 | For installing an TFP-80C packaged MCU (with four flat washers) |
| 7 | Documentation | 1 | User's manual for HS2128ECN61H (this manual) |

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# Section 2   Connection Procedures

## 2.1      Connecting User System Interface Cable to Emulator Station

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⚠ **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.**

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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.

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# 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.**

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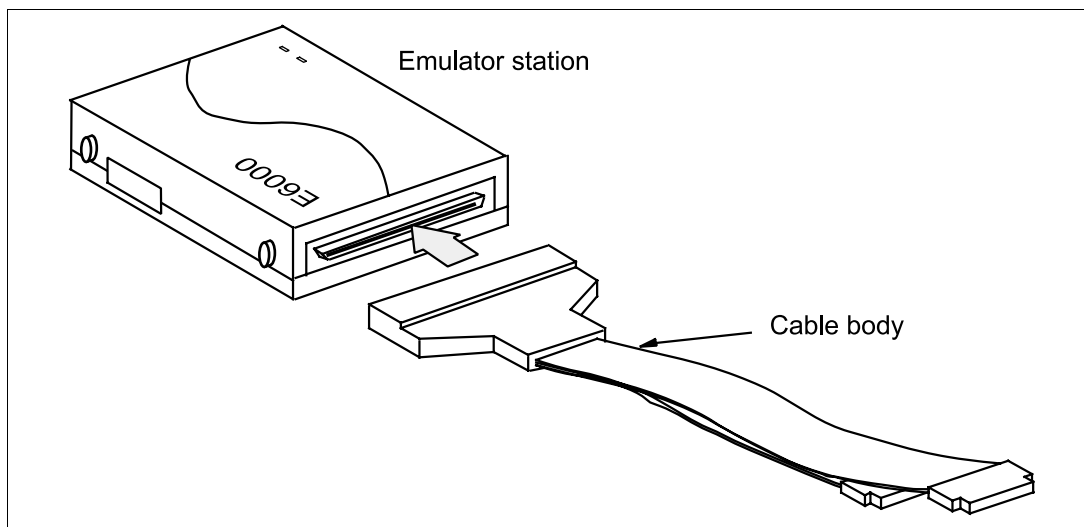   body connector into the emulator station socket (figure 2).

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**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 TFP-80C package, and fasten it to the user system before soldering.

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### 2.2.2    Soldering IC Socket

After fastening, solder the IC socket for an TFP-80C 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

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# CAUTION

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

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Align pin 1 on the IC socket for an TFP-80C 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

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# CAUTION

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

2.  **The tightening torque must be 0.294 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.**

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Fasten the user system interface cable head to the IC socket for an TFP-80C package on the user system with the four screws (M2.6 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.
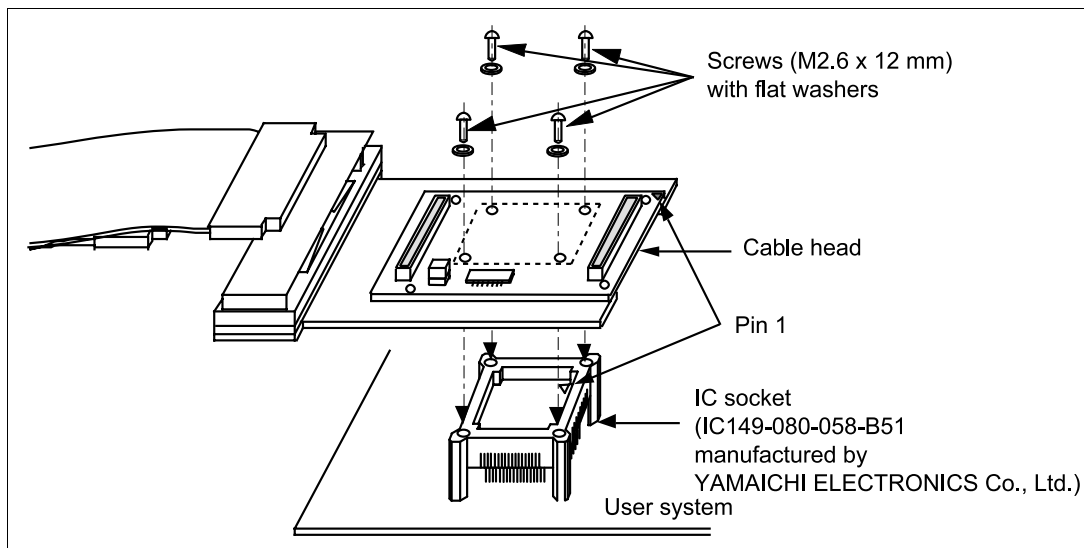


**Figure 3   Connecting User System Interface Cable to User System**

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### 2.2.5    Fastening Cable Body

1.  Open the cable holder at the cable head.

2.  Placing the cable body so it fits inside the cable holder, connect the cable body to the cable head.

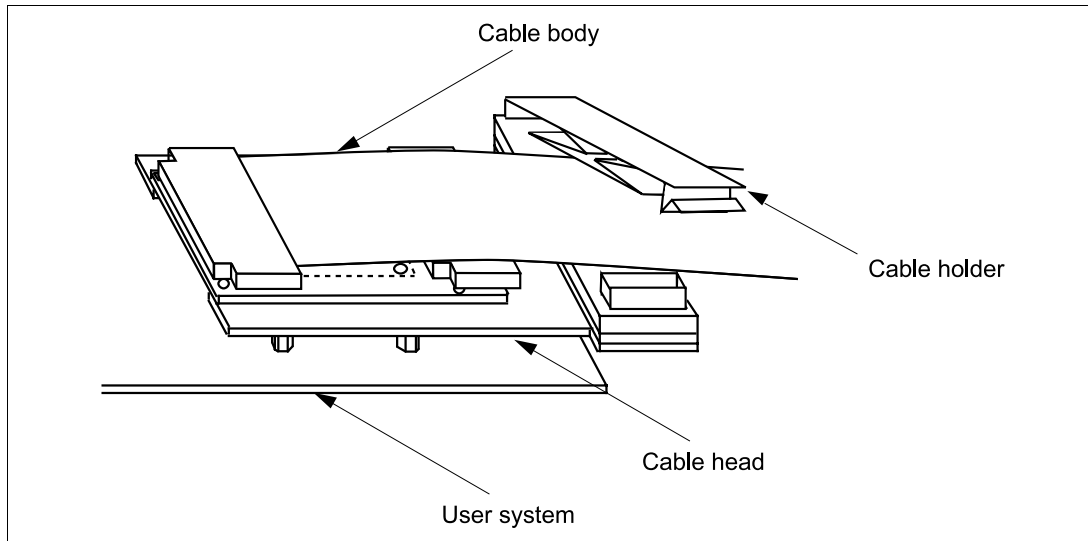3.  Close the cable holder to prevent the cable body from being separated from the cable head.



**Figure 4   Fastening Cable Body**

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## 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 TFP-80C package (IC149-080-058-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.
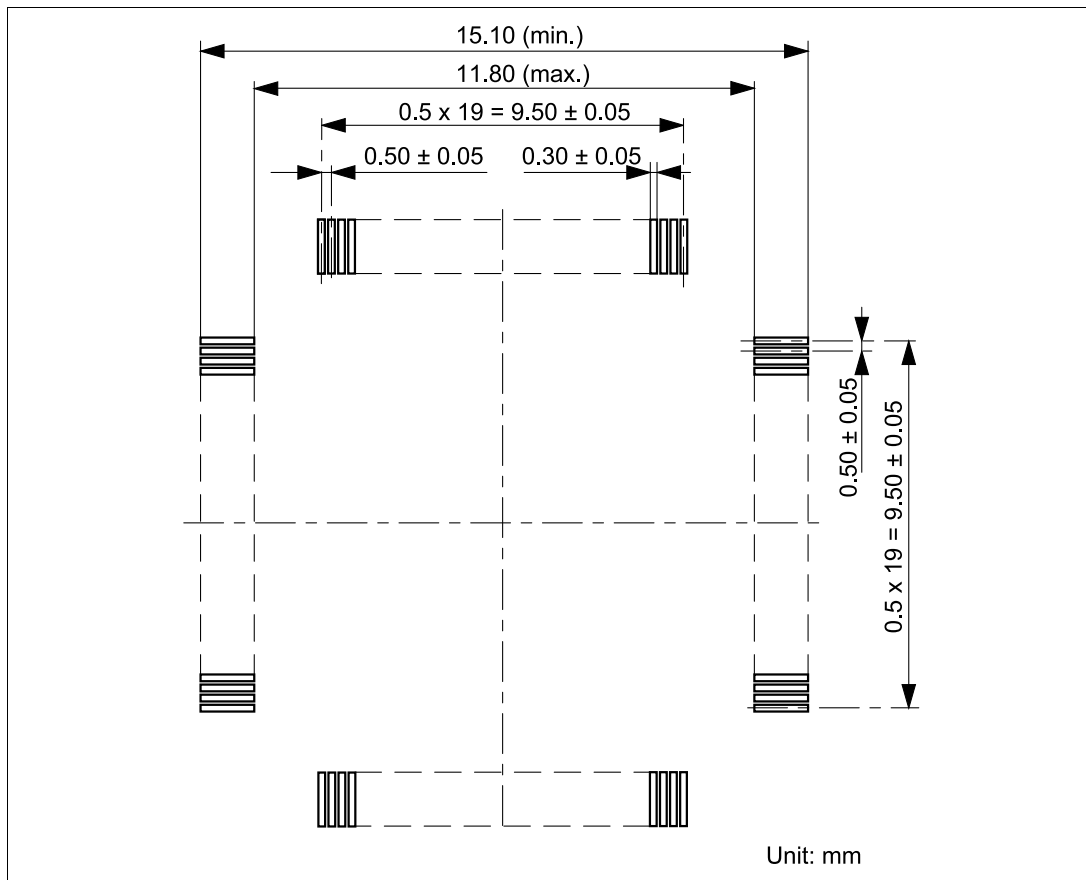


**Figure 5　Recommended Dimensions for Mount Pad**

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## 2.4    Dimensions for User System Interface Cable Head

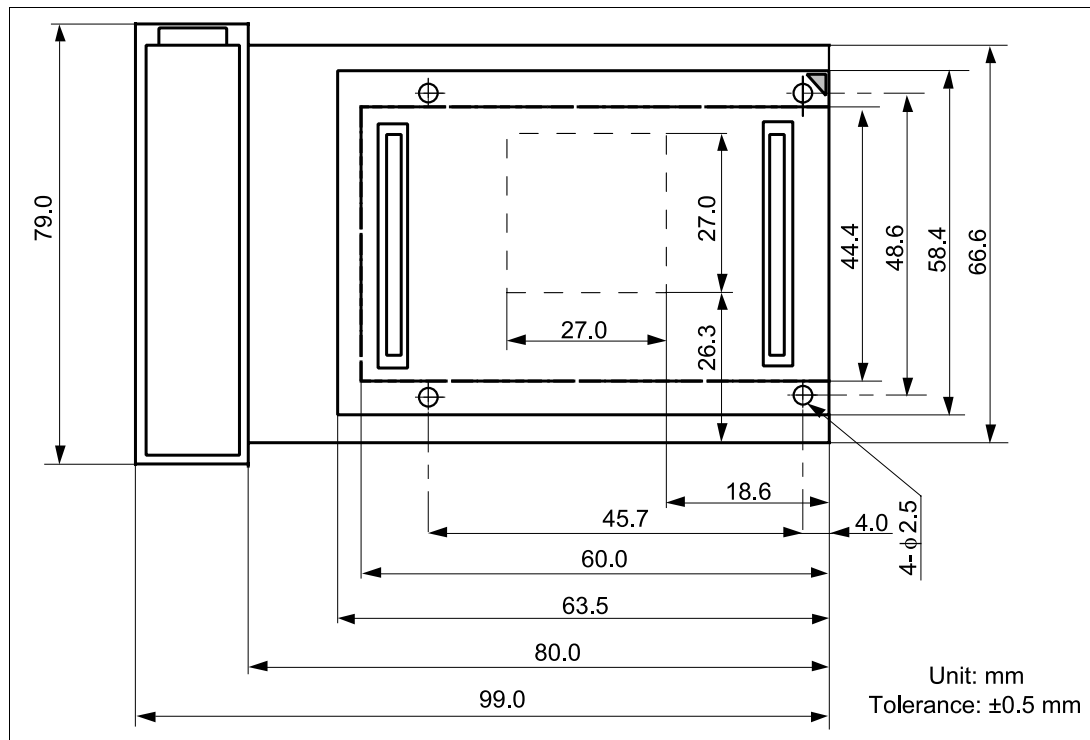The dimensions for the user system interface cable head are shown in figure 6.



**Figure 6   Dimensions for User System Interface Cable Head**

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## 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.
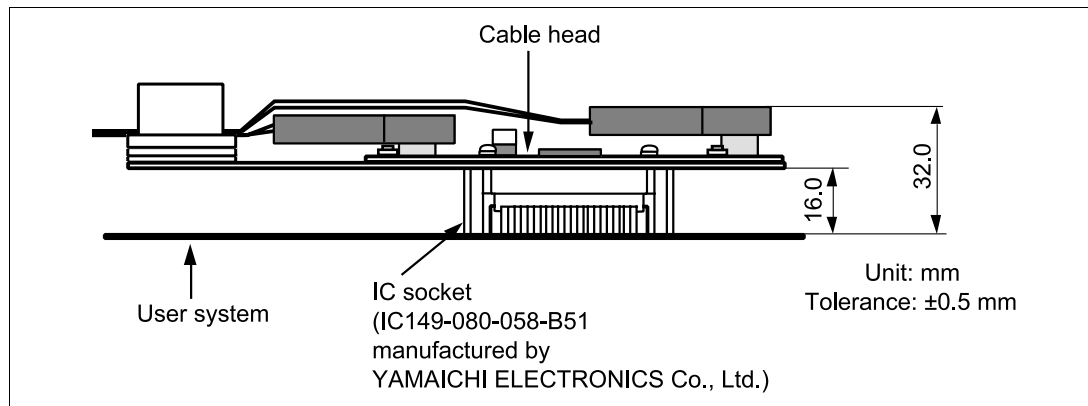


**Figure 7   Resulting Dimensions after Connecting User System Interface Cable**

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# Section 3  Installing the MCU to the User System

## CAUTION

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

2. **Use a Phillips-type screwdriver whose head matches the screw head.**

3. **The tightening torque must be 0.294 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 (M2.6 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.
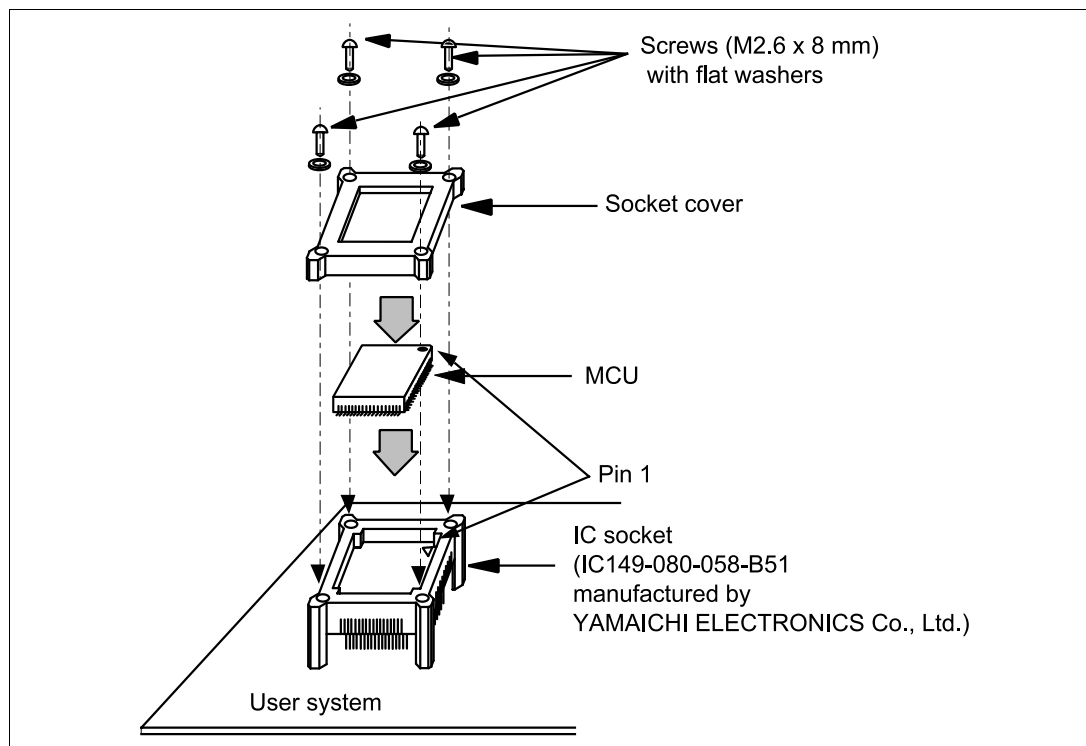
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**Figure 8   Installing MCU to User System**

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# Section 4   Verifying Operation

1. When using the E6000 emulator (HS2148EPI60H) for the H8S/2148, H8S/2138, H8S/2128 series, turn on the emulator according to the procedures described in the H8S/2148, H8S/2138, H8S/2128 Series E6000 Emulator User's Manual (HS2148EPI60HE).

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 H8S/2148, H8S/2138, H8S/2128 series E6000 Emulator User's Manual (HS2148EPI60HE).

    — 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
      Supply the external clock from the user system to the emulator.  Connect a crystal oscillator to the EXTAL and XTAL terminals for the system clock ($\phi$).  Select the external clock as the system clock ($\phi$), by using the CLOCK command (emulator command).  For details, refer to section 20, Clock Pulse Generator, in the H8S/2128 Series, H8S/2124 Series Hardware Manual.

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# 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 HS2148EPI60H 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 9.
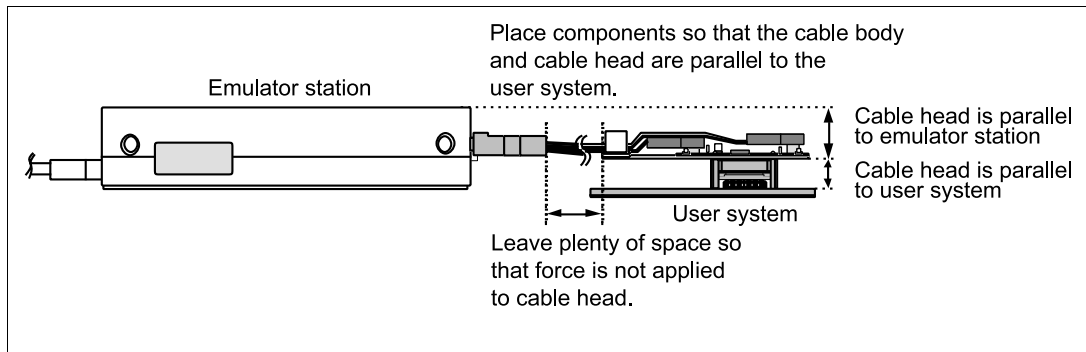


**Figure 9   User System Interface Cable Location Example**

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