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**H8S/2169Series TFP-144**  
**User System Interface Cable (HS2169ECN61H)**  
**for E6000 Emulator**  
**User's Manual**

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## Preface

Thank you for purchasing this user system interface cable (HS2169ECN61H) for the Renesas's original microcomputer H8S/2169 series.

The HS2169ECN61H is a user system interface cable that connects an H8S/2148 series E6000 emulator (HS2148EPI61H; hereinafter referred to as the emulator) to the IC socket for a TFP-144 package and expansion I/O board (HS2169EIO61H) for the H8S/2169 series MCU on the user system.

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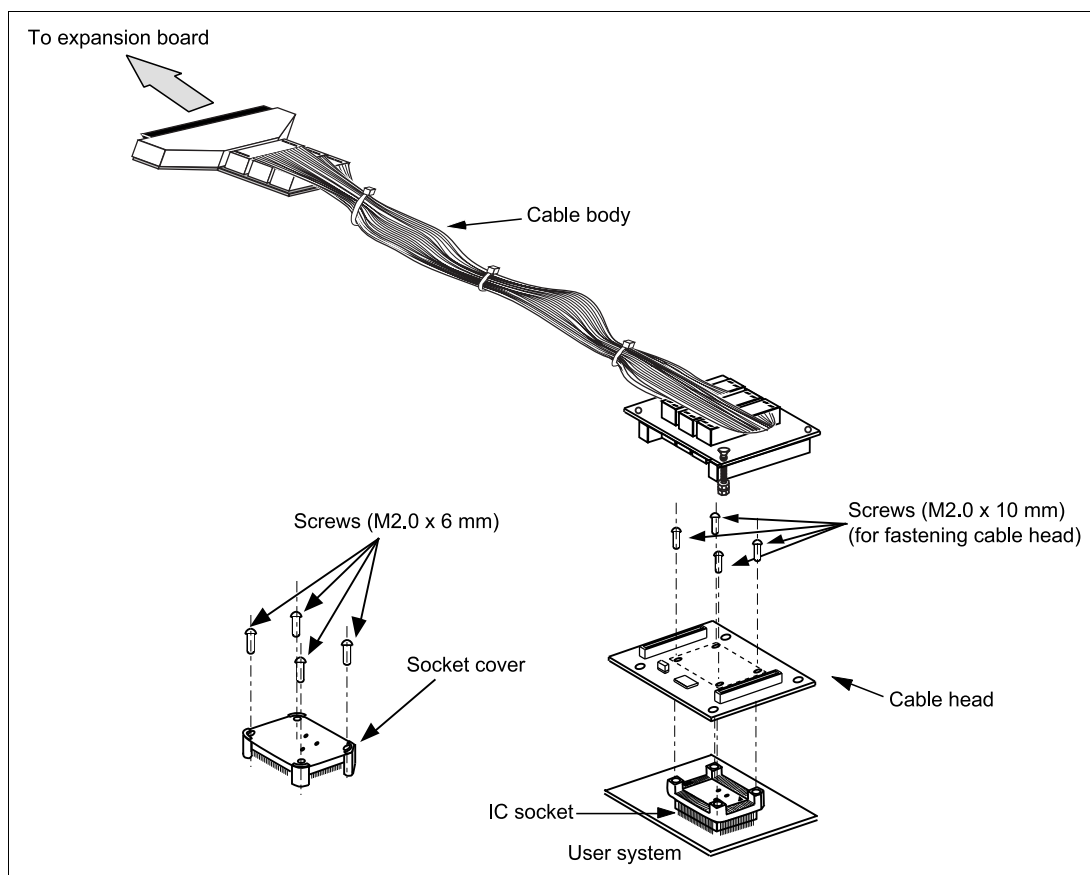
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## Section 1 Configuration

### CAUTION

**Use an NQPACK144SE socket (manufactured by Tokyo Eletech Corporation) for the TFP-144 package IC socket on the user system.**

Figure 1 shows the configuration of the HS2169ECN61H user system interface cable for the TFP-144 package.



**Figure 1 HS2169ECN61H User System Interface Cable**

Table 1 lists the HS2169ECN61H components. Please make sure you have all of these components when unpacking.

**Table 1      HS2169ECN61H Components**

<b>No.</b>	<b>Component</b>	<b>Quantity</b>	<b>Remarks</b>
1	Cable body	1	Flat cable
2	Cable head	1	
3	IC socket	1	For the TFP-144 package
4	Socket cover	1	For installing an TFP-144 packaged MCU
5	Screws (M2.0 x 10 mm)	4	For fastening cable head
6	Screws (M2.0 x 6 mm)	4	For installing an TFP-144 packaged MCU
7	Guide pins ( $\phi$ 1 mm)	3	For determining the IC socket location
8	Screwdriver	1	For tightening screws
9	Documentation	1	User's manual for HS2169ECN61H (this manual)



## Section 2 Connection Procedures

### 2.1 Connecting User System Interface Cable to Expansion I/O 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 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.**

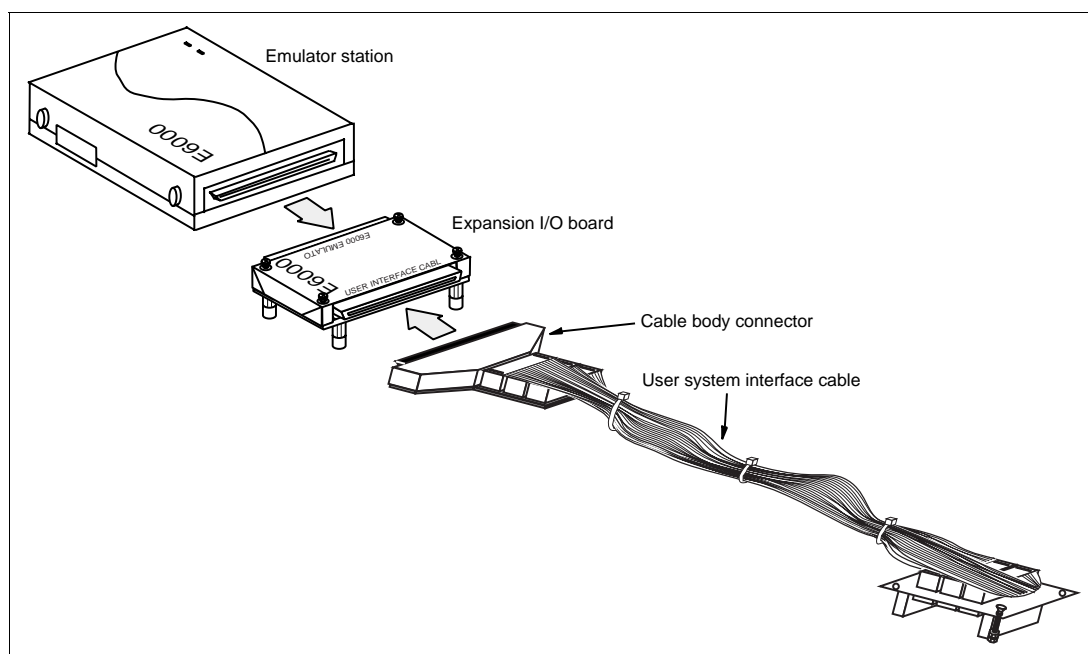
To connect the cable body to the emulator station, follow the instructions below.

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. Connect the expansion I/O board labeled USER INTERFACE CABLE and the user system interface cable.



**Figure 2 Connecting User System Interface Cable to Expansion I/O Board**

## 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, the emulator product, and the expansion I/O board 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.

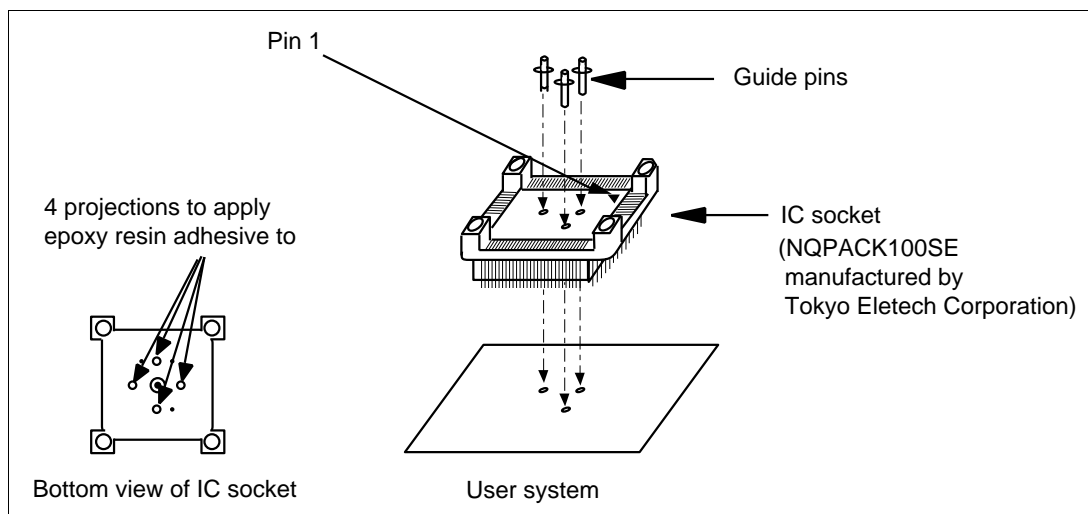
### 2.2.1 Installing IC Socket

After checking the location of pin 1 on the IC socket fasten it to the user system before soldering.

### **CAUTION**

**After confirming the location of pin 1 on the IC socket, apply epoxy resin adhesive to the end of the four projections at the bottom of the IC socket, and fasten it to the user system.**

Use the guide pins provided to determine where to install the IC socket, as shown in figure 3.



**Figure 3 Location Setting of IC Socket**

### **2.2.2 Soldering IC Socket**

After fastening, solder the IC socket for a TFP-144 package to the user system.

## **CAUTION**

**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.**

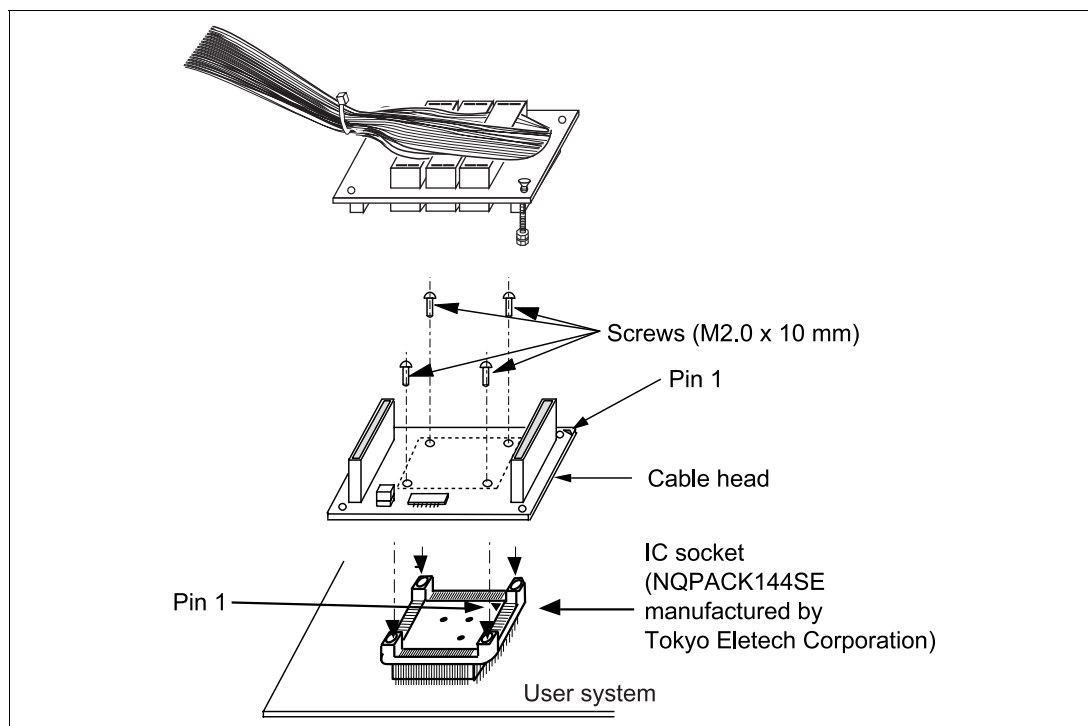
Align pin 1 on the IC socket for an TFP-144 package on the user system with pin 1 on the user system interface cable head, and insert the user system interface cable head into the IC socket on the user system, as shown in figure 4.

### 2.2.4 Fastening Cable Head

## CAUTION

1. Use a 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.

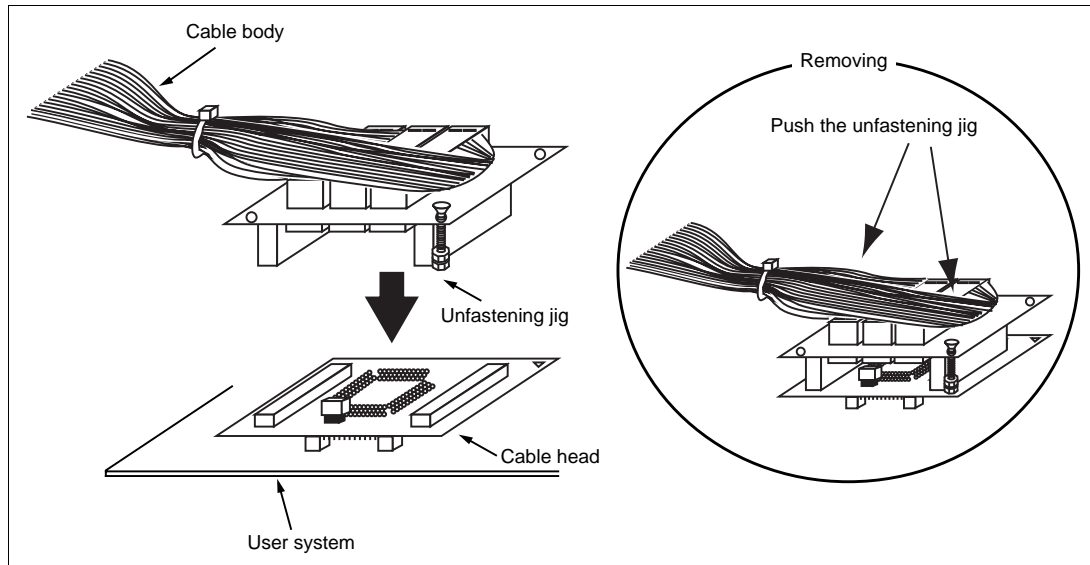
Fasten the user system interface cable head to the IC socket for an TFP-144 package on the user system with the four screws (M2.0 x 10 mm) provided. Each screw should be tightened a little at a time, alternating between screws on opposing corners. Take special care, such as manually securing the IC socket 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 Cable to User System**

### 2.2.5 Fastening Cable Body

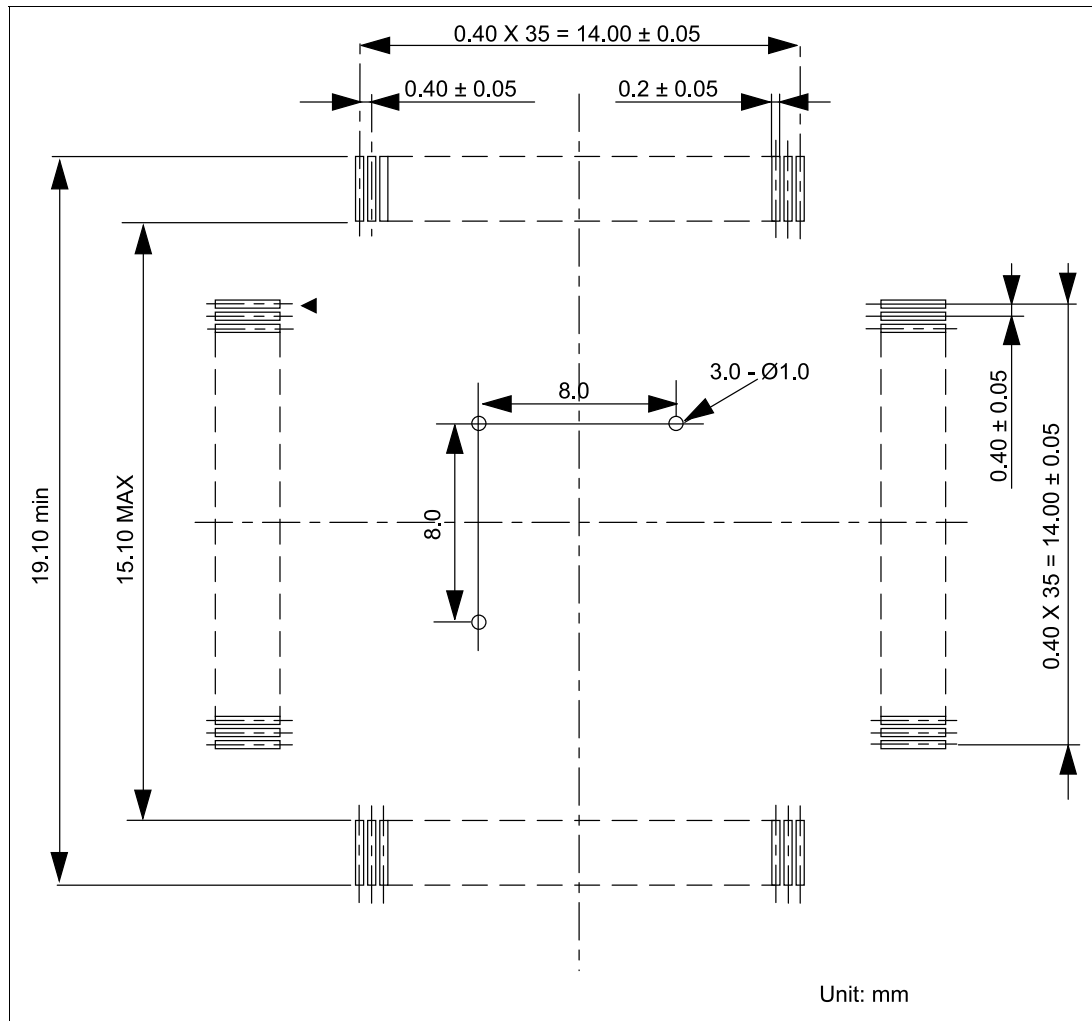
Connect the cable body to the cable head.



**Figure 5 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 TFP-144 package (NQPACK144SE: manufactured by Tokyo Eletech Corporation). Note that the dimensions in figure 6 are somewhat different from those of the actual chip's mount pad.

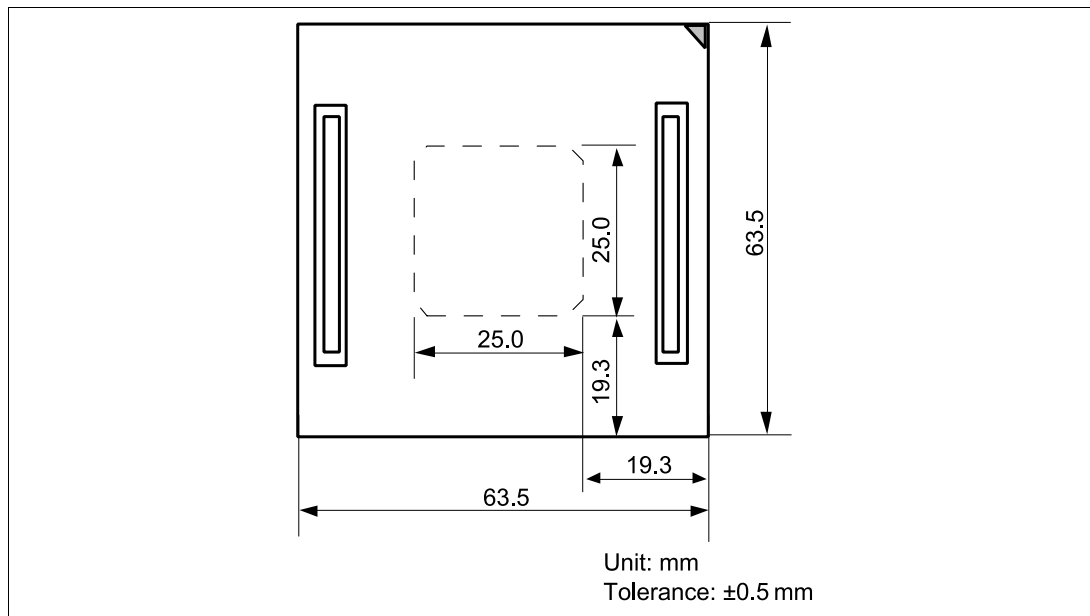


**Figure 6 Recommended Dimensions for Mount Pad**



## 2.4 Dimensions for User System Interface Cable Head

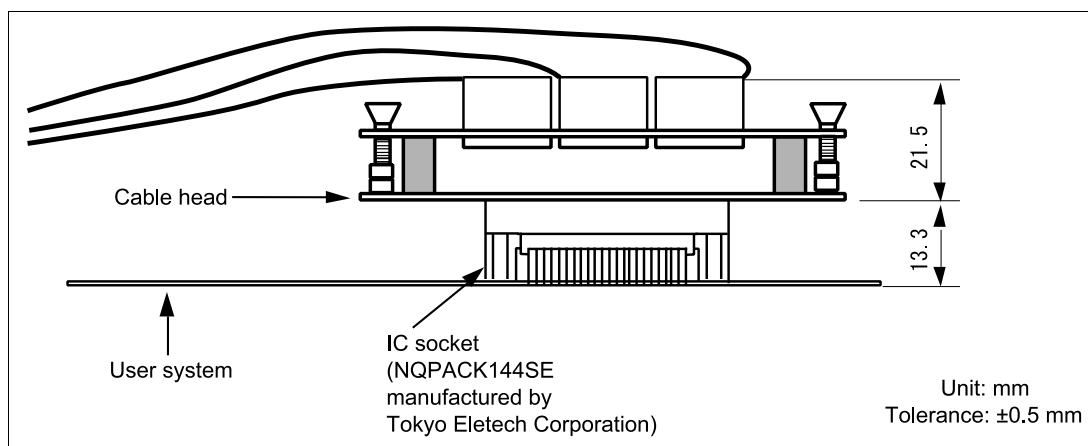
The dimensions for the user system interface cable head are shown in figure 7.



**Figure 7 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 8.



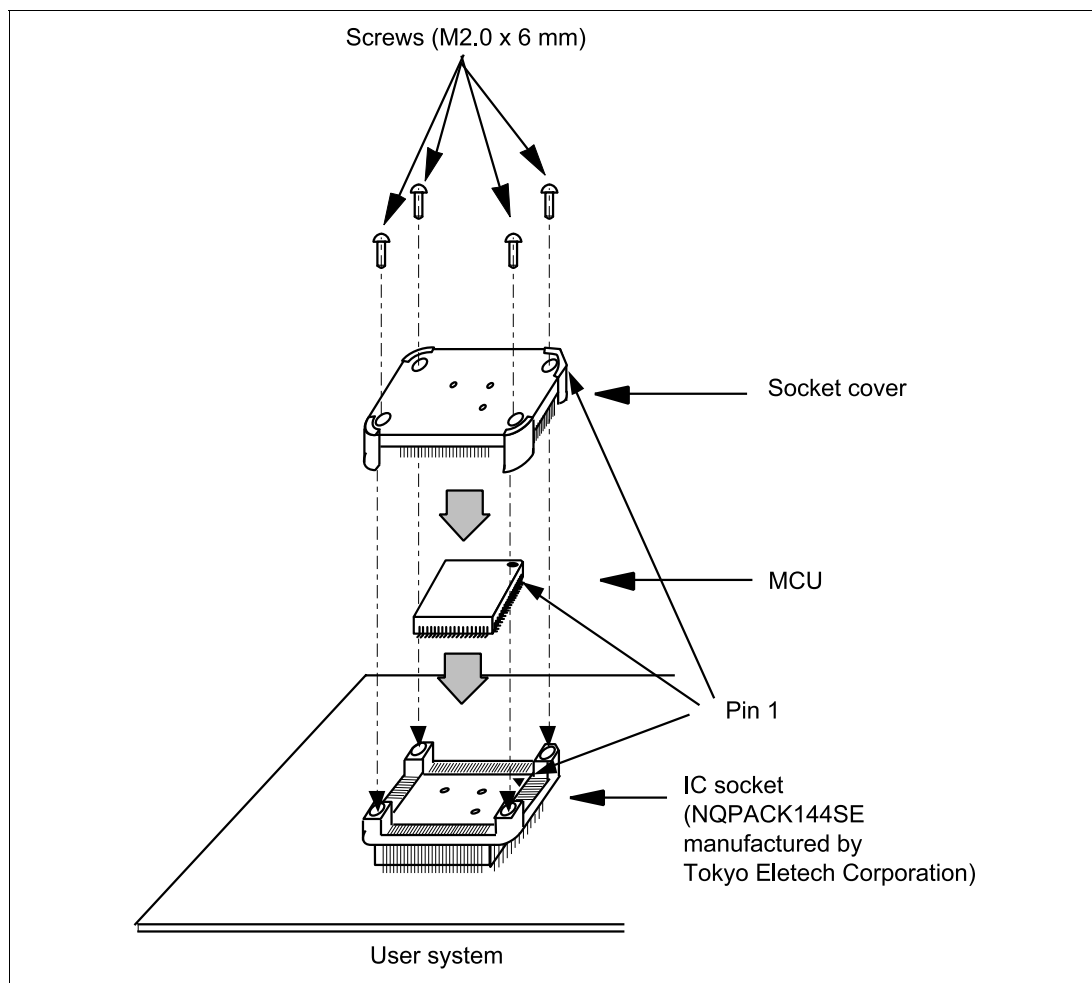
**Figure 8 Resulting Dimensions after Connecting User System Interface Cable**

## Section 3 Installing the MCU to the User System

### CAUTION

1. Check the location of pin 1 before inserting.
2. Use a 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 9. 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.

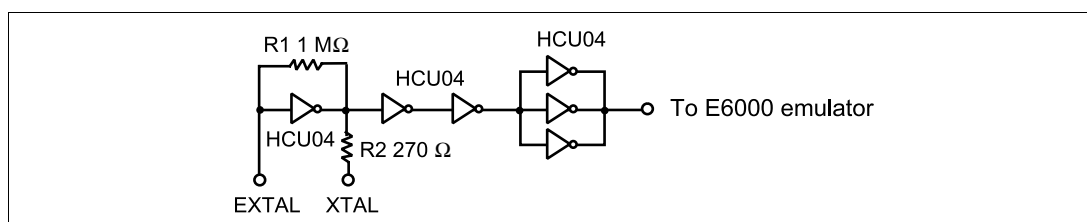


**Figure 9 Installing MCU to User System**

## Section 4 Verifying Operation

1. When using the E6000 emulator for the H8S/2148 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 (HS2148EPI61HE).
  - 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 the target clock Target or Target/2 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 the Clock Pulse Generator section, in the H8S/2169 Series Hardware Manual.

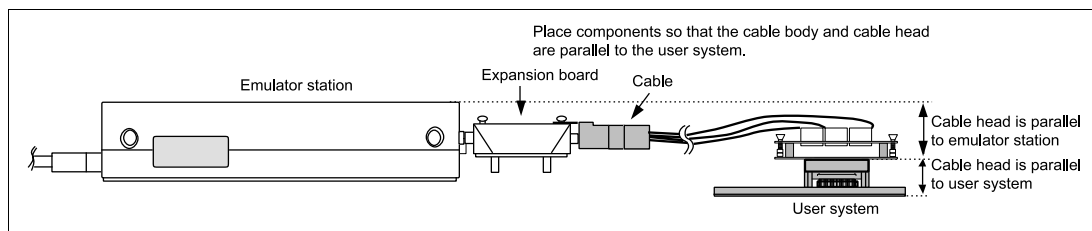
Figure 10 shows the oscillator circuit on the user system interface cable.



### Figure 10 Oscillator Circuit

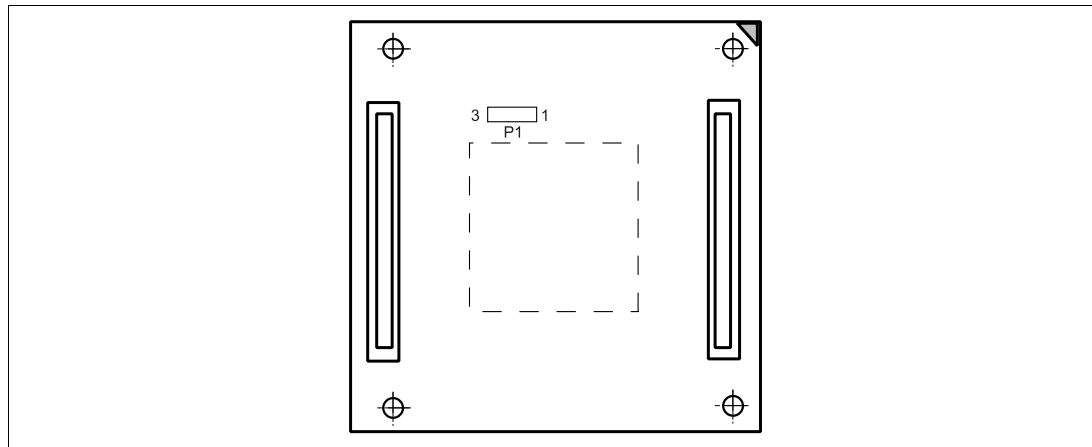
## Section 5 Notice

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. To avoid breaking wires in the cable body, do not place heavy or sharp metal objects on the user system interface cable.
4. 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. Position the emulator station, user system interface cable, and user system as shown in figure 11.



**Figure 11 User System Interface Cable Location Example**

5. The P1 short connector is for testing. Do not remove the jumper pin inserted in the side of pin 1 and pin 2.



**Figure 12 P1 Short Connector**