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User's Manual

H8S/2168 Group TFP-144 User System Interface Cable for E6000 Emulator

HS2168ECN61H User's Manual

Renesas Microcomputer Development Environment System
H8S Family / H8S/2100 Series

Renesas Electronics
www.renesas.com

Rev.2.00 2003.12

Preface

Thank you for purchasing this user system interface cable (HS2168ECN61H) for the Renesas' original microcomputer H8S/2168 group.

The HS2168ECN61H is a user system interface cable that connects an H8S/2168 group E6000 emulator (HS2168EPI61H; hereinafter referred to as the emulator) to the IC socket for a TFP-144 package on the user system.

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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 HS2168ECN61H user system interface cable for the TFP-144 package.

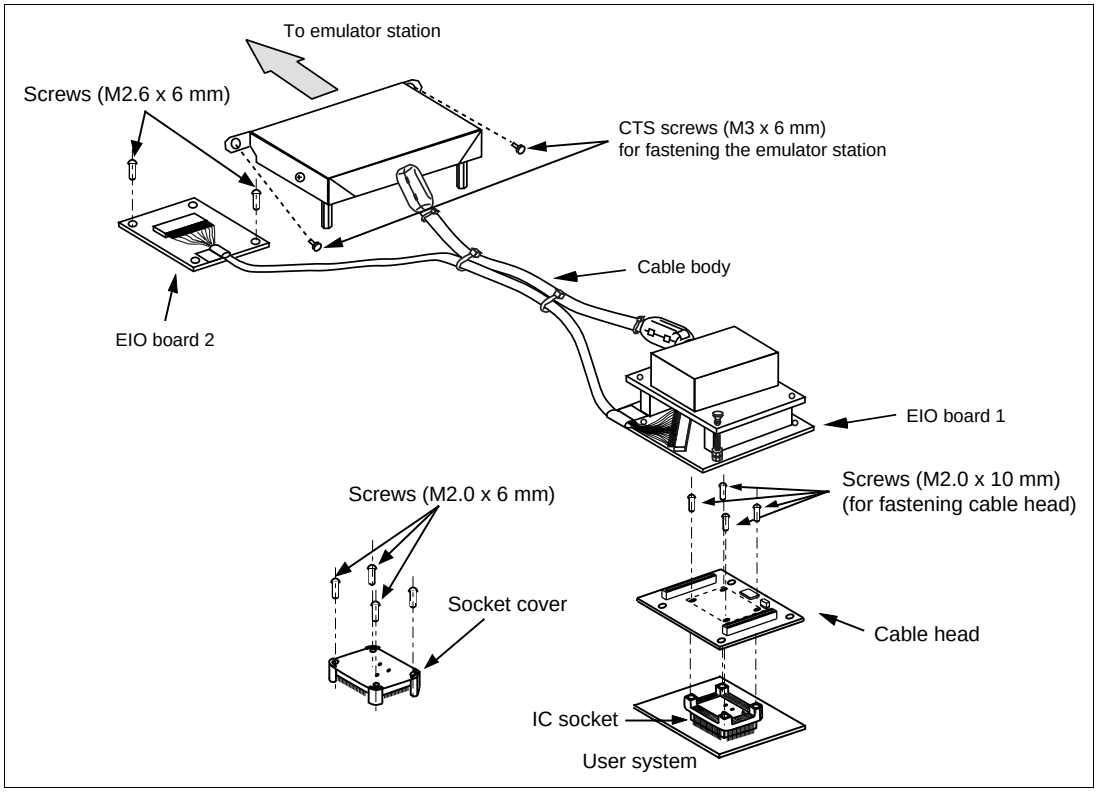

Figure 1 HS2168ECN61H User System Interface Cable

Table 1 lists the HS2168ECN61H components. Please make sure you have all of these components when unpacking.

Table 1 HS2168ECN61H Components

No.	Component	Quantity	Remarks
1	Cable body	1	Includes coaxial cable and two EIO boards
2	Cable head	1	
3	IC socket	1	For the TFP-144 package
4	Socket cover	1	For installing a TFP-144 packaged MCU
5	Screws (M2.6 x 6 mm)	2	For fastening EIO board 2
6	Screws (M2.0 x 10 mm)	4	For fastening cable head
7	Screws (M2.0 x 6 mm)	4	For installing a TFP-144 packaged MCU
8	CTS screws (M3 x 6 mm)	2	For fastening the emulator station
9	Guide pins (ϕ 1 mm)	3	For determining the IC socket location
10	Screwdriver	1	For tightening screws
11	Documentation	1	User's manual for HS2168ECN61H (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.**

Make sure the user system and the 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.

2.1.1 Connecting User System Interface Cable to Cable Body Connector

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 screws (M3 × 6 mm) (figure 2).

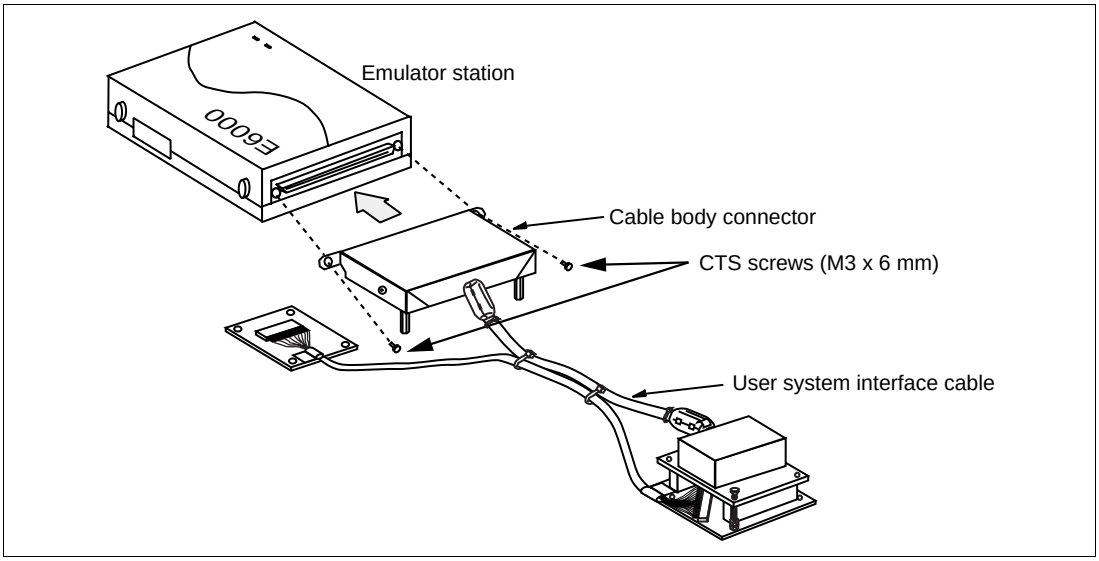

Figure 2 Connecting User System Interface Cable to Emulator Station (1)

2.1.2 Connecting EIO Board 2 to Emulator

1. Remove four screws at the side of the emulator station.
2. Pull up and remove the cover of the emulator casing.
3. Insert connector P5 of EIO board 2 into connector P5 in the emulator station.
4. Fasten EIO board 2 with the provided two screws (M2.6 × 6 mm).
5. Set up the coaxial cable, which has been connected to EIO board 2, into a gutter of the emulator station.
6. Set the cover of the emulator station and fasten four screws.

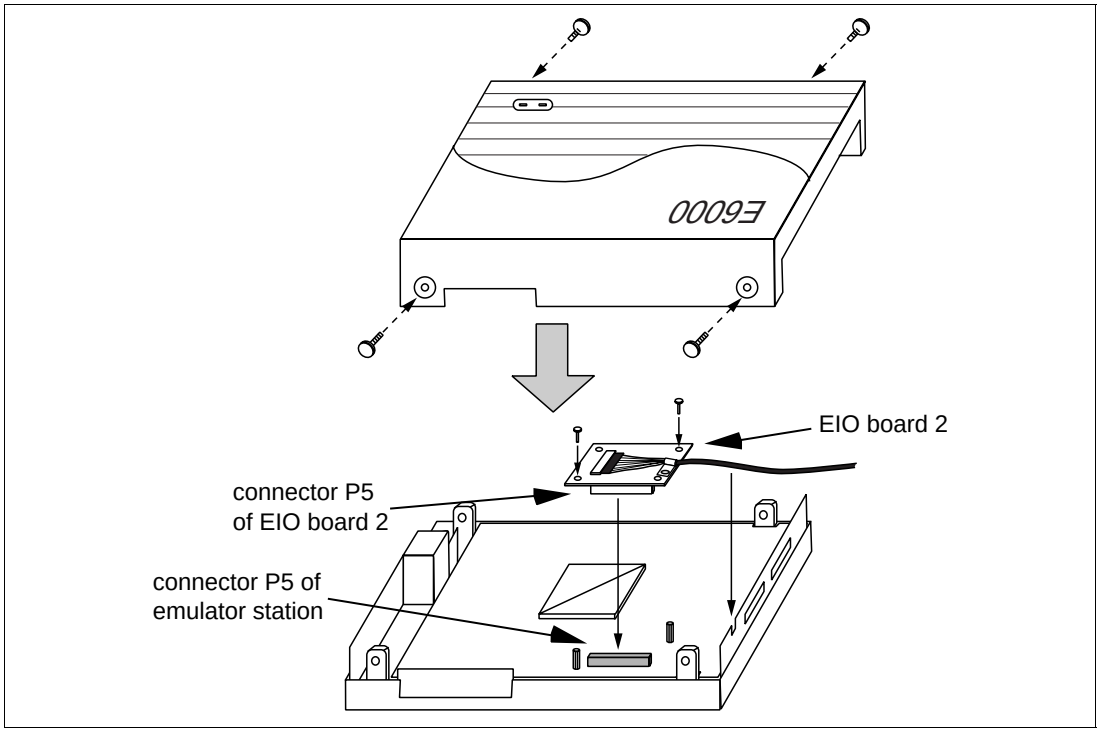

Figure 3 Connecting User System Interface Cable to Emulator Station (2)

2.1.3 Removing EIO Board 2 from Emulator

1. Remove four screws from the side of the emulator station.
2. Pull up and remove the cover of the emulator casing.
3. Remove two screws (M2.6 × 6 mm) from EIO board 2.
4. Remove EIO board 2 from connector P5 of the emulator station.
5. Remove the coaxial cable, which has been connected to EIO board 2, from a gutter of the emulator station.
6. Set the cover of the emulator station and fasten four screws.

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 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 4.

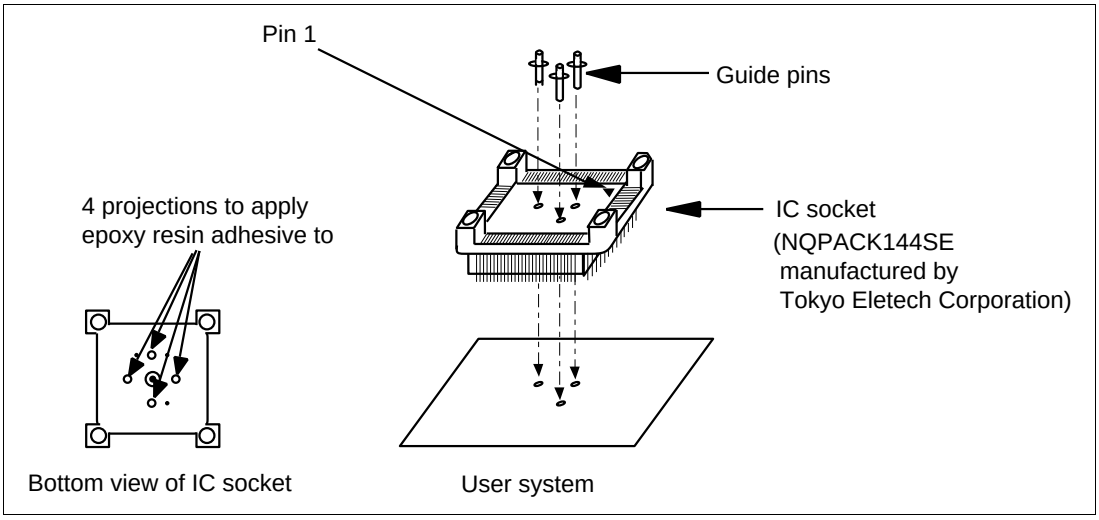

Figure 4 Location Setting of IC Socket

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 a 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 5.

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 a TFP-144 package on the user system with the four screws (M2.0 × 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.

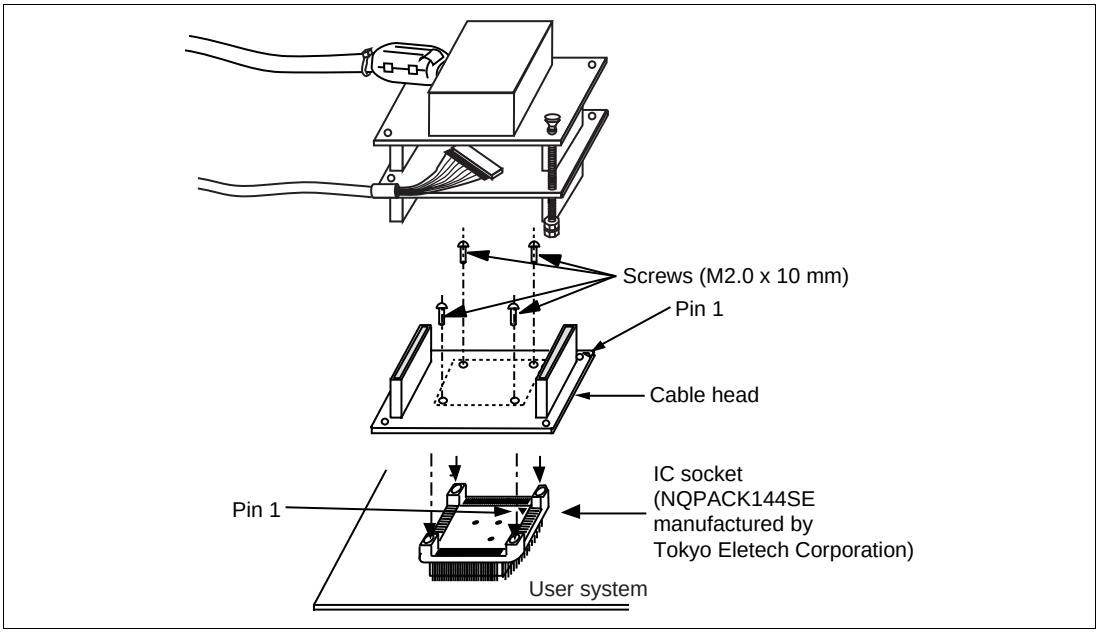

Figure 5 Connecting User System Interface Cable to User System

2.2.5 Fastening Cable Body

Connect the cable body and EIO board 1 to the cable head.

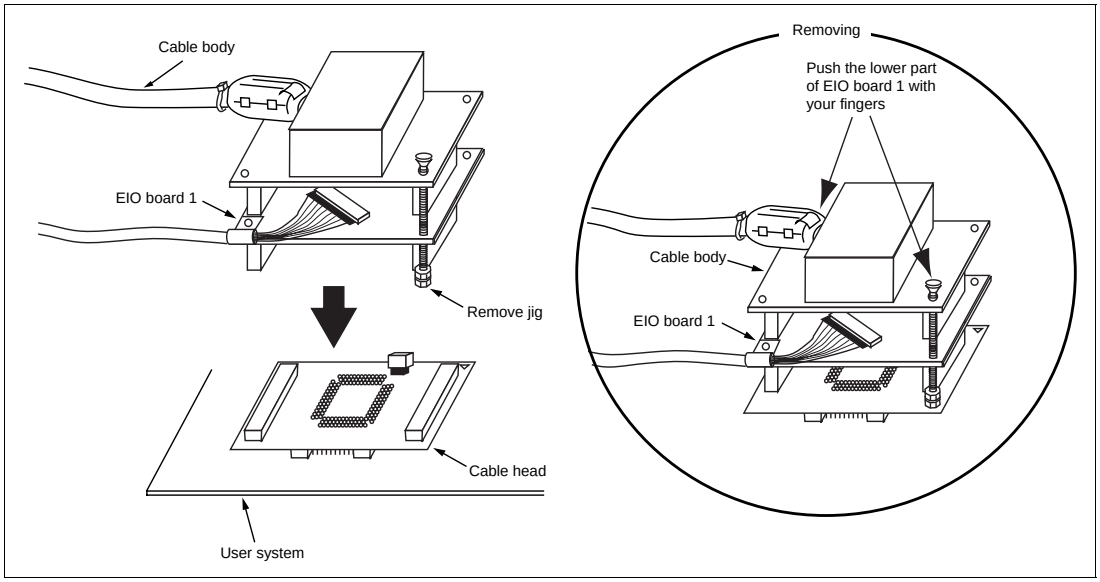

Figure 6 Fastening Cable Body and EIO Board 1

When removing the cable body or EIO board 1, push the unfastening jigs.

If the lower part of the cable body is pushed, EIO board 1 may be removed. Push the lower part of EIO board 1 with your fingers.

2.3 Recommended Dimensions for User System Mount Pad

Figure 7 shows the recommended dimensions for the mount pad (footprint) for the user system with an IC socket for a TFP-144 package (NQPACK144SE: manufactured by Tokyo Eletech Corporation). Note that the dimensions in figure 7 are somewhat different from those of the actual chip's mount pad.

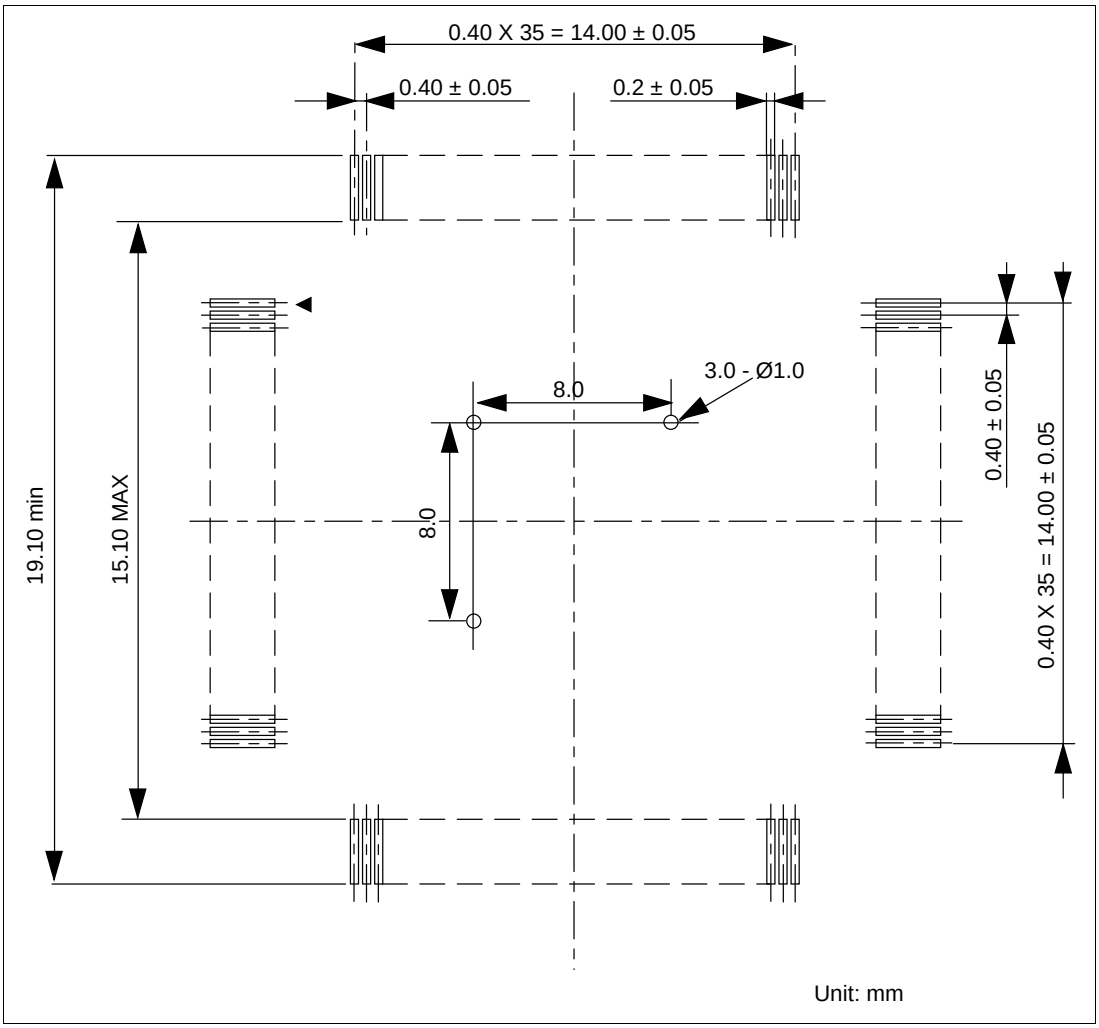

Figure 7 Recommended Dimensions for Mount Pad

2.4 Dimensions for User System Interface Cable Head

The dimensions for the user system interface cable head are shown in figure 8.

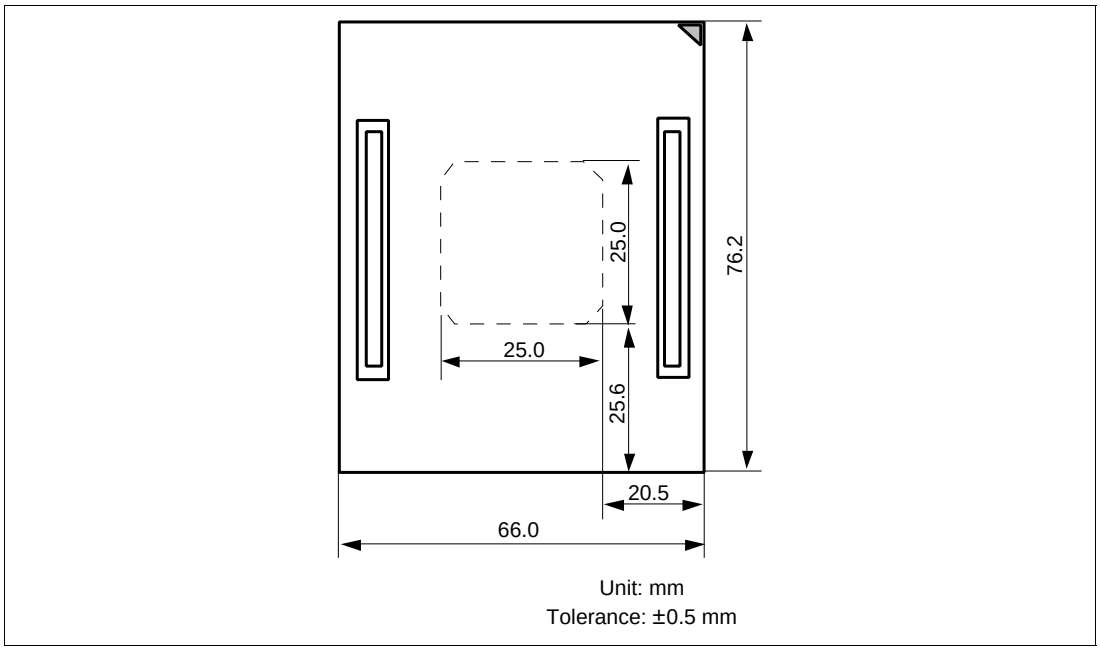

Figure 8 Dimensions for User System Interface Cable Head

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 9.

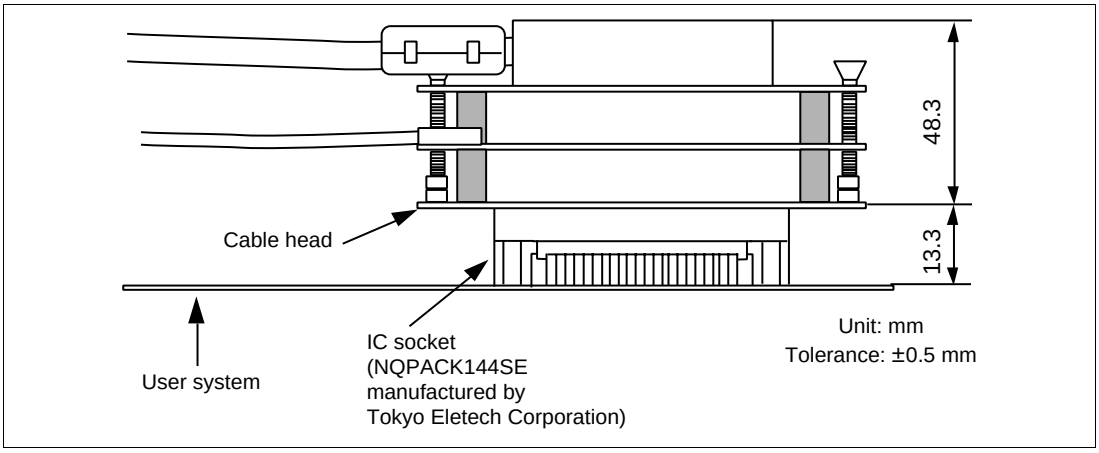

Figure 9 Resulting Dimensions after Connecting User System Interface Cable

Section 3 Installing the MCU on 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 10. After inserting the MCU, fasten the socket cover with the provided four screws (M2.0 × 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.

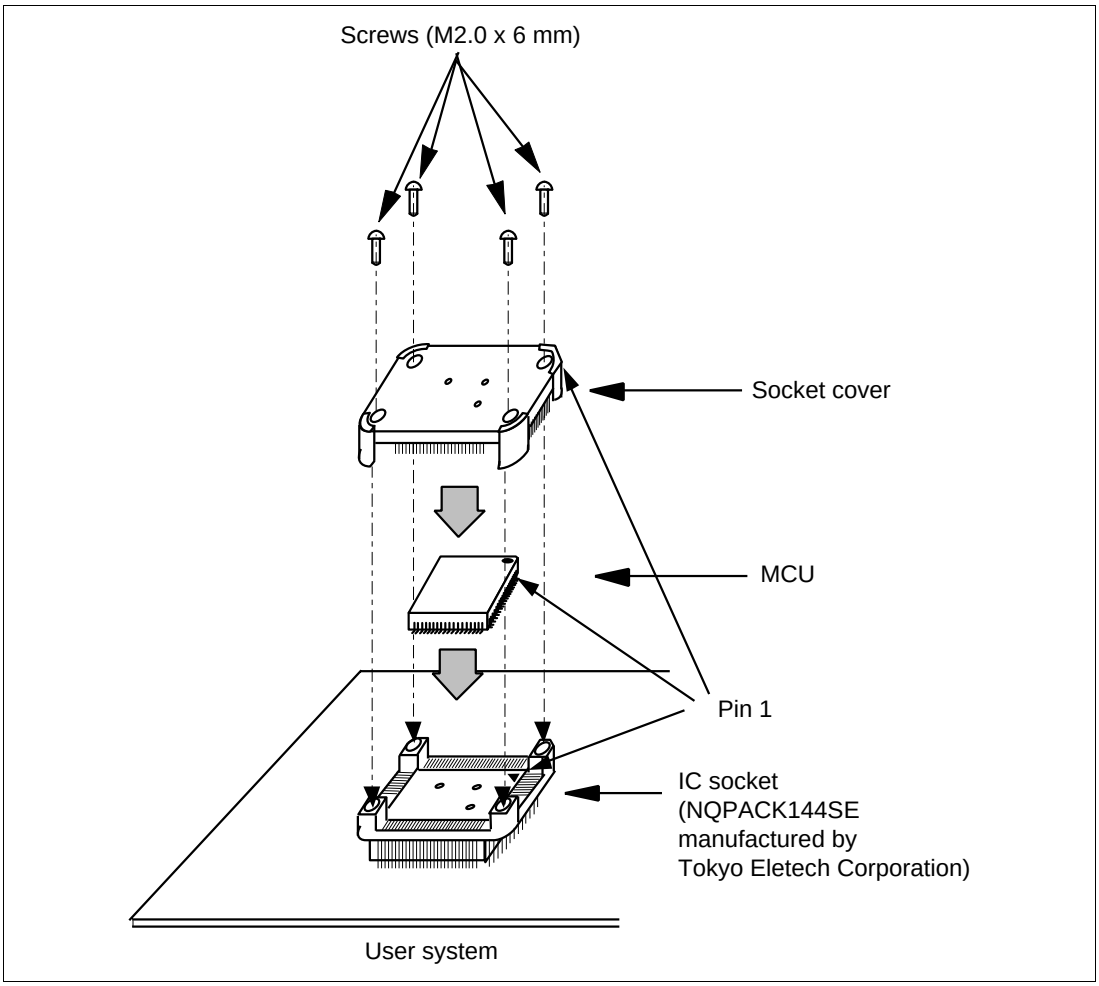

Figure 10 Installing MCU to User System

Section 4 User System Interface Circuit

The microcomputer (H8S/2168) is installed in this user system interface cable for emulating the LPC function. An interface circuit, as shown in figure 11, is provided for the user system interface signal of the H8S/2168. Figure 12 and table 2 show the settings of switches.

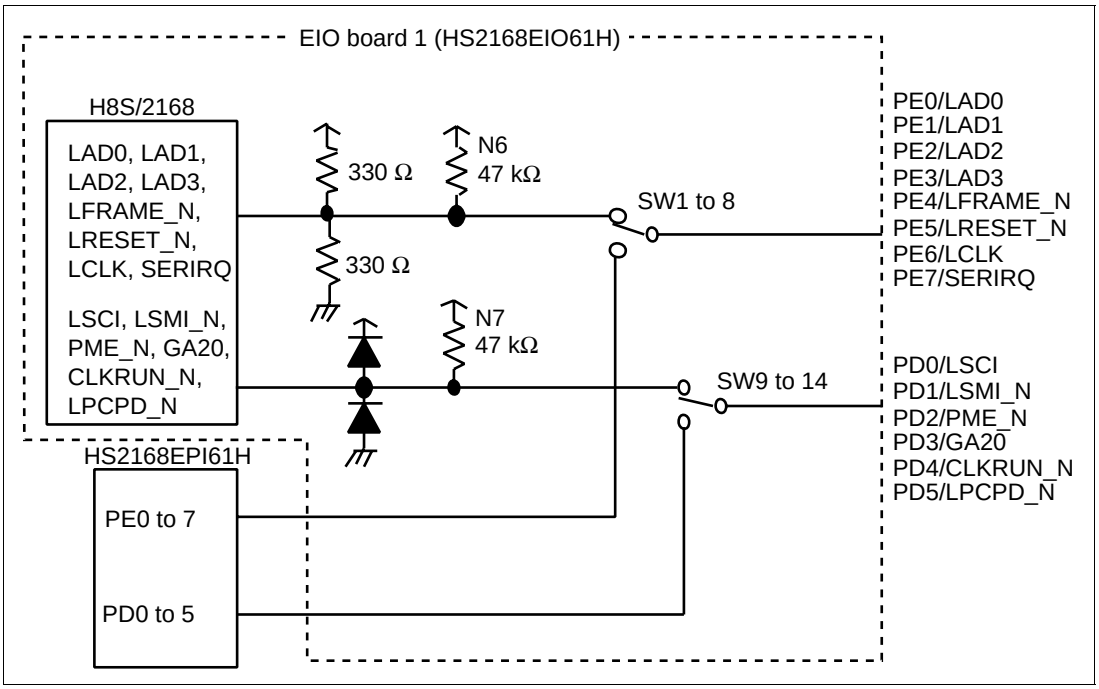

Figure 11 User System Interface Circuit

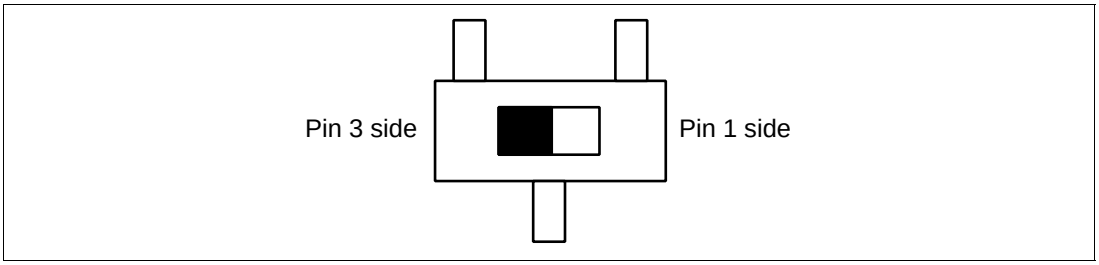

Figure 12 Settings of Switch

Table 2 Settings of Switches

Switch Number	Pin 1 Side	Pin 3 Side
SW1	Port E7	SERIRQ
SW2	Port E6	LCLK
SW3	Port E5	LRESET_N
SW4	Port E4	LFRAME_N
SW5	Port E3	LAD3
SW6	Port E2	LAD2
SW7	Port E1	LAD1
SW8	Port E0	LAD0
SW9	Port D5	LPCPD_N
SW10	Port D4	CLKRUN_N
SW11	Port D3	GA20
SW12	Port D2	PME_N
SW13	Port D1	LSMI_N
SW14	Port D0	LSCI

Section 5 Verifying Operation

1. When using the E6000 emulator for the H8S/2168 group, turn on the emulator according to the procedures described in the H8S/2168 Group E6000 Emulator User's Manual (HS2168EPI61HE).
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 user's manual (HS2168EPI61HE).
   — To use the emulator internal clock
   Select the clock in the emulator station as the system clock (ϕ), by using the CLOCK command (emulator command).
   — To use the external clock on the user system
   Select the target clock by using the CLOCK command (emulator command) and supply the external clock from the user system to the emulator. When a crystal oscillator to the EXTAL and XTAL terminals for the system clock (ϕ) the crystal oscillator will oscillate in the circuit as shown in figure 13. External clock must be input from the EXTAL terminal. The clock input conditions are same as those for the H8S/2168 group in the hardware manual.

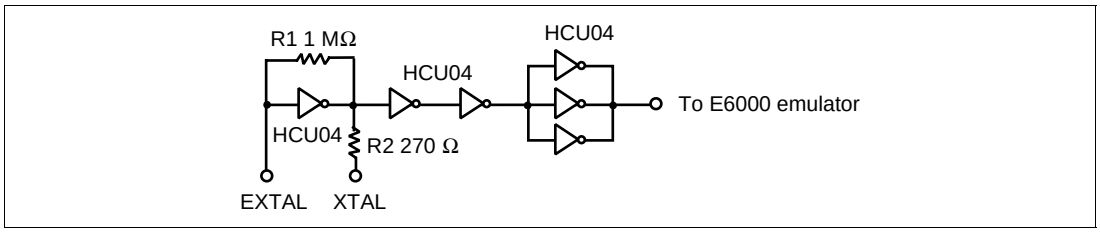

Figure 13 Oscillator Circuit

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. 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 14.

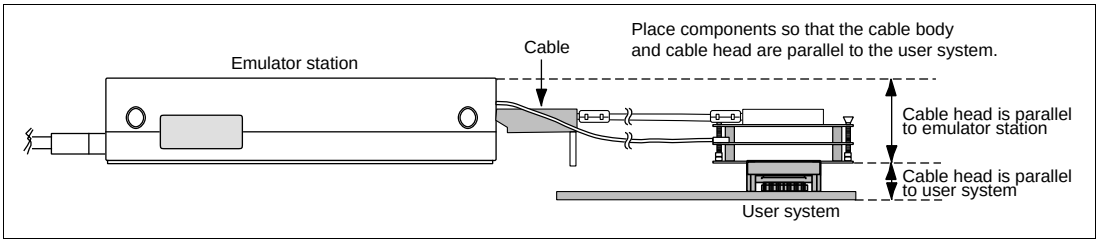

Figure 14 User System Interface Cable Location Example

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

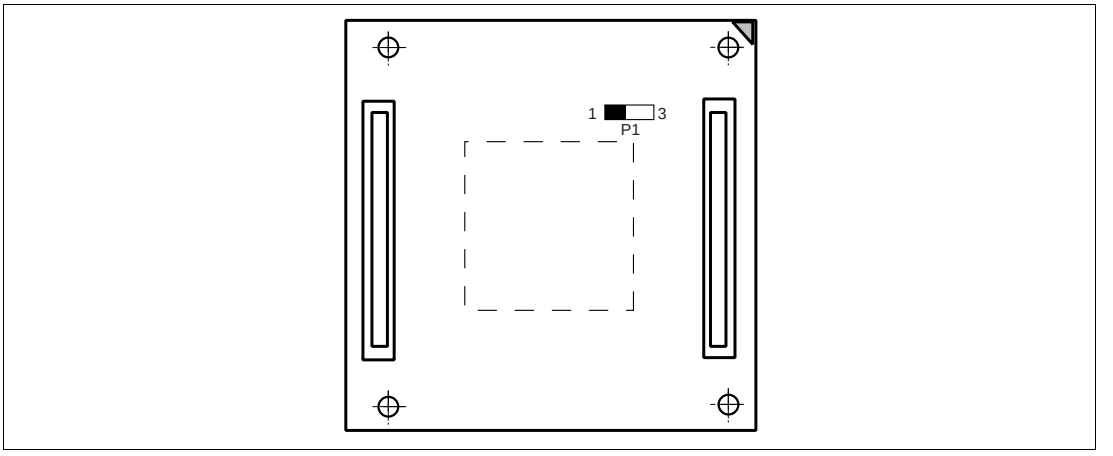

Figure 15 P1 Short Connector

6. To prevent EMI noise, enclose the user system interface cable head in a case. The recommended material of the case is iron plated with nickel or resin plated with nickel inside. The case must be large enough to include the user system interface cable head, user system interface cable, and target system.

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H8S/2168 Group TFP-144
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for E6000 Emulator User's Manual

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