

# H8SX/1663 Group E6000H FP-144L User System Interface Board

HS1664ECH61H User's Manual

Renesas Microcomputer Development Environment System

H8SX Family / H8SX/1600 Series

HS1664ECH61HE

User's Manual

Rev.1.00

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Renesas Technology  
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## READ FIRST

- **READ** this user's manual before using this user system interface board.
- **KEEP the user's manual handy for future reference.**

**Do not attempt to use the user system interface board until you fully understand its mechanism.**

### **User System Interface Board:**

Throughout this document, the term "user system interface board" shall be defined as the following product produced only by Renesas Technology Corp. excluding all subsidiary products.

- User system interface board (HS1664ECH61H)

The user system or a host computer is not included in this definition.

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This user system interface board is for connecting the evaluation chip board and user system. This user system interface board must only be used for the above purpose.

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Some figures in this user's manual may show items different from your actual system.

## **Limited Anticipation of Danger:**

Renesas cannot anticipate every possible circumstance that might involve a potential hazard. The warnings in this user's manual and on the user system interface board are therefore not all inclusive. Therefore, you must use the user system interface board safely at your own risk.

# SAFETY PAGE

## READ FIRST

- **READ** this user's manual before using this user system interface board.
- **KEEP** the user's manual handy for future reference.

Do not attempt to use the user system interface board 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 E6000H emulator and user system before connecting or disconnecting any CABLES or PARTS.**
- 3. Always before connecting any BOARDS, make sure that pin 1 on both sides are correctly aligned.**

# Preface

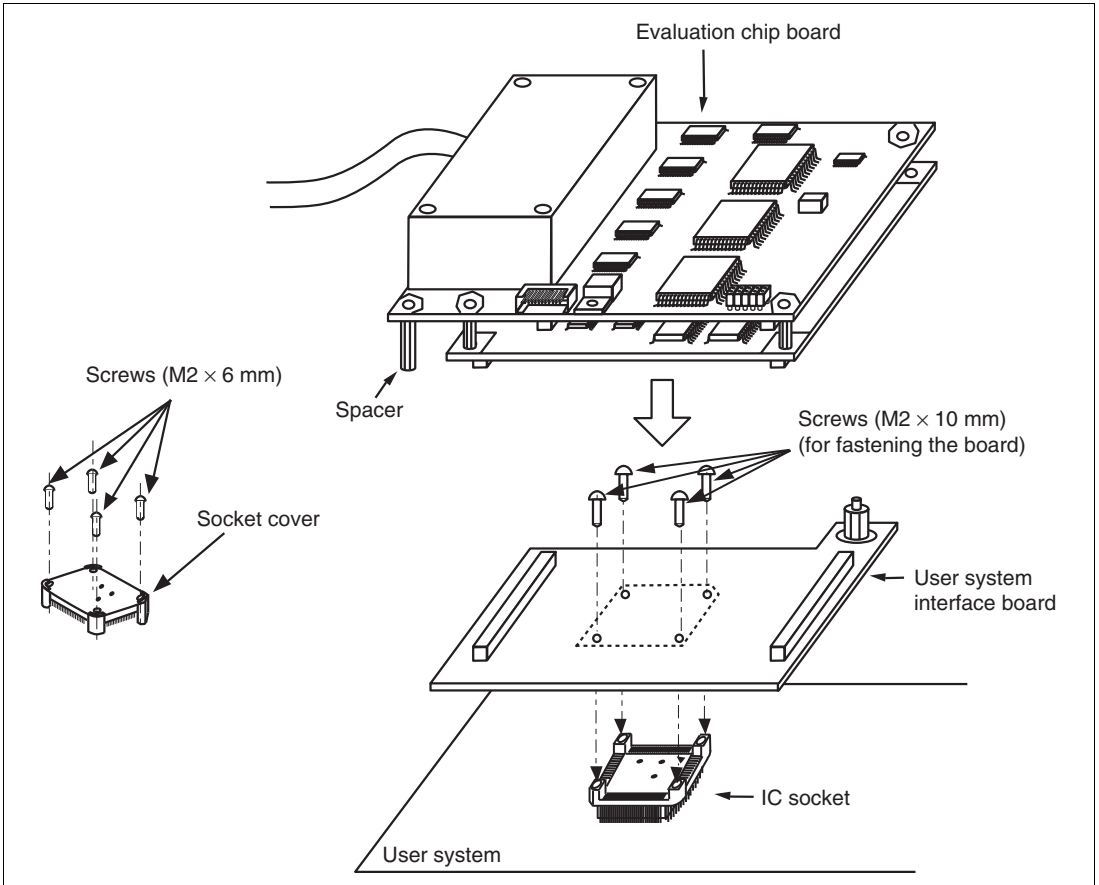
The HS1664ECH61H is a user system interface board that connects a user system for the H8SX/1663, H8SX/1664 FP-144L package to the H8SX/1650 E6000H emulator (HS1650EPH60H). Emulation of the H8SX/1663 group is only possible when this user system interface board is connected to the HS1650EPH60H.

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# Section 1 Configuration

Figure 1 and table 1 show the configuration and components of the user system interface board for the FP-144L package. Please make sure you have all of these components after you have unpacked the box.



**Figure 1 User System Interface Board for the H8SX/1663, H8SX/1664 FP-144L Package**

# CAUTION

Use an NQPACK144SD socket (manufactured by Tokyo Eletech Corporation) as the FP-144L-packaged IC socket on the user system.

Table 1 HS1664ECH61H Components

No.	Component	Quantity	Remarks
1	User system interface board	1	
2	IC socket	1	For the FP-144L package (to be mounted on the user system)
3	Socket cover	1	For installing an FP-144L-packaged MCU
4	Screw (M2 x 10 mm)	4	For fastening the board
5	Screw (M2 x 6 mm)	4	For installing an FP-144L-packaged MCU
6	Spacers (2.6MP x 25 mm)	2	
7	Spacers (2.6MQ x 13 mm)	4	
8	Screwdriver	1	For tightening screws
9	Guide pins ( $\phi$ 1 mm)	3	For determining the IC socket location
10	Documentation	1	User's manual for HS1664ECH61H (this manual)

## Section 2 Connection Procedures

### 2.1 Connecting the User System Interface Board to the User System

#### **WARNING**

**Always switch OFF the user system and the emulator product before the USER SYSTEM INTERFACE BOARD is connected or removed. Before connecting the two, 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.**

#### **CAUTION**

- 1. Do not connect a 5-V signal to any pin, including the USB pins. Incorrect usage will cause damage to the emulator product, user system interface board, and user system.**
- 2. To connect the emulator to the user system, ensure that the SW1 jumper pin is inserted to [USER-ON]. Failure to do so will damage the emulator product, user system interface board, and user system.**

To connect the board to the user system, follow the instructions below.

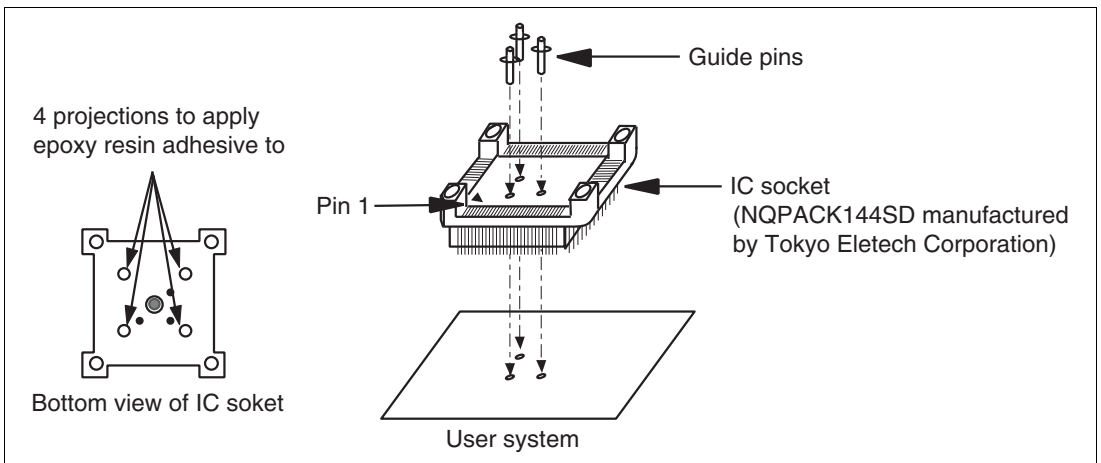
### 2.1.1 Installing the IC Socket

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 with the product to determine where to install the IC socket, as shown in figure 2.



**Figure 2 Correctly Placing the IC Socket**

### 2.1.2 Soldering the IC Socket

After fastening, solder the IC socket for an FP-144L package to the user system.

## CAUTION

**Be sure to completely solder the leads so that the solder gently covers the leads and forms solder fillets. (Use slightly more solder than with the MCU.)**

### 2.1.3 Inserting the IC Socket Connector

## CAUTION

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

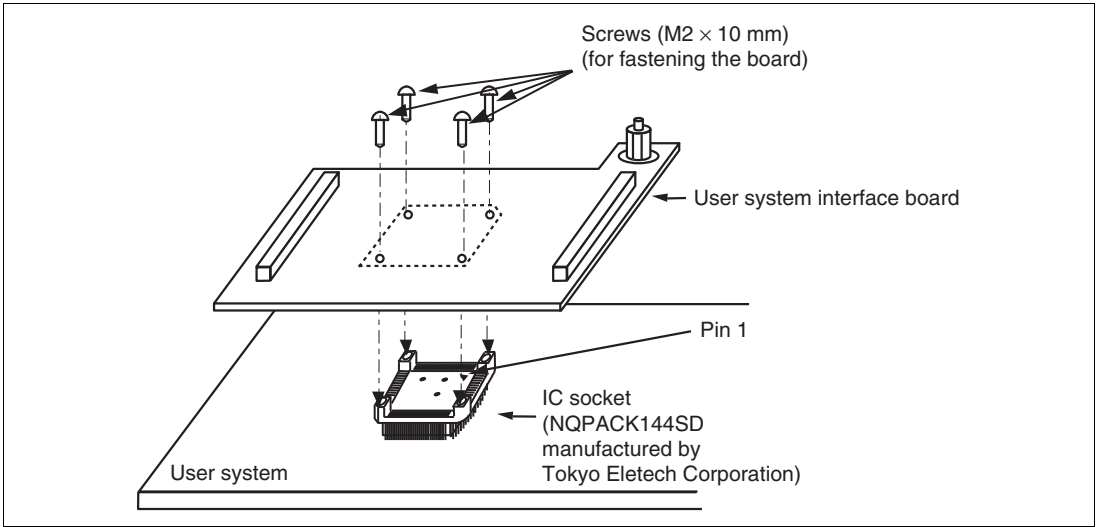
After checking the location of pin 1 on the user system interface board and pin 1 on the IC socket connector, align the guide pins on the IC socket connector with the guide holes on the user system interface board, and insert the IC socket connector into the IC socket (figure 3).



## CAUTION

1. Use the screwdriver provided for tightening screws.
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 board to the IC socket for an FP-144L package on the user system with the four screws (M2 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.

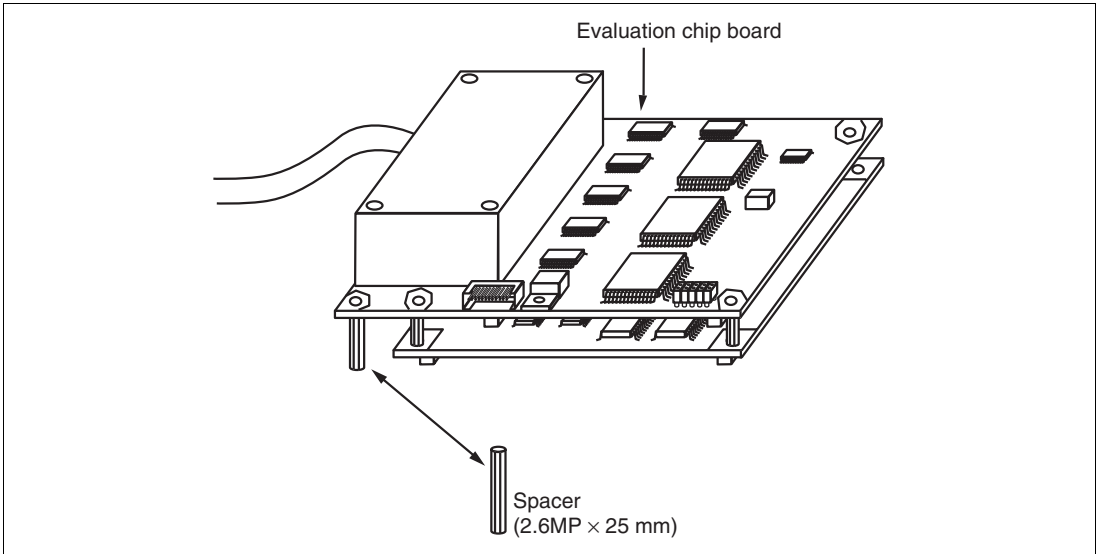


**Figure 3 Connecting the User System Interface Board to the User System**

## 2.2 Exchanging the Spacers of the Evaluation Chip Board

After connecting the user system interface board to the user system, be careful not to apply load to the user system.

Exchange the spacers (2.6MP × 10 mm) of the evaluation chip board with the spacers (2.6MP × 25 mm) provided with the user system interface board and adjust the height.



**Figure 4 Exchanging the Spacers**

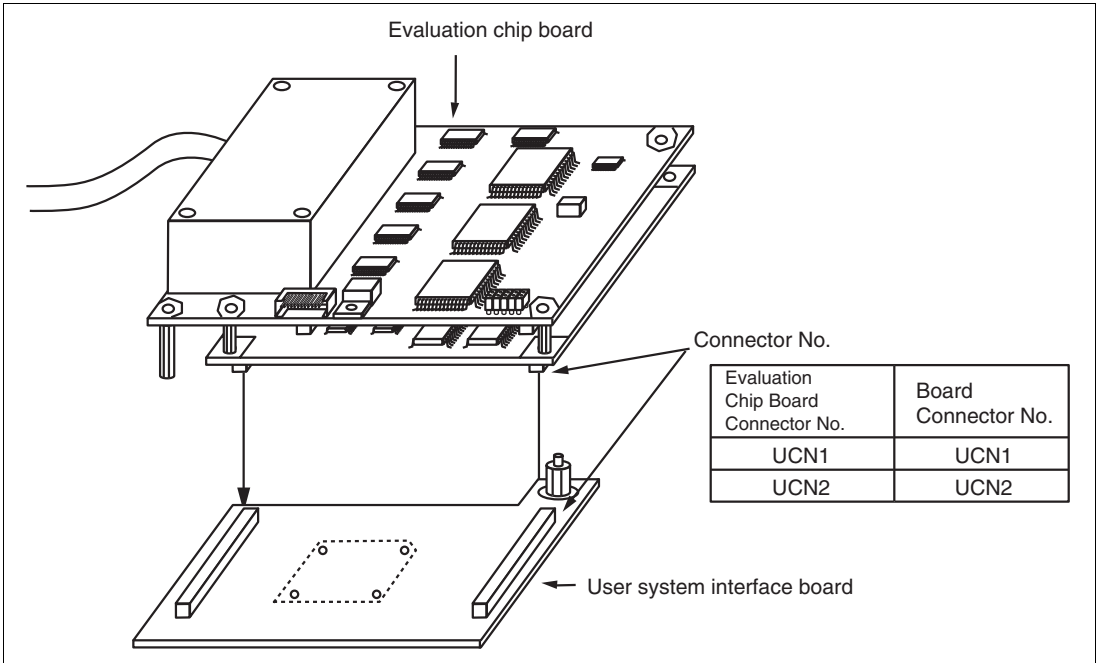
## 2.3 Connecting the User System Interface Board to the Evaluation Chip Board

### **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 BOARD is connected or removed. Before connecting the two, make sure that the pin 1 positions on both sides are correctly aligned.**
- 2. The user system interface board must be used with the emulator for which it was designed.**

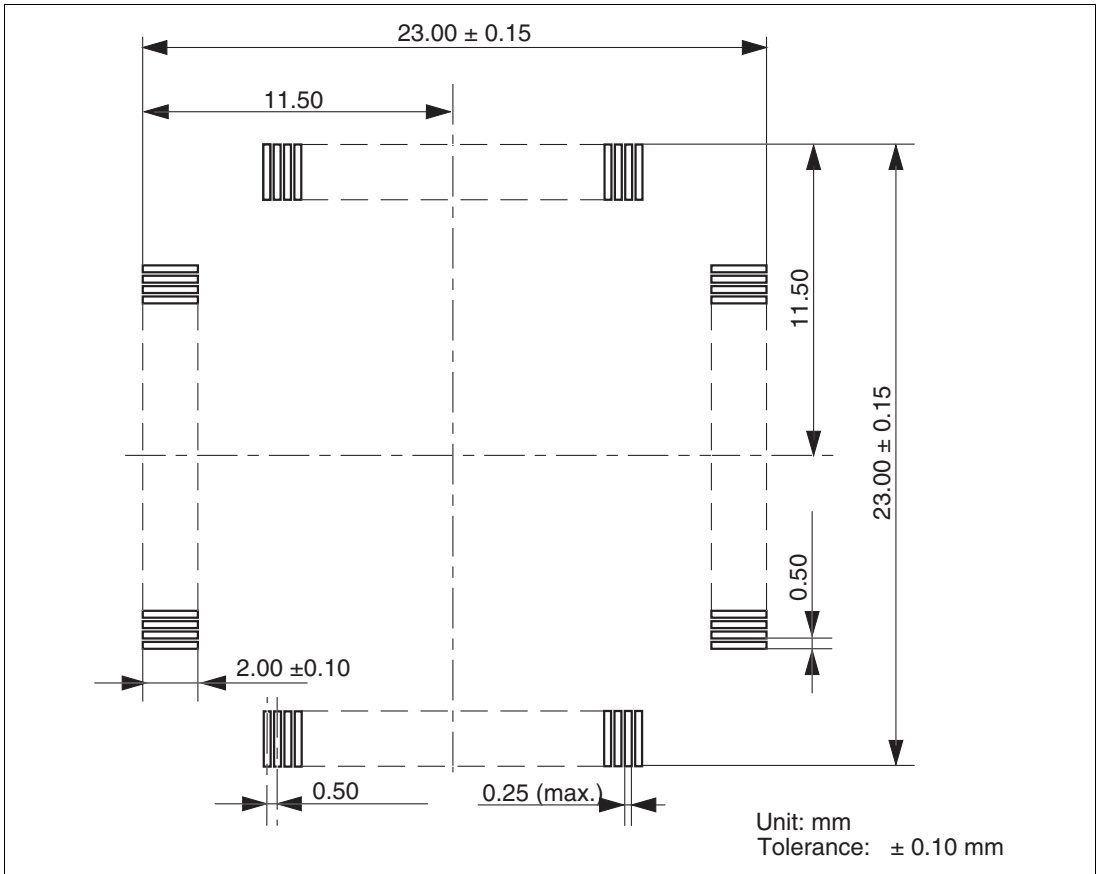
1. Make sure the user system and emulator are turned off.
2. Align the connectors on the user system interface board with those on the evaluation chip board by matching the numbers on the connectors (figure 5).
3. Adjust the height of the spacers of the evaluation chip board to accommodate the user system.



**Figure 5 Connecting the User System Interface Board to the Evaluation Chip Board**

## 2.4 Recommended Dimensions for the User System Mounting Pad (Footprint)

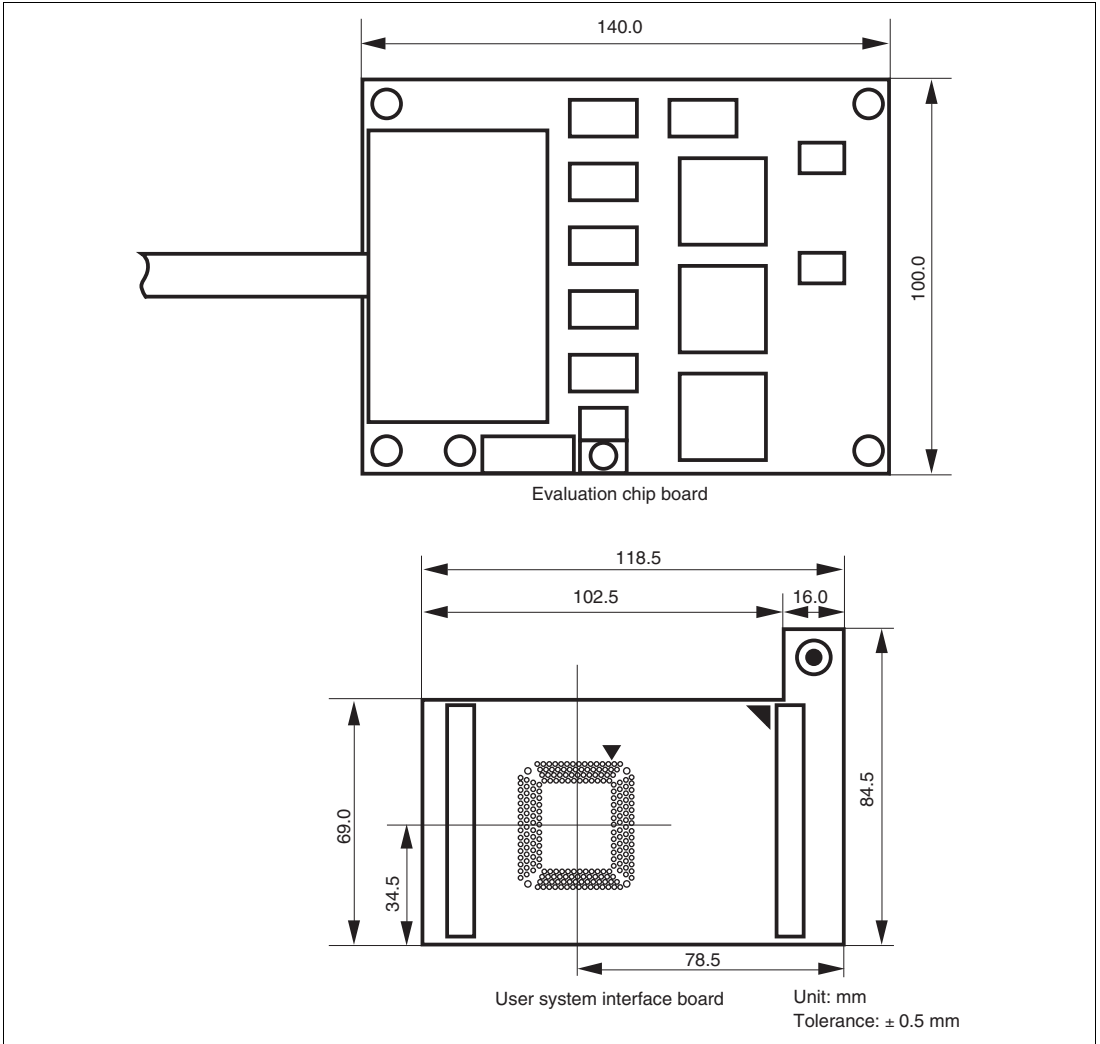
Figure 6 shows the recommended dimensions for the mounting pad (footprint) for the user system with the IC socket for an FP-144L package (NQPACK144SD: manufactured by Tokyo Eletech Corporation). Note that the dimensions in figure 6 are somewhat different from those of the mounting pad for the system with the actual MCU.



**Figure 6 Recommended Dimensions for the Mounting Pad**

## 2.5 Dimensions of the Evaluation Chip Board and the User System Interface Board

The dimensions of the evaluation chip board and the user system interface board are shown in figure 7.



**Figure 7** Dimensions of the Evaluation Chip Board and the User System Interface Board

## 2.6 Resulting Dimensions after Connecting the User System Interface Board

The dimensions of the assembly after the user system interface board has been connected to the user system are shown in figure 8.

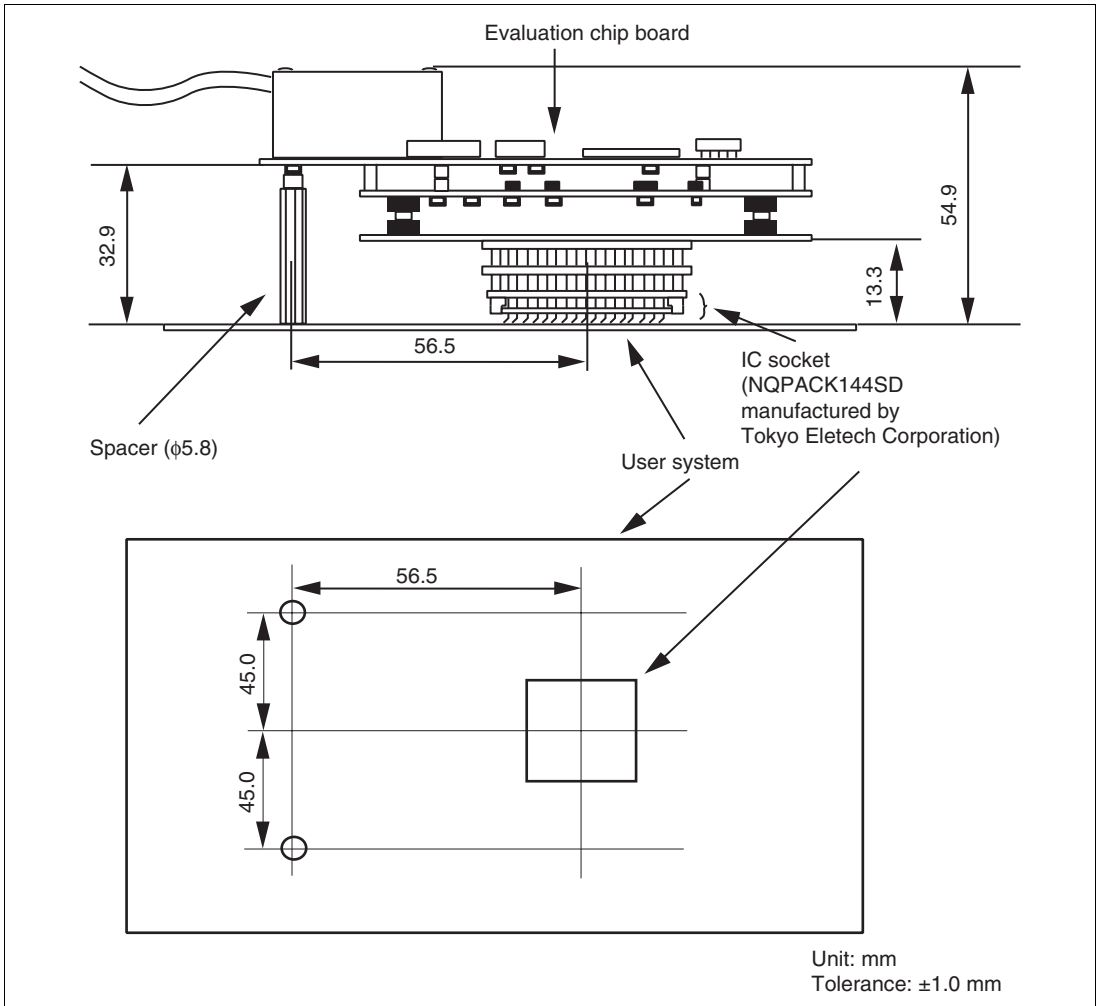


Figure 8 Dimensions of the Assembly after Connection of the User System Interface Board



## 2.7 Using the Emulator without Connecting User System

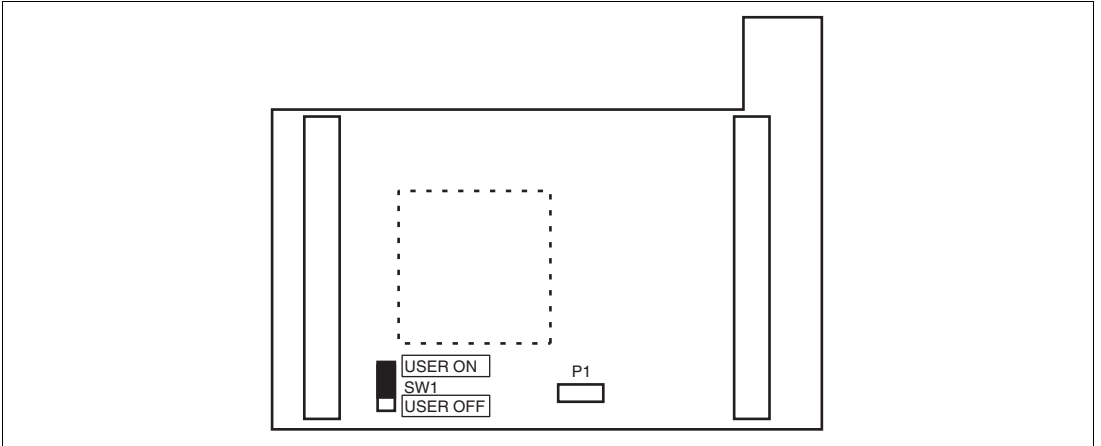
### **WARNING**

**Always switch OFF the user system and the emulator product before the USER SYSTEM INTERFACE BOARD is connected or removed. Before connecting the two, 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.**

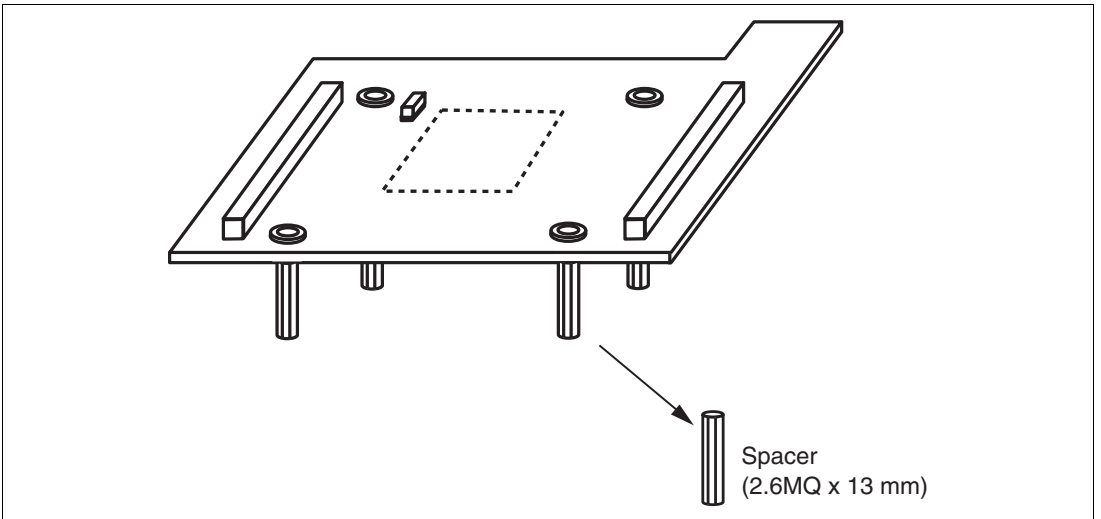
### **CAUTION**

**When this emulator is used without connecting to the user system, ensure that the SW1 jumper pin is inserted to [USER-OFF]. Failure to do so will damage the emulator product, user system interface cable, and user system.**

Attach the provided spacers (2.6MQ x 13 mm) to four positions on the user system interface board not to apply loads to the connector (CN1) on the board (figure 10).



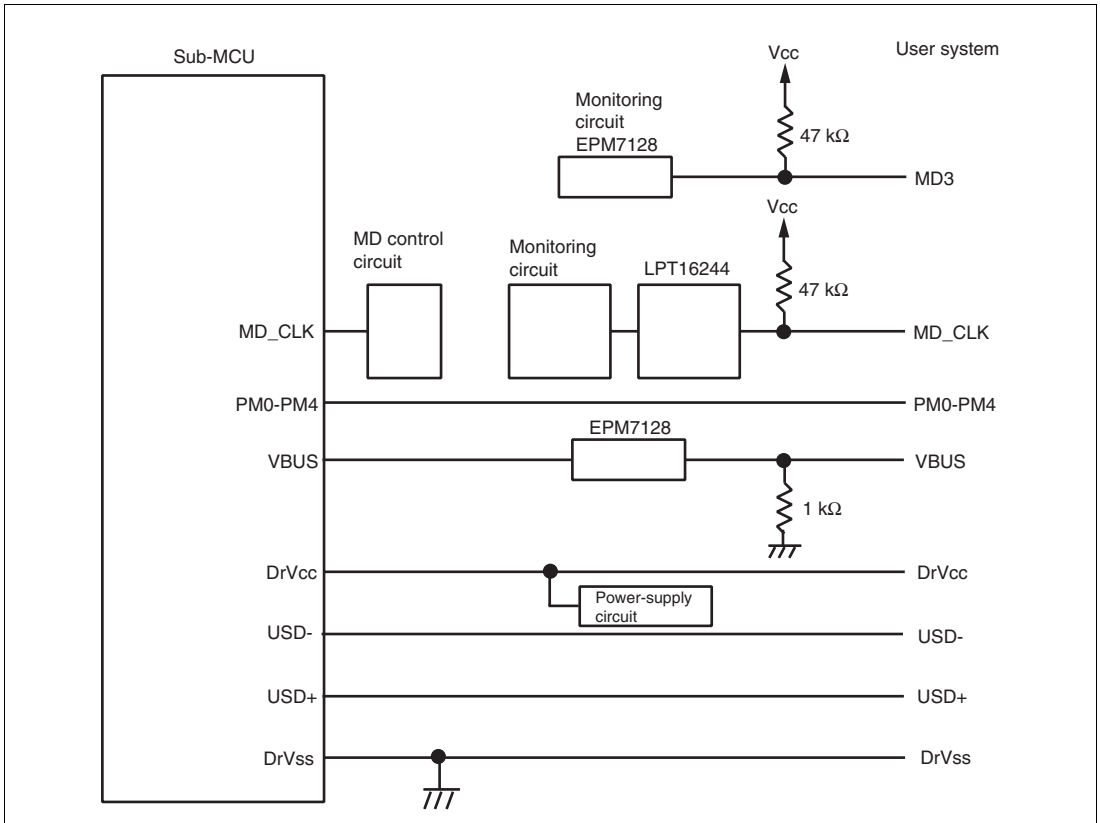
**Figure 9 SW1 Jumper Socket**



**Figure 10 Attaching Spacers**

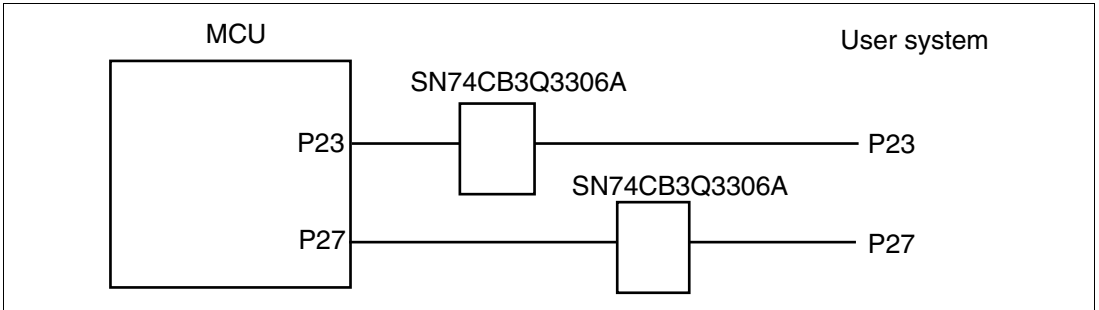
## Section 3 User System Interface Circuits

The following user interface circuits are required for the emulator when the user system interface board is in use.

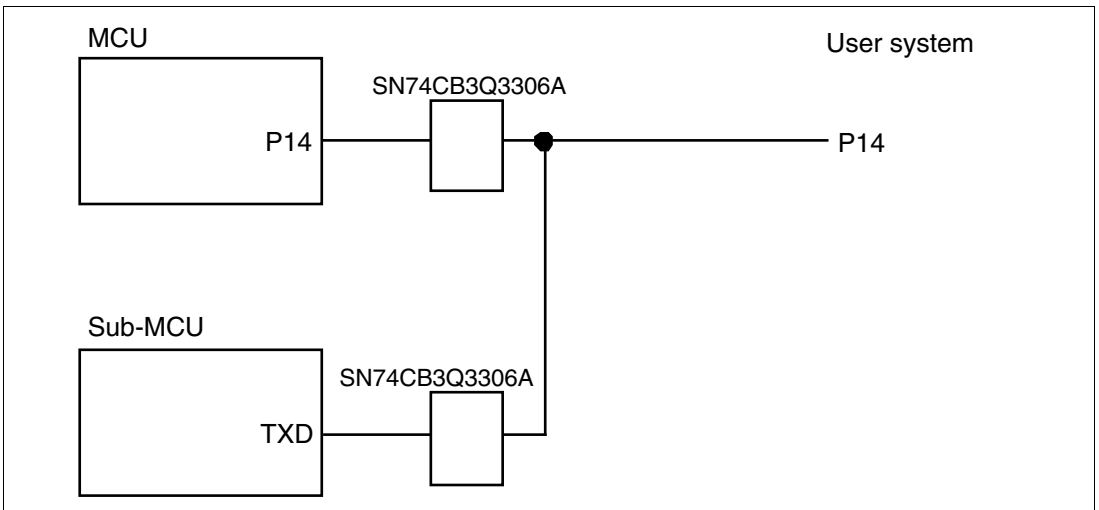


**Figure 11 User System Interface Circuit (1)**

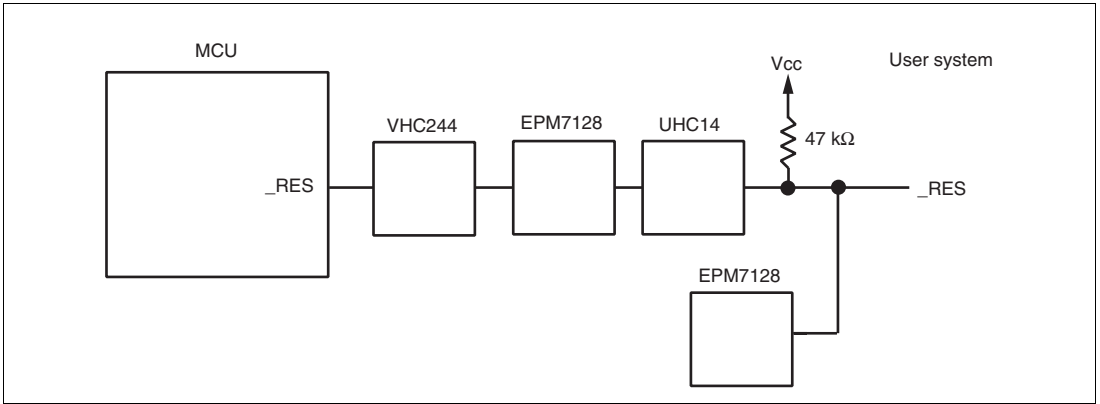
**Note:** The power-supply circuit shown above is turned on/off by the setting of the SW1 jumper pin on HS1664ECH61H. Ensure that the jumper pin is inserted to [USER-ON] on HS1664ECH61H when connecting the emulator (with HS1664ECH61H attached) to the user system or supplying power to DrVCC. Otherwise the emulator product, user system interface board, and user system will be damaged.



**Figure 12 User System Interface Circuit (2)**



**Figure 13 User System Interface Circuit (3)**

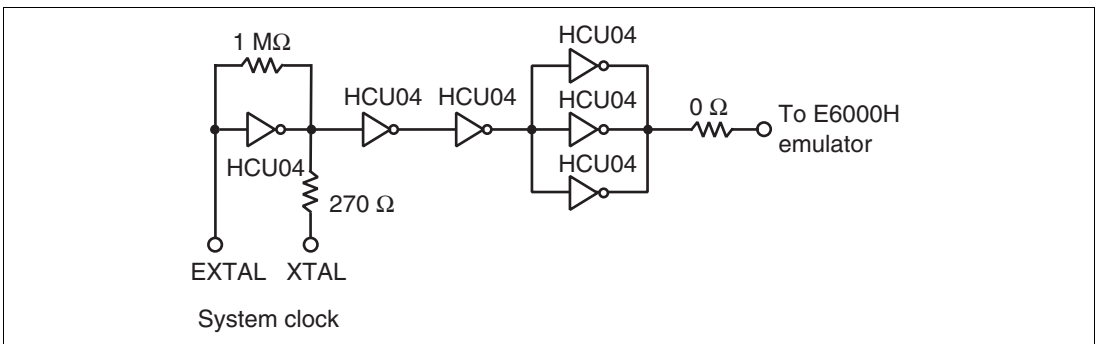


**Figure 14 User System Interface Circuit (4)**

## Section 4 Verifying Operation

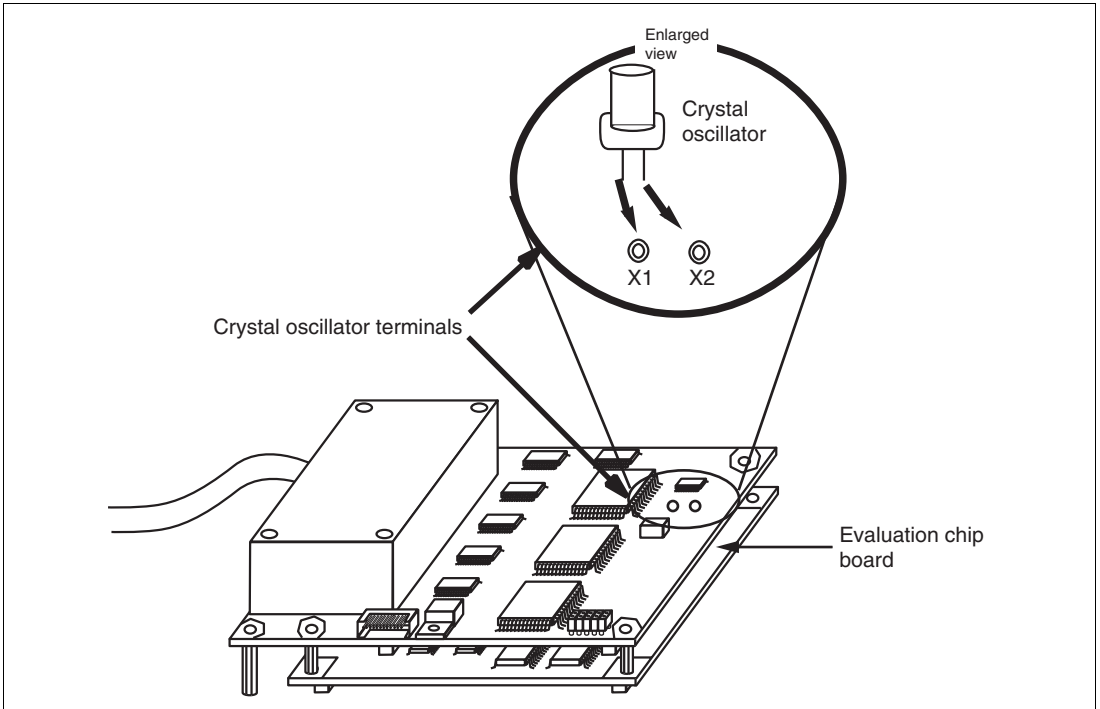
1. Turn on the emulator according to the procedures described in the H8SX/1650 E6000H Emulator User's Manual (HS1650EPH60HE).
2. Verify the user system interface cable connections by checking the pin states with the EXMONITOR\_DISPLAY command (emulator command) and checking the bus states with the MEMORY\_FILL 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 board supports three kinds of clock sources as the MCU clock. For details, refer to the H8SX/1650 E6000H Emulator User's Manual (HS1650EPH60HE).
  - To use the emulator internal clock  
Select the clock in the emulator by 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 by inputting the signal to the EXTAL pin (pin 98) on the user system interface board or connecting a crystal oscillator to the XTAL (pin 97) and EXTAL pins. For details, refer to the H8SX/1650 Hardware Manual.

Figure 15 shows the clock oscillator on the user system interface board.



**Figure 15 Clock Oscillator**

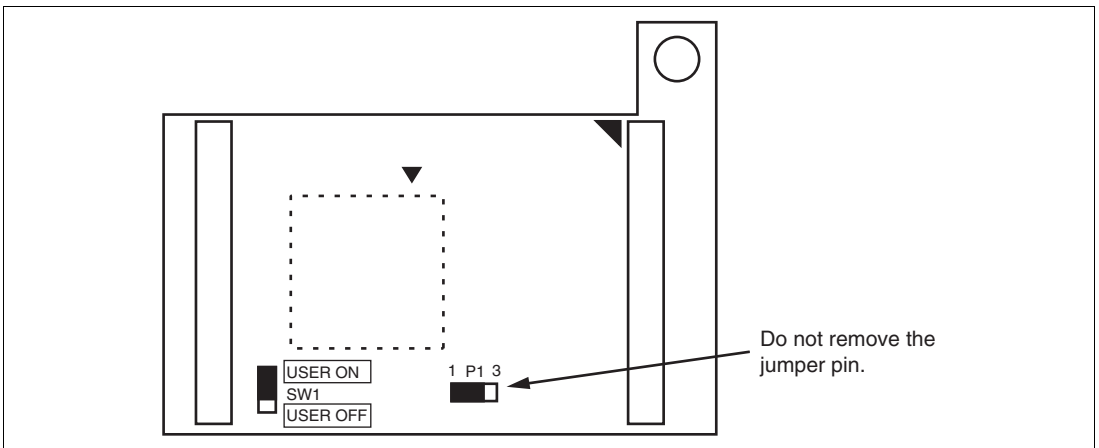
- To use the crystal oscillator mounted on the evaluation chip board  
Install the crystal oscillator into the crystal oscillator terminals on the evaluation chip board.



**Figure 16 Installing the Clock Oscillator**

## Section 5 Points for Caution

1. Before connecting any parts or cables, make sure that the pins at the pin 1 position on both sides are correctly aligned.
2. Do not apply excessive force to the user system interface board while it is connected to the user system.
3. The dimensions of the recommended mounting pad for the IC socket for this user system interface board are different from those of the pad for the MCU.
4. This user system interface board is specifically designed for the HS1650EPH60H emulator. Do not use this board with any other emulator.
5. When power is not being supplied to the Vcc pin on the user system interface board, the emulator displays \*\* VCC DOWN. In this situation, the emulator will not operate correctly.
6. The P1 short connector is used for testing. Do not remove the inserted jumper pin.



**Figure 17 Jumper Socket**

7. Do not connect this user system interface board to the user system for the H8SX/1650 group.



8. When you use the emulator without connecting it to the user system, ensure that the SW1 jumper pin is inserted to [USER-OFF]. While no pin or SW1 jumper pin is inserted to [USER-OFF], the emulator supplies 3.3-V power to DrVCC, which is the power supply exclusively used for USB.
9. To connect the emulator to the user system, ensure that the SW1 jumper pin is inserted to [USER-ON]. While SW1 jumper pin is inserted to [USER-ON], the emulator does not supply power to DrVCC, which is the power supply exclusively used for USB. Thus the power must be supplied from the user system instead.
10. Do not connect a 5-V signal to any pin, including the USB pins. Incorrect usage will cause damage to the emulator product, user system interface board, and user system.

## Section 6 Restrictions

There are the following restrictions on emulation of the H8SX/1663 group when the user system interface board is connected to the emulator.

1. The USB clock frequency is fixed to 48 MHz regardless of the EXTAL input.
2. P14 cannot be used as a port if the serial output function has already been selected. The port pin state cannot be read from the port register.
3. The user system interface board does not support subclock operation. Thus the following function and register cannot be used:
  - 32k timer
  - Subclock control register (SUBCKCR) of the clock pulse generator
  - Interrupt priority register D (IPRD2 to IPRD0)
4. Exception processing of sleep instructions is not supported. Even if the SLPIE bit of the standby control register (SBYCR) is set to 1, the emulator enters the power-down mode and no exception processing of sleep instructions occurs.

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**User System Interface Board**  
**HS1664ECH61H User's Manual**

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H8SX/1663 Group E6000H FP-144L  
User System Interface Board  
HS1664ECH61H User's Manual



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