

To our customers,

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April 1<sup>st</sup>, 2010  
Renesas Electronics Corporation

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H8SX/1653 Group  
E6000H TFP-120  
User System Interface Board  
HS1653ECN61H User's Manual  
Renesas Microcomputer  
Development Environment  
System

HS1653ECN61HE



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

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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 (HS1653ECN61H)

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# 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

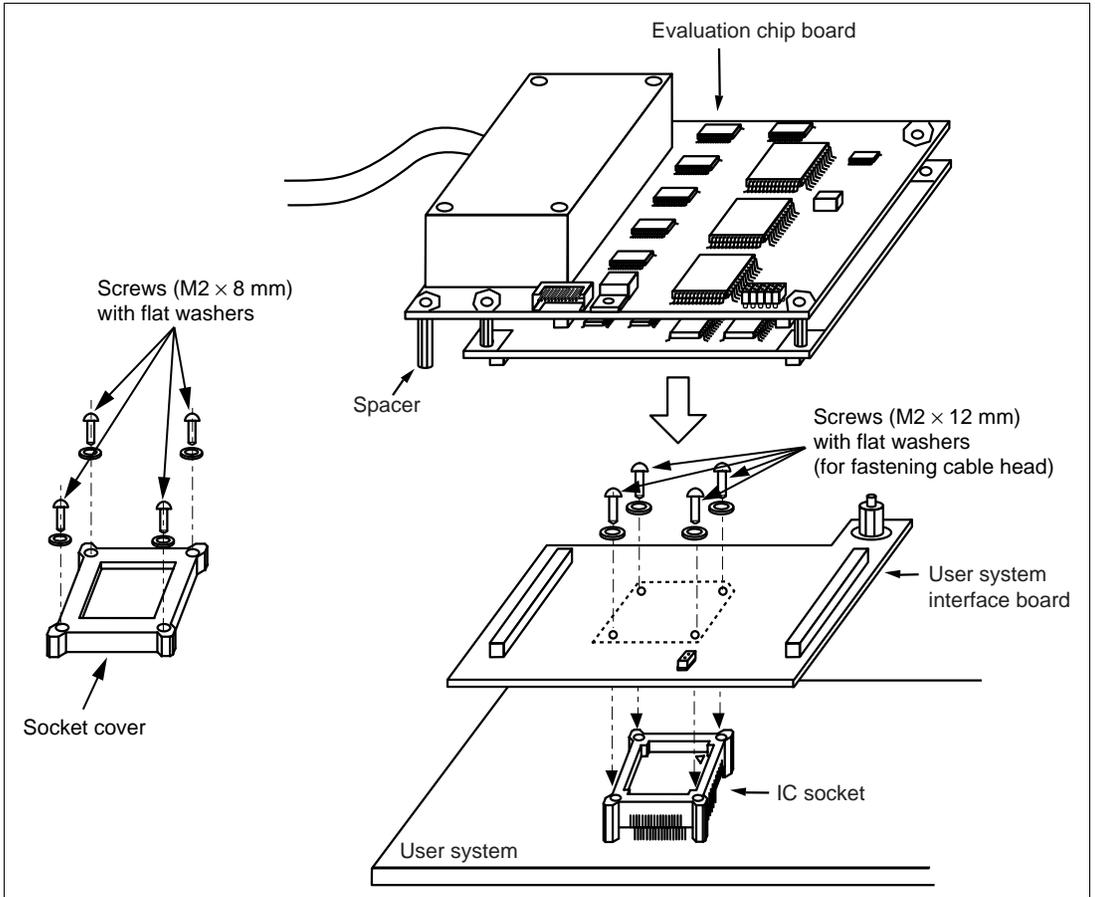
The HS1653ECN61H is a user system interface board that connects a user system for the H8SX/1653 TFP-120 package to the H8SX/1650 E6000H emulator (HS1650EPH60H). Emulation of the H8SX/1653 group is only possible when this user system interface board is connected to the HS1650EPH60H.

# Contents

|           |  |    |
|-----------|--|----|
| Section 1 | Configuration.....   | 1  |
| Section 2 | Connection Procedures .....  | 3  |
| 2.1       | Connecting User System Interface Board to User System.....                 | 3  |
| 2.1.1     | Installing IC Socket.....  | 4  |
| 2.1.2     | Soldering IC Socket.....   | 4  |
| 2.1.3     | Installing IC Socket.....  | 4  |
| 2.1.4     | Fastening IC Socket Connector.....   | 5  |
| 2.2       | Exchanging the Spacer of the Evaluation Chip Board.....                    | 7  |
| 2.3       | Connecting User System Interface Board to Evaluation Chip Board .....      | 8  |
| 2.4       | Recommended Dimensions for User System Mount Pad (Footprint).....          | 10 |
| 2.5       | Dimensions for Evaluation Chip Board and User System Interface Board ..... | 11 |
| 2.6       | Resulting Dimensions after Connecting User System Interface Board.....     | 12 |
| 2.7       | Using the Emulator without Connecting User System.....                     | 13 |
| Section 3 | User System Interface Circuits .....                                       | 15 |
| Section 4 | Verifying Operation.....   | 18 |
| Section 5 | Notice.....  | 20 |
| Section 6 | Restrictions .....   | 22 |

# Section 1 Configuration

Figure 1 and table 1 show the configuration and components of the user system interface board for the TFP-120 package. Please make sure you have all of these components when unpacking.



**Figure 1 User System Interface Board for the H8SX/1653 TFP-120 Package**

# CAUTION

Use an IC149-120-043-B51 socket (manufactured by YAMAICHI ELECTRONICS Co., Ltd.) for the TFP-120 package IC socket on the user system.

**Table 1** HS1653ECN61H Components

| No. | Component                   | Quantity | Remarks  |
|-----|-----------------------------|----------|--|
| 1   | User system interface board | 1        |  |
| 2   | IC socket                   | 1        | For the TFP-120 package (to be mounted on the user system)     |
| 3   | Socket cover                | 1        | For installing a TFP-120-packaged MCU                          |
| 4   | Screw (M2 x 12 mm)          | 4        | For fastening cable head (with four flat washers)              |
| 5   | Screw (M2 x 8 mm)           | 4        | For installing a TFP-120-packaged MCU (with four flat washers) |
| 6   | Spacers (2.6MP x 25 mm)     | 2        |  |
| 7   | Spacers (2.6MQ x 16 mm)     | 4        |  |
| 8   | User's manual               | 1        | User's manual for HS1653ECN61H (this manual)                   |

## Section 2 Connection Procedures

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

#### **WARNING**

**Always switch OFF the user system and the emulator product before the USER SYSTEM INTERFACE BOARD 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.**

#### **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 [ON]. Failure to do so will damage the emulator product, user system interface board, and user system.**

To connect the cable head to the user system, follow the instructions below.

### **2.1.1 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 a TFP-120 package, and fasten it to the user system before soldering.

### **2.1.2 Soldering IC Socket**

After fastening, solder the IC socket for a TFP-120 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.)

### **2.1.3 Installing IC Socket**

## **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 2).

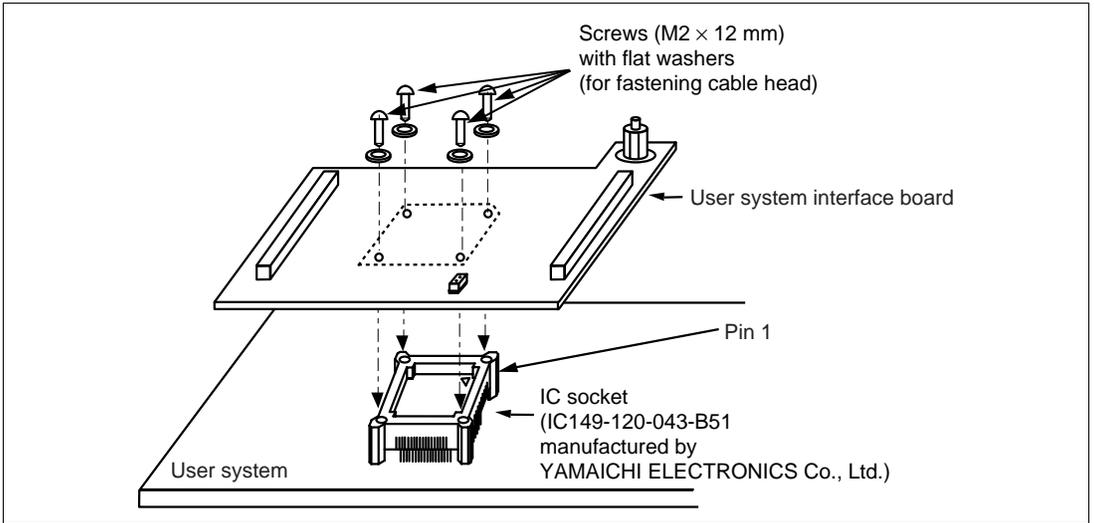
#### 2.1.4 Fastening IC Socket Connector

## CAUTION

1. Use the screwdriver provided for tightening screws.
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.

Fasten the user system interface board to the IC socket on the user system with four screws (M2 × 12 mm) provided.

Take special care, such as manually securing the IC socket soldered area, to prevent the soldered IC socket from being damaged by twisting the components.

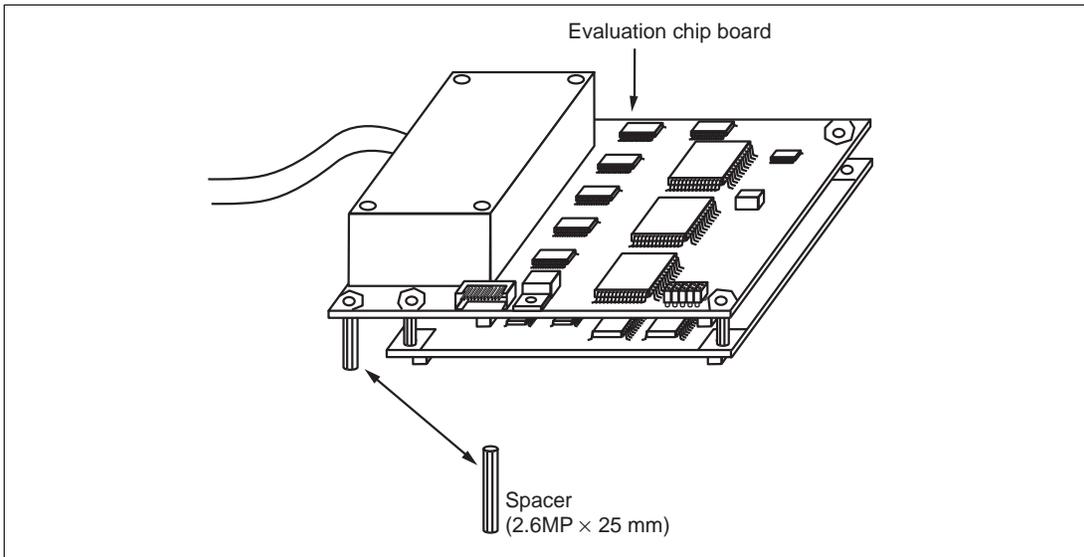


**Figure 2 Connecting User System Interface Board to User System**

## 2.2 Exchanging the Spacer of the Evaluation Chip Board

While the user system interface board is connected to the user system, be careful not to apply load.

Exchange the spacer (2.6MP × 10 mm) of the evaluation chip board with another spacer (2.6MP × 25 mm) provided for the user system interface board.



**Figure 3 Exchanging the Spacer**

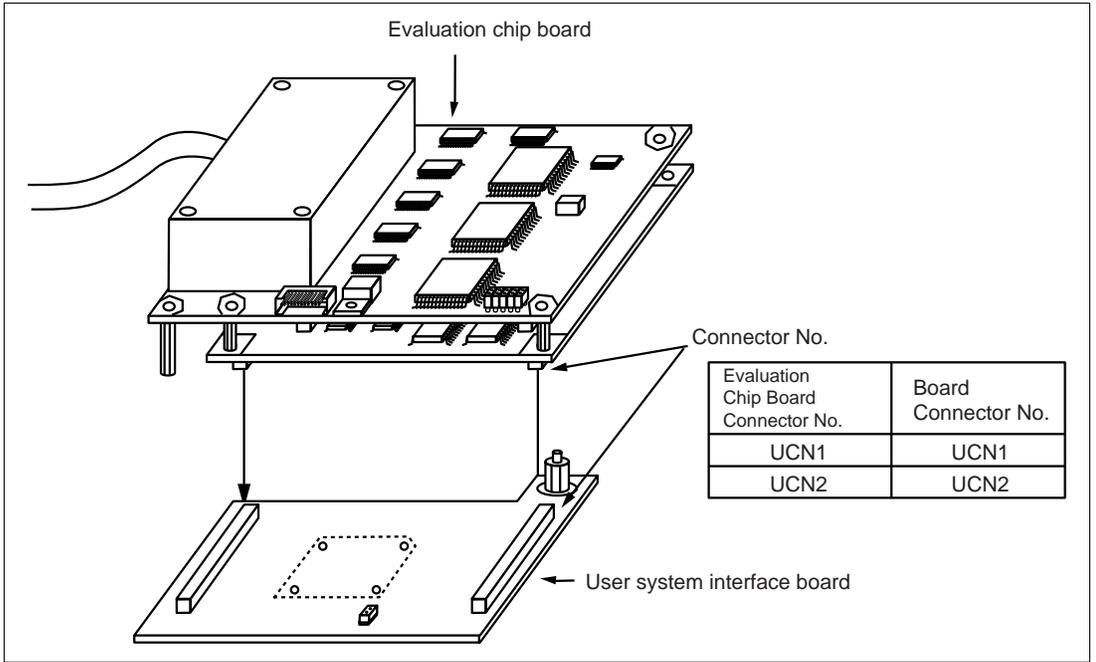
## 2.3 Connecting User System Interface Board to Evaluation Chip Board

### **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 to or removed from any part. Before connecting, make sure that pin 1 on both sides are correctly aligned.**
- 2. The user system interface board dedicated to the emulator must be used.**

1. Make sure that power of the user system and the emulator is turned off.
2. Align the connectors on the board with those on the evaluation chip board according to their numbers (figure 4).
3. Adjust the height of the spacer of the evaluation chip board with the user system.



**Figure 4 Connecting User System Interface Board to Evaluation Chip Board**

## 2.4 Recommended Dimensions for User System Mount Pad (Footprint)

Figure 5 shows the recommended dimensions for the mount pad (footprint) for the user system with an IC socket for a TFP-120 package (IC149-120-043-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.

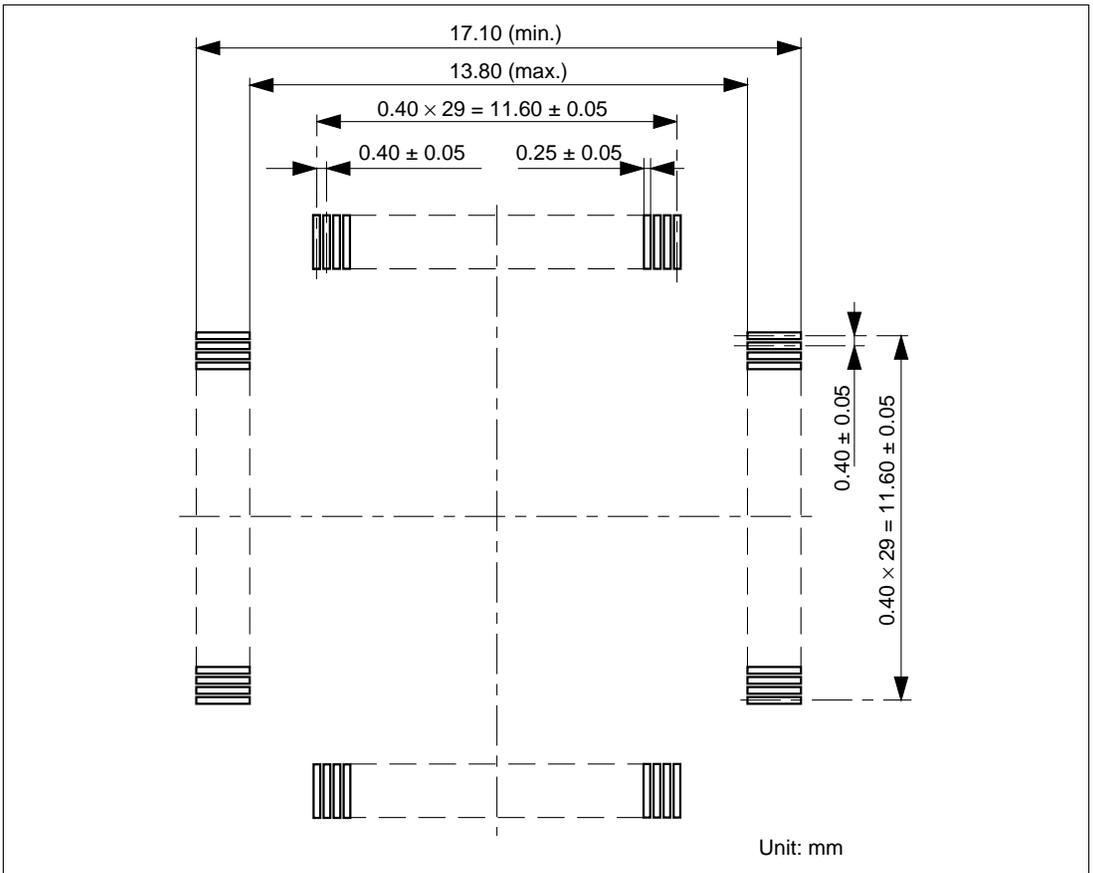
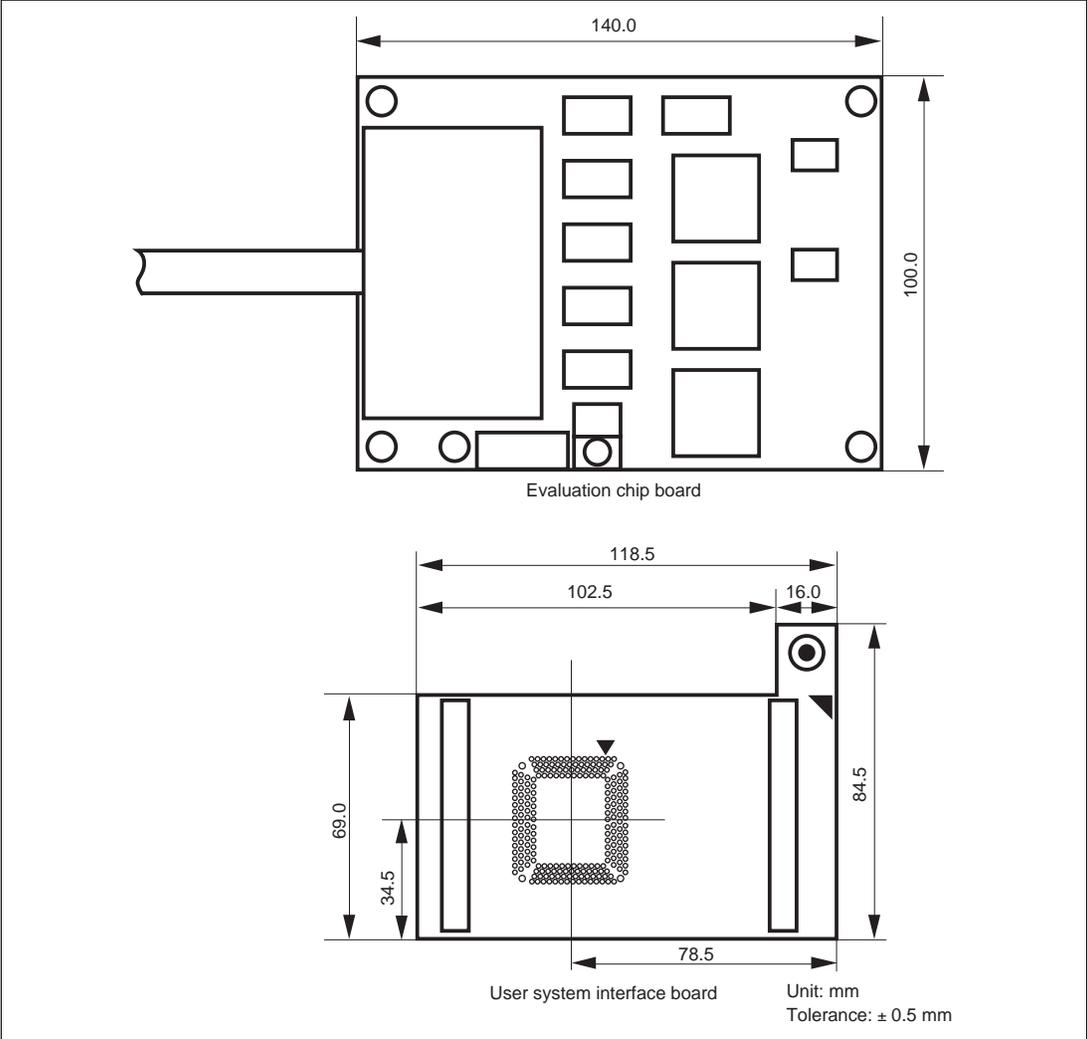


Figure 5 Recommended Dimensions for Mount Pad

## 2.5 Dimensions for Evaluation Chip Board and User System Interface Board

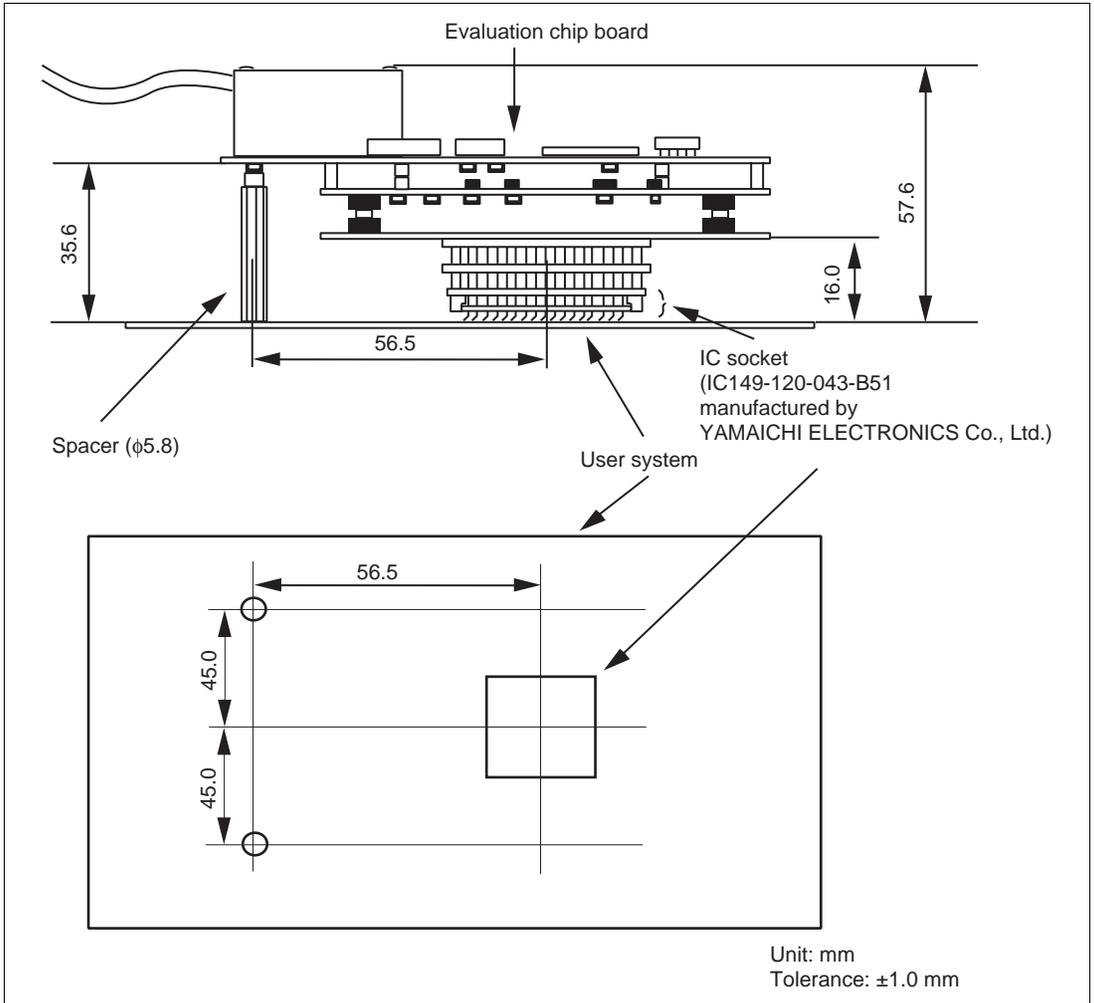
The dimensions for the evaluation chip board and the user system interface board are shown in figure 6.



**Figure 6 Dimensions for Evaluation Chip Board and User System Interface Board**

## 2.6 Resulting Dimensions after Connecting User System Interface Board

The resulting dimensions, after connecting the user system interface board to the user system, are shown in figure 7.



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

## 2.7 Using the Emulator without Connecting User System

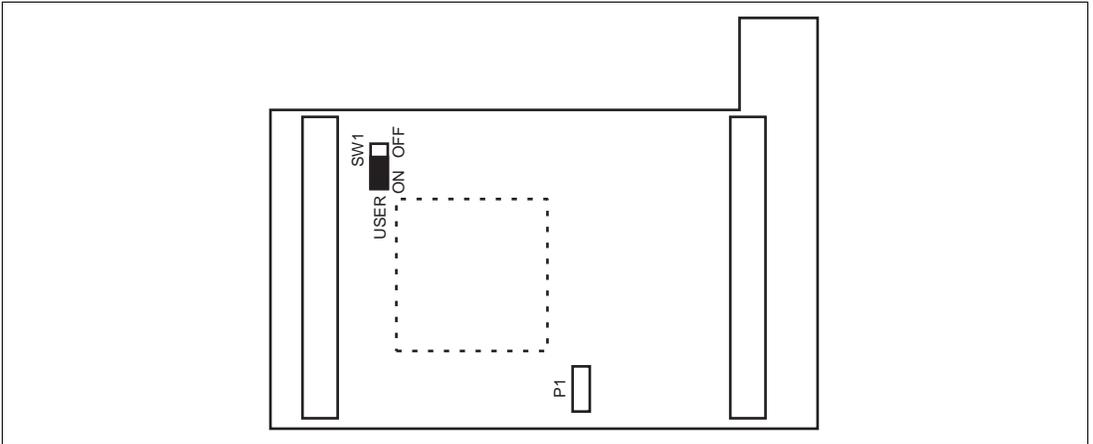
### **WARNING**

**Always switch OFF the user system and the emulator product before the USER SYSTEM INTERFACE BOARD is connected 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.**

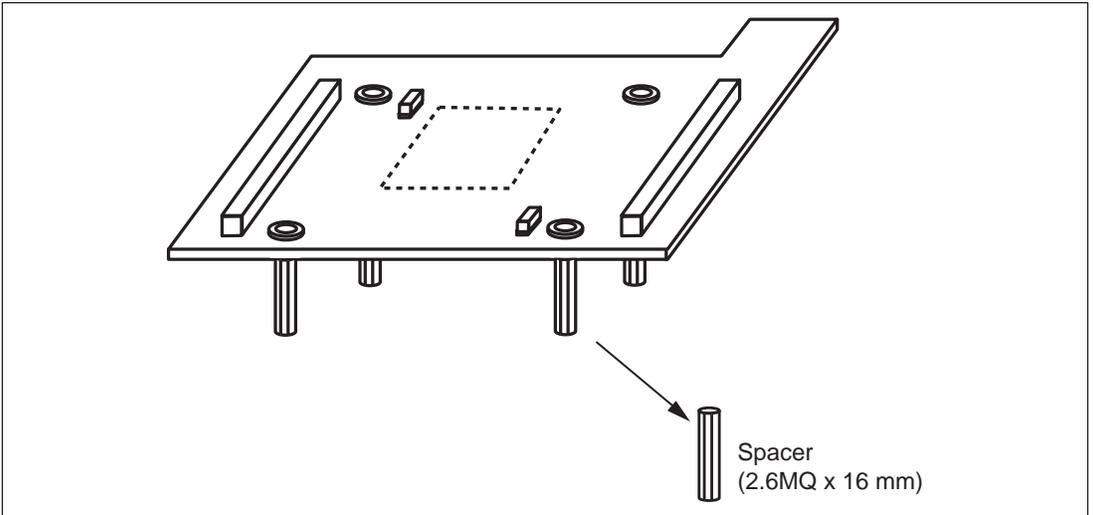
### **CAUTION**

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

Attach the provided spacers (2.6MQ x 16 mm) to four positions on the user system interface board not to apply loads to the connector (CN1) on the board.



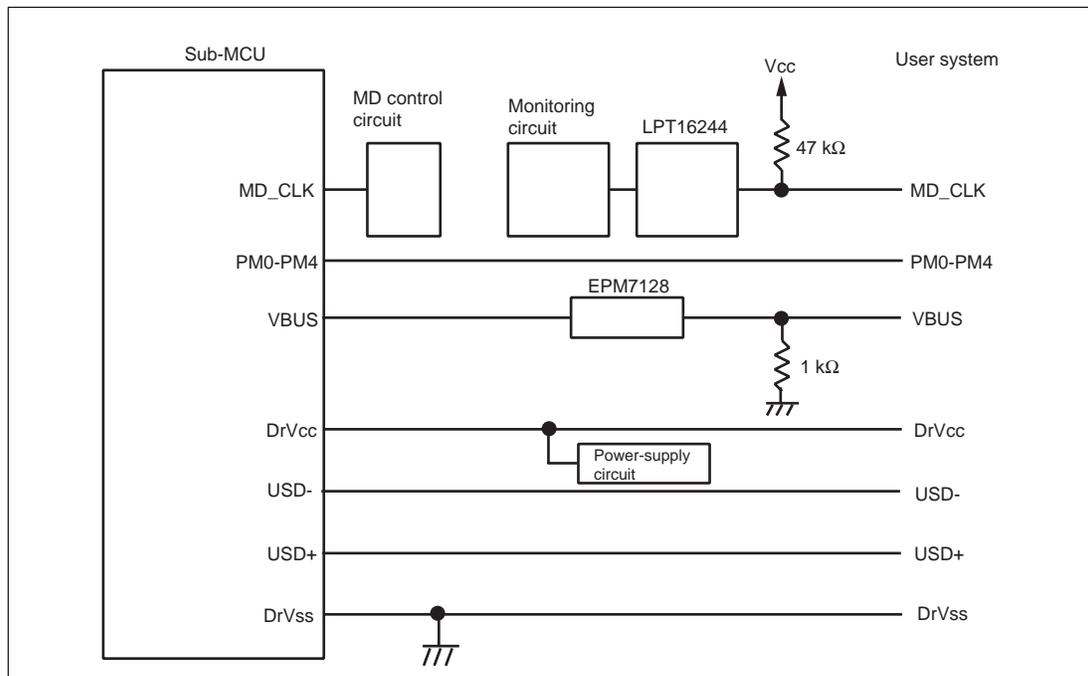
**Figure 8 SW1 Jumper Socket**



**Figure 9 Attaching Spacers**

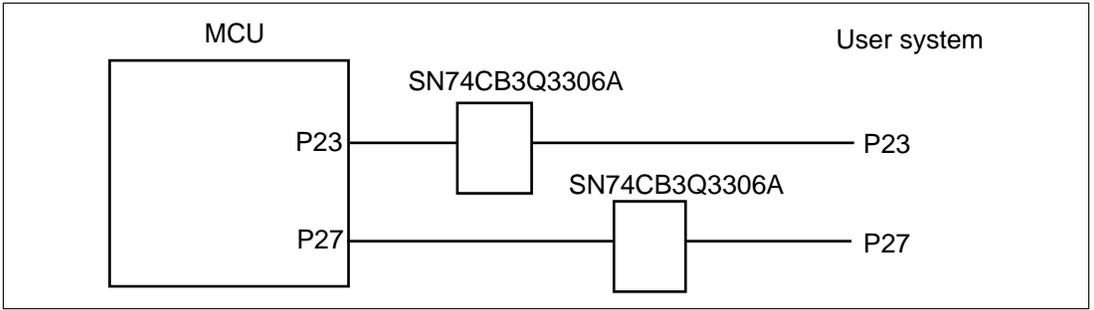
## Section 3 User System Interface Circuits

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

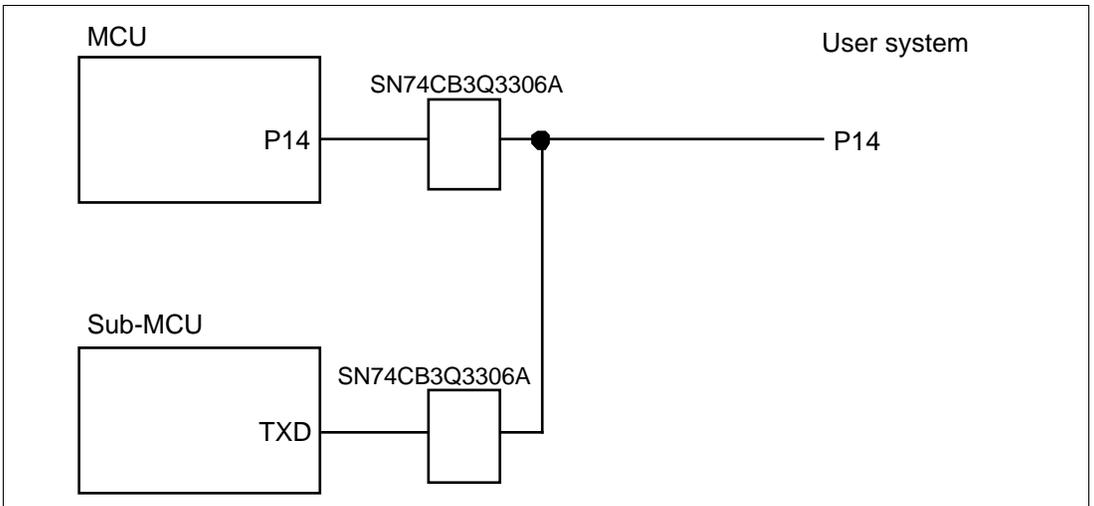


**Figure 10 User System Interface Circuit (1)**

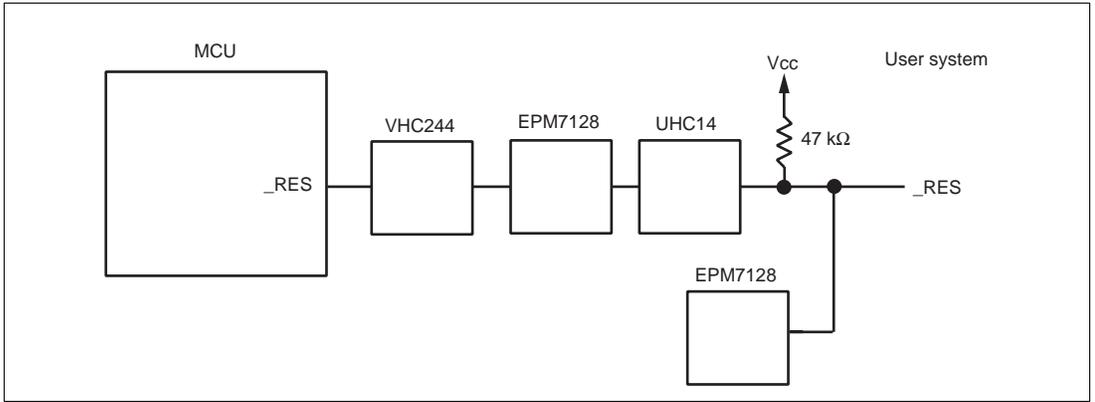
**Note:** The power-supply circuit shown above is turned on/off by the setting of the SW1 jumper pin on HS1653ECN61H. Ensure that the jumper pin is inserted to [ON] on HS1653ECN61H when connecting the emulator (with HS1653ECN61H attached) to the user system or supplying power to DrVCC. Otherwise the emulator product, user system interface board, and user system will be damaged.



**Figure 11 User System Interface Circuit (2)**



**Figure 12 User System Interface Circuit (3)**

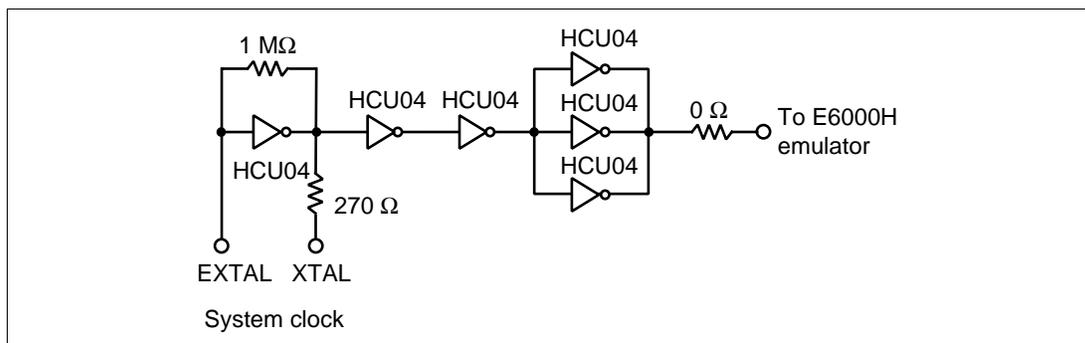


**Figure 13 User System Interface Circuit (4)**

## Section 4 Verifying Operation

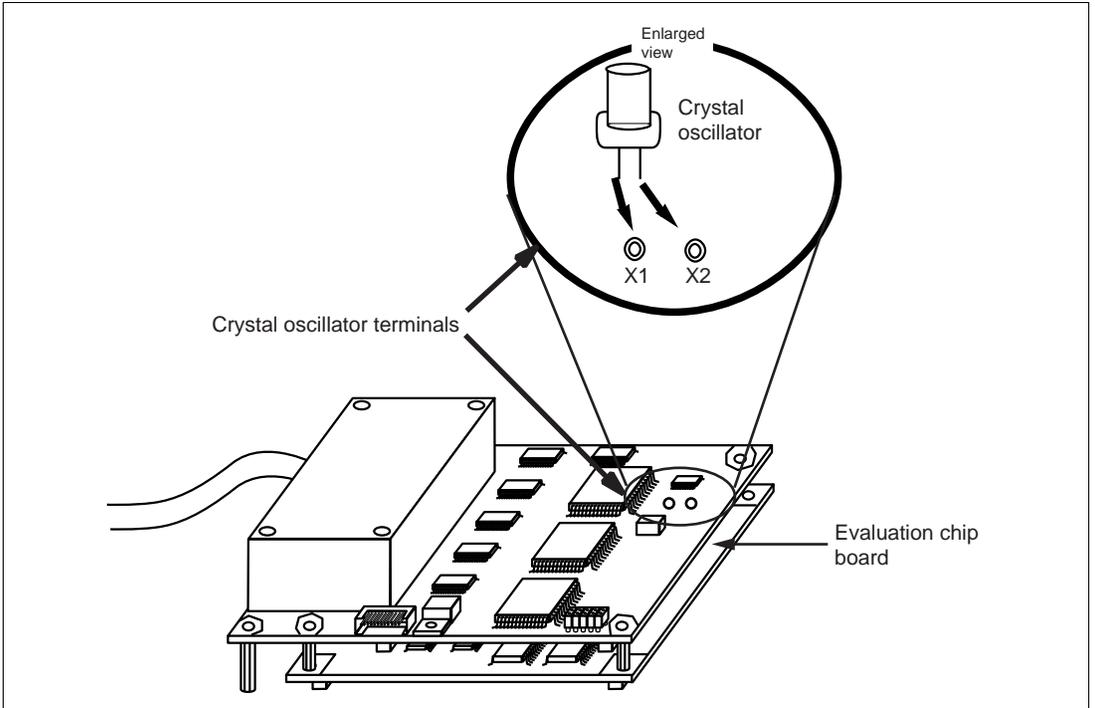
1. Turn on the emulator according to the procedures described in the H8SX/1650 E6000H Emulator User's Manual (HS1650EPH60HE).
2. Verify the user system interface cable connections by checking the pin states with the CHECK command (emulator command) and checking the bus states with the FILL command (emulator 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 EXTAL pin (pin 84) on the user system interface board or connecting the crystal oscillator to the XTAL (pin 83) and EXTAL pins. For details, refer to the H8SX/1650 Hardware Manual.

Figure 14 shows the clock oscillator on the user system interface board.



**Figure 14 Clock Oscillator**

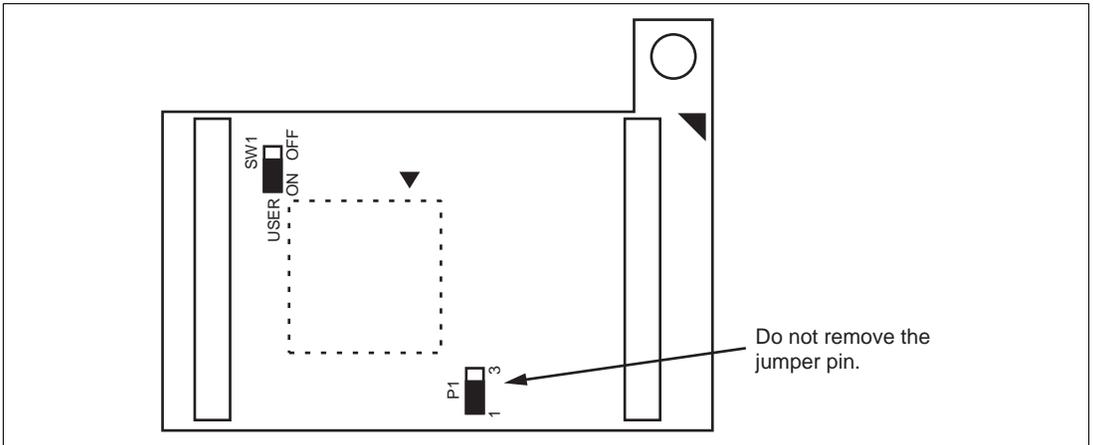
- To use the crystal oscillator mounted on the evaluation chip board  
Install the crystal oscillator into the crystal oscillator terminals on the evaluation chip board.



**Figure 15** Installing the Clock Oscillator

## Section 5 Notice

1. Before connecting any parts or cables, make sure that pin 1 on the 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 mount pad for the IC socket for this user system interface board are different from those of 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 supplied to the Vcc pin on the user system interface board, the emulator displays \*\* VCC DOWN. The emulator will not operate correctly.
6. The P1 jumper socket is used for testing. Do not remove the inserted jumper pin.



**Figure 16 Jumper Socket**

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

8. When this emulator is used without connecting to the user system, ensure that the SW1 jumper pin is inserted to [OFF]. Failure to do so will damage the emulator product, user system interface cable, and user system.
9. To connect the emulator to the user system, ensure that the SW1 jumper pin is inserted to [ON]. Failure to do so will damage the emulator product, user system interface board, and user system.
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/1653 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.

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**Renesas Microcomputer Development Environment System  
User's Manual  
H8SX/1653 Group E6000H TFP-120  
User System Interface Board HS1653ECN61H**

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