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April 1st, 2010
Renesas Electronics Corporation

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User's Manual

H8SX/1668R Group E6000H PLQP0144KA-A User System Interface Board

HS1668RECH61H User's Manual

Renesas Microcomputer Development Environment System

H8SX Family / H8SX/1600 Series

HS1668RECH61HE

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Rev.2.00 2008.04

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IMPORTANT INFORMATION

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 (HS1668RECH61H)

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

Purpose of the User System Interface Board:

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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Target User of the User System Interface Board:

This user system interface board 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 board 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 board.

LIMITED WARRANTY

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Figures:

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

Limited Anticipation of Danger:

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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 **DANGER** indicates an imminently hazardous situation which, if not avoided, will result in death or serious injury.

⚠ WARNING **WARNING** indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.

⚠ CAUTION **CAUTION** indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury.

CAUTION **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 HS1668RECH61H is a user system interface board that connects a user system for the H8SX/1668R PLQP0144KA-A (former package: FP-144L) package to the H8SX/1650 E6000H emulator (HS1650EPH60H). Emulation of the H8SX/1668R group is only possible when this user system interface board is connected to the HS1650EPH60H.

Content

Section 1 Configuration

Figure 1 and table 1 show the external appearance and components, respectively, of the user system interface board for the PLQP0144KA-A package. Please make sure you have all of these components after you have unpacked the box.

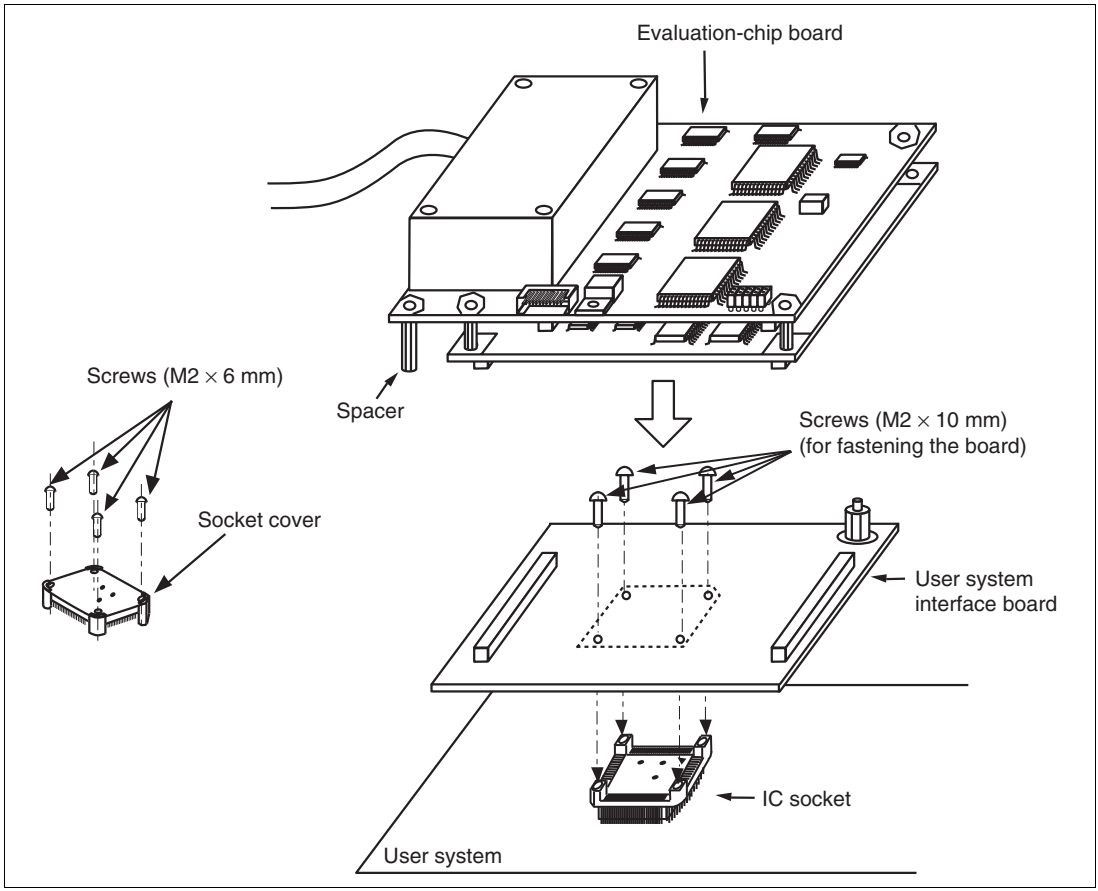


Figure 1 H8SX/1668R PLQP0144KA-A User System Interface Board

CAUTION

Use an NQPACK144SD-ND socket (manufactured by Tokyo Eletech Corporation) as the PLQP0144KA-A-packaged IC socket on the user system.

Table 1 HS1668RECH61H Components

No.	Component	Quantity	Remarks
1	User system interface board	1	
2	IC socket	1	For the PLQP0144KA-A package (to be mounted on the user system)
3	Socket cover	1	For installing a PLQP0144KA-A-packaged MCU
4	Screws (M2 x 10 mm)	4	For fastening the board
5	Screws (M2 x 6 mm)	4	For installing a PLQP0144KA-A-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 (ϕ1 mm)	3	For determining the IC socket location
10	Documentation	1	User's manual for HS1668RECH61H (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 all of pins including the port N 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.

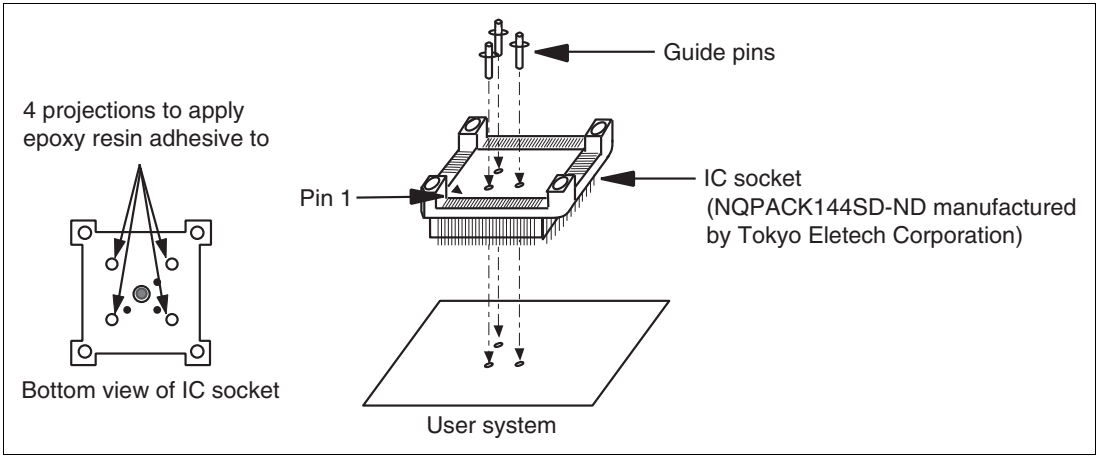


Figure 2 Correctly Placing the IC Socket

2.1.2 Soldering the IC Socket

After fastening, solder the IC socket for a PLQP0144KA-A 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).

2.1.4 Fastening the IC Socket Connector

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 a PLQP0144KA-A 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.

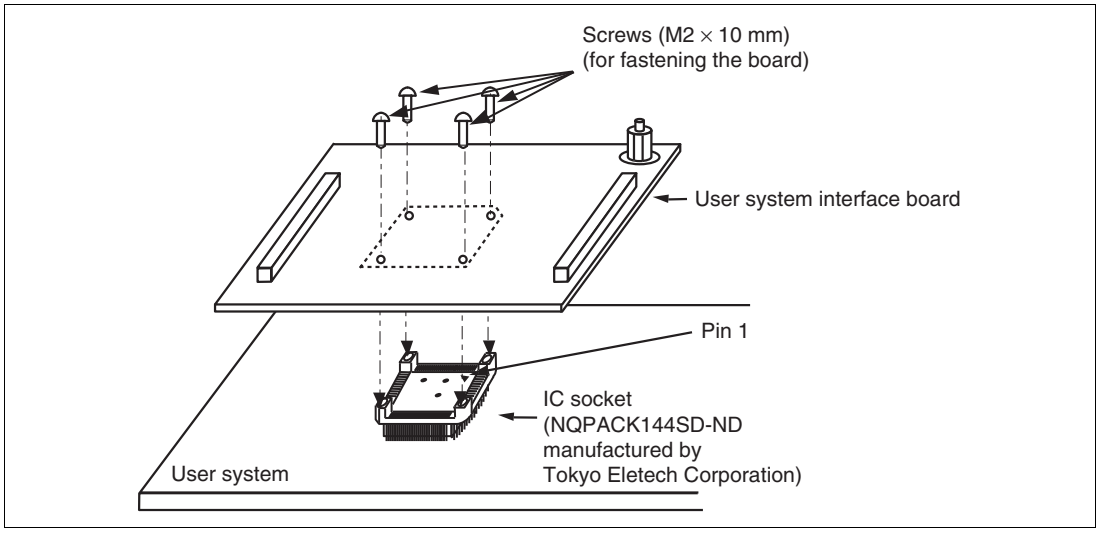


Figure 3 Connecting the User System Interface Board to the User System

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.

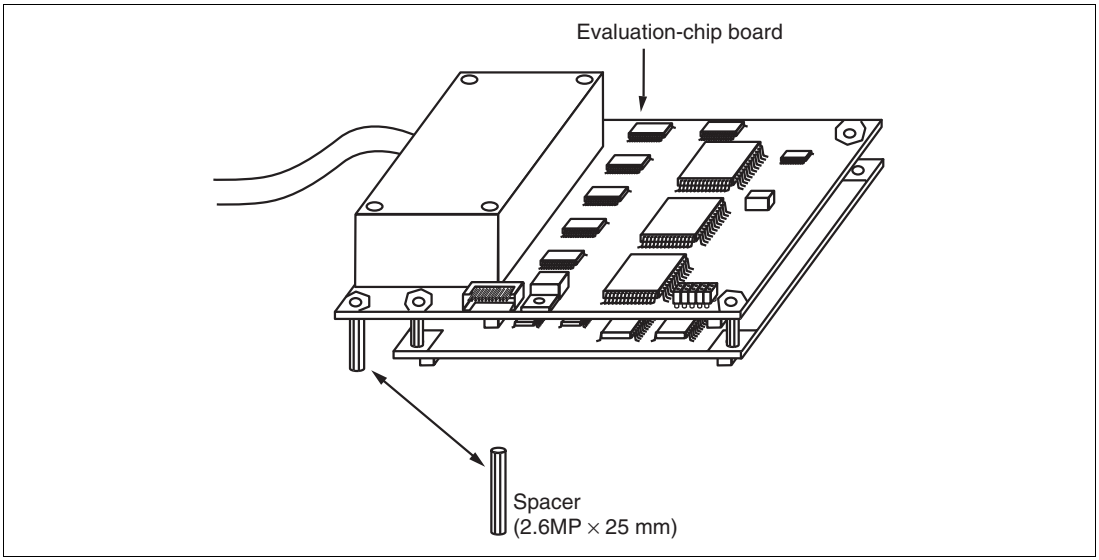


Figure 4 Exchanging the Spacers

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.

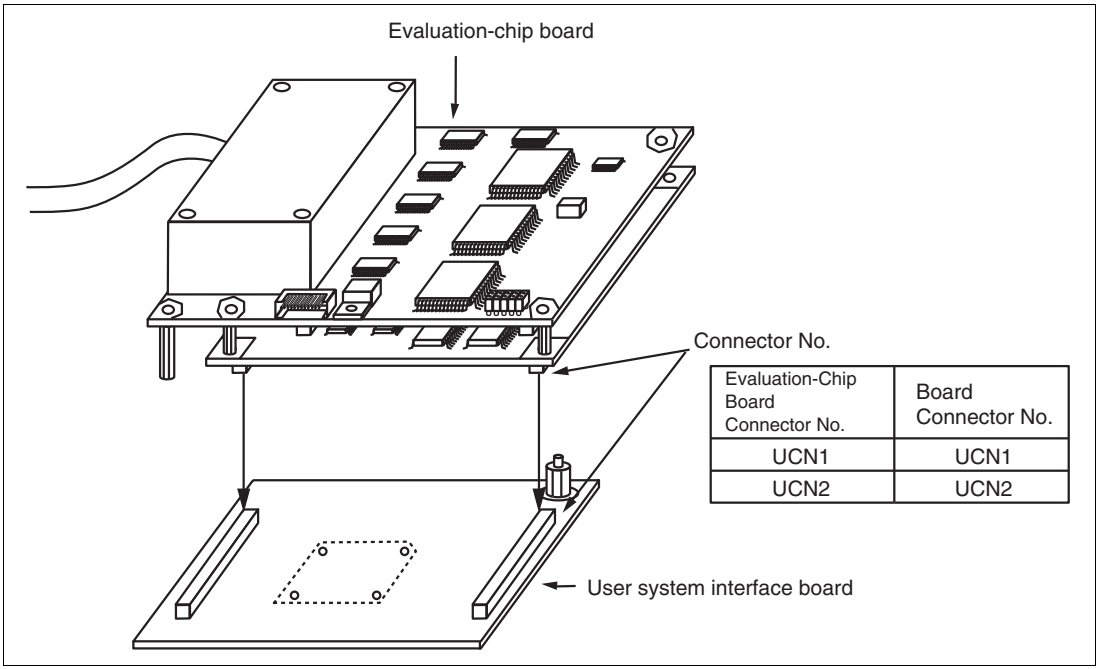
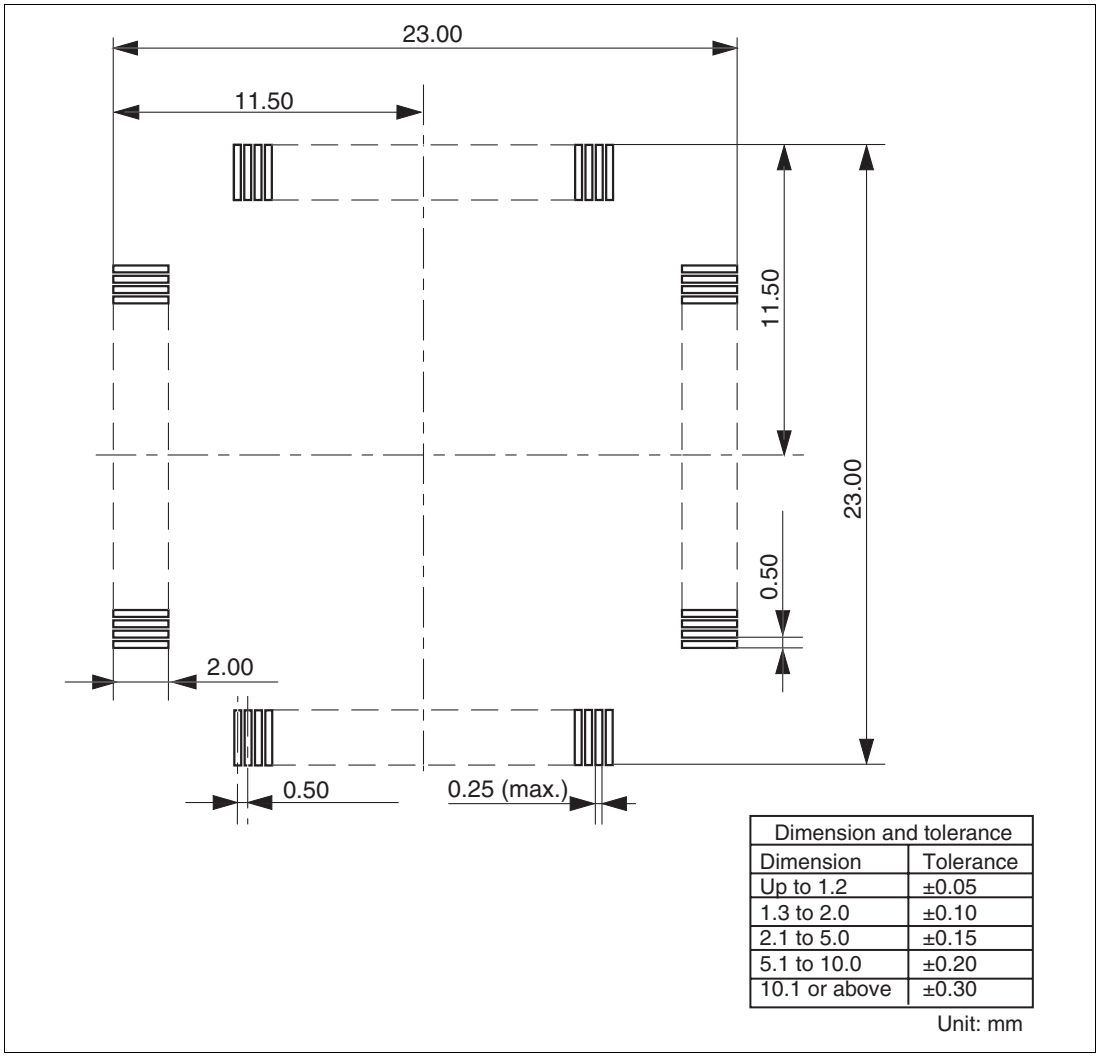


Figure 5 Connecting the User System Interface Board to the Evaluation-Chip Board

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 a PLQP0144KA-A package (NQPACK144SD-ND: 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.



Dimension and tolerance	
Dimension	Tolerance
Up to 1.2	±0.05
1.3 to 2.0	±0.10
2.1 to 5.0	±0.15
5.1 to 10.0	±0.20
10.1 or above	±0.30

Unit: mm

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.

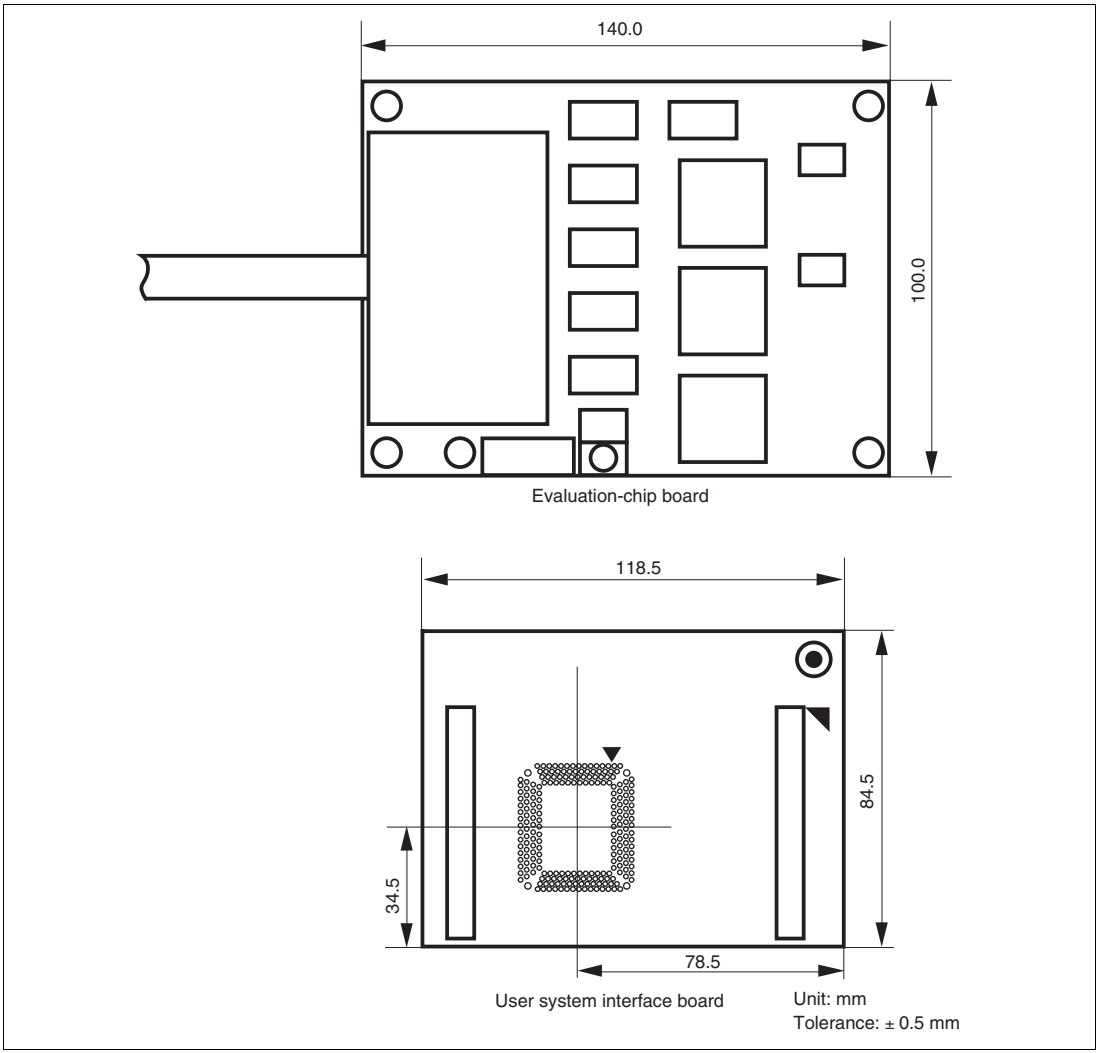


Figure 7 Dimensions of the Evaluation-Chip Board and the User System Interface Board

2.6 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.

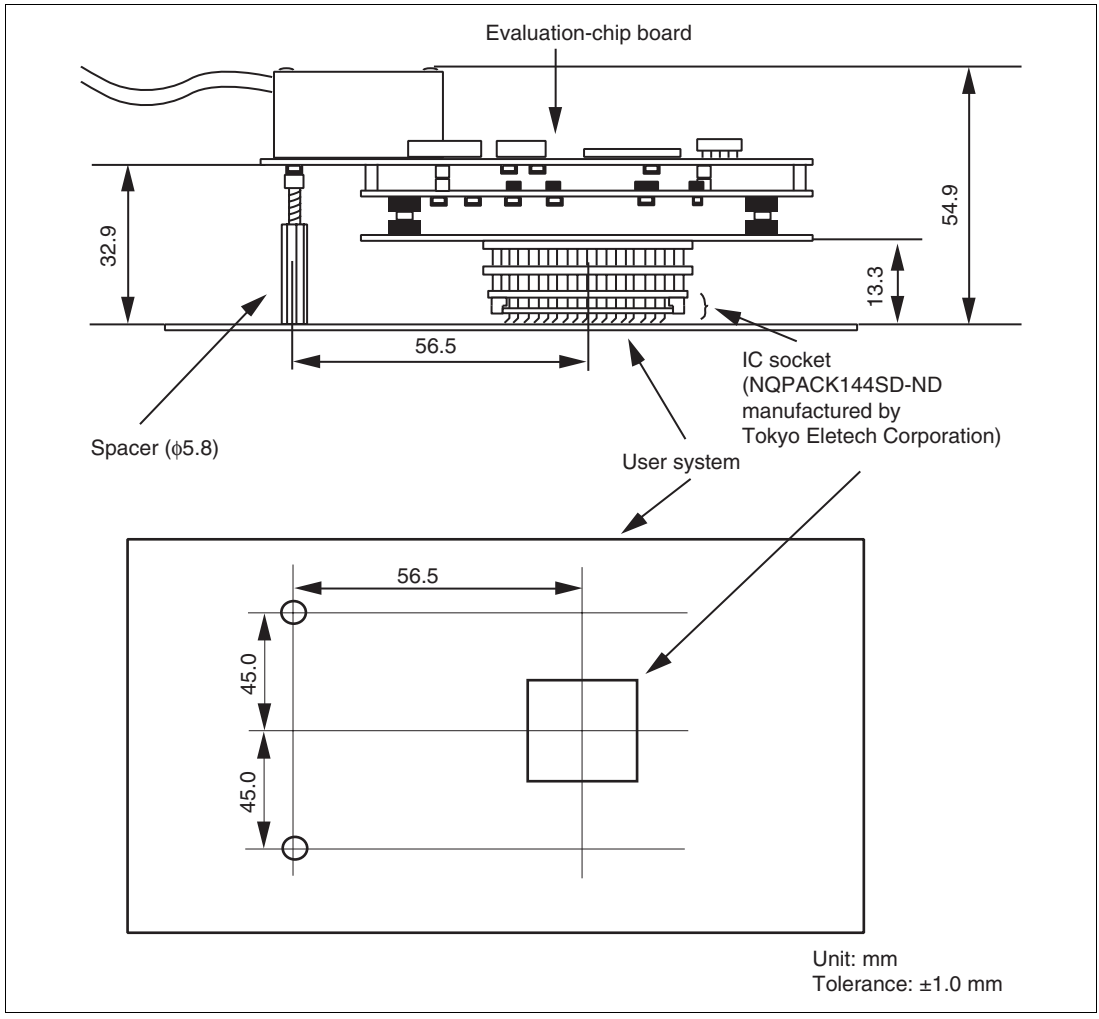


Figure 8 Dimensions of the Assembly after Connection of the User System Interface Board

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 board, 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).

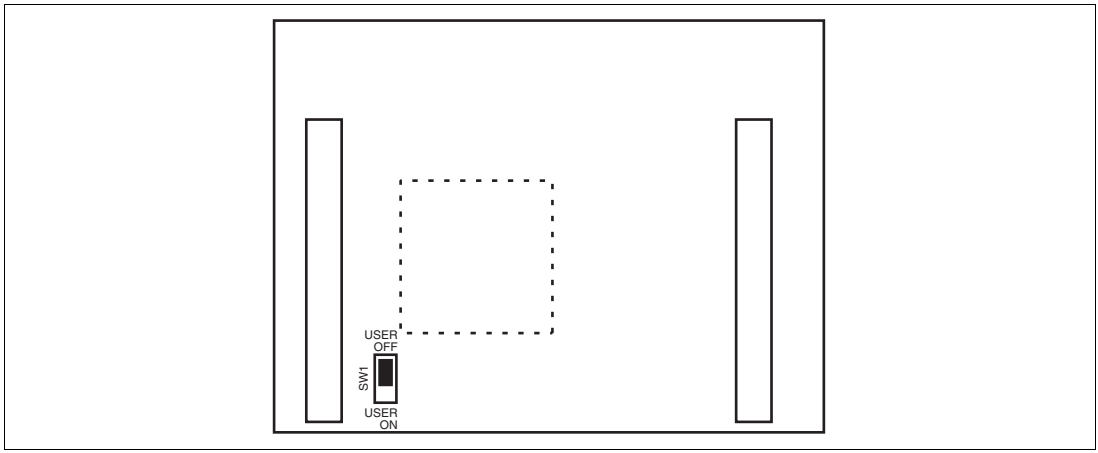


Figure 9 SW1 Jumper Socket

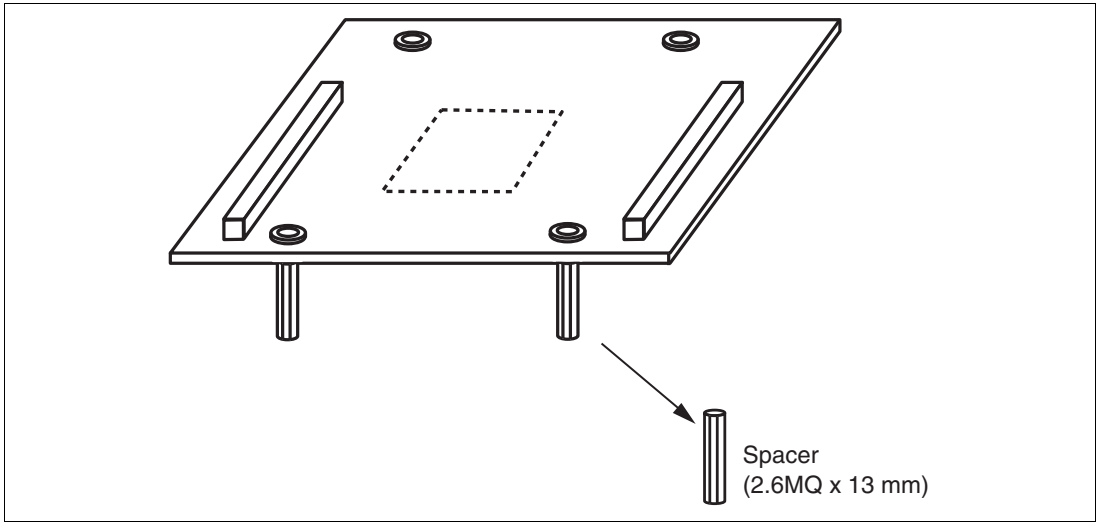


Figure 10 Attaching Spacers

CAUTION

1. **Check the location of pin 1 before inserting.**
2. **Use the screwdriver provided for tightening screws.**
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 11. After inserting the MCU, fasten the socket cover with the provided four screws (M2 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.

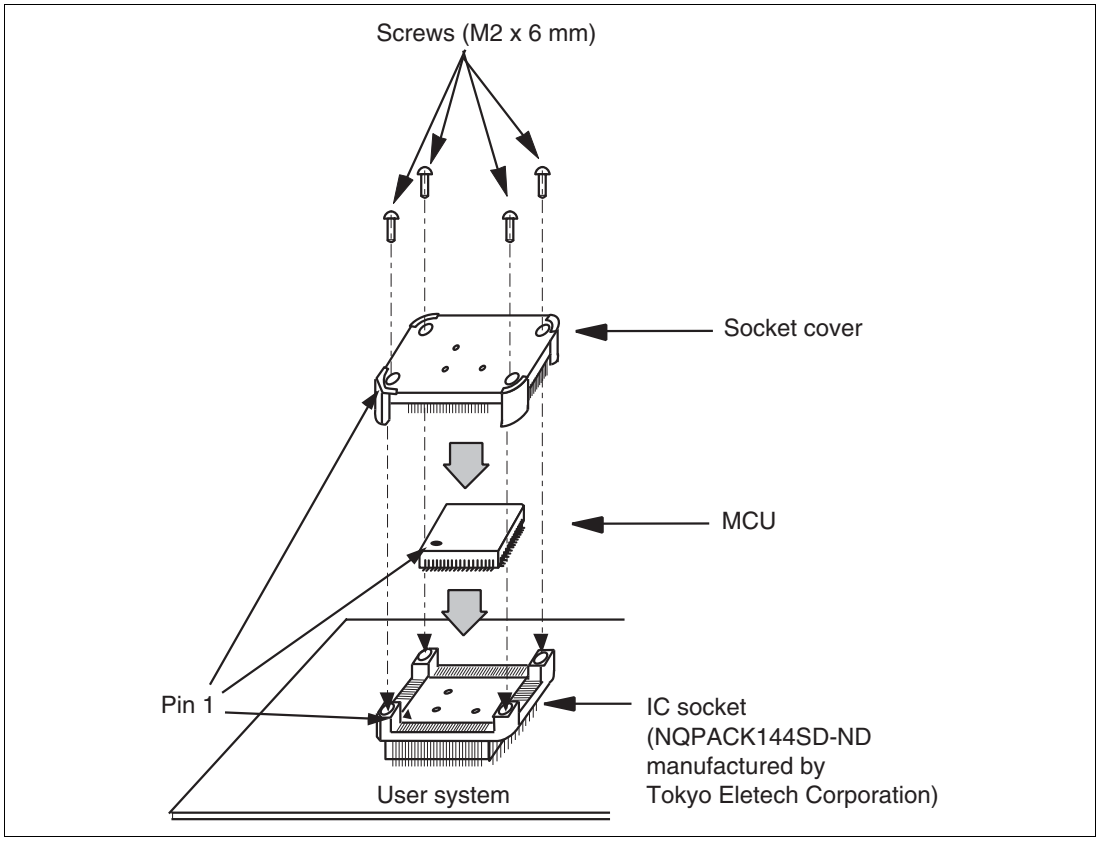


Figure 11 Installing MCU to User System

Section 4 User System Interface Circuits

The following user system interface circuits are required to use the emulator with the user system interface board.

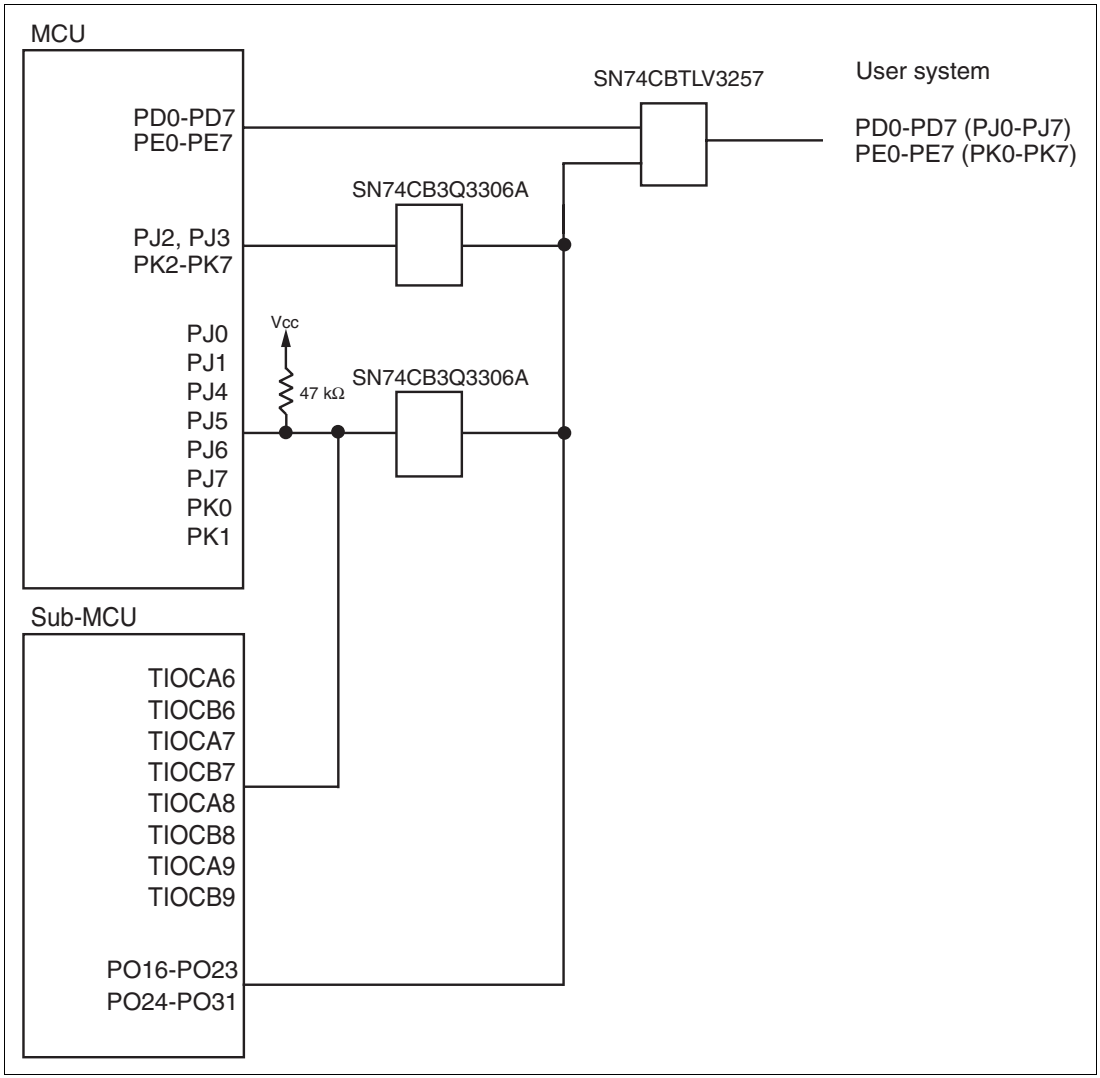


Figure 12 User System Interface Circuit (1)

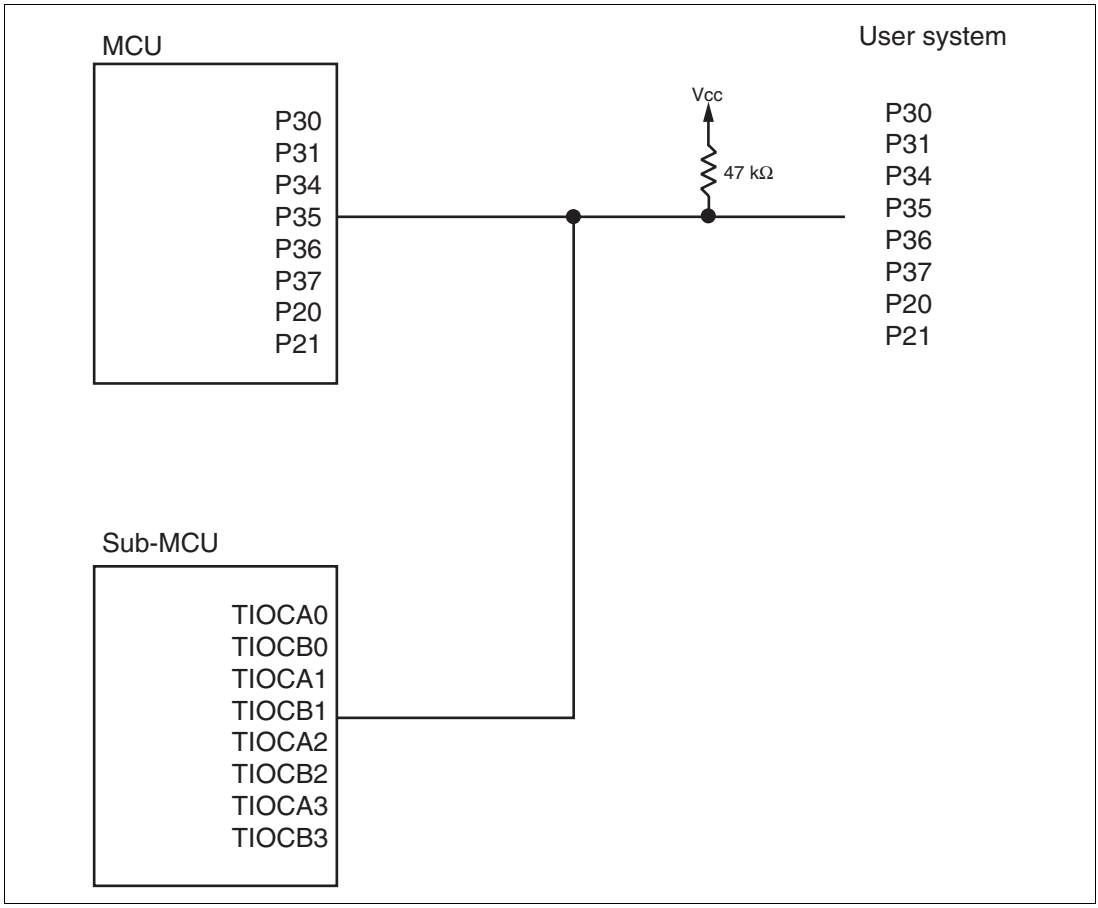


Figure 13 User System Interface Circuit (2)

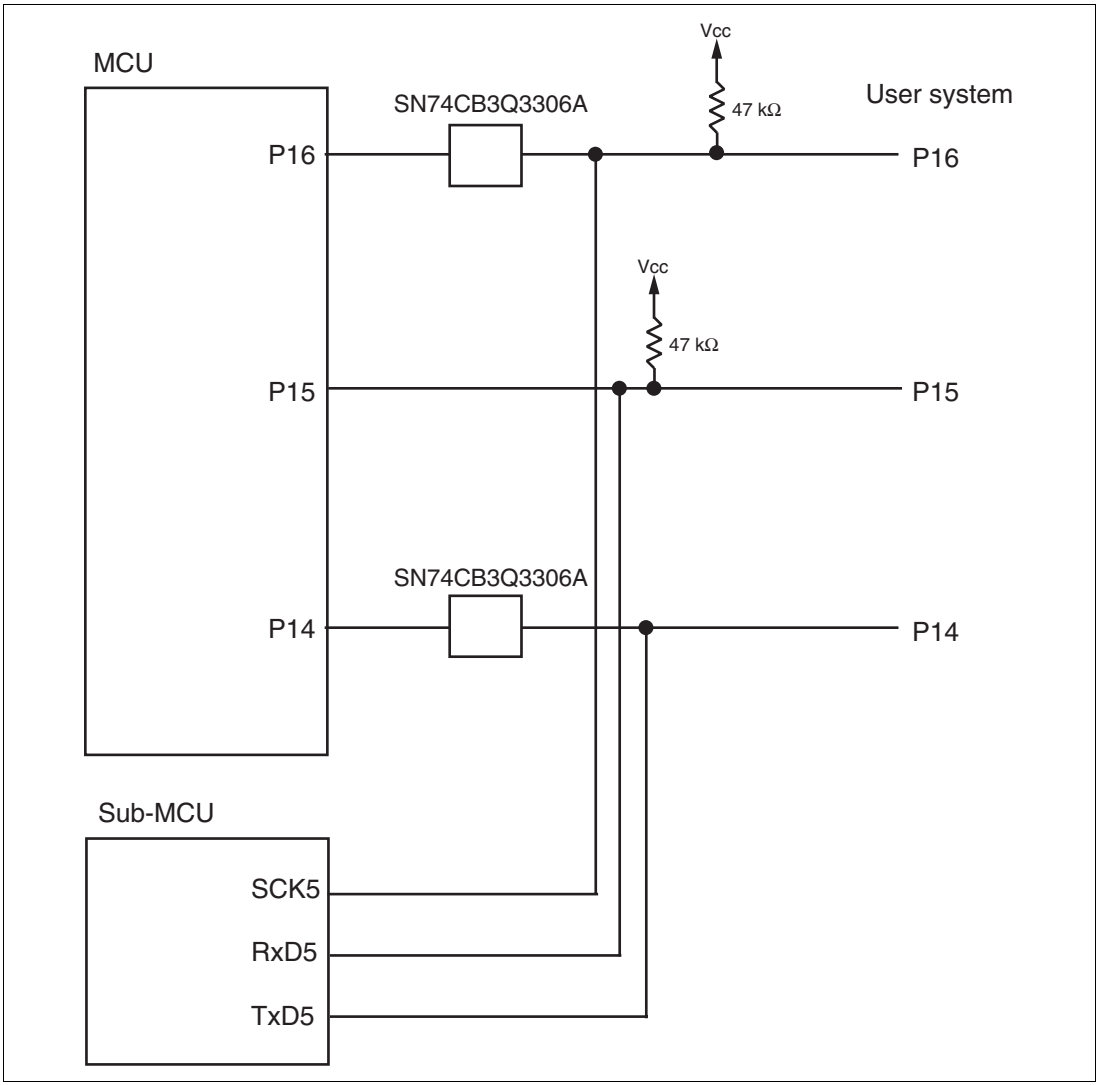


Figure 14 User System Interface Circuit (3)

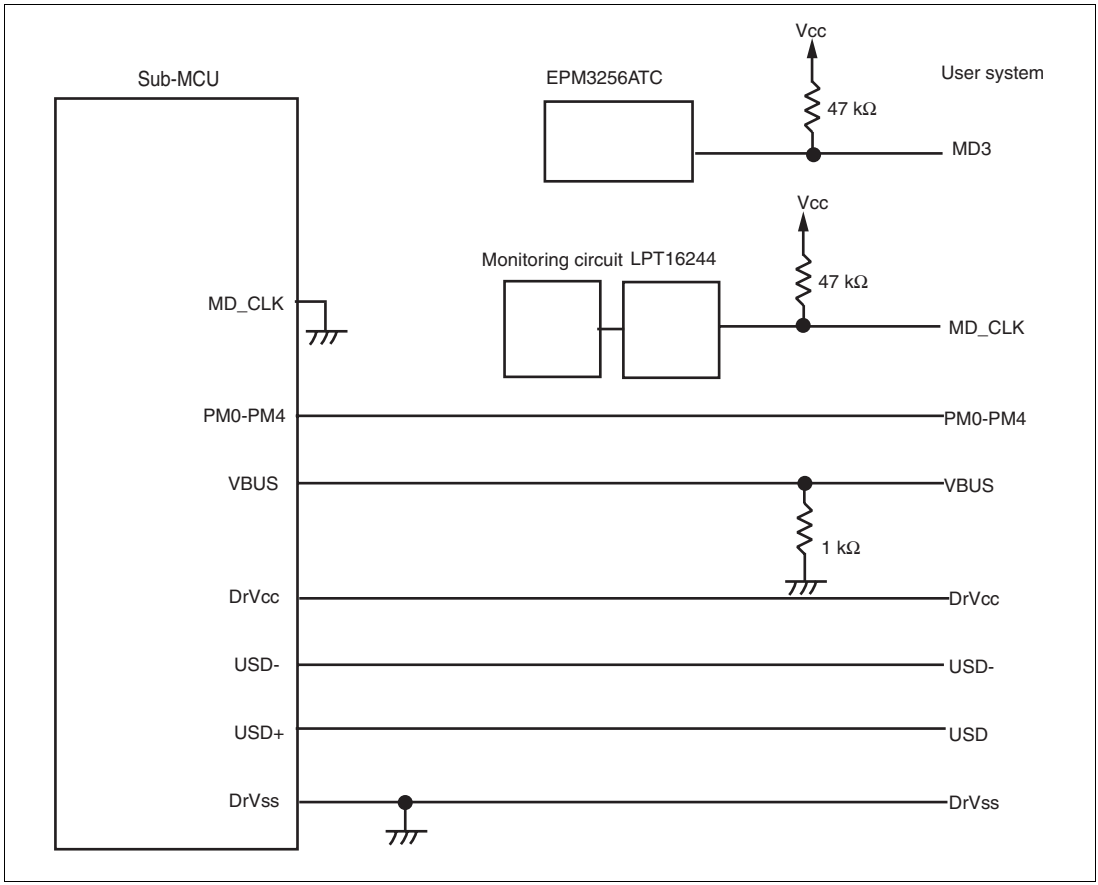


Figure 15 User System Interface Circuit (4)

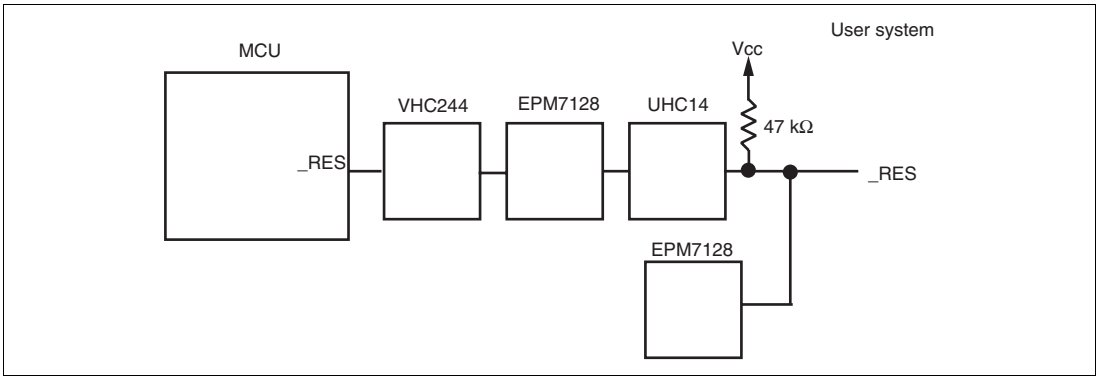


Figure 16 User System Interface Circuit (5)

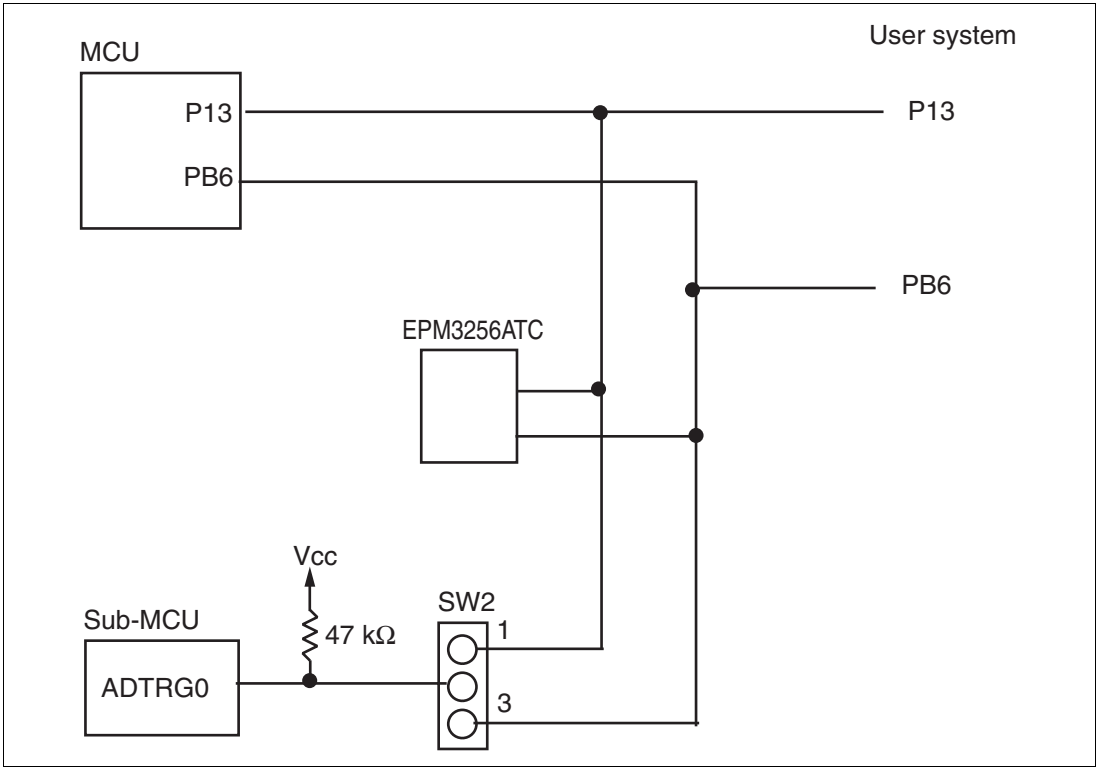


Figure 17 User System Interface Circuit (6)

Section 5 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/1668R Group Hardware Manual.

Figure 18 shows the clock oscillator on the user system interface board.

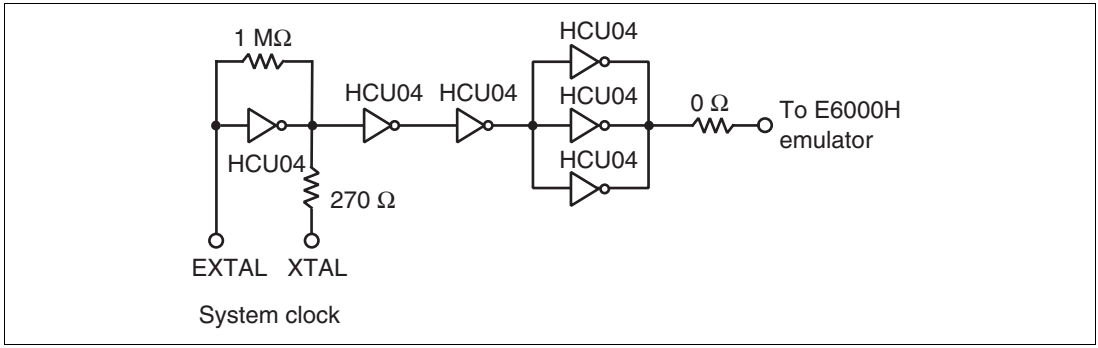


Figure 18 Clock Oscillator

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

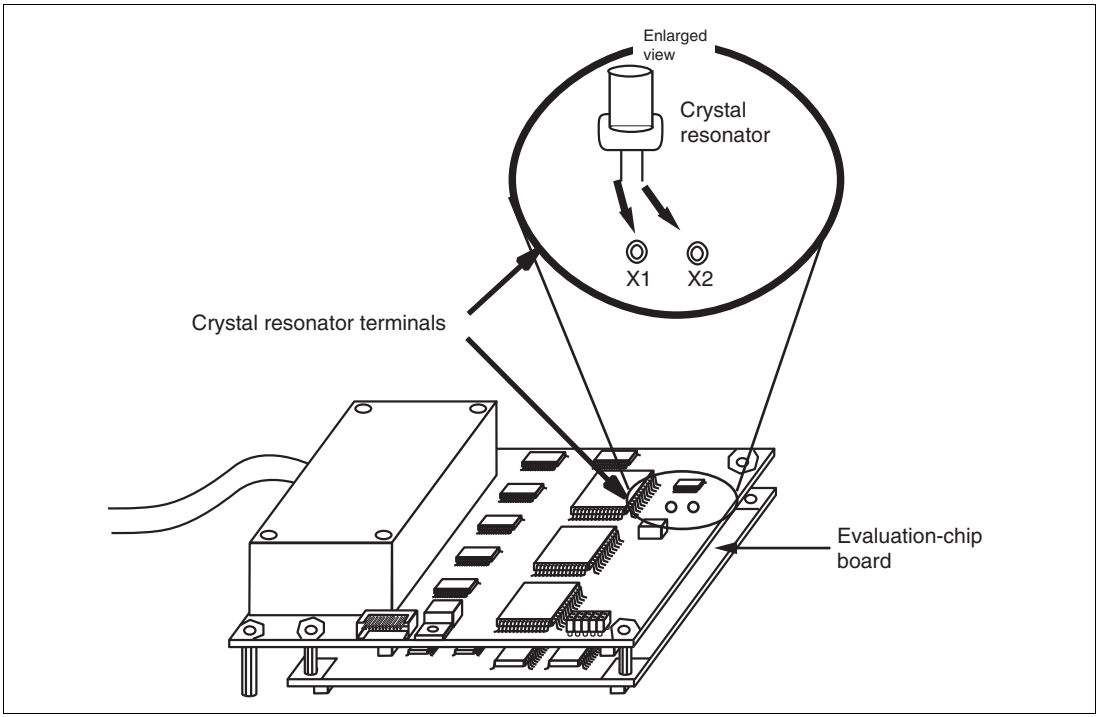


Figure 19 Mounting the Crystal Resonator

Section 6 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, SW4, and SW5 jumper sockets are for use in testing. Do not remove the inserted jumpers.

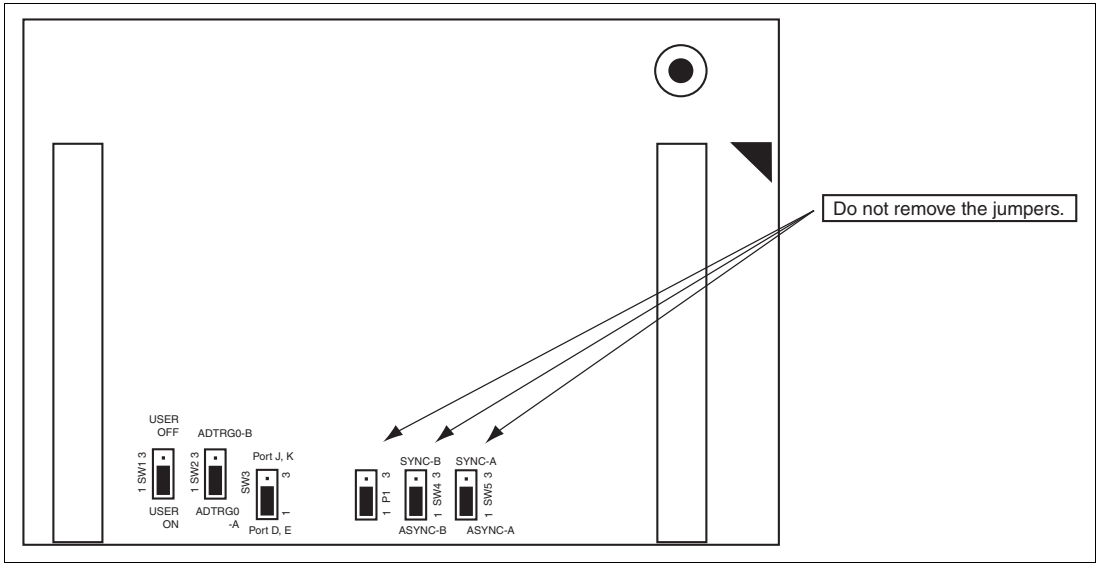


Figure 20 P1, SW4, and SW5 Jumper Sockets

Section 7 Restrictions

1. Deep-software standby mode

   This emulator does not support deep-software standby mode.

   Note that the emulator switches to the software standby mode even if the register setting to select the deep-software standby mode is made.

2. Sleep-instruction exception processing

   This emulator does not support the processing of sleep-instruction exceptions. Even if the SLPIE bit of the standby control register (SBYCR) is set to 1, the execution of a sleep instruction simply makes the emulator enter the low-power-consumption mode with no exception processing for the sleep instruction.

3. User break controller (UBC)

   The user break controller (UBC) is not available for this emulator.

   Do not access the registers for the UBC, which are at addresses H'FFA00 to H'FFA34.

4. Serial communications interface (SCI5)

   Since the port functions of pins P14 and P16 are not available when they are in use for serial output, the states of these port pins cannot be read from the port registers.

5. Input-buffer control registers (PnICR)

   In the actual device, setting a given bit of a PnICR to 0 disables the input buffer and fixes the input signal to the high level; setting a given bit to 1 makes the corresponding pin available as an input pin. On the emulator, however, input is enabled regardless of the settings of bits in the ICR register.

   When using any of the peripheral modules indicated below, however, ensure that the user program has set the ICR bit for the corresponding pin to 1.

   Relevant peripheral modules: SCI5, ADC_Unit1

6. Port function control register D (PFCRD)

   In this emulator, the port J and K functions cannot be selected by controlling the PCJKE bit in the register PFCRD. A value read from PFCRD is always 0 and writing to PFCRD has no effect. To select ports J and K, the position of the jumper in SW3 on HS1668RECH61H must be altered (figure 19). In the product as shipped, the jumper is inserted to select ports D and E.

7. Port function control register 6 (PFCR6)

   In this emulator, the ADTRG0#-B function cannot be selected by controlling the ADTRG0S bit in the register PFCR6. To select ADTRG0#-B, the position of the jumper in SW2 on HS1668RECH61H must be altered (figure 19). In the product as shipped, the jumper is inserted to select ADTRG0-A.

8. A/D converter

   In the emulator, the evaluation chip and the slave chip are used to implement functions of Unit 0 and Unit 1, respectively, of the A/D converter. For this reason, when the A/D control register (ADCR) has been set to start A/D conversion (with synchronization of units) by an external trigger from the ADTRG0 pin, the interrupt timing at the end of the A/D conversion will be different between Unit 0 and Unit 1.

9. Clock Input to the USB Module

   While using the emulator, the frequency of the clock signal supplied to the USB module is fixed to 48 MHz regardless of the EXTAL input by the user.

10. Subclock Operation

    This emulator 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 (IPRD to IPRD0)

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User System Interface Board
HS1668RECH61H User's Manual

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H8SX/1668R Group E6000H PLQP0144KA-A User System Interface Board

HS1668RECH61H User's Manual

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