To our customers,

Old Company Name in Catalogs and Other Documents

On April 1st, 2010, NEC Electronics Corporation merged with Renesas Technology Corporation, and Renesas Electronics Corporation took over all the business of both companies. Therefore, although the old company name remains in this document, it is a valid Renesas Electronics document. We appreciate your understanding.

Renesas Electronics website: http://www.renesas.com

April 1st, 2010
Renesas Electronics Corporation

Issued by: Renesas Electronics Corporation (http://www.renesas.com)

Send any inquiries to http://www.renesas.com/inquiry.

Notice

1. All information included in this document is current as of the date this document is issued. Such information, however, is subject to change without any prior notice. Before purchasing or using any Renesas Electronics products listed herein, please confirm the latest product information with a Renesas Electronics sales office. Also, please pay regular and careful attention to additional and different information to be disclosed by Renesas Electronics such as that disclosed through our website.
2. Renesas Electronics does not assume any liability for infringement of patents, copyrights, or other intellectual property rights of third parties by or arising from the use of Renesas Electronics products or technical information described in this document. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.
3. You should not alter, modify, copy, or otherwise misappropriate any Renesas Electronics product, whether in whole or in part.
4. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation of these circuits, software, and information in the design of your equipment. Renesas Electronics assumes no responsibility for any losses incurred by you or third parties arising from the use of these circuits, software, or information.
5. When exporting the products or technology described in this document, you should comply with the applicable export control laws and regulations and follow the procedures required by such laws and regulations. You should not use Renesas Electronics products or the technology described in this document for any purpose relating to military applications or use by the military, including but not limited to the development of weapons of mass destruction. Renesas Electronics products and technology may not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations.
6. Renesas Electronics has used reasonable care in preparing the information included in this document, but Renesas Electronics does not warrant that such information is error free. Renesas Electronics assumes no liability whatsoever for any damages incurred by you resulting from errors in or omissions from the information included herein.
7. Renesas Electronics products are classified according to the following three quality grades: "Standard", "High Quality", and "Specific". The recommended applications for each Renesas Electronics product depends on the product's quality grade, as indicated below. You must check the quality grade of each Renesas Electronics product before using it in a particular application. You may not use any Renesas Electronics product for any application categorized as "Specific" without the prior written consent of Renesas Electronics. Further, you may not use any Renesas Electronics product for any application for which it is not intended without the prior written consent of Renesas Electronics. Renesas Electronics shall not be in any way liable for any damages or losses incurred by you or third parties arising from the use of any Renesas Electronics product for an application categorized as "Specific" or for which the product is not intended where you have failed to obtain the prior written consent of Renesas Electronics. The quality grade of each Renesas Electronics product is "Standard" unless otherwise expressly specified in a Renesas Electronics data sheets or data books, etc.

   "Standard": Computers; office equipment; communications equipment; test and measurement equipment; audio and visual equipment; home electronic appliances; machine tools; personal electronic equipment; and industrial robots.

   "High Quality": Transportation equipment (automobiles, trains, ships, etc.); traffic control systems; anti-disaster systems; anti-crime systems; safety equipment; and medical equipment not specifically designed for life support.

   "Specific": Aircraft; aerospace equipment; submersible repeaters; nuclear reactor control systems; medical equipment or systems for life support (e.g. artificial life support devices or systems), surgical implantations, or healthcare intervention (e.g. excision, etc.), and any other applications or purposes that pose a direct threat to human life.
8. You should use the Renesas Electronics products described in this document within the range specified by Renesas Electronics, especially with respect to the maximum rating, operating supply voltage range, movement power voltage range, heat radiation characteristics, installation and other product characteristics. Renesas Electronics shall have no liability for malfunctions or damages arising out of the use of Renesas Electronics products beyond such specified ranges.
9. Although Renesas Electronics endeavors to improve the quality and reliability of its products, semiconductor products have specific characteristics such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Further, Renesas Electronics products are not subject to radiation resistance design. Please be sure to implement safety measures to guard them against the possibility of physical injury, and injury or damage caused by fire in the event of the failure of a Renesas Electronics product, such as safety design for hardware and software including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult, please evaluate the safety of the final products or system manufactured by you.
10. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. Please use Renesas Electronics products in compliance with all applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive. Renesas Electronics assumes no liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
11. This document may not be reproduced or duplicated, in any form, in whole or in part, without prior written consent of Renesas Electronics.
12. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products, or if you have any other inquiries.

(Note 1) "Renesas Electronics" as used in this document means Renesas Electronics Corporation and also includes its majority-owned subsidiaries.

(Note 2) "Renesas Electronics product(s)" means any product developed or manufactured by or for Renesas Electronics.

To all our customers

Regarding the change of names mentioned in the document, such as Hitachi Electric and Hitachi XX, to Renesas Technology Corp.

The semiconductor operations of Mitsubishi Electric and Hitachi were transferred to Renesas Technology Corporation on April 1st 2003. These operations include microcomputer, logic, analog and discrete devices, and memory chips other than DRAMs (flash memory, SRAMs etc.) Accordingly, although Hitachi, Hitachi, Ltd., Hitachi Semiconductors, and other Hitachi brand names are mentioned in the document, these names have in fact all been changed to Renesas Technology Corp. Thank you for your understanding. Except for our corporate trademark, logo and corporate statement, no changes whatsoever have been made to the contents of the document, and these changes do not constitute any alteration to the contents of the document itself.

Renesas Technology Home Page: http://www.renesas.com

Renesas Technology Corp.
Customer Support Dept.
April 1, 2003

Cautions

Keep safety first in your circuit designs!

1. Renesas Technology Corporation puts the maximum effort into making semiconductor products better and more reliable, but there is always the possibility that trouble may occur with them. Trouble with semiconductors may lead to personal injury, fire or property damage.
   Remember to give due consideration to safety when making your circuit designs, with appropriate measures such as (i) placement of substitutive, auxiliary circuits, (ii) use of nonflammable material or (iii) prevention against any malfunction or mishap.

Notes regarding these materials

1. These materials are intended as a reference to assist our customers in the selection of the Renesas Technology Corporation product best suited to the customer's application; they do not convey any license under any intellectual property rights, or any other rights, belonging to Renesas Technology Corporation or a third party.
2. Renesas Technology Corporation assumes no responsibility for any damage, or infringement of any third-party's rights, originating in the use of any product data, diagrams, charts, programs, algorithms, or circuit application examples contained in these materials.
3. All information contained in these materials, including product data, diagrams, charts, programs and algorithms represents information on products at the time of publication of these materials, and are subject to change by Renesas Technology Corporation without notice due to product improvements or other reasons. It is therefore recommended that customers contact Renesas Technology Corporation or an authorized Renesas Technology Corporation product distributor for the latest product information before purchasing a product listed herein.
   The information described here may contain technical inaccuracies or typographical errors.
   Renesas Technology Corporation assumes no responsibility for any damage, liability, or other loss rising from these inaccuracies or errors.
   Please also pay attention to information published by Renesas Technology Corporation by various means, including the Renesas Technology Corporation Semiconductor home page (http://www.renesas.com).
4. When using any or all of the information contained in these materials, including product data, diagrams, charts, programs, and algorithms, please be sure to evaluate all information as a total system before making a final decision on the applicability of the information and products. Renesas Technology Corporation assumes no responsibility for any damage, liability or other loss resulting from the information contained herein.
5. Renesas Technology Corporation semiconductors are not designed or manufactured for use in a device or system that is used under circumstances in which human life is potentially at stake. Please contact Renesas Technology Corporation or an authorized Renesas Technology Corporation product distributor when considering the use of a product contained herein for any specific purposes, such as apparatus or systems for transportation, vehicular, medical, aerospace, nuclear, or undersea repeater use.
6. The prior written approval of Renesas Technology Corporation is necessary to reprint or reproduce in whole or in part these materials.
7. If these products or technologies are subject to the Japanese export control restrictions, they must be exported under a license from the Japanese government and cannot be imported into a country other than the approved destination.
   Any diversion or reexport contrary to the export control laws and regulations of Japan and/or the country of destination is prohibited.
8. Please contact Renesas Technology Corporation for further details on these materials or the products contained therein.

User's Manual

SH7727 E10A Emulation Memory Board (HS7727EJH01H)

User's Manual

Renesas Electronics
www.renesas.com

Rev.1.0 2002.09

Cautions

1. Hitachi neither warrants nor grants licenses of any rights of Hitachi's or any third party's patent, copyright, trademark, or other intellectual property rights for information contained in this document. Hitachi bears no responsibility for problems that may arise with third party's rights, including intellectual property rights, in connection with use of the information contained in this document.
2. Products and product specifications may be subject to change without notice. Confirm that you have received the latest product standards or specifications before final design, purchase or use.
3. Hitachi makes every attempt to ensure that its products are of high quality and reliability. However, contact Hitachi's sales office before using the product in an application that demands especially high quality and reliability or where its failure or malfunction may directly threaten human life or cause risk of bodily injury, such as aerospace, aeronautics, nuclear power, combustion control, transportation, traffic, safety equipment or medical equipment for life support.
4. Design your application so that the product is used within the ranges guaranteed by Hitachi particularly for maximum rating, operating supply voltage range, heat radiation characteristics, installation conditions and other characteristics. Hitachi bears no responsibility for failure or damage when used beyond the guaranteed ranges. Even within the guaranteed ranges, consider normally foreseeable failure rates or failure modes in semiconductor devices and employ systemic measures such as fail-safes, so that the equipment incorporating Hitachi product does not cause bodily injury, fire or other consequential damage due to operation of the Hitachi product.
5. This product is not designed to be radiation resistant.
6. No one is permitted to reproduce or duplicate, in any form, the whole or part of this document without written approval from Hitachi.
7. Contact Hitachi's sales office for any questions regarding this document or Hitachi semiconductor products.

IMPORTANT INFORMATION

READ FIRST

• READ this user's manual before using this emulation memory board.

• KEEP the user's manual handy for future reference.

Do not attempt to use the emulation memory board until you fully understand its mechanism.

Emulation Memory Board:

Throughout this document, the term "emulation memory board" shall be defined as the following products produced only by Hitachi, Ltd. excluding all subsidiary products.

- Emulation memory board
- Power cables supplied together with this emulation memory board

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

Purpose of the Emulation Memory Board:

This emulation memory board is an optional board for supporting the development of the systems using Hitachi microcomputer SH7727. This emulation memory board must only be used for the above purpose.

Limited Applications:

This emulation memory board is not authorized for use in MEDICAL, atomic energy, aeronautical or space technology applications without consent of the appropriate officer of a Hitachi sales company. Such use includes, but is not limited to, use in life support systems. Buyers of this emulation memory board must notify the relevant Hitachi sales offices before planning to use the product in such applications.

Improvement Policy:

Hitachi, Ltd. (including its subsidiaries, hereafter collectively referred to as Hitachi) pursues a policy of continuing improvement in design, functions, performance, and safety of the emulation memory board. Hitachi reserves the right to change, wholly or partially, the specifications, design, user's manual, and other documentation at any time without notice.

Target User of the Emulation Memory Board:

This emulation memory 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 emulation memory 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 emulation memory board.

LIMITED WARRANTY

Hitachi warrants its emulation memory boards to be manufactured in accordance with published specifications and free from defects in material and/or workmanship. Hitachi, at its option, will repair or replace any emulation memory boards returned intact to the factory, transportation charges prepaid, which Hitachi, upon inspection, determine to be defective in material and/or workmanship. The foregoing shall constitute the sole remedy for any breach of Hitachi's warranty. See the Hitachi warranty booklet for details on the warranty period. This warranty extends only to you, the original Purchaser. It is not transferable to anyone who subsequently purchases the emulation memory board from you. Hitachi is not liable for any claim made by a third party or made by you for a third party.

DISCLAIMER

HITACHI MAKES NO WARRANTIES, EITHER EXPRESS OR IMPLIED, ORAL OR WRITTEN, EXCEPT AS PROVIDED HEREIN, INCLUDING WITHOUT LIMITATION THEREOF, WARRANTIES AS TO MARKETABILITY, MERCHANTABILITY, FITNESS FOR ANY PARTICULAR PURPOSE OR USE, OR AGAINST INFRINGEMENT OF ANY PATENT. IN NO EVENT SHALL HITACHI BE LIABLE FOR ANY DIRECT, INCIDENTAL OR CONSEQUENTIAL DAMAGES OF ANY NATURE, OR LOSSES OR EXPENSES RESULTING FROM ANY DEFECTIVE EMULATION MEMORY BOARD, THE USE OF ANY EMULATION MEMORY BOARD, OR ITS DOCUMENTATION, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGES. EXCEPT AS EXPRESSLY STATED OTHERWISE IN THIS WARRANTY, THIS EMULATION MEMORY BOARD IS SOLD "AS IS ", AND YOU MUST ASSUME ALL RISK FOR THE USE AND RESULTS OBTAINED FROM THE EMULATION MEMORY BOARD.

State Law:

Some states do not allow the exclusion or limitation of implied warranties or liability for incidental or consequential damages, so the above limitation or exclusion may not apply to you. This warranty gives you specific legal rights, and you may have other rights which may vary from state to state.

The Warranty is Void in the Following Cases:

Hitachi shall have no liability or legal responsibility for any problems caused by misuse, abuse, misapplication, neglect, improper handling, installation, repair or modifications of the emulation memory board without Hitachi's prior written consent or any problems caused by the user system.

All Rights Reserved:

Other Important Things to Keep in Mind:

1. Circuitry and other examples described herein are meant merely to indicate the characteristics and performance of Hitachi's semiconductor products. Hitachi assumes no responsibility for any intellectual property claims or other problems that may result from applications based on the examples described herein.

2. No license is granted by implication or otherwise under any patents or other rights of any third party or Hitachi.

Figures:

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

Limited Anticipation of Danger:

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

SAFETY PAGE

READ FIRST

• READ this user's manual before using this emulation memory board.

• KEEP the user's manual handy for future reference.

Do not attempt to use the emulation memory 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, the emulation memory board, and the emulator product or will result in PERSONAL INJURY. The USER PROGRAM will be LOST.

1. **Do not repair or remodel the emulation memory board by yourself for electric shock prevention and quality assurance.**
2. **Always switch OFF the emulator product, the emulation memory board, and the user system before connecting or disconnecting any CABLES or JUMPERS.**
3. **Always switch OFF the emulation memory board and the user system before connecting or disconnecting the IC socket or the user interface connector.**
4. **When connecting the user interface connector to the IC socket on the user system, ensure that pin 1 on both sides are correctly aligned.**
5. **Supply power according to the power specifications and do not supply an incorrect power voltage. Use only the provided power cables.**

Warnings on Emulation Memory Board Usage

Be sure to read and understand the warnings below before using this emulation memory board. Note that these are the main warnings, not a complete list.

⚠ WARNING

Always switch OFF the emulator product, the emulation memory board, and the user system before connecting or disconnecting any CABLES, JUMPERS, or PARTS. Failure to do so will result in a FIRE HAZARD and will damage the emulator product, the emulation memory board, or the user system, or will result in PERSONAL INJURY. The USER PROGRAM will be LOST.

CAUTION

Position the emulator product, the emulation memory board, and the user system so that no cable is bent or twisted. A bent or twisted cable will impose stress on the user interface leading to connection or contact failure. Make sure that the emulation memory board is placed in a secure position so that it does not move during use nor impose stress on the user interface.

Preface

Thank you for purchasing the SH7727 E10A emulation memory board. The emulation memory board supports the development of systems using Hitachi microcomputer SH7727.

Read this user's manual before using the emulation memory board, and keep the manual handy for future reference.

CAUTION

READ this user's manual before using the emulation memory board. Incorrect operation or connection will damage the emulation memory board and the user system. The USER PROGRAM will be LOST.

Related Manuals:

- SH7727 Hardware Manual
- SH7727 E10A Emulator User's Manual

Related Hardware: SH7727 E10A Emulators

- HS7727KCM01H
- HS7727KCM02H
- HS7727KCI01H
- HS7727KCI02H

Contents

Section 1 Overview

The SH7727 E10A emulation memory board (hereinafter referred to as the emulation memory board) has an SH7727 (hereinafter referred to as the MCU), E10A emulator (hereinafter called the emulator) connectors (H-UDI port connectors), a user interface connector (hereinafter called the user interface), and SRAM devices. User programs can be emulated by connecting this emulation memory board to the emulator.

1.1 Features

1. The emulation memory board has emulator connectors (H-UDI port connectors) and a user interface connector (YQPACK240SD). When the user system has an IC socket (NQPACK240SD) but has no H-UDI connector, the user system can be connected to the emulator through the emulation memory board and the user program can be emulated.
2. The emulation memory board has SRAM devices that can be used as a substitute for the flash memory or EPROM devices. User programs can be emulated by connecting the emulation memory board to the emulator and supplying external power to the emulation memory board, even when no user system is connected to the emulator.
3. The emulation memory board has switches for various settings. These switches can select
   (1) the source of the power supplied to the emulation memory board,
   (2) the source of the clock supplied to the MCU on the emulation memory board, and
   (3) the destination of the CS0 signal output from the MCU.
4. The emulation memory board has a DIP switch, which can set the MCU's MD pin status.

1.2 Components

Figure 1.1 and table 1.1 show the components of the emulation memory board. Please make sure you have all of these components when unpacking.

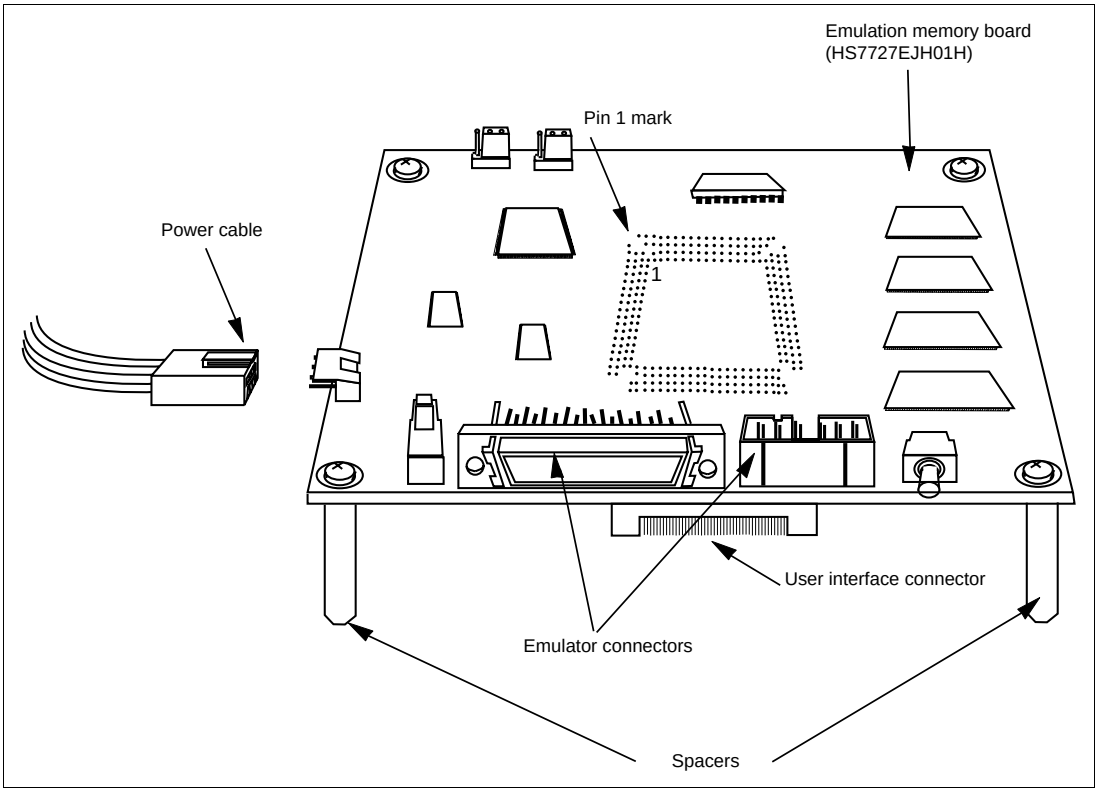


Figure 1.1 Emulation Memory Board Appearance

Table 1.1 Emulation Memory Board Components (HS7727EJH01H)

Item	Quantity	Notes
Emulation memory board	1	
Power cables (2 cables for 5 V and 2 cables for GND)	1 set	For an external power supply
Screws (M2 x 10 mm)	4	For fastening user interface connector
NQPACK240SD	1	User interface connector
Guide pins for NQPACK240SD	3	Provided for NQPACK240SD
Screwdriver	1	Provided for NQPACK240SD
Spacers (13 mm)	4	Fixed to the emulation memory board
SH7727 E10A Emulation Memory Board User's Manual	1	This manual

Section 2 Notes on Use

CAUTION

READ the following warnings before using the emulation memory board. Incorrect operation will damage the emulation memory board, the user system, and the emulator product. The USER PROGRAM will be LOST.

1. Cover the emulation memory board with a casing before using it. If using the emulation memory board without a casing, do not touch any component and prevent any short circuit.
2. Never place heavy objects on the emulation memory board.
3. Protect the emulation memory board from excessive impacts and stresses.
4. Do not supply power outside the specified voltage range.
5. When moving the emulation memory board, take care not to vibrate or damage it.
6. Supply power to the connected equipment only after connecting all cables. Cables must not be connected or removed while the power is on.
7. The emulation memory board may operate incorrectly due to static electricity. In this case, connect the GND patterns (the spacer-fixed sections at the four corners) on the emulation memory board to those of the user system through cables to discharge static electricity.
8. The emulation memory board can operate only when connected to the emulator; the emulation memory board cannot be used alone or only by connecting to the user system.

Section 3 Emulation Memory Board Functions

The functions of the emulation memory board are listed in table 3.1.

Table 3.1 Emulation Memory Board Functions

Function	Specifications
Clock	• Iϕ (CPU clock) = 160 MHz (max.) • Clock installed in this emulation memory board: 13.3 MHz (EXTAL input)
Substitution emulation memory	• Capacity: 4 Mbytes (8 blocks of 256 kwords x 16 bits) • 66 MHz (max.) = B (bus clock): Two wait cycles inserted by WCR2 • CS0 area (Substitution memory area: H'00000000 to H'003FFFFF) • Bus width can be selected from 16 or 32 bits (8-bit width is not supported)
User interface	Supported package: 240-pin QFP
Crystal oscillator	Supported frequency for crystal oscillation: 10 MHz to 16.7 MHz
Switch settings	• SW3: Selects the power source • JP1 and JP3: Select the clock source • JP4: Selects the CS0 signal output destination
DIP switch settings	• SW2-1 to SW2-3: Selects the clock operating mode • SW2-4 and SW2-5: Select the bus width for area 0 • SW2-6: Selects the endian • SW2-7: Selects the ASE mode • SW2-8: Selects the source of MD0 to MD5 • SW2-9: Selects whether or not to write-protect the substitution emulation memory
RESET switch	SW1: Issues a RESET signal
LEDs	• LED1: RESET and POWER • LED2: WAIT and RUN • LED3: BREQ and NMI • LED4: STATUS1 and STATUS0

Table 3.1 Emulation Memory Board Functions (cont)

Function	Specifications
Power supply	• The emulation memory board can operate without connecting the user system by supplying +5 V through power connector J1 (IL-4P-S3FP2: manufactured by Japan Aviation Electronics Industry, Ltd.) The power connector pins work as follows: Pin 1: GND (black) Pin 2: 5 V (red) Pin 3: 5 V (red) Pin 4: GND (black) • When the emulation memory board is connected to the user system, supply +3.3 V from the VccQ pin on the YQPACK240SD connector, respectively.

Notes: 1. For the substitution emulation memory, a 16-bit bus and a 32-bit bus are supported. Do not set the bus width to 8 bits when using the substitution emulation memory.

2. When allocating substitution emulation memory to an area, set WCR2 of the bus state controller to provide an appropriate cycle access state.

CAUTION

Restriction on Buffer Control Using the RD Signal:
RD signal output cannot be disabled from the emulator. Consequently, when the buffer control on the user system uses only the RD signal, data read from this emulation memory board and data output from the buffer may conflict. For this reason, when using the emulation memory board, be sure to control the data bus buffer of the user system with both the CS and RD (used in direction control) signals.

Section 4 Emulation Memory Board Operation

The emulation memory board has a RESET switch (SW1) for issuing a reset signal, a DIP switch (SW2) and jumper switches (JP1, JP3, and JP4) for various settings, a switch (SW3) for selecting the power source, a socket (SP1) for installing a crystal oscillator, and LEDs for signal monitoring. Figure 4.1 shows the switches, socket (SP1), and LEDs.

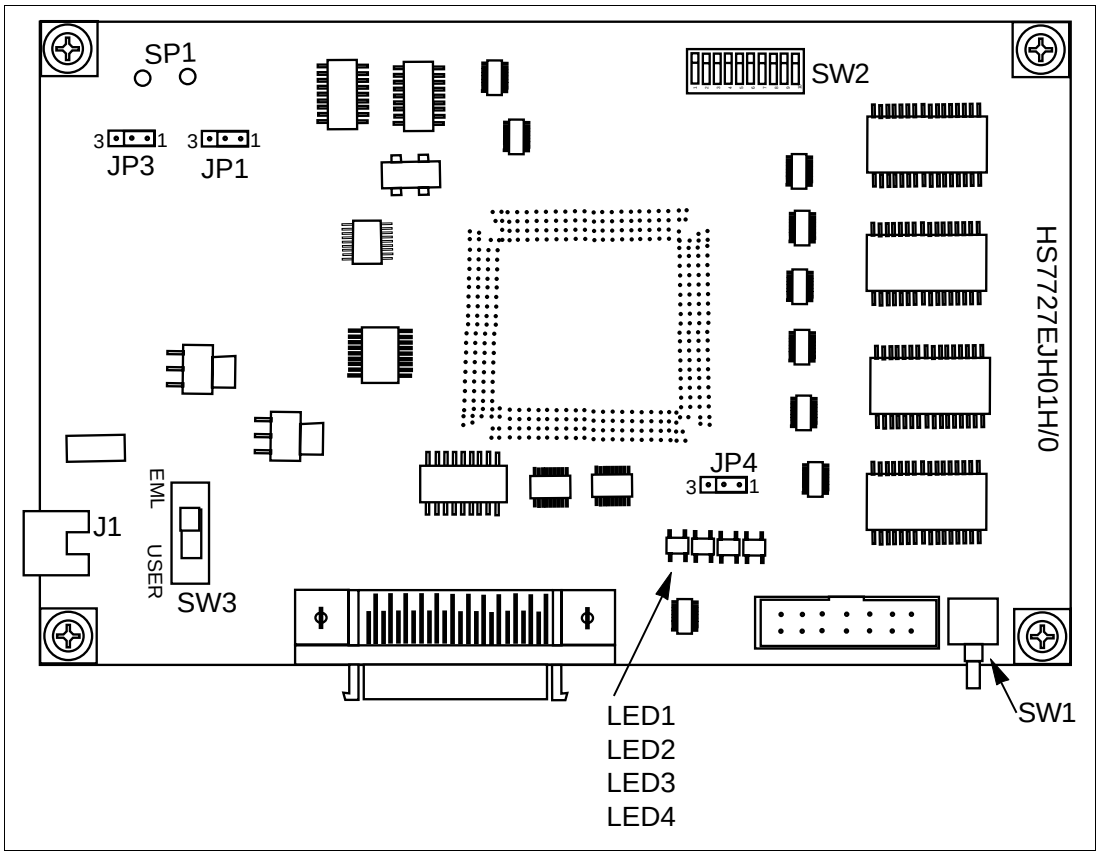


Figure 4.1 Switches, Socket, and LEDs

4.1 Switch Setting

4.1.1 Power Source Switch Setting

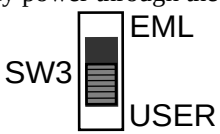
The SW3 selects whether the power for the emulation memory board is supplied from an external source or through the user interface.

⚠ WARNING

Always switch OFF the user system and the emulation memory board before power source switch setting. Failure to do so will damage the user system and the emulation memory board. The USER PROGRAM will be LOST.

To supply power from an external source (sliding the switch to EML):

To supply power through the user interface (sliding the switch to USER):



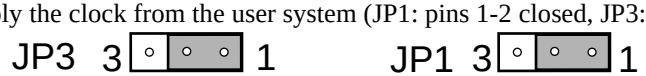
4.1.2 Jumper Switch Setting

The emulation memory board has three jumper switches JP1, JP3, and JP4 for the following settings.

JP1 and JP3 Functions: The JP1 and JP3 select whether the clock for the MCU is supplied from the emulation memory board or from the user system, or a crystal oscillator is installed into the socket (SP1) on the emulation memory board.

To supply the clock from the emulation memory board (JP1: pins 1-2 closed, JP3: pins 2-3 closed):

To supply the clock from the user system (JP1: pins 1-2 closed, JP3: pins 1-2 closed):



To install a crystal oscillator into the SP1 socket on the emulation memory board (JP1: pins 2-3 closed, JP3: opened):

Note: The emulation memory board supports the external clock input through the EXTAL pin and the clock generated by the crystal oscillator installed on the SP1 socket. Therefore, be sure to supply the clock to the EXTAL pin when using the user system clock. If the clock is supplied to the XTAL, EXTAL2, or XTAL2 pin, the emulation memory board cannot operate.

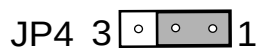
JP4 Function: The JP4 selects the CS0 signal output destination to specify whether the memory on the emulation memory board or on the user system is used.

CAUTION

1. Restriction on Buffer Control Using the RD Signal:
RD signal output cannot be disabled from the emulator. Consequently, when the buffer control on the user system uses only the RD signal, data read from this emulation memory board and data output from the buffer may conflict. For this reason, when using the emulation memory board, be sure to control the data bus buffer of the user system with both the CS and RD (used in direction control) signals.

2. The substitution emulation memory is allocated to the 4 Mbytes from the start address of area 0. If the memory of the user system is allocated to area 0, that is, the same area as the substitution emulation memory, only the memory selected by the JP4 setting is used. When the substitution emulation memory is selected by JP4, the CS0 signal is not output to the user system.

To use the substitution memory on the emulation memory board (EML side: pins 1-2 closed):



To use the memory of the user system (USER side: pins 2-3 closed):

4.1.3 DIP Switch (SW2) Setting

The emulation memory board has one DIP switch for the following settings.

- Selecting the clock operating mode: Three switches
- Selecting the memory bus width for area 0: Two switches
- Selecting the endian: One switch
- Selecting the ASE mode: One switch
- Selecting SELECT (input destination of MD0 to MD5): One switch
- Selecting write-protection: One switch

Tables 4.1 to 4.6 show the SW2 functions.

Note: For details on the mode control pins (MD0 to MD5), refer to the SH7727 Hardware Manual.

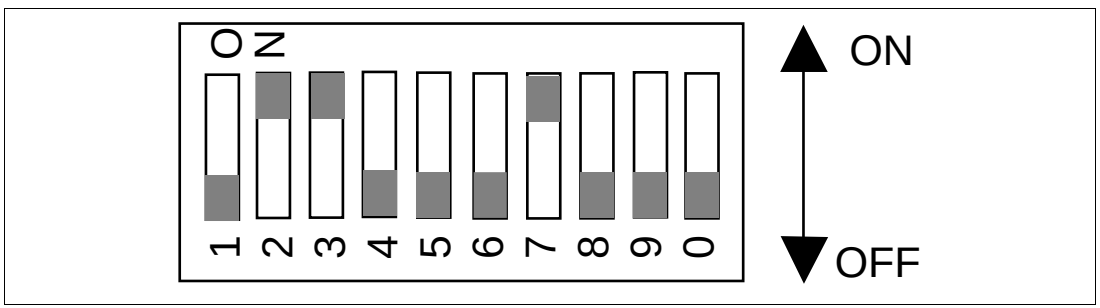


Figure 4.2 DIP Switch (SW2) Appearance and Settings at Shipment

Clock Operating Mode Setting: Select the clock operating mode as shown in table 4.1.

Table 4.1 Clock Operating Mode Setting (Switches 1 to 3 in SW2)

Switches in SW2 (Corresponding Mode Pins)				
3 (MD2)	**2 (MD1)**	**1 (MD0)**	**Clock Mode**	**Remarks**
ON	ON	ON	0	
ON	ON	OFF	1	Initial setting at shipment
ON	OFF	ON	2	
OFF	OFF	OFF	7	

Area 0 Bus Width Setting: Select the bus width for area 0 as shown in table 4.2.

Table 4.2 Memory Bus Width Setting (Switches 4 and 5 in SW2)

Switches in SW2 (Corresponding Mode Pins)			
5 (MD4)	**4 (MD3)**	**Bus Width**	**Remarks**
ON	ON	Reserved	Do not use this setting
ON	OFF	8 bits	Do not use this setting*
OFF	ON	16 bits	
OFF	OFF	32 bits	Initial setting at shipment

Note: The substitution emulation memory does not support the 8-bit bus width.

Endian Setting: Select the endian as shown in table 4.3. Big endian is set when the switch is on, and little endian is set when the switch is off.

Table 4.3 Endian Setting (Switch 6 in SW2)

Switch in SW2 (Corresponding Mode Pin)		
6 (MD5)	**Endian**	**Remarks**
ON	Big endian	
OFF	Little endian	Initial setting at shipment

ASE Mode Setting: Select the ASE mode as shown in table 4.4. The ASE mode is set when the switch is on, and the normal mode is set when the switch is off.

Table 4.4 Master or Slave Mode Setting (Switch 7 in SW2)

Switch in SW2 (Corresponding Pin)		
7 (ASEMD0)	**Chip Mode**	**Remarks**
ON	ASE mode	E10A emulator is used (initial setting at shipment)
OFF	Normal mode	E10A emulator is not used

Note: The emulation memory board is connected to the E10A emulator. Do not change the setting at shipment.

SELECT (Input Destination of MD0 to MD5) Setting: Select the input destination of MD control pins (MD0 to MD5) as shown in table 4.5. When the switch is set to ON, settings of MD0 to MD5 input from the user system are valid. When the switch is set to OFF, settings of MD0 to MD5 set by the DIP switch are valid.

Table 4.5 SELECT Setting (Switch 8 in SW2)

Switch in SW2 (Corresponding Pin) 8 (SELECT)	Input Destination of MD0 to MD5 to SH7727	Remarks
ON	User system	
OFF	DIP switch	Initial setting at shipment

Note: When the emulation memory board is independently used, set the switch to off.

Write-Protection Setting: Select whether to write-protect the substitution emulation memory while the user program is running as shown in table 4.6. When the switch is set to ON, the substitution emulation memory is write-protected. When the switch is set to OFF, the substitution emulation memory can be written to.

Table 4.6 Write-Protection Setting (Switch 0 in SW2)

Switch in SW2 (Corresponding Pin) 0 (WP)	Write-Protection	Remarks
ON	Write-protected	
OFF	Write-enabled	Initial setting at shipment

Notes: 1. In the following two situations, the substitution emulation memory will not be write-protected even when this switch is set to ON (write-protected): when an E10A emulator break is executed immediately after a write instruction and when step execution is performed.

2. When JP4 is set to select the USER side (user system memory), the write-protection setting switch (switch 0 in SW2) becomes invalid; the substitution emulation memory is not write-protected even when switch 0 in SW2 is set to ON (write-protected).

4.1.4 RESET Switch (SW1)

The emulation memory board has RESET switch for issuing a reset signal.

The /RESETP signal to the MCU is obtained by ORing the reset signal from the RESET switch, that from the power-on reset circuit on the emulation memory board, and the /RESETP signal from the user system. The manual reset, on the other hand, is done using only the /RESETM signal from the user system. Figure 4.3 shows the logic diagram for the reset circuit.

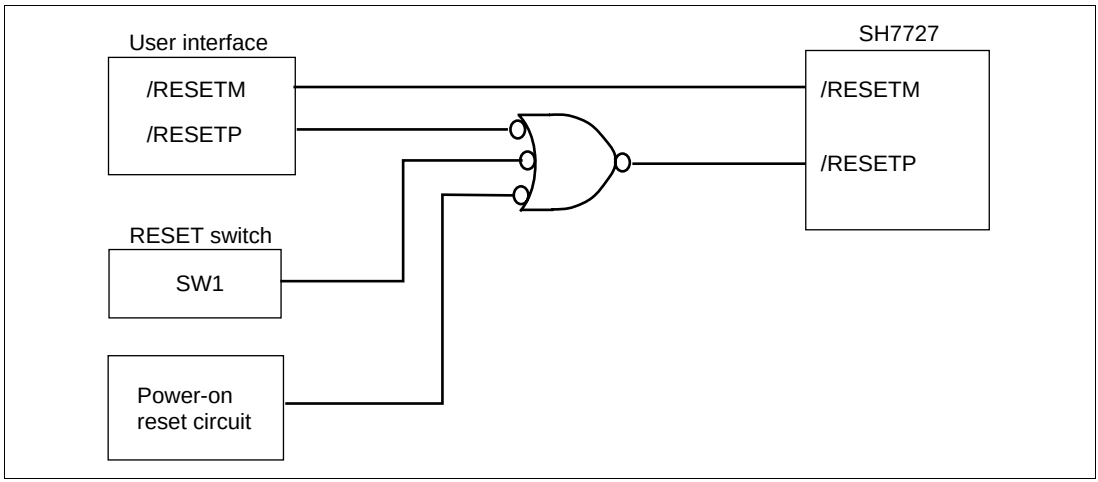


Figure 4.3 Reset Circuit Logic Diagram

4.2 Monitor LEDs

The emulation memory board has LEDs for monitoring the operating state. Table 4.8 shows the LEDs and the states to be monitored.

For details on STATUS1 and STATUS0 signals, refer to the SH7727 Hardware Manual.

Table 4.8 LEDs and States to Be Monitored

LED	Indication on the Board	LED Status	Remarks
LED1	RESET	Green LED lit when /RESETP is asserted	
	POWER	Red LED lit when power is supplied	
LED2	WAIT	Green LED lit when /WAIT is asserted	
	RUN	Red LED lit when in USER RUN state	Signal: /ASEBRKAK
LED3	BREQ	Green LED lit when /BREQ is asserted	
	NMI	Red LED lit when /NMI is asserted	
LED4	STATUS1	Green LED lit when STATUS1 is 0 (low)	
	STATUS0	Red LED lit when STATUS0 is 0 (low)	

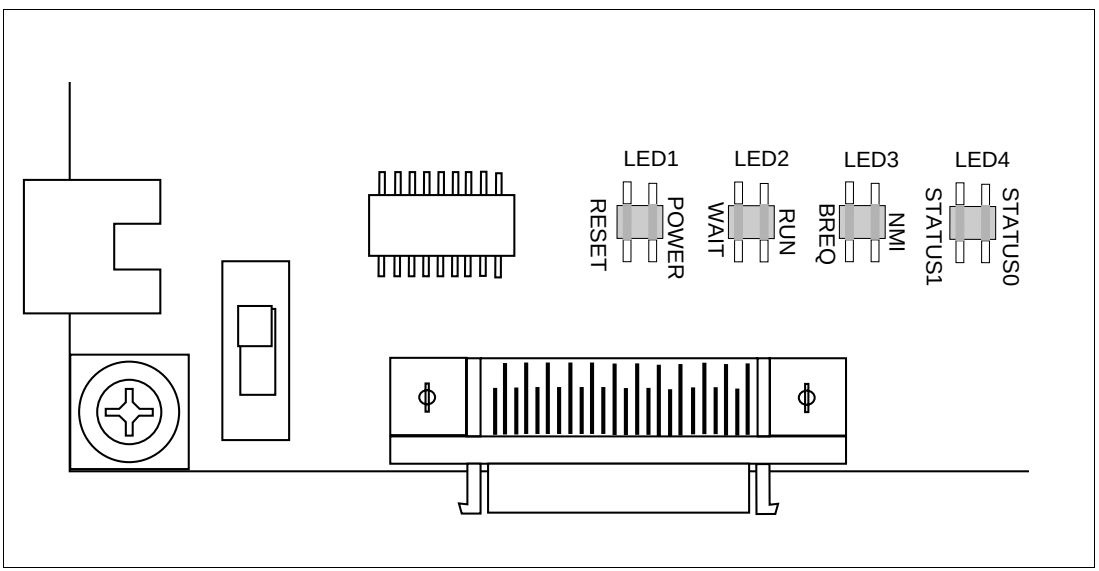


Figure 4.4 LED Location and Indication on the Board

Section 5 Connection Procedures

5.1 Connecting Emulation Memory Board to Emulator and User System

Be sure to switch off the emulator and user system before connecting the emulation memory board, emulator, and user system. Do not supply power to the power connector on the emulation memory board when using the user system.

⚠ WARNING

Observe the precautions listed below. Failure to do so will result in a FIRE HAZARD and will damage the user system, the emulation memory board, and the emulator product or will result in PERSONAL INJURY. The USER PROGRAM will be LOST.

1. **Always switch OFF the emulator product, the emulation memory board, and the user system before connecting the EMULATOR PRODUCT, EMULATION MEMORY BOARD, or USER SYSTEM.**
2. **DO NOT supply power to the emulation memory board from power connector (J1) when the emulation memory board is connected to the user system. When connected to the user system, the emulation memory board receives power from the VccQ pin of the IC socket (NQPACK240SD) and operates by the user system power.**

Connecting Emulation Memory Board to Emulator: Connect the emulator to the 14-pin connector (CN1) or 36-pin connector (CN2) on the emulation memory board, depending on the emulator type as follows:

HS7727KCM01H or HS7727KCI01H: 14-pin connector (CN1)
HS7727KCM02H or HS7727KCI02H: 36-pin connector (CN2)

For details on the connection procedure, refer to the SH7727 E10A Emulator User's Manual.

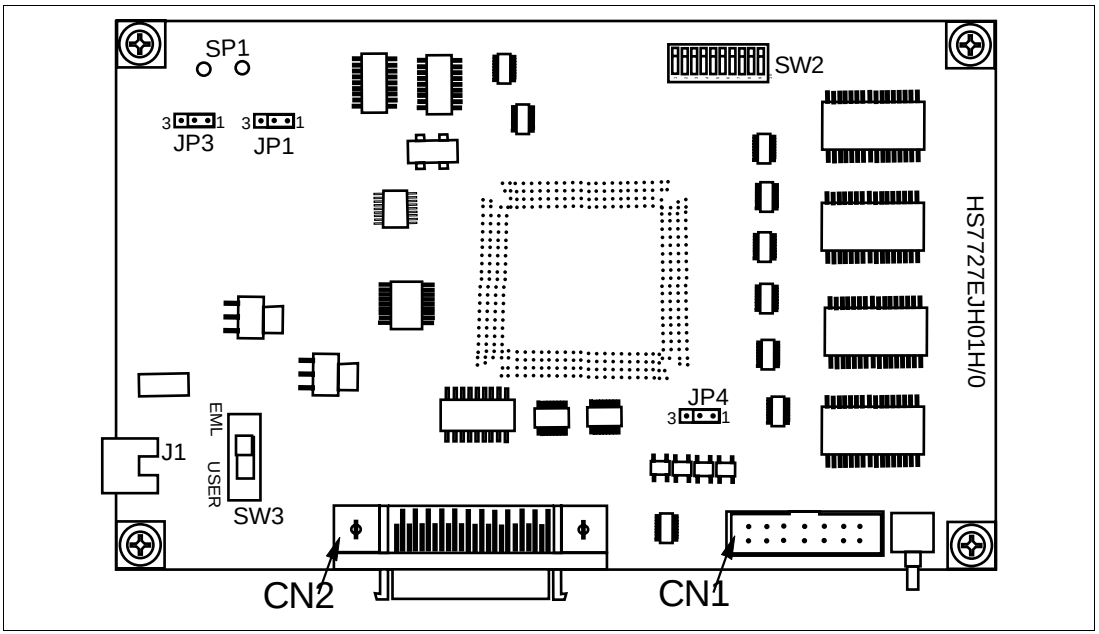


Figure 5.1 Connectors for Emulator

Connecting Emulation Memory Board to User System: Follow the instructions below.

⚠ WARNING

Observe the precautions listed below. Failure to do so will result in a FIRE HAZARD and will damage the user system, the emulation memory board, and the emulator product or will result in PERSONAL INJURY. The USER PROGRAM will be LOST.

1. **Always switch OFF the emulator product, the emulation memory board, and the user system before connecting the EMULATOR PRODUCT, EMULATION MEMORY BOARD, or USER SYSTEM.**
2. **Use the recommended IC socket on the user system. Otherwise, excessive force will be applied to the emulation memory board and the user system when the emulation memory board is connected to or disconnected from the user system.**

CAUTION

1. **Use NQPACK240SD (manufactured by Tokyo Eletech Corporation) as the QFP240 IC socket on the user system.**
2. **To mount the MCU directly on the NQPACK240SD socket, a socket cover must be used. Separately purchase HQPACK240SD (manufactured by Tokyo Eletech Corporation).**

1. Confirm that the pins of the YQPACK connector on the emulation memory board are not bent.
2. Align pin 1 of the YQPACK connector on the emulation memory board with pin 1 of the NQPACK socket on the user system, and insert the connector into the socket.

CAUTION

The structures of the YQPACK connector and NQPACK socket prevent the connector from being fully inserted in the wrong direction. If the connector cannot be inserted fully, pin 1 on the connector and that on the socket may not be aligned correctly. If the emulation memory board and the user system are connected with the incorrect alignment of pin 1, they will be damaged by additional forces. Check the pin 1 locations on the connector and socket and re-insert the YQPACK connector.

3. After inserting the YQPACK connector on the emulation memory board into the NQPACK socket of the user system, fix the emulation memory board in place with the supplied screws, as shown in figure 5.2.

CAUTION

1. **Use the supplied screwdriver.**
2. **The tightening torque must be 0.054 N•m or less. Stop tightening when the force required to turn the screw becomes significantly greater than that needed when first tightening.**
3. **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 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.**

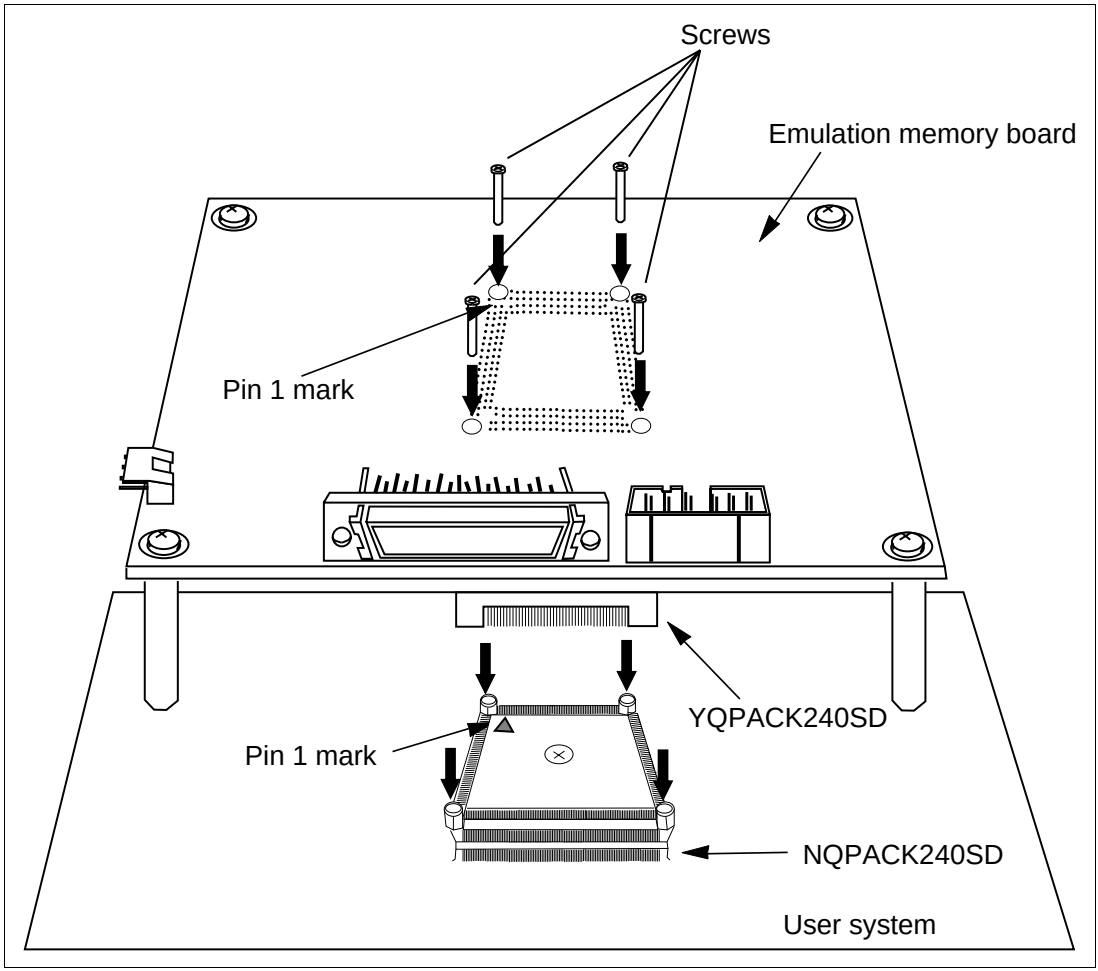


Figure 5.2 Connecting Emulation Memory Board to User System

Power Supply Specifications: When the user system is connected, the emulation memory board operates by the user system power. Supply the user system power according to the specifications and rising timing shown in table 5.1 and figure 5.3.

CAUTION

1. **Check that the SW3 switch is set to the power supply through the user interface, and supply 3.3-V power to the VccQ pin. Do not supply power to the power connector (J1) on the emulation memory board.**
2. **When power is supplied through the user interface (YQPACK), only 3.3-V power should be supplied from the user system, and the emulation memory board generates 1.9-V power from the 3.3-V power. Therefore, the Vcc pin (1.9 V) of the user interface (YQPACK) is not connected to the MCU on the emulation memory board.**

Table 5.1 Power Supply Specifications

Allowable Power Range	Current Consumption
+ 3.3 VDC ± 5%	1.3 A (max.)

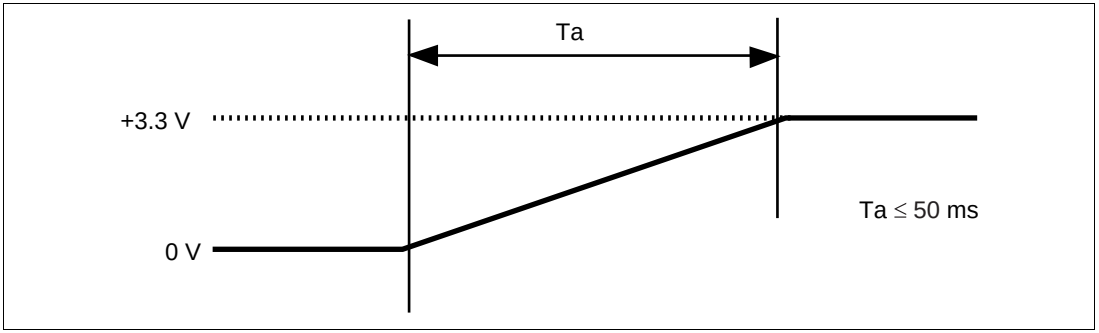


Figure 5.3 Characteristics of DC Rising Timing

5.2 Operating Emulation Memory Board Without Connecting User System

Be sure to switch off the emulator and emulation memory board before connecting them together and before connecting the power cables to the emulation memory board.

⚠ WARNING

Always switch OFF the emulator product and the emulation memory board before connecting the EMULATOR PRODUCT, EMULATION MEMORY BOARD, or POWER CABLES. Failure to do so will result in a FIRE HAZARD and will damage the emulator product and the emulation memory board or will result in PERSONAL INJURY. The USER PROGRAM will be LOST.

Connecting to the Emulator: Connect the emulation memory board to the emulator by using the same procedure as in section 5.1, Connecting Emulation Memory Board to Emulator and User System.

Connecting the Power Cables: After making sure the alignment is correct, connect the provided power cables to the power connector (J1) on the emulation memory board to supply power, as shown in figure 5.4. (The power cable and connector structures will prevent the power cables from being connected in the wrong direction.)

Note that the red cables are for 5-V power and the black ones are for GND; connect them to the DC power source correctly.

⚠ WARNING

Be sure to connect the power cables to the DC power source correctly, that is, the red cables to the 5-V power and the black ones to GND. Failure to do so will result in a FIRE HAZARD and will damage the emulator product and the emulation memory board or will result in PERSONAL INJURY. The USER PROGRAM will be LOST.

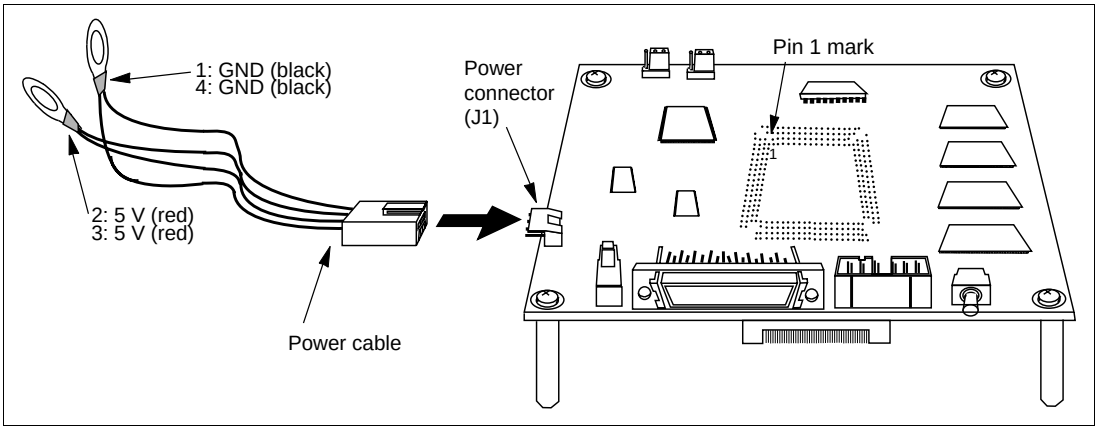


Figure 5.4 Connecting Power Cables to Power Connector

Power Supply Specifications: Table 5.2 shows the power supply specifications, and figure 5.5 shows the rising timing of the power.

Table 5.2 Power Supply Specifications

Allowable Power Range	Current Consumption
+ 5.0 VDC ± 5%	1.3 A (max.)

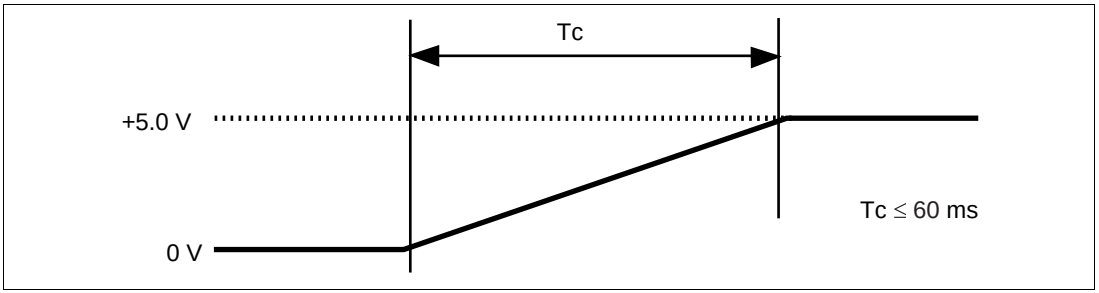


Figure 5.5 Characteristics of DC Rising Timing

5.3 Disconnecting Emulation Memory Board from User System

Be sure to switch off the emulator and user system before disconnection.

⚠ WARNING

Always switch OFF the emulator product, the emulation memory board, and the user system before disconnecting the EMULATOR PRODUCT, EMULATION MEMORY BOARD, or USER SYSTEM. Failure to do so will result in a FIRE HAZARD and will damage the emulator product, the emulation memory board, and the user system or will result in PERSONAL INJURY. The USER PROGRAM will be LOST.

Disconnecting Emulation Memory Board from User System: Follow the instructions below.

1. Remove the screws that connect the YQPACK connector and the NQPACK socket.
2. After removing all screws, remove the emulation memory board from the user system, taking care not to bend any of the pins.

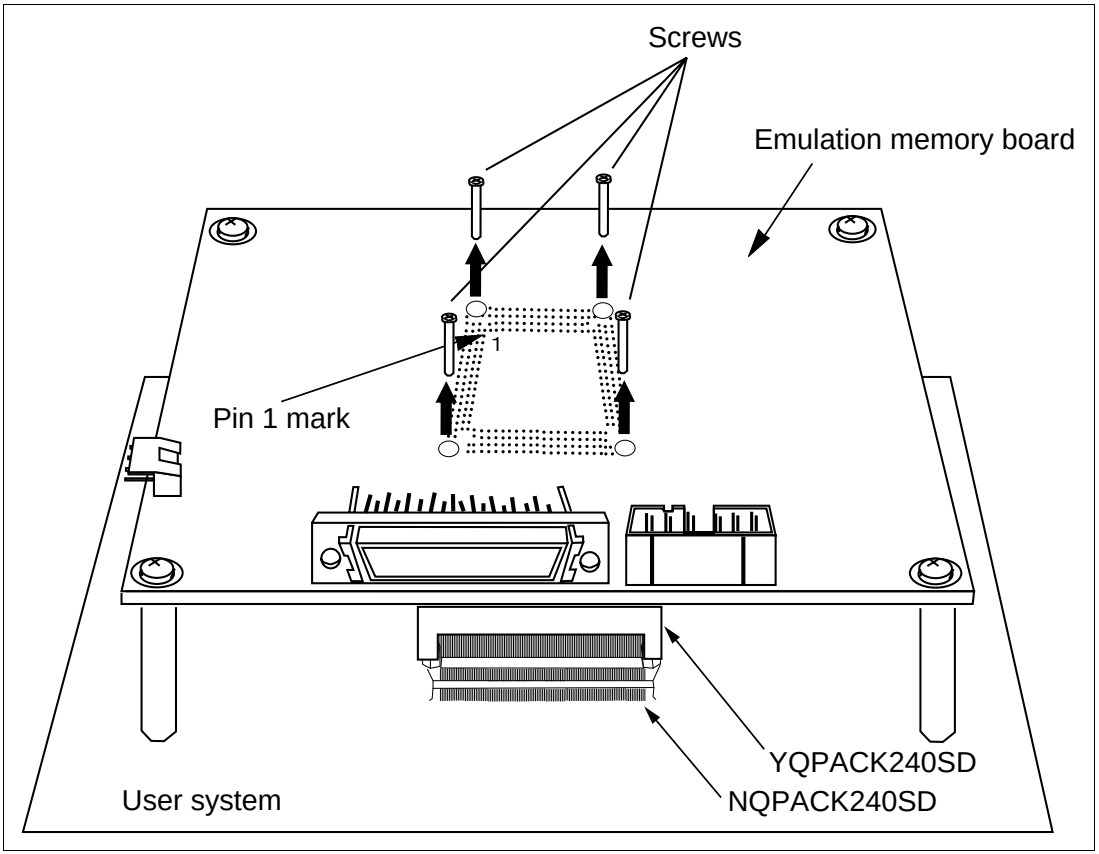


Figure 5.6 Disconnecting Emulation Memory Board

5.4 Recommended Dimensions for User System Mount Pad

Figure 5.7 shows the recommended dimensions for the mount pad (footprint) for the user system with an IC socket for a QFP240 package (NQPACK240SD: manufactured by Tokyo Eletech Corporation). Note that the dimensions in figure 5.7 are somewhat different from those of the actual chip's mount pad.

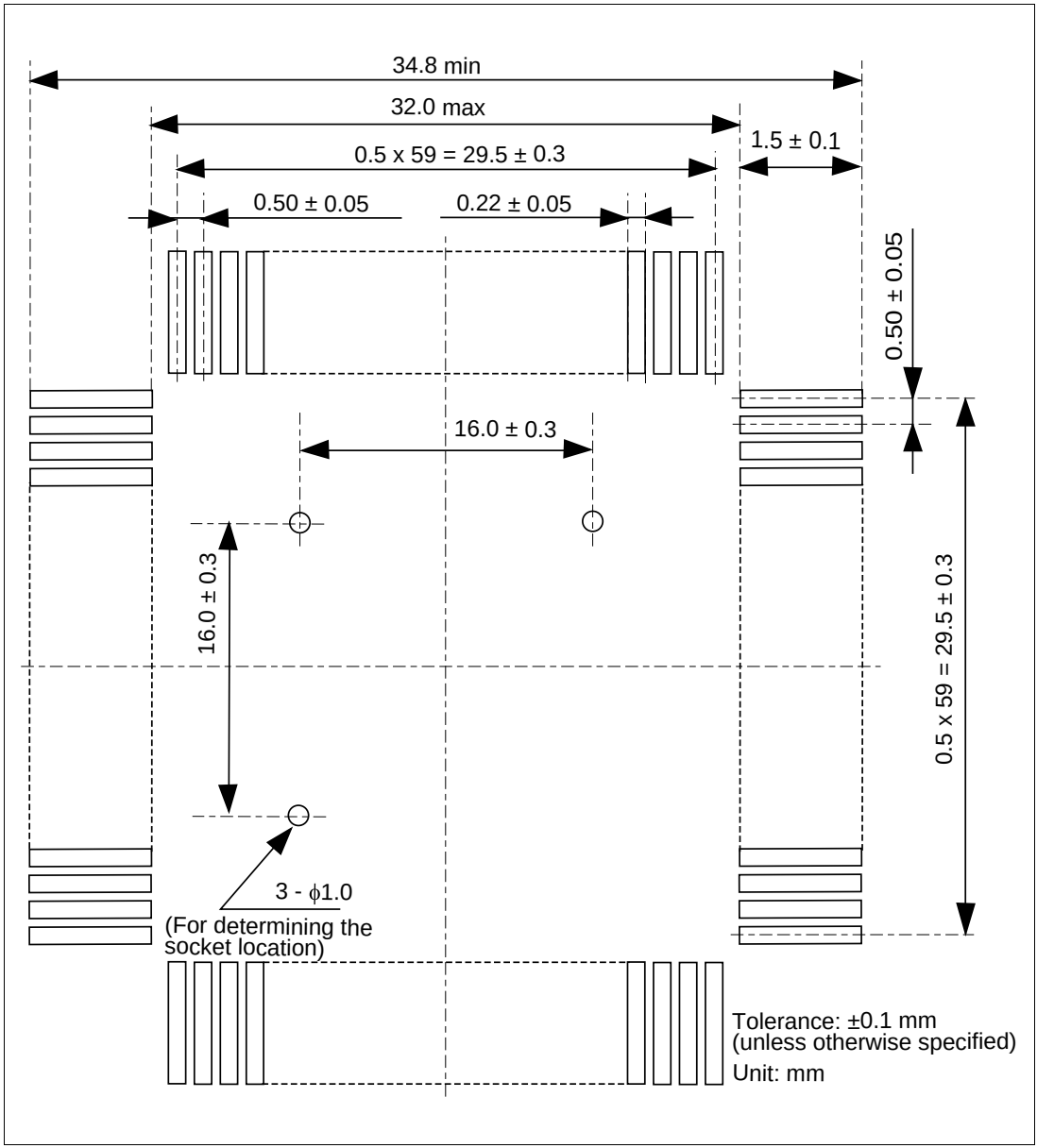


Figure 5.7 Recommended Dimensions for Mount Pad

Section 6 Limitations

6.1 Unavailable Pins

Since the H-UDI is used on the emulation memory board, the following signals that are multiplexed with H-UDI signals cannot be used:

(1) When using the 36-pin connector (CN2):

PTE[7]/PCC0RDY, PTE[0], PTG[5], PCC0BVD2/PTG[3], PCCBVD1/PTG[2], PCC0CD2#/PTG[1], PCC0CD1#/PTG[0], PTF[7]/PINT[15], PTF[6]/PINT[14], PTF[5]/PINT[13], PTF[4]/PINT[12], PCC0WAIT/PTH[6]

(2) When using the 14-pin connector (CN1):

PTE[0], PTG[5], PTF[7]/PINT[15], PTF[6]/PINT[14], PTF[5]/PINT[13], PTF[4]/PINT[12]

Note: When the 14-pin connector (CN1) is used, PTE[7]/PCC0RDY, PCC0BVD2/PTG[3], PCCBVD1/PTG[2], PCC0CD2#/PTG[1], PCC0CD1#/PTG[0], and PCC0WAIT/PTH[6] can be used. However, pull up or do not connect these signals in the user system side to avoid affection by the user system.

6.2 Limitations on Connecting the User System

To use the emulation memory board together with the user system, do not mount any components in the mount-prohibited areas (figure 6.1) of the user system. If any component is mounted on any of these areas, remove the corresponding spacer from the emulation memory board. In this case, take special care not to give any stress to the user interface section (NQPACK).

The height of the mounted components must be 8.0 mm or shorter in the height-limited area (figure 6.1) of the user system. If any component in this area is higher than 8.0 mm, the emulation memory board cannot be connected to the user system.

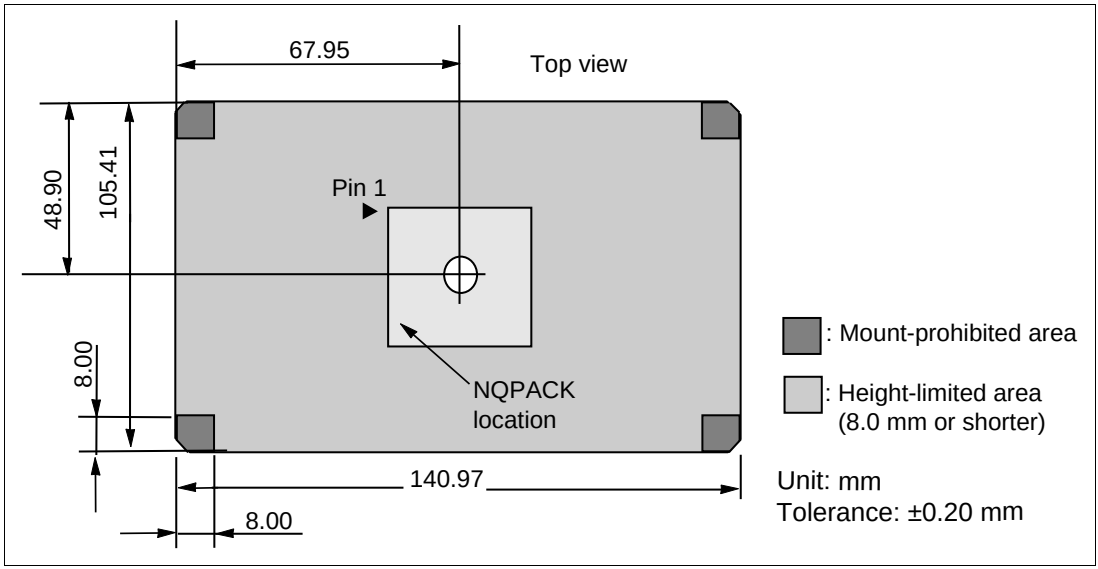


Figure 6.1 Mount-Prohibited and Height-Limited Areas of User System

Section 7 User Interface

7.1 Pin Assignment and Handling of User Interface Signals

The emulation memory board has a connector (YQPACK) for user interface. Table 7.1 shows the pin assignment of the user interface connector and signal handling on the emulation memory board.

Table 7.1 Pin Assignment and Handling of User Interface

No.	Signal Name	Handling	Notes	No.	Signal Name	Handling	Notes
1	Vcc_RTC	1.9 V		26	D26/PTB2		
2	XTAL2	NC		27	D25/PTB1		
3	EXTAL2	NC		28	D24/PTB0		
4	Vss_RTC	NC		29	VssQ	GND	
5	MD1	Pull-up	47 kΩ	30	D23/PTA7		
6	MD2	Pull-up	47 kΩ	31	VccQ	3.3 V	
7	NMI	Pull-up	47 kΩ	32	D22/PTA6		
8	IRQ0#/IRL0#/PTH0	Pull-up	47 kΩ	33	D21/PTA5		
9	IRQ1#/IRL1#/PTH1	Pull-up	47 kΩ	34	D20/PTA4		
10	IRQ2#/IRL2#/PTH2	Pull-up	47 kΩ	35	VSS	GND	
11	IRQ3#/IRL3#/PTH3	Pull-up	47 kΩ	36	D19/PTA3		
12	IRQ4#/PTH4	Pull-up	47 kΩ	37	VCC	NC	
13	VEPWC			38	D18/PTA2		
14	VCPWC			39	D17/PTA1		
15	MD5	Pull-up	47 kΩ	40	D16/PTA0		
16	BREQ#	Pull-up	47 kΩ	41	D15		
17	BACK#			42	VssQ	GND	
18	VssQ	GND		43	D14		
19	CKIO2			44	VccQ	3.3 V	
20	VccQ	3.3 V		45	D13		
21	D31/PTB7			46	D12		
22	D30/PTB6			47	D11		
23	D29/PTB5			48	D10		
24	D28/PTB4			49	D9		
25	D27/PTB3			50	D8		

Table 7.1 Pin Assignment and Handling of User Interface (cont)

No.	Signal Name	Handling	Notes	No.	Signal Name	Handling	Notes
51	D7			81	A16		
52	D6			82	A17		
53	VssQ	GND		83	A18		
54	D5			84	A19		
55	VccQ	3.3 V		85	A20		
56	D4			86	VssQ	GND	
57	D3			87	A21		
58	D2			88	VccQ	3.3 V	
59	D1			89	A22		
60	D0			90	A23		
61	A0			91	VSS	GND	
62	A1			92	A24		
63	A2			93	VCC	NC	
64	VssQ	GND		94	A25		
65	A3			95	BS#/PTK4	Pull-up	47 kΩ
66	VccQ	3.3 V		96	RD#		
67	A4			97	WE0#/DQMLL		
68	A5			98	WE1#/DQMLU/WE		
69	A6			99	WE2#/DQMUL/ ICIORD#/PTK6	Pull-up	47 kΩ
70	A7			100	VssQ	GND	
71	A8			101	WE3#/DQMUU/ ICIOWR#/PTK7	Pull-up	47 kΩ
72	A9			102	VccQ	3.3 V	
73	A10			103	RDWR		
74	A11			104	PTE7/PCC0RDY/ AUDSYNC#	Pull-up	47 kΩ
75	VssQ	GND		105	CS0#	Pull-up	47 kΩ
76	A12			106	CS2#/	Pull-up	47 kΩ
77	VccQ	3.3 V		107	CS3#	Pull-up	47 kΩ
78	A13			108	CS4#/PTK2	Pull-up	47 kΩ
79	A14			109	CS5#/CE1A#/PTK3	Pull-up	47 kΩ
80	A15			110	CS6#/CE1B#	Pull-up	47 kΩ

Table 7.1 Pin Assignment and Handling of User Interface (cont)

No.	Signal Name	Handling	Notes	No.	Signal Name	Handling	Notes
111	CE2A#/PTE4	Pull-up	47 kΩ	132	VssQ	GND	
112	CE2B#/PTE5	Pull-up	47 kΩ	133	RESERVED/PTJ3	Pull-up	47 kΩ
113	AFE_HC1/USB1d_DPLS/PTK0	Pull-up	47 kΩ	134	VccQ	3.3 V	
114	AFE_RLYCNT#/ USB1Ddmns/ptk1	Pull-up	47 kΩ	135	RESERVED/PTJ4	Pull-up	47 kΩ
115	VssQ	GND		136	RESERVED/PTJ5	Pull-up	47 kΩ
116	AFE_SCLK/ USB1d_TXDPLS	Pull-up	47 kΩ	137	VSS	GND	
117	VccQ	3.3 V		138	PTD5/CL1		
118	PTM7/PINT7/AFE_FS/USB1d_RCV	Pull-up	47 kΩ	139	VCC	NC	
119	PTM6/PINT6/ AFE_RXIN/ USB1d_SPEED	Pull-up	47 kΩ	140	PTD7/DON		
120	PTM5/PINT5/ AFE_TXOUT/ USB1d_TXSE0	Pull-up	47 kΩ	141	PTE6/M_DISP		
121	PTM4/PINT4/ AFE_RDET#/ USB1d_TxDMNS	Pull-up	47 kΩ	142	PTE3/FLM		
122	USB1d_SUSPEND			143	PTE0/TDO		
123	USB1_ovr_cmt#/ USBF_VBUS	Pull-up	47 kΩ	144	PCC0RESET/ DRAK0		
124	USB2_ovr_cmt#	Pull-up	47 kΩ	145	PCC0DRV/ DACK0#		
125	RTS2#/ USB1dTXENL			146	WAIT#	Pull-up	47 kΩ
126	PTE2/USB1_pwr_en	Pull-up	47 kΩ	147	RESETM#	Pull-up	47 kΩ
127	PTE1/USB2_pwr_en	Pull-up	47 kΩ	148	ADTRG#/PTH5	Pull-up	47 kΩ
128	CKE/PTK5	Pull-up	47 kΩ	149	IOIS16#/PTG7	Pull-up	47 kΩ
129	RAS3#/PTJ0	Pull-up	47 kΩ	150	ASEMD0#	NC	
130	RESERVED/PTJ1	Pull-up	47 kΩ	151	PTG5/ ASEBRKAK#	NC	
131	RESERVED/ CAS#/PTJ2	Pull-up	47 kΩ	152	PTG4	Pull-up	47 kΩ

Table 7.1 Pin Assignment and Handling of User Interface (cont)

No.	Signal Name	Handling	Notes	No.	Signal Name	Handling	Notes
153	PCC0BVD2/PTG3/ AUDATA3	Pull-up	47 kΩ	178	VCC	1.9 V	
154	PCCBVD1/PTG2/ AUDATA2	Pull-up	47 kΩ	179	XTAL	NC	
155	VSS	GND		180	EXTAL		
156	PCC0CD2#/PTG1/ AUDATA1	Pull-up	47 kΩ	181	LCD15/PTM3/ PINT10		
157	VCC	NC		182	LCD14/PTM2/ PINT9		
158	PCC0CD1#/PTG0/ AUDATA0	Pull-up	47 kΩ	183	LCD13/PTM1/ PINT8		
159	VssQ	GND		184	LCD12/PTM0		
160	PTF7/PINT15/ TRST#	NC		185	STATUS0/PTJ6	Pull-up	47 kΩ
161	VccQ	3.3 V		186	STATUS1/PTJ7	Pull-up	47 kΩ
162	PTF6/PINT14/TMS	NC		187	CL2/PTH7		
163	PTF5/PINT13/TDI	NC		188	VssQ	GND	
164	PTF4/PINT12/TCK	NC		189	CKIO	Pull-up	47 kΩ
165	PTF3/PINT11	Pull-up	47 kΩ	190	VccQ	3.3 V	
166	PCCREG/PTF2	Pull-up	47 kΩ	191	TXD0/SCPT0		
167	PCC0VS1#/PTF1	Pull-up	47 kΩ	192	SCK0/SCPT1	Pull-up	47 kΩ
168	PCC0VS2#/PTF0	Pull-up	47 kΩ	193	TXD_SIO/SCPT2		
169	MD0	Pull-up	47 kΩ	194	SIOMCLK/SCPT3	Pull-up	47 kΩ
170	Vcc_PLL1	NC		195	TXD2/SCPT4		
171	CAP1	NC		196	SCK_SIO/SCPT5	Pull-up	47 kΩ
172	Vss_PLL1	NC		197	SIOFSYNC/SCPT6	Pull-up	47 kΩ
173	Vss_PLL2	NC		198	RXD0/SCPT0	Pull-up	47 kΩ
174	CAP2	NC		199	RXD_SIO/SCPT2	Pull-up	47 kΩ
175	Vcc_PLL2	NC		200	VSS	GND	
176	PCC0WAIT/PTH6/ AUDCK	Pull-up	47 kΩ	201	RXD2/SCPT4	Pull-up	47 kΩ
177	VSS	GND		202	VCC	NC	

Table 7.1 Pin Assignment and Handling of User Interface (cont)

No.	Signal Name	Handling	Notes	No.	Signal Name	Handling	Notes
203	SCPT7/CTS2#/ IRQ5#	Pull-up	47 kΩ	222	MD3	Pull-up	47 kΩ
204	LCD11/PTC7/ PINT3			223	MD4	Pull-up	47 kΩ
205	LCD10/PTC6/ PINT2			224	Scan_testen#	NC	
206	LCD9/PTC5/PINT1			225	AVCC_USB		
207	VssQ	GND		226	USB1_P (analog)		
208	LCD8/PTC4/PINT0			227	USB1_M (analog)		
209	VccQ	3.3 V		228	AVSS_USB		
210	LCD7/PTD3			229	USB2_P (analog)		
211	LCD6/PTD2			230	USB2_M (analog)		
212	LCD5/PTC3			231	AVCC_USB		
213	LCD4/PTC2			232	AVSS		
214	LCD3/PTC1			233	AN2/PTL2		
215	LCD2/PTC0			234	AN3/PTL3		
216	LCD1/PTD1			235	AN4/PTL4		
217	LCD0/PTD0			236	AN5/PTL5		
218	DREQ0#/PTD4	Pull-up	47 kΩ	237	AVCC	AVCC	
219	LCK/UCLK/PTD6			238	AN6/PTL6		
220	RESETP#	Pull-up	47 kΩ	239	AN7/PTL7		
221	CA	Pull-up	47 kΩ	240	AVSS		

CAUTION

When power is supplied through the user interface (YQPACK), only 3.3-V power should be supplied from the user system, and the emulation memory board generates 1.9-V power from the 3.3-V power. Therefore, the Vcc pin (1.9 V) of the user interface (YQPACK) is not connected to the MCU on the emulation memory board.

Handling:

- Pull-up: The pin is pulled up to 3.3 V through a 47-kΩ resistor on the board.
- 3.3 V: 3.3 V is supplied from the user system (when sliding SW3 to USER).
- GND: The pin is connected to GND on the board.
- NC: The MCU pin is not connected to the user interface connector.
- Blank: The MCU pin is directly connected to the user interface connector.

7.2 Pin Handling on the Emulation Memory Board and User System

The emulation memory board is connected to the user system through the user interface connector (YQPACK) and the IC socket (NQPACK). Figure 7.1 shows the signal line handling on the emulation memory board and the user system.

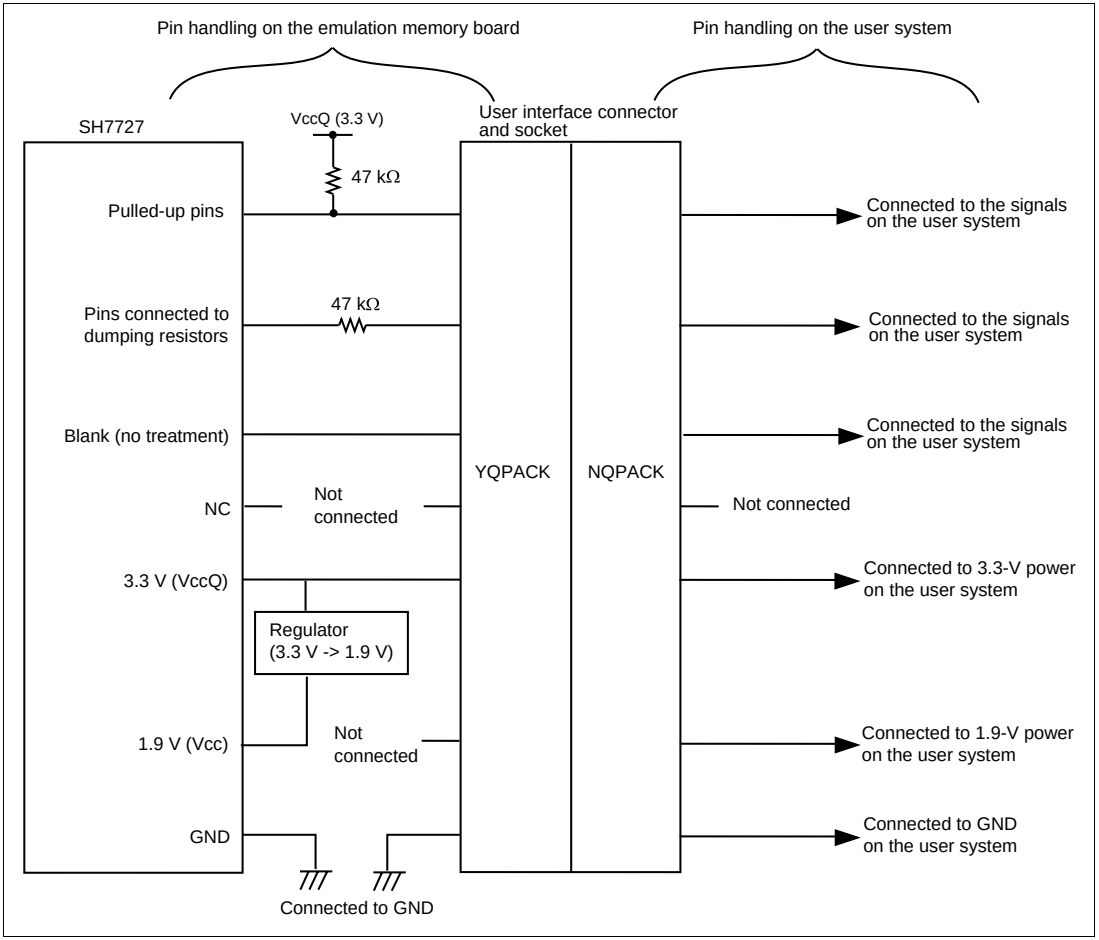


Figure 7.1 Signal Line Handling on the Emulation Memory Board and User System

Section 8 Emulation Memory Board Block Diagram

The emulation memory board has an MCU (SH7727), a user interface connector, emulator connectors, and memory. Figure 8.1 shows the block diagram of the emulation memory board.

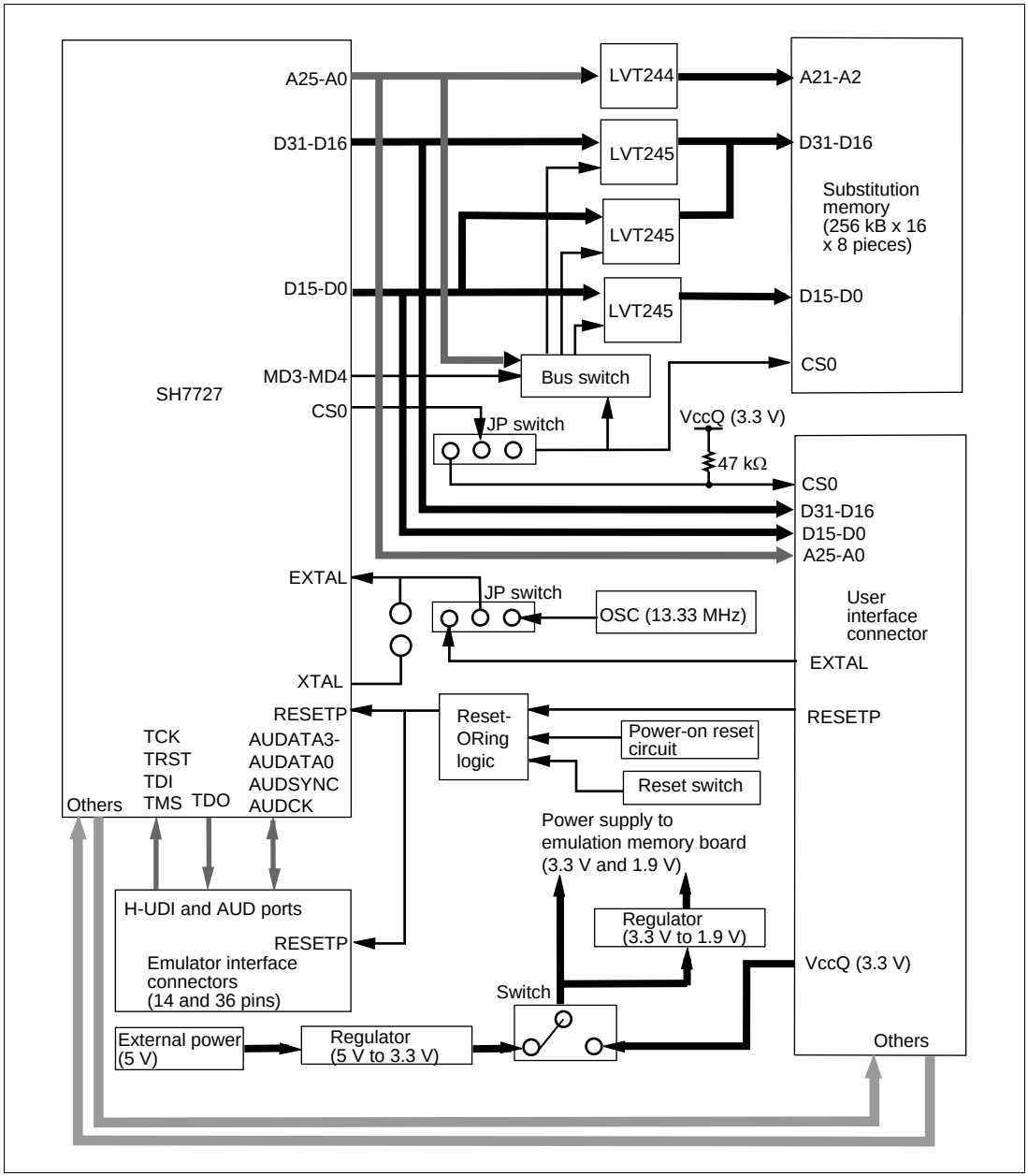


Figure 8.1 Emulation Memory Board Block Diagram

Section 9 Using the Emulator in a Case

Package the emulator and the emulation memory board in a case as shown below. The recommended material of the case to prevent electrical magnetic interference (EMI) noise is iron plated with nickel or resin plated with nickel inside. The case must have enough size to hold the emulation memory board and the user system.

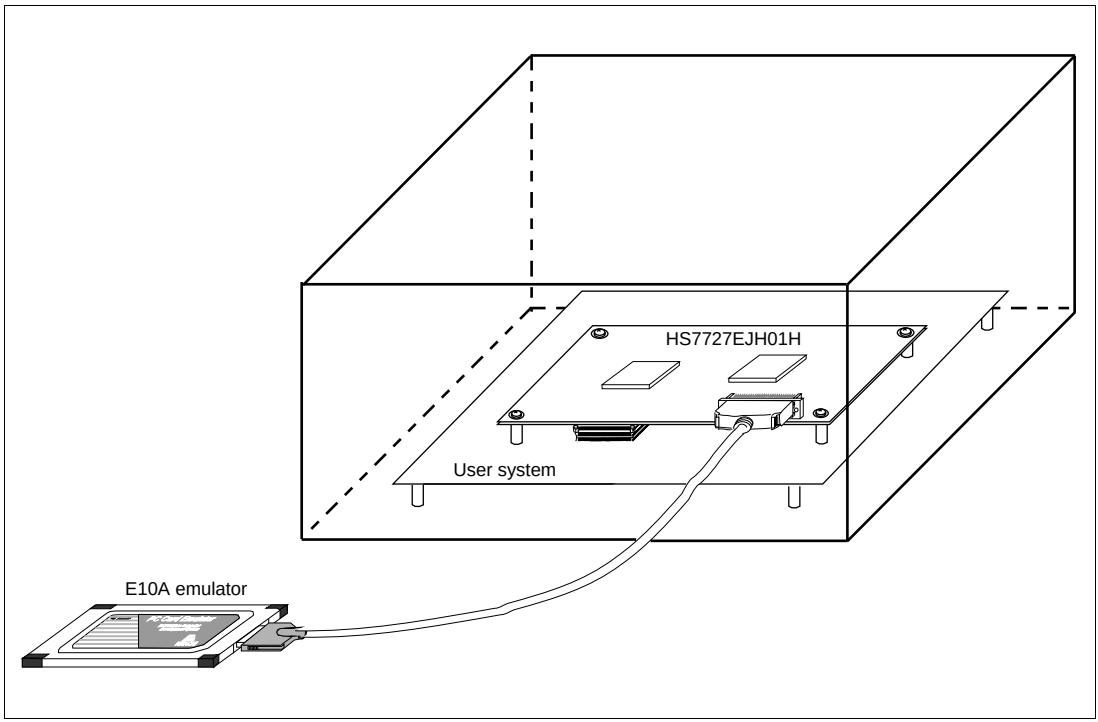


Figure 9.1 Configuration for Countermeasure against EMI Noise

Note: EMI stands for Electrical Magnetic Interference.