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April 1st, 2010
Renesas Electronics Corporation

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User's Manual

SH7010 Series E6000

Supplementary Information

HS7010EPI60HE
Renesas Microcomputer Development Environment System

Renesas Electronics
www.renesas.com

Rev.2.0 2003.06

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- Emulator station
- User system interface cables
- PC interface board
- Optional SIMM memory module

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SAFETY PAGE

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

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⚠ 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 E6000 emulator and user system before connecting or disconnecting any CABLES or PARTS.**
3. **Always before connecting any CABLES, make sure that pin 1 on both sides are correctly aligned.**
4. **Supply power according to the power specifications and do not apply an incorrect power voltage. Use only the provided power cable.**

CAUTION

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Preface

Thank you for purchasing the SH7010 series E6000 emulator.

The SH7010 series E6000 emulator (hereafter referred to as the E6000) was designed as a software and hardware development tool for systems based on Renesas's original microcomputers SH7010 series.
The E6000 provides three 3.5-type floppy disks: three stores the HDI system (HS7010EPI60SF disks #1 to #3).

There are three manuals for the E6000: the SH series E6000 Emulator User's Manual, this Supplementary Information, and the HDI User's Manual. The E6000 Emulator User's Manual describes E6000 functions common to all SH series microcomputers. This Supplementary Information describes the functions specialized for each microcomputer supported by the SH7010 series E6000 emulator. Please read this manual before using the E6000.

To connect the E6000 to the user system, a user system interface cable for each package type is available. For details on the user system interface cable, refer to the User System Interface Cable User's Manual.

The following shows the related manuals:

- SH Series E6000 Emulator User's Manual (HS7000EPI60HE)
- HDI User's Manual (HS6400DIIW3SE)
- User System Interface Cable User's Manual (HS7011ECN61HE, etc.)
- The PC interface board user's manual which will be the following manuals:
  ISA Bus Interface Board User's Manual (HS6000EII01HE)
  PCI Bus Interface Board User's Manual (HS6000EIC01HE)
  PCMCIA Interface Card User's Manual (HS6000EIP01HE)
- SH7010, SH7040, SH7050 SIMM Memory Module User's Manual (HS6000EMS22HE)

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Figures

Tables

Section 1 Overview

The SH7010 series E6000 emulator (hereafter referred to as the E6000) is an efficient software and hardware development support tool for application systems using Renesas's original microcomputers SH7011, SH7016 and SH7017.

1.1 Environment Conditions

Table 1.1 Environment Conditions

Item	Specifications	
Temperature	Operating: +10 to +35°C	
	Storage: –10 to +50°C	
Humidity	Operating: 35 to 80% RH; no condensation	
	Storage: 35 to 80% RH; no condensation	
Ambient gases	No corrosive gases	
AC Power supply voltage	100 V to 240 V AC ±5% 50/60 Hz 0.6 A max.	
AC input cable*	HS7010EPI61H	HS7010EPI61HB
	100 V-120 V (UL)	200 V-240 V (BS)
User system voltage (UVcc)	Depends on the target MCU within the range 3.0 V to 5.5 V	

Note: HS7010EPI61H must be used at AC100 V-120 V input voltage.
HS7010EPI61HB must be used at AC200 V-240 V input voltage.

1.2 Supported MCUs and User System Interface Cables

Tables 1.2 to 1.3 show the correspondence between the MCUs, the user system interface cables, and the SIMM memory modules supported by the E6000.
HD6417014F28 and HD6417014RF28 (ROMless versions with high-speed A/D converter) are not supported.

SH7011, SH7016, SH7017 Series:

Table 1.2 User System Interface Cables for SH7011, SH7016 and SH7017

MCU Type Number	Package	E6000 User System Interface Cables
HD6417011	100-pin TQFP (TFP-100B)	HS7011ECN61H
HD6437016 HD64F7017	112-pin QFP (FP-112)	HS7017ECH61H

Table 1.3 SIMM Memory Modules for SH7010, SH7040 and SH7050

MCU Type Number	SIMM Memory Modules
HD6417011	HS6000EMS21H (2.5-Mbyte SIMM memory module)
HD6437016	HS6000EMS22H (6.5-Mbyte SIMM memory module)
HD64F7017	

1.3 Operating Voltage and Frequency Specifications

Table 1.4 shows examples of the MCU operating voltage and frequency specifications supported by the E6000. Some MCUs do not guarantee low-power and high-frequency operations.

Table 1.4 Operating Voltage and Frequency Specifications

MCU Types	Operating Voltage (Vcc) (V)	Operating Frequency (ϕ) (MHz)
SH7011	3.0-3.6	20
SH7016, SH7017	4.5-5.5	28.7

NOTE

For details on the operating voltage and frequency specifications, refer to the MCU hardware manual.

In the E6000, clock can be selected as shown in tables 1.5 and 1.6 by using the Configuration window or the Clock command.
Select the clock from a range between 4 MHz to the maximum operation frequency ϕ (MHz) (see table 1.4). If the input clock and clock divisor is 4 MHz or below, an error will occur.

Table 1.5 Clock Selections for E6000 SH7016/7017 Emulator

Item	Command		Configuration Window Setting		Notes
	Command Name	Parameter	Option name	Parameter	
Input clock	CLOCK	8	Clock Rate	8 MHz	Initial value
		8.19		8.19 MHz	
		10		10 MHz	
		Target		Target	
Clock multiplication	CLOCK_MODE	×1	Clock Mode	PLL × 1	Initial value
		×2		PLL × 2	
		×4		PLL × 4	
		Target*		Target*	
Clock division	CLOCK_DIVISOR	1	Clock Divisor	1	Initial value
		2		2	
		4		4	

Note: *The parameter set for clock multiplication is the same parameter set for mode pins MD3 and MD2 on the user system when Target is selected for the parameter of the clock multiplication.

Table 1.6 Clock Selections for E6000 SH7011 Emulator

Item	Command		Configuration Window Setting		Notes
	Command Name	Parameter	Option name	Parameter	
Input clock	CLOCK	16	Clock Rate	16 MHz	Initial value
		16.38		16.38 MHz	
		20		20 MHz	
		Target		Target	
Clock multiplication	CLOCK_MODE	×1	Clock Mode	PLL × 1	Initial value
Clock division	CLOCK_DIVISOR	1	Clock Divisor	1	Initial value
		2		2	
		4		4	

NOTE

The clock specified by the HDI Clock command or through the Configuration window is divided or multiplied and becomes the system clock (ϕ). Therefore system clock (ϕ) is 10 MHz when Target is selected for clock input, and a 20 MHz crystal oscillator is connected to EXTAL, and division is 2 and multiplication is 1.

Section 2 User System Interface

All user system interface signals are directly connected to the MCU in the E6000 with no buffering except for those listed below which are connected to the MCU through control circuits:

- NMI
- RES
- MD3, MD2, MD1, MD0
- XTAL
- EXTAL
- WDTOVF

2.1 Signal Protection

All user system interface signals are protected from over- or under-voltage by use of diode arrays except for the AVcc.

Pull-up resistors are connected to the port signals except for the analog port signals.

The Vcc pins (except for the AVcc pin) at the head of the user system interface cable are connected together. The E6000 monitors this and determines whether the user system is connected.

2.2 User System Interface Circuits

The interface circuit between the MCU in the E6000 and the user system has a signal delay of about 8 ns due to the user system interface cable and it includes pull-up resistors. Therefore, high-impedance signals will be pulled up to the high level. When connecting the E6000 to a user system, adjust the user system hardware to compensate for propagation delays.

The following diagrams show the interface signal circuits.

Default:

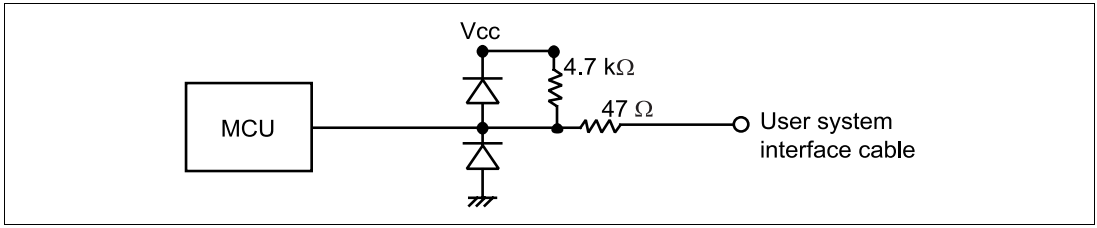

Figure 2.1 Default User System Interface Circuit

Mode Pins (MD3, MD2, MD1 and MD0): The mode pins are only monitored. The operation modes and clock modes depend on the HDI settings. Mode pins do not exist in the SH7011.

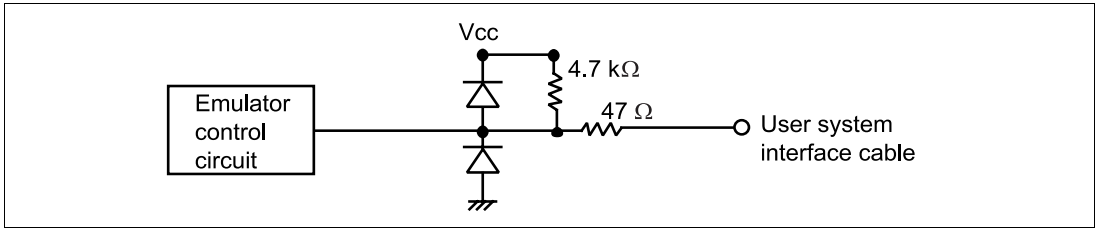

Figure 2.2 User System Interface Circuit for Mode Pins

RES and NMI:

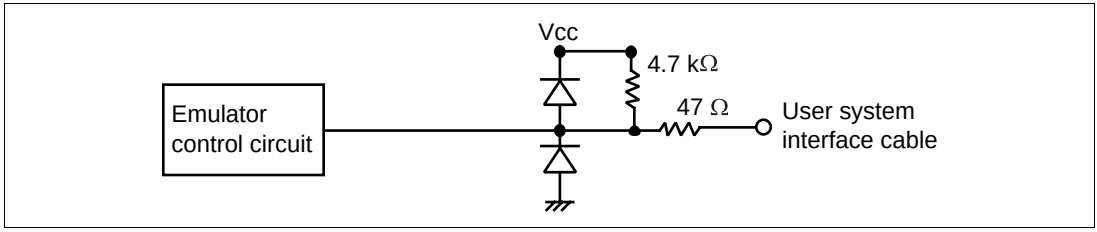

Figure 2.3 User System Interface Circuit for RES and NMI

PF0/AN0-PF7/AN7 (for SH7011: AN0-AN6):

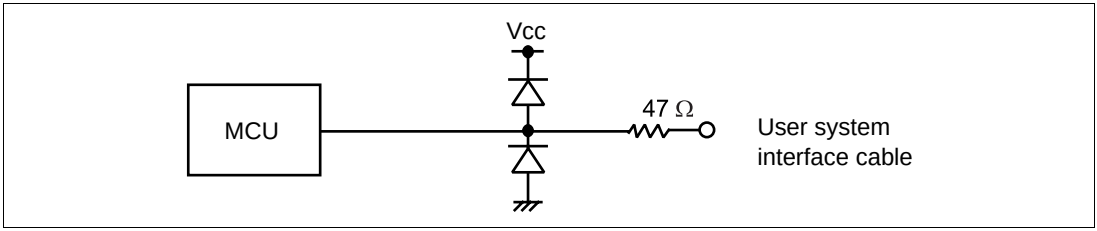

Figure 2.4 User System Interface Circuit for PF0/AN0-PF7/AN7

IRQ0–IRQ7 and WDTOVF: The IRQ0 to IRQ7 and WDTOVF signals are input to the MCU and also to the trace acquiring circuit. Therefore, the rising and falling time of these signals must be within 8 ns/v or shorter.

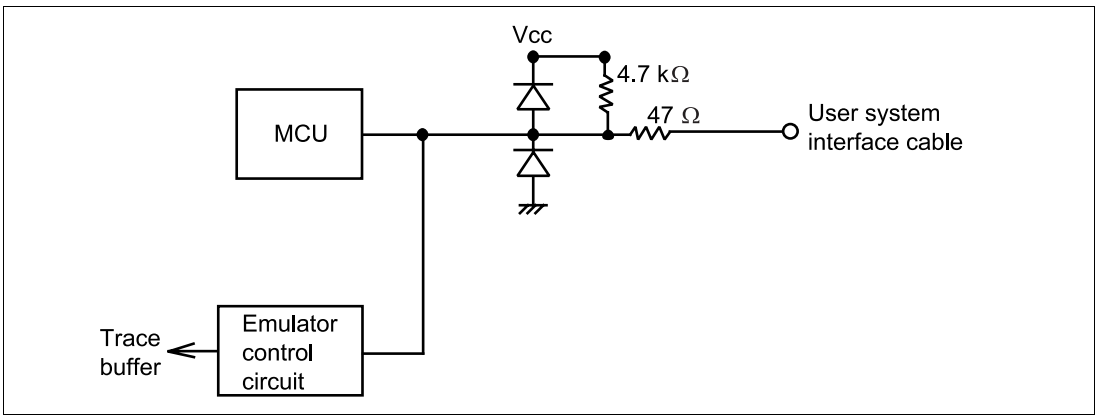

Figure 2.5 IRQ0–IRQ7 and WDTOVF User System Interface Circuit

AVcc and AVss

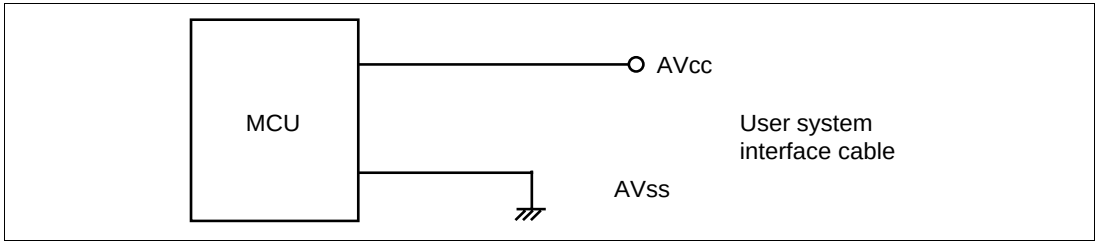

Figure 2.6 User System Interface Circuit for Avcc and AVss

XTAL and EXTAL

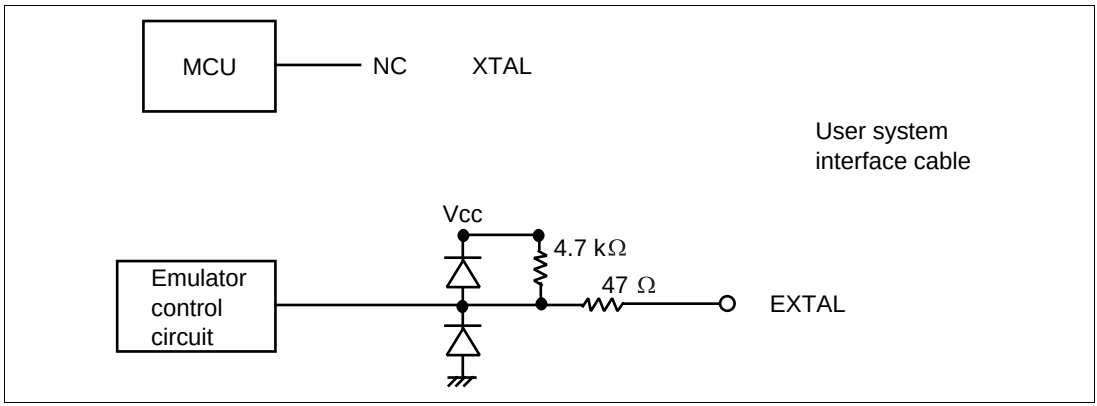

Figure 2.7 User System Interface Circuit for XTAL and EXTAL

Section 3 Notes on Use

3.1 I/O Register Differences between Actual MCU and E6000

In the E6000, one evaluation chip emulates several types of MCU. Therefore, there are some differences in I/O registers between an actual MCU and the E6000. Note these differences when accessing the I/O registers.

I/O port is in the input state at default. The I/O register contents indicate the emulator port status. When the user system interface cable is not connected, the read value is 1 due to the emulator's pull-up resistors.

In E6000, accesses to the following registers for controlling the flash memory are invalid.

- RAM emulation register (RAMER: H'FFFF8628)
- Flash memory control register 1 (FLMCR1: H'FFFF8580)
- Flash memory control register 2 (FLMCR2: H'FFFF8581)
- Block register 1 (EBR1: H'FFFF8582)

3.2 Access to the Reserved Area

Reserved area cannot be accessed in the actual MCU.

3.3 Use of Internal RAM Area and Internal ROM Area

The internal ROM size of the MCU is 64 kbytes or 128 kbytes; however, the E6000 has 256 kbytes of ROM. The internal RAM size of the MCU is 3 kbytes or 4 kgytes; however, the E6000 has 6 kbytes of RAM.

3.4 Support of Flash Memory

The E6000 does not emulate the flash memory control operation in the MCU.

Section 4 HDI Parameters

4.1 Address Areas

Table 4.1 lists the parameters for address areas (Area) that can be specified with HDI command line interface or displayed as trace results.

Table 4.1 Address Area Parameters

HDI Parameter (Trace Display)	Address Area	Description
ROM (ROM)	Internal ROM	MCU's internal ROM, which can be read but cannot be written to.
RAM (RAM)	Internal RAM	MCU's internal RAM, which can be read and written to.
IO (I/O)	Internal I/O registers	MCU's internal I/O register area.
CACHE (Cache)	Internal cache	MCU's internal cache area.
TAR16 (Tar16)	User memory (16-bit bus)	16-bit bus user area.
TAR8 (Tar8)	User memory (8-bit bus)	8-bit bus user area.
EMU16 (Tar16)	Emulation memory (16-bit bus)	16-bit bus emulation memory.
EMU8 (Emu8)	Emulation memory (8-bit bus)	8-bit bus emulation memory.

4.2 Access Status

Table 4.2 lists the parameters for bus status (bus) that can be specified with HDI command line interface or displayed as trace results.

Table 4.2 Bus Status Parameters

HDI Parameter (Trace Display)	Bus Status	Description
DMAC (DMAC)	On-chip DMAC	Access by the MCU's DMAC
CACHE (Cache)	Cache fill	MCU internal cache fill cycle
DATA (Data)	CPU data access	Data access for instruction execution by the CPU
PROG (Prog)	CPU instruction fetch	Instruction fetch access by the CPU
SLEEP_DMAC (Sleep: DMAC)	Sleep status	DMAC cycle was generated in sleep mode.

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SH7010 Series E6000
Supplementary Information

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