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April 1st, 2010
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User's Manual

H8S, H8SX Family E10A-USB Emulator

Additional Document for User's Manual Supplementary Information on Using the H8S/2339EF, H8S/2329EF, and H8S/2319EF

Renesas Microcomputer Development Environment System
H8S Family / H8S/2300 Series
H8S Family / H8S/2100 Series
E10A-USB for H8S/2339F HS2339KCU01HE

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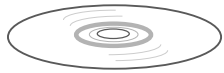
Section 1 Connecting the Emulator with the User System

1.1 Components of the E10A-USB Emulator

The H8S/2339F E10A-USB emulator supports the H8S/2339EF, H8S/2329EF, and H8S/2319EF (hereafter referred to as the MCU unless the description is specific to any of them). It also supports MCU operating modes 4, 5, 6, and 7 and enables realtime emulation. Table 1.1 lists the components of the E10A-USB emulator.

Table 1.1 Components of the Emulator

Classi-fication	Component	Appearance	Quan-tity	Remarks
Hard-ware	Emulator box		1	HS0005KCU01H: Depth: 65.0 mm, Width: 97.0 mm, Height: 20.0 mm, Mass: 72.9 g or HS0005KCU02H[*1]: Depth: 65.0 mm, Width: 97.0 mm, Height: 20.0 mm, Mass: 73.7 g
	User system interface cable		1	14-pin type: Length: 20 cm, Mass: 33.1 g
	USB cable		1	Length: 150 cm, Mass: 50.6 g
Soft-ware	H8S/2339F E10A-USB emulator setup program, H8S, H8SX Family E10A-USB Emulator User's Manual, Supplementary Information on Using the H8S/2339EF, H8S/2329EF, and H8S/2319EF[*2], and Test program manual for HS0005KCU01H and HS0005KCU02H		1	HS0005KCU01SR, HS0005KCU01HJ-H8S, HS0005KCU01HE-H8S, HS2339KCU01HJ, HS2339KCU01HE, HS0005TM01HJ, and HS0005TM01HE (provided on a CD-R)

Notes: 1. When HS0005KCU02H is purchased, the 36-pin type cable is provided; however, it is not available for this MCU.

2. Additional document for the MCUs supported by the emulator is included. Check the target MCU and refer to its additional document.

1.2 Connecting the E10A-USB Emulator with the User System

Before connecting an E10A-USB emulator (hereafter referred to as the emulator) with the user system, a connector must be installed in the user system so that an user system interface cable can be connected. When designing the user system, refer to an example of recommended connection between the connector and the MCU shown in this manual.
Before designing the user system, be sure to read the E10A-USB Emulator User's Manual and the hardware manual for related MCUs.

Connect pins 8, 9, 10, 12, 13, and 14 of the user system connector to GND firmly on the PCB. These pins are used as electrical GND and to monitor the connection of the user system connector. Note the pin arrangement of the user system connector.

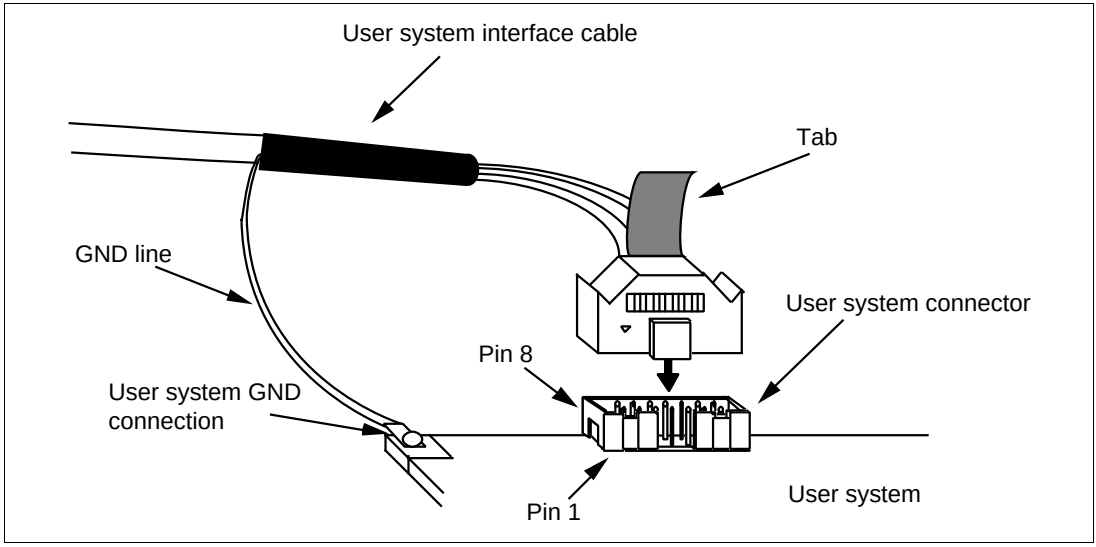


Figure 1.1 Connecting the User System Interface Cable to the User System

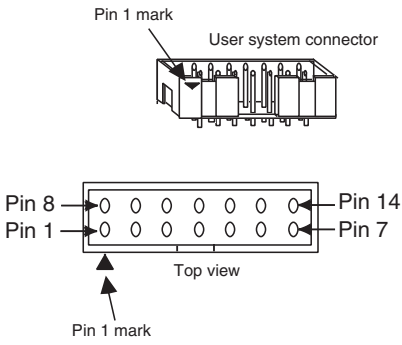
Notes:
1. The pin number assignments of the 14-pin connector differ from those of the E7 emulator; however, the physical location is the same.
2. When designing the connector layout on the user board, do not place any components within 3 mm of the user system connector.

⚠ WARNING

Be sure to place the GND line of the user system interface cable on the GND of the user system with a screw, etc. Failure to do so will result in a FIRE HAZARD due to an overcurrent and will damage the user system, the emulator product, and the host computer.

1.3 Pin Assignments of the User System Connector

Figure 1.2 shows the pin assignments of the user system connector.



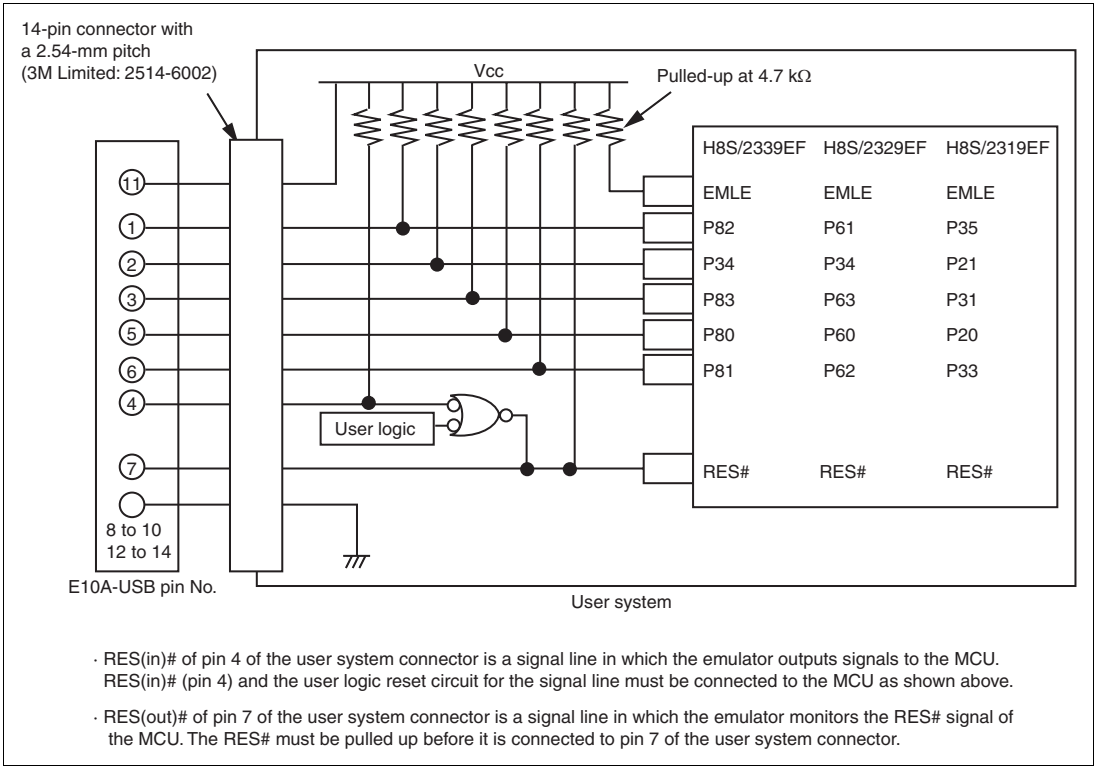
Pin No.	Signal Name H8S/2339EF	H8S/2329EF	H8S/2319EF	Input/Output *1
1	P82	P61	P35	Input
2	P34	P34	P21	Input
3	P83	P63	P31	Output
4	RES(in)# *2,*5	RES(in)# *2,*5	RES(in)# *2,*5	Input
5	P80	P60	P20	Input
6	P81	P62	P33	Input
7	RES(out)# *2	RES(out)# *2	RES(out)# *2	Output
8 to 10 12 to 14	GND *3	GND *3	GND *3	—
11	Vcc *4	Vcc *4	Vcc *4	—

Notes: 1. Input or output from the user system.
2. The symbol (#) means that the signal is active-low.
3. By detecting GND on the user system side, the emulator decides whether the user system is connected or not.
4. Connect Vcc with the Vcc of the MCU.
5. The port and peripheral functions assigned to pins 1 to 3 and 5 to 6 of the user system connector cannot be used.
6. RES(in) is not the pin name of the MCU. It cannot be directly connected to the MCU pins.

Figure 1.2 Pin Assignments of the User System Connector

1.4 Example of Emulator Connection

The figure shown below is an example of connecting the user system to the emulator.



· RES(in)# of pin 4 of the user system connector is a signal line in which the emulator outputs signals to the MCU. RES(in)# (pin 4) and the user logic reset circuit for the signal line must be connected to the MCU as shown above.

· RES(out)# of pin 7 of the user system connector is a signal line in which the emulator monitors the RES# signal of the MCU. The RES# must be pulled up before it is connected to pin 7 of the user system connector.

Figure 1.3 Example of Emulator Connection

Notes: 1. The emulator uses P34 and P80 to P83 in the H8S/2339EF, P34 and P60 to P63 in the H8S/2329EF, and P20 to P21, P31, P33, and P35 in the H8S/2319EF. Pull up the emulator and MCU pins and connect them to the user system connector.

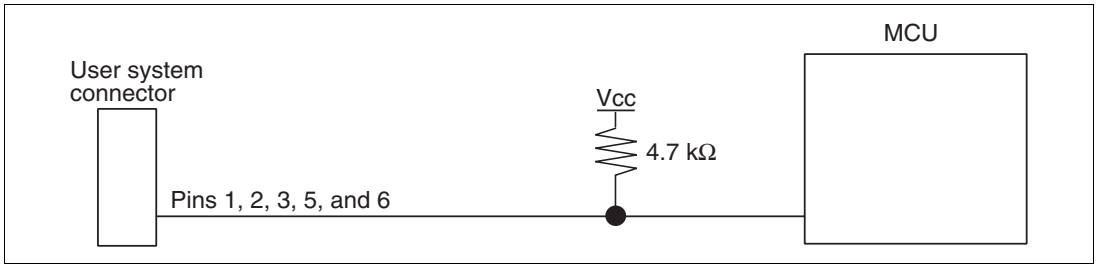


Figure 1.4 Connection of Emulator and MCU

2. The EMLE pin in the H8S/2339EF, H8S/2329EF, and H8S/2319EF must be pulled up when connecting with the emulator, and connected to ground when not connecting with the emulator.

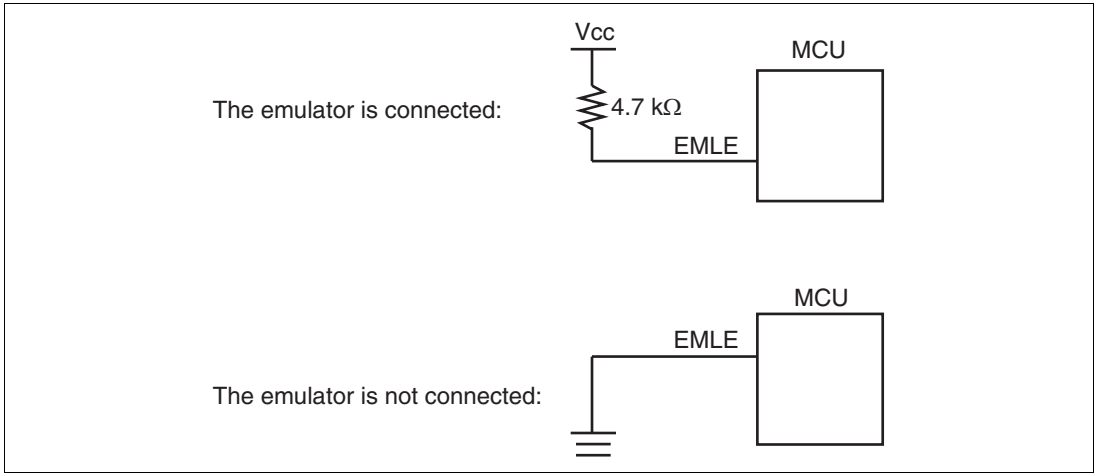


Figure 1.5 EMLE Pin and Emulator

3. RES(in)# of pin 4 of the user system connector is a signal line in which the emulator outputs signals to the MCU. RES(in)# of pin 4 and the user system reset circuit must be connected to the MCU, as shown in figure 1.6. RES(out)# of pin 7 of the user system connector is a signal line in which the emulator monitors the RES# signal of the MCU. The RES# must be pulled up before it is connected to pin 7 of the user system connector.

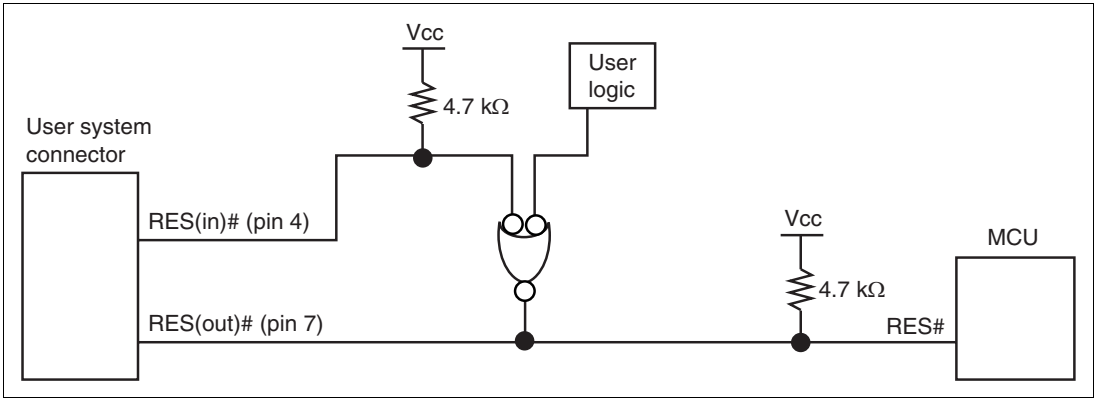


Figure 1.6 Connection of the RES# Pin

4. Connect GND of pins 8 to 10 and 12 to 14 in the user system connector to ground in the user system.
5. Connect Vcc, pin 11 of the user system connector, to the power supply (Vcc) in the user system. The input voltage, Vcc, is within the range of guaranteed operation of the microcomputer.
6. In the H8S/2339, H8S/2329, and H8S/2319 series, only H8S/2339EF, H8S/2329EF, and H8S/2319EF can be connected to the emulator. H8S/2339F, H8S/2329F, and H8S/2319F for general use cannot be used.
7. When H8S/2339EF and H8S/2329EF are connected to the emulator, SCI0 (serial communication interface channel 0) cannot be used.
8. When H8S/2319EF is connected to the emulator, SCI1 (serial communication interface channel 1) cannot be used.
9. When H8S/2339EF, H8S/2329EF, and H8S/2319EF are connected to the emulator, the following pin functions cannot be used.

Table 1.2 Unavailable Pin Functions

H8S/2339EF	H8S/2329EF	H8S/2319EF
P34 and P80 to P83	P34 and P60 to P63	P20, P21, P31, P33, and P35
FWE	FWE	FWE
SCK0	SCK0	SCK1, TxD1, and RxD1
DREQ0# and DREQ1#	DREQ0# and DREQ1#	IRQ5#
TEND0#	TEND0#	TIOCA3 and TIOCB3
–	CS4# and CS5#	–

Note: The symbol “#” means that the signal is active-low.

Section 2 Specification of the Emulator's Software

2.1 Differences between the H8S/2339EF, H8S/2329EF, H8S/2319EF, and the Emulator

1. When the emulator system is initiated, it initializes the general registers and part of the control registers as shown in table 2.1. The initial value of the MCU is undefined. When the emulator is initiated from the workspace, a value to be entered is saved in a session.
   For the registers shown in table 2.1, values other than PC or CCR are not changed even if the CPU reset command is issued. If ER7 (SP) is changed as an odd value, it must be modified in the [Register] window.

Table 2.1 Register Initial Values at Emulator Power-On

Register	Initial Value
PC	Reset vector value in the vector address table
ER0 to ER6	H'0
ER7 (SP)	H'10
CCR	1 for I mask, and others undefined
EXR	H'7F

2. System Control Register
   In the emulator, the internal I/O registers can be accessed from the [IO] window. However, be careful when accessing the system control register. The emulator saves the register value of the system control register at a break and returns the value when the user program is executed. Since this is done during a break, do not rewrite the system control register in the [IO] window.

3. Memory Access during Emulation
   If the memory contents are referenced or modified during emulation, realtime emulation cannot be performed because the user program is temporarily halted.

4. The emulator communicates with the MCU by using the pins shown in figure 1.2 (section 1.3). These pins cannot be used.

5. When the emulator is used, the power consumed by the MCU can reach several mA. This is because the user power supply drives ICs to make the communication signal level match the user-system power-supply voltage.

6. Do not use an MCU that has been used for debugging.
   If the flash memory is rewritten many times, and the MCU is left for a few days, data may be lost due to retention problems.
   If the flash memory is rewritten many times, the data will not be erased. If an error message is displayed, exchange the MCU for a new one.

7. Sum Data Displayed in the Writing Flash memory Mode
   Sum data, which is displayed in the 'Writing Flash memory' mode, is a value that data in the whole ROM areas has been added by bytes.

8. Note on Executing the User Program
   The set value is rewritten since the emulator uses flash memory registers during programming (Go, Step In, Step Out, or Step Over) of the flash memory.

9. MCU Operating Mode
   The emulator supports modes 4 and 5 (expanded mode with on-chip ROM disabled modes), mode 6 (expanded mode with on-chip ROM enabled mode), and mode 7 (single-chip mode).

10. Programming Flash Memory during Debugging
    The flash memory is programmed in the following functions because they use breakpoints:
    - When executing [Go to cursor]
    - When stepping over the subroutine
    - When executing the subroutine at step-out operation

11. Loading Sessions
    Information in [JTAG clock] of the [Configuration] dialog box cannot be saved by sessions. Thus the TCK value becomes the initial value when loading sessions.
    — When HS0005KCU01H or HS0005KCU02H is used: TCK = 1.25 MHz

12. Note on Using the Watchdog Timer (WDT)
    If a reset occurs by an overflow of the WDT during user program halting, the emulator will not operate correctly. Do not use the reset function by the overflow of the WDT.

13. Value Set in the [System Clock] Dialog Box when Connecting the Emulator

    Input the frequency of the oscillator in use in the [System Clock] dialog box (this also applies when the MCU is multiplied by the PLL circuit).

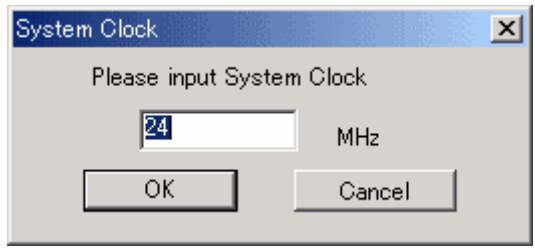


Figure 2.1 [System Clock] Dialog Box

14. Emulation on Programming or Erasing the Internal Flash Memory

    A break cannot be generated while the program for programming or erasing the internal flash memory is being called. Note that the following processing also cannot be performed:

    - Execution of the [STOP] button
    - Auto-update of the watch function and use of the tool-chip watch function
    - Memory operation during executing emulation

2.2 The H8S/2339F E10A-USB Emulator Specific Functions and Notes

Notes: 1. Do not use an MCU that has been used for debugging.
2. If the flash memory is rewritten many times, and the emulator is left for a few days, data may be lost due to retention problems.
3. If the flash memory is rewritten many times, the data will not be erased. If an error message is displayed, exchange the MCU for a new one.

2.2.1 Emulator Driver Selection

Table 2.2 shows drivers which can be selected in the [Driver Details] dialog box.

Table 2.2 Type Name and Driver

Type Name	Driver
HS0005KCU01H, HS0005KCU02H	Renesas E-Series USB Driver

2.2.2 Hardware Break Functions

Hardware Break Conditions: In the H8S/2339F E10A-USB emulator, conditions of Break Condition 1,2 can be set. Table 2.3 lists the items that can be specified.

Table 2.3 Hardware Break Condition Specification Items

Items	Description
Address bus condition	Breaks when the MCU address bus value matches the specified value.
Data bus condition	Breaks when the MCU data bus value matches the specified value. High or low byte or word can be specified as the access data size.
Read or write condition	Breaks in the read or write cycle.

Table 2.4 lists the combinations of conditions that can be set in the [Break condition] dialog box.

Table 2.4 Conditions Set in [Break condition] Dialog Box

	Condition		
Dialog Box	**Address Bus Condition**	**Data Condition**	**Read or Write Condition**
[Break condition 1]	O	O	O
[Break condition 2]	O	O	O

Note: O: Can be set by checking the radio button in the dialog box.

Table 2.5 lists the combinations of conditions that can be set by the BREAKCONDITION_SET command.

Table 2.5 Conditions Set by BREAKCONDITION_SET Command

	Condition		
Channel	**Address Bus Condition (<addropt> option)**	**Data Condition (<dataopt> option)**	**Read or Write Condition (<r/wopt> option)**
Break condition 1	O	O	O
Break condition 2	O	O	O

Note: O: Can be set by the BREAKCONDITION_SET command.

Notes on Setting the Break Condition:

1. When [Step In], [Step Over], or [Step Out] is selected, the settings of Break Condition are disabled.
2. The settings of Break Condition are disabled when an instruction to which a BREAKPOINT has been set is executed.
3. When step over function is used, the settings of BREAKPOINT and Break Condition are disabled.

2.2.3 Notes on Setting the [Breakpoint] Dialog Box

1. When an odd address is set, the address is rounded down to an even address.
2. A BREAKPOINT is accomplished by replacing instructions. Accordingly, it can be set only to the flash memory or the RAM area. However, a BREAKPOINT cannot be set to the following addresses:
   - An area other than flash memory or RAM
   - An area occupied by the emulator program
   - An instruction in which Break Condition is satisfied
3. During step execution, a BREAKPOINT is disabled.
4. A condition set at Break Condition is disabled immediately after starting execution when an instruction at a BREAKPOINT is executed. A break does not occur even if a condition of Break Condition is satisfied immediately after starting the execution.
5. When execution resumes from the breakpoint address after the program execution stops at the BREAKPOINT, single-step execution is performed at the address before execution resumes. Therefore, realtime operation cannot be performed.
6. Settings of BREAKPOINT and Break Condition are invalid while the STEP OVER function is being used.

2.2.4 Note on Using the JTAG Clock (TCK)

When the JTAG clock (TCK) is used, set the frequency to lower than that of the system clock.

2.2.5 Trace Function

The emulator uses the branch-instruction trace function in the MCU, and acquires a trace by operating the user program in realtime. This function displays the four-channel branch-source address, the mnemonic, and the operand.

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Publication Date:	Rev.1.00, September 15, 2004
	Rev.2.00, November 15, 2007
Published by:	Sales Strategic Planning Div.
	Renesas Technology Corp.
Edited by:	Customer Support Department
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Renesas Technology Corp. Sales Strategic Planning Div. Nippon Bldg., 2-6-2, Ohte-machi, Chiyoda-ku, Tokyo 100-0004, Japan

RENESAS SALES OFFICES

http://www.renesas.com

Refer to "**http://www.renesas.com/en/network**" for the latest and detailed information.

Renesas Technology America, Inc.
450 Holger Way, San Jose, CA 95134-1368, U.S.A
Tel: <1> (408) 382-7500, Fax: <1> (408) 382-7501

Renesas Technology Europe Limited
Dukes Meadow, Millboard Road, Bourne End, Buckinghamshire, SL8 5FH, U.K.
Tel: <44> (1628) 585-100, Fax: <44> (1628) 585-900

Renesas Technology (Shanghai) Co., Ltd.
Unit 204, 205, AZIACenter, No.1233 Lujiazui Ring Rd, Pudong District, Shanghai, China 200120
Tel: <86> (21) 5877-1818, Fax: <86> (21) 6887-7898

Renesas Technology Hong Kong Ltd.
7th Floor, North Tower, World Finance Centre, Harbour City, 1 Canton Road, Tsimshatsui, Kowloon, Hong Kong
Tel: <852> 2265-6688, Fax: <852> 2730-6071

Renesas Technology Taiwan Co., Ltd.
10th Floor, No.99, Fushing North Road, Taipei, Taiwan
Tel: <886> (2) 2715-2888, Fax: <886> (2) 2713-2999

Renesas Technology Singapore Pte. Ltd.
1 Harbour Front Avenue, #06-10, Keppel Bay Tower, Singapore 098632
Tel: <65> 6213-0200, Fax: <65> 6278-8001

Renesas Technology Korea Co., Ltd.
Kukje Center Bldg. 18th Fl., 191, 2-ka, Hangang-ro, Yongsan-ku, Seoul 140-702, Korea
Tel: <82> (2) 796-3115, Fax: <82> (2) 796-2145

Renesas Technology Malaysia Sdn. Bhd
Unit 906, Block B, Menara Amcorp, Amcorp Trade Centre, No.18, Jalan Persiaran Barat, 46050 Petaling Jaya, Selangor Darul Ehsan, Malaysia
Tel: <603> 7955-9390, Fax: <603> 7955-9510

H8S, H8SX E10A-USB Emulator
Additional Document for User's Manual Supplementary Information on Using the H8S/2339EF, H8S/2329EF, and H8S/2319EF

Renesas Electronics Corporation
1753, Shimonumabe, Nakahara-ku, Kawasaki-shi, Kanagawa 211-8668 Japan

REJ10B0153-0200