

To our customers,

---

## Old Company Name in Catalogs and Other Documents

---

On April 1<sup>st</sup>, 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 1<sup>st</sup>, 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.

# H8SX Family

## Access to the External Address Space in Single-chip Mode

---

### Introduction

Register setting etc. are required for the H8SX MCU to use the external address space in single-chip mode.

This sample application describes access to SRAM that is connected in the external address space when the MCU has been booted-up in single-chip mode.

### Target Device

H8SX/1663 group

### Preface

Descriptions in this application note are in accord with the *H8SX/1663 Group Hardware Manual*, and the program can be used with the above target device.

Some functions might have been modified due to the addition of functionality etc., so please confirm items with the Hardware Manual and perform sufficient evaluation before use.

### Contents

1. Specifications .....	2
2. Applicable Conditions .....	2
3. Description of Functions Used .....	3
4. Description of Operation .....	5
5. Description of Software .....	7
6. Documents for Reference .....	16

## 1. Specifications

The H8SX MCU is booted-up in single-chip mode, and gains access to byte-control SRAM that is connected to area 2 in the external address space. One Mbyte is read and written during SRAM access.

## 2. Applicable Conditions

**Table 1 Applicable Conditions**

Item	Description
Operating frequency	EXTAL input clock: 12 MHz System clock (I $\phi$ ): 24 MHz (frequency-doubled from input clock) Peripheral module clock (P $\phi$ ): 24 MHz (frequency-doubled from input clock) External bus clock (B $\phi$ ): 24 MHz (frequency-doubled from input clock)
Operating mode	Mode 7 (Single-chip mode) Mode pin settings: MD3 = 0, MD2 = 1, MD1 = 1, MD0 = 1, MD_CLK = 0
Development tool	High-performance Embedded Workshop Ver.4.04.01
C/C++ compiler	H8S, H8/300 SERIES C/C++ Compiler Ver.6.02.00 (from Renesas Technology Corp.) Optional settings: -cpu=h8sxa:24:md, -code=machinecode, -optimize=1, -regparam=3, -speed=(register,shift,struct,expression)
Optimizing Linkage Editor	Optimizing Linkage Editor Ver.9.03.00 (from Renesas Technology Corp.) Optional setting -start=P/01000, BCS2/0400000

**Table 2 Specifications of Byte-control SRAM**

Item	Description
Product Name	R1LV1616RSD-7SR (from Renesas Technology Corp.)
Configuration	1 M $\times$ 16-bit words
Capacity	16 M bits

### 3. Description of Functions Used

#### 3.1 System Control Register (SYSCR)

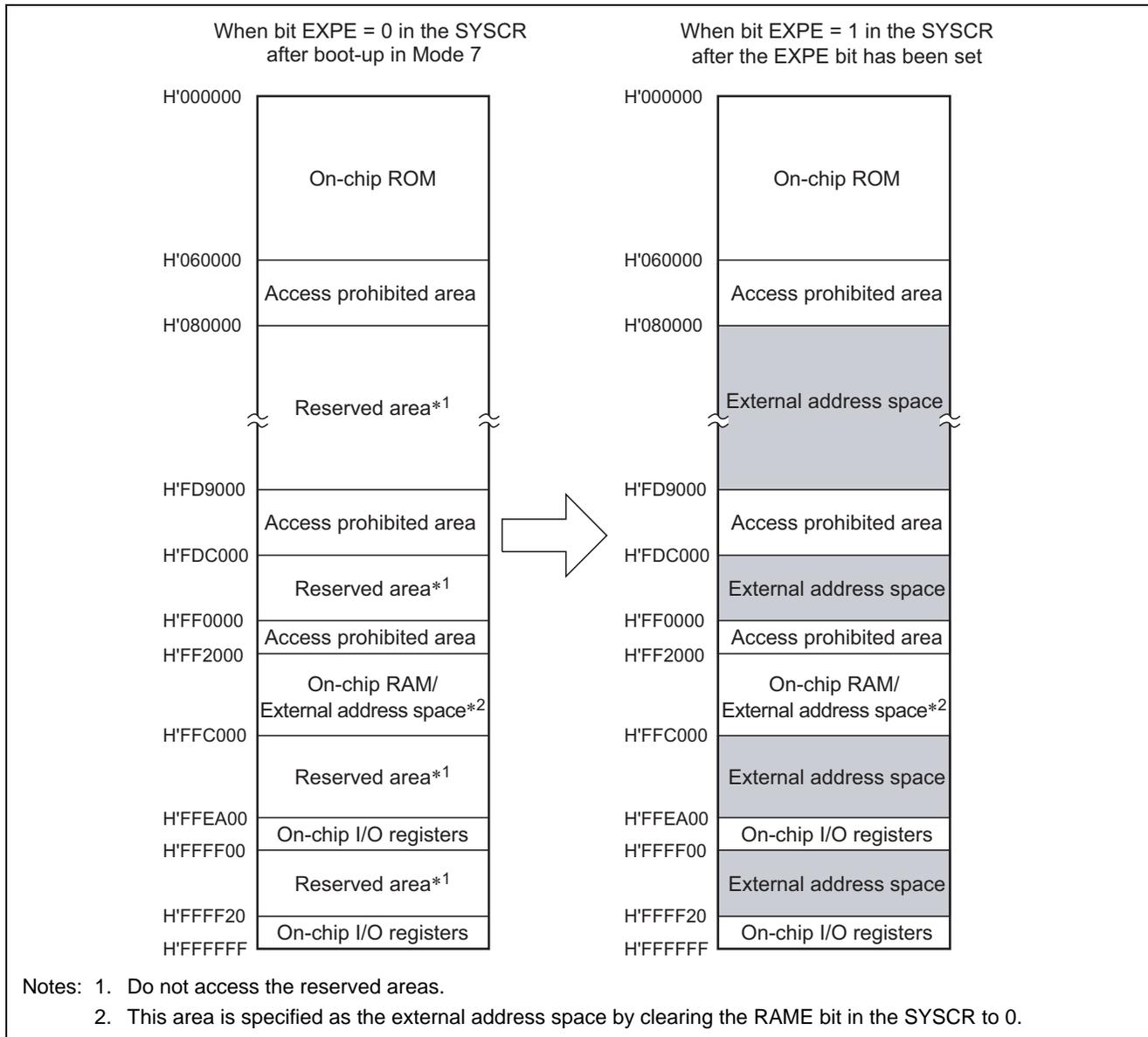
The EXPE bit in the SYSCR is listed in table 3.

**Table 3 System control register (SYSCR)**

Bit	Bit Name	Setting Value	Descriptions
9	EXPE	1	<p>External Bus Mode Enable</p> <p>Selects external bus mode. In external extended mode, this bit is fixed to 1 and cannot be changed. In single-chip mode, the initial value of this bit is 0, and the bit is readable and writable. When writing 0 to this bit after reading EXPE = 1, an external bus cycle should not be executed. Depending on the settings of the write data buffer function, execution of external bus cycle may be carried out in parallel with the internal bus cycle.</p> <p>0: External bus disabled                      1: External bus enabled</p>

### 3.2 Address Map

The address map in mode 7 (single-chip mode) is shown in Figure 1. As illustrated below, the external address space can be accessed by changing the value of the EXPE bit in the SYSCR from 0 to 1.



**Figure 1 Address Map in Operating Mode 7 of the H8SX/1663**

## 4. Description of Operation

### 4.1 Procedure for Setting the Sample Program

The procedure for settings to access the external address space (area 2) is shown in Figure 2. In single-chip mode, setting the EXPE bit in the SYSCR to 1 enables access to the external address space.

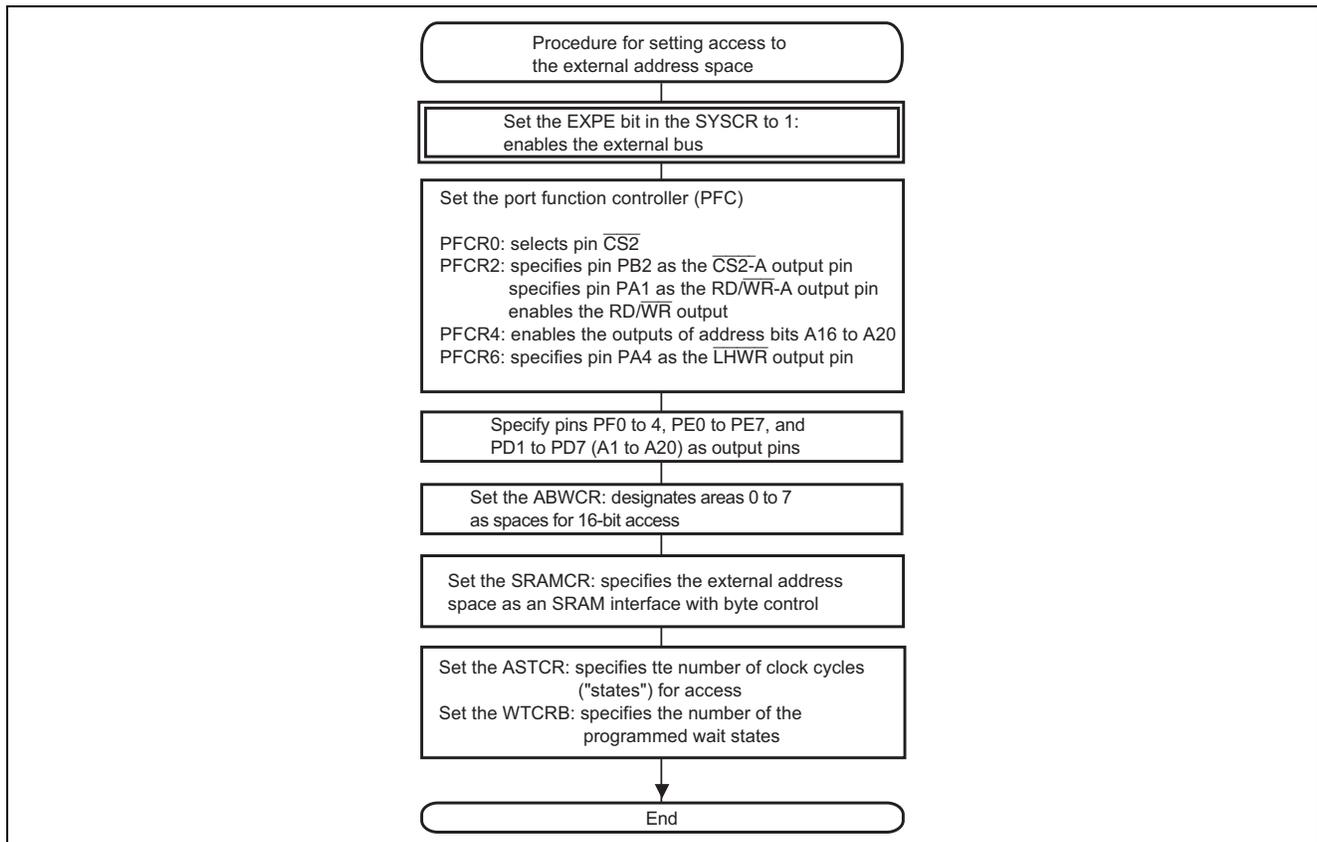
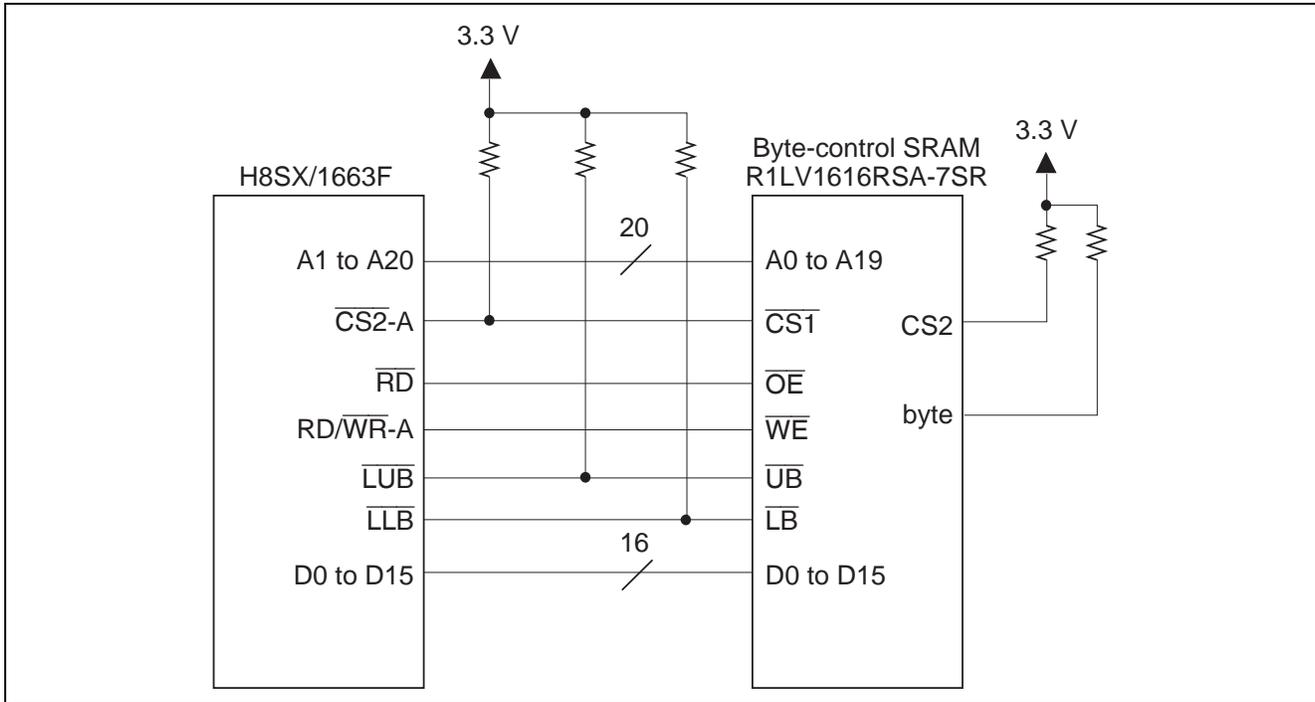


Figure 2 Procedure of Settings for Access to External Address Space

**4.2 Example of Connections for the Sample Program**

An example of the connection for byte-control SRAM when setting access to the external address space is shown in Figure 3.



**Figure 3 Example of Connection of Byte-control SRAM**

## 5. Description of Software

### 5.1 Vector Table

**Table 4** Interrupt Exception Handling Vector Table

Exception Handling Source	Vector Number	Vector Table Address	Vector Destination Function
Reset	0	H'000000	init

### 5.2 List of Functions

**Table 5** List of Functions in File main.c

Function Name	Function
Init	Initialization routine Releases modules from module stop state, sets the clocks and calls the main function.
Main	Main routine Calls the Bsclnit function, and then verifies a 1-Mbyte area to confirm the operation of the external bus.
Bsclnit	Initialization of Area 2 (byte-control SRAM area) Enables the external bus and specifies Area 2 as a byte-control SRAM interface with 16-bit bus width.

### 5.3 RAM Usage

**Table 5** RAM Usage

Type	Name of Variable	Description	Function used
unsigned char	area2 [0x100000]	User variable (byte-control SRAM area)	main

## 5.4 Description of Functions

### 5.4.1 Function init

(1) Functional overview

The initialization routine releases the required modules from module-stop state, sets the clocks and calls the main function.

(2) Arguments

None

(3) Return value

None

(4) Description of internal register usage

Internal registers used in this sample task are listed below. Note that the settings shown below are not the initial values but the values used in this sample task.

- Mode control register (MDCR) Number of bits: 16      Address: H'FFFDC0

Bit	Bit Name	Setting	R/W	Description
15	MDS7	Undefined*	R	Indicates the value set by the mode pin (MD3). When MDCR is read, the input level on the MD3 pin is latched. This latching is released by a reset.
11	MDS3	Undefined*	R	Mode Select 3 to 0
10	MDS2	Undefined*	R	These bits indicate the value corresponding to the operating mode selected by the mode pins (MD2 to MD0; see table 7). When MDCR is read, the input levels on pins MD2 to MD0 are latched into these bits. The latches are released by a reset.
9	MDS1	Undefined*	R	
8	MDS0	Undefined*	R	

Note: \* Determined by the settings on pins MD3 to MD0.

**Table 7 Values of Bits MDS3 to MDS0**

MCU Operating Mode	Pins			MDCR			
	MD2	MD1	MD0	MDS3	MDS2	MDS1	MDS0
2	0	1	0	1	1	0	0
4	1	0	0	0	0	1	0
5	1	0	1	0	0	0	1
6	1	1	0	0	1	0	1
7	1	1	1	0	1	0	0

- System clock control register (SCKCR) Number of bits: 16      Address: H'FFFDC4

Bit	Bit Name	Setting	R/W	Description
10	ICK2	0	R/W	System Clock ( $I\phi$ ) Select
9	ICK1	0	R/W	These bits select the frequency of the system clock, which is provided to the CPU, DMAC, DTC etc. 001: Input clock $\times$ 2
8	ICK0	1	R/W	
6	PCK2	0	R/W	Peripheral Module Clock ( $P\phi$ ) Select
5	PCK1	0	R/W	These bits select the frequency of the peripheral module clock. 001: Input clock $\times$ 2
4	PCK0	1	R/W	
2	BCK2	0	R/W	External Bus Clock ( $B\phi$ ) Select
1	BCK1	0	R/W	These bits select the frequency of the external bus clock. 001: Input clock $\times$ 2
0	BCK0	1	R/W	

- MSTPCRA, MSTPCRB and MSTPCRC control the module stop state. Setting a bit to 1 makes the corresponding module enter the module stop state, while clearing the bit to 0 releases the module from module stop state.

- Module stop control register A (MSTPCRA) Number of bits: 16      Address: H'FFFDC8

Bit	Bit Name	Setting	R/W	Description
15	ACSE	0	R/W	All-Module-Clock-Stop Mode Enable Enables/disables all-module-clock-stop mode for reducing current consumption by stopping the bus controller and I/O ports operation when the CPU executes the SLEEP instruction after the module stop state has been set for all the on-chip peripheral modules controlled by the MSTPCRA and MSTPCRB. 0: Disables the all-module-clock-stop mode 1: Enables the all-module-clock-stop mode
13	MSTPA13	1	R/W	DMA controller (DMAC)
12	MSTPA12	1	R/W	Data transfer controller (DTC)
9	MSTPA9	1	R/W	8-bit timer unit (TMR_3 and TMR_2)
8	MSTPA8	1	R/W	8-bit timer unit (TMR_1 and TMR_0)
5	MSTPA5	1	R/W	D/A converter (channels 1 and 0)
3	MSTPA3	1	R/W	A/D converter (unit 0)
0	MSTPA0	1	R/W	16-bit timer pulse unit (TPU channels 5 to 0)

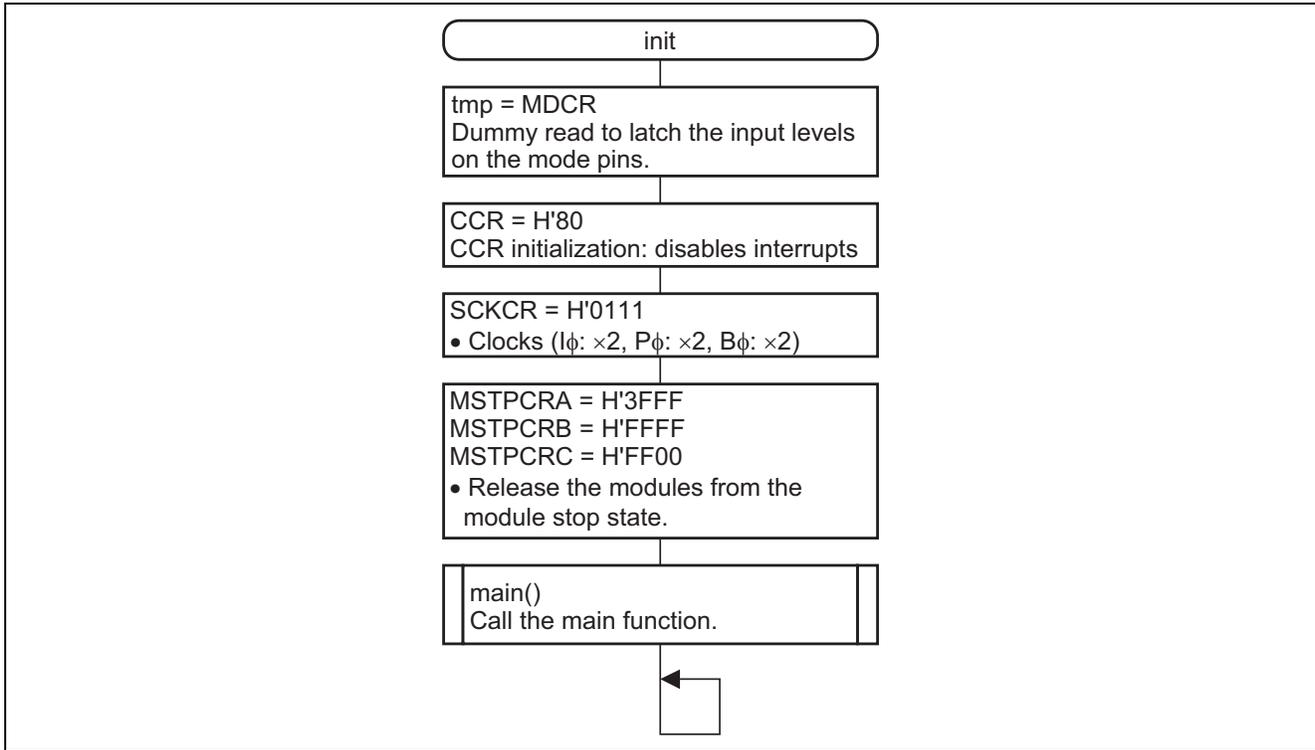
- Module stop control register B (MSTPCRB) Number of bits: 16      Address: H'FFFDCA

Bit	Bit Name	Setting	R/W	Description
15	MSTPB15	1	R/W	Programmable pulse generator (PPG)
12	MSTPB12	1	R/W	Serial communications interface_4 (SCI_4)
10	MSTPB10	1	R/W	Serial communications interface_2 (SCI_2)
9	MSTPB9	1	R/W	Serial communications interface_1 (SCI_1)
8	MSTPB8	1	R/W	Serial communications interface_0 (SCI_0)
7	MSTPB7	1	R/W	I <sup>2</sup> C bus Interface_1 (IIC_1)
6	MSTPB6	1	R/W	I <sup>2</sup> C bus Interface_0 (IIC_0)

- Module stop control register C (MSTPCRC) Number of bits: 16      Address: H'FFFDCC

Bit	Bit Name	Setting	R/W	Description
15	MSTPC15	1	R/W	Serial communications interface_5 (SCI_5), (IrDA)
14	MSTPC14	1	R/W	Serial communications interface_6 (SCI_6)
13	MSTPC13	1	R/W	8-bit timer unit (TMR_4, TMR_5)
12	MSTPC12	1	R/W	8-bit timer unit (TMR_6, TMR_7)
11	MSTPC11	1	R/W	Universal serial bus interface (USB)
10	MSTPC10	1	R/W	Cyclic redundancy check
4	MSTPC4	0	R/W	On-chip RAM_4 (H'FF2000 to H'FF3FFF)
3	MSTPC3	0	R/W	On-chip RAM_3 (H'FF4000 to H'FF5FFF)
2	MSTPC2	0	R/W	On-chip RAM_2 (H'FF6000 to H'FF7FFF)
1	MSTPC1	0	R/W	On-chip RAM_1 (H'FF8000 to H'FF9FFF)
0	MSTPC0	0	R/W	On-chip RAM_0 (H'FFA000 to H'FFBFFF)

### (5) Flowchart



### 5.4.2 Function main

(1) Functional overview

The main routine calls the BscInIt function and verifies a 1-Mbyte area to confirm the operation of the external bus.

(2) Arguments

None

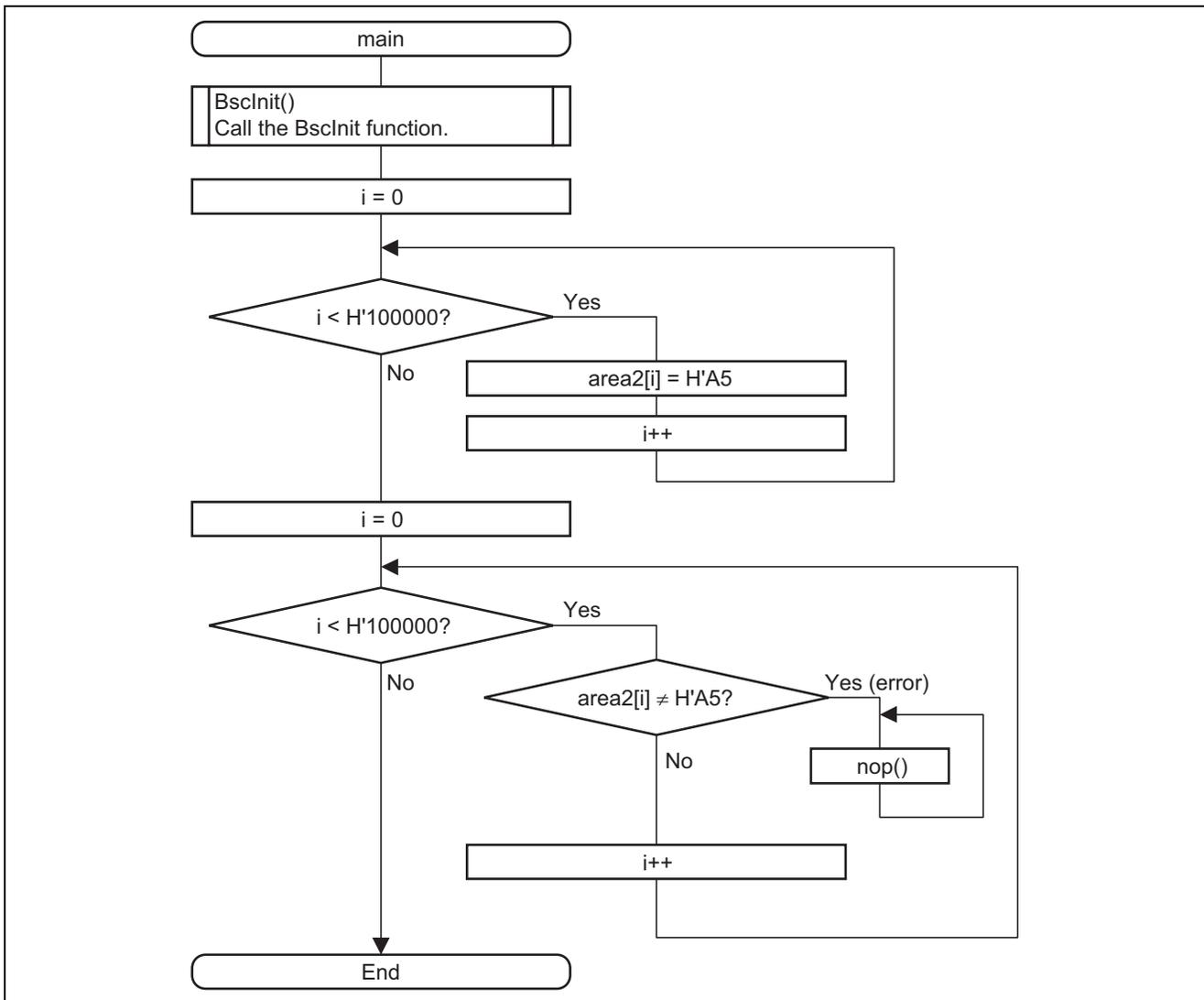
(3) Return value

None

(4) Description of internal register usage

None

(5) Flowchart



### 5.4.3 Function Bsclnit

(1) Functional overview

Initialization of Area 2 (byte-control SRAM area)

Settings are made to enable the external bus, and a byte-control SRAM interface with 16-bit bus width is specified for area 2.

(2) Arguments

None

(3) Return value

None

(4) Description of internal register usage

Internal registers used in this sample task are listed below. Note that the settings shown below are not the initial values but the values used in this sample task.

- Port D data direction register (PDDDR)                      Number of bits: 8                      Address: H'FFFB8C  
 Function: Specifies pins PD7 to PD1 as the address output pins.  
 Value: H'FE
- Port E data direction register (PEDDR)                      Number of bits: 8                      Address: H'FFFB8D  
 Function: Specifies pins PE7 to PE0 as the address output pins.  
 Value: H'FF
- Port F data direction register (PFDDR)                      Number of bits: 8                      Address: H'FFFB8E  
 Function: Specifies pins PF4 to PF0 as the address output pins.  
 Value: H'1F
- Port function control register 0 (PFCR0)                      Number of bits: 8                      Address: H'FFFBC0

Bit	Bit Name	Setting	Description
7	CS7E	Not set	CS7 to CS0 Enable
6	CS6E	Not set	These bits specify enabling/disabling of the corresponding $\overline{CSn}$ output.
5	CS5E	Not set	
4	CS4E	Not set	0: Specifies pin $\overline{CSn}$ as an I/O port pin
3	CS3E	Not set	1: Specifies pin $\overline{CSn}$ as the $\overline{CSn}$ output pin (n = 7 to 0)
2	CS2E	1	
1	CS1E	Not set	
0	CS0E	Not set	

- Port function control register 2 (PFCR2)                      Number of bits: 8                      Address: H'FFFBC2

Bit	Bit Name	Setting	Description
6	CS2S	0	CS2 Output Pin Select 0: Specifies pin PB2 as the $\overline{CS2}$ -A output pin 1: Specifies pin PB1 as the $\overline{CS2}$ -B output pin
3	RDWRS	0	RD/ $\overline{WR}$ Output Pin Select 0: Specifies pin PA1 as the RD/ $\overline{WR}$ -A output pin 1: Specifies pin PB6 as the RD/ $\overline{WR}$ -B output pin
2	RDWRE	1	RD/ $\overline{WR}$ Output Enable 0: Output of RD/ $\overline{WR}$ is disabled. 1: Output of RD/ $\overline{WR}$ is enabled.

- Port function control register 4 (PFCR4)      Number of bits: 8      Address: H'FFFBC4

Bit	Bit Name	Setting	Description
4	A20E	1	Address A20 Enable 0: Disables output of address bit A20 1: Enables output of address bit A20
3	A19E	1	Address A19 Enable 0: Disables output of address bit A19 1: Enables output of address bit A19
2	A18E	1	Address A18 Enable 0: Disables output of address bit A18 1: Enables output of address bit A18
1	A17E	1	Address A17 Enable 0: Disables output of address bit A17 1: Enables output of address bit A17
0	A16E	1	Address A16 Enable 0: Disables output of address bit A16 1: Enables output of address bit A16

- Port function control register 6 (PFCR6)      Number of bits: 8      Address: H'FFFBC6

Bit	Bit Name	Setting	Description
6	LHWROE	1	LHWR Output Enable 0: Specifies pin PA4 as an I/O port pin 1: Specifies pin PF4 as the $\overline{\text{LHWR}}$ output pin

- Bus width control register (ABWCR)      Number of bits: 16      Address: H'FFFD84  
Function: Designates areas 7 to 0 as a 16-bit access space.  
Value: H'00FF

- Access state control register (ASTCR)      Number of bits: 16      Address: H'FFFD86  
Function: Designates areas 7 to 0 as a three-state access space.  
Value: H'FF00

- Wait control register B (WTCRB)      Number of bits: 16      Address: H'FFFD8A  
Function: Specifies the number of programmed wait states (clock cycles). Seven wait cycles are inserted for area 2.  
Value: H'0700

- SRAM mode control register (SRAMCR)      Number of bits: 16      Address: H'FFFD98

Bit	Bit Name	Setting	Description
10	BCSEL2	1	Selects the bus interface for the corresponding area. 0: Basic bus interface 1: Byte-control SRAM interface

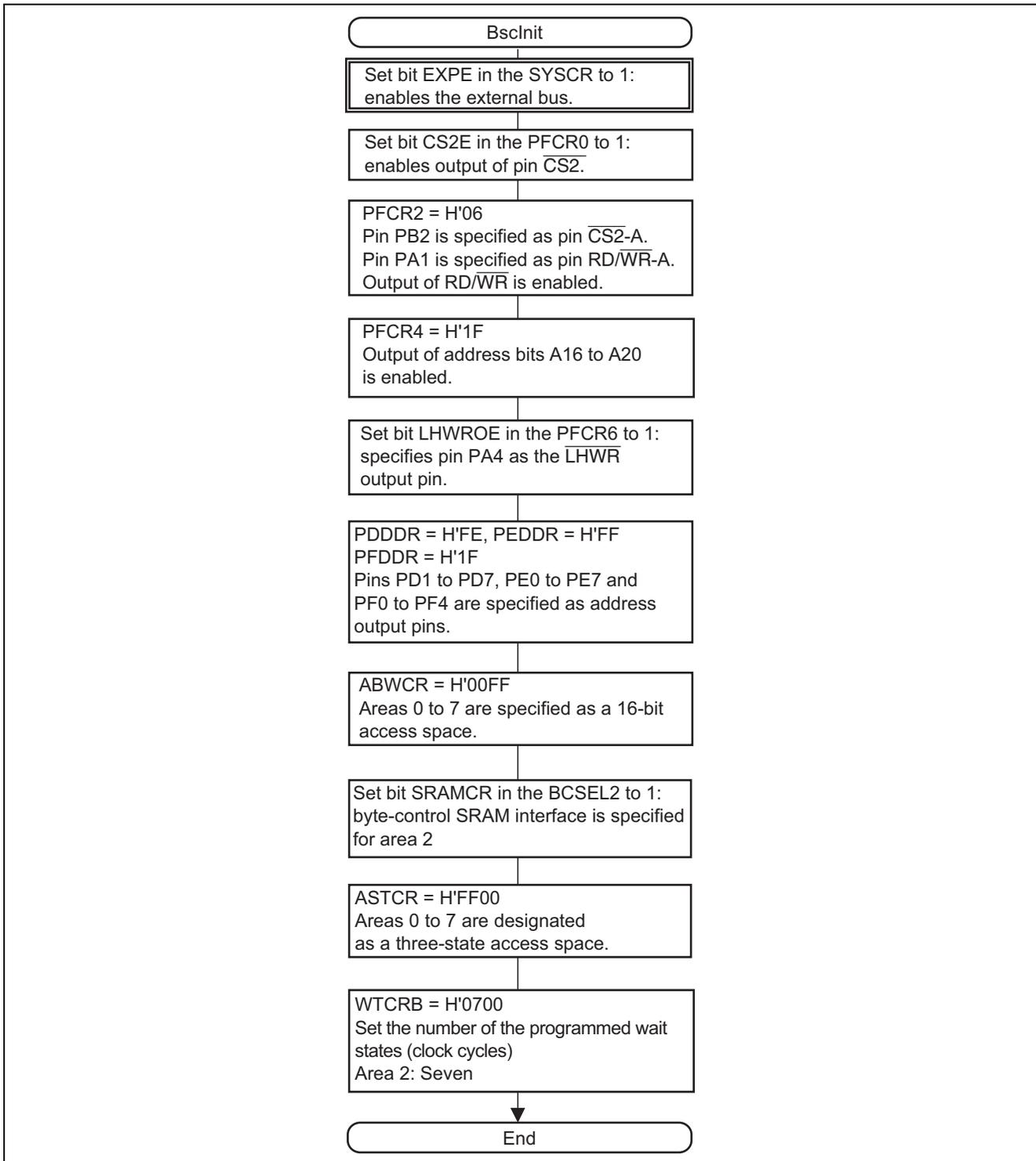
- System control register (SYSCR)

Number of bits: 16

Address: H'FFDC2

Bit	Bit Name	Initial Value	Descriptions
9	EXPE	1	<p>External Bus Mode Enable</p> <p>Selects external bus mode. In external extended mode, this bit is fixed to 1 and cannot be changed. In single-chip mode, the initial value of this bit is 0, and the bit is readable and writable. When writing 0 to this bit after reading EXPE = 1, an external bus cycle should not be executed. Depending on the settings of the write data buffer function, execution of external bus cycle may be carried out in parallel with the internal bus cycle.</p> <p>0: External bus disabled            1: External bus enabled</p>

(5)Flowchart



## 6. Documents for Reference

- Hardware Manual  
H8SX/1663 Group Hardware Manual  
The most up-to-date version of this document is available on the Renesas Technology Website.
- Technical News/Technical Update  
The most up-to-date version of this document is available on the Renesas Technology Website.
- Datasheet  
R1LV1616R Series Datasheet  
The most up-to-date version of this document is available on the Renesas Technology Website.

## Website and Support

Renesas Technology Website

<http://www.renesas.com/>

Inquiries

<http://www.renesas.com/inquiry>

[csc@renesas.com](mailto:csc@renesas.com)

## Revision Record

Rev.	Date	Description	
		Page	Summary
1.00	Sep.19.08	—	First edition issued

All trademarks and registered trademarks are the property of their respective owners.

Notes regarding these materials

1. This document is provided for reference purposes only so that Renesas customers may select the appropriate Renesas products for their use. Renesas neither makes warranties or representations with respect to the accuracy or completeness of the information contained in this document nor grants any license to any intellectual property rights or any other rights of Renesas or any third party with respect to the information in this document.
2. Renesas shall have no liability for damages or infringement of any intellectual property or other rights arising out of the use of any information in this document, including, but not limited to, product data, diagrams, charts, programs, algorithms, and application circuit examples.
3. You should not use the products or the technology described in this document for the purpose of military applications such as the development of weapons of mass destruction or for the purpose of any other military use. When exporting the products or technology described herein, you should follow the applicable export control laws and regulations, and procedures required by such laws and regulations.
4. All information included in this document such as product data, diagrams, charts, programs, algorithms, and application circuit examples, 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 products listed in this document, please confirm the latest product information with a Renesas sales office. Also, please pay regular and careful attention to additional and different information to be disclosed by Renesas such as that disclosed through our website. (<http://www.renesas.com>)
5. Renesas has used reasonable care in compiling the information included in this document, but Renesas assumes no liability whatsoever for any damages incurred as a result of errors or omissions in the information included in this document.
6. When using or otherwise relying on the information in this document, you should evaluate the information in light of the total system before deciding about the applicability of such information to the intended application. Renesas makes no representations, warranties or guaranties regarding the suitability of its products for any particular application and specifically disclaims any liability arising out of the application and use of the information in this document or Renesas products.
7. With the exception of products specified by Renesas as suitable for automobile applications, Renesas products are not designed, manufactured or tested for applications or otherwise in systems the failure or malfunction of which may cause a direct threat to human life or create a risk of human injury or which require especially high quality and reliability such as safety systems, or equipment or systems for transportation and traffic, healthcare, combustion control, aerospace and aeronautics, nuclear power, or undersea communication transmission. If you are considering the use of our products for such purposes, please contact a Renesas sales office beforehand. Renesas shall have no liability for damages arising out of the uses set forth above.
8. Notwithstanding the preceding paragraph, you should not use Renesas products for the purposes listed below:
  - (1) artificial life support devices or systems
  - (2) surgical implantations
  - (3) healthcare intervention (e.g., excision, administration of medication, etc.)
  - (4) any other purposes that pose a direct threat to human life

Renesas shall have no liability for damages arising out of the uses set forth in the above and purchasers who elect to use Renesas products in any of the foregoing applications shall indemnify and hold harmless Renesas Technology Corp., its affiliated companies and their officers, directors, and employees against any and all damages arising out of such applications.
9. You should use the products described herein within the range specified by Renesas, especially with respect to the maximum rating, operating supply voltage range, movement power voltage range, heat radiation characteristics, installation and other product characteristics. Renesas shall have no liability for malfunctions or damages arising out of the use of Renesas products beyond such specified ranges.
10. Although Renesas endeavors to improve the quality and reliability of its products, IC products have specific characteristics such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Please be sure to implement safety measures to guard against the possibility of physical injury, and injury or damage caused by fire in the event of the failure of a Renesas 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 applicable measures. Among others, since the evaluation of microcomputer software alone is very difficult, please evaluate the safety of the final products or system manufactured by you.
11. In case Renesas products listed in this document are detached from the products to which the Renesas products are attached or affixed, the risk of accident such as swallowing by infants and small children is very high. You should implement safety measures so that Renesas products may not be easily detached from your products. Renesas shall have no liability for damages arising out of such detachment.
12. This document may not be reproduced or duplicated, in any form, in whole or in part, without prior written approval from Renesas.
13. Please contact a Renesas sales office if you have any questions regarding the information contained in this document, Renesas semiconductor products, or if you have any other inquiries.