

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.

SH7262/SH7264 Group

Transferring Program to RAM (CPU Transfer)

Summary

This application note describes an example of transferring program to RAM using the software.

Target Device

SH7264 MCU (In this document, SH7262/SH7264 are described as "SH7264".)

Contents

1. Introduction.....	2
2. Applications	3
3. Sample Program Listing.....	10
4. References	18

1. Introduction

1.1 Specifications

Transfers the program from an external ROM to internal RAM by software, and executes the program on internal RAM.

1.2 Modules Used

- Cache

1.3 Applicable Conditions

MCU	SH7262/SH7264
Operating Frequency	Internal clock: 144 MHz Bus clock: 72 MHz Peripheral clock: 36 MHz
Integrated Development Environment	Renesas Technology Corp. High-performance Embedded Workshop Ver.4.04.01
C compiler	Renesas Technology SuperH RISC engine Family C/C++ compiler package Ver.9.02 Release 00
Compiler options	Default setting in the High-performance Embedded Workshop (-cpu=sh2afpu -fpu=single -object="\$(CONFIGDIR)\$(FILELEAF).obj" -debug -gbr=auto -chgincpath -errorpath -global_volatile=0 -opt_range=all -infinite_loop=0 -del_vacant_loop=0 -struct_alloc=1 -nologo)

1.4 Related Application Note

Refer to the related application notes as follows:

- SH7262/SH7264 Group Example of Initialization
- SH7262/SH7264 Group Transferring Program to RAM (DMA Transfer)

2. Applications

The SH7264 CPU transfers program from an external ROM to internal RAM, and executes the program on internal RAM.

2.1 Section Alignment in the Sample Program

Use the compiler extended specifications #pragma section to change the section name of the program to transfer. The sample program changes the section of the transfer source program to PROM, and the section of the transfer destination program on internal RAM to PRAM. The following figure shows the memory map in the sample program.

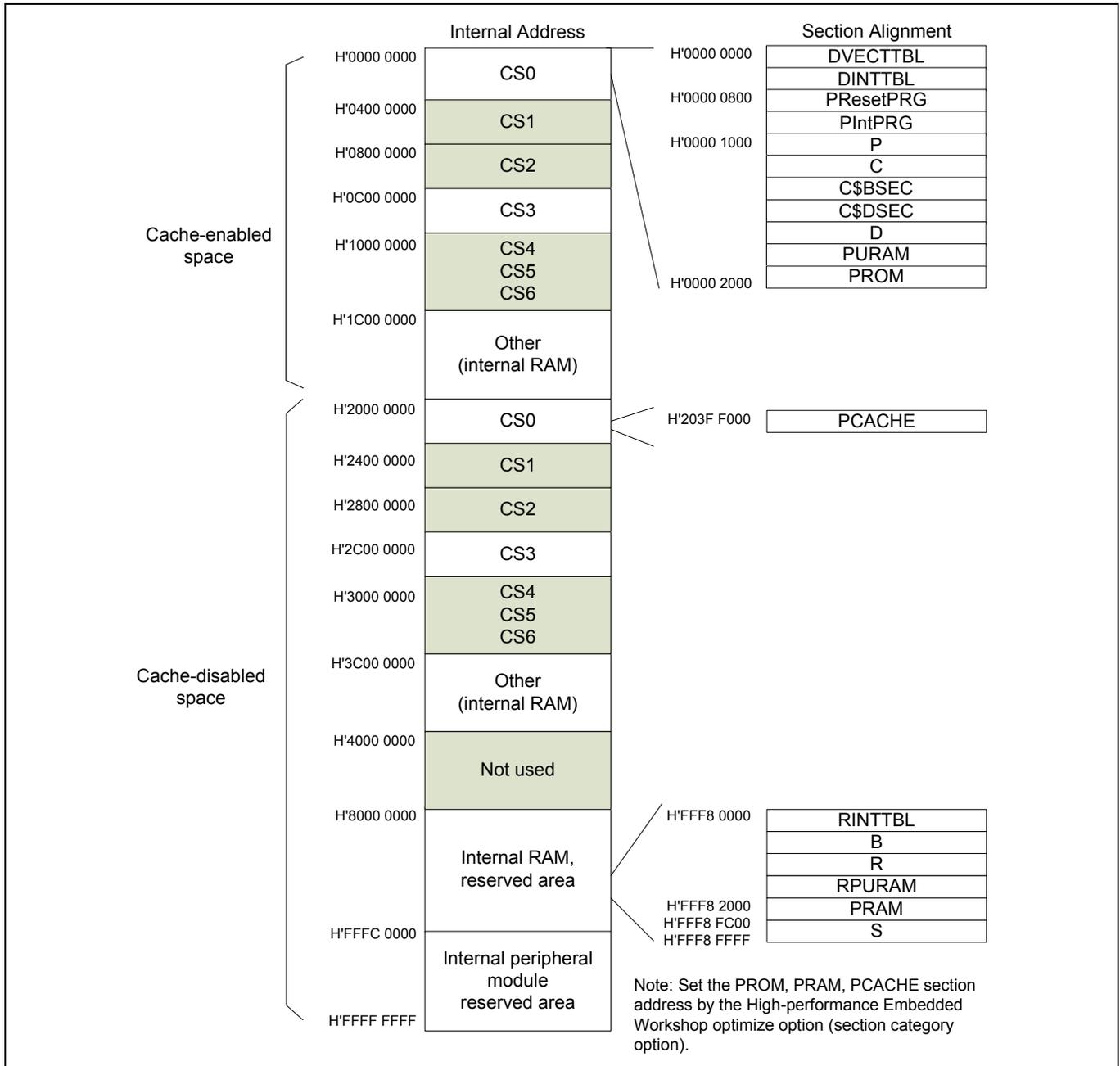


Figure 1 Memory Map

2.2 Linkage Editor Setting

Specify the section address by the linkage editor options. Table 1 lists sections to transfer in the sample program. Table 2 lists linkage editor options to use.

Table 1 Sections to Transfer

Section Name	Description
PROM	Transfer source
PRAM	Transfer destination

Note: When specifying the section address, select [Build] menu on the High-performance Embedded Workshop window, and open the [SuperH RISC engine Standard Toolchain] dialog box. For details, refer to the High-performance Embedded Workshop User's Manual.

Table 2 Linkage Editor Options

Option	Description
<code>-rom=D=R,PROM=PRAM</code>	Specifies ROM to RAM mapped sections
<code>start=DVECTTBL,DINTTBL/00,PResetPRG, PIntPRG/0800,P,C,C\$BSEC,C\$DSEC,D,PURAM PROM/01000,PRAM/01C000000,PCACHE/0203FF000, B,R,RPURAM/0FFF80000, S/0FFF8FC00</code>	Specifies a section starting address

2.3 Retrieving the Section Address

Use the section address operators listed in the following table to retrieve the section address in the program.

Table 3 Address Operators

Format	Description
<code>__sectop (" <section name> ")</code>	Refers to the starting address of the specified <section name>.
<code>__secend (" <section name> ")</code>	Refers to the end address +1 of the specified <section name>.
<code>__secsz (" <section name> ")</code>	Generates the size of the specified <section name>.

2.4 Sample Program Operation

The sample program uses software to transfer the section PROM size program from the section PROM starting address in CS0 space to the section PRAM allocated on internal RAM.

As the CPU transfers the program to the cache-enabled space while the operand cache (write back mode) is enabled, the program transferred may be fetched by the operand cache and the instruction fetch may not be executed. Write back the operand cache after transferring the program to the cache-enabled space by CPU.

To verify that this works, allocate a function using the compare match timer (`io_blink_led` function) to the section PROM, and transfers it on internal RAM. When the transfer is completed, the sample program executes the `io_blink_led` function.

2.5 Write Back the Operand Cache

The SH7264 operand cache can be read and programmed by MOV instruction. Access the operand cache address array to write back the operand cache. The address array for the operand cache is allocated from H'F080 0000 to H'FOFF FFFF. The data array for the operand cache is allocated from H'F180 0000 to H'F1FF FFFF.

When programming a cache line for which the U bit is 1 (data is programmed) and the V bit is 1 (the entry data is valid) in the operand cache address array, write back the cache line. How to write back the operand cache depends on the value of the associative bit (A bit).

- Non-associative Operation

When specifying A bit as 0, (non-associative operation), write back to the entry corresponding to the entry address and way specified.

- Associative Operation

When specifying A bit as 1, (associative operation), write back to the entry of the way which has the same tag address with the tag address in cache corresponding to the specified entry address. Compares the tag addresses in 4 ways. Writes U bit and V bit in the entry matched, however, the tag address and LRU bit are not reflected in the entry. When addresses match in no ways, nothing is written.

Table 4 lists the overview of cache. Figure 2 shows the basic concept of searching cache. Figure 3 shows how to specify the memory-mapped cache access (operand cache).

Table 4 Cache Overview

Item	Description
Capacity	Instruction cache: 8 KB Operand cache: 8 KB
Structure	Instructions and data separated, 4-way set associative
Way lock function	Ways 2 and 3 can be locked (operand cache only)
Line size	16 bytes
Number of entry	128 entries/way
Write mode	Selectable from write-back or write-through modes
Replacement	LRU (Least Recently Used) algorithm

Note: For details on cache, refer to the Cache chapter in the "SH7262 Group, SH7264 Group Hardware Manual".

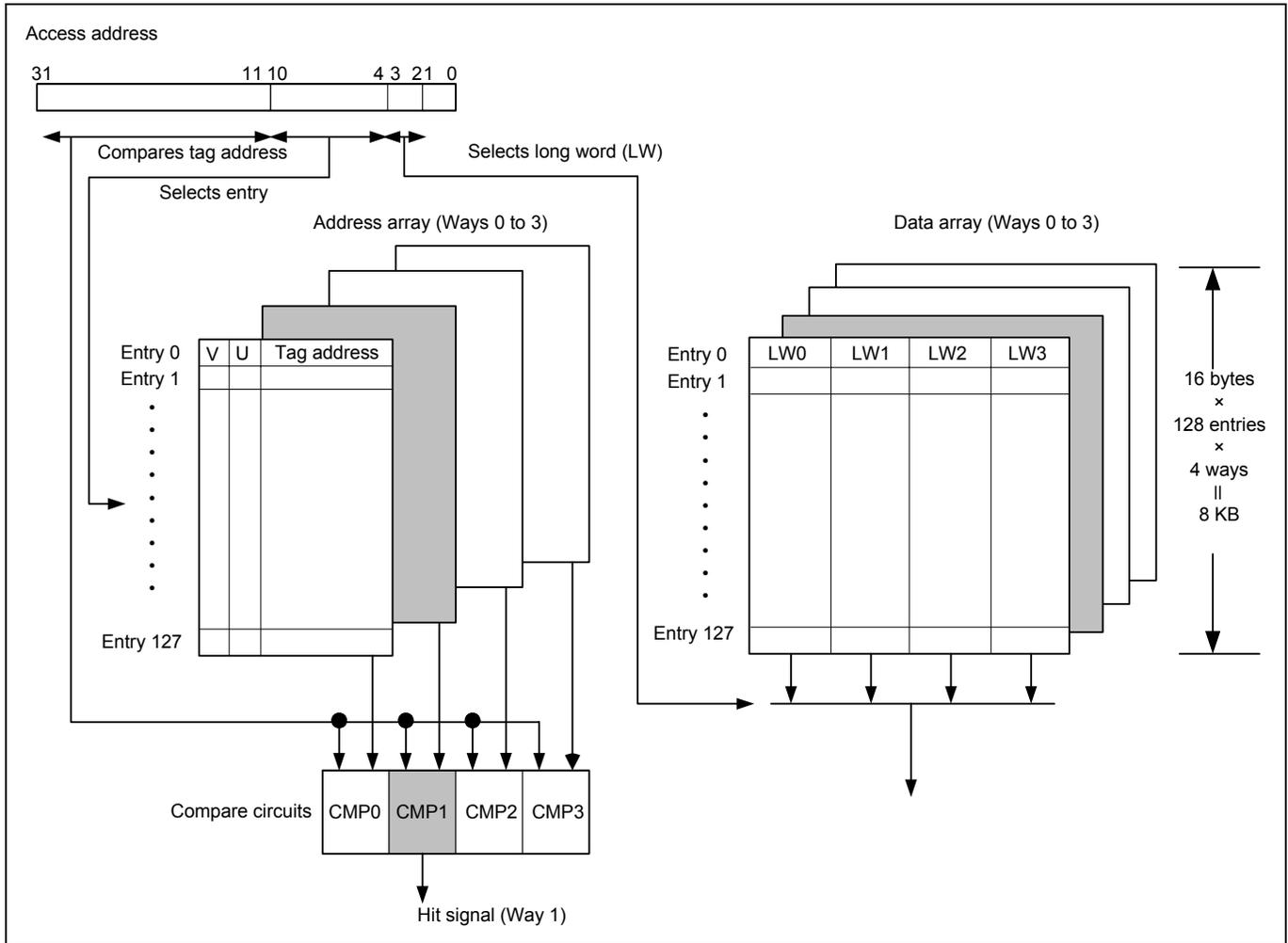


Figure 2 Basic Concept of Searching Cache

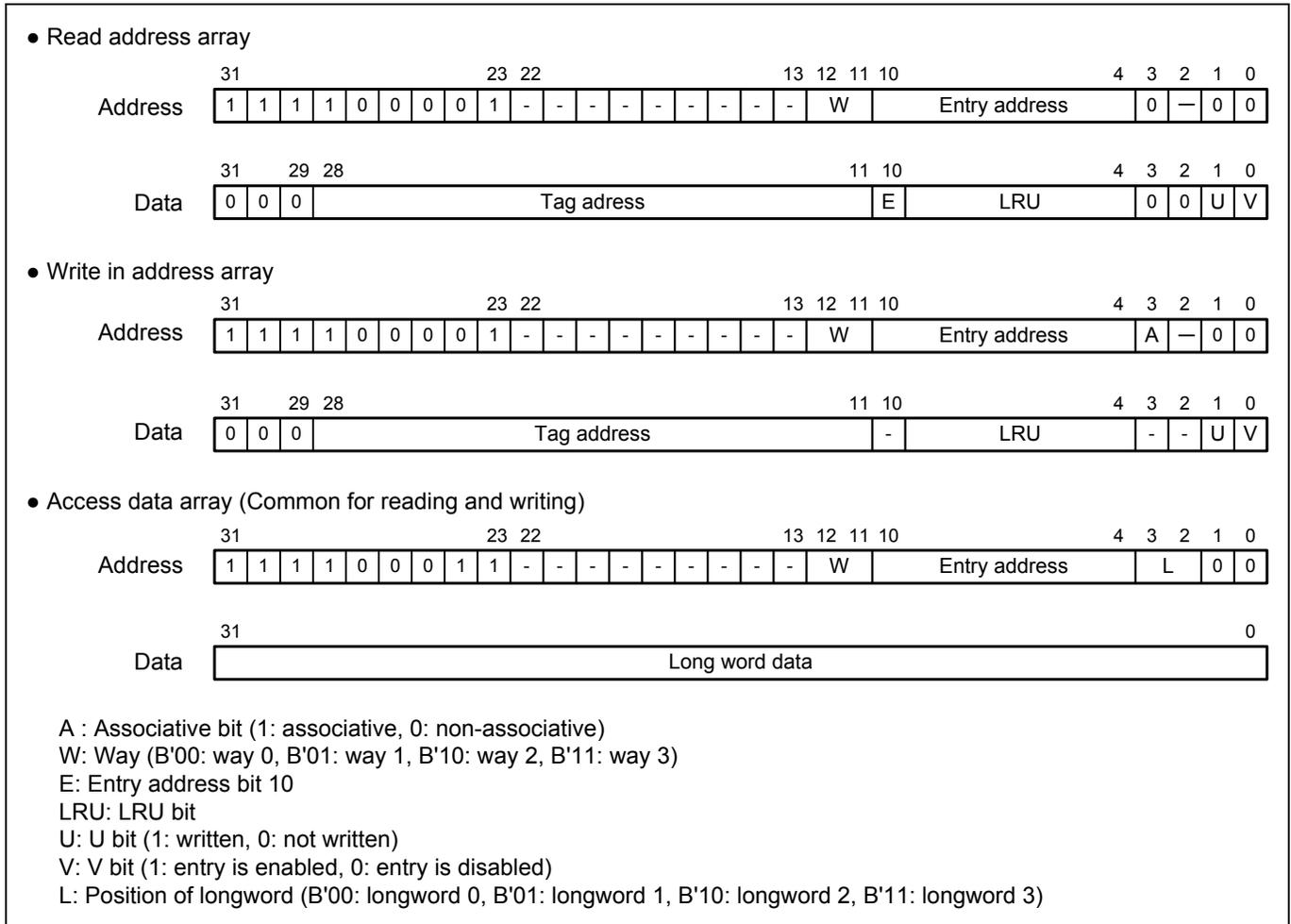


Figure 3 How to Specify the Memory-Mapped Cache Access (Operand Cache)

2.6 Sample Program Flow

Figure 4 shows the flow chart of the sample program. Figure 5 shows the flow chart of writing back the operand cache.

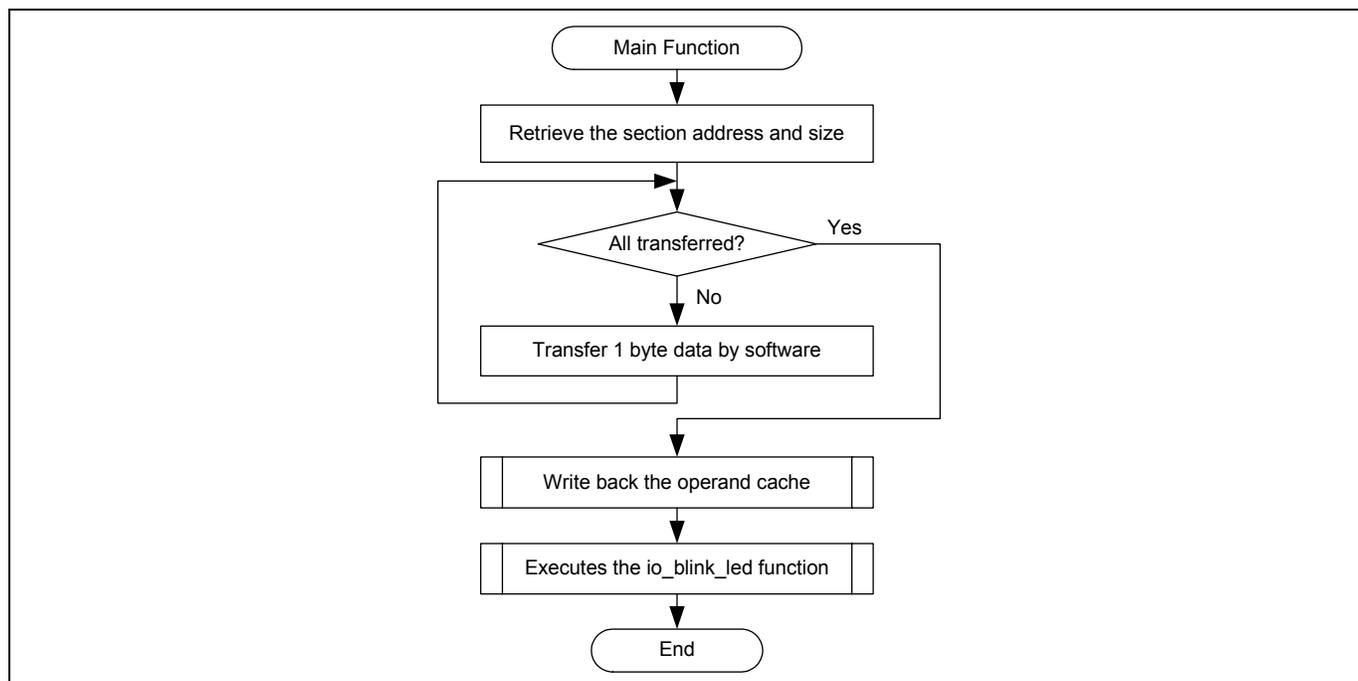


Figure 4 Sample Program Main Flow Chart

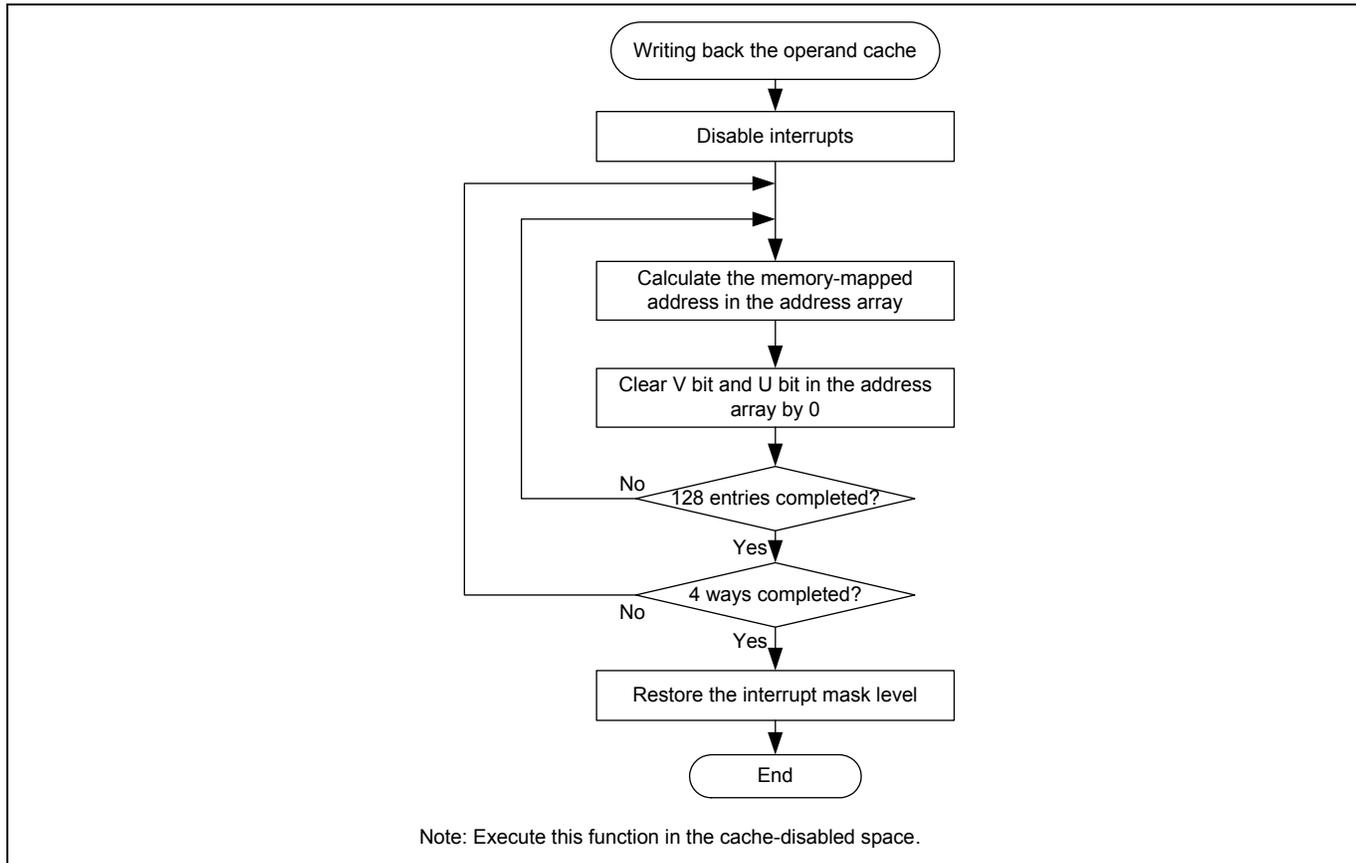


Figure 5 Flow Chart of Writing Back Operand Cache

3. Sample Program Listing

3.1 Sample Program Listing "main.c" (1/5)

```

1      /*****
2      *   DISCLAIMER
3      *
4      *   This software is supplied by Renesas Technology Corp. and is only
5      *   intended for use with Renesas products. No other uses are authorized.
6      *
7      *   This software is owned by Renesas Technology Corp. and is protected under
8      *   all applicable laws, including copyright laws.
9      *
10     *   THIS SOFTWARE IS PROVIDED "AS IS" AND RENESAS MAKES NO WARRANTIES
11     *   REGARDING THIS SOFTWARE, WHETHER EXPRESS, IMPLIED OR STATUTORY,
12     *   INCLUDING BUT NOT LIMITED TO WARRANTIES OF MERCHANTABILITY, FITNESS FOR A
13     *   PARTICULAR PURPOSE AND NON-INFRINGEMENT. ALL SUCH WARRANTIES ARE EXPRESSLY
14     *   DISCLAIMED.
15     *
16     *   TO THE MAXIMUM EXTENT PERMITTED NOT PROHIBITED BY LAW, NEITHER RENESAS
17     *   TECHNOLOGY CORP. NOR ANY OF ITS AFFILIATED COMPANIES SHALL BE LIABLE
18     *   FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES
19     *   FOR ANY REASON RELATED TO THE THIS SOFTWARE, EVEN IF RENESAS OR ITS
20     *   AFFILIATES HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.
21     *
22     *   Renesas reserves the right, without notice, to make changes to this
23     *   software and to discontinue the availability of this software.
24     *   By using this software, you agree to the additional terms and
25     *   conditions found by accessing the following link:
26     *   http://www.renesas.com/disclaimer
27     *****/
28     *   Copyright (C) 2009. Renesas Technology Corp., All Rights Reserved.
29     *"FILE COMMENT"***** Technical reference data *****
30     *   System Name   : SH7264 Sample Program
31     *   File Name    : main.c
32     *   Abstract     : Transferring Program to RAM (CPU transfer).
33     *   Version      : 1.00.00
34     *   Device       : SH7262/SH7264
35     *   Tool-Chain   : High-performance Embedded Workshop (Ver.4.04.01).
36     *                 : C/C++ compiler package for the SuperH RISC engine family
37     *                 :                               (Ver.9.02 Release00).
38     *   OS           : None
39     *   H/W Platform: M3A-HS64G50 (CPU board)
40     *   Description  :
41     *****/
42     *   History      : Aug.04,2009 Ver.1.00.00
43     *"FILE COMMENT END"*****/
44     #include <machine.h>
45     #include "iodefine.h"

```

3.2 Sample Program Listing "main.c" (2/5)

```

46
47  /* ==== Prototype declaration ==== */
48  void main(void);
49  void io_blink_led(void);
50  void io_init_cmt0(void);
51  extern int io_cache_writeback(void);
52
53  /*"FUNC COMMENT"*****
54  * ID          :
55  * Outline     : Sample program main (Transfer program from ROM to RAM).
56  *-----
57  * Include     : iodef.h
58  *-----
59  * Declaration : void main(void);
60  *-----
61  * Description : Transfers the section PROM to the section PRAM allocated on
62  *              : internal RAM by software, and executes the transferred program
63  *              : (io_blink_led) function.
64  *-----
65  * Argument    : void
66  *-----
67  * Return Value : void
68  *-----
69  * Note        :
70  *"FUNC COMMENT END"*****/
71  void main(void)
72  {
73      unsigned char *src,*dst;
74      unsigned long size;
75
76      /* ==== Retrieves the section address and size ==== */
77      src = __sectop("PROM");
78      dst = __sectop("PRAM");
79      size = __secsize("PROM");
80
81      /* ==== Transfers the section ==== */
82      while(size-- > 0ul){
83          *dst++ = *src++;
84      }
85
86      /* ==== Writes back the operand cache ==== */
87      io_cache_writeback();
88
89      /* ==== Executes the io_blink_led function ==== */
90      io_blink_led();          /* Inverts the port A0 */
91  }
92
93  #pragma section ROM /* Following section P is handled as section PROM. */
    
```

3.3 Sample Program Listing "main.c" (3/5)

```

94  /*"FUNC COMMENT"*****
95  * ID          :
96  * Outline    : Count at a constant period
97  *-----
98  * Include    : iodef.h
99  *-----
100 * Declaration : void io_blink_led(void);
101 *-----
102 * Description : Initializes the I/O port PA0 (connected to the LED) and the
103 *             : compare match timer CMT0 at 1 ms to turn ON or OFF the LED
104 *             : connected to the PA0 once every 1000 times 1 ms flagff
105 *-----
106 * Argument   : void
107 *-----
108 * Return Value : void
109 *-----
110 * Note       : Add the section PROM and transfer section PRAM in the linkage editor
111 *             : options and set the [ROM to RAM mapped sections].
112 *"FUNC COMMENT END"*****/
113 void io_blink_led(void)
114 {
115     volatile unsigned int CountCMT0 = 1000;    /* For 1 sec soft count */
116
117     /* ==== Initializes the LED ==== */
118     /* ---- PB22 (Control signal to enable the PA0) ---- */
119     PORT.PBCR5.BIT.PB22MD = 0;                /* Sets the function of the PB22 pin
120                                             to general-purpose I/O */
121     PORT.PBDR1.BIT.PB22DR = 1;                /* Specifies the output data as 1 */
122     PORT.PBIOR1.BIT.PB22IOR = 1;             /* Specifies the direction to output */
123     /* ---- PA0 (Signal to turn ON or OFF the LED) ---- */
124     PORT.PADR0.BIT.PA0DR = 1;                /* Specifies the output data as 1 */
125     PORT.PAIOR0.BIT.PA0IOR = 1;             /* Specifies the direction to output */
126

```

3.4 Sample Program Listing "main.c" (4/5)

```

127     /* ==== Initializes the CMT0 (1 ms periodic timer) ==== */
128     io_init_cmt0();
129
130     while(1){
131         /* ---- Verifies the compare match (1 ms) flag ---- */
132         while (CMT.CMCSR0.BIT.CMF == 0){
133             /* Waits for 1 ms elapsed */
134         }
135         CMT.CMCSR0.BIT.CMF = 0;           /* Clears the compare match flag (CMF) to 0 */
136         CountCMT0--;                     /* Updates the 1 sec soft counter (CountCMT0) */
137         /* ---- Verifies the 1 sec soft counter ---- */
138         if(CountCMT0 == 0u){
139             CountCMT0 = 1000u;           /* Initializes the 1 sec soft counter again */
140             PORT.PADR0.BIT.PA0DR ^= 1u ; /* Inverts the port A0 output */
141         }
142     }
143 }
144 /*"FUNC COMMENT"*****
145 * ID          :
146 * Outline     : CMT0 periodic timer setting
147 *-----
148 * Include     : iodefine.h
149 *-----
150 * Declaration : void io_init_cmt0(void);
151 *-----
152 * Description : Sets the CMT0 to set the CMF flag at every 1 ms.
153 *-----
154 * Argument    : void
155 *-----
156 * Return Value : void
157 *-----
158 * Note        : Add the section PROM and transfer section PRAM in the linkage
159 *              : editor options and set the [ROM to RAM mapped sections].
160 *"FUNC COMMENT END"*****/
161 void io_init_cmt0(void)
162 {
163     /* ==== Configures the periodic (1 ms) timer ==== */
164     /* ---- Sets the Standby control register 7 (STBCR7) ---- */
165     CPG.STBCR7.BIT.MSTP72 = 0x0; /* Enables the CMT */
166
167     /* ---- Sets the Compare match timer start register (CMSTR) ---- */
168     CMT.CMSTR.BIT.STR0 = 0;      /* Stops channel 0 to count */
169
170     /* ---- Sets the Compare match control/status register (CMCSR0) ---- */
171     CMT.CMCSR0.WORD = 0x0002;    /* Disables the compare match interrupt,
172                                   specifies 1/128 of the peripheral clock */
173 }
    
```

3.5 Sample Program Listing "main.c" (5/5)

```

174     /* ---- Sets the Compare match timer counter register (CMCNT0) ---- */
175     CMT.CMCNT0.WORD = 0x0000;      /* Clears the timer counter */
176
177     /* ---- Sets the Compare match timer constant register (CMCOR0) ---- */
178     CMT.CMCOR0.WORD = 280;         /* Sets the period to compare match (1 ms) */
179                                     /* 1 ms = 1/P clock (36 MHz) * 128 * (280+1) */
180     /* ---- Sets the Compare match timer start register (CMSTR) ---- */
181     CMT.CMSTR.BIT.STR0 = 1;       /* Starts channel 0 to count */
182 }
183 /* End of File */
    
```

3.6 Sample Program Listing "cache.c" (1/3)

```

1      /*****
2      *   DISCLAIMER
3      *
4      *   This software is supplied by Renesas Technology Corp. and is only
5      *   intended for use with Renesas products. No other uses are authorized.
6      *
7      *   This software is owned by Renesas Technology Corp. and is protected under
8      *   all applicable laws, including copyright laws.
9      *
10     *   THIS SOFTWARE IS PROVIDED "AS IS" AND RENESAS MAKES NO WARRANTIES
11     *   REGARDING THIS SOFTWARE, WHETHER EXPRESS, IMPLIED OR STATUTORY,
12     *   INCLUDING BUT NOT LIMITED TO WARRANTIES OF MERCHANTABILITY, FITNESS FOR A
13     *   PARTICULAR PURPOSE AND NON-INFRINGEMENT. ALL SUCH WARRANTIES ARE EXPRESSLY
14     *   DISCLAIMED.
15     *
16     *   TO THE MAXIMUM EXTENT PERMITTED NOT PROHIBITED BY LAW, NEITHER RENESAS
17     *   TECHNOLOGY CORP. NOR ANY OF ITS AFFILIATED COMPANIES SHALL BE LIABLE
18     *   FOR ANY DIRECT, INDIRECT, SPECIAL, INCIDENTAL OR CONSEQUENTIAL DAMAGES
19     *   FOR ANY REASON RELATED TO THE THIS SOFTWARE, EVEN IF RENESAS OR ITS
20     *   AFFILIATES HAVE BEEN ADVISED OF THE POSSIBILITY OF SUCH DAMAGES.
21     *
22     *   Renesas reserves the right, without notice, to make changes to this
23     *   software and to discontinue the availability of this software.
24     *   By using this software, you agree to the additional terms and
25     *   conditions found by accessing the following link:
26     *   http://www.renesas.com/disclaimer
27     *****/
28     *   Copyright (C) 2008(2009). Renesas Technology Corp., All Rights Reserved.
29     *   "FILE COMMENT"***** Technical reference data *****
30     *   System Name : SH7264 Sample Program
31     *   File Name  : cache.c
32     *   Abstract   : sample of cache register
33     *   Version    : 1.01.00
34     *   Device     : SH7262/SH7264
35     *   Tool-Chain : High-performance Embedded Workshop (Ver.4.04.01).
36     *               : C/C++ compiler package for the SuperH RISC engine family
37     *               :                               (Ver.9.02 Release00).
38     *   OS         : None
39     *   H/W Platform: M3A-HS64G50(CPU board)
40     *   Description :
41     *****/
42     *   History    : Dec.03,2008 Ver.1.00.00
43     *               : Jun.29,2009 Ver.1.01.00 Changed FILE FORMAT
44     *   "FILE COMMENT END"*****/
45     #include <machine.h>
46     #include "iodefine.h"

```

3.7 Sample Program Listing "cache.c" (2/3)

```

47
48
49  /* ==== Prototype Declaration ==== */
50  void io_init_cache(void);
51  int io_cache_writeback(void);
52
53
54  #pragma section CACHE      /* It is placed in the CS0 cache-disabled space */
55
56  .....
57
101 /*"FUNC COMMENT"*****
102  * ID          :
103  * Outline     : Write-back of cache
104  *-----
105  * Include     : iodef.h
106  *-----
107  * Declaration : int io_cache_writeback(void);
108  *-----
109  * Description : All lines of operand cache are disabled, and the contents of
110  *              : cache memory are written back to the external memory.
111  *              : It has nothing to do with the write-through mode.
112  *-----
113  * Argument    : void
114  *-----
115  * Return Value : 0 : Normal completion
116  *-----
117  * Note        : None
118  *"FUNC COMMENT END"*****/
119  int io_cache_writeback(void)
120  {
121      volatile unsigned long *arry;
122      unsigned int i,j;
123      int mask;
124
125      /* ==== Interrupt mask setting ==== */
126      mask = get_imask();
127      set_imask(15);          /* Set to the level 15 */
128

```

3.8 Sample Program Listing "cache.c" (3/3)

```

129     /* ==== All entries disabled ==== */
130     for(i=0u; i <4u; i++){
131         for(j=0u; j < 128u; j++){
132             /* ---- Creating an address array address ---- */
133             arry = (volatile unsigned long *) (0xf0800000 | (i<<11) | (j<<4));
134             /* ---- Write U=0 and V=0 in the address array ---- */
135             *arry &= 0xfffffffful; /* V=0,U=0 */
136         }
137     }
138
139     /* ==== Interrupt mask recovery ==== */
140     set_imask(mask); /* Set to the original level */
141
142     return 0;
143 }
144
145
146     /* End of File */

```

4. References

- Software Manual
SH-2A/SH-2A-FPU Software Manual Rev. 3.00
(Download the latest version from the Renesas website.)
- Hardware Manual
SH7262 Group, SH7264 Group Hardware Manual Rev. 1.00
(Download the latest version from the Renesas website.)

Website and Support

Renesas Technology Website
<http://www.renesas.com/>

Inquiries
<http://www.renesas.com/inquiry>
csc@renesas.com

Revision History

Rev.	Date	Description	
		Page	Summary
1.00	Sep. 30, 2009	—	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.