SH7266/SH7267 Groups

E10A-USB Flash Memory Download Function (Download to the Serial Flash Memory)

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Abstract

E10A-USB emulator has the function to download a load module to the flash memory. This function requires a download program to access the flash memory (hereinafter called the “FMTOOL”).

This document describes how to download a load module to the serial flash memory applying the FMTOOL.

Target Device

SH7266/SH7267 Groups (hereinafter called the “SH7267”)

When using this application note with other Renesas MCUs, careful evaluation is recommended after making modifications to comply with the alternate MCU.

Contents

1. Specifications

Download the load module to the serial flash memory using the FMTOOL that supports the serial flash memory. The FMTOOL uses the Renesas serial peripheral interface (RSPI) and allows the serial flash memory accessed.

Table 1.1 lists the peripheral functions and the applications. Figure 1.1 shows the procedure of download using the FMTOOL.

Table 1.1 Peripheral Functions and Applications

Peripheral Function	Application
Renesas Serial Peripheral Interface (RSPI) channel 0	Download to the serial flash memory
H-UDI	Connects the E10A-USB emulator

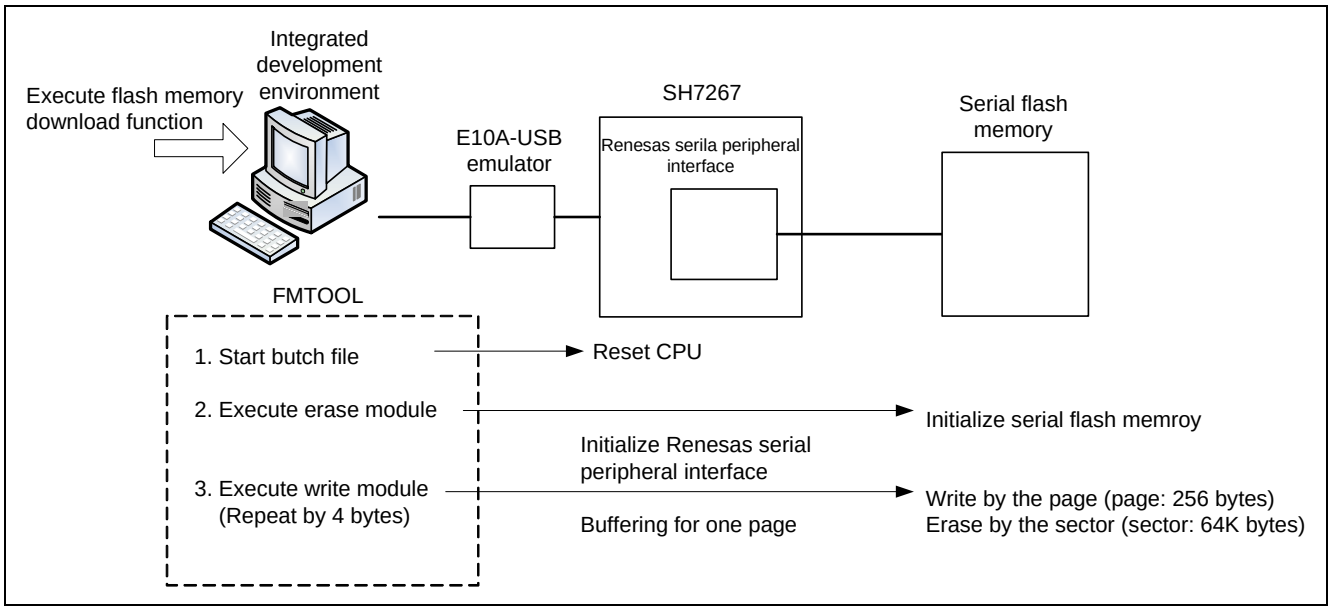


Figure 1.1 Procedure of Download Using FMTOOL

2. Operation Confirmation Conditions

The sample code accompanying this application note has been run and confirmed under the conditions below.

Table 2.1 Operation Confirmation Conditions

Item	Contents
MCU used	SH7267
Device used	Serial flash memory manufacturer: Silicon Storage Technology model: SST25VF016B
Operating frequency	CPU clock (Iφ): 144MHz Bus clock (Bφ): 72MHz Peripheral clock (Pφ): 36MHz
Operating voltage	Source power (I/O): 3.3V Source power (internal): 1.25V
Integrated development environment	Renesas Electronics High-performance Embedded Workshop Ver.4.07.00
C compiler	Renesas Electronics SuperH RISC engine FamilyC/C++ Compiler Package Ver.9.03 Release02
	Complier option -cpu=sh2afpu -fpu=single -include="$(WORKSPDIR)\inc" -object="$(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
Board used	R0K572670C000BR

3. Reference Application Note(s)

For additional information associated with this document, refer to the following application note(s).

- SH7266/SH7267 Groups Boot From the Serial Flash Memory
  (document No.: R01AN0214EJ)
- SH7262/SH7264 Groups Renesas Serial Peripheral Interface Serial Flash Memory Connection Sample Program
  (document No.: REJ06B1001)
- Flash Memory Download Program for the E10A-USB Emulator Application Note (document No.:R01AN0957EJ)

4. Hardware

4.1 Hardware Configuration

Table 4.1 lists the used pins and their functions.

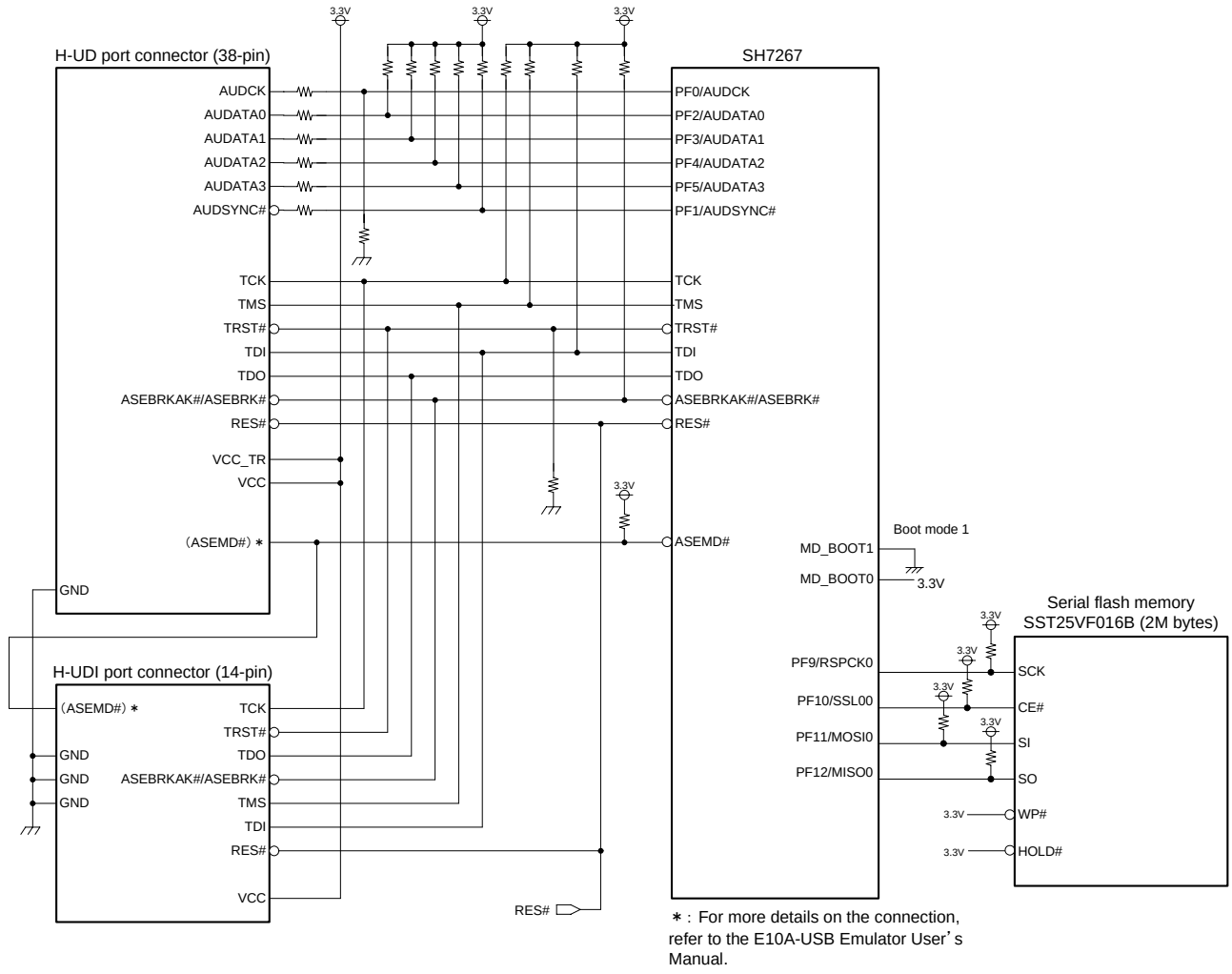
Table 4.1 Used Pins and Their Functions

Pin name	Input/Output	Function
RSPCK0	Output	Clock output to the serial flash memory
SSL00	Output	Output device selection signal to the serial flash memory
MOSI0	Output	Data output to the serial flash memory
MISO0	Input	Data input from the serial flash memory
MD_BOOT0	Input	Selection of boot mode (bit 0)
MD_BOOT1	Input	Selection of boot mode (bit 1)
AUDCK	Output	Clock output to the E10A-USB emulator (38-pin)
AUDATA0	Output	Address output to the E10A-USB emulator (38-pin) (bit 0)
AUDATA1	Output	Address output to the E10A-USB emulator (38-pin) (bit 1)
AUDATA2	Output	Address output to the E10A-USB emulator (38-pin) (bit 2)
AUDATA3	Output	Address output to the E10A-USB emulator (38-pin) (bit 3)
AUDSYNC#	Output	Synchronous signal output to the E10A-USB emulator (38-pin)
TCK	Input	Clock input from the E10A-USB emulator
TMS	Input	Mode selection from the E10A-USB emulator
TRST#	Input	Reset input from the E10A-USB emulator
TDI	Input	Data input from the E10A-USB emulator
TDO	Output	Data output to the E10A-USB emulator
ASEBRKAK#/ASEBRK#	Input/Output	Break request and response
RES#	Input	System reset signal
ASEMD#	Input	Selection of ASE mode

Note:“#” indicates a negative-true logic or an active low.

4.2 Reference Circuit

Figure 4.1 shows the connection with the serial flash memory.



Note: l "#" indicates a negative-true logic or an active low.

Figure 4.1 Connection Example

5. Software

5.1 Operation Overview

The FMTOOL consists of two programs; the erase module and the write module. The E10A-USB emulator writes program data and constant data into the flash memory using these programs. For details on the erase module and the write module, refer to the section “6.22 Downloading to the Flash Memory Area” in the E10A-USB Emulator User’s Manual.

5.1.1 Batch File

Execute a reset command to initialize the SH7267 using the batch file which has been started before download of the load module. For details on the batch file and the reset command, refer to the manual listed in the integrated development environment.

5.1.2 Erase Module

Figure 5.1 shows the outline of the erase module in the FMTOOL. When downloading of the load module starts, the FMTOOL is transmitted to the high-speed on-chip RAM on the SH7267. The erase module is executed only once after the transmission.

The erase module usually has the function for chip erase processing of the flash memory. Unlike this typical processing, the initialization of the Renesas serial peripheral interface and the cancellation of protect setting in the flash memory are executed.

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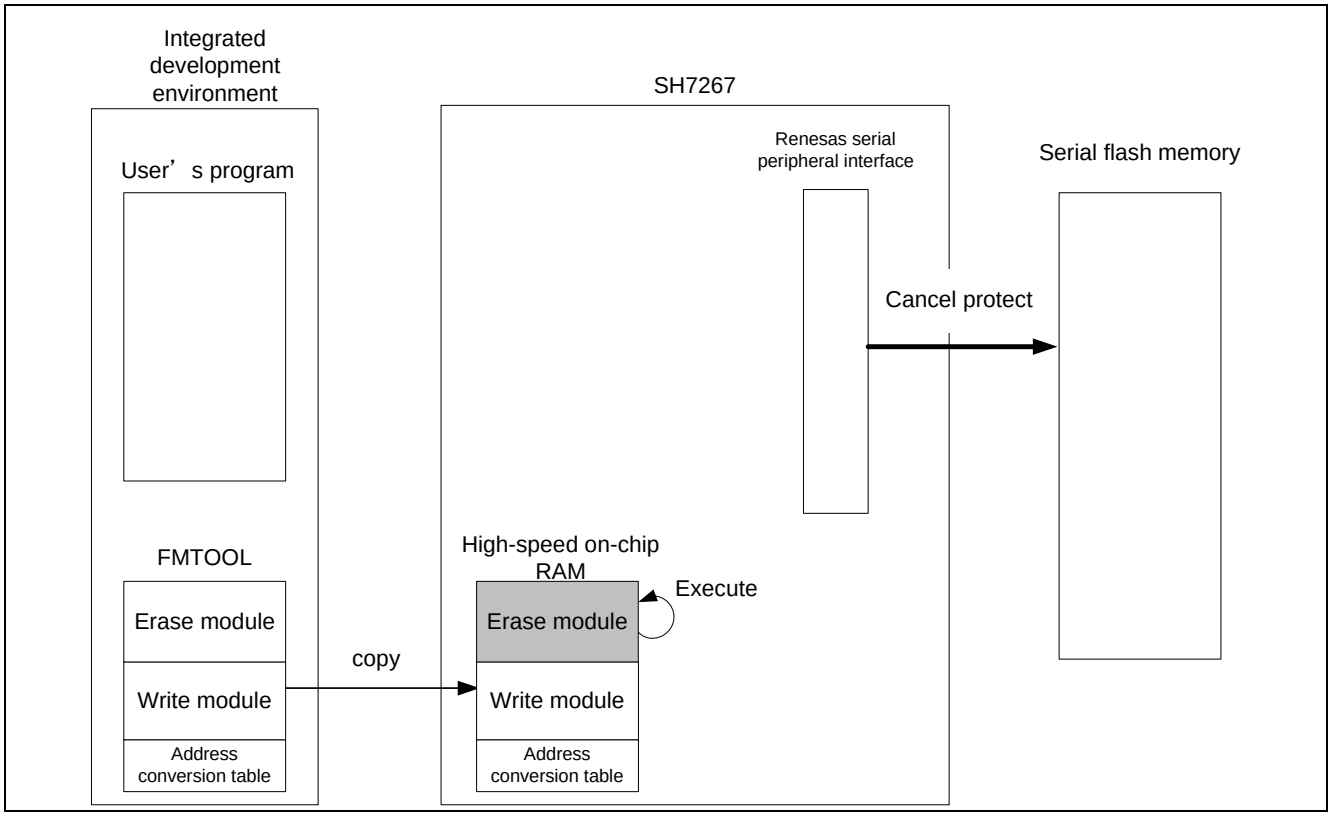


Figure 5.1 Erase Module Outline

5.1.3 Write Module

Figure 5.2 shows the outline of the write module in the FMTOOL. The write module is executed repeatedly in the high-speed on-chip RAM when downloading of the load module. The write module receives the program data which are divided into access size as the argument and writes the data to the serial flash memory after calculating the write destination address for the program data and buffering such data on a per-page basis. When the write destination address is in the undeleted sector, writes after erasing the sector.

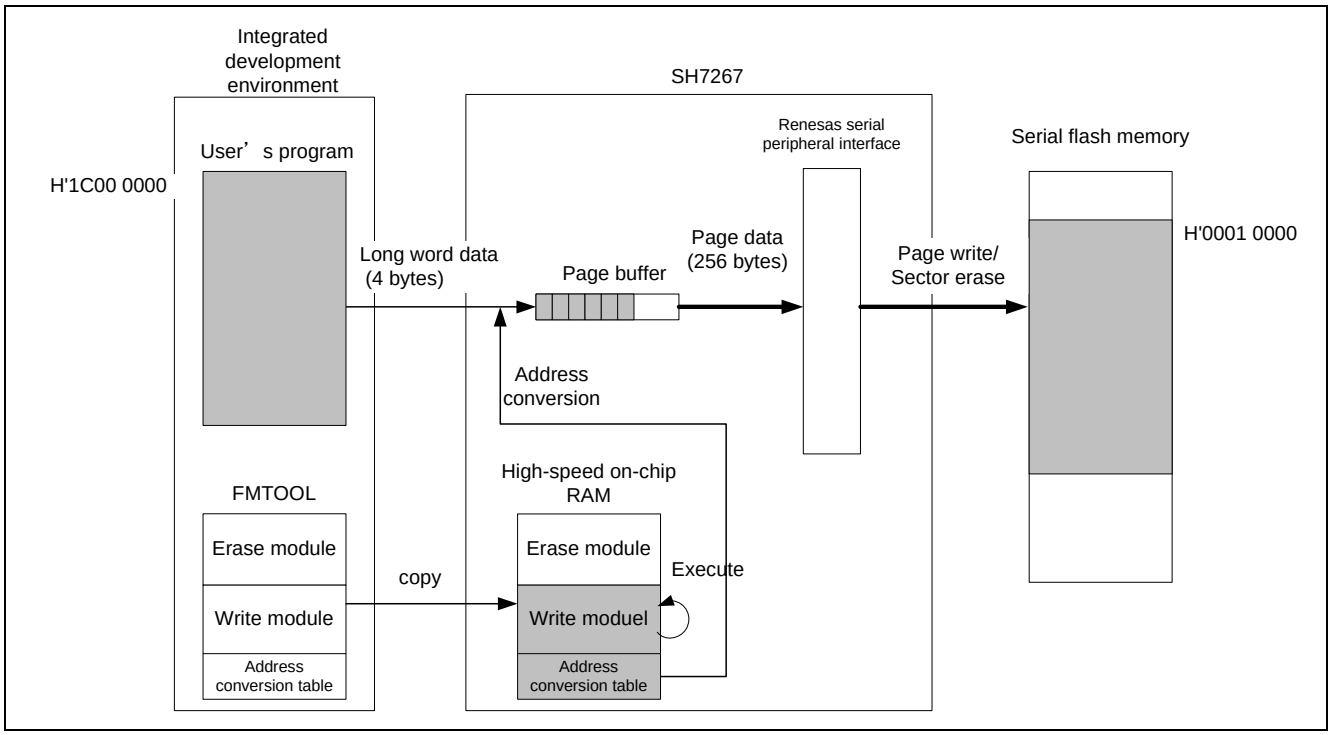
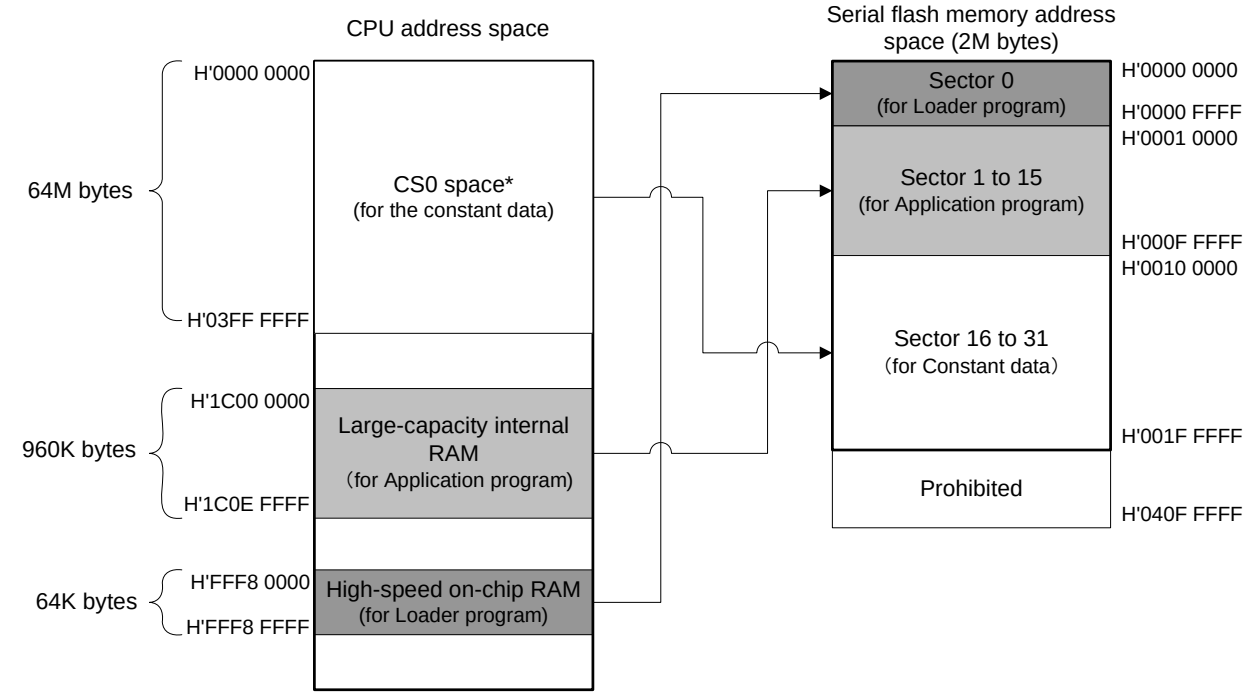


Figure 5.2 Write Module Outline

The write module executes the address conversion to store the program which arranged in the discontinuous area or the constant data efficiently to the serial flash memory. Figure 5.3 shows the address conversion of the sample code. The conversion rule is described in the Address Conversion Table in "5.4 Structure/Union List of this application note". It may be changed when needed.



Note: All areas in the CS0 are suject to address conversion but the area which exceeds the capacity of the serial flash memory cannnot be used.

Figure 5.3 Address Conversion of Sample Code

5.2 File Composition

Table 5.1 lists the file composition. The files generated by the integrated development environment should not be listed in this table.

Table 5.1 File Composition

File Name	Outline	Remarks
fm_entry.src	Entry module of FMTOOL	Entry of erase module and write module
fm_main.c	Main module of FMTOOL	Called function from the entry
fm_cpg.c	Initialization of CPG	
fm_r_sf_rspi.c	Serial flash memory processing	
fm_io_rspi.c	Control processing of the Renesas serial peripheral interface	
fm_map.c	Address conversion table	
cpg.h	I/F definition of fm_cpg.c	
r_sf_rspi.h	I/F definition of fm_r_sf_rspi.c	
io_rspi.h	I/F definition of fm_io_rspi.c	
map.h	I/F definition of fm_map.c	
sh7267_slash_fmtool.hdc	Batch file	Used for the project on the load module
dummy.c	Dummy data definition of the load module	Used for the project on the load module.

5.3 Constants

Table 5.2 lists the constants used in the sample code.

Table 5.2 Constants Used in the Sample Code

Constant Name	Setting Value	Contents
SF_PAGE_SIZE	256	Page size (256 bytes)
PAGE_SIZE	SF_PAGE_SIZE	ditto
SF_SECTOR_SIZE	(64*1024)	Sector size (64K bytes)
SECTOR_SIZE	SF_SECTOR_SIZE	ditto
SF_REQ_PROTECT	0	Sets protect in the serial flash memory
SF_REQ_UNPROTECT	1	Cancels the protect in the serial flash memory
SR_Init	0x000000F0	Status register initial value
DEFAULT_VALUE	0xFFFFFFFF	Initial value of management data used by FMTOOL
TYPE_BYTE	0x4220	R5 parameter of write module (data access size : byte-size)
TYPE_WORD	0x5720	R5 parameter of write module (data access size: word-size)
TYPE_LONG	0x4C20	R5 parameter of write module (data access size: long-size)
FM_END_OF_TABLE	0xFFFFFFFF	Value which indicates the last element of the address conversion table

5.4 Structure/Union List

Figure 5.4 shows the structure/union used in the sample code.

```
/* Structure of definition for the address conversion table */
typedef struct
{
    uint32_t src_top;       /* starting address (source) */
    uint32_t src_end;       /* ending address+1 (source) */
    uint32_t dest_top;      /* starting address (destination) */
} addr_tbl_t;

/* Address conversion table */
const addr_tbl_t g_fm_addr_tbl[] =
{
       /* src_top,  src_end,    dest_top */
       {0xFFF80000, 0xFFF90000, 0x00000000},      /* high-speed on-chip RAM (Loader program) */
       {0x1C000000, 0x1C0F0000, 0x00010000},      /* large-capacity internal RAM (cache effective space) */
       {0x00000000, 0x04000000, 0x00100000},      /* CS0 space (constant data) */
       {FM_END_OF_TABLE, 0, 0}
};
```

Figure 5.4 Structure/Union Used in the Sample Code

5.5 Variables

Table 5.3lists the global variables. Table 5.4 lists the static variables

Table 5.3 Global Variables

Type	Variable Name	Contents	Function Used
addr_tbl_t	g_fm_addr_tbl	Address conversion table	fmtool_write

Table 5.4Static Variables

Type	Variable Name	Contents	Function Used
uint32_t	fmtool_pre_erase_sctno	Management information of erased sectors	fmtool_init, fmtool_write
uint32_t	fmtool_cur_page	Starting address of buffering pages	fmtool_init, fmtool_write
uint32_t	fmtool_page_buf[PAGE_SIZE / sizeof(uint32_t)]	Page buffer	fmtool_write

5.6 Functions

Table 5.5 lists the functions.

Table 5.5 Functions

Function Name	Outline
_ERASE_ENTRY	Entry processing for erase module
_WRITE_ENTRY	Entry processing for write module
fmtool_init	Main processing for erase module (initialization)
fmtool_write	Main processing for write module (erase/write processing)
R_SF_RSPI_Init	Serial flash memory operating function (initialization of Renesas serial peripheral interface and serial flash memory)
R_SF_RSPI_CtrlProtect	Serial flash memory operating function (protect control)
R_SF_RSPI_EraseChip	Serial flash memory operating function (chip erase processing)
R_SF_RSPI_EraseSector	Serial flash memory operating function (sector erase processing)
R_SF_RSPI_ByteProgram	Serial flash memory operating function (write processing)
R_SF_RSPI_ByteRead	Serial flash memory operating function (read processing) * Not available in the sample code.
io_set_cpg	Initialization of clock pulse generator (CPG)
io_init_rspi	Initialization of the Renesas serial peripheral interface (RSPI)
io_cmd_exe	Out put processing for RSPI
io_cmd_exe_rdmode	Input processing for RSPI

5.7 Function Specifications

The following tables list the sample code function specifications.

_ERASE_ENTRY

Outline	Entry processing for the erase module
Header	None
Declaration	_ERASE_ENTRY:
Description	Allocates this function in the address H'FFF8 2000 in the entry section of the erase module which is activated by the E10A-USB flash memory download function. This module executes fmtool_init function after setting the stack pointer.
Argument	R4 register : Access size (byte: H'4220, word: H'5720, long: H'4C20
Returned value	None
Remarks	Described in the assembly language

_WRITE_ENTRY

Outline	Entry processing for the write module
Header	None
Declaration	_WRITE_ENTRY:
Description	Allocates this function in the address H'FFF8 2100 in the entry section of the write module which is activated by the E10A-USB flash memory download function. This module executes fmtool_write function after setting the stack pointer.
Argument	R4 register : Address where the write data are allocated R5 register : Access size (byte: H'4220, word: H'5720, long: H'4C20) R6 register : Write data
Returned value	R0 register is 0: normal end R0 register is 1: error end
Remarks	Described in the assembly language

fmtool_init

Outline	Main processing for erase module (initialization)
Header	None
Declaration	void fmtool_init(void);
Description	Initializes the Renesas serial peripheral interface and the serial flash memory. This function is executed from the entry point of the FMTOOL (_ERASE_ENTRY).
Argument	None
Returned value	None
Remarks	

fmtool_write

Outline	Main processing for the write module (erase/write processing)	
Header	None	
Declaration	int32_t fmtool_write(uint32_t addr, int32_t access_size, uint32_t write_data);	
Description	Executes erase and write processing in the serial flash memory. The serial flash memory is accessed by the sector for erasing and by the page for writing. This function is executed from the entry point of the FMTOOL (_WRITE_ENTRY).	
Argument	First argument: addr	: Address where the write data are allocated
	Second argument: size	: Access size (byte: H'4220, word: H'5720, long: H'4C20)
	Third argument: write_data	: Write data
Returned value	0: normal end negative value: error end	
Remarks	Only long word size is available for the access size.	

R_SF_RSPI_Init

Outline	Serial flash memory operating function (initialization of Renesas serial peripheral interface and serial flash memory)
Header	“r_sf_rspi.h”
Declaration	void R_SF_RSPI_Init(void);
Description	Initializes the basic part of the Renesas serial peripheral interface. Cancels protect in the serial flash memory.
Argument	None
Returned value	None
Remarks	

R_SF_RSPI_CtrlProtect

Outline	Serial flash memory operating function (protect control)	
Header	“r_sf_rspi.h”	
Declaration	void R_SF_RSPI_CtrlProtect(en_sf_req_t req);	
Description	Sets/cancels protect in the serial flash memory.	
Argument	First argument: req	: protect request (SF_REQ_PROTECT: sets protect SF_REQ_UNPROTECT: cancels protect)
Returned value	None	
Remarks		

R_SF_RSPI_EraseChip

Outline	Serial flash memory operating function (chip erase processing)
Header	“r_sf_rspi.h”
Declaration	void R_SF_RSPI_EraseChip(void);
Description	Executes a chip erase in the serial flash memory.
Argument	None
Returned value	None
Remarks	

R_SF_RSPI_EraseSector

Outline	Serial flash memory operating function (sector erase processing)	
Header	“r_sf_rspi.h”	
Declaration	void R_SF_RSPI_EraseSector(int32_t sector_no);	
Description	Executes a sector erase in the serial flash memory.	
Argument	First argument: sector_no	: sector number to be erased
Returned value	None	
Remarks		

R_SF_RSPI_ByteProgram

Outline	Serial flash memory operating function (write processing)	
Header	“r_sf_rspi.h”	
Declaration	void R_SF_RSPI_ByteProgram(uint32_t addr, uint8_t * buf, int32_t size);	
Description	Writes the data specified by the argument to the serial flash memory. Uses the byte program command (H’02) or the auto-increment addressing, word programming command (H’AD).	
Argument	First argument: addr	: write address (the address in the serial flash memory)
	Second argument: buf	: write data (start address in the buffer)
	Third argument: size	: data byte count
Returned value	None	
Remarks		

R_SF_RSPI_ByteRead

Outline	Serial flash memory operating function (read processing)	
Header	“r_sf_rspi.h”	
Declaration	void R_SF_RSPI_ByteRead(uint32_t addr, uint8_t * buf, int32_t size);	
Description	Reads the area specified by the argument to the serial flash memory and stores in the buffer. Uses the read command (H’0B).	
Argument	First argument: addr	: read address (the address in the serial flash memory)
	Second argument: buf	: start address in the read buffer
	Third argument: size	: data byte count
Returned value	None	
Remarks	Not used in the sample code	

io_set_cpg

Outline	Initialization of clock pulse generator (CPG)	
Header	"cpg.h"	
Declaration	void io_set_cpg(void);	
Description	Allows clock supply for the operation frequency and the peripheral module	
Argument	None	
Returned value	None	
Remarks		

io_init_rspi

Outline	Initialization of the Renesas serial peripheral interface (RSPI)
Header	"io_rspi.h"
Declaration	void io_init_rspi(void);
Description	Initializes the channel 0 in the RSPI.
Argument	None
Returned value	None
Remarks	

io_cmd_exe

Outline	Output processing for RSPI	
Header	"io_rspi.h"	
Declaration	void io_cmd_exe(uint8_t *ope, int32_t ope_sz, uint8_t *data, int32_t data_sz);	
Description	Transmits the operation code and the data which are specified by the argument. Sets the operation code up to 8 bytes.	
Argument	First argument: ope	Start address in the opcode
	Second argument: ope_sz	Size of the opcode
	Third argument: data	Start address of the data
	Fourth argument: data_sz	Size of the data
Returned value	None	
Remarks		

io_cmd_exe_rdmode

Outline	Input processing for RSPI
Header	"io_rspi.h"
Declaration	void io_cmd_exe_rdmode(uint8_t *ope, int32_t ope_sz, uint8_t *rd, int32_t rd_sz);
Description	Receives the data in specified size after transmitting the operation code specified by the argument. Sets the operation code up to 8 bytes.
Argument	First argument: ope Second argument: ope_sz Third argument: rd Fourth argument: rd_sz
Returned value	None
Remarks	

5.8 Flowchart

This section describes the procedure of major functions used in the sample code. Regarding the serial flash memory operating function and the RSIP control procedure, refer to the “SH7262/SH7264 Groups Renesas Serial Peripheral Interface Serial Flash Memory Connection Sample Program (doc No. REJ06B1001)”.

5.8.1 Erase Module

Figure 5.5shows the procedure of the erase module.

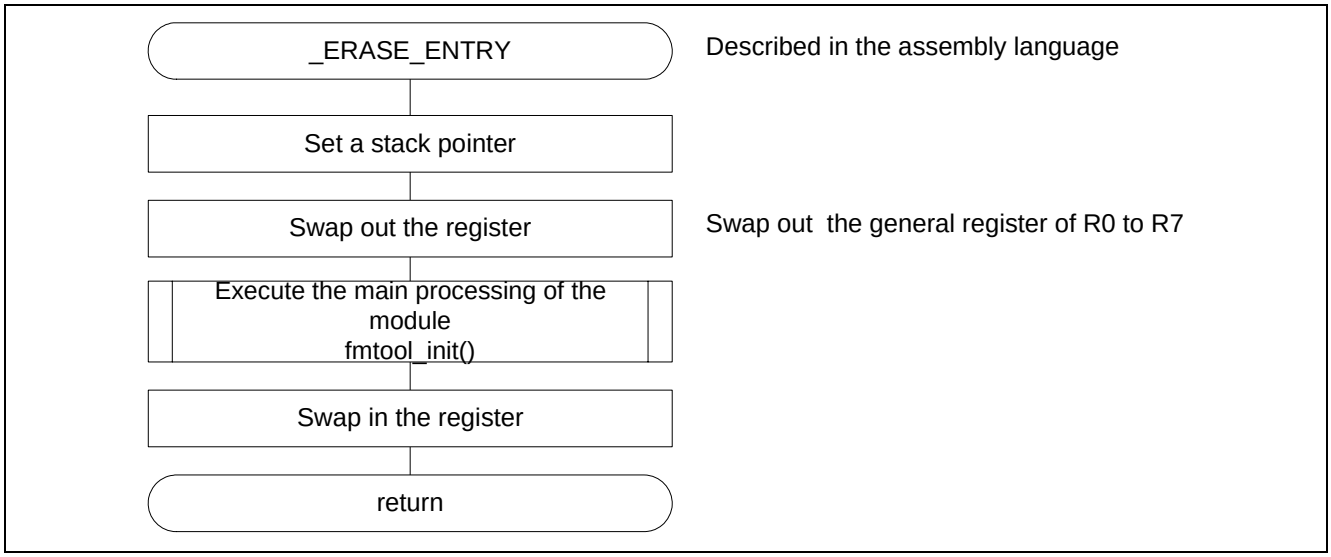


Figure 5.5 Erase Module

5.8.2 Write Module

Figure 5.6 shows the procedure of the write module.

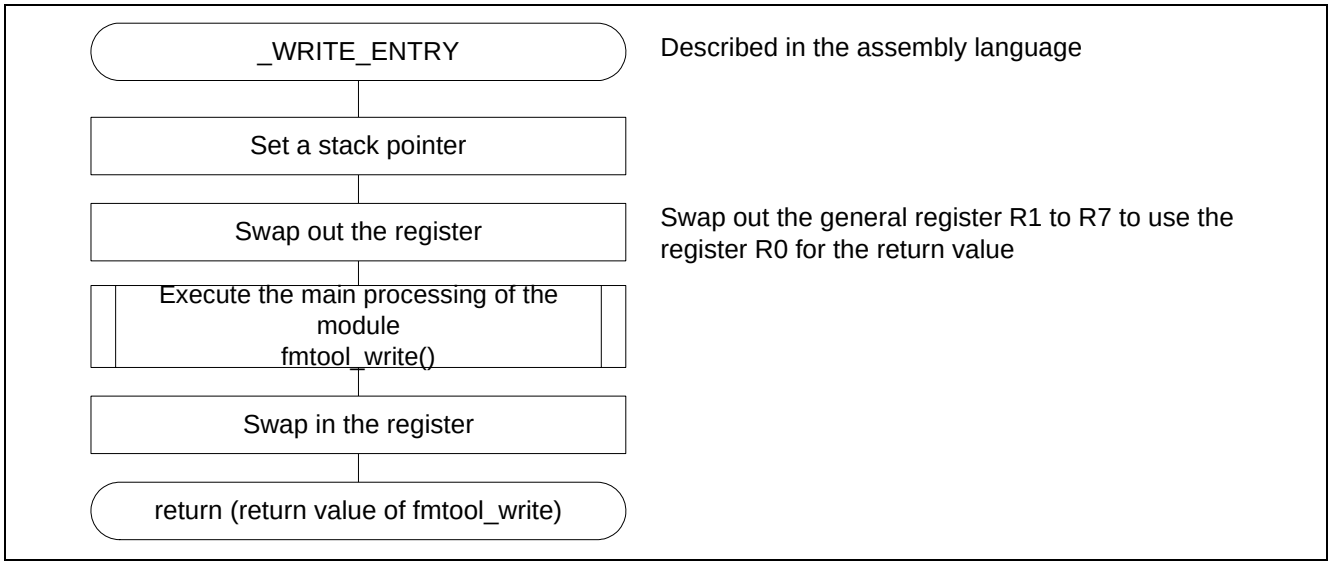


Figure 5.6 Write Module

5.8.3 Initialization of FMTOOL

Figure 5.7 shows the procedure of initialization of the FMTOOL.

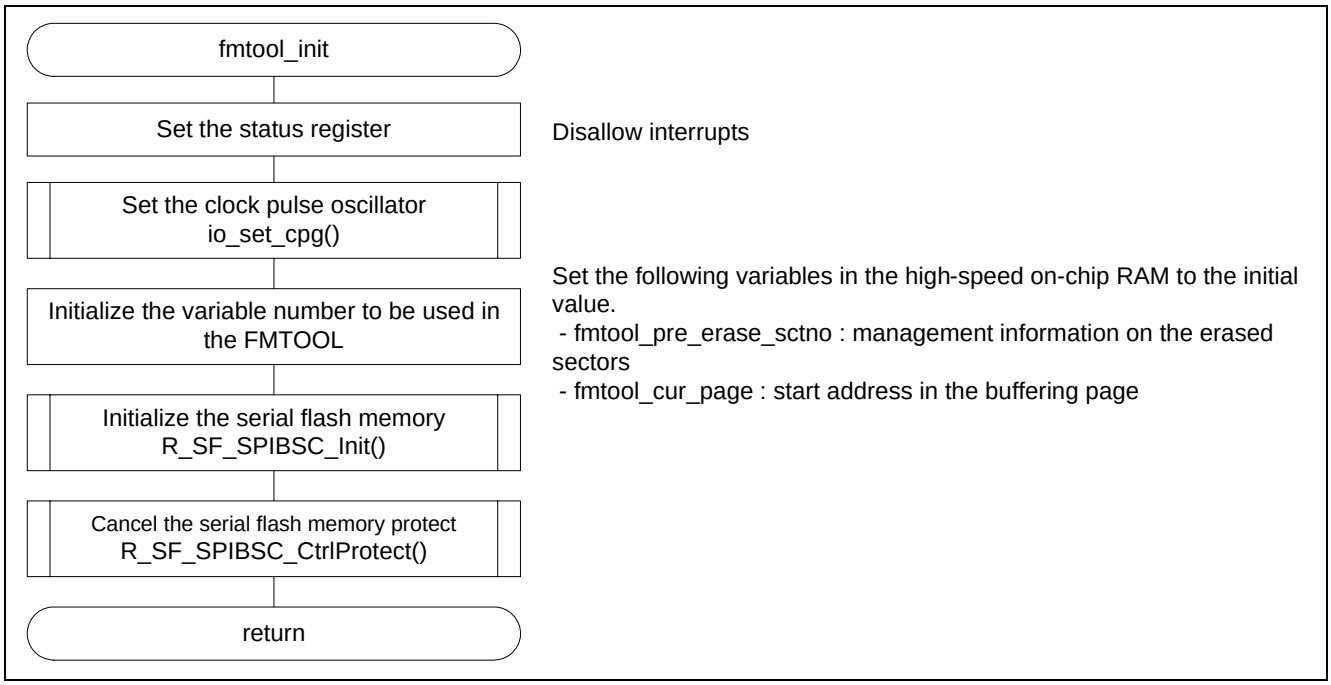


Figure 5.7 Initialization of FMTOOL

5.8.4 Write Processing for the Flash Memory

Figure 5.8 shows the write processing for the flash memory.

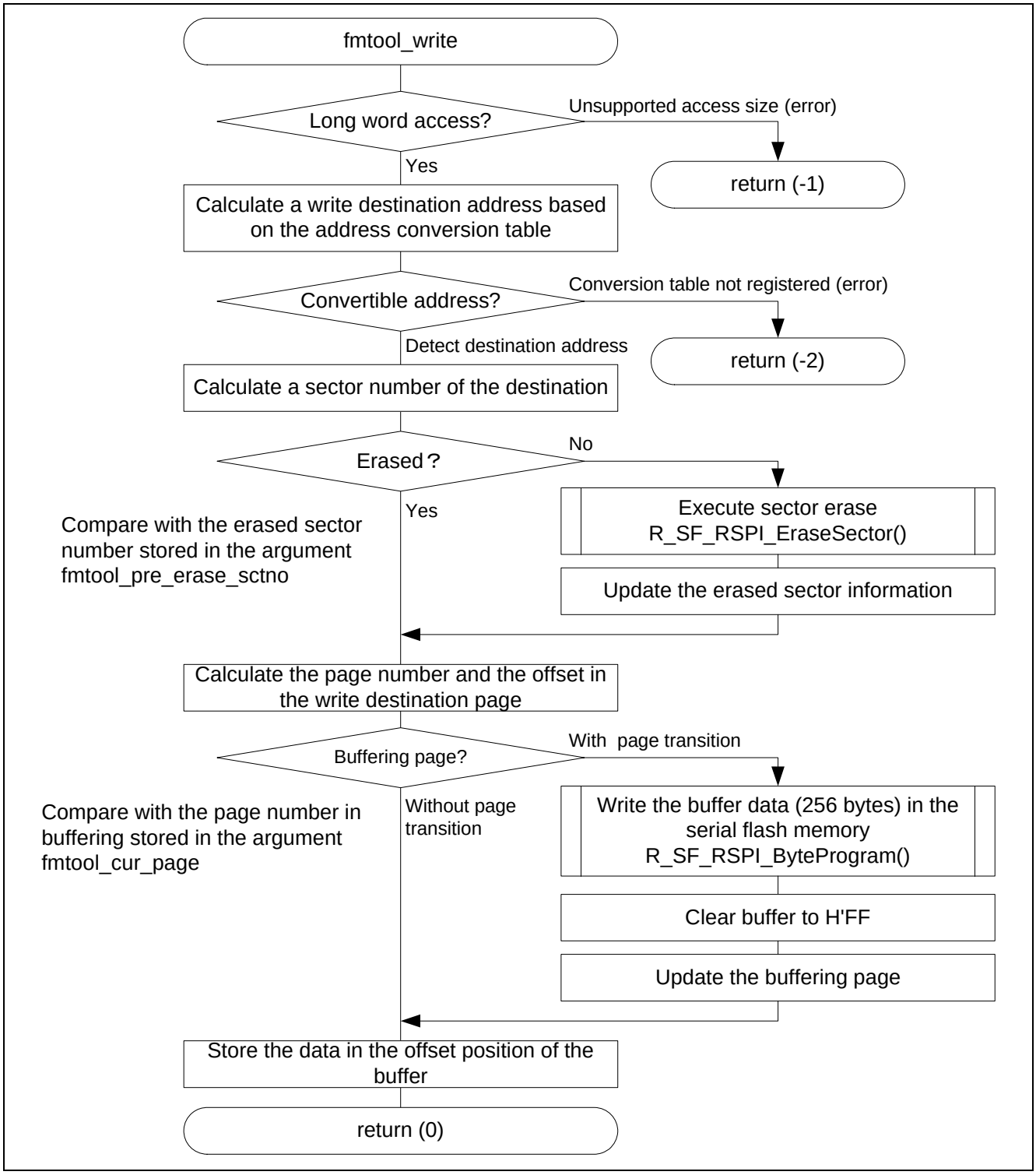


Figure 5.8 Write Processing for the Flash Memory

5.9 Basic Precautions

5.9.1 Adding Dummy Data to the Load Module

The FMTOOL writes data by the page with buffering for the purpose of accelerating the write speed to the serial flash memory. Writing to the serial flash memory is carried in the timing of specifying the address in the page different from the page under buffering. Therefore it is possible that the data for the last page may be remained in the buffer and not be written in the serial flash memory. Assign dummy data in the last page of the load module to avoid leaving the valid data in the buffer.

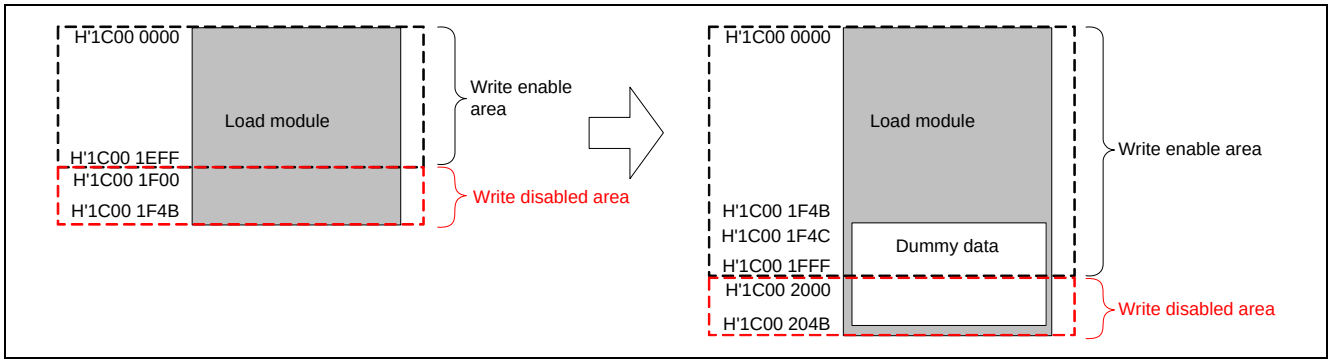


Figure 5.9 Write Disabled Area in Load Module

Figure 5.10 shows an example for adding dummy data to the section. Define the constant data of 256 bytes in the provided dummy section (CDUMMY_MODULE_END) and allocate it at the end of the ROM area.

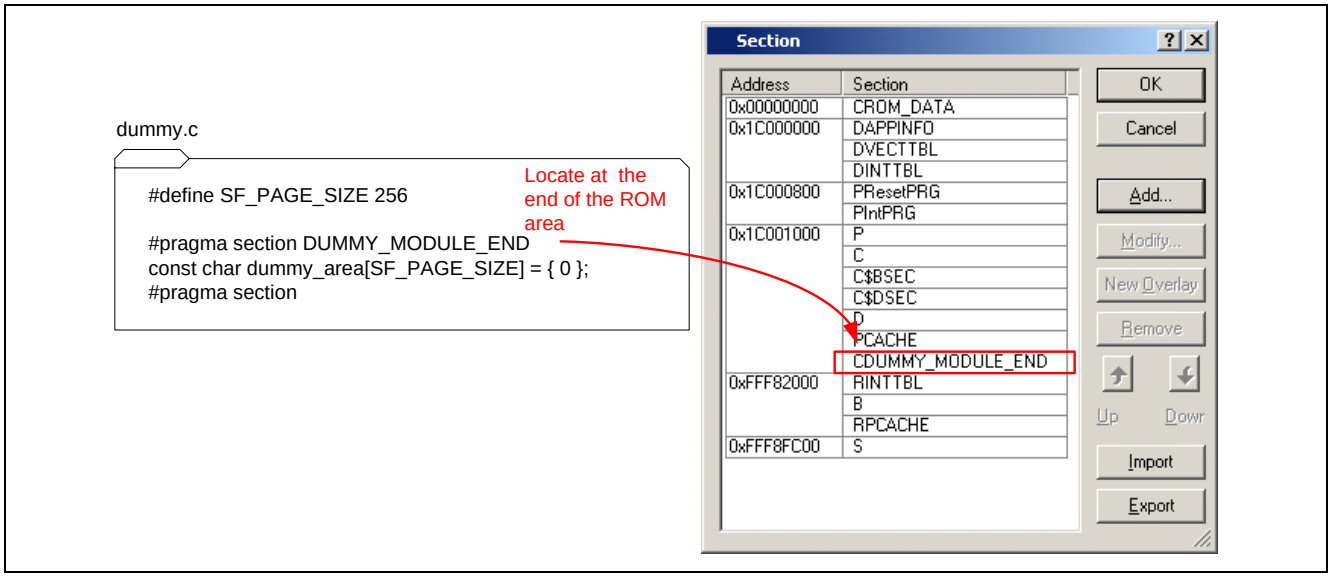


Figure 5.10 Example of Adding Dummy Data

5.9.2 Forbidding Sharing Sectors between the Load Modules

Figure 5.11 shows the operation under the assumption that two load module share one sector. Downloading several load modules in the FMTOOL is enabled, although sharing one sector between the load modules is disabled. When downloading multiple data in one sector, the earlier downloaded data is deleted that may be followed by a false operation.

The mentioned load module area includes the dummy data area described in the section 5.9.1.

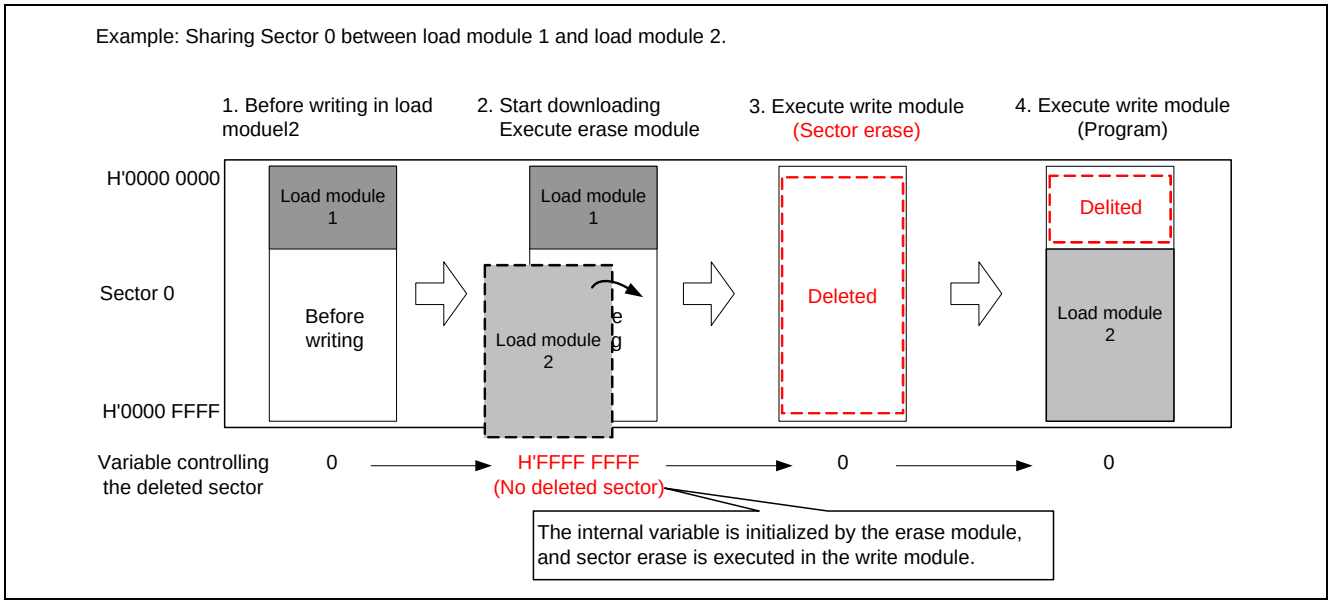


Figure 5.11 Operation when Sharing a Sector between Load Modules

5.9.3 Forbiding Sharing Sectors within the Address Conversion Table

Figure 5.12 shows the operation under the assumption that one sector is shared within the address conversion table. In the example, g_fm_addr_tbl[0] and g_fm_addr_tbl[1] in the address conversion table share the sector 0, the data written in the g_fm_addr_tbl[0] will be deleted when downloading the area subject to the g_fm_addr_tbl[1].

Set the value which does not share a write sector in the address conversion table.

Example of address conversion table for the sector shared.

	Source: Starting address (src_top)	Source: Ending address+1 (src_end)	Destination: Starting address (dest_top)	Write sector (64KB sector)
g_fm_addr_tbl[0]	H'1C00 0000	H'1C02 0000	H'0000 8000	Sector 0, Sector 1, Sector 2
g_fm_addr_tbl[1]	H'FFF8 0000	H'FFF8 2000	H'0000 0000	Sector 0

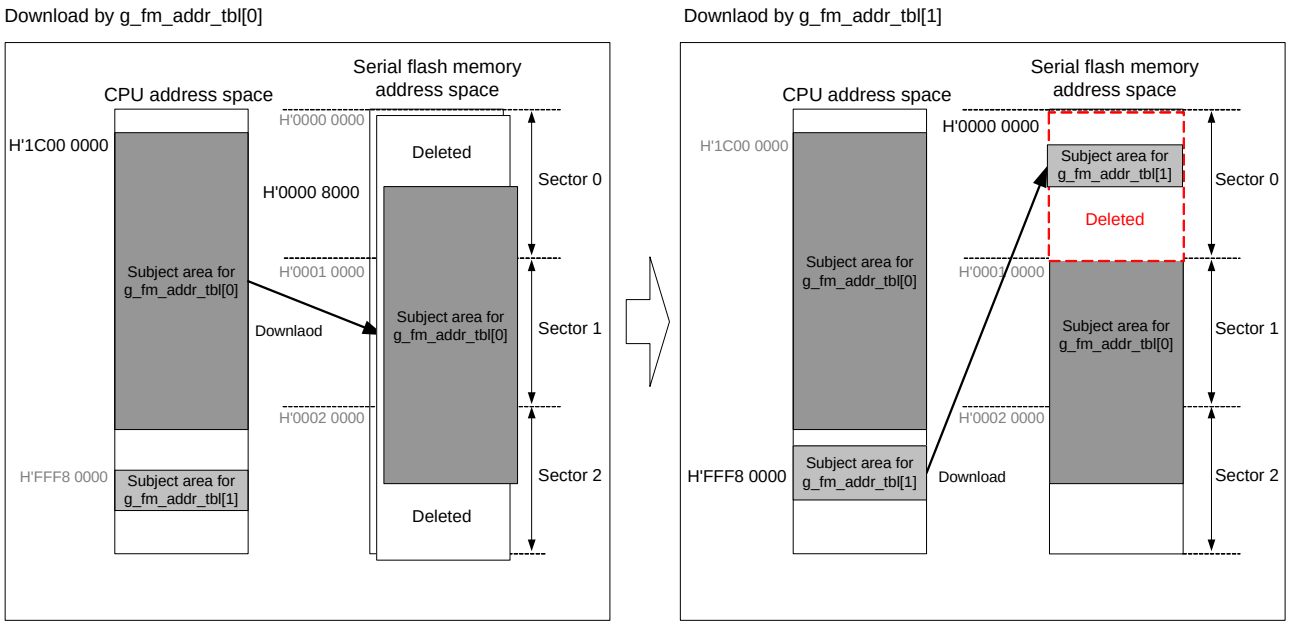


Figure 5.12 Operation when Sharing a Sector within the Address Conversion Table.

6. Application Example

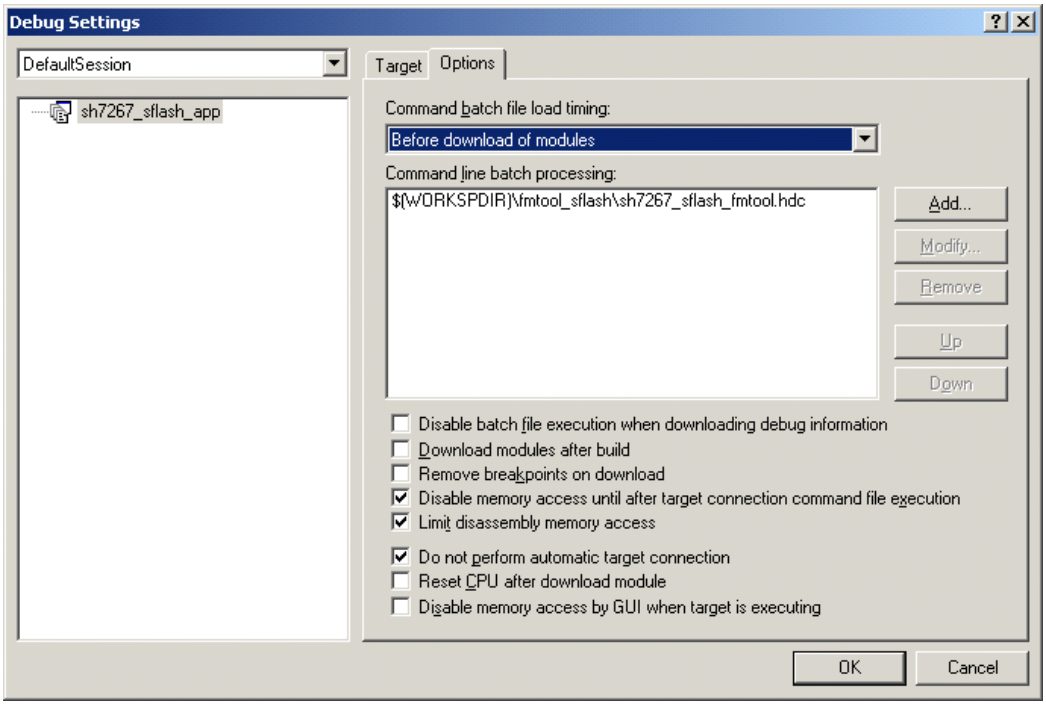
6.1 Procedure of User Program Download

This section describes the procedure of downloading user programs to the serial flash memory using the created FMTOOL (sh7267_sflash_fmtool.mot).

6.1.1 Prepare for the Download Environment

1. Connect user's system with the E10A-USB emulator connected to PC.
2. Start the High-performance Embedded Workshop to open the work space for user programs.
3. The CPU Select dialog box is displayed as shown in Figure 6.1.

   Select the CPU in use from the drop-down listbox for Device and click the OK button.



Note: The shown window is an example agopting the SH72673.

Figure 6.1 Device Select Dialog Box

4. The Connecting dialog box is displayed and emulator connection gets started.
   The reset signal request dialog box shown in Figure 6.2is displayed.

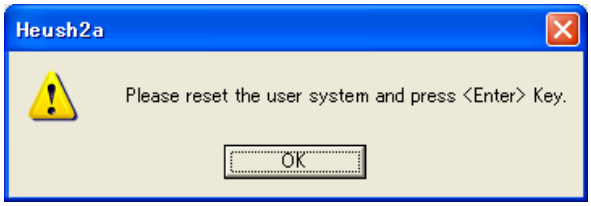


Figure 6.2 RESET Signal Request Dialog Box

5. Turn on the user's system.
   Having received the RESET signal from the user's system, click the OK button.

When “Connected” is displayed on the Output Window in the High-performance Embedded Workshop, the E10A-USB emulator successfully started.

6.1.2 Registering a Batch File

1. Select in the menu; [Debug] → [Debug Settings]
2. The window shown in Figure 6.3 is open.
3. Select “Before download modules” in the pull-down menu for the “Command batch file load timing”.
4. Click the “Add” at “Command line batch processing” to add a batch file.
5. Click the OK button, and registration is completed.

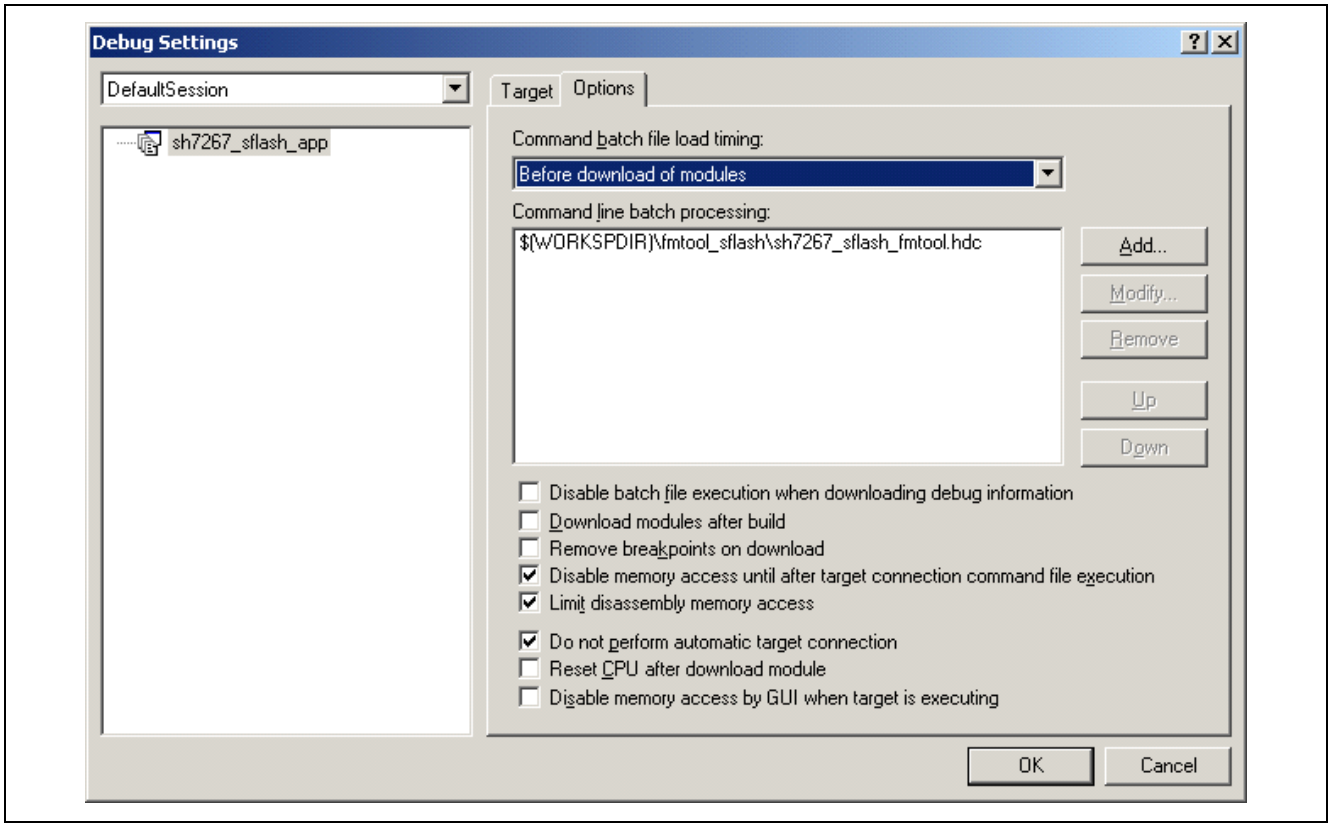


Figure 6.3 Window for Debug Setting

6.1.3 Setting Configuration Dialog Box

1. Select in the menu; [Setup] → [Emulator] → [System]
2. Figure 6.4 shows the "Configuration" dialog box (the page of lading flash memory) for setting to download a user program to the external flash memory using the E10A-USB emulator.

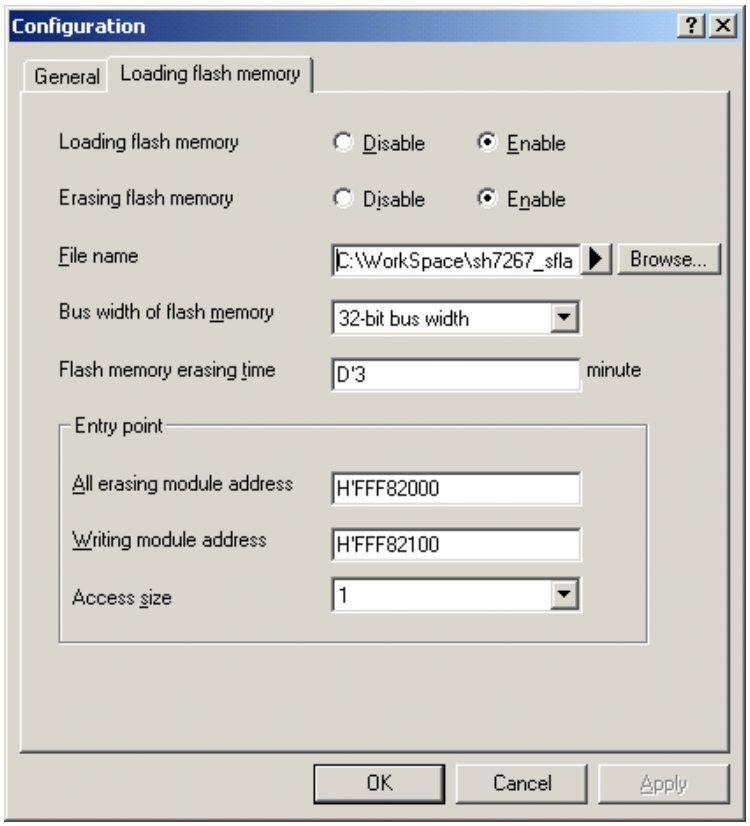


Figure 6.4 Configuration Dialog Box (in the page of loading flash memory)

Table 6.1 lists the setting for each item. When make the settings and click the OK button, configuration is completed.

Table 6.1 Setting Value in the Configuration Dialog Box

Item	Setting Value
Loading flash memory	Enable
Erasing flash memory	Enable
File Name	sh7267_sflash_fmtool.mot (the directory which stores the FMTOOL)
Bus width of flash memory	32-bit bus width
All erasing module address	Specify the start address of erase module (H'FFF8 2000)
Writing module address	Specify the start address of write module (H'FFF8 2100)

6.1.4 Adding a Download Module

Open the debug setting window from the debug menu and click "Add". When the download module window shown in Figure 6.5 is displayed, add user programs which to be loaded into the serial flash memory to the download module.

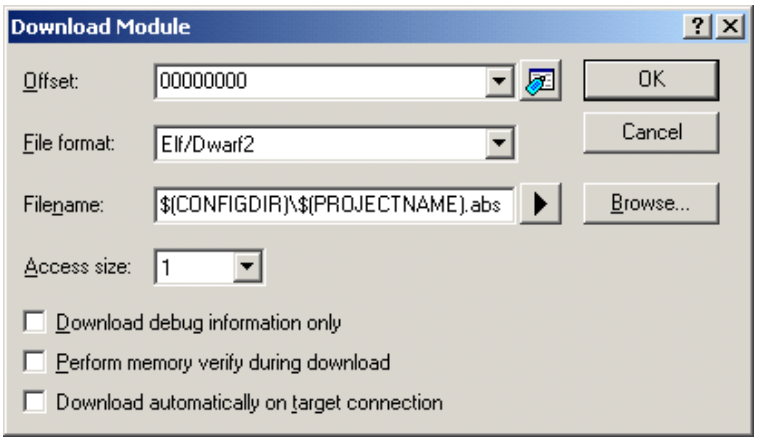


Figure 6.5 Download Module Window

6.1.5 Downloading a User Program

Using the download function shown in Figure 6.6, download the user programs.

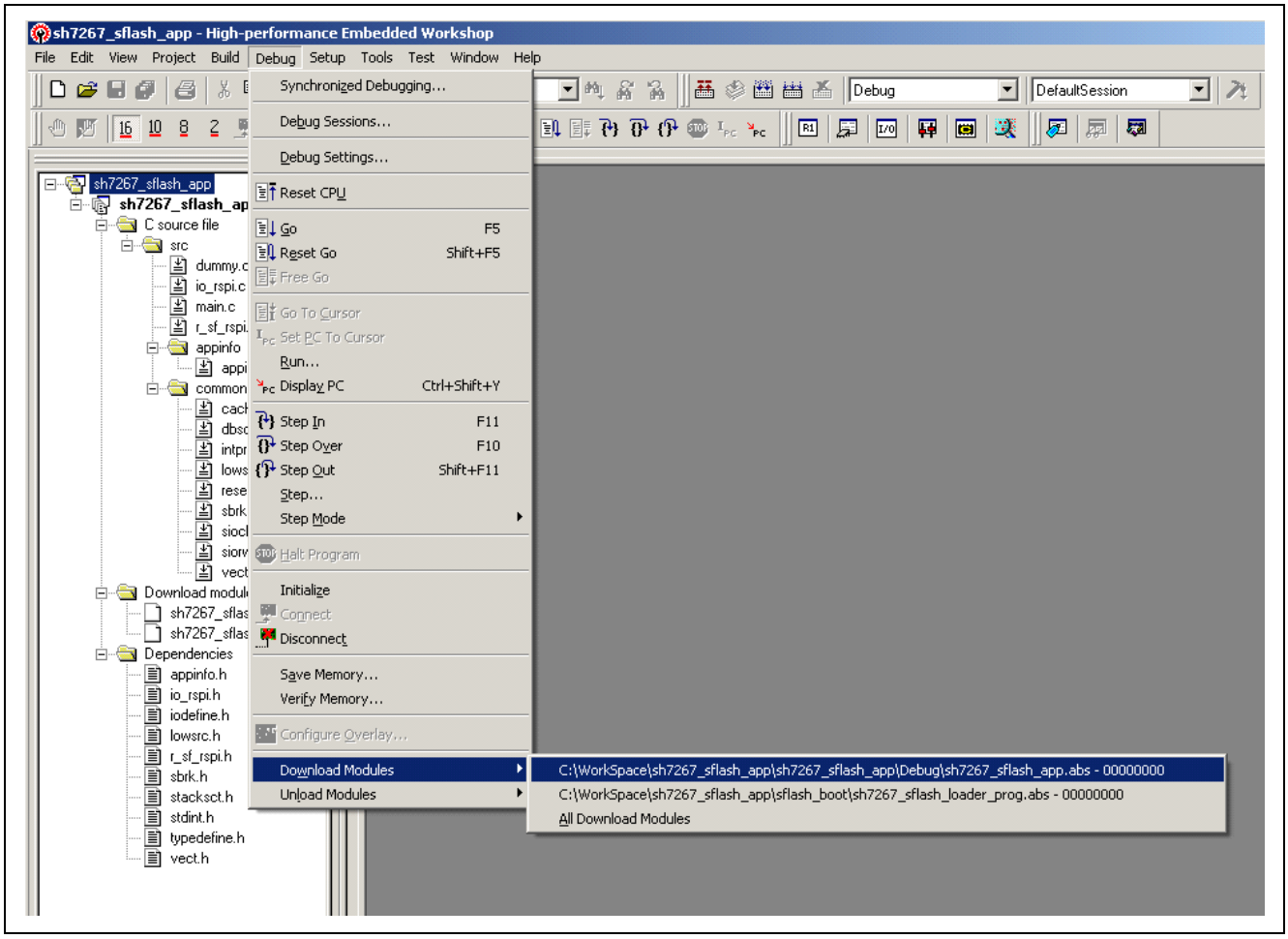


Figure 6.6 Downloading User Programs

6.2 Application to Serial Flash Boot

In this application note, the function for booting from the serial flash memory is called the “serial flash boot”. For details on the serial flash boot, refer to “SH7266/SH7267 Groups Boot From the Serial Flash Memory (document No.:R01AN0214EJ)”.

The sample code provides the processing which corresponds to the example

6.2.1 Changes in replacing the Downloader to the FMTOOL

This section explains the changes in replacing the downloader which is the writing tool for flash of the above application note (R01AN0214EJ) to the FMTOOL.

1. Change the storing address for the application program

Figure 6.7shows examples of the section allocation and the address conversion for booting the serial flash memory. The application program is stored in the sector 1 or later because the sector cannot be shared between the load modules. The value of APROG_TOP_SFLASH Macro which defined in the loader program needs to be changed.

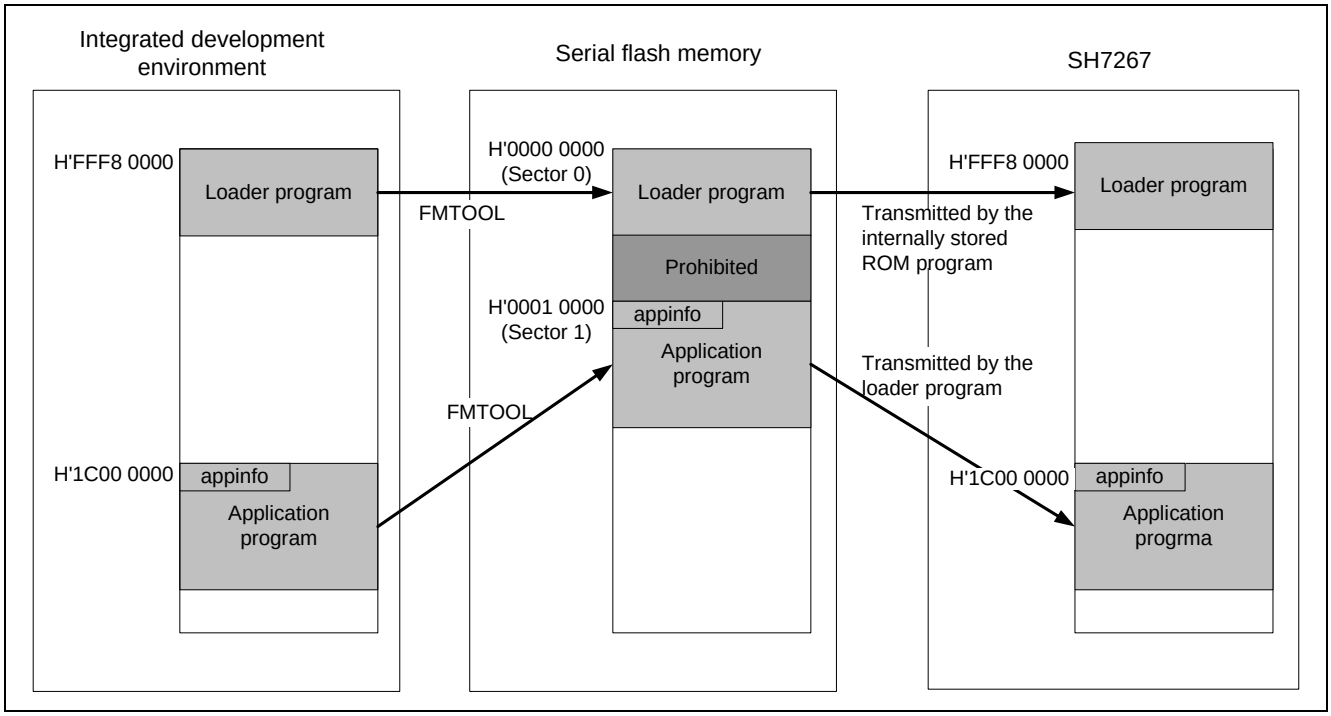


Figure 6.7 Section Allocation and Address Conversion at Booting the Serial Flash

2. Add dummy data

Make sure to add dummy data to the loader program and the application program as described in the section “ 5.9.1 Adding Dummy Data to the Load Module”

3. Download the load module

The operational procedure for the integrated development environment is also changed for downloading the load module. For the procedure to download, refer to the section “6.1 Procedure of User Program Download”.

6.2.2 Storing and Reading Constant Data

The downloader downloads the load module to the serial flash memory by RAM, although the FMTOOL does not use the RAM for downloading. The FMTOOL enables to store the data which exceeds the RAM limit to the serial flash memory.

This section describes the method to store the constant data to the serial flash memory and read it locally when needed. This method is effective for the constant data which has large capacity such as graphic data.

Figure 6.8 shows the operation for storing and reading the constant data. The application program will be implemented as follows.

- Declare the const-modified constant data within the section which defined in the unused space such as CS0 space.
- Do not access to the constant data directly from the variable identifier.
- Implement the access function of RSPI and read the constant data from the serial flash memory when needed.

Note: The area where the section to be allocated must be registered in the address conversion table.

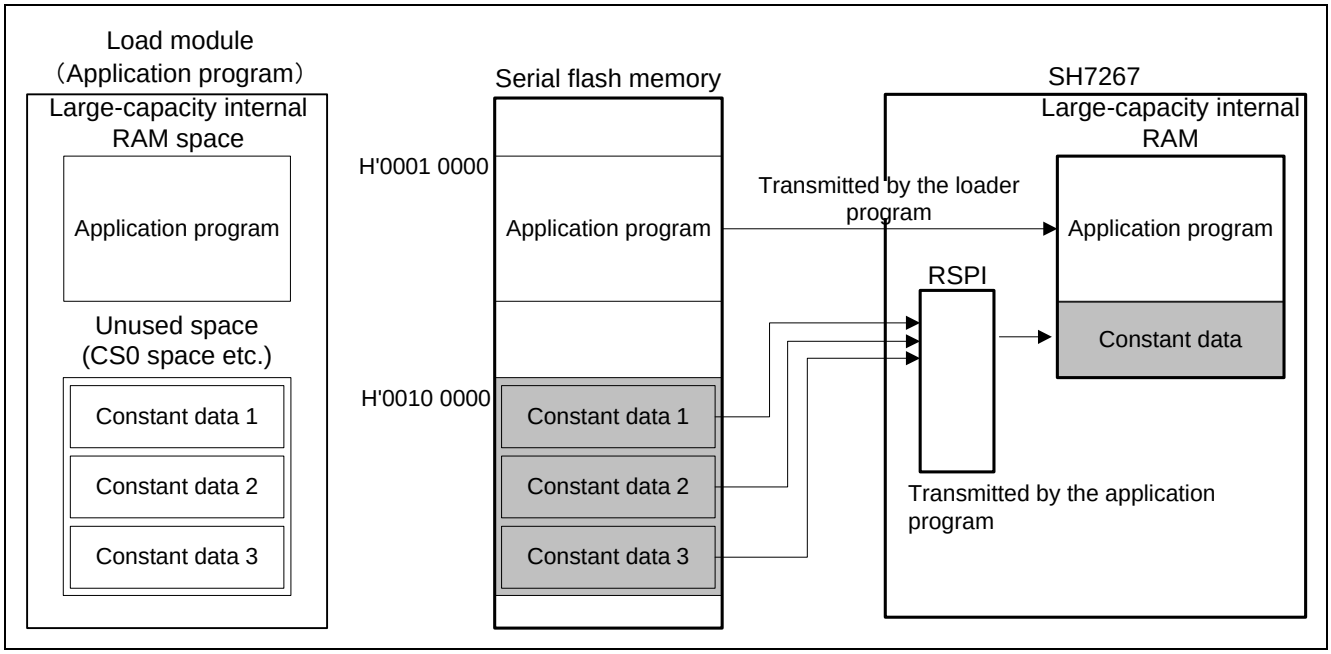


Figure 6.8 Operation of Storing and Reading the Constant Data

6.3 Customizing FMTOOL

The sample code is dependent on the specification of the device in the serial flash memory. Customization of the program may be necessary when altering the device.

6.3.1 Device Specification Capable for Sample Code

Table 6.2 and Table 6.3 list the specification of the current device and the commands used in the sample code respectively.

Table 6.2 Specification of the Current Device

Item	Description
Manufacturer	Silicon Storage Technology, Inc.
Model	SST25VF016B
Capacity	2M bytes
Interface	Four-wire SPI bus (non-multi I/O bus)
Access time	80 MHz
Sector structure	Uniform
Sector size	64K bytes
Page size	256 bytes

Table 6.3 Commands Used in the Sample Code

Item	Description
Erase command	H'D8 (64KB sector erase)
Program command	H'02 (byte programming) H'AD (auto-increment addressing, word programming)

6.3.2 Contents of Customization

Table 6.4 lists the necessary customizations and the contents.

Table 6.4 Necessary Customization and the Contents

Cases	Contents
Improper sector size (not suitable for 64K-byte sector area)	For the Uniform type sector structure, alter the setting value of macro SF_SECTOR_SIZE to the new sector size. Change the sector erase command used in R_SF_RSPI_EraseChip function to the command that supports the new sector size. For the Top or Bottom type structure, the algorithm to discriminate sector number in fmtool_write function should also be altered.
Different procedure for device initialization	Customization is required for the serial flash memory operation function and the Renesas serial peripheral interface control function. For details, refer to the sample code.
The command in Table 6.3 is unusable.	
Different electric characteristics.	

Note: The FMTOOL is flash memory specification dependent. Therefore the items in Table 6.4 do not cover all the cases. Check the data sheet and modify the FMTOOL according to the specification in it.

7. Sample Code

The sample code can be downloaded from the Renesas Electronics website.

8. Reference Documents

Hardware Manual

SH7266 Group, SH7267 Group User's Manual: Hardware Rev.1.00

(The latest version can be downloaded from the Renesas Electronics website.)

Technical Update/Technical News

(The latest information can be downloaded from the Renesas Electronics website.)

C Complier Manual

SuperH RISC engine C/C++ Compiler, Assembler, Optimizing Linkage Editor

Compiler Package V.9.04 User's Manual

C Complier User's Manual Rev.1.01

(The latest version can be downloaded from the Renesas Electronics website.)

SuperH Family E10A-USB Emulator User's Manual Rev.9.00

(The latest version can be downloaded from the Renesas Electronics website.)

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Revision History	SH7266/SH7267 Group Application Note E10A-USB Flash Memory Download Function (Download to Serial Flash Memory)

Rev.	Date	Description	
		Page	Summary
1.00	Jun.18, 2012	—	First edition issued

General Precautions in the Handling of MPU/MCU Products

The following usage notes are applicable to all MPU/MCU products from Renesas. For detailed usage notes on the products covered by this manual, refer to the relevant sections of the manual. If the descriptions under General Precautions in the Handling of MPU/MCU Products and in the body of the manual differ from each other, the description in the body of the manual takes precedence.

1. Handling of Unused Pins
   Handle unused pins in accord with the directions given under Handling of Unused Pins in the manual.
   — The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible. Unused pins should be handled as described under Handling of Unused Pins in the manual.
2. Processing at Power-on
   The state of the product is undefined at the moment when power is supplied.
   — The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the moment when power is supplied.
   In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the moment when power is supplied until the reset process is completed.
   In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the moment when power is supplied until the power reaches the level at which resetting has been specified.
3. Prohibition of Access to Reserved Addresses
   Access to reserved addresses is prohibited.
   — The reserved addresses are provided for the possible future expansion of functions. Do not access these addresses; the correct operation of LSI is not guaranteed if they are accessed.
4. Clock Signals
   After applying a reset, only release the reset line after the operating clock signal has become stable. When switching the clock signal during program execution, wait until the target clock signal has stabilized.
   — When the clock signal is generated with an external resonator (or from an external oscillator) during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Moreover, when switching to a clock signal produced with an external resonator (or by an external oscillator) while program execution is in progress, wait until the target clock signal is stable.
5. Differences between Products
   Before changing from one product to another, i.e. to one with a different type number, confirm that the change will not lead to problems.
   — The characteristics of MPU/MCU in the same group but having different type numbers may differ because of the differences in internal memory capacity and layout pattern. When changing to products of different type numbers, implement a system-evaluation test for each of the products.

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