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S1C17801
EXTFLSC Application Note

When using the commands, follow the instructions of NOTICE_Application Notes Sample Programs.pdf being included in the downloaded compressed file.

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OVERVIEW

This document is a reference to use the S1C17801 function of erasing and rewriting external Flash.

OPERATING ENVIRONMENT

・S5U1C17801T1100 (hereafter SVT17801:Software eValuation Tool for S1C17801）
  A set of SVT17801 CPU board and SVT17 ICD board (two sets as necessary)
・USB miniB cable
・PC
  Installed with GNU17 development tools
  Installed with the USB driver for the SVT17 ICD board

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1. SPECIFICATIONS

This sample software controls erasing and writing the external Flash (SPANSION S29JL064H) mounted on SVT17801.

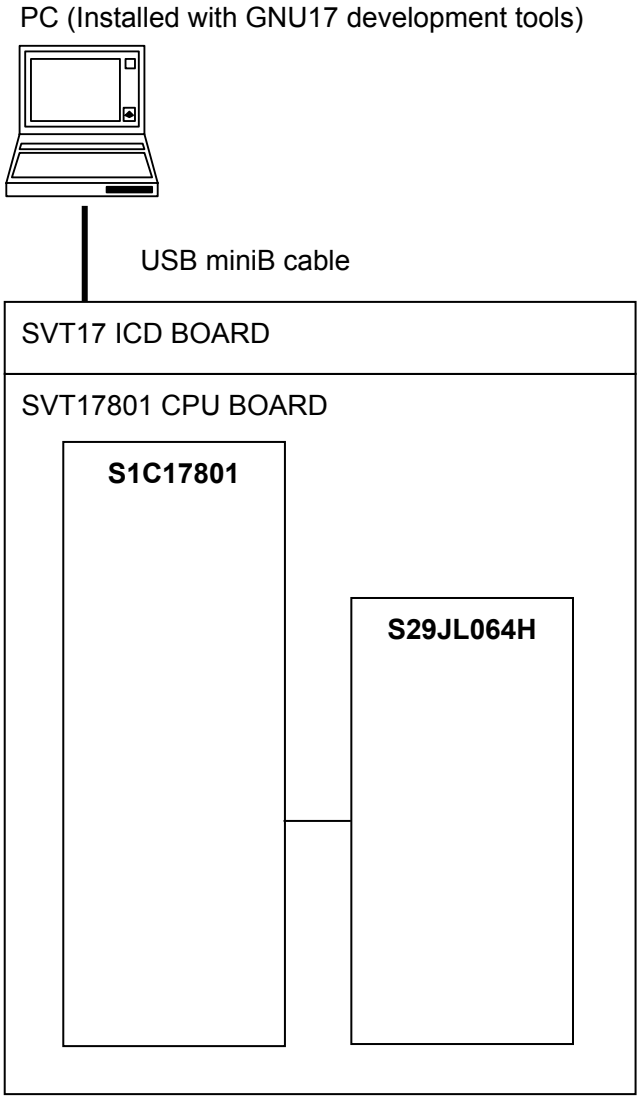
It inputs the following commands from “command >” prompt of [Simulated I/O] window.

Command list

Command name	Description
chip	Chip erase (erase all)
sec	Sector erase (Erase sectors in the specified address range)
write	Data write (Write a sector to the specified address)
all	All write (Write to the whole area)

The following describes the connection procedure.

When connected with SVT17801 CPU BOARD



2. DESCRIPTIONS OF FUNCTIONS USED

Input and output pins	The connection pins (A0 to A21, D0 to D15, CE, OE, WE, and RY/BY) to the external Flash is connected with the addresses A1 to A22, data D0 to D15, CE0, RD, WRL and P44. Addresses A1 to A22 are also used by general input and output port pins (P61 to P67, P70 to P77, and P80 to P86). Data D0 to D15 are also used by general input and output port pins (P90 to P97, and PB0 to PB7). CE0 is also used by general input and output port pins (PA0). RD is also used by general input and output port pins (PA4). WRL is also used by general input and output port pin (PA5). ※ The setting is defined within boot.c.
SRAMC	Defines the access Wait/DeviceSize/BSL method setting of CE0. ※ The setting is defined within boot.c.
Interrupt handler	Unused.

3. SOFTWARE DESCRIPTION

3.1 File configuration

File name	Function
boot.c	Startup module
main.c	Main function
inthdlr.c	Interrupt handler function
vector.c	Vector table settings
header/reg_801.h	Register definitions
header/vector.h	Vector table definitions
extflsc_drv/extflsc_drv.c	External Flash driver API group
extflsc_drv/extflsc_api.h	External Flash driver API definition
gpio_drv/	GPIO drivers group folder
cmu_drv/	CMU drivers group folder
flashc_drv/	FLASHC drivers group folder
itc_drv/	ITC drivers group folder
sramc_drv/	SRAMC drivers group folder
extflsc_gnu17IDE.lds	Linker script file
extflsc_gnu17IDE.cmd	GDB command file
extflsc_gnu17IDE.par	Parameter configuration file
extflsc_gnu17IDE.mak	Make file
.cdtproject	Project file
.gnu17project	Project file
.project	Project file
GDB17 Launch for extflsc.launch	Project startup file

3.2 Descriptions of the modules

File name: main.c

Function name	Function
main	Sets up I/O ports and ITC, initially sets the external Flash, and displays relevant messages in the Simulated I/O.
PortInitialize	Unprocessed (Initialized by boot.c)
ItcInitialize	Sets unused by interrupt
ExtFlscInitialize	Initializes the external Flash control

For the GPIO driver functions, refer to the “Detailed description of GPIO driver” chapter.
For ITC driver functions, refer to the “Detailed description of ITC driver” chapter.

3.3 Global variables

The following shows the global variables used in the sample program.

Variable name	Type	Function
inbuff[128]	unsigned char	For Simulated I/O input
outbuff[128]	unsigned char	For Simulated I/O output

3.4 Structure

The following describes the structure used in the sample program.

Definition name		
T_EXTFLSC_CFG	config	
Member		
control	unsigned long	Control register address
Remarks		
Structure for setting the initial value of EXTFLSC.		

3.5 Operating procedures

Import the project
(1) Launch the IDE and import the "extflsc" project.
※ For the import procedure, refer to S5U1C17001C Manual "Software Development Procedure."

Build
(1) Build "extflsc" project using the IDE.

Connection and powering on procedures
(1) Connect SVT17801, USB miniB cable and PC.
(2) Reset SVT17 ICD board.

Run the program
(1) Execute "extflsc" project using the IDE.
(2) After executing "extflsc", a "command >" prompt is displayed in the [Simulated I/O] window.
(3) Input one of the following commands.

Command list

Command name	Description
chip	Chip erase (erases all)
sec	Sector erase (Erases sectors in the specified address range)
write	Data write (Writes a sector to the specified address)
all	All write (Writes to the whole area)

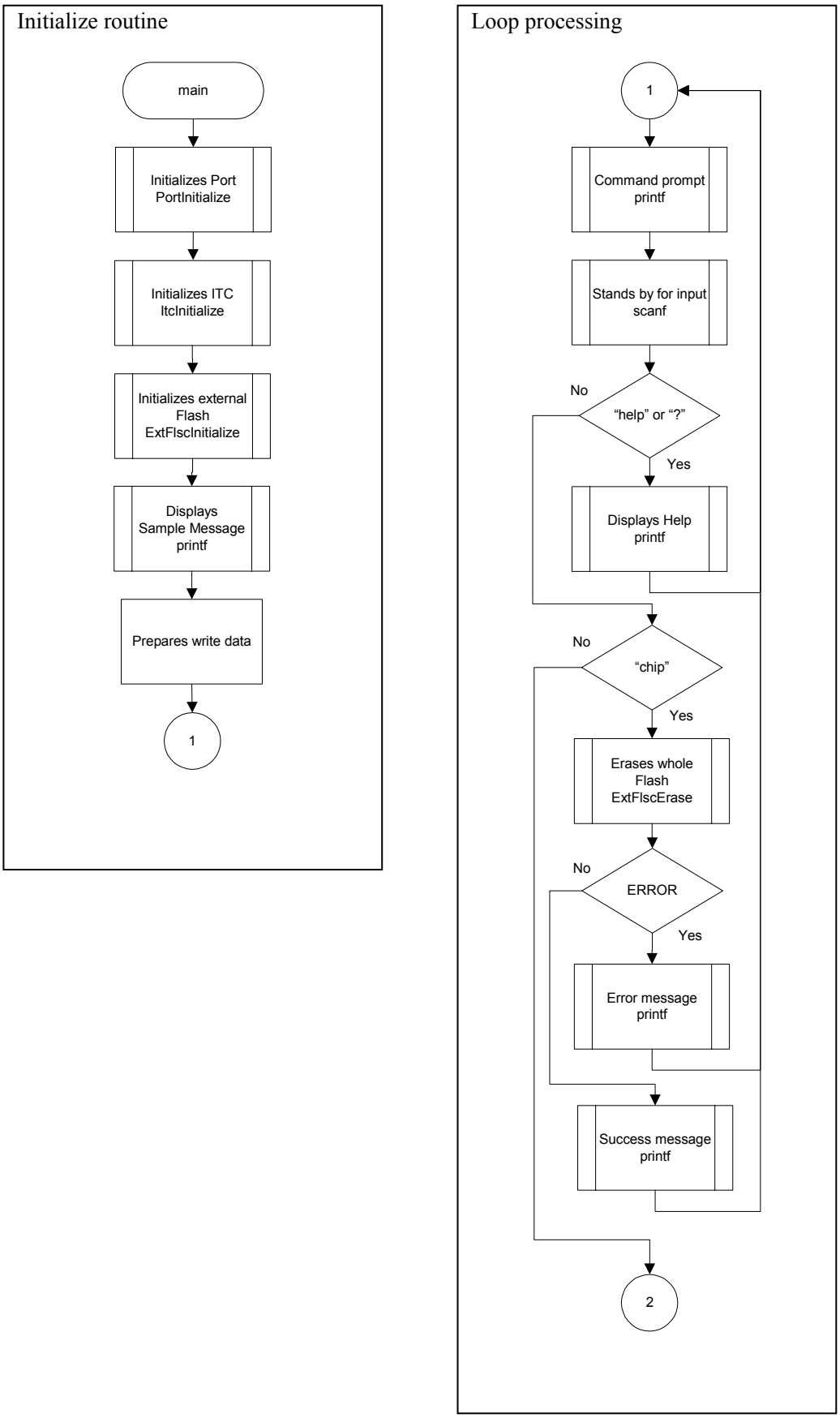
The "chip" command input erases the whole area in the external Flash.
The "sec" command input deletes sectors. By inputting the start address and end address from the Simulated I/O without a break after the command input, sectors within a range of the addresses are erased.
The "write" command input writes 64K bytes data. By inputting the write start address from the Simulated I/O without a break after the command, data is written to the address.
The "all" command input writes data to the whole area in the external Flash.

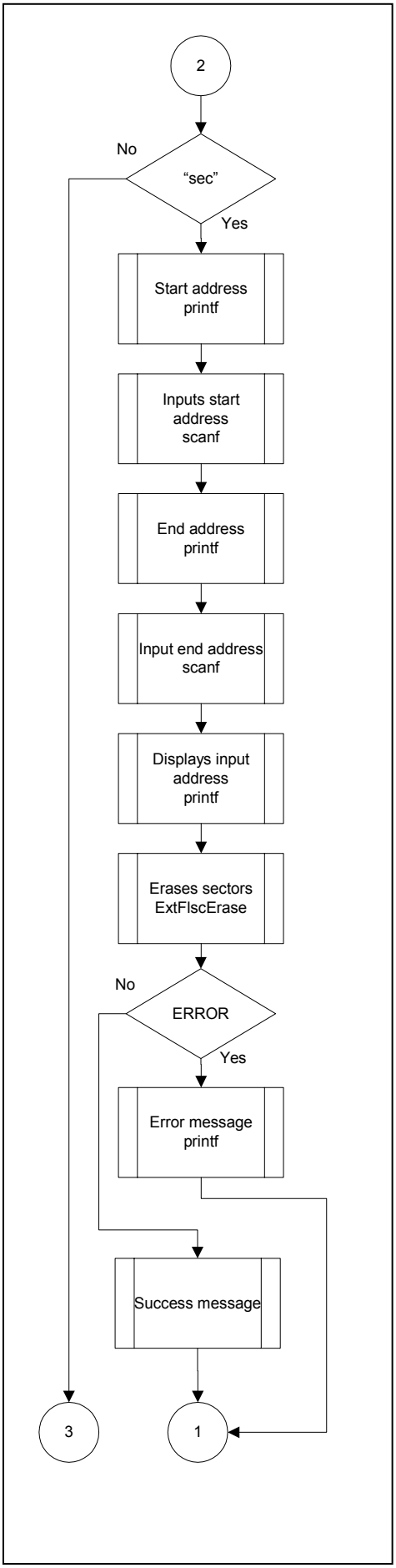
3.6 Outline of the sample program operations

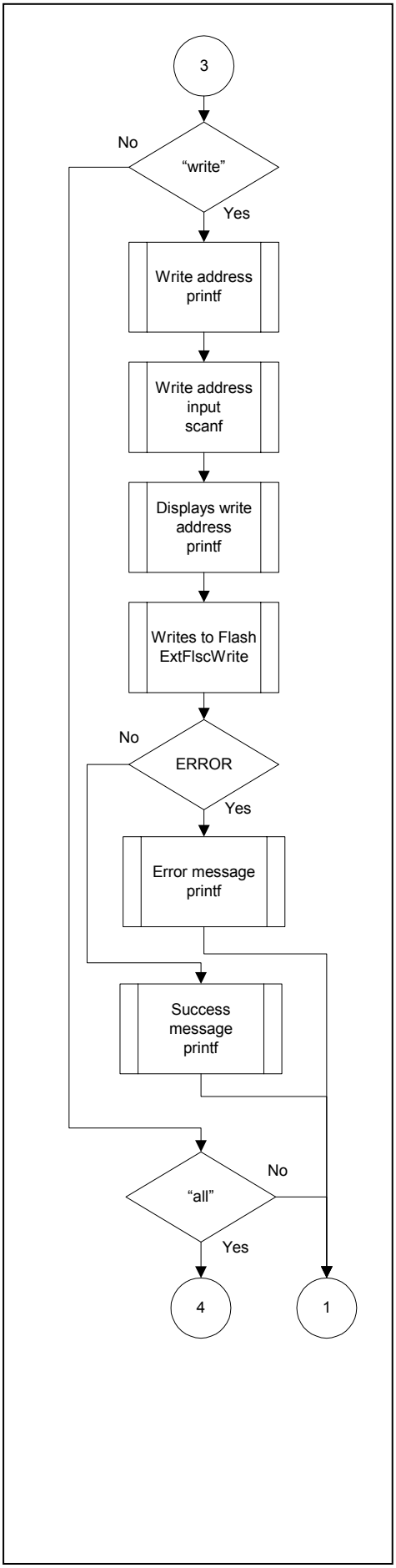
(1) Initializes a port
(2) Initializes ITC
(3) Initializes EXTFLSC.
(4) Stands by for command input from the Simulated I/O
(5) Process according to the command

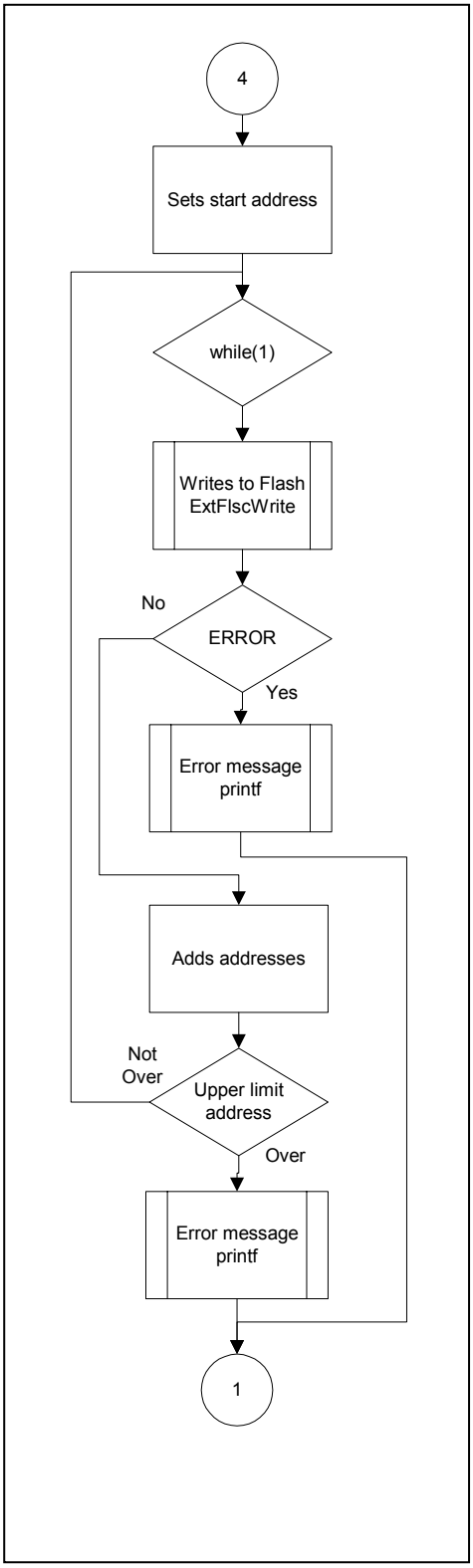
3.7 Flowchart

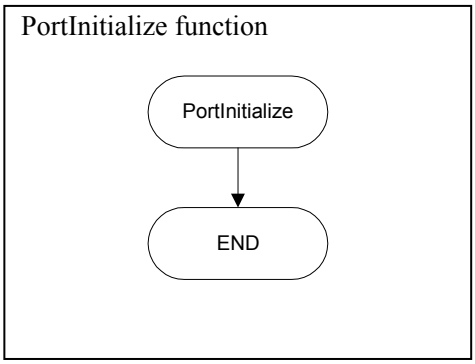
The following shows the flowchart of the main routine and interrupt handler functions.

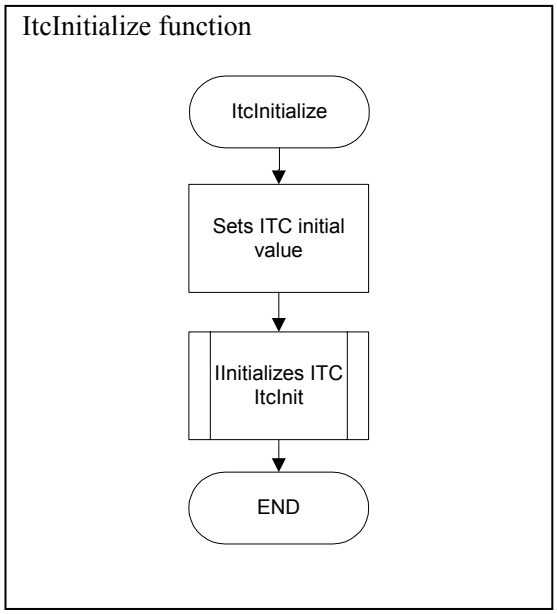


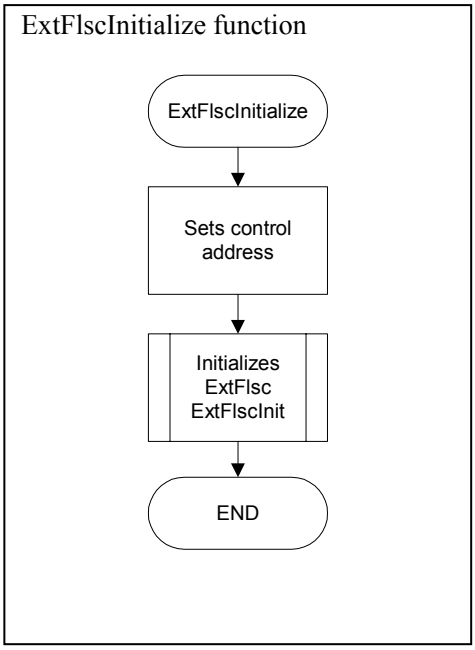

2
No
"sec"
Yes
Start address printf
Inputs start address scanf
End address printf
Input end address scanf
Displays input address printf
Erases sectors ExtFlscErase
No
ERROR
Yes
Error message printf
Success message
3
1


3
No
"write"
Yes
Write address printf
Write address input scanf
Displays write address printf
Writes to Flash ExtFlscWrite
No
ERROR
Yes
Error message printf
Success message printf
No
"all"
Yes
4
1


4
Sets start address
while(1)
Writes to Flash
ExtFlscWrite
No
ERROR
Yes
Error message
printf
Adds addresses
Not
Over
Upper limit
address
Over
Error message
printf
1


PortInitialize function
PortInitialize
END


ItcInitialize function
ItcInitialize
Sets ITC initial value
IInitializes ITC
ItcInit
END


ExtFlscInitialize function
ExtFlscInitialize
Sets control address
Initializes ExtFlsc
ExtFlscInit
END

3.8 Detailed Explanation of the ExtFlsc Driver Functions

The following explains the functions described in the files extflsc_drv.c and extflsc_api.h.

Initialization

Format	void ExtFlscInit(T_EXTFLSC_CFG *config)
Function	Initializes EXTFLSC
Argument	config -in Initialization parameter for EXTFLSC
Return value	None

(Description)
Receives an argument indicating a control register address of the external Flash, and holds it in an internal variable.
Uses the held address to access the external Flash

```
typedef struct {
        unsigned long        control;    // Control register address
} T_EXTFLSC_CFG;
```

Initializing the external Flash

Format	int ExtFlscErase(unsigned char mode, unsigned long startAddress, unsigned long endAddress)
Function	Erases Flash
Argument	mode -in Erase mode EXTFLSC_ERASE_CHIP : Erases whole Flash EXTFLSC_ERASE_SECTOR : Erases flash sectors startAddress -in Address to start erasing endAddress -in Address to end erasing
Return value	SUCCESS : Terminated successfully ERROR : Failed in processing

(Description)
Executes erasing process specified by the mode argument.
StartAddress/EndAddress must be specified also for EXTFLSC_ERASE_CHIP.

If an address that is not within the external Flash area is specified, ERROR is returned.
IF erasing process fails, ERROR is returned.

Writing external Flash

Format	int ExtFlscWrite(unsigned long address, unsigned long size, unsigned short *data)
Function	Writes to the Flash
Argument	address -in Write start address size -in Write size data -in Storage pointer to write data
Return value	SUCCESS : Terminated successfully ERROR : Failed in processing
(Description) Writes data with the size of area specified by the data argument, to the Flash starting from the address specified by the address argument. IF writing process fails, ERROR is returned. If an odd number is specified for the address argument, ERROR is returned.	

3.9 Header Definitions

The table below show the definitions used in the driver functions.

Definition name	Value	Description
EXTFLSC_ERASE_CHIP	0x10	Chip erase command
EXTFLSC_ERASE_SECTOR	0x30	Sector erase command
EXTFLSC_TOP_ADDRESS	0x100000	Start address of the external Flash
EXTFLSC_END_ADDRESS	0x8FFFFF	End address of the external Flash
EXTFLSC_SMALL_SEC	0x2000	Minimum block size
EXTFLSC_LARGE_SEC	0x10000	Maximum block size
EXTFLSC_COM1_ADDR	(0x555 << 1)	Address of Flash command 1
EXTFLSC_COM2_ADDR	(0x2aa << 1)	Address of Flash command 2
EXTFLSC_ERASE1	0xaa	Flash erase command 1
EXTFLSC_ERASE2	0x55	Flash erase command 2
EXTFLSC_ERASE3	0x80	Flash erase command 3
EXTFLSC_ERASE4	0xaa	Flash erase command 4
EXTFLSC_ERASE5	0x55	Flash erase command 5
EXTFLSC_PROG1	0xaa	Flash byte program command 1
EXTFLSC_PROG2	0x55	Flash byte program command 2
EXTFLSC_PROG3	0xa0	Flash byte program command 3
EXTFLSC_RESET	0xf0	Flash reset command
EXTFLSC_B_DQ6	0x0040	Toggle bit

REVISION HISTORY

Date	revision	modification	note
08/04/30	1.0	New issue	

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