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Flash Development Toolkit

Application Note (Introduction)

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Renesas Flash Development Toolkit

Application Note (Introduction)

Revision 1.0

Renesas Technology Corp.

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1. Overview

This application note describes how to use the Renesas Flash Development Toolkit.

The target devices are the following three series:

- (1) H8/300H Tiny Series (H8/3694F)
- (2) H8S Family (H8S/2378F)
- (3) R8C/Tiny Series (R5F21154)

2. Functions of the Flash Development Toolkit

The Renesas Flash Development Toolkit is an on-board flash programming tool for Renesas F-ZTAT microcomputers, which offers a sophisticated and easy-to-use graphical user interface.

When it is used with Renesas High-performance Embedded Workshop (HEW), it provides users who develop

embedded application software using Renesas F-ZTAT microcomputers with an integrated development environment.

The Flash Development Toolkit can also be used as an editor for S-record and hexadecimal files.

Note: F-ZTAT (Flexible-Zero Turn Around Time) is a trademark of Renesas Technology Corp.

2.1 Main Functions

The Flash Development Toolkit has the following main functions:

- Connecting a device: Connects a device to the interface of the Flash Development Toolkit.
- Disconnecting the device: Disconnects the device from the interface of the Flash Development Toolkit.
- Erasing in blocks: Opening the "Erase Block" dialog erases all or specific blocks in flash memory on the device.
- Checking the blank status: Checks whether the flash section on the target device is blank.
- Uploading data: Uploads data from the target device.
- Downloading a target file: Downloads an active file using the hexadecimal editor.
- Returning a checksum: Returns a checksum of data in flash memory.
- Specifying a flash area: Sets a flash area in which non-programming (such as uploading and blank check) operations are to be performed.

The Flash Development Toolkit is available in the simple interface mode and the basic simple interface mode in which you can operate the kit easily. This application note describes the basic simple interface mode in which you can easily program the specified file in a microcomputer.

For details, refer to Renesas Flash Development Toolkit 3.4 User's Manual.





Figure 2-1 Graphical User Interface of the Flash Development Toolkit

2.2 Basic Simple Interface Mode

The basic simple interface mode allows you to easily write a program or data in flash memory on the target device without creating a project and registering and storing device information.

This mode is called by selecting "Flash Development Toolkit 3.4 Basic" in the Start menu. This mode is used to simplify the look and feel of the Flash Development Toolkit.

In the basic simple interface mode, any previous settings are restored at the start-up. To change the device, kernel, or port settings, select [Options -> New Settings...]. The wizard is started up and collects new settings. shows the screen of the basic simple interface mode.

FDT Simple Interface	(Supported Version)		
Options			
	BASIC FILE PROGRAM	4MING	Exit
Device :	H8/3694F Port :	FDM	
File Selection	Download File	Area	
Oownload File		Areaj 🔽 User Bo	ot Area
User Area: 📘			
User Boot Area:			
	Program Flash]	Disconnect

Figure 2-2 Basic Simple Interface Mode

2.3 Simple Interface Mode

The simple interface mode allows you to manage multiple devices, programs, or data by creating a project, and registering and storing device information. To use this mode, create a project using the Flash Development Toolkit called by selecting it as follows.

Call the "FDT Simple Interface" dialog by selecting [Tools(T) -> Simple Interface...]. This mode is used to simplify the look and feel of the Flash Development Toolkit after a project has been created. The screen of the simple interface mode is shown in Figure 2-3.

FDT Simple Interface (Supported	Version)	
Options		
Project :	3694	Back to Project
Device : H8/3694F	Port : FDM	Exit
File¥Image Selection	Download File Area	
🕥 Download Project Image	🔲 User Area	厂 User Boot Area
Ownload File		
User Area:		
User Boot Area		
	Program Flash	Disconnect

Figure 2-3 Simple Interface Mode

3. Operating the H8/300H Tiny Series (H8/3694F)

3.1 Connecting the H8/3694F and Adapter Board

3.1.1 Connecting the Adapter Board

On-board programming adapter board for F-ZTAT* microcomputers HS0008EAUF1H (called the adapter board hereafter), which is connected between a host computer and user system, has a function which can write a user application program in flash memory built into an F-ZTAT microcomputer on the user system (on-board) and erase it from the flash memory.

The adapter board connection is shown in Figure 3-1.

Note: F-ZTAT (Flexible-Zero Turn Around Time) is a trademark of Renesas Technology Corp.

Note: FDM (flash development module) is a former name of the adapter board.



Figure 3-1 Connecting the Adapter Board

3.1.2 User Interface Cable Signals

Pin numbers and corresponding signals of the user system interface cable used for connecting the adapter board and user system are listed below.

Table 3-1	Pin Numbers and	Corresponding	Signals	of the	HS0008EAUF1H	User System	Interface
Cable							

No	Signal Name	No	Signal Name
1	RES	2	GND
3	FWx	4	GND
5	MD0	6	GND
7	MD1	8	GND
9	MD2 (IO0)	10	GND
11	MD3 (IO1)	12	GND
13	MD4 (IO2)	14	GND
15	RXD (TXD on the user system side)	16	GND*1
17	TXD (RXD on the user system side)	18	VIN (Vcc or PVcc)*2
19	SCK (NC)	20	VIN (PVcc)*2

Notes:

1. Be sure to connect pin No. 16 to GND to confirm that the user system is connected properly.

2. For a device with Vcc and PVcc, be sure to supply Vcc or PVcc (pin No. 18) and PVcc (pin No. 20) to the VIN pins of the user interface connector, respectively. To use a device under condition that Vcc = PVcc, or only Vcc is present in the device, be sure to supply Vcc to both VIN pins Vcc or PVcc (pin No. 18) and PVcc (pin No. 20).

3.1.3 Connecting the Adapter Board

An example of connecting the H8/3694F and Renesas adapter board (HS0008EAUF1H) is shown in Figure 3-2. The pull-up and pull-down resistor values shown are only examples. Evaluate the microcomputer to determine the actual values on the user system.



Figure 3-2 Example of Connecting the H8/3694F and Adapter Board

3.1.4 Setting Pins on the Adapter Board

An example of setting pins for the boot mode when the H8/3694F user system and Renesas adapter board (HS0008EAUF1H) are connected is shown in.

Pin No.	Pin on the Adapter Board	Pin on the Device	Input/Output	Output Level
1	RES	RES	Output (default)	Adapter board
3	FWx	NC	NC	-
5	MD0	NMI	Output	Low (0)
7	MD1	NC	NC	-
9	MD2 (IO0)	P85	Output	High (1)
11	MD3(IO1)	NC	NC	-
13	MD4 (IO2)	NC	NC	-
15	RXD	TXD	Input (default)	Adapter board
17	TXD	RXD	Output (default)	Adapter board
19	SCK (NC)	NC	NC (default)	-

Table 3-2 Example of Setting Pins on the H8/3694F and Adapter Board (for Boot Mode)

Note: NC: Means no connection.

3.2 Boot Mode

The following two modes are available to program and erase flash memory: The boot mode which enables on-board programming/erase operations and the programmer mode which enables programming/erase operations using a PROM programmer. In addition to the above modes, the user mode enables on-board programming/erase operations. When the H8/3694F is started from the reset state, it enters a mode depending on the input levels of the TEST and NMI pins and port as listed in Table 3-3. The input level of each pin must be set at least 4 states before the reset state is canceled. When the LSI enters the boot mode, the boot program built into the LSI is activated. The boot program transfers the programming control program from the externally connected Flash Development Toolkit to the on-chip RAM via SCI3, erases the entire flash memory, then executes the programming control program. The boot mode is available for initial programming in the on-board state and forced recovery when data cannot be programmed or erased in the user mode. In the user mode, any desired block can be erased and programmed by branching to a user-provided programming/erase program.

For details, refer to the Hardware Manual.

Table 3-3 Programming Mode Selection

LSI Status after a Reset State Is Canceled		TEST	NMI	P85	PB0	PB1	PB2
On-board programming	User mode	0	1	Х	Х	Х	Х
modes	Boot mode	0	0	1	Х	Х	Х
Programmer mode		1	Х	Х	0	0	0

Note: X: Don't care

3.3 Starting the Flash Development Toolkit

From the "All Programs" menu, select "Flash Development Toolkit 3.4 Basic."

	0	• 🛍 •		
	6	🔸 🖬 FDT 🔸	Flash Development Toolkit 34	b
	🖬 tool	• 🗃	🏸 Flash Development Toolkit 3.4 Basic	P
すべてのプログラム(<u>P</u>)	2 💼 スタートアップ	・ L1 ビソンヨン 2/10 1121至 3.9Cm 3.1T	😵 Help	1
and the second s	2010 2010 2010 2010 2010 2010 2010 201	17 個のオブジェクト	🛃 User Guide (PDF)	L

The basic simple interface screen of the Flash Development Toolkit appears.

When the Flash Development Toolkit is started up for the second and subsequent times, the displayed basic simple interface screen of the Flash Development Toolkit contains the previously selected device and port information.

FDT Simple Interface (Supp	oorted Version)	
Options		
Login	BASIC FILE PROGRAMMING	Exit
AutoConnect AutoDisconnect	Port : FDM	
Readback Verify Request Checksum Erase Device Before Program	Download File Area	
About		
Data Area:	Program Flash	Disconnect

3.4 Setting Product Information

3.4.1 New Settings

Select "New Settings" from "Options." The screen for selecting the device and kernel appears.

If you cannot select "New Settings" from "Options," click "Disconnect."

FDT Simple Interface (Suppo	orted Version)	
Options		
Login	BASIC FILE PROGRAMMING	Exit
AutoConnect AutoDisconnect	Port : FDM	
Readback Verify Request Checksum Erase Device Before Program	Download File Area	sta Avea
New Settings		
About		ii] .
Data Area:	Program Flash	Disconnect

3.4.2 Selecting the Device and Kernel

Select the target device from the pull-down menu. In this example, select H8/3694F.

Workspace and The State	The FLASH Developm FLASH devices. Select the device you Select Device: H8	nent Toolkit supports wish to use with this 3/3694F	a number of Renesas project from the list The Other
Device Image Target files Construction Service Image Construction Service Image Comme.mot Service Image Comme.mot Device Image Comme.mot Service Image Service I	Protocol Compiler Kernel Path Kernel Version	B Renesas 4.0A C:¥Program Files¥F 1_2_00	enesas¥FDT3.4¥Kernels¥P
S OF FE AS BO BY SEATTLE	<		>

When you have selected the device, click "Next(N)."

3.4.3 Selecting a Communications Port

Select the adapter board (FDM) from the pull-down menu.

Communications Port	
Workspace and the second	The FLASH Development Toolkit supports connection through the standard PC Serial port and the USB port. Use this page to select your desired communications port. All settings may be changed after the project is created.
Target files on the second sec	Select port: FDM
Motor Control	Select an Interface type to connect to the target device with. Normally this will be "Direct Connection" or simply left blank.
Target files 1 2 14 20 15 Drive, mot 2 7 91 08 1 9 Data, mot 5 70 55 FD 5 Algorithm, mo 5 99 A DE A 5 64 85 97 0 44 D4 45 75 54 AD 20 75 6 47 EZ 64 80 53	Select Interface:
	< 戻る(B) 次へ(N)> キャンセル

When you have selected the communications port, click "Next(N)."

3.4.4 Device Settings (Setting the Input Clock)

Enter the frequency of the clock used for the board in MHz. For example, enter 9.8 (MHz).

Device Settings		×
Workspace 10 10 Workspace 10 10 Display Device Image 1 CD.mot 2 Comms.mot 2 Comms.mot 2 Device Image 2 Comms.mot 2 Device Image 2 Device Imag	Please enter the specific device option [H8/3694F] using [Pro Enter the CPU crystal frequency for the selected device: Enter the clock mode for the selected device: Select the multiplier for the Main clock frequency (CKM): Select the multiplier for the Peripheral clock frequency (CKP):	ns based on: ptocol B] 9.8 Mhz NONE 💌 1 💌
	< 戻る(B) [次へ(N)ン キャンセル

When you have entered the value, click "Next(N)."

The input clock is the frequency of the clock directly input to the microcomputer. Enter the frequency of the crystal or ceramic resonator connected to the user system with three significant digits. The input clock differs from the operating frequency (PLL output).

3.4.5 Selecting the Connection Type (Boot Mode and Communication Speed)

Select "BOOT Mode" for "Select Connection."

Set the baud rate. For example, select "Use Default."

Connection Type	
Workspace Workspace Thdustrial Cr	The FLASH Development Toolkit can connect to your device in a number of different ways. All the options on this page may be changed after the Project has been created. Select Connection: © BOOT Mode © USER Program Mode
Device Image	□ Kernel already running
A DE POLICIA DE LA COMPANYA DE LA CO	In BOOT Program mode the device erases its FLASH prior to connection. The Toolkit downloads programming kernels to the device as required. The Recommended Speed setting is based on the current device and clock. The user may also input their own, if this is supported by the kernel (and the optional FDM). Recommended Speeds: 19200 Use Default User Specified:
	< 戻る(B) (次へい) キャンセル

When you have selected the connection type, click "Next(N)."

3.4.6 Selecting Programming Options (Protection Level and Messaging Level)

Select the protection level and messaging level. For example, select "Automatic" for "Protection" and "Advanced" for "Messaging."

Workspace industrial Cr	The FLASH Development Toolkit offers a device protection system, plus an advanced messaging level for use with hardware and kernel development. What level of device protection would you like? Protection
B OC EC-TO DEVICE ITORCE	Automatic C Interactive C None
7 E E E E S Keyboard.m 7 E E E S Keyboard.m 1 S Reyboard.m 1 S D S Comms.mot 1 D S Comms.mot	When programming the device, any blocks found to have been writte previously will automatically be erased. What level of messaging would you like? Messaging
92 1A 20 21 Drive, mot. 8 27 91 08 1 Data, mot. 6 F0 56 F0 5 Algorithm.ms 5 50 9A DZ AF 5 64 85 97 6 24 D4 40 75 54 AD 20 F6 1 8 47 E7 64 80 83 67 1 1	The Toolkit will display verbose messages whenever it is communicating with the Target device. This mode is useful for Interface hardware development, and Kernel development.

When you have selected programming options, click "Next(N)."

3.4.7 Adapter Board Pin Settings

Set the pins on the adapter board (FDM) for the boot mode.

In the H8/3694F boot mode, set the output of P85 to high (1) and that of $\overline{\text{NMI}}$ to low (0). On the H8/3694F user system, MD2 (IO0) is connected to P85 and MD0 is connected to $\overline{\text{NMI}}$. Therefore, set MD2 (IO0) and MD0 to output and set the output of MD2 (IO0) to high and that of MD0 to low. No FWE pin setting is required because no FWE pin is given.

FDM Pin Settings	Please select the pin settings for the FDM BOOT Mode using Clock Mode NONE
 A Display Display Display Display Target files Comme.mot E B II 1 Keyboard.m E B II 1 Forme.mot Forme.mot<th>Operating Mode: U: User Defined FWx SCK MD4 MD3 MD2 MD1 MD0 BOOT Mode Outputs □ <</th>	Operating Mode: U: User Defined FWx SCK MD4 MD3 MD2 MD1 MD0 BOOT Mode Outputs □ <
	< 戻る(B) (二次へ(M)> キャンセル

When you have set the pins, click "Next(N)."

An example of connecting the H8/3694F and Renesas adapter board (HS0008EAUF1H) is shown in Figure 3-3. The pull-up and pull-down resistor values shown are only examples. Evaluate the microcomputer to determine the actual values on the user system.



Figure 3-3 Example of Connecting the H8/3694F and the Adapter Board

An example of setting pins for the boot mode when the H8/3694F user system and Renesas adapter board (HS0008EAUF1H) are connected is shown in Table 3-4.

Pin No.	Pin on the Adapter Board	Pin on the Device	Input/Output	Output Level
1	RES	RES	Output (default)	Adapter board
3	FWx	NC	NC	-
5	MD0	NMI	Output	Low (0)
7	MD1	NC	NC	-
9	MD2 (IO0)	P85	Output	High (1)
11	MD3(IO1)	NC	NC	-
13	MD4 (IO2)	NC	NC	-
15	RXD	TXD	Input (default)	Adapter board
17	TXD	RXD	Output (default)	Adapter board
19	SCK (NC)	NC	NC (default)	-

Table 3-4 Example of Setting Pins on the H8/3694F and the Adapter Board (for the Boot Mode)

Note: NC: Means no connection.

3.4.8 Reset Mode Pin Settings

Set pins on the adapter board for restarting the device in the reset mode. These settings are not required for this procedure.

Workspace and The Internet	Please select the pin settings required after a device RESET RESET Mode using Clock Mode NONE
Display Device Image Target files	Operating Mode: U: User Defined
A 72 ES DI T S Keyboard.m S BA 33 I S Comme.mot Comme.mot Device Image Device Image S BA 33 I S Comme.mot Device Image Device Image De	FWx SCK MD4 MD3 MD2 MD1 MD0 RESET F F F F F F F = 0x00 RESET F F F F F F F = 0x00 Setting
	< 戻る(B) 完了 キャンセル

When you have set the items, click "Finish."

3.4.9 Completion of Setting

Device and port settings are now completed.

FDT Simple Interface	(Supported Ve	rsion)			
Options	BASIC I	FILE PROGRAMMIN	з		Exit
Device :	H8/3694F	Port :	FDM		
File Selection		Download File Area	ı r	-	-
Download File		J User Area	1 1	User boot Area	
User Area:					
User Boot Area:					
		Program Flash		Dis	connect

3.5 Programming Flash Memory

3.5.1 Selecting the Program Area and File

Select the download program area and the S-type file.

Check "User Area" in "Download File Area" to enable an S-type file to be specified in "User Area" in "Download File."

Then, click the "..." (browse) button on the right, which becomes active, to open the "Open File" dialog.

In the "Open File" dialog, specify the S-type file sample.mot to be downloaded and click "Open(O)."

FDT Simple Interface (S	Supported Ve	ersion)		
Options				
	BASIC	FILE PROGRAMMING		Exit
Device :	H8/3694F	Port :	FDM	
File Selection		-Download File Area -		
Download File		🔽 User Area	📕 User B	Boot Area
User Area:				
- ファイルを開く	-			
ファイルの場所型:	🔁 sample			∃ -
🗟 sample.mot				
ファイル名(N):	sample.mot			THE CONTRACT
ー ファイルの種類(T):	Project Files			キャンセル
	1			

3.5.2 Starting Programming

File selection has been completed.

When the Flash Development Toolkit is started up for the second and subsequent times, the following screen is opened. The previously selected information is retained.

FDT Simple Interfac	e (Supported V	(ersion)		
Options				
	BASIC	FILE PROGRAMMING		Exit
Device :	H8/3694F	Port : FDN	M	
File Selection		Download File Area		
 Download File 		🔽 User Area	🗖 User Boot	Area
User Area:	C:¥05fdt¥mot¥H8_3	694F¥sample¥sample.mot		
User Boot Area	[
		Program Flash	[Disconnect
12				

When you have selected items, click "Program Flash."

3.5.3 Selecting a USB Device

FDT Simple Interface	(Supported Version)		
Options			
	BASIC FILE PROGRAMMING	3	Exit
Device :	H8/3694F Port :	FDM	
Sele	ct USB Device		1
-File Selection			
C Developed D	1 USB device located	<u><u>o</u>k</u>	t Area
• Download Fi	4 - SN: 00000 [Closed]	<u>C</u> ancel	
User A			
User Boot A			
			Disconnect
	0%		
Connecting to device 'H8/	'3694F' on 'FDM'		
Configuration: 'ROOT Mode' connection -	- using amulated interface		
Opening port 'FDM'	, asing emulated interface		

Select a USB device. In this example, select the adapter board (FDM).

When you have selected the USB device, click "OK."

3.5.4 Ending Programming

Programming starts, then ends.

Confirm	the message	indicating th	at programming	terminated	normally.
			····· · · · · · · · · · · · · · · · ·		

FDT Simple Interface (Supported Vers	ion)			
Options					
	BASIC FILI	E PROGRAMMIN	G		Exit
Device :	H8/3694F	Port :	FDM		
File Selection	Do	ownload File Area	a ———		
Ownload File		🔽 User Area	Э	🗖 Use	r Boot Area
User Area: C:¥0	5fdt¥mot¥H8_3694F	¥sample¥sample.	.mot		
User Boot Area					
	Pro	gram Flash			Disconnect
Operation on User Area					~
Downloaded the operation mod	Jule				
Writing image to device [0x00)000000 - 0×000000	DFF]			
Data programmed at the follow	ving positions:				
H'00000000 - H'000000FF	Length : H'000001(00			
256 Bytes programmed in 1 se	conds				
Image successfully writte	n to device				
					(Course)
					~

Click "Exit." The Flash Development Toolkit terminates.

3.6 Reprogramming

To program flash memory for the second and subsequent times in the basic simple interface mode, follow the procedure below:

Open "Flash Development Toolkit 3.4 Basic." The basic simple interface screen appears. The previously set product information and the settings related to the file to be downloaded are retained.

FDT Simple Interfac	e (Supported V	'ersion)		
Options				
Γ	BASIC	FILE PROGRAMMING		Exit
Device :	H8/3694F	Port :	FDM	
File Selection		_ Download File Area —		
Download File		🔽 User Area	🗖 User	Boot Area
User Area:	C:¥05fdt¥mot¥H8_3	694F¥sample¥sample.mo	ıt	
User Boot Area	[
	[Program Flash		Disconnect

Click "Program Flash." Programming starts, then ends.

To program a different file into a different product, use the simple interface mode.

4. Operating the H8S Family (H8S/2378F)

4.1 Connecting the Adapter Board

The on-board programming adapter board for F-ZTAT* microcomputers HS0008EAUF1H (called the adapter board hereafter), which is connected between a host computer and the user system, can write a user application program in flash memory built into an F-ZTAT microcomputer on the user system (on-board) and erase it from the flash memory. The adapter board connection is shown in Figure 4-1.

Note: F-ZTAT (Flexible-Zero Turn Around Time) is a trademark of Renesas Technology Corp.

Note: FDM (flash development module) is a former name of the adapter board.



Figure 4-1 Connecting the Adapter Board

A list of pin numbers and corresponding signals of the user system interface cable used for connecting the adapter board and user system is shown below.

No	Signal Name	No	Signal Name
1	RES	2	GND
3	FWx	4	GND
5	MD0	6	GND
7	MD1	8	GND
9	MD2 (IO0)	10	GND
11	MD3 (IO1)	12	GND
13	MD4 (IO2)	14	GND
15	RXD (TXD on the user system side)	16	GND*1
17	TXD (RXD on the user system side)	18	VIN (Vcc or PVcc)*2
19	SCK (NC)	20	VIN (PVcc)*2

Table 4-1 Pin Numbers and Corresponding Signals of the HS0008EAUF1H User System Interface Cable

Notes:

1. Be sure to connect pin No. 16 to GND to ensure that the user system is connected correctly.

2. For a device with Vcc and PVcc, be sure to supply Vcc or PVcc (pin No. 18) and PVcc (pin No. 20) to the VIN pins of the user interface connector, respectively. To use a device under conditions Vcc = PVcc or only Vcc, is present in the device, be sure to supply Vcc to both VIN pins Vcc or PVcc (pin No. 18) and PVcc (pin No. 20).

4.1.1 Connecting the Adapter Board

An example of connecting the H8S/2378F and Renesas adapter board (HS0008EAUF1H) is shown in Figure 4-2. The pull-up and pull-down resistor values shown are only examples. Evaluate the microcomputer to determine the actual values on the user system.



Figure 4-2 Example of Connecting the H8S/2378F and the Adapter Board
4.1.2 Setting Pins on the Adapter Board

An example of setting pins for the boot mode when the H8S/2378F user system and Renesas adapter board (HS0008EAUF1H) is connected is given in Table 4-2. Use the mode switch to set the operating mode.

Pin No.	Pin on the Adapter	Pin on the Device	Input/Output	Output Level
	Board			
1	RES	RES	Output (default)	Adapter board
3	FWx	Mode switch	Output	High (1)
5	MD0	NC	NC	-
7	MD1	NC	NC	-
9	MD2 (IO0)	Serial I/O switch	Output	Low (0)
11	MD3(IO1)	NC	NC	-
13	MD4 (IO2)	NC	NC	-
15	RXD	TXD	Input (default)	Adapter board
17	TXD	RXD	Output (default)	Adapter board
19	SCK (NC)	NC	NC (default)	-

 Table 4-2
 Example of Setting Pins on the H8S/2378F and Adapter Board (for Boot Mode)

Note: NC: Means no connection.

4.2 Boot Mode

4.2.1 Operating Modes

The H8S/2378 has six operating modes (modes 1 to 5 and 7). The operating mode is selected by the setting of mode pins (MD2 to MD0).

Modes 1, 2, and 4 are externally expanded modes in which the CPU can access external memory and peripheral devices. In the externally expanded modes, each area in the external address space can be switched between 8- or 16-bit address space by the bus controller after the start of the execution of a program. If any one of the areas is set to 16-bit address space, the 16-bit bus mode is used. If all areas are set to 8-bit address space, the 8-bit bus mode is used.

Mode 7 is a single-chip activation externally expanded mode in which the CPU can switch to access external memory and peripheral devices at the start of the execution of a program.

Mode 3 is the boot mode and mode 5 is the user boot mode, both in which flash memory can be programmed or erased. Do not change the settings of pins MD2 to MD0 during LSI operation.

MCU	MD2	MD1	MD0	CPU Operating	Description	On-Chip	External	Data Bus
Operating Mode				Mode		ROM	Initial Value	Maximum Value
1	0	0	1	Advanced	Expanded mode with on-chip ROM disabled	Disabled	16 bits	16 bits
2	0	1	0	Advanced	Expanded mode with on-chip ROM disabled	Disabled	8 bits	16 bits
3	0	1	1	Advanced	Boot mode	Enabled	_	16 bits
4	1	0	0	Advanced	Expanded mode with on-chip ROM enabled	Enabled	8 bits	16 bits
5	1	0	1	Advanced	User boot mode	Enabled	_	16 bits
7	1	1	1	Advanced	Single-chip mode	Enabled	—	16 bits

Table 4-3 MCU Operating Modes

4.2.2 On-Board Programming Modes

There are three on-board programming modes: Boot mode, user program mode, and user boot mode.

(1) Boot mode:

This mode is a program mode that uses an on-chip SCI interface. The user area and user boot area can be programmed.

This mode can adjust the bit rate between the host computer and this LSI automatically.

(2) User program mode:

The user area can be programmed by using a desired interface.

(3) User boot mode:

The user boot program of a desired interface can be created and the user area can be programmed.

The results of comparing programming and erasing related functions on the boot mode, user program mode, and user boot mode are shown in Table 4-4.

Function	Boot Mode	User Program Mode	User Boot Mode
Programming/erasing environment	On-board programming		
Programming/erasing enable area	User area User boot area	User area	User area
All erasure	 ✓ (Automatic) 	✓	✓
Erasure in block units	√*1	\checkmark	\checkmark
Program data transfer	From the host computer via the SCI	From a desired device via RAM	From a desired device via RAM
Reset start	Embedded program storage area	User area	User boot area*2
Transition to the user mode	Changing mode setting and reset	Changing the FLSHE bit setting	Changing mode setting and reset

 Table 4-4
 Comparison of Programming Modes

Notes:

1. All-erasure is performed. After that, the specified block can be erased.

2. Firstly, the reset vector is fetched from the embedded program storage area. After the flash memory related registers are checked, the reset vector is fetched from the user boot area.

The user boot area can be programmed or erased only in the boot mode.

The user area and user boot area are entirely erased in the boot mode. Then, the user area or user boot area can be programmed by commands. However, the contents of the area cannot be read until the all-erasure state. You can program the user boot area in the boot mode then program the user area is programmed in the user boot mode, or program only the user area by not entering the user boot mode.

In the user boot mode, the boot operation via a desired interface can be performed by the mode pin setting different from that in the user program mode.

4.3 Activating the Flash Development Toolkit

From the "All Programs" menu, select "Flash Development Toolkit 3.4 Basic."

	1	• 🗃	•		
	0	• 📾 FDT	•	Flash Development Toolkit 3.4	
	🖬 tool	• 🗃		🧚 Flash Development Toolkit 3.4 Basic	-
すべてのプログラム(<u>P</u>)	2 🛅 2.9-1.797	• 1 1 1 20 20 2010 1 12 12 3 3 cm	3 IT	😵 Help	ᆛ
		17 個のオブジェクト		🛃 User Guide (PDF)	
Par	🗾 💋 🖉 🖉 🖉	7950W	TABUT		

The basic simple interface screen of the Flash Development Toolkit appears.

When the Flash Development Toolkit is started up for the second and subsequent times, the displayed basic simple interface screen of the Flash Development Toolkit contains the previously selected device and port information.

FDT Simple Interface	(Supported Version)	
Options		
	BASIC FILE PROGRAMMING Exit	1
Device :	- Port : FDM	
File Selection	Download File Area	
Ownload File	🔽 User Area 🕅 User Boot Area	
User Area:		
User Boot Area		
	Program Flash Disconnect	
2		

4.4 Setting Product Information

4.4.1 New Settings

Select "New Settings" from "Options." The screen for selecting the device and kernel appears.

If you cannot select "New Settings" from "Options," click "Disconnect."

FDT Simple Interface (Suppo	orted Version)	
Options		
Login	BASIC FILE PROGRAMMING	Exit
AutoConnect AutoDisconnect	Port : FDM	
Readback Verify Request Checksum Erase Device Before Program	Download File Area	2 Area
New Settings		
About		ii]
Data Area:	Program Flash	Disconnect

4.4.2 Selecting the Device and Kernel

Select the target device from the pull-down menu.

Select "Generic BOOT Device" because the H8S/2378F is a 0.18- μm product.

Workspace and Sp 11 and	The FLASH Develo FLASH devices. Select the device Select Device:	pment Toolkit supports a you wish to use with this p Generic BOOT Device	number of F project from	Renesas the list Other
Comme mot Comme mot	Protocol Compiler Kernel Path Kernel Version	C N/A N/A 1 N/A		

When you have selected the device, click "Next(N)."

A list of 0.18-µm products for which "Generic BOOT Device" is selected is shown in Table 4-5.

Series or Family	Microcomputer Name	Series or Family	Microcomputer Name
	SH7149F	H8S/2400 Series	H8S/2437F
	SH7146F		H8S/2378F
	SH7086F	H8S/2300 Series	H8S/2368F
SuperH RISC	SH7085F		H8S/2319CF
engine Family	SH7084F		H8S/2189F
	SH7083F		H8S/2172F
	SH7058F	488/2100 Series	H8S/2168F
	SH7055SF		H8S/2167F
	H8SX/1657F		H8S/2166F
LIGEN Family	H8SX/1582F		H8S/2114F
noox family	H8SX/1527F	LISS/2004 Series	H8/3069F
	H8SX/1525F	nos/soun selles	H8/3029F
	H8S/2556F		
	H8S/2552F		
H8S/2500 Series	H8S/2551F		
	H8S/2506F		
	H8S/2505F		

Table 4-5 0.18-µm Products

4.4.3 Selecting a Communications Port

Select the adapter board (FDM) from the pull-down menu.

Communications Port				×
Workspace Industrial Co Workspace Industrial Co Display Device Image Target files Comms mot Sea 33 S Comms mot Device Image Target files Comms mot Device Image Target files Comms mot Device Image Comms mot Comms mot	The FLASH Develop standard PC Serial p your desired commu the project is create Select port: Select an Interface t this will be "Direct t Select Interface:	oment Toolkit supp oort and the USB inications port. All ed. FDM type to connect to Connection" or sin	oorts connection through the port. Use this page to select settings may be changed after to the target device with. Normally mply left blank.	
		〈 戻る(<u>B</u>) 【	次へ())ン キャンセル	1

When you have selected the communications port, click "Next(N)."

4.4.4 Adapter Board Pin Settings

Set the pins on the adapter board (FDM) for the boot mode.

For example, set the output of FWx to high (1) and that of MD2 to low (0).

In this example, the FWE pin outputs high (1) for setting the mode and MD2 (IO0) outputs low (0) for serial communications connection. To select the boot mode (mode 3), use DIP switch SW6.

- SW6-3: On (0)
- SW6-2: Off (1)
- SW6-1: Off (1)

FDM Pin Settin	ngs							$\mathbf{\times}$
Please set the FI	DM pin	values	for cor	nectio	n :			
	FWx	SCK	MD4	MD3	MD2	MD1	MD0	
FDM Outputs	☑	Г	Γ	Г	⊽	Г	□ = 0x84	
FDM Pin Setting	•	Г	Г	Г	Г	Г	☐ = 0x80	
WARNING: Incorrect settings could damage your hardware								
				0)K		Cancel	

When you have set the pins, click "OK."

FLASH	Development Toolkit 🛛 🔀
1	FDT will now attempt to connect to your generic device. Please ensure the board is connected, powered and in Boot mode.

Click "OK."

An example of connecting the H8S/2378F and Renesas adapter board (HS0008EAUF1H) is shown in Figure 4-3. The pull-up and pull-down resistor values shown are only examples. Evaluate the microcomputer to determine the actual values on the user system.



Figure 4-3 Example of Connecting the H8S/2378F and the Adapter Board

An example of setting pins for the boot mode when the H8S/2378F user system and Renesas adapter board (HS0008EAUF1H) are connected is given in Table 4-6. Use the mode switch to set an operating mode.

Pin No.	Pin on the Adapter Board	Pin on the Device	Input/Output	Output Level
1	RES	RES	Output (default)	Adapter board
3	FWx	Mode switch	Output	High (1)
5	MD0	NC	NC	-
7	MD1	NC	NC	-
9	MD2 (IO0)	Serial I/O switch	Output	Low (0)
11	MD3(IO1)	NC	NC	-
13	MD4 (IO2)	NC	NC	-
15	RXD	TXD	Input (default)	Adapter board
17	TXD	RXD	Output (default)	Adapter board
19	SCK (NC)	NC	NC (default)	-

Table 4-6 Example of Setting Pins on the H8S/2378F and Adapter Board (for the Boot Mode)

Note: NC: Means no connection.

4.4.5 Selecting the USB Device

Check the device.

Query Generic Device	
Booting Device	
Sending Supported Devices Inquiry	
Selecting Device	
Sending Clock Mode Inquiry	
Selecting Clock Mode	
Sending Other Inquiries	
UK	Jancel

Select the adapter board (FDM).

<u> </u>
<u>C</u> ancel

When you have selected USB device, click "OK."

4.4.6 Selecting the Device

Check the device.

~	Booting Device
\checkmark	Sending Supported Devices Inquiry
	Selecting Device
	Sending Clock Mode Inquiry
	Selecting Clock Mode
	Sending Other Inquiries

Select HD64F2378.

Select Device			
Select a device :	HD64F2378		•
		<u>OK</u>	Cancel

When you have selected the device, click "OK."

4.4.7 Selecting the Clock Mode

Check the device.



Select the clock mode.

Select Clock Mo	de	
Select a clock	0	<u>•</u>
		Cancel

When you have selected the clock mode, click "OK."

4.4.8 Checking the Generic Device

The device has been checked.

\checkmark	Booting Device	
\checkmark	Sending Supported Device	s Inquiry
\checkmark	Selecting Device	HD64F2378
\checkmark	Sending Clock Mode Inqui	ry
\checkmark	Selecting Clock Mode	0
\checkmark	Sending Other Inquiries	

Click "OK."

4.4.9 Setting the Device (Input Clock)

In the first column enter the frequency of the clock used for the board in MHz. For example, enter 8.25 (MHz).

Device Settings		
Workspace of States Workspace Tridustrial Co Workspace Tridustrial Co Device Image Target files of Device Image Target files of States Comms.mot Device Image Comms.mot Device Image Comms.mot	Please enter the specific device option [HD64F2378] using [Pr Enter the CPU crystal frequency for the selected device: Enter the clock mode for the selected device: Select the multiplier for the Main clock frequency (CKM): Select the multiplier for the Peripheral clock frequency (CKP):	ns based on: otocol C] 8.25 Mhz 1 V
	< 戻る(B) [次へいのン キャンセル

When you have entered the value, click "Next(N)."

The input clock is the frequency of the clock directly input to the microcomputer. Enter the frequency of the crystal or ceramic resonator connected to the user system with three significant digits. The input clock differs from the operating frequency (PLL output).

4.4.10 Selecting the Connection Type (Communication Speed)

Select a baud rate from the pull-down menu. For example, select 19200 (baud).

Connection Type	
Workspace and Dates	The FLASH Development Toolkit can connect to your device in a number of different ways. All the options on this page may be changed after the Project has been created.
Device Image	Kernel already running
Comms.mot Control Comms.mot Co	In BOOT Program mode the device erases its FLASH prior to connection. The Toolkit downloads programming kernels to the device as required. The Recommended Speed setting is based on the current device and clock. The user may also input their own, if this is supported by the kernel (and the optional FDM). Recommended Speeds: 19200 Use Default User Specified:
	< 戻る(B) (次へ)(D) キャンセル

When you have selected the baud rate, click "Next(N)."

4.4.11 Selecting Programming Options (Protection Level and Messaging Level)

Select the protection level and messaging level. For example, select "Automatic" for "Protection" and "Advanced" for "Messaging."

Workspace and The FF SB	The FLASH Development Toolkit offers a device protection system, plus an advanced messaging level for use with hardware and kernel development. What level of device protection would you like?
DI EC-TOPISPIAN TO DE STA	Automatic C Interactive C None
A Comma mot	What level of messaging would you like?
5 93 1A 20 00 50 Drive mot 5 27 91 08 14 50 Data mot 6 70 56 70 5 51 Algorithm mot 5 50 9A DE A 5 64 85 97 6 24 04 40 75 54 AD 20 76	The Toolkit will display verbose messages whenever it is communicating with the Target device. This mode is useful for Interface hardware development, and Kernel development.

When you have selected programming options, click "Next(N)."

4.4.12 Reset Mode Pin Settings (FDM)

Set pins on the adapter board (FDM) for restarting the device in the reset mode. These settings are not required for this procedure.

Operating Mode: U: User Defined Operating Mode: U: User Defined Operating Mode: U: User Defined FWx SCK MD4 MD3 MD2 MD1 MD0 RESET Image: Operating Mode: Image: Operating Mode: Image: FWx SCK MD4 MD3 MD2 MD1 MD0 RESET Image: Operating Mode: Image: Operating Mode: Image: FWx SCK MD4 MD3 MD2 MD1 MD0 RESET Image: Operating Mode: Image: Operating Mode: Image: FWx SCK MD4 MD3 MD2 MD1 MD0 RESET Image: Operating Device Image: Image: Operating Scott Image: Operating Mode: Image: Setting Image: Setting Image: Setting Image: No page: Image: Setting Image: No page: Image: No page: Image: No page: Image: No page: Image: <th>Workspace of The State</th> <th>Please select the pin settings required after a device RESET RESET Mode using Clock Mode CUSTOM</th>	Workspace of The State	Please select the pin settings required after a device RESET RESET Mode using Clock Mode CUSTOM
Image: State of the state	Target files of the files of th	Operating Mode: U: User Defined
E SD 9A DE A 5 64 05 97 0 24 D4 4D 75 54 AD 2D 75 8 47 E7 64 00 03 20 75 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1 1	Comme.mot	RESET F F F F F F F F = 0x00 RESET F F F F F F F F = 0x00 Setting
	E SD 9A DE AF 15 64 85 97 8 24 D4 40 75 54 AD 20 76 5 8 47 EF 64 80 83 67 77 11	** WARNING: NO FDM FILE **

When you have set the items, click "Finish."

4.4.13 Completion of Setting

Device and port settings are now completed.

FDT Simple Interface	(Supported Version)	
Options		
	BASIC FILE PROGRAMMING	xit
Device :	HD64F2378 Port : FDM	
File Selection	Download File Area	
Oownload File	User Areaj User Boot Area	
User Area:		3443
User Boot Area		
	Program Flash Discor	nect

4.5 Programming Flash Memory

4.5.1 Selecting the Program Area and File

Select the download program area and S-type file.

Check "User Area" in "Download File Area" to enable an S-type file to be specified in "User Area" in "Download File." Then, click the "..." (browse) button on the right, which becomes active, to open the "Open File" dialog.

In the "Open File" dialog, specify S-type file demo.MOT, a demo program for turning on LEDs, to be downloaded and click "Open(O)."

Options BASIC FILE PROGRAMMING Exit Device : HD64F2378 Port : FDM File Selection Download File Area で Download File User Area User Boot Area で Download File User Area ファイルを間K ファイルの場所の: LED 「 年 全 学 管 学 で 団 demo.MOT ファイルる似: demo.MOT ファイルの種類①: Project Files ▼ オャンセル	FDT Simple Interface (S	Supported Ver	sion)			
BASIC FILE PROGRAMMING Device : HD64F2378 Port : FDM File Selection Download File Area で Download File User Area User Boot Area ・ ファイルを間K ファイルの場所の: LED ・ 年 全 管 部・ 同 demo.MOT ファイル名(い): demo.MOT ファイルの種類(い): Project Files ・ キャンセル	Options				- 5.3	-
Device: HD64F2378 Port: FDM File Selection Download File Area © Download File User Area User Area ファイルを開K ファイルの場所の: こ LED 「 住 ご ご ご ファイル名(い): demo.MOT ファイルの種類(い): Project Files		BASIC FI	LE PROGRAMMING		EXIT	_
File Selection Download File Area I User Area User Boot Area User Area I User Area 771ルを開K マンイルを開く ファイルの場所の: LED I demo.MOT I MKOU ファイル名(N): demo.MOT アケイルる(M): demo.MOT アケイルの種類(T): Project Files	Device :	ID64F2378	Port :	FDM		
✓ User Area User Boot Area ● Download File User Area ● 274ルを間K ⑦アイルの場所 ①: ● LED ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ● ●	File Selection	C)ownload File Area			_
User Area:	• Download File		🔽 User Area	E	User Boot Area	
ファイルを駅 こと マー	User Area:					
ファイルの場所の: こ し こ こ ご こ <td< td=""><td>ロ ファイルを開く</td><td></td><td></td><td></td><td>? 🛛</td><td></td></td<>	ロ ファイルを開く				? 🛛	
Compared and Compared American Compared Americ	ファイルの場所型:	ED LED		- 🗢 🖻) 🕂 🃰	
ファイル名(N): demo.MOT ファイルの種類(T): Project Files マキャンセル	🖻 demo.MOT					
ファイル名(小): demo.MOT ファイルの種類(①: Project Files マキャンセル						
ファイル名(心): demo.MOT (単次の) ファイルの種類(①): Project Files マキャンセル						
ファイル名(N): demo.MOT 開KO) ファイルの種類(T): Project Files ▼ キャンセル						
ファイルの種類①: Project Files キャンセル	ファイル名(<u>N</u>):	demo.MOT			- 開K@)	
	ファイルの種類(工):	Project Files		<u> </u>	キャンセル	

4.5.2 Starting Programming

File selection has been completed.

When the Flash Development Toolkit is started up for the second and subsequent times, the following screen is opened. The previously selected information is retained.

FDT Simple Interface (Supported V	(ersion)
Options	
BASIC	FILE PROGRAMMING
Device : HD64F2378	Port : FDM
File Selection	Download File Area
Ownload File	▼ User Area
User Area: C:¥05fdt¥mot¥2378	ST_ver.100¥demo¥ROM¥LED¥demo.MOT
User Boot Area	
	Program Flash Disconnect

When you have selected items, click "Program Flash."

4.5.3 Ending Programming

By clicking "Start", programming starts, then ends.

Confirm the mess	sage indicating	g that program	ning terminat	ed normally.
		1 0	U	

FDT Simple Interface (Supported Ver	rsion)		
Options			
BASIC F	ILE PROGRAMMING		Exit
Device : HD64F2378	Port : FC	M	
File Selection	Download File Area		
• Download File	🔽 User Area	T User Boot	Area
User Area: C:¥05fdt¥mot¥2378ST	_ver.100¥demo¥ROM¥LE[D¥demo.MOT	
User Boot Area:			
	Program Flash	Ĺ	Disconnect
Writing image to device [0x00000000 - 0x0000 Writing image to device [0x00000200 - 0x0000	0007F] 002FF]		<u>^</u>
Data programmed at the following positions: H'00000000 - H'0000007F Length : H'00000 H'00000200 - H'000002FF Length : H'00000)080)100		
384 Bytes programmed in O seconds			
Image successfully written to device			
<			×

Click "Exit." The Flash Development Toolkit terminates operation.

4.6 Reprogramming

To program flash memory for the second and subsequent times in the basic simple interface mode, follow the procedure below:

Open "Flash Development Toolkit 3.4 Basic." The basic simple interface screen appears. The previously set product information and the settings related to the file to be downloaded are displayed as is.

FDT Simple Interface	e (Supported V	(ersion)		
Options				
	BASIC	FILE PROGRAMMING	à	Exit
Device :	HD64F2378	Port :	FDM	j
File Selection		Download File Area		
Download File		🔽 User Area	Γ	User Boot Area
User Area:	C:¥05fdt¥mot¥2378	ST_ver.100¥demo¥RON	/¥LED¥demo.MO7	·
User Boot Area	[
	[Program Flash		Disconnect

Click "Program Flash." Programming starts, then ends.

To program a different file into a different product, use the simple interface mode.

5. Operating the R8C/Tiny Series (R5F21154)

The single-chip microcomputer R8C/15 Group incorporates flash memory. This section describes how to program and erase a user application program in flash memory on the R5F21154 in the R8C/15 Group using the Flash Development Toolkit and R8C/15 starter kit.

5.1 Flash Memory Programming Mode

Program flash memory as follows:

Programming mode:	Standard serial input/output mode
Outline:	Program the user ROM area using the dedicated serial programmer.
Programmable area:	User ROM area
Operating mode:	Boot mode
ROM programmer:	Serial programmer

5.2 Connecting the CPU Board

The R8C/15 starter kit contains the following items:

USB cable E8 emulator (R0E000080KCE00) User system interface cable CPU board (M3A-0115-CPU)

Connect the E8 emulator to a USB port on the host computer using the USB cable and the CPU board to the E8 emulator using the user system interface cable.

Install the Flash Development Toolkit on the host computer.

The CPU board connection is depicted in Figure 5-1.



Figure 5-1 Connecting the CPU Board

5.3 Starting the Flash Development Toolkit

From the "All Programs" menu, select "Flash Development Toolkit 3.4 Basic."

	0	• 🛅 •		
	6	• 📾 FDT •	🌮 Flash Development Toolkit 3.4	1
1	🖬 tool	• 🗃	🧚 Flash Development Took it 3.4 Basic	P
すべてのプログラム(P)	2 🛅 スタートアップ	→ 1 UV32 2/10 UEE 390m 3 17	😤 Heb	H
		17 個のオブジェクト	🛃 User Guide (PDF)	
Par	🔜 📴 DØA7O 🔘 🕸 TA793	NW SALES AND WE LOUGH BOULDARY	مصديدا بتصل سيبصبها والتصمق والك	

The basic simple interface screen of the Flash Development Toolkit appears.

When the Flash Development Toolkit is started up for the second and subsequent times, the displayed basic simple interface screen of the Flash Development Toolkit contains the previously selected device and port information.

FDT Simple Interface	(Supported Version)	
Options		
	BASIC FILE PROGRAMMING	Exit
Device :	- Port: FDM	
File Selection	Download File Area	
	🔽 User Area 🕅 Use	er Boot Area
Ownload File		
User Area:		
User Boot Area		
	Program Flash	Disconnect
]

5.4 Setting Product Information

5.4.1 New Settings

Select "New Settings" from "Options." The screen for selecting the device and kernel appears.

If you cannot select "New Settings" from "Options," click "Disconnect."

FDT Simple Interface (Suppo	orted Version)	
Options		
Login	BASIC FILE PROGRAMMING	Exit
AutoConnect AutoDisconnect	Port : FDM	
Readback Verify Request Checksum Erase Device Before Program	Download File Area	ta Area
New Settings		
About		i
Data Area	Program Flash	Disconnect

5.4.2 Selecting the Device and Kernel

Select the target device from the pull-down menu.

In this example, select R5F21154.

Workspace Industrial Cr	The FLASH Develop FLASH devices. Select the device y Select Device:	oment Toolkit supports a numb ou wish to use with this projec R5F21154	er of Renesas t from the list • Other
Target files Comms.mot	Protocol Compiler Kernel Path Kernel Version	D Renesas embedded C:¥Program Files¥Renesas 1_0_00	:¥FDT3.4¥Kernels¥Pr
E 5D 9A DE A9 25 64 85 97 8 24 D4 4D 75 54 AD 2D 76 3 8 4F EF 64 80 83 65 65 1E 1	<		>

When you have selected the device, click "Next(N)."

5.4.3 Selecting the Communications Port

Select E8 from the pull-down menu.

Communications Port			
Workspace Industrial Co Workspace Industrial Co Display Device Image Target files of Comms mot Es Di TS Keyboard m S a Di TS Keyboard m S a Di TS Comms mot Device Image Comms mot Device Image Comms mot S a Di TS Comms mot	The FLASH Developm standard PC Serial po your desired commun the project is created Select port: Select an Interface ty this will be "Direct Co Select Interface:	nent Toolkit supports connection throug ort and the USB port. Use this page to s ications port. All settings may be chang E8 Ype to connect to the target device with onnection" or simply left blank. Direct Connection	h the select sed after
		< 戻る(B) (二次へ(M))>	キャンセル

When you have selected the communications port, click "Next(N)."

5.4.4 Selecting the Connection Type (Communication Speed)

Set the baud rate. For example, select "Use Default."

Connection Type	The FLASH Development Toolkit can connect to your device in a number of different ways. All the options on this page may be
Workspace Industrial Co	changed after the Project has been created. Select Connection: © USER Program Mode
	└── Kernel already running
Comme mot Comme mot	In BOOT Program mode the device erases its FLASH prior to connection. The Toolkit downloads programming kernels to the device as required. The Recommended Speed setting is based on the current device and clock. The user may also input their own, if this is supported by the kernel (and the optional FDM). Recommended Speeds: 500000 User Specified: User Specified:
	< 戻る(B) (次へ(M))> キャンセル

When you have selected the communication speed, click "Next(N)."

5.4.5 Selecting Programming Options (Protection Level and Messaging Level)

Select the protection level and messaging level. For example, select "Automatic" for "Protection" and "Advanced" for "Messaging."

Workspace and the second	The FLASH Development Toolkit offers a device protection system, plus an advanced messaging level for use with hardware and kernel development. What level of device protection would you like? Protection
B DC EC-TO DEVICE TO BA	Automatic C Interactive C None
LCD.mot LCD.mot LCD.mot LCD.mot Motor Control Device Image	When programming the device, any blocks found to have been written previously will automatically be erased. What level of messaging would you like? Messaging
Target files	C Standard Advanced
8 27 91 08 1.5 Data mot 6 70 56 FD 5 20 Algorithm.m 5 50 9A DZ A 5 64 85 97 6 24 D4 45 75 54 AD 20 F5 5 8 47 E7 54 80 33 57 51 1	The Toolkit will display verbose messages whenever it is communicating with the Target device. This mode is useful for Interface hardware development, and Kernel development.

When you have set the programming options, click "Finish."

5.4.6 Completion of Setting

Device and port settings are now completed.

FDT Simple Interface	(Supported Ve	ersion)			
Options	BASIC	FILE PROGRAMMING	à		Exit
Device :	R5F21154	Port :	E8	j	
File Selection		-Download File Area	. <u> </u>		
Ownload File		🗖 User Area		Data Area	
User Area:					
Data Area:					
		Program Flash		Disc	onnect
8					

5.5 Programming Flash Memory

5.5.1 Selecting the Program Area and File

Select a download program area and S type file.

Check "User Area" in "Download File Area" to enable an S-type file to be specified in "User Area" in "Download File." Then, click the "..." (browse) button on the right, which becomes active, to open the "Open File" dialog. In the "Open File" dialog, specify S-type file ad_onkai.mot to be downloaded and click "Open(O)."

FDT Simple Interface (Supported Version)
Options
BASIC FILE PROGRAMMING Exit
Device : R5F21154 Port : E8
File Selection Download File Area
User Area:
ファイルを開く ? 🔀
ファイルの場所型: 🗁 Debug 🚽 🗢 🖻 📸 📰 🕇
ad_onkai.mot
ファイル名(N): ad_onkai.mot 開((Q)
ファイルの種類(①: Project Files ▼ キャンセル

5.5.2 Starting Programming

When the Flash Development Toolkit is started up for the second and subsequent times, the following screen is opened. The previously selected information is retained.

FDT Simple Interfa	ce (Supported)	Version)					
Options							
i i i	BASIC FILE PROGRAMMING Exit						
Device : [R5F21154	Port :	E8				
File Selection		Download File Area					
Ownload File		🔽 User Area	☐ Dat	ta Area			
User Area:	C:¥05fdt¥mot¥M3A	0115_17¥PROGRAM¥AD_	ONKAI¥ad_onkai¥l	Debug¥ad_onk			
Data Area							
	0	Program Flash		Disconnect			
				1.			

When you have selected items, click "Program Flash."

5.5.3 Setting the Power Supply

Set the power supply.

Check "Power Supply" and set the power supply voltage to 5.0 V.

the target: t is closed)
OK
Cancel

When you have set the items, click "OK."

[Restriction]

The E8 emulator is designed to supply power. However, it cannot be guaranteed that the E8 emulator supplies the power required for programming flash memory on a microcomputer because the power load differs depending on the user system. To program an actual product, not the power from the E8 emulator but the stable voltage from an external power source must be supplied. In this case, uncheck "Power Supply" to stop the power supplied from the E8 emulator.

Target Power from E8	X
Please select whether the E8 should (this setting will be retained until the	power the target: project is closed)
Power Supply	
C 33 V	ОК

5.5.4 Ending Programming

Click "Start." Programming starts, then ends.

Confirm the message indicating the	at programming terminated	normally.
------------------------------------	---------------------------	-----------

FDT Simple Interface	(Supported Ve	ersion)		
Options				
	BASIC	FILE PROGRAMMING		Exit
Device :	R5F21154	Port :	E8	
File Selection		-Download File Area		
Ownload File		🔽 User Area	🗖 Data	a Area
User Area:	C:¥05fdt¥mot¥M3A01	15_17¥PROGRAM¥AD	ONKAI¥ad_onkai¥D	ebug¥ad_onk
Data Area				
		Program Flash		Disconnect
Writing image to device Writing image to device Data programmed at the H'0000E000 - H'0000E71	[0x0000E000 - 0x000 [0x0000FE00 - 0x000 following positions: FF Length : H'0000	00E7FF] 00FFFF] 00800		
H'0000FE00 - H'0000FF 2.50 K programmed in 0 s	FF Length:H'000 seconds	00200		
Image successfully w	ritten to device			
<				×

Click "Exit." The Flash Development Toolkit terminates.

5.6 Reprogramming

To program flash memory for the second and subsequent times in the basic simple interface mode, follow the procedure below:

Open "Flash Development Toolkit 3.4 Basic." The basic simple interface screen appears. The previously set product information and the settings related to the file to be downloaded are displayed as is.

FDT Simple Interfac	e (Supported \	/ersion)		
Options				
	BASIC	FILE PROGRAMMING		Exit
Device :	R5F21154	Port :	E8	
File Selection		Download File Area		
Download File		🔽 User Area	🗖 Data i	Area
User Area:	C:¥05fdt¥mot¥M3A	0115_17¥PROGRAM¥AD_O	NKAI¥ad_onkai¥Det	pug¥ad_onk
Data Area	<u></u>			
	[Program Flash		Disconnect

Click "Start." Programming starts, then ends.

To program a different file into a different product, use the simple interface mode.

5.7 ID Code

5.7.1 ID Code Checking Function

In the standard serial input/output mode, the ID code checking function is available to prevent flash memory from being read or reprogrammed easily.

When flash memory is not blank, this function checks whether the ID code sent from the programmer and the 7-byte ID code programmed in flash memory match. If they do not match, the function does not accept any command sent from the programmer.

It is advisable to create a program in which an ID code is set in the ID code area in advance and write the program in flash memory, to prevent flash memory from being read or reprogrammed easily.

5.7.2 When No ID Code Checking Is Made

5.7.3 ID Code Input

When a file in which an ID code is set is programmed in flash memory, the ID code must be entered to program a new file.

In this case, select the file and click "Start." The "ID Code" dialog appears.

ID C	heck							
ID :	77	77	77	77	77	77	77	Browse
							ОК	Cancel

When the ID code of the already programmed file is H'11223344556677, enter the code.

ID CI	heck							
ID :	11	22	33	44	55	66	77	Browse
						[OK	Cancel

When you have set the ID code, click "OK."
A new file is programmed.

FDT Simple Interfa	ace (Supported V	ersion)		
Options				
	BASIC	FILE PROGRAMMING		Exit
Device :	R5F21154	Port :	E8	
File Selection		- Download File Area -		
Download File		🔽 User Area		lata Area
User Area	a: C:¥05fdt¥fdt¥21154	¥21154¥ad_onkai77.mot)	
Data Area	a:			
		Program Flash		Disconnect
Operation on User Ar	ea			~
Writing image to device	ce (0×0000E000 - 0×00	000E7FF]		(and
Writing image to devic	ce [0x0000FE00 - 0x0(DOOFFFF]		
H'0000E000 - H'0000	E7FF Length : H'000	00800		
H'0000FE00 - H'0000)FFFF Length:H'00	000200		
2.50 K programmed in	0 seconds			
Image successfull	y written to device			
User Area Data Area Operation on User Area Writing image to devic Writing image to devic Data programmed at 1 H'0000E000 - H'0000 H'0000FE00 - H'0000 2.50 K programmed in Image successfull	a: C:¥05fdt¥fdt¥21154 ea ce [0x0000E000 - 0x00 ce [0x0000FE00 - 0x00 the following positions: IE7FF Length : H'00 0 seconds y written to device	#21154¥ad_onkai77.mot Program Flash 000E7FF] 000FFFF] 000800 000200		 Disconnect

5.7.4 ID Code Mismatch

If the entered ID code differs from the programmed ID code, an ID code mismatch occurs and no file can be programmed.

FDT Simple Interfa	ce (Supported V	ersion)			
Options					
[BASIC	FILE PROGRAMMING			
Device :	R5F21154	Port :	E8	_	
File Selection		- Download File Area -			
Ownload File		🔽 User Area	Г	Data Area	
User Area:	C:¥05fdt¥fdt¥21154¥	¥21154¥ad_onkai77.mot	0		
Data Area					
		Program Flash		Disconnect	
Adaptor version type (ок			<u>^</u>	
(current type = E8EM)					
(current ver = 01-03-	97 OK 00-00)				
Attempting to power ta	arget at 5.0V				
Version Information: V	ER.0.20				
Changing baud rate to	500000 bps				
Error No 16194: ID	code check failure			×	

5.7.5 ID Code File

When an ID code is set, an id file is created. This id file contains the set ID code. You can use this file to set an ID code.

When an attempt is made to program a file in which the ID code is set to H'777777777777777777777, the "ID Check" dialog appears.

ID CI	heck							X
ID :	77	77	77	77	77	77	77	Browse
							OK	Cancel

Click "Browse...."

The id file selection screen appears. Select the id file for the file programmed in flash memory. For example, select ad_onkai12.id.

Open the S-Rec	ord file		? 🗙
ファイルの場所 (D): Default ad_onkai12.id ad_onkai12.mot ad_onkai77.id ad_onkai77.id ad_onkai77.mot ad_onkai.mot	21154	_ ← È <u> </u>	
」 ファイル名(N): ファイルの種類(I):	ad_onkai12.id Unlock Files	開(②) ★ャンセル	

When you have selected the file, click "Open(O)."

The ID code is displayed.

) CI	heck							
D :	11	22	33	44	55	66	77	Browse
							ок	Cancel

Click "OK."

A new file is programmed.

FDT Simple Interface (Supported)	(ersion)	
Options		
BASIC	FILE PROGRAMMING	Exit
Device : R5F21154	Port : E8	
- File Selection	Download File Area	5
Download File	🔽 User Area	🗖 Data Area
User Area: C:¥05fdt¥fdt¥21154	¥21154¥ad_onkai77.mot	
Data Area		
[Program Flash	Disconnect
Operation on User Area		
Writing image to device [0x0000E000 - 0x0 Writing image to device [0x0000FE00 - 0x0	000E7FF] 000FFFF]	
Data programmed at the following positions:		
H'0000E000 - H'0000E7FF Length : H'00	000800	
2.50 K programmed in 1 seconds	000200	
Image successfully written to device		
		~

6. Selecting and Setting Functions

This section describes how to select a function and set the selected function.

6.1 Options Menu

6.1.1 Login...

This allows changing of which user is logged in to the Flash Development Toolkit. The hotkey Ctrl+Shift+U also invokes the Login dialog.

6.1.2 Auto Disconnect

This forces the Flash Development Toolkit to automatically disconnect after programming, so that the user does not need to press the Disconnect button.

6.1.3 Readback Verify

This option controls whether the Flash Development Toolkit automatically performs a read and compare operation after programming. The setting is remembered between sessions.

6.1.4 Request Checksum

This option controls whether the Flash Development Toolkit automatically performs a checksum request operation after programming. The setting is remembered between sessions.

6.1.5 Erase Device Before Program

This option controls whether the Flash Development Toolkit automatically performs an erase operation before programming the device. This will erase all blocks in all memory areas prior to programming. The setting is remembered between sessions.

6.1.6 New Settings...

Run the Wizard to allow entry of the new settings.

6.1.7 About...

Shows the About box.

6.2 Dialog Control

6.2.1 Exit

Clicking this will exit the Flash Development Toolkit.

6.2.2 Download File radio button

When this button is on, a download file can be selected.

6.2.3 Download File Area

For devices with a User Boot Area, the user can choose whether to download the file to the User Area or the User Boot

Area.

For devices with a Data Area, the user can choose whether to download the file to the User Area or the Data Area.

6.2.4 Program Flash

Clicking on Program Flash allows the Flash Development Toolkit to download the specified file to the FLASH memory. Additionally, if Readback Verify is switched off, the Checksum will also be calculated and output to the screen.

6.2.5 Disconnect

Clicking on Disconnect forces the Flash Development Toolkit to disconnect.

6.2.6 File Selection

The filename can be specified in the File Selection section (by typing or browsing), for each area enabled by the Download File Area checkboxes

Flash Development Toolkit Application Note (Introduction)

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Flash Development Toolkit Application Note (Introduction)



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