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Application Note

Flash Development Toolkit

Application Note (Introduction)

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Renesas Flash Development Toolkit

Application Note (Introduction)

Revision 1.0

Renesas Technology Corp.

Contents

1. Overview 1

2. Functions of the Flash Development Toolkit 1

2.1 Main Functions 1

2.2 Basic Simple Interface Mode 3

2.3 Simple Interface Mode 4

3. Operating the H8/300H Tiny Series (H8/3694F) 5

3.1 Connecting the H8/3694F and Adapter Board 5

3.1.1 Connecting the Adapter Board 5

3.1.2 User Interface Cable Signals 6

3.1.3 Connecting the Adapter Board 6

3.1.4 Setting Pins on the Adapter Board 8

3.2 Boot Mode 9

3.3 Starting the Flash Development Toolkit 10

3.4 Setting Product Information 11

3.4.1 New Settings 11

3.4.2 Selecting the Device and Kernel 12

3.4.3 Selecting a Communications Port 13

3.4.4 Device Settings (Setting the Input Clock) 14

3.4.5 Selecting the Connection Type (Boot Mode and Communication Speed) 15

3.4.6 Selecting Programming Options (Protection Level and Messaging Level) 16

3.4.7 Adapter Board Pin Settings 17

3.4.8 Reset Mode Pin Settings 19

3.4.9 Completion of Setting 20

3.5 Programming Flash Memory 21

3.5.1 Selecting the Program Area and File 21

3.5.2 Starting Programming 22

3.5.3 Selecting a USB Device 23

3.5.4 Ending Programming 24

3.6 Reprogramming 25

4. Operating the H8S Family (H8S/2378F) 26

4.1 Connecting the Adapter Board 26

4.1.1 Connecting the Adapter Board 27

4.1.2 Setting Pins on the Adapter Board 29

4.2 Boot Mode 30

4.2.1 Operating Modes 30
4.2.2 On-Board Programming Modes 30
4.3 Activating the Flash Development Toolkit 32
4.4 Setting Product Information 33
4.4.1 New Settings 33
4.4.2 Selecting the Device and Kernel 34
4.4.3 Selecting a Communications Port 35
4.4.4 Adapter Board Pin Settings 36
4.4.5 Selecting the USB Device 38
4.4.6 Selecting the Device 39
4.4.7 Selecting the Clock Mode 40
4.4.8 Checking the Generic Device 41
4.4.9 Setting the Device (Input Clock) 42
4.4.10 Selecting the Connection Type (Communication Speed) 43
4.4.11 Selecting Programming Options (Protection Level and Messaging Level) 44
4.4.12 Reset Mode Pin Settings (FDM) 45
4.4.13 Completion of Setting 46
4.5 Programming Flash Memory 47
4.5.1 Selecting the Program Area and File 47
4.5.2 Starting Programming 48
4.5.3 Ending Programming 49
4.6 Reprogramming 50
5. Operating the R8C/Tiny Series (R5F21154) 51
5.1 Flash Memory Programming Mode 51
5.2 Connecting the CPU Board 51
5.3 Starting the Flash Development Toolkit 52
5.4 Setting Product Information 53
5.4.1 New Settings 53
5.4.2 Selecting the Device and Kernel 54
5.4.3 Selecting the Communications Port 55
5.4.4 Selecting the Connection Type (Communication Speed) 56
5.4.5 Selecting Programming Options (Protection Level and Messaging Level) 57
5.4.6 Completion of Setting 58
5.5 Programming Flash Memory 59
5.5.1 Selecting the Program Area and File 59
5.5.2 Starting Programming 60
5.5.3 Setting the Power Supply 61

5.5.4 Ending Programming 62
5.6 Reprogramming 63
5.7 ID Code 64
5.7.1 ID Code Checking Function 64
5.7.2 When No ID Code Checking Is Made 64
5.7.3 ID Code Input 64
5.7.4 ID Code Mismatch 66
5.7.5 ID Code File 67
6. Selecting and Setting Functions 69
6.1 Options Menu 69
6.1.1 Login... 69
6.1.2 Auto Disconnect 69
6.1.3 Readback Verify 69
6.1.4 Request Checksum 69
6.1.5 Erase Device Before Program 69
6.1.6 New Settings… 69
6.1.7 About... 69
6.2 Dialog Control 69
6.2.1 Exit 69
6.2.2 Download File radio button 69
6.2.3 Download File Area 69
6.2.4 Program Flash 70
6.2.5 Disconnect 70
6.2.6 File Selection 70

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.

The graphical user interface screen of the Flash Development Toolkit is shown in Figure 2-1.

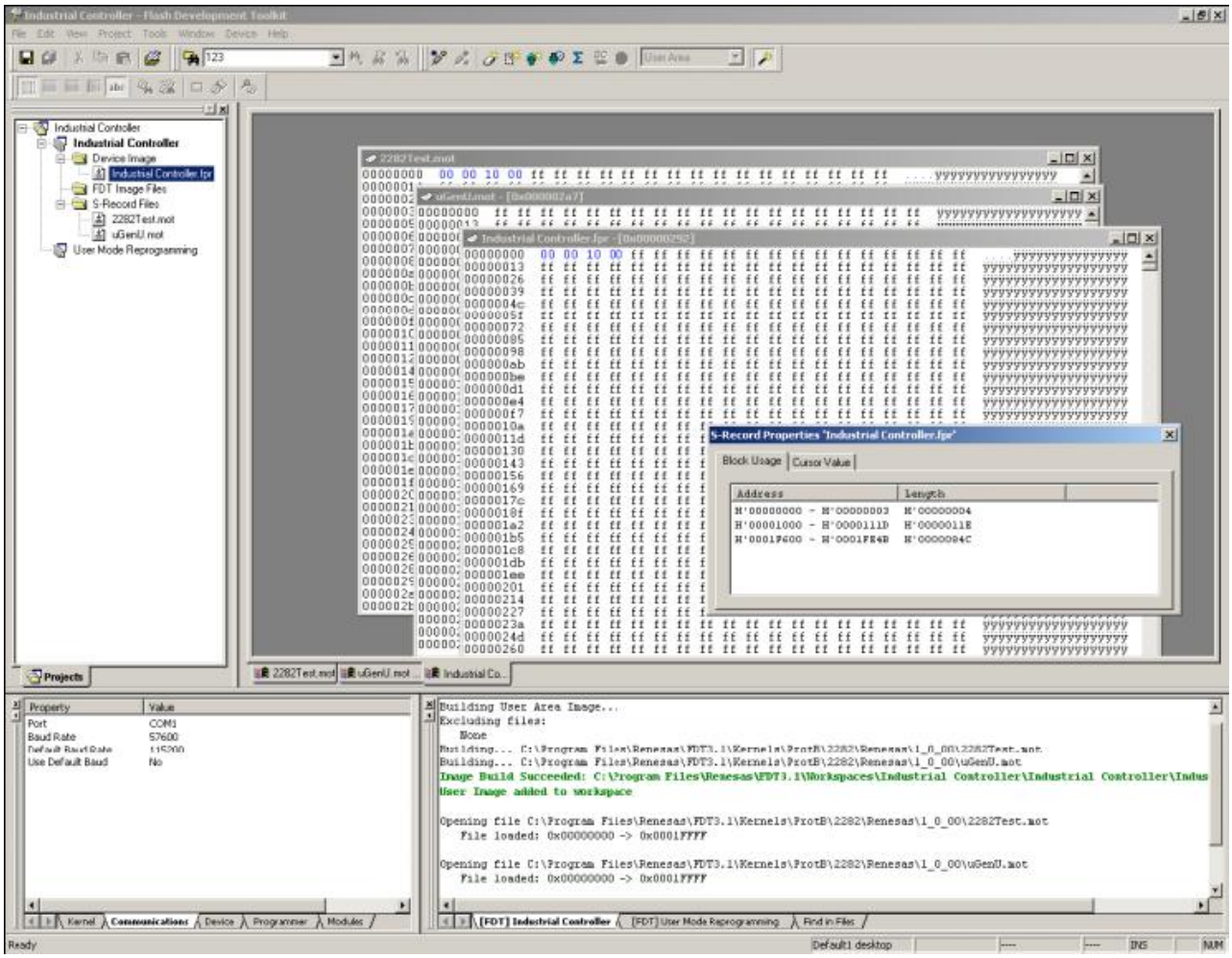


Figure 2-1 Graphical User Interface of the Flash Development Toolkit

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.

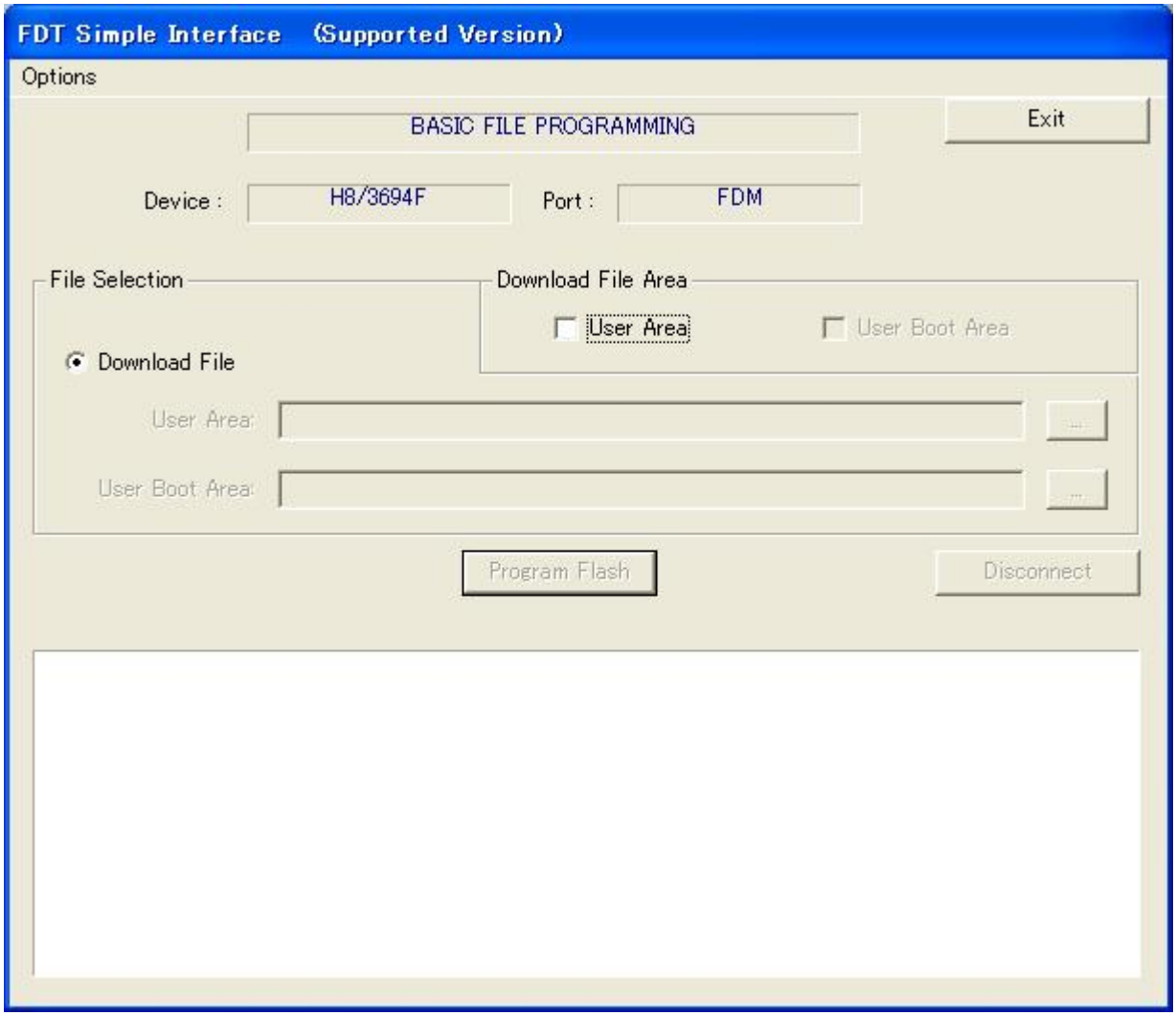


Figure 2-2 Basic Simple Interface Mode

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.

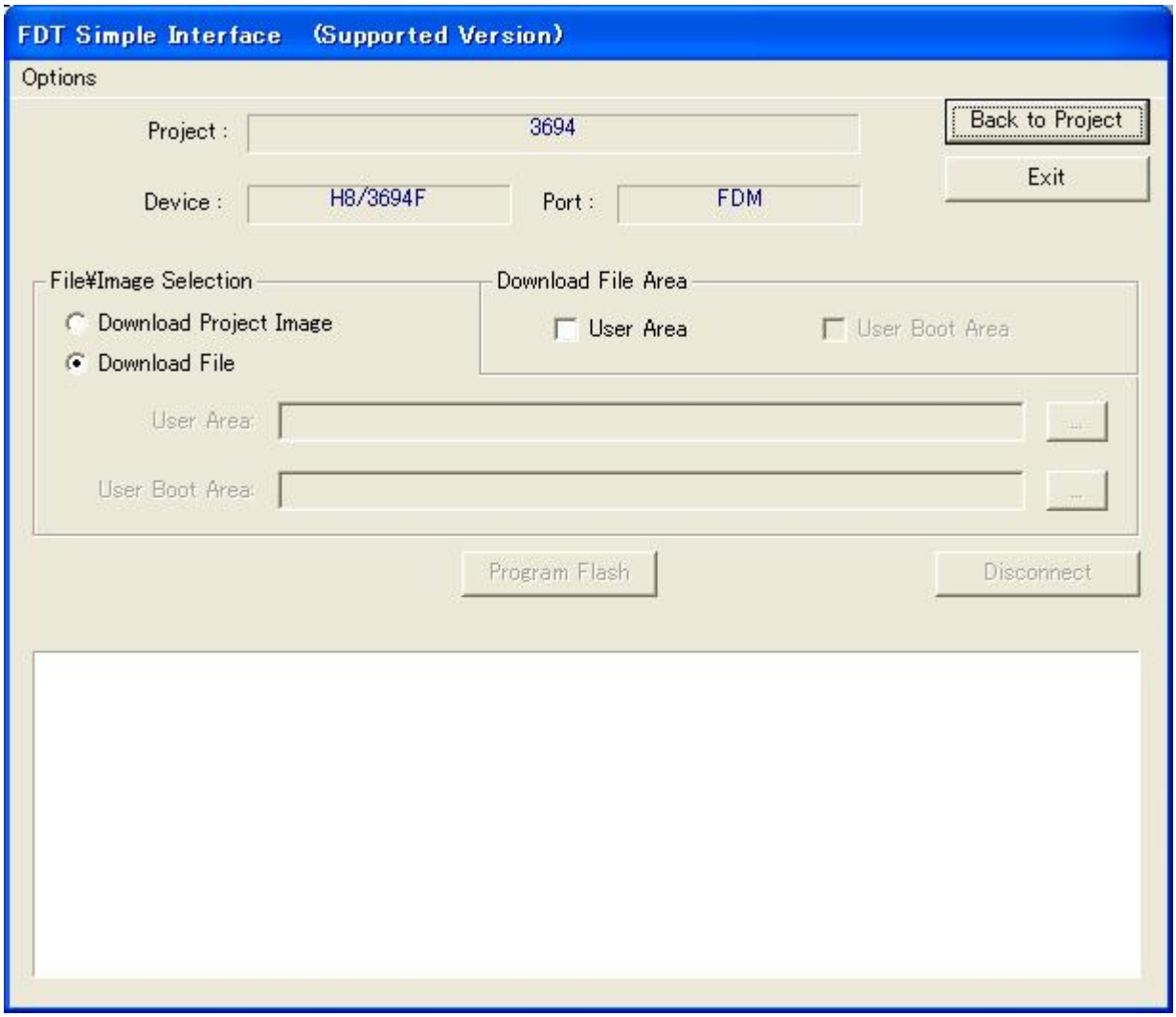


Figure 2-3 Simple Interface Mode

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.

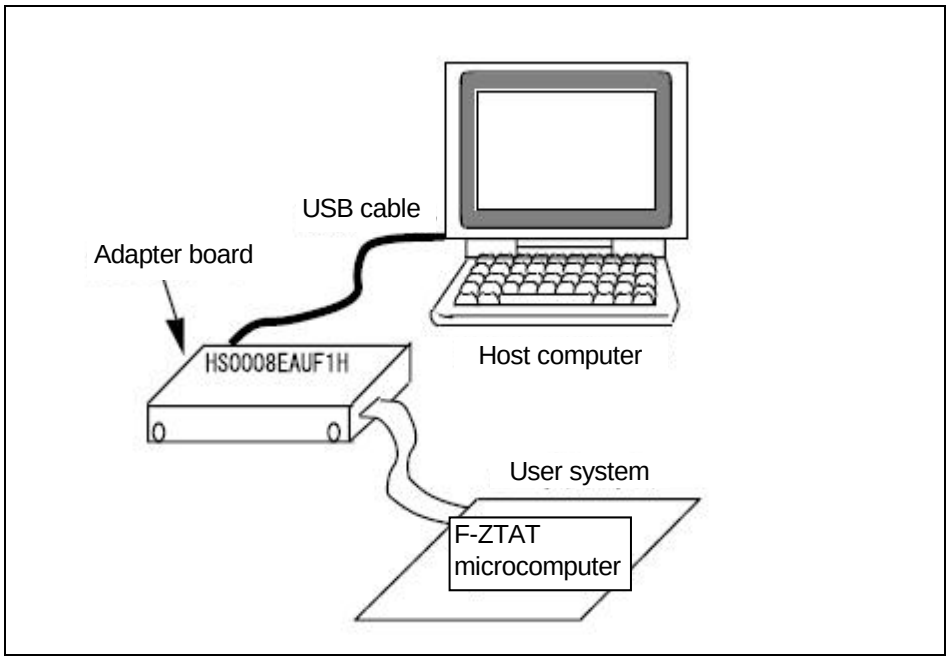


Figure 3-1 Connecting the Adapter Board

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	$\overline{\text{RES}}$	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.

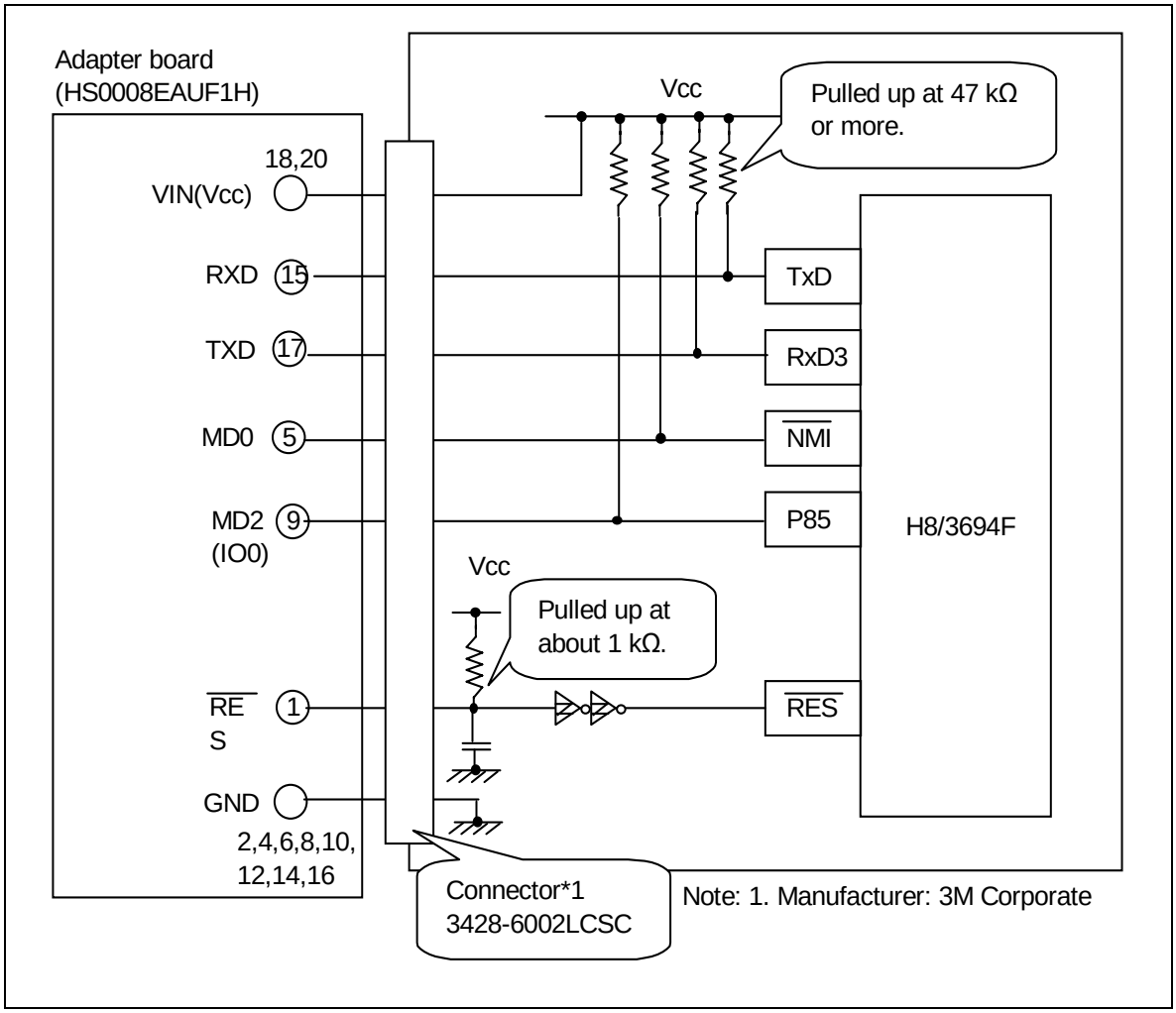


Figure 3-2 Example of Connecting the H8/3694F and Adapter Board

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.

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

Pin No.	Pin on the Adapter Board	Pin on the Device	Input/Output	Output Level
1	$\overline{\text{RES}}$	$\overline{\text{RES}}$	Output (default)	Adapter board
3	FWx	NC	NC	−
5	MD0	$\overline{\text{NMI}}$	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)	−

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	$\overline{\text{NMI}}$	P85	PB0	PB1	PB2
On-board programming modes	User mode	0	1	X	X	X	X
	Boot mode	0	0	1	X	X	X
Programmer mode		1	X	X	0	0	0

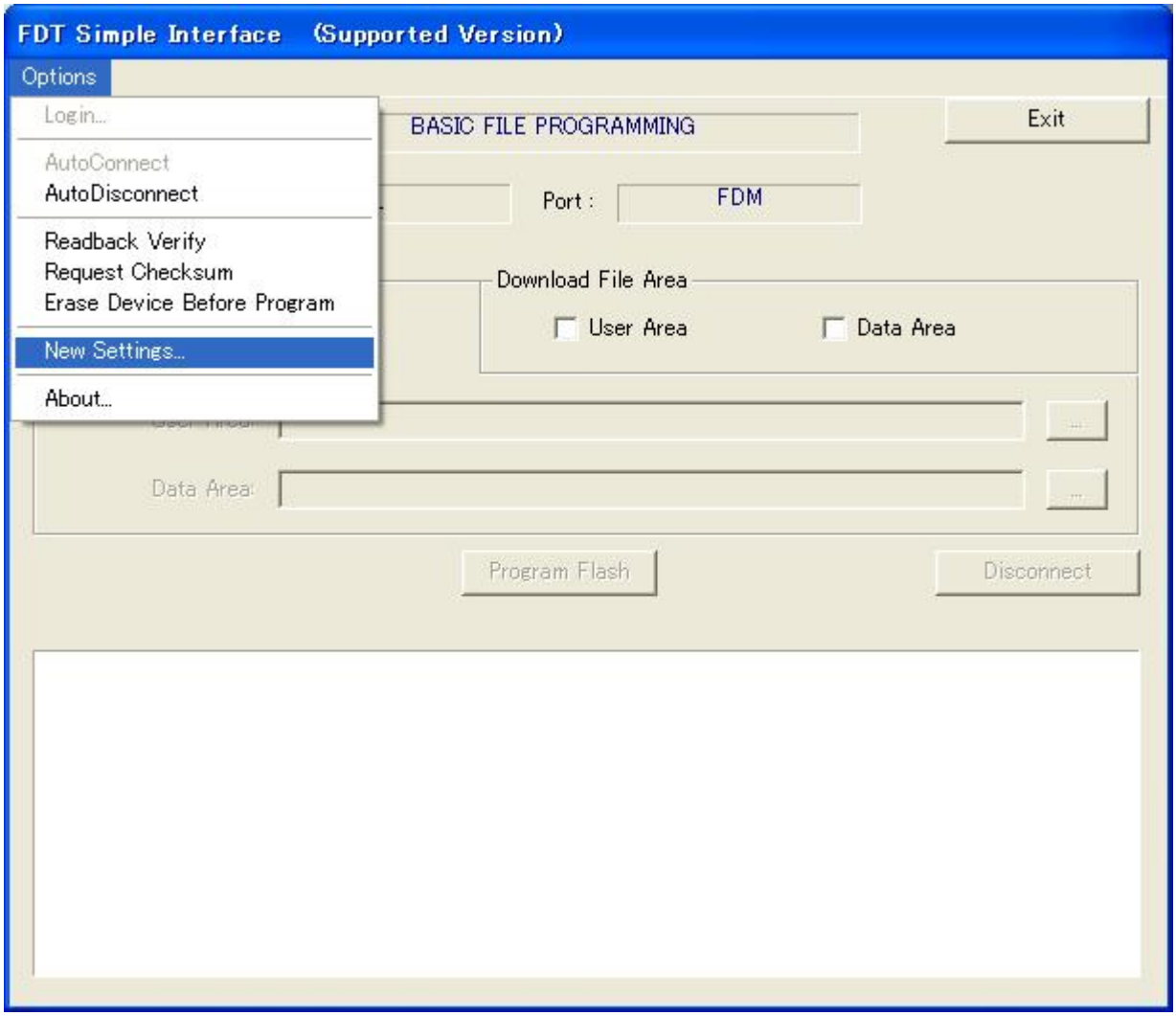
Note: X: Don't care

3.3 Starting the Flash Development Toolkit

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

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.

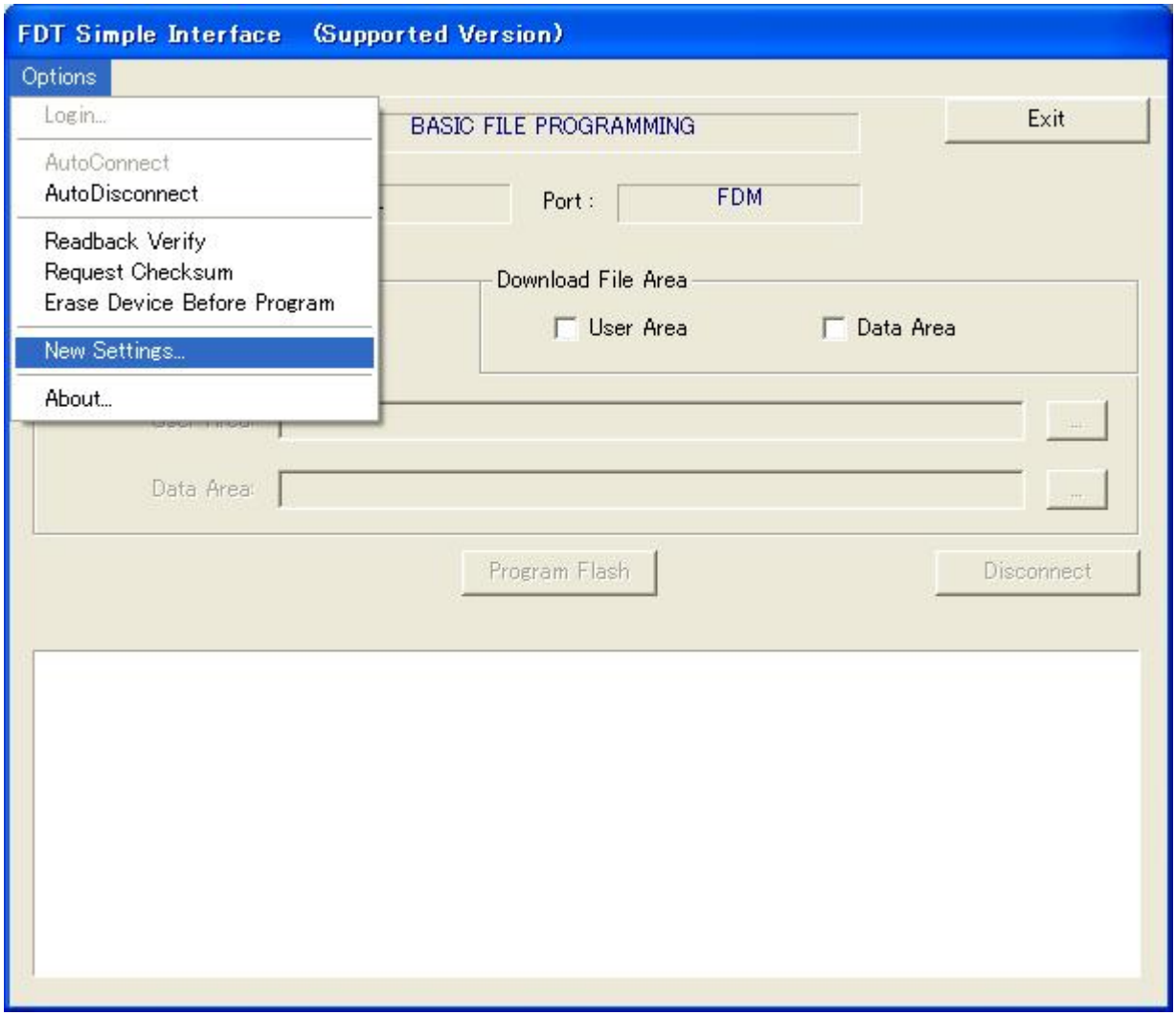


3.4 Setting Product Information

3.4.1 New Settings

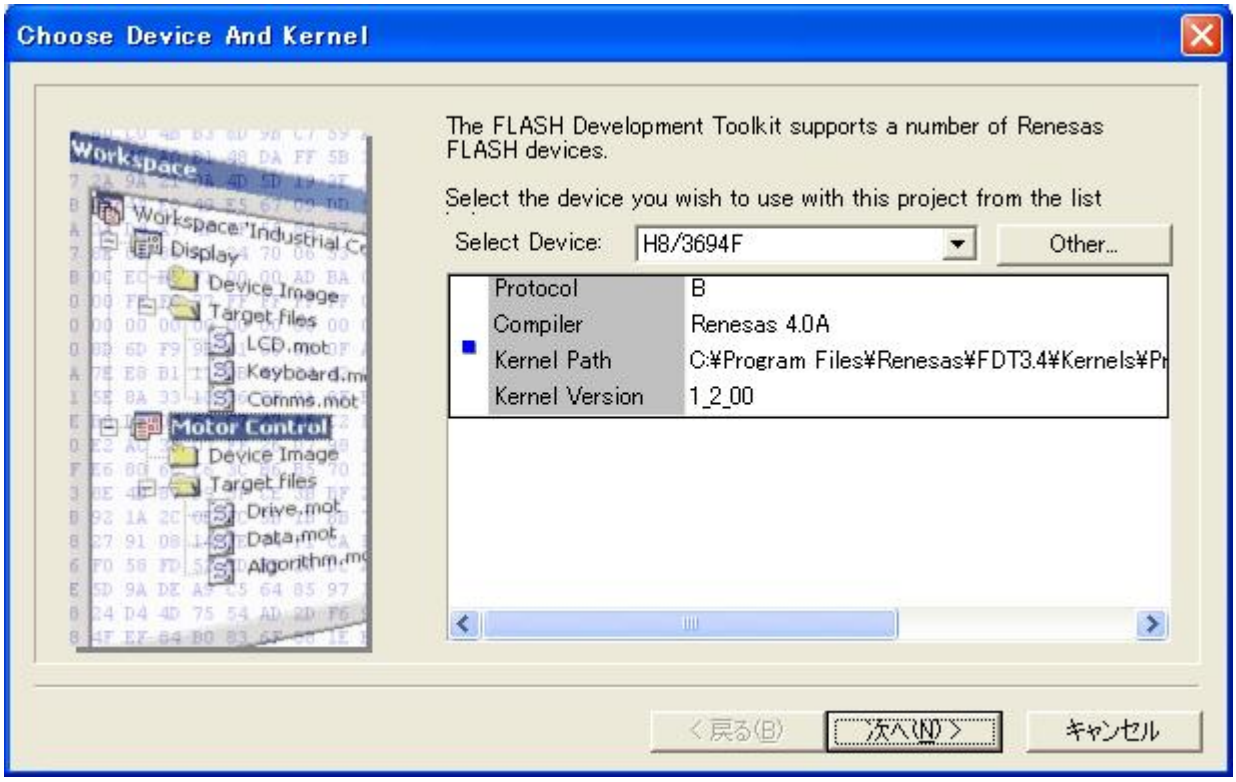
Select "New Settings" from "Options." The screen for selecting the device and kernel appears.

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



3.4.2 Selecting the Device and Kernel

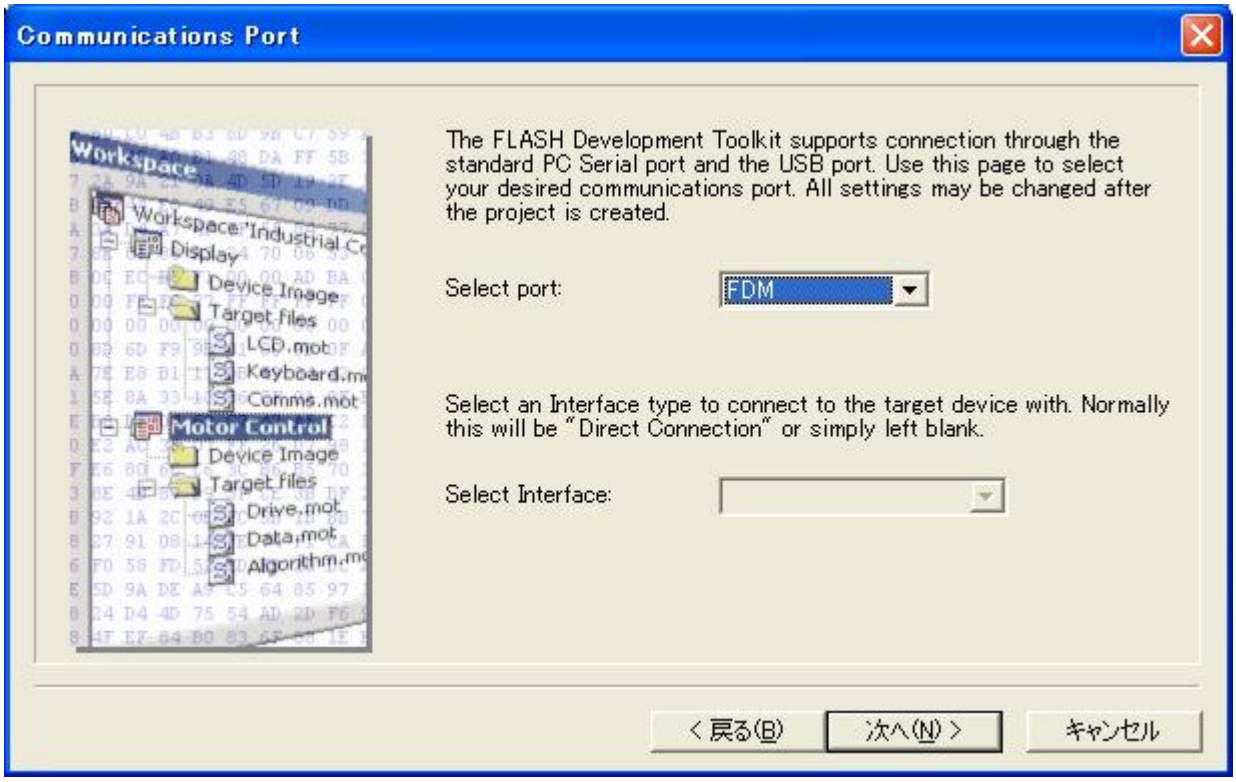
Select the target device from the pull-down menu. In this example, select H8/3694F.



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

3.4.3 Selecting a Communications Port

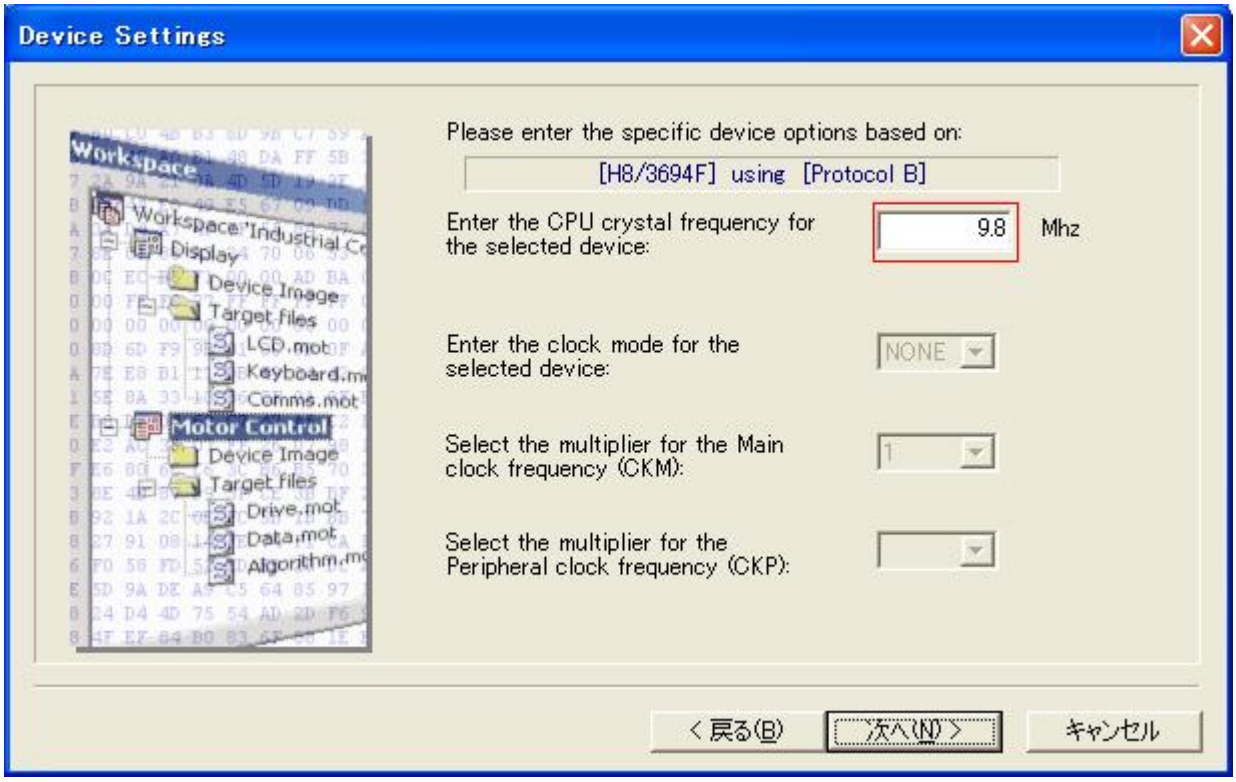
Select the adapter board (FDM) from the pull-down menu.



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).



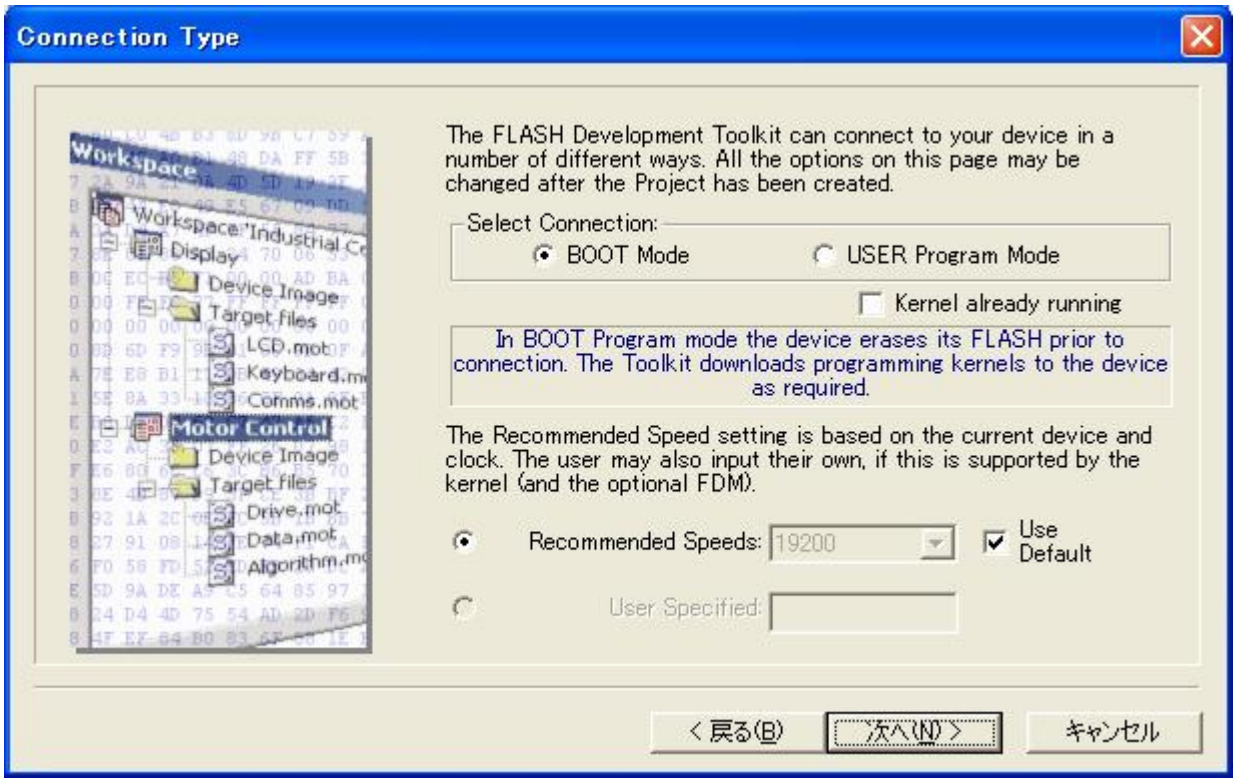
When you have entered the value, click "Next(N)."

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."

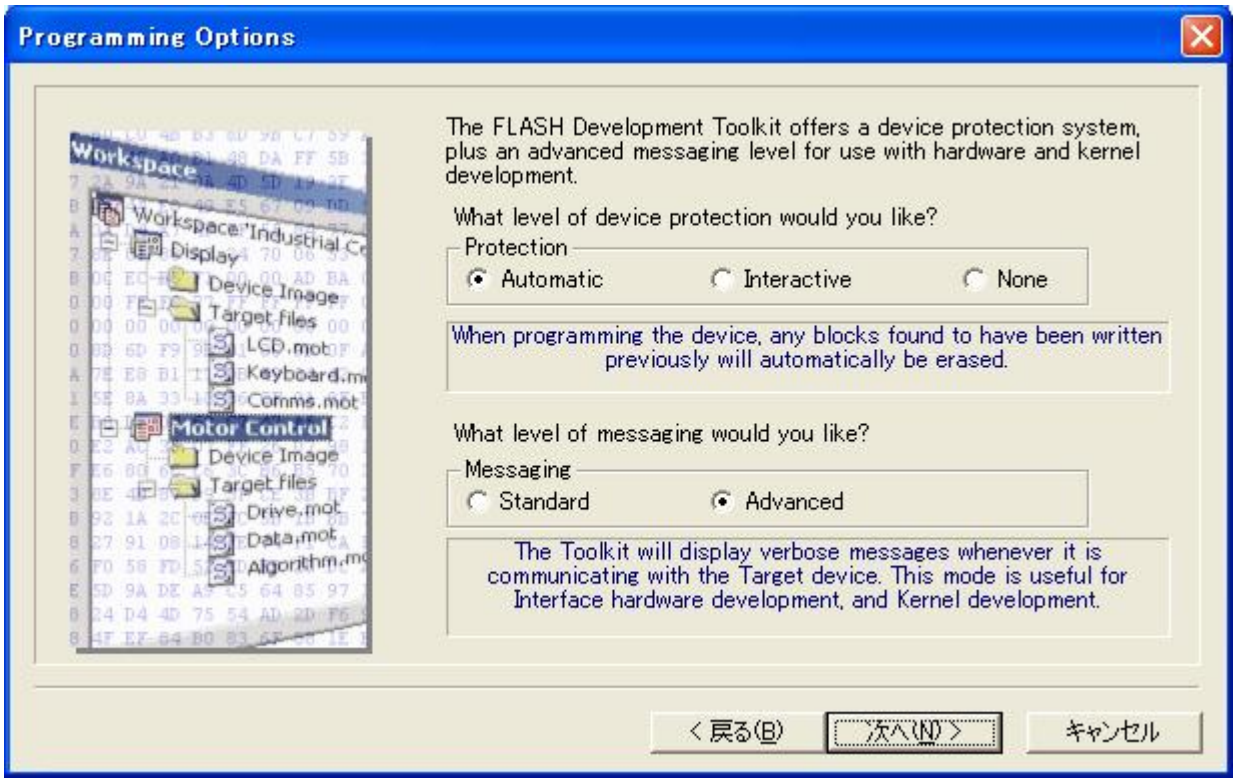
Set the baud rate. For example, select "Use Default."



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."

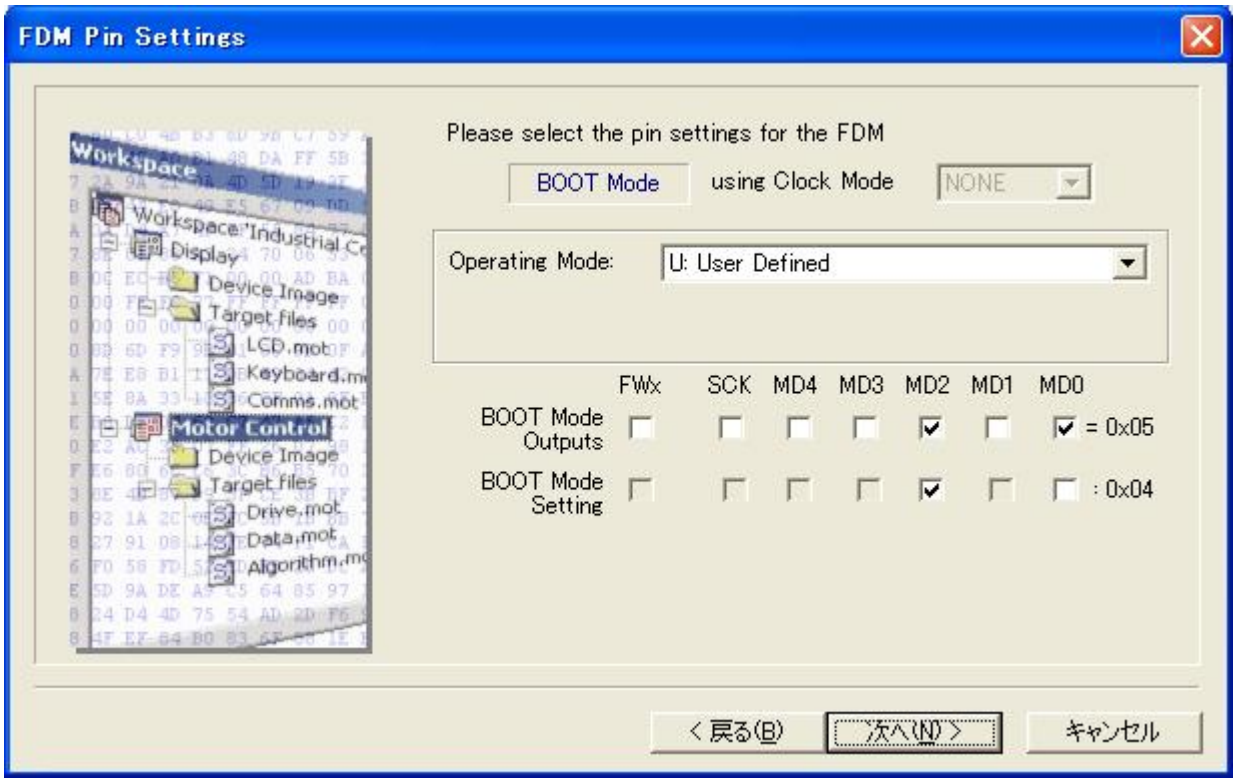


When you have selected programming options, click "Next(N)."

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.



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.

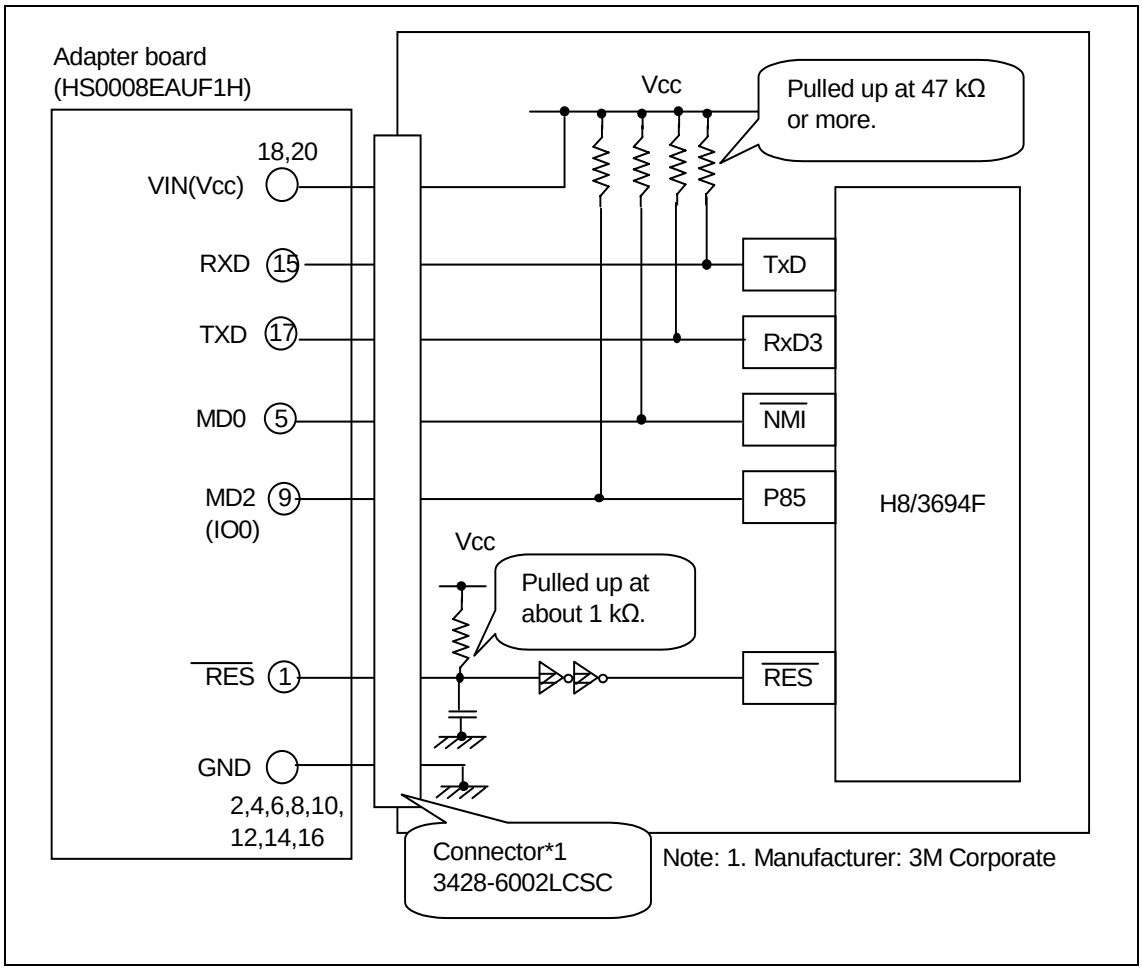


Figure 3-3 Example of Connecting the H8/3694F and the Adapter Board

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.

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

Pin No.	Pin on the Adapter Board	Pin on the Device	Input/Output	Output Level
1	$\overline{\text{RES}}$	$\overline{\text{RES}}$	Output (default)	Adapter board
3	FWx	NC	NC	−
5	MD0	$\overline{\text{NMI}}$	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)	−

Note: NC: Means no connection.

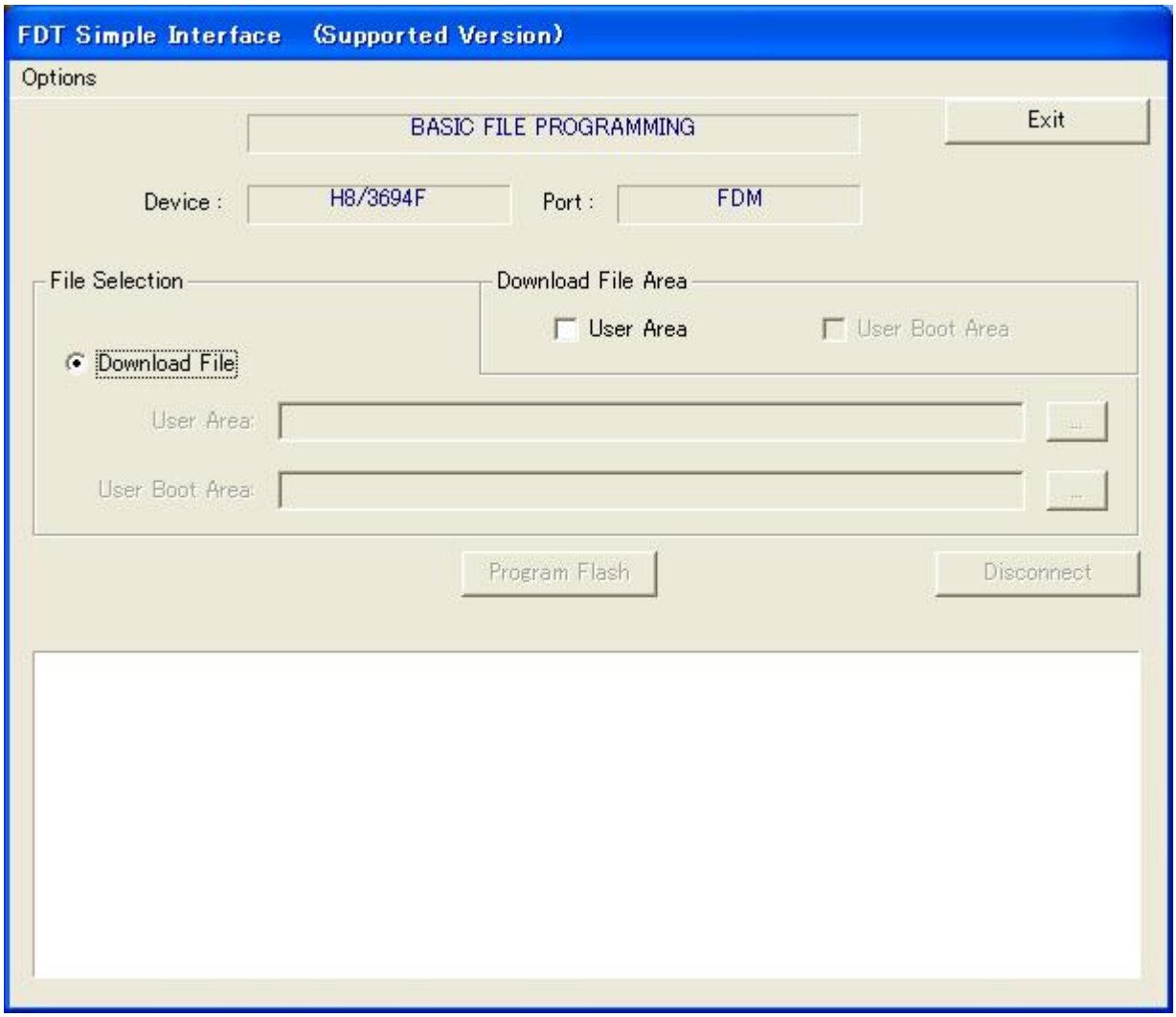
3.4.8 Reset Mode Pin Settings

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

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

3.4.9 Completion of Setting

Device and port settings are now completed.



3.5 Programming Flash Memory

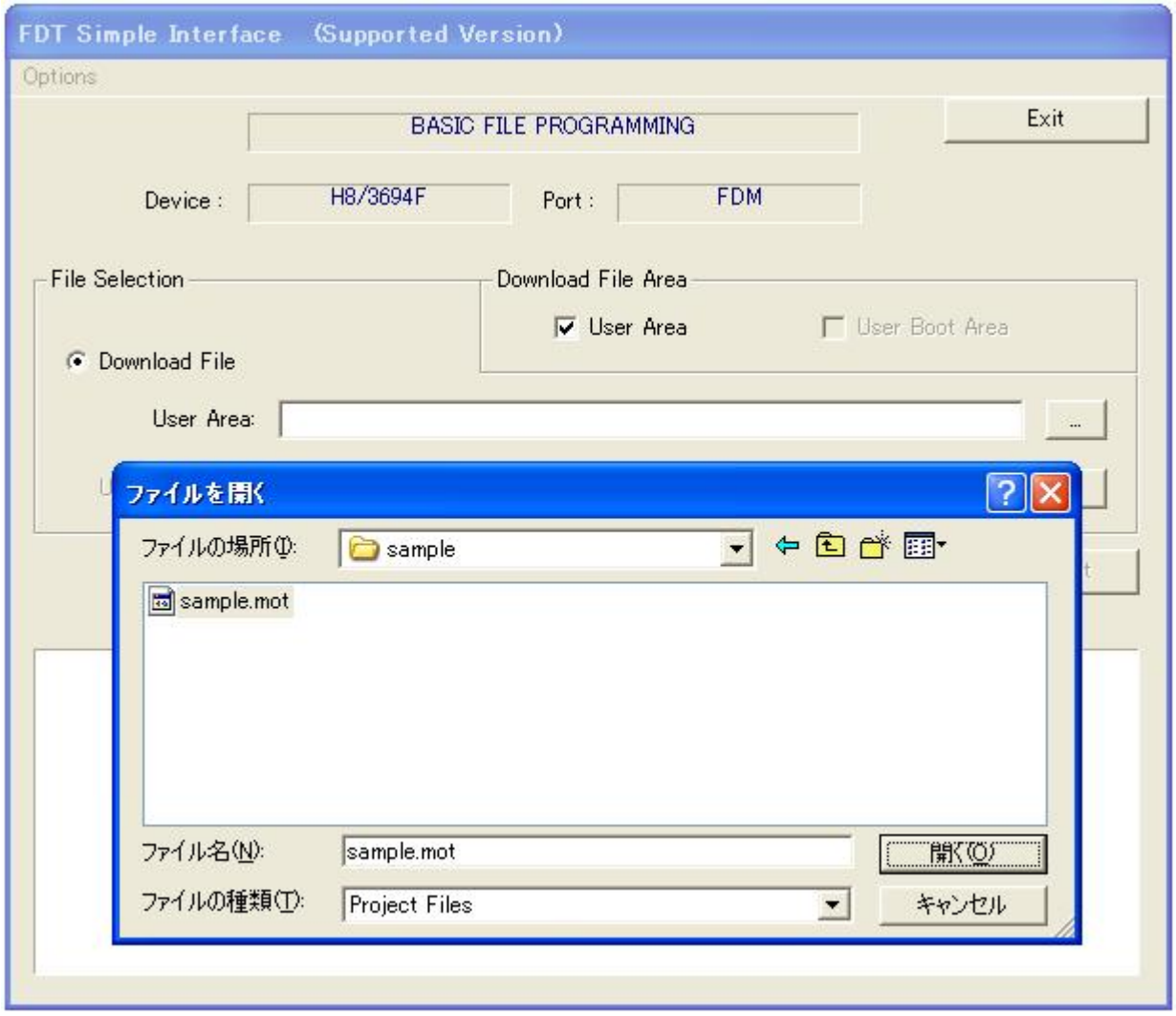
3.5.1 Selecting the Program Area and File

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)."

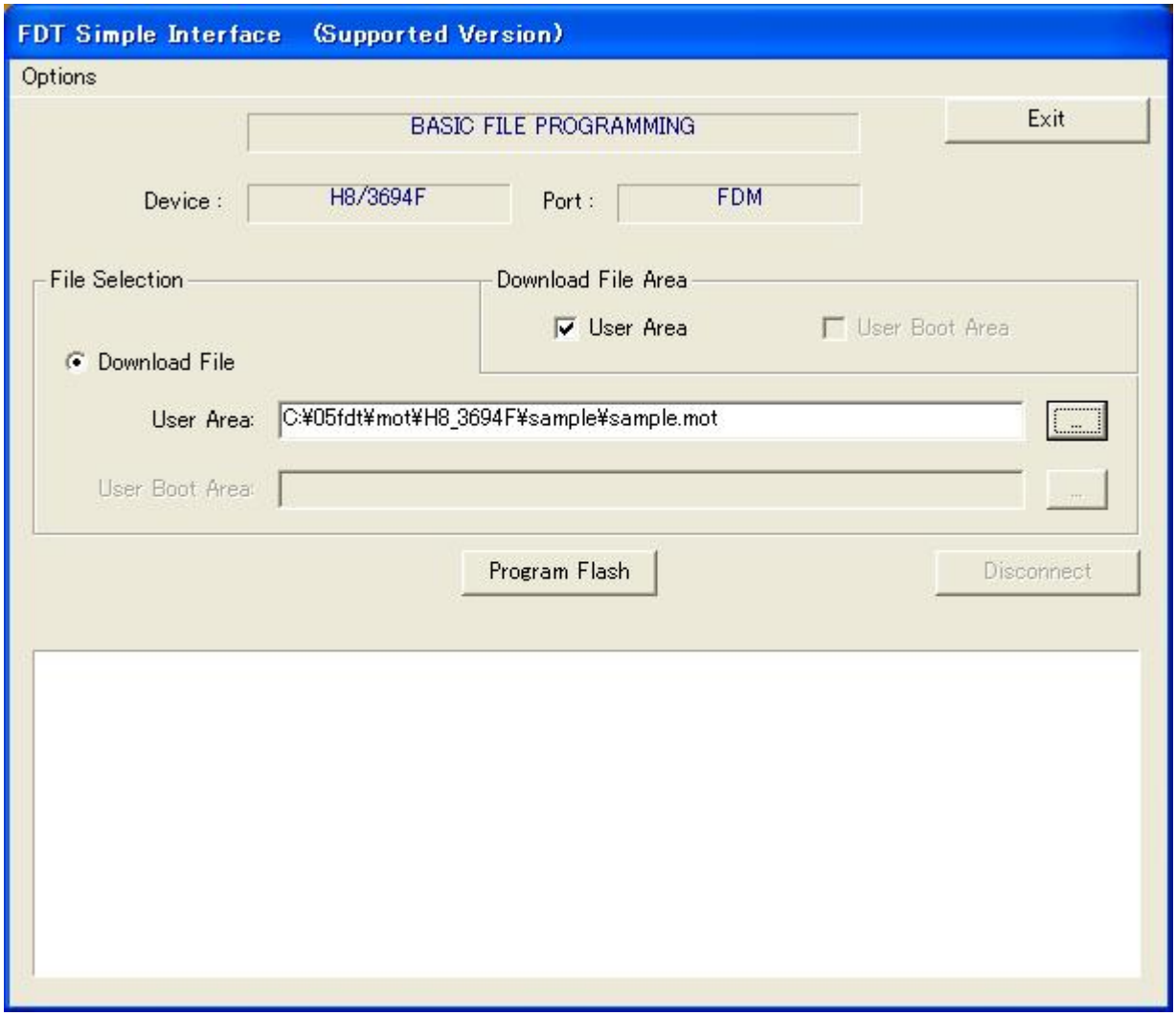


3.5.2 Starting Programming

File selection has been completed.

When the Flash Development Toolkit is started up for the second and subsequent times, the following screen is opened.

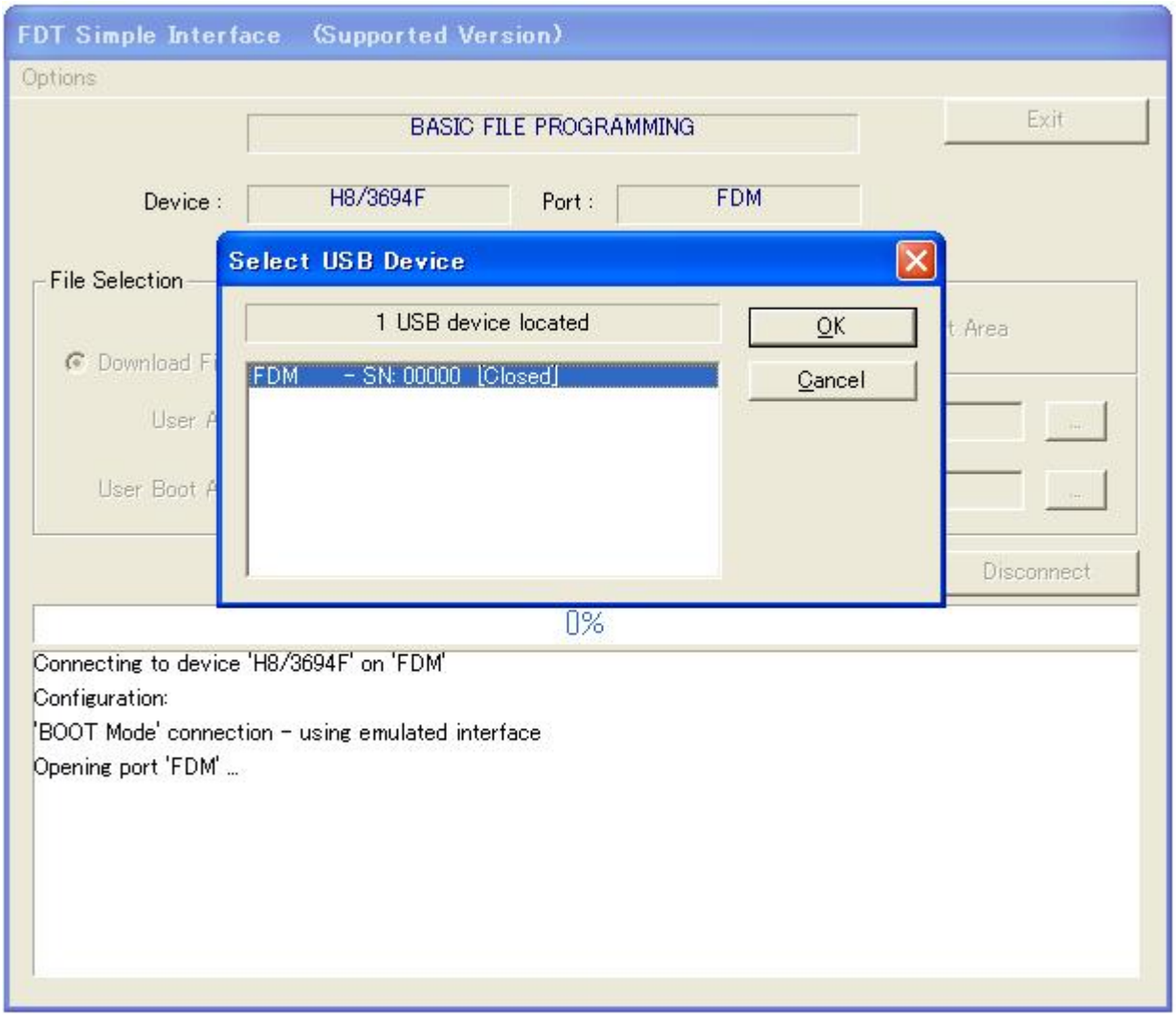
The previously selected information is retained.



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

3.5.3 Selecting a USB Device

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

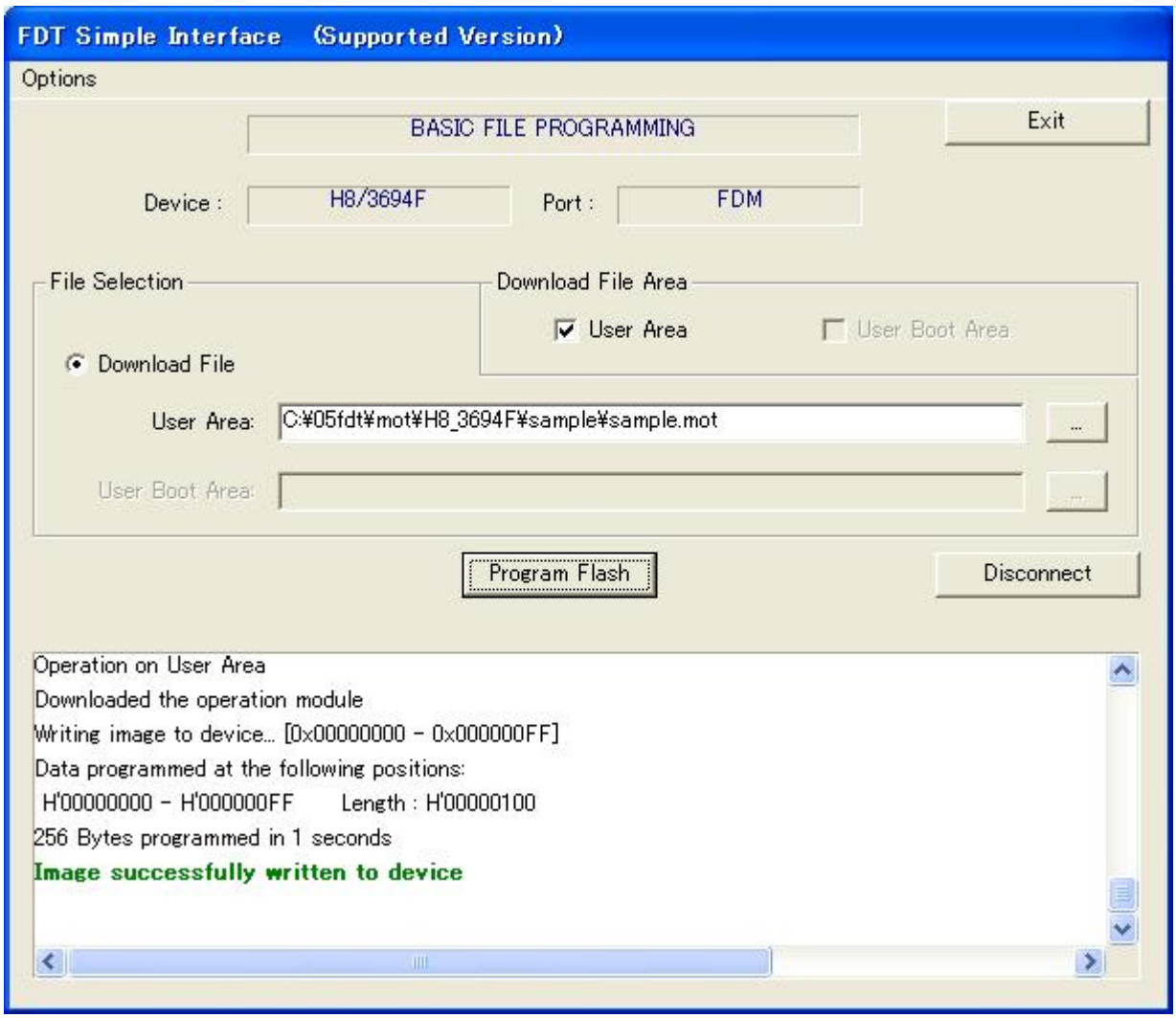


When you have selected the USB device, click "OK."

3.5.4 Ending Programming

Programming starts, then ends.

Confirm the message indicating that programming terminated normally.

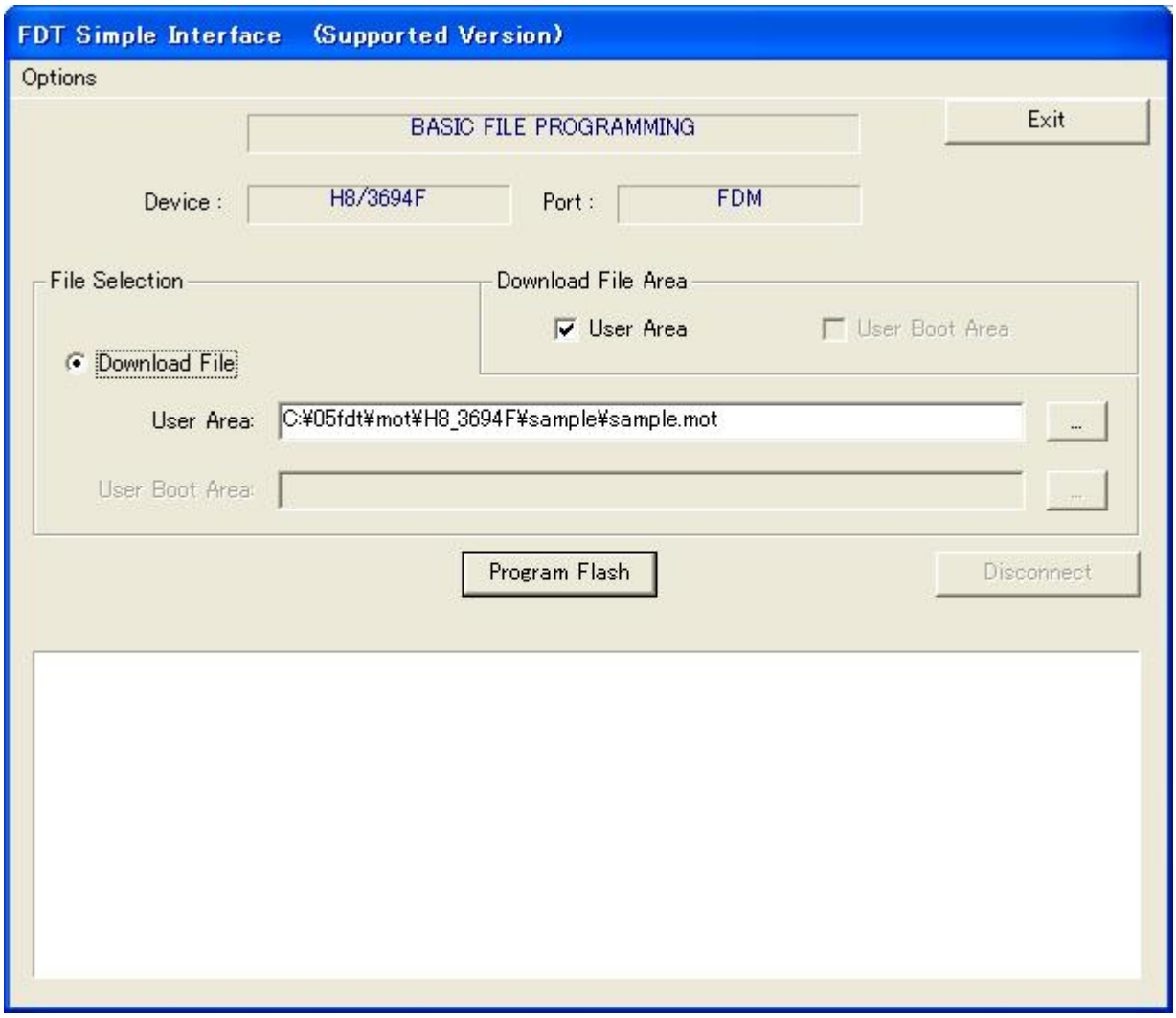


Click "Exit." The Flash Development Toolkit terminates.

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.



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.

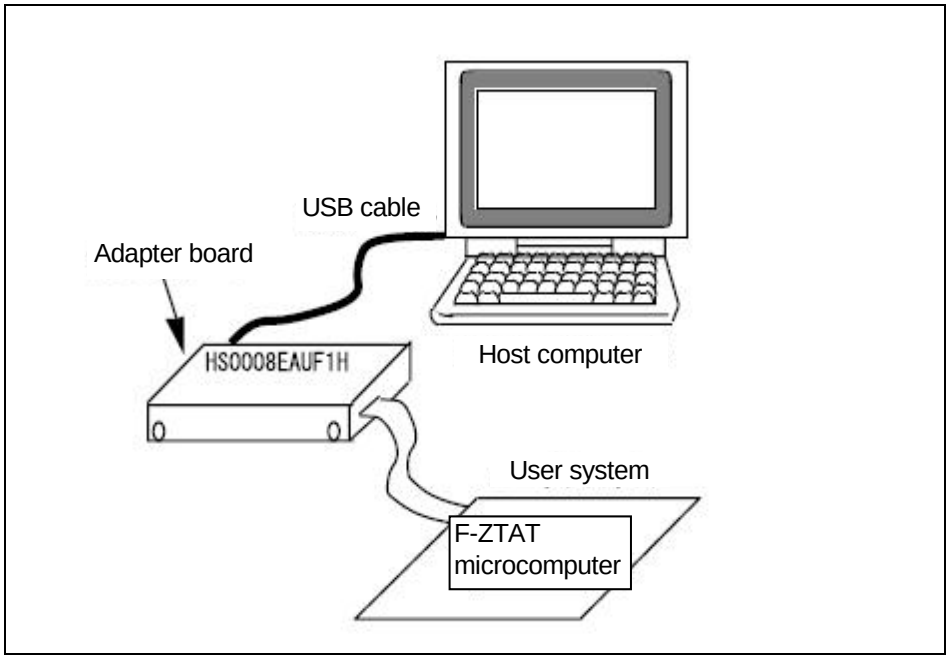


Figure 4-1 Connecting the Adapter Board

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.

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

No	Signal Name	No	Signal Name
1	$\overline{\text{RES}}$	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 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.

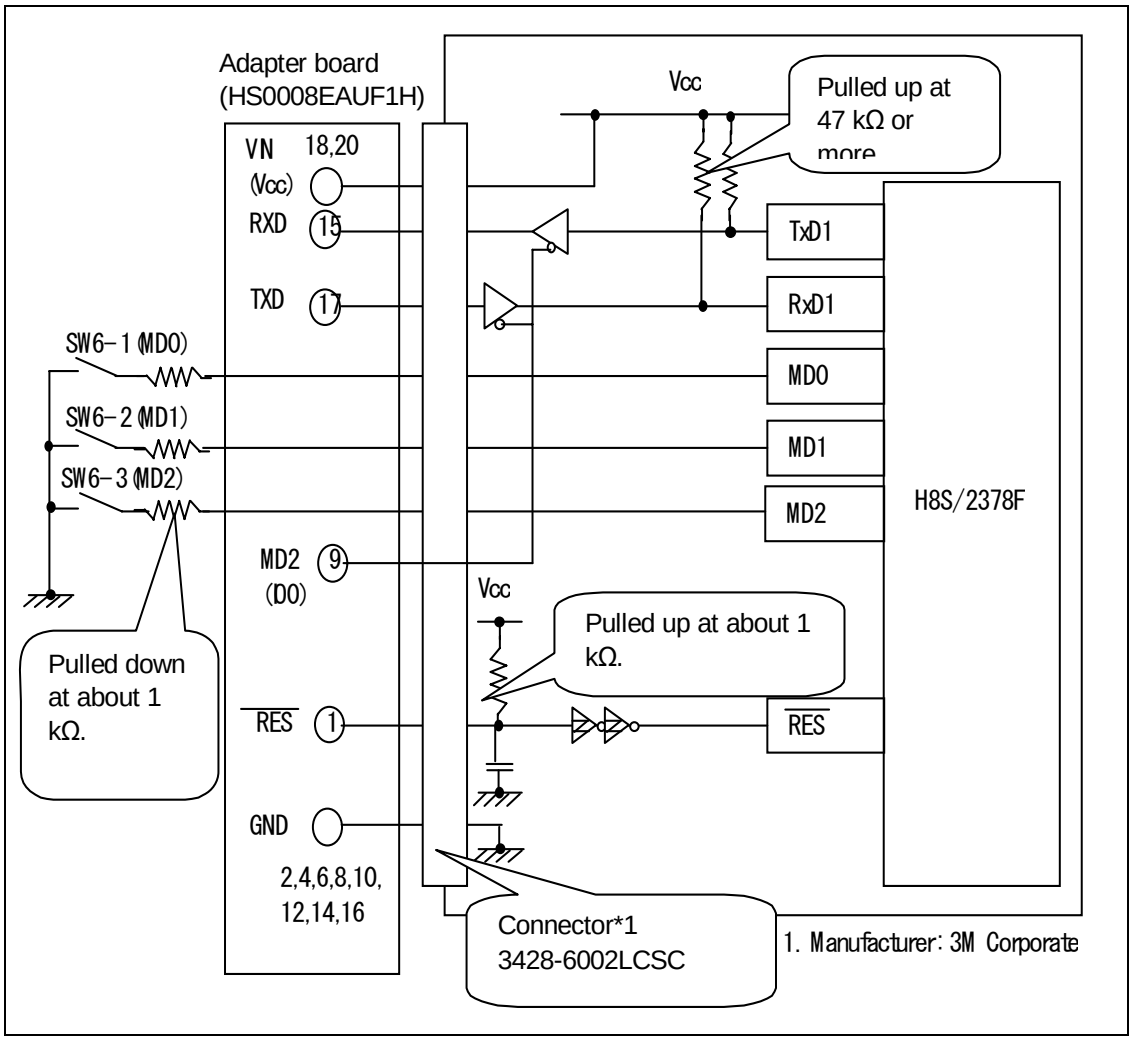


Figure 4-2 Example of Connecting the H8S/2378F and the Adapter Board

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.

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

Pin No.	Pin on the Adapter Board	Pin on the Device	Input/Output	Output Level
1	$\overline{\text{RES}}$	$\overline{\text{RES}}$	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)	−

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.

Table 4-3 MCU Operating Modes

MCU Operating Mode	MD2	MD1	MD0	CPU Operating Mode	Description	On-Chip ROM	External Data Bus	
							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

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.

Table 4-4 Comparison of Programming Modes

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	✓	✓
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

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.

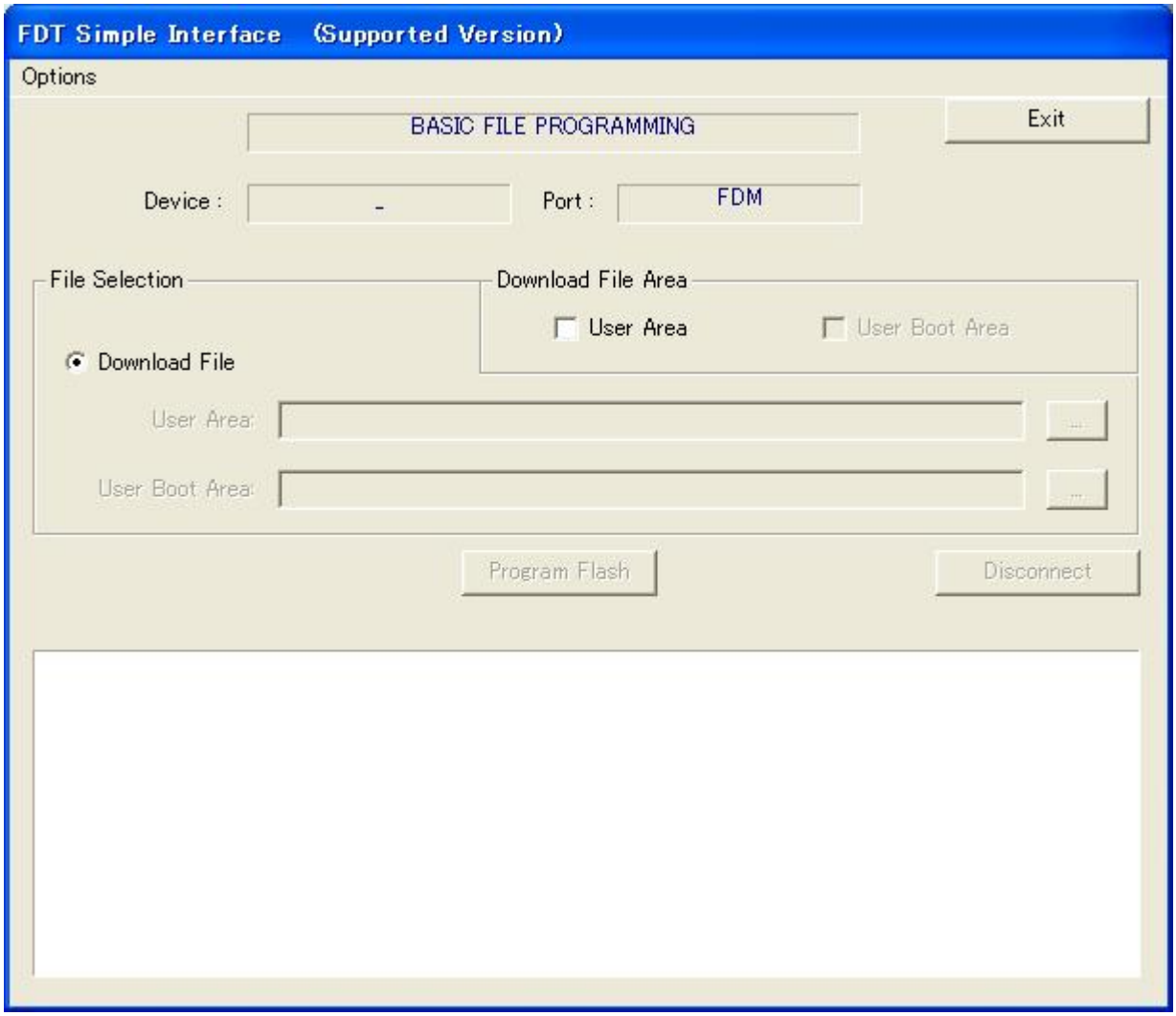
In the user boot mode, the boot operation via a desired interface can be performed by the mode pin setting different from that in the user program mode.

4.3 Activating the Flash Development Toolkit

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

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.

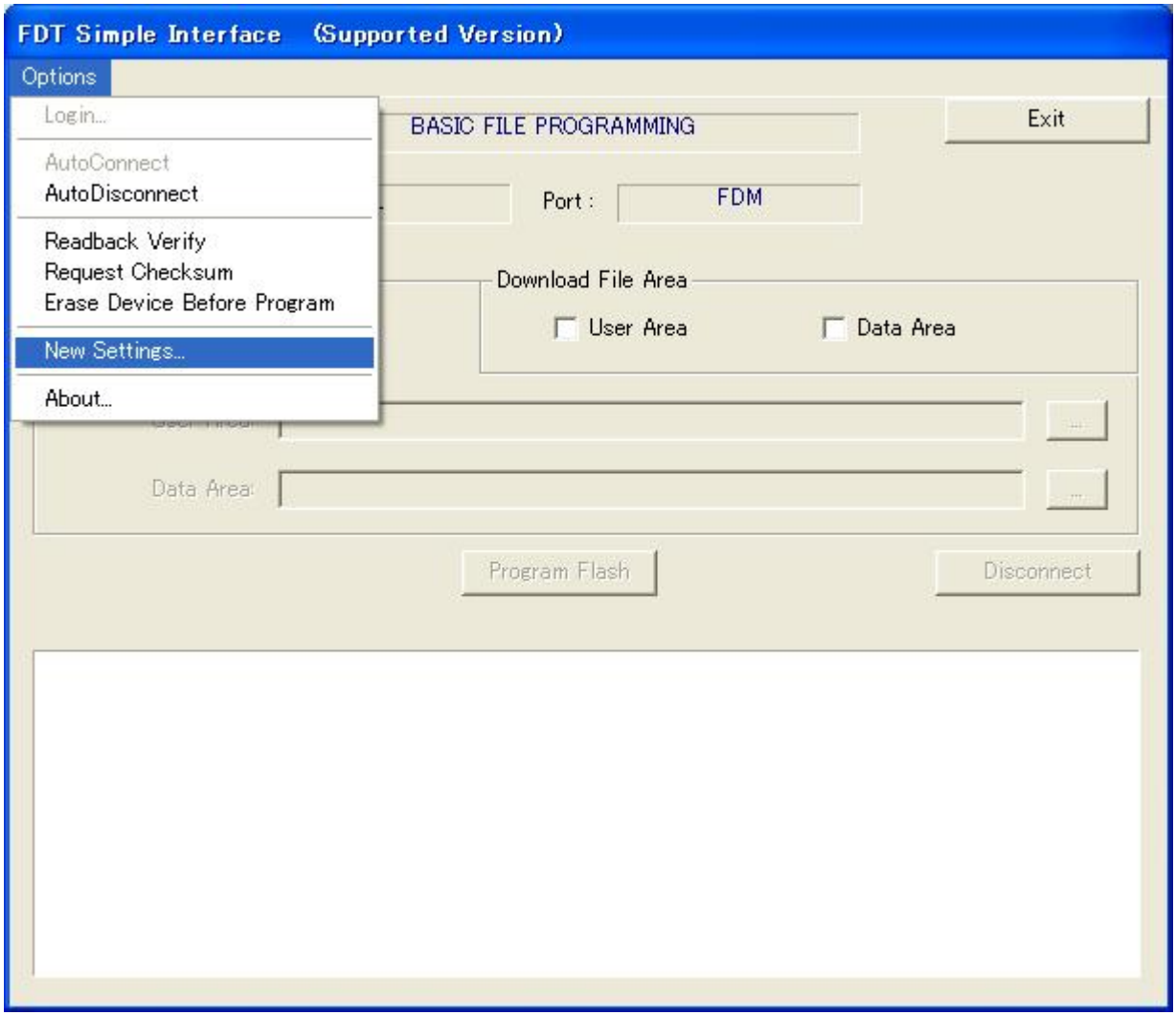


4.4 Setting Product Information

4.4.1 New Settings

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

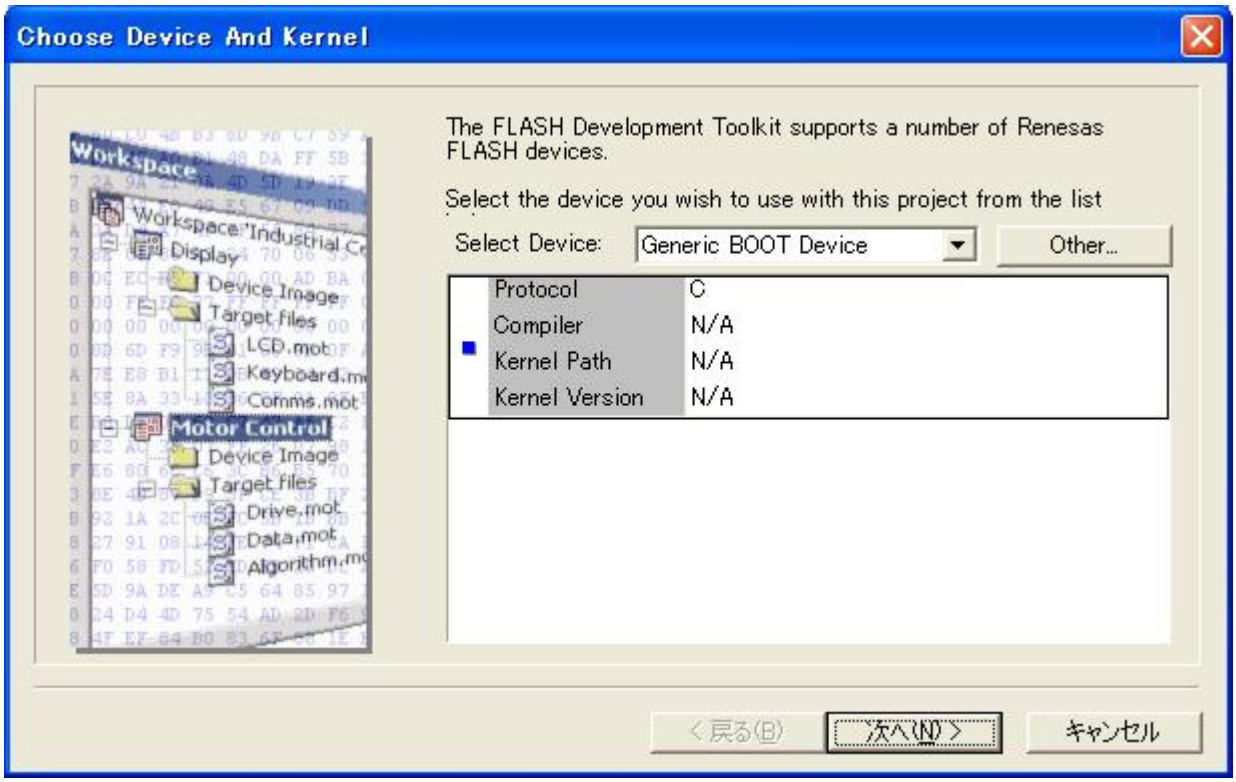
If you cannot select "New Settings" from "Options," click "Disconnect."



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.



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

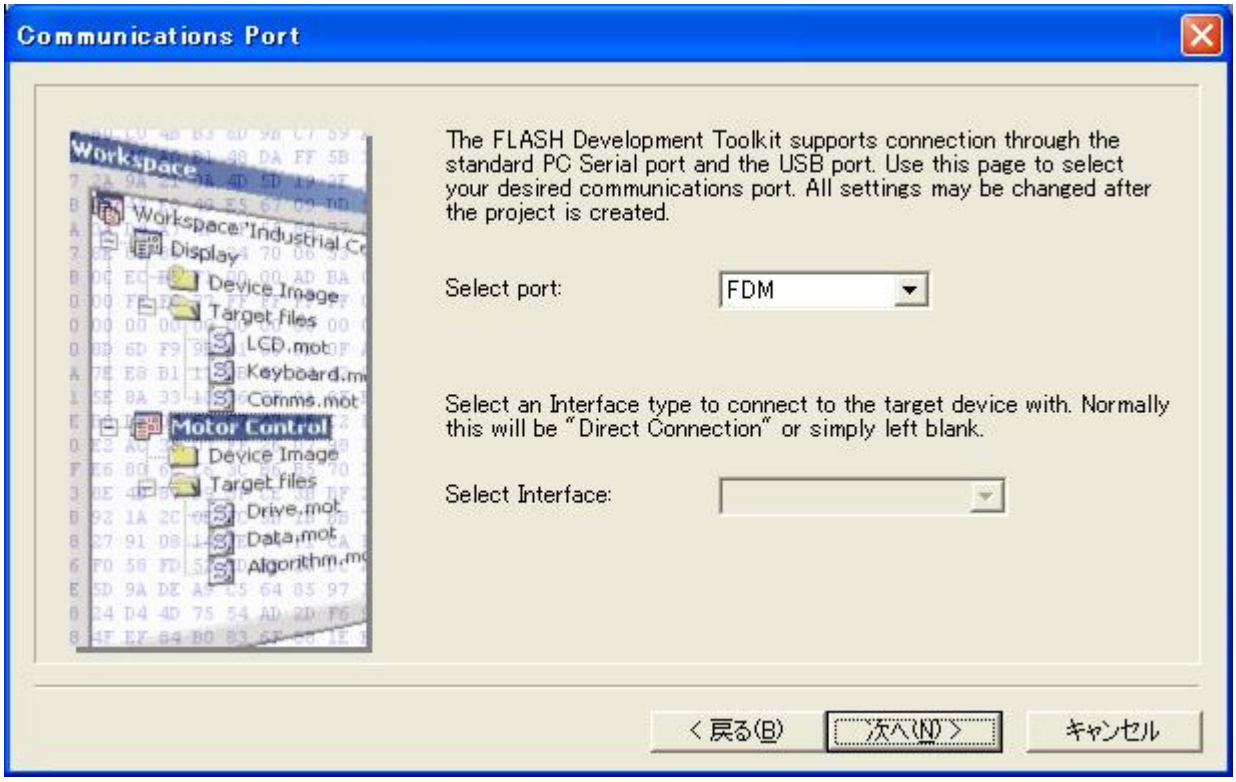
A list of 0.18-µm products for which "Generic BOOT Device" is selected is shown in Table 4-5.

Table 4-5 0.18-µm Products

Series or Family	Microcomputer Name	Series or Family	Microcomputer Name
SuperH RISC engine Family	SH7149F	H8S/2400 Series	H8S/2437F
	SH7146F	H8S/2300 Series	H8S/2378F
	SH7086F		H8S/2368F
	SH7085F		H8S/2319CF
	SH7084F	H8S/2100 Series	H8S/2189F
	SH7083F		H8S/2172F
	SH7058F		H8S/2168F
	SH7055SF		H8S/2167F
H8SX Family	H8SX/1657F		H8S/2166F
	H8SX/1582F		H8S/2114F
	H8SX/1527F	H8S/300H Series	H8/3069F
	H8SX/1525F		H8/3029F
H8S/2500 Series	H8S/2556F		
	H8S/2552F		
	H8S/2551F		
	H8S/2506F		
	H8S/2505F		

4.4.3 Selecting a Communications Port

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



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.

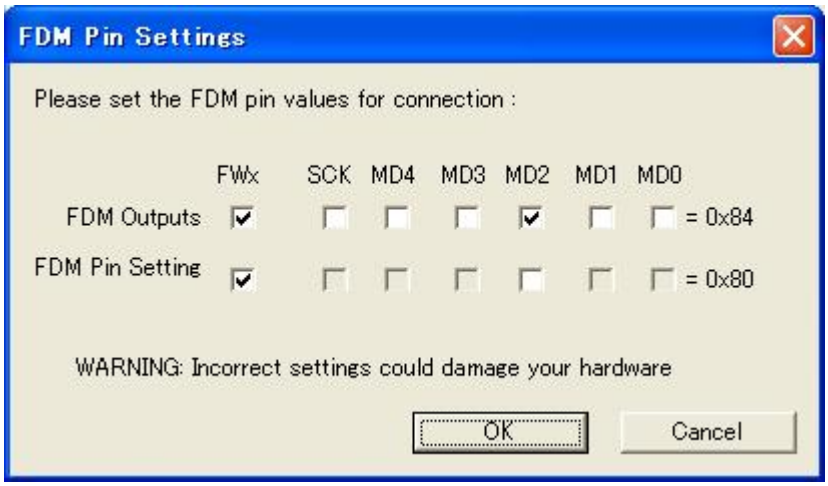
For example, set the output of FWx to high (1) and that of MD2 to low (0).

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)



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

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.

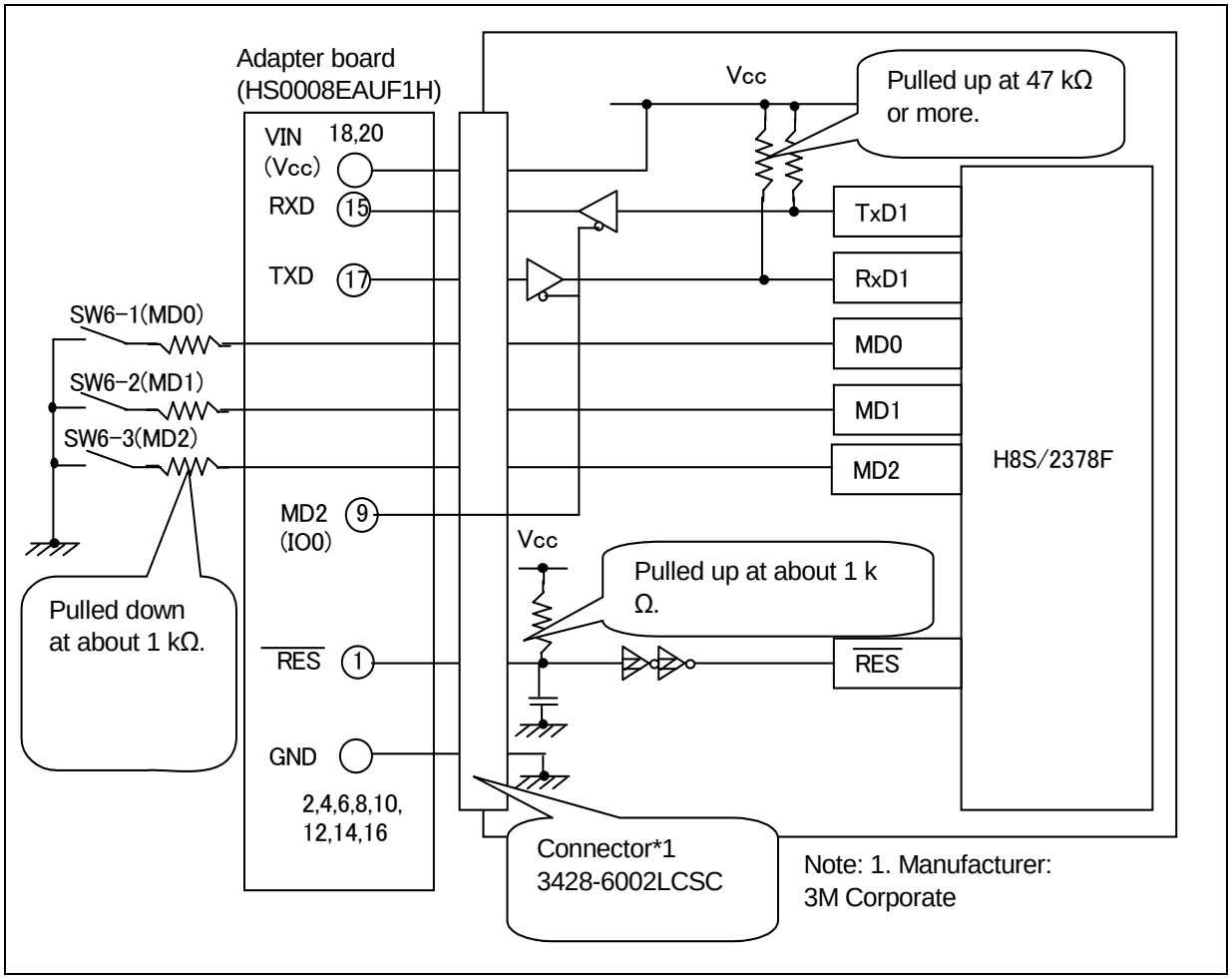


Figure 4-3 Example of Connecting the H8S/2378F and the Adapter Board

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.

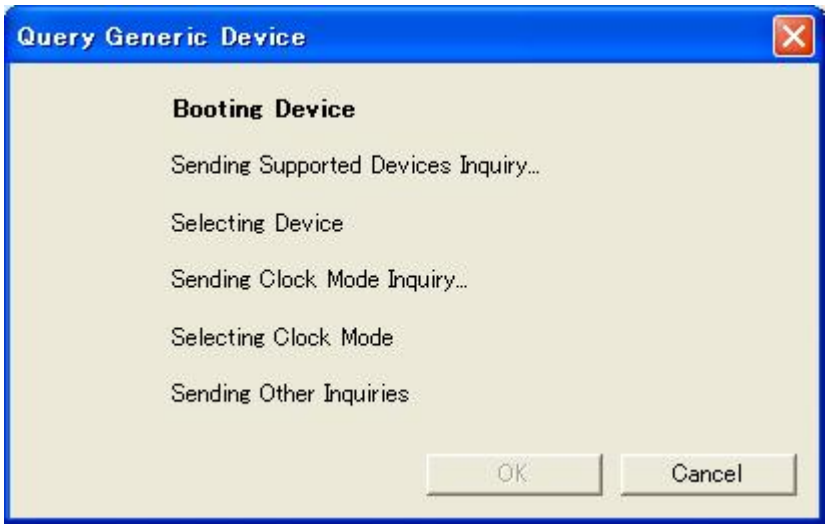
Table 4-6 Example of Setting Pins on the H8S/2378F and Adapter Board (for the Boot Mode)

Pin No.	Pin on the Adapter Board	Pin on the Device	Input/Output	Output Level
1	$\overline{\text{RES}}$	$\overline{\text{RES}}$	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)	−

Note: NC: Means no connection.

4.4.5 Selecting the USB Device

Check the device.

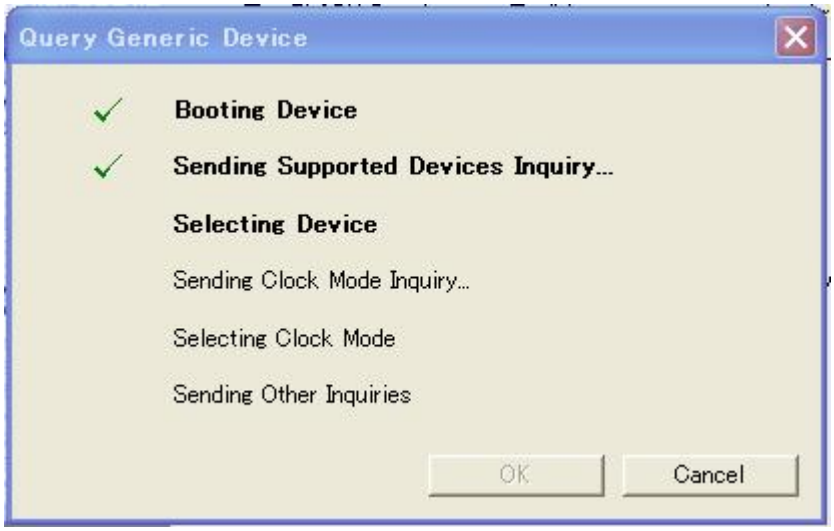


Select the adapter board (FDM).

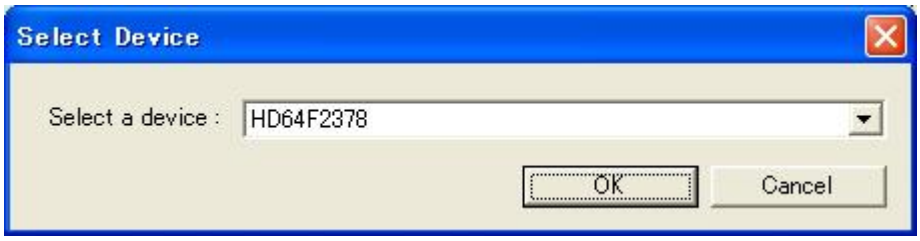
When you have selected USB device, click "OK."

4.4.6 Selecting the Device

Check the device.



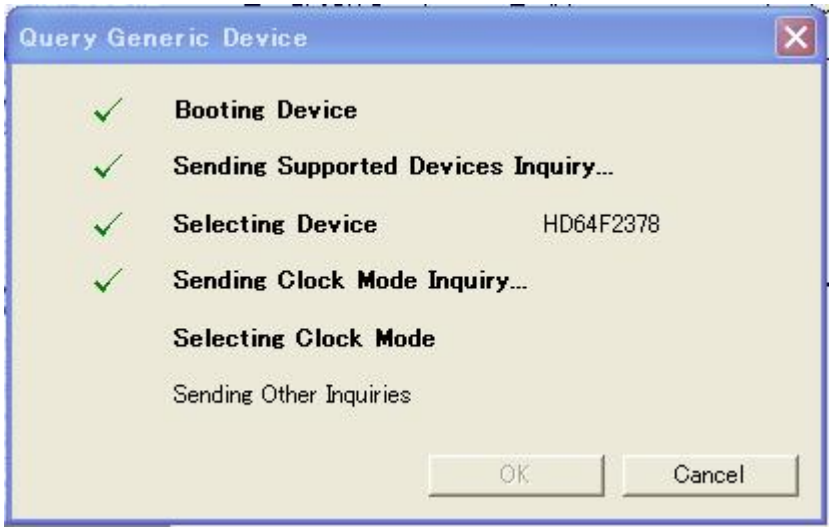
Select HD64F2378.



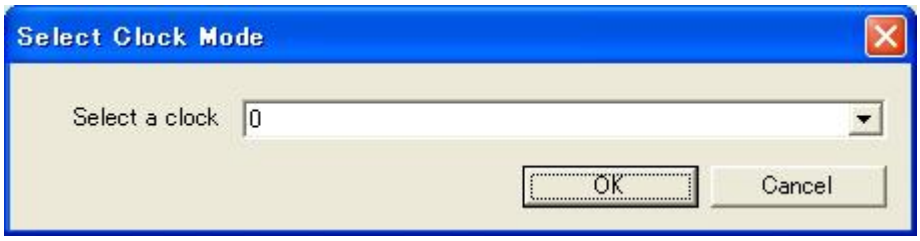
When you have selected the device, click "OK."

4.4.7 Selecting the Clock Mode

Check the device.



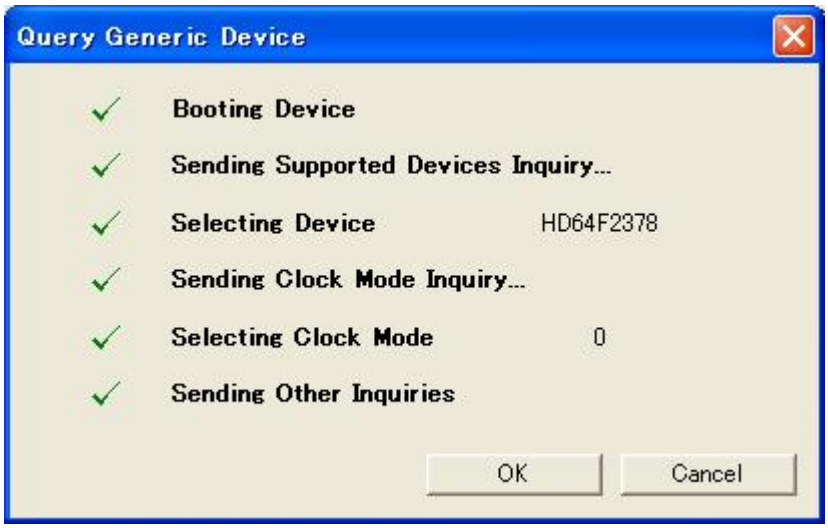
Select the clock mode.



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

4.4.8 Checking the Generic Device

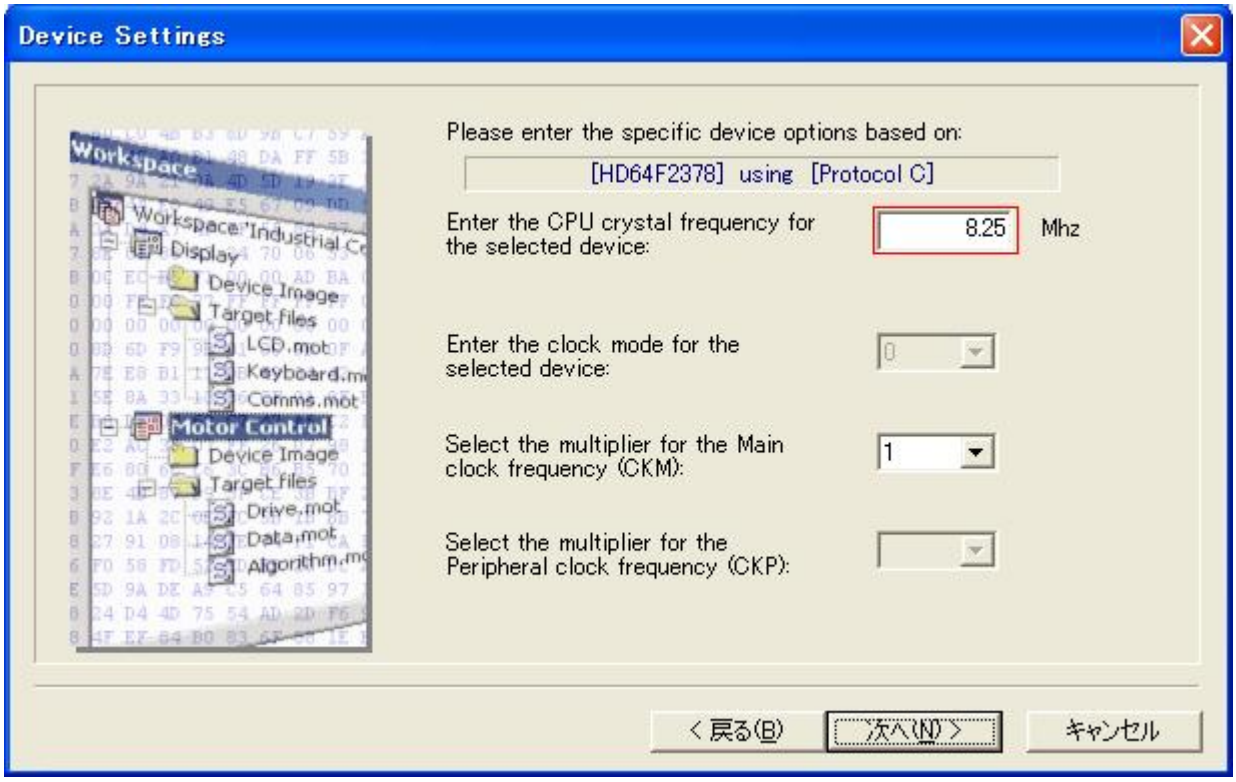
The device has been checked.



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).

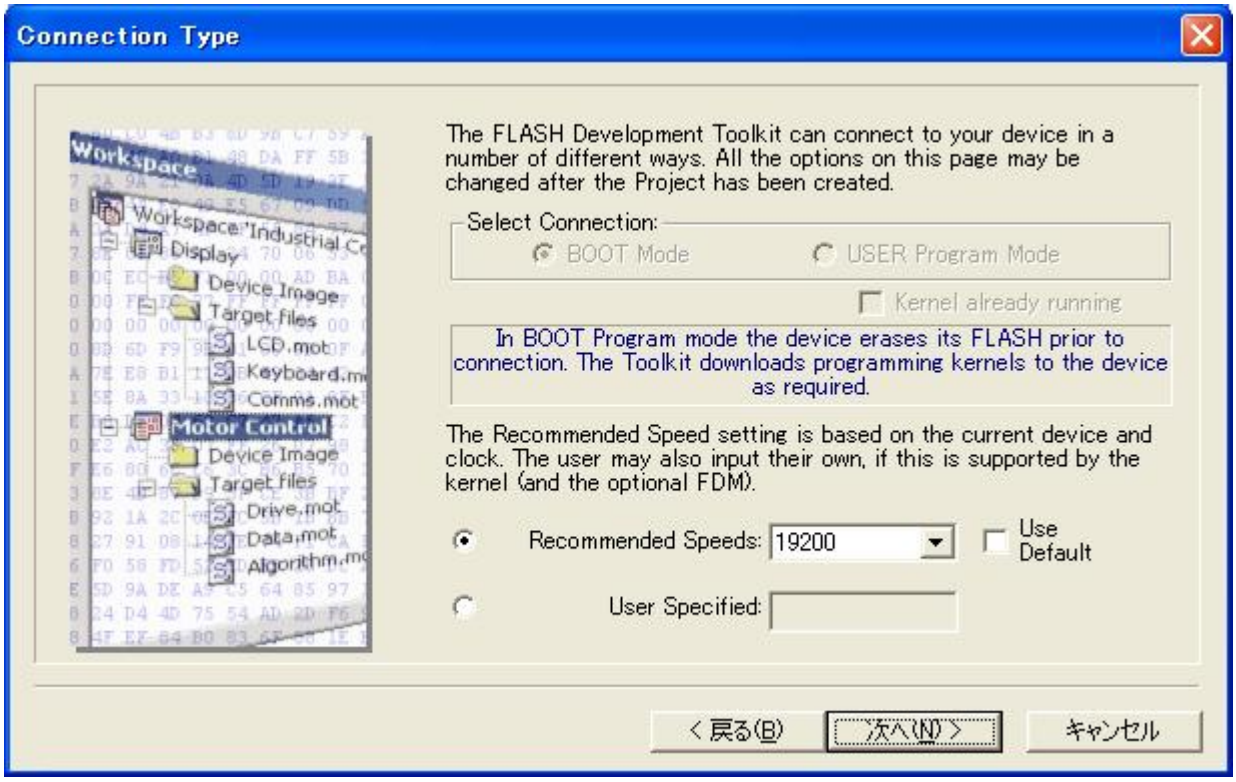


When you have entered the value, click "Next(N)."

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)

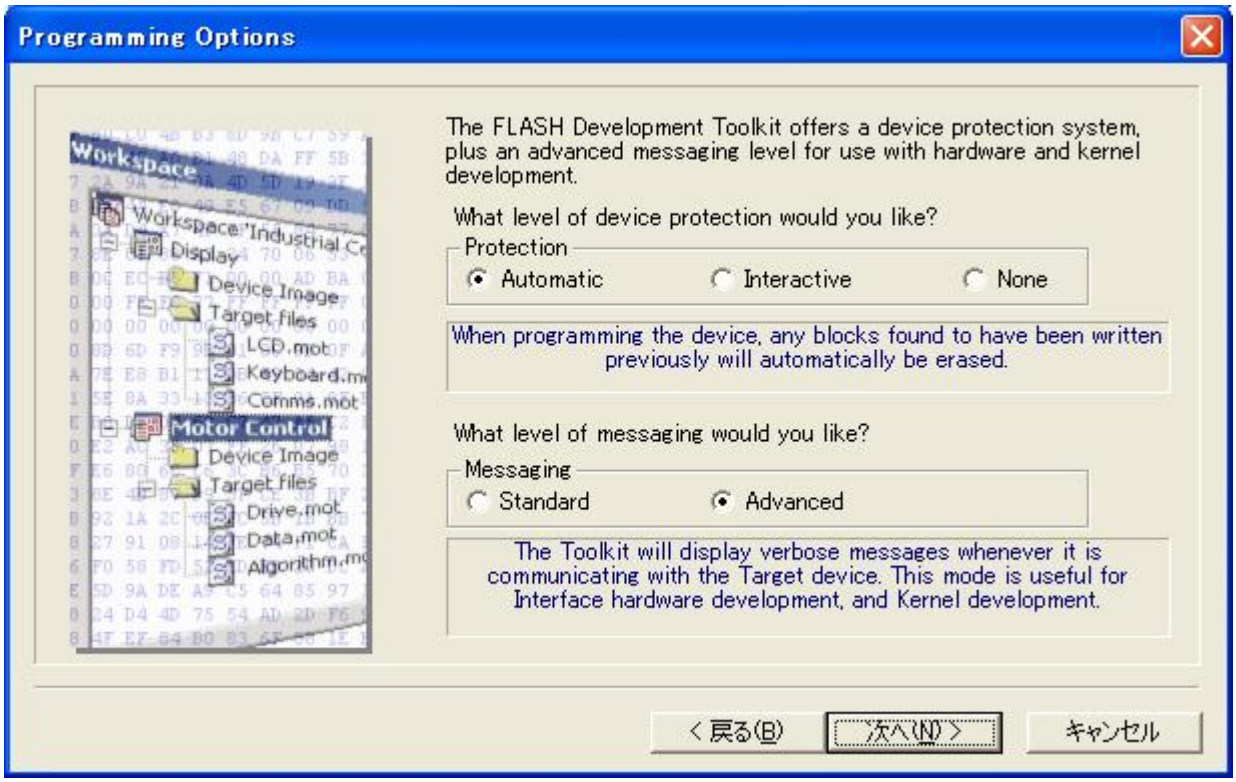
Select a baud rate from the pull-down menu. For example, select 19200 (baud).



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."



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

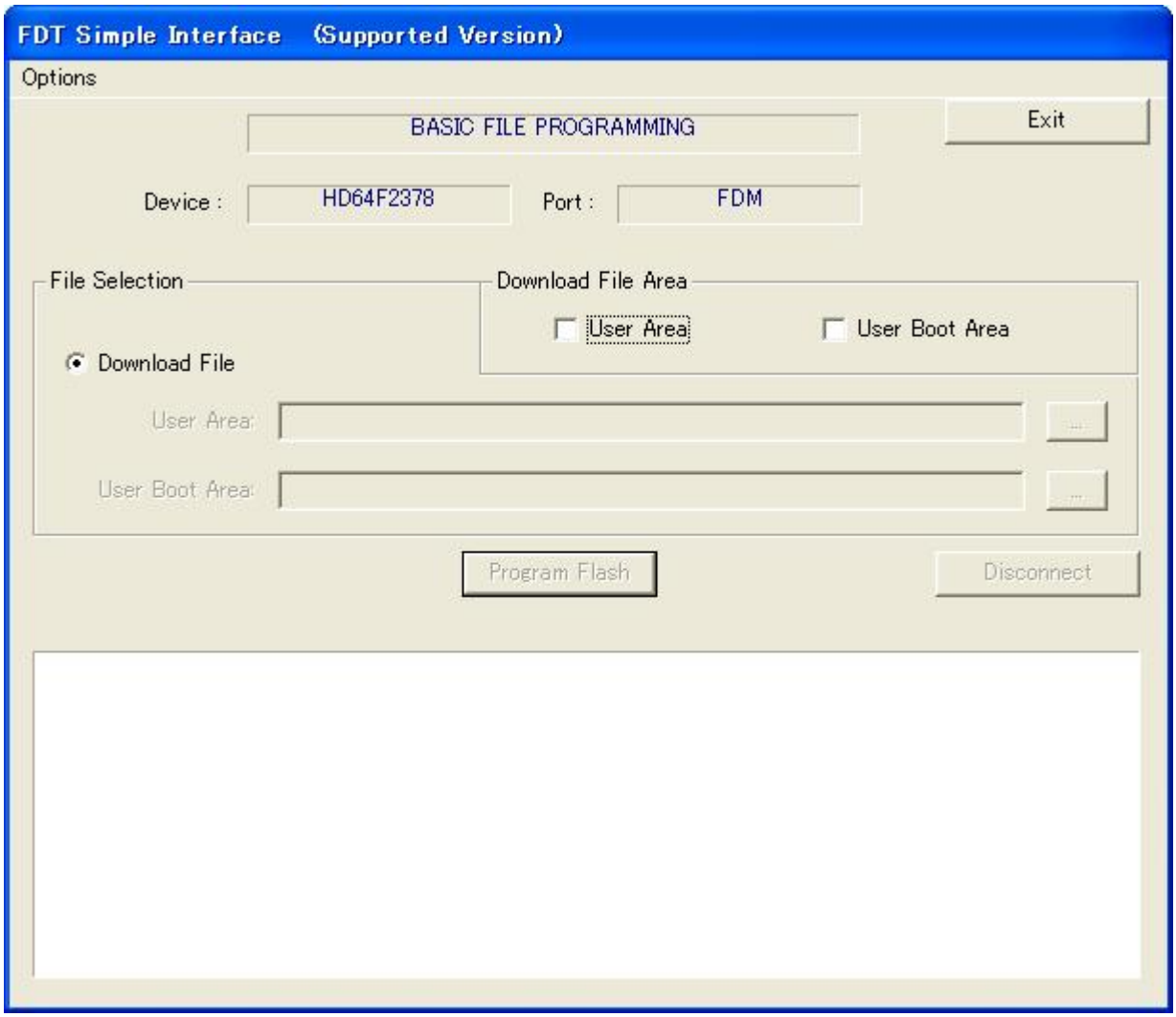
4.4.12 Reset Mode Pin Settings (FDM)

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

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

4.4.13 Completion of Setting

Device and port settings are now completed.



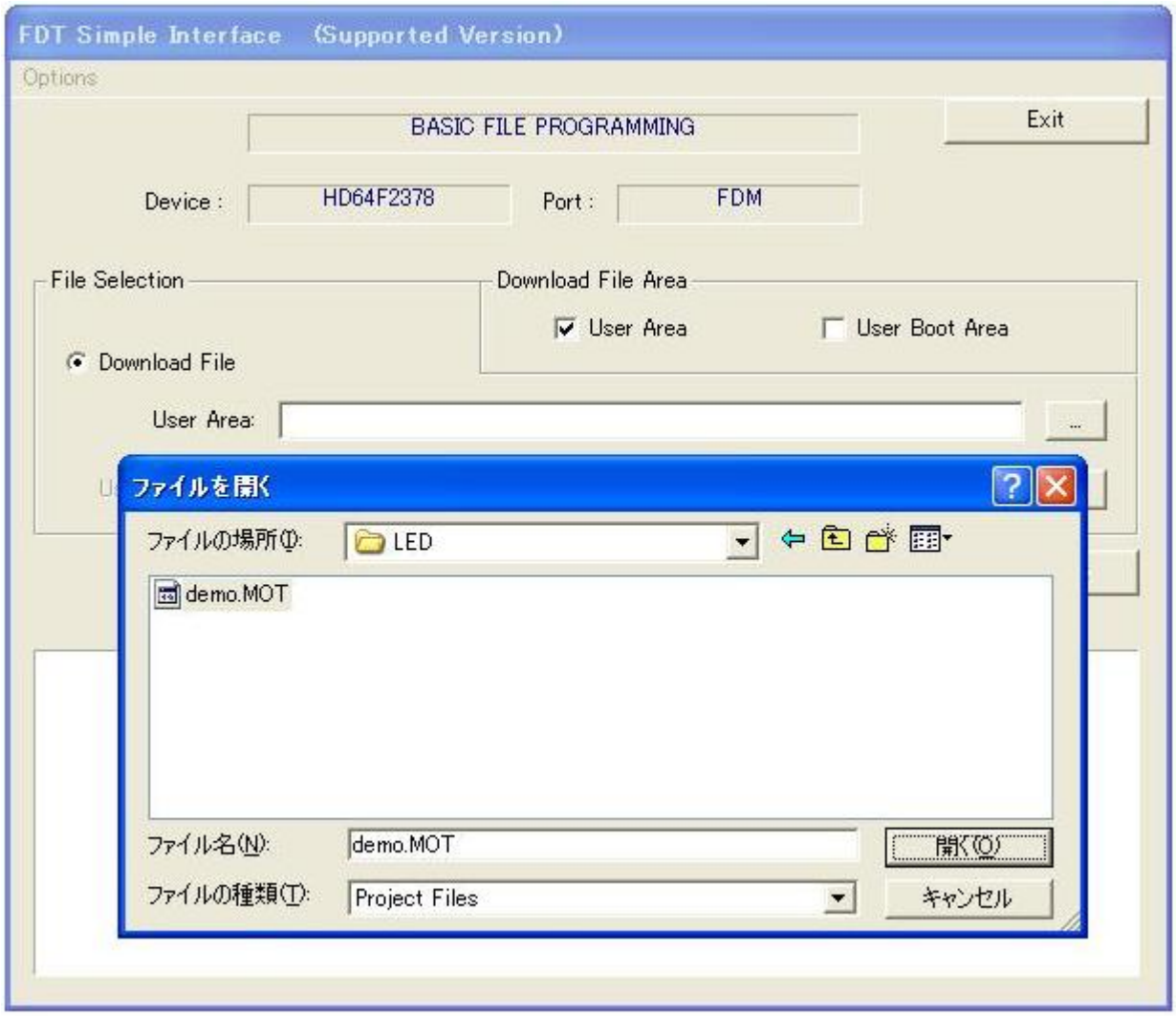
4.5 Programming Flash Memory

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)."

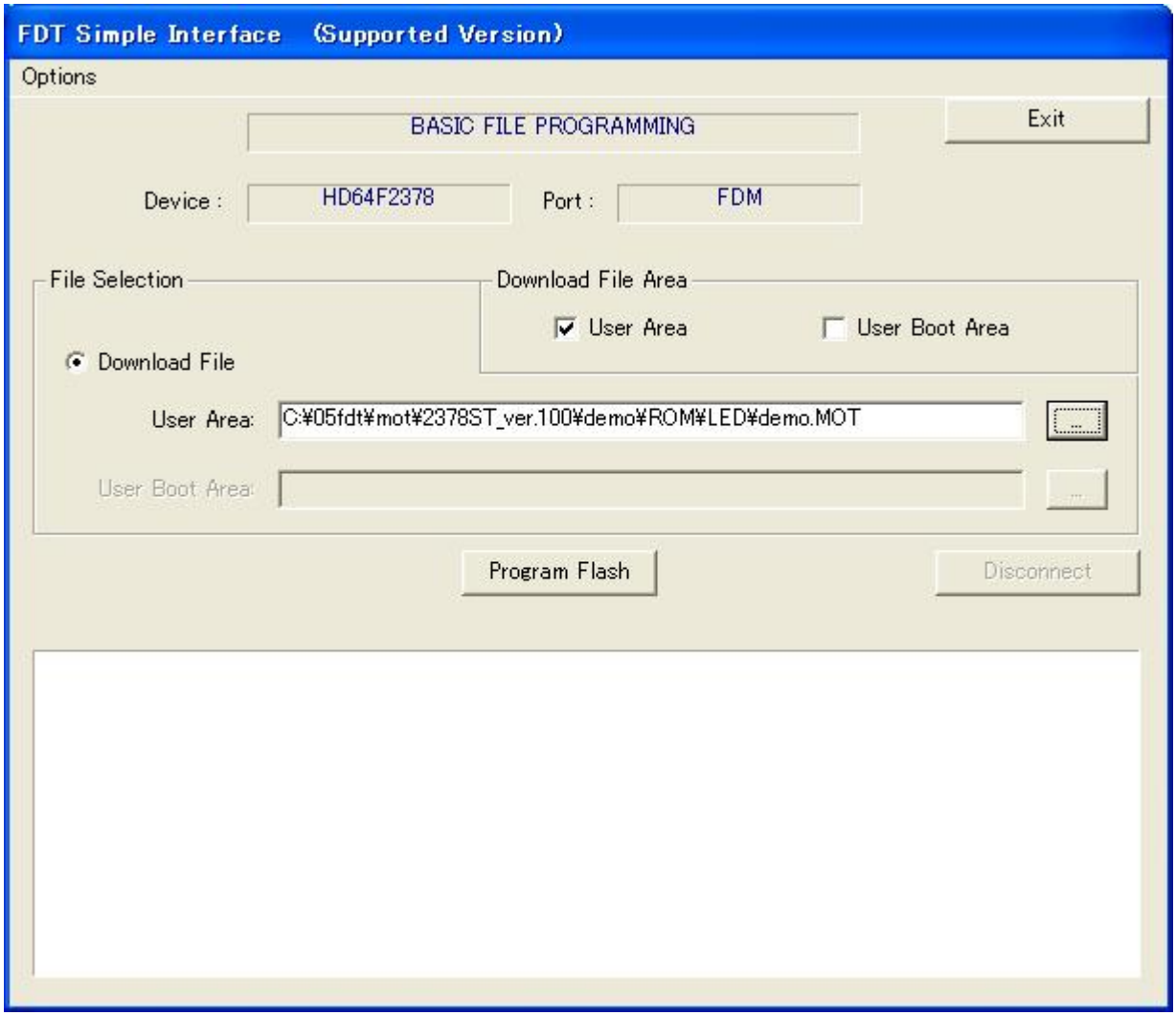


4.5.2 Starting Programming

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.

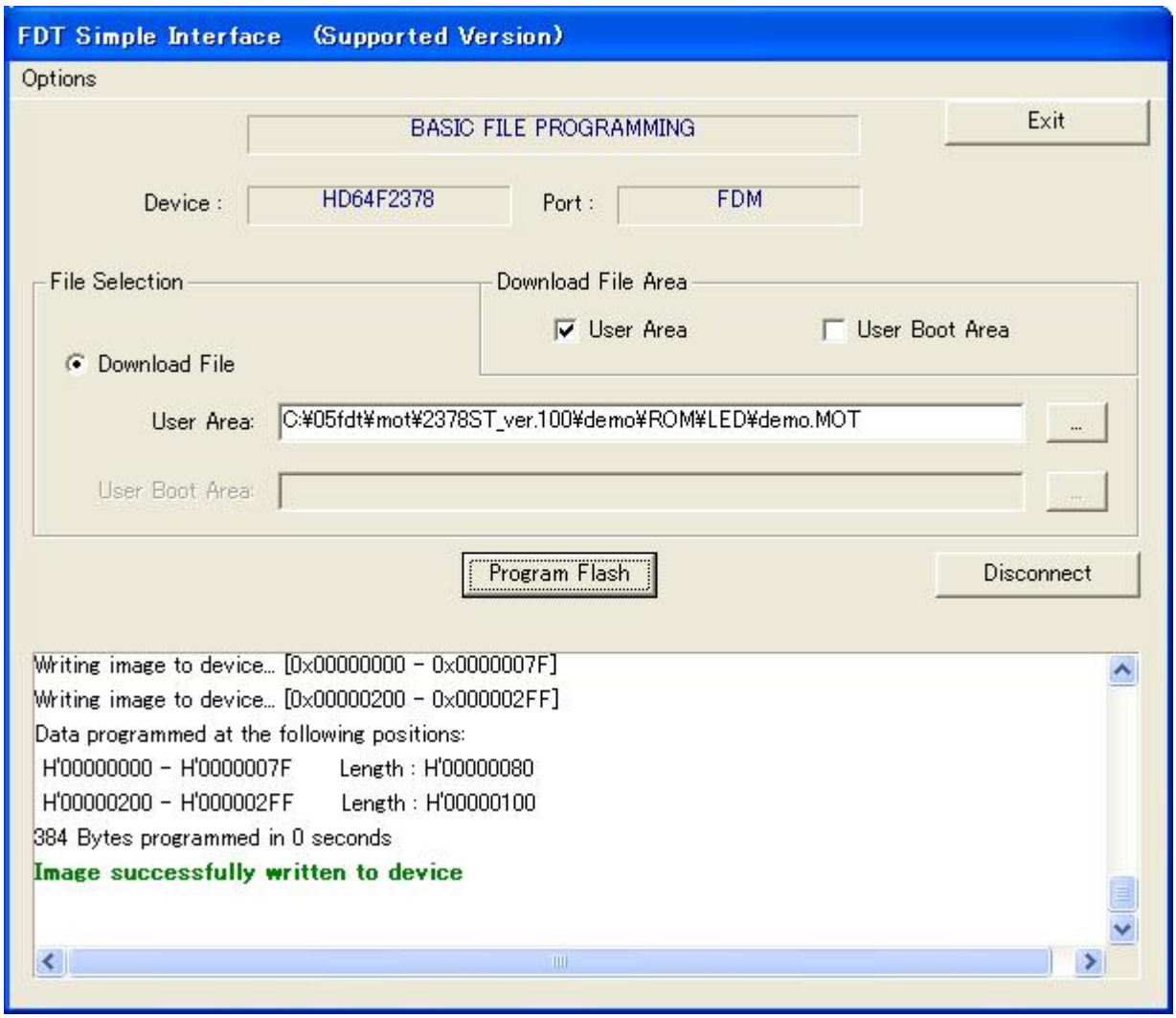


When you have selected items, click "Program Flash."

4.5.3 Ending Programming

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

Confirm the message indicating that programming terminated normally.

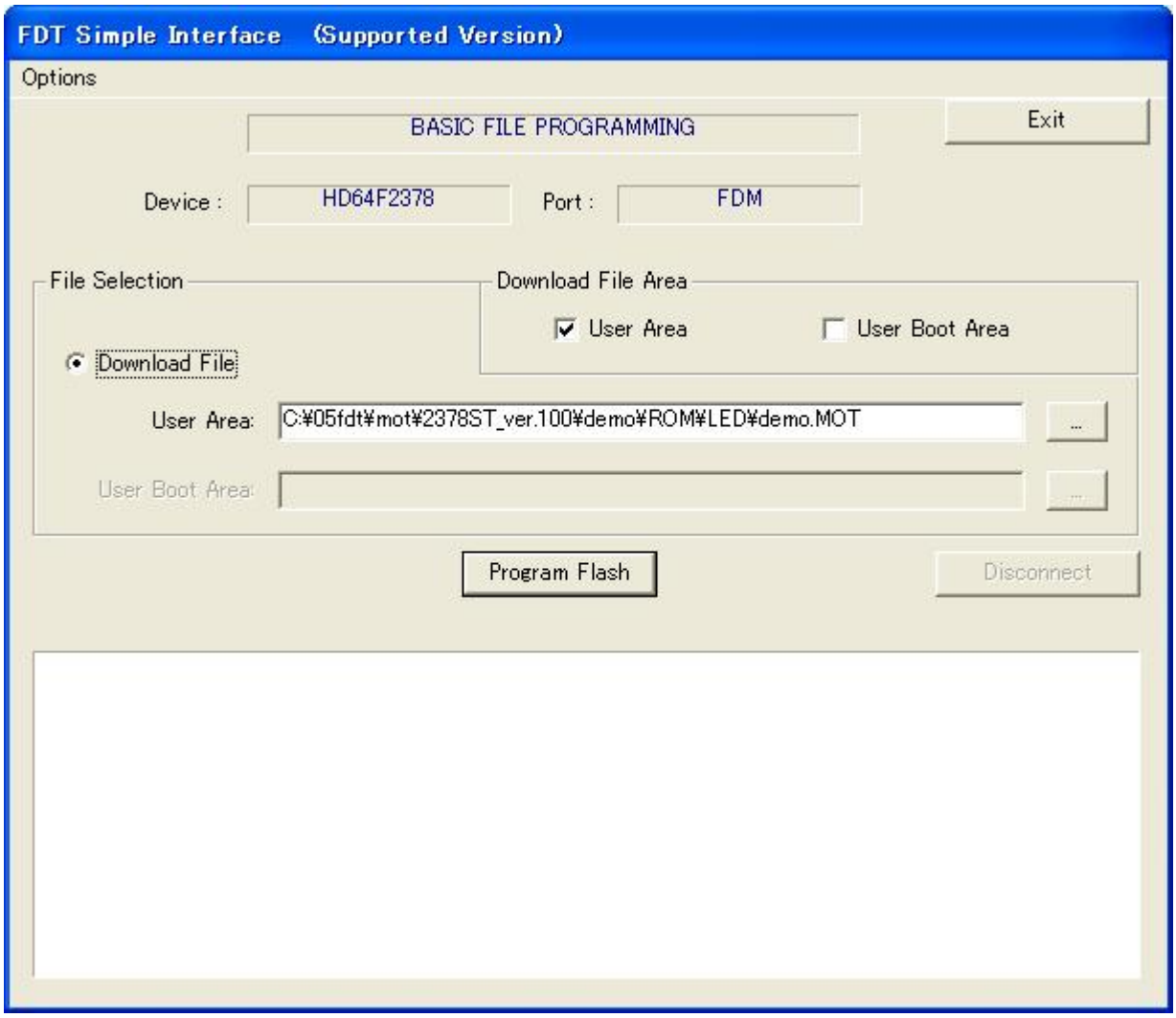


Click "Exit." The Flash Development Toolkit terminates operation.

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.



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.

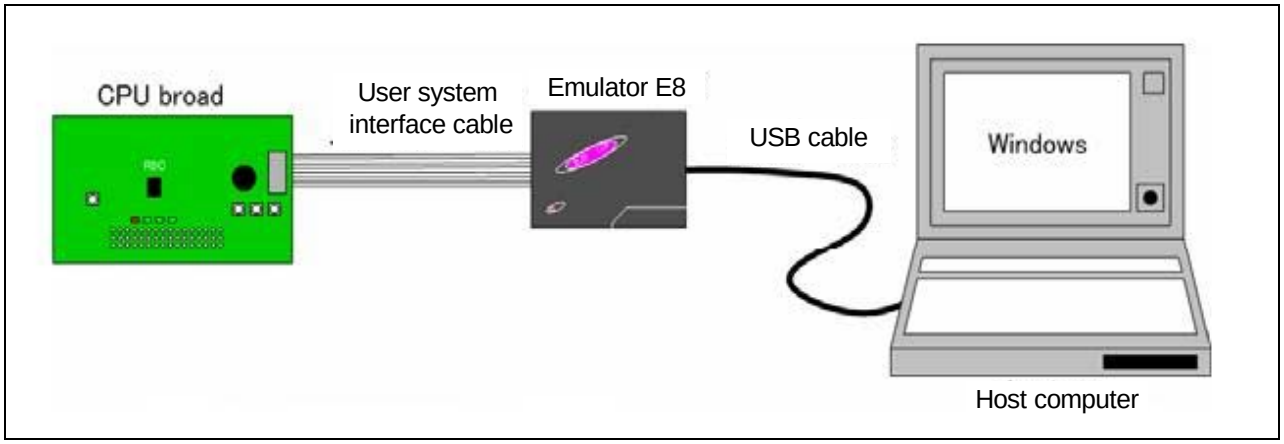


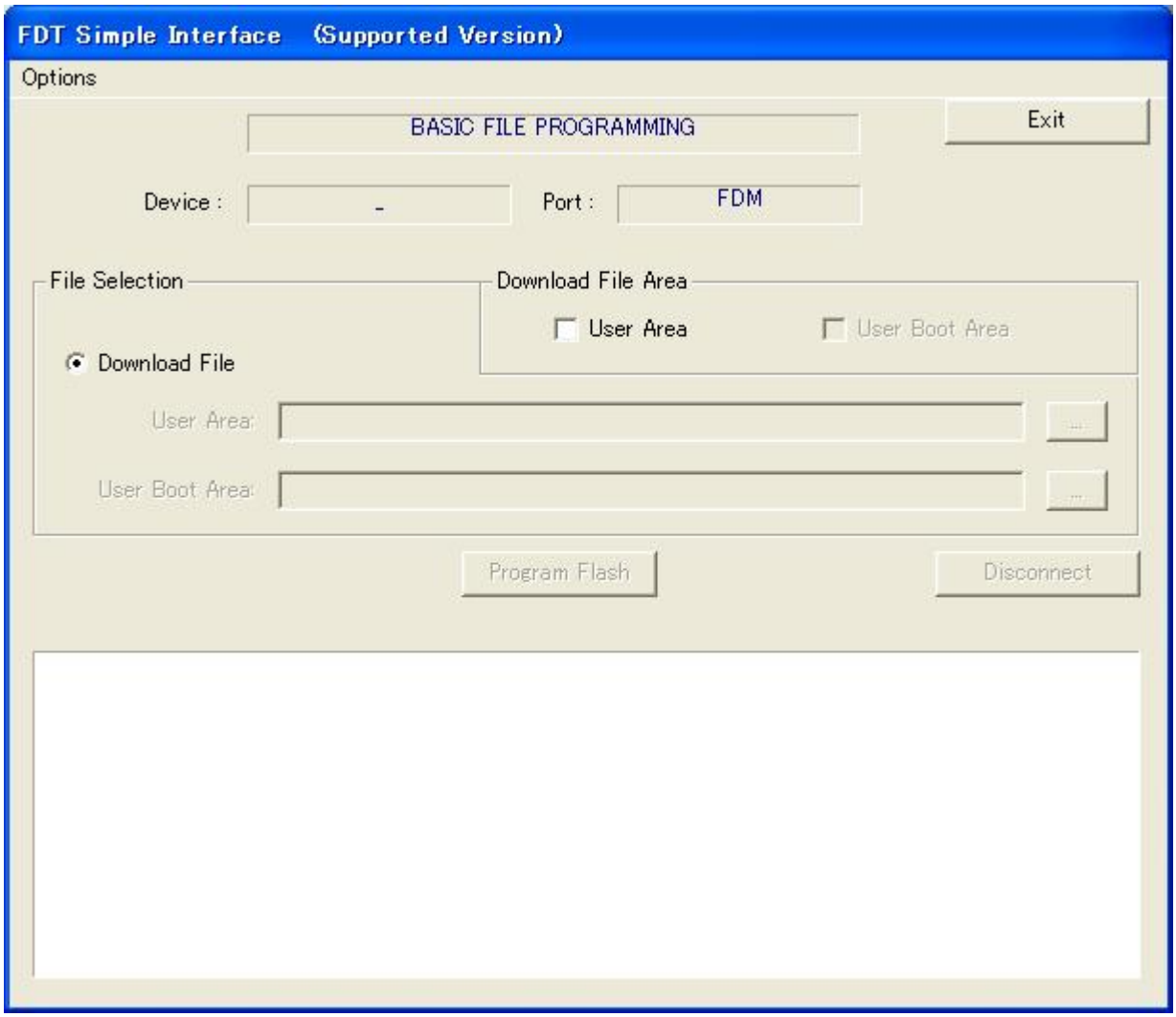
Figure 5-1 Connecting the CPU Board

5.3 Starting the Flash Development Toolkit

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

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.

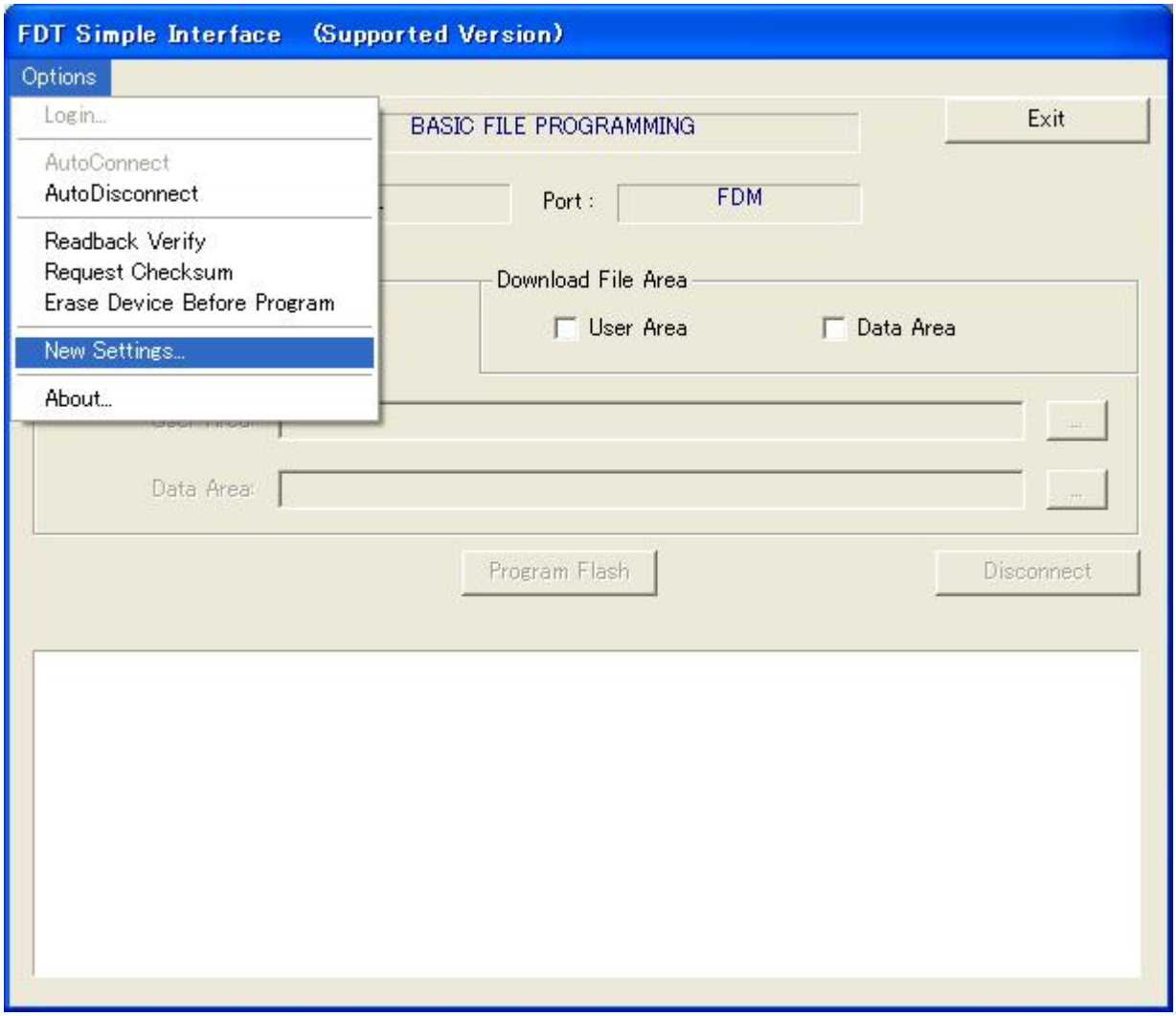


5.4 Setting Product Information

5.4.1 New Settings

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

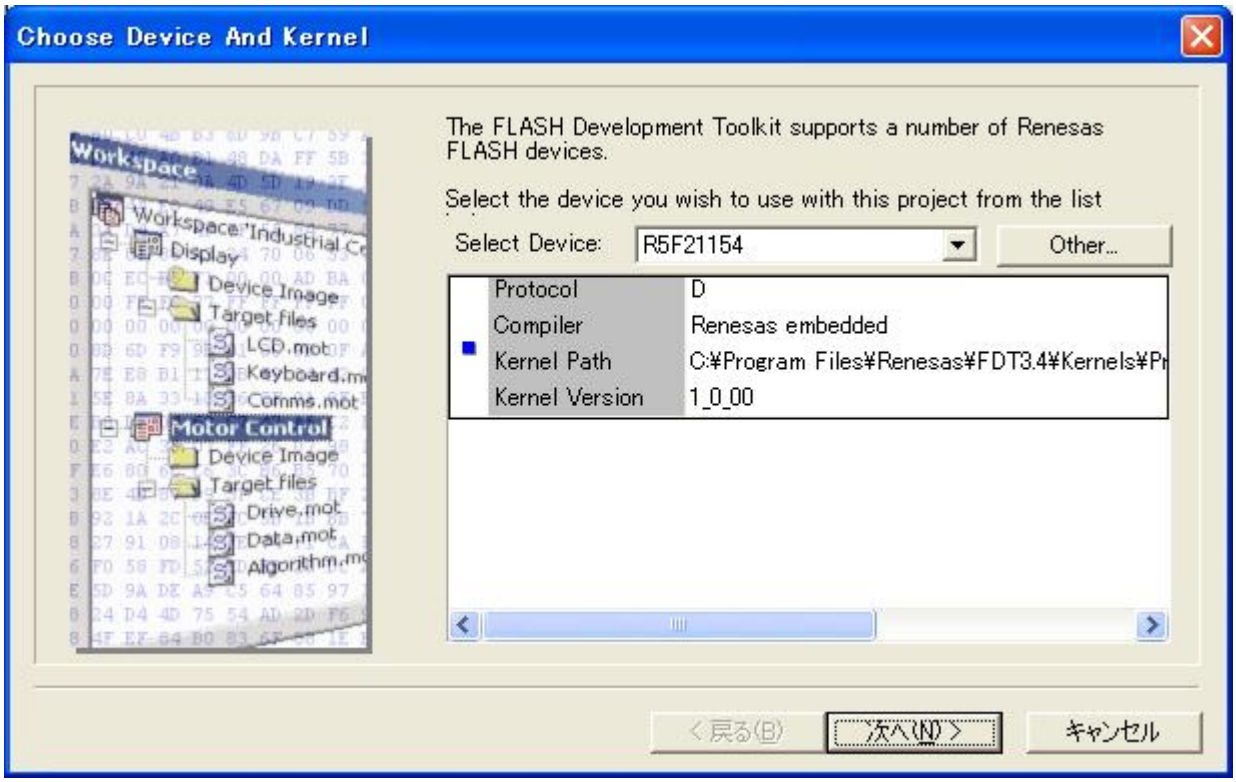
If you cannot select "New Settings" from "Options," click "Disconnect."



5.4.2 Selecting the Device and Kernel

Select the target device from the pull-down menu.

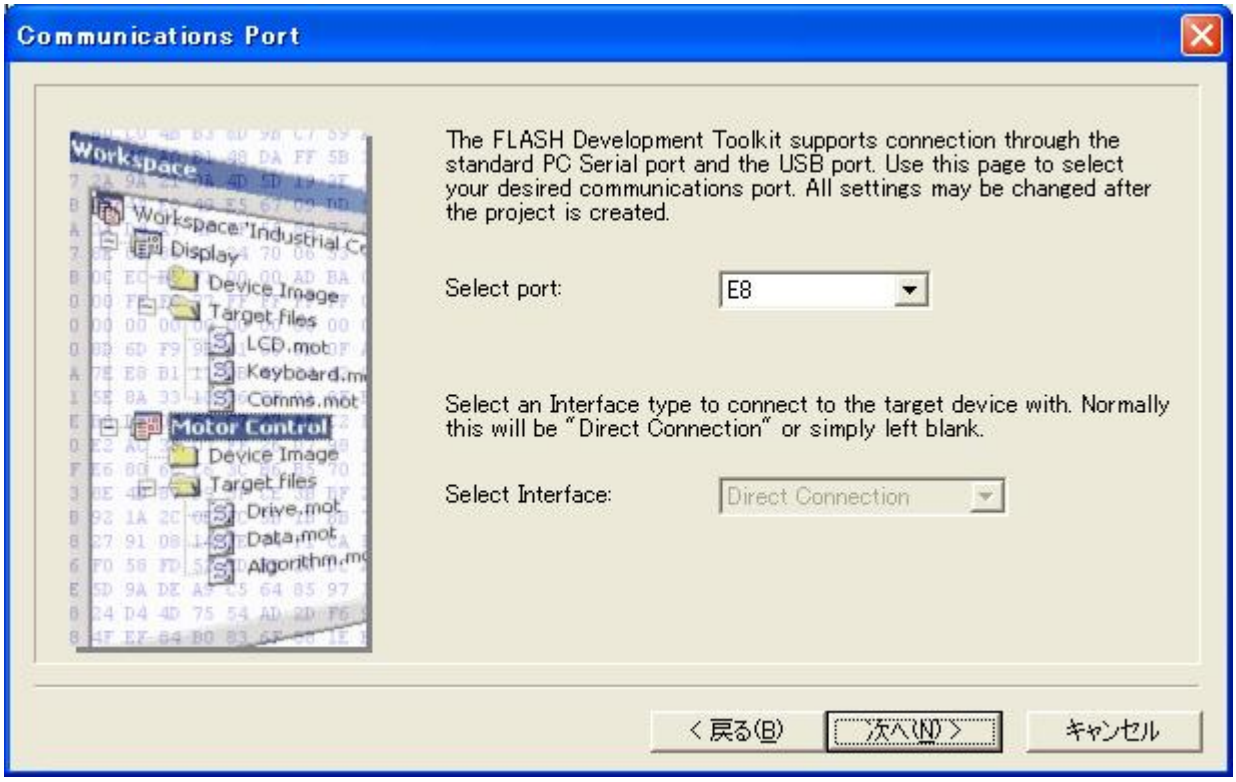
In this example, select R5F21154.



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

5.4.3 Selecting the Communications Port

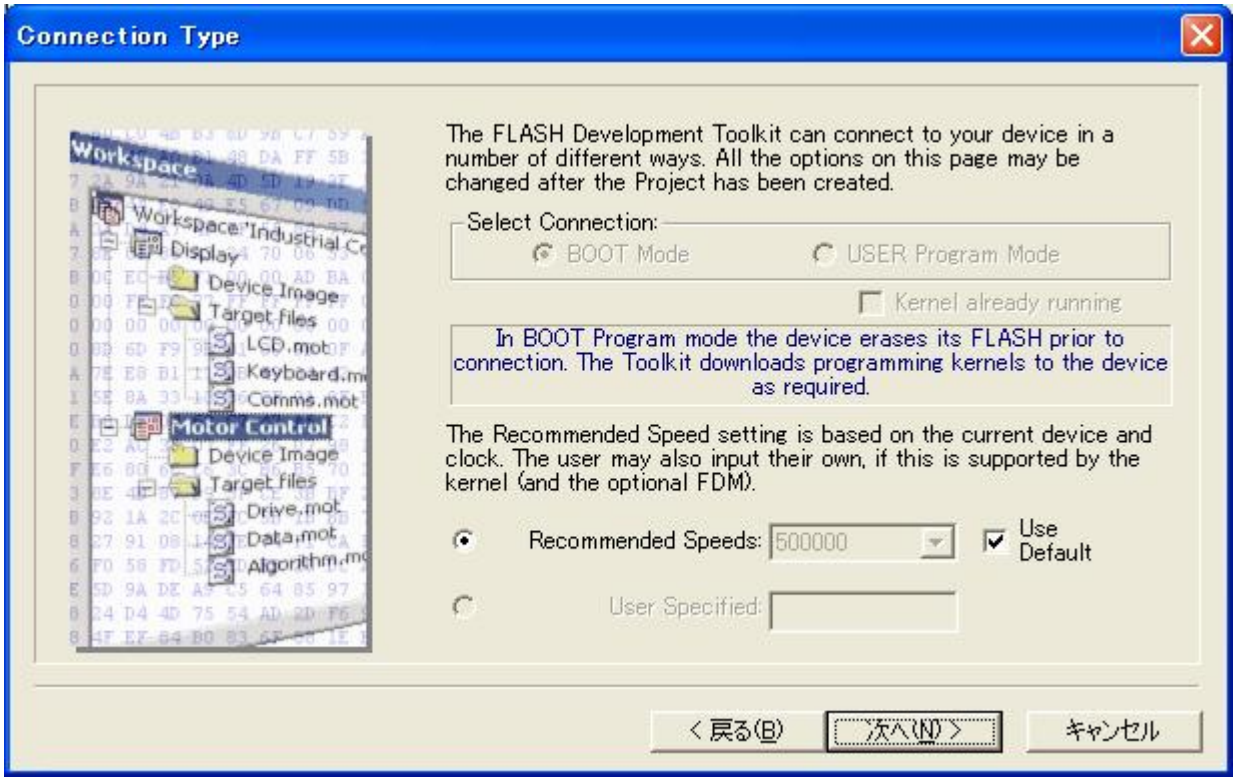
Select E8 from the pull-down menu.



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

5.4.4 Selecting the Connection Type (Communication Speed)

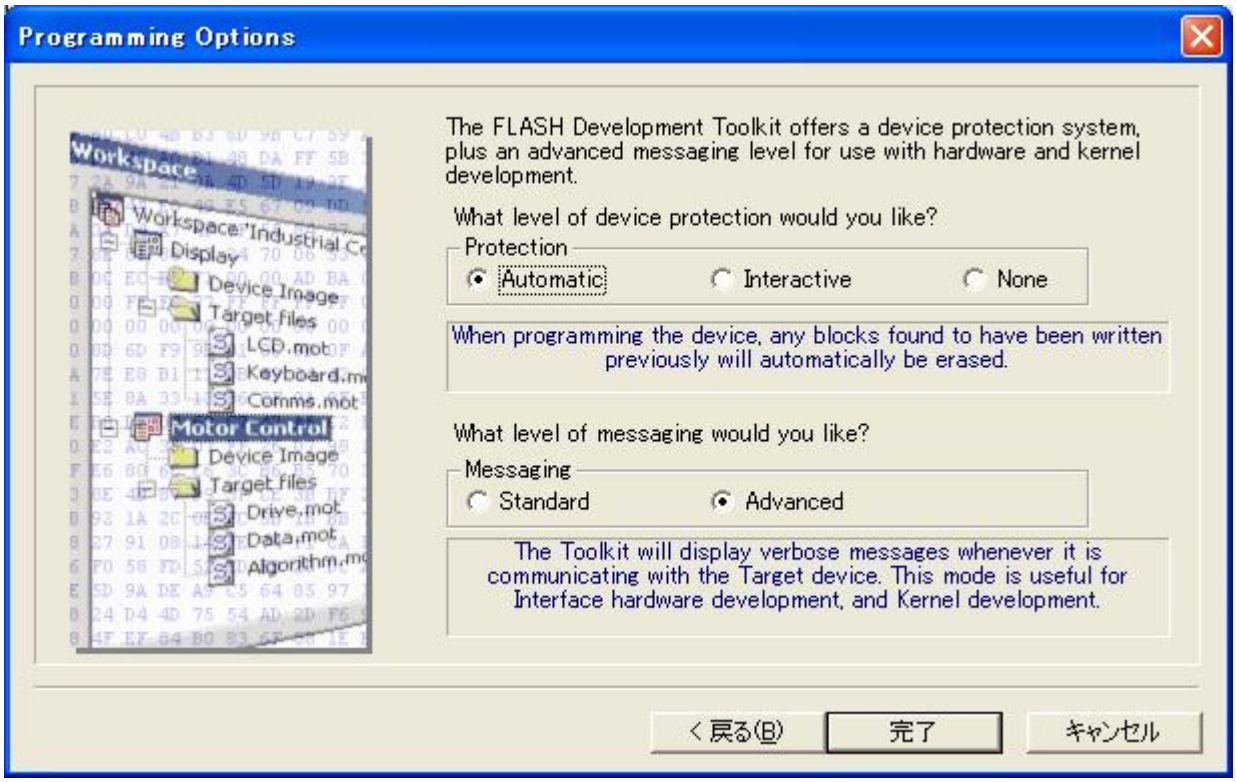
Set the baud rate. For example, select "Use Default."



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

5.4.5 Selecting Programming Options (Protection Level and Messaging Level)

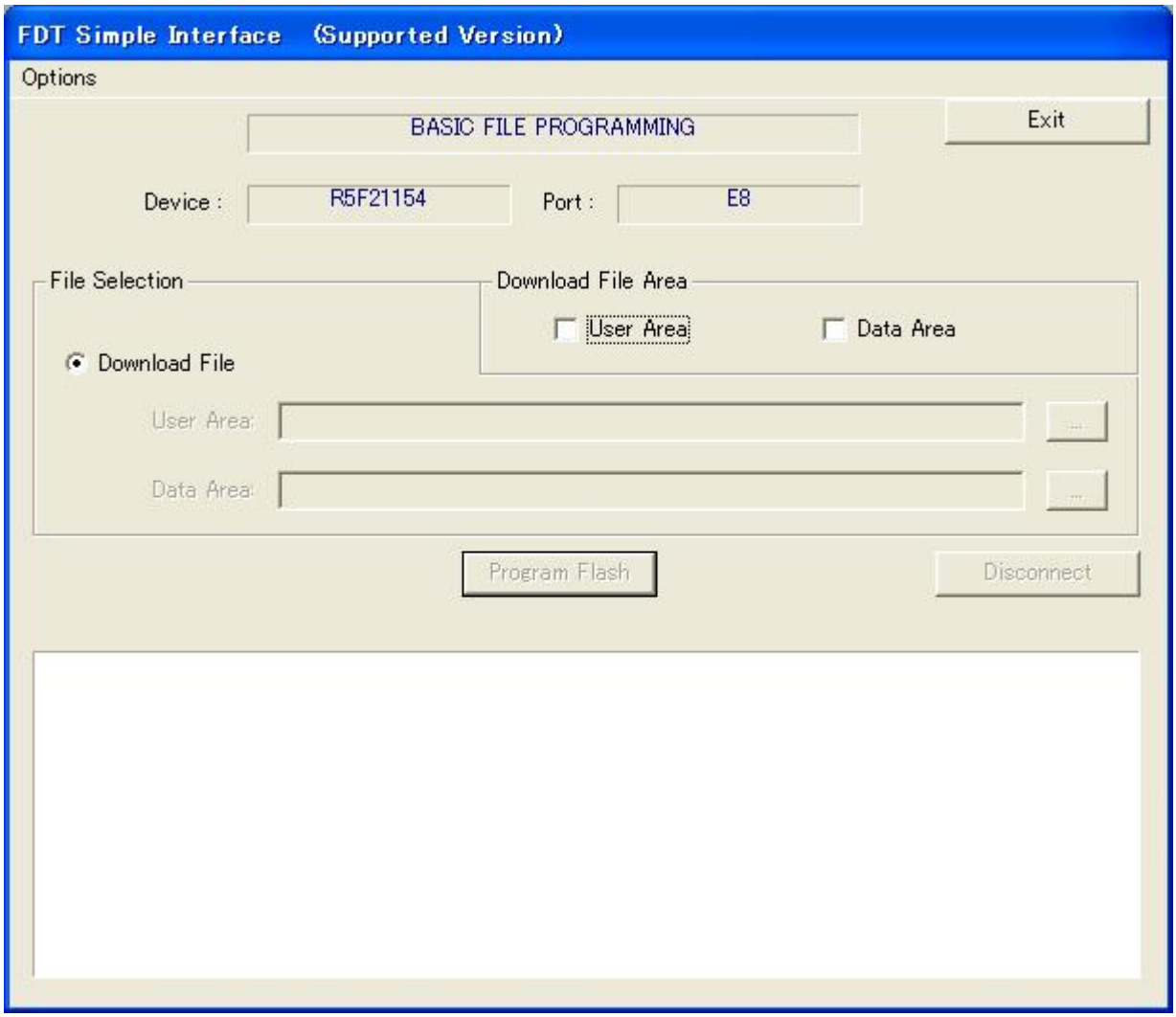
Select the protection level and messaging level. For example, select "Automatic" for "Protection" and "Advanced" for "Messaging."



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

5.4.6 Completion of Setting

Device and port settings are now completed.



5.5 Programming Flash Memory

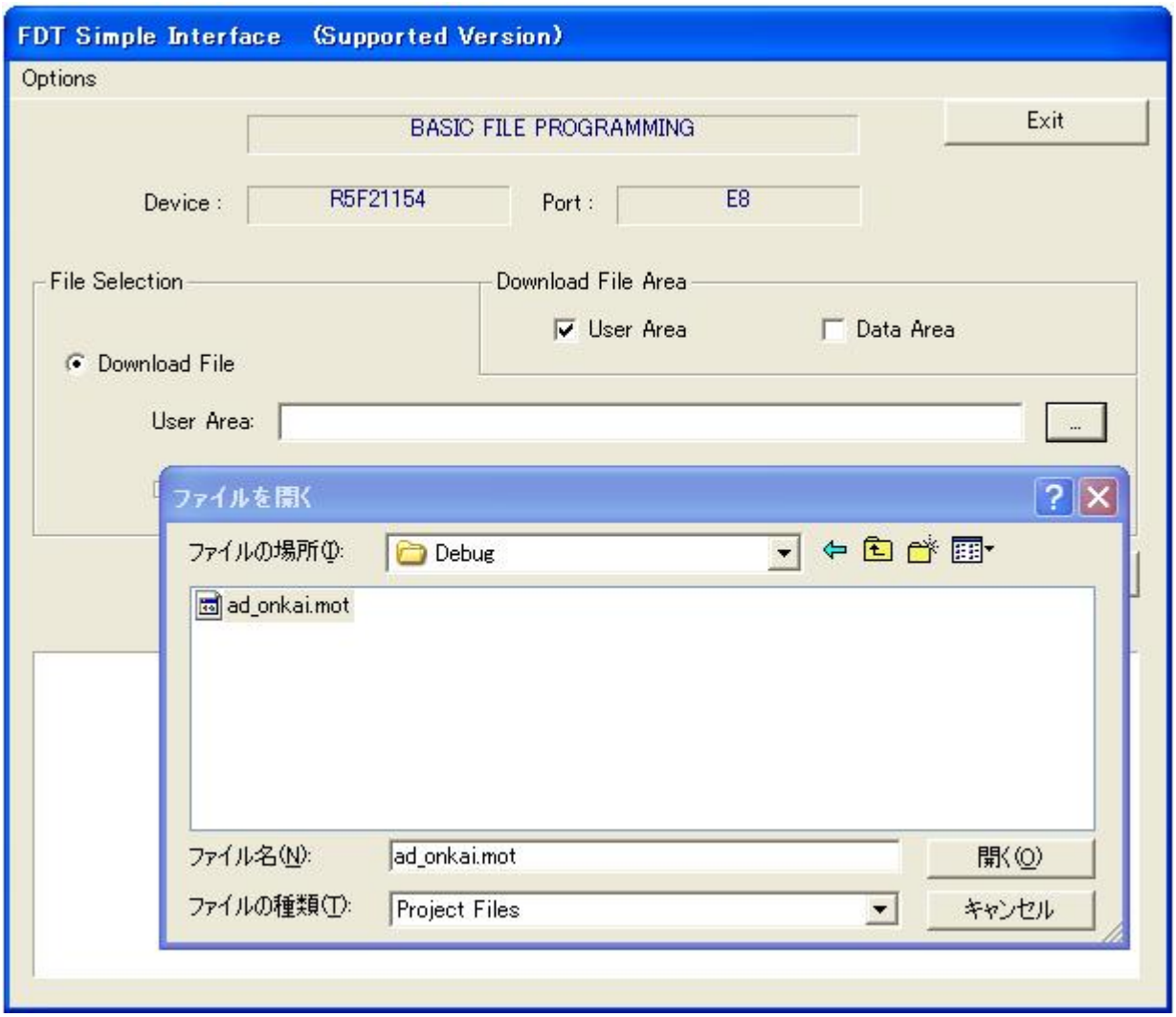
5.5.1 Selecting the Program Area and File

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."

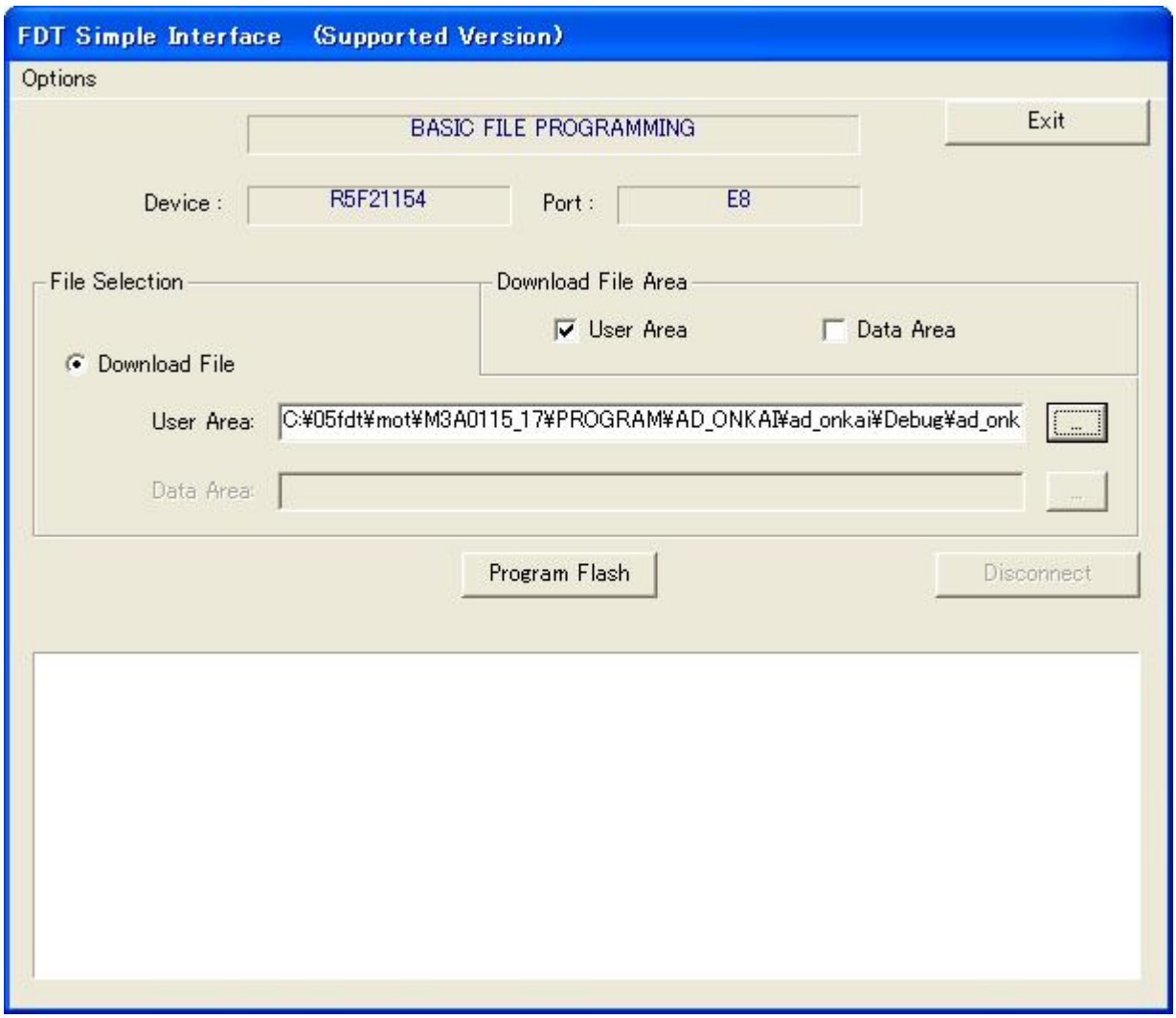
Then, click the "..." (browse) button on the right, which becomes active, to open the "Open File" dialog.

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



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.

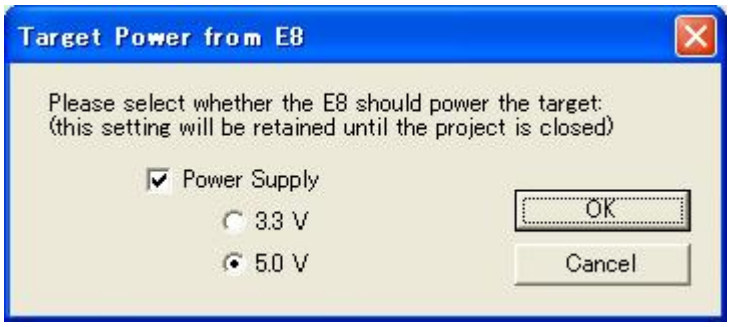


When you have selected items, click "Program Flash."

5.5.3 Setting the Power Supply

Set the power supply.

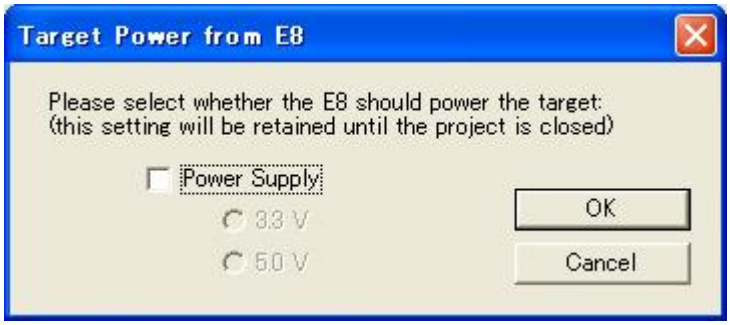
Check "Power Supply" and set the power supply voltage to 5.0 V.



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

[Restriction]

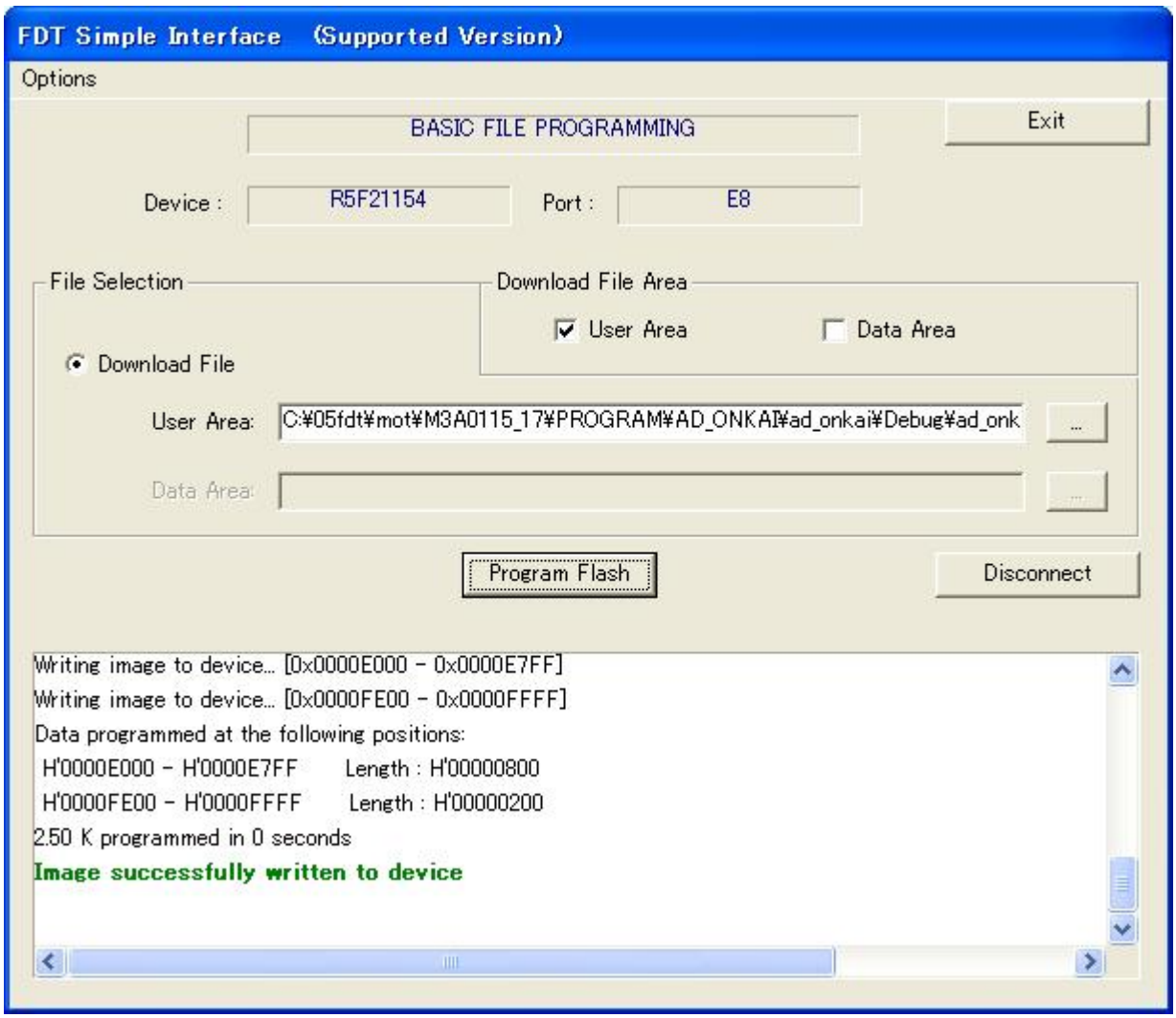
The E8 emulator is designed to supply power. However, it cannot be guaranteed that the E8 emulator supplies the power required for programming flash memory on a microcomputer because the power load differs depending on the user system. To program an actual product, not the power from the E8 emulator 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.



5.5.4 Ending Programming

Click "Start." Programming starts, then ends.

Confirm the message indicating that programming terminated normally.

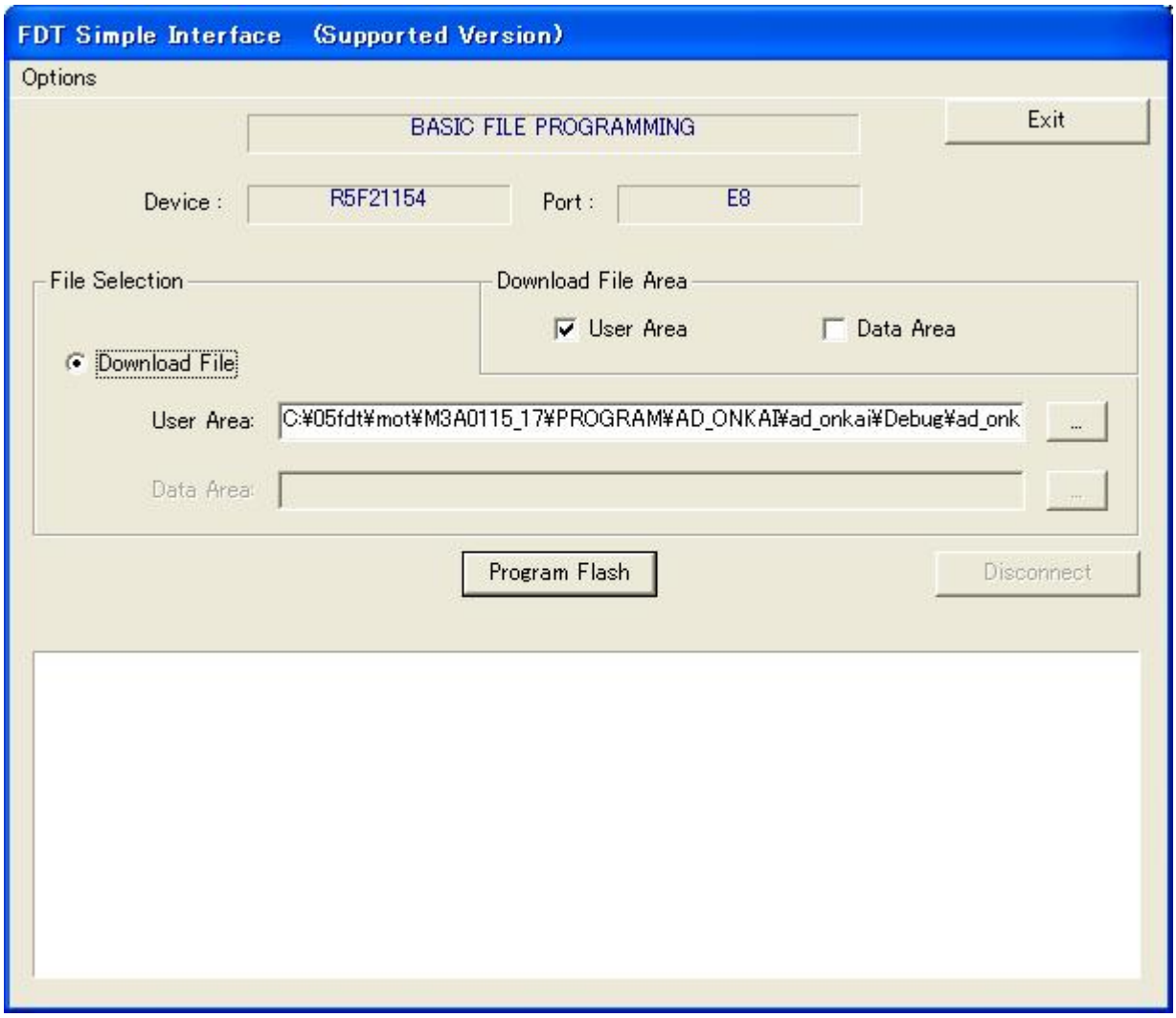


Click "Exit." The Flash Development Toolkit terminates.

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.



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.

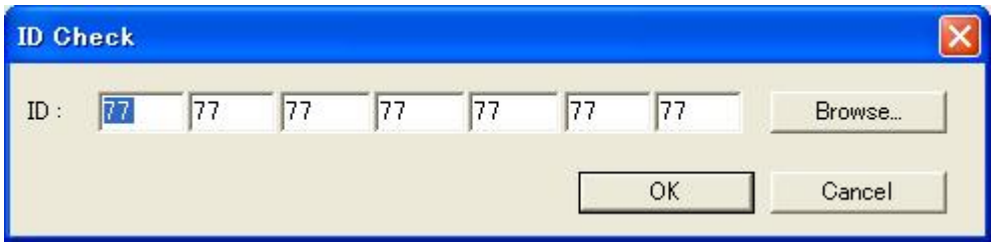
5.7.2 When No ID Code Checking Is Made

When no ID code is set, a blank or H'FFFFFFFFFFFFFF is set in the ID code area. When the ID code of a programmed file is blank or H'FFFFFFFFFFFFFF, no ID code checking is made and the specified file can be programmed.

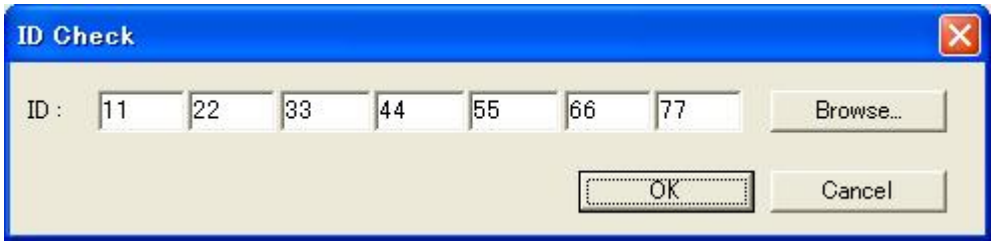
5.7.3 ID Code Input

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.

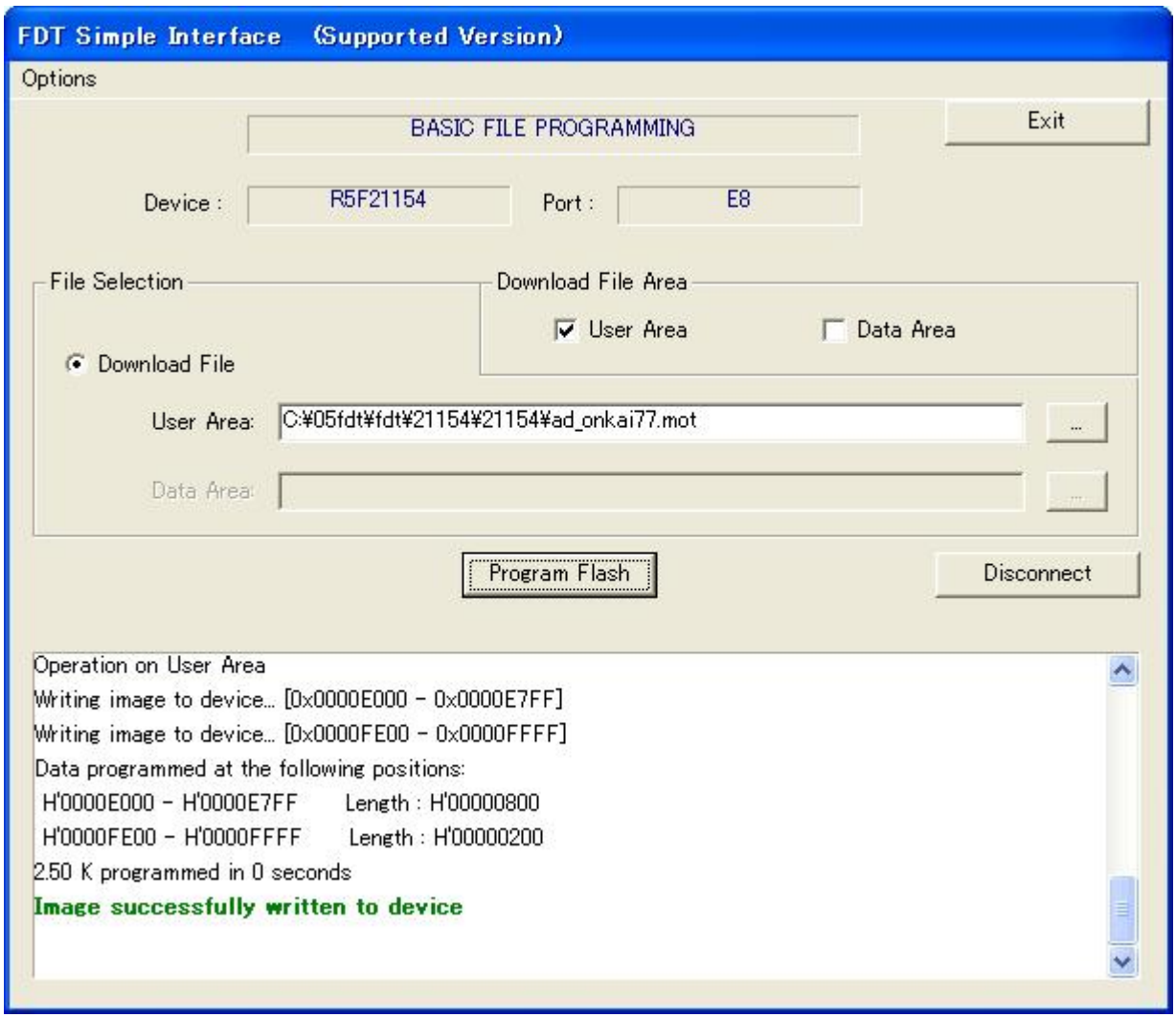


When the ID code of the already programmed file is H'11223344556677, enter the code.



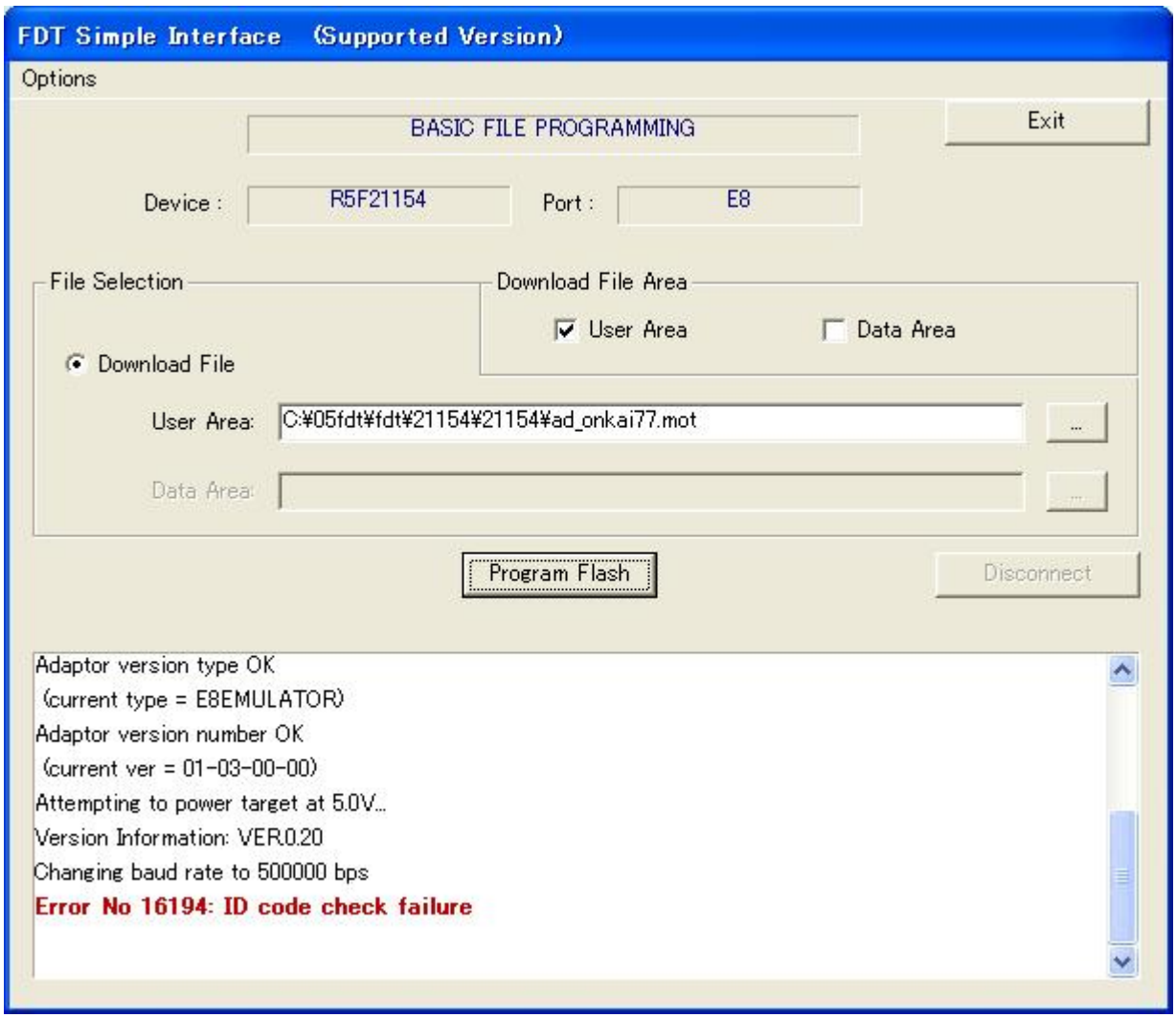
When you have set the ID code, click "OK."

A new file is programmed.



5.7.4 ID Code Mismatch

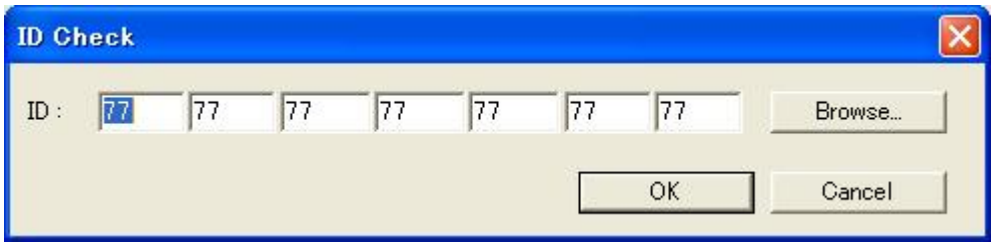
If the entered ID code differs from the programmed ID code, an ID code mismatch occurs and no file can be programmed.



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'77777777777777, the "ID Check" dialog appears.

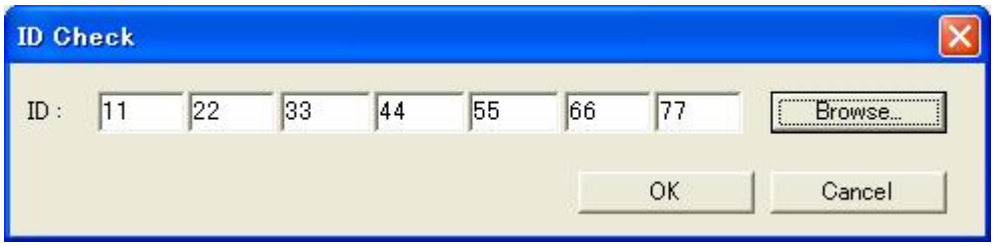


Click "Browse...."

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

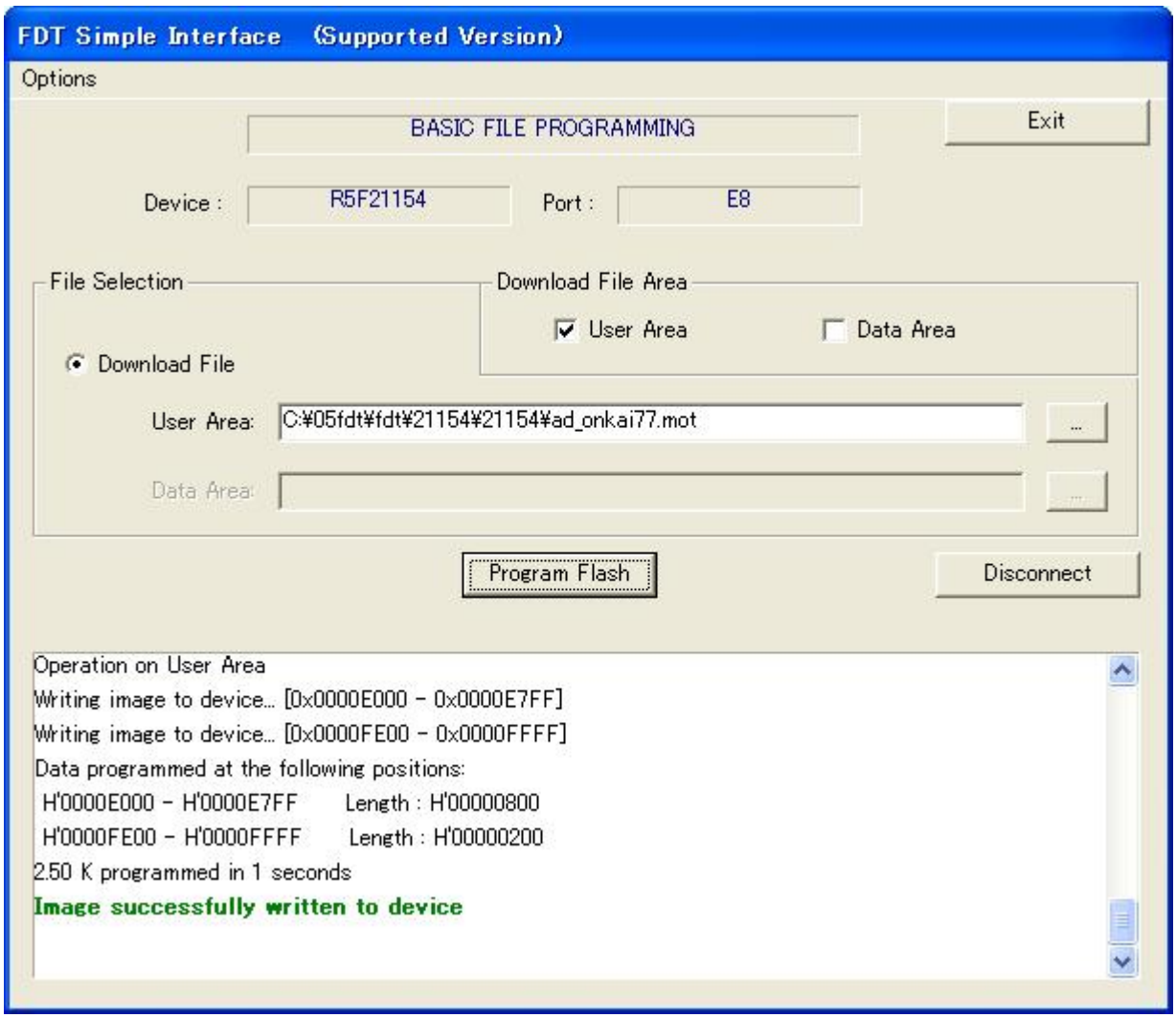
When you have selected the file, click "Open(O)."

The ID code is displayed.



Click "OK."

A new file is programmed.



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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