User's Manual

HEX Consolidation Utility

Utility for Generating ROM Code for Ordering Renesas Electronics Preprogrammed Flash Memory Devices

User's Manual

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How to Use This Manual

Target Readers This manual is intended for users who are going to place an order for a Renesas Electronics microcontroller that incorporates flash memory preprogrammed by Renesas Electronics. These microcontrollers are known as “flash memory device”.

Purpose This manual is intended to give users an understanding of the features of the HEX Consolidation Utility.

Organization This manual includes the following sections.

- Overview
- Installation
- Usage
- Messages

How to Read This Manual It is assumed that the readers of this manual have general knowledge of electricity, logic circuits, and microcontrollers. In the descriptions of the applications, it is also assumed that the readers have sufficient knowledge of Windows®. For Windows usage and terminology, refer to each Windows manual.

To understand the overall operation:

→ Read this manual according to the **CONTENTS**.

To know the hardware specifications of the microcontroller:

→ See the user’s manual for the target device.

To know how to place orders for a flash memory device:

→ Consult an Renesas Electronics sales representative or distributor.

Conventions **Note**: Footnote for item marked with **Note** in the text.

Caution: Information requiring particular attention

Remark: Supplementary information

Numeral representation: Binary ... xxxx or xxxxB

Decimal ... xxxx

Hexadecimal ... 0XXXXX or xxxxH

Terminology The meanings of the terms used in this manual are as follows:

Term	Meaning
HCU	HEX Consolidation Utility, a utility for generating the ROM code required for placing orders for Renesas Electronics devices that incorporate flash memory preprogrammed by NEC Electronics
FP5	Abbreviation of the flash memory programmer PG-FP5
E1/E20	Abbreviation of the E1 emulator / E20 emulator
MINICUBE2	Nickname used for the main unit of QB-MINI2, the on-chip debug emulator with programming function
RFP	Abbreviation of the flash memory programming software, Renesas Flash Programmer
PR5 file	Abbreviation of the parameter file for PG-FP5 Parameter file contain parameter information required for writing programs to the flash memory in the target microcontroller. These files have the extension `*.pr5`. Do not change the data in the parameter file. If the data is changed, HCU might not operate properly.
ESF file	Abbreviation of the setting file for PG-FP5 Setting file store the data required to write programs. In FP5, a setting file stores the settings related to the programming environment, such as target microcontroller settings and command option specifications. In RFP, project files have the extension `*.esf`. If the data is changed, HCU might not operate properly.
Option data	General term for Security flag settings (Disable Chip Erase, Disable Block Erase, Disable Program, Disable Read), Brock protection settings (the flash shield window, Boot Block end), reset vector handling function settings, option byte settings, on-chip debug security ID settings, wide-voltage mode, and full-speed mode The functions that can be used differ depending on the target microcontroller.
HEX file	A file of Intel HEX format type or Motorola HEX format type without option data It corresponds to the following file format. - Intel HEX format - Intel HEX-32 format - Motorola S type HEX format
HCUHEX file	A file that integrates option data and HEX file is generated by using the HCU In the case of the HEX file of the Intel HEX format or Intel HEX-32 format, it generates to the Intel HEX-32 format. In the case of the HEX file of the Motorola S type HEX format, it generates to the Motorola S type HEX format (data record S3 and end record S7).

Related Documents See the following documents when using this manual.

The related documents indicated in this publication may include preliminary versions. However, preliminary versions are not marked as such.

Document Name	Document No.
PG-FP5 Flash Memory Programmer User's Manual	R20UT0008E

Caution The related documents listed above are subject to change without notice. Be sure to use the latest version of each document when designing.

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CHAPTER 1 OVERVIEW

The ROM code generator HEX Consolidation Utility (HCU) is a software tool that includes functions for creating the ROM code required when placing an order for a Renesas Electronics microcontroller that incorporates flash memory preprogrammed by Renesas Electronics.

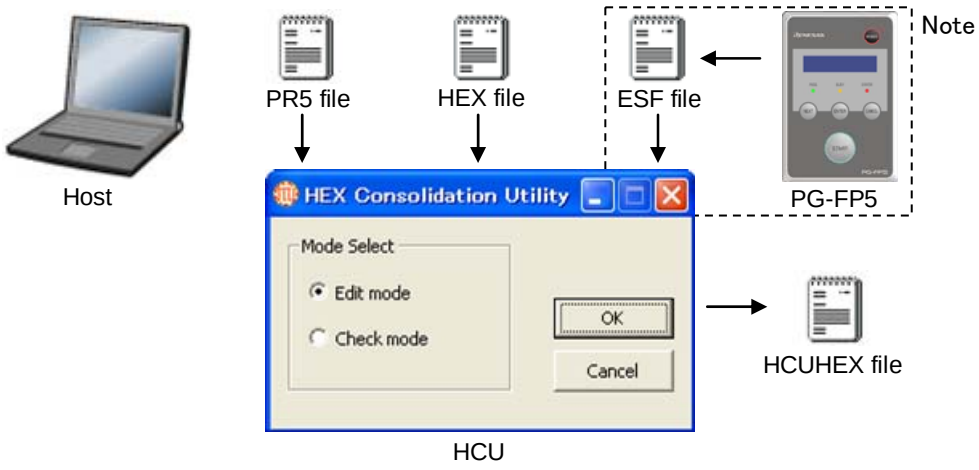
1.1 Features

- Merging of HEX files and option data
- Viewing and editing option data settings

1.2 HCU System Organization

The following figure shows an example of how a system that uses the HCU is organized.

Figure 1-1. HCU System Organization



HCU operation overview

The HCU can generate HCUHEX files and can be used to check option data settings. For details about using the HCU, see *CHAPTER 3 USAGE*.

Note As for the ESF file generated by PG-FP5, the contents of a setting of option data are included. HCU can load option data from an ESF file. When you do not have PG-FP5, HCU can input directly the option data.

1.3 Operating Environment

This section explains the following items with respect to the operating environment:

- Hardware environment
- Software environment

1.3.1 Hardware environment

Host machine

- Computer that satisfies the system requirements of the OS used

1.3.2 Software environment

- Windows XP (32-bit only)
- Windows Vista (32-bit and 64-bit)
- Windows 7 (32-bit and 64-bit)

1.4 Supported Microcontrollers

For the microcontrollers supported by the HCU, contact a Renesas Electronics sales representative or distributor.

CHAPTER 2 INSTALLATION

This chapter describes the following items related to HCU:

- Obtaining
- Installation
- Uninstallation
- Updating HCU

2.1 Obtaining

Download HCU and PR5 file from the following websites:

- Websites of HCU

Japanese: http://japan.renesas.com/hcu

English: https://www5.renesas.com/micro/tool_reg/OdsListTool.do?code=640&lang=en

- Websites of PR5 file

Japanese: http://japan.renesas.com/pg_fp5

English: http://www.renesas.com/pg_fp5

Caution Use of the latest version of software is recommended to guarantee HCU operation.

2.2 Installation

This section describes how to install HCU, PR5 file, and ESF file.

Table 2-1. Installation

Item	Description
HCU	Unzip the downloaded file (`hcu_gui_vxxx.zip`) into any folder and run `HCU.exe` included in the folder. (*xxxx* shows HCU version.)
PR5 file	Unzip the downloaded file into any folder. The file `*.pr5` is included in the folder.
ESF file	This file is created by using FP5. For details about how to create ESF files, see the *PG-FP5 Flash Memory Programmer User's Manual* (R20UT0008E).

2.3 Uninstallation

This section describes how to uninstall HCU, PR5 file, and ESF file. These items can be uninstalled in any order.

Table 2-2. Uninstallation

Item	Description
HCU	Remove the HCU (`HCU.exe`).
PR5 file	Remove the PR5 file (`*.pr5`).
ESF file	Remove the ESF file (`*.esf`).

2.4 Updating HCU

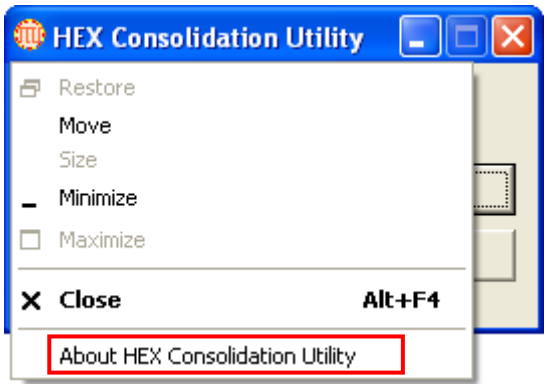
Updating HCU enables the following:

- Addition of newly supported functions or microcontrollers
- Correction of restrictions

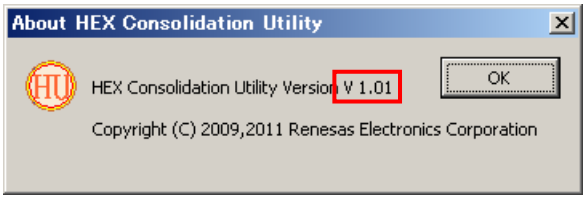
Caution Use of the latest version of software is recommended to guarantee HCU operation.

(1) Start HCU.

(2) Click the icon on the left side of the title bar or right-click the title bar. The system menu is displayed.



(3) Click **About HEX Consolidation Utility**. The following dialog box opens.



In this case, HCU version is 1.01.

CHAPTER 3 USAGE

This chapter describes the HCU dialog boxes.

3.1 Introduction

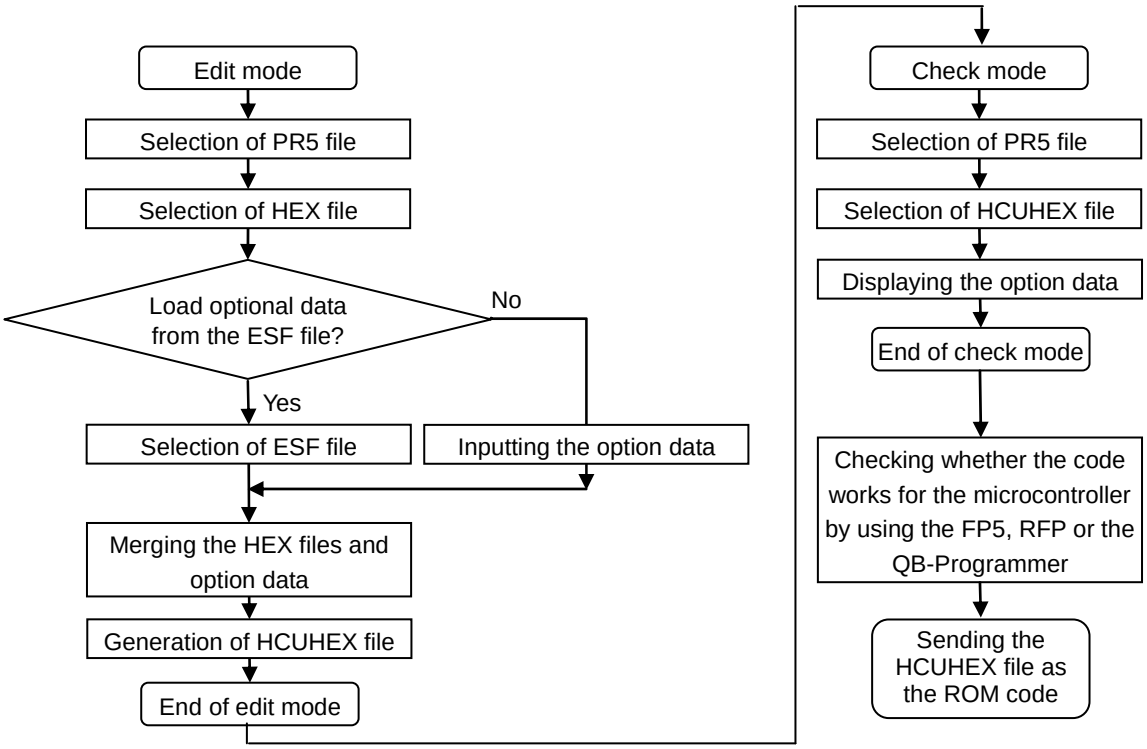
Make sure that the HCU and the PR5 file for the microcontroller used are installed. For details about installation, see *CHAPTER 2 INSTALLATION*.

3.2 Overview of Basic HCU Operation

The following figure shows an overview of the basic operation after the HCU starts.

Caution After the HCUHEX file is created in edit mode, be sure to enter check mode to check whether the specified option data settings are correct. Use FP5, RFP or QB-Programmer to check whether the code works for the microcontroller before sending the HCUHEX file as the ROM code. In addition, a verification of operation is the next work. The HCUHEX file is programmed on a microcontroller. The microcontroller is verified by the HEX file and it is checked whether data is equal.

Figure 3-1. Dialog Boxes Displayed in the Startup Wizard



3.3 Modes

The HCU can operate in the following two modes:

- Edit mode

  To create an HCUHEX file in this mode, select a PR5 file and a HEX file and then load option data from an ESF file or directly input option data. For details about this procedure, see *3.4 Edit Mode*.

- Check mode

  In this mode, the settings specified by option data can be checked by selecting the PR5 and HCUHEX files. For details about this procedure, see *3.5 Check Mode*.

3.4 Edit Mode

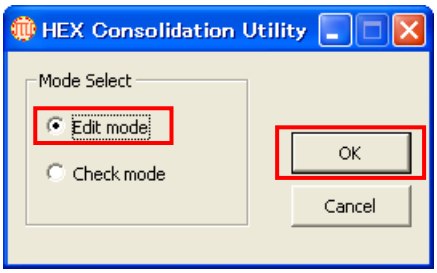
In this mode, the HCUHEX file can be created by selecting a PR5 file and a HEX file and then loading option data from an ESF file or directly inputting option data.

Caution After the HCUHEX file is created in edit mode, be sure to enter check mode to check whether the specified option data settings are correct.

3.4.1 Example of using the HCU in edit mode

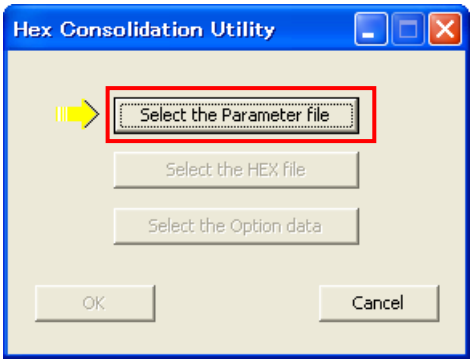
The following describes an example of using the HCU in edit mode. Use the HCU in the order described in this section. To return to a previous dialog box, click the Cancel button.

(1) Run `HCU.exe`. When the HCU starts, the following dialog box is displayed.



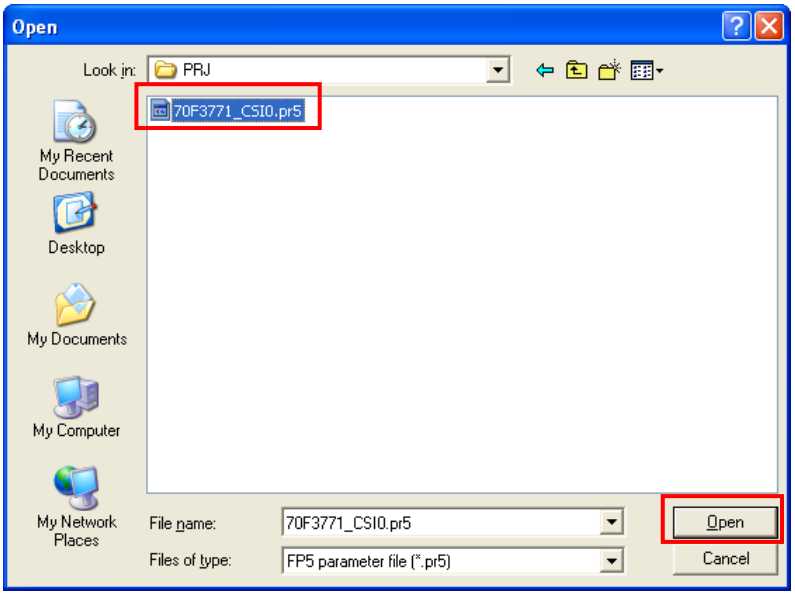
In the **Mode Select** area, select the **Edit mode** option and click the **OK** button. The dialog box shown in (2) opens.

(2) Open the dialog box to select a PR5 file.



Click the **Select the Parameter file** button. The dialog box shown in (3) opens.

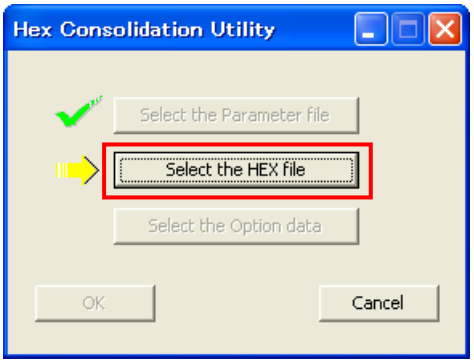
(3) Select a PR5 file. (Here, *70F3771_CSI0.pr5* is selected as an example.)



Select the PR5 file and click the **Open** button. The dialog box shown in (4) opens.

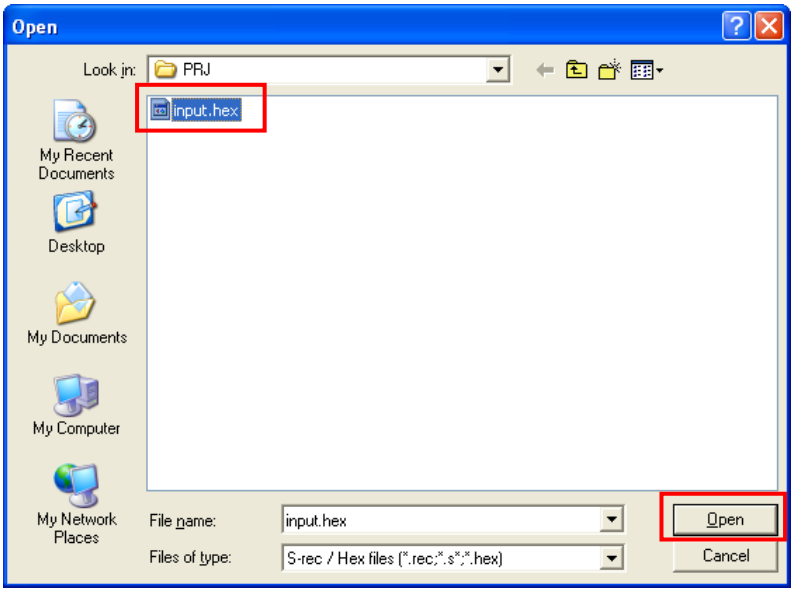
Remark If multiple PR5 files, such as `70F3771_CSI0.pr5` and `70F3771_CSI3.pr5`, are provided for one microcontroller, both files can be selected.

(4) Open the dialog box to select a HEX file.



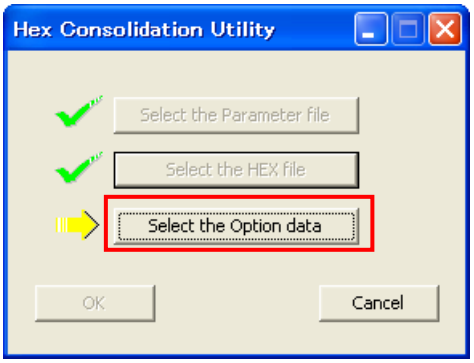
Click the **Select the HEX file** button. The dialog box shown in (5) opens.

(5) Select a HEX file. (Here, *input.hex* is selected as an example.)



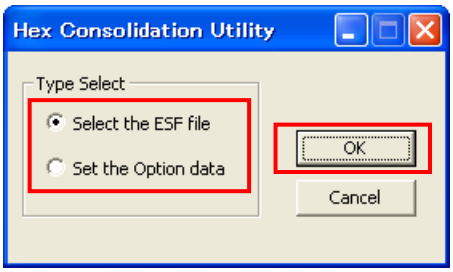
Select the HEX file and click the **Open** button. The dialog box shown in (6) opens.

(6) Open the dialog box to specify how to input option data.



Click the **Select the Option data** button. The dialog box shown in (7) opens.

(7) Specify how to input option data.

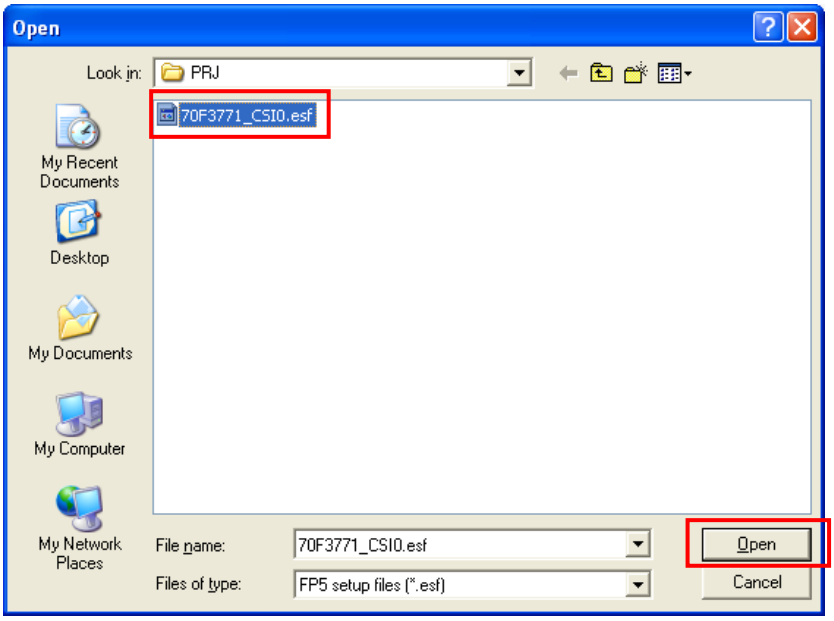


Input option data by loading the data from an ESF file, or by inputting option data directly.

To load the data from an ESF file, select the **Select the ESF file** option and click the **OK** button. The dialog box shown in (8) opens.

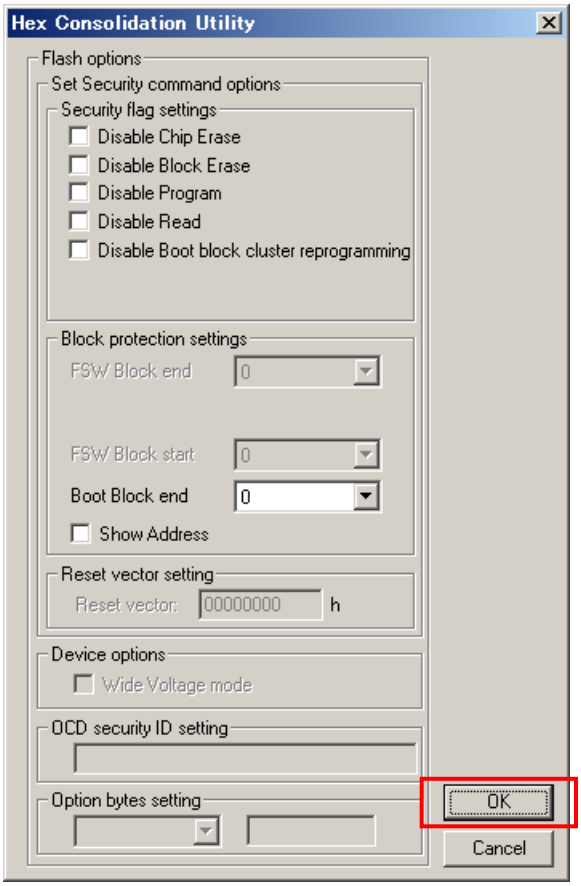
To input option data directly, select the **Set the Option data** option and click the **OK** button. The dialog box shown in (9) opens.

(8) Select an ESF file. (Here, *70F3771_CSI0.esf* is selected as an example.)



Select the ESF file and click the **Open** button. The dialog box shown in (9) opens.

(9) Specify the option data settings.



In the **Set Security command options** area, specify the security flag settings (Disable Chip Erase, Disable Block Erase, Disable Program, Disable Read), the block protection settings (the flash shield window, Boot Block end), and the reset vector.
In the **Device options** area, specify whether to use the wide voltage mode.
In the **OCD security ID setting** area, specify the on-chip debug security ID.
In the **Option bytes setting** area, specify the option bytes.

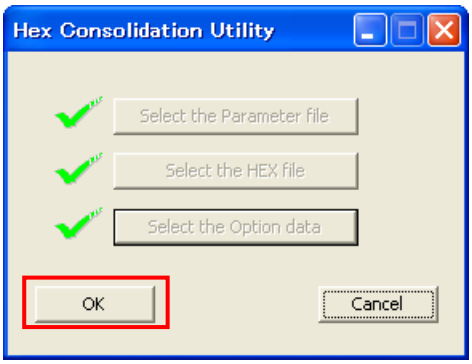
For details about each feature, see the user's manual for each microcontroller or the *PG-FP5 Flash Memory Programmer User's Manual* (R02UT0008E)

Specify each setting and click the **OK** button.
The dialog box shown in (10) opens.

Remarks 1. The setup items that appear dimmed are not available because they are not supported by the target microcontroller.

2. If the option bytes or the on-chip debug security ID is allocated to a specific address in the flash memory, setting these items is not necessary and therefore the **Option bytes setting** or **OCD security ID setting** area appears dimmed.

(10) Prepare for HCUHEX file creation.

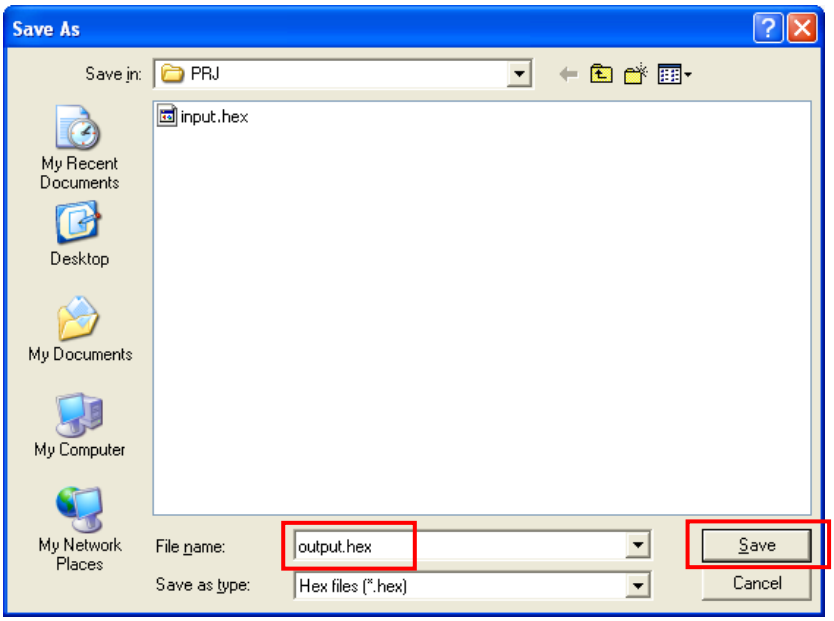


Click the **OK** button. The dialog box shown in (11) opens.

(11) Merge the HEX file and option data.

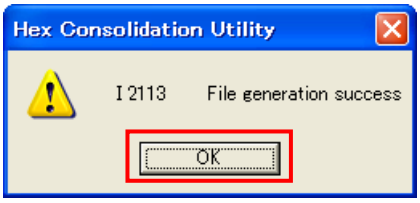
Click the **OK** button. The dialog box shown in (12) opens.

(12) Input the HCUHEX file name. The file is created. (Here, *output.hex* is input as an example.)



In the **File name** box, input any name and click the **Save** button. The HCUHEX file is created and the dialog box shown in (13) opens.

(13) This is the end of HCUHEX file creation.



Click the **OK** button. The display returns to the dialog box shown in (1).

Caution After the HCUHEX file is created in edit mode, be sure to enter check mode to check whether the specified option data settings are correct.

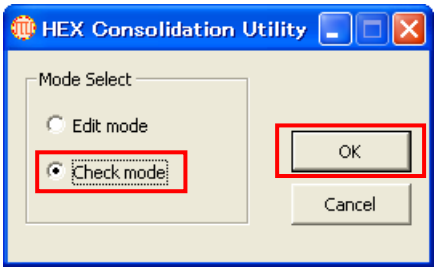
3.5 Check Modes

In this mode, the settings specified by option data can be checked by selecting the PR5 and HCUHEX files.

3.5.1 Example of using the HCU in check mode

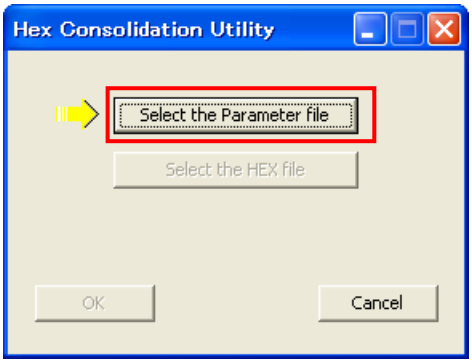
The following describes an example of using the HCU in check mode. Use the HCU in the order described in this section. To return to a previous dialog box, click the Cancel button.

(1) Run `HCU.exe`. When the HCU starts, the following dialog box is displayed.



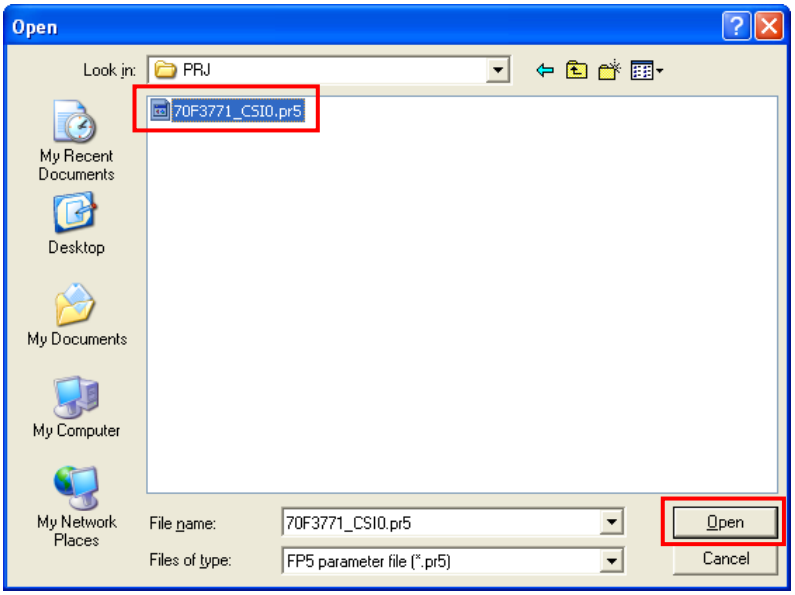
In the **Mode Select** area, select the **Check mode** option and click the **OK** button. The dialog box shown in (2) opens.

(2) Open the dialog box to select a PR5 file.



Click the **Select the Parameter file** button. The dialog box shown in (3) opens.

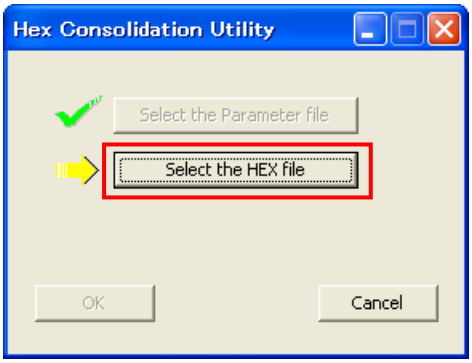
(3) Select a PR5 file. (Here, *70F3771_CSI0.pr5* is selected as an example.)



Select the PR5 file and click the **Open** button. The dialog box shown in (4) opens.

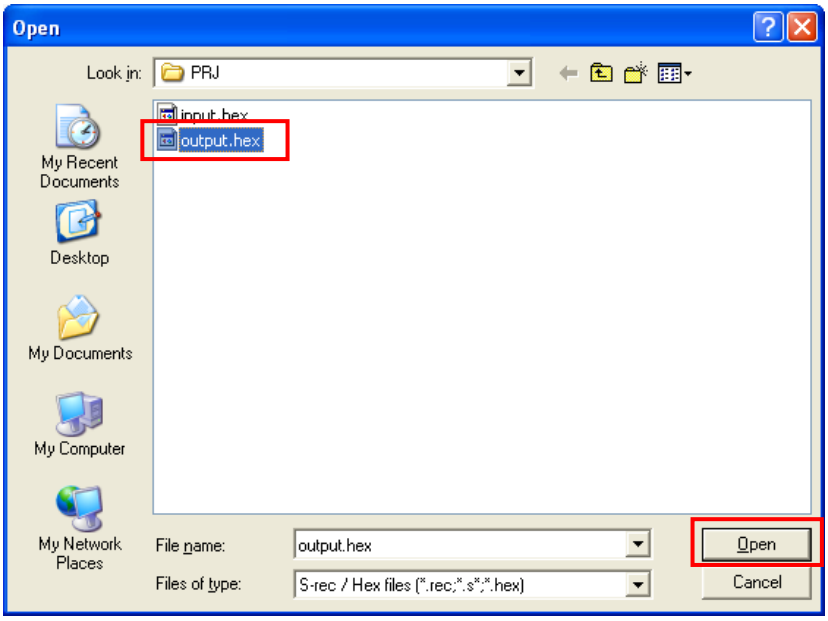
Remark If multiple PR5 files, such as `70F3771_CSI0.pr5` and `70F3771_CSI3.pr5`, are provided for one microcontroller, both files can be selected.

(4) Open the dialog box to select the HCUHEX file.



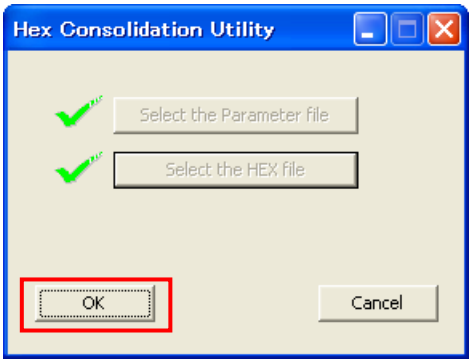
Click the **Select the HEX file** button. The dialog box shown in (5) opens.

(5) Select an HCUHEX file. (Here, *output.hex* is selected as an example.)



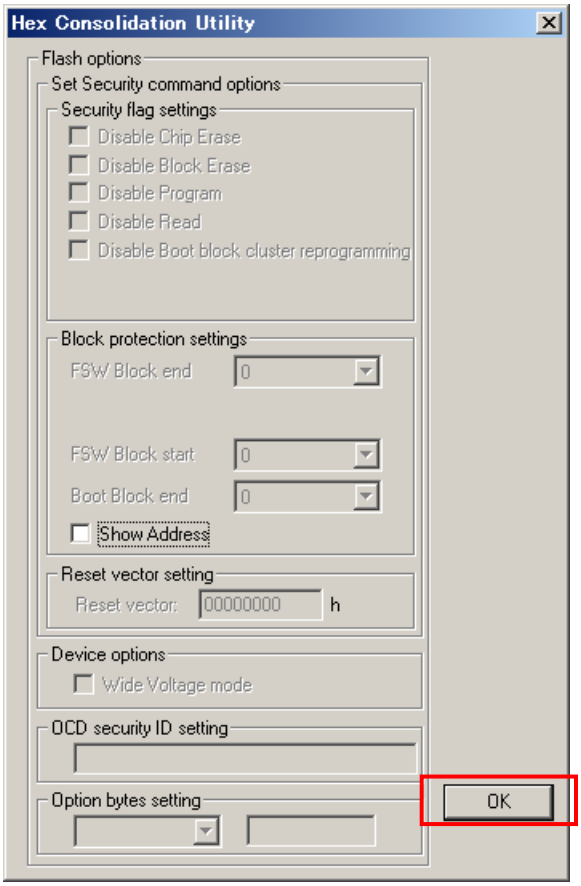
Select the PR5 file and click the **Open** button. The dialog box shown in (6) opens.

(6) Prepare to check the option data settings.



Click the **Select the Option data** button. The dialog box shown in (7) opens.

(7) Check the option data settings.



In the **Security command options** area, the settings for the security flag settings (Disable Chip Erase, Disable Block Erase, Disable Program, Disable Read), the block protection settings (the flash shield window, Boot Block end), and the reset vector can be checked.
In the **Device options** area, whether the wide voltage mode is used can be checked.
In the **OCD security ID setting** area, the on-chip debug security ID can be checked.
In the **Option bytes setting** area, the option bytes can be checked.

The settings appear dimmed and cannot be edited.

For details about each feature, see the user's manual for each microcontroller or the *PG-FP5 Flash Memory Programmer User's Manual* (R02UT0008E)

Check each setting and click the **OK** button. This dialog box closes and the dialog box shown in (1) opens.

Remark If the option bytes or the on-chip debug security ID is allocated to a specific address in the flash memory, setting these items is not necessary and therefore the **Option bytes** or **OCD security ID setting** area appears dimmed.

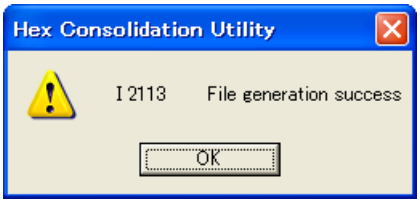
APPENDIX A MESSAGES

A.1 Message Format

Messages are output in error dialog boxes or in information dialog boxes.

Figure A-1. Error Dialog Box

Figure A-2. Information Dialog Box



A.2 Messages Displayed in Error Dialog Boxes

No.	Message	Description
E 2102	Read parameter file failed.	The PR5 file cannot be read because the format is invalid. Obtain a valid PR5 file.
E 2104	Open HEX file failed.	The HEX file cannot be opened. Confirm that the file is accessible.
E 2105	This is already a consolidated HEX file.	An HCUHEX file was selected. Select a HEX file.
E 2106	This is not a consolidated HEX file.	The selected file is not an HCUHEX file. Select an HCUHEX file.
E 2107	Option data is not correct!	Invalid option data was input. Obtain a valid HCUHEX file.
E 2108	Read HEX file failed.	The HEX file cannot be read because the format is invalid. Obtain a valid HEX file.
E 2110	Read Setting file failed.	The ESF file cannot be read because the format is invalid. Obtain a valid ESF file.
E 2111	Setting file is not match parameter file.	The selected PR5 file does not match the PR5 file specified in the ESF file. Confirm that the combination of the ESF and PR5 files is correct.
E 2112	Open output file failed.	The HCUHEX file cannot be opened. Confirm that the file is accessible.
E 2118	Out of range! It is possible that the option data does not match the parameter file.	The input option data value is out of the specifiable range. Input a correct value.
E 2220	OCD_ID input wrong!	An invalid on-chip debug security ID value was input. Input a correct value.
E 2221	Option byte input wrong!	An invalid option byte value was input. Input a correct value.
E 2503	HEX file address out of range against target device.	The input HEX file address range is out of the flash memory address range in the target microcontroller. Obtain a valid HEX file.

A.3 Messages Displayed in Information Dialog Boxes

No.	Message	Description
I 2113	File generation success	The HCUHEX file was successfully created.
I 2119	Do you want merge the HEX file and the Option data? Please enter a new HEX file name.	The HEX file and option data will be merged. Click the **OK** button to continue the operation, or the **Cancel** button to go back to the previous dialog box.
I 2401	Caution: When 'Chip Erase' is disabled, chip cannot be erased and programmed any more!	If the **Disable Chip Erase** option is selected, the flash memory in the target device cannot be erased and reprogrammed. Click the **OK** button to continue the operation, or the **Cancel** button to go back to the previous dialog box.
I 2402	Caution: When 'Boot block cluster reprogramming' is disabled, chip cannot be erased and programmed any more!	If the **Boot block cluster reprogramming** option is not selected, the flash memory in the target device cannot be erased and reprogrammed. Click the **OK** button to continue the operation, or the **Cancel** button to go back to the previous dialog box.
I 2403	Caution: When 'Block Erase' is disabled, chip cannot be erased and programmed any more!	If the **Disable Block Erase** option is selected, the flash memory in the target device cannot be erased and reprogrammed. Click the **OK** button to continue the operation, or the **Cancel** button to go back to the previous dialog box.
I 2419	Caution: Boot Block swapping will not be possible with this selection. Anyhow, boot block protection is possible.	Boot block swapping cannot be executed because the specified block number is more than half the maximum block number specified in the PR5 file. Boot block protection can be specified. Click the **OK** button to continue the operation, or the **Cancel** button to go back to the previous dialog box.

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