RENESAS

PG-FP6 V1.02
Flash Memory Programmer

User's Manual

Preface

Thank you for purchasing the PG-FP6. The PG-FP6 is a flash memory programmer for MCUs from Renesas Electronics.

If you have any questions about the PG-FP6, contact your local distributor.

You can download the latest manuals from the Renesas Tools homepage (https://www.renesas.com/pg-fp6).

Important

Before using this product, be sure to read this user's manual carefully.

Keep this user's manual, and refer to it when you have questions about this product.

Purpose of use of the product:

This product is a device to support the development of systems that uses MCUs from Renesas Electronics. This product is a tool that erases, writes and verifies programs on a Renesas Electronics on-chip flash memory MCU on the target system.
Be sure to use this product correctly according to said purpose of use. Please avoid using this product other than for its intended purpose of use.

For those who use this product:

This product can only be used by those who have carefully read the user's manual and know how to use it.
Use of this product requires basic knowledge of electric circuits, logical circuits, and MCUs.

When using this product:

(1) This product is a development-support unit for use in your program development and evaluation stages. When a program you have finished developing is to be incorporated in a mass-produced product, the judgment as to whether it can be put to practical use is entirely your own responsibility, and should be based on evaluation of the device on which it is installed and other experiments.

(2) In no event shall Renesas Electronics Corporation be liable for any consequence arising from the use of this product.

(3) Renesas Electronics Corporation strives to provide workarounds for and correct trouble with products malfunctions, with some free and some incurring charges. However, this does not necessarily mean that Renesas Electronics Corporation guarantees the provision of a workaround or correction under any circumstances.

(4) Renesas Electronics Corporation cannot predict all possible situations and possible cases of misuse that carry a potential for danger. Therefore, the warnings in this user's manual and the warning labels attached to this product do not necessarily cover all such possible situations and cases. The customer is responsible for correctly and safely using this product.

(5) The power adapter that comes with the product covered by this document conforms to the region-specific standard. This fact must be taken into account when the product is to be used in some other country.

(6) Renesas Electronics Corporation will not assume responsibility of direct or indirect damage caused by an accidental failure or malfunction in this product.

When disposing of this product:

Penalties may be applicable for incorrect disposal of this waste, in accordance with your national legislation.

Usage restrictions:

This product has been developed as a means of supporting system development by users. Therefore, do not use it as an embedded device in other equipment.

About product changes:

We are constantly making efforts to improve the design and performance of our product. Therefore, the specification or design of the product, or this user's manual, may be changed without prior notice.

About rights:

(1) We assume no responsibility for any damage or infringement on patent rights or any other rights arising from the use of any information, products or circuits presented in this user's manual.

(2) The information or data in this user's manual does not implicitly or otherwise grant a license to patent rights or any other rights belonging to Renesas or to a third party.

(3) This user's manual and this product are copyrighted, with all rights reserved by Renesas. This user's manual may not be copied, duplicated or reproduced, in whole or part, without prior written consent from Renesas.

About diagrams:

Some diagrams in this user's manual may differ from the objects they represent.

Precautions for Safety

This chapter describes the precautions which should be taken in order to use this product safely and properly. Be sure to read and understand this chapter before using this product.

Contact us if you have any questions about the precautions described here.

⚠WARNING

WARNING indicates a potentially dangerous situation that will cause death or heavy wound unless it is avoided.

⚠CAUTION

CAUTION indicates a potentially dangerous situation that will cause a slight injury or a medium-degree injury or property damage unless it is avoided.

In addition to the two above, the following are also used as appropriate.

△ means WARNING or CAUTION.

Example:

⚠CAUTION AGAINST AN ELECTRIC SHOCK

🚫 means PROHIBITION.

Example:

🚫DISASSEMBLY PROHIBITED

● means A FORCIBLE ACTION.

Example:

⬤UNPLUG THE POWER CABLE FROM THE RECEPTACLE.

⚠ WARNING

Warnings for Power Supply:

If the power cable of the power adapter that comes with the product does not fit the receptacle, do not alter the power cable and do not plug it forcibly. Failure to comply may cause electric shock and/or fire.

Use a power cable which complies with the safety standard of the country.

Do not touch the plug of the power cable when your hands are wet. This may cause electric shock.

This product is connected signal ground with frame ground. If yours developing product is transform-less (not having isolation transformer of power), this may cause electric shock. Also, this may give an un-repairable damage to this product and your developing product.
While developing, connect power of the product to commercial power through isolation transformer in order to avoid these dangers.

To eliminate differences in potential between the grounds of this product and of the user system, only connect the plug of the power cable to the outlet after connecting this product and the user system.

If other equipment is connected to the same branch circuit, care should be taken not to overload the circuit.

If you smell a strange odor, hear an unusual sound, or see smoke coming from this product, then disconnect power immediately by unplugging the power cable from the outlet.
Do not use this as it is because of the danger of electric shock and/or fire. In this case, contact your local distributor.

Before setting up this product and connecting it to other devices, turn off power or remove a power cable to prevent injury or product damage.

Warnings to Be Taken for Handling:

Do not modify this product. Personal injury due to electric shock may occur if this product is modified. Modifying the product will void your warranty.

Warning for Installation:

Do not set this product in water or areas of high humidity. Spilling water or some other liquid into the product may cause un-repairable damage.

Warning for Use Temperature:

The maximum allowable ambient temperature for using this product is 35 ˚C. Care should be taken that a maximum ambient temperature is not exceeded when this product is to be used.

⚠CAUTION

Caution on the Power Adapter:

Use only the supplied dedicated power adapter for this product.

Do not use the power adapter for other equipment.

Caution on Turning on the Power:

Observe the following specified order for the power-on and power-off procedures of the user system and this product. Doing otherwise may cause the user system or this product to fail.

Power ON: (1) This product ON, (2) User system ON

Power OFF: (1) User system OFF, (2) This product OFF

Caution on Handling This Product:

Exercise caution when handling the product. Be careful not to apply a mechanical shock.

Do not touch the connector pins of this product and the target MCU connector pins directly. Static electricity may damage the internal circuits.

When attaching and removing the cable, hold the plug of the cable and do not touch the cable. Do not pull this product by the communications interface cable or the flexible cable. Excessive flexing or force may break conductors.

⚠CAUTION

Caution on System Malfunctions:

If this product malfunctions because of interference like external noise, do the following to remedy the trouble.

(1) Exit the FP6 Terminal, and shut OFF this product and the user system. If the power cannot be turned off with the power switch of this product, unplug the power adapter.

(2) After a lapse of 10 seconds, turn ON the power of this product and the user system again, and then launch the FP6 Terminal.

Caution on Disposal:

Penalties may be applicable for incorrect disposal of this waste, in accordance with your national legislation.

European Union regulatory notices:

The WEEE (Waste Electrical and Electronic Equipment) regulations put responsibilities on producers for the collection and recycling or disposal of electrical and electronic waste. Return of WEEE under these regulations is applicable in the European Union only. This equipment (including all accessories) is not intended for household use. After use the equipment cannot be disposed of as household waste, and the WEEE must be treated, recycled and disposed of in an environmentally sound manner.

Renesas Electronics Europe GmbH can take back end of life equipment, register for this service at "http://www.renesas.eu/weee".

Contents

Terminology

The meanings of the terms used in this document are as follows.

Term	Meaning
FP6	Abbreviation of the flash memory programmer PG-FP6
FP6 Terminal	Windows® application for setting up the PG-FP6 main unit and handling commands
Target MCU	On-chip flash memory microcontroller from Renesas Electronics
Target system	User-designed board on which the target MCU is mounted
ESF file	FP6's setup file (file extension: *.esf). This file contains settings regarding the programming environment such as the target MCU and options.
Program file	Program to be written to the MCU. For the FP6, the following file formats are supported. <RL78, 78K, and V850> a. Intel HEX format HEX file b. Intel HEX format HCUHEX file c. Motorola S-record format HEX file d. Motorola S-record format HCUHEX file <RX family and SuperH family> a. Intel HEX format HEX file b. Motorola S-record format HEX file c. DDI file <RH850 family and R8C family> a. Intel HEX format HEX file b. Motorola S-record format HEX file Note Only the ASCII character code (1 byte) is supported. Unicode is not supported.
Flash-option data	General term for MCU operation settings such as security settings
HEX file	HEX file of Intel HEX format type or Motorola S-record format type that does not include flash-option data
HCUHEX file	For details, refer to the following Web page. https://www.renesas.com/search/keyword-search.html#q=HEX+Consolidation+Utility
DDI file	File that contains data in multiple flash areas generated by the Flash Development Toolkit
RPI file	Image file generated by the RFP that combine usable HEX files and flash-option data.
Flash Development Toolkit	Software for programming the on-chip flash memory of Renesas MCUs. For details, refer to the following Web page. https://www.renesas.com/fdt
RFP	Abbreviation of "Renesas Flash Programmer", software for programming the on-chip flash memory of Renesas MCUs. For details, refer to the following Web page. https://www.renesas.com/rfp
PR5 file	Information file specific to the target MCU. This file is generated by the PG-FP6. Each PR5 file holds parameter information required for programming of the flash memory in the target MCU.

Term	Meaning
FINE	Single- or dual-line communications interface operating through the FINE pins of an MCU. Some of our MCUs support programming via single-line FINE.
ID authentication mode	One of the security features of the MCU. Connection of the flash programmer is protected by ID authentication. For details, refer to the user's manual of the MCU.
Command protection mode	One of the security features of the MCU. Execution of individual commands (e.g., the erase command) can be restricted. For details on operations while the security feature is enabled, refer to the user's manual of the MCU.

Replacing Terms

Some terms used in this document should be replaced as shown in the tables below, depending on the MCU in use.

- When an RX100 or RX200 MCU is in use:

Term in This Manual	To be Replaced with
Set Security	Access window program

- When an RL78 MCU is in use:

Term in This Manual	To be Replaced with
Flash access window	Flash shield window

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1.   Overview

The FP6 is a tool that is used to erase, write, and verify programs on a Renesas Electronics on-chip flash memory MCU on the target system.

1.1   Features

*   Standalone programming

*   Programming through a dedicated GUI under PC control

*   Up to eight instances of programming environment available

*   Specialized for use on production lines (command control via serial communication and remote control of signals from external devices)
    Compatibility with the PG-FP5 interface allows utilization of resources developed with the PG-FP5.

*   Programming of a unique code to a designated area of flash memory

*   The FP6 Manager allows the customization required in development and mass-production, such as prevention of a programming operator from modifying the programming settings.

*   Self-testing function

1.2   Supported MCUs

MCUs supported by the FP6 are listed on the Web page at the following link:

https://www.renesas.com/pg-fp6

1.3   FP6 System Configuration

The system configuration of the FP6 is shown below.
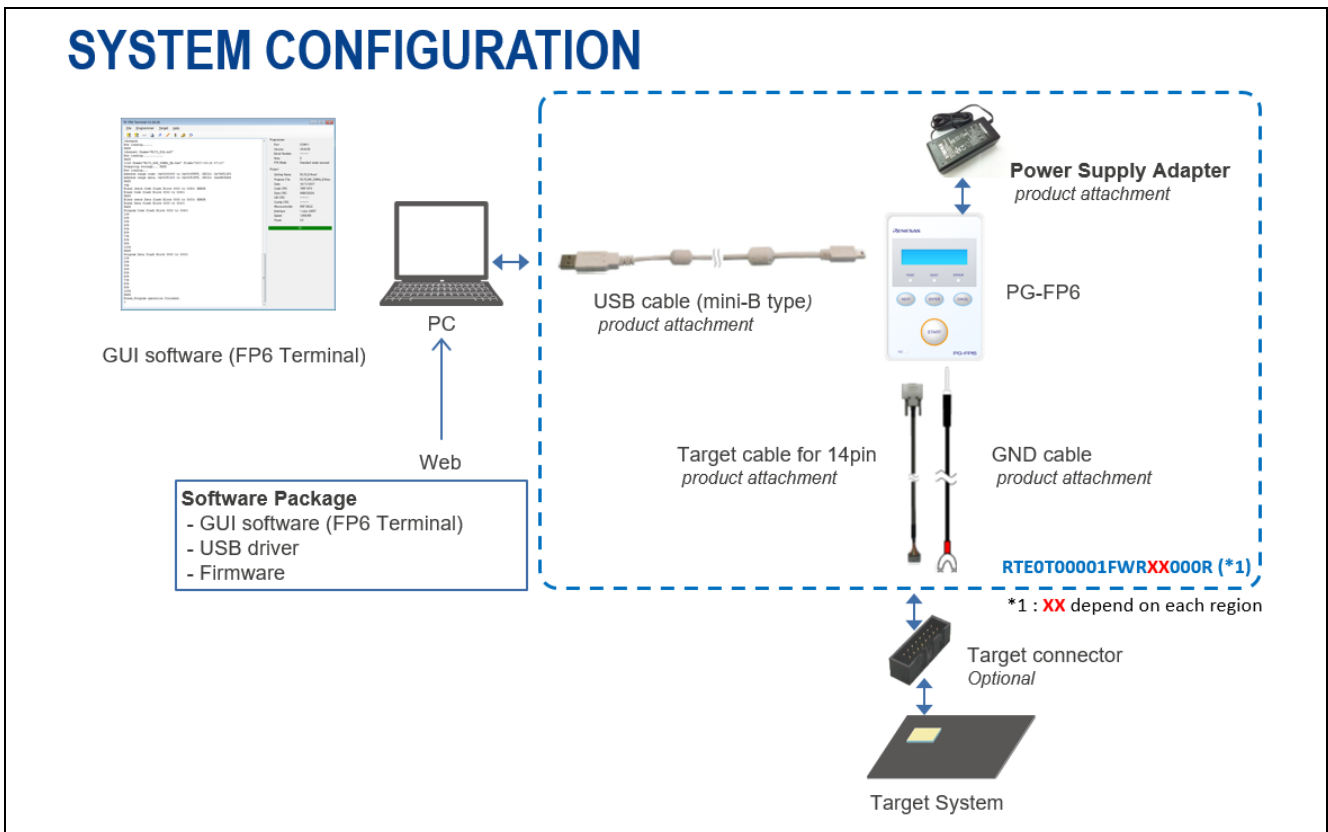
Figure 1.1   Image of FP6 Connection

*Note: The product type name and the standard with which the power adapter that comes with the FP6 complies vary
         with the region where it is to be used. Be sure to use the power adapter that is appropriate for your region.

Table 1.1   Product Type Names for Ordering

Target Regions and Certification	Product Type Name	Plug Shape	Voltage Range
Japan (PSE)	RTE0T00001FWRJP000R	A	AC: 90-264 V
Europe (CE) and USA (FC VI UL LISTED)	RTE0T00001FWREA000R	SE C BF A	
China (CCC), Hong Kong (CE), Chinese Taipei (RoHS), South Korea (KC), Singapore (SAFETY MARK)	RTE0T00001FWRAS000R	SE C BF A	

Notes: 1. Since regulations that apply to the FP6 vary with the region, we cannot ship a product to a region other than
            that from which the order was made. For example, if you place an order in Japan, you cannot purchase a
            product intended for Europe and the USA.
            Please purchase the product from a Renesas Electronics Corporation representative (responsible for sales)
            or distributor in the region where it is to be used.

2. If you wish to know which model is available in a region not included in the above table, please contact either
            a Renesas Electronics Corporation representative (responsible for sales) or distributor.

3. The power adapter that comes with the FP6 complies with the regulations that are applicable in the target
            region. Its plug is also in the shape that is usable in that region.

1.4   Operating Environments

1.4.1   Hardware environment

• Host PC
  — Processor: At least 1 GHz
  — Main memory: We recommend at least 2 GB.
                         At least 1 GB (or at least 2 GB for 64-bit editions of Windows OS) is required.
  — Display: Resolution should be at least 1024 x 768.
  — Interface: USB2.0 or serial interface (RS-232C)

1.4.2   Software environment

• Operating System
  — Windows 7 (32-bit edition, 64-bit edition)
  — Windows 8.1 (32-bit edition, 64-bit edition)
  — Windows 10 (32-bit edition, 64-bit edition)
  — Microsoft .NET Framework 4.5.2

1.5 Hardware Specifications

Table 1.2   Hardware Specifications

Hardware	Items	Specifications
FP6 main unit	Operating power supply	Supplied via the power adapter (5 V, 2 A): recommended USB-bus power supply (VBUS 4.5 V min. / 500 mA max.)
	Operating environment condition	Temperature: 5°C to 35°C (no condensation)
	Storage environment condition	Temperature: −15°C to 55°C (no condensation)
	Package size	140 × 90 × 30 mm (not including projections)
	Weight	Approximately 245 g
	Operation mode	FP6 Terminal operation, standalone operation, remote operation, and communication command operation
Power adapter	Specifications	Power adapter for each region *1
Host PC interface	Target host PC	PC/AT compatible
	USB connector	Type mini-B, USB 2.0
	USB cable	Approximately 2 m
	Serial port	9-pin D-Sub male port for RS-232C *2
Target interface	Target connector	15-pin D-Sub female connector
	Target cable	14-pin type Cable length: Approximately 42 cm
	Power supply	1.8 V to 5.5 V Note: Power cannot be supplied in USB-bus power operation.
	Power supply detection	Available
	GND cable	Approximately 1 m
Remote interface	Remote connector	15-pin D-sub female connector

Notes: 1.   The power adapter that comes with the FP6 varies with the region where it is to be used. For the product type names, see Table 1.1, Product Type Names for Ordering.
2.   Connecting to the host PC has to use a cross cable.

1.6 Formats of Program Files

For a HEX file to be readable by the FP6, it must have the correct format and satisfy the following conditions. If a program file with a non-supported format is read, an error will occur.

1.6.1   Intel HEX format

- The format file ends with the end record.
- All lines consist solely of record types 00 to 05.

1.6.2   Motorola S format

- The format file ends with the end record (S7, S8, or S9).
- All lines consist solely of record types S0 to S9 (excluding S4).

1.7 Regulatory Compliance Notices

1.7.1   European Union regulatory notices

This product complies with the following EU Directives. (These directives are only valid in the European Union.)

CE Certifications:

- Electromagnetic Compatibility (EMC) Directive 2014/30/EU

    EN 55032 Class A

WARNING: This is a Class A product. This equipment can cause radio frequency noise when used in the residential area. In such cases, the user/operator of the equipment may be required to take appropriate countermeasures under his responsibility.

    EN 55024

- Information for traceability
    — Authorized representative & Manufacturer
        Name: Renesas Electronics Corporation
        Address: TOYOSU FORESIA, 3-2-24, Toyosu, Koto-ku, Tokyo 135-0061, Japan
    — Person responsible for placing on the market
        Name: Renesas Electronics Europe GmbH
        Address: Arcadiastrasse 10, 40472 Dusseldorf, Germany
    — Trademark and type names
        Trademark: Renesas
        Product name: PG-FP6
        Type names: RTE0T00001FWRJP000R
                       RTE0T00001FWREA000R
                       RTE0T00001FWRAS000R

Environmental Compliance and Certifications:

- Waste Electrical and Electronic Equipment (WEEE) Directive 2012/19/EU

1.7.2   United States regulatory notices

This product complies with the following EMC regulation. (This is only valid in the United States.)

FCC Certifications:

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

CAUTION: Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

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2   FP6 Main Unit: Names and Functions of Parts

This chapter gives the names and functions of the parts on the FP6 main unit.

2.1 FP6 control panel

Indicators and buttons are placed on the top of the FP6.
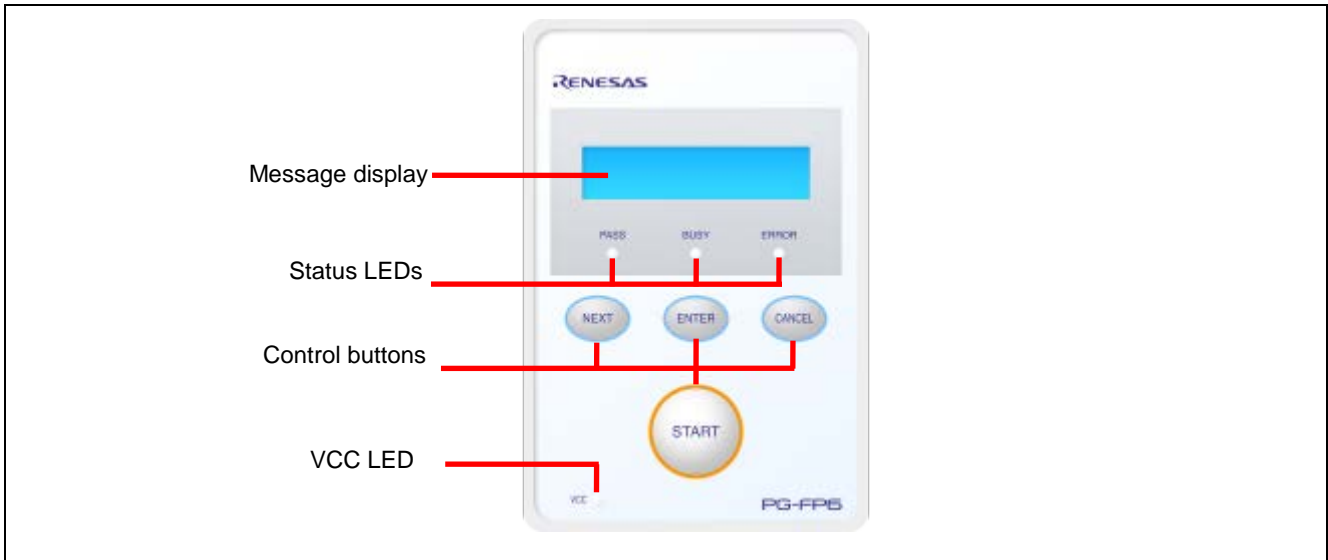
Figure 2.1   FP6 Top View <Control Panel>

(1)   Indicators

• Message display	An LCD display of 16×2 characters that indicates the operating mode or menus. It is mainly used when the FP6 is in standalone mode.	

- Message display   An LCD display of 16×2 characters that indicates the operating mode or menus.

    It is mainly used when the FP6 is in standalone mode.

- Status LEDs   These LEDs show the operating state of the FP6.

    PASS (blue) indicates a normal end, BUSY (orange) indicates processing in progress, and ERROR (red) indicates an abnormal end.

- VCC LED   This LED is illuminated (green) when power is being supplied to the user system.

(2)   Buttons

- [NEXT] button   Proceeds to the next menu item.
- [ENTER] button   Selects the item shown in the message display.
- [CANCEL] button   Cancels the current selection and returns to the previous menu item. The currently running command cannot be stopped, except for the [Read] command.
- [START] button   Executes the [Start] command with the current active-programming-area setting.

2.2 FP6 connectors

The power-supply connector, serial port, and USB connector are placed on the host interface side of the FP6.

The target connector, GND connector, and remote connector are placed on the target connector side of the FP6.

Figure 2.2   FP6 Top View <Connectors>
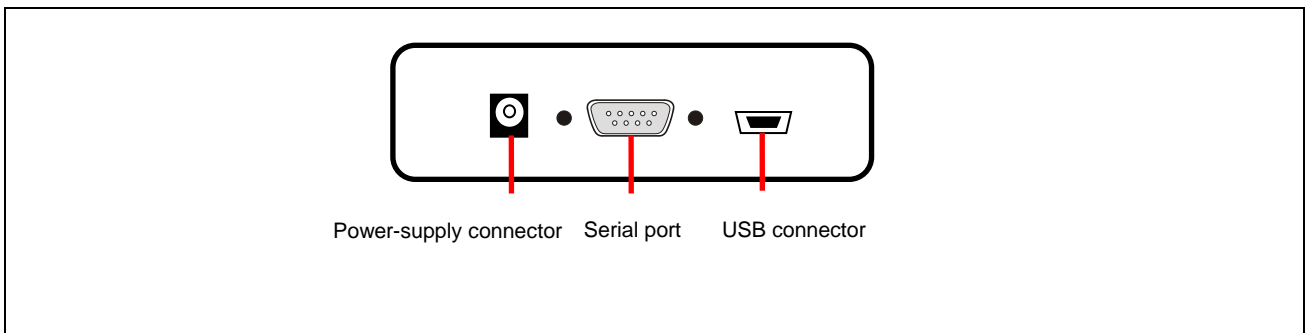
Figure 2.3   FP6 Host Interface Side
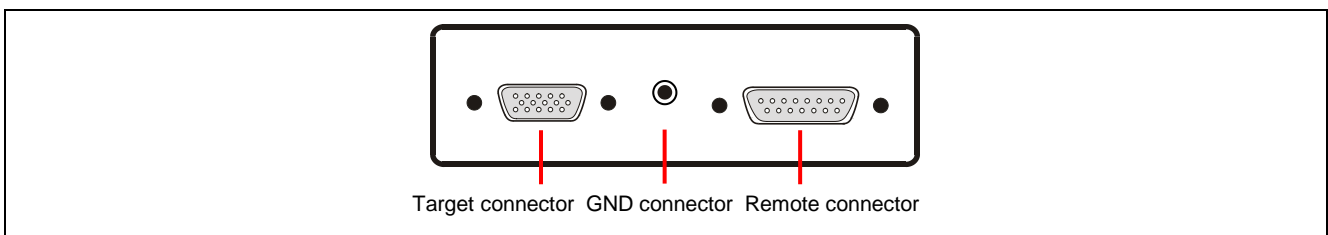
Figure 2.4   FP6 Target Connector Side
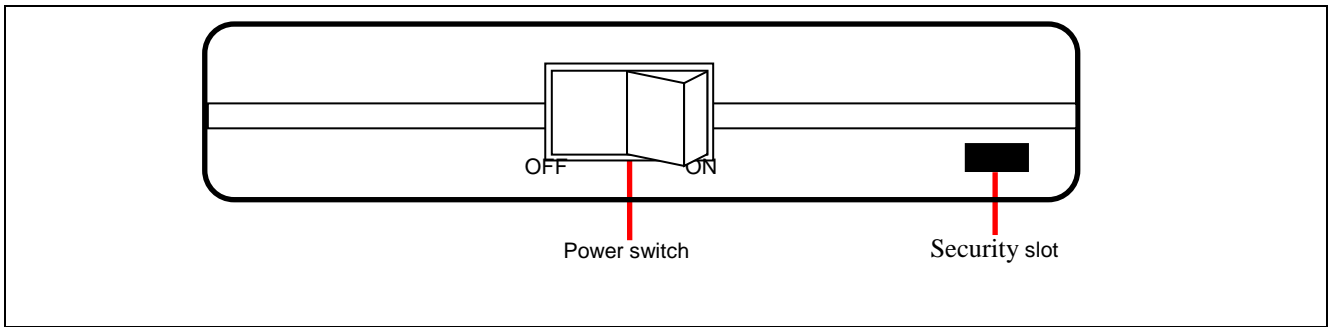
Figure 2.5   Power Switch

(1)   Power-supply connector

Connect the power-supply connector to the power adapter for your region. For details on the power-supply connector specifications, refer to chapter 8, Connectors and Cables.

Note: Do not use a power adapter other than that included with the PG-FP6.

(2)   Serial port

Communication is established by connecting the host PC serial port and the FP6 serial port via a serial cable (RS-232C crossover cable). The data transfer conditions are as follows.

— Data transfer speed: 9,600 bps, 19,200 bps, 38,400 bps, 57,600 bps, or 115,200 bps
— Data bit: 8 bits
— Parity: none
— Stop bit: 1 bit
— Flow control: hardware

The transfer speed can be changed although it is set to 9,600 bps by default. For details on the serial connector specifications, refer to chapter 8, Connectors and Cables.

(3)   USB connector

Communication is established by connecting the FP6 USB connector (mini-B type) and the host PC USB port via a USB cable. This connector conforms to USB 2.0 standards. For details on the USB connector specifications, refer to chapter 8, Connectors and Cables.

(4)   Target connector

Connect the target connector to the target system via the target cable. For details on the target connector specifications, refer to chapter 8, Connectors and Cables.

(5)   GND connector

To reinforce the GND, connect the GND connector of the FP6 and the GND of the target system via the GND cable. For details on the GND connector specifications, refer to chapter 8, Connectors and Cables.

Note: The FP6 and target system may be damaged if there are differences in potential between the grounds of the FP6 and of the target system. Use the GND cable to eliminate differences in potential before connecting the target cable.

(6)   Remote connector

The FP6 can be remote controlled by connecting the remote connector and an external control device. For details on remote operation, refer to chapter 6, Usage of the Remote Connector, and chapter 8, Connectors and Cables.

(7)   Power switch

The power switch turns on/off the FP6.

(8)   Security slot

This is a security slot for the Kensington lock.

3   Software Installation

This chapter explains how to install software.

3.1 Obtaining Software

Download the FP6 Terminal and USB driver from the following Web page.

https://www.renesas.com/pg-fp6

Note: We recommend the use of the latest version of software to assure the correct operation of the FP6.

3.2 Installation

This section explains the installation procedure for the FP6 Terminal and the USB driver.

Table 3.1   Installation

Item	Method
FP6 Terminal and USB driver	Execute the downloaded executable file (PG-FP6_Package_Vxxx.exe) and follow the directions on the installer screen. After installation, the USB driver detects the FP6 by plug-and-play.

3.2.1   Notes on installation

(1)   Basically we recommend using the latest version.

(2)   You might be asked to reboot your computer after installing the FP6. Be sure to close all other applications before rebooting your computer.

(3)   You must have administrator privileges to install the FP6.

(4)   The FP6 can only be installed in a folder that is named using ASCII characters (excluding the 11 characters / * : < > ? | " \ ; , and character strings that begin and end with a space). The FP6 might not operate correctly if installed in a folder that is named using other characters.

(5)   The FP6 cannot be installed from a network drive or on a network drive.

(6)   The installer does not specify environment variable paths. If these paths are required, add them after installation.

(7)   The Microsoft .NET Framework and the Microsoft Visual C++ runtime libraries are required to run the installer. If the Microsoft .NET Framework and the Microsoft Visual C++ runtime libraries are not installed, the FP6 Terminal will install them.

(8)   Make sure that your host PC is connected to the network before installing the program. If you wish to install the program on a host PC that is not connected to the network, first go to the Microsoft Download Center and install the Microsoft .NET Framework 4 before installing the FP6 Terminal.

(9)   If the installer is started on a non-Japanese version of Windows and the path contains multi-byte characters, it will cause an error, and the installer will not start.

(10) The following folders created after installation (including the files under the folders) contain files required for the tools to operate. Do not delete them.

      (Windows is the 32-bit edition and the system drive is C:)

      C:\Program Files\Renesas Electronics\Programming Tools\

      (Windows is the 64-bit edition and the system drive is C:)

      C:\Program Files (x86)\Renesas Electronics\Programming Tools\

(11) To change the folder of the installed tools, uninstall all software related to CS+ (integrated development environment from Renesas), the FP6 Terminal, and the USB driver, and install them again.

(12) In the environment where CS+, the FP6 Terminal, and the USB driver for the FP6 are installed, the FP6 Terminal and the USB driver for the FP6 are included in the target software of the CS+ integrated uninstaller. If you do not wish to delete them, exclude them from the uninstallation targets.

(13) If a CS+ instance launched via Rapid Start is in the notification area (system tray) during installation, the following error message will appear. Exit the application, and run the installer again.
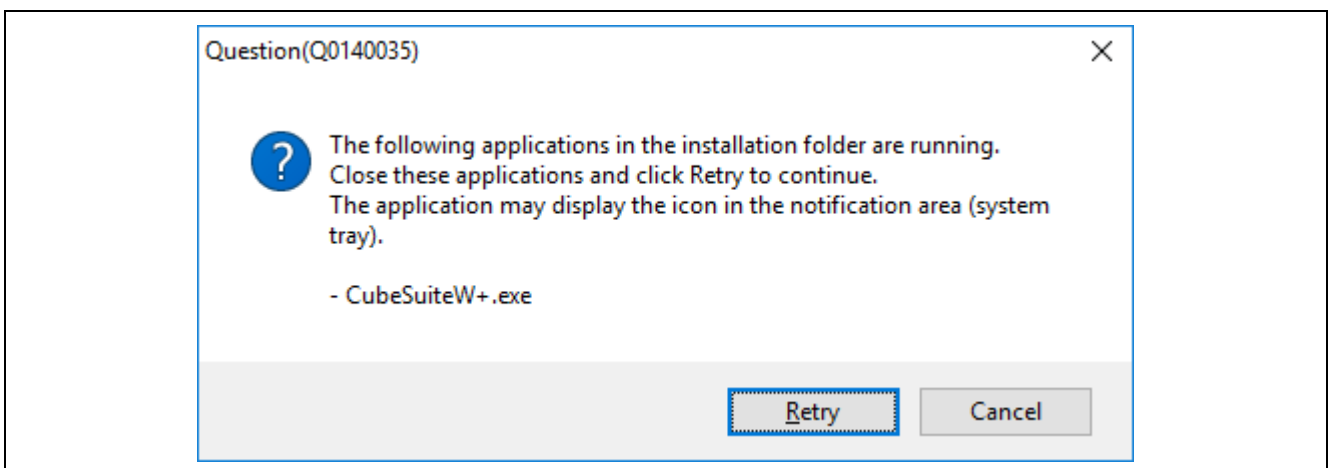
Figure 3.1 Message dialog

3.3 Uninstallation

This section explains how to uninstall the FP6 Terminal and the USB driver. The uninstallation order is not prescribed.

Table 3.2   Uninstallation

Item	Method
FP6 Terminal and USB driver	Use [Add or Remove Programs] on the Control Panel to uninstall the FP6 Terminal and the USB driver. The names are [PG-FP6] and [Renesas USB Driver x86 for PG-FP6] (or [Renesas USB Driver x64 for PG-FP6]), respectively.

4   Usage of the FP6 Terminal

4.1 Main Window

The main window of the FP6 Terminal that has been started up is shown below.
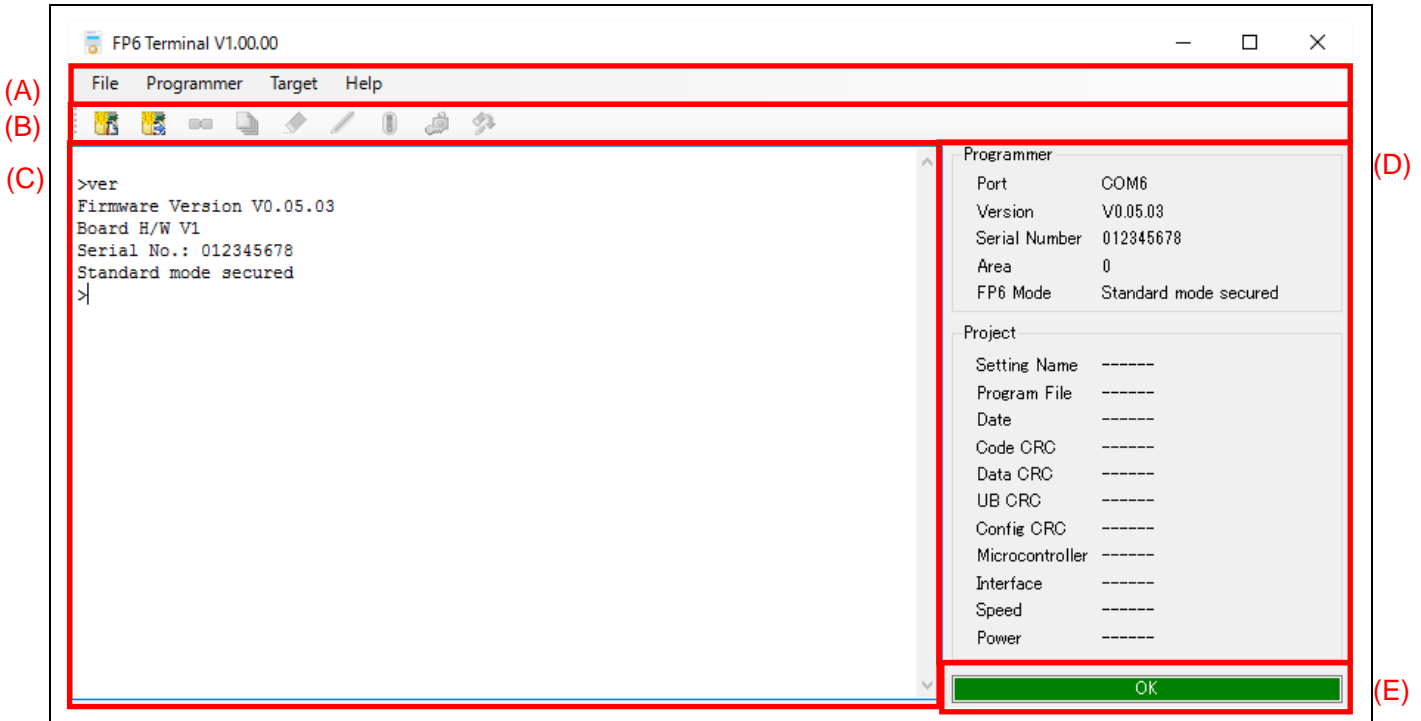
Figure 4.1   Main Window

Table 4.1   Main Window

	Name	Description	Refer to
(A)	Menu bar	Commands executable through the FP6 Terminal	4.4
(B)	Toolbar	Frequently used commands (provided as buttons)	4.5
(C)	Console window	Execution result and log of commands	-
(D)	Parameter window	Programming parameter settings	-
(E)	Status bar	State of command execution indicated by colors and messages	-

(A) Menu bar

    This is the menu for operating the programmer. For details on the menu bar, see section 4.4, Menu Bar.

(B) Toolbar

    The frequently used menu items can be executed by clicking on the buttons. For details on the toolbar, see section 4.5, Toolbar.

(C) Console window

    This window shows the execution result and log of commands.

    Note that log entries older than the 3000th line are automatically deleted.

(D) Parameter window

    This window shows the settings of the FP6 when an ESF file or a program file is downloaded, the FP6 is connected, or the programming area is changed. However, the information on connection with the target MCU is not displayed when "Disable Upload" is selected in the [FP6 Manager] dialog box (see figure 4.16).

(E) Status bar

    The current state of the FP6 and the result of command execution are displayed. This facility is effective only when a command is executed from the menu bar. The state shown on this bar is not updated when a command is executed through the console window.

Table 4.2   Status Information

Status	Description
Run	Command execution is in progress.
OK	Command execution ended normally.
ERROR	Command execution failed.

4.2 Creating a New Setting

4.2.1   [Create New Setting] dialog box

Selecting [File]-[New Setup File…] from the menu bar opens the [Create New Setting] dialog box, as shown below.
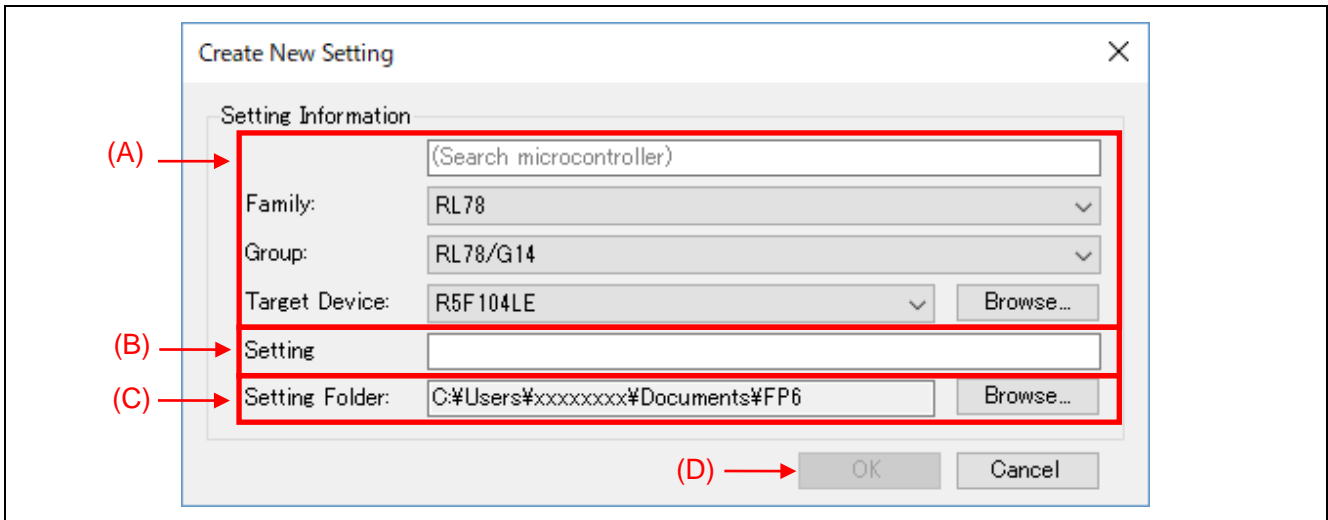
Figure 4.2   [Create New Setting] Dialog Box

(A) Target MCU

    Select the family, group, and type name of the target MCU.

    Entering the group or type name of the MCU in [(Search microcontroller)] initiates a search for the target MCU and displays the details of the first MCU to have matched.

    Note: Using the [Browse] button is not generally necessary.

(B) Setting name

    Specify the name of a setting to be created.

    Notes: 1.   Since the setting name is used for an ESF file name, only use characters that are allowed for file names.
            2.   Up to 46 alphanumeric characters can be used for each setting name.

(C) Folder

    Specify the path to the folder in which an ESF file will be created.

(D) OK

    Click on the [OK] button to create an ESF file in the specified folder and open the [Setup] dialog box.

4.3 [Setup] Dialog Box
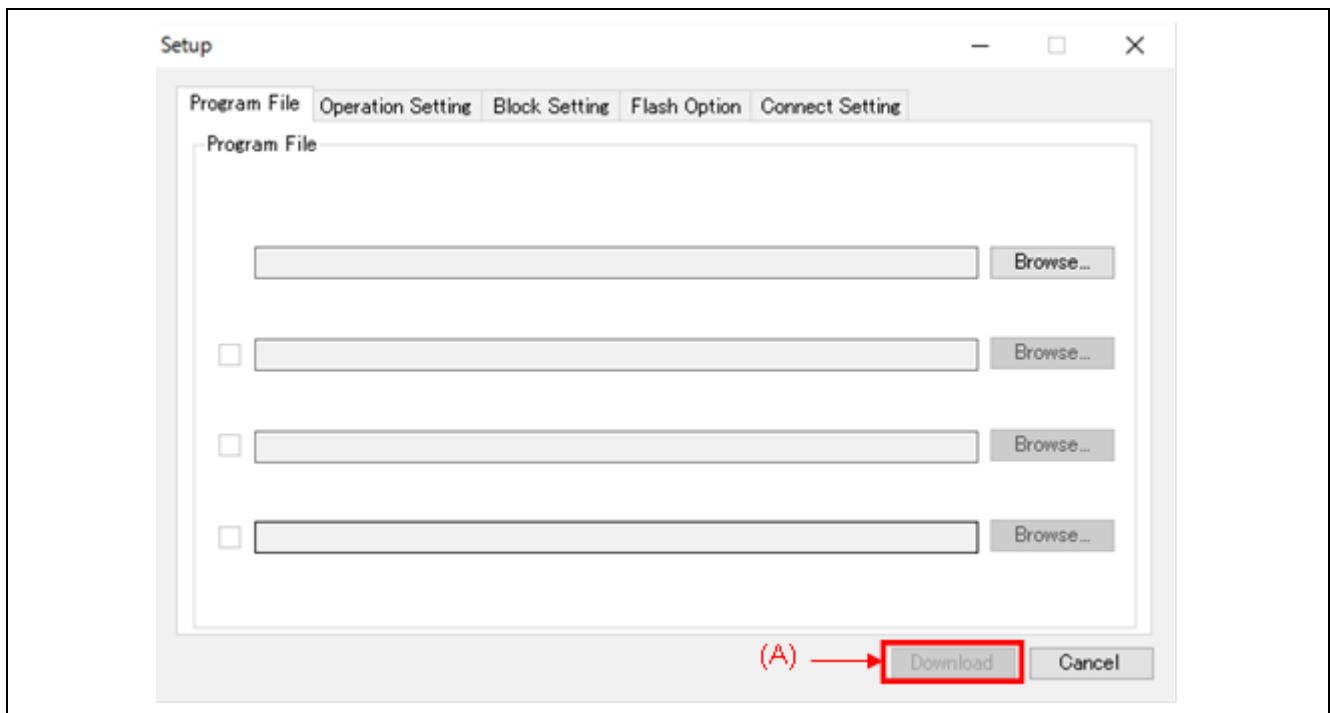
Figure 4.3   [Setup] Dialog Box

(A) [Download]/[OK] button

[Download] is displayed when the FP6 is connected and [OK] is displayed when it is not connected. Clicking on this button applies the changes made in the [Setup] dialog box to the ESF file, and closes the [Setup] dialog box. When the FP6 is connected, the ESF file, PR5 file, and program file are downloaded to the FP6.

4.3.1   [Program File] tabbed page

The [Program File] tabbed page allows you to select the files to be written to the target MCU.
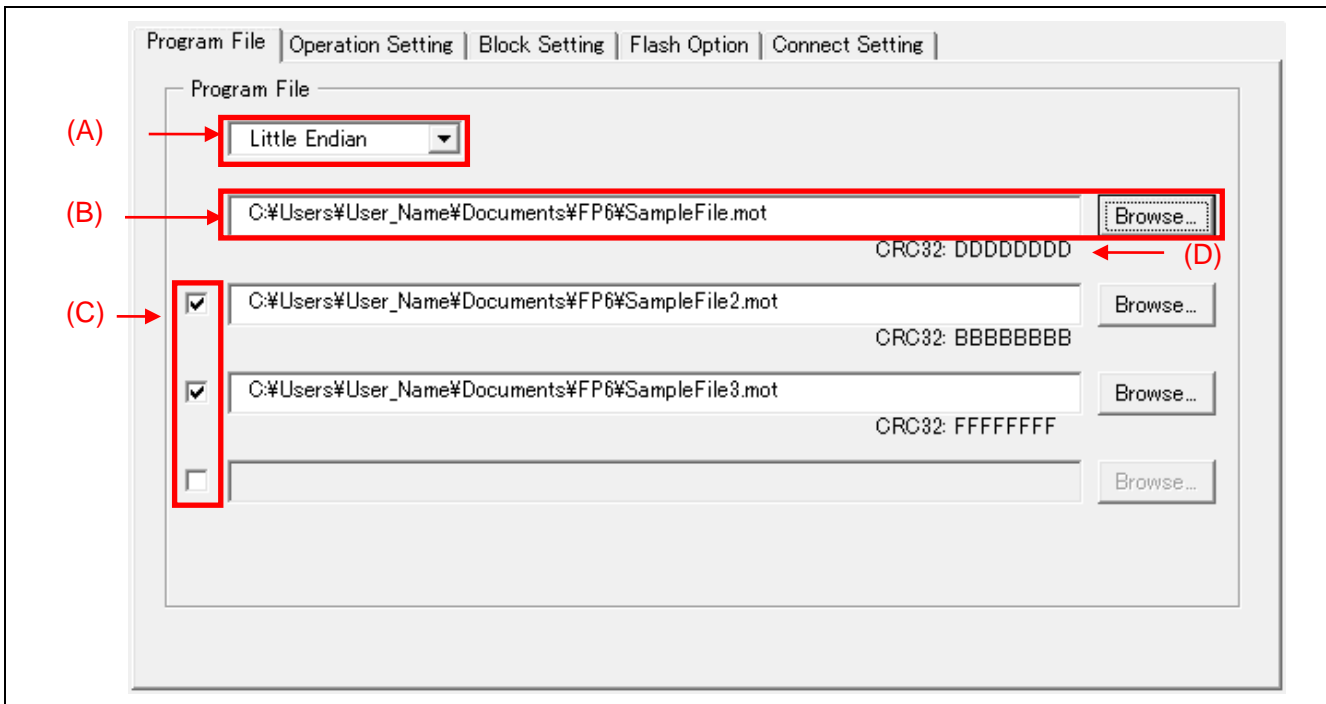
Figure 4.4   [Program File] Tabbed Page

(A) Endian

   Select the endian according to the data of the program file. This item is not displayed when the target MCU does not support switching of the endian.

(B) Program file

   Use the [Browse] button to select a program file to be written to the flash memory of the target MCU.

(C) Checkboxes for selecting multiple files

   When a checkbox is selected, the corresponding [Browse] button becomes selectable. You can select multiple program files in this way.

   Note: Multiple DDI, HCUHEX, or RPI files cannot be selected.

(D) CRC-32

   The checksum (CRC-32) of the selected file is displayed.

   Notes: 1.   CRC-32 is not displayed for a DDI format file.

   2.   This checksum is calculated from the entire file including a linefeed code. Therefore, it does not match the checksum acquired from the target MCU.

4.3.2   [Operation Setting] tabbed page

The [Operation Setting] tabbed page allows you to change settings related to the operation of flash memory.

Note: Some items may not be displayed or the values of some items may not be changeable depending on the selected target MCU or program file.
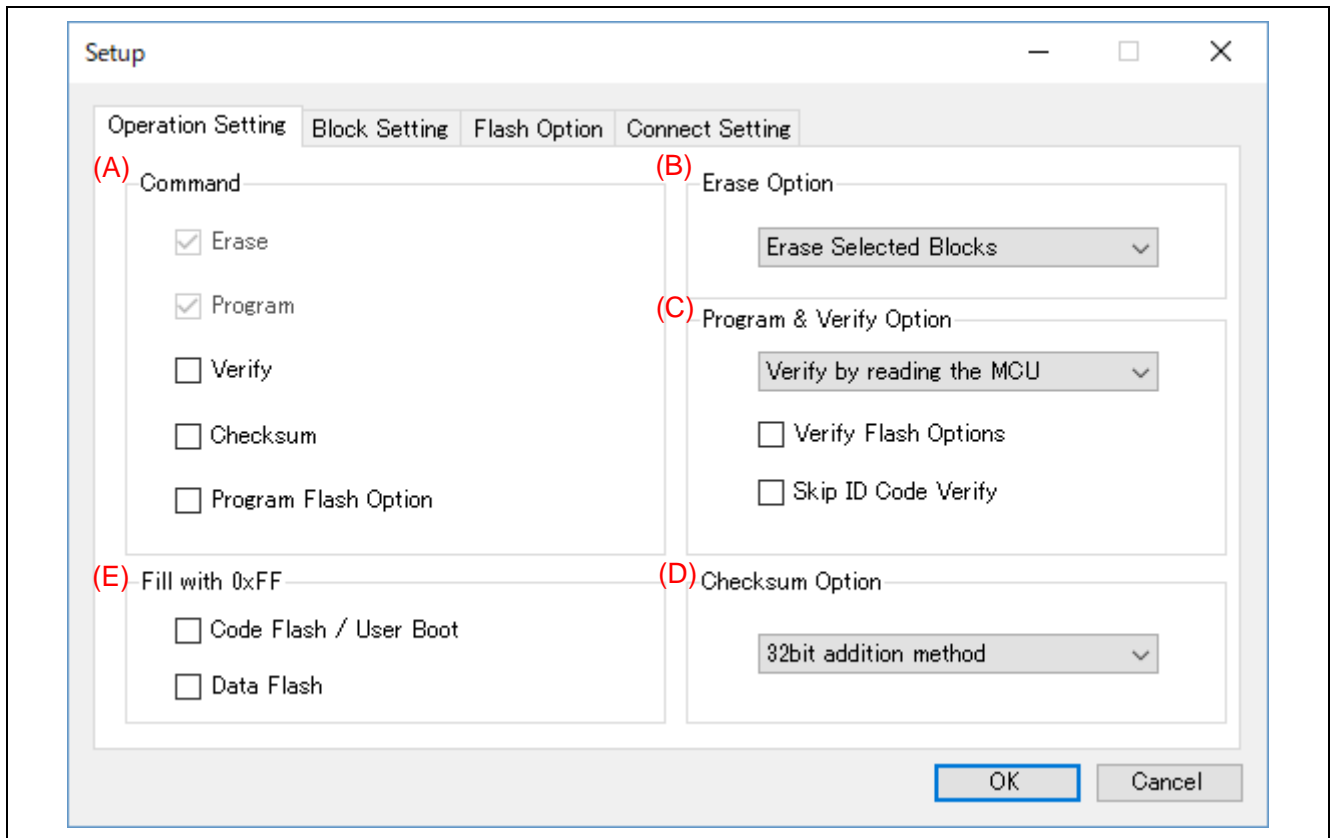
Figure 4.5   [Operation Setting] Tabbed Page

(A) Command

Select the command(s) to be executed in response to pressing the [START] button on the FP6 or clicking on the [Start] button on the FP6 Terminal. When multiple commands are selected, they are executed in order from the top. The five processes listed below can be selected as commands. Note that some commands may not be available depending on the selected target MCU.

Note: If you wish to execute any of these commands individually, select it from the [Target] menu.

— Erase

This command erases flash memory data in the range selected for "(B) Erase Option".

— Program

This command programs data in the range selected for "(C) Program & Verify Option".

— Verify

This command verifies data in the range selected for "(C) Program & Verify Option".

— Checksum

This command acquires the checksum of flash memory. The method selected for "(D) Checksum Option" is used for calculating the checksum.

— Program Flash Option

This command applies the flash-option data, including "lock bits", "OTP", "flash access window", "option bytes", and "security", which have been configured on the [Block Setting] and [Flash Option] tabbed pages.

(B) Erase Option

Select an option for "Erase" under "Command".

—— Erase Selected Blocks

Only the blocks selected on the [Block Setting] tabbed page will be erased. For the [Block Setting] tabbed page, see section 4.3.3, [Block Setting] tab.

—— Erase All Blocks

All blocks will be erased.

Note: Security features of some MCUs may prevent erasure of certain blocks.

—— Erase Chip

All blocks will be erased with flash options cleared.

Notes: 1.   This option does not restore the default state (at shipment) of the MCU. The MCU may not operate unless the correct flash options are written after the chip has been erased.

2.   When "Chip Mode" is selected on the [Block Setting] tabbed page, "Erase Chip" is automatically selected as the erase option and cannot be changed on the [Operation Setting] tabbed page.

3.   When "Erase Chip" is executed, the chip erasure command or the configuration clear command will be executed after all blocks are erased. For details of these commands, refer to the user's manual for the MCU.

(C) Program & Verify Option

Select an option for "Program" or "Verify" under "Command".

—— Verification type

Select the type of verification from the items listed below. Note that the value is fixed for some MCUs.

• Verify by reading the MCU

Data will be acquired from the MCU with a read command, and the FP6 will perform verification. The comparison may not be executed in some cases, such as when execution of a read command is disabled by a setting for the MCU.

• Verify in the MCU

Data will be sent to the MCU with a verify command, and the MCU will perform verification. Since the range of comparison may be extended depending on the specifications of the verify command, a verify error may occur if filling of 0xFF is not performed.

—— Verify Flash Options

Select whether or not to verify values in the flash option area.

To use this feature, select "Program Flash Option" under "Command".

—— Skip ID Code Verify

In general, do not select the checkbox when this feature is displayed as an option. However, use this feature in cases of the following type.

The security settings of the MCU may make reading of the ID code impossible since the ID code in the MCU is protected. This may lead to an error may occur in verification processing. To avoid errors of this type, select this checkbox to use the feature.

For details, refer to section 11.8, Verification after Protecting the MCU.

(D) Checksum Option

Select the method for calculation when "Checksum" is selected under "Command". Usable methods vary with the target MCU.

(E) Fill with 0xFF

Select this checkbox if you wish to fill the ranges that do not contain program file data with 0xFF.

Target areas: Code flash and user-boot areas or data flash area

— When "Fill with 0xFF" is selected

- Programming: 0xFF will be written to the ranges that do not contain program file data.
- Verification: The ranges that do not contain program file data will be compared with 0xFF as the expected value.

— When "Fill with 0xFF" is not selected

- Programming: No data will be written to the ranges that do not contain program file data.
- Verification: The ranges that do not contain program file data will not be verified.

Notes: 1. "Fill with 0xFF" cannot be deselected for some MCUs.
2. Even if "Fill with 0xFF" is not used, filling of 0xFF is always performed in the minimum unit of programming by the MCU.

4.3.3 [Block Setting] tabbed page

The [Block Setting] tabbed page allows you to designate blocks in the target MCU to be handled.

Note: Only the items supported by the target MCU are listed on this page.
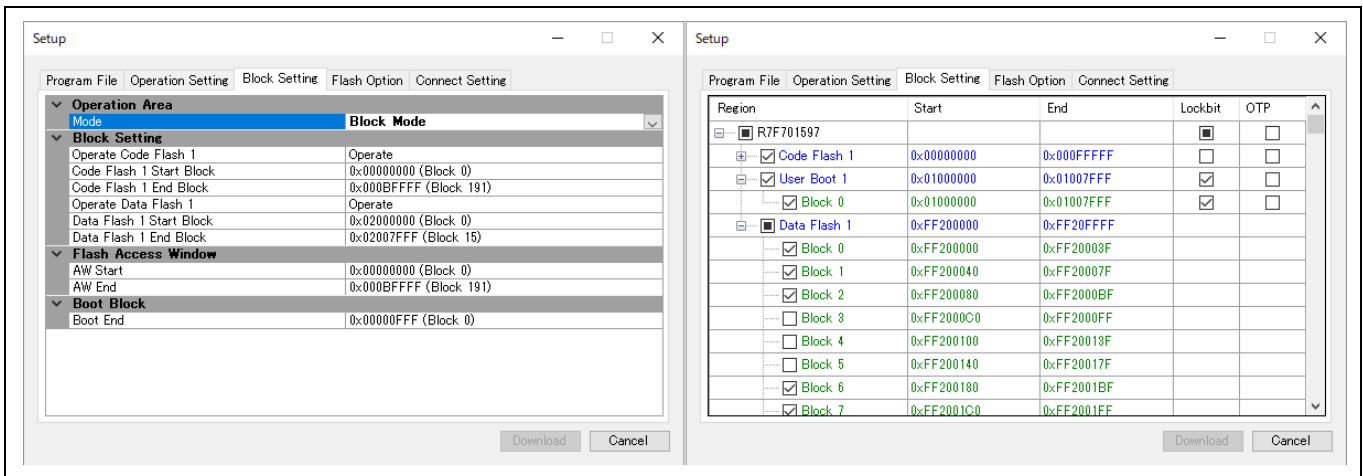
Figure 4.6   [Block Setting] Tabbed Page

(A) Operation area

   Specify the target range for erase, program, and verify operations.

   The flash memory can be handled as a whole (Chip Mode) or in block units (Block Mode).

   ⎯ Mode

   • Chip Mode

      This mode is used to handle the entire chip.

      Note: When "Chip Mode" is selected, [Erase Option] on the [Operation Setting] tabbed page is fixed to "Erase Chip".

   • Block Mode

      This mode is used to specify a range of blocks. Erasure, programming, and verification will not be executed for blocks outside the range.

   ⎯ Operation of code flash, data flash, and user boot flash

      Select whether the code flash, data flash, and user boot flash areas should be regarded as the target of operation.

      Note: When SuperH is selected as the target MCU, either code flash or user boot flash can be specified as the target of operation. When both areas need to be programmed simultaneously, you can select both areas by specifying a DDI-format file as the program file.

   ⎯ Start/end block of code/data/user boot flash

      Select the start and end addresses of the code flash, data flash, and user boot flash areas to be handled.

(B) Flash access window

   Specify the range of the flash access window.

   Note: When an HCUHEX or RPI file is selected, the range of the flash access window cannot be changed.

(C) End block of the boot area

   Specify the end block of the boot area.

   Note: When an HCUHEX or RPI file is selected, the end block of the boot area cannot be changed.

(D) Lock bits or OTP

To set the lock bits or OTP, select the target blocks on the [Block Setting] tabbed page and use communication commands. Alternatively, select "Set" for "Set Option" of each item on the [Flash Option] tabbed page and click [Program Flash Option] on the [Operation Setting] tabbed page and execute [Start].

Note: When an HCUHEX or RPI file is selected, the lock bits or OTP cannot be changed.

4.3.4   [Flash Option] tabbed page

The [Flash Option] tabbed page allows you to specify flash options for the target MCU.

Note: Only the items supported by the target MCU are listed on this page. For the meaning of each item and details on settings, refer to the user's manual of the target MCU.
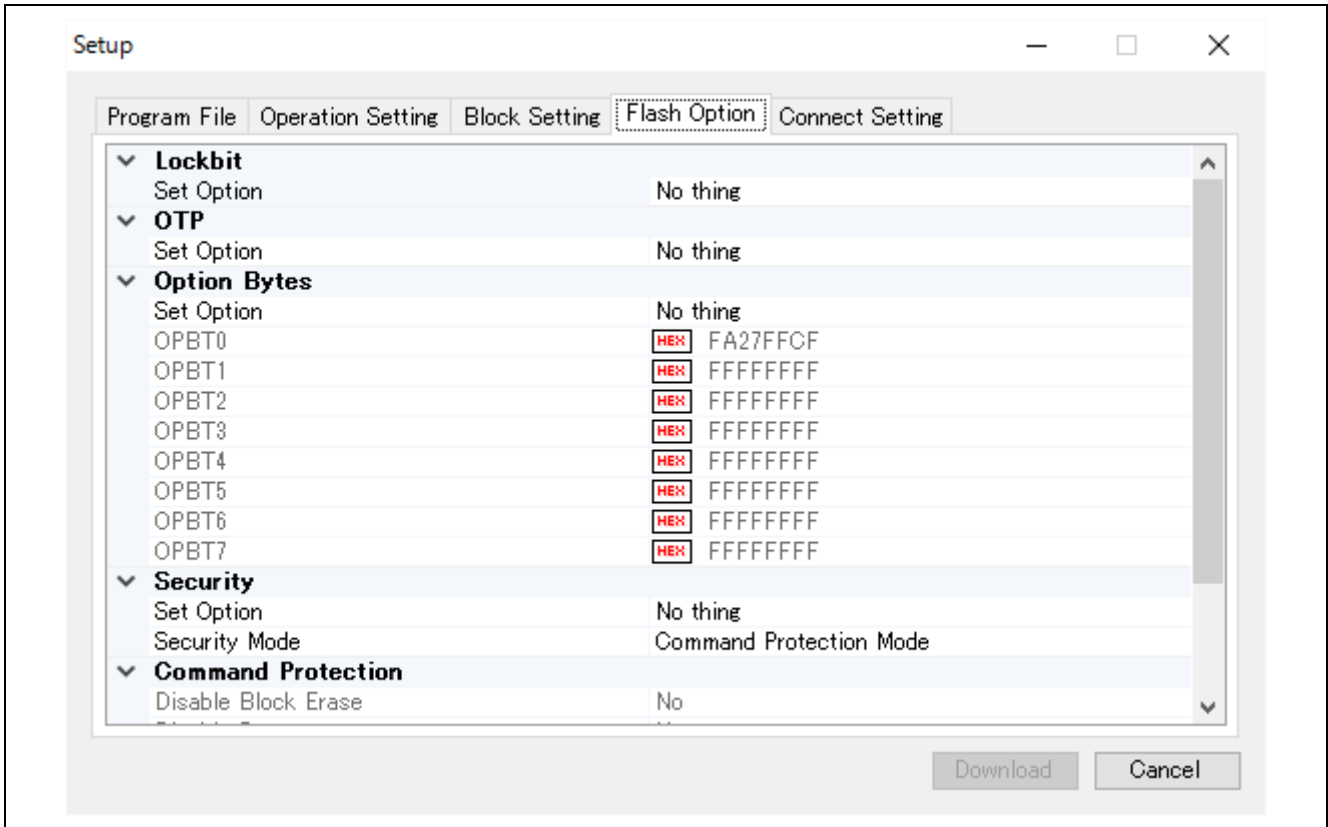
Figure 4.7   [Flash Option] Tabbed Page

(A) Lock bits

Select whether to set the lock bits. When "Set" is selected, the lock bits for the blocks selected on the [Block Setting] tabbed page will be set.

(B) OTP

Select whether to set the OTP. When "Set" is selected, the OTP for the blocks selected on the [Block Setting] tabbed page will be set.

(C) Flash access window

Select whether to set the flash access window. When "Set" is selected, the range of blocks selected on the [Block Setting] tabbed page will be set as the flash access window.

(D) Option Bytes (OPBT)

You can change the settings of option bytes (OPBT).

— Enable Extended Option Bytes

Select "Enable" or "Disable", respectively, to enable or disable setting of extended option bytes (OPBT8 and above) and acquisition of their values.

Note: Be careful when you rewrite the values of the extended option bytes since they may include important settings for the MCU.

— OPBT0 to OPBT7

Enter the value of option bytes in 4-byte units in hexadecimal notation (bit 31 to bit 0).

— OPBT8 and above

Enter the value of extended option bytes in 4-byte units in hexadecimal notation (bit 31 to bit 0).

(E) ICU-S

Enable or disable the ICU-S.

Note: For some MCUs, the ICU-S cannot be disabled after it has been enabled. For details, refer to the user's manual of the target MCU.

(F) Security

Make security settings for the target MCU.

— Command Protection Mode

Enables command protection, such as write protection.

— ID Authentication Mode

Enables ID authentication in serial programming.

— Disable Serial Programming

Disables serial programming mode.

(G) Command Protection

To disable the use of individual commands, select "Yes".

Note: If you select "Yes" (i.e. disable) for each command on this page and once this setting is written to the target MCU, you may no longer be able to enable the use of that command due to the specifications of the MCU. For details, refer to the user's manual of the target MCU.

(H) Reset Vector

Enter the reset vector value of the target MCU in hexadecimal notation.

(I) ID Code & Access Password

— ID Code

Enter the ID code in hexadecimal notation.

— Code Flash Access Password

Enter the password for accessing code flash memory in hexadecimal notation.

— Data Flash Access Password

Enter the password for accessing data flash memory in hexadecimal notation.

4.3.5   [Connect Setting] tabbed page

The [Connect Setting] tabbed page allows you to fill the information necessary for connecting the MCU.

Note: The items displayed on this page vary with the type of the target MCU.
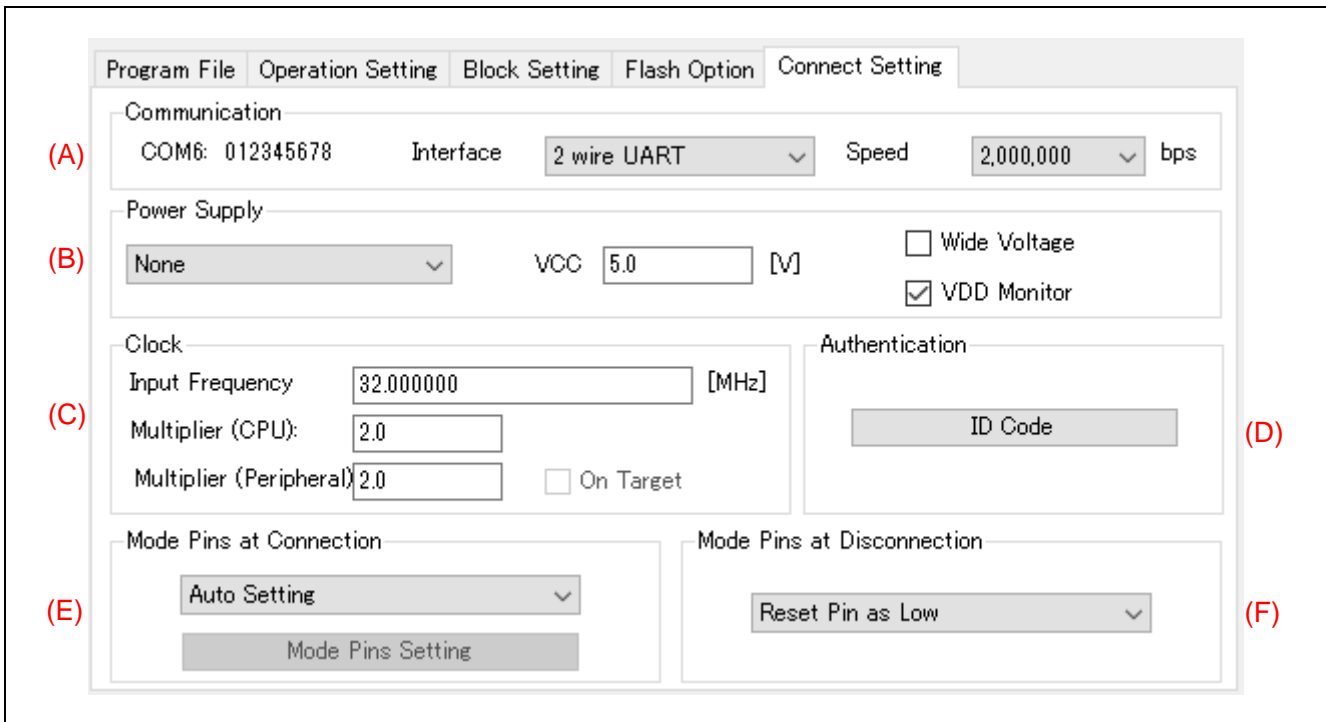
Figure 4.8   [Connect Setting] Dialog Box

(A) Communication

—   Information on the programmer

The communication port and serial number of the currently connected FP6 are displayed.

Note: You cannot select any other FP6 through this dialog box. To do so, select [Programmer]–[Setup PC Connection] in the main window.

—   Interface

Select the method for communicating with the target MCU.

—   Speed

Select the communication speed in the communication mode selected for "Interface".

(B) Power Supply

—   Power Supply from FP6/None

Select whether power should be supplied from the FP6 or the target system during the process of connecting the target MCU.

Notes: 1.   We recommend supplying power from the target system to the MCU for on-board programming. Specify the voltage value within the range of 1.8 V to 5.5 V.

2.   The voltage value should meet the operating conditions of the target MCU and target system.

—   Wide Voltage

Select this checkbox to perform programming in wide voltage mode.

— VDD Monitor

Select this checkbox to detect an error when there is a gap of approximately ±5% from the voltage value that was entered in [VCC].

Note: The voltage value is measured on the FP6 side of the target cable. Accordingly, this facility does not guarantee that the voltage set for the target MCU on the target system is being supplied.

(C) Clock

Set the frequency of the input clock, the multiplication ratio of the main clock, and the multiplication ratio of the peripheral clock. Set the input clock frequency in MHz. If the value is smaller than 1 MHz, use a decimal. The display is switched depending on the type of the target MCU. You can check the clock settings for each target MCU in the Points for Caution stated in the Release Note, which can be obtained from the Renesas Tools homepage (https://www.renesas.com/pg-fp6).

(D) Authentication

Use this button if you wish to change the authentication code required for connecting the target MCU in which the ID code or access password is set. Enter the ID code for authentication in hexadecimal notation (0 to 9 and A to F).

Note: When an RX-family device is connected via the FP6, input the value in the order (control code) ID1, ID2, ..., ID16.
Example:
When the number of effective bytes = 16, control code = 0x45, ID code = ID1=0x01, ID2=0x02, ID3=0x03, ID4=0x04, ID5=0x05, ID6=0x06, ID7=0x07, ID8=0x08, ID9=0x09, ID10=0x0A, ID11=0x0B, ID12=0x0C, ID13=0x0D, ID14=0x0E and ID15=0x0F, the value will be '45010203040506070809 0A0B0C0D0E0F'.

Note: Byte order of the ID code of the debug tool can be different from that of FP6. Please confirm the specification about ID code of the debug tool you're using.

Note: FP6 repeats it up to three times if ID code authentication fails.

(E) Mode Pins at Connection

To modify the level of the mode pins (I/O pins) at connection, change "Auto Setting" to "Custom Setting".

The [Mode Pins Setting] dialog box shown below will open.
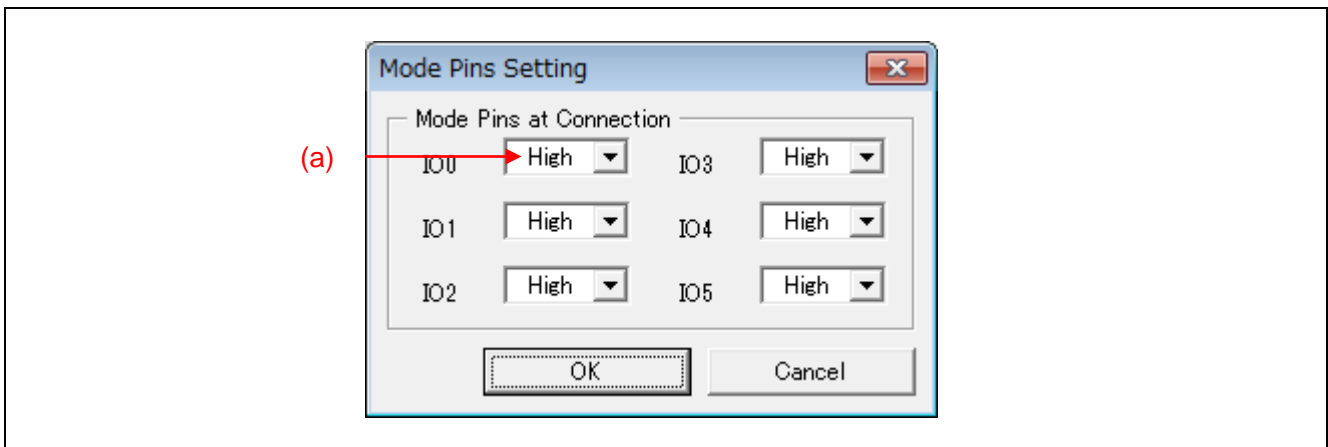
Figure 4.9   [Mode Pins Setting] Dialog Box

(a) Hi-Z/High/Low

You can change the output level of individual pins.

Table 4.3   FP6 Pin Configuration When Using RX or SuperH

Pin Number (14 Pins)	Pin Name (RX or SuperH)
1	IO4
2	GND
3	IO5
4	IO0
5	TxD2
6	IO1
7	IO3
8	VCC
9	—
10	IO2
11	RxD
12	GND
13	RESET
14	—

(F) Mode Pins at Disconnection

Select the state of the reset pin at disconnection from the target MCU.

⎯ Reset Pin as Low

After disconnection, a low-level signal is continuously output from the RESET pin.

⎯ Reset Pin as Hi-Z

After disconnection, the RESET pin is held low for a short time and then placed in a Hi-Z state. This setting is used when making the target MCU operate after completion of the FP6 processing.

4.4 Menu Bar

4.4.1   [File] menu

4.4.1.1   [New Setup File…]

This menu item is used to select a new target MCU, create a new ESF file, and download it to the FP6.

4.4.1.2   [Open Setup File…]

This menu item is used to open an ESF file created by using the FP6 and download it to the FP6.

4.4.1.3   [Import Setup File…]

This menu item is used to open an ESF file created by using the PG-FP5 or the old version of the FP6 and download it to the FP6 with updated parameters.

Note: When an ESF file created by using the FP5 is imported to the FP6, the [Config Setting] checkbox on the [Block Setting] tabbed page of the [Setup] dialog box is not selected by default. If necessary, select the [Config Setting] checkbox before clicking on [Download] in the [Setup] dialog box. This note is only applicable to the RX64M, RX71M, RX651, and RX65N groups.

4.4.1.4   [Upload Files]

This menu item is used to upload a program file, ESF file, and PR5 file to the PC from the currently connected FP6. When this menu item is selected, the [Browse for Folder] dialog box will appear.

Note: This menu item is not executable when [Disable Upload] is selected for the currently connected FP6.

4.4.1.5   [File Checksum]

This menu item is used to calculate the checksum of the data in the program file, which is saved in the currently connected FP6, and display the value in the console window.

4.4.1.6   [Recently used setup files]

This menu item is used to display the setup files that have most recently been created (up to four filenames). Clicking on the name of a setup file directly shows the [Setup] dialog box.
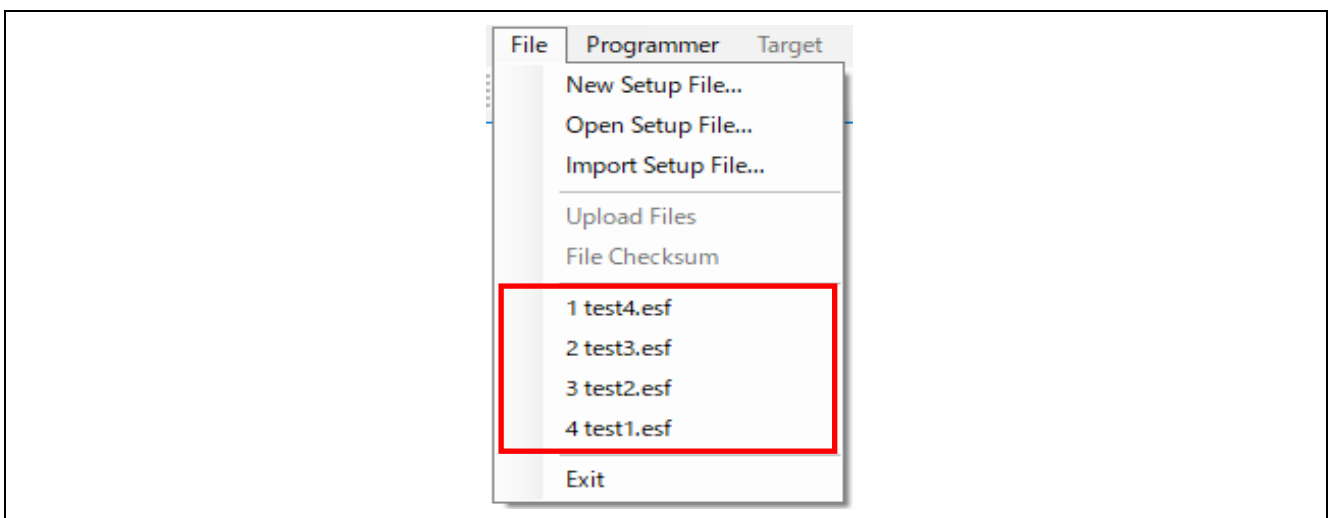
Figure 4.10   [Recently used setup files] Dialog Box

4.4.1.7   [Exit]

This menu item is used to close the FP6 Terminal.

4.4.2   [Programmer] menu

4.4.2.1   [Setup PC Connection]

This menu item is used to select the port and baud rate for communications between the FP6 Terminal and the FP6.

- [PC Connection] dialog box
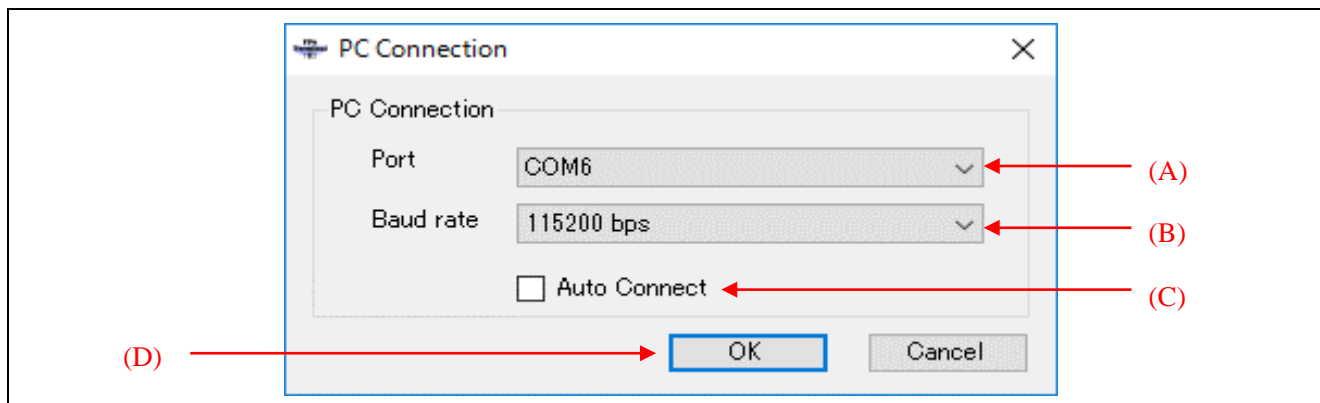
Figure 4.11   [PC Connection] Dialog Box

(A) [Port]

Select the communications port connected to the FP6. When a USB interface cable is used for connection, "COMx: FP6(S/N:xxxxxxxx)" will be displayed.
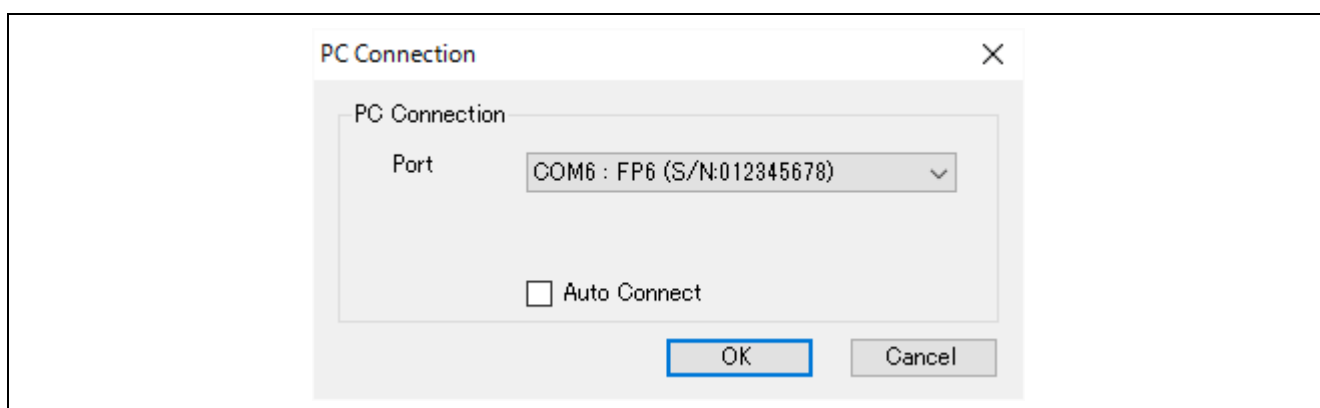
Figure 4.12   [PC Connection] Dialog Box (USB Connection)

(B) [Baud rate]

Select the baud rate for communications between the FP6 and the serial port of the PC.

Notes: 1. [Baud rate] is hidden when a USB-connected port is selected for [Port].
   2. Confirm the baud rate of the FP6 main unit from [Utility]-[RS232C Baudrate] on the LCD message display and set the same baud rate here.

(C) [Auto Connect]

When this checkbox is selected, the [PC Connection] dialog box will be skipped before the main window of the FP6 Terminal opens in cases where the FP6 is connected to the same COM port as in the previous connection or to any COM port via USB.

(D) [OK]

Clicking on this button starts connection to the FP6 with the current settings. When the PC is connected to the FP6, the firmware version of the FP6 will be checked. If the firmware version does not match that expected by the FP6 Terminal, the [Update Firmware] dialog box will appear. Select whether to update the firmware.

4.4.2.2   [Firmware Update]

This menu item is used to update the FP6 firmware.

4.4.2.3   [Logging]

This menu item is used to save the communication log for the results of command execution displayed on the console window. Selecting this menu item opens the [Save File] dialog box, in which you can specify the location where the file will be saved and the file name. While a log is being acquired, a check mark (√) is displayed next to the [Logging] menu item. When the menu item is selected again, the √ mark will disappear and the acquired log data will be saved in the file.

4.4.2.4   [Select Programming Area]

This menu item is used to change the active programming area for the currently connected FP6.

- [Select Programming Area] dialog box

  Selecting the [Select Programming Area] menu item opens [Select Programming Area] dialog box, in which you can change the programming area for the currently connected FP6. To change the programming area, select an area and click on [OK]. To cancel the change, click on [Cancel].
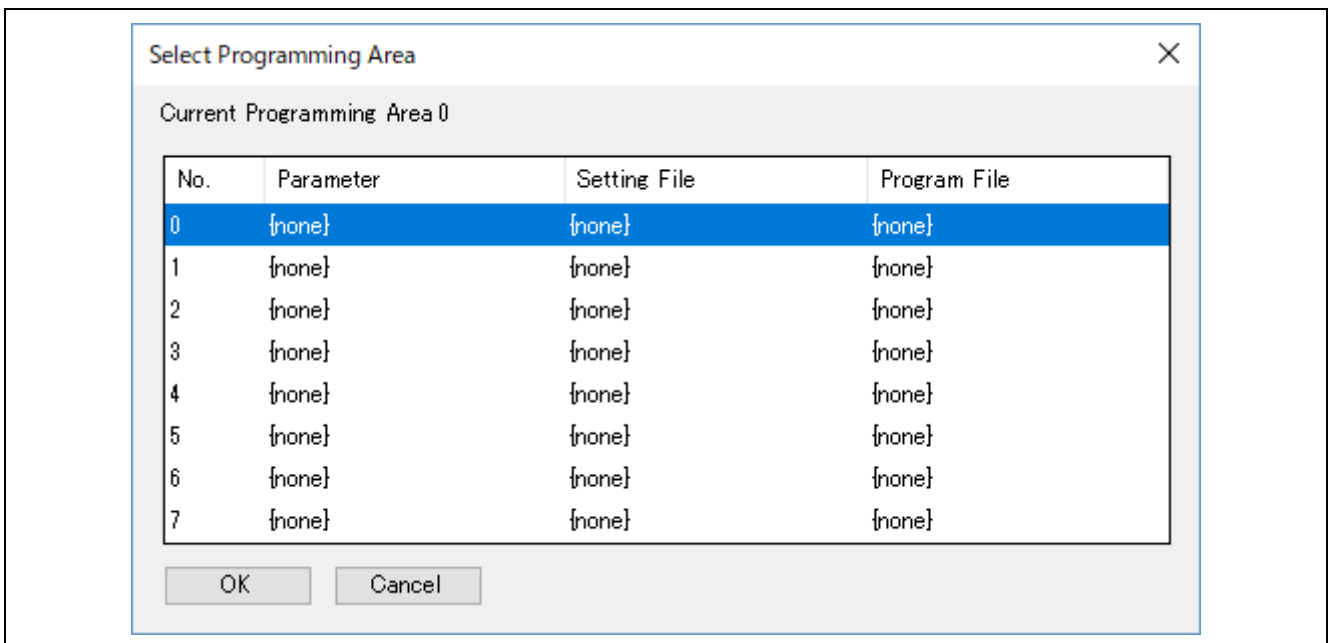
Figure 4.13   [Select Programming Area] Dialog Box

4.4.2.5   [Buzzer]

This menu item is used to make settings regarding the output from the buzzer included in the FP6. When the output of the buzzer sound is enabled, the FP6 makes a buzzer sound upon completion of the target MCU operation in response to pressing the [START] button on the FP6 or clicking on the [Start] button on the FP6 Terminal. While the output of the buzzer sound is enabled, a √ mark is displayed next to the [Buzzer] menu item.

4.4.2.6 [Self Test]

This menu item is used for self-testing of the FP6.

- [Self Test] dialog box
  After self-testing of the FP6 hardware has completed, the following dialog box will appear to show the result of self-testing of the FP6 hardware.

Notes: 1. The MCU and equipment connected to the target connector and remote connector must be removed before the test.
      2. Execute the test while power is being supplied from the power adapter to the FP6.
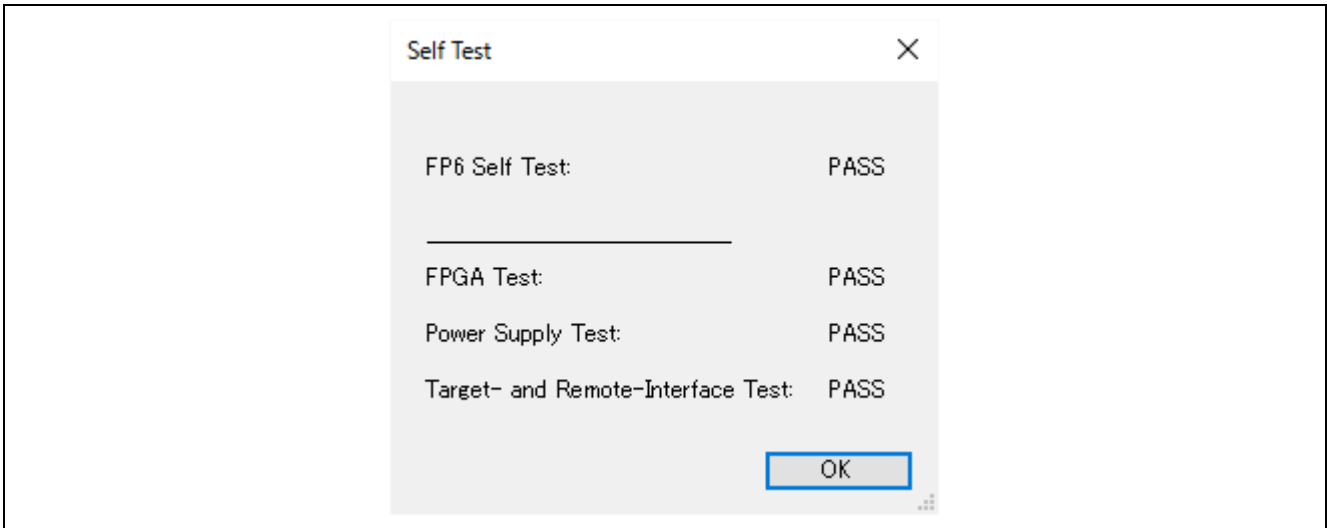
Figure 4.14   [Self Test] Dialog Box

4.4.2.7 [FP6 Manager]

This menu item is used to make security settings, such as disabling uploading or modification of FP6 settings, and change the operation mode of the FP6 main unit.

(1) Setting a password in the FP6
  To execute [FP6 Manager], a password needs to be set in the FP6. If no password has been set in the currently connected FP6, the [Set Password] dialog box will appear.
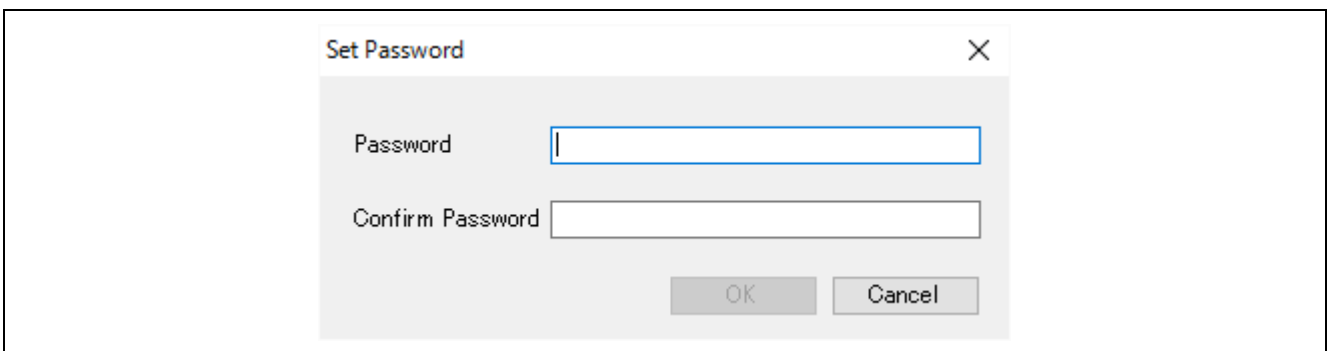
Figure 4.15   [Set Password] Dialog Box

(2) Login to FP6 Manager

If a password is already set in the FP6, the [Login to FP6 Manager] dialog box will appear. In this dialog box, enter the password and log in to the [FP6 Manager] menu.
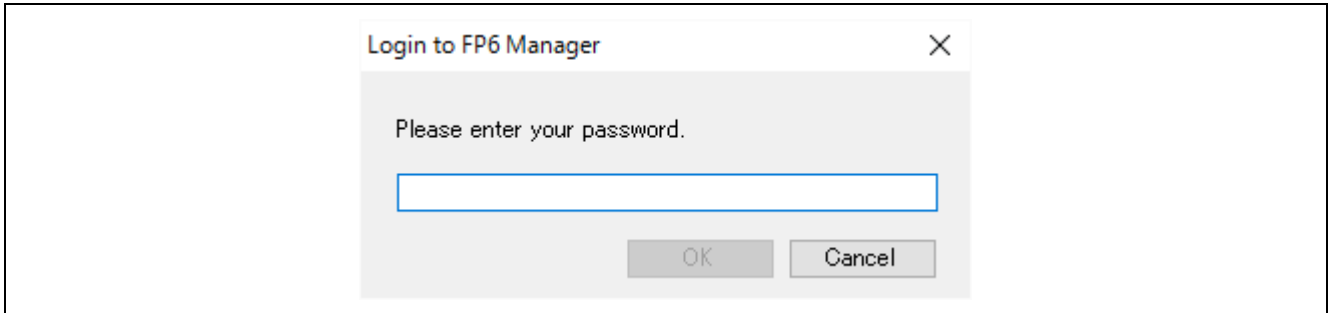
Figure 4.16   [Login to FP6 Manager] Dialog Box

Note: When the password does not match, it can be initialized. However, the data downloaded to the FP6 will also be cleared.

- [FP6 Manager] dialog box

This dialog box allows you to select security features (disabling uploading or modification of FP6 settings), operation mode, and other optional functions. These functions are managed with a password.
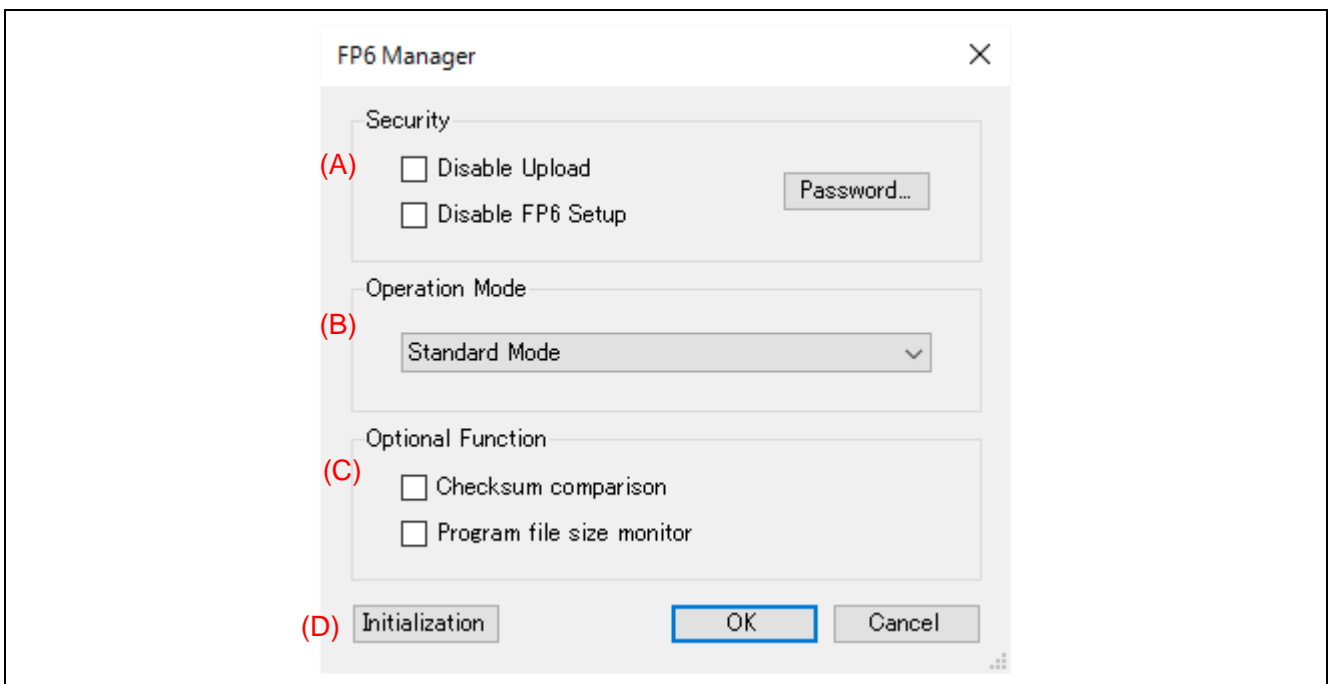
Figure 4.17   [FP6 Manager] Dialog Box

(A) Security

Enable security features to protect the data downloaded to the FP6.

- Disable Upload

Disables uploading of setting files including program files from the FP6

- Disable FP6 Setup

Disables modification of the FP6 settings and downloading of ESF files and program files to the FP6

- Password

Allows you to change the password for logging in to the [FP6 Manager] dialog box

(B) Operation Mode

Select the operation mode of the FP6 main unit.

- Standard Mode

    The default mode at shipment.

- Bank Mode

    In this mode, the active programming area is switched by using bank signals instead of a standalone menu. For bank mode, refer to chapter 6, Usage of the Remote Connector.

- Simple Mode

    In this mode, the ESF file is switched by using the [NEXT] and [CANCEL] buttons. For simple mode, refer to chapter 5, Usage in Standalone Mode.

- Unique Code Mode

    In this mode, the 'serno' command is usable as a communication command. For the 'serno' command, refer to chapter 7, Usage of Communications Commands.

(C) Optional Function

Select optional functions that you wish to use in command execution.

- Checksum comparison

    When this function is enabled and the checksum (*sum*) command of the target MCU is executed, the checksum of the downloaded program file will be displayed. An error will be reported if there is a mismatch.

- Program file size monitor

    When this function is enabled and the programming (*prg*) or verify (*vrf*) command is executed, an error will be reported in cases where the selected program file has data that exceeds the programmable area of the target MCU.

(D) Initialization

Click on this button to initialize the settings and password that were downloaded to the FP6.

4.4.3   [Target] menu

This menu is used to perform operations for the target MCU, such as erasure or programming. When the selected target MCU does not support a given function, the corresponding menu item will be hidden. This menu is invalid when the FP6 has not been connected.

4.4.3.1   Blank Check

This command checks if data has already been written to the target MCU.

4.4.3.2   Erase

This command erases flash memory in the target MCU.

4.4.3.3   Program

This command writes data that has been downloaded to the FP6 to the flash memory in the target MCU.

4.4.3.4   Verify

This command compares data written to the target MCU with data downloaded to the FP6.

4.4.3.5   Read

This command reads data from the flash memory in the target MCU. In the submenu, select whether to display the result of reading in the console window or save it in a file.

4.4.3.6   Program Flash Options

This command sets flash options, such as option bytes, security, flash access window, OTP, and lock bits, which have been made on the [Flash Option] tabbed page of the [Setup] dialog box.

4.4.3.7   Checksum

This command acquires the checksum of data of flash memory in the target MCU.

4.4.3.8   Start

This command executes the commands selected in the [Operation Setting] tabbed page of the [Setup] dialog box.

4.4.3.9   Connect

This command is used for connection or disconnection with the target MCU. This menu item can be selected only when automatic connection of the FP6 (see 7.4.1, autocon command) is disabled. Executing this command connects the target MCU, placing a tick against the menu item. Executing this command again disconnects the target MCU, removing the tick from the menu item.

4.4.3.10 Get Signature

This command establishes connection with the target MCU and displays MCU information in the console window.

4.4.3.11 Get Flash Options

This command acquires information on flash options from the target MCU and displays it in the console window and a popup dialog box. The acquired information can also be saved as a new ESF file.

- [Flash Options] dialog box

    The result of executing the Get Flash Options command will be displayed on the [Block Setting] and [Flash Option] tabbed pages of this dialog box.
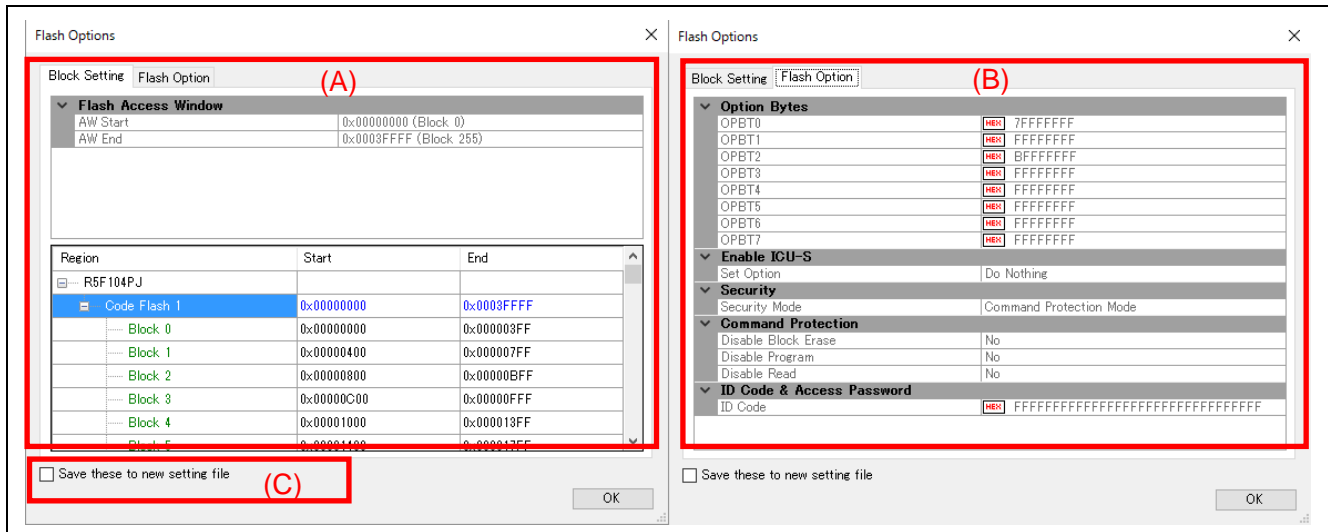
Figure 4.18   [Flash Options] Dialog Box

(A) [Block Setting] tabbed page

This page shows the settings made for [Lockbit & OTP], [Flash access window], and [End block of the boot area] on the [Block Setting] tabbed page of the [Setup] dialog box. For details, see section 4.3.3, [Block Setting] tabbed page.

(B) [Flash Option] tabbed page

This page shows the settings made on the [Flash Option] tabbed page of the [Setup] dialog box. For details, see section 4.3.4, [Flash Option] tabbed page.

Note: Some data may not be acquired depending on the state of the MCU. Items for which no data have been acquired are left blank.

(C) [Save these to new setting file] checkbox

Select this checkbox if you wish to save the flash-option data that have been acquired as a new ESF file.

Note: Data will not be saved in an ESF file if all data have not been acquired.

4.4.4   [Help] menu

4.4.4.1   [About FP6 Terminal]

This menu item shows the version information of the FP6 Terminal.

4.5 Toolbar

The menu items frequently used on the FP6 Terminal are displayed as buttons on the toolbar. Similar to the target menus on the menu bar, some buttons may be hidden depending on the selected operation or type of the target MCU.

Table 4.4   Toolbar Buttons

Icon	Description
	The same action as selecting [New Setup File…] in the [File] menu.
	The same action as selecting [Select Programming Area…] in the [Programmer] menu.
	The same action as selecting [Connect] in the [Target] menu. Left side: Connect the FP6 when it is disconnected Right side: Disconnect the FP6 when it is connected
	The same action as selecting [Blank Check] in the [Target] menu.
	The same action as selecting [Erase] in the [Target] menu.
	The same action as selecting [Program] in the [Target] menu.
	The same action as selecting [Verify] in the [Target] menu.
	The same action as selecting [Program Flash Options] in the [Target] menu.
	The same action as selecting [Start] in the [Target] menu.

4.6 Example of Operation Using the FP6 Terminal

This chapter explains a series of basic FP6 operations using the FP6 Terminal, taking a case where the RL78/G14 is used as the target MCU as an example.

• Series of operations described in this chapter:

The operation conditions for this chapter are as follows.

Host PC interface: USB

Programming area: Area 0

Target MCU: R5F104LE (RL78/G14)

Power supply: None (i.e. supplied from the target system)

Clock supply: 32 MHz (on-chip oscillator clock)

Communications interface: Single-wire UART (1 Mbps)

Security setting: Disabled

Operation mode: Chip mode

Flash options: Not used

The operation steps described in this chapter are as follows.

    (1) Installing the FP6 Terminal and USB driver

    (2) Connecting the FP6 to the host PC

    (3) Connecting the target system

    (4) Starting up the FP6 Terminal

    (5) Setting up a programming environment

    (6) Executing the [Start] command

    (7) System shutdown

4.6.1   Installing the FP6 Terminal and USB driver

Refer to chapter 3, Software Installation, and install FP6 Terminal and the USB driver on the host PC.

4.6.2   Connecting the FP6 to the host PC

    <1> Connect the USB connector of the FP6 to the USB port on the host PC via a USB cable.
    <2> Connect the power adapter (which comes with the FP6) to the FP6.
    <3> Turn on the power switch on the FP6. Do not connect the target MCU before turning on power.

4.6.3   Connecting the target system

Be sure to turn on the power of the FP6 before connecting the target system.
    <1> Connect the GND connector of the FP6 to the target system via the GND cable.

Note: The FP6 and target system may be damaged if there are differences in potential between the grounds of the FP6 and of the target system. Use the GND cable to eliminate differences in potential before connecting the target cable.

  <2> Connect the target connector of the FP6 to the target system via the target cable.

Note: Connect the target system before supplying V_{CC} power from the target system.

4.6.4   Starting up the FP6 Terminal

  <1> Click on the [Start] menu and select [PG-FP6] to start the FP6 Terminal.
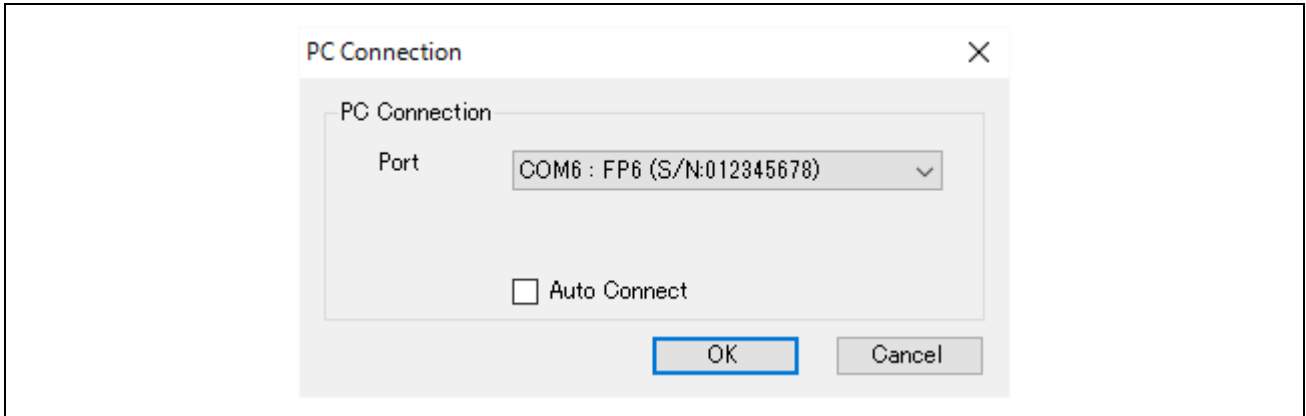
Figure 4.19   Connection between the FP6 Terminal and the FP6

  <2> Clicking on the [OK] button in the [PC Connection] dialog box connects the PC with the FP6 through the selected communication port.

  <3> When the FP6 Terminal is started correctly, the main window is opened.
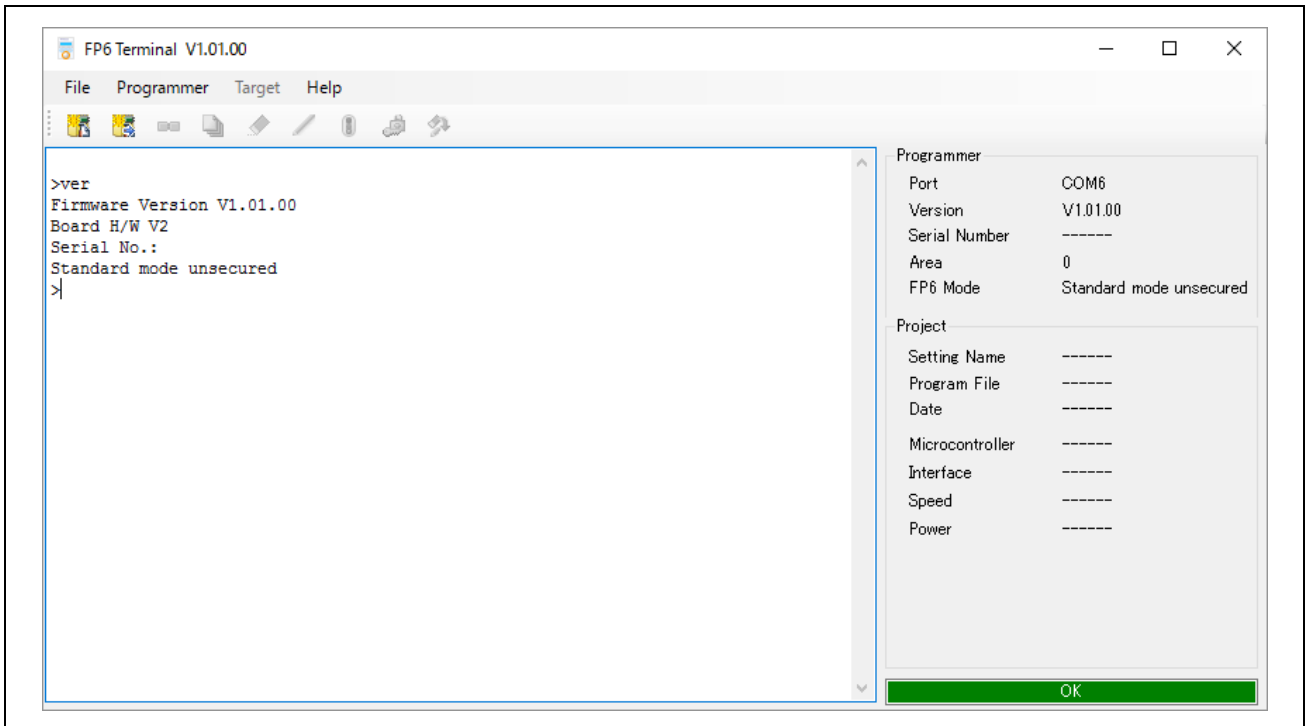
Figure 4.20   Main Window

4.6.5   Setting up a programming environment

<1> When the main window is opened, select [New Setup File…].
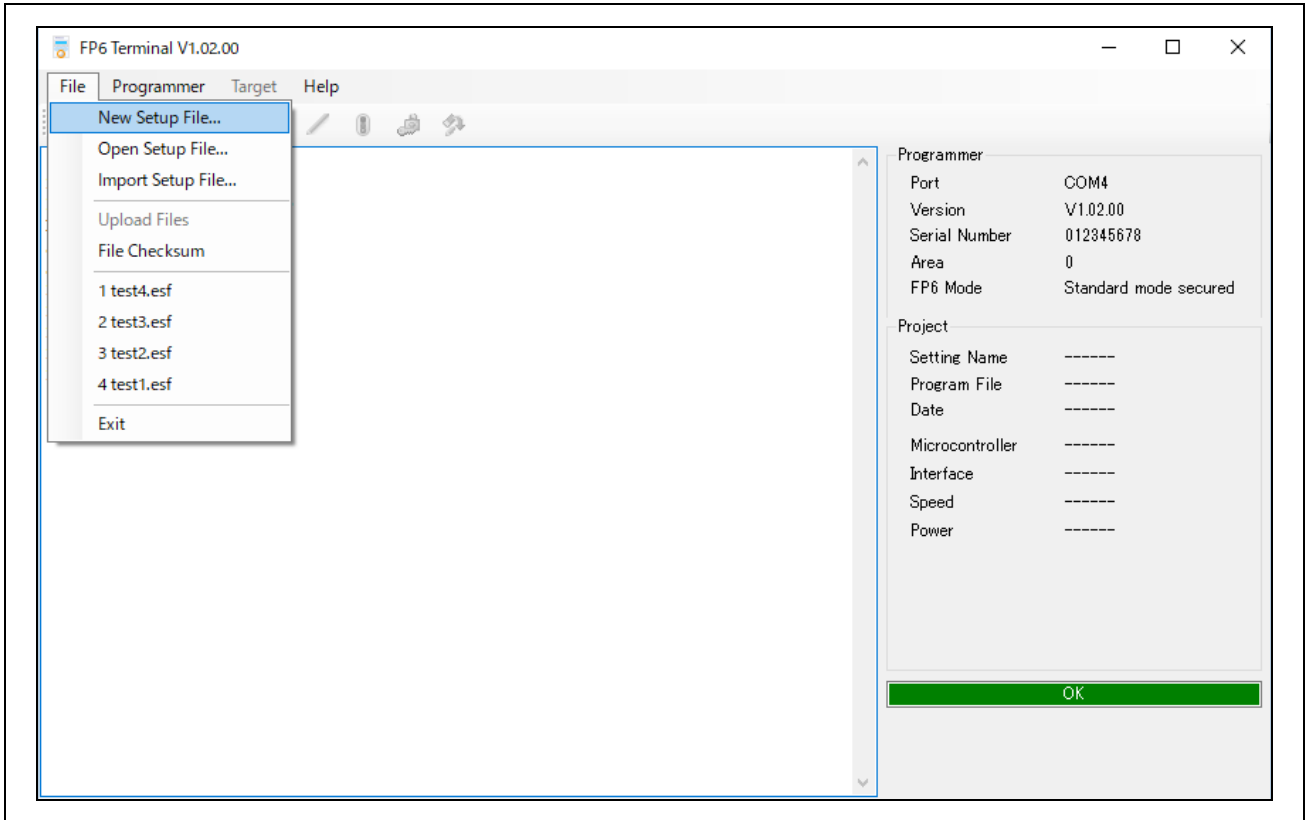
Figure 4.21   [Setup] Command

<2> Create a new ESF file. Select the family, group, and type name of the target MCU, and enter a setting name as shown in figure 4.22, and click on the [OK] button.
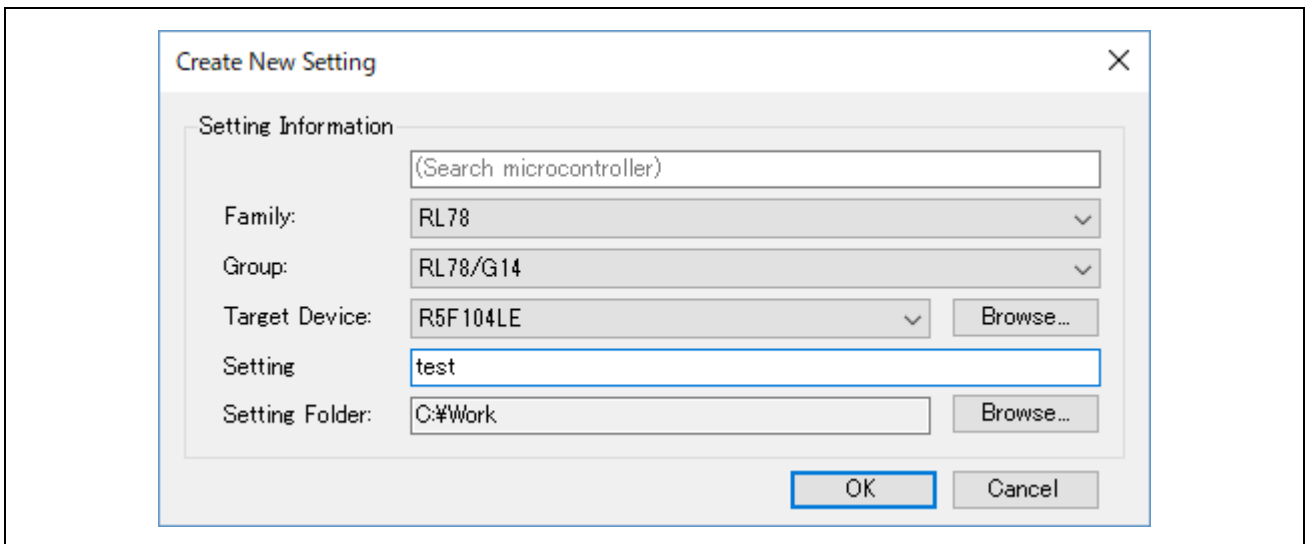
Figure 4.22   [Create New Setting] Dialog Box

<3> The [Setup] dialog box will appear. Designate a program file on the [Program File] tabbed page. Click on the [Browse…] button to select a file.
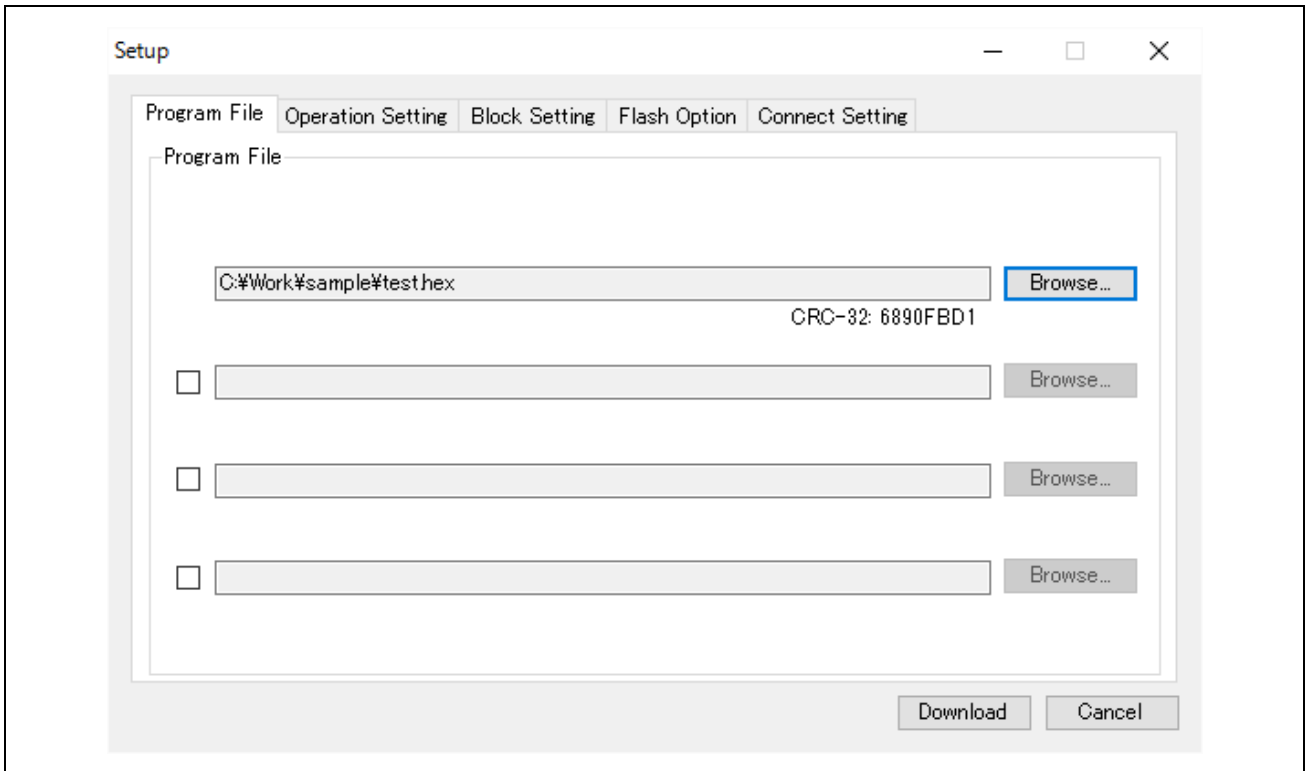
Figure 4.23   Selecting a Program File

<4> Check that "chip mode" is selected as the operation mode on the [Block Setting] tabbed page.
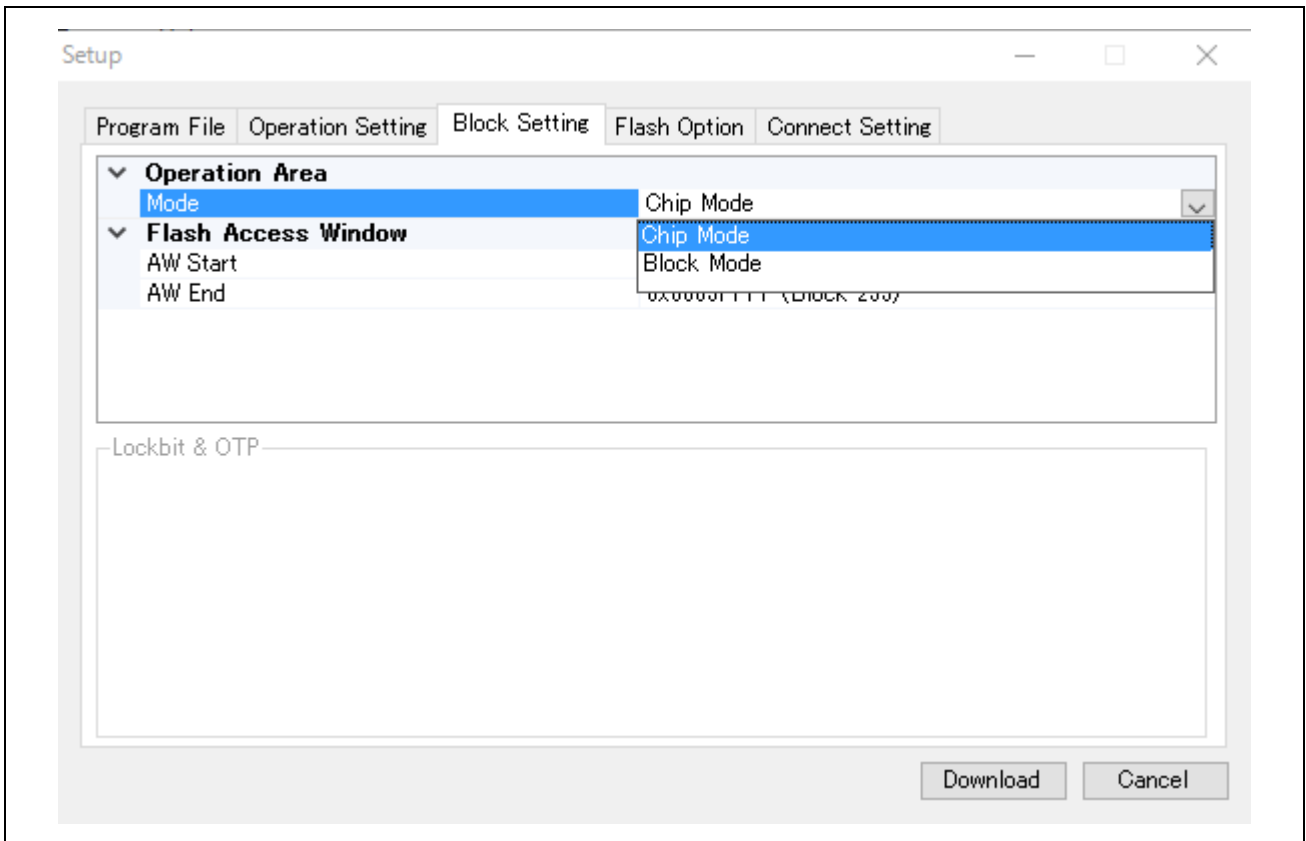
Figure 4.24   Changing the Block Setting

<5> Click on the [Download] button to download PR5, ESF and program files to the FP6. When downloading is complete, the screen shown below will appear. This completes the setting of the programming environment.
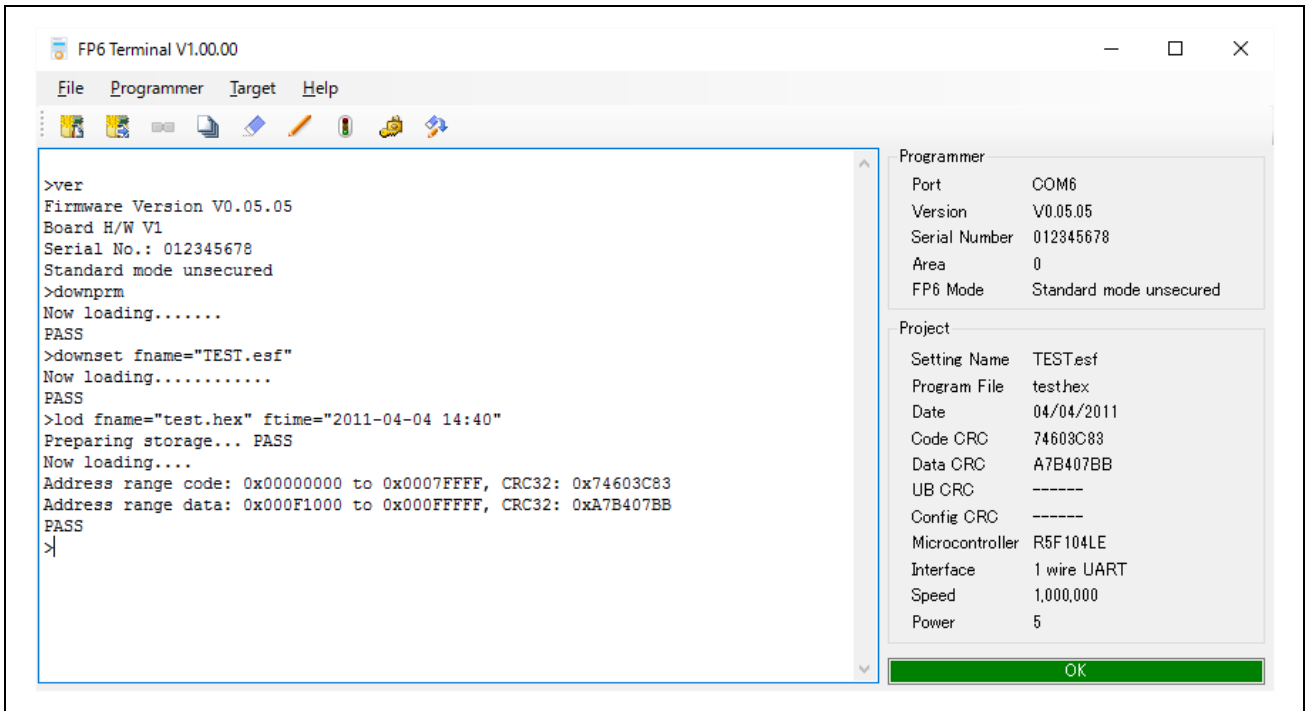
Figure 4.25   Downloading PR5, ESF, and Program Files

4.6.6   Executing the [Start] command

Execute the [Start] command from the [Target] menu.
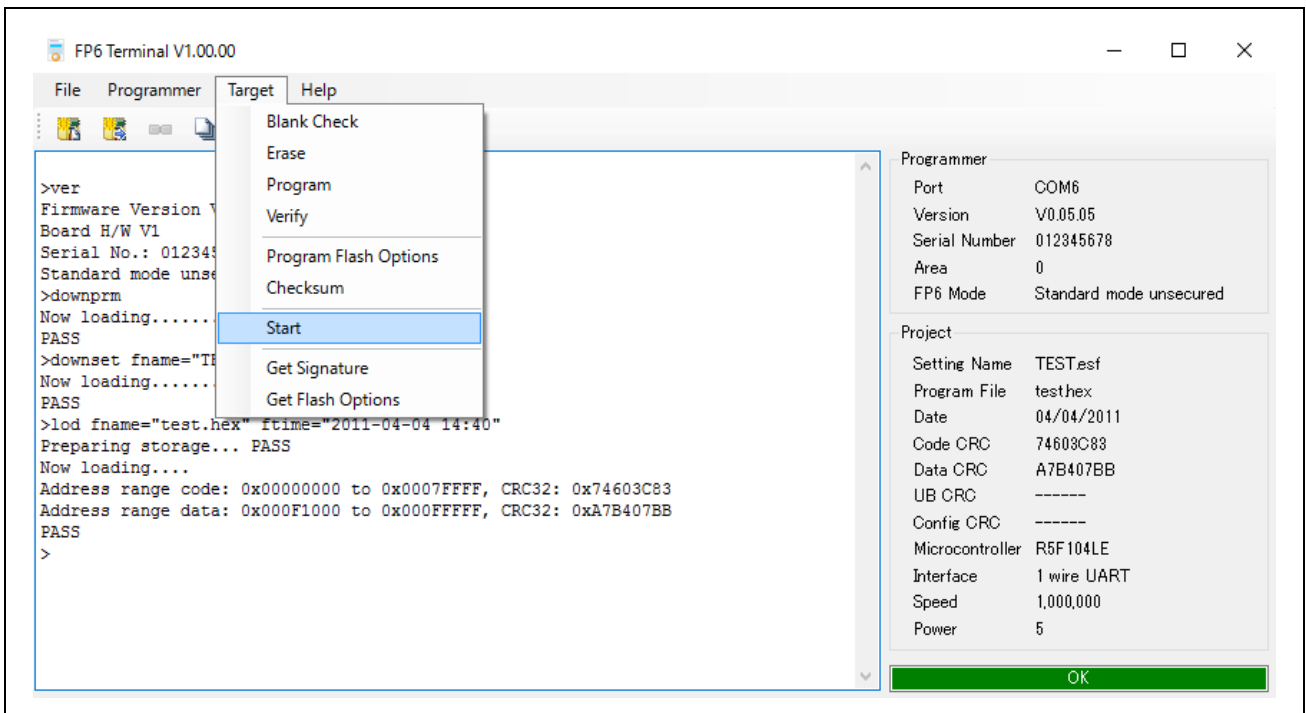
Figure 4.26   [Start] Command

When the [Start] command is executed, the [Erase] and [Program] commands are executed in that order for the R5F104LE.

Note: If you wish to write to another target system, turn the power off, connect the target system, and supply power before executing the [Start] command.

When execution of the [Start] command is completed, "Erase, Program operation finished" is displayed in the console window.
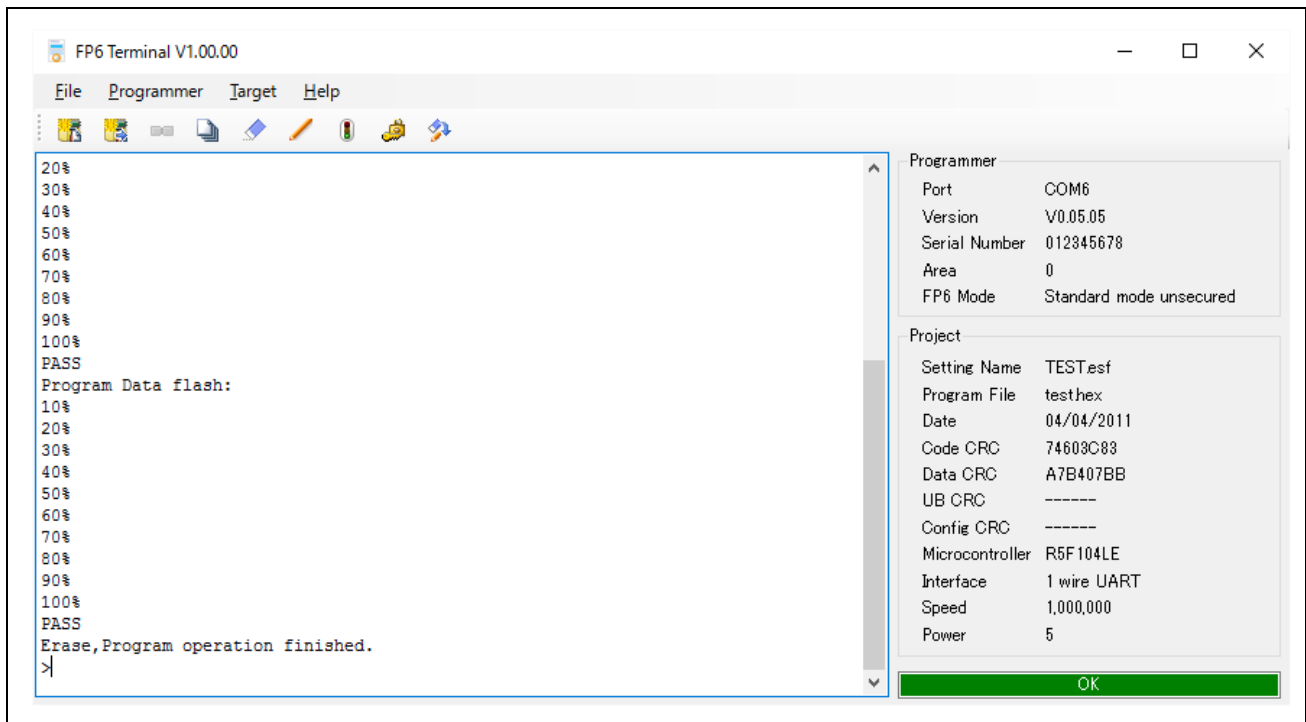
Figure 4.27   Result of Executing the [Start] Command

4.6.7   System shutdown

<1> Remove the target system from the target cable.

Note: When Vcc is supplied from the target system, turn the power off before removing the target system.

<2> If you do not intend to program any other MCUs, execute the [Exit] command from the [File] menu to close the FP6 Terminal. All settings that have been made so far are saved in the ESF file and can be restored when the FP6 Terminal is restarted. The PR5, ESF, and program files are saved in the FP6 internal flash memory.

<3> Turn off the power switch of the FP6.

<4> Remove the power adapter and USB cable from the FP6.

Note: If an error has occurred in the above steps, refer to chapter 10, Troubleshooting and Appendix A, Messages. Also refer to 4.4.2.6, [Self Test], and perform self-testing. If this does not resolve the problem, see the FAQ (<https://www.renesas.com/pg-fp6> → Design Support → FAQ) or access https://www.renesas.com/contact for inquiry.

5   Usage in Standalone Mode

The FP6 has a standalone mode in which the FP6 by itself can execute the [Erase], [Program], and [Start] commands without a host PC. This mode is useful for using the FP6 on the production line during mass production and for upgrading in the field.

- Standard mode

  Various functions on the LCD menu can be executed by operating buttons on the main unit or inputting the remote interface signal (NEXT, ENTER, CANCEL, START, VERIFY, or CLEAR).

- Simple mode

  This mode allows changing the programming areas by the NEXT button. In this mode, the functions on the LCD menu cannot be executed unlike in the standard mode. Table 5.1 shows assignments of remote interface signals in simple mode.

Table 5.1   Assignments of Remote Interface Signals in Simple Mode

Button on FP6 Main Unit	Pin Number Assigned to Remote Interface Signal	Function in Simple Mode
CANCEL	5	CANCEL
ENTER	6	Depends on the [Start] setting.
NEXT	7	Changes programming areas. (Increments the number by 1. Returns to 0 after area 7.)
START	9	Depends on the [Start] setting.

- Bank mode

  Refer to chapter 6, Usage of the Remote Connector.

- Unique code mode

  Refer to section 7.4.15, serno command.

5.1 Details of Buttons, Message Display, and Status LEDs

In standalone mode, command menus are selected and executed using the control button ([NEXT], [ENTER], [CANCEL], or [START]) on the top of the FP6 main unit.

The selected command menu is shown in the message display, and the result of command execution is indicated by the message display and status LEDs.

The command menu consists of two levels of menus: a main menu and submenu.

[NEXT] button: Displays the next menu on the same level.

[ENTER] button: Selects or executes the menu item currently displayed.

[CANCEL] button: Cancels the current selection and returns to the previous menu level. The command currently running cannot be stopped, except for the [Read] command.

[START] button: Executes the [Start] command. It can be executed from any command menu, and the display returns to the same command menu after execution.
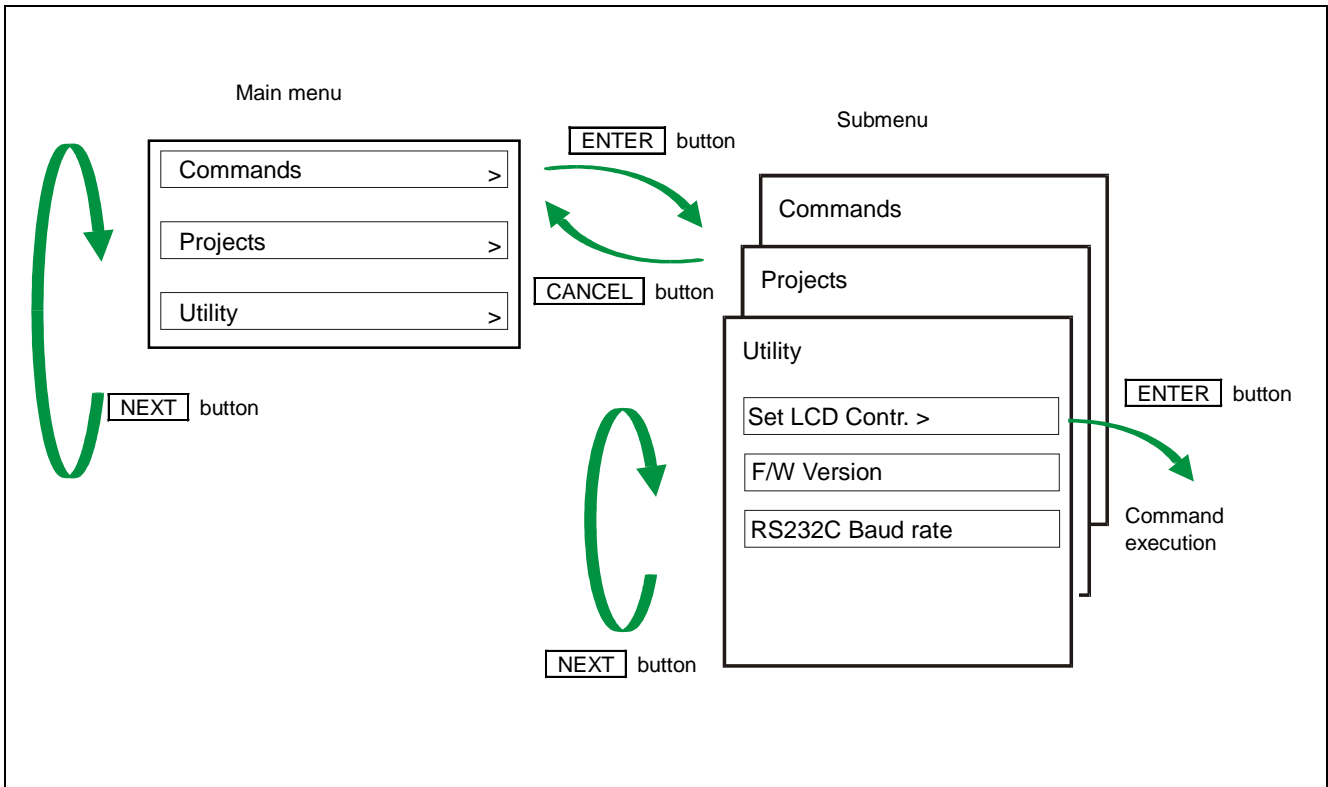
Figure 5.1   Transition of the States of Menus by Using Buttons

On the main menu level, the FP6 shows the selectable menu items. On the submenu level, the first line and the second line in the message display show the menu item and the response from the FP6, if any, respectively.

A command prompt '>' displayed at the end of a menu line indicates that it is selectable with the [ENTER] button, or that the menu (command) can be executed. If the command prompt '>' is not displayed at the end of a menu line, it means that the function is available only for display.

When power to the FP6 is turned on, 'Commands >' is displayed in the message display.

The status LEDs indicate the states of communications with the MCU and the result of execution, as shown below.

Table 5.2   Status LEDs

Status LED	Color	State
PASS	Blue	The selected command has been executed correctly. The command that has been correctly executed is displayed in the message display.
BUSY	Orange	The selected command is under execution. The detailed execution state is displayed in the message display.
ERROR	red	The selected command has been executed incorrectly. Details on errors are displayed in the message display.
VCC	green	Power is being supplied to the user system.

Note: For details on errors displayed in the message display, refer to section A.2, Error Messages Displayed in Message Display.

5.2 Standalone Operation Menu

In standalone mode, the programming environment of the target MCU can be checked and then programs can be written by using the commands explained in this section.

5.2.1　[Commands] menu

The [Commands] menu provides various commands required for programming the target MCU. Select a command from this menu and press the [ENTER] button; the FP6 will then execute the command for the target MCU, based on the settings downloaded to the active programming area. For details on command execution, refer to section 4.4.3, [Target] menu.

Table 5.3　[Commands] Menu

Main Menu	Submenu	Description
[Commands >]	[E.P.　　　　　>]	Pressing the [ENTER] button executes the [Start] command.
	[Program　　　>]	Pressing the [ENTER] button executes the [Program] command.
	[Erase　　　　>]	Pressing the [ENTER] button executes the [Erase] command.
	[Verify　　　　>]	Pressing the [ENTER] button executes the [Verify] command.
	[Program Flash　>] Options	Pressing the [ENTER] button executes the [Program Flash Options] command.
	[Checksum　　>]	Pressing the [ENTER] button executes the [Checksum] command. The checksum value read from the target MCU is displayed in the message display.
	[Signature　　>]	Pressing the [ENTER] button executes the [Signature read] command. The MCU name is displayed in the message display.
	[Connect　　　>]	Pressing the [ENTER] button executes the [Connect] (con) command.
	[Disconnect　　>]	Pressing the [ENTER] button executes the [Connect] (dcon) command.

5.2.2   [Project] menu

The [Project] menu is used to check information about switching the programming area and checking the ESF file name, program file name, and CRC value.

Table 5.4   [Project] Menu

Main Menu	Submenu	Description
[Project >]	[Project Name >]	Pressing the [ENTER] button displays the name of the ESF file stored in the active programming area on the message display.
	[PRM Name >]	Pressing the [ENTER] button displays the name of the PR5 file stored in the active programming area on the message display.*
	[Program File >]	Pressing the [ENTER] button displays the name of the program file stored in the active programming area on the message display.*
	[File Checksum >]	Pressing the [ENTER] button displays the results of executing the [File Checksum] command from the [File] menu of the FP6 Terminal.
	[Progarea >]	Pressing the [ENTER] button causes a transition to the next programming area.

Note: If the file to be displayed has not been downloaded, [n.a.] is displayed. If the file name exceeds 16 characters, "~" is displayed as the 16th character.

5.2.3   [Utility] menu

The [Utility] menu is used to adjust the LCD contrast and check the firmware version of the FP6 main unit.

Table 5.5   [Utility] Menu

Main Menu	Submenu	Description
[Utility >]	[Set LCD Contr. >]	Adjust the contrast in the message display. After pressing the [ENTER] button, the contrast can be adjusted using the [NEXT] (darken) or [CANCEL] (lighten) button. To fix the contrast, click on the [ENTER] button.
	[F/W Version]	Pressing the [ENTER] button displays the FP6 firmware version.
	[RS232C Baud rate]	Pressing the [ENTER] button displays the current baud rate value set for the RS-232C host interface.

6   Usage of the Remote Connector

This chapter describes the usage of the remote connector.

The FP6 can be remotely controlled by connecting the remote connector and external control device. Remote control can be used to operate and check programming and the display of PASS, BUSY or ERROR from the external control device.

6.1 Remote Interface Mode

The remote interface has a standard mode and a bank mode.

The modes are switched by using [Operation Mode] of [FP6 Manager].

For details of the mode setting, refer to section 4.4.2.7, [FP6 Manager].

- Standard mode
  The same signals as the control buttons (NEXT, ENTER, and CANCEL) on the command menu of the FP6 unit can be input.
- Bank mode
  This mode allows inputting of the bank signals (BANK0 to BANK2) that indicate the programming area. The control buttons (NEXT, ENTER, and CANCEL) will change their functions to those inputting bank signals, so that the command menu shown on the FP6 message display will be disabled.

Note: Do not operate the buttons in the bank mode. Otherwise, confliction occurs between the remote signal and signal input by operating the button.

7 Usage of Communications Commands

This chapter describes how to use communications commands from a host PC to operate the FP6.

7.1 Starting the Communications Software

In order to use communications commands for operation, communications with the FP6 must be established with communications software. In this chapter, we shall describe how to use communications software to establish communications.

7.1.1 Connecting the system

Connect a USB cable to the USB port on your host PC, and then connect the other end to the USB connector on the FP6. Next, plug the power supply adapter into an outlet, then connect it to the FP6 power supply connector.

7.1.2 Starting the FP6

After the connections are made, turn on the FP6 power supply switch.

7.1.3 Starting communications software

Start communications software.

Check the COM port number with Device Manager.
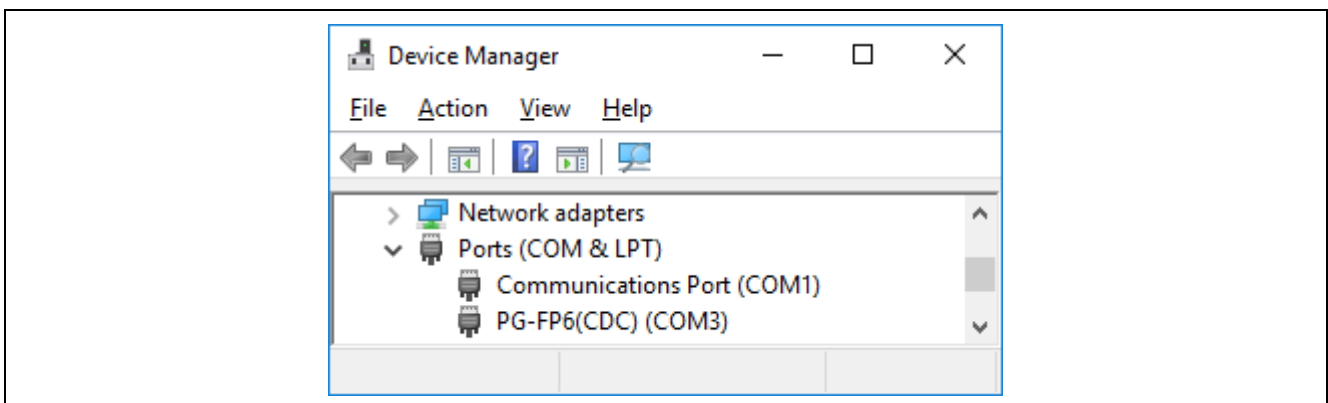
Figure 7.1   Checking the COM Port Number Settings

In the case of using the RS - 232C cable, select the data transfer conditions listed below.

Data transfer rate: 9600 bps, 19200 bps, 38400 bps, 57600 bps, or 115200 bps

Data bits: 8 bits

Parity: None

Stop bit: 1 bit

Flow control: Hardware

The default data transfer rate is 9600 bps, but it may be changed by the FP6 Terminal or terminal commands to another rate. In such cases, use the [PC connection] in the [Programmer] menu of the FP6 Terminal to check the transfer rate and make sure they match.

When communications software starts correctly, the main window will open. If communications are established, then a ">" will be displayed when the Enter key on the host PC is pressed. This completes the preparation for using communications commands.

Note: Press the Enter key once after FP6 has started. Alternatively, send a linefeed code once to FP6 by using
        communications software.

7.2 Command List

The following is a list of FP6 control commands and target commands.

Table 7.1   List of FP6 Control Commands

Command Name	Description
autocon	This command is used to select whether to automatically or manually connect or disconnect the target MCU in the following processes, or to refer to the current setting. • From entering flash memory programming mode to verifying the signature • Leaving the flash memory programming mode
brt	Confirms and changes the data transfer rate during serial communications with the host PC.
conf	Displays a list of the information stored in the FP6.
dwnprm	Downloads the PR5 file.
downset	Downloads the ESF file.
fcks	Gets a checksum value of the program file that was downloaded to the active programing area of the FP6.
files	Displays the information concerning the program file that was downloaded to the FP6.
hex	Uploads the program file in Intel HEX format.
hlp	Displays a list of available commands, with simple descriptions.
lod	Downloads the program file.
prm	Displays the information concerning the PR5 file and ESF file that were downloaded to the FP6.
progarea	Confirms, changes and deletes data in the active programming areas.
res	Resets the FP6.
selftest	Executes a self-test.
serno	Sets the unique code for embedding in the program file.
sound	Sets the buzzer.
srec	Uploads the program file in Motorola S format.
trc	Displays the communication information between the FP6 and target MCU.
upprm	Uploads the PR5 file.
upset	Uploads the ESF file.
ver	Displays the FP6 version.

Table 7.2   List of FP6 Device Commands

Command Name	Description
bln	Executes the blank check.
clr	Executes the Configuration clear.
con	Executes the processes from "transition to flash memory programming mode" to "signature verification".
dcon	Executes the termination of the flash memory programming mode.
ep	Executes the erasure and programming successively.
ers	Executes the Erase command.
gdi	Gets the information of blank check and flash option.
ged	Gets the information of endian.
gid	Gets the ID code.
glb	Gets the information of lock bit.
gob	Gets the information of option byte.
gof	Gets the information of OFS.
gos	Gets the information of flash option.
got	Gets the information of OTP.
gsc	Gets the information of security.
gtm	Gets the information of Trusted Memory.
idc	Executes the ID code setting.
opb	Executes the option byte setting.
otp	Executes the OTP setting.
pfo	Sets the flash options collectively.
prg	Executes programming.
read	Reads the flash memory data from the target MCU.
rsc	Executes the Security Release command.
scf	Executes the [Set Security] command.
sed	Executes the endian setting.
sid	Sets the ID code and enables ID authentication in the serial programming mode.
sig	Executes the Signature read command.
slb	Executes the lock bit setting.
spd	Disables the serial programming.
stm	Executes the Trusted Memory setting.
sum	Executes the Checksum command.
vrf	Executes the Verify command.

7.3 Description of Commands

Each of the commands is described using the following format.

Command name

Presents an overview of the command.

Input format

Presents the input format for the command[Note].

Description of the function

Describes the function of the command.

Example of usage

Presents an example of using the command.

Note: The symbols used to describe the input format are defined below.

Notation	Description
Characters within single quotation marks ' '	Characters that must be input as displayed
Characters within angle brackets < >	Information that must be provided
Characters within parentheses ( )	Optional items
Options separated by vertical bars |	Options where only one option can be selected

7.4 Description of FP6 Control Commands

7.4.1   autocon command

This command is used to select whether to automatically or manually connect or disconnect the target MCU in the following processes, or to refer to the current setting.

- From entering flash memory programming mode to verifying the signature
- Leaving the flash memory programming mode

Input format
_____

'autocon' ('on | off')

Description of the function
_____

Selects either automatic (on) or manual (off) execution, to be executed before and after the target command completion, of the processes from entering flash memory programming mode to verifying the signature (con command), and leaving the flash memory programming mode (dcon command). The initial value is automatic (on). If this command is executed without an option, the current setting is displayed (automatic (on) or manual (off)). The default setting is automatic (on).

on: The con command and dcon command are executed automatically.

off: The con command and dcon command are executed manually. When set to manual (off), the con command is executed, the target command can be executed. Furthermore, various target commands can be executed multiple times. Execute the dcon command to terminate. Note that the ep command will automatically execute the con command and dcon command even if this is set to manual (off).

Example of usage
_____

Example of Communication Software Terminal Display
>autocon AutoCon is on / off >autocon on AutoCon is on >autocon off AutoCon is off

7.4.2   brt command

Confirms and changes the data transfer rate for serial communications with the host PC.

Input format

'brt' ('9600' | '19200' | '38400' | '57600' | '115200')

Description of the function

This command can be used with its options to change the data transfer rate for serial communications with the host PC. When the data transfer rate is changed, it will be necessary to change the data transfer rate of the COM port setting with terminal software and reconnect.

If no options are used with this command, the current data transfer rate will be displayed.

If the serial connector is connected, the data transfer rate will be displayed.

If a USB connector is used, the USB version will be displayed.

- USB (HS) ... USB 2.0
- USB (FS) ... USB 1.1

The default data transfer rate is 9600 bps.

> 9600: Changes the data transfer rate to 9600 bps.
>
> 19200:   Changes the data transfer rate to 19200 bps.
>
> 38400:   Changes the data transfer rate to 38400 bps.
>
> 57600:   Changes the data transfer rate to 57600 bps.
>
> 115200:   Changes the data transfer rate to 115200 bps.

Example of usage

Example of Communication Software Terminal Display
>brt [When the serial connector is connected at 115200 bps] Current Baud rate is: 115200 >brt [When the USB connector is connected at High speed] Current Baud rate is: USB (HS) >brt 19200 New Baud rate is: 19200

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7.4.3   conf command

Displays a list of the information stored in the FP6.

Input format

'conf'

Description of the function

Displays the following information stored in the FP6.

- Version information (firmware version, board hardware version, FPGA version, serial number, and FP6 mode)
- Program area information (area divisions, active programming areas, and maximum size of program file information (code area and data area))
- Program file information (file name, creation date, size, and checksum)
- PR5 file and ESF file information in all programming areas (PR5 file names, PR5 file checksums, and ESF file checksums)
- Automatic connection information
- Buzzer information
- Automatic power supply OFF information
- Security setting information
- FP6 manager option setting information

Example of usage

Example of Communication Software Terminal Display
>conf
Firmware Version Vx.xx.xx
Board H/W Vx
Serial No.: xxxxxxxxxx
Standard mode unsecured
Number of Program areas: 8   Active Program Area: 0
Size of Program Areas (Code / Data / User Boot / Config):
Area 0: 0x1000000 / 0x800000 / 0x800000 / 0x80000
Area 1: 0x1000000 / 0x800000 / 0x800000 / 0x80000
Area 2: 0x1000000 / 0x800000 / 0x800000 / 0x80000
Area 3: 0x1000000 / 0x800000 / 0x800000 / 0x80000
Area 4: 0x1000000 / 0x800000 / 0x800000 / 0x80000
Area 5: 0x1000000 / 0x800000 / 0x800000 / 0x80000
Area 6: 0x1000000 / 0x800000 / 0x800000 / 0x80000
Area 7: 0x1000000 / 0x800000 / 0x800000 / 0x80000
Area Filename   Date   Time   Range   CRC
*0 RX71MB.mot   2016-02-05 16:34 FFC00000-FFC00FFF C3E2C255
00100000-0010400F 66AD12B9
FF7F8000-FF7F8FFF 1CD20C10
00120000-001200FF A72B0AD3
1 RX71MA.mot   2016-02-05 16:36

```
                            00100000-0010400F 66AD12B9


                            00120000-001200FF A72B0AD3

  2 {unknown data}



  3 test.hex              2011-11-30 13:11 00000000-00003FFF C80EBAB6



  4 {unknown data}



  5 {unknown data}



  6 {unknown data}



  7 {unknown data}


 Area File name                    CRC      Type
 *0  R5F571M                       41F6142D PR5
    Test1                          62189515 PRJ
  1  R5F571M                       41F6142D PR5
    Test2                          5AC4344E PRJ
  2  78F1166                       C8005840 PR5
    {invalid}                               PRJ
  3 {invalid}                               PR5
    {invalid}                               PRJ
  4 {invalid}                               PR5
    {invalid}                               PRJ
  5 {invalid}                               PR5
    {invalid}                               PRJ
  6 {invalid}                               PR5
    {invalid}                               PRJ
  7 {invalid}                               PR5
    {invalid}                               PRJ


 AutoCon is off
 Sound is on
 Security state is: Inactive
 Manager option byte: 0x00
   HEX file Upload enabled
   Device Setup enabled
   Checksum comparison off
```

7.4.4   downprm command

Downloads the PR5 file.

Input format

'downprm'

<PR5 file data>

Description of the function

Downloads the PR5 file to the FP6 main unit. Before executing the downset command, be sure to execute the downprm command to download the PR5 file.

7.4.5   downset command

Downloads the ESF file.

Input format

'downset ('fname="filename"')'

<ESF file data>

Description of the function

Downloads the ESF file to the FP6 main unit.

Be sure to execute the downprm command before the downset command.

Be sure to execute the lod command after the downset command.

File names without options are not stored.

fname="filename":

Specifies the name of the ESF file to be downloaded. The maximum number of characters is 50.

If 51 or more characters are specified, the first 50 characters are used.

7.4.6   fcks command

Gets a checksum value of the program file that was downloaded to the active programing area of the FP6.

Input format

'fcks' (<type> <start1> <end1> (<start2> <end2> (<start3> <end3> (<start4> <end4> (<start5> <end5>)))))

Description of the function

Gets a checksum value of the program file in the active programming area.

Specifies the calculation method, start address and number of bytes in the options.

If this command is specified without options, an appropriate calculation method for the target MCU is used for all the areas.

type: Specifies one of the following calculation methods.

   crc: 32-bit CRC method

   crc16: 16-bit CRC method

   ari: 16-bit subtraction calculation method (When a V850, RL78, and 78K is selected)

     32-bit subtraction calculation method (When a RX, RH850, SuperH, and R8C is selected)

   k0s_sp: Division method (original)

startx: The start address is specified in hexadecimal. (A maximum of five ranges can be specified.)

endx: Specifies the end address in hexadecimal. (A maximum of five ranges can be specified.)

Example of usage

Example of Communication Software Terminal Display
> fcks crc 0 3fffff
Checksum Code Flash 1 : 000000-3FFFFF = 26218DD4
> fcks ari 0 3fffff 400000 41ffff
Checksum Code Flash 1 : 000000-3FFFFF = 61C0
Checksum Data : Flash 1 : 400000-41FFFF = 0200
Checksum Total   : 63C0

7.4.7 files command

Displays the information concerning the program file that was downloaded to the FP6.

Input format

'files' ('check')

Description of the function

If no options are used, the information (file name, creation date, size, and checksum) concerning the program file downloaded to the FP6 is displayed.

check: The checksum of all programming areas stored in the program file, from START to END, is recalculated with the 32-bit CRC method, and cross-checked with the checksum stored in the FP6 during download.

Example of usage

Example of Communication Software Terminal Display
>files
Area Filename   Date   Time   Range   CRC
*0 RX71MB.mot   2016-02-05 16:34
FFC00000-FFC00FFF C3E2C255
00100000-0010400F 66AD12B9
FF7F8000-FF7F8FFF 1CD20C10
00120000-001200FF A72B0AD3
1 RX71MA.mot   2016-02-05 16:36
00100000-0010400F 66AD12B9
00120000-001200FF A72B0AD3
2 {unknown data}
3 test.hex   2011-11-30 13:11
00000000-00003FFF C80EBAB6
4 {unknown data}
5 {unknown data}
6 {unknown data}
7 {unknown data}

7.4.8   hex command

Uploads the program file to the host PC in Intel HEX format.

Input format

'hex' (<start1><length1>(<start2><length2>(<start3><length3>(<start4><length4>))))

Description of the function

If a program file has been downloaded to an active programming area, executing this command will upload the program file in Intel HEX format. If this command is executed without any options, the upload will be executed with the address size used during downloading. If a program has not been downloaded, "Invalid argument" will be displayed.

start address: The start address is designated as a hexadecimal number. (A maximum of four ranges can be specified.)

length: The number of bytes is designated as a hexadecimal number. (A maximum of four ranges can be specified.)

Example of usage

Example of Communication Software Terminal Display
> hex 0 3fff
Press any key to start/continue output.
:200000008100810081008100810081008100810081008100810081008100810081008100D0
:200020008100810081008100810081008100810081008100810081008100810081008100FFFF33
:
:00000001FF

7.4.9   hlp command

Lists available commands with brief descriptions.

Input format

'hlp'

Description of the function

Lists available commands with brief descriptions.

Example of usage

Example of Communication Software Terminal Display
>hlp
-------------- Control commands --------------
downprm/downset: Download parameter/customer settings
upprm /upset : Upload parameter/customer settings
lod   : Download Intel Hex or Motorola S-record file
hex/srec   : Upload Intel Hex / Motorola S-record file
progarea   : Change Program area
files   : Show downloaded HEX/SREC files in FP6 memory
prm   : Show Parameter file (PRM/SET) information
conf   : Show / Modify FP6 configuration
brt   : Set Baud rate to host
fcks   : Calculate file checksum (FP6 memory)
ver   : Show firmware version
res   : Reset FP6
sound   : Enable / Disable sound generation
trc   : Show Device communication trace
selftest   : Perform a Selfcheck
-------------- Device commands --------------
bln   : Blankcheck
ers   : Erase
prg   : Program
vrf   : Verify
read   : Read
ep   : Erase and Program
sig   : Show device signature
sum   : Get device checksum
scf   : Set security information

7.4.10 lod command

Downloads program files.

Input format

'lod' ('fname="filename"') ('ftime="date and time"')

Description of the function

Downloads the program file to an active programming area. After this command is executed, the program file must be downloaded to the FP6 in ASCII format using communications software. If using the terminal software, select [Transfer], and then select the program file. The options are to delete or not to delete the file before downloading, the file name, and the creation date. If this command is executed without any options, the file name and creation date will not be stored. Use the FP6 Terminal.

fname = "filename":

Designates the file name of the program file that is downloaded. The maximum number of characters is 31. If 32 or more characters are specified, the first 31 characters are used.

ftime = "date and time":

Designates the creation date and time of the downloaded program file. The format is YYYY-MM-DD HH:MM.

YYYY: Year; MM: Month; DD: Date; HH: Hour; MM: Minute

Example of usage

Command	Status	Status LED	Message Display	Screen Output
lod	Display after execution of the command (before downloading)	BUSY	*** BUSY ***	Preparing storage ....PASS Now loading...
	Display during downloading	BUSY	*** BUSY ***	...
	Display after normal ending of the download	PASS	Returns to the display before executing the command.	PASS
	Display after error ending of the download	ERROR	Returns to the display before executing the command.	ERROR: <text>

Example of Communication Software Terminal Display
>lod
[When the MCU supports only the code flash area]
Address range: 0x00000000 to 0x00003FFF, CRC32: 0xC80EBAB6
PASS
>lod fname="sample.hex" ftime="2006-02-24 21:13"
[When the MCU also supports areas other than code flash]
Address range code: 0xFFF00000 to 0xFFFFFFFF, CRC32: 0xD253DA27
Address range data: 0x00100000 to 0x00107FFF, CRC32: 0x0CA407F9
Address range boot: 0xFF7FC000 to 0xFF7FFFFF, CRC32: 0xE39BE9B8
PASS

7.4.11 prm command

Displays the information concerning the PR5 file and ESF file that were downloaded to the FP6.

Input format

'prm'

Description of the function

Displays the information concerning the PR5 file and ESF file (PR5 file name, PR5 file checksum, ESF file checksum, ESF file name) that were downloaded to all the programming areas of the FP6.

Example of usage

Example of Communication Software Terminal Display
>prm
Area File name   CRC   Type
*0 R5F571M   41F6142D PR5
Test1   62189515 PRJ
1 R5F571M   41F6142D PR5
Test2   5AC4344E PRJ
2 78F1166   C8005840 PR5
{invalid}   PRJ
3 {invalid}   PR5
{invalid}   PRJ
4 {invalid}   PR5
{invalid}   PRJ
5 {invalid}   PR5
{invalid}   PRJ
6 {invalid}   PR5
{invalid}   PRJ
7 {invalid}   PR5
{invalid}   PRJ

7.4.12 progarea command

Confirms, changes and deletes data from active programming areas.

Input format

'progarea' ('clear' '0' | '1' | '2' | '3' | '4' | '5' | '6' | '7') | ('0' | '1' | '2' | '3' | '4' | '5' | '6' | '7')

Description of the function

The active programming area can be changed by designating a numerical option. Also, by designating the clear option, the data in the active programming area (PR5 file, ESF file, and program file) can be deleted. If there are no options, then the current active programming area is displayed.

clear: Clears the data in the active programming area (PR5 file, ESF file, and program file).

0:      Changes the active programming area to 0.

1:      Changes the active programming area to 1.

2:      Changes the active programming area to 2.

3:      Changes the active programming area to 3.

4:      Changes the active programming area to 4.

5:      Changes the active programming area to 5.

6:      Changes the active programming area to 6.

7:      Changes the active programming area to 7.

Example of usage

Example of Communication Software Terminal Display
>progarea Active Program Area: 0 Max. code area size: 16 MByte Max. data area size: 4 MByte Max. user boot area size: 4 Mbyte >progarea clear 1 > progarea 0 Active Program Area: 0

7.4.13   res command

Resets FP6.

Input format
_____

'res'

Description of the function
_____

Resets and restarts the FP6 main unit.

Example of usage
_____

Example of Communication Software Terminal Display
>res Starting FP6... Firmware Version Vx.xx.xx Board H/W Vx Serial No.:xxxxxxxxxx Standard mode unsecured

7.4.14   selftest command

Executes a diagnostic test.

Input format

'selftest'

Description of the function

Executes a self-test to diagnose hardware faults.

Example of usage

Example of Communication Software Terminal Display
>selftest ***** CAUTION ***** Remove any plugs from Target- and Remote-Connector before starting. Any hardware attached to those connectors may be damaged by this test ! ***** CAUTION ***** Target- and Remote-connector unplugged ? If yes, press 's' to start the test. Otherwise, press 'n' to cancel the test: s FPGA Test: PASS Power Supply Test: PASS Target- and Remote-Interface Test: PASS Selftest PASSED.

7.4.15 serno command

Sets the unique code for embedding in the program file.

Input format

'serno' <start address> <pattern>

Description of the function

Sets the unique code for embedding in the program file. This command becomes available when the unique code mode is enabled by the FP6 Manager setting. A target command (such as ep, prg, and vrf) is executed with the specified address replaced by unique code in the program file. The setting of the unique code is cleared on completion of the target command.

Note: When filling with 0xFF is disabled and the area of data flash memory in the program file specified in the serno command is blank, embedding of the unique code in that area does not proceed.

start address: Specifies the start address in hexadecimal.

pattern: Specifies the unique code in hexadecimal notation. A maximum of 64 bytes can be specified.

Example of usage

Example of Communication Software Terminal Display
>serno 8000 00010203 OK

7.4.16 sound command

Sets the buzzer.

Input format

'sound' ('off' | 'on')

Description of the function

Sets the buzzer. "Enabled" or "disabled" is optionally designated. If no option is designated, the current setting is displayed.

off: Disables the buzzer.

on: Enables the buzzer.

Example of usage

Example of Communication Software Terminal Display
>sound Sound is off >sound off Sound is off >sound on Sound is on

7.4.17   srec command

Uploads the program file in Motorola S format.

Input format

'srec' (<start1><length1>(<start2><length2>(<start3><length3>(<start4><length4>))))

Description of the function

If a program file has been downloaded to an active programming area, executing this command will upload the program file in Motorola S format. If this command is executed without any options, the upload will be executed with the address size used during downloading. If a program has not been downloaded, "Invalid argument" will be displayed.

start address: The start address is designated as a hexadecimal number. (A maximum of four ranges can be specified.)

length: The number of bytes is designated as a hexadecimal number. (A maximum of four ranges can be specified.)

Example of usage

Example of Communication Software Terminal Display
> srec 0 3fff Press any to start/continue output. S0030000FC S325000000008100810081008100810081008100810081008100810081008100810081008100CA S325000000208100810081008100810081008100810081008100810081008100810081008100FFFF2D   : S5030000FC S70500000000FA

7.4.18 trc command

Displays the communication information between the FP6 and target MCU.

Input format

'trc'

Description of the function

Displays the communication information between the FP6 and target MCU. Up to 4096 lines can be stored.

If the communication information exceeds 4096 lines, old data is deleted.

Example of usage

Example of Communication Software Terminal Display
>trc Debug Output Number   Time us   Send Rec. 　　: 0214   0008675924   17   -- 0215   0008678930   --   02 　　: Total number of transmitted bytes : 266282 Total number of received bytes :   006212

7.4.19 upprm command

Uploads the PR5 file.

Input format

'upprm'

Description of the function

If the PR5 file has been downloaded to an active programming area, executing this command will upload the PR5 file.

Example of usage

Example of Communication Software Terminal Display
>upprm Press any key to start/continue output. [FlashProParameterFile] 　　: [CHECKSUM] SUM=BA9F0491 [EOF]

7.4.20 upset command

Uploads the ESF file.

Input format

'upset'

Description of the function

If the ESF file has been downloaded to an active programming area, executing this command will upload the ESF file.

Example of usage

Example of Communication Software Terminal Display
>upset Press any key to start/continue output. [FlashproCustomerSettingFile] 　　: [CHECKSUM] SUM=F7D4A9E7 [EOF]

7.4.21 ver command

Displays the FP6 version.

Input format

'ver'

Description of the function

Displays the FP6 version (firmware version, board hardware version, and serial number).

Example of usage

Example of Communication Software Terminal Display
>ver Firmware Version Vx.xx.xx Board H/W Vx Serial No.:xxxxxxxxx Standard mode unsecured

7.5 Description of FP6 Device Commands

7.5.1   bln command

Executes the blank check.

Input format

'bln'

Description of the function

Executes the blank check for the target flash memory.

The area specified in operation mode is checked.

Example of usage

Example of Communication Software Terminal Display
>bln [When the area is blank] Blank check Block 000: Blank check Block 001: Blank check Block 002: Blank check Block 003: PASS Blank check operation finished. >bln [When the area is not blank] Blank check Block 000: ERROR ERROR(E051): Not Blank. Blank check operation finished.

7.5.2 clr command

Executes "Configuration clear".

Input format

'clr'

Description of the function

Executes "Configuration clear".

Note: For details of the "Configuration clear", refer to the user's manual of the MCU.

Example of usage

Example of Communication Software Terminal Display
>clr Configuration clear : PASS Configuration clear operation finished.

7.5.3 con command

Executes the processes from "transition to the flash memory programming mode" to "signature verification".

Input format

'con'

Description of the function

Executes the processes from "transition to the flash memory programming mode" to "signature verification". In order to use this command, "manual" (off) must be set with the autocon command beforehand.

7.5.4 dcon command

Executes the process to end the flash memory programming mode.

Input format

'dcon'

Description of the function

Executes the process to end the flash memory programming mode. In order to use this command, "manual" (off) must be set with the autocon command beforehand.

7.5.5 ep command

Executes the [Start] command.

Input format

'ep' or 'epv'

Description of the function

Executes the [Start] command.

Example of usage

Command	Status	Status LED	Message Display	FP6 Response Message
ep	Display while executing the command	BUSY	Display contents of the ers and prg commands	See the descriptions of the ers and prg commands.
	Display after executing the command [When completed normally]	PASS	Returns to the display before executing the command.	PASS Erase, Program operation finished. or PASS EPV operation finished.
	Display after executing the command [When terminated abnormally]	ERROR	ERROR: xxx xxxxxxxxxxxxxxxx	ERROR(Exxx): <text> Erase, Program operation finished.

Example of Communication Software Terminal Display
>ep Blank check Block 000: Blank check Block 001: Blank check Block 002: Blank check Block 003: PASS, Erase skipped. Program Chip: 10% 20%   : 100% PASS Erase,Program operation finished.

7.5.6   ers command

Executes the Erase command.

Input format

'ers'

Description of the function

Erases the target flash memory.

The range specified in operation mode is to be erased.

If this command is executed with the "Erase Chip" specified, initialization of flash options is also executed.

Example of usage

Example of Communication Software Terminal Display
>ers Blank check Block 000: Blank check Block 001: Blank check Block 002: Blank check Block 003: PASS, Erase skipped. Erase operation finished.

7.5.7   gdi command

Gets the information of blank check and flash option.

Input format

'gdi'

Description of the function

Obtains the information of blank check and flash options.

Example of usage

Example of Communication Software Terminal Display
>gdi Blank check CF1: 000000000000000000000000000000C0 UB: FF   : Trusted Memory:xx TMINF: xxxxxxxx TM address: xxxxxxxx xxxxxxxx PASS Get Device Info operation finished.

7.5.8   ged command

Gets the information of endian.

Input format

'ged'

Description of the function

Gets the information of endian.

Example of usage

Example of Communication Software Terminal Display
>ged Get Endianness Little Endian PASS Get Endianness operation finished.

7.5.9   gid command

Gets the ID code.

Input format

'gid'

Description of the function

Gets the ID code.

Example of usage

Example of Communication Software Terminal Display
>gid OCD-ID : FFFFFFFFFFFFFFFFFFFFFFFF PASS OCD-ID operation finished.

7.5.10   glb command

Gets the lock bit.

Input format

'glb'

Description of the function

Gets the lock bit.

Example of usage

Example of Communication Software Terminal Display
>glb LockBits : CF1: FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF CF2: FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF UB: FF PASS LockBits operation finished.

7.5.11   gob command

Gets the information of option bytes.

Input format

'gob'

Description of the function

Obtains the information of option bytes.

Example of usage

Example of Communication Software Terminal Display
>gob Option Bytes : FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF FFFFFFFF Extended Option Bytes : FFFFFFFF PASS Option Bytes operation finished.

7.5.12 gof command

Gets the information of OFS.

Input format

'gof'

Description of the function

Gets the information of OFS.

Note: For details of OFS, refer to the user's manual of the MCU.

Example of usage

Example of Communication Software Terminal Display
>gof Get OFS OFS: FFFFFFFF FFFFFFFF PASS Get OFS operation finished.

7.5.13 gos command

Gets the information of flash option.

Input format

'gos'

Description of the function

Reads and outputs the target flash option information. When the read-disable setting is effective, unreadable data are not output.

Example of usage

Example of Communication Software Terminal Display
>gos OFS: FFFFFFFF FFFFFFFF PASS Get Option Setting operation finished.

7.5.14 got command

Gets the information of OTP.

Input format

'got'

Description of the function

Gets the information of OTP.

Note: For details of OTP, refer to the user's manual of the MCU.

Example of usage

Example of Communication Software Terminal Display
>got OTP flags : CF1: FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF CF2: FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF UB: FF PASS OTP operation finished.

7.5.15 gsc command

Gets the information of security.

Input format

'gsc'

Description of the function

Gets the security information set on the MCU.

Example of usage

Example of Communication Software Terminal Display
>gsc Command protection: FF PASS Security operation finished.

7.5.16 gtm command

Gets the information of Trusted Memory.

Input format

'gtm'

Description of the function

Gets the information of Trusted Memory.

Note: For details of Trusted Memory, refer to the user's manual of the MCU.

Example of usage

Example of Communication Software Terminal Display
>gtm Trusted Memory: FF TMINF: FFFFFFFF TM address: 00120060 00120064 PASS Get Trusted Memory operation finished.

7.5.17 idc command

Executes the ID code setting.

Input format

'idc'

Description of the function

Executes the ID code setting.

Note: Do not issue this command if you are using HCUHEX files.

Example of usage

Example of Communication Software Terminal Display
>idc Set ID code PASS ID code operation finished.

7.5.18 opb command

Sets the option bytes.

Input format
_____

'opb'

Description of the function
_____

Sets the option bytes.

Example of usage
_____

Example of Communication Software Terminal Display
>opb Set Option Bytes PASS Option Bytes operation finished.

7.5.19 otp command

Executes the OTP setting.

Input format
_____

'otp'

Description of the function
_____

Executes the OTP setting.

Note: For details of OTP, refer to the user's manual of the MCU.
        Do not issue this command if you are using HCUHEX files.

Example of usage
_____

Example of Communication Software Terminal Display
>otp Set OTP protection PASS OTP operation finished.

7.5.20 pfo command

Sets the flash options collectively.

Input format

'pfo'

Description of the function

Sets the flash options collectively.

Example of usage

Example of Communication Software Terminal Display
>pfo Set Flash Option PASS Program Flash Option operation finished.

7.5.21 prg command

Executes programming.

Input format

'prg'

Description of the function

Executes programming.

When filling with 0xFF is disabled, programming is performed to the locations where program file data exist. In this case, data is programmed with the minimum alignment unit of the MCU.

Note: Do not issue this command if you are using HCUHEX files.

Example of usage

Example of Communication Software Terminal Display
>prg Program Chip: 10% 20%   : 100% PASS Program operation finished.

7.5.22   read command

Reads data of the flash memory in the target MCU.

Input format

'read' ('hex' | 'srec') (<start_address> <end_address>)

Description of the function

Reads data of the flash memory in the target MCU and outputs the data in the specified format.

If this command is executed without options, data in the range set in operation mode is read.

Note: Do not issue this command if you are using HCUHEX files.

No option specified: Outputs data in the hexadecimal format.

hex: Reads data with the Intel HEX format.

srec: Reads data with the Motorola HEX format.

start_address: Designates the start address (in block units) with a hexadecimal number.

end_address: Designates the end address (in block units) with a hexadecimal number.

Example of usage

Example of Communication Software Terminal Display
>read FE000000 FE0000FF Read FE000000 to FE0000FF: Press any key to start/continue output. FE000000: FB F9 F1 F9 F1 31 37 B1 E9 FF F9 FF 20 74 F5 F5 FE000010: F9 F9 FB ED FF B5 F7 F7 69 B9 FB F9 71 A9 36 75   : FE0000F0: 3D FF BF 9F 7D 7F 6F 7D 77 1F DF FF FF FF FF FF PASS Read operation finished.

7.5.23 rsc command

Executes the Security Release command.

Input format

'rsc'

Description of the function

Executes the Security Release command.

Note: For details of the Security Release command, refer to the user's manual of the MCU.

Example of usage

Example of Communication Software Terminal Display
>rsc Release security PASS Release security operation finished.

7.5.24 scf command

Sets security information.

Input format

'scf'

Description of the function

Sets security information to the MCU.

Note: Do not issue this command if you are using HCUHEX files.

Example of usage

Example of Communication Software Terminal Display
>scf Set security Flags PASS Security operation finished.

7.5.25   sed command

Executes the endian setting.

Input format

'sed'

Description of the function

Executes the endian setting.

Example of usage

Example of Communication Software Terminal Display
>sed
Set Endianness
PASS
Set Endianness operation finished.

7.5.26   sid command

Sets the ID code and enables ID authentication in the serial programming mode.

Input format

'sid' (<ID Code>)

Description of the function

Sets the ID code and enables ID authentication in the serial programming mode.

ID Code: Specifies the ID code to be set by a hexadecimal number.

No option specified: Value of ESF file downloaded is set.

Set the ID code with a size supported by the MCU.

If ID code with an unavailable size is specified, an error occurs.

Example of usage

Example of Communication Software Terminal Display
>sid 0123456789ABCDEF
Set Serial Programming ID
PASS
Set Progr. ID operation finished.

7.5.27   sig command

Executes the [Signature read] command.

Input format

'sig'

Description of the function

Executes the [Signature read] command.

Example of usage

Example of Communication Software Terminal Display
>sig Device name: D70FXXXX Device data: 10 DF 40 Device Version: 2.00 Firmware Version: 3.04 PASS Signature operation finished.

7.5.28   slb command

Sets the Lock bit information.

Input format

'slb'

Description of the function

Sets the Lock bits on the MCU.

Example of usage

Example of Communication Software Terminal Display
>slb Set LockBits PASS LockBits operation finished.

7.5.29 spd command

Disables the serial programming.

Input format

'spd'

Description of the function

Disables the serial programming for the MCU.

Example of usage

Example of Communication Software Terminal Display
>spd Set Serial Programming Disable PASS Set SerProgDis operation finished.

7.5.30 stm command

Sets the Trusted Memory.

Input format

'stm'

Description of the function

Enables the Trusted Memory setting.

Note: For details of the Trusted Memory, refer to the user's manual of the MCU.

Example of usage

Example of Communication Software Terminal Display
>stm Set Trusted Memory PASS Set Trusted Memory operation finished.

7.5.31 sum command

Executes the Checksum command.

Input format

'sum'

Description of the function

Executes the Checksum command and gets checksum values in the MCU.

Example of usage

Example of Communication Software Terminal Display
>sum Checksum: 0x1234 PASS Checksum operation finished.

7.5.32 vrf command

Executes the Verify command.

Input format

'vrf'

Description of the function

Executes the Verify command.

Example of usage

Example of Communication Software Terminal Display
>vrf Verify Chip: 10% 20%   : 100% PASS Verify operation finished.

8   Connectors and Cables

8.1 Power-Supply Connector

The power-supply connector is laid out on the host interface side of the FP6.

Power-supply connector
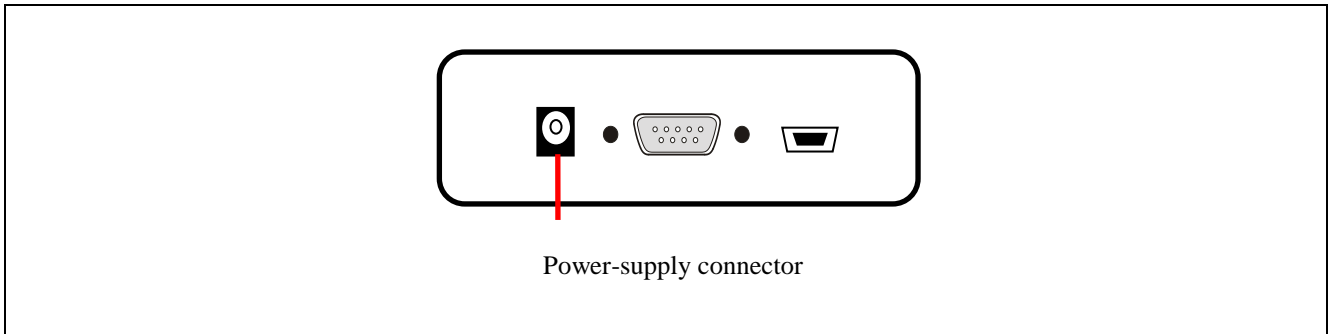
Figure 8.1   Power-Supply Connector

Figure 8.2   Pin Assignments of the Power-Supply Connector

Note: Do not connect a power adapter other than the one for the PG-FP6 to the power-supply connecter.

The following is the specification of the power-supply adapter.

— Input: AC90-264 V
— Output: 5 V/2 A
— Plug: Center plus/inner diameter (∅1.7)/outer diameter (∅4.0)
— Connector model No.:   HEC0470-01-0630

8.2 Serial Connector

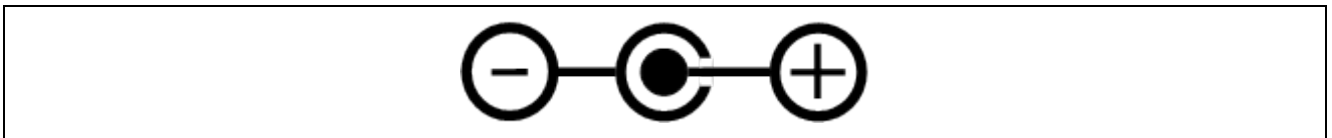The serial connector (9-pin D-sub male connector) is laid out on the host interface side of the FP6.
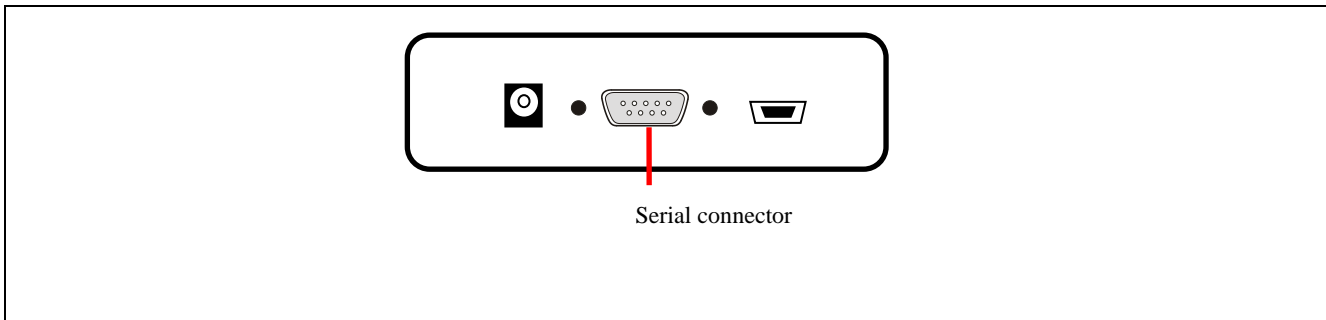
Serial connector

Figure 8.3   9-Pin D-Sub Serial Connector
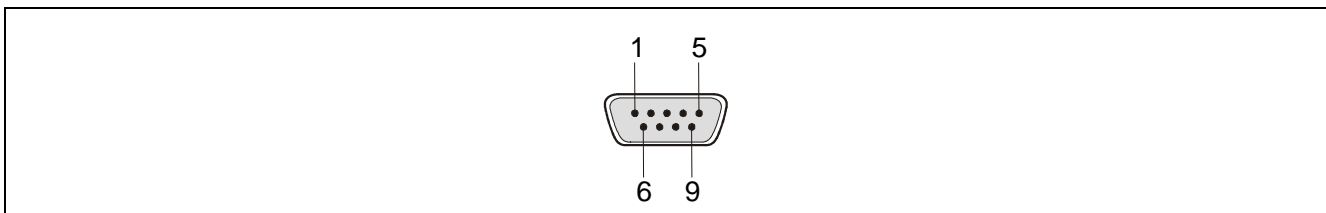
Figure 8.4   Pin Assignments of the Serial Connector

Table 8.1   Pin Configuration of the 9-Pin D-Sub Serial Connector

Serial Connector	Signal Name
1	NC
2	RxD
3	TxD
4	NC
5	V_{SS}
6	NC
7	RTS
8	CTS
9	NC

Note: Part number of the serial connector (9-pin D-sub male connector): DELC-J9PAF-20L9E (manufactured by Japan
        Aviation Electronics Industry, Limited)

8.2.1   Serial cable connected to the 9-pin D-sub serial connector

A serial cross cable is additionally required. The connectors on both sides are 9-pin D-sub female connectors. The following shows the connection.
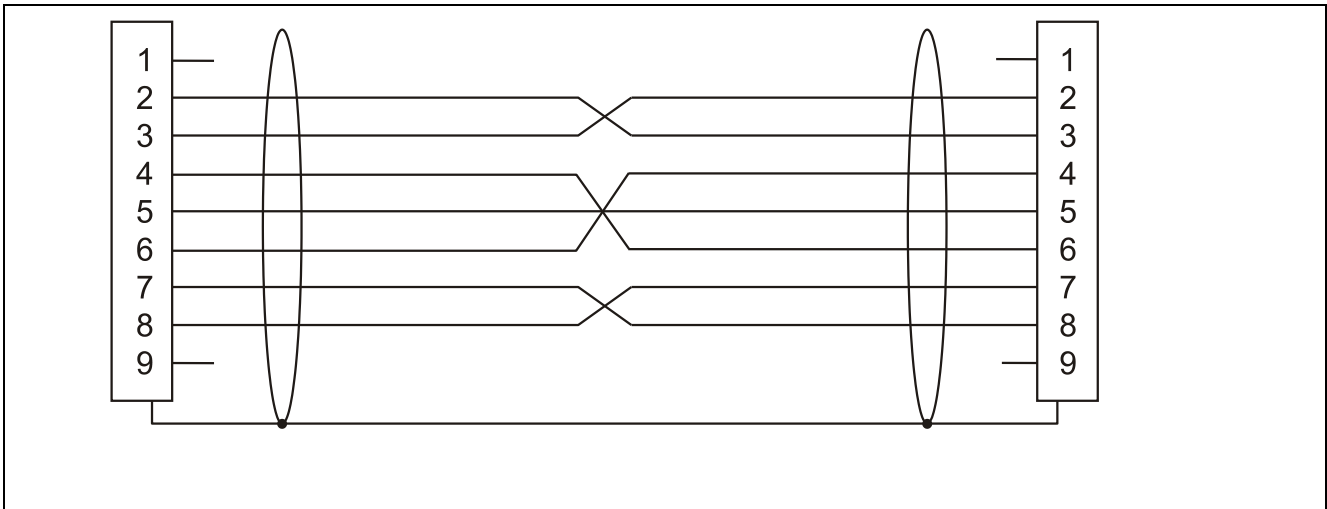
Figure 8.5   Connection of the Serial Cable

8.3 USB Connector

The mini-B type USB connector is laid out on the host interface side of the FP6.
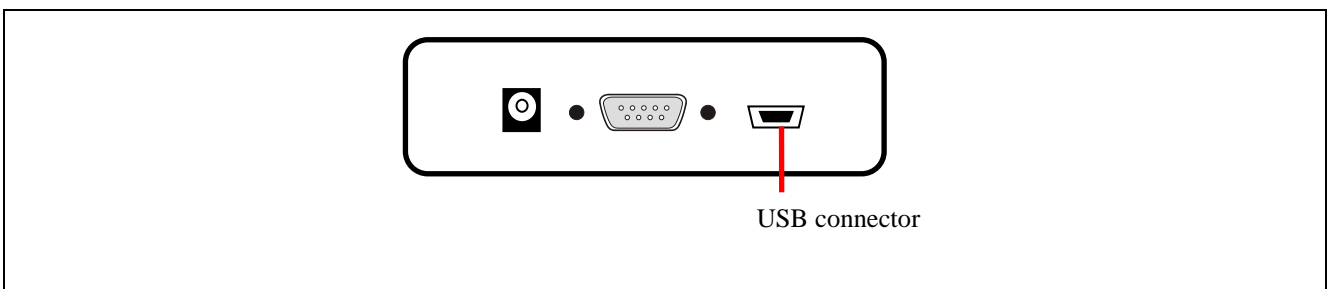
USB connector

Figure 8.6   USB Connector (Host Interface Side of the FP6)

Note: Part number of the mini-B USB connector: UX60SC-MB-5S8 (manufactured by Hirose Electric Co., Ltd.)

8.3.1   USB cable

The USB cable is approximately two meters long. The cable is equipped with a USB mini-B type connector and USB A type connector.

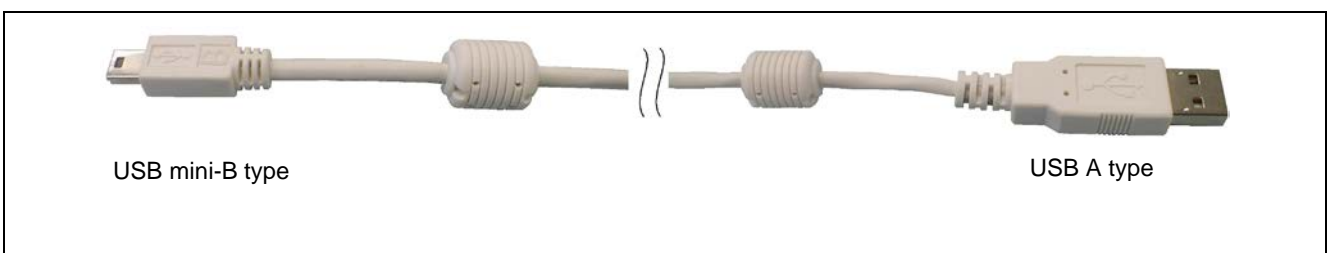USB mini-B type   USB A type

Figure 8.7   Appearance of the USB Cable

8.4 Target Connector

The target connector is laid out on the right side of the FP6.
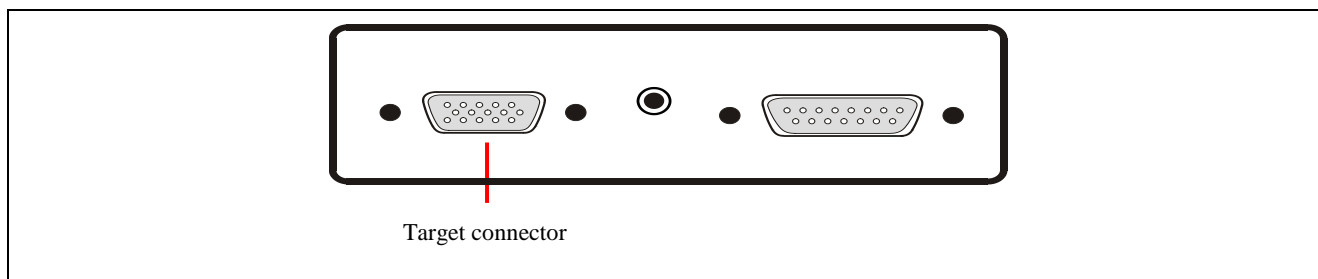
Figure 8.8   Target Connector (Target Connector Side of the FP6)
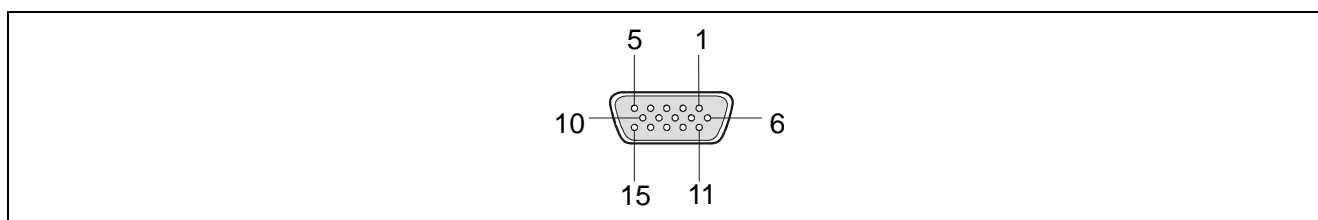
Figure 8.9   Pin Assignments of the Target Connector (15-Pin D-Sub Female Connector)

Note: Part number of the target connector (15-pin D-sub female connector): D02-M15SAG-20L9E (manufactured by Japan Aviation Electronics Industry, Limited)

Table 8.2   Pin Configuration of the Target Connector

FP6 D-Sub 15	Signal Name
1	SO/TxD1/IO3
2	SI/RxD
3	SCK/IO4
4	$\overline{\text{RESET}}$
5	NC*
6	FLMD1
7	TxD2/HS
8	V_{CC}
9	V_{CC}
10	IO1
11	NC*
12	FLMD0/IO0
13	IO2
14	CLK/IO5
15	GND

Note: Reserved pin. Leave this pin open.

Note: Each signal name is the signal name of FP6. For the connection with the target MCU, refer to "9.Examples of Connection with Microcontroller".

8.4.1   Target cable (14-pin type)

The target cable (14-pin type) is a standard shielded cable and is approximately 42 centimeters long. The target cable is equipped with a 15-pin D-sub male connector and a 14-pin 2.54-mm pitch multipurpose female connector.

Note: The following are the recommended connectors to be connected to the 14-pin 2.54-mm pitch multipurpose female connectors.
- 7614-6002 (straight angle type manufactured by 3M Japan Limited)
- 2514-6002 (straight angle type manufactured by 3M Limited)

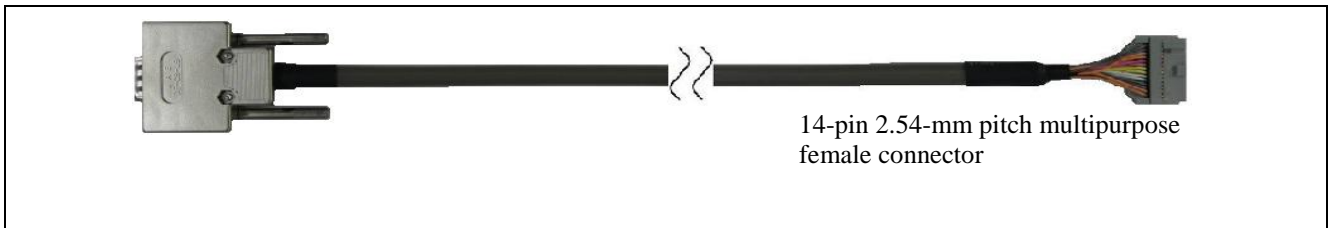14-pin 2.54-mm pitch multipurpose female connector

Figure 8.10   Appearance of the Target Cable (14-Pin Type)
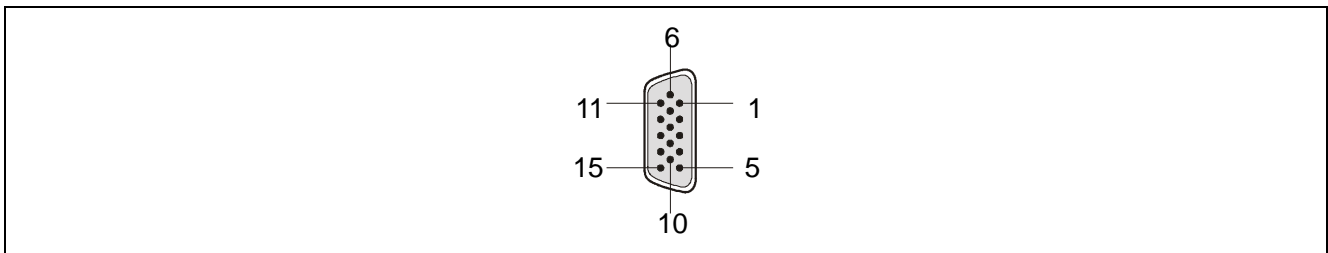

Figure 8.11   Pin Assignments of the 15-Pin D-Sub Male Connector of the Target Cable (14-Pin Type)
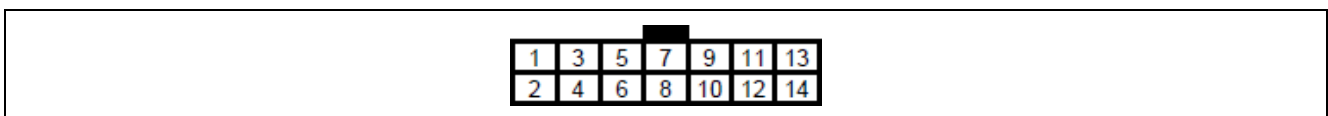
Figure 8.12   Appearance of the 14-Pin 2.54-mm Pitch Multipurpose Female Connector of the Target Cable (14-Pin Type) (View from the Socket Side)

Table 8.3   Pin Configuration of the Target Connector (14-Pin Type)

Signal Name	15-Pin D-Sub Male Connector	14-Pin 2.54-mm Pitch Multipurpose Female Connector
SCK/IO4	3	1
GND	15	2
CLK/IO5	14	3
FLMD0/IO0	12	4
SI/RxD	2	5
IO1	10	6
SO/TxD1/IO3	1	7
V_{CC}	8	8
FLMD1	6	9
IO2	13	10
TxD2/HS	7	11
GND	15	12
$\overline{\text{RESET}}$	4	13
Not used [2]	–	14

Notes: 1.   Reserved pin. Leave this pin open.
        2.   Left open in the target cable. If you use the same 14-pin connector for debugging, please also refer to the user's manual of the emulator.

8.4.2   Conversion adapter for 16-pin products

For a 16-pin target system, use the QB-F14T16-01 (14-pin/16-pin conversion adapter) for the E1 emulator.

Note: This conversion adapter is only usable with 78K and V850 MCUs.

8.5 GND Connector

The banana-jack GND connector is laid out on the target connector side of the FP6.

GND connector

Figure 8.13   GND Connector (Target Connector Side of the FP6)

Note: Part number of the GND connector (banana jack): PB4 (manufactured by HIRSCHMANN)

8.5.1   GND cable

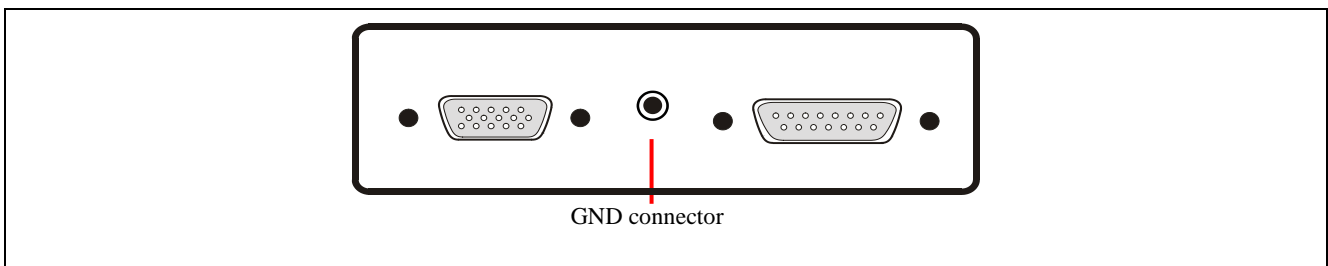The GND cable is approximately one meter long. The cable is equipped with a banana jack and a spade terminal.

Note: The FP6 and target system may be damaged if there are differences in potential between the grounds of the FP6 and of the target system. Use the GND cable to eliminate differences in potential before connecting the target cable.
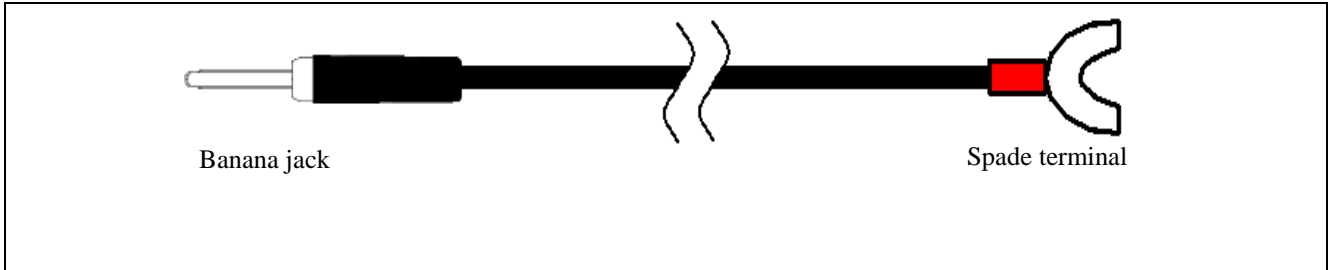
Figure 8.14   Appearance of the GND Cable

Note: Part number of the banana jack: TJ-2167 (manufactured by Sato Parts Co., Ltd.)
Part number of the spade terminal: BPF1.25-3 (red) (manufactured by Daido Solderless Terminals Mfg. Co., Ltd.)

8.6 Remote Connector

The remote connector (a 15-pin D-sub female connector) is laid out on the target connector side of the FP6.
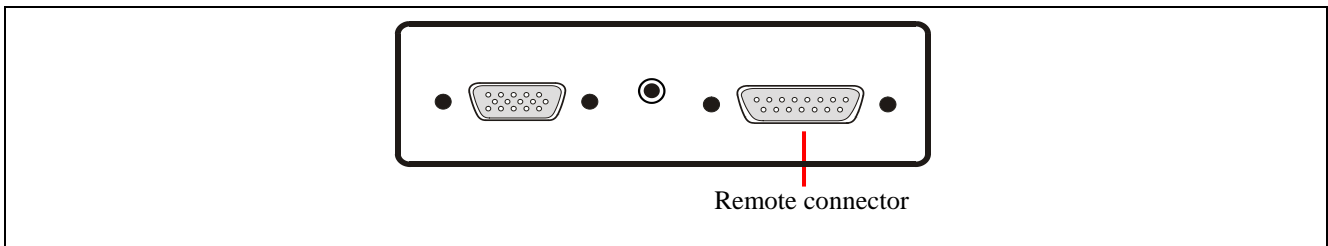
Figure 8.15   Remote Connector (Target Connector Side of the FP6)
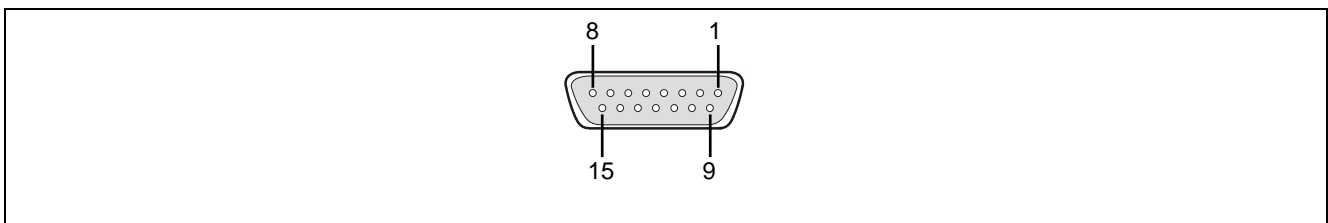
Figure 8.16   Pin Assignments of the Remote Connector (15-Pin D-Sub Female Connector)

Note: Part number of the remote connector (a 15-pin D-sub female connector): DALC-J15SAF-20L9E (manufactured by Japan Aviation Electronics Industry, Limited)

The remote connector pins of the FP6 have the following functions. Table 8.4 shows the pin numbers on the remote connector of the FP6. Each input pin is pulled-up inside the FP6.

Table 8.4   Pin Functions of the Remote Interface

| Pin Number	Input/ Output	Pin Name		Function	Active Level
1	Output	CONN		Indicates that the remote interface is connected. When the power of the FP6 is ON, the CONN is always valid.	High level
2	Output	BUSY		Outputs the status indicated by the status LED "BUSY".	High level
3	Output	PASS		Outputs the status indicated by the status LED "PASS".	High level
4	Output	ERROR		Outputs the status indicated by the status LED "ERROR".	High level
5	Input	Modes other than bank mode	CANCEL	Same as the function of the CANCEL button.	Low level
	Input	Bank mode	BANK0	Indicates the lowest 1 bit of the 3-bit programming area number.	Low level
6	Input	Standard mode	ENTER	Same as the function of the ENTER button.	Low level
	Input	Bank mode	BANK1	Indicates the middle 1 bit of the 3-bit programming area number.	Low level
7	Input	Standard mode	NEXT	Same as the function of the NEXT button.	Low level
	Input	Bank mode	BANK2	Indicates the highest 1 bit of the 3-bit programming area number.	Low level
8	Input	VRF		Executes verification.	Low level
9	Input	START		Inputs the "START" (Start command) signal.	Low level
10	Input	CLR		Clears the "PASS" and "ERROR" signals.	Low level
11 to 15	–	GND		GND pins	–

Notes: Each input pin is pulled-up inside the FP6.

Table 8.5   Programming Areas and Banks

	BANK2	BANK1	BANK0
Programming area 0	0	0	0
Programming area 1	0	0	1
Programming area 2	0	1	0
Programming area 3	0	1	1
Programming area 4	1	0	0
Programming area 5	1	0	1
Programming area 6	1	1	0
Programming area 7	1	1	1

Notes: 1. 0: Low level
            1: High level
        2. Set BANK0, BANK1, and BANK2 to the low level in programming area 0.
            Set BANK0 and BANK1 to the high level and BANK2 to the low level in programming area 3.

9   Examples of Connections with Microcontrollers

The following shows examples of interface circuits. Refer to the recommended design for the connection of pins for the target MCU. The pin names might differ depending on the target MCU. For details about the actual pin names, refer to the user's manual of each target MCU.

9.1 78K and V850 (UART communications)

Figure 9.1   Example of a Circuit for 78K and V850 (UART – On-Chip Single-Power-Supply Flash Memory Microcontroller)

Notes: 1.   These pins do not need to be short-circuited unless the FP6 is used with the E1 or E20.
   2.   In case of using the alternate-function pin with a pull-up resistor, connect the pin to FLMD1 of the target connector. In flash memory programming mode, the output on the FLMD1 pin is at the low level.

9.2 78K and V850 (CSI communications)
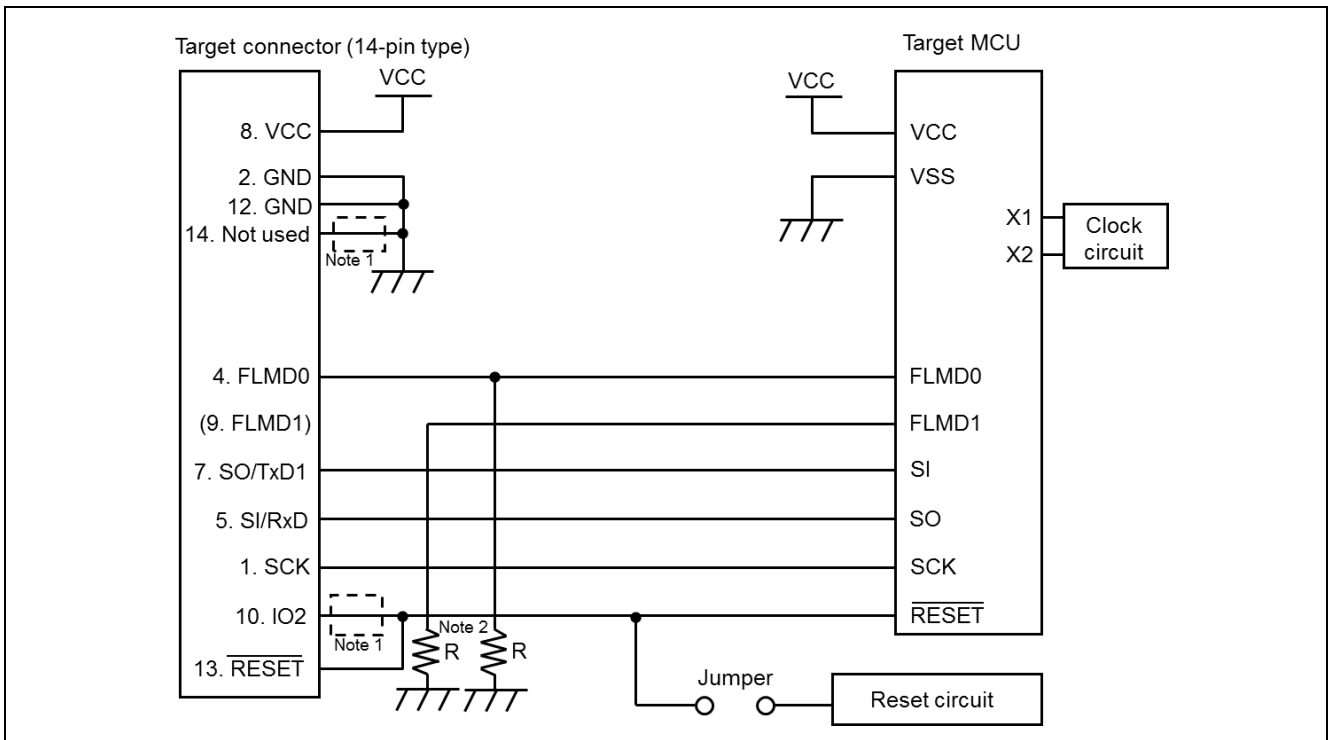
Figure 9.2　　Example of a Circuit for 78K and V850 (CSI − On-Chip Single-Power-Supply Flash Memory Microcontroller)

Notes: 1.　These pins do not need to be short-circuited unless the FP6 is used with the E1 or E20.

2.　In case of using the alternate-function pin with a pull-up resistor, connect the pin to FLMD1 of the target connector. In flash memory programming mode, the output on the FLMD1 pin is at the low level.

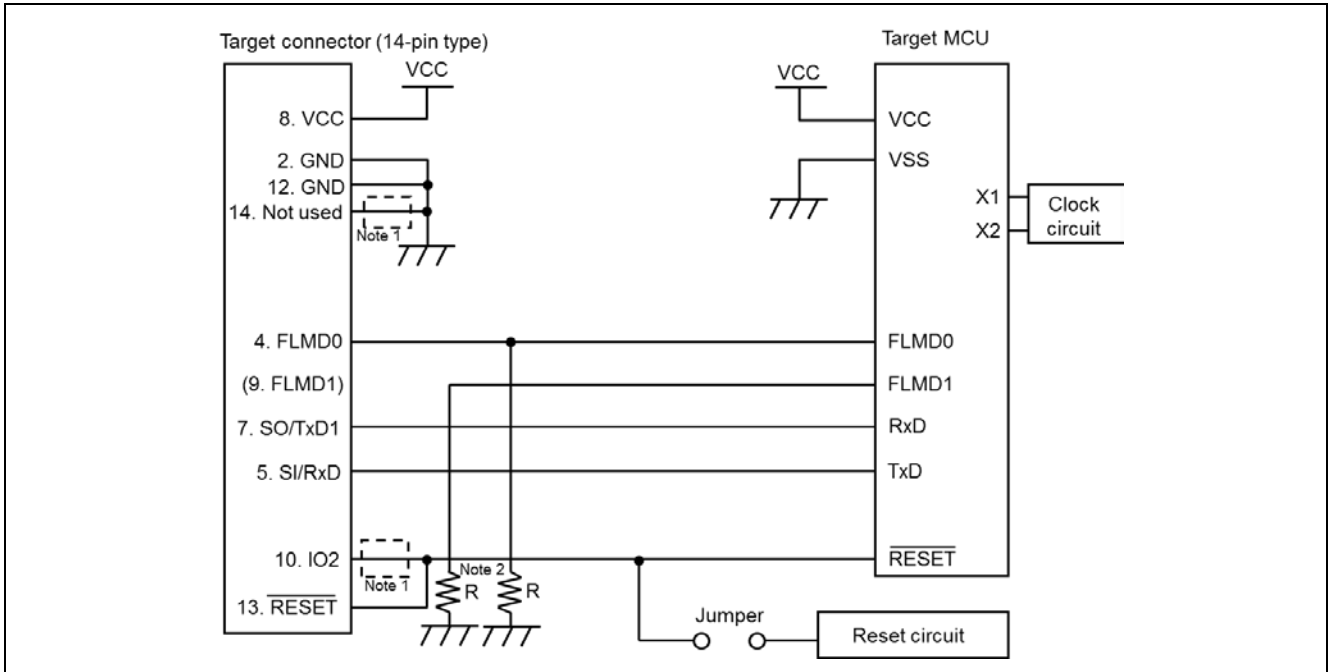## 9.3 78K and V850 (CSI-H/S communications)

Figure 9.3   Example of a Circuit for 78K and V850 (CSI-H/S – On-Chip Single-Power-Supply Flash Memory Microcontroller)

Notes: 1.   These pins do not need to be short-circuited unless the FP6 is used with the E1 or E20.

2.   In case of using the alternate-function pin with a pull-up resistor, connect the pin to FLMD1 of the target connector. In flash memory programming mode, the output on the FLMD1 pin is at the low level.

9.4 78K0S (Single-wire UART communications)

Figure 9.4   Example of a Circuit for 78K0S (Single-Wire UART)

Note: These pins do not need to be short-circuited when using the FP6. Short-circuit them if necessary.

9.5 78K0R (Single-wire UART communications)
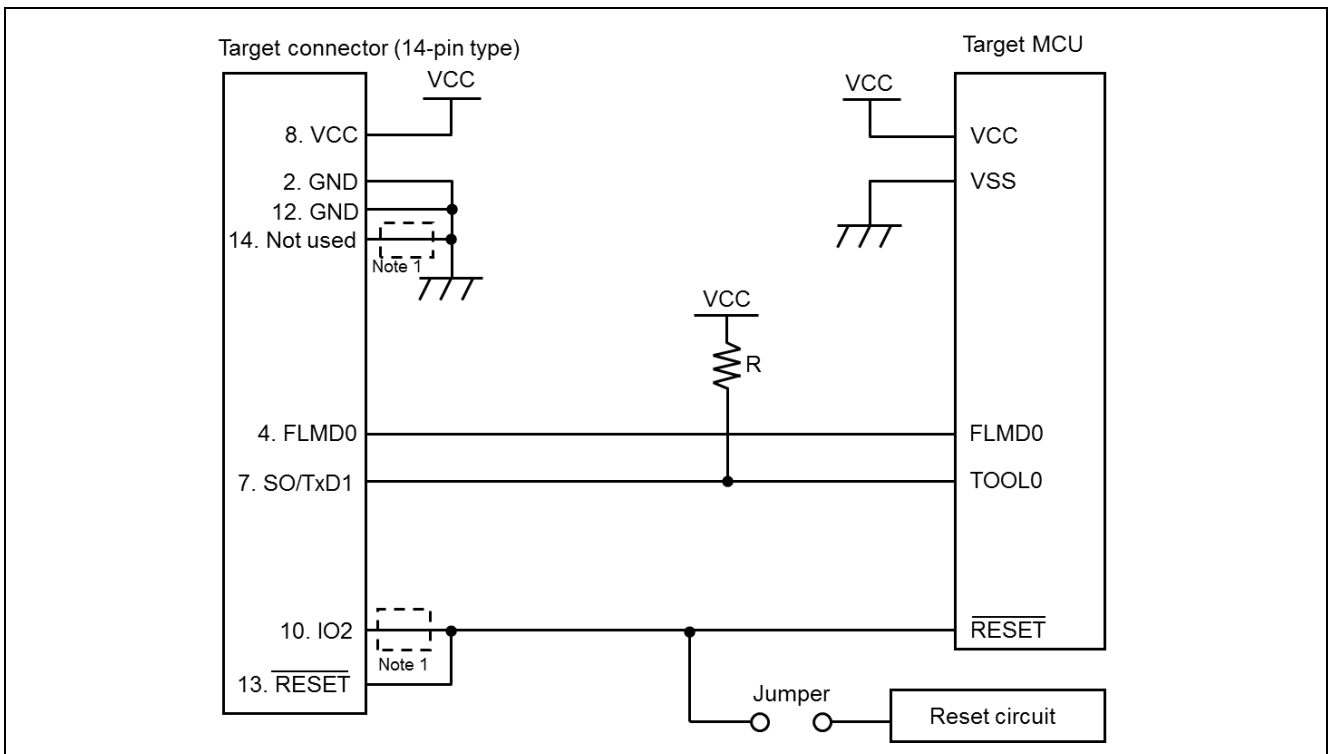
Figure 9.5   Example of a Circuit for 78K0R (Single-Wire UART)

Note: These pins do not need to be short-circuited when using the FP6. Short-circuit them if necessary.

9.6 78K0 (TOOLCx and TOOLDx communications)
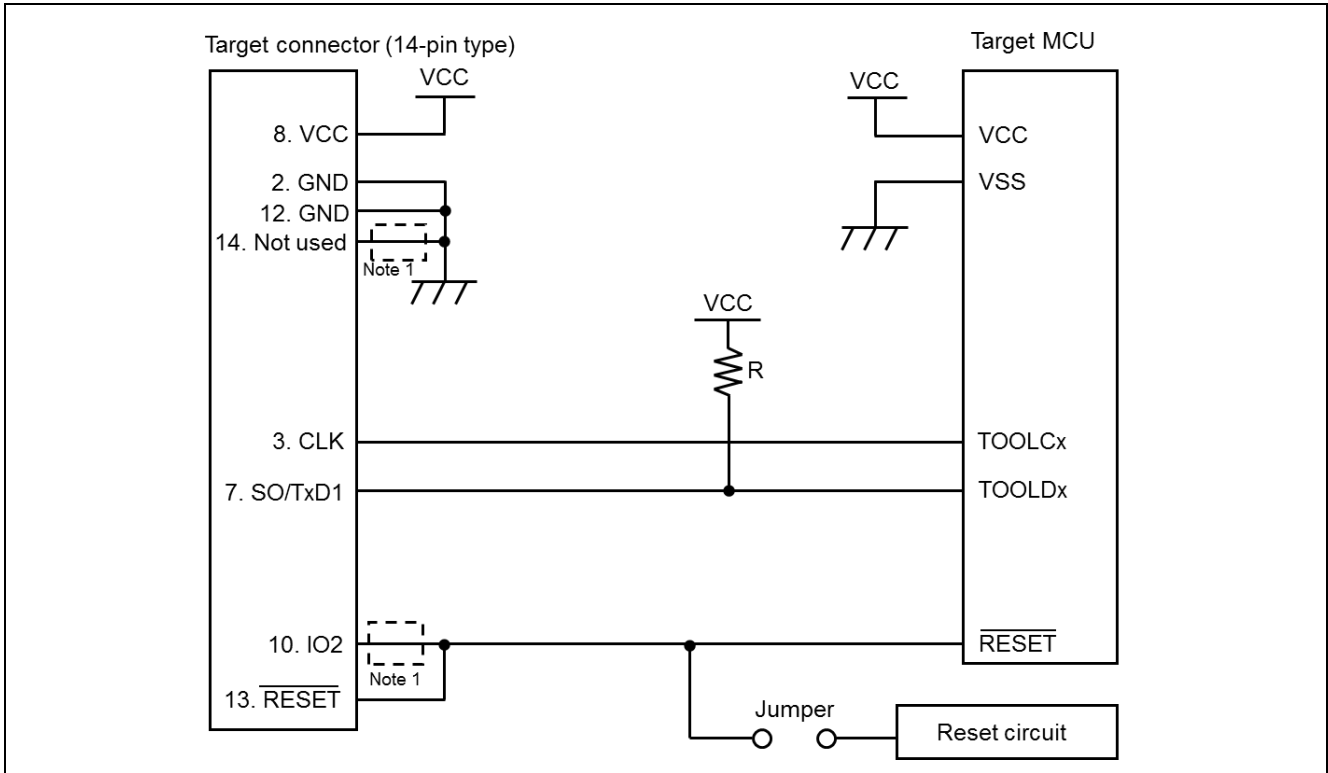
Figure 9.6   Example of a Circuit for 78K0 (TOOLCx and TOOLDx)

Note: These pins do not need to be short-circuited when using the FP6. Short-circuit them if necessary.

9.7 V850E2 (Single-wire UART communications)

Figure 9.7   Example of a Circuit for V850E2 (Single-Wire UART)

Notes: 1. These pins do not need to be short-circuited unless the FP6 is used with the E1 or E20.
2. In case of using the alternate-function pin with a pull-up resistor, connect the pin to FLMD1 of the target connector. In flash memory programming mode, the output on the FLMD1 pin is at the low level.
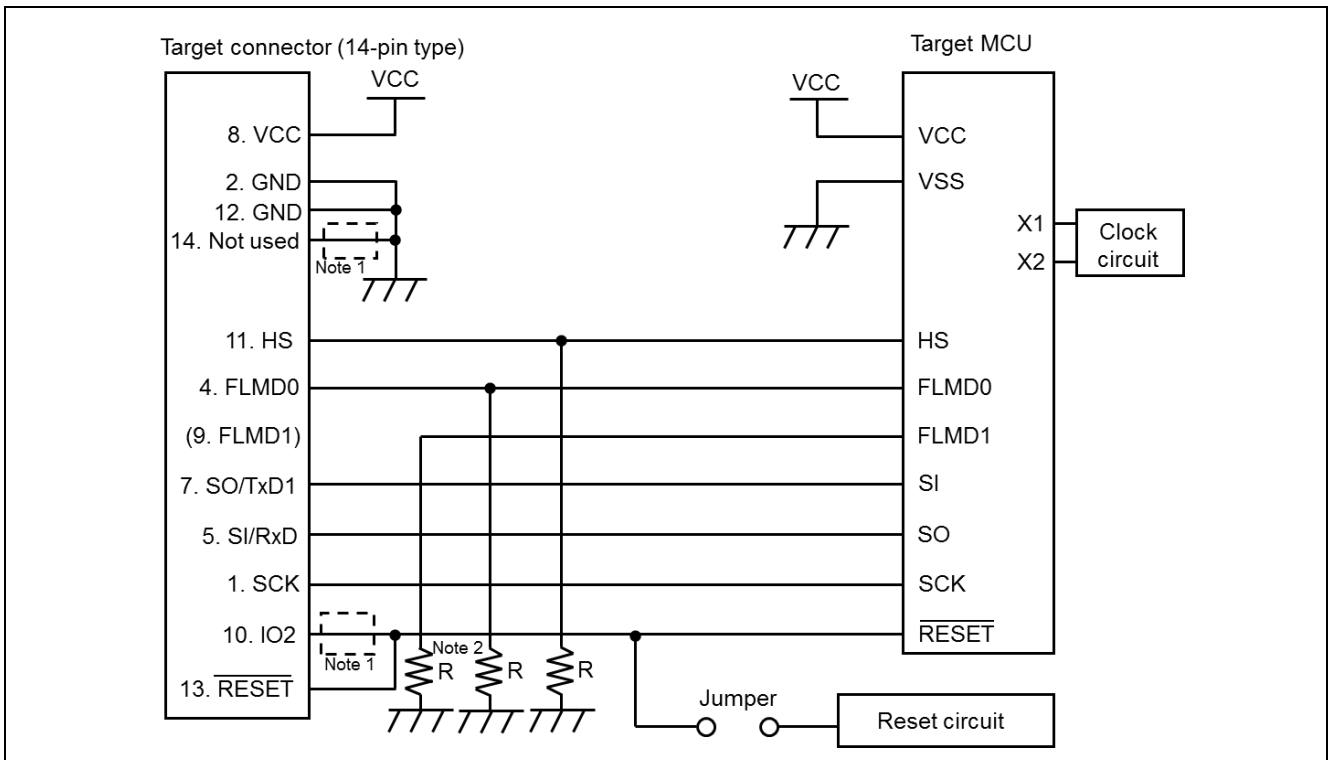
9.8 V850E2 (CSI communications)

Figure 9.8   Example of a Circuit for V850E2 (CSI)

Notes: 1.   These pins do not need to be short-circuited unless the FP6 is used with the E1 or E20.

2.   In case of using the alternate-function pin with a pull-up resistor, connect the pin to FLMD1 of the target connector. In flash memory programming mode, the output on the FLMD1 pin is at the low level.
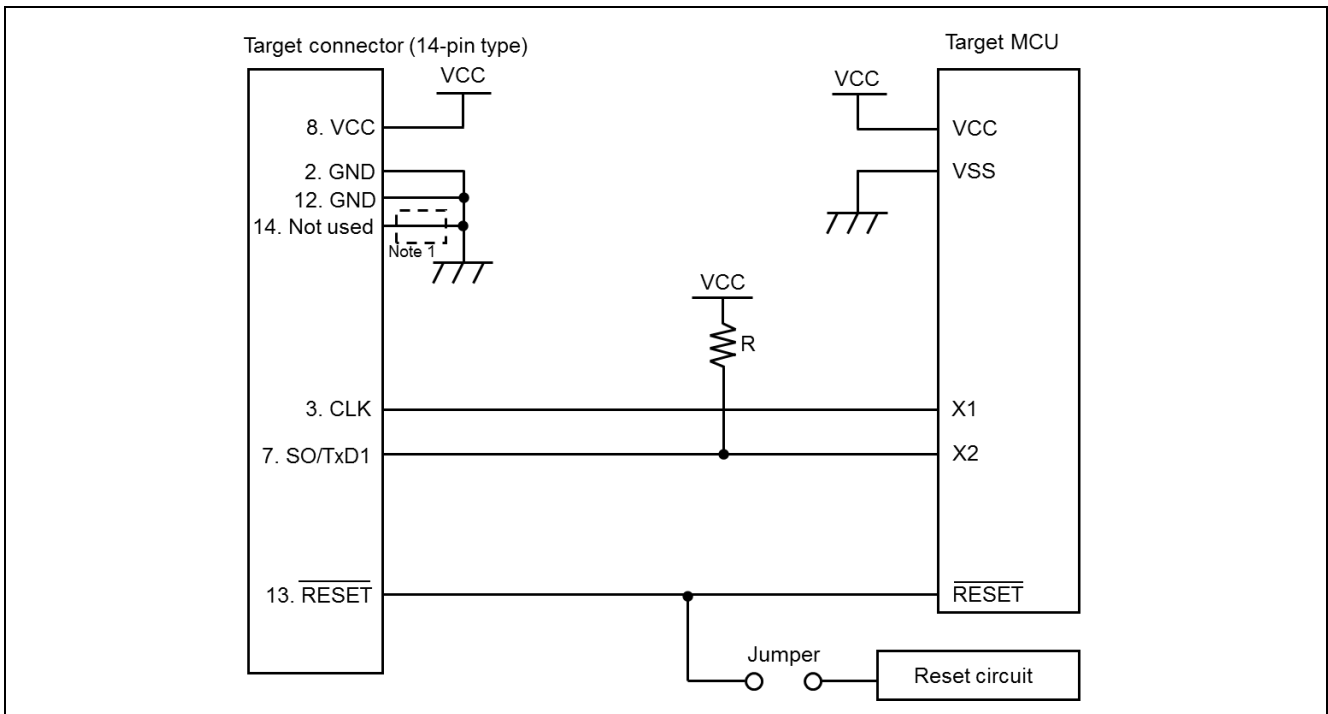
9.9 RL78 (Single-wire UART communications, VDD = EVDD)

Figure 9.9   Example of a Circuit for RL78 Family (VDD = EVDD)

Note: These pins do not need to be short-circuited unless the FP6 is used with the E1, E20, E2, or E2 Lite.

9.10   RL78 (Single-wire UART communications, VDD ≠ EVDD)
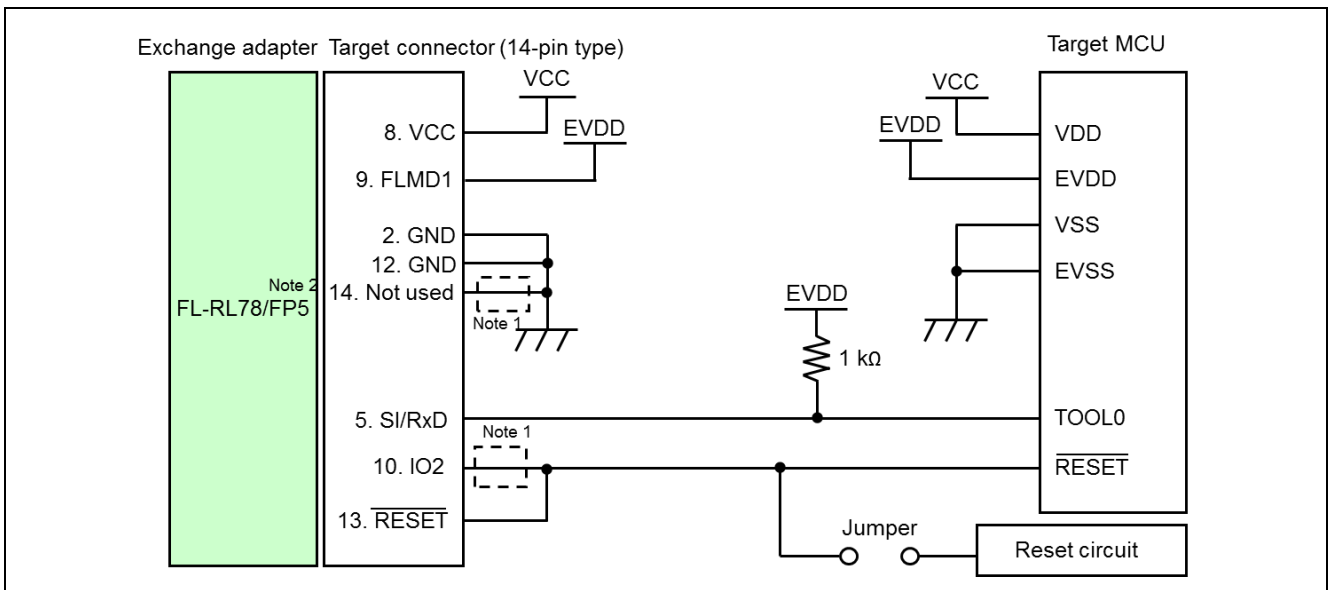
Figure 9.10   Example of a Circuit for RL78 Family (VDD ≠ EVDD)

Notes: 1.   These pins do not need to be short-circuited unless the FP6 is used with the E1, E20, E2 or E2 Lite.
        2.   To perform when VDD ≠ EVDD, connect the conversion adaptor FL-RL78/FP5 (a product of Naito Densei Machida Mfg. Co., Ltd.).

9.11   RX and SuperH (SCI communications)
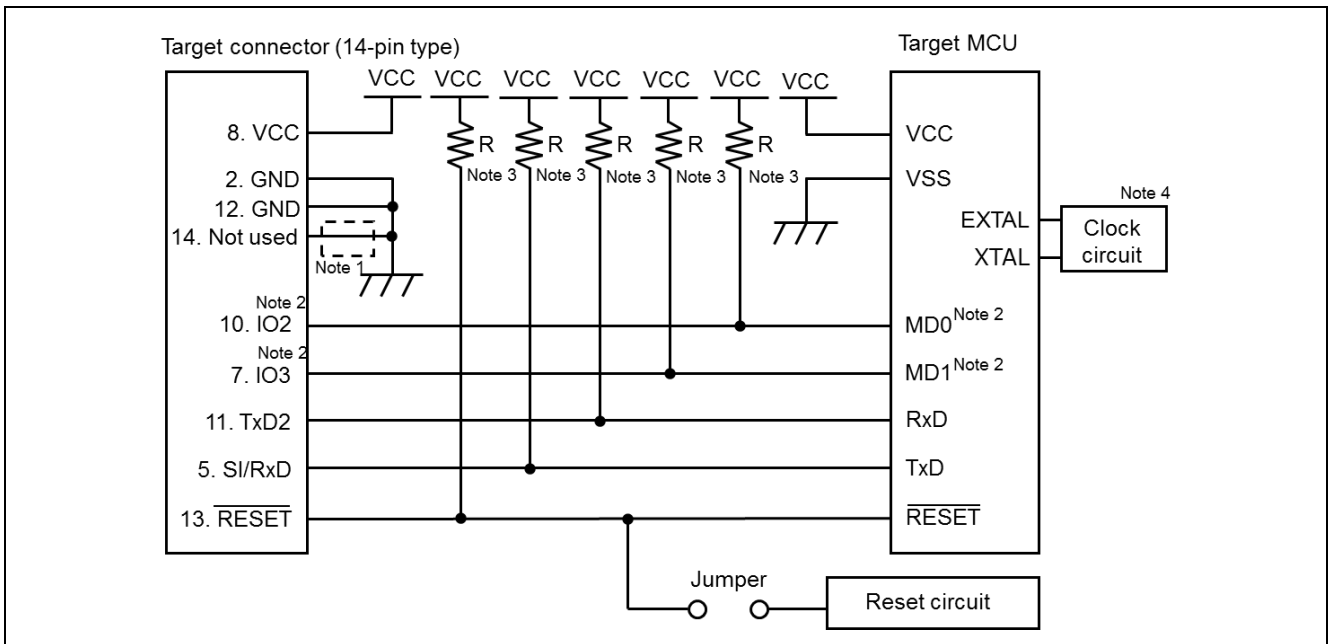
Figure 9.11   Example of a Circuit for RX Family and SuperH Family (SCI) (Case of RX62T)

Notes: 1. These pins do not need to be short-circuited unless the FP6 is used with the E1, E20, E2, E2 Lite or E8a.

2. Connect the mode setting pins of operating mode to any of the IO0 to IO5 pins. The signal settings for IO0 to IO5 pins can be set in the [Mode Pins Setting] dialog box on the [Connect Setting] tab in the [Setup] dialog box. Normally, use the initial settings in the [IO Signal Settings] area. It is compatible with examples of circuits in the E1/E20 Emulator Additional Document for User's Manual (RX User System Design).

3. The value of each resistor should be in the range from 4.7 KΩ to 10 KΩ.

4. The need for the clock circuit might differ depending on the target MCU. Refer to the user's manual of the target MCU.

9.12   R8C

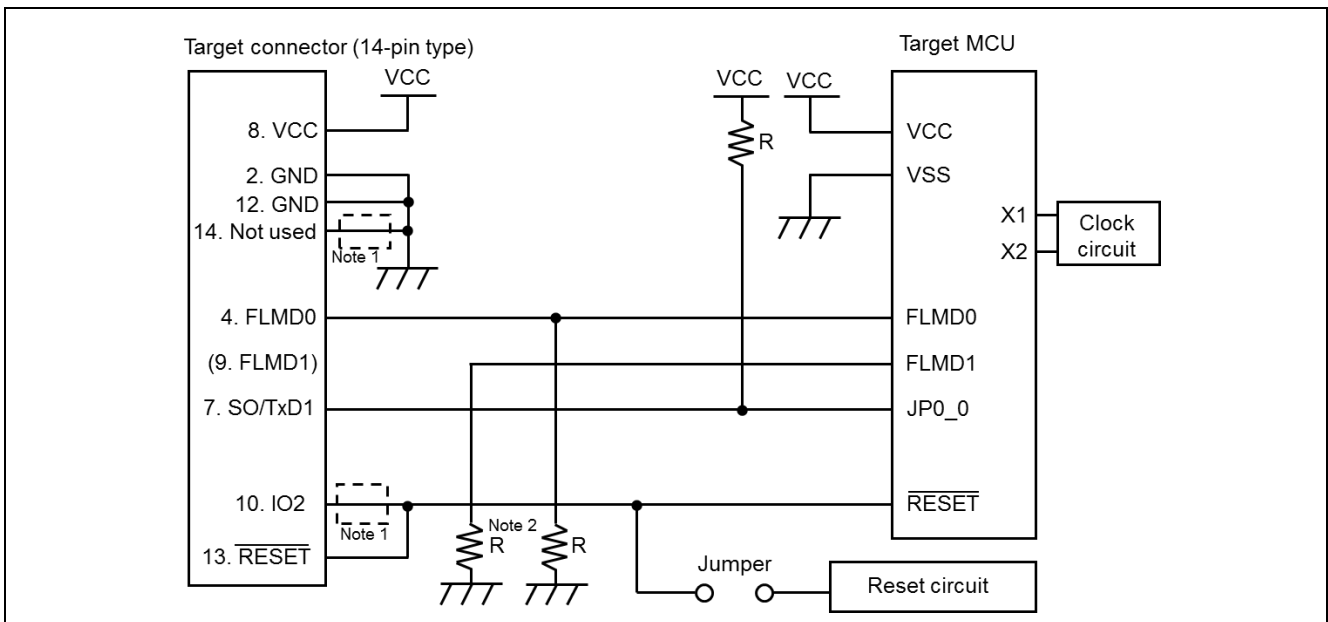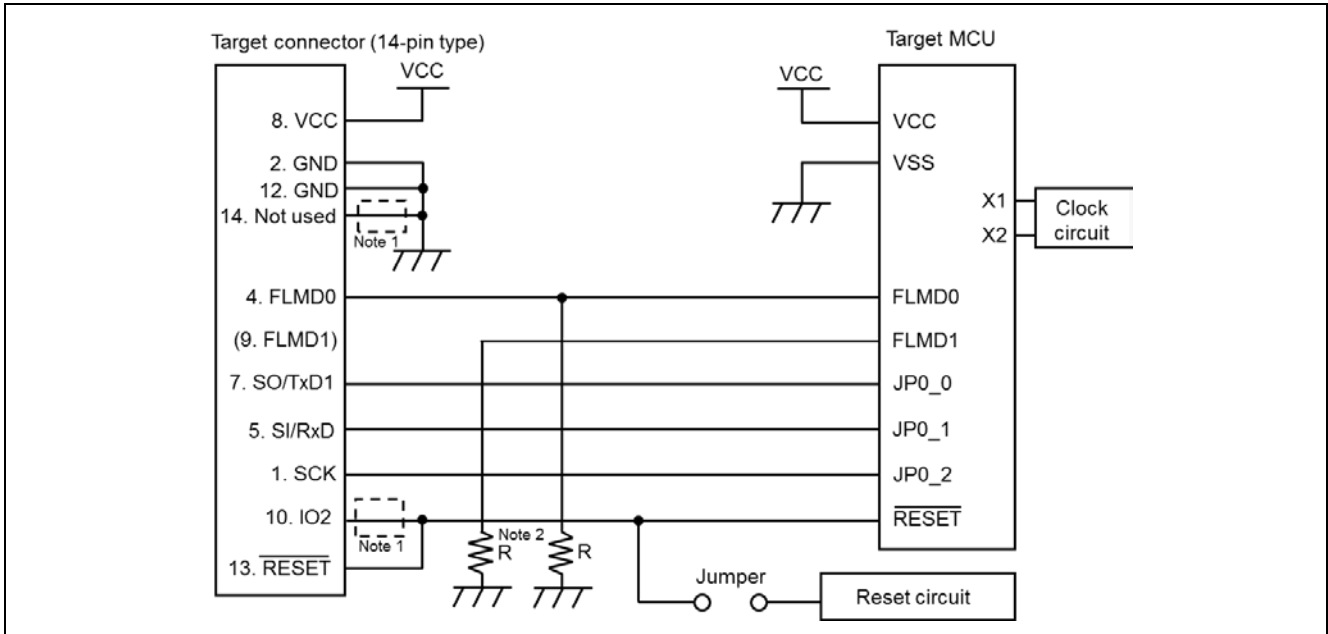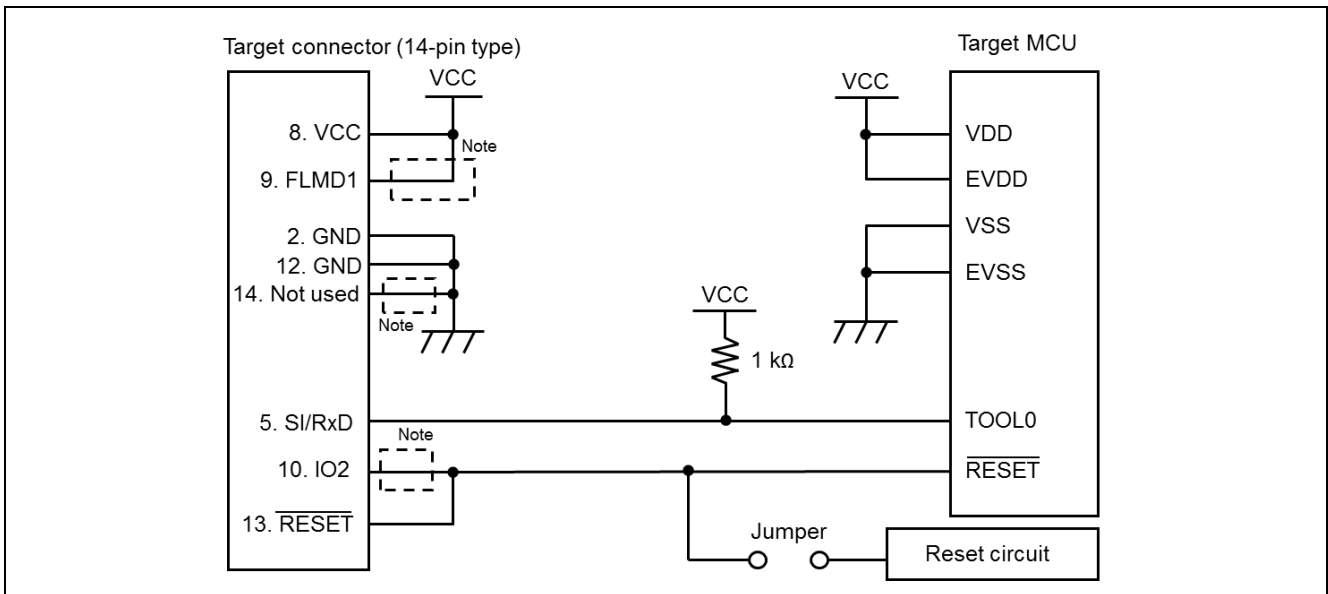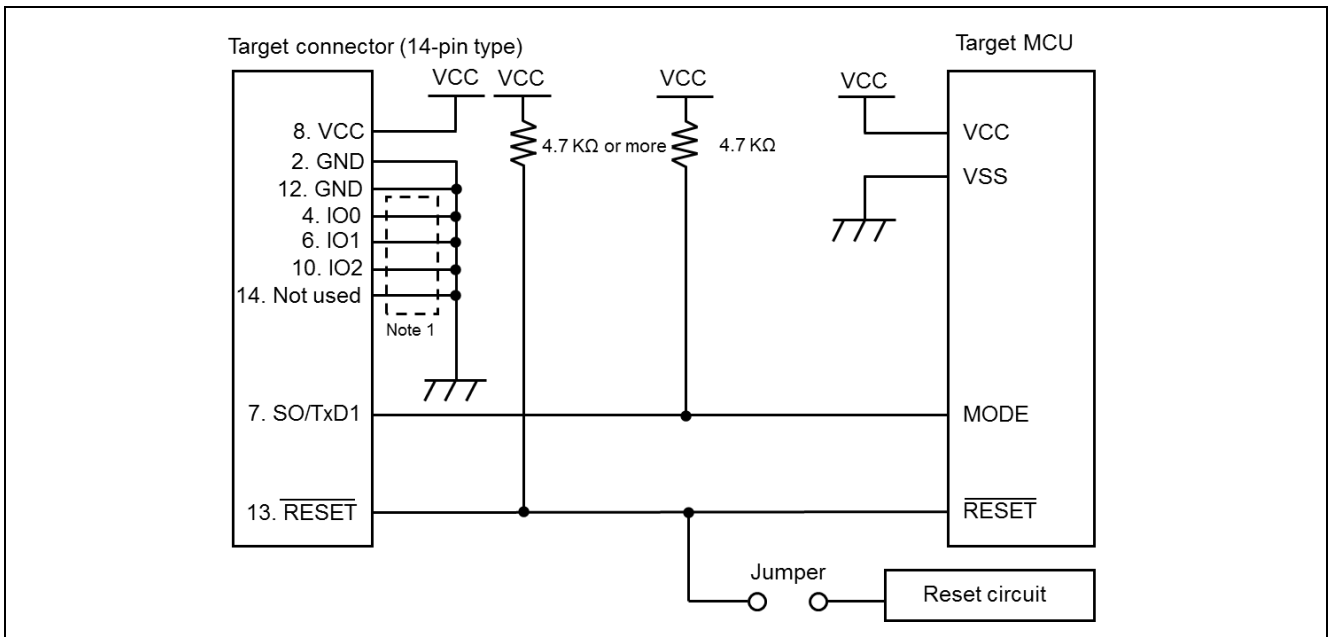**Figure 9.12   Example of a Circuit for R8C Family**

Note: These pins do not need to be short-circuited unless the FP6 is used with the E1, E20 or E8a.

9.13   RX100, RX200, and RX65x series (FINE communications)
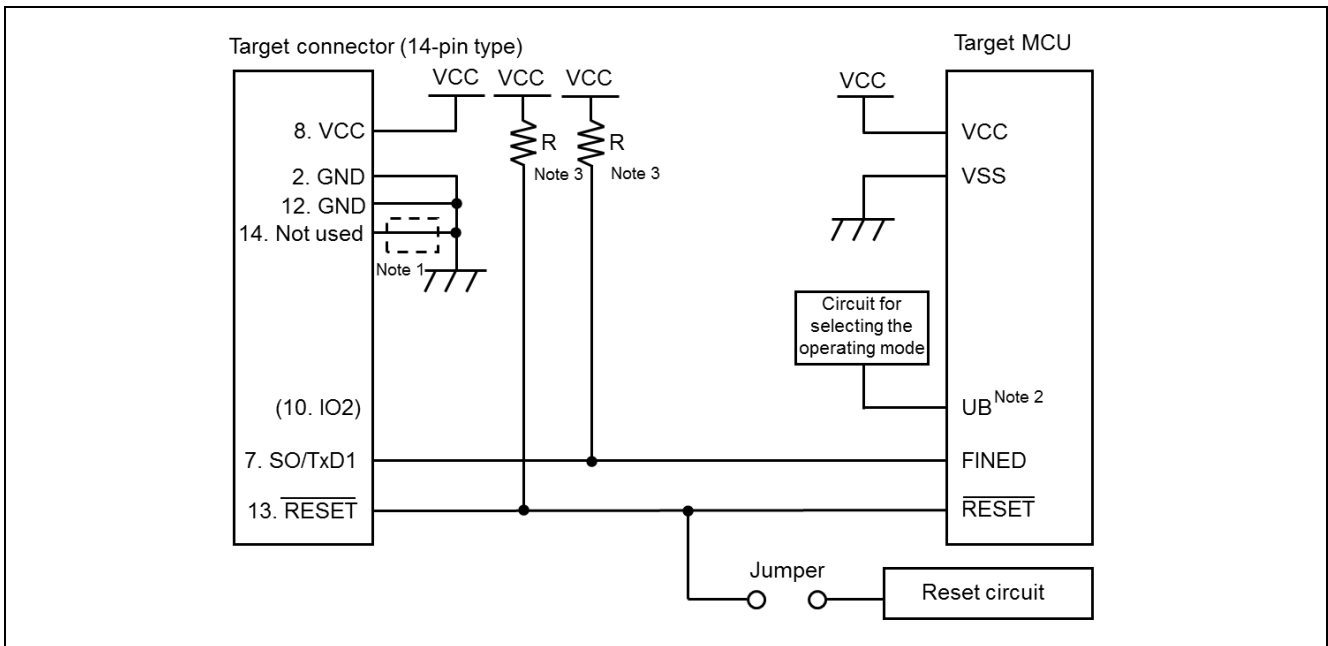
Figure 9.13   Example for RX100, RX200, and RX65x series (FINE)

Notes: 1.   These pins do not need to be short-circuited unless the FP6 is used with the E1, E20, E2, or E2 Lite.
    2.   The UB pin controls entry to the user boot mode. Set up the UB pin to select the boot mode (SCI) or connect the pin to IO2 of the target connector.
    3.   The value of each resistor should be in the range from 4.7 KΩ to 10 KΩ.when the FP6 is used with the E1, E20, E2, or E2 Lite.

9.14   RH850 type 1 (1-wire UART communications)
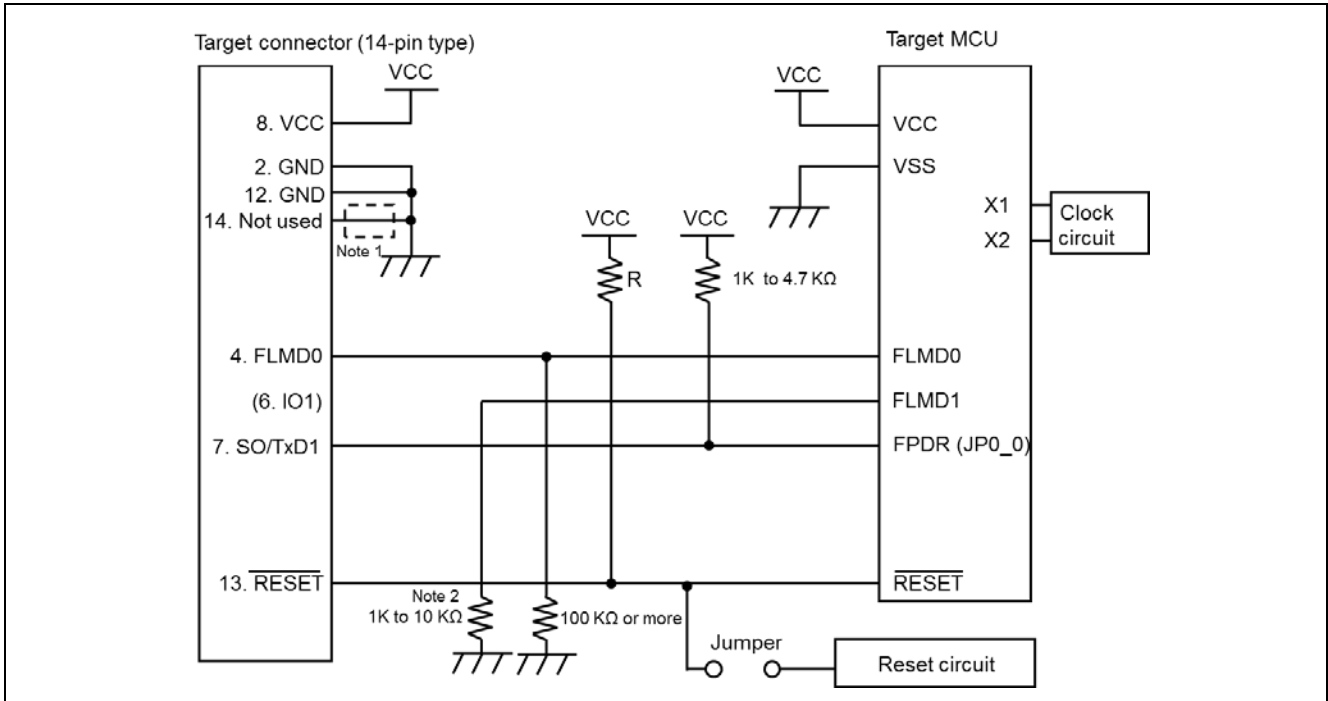
Figure 9.14   Example of a Circuit for RH850 Family (1-Wire UART) (Case of RH850/F1x)

Notes: 1.   These pins do not need to be short-circuited unless the FP6 is used with the E1, E20 or E2.

2.   In case of using the alternate-function pin with a pull-up resistor, connect the pin to IO1 of the target connector. In serial programming mode, the output on the IO1 pin is at the low level.

9.15   RH850 type 1 (2-wire UART or CSI communications)
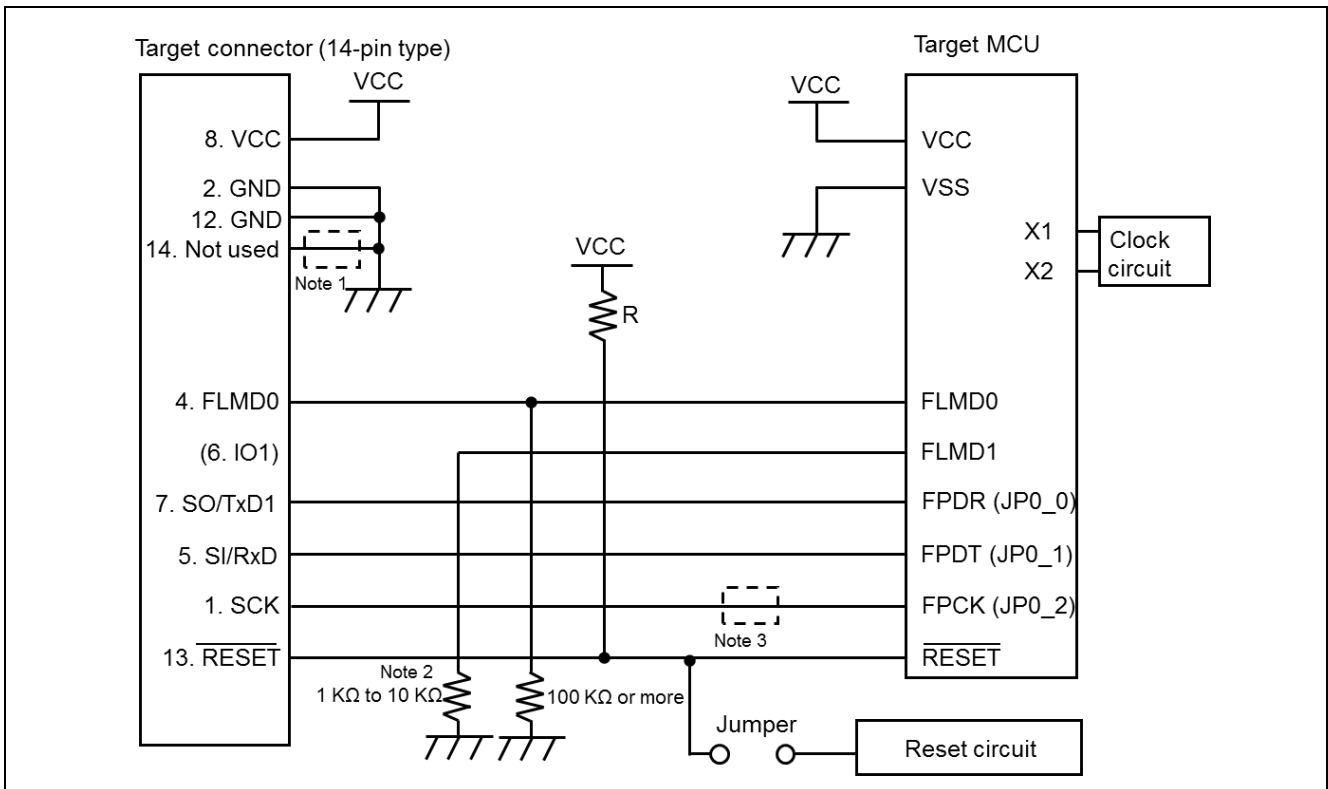
Figure 9.15   Example of a Circuit for RH850 Family (2-Wire UART or CSI) (Case of RH850/F1x)

Notes: 1. These pins do not need to be short-circuited unless the FP6 is used with the E1, E20 or E2.

2. In case of using the alternate-function pin with a pull-up resistor, connect the pin to IO1 of the target connector. In serial programming mode, the output on the IO1 pin is at the low level.

3. These pins do not need to be short-circuited when using 2-wire UART.

9.16   RH850 type 2 (2-wire UART or CSI communications)
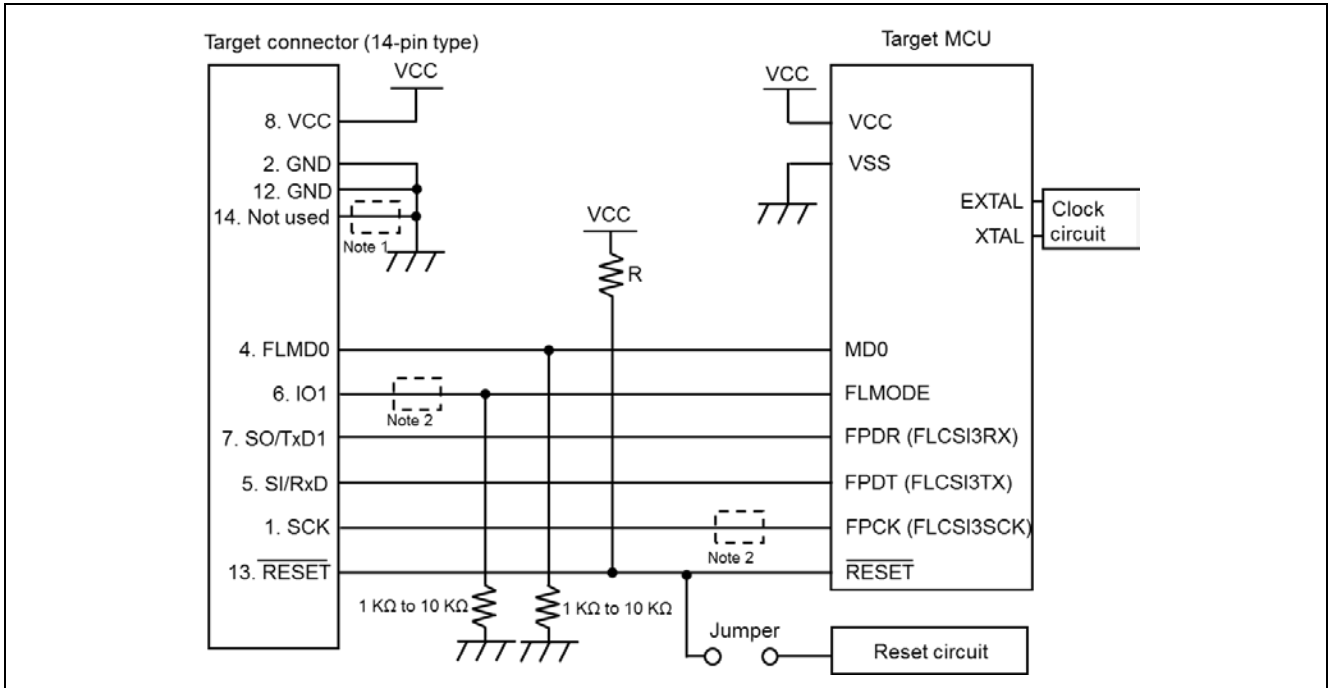
Figure 9.16   Example of a Circuit for RH850 Family (2-wire UART or CSI communications) (Case of RH850/E1x)

Notes: 1.   These pins do not need to be short-circuited unless the FP6 is used with the E1, E20 or E2.

2.   These pins do not need to be short-circuited when using 2-wire UART.

9.17   Renesas Synergy (UART communications)
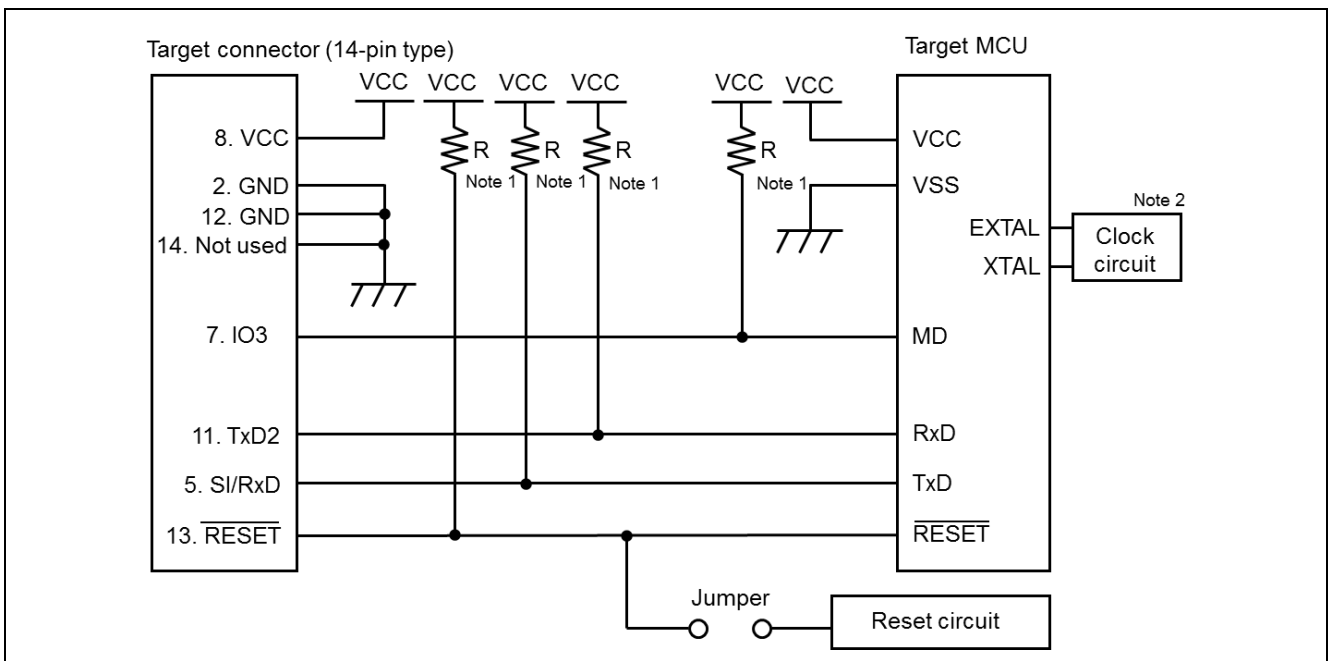
Figure 9.17   Example of a Circuit for an S7G2 (UART communications)

Notes: 1.   The value of each resistor should be in the range from 4.7 KΩ to 10 KΩ.

2.   Some MCUs do not require an external clock circuit. To check if the clock circuit is necessary, see the user's manual for the target MCU.

10 Troubleshooting

This chapter covers frequently asked questions (FAQ).

10.1 FAQ

For frequently asked questions, refer to the following support portal (FAQ):

https://www.renesas.com/pg-fp6 -> Design Support -> FAQ

* Using the self-testing function, the user can find out the reason why the FP6 does not operate normally, such as a defect in the FP6, or problems in other hardware. For how to use the tool, refer to 4.4.2.6, [Self Test],.

11 Points for Caution

This chapter gives some notes on rewriting the memory in the target MCU.

11.1   Checking before Connection

- Applies to: All MCUs

  Connection of the target MCU in the cases listed below may damage the tool in use or the target system due to conflicts between signals. Be sure to check that the settings and circuit connection are correct.

  —— The type of the target MCU to be connected was mistaken.
  —— The wrong recommended circuit was used for the target MCU.
  —— The output setting of mode setting pins was wrong while the setting is for manual entry to boot mode.
  —— The power-supply setting was wrong.

11.2   Manipulating the User Boot Mat

- Applies to: RX610

  If a valid ID code has not been set before the MCU is connected (i.e. the device is not protected), manipulation of the user boot mat is not possible on completion of the connection. To enable manipulation of the user boot mat, set a valid ID code before connecting the MCU.

- Applies to: SH family

  Reading and uploading of data in user boot mat areas are not supported.

- Applies to: SH family

  If you are using HEX files, do not select [Operate] for both the code flash and user boot flash areas on the [Block Setting] tabbed page of the [Setup] dialog box.

11.3   Erasing a Chip

- Applies to: RH850

  When a chip is erased, the configuration data are cleared after all other data have been erased. In other words, the option settings of the MCU are all erased. Since all settings, including the settings at the time of shipment, are erased, be sure to make the required settings at the same time.

  In addition, processing to clear the configuration data is prohibited in some MCUs. When you wish to erase a chip, refer to the user's manual of the target MCU in use and determine whether the processing is available.

11.4   Auto-Padding with 0xFF

- Applies to: All MCUs

  When an amount of data is less than the minimum unit for programming a flash memory, the data are always padded with 0xFF before programming.

- Applies to: RX

  When programming the configuration setting area, parts with no data will be padded with 0xFF.

11.5   Wide Voltage Mode

- Applies to: 78K0R family

   If you wish to enable wide voltage mode, select the [Wide Voltage] checkbox on the [Connect Setting] tabbed page of the [Setup] dialog box. Since the FP6 ignores any wide voltage setting in a HCUHEX file, this is the case regardless of whether you are using an HCUHEX file.

11.6   Switching to Dual Mode

- Applies to: RX-family MCUs with flash memory in a dual-bank structure

   When you create a new ESF file for the FP6 Terminal, select a target device name that matches the bank mode selected by the Bank Mode Select bits in the option-setting memory.

   The following error messages will appear when the FP6 is connected to an MCU with a different bank mode.

   Message displayed on the FP6:   ERROR:023 Inv. Sig. addr.

   FP6 Terminal: Connection or synchronisation failed.

   The bank mode for the MCU is changed by the following actions.
   —— Resetting the MCU after a setting for bank mode which differs from the current setting has been written to the Bank Mode Select bits
   —— Resetting the MCU after selecting [Erase Chip] to erase a chip that is currently in dual mode

   [How to switch a chip from the linear mode to the dual mode]
   1.   Create a new ESF file for an MCU in the linear mode.
   2.   Select the erasure option as [Erase Chip] to erase the chip.
   3.   Program the option-setting memory with a file that specifies the dual mode.
   4.   Reset the MCU.

11.7   RPI Files

- Applies to: RL78 family, RX100 series[1], and RX200 series[1]

   When you are using an RPI file, the following settings will be effective even if the RPI file includes no settings regarding command protection[2] or a flash-access window.

   —— Command Protection[2]
      Disable Block Erase: No
      Disable Program: No
      Disable Boot Block Cluster Programming: No
   —— Flash Access Window
      Beginning: Block 0 in the code flash memory of the target MCU
      End: The last block in the code flash memory of the target MCU

Notes: 1. Only those MCUs that support flash-access windows
            2. For the RL78 family only

11.8   Verification after Protecting the MCU

- Applies to: RH850, RX64M, RX71M

   Setting the following protection functions of the MCU restricts the verification function.

— ID code protection

Proceeding with verification ("Verify by reading the device") without issuing a reset after the ID code protection bit has been set (written) will cause a protection error. To avoid this type of error, be sure to reset the MCU after setting (writing to) the ID code protection bit. The FP6 enters the ID authentication mode and verification is enabled.

— Read command protect (Reading prohibited)

After the read command protection bit has been set, the ID code written to the MCU cannot be verified. However, the setting of the read command protection bit becomes effective immediately after a new setting has been written.

12   Maintenance and Warranty

This chapter covers basic maintenance, warranty information, provisions for repair and the procedures for requesting a repair.

12.1   Maintenance

(1) If dust or dirt collects on this product, wipe it off with a dry soft cloth. Do not use thinner or other solvents because these chemicals can cause the surface coating to separate.

(2) When you do not use this product for a long period, disconnect it from the power supply, host PC and user system.

12.2   Warranty

(1) This product comes with a one-year warranty after purchase.
Should the product break down or be damaged while you're using it under normal condition based on its user's manual, it will be repaired or replaced free of cost.

(2) However, if the following failure or damage occurs to the product under warranty, the product will be repaired or

a) Failure or damage attributable to the misuse or abuse of the product or its use under other abnormal conditions.

b) Failure or damage attributable to improper handling of the product after purchase, such as dropping of the product when it is transported or moved.

c) Failure or damage to the product caused by other pieces of equipment connected to it.

d) Failure or damage attributable to fire, earthquakes, thunderbolts, floods, or other natural disasters or abnormal voltages, etc.

e) Failure or damage attributable to modifications, repairs, adjustments, or other acts made to the product by other than Renesas Electronics Corporation.

(3)   Consumables (e.g., sockets and adapters) are not covered by the aforementioned repair.

In the above cases, contact your local distributor. If your product is being leased, consult the leasing company or the owner.

12.3   Repair Provisions

(1) Repairs not covered by warranty

Problems arising in products for which more than one year has elapsed since purchase are not covered by warranty.

(1)   Replacement not covered by warranty

If your product's fault falls into any of the following categories, the fault will be corrected by replacing the entire product instead of repairing it, or you will be advised to purchase a new product, depending on the severity of the fault.

— Faulty or broken mechanical portions

— Flaws, separation, or rust in coated or plated portions

— Flaws or cracks in plastic portions

— Faults or breakage caused by improper use or unauthorized repair or modification

— Heavily damaged electric circuits due to overvoltage, overcurrent or shorting of power supply

— Cracks in the printed circuit board or burnt-down patterns

— A wide range of faults that make replacement less expensive than repair

— Faults that are not locatable or identifiable

(2)   Expiration of the repair period

When a period of one year has elapsed after production of a given model ceased, repairing products of that model may become impossible.

(3) Carriage fees for sending your product to be repaired

   Carriage fees for sending your product to us for repair are at your own expense.

12.4 How to Make Request for Repair

If your product is found faulty, fill in the Repair Request Sheet downloadable from the following URL. And email the sheet and send the product to your local distributor. To ensure rapid repair, fill in the sheet as specific as possible.

   https://www.renesas.com/repair

⚠ CAUTION

Note on Transporting the Product:

When sending your product for repair, use the packing box and cushioning material supplied with the product when it was delivered to you and specify caution in handling (handling as precision equipment). If packing of your product is not complete, it may be damaged during transportation. When you pack your product in a bag, make sure to use the conductive plastic bag supplied with the product (usually a blue bag). If you use a different bag, it may lead to further trouble with your product due to static electricity.

Appendix A.   Messages

This chapter explains the messages.

A.1   Messages Defined in FP6 Terminal Specification

(1)

No.	Message	Description
E0000001	Reading of a product list file failed.	Reinstall FP6 Terminal.
E0000002	Saving of a configuration file for the FP6 terminal failed.	Permit writing FP6.ini in the document folder.
E0000004	The firmware file for the FP6 was not correct.	Reinstall FP6 Terminal.
E0000005	Creation or updating of a setting file failed.	Create an ESF file in a writable folder.
E0000006	The name of the folder for a setting file or the name of a setting file is too long. The name of a folder must have no more than 244 characters.	Shorten the path of the folder of the ESF file.
E0000007	A setting file was not found.	Confirm an ESF file or create a new file.
E0000008	The setting file was not correct.	Confirm an ESF file or create a new file.
E0000010	The device information file cannot be opened.	Confirm a device information file or create a new file. Reinstall FP6 Terminal if the error cannot be fixed.
E0000011	The device information file is not correct.	Confirm a device information file or create a new file. Reinstall FP6 Terminal if the error cannot be fixed.
E0000012	Preparation for downloading a program file failed.	Confirm that there is not a file with the same name as that of the file selected in [Program file 1]. When there is such a file, move it from the folder or permit overwriting it.
E0000014	The selected program file cannot be opened.	Select a program file again.
E0000015	The format of the selected program file is not supported.	Select a program file again.
E0000016	Data were overlapping.	This error message will appear when processing to write data to overlapping address ranges is attempted. Confirm that the program file does not include data for overlapping address ranges.
E0000017	The DDI, HCUHEX, and RPI formats cannot be selected for program files 2 to 4.	Select the RPI, HCUHEX and DDI format files in [Program File 1].
E0000018	System error.	Reinstall FP6 Terminal.
E0000019	Since a write-protected folder or file was specified, creating the file was not possible.	Specify a writable folder or file.
E0000023	Updating of the files failed.	Ensure that the files in the selected folder are not protected.
E0010001	A timeout occurred during communications with FP6.	Confirm the connection with the FP6.
E0010002	An error in communications with the FP6 occurred.	Confirm the connection with the FP6.
E0010003	Updating of the firmware for the FP6 failed. The FP6 terminal was started in a limited mode.	Confirm the connection with the FP6. The firmware file may be damaged. Reinstall FP6 Terminal.
E0010004	The FP6 must be connected to the target MCU to create a new ESF file for the selected target.	Connect the PC, the FP6 and the target MCU.
E0010006	Setting of a password failed.	Confirm the connection between the PC and the FP6.

(2)

No.	Message	Description
E0010007	Authentication of a password failed.	Input a correct password or initialize the FP6.
E0010008	The value input for the password was not correct.	Only hexadecimal numbers can be used for the FP6 password.
E0020001	The value input for VCC was out of range.	Set the VCC value according to the MCU specification.
E0020002	The input is not correct.	Input a correct value.
E0020003	The value input for the input frequency was out of range.	Set the input frequency according to the MCU specification.
E0020004	No target area is selected.	Select at least one target area on the [Block Setting] tabbed page.
E0030001	An error occurred in communications with the target MCU.	Confirm the environment setting of the target system. Check the connection between the FP6 and the target MCU.
E0030002	Setting of the frequency failed.	Confirm the environment of the target system and the connection setting.
E0030003	Authentication of the ID code failed.	Confirm the connection between the FP6 and the target system.

A.2   Error Messages Displayed in Message Display

(1)

No.	Message	Possible Workaround
001	Invalid PR5 data	The PR5 file may include invalid data, or the file may be defective. Perform setting again by using the correct PR5 file.
002	Not connected	Execute a 'con' command before the command causing this error.
005	Not supported!	The command issued is not supported on the MCU and thus cannot be used. Check if the target MCU to be connected has been selected.
006	Command aborted!	The [Read] command has been canceled.
008	Parameter Error!	The PR5 file may be damaged.
009	HEX file Error!	The downloaded program file may be damaged.
012	Synchron. Failed	The FP6 cannot establish connection to the target MCU. The cause may be a wrong connection between the MCU and the FP6, bad socket contacts or the oscillator not operating.
013	Addr. Range err	The address given in the command exceeds the address range of the MCU.
014	RDY detect. fail	The FP6 cannot establish connection to the target MCU. The cause may be a wrong connection between the MCU and the FP6, bad socket contacts or the oscillator not operating.
015	Freq. set failed	Check if the oscillator frequency is allowed. If yes, please contact a Renesas Electronics sales representative or distributor.
016	Baudrt. set fail	An unsupported baud rate was specified. Please consult the user's manual of the MCU and specify supported baud rate.
017	ID code chk. err	Set the security ID specified for the target MCU.
018	Lockbit dis. err	A communication problem occurred between the FP6 and target MCU. Try the operation again. Or, the MCU may be damaged.
019	Lockbit ena. err	A communication problem occurred between the FP6 and target MCU. Try the operation again. Or, the MCU may be damaged.
020	Inv. Sig. ID	Check if the correct MCU is selected.
021	Inv. Sig. Code	Check if the correct MCU is selected.
022	Inv. Sig. func.	Check if the correct MCU is selected.
023	Inv. Sig. addr.	Check if the correct MCU is selected.
024	Inv. device name	Check if the correct MCU is selected.
026	Inv Dev/Firm ver	Check if the correct MCU is selected.
027	Unkn. Signature	Check if the correct PR5 file is used.
029	Inv. DeviceInfo	Check if the correct MCU is selected.
034	Endian info err	A communication problem occurred between the FP6 and target MCU. Try the operation again.
036	ICU mode err	A communication problem occurred between the FP6 and target MCU. Try the operation again. Or, the MCU may be damaged.

(2)

No.	Message	Possible Workaround
040	Erase Timeout	A communication problem occurred between the FP6 and target MCU. Try the operation again.
041	Erase failure	The MCU may be damaged.
042	Ers time exceed	The MCU may be damaged.
043	Ers Timeset err	The PR5 file may contain invalid data. Please contact Renesas Electronics.
050	Bln Timeout	A communication problem occurred between the FP6 and target MCU. Try the operation again.
051	Blank chk failed	The MCU connected is not empty. Use the 'erase' command before programming.
070	Write timeout	A communication problem occurred between the FP6 and target MCU. Try the operation again.
071	Write failed	Either the MCU was not blank before writing or the MCU may be damaged.
073	Wrt. Timeset err	The PR5 file may contain invalid data. Please contact Renesas Electronics.
074	No Prog Data	The operation area contains no valid data for the program file. Check the block setting and program file downloaded to the FP6.
075	No Flash Option	The flash option settings have not been specified. When using the Program Flash Option command (pfo command), specify the flash option settings.
080	Vrf Timeout	A communication problem occurred between the FP6 and target MCU. Try the operation again.
081	Verify failed	The data of flash memory in the target MCU are not the same as those in the FP6.
090	IVrf Timeout	A communication problem occurred between the FP6 and target MCU. Try the operation again.
091	IVerify failed	An error was occurred while the write data level was being checked.
092	VGT Comm err	A communication problem occurred between the FP6 and target MCU. Improve the connection environment between the FP6 and target MCU.
093	SUM Comm err	A communication problem occurred between the FP6 and target MCU. Improve the connection environment between the FP6 and target MCU.
094	SCF Comm err	A communication problem occurred between the FP6 and target MCU. Improve the connection environment between the FP6 and target MCU. It is displayed when security setting is changed from prohibition to permission. Set security setting to permission by chip erasure.
095	GSC Comm err	A communication problem occurred between the FP6 and target MCU. Improve the connection environment between the FP6 and the MCU.
096	CLR Comm err	A communication problem occurred between the FP6 and target MCU. Try the operation again. Or, the MCU may be damaged.
099	READ Comm err	A communication problem occurred between the FP6 and target MCU. Improve the connection environment between the FP6 and the MCU. It is displayed when read prohibition is set in security setting. Set read permission by chip erasure.

(3)

No.	Message	Possible Workaround
204	Not connected	The target MCU was not connected to the FP6 with 'con' command when a 'dcon' command was issued.
210	Already conn.	A 'con' command was issued when the target MCU was already connected to the FP6 with a 'con' command.
302	HEX range err	The address range of the downloaded program file is outside the set address range.
303	Invalid ID Tag	The format of the ID Tag is not correct. Download the correct file.
400	Targ. power det.	The FP6 should supply V_{CC} power, but V_{CC} has been detected to be 0.2 V or higher on the target system before supplying V_{CC}. The FP6 response message "Target power detected! Check Setup." is output.
402	FP6 int Vcc fail	Please contact a Renesas Electronics sales representative or distributor.
404	Targ. power fail	The target should supply V_{CC} power, but V_{CC} voltage is outside the range of a V_{CC} set value ±5% just before starting communication. The FP6 response message "No VCC applied or Voltage is out of range." is output.
405	Power failure	An overcurrent was detected when V_{CC} was output. Check the connection with the MCU.
406	Power failure	V_{CC} cannot be supplied from the FP6 when a power adapter is not connected.
407	Input Power fail	The voltage of the USB and the power adapter is not correct.
585	GOB Comm err	A communication problem occurred between the FP6 and target MCU. Improve the connection environment between the FP6 and the MCU.
586	GID Comm err	A communication problem occurred between the FP6 and target MCU. Improve the connection environment between the FP6 and the MCU.
587	SLB Comm err	A communication problem occurred between the FP6 and target MCU. Improve the connection environment between the FP6 and the MCU.
588	GOT Comm err	A communication problem occurred between the FP6 and target MCU. Try the operation again. Or, the MCU may be damaged.
589	GLB Comm err	A communication problem occurred between the FP6 and target MCU. Try the operation again. Or, the MCU may be damaged.
590	IDC Comn err	A communication problem occurred between the FP6 and target MCU. Improve the connection environment between the FP6 and the MCU. Or, set the correct ID code.
591	OPB Comn err	A communication problem occurred between the FP6 and target MCU. Improve the connection environment between the FP6 and the MCU. Or, set the correct option bytes.
592	OTP Comm err	A communication problem occurred between the FP6 and target MCU. Try the operation again. Or, the MCU may be damaged.
593	SID Comm err	A communication problem occurred between the FP6 and target MCU. Try the operation again. Or, the MCU may be damaged.
594	OFS Comm err	A communication problem occurred between the FP6 and target MCU. Try the operation again. Or, the MCU may be damaged.
595	SED Comm err	A communication problem occurred between the FP6 and target MCU. Try the operation again. Or, the MCU may be damaged.
596	GED Comm err	A communication problem occurred between the FP6 and target MCU. Try the operation again. Or, the MCU may be damaged.
597	SPD Comm err	A communication problem occurred between the FP6 and target MCU. Try the operation again. Or, the MCU may be damaged.
598	ICU Comm err	A communication problem occurred between the FP6 and target MCU. Try the operation again. Or, the MCU may be damaged.
599	STM Comm err	A communication problem occurred between the FP6 and target MCU. Try the operation again. Or, the MCU may be damaged.
600	GTM Comm err	A communication problem occurred between the FP6 and target MCU. Try the operation again. Or, the MCU may be damaged.
601	SPD is active	Serial programming is disabled for the MCU currently connected to the FP6. There is no way to release this setting.

(4)

No.	Message	Possible Workaround
801	FP6 Power err	Please contact a Renesas Electronics sales representative or distributor.
802	-(No display)-	Please contact a Renesas Electronics sales representative or distributor.
803	NAND flash err	Please contact a Renesas Electronics sales representative or distributor.
804	NAND flash err	Please contact a Renesas Electronics sales representative or distributor.
805	NAND flash err	Please contact a Renesas Electronics sales representative or distributor.
806	NAND flash err	Please contact a Renesas Electronics sales representative or distributor.
808	NAND flash err	Please contact a Renesas Electronics sales representative or distributor.
809	FP6 Config err	Please contact a Renesas Electronics sales representative or distributor.
810	FP6 Config err	Please contact a Renesas Electronics sales representative or distributor.
811	Statistics err	Please contact a Renesas Electronics sales representative or distributor.
820	FP6 FW err	The firmware of the FP6 is incorrect. This error may occur when the power of the FP6 main unit is turned off during updating the version of firmware. Please contact a Renesas Electronics sales representative or distributor.
821	FP6 FW err	The firmware of the FP6 is incorrect. Please contact a Renesas Electronics sales representative or distributor.

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Appendix B.   Supplementary Information

This chapter covers supplementary information referred to by the user's manual of the FP6.

B.1   32-Bit CRC Method

```
/*  The generator polynomial used for this table is                 */
/*  x^32+x^26+x^23+x^22+x^16+x^12+x^11+x^10+x^8+x^7+x^5+x^4+x^2+x^1+x^0   */
/*  according to Autodin/Ethernet/ADCCP protocol standards           */
/*  Binary: 0x04c11db7                                               */
const uint32_t CRC32_Tab [256]= {
    0x00000000, 0x04c11db7, 0x09823b6e, 0x0d4326d9, 0x130476dc, 0x17c56b6b, 0x1a864db2, 0x1e475005,
    0x2608edb8, 0x22c9f00f, 0x2f8ad6d6, 0x2b4bcb61, 0x350c9b64, 0x31cd86d3, 0x3c8ea00a, 0x384fbdbd,
    0x4c11db70, 0x48d0c6c7, 0x4593e01e, 0x4152fda9, 0x5f15adac, 0x5bd4b01b, 0x569796c2, 0x52568b75,
    0x6a1936c8, 0x6ed82b7f, 0x639b0da6, 0x675a1011, 0x791d4014, 0x7ddc5da3, 0x709f7b7a, 0x745e66cd,
    0x9823b6e0, 0x9ce2ab57, 0x91a18d8e, 0x95609039, 0x8b27c03c, 0x8fe6dd8b, 0x82a5fb52, 0x8664e6e5,
    0xbe2b5b58, 0xbaea46ef, 0xb7a96036, 0xb3687d81, 0xad2f2d84, 0xa9ee3033, 0xa4ad16ea, 0xa06c0b5d,
    0xd4326d90, 0xd0f37027, 0xddb056fe, 0xd9714b49, 0xc7361b4c, 0xc3f706fb, 0xceb42022, 0xca753d95,
    0xf23a8028, 0xf6fb9d9f, 0xfbb8bb46, 0xff79a6f1, 0xe13ef6f4, 0xe5ffeb43, 0xe8bccd9a, 0xec7dd02d,
    0x34867077, 0x30476dc0, 0x3d044b19, 0x39c556ae, 0x278206ab, 0x23431b1c, 0x2e003dc5, 0x2ac12072,
    0x128e9dcf, 0x164f8078, 0x1b0ca6a1, 0x1fcdbb16, 0x018aeb13, 0x054bf6a4, 0x0808d07d, 0x0cc9cdca,
    0x7897ab07, 0x7c56b6b0, 0x71159069, 0x75d48dde, 0x6b93dddb, 0x6f52c06c, 0x6211e6b5, 0x66d0fb02,
    0x5e9f46bf, 0x5a5e5b08, 0x571d7dd1, 0x53dc6066, 0x4d9b3063, 0x495a2dd4, 0x44190b0d, 0x40d816ba,
    0xaca5c697, 0xa864db20, 0xa527fdf9, 0xa1e6e04e, 0xbfa1b04b, 0xbb60adfc, 0xb6238b25, 0xb2e29692,
    0x8aad2b2f, 0x8e6c3698, 0x832f1041, 0x87ee0df6, 0x99a95df3, 0x9d684044, 0x902b669d, 0x94ea7b2a,
    0xe0b41de7, 0xe4750050, 0xe9362689, 0xedf73b3e, 0xf3b06b3b, 0xf771768c, 0xfa325055, 0xfef34de2,
    0xc6bcf05f, 0xc27dede8, 0xcf3ecb31, 0xcbffd686, 0xd5b88683, 0xd1799b34, 0xdc3abded, 0xd8fba05a,
    0x690ce0ee, 0x6dcdfd59, 0x608edb80, 0x644fc637, 0x7a089632, 0x7ec98b85, 0x738aad5c, 0x774bb0eb,
    0x4f040d56, 0x4bc510e1, 0x46863638, 0x42472b8f, 0x5c007b8a, 0x58c1663d, 0x558240e4, 0x51435d53,
    0x251d3b9e, 0x21dc2629, 0x2c9f00f0, 0x285e1d47, 0x36194d42, 0x32d850f5, 0x3f9b762c, 0x3b5a6b9b,
    0x0315d626, 0x07d4cb91, 0x0a97ed48, 0x0e56f0ff, 0x1011a0fa, 0x14d0bd4d, 0x19939b94, 0x1d528623,
    0xf12f560e, 0xf5ee4bb9, 0xf8ad6d60, 0xfc6c70d7, 0xe22b20d2, 0xe6ea3d65, 0xeba91bbc, 0xef68060b,
    0xd727bbb6, 0xd3e6a601, 0xdea580d8, 0xda649d6f, 0xc423cd6a, 0xc0e2d0dd, 0xcda1f604, 0xc960ebb3,
    0xbd3e8d7e, 0xb9ff90c9, 0xb4bcb610, 0xb07daba7, 0xae3afba2, 0xaafbe615, 0xa7b8c0cc, 0xa379dd7b,
    0x9b3660c6, 0x9ff77d71, 0x92b45ba8, 0x9675461f, 0x8832161a, 0x8cf30bad, 0x81b02d74, 0x857130c3,
    0x5d8a9099, 0x594b8d2e, 0x5408abf7, 0x50c9b640, 0x4e8ee645, 0x4a4ffbf2, 0x470cdd2b, 0x43cdc09c,
    0x7b827d21, 0x7f436096, 0x7200464f, 0x76c15bf8, 0x68860bfd, 0x6c47164a, 0x61043093, 0x65c52d24,
    0x119b4be9, 0x155a565e, 0x18197087, 0x1cd86d30, 0x029f3d35, 0x065e2082, 0x0b1d065b, 0x0fdc1bec,
    0x3793a651, 0x3352bbe6, 0x3e119d3f, 0x3ad08088, 0x2497d08d, 0x2056cd3a, 0x2d15ebe3, 0x29d4f654,
    0xc5a92679, 0xc1683bce, 0xcc2b1d17, 0xc8ea00a0, 0xd6ad50a5, 0xd26c4d12, 0xdf2f6bcb, 0xdbee767c,
    0xe3a1cbc1, 0xe760d676, 0xea23f0af, 0xeee2ed18, 0xf0a5bd1d, 0xf464a0aa, 0xf9278673, 0xfde69bc4,
    0x89b8fd09, 0x8d79e0be, 0x803ac667, 0x84fbdbd0, 0x9abc8bd5, 0x9e7d9662, 0x933eb0bb, 0x97ffad0c,
    0xafb010b1, 0xab710d06, 0xa6322bdf, 0xa2f33668, 0xbcb4666d, 0xb8757bda, 0xb5365d03, 0xb1f740b4
};


uint32_t CalcMemoryCRC32 (uint32_t address, uint32_t length)
{
    uint32_t i, rd_ptr, crc_accum;
    uint8_t  byte, data [16];
```

```
    crc_accum= 0xFFFFFFFF;  /* Init Pattern */

    for (i= 0, rd_ptr= 16; i < length; i++)

    {

        /* Check flash read buffer and fill if needed */

        if (rd_ptr == 16)

        {

            Memory_Read (address, 16, data);

            rd_ptr= 0;

            address+= 16;

        }

        byte= ((crc_accum >> 24) ^ data [rd_ptr++]) & 0xFF;

        crc_accum= (crc_accum << 8) ^ CRC32_Tab [byte];

    }

    return crc_accum;

}
```

Figure B.1   32-bit CRC Calculation Specifications

B.2   Division Method

```
#define BLOCKSIZ 256

/* You have to store 1-Block ROM data. */

unsigned char rom_data[BLOCKSIZ];


unsigned char

bist_calc()

{

int i;

unsigned short bist, bist_temp;


bist = 0;

for(i = 0; i < BLOCKSIZ; i++){

bist_temp = bist & 0x1;

bist_temp = (bist_temp << 8) |   (bist_temp << 9) |

    (bist_temp << 11)| (bist_temp << 12);

bist = (bist >> 1) ^ rom_data[i] ^ bist_temp;

        }

return((unsigned char)bist);

}
```

Figure B.2   Division (Original) Calculation Specifications

B.3   16-Bit CRC Method

```
/* The generator polynomial used for this table is: */
/* x^16+x^12+x^5+x^0 according to CCITT-16 standard. */
/* Binary: 0x1021 */
const uint16_t CRC16_Tab [256]= {
    0x0000,0x1021,0x2042,0x3063,0x4084,0x50A5,0x60C6,0x70E7,
    0x8108,0x9129,0xA14A,0xB16B,0xC18C,0xD1AD,0xE1CE,0xF1EF,
    0x1231,0x0210,0x3273,0x2252,0x52B5,0x4294,0x72F7,0x62D6,
    0x9339,0x8318,0xB37B,0xA35A,0xD3BD,0xC39C,0xF3FF,0xE3DE,
    0x2462,0x3443,0x0420,0x1401,0x64E6,0x74C7,0x44A4,0x5485,
    0xA56A,0xB54B,0x8528,0x9509,0xE5EE,0xF5CF,0xC5AC,0xD58D,
    0x3653,0x2672,0x1611,0x0630,0x76D7,0x66F6,0x5695,0x46B4,
    0xB75B,0xA77A,0x9719,0x8738,0xF7DF,0xE7FE,0xD79D,0xC7BC,
    0x48C4,0x58E5,0x6886,0x78A7,0x0840,0x1861,0x2802,0x3823,
    0xC9CC,0xD9ED,0xE98E,0xF9AF,0x8948,0x9969,0xA90A,0xB92B,
    0x5AF5,0x4AD4,0x7AB7,0x6A96,0x1A71,0x0A50,0x3A33,0x2A12,
    0xDBFD,0xCBDC,0xFBBF,0xEB9E,0x9B79,0x8B58,0xBB3B,0xAB1A,
    0x6CA6,0x7C87,0x4CE4,0x5CC5,0x2C22,0x3C03,0x0C60,0x1C41,
    0xEDAE,0xFD8F,0xCDEC,0xDDCD,0xAD2A,0xBD0B,0x8D68,0x9D49,
    0x7E97,0x6EB6,0x5ED5,0x4EF4,0x3E13,0x2E32,0x1E51,0x0E70,
    0xFF9F,0xEFBE,0xDFDD,0xCFFC,0xBF1B,0xAF3A,0x9F59,0x8F78,
    0x9188,0x81A9,0xB1CA,0xA1EB,0xD10C,0xC12D,0xF14E,0xE16F,
    0x1080,0x00A1,0x30C2,0x20E3,0x5004,0x4025,0x7046,0x6067,
    0x83B9,0x9398,0xA3FB,0xB3DA,0xC33D,0xD31C,0xE37F,0xF35E,
    0x02B1,0x1290,0x22F3,0x32D2,0x4235,0x5214,0x6277,0x7256,
    0xB5EA,0xA5CB,0x95A8,0x8589,0xF56E,0xE54F,0xD52C,0xC50D,
    0x34E2,0x24C3,0x14A0,0x0481,0x7466,0x6447,0x5424,0x4405,
    0xA7DB,0xB7FA,0x8799,0x97B8,0xE75F,0xF77E,0xC71D,0xD73C,
    0x26D3,0x36F2,0x0691,0x16B0,0x6657,0x7676,0x4615,0x5634,
    0xD94C,0xC96D,0xF90E,0xE92F,0x99C8,0x89E9,0xB98A,0xA9AB,
    0x5844,0x4865,0x7806,0x6827,0x18C0,0x08E1,0x3882,0x28A3,
    0xCB7D,0xDB5C,0xEB3F,0xFB1E,0x8BF9,0x9BD8,0xABBB,0xBB9A,
    0x4A75,0x5A54,0x6A37,0x7A16,0x0AF1,0x1AD0,0x2AB3,0x3A92,
    0xFD2E,0xED0F,0xDD6C,0xCD4D,0xBDAA,0xAD8B,0x9DE8,0x8DC9,
    0x7C26,0x6C07,0x5C64,0x4C45,0x3CA2,0x2C83,0x1CE0,0x0CC1,
    0xEF1F,0xFF3E,0xCF5D,0xDF7C,0xAF9B,0xBFBA,0x8FD9,0x9FF8,
    0x6E17,0x7E36,0x4E55,0x5E74,0x2E93,0x3EB2,0x0ED1,0x1EF0
};


uint16_t CalcMemoryCRC16 (uint32_t address, uint32_t length)
{
    uint32_t i, rd_ptr;
    uint16_t crc_accum;
    uint8_t byte, data [4];


    crc_accum= 0x0000; /* Init Pattern */
    for (i= 0, rd_ptr= 0; i < length; i++)
    {
        /* Check flash read buffer and fill if needed */
        if (rd_ptr == 0)
```

```
        {
                Memory_Read (address, 4, data);

                rd_ptr= 4;

                address+= 4;
        }
        byte= (crc_accum >> 8) ^ data [--rd_ptr];

        crc_accum= (crc_accum << 8) ^ CRC16_Tab [byte];

    }

    return crc_accum;

}
```

Figure B.3   16-bit CRC Calculation Specifications

Appendix C.　Equivalent Circuits of the Target Interface

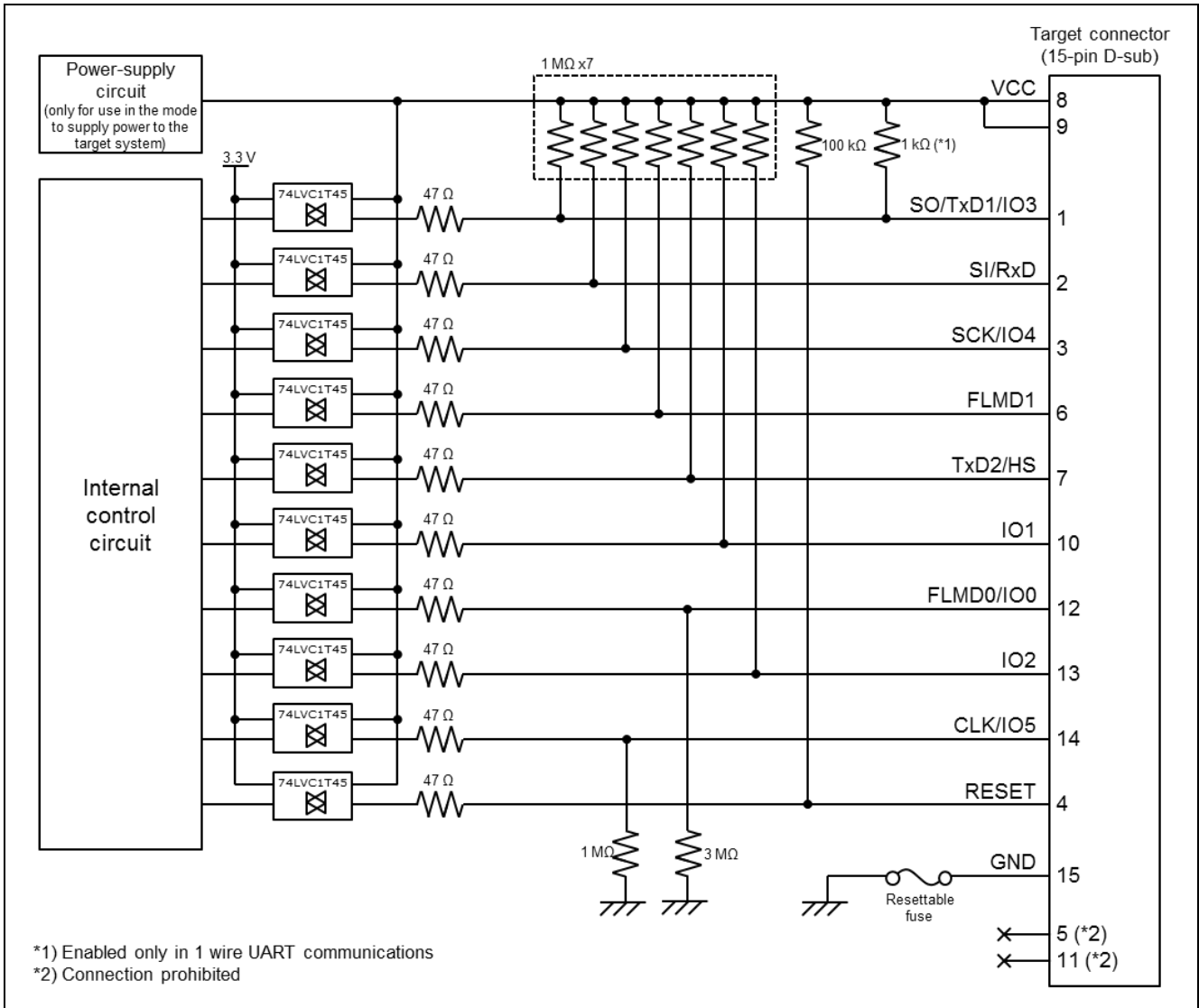This chapter shows equivalent circuits of the target interface.

Figure C.1　　Equivalent Circuits of the Target Interface

Appendix D.　Electrical Specifications of the Remote Interface

This chapter gives the electrical specifications of the remote interface.

D.1　Absolute Maximum Ratings (TA=0 to 40℃)

Pin name	Symbol	Parameter or Conditions	Ratings	Unit
CONN BUSY PASS ERROR CANCEL ENTER NEXT VRF START CLEAR	V_I	Input voltage	-0.5 to $+6.0$	V
	I_O	Output current	± 50	mA
	I_{IK}	Input current ($V_I < 0V$)	-50	mA

Note:　Product quality may suffer if the absolute maximum rating is exceeded even momentarily for any parameter.
That is, the absolute maximum ratings are rated values at which the product is on the verge of suffering physical damage, and therefore the product must be used under conditions that ensure that the absolute maximum ratings are not exceeded.

D.2　DC Characteristics (TA=0 to 40℃, C=0pF (Unloaded Condition))

Pin name	Symbol	Parameter or Conditions	MIN.	TYP.	MAX.	Unit
CONN BUSY PASS ERROR	V_{OH}	Output voltage, high (I_{OH}=8mA)	2.3			V
		Output voltage, high (I_{OH}=100μA)	3.0	3.3		V
	V_{OL}	Output voltage, low (I_{OL}=8mA)			0.8	V
		Output voltage, low (I_{OH}=100μA)		0	0.1	V
CANCEL ENTER NEXT VRF START CLEAR	V_{IH}	Input voltage, high	2			V
	V_{IL}	Input voltage, low			0.8	V
CONN BUSY PASS ERROR	I_{OH}	Output current, high			-8	mA
	I_{OL}	Output current, low			$+8$	mA
CANCEL ENTER NEXT VRF START CLEAR	I_I	Input current			± 1	mA
	R_{IPU}	Internal pull-up resistor (3.3V)		4.7		KΩ

D.3   AC Characteristics (T_A=0 to 40℃, C=0pF (Unloaded Condition))

D.3.1   Standard mode

(1)

Pin name	Symbol	Parameter or Conditions	MIN.	TYP.	MAX.	Unit
CONN BUSY PASS ERROR	t_{PLH}	Rise time(I_O=8mA)			5	ns
	t_{PHL}	Fall time (I_O=8mA)			5	ns
CANCEL ENTER NEXT VRF START CLEAR	t_{PLIN}	Low-level width of input signal	50			ms
	t_{PCNIN}	Time from the rise of the CONN signal until the input signal is acknowledged	1			ms

(2)

Pin name	Symbol	Parameter or Conditions	MIN.	TYP.	MAX.	Unit
	t_{PINBU}	Time from the fall of the VRF, START, or ENTER signal until the rise of the BUSY signal			50	ms
	t_{PBUIN}	Time from the fall of the BUSY signal until the CLEAR signal can be input	1			ms
	t_{PCLPE}	Time from the fall of the CLEAR signal until the fall of the PASS or ERROR signal			50	ms
	t_{PPEIN}	Time from the fall of the BUSY signal until the VRF, START, or ENTER signal can be input			1	ms
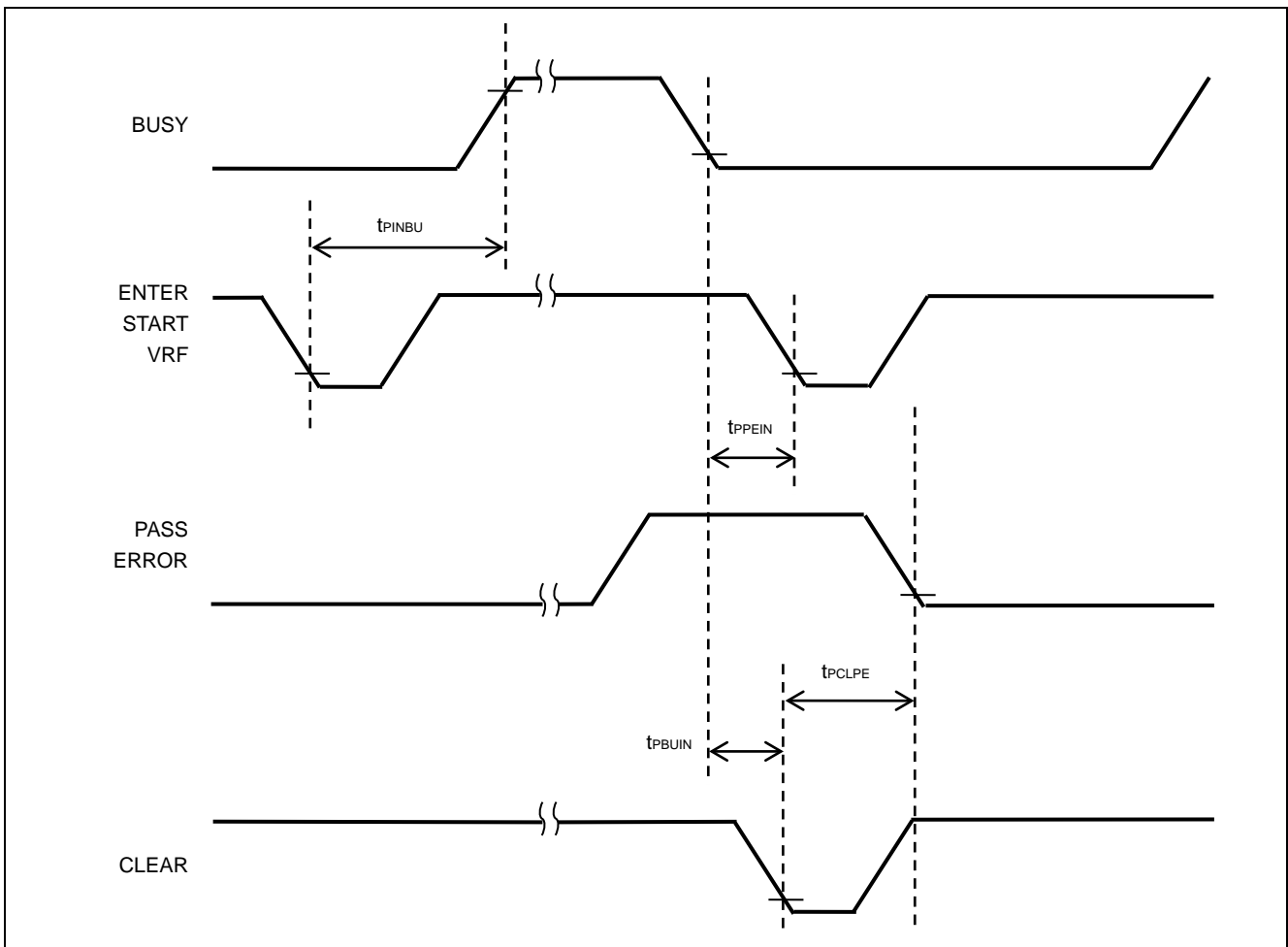
D.3.2   Bank mode

(1)

Pin name	Symbol	Parameter or Conditions	MIN.	TYP.	MAX.	Unit
CONN BUSY PASS ERROR	t_{PLH}	Rise time (I_O=8mA)			5	ns
	t_{PHL}	Fall time (I_O=8mA)			5	ns
BANK0 BANK1 BANK2 VRF START CLEAR	t_{PLIN}	Low-level width of input signal	50			ms
	t_{PCNIN}	Time from the rise of the CONN signal until the input signal is acknowledged	1			ms

(2)
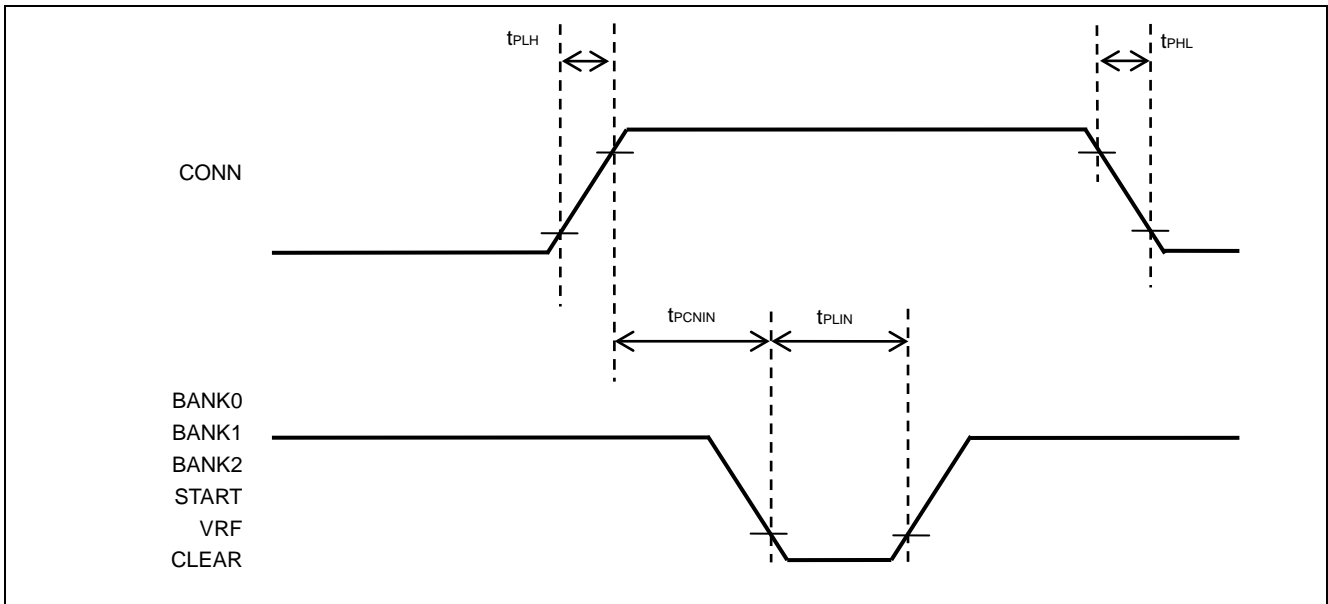
Pin name	Symbol	Parameter or Conditions	MIN.	TYP.	MAX.	Unit
	t_{PBAIN}	Time from the fall of the BANK signal until the VRF or START signal can be input	1			ms
	t_{PINBU}	Time from the fall of the VRF, START or ENTER signal until the rise of the BUSY signal			100	ms
	t_{PBUIN}	Time from the fall of the BUSY signal until the CLEAR signal can be input	5			ms
	t_{PCLPE}	Time from the fall of the CLEAR signal until the fall of the PASS or ERROR signal			50	ms
	t_{PPEBA}	Time from the fall of the BUSY signal until the BANK signal can be input	10			ms
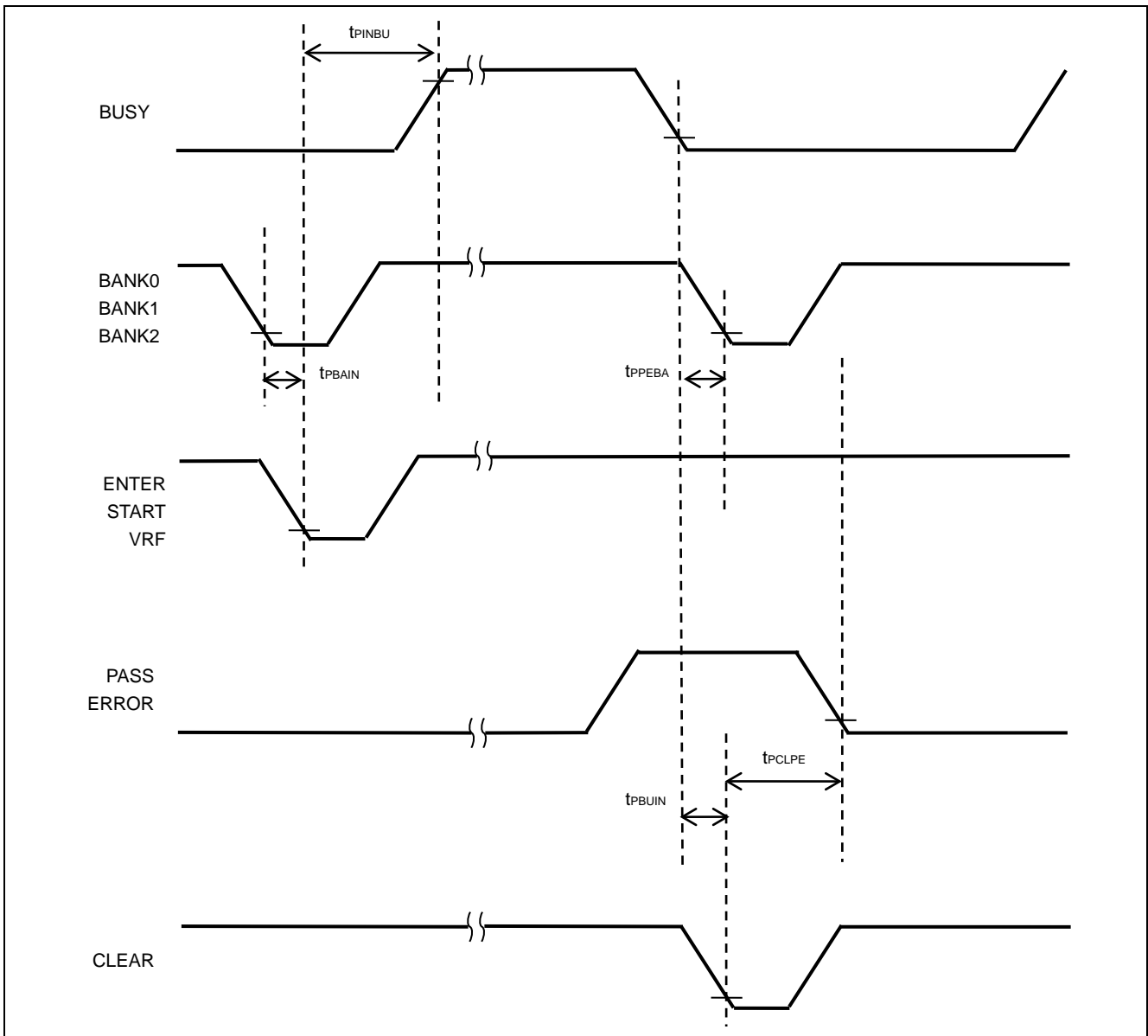
D.3.3   Simple mode

(1)

Pin name	Symbol	Parameter or Conditions	MIN.	TYP.	MAX.	Unit
CONN BUSY PASS ERROR	t_{PLH}	Rise time (IO=8mA)			5	ns
	t_{PHL}	Fall time (IO=8mA)			5	ns
CANCEL ENTER NEXT VRF START CLEAR	t_{PLIN}	Low-level width of input signal	50			ms
	t_{PCNIN}	Time from the rise of the CONN signal until the input signal is acknowledged	1			ms

(2)

Pin name	Symbol	Parameter or Conditions	MIN.	TYP.	MAX.	Unit
	t_{PBAIN}	Time from the fall of the NEXT signal until the VRF or START signal can be input	1			ms
	t_{PINBU}	Time from the fall of the VRF, START or ENTER signal until the rise of the BUSY signal (When the input signal is input after having changed the program area)			8000	ms
		Time from the fall of the VRF, START or ENTER signal until the rise of the BUSY signal (When the input signal is input without changing the program area)			50	ms
	t_{PBUIN}	Time from the fall of the BUSY signal until the CLEAR signal can be input	1			ms
	t_{PCLPE}	Time from the fall of the CLEAR signal until the fall of the PASS or ERROR signal			50	ms
	t_{PPENE}	Time from the fall of the BUSY signal until the NEXT signal can be input	1			ms

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