RENESAS

Renesas Flash Programmer

Usage from the Command Line

Introduction

This document introduces the command line control by using the Renesas Flash Programmer. Using command lines enables the automated control of programming.

Target Devices

RA family

RL78 family

RX family

RH850 family

Renesas Synergy™ microcontrollers

RE family

Power management (power-management IC)

Renesas USB Power Delivery family (C30 group)

ICs for driving motors and actuators (ICs for motor control)

Contents

1. Overview

The Renesas Flash Programmer (RFP) enables the automated control of programming by using command lines.

There are two types of command line control of the RFP.

- Use of project files from a simple command line (for Windows)
- Use of rfp-cli from a command line (for Windows and Linux)

For rfp-cli, programming can be controlled from the command line alone without the use of project files. This facility is supported by V3.08.00 and later versions of the RFP.

This document introduces various examples of processing by using command lines so try using them and adapting them to your own needs.

For details on the RFP, refer to the user's manual.

https://www.renesas.com/rfp

2. Procedure before Using Project Files from the Simple Command Line

This chapter helps you to understand the sequence of the basic procedures to follow before setting up processing that uses project files of the RFP from the simple command line, taking the RL78/G14 as an example of the target MCU.

- The descriptions in this chapter apply under the following conditions.
  Target MCU: R5F104LE (RL78/G14)
  Tool: E2 emulator Lite
  Connection: 1-wire UART (single-wire UART)
  Bit rate: 1,000,000 bps
  Clock to be supplied: None (on-chip clock oscillator)
  Power supply: E2 emulator Lite (3.3 V)
  Operations of flash memory: Erasure, programming, and verification
  Options for flash memory: None

- This chapter describes the following procedures. If you already understand the items up to step 4, Setting a project, start with reference to step 5, Creating a batch file.
  1. Connecting a system
  2. Connecting a target system
  3. Creating a project file
  4. Setting a project
  5. Creating a batch file
  6. Executing the batch file

2.1 Connecting a System

Connect the USB port of the host PC to the tool to be used via a USB cable.
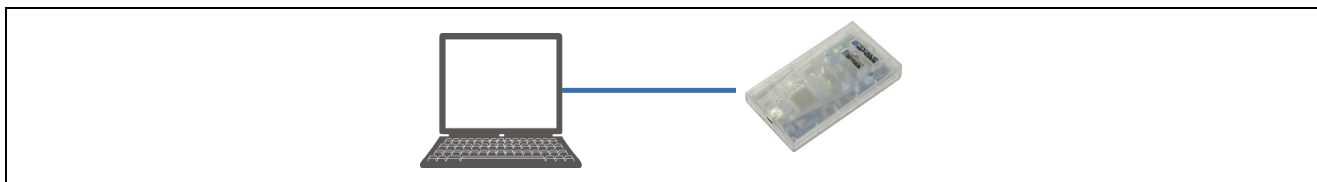
Figure 2.1   Connecting a Tool

2.2 Connecting a Target System

Connect the target cable of the tool to be used to the target system.

Target system

Figure 2.2   Connecting a Target System

2.3 Creating a Project File

Start the RFP GUI to open the main window.

Select [New Project] from the [File] menu to open the [Create New Project] dialog box.
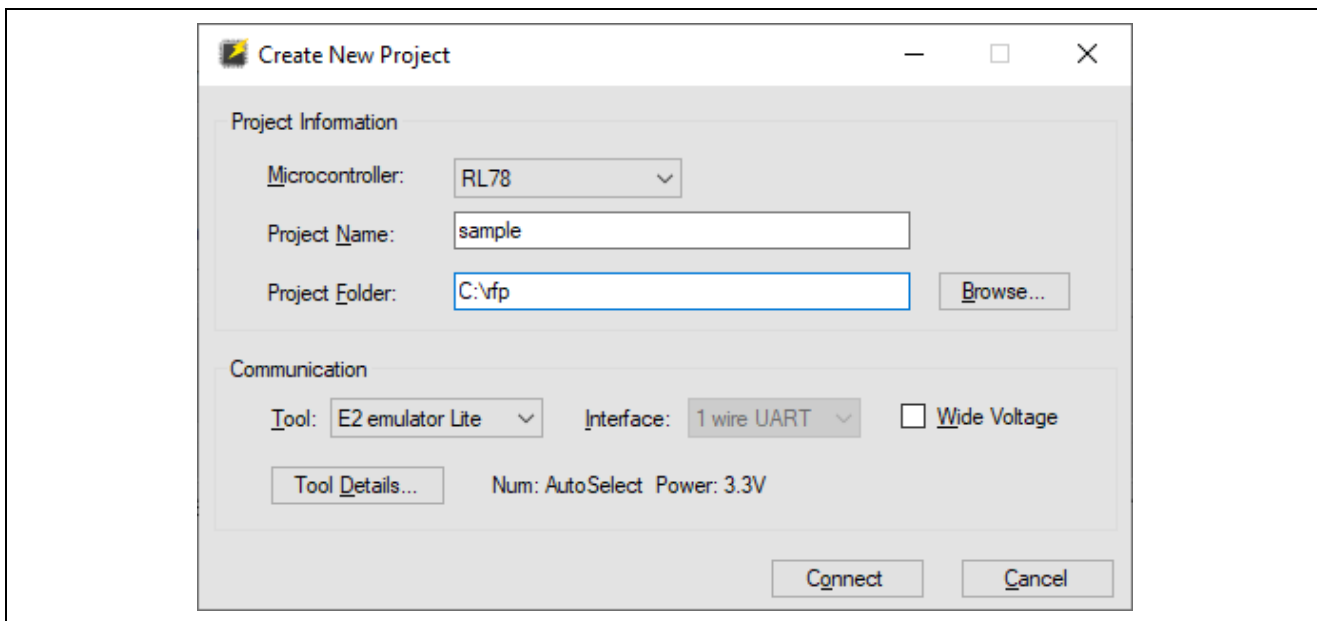
Figure 2.3   [Create New Project] Dialog Box

Select "RL78" for [Microcontroller], enter "sample" for [Project Name], specify "C:\rfp" for [Project Folder], and select "E2 emulator Lite" for [Tool].

Clicking on the [Tool Details] button opens the [Tool Details] dialog box.
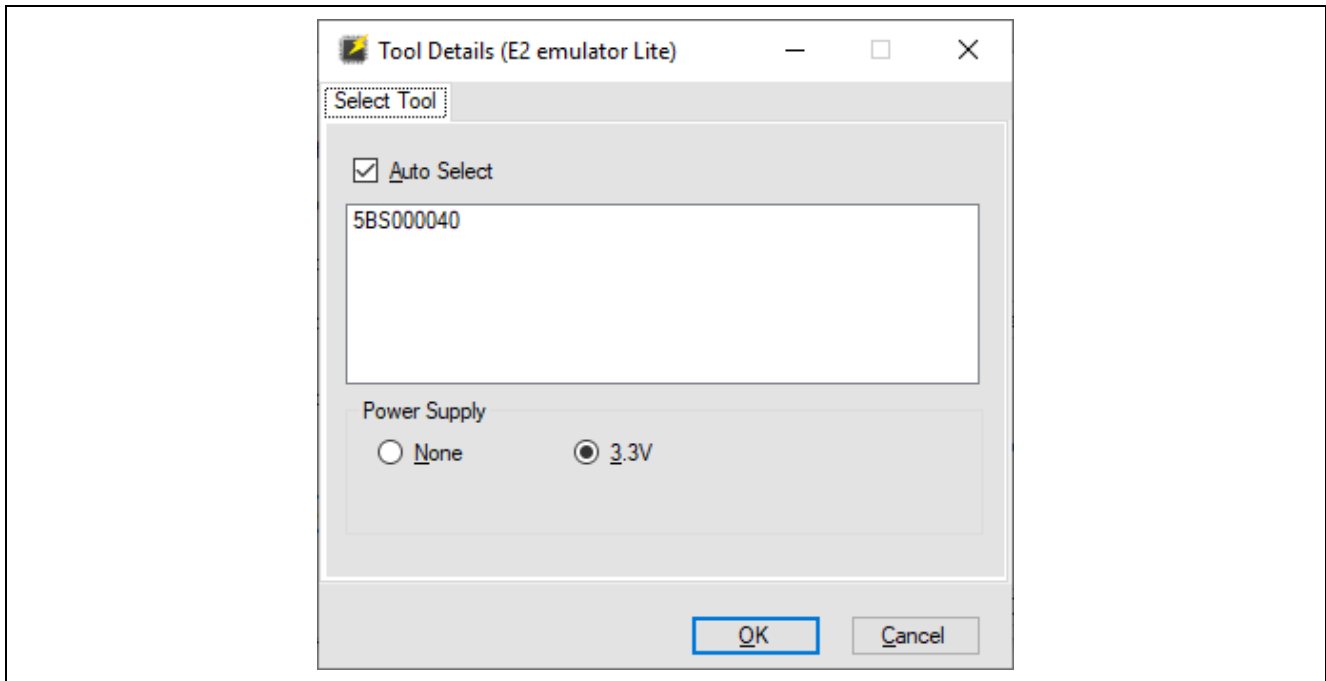
Figure 2.4   [Tool Details] Dialog Box

Select "3.3V" and click on the [OK] button.

After returning to the [Create New Project] dialog box, click on the [Connect] button.

The project file is created and the display returns to the main window.
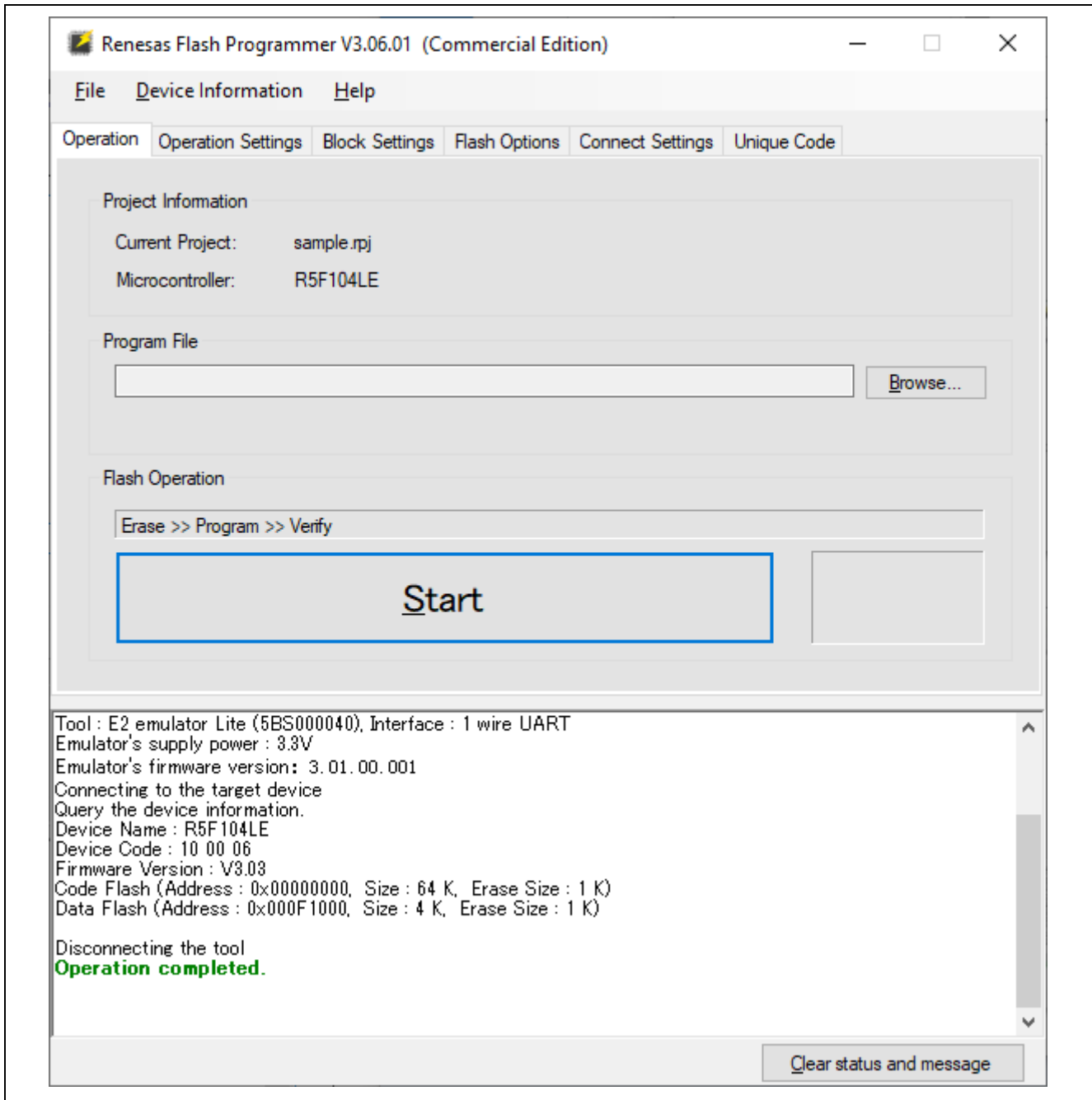
Figure 2.5　　　Main Window

2.4   Setting a Project

Specify "C:\rfp\sample.mot" for [Program File] on the [Operation] tabbed page.
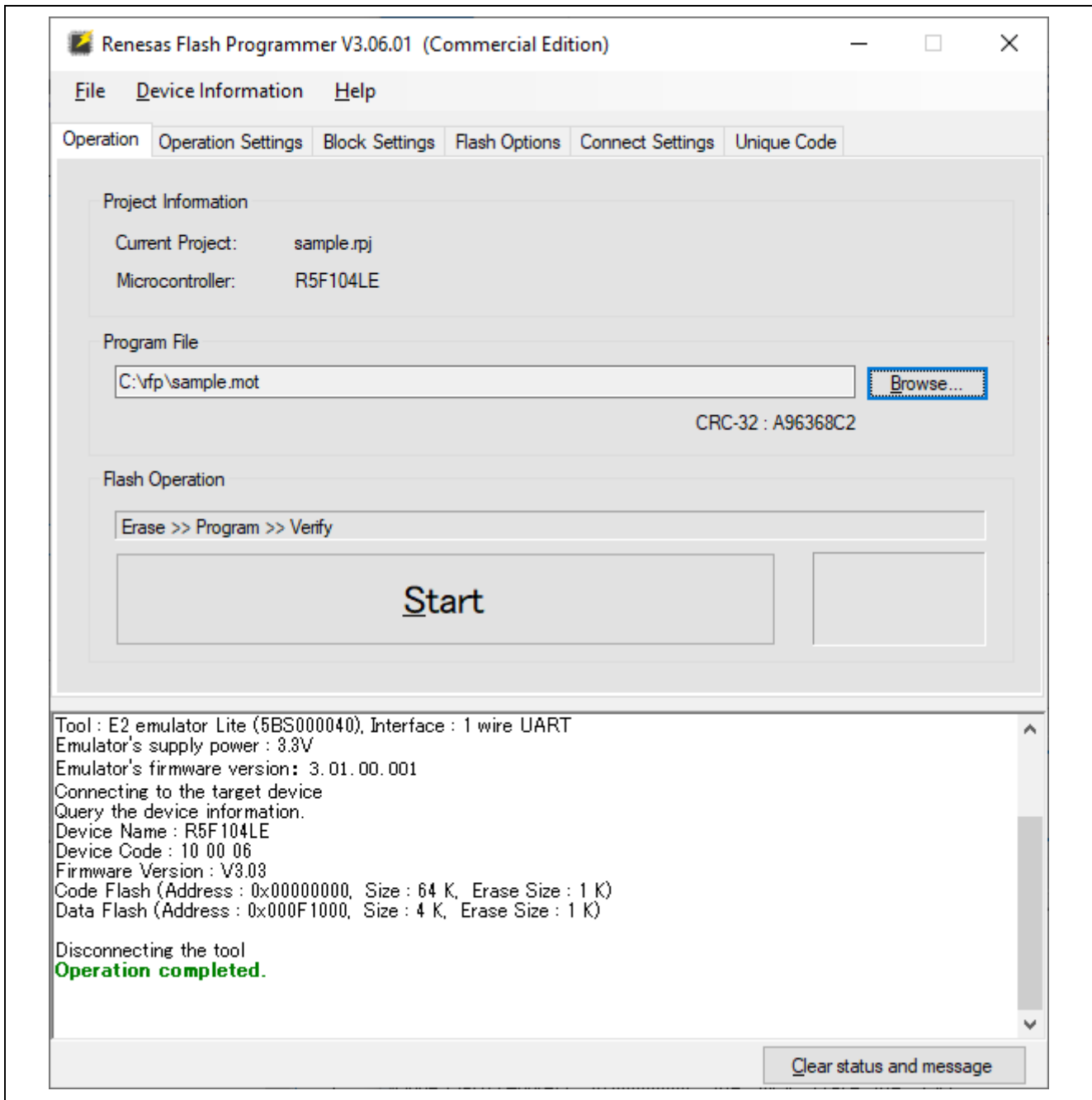
Figure 2.6   [Operation] Tabbed Page

On the [Operation Settings] tabbed page, select the [Erase], [Program], and [Verify] checkboxes in the [Command] category and confirm this.
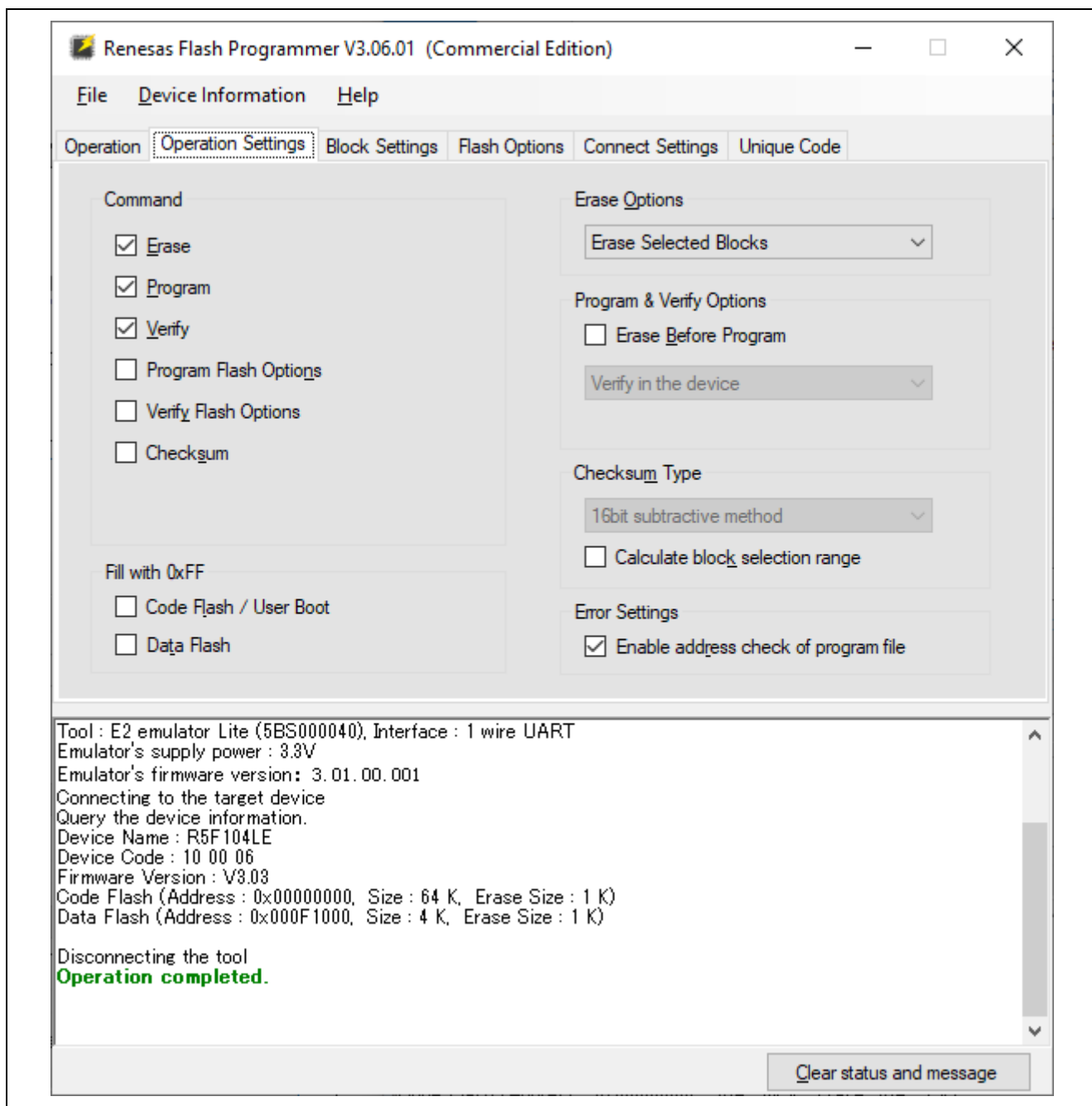
Figure 2.7   [Operation Settings] Tabbed Page

Specify "1,000,000 bps" for [Speed] on the [Connect Settings] tabbed page.
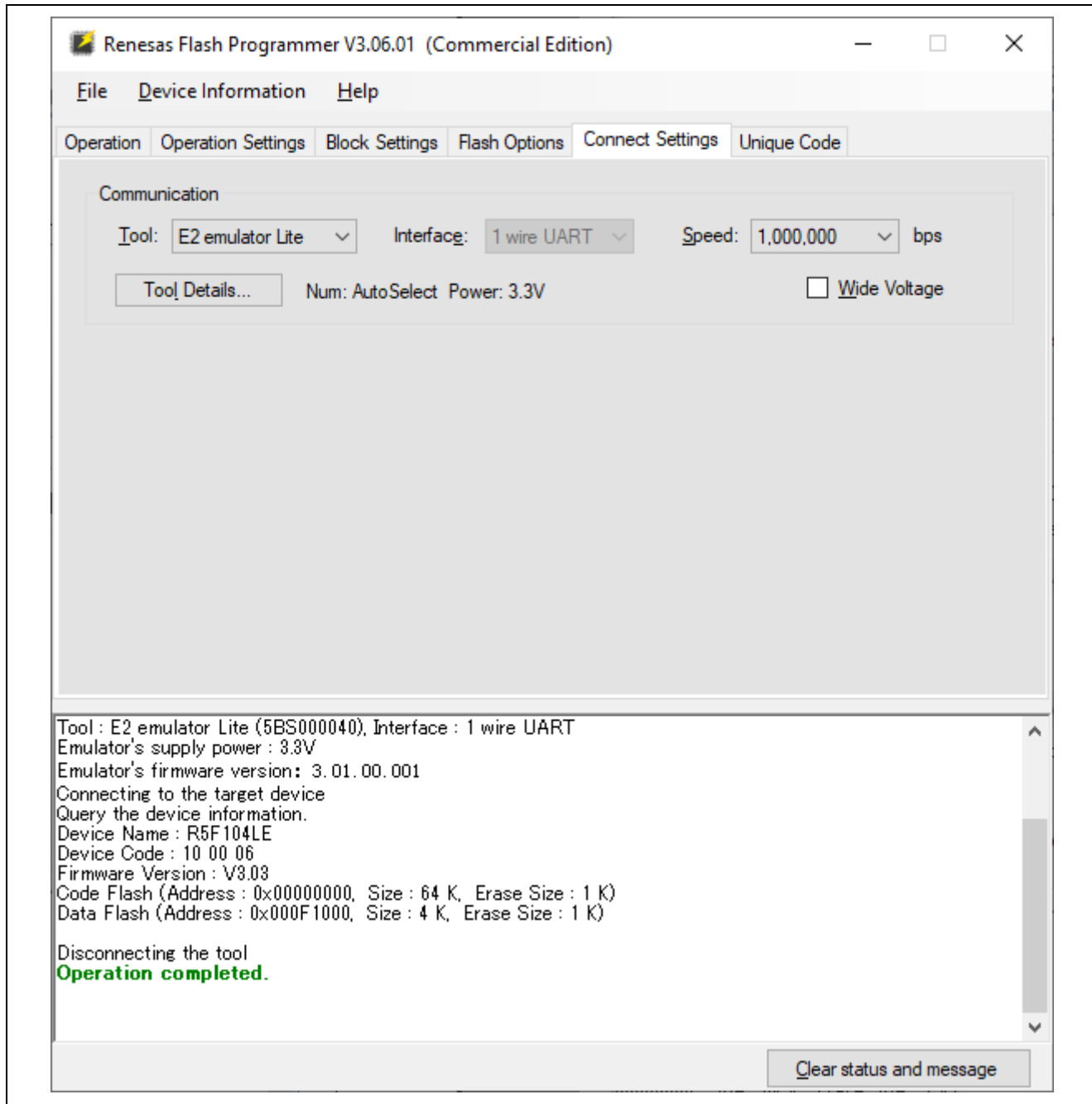
Figure 2.8   [Connect Settings] Tabbed Page

Select [Save Project] from the [File] menu to save the project.

Select [Exit] from the [File] menu to close the RFP window.

2.5   Creating a Batch File

Enter the following in a text editor and save it as "C:\rfp\sample.bat".

SET PATH=%PATH%;C:\Program Files (x86)\Renesas Electronics\Programming Tools\Renesas Flash Programmer V3.06

RFPV3.exe /silent "C:\rfp\sample\sample.rpj"

ECHO Result Code: %ErrorLevel%

PAUSE

Figure 2.9   Creating a Batch File

Using the silent option starts the RFP in a silent mode in which the GUI is not displayed.

After the specified project file (sample.rpj) is opened and processing which is equivalent to execution (in this case, erasure, programming, and verification) in response to pressing the [Start] button once is done, the RFP is closed.

If the processing succeeded, result code 0 is returned. Otherwise, 1 is returned.

Specify the folder in which the RFP has been installed as the folder indicated by "SET PATH".

"PAUSE" is added so that the output against the command prompts can be confirmed after the RFP has been closed.

2.6   Executing the Batch File

Execute the sample.bat batch file.

The following lines are displayed in the command prompt window.

C:\rfp>SET PATH=%PATH%;C:\Program Files (x86)\Renesas Electronics\Programming Tools\Renesas Flash Programmer V3.06

C:\rfp>RFPV3.exe /silent "C:\rfp\sample\sample.rpj"

C:\rfp>ECHO Result Code: 0

Result Code: 0

C:\rfp>PAUSE

Press any key to continue…

Figure 2.10   Executing the Batch File

3. Examples of Processing from the Simple Command Line with the Use of Project Files

This chapter describes examples of processing from the simple command line with the use of project files. For details on the simple command line, refer to the user's manual.

https://www.renesas.com/rfp

3.1 Programming Multiple Program Files

Using the file option allows the specification of a program file without using one specified by a project. Multiple program files are also specifiable.

The command in the following example is for the programming of "sample1.mot" and "sample2.mot".

RFPV3.exe /silent "C:\rfp\sample\sample.rpj" /file "C:\rfp\sample1.mot" /file "C:\rfp\sample2.mot"

3.2 Consecutive Programming of Different Specified Projects

When programming is executed several times from the command line, different projects can be specified and consecutive programming is possible.

The following shows an example of commands for the consecutive programming of "sample1.rpj" and "sample2.rpj".

RFPV3.exe /silent "C:\rfp\sample\sample1.rpj"

RFPV3.exe /silent "C:\rfp\sample\sample2.rpj"

3.3 Executing the Specified Commands (Erasure, Programming, and Verification)

The command option can be used to specify a command without using the specification of a command (erasure, programming, or verification) in a project. Multiple commands are also specifiable.

The following shows an example of the specification of three commands (e: erasure, p: programming, and v: verification).

RFPV3.exe /silent "C:\rfp\sample\sample.rpj" /command epv

3.4 Programming Sections of the Option Bytes (OPBTs) of MCUs with RH850G4MH Cores

The write32 option can be used to program specified values to specified addresses without using the program file specified in the project.

The following shows an example of programming of the value 0x01020304 to OPBT0 (address 0xFF320080) and the value 0x0A0B0C0D to OPBT1 (address 0xFF320084) of an RH850/E2M.

RFPV3.exe /silent "C:\rfp\sample\sample.rpj" /write32 FF320080 01020304 0A0B0C0D

Since this option also involves reading, it cannot be used with devices that do not support reading or those from which reading is not possible due to security settings.

3.5 Programming with a Specified Emulator

Using the tool option can specify the serial number of an emulator.

The following shows an example of programming through an emulator with the serial number represented by "xxxxxxxxx" of the emulator.

RFPV3.exe /silent "C:\rfp\sample\sample.rpj" /tool xxxxxxxxx

3.6 Simultaneous Programming through Multiple Devices Connected to a PC (Gang Programming)

Multiple RFPs can be started on a PC. It can also be used for programming multiple devices by specifying the serial numbers of different emulators. The start command of the Windows command prompt can also be used to set up a batch file that launches multiple batch files which continue running at the same time.

The following shows an example where two RFPs are started at the same time to program the devices connected to two emulators in the sample.rpj project.

This example is the sample1.bat batch file to handle programming through the first emulator (serial number: xxxxxxxxx).

```
RFPV3.exe /silent "C:\rfp\sample\sample.rpj" /tool xxxxxxxxx
echo off
if errorlevel 1 goto NG
:OK
echo OK Result Code: %ErrorLevel%
goto END
:NG
echo NG Result Code: %ErrorLevel%
:END
PAUSE
exit
```

This example is the sample2.bat batch file to handle programming through the second emulator (serial number: yyyyyyyyy).

```
RFPV3.exe /silent "C:\rfp\sample\sample.rpj" /tool yyyyyyyyy
echo off
if errorlevel 1 goto NG
:OK
echo OK Result Code: %ErrorLevel%
goto END
:NG
echo NG Result Code: %ErrorLevel%
:END
PAUSE
exit
```

This example is the sample.bat batch file, which executes calls of both "sample1.bat" and "sample2.bat".

```
:LOOP
start sample1.bat
start sample2.bat
PAUSE
goto LOOP
```

3.7 Output of Descriptions of the Executed Command Lines to the Windows Command Prompt

The file RFPV3.Console.exe in the folder where the RFP is installed produces descriptions of the executed command lines in the command prompt window.

The following shows an example of the execution of RFPV3.Console.exe for programming from the sample.rpj project.

RFPV3.Console.exe "C:\rfp\sample\sample.rpj"

The following is output to the command prompt.

C:\rfp>RFPV3.Console.exe "C:\rfp\sample\sample.rpj"

Renesas Flash Programmer V3.06.01 [1 Oct 2019]   (Commercial Edition)

Load a project (C:\rfp\sample\sample.rpj).

Load a file (C:\rfp\sample.mot). CRC-32 : A96368C2

Connected device: R5F104LE

Connecting the RFP to the tool.

: (Omitted.)

Disconnecting the RFP from the tool.

The operation succeeded.

4.   Examples of Processing from Command Lines with the Use of rfp-cli

This chapter describes examples of processing from command lines with the use of rfp-cli. When rfp-cli is used from a command line, programming can be controlled from the command line alone without the use of project files. For details on running rfp-cli from the command line you will be using, refer to the user's manual and rfp_cli.md in the DOC folder in the installation folder. Running rfp-cli -h shows the usage of rfp-cli.

https://www.renesas.com/rfp

Caution   Change the examples to suit the target system you are using.

4.1   Programming a Program File

Specifying the options related to the MCUs or tools allows the programming of a program file. The command in the following example is for the programming of "sample.mot" with the following conditions.

    Target MCU: RL78 (-d option)
    Tool: E2 emulator Lite (-t option)
    Power supply: E2 emulator Lite (3.3 V) (-vo option)
    Operations of flash memory: Erasure, programming, and verification (-a option)

```
rfp-cli -d rl78 -t e2l -vo 3.3 -a "C:\rfp\sample.mot"
```

4.2   Programming Multiple Program Files

Multiple program files are programmable.

The command in the following example is for the programming of "sample1.mot" and "sample2.mot".

```
rfp-cli -d rl78 -t e2l -vo 3.3 -a "C:\rfp\sample1.mot" "C:\rfp\sample2.mot"
```

4.3   Executing the Specified Commands (Erasure, Programming, Verification, and Checksum)

A single command (erasure, programming, or verification) or multiple commands are specifiable.

The following shows an example of the specification of four commands (e: erasure, p: programming, v: verification, and c: checksum).

```
rfp-cli -d rl78 -t e2l -vo 3.3 -e -p -v -c "C:\rfp\sample.mot"
```

4.4   Programming Options in Flash Memory

Specifying the -fo option allows the programming of options for flash memory. The command in the following example is for the programming of "sample.mot" and the option for flash memory "programming prohibited".

```
rfp-cli -d rl78 -t e2l -vo 3.3 -a -fo flags p "C:\rfp\sample.mot"
```

4.5   Reading Options for Flash Memory

Specifying the -rfo option allows the reading and display of options for flash memory.

```
rfp-cli -d rl78 -t e2l -vo 3.3 -rfo
```

4.6 Reading or Programming Sections of the Option Bytes (OPBTs) of MCUs with RH850G4MH Cores

In devices with the RH850G4MH core, option bytes are allocated to memory. Using memory read commands allows the simple confirmation of option bytes. In addition, using commands for programming sections allows the programming of sections of option bytes.

The following shows an example of the reading and display of OPBT0 (address 0xFF320080) and OPBT1 (address 0xFF320084) of an RH850/E2M.

```
rfp-cli -d rh850/e2x -t e2 -rv FF320080 8 -view-size 4
```

The following shows an example of programming of the value 0x01020304 to OPBT0 (address 0xFF320080) and the value 0x0A0B0C0D to OPBT1 (address 0xFF320084) of an RH850/E2M.

```
rfp-cli -d rh850/e2x -t e2 -write32 FF320080 01020304,0A0B0C0D
```

Since these options also involve reading, they cannot be used with devices that do not support reading or those from which reading is not possible due to security settings.

4.7 Programming with a Specified Emulator

Using the tool option can specify the serial number of an emulator.

The following shows an example of programming through an emulator with the serial number represented by "xxxxxxxxx" of the emulator.

```
rfp-cli -d rl78 -t e2l:xxxxxxxxx -vo 3.3 -a "C:\rfp\sample.mot"
```

4.8 Setting Reset Signals with a Serial Connection through a COM Port

For a serial connection through a COM port, the RTS and DTR pins can be used for controlling reset signals and the option settings are made to select the logical sense of the signals.

The following shows an example of output of the high level from the DTR pin when the pin is used as a reset signal for COMx (where x means the COM port number) to reset the device.

```
rfp-cli -d rl78 -port COMx -dtr-inv -a "C:\rfp\sample.mot"
```

4.9 Simultaneous Programming through Multiple Devices Connected to a PC (Gang Programming)

Multiple RFPs can be started on a PC. It can also be used for programming multiple devices by specifying the serial numbers of different emulators. The start command of the Windows command prompt can also be used to set up a batch file that launches multiple batch files which continue running at the same time.

The following shows an example where two RFPs are started at the same time to program the devices connected to two emulators.

This example is the sample1.bat batch file to handle programming through the first emulator (serial number: xxxxxxxxx).

```
rfp-cli -d rl78 -t e2l:xxxxxxxxx -vo 3.3 -a "C:\rfp\sample.mot"
echo off
if errorlevel 1 goto NG
:OK
echo OK Result Code: %ErrorLevel%
goto END
:NG
```

```
echo NG Result Code: %ErrorLevel%

:END

PAUSE

Exit
```

This example is the sample2.bat batch file to handle programming through the second emulator (serial number: yyyyyyyyy).

```
rfp-cli -d rl78 -t e2l:yyyyyyyyy -vo 3.3 -a "C:\rfp\sample.mot"

echo off

if errorlevel 1 goto NG

:OK

echo OK Result Code: %ErrorLevel%

goto END

:NG

echo NG Result Code: %ErrorLevel%

:END

PAUSE

Exit
```

This example is the sample.bat batch file, which executes calls of both "sample1.bat" and "sample2.bat".

```
:LOOP

start sample1.bat

start sample2.bat

PAUSE

goto LOOP
```

General Precautions in the Handling of Microprocessing Unit and Microcontroller Unit Products

The following usage notes are applicable to all Microprocessing unit and Microcontroller unit products from Renesas. For detailed usage notes on the products covered by this document, refer to the relevant sections of the document as well as any technical updates that have been issued for the products.

1. Precaution against Electrostatic Discharge (ESD)

   A strong electrical field, when exposed to a CMOS device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop the generation of static electricity as much as possible, and quickly dissipate it when it occurs. Environmental control must be adequate. When it is dry, a humidifier should be used. This is recommended to avoid using insulators that can easily build up static electricity. Semiconductor devices must be stored and transported in an anti-static container, static shielding bag or conductive material. All test and measurement tools including work benches and floors must be grounded. The operator must also be grounded using a wrist strap. Semiconductor devices must not be touched with bare hands. Similar precautions must be taken for printed circuit boards with mounted semiconductor devices.

2. Processing at power-on

   The state of the product is undefined at the time when power is supplied. The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the time when power is supplied. In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the time when power is supplied until the reset process is completed. In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the time when power is supplied until the power reaches the level at which resetting is specified.

3. Input of signal during power-off state

   Do not input signals or an I/O pull-up power supply while the device is powered off. The current injection that results from input of such a signal or I/O pull-up power supply may cause malfunction and the abnormal current that passes in the device at this time may cause degradation of internal elements. Follow the guideline for input signal during power-off state as described in your product documentation.

4. Handling of unused pins

   Handle unused pins in accordance with the directions given under handling of unused pins in the manual. The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of the LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible.

5. Clock signals

   After applying a reset, only release the reset line after the operating clock signal becomes stable. When switching the clock signal during program execution, wait until the target clock signal is stabilized. When the clock signal is generated with an external resonator or from an external oscillator during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Additionally, when switching to a clock signal produced with an external resonator or by an external oscillator while program execution is in progress, wait until the target clock signal is stable.

6. Voltage application waveform at input pin

   Waveform distortion due to input noise or a reflected wave may cause malfunction. If the input of the CMOS device stays in the area between V_{IL} (Max.) and V_{IH} (Min.) due to noise, for example, the device may malfunction. Take care to prevent chattering noise from entering the device when the input level is fixed, and also in the transition period when the input level passes through the area between V_{IL} (Max.) and V_{IH} (Min.).

7. Prohibition of access to reserved addresses

   Access to reserved addresses is prohibited. The reserved addresses are provided for possible future expansion of functions. Do not access these addresses as the correct operation of the LSI is not guaranteed.

8. Differences between products

   Before changing from one product to another, for example to a product with a different part number, confirm that the change will not lead to problems. The characteristics of a microprocessing unit or microcontroller unit products in the same group but having a different part number might differ in terms of internal memory capacity, layout pattern, and other factors, which can affect the ranges of electrical characteristics, such as characteristic values, operating margins, immunity to noise, and amount of radiated noise. When changing to a product with a different part number, implement a system-evaluation test for the given product.

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Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,
Koto-ku, Tokyo 135-0061, Japan

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