RL78/G1C

Utilising the I2C in Master Mode Sample Code for e2studio

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Introduction

The purpose of this Application Note is to show the user how to add the associated RL78/G1C sample code to a new or existing e2studio workspace; as well as give an explanation of what the sample code does.

The sample code provided with this Application Note demonstrates usage of the I2C Interface in Master Mode. The program runs on the RL78/G1C RSK and demonstrates usage of the I2C interface in Master Mode, by reading and writing to an EEPROM device.

Target Device

RL78/G1C

Development environment

IDE: e2studio
Compiler: GNURL78 v13.01 -ELF
Hardware: Renesas Starter Kit for RL78/G1C

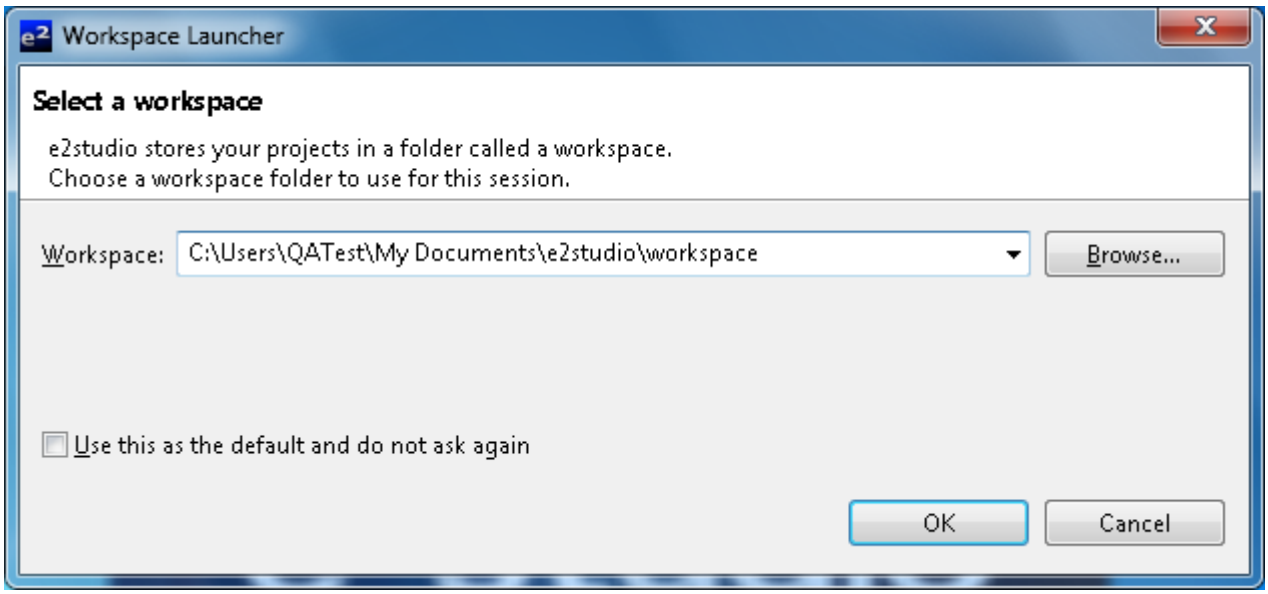
Contents

1. Installation

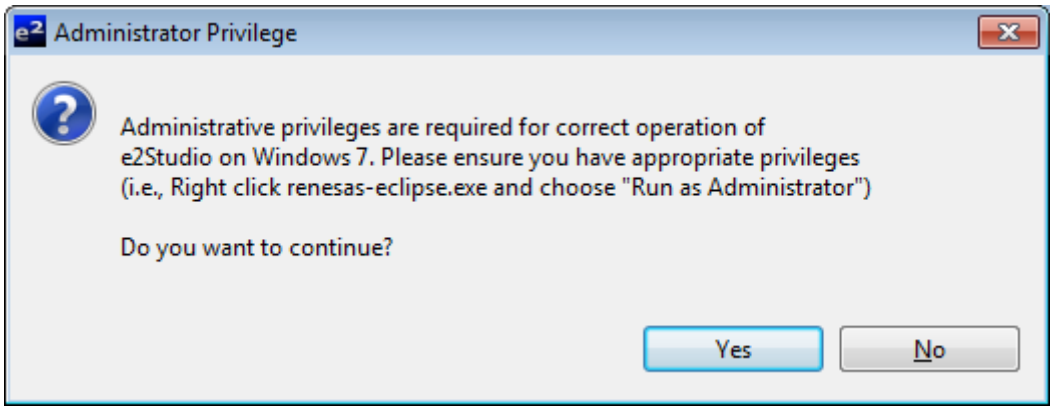
This section assumes e2studio IDE is already installed on the user's personal computer (PC). Create a new folder and name it as 'RSKRL78G1C_Workspace'. Copy the zipped file IIC_Master.zip, available in the Application Note package downloaded from the website, to this folder. Extract the IIC_Master.zip file to the RSKRL78G1C_Workspace folder.

2. Creating the Project Workspace

Open E2studio IDE by clicking the Windows Start button, select All Programs > Renesas Electronics e2studio > Renesas e2studio.



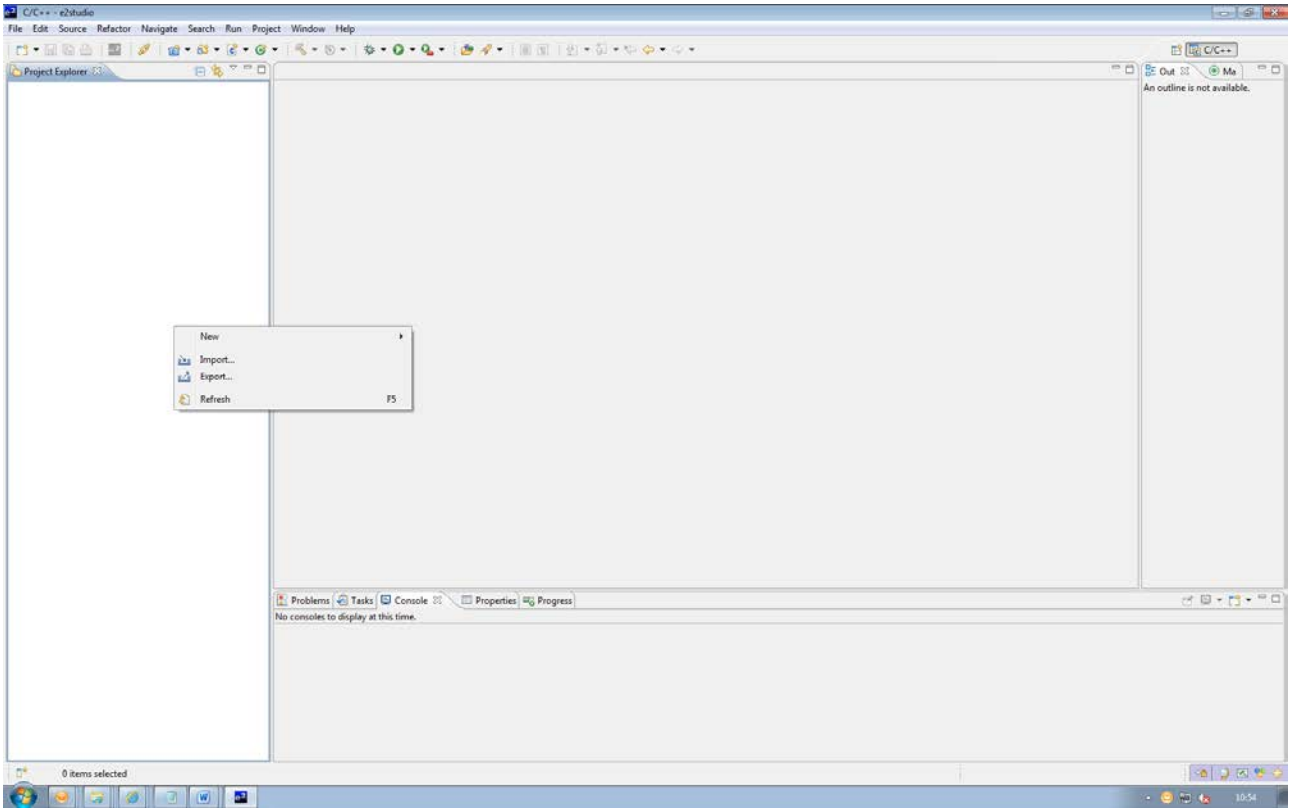
Select <OK>.



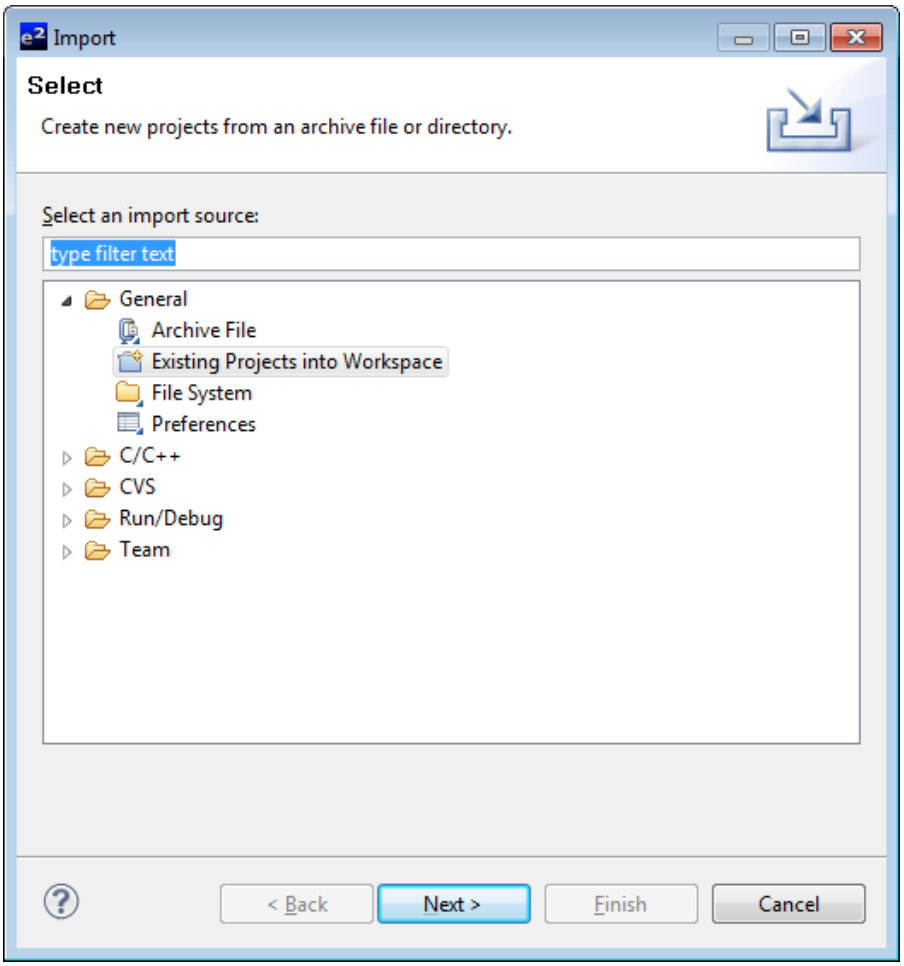
Select <Yes> to Administrator Privilege dialog.

On the welcome screen select Go the Workbench icon as shown above.

1. Once the e2studio environment has initialised, right click in the project explorer window and click <Import…>



2. The Import dialog will now appear. Expand the “General” folder icon, and select “Existing Projects into Workspace”, then click ‘Next’.

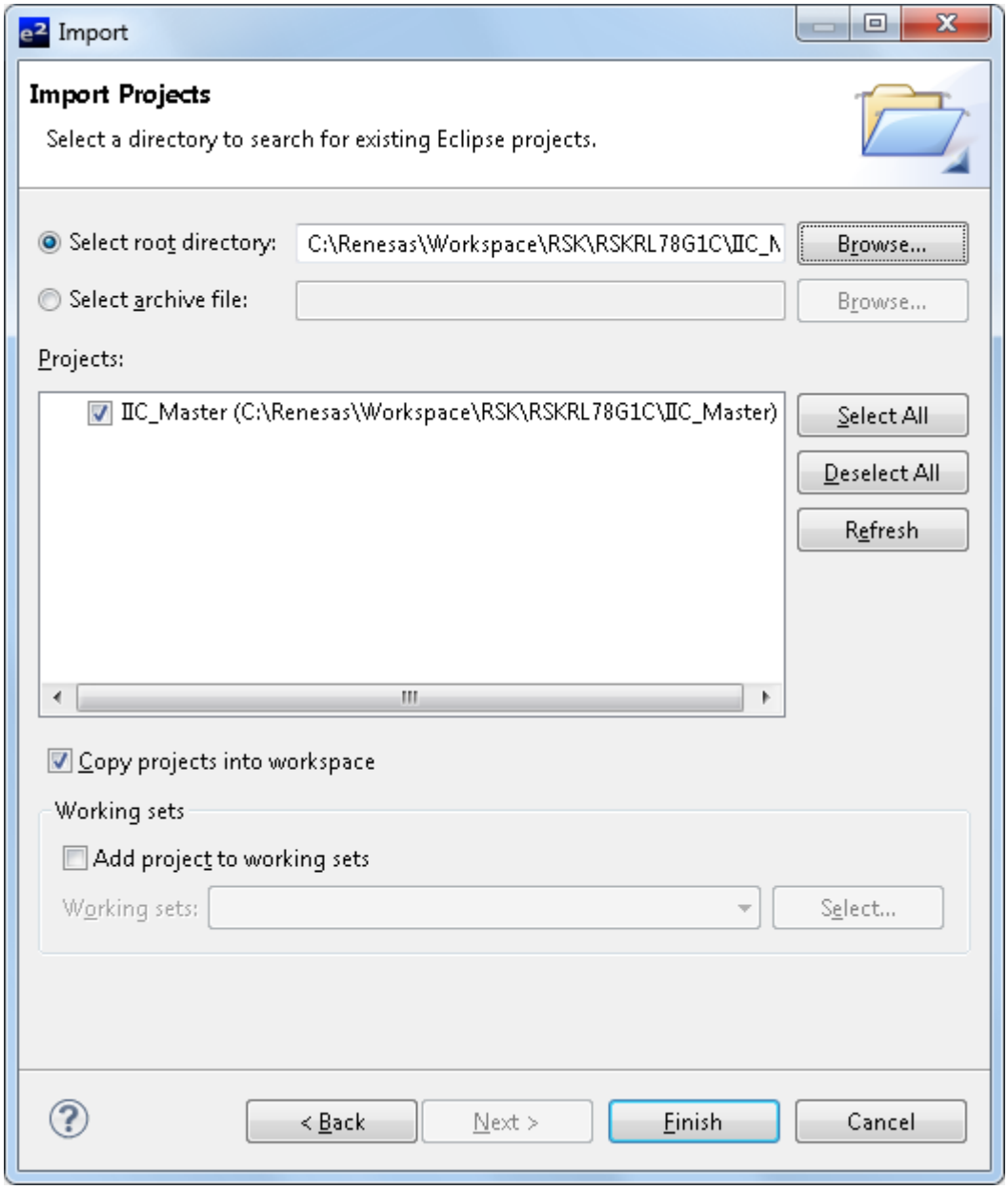


3. The Import Dialog will now appear specify the project to import .Click the “Browse” button and locate the directory: C:\Renesas\Workspace\RSK\RSKRL78G1C.

   Navigate to the unzipped IIC_Master folder located in RSKRL78G1C Workspace folder.
   Select the IIC_Master folder.

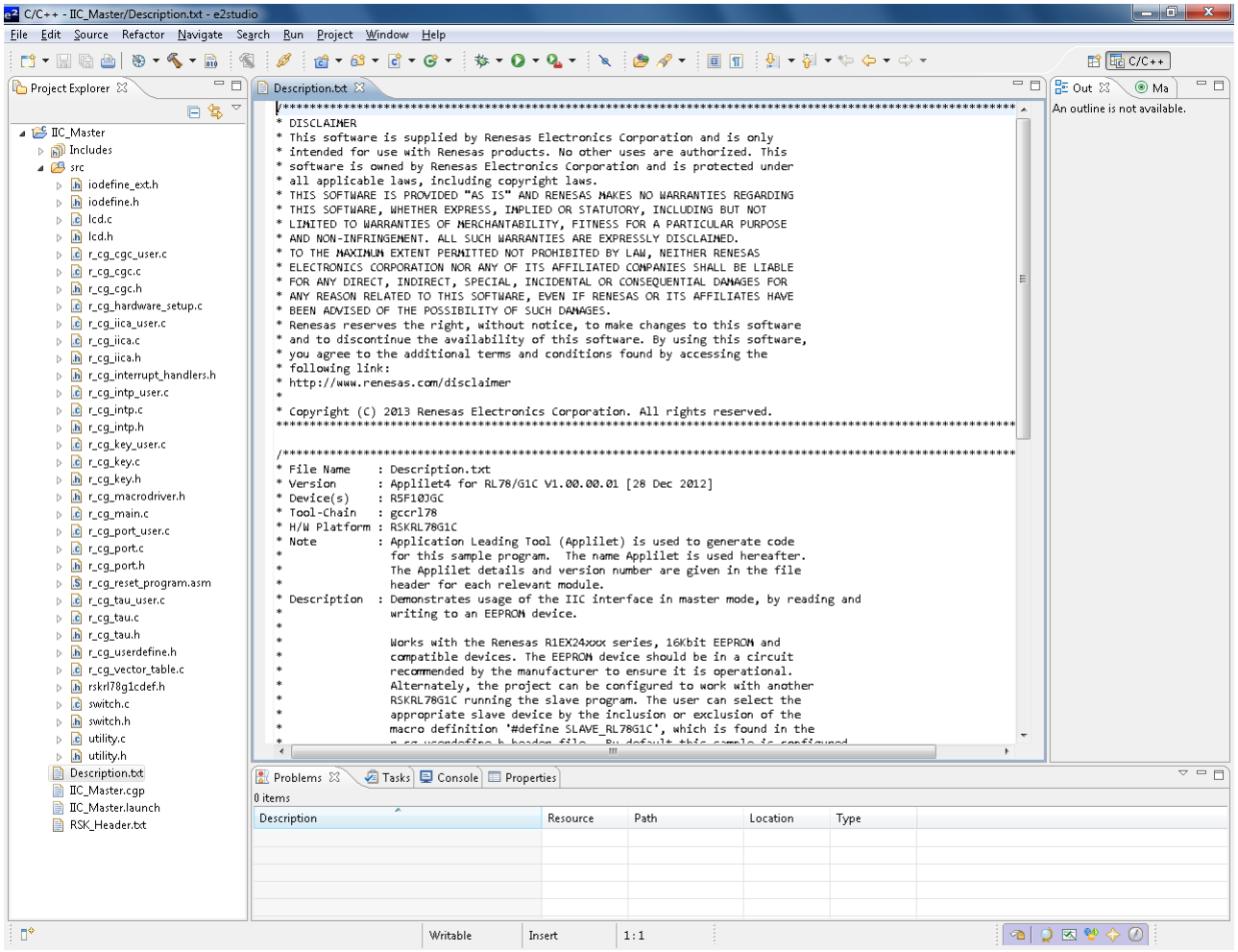
   And also ensure that the ‘Copy projects into workspace’ option is ticked.

   The IDE e2studio will load the project.


Import
Import Projects
Select a directory to search for existing Eclipse projects.
Select root directory:
C:\Renesas\Workspace\RSK\RSKRL78G1C\IIC_M
Browse...
Select archive file:
Browse...
Projects:
IIC_Master (C:\Renesas\Workspace\RSK\RSKRL78G1C\IIC_Master)
Select All
Deselect All
Refresh
Copy projects into workspace
Working sets
Add project to working sets
Working sets:
Select...
< Back
Next >
Finish
Cancel

3. Opening Sample Code and Source Files

Once the project has been opened, the source code and all dependant files can be opened in the editor by expanding the folders in the Project Tree window and double clicking the files listed. All files have been grouped according to their file type.



4. Source Code Functionality

The source code project is specifically written to run on the appropriate RSK. However this source code can be useful as an example even without the RSK.

The project was written using source files containing API functions generated using Code Generator. The project will contain a C source file ‘r_cg_main.c’. This source file includes the C function main(). All source files and dependent files whose filenames are prefixed with ‘r_’ were generated using Application Leading Tool. For more information, refer Description.txt.

5. Code Execution

Demonstrates usage of the IIC interface in master mode, by reading and writing to an EEPROM device.

Works with the Renesas R1EX24xxx series, 16Kbit EEPROM and compatible devices. The EEPROM device should be in a circuit recommended by the manufacturer to ensure it is operational. Alternately, the project can be configured to work with another RSKRL78G1C running the slave program. The user can select the appropriate slave device by the inclusion or exclusion of the macro definition '#define SLAVE_RL78G1C', which is found in the r_cg_userdefine.h header file. By default this sample is configured to work with the EEPROM device,

Modifications:

The IIC pull-up resistors are connected to Board_VDD by default. This is correct for power configurations where Board_VDD is 5V. For power configurations where Board_VDD is 3.3V, the IIC pull-up resistors should be connected to Board_5V, by removing R83 and fitting R84.

Please refer to the schematics document and component placement diagram in the User Manual to help locate components.

Instructions:

1. Connect a compatible EEPROM memory device as follows:

EEPROM | RSK

SDA -> SDA (JA1, pin 25)

SCL -> SCL (JA1, pin 26)

GND -> Any ground point.

(Ensure the device is powered as its datasheet specifies)

2. Build and download the sample code to the RSK.

3. Click the 'Resume' button to go to the main() function, and 'Resume' again to start program execution'. "IIC Mast" will be displayed on the LCD. First line of the LCD and "SW2, SW3" will be displayed on the second line.

4. Press switch SW2 to perform a write operation. If the write is successful, the LCD displays show the data sent to the EEPROM, address location 0.

5. Press switch SW3 to perform a read operation. The read data will be compared to the data written in step 4, and the result will be displayed on the LCD.

Note: If the IIC slave becomes unresponsive, stop the sample and disconnect power to the RSK, recheck the EEPROM connections, then reconnect power and start from step 1 again. An error message will be displayed on the LCD if a read operation is performed as the first operation.

6. Website, Inquiries and Support

Renesas Electronics Website
http://www.renesas.com/
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Revision Record

Rev.	Date	Description	
		Page	Summary
1.00	November 01, 2013	—	First edition issued

General Precautions in the Handling of MPU/MCU Products

The following usage notes are applicable to all MPU/MCU 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. Handling of Unused Pins
   Handle unused pins in accord 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 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. Unused pins should be handled as described under Handling of Unused Pins in the manual.
2. Processing at Power-on
   The state of the product is undefined at the moment 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 moment 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 moment 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 moment when power is supplied until the power reaches the level at which resetting has been specified.
3. Prohibition of Access to Reserved Addresses
   Access to reserved addresses is prohibited.
   — The reserved addresses are provided for the possible future expansion of functions. Do not access these addresses; the correct operation of LSI is not guaranteed if they are accessed.
4. Clock Signals
   After applying a reset, only release the reset line after the operating clock signal has become stable. When switching the clock signal during program execution, wait until the target clock signal has 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. Moreover, 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.
5. Differences between Products
   Before changing from one product to another, i.e. to a product with a different type number, confirm that the change will not lead to problems.
   — The characteristics of an MPU or MCU in the same group but having a different part number may differ in terms of the 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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