RL78/G1C

Utilising I²C in Master Mode for Cubesuite+

R01AN1736EG0100
Rev.1.00
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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 CubeSuite+ 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: Cubesuite+
Compiler: CA78K0R
Hardware: Renesas Starter Kit for RL78/G1C

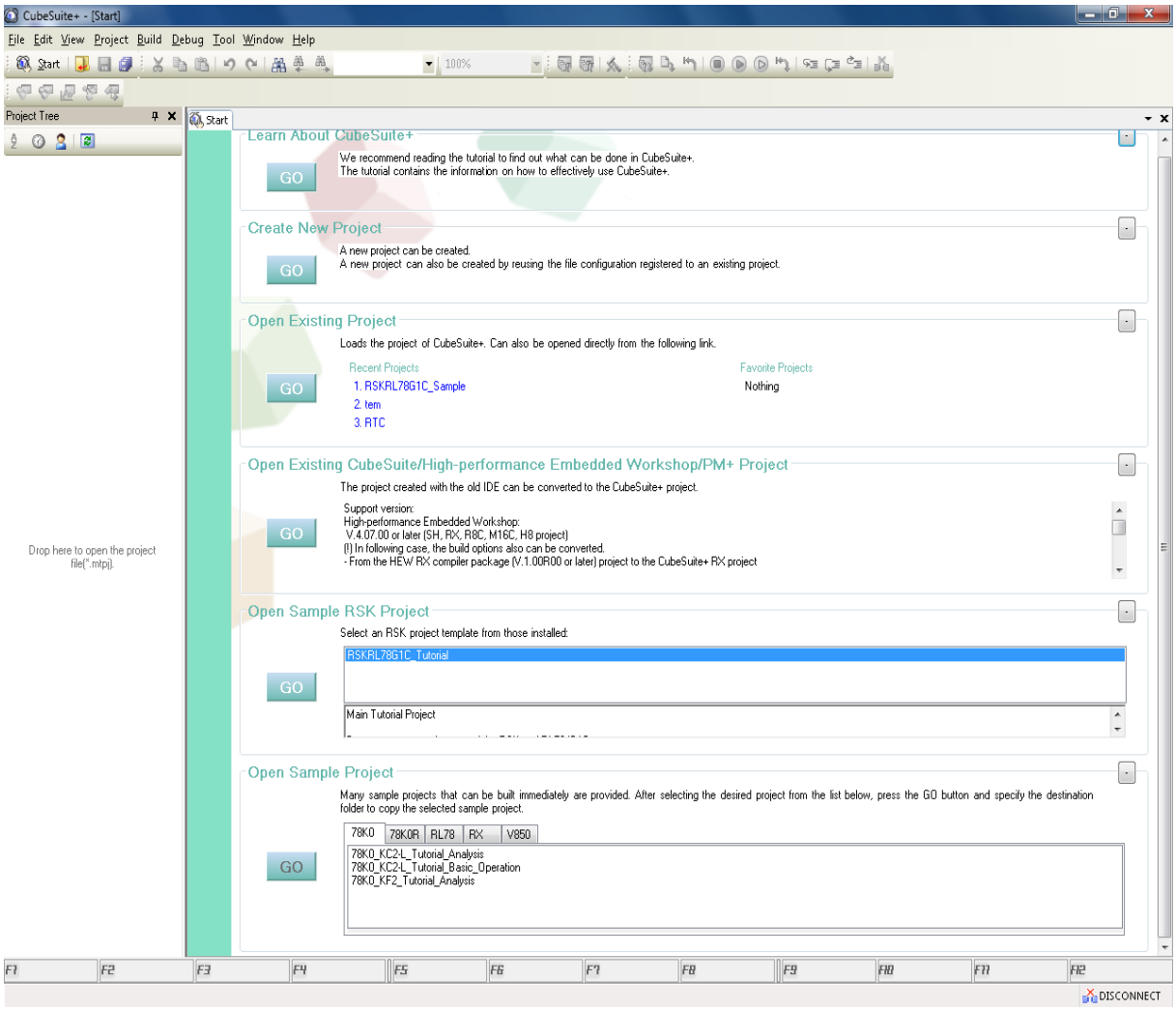
Contents

1. Installation

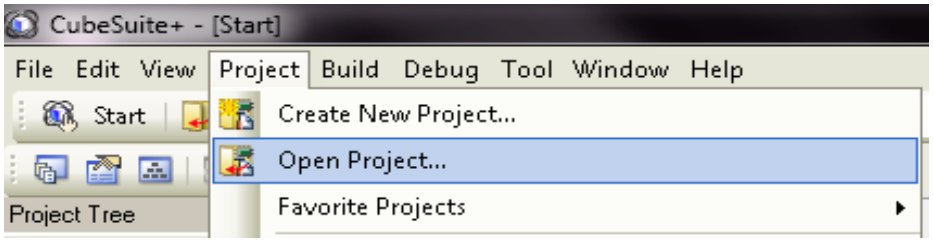
This section assumes CubeSuite+ IDE is already installed on the user's personal computer (PC). Create a new folder and name it as 'RSKRL78G1C_Workspace'. Copy the zipped file 'an_r01an1736eg0100_rl78g1c_iic.zip', available in the Application Note package downloaded from the website, to this folder. Extract the 'an_r01an1736eg0100_rl78g1c_iic.zip' file to the RSKRL78G1C_Workspace folder.

2. Creating the Project Workspace

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

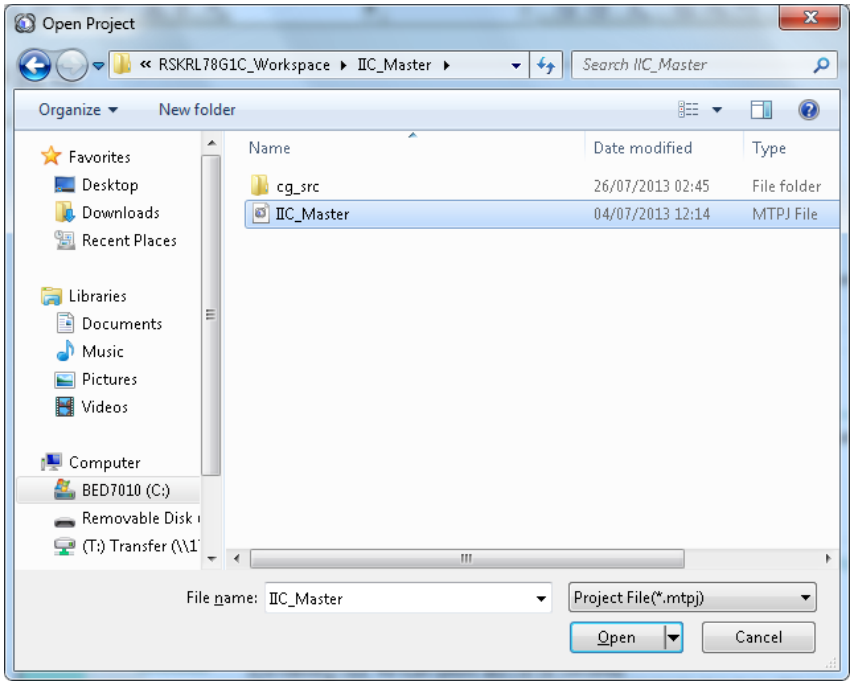


From the menu bar select File > Project > Open Project…

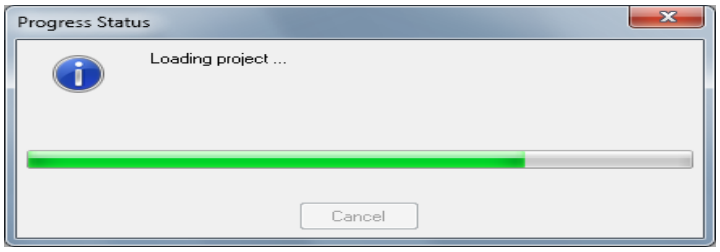


CubeSuite+ will open a dialog.
Navigate to the unzipped IIC_Master folder located in RSKRL78G1C_Workspace.
Select the IIC_Master.mtpj file.

Click <Open>

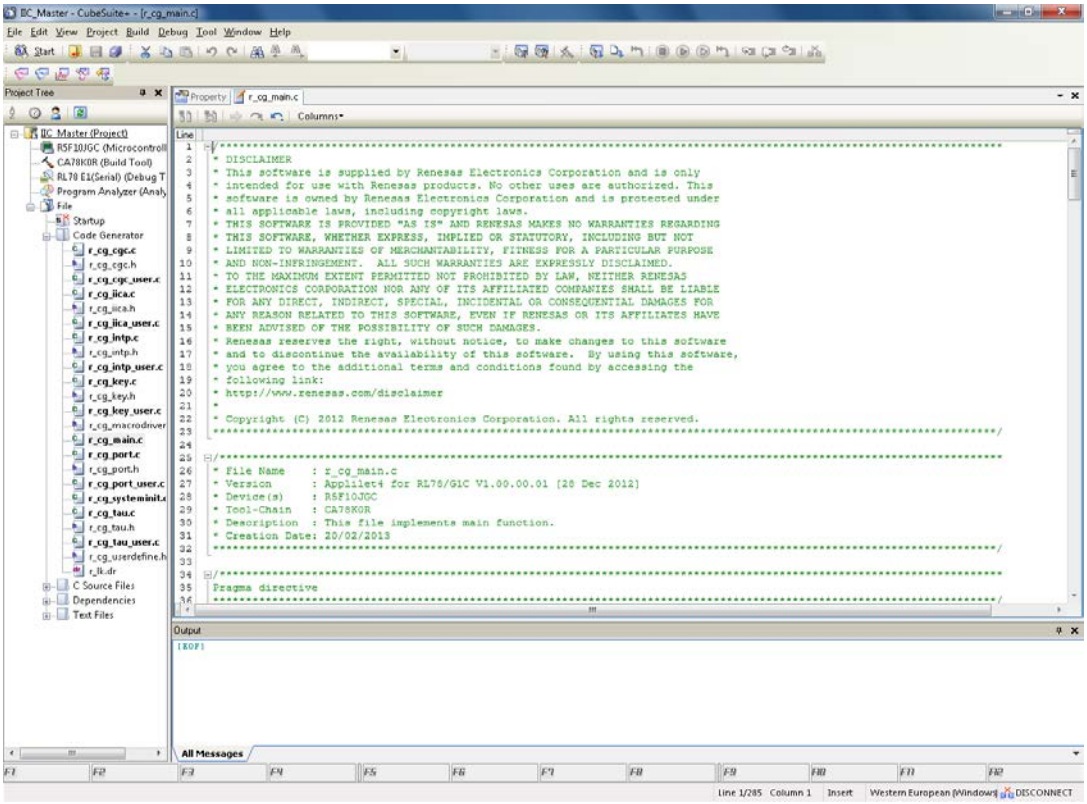


A Progress Status dialog will appear briefly whilst CubeSuite+ loads the project.



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_main.c’. This source file includes the C function main(). All source files and dependant files whose filenames are prefixed with ‘r_’ were generated using Application Leading Tool.

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.

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 'Go' to start the program execution. "IIC M" will be displayed on the 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.

If the write is successful, an incrementing number is displayed on the panel LCD starting from 0 and loops back after on the tenth write. When connected to an EEPROM device, a successful write will also show 'WR'. When connected to another RSKRL78/G1C running the slave IIC application, '*WR*' is displayed instead.

5. Press switch SW2 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.

Website and Support

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

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Revision History

Rev.	Date	Description	
		Page	Summary
1.00	Nov 11, 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 part 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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