RL78/G1C

Sample Tutorial using the RL78/G1C RSK for Cubesuite+

R01AN1748EG0100
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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.

This code, running on the RL78/G1C RSK, will call three functions to demonstrate Port pin control (FlashLEDs), Interrupt usage (TimerADC) and C variable initialization (Statics_Test). Code is also included to drive the optional LCD module.

Target Device

RL78/G1C

Development environment

IDE: Cubesuite+
Compiler: CA78K0R
Hardware: Renesas Starter Kit for RL78/G1C

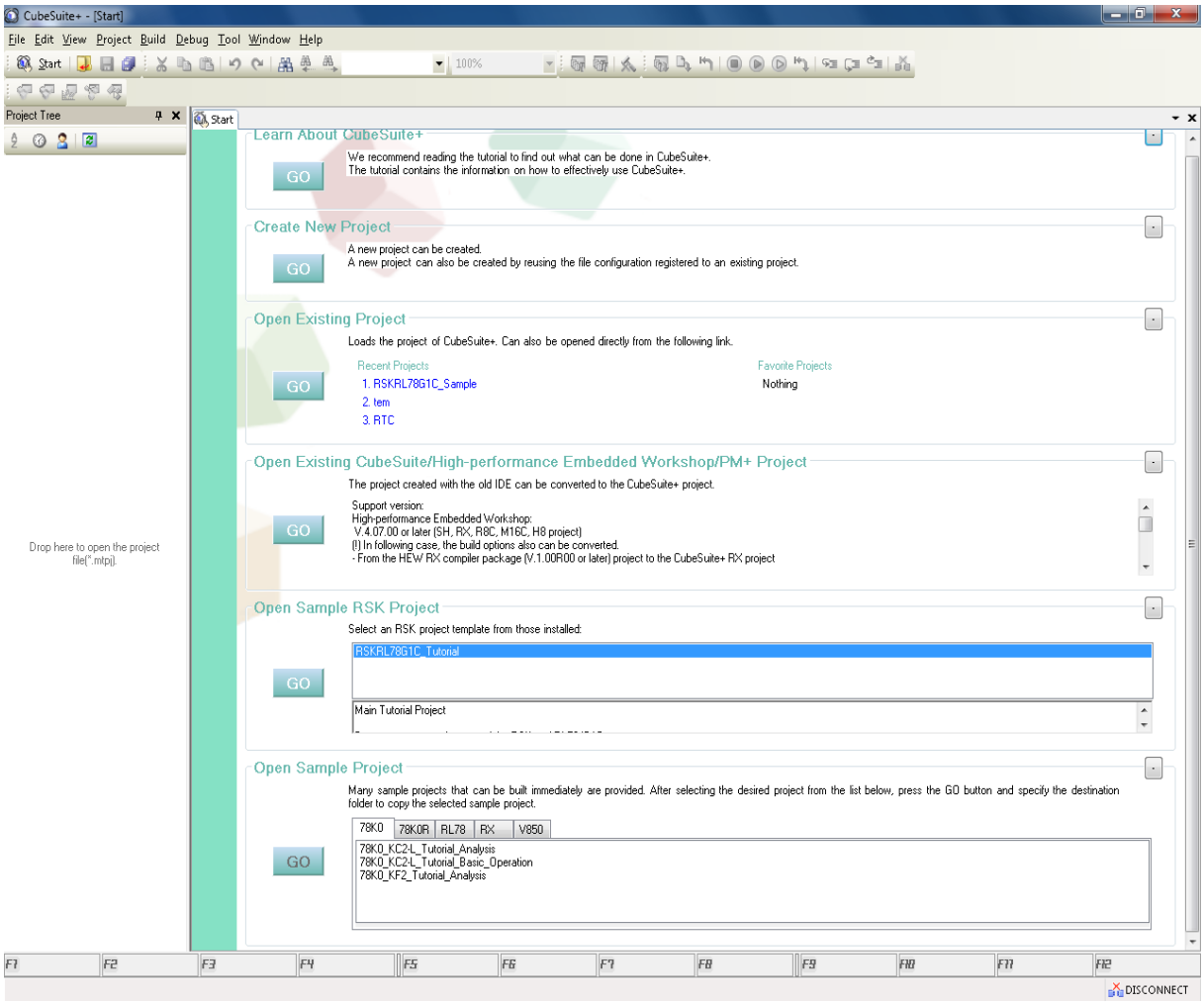
Contents

1. Installation

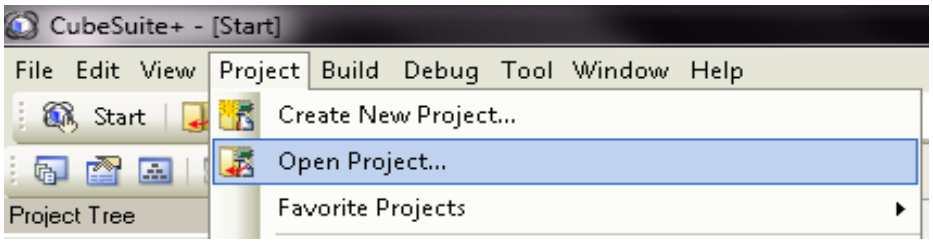
This section assumes CubeSuite+ IDE is already installed on the user's personal computer (PC). Create a new folder and name it as 'RSKRL78G1C_Workspace'. Copy the zipped file 'an_r01an1748eg0100_rl78g1c_apl.zip', available in the Application Note package downloaded from the website, to this folder. Extract the 'an_r01an1748eg0100_rl78g1c_apl.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+.

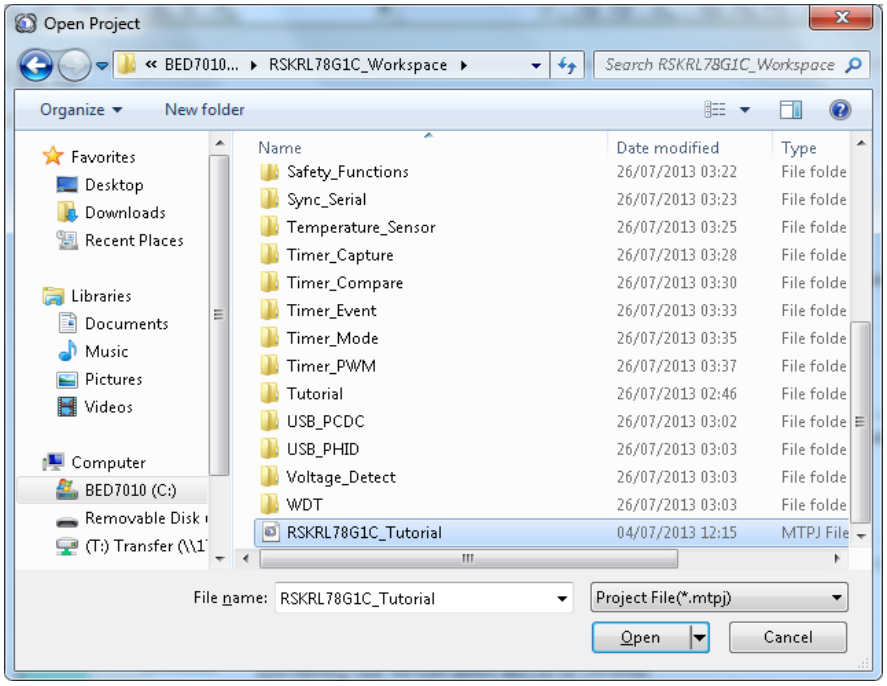


From the menu bar select File > Project > Open Project…

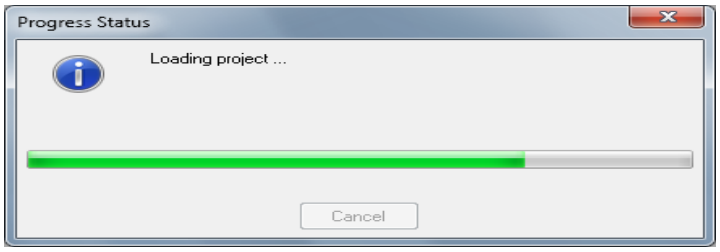


CubeSuite+ will open a dialog.
Navigate to the unzipped Tutorial folder located in RSKRL78G1C_Workspace.
Select the Tutorial.mtpj file.

Click <Open>

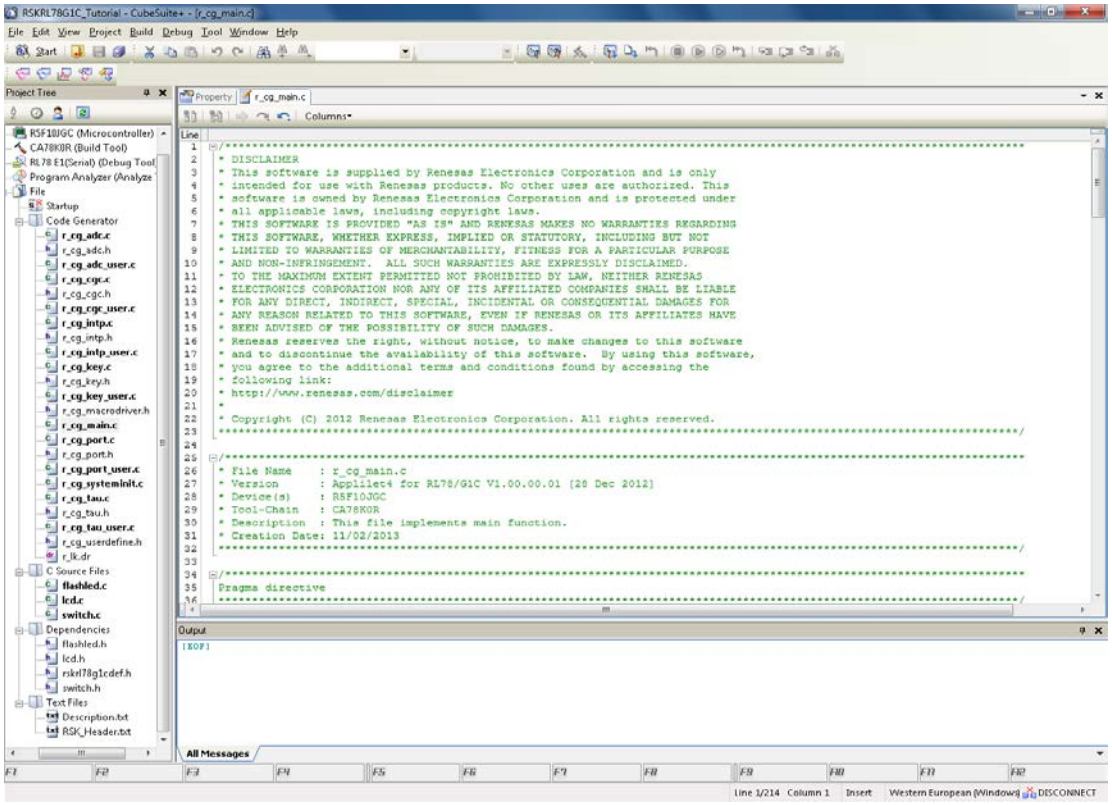


A Progress Status dialog will appear briefly whilst CubeSuite+ loads the project.



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_cg_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

This is the main tutorial code. This code will call three functions to demonstrate Port pin control (FlashLEDs), Interrupt usage (TimerADC) and C variable initialization (static_test). Code is also included to drive the optional LCD module

Operation:

1. The tutorial code initialises the LCD module, and displays 'Renesas' on the first line of the LCD, and the name of theMCU on the second line.

2. The tutorial code calls the Flash_LED function which toggles the user LEDs repeatedly and waits in a loop until either a switch is pressed or the LEDs flash 200 times.

3. The tutorial then calls the Timer_ADC function which configures the ADC unit, and a timer unit to generate periodic interrupts. The timer's period is varied by the ADC conversion results. The ADC unit is configured to generate an interrupt after each AD conversion completes and store the result.

4. The ADC interrupt fetches the ADC result, which is used to set a new timer period. The timer interrupt handler toggles the user LEDs.

5. After calling Timer_ADC and setting up the timer & ADC interrupts, the tutorial calls the static_test function which runs in parallel to the callback functions in step 4. This function displays the string 'STATIC' which is fetched from a static variable and is replaced, letter by letter, by the string 'TESTTEST'. The LCD then reverts to the original display on completion.

6. After the static test function completes, the MCU waits in an infinite while loop; and is periodically interrupted with the callback function in step 4.

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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