

RL78/G1C

Utilising the Timer Mode Sample Code for e2studio

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APPLICATION NOTE

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 runs on the RL78/G1C RSK and demonstrates usage of Timer RJ by outputting a 1 KHz signal with 50% duty cycle.

Target Device

RL78/G1C

Development environment

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

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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 'Timer_Mode.zip', available in the Application Note package downloaded from the website, to this folder. Extract the 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.

e ² Workspace Launcher					
Select a wor	rkspace				
	res your projects in a folder called a workspace. orkspace folder to use for this session.				
<u>W</u> orkspace:	C:\Users\QATest\My Documents\e2studio\workspace	•	<u>B</u> rowse		
<u> U</u> se this a	s the default and do not ask again	ОК	Cancel		

Select <OK>.

e ² Adm	inistrator Privilege	×
?	Administrative privileges are required for correct operation of e2Studio on Windows 7. Please ensure you have appropriate privileges (i.e., Right click renesas-eclipse.exe and choose "Run as Administrator")	
	Do you want to continue?	
	Yes <u>N</u> o	

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...>

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2. The Import dialog will now appear. Expand the "General" folder icon, and select "Existing Projects into Workspace", then click 'Next'.

e ² Import	- • •			
Select Create new projects from an archive file or directory.				
Select an import source:				
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(?) < <u>Back</u> Next > Einish	Cancel			

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

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

And also ensure that the 'Copy projects into workspace' option is ticked, and then click <Finish>

The IDE e2studio will load the project.



RL78/G1C

e ² Import				
Import Projects Select a directory to searc	ch for existing Eclipse projects.			
 Select root directory: Select archive file: 	C:\Renesas\Workspace\RSK\RSKRL78G1C\Time	Browse		
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▼ Timer_Mode (C:\	Renesas\Workspace\RSK\RSKRL78G1C\Timer_Mı	<u>S</u> elect All <u>D</u> eselect All R <u>e</u> fresh		
•	4 III			
 ✓ <u>C</u>opy projects into workspace Working sets ✓ Add project to working sets Working sets: 				
?	< <u>B</u> ack <u>N</u> ext > <u>Finish</u>	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.

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⊳ h r_cg_tau.h	* File Name : Description.txt	
In r_cg_userdefine.h	* Version : Applilet4 for RL78/GIC V1.00.00.01 [28 Dec 2012]	
Im r_cg_userdenne.n Im r_cg_vector_table.c	* Device(s) : ASF101GG * Tool-thain : gcc178	
Is rskri78q1cdef.h	* H/W Platform: RSKRL78GIC	
In Isknyogicuei.n Isknyogicuei.n	* Note : Application Leading Tool (Applilet) is used to generate code	
b In utility.h	* for this sample program. The name Applilet is used hereafter.	
Description.txt	* The Applilet details and version number are given in the file	
RSK_Header.txt	* header for each relevant module. * Description : Demostrates usage of the Timer Array Unit's (TAU) ability to generate a square wave.	
Timer_Mode.cqp	*	
Timer_Mode.launch	* Instructions :	
Inner_wode.adnch	* 1. Compile the sample code and download to the RSK. Click the 'Go'	
	* button to start program execution.	
	* 2 "1 kHz " and "J3 pin10" will be displayed on the LCD.	
	*	
	* 3. Observe the waveform on the oscilloscope. LEDØ will appear as if constantly lit.	
	* This is due to the high speed at which it is being toggled.	
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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 dependent files whose filenames are prefixed with 'r_' were generated using Application Leading Tool. For more information, refer Description.txt.



5. Code Execution

The sample code demonstrates usage of the Timer Array Unit 0 (TAU0) to output a 1 KHz square wave.

Instructions:

1. Compile the sample code, and download to the RSK. Click the 'Resume' button to start program execution. Click again if the program stops at main().

2. "1 kHz" and "J3 pin10" will be displayed on the LCD.

3. Observe the waveform on the oscilloscope. LED0 will appear as if constantly lit. This is due to the high speed at which it is being toggled.



6. Website, Inquiries and Support

Renesas Electronics Website <u>http://www.renesas.com/</u> Inquiries <u>http://www.renesas.com/inquiry</u> Support <u>http://www.renesas.com/rskrl78g1c</u>

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Revision Record

		Descripti	Description		
Rev.	Date	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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