RL78/G1C

Utilising the Timer Event 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 runs on the RL78/G1C RSK and demonstrates usage of the Timer Array Unit's (TAU) ability to count external events. An event is either a rising or falling edge signal. In this sample code, an event is a falling edge signal. The TAU has the capability to filter noises on the signal input.

Target Device

RL78/G1C

Development environment

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

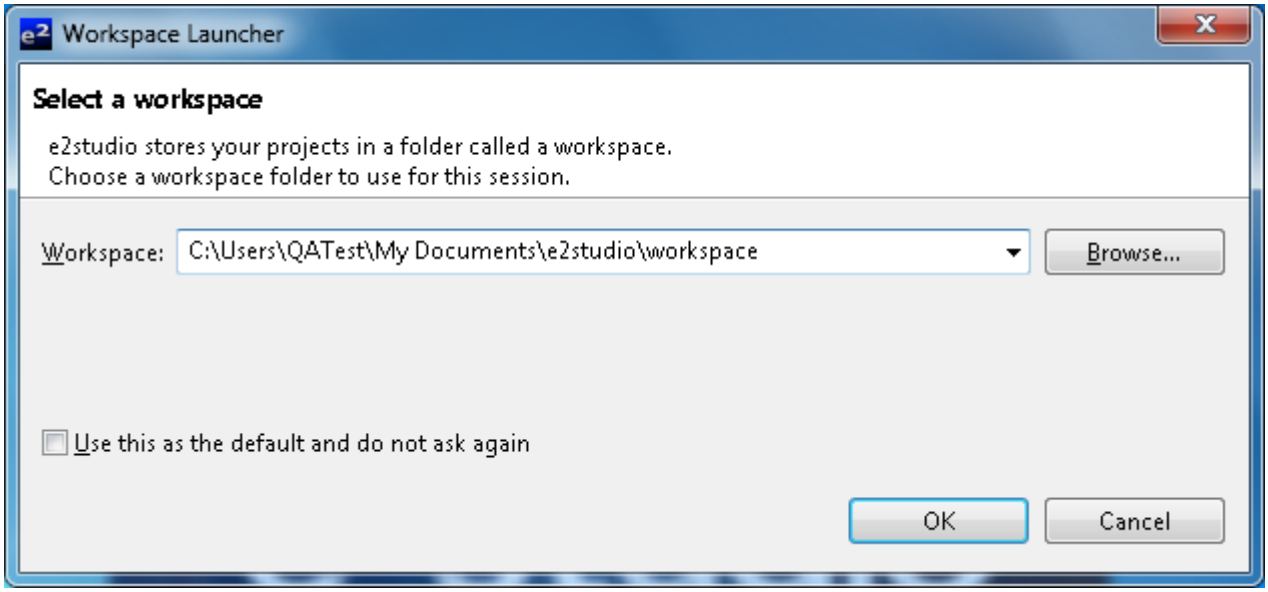
Contents

1. Installation

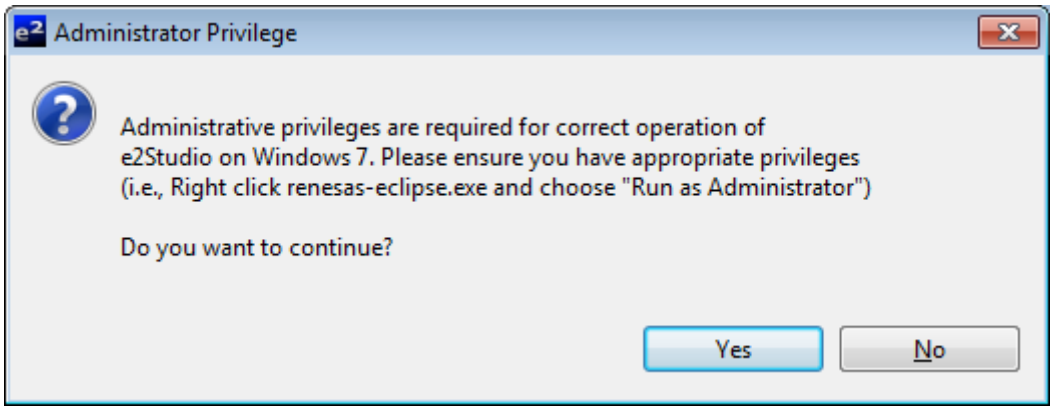
This section assumes e2studio IDE is already installed on the user's personal computer (PC). Create a new folder and name it as 'RSKRL78G1C_Workspace'. Copy the zipped file Timer_Event.zip, available in the Application Note package downloaded from the website, to this folder. Extract the Timer_Event.zip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

2. Creating the Project Workspace

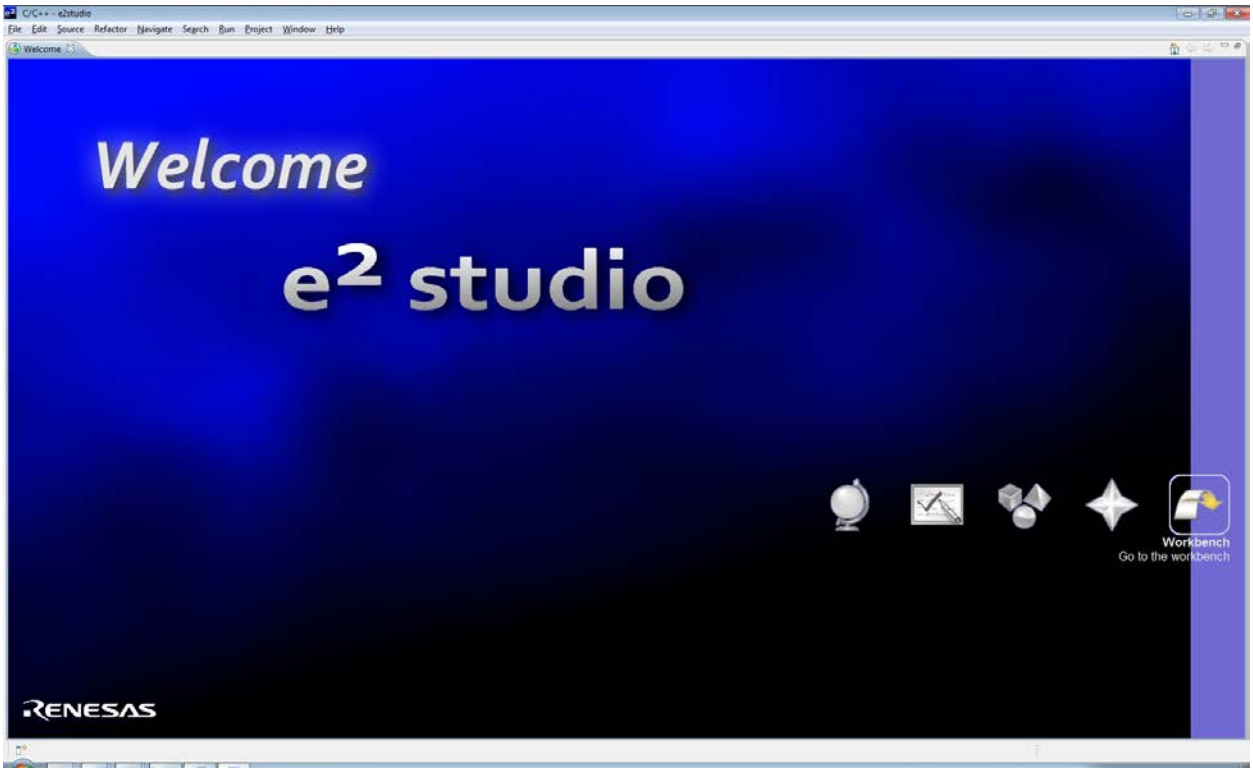
Open E2studio IDE by clicking the Windows Start button, select All Programs > Renesas Electronics e2studio > Renesas e2studio.



Select <OK>.

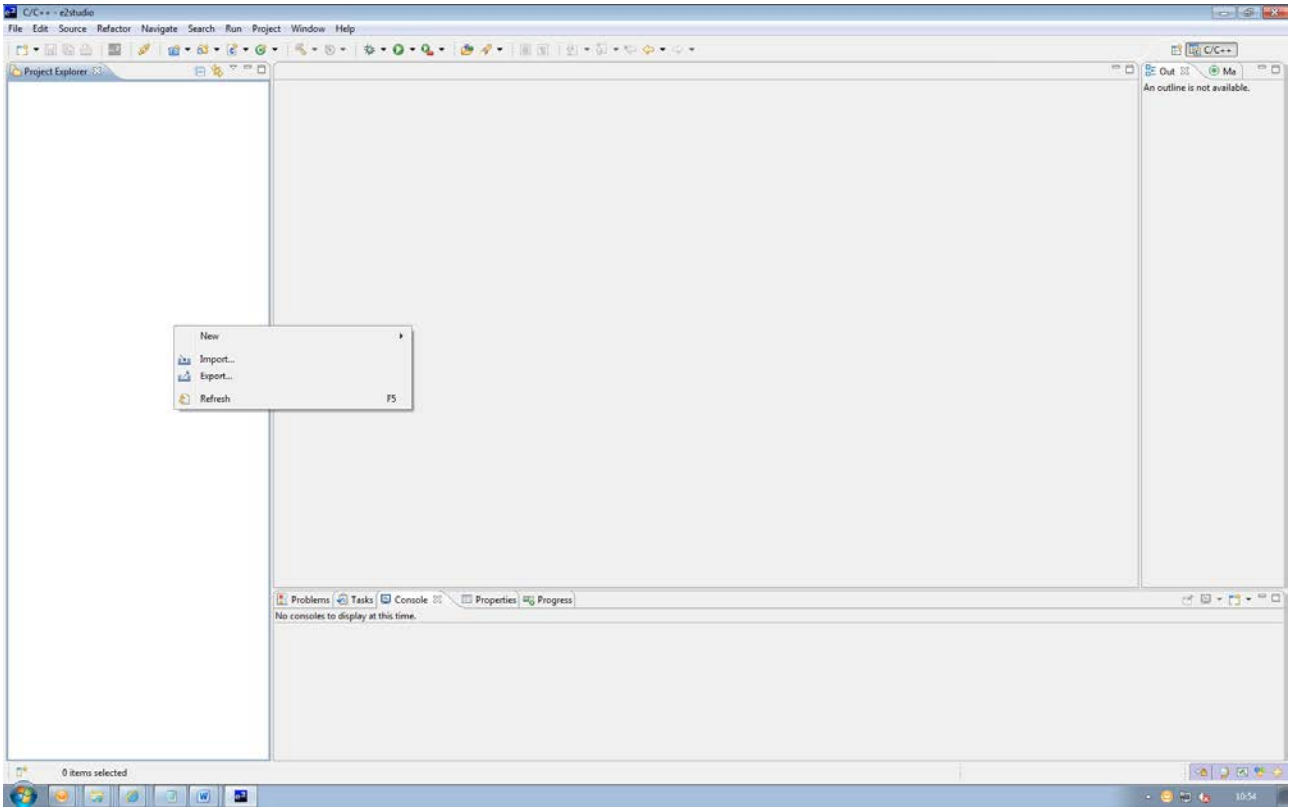


Select <Yes> to Administrator Privilege dialog.

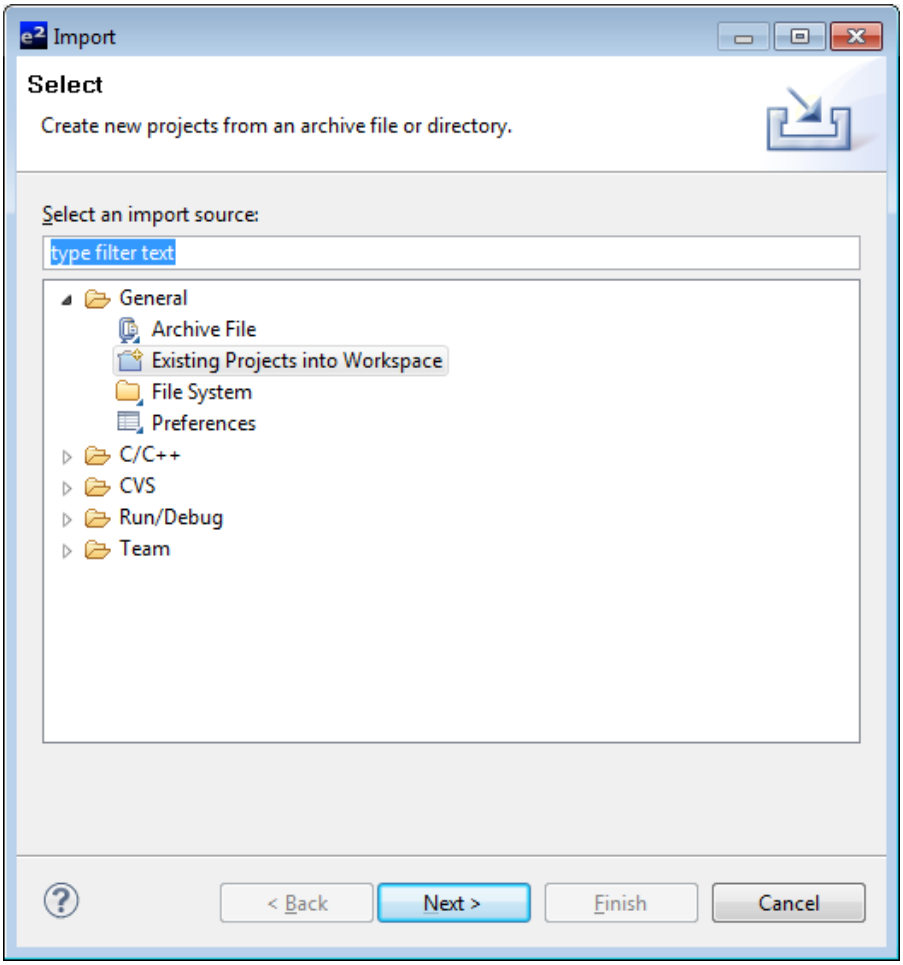


On the welcome screen select Go the Workbench icon as shown above.

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’.

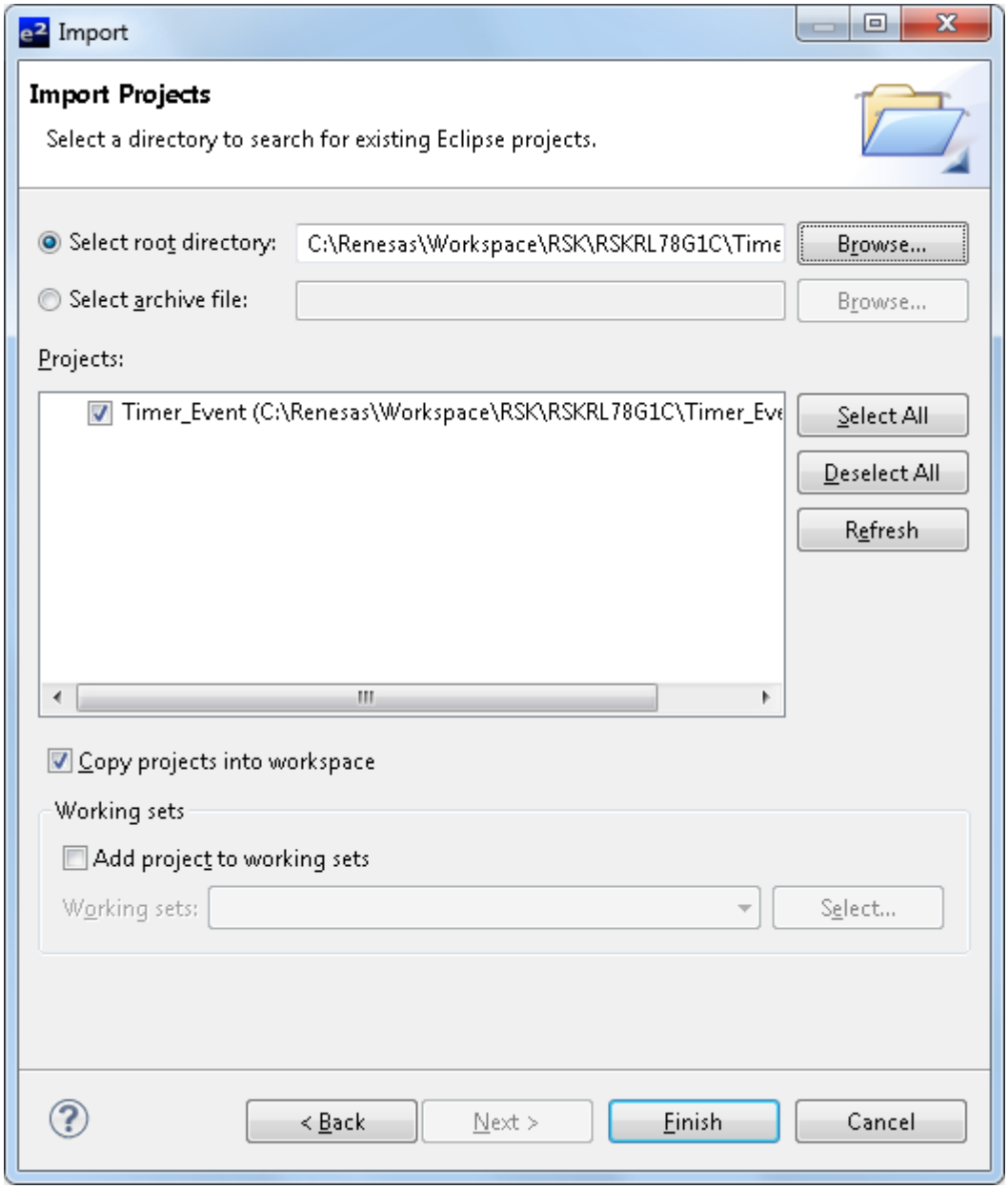


3. The Import Dialog will now appear and specify the project to import. Click the “Browse” button and locate the directory: C:\Renesas\Workspace\RSK\RSKRL78G1C.

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

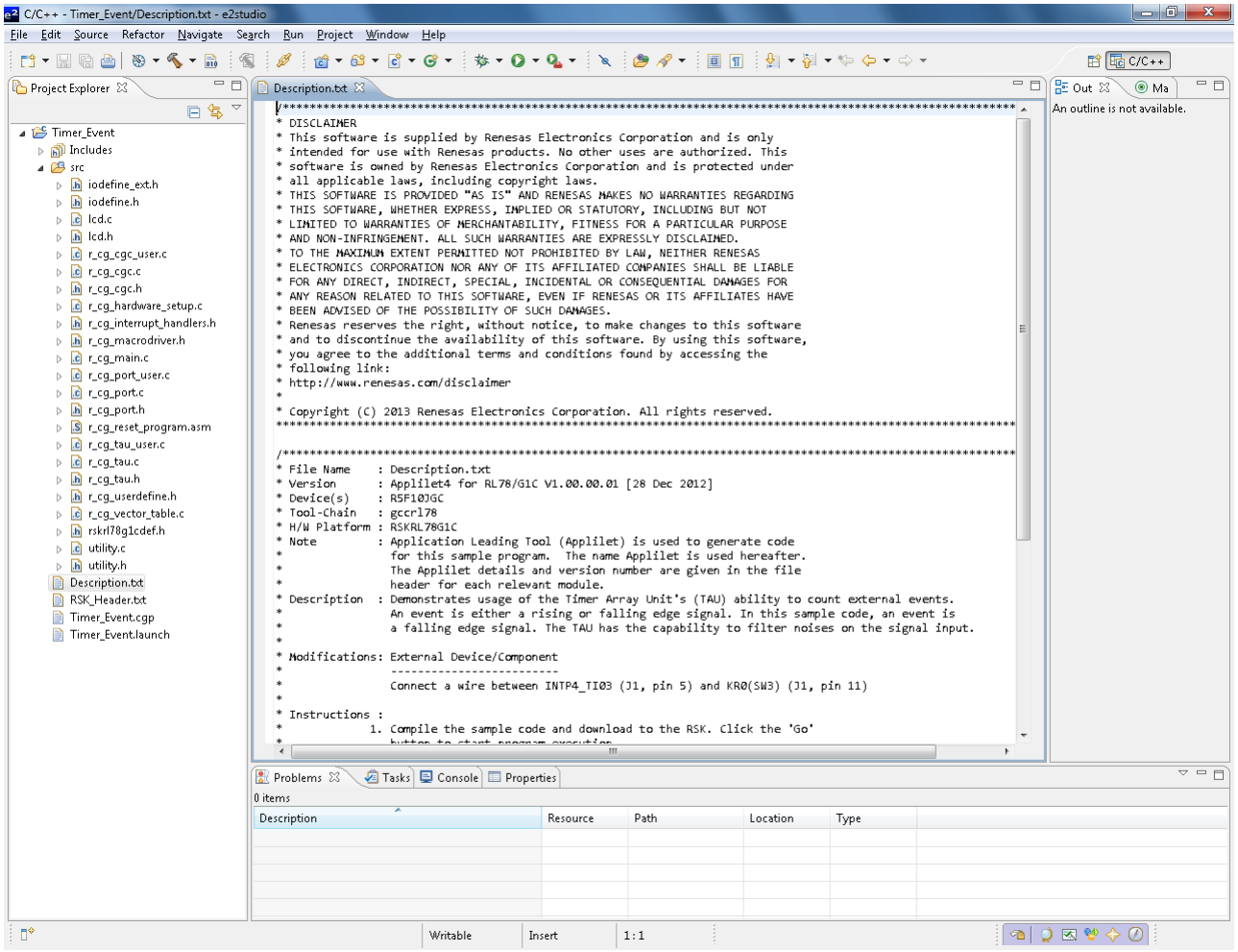
   And also ensure that the ‘Copy projects into workspace’ option is ticked, and then click <Finish>

   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\Time
Browse...
Select archive file:
Browse...
Projects:
Timer_Event (C:\Renesas\Workspace\RSK\RSKRL78G1C\Timer_Eve
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_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's (TAU) ability to count external events. An event is either a rising or falling edge signal. In this sample code, an event is a falling edge signal. The TAU has the capability to filter noise on the signal input.

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. The string "TR Event" will appear on the 1st line of the LCD. The string "Push SW3" will appear on the 2nd line of the LCD.

3. Press switch SW3 to generate an event. An interrupt is also generated.

4. The number of captured events is displayed on the 2nd line of the LCD display. Press SW3 to generate another event and observe the number incremented on the LCD display.

5. The user may view the captured timer value by selecting the variable named 'g_event_count' in r_cg_tau_user.c and dragging it into the 'Expressions' window.

6. When the number of events reaches 100, it will restart from 1 on the next detected event.

6. Website, Inquiries and Support

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

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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