RL78/G23

Capacitive Touch Evaluation System Sample Code

Introduction

This document describes the contents of the sample code for the RL78/G23 Capacitive Touch Evaluation System.

Target Device

RL78/G23 (R7F100GSN2DFB)

Contents

1. Specification

This is a sample code that adds LED illumination processing linked to the touch button to the project file generated by "QE for Capacitive Touch" that is development assistance tool for capacitive touch sensors. For instructions on developing capacitive touch sensing applications using the RL78 MCU, see Reference[1] "RL78Family Using QE and SIS to Develop Adaptive Touch Applications (R01AN5512)".

2. Operation Confirmation Conditions

The sample code accompanying this application note has been run and confirmed under the conditions below.

Table 2-1 Operation Confirmation Conditions

Item	Contents
MCU	RL78/G23 (R7F100GSN2DFB)
Operating frequency	32MHz（Supplied from High-speed on-chip oscillator）
Operating voltage	5.0V
Evaluation board	Capacitive Touch Evaluation System for RL78/G23 (Product No : RTK0EG0030S01001BJ) • RL78/G23 CPU Board(Product No : RTK0EG0029C01001BJ) • Capacitive Touch Evaluation Application Board — Self-Capacitance Buttons / Wheels / Slider Board (Product No :RTK0EG0019B01002BJ)
Integrated development environment	Renesas e² studio Version 2021-07 (21.7.0)
C Compiler	Renesas CC-RL V1.10.00
RL78 Smart Configurator e²studio plug-in	V1.1.0
Development Assistance Tool for Capacitive Touch Sensors	QE for Capacitive Touch[RA,RL78,Synergy] V2.0.0
Emulator	Renesas E2 Emulator Lite

Table 2-2 Components of Smart Configurator

Component	Version	Configuration
Board Support Packages. - v1.12 (r_bsp)	1.12	r_bsp(used)
Capacitive Sensing Unit driver. (r_ctsu)	1.10	r_ctsu(used)
Interval Timer	1.0.0	Config_TAU0_1(TAU0_1: used)
Ports	1.0.0	Config_PORT(PORT: used)
Touch middleware. (rm_touch)	1.10	rm_touch(used)
UART Communication	1.0.0	Config_UARTA1(UARTA1: used)

3. Usage notes

3.1 Serial communication monitoring settings

To monitor by serial communication with QE for Capacitive Touch, after importing the project into e^2 studio, make the following settings on the “CapTouch Main (QE)” tab of QE for Capacitive Touch.

To Select a Project : rl78g23_rssk_sample

To Prepare a Configuration : rl78g23_rssk_sample.tifcfg

Baud rate : 153600

Port : COM port number of the CPU board recognized by the PC

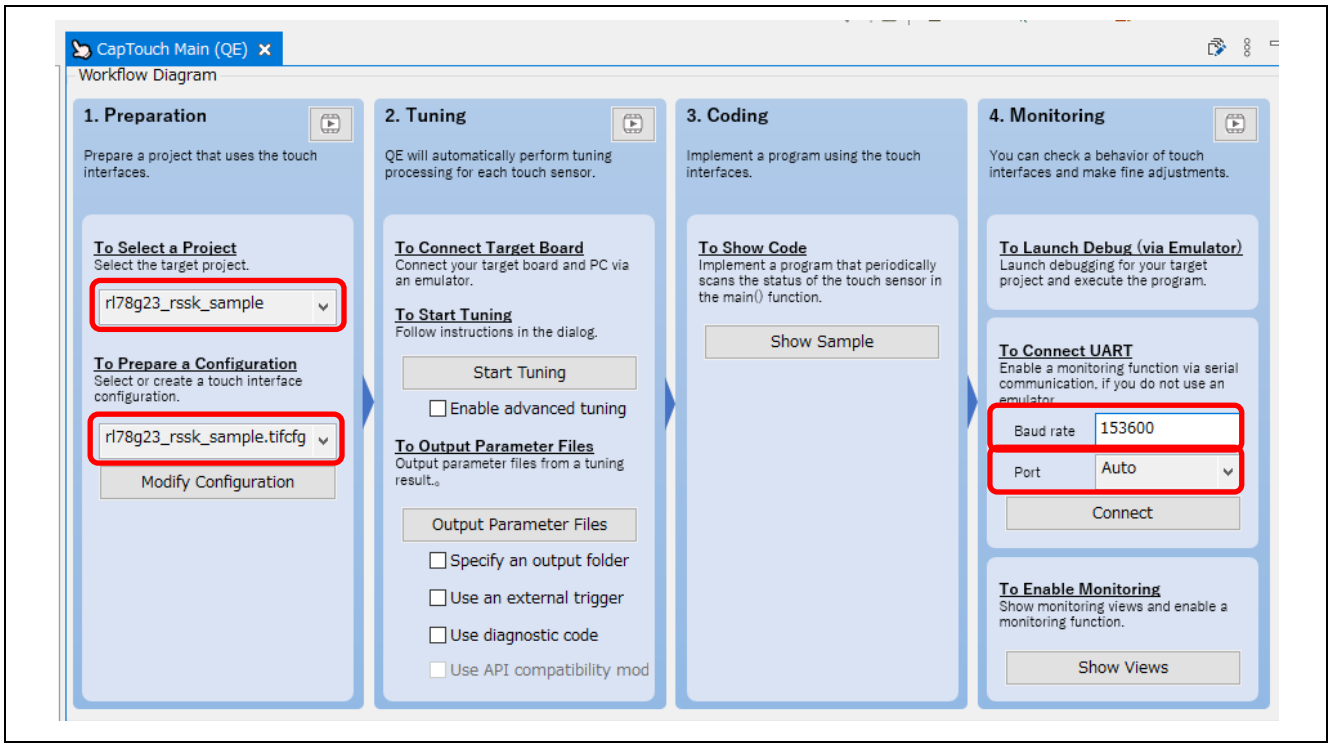

Figure 3-1 CapTouch Main (QE) Tab Settings

3.2 UARTA1 module baud rate setting

In this sample code, the baud rate setting is manually set by the user initialization function of the UARTA1 module. If you want to set an arbitrary baud rate with the Smart Configurator, delete the codes in the user initialization function.

File name : Config_UARTA1_user.c

Function name : R_Config_UARTA1_Create_UserInit()

```
void R_Config_UARTA1_Create_UserInit(void)
{
    /* Start user code for user init. Do not edit comment generated here */
    BRGCA1 = 0x68U;      /* 153600 bps @ fSEL = 32MHz */
    UTA1CK = 0x0000;    /* CLKA1 pin output disable, UARTA1 clock source is fSEL */
    /* End user code. Do not edit comment generated here */
}
```

4. Sample Code

Sample code can be downloaded from the Renesas Electronics website.

5. Reference Documents

[1]. RL78 Family Using QE and SIS to Develop Capacitive Touch Application (R01AN5512)
The latest version can be downloaded from the Renesas Electronics website.

[2]. RL78/G23 Capacitive Touch Evaluation System User's Manual (R12UZ0095)
The latest version can be downloaded from the Renesas Electronics website.

6. Website and Support

Visit the following URLs to learn about the kit and the RA family of microcontrollers, download tools and documentation, and get support.

RTK0EG0030S01001BJ Resources	renesas.com/rssk-touch-rl78g23
Renesas Capacitive Touch Solution	renesas.com/solutions/touch-key
QE for Capacitive Touch	renesas.com/qe-capacitive-touch
Renesas Support	renesas.com/support

Revision History

Rev.	Date	Description	
		Page	Summary
1.00	8.Sep.2021	-	First edition issued

General Precautions in the Handling of Microprocessing Unit and Microcontroller Unit Products

The following usage notes are applicable to all Microprocessing unit and Microcontroller unit 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. Precaution against Electrostatic Discharge (ESD)

   A strong electrical field, when exposed to a CMOS device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop the generation of static electricity as much as possible, and quickly dissipate it when it occurs. Environmental control must be adequate. When it is dry, a humidifier should be used. This is recommended to avoid using insulators that can easily build up static electricity. Semiconductor devices must be stored and transported in an anti-static container, static shielding bag or conductive material. All test and measurement tools including work benches and floors must be grounded. The operator must also be grounded using a wrist strap. Semiconductor devices must not be touched with bare hands. Similar precautions must be taken for printed circuit boards with mounted semiconductor devices.
2. Processing at power-on

   The state of the product is undefined at the time 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 time 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 time 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 time when power is supplied until the power reaches the level at which resetting is specified.
3. Input of signal during power-off state

   Do not input signals or an I/O pull-up power supply while the device is powered off. The current injection that results from input of such a signal or I/O pull-up power supply may cause malfunction and the abnormal current that passes in the device at this time may cause degradation of internal elements. Follow the guideline for input signal during power-off state as described in your product documentation.
4. Handling of unused pins

   Handle unused pins in accordance 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 the 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.
5. Clock signals

   After applying a reset, only release the reset line after the operating clock signal becomes stable. When switching the clock signal during program execution, wait until the target clock signal is 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. Additionally, 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.
6. Voltage application waveform at input pin

   Waveform distortion due to input noise or a reflected wave may cause malfunction. If the input of the CMOS device stays in the area between V_{IL} (Max.) and V_{IH} (Min.) due to noise, for example, the device may malfunction. Take care to prevent chattering noise from entering the device when the input level is fixed, and also in the transition period when the input level passes through the area between V_{IL} (Max.) and V_{IH} (Min.).
7. Prohibition of access to reserved addresses

   Access to reserved addresses is prohibited. The reserved addresses are provided for possible future expansion of functions. Do not access these addresses as the correct operation of the LSI is not guaranteed.
8. Differences between products

   Before changing from one product to another, for example to a product with a different part number, confirm that the change will not lead to problems. The characteristics of a microprocessing unit or microcontroller unit products in the same group but having a different part number might differ in terms of 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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(Rev.5.0-1 October 2020)

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