[Notification]

Current Consumption Tuning Solution for RX and RL78 Families

Using E2 Emulator and QE for Current Consumption

Outline

This document provides an overview of the current consumption tuning solution for the RX and RL78 families.

This solution combines the E2 emulator and QE for Current Consumption and enables current consumption measurement while running the program. Because measurement does not require a dedicated measuring instrument or board modification, less time is required for preparing for tuning. Use this current consumption tuning solution to reduce the time required for tuning the current consumption.

QE for Current Consumption (current consumption measurement tool) is a standard development support tool built around the e^2 studio integrated development environment and CS+ (CS+ for CC only).

## 1. Current Consumption Tuning Solution

So far, debugging for low power consumption required repeated program corrections and verification because the relationship between the current consumption and program is unclear. This solution has the following three features to reduce the time required for tuning the current consumption.

1.1 Three Features

➢ **Easy to measure: The solution allows the current to be measured just with the E2 emulator and QE for Current Consumption.**

Additional measuring instruments or board modification is unnecessary. The current consumption of the entire system can be measured easily just by connecting the E2 emulator to the user system and operating QE for Current Consumption in the integrated development environment on a PC.

The figure below shows an example in which the E2 emulator is connected and the current consumption of the entire system is shown in a waveform when the program is run and stopped. The current value at a cursor position (red line in the computer screen) can be confirmed as with an ammeter.
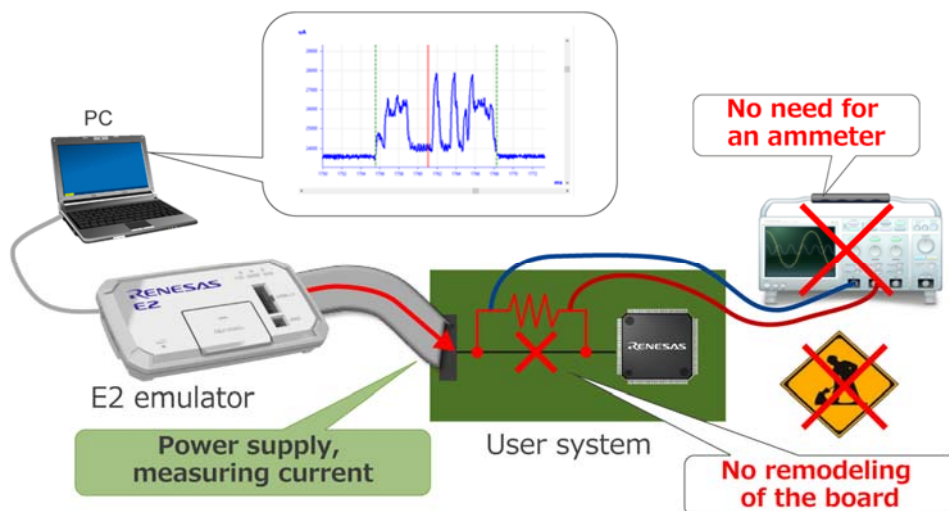
■ **Failsafe capture: Detect an abnormal current and stop the program.**

By using the E2 emulator together with QE for Current Consumption, the program can be stopped based on detection of a specified trigger condition (for example, an abnormal current increase or an infrequent event). A current value or time can be specified for the trigger condition. This function allows for failsafe capturing of abnormal current to aid in troubleshooting.

The figure below shows an example in which a current value (red dotted line) is set as a trigger condition and the program is stopped when the trigger condition is met.
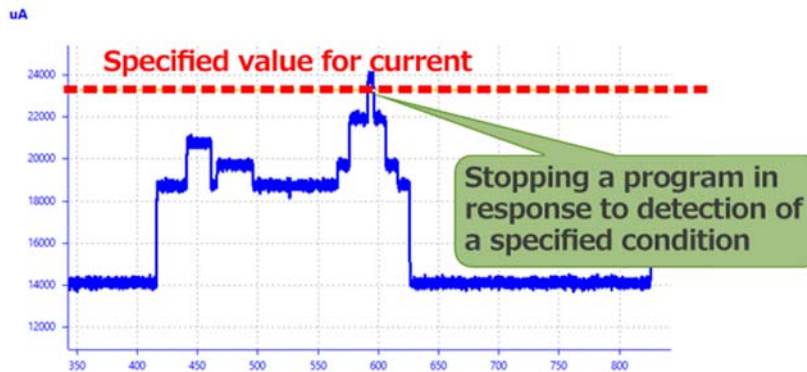
■ **Find quickly: Visualize the relationship between the program and current.**

The relationship between program operations and current consumption changes is visualized by setting monitoring points in the program. Multiple monitoring points can be set in the program in the same way as you set break points. This function allows the cause of current increases to be identified.

The figure below shows an example in which multiple monitoring points are set in the program and the program is shown by double-clicking a monitoring point in which an abnormal current occurred.
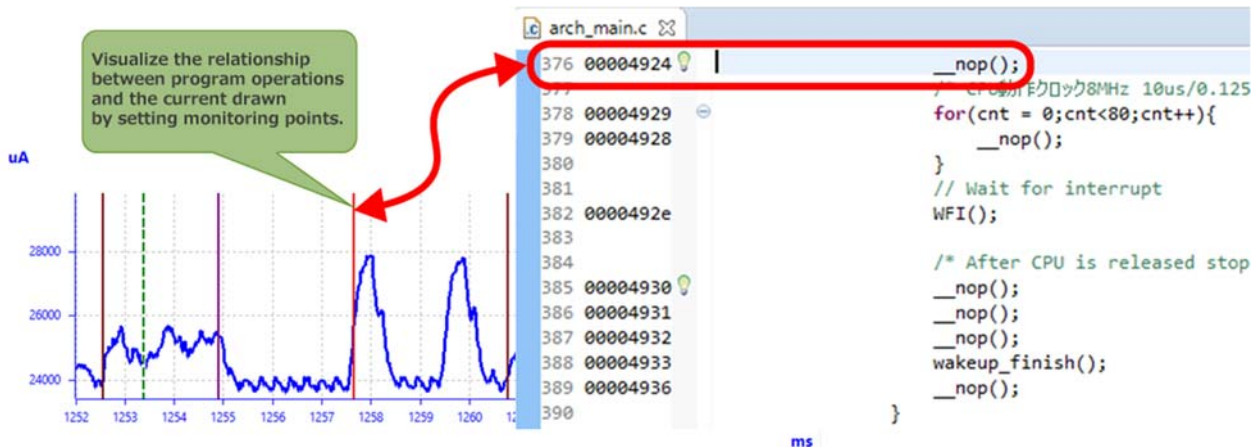
1.2 Supported Devices

- RX family (RX100, RX200 series)

- RL78 family

2. E2 Emulator

The E2 emulator is an advanced on-chip debugging emulator and flash programmer designed for the purpose of improving development efficiency.

The maximum download speed is twice that of the E1 emulator. The E2 emulator shares the same pin-out convention as E1, and can therefore be connected to a user system designed for the E1 emulator.

Consider using the E2 emulator for the next-generation MCUs, such as the RX66T group having the new CPU core RXv3 in the RX family.

https://www.renesas.com/e2

■ Purchasing the product

To order the product, contact your local Renesas Electronics sales office or distributor with the following information.
For product pricing, contact us in the same manner.

Product name	Orderable part number
E2 emulator	RTE0T00020KCE00000R

3. QE for Current Consumption

QE for Current Consumption is a development support tool for embedded system development using MCUs in the RL78 or RX family. It enables current consumption tuning to be carried out more quickly.

QE for Current Consumption is a standard development support tool built around the e^2 studio integrated development environment and CS+[Note].

Note: The version of the supported IDE varies depending on the device family.
See below for details.

	RX family	RL78 family
e^2 studio	V6.2.0 or later	V6.0.0 or later
CS+ (CS+ for CC)	V6.01.00 or later	V6.00.00 or later

■ How to use QE for Current Consumption

For instructions on using QE for Current Consumption in e^2 studio and CS+, see the following application notes.

➢ For e^2 studio

- Current Consumption Tuning Solution for RL78 Family (E2 emulator, e^2 studio)

https://www.renesas.com/search/keyword-search.html#genre=document&q=r20an0456

- Current Consumption Tuning Solution for RX Family (E2 emulator, e^2 studio)

https://www.renesas.com/search/keyword-search.html#genre=document&q=r20an0483

➤ For CS+

- Current Consumption Tuning Solution for RL78 Family (E2 emulator, CS+)

  https://www.renesas.com/search/keyword-search.html#genre=document&q=r20an0457

- Current Consumption Tuning Solution for RX Family (E2 emulator, CS+)

  https://www.renesas.com/search/keyword-search.html#genre=document&q=r20an0484

To find more documents and downloads for QE for Current Consumption, see the URL below.

https://www.renesas.com/qe-current-consumption

Revision History

Rev.	Date	Description	
		Page	Summary
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