[Notes]

E20 Emulator, E1 Emulator, E2 Emulator, E2 Emulator Lite

Outline

When using the E20 emulator, E1 emulator, E2 emulator, or E2 emulator Lite (hereafter E2 Lite), note the following points.

1. When using the large trace capacity or coverage function of the E20 emulator for the RX family

2. When using the large trace capacity or coverage function of the E20 emulator and the internal trace function of E20, E1, E2, and E2 Lite for the RX family

1. When Using the Large Trace Capacity or Coverage Function of the E20 Emulator for the RX Family

1.1   Applicable Product

➢ E20 emulator

1.2   Applicable MCUs

➢ RX family: RX64M, RX65N, RX651, and RX71M groups

1.3   Details

When the large trace capacity or coverage function of the E20 emulator is used for the RX family, a user program runs out of control under certain conditions. Note that this phenomenon occurs only during debugging with the emulator, and does not occur during operation of the chip itself.

1.4   Conditions

If both conditions (1) and (2) are met, this problem may occur depending on the condition of the trace buffer embedded in MCU.

(1)   Either of the following functions is used.

(1-1) Large trace capacity
For e^2 studio: The trace output mode is set to "trace priority".

For CS+: The external trace output is set to "trace output priority".

(1-2) Coverage function
For e^2 studio: The acquisition mode is set to "trace priority".

For CS+: The coverage measurement method is set to "coverage measurement priority".

(2)   "RTSD instruction or RTFI instruction" is placed immediately after the "BSR instruction or JSR instruction".

Example:

_func_A:
 	
     :
 	
          BSR   _func_B   ; (1)
 	
          RTSD #20, R8-R9   ; (2)
	_func_B:
	
	     :
	
	          RTS

The RTSD instruction (2) is placed immediately after the BSR instruction (1).

In C programs, when call for another function is coded at the end of a function (as shown in the following example), an instruction sequence (as shown in the preceding example) may be generated depending on the compiler type and settings.

Example:

void func_A(void) {
 	
     :
 	
     func_B();
 	
}
	void func_B(void) {
	
	          :
	
	}

The specific instruction format of (2) in which this phenomenon occurs is as follows.

Instruction format of (2)
RTSD src, dest-dest2
RTFI

When this phenomenon occurs, the branch destination for the execution of (2) becomes an address that is different from the normal address, and the program runs out of control.

1.5 Workaround

Do either of the following methods to change the settings so as not to satisfy the conditions of section 1.4 (1):

- When using the large trace capacity

   For e^2 studio: The trace output mode is set to "trace priority". --> Change the setting to "CPU execution priority".

   For CS+: The external trace output is set to "trace output priority". --> Change the setting to "CPU execution priority".

- When using the coverage function

   For e^2 studio: The acquisition mode is set to "trace priority". --> Change the setting to "CPU execution priority".

   For CS+: The coverage measurement method is set to "coverage measurement priority". --> Change the setting to "CPU execution priority".

1.6 Schedule for Fixing the Problem

This problem will be fixed in the next version of e^2 studio and CS+.

2. When Using the Large Trace Capacity or Coverage Function of the E20 Emulator and the Internal Trace Function of E20, E1, E2, and E2 Lite for the RX Family

2.1 Applicable Products

➢ E20 emulator, E1 emulator, E2 emulator, and E2 emulator Lite

2.2 Applicable MCUs

➢ RX family: MCU with RXv2 core and RXv3 core *

* See below for details.

https://www.renesas.com/us/en/products/microcontrollers-microprocessors/rx-32-bit-performance-efficiency-mcus/rx-features

2.3 Details

When the large trace capacity or coverage function of the E20 emulator and the internal trace function of E20, E1, E2, and E2 Lite are used for the RX family, if specific conditions are satisfied, trace information or coverage information cannot be correctly acquired. Note that this phenomenon occurs only during debugging with the emulator, and does not occur during operation of the chip itself.

2.4 Conditions

When the trace function or coverage function is enabled, if the time of branch instruction execution to branch to a smaller address overlaps with the time of interrupt acceptance, this phenomenon occurs.

Example: When branching to address (1) that is smaller than (3) in the following branch instruction of (3) and at the same time, accepting an interrupt

```
LOOP:                      ; (1)
        :
        SUB    r3, r4
        BNE    LABEL1          ; (2) (the first branch instruction after (1))
        :
         BNE   LOOP   ; (3)
        :
LABEL1:
        :
```

When this phenomenon occurs, the operation will be as follows.

Function	Operation when this phenomenon occurs
Trace acquisition	The trace information of (1) to (2) (the first branch instruction after (1)) which was not actually executed is displayed additionally before the trace information of the interrupt handler.
Coverage acquisition	It is displayed that all instructions from (1) to (3) have been executed (covered) regardless of the actual execution status.

For trace acquisition, if the same instruction sequence is output to the trace result before and after the interrupt processing execution, it can be determined that this phenomenon may have occurred.

For coverage acquisition, there is no way to determine whether this phenomenon has occurred.

2.5 Workaround

There is no workaround for this problem.

2.6 Schedule for Fixing the Problem

We do not plan to fix the problem.

Revision History

Rev.	Date	Description	
		Page	Summary
1.00	Feb. 16, 2018	-	First edition issued
1.01	Mar. 25,2021	3	Applicable MCUs

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