

[Notes]

R20TS0765EJ0100

Rev.1.00

Oct. 16, 2021

RX Family

Flash Module Using Firmware Integration Technology,

RX Driver Package

Outline

When using the product in the title, note the following point.

- Notes on executing "R_FLASH_Write" on non-blocking mode

1. Notes on executing "R_FLASH_Write" on non-blocking mode

1.1 Applicable Products

- RX Family Flash Module Using Firmware Integration Technology

(Hereafter referred to as the Flash Module)

The applicable revisions and documents are as follows.

Table 1.1 Flash Module applicable products

Revision	Document number
Rev.3.00	R01AN2184EU0300
Rev.3.10	R01AN2184EU0310
Rev.3.20	R01AN2184EU0320
Rev.3.30	R01AN2184EU0330
Rev.3.40	R01AN2184EU0340
Rev.3.41	R01AN2184EU0341
Rev.3.42	R01AN2184EU0342
Rev.3.50	R01AN2184EU0350
Rev.4.00	R01AN2184EJ0400
Rev.4.10	R01AN2184EJ0410
Rev.4.20	R01AN2184EJ0420
Rev.4.30	R01AN2184EJ0430
Rev.4.40	R01AN2184EJ0440
Rev.4.50	R01AN2184EJ0450
Rev.4.60	R01AN2184EJ0460
Rev.4.70	R01AN2184EJ0470
Rev.4.80	R01AN2184EJ0480

(2) RX Driver Package

The Flash Module in (1) is also included in the RX Driver Packages.

The product names, revisions, documents of the RX Driver Packages, and the revisions of the Flash Module are as follows.

Table 1.2 Products that include the Flash Module

RX Driver Package product name	RX Driver Package revision	Document number	Flash Module revision
RX Family RX Driver Package Ver.1.13	Rev.1.13	R01AN3859EJ0113	Rev.3.20
RX Family RX Driver Package Ver.1.14	Rev.1.14	R01AN4191EJ0114	Rev.3.30
RX Family RX Driver Package Ver.1.15	Rev.1.15	R01AN4372EJ0115	Rev.3.30
RX Family RX Driver Package Ver.1.16	Rev.1.16	R01AN4471EJ0116	Rev.3.40
RX Family RX Driver Package Ver.1.17	Rev.1.17	R01AN4572EJ0117	Rev.3.41
RX Family RX Driver Package Ver.1.18	Rev.1.18	R01AN4659EJ0118	Rev.3.42
RX Family RX Driver Package Ver.1.19	Rev.1.19	R01AN4677EJ0119	Rev.3.50
RX Family RX Driver Package Ver.1.20	Rev.1.20	R01AN4794EJ0120	Rev.4.00
RX Family RX Driver Package Ver.1.21	Rev.1.21	R01AN4843EJ0121	Rev.4.10
RX Family RX Driver Package Ver.1.22	Rev.1.22	R01AN4873EJ0122	Rev.4.20
RX Family RX Driver Package Ver.1.23	Rev.1.23	R01AN4976EJ0123	Rev.4.40
RX Family RX Driver Package Ver.1.24	Rev.1.24	R01AN5267EJ0124	Rev.4.40
RX Family RX Driver Package Ver.1.25	Rev.1.25	R01AN5371EJ0125	Rev.4.50
RX Family RX Driver Package Ver.1.26	Rev.1.26	R01AN5401EJ0126	Rev.4.50
RX Family RX Driver Package Ver.1.27	Rev.1.27	R01AN5600EJ0127	Rev.4.60
RX Family RX Driver Package Ver.1.29	Rev.1.29	R01AN5826EJ0129	Rev.4.60
RX Family RX Driver Package Ver.1.30	Rev.1.30	R01AN5882EJ0130	Rev.4.60
RX Family RX Driver Package Ver.1.31	Rev.1.31	R01AN5975EJ0131	Rev.4.70
RX Family RX Driver Package Ver.1.32	Rev.1.32	R01AN6013EJ0132	Rev.4.80

(3) FIT Modules used in combination with Flash Module and their application notes

The problem may occur when certain FIT Modules are used with the Flash Module in (1).

Examples

- RX Family Flash Memory Data Management Module Using Firmware Integration Technology (R20AN0507EJ)
<https://www.renesas.com/jp/en/document/apn/rx-family-flash-memory-data-management-module-using-firmware-integration-technology>
- RX Family Firmware Update Module Using Firmware Integration Technology (R01AN5824EJ)
<https://www.renesas.com/jp/en/document/apn/rx-family-firmware-update-module-using-firmware-integration-technology-application-notes>
- RX Family TSIP (Trusted Secure IP) Module Firmware Integration Technology (R20AN0548EJ)
<https://www.renesas.com/jp/en/document/apn/rx-family-tsip-trusted-secure-ip-module-firmware-integration-technology-binary-version>

1.2 Applicable Devices

RX64M, RX651, RX65N, RX66N, RX66T, and RX671 groups

RX71M, RX72M, RX72N, and RX72T groups

1.3 Details

During the execution of the Flash Module function "R_FLASH_Write", some program commands for the flash sequencer are not completed properly under certain conditions. As the result, the commands are aborted, and the callback function does not send notifications to the user application.

1.4 Conditions

The problem occurs when the following conditions are met.

Condition 1: The Flash Module is set to the non-blocking mode.

Condition 2: The time for processing the specific segment in the main routine gets longer than the programming time. Refer to the code snippets (Segment A) in (1) below.


The following sections show an example of Condition 2, in which an interruption has occurred during the process.

(1) Main routine process

The code snippets show the segment of the main routine process, in which "flash_write" of "r_flash_fcu.c" writes the final program command (D0h), and the current counter variable is set to 0.

If the time between the completion of D0h and the setting of the variable gets longer than the programming time for the flash memory, an FRDY interrupt request interrupts the variable setting.

```
flash_err_t flash_write(uint32_t src_start_address,
                        uint32_t dest_start_address,
                        uint32_t num_bytes)
{
  (Omitted)                                Write the final program command (D0h)
  /* Issue write end command */
  *g_pfcu_cmd_area = (uint8_t) FLASH_FACI_CMD_FINAL;
  -----
  /* Reset fcu write count */
  g_current_parameters.current_count = 0;
  (Omitted)                                Set the current counter variable to 0
```

Segment A 

The codes are expanded by the assembler as follows.

D0h is done in (2).

If an interrupt request occurs during (2) when the one-cycle instruction is executed, and if the interrupt processing time gets longer than the programming time for the flash memory, an FRDY interrupt request occurs, and the current counter variable is not set to 0.

```
(*g_pfcu_cmd_area = (uint8_t) FLASH_FACI_CMD_FINAL;)
(1) mov.l    [r9], r14
(2) mov.b    #208, [r14]
(g_current_parameters.current_count = 0;)
(3) mov.l    #0, 12[r6]
```

(2) FRDY interrupt process

The code snippets show "Excep_FCU_FRDYI" in "r_flash_fcu.c", which is the process in the FRDY interrupt routine.

An FRDY interrupt request has occurred while the current counter variable has not been set to 0 in the main routine. Since the condition in the while statement is not satisfied, some of the program commands in Segment B are not executed, and the processing of the programs is aborted.

```
static void Excep_FCU_FRDYI(void)
{
  (Omitted)
  while (g_current_parameters.current_count++ <
  g_current_parameters.fcu_min_write_cnt)
  {
    /* Copy data from source address to destination area */
    *(FCU_WORD_PTR) g_pfcu_cmd_area = *(uint16_t *)
g_current_parameters.src_addr;
    (Omitted)
  }
  (Omitted)
}
```

Current counter variable is not set to 0

Segment B

1.5 Workaround

Refer to the following and change r_flash_rx~~src~~r_flash_fcu.c as shown in red.

Before modification

```
flash_err_t flash_write(uint32_t src_start_address,
                        uint32_t dest_start_address,
                        uint32_t num_bytes)
{
  (Omitted)
  /* Issue write end command */
  *g_pfcu_cmd_area = (uint8_t) FLASH_FACI_CMD_FINAL;

  /* Reset fcu write count */
  g_current_parameters.current_count = 0;
  (Omitted)
}
```

After modification

```
flash_err_t flash_write(uint32_t src_start_address,
                        uint32_t dest_start_address,
                        uint32_t num_bytes)
{
  (Omitted)
  /* Reset fcu write count */
  g_current_parameters.current_count = 0;

  /* Issue write end command */
  *g_pfcu_cmd_area = (uint8_t) FLASH_FACI_CMD_FINAL;
  (Omitted)
}
```

1.6 Schedule for Fixing the Problem

The problem will be fixed in the next version.

Revision History

Rev.	Date	Description	
		Page	Summary
1.00	Oct.16.21	-	First edition issued

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