

[Notes]

R20TS0552EJ0100

Rev.1.00

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RE Software Development Kit

RE01 1500KB CMSIS Driver Package Rev1.00, Rev1.01

EHC Driver LVD Setting

## Overview

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

1. Wait time until the LVD operation stabilizes in the EHC driver

## 1. Wait Time Until the LVD Operation Stabilizes in the EHC Driver

### 1.1 Applicable Products

The product name, revision number, and document number of the applicable RE01 1500KB group CMSIS Driver Package and the revision number of the included EHC driver is as follows.

Table 1 RE01 1500KB Group CMSIS Driver Package Applicable Products

RE01 1500KB group CMSIS Driver Package Product name	RE01 1500KB Group CMSIS Driver Package revision	Document number	Revision number of the included EHC
RE01 1500KB Group CMSIS Driver Package Rev1.01	Rev.1.01	R01AN5278EJ0101	Rev.1.00
RE01 1500KB Group CMSIS Driver Package Rev1.00	Rev.1.00	R01AN4947EJ0100	Rev.1.00

### 1.2 Applicable Devices

RE01 family: RE01 1500KB group

### 1.3 Details and Conditions

The EHC driver (r\_ehc.c) that is included in the RE01 1500KB Group CMSIS Driver Package uses LVD to detect the charge state of the secondary battery or a drop in VCC voltage. When LVD is enabled, wait time until LVD operation stabilizes is not sufficient.

For this reason, voltage detection by LVD may not work properly, and, as a result, detection of the charge state of the secondary battery and EHC initialization if VCC voltage has dropped may not be performed correctly.

This problem occurs when configuration "SYSTEM\_CFG\_EHC\_MODE" in configuration definition file "r\_core\_cfg.h" is set to 1 (enable EHC start processing).

### 1.4 Workaround

You can avoid this problem by one of the following methods:

- Download the source code to modify the EHC Driver (r\_ehc.c) from the following URL to replace the EHC driver (r\_ehc.c) included in the RE01 1500KB Group CMSIS Driver Package.

<Source Code to Modify EHC Driver in CMSIS Driver Package Rev1.00 and Rev1.01 for RE01 1500KB Group>

[www.renesas.com/us/en/software/D4001304.html](http://www.renesas.com/us/en/software/D4001304.html)

- Modify the source code of the EHC driver (r\_ehc.c) to add software-based wait processing by performing the procedure below.

[Source code modification procedure]

- (1) Add definitions and function declarations.
- (2) Add a software wait function.
- (3) Add branch processing to the software wait function. (2 locations)

The following is an example of source code modification.

[Source code modification example: (1) Add definitions and function declarations]

Location: Around line 80

- Before modification

```

/*-----
-----
* Macro
*-----
---*/

#if defined(__ICCARM__)                /* IAR Compiler */
#define NON_VOLATILE __root           /* */
#define NON_VOLATILE_ATTRIBUTE        /* */
#elif defined(__GNUC__)               /* GCC Compiler */
#define NON_VOLATILE                 /* */
#define NON_VOLATILE_ATTRIBUTE       __attribute__((__used__)) /* */
#else
#error "That compiler is not supported in this release."
#endif

/*-----
-----
* Private global variables and functions
*-----
---*/

NON_VOLATILE static void ehc_Startup_ramfunc(void) __attribute__
((section(".ehc_ramfunc"))) NON_VOLATILE_ATTRIBUTE; /* */

void r_ehc_Startup(void);              /* */

NON_VOLATILE void NMI_Handler( void ) __attribute__
((section(".ehc_ramfunc"))) NON_VOLATILE_ATTRIBUTE; /* */

NON_VOLATILE void IEL1_IRQHandler_EHC( void ) __attribute__
((section(".ehc_ramfunc"))) NON_VOLATILE_ATTRIBUTE; /* */

```

• After modification

```

/*-----
-----
* Macro
*-----
---*/

#if defined(__ICCARM__)                /* IAR Compiler */
#define NON_VOLATILE __root            /* */
#define NON_VOLATILE_ATTRIBUTE        /* */
#define STACKLESS_ATTRIBUTE    __stackless
#elif defined(__GNUC__)                /* GCC Compiler */
#define NON_VOLATILE                  /* */
#define NON_VOLATILE_ATTRIBUTE    __attribute__((used)) /* */
#define STACKLESS_ATTRIBUTE    __attribute__((naked))
#else
#error "That compiler is not supported in this release."
#endif

/* Delay count for LVD stabilization. */
#define LVD_STABILIZAION_DELAY_MOCO    (300U)
#define LVD_STABILIZAION_DELAY_LOCO    (5U)

/*-----
-----
* Private global variables and functions
*-----
---*/

NON_VOLATILE static void ehc_Startup_ramfunc(void) __attribute__
((section(".ehc_ramfunc"))) NON_VOLATILE_ATTRIBUTE; /* */

void r_ehc_Startup(void); /* */

NON_VOLATILE void NMI_Handler( void ) __attribute__
((section(".ehc_ramfunc"))) NON_VOLATILE_ATTRIBUTE; /* */

NON_VOLATILE void IEL1_IRQHandler_EHC( void ) __attribute__
((section(".ehc_ramfunc"))) NON_VOLATILE_ATTRIBUTE; /* */

NON_VOLATILE STACKLESS_ATTRIBUTE static void
ehc_software_delay_loop(uint32_t loop_cnt) __attribute__
((section(".ehc_ramfunc"))) NON_VOLATILE_ATTRIBUTE; /* */

```

[Source code modification example: (2) Add a software wait function]

Add the following function.

Location: Around line 1100

Function name: ehc\_software\_delay\_loop

```

#if defined(__ICCARM__)          /* IAR Compiler */
#pragma location = ".ehc_ramfunc"
#endif

/* Function Name : ehc_software_delay_loop */
NON_VOLATILE STACKLESS_ATTRIBUTE static void
ehc_software_delay_loop(uint32_t loop_cnt)
{
    __asm volatile ("ehc_sw_delay_loop:    ¥n"

#if defined(__ICCARM__)
        "    subs r0, #1          ¥n"    ///< 1 cycle
#elif defined(__GNUC__)
        "    sub r0, r0, #1      ¥n"    ///< 1 cycle
#endif

        "    cmp r0, #0         ¥n"    ///< 1 cycle
/* CM0 has a different instruction set */
#ifdef __CORE_CM0PLUS_H_GENERIC
        "    bne ehc_sw_delay_loop ¥n" ///< 2 cycles
#else
        "    bne.n ehc_sw_delay_loop ¥n" ///< 2 cycles
#endif

        "    bx lr              ¥n");  ///< 2 cycles

} /* End of function ehc_software_delay_loop() */

```

[Source code modification example:(3) Add branch processing to the software wait function (1/2)]

Location: Around line 270

Function name: r\_ehc\_Startup

· Before modification

```

/*-----
-----
* Set the LVD1 circuit monitor enable
* LVCMPCR register
*   b6 : [ LVDBATE] Power status selection
*           - [0] LVDVBAT circuit monitor disable
*   b5 : [  LVD1E] Power status selection
*           - [1] LVD1 circuit monitor enable
*-----
---*/
SYSTEM->LVCMPCR = 0x20U;    /* SYSTEM->LVCMPCR_b.LVD1E   = 1U; *
                          * SYSTEM->LVCMPCR_b.LVDBATE = 0U; */

/*-----
-----
* Set the LVD1 circuit monitor control register 1
* LVD1CR1 register
* b1-b0 : [ IDTSEL] Select the condition under which the interrupt
occurs
*           - [01] VCC < Vdet1 select
*   b2 : [  IRQSEL] Selection of interrupt type
*           - [0] NMI interrupt select
*-----
---*/
SYSTEM->LVD1CR1 = 0x01U;    /* SYSTEM->LVD1CR1_b.IDTSEL = 1U; *
                          * SYSTEM->LVD1CR1_b.IRQSEL  = 0U; */

```

• After modification

```

/*-----
-----
* Set the LVD1 circuit monitor enable
* LVCMPCR register
*   b6 : [ LVDBATE] Power status selection
*           - [0] LVDVBAT circuit monitor disable
*   b5 : [  LVD1E] Power status selection
*           - [1] LVD1 circuit monitor enable
*-----
---*/

SYSTEM->LVCMPCR = 0x20U;    /* SYSTEM->LVCMPCR_b.LVD1E   = 1U; *
                          * SYSTEM->LVCMPCR_b.LVDBATE = 0U; */

/*-----
-----
* Wait LVD1 stabilization (System clock source : MOCO)
*-----
---*/

ehc_software_delay_loop(LVD_STABILIZAION_DELAY_MOCO);

/*-----
-----
* Set the LVD1 circuit monitor control register 1
* LVD1CR1 register
* b1-b0 : [ IDTSEL] Select the condition under which the interrupt
occurs
*           - [01] VCC < Vdet1 select
*   b2 : [  IRQSEL] Selection of interrupt type
*           - [0] NMI interrupt select
*-----
---*/

SYSTEM->LVD1CR1 = 0x01U;    /* SYSTEM->LVD1CR1_b.IDTSEL = 1U; *
                          * SYSTEM->LVD1CR1_b.IRQSEL = 0U; */

```

[Source code modification example: (3) Add branch processing to the software wait function (2/2)]

Location: Around line 770

Function name: ehc\_Startup\_ramfunc

• Before modification

```

/*-----
-----
* Set the LVD1 circuit monitor enable
* LVCMPCR register
*   b6 : [ LVDBATE] Power status selection
*           - [1] LVDVBAT circuit monitor enable
*-----
---*/
SYSTEM->LVCMPCR_b.LVDBATE = 1U;

/*-----
-----
* Set the LVDBAT circuit monitor control register 1
* VDBATCR1 register
* b1-b0 : [ IDTSEL] Select the condition under which the interrupt
occurs
*           - [00] VBAT_EHC >= VdetBAT select
*   b2 : [ IRQSEL] Selection of interrupt type
*           - [1] Masqaple interrupt select
*-----
---*/
SYSTEM->LVDBATCR1 = 0x04; /* SYSTEM->LVDBATCR1_b.IDTSEL = 0U; *
                        * SYSTEM->LVDBATCR1_b.IRQSEL = 1U; */

```



• After modification

```

/*-----
-----
* Set the LVD1 circuit monitor enable
* LVCMPCR register
*   b6 : [ LVDBATE] Power status selection
*           - [1] LVDVBAT circuit monitor enable
*-----
---*/
SYSTEM->LVCMPCR_b.LVDBATE = 1U;

/*-----
-----
* Wait LVDBAT stabilization (System clock source : LOCO)
*-----
---*/
ehc_software_delay_loop(LVD_STABILIZAION_DELAY_LOCO);

/*-----
-----
* Set the LVDBAT circuit monitor control register 1
* VDBATCR1 register
* b1-b0 : [ IDTSEL] Select the condition under which the interrupt
occurs
*           - [00] VBAT_EHC >= VdetBAT select
*   b2 : [ IRQSEL] Selection of interrupt type
*           - [1] Masqaple interrupt select
*-----
---*/
SYSTEM->LVDBATCR1 = 0x04; /* SYSTEM->LVDBATCR1_b.IDTSEL = 0U; *
                        * SYSTEM->LVDBATCR1_b.IRQSEL = 1U; */

```

1.5 Schedule for Fixing the Problem

This problem will be fixed in the next version. (Scheduled to be released in May 2020.)

**Revision History**

Rev.	Date	Description	
		Page	Summary
1.00	Feb.16.20	-	First edition issued

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