[Notes]
e^2 studio Smart Configurator Plug-in,
Smart Configurator for RX

R20TS0920ES0100
Rev.1.00
Feb.01, 2023

Outline

When using the products in the title, note the following points.

1. When using DA component to provide reference input voltage for Comparator component

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1.1 Applicable Products

- e^2 studio 7.2 (Smart Configurator Plug-in V1.5.0) or later
- Smart Configurator for RX V1.5.0 or later

1.2 Applicable Devices

- RX family: RX13T, RX23T, RX24T(U), RX66T, RX72T

1.3 Details

When using DA component to provide the reference voltage for Comparator component, there is a possibility that the Comparator output result is wrong at the beginning (use case as **Figure 1.1**) due to the two problems as below:

(1) The Comparator operation is enabled before DA converter starts the conversion.

(Comparator operation should be enabled after DA converter starts the conversion.)

(2) There is not enough waiting time for the DA conversion before enabling the Comparator output.

```
void main(void)
{
   R_Config_DA0_Start();
   R_Config_CMPC0_Start();
}
```

Figure 1.1: Use case for using DA0 output as the reference voltage for Comparator 0

1.4 Condition

Below are the steps to reproduce the issue:

(1) Creating Smart configurator project on the affected device (e.g., R5F566TAAxFF).

(2) Add DA component from the software component page.

(3) Configure the DA0 as the reference voltage for Comparator (see **Figure 1.2**).

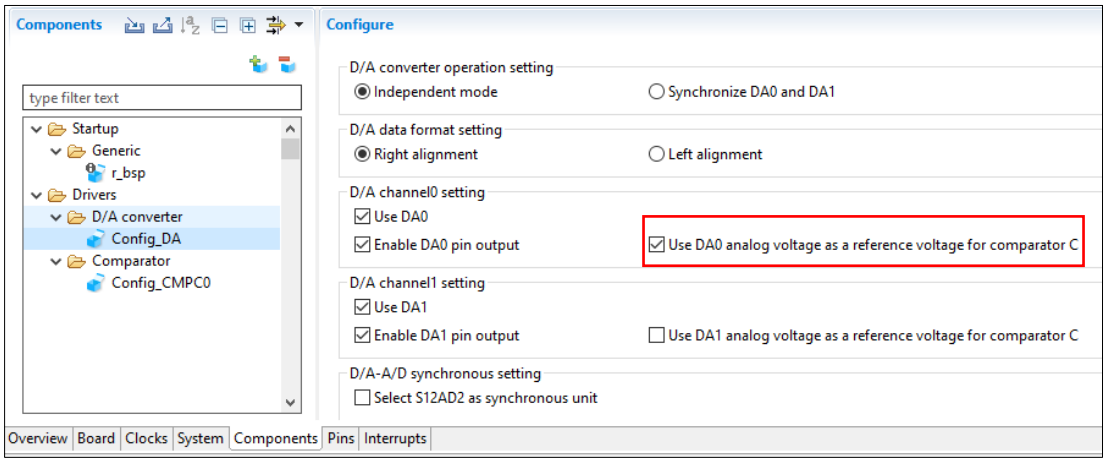

Figure 1.2: Configuring the DA0 voltage as the reference voltage for Comparator on DA GUI

(4) Add Comparator component (channel 0) from the software component page.

(5) Set the “Reference input voltage select” setting to “On-chip D/A converter 0” (see **Figure 1.3**).

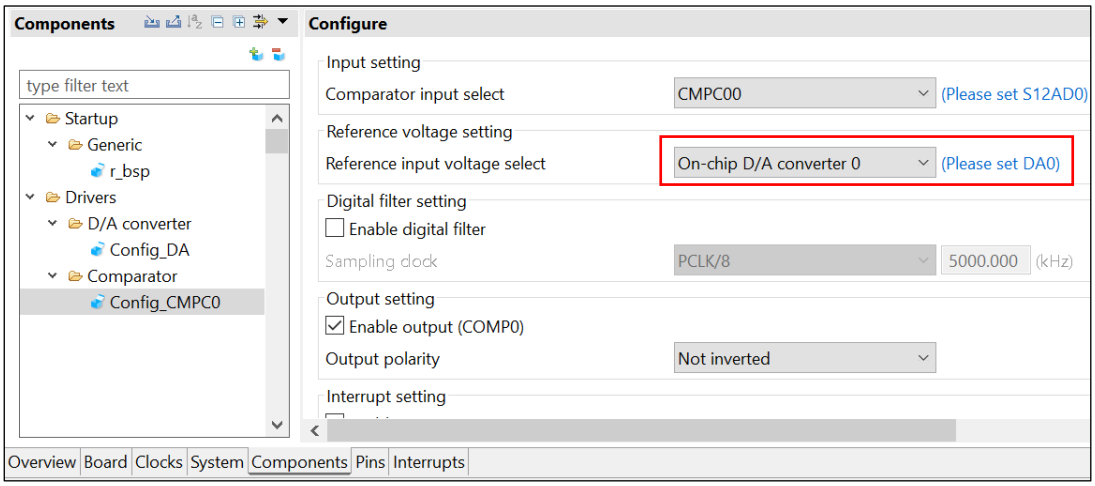

Figure 1.3: Configuring reference input voltage to “On-chip D/A converter 0” on Comparator GUI

(6) Click “Generate Code” button to generate codes for DA component and Comparator component configuration.

(7) Observe the generated code in “R_Config_CMPC0_Create()” API in the file “Config_CMPC.c” file. The Comparator operation is enabled in this initialization API instead of the “R_Config_CMPC0_Start()” API (see **Figure 1.4**).

```
void R_Config_CMPC0_Create(void)
{
    uint16_t w_count;

    /* Cancel CMPC stop state in LPC */
    MSTP(CMPC) = 0U;
    ……
    /* Enable comparator C0 operation */
    CMPC0.CMPCTL.BIT.HCMPON = 1U;

    /* Waiting for comparator stabilization time, 1us */
    for (w_count = 0U; w_count < _0021_CMPC_WAIT_CYCLE; w_count++)
    {
        nop();
    }
    ……
    R_Config_CMPC0_Create_UserInit();
}
```

Figure 1.4: Comparator operation enable setting in the initialization API

(8) Observe the generated code in "R_Config_DA_Start()", there is no waiting time after starting the DA operation (**Figure 1.5**) when configuring DA output voltage as the Comparator reference voltage.

```
void R_Config_DA0_Start(void)
{
    DA.DADR0 = 0x0000U;
    DA.DADSELR.BIT.OUTDA0 = 1U;
    DA.DADSELR.BIT.OUTREF0 = 1U;
    DA.DACR.BIT.DAE = 0U;
    DA.DACR.BIT.DAOE0 = 1U;
}
```

No waiting time (3 µs) is added after starting the DA conversion when configuring its output as reference voltage for Comparator

Figure 1.5: DA start operation setting in "R_Config_DA_Start()" API

1.5 Workaround

Please add waiting time (minimum 3 µs) after calling DA start API and before calling the Comparator start API as below. The 3 µs setting value is counted out based on default ICLK frequency (160 MHz) for RX66T, please re-calculate when other ICLK frequency is used.

```
void main(void)
{
   uint16_t w_count;

   R_Config_DA0_Start();

   /* Waiting for DA0 conversion completion, 3 µs */
   for (w_count = 0U; w_count < 0x63; w_count++)
   {
       nop();
   }

   R_Config_CMPC0_Start();
}
```

1.6 Schedule for Fixing the Problem

This problem will be fixed in the following versions.

- e² studio 2023-04
- Smart Configurator for RX V2.17.0 (April 2023)

Revision History

Rev.	Date	Description	
		Page	Summary
1.00	Feb.01.23	-	First edition issued

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