

[Notes]

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e² studio Smart Configurator Plug-in, Smart Configurator for RX

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

- e² 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**).

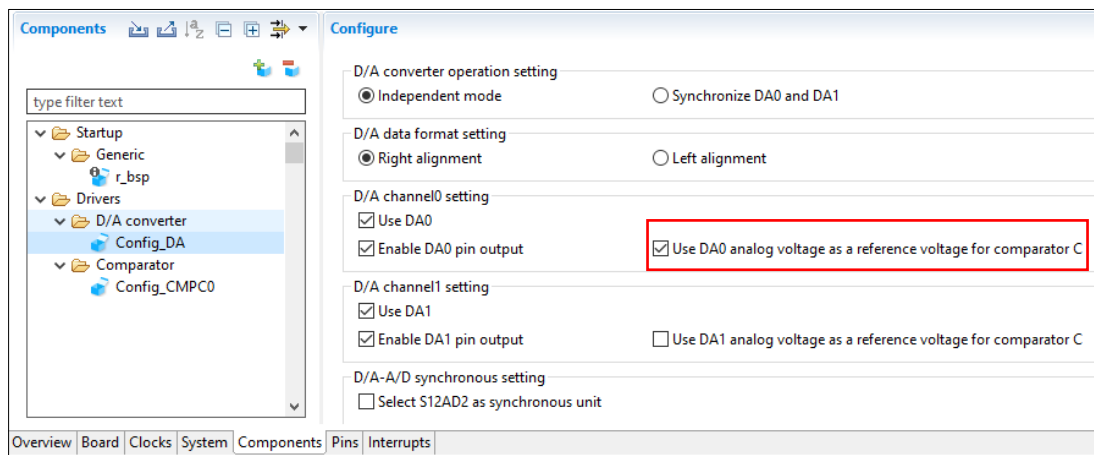


Figure 1.2: Configuring the DA0 voltage as the reference voltage for Comparator on DA GUI

- (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**).

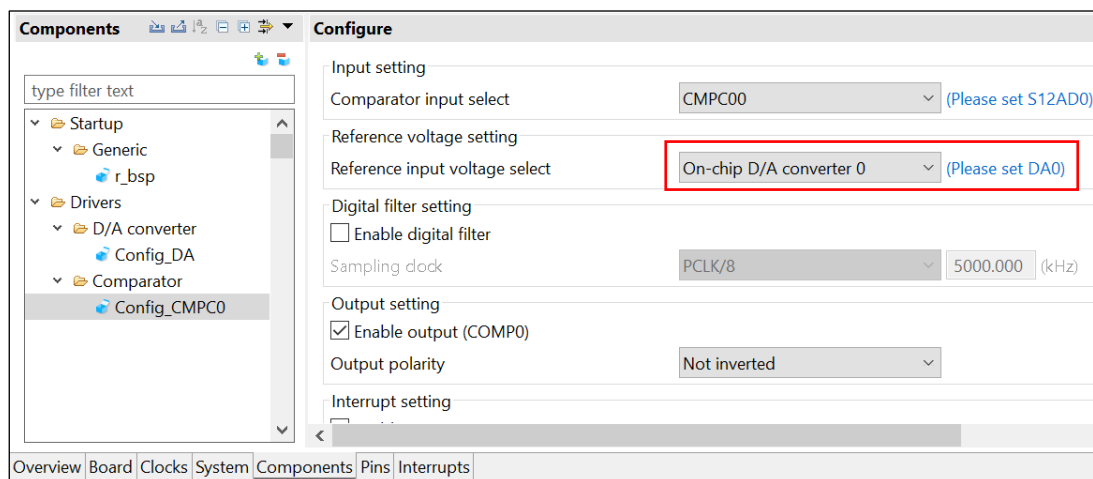


Figure 1.3: Configuring reference input voltage to “On-chip D/A converter 0” on Comparator GUI

- (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 = 0x00000U;
    DA.DADSELR.BIT.OUTDA0 = 1U;
    DA.DADSELR.BIT.OUTREF0 = 1U;
    DA.DACR.BIT.DAE = 0U;
    DA.DACR.BIT.DAOE0 = 1U;
}
```

No waiting time (3 μ s) 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 μ s) after calling DA start API and before calling the Comparator start API as below. The 3 μ s 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  $\mu$ s */
    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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