

# Smart Configurator for RISC-V MCU Plug-in in e<sup>2</sup> studio 2024-07

## Smart Configurator for RISC-V MCU V1.2.0

### Release Note

#### Introduction

Thank you for using the Smart Configurator for RISC-V MCU.

This document describes the restrictions and points for caution. Read this document before using the product.

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## 1. Introduction

Smart Configurator is a utility for combining software to meet your needs. It supports the following three functions related to the embedding of Renesas drivers in your systems: importing middleware, generating driver code, and setting pins.

Smart Configurator for RISC-V MCU V1.2.0 is equivalent to Smart Configurator for RISC-V MCU Plug-in in e<sup>2</sup> studio 2024-07 Smart Configurator for RISC-V MCU V1.2.0.

### 1.1 System Requirements

The operating environment is as follows.

#### 1.1.1 Windows PC

- System: x64/x86 based processor  
Windows® 11  
Windows® 10 (64-bit version)  
Windows® 8.1 (64-bit version)
- Memory capacity: We recommend 4 GB or more.
- Capacity of hard disk: At least 300 MB of free space.
- Display: Graphics resolution should be at least 1024 x 768, and the mode should display at least 65,536 colors.
- Processor: 1 GHz or higher (must support hyper-threading, multi-core CPUs)

#### 1.1.2 Linux PC

Smart Configurator for RISC-V MCU plug-in in e<sup>2</sup> studio 2024-07 or later is supported on Linux OS.

- System: x64 based processor, 2 GHz or faster (with multicore CPUs)  
Ubuntu 22.04 LTS Desktop (64-bit version)  
Ubuntu 20.04 LTS Desktop (64-bit version)
- Memory capacity: We recommend 2 GB or more.
- Capacity of hard disk: At least 2 GB of free space.

#### 1.1.3 Development Environments

- Windows  
LLVM for Renesas RISC-V 17.0.2.202401 or later  
IAR Embedded Workbench for RISC-V 3.30.1 or later  
SEGGER Embedded Studio for RISC-V 8.10 or later
- Linux  
LLVM for Renesas RISC-V 17.0.2.202406 or later  
IAR bxriscv-3.30.1 or later  
SEGGER Embedded Studio 8for RISC-V 8.12a or later

## 2. Support List

### 2.1 Support Devices List

Below is a list of devices supported by the Smart Configurator for RISC-V MCU Plug-in in e<sup>2</sup> studio 2024-07 Smart Configurator for RISC-V MCU V1.2.0.

**Table 2-1 Support Devices**

| Group<br>(HW Manual number)            | PIN   | Device name   |
|----------------------------------------|-------|---------------|
| RISC-V/G021 Group<br>(R01UH1036EJ0110) | 16pin | R9A02G0214CBY |
|                                        | 24pin | R9A02G0214CNK |
|                                        | 32pin | R9A02G0214CNH |
|                                        | 48pin | R9A02G0214CNE |

### 2.2 Support Components List

Below is a list of Components supported by the Smart Configurator for RISC-V MCU Plug-in in e<sup>2</sup> studio 2024-07 Smart Configurator for RISC-V MCU V1.2.0.

**Table 2-2 Support Components**

✓: Support (\*), -: Non-support

| No | Components                                     | Mode                   | G021 | Remarks |
|----|------------------------------------------------|------------------------|------|---------|
| 1  | A/D Converter                                  | -                      | ✓    |         |
| 2  | Comparator                                     | -                      | ✓    |         |
| 3  | D/A Converter                                  | -                      | ✓    |         |
| 4  | Data Transfer Controller                       | -                      | ✓    |         |
| 5  | Delay Counter                                  | -                      | ✓    |         |
| 6  | Divider Function                               | -                      | ✓    |         |
| 7  | Event Link Controller                          | -                      | ✓    |         |
| 8  | External Event Counter                         | -                      | ✓    |         |
| 9  | IIC Communication (Master mode)                | -                      | ✓    |         |
| 10 | IIC Communication (Slave mode)                 | -                      | ✓    |         |
| 11 | Input Pulse Interval/Period Measurement        | -                      | ✓    |         |
| 12 | Input Signal High-/Low-Level Width Measurement | -                      | ✓    |         |
| 13 | Interrupt Controller                           | -                      | ✓    |         |
| 14 | Interval Timer                                 | 8 bit count mode       | ✓    |         |
|    |                                                | 16 bit count mode      | ✓    |         |
|    |                                                | 16 bit capture mode    | ✓    |         |
|    |                                                | 32 bit count mode      | ✓    |         |
| 15 | Key Interrupt                                  | -                      | ✓    |         |
| 16 | One-Shot Pulse Output                          | -                      | ✓    |         |
| 17 | Ports                                          | -                      | ✓    |         |
| 18 | PWM Output                                     | -                      | ✓    |         |
| 19 | Real-Time Clock                                | -                      | ✓    |         |
| 20 | Remote Control Signal Receiver                 | -                      | ✓    |         |
| 21 | Simple SPI Communication                       | Transmission           | ✓    |         |
|    |                                                | Reception              | ✓    |         |
|    |                                                | Transmission/reception | ✓    |         |
| 22 | Square Wave Output                             | -                      | ✓    |         |
| 23 | UART Communication                             | Transmission           | ✓    |         |
|    |                                                | Reception              | ✓    |         |
|    |                                                | Transmission/reception | ✓    |         |
| 24 | Voltage Detector                               | -                      | ✓    |         |
| 25 | Watchdog Timer                                 | -                      | ✓    |         |

## 2.3 New support

### 2.3.1 BSP (Board Support Package) revision update

BSP rev1.20 is supported and will be added as default BSP when creating Smart Configurator project.

### 2.3.2 Linux host OS support

From this version, Linux host has been supported.

- For stand-alone version, user can start Smart Configurator for RISC-V as below steps.
- 1) Download stand-alone Smart Configurator for RISC-V package: SmartConfigurator\_for\_RISC-V\_MCU\_V1\_2\_0.tar.gz from Renesas web and extract to local folder.
  - 2) Go to extracted folder .\$/DIR/eclipse and run SmartConfigurator

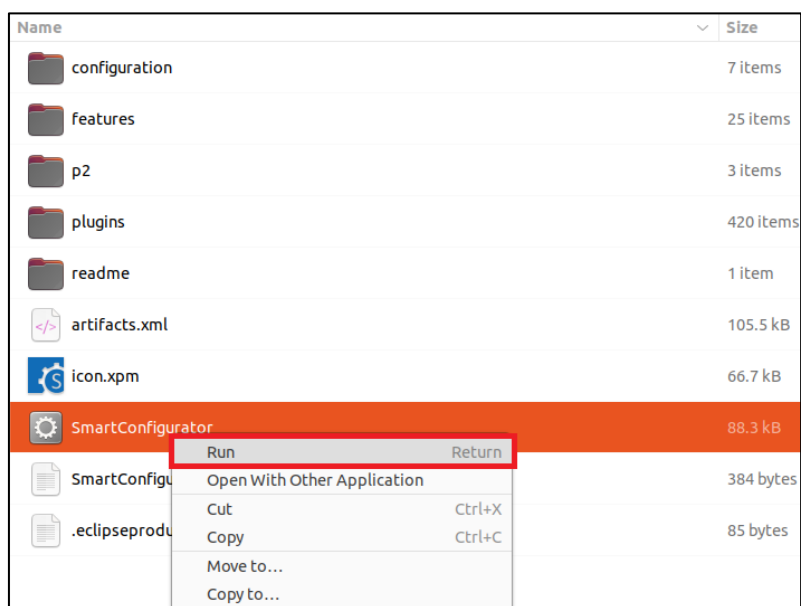


Figure 2-1 Run SmartConfigurator

- 3) Create Smart Configurator project and start to use

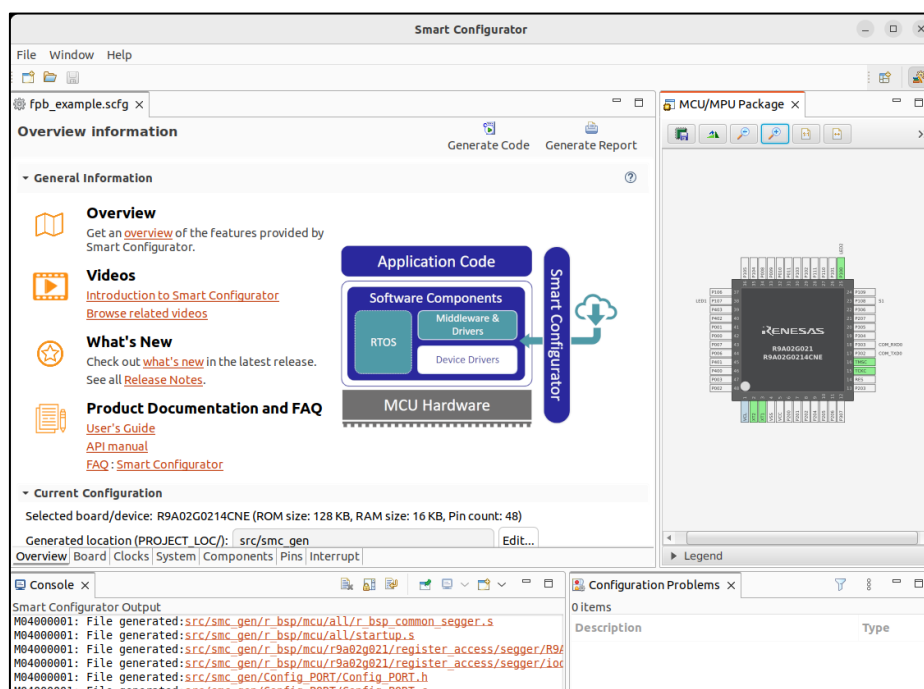


Figure 2-2 Stand-alone SmartConfigurator started

- For e<sup>2</sup> studio Smart Configurator plugin version, user can start Smart Configurator for RISC-V as below steps.
- Run e<sup>2</sup> studio under installation directory: `/home/sc/.local/share/renesas/e2_studio`

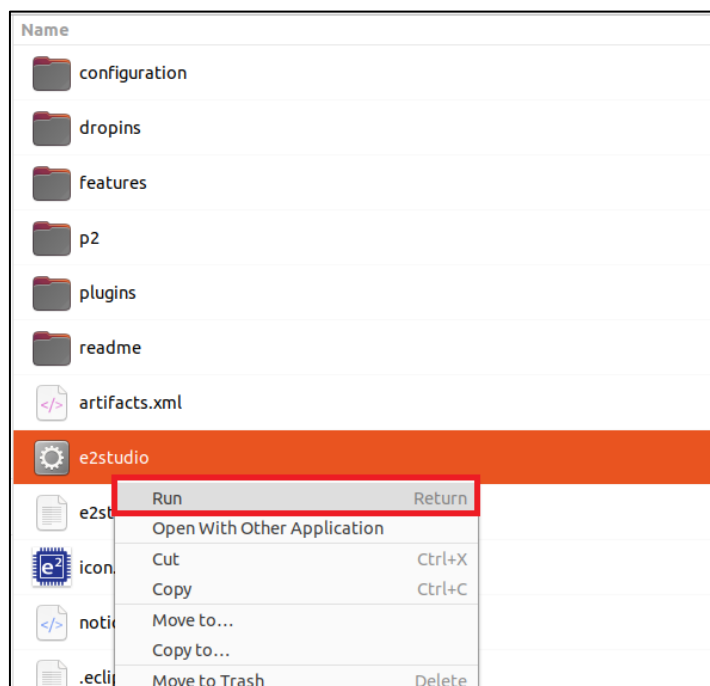


Figure 2-3 Run e<sup>2</sup> studio

- Create new project with Renesas RISC-V MCU and select Smart Configurator in project wizard, after project created, Smart Configurator will be started.

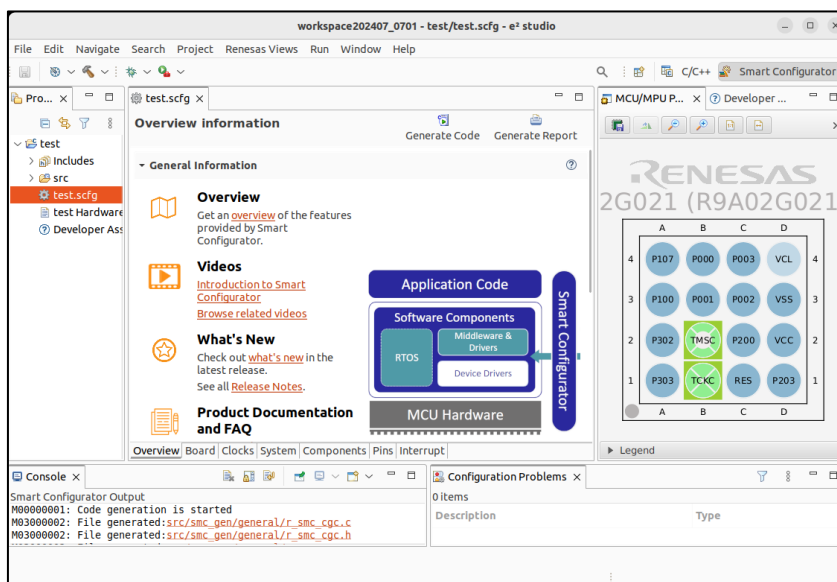
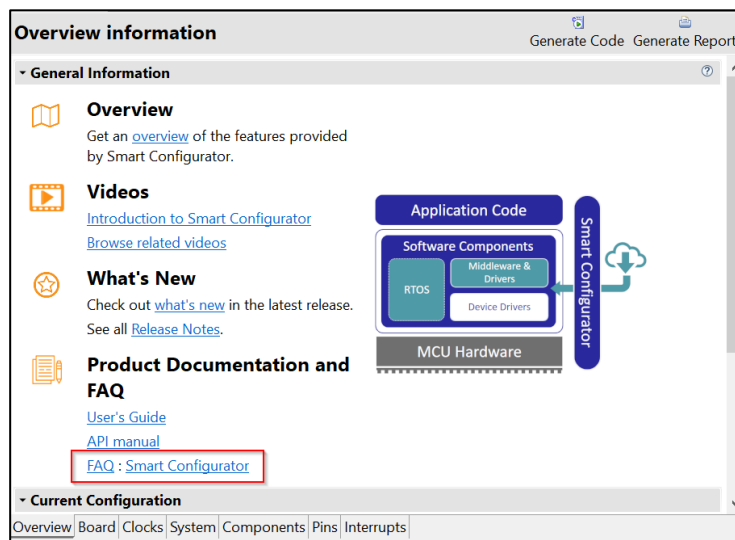


Figure 2-4 Smart Configurator started

### 2.3.3 Access FAQ from Overview tab

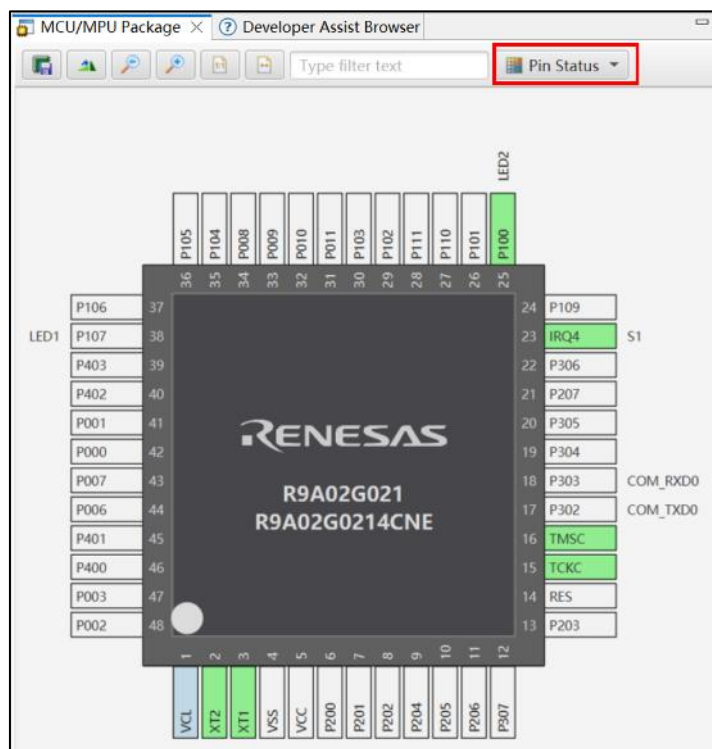
From this version, FAQ can be accessed from Overview tab.



**Figure 2-5 FAQ link at Overview tab**

### 2.3.4 Simplify MCU/MPU Package view

From this version, when using QFP device, MCU/MPU Package view is simplified to remove outer pad by default for easy recognition of user changes.



**Figure 2-6 MCU/MPU Package view with outer pad setting**

2.3.5 Support My Renesas login within Smart Configurator standalone

From this version, users can login My Renesas within Smart Configurator and download SIS modules.

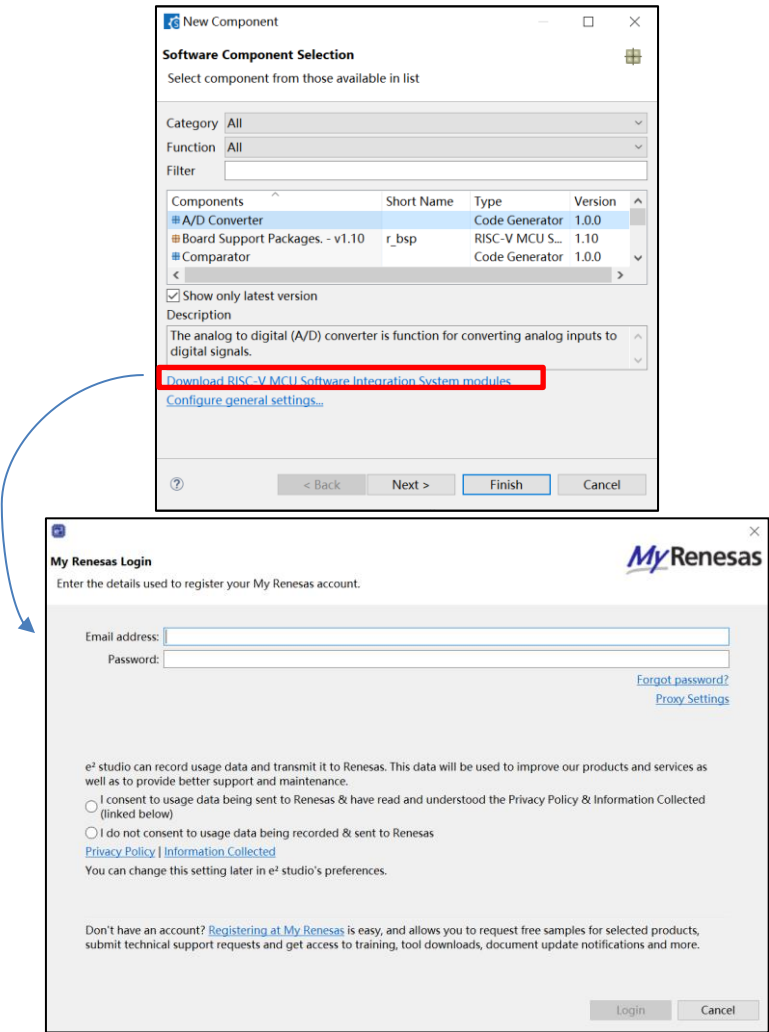


Figure 2-7 My Renesas log from Smart Configurator standalone

Note: Due to some SIS modules don't support IAR/SEGGER toolchain, so they will not be shown in components list when user selected IAR/SEGGER toolchain project.



### 3. Changes

This chapter describes changes to the Smart Configurator for RISC-V MCU V1.2.0.

#### 3.1 Correction of issues/limitations

**Table 3-1 List of Correction of issues/limitations**

✓ : Applicable, -: Not Applicable

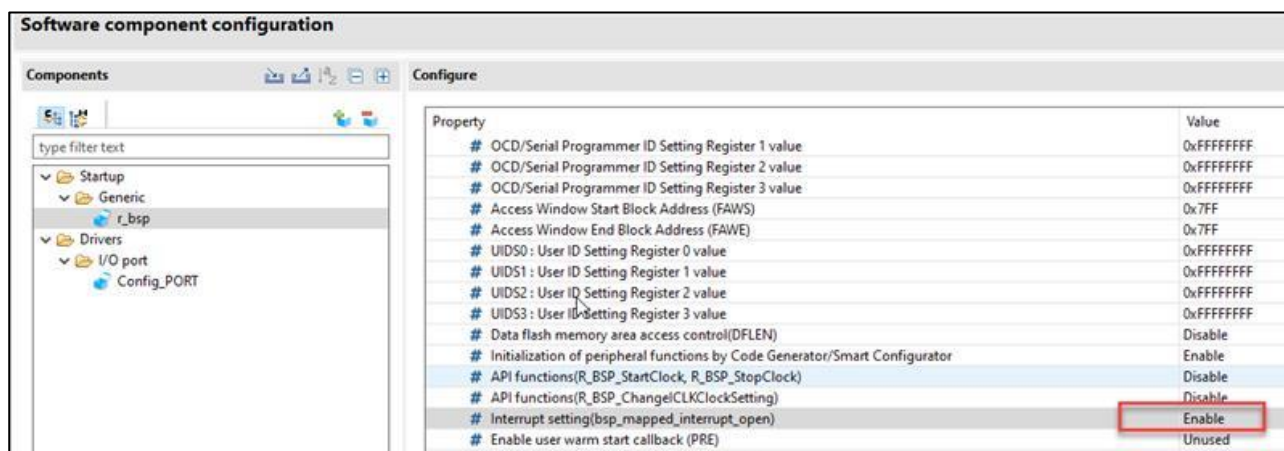
| No | Description                                                                             | G021 | Remarks |
|----|-----------------------------------------------------------------------------------------|------|---------|
| 1  | Fixed the build error in mcu_mapped_interrupts.c                                        | ✓    |         |
| 2  | Fixed the issue of developer assistance R_Config_IICA1_Master_Send has wrong parameters | ✓    |         |
| 3  | Fixed the issue of the core options in SEGGER Embedded Studio project                   | ✓    |         |
| 4  | Fixed the issue of the description of KEY_INTKR in interrupt page                       | ✓    |         |

#### 3.2 Details of Changes

##### 3.2.1 Fixed the build error in mcu\_mapped\_interrupts.c

When enabling the [Interrupt setting(bsp\_mapped\_interrupt\_open)] in r\_bsp, there will be build errors in mcu\_mapped\_interrupts.c:

This issue has been fixed in this version.



**Figure 3-1 Enable the [Interrupt setting(bsp\_mapped\_interrupt\_open)]**

##### 3.2.2 Fixed the issue of developer assistance R\_Config\_IICA1\_Master\_Send has wrong parameters

When using the developer assistance function, for IICA Master\_Send and Master\_Receive function, after drag, the parameters are wrong.

This issue has been fixed in this version.

##### 3.2.3 Fixed the issue of the core options in SEGGER Embedded Studio project

When using SEGGER toolchain, the following options default vales have been changed:

- 1) RISC-V ISA Zba Extension: is "Yes".
- 2) RISC-V ISA Zbb Extension: is "Yes".

3) RISC-V ISA Zbs Extension: is “Yes”.

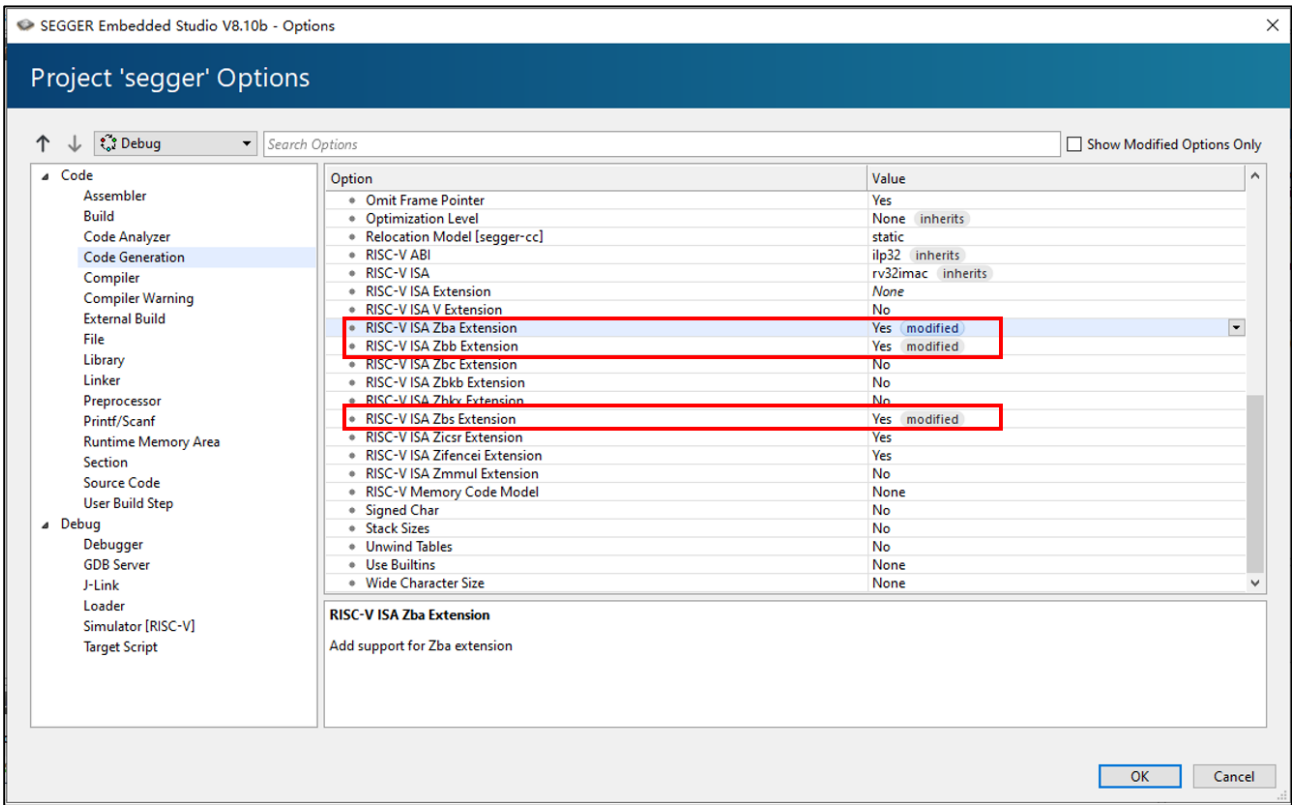


Figure 3-2 Change the Zba/Zbb/Zbs Extension options

3.2.4 Fixed the issue of the description of KEY\_INTKR in interrupt page

Add the description of KEY\_INTKR interrupt in interrupt page.

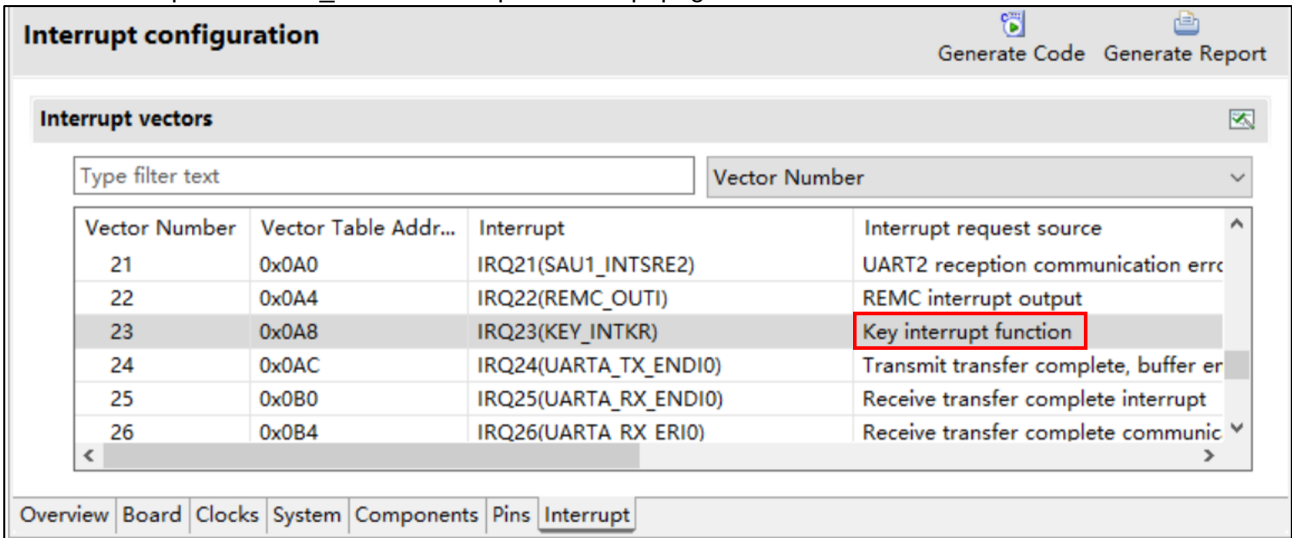


Figure 3-3 KEY\_INTKR interrupt description

### 3.3 Specification changes

Table 3-2 List of Correction of issues/limitations

✓: Applicable, -: Not Applicable

| No | Description                                                                                   | G021 | Remarks |
|----|-----------------------------------------------------------------------------------------------|------|---------|
| 1  | Improvement for changing blinky frequency for Blinky sample project                           | ✓    |         |
| 2  | Improvement for port initialization sequence for I2C to remove glitch on the I2C SDA/SCL line | ✓    |         |
| 3  | Improvement for adding common functions node for developer assistance function                | ✓    |         |
| 4  | Improvement for adding a new interrupt vector routine for NMI interrupt                       | ✓    |         |
| 5  | Improvement for removing PMR setting for ICU pins                                             | ✓    |         |

#### 3.3.1 Improvement for changing blinky frequency for Blinky sample project

From this version, Blinky sample project is improved to detect if selected board has switch, users can use switch to change blinky frequency.

```
#include "r_smc_entry.h"

volatile uint32_t blinkDelay = 1000; // Initial blink delay of 1s

int main(void);

int main(void)
{
    /* Start SW Interrupt */
    R_Config_ICU_IRQ4_Start();

    while(1)
    {
        /* Toggle LED status */
        PIN_WRITE(LED2) = ~PIN_READ(LED2);

        /* Delay blinkDelay milliseconds before returning */
    }
}
```

Figure 3-4 Create new project in Smart Configurator

#### 3.3.2 Improvement for port initialization sequence for I2C to remove glitch on the I2C SDA/SCL line

From this version, port initialization sequence has been changed for I2C to remove glitch on the I2C SDA/SCL line.

Remove PODR setting, move NCODR, PMR, PSEL settings after IICE = 1.

```

/* Function Name: R_Config_IICAI_Create */
void R_Config_IICAI_Create(void)
{
    R_MSTP->MSTPCRB.b.MSTPB8 = 0; /* cancel the module-stop state */
    R_IICA->IICCTL10.b.IICE = 0; /* Mask channel interrupt */
    R_CLIC->cllicintie20.b.IE = 0; /* disable IICAI_ENDI interrupt */
    R_ICU->IELSR1 &= 0xFFFFFFF0; /* clear IICAI_ENDI interrupt flag */
    /* Set channel interrupt */
    R_CLIC->cllicintet120 = _OF_INT_PRIORITY_15; /* set IICAI_ENDI interrupt level 15 priority */
    R_CLIC->cllicintat20 = _C3_INT_VECTOR_MODE; /* set IICAI_ENDI interrupt to vector mode */
    R_ICU->IELSR1 &= 0xFFFFFFF0; /* set value of IICAI_ENDI interrupt event selection */
    /* Set SDAAI pin */
    R_PFS->P01PPFS.b.NCODR = 1;
    R_PFS->P01PPFS.b.PMR = 0;
    R_PFS->P01PPFS.b.PSEL = 0x07U;
    R_PFS->P01PPFS.b.POR = 1;
    R_PFS->P01PPFS.b.PDR = 0;
    /* Set SDAAI pin */
    R_PFS->P01PPFS.b.NCODR = 1;
    R_PFS->P01PPFS.b.PMR = 0;
    R_PFS->P01PPFS.b.PSEL = 0x07U;
    R_PFS->P01PPFS.b.POR = 1;
    R_PFS->P01PPFS.b.PDR = 0;
    R_IICA->IICCTL11.b.SMC = 0;
    R_IICA->IICGHI1 = 4C_IICAI_IICGH_VALUE;
    R_IICA->IICGHI1 = 55_IICAI_IICGH_VALUE;
    R_IICA->IICCTL11 |= 01_IICAI_PCLKB_HALF;
    R_IICA->SVA1 = 10_IICAI_MASTERADDRESS;
    R_IICA->IICF1.b.STCEN = 1;
    R_IICA->IICF1.b.IICRSV = 1;
    R_IICA->IICCTL10.b.SPIE = 0;
    R_IICA->IICCTL10.b.WTDN = 1;
    R_IICA->IICCTL10.b.ACKE = 1;
    R_CLIC->cllicintie20.b.IE = 1;
    R_IICA->IICCTL10.b.IICE = 1;
    R_IICA->IICCTL10.b.LREL = 1;
    /* Set SDAAI pin */
    R_PFS->P01PPFS.b.PDR = 1;
    /* Set SDAAI pin */
    R_PFS->P01PPFS.b.PDR = 1;
    R_Config_IICAI_Create_UserInit();
}

```

Before

```

/* Function Name: R_Config_IICAI_Create */
void R_Config_IICAI_Create(void)
{
    R_MSTP->MSTPCRB.b.MSTPB8 = 0; /* cancel the module-stop state */
    R_IICA->IICCTL10.b.IICE = 0; /* Mask channel interrupt */
    R_CLIC->cllicintie20.b.IE = 0; /* disable IICAI_ENDI interrupt */
    R_ICU->IELSR1 &= 0xFFFFFFF0; /* clear IICAI_ENDI interrupt flag */
    /* Set channel interrupt */
    R_CLIC->cllicintet120 = _OF_INT_PRIORITY_15; /* set IICAI_ENDI interrupt level 15 priority */
    R_CLIC->cllicintat20 = _C3_INT_VECTOR_MODE; /* set IICAI_ENDI interrupt to vector mode */
    R_ICU->IELSR1 &= 0xFFFFFFF0; /* set value of IICAI_ENDI interrupt event selection */
    /* Set SDAAI pin */
    R_PFS->P01PPFS.b.NCODR = 1;
    R_PFS->P01PPFS.b.PMR = 0;
    R_PFS->P01PPFS.b.PSEL = 0x07U;
    R_PFS->P01PPFS.b.POR = 1;
    R_PFS->P01PPFS.b.PDR = 1;
    /* Set SDAAI pin */
    R_PFS->P01PPFS.b.NCODR = 1;
    R_PFS->P01PPFS.b.PMR = 0;
    R_PFS->P01PPFS.b.PSEL = 0x07U;
    R_PFS->P01PPFS.b.POR = 1;
    R_PFS->P01PPFS.b.PDR = 1;
    R_IICA->IICCTL11.b.SMC = 0;
    R_IICA->IICGHI1 = 4C_IICAI_IICGH_VALUE;
    R_IICA->IICGHI1 = 55_IICAI_IICGH_VALUE;
    R_IICA->IICCTL11 |= 01_IICAI_PCLKB_HALF;
    R_IICA->SVA1 = 10_IICAI_MASTERADDRESS;
    R_IICA->IICF1.b.STCEN = 1;
    R_IICA->IICF1.b.IICRSV = 1;
    R_IICA->IICCTL10.b.SPIE = 0;
    R_IICA->IICCTL10.b.WTDN = 1;
    R_IICA->IICCTL10.b.ACKE = 1;
    R_CLIC->cllicintie20.b.IE = 1;
    R_IICA->IICCTL10.b.IICE = 1;
    R_IICA->IICCTL10.b.LREL = 1;
    /* Set SDAAI pin */
    R_PFS->P01PPFS.b.PDR = 1;
    /* Set SDAAI pin */
    R_PFS->P01PPFS.b.PDR = 1;
    R_Config_IICAI_Create_UserInit();
}

```

After

Figure 3-5 Port initialization sequence for I2C

### 3.3.3 Improvement for adding common functions node for developer assistance function

From this version, the functions in general folder have been added in components node:

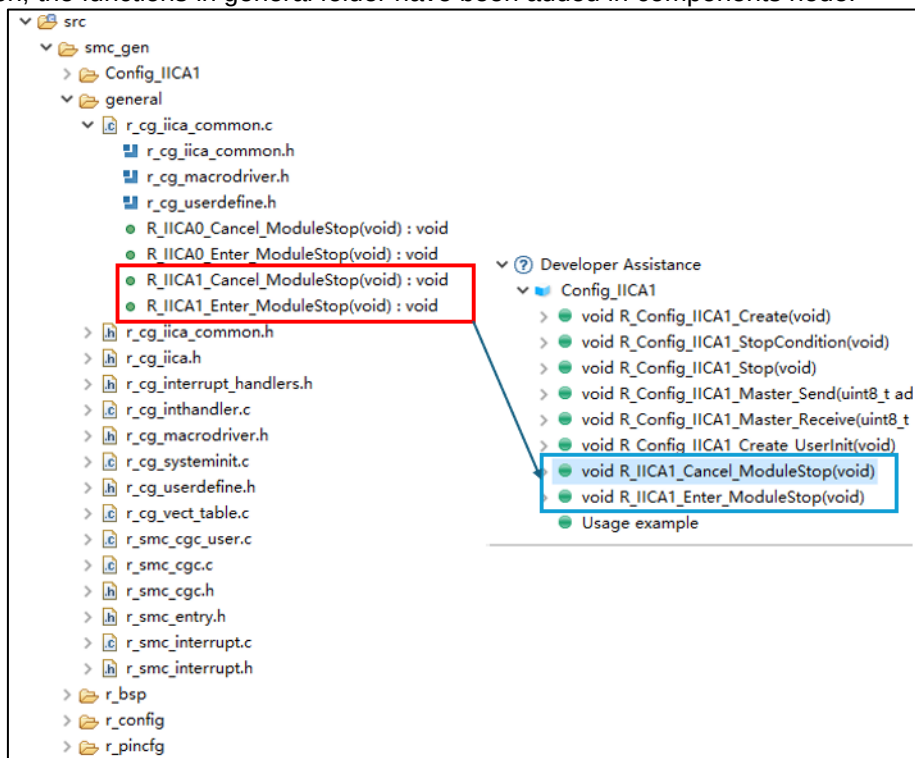


Figure 3-6 Common functions node for developer assistance

### 3.3.4 Improvement for adding a new interrupt vector routine for NMI interrupt

From this version, the NMI interrupt will be pointed to a new interrupt vector routine nmi\_handler() function in r\_cg\_vect\_table.c:



Figure 3-7 New interrupt vector routine for NMI interrupt

### 3.3.5 Improvement for removing PMR setting for ICU pins

From this version, the pin setting code of ICU will be removed PMR setting code in R\_Config\_ICU\_Create().

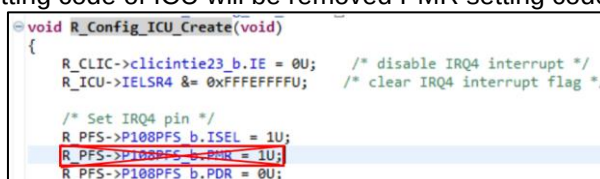


Figure 3-8 Remove PMR setting for ICU pins

4. Points for Limitation

This section describes points for limitation regarding the Smart Configurator for RISC-V MCU V1.2.0.

4.1 List of Limitation

Table 4-1 List of Limitation ✓ : Applicable, - : Not Applicable

| No | Description                                                                                                                            | G021 | Remarks |
|----|----------------------------------------------------------------------------------------------------------------------------------------|------|---------|
| 1  | Note on extra help document issue                                                                                                      | ✓    |         |
| 2  | Note on PORT functions in developer assistance function cannot be dragged issue                                                        | ✓    |         |
| 3  | Note on ITL function 16 bit capture mode with channel 0 and 1 can't be used together with 16 bit count mode with channel 2 and 3 issue | ✓    |         |
| 4  | Note on BSP machine timer does not support refresh operation issue                                                                     | ✓    |         |

4.2 Details of Limitation

4.2.1 Note on extra help document issue

For Smart Configurator, there is an extra help "Smart Browser" under "[Help] > [Help Contents]". Please ignore it.

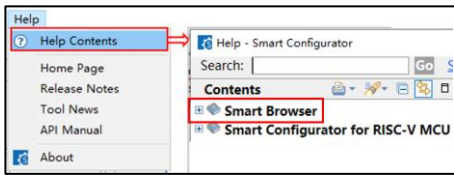


Figure 4-1 Extra help issue

4.2.2 Note on PORT functions in developer assistance function cannot be dragged issue

In e<sup>2</sup> studio version, when using Developer Assistance function, there are two PORT functions cannot be dragged to the file.  
Please add these two functions manually.  
This issue will be fixed in next release.

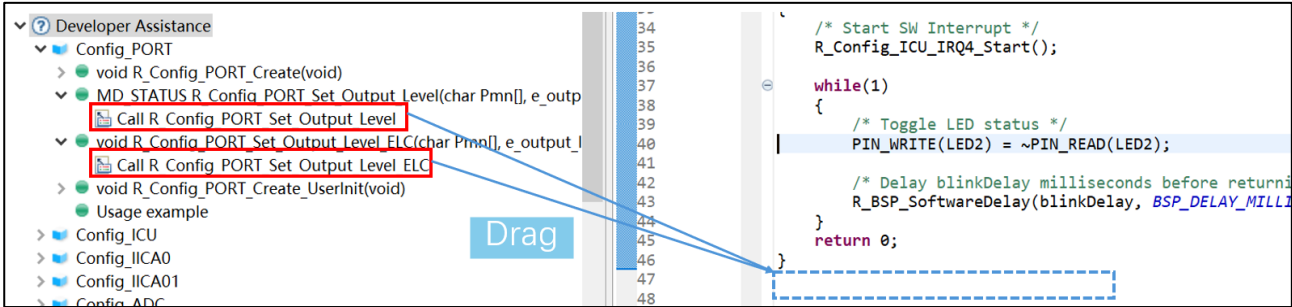


Figure 4-2 PORT functions cannot be dragged issue

4.2.3 Note on ITL function 16 bit capture mode with channel 0 and 1 can't be used together with 16 bit count mode with channel 2 and 3 issue

When using 16 bit capture mode with channel 0 and 1,if user wants to use 16 bit count mode with channel 2 and 3 at same time. Smart Configurator only support selecting "ITLCMP01 compare match interrupt" as "Capture trigger". If user wants to use the "Capture trigger" other than "ITLCMP01 compare match interrupt" for 16 bit count mode with channel 2 and 3, Smart Configurator can't support these settings now.



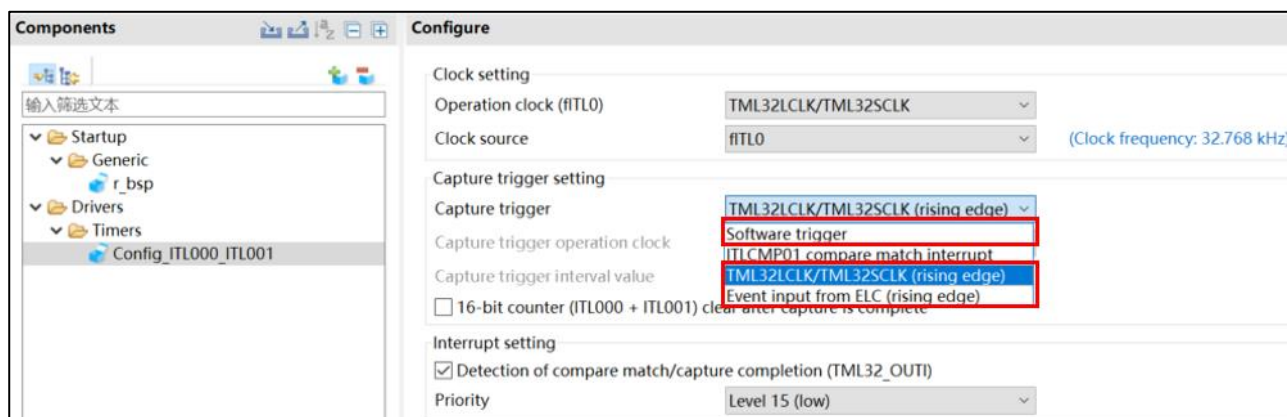


Figure 4-3 "Capture trigger" other than "ITLCMP01 compare match interrupt" settings

As a workaround, please change the code in the following steps manually. If code generation is executed again after changing the code, the code will be conflicted. Please refer to chapter 11.3.2 Steps for Resolving the Merge Conflict of RISC-V MCU Smart Configurator User's Guide: e<sup>2</sup> studio.

Step1: Create a component - Interval Timer (ITL000, ITL001) as 16bit Capture Mode. Set "ITLCMP01 compare match interrupt" as "Capture trigger" and generate code.

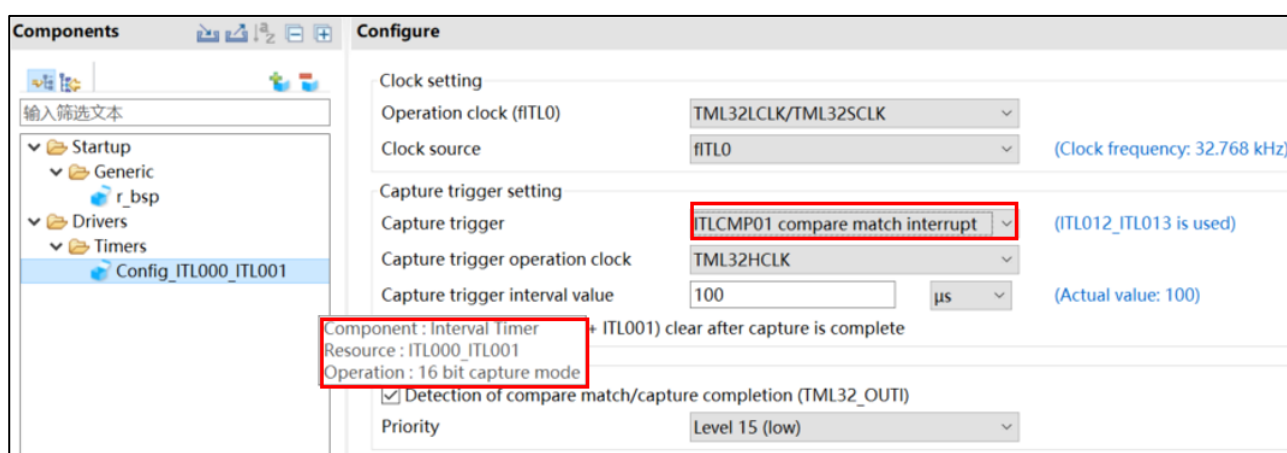


Figure 4-4 Set "ITLCMP01 compare match interrupt" as "Capture trigger"

Step2: Change driver code manually. Using TML32LCLK/TML32SCLK (rising edge) as example:

- 1) Change code in Config\_ITL000\_ITL001.c file: The macro definition can be found in ..\smc\_gen\general\r\_cg\_itl.h.

```
void R_Config_ITL000_ITL001_Create(void)
{
    ...
    /* Capture setting */
    ...
    R_TML32->ITLCC0 |=
    _00_ITL_CAPTURE_COUNTER_RETAIN;
    R_TML32->ITLCC0 &=
    FC ITL CAPTURE TRIGGER CLEAR;
    R_TML32->ITLCC0 |=
    _01_ITL_CAPTURE_TRIGGER_INTERNAL;
    R_Config_ITL000_ITL001_Create_UserInit();
}
```

```
void R_Config_ITL000_ITL001_Create(void)
{
    ...
    /* Capture setting */
    ...
    R_TML32->ITLCC0 |=
    _00_ITL_CAPTURE_COUNTER_RETAIN;
    R_TML32->ITLCC0 &=
    FC ITL CAPTURE TRIGGER CLEAR;
    /* Start user code */
    R_TML32->ITLCC0 |=
    _02_ITL_CAPTURE_TRIGGER_TML32LCLK_TML32SCLK;
    /* End user code */
    R_Config_ITL000_ITL001_Create_UserInit();
}
```

2) Change code in Config\_ITL000\_ITL001.c file:

|                                                                                                                                                                                                                                                                                                                                                                                                                        |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                   |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <pre> void R_Config_ITL000_ITL001_Start(void) {     R_TML32-&gt;ITLS0 &amp;=     (uint8_t)~_10_ITL_CAPTURE_COMPLETE_DETECT     E;     R_TML32-&gt;ITLMKF0 &amp;=     (uint8_t)~_10_ITL_CAPTURE_COMPLETE_MASK;     /* Mask channel 2 compare match     status flag */     R_TML32-&gt;ITLMKF0  =     04_ITL_CHANNEL2_COUNT_MATCH_MASK;     R_TML32-&gt;ITLCTL0_b.EN0 = 1U;     R_TML32-&gt;ITLCTL0_b.EN2 = 1U; } </pre> | <pre> void R_Config_ITL000_ITL001_Start(void) {     R_TML32-&gt;ITLS0 &amp;=     (uint8_t)~_10_ITL_CAPTURE_COMPLETE_DETECT;     R_TML32-&gt;ITLMKF0 &amp;=     (uint8_t)~_10_ITL_CAPTURE_COMPLETE_MASK;     /* Mask channel 2 compare match status     flag */     /* Start user code */     R_TML32-&gt;ITLMKF0 &amp;=     (uint8_t)~_04_ITL_CHANNEL2_COUNT_MATCH_MASK;     /* End user code */     R_TML32-&gt;ITLCTL0_b.EN0 = 1U;     R_TML32-&gt;ITLCTL0_b.EN2 = 1U; } </pre> |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

3) Add code in ..\smc\_gen\general\r\_cg\_itl\_common\_user.c file:

|                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                       |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <pre> void r_itl_interrupt(void) {     R_ICU-&gt;IELSR20 &amp;= 0xFFFEFFFFU; /*     clear TML32_OUTI interrupt flag */     if (_10_ITL_CAPTURE_COMPLETE_DETECTE     == (R_TML32-&gt;ITLS0 &amp;     _10_ITL_CAPTURE_COMPLETE_DETECTE))     {         R_TML32-&gt;ITLS0 &amp;=         (uint8_t)~_10_ITL_CAPTURE_COMPLETE_DETECT         E;          R_Config_ITL000_ITL001_Callback_Shared_In         terrupt();     }     R_TML32-&gt;ITLS0 &amp;=     (uint8_t)~_01_ITL_CHANNEL0_COUNT_MATCH_DE     TECTE; } </pre> | <pre> void r_itl_interrupt(void) {     R_ICU-&gt;IELSR20 &amp;= 0xFFFEFFFFU; /*     clear TML32_OUTI interrupt flag */     if (_10_ITL_CAPTURE_COMPLETE_DETECTE ==     (R_TML32-&gt;ITLS0 &amp;     _10_ITL_CAPTURE_COMPLETE_DETECTE))     {         R_TML32-&gt;ITLS0 &amp;=         (uint8_t)~_10_ITL_CAPTURE_COMPLETE_DETECTE;          R_Config_ITL000_ITL001_Callback_Shared_Inter         rupt();     }     /* Start user code */     if (_04_ITL_CHANNEL2_COUNT_MATCH_DETECTE     == (R_TML32-&gt;ITLS0 &amp;     _04_ITL_CHANNEL2_COUNT_MATCH_DETECTE))     {         R_TML32-&gt;ITLS0 &amp;=         (uint8_t)~_04_ITL_CHANNEL2_COUNT_MATCH_DETEC         TE;          R_Config_ITL000_ITL001_Callback_Shared_Inter         rupt();     }     /* End user code */     R_TML32-&gt;ITLS0 &amp;=     (uint8_t)~_01_ITL_CHANNEL0_COUNT_MATCH_DETEC     TE; } </pre> |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

#### 4.2.4 Note on BSP machine timer does not support refresh operation issue

When using the machine timer in default r\_bsp v1.20, if user wants to use refresh operation, Smart Configurator can't support refresh function. User needs to add code manually.

As a workaround, in r\_bsp v1.21 has supported refresh operation.

Please use r\_bsp v1.21 by following steps:

Step1: Download r\_bsp v1.21 by [Download RISC-V MCU Software Integration System Modules].

- ① Click [Download RISC-V MCU Software Integration System Modules] link→
- ② Click BSP Rev.1.21→
- ③ Click [Download].

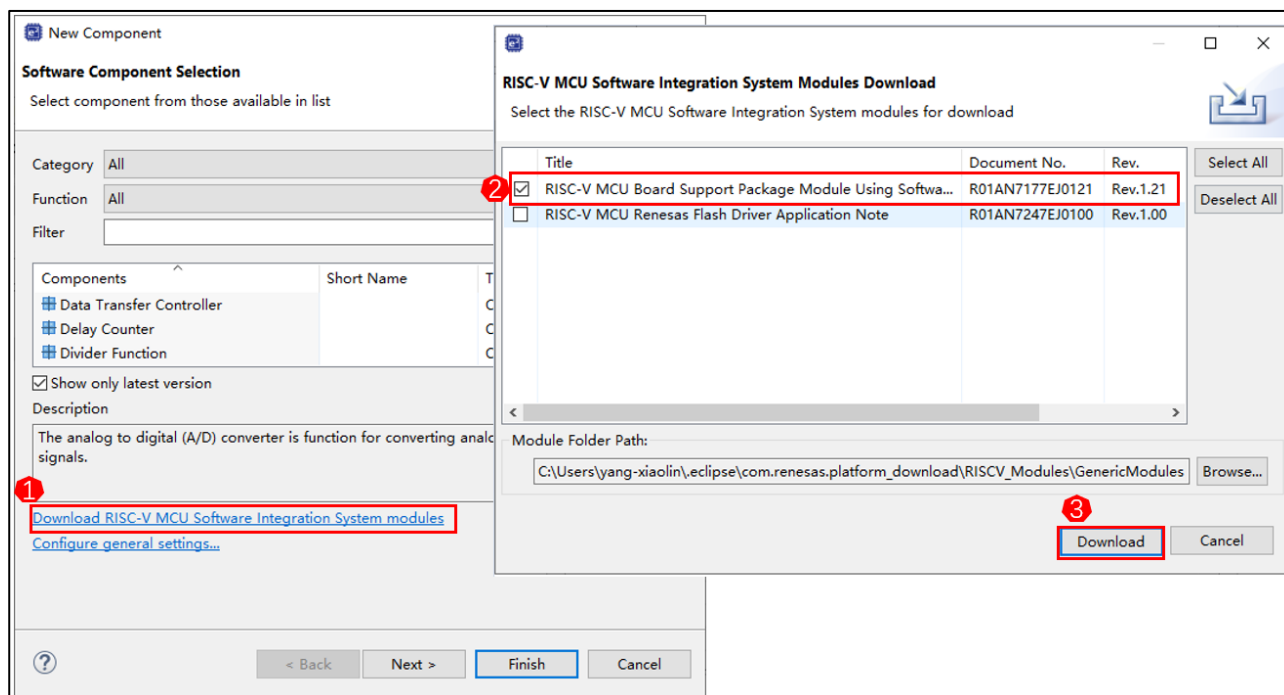


Figure 4-5 Download r\_bsp v1.21 by [Download RISC-V MCU Software Integration System Modules]

Step2: Change the [Code generation behavior] setting to “Re-generate all component files” by Click [Configure general setting...] in Step1 “New Component” window.

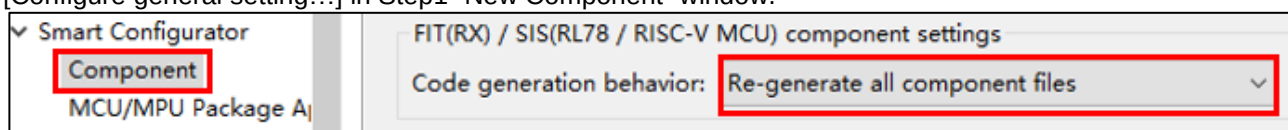


Figure 4-6 [Code generation behavior] setting

Note: If the \smc\_gen\r\_config\r\_bsp\_config.h file cannot be updated correctly, please using following workaround: Remove r\_bsp by right-click menu → Click generate code → Add BSP v1.21 by [New Component] dialog → Click generate code again.

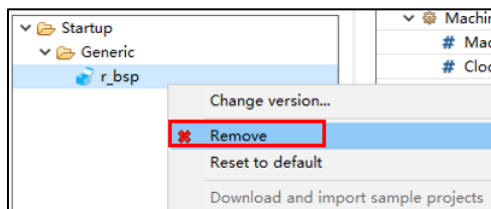


Figure 4-7 Remove r\_bsp



Step 3: Change r\_bsp version.

- ① Right-click [Change version] → ② Confirm BSP version is Rev.1.21→ ③ Click [Next]→
- ④ Click [Finish]→ ⑤ Click [Yes] →⑥ Click [Proceed] .

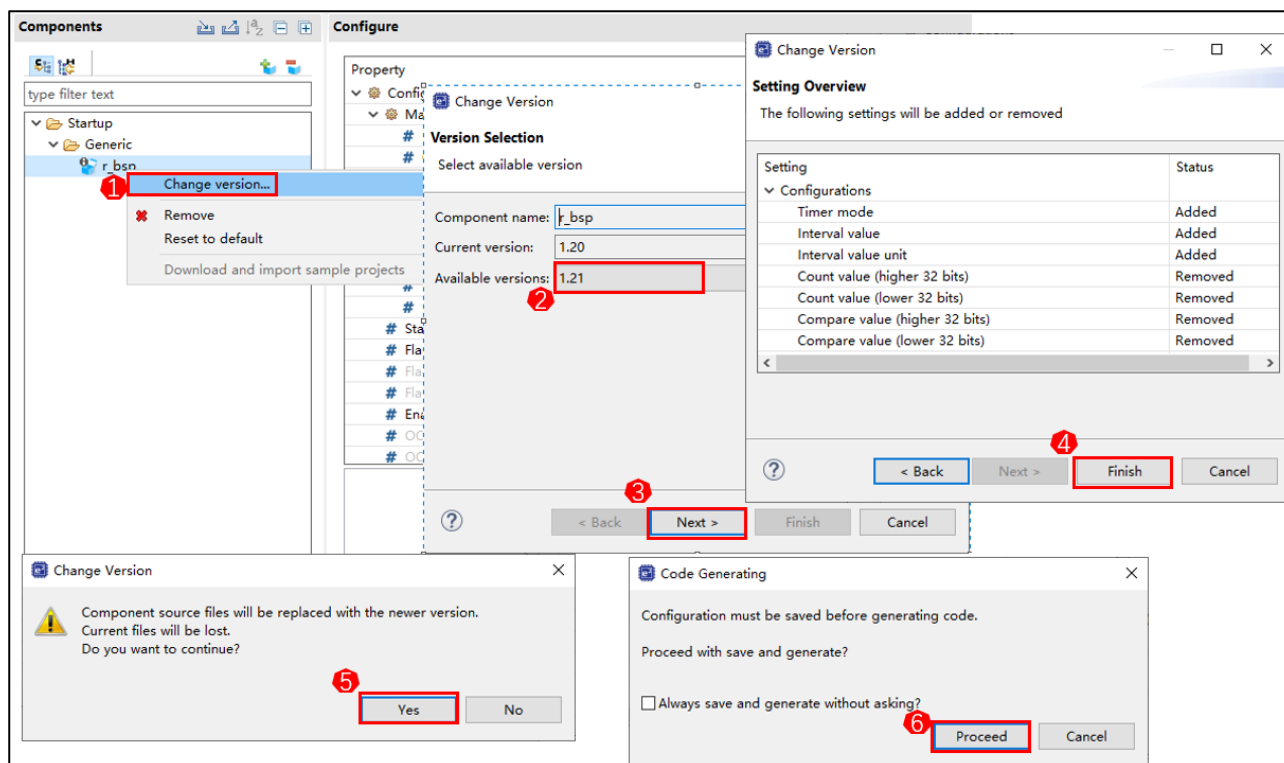


Figure 4-8 Change r\_bsp version

Step 4: When using “Periodic” of Timer mode, please add code in `..\smc_gen\general\r_cg_inthandler.c` manually. Detailed information of machine timer, please refer to `..\smc_gen\r_bsp\doc\en\r01an7177ej0121-risc-v-mcu-bsp.pdf` chapter 3.2.4 Machine Timer Operation and chapter 5.3 API for Machine Timer.

| Property                          | Value                                      |
|-----------------------------------|--------------------------------------------|
| Configurations                    |                                            |
| Machine timer setting             |                                            |
| Machine timer                     | <input checked="" type="checkbox"/> Enable |
| Clock source select               | Machine timer clock                        |
| Timer mode                        | Periodic                                   |
| Interval value                    | 100                                        |
| Interval value unit               | count                                      |
| mtip priority                     | Level 15 (low)                             |
| Machine software interrupt (msip) | <input checked="" type="checkbox"/> Enable |
| msip priority                     | Level 15 (low)                             |

Figure 4-9 “Periodic” of Timer mode

```
#include "r_cg_interrupt_handlers.h"
/* Start user code */
#include "platform.h"
/* End user code */

...
void INT_ACLINT_MTIPT(void)
{
    /* Start user code */
    #if BSP_CFG_MACHINE_TIMER == 1 && BSP_CFG_MACHINE_TIMER_MODE == 1
        machine_timer_refresh();
    #endif
    /* End user code */
    ...
}
```

## 5. Points for Caution

This section describes points for caution regarding the Smart Configurator for RISC-V MCU V1.2.0.

### 5.1 List of Caution

**Table 5-1 List of Caution**

✓ : Applicable, -: Not Applicable

| No | Description                                                                                      | G021 | Remarks |
|----|--------------------------------------------------------------------------------------------------|------|---------|
| 1  | Note on the installation of the Smart Configurator                                               | ✓    |         |
| 2  | Note on the include path update issue when renaming the component's configuration name           | ✓    |         |
| 3  | Note on TAU Input Signal High/Low level Measurement components.                                  | ✓    |         |
| 4  | Note on using the user code protection feature                                                   | ✓    |         |
| 5  | Note on the build error when an interrupt is not allocated to any interrupt vector               | ✓    |         |
| 6  | Note on SIS modules cannot be showed in New Component window                                     | ✓    |         |
| 7  | Note on the start address 00000000 is not from start.s file function for Blinky CPP LLVM project | ✓    |         |
| 8  | Note on the issue when opening the emProject file in SEGGER                                      | ✓    |         |

### 5.2 Details of Caution

#### 5.2.1 Note on the installation of the Smart Configurator

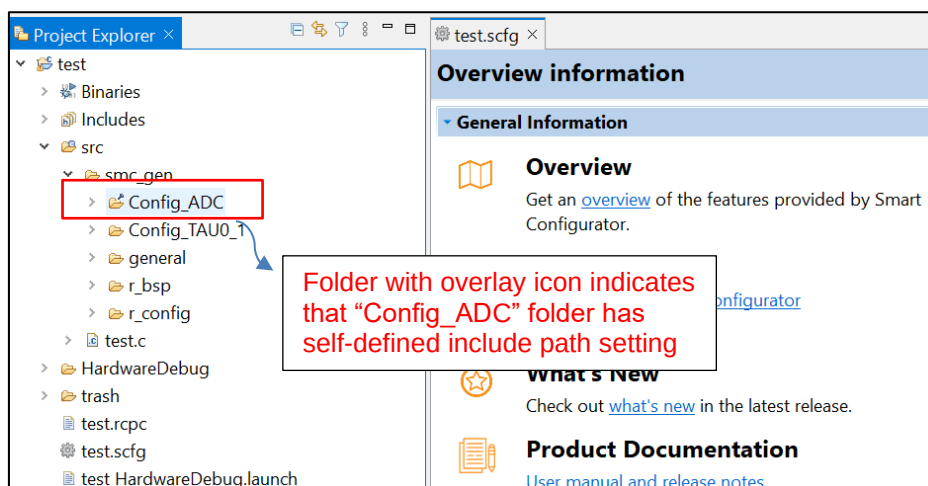
Do not set more than 64 characters for the installation directory.

The user might see an error message "The specified path is too long" and will not be able to install Smart Configurator.

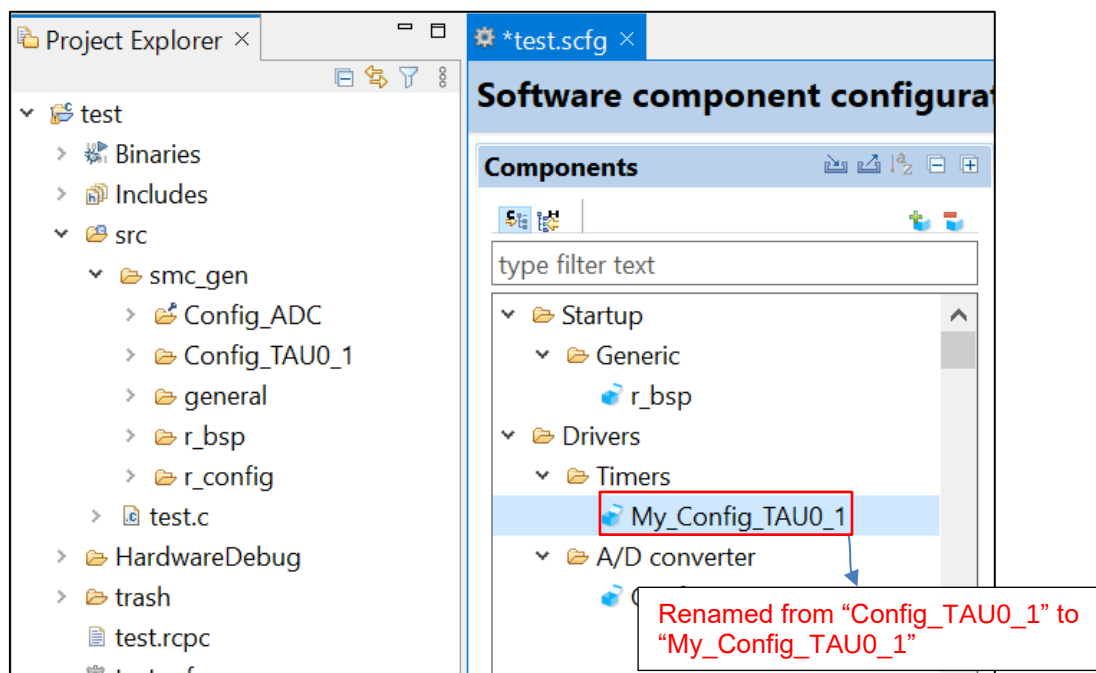
#### 5.2.2 Note on the include path update issue when renaming the component's configuration name

When renaming the added component's configuration in e<sup>2</sup> studio Smart Configurator project that has self-defined include path setting for any folder or file, include path setting for that folder or file will keep the old name setting after code generation. This will cause build error when compiling the newly generated codes so please manually update the include path.

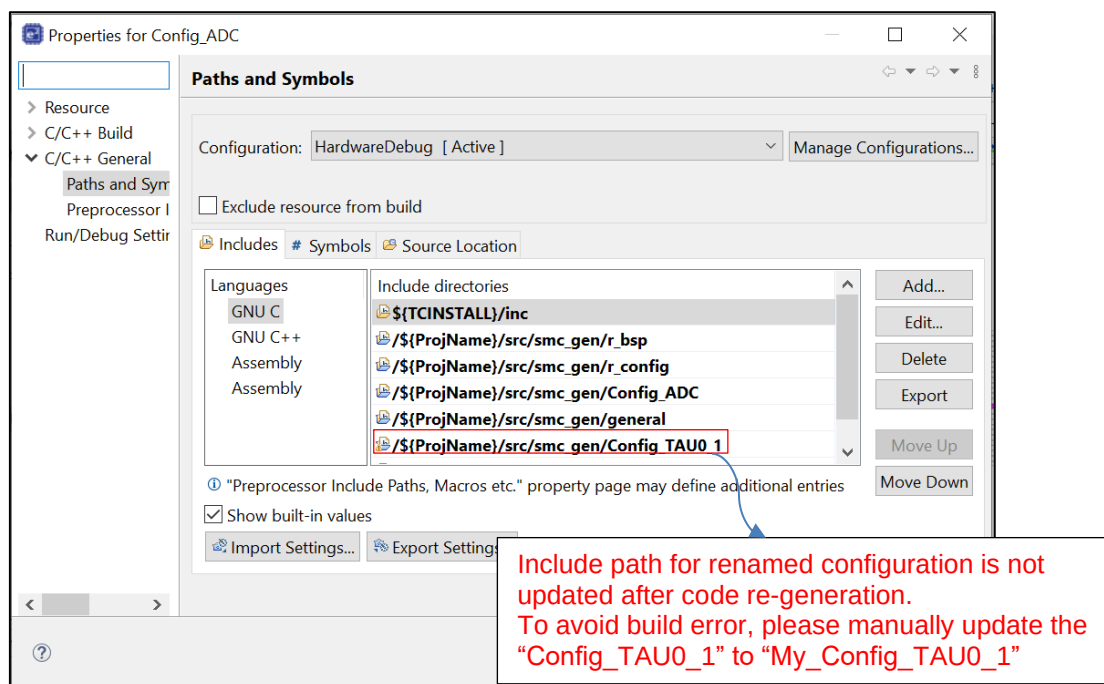
The folder or file which has self-defined include path setting can be recognized by checking the overlay icon (📁) on that folder or file. Below is an example on how to handle the include path update after renaming Compare Match Timer component configuration.



**Figure 5-1 Interval Timer component configuration before renaming**



**Figure 5-2 The Interval Timer component configuration after renaming**



**Figure 5-3 Include path setting for the “Config\_ADC” configuration**

### 5.2.3 Note on TAU Input Signal High/Low level Measurement component

When using TAU Input Signal High/Low level Measurement component, after used noise filter function for TImn input pulse, please make sure the High/Low level width min value needs to be greater than two times the minimum value prompted on the UI.

For example, the High/Low level width min value is 0.032us (min value), when use noise filter function, the width min value should be 0.064us.

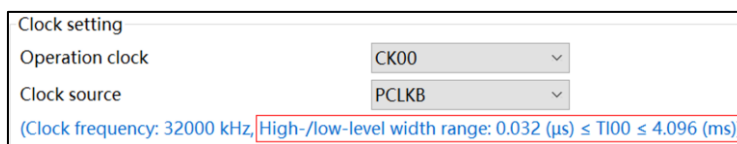


Figure 5-4 High/Low level width min value

### 5.2.4 Note on using the user code protection feature

The user code protection feature will be supported for all Code Generation components. Please use the following specific tags to add user code when using the user code protection feature. If the specific tags do not match exactly, inserted user code will not be protected after the code generation.

```
/* Start user code */
```

User code can be added between the specific tags

```
/* End user code */
```

### 5.2.5 Note on the build error when an interrupt is not allocated to any interrupt vector

Use IRQ0 as example, when IRQ0 is used in interrupt component, but an interrupt error is shown in “Configuration Problems” window. It means all interrupt vectors which can used by IRQ0 have been used.

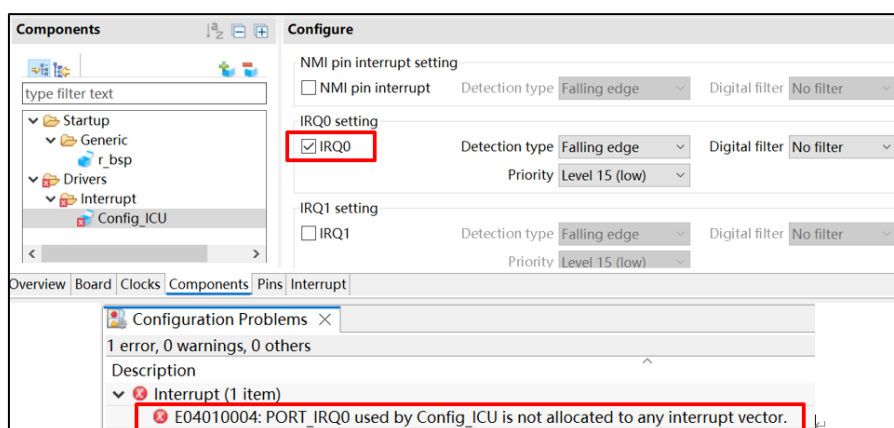


Figure 5-5 An interrupt is not allocated to any interrupt vector

When you generate code, some build error will be shown:

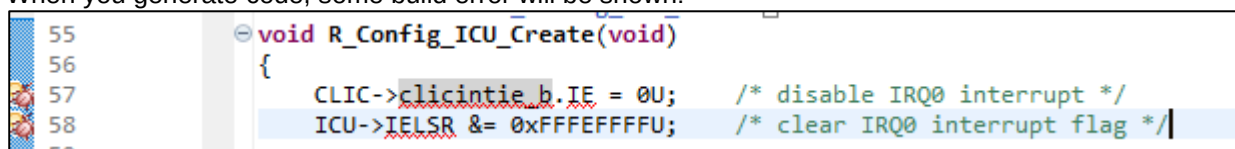


Figure 5-6 Build errors when an interrupt is not allocated to any interrupt vector

To solve these build errors, please refer to Smart Configurator User's Manual e<sup>2</sup> studio or IAREW, SEGGER Embedded Studio chapter 4.6.4 Resolving Interrupt error.

### 5.2.6 Note on the start address 00000000 is not from start.s file function for Blinky CPP LLVM project

When using a Blinky CPP LLVM project, the start address 00000000 is not from start.s file function.



Figure 5-7 Incorrect function of start address 00000000

Correct start function address should in BSP start.s file and `_PowerON_Reset()`.

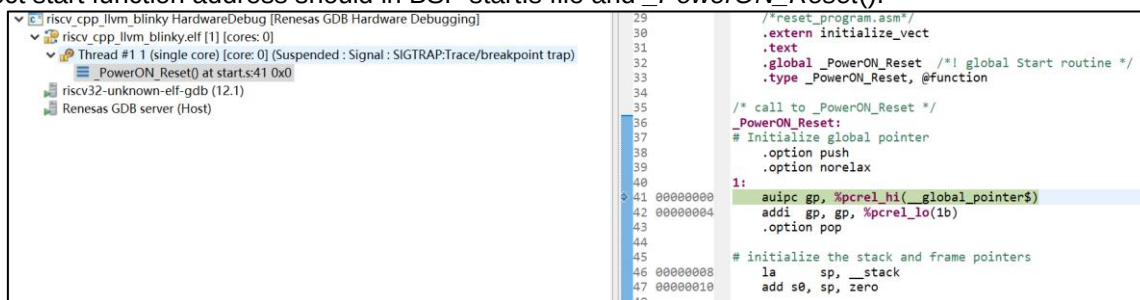


Figure 5-8 Start address 00000000 is from start.s file and `_PowerON_Reset()`

As a workaround, please changed the [Debug format] to dwarf-2 or dwarf-3:

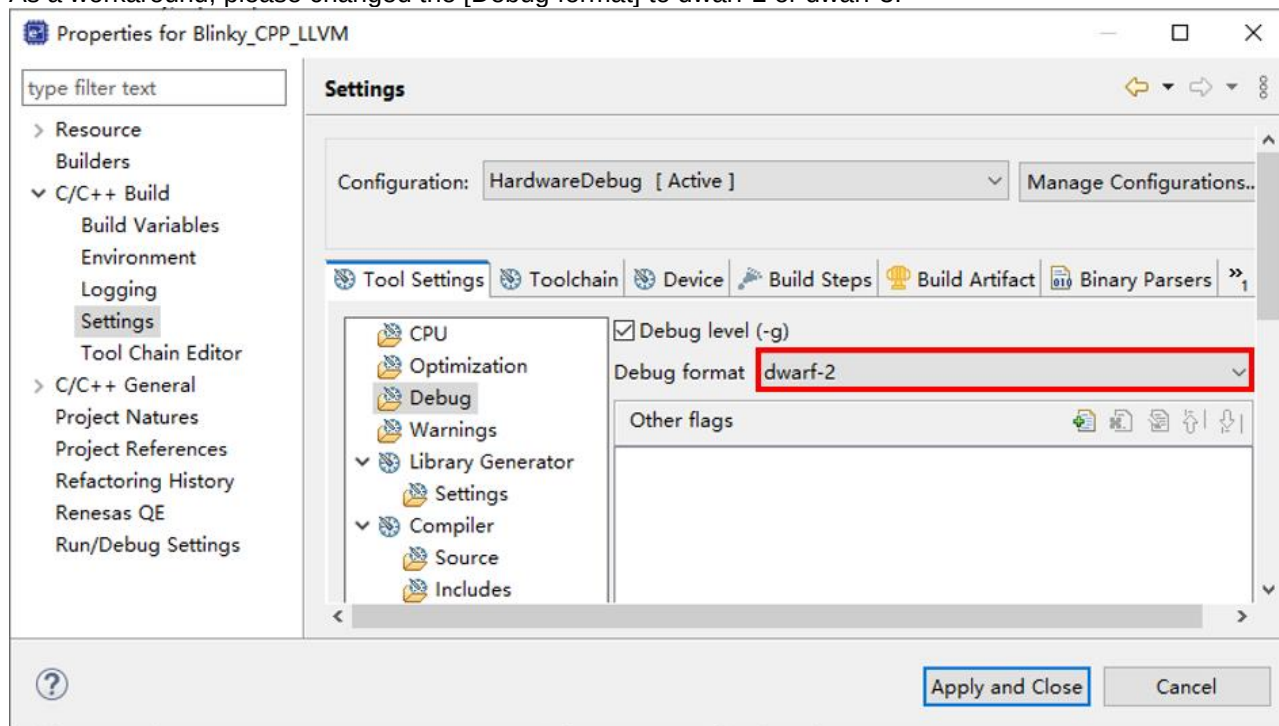


Figure 5-9 Change the [Debug format] CPP LLVM project

5.2.7 Note on the issue when opening the emProject file in SEGGER

When opening the emProject file generated by SEGGER. The following prompt box will be pop up.

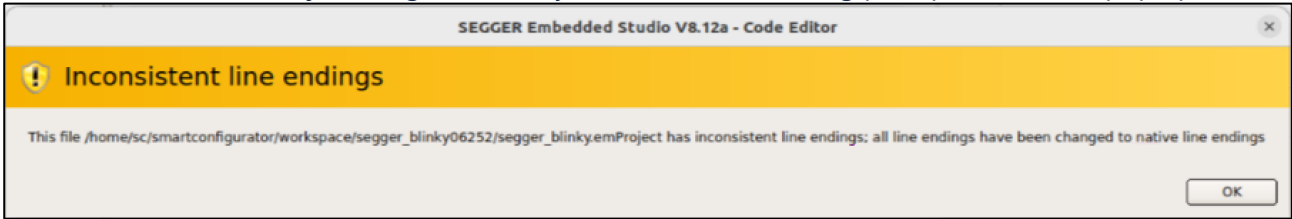


Figure 5-10 The issue when opening the emProject file

As a workaround, please "Ctrl + A" right-click change Line ending to "Unix".

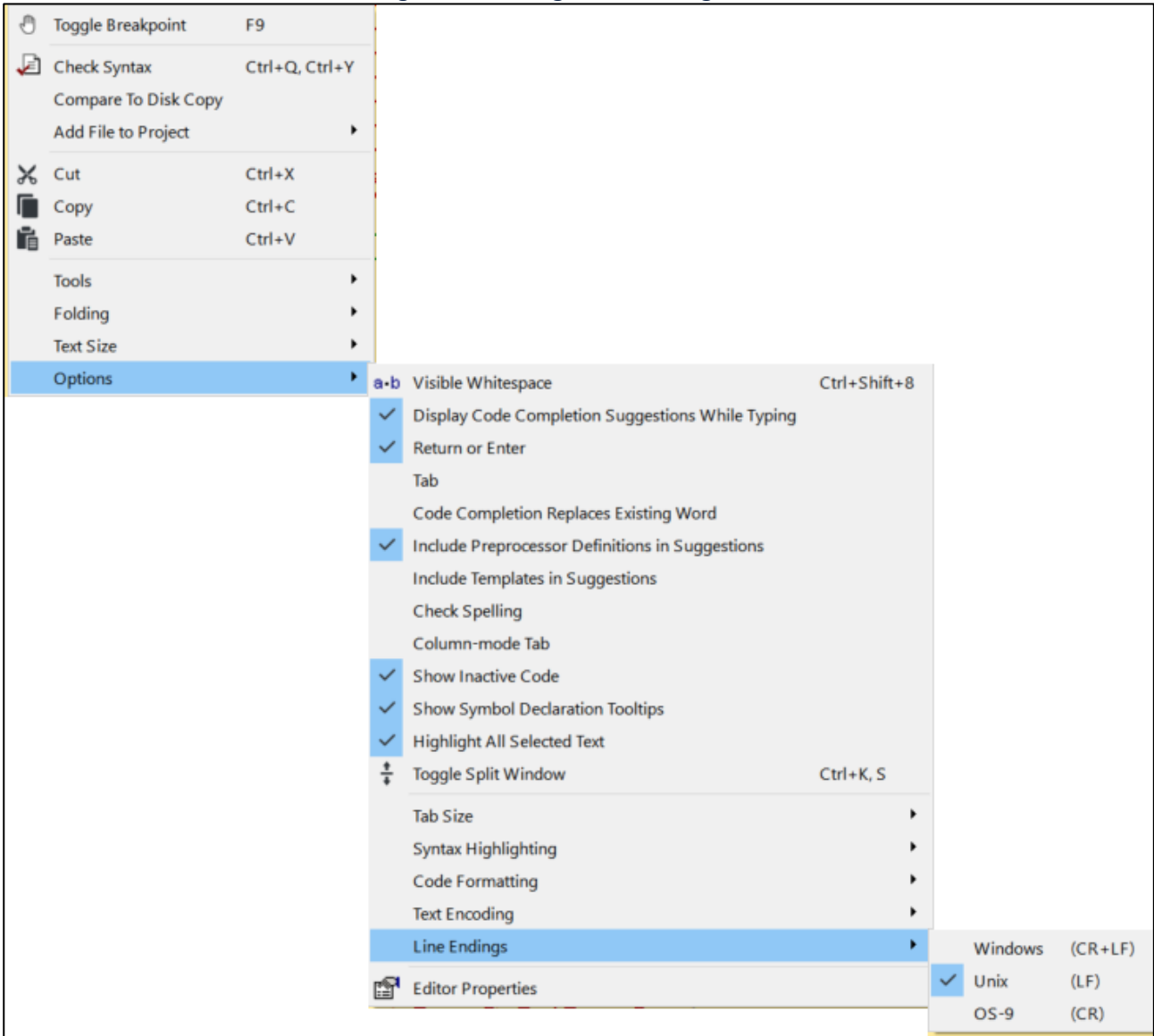


Figure 5-11 Change Line ending to "Unix"

Revision History

| Rev. | Section                  | Description                                                                  |
|------|--------------------------|------------------------------------------------------------------------------|
| 1.00 | -                        | First edition issued                                                         |
| 1.01 | 4. Points for Limitation | Add 4.2.4 Note on BSP machine timer does not support refresh operation issue |



## General Precautions in the Handling of Microprocessing Unit and Microcontroller Unit Products

The following usage notes are applicable to all Microprocessing unit and Microcontroller unit products from Renesas. For detailed usage notes on the products covered by this document, refer to the relevant sections of the document as well as any technical updates that have been issued for the products.

### 1. Precaution against Electrostatic Discharge (ESD)

A strong electrical field, when exposed to a CMOS device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop the generation of static electricity as much as possible, and quickly dissipate it when it occurs. Environmental control must be adequate. When it is dry, a humidifier should be used. This is recommended to avoid using insulators that can easily build up static electricity. Semiconductor devices must be stored and transported in an anti-static container, static shielding bag or conductive material. All test and measurement tools including work benches and floors must be grounded. The operator must also be grounded using a wrist strap. Semiconductor devices must not be touched with bare hands. Similar precautions must be taken for printed circuit boards with mounted semiconductor devices.

### 2. Processing at power-on

The state of the product is undefined at the time when power is supplied. The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the time when power is supplied. In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the time when power is supplied until the reset process is completed. In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the time when power is supplied until the power reaches the level at which resetting is specified.

### 3. Input of signal during power-off state

Do not input signals or an I/O pull-up power supply while the device is powered off. The current injection that results from input of such a signal or I/O pull-up power supply may cause malfunction and the abnormal current that passes in the device at this time may cause degradation of internal elements. Follow the guideline for input signal during power-off state as described in your product documentation.

### 4. Handling of unused pins

Handle unused pins in accordance with the directions given under handling of unused pins in the manual. The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of the LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible.

### 5. Clock signals

After applying a reset, only release the reset line after the operating clock signal becomes stable. When switching the clock signal during program execution, wait until the target clock signal is stabilized. When the clock signal is generated with an external resonator or from an external oscillator during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Additionally, when switching to a clock signal produced with an external resonator or by an external oscillator while program execution is in progress, wait until the target clock signal is stable.

### 6. Voltage application waveform at input pin

Waveform distortion due to input noise or a reflected wave may cause malfunction. If the input of the CMOS device stays in the area between  $V_{IL}$  (Max.) and  $V_{IH}$  (Min.) due to noise, for example, the device may malfunction. Take care to prevent chattering noise from entering the device when the input level is fixed, and also in the transition period when the input level passes through the area between  $V_{IL}$  (Max.) and  $V_{IH}$  (Min.).

### 7. Prohibition of access to reserved addresses

Access to reserved addresses is prohibited. The reserved addresses are provided for possible future expansion of functions. Do not access these addresses as the correct operation of the LSI is not guaranteed.

### 8. Differences between products

Before changing from one product to another, for example to a product with a different part number, confirm that the change will not lead to problems. The characteristics of a microprocessing unit or microcontroller unit products in the same group but having a different part number might differ in terms of internal memory capacity, layout pattern, and other factors, which can affect the ranges of electrical characteristics, such as characteristic values, operating margins, immunity to noise, and amount of radiated noise. When changing to a product with a different part number, implement a system-evaluation test for the given product.

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