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# Smart Configurator for RISC-V MCU Plug-in in e<sup>2</sup> studio 2024-01

## Smart Configurator for RISC-V MCU V1.0.0

### Release Note

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#### 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 V1.0.0 is equivalent to Smart Configurator for RISC-V MCU Plug-in in e<sup>2</sup> studio 2024-01.

### 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 Development Environments

- LLVM for Renesas RISC-V 17.0.0.202310 or later
- IAR Embedded Workbench for RISC-V 3.20.1 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 V1.0.0.

**Table 2-1 Support Devices**

Group (HW Manual number)	PIN	Device name
RISC-V/G021 Group (R01UH1036EJ0100)	16pin	R9A02G0214CBB
	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 V1.0.0.

**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	-	✓	

### 3. Points for Limitation

This section describes points for limitation regarding the Smart Configurator for RISC-V MCU V1.0.0.

#### 3.1 List of Limitation

Table 5-1 List of Limitation

✓: Applicable, -: Not Applicable

No	Description	G021	Remarks
1	Note on extra help document issue	✓	
2	Note on Help URL issue	✓	
3	Note on the interrupt of 32-bit interval timer can only occur once issue	✓	
4	Note on the build issue when use multiple DTC components	✓	
5	Note on the build issue when rename DTC component	✓	
6	Note on the issue when using IIC20/IIC21 master mode component	✓	

#### 3.2 Details of Limitation

##### 3.2.1 Note on extra help document issue

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

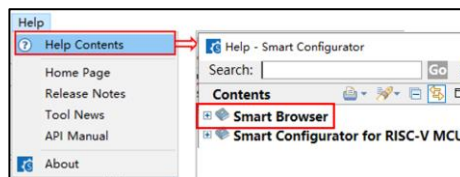


Figure 3-1 Extra help issue

##### 3.2.2 Note on Help URL issue

In Smart Configurator for RISC-V MCU introduction page, there isn't correct URL for RISC-V MCU. Please ignore RL78's URL. The URL will be available in next release.

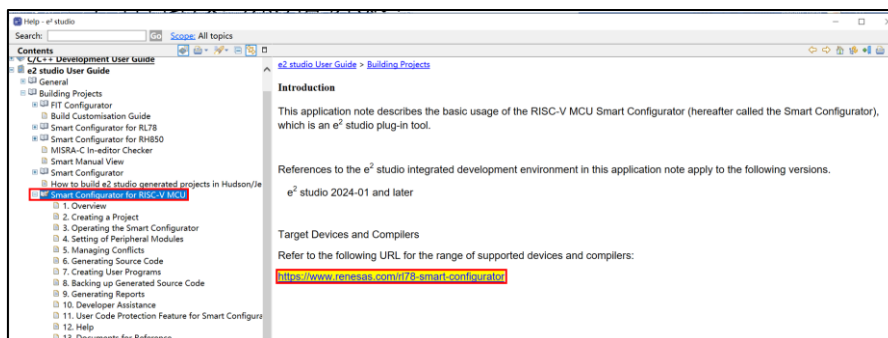


Figure 3-2 No RISC-V MCU URL issue

### 3.2.3 Note on the interrupt of 32-bit interval timer can only occur once issue

If you meet the interrupt of 32-bit interval timer counter mode can only occur once issue, please try to follow workaround to solve.

Please move “clear TML32\_OUTI interrupt flag” to the top of the interrupt service routine in smc\_gen/general/r\_cg\_itl\_common\_user.c file.

This issue will be improved in next release.

```
void r_itl_interrupt(void)
{
    if (_01_ITL_CHANNEL0_COUNT_MATCH_DETECTE == (R_TML32->ITLS0 & _01_ITL_CHANNEL0_COUNT_MATCH_DETECTE))
    {
        R_TML32->ITLS0 &= (uint8_t)~_01_ITL_CHANNEL0_COUNT_MATCH_DETECTE;
        R_Config_ITL000_Callback_Shared_Interrupt();
    }
    R_ICU->IELSR20 &= 0xFFFEFFFF; /* clear TML32_OUTI interrupt flag */
}
```

Figure 3-3 Interrupt of 32-bit interval timer

### 3.2.4 Note on the build issue when use multiple DTC components

When two or more DTC components have been created, there will be a build error for typedef redefinition of struct st\_dtc\_data\_t.

As a workaround, please copy following code to ..\smc\_gen\general\r\_cg\_dtc.h file.

And remove the typedef definition in each Config\_DTC.h and Config\_DTCn.h.

This issue will be improved in next release.

```
/* Start user code for function. Do not edit comment generated here */
typedef struct
{
    uint32_t mra_mrb;
    uint32_t sar;
    uint32_t dar;
    uint32_t cra_crb;
} st_dtc_data_t;
/* End user code. Do not edit comment generated here */
```

### 3.2.5 Note on the build issue when rename DTC component

When rename the DTC component, after generate code, there will be build error about interrupt name mismatch in r\_cg\_vect\_table.c and r\_cg\_dtc\_common\_user.c.

As a workaround, please use the same name in r\_cg\_vect\_table.c and r\_cg\_dtc\_common\_user.c.

This issue will be improved in next release and the interrupt name will be changed to r\_dtc\_interrupt().

```
ld.lld: error: undefined symbol: r_Config_DTC1_interrupt
>>> referenced by r_cg_vect_table.c
>>>      ./src/smc_gen/general/r_cg_vect_table.o:(gp_Vectors)
>>> did you mean r_Config_DTC_interrupt
>>> defined in: ./src/smc_gen/general/r_cg_dtc_common_user.o
clang: error: ld.lld command failed with exit code 1 (use -v to see invocation)
```

Figure 3-4 The build issue when rename DTC component

### 3.2.6 Note on the issue when using IIC20/IIC21 master mode component

When using IIC20/IIC21 master mode component, R\_Config\_IIC20\_Create() and R\_Config\_IIC21\_Create() are calling by R\_SAU0\_Create() function wrongly. They should be called by R\_SAU1\_Create() function.

As a workaround,

- 1) Please move R\_Config\_IIC20\_Create()/R\_Config\_IIC21\_Create() from R\_SAU0\_Create() function to R\_SAU1\_Create() in ..\smc\general\general\r\_sau\_common.c.
- 2) Please add R\_SAU1\_Create() function in ..\smc\_gen\general\r\_cg\_systeminit.c. If no other functions are used for SAU0, please remove R\_SAU0\_Create() function in ..\smc\_gen\general\r\_cg\_systeminit.c.

This issue will be improved in next release.

```

57 void R_SAU0_Create(void)
58 {
59     R_MSTP->MSTPCRB.b.MSTPB21 = 0U;    /* cancel the SAU0-stop state*/
60     R_Config_IIC20_Create();
61     R_Config_IIC21_Create();
62 }
63
64
65 /* Function Name: R_SAU1_Create
66 * Description : This function enables SAU1 input clock supply and initializes SAU1 module.
67 * Arguments : None
68 * Return Value : None
69 *****/
70 void R_SAU1_Create(void)
71 {
72     R_MSTP->MSTPCRB.b.MSTPB20 = 0U;    /* cancel the SAU0-stop state*/
73 }
74
75
76 void R_Systeminit(void)
77 {
78     /* CSR register setting */
79     asm( "li t0, 0x00000008" );
80     asm( "csrw mstatus, t0" );    //Set mstatus.mie
81
82     /* Enable writing to PFS pin function control registers */
83     R_BSP_RegisterProtectDisable(BSP_REG_PROTECT_PMNPFPS);
84
85     /* Initialize clocks settings */
86     R_CGC_Create();
87
88     /* Set peripheral settings */
89     R_SAU1_Create();
90
91     /* Disable writing to PFS pin function control registers */
92     R_BSP_RegisterProtectEnable(BSP_REG_PROTECT_PMNPFPS);
93 }

```

Figure 3-5 The issue when using IIC20/IIC21 master mode component

## 4. Points for Caution

This section describes points for caution regarding the Smart Configurator for RISC-V MCU V1.0.0.

### 4.1 List of Caution

Table 6-1 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 IAR build error when using more components	✓	
6	Note on the build error when an interrupt is not allocated to any interrupt vector	✓	

## 4.2 Details of Caution

### 4.2.1 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.

### 4.2.2 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.

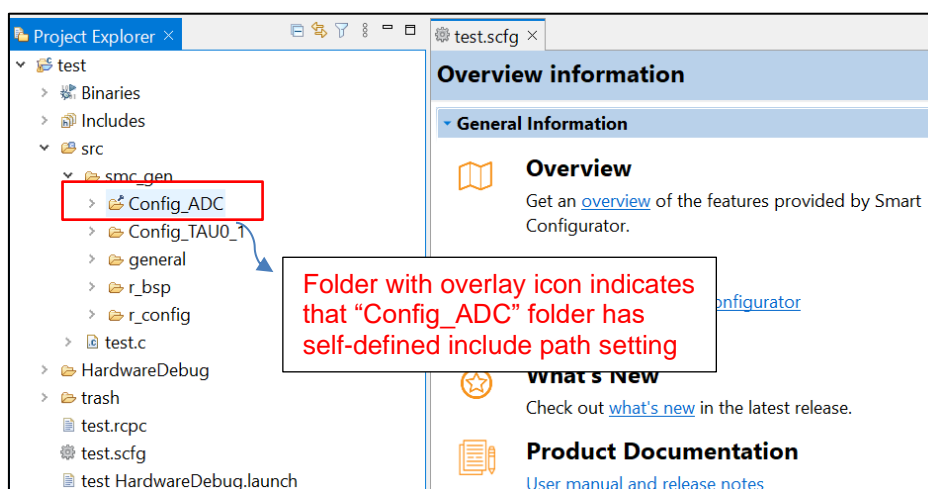
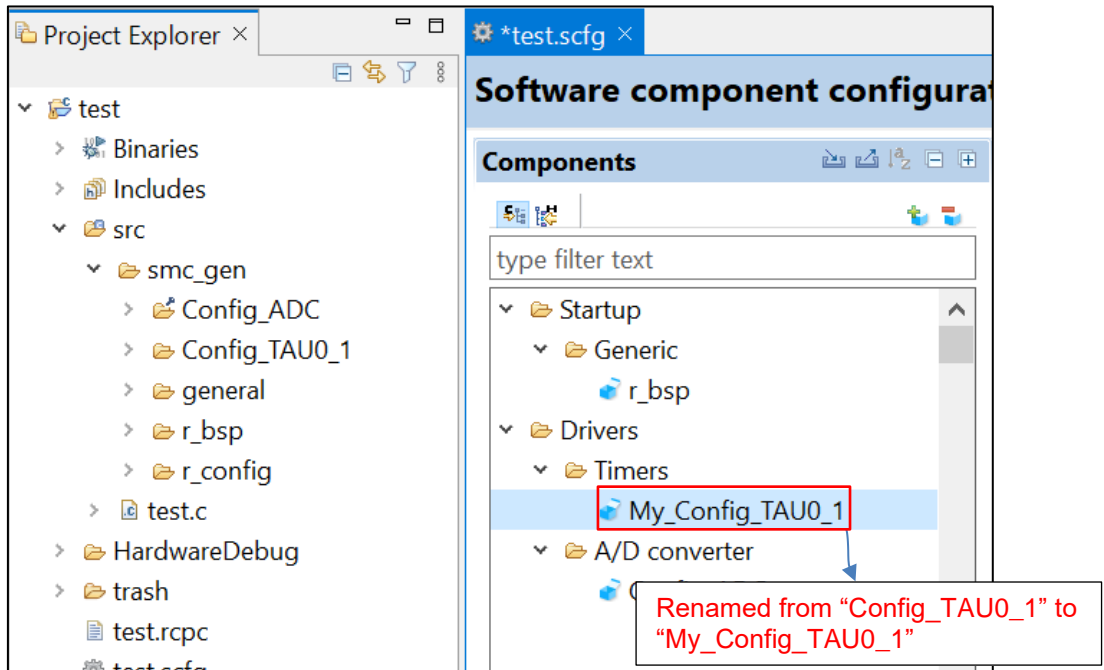
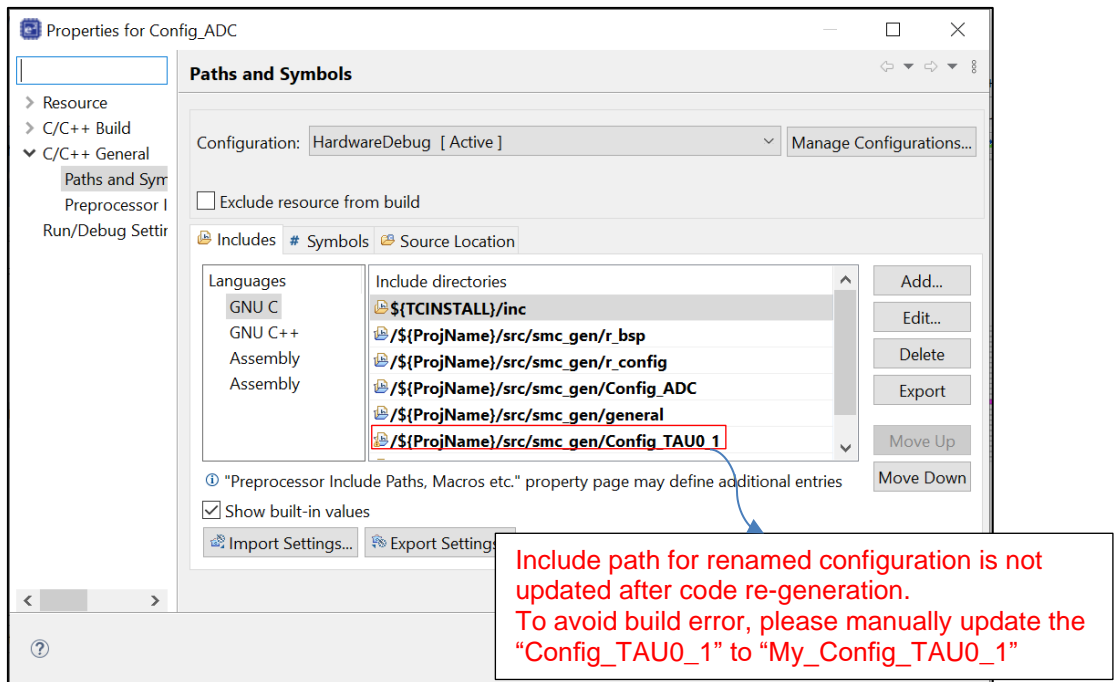


Figure 4-1 Interval Timer component configuration before renaming



**Figure 4-2 The Interval Timer component configuration after renaming**



**Figure 4-3 Include path setting for the “Config\_ADC” configuration**



### 4.2.3 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.

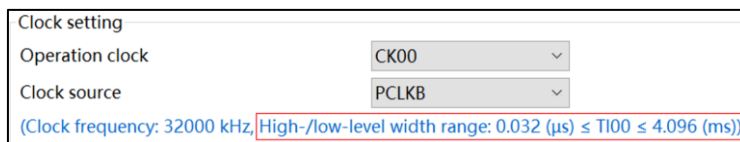


Figure 4-4 High/Low level width min value

### 4.2.4 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 */
```

### 4.2.5 Note on IAR build error when using more components

When the following build error is met, it means the code size is too large for available space 0x200040CC to 0x20006FFF.

As a workaround, please reduce the used components' count.

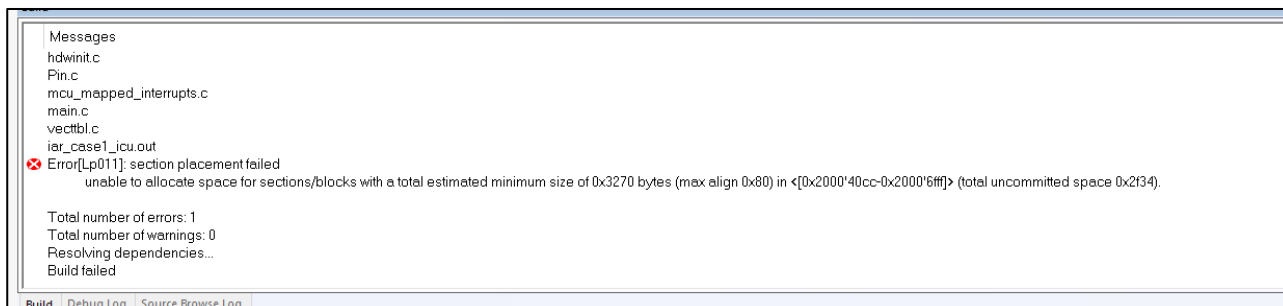
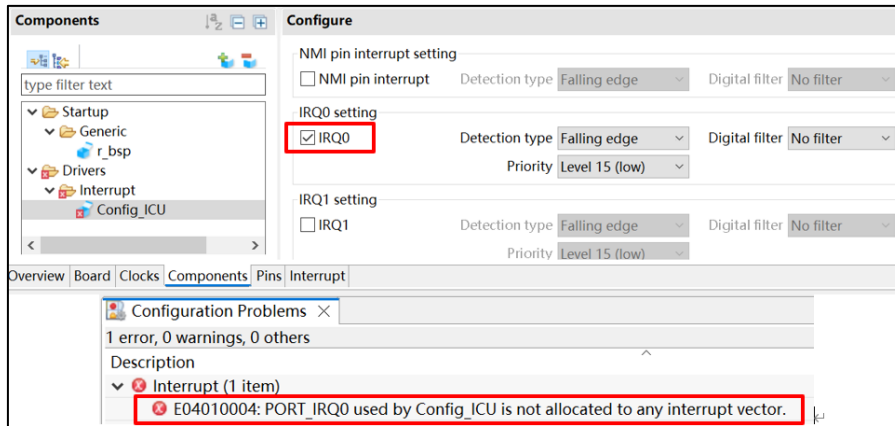


Figure 4-5 IAR build error for section placement failed

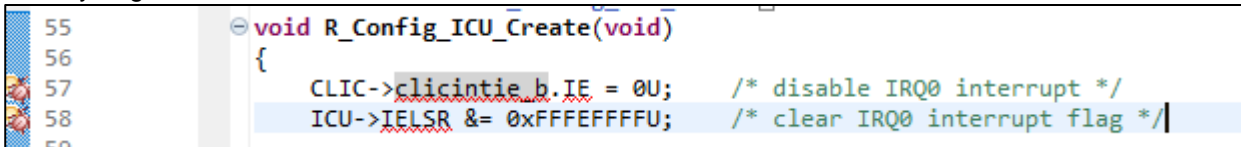
**4.2.6 Note on the build error when an interrupt is not allocated to any interrupt vector**

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 be used by IRQ0 have been used.



**Figure 4-6 An interrupt is not allocated to any interrupt vector**

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



**Figure 4-7 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 chapter 4.6.4 Resolving Interrupt error.

## Revision History

Rev.	Section	Description
1.00	-	First edition issued

## 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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