

RZ/A3UL

Getting Started with RZ/A Flexible Software Package

Introduction

This manual describes how to use the RZ/A Flexible Software Package (FSP) for developing applications for the RZ microprocessor series.

Target Device

RZ/A3UL



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1. Introduction

1.1 Overview

This application note describes how to use the Renesas RZ/A Flexible Software Package (FSP) running on the Cortex®-A55 (hereinafter referred to as CA55) incorporated on RZ/A3UL.

1.2 Introduction to FSP

1.2.1 Purpose

The Renesas RZ/A Flexible Software Package (FSP) is an optimized software package designed to provide easy to use, scalable, high-quality software for embedded system design. The primary goal is to provide lightweight, efficient drivers that meet common use cases in embedded systems.

1.2.2 e2 studio IDE

FSP provides a host of efficiency enhancing tools for developing projects targeting the Renesas RZ series of MPU devices. The e2 studio IDE provides a familiar development cockpit from which the key steps of project creation, module selection and configuration, code development, code generation, and debugging are all managed.

1.3 Limitations

1.3.1 Hardware Initial Setup

RZ/A FSP expects the initial setup of hardware should be carried out beforehand by RZ/A Initial Program Loader (hereinafter referred to as IPL). For detail on IPL, please refer to the <u>Application Note</u>.



2. Starting Development Introduction

2.1 e2 studio setup

2.1.1 What is e2 studio?

Renesas e2 studio is a development tool encompassing code development, build, and debug. e2 studio is based on the open-source Eclipse IDE and the associated C/C++ Development Tooling (CDT).

When developing for RZ MPUs, e2 studio hosts the RZ/A FSP. The FSP provides a wide range of time saving tools to simplify the selection, configuration, and management of modules and threads, to easily implement complex applications.

2.1.2 e2 studio Prerequisites

2.1.2.1 Obtaining an RZ MPU Kit

To develop applications with RZ/A FSP, start with RZ/A3UL Evaluation Board Kit.

RZ/A3UL Evaluation Board Kit related information is available at RZ/A3UL Evaluation Board Kit.

	Board name on GUI screen	Note
QSPI Edition (RTK9763U02S01000BE)	RZ/A3UL Evaluation Board Kit QSPI Edition (Exec with DDR SDRAM)	If you select this, the initial program loader will transfer the entire program including the code area to DDR4.
	RZ/A3UL Evaluation Board Kit QSPI Edition (eXecute-In- Place)	If you select this, only the data area will be transferred to DDR4 by the initial program loader. The code area on the flash ROM is referenced during execution.
Octal-SPI Edition (RTK9763U02S01001BE)	RZ/A3UL Development board Dialog OCTAL Boot (eXecute-In-Place)	If you select this, only the data area will be transferred to OctaRAM by the initial program loader. The code area on the flash ROM is referenced during execution.

The relationship between the board type and the board name on e^2 studio is as follows.

2.1.2.2 PC Requirements

The following are the minimum PC requirements to use e2 studio:

- Windows 10 or Ubuntu 20.04 LTS Desktop(64-bit) with Intel i5 or i7, or AMD A10-7850K or FX
- Memory: 8-GB DDR3 or DDR4 DRAM (16-GB DDR4/2400-MHz RAM is preferred)
- Minimum 250-GB hard disk

2.1.2.3 Licensing

FSP licensing includes full source code, limited to Renesas hardware only.

2.1.3 e2 studio installation for Windows PC

This chapter describes how to install the e2 studio IDE on Windows PC. If you would like to install e2 studio and FSP at the same time, please jump to 2.2.1.

2.1.3.1 Download

The latest e2 studio IDE installer package can be downloaded from Renesas website for free. Please check detailed information from: <u>https://www.renesas.com/e2studio</u>. Note that user has to login to the Renesas account (in MyRenesas page) for the software download.



2.1.3.2 Installation of e2 studio IDE

1. Double-click the e2 studio installer to launch the e2 studio installation wizard. Then, select the [Custom Install] option and click the [Next] button.

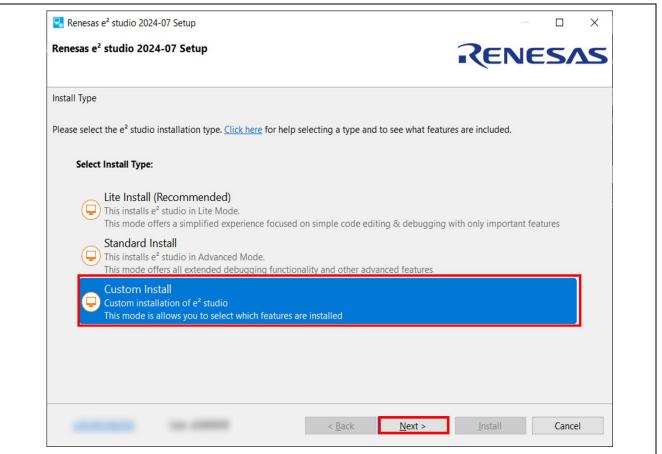


Figure 1: e2 studio installation wizard

Note:

If you are using a multi-user environment, you may receive a prompt to confirm whether you want to install it for the current user only or for all users.

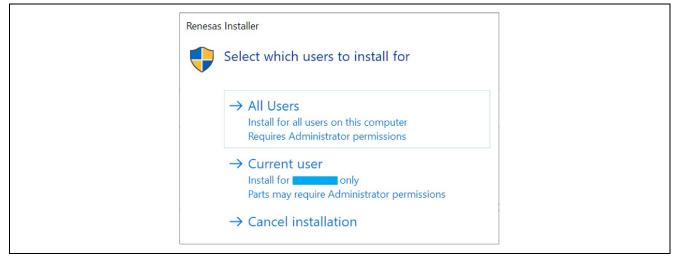


Figure 2: Select User for Installation



2. Welcome page

User can change the install folder by clicking [Change...]. Click [Next] to continue.

Note:

- 1. If you would like to have multiple versions of e2 studio, please specify new folder here.
- 2. Multi-byte characters cannot be used for e2 studio installation folder name.

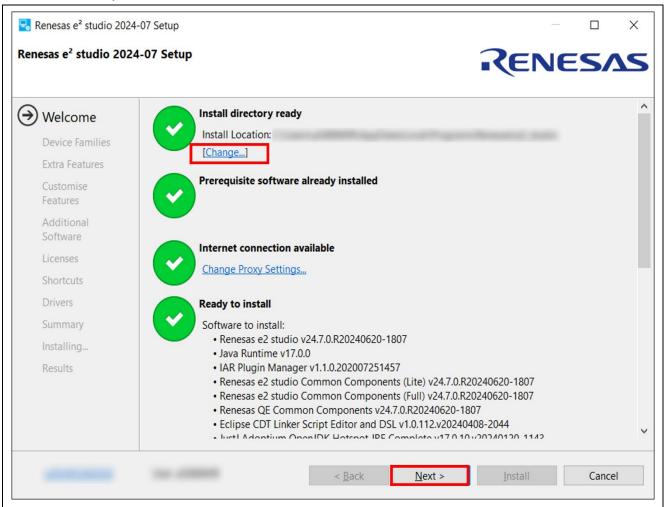


Figure 3: Installation of e2 studio – Welcome page



3. Device Families

Select Devices Families to install. Click the [Next] button to continue.

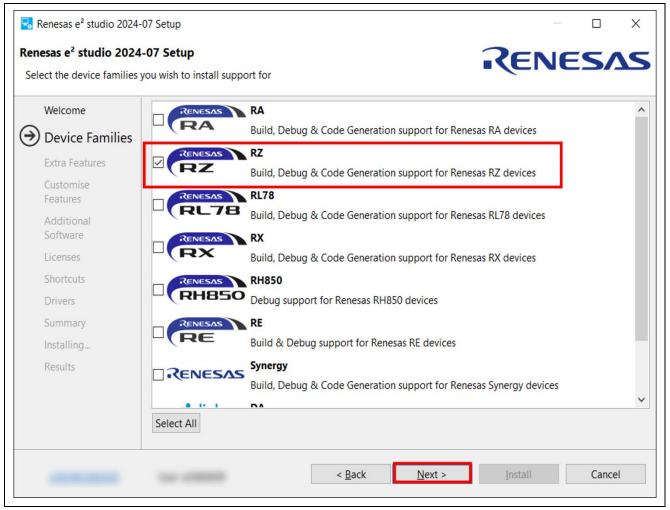


Figure 4: Installation of e2 studio – Device Families



4. Extra Features

Select Extra Features (i.e., Language packs, Git support...) to be installed. For non-English language users, please select Language packs at this step if needed. Then, click the [Next] button to continue.

🗟 Renesas e² studio 2024	-07 Setup		— 🗆 X
Renesas e² studio 2024 Select the extra features y			RENESAS
Welcome Device Families		P	Japanese Language Support
⊖ Extra Features			Chinese (Simplified) Language Support
Customise Features			Chinese (Traditional) Language Support
Additional Software			Git Integration
Licenses		\mathbf{E}	Git SCM Support
Shortcuts Drivers			Terminals ANSI/vt102 compatible Terminal support for Serial, ssh and Telnet
Summary			
Installing			
Results			
	Select	t All	
_			< <u>B</u> ack <u>N</u> ext > <u>Install</u> Cancel

Figure 5: Installation of e2 studio – Extra Features



5. Customize Features

Select the components to install and click the [Next] button to continue. Be sure to choose "Renesas FSP Smart Configurator Core". Otherwise, FSP won't be built on e2 studio successfully.

-	Renesas e² studio 2024	-07 Setup				×
Rer	nesas e² studio 2024	I-07 Setup	Ren	E	SΛ	S
9	Welcome Device Families Extra Features Customise Features Additional Software Licenses Shortcuts Drivers Summary Installing Results	Select the components you want to install. Renesas RE tamily support to allow project generation and build or executable projects and IAR projects.		projects,	aebug only	~
			Size of inst	all: 911	.5 MB	
		< <u>B</u> ack <u>N</u> ext >	Install		Cancel	

Figure 6: Installation of e2 studio – Features



6. Additional Software

Select additional software (i.e., compilers, utilities, QE...) to be installed. Be sure that you select the "GCC toolchains & Utilities" tab, choose the following items, and click [Next] to continue.

• GCC ARM A-Profile (AArch64 bare-metal) 13.2 rel1

Renesas e ² studio 2024-0 Renesas e ² studio 2024-		30	
Select the additional softwa	are you wish to install		
Welcome Device Families Extra Features Customise Features Additional Software Licenses Shortcuts Drivers Summary Installing Results	 Renesas QE Renesas AI Renesas Toolchains && Utilities Renesas Toolchains && Utilities Renesas E2 Self-Checking Program V1.02.00 Renesas E2 Lite Self-Checking Program V1.00.00 Renesas E1, E20 Self-Checking Program V1.01.00 GCC Toolchains && Utilities GNU ARM Embedded 12.2-Rel1 GNU ARM Embedded 10.3 2021.10 GNU ARM Embedded 9.3.1 2020q2 GNU ARM Embedded 9.2.1 2019q4 GNU ARM Embedded 6 2017q2 GCC ARM A-Profile (AArch64 bare-metal) 13.2.Rel1 GCC ARM A-Profile (AArch64 bare-metal) 10.3 2021.01 LibGen for GNU ARM Embedded 	v1.02.00 v1.00.00 v1.01.00 12.2.1.arm-12-24 10.3.0.202110 9.3.1.2020q2 9.2.1.2019q4 6.0.0.2017q2 13.2.1.20231009 7 10.3.0.2021-07 1.2023.11	1000 B 1000 B 1000 B 1000 B 1000 B 8.8 MB
	< <u>B</u> ack <u>N</u> ex	t> Ins	381.5 MB download required

Figure 7: Installation of e2 studio – Additional Software



7. Licenses Agreement

Please read and accept the software license agreement, then click the [Next] button. Note that acceptance of the license agreement is mandatory; without it, the installation process cannot proceed.

🔜 Renesas e² studio 20.					×
Renesas e ² studio 20	24-07 Setup		KENE	S/	12
Welcome	Please read and accept the foll	owing Software Agreements			
Device Families	Renesas e2 studio	License Terms and Conditions for RENESAS e2	2 studio		^
Extra Features	OpenJDK License Agreement	This Renesas e2 studio license agreement ("Ad	areement") is het	ween the	
Customise Features	ARM DS-5 Toolchain Integrat IAR Plugin Manager	entity on whose behalf you are entering into t Renesas Electronics Corporation, a Japanese of	his Agreement (" company with its r	Client") an egistered	
Additional Software		office at 3-2-24, Toyosu, Koto-ku, Tokyo 135-0 SHOULD READ THIS AGREEMENT CAREFULLY BINDING CONTRACT BETWEEN CLIENT AND	, AS IT CONSTITU		J
Licenses		The Renesas IDE Software (defined below) is is by a company or corporation only and is not o	designed, develop	oed or	
Shortcuts		produced for any private use or purpose. If yo intend to install the Renesas IDE Software on			Sec. 1
Drivers		Renesas IDE Software is expected to be used	and the second	ose direct	ly
Summary		or indirectly, you should click "No" on the inst Otherwise, by clicking the "I accept" button or		nechanisn	n
Installing		designed to acknowledge agreement to the to			
Results		this Agreement, or by installing, accessing, or or any portion of the Renesas IDE Software, yo behalf of the entity for which you are authoriz	ou accept this Agi	reement o	n
	< >>	and acknowledge that such entity is legally be			
	accept the terms of the Sof	tware Agreements		Pri	int all
		< <u>B</u> ack <u>N</u> ext >	Install	Cance	1

Figure 8: Installation of e2 studio – Licenses



8. Shortcuts

Select a shortcut name for the start menu and click the [Next] button to continue.

Note:

If e2 studio was installed in another location, it is recommended to rename it to distinguish from the other e2 studio(s).

Renesas e² studio 2024	I-07 Setup				×
Renesas e² studio 2024	4-07 Setup	Ren	NE	S/	12
Welcome Device Families Extra Features Customise Features Additional Software Licenses Shortcuts Drivers Summary Installing Results	Shortcuts to important programs and files will be created in the following location of the start menu group: Renesas Electronics e2 studio	ations:		<u>R</u> estore I	Default
	< <u>B</u> ack <u>N</u> ext >	<u>I</u> nstall		Cance	el

Figure 9: Installation of e2 studio – Shortcuts



9. Summary

On the summary page, a list of components to be installed will be displayed. Please review the contents and click the [Install] button to proceed with the installation of the Renesas e2 studio IDE.

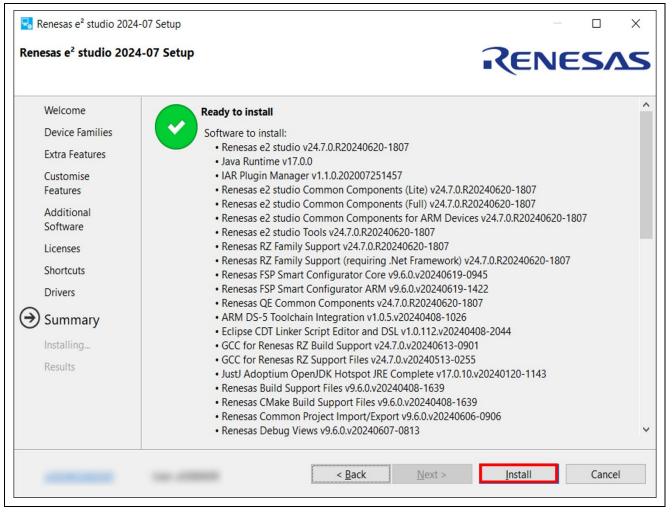


Figure 10: Installation of e2 studio – Summary

10.Installing...

The installation will proceed. Depending on selected items of the additional software, new dialog prompts may appear during the installation process. Please follow the instructions provided by the installer when this occurs.



11.Results

If the installation has been successfully completed, you should see the following information.

	Renesas e ²	² studio 2024-07 s	Setup		
Renesas e² studio 2024-0	7 Setup			RENE	SΔS
Welcome Device Families Extra Features Customise Features Additional Software Licenses Shortcuts Summary Installing	Installation of e2 studio Please click OK to close. Launch e2 studio? View Release Notes View What's New?				
		< Back	Next >	Cancel	ОК

Figure 11: Results Page



2.1.4 e2 studio installation for Linux PC

This chapter describes how to install the e2 studio IDE on Linux PC.

2.1.4.1 Prerequisite

Please download the development tool related stuff:

 SEGGER J-Link driver
 Please download the driver V7.92c or after from: https://www.segger.com/downloads/jlink/JLink Linux x86 64.deb

• e2 studio IDE installer

The latest e2 studio IDE installer package can be downloaded from Renesas website for free. Please check detailed information from: <u>https://www.renesas.com/e2studio</u>.

2.1.4.2 Installation

This section describes the procedure of each software installation. Filename, version number and the file path are just examples. Please replace those in accordance with your environment.

• Segger J-Link driver

Open a terminal window and enter the commands stated below:

```
$ sudo dpkg -i JLink_Linux_V792c_x86_64.deb
```

If the previous installation fails with unmet dependencies, please retry as follows:

```
$ sudo apt-get -f install
$ sudo dpkg -i JLink_Linux_V792c_x86_64.deb
```

• e2 studio

- 1. Run the e2 studio IDE Installer "./e2studio_installer-yyyy-mm_linux_host.run". (Before running the installer, check the execution permission of the installer.
- 2. User needs to select Install Type as shown below. In this material, it is expected that Custom Install is selected. Then, click [Next >] to continue.

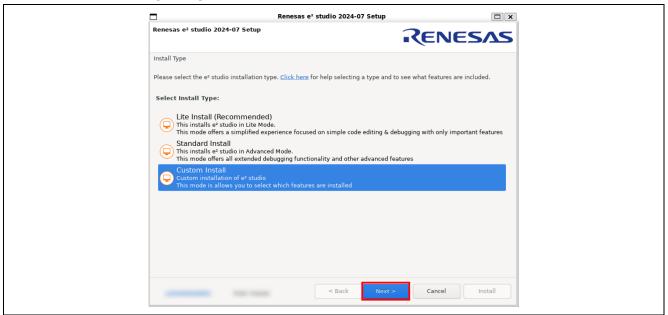


Figure 12: Selection of Install Type



3. User can change the install folder by clicking [Change...]. Click [Next] to continue.

Note:

- 1. If you would like to have multiple versions of e2 studio, please specify new folder here.
- 2. Multi-byte characters cannot be used for e2 studio installation folder name.



Figure 13: Installation of e2 studio – Welcome page

3. Device Families

Select Devices Families to install. Click the [Next] button to continue.

	Renesas e² studio 2024-07 Setup	1	×
Renesas e ² studio 2024-07 Se Select the device families you wi		RENES	ΔS
Welcome	RA RA Build, Debug & Code General	ation support for Renesas RA devic	ces
Extra Features		ation support for Renesas RZ devic	ces
Additional Software		ation support for Renesas RL78 dev	vices
Licenses Shortcuts		ation support for Renesas RX devic	ces
Summary	RH850 RH850 Debug support for Renesas R	RH850 devices	
Results	RENESAS RE Build & Debug support for Re	enesas RE devices	
	RENESAS RZ Build & Debug support for Lir	nux on Renesas RZ devices	
Se			
	< Back Nex	xt > Cancel Ir	nstall

Figure 14: Installation of e2 studio – Device Families



4. Extra Features

Select Extra Features (i.e., Language packs, SVN & Git support, RTOS support...) to be installed. For non-English language users, please select Language packs at this step if needed. Then, please click the [Next] button to continue.

		e² studio 2024-07 Setup
Renesas e² studio 2024-07 Se Select the extra features you wit		RENESAS
Welcome Device Families Extra Features Customise Features Additional Software Licenses Shortcuts Summary Installing Results		Japanese Language Support Chinese (Simplified) Language Support Chinese (Traditional) Language Support Git Integration Git SCM Support Terminals ANSI/vt102 compatible Terminal support for Serial, ssh and Telnet
S	elect All	< Back Next > Cancel Install

Figure 15: Installation of e2 studio – Extra Features

5. Customize Features

Select the components to install and click the [Next] button to continue. Be sure that "Renesas FSP Smart Configurator Core" is certainly selected.

Renesas e² studio 2024-07 Setup
Select the components you want to install.
Welcome Improve Pamily Support (24.7.0.420240620-1807) Device Families Extra Features Image: Customise Features Reness FSP Smart Configurator Core (9.6.0.v20240619-0945) Common components for Reness FSP Smart Configurator Image: Customise Features Reness FSP Smart Configurator CAMB (9.6.0.v20240619-1422) Common Components for Reness FSP Smart Configurator Image: Customise Features Image: Components for Reness FSP Smart Configurator Image: Customise Features Image: Components for Reness FSP Smart Configurator Image: Customise Features Image: Components for Reness FSP Smart Configurator Image: Customise Features Image: Components for Reness FSP Smart Configurator Image: Customise Features Image: Common Components for Reness FSP Smart Configurator Image: Customise Features Image: Common Components for Reness FSP Smart Configurator Image: Customise Features Image: Common Components for Reness FSP Smart Configurator Image: Customise Features Image: Common Components for Reness FSP Smart Configurator Image: Customise Features Image: Common Components for Reness FSP Smart Configurator Image: Customise Features Image: Customise Features Image: Customise Features Image: Customise Features Image: Customise Image: Customise Features

Figure 16: Installation of e2 studio – Features



6. Customize Features

Select additional software (i.e., compilers, utilities, QE...) to be installed. Be sure that you select the "GCC toolchains & Utilities" tab, choose the following items, and click [Next] to continue.

• GCC ARM A-Profile (AArch64 bare-metal) 13.2 rel1

Figure 17: Installation of e2 studio – Additional Software

7. License Agreement

Read and accept the software license agreement. Click the [Next] button. Please note that user must accept the license agreement, otherwise installation cannot be continued.

	Renesas e ² s	tudio 2024-07 Setup	
Renesas e² studio 2024	1-07 Setup	RE	ΕΝΕΣΛΣ
Welcome	Please read and accept	t the following Software Agreemen	its
Device Families Extra Features Customise Features Additional Software Licenses Shortcuts Summary Installing Results	Renesas e2 studio OpenJDK License Agreem ARM DS-5 Toolchain Inter IAR Plugin Manager	License Terms and Conditions for RENE This Renease 25 studio license agreem between the entity on whose behalf yo Agreement ("Client") and Renease Elec Japanese company with its registered of Kota-ku. Tokyo 135-0061. Japan ("Reme THIS AGREEMENT CAREFULLY. AS IT CC CONTRACT BETWEEN CLIENT AND REN The Renease IDE Software (defined bel commercial use by a company or corpy designed, developed or produced for an if you are an individual, or is expected to be used for a private pu you should click "No" on the installer. Otherwise, by clicking the "I accept" bu mechanism designed to acknowledge - an electronic copying or using all or any IDE Software, you accept this Agreement or which you are authorized to act (e. acknowledge that such entity is legally and you represent and warrant that you authority to act on behalf of and bind s yourself. IF YOU DO NOT AGREE TO THE TERMS	tent ("Agreement") is us are entering into this stronics Corporation, a diffice at 3-2-24, Toyosu, diffice at 3-2-24, Toyosu, saar), YoU SHOULD READ NSTITUTES A BINDING ESAS. NOW) is intended for varation only and is not ny private use or purpose. Io install the Renesas IDE the Renesas IDE Software rpose directly or indirectly, atton or other button or agreement to the terms of or by installing, accessing, y portion of the Renesas in on behalf of the entity J, an employer) and to hen half of the entity u have the right, power and uch entity (if any) and CONTAINED IN THIS
		AUTHORITY TO ACT ON BEHALF OF AN	D BIND SUCH ENTITY, DO
	I accept the terms of t		Print all

Figure 18: Installation of e2 studio – Licenses



8. Shortcuts

Select shortcut name for start menu and click [Next] button to continue.

Figure 19: Installation of e2 studio – Shortcuts

9. Summary

Components list to be installed is shown. Please confirm the contents and click the [Install] button to install the Renesas e2 studio IDE.

Renesas e² studio 2024-07 Setup Welcome Device Families Extra Features Customise Features Additional Software Licenses Shortcuts Menesas PS Summary Installing Results Distalling Results
Device Families Software to install: Extra Features Senesas e2 studio CA2.0.802040620-1807 Customise Features Features Namime V1.0.0 Additional Senesas e2 studio Common Components (Full) v24.7.0.820240620-1807 Software V24.7.0.820240620-1807 Licenses Renesas e2 studio Common Components (Full) v24.7.0.820240620-1807 Shortcuts Renesas e2 studio Common Components (Full) v24.7.0.820240620-1807 Renesas e2 studio Common Components (Full) v24.7.0.820240620-1807 Shortcuts Renesas e2 studio Configurator ARM Pevices Software V24.7.0.820240620-1807 Installing Renesas E7 FP Smart Configurator CRM My 96.0.v20240619-0422 Renesas FP Smart Configurator CRM My 96.0.v20240619-0425 Renesas CP Common Components v24.7.0.820240620-1807 Installing Renesas CP Common Components v24.7.0.820240620-1807 Results CC for Renesas R2 Eanily Support v24.7.0.v20240619-0422 Results CC for Renesas R2 Eanily Support v24.7.0.020240610-1020 Installing Reclease Studio Support V24.7.0.v202406108-0206 Results CC for Renesas R2 Eanily Support v24.7.0.v202406108-0201 Usit Adoptium OpenJDK Hotspot JRE Complete v17.0.10.v20240120-1143 <td< th=""></td<>
Renesas Common Project Import/Export v9.6.0.v2024006-0906 Renesas Debug Views v9.6.0.v2024000-0813 Renesas Debug Views (Lite) v9.6.0.v2024007-0813 Renesas RTOS Debug Views v9.6.0.v20240530-1615 Renesas RZ Debug Support v24.7.0.v20240630-1615 Renesas RZ Debug Support V24.7.0.v20240622-0251 Renesas RZ Debug Views Views Views V0.6.0.v20240622-0251 Renesas Smart Configurator for RZ v24.7.0.v20240622-0854 Renesas e 2 studio ARM Common Debug v9.6.0.v20240520-0840 Renesas e 2 studio ARM Common GCC Build v9.6.0.v20240520-0840

Figure 20: Installation of e2 studio – Summary



10.Installing...

The installation is performed. Depending on selected items of additional software, new dialog prompts may appear during the installation process. Please see chapter 2.1.3.2 for more detailed information.

11.Results

If the installation is successfully done, you should see the following information.

nesas e² studio 2024-07 Setup
Welcome Installation of e2 studio is complete. Device Families Please click OK to close. Extra Features Launch e2 studio? Customise View Release Notes? Additional View What's New? Software View What's New? Licenses Shortcuts Summary Installing Presults Please click OK to close.

Figure 21: Summary Page



2.2 FSP setup

In this section, 3 ways of FSP installation are described. However, at this moment, platform installer won't be available and so, please install FSP based on either 2.2.2 or 2.2.3.

2.2.1 Installation of FSP Packs using Platform Installer

This section describes how to install FSP using Platform Installer **setup_rzafsp_v3_2_0_e2s_v2024-07.exe** showcased at <u>here</u>.

 Double-click setup_rzafsp_v3_2_0_e2s_v2024-07.exe, select either [Quick Install] or [Custom Install] and click [Next >] when the installation wizard is shown. When you chose [Quick Install], you can jump to 6. Licenses.

Note:

If e2 studio was installed in your PC, the option to upgrade the existing version or install e2 studio to a different location will be displayed.

Install Type		
	Select Install Type:	
	Quick Install Default installation of e ² studio, FSP & GCC ARM Embedded	
	Custom Installation of e ² studio, FSP & GCC ARM Embedded	

Figure 22: FSP Platform Installation Wizard

2. Welcome page

User can change the install folder by clicking [Change...]. Click [Next] to continue.

Note:

- 1. If you would like to have multiple versions of e2 studio, please specify new folder here.
- 2. Multi-byte characters cannot be used for e2 studio installation folder name.





Figure 23: FSP Platform Installer – Welcome page

3. Extra Features

Select Extra Features (i.e., Language packs, SVN & Git support, RTOS support...) to be installed. For non-English language users, please select Language packs at this step if needed. Then, click the [Next] button to continue.

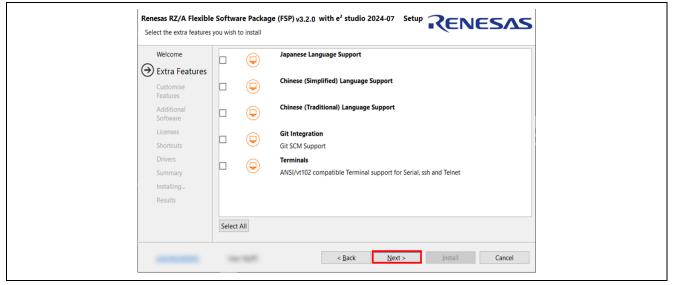


Figure 24: FSP Platform Installer – Extra Features

4. Customize Features

Essential features have already been selected. If you would like to install additional features, please check those and then click [Next >].



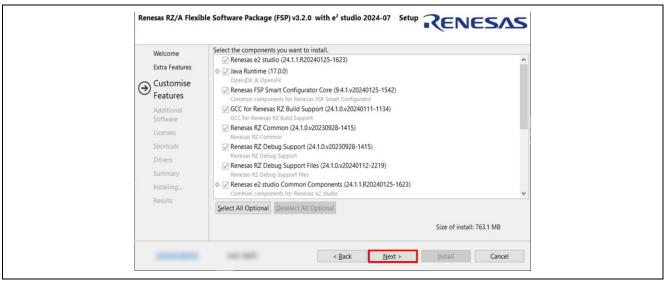


Figure 25: FSP Platform Installer – Features



5. Additional Software

All the software is selected by default. click [Next >].

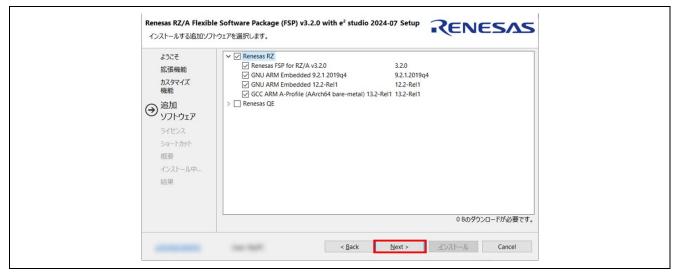


Figure 26: FSP Platform Installer – Additional Software

6. Licenses

Please read and accept Software License Agreements to be listed and click [Next >].

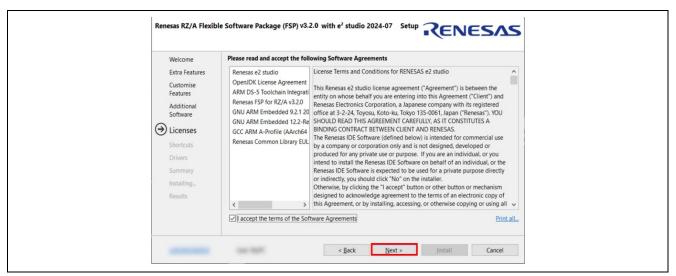


Figure 27: FSP Platform Installer – Licenses

7. Shortcuts

Select shortcut name for start menu and click [Next] button to continue.

Note:

If e2 studio was installed in another location, it is recommended to rename it to distinguish from the other e2 studio(s).



Welcome Extra Features	Shortcuts to important programs and files will be created in the following locations: In start menu group: Renesas RZA v3.2.0
Customise Features Additional Software Licenses Shortcuts Drivers Summary Installing Results	€ <u>Restore</u> Defaul

Figure 28: FSP Platform Installer – Shortcuts

8. Summary

Components list to be installed is shown. Please confirm the contents and click the [Install] button to install the Renesas e2 studio IDE.

Welcome
Extra Features Customise Features Additional Software Licenses Shortcuts Drivers O Summary Installing,, Results

Figure 29: FSP Platform Installer – Summary

10.Installing...

The installation is performed. Depending on selected items of additional software, new dialog prompts may appear during the installation process. At that time, please follow the instruction the installer indicates.

11.Results

If the installation is successfully done, you should see the following information.



Licenses Shortcuts Drivers Summary Installing

Figure 30: Installation Results of FSP Platform Installer

2.2.2 Installation of FSP Packs using Package Installer

Package Installer **RZA_FSP_Packs_v3.2.0.exe** is showcased at <u>here</u>. Please note that it's for Windows Host PC only.

Here is the procedure:

- 1. Exit e2 studio.
- 2. Invoke RZA_FSP_Packs_v3.2.0.exe.
- 3. Click [Next >] to start the installation.

Renesas Flexible Software Package (FSP) Installer This installer will install FSP packs and documentation into an existing e2 studio installation. The documentation will be available at <install_directory>/fsp_documentation/rza/<version: The source for FSP can be found at https://github.com/renesas/rza-fsp</version: </install_directory>	
Next > Cancel	

Figure 31: FSP Package Installer

4. See the license term and click [I Agree] if it's acceptable



RZA FSP v3.2.0 Please review the license terms before installing Renesas RZA FSP v3.2.0	
https://qithub.com/renesas/rza-fsp/blob/master/LICENSE.md	
If you accept all terms of the agreement, click I Agree.	
< Back I Agree Cancel	

Figure 32: FSP License Term

5. Specify e2 studio installation folder (e.g., C:\Renesas\e2studio) and click [Install].

	2hoose Install Location	
• (ENESAS	Choose the folder in which to install Renesas RZA FSP v3.2.0	
The installation path must po C:¥Renesas¥e2_studio). Plea	nt to the root of the e2 studio installation (e.g. se make sure e2 studio is closed before installation.	
Browse to folder where e2 C:¥Renesas¥e2_studio¥	studio is installed	
Space required: 47.8 MB Space available: 10.7 GB		
	< Back Install Cancel	

Figure 33: FSP Installation

6. Click [Finish] to complete the installation.



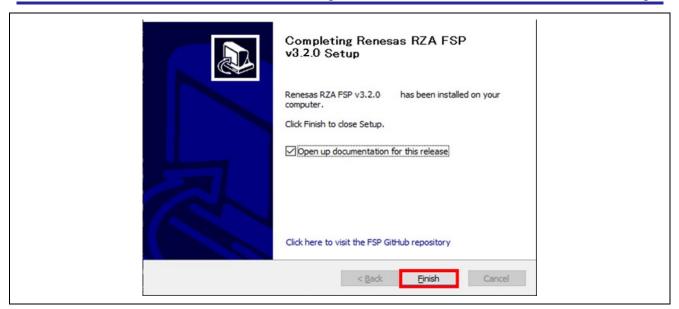


Figure 34: Completion of FSP Installation

If the box **Open up documentation for this release** is checked at that time, FSP documentation for the installed version of FSP should be opened.

2.2.3 Installation of FSP Packs using Package Zip file

No Package installer is available for Linux Host PC and therefore, you need to install FSP Packs with **RZA_FSP_Packs_v3.2.0.zip**. This section describes how to do install it. Please note that the same installation procedure is valid for Windows Host PC.



- 1. Download **RZA_FSP_Packs_v3.2.0.zip** from <u>here</u>.
- 2. Extract the zip file to e^2 studio installation directory.
 - If the FSP Packs are successfully extracted, rz_fsp/rza/packs directory is placed at the location below:
 - <e² studio installation directory>/internal/projectgen

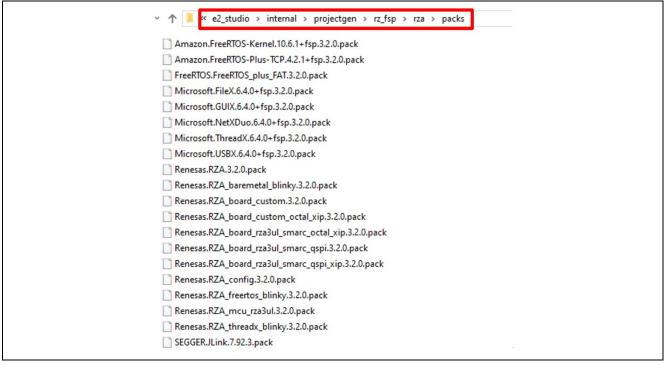
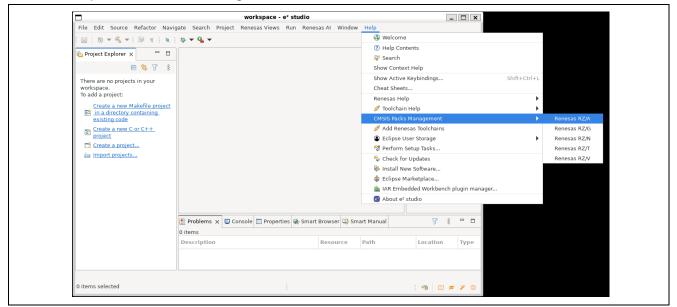


Figure 35: FSP Packs in e2 studio installation directory

- 3. At the 1st invocation of e² studio after you carry out the above procedure, FSP Packs should be installed automatically.
- 4. You can check if the installation is successfully done by the following procedure: Click **Help > CMSIS Packs Management > Renesas RZ/A**.





If FSP is successfully installed, 3.2.0 should be listed under FSP as shown below:

/home/masao/.eclipse/com.renesas.p	olatform_1646807469/intern	al/projectgen	/rz_fs	p/rz
Show in System Explorer				
Available Packs		€	(1)	+
Category	Version	Status		
▼ 聞 FSP				
▶ iii 3.2.0				
FSP Companions				
Generic				
Search				



3. Set up an SMARC EVK

Below is an example of a typical system configuration.

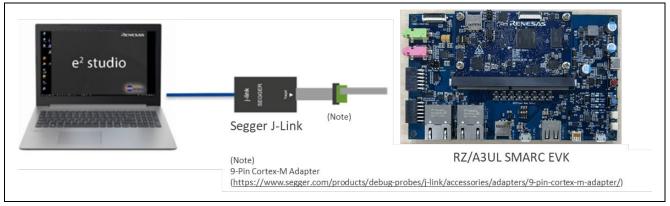


Figure 36: System Configuration Example – SMARC EVK

3.1 Supported Debugger

 SEGGER J-Link For details on SEGGER J-Link, please see <u>J-Link Debug Probes by SEGGER – the Embedded Experts</u>.

3.2 Board Setup

3.2.1 Boot Mode

Set up the SW11 as follows to configure Boot Mode 3 (QSPI or OCTA Boot (1.8V) Mode)/

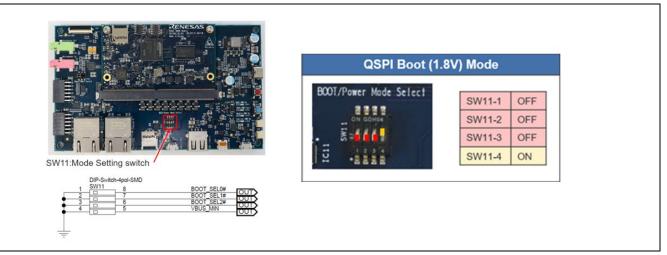


Figure 37: Boot MODE



3.2.2 JTAG connection

When connecting JTAG, you must set the DIP SW1 settings as follows:

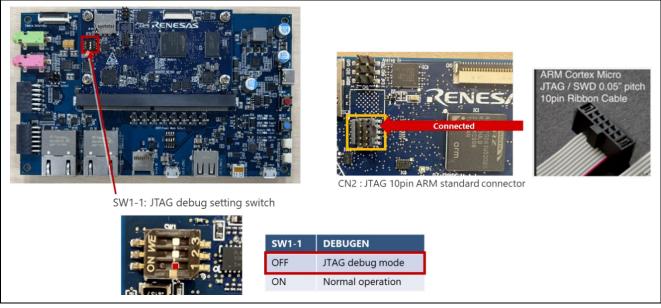


Figure 38: JTAG connection

Please note that RZ/A3UL SMARC EVK has CoreSight 10 connector and therefore, the following adapter must be needed to connect Segger J-Link.

https://www.segger.com/products/debug-probes/j-link/accessories/adapters/9-pin-cortex-m-adapter/

3.2.3 Debug Serial (console output)

Debug serial uses CN14. The baud rate is 115200bps.

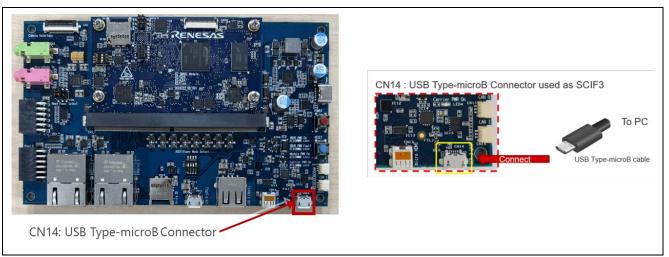


Figure 39: Debug Serial (console output)



3.2.4 Power Supply

Here are the proven power supply related goods to be used in Renesas' development. Please prepare for the equivalent ones for your development.

- USB Type-C cable CB-CD23BK (manufactured by Aukey)
- USB PD Charger Anker PowerPort III 65W Pod (manufactured by Anker)

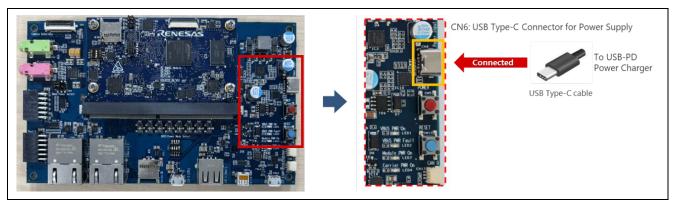


Figure 40: Power Supply

For power supply, please follow the following procedure:

- Connect USB-PD Power Charger to USB Type-C Connector (CN6). Once USB-PD Power Charger is connected to the CN6, LED1 (VBUS PWR ON) and LED3 (Module PWR ON) should light up.
- Press the power button (SW9) to turn on the power When turning on the power, you need to press and hold the power button for 1 second. Also, the power button should be pressed and held for 2 seconds for turning off the power.
- 3. If the power supply is successful, LED4 (Carrier PWR On) should light up.

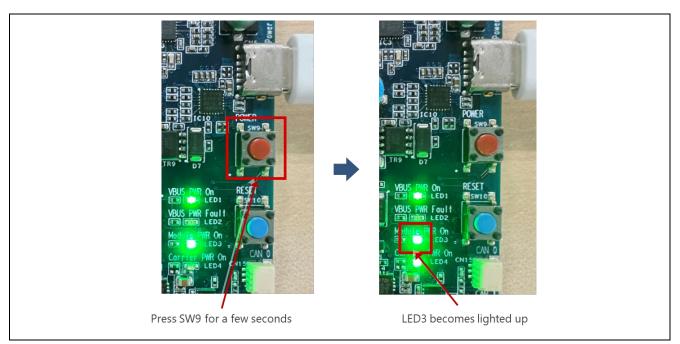


Figure 41: LED Status after Turning on EVK



3.2.5 How to check if your board is operational

This section describes how to check if your board is operational.

- 1. Connect the board to your development PC as described in 3.2.3.
- 2. Turn on the board as described in 3.2.4.
- 3. Launch Terminal Software (e.g., Tera Term).
- 4. Establish the connection between the board and development PC as shown in figure below:



Figure 42: Establishment of connection between EVK and Development PC

5. You should see the following message on your Terminal Software. You can ignore the keyword "error" since the cause of error is that nothing is programmed to QSPI Flash or OctaFlash by default.

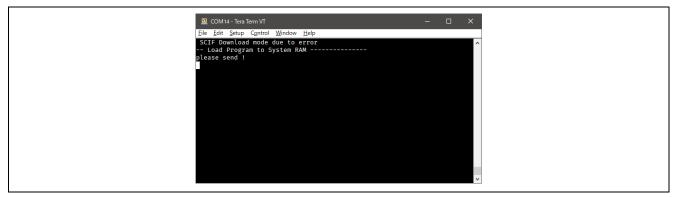


Figure 43: Message on your terminal at the 1st power-up of EVK

4. Tutorial: Your First RZ MPU Project - Blinky

4.1 Tutorial Blinky

The goal of this tutorial is to quickly get acquainted with the Flexible Platform by moving through the steps of creating a simple application using e2 studio and running that application on an RZ MPU board.

4.2 What Does Blinky Do?

The application used in this tutorial is Blinky, traditionally the first program run in a new embedded development environment.

Blinky is the "Hello World" of microprocessors. If the LED blinks you know that:

- The toolchain is setup correctly and builds a working executable image for your chip.
- The debugger has installed with working drivers and is properly connected to the board.
- The board is powered up and its jumper and switch settings are probably correct.
- The microprocessor is alive, the clocks are running, and the memory is initialized.
- Timer (GTM) interrupt is intentionally fired and GPIO is properly controlled.

Note:

SRMAC EVK board does not have any LED. Thus, Blinky sample application used in this tutorial is designed to use the Pmod module described below alternatively:



Pmod LED (Four High-brightness LEDs):
 <u>https://reference.digilentinc.com/pmod/pmodled/start</u>

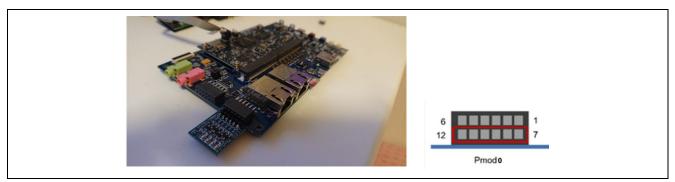


Figure 44: Connection Pmod LED module (410-076)

This module is not included on the SRMAC EVK board and so, please prepare it beforehand.

4.3 Create a New Project for Blinky

The creation and configuration of an RZ/A C/C++ FSP Project is the first step in the creation of an application. The base RZ/A pack includes a pre-written Blinky example application.

Follow these steps to create an RZ MPU project:

1. In e2 studio, click [File] > [New] > [C/C++ Project].

File	Edit	Navigate	Search	Project	Renesas Views	Run	Window	Help		
	New				Alt+Shift+N >		Renesas C/	C++ Project	>	2
	Open	File				C	C/C++ Pro	iect		Г
	Open Projects from File System Recent Files				2	Project			\vdash	
				>		Example				
	Close	Editor			Ctrl+W	-9	Other		Ctrl+N	F
	Close	All Editors			Ctrl+Shift+W		,			

Figure 45: New C/C++ Project

2. Select [Renesas RZ] > [Renesas RZ/A C/C++ FSP Project] and Click Next.

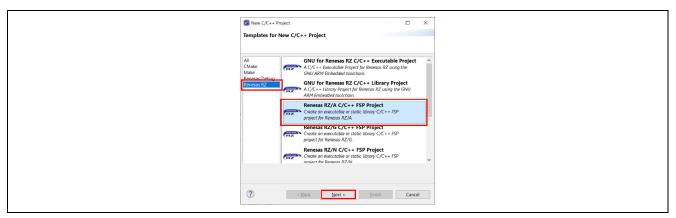


Figure 46: Renesas RZ/A C/C++ FSP Project

- 3. Assign a name to this new project. Blinky is a good name to use for this tutorial.
- 4. Click Next. The Project Configuration window shows your selection.



Renesas RZ/A C/C++ FSP Project	- 🗆 X
Renesas RZ/A C/C++ FSP Project	
Project Name and Location	
Project name	
Blinky	
Use default location	
Location: C\workspace\Blinky	B <u>r</u> owse
You can download more Renesas packs here	
0	< Back Next > Finish Cancel

Figure 47 : e2 studio Project Configuration window (part 1)

5. Select the board support package corresponding to the package you would like to use, GCC ARM A-Profile (AArch64 bare-metal) and 13.2.1 from the Device Selection drop-down list, Toolchains and Version Selection drop-down list respectively. Then, Click [Next].

	sas RZ/A C/C++ FSP Project		X
	s RZ/A C/C++ FSP Project		
Device	and Tools Selection		
Device :	Selection		
FSP Ver	rsion: 3.2.0 v	Board Description	
Board:	RZ/A3UL Evaluation Board Kit QSPI Edition (eXecute-In-Place)		
Device	: R9A07G063U02GBG		
Core:	Core 0 ~	Device Details	
Langua	ige: ●C○C++	TrustZone No Pins 361 Processor Cortex-A55	>
Toolcha	ins	Debugger	
GCC A	RM A-Profile (AArch64 bare-metal)	J-Link ARM	~
13212	0231009 🗸		
(?)		< Back Next > Einish	Cancel

Figure 48 : e2 studio Project Configuration window (part 2)

6. Select the **Build Artifact** and **RTOS**.



Renesas RZ/A C/C++ FSP Project Renesas RZ/A C/C++ FSP Project Build Artifact and RTOS Selection		×
Build Artifact Selection Executable Project builds to an executable file Static Library Project builds to a static library file Executable Using an RZ/A Static Library Project builds to an executable file Project uses an existing RZ/A static library project 	RTOS Selection No RTOS	~
0	< Back	Next > Einish Cancel

Figure 49 : e2 studio Project Configuration window (part 3)

7. Select the **Blinky** template for your board and click **Finish**.

Renesas RZ/A C/C++ FSP Project	
Renesas RZ/A C/C++ FSP Project	-
Project Template Selection	1
Project Template Selection	
Bare Metal - Blinky Bare metal FSP project that includes BSP and will blink LEDs if available. This project will initialize clocks, pins, stacks, and the C runtime environment. [Renesas.RZA3.0.0.pack]	
Bare Metal - Minimal Bare metal FSP project that includes BSP. This project will initialize clocks, pins, stacks, and the C runtime environment. [Renesas.RZA3.0.0.pack]	
Code Generation Settings	
Use Renesas Code Formatter	
A seck A seck	Cancel

Figure 50 : e2 studio Project Configuration window (part 4)

Once the project has been created, the name of the project will show up in the **Project Explorer** window of e2 studio. Now click the **Generate Project Content** button in the top right corner of the **Project Configuration** window to generate your board specific files.



Summary		G	Generate Project Content
Project Summary		Renes	SAS
Device: R9A070 Core: Core 0 Toolchain: GCC for Toolchain Version: 13.2.1.2 FSP Version: 3.2.0 Project Type: Flat	r Renesas RZ (A-Profile AArch64 bare-metal) 20231009 √g3e/Blinky 😓		
RZA Configuration Templatu Board Support Package Con I/O Port Memory Management Unit General Timer Board support package for f Board support package for f Board support package for f	mmon Files R9A07G063U02GBG	v3.1.0 v3.1.0 v3.1.0 v3.1.0 v3.1.0 v3.1.0 v3.1.0 v3.1.0 v3.1.0 v3.1.0 v3.1.0 v3.1.0 v3.1.0	

Figure 51 : e2 studio Project Configuration tab

Your new project is now created, configured, and ready to build.

4.3.1 Details about the Blinky Configuration

The Generate Project Content button creates configuration header files, copies source files from templates, and generally configures the project based on the state of the Project Configuration screen.

For example, if you check a box next to a module in the Components tab and click the Generate Project Content button, all the files necessary for the inclusion of that module into the project will be copied or created. If that same check box is then unchecked those files will be deleted.

4.3.2 Configuring the Blinky Clocks

By selecting the Blinky template, the clocks are configured by e2 studio for the Blinky application. The clock configuration tab (see 5.2.3. Configuring Clocks) shows the Blinky clock configuration. The Blinky clock configuration is stored in the BSP clock configuration file.

4.3.3 Configuring the Blinky Pins

By selecting the Blinky template, the GPIO pins used to toggle the LED1 are configured by e2 studio for the Blinky application. The pin configuration tab shows the pin configuration for the Blinky application (see 5.2.4.Configuring Pins). The Blinky pin configuration is stored in the BSP configuration file.

4.3.4 Configuring the Parameters for Blinky Components

The Blinky project automatically selects the following HAL components in the Components tab:

- r_gtm
- r_ioport
- r_mmu

To see the configuration parameters for any of the components, check the Properties tab in the HAL window for the respective driver (see 5.2.9.Adding and Configuring HAL Drivers).

4.3.5 Where is main()?

The main function is located in <project>/rza_gen/main.c. It is one of the files that are generated during the project creation stage and only contains a call to hal_entry(). For more information on generated files, see Adding and Configuring HAL Drivers.



4.3.6 Blinky Example Code

The blinky application is stored in the hal_entry.c file. This file is generated by e2 studio when you select the Blinky Project template and is located in the project's src/ folder.

The application performs the following steps:

- 1. Get the LED information for the selected board by bsp_leds_t structure.
- 2. Set the configuration of Timer (GTM) and the callback function that is called when interrupt is fired.
- 3. Define the output level HIGH for the GPIO pins controlling the LEDs for the selected board.
- 4. Toggle the LEDs by calling "R_BSP_PinWrite((bsp_io_port_pin_t) pin, pin_level)" for writing to the GPIO pin in callback function of GTM that is called with the specified interval.

4.4 Build the Blinky Project

Highlight the new project in the Project Explorer window by clicking on it and build it. There are three ways to build a project:

- 1. Click on Project in the menu bar and select Build Project.
- 2. Click on the hammer icon.
- 3. Right-click on the project and select Build Project.

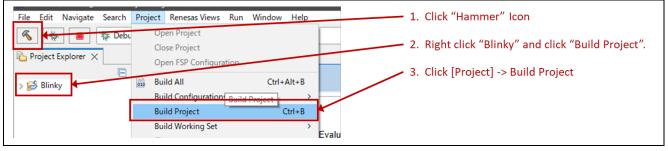


Figure 52 : e2 studio Project Explorer window

Once the build is completed, a message shown below is displayed in the build Console window that displays the final image file name and section sizes in that image:

/rza	/fsp/src/bsp/cmsis/Device/RENESAS/Source/program entry.asm
/rza	/fsp/src/bsp/cmsis/Device/RENESAS/Source/startup.asm
Buildi	ng file:/rza/fsp/src/bsp/cmsis/Device/RENESAS/Source/system.c
/rza	/fsp/src/bsp/cmsis/Device/RENESAS/Source/system.c
Buildi	ng file:/rza/fsp/src/bsp/cmsis/Device/RENESAS/Source/vector_table.asm
Buildi	ng file:/rza/board/rza3ul_smarc_qspi_xip/board_init.c
Buildi	ng file:/rza/board/rza3ul_smarc_qspi_xip/board_leds.c
/rza	/fsp/src/bsp/cmsis/Device/RENESAS/Source/vector_table.asm
/rza	/board/rza3ul_smarc_qspi_xip/board_init.c
	/board/rza3ul_smarc_qspi_xip/board_leds.c
	ng target: Blinky.elf
	4-none-elf-objcopy -O ihex "Blinky.elf" "Blinky.hex"
aarch6	4-none-elf-sizeformat=berkeley "Blinky.elf"
tex	
1192	4 6736 2164980 2183640 2151d8 Blinky.elf
19:52:	34 Build Finished. 0 errors, 0 warnings. (took 6s.813ms)

Figure 53 : e2 studio Project Build console



4.5 Debug the Blinky Project

4.5.1 Debug prerequisites

To debug the project on a board, you need

- The board to be connected to e2 studio
- The debugger to be configured to talk to the board
- The application to be programmed to the microprocessor

Applications run from the internal ram or external ram of your microprocessor. To run or debug the application, the application must first be programmed to ram by JTAG debugger. SMARC EVK board has an JTAG header and requires an external JTAG debugger to the header.

4.5.2 Debug steps

To debug the Blinky application, follow these steps:

1. Configure the debugger for your project by clicking [Run] > [Debugger Configurations...].

Renesas Debug Tools > Run Ctrl+F11 Debug F11 Run History > Run As > Run Configurations Debug History	Run Ctrl+F11 Debug F11 Run History > Run As > Run Configurations > Debug History > * Debug As >	Run Ctrl+F11 Debug F11 Run History > Run As > Run Configurations > Debug History >	Run	Window Help	
Image: bebug F11 Run History > Run As > Run Configurations	Image: body of the second s	Image: body with the second		Renesas Debug Tools	>
Run History > Run As > Run Configurations	Run History > Run As > Run Configurations Debug History > Debug As >	Run History > Run As > Run Configurations > Debug History > * Debug As	Q	Run	Ctrl+F11
Run As > Run Configurations	Nun As > Run Configurations > Debug History > ★ Debug As >	Run As > Run Configurations > Debug History > * Debug As	椮	Debug	F11
Run Configurations	Run Configurations Debug History > As Debug As >	Run Configurations Debug History > the Debug As >		Run History	>
	Debug History >	Debug History >	-		>
Debug History >	🎋 Debug As >	The Debug As		Run Configurations	
					>

Figure 54 : e2 studio Debug icon

or by selecting the drop-down menu next to the bug icon and selecting [Debug Configurations...].

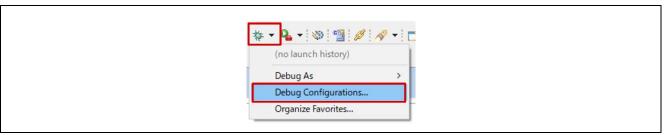


Figure 55 : e2 studio Debugger Configurations selection option



2. Select your debugger configuration in the window. If it is not visible, then it must be created by clicking the "New" icon in the top left corner of the window. Once selected, the **Debug configuration** for your **Blinky** project should be displayed.

C C/C++ Remote Application E ASE Script G OB Hardware Debugging G OB SopenOCD Debugging G OB Simulator Debugging (I) Java Application L Lunch Group Remote Java Application Renesas GDB Hardware Debugging Blinky Debug_Flat Renesas Simulator Debuggir Muld Configuration: Use workspace settings C Inside auto build O Insable auto build O Leable auto build O Leable auto build O Use workspace settings Configure Workspace Settings

Figure 56 : e2 studio Debugger Configurations window with Blinky project (1)

3. Select the debug configuration for the generated project and select the **Debugger** tab.

Edit Renesa	GDB Hardware Debugging configuration Blinky Debug_Flat for Debug	
Launch Config	uration Name: Blinky Debug_Flat	
🗎 Main 🏁 Deb	ugger 🕨 Startup 🗉 Common 💱 Source	
	are: J-Link ARM V Target Device: R9A07G063U	

Figure 57 : e2 studio Debugger Configurations window with Blinky project (2)



4. Select the Connection Settings tab inside the Debugger tab.

Name: Blinky Debug_Flat	Common
	vice: R9A07G063U02GBG
GDB Settings Connection Settings Debug Too	l Settings
✓ J-Link	^

Figure 58 : e2 studio Debugger Configurations window with Blinky project (3)

5. Change **Reset after download** to **Yes**.

📄 Main 🐝 Debugger 🐌 Startup 🧤 Source [Common	
Debug hardware: J-Link ARM V Target Dev	vice: R9A07G063U02GBG	
GDB Settings Connection Settings Debug Too	Settings	
✓ J-Link		^
Туре	USB	~
J-Link Serial	(Auto)	
Settings File	\${workspace_loc:/	\${ProjN
Script File		
Log File	\${workspace_loc:/	\${ProjN
Low Power Handling	No	~
✓ IP Connection		
Connection Method	IP via LAN	~
Host Name/IP Address[:port number]		
Identifier		
Tunnel Server		
Port Number		
Password		
✓ Interface		
Туре	JTAG	~
Speed (kHz)	15000	~
✓ JTAG Scan Chain		
Multiple Devices	No	¥
IRPre	0	
DRPre	0	
✓ Connection		
Register initialization	No	~
Reset at the beginning of connection	Yes	~
Reset at the end of connection	No	~
Reset before download	No	~
Reset after download	Yes	~

Figure 59 : e2 studio Debugger Configurations window with Blinky project (4)

٦

6. If you have selected the QSPI Edition of the SMARC EVK board, skip to Step 8. If you have selected the OCTAL Edition of the SMARC EVK board, Select the **Debug Tool Settings tab** inside the **Debugger** tab.

Edit Ronosas	GDB Hardware Debugging configuration Blinky Debug_Flat for Debu	a
Luit Kellesas	Sob hardware bebugging configuration blinky bebug_hat for bebug	9
Launch Configu	ration Name: Blinky Debug_Flat	
🖹 Main 🏁 Debu	ıgger ▶ Startup 🗉 Common 🦻 Source	
	re: J-Link ARM 🗸 Target Device: R9A07G063U	

Figure 60 : e2 studio Debugger Configurations window with Blinky project (5)

7. Change Flash Bus Type to OctaBus (At this time, Flash Memory Type is automatically changed to OctaFlash).

Edit Configuration		×
dit Renesas GDB Hardware Debugging	configuration Blinky Debug_Flat f	or Debug
aunch Configuration Name: Blinky Debug_Fla	t	
🕯 Main 🎋 Debugger 🕨 Startup 💷 Common 🕏	✓ Source	
Debug hardware: J-Link ARM ~ Target Dev	vice: R9A07G063U	
GDB Settings Connection Settings Debug To	ool Settings	
 ✓ IO 		
Use Default IO Filename	Yes	~
IO Filename	\${support_area_loc}	
✓ General Debug		
Reset After Reload	Yes	~
✓ Memory		
Endian	Little Endian	~
✓ Break		
Use Flash Breakpoints	Yes	~
Allow Simulation	No	~
✓ Flash		
Flash Bus Type	OctaBus	~
Flash Memory Type	OctaFlash	\checkmark
WorkRam Start		

Figure 61 : e2 studio Debugger Configurations window with Blinky project (6)



8. Select the debug configuration for the generated project and select the **Startup** tab.

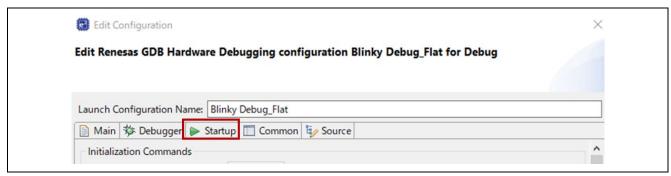


Figure 62 : e2 studio Debugger Configurations window with Blinky project (7)

9. Be sure to change the setting in Load type field of Program Binary [Blinky... raw from Image and Symbols to Symbols only.

t Renesas GDB Hardware	Debugging configur	ation Blinky [Debug_Flat for Debug	9	Edit Renesas GDB Hardware	Debugging configura	ation Blinky I	Debug_Flat for Debu	g
unch Configuration Name: Bl	inky Debug_Flat				Launch Configuration Name: Bl	inky Debug_Flat			
Main 🕸 Debugger 🕟 Star	rtup 🔲 Common 🧤	Source			Main 🕸 Debugger 🕨 Star	tup 🔲 Common 🧤	Source		
Reset and Delay (seconds):	3				Reset and Delay (seconds):	3			
Halt				*	Halt				
□ Halt				Ŷ	Load image and symbols				
oad image and symbols Filename	Load type	Offset (hex)		Add	Load image and symbols Filename	Load type Symbols only	Offset (hex)	On connect Vec	Add
oad image and symbols Filename		Offset (hex)	On connect Yes	Add Edit	Load image and symbols Filename	Symbols only v Image and Symbols	Offset (hex)	On connect Yes	Add Edit
pad image and symbols		Offset (hex)			Load image and symbols Filename	Symbols only Image and Symbols Image only Symbols only	Offset (hex)		
oad image and symbols		Offset (hex)		Edit	Load image and symbols Filename	Symbols only Image and Symbols Image only	Offset (hex)		Edit

Figure 63 : e2 studio Debugger Configurations window with Blinky project (8)



10. Click on Add... to launch Add download module window. Then click Workspace..., choose rza3ul_smarc_qspi_ipl.srec(*) as module to be downloaded and finally click on OK.
* If you have selected "RZ/A3UL Evaluation Board Kit OCTAL Edition (eXecute-In-Place)" in board selection, use "rza3ul_smarc_octal_ipl.srec" instead.

Launch Configuration Name: B	linky Debug_Flat]	
📄 Main 🕸 Debugger 🕨 Sta	irtup 🔲 Common 🎼	Source				
Initialization Commands Reset and Delay (seconds) Halt	: 3					Add download module Specify download module name:
				~	•	Variables Search Project Workspace File System
Load image and symbols						OK Cancel
Filename Program Binary [Blinky	Load type Symbols only	Offset (hex)	On connect Yes	Add Edit		
				Remove		e² Add download module -
				Move up Move down		Select a workspace resource
	Specif \${wor			pace File System		✓ S Blinky > ≥ Settings > ≥ Bebug ✓ ≥ ipl igra3ul_smarc_qspi_ipl.eff igra3ul_smarc_qspi_ipl.eff > ≥ ra3ul_smarc_qspi_ipl.eff > ≥ ra_cfg > ≥ script

Figure 64 : e2 studio Debugger Configurations window with Blinky project (9)



Г

11.Again, click on Add... to launch Add download module window. Then click Workspace..., choose BLINKY.srec as module to be downloaded and finally click on OK.

dit Renesas GDB Hardware	Debugging configu	ration Blinky I	Debug_Flat for	Debug					
Launch Configuration Name: B	Blinky Debug, Flat				1				
📄 Main 🕸 Debugger 🕨 Sta		Course			ň.,				
Initialization Commands	artup Common 4	Source			-				
Reset and Delay (seconds)									
	<i>j</i> ¢ <u>3</u>					Add download			
Halt						Specify download	module name:		
				·	L .				
									1
				×	~	Variables	Search Project	Workspace	File System
Load image and symbols									
Filename	Load type	Offset (hex)	On connect	Add				OK	Cancel
Program Binary [Blinky			Yes	- Internet and Internet and Internet					
rza3ul_smarc_qspi_ipl.s	Image and Symbols	0	Yes	Edit					
				Remove					
				Move up		Add download			
				Move down					
				move down		Select a workspace	e resource		
						V 😂 Blinky			^
					-	V 🗁 Debug			
	e Ado	download mod				> 🗁 128			
	Specify	download mod	ule name:			> 🧀 rza_ > 🤭 src	gen		
		space_loc:¥Blink		.srec}	L 🔺	Blin	ky.bin		
	-		_			Blin			
	Varia	ibles Sear	ch Project	Workspace File System		Blin	ky.elf.in		
						Blin			
				OK Cancel		Blin	byebd		
						Blin			
							efile.init		
							nory_regions.ld		*
								a	

Figure 65: e2 studio Debugger Configurations window with Blinky project (10)

12. Add the "set breakpoint enable-memread 0" to Initialization Commands.

Iame: Blinky Debug_Flat	
📄 Main 🕸 Debugger 🕟 Startup 🔲 Common 🦆 Source	
Initialization Commands	
Reset and Delay (seconds): 3	
Halt	
set breakpoint enable-memread 0	~
	
	\sim

Figure 66: e2 studio Debugger Configurations window with Blinky project (11)



12. Then, click **Debug** button.

					1
Name: Blinky Debug_Flat					
📄 Main 🏇 Debugger 🕟 Star	rtup 🔲 Common 🍹	Source			
Initialization Commands					
Reset and Delay (seconds):	3				
Halt					
set breakpoint enable-memrea	ad 0				~
					~
Load image and symbols					
	Load type	Offset (hex)			Add
Program Binary [Blinky			Yes		
rza3ul_smarc_qspi_ipl.sr			Yes		Edit
Blinky.srec [C:\work\a3u	Image and Symbols	0	Yes		Remove
					Move up
					Move down
					wove down
Runtime Options					
Set program counter at (hex)):				
Set breakpoint at:	main]			
Resume					
Run Commands					
Kun commanus					
				D	
				Revert	Apply
			L	Debug	Close

Figure 67: e2 studio Debugger Configurations window with Blinky project (12)

13. Debug session is now started.

e Progress Information	- D X
Launching Blinky Debug_Flat	
Configuring GDB	
	Cancel Details >>

Figure 68: e2 studio Debugger Configurations window with Blinky project (13)

14. If you see the following window, please click **Switch** to continue.

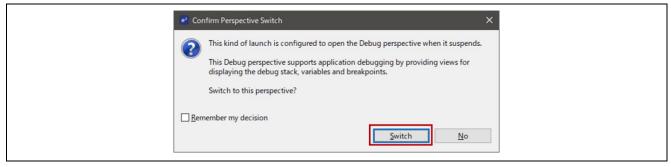


Figure 69: e2 studio Debugger Configurations window with Blinky project (14)



4.6 Details about the Debug Process

In debug mode, e2 studio executes the following tasks:

- 1. Downloading the application image to QSPI/OctaFlash ROM or DDR SDRAM.
- 2. Setting a breakpoint at main().
- 3. Setting the stack pointer register to the stack.

This section describes the detail on the debug process of Blinky Project.

4.6.1 Run the Blinky Project

Click [Run] > [Resume] or click on the Play icon shown below:



Figure 70 : e2 studio Debugger Play icon

Make sure the box **Set breakpoint at:** is checked and specify **main** as its value, Program Counter should be stopped at main() function.

Initialization Commands	tup 🔲 Common 🧤			
Reset and Delay (seconds):	3			
Halt				
Load image and symbols				
Filename	Load type	Offset (hex)	On connect	
Program Binary [barem	Symbols only		Yes	
✓ rza3ul_smarc_qspi_ipl.s		0	Yes	
baremetal_blinky_new.s		0	Yes	
Runtime Options				
Set program counter at (hex)				
		-		
✓ Set breakpoint at:	main			

Figure 71 : Set breakpoint at: option



(Blinky] FSP (Configuration C 0x12018 C hal_entry.c C main.c ×	- 0
1 2 3 4 20022018	<pre>/* generated main source file - do not edit */ #include "hal data.h" @ int main(void) a f</pre>	^
 ⇒ 5 20022020 6 20022020 7 8 	hal_entry ();	

Figure 72 : Blinky project in Debug Mode

After that LED on the Pmod LED should start to blink when clicking [Run] > [Resume] or Play icon again.



5. FSP Application Launch with e2 studio

5.1 Create a Project

5.1.1 What is a Project?

In e2 studio, all FSP applications are organized in RZ MPU projects. Setting up an RZ MPU project involves:

- 1. Create a Project
- 2. Configuring a Project

These steps are described in detail in the next two sections. When you have existing projects already, after you launch e2 studio and select a workspace, all projects previously saved in the selected workspace are loaded and displayed in the **Project Explorer** window. Each project has an associated configuration file named configuration.xml, which is in the project's root directory.

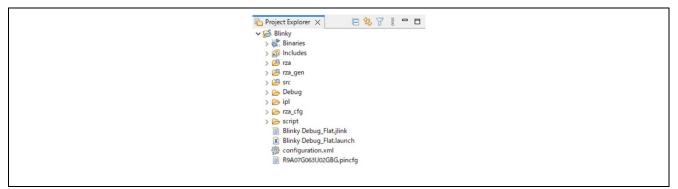


Figure 73 : e2 studio FSP Configuration Perspective

Double-click on the configuration.xml to open the RZ MPU Project Editor. To edit the project configuration, make sure that the **FSP Configuration** perspective shown below is selected in the upper right-hand corner of the e2 studio window. Once selected, you can use the editor to view or modify the configuration settings associated with this project.



Figure 74 : e2 studio FSP Configuration Perspective



Note:

Whenever the RZ project configuration (that is, the configuration.xml file) is saved, a verbose RZ Project Report file (rza_cfg.txt) with all the project settings is generated. The format allows differences to be easily viewed using a text comparison tool. The generated file is located in the project root directory.

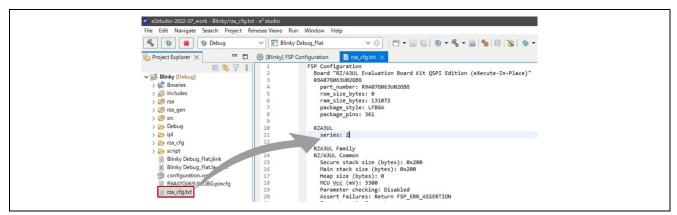


Figure 75 : RZ Project Report

The RZ Project Editor has several tabs. The configuration steps and options for individual tabs are discussed in the following sections.

Note:

The tabs available in the RZ Project Editor depend on the e2 studio version and the layout may vary slightly, however the functionality should be easy to follow.

💮 [Blinky] FSP Config	guration ×			
Summary			Generate Projec	ct Content
Project Summary			Renesas	^
Board: Device:	RZ/A3UL Evaluation Board Kit QSPI Edition (eXecute-In-Place) R9A07G063U02GBG			
Core:	Core 0			
Toolchain:	GCC for Renesas RZ (A-Profile AArch64 bare-metal)			
Toolchain Version:				
FSP Version:	3.1.0			
Project Type:	Flat			
Location:	C:/work/g3e/Blinky 🔄			
Selected software co	omponents			
	that blinks an LED. No RTOS included.	v3.1.0		
RZA Configuration		v3.1.0		
	kage Common Files	v3.1.0		
I/O Port		v3.1.0		
Memory Managem	ent Unit	v3.1.0		
General Timer		v3.1.0		
	kage for R9A07G063U02GBG	v3.1.0		
Board support pac		v3.1.0		
	kage for RZ/A3UL (RZ/A3UL) - FSP Data	v3.1.0		
	on Board Kit QSPI Edition (eXecute-In-Place) Board Support Files	v3.1.0		~
Support	ks Pins Interrupts Event Links Stacks Component			

Figure 76 : RZ Project Editor tabs



5.1.2 Creating a New Project

For RZ MPU applications, generate a new project using the following steps:

1. Click on [File] > [New] > [C/C++ Project].

New Alt+Shift+N> Renesas C/C++ Project Image: Constraint of the system o	File	Edit	Navigate	Search	Project	Renesas Views	Run	Window Help		_
Open Projects from File System Project Recent Files Example Close Editor Ctrl+W Other Ctrl+N		New				Alt+Shift+N	•	Renesas C/C++ Project	>	2
Recent Files Close Editor Ctrl+W Other Ctrl+N		Open	File				C	C/C++ Project		
Close Editor Ctrl+W 🔂 Other Ctrl+N	۵,	Open	Projects fro	om File Sy	stem			Project		H.
Other Ctri+N		Recer	nt Files				' 🖻	Example		
Close All Editors Ctrl+Shift+W								Other	Ctrl+N	E.
		Close	All Editors			Ctrl+Shift+W	1			

Figure 77 : New RZ MPU Project

2. Click on the Renesas RZ/A C/C++ FSP Project template for the type of project you are creating.

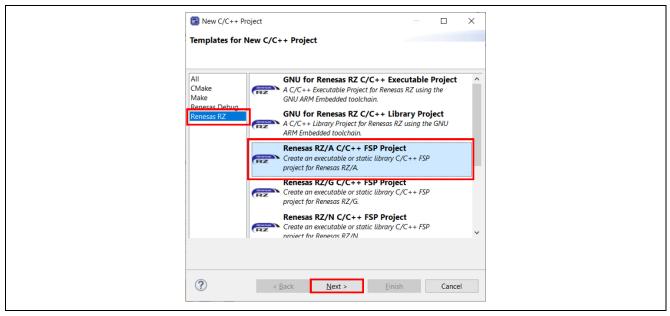


Figure 78 : New Project Templates



3. Select a project name and location.

Renesas RZ/A C/C++ FSP Project		- 🗆 X	
Renesas RZ/A C/C++ FSP Project			
Project Name and Location			
Project name			
Blinky			
Use default location			
Location: C\workspace\Blinky		Browse	
You can download more Renesas packs here			
0	< <u>B</u> ack <u>N</u> ext > Einis	th Cancel	
\odot	~ Tarr Werrs Dun?	Cancer	

Figure 79 : RZ MPU Project Generator (Screen 1)

4. Click [Next].

5.1.2.1 Selecting a Board and Toolchain

In the Project Configuration window select the hardware and software environment:

- 1. Select the **FSP version**.
- Select the Board for your application. You can select an existing RZ MPU Evaluation Kit or Custom User Board for any of the RZ MPU devices with your own BSP definition. (Please refer 2.1.2.1 for more information about the RZ MPU Evaluation Kit.)
- 3. Select the **Device**. The **Device** is automatically populated based on the **Board** selection. Only change the **Device** when using the **Custom User Board QSPI Boot (eXecute-In-Place)** board selection.
- 4. The Toolchain selection defaults to GCC ARM A-Profile (AArch64 bare-metal).
- 5. Select the Toolchain version. This should default to the installed toolchain version.
- 6. Select the Debugger. The J-Link Arm Debugger is preselected.
- 7. Click Next.

📴 Renesas R	Z/A C/C++ FSP Project				
	'A C/C++ FSP Project Tools Selection				Ď
Device Select FSP Version: Board:		Board Description			
Device: Core:	R9A07G063U02GBG				
Language:	©C ○C++	Device Details TrustZone Pins Processor	No 361 Cortex-A55		
Toolchains GCC ARM A 13.2.1.20231	-Profile (AArch64 bare-metal) 009 ~ Manage Toolchains	Debugger J-Link ARM			~
?		< <u>B</u> ack	<u>N</u> ext >	Einish	Cancel

Figure 80 : RZ MPU Project Generator (Screen 2)



5.1.2.2 Selecting a Project Template

In the next window, select the build artifact and RTOS.

Renease RZ/A C/C++ FSP Project Build Artifact alerotion Wild Artifact Selection Project builds to an executable file O Forcidable Outling INZ/A Static library file Project builds to a static library project
Executable Project builds to an executable file Static Ubrary Project builds to a static library file Executable Using an RZ/A Static Library Project builds are excutable file

Figure 81 : RZ MPU Project Generator (Screen 3)

In the next window, select a project template from the list of available templates. By default, this screen shows the templates that are included in your current RZ/A MPU Pack. To add threads, select **RTOS**, or **No RTOS** if an RTOS is not being used. Once you have selected the appropriate template, click **Finish**.

Note:

The tabs available in the RZ Project Editor depend on the e2 studio version and the layout may vary slightly, however the functionality should be easy to follow.

Rennes R2A CC++ 12P Project Registration R2A CC++ 12P Project		Argent Transact XLA, SCI - 1- KP Project Argent Transact XLA, SCI - 1- KP Argent Tran
C Constant Metal - Manimal Annual Service Service and Service Service and Service and Service and Service and Service Service and Service Serv	Preetros - Binky - Static Allocation Interview pages that is called by a static and the transmission of the state is the transmission of the state is a single transmission of	or
cols Generation Settings IP to It Revises Lifet formation	Loto desantos tomaja El for Annoa Colo Farrate	Cade Servershot settings -/Use Reneals Cade Formation
C Carro Nonto Bern Carrol	(7) (8000 Hints Faid (7)	() <tax not=""> Balls Carrot</tax>

Figure 82 : RZ MPU Project Generator (Screen 4)

When the project is created, e2 studio displays a summary of the current project configuration in the RZ MPU Project Editor.



RZ/A3UL

Blinky] FSP Configuration X		0
Summary	Generate P	roject Content
Project Summary		^
	RENESAS	
Board: RZ/A3UL Evaluation Board Kit QSPI Edition (eXecute-In-Place)		
Device: R9A07G063U02GBG		
Core: Core 0		
Toolchain: GCC for Renesas RZ (A-Profile AArch64 bare-metal)		
Toolchain Version: 13.2.1.20231009		
FSP Version: 3.1.0		
Project Type: Flat		
Location: C:/work/g3e/Blinky		
Selected software components		
Simple application that blinks an LED. No RTOS included.	v3.1.0	
RZA Configuration Template File	v3.1.0	
Board Support Package Common Files	v3.1.0	
I/O Port	v3.1.0	
Memory Management Unit	v3.1.0	
General Timer	v3.1.0	
Board support package for R9A07G063U02GBG	v3.1.0	
Board support package for RZA3UL	v3.1.0	
Board support package for RZ/A3UL (RZ/A3UL) - FSP Data	v3.1.0	
RZ/A3UL Evaluation Board Kit QSPI Edition (eXecute-In-Place) Board Support Files	v3.1.0	

Figure 83 : RZ MPU Project Editor and available editor tabs

- With the **Summary** tab, you can see all they key characteristics of the project: board, device, toolchain, and more.
- With the BSP tab, you can change board specific parameters from the initial project selection.
- With the **Clocks** tab, you can configure the MCU clock settings for your project.
- With the Interrupts tab, you can add new user events/interrupts.
- With the **Stacks** tab, you can add and configure FSP modules. For each module selected in this tab, the **Properties** window provides access to the configuration parameters, interrupt selections.
- The **Components** tab provides an overview of the selected modules. Although you can also add drivers for specific FSP releases and application sample code here, this tab is normally only used for reference.

The functions and use of each of supported tabs is explained in detail in the next section.

Please note that RZ/A FSP doesn't support **Event Links** tab and so, those tabs are grayed out as shown above.



5.2 Configuring a Project

Each of the configurable elements in an FSP project can be edited using the appropriate tab in the RZ Configuration editor window. Importantly, the initial configuration of the MPU after reset and before any user code is executed is set by the configuration settings in the **BSP** tab. When you select a project template during project creation, e2 studio configures default values that are appropriate for the associated board. You can change those default values as needed. The following sections detail the process of configuring each of the project elements for each of the associated tabs.

5.2.1 Summary Tab

Project Summary Image: RZ/A3UL Evaluation Board Kit QSPI Edition (eXecute-In-Place) Device: R9A07G063U02GBG Core: Core 0 Toolchain: GCC for Renesas RZ (A-Profile AArch64 bare-metal) Project Type: Flat Location: C////rowork/g3e//Blinky Selected software components Simple application that blinks an LED. No RTOS included. v3.1.0 R2A Configuration Template File v3.1.0 I/O Port v3.1.0 I/O Port v3.1.0 Memory Management Unit v3.1.0 General Timer v3.1.0 Board support package for RPA07G063U02GBG v3.1.0	Summary			Generate Proje	ct Content
Board: RZ/A3UL Evaluation Board Kit QSPI Edition (eXecute-In-Place) Device: R9A070603U02GBG Core: Core 0 Toolchain: GCC for Renesas RZ (A-Profile AArch64 bare-metal) Toolchain: I3.2.1.20231009 FSP Version: 3.1.0 Project Type: Flat Location: C:/work/g3e/Blinky Selected software components V3.1.0 RZA Configuration Template File V3.1.0 Board Support Package Common Files V3.1.0 I/O Port V3.1.0 Board Support package for R9A07G063U02GBG V3.1.0 Board Support package for RPA07G063U02GBG V3.1.0 Board Support package for RPA07G063U02GBG V3.1.0 Board Support package for RZA3UL V3.1.0	Project Summar	у			~
Simple application that blinks an LED. No RTOS included. v3.1.0 RZA Configuration Template File v3.1.0 Board Support Package Common Files v3.1.0 I/O Port v3.1.0 Memory Management Unit v3.1.0 General Timer v3.1.0 Board support package for R9A07G063U02GBG v3.1.0 Board support package for RZA3UL v3.1.0	Device: Core: Toolchain: Toolchain Version: FSP Version: Project Type:	R9A07G063U02GBG Core 0 GCC for Renesas RZ (A-Profile AArch64 bare-metal) 13.2.1.20231009 3.1.0 Flat		(ENESAS	
RZA Configuration Template File v3.1.0 Board Support Package Common Files v3.1.0 I/O Port v3.1.0 Memory Management Unit v3.1.0 General Timer v3.1.0 Board support package for R9A07G063U02GBG v3.1.0 Board support package for RZA3UL v3.1.0	Selected software c	omponents			
Board support package for RZ/A3UL (RZ/A3UL) - FSP Data v3.1.0 RZ/A3UL Evaluation Board Kit QSPI Edition (eXecute-In-Place) Board Support Files v3.1.0	RZA Configuration Board Support Pa I/O Port Memory Managen General Timer Board support pac Board support pac Board support pac	n Template File ckage Common Files nent Unit ckage for R9A07G063U02GBG ckage for RZA3UL ckage for RZ/A3UL (RZ/A3UL) - FSP Data	v3.1.0 v3.1.0 v3.1.0 v3.1.0 v3.1.0 v3.1.0 v3.1.0 v3.1.0 v3.1.0 v3.1.0		~

Figure 84 : Configuration Summary tab

The **Summary** tab, seen in the above figure, identifies all the key elements and components of a project. It shows the target board, the device, toolchain and FSP version. Additionally, it provides a list of all the selected software components and modules used by the project. This is a more convenient summary view when compared to the **Components** tab.



5.2.2 Configuring the BSP

The **BSP** tab shows the currently selected board (if any) and device. The Properties view is located in the lower left of the Project Configurations view as shown below:

Note:

If the Properties view is not visible, click **Window > Show View > Properties** in the top menu bar.

	ties 🗙 🛐 Problems 🏽 🗞 スマート・ブ	ラウザー 🛃 🖁		1
RZ/A3UI	Evaluation Board Kit QSPI E	dition (eXecute-In-Place)		
Settings	Property	Value		
	✓ R9A07G063U02GBG part_number	R9A07G063U02GBG		
	rom_size_bytes	0		
	ram_size_bytes	131072		
	package_style	LFBGA		
	package_pins	361		
	✓ RZ/A3UL Common			
	Secure stack size (bytes)	0x200		
	Main stack size (bytes)	0x200		
	Heap size (bytes)	0		
	MCU Vcc (mV)	3300		
	Parameter checking	Disabled		
	Assert Failures	Return FSP_ERR_ASSERTION		
	Error Log	No Error Log		
	PFS Protect	Enabled		
	C Runtime Initialization	Enabled		

Figure 85 : Configuration BSP tab

The **Properties** view shows the configurable options available for the BSP. These can be changed as required. The BSP is the FSP layer above the MPU hardware.

When you click the **Generate Project Content** button, the BSP configuration contents are written to rza_cfg/fsp_cfg/bsp/cfg.h This file is created if it does not already exist.

Warning:

Do not edit this file as it is overwritten whenever the Generate Project Content button is clicked.

5.2.3 Configuring Clocks

The **Clocks** tab presents a graphical view of the MPU's clock tree, and each HAL driver uses the settings for dedicated numerical calculation. For example, scif_uart driver calculates the communication rate from the settings in Clocks tab. Please note that PLLs should be configured by IPL and therefore, PLL settings should be consistent with those in IPL.



RZ/A3UL

s Configu	ation			0
Connigu				Generate Project
				Restore
4MHz	PLL1 1GHz	ICLK Div /1	$\sim \longrightarrow$ ICLK 1GHz	
	PLL2 1600MHz	→ Dív /2 800MHz → Dív /2 400MHz		
	PLL2 IGOUNIPIZ			
	> PLL2 533MHz	SDOCLK Set: 533MH	iz → SDOCLK 533MHz	
		Div /2 266500kHz SD1CLK Sel: 533MH	Iz → SD1CLK 533MHz	
		> Div /8 100MHz > POCLK Div /1	✓ → POCLK 100MHz	
		> Div /10 80MHz	→ TSUCLK 80MHz	
	> PLL3 1600MHz	→ Div /2 800MHz → Div /2 400MHz	ATCLK 400MHz	
	PELS IDDOMINE		A ROCK HOMITZ	
		Div /4 200MHz > I2CLK Div /1	✓ → I2CLK 200MHz	
		→ P1CLK Div /1	✓ → P1CLK 200MHz	
			MOCLK 200MHz	
		Div /2 100MHz	> ZTCLK 100MHz	
		P2CLK Div /1	V	
		Faces by / i	Track with	
	→ PLL3 533MHz	PLL3_3 Sel: 533MHz V > PLL3_3 Div /2 V Div /2 133250kHz		
		-	↓ 	
	> PLL3 400MHz		SPI QSPI0_SPCLK 66625kF	
		V Div /2 66625kHz	→ SPI1CLK 66625kHz	
		→ Div /2 266500kHz	→ M2CLK 266500kHz	
		→ PLL3_5 Sel: 400MHz V → PLL3_5 Div /1 V → Div /2 200MHz		
			Octa QSPI0_SPCLK 100MH	
	> Div / 1000	Div /2 100MHz	OC1CLK 100MHz	
	017/1000		CCICCK IOWIN2	
	PLL4 1600MHz	→ Sel: OSC Div / 1000 V → Div /2 12kHz	SOCLK 12kHz	
	-			
	PLL5 1500MHz	→ DSLA Div /2 V → Div /1 750MHz	→ M3CLK 750MHz	
	PLL5 500MHz	→ Div /2 250MHz		
	> PLL6 500MHz	→ Div /2 250MHz → PLL6_2 Sel: 250MHz (fr ∨	HPCLK 250MHz	

Figure 86 : Configuration Clocks tab

When mousing over the blocks of PLLs on clocks tab, you should see the pop-up message describing this precaution.

OSC 24MHz	> PLL1 1GHz	
	PLL2 1600M Only when c	es not support this configuration change. hanging the setting in IPL, edit PLL frequency depending on IPL setting.

Figure 87 : Precautions for PLL settings

When you click the **Generate Project Content** button, the clock configuration contents are written to: rza_gen/bsp_clock_cfg.h

This file will be created if it does not already exist.

Warning:

Г

Do not edit this file as it is overwritten whenever the Generate Project Content button is clicked.



5.2.4 Configuring Pins

The pins tab provides flexible configuration of the MPU's pins. As many pins can provide multiple functions, they can be configured on a peripheral basis. For example, selecting a serial channel via the SCIF peripheral offers multiple options for the location of the receive and transmit pins for that module and channel. Once pins are configured, it is shown as green in the **FSP Visualization** view.

Pin Configuration			Gen	erate Project Content	👫 🔺 🌮 🕐 🖻 Type pin function 📰 Pin Function 👻 🔤 Module Name 👻
Select Pin Configuration		Export to CSV file	Configure	Pin Driver Warnings	
RZA3UL-SMARC-QSPI-XIP	✓ Manage configurat	tions			
Generate data: g_bsp_pin_cfg	,				
$PinSelection\qquad \boxplus \ \blacksquare \ \boxminus \ \downarrow^{a}_{Z}$	Pin Configuration			Cycle Pin Group	
Type filter text	Name	Value	Lock	Link	
> Connectivity:CAN A	Pin Group Selection	Mixed			
> ✓ Connectivity:ETHE	Operation Mode	Disabled			
> V Connectivity:RIIC	✓ Input/Output			<	
> Connectivity:RSPI	SCIF4_RXD	None	(1)	- C) .	000 0 0 0 0 0 0 0 000
> Connectivity:SCI	SCIF4_SCK	None	17		
✓ ✓ Connectivity:SCIF	SCIF4_TXD	None	18	-	
✓ SCIF0					
SCIF1					
SCIF2					
SCIF3					000 00000000000000000000000000000000000
SCIF4	<			>	-880 880
> V Connectivity:USB					
> Debug:JTAG/SWD	Module name: SCIF4				
> Interrupt:IRO Y					
Pin Function Pin Number					
Summary BSP Clocks Pins Interrup	ate Front Links Stacks Commons	nte.			▶ Legend

Figure 88 : Pin Configuration

The pin configurator includes built-in conflict checker. So, if the same pin is allocated to another peripheral or I/O function, the pin will be shown as red in the **FSP Visualization** view and with white cross in a red square in the **Pin Selection** pane and **Pin Configuration** pane in the main **Pins** tab.

In the example shown below, port P13_1 is already used by the Display, and the attempt to connect to this pin to the Serial Communication Interface with FIFO (SCIF) results in dangling connection error. To fix this error, select another port from the pin drop-down list or disable the Display.

Select Pin Configuration Image configurations RZABUL-SMARC-QSPI-XDF Manage configurations Image configurations Image configurations Image configurations <	*[Blinky] FSP Configuration × Pin Configuration			Gen	O erate Projec	ct Content
Type filter text Name Value Lock Link V @ Periphenis Operation Mixed Outom Operation Mixed Outom Image: Section Image: Se	RZABUL-SMARC-QSPI-XIP			Configure	Pin Driver V	Warnings
V @ Prinjhenis Pin Group Selection Mixed > AnalogADC Operation Mode Custom > ConnectivityGFH SCIF1_CTS None ConnectivityGFH > ConnectivityGFH SCIF1_RSN Operation Operation > ConnectivityGFH SCIF1_RSN None ConnectivityGFH > SCIF1 SCIF1 None ConnectivityGFH	Pin Selection $\exists \exists t \models t \models \downarrow^a_{t \ge t}$	Pin Configuration			😲 Cycle Pi	in Group
	Peripherals AnalogADC AnalogADC AnalogADC AnalogADC ConnectivityCAN ConnectivityCAN ConnectivitySIC ConnectivitySI ConnectivitySI ConnectivitySI ConnectivitySI SOF0 SOF0	Pin Group Selection Operation Mode Input/Output SCIF-LCTS SCIF-LRTS SCIF-LRTS SCIF-LRTS SCIF-LRTS SCIF-LRTS SCIF-LTDO	Mixed Custom None None (20 * P13_1 None			>
	Pin Function Pin Number Summary BSP Clocks (3) Pins Inte	errupts Event Links Stacks Compone	nts			

Figure 89 : e2 studio Pin Configurator

When you click the **Generate Project Content** button, the pin configuration contents are written to: ra_gen\bsp_pin_cfg.h. This file will be created if it does not already exist.

Warning:

Do not edit this file as it is overwritten whenever the Generate Project Content button is clicked.



5.2.5 Configuring Interrupts from the Stacks Tab

You can use the **Properties** view in the **Stacks** tab to enable interrupts by setting the interrupt priority. Select the driver in the **Stacks** pane to view and edit its properties.

		HAL/Common General g_ioport I/O Port Driver on r_ioport g_timer0 Timer Driver on r_gtm General g_ioport I/O Port Driver on r_ioport Driver on r_ioport
	> Summar	s New Object > Remove
	rties × 💽 Problems 🌸 スマート・ブラウザー	📑 🔚 🏹 🗔 🔗 🖇 🗖 🗖 🌇 Pin Conflicts 📮 Console 🔯 Debug 🗙
g_timer	0 Timer Driver on r_gtm	Value
	 Common Module g_timer0 Timer Driver on r_gtm 	
	 General 	
	✓ Interrupts	
	Callback	timer_isr
	Underflow Interrupt Priority	5
	Generate at Start	Disable

Figure 90 : Configuring Interrupts in the Stacks tab

5.2.6 Creating Interrupts from the Interrupts Tab

On the **Interrupts** tab, the user can bypass a peripheral interrupt set by the FSP by setting a user-defined ISR. This can be done by adding a new event via New User Event button.

-	Configuration	Generate Project Content
User Events		👰 New User Event > 🕼 Remove
Event		ISR
ID:78 GTM0	INT (GTM0 Interrupt)	gtm_int_isr
Allocations		
Interrupt	Event	ISR
0	ID:78 GTM0 INT (GTM0 Interrupt)	gtm_int_isr

Figure 91 : Configuring interrupt in Interrupt Tab

5.2.7 Viewing Event Links

RZ/A FSP doesn't support **Event Links** tab, and it is grayed out.



5.2.8 Adding Threads and Drivers

Every RTOS-based RZ/A FSP Project includes at least one RTOS Thread and a stack of FSP module running in that thread. The **Stacks** tab is a graphical user interface which helps you to add the right modules to a thread and configure the properties of both the threads and the modules associated with each thread. Once you have configured the thread, e2 studio automatically generates the code reflecting your configuration choices.

For any driver, or, more generally, any module that you add to a thread, e2 studio automatically resolves all dependencies with other modules and creates the appropriate stack. This stack is displayed in the **Stacks** pane, which e2 studio populates with the selected modules and module options for the selected thread.

The default view of the **Stacks** tab includes a Common Thread called **HAL/Common**. This thread includes the driver for I/O control (IOPORT). The default stack is shown in the **HAL/Common Stacks** pane. The default modules added to the HAL/Common driver are special in that the FSP only requires a single instance of each, which e2 studio then includes in every user-defined thread by default.

In applications that do not use an RTOS or run outside of the RTOS, the HAL/Common thread becomes the default location where you can add additional drivers to your application.

For a detailed description on how to add and configure modules and stacks, see the following sections:

- Adding and Configuring HAL Drivers
- Adding Drivers to a Thread and Configuring the Drivers

Only you have added a module either to HAL/Common or to a new thread, you can access the driver's configuration options in the **Properties** view. If you added thread objects, you were able to access the objects configuration options in the **Properties** view in the same way.

5.2.9 Adding and Configuring HAL Drivers

For applications that run outside or without the RTOS, you can add additional HAL drivers to your application using the HAL/Common thread. To add drivers, follow these steps:

- 1. Click on the HAL/Common icon in the **Stacks** pane. The Modules pane changes to **HAL/Common** Stacks.
- 2. Click New Stack to see a drop-down list of HAL level drivers available in the FSP.
- 3. Select a driver from the menu New Stack > Driver.

Threads	HAL/Common Stacks	New Stack > 🐣 Extend Stack > 🙀 Remove	000000
	g joport VO Port Driver on r_joport		- r_rspi on r_scif_uart
		Timers > Transfer >	
Objects 🕢 New Object > 🔬 Remove			000 0

Figure 92 : e2 studio Project configurator - Adding drivers

4. Select the driver module in the **HAL/Common Modules** pane and configure the driver properties in the **Properties** view.



e2 studio adds the following files when you click the Generate Project Content button:

- The selected driver module and its files to the rza/fsp directory
- The main() function and configuration structures and header files for your application as shown in the table below.

File	Contents	Overwritten by Generate Project Content?
rza_gen/main.c	Contains main() calling generated and user code. When called, the BSP has already initialized the MPU	Yes
rza_gen/hal_data.c	Configuration structures for HAL Driver only modules	Yes
rza_gen/hal_data.h	Header file for HAL driver only modules	Yes
src/hal_entry.c	User entry point for HAL Driver only code. Add your code here	No
src/mmu_page_table.c	Virtual memory page table settings	No
src/sections.c	Rules for section transfer from ROM to RAM	No
src/syscalls.c	Low-level processing stub for file I/O functions	No

The configuration header files for all included modules are created or overwritten in the folder "rza_cfg/fsp_cfg".

5.2.10 Adding Drivers to a Thread and Configuring the Drivers

For an application that uses the RTOS, you can add one or more threads, and for each thread at least one module that runs in the thread. You can select modules from the Driver dropdown menu. To add modules to a thread, follow these steps:

1. In the **Threads** pane, click **New Thread** to add a Thread.



Stacks	Configuration		
Threads	🔄 New Thread 🙀 Remove	New Thread Stacks	₽ <u></u>
✓ ▲ H ♦ <td>AL/Common G_ioport I/O Port (r_ioport) G_mmu MMU Driver on r_mmu FreeRTOS Port (rm_freertos_port lew Thread New Object > Remove</td> <td>Add stacks to the (above), or by pa</td> <td></td>	AL/Common G_ioport I/O Port (r_ioport) G_mmu MMU Driver on r_mmu FreeRTOS Port (rm_freertos_port lew Thread New Object > Remove	Add stacks to the (above), or by pa	
-	BSP Clocks Pins Interrupts Event		5
New Th	read		
Settings	Property	Value	
	Common General Hooks Stats Memory Allocation Timers		Enter Symbol Name of your
	Optional Functions Logging Thread		thread here. Example: my_thread
	Symbol Name	new thread0 New Thread	Enter Name of your thread here Example: My Thread

Figure 93 : Adding a new RTOS Thread on the Stack tab

2. In the properties view, click on the Name and Symbol entries and enter distinctive name and symbol for the new thread.

Note:

e2 studio updates the name of the thread stacks pane to My Thread Stacks.

3. In the My Thread Stacks pane, click on New Stack to see a list of modules and drivers.

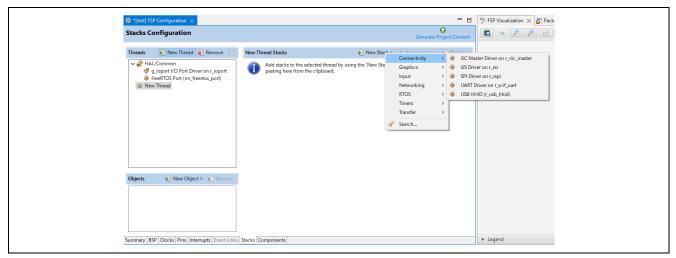


Figure 94 : Adding Modules and Drivers to a thread



- 4. Select a module or driver from the list.
- 5. Click on the added driver and configure the driver as required by the application by updating the configuration parameters in **Properties** view. To see the selected module or driver and be able to edit its properties, make sure the Thread containing the driver is highlighted in the **Threads** pane.

	FSP Configuration \times			- 0
	Configuration		Generate Project Co	
4 4 ~ @ N	New Thread Common G.external.irq0 External Stack G.external.irq0 External G.external.irq0 External IRQ Driver on r for thread Sector and Sec	Remov	tack > ≗ Extend Stack > re	
	PSD Clasks Dire later into Event Links Starks Components			_
-	BSP Clocks Pins Interrupts Event Links Stacks Components		🖻 Dia Castlicte 🕞 Cancala	#t Deb
Proble	ms 🗣 スマート・ブラウザー 🥅 Properties 🗙	C 🗷 7 🗔 🖋 🔋 🗖	Console	称 Deb
Proble	ms ④ スマート・ブラウザー III Properties × nal_irq0 External IRQ Driver on r_intc_irq		Pin Conflicts 📮 Console	恭 Deb
Proble	ms ④ スマート・ブラウザー I Properties × nal_irq0 External IRQ Driver on r_intc_irq Property	C 👿 7 🗔 🖋 8 🧧 🗆 Volue	Pin Conflicts 🕒 Console	参 Deb
Problem	ms @ スマート・プラウザー III Properties × nal_irq0 External IRQ Driver on r_intc_irq Property v Common	Value	Pin Conflicts 🕒 Console	🌣 Deb
Problem	ms @ スマート・ブラウザー III Properties × hal_irq0 External IRQ Driver on r_intc_irq Property		Pin Conflicts 💿 Console	‡r Det
Problem	ms @ スマート・プラウザー III Properties × nal_irq0 External IRQ Driver on r_intc_irq Property v Common	Value Default (BSP)	Pin Conflicts 💿 Console	‡r Deb
Problem	ms @ スマート・ブラウザー III Properties × nal_irq0 External IRQ Driver on r_intc_irq Property v Common Parameter Checking v Module g_external_irq0 External IRQ Driver on r_intc_irq Name	Value Default (BSP) g_external_irq0	Pin Conflicts 💿 Console	‡≱ Deb
Problem	ms	Value Default (BSP) g_external_irq0 0	Pin Conflicts 🖾 Console	恭 Deb
Problem	ms @ スマート・ブラウザー III Properties × nal_irq0 External IRQ Driver on r_intc_irq Property v Common Parameter Checking v Module g_external_irq0 External IRQ Driver on r_intc_irq Name	Value Default (BSP) g_external_irq0	Pin Conflicts Console	
Problem	ms	Value Default (BSP) g_external_irq0 0	Pin Conflicts 🖾 Console	恭 Deb
Problem	ms ● スマート・プラウザー Properties × al_irq0 External IRQ Driver on r_intc_irq Property Common Parameter Checking Module g_external_irq0 External IRQ Driver on r_intc_irq Name Channel Trigger	Value Default (BSP) g_external_irq0 0 Rissing	Pin Conflicts Console	校 Deb
Problem	ms	Value Default (BSP) g_external_irq0 0 Rising NULL	Pin Conflicts Console	☆ Deb

Figure 95 : Configuring Module or Driver properties

6. When you press the Generate Project Content button for the example above, e2 studio creates the files as shown in the following table:

File	Contents	Overwritten by Generate Project Content?
rza_gen/main.c	Contains main() calling generated and user code. When called, the BSP will have initialized the MPU.	Yes
rza_gen/my_thread.c	Generated thread "my_thread" and configuration structures for modules added to this thread.	Yes
rza_gen/my_thread.h	Header file for thread "my_thread"	Yes
rza_gen/hal_data.c	Configuration structures for HAL Driver only modules.	Yes
rza_gen/hal_data.h	Header file for HAL driver only modules.	Yes
src/hal_entry.c	User entry point for HAL Driver only code. Add your code here.	No
src/my_thread_entry.c	User entry point for thread "my_thread". Add your code here.	No

5.2.11 Configuring Threads

If the application uses an RTOS, the Stacks tab can be used to simplify the creation of RTOS threads, semaphores, mutexes, and event flags. The components of each thread can be configured from the **Properties** view as shown below:



શ Probler	ns 🛞 スマート・ブラウザー 🧮 Properties 🗙	📑 🔚 7 🗔 🛷 i 🗖 🗖
New Thr	ead	
Settings	Property V Common > General	Value
	Hooks Stats Memory Allocation Timers	
	Optional Functions Logging	
	✓ Thread Symbol Name	new_thread0 New Thread
	Stack size (bytes) Priority Thread Context	4096 1
	Memory Allocation	NULL Static

Figure 96 : New Thread Properties

The Properties view contains settings which are common for all Threads (**Common**) and settings for this particular thread (**Thread**).

For this thread instance, the thread's name and properties (such as priority level or stack size) can be easily configured. e2 studio checks that the entries in the property field are valid. For example, it will verify that the field **Priority**, which requires an integer value, only contains numeric values between 0 and 9.



To add RTOS resources to a Thread, select a thread and click on **New Object** in the Thread Objects pane. The pane takes on the name of the selected thread, in this case **My Thread Objects**.

✓ MAL/Common ♥ g_ioport I/O Port Driver on r_ioport ♥ FreeRTOS Port (m_freertos_port) ♥ @ New Thread ♥ g_external_irq0 External IRQ Driver on r_intc_irq Ø g_new_message_buffer0 Message Buffer Ø g_new_message_buffer0 Message Buffer Ø g_new_message_buffer0 Message Buffer	Threads	🔄 New Thread 👔 Remove 🛛 🖃	New Thread	d Stacks	New Stack >	🐣 Extend
Summany PSD Clocks Dins Intersunt Suppl Links Stacks Components	 g_ioport I/O Port D FreeRTOS Port (rm_ New Thread g_external_irq0 Ext 	freertos_port) ernal IRQ Driver on r_intc_irq @ New Object > Remove	Exte	rnal IRQ Driver on		
Summary DSP Clocks Prins Interrupts Event Links Stacks Components	Summary BSP Clocks Pins II	nterrupts Event Links Stacks Compon	ents			
Problems (%) スマート・ブラウザー □ Properties × Image: Problems (%) スマート・ブラウザー □ Properties × Image: Problems (%) スマート・ブラウザー □ Properties ×						
g_new_message_buffer0 Message Buffer						4

Figure 97 : Configuring Thread Object Properties

Make sure to give each thread object a unique symbol by updating the **Symbol** entries in the **Properties** view.



5.3 Reviewing and Adding Components

The **Components** tab enables the individual modules required by the application to be included or excluded. Modules common to all RZ/A MPU projects are preselected. All modules that are necessary for the modules selected in the **Stacks** tab are included automatically. You can include or exclude additional modules by ticking the box next to the required component.

Components Configuration		Gen	erate Project Conter	nt
		Group by: Vendor v Filter: All v	Search]
Component	Version	Description	Variant	^
Renesas				
V 🐼 BSP				
V 🖗 Board				
custom		Custom Board Support Files		
✓ rza3ul_smarc_qspi_xip		RZ/A3UL Evaluation Board Kit QSPI Edition (eXecute-In		
✓ ♀ rza3ul				
✓ device		Board support package for R9A07G063U02GBG (RZ/A3UL)	R9A07G063U02G	
✓ device		Board support package for RZA3UL (RZA)		
device		Board support package for R9A07G063U01GBG (RZ/A3UL)	R9A07G063U01G	
🕼 fsp		Board support package for RZ/A3UL (RZ/A3UL) - FSP Data		
🗸 💸 Common				
🗸 🧳 all				
config		Application configuration settings (Virtual memory setti		
✓ fsp_common		Board Support Package Common Files		
🗸 💸 HAL Drivers				
🗸 🥥 all				
r_cru		Camera Data Receiving Unit		
r_dmac		Direct Memory Access Controller		
r_gether		Gigabit Ethernet Driver		
r_gether_phy		Gigabit Ethernet PHY Driver		
🔽 r_gtm		General Timer		
✓ r_intc_irq	1.000	External IRQ Driver(IRQ)		~

Figure 98 : Components Tab

By clicking the **Generate Project Content** button, the .c and .h files for each selected component are copied into the following folders:

- rza/fsp/inc/api
- rza/fsp/inc/instances
- rza/fsp/src/bsp
- rza/fsp/src/<Driver_Name>

e2 studio also creates configuration files in the rza_cfg/fsp_cfg folder with configuration options set in the **Stacks** tab.

5.4 Debugging the Project

Once your project builds without errors, you can use the Debugger to download your application to the board and execute it.

To debug an application, follow these steps:

1. On the drop-down list next to the debug icon, select **Debug Configurations**.

夺	• 💁 • 🖾 🛷 •	
	1 FSP_project Debug	
	Debug As	
	Debug Configurations	
	Organize Favorites	

Figure 99 : Select of Debug Configurations



2. In the **Debug Configurations** view, click on your project listed as **MyProject Debug_Flat**.

e' Debug Configurations			-	
Create, manage, and run configurations				Ť.
📑 🖻 🍋 🗎 🗮 🖻 🏹 🗸	Name: MyProject Debug_Flat			
type filter text	📄 Main 🕸 Debugger 🐌 Startup 🧤 So	urce 🔲 Common		
C/C++ Application C/C++ Remote Application	Project:			
EASE Script	MyProject			Browse
GDB Hardware Debugging	C/C++ Application:			
 GDB OpenOCD Debugging GDB Simulator Debugging (RH850) 	Debug/MyProject.elf			
Java Applet Java Application Launch Group Remote Java Application C Reness GDB Hardware Debugging	Build (if required) before launching Build Configuration: Use Active	¥ariables	Searc <u>h</u> Project	Browse
C MyProject Debug_Flat	O Enable auto build	O Disable aut		
Renesas Simulator Debugging (RX, RL78) Filter matched 13 of 15 items	Use workspace settings	<u>Contigure wo</u>	Re <u>v</u> ert	Apply
0	1		<u>D</u> ebug	Close

Figure 100 : Debug Configuration Window

3. Please set load images and set **Reset after download** setting to **Yes** as shown below:

				Debug hardware: J-Link ARM v Target Device: R9A07G063U02GBG GDB Settings Connection Settings Debug Tool Settings
				Register initialization No
Load image and symbols				Reset at the beginning of connection No Reset at the end of connection No
				Reset before download No
Filename	Load type	Offset (hex)	On connect	Reset after download Yes
Program Binary [My_Pr	Image only		Yes	ID Code (Bytes) FFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFFF
rza3ul_smarc_qspi_ipl.s	Image and Symbols	0	Yes	Hold reset during connect No
My_Project.srec [C:¥W	Image and Symbols	0	Yes	Set CPSR(5bit) after download No

Figure 101 : Debug Setting

4. Connect the board to your PC via a standalone Segger J-Link debugger and click **Debug**.

Note:

For details on using J-Link and connecting the board to the PC, see 3.2.2.JTAG connection.



5.5 Modifying Toolchain Settings

There are instances where it may be necessary to make changes to the toolchain being used (for example, to change optimization level of the compiler or add a library to the linker). Such modifications can be made within e2 studio through the menu **Project > Properties > Settings** when the project is selected. The following screenshot shows the settings dialog for the GNU Arm toolchain. This dialog will look slightly different depending upon the toolchain being used.

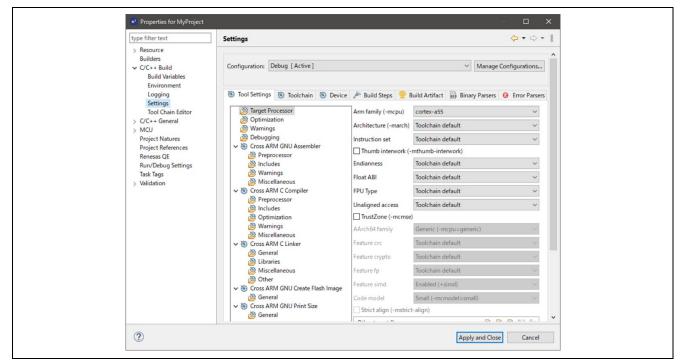


Figure 102 : e2 studio Project toolchain settings

The scope for the settings is project scope which means that the settings are valid only for the project being modified.

The settings for the linker which control the location of the various memory sections are contained in a script file specific for the device being used. This script file is included in the project when it is created and is found in the created project. (for example, script/rza3ul_smarc_qspi_xip.ld).

5.6 Importing an Existing Project into e2 studio

- 1. Launch e2 studio.
- 2. Open an existing Workspace to import the project and skip to step d. If the workspace does not exist, proceed with the following steps:
 - a. At the end of e2 studio startup, you will see the Workspace Launcher Dialog box as shown in the following figure.

e ² Eclipse Launcher			×
Select a directory as workspace			
e ² studio uses the workspace directory to store its	s preferences and development artifact	s.	
Workspace: C:\Users\ <user_name\e2studio\wo< td=""><td>rkspace</td><td>✓ <u>B</u>rowse</td><td></td></user_name\e2studio\wo<>	rkspace	✓ <u>B</u> rowse	
Use this as the default and do not ask again			
<u>R</u> ecent Workspaces			
	Launci	Cancel	

Figure 103 : Workspace Launcher dialog



b. Enter a new workspace name in the Workspace Launcher Dialog as shown in the following figure. e2 studio creates a new workspace with this name.

e ² Eclipse Launcher X
Select a directory as workspace
e ² studio uses the workspace directory to store its preferences and development artifacts.
Workspace C:\Users\ <username>\c2studio\new_workspace Browse</username>
Use this as the default and do not ask again
<u>R</u> ecent Workspaces
Launch Cancel

Figure 104 : Workspace Launcher dialog - Select Workspace

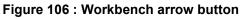
- c. Click [Launch].
- d. When the workspace is opened, you may see the Welcome Window. Click on the **Workbench** arrow button to proceed past the Welcome Screen as seen in the following figure.

RENESAS Welcome to e ² studio	Workbench
--	-----------

Figure 105 : Workbench arrow button

3. You are now in the workspace that you want to import the project into. Click the **File** menu in the menu bar, as shown in the following figure:

	spWorkspace - FSPproject/confi
	File Edit Navigate Search Proje ← Menu bar ★ ■ ★ Debug ← Tool bar ↓ ▼ ☆ ▼ ☆ ▼ ☆ ▼ ☆



4. Click [Import] on the [File] menu or "Import project" on Project Explorer, as shown in the following figure:

File	Edit Navigate Search Project		u	Project Explorer 🛛 🗖 🗖
C 3	New Open File Open Projects from File System	Alt+Shift+N >	ci s	
	Recent Files Close Editor	> Ctrl+W		There are no projects in your workspace. To add a project:
	Close All Editors	Ctrl+Shift+W		Create a new C or C++ project
	Save Save As	Ctrl+S		Create a project <u>Import projects</u>
	Save All Revert	Ctrl+Shift+S	or	
	Move			
6	Rename Refresh	F2 F5		
	Convert Line Delimiters To	>		
۵	Print	Ctrl+P		
	Import Export			
	Properties	Alt+Enter		
	Switch Workspace Restart	>		
_	Exit		J	

Figure 107 : File drop-down menu



5. In the **Import** dialog box, as shown in the following figure, choose the **General** option, then **Existing Projects into Workspace**, to import the project into the current workspace.

Select an import wizard: type filter text Seneral CMSIS Park
 Existing Projects into Workspace File System GNUARM-NONE/RZ(DS-5) project conversion to GCC ARM Embedded Preferences Projects from Folder or Archive Renesas CS- Project for CC-RX and CC-RL Renesas CS- Project for CC-RX and CC-RL Renesas GitHub freeRTOS (with IoT libraries) Project Sample Projects on Renesas Website C/C++ Code Generator Finstall Comph Rencing Tracing XML

Figure 108 : Project Import dialog with "Existing Projects into Workspace" option selected

- 6. click [Next >]
- 7. To import the project, use either **Select archive file** or **Select root directory**. First, choose **Select root directory** as shown below:

3 Import			×
Import Projects			
Select a directory to search for existing Eclipse projects.			
Select root directory:	~	Browse	
O Select archive file:	~	Browse	
Projects:			
		Select All	I
		Deselect A	All
		Refresh	
Options			
Search for nested projects			
Copy projects into workspace			
Close newly imported projects upon completion			
Hide projects that already exist in the workspace			
Working sets			
Add project to working sets		New	
Working sets:	~	Select	
		Cancel	

Figure 109 : Import Existing Project dialog 1 - Select root directory



- 8. Click [Browse...].
- 9. Choose the directory of the project you would like to import to specify the directory as **root directory**.
- 10. Select the project for import.
- 11.Click [Open].
- 12. Select the project to import from the list of [Projects:] as shown below:

e Import	-	
Import Projects Select a directory to sear	rch for existing Eclipse projects.	
 Select root directory: Select archive file: 	C:YworvfR/A0UI YtmpYe2shudio-2022-07 wr V	Browse
Projects:	TANKA SALE PARAMA INTE 1	
M Blinky	ZASUUAtinoAccession onto ovjevnik/Blinny)	Select All Deselect All
		Refresh

Figure 110 : Import Existing Project dialog 2 – Select the project to be imported

13. Click [Finish] to import the project.



6. Notes on development

6.1 Unexpected Update of Program placed on Flash ROM

If the program written to Flash ROM isn't updated expectedly even though there is no failure in downloading your program via e2studio, please check the settings of Flash Bus Type and Flash Memory Type shown in the figure below:

Edit Configuration			\times
Edit Renesas GDB Hardware Debugging configu	uration test bustype Debug Flat for		
Launch Configuration Name: rza_blinky Debug_Flat			
Main * Debugger > Startup * Source Common			
Debug hardware: J-Link ARM 💛 Target Device: R9A0	07G063U		
GDB Settings Connection Settings Debug Tool Setting	gs		
× I0	-		^
Use Default IO Filename Y	/es	~	
IO Filename \$	{support_area_loc}		
✓ General Debug			
Reset After Reload Y	/es	~	
✓ Memory			
Endian L	ittle Endian	~	
✓ Break			
Use Flash Breakpoints Y	/es	~	
Allow Simulation N	No	~	
✓ Flash		_	
Flash Bus Type C	OctaBus	×	
Flash Memory Type C	DctaFlash	~	
WorkRam Start			
WorkRam End			
Erase on-chip program flash before download		~	
Erase on-chip data flash before download		~	
		~	
	x0		

Figure 111 : Flash related settings in Debug Tool Settings

When Flash Bus Type and/or Flash Memory Type don't match the configuration of board shown in the following table, your program won't be downloaded properly.

Board Edition	Expected Flash Settings
QSPI Edition (RTK9763U02S01000BE)	Flash Bus Type : SPIBSC
	Flash Memory Type : SerialFlash
Octal-SPI Edition (RTK9763U02S01001BE)	Flash Bus Type : OctaBus
	Flash Memory Type : OctaFlash



6.2 Getting USB Hub to be workable with USBX

When using USB Hub with USBX, please follow the pro shown below:

- 1. Copy rza/microsoft/azure-rtos/usbx/common/core/inc/ux_user_sample.h to the directory rza/fsp/src/rm_usbx_port and rename it to ux_user.h.
- 2. Add the definitions listed below to ux_user.h.

#define	UX_MAX_CLASS_DRIVER	3
#define	UX_MAX_ED	80
#define	UX_MAX_TD	128
#define	UX_MAX_ISO_TD	128

3. Add the following definition to rza_azurertos_sample/rza/fsp/src/rm_usbx_port/ux_port.h.

#define UX_INCLUDE_USER_DEFINE_FILE



Revision History

	Description			
Rev.	Date	Page	Summary	
3.2.0	Sep.30.2024	22 to 31,	Updated the description and figure based on the latest	
		37, 39	development environment.	
3.1.0	Jul.31.2024	6 to 29,	Updated the description and figure based on the latest	
		34, 37,	development environment.	
		44 to 45,		
		50, 52,		
		54 to 55		
		40 to 42	Corrected the debug step when using the OCTAL Edition of the SMARC EVK board.	
3.0.0	Apr.26.2024	6 to 29,	Updated the description and figure based on the latest	
		32 to 36,	development environment.	
		47 to 53		
2.0.2	Feb.29.2024	15, 36, 72,	Added 2.2 to install Arm GNU toolchain.	
		73	Added Step 4 and 5 to 4.5.2.	
			Removed 6.1 Unexpected termination of GDB connection.	
			Removed 6.3 to describe the way to fix the building error.	
2.0.1	Sep.30.2023	-	Updated the versions.	
2.0.0	Jun.30.2023	63, 67	Added 6.3 to describe the way to fix the building error.	
			Added 6.4 to describe the way to use USBX.	
1.21	Apr.07.2023	22, 23	Added 2.2.3 to describe the way to install FSP with the zipped	
			Packs.	
1.20	Dec.26.2022	-	Added the instructions for installing FSP using Platform	
			Installer.	
1.10	Sep.30.2022	-	Added the info on "RZ/A3UL Evaluation Board Kit Octal-SPI	
			Edition.	
1.00	Jul.28.2022	-	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 is supplied until the power is supplied until the power reaches the level at which reseting 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 systemevaluation test for the given product.

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