RZ/T2, RZ/N2 Group

OPC UA Server and PubSub Sample Program Package Guide

Introduction

This document is a guide for the OPC UA Server and PubSub sample program package for RZ/T2, RZ/N2. This guide describes the structure of this package.

RZ/T2M and RZ/T2ME are designed to be compatible, so please use the model names in this document interchangeably.

Target Device

RZ/T Series: RZ/T2M (RZ/T2ME), RZ/T2H Group
RZ/N Series: RZ/N2L, RZ/N2H Group

Contents

1. Overview 2
1.1 Requirements 2
1.1.1 RZ/T2M 2
1.1.2 RZ/N2L 2
1.1.3 RZ/T2H 3
1.1.4 RZ/N2H 3
1.1.5 Common 4
2. Package folder structure 5
3. Feature added 6

1. Overview

This guide applies to the OPC UA Server and PubSub sample program package for RZ/T2 and RZ/N2. For details on the supported features, please refer to the application note.

1.1 Requirements

This project has been developed and tested on these environments using the following boards and tools.

1.1.1 RZ/T2M

Table 1.1. RZ/T2M environment

Category	Name	Version	Description
Board	RZ/T2M RSK Board	-	Renesas RZ/T2M-RSK - Renesas Starter Kit Plus for RZ/T2M | Renesas
IDE	EWARM	9.60.3	IAR Systems IAR Embedded Workbench for Arm | IAR
	e² studio	2025-12	RZ FSP GitHub - renesas/rz-fsp: Flexible Software Package (FSP) for Renesas RZ series · GitHub
Configurator	FSP Smart Configurator	2025-12	
Flexible Software Package	FSP	4.0.0	
GCC Compiler	GNU ARM Embedded Toolchain	13.3.1.arm-13-24	
Emulator	J-Link ™	8.60	SEGGER SEGGER - The Embedded Experts - Downloads - J-Link / J-Trace
	I-jet	-	IAR Systems IAR debug probes | IAR

1.1.2 RZ/N2L

Table 1.2. RZ/N2L environment

Category	Name	Version	Description
Board	RZ/N2L RSK Board	-	Renesas RZ/N2L-RSK - Renesas Starter Kit+ for RZ/N2L | Renesas
IDE	EWARM	9.60.3	IAR Systems IAR Embedded Workbench for Arm | IAR
	e² studio	2025-12	RZ FSP GitHub - renesas/rz-fsp: Flexible Software Package (FSP) for Renesas RZ series · GitHub
Configurator	FSP Smart Configurator	2025-12	
Flexible Software Package	FSP	4.0.0	
GCC Compiler	GNU ARM Embedded Toolchain	13.3.1.arm-13-24	
Emulator	J-Link ™	8.60	SEGGER SEGGER - The Embedded Experts - Downloads - J-Link / J-Trace
	I-jet	-	IAR Systems IAR debug probes | IAR

1.1.3 RZ/T2H

Table 1.3. RZ/T2H environment

Category	Name	Version	Description
Board	RZ/T2H Evaluation Board	-	Renesas RZ/T2H-EVKIT - Evaluation Board Kit for RZ/T2H | Renesas
IDE	EWARM	9.60.3	IAR Systems IAR Embedded Workbench for Arm | IAR Patch for RZ/T2H, N2H “EWARM_Patch_for_RZT2H_N2H_rev1.0.zip” is required
	e² studio	2026-04.1	RZ FSP GitHub - renesas/rz-fsp: Flexible Software Package (FSP) for Renesas RZ series · GitHub
Configurator	FSP Smart Configurator	2026-04.1	
Flexible Software Package	FSP	4.1.0	
GCC Compiler	GNU ARM Embedded Toolchain	13.3.1.arm-13-24	
	GNU ARM A-Profile (AArch64 bare-metal)	13.2.1.20231009	
Emulator	J-Link ™	8.60	SEGGER SEGGER - The Embedded Experts - Downloads - J-Link / J-Trace
	I-jet	-	IAR Systems IAR debug probes | IAR

1.1.4 RZ/N2H

Table 1.4. RZ/N2H environment

Category	Name	Version	Description
Board	RZ/N2H Evaluation Board	-	Renesas RZ/N2H-EVKIT - Evaluation Board Kit for RZ/N2H | Renesas
IDE	EWARM	9.60.3	IAR Systems IAR Embedded Workbench for Arm | IAR Patch for RZ/T2H, N2H “EWARM_Patch_for_RZT2H_N2H_rev1.0.zip” is required
	e² studio	2026-04.1	RZ FSP GitHub - renesas/rz-fsp: Flexible Software Package (FSP) for Renesas RZ series · GitHub
Configurator	FSP Smart Configurator	2026-04.1	
Flexible Software Package	FSP	4.1.0	
GCC Compiler	GNU ARM Embedded Toolchain	13.3.1.arm-13-24	
	GNU ARM A-Profile (AArch64 bare-metal)	13.2.1.20231009	
Emulator	J-Link ™	8.60	SEGGER SEGGER - The Embedded Experts - Downloads - J-Link / J-Trace
	I-jet	-	IAR Systems IAR debug probes | IAR

1.1.5 Common

Table 1.5. Common environment

Category	Name	Version	Link	Notes
USB Flash Drive	-	-	-	Used as file storage for file system Formatting to FAT32 format required *Can be operated without USB Flash Drive.
OPC UA Client Tool	UaExpert	2.0.1	OPC UA Clients - Unified Automation (unified-automation.com)	
Packet analyzer	Wireshark	4.4.7	Wireshark · Download	
OPC Communication Generic Tool	OpcCmd Utility	-	OpcCmd Utility Download - OPC Labs Knowledge Base	Used as OPC UA PubSub Subscriber
OPC UA Publisher Tool	UADemoPublisher	-	OPC UA Demo Publisher Download - OPC Labs Knowledge Base	
Low-code development tool	Node-RED	4.0.3	Node-RED (nodered.org) Node.js — Run JavaScript Everywhere (nodejs.org)	Used as OPC UA Client Graphical display of Node value

2. Package folder structure

The folder structure of this sample program package is below.

The folder structure of “RZ***_OPC_***_rev****.zip” and the usage of “AttachedFiles” are described in the application note (r01an8281******-rzt2-rzn2-opcua.pdf).

Item	Description
r01an8282xx0420-rzt2-rzn2-opcua-package.zip	
├── RZT2M_OPCUA_RSK_rev0420.zip	Projects for RZ/T2M RSK
├── RZN2L_OPCUA_RSK_rev0420.zip	Projects for RZ/N2L RSK
├── RZT2H_OPCUA_EVB_rev0420.zip	Projects for RZ/T2H EVB
├── RZN2H_OPCUA_EVB_rev0420.zip	Projects for RZ/N2H EVB
├── r01an8281ej0120-rzt2-rzn2-opcua.pdf	Application Note (English)
├── r01an8281jj0120-rzt2-rzn2-opcua.pdf	Application Note (Japanese)
├── r01an8282ej0420-rzt2-rzn2-opcua-package.pdf	This document
├── SBOM	SBOM files folder
│ ├── RZT2M_opcua_rsk_rev0420.spdx	SBOM file for RZ/T2M project (.spdx format)
│ ├── RZT2M_opcua_rsk_rev0420.json	SBOM file for RZ/T2M project (.json format)
│ ├── RZN2L_opcua_rsk_rev0420.spdx	SBOM file for RZ/N2L project (.spdx format)
│ ├── RZN2L_opcua_rsk_rev0420.json	SBOM file for RZ/N2L project (.json format)
│ ├── RZT2H_opcua_evb_rev0420.spdx	SBOM file for RZ/T2H project (.spdx format)
│ ├── RZT2H_opcua_evb_rev0420.json	SBOM file for RZ/T2H project (.json format)
│ ├── RZN2H_opcua_evb_rev0420.spdx	SBOM file for RZ/N2H project (.spdx format)
│ └── RZN2H_opcua_evb_rev0420.json	SBOM file for RZ/N2H project (.json format)
└── AttachedFiles	Attached files folder
├── patch_open62541.zip	Patch file for open62541
├── keyfiles.zip	Key files for OPC UA security communication
├── original_scripts.zip	Build script files for FSP updates
└── node-red_opcua_v2.1.json	Node-RED configuration file

3. Feature added

This section describes package updates and function additions.

Version 4.20 includes the following updates:

- Added support for the “Embedded 2017 UA Server [UACore 1.04]” profile.
- Added support for the “User Token – X509 Certificate Server Facet”.
- Updated the versions of open62541 and Mbed TLS.
  - open62541: v1.3.15 → v1.3.18
  - Mbed TLS: v3.6.4 → v3.6.6
- Changed the file management structure on the USB flash drive connected to the evaluation board.

Revision History

Rev.	Date	Description	
		Page	Summary
4.00	Apr.15, 2026	-	First edition issued
		-	Combined the packages for RZ/T2M, RZ/N2L, RZ/T2H and RZ/N2H into a single package
		p.4	Updated “Feature added” ・ RZ FSPv4.0.0 support
4.10	May.29, 2026	p.2	Copied “Requirements” from the application note
		p.5	Updated versions Added SBOM files Added the original build script files for FSP updates
		p.6	Updated “Feature added” ・ Added support for functionality equivalent to OPC UA Server certification under the 'Micro Embedded Device 2017 Server [UACore 1.04]' profile
4.20	Aug.28, 2026	p.5	Updated versions
		p.6	Updated “Feature added” ・ Added support for the “Embedded 2017 UA Server [UACore 1.04]” profile. ・ Added support for the “User Token – X509 Certificate Server Facet”. ・ Updated the versions of open62541 and Mbed TLS. ・ open62541: v1.3.15 → v1.3.18 ・ Mbed TLS: v3.6.4 → v3.6.6 ・ Changed the file management structure on the USB flash drive connected to the evaluation board.

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

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

1. Precaution against Electrostatic Discharge (ESD)
   A strong electrical field, when exposed to a CMOS device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop the generation of static electricity as much as possible, and quickly dissipate it when it occurs. Environmental control must be adequate. When it is dry, a humidifier should be used. This is recommended to avoid using insulators that can easily build up static electricity. Semiconductor devices must be stored and transported in an anti-static container, static shielding bag or conductive material. All test and measurement tools including work benches and floors must be grounded. The operator must also be grounded using a wrist strap. Semiconductor devices must not be touched with bare hands. Similar precautions must be taken for printed circuit boards with mounted semiconductor devices.
2. Processing at power-on
   The state of the product is undefined at the time when power is supplied. The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the time when power is supplied. In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the time when power is supplied until the reset process is completed. In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the time when power is supplied until the power reaches the level at which resetting is specified.
3. Input of signal during power-off state
   Do not input signals or an I/O pull-up power supply while the device is powered off. The current injection that results from input of such a signal or I/O pull-up power supply may cause malfunction and the abnormal current that passes in the device at this time may cause degradation of internal elements. Follow the guideline for input signal during power-off state as described in your product documentation.
4. Handling of unused pins
   Handle unused pins in accordance with the directions given under handling of unused pins in the manual. The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of the LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible.
5. Clock signals
   After applying a reset, only release the reset line after the operating clock signal becomes stable. When switching the clock signal during program execution, wait until the target clock signal is stabilized. When the clock signal is generated with an external resonator or from an external oscillator during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Additionally, when switching to a clock signal produced with an external resonator or by an external oscillator while program execution is in progress, wait until the target clock signal is stable.
6. Voltage application waveform at input pin
   Waveform distortion due to input noise or a reflected wave may cause malfunction. If the input of the CMOS device stays in the area between V_{IL} (Max.) and V_{IH} (Min.) due to noise, for example, the device may malfunction. Take care to prevent chattering noise from entering the device when the input level is fixed, and also in the transition period when the input level passes through the area between V_{IL} (Max.) and V_{IH} (Min.).
7. Prohibition of access to reserved addresses
   Access to reserved addresses is prohibited. The reserved addresses are provided for possible future expansion of functions. Do not access these addresses as the correct operation of the LSI is not guaranteed.
8. Differences between products
   Before changing from one product to another, for example to a product with a different part number, confirm that the change will not lead to problems. The characteristics of a microprocessing unit or microcontroller unit products in the same group but having a different part number might differ in terms of internal memory capacity, layout pattern, and other factors, which can affect the ranges of electrical characteristics, such as characteristic values, operating margins, immunity to noise, and amount of radiated noise. When changing to a product with a different part number, implement a system-evaluation test for the given product.

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