RZ/T2M RZ/T2ME Group

EtherCAT Sample program Package

Introduction

This document is an application note for the EtherCAT® sample program package for RZ/T2M and RZ/T2ME.

This application note describes the structures of this package and usage of the sample programs.

Target Device

RZ/T2M Group, RZ/T2ME Group

Related Documents

- Document No. r20ut4939 (RZ/T2M and RZ/T2ME Group Renesas Starter Kit+ for RZ/T2M and RZ/T2ME User's Manual)
- Document No. r01uh0916 (RZ/T2M Group User's Manual: Hardware)
- Document No. r01uh1062 (RZ/T2ME Group User's Manual: Hardware)
- Document No. r01an6434 (RZ/T2, RZ/N2 Getting Started with Flexible Software Package)

Contents

1. Overview 3
1.1 Requirements 3
2. Package folder structure 4
3. Feature added. 5
4. Rivision History 6

1. Overview

This application note applies to the EtherCAT stack sample program package for RZ/T2M and RZ/T2ME.

1.1 Requirements

This sample program package runs under the operating requirement below.

Table 1. Requirements

Item	Vendor	Description
Board	Renesas Electronics	RZ/T2M RSK Board ・Cortex®-R52 CPU0 clock is 800MHz. ・Cortex®-R52 CPU1 clock is 800MHz. RZ/T2ME RSK Board ・Cortex®-R52 CPU0 clock is 800MHz. ・Cortex®-R52 CPU1 clock is 800MHz.
IDE	IAR Systems	Embedded Workbench® for ARM Version 9.60.1 or later
	Renesas Electronics	e² studio 2024-04 or later Flexible Software Package (FSP) for Renesas RZ/T series v2.1.0 or later※ FSP Smart Configurator 2024-04 (FSP v2.1.0) or later※ Please download from the link below. https://github.com/renesas/rzt-fsp/releases
Emulator	IAR Systems	I-jet
	SEGGER	J-Link (Version : 7.96j or later)
GCC Compiler	Arm	The GNU ARM Embedded Toolchain (version 12.2.1.arm-12-24)
SSC Tool	Beckhoff Automation	Slave Stack Code (SSC) Tool Version 5.13
Software PLC	Beckhoff Automation	TwinCAT3

※We apologize that this Sample Package does not support FSP RZ/T v2.3.0.

2. Package folder structure

The folder structure of this sample program package is below.

```
r01an5926xx0211-rzt2m-rzt2me-ethercat-package
├─RZT2M_EtherCAT_RSK_rev0211.zip
│  ├─common
│  │  ├─ecat_IO_CiA402_FoE
│  │  │  ├─ESI
│  │  │  ├─SSCconfig
│  │  │  └─Patch
│  │  ├─ecat_EoE_lwIP
│  │  │  ├─ESI
│  │  │  ├─SSCconfig
│  │  │  └─Patch
│  │  └─ecat_EoE_plusTCP
│  │     ├─ESI
│  │     ├─SSCconfig
│  │     └─Patch
│  └─project
│     └─rsk_rzt2m
│        ├─ecat_IO_CiA402_FoE
│        │  ├─ewarm
│        │  │  └─xSPI0 (CPU0 & CPU1 Project)
│        │  └─e2studio
│        │     └─xSPI0 (CPU0 & CPU1 Project)
│        ├─ecat_EoE_lwIP
│        │  ├─ewarm
│        │  │  ├─RAM (CPU0 & CPU1 Project)
│        │  │  └─xSPI0 (CPU0 & CPU1 Project)
│        │  └─e2studio
│        │     ├─RAM (CPU0 & CPU1 Project)
│        │     └─xSPI0 (CPU0 & CPU1 Project)
│        └─ecat_EoE_plusTCP
│           ├─ewarm
│           │  ├─RAM (CPU0 & CPU1 Project)
│           │  └─xSPI0 (CPU0 & CPU1 Project)
│           └─e2studio
│              ├─RAM (CPU0 & CPU1 Project)
│              └─xSPI0 (CPU0 & CPU1 Project)
├─r01an5926ej0211-rzt2m-rzt2me-ethercat-package.pdf
├─r01an6635ej0211-rzt2m-rzt2me-ecat-eoe.pdf
└─r01an7378ej0211-rzn2m-rzt2me-ecat-cia402-foe.pdf
```

3. Feature added.

Describes package updates and function additions.

For usage of each sample program, refer to the document which is contained in the corresponding sample program package.

4. Rivision History

		Description	
Rev.	**Date**	**Page**	**Summary**
1.00	Jun 7, 2022	-	First edition issued
1.10	July 1, 2022	-	Add CiA402 Option
1.20	Nov 7, 2022	-	Add EoE Option
1.30	Feb 7, 2023	-	Added EEPROM capacity setting change
1.40	Jun 30, 2023	-	Add FoE project ”r01an6943ej0100-rzn2m-ecat-foe”
			Corrected the document corresponding to package version V1.30
1.50	Oct 31, 2023	-	Updated documentation for FSP v1.3.0
			Modified IO project, CiA402 project to pass CTT
			Slightly changed EoE project
			Added Setting ROM Boot Mode
2.00	May 31, 2024	-	Supported FSP v2.0.0 and dual core
			Added the new project “r01an7378ej0200-rzt2m-ecat-cia402-foe” integrated IO, CiA402, and FoE project
			Supported Common Device Profile(ETG.5003.1) in the new project
			Deleted IO, CiA402, and FoE project
2.10	Aug 21, 2024	-	Supported FSP v2.1.0
			Supported RZ/T2ME
		4	Changed the folder name from rzt2m_rsk_rzt2m to rsk_rzt2m
2.11	Mar 7, 2025	-	Supported FSP RZ/T v2.2.0
		3	Updated “Table 1. Requirements”
		4	Updated “2. Package folder structure”

Website and Support

Renesas Electronics Website
http://www.renesas.com/

Inquiries
http://www.renesas.com/contact/

All other logos and trademarks are the property of the respective trademark owners.

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.

- Arm® and Cortex® are registered trademarks of Arm Limited (or its subsidiaries) in the EU and/or elsewhere. All rights reserved.
- Ethernet is a registered trademark of Fuji Xerox Co. Ltd.
- IEEE is a registered trademark of the Institute of Electrical and Electronics Engineers Inc
- EtherCAT® and TwinCAT® are registered trademark and patented technology, licensed by Beckhoff Automation GmbH, Germany.
- J-Link is a trademark of SEGGER Microcontroller GmbH.
- Additionally all product names and service names in this document are a trademark or a registered trademark which belongs to the respective owners. a trademark or a registered trademark which belongs to the respective owners.

Notice

1. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation or any other use of the circuits, software, and information in the design of your product or system. Renesas Electronics disclaims any and all liability for any losses and damages incurred by you or third parties arising from the use of these circuits, software, or information.
2. Renesas Electronics hereby expressly disclaims any warranties against and liability for infringement or any other claims involving patents, copyrights, or other intellectual property rights of third parties, by or arising from the use of Renesas Electronics products or technical information described in this document, including but not limited to, the product data, drawings, charts, programs, algorithms, and application examples.
3. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.
4. You shall not alter, modify, copy, or reverse engineer any Renesas Electronics product, whether in whole or in part. Renesas Electronics disclaims any and all liability for any losses or damages incurred by you or third parties arising from such alteration, modification, copying or reverse engineering.
5. Renesas Electronics products are classified according to the following two quality grades: “Standard” and “High Quality”. The intended applications for each Renesas Electronics product depends on the product’s quality grade, as indicated below.
   "Standard": Computers; office equipment; communications equipment; test and measurement equipment; audio and visual equipment; home electronic appliances; machine tools; personal electronic equipment; industrial robots; etc.
   "High Quality": Transportation equipment (automobiles, trains, ships, etc.); traffic control (traffic lights); large-scale communication equipment; key financial terminal systems; safety control equipment; etc.

   Unless expressly designated as a high reliability product or a product for harsh environments in a Renesas Electronics data sheet or other Renesas Electronics document, Renesas Electronics products are not intended or authorized for use in products or systems that may pose a direct threat to human life or bodily injury (artificial life support devices or systems; surgical implantations; etc.), or may cause serious property damage (space system; undersea repeaters; nuclear power control systems; aircraft control systems; key plant systems; military equipment; etc.). Renesas Electronics disclaims any and all liability for any damages or losses incurred by you or any third parties arising from the use of any Renesas Electronics product that is inconsistent with any Renesas Electronics data sheet, user’s manual or other Renesas Electronics document.
6. When using Renesas Electronics products, refer to the latest product information (data sheets, user’s manuals, application notes, “General Notes for Handling and Using Semiconductor Devices” in the reliability handbook, etc.), and ensure that usage conditions are within the ranges specified by Renesas Electronics with respect to maximum ratings, operating power supply voltage range, heat dissipation characteristics, installation, etc. Renesas Electronics disclaims any and all liability for any malfunctions, failure or accident arising out of the use of Renesas Electronics products outside of such specified ranges.
7. Although Renesas Electronics endeavors to improve the quality and reliability of Renesas Electronics products, semiconductor products have specific characteristics, such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Unless designated as a high reliability product or a product for harsh environments in a Renesas Electronics data sheet or other Renesas Electronics document, Renesas Electronics products are not subject to radiation resistance design. You are responsible for implementing safety measures to guard against the possibility of bodily injury, injury or damage caused by fire, and/or danger to the public in the event of a failure or malfunction of Renesas Electronics products, such as safety design for hardware and software, including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult and impractical, you are responsible for evaluating the safety of the final products or systems manufactured by you.
8. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. You are responsible for carefully and sufficiently investigating applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive, and using Renesas Electronics products in compliance with all these applicable laws and regulations. Renesas Electronics disclaims any and all liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
9. Renesas Electronics products and technologies shall not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations. You shall comply with any applicable export control laws and regulations promulgated and administered by the governments of any countries asserting jurisdiction over the parties or transactions.
10. It is the responsibility of the buyer or distributor of Renesas Electronics products, or any other party who distributes, disposes of, or otherwise sells or transfers the product to a third party, to notify such third party in advance of the contents and conditions set forth in this document.
11. This document shall not be reprinted, reproduced or duplicated in any form, in whole or in part, without prior written consent of Renesas Electronics.
12. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products.

(Note1) “Renesas Electronics” as used in this document means Renesas Electronics Corporation and also includes its directly or indirectly controlled subsidiaries.

(Note2) “Renesas Electronics product(s)” means any product developed or manufactured by or for Renesas Electronics.

(Rev.4.0-1 November 2017)

Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,
Koto-ku, Tokyo 135-0061, Japan
www.renesas.com

Trademarks

Renesas and the Renesas logo are trademarks of Renesas Electronics Corporation. All trademarks and registered trademarks are the property of their respective owners.

Contact information

For further information on a product, technology, the most up-to-date version of a document, or your nearest sales office, please visit: www.renesas.com/contact/.

© 2025 Renesas Electronics Corporation. All rights reserved.