

# MC-COM User's Manual

All information contained in these materials, including products and product specifications, represents information on the product at the time of publication and is subject to change by Renesas Electronics Corp. without notice. Please review the latest information published by Renesas Electronics Corp. through various means, including the Renesas Electronics Corp. website (<http://www.renesas.com>).

## 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](http://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/](http://www.renesas.com/contact/).

# 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.

## MC-COM User's Manual

---

### Contents

1. Overview .....	3
1.1 Presupposition and precautions of this document .....	3
2. Product Contents .....	4
3. Product Order Information .....	4
4. Hardware Configuration and Default Setting .....	5
4.1 Hardware configuration .....	5
4.2 Block diagram .....	6
4.3 Board Layout .....	7
4.4 Standoffs and Screws .....	7
4.5 Jumper pin setting .....	8
4.6 Connection Example .....	8
5. Communication Board Functions .....	9
5.1 Power Supply .....	9
5.2 USB communication .....	9
5.3 Serial Communication .....	9
6. Design and Manufacture Information .....	10
7. Website and Support .....	10

---

**Figure of contents**

Figure 2-1 Product contents .....	4
Figure 4-1 MC-COM block diagram.....	6
Figure 4-2 Communication board .....	7
Figure 4-3 Standoffs and Screws assembly .....	7
Figure 4-4 Default jumper pin setting .....	8
Figure 4-5 Connection Example .....	8

**Table of contents**

Table 4-1 Communication board specification .....	5
Table 4-2 Jumper pin setting .....	8
Table 5-1 SCI connector (CN5) pin assignment.....	9
Table 5-2 SCI connector (CN4) pin assignment.....	9

## 1. Overview

MC-COM is a communication board kit for motor control evaluation. This product supports the Motor Control Development Support Tool, and can be used with CPU board equipped with Renesas MCU and inverter board to efficiently perform motor control evaluations.

### 1.1 Presupposition and precautions of this document

1. Experience of using tools: This document assumes that the user has used terminal emulation program of Integrated Development Environment (IDE) such as e2 studio before.
2. Knowledge about the development subject: This document assumes that the user has a basic knowledge to modify the sample project regarding MCU and embedded system.
3. Before using this product, wear an antistatic wrist strap. If you touch this product with static charge on your body, a device failure may occur, or operation may become unstable
4. All screen shots provided in this document is for reference. Actual screen displays may differ depending on the software and development tool version which you use.

## 2. Product Contents

This kit consists of the following parts.

1. Communication Board (RTK0EMXC90Z00000BJ) x1
2. Communication Cable x1
3. USB Cable x1
4. Screw x4
5. Standoff x4

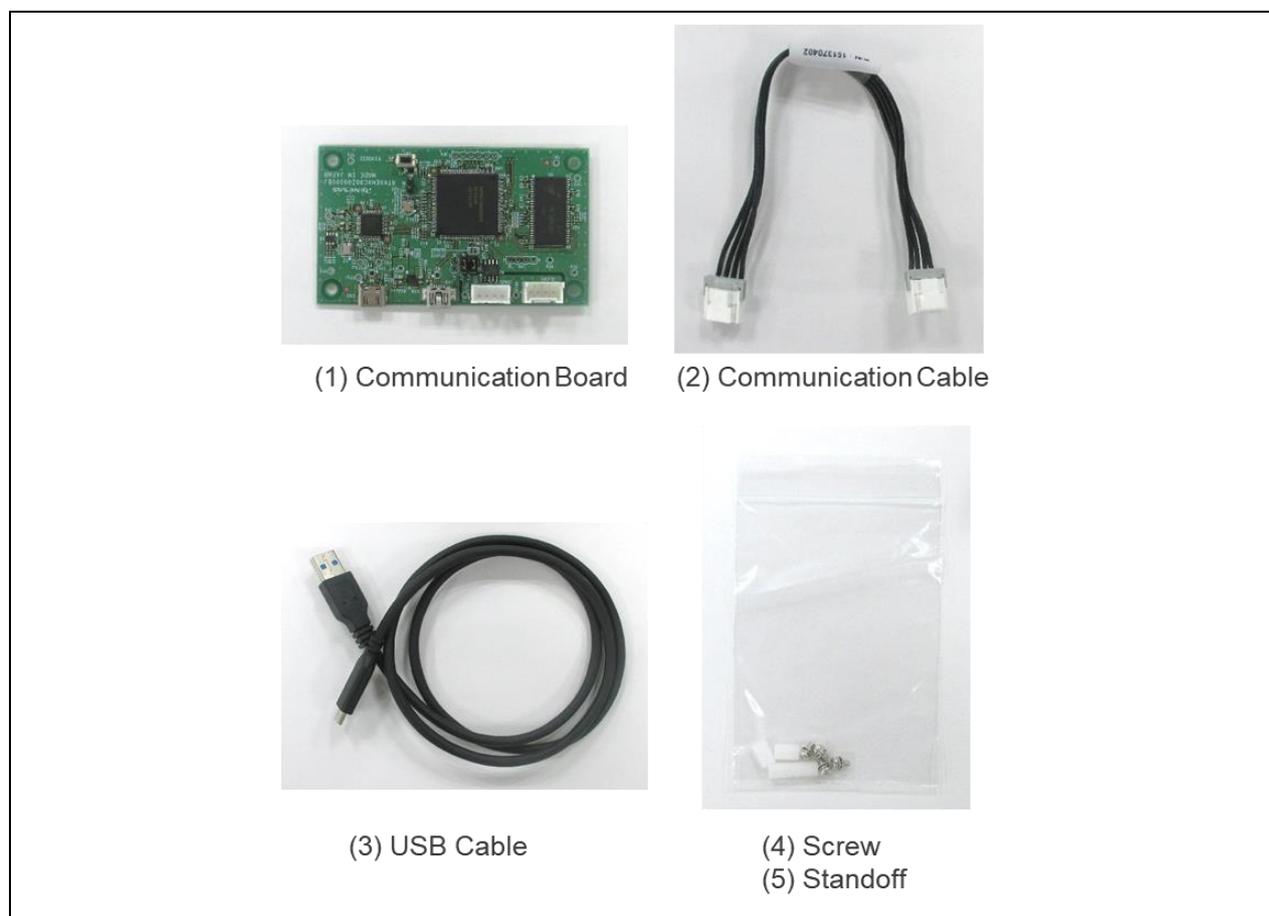


Figure 2-1 Product contents

## 3. Product Order Information

Product No. to order MC-COM : RTK0EMXC90S00000BJ

## 4. Hardware Configuration and Default Setting

### 4.1 Hardware configuration

The specifications of the communication board are shown below.

**Table 4-1 Communication board specification**

item	Specification	
Product name	Communication Board	
Board part No.	RTK0EMXC90Z0000BJ	
External view	 <p>Note: The actual product may differ from this photo.</p>	
Mounted MCU	Product group	RX72N group
	Product No.	R5F572NNDDFB
	CPU maximum operating frequency	240MHz
	Bit count	32 bit
	Package / Pin number	LFQFP / 144 pin
	RAM	1M byte
MCU input clock	20MHz (Generate with external crystal oscillator)	
Power supply	DC 5V <ul style="list-style-type: none"> <li>Power is supplied from USB connector</li> </ul>	
Connector	<ul style="list-style-type: none"> <li>USB Type-C connector for PC</li> <li>SCI connector for CPU board</li> <li>USB miniB connector (not available for users)</li> </ul>	
Isolation	<ul style="list-style-type: none"> <li>Between SCI connector and MCU</li> <li>Isolation device Si8622BC-B-IS (Skyworks Solutions Inc.) or ISO7421FED (Texas Instruments)</li> </ul>	
Switch	MCU reset switch	
Operating temperature	Room temperature	
Operating humidity	No condensation allowed	

## 4.2 Block diagram

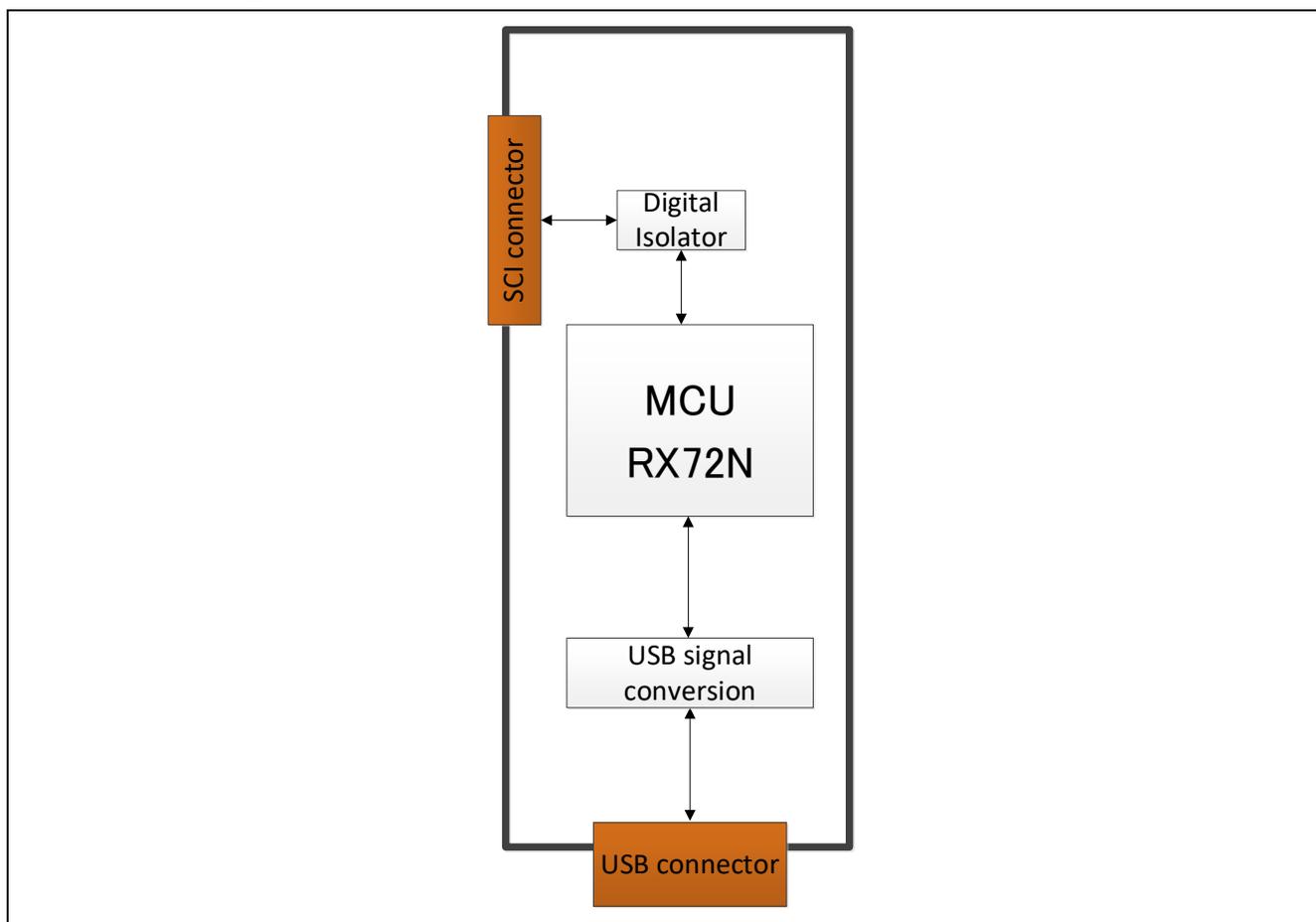


Figure 4-1 MC-COM block diagram

### 4.3 Board Layout

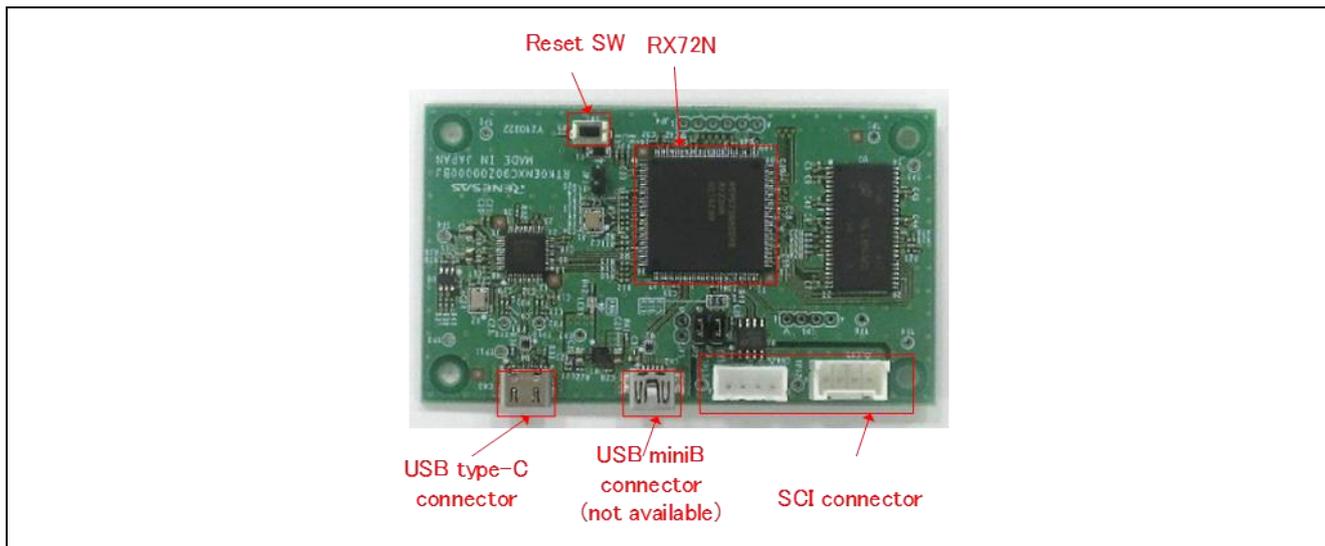


Figure 4-2 Communication board

### 4.4 Standoffs and Screws

Before using this product, assemble the included standoffs and screws as shown below.

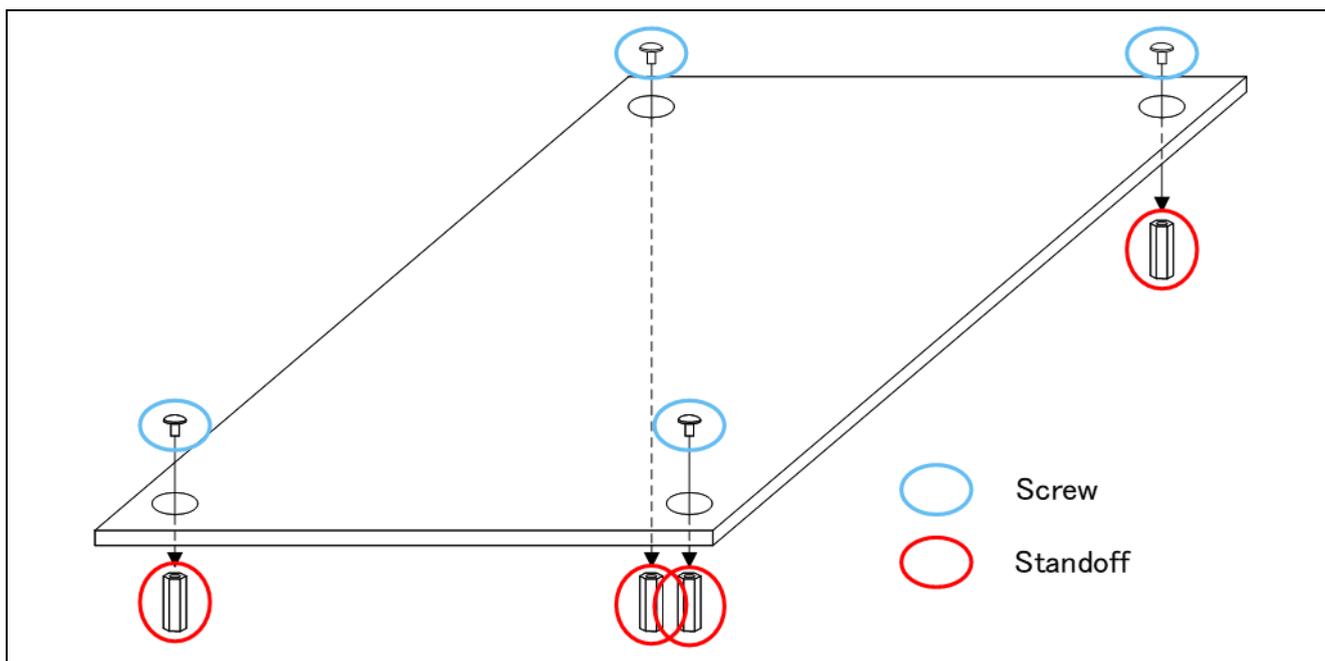


Figure 4-3 Standoffs and Screws assembly

### 4.5 Jumper pin setting

Default settings and functions of the jumper pins (JP1~JP3) are as follows.

Table 4-2 Jumper pin setting

Jumper pin	Default setting	Function
JP1	1-2pin open	1-2pin short : Disable pull-up for MD port (Not available) 1-2pin open : Enable pull-up for MD port
JP2	1-2pin short	1-2pin short : Disable pull-up for GPIO(PC6) 1-2pin open : Enable pull-up for GPIO(PC6)
JP3	1-2pin short	1-2pin short : Disable pull-up for GPIO(PC5) 1-2pin open : Enable pull-up for GPIO(PC5)

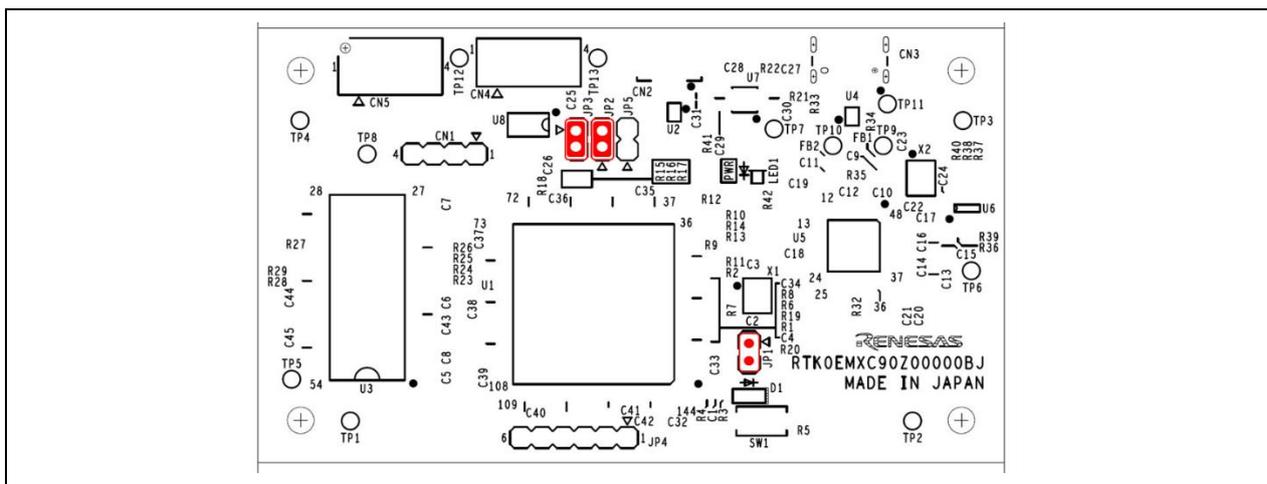


Figure 4-4 Default jumper pin setting

### 4.6 Connection Example

Figure 4-5 shows a connection example when using this product in combination with a Renesas CPU board and a Renesas inverter board kit (MCI-LV-1, P/N: RTK0EM0000S04020BJ).

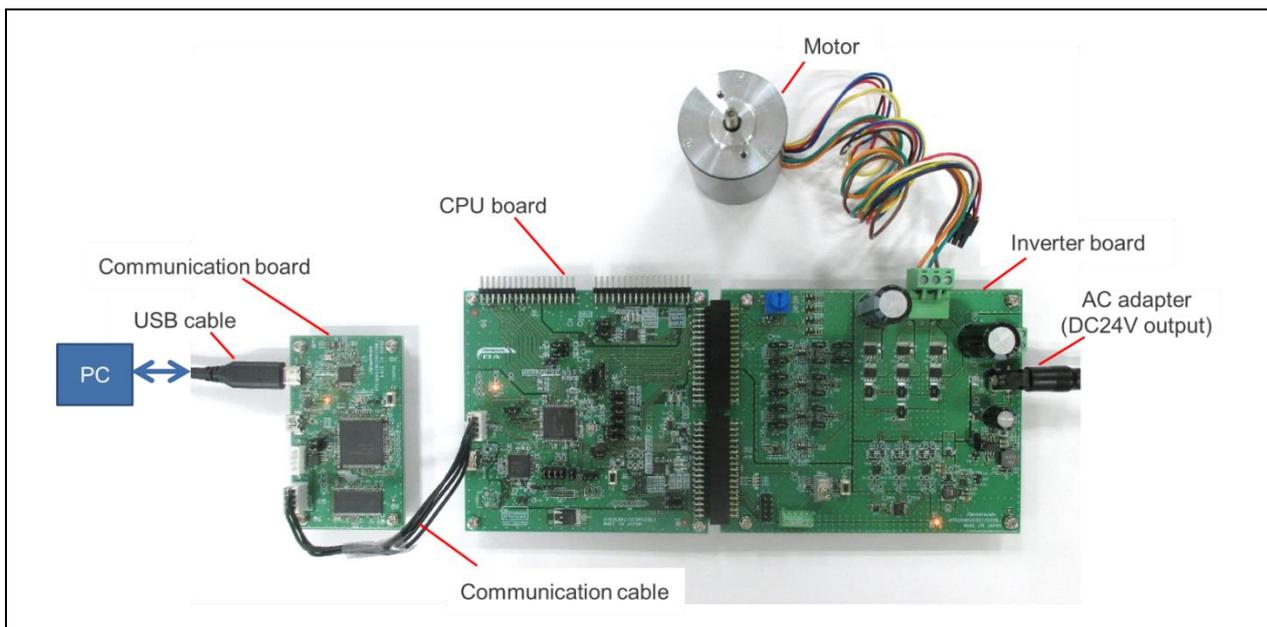


Figure 4-5 Connection Example

## 5. Communication Board Functions

This section describes the specification of the communication board.

### 5.1 Power Supply

Power of this product is supplied at 5V from USB connector.

### 5.2 USB communication

This product is equipped with a USB type-C connector for communication with a PC when using Renesas Motor Workbench, etc.

### 5.3 Serial Communication

This product has two SCI connectors for serial communication with the target MCU when using Renesas Motor Workbench, etc. The pin assignments are shown in Table 5-1 and Table 5-2. When using the communication cable bundled with this product, use CN5. When using the communication cable bundled with RTK0EMX270S00020BJ or RTK0EMA170S00020BJ, use CN4.

The serial communication connector and the MCU (RX72N) are connected via a digital isolator, so the communication board and the CPU board with the target MCU are isolated.

**Table 5-1 SCI connector (CN5) pin assignment**

Pin No.	Function	Note
1	VCC	
2	RXD	Connect to TXD of target MCU
3	TXD	Connect to RXD of target MCU
4	GND	

**Table 5-2 SCI connector (CN4) pin assignment**

Pin No.	Function	Note
1	VCC	
2	RXD	Connect to TXD of target MCU
3	TXD	Connect to RXD of target MCU
4	GND	

## 6. Design and Manufacture Information

You can obtain information on the design and manufacture of this product from [renesas.com](https://www.renesas.com).

## 7. Website and Support

In order to learn, download tools and documents, apply technical support for RA family MCU and its kit, visit the below Web site.

- RA Product Information [renesas.com/ra](https://www.renesas.com/ra)
- RA Product Support Forum [renesas.com/ra/forum](https://www.renesas.com/ra/forum)
- Renesas Support [renesas.com/support](https://www.renesas.com/support)

---

Revision History	MC-COM User's Manual
------------------	----------------------

Rev.	Date	Description	
		Page	Summary
1.00	August 3, 2021	-	First edition
1.10	April 21, 2022	5	Revised Table 4-1

---

MC-COM User's Manual

Publication Date: Rev 1.10 April 21, 2021

Published by: Renesas Electronics Corporation

---

# MC-COM User's Manual



Renesas Electronics Corporation

R12UZ0093EJ0110