Evaluation Board Manual

RX26T Group

MCB-RX26T Type C Evaluation Board Manual

Renesas RX Family
RX200 Series

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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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For Your Safety

Be sure to read the precautions and instructions in this manual before using this product.

Meaning of Notations

In this manual, items related to the safe use of the product are indicated as described below.

The degree of injury to persons or damage to property that could result if the designated content in this manual is not followed is indicated as follows.

⚠ Danger	Indicates content that, if not followed, could result in death or serious injury to the user, and which is highly urgent.
⚠ Warning	Indicates content that, if not followed, could result in death or serious injury to the user.
⚠ Caution	Indicates content that, if not followed, could result in injury to persons or physical damage.

Warnings Regarding Use of the Product

■ Danger Items

⚠ Danger	
  	• The product should be used only by persons (users) having a thorough knowledge of electrical and mechanical components and systems, a full knowledge of the risks associated with handling them, and training in inverter motor control and handling motors, or equivalent skills. Users should be limited to persons who have carefully read the Caution Items contained in this manual. • The product contains high-temperature components that could be dangerous. Do not touch the product or cables while power is being supplied. • Carefully check to make sure that there are no pieces of conductive materials or dust adhering to the board, connectors, and cables. • Do not touch the motor while power is being supplied. • Ensure that the motor is insulated and placed in a stable location before supplying power.

■ Warning Items

Warning	
	Always insert plugs, connectors, and cables securely, and confirm that they are fully inserted. Incomplete connections could cause fire, burns, electric shock, or injury.
	Use the power supply apparatus specified in the manual. Failure to do so could cause fire, burns, electric shock, injury, or malfunction.
	Disconnect the power supply and unplug all cables when the system will not be used for a period of time or when moving the system. Failure to do so could cause fire, burns, electric shock, or malfunction. This will protect the system against damage due to lightning.
	Use a mechanism (switch, outlet, etc.) located within reach to turn off (disconnect) the power supply. In case of emergency, it may be necessary to cut off the power supply quickly.
	In this product, the ground of the main power supply circuit is connected to the ground of the CPU board. When the user evaluates the product, be aware that the product and the measuring instruments may be damaged depending on the connection method of the measuring instruments.
	Turn off the power supply immediately if you notice abnormal odor, smoke, abnormal sound, or overheating. Continuing to use the system in an abnormal condition could cause fire, burns, or electric shock.
	Do Not Disassemble, Modify, or Repair! Doing so could cause fire, burns, electric shock, injury, or malfunction.
	Do not use the product for any purpose other than initial evaluation of motor control in a testing room or lab. Do not integrate the product or any part of it into other equipment. Do not insert or remove cables or connectors when the product is powered on. The product has no safety case. The user must cover the product for safety protection. Failure to observe the above could cause fire, electric shock, burns, or malfunction. The product may not perform as expected if used for other than its intended purpose.

■ Caution Items

Caution	
	Caution – Hot! The motor gets hot. Touching it could cause high-temperature burns.
	Follow the procedure specified in the manual when powering the system on or off. Failure to do so could cause overheating or malfunction.
	Caution – Static Electricity Use the antistatic band. Failure to do so could cause malfunction or unstable motion.

Renesas RX Family

MCB-RX26T Type C Evaluation Board Manual

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1. Overview

MCB-RX26T Type C is a CPU board for motor control evaluation. By using this product in combination with an inverter board, motor control using RX26T can be easily performed.

There are two versions of the MCB-RX26T (Version 1 and Version 2), each with a different circuit diagram and terminal configuration. The model names for each are as follows:

Version 1 Model : RTK0EMXE30C00000BJ
Version 2 Model : RTK0EMXE30C00001BJ

1.1 Presupposition and precautions of this document

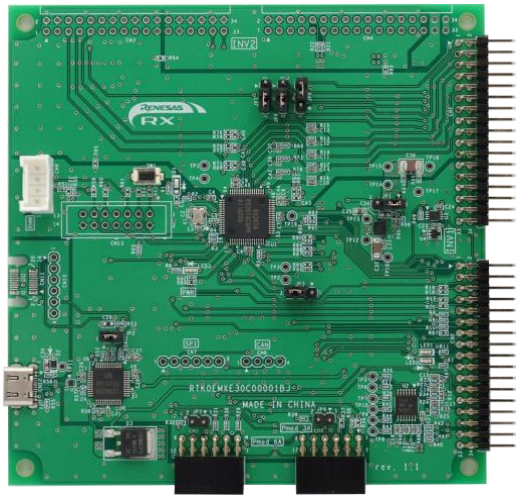
1. Experience of using tools: This document assumes that the user has used terminal emulation program of Integrated Development Environment (IDE) such as e^2 studio before.
2. Knowledge about the development subject: This document assumes that the user has a basic knowledge to modify the sample project 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.
5. The onboard debugger circuit on this product is not isolated. *1 For evaluations of motor drive operation, please use the communication board (MC-COM) to connect to the PC and use the Renesas Motor Workbench development support tool. Because the communication board is equipped with an isolator, isolation between the PC and this product is ensured. Furthermore, Renesas Motor Workbench allows variables to be read and written without stopping the MCU, enabling safe evaluation and debugging of motor drive operation. *2

   *1 When using the onboard debugger or an external emulator, this product and the PC share a common GND. In that case, supplying external power to the inverter board or driving the motor may damage the board or the PC.
   *2 If the MCU is stopped by the debugger while the motor is running, the MOSFETs on the inverter board may remain ON(conducting state), which may result in damage to the motor or the inverter board.

2. Product Contents

This kit consists of the following parts.

1. CPU Board (Version 1 : RTK0EMXE30C00000BJ)
   (Version 2 : RTK0EMXE30C00001BJ) x1
2. USB Cable x1
3. Screw x4
4. Standoff x4



(1) CPU board



(2) USB cable



(3) screw
(4) standoff

Figure 2-1 Product contents

3. Product Order Information

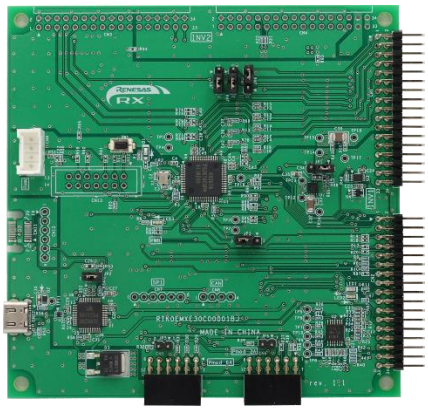
Product number for ordering item	Included item
RTK0EMXE30C00000BJ (MCB-RX26T Type C Version 1)	CPU Board (RTK0EMXE30C00000BJ)
RTK0EMXE30C00001BJ (MCB-RX26T Type C Version 2)	CPU Board (RTK0EMXE30C00001BJ)
RTK0EM0000S04020BJ (MCI-LV-1)	Inverter Board (RTK0EM0000B12020BJ) Brushless DC Motor (R42BLD30L3)
RTK0EMXC90S00000BJ (MC-COM)	Communication board (RTK0EMXC90Z00000BJ) Communication cable USB cable

4. Hardware Configuration and Default Setting

4.1 Hardware configuration

The specifications of the CPU board are shown below.

Table 4-1 CPU board specification

item		Specification
Product name		CPU Board
Board part No.		Version 1 : RTK0EMXE30C00000BJ Version 2 : RTK0EMXE30C00001BJ
Compatible inverter board		RTK0EM0000B12020BJ
External view		 Note: The actual product may differ from this photo.
Mounted MCU	Product group	RX26T group
	Product No.	R5F526TACDFM
	CPU maximum operating frequency	120MHz
	Bit count	32bit
	Package / Pin count	LFQFP / 64pin
	ROM	256KB
MCU input clock		10MHz (Generate with external crystal oscillator)
Power supply		DC 5V,3.3V (selectable with jumper switch) Select one way automatically from the below • Power is supplied from compatible inverter board • Power is supplied from USB connector
Debugger		E2 On-Board (Onboard debugger circuit)
Connector		• Inverter board connector and through hole • USB connector for E2 On-Board • SCI connector for Renesas Motor Workbench communication • Through hole for CAN communication • Through hole for SPI communication • Pmod connectors
Switch		MCU reset switch
LED		User-controllable LED x2, Power LED x1
Board size		109mm (W) x 109mm (L)
Operating temperature		Room temperature
Operating humidity		No condensation allowed
EMC Directive		EN61326-1:2021 EMI:Class A EMS:Basic Electromagnetic environment

4.2 Block diagram

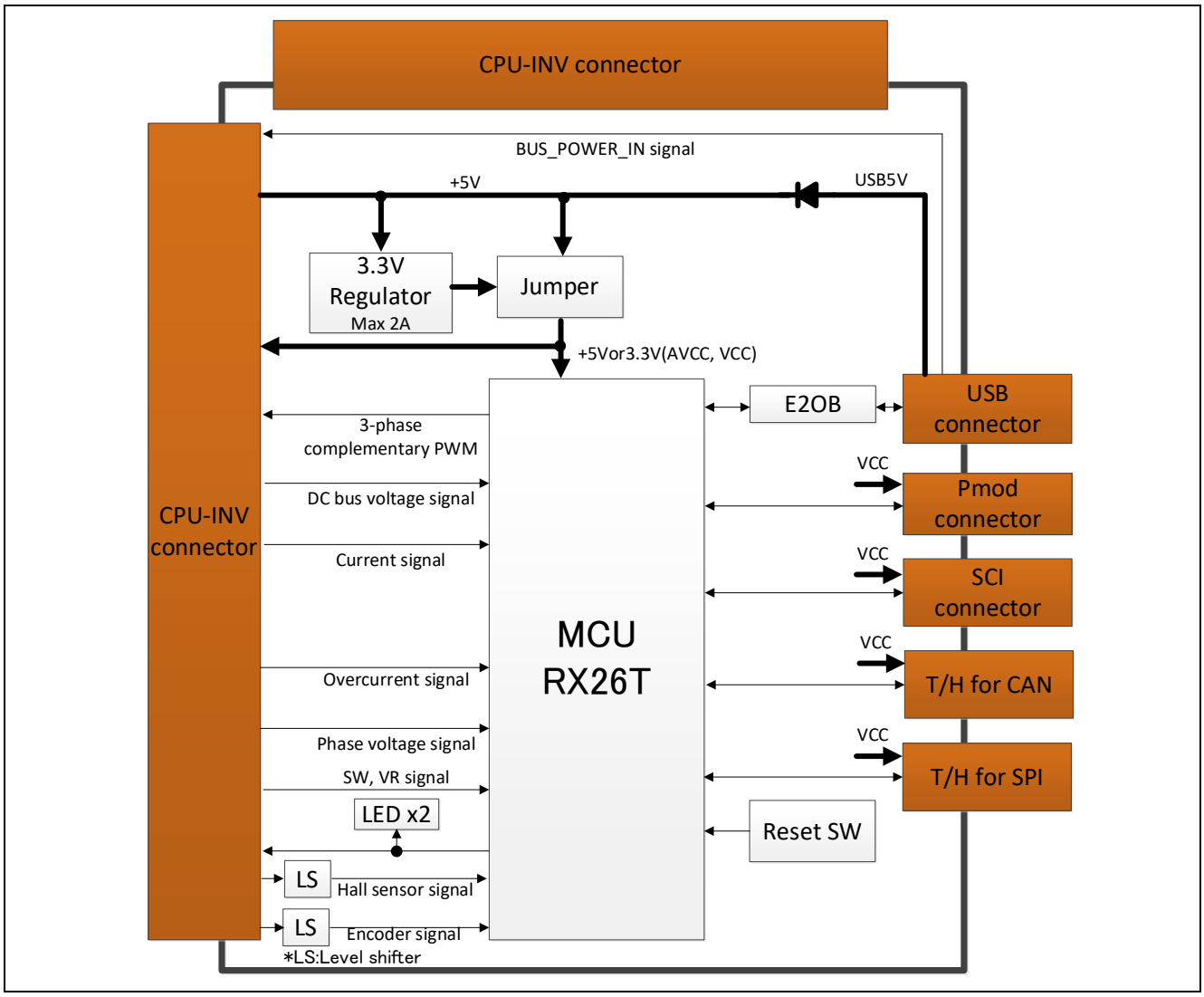


Figure 4-1 CPU board block diagram

4.3 Board Layout

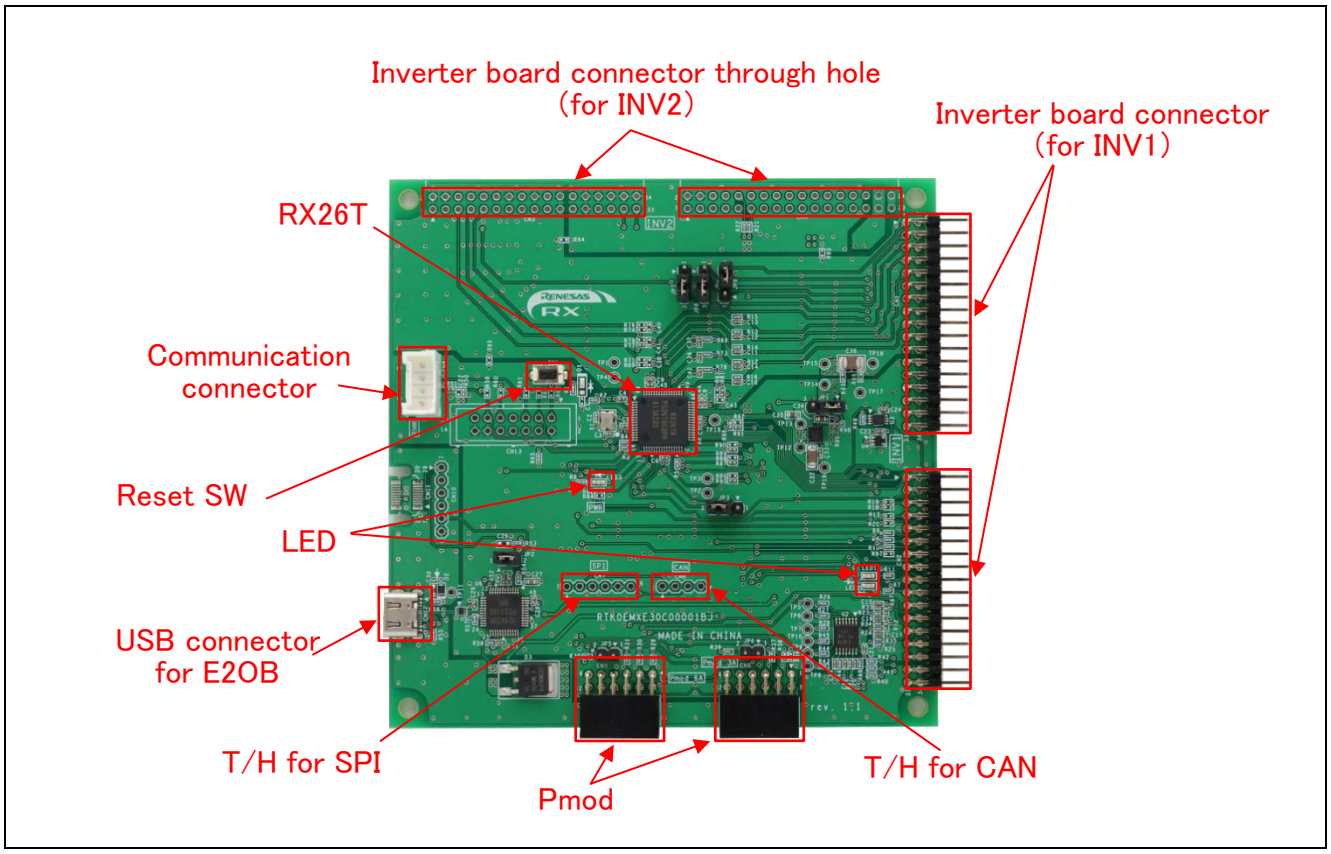


Figure 4-2 CPU Board Layout

4.4 Standoffs and Screws

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

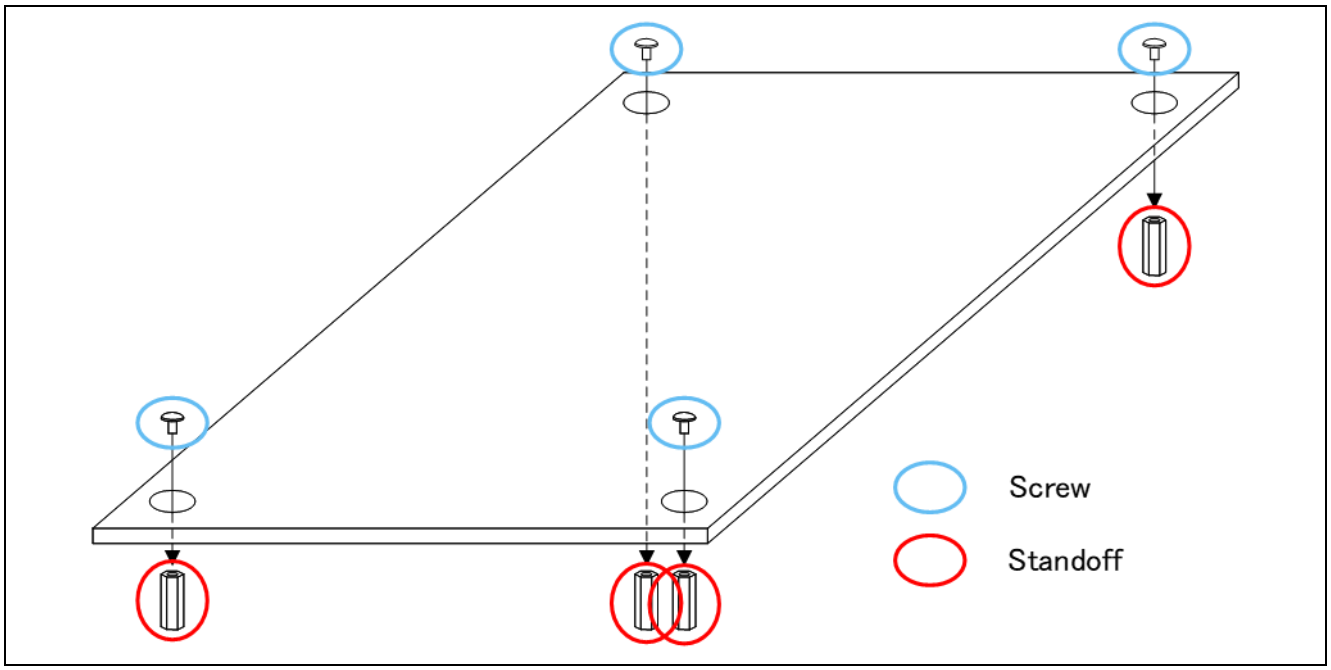


Figure 4-3 Standoffs and Screws assembly

4.5 Jumper pin setting

(1) Version 1(RTK0EMXE30C00000BJ)'s default settings and functions of the jumper pins and jumper resistor, LPF are as follows.

Table 4-2 Jumper pin setting of CPU board (Version 1)

JP No.	Function	Setting (function in use)			Default setting
		open	1-2 short	2-3 short	
1	MCU operation voltage	N/A	5V	3.3V	1-2 short
2	On board debugger	Enabled	Disabled	N/A	1-2 short

Table 4-3 Jumper resistor and LPF setting of CPU board (Version 1)

resistors & capacitors	Function in use							Default setting *3
	INV1	INV2	HV INV	IPS *1	Encoder	Pmod	Smart driver *2	
R67	-	-	-	-	short	-	-	short
R69	-	open	-	short	-	-	-	open
R71	-	short	-	open	-	-	-	open
C38	-	220pF	-	DNF	-	-	-	DNF
R72	-	-	-	-	short	-	-	short
R74	-	open	-	short	-	-	-	open
R76	-	short	-	open	-	-	-	open
C40	-	220pF	-	DNF	-	-	-	DNF
R77	-	open	-	short	-	-	-	short
R79	-	short	-	open	-	-	-	open
C41	-	220pF	-	DNF	-	-	-	DNF
R81	-	open	-	short	-	-	-	short
R83	-	short	-	open	-	-	-	open
C43	-	220pF	-	DNF	-	-	-	DNF
R85	-	open	-	-	short	-	-	short
R86	-	short	-	-	open	-	-	open
R87	-	open	-	-	short	-	-	short
R88	-	short	-	-	open	-	-	open
R89	-	open	short	-	-	-	short	short
R90	-	short	open	-	-	-	open	open
R91	-	open	short	-	-	-	short	short
R92	-	short	open	-	-	-	open	open
R68	680Ω	-	open	-	-	-	-	680Ω
R70	open	-	680Ω	-	-	-	-	open
R73	680Ω	-	open	-	-	-	-	680Ω
R75	open	-	680Ω	-	-	-	-	open
R78	680Ω	-	open	-	-	-	-	680Ω
R80	open	-	680Ω	-	-	-	-	open
R82	-	-	-	-	-	open	-	short
R84	-	-	-	-	-	short	-	open

- : Can be either open (DNF) or short
DNF : Unmounted
INV1 : an inverter board connected to CN1 and CN2
INV2 : an inverter board connected to CN3 and CN4
HV INV : a high voltage inverter board with PFC connected to CN1 and CN2

*1 Inductive position sensor.
*2 3-phase smart gate driver.
*3 INV1, Encoder and Smart driver are available

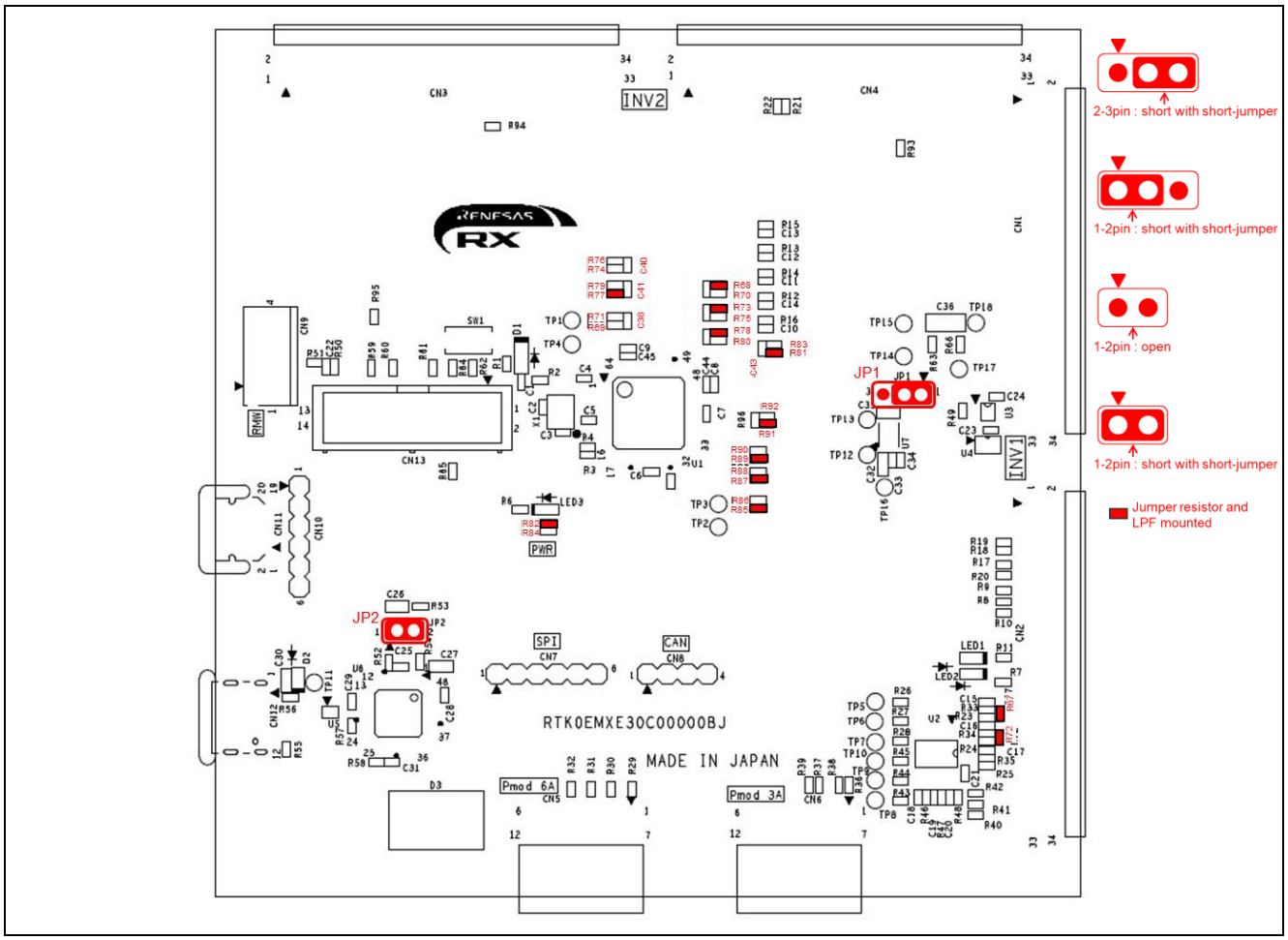


Figure 4-4 Default jumper pin and jumper resistor, LPF setting (Version 1)

(2) Version 2(RTK0EMXE30C00001BJ)'s default settings and functions of the jumper pins and jumper resistor, LPF are as follows.

Table 4-4 Jumper pin setting of CPU board (Version 2)

JP No.	Function	Setting (function in use)			Default setting
		open	1-2 short	2-3 short	
1	MCU operation voltage	N/A	5V	3.3V	1-2 short
2	On board debugger	Enabled	Disabled	N/A	1-2 short
3	PFCPWM2/SPI	CN7(SPI)	Smart driver *2	PFCPWM2	2-3 short
5	I2C pull up / PFCPWM2	Pull up Disabled (PFCPWM2)	Pull up Enabled (Pmod I2C)	N/A	open
6	UART RXD pull up/ PFCPWM1	Pull up Disabled (PFCPWM1)	Pull up Enabled (Pmod UART)	N/A	open
7	VU/VPFC	N/A	VU	VPFC	2-3 short
8	VV/IPFC1	N/A	VV	IPFC1	2-3 short
9	VW/Temperature	N/A	VW	Temperature	2-3 short

Table 4-5 Jumper resistor and LPF setting of CPU board (Version 2)

resistors & capacitors	Function in use							Default setting *3
	INV1	INV2	HV INV	IPS *1	Encoder	Pmod	Smart driver *2	
R67	-	-	-	-	short	-	-	short
R69	-	open	-	short	-	-	-	open
R71	-	short	-	open	-	-	-	open
C38	-	220pF	-	DNF	-	-	-	DNF
R72	-	-	-	-	short	-	-	short
R74	-	open	-	short	-	-	-	open
R76	-	short	-	open	-	-	-	open
C40	-	220pF	-	DNF	-	-	-	DNF
R77	-	open	-	short	-	-	-	short
R79	-	short	-	open	-	-	-	open
C41	-	220pF	-	DNF	-	-	-	DNF
R81	-	open	-	short	-	-	-	short
R83	-	short	-	open	-	-	-	open
C43	-	220pF	-	DNF	-	-	-	DNF
R85	-	open	-	-	short	-	-	short
R86	-	short	-	-	open	-	-	open
R87	-	open	-	-	short	-	-	short
R88	-	short	-	-	open	-	-	open
R89	-	open	short	-	-	-	short	short
R90	-	short	open	-	-	-	open	open
R91	-	open	short	-	-	-	short	short
R92	-	short	open	-	-	-	open	open
R82	-	-	-	-	-	open	-	short
R84	-	-	-	-	-	short	-	open

- : Can be either open (DNF) or short
DNF : Unmounted
INV1 : an inverter board connected to CN1 and CN2
INV2 : an inverter board connected to CN3 and CN4
HV INV : a high voltage inverter board with PFC connected to CN1 and CN2

*1 Inductive position sensor.
*2 3-phase smart gate driver.
*3 INV1, Encoder and Smart driver are available

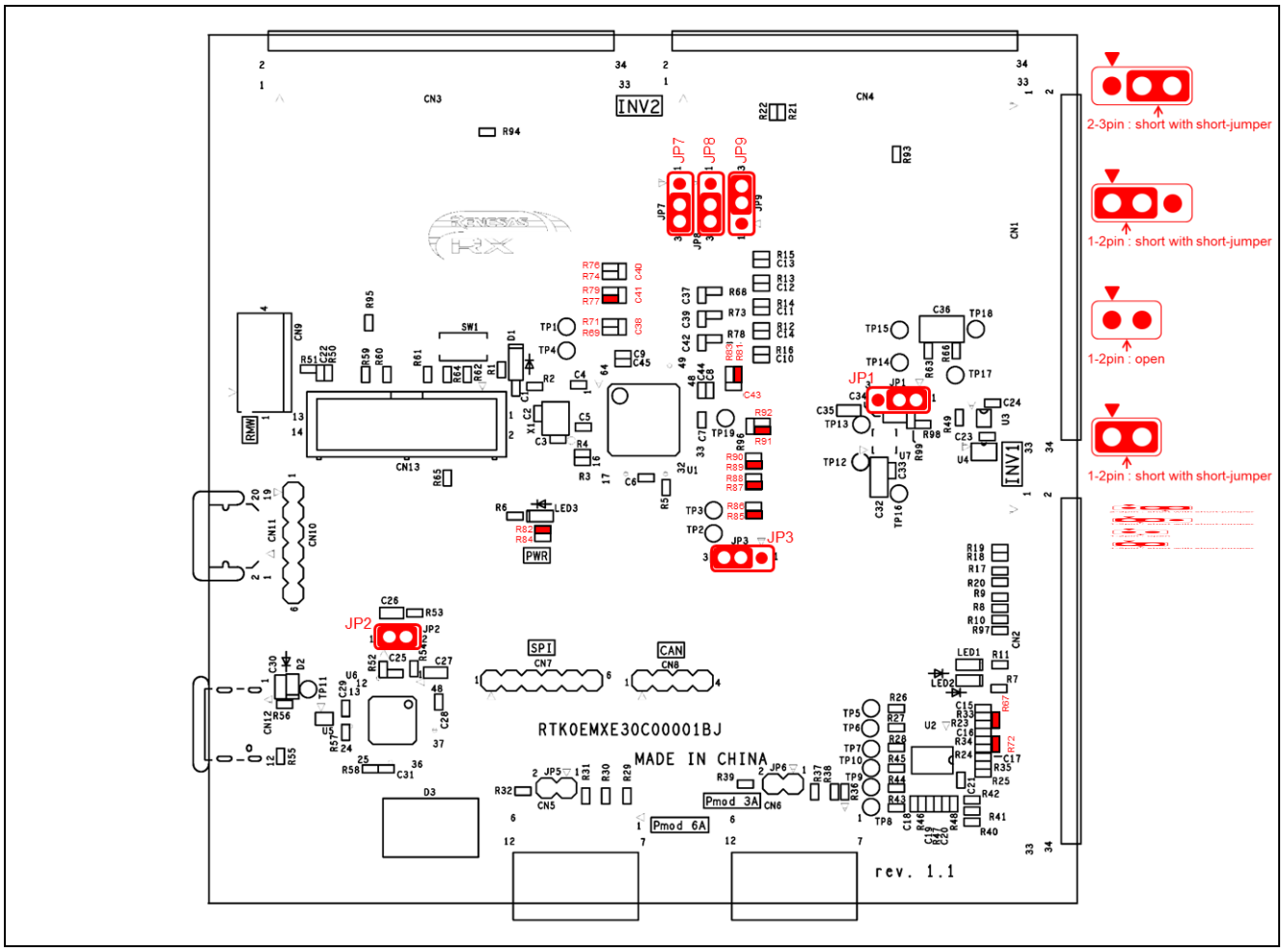


Figure 4-5 Default jumper pin and jumper resistor, LPF setting (Version 2)

4.6 Hardware Setup

4.6.1 Board Connection

Figure 4-6 show connection examples when using this product with the inverter board kit (product name : MCI-LV-1, model name : RTK0EM0000S04020BJ). To prevent damage to the PC, isolate the PC and CPU board by using a communication board kit (Product Name: MC-COM, Model Name: RTK0EMXC90S00000BJ) as shown in Figure 4-6. Note that the connector between the CPU board and the inverter board is a tight fit, so be careful not to bend the pins when connecting or disconnecting.

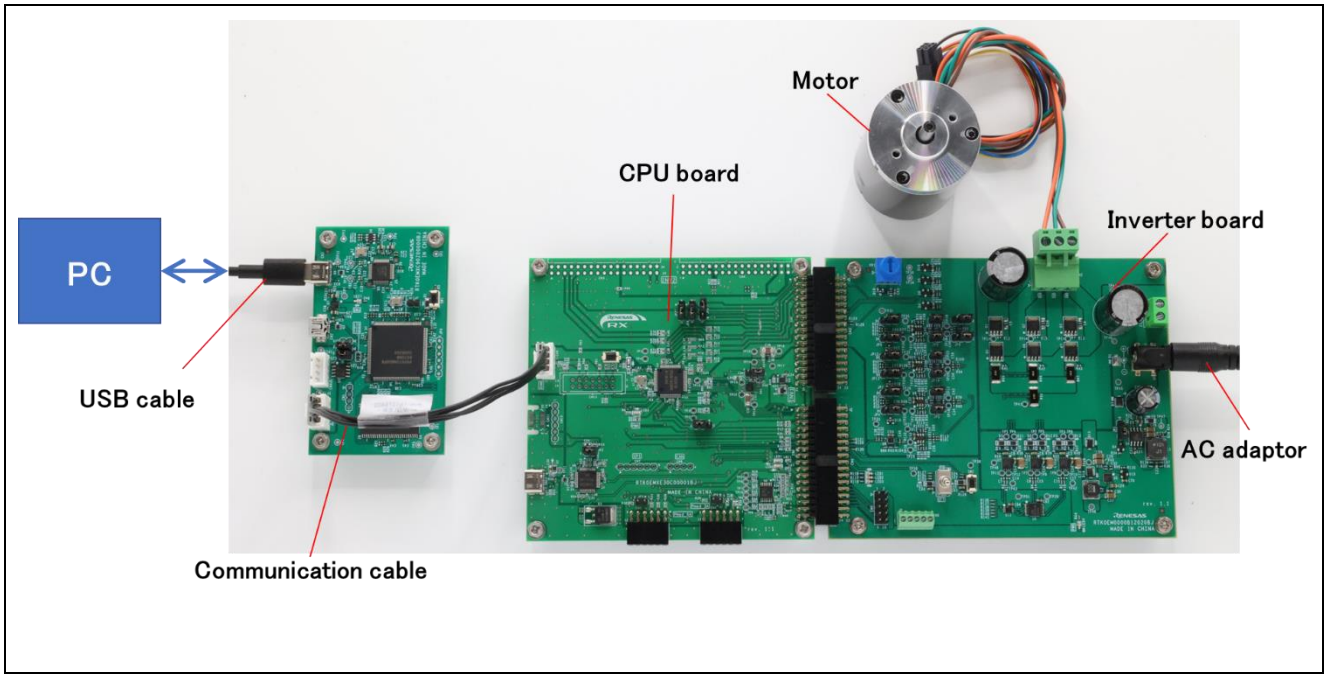


Figure 4-6 Board connection example

5. CPU Board Specification

This section describes the specification of the CPU Board.

5.1 Functions

5.1.1 Power supply

When not connected to the inverter board, power should be supplied from the USB connector(CN12). When connecting to the inverter board, power supply from the USB connector or from the inverter board will be automatically selected. USB power supply has priority. The MCU operation voltage can be selected at either 5 V or 3.3 V for this product. The operation voltage is switched with JP1 as shown in Table 4-2,Table 4-4.

5.1.2 On-board debugger

This product has the on-board debugger circuit, E2 On-Board (hereinafter called “E2OB”). You can write a program (firmware) of RX26T with it. When you write a program, open (remove) JP2 and connect the CPU board to PC with USB cable. E2OB operates as debugger equivalent to E2 emulator Lite. If connecting from Integrated Development Environment (e.g. e^2 studio) or flash programming tool (e.g. Renesas Flash Programmer), set the type of debugger (tool) to “E2 emulator Lite”.
After writing a program, short JP2 for CPU board operation.

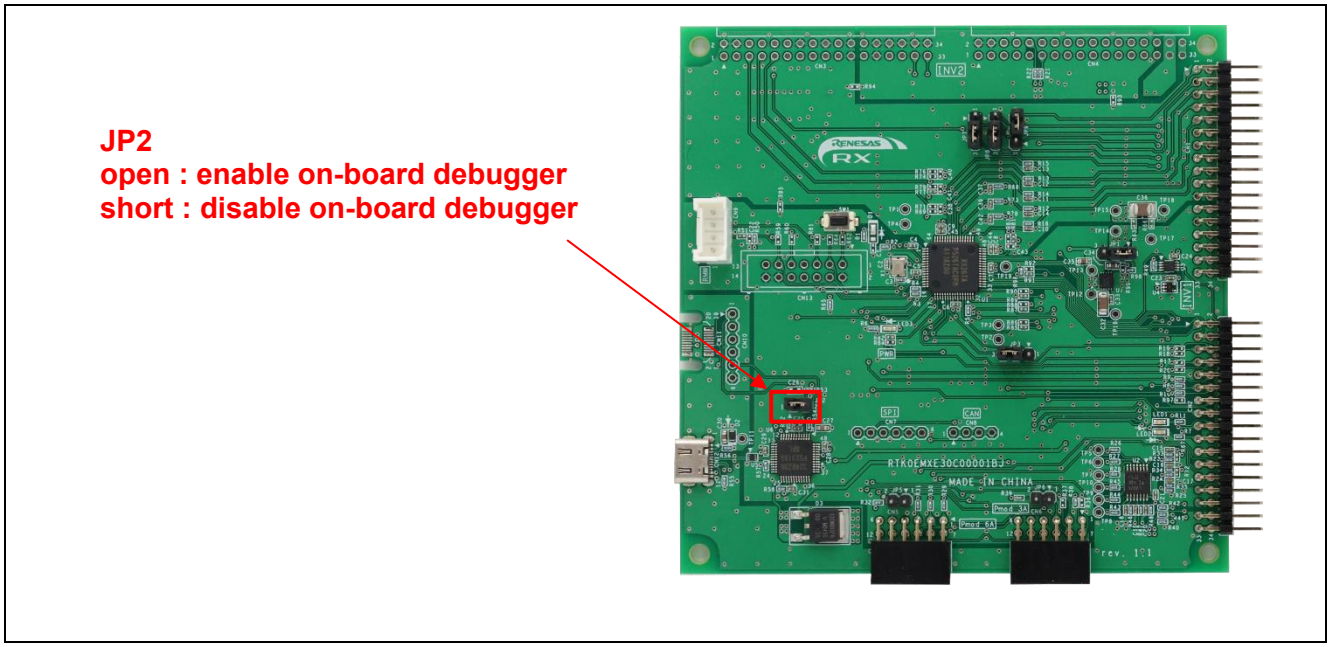


Figure 5-1 JP2 setting

5.1.3 Inverter board connector

Max 2 inverter boards can be connected to this product. This product has connecter for 1st inverter board, and through holes for 2nd inverter board. 1st inverter board is connected with CN1 and CN2, and 2nd inverter board is connected with CN3 and CN4. The pin assignments of the connectors are shown in Table 5-1 to Table 5-8.

(1) The pin assignments (CN1 to CN4) for Version 1 (RTK0EMXE30C00000BJ) are shown below

Table 5-1 1st inverter board connector (CN1) pin assignment (Version 1)

Pin No.	Pin Function	RX26T Pin	Pin No.	Pin Function	RX26T Pin
1	Temperature	P46/AN006 (*)	2	AGND	- (AVSS)
3	VPN	P43/AN003	4	AGND	- (AVSS)
5	IU	P40/AN000	6	NC	-
7	IV	P41/AN001	8	NC	-
9	IW	P42/AN002	10	NC	-
11	VU	P44/AN004 (*)	12	VV	P45/AN005 (*)
13	VW	P46/AN006 (*)	14	AGND	- (AVSS)
15	VPFC	P44/AN004 (*)	16	NC	-
17	VR / IPFC2	P47/AN206	18	AGND	- (AVSS)
19	AVCC	- (AVCC)	20	AVCC	- (AVCC)
21	AGND	- (AVSS)	22	AGND	- (AVSS)
23	VCC	- (VCC)	24	VCC	- (VCC)
25	GND	- (VSS)	26	GND	- (VSS)
27	UN	P74/GTIOC0B	28	GND	- (VSS)
29	UP	P71/GTIOC0A	30	GND	- (VSS)
31	VN	P75/GTIOC1B	32	GND	- (VSS)
33	VP	P72/GTIOC1A	34	GND	- (VSS)

(*) Exclusively assigned by jumper pin and jumper register setting

Table 5-2 1st inverter board connector (CN2) pin assignment (Version 1)

Pin No.	Pin Function	RX26T Pin	Pin No.	Pin Function	RX26T Pin
1	WN	P76/GTIOC2B	2	GND	- (VSS)
3	WP	P73/GTIOC2A	4	GND	- (VSS)
5	DRV_SCK	PB3/RSPCKA	6	DRV_RXD	PB0/MOSIA
7	DRV_TXD	PB4/MISOA	8	DRV_CS	PD6/SSLA0
9	BUS_POWER_IN	-	10	INV_CONNECTED	-
11	SAFE_LOCK	-	12	OCINV	P96/GTETRGB
13	DRV_nFault	P70/GTETRGA (*)	14	DRV_EN	P22
15	CON_MOT_SEL	P90 (*)	16	SW1	P21
17	SW2	P20	18	LED1	P65
19	LED2	PB5 (*)	20	NC	-
21	HALL_U	P11/IRQ1	22	HALL_V	P00/IRQ2
23	HALL_W	PE2/IRQ0	24	SIO_SDA	PB2/SDA
25	SCK_SCL	PB1/SCL	26	CSN_IRQN/ENC_Z	P01/GTETRGC
27	IPS_A ENC_A	P52/AN200 (*) P94/GTIOC5A (*)	28	IPS_A#	P53/AN201 (*)
29	IPS_B ENC_B	P54/AN202 (*) P91/GTIOC5B (*)	30	IPS_B#	P64/AN210 (*)
31	GND	- (VSS)	32	GND	- (VSS)
33	+5V	-	34	+5V	-

(*) Exclusively assigned by jumper pin and jumper register setting

Table 5-3 2nd inverter board connector (CN3) pin assignment (Version 1)

Pin No.	Pin Function	RX26T Pin	Pin No.	Pin Function	RX26T Pin
1	NC	-	2	AGND	- (AVSS)
3	VPN	P64/AN210 (*)	4	AGND	- (AVSS)
5	IU	P52/AN200 (*)	6	NC	-
7	IV	P53/AN201 (*)	8	NC	-
9	IW	P54/AN202 (*)	10	NC	-
11	NC	-	12	NC	-
13	NC	-	14	AGND	- (AVSS)
15	NC	-	16	NC	-
17	NC	-	18	AGND	- (AVSS)
19	AVCC	- (AVCC)	20	AVCC	- (AVCC)
21	AGND	- (AVSS)	22	AGND	- (AVSS)
23	VCC	- (VCC)	24	VCC	- (VCC)
25	GND	- (VSS)	26	GND	- (VSS)
27	UN	P90/GTIOC6B (*)	28	GND	- (VSS)
29	UP	P93/GTIOC6A	30	GND	- (VSS)
31	VN	P91/GTIOC5B (*)	32	GND	- (VSS)
33	VP	P94/GTIOC5A (*)	34	GND	- (VSS)

(*) Exclusively assigned by jumper pin and jumper register setting

Table 5-4 2nd inverter board connector (CN4) pin assignment (Version 1)

Pin No.	Pin Function	RX26T Pin	Pin No.	Pin Function	RX26T Pin
1	WN	P92/GTIOC4B	2	GND	- (VSS)
3	WP	P95/GTIOC4A	4	GND	- (VSS)
5	NC	-	6	NC	-
7	NC	-	8	NC	-
9	BUS_POWER_IN	-	10	INV_CONNECTED	-
11	SAFE_LOCK	-	12	OCINV	P70/GTETRGA (*)
13	NC	-	14	NC	-
15	NC	-	16	NC	-
17	NC	-	18	NC	-
19	NC	-	20	NC	-
21	NC	-	22	NC	-
23	NC	-	24	NC	-
25	NC	-	26	NC	-
27	NC	-	28	NC	-
29	NC	-	30	NC	-
31	GND	- (VSS)	32	GND	- (VSS)
33	+5V	-	34	+5V	-

(*) Exclusively assigned by jumper pin and jumper register setting

(2) The pin assignments (CN1 to CN4) for Version 2 (RTK0EMXE30C00001BJ) are shown below

Table 5-5 1st inverter board connector (CN1) pin assignment (Version 2)

Pin No.	Pin Function	RX26T Pin	Pin No.	Pin Function	RX26T Pin
1	Temperature	P46/AN006 (*)	2	AGND	- (AVSS)
3	VPN	P43/AN003	4	AGND	- (AVSS)
5	IU	P40/AN000	6	NC	-
7	IV	P41/AN001	8	NC	-
9	IW	P42/AN002	10	NC	-
11	VU	P44/AN004 (*)	12	VV	P45/AN005 (*)
13	VW	P46/AN006 (*)	14	AGND	- (AVSS)
15	VPFC	P44/AN004 (*)	16	IPFC1	P45/AN005 (*)
17	VR / IPFC2	P47/AN206	18	AGND	- (AVSS)
19	AVCC	- (AVCC)	20	AVCC	- (AVCC)
21	AGND	- (AVSS)	22	AGND	- (AVSS)
23	VCC	- (VCC)	24	VCC	- (VCC)
25	GND	- (VSS)	26	GND	- (VSS)
27	UN	P74/GTIOC0B	28	GND	- (VSS)
29	UP	P71/GTIOC0A	30	GND	- (VSS)
31	VN	P75/GTIOC1B	32	GND	- (VSS)
33	VP	P72/GTIOC1A	34	GND	- (VSS)

(*) Exclusively assigned by jumper pin and jumper register setting

Table 5-6 1st inverter board connector (CN2) pin assignment (Version 2)

Pin No.	Pin Function	RX26T Pin	Pin No.	Pin Function	RX26T Pin
1	WN	P76/GTIOC2B	2	GND	- (VSS)
3	WP	P73/GTIOC2A	4	GND	- (VSS)
5	DRV_SCK	PB3/RSPCKA	6	PFCPWM2/ DRV_RXD	PB2/GTIOC7A (*) PB0/MOSIA (*)
7	DRV_TXD	PB4/MISOA	8	DRV_CS	PD6/SSLA0
9	BUS_POWER_IN	-	10	INV_CONNECTED	-
11	SAFE_LOCK	-	12	OCINV	P96/GTETRGB
13	OCPFC/ DRV_nFault	P70/GTETRGA (*)	14	PFCPWM1/ DRV_EN	PB6/GTIOC3A
15	CON_MOT_SEL	P90 (*)	16	SW1	P21
17	SW2	P20	18	LED1	P65
19	LED2	PB5 (*)	20	NC	-
21	HALL_U	P11/IRQ1	22	HALL_V	P00/IRQ2
23	HALL_W	PE2/IRQ0	24	SIO_SDA	PB2/SDA0
25	SCK_SCL	PB1/SCL0	26	CSN_IRQN/ENC_Z	P01/GTETRGC
27	IPS_A ENC_A	P52/AN200 (*) P94/GTIOC5A (*)	28	IPS_A#	P53/AN201 (*)
29	IPS_B ENC_B	P54/AN202 (*) P91/GTIOC5B (*)	30	IPS_B#	P64/AN210 (*)
31	GND	- (VSS)	32	GND	- (VSS)
33	+5V	-	34	+5V	-

(*) Exclusively assigned by jumper pin and jumper register setting

Table 5-7 2nd inverter board connector (CN3) pin assignment (Version 2)

Pin No.	Pin Function	RX26T Pin	Pin No.	Pin Function	RX26T Pin
1	NC	-	2	AGND	- (AVSS)
3	VPN	P64/AN210 (*)	4	AGND	- (AVSS)
5	IU	P52/AN200 (*)	6	NC	-
7	IV	P53/AN201 (*)	8	NC	-
9	IW	P54/AN202 (*)	10	NC	-
11	NC	-	12	NC	-
13	NC	-	14	AGND	- (AVSS)
15	NC	-	16	NC	-
17	NC	-	18	AGND	- (AVSS)
19	AVCC	- (AVCC)	20	AVCC	- (AVCC)
21	AGND	- (AVSS)	22	AGND	- (AVSS)
23	VCC	- (VCC)	24	VCC	- (VCC)
25	GND	- (VSS)	26	GND	- (VSS)
27	UN	P90/GTIOC6B (*)	28	GND	- (VSS)
29	UP	P93/GTIOC6A	30	GND	- (VSS)
31	VN	P91/GTIOC5B (*)	32	GND	- (VSS)
33	VP	P94/GTIOC5A (*)	34	GND	- (VSS)

(*) Exclusively assigned by jumper pin and jumper register setting

Table 5-8 2nd inverter board connector (CN4) pin assignment (Version 2)

Pin No.	Pin Function	RX26T Pin	Pin No.	Pin Function	RX26T Pin
1	WN	P92/GTIOC4B	2	GND	- (VSS)
3	WP	P95/GTIOC4A	4	GND	- (VSS)
5	NC	-	6	NC	-
7	NC	-	8	NC	-
9	BUS_POWER_IN	-	10	INV_CONNECTED	-
11	SAFE_LOCK	-	12	OCINV	P70/GTETRGA (*)
13	NC	-	14	NC	-
15	NC	-	16	NC	-
17	NC	-	18	NC	-
19	NC	-	20	NC	-
21	NC	-	22	NC	-
23	NC	-	24	NC	-
25	NC	-	26	NC	-
27	NC	-	28	NC	-
29	NC	-	30	NC	-
31	GND	- (VSS)	32	GND	- (VSS)
33	+5V	-	34	+5V	-

(*) Exclusively assigned by jumper pin and jumper register setting

Figure 5-2 show a connection example when using this product with the inverter board and the communication board. When using INV2, mount CN3 and CN4, and mount jumper resistors and LPF according to "4.5 Jumper pin setting".



Figure 5-2 Board connection of CPU board, INV board and COM board

5.1.4 Serial communication

For serial communication using Renesas Motor Workbench, the CPU board has SCI connector. Pin assignment for SCI connector is listed in Table 5-9.

Table 5-9 SCI connector (CN9) pin assignment

Pin No.	Pin Function	RX26T Connection Pin
1	GND	-
2	MCU RXD	PD5/RXD1
3	MCU TXD	PD3/TXD1
4	VCC	-

5.1.5 Reset circuit

This product has a reset circuit to enable power-on reset or external reset on MCU. Push the reset switch (SW1) to externally reset MCU.

5.1.6 LED

This product has 2 controllable LEDs, so that they can be used for program debug and the system. LED switches ON when output from the corresponding port is “LOW” and switches OFF when output is “HIGH”. Pin assignment for corresponding LEDs is listed in Table 5-10.

Table 5-10 LED pin assignment

RX26T pin output		LED1	LED2
P65	HIGH	OFF	-
	LOW	ON	-
PB5	HIGH	-	OFF
	LOW	-	ON

5.1.7 CAN Communication

This product has through holes for CAN communication. Note that CAN driver is not equipped. Pin assignment for CAN communication connector is listed in Table 5-11.

Table 5-11 CAN communication pin assignment (CN8)

Pin No.	RX26T pin
1	VCC
2	P92/CTX0
3	P93/CRX0
4	VSS

5.1.8 SPI Communication

This product has through holes for SPI communication. Pin assignment for SPI communication connector is listed in Table 5-12.

Table 5-12 SPI communication pin assignment (CN7)

Pin No.	RX26T pin
1	PD6/SSLA0
2	PB0/MOSIA
3	PB4/MISOA
4	PB3/RSPCKA
5	VSS
6	VCC

5.1.9 Pmod

This product has two connectors for Pmod module connection. Pin assignments are shown in Table 5-13 and Table 5-14.

Table 5-13 Pmod Type 3A connector pin assignment (CN6)

No.	RX26T port	No.	RX26T port
1	PD6_CTS1#	7	PD7_IRQ8
2	PD4_TXD12	8	PB5
3	PB6_RXD12	9	P95
4	PB4_MISOA	10	P93
5	VSS	11	VSS
6	VCC	12	VCC

Table 5-14 Pmod Type 6A connector pin assignment (CN5)

No.	RX26T port	No.	RX26T port
1	PD7_IRQ8	7	PD4
2	PB5	8	PB6
3	PB1_SCL0	9	P95
4	PB2_SDA0	10	P93
5	VSS	11	VSS
6	VCC	12	VCC

5.1.10 Test points

The CPU board has several test points to monitor various signals. They are marked in Figure 5-3 and summarized in Table 5-15.

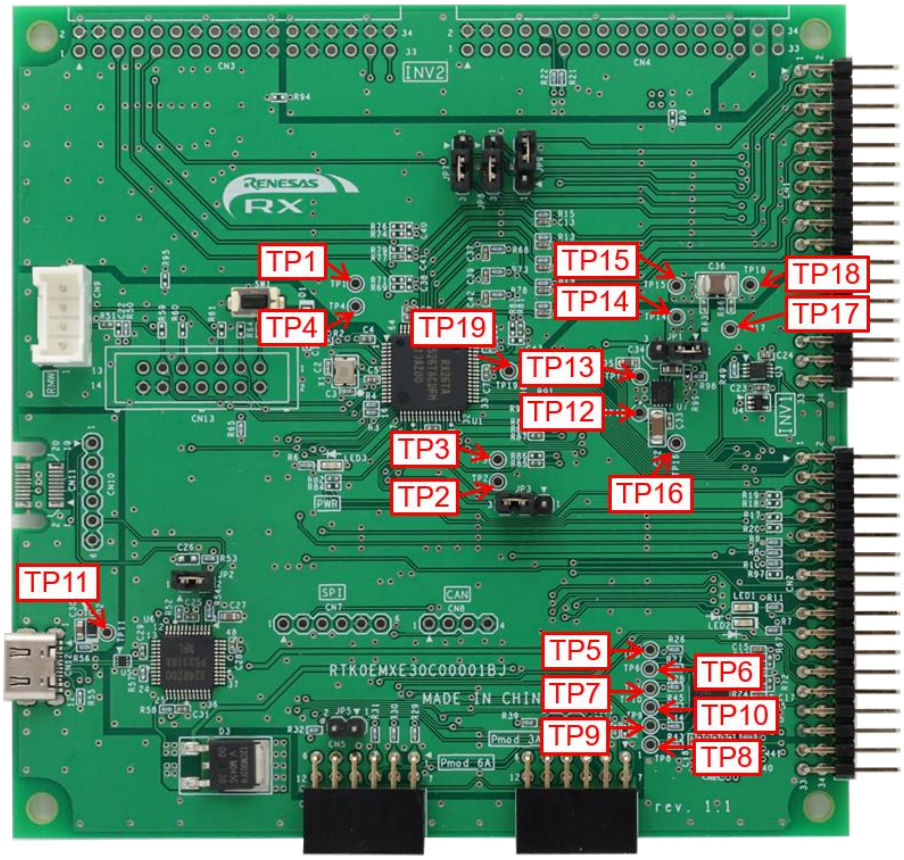


Figure 5-3 Test points

Table 5-15 Test points

No.	Signal name	Description
TP1	AVCC	Analog Power
TP2	VCC	Digital Power
TP3	VSS	Digital GND
TP4	AGND	Analog GND
TP5	P94/GTIOC5A/ENCA	P94/GTIOC5A/ENCA
TP6	P91/GTIOC5B/ENCB	P91/GTIOC5B/ENCB
TP7	P01/GTETRGC/ENCZ	P01/GTETRGC/ENCZ
TP8	P11/IRQ1/HU	P11/IRQ1/HU
TP9	P00/IRQ2/HV	P00/IRQ2/HV
TP10	PE2/IRQ0/HW	PE2/IRQ0/HW
TP11	VBUS	USB Power (E2OB)
TP12	+5V	+5V Power
TP13	3.3V	3.3V Power
TP14	VCC	VCC Power
TP15	AVCC	AVCC Power
TP16	GND	+5VGND
TP17	GND	Digital GND
TP18	AGND	Analog GND
TP19	P22/GPIO	P22/GPIO

5.1.11 Pin function list

Table 5-16 RX26T pin function list

Pin number	Pin function	Board function
1	EMLE	Emulator
2	IRQ2	HALL_V
3	VCL	VCL
4	MD	Emulator
5	GTETRGC/(IRQ4)	ENC_Z / CSN_IRQN
6	RES#	Emulator
7	XTAL	Crystal
8	VSS	VSS
9	EXTAL	Crystal
10	VCC	VCC
11	IRQ0	HALL_W
12	TRST#/PD7/IRQ8	Emulator / INT
13	TMS/SSLA0/CTS1#	Emulator / UART / SPI
14	TDI/RXD1	Emulator / UART
15	TCK/TXD12/PD4	Emulator / UART
16	TDO/TXD1	Emulator / UART
17	RXD12/PB6/GTIOC3A	UART / PFCPWM1
18	PB5	RESET/LED2
19	PB4/MISOA	UART / SPI
20	RSPCKA	SPI
21	SDA/GTIOC7A	I2C / (PFCPWM2)
22	SCL	I2C
23	MOSIA	SPI
24	VCC	VCC
25	GTETRGB/POE4#	OCINV / OCPFC
26	VSS	VSS
27	P95/GTIOC4A	GPIO
28	GTIOC5A	ENC_A
29	P93/CRX0/GTIOC6A	GPIO / CRX
30	CTX0/GTIOC4B	CTX
31	GTIOC5B	ENC_B
32	P90/GTIOC6B	CON_MOT_SEL
33	GTIOC2B/MTIOC4D	WN
34	GTIOC1B/MTIOC4C	VN
35	GTIOC0B/MTIOC3D	UN
36	GTIOC2A/MTIOC4B	WP
37	GTIOC1A/MTIOC4A	VP
38	GTIOC0A/MTIOC3B	UP
39	GTERTGA/POE0#/IRQ5	nFault
40	VCC	VCC
41	VSS	VSS
42	P22	GPIO
43	P21	SW1
44	P20/IRQ7	SW2
45	P65	LED1
46	AN210	IPS_B#
47	AVCC	AVCC
48	AVSS	AVSS
49	AN202	IPS_B
50	AN201	IPS_A#
51	AN200	IPS_A
52	AN206	VR
53	AN006	VW
54	AN005	VV
55	AN004	VU
56	AN003	VDC
57	AN002	IW

Pin number	Pin function	Board function
58	AN001	IV
59	AN000	IU
60	NC	-
61	AVCC	AVCC
62	AVSS	AVSS
63	NC	-
64	IRQ1	HALL_U

Note: Jumper switching is required to use the functions in parentheses.

6. Regulatory information

This product meets the following standards. See “General Precautions in the Handling of Microprocessing Unit and Microcontroller Unit Products” of this Evaluation Board Manual for the precautions.

6.1 EMC Directive

This product is herewith confirmed to comply with the requirements set out in the Council Directives on the Approximation of the laws of the Member States relating to Electromagnetic Compatibility Directive 2014/30/EU.

This product is in conformity with the following relevant UK Statutory Instrument(s) (and its amendments): 2016 No. 1091 Electromagnetic Compatibility Regulations 2016.

Warning – This is a Class A product. In a domestic environment this product may cause radio interference in which case the user may be required to take adequate measures to correct this interference.

6.2 Material Selection, Waste, Recycling and Disposal Standards

- China SJ/T 11364-2014, 10-year environmental protection use period.
- WEEE Directive (2012/19/EU) & The Waste Electrical and Electronic Equipment Regulations 2013



The WEEE (Waste Electrical and Electronic Equipment) regulations put responsibilities on producers for the collection and recycling or disposal of electrical and electronic waste. Return of WEEE under these regulations is applicable in the UK and European Union.

This product (including all accessories) is not intended for household use. After use the product cannot be disposed of as household waste, and the WEEE must be treated, recycled and disposed of in an environmentally sound manner.

Renesas Electronics Europe GmbH can take back end of life product. Register for this service at; https://www.renesas.com/form/weee-questionnaire

7. Design and Manufacture Information

The design resources for the MCB-RX26T Type C (schematics, PCB layout data, BOM, etc.) and software development tools (Renesas Motor Workbench, QE for Motor, sample code, application note, etc.) are available for download from the following website: renesas.com/mcb-rx26t-type-c

8. Website and Support

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

• RX Product Information renesas.com/rx

• RX Product Support Forum renesas.com/rx/forum

• Renesas Support renesas.com/support

Revision History

Rev.	Date	Description	
		Page	Summary
1.00	August 25, 2023	-	First edition
1.10	March 1, 2026	-	Support MCB-RX26T Type C Version 2

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