User's Manual

RA8T2 Group

MCK-RA8T2 User's Manual

Renesas RA Family
RA8 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.

Renesas RA Family

MCK-RA8T2 User's Manual

Contents

Figure of contents

Table of contents

1. Overview

MCK-RA8T2 is a motor control evaluation kit. By using this product, motor control with MCK-RA8T2 can be performed easily.
MCK-RA8T2 has characteristics shown below.

（1） Supports Brushless DC motor.

（2） Supports 1-/2-/3-shunt current detection.

（3） Supports Motor Control Development Support Tool (Renesas Motor Workbench).

（4） Provides overcurrent protection function using overcurrent detection circuit.

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.

2. Product Contents

This kit consists of the following parts.

1. Inverter Board (RTK0EM0000B12020BJ) x1
2. CPU Board (RTK0EMA6L0C00000BJ) x1
3. Communication board (RTK0EMXC90Z00000BJ) x1
4. Brushless DC Motor (R42BLD30L3) x1
5. Communication cable x1
6. USB cable x1
7. Screw x12
8. Standoff x12

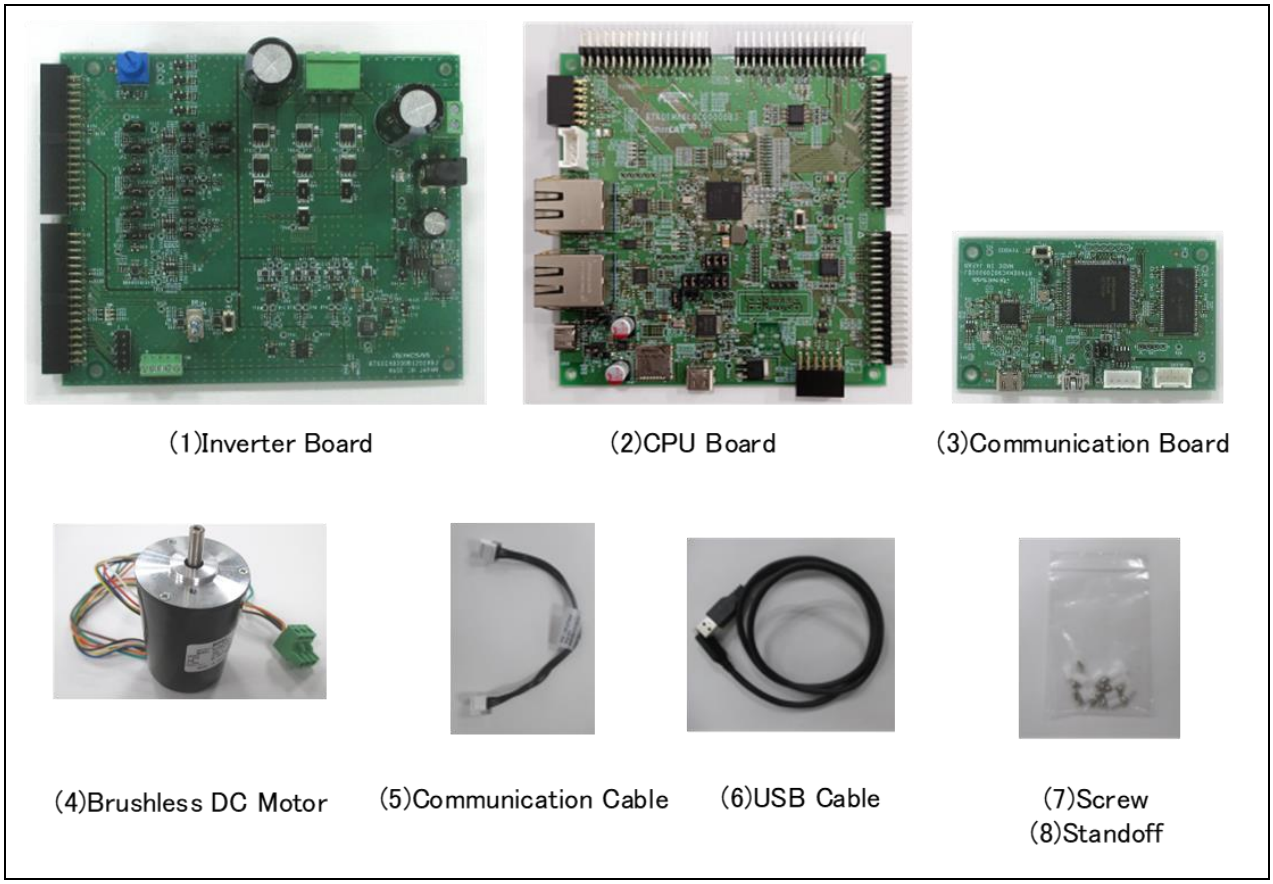


Figure 2-1 Product contents

3. Product Order Information

Product number to order MCK-RA8T2: RTK0EMA6L0S00020BJ

4. Hardware Configuration and Default Setting

4.1 Hardware configuration

MCK-RA8T2 consists of the inverter board, the CPU board and the communication board. Specifications as a kit and for the relevant boards are listed below.

Table 4-1 MCK-RA8T2 specification (1/4)

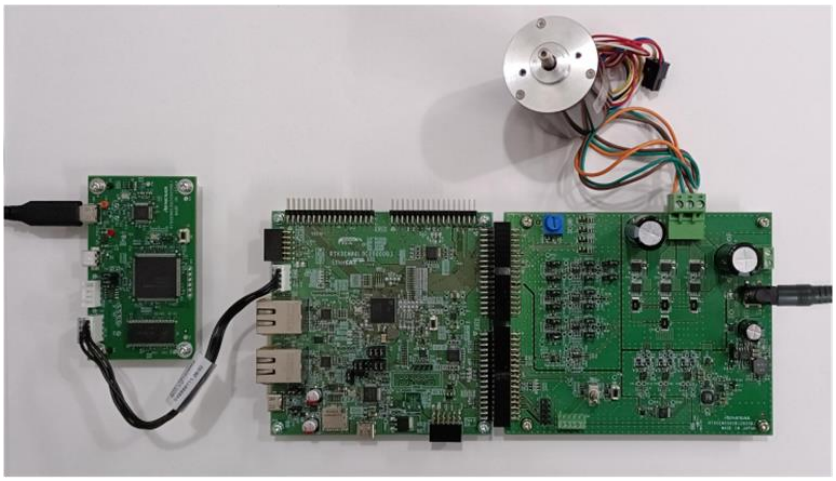
Item	Specification	
Kit product name	MCK-RA8T2	
Kit product No.	RTK0EMA6L0S00020BJ	
Kit configuration	Inverter Board	RTK0EM0000B12020BJ
	CPU Board	RTK0EMA6L0C00000BJ
	Communication board	RTK0EMXC90Z00000BJ
	Brushless DC Motor	R42BLD30L3 (MOONS') Rated voltage：36[V] Rated current：1.67[A]
Isolation	Inverter board - CPU board : Non-isolated Communication board – CPU board : isolated (up to $1kV_{RMS}$)	
External view	 Note: The actual product may differ from this photo.	
Board size	Inverter board : 133 mm (W) x 109 mm (L) CPU board : 109 mm (W) x 109 mm (L) Comunication board : 89mm(W) × 52mm(L)	
Operating temperature	Room temperature	
Operating humidity	No condensation allowed	
EMC Directive	EN61326-1:2021 EMI：Class A EMS：Industrial Electromagnetic environment	

Table 4-2 MCK-RA8T2 specification (2/4)

Item	Specification
Product name	Inverter board
Board part No.	RTK0EM0000B12020BJ
External view	 Note: The actual product may differ from this photo.
Power supply	2 ways • From DC jack or Power supply connector (DC 12~48V) *1 • From CPU board (DC 5V)
Rated output current	AC 10 A (RMS value) *2
Switching frequency	20 kHz (typical)
Current detection method	1- / 2- / 3-shunt detection
Shunt resistor	10 mohm
PWM logic	Lower arm, Upper arm : Positive logic
DC bus voltage detection （bus voltage detection）	Detection by resistance division (0 V ~ 48 V)
3-phase output voltage detection	Detection by resistance division (0 V ~ 48 V)
3-phase output current detection	With shunt resistor (-16.5 A ~ +16.5 A)
Overcurrent detection function	21.4 A
Supporting sensor	HALL sensor, Encoder
Connector	• CPU card connector • Motor connector • Power input connector • HALL sensor connector • Encoder/Inductive position sensor connector
Switch	• Toggle switch x1 • Push switch x1
LED	• LED x3 • Power LED

*1 The polarity of the DC jack (J1) is center positive. The compatible plug has an inner diameter of 2.1 mm and an outer diameter of 5.5 mm.
*2 It is strongly recommended to attach a heat sink to the MOSFET when using over 5A.

Table 4-3 MCK-RA8T2 specification (3/4)

item		Specification
Product name		CPU Board
Board part No.		RTK0EMA6L0C00000BJ
Compatible inverter board		RTK0EM0000B12020BJ
External view		 Note: The actual product may differ from this photo.
Mounted MCU	Product group	RA8T2 group
	Product No.	R7KA8T2LFLCAC *1
	CPU maximum operating frequency	1GHz
	Bit count	32 bit
	Package / Pin count	BGA / 289 pin
	MRAM / SRAM	1MB / 2MB
MCU input clock		24MHz (Generate with external crystal oscillator)
Power supply		DC 5V Select one way automatically from the below • Power is supplied from compatible inverter board • Power is supplied from USB connector
Debugger		J-Link On-Board (Onboard debugger circuit)
Connector		• Inverter board connector (2 pair) • USB connector for J-Link On-Board • USB connector for RA8T2 • SCI connector for Renesas Motor Workbench communication • Through hole for CAN communication • 20 pin through hole for Arm debugger • Pmod connectors (Type2A + Type3A/6A) • Ether CAT connector • MicroSD slot • DSMIF
Switch		MCU reset switch
LED		User-controllable LED x6, Power LED x1,Ether CAT LED x8

*1 Products with serial numbers “25xxxxx” are equipped with RA8T2 chip version A. Please refer to the user’s manual of RA8T2 for the restriction of chip version A

Table 4-4 MCK-RA8T2 specification (4/4)

item		Specification
Product name		Communication Board
Board part No.		RTK0EMXC90Z00000BJ
External view		 Note: The actual product may differ from this photo.
Mounted MCU	Product group	RX72N group
	Product No.	R5F572NNDDFB
	CPU maximum operating frequency	240MHz
	Bit count	32 bit
	Package / Pin count	LFQFP / 144 pin
	RAM	1M byte
MCU input clock		20MHz (Generate with external crystal oscillator)
Power supply		DC 5V • Power is supplied from USB connector
Connector		• USB Type-C connector for PC • SCI connector for CPU board • USB miniB connector (not available for users)
Isolation		• Between SCI connector and MCU • Up to 1kV$_{RMS}$
Switch		MCU external reset switch

4.2 Block diagram

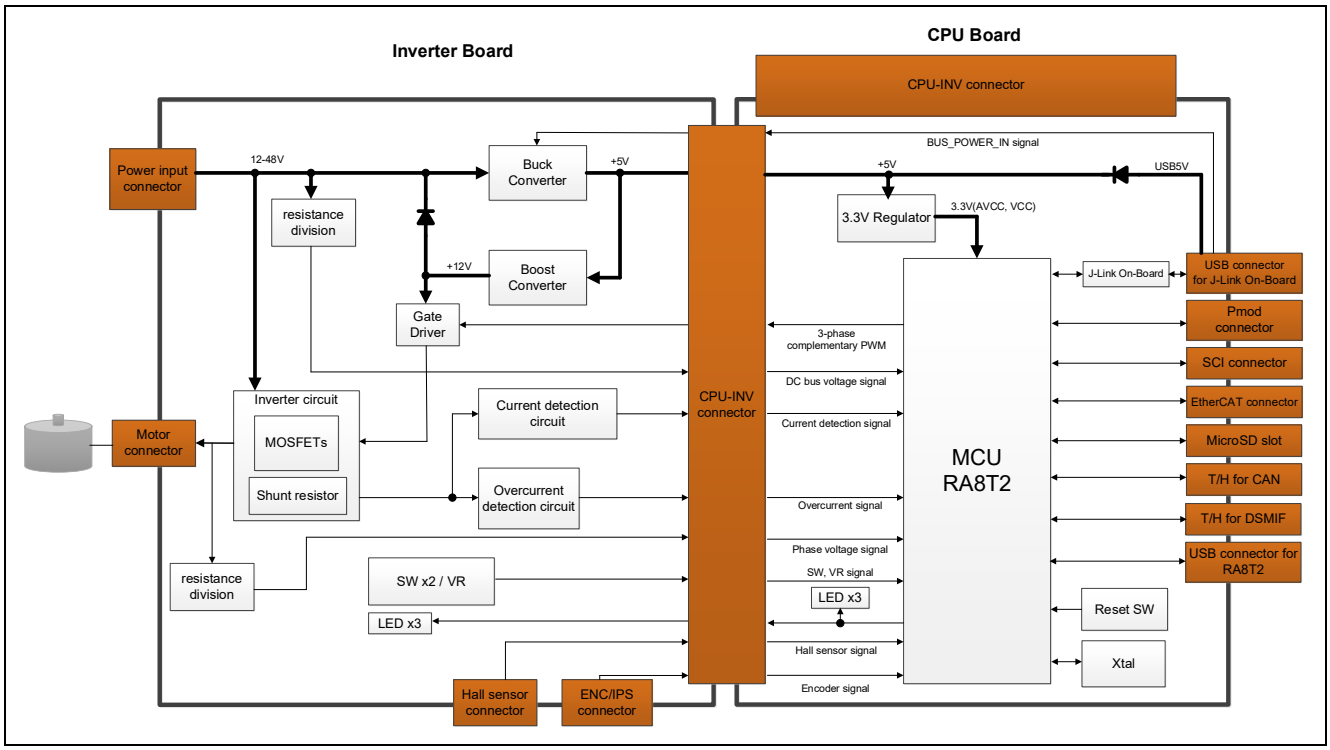


Figure 4-1 MCK-RA8T2 block diagram

4.3 Board Layout

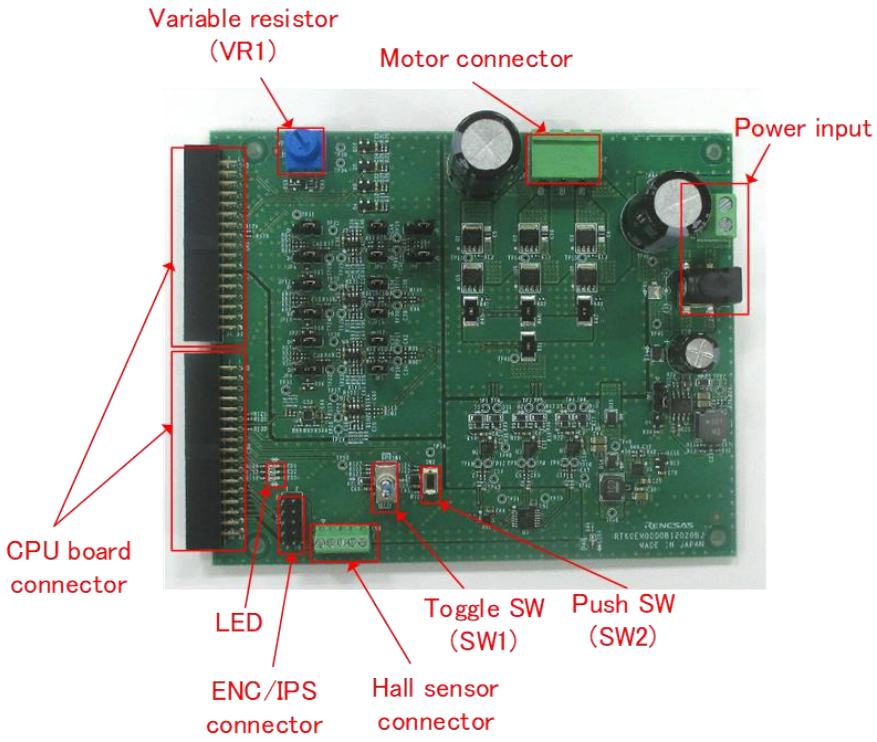


Figure 4-2 Inverter board layout

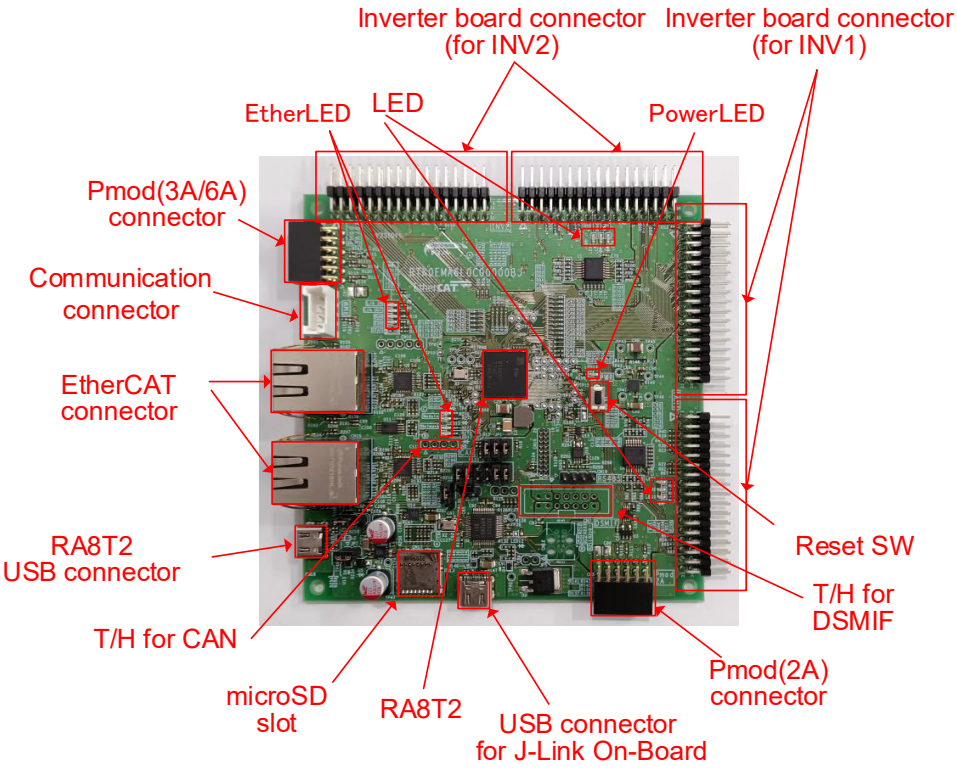


Figure 4-3 CPU board layout

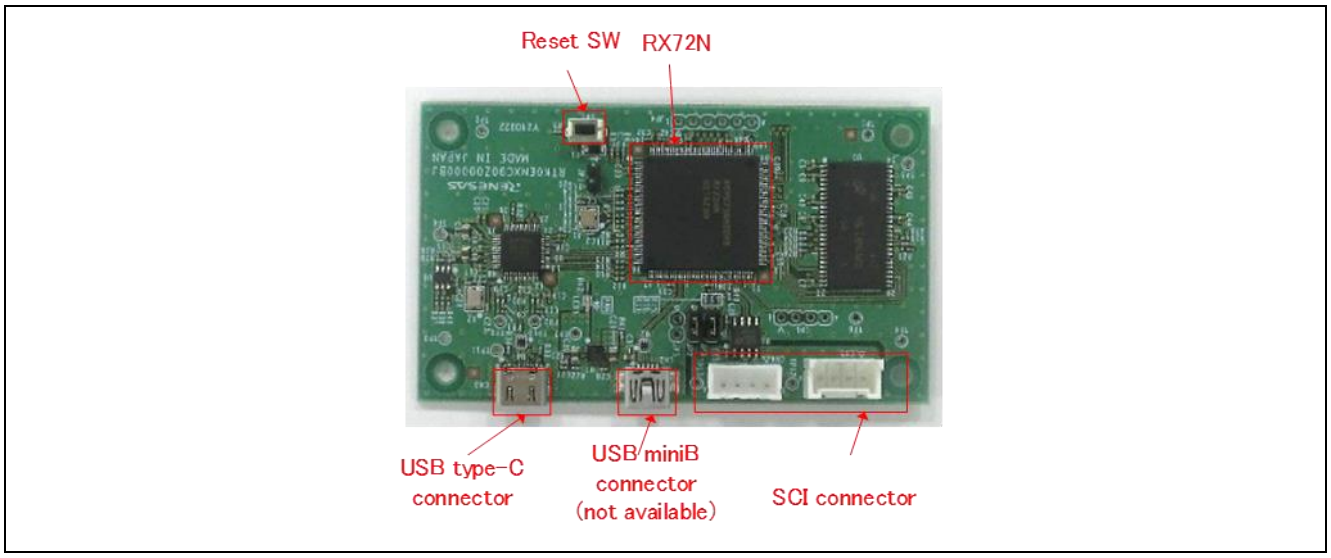


Figure 4-4 Communication board layout

4.4 Standoffs and Screws

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

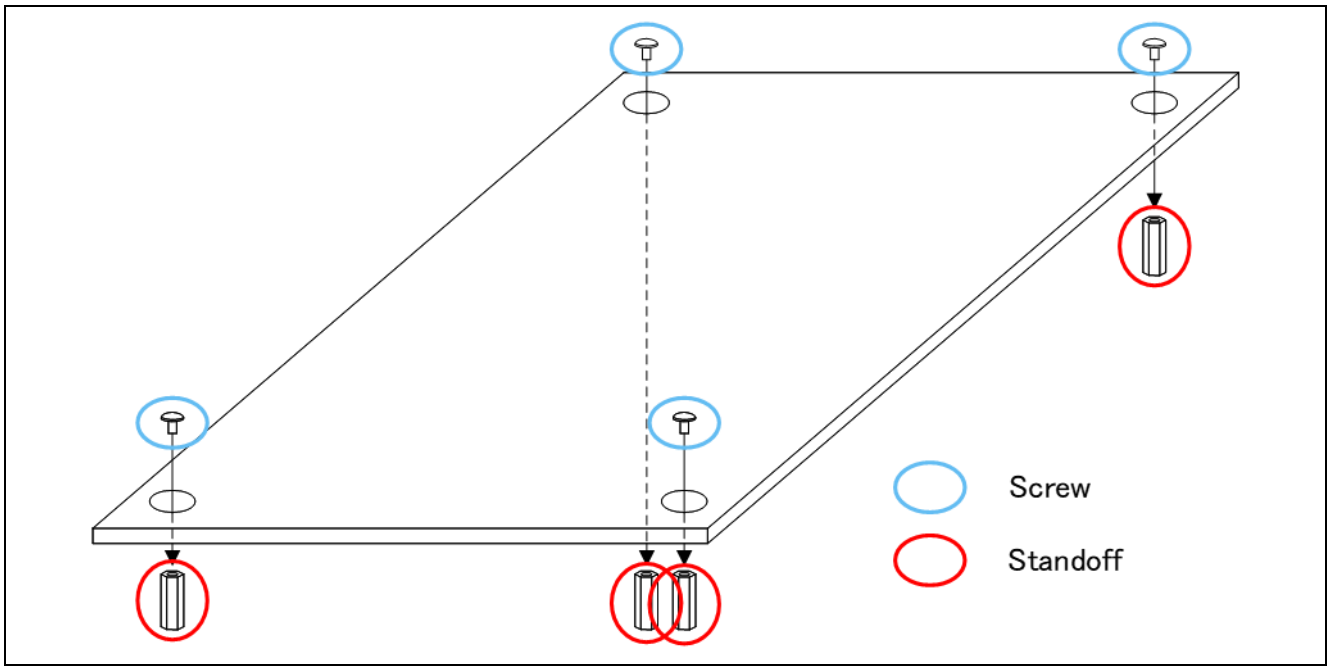


Figure 4-5 Standoffs and Screws assembly

4.5 Jumper pin setting

4.5.1 Inverter board

Default settings and functions of the jumper pins (JP1~JP15) are as follows.

Table 4-5 Jumper pin setting of Invertor board

JP No.	Default setting	Function
JP1	2-3pin short	1-2pin short : Disable 5V regulator 2-3pin short : Enable 5V regulator
JP2, JP3, JP4, JP6, JP12, JP13	2-3pin short	1-2pin short : Disable current detection amplifiers 2-3pin short : Enable current detection amplifiers
JP5, JP7, JP9, JP10, JP14, JP15	1-2pin short	1-2pin short : Current detection amplifier gain = 20 1-2pin open : Current detection amplifier gain = 10
JP8, JP11	1-2pin short	1-2pin short : 2/3 shunt current detection 2-3pin short : 1 shunt current detection

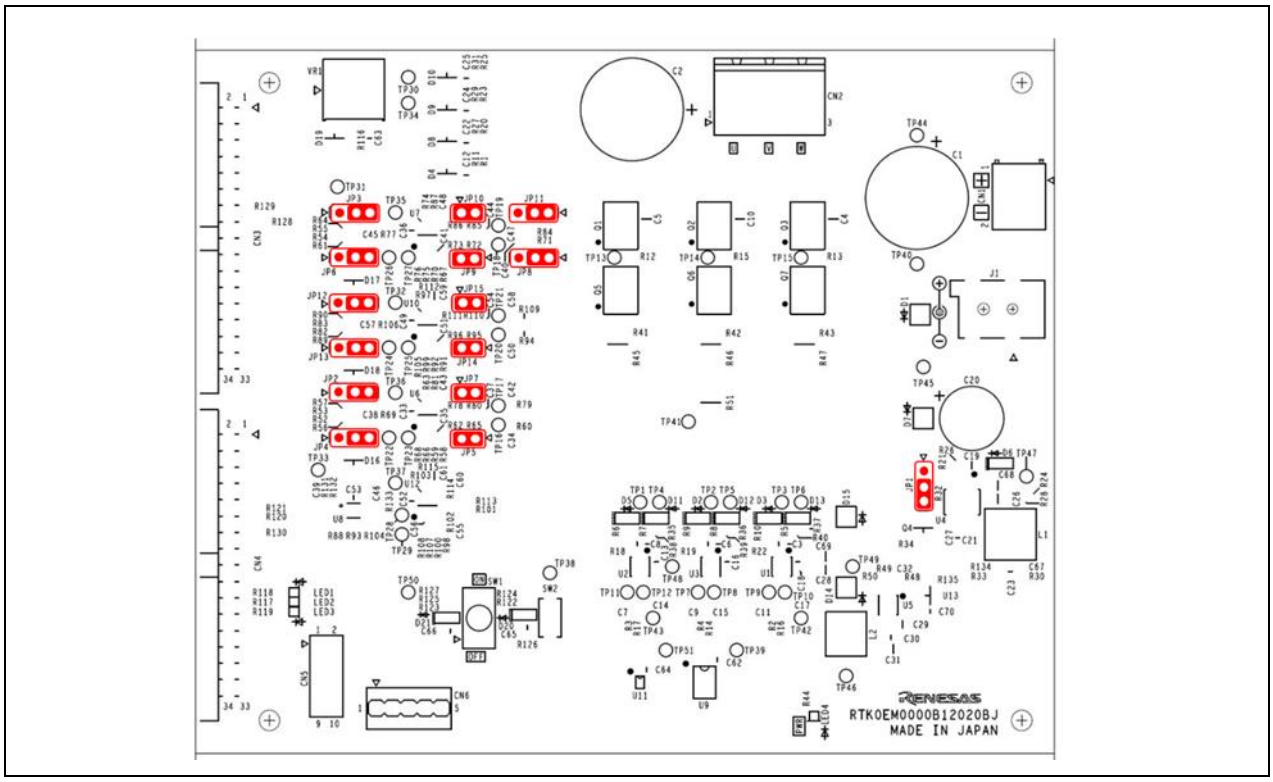


Figure 4-6 Default jumper pin setting of Inverter board

4.5.2 CPU board

Default settings and functions of the jumper pins (JP1~JP7) are as follows.

Table 4-6 Jumper pin setting of CPU board

JP No.	Function	Setting (function in use)			Default setting
		open	1-2 short	2-3 short	
JP1	Ether CAT ID setting	bit = HIGH(*1)	bit = LOW	-	1-2,3-4,5-6 short
JP2	On-board Debugger connection	Disconnected	Connected	-	1-2,3-4,9-10,11-12 short
JP3	On-board Debugger	Enabled	Disabled	-	open
JP4	RA8T2 operating mode	Single chip	Single-chip/SCI boot	RA8T2 RESET	1-2 short
JP5	Jumper to bypass D3	Via D3	Bypass	-	not mounted(open)
JP6	USB_VBUS signal	(prohibited)	LOW	USBFS_VBUS	1-2 short
JP7	USB +5V power select	From CN13	From CN18	-	open

(*1) use pull-up resistor

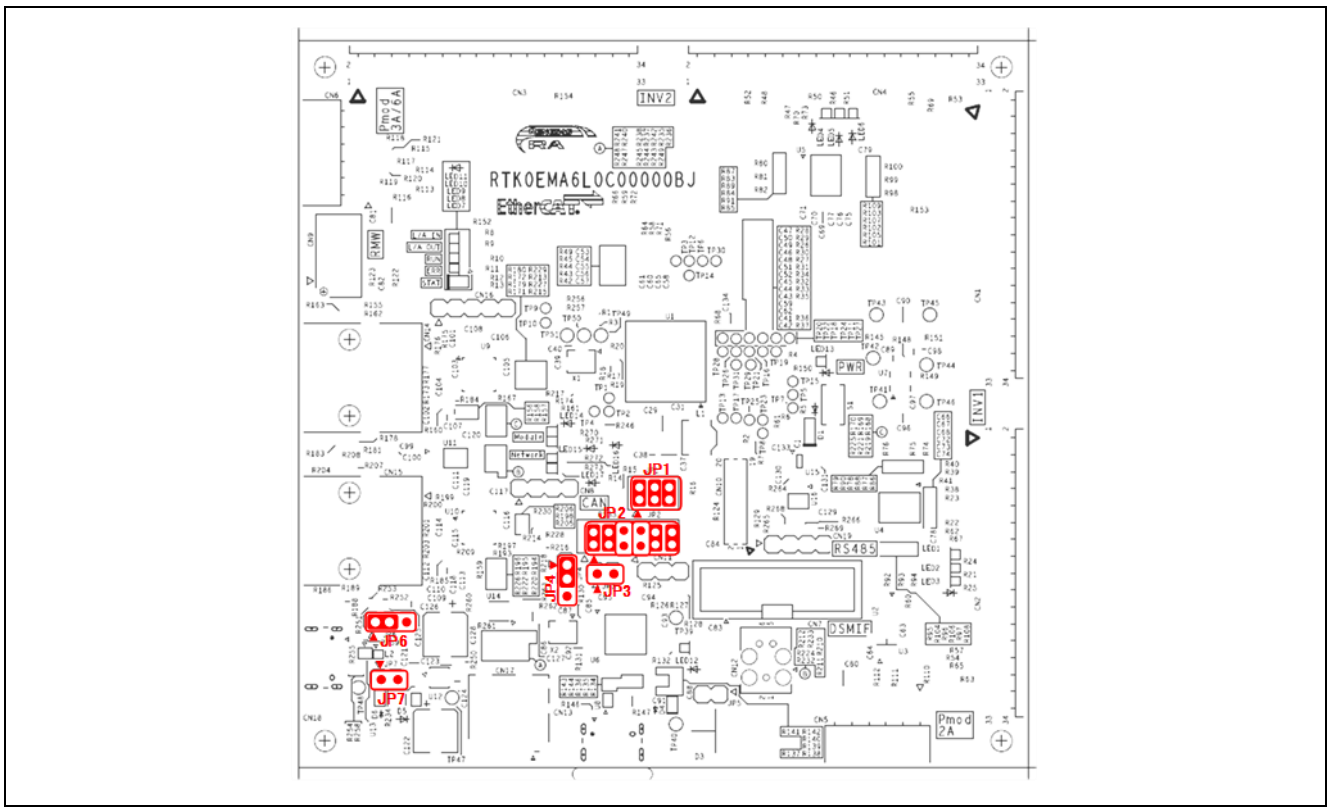


Figure 4-7 Default jumper pin setting of CPU board

4.5.3 Communication board

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

Table 4-7 Jumper pin setting of Communication board

JP No.	Default setting	Function
JP1	1-2pin open	1-2pin short : Enable 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)

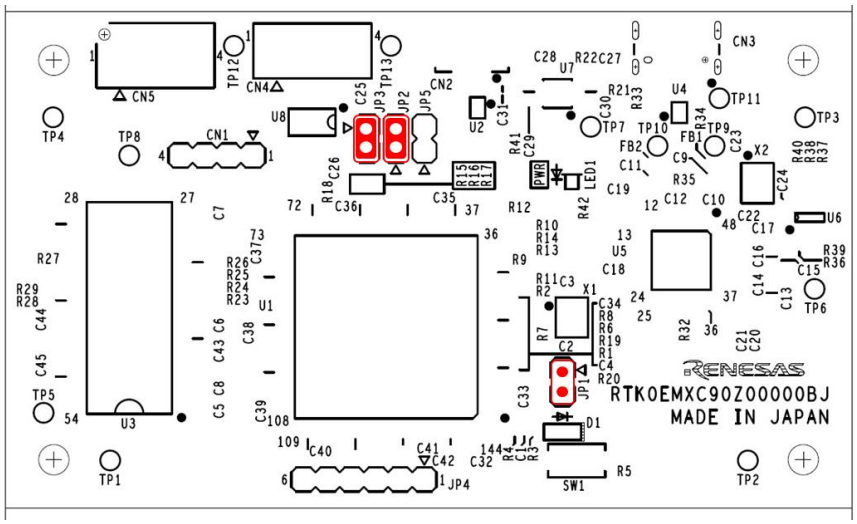


Figure 4-8 Default jumper pin setting of Communication board

4.6 Hardware Setup

4.6.1 Board Connection

When using this product for motor control evaluation, connect the boards as shown in Figure 4-9. 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.
Please refer to 4.6.2 for the power supply method. In Figure 4-9 the power is supplied from the AC adapter.
The RA8T2 CPU board supports a maximum of two-motor control and can be connected as shown in Figure 6-2 shown later, if you prepare an additional inverter board and motor.

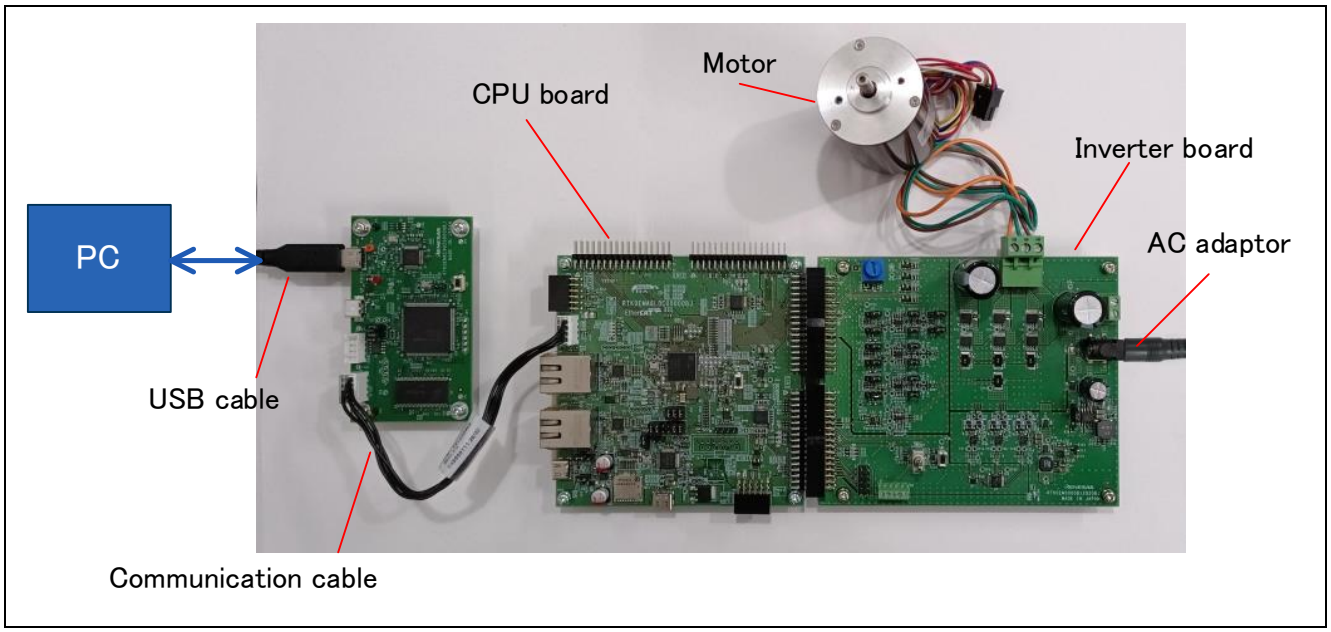


Figure 4-9 Board connection

4.6.2 Power Supply

There are three ways to supply power to the CPU board and inverter board, and the power supply for the communication board is independent of the CPU board and inverter board and is supplied at 5V from the USB connector.

(1) From DC jack

Use an AC adapter or something similar to supply power from the DC jack (J1) on the inverter board. The compatible plug has an outer diameter of 5.5 mm, an inner diameter of 2.1 mm, and a polarity of center positive. The input voltage range is 12 to 48V.

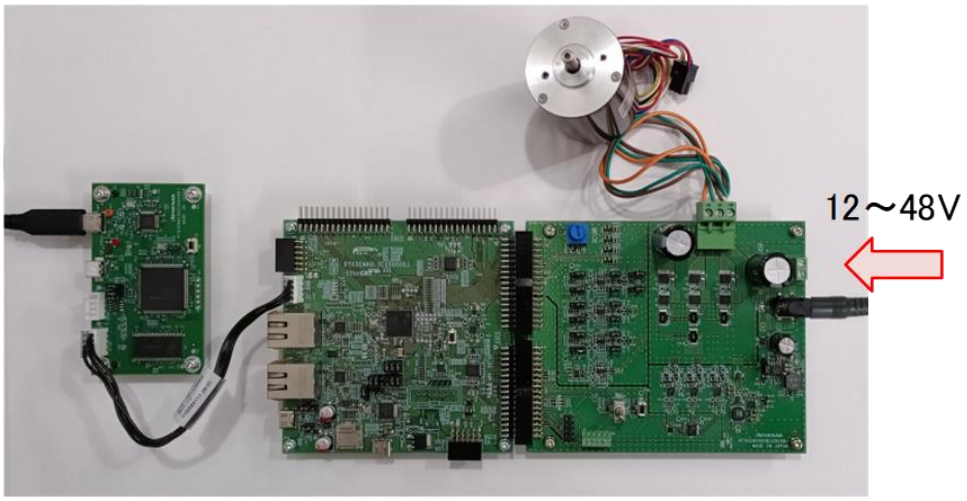


Figure 4-10 Power supply from DC jack

(2) From terminal block

Supply power from the terminal block (CN1) of the inverter board using a DC stabilized power supply or the like. The polarity should follow the silk indication (“+”, “-“) on the board. The input voltage range is 12 to 48V.

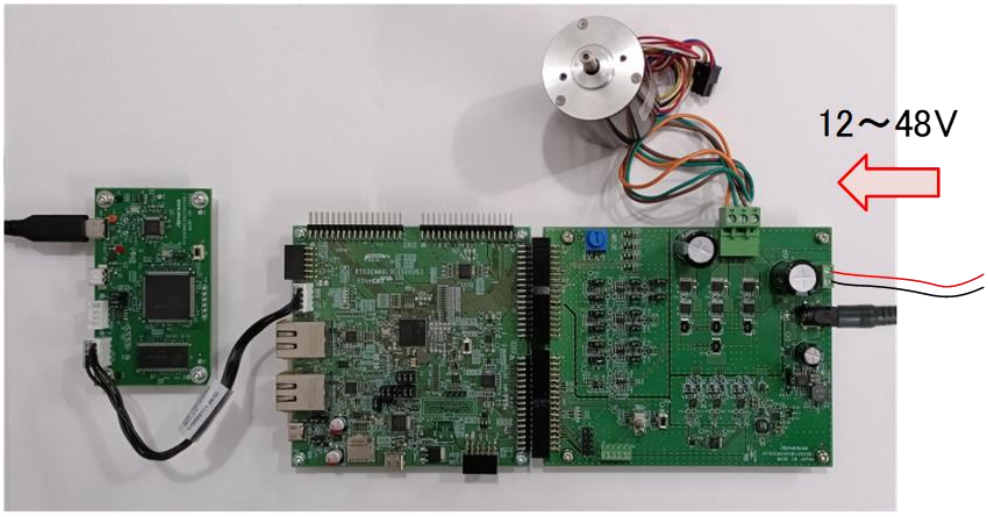


Figure 4-11 Power supply from terminal block

(3) From USB connector

5V power is supplied from the USB Type-C connector on the CPU board. Use a USB adapter capable of outputting 1A or more so that the motor can be driven sufficiently.

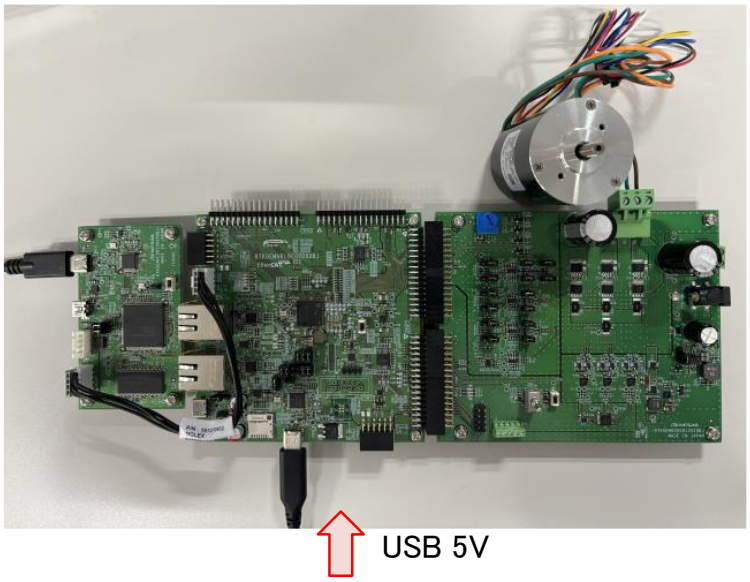


Figure 4-12 Power supply from USB connector

It is also possible to supply power from the USB connector on the CPU board and the DC jack or terminal block on the inverter board at the same time. In this case, the MCU drive voltage of 3.3V and the gate driver drive voltage are generated from the USB supply of 5V, while the motor drive voltage is supplied from the DC jack or terminal block. Please refer to Table 4-8 for the power supply conditions and each voltage generation.

Table 4-8 Power supply and driving voltage generation

			Case 1	Case 2	Case 3
Power supply condition	CPU board	USB 5V *1	✓	-	✓
	Inverter board	External power (12~48V) *2	-	✓	✓
Power source for	CPU board	I/O (VCC,3.3V)	[A]	[B]	[A]
		BUS (5V)	[A]	[B]	[A]
	Inverter board	I/O (VCC,3.3V)	[A]	[B]	[A]
		BUS (5V)	[A]	[B]	[A]
		Gate driver (11.4V)	[A]	[B]	[A]
		Motor drive (11.4V or 12~48V)	[A]	[B]	[B]

Power supply condition:

✓ : supplied

- : not supplied

Driving voltage generation

[A]: generated from USB 5V on CPU board

[B]: generated from external power on inverter board

*1 Motor drive current of 1 A or more may be required for each inverter board.

*2 When connecting two inverter boards to the CPU board and also inputting an external power supply to INV2, it is necessary to supply an external power supply (which can be different from INV2) to INV1 as well, or to supply USB 5V to the CPU board.

5. Inverter Board Specification

This section describes inverter board specification.

5.1 Functions

5.1.1 Inverter control circuit block

The inverter board has the inverter control circuit block which controls the motor with 6 POWER MOSFETs. POWER MOSFET is controlled with 6-phase timer output of MCU.
The inverter control circuit block outputs DC bus voltage, U, V and W phase voltage and shunt current to the connectors (CN3, CN4). By inputting these output voltages to A/D of MCU on the CPU card, analog values of the voltage and the shunt current of each phase can be measured. Refer to
5.1.2 for the current detection and refer to 5.1.4 for the voltage detection, respectively. Also function to detect overcurrent from the input current is available. Refer to 5.1.3 for details.
An illustration of the inverter control circuit block is shown in Figure 5-1 . In the actual circuit, some inputs on the A/D pins are via voltage dividers and offsets and so on. Refer to the circuit diagram for details.

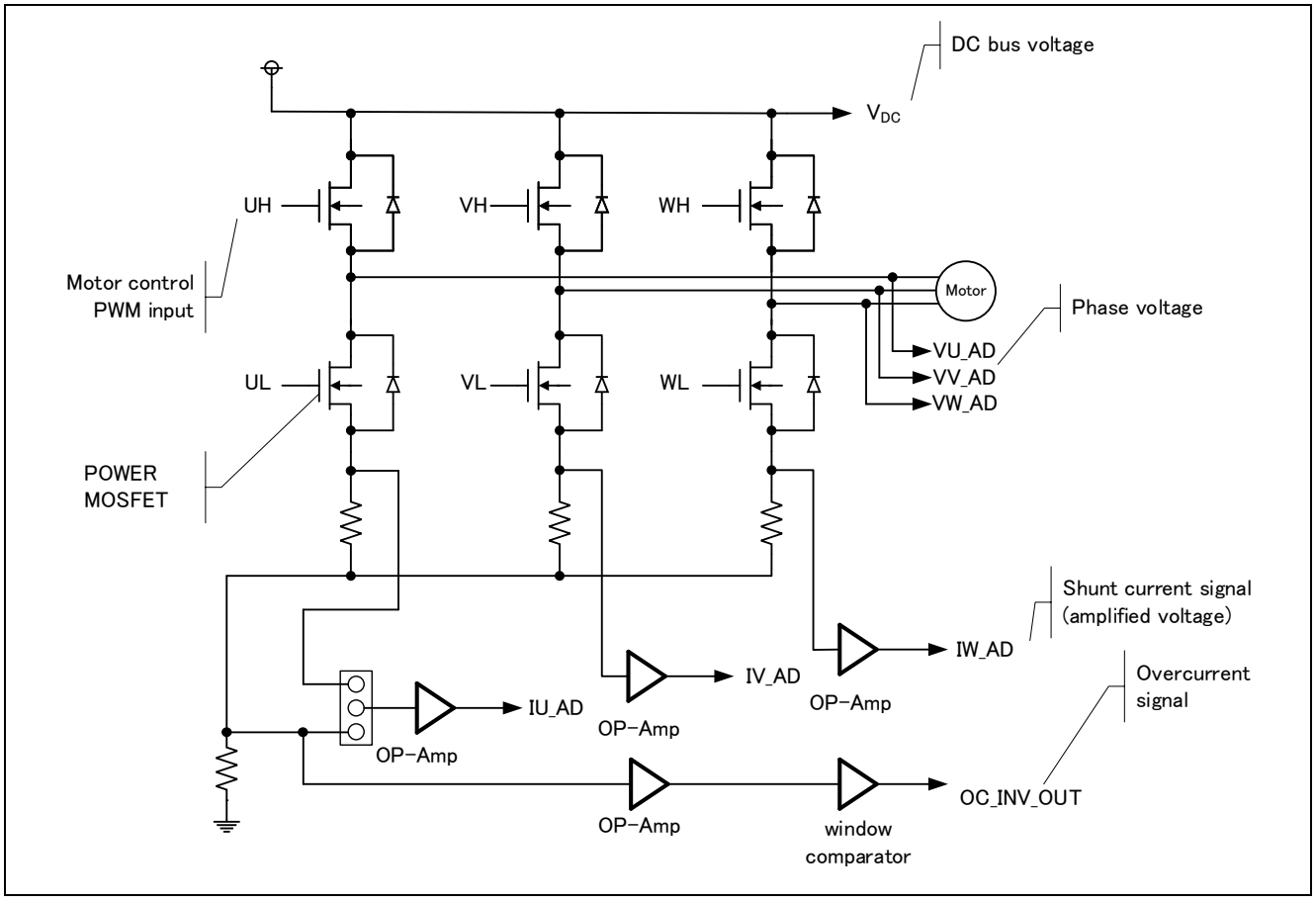


Figure 5-1 Illustration of inverter control circuit block

5.1.2 Current detection circuit

The inverter board has the current detection circuit to measure the current at the U, V and W phase. The current detection circuit uses shunt resistor at each phase. Voltage drop caused by the current flowing through the shunt resistor is amplified by the current detection amplifier to output. The default gain of the current detection amplifier is set to 20x, but the gain can be changed to 10x by setting JP5, JP7, JP9, JP10, JP14, and JP15 to open. The relationship between the current Iin flowing through the shunt resistor and the voltage Vout output from the current detection circuit is shown in equations (1) and (2). In addition, by switching JP8 and JP11 to 2-3 pin short circuit, 1 shunt current detection can be supported.

$$\text{Amplifier gain 10x} : \mathrm{Vout[V]} = \mathrm{Iin[A]} \times \mathrm{Rs[\Omega]} \times 10 + \mathrm{AVCC}/2 \quad (1)$$

$$\text{Amplifier gain 20x} : \mathrm{Vout[V]} = \mathrm{Iin[A]} \times \mathrm{Rs[\Omega]} \times 20 + \mathrm{AVCC}/2 \quad (2)$$

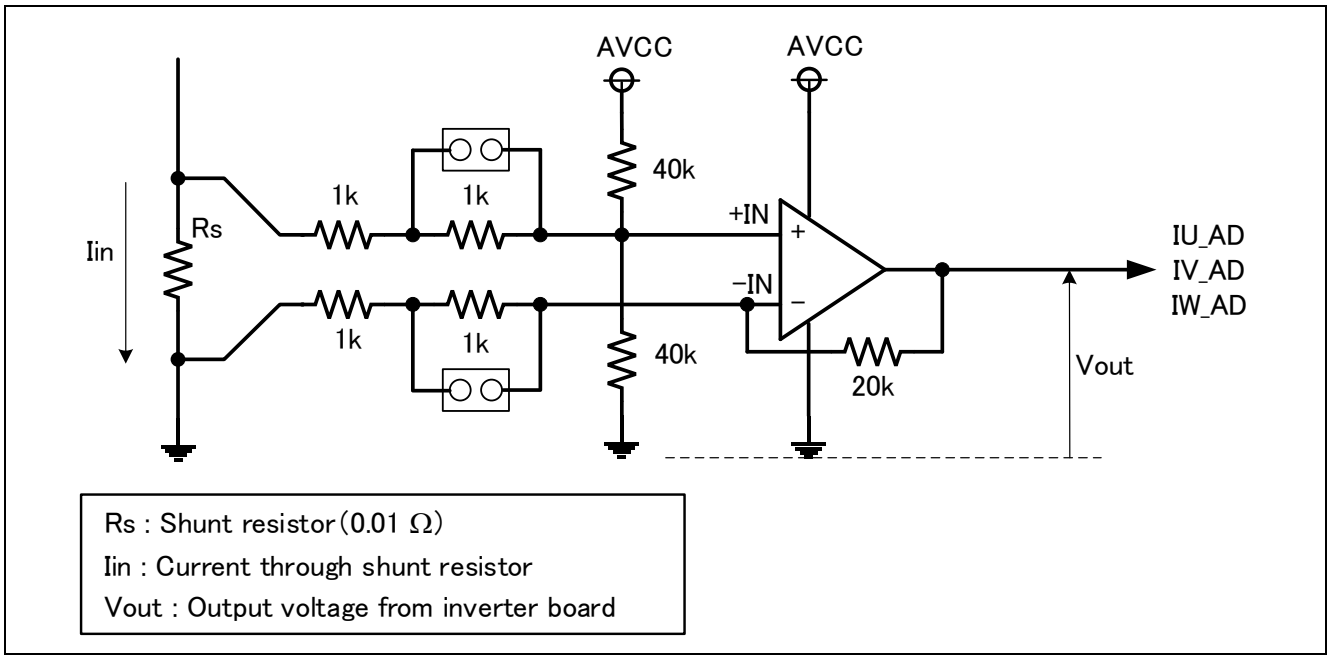


Figure 5-2 Current detection circuit

5.1.3 Overcurrent detection circuit

Detect the overcurrent from the input current, using the overcurrent detection circuit illustrated in Figure 5-3 If the current value is within the range of threshold, OC_INV_OUT is HIGH, and this changes to LOW if overcurrent is detected. Therefore, you can protect the board and motor by monitoring the over current detection signal and setting PWM signals for gate driver to LOW or Hi-Z if the over current detection signal changes to LOW.

The overcurrent detection circuit does not directly protect the board and motor. Protect them by performing appropriate processing with equipment such as microcontroller.

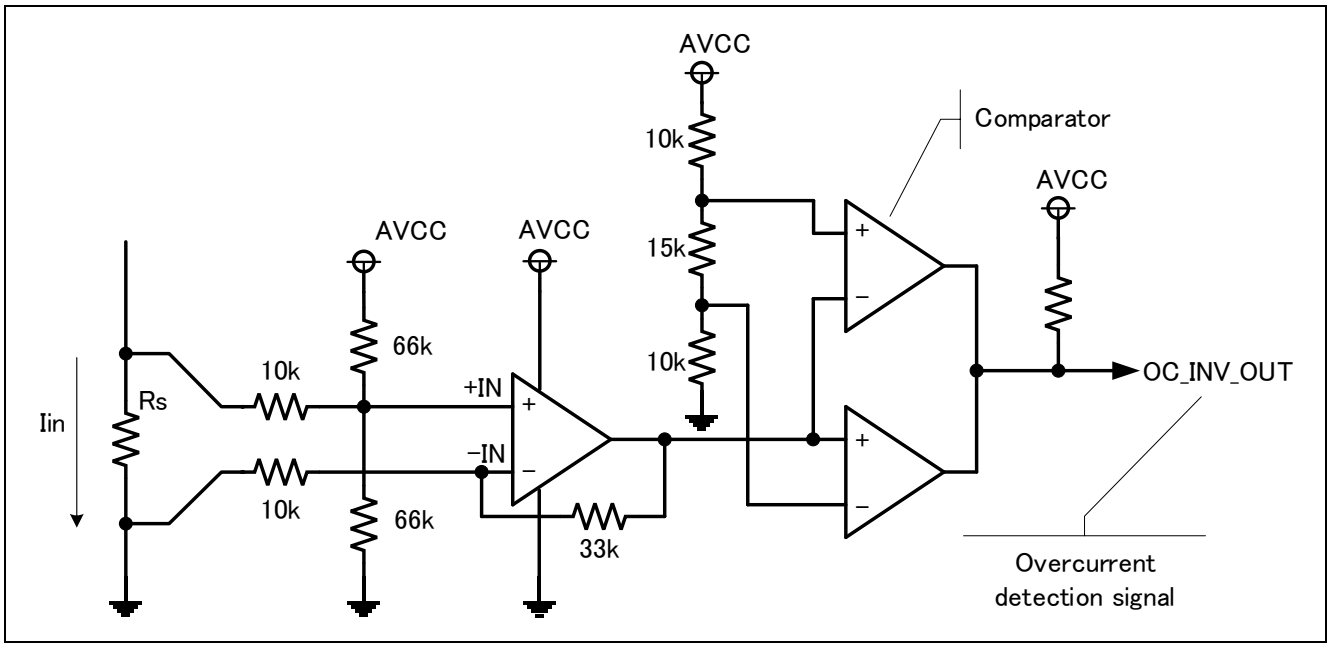


Figure 5-3 Overcurrent detection circuit

5.1.4 Output voltage detection circuit

The inverter board has the circuit that inputs bus voltage and three-phase output voltage (U, V and W phase) into the AD pin of the microcontroller through resistive voltage divider. Relation between the three-phase output voltage, the bus voltage and the detection voltage is described by the below equation (3).

$$\mathrm{Vout}[V] = \frac{470}{10 \times 10^3 + 470} \times Vin[V] \qquad (3)$$

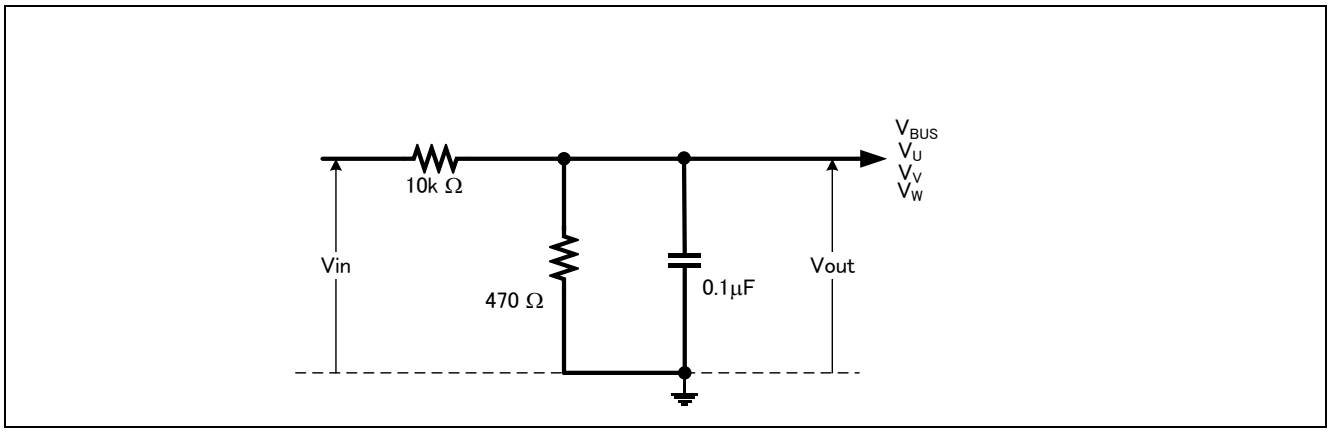


Figure 5-4 Output voltage detection circuit

5.1.5 Voltage generation circuit

On the inverter board, the gate driver voltage ("+12V" in the schematic) is generated from the 5V power supply ("+5V" in the schematic) with the boost converter. If 5V is not supplied from the CPU board, the buck converter on the inverter board generates 5V from the voltage input (12 to 48V) from the DC jack or terminal block.

Table 5-1 Voltage generation

Item	Input voltage [V]	Output voltage (TYP.) [V]	Output current (Max) [A]
5V generation	12～48	5	0.6
Gate driver voltage generation	5	11.4	-

5.1.6 LED

The inverter board has three LEDs which the user can control. The LED ON/OFF is controlled by the pin state.

Table 5-2 LED

Connector pin		LED1	LED2	LED3
CN4-18	HIGH	OFF	-	-
	LOW	ON	-	-
CN4-19	HIGH	-	OFF	-
	LOW	-	ON	-
CN4-20	HIGH	-	-	OFF
	LOW	-	-	ON

5.1.7 Toggle switch and push switch

The inverter board has toggle switch (SW1) and push switch (SW2). The pin voltage is controlled by the state of them.

Table 5-3 Toggle switch and push switch

Connector pin		SW1	SW2
CN4-16	HIGH	ON	-
	LOW	OFF	-
CN4-17	HIGH	-	RELEASE
	LOW	-	PUSH

5.1.8 Variable resistor

The inverter board has a variable resistor (VR1). If turning the variable resistor clockwise, terminal voltage of the variable resistor (CN3-17) becomes low. If turning it counterclockwise, the voltage becomes high.

Table 5-4 Variable resistance specification

Item	Specification
Input voltage range	0~AVCC
Variable resistor range	0~10kΩ

5.2 Pin assignment

5.2.1 CPU board connector

Table 5-5 CPU board connector (CN3)

Pin No.	Output direction	Pin Function
1	-	SPARE1
2	-	AGND
3	To CPU	DC bus voltage detection
4	-	AGND
5	To CPU	U-phase current detection
6	To CPU	U-phase current detection (PGAVSS)
7	To CPU	V-phase current detection
8	To CPU	V-phase current detection (PGAVSS)
9	To CPU	W-phase current detection
10	To CPU	W-phase current detection (PGAVSS)
11	To CPU	U-phase voltage detection
12	To CPU	V-phase voltage detection
13	To CPU	W-phase voltage detection
14	-	AGND
15	To CPU	VPFC_AD
16	To CPU	IPFC_AD
17	To CPU	VR1
18	-	AGND
19	-	AVCC
20	-	AVCC
21	-	AGND
22	-	AGND
23	-	VCC
24	-	VCC
25	-	DGND
26	-	DGND
27	To INV	PWM U-phase (Lower)
28	-	DGND
29	To INV	PWM U-phase (Upper)
30	-	DGND
31	To INV	PWM V-phase (Lower)
32	-	DGND
33	To INV	PWM V-phase (Upper)
34	-	DGND

Table 5-6 CPU board connector (CN4)

Pin No.	Output direction	Pin Function
1	To INV	PWM W-phase (Lower)
2	-	DGND
3	To INV	PWM W-phase (Upper)
4	-	DGND
5	-	SPARE2
6	-	SPARE3
7	-	SPARE4
8	-	SPARE5
9	To INV	Bus power signal from CPU board
10	To CPU	Inverter connected signal
11	To CPU	Save interlock signal
12	To CPU	Over current detection
13	To CPU	OC_PFC_OUT
14	To INV	PWM_IN
15	To INV	RELAY_IN
16	To CPU	SW1
17	To CPU	SW2
18	To INV	LED1
19	To INV	LED2
20	To INV	LED3
21	To CPU	HALL U
22	To CPU	HALL V
23	To CPU	HALL W
24	To CPU	IPS_SIO_SDA
25	To CPU	IPS_SCK_SCL
26	To CPU	IPS_CSN_IRQN/Encoder Z
27	To CPU	IPS_A/ Encoder A
28	To CPU	IPS_A#/ Encoder A#
29	To CPU	IPS_B/ Encoder B#
30	To CPU	IPS_B#/ Encoder B#
31	-	GND
32	-	GND
33	-	+5V
34	-	+5V

5.2.2 Hall sensor signal input

This product has connector for hall sensor signal input. Pin assignment of it is listed in Table 5-7.

Table 5-7 Connector for hall sensor signal input (CN6) pin assignment

Pin No.	Pin Function
1	DGND
2	+5V
3	HALL_W
4	HALL_V
5	HALL_U

5.2.3 Encoder/Inductive position sensor signal input

This product has connector for encoder/inductive position sensor signal input. Pin assignment for them is listed in Table 5-8.

Table 5-8 Connector for encoder/inductive position sensor signal input (CN5) pin assignment

Pin No.	Pin function
1	VCC
2	+5V
3	CSN_IRQN/ENC_Z
4	SIO_SDA
5	SCK_SCL
6	IPS_A/ENC_A
7	IPS_A#/ENC_A#
8	IPS_B/ENC_B
9	IPS_B#/ENC_B#
10	DGND

6. CPU Board Specification

This section describes the specification of the CPU Board.

6.1 Functions

6.1.1 Power supply

When not connected to the inverter board, power should be supplied from the USB connector(CN13). 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.

6.1.2 Onboard debugger

This product has the onboard debugger circuit, J-Link On-Board (hereinafter called “J-Link-OB”). You can write a program (firmware) of RA8T2 with it. When you write a program, open the JP3 and connect the USB connector(CN13) on CPU board to PC with USB cable. J-Link-OB operates as debugger equivalent to J-Link. If connecting from Integrated Development Environment(e.g. e^2 studio) or flash programing tool (e.g. J-Flash Lite by SEGGER), set the type of debugger (tool) to “J-Link”.

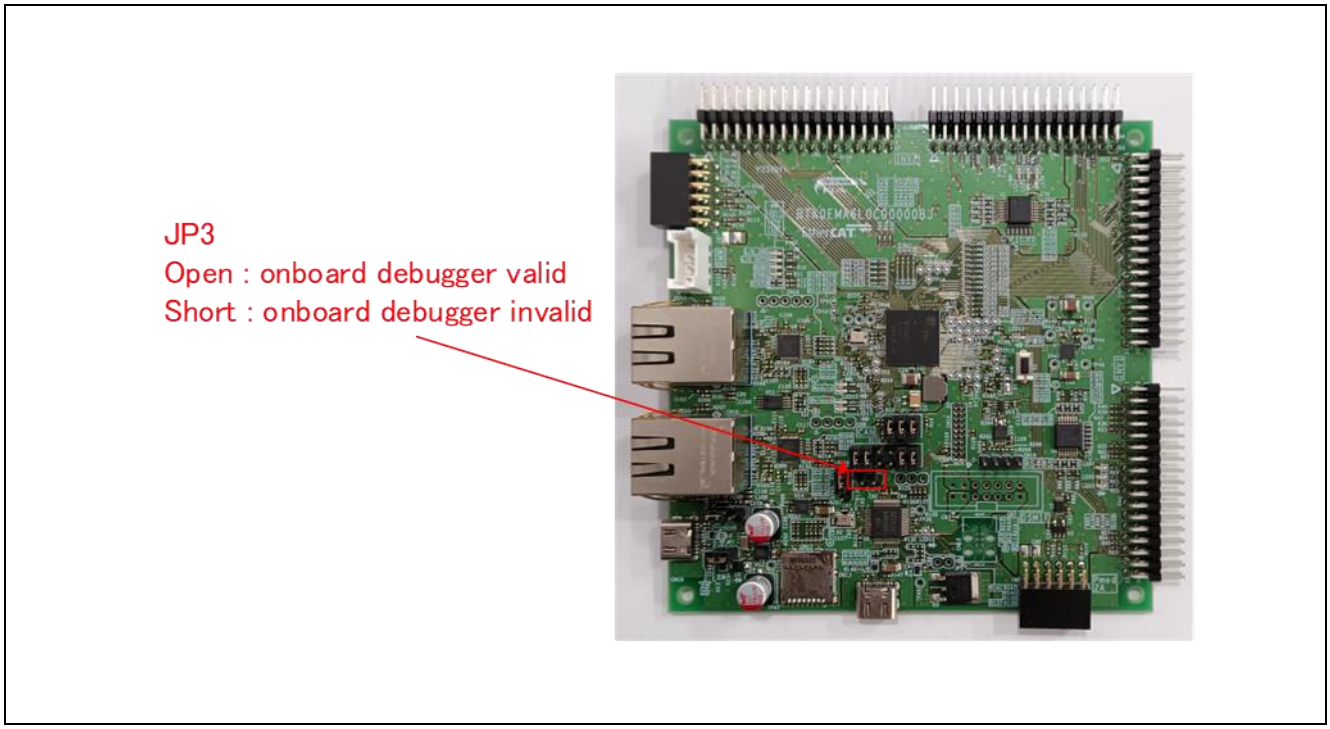


Figure 6-1 Setting of JP3

6.1.3 J-Link Virtual COM Port

This product supports J-Link Virtual COM Port. By connecting to a PC with USB connector (CN13), a virtual COM port via USB is available.

6.1.4 RA8T2 USB IF

This product has a USB connector (CN18) for the USB Full-Speed module in RA8T2.

6.1.5 Inverter board connector

Max 2 inverter boards can be connected to this product. 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 6-1, Table 6-2, Table 6-3, Table 6-4.

Table 6-1 1st inverter board connector (CN1) pin assignment

Pin No.	Pin Function	RA8T2 Pin	Pin No.	Pin Function	RA8T2 Pin
1	HVtemp	P005/AN005(*)	2	AGND	- (AVSS)
3	VDC	P007/AN007	4	AGND	- (AVSS)
5	IU	P006/AN006	6	NC	-
7	IV	P008/AN008	8	NC	-
9	IW	P010/AN010	10	NC	-
11	VU	P009/AN009	12	VV	P011/AN011
13	VW	P013/AN013	14	AGND	- (AVSS)
15	VPFC	P012/AN012	16	IPFC1	P812/AN022
17	VR/IPFC2	P015/AN015	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	P604/GTIOC8B	28	GND	- (VSS)
29	UP	P605/GTIOC8A	30	GND	- (VSS)
31	VN	P602/GTIOC7B	32	GND	- (VSS)
33	VP	P603/GTIOC7A	34	GND	- (VSS)

(*) Exclusively assigned by jumper resistor setting

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

Pin No.	Pin Function	RA8T2 Pin	Pin No.	Pin Function	RA8T2 Pin
1	WN	P613/GTIOC9B	2	GND	- (VSS)
3	WP	P612/GTIOC9A	4	GND	- (VSS)
5	DRV_SCK	P610/RSPCKA	6	DRV_RXD PWMPFC2	P115/MOSIA GTIOC5A
7	DRV_TXD	P609/MISOA	8	DRV_CS	P114/SSLA0
9	BUS_POWER_IN	-	10	INV_CONNECTED	P504
11	SAFE_LOCK	P503	12	OC#	P112/GTETRGA (*)
13	nFault	P112/GTETRGA (*)	14	DRV_EN PWMPFC1	P300 GTIOC3A
15	Relay	P505	16	SW1	PA00
17	SW2	PA07	18	LED1	P614
19	LED2	PA15	20	LED3	PA04
21	HALL_U	PA08/IRQ6	22	HALL_V	PA10/IRQ4
23	HALL_W	PA09/IRQ5	24	SIO_SDA	P514/SDA2
25	SCK_SCL	P515/SCL2	26	CSNIRQN/ENC_Z	P615/GTETRGC
27	IPS_A ENC_A	P501/AN020 (*) P507/GTIOC0A (*)	28	IPS_A#	P014/AN014
29	IPS_B ENC_B	P502/AN019 (*) P508/GTIOC0B (*)	30	IPS_B#	P500/AN021
31	GND	- (VSS)	32	GND	- (VSS)
33	+5V	-	34	+5V	-

(*) Exclusively assigned by jumper resistor setting

Table 6-3 2nd inverter board connector (CN3) pin assignment

Pin No.	Pin Function	RA8T2 Pin	Pin No.	Pin Function	RA8T2 Pin
1	NC	-	2	AGND	- (AVSS)
3	VDC	P806/AN018	4	AGND	- (AVSS)
5	IU	P002/AN002	6	NC	-
7	IV	P000/AN000	8	NC	-
9	IW	P004/AN004	10	NC	-
11	VU	P001/AN001 (*)	12	VV	P513/AN016 (*)
13	VW	P003/AN003 (*)	14	AGND	- (AVSS)
15	NC	-	16	NC	-
17	VR	P805/AN017	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	P202/GTIOC5B	28	GND	- (VSS)
29	UP	P203/GTIOC5A	30	GND	- (VSS)
31	VN	P600/GTIOC6B	32	GND	- (VSS)
33	VP	P601/GTIOC6A	34	GND	- (VSS)

(*) Exclusively assigned by jumper resistor setting

Table 6-4 2nd inverter board connector (CN4) pin assignment

Pin No.	Pin Function	RA8T2 Pin	Pin No.	Pin Function	RA8T2 Pin
1	WN	P204/GTIOC4B	2	GND	- (VSS)
3	WP	P205/GTIOC4A	4	GND	- (VSS)
5	DRV_SCK	P610/RSPCKA	6	DRV_RXD	P115/MOSIA
7	DRV_TXD	P609/MISOA	8	DRV_CS	P315/SSLA3
9	BUS_POWER_IN	-	10	INV_CONNECTED	P100
11	SAFE_LOCK	P800	12	OC#	P101/GTETRGB (*)
13	nFault	P101/GTETRGB (*)	14	DRV_EN	P808
15	Relay	P809	16	SW1	P901
17	SW2	P313	18	LED1	P900
19	LED2	P509	20	LED3	P510
21	HALL_U	P314/IRQ28	22	HALL_V	P802/IRQ18
23	HALL_W	P803/IRQ19	24	SIO_SDA	P514/SDA2
25	SCK_SCL	P515/SCL2	26	CSNIRQN/ENC_Z	P804/GTETRGD
27	IPS_A ENC_A	P001/AN001 (*) P103/GTIOC2A (*)	28	IPS_A#	P513/AN016 (*)
29	IPS_B ENC_B	P003/AN003 (*) P102/GTIOC2B (*)	30	IPS_B#	P005/AN005 (*)
31	GND	- (VSS)	32	GND	- (VSS)
33	+5V	-	34	+5V	-

(*) Exclusively assigned by jumper resistor setting

Figure 6-2 show a connection example when using this product with the inverter board and the communication board. And also see 4.6.2 for power supply.

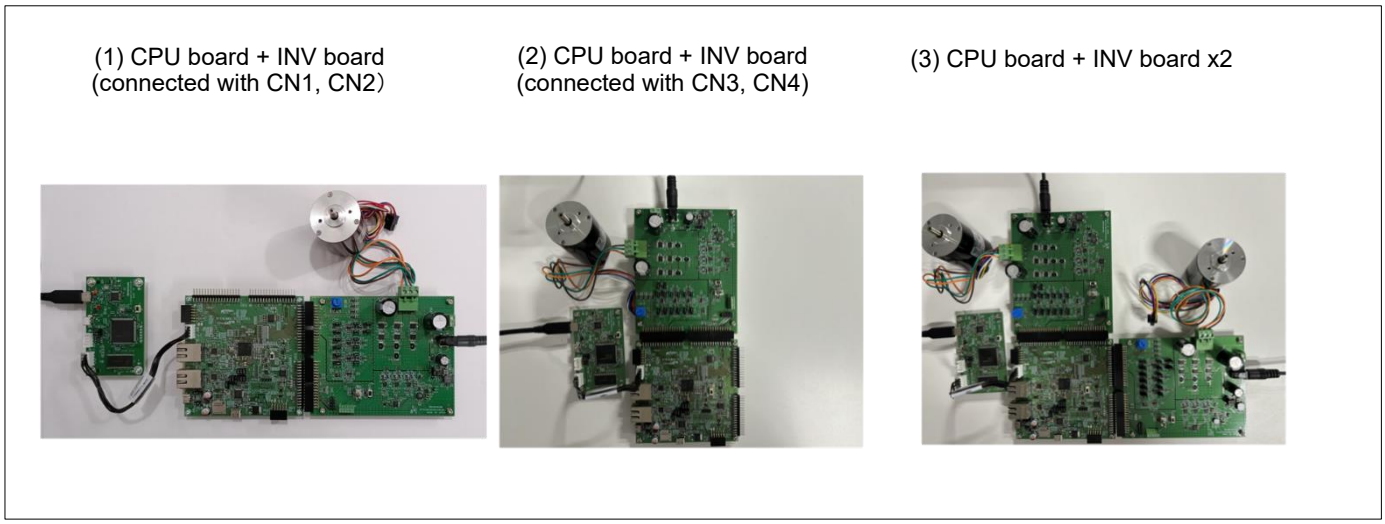


Figure 6-2 Board connection of CPU board, INV board and COM board

6.1.6 Serial communication

For serial communication using Renesas Motor Workbench, the CPU board has SCI connector. Pin assignment for SCI connector is listed in Table 6-5.

Table 6-5 SCI connector (CN9) pin assignment

Pin No.	Pin Function	RA8T2 Pin
1	GND	-
2	MCU RXD	P401/RXD1
3	MCU TXD	P400/TXD1
4	VCC	-

6.1.7 Reset circuit

This product has a reset circuit to enable power-on reset or external reset on MCU. Push the reset switch (S1) to externally reset MCU.

6.1.8 LED

This product has 6 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 6-6.

Table 6-6 LED pin assignment

RA8T2 Pin		LED1	LED2	LED3	LED4	LED5	LED6
P614	Output HIGH	OFF	-	-	-	-	-
	Output LOW	ON	-	-	-	-	-
PA15	Output HIGH	-	OFF	-	-	-	-
	Output LOW	-	ON	-	-	-	-
PA04	Output HIGH	-	-	OFF	-	-	-
	Output LOW	-	-	ON	-	-	-
P900	Output HIGH	-	-	-	OFF	-	-
	Output LOW	-	-	-	ON	-	-
P509	Output HIGH	-	-	-	-	OFF	-
	Output LOW	-	-	-	-	ON	-
P510	Output HIGH	-	-	-	-	-	OFF
	Output LOW	-	-	-	-	-	ON

6.1.9 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 6-7.

Table 6-7 CAN communication pin assignment (CN8)

Pin No.	RA8T2 Pin
1	VCC
2	PD00/CTX1
3	PC15/CRX1
4	VSS

6.1.10 Pmod

This product has two connectors for Pmod module connection. Pin assignments are shown in Table 6-8 and Table 6-9.

.

Table 6-8 Type 2A connector pin assignment (CN5)

Pin No.	RA8T2 Pin	Pin No.	RA8T2 Pin
1	P113_SSLA1	7	P813
2	P115_MOSIA	8	PA06
3	P609_MISOA	9	P611
4	P610_RSPCKA	10	PA11
5	VSS	11	VSS
6	VCC	12	VCC

Table 6-9 Pmod Type 3A/6A connector pin assignment (CN6)

Pin No.	RA8T2 Pin	Pin No.	RA8T2 Pin
1	P710_CTS4(P715_IRQ12)	7	P410
2	P415_TXD4	8	P412
3	P414_RXD4(P515_SCL2)	9	P413
4	P411(P514_SDA2)	10	P512
5	VSS	11	VSS
6	VCC	12	VCC

(*) default setting is Pmod 3A, select 6A with jumper resistor. 3A assignment is in brackets.

6.1.11 RS-485

This product has connector for RS-485. Pin assignments are shown in **Table 6-10**.

Table 6-10 RS-485 connector pin assignment (CN19)

Pin No.	RA8T2 Pin
1	+5V
2	A/Y
3	B/Z
4	GND

6.1.12 DSMIF

This product has through holes for DSMIF. Pin assignment for DSMIF connector are shown in **Table 6-11.**

Table 6-11 DSMIF connector pin assignment (CN7)

Pin No.	RA8T2 Pin	Pin No	RA8T2 Pin
1	+5V	2	VCC
3	+5V	4	VCC
5	PC10/DSM1CLK2	6	PC13/DSM1DAT2
7	PC11/DSM1CLK1	8	PC14/DSM1DAT1
9	PC12/DSM1CLK0	10	PC08/DSM1DAT0
11	PC04/DSM0CLK0	12	PC07/DSM0DAT0
13	GND	14	GND

6.1.13 Ether CAT

This product has connectors for Ether CAT. When using Ether CAT, connect to the target via CN14 and CN15.

6.1.14 MicroSD

This product has slot of MicroSD. When using a MicroSD card, insert a MicroSD card into CN17.

6.2 RA8T2 pin function list

Table 6-12 RA8T2 pin function list

Pin Layout	RA8T2 pin function	Signal function
A1	P609/MISOA	Smart Driver (MISO), Pmod2A
A2	P113/SSLA1	Pmod2A
A3	P115/MOSIA/GTIOC5A	Smart Driver (MOSI), HV1_InterleavePWM_PFC, Pmod2A
A4	P112/GTETRGA	Smart Driver (INV1 nFault), INV1 Over Current, HV1_OC_PFC
A5	P302	-
A6	P915	-
A7	VLO3	VLO
A8	VLO1	VLO
A9	VSS_DCDC1	GND
A10	VCC_DCDC3	VCC
A11	VCC_DCDC1	VCC
A12	P309	Ether CAT(LED_Network1)
A13	P906/CAT1_ERXD0	Ether CAT(CAT1_DUPLEX)
A14	P905/CAT1_RX_CLK	Ether CAT(CAT1_BCAST_OFF)
A15	P907/CAT1_ERXD1	Ether CAT(CAT1_PHYAD2)
A16	P904	Ether CAT(LED_Module2)
A17	P207	Ether CAT(LED_Module1)
B1	P813	Pmod2A(GPIO)
B2	PA12/RXD9	ARM debugger
B3	P114/SSLA0	Smart Driver (INV1 CS)
B4	PA11	Pmod2A(GPIO)
B5	P300/GTIOC3A	Smart Driver (INV1 EN)/ HV1_PWM_PFC
B6	P303	-
B7	VLO4	VLO
B8	VLO2	VLO
B9	VSS_DCDC2	GND
B10	VCC_DCDC4	VCC
B11	VCC_DCDC2	VCC
B12	P311/CAT1_TX_CLK	Ether CAT
B13	P908/CAT1_ERXD2	Ether CAT(CAT1_PHYAD1)
B14	P909/CAT1_ERXD3	Ether CAT(CAT1_PHYAD0)
B15	P206/CAT1_RX_DV	Ether CAT(CAT1_CONFIG2)
B16	PD01/SD0DAT2	SDHI
B17	PD02/SD0DAT1	SDHI
C1	PA06	Pmod2A(GPIO)
C2	P613/GTIOC9B	INV1 PWM_WL
C3	PA13/CTS_RTS9	ARM debugger
C4	P301	-
C5	P200	-
C6	P210/SWDIO	ARM debugger
C7	P208/TDI	ARM debugger
C8	P110	ARM debugger
C9	P308/TRCLK	ARM debugger
C10	P305/TRDATA2/CAT1_ETXD2	ARM debugger, Ether CAT
C11	P307/TRDATA0/CAT1_ETXD0	ARM debugger, Ether CAT
C12	P911	Ether CAT(JPswitch)
C13	P312/CAT1_RX_ER	Ether CAT(CAT1_ISO)
C14	PD04/SD0CMD	SDHI
C15	PD03/SD0DAT0	SDHI
C16	PD05/SD0CLK	SDHI
C17	PD06/SD0WP	SDHI
D1	PA04	INV1 LED3
D2	P611	Pmod2A(GPIO)
D3	P610/RSPCKA	Smart Driver (SCK), Pmod2A
D4	PA14/TXD9	ARM debugger
D5	RES	ARM debugger

Pin Layout	RA8T2 pin function	Signal function
D6	P211/SWCLK	ARM debugger
D7	P109	-
D8	P108	-
D9	P903	-
D10	P304/TRDATA3/CAT1_ETXD3	ARM debugger, Ether CAT
D11	P306/TRDATA1/CAT1_ETXD1	ARM debugger, Ether CAT
D12	P912	Ether CAT(JPswitch)
D13	PB04/CAT0_ETXD3	Ether CAT
D14	PB07	Ether CAT(JPswitch)
D15	PB05/IRQ15	Ether CAT(CAT1_INTRP)
D16	PB03/CAT0_ETXD2	Ether CAT
D17	PB01/CAT0_TX_CLK	Ether CAT
E1	PA15	INV1 LED2
E2	P615/ GTETRGC	INV1 ENC_Z, INV1 IPS CSNIRQN
E3	P614	INV1 LED1
E4	P612/ GTIOC9A	INV1 PWM_WH
E5	P914	-
E6	P201/MD	ARM debugger
E7	P209/TDO	ARM debugger
E8	P111/ SD0DAT3	SDHI
E9	P902	-
E10	P310/CAT1_TX_EN	Ether CAT
E11	P910	-
E12	P913	Ether CAT(LED_Network2)
E13	PB02/ CAT0_ETXD1	Ether CAT
E14	PB06	SDHI
E15	PD07/ SD0CD	SDHI
E16	PB00/ CAT0_ETXD	Ether CAT
E17	P706/ ETHPHYCLK	Ether CAT
F1	PA02/ RXD2	RS485
F2	PA10/ IRQ4	INV1 HALL_V
F3	PA08/ IRQ6	INV1 HALL_U
F4	PA09/ IRQ5	INV1 HALL_W
F5	PC14/ DSM1DAT1	DSMIF
F6	VCC4	VCC
F7	VSS4	GND
F8	VSS21	GND
F9	VCL5	VCL
F10	VSS12	GND
F11	VCC12	VCC
F12	P700/ CAT0_ERXD2	Ether CAT(CAT0_PHYAD1)
F13	P702/ CAT0_ERXD0	Ether CAT(CAT0_DUPLEX)
F14	P406/ CAT0_ERXD3	Ether CAT(CAT0_PHYAD0)
F15	P701/ CAT0_ERXD1	Ether CAT(CAT0_PHYAD2)
F16	P707/ IRQ8	Ether CAT(CAT0_INTRP)
F17	P705/ CAT0_TX_EN	Ether CAT
G1	PA00	INV1 SW1
G2	PA03/ TXD2	RS485
G3	PA05/ DE2	RS485
G4	PA07/ IRQ16	INV1 SW2, HV1 Over temp
G5	PC12/DSM1CLK0	DSMIF
G6	VCC5	VCC
G7	VSS6	GND
G8	VSS22	GND
G9	VCL6	VCL
G10	VSS13	GND
G11	VCC13	VCC
G12	P405/ CAT0_RX_DV	Ether CAT(CAT0_CONFIG2)
G13	P704/ CAT0_RX_ER	Ether CAT(CAT0_ISO)

Pin Layout	RA8T2 pin function	Signal function
G14	P703/ CAT0_RX_CLK	Ether CAT(CAT0_BCAST_OFF)
G15	PB14/CATSYNC0	Ether CAT
G16	PB12/CATLINKACT0	Ether CAT
G17	PB11/CATLEDERR	Ether CAT
H1	P504	INV1 InverterConnected
H2	P503	INV1 SafeLock
H3	P505	Smart Driver (INV1 SEL)/ HV1_Relay
H4	PA01	-
H5	PC11/DSM1CLK1	DSMIF
H6	VCC6	VCC
H7	VSS6	GND
H8	VSS26	GND
H9	VCL7	VCL
H10	VSS23	GND
H11	VCC3	VCC
H12	VSS3	GND
H13	P403/ CATI2CCLK	Ether CAT
H14	VCC10	VCC
H15	PB09/CATIRQ	Ether CAT
H16	PB10/CATLEDSTER	Ether CAT
H17	PB13/CATLINKACT1	Ether CAT
J1	P506	-
J2	P507/GTIOC0A	INV1 ENCA
J3	P508/GTIOC0B	INV1 ENCB
J4	P509/GTIOC1A	INV2 LED2
J5	PC13/DSM1DAT2	DSMIF
J6	VCC8	VCC
J7	VSS8	GND
J8	VCL10	VCL
J9	VCL8	VCL
J10	VSS24	GND
J11	VCL0	VCL
J12	VSS16	GND
J13	P404/CATI2CDATA	Ether CAT
J14	PB08/CATLEDRUN	Ether CAT
J15	VSS10	GND
J16	VSS11	GND
J17	VSS1	GND
K1	PC15/ CRX1	CAN
K2	P608	-
K3	P510	INV2 LED3
K4	PD00/ CTX1	CAN
K5	PC07/DSM0DAT0	DSMIF
K6	VSS15	GND
K7	VSS27	GND
K8	VCL11	VCL
K9	VCL9	VCL
K10	VSS25	GND
K11	VCL1	VCL
K12	VSS17	GND
K13	P410	Pmod6A(GPIO)/Pmod3A(GPIO)
K14	VCC11	VCC
K15	VCC1	VCC
K16	XTAL	XTAL
K17	EXTAL	EXTAL
L1	PC03	-
L2	PC02	-
L3	PC04/DSM0CLK0	DSMIF
L4	PC09	-

Pin Layout	RA8T2 pin function	Signal function
L5	PC05	-
L6	VCC15	VCC
L7	VSS9	GND
L8	VSS7	GND
L9	VSS20	GND
L10	VCL4	VCL
L11	VCL2	VCL
L12	VSS18	GND
L13	P414/ RXD4	Pmod3A
L14	P402/ CAT0_LINKSTA	Ether CAT
L15	VCC2	VCC
L16	P214/XCOUT	XCOUT
L17	P215/XCIN	XCIN
M1	PC00	-
M2	P607	-
M3	PC01	-
M4	PC08/DSM1DAT0	DSMIF
M5	PC10/DSM1CLK2	DSMIF
M6	P104	-
M7	VCC9	VCC
M8	VCC7	VCC
M9	P810	-
M10	VSS19	GND
M11	VCL3	VCL
M12	P412	Pmod3A/Pmod6A(GPIO)
M13	P710/CTS4	Pmod3A(GPIO)
M14	P411	Pmod3A(GPIO)
M15	P408/USB_VBUSEN	USB_VBUSEN
M16	VBATT	VCC
M17	VSS2	GND
N1	P605/GTIOC8A	INV1 PWM_UH
N2	P604/GTIOC8B	INV1 PWM_UL
N3	P606	-
N4	PC06	-
N5	P107	-
N6	P106	-
N7	P105	-
N8	P811	-
N9	P013/AN013	INV1 VW
N10	P011/AN011	INV1 VV
N11	P807	-
N12	P708/CAT0_MDC	Ether CAT
N13	P712/CATLATCH1	Ether CAT
N14	P714/CATSYNC1	Ether CAT
N15	P711/CATRESETOUT	Ether CAT
N16	P713/CATLATCH0	Ether CAT
N17	P401/RXD1	RMW
P1	P603/GTIOC7A	INV1 PWM_VH
P2	P602/GTIOC7B	INV1 PWM_VL
P3	P600/GTIOC6B	INV2 PWM_VL
P4	P601/GTIOC6A	INV2 PWM_VH
P5	P102/GTIOC2B	INV2 ENCB
P6	P801	-
P7	P803/IRQ19	INV2 HALL_W
P8	P812/AN022	INV1 IPFC1
P9	P012/AN012	INV1_VPFC
P10	P010/AN010	INV1 IW
P11	P009/AN009	INV1 VU
P12	P805/AN017	INV2_VR

Pin Layout	RA8T2 pin function	Signal function
P13	P512	Pmod6A(GPIO),Pmod3A(GPIO)
P14	P413	Pmod6A(GPIO),Pmod3A(GPIO)
P15	P515/SCL2	Pmod6A,INV1 IPS SCL,INV2 IPS SCL
P16	P709/CAT0_MDIO	Ether CAT
P17	P400/TXD1	RMW
R1	VCC14	VCC
R2	P315/SSLA3	Smart Driver (INV2 CS)
R3	P900	INV2 LED1
R4	P103/GTIOC2A	INV2 ENCA
R5	P101/GTETRGB	Smart Driver (INV2 nFault),INV2 OverCurrent
R6	P802/IRQ18	INV2 HALL_V
R7	P804/GTETRGD/IRQ14	INV2 ENC_Z,INV2 IPS CSNIRQN
R8	P501/AN020	INV1 IPS_A
R9	AVCC0	AVCC
R10	AVSS0	AGND
R11	P005/AN005	INV2 IPS_B#,INV1_HV_temp
R12	P003/AN003	INV2 VW,INV2 IPS_B
R13	P513/AN016	INV2 VV,INV2 IPS_A#,USB
R14	P514/SDA2	Pmod6A,INV1 IPS SDA,INV2 IPS SDA
R15	P415/TXD4	Pmod3A,Pmod6A(GPIO)
R16	P409/USB_OVRCURA_A-DS	USB
R17	P407/USB_VBUS	USB
T1	P205/ GTIOC4A	INV2 PWM_WH
T2	P203/ GTIOC5A	INV2 PWM_UH
T3	P313	INV2 SW2
T4	P901	INV2 SW1
T5	P809	Smart Driver (INV2 SEL)
T6	P800	INV2 SafeLock
T7	P502/AN019	INV1 IPS_B
T8	P014/AN014	INV1 IPS_A#
T9	VREFL	AGND
T10	VREFL0	AGND
T11	P004/AN004	INV2 IW
T12	P007/AN007	INV1 VDC
T13	P001/AN001	INV2 VU,INV2 IPS_A
T14	P806/AN018	INV2 VDC
T15	P715/IRQ12	Pmod6A
T16	P815/USB_DM	USB
T17	VSS_USB	GND
U1	P204/GTIOC4B	INV2 PWM_WL
U2	P202/GTIOC5B	INV2 PWM_UL
U3	P314/IRQ28	INV2 HALL_U
U4	VSS14	GND
U5	P808	Smart Driver (INV2 EN)
U6	P100	INV2 InverterConnected
U7	P500/AN021	INV1 IPS_B#
U8	P015/AN015	INV1_VR,INV1_IPFC2
U9	VREFH	AVCC
U10	VREFH0	AVCC
U11	P008/AN008	INV1 IV
U12	P006/AN006	INV1 IU
U13	P000/AN000	INV2 IV
U14	P002/AN002	INV2 IU
U15	P511/CAT1_LINKSTA	Ether CAT
U16	P814/USB_DP	USB
U17	VCC_USB	VCC

7. Communication Board Specification

This section describes the specification of the communication board.

7.1 Functions

7.1.1 Power supply

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

7.1.2 USB communication

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

7.1.3 Serial communication

This board has two SCI connectors for serial communication with the target MCU when using Renesas Motor Workbench, etc. The pin assignments are shown in Table 7-1 and Table 7-2. When using the communication cable bundled with this product, use CN5.
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 7-1 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 7-2 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	

8. Design and Manufacture Information

You can obtain information on the design and manufacture of this product from renesas.com .

9. 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
• Renesas Support renesas.com/support

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