

# RX13T CPU Card User's Manual

R12UZ0051EJ0110  
Rev.1.10  
2022.2.21

## For Your Safety




Do not fail to read this manual before using the RX13T CPU card (RTK0EMXA10C00000BJ) (the product).

- Follow the indications in this manual when using the product.
- This product is an optional board for "Evaluation System for BLDC Motor (RTK0EMX270S00020BJ)" and "24V Motor Control Evaluation System for RX23T (RTK0EM0006S01212BJ)".
- Keep this manual near the product so you can refer to it whenever necessary.
- Transfer or sale of the product to third parties is prohibited without written approval.
- The purchaser or importer of the product is responsible for ensuring compliance with local regulations. In addition, the customer is responsible for ensuring that the product is handled correctly and safely, in accordance with the laws of the customer's country (region).
- All information contained in this manual represents information on products at the time of publication of this manual. Please note that the product data, specification, sales offices, contents of website, address, etc., are subject to change by Renesas Electronics Corporation without notice due to product improvements or other reasons. Please confirm the latest information on Renesas Electronics website.
- The manual for the product, and specification (the documents) are the tool that was developed for the function and performance evaluation of Renesas Electronics semiconductor device (Renesas Electronics device) mounted on the product, and not guarantee the same quality, function and performance.
- By purchasing the product or downloading the documents from Renesas Electronics website, the support services provided from Renesas Electronics is not guaranteed.

## 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.

|  |   |
|--|---|
|  <b>Danger</b>  | Indicates content that, if not followed, could result in death or serious injury* <sup>1</sup> to the user, and which is highly urgent. |
|  <b>Warning</b> | Indicates content that, if not followed, could result in death or serious injury to the user.   |
|  <b>Caution</b> | Indicates content that, if not followed, could result in injury* <sup>2</sup> to persons or physical damage.* <sup>3</sup>              |

Note 1. Serious injury refers to conditions resulting in persistent after-effects and for which treatment would necessitate hospitalization or regular hospital visits, such as loss or impairment of eyesight, burns (high- or low-temperature), electric shock, bone fracture, or poisoning.

Note 2. Injury refers to conditions for which treatment would necessitate hospitalization or regular hospital visits.

Note 3. Physical damage refers to damage affecting the wider surroundings, such as the user's home or property.

Requirements related to the handling of the product are classified into the following categories.



- Marks indicating that an action is prohibited.

|   |   |   |  |
|---|---|---|--|
|  | <p><b>General Prohibition</b><br/>The indicated action is prohibited.</p> |  | <p><b>Example: Do Not Touch!</b><br/>Touching the specified location could result in injury.</p> |
|---|---|---|--|

- Marks indicating that an action is prohibited.






|   |   |   |  |
|---|---|---|--|
|  | <p><b>General Caution</b><br/>Indicates a general need for caution that is not specified.</p> |  | <p><b>Example: Caution – Hot!</b><br/>Indicates the possibility of injury due to high temperature.</p> |
|---|---|---|--|

- Marks directing that the specified action is required.







|   |   |   |   |
|---|---|---|---|
|  | <p><b>General Instruction</b><br/>The specified action is required.</p> |  | <p><b>Example: Turn Off (Disconnect) Power Supply!</b><br/>Instructs the user to turn off (disconnect) the power supply to the product.</p> |
|---|---|---|---|

## Warnings Regarding Use of the Product





### ■ Danger Items

|   |   |
|---|---|
|  <b>Danger</b>  |   |
| <br><br> | <ul style="list-style-type: none"> <li>• <b>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.</b></li> <li>• Unlike typical equipment, the product has no protective case to ensure safety, and it contains moving parts and high-temperature components that could be dangerous. Do not touch the evaluation board or cables while power is being supplied.</li> <li>• Carefully check to make sure that there are no pieces of conductive materials or dust adhering to the board, connectors, and cables.</li> <li>• There are moving parts, driven by a motor. Do not touch the motor while power is being supplied.</li> <li>• Ensure that the motor is insulated and placed in a stable location before supplying power.</li> </ul> |
|    | <p><b>Do Not Connect Load to Motor!</b></p> <ul style="list-style-type: none"> <li>• This could cause fire, burns, or injury.</li> </ul>  |

■ Warning Items

|  <b>Warning</b> |  |
|--|--|
|                 | <p>Caution – Rotating Parts!</p> <ul style="list-style-type: none"> <li>The system includes a motor. Touching the rotating shaft could cause high-temperature burns or injury.</li> </ul>  |
|                 | <p>Always insert plugs, connectors, and cables securely, and confirm that they are fully inserted.</p> <ul style="list-style-type: none"> <li>Incomplete connections could cause fire, burns, electric shock, or injury.</li> </ul>  |
|  | <p>Use the power supply apparatus specified in the manual.</p> <ul style="list-style-type: none"> <li>Failure to do so could cause fire, burns, electric shock, injury, or malfunction.</li> </ul>   |
|  | <p>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.</p> <ul style="list-style-type: none"> <li>Failure to do so could cause fire, burns, electric shock, or malfunction.</li> <li>This will protect the system against damage due to lightning.</li> </ul>   |
|  | <p>Use a mechanism (switch, outlet, etc.) located within reach to turn off (disconnect) the power supply.</p> <ul style="list-style-type: none"> <li>In case of emergency, it may be necessary to cut off the power supply quickly.</li> </ul>   |
|                 | <p>Turn off the power supply immediately if you notice abnormal odor, smoke, abnormal sound, or overheating.</p> <ul style="list-style-type: none"> <li>Continuing to use the system in an abnormal condition could cause fire, burns, or electric shock.</li> </ul>   |
|               | <p>Do Not Disassemble, Modify, or Repair!</p> <ul style="list-style-type: none"> <li>Doing so could cause fire, burns, electric shock, injury, or malfunction.</li> </ul>  |
|               | <p><b>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.</b></p> <ul style="list-style-type: none"> <li>The product has no safety case.</li> <li>Failure to observe the above could cause fire, electric shock, burns, or malfunction.</li> <li>The product may not perform as expected if used for other than its intended purpose.</li> </ul> |

■ Caution Items

|  <b>Caution</b> |  |
|--|--|
|                 | <p>Caution – Hot!</p> <ul style="list-style-type: none"> <li>The motor gets hot. Touching it could cause high-temperature burns.</li> </ul>  |
|                 | <p>Follow the procedure specified in the manual when powering the system on or off.</p> <ul style="list-style-type: none"> <li>Failure to do so could cause overheating or malfunction.</li> </ul> |
|                 | <p>Caution – Static Electricity</p> <ul style="list-style-type: none"> <li>Use the antistatic band. Failure to do so could cause malfunction or unstable motion.</li> </ul>                        |

## Overview

The RX13T CPU card (RTK0EMXA10C00000BJ) is an optional board for the Evaluation System for BLDC Motor (RTK0EMX270S00020BJ) and the 24V Motor Control Evaluation System for RX23T (RTK0EM0006S01212BJ). By connecting this product to an inverter board (the INV-BRD), motor evaluation using RX13T becomes possible.

An emulator, INV-BRD, and equipment must be provided by the customer.

This user's manual describes the proper handling of the product.

## Target Device

RX13T microcontroller

## Related Documents

- RX13T CPU Card Schematic: R12TU0057EJ
- RX13T CPU Card BOM List: R12TU0058EJ
- RX13T CPU Card PWB Pattern Drawing: R12TU0059EJ
- Evaluation System for BLDC Motor User's Manual: R12UZ0062
- 24V Motor Control Evaluation System for RX23T User's Manual: R20UT3697

## Package Contents

- RX13T CPU Card Information
- Caution regarding the Motor Control Evaluation Board – RX13T CPU Card –
- Connectors

## Abbreviations

| Abbreviations | Full Name        | Remarks   |
|---------------|------------------|---|
| INV-BRD       | Inverter Board   | Inverter board included in "Evaluation System for BLDC Motor" (Board P/N.: RTK0EM0000B10020BJ)<br>or<br>Inverter board included in "24V Motor Control Evaluation System for RX23T" (Board P/N.: RTK0EM0001B00012BJ) |
| E2 Lite       | E2 emulator Lite | on-chip debugging emulator and flash programmer<br>Product No.: RTE0T0002LKCE00000R   |

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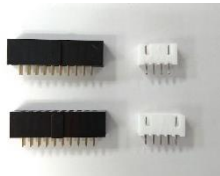
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## 1. Specifications

### 1.1 Specification

Table 1-1 Overview of RX13T CPU Card Specifications

| Item                                   | Specification   |                 |
|--|---|-----------------|
| Product name                           | RX13T CPU card  |                 |
| Board product No.                      | RTK0EMXA10C0000BJ   |                 |
| Supported inverter board / product No. | Inverter board supplied with Evaluation System for BLDC Motor / RTK0EM0000B10020BJ<br>Inverter board supplied with 24V Motor Control Evaluation System for RX23T / RTK0EM0001B00012BJ   |                 |
| Exterior view                          | <div style="display: flex; justify-content: space-around; align-items: center;"> <div style="text-align: center;">  <p>Board</p> </div> <div style="text-align: center;">  <p>Included items (connectors)</p> </div> </div> <p>Note: Appearance of actual product may differ from photo.</p> |                 |
| MCU                                    | Product group   | RX13T group     |
|  | Product No.   | R5F513T5ADFL    |
|  | CPU max. operating frequency  | 32 MHz          |
|  | Bit count   | 32 bits         |
|  | Package / Pin count   | LFQFP / 48 pins |
|  | RAM   | 12KB            |
| MCU input clock                        | Crystal Oscillator is not mounted   |                 |
| Input power supply voltage             | DC 5 V (±5%)<br>Selectable among the following: <ul style="list-style-type: none"> <li>• Power supply from supported inverter board</li> <li>• Power supply from USB connector *1</li> </ul>  |                 |
| Supported sensors                      | Hall sensor, encoder<br>(through holes provided for signal monitoring test pins)  |                 |
| Supported emulator                     | On-board emulator   |                 |
| Connectors                             | <ul style="list-style-type: none"> <li>• Emulator connector (USB)</li> <li>• Inverter board connectors x 2 (Unmounted)</li> <li>• Serial communication connectors x 3 (Unmounted)</li> <li>• Hall sensor connector (Unmounted)</li> <li>• Encoder connector (Unmounted)</li> </ul>  |                 |
| Switch                                 | MCU external reset switch   |                 |
| LEDs                                   | User control LEDs x 2   |                 |
| Operating temperature                  | Room temperature  |                 |
| Operating humidity                     | No condensation   |                 |

Note 1. Power supply from the supported emulator is only supported for standalone operation. Power supply from USB connector is not supported when INV-BRD is connected.

## 1.2 Regulatory Compliance Notices

### 1.2.1 European Union regulatory notices

This product complies with the following EU Directives. (These directives are only valid in the European Union.)

CE Certifications:

- Electromagnetic Compatibility (EMC) Directive 2014/30/EU  
EN61326-1 : 2013 Class A

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**WARNING:** This is a Class A product. This equipment can cause radio frequency noise when used in the residential area. In such cases, the user/operator of the equipment may be required to take appropriate countermeasures under his responsibility.

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- Information for traceability
  - Authorised representative  
Name: Renesas Electronics Corporation  
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Trademark: Renesas  
Product name: RX13T CPU Card for Motor Control  
Type name: RTK0EMXA10C00000BJ

Environmental Compliance and Certifications:

- Waste Electrical and Electronic Equipment (WEEE) Directive 2012/19/EU

2. Block Diagram

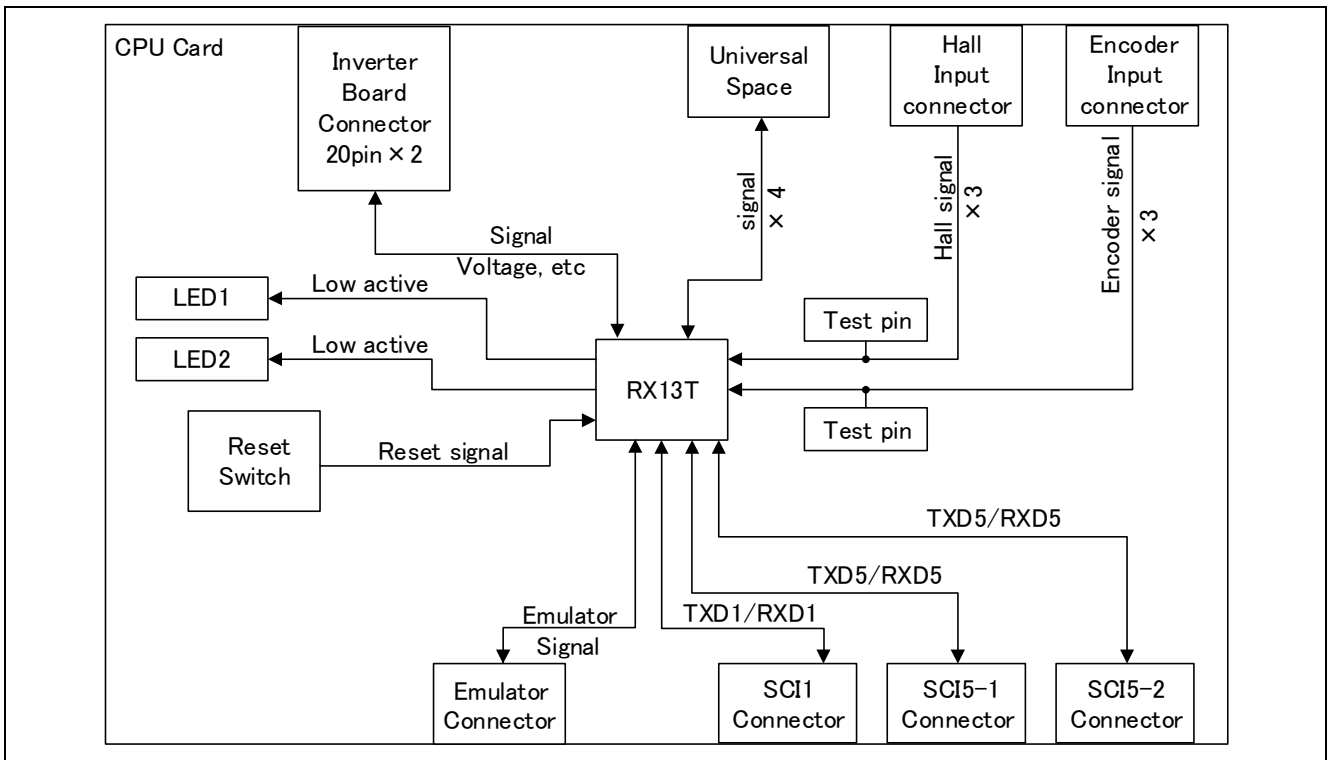


Figure 2-1 RX13T CPU Card Block Diagram



### 3. Layout

Layout of the product is shown in Figure 3-1 and Figure 3-2. Note that CN3, CN4, CN5, CNA and CNB are not mounted in the factory setting.

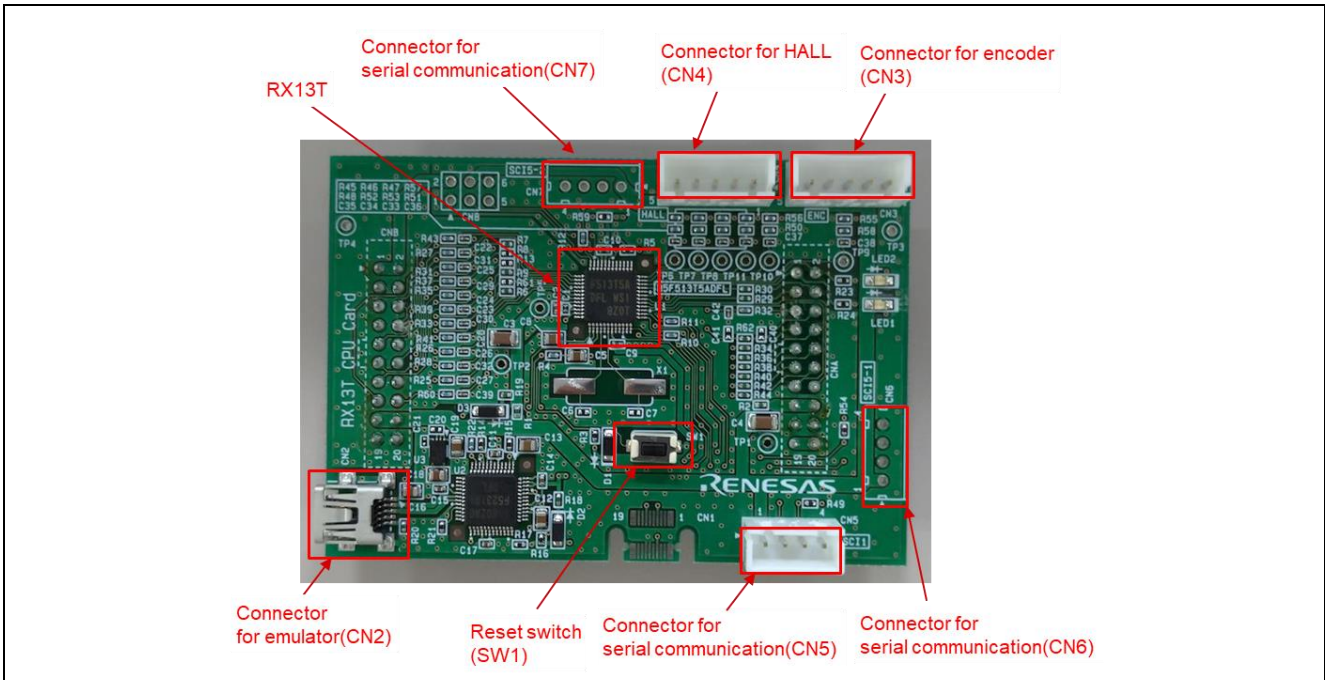


Figure 3-1 RX13T CPU Card Layout (Top View)

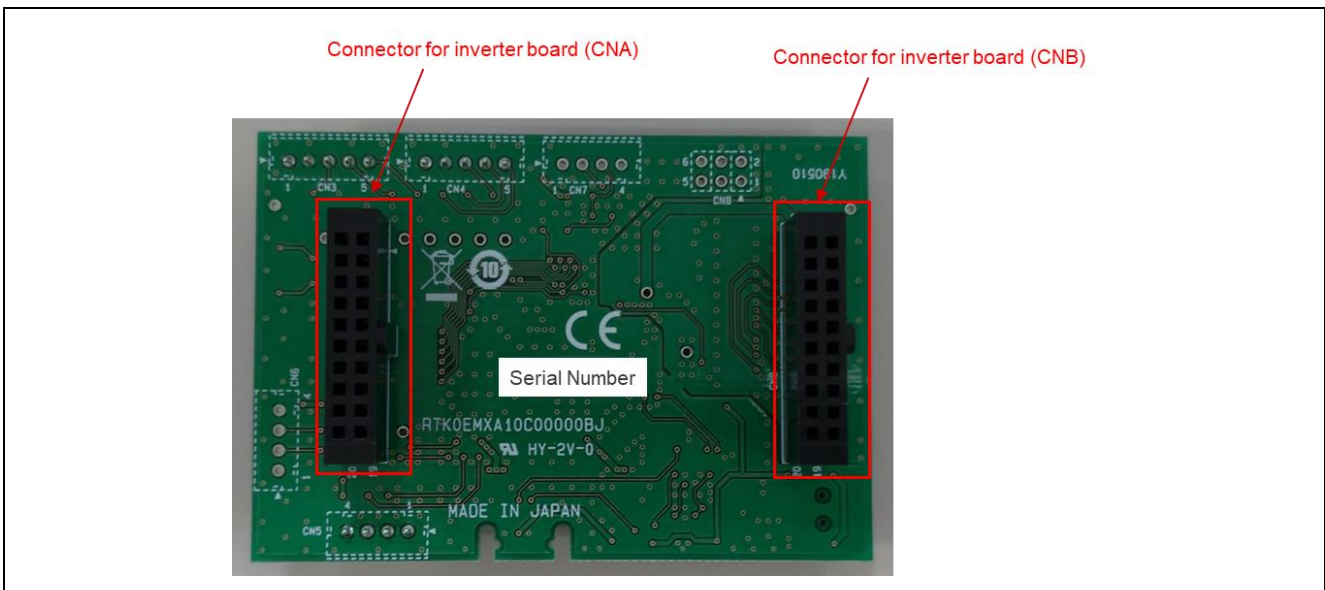


Figure 3-2 RX13T CPU Card Layout (Bottom View)

### 4. Usage

To use this product connecting with INV-BRD, mount CN5, CNA, and CNB as shown in Figure 3-1 and Figure 3-2. Also, mount CN3 and CN4 as necessary. Please be sure to check the orientation of each connector when mounting.

Before connecting to the INV-BRD, be sure to write the software corresponding to the INV-BRD to this product. The board may be damaged if it is connected to the INV-BRD with the factory default software or with software that is not compatible with the inverter board.

For details on writing software, please refer to 5.2. For the operation of the written software, refer to the application note of each software.

Please refer to the user's manual of each INV-BRD for the connection method with INV-BRD.

## 5. Functions

### 5.1 Power Supply

The product does not have a dedicated power supply connector. When not connected to the INV-BRD, it can draw power via the USB connector. The product is not allowed to draw power via the USB connector when it is connected to the INV-BRD.

### 5.2 On-Board Emulator

The product is equipped with an on-board emulator for RX13T flash programming. Connect your PC to the product with USB cable for flash programming. When you use the on-board emulator, configure the setting of IDE or Renesas Flash Programmer as follows;

Tool : E2Lite  
 Interface : FINE  
 Power Supply : None

### 5.3 Connecting the Inverter Board

The product connects to the INV-BRD via the inverter board connectors (CNA and CNB). Table 5-1 and Table 5-2 list the pin assignments of the inverter board connectors.

**Table 5-1 Pin Assignments of Inverter Board Connector (CNA)**

| Pin No. | Pin Function | RX13T Connection Pins | Pin No. | Pin Function | RX13T Connection Pins |
|---------|--------------|-----------------------|---------|--------------|-----------------------|
| 1       | LED1#        | PD6                   | 2       | LED2#        | PD4                   |
| 3       | PFC_G1       | PB3                   | 4       | VRL          | PB2                   |
| 5       | FO#          | PE2/POE10#            | 6       | INVRES       | P10                   |
| 7       | WN           | P76/MTIOC4D           | 8       | VN           | P75/MTIOC4C           |
| 9       | UN           | P74/MTIOC3D           | 10      | WP           | P73/MTIOC4B           |
| 11      | VP           | P72/MTIOC4A           | 12      | UP           | P71/MTIOC3B           |
| 13      | SW1#         | PB5                   | 14      | SW2#         | PB4                   |
| 15      | 5V           | VCC                   | 16      | 5V           | VCC                   |
| 17      | GND          | VSS                   | 18      | GND          | VSS                   |
| 19      | 3.3V         | —                     | 20      | 3.3V         | —                     |

**Table 5-2 Pin Assignments of Inverter Board Connector (CNB)**

| Pin No. | Pin Function | RX13T Connection Pins | Pin No. | Pin Function | RX13T Connection Pins |
|---------|--------------|-----------------------|---------|--------------|-----------------------|
| 1       | AVCC         | AVCC                  | 2       | AVCC         | AVCC                  |
| 3       | NC           | NC                    | 4       | NC           | NC                    |
| 5       | IU           | AN000                 | 6       | IV           | AN001                 |
| 7       | IW           | AN002                 | 8       | VPN          | AN006                 |
| 9       | TEMP         | (AN005) *1            | 10      | VU           | AN003                 |
| 11      | VV           | AN004                 | 12      | VW           | AN005                 |
| 13      | VAC          | (AN004) *1            | 14      | IPFC         | (AN003) *1            |
| 15      | VR           | AN007                 | 16      | RSVIN        | P47                   |
| 17      | VCCIO        | VCC                   | 18      | VCCIO        | VCC                   |
| 19      | GND          | VSS                   | 20      | GND          | VSS                   |

\*1 Not connected in factory setting

## 5.4 Serial Communication

The product communicates with the UART via the serial communication connectors. There are three serial communication connectors: CN5, CN6, and CN7. Table 5-3 lists their pin assignments. Use CN5 when using a tool such as waveform display in conjunction with the INV-BRD.

**Table 5-3 Pin Assignments of Serial Communication Connectors (CN5, CN6, CN7)**

| Connector No. | Pin No. | Pin Function | RX13T Connection Pins |
|---------------|---------|--------------|-----------------------|
| CN5<br>(DNF)  | 1       | 5V           | VCC                   |
|               | 2       | TX for MCU   | PD3/TXD1              |
|               | 3       | RX for MCU   | PD5/RXD1              |
|               | 4       | GND          | VSS                   |
| CN6<br>(DNF)  | 1       | 5V           | VCC                   |
|               | 2       | TX for MCU   | PB6/TXD5              |
|               | 3       | RX for MCU   | PB7/RXD5              |
|               | 4       | GND          | VSS                   |
| CN7<br>(DNF)  | 1       | 5V           | VCC                   |
|               | 2       | TX for MCU   | P23/TXD5              |
|               | 3       | RX for MCU   | P24/RXD5              |
|               | 4       | GND          | VSS                   |

## 5.5 Hall Sensor Signal Input

The product is equipped with a Hall sensor signal input connector. The connector is not mounted at the factory, but a connector (JST B5B-XH-A) that can be mounted on this terminal is included in this product. The signals are pulled up to 5 V and passed through RC filters before being input to the RX13T. Table 5-4 lists the pin assignments of the Hall sensor signal input connector.

**Table 5-4 Pin Assignments of Hall Sensor Signal Input Connector (CN4)**

| Pin No. | Pin Function | RX13T Connection Pins |
|---------|--------------|-----------------------|
| 1       | 5V           | VCC                   |
| 2       | GND          | VSS                   |
| 3       | HALL_U       | P93/IRQ0              |
| 4       | HALL_V       | P94/IRQ1              |
| 5       | HALL_W       | PA2/IRQ4              |

## 5.6 Encoder Signal Input

The product is equipped with an encoder signal input connector. The connector is not mounted at the factory, but a connector (JST B5B-XH-A) that can be mounted on this terminal is included in this product. Using this connector, you can input the encoder signal to the RX13T. The signals are pulled up to 5 V and passed through RC filters before being input to the RX13T. Table 5-5 lists the pin assignments of the signal input connector.

**Table 5-5 Pin Assignments of Encoder Signal Input Connector (CN3)**

| Pin No. | Pin Function | RX13T Connection Pins |
|---------|--------------|-----------------------|
| 1       | 5V           | VCC                   |
| 2       | GND          | VSS                   |
| 3       | ENC_A        | PB1/MTCLKA            |
| 4       | ENC_B        | PB0/MTCLKB            |
| 5       | ENC_Z        | PA3/MTIOC1B           |

## 5.7 Extension of Unused Pins

To facilitate general use of the product, the unused pins of the RX13T are extended through universal connector through holes in the board. Table 5-6 lists the pin assignments of the universal area through holes.

**Table 5-6 Pin Assignments of Universal Area Through Holes (CN8)**

| Pin No. | RX13T Connection Pins |
|---------|-----------------------|
| 1       | VSS                   |
| 2       | AVCC                  |
| 3       | P22                   |
| 4       | VCC                   |
| 5       | P70                   |
| 6       | VSS                   |

## 5.8 Reset Circuit

The product is equipped with a reset circuit for resetting the microcontroller at power-on reset and external reset. To apply an external reset to the microcontroller, press the pushbutton (SW1).

## 5.9 LEDs

Two LEDs are mounted on the product for use in debugging programs and general system applications. Each turns on when the output on the corresponding port is low-level and turns off when the output is high-level. Table 5-7 lists the pin assignments corresponding to the LEDs.

**Table 5-7 RX13T CPU Card LED Connection Pin Assignments**

| Corresponding RX13T Port |                   | LED1 | LED2 |
|--------------------------|-------------------|------|------|
| PD6                      | High-level output | Off  | -    |
|                          | Low-level output  | On   | -    |
| PD4                      | High-level output | -    | Off  |
|                          | Low-level output  | -    | On   |

6. RX13T CPU Card details

6.1 RX13T Pin Assignments

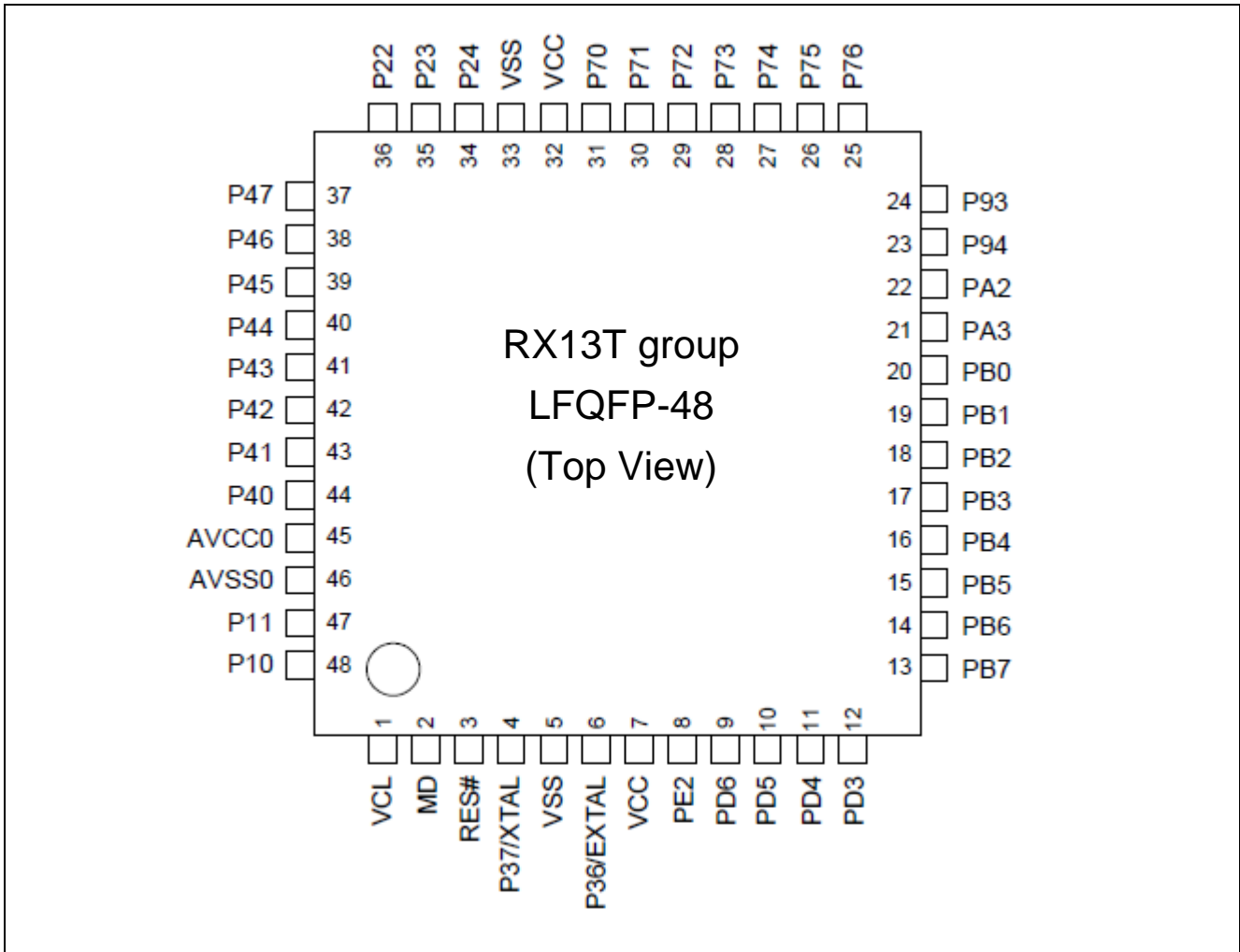


Figure 6-1 RX13T Pin Assignments

6.2 List of RX13T Pin Functions

Table 6-1 List of RX13T Pin Functions

| Pin No. | RX13T Pin Functions   | CPU Card connection | Function             |
|---------|---|---------------------|----------------------|
| 1       | VCL   | capacitor           | -                    |
| 2       | MD/FINED  | CN2. 7              | Emulator             |
| 3       | RES#  | CN2. 13             | MCU reset            |
| 4       | XTAL/P37  | -                   | -                    |
| 5       | VSS   | VSS                 | VSS                  |
| 6       | EXTAL/P36   | -                   | -                    |
| 7       | VCC   | VCC                 | VCC                  |
| 8       | PE2/POE10#/NMI/IRQ0   | CNA. 5              | FO#                  |
| 9       | PD6/MTIOC0D/CTS1#/RTS1#/SS1#/IRQ5/ADST0                       | CNA. 1              | LED1                 |
| 10      | PD5/MTIOC0C/RXD1/SMIS01/SSCL1/IRQ3                            | CN5. 3              | SCI1 communication   |
| 11      | PD4/MTIOC0B/SCK1/IRQ2   | CNA. 2              | LED2                 |
| 12      | PD3/MTIOC0A/TXD1/SMOS11/SSDA1                                 | CN5. 2              | SCI1 communication   |
| 13      | PB7/MTIOC3C/MTCLKD/RXD1/SMIS01/SSCL1/RXD5/SMIS05/SSCL5/IRQ5   | CN6. 3              | SCI5-1 communication |
| 14      | PB6/MTIOC1B/MTIOC3A/TXD1/SMOS11/SSDA1/TXD5/SMOS15/SSDA5       | CN6. 2              | SCI5-1 communication |
| 15      | PB5/ADTRG0#   | CNA. 13             | SW1                  |
| 16      | PB4/POE8#   | CNA. 14             | SW2                  |
| 17      | PB3/MTIOC0A/CACREF/SCK5/SCK12                                 | CNA. 3              | PFC_G1               |
| 18      | PB2/MTIOC0B/MTCLKC/ADSMO/TXD5/SMOS15/SSDA5/SDA0/              | CNA. 4              | VRL                  |
| 19      | PB1/MTIOC0C/MTIC5W/MTCLKA/RXD5/SMIS05/SSCL5/SCL0/IRQ2         | CN3. 3              | ENC_A                |
| 20      | PB0/MTIOC0D/MTIOC2A/MTCLKB/TXD12/TXDX12/SIOX12/SMOS112/SSDA12 | CN3. 4              | ENC_B                |
| 21      | PA3/MTIOC1B/MTIOC2A/CTS12#/RTS12#/SS12#                       | CN3. 5              | ENC_Z                |
| 22      | PA2/MTIOC1A/MTIOC2B/ CTS5#/RTS5#/SS5#/IRQ4                    | CN4. 5              | HALL_W               |
| 23      | P94/MTIOC2B/MTIC5U/MTCLKA/RXD12/RXDX12/SMIS012/SSCL12/ IRQ1   | CN4. 4              | HALL_V               |
| 24      | P93/MTIOC1A/MTIC5V/ SCK5/SCK12/IRQ0/ADTRG0#                   | CN4. 3              | HALL_U               |
| 25      | P76/MTIOC4D   | CNA. 7              | WN                   |
| 26      | P75/MTIOC4C   | CNA. 8              | VN                   |
| 27      | P74/MTIOC3D   | CNA. 9              | UN                   |
| 28      | PE2/POE10#/NMI/IRQ0   | CNA. 5              | FO#                  |
| 29      | PD6/MTIOC0D/CTS1#/RTS1#/SS1#/IRQ5/ADST0                       | CNA. 1              | LED1                 |
| 30      | PD5/MTIOC0C/RXD1/SMIS01/SSCL1/IRQ3                            | CN5. 3              | SCI1 communication   |
| 31      | PD4/MTIOC0B/SCK1/IRQ2   | CNA. 2              | LED2                 |
| 32      | PD3/MTIOC0A/TXD1/SMOS11/SSDA1                                 | CN5. 2              | SCI1 communication   |
| 33      | PB7/MTIOC3C/MTCLKD/RXD1/SMIS01/SSCL1/RXD5/SMIS05/SSCL5/IRQ5   | CN6. 3              | SCI5-1 communication |
| 34      | PB6/MTIOC1B/MTIOC3A/TXD1/SMOS11/SSDA1/TXD5/SMOS15/SSDA5       | CN6. 2              | SCI5-1 communication |
| 35      | PB5/ADTRG0#   | CNA. 13             | SW1                  |
| 36      | PB4/POE8#   | CNA. 14             | SW2                  |
| 37      | PB3/MTIOC0A/CACREF/SCK5/SCK12                                 | CNA. 3              | PFC_G1               |
| 38      | PB2/MTIOC0B/MTCLKC/ADSMO/TXD5/SMOS15/SSDA5/SDA0/              | CNA. 4              | VRL                  |
| 39      | PB1/MTIOC0C/MTIC5W/MTCLKA/RXD5/SMIS05/SSCL5/SCL0/IRQ2         | CN3. 3              | ENC_A                |
| 40      | PB0/MTIOC0D/MTIOC2A/MTCLKB/TXD12/TXDX12/SIOX12/SMOS112/SSDA12 | CN3. 4              | ENC_B                |
| 41      | PA3/MTIOC1B/MTIOC2A/CTS12#/RTS12#/SS12#                       | CN3. 5              | ENC_Z                |
| 42      | PA2/MTIOC1A/MTIOC2B/ CTS5#/RTS5#/SS5#/IRQ4                    | CN4. 5              | HALL_W               |
| 43      | P94/MTIOC2B/MTIC5U/MTCLKA/RXD12/RXDX12/SMIS012/SSCL12/ IRQ1   | CN4. 4              | HALL_V               |
| 44      | P93/MTIOC1A/MTIC5V/ SCK5/SCK12/IRQ0/ADTRG0#                   | CN4. 3              | HALL_U               |
| 45      | P76/MTIOC4D   | CNA. 7              | WN                   |
| 46      | P75/MTIOC4C   | CNA. 8              | VN                   |
| 47      | P74/MTIOC3D   | CNA. 9              | UN                   |
| 48      |   |                     |                      |

## 7. Caution Items

The product includes some unused pins that have not been processed. For information on accurate pin processing, refer to the hardware manual of the microcontroller.



## Website and Support

Renesas Electronics Website

<http://www.renesas.com/>

Inquiries

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## Revision History

| Rev. | Date          | Description |  |
|------|---------------|-------------|--|
|      |               | Page        | Summary  |
| 1.00 | Jul. 22, 2019 | -           | First edition issued   |
| 1.10 | Feb. 21, 2022 |             | Revised the description for the compatible inverter board<br>Revised the section 4 (Usage) |