RA2L1 Group

CTSU Application Example: 3D Gesture Electrode Board (Hardware)

Introduction

The RA2L1 Group is equipped with hardware (Capacitive Touch Sensing Unit2; CTSU2) that senses contact of the human body by measuring the capacitance generated between the touch electrode and the human body (hand, etc.).

This application note explains the hardware specifications of the 3D Gesture Electrode Board (RTK0EG0023B01002BJ) which is a sample application of the CTSU2 mutual capacitance method. This electrode board uses CPU board of capacitive touch evaluation system.

Target Device

RA2L1 Group

Related Documents

1. RA Family Using QE and FSP to Develop Capacitive Touch Applications (R01AN4934EJ)
2. RA2L1 Group Capacitive Touch Evaluation System User's Manual (R12UZ0084EJ)
3. RX130 Group CTSU Application Example: 3D Gesture Demo Set Small version (Hardware) (R01AN4320EJ)
4. RX231 Group CTSU Application Example: 3D Gesture Demo Set (Hardware) (R01AN4219EJ)

Contents

1. Overview

RTK0EG0023B01002BJ is a detecting 3D gesture electrode board that uses CPU board of capacitive touch evaluation system. This demo kit has the following features:

- Simple parts configuration
- Compatible with CPU board of capacitive touch evaluation system
- Quick and easy setup and operation (compact and light, powered from CPU board)
- Detection distance from about 60mm* (3D Gesture Electrode Board size: 100mm×100mm×110mm)

*Note: This is the detection distance when the power supply voltage is 5V.

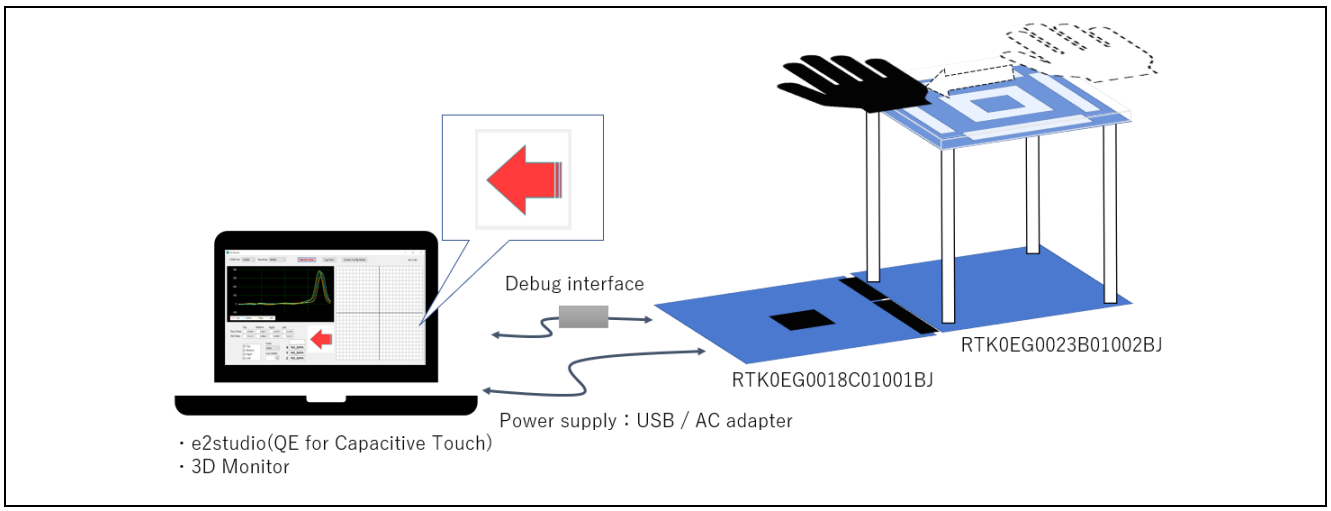

Figure 1-1 3D Gesture Electrode Board System

2. External Appearance

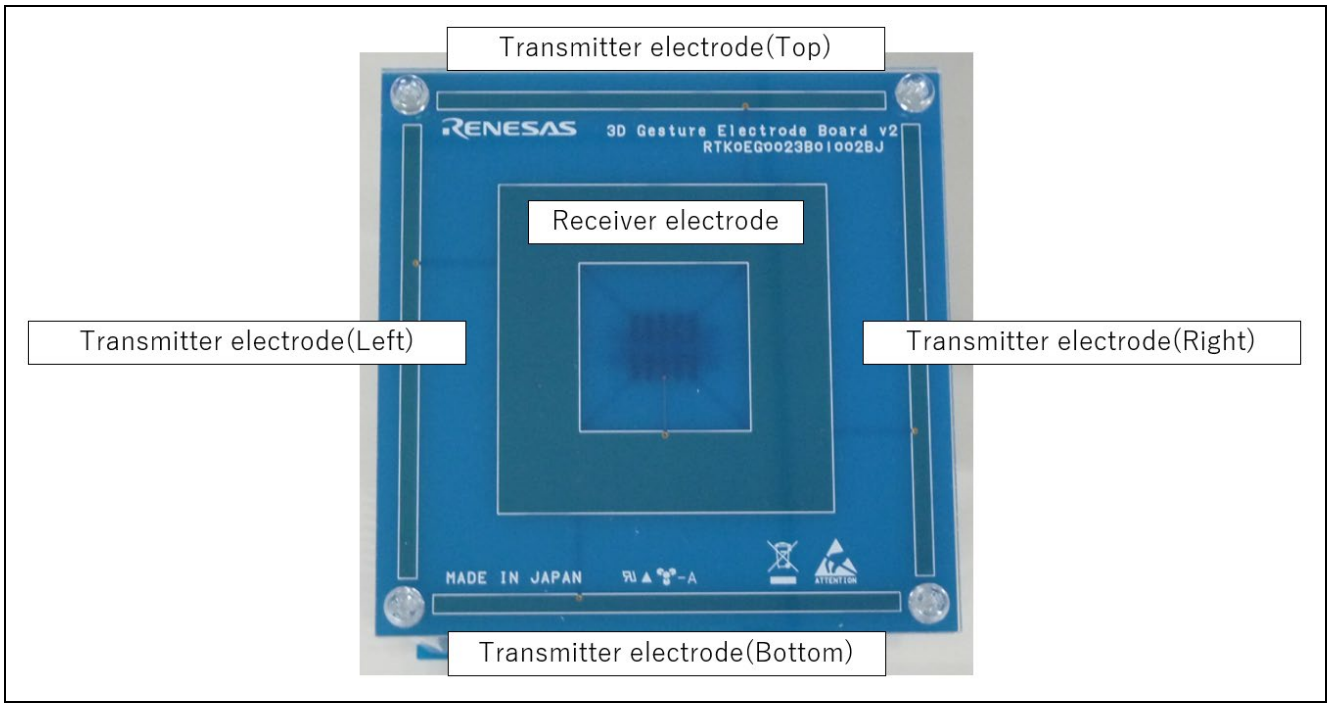

Figure 2-1 External Appearance (top view)

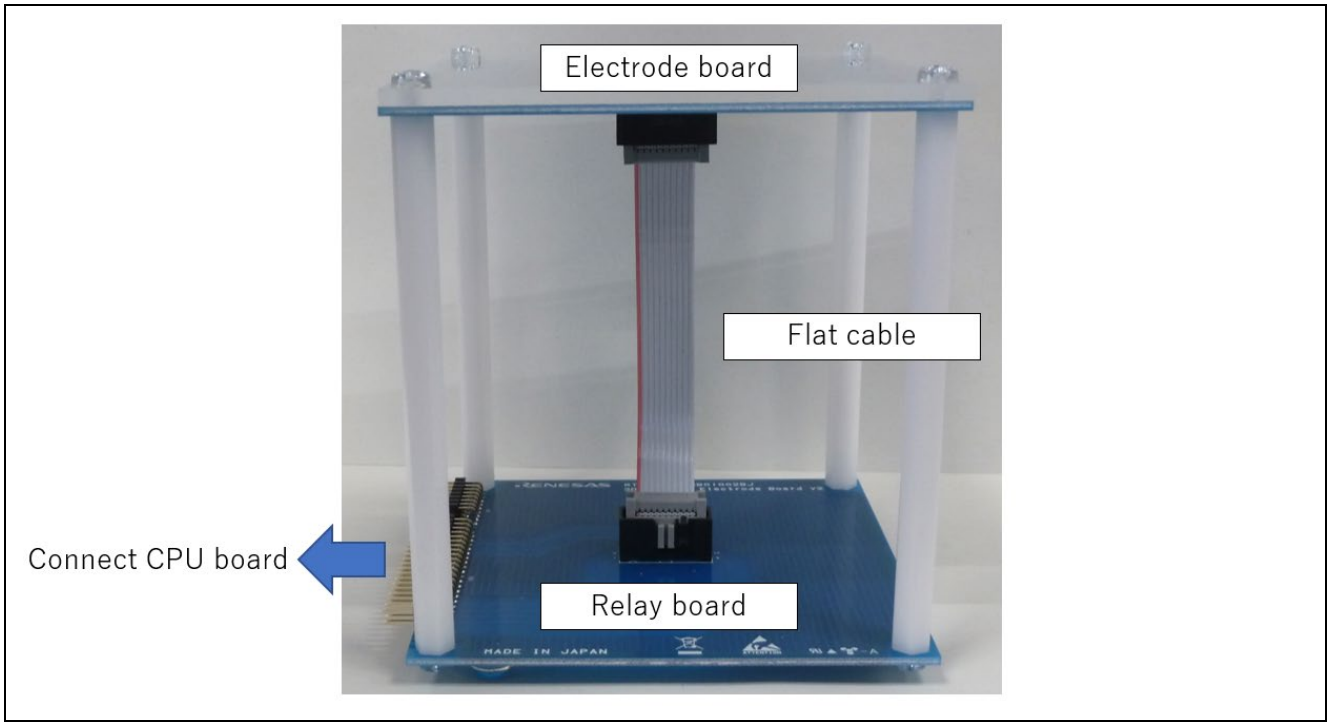

Figure 2-2 External Appearance (front view)

3. Hardware Specification

Table 3-1 Hardware Specification

Item	Description	Notes
Board size	100.0×100.0[mm]	Upper board：Electrode board Bottom board：Relay board
Gesture detecting electrode board	Receiver electrode: 1	-
	Transmitter electrode: 4	-
Interface	16-pin connector	Connect to CN1 of CPU board
	40-pin connector	Connect to CN2 of CPU board
Power Supply	5.0V	Power supply from CPU board
CPU Board*	RA2L1 Cap Touch CPU Board (RTK0EG0018C01001BJ)	Renesas Electronics Capacitive Touch Evaluation System for RA2L1 (RTK0EG0022S01001BJ) Accessories

*Note: CPU board is not included and need to be purchased separately.

4. Block Diagram

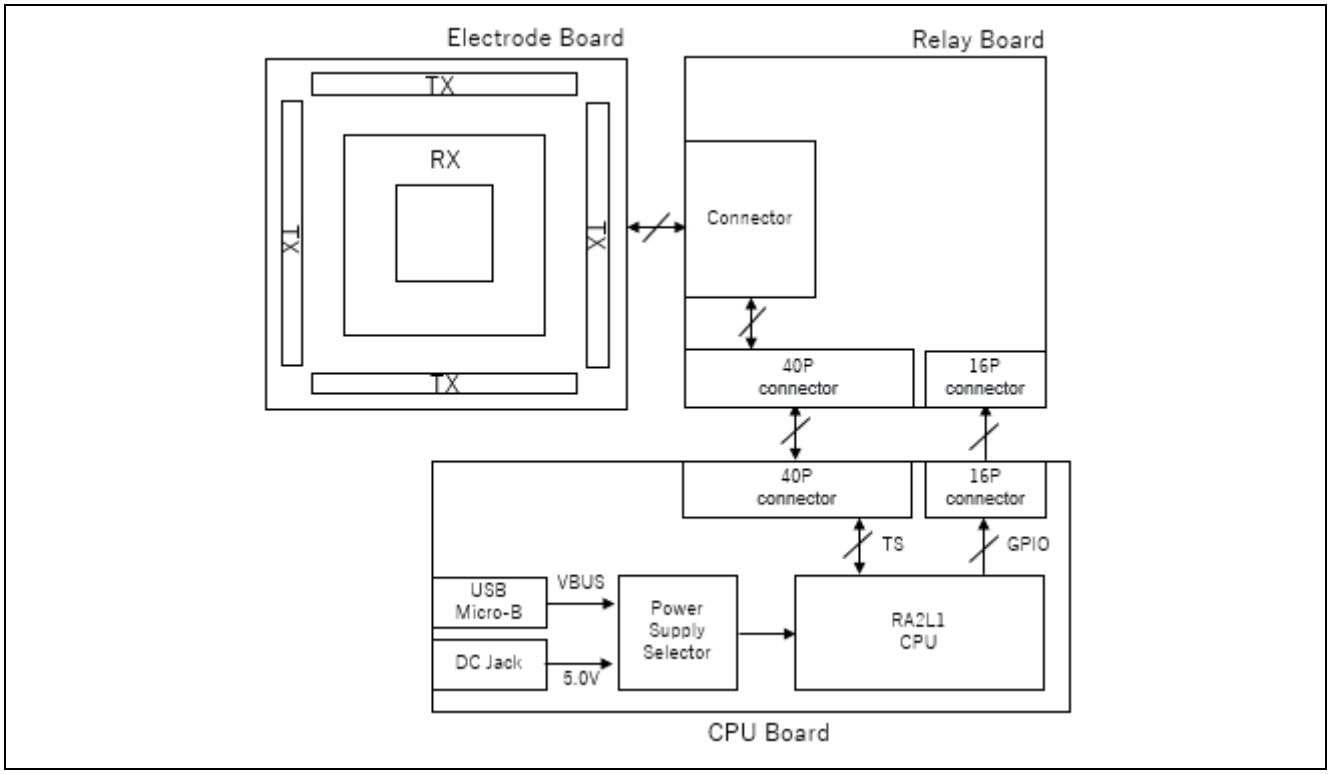

Figure 4-1 Block Diagram

5. BOM (part list)

Table 5-1 BOM

Item	Quantity	Reference	Manufacturer	Part number	Remarks
1	1	CN1	HIROSUGI-KEIKI	PSR-420256-08	Connector Header
2	1	CN2	HIROSUGI-KEIKI	PSR-420256-20	Connector Header
3	1	CN3	OMRON	XG4C-1031	Connector Socket
4	1	-	-	RTK0EG0023B01002BJ	PCB
5	1	CN101	3M	D2510-6V0C-AR-WD	Connector Header
6	1	-	-	RTK0EG0023B01002BJ	PCB
7	8	-	HIROSUGI-KEIKI	PC-0408	Screw(M4)
8	4	-	HIROSUGI-KEIKI	AS-4100	Spacer(M4)
9	1	(CN3,CN101)	3M	3365/10 300SF	Flat cable
10	2	(CN3,CN101)	OMRON	XG4M-1030	Connector
11	4	-	TOCHIGIYA	TM-180-303	Rubber foot

Revision History

Rev.	Date	Description	
		Page	Summary
1.00	2021.11.4	-	First edition release

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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(Rev.5.0-1 October 2020)

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