

**RAA2S4704**

Evaluation Kit

This document provides comprehensive instructions for setting up and using the evaluation kit, including both hardware and software components.

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# 1. Introduction

The Quick Start Guide for the RAA2S4704 Evaluation Kit (EVK) provides a detailed step-by-step process to help users get started with the kit. This includes instructions for hardware setup, software installation, and basic configuration.

For detailed process, see the *RAA2S4704 Evaluation Manual* document.

# 2. Evaluation Kit Description

The RAA2S4704 Evaluation Kit includes:

- An Evaluation Board (EVB) with a soldered RAA2S4704 IC
- A USB cable
- The RICBox GUI and product plug-in, which can be downloaded from the Renesas website

## 2.1 Main Components of the EVB

The RAA2S4704 Evaluation Kit comes with the following key components designed to facilitate comprehensive evaluation and testing (see Figure 1):

- Communication and Power Supply: Handles SPI communication with the RAA2S4704 and includes a USB port for power supply and communication.
- RAA2S4704 Evaluation: Contains the RAA2S4704 IC and access to all its pins.
- Sensor Replacement: Includes a stimulation circuit to replicate a steering wheel, a touchpad, and an onboard potentiometer for temperature sensor stimulation.

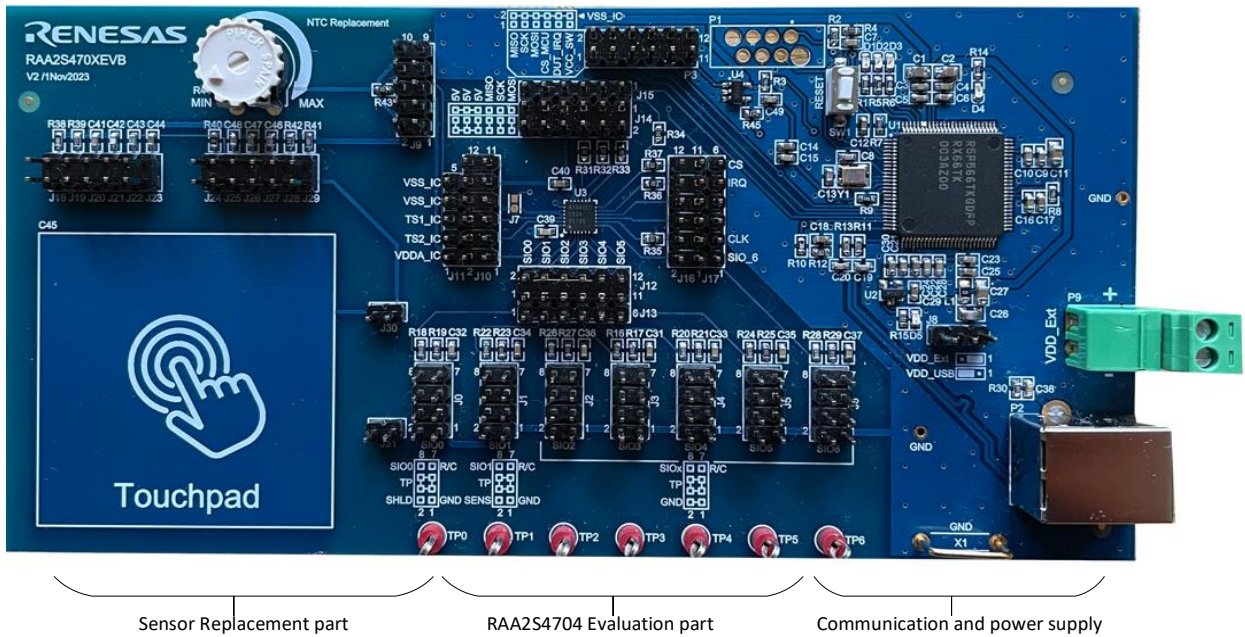


Figure 1. Main Blocks of the EVB

# 3. Hardware Setup

Follow these steps to set up the Evaluation Board:

1. Set the application specific jumpers according to Figure 2 and Table 1.
2. Connect the USB cable to the USB connector on the EVB and then to your computer.
3. Check the LEDs:
  - Status LED D3 should be blinking.
  - LEDs D4 and D5 should be ON, indicating 5V supply and USB supply, respectively.

Table 1. Main Components of the EVB

Designator	Type	Description
P2	USB connector	USB connector type B
P9	Connector	External supply
SW1	Button	Microcontroller reset
X1	Test point	GND
D1	Red LED	For debug purpose
D2	Green LED	For debug purpose
D3	Green LED	Microcontroller heartbeat
D4	Red LED	5V
D5	Red LED	USB power supply
J0-J6	Header 2x4	SIO input
J7	Jumper	Connect EPAD from RAA2S4704 to GND
J8	Header 1x3	Select between USB or external supply
J9	Header 2x5	External temperature sensor connection
J10-J17	Headers	Access to RAA2S4704 pinouts. Can be used as test points
J18	Header 1x2	R <sub>SGNDLOAD</sub> = 5k
J19	Header 1x2	R <sub>SGNDLOAD</sub> = 100k
J20	Header 1x2	C <sub>SGND</sub> = 470pF
J21	Header 1x2	C <sub>SGND</sub> = 1.5nF
J22	Header 1x2	C <sub>SHLDSEN</sub> = 100pF
J23	Header 1x2	C <sub>SHLDSEN</sub> = 1nF
J24	Header 1x2	C <sub>SHLDSEN</sub> = 0(short)
J25	Header 1x2	C <sub>SENS</sub> = 100pF
J26	Header 1x2	C <sub>SENS</sub> = 47pF
J27	Header 1x2	C <sub>SENS</sub> = 22pF
J28	Header 1x2	R <sub>SENSLOAD</sub> = 100k
J29	Header 1x2	R <sub>SENSLOAD</sub> = 5k
JP30	Header 1x2	Jumper to touch pad
JP31	Header 1x2	Jumper to touch pad

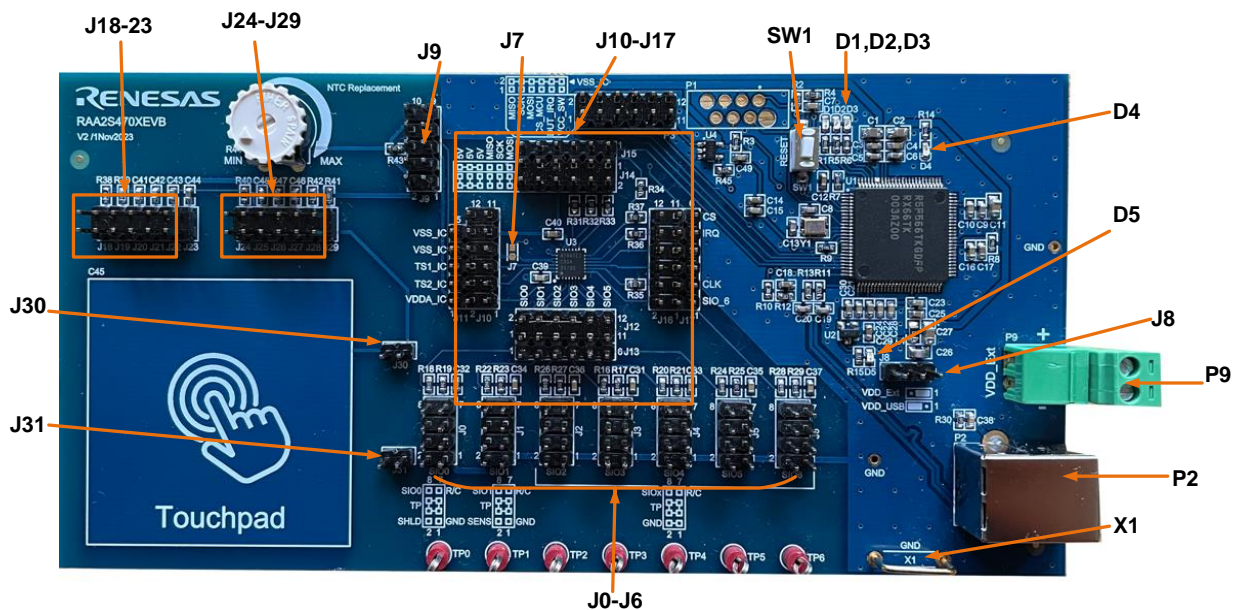


Figure 2. Main Components of the EVB

## 4. Software Setup

### 4.1 Installation

To begin setting up the software for the EVB, follow these steps:

1. Download and install the Renesas IC Toolbox (RICBox) and the RAA2S4704 plug-in from the Renesas website.
2. Start the RICBox software and select the RAA2S4704 product.

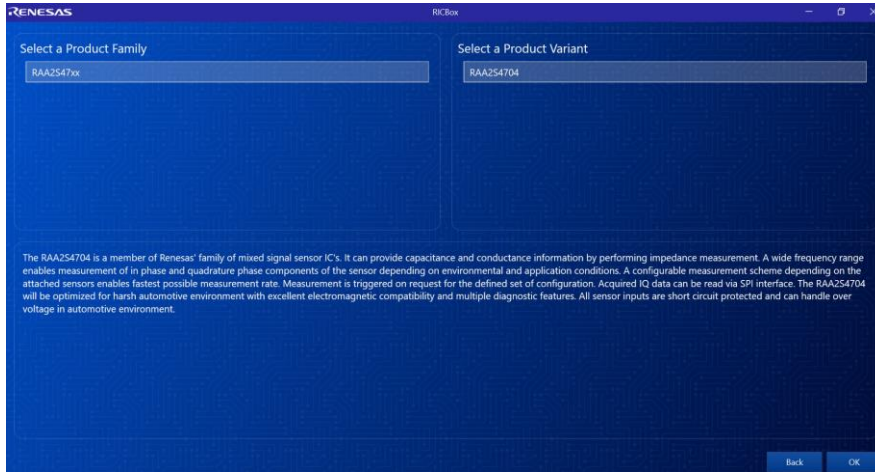


Figure 3. Family and Product Selection

### 4.2 Configuration

To properly configure the EVB, follow the steps below for both I/Q measurement and FuSa + Auxiliary measurement settings:

1. I/Q Measurement Configuration:
  - a. Go to the "Configuration" page and select the "IQ measurement configuration" tab.
  - b. Adjust parameters such as sensor or shield channel assignment, PGA gain, SNS gain, excitation frequency, averaging factor, and DAC attenuation.
  - c. Write the configuration to the RAA2S4704 registers.  
For more information, see the *RAA2S4704 Functional Description* document.

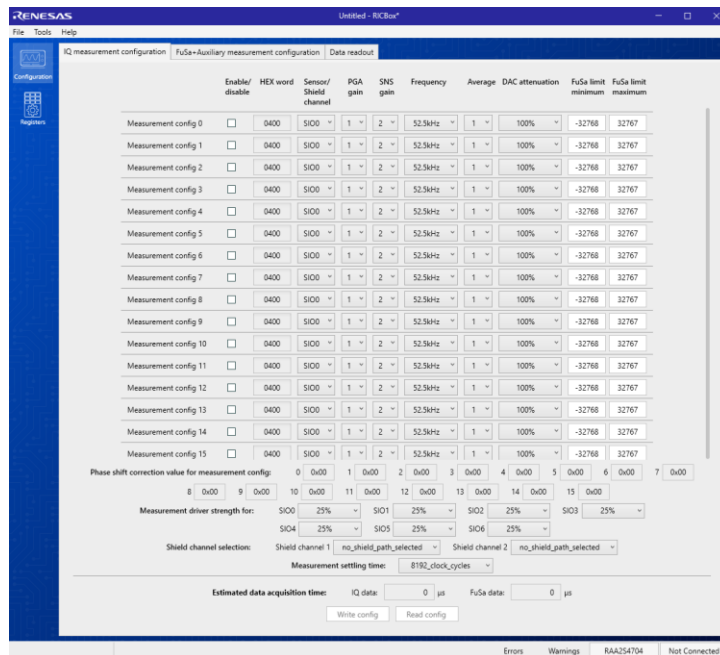


Figure 4. IQ Measurement Configuration Tab

2. FuSa + Auxiliary Measurement Configuration:
  - a. Go to the "FuSa+Auxiliary measurement configuration" tab.
  - b. Configure FuSa settings and auxiliary parameters.
  - c. Write the configuration to the RAA2S4704 registers.  
For more information, see the *RAA2S4704 Functional Description* document.

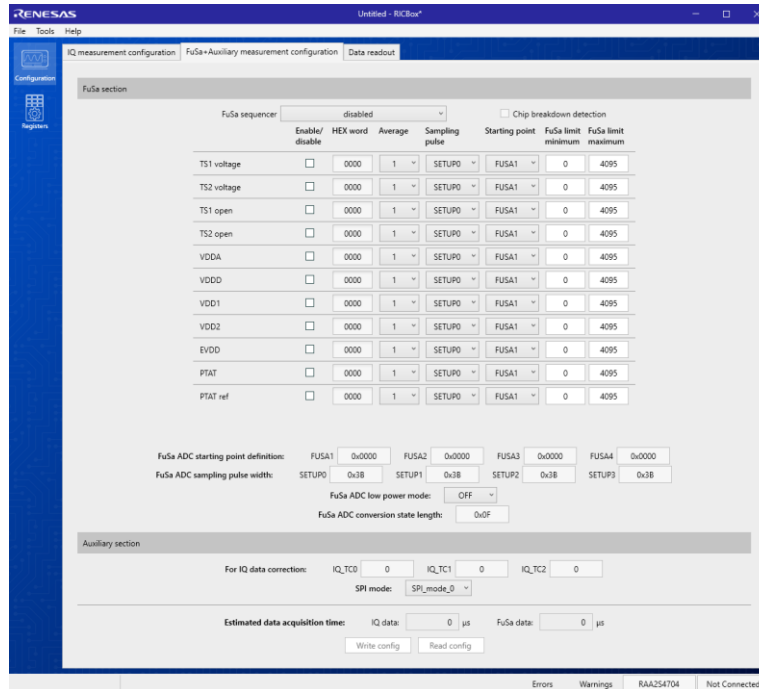


Figure 5. FuSa+Auxillary Tab

## 5. Example Configuration

This section considers an example application circuit as shown in Figure 6 which is a typical application scenario. It describes how to configure the IC for such a load and evaluate it using the RAA2S4704 EVB.

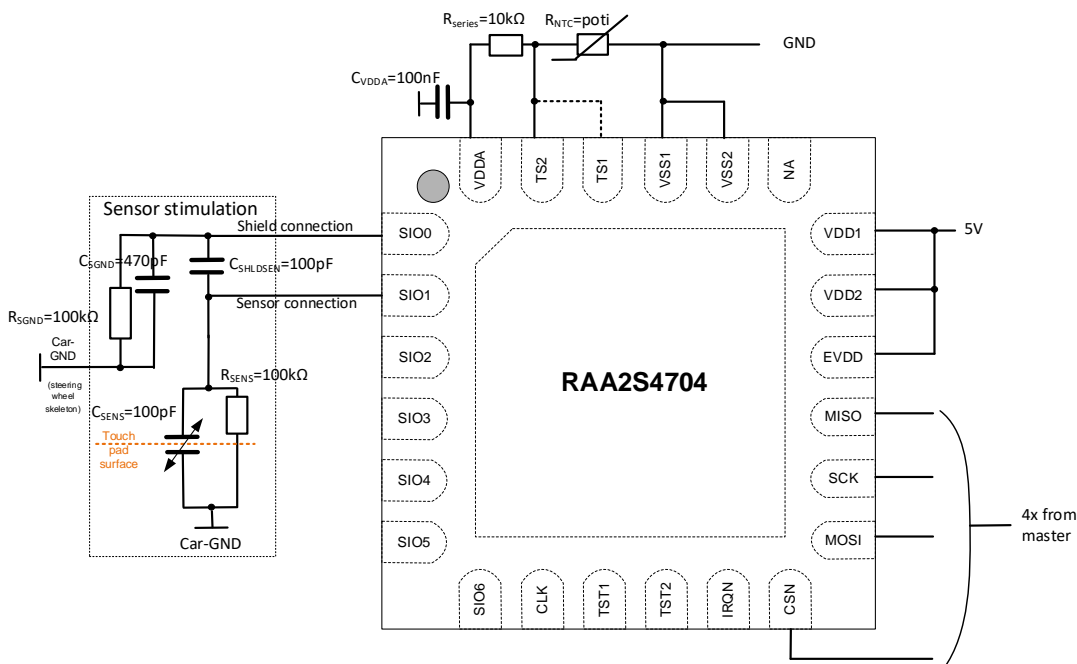


Figure 6. Example Circuit Schematic

## 5.1 Hardware Setup

Follow these steps to setup the Evaluation Board:

1. Set the jumpers as shown in Figure 7.
2. Connect the USB cable to the EVB and your computer.
3. Verify the LED statuses as described in section 3.

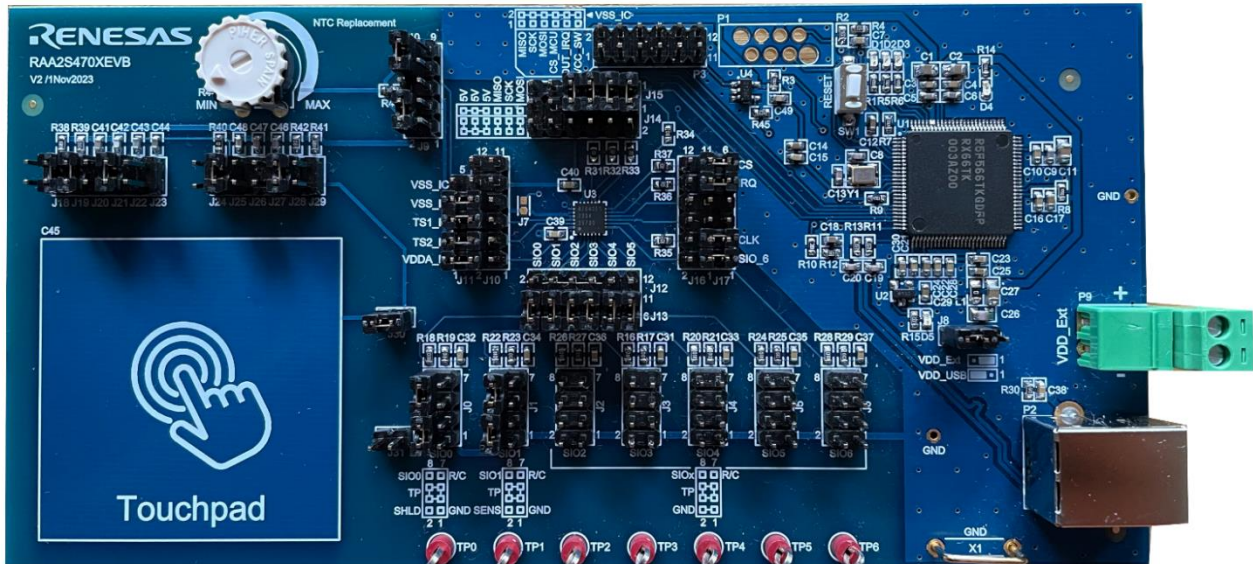


Figure 7. Example Circuit Connection

## 5.2 Software Setup

1. Start the RICBox software and select the RAA2S4704 product.
2. Establish a connection to the EVB.
3. Configure the I/Q measurement and FuSa + Auxiliary measurement settings as described in section 4.

## 6. Data Analysis

To successfully set up and utilize the Evaluation Board for data measurement and analysis, follow these steps:

1. Go to the "Data readout" tab in the RICBox software.
2. Start the measurement and view the result data.
3. Use the graphical display and data logging options to analyze the data.

The obtained sense results through SIO1 channel can be post-processed to derive the capacitance change and resistance values. For more information, see the *RAA2S4704 Functional Description* document.

## 7. Troubleshooting

### 7.1 Connection Issues

- Ensure all jumpers and LEDs are properly set.
- Verify the IC is correctly placed inside the socket.

### 7.2 Calibration Issues

- Verify the correctness of the input data and reacquire it if necessary.

## 8. Glossary

Term	Description
ADC	Analog-to-Digital Converter
C	Capacitance
DAC	Digital-to-Analog Converter
EVB	Evaluation Board
FuSa	Functional Safety
GND	Ground
IC	Integrated Circuit
LED	Light Emitting Diode
MCU	Microcontroller
PGA	Programmable Gain Amplifier
SPI	Serial Peripheral Interface
USB	Universal Serial Bus

## 9. Revision History

Revision	Date	Description
01.00	Dec 16, 2024	First version.