

RA6W2 Getting Started Guide

This document is intended to help new or existing developers quickly start evaluating the EVK and using SDK to develop Wi-Fi and Bluetooth LE applications with the RA6W2 chipset.

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1. Terms and Definitions

AP	Access Point
API	Application Program Interface
Arm	Advanced Risc Machine
Bluetooth LE	Bluetooth [®] Low Energy
COM	Communication Port
CPU	Central Processing Unit
DPM	Dynamic Power Management
GDB	GNU Debugger
EVK	Evaluation Kit
FSP	Flexible Software Package
GCC	GNU Compiler Collection
GPIO	General-Purpose Input/Output
IDE	Integrated Development Environment
IC	Integrated Circuit
MCU	Micro Controller Unit
PMGR	Power Manager
PXP	Proximity Profile
QSPI	Quad Serial Peripheral Interface
RAM	Random Access Memory
ROM	Read Only Memory
RTC	Real Time Clock
RTOS	Real Time Operating System
RX	Receive
SD	Secure Digital
SDK	Software Development Kit
SMA	SubMiniature Version A
SoC	System on Chip
SPI	Serial Peripheral Interface
SPS	Serial Port Service
TX	Transmit
UART	Universal Asynchronous Receiver/Transmitter
UDP	User Datagram Protocol
WLCSP	Wafer Level Chip Scale Package
WSL	Windows Subsystem for Linux

2. Overview

RA6W2 is a highly integrated ultra-low-power Wi-Fi plus Bluetooth® Low Energy (Bluetooth LE) Combo system in a package that allows you to develop Wi - Fi and Bluetooth LE solutions using a single chip. This Getting Started Guide provides an overview of setting up the RA6W2 EVK, Programming the released SDK images, instructions for importing and building images with the sample project template using e² studio Integrated Development Environment (IDE).

The following are the quick guidelines to start using EVK:

- RA6W2 EVK hardware (see Section [Section 3 Evaluation Kit](#)).
- Setting up the evaluation board (see [Section 4 Set Up RA6W2 EVK](#)).
- Programming firmware image (see [Section 4.1 Firmware Image Programming](#)).
- Configuring EK-RA6W2 Serial Debug Interface (see [Section 4.2 EK-RA6W2 Serial Debug Interface Configuration](#)).
- Provisioning Wi-Fi (see [Section 4.3 Provision Wi-Fi](#)).
- Evaluating throughput with iPerf (see [Section 5.1 Test Throughput with iPerf Traffic Generator](#)).
- Measuring current consumption (see [Section 5.2 Measure Current Consumption](#)).
- Software development kit and build setup (see [Section 6 Software Development Kit and Build Setup](#)).

For more resources, go to:

- RA6W2 product page – documentation, example projects.
- EK-RA6W1 board page (<https://www.renesas.com/en/design-resources/boards-kits/ek-ra6w1>).

3. Evaluation Kit

The RA6W2 evaluation kit (EVK) is designed to test and develop Wi-Fi applications quickly. The EVK is provided to simplify the process of starting a project with the RA6W2.

The EVK contains:

- Evaluation kit (EVK): The board is made by a mother board with debugging and power measurement circuitry and a daughter board containing the RA6W2 and related needed circuitry.
- USB cable.

3.1 EK-RA6W2

Figure 1 shows the hardware configuration of the RA6W2 EVK and Table 1 shows EK-RA6W2 components and descriptions.

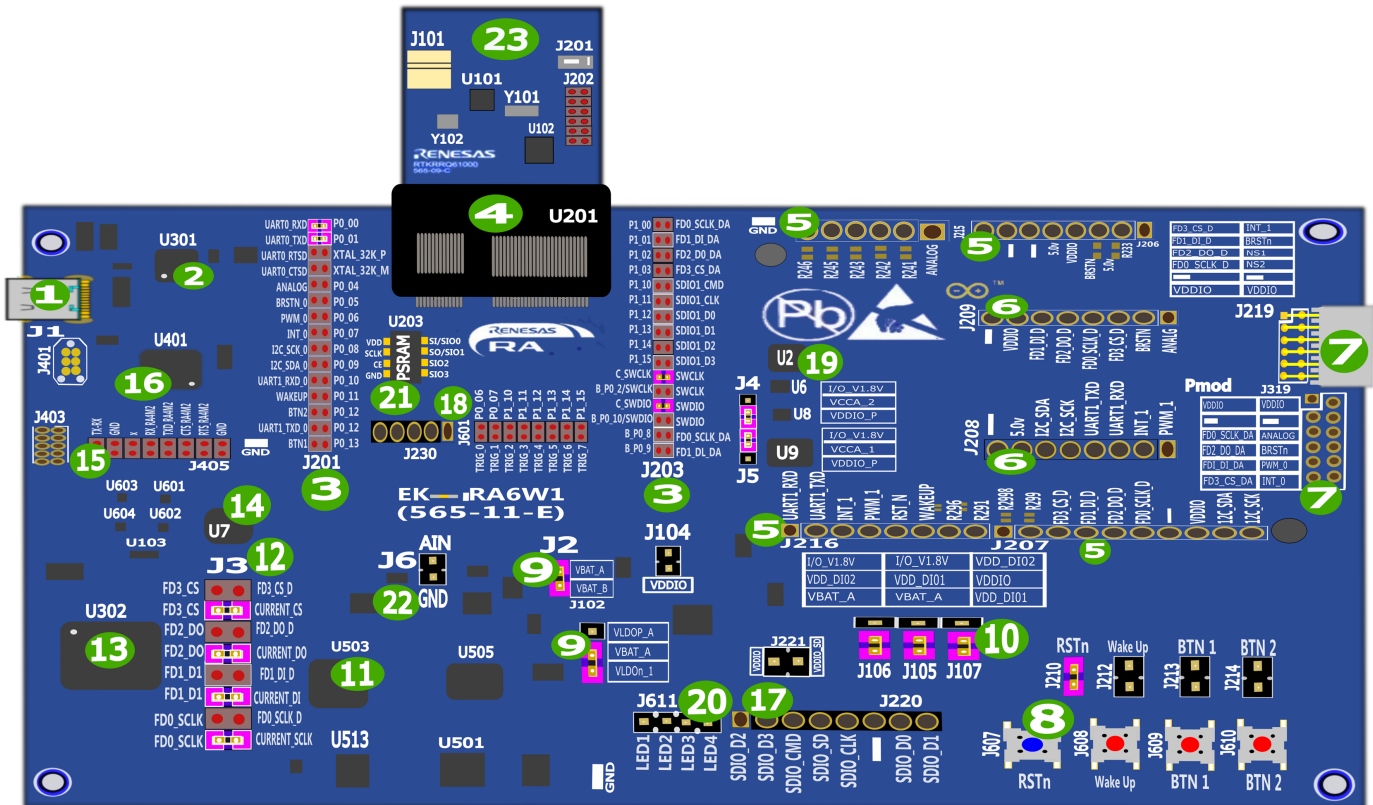


Figure 1. EK-RA6W2 hardware configuration

Table 1. Components on EK-RA6W2

No	Name	Description
1	USB302 – USB port	Provides power and data port for the RA6W2 EK.
2	U301 – USB HUB	Connects JTAG and UART interfaces to the PC.
3	J201/J203 – Signal/Power breakout headers	Exposes all the pins of the Daughterboard and Motherboard to allow wiring for custom configurations as well as monitoring of the hardware signals. See Figure 2 and Figure 3 .
4	U201- daughterboard connector	The interface mating connector for the Daughterboard.
5	J206/J207/J215/J216 - Arduino sockets	The sockets for plugging in Arduino interface add-on boards. See Figure 9 .
6	J208/J209 - MikroBUS™ sockets	Sockets for plugging in MikroBUS™ interface add-on boards. It is multiplexed with PMOD (to be used with DA1453x). See Figure 13 .
7	J219 - PMOD connectors	The socket for plugging in PMOD interface add-on boards. J319 is a header, No mounted. J219 and J319 share some signals which are multiplexed with MikroBUS™. See Figure 5 .
8	J607 - Push-buttons	J607 push-button used to reset Daughterboard, J608/J609/J610 push buttons for general use. See Figure 11 .
9	J2/J102 - Power selection	The current sense circuit option. Using this current measurement circuit, you can monitor the current consumption of Daughterboard through Smart Snippets Toolbox software application.
10	J105/J106/J107 - I/O voltage selection	Selects the I/O voltage applied to the Daughterboard (1.8 V, 3.3 V).
11	U503 - Current sense	The current sense circuit.
12	J3 - SPI interface switch	Selects the I/O voltage generated for the Daughterboard board (1.8 V, 3.3 V). See Figure 14 .
13	U302 - USB interface IC	Provides communication between Daughterboard UART port and PC. It also transfers the current measurement samples to PC.
14	U7 - Level translators	Transfers the data between Daughterboard and FTDI (U302) in proper voltage level.
15	J405 - External J-link connector	Provides access to Wi-Fi SoC or Bluetooth LE SoC. See Figure 6 .
16	U401 – MCU	Place where the SWD implementation of SEGGER applied.
17	J220 - SDIO header	Must be mounted.
18	J601 – Trigger	The trigger signals monitored and presented on Smart Snippets Toolbox. See Figure 12 .
19	U2/U6/U8/U9 - Level translators	For the interface section (PMOD, Android and MikroBUS).
20	J611 – LEDs	Four LEDs are connected to this header. To enable an LED, a jumper wire must be connected between a GPIO and one of the pins of J611.
21	U202 - PSRAM	PSRAM. See Figure 4 .
22	J6 – AIN GND	AIN is a generic Analog Input which is accessible on J6 header.
23	Daughterboard	

[Figure 15](#) shows the hardware configuration of the daughterboard of the RA6W2 EVK.

NOTE
Renesas Electronics recommends using a daughterboard with an antenna.

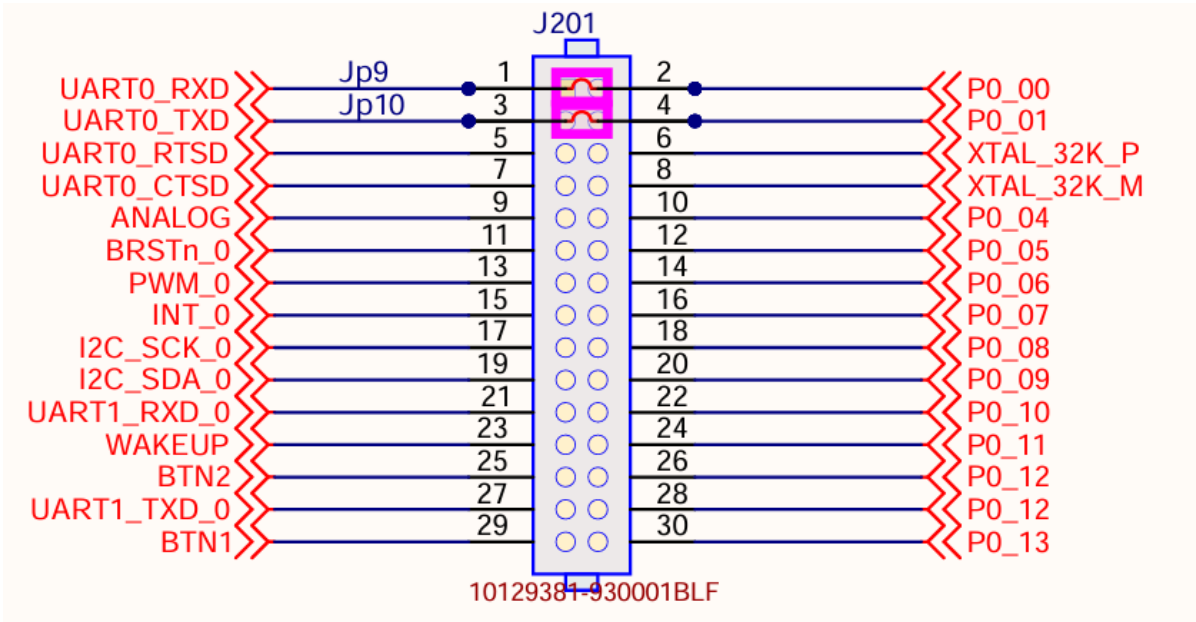


Figure 2. Breakout Header J201

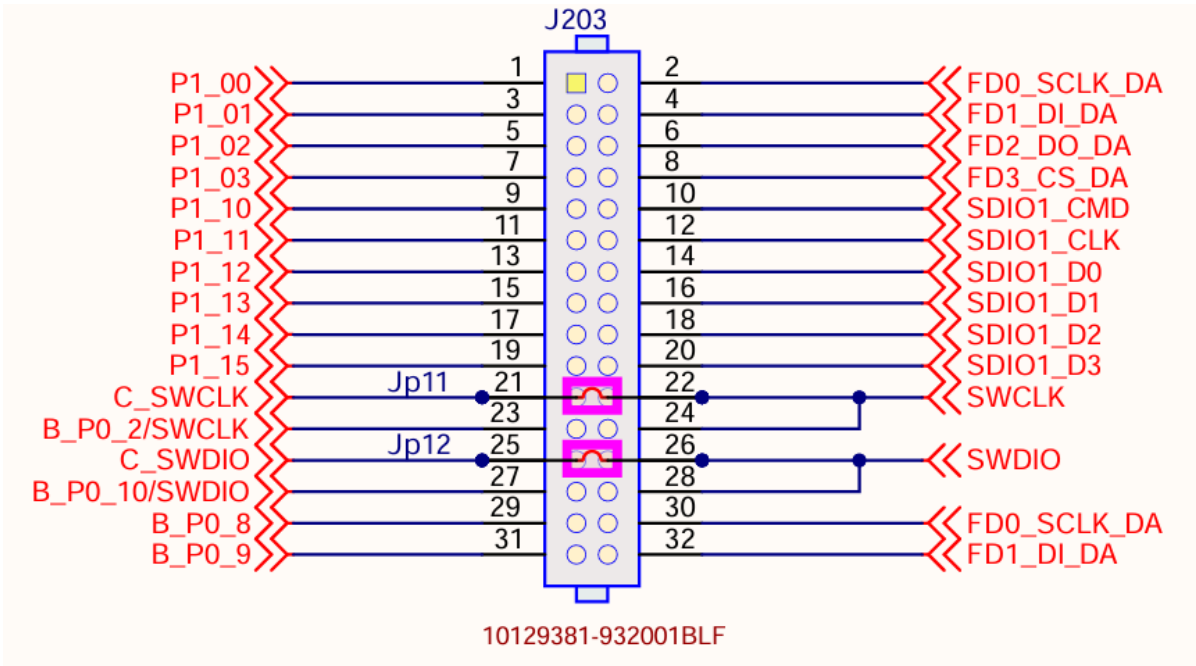


Figure 3. Breakout Header J203

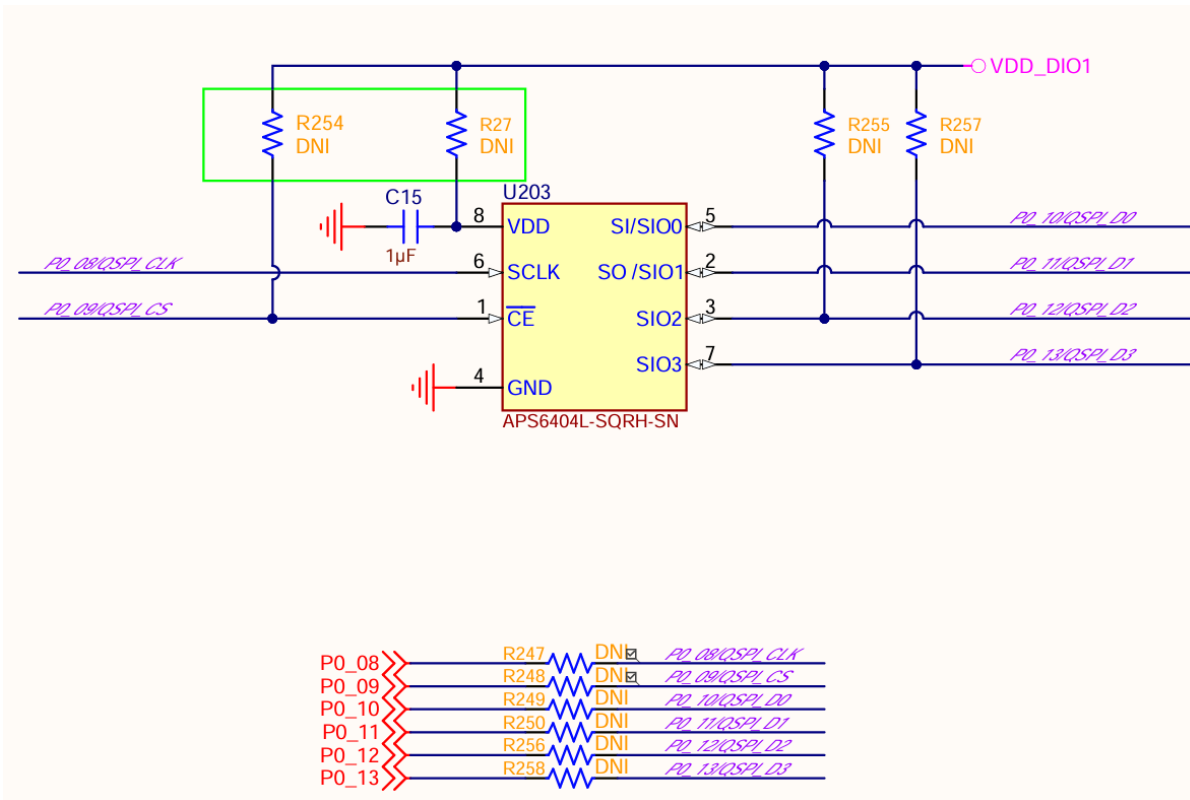


Figure 4. PSRAM

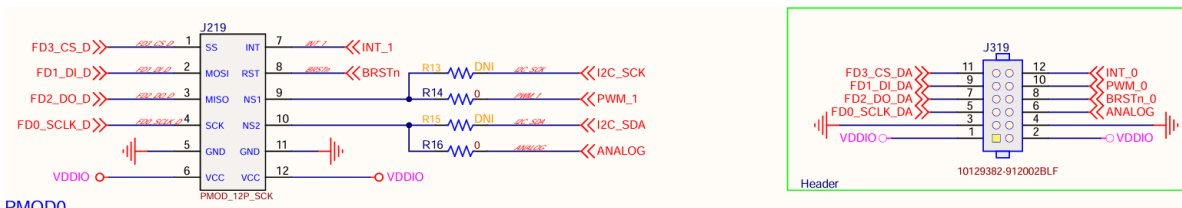


Figure 5. PMOD0

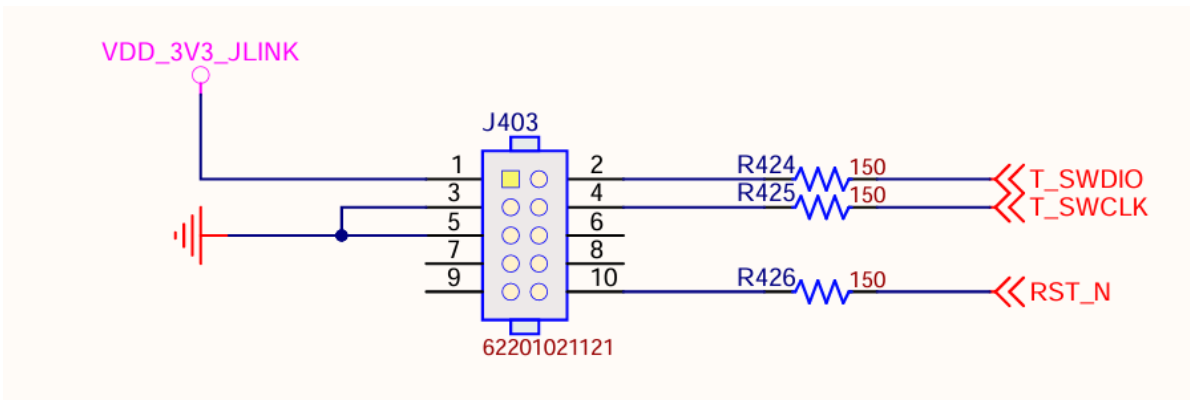


Figure 6. External J-Link connector

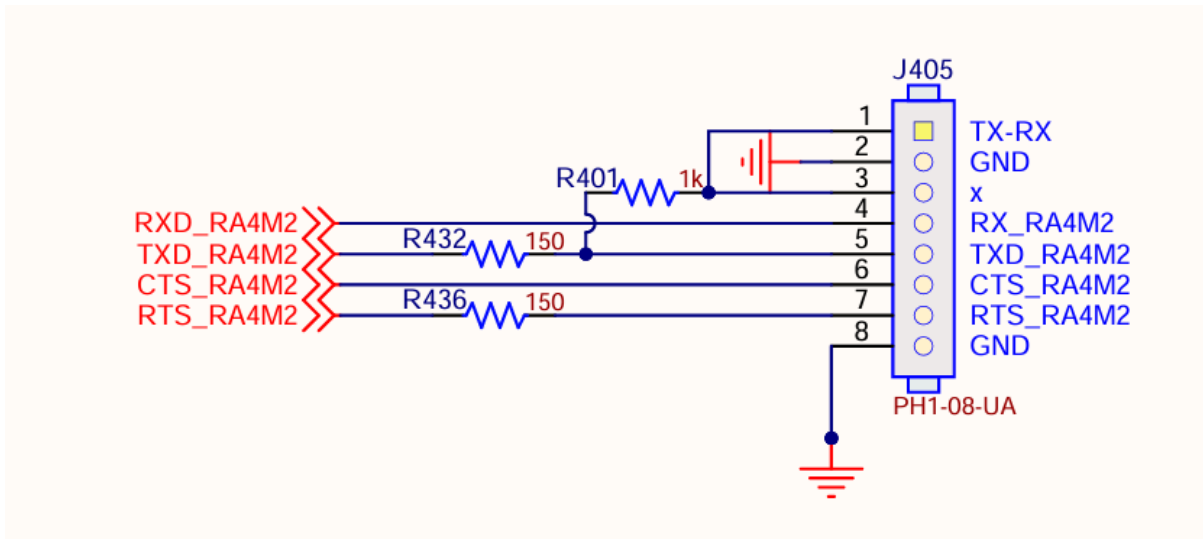


Figure 7. Auxiliary UART

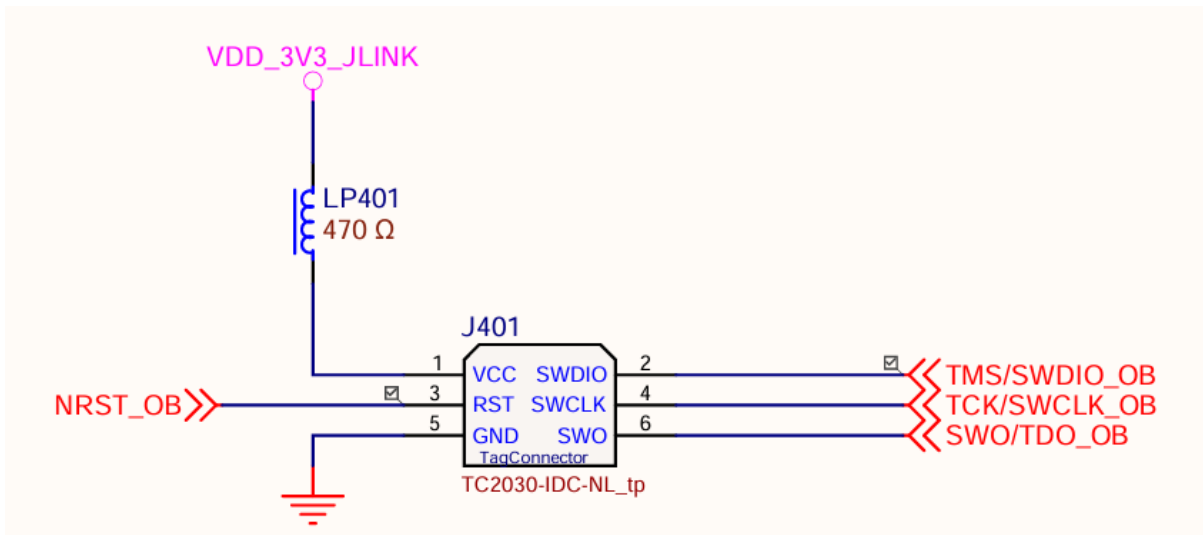


Figure 8. Programming RA4M2

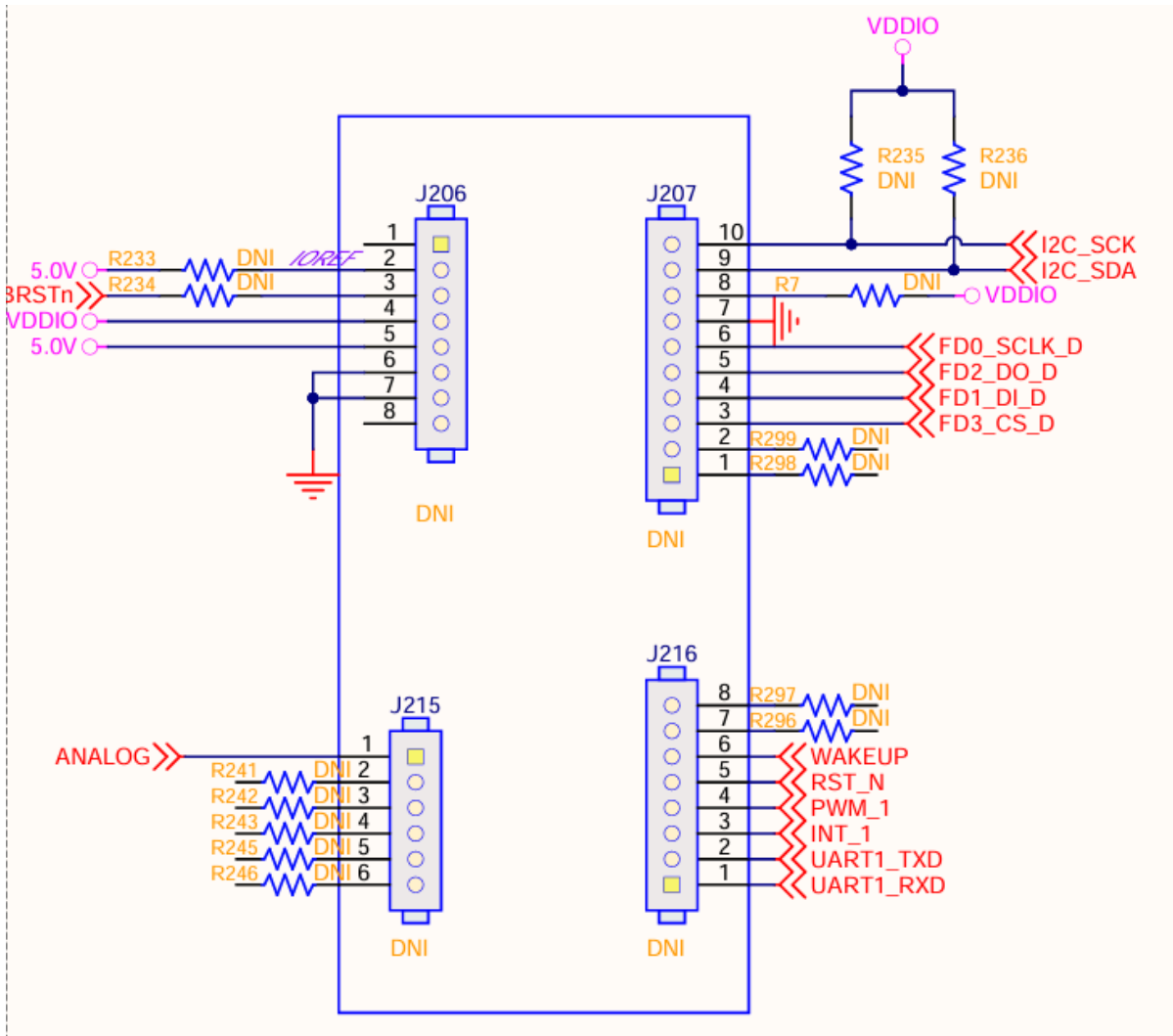


Figure 9. Arduino Interface

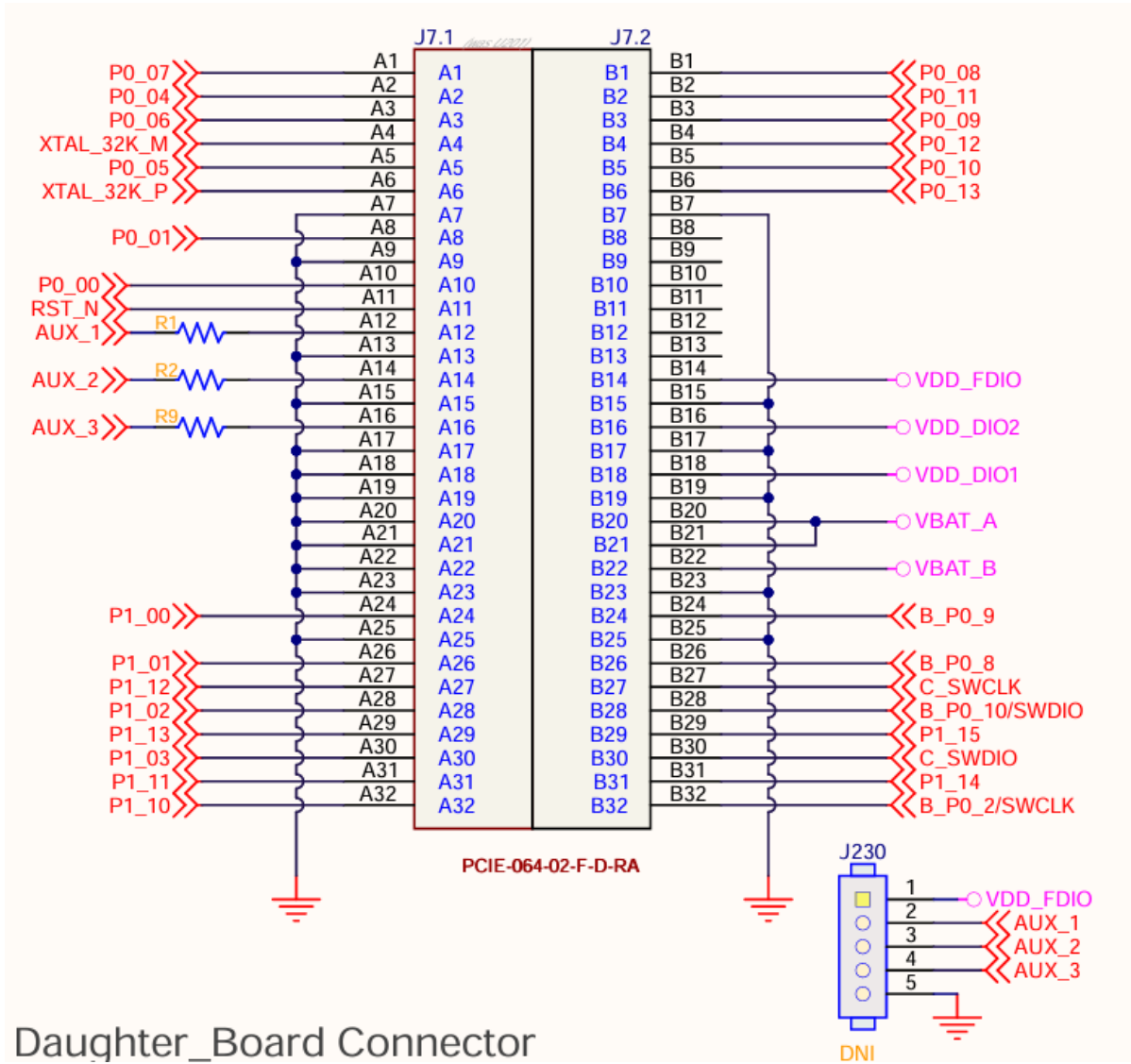


Figure 10. Daughter Board Connector

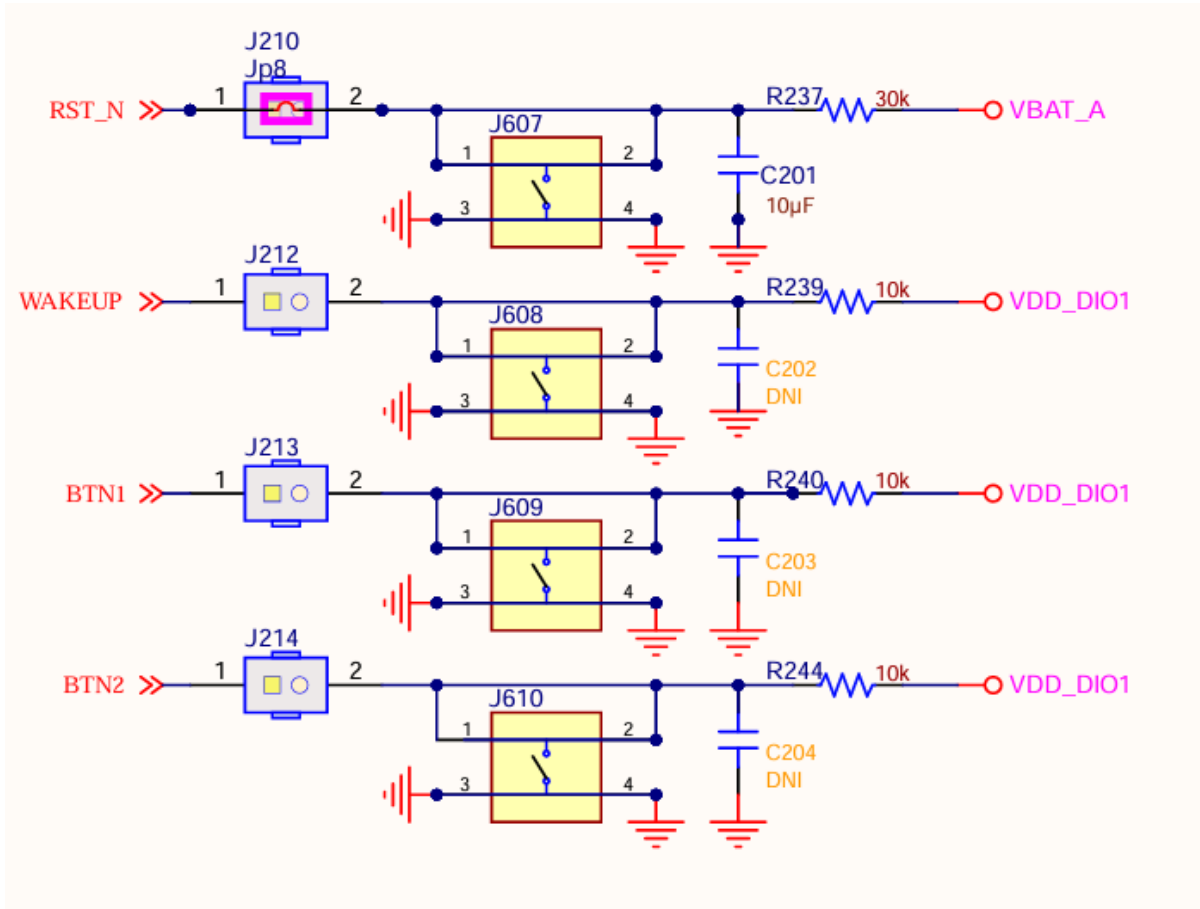


Figure 11. Buttons

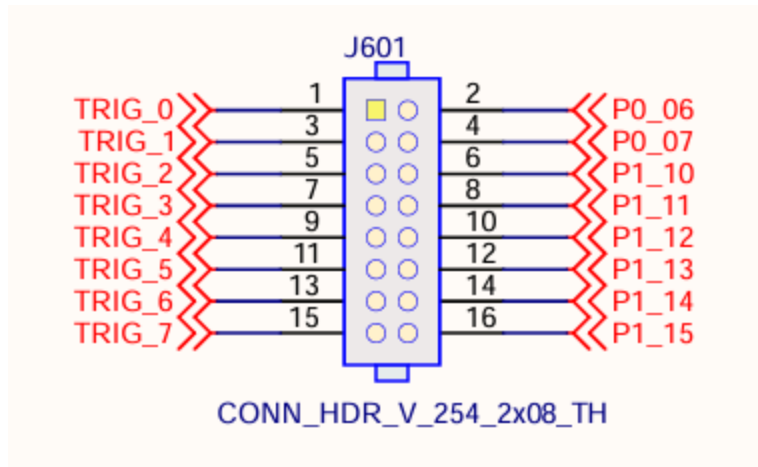
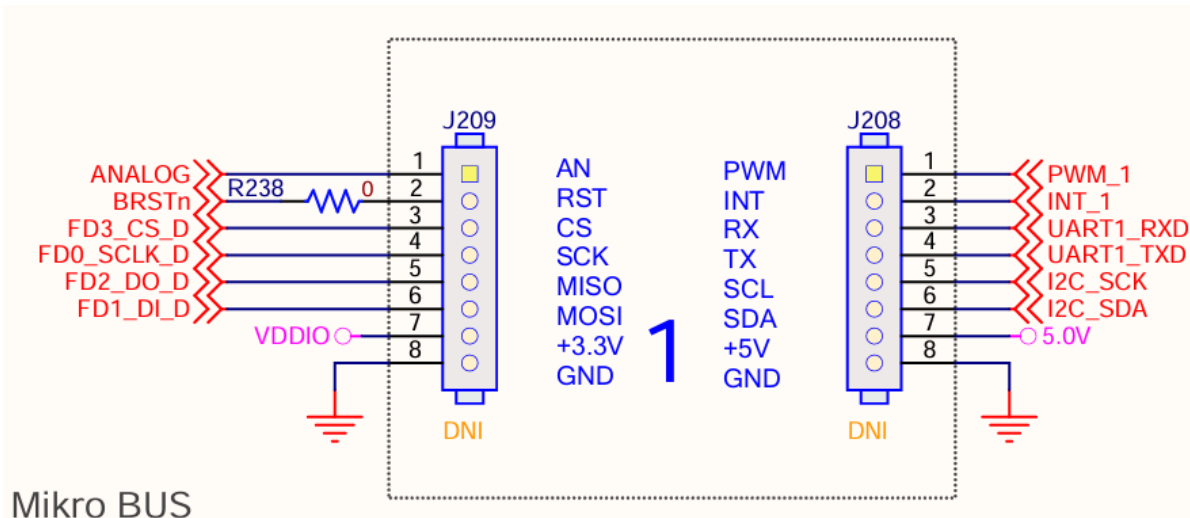


Figure 12. Trigger



Mikro BUS

Figure 13. Micro BUS

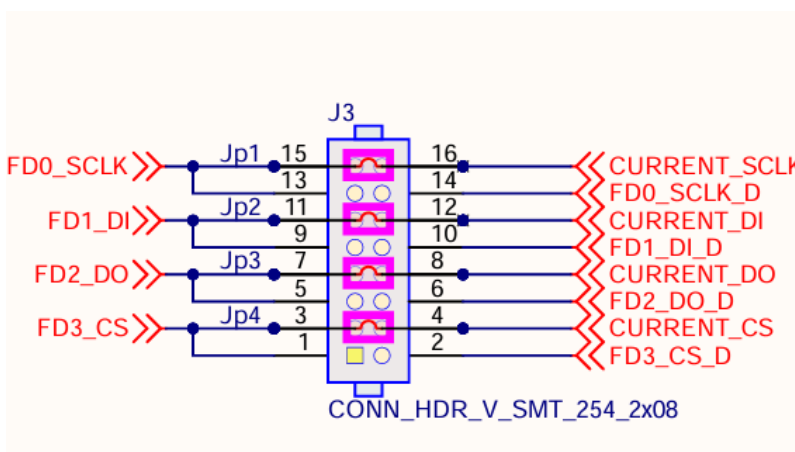


Figure 14. J3

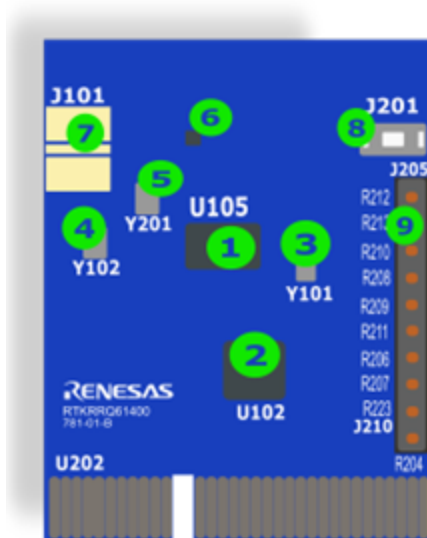


Figure 15. RA6W2 daughterboard

Table 2 shows the components of EK-RA6W2 daughterboard.

Table 2. EK-RA6W2 daughterboard components

No	Name	Description
1	U105 – RA6W2	RA6W2 – WLCSP
2	U102 – Serial Flash	Serial Flash – AT25SL641
3	Y101 – Crystal	40 MHz crystal
4	Y102 – Crystal	32.768 kHz crystal
5	Y201 – Crystal	32 MHz crystal
6	SW202 – RF switch	RF switch for Wi-Fi and Bluetooth LE
7	J101 – SMA connector	SMA connector for external antenna
8	J201 – Reset switch	Switch to reset the RA6W2
9	J205 – Headers	RF switch control signal/Bluetooth LE signal breakout headers (see Figure 16).

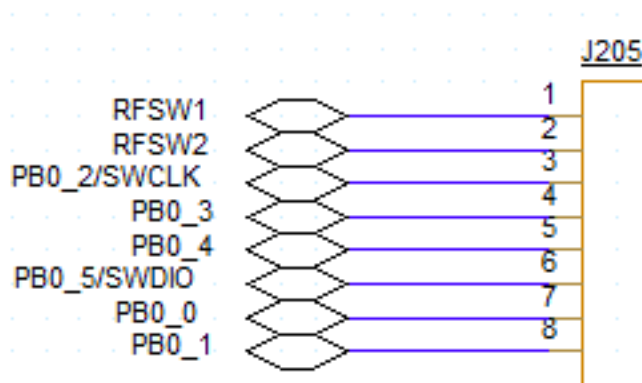


Figure 16. Breakout header J205 – daughterboard

4. Set Up RA6W2 EVK

Before setting up ensure that the Evaluation Kit (EVK) and the required software are properly connected and installed. Use the USB cable included in the EVK to connect the host computer and the EVK. When the EVK is connected to the USB port (USB302 on the RA6W2 EVK) USB Serial COM ports are created.

- For Windows, three USB Serial COM ports are displayed in the device manager (see [Figure 17](#)).

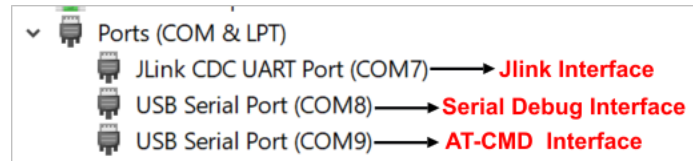


Figure 17. Windows – COM ports

NOTE

If Windows Device Manager displays **Unknown Device**, the FTDI serial driver is not installed. Download the driver by following the URL and installing it manually: <http://www.ftdichip.com/Drivers/>.

The lower numbered J-Link CDC UART Port (COM7, in this case) is the onboard J-Link. The next USB Serial Port (COM8, in this case) is for the RA6W2 debug interface. The higher numbered USB Serial Port (COM9, in this case) is for the RA6W2 AT command interface or current consumption measurement. A serial terminal application can be used for debugging RA6W2.

The **Tera Term** terminal emulator program is recommended and can be downloaded from <https://github.com/TeraTermProject/teraterm/releases/tag/v5.2>.

- For Linux, two Serial COM ports are created. It can be checked using the following command in Terminal.

```
developer:~$ ls /dev/ttyUSB*
developer:~$ /dev/ttyUSB0 /dev/ttyUSB1
```

The lower numbered USB Serial Port (/dev/ttyUSB0, in this case) is for the RA6W2 debug interface. The higher numbered USB Serial Port (/dev/ttyUSB1, in this case) is for the RA6W2 AT command interface or current consumption measurement. A serial terminal application can be used for debugging RA6W2.

Minicom is recommended for Linux and to install minicom on Linux, run this command:

```
developer:~$ sudo apt-get install minicom
```

When the terminal emulation application is installed, connect the USB cable to USB302 on the RA6W2 EVK and start the terminal emulation program. In the terminal emulation program, go to the Serial Port setup and select the preferred COM Port.

4.1 Firmware Image Programming

4.1.1 Program Firmware Images for Windows

Programming firmware images to the EVK requires the Renesas Flash Programmer(RFP) tool. The RFP provides a graphical interface to flash binary images into the RA6W2 EVK through the on-chip debug interface.

System requirements:

- OS: Windows 11 (64 bit)
- USB drivers (installed along with RFP setup)
- Renesas Flash Programmer V3.22.00 or later
- Hardware: RA6W2 EVK.

To program firmware:

- Download and launch the Renesas Flash Programmer installer,
- In the **Software License Agreement** select **Agree** and click **Next**.

3. During installation, in a **Windows Security** dialog , select the **Always trust software from "Renesas Solutions Corp"** checkbox.
4. Click **Install**, and then click **Next**.

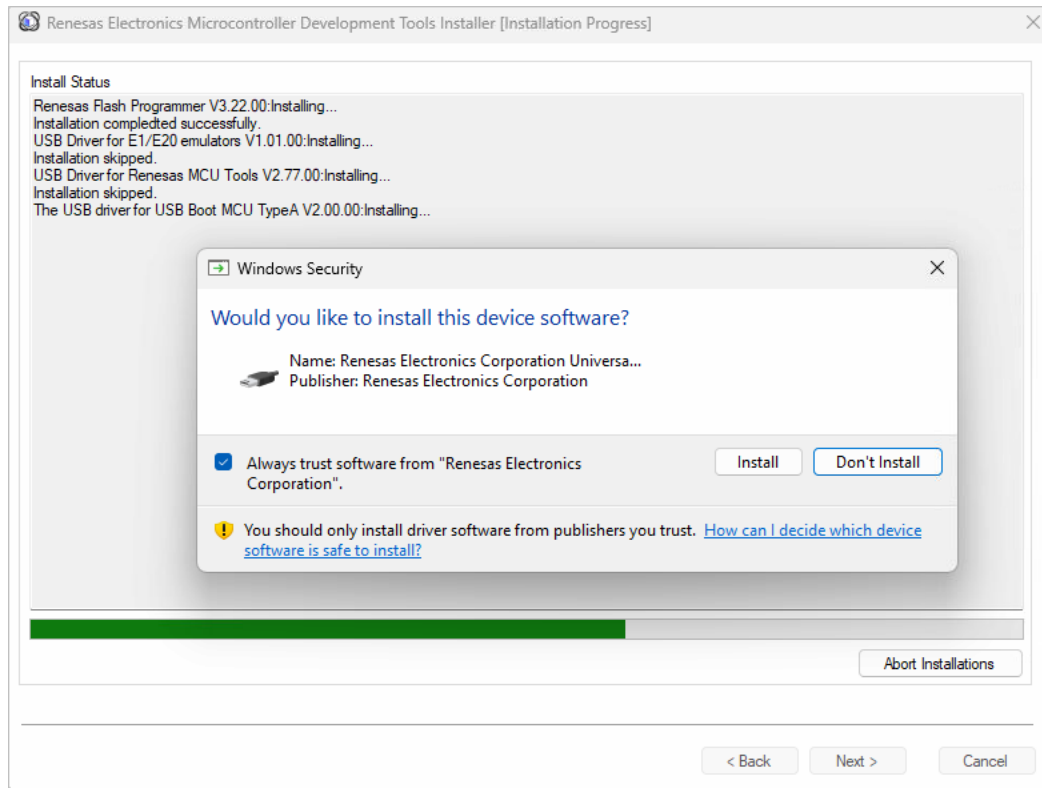
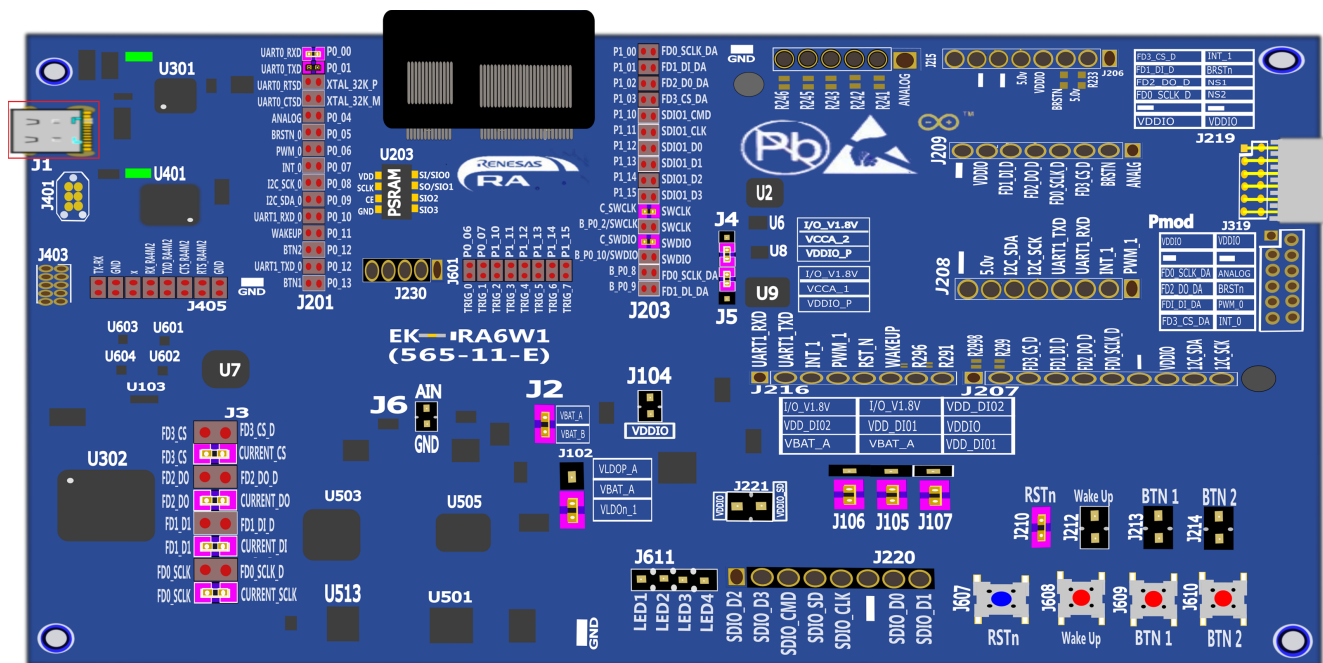


Figure 18. Windows Security prompt for USB driver installation

5. After installation completes, click Finish to exit the setup.
6. From the Windows Start menu, launch the Renesas Flash Programmer tool
7. Connect the RA6W2 EVK to the PC using the USB debug interface.



- 8. In the tool, to create a new project, go to **File > New Project**.
 - a. In Microcontroller, select the **RA6W1, RA6W2 group** as the target microcontroller.

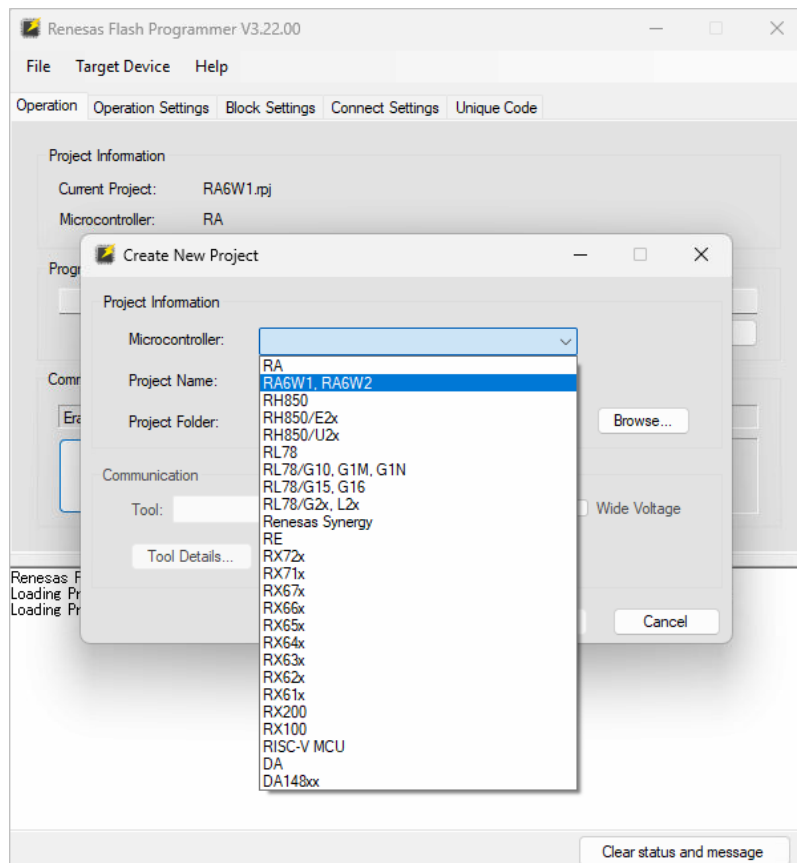


Figure 20. Selecting RA6W1, RA6W2

- b. In **Project Name**, enter the needed project name, and click **Connect**.

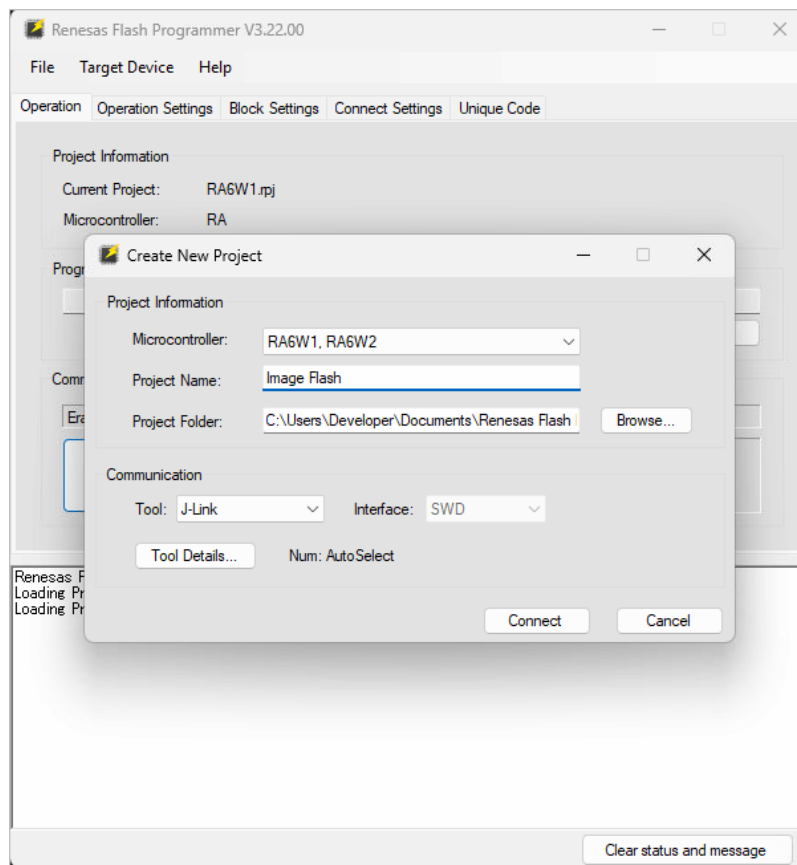


Figure 21. Connecting RA6W2 EVK

When the device is connected, the status message "**Operation completed**" appears.

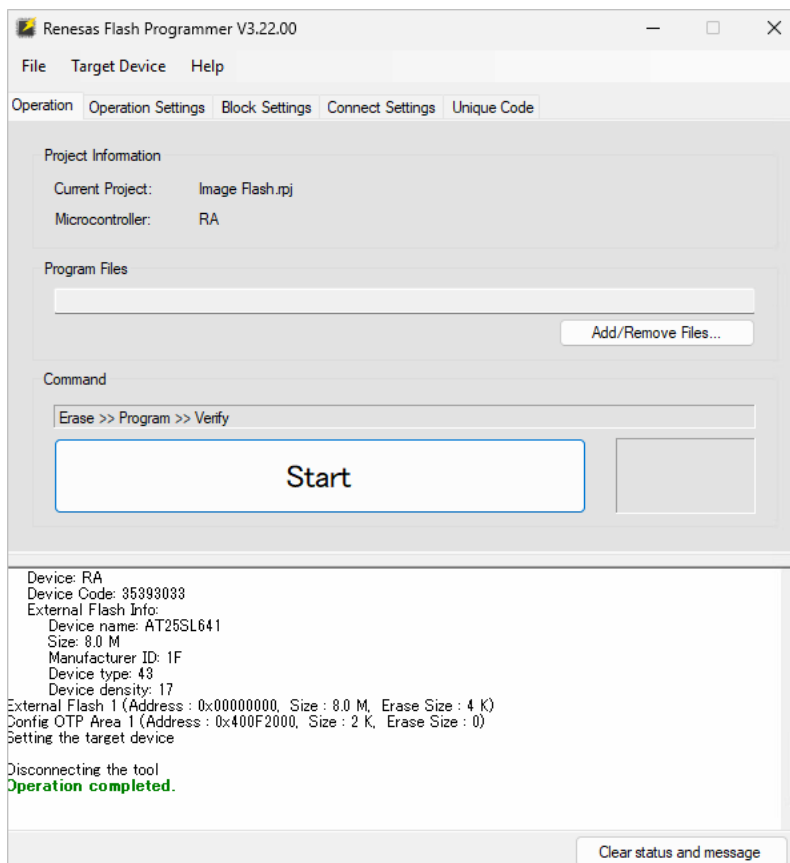


Figure 22. Connection status – Operation completed

9. Select **Add/Remove Files**, then browse, select **All Files** and choose the `.img` file to be programmed.
10. In the **File Offset** dialog, click **OK**.

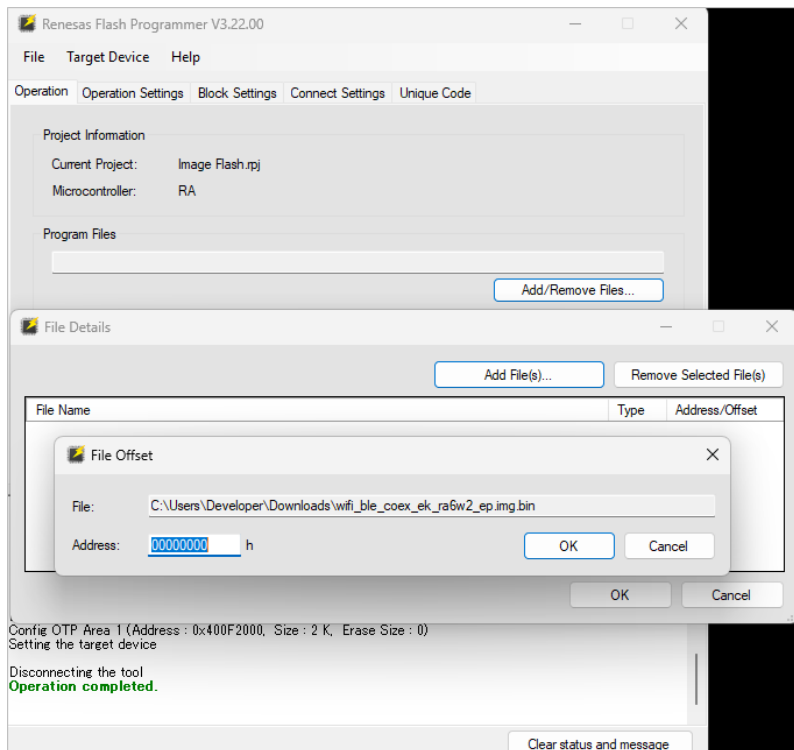


Figure 23. File Offset dialog

11. In the **File details** dialog, to confirm the selection, click **OK** again.
12. In **Renesas Flash Programmer**, to flash the image, click **Start**.

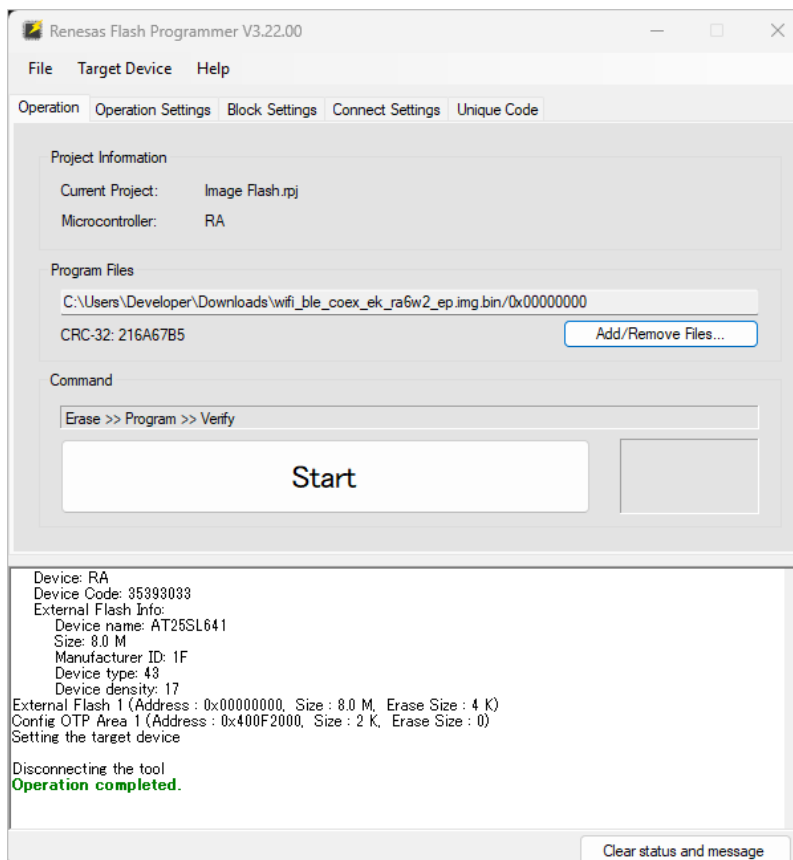


Figure 24. Start programming

A Progress Report window appears, showing the running progress. When programming is completed, the status dialog shows "**Operation completed**", showing that the firmware image is successfully written to the RA6W2 EVK.

4.1.2 Program Firmware Images for Linux

Programming firmware images to EVK in Linux requires the CLI tool of Renesas Flash Downloader.

System requirements:

- OS: Ubuntu 22.04.4 LTS or later.
- J-Link Linux driver – J-Link Version 864 or later.
- Renesas Flash Programmer V3.22.00 or later
- Hardware: RA6W2 EVK.

To program the firmware:

1. Extract the RFP_CLI_Linux_V32200_x64.tgz.

```
tar -xzf RFP_CLI_Linux_V32200_x64.tgz
```

2. Go to the extracted folder and check the J-Link serial number.

```
cd linux-x64/
./rfp-cli -d RA6W2 -lt
```

3. Program the firmware.

```
./rfp-cli -d RA6W2 -tool jlink:<jlink_serial_no> -if swd -s 25M -auto -bin 0 <path_to_.img file>
```

For example of successful operation, see [Figure 25](#).

```
developer@TWMA-WKS0193:~/Downloads/linux-x64$ ./rfp-cli -d RA6W2 -lt
Renesas Flash Programmer CLI V1.15
Module Version: V3.22.00.000
Package Version: V3.22.00 [1 Jan 2026]

[Tool]
jlink J-Link
1100009664
developer@TWMA-WKS0193:~/Downloads/linux-x64$ ./rfp-cli -d RA6W2 -tool jlink:1100009664 -if swd -s 25M -auto -bin 0 /home/developer/Downloads/wifi_ble_coex_ek_ra6w2_ep.img.bin
Renesas Flash Programmer CLI V1.15
Module Version: V3.22.00.000
Package Version: V3.22.00 [1 Jan 2026]
Load: "/home/developer/Downloads/wifi_ble_coex_ek_ra6w2_ep.img.bin" (Offset=00000000)

Connecting the tool (J-Link)
J-Link Firmware: J-Link OB-RA4M2-CortexM compiled Feb 2 2026 09:00:55
Tool: J-Link (SEGGER J-Link (unknown))
Interface: SWD

Loading flash configurations file... (Resources/RA6W1/flash_configurations)
Completed.
Loading bootloader binary... (Resources/RA6W1/uartboot.bin)
Completed. 42.5 K
Read xSPI flash device informations...
Completed.
Speed: 25,000,000 Hz
Connected to RA

Erasing the target device
[External Flash 1] 00000000 - 007FFFFF
[External Flash 1] 00000000 - 001CEFFF
Writing data to the target device
[External Flash 1] 00000000 - 001CEBFF
Verifying data on the target device
[External Flash 1] 00000000 - 001CEBFF

Disconnecting the tool
Operation successful
```

Figure 25. Programming of firmware in Linux

4.1.3 Program Firmware Images for macOS

Programming firmware images to EVK in macOS requires the CLI tool of Renesas Flash Downloader.

System requirements:

- OS: Mac OS 14 (Sonoma) or later versions.
- J-Link driver – J-Link Version 864 or later.
- ● Renesas Flash Programmer V3.22.00 or later
 - Hardware: RA6W2 EVK.

To program firmware:

1. Extract the RFP_CLI_macOS_V32200_arm64.zip.

```
tar -xzf RFP_CLI_macOS_V32200_arm64.zip
```

2. Go to the extracted folder and check the J-Link serial number.

```
cd macos-arm64
./rfp-cli -d RA6W2 -lt
```

3. Program the firmware using this command:

```
./rfp-cli -d RA6W2 -tool jlink:<jlink_serial_number> -if swd -s 25M -auto -bin 0 <path_to_.img file>
```

For example of successful operation, see [Figure 26](#).

```
[thinkpalm@thinkpalms-MacBook-Air macos-arm64 % ./rfp-cli -d RA6W2 -lt
Renesas Flash Programmer CLI V1.15
Module Version: V3.22.00.000
Package Version: V3.22.00 [1 Jan 2026]

[Tool]
jlink J-Link
1100009664
[thinkpalm@thinkpalms-MacBook-Air macos-arm64 % ./rfp-cli -d RA6W2 -tool jlink:1100009664 -if SWD -s 25M -auto -bin 0 /Users/thinkpalm/Downloads/wifi_ble_coex_ek_ra6w2_ep.img.bin
Renesas Flash Programmer CLI V1.15
Module Version: V3.22.00.000
Package Version: V3.22.00 [1 Jan 2026]
Load: "/Users/thinkpalm/Downloads/wifi_ble_coex_ek_ra6w2_ep.img.bin" (Offset=00000000)

Connecting the tool (J-Link)
J-Link Firmware: J-Link OB-RA4M2-CortexM compiled Feb 2 2026 09:00:55
Tool: J-Link (SEGGER J-Link (unknown))
Interface: SWD

Loading flash configurations file... (Resources/RA6W1/flash_configurations)
Completed.
Loading bootloader binary... (Resources/RA6W1/uartboot.bin)
Completed. 42.5 K
Read xSPI flash device informations...
Completed.
Speed: 25,000,000 Hz
Connected to RA

Erasing the target device
[External Flash 1] 00000000 - 007FFFFF
[External Flash 1] 00000000 - 001CEFFF
Writing data to the target device
[External Flash 1] 00000000 - 001CEBFF
Verifying data on the target device
[External Flash 1] 00000000 - 001CEBFF

Disconnecting the tool
Operation successful
```

Figure 26. Programming of firmware in macOS

4.2 EK-RA6W2 Serial Debug Interface Configuration

The RA6W2 provides a command/debug interface on UART0 for performing configuration and diagnostic functions. Connect the USB cable to the USB debug interface on the RA6W2 EVK and start the terminal emulation program.

4.2.1 Configure Tera Term Serial Terminal Application

1. In the Tera Term program, go to the **Serial Port** setup and select the lower numbered COM port (COM8, in this case) and configure it as in [Table 3](#) and [Table 4](#).

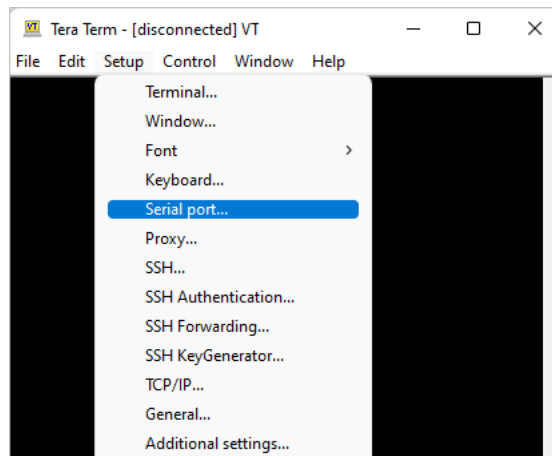


Figure 27. Serial port setup

2. Connect USB cable to RA6W2 EVK and pressing Enter. The following prompt appears in the UART console:


```
[/RA6W2-RRQ61051]
```

Table 3. Serial port configuration values

Settings	Value
Baud Rate	115200
Data Bits	8
Parity	None
Stop Bits	1
Flow Control (Hardware/Software)	None

Table 4. Terminal settings

Settings	Value
Receive	LF
Transmit	CR + LF

4.2.2 Configure Minicom for Linux

1. Connect the USB cable to the USB Debug Interface on the RA6W2 EVK and open a terminal for the minicom.
2. Start minicom using the following command:

```
developer:~$ sudo minicom -D /dev/ttyUSB0
```

3. Enter the password.

After entering the password, minicom terminal view opens, see [Figure 28](#).

NOTE

`/dev/ttyUSB0` is for the debug interface and `/dev/ttyUSB1` is for the AT command interface

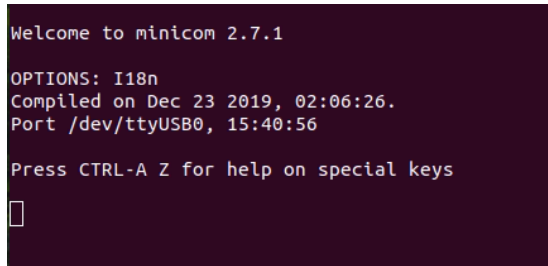


Figure 28. Minicom terminal view

4. To configure minicom, press Ctrl+A followed by Z. It prompts a command summary as shown in [Figure 29](#).



Figure 29. Minicom command summary

5. When prompt appears, type O to select O for "cOnfigure Minicom..O".
6. In the configuration prompt, select **Serial port setup**.

- Configure minicom values using letters as shown in [Table 1](#) using letters to configure. For example, to select Baud rate, use **E**.

```

+-----+
| A - Serial Device      : /dev/ttyUSB0 |
| B - Lockfile Location  : /var/lock    |
| C - Callin Program     :              |
| D - Callout Program    :              |
| E - Bps/Par/Bits       : 115200 8N1  |
| F - Hardware Flow Control : No        |
| G - Software Flow Control : No        |
+-----+
Change which setting? █
    
```

Figure 30. Setting minicom values

- After it is configured, use **Save setup as dfl** for saving as default.
- Press Enter.
The **Configuration saved** dialog appears.

```

ed on Dec 23 2019, 02:06:26.
dev/ttyUSB0, 15:40:56

CTRL-A Z for help on special keys

+-----[configuration]-----+
| Filenames and paths          |
| File transfer protocols      |
| Serial port setup           |
| Modem and dialing           |
| Screen and keyboard         |
| Save setup as dfl           |
| Save setup as..             |
| Exit                         |
+-----+

+-----+
| Configuration saved          |
+-----+
    
```

Figure 31. Configuration saved

- Click **Exit**.
- For proper minicom printing, press Ctrl+A followed by Z. It prompts the command summary in [Figure 32](#).

```

+-----+
| Minicom Command Summary     |
+-----+
| Commands can be called by CTRL-A <key> |
+-----+
| Main Functions              | Other Functions |
+-----+-----+
| Dialing directory..D       | run script (Go)...G | Clear Screen.....C |
| Send files.....S          | Receive files.....R | cOnfigure Minicom..O |
| comm Parameters....P      | Add linefeed.....A | Suspend minicom...J |
| Capture on/off....L       | Hangup.....H       | eXit and reset...X  |
| send break.....F         | initialize Modem...M | Quit with no reset.Q |
| Terminal settings..T      | run Kermit.....K   | Cursor key mode...I |
| lineWrap on/off...W       | Local Echo on/off..E | Help screen.....Z  |
| Paste file.....Y          | Timestamp toggle...N | scroll Back.....B   |
| Add Carriage Ret...U      |                       |                       |
+-----+-----+
| Select function or press Enter for none. |
+-----+
    
```

Figure 32. Minicom command summary window

- Select U for **Add Carriage Ret..U**.
- To complete the configuration, press Enter. See [Figure 33](#).



Figure 33. Successful configuration

4.2.3 Configure RA6W2 EVK AT Command Interface

4.2.3.1 AT Command Jumper Configuration

For using AT Commands, flash `wifi_ble_coex_at_uart_ek_ra6w2_ep.img`.

Connect the following jumpers to facilitate the AT command UART connection, see [Figure 34](#):

- Connect **P0_04** on J201 to **FD0_SCLK_DA** on J203
- Connect **P0_05** on J201 to **FD1_DI_DA** on J203
- Connect **FD3_CS** on J3 to **FD3_CS_D** on J3
- Connect **FD2_DO** on J3 to **FD2_DO_D** on J3
- Connect **FD1_DI** on J3 to **FD1_DI_D** on J3
- Connect **FD0_SCLK** on J3 to **FD0_SCLK_D** on J3

After connecting the jumpers, connect the RA6W2 to laptop through USB cable to access the AT command terminal.

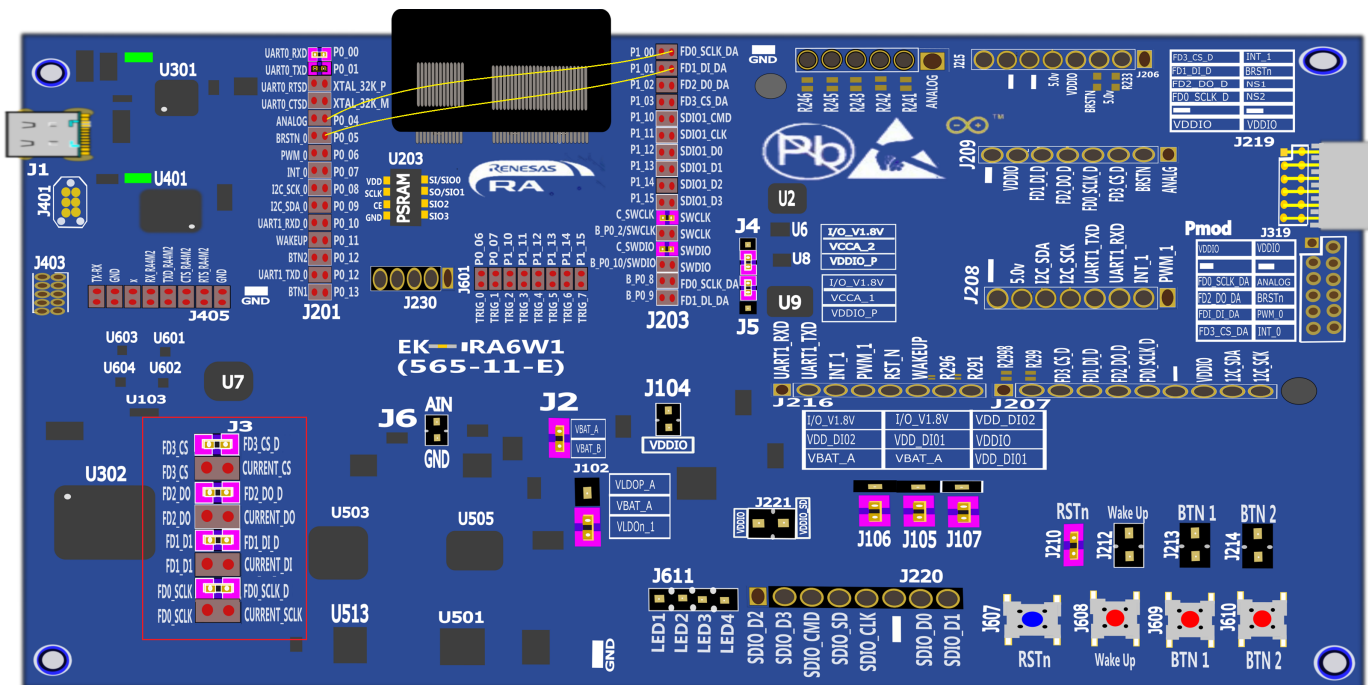


Figure 34. Jumper connections

4.2.3.2 AT Command Terminal Configuration

The RA6W2 provides an AT command interface on UART1 for performing configuration. Connect the USB cable to the USB302 on the RA6W2 EVK and start the terminal emulation program. In the terminal emulation program, go to the

Serial Port setup and select the higher numbered COM port (COM9, in this case) and configure it as in [Table 3](#) and [Table 4](#).

For more AT command details, see *AT Command Manual*. For basic connection using AT commands, see [1 AT Command Wi-Fi Provisioning](#).

When connecting USB cable to EK-RA6W2, the screen is initially blank. Enter the following command (which is hidden by default) in the blank screen to enable echo output:

```
ATE //(hidden)
Echo on //(command return)
OK
```

4.3 Provision Wi-Fi

Provisioning a Wi-Fi device is the process of setting up the device to connect to a network and function properly. This involves configuring network settings, ensuring secure authentication, and assigning necessary parameters.

After the terminal emulator setup ([Section 4.2](#)), Please follow the below steps.

4.3.1 Factory Reset (Optional)

Factory reset reverts the board to default configurations. To reset the board to default settings, enter: factory in the UART console window through Tera Term (or your console emulator).

After Factory Reset, the RA6W2 reboots. The Easy Setup Wi-Fi configuration wizard appears automatically.

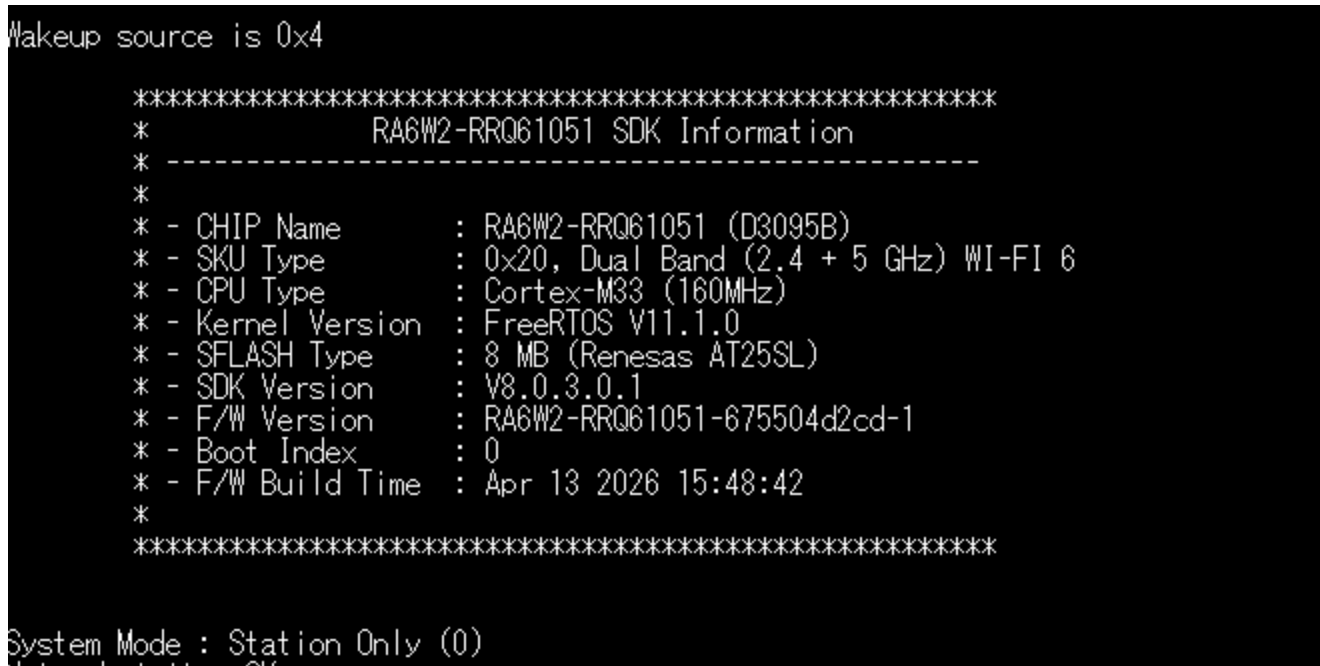


Figure 35. Reboot after factory reset

4.3.2 Setup for Station Mode

You can configure the Wi-Fi functions of the RA6W2 by running the Easy Setup Wi-Fi configuration wizard.

NOTE

In case of factory reset, the Easy Setup Wi-Fi configuration wizard appears and then follows the following prompts. If reconfiguring, complete the following step.

To configure the RA6W2 for operating in Station mode, open its debug console and run the `setup` command at the `[/RA6W2-RRQ61051]` prompt. To complete the setup, follow the following prompts:

```

[/RA6W2 -RRQ61051] setup //Start the Easy Setup Wizard.
Stop all services for the setting.
Are you sure ? [Yes/No] : Y //Enter Y to stop the services.
[ RA6W2 -RRQ61051 EASY SETUP - V4]
Country Code List:
AD AE AF AI AL AM AR AS AT AU AW AZ BA BB BD BE BF BG BH BL
BM BN BO BR BS BT BY BZ CA CF CH CI CL CN CO CR CU CX CY CZ
DE DK DM DO DZ EC EE EG ES ET EU FI FM FR GA GB GD GE GF GH
GL GP GR GT GU GY HK HN HR HT HU ID IE IL IN IR IS IT JM JO
JP KE KH KN KP KR KW KY KZ LB LC LI LK LS LT LU LV MA MC MD
ME MF MH MK MN MO MP MQ MR MT MU MV MW MX MY NG NI NL NO NP
NZ OM PA PE PF PG PH PK PL PM PR PY QA RE RO RS RU RW
SA SE SG SI SK SN SR SV SY TC TD TG TH TN TR TT TW TZ UA UG
UK US UY UZ VA VC VE VI VN VU WF WS YE YT ZA ZW ALL
COUNTRY CODE ? [Quit] (Default KR) : KR //Enter the country code.
SYSMODE(WLAN MODE) ?
1. Station
2. Soft-AP
3. WiFi Direct
4. WiFi Direct P2P GO Fixed
5. Station & Soft-AP
MODE ? [1/2/3/4/5/Quit] (Default Station) : 1 //Enter 1 for Station mode.
BAND ?
1. 2.4 GHz
2. 5 GHz
3. AUTO
MODE ? [1/2/3/Quit] (Default 3. AUTO) : 1 //Select Wi-Fi Frequency Band.
[ STATION CONFIGURATION ]
=====
[NO] [SSID] [SIGNAL] [CH] [SECURITY]
-----
[ 0] AndroidHotspot0568 -25 6 WPA2
[ 1] U+Net0208 -37 2 WPA2
[ 2] wonhome -49 11 WPA2
[ 3] SK_WiFiGIGA1200 -53 3 WPA / WPA2
[ 4] [Hidden] BSSID-0a:5d:dd:de:12:03 -54 3 WPA2
[ 5] DIRECT-GWM2020 Series -56 3 WPA2
[ 6] AT_303_WBEH2GT_a879 -66 11 WPA2
[ 7] olleh_WiFi_B602 -67 10 WPA / WPA2
[ 8] KT_GiGA_2G_Wave2_04A0 -70 6 WPA / WPA2
[ 9] KT_GiGA_2G_Wave2_99EB -79 6 WPA / WPA2
[10] anyppi -81 8 WPA2
-----
[Enter] Rescan
=====
Select SSID ? (1~11/Manual/Quit) : 0 //Enter the SSID NO from the list.
PSK-KEY(ASCII characters 8~63 or Hexadecimal characters 64) ? [Quit]
n
:***** //Enter the password for the AP.
Do you want to set advanced WiFi configuration ? [No/Yes/Quit] (Default No) : N
//Enter N to skip this step.
Enable DPM (Dynamic Power Management) ? [Yes/No/Manual/Quit] : N //Enter N to disable
DPM.
=====
BAND : 2.4 GHz
SSID : AndroidHotspot0568
Security : WPA2PSKENCIPHERING: TKIP/AES(CCMP)
Password: 123abc456
PMF : Default
WIFI CONFIGURATION CONFIRM ? [Yes/No/Quit] : Y //Enter Y to confirm the configuration.
IP Connection Type ? [Automatic IP/Static IP/Quit] : A //Enter A for automatic DHCP IP address.

```

```

IP Connection Type: Automatic IP
IP CONFIGURATION CONFIRM ? [Yes/No/Quit] : Y           //Enter Y to confirm the configuration.
SNTP Client enable ? [Yes/No/Quit] : N               //Enter N to disable time sync.
Connection COMPLETE to c8:9e:43:5f:e0:35
>>> Network Interface (wlan0) : UP
    Assigned addr   : 192.168.1.3
    netmask         : 255.255.255.0
    gateway         : 192.168.1.1
    DHCP Server IP  : 192.168.1.1
    Lease Time      : 24h 00m 00s
    Renewal Time    : 12h 00m 00s
    
```

The configuration is now complete and stored in NVRAM.
 For setting up in different modes, see [Appendix Appendix A Configuration Modes Setup](#).

4.3.3 Provision Wi-Fi Using Bluetooth® LE

Bluetooth® LE is available on the RA6W2 module. The RA6W2 module can be used in products such as "Wi-Fi door-lock" where Wi-Fi is the main connection used during normal operation. Bluetooth® LE is a support connection used to perform Wi-Fi provisioning during the initial "Out-of-the-Box" setup of the product. A Bluetooth® LE peer application such as an Android/iOS mobile application provides an interface to provision the Wi-Fi interface of the RA6W2 device by providing configuration information such as a Wi-Fi Home router's SSID, password, and server information.

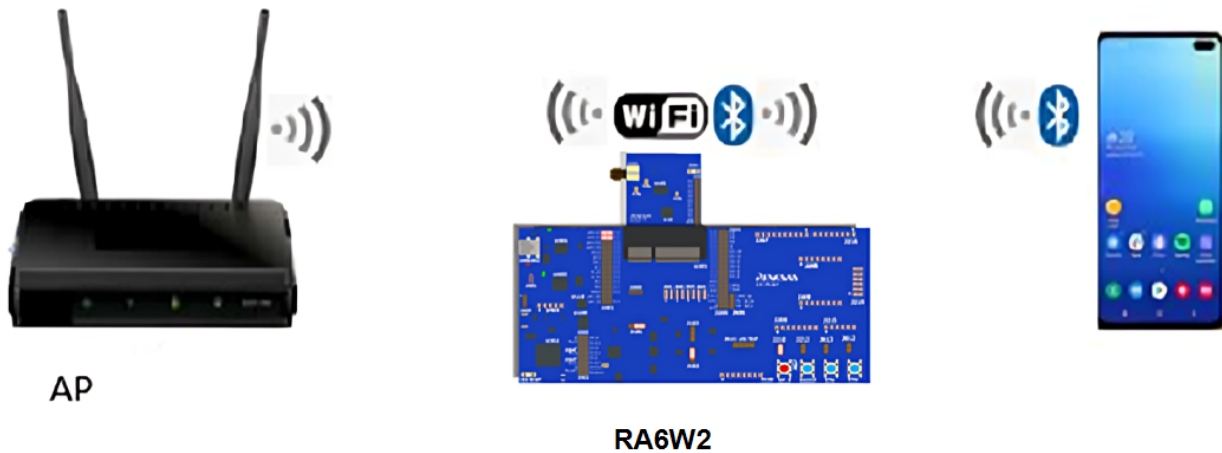


Figure 36. Provision through Bluetooth® LE diagram

To use the mobile application to provision the Wi-Fi connection on the RA6W2, see *RA6W2 FreeRTOS Wi-Fi Provisioning over Bluetooth® LE Manual*.

5. Test Procedures

The following sections describe several tests that verify the proper operation of the RA6W2 and demonstrates its various features.

The tests include:

- Throughput Test – demonstrates the Wi-Fi performance of the RA6W2.
- Current Consumption Measurements – demonstrates the amount of power used when the RA6W2 is in various Sleep modes or in Operational DPM mode.

5.1 Test Throughput with iPerf Traffic Generator

iPerf is a free IP-based a traffic generator tool that can be used for active measurements of the maximum achievable bandwidth on IP networks.

iPerf 2.1.3 (recommended) for Windows and Linux can be downloaded from

<https://sourceforge.net/projects/iperf2/files/>.

There are various test setup types that can be used for Wi-Fi throughput tests:

- **Conducted** – uses RF cables to connect the communicating devices. This effectively eliminates issues caused by the wireless domain.
- **Wireless/Over the Air** – uses antennas connected to the station and access point, as opposed to RF cables, thus introducing additional elements and better replicating real-life usage.
- **Hybrid (Wireless plus Attenuation Control)** – is the same as a wireless test setup, using antennas, but digital attenuators are also introduced as part of the signal path between the AP's RF ports and antennas. This allows for total control over the RSSI, replicating varying distance between the Access Point and Station.

The provided examples work in any of the above scenarios.

NOTE

For clean and accurate results, Renesas recommends using an anechoic RF chamber for any of the mentioned tests. Also use a dedicated Access Point for tests. If iPerf does not work and the issue is related to firewall restrictions, contact IT department.

5.1.0.1 Configure Testbed

To configure the Testbed:

1. Download iPerf 2.1.3 from <https://sourceforge.net/projects/iperf2/files/>.
2. Create a folder called "iperf" in the C:\ directory.
3. Unzip the downloaded iPerf file (if necessary) and move the contents to the "iperf" folder.
4. Rename the downloaded iperf executable file from "iperf-2.1.3-win.exe" to "iperf.exe".
5. To ensure stable iPerf testing, run the Windows Security APP and turn off the network firewall. It is recommended to disable the laptop from all network firewalls before attempting a test.

To set up the Test Environment after setting up the iPerf:

1. Connect your computer to the LAN port of an Access Point (such as the Asus RT-AX88U) through an ethernet cable.

The computer should receive an automatic IP address from the Access Points DHCP server. If the Access Point is configured to not provide automatic IP addresses, make sure to manually configure your computer to use a suitable IP address and subnet mask. Make sure that the computer is not connected to any other networks over ethernet or Wi-Fi.
2. Connect EK-RA6W2 EVK wirelessly to the same Access Point.
3. Connect EK-RA6W2 EVK wirelessly to the same Access Point SSID.
4. To verify a properly configured connection, ping the RA6W2 from your computer or ping it from the RA6W2 to your computer.

```
net
ping <destination IP address>
```

5.1.1 EK-RA6W2 as iPerf Client

The provided UDP uplink iPerf example can be used to primarily evaluate TX throughput speeds.

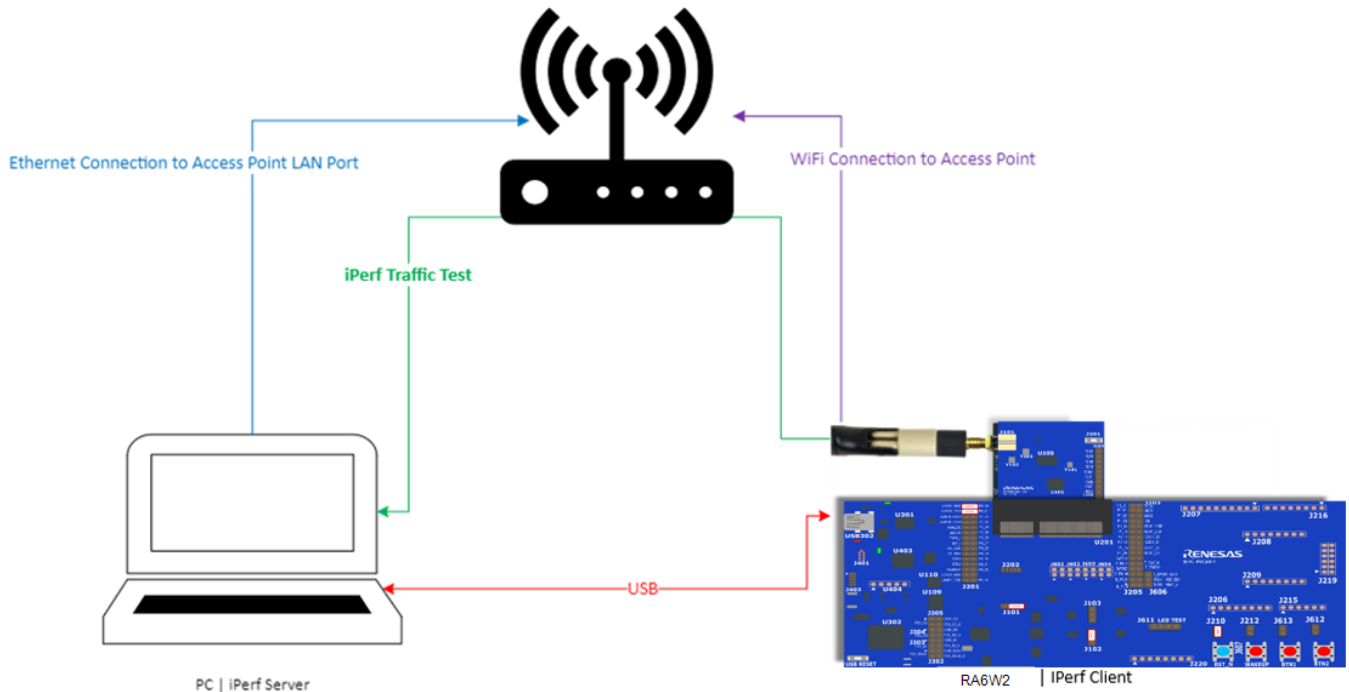


Figure 37. UDP uplink iPerf example

To configure as iPerf server for Windows:

1. Start an iPerf Server on your laptop by opening the command prompt and navigating to the directory in which iPerf is located.
2. Type "ipconfig" in the command prompt to see your laptop's IP address.

```
Ethernet adapter Ethernet:

Connection-specific DNS Suffix . : thinkpalm.lan
Link-local IPv6 Address . . . . . : fe80::343:1650:a9:29f6%14
IPv4 Address. . . . . : 172.27.10.72
Subnet Mask . . . . . : 255.255.255.0
Default Gateway . . . . . : 172.27.10.100
```

Figure 38. IP address

3. Start the UDP server in the Windows command prompt.

```
iperf.exe -s -i1 -u
```

```
C:\Users\itamar.ben.amitai\Downloads\iperf-2.0.10-win>iperf.exe -s -i1 -u
-----
Server listening on UDP port 5001
Receiving 1470 byte datagrams
UDP buffer size: 64.0 KByte (default)
-----
```

Figure 39. Start UDP

To run traffic from the EK-RA6W2 to the iPerf server on the Windows computer:

1. Select the network Command mode, in the **Tera Term** console, by typing the `net` command.
2. Start the UDP client:

```
iperf -I WLAN0 -c <Server IP> -t 10 -i 1 -u
```

3. Read the throughput measurements from the iPerf server window.

```
[/RRQ61400/net] # iperf -I WLAN0 -c 192.168.50.224 -i 1 -u
[/RRQ61400/net] #
[UDP] Tx Test <Client> ==> 192.168.50.224:5001
[UDP] Tx: [No ] [Interval] [Transfer] [Bandwidth] [Dst IP:Port]
[UDP] Tx: [0001] 0.00- 1.00 1.011 MBytes 8.490 Mbits/sec 192.168.50.224:5001
[UDP] Tx: [0002] 1.00- 2.00 957.509 KBytes 7.843 Mbits/sec 192.168.50.224:5001
[UDP] Tx: [0003] 2.00- 3.00 1.143 MBytes 9.595 Mbits/sec 192.168.50.224:5001
[UDP] Tx: [0004] 3.00- 4.00 1.041 MBytes 8.737 Mbits/sec 192.168.50.224:5001
[UDP] Tx: [0005] 4.00- 5.00 1.002 MBytes 8.419 Mbits/sec 192.168.50.224:5001
[UDP] Tx: [0006] 5.00- 6.00 1.134 MBytes 9.525 Mbits/sec 192.168.50.224:5001
[UDP] Tx: [0007] 6.00- 7.00 1.080 MBytes 9.066 Mbits/sec 192.168.50.224:5001
[UDP] Tx: [0008] 7.00- 8.00 1.028 MBytes 8.631 Mbits/sec 192.168.50.224:5001
[UDP] Tx: [0009] 8.00- 9.00 1.086 MBytes 9.125 Mbits/sec 192.168.50.224:5001
[UDP] Tx: [0010] 9.00-10.00 946.025 KBytes 7.749 Mbits/sec 192.168.50.224:5001
[UDP] Tx: [Total] 0.00-10.05 10.394 MBytes 8.711 Mbits/sec 192.168.50.224:5001
```

Figure 40. Start UDP client

```
C:\iperf>iperf.exe -s -i1 -u
-----
Server listening on UDP port 5001
Receiving 1470 byte datagrams
UDP buffer size: 64.0 KByte (default)
-----
[376] local 192.168.50.224 port 5001 connected with 192.168.50.156 port 54093
[ ID] Interval Transfer Bandwidth Jitter Lost/Total Datagrams
[376] 0.0- 1.0 sec 993 KBytes 8.14 Mbits/sec 2.014 ms 0/ 692 (0%)
[376] 1.0- 2.0 sec 956 KBytes 7.83 Mbits/sec 2.398 ms 0/ 666 (0%)
[376] 2.0- 3.0 sec 1.14 MBytes 9.56 Mbits/sec 2.153 ms 0/ 813 (0%)
[376] 3.0- 4.0 sec 1.04 MBytes 8.74 Mbits/sec 2.949 ms 0/ 743 (0%)
[376] 4.0- 5.0 sec 1.01 MBytes 8.44 Mbits/sec 1.284 ms 2/ 720 (0.28%)
[376] 5.0- 6.0 sec 1.13 MBytes 9.48 Mbits/sec 2.472 ms 0/ 806 (0%)
[376] 6.0- 7.0 sec 1.09 MBytes 9.10 Mbits/sec 2.677 ms 0/ 774 (0%)
[376] 7.0- 8.0 sec 1.03 MBytes 8.62 Mbits/sec 2.246 ms 0/ 733 (0%)
[376] 8.0- 9.0 sec 1.09 MBytes 9.11 Mbits/sec 3.200 ms 0/ 775 (0%)
[376] 9.0-10.0 sec 947 KBytes 7.76 Mbits/sec 4.265 ms 0/ 660 (0%)
[376] 0.0-10.0 sec 10.4 MBytes 8.69 Mbits/sec 2.781 ms 3/ 7416 (0.04%)
```

Figure 41. Measurements

5.1.2 EK-RA6W2 as iPerf Server

The provided UDP downlink iPerf example can be used to primarily evaluate RX throughput speeds.

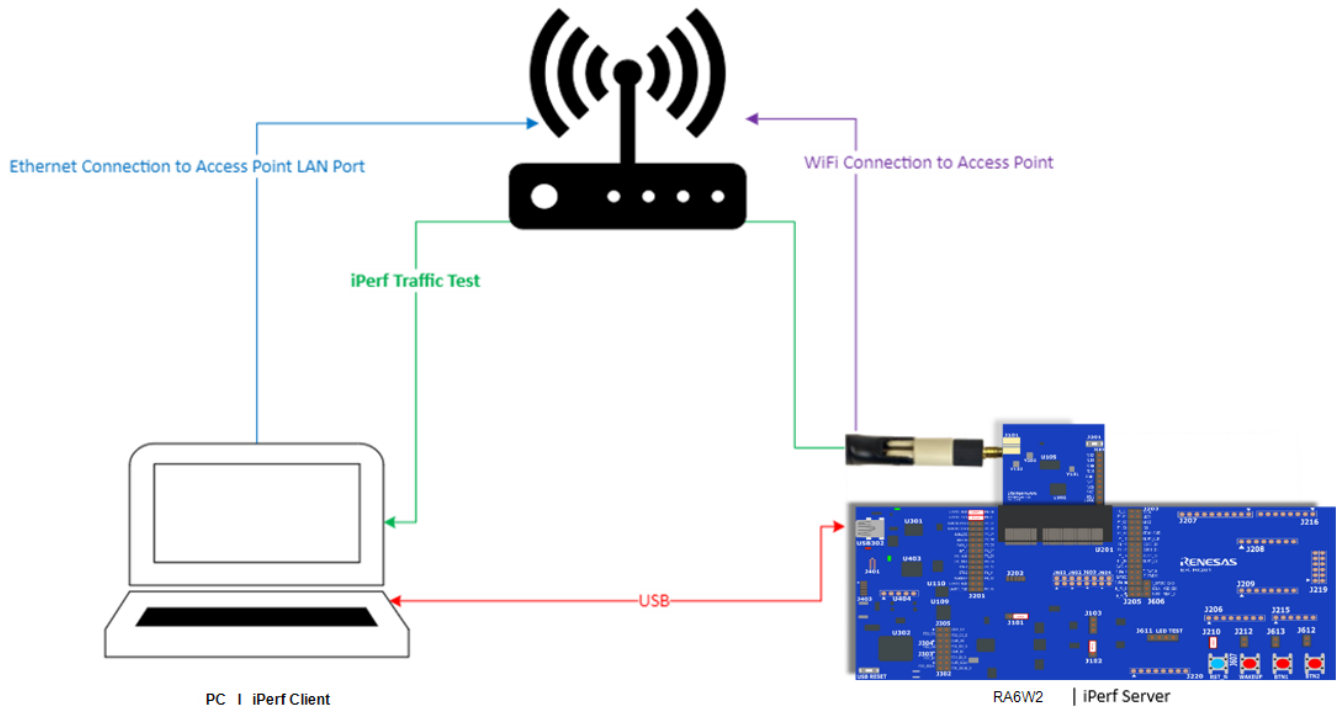


Figure 42. UDP downlink iPerf example

To configure EK-RA6W2 as iPerf Server

1. To select the network command mode, type the net command in the **Tera Term** console.
2. Start the UDP server:

```
iperf -I WLAN0 -s -u -i 1
```

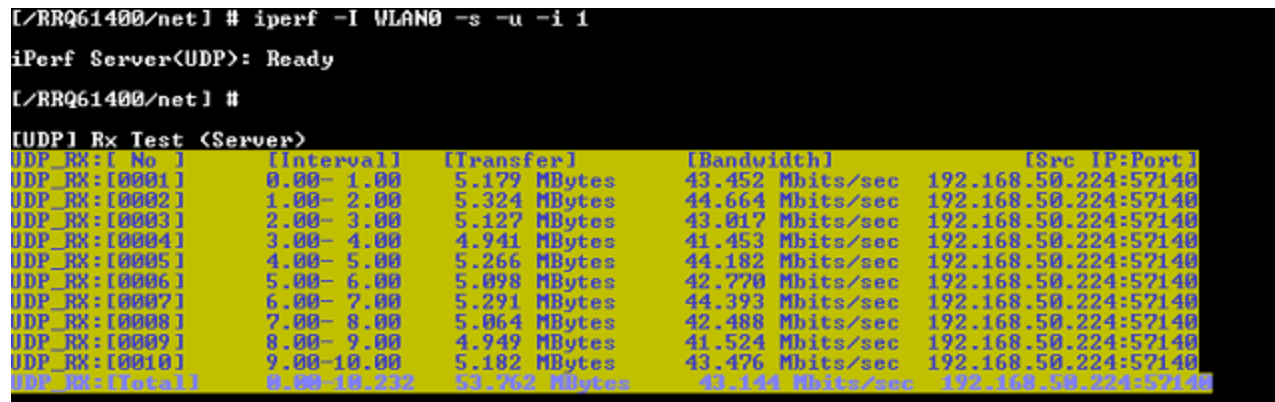


Figure 43. Start UDP

To run Traffic from Windows Computer as iPerf Client:

1. Close the existing command prompt on the laptop running the UDP server.
2. Open the command prompt and navigate to the directory where iPerf is located.
3. Start the UDP client in the Windows command prompt:

```
iperf.exe -c <Server IP> -t 10 -i 1 -u -b100m
```

```
C:\iperf>iperf.exe -c 192.168.50.156 -i 1 -u -b100m
-----
Client connecting to 192.168.50.156, UDP port 5001
Sending 1470 byte datagrams, IPG target: 117.60 us (kalman adjust)
UDP buffer size: 64.0 KByte (default)
-----
[376] local 192.168.50.224 port 57140 connected with 192.168.50.156 port 5001
[ ID] Interval      Transfer      Bandwidth
```

Figure 44. Start UDP client

5.2 Measure Current Consumption

NOTE

Current consumption measurement through SmartSnippets is available only after releasing the latest EVK.

There are numerous available methods for measuring current consumption to evaluate the power save performance of different Sleep modes and DPM configurations. Currently measurements are supported only for the Wi-Fi part of the RA6W2.

The following instructions explain how to perform such measurements using the SmartSnippets Toolbox or a standard power analyzer and focus measuring current consumption in forced Sleep modes and DPM mode.

5.2.1 PMGR Sleep Mode CLI Commands

RA6W2 can be configured to temporarily enter Power Manager (PMGR) Sleep mode 2 to Sleep mode 3 for a 5 second duration through CLI commands (custom durations are not yet supported).

```
pmgr force
- Usage: force [lld_states: PMGR_LLD_POWER_MODE_SLEEP2, PMGR_LLD_POWER_MODE_SLEEP3, PMGR_LLD_POWER_MODE_SLEEP4, PMGR_LLD_POWER_MODE_DPM, PMGR_LLD_POWER_MODE_CPU_WFI, PMGR_LLD_POWER_MODE_AUTO]
```

Example:

```
pmgr force PMGR_LLD_POWER_MODE_SLEEP3
```

To prepare SmartSnippets Toolbox:

1. Download and install the latest version of the SmartSnippets Toolbox for current measurement from the Renesas Product webpage or from the provided evaluation Software package.

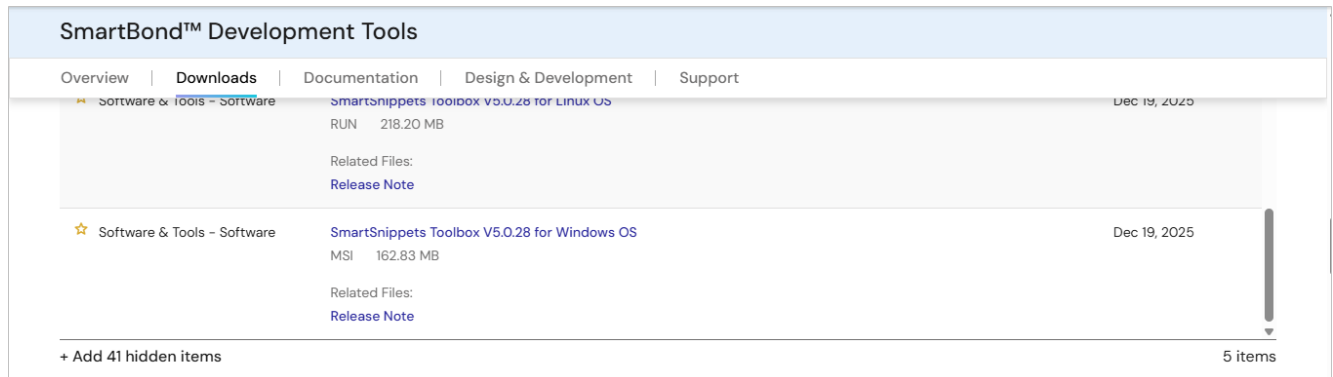


Figure 45. SmartSnippets toolbox

2. Connect jumpers between the pins highlighted in red in Figure 46. LED light turns on when jumper J102 is set.

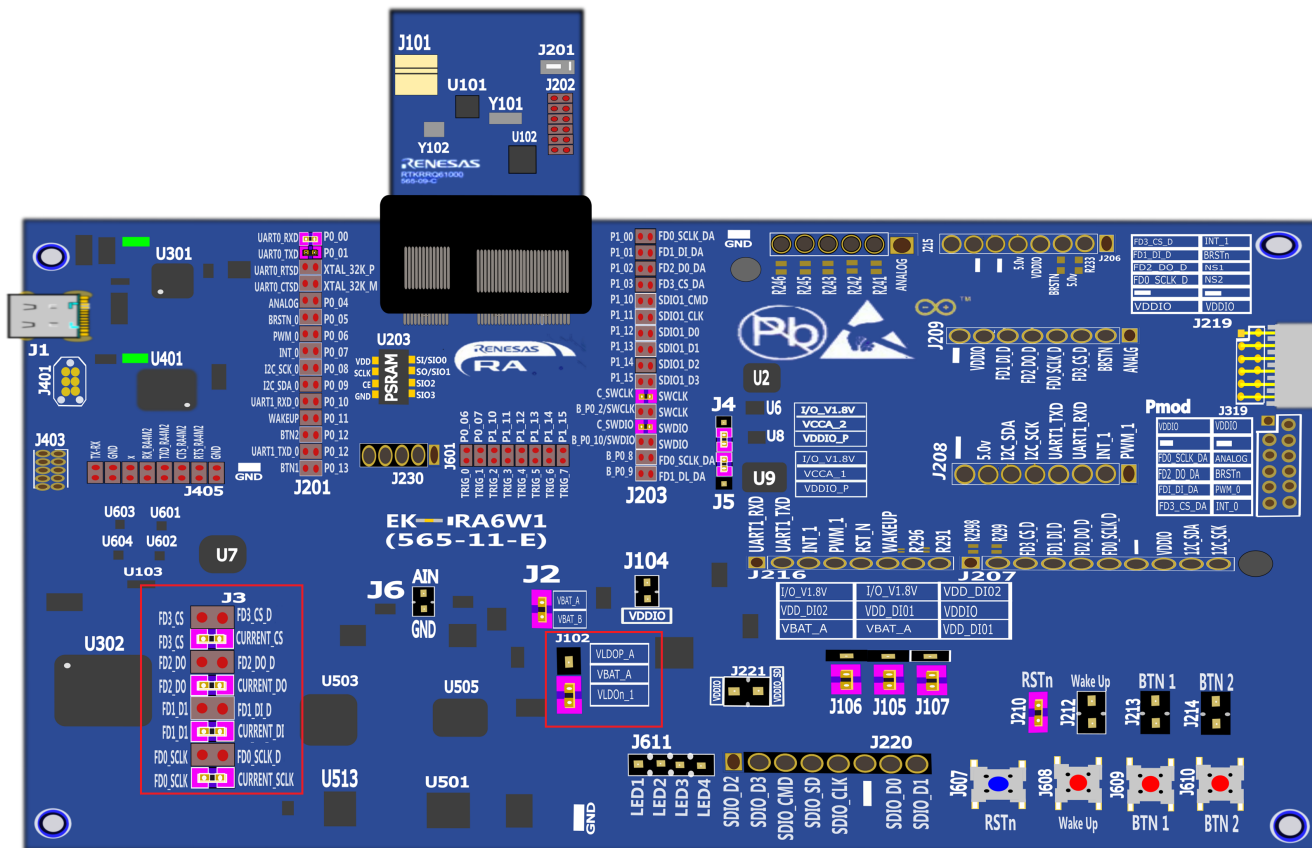


Figure 46. Jumper setting

3. Connect the EVK to your computer through USB.

5.2.2 Measure with SmartSnippets

To measure the current consumption with SmartSnippets:

1. Disassemble the RA6W2 daughterboard from the motherboard and power up the EVK through USB to your computer.
2. Close any open instances of the UART COM port.
3. Open SmartSnippets Toolbox on your computer.
4. Select **Board > Device > RA6W2_WI-FI**.

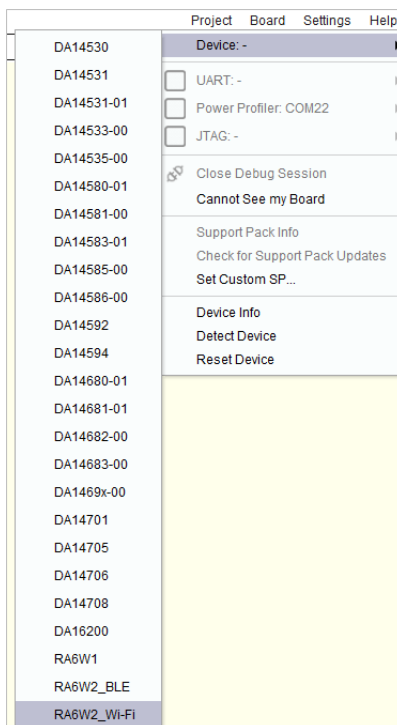


Figure 47. RA6W2 device

5. On the **Chart View** tab, select **VBAT_WI-FI** and **CH1/CH2 Charge** checkboxes.

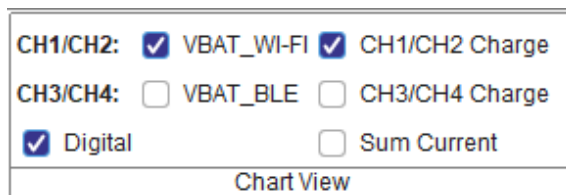


Figure 48. Chart View tab

You should see the VBAT Wi-Fi – CH1/CH2 current measurement window.

6. Identify the EK-RA6W2-related COM ports through the Windows Device Manager.
7. Based on the identified pair of COM ports belonging to the RA6W2 EVK (in this case COM21 and COM22), select the following configurations:

- Press down the **RST_N** (Reset) button on the RA6W2. If the board has previous connection to an AP, it automatically re-connects.

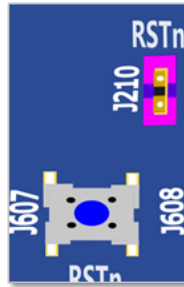


Figure 52. Reset button

- In SmartSnippets, select **Start**.
- Connect to the console through UART using Tera Term, see [Section 4.2 EK-RA6W2 Serial Debug Interface Configuration](#).
- In the UART console, select the needed configuration:
 Example:
 Configure the RA6W2 as in **Station + DPM mode** (see [Appendix A.3 Set up Station Mode with DPM Enabled](#)).
 //OR//
 Enter **forced sleep modes (2 or 3)** by using the following command syntax: "pmgr force <mode>"

```
pmgr force PMGR_LLD_POWER_MODE_SLEEP3
```
- In SmartSnippets, select **Stop**.
- To measure the average current consumption over a selected period, on the **Tools** tab, click **Measure**.
- Click and drag the measurement cursor over the section that you want measure in the top screen (CH1/CH2 Current – VBAT) and read the "Iav" measurement for the average current between the selected measurement points.

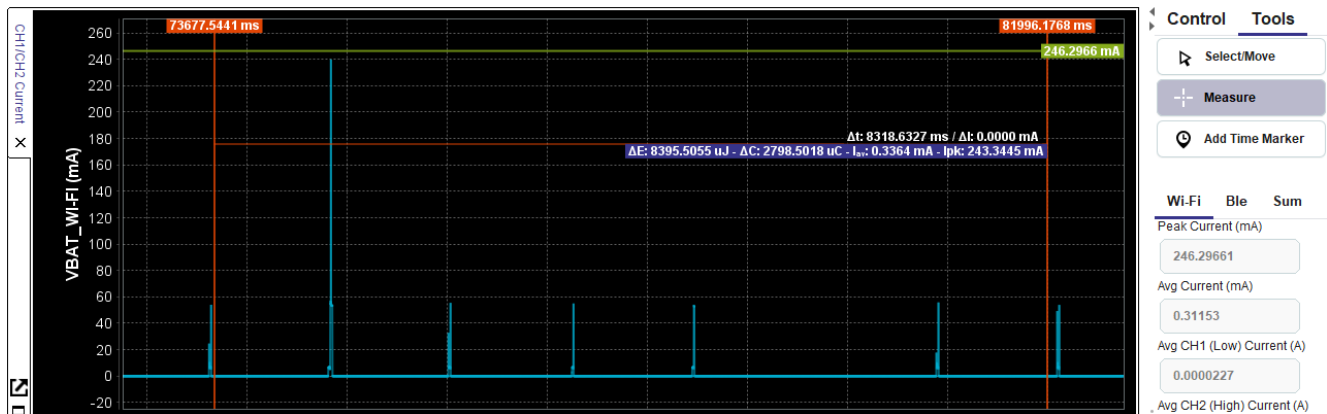


Figure 53. Measurement points

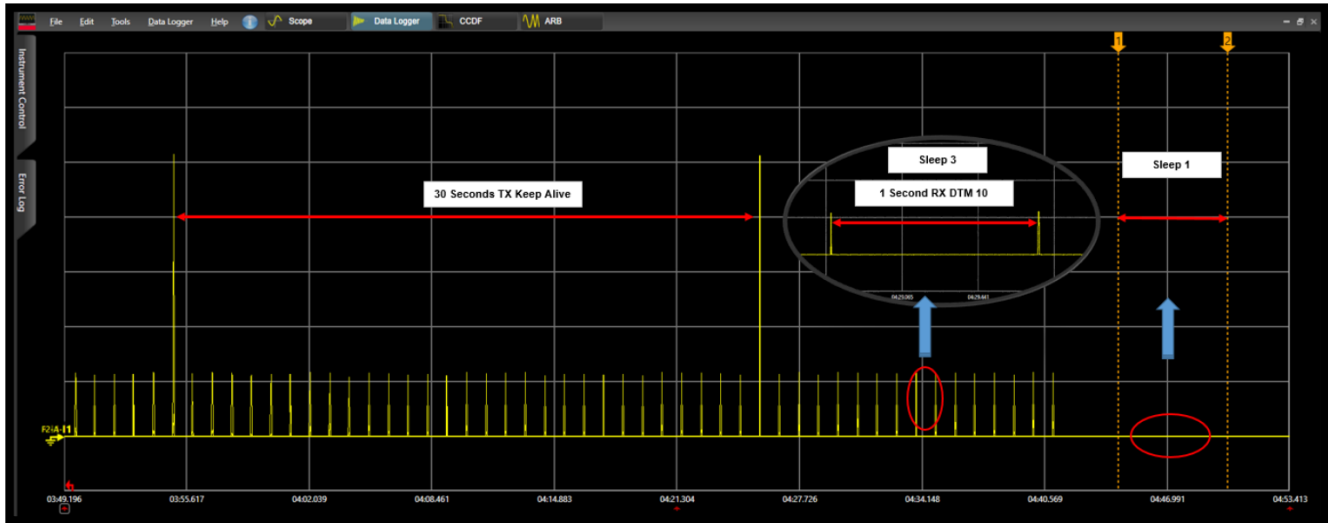


Figure 55. Measurements

5.2.4 Measure Sleep 1 Current Consumption

Measuring the current consumption for Sleep 1 follows the same process as described in [Section 4.3.2 Setup for Station Mode](#) and [Appendix A.1 Set up Soft AP Mode](#), but it does not require any configuration in the CLI. The following modifications are needed in the test setup to force the device to Sleep 1 Mode:

1. Remove the pull-up on the RST of the daughterboard.

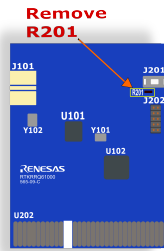


Figure 56. Remove resistor

2. Remove the J210 jumper on the motherboard.
3. Connecting a jumper between the GND and J210 RST_N pins.

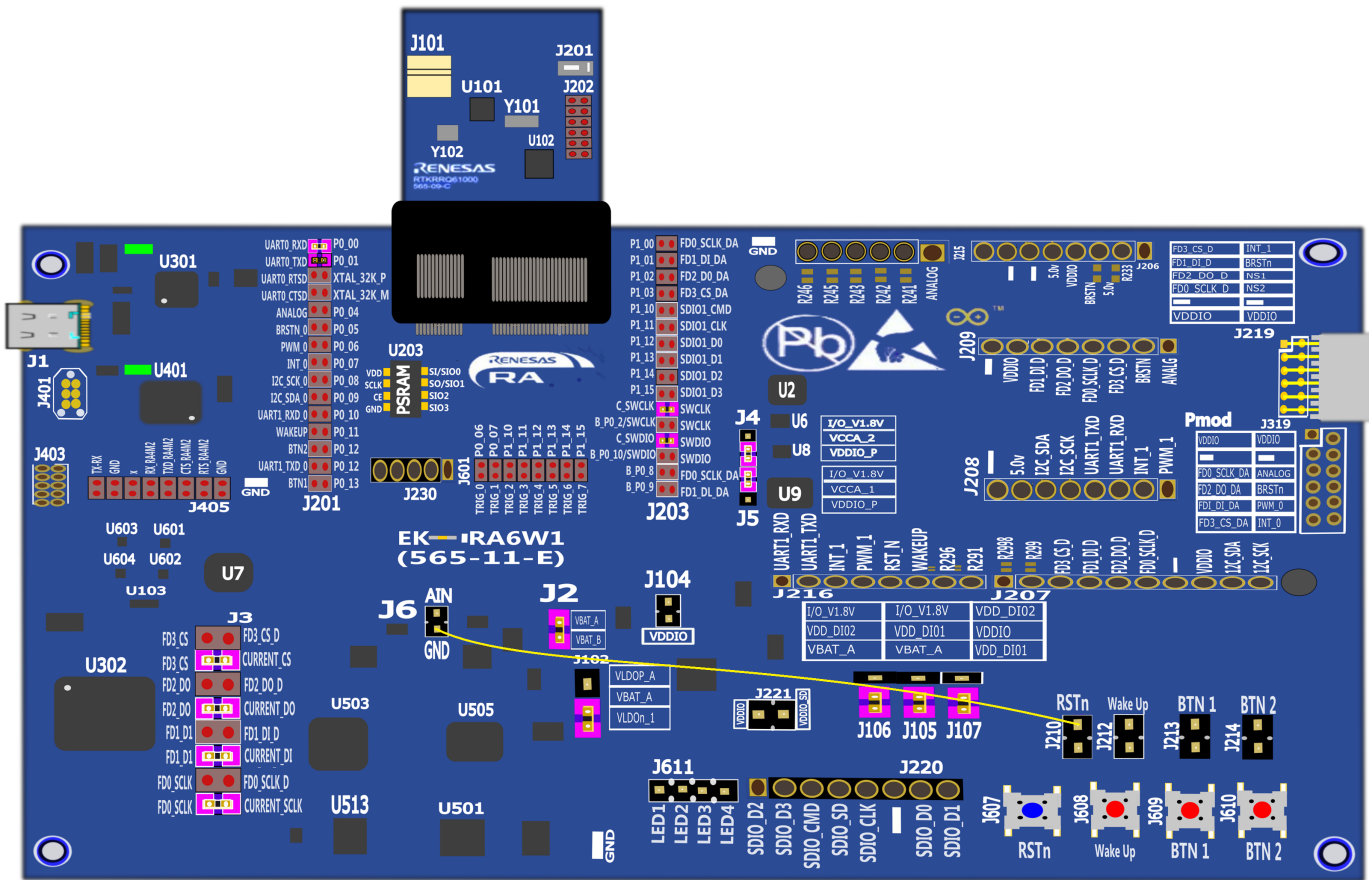


Figure 57. Connecting jumper between pins

5.2.5 Power Consumption Measurement for Combo (RA6W2/RRQ61051 Wi-Fi Only)

Current measurement can be performed with external equipment by connecting pins **VLDOP_A** and **VBAT_A** to J102:

1. Remove jumper from J2.
2. Set wire connection between J104 pin 1 and J2 pin 1.

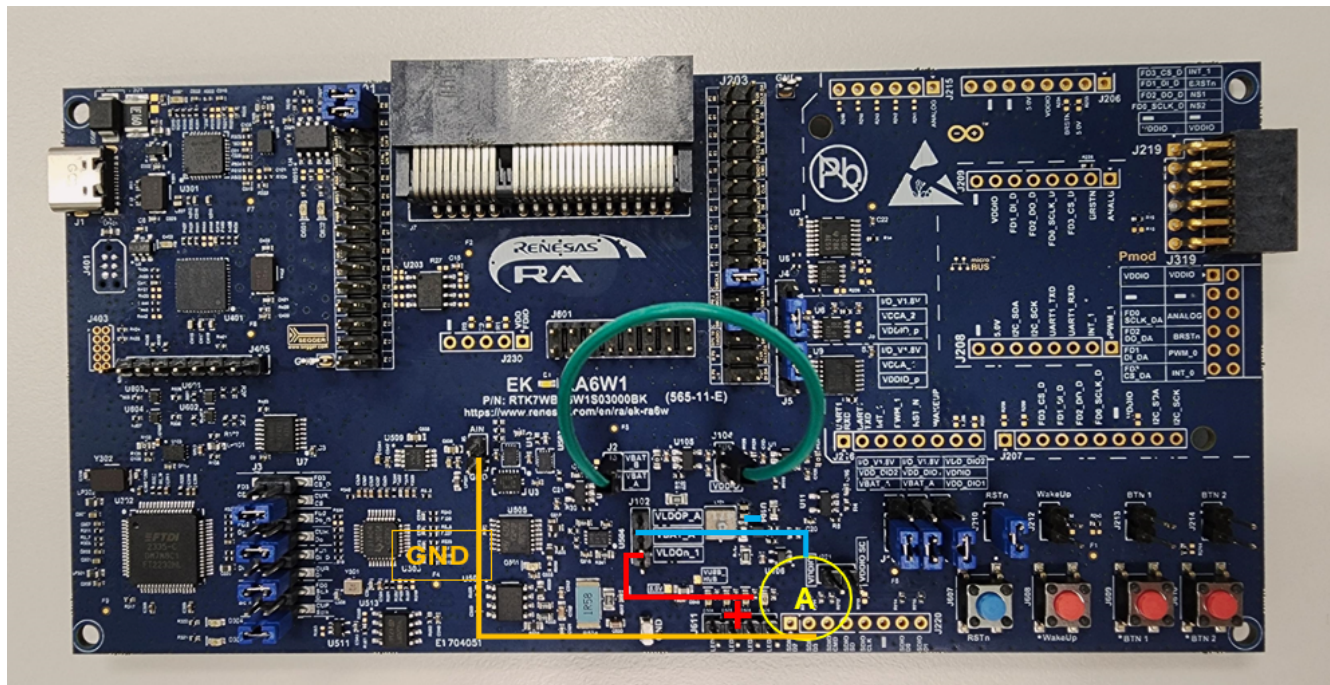
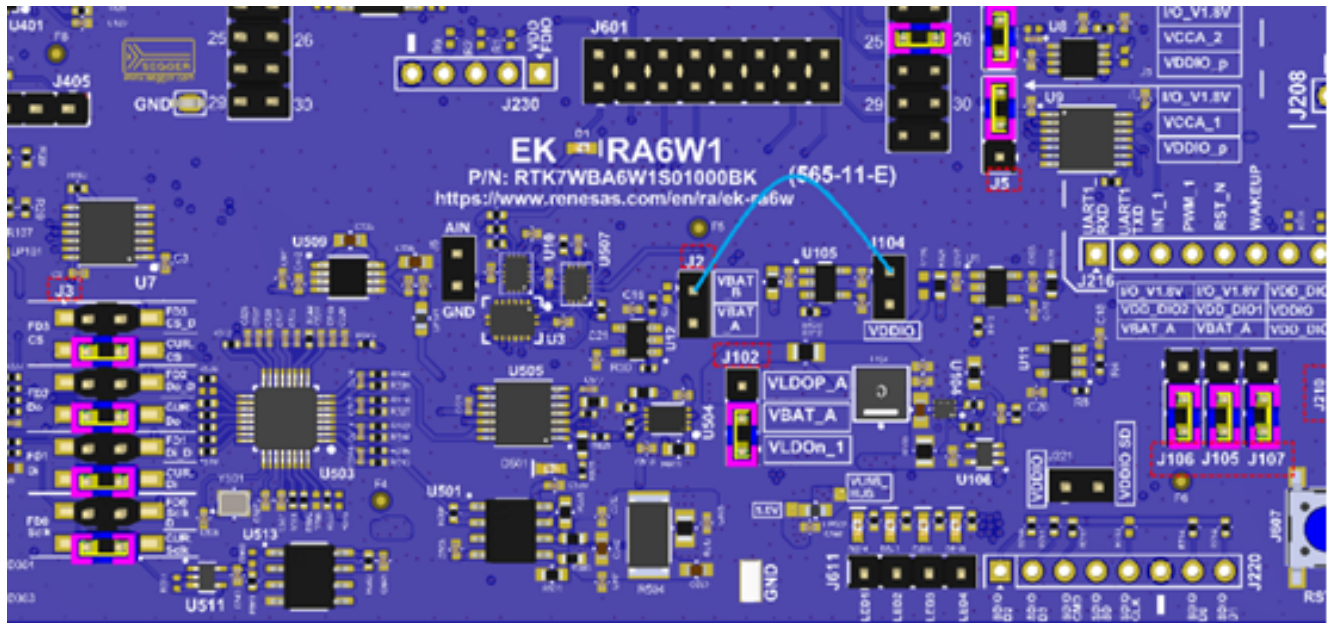


Figure 58. Connecting jumper between pins RA6W2/RRQ61051 Wi-Fi only

5.2.6 Power Consumption Measurement for Combo (RA6W2/RRQ61051 Bluetooth LE only)

Current measurement can be performed with external equipment by connecting to J2:

- Place jumper on pins 2 and 3 of J102.

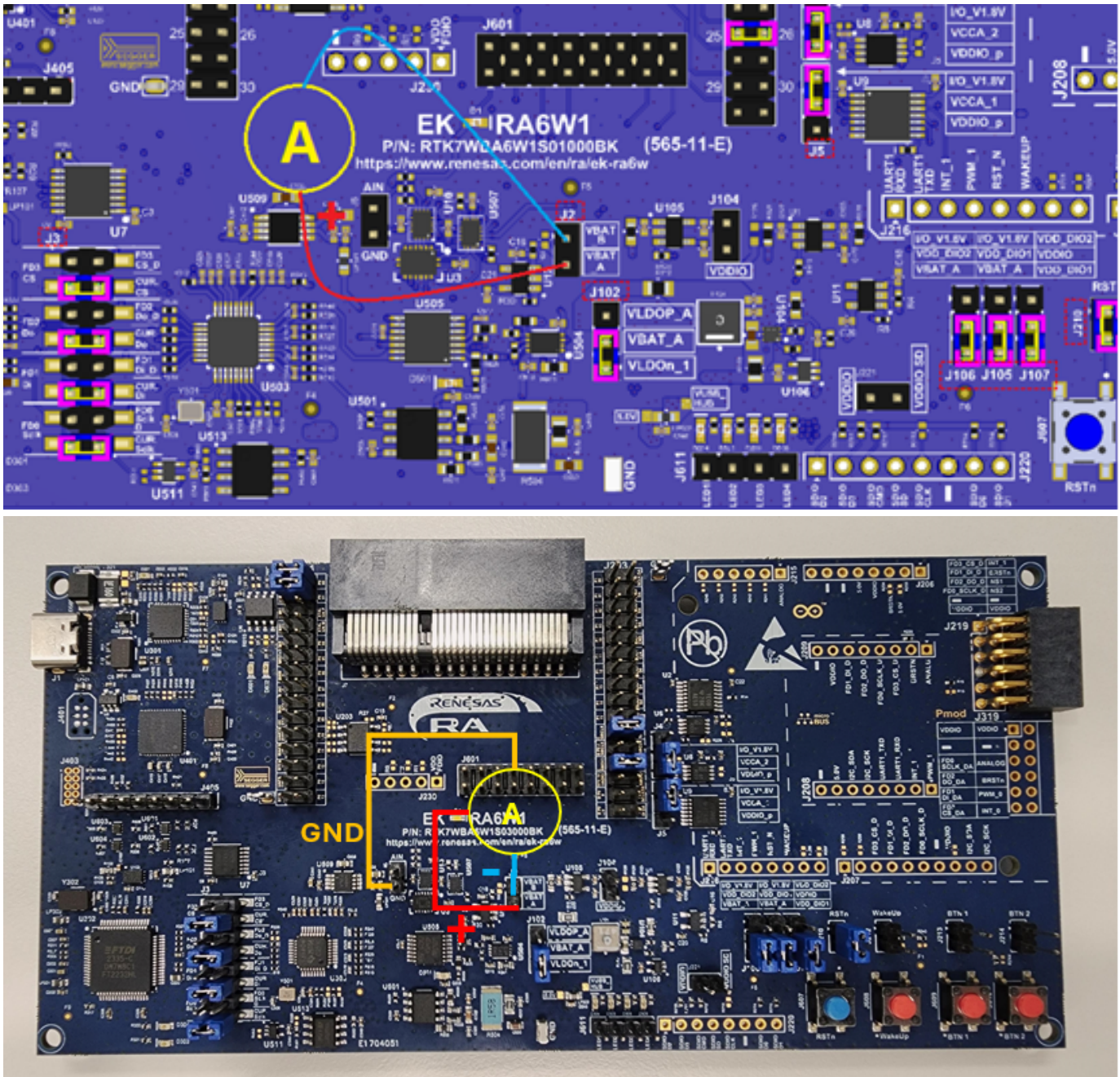


Figure 59. Connecting jumper between pins RA6W2/RRQ61051 Bluetooth LE only

6. Software Development Kit and Build Setup

Wi-Fi applications can be developed for the RA6W2 using the RA6W2 FreeRTOS Software Development Kit (SDK) and the Renesas e² studio IDE on either a Windows 10, Linux or macOS based development system.

To start developing applications for the RA6W2, complete the following steps:

1. Install and configure the e² studio IDE.
2. Import the RA6W2 SDK into the e² studio IDE and build an application.
3. Download and test the application.
4. Use J-Link debugger to debug the application.

Figure 61 shows the typical e² studio project for the RA6W2 FSP.

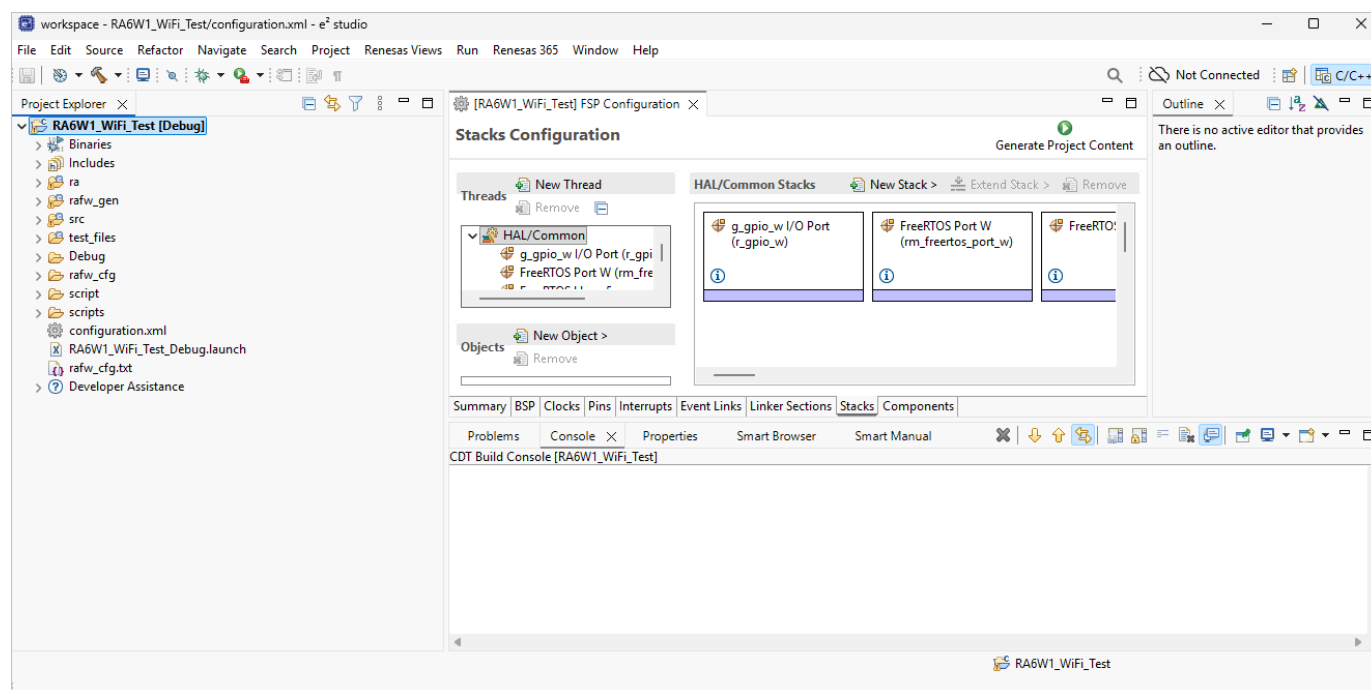


Figure 61. Project view

System requirements:

- Windows 10 64 bit or later versions
- Ubuntu 22.04 LTS or later versions
- macOS 14 (Sonoma) or later versions
- e² studio installer-2025-12 or later versions.

6.1 Install e² studio IDE for Windows

The following files are required for installation in Windows and can be found in the RA6W2 Software and Tools section in product page:

- e² studio installer – e2studio_installer-2025-12_windows_host.exe.
- RA6W2 FSP pack – RAFW_FSP_Packs_2.0.1.
- J-Link V878 or later.

To install e² studio IDE for Windows:

1. Run the installer, in the **e²studio** setup wizard, select **Standard Install**, and then select **Next**.

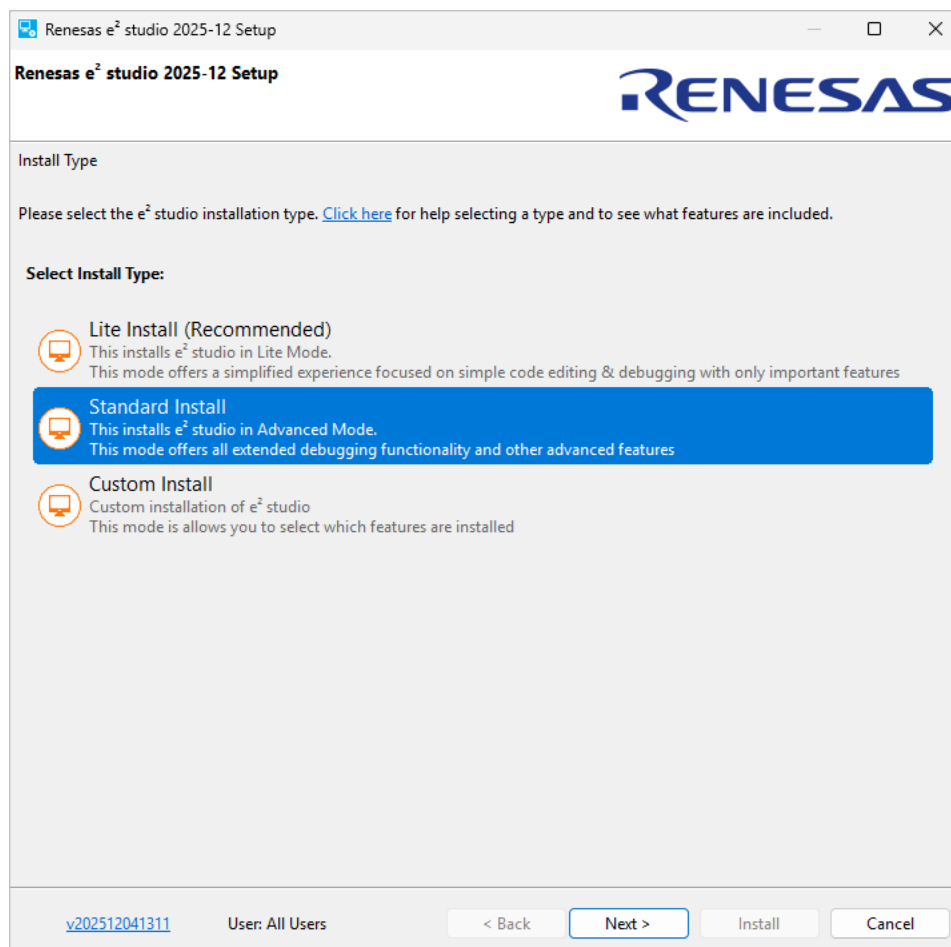


Figure 62. Standard installation

2. On the **Device Families** step, select **RA for Wireless**.

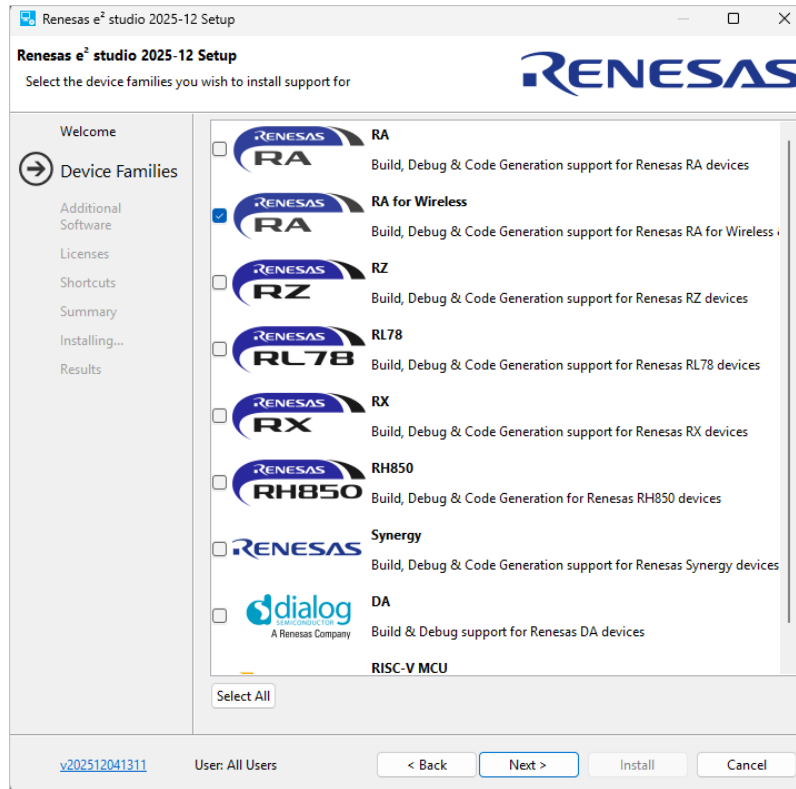


Figure 63. Device families

- On the **Additional Software** step, expand **GCC Toolchains and Utilities**, select the **GNU ARM Embedded 13.3** checkbox, and click **Next**.

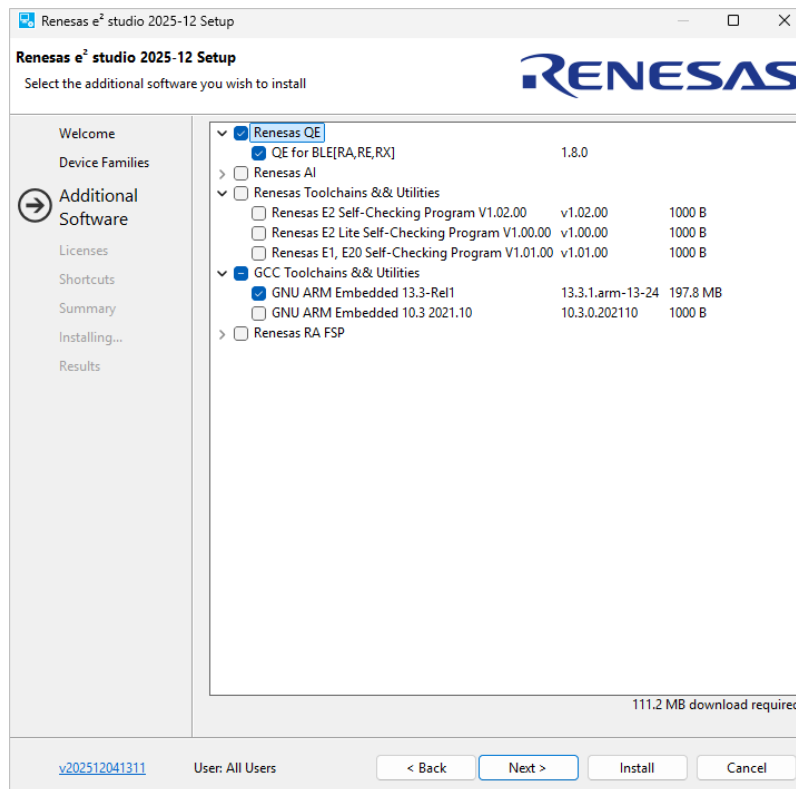


Figure 64. Additional software

- 4. On the **Licenses** step, accept the terms of the software agreement by selecting the checkbox, and click **Next**.
- 5. On the **Shortcuts** step, click **Next**.

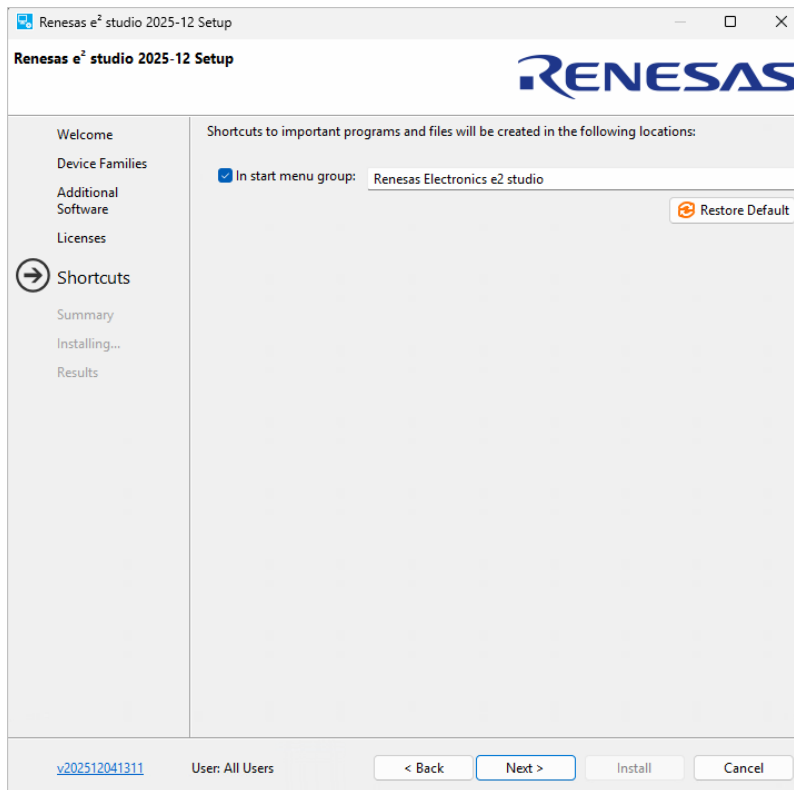


Figure 65. Shortcuts

- 6. On the **Summary** step, click **Install**.

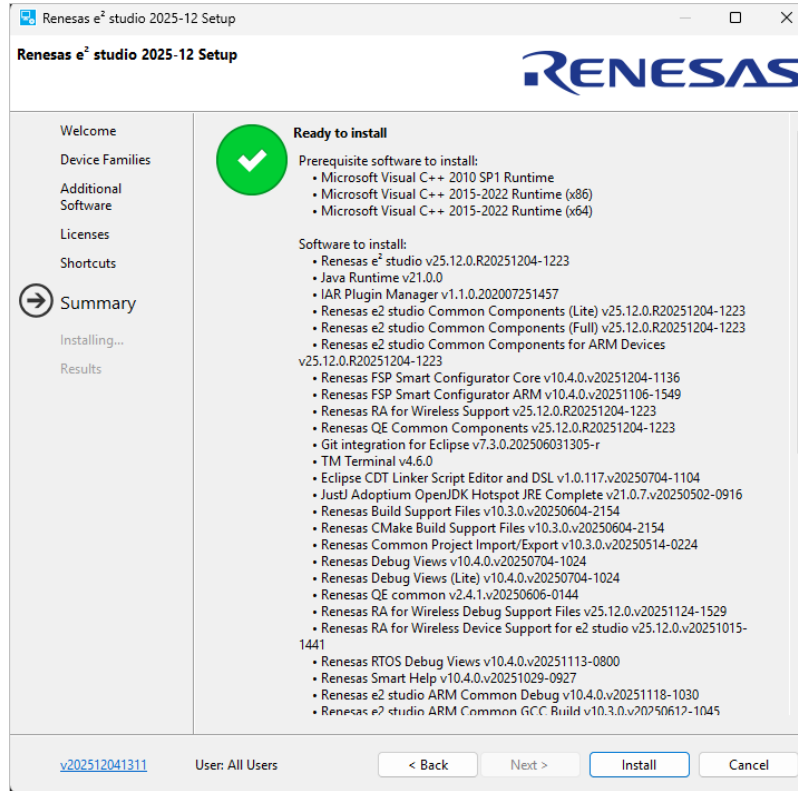


Figure 66. Ready to install

7. While installing e² studio, GNU Arm[®] Embedded 13.3 toolchain installation initializes.

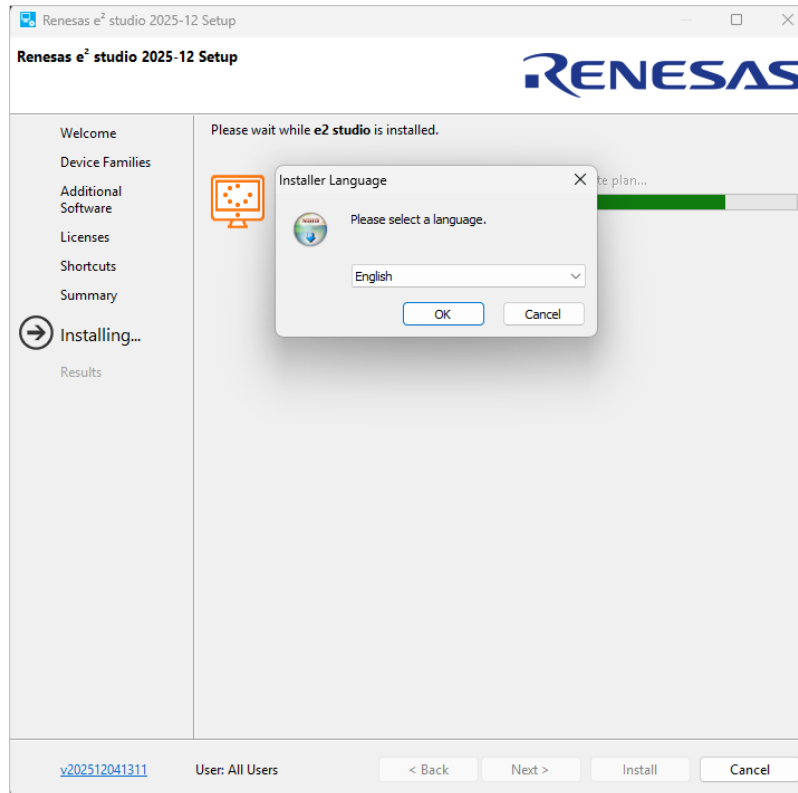


Figure 67. Toolchain installation

8. Complete the toolchain installation.

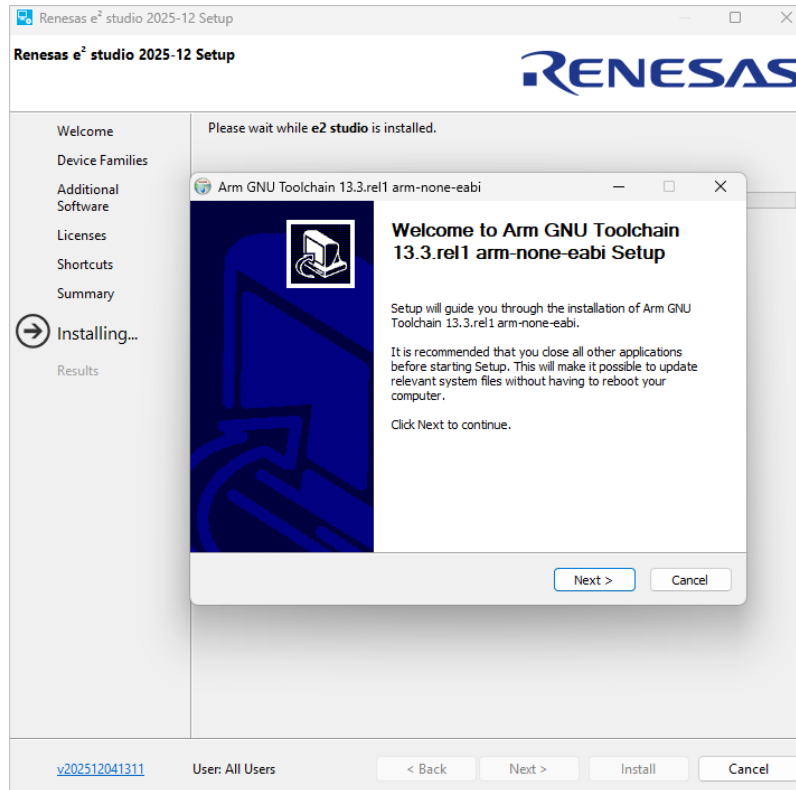


Figure 68. Toolchain setup wizard

- 9. When the e² studio is installed, select the **Launch e² studio** checkbox and click **OK**.
- 10. Open e² studio and continue with installing the RA6W2 FSP pack.

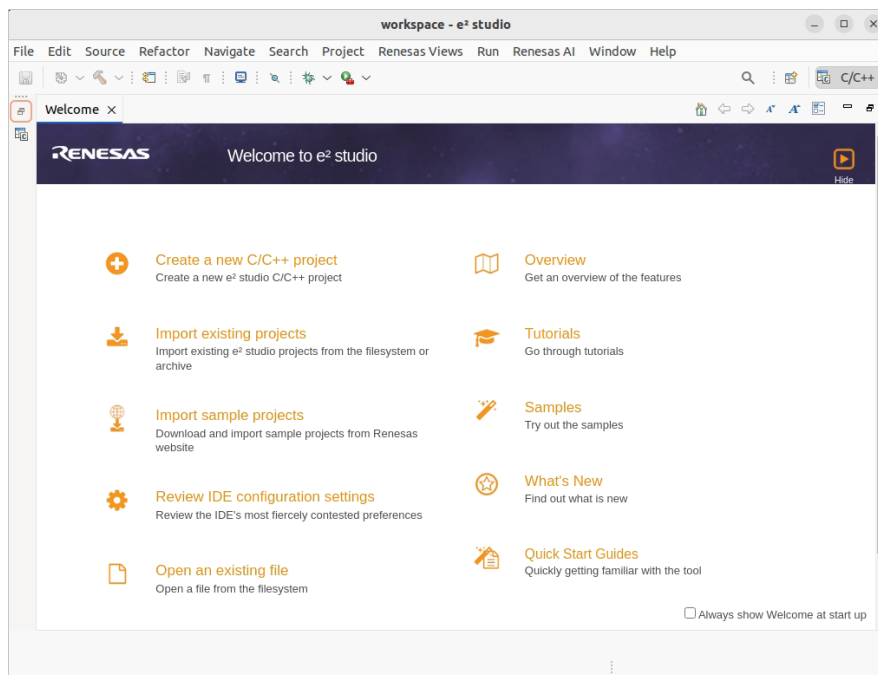


Figure 69. Welcome to e² studio

6.2 Install e² studio IDE for Linux

The following files are required for installation for Linux and can be found in the RA6W2 Software and Tools section in product page:

- e² studio installer – e2studio_installer-2025-12_linux_host.run.
- RA6W2 FSP pack – RAFW_FSP_Packs_2.0.1.
- J-Link V878 or later.

To install e² studio IDE for Linux:

1. Give the execution permissions to the e² studio installer and run installer, see [Figure 70](#).

```
developer@TVMA-WKS0193:~/Downloads$ chmod +x e2studio_installer-2025-12_linux_host.run
developer@TVMA-WKS0193:~/Downloads$ ./e2studio_installer-2025-12_linux_host.run
Verifying archive integrity... 100% MD5 checksums are OK. All good.
```

Figure 70. Installer

2. In the e²studio setup wizard, select **Standard Install**, and select **Next**.

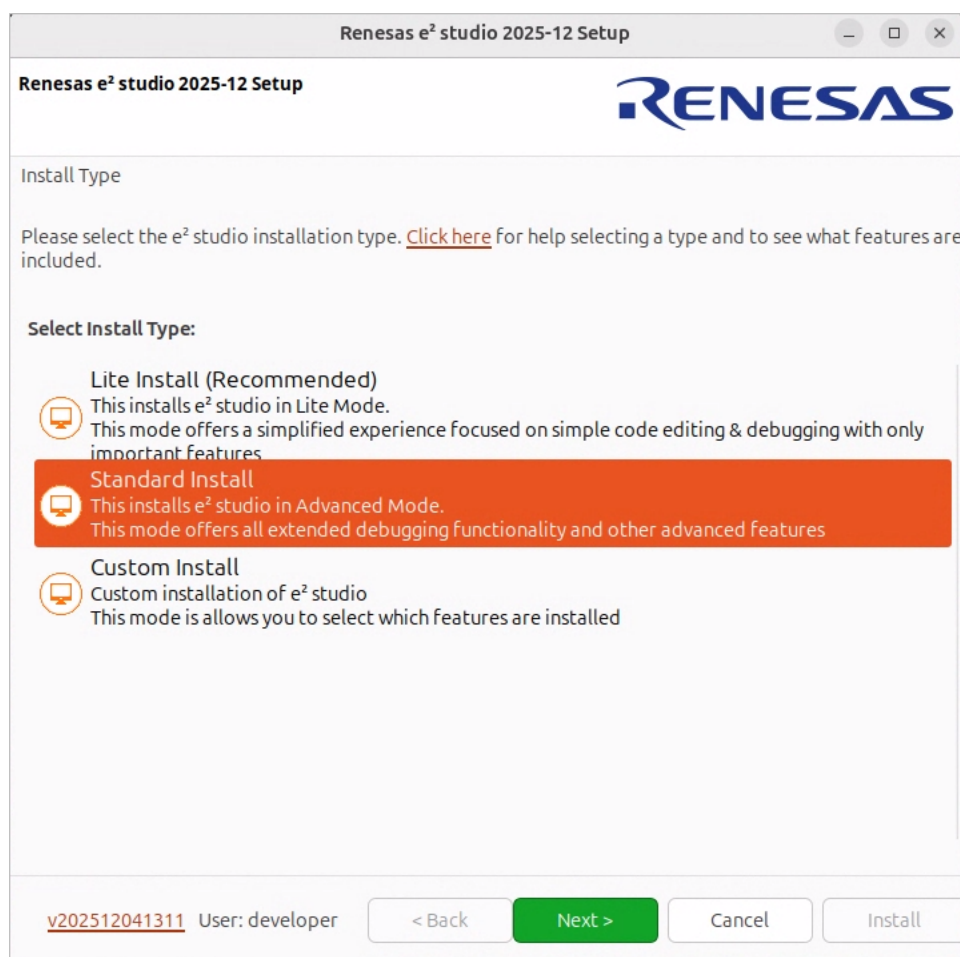


Figure 71. Standard installation

3. On the **Device Families** step, select **RA for Wireless**.

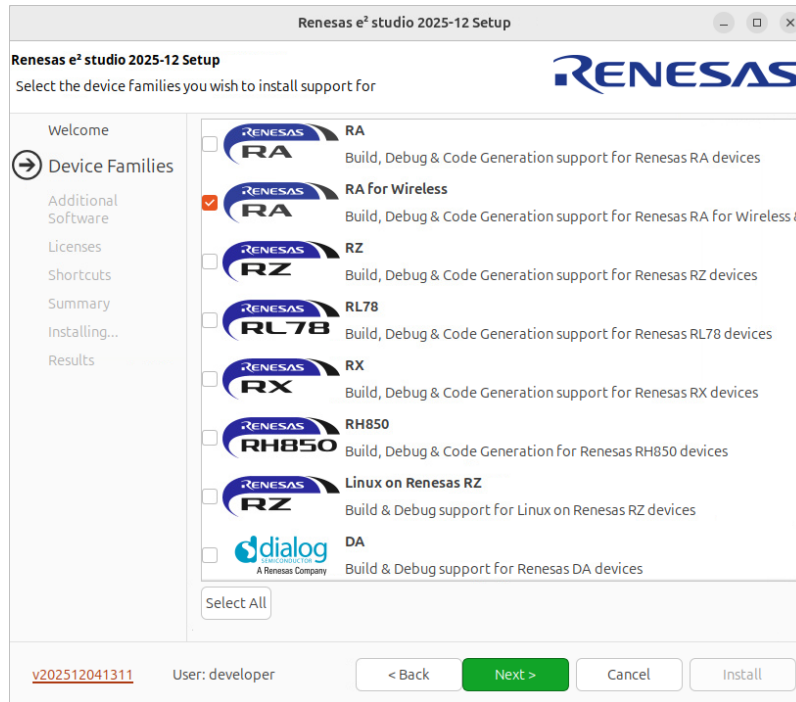


Figure 72. Device families

4. On the **Additional Software** step, expand **GCC Toolchains and Utilities**, select the **GNU ARM Embedded 13.3** checkbox, click **Next > Install**, see [Figure 73](#).

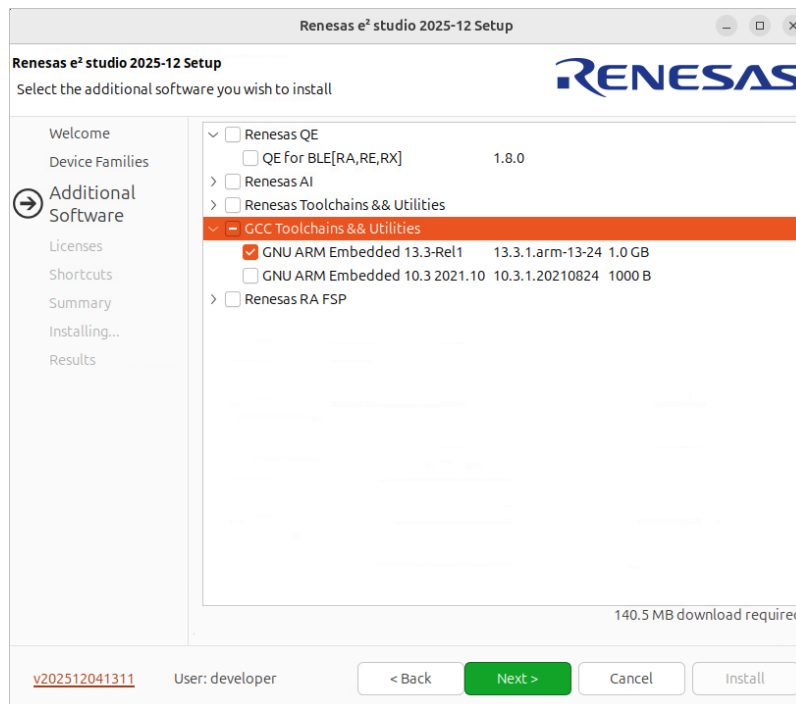


Figure 73. Device families

5. After completing e² studio installation, open e² studio and continue with installing the RA6W2 FSP pack. See [Section 6.4 Install RA6W2](#).

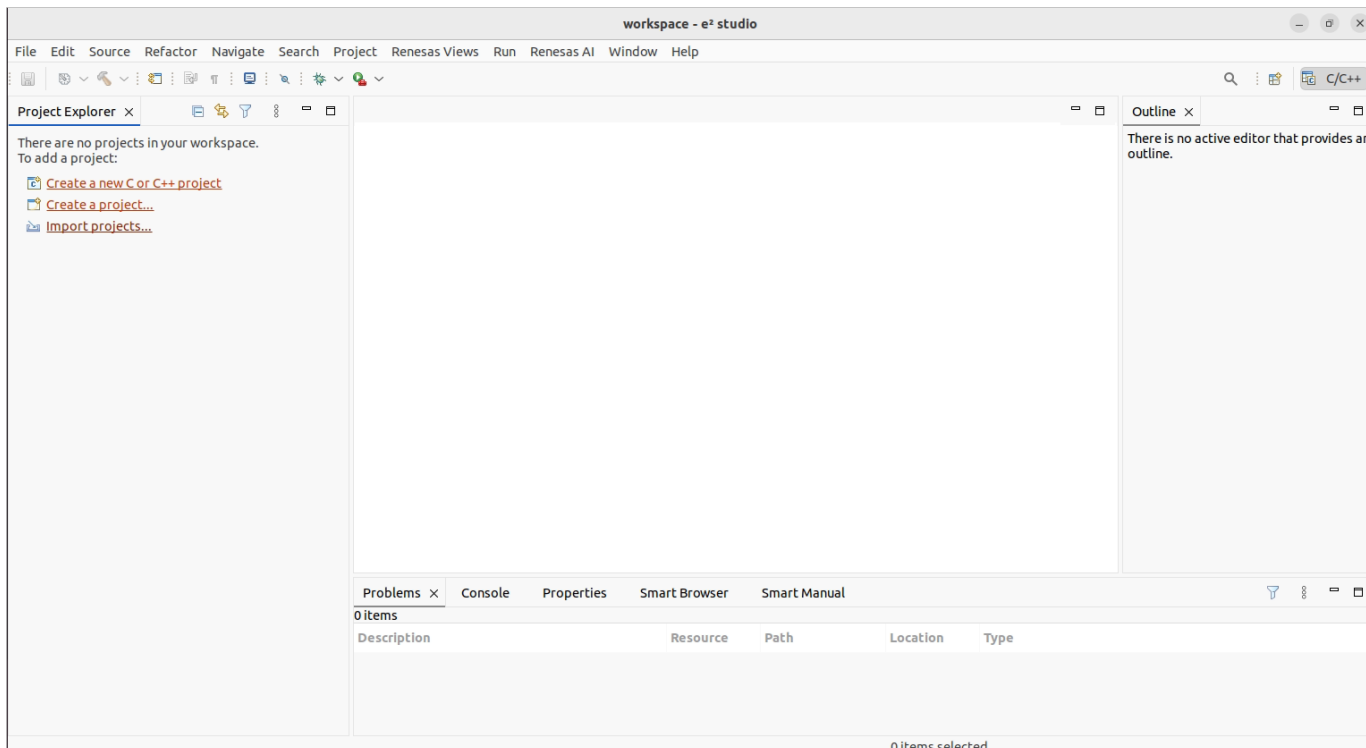


Figure 74. e² studio

6.3 Install e2 studio IDE for macOS

- e² studio installer – e2studio_installer-2025-12_macosx_host.txz.
- RA6W2 FSP pack – RAFW_FSP_Packs_2.0.1.
- J-Link V878 or later.
- Toolchain Installer – arm-gnu-toolchain-13.3.rel1-darwin-arm64-arm-none-eabi.pkg.
- Python 3 Installer – python-3.13.6-macos11.pkg.

To install e² studio IDE for macOS:

1. In the downloaded archive, extract the E2studio.app file and move it to the application folder.
2. In the application folder, double-click E2studio.app to start the e² studio.

If the E2studio.app is damaged and can't be opened, you should move it to the Trash. Error message appears when the e2 studio is started, see Figure 75, open the terminal window and run the following command:

```
xattr -d com.apple.quarantine /Applications/E2studio.app
```

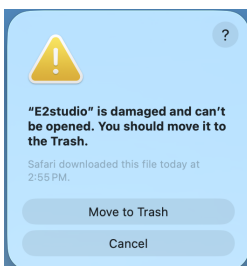


Figure 75. Error in Starting e² studio

3. Install the Toolchain by double-clicking the installer.

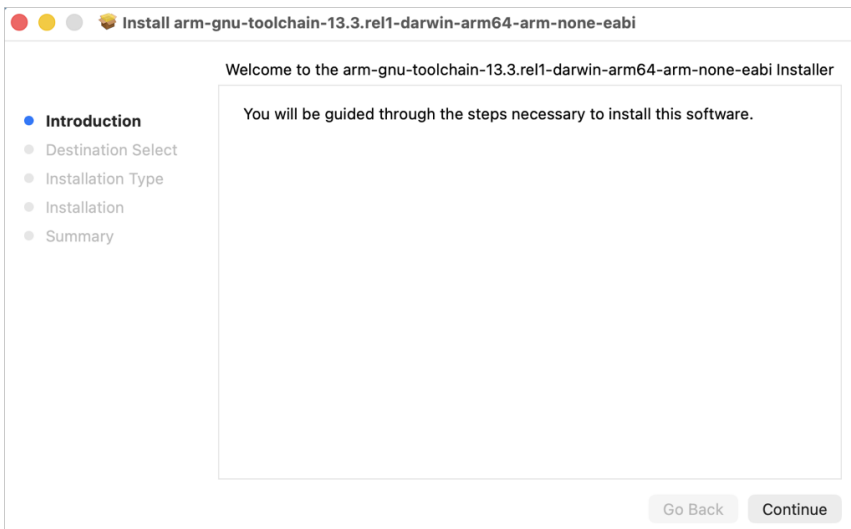


Figure 76. Toolchain Installer

4. After Toolchain Installation is successfully completed, in **e2 studio**, go to **Help > Add Renesas Toolchains**, see [Figure 77](#).

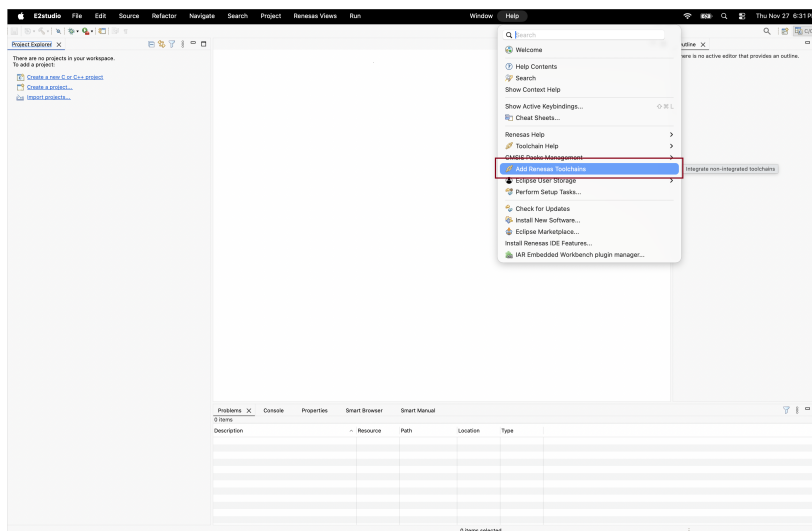


Figure 77. Add Renesas Toolchains

5. In the **Renesas Toolchain Management** dialog, click **Add**.

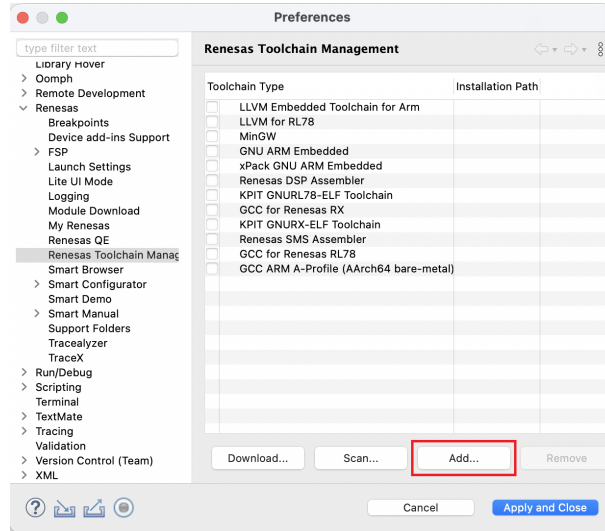


Figure 78. Renesas Toolchain Management

6. In the **Add New Toolchain** dialog, click **Browse**.
7. Go to **Applications > ArmGNUToolchain > 13.3.rel1 > arm-none-eabi**, and click **Open**.

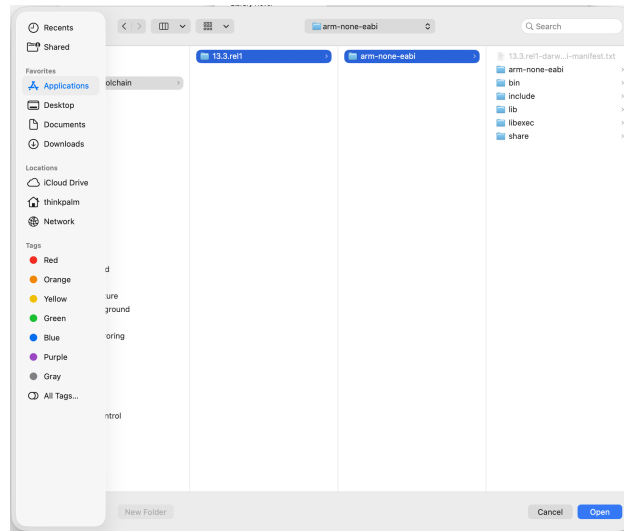


Figure 79. Choose the Installed Toolchain

8. In the **Add New Toolchain** dialog, click **OK**.
9. In the **Renesas Toolchain Management** dialog, click **Apply and Close**.

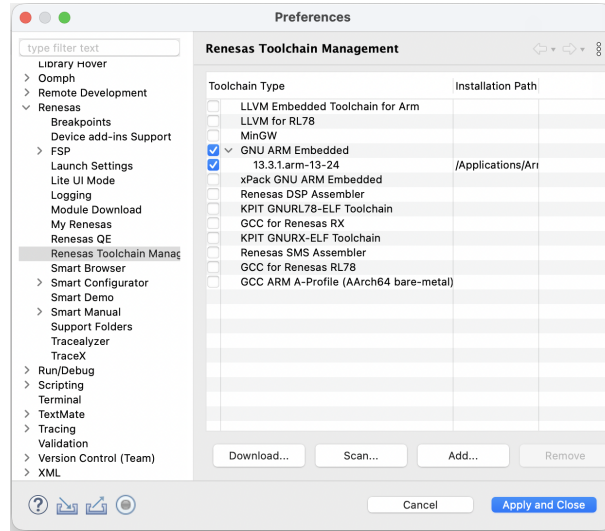


Figure 80. Finalize Toolchain Settings

10. Install Python3 by double-clicking `Installer – python-3.13.6-macos11.pkg`.

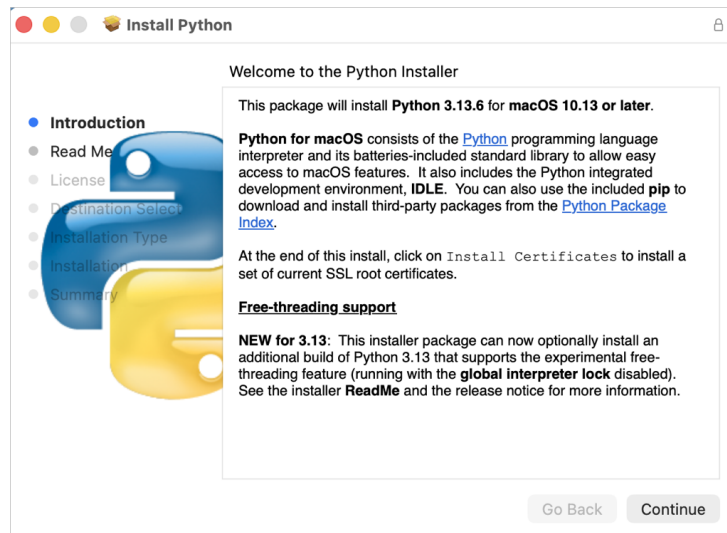


Figure 81. Python3 Installer

11. After Python3 installation is completed successfully, restart **e2 studio** using **File > Restart**.

12. Install Renesas QE using **Renesas Views > Renesas Software Installer**, [Figure 82](#).

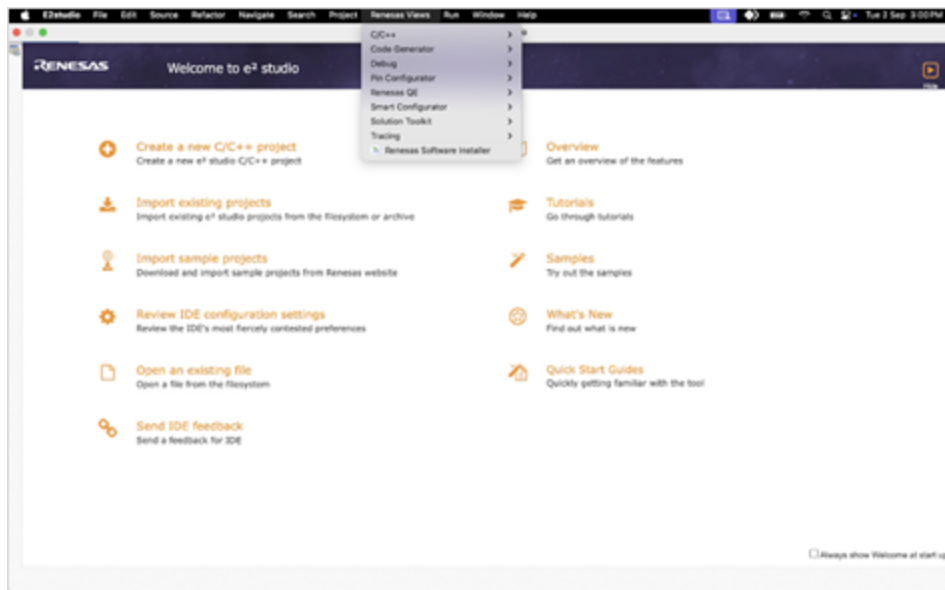


Figure 82. Renesas Views > Renesas Software Installer

13. Select **Renesas QE**, and then click **Next**.
14. Select **QE for BLE[RA,RE,RX] [v1.8.0]**, and then click **Finish**.

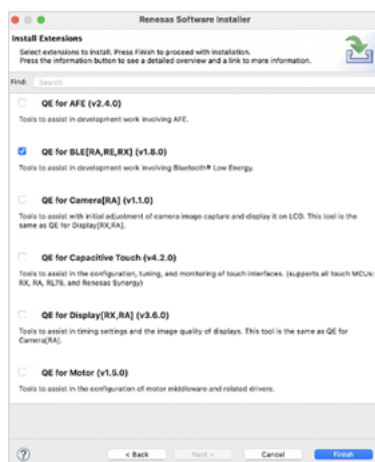


Figure 83. QE for BLuetooth LE

15. Click **Next**.
16. Accept terms and conditions and click **Finish**.
17. Click **Select All** and **Trust Selected**.

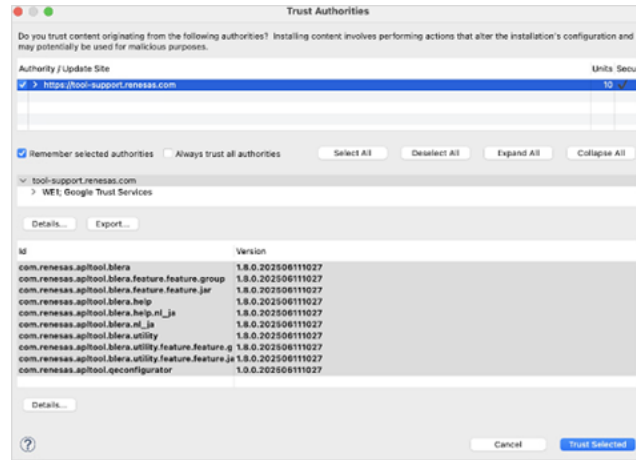


Figure 84. Trust Authorities

18. Click **Select All** and **Trust Selected** again.

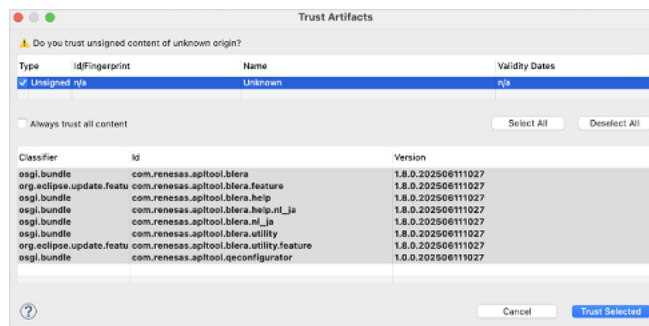


Figure 85. Trust Artifacts

19. Restart e² studio by clicking the **Restart Now**.

6.4 Install RA6W2

To build the SDK, install the RA6W2 FSP pack:

NOTE
The same procedure applies to both Windows OS, Linux and macOS.

To install the latest **RA6W2 FSP Release package**:

1. Unzip the `RAFW_FSP_Packs_2.0.1.zip` to the e² studio install directory.
2. To find the exact e² studio install directory, click **Help > About e2 studio**. For macOS, click **e2studio > About e2studio**.
3. In the **About e2studio** dialog, click **Installation Details**.

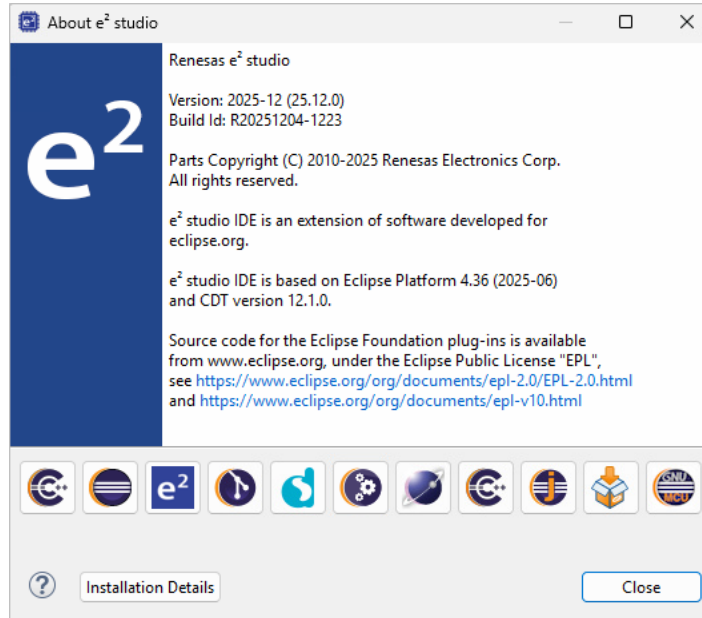


Figure 86. e² studio details

4. In the e2 studio Installation Details dialog, select the Support Folders tab.

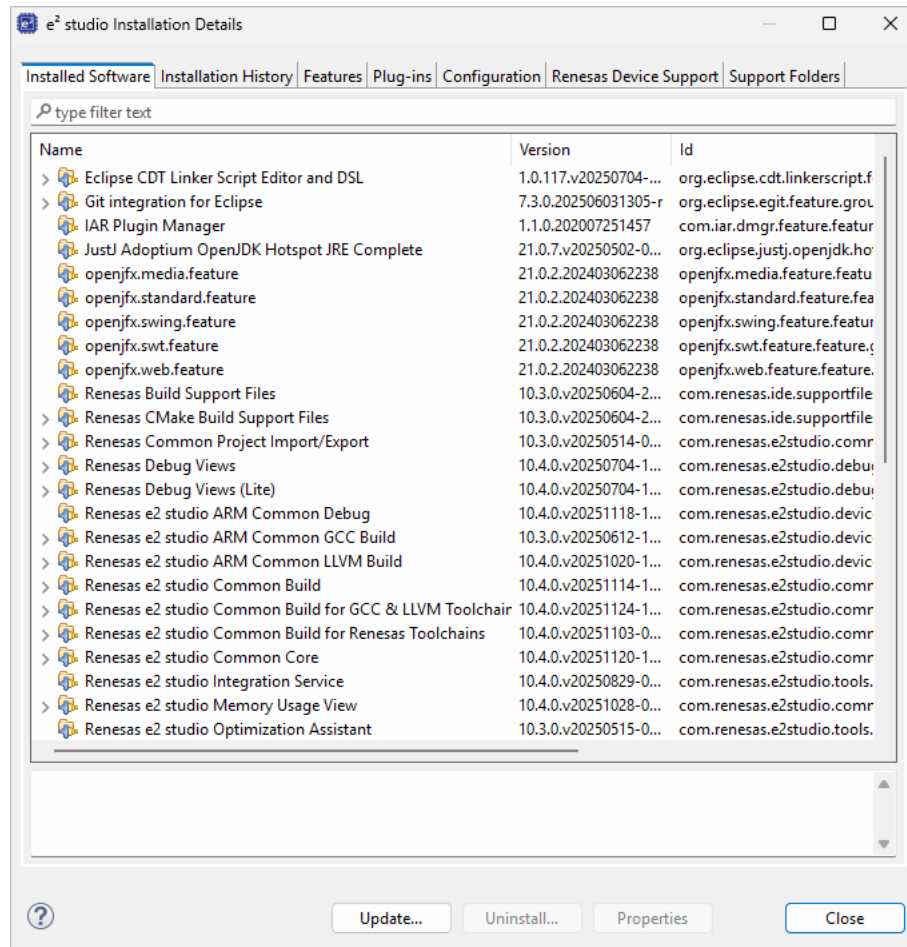


Figure 87. e² studio installation details

- To open the system file manager in the directory that corresponds to e² studio install directory, click the e² studio support area link.

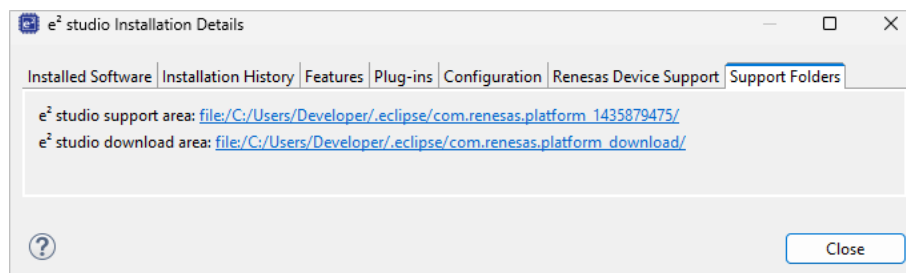


Figure 88. Support folders

- Extract the `RAF_W_FSP_Packs_2.0.1.zip` file.
- Copy and paste the **Internal folder** to the **e² studio support** folder. In MacOS, select the **Merge** option when copying the internal folder.
- To restart e² studio, click **File > Restart**.

NOTE

For updating/re-installing the `RRQ_FSP_Packs`, delete the following folders in the e² studio support folder first.

- `DebugComp\rrq\`
- `internal\cmsis\data\rrq\`
- `internal\devassist\rafw_fsp\`
- `internal\projectgen\rafw_fsp\`

Then follow Step 5 and Step 8.

6.5 Load Project Template in e² studio

To load the project template:

- Extract the `wifi_ble_coex_ek_ra6w2_ep.zip` project template to a directory.
- To import project template, click **File > Import**.
- Under **General**, select **Rename & Import Existing C/C++ Project into Workspace**.

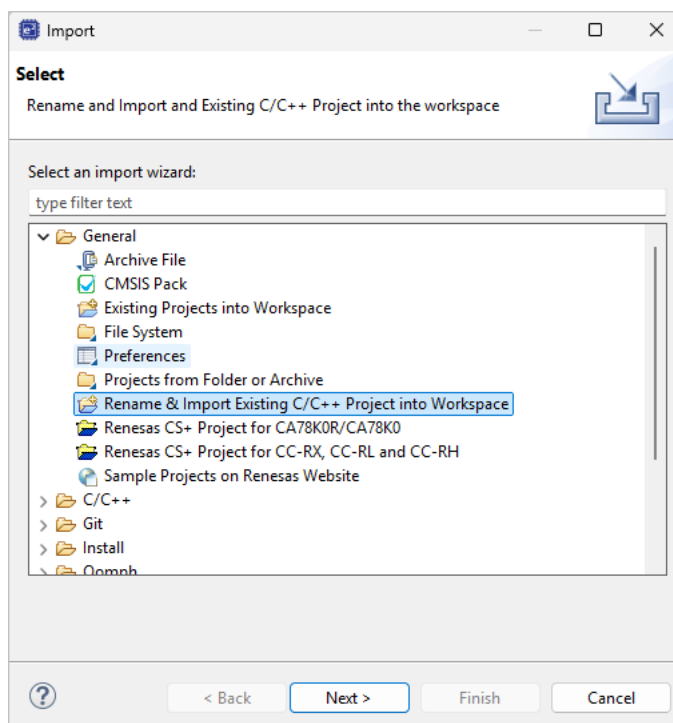


Figure 89. Rename and import

4. Go to the project template directory (unzip wifi_ble_coex_ek_ra6w2_ep.zip), and in the **Project name** field, enter the name and click **Finish**.
5. In the **Project name** field, enter the name and click **Finish**, see [Figure 90](#).

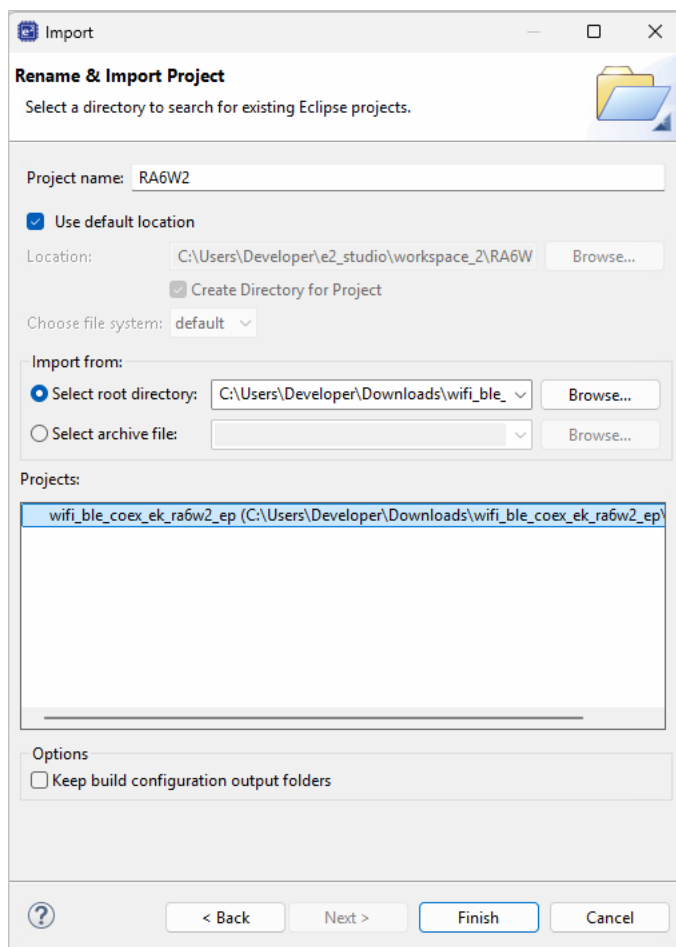


Figure 90. Finish import

6. After import finishes, install python using the following steps in Windows:
 - a. Right-click the project, click **Show in Local Terminal > Terminal**.
 - b. In console, enter "python3".

NOTE
 For Windows, if Python 3 is installed already and above terminal appears, for python Integration, see [Appendix D Python Integration in e2 studio Windows](#).

- c. Microsoft store appears and to install Python 3, click **Get**.

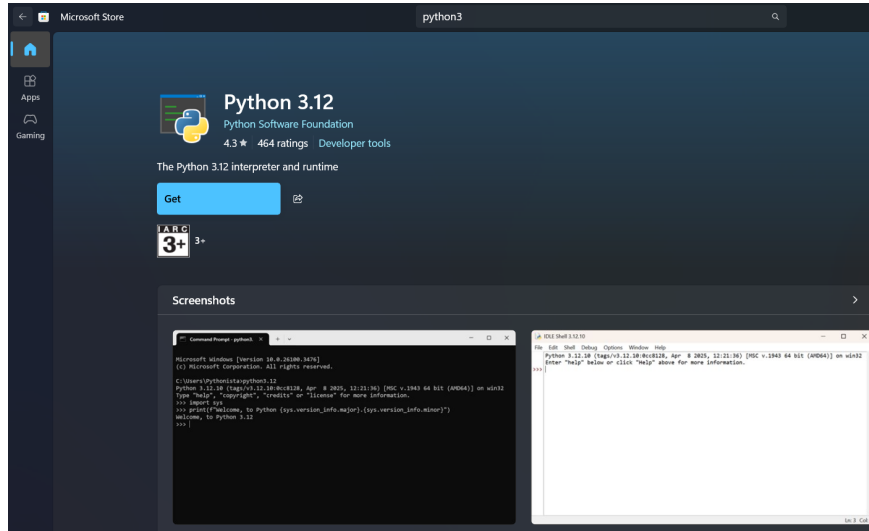


Figure 91. Install Python 3

7. Go to **configuration.xml** and click **Generate Project Content**.

Figure 92. Configuration and generate project contents

- 8. To build the project, right-click the project and click **Build Project**.
- 9. To see the build progress, open the console window.

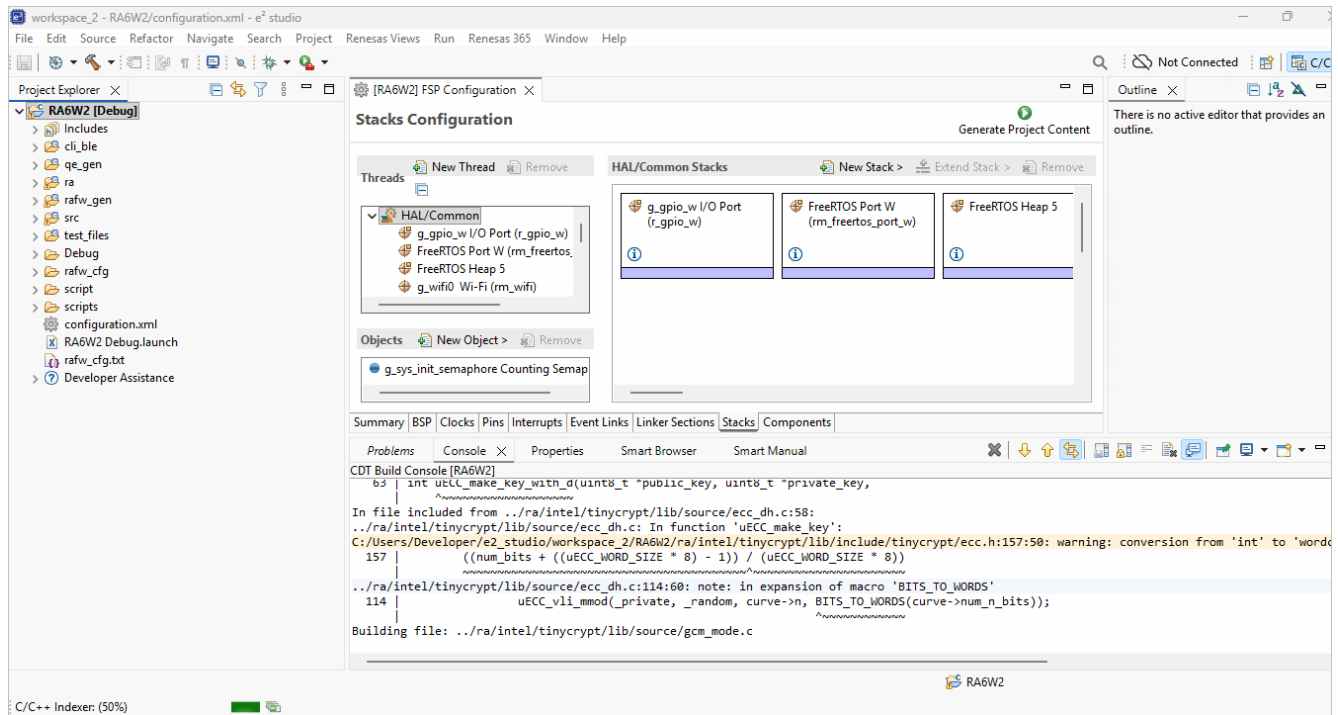


Figure 93. Console window

Figure 94 shows the successful build.

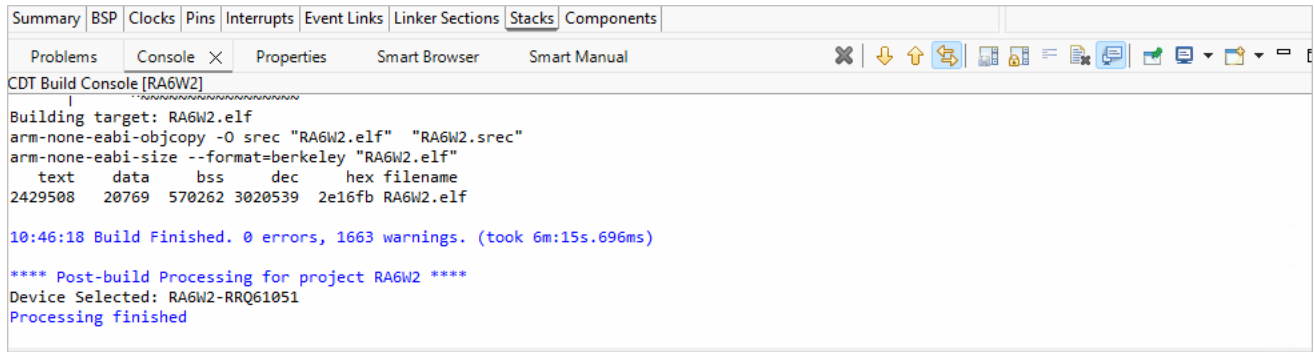


Figure 94. Successful build

10. If there is no .img.bin file generated on Windows and Python 3 command does not show any error in console, follow the step 6.

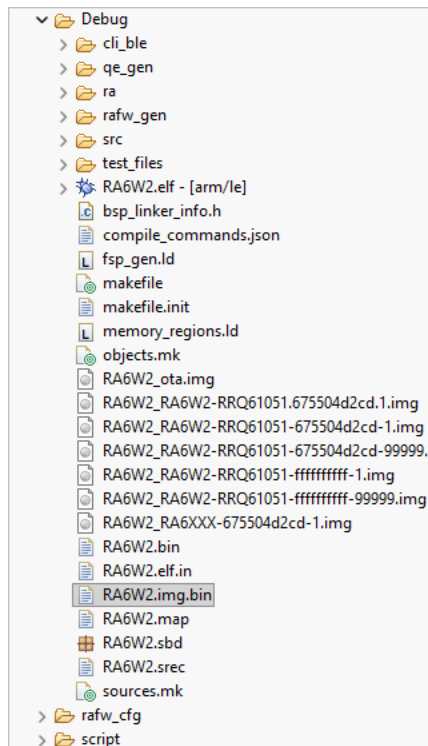


Figure 95. Image in Project Explorer tab

6.6 Flash and Debug using e² studio

You can flash and debug in e² studio using J-Link.

System Requirements:

- e² studio installer-2025-12 or later versions
- Segger J-Link V878 or later.

To flash and debug in e² studio:

1. Install RA6W2 FSP Pack and Load Project Template in e² studio.
2. Build Debug for RA6W2.
3. Go to **Debug > Debug New_configuration**.

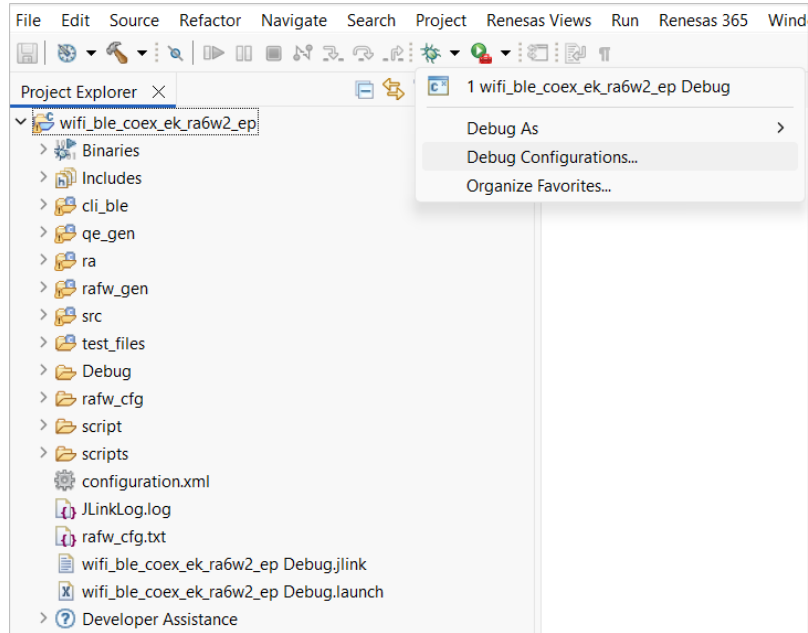


Figure 96. Debug Configuration in e² studio

4. In **Debug Configurations**, select **Renesas GDB Hardware Debugging**, and then select **Launch Configuration**.

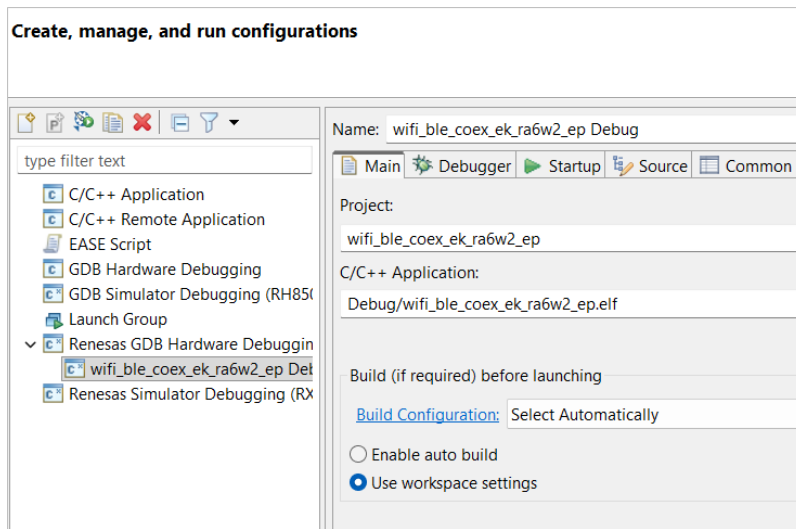


Figure 97. Debug Configuration page

5. On the **Debugger** tab, set up the target device as follows:

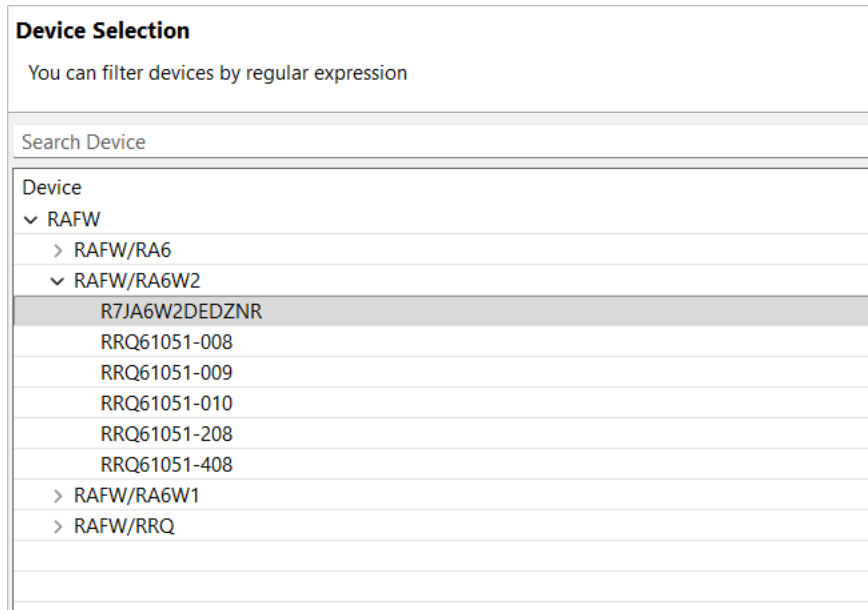


Figure 98. Device selection in Debugger

6. On the **Startup** tab, and change load type of **Program Binary** to **Symbols Only**.

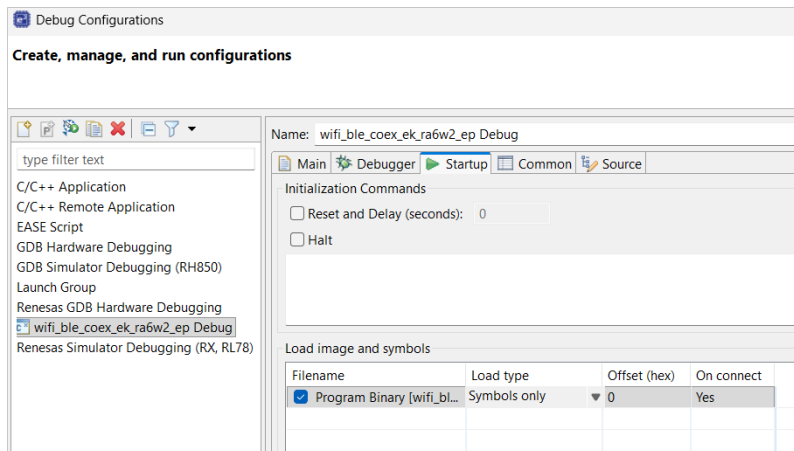


Figure 99. Symbols only

7. To add **Download Module (.img.bin)** from Debug, go to **Add > Workspace > Project File > Debug > test_files > .img.bin**.

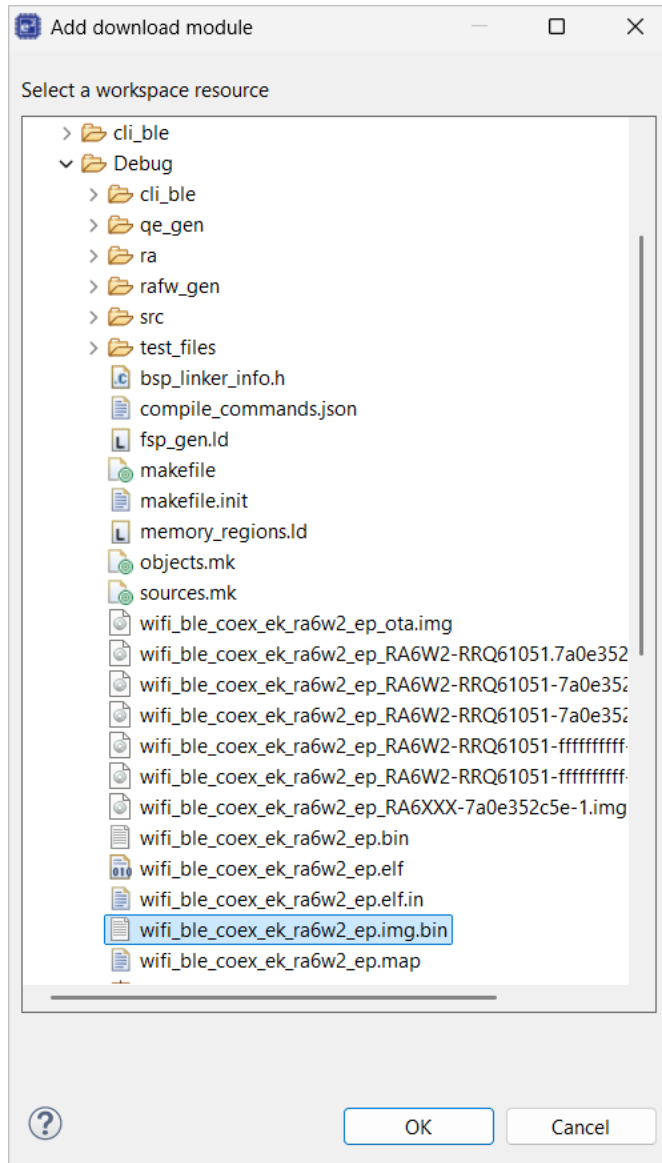


Figure 100. Add Download Module

8. Change Load Type of `.img.bin` into **Raw Binary** and **Offset** as `a000000`. Then click **Apply > Debug**.

Load image and symbols			
Filename	Load type	Offset (hex)	On connect
<input checked="" type="checkbox"/> Program Binary [wifi_bl...	Symbols only	0	Yes
<input checked="" type="checkbox"/> wifi_ble_coex_ek_ra6w2...	Raw Binary	a000000	Yes

Figure 101. Change Load type and Offset

9. Click **Switch**.

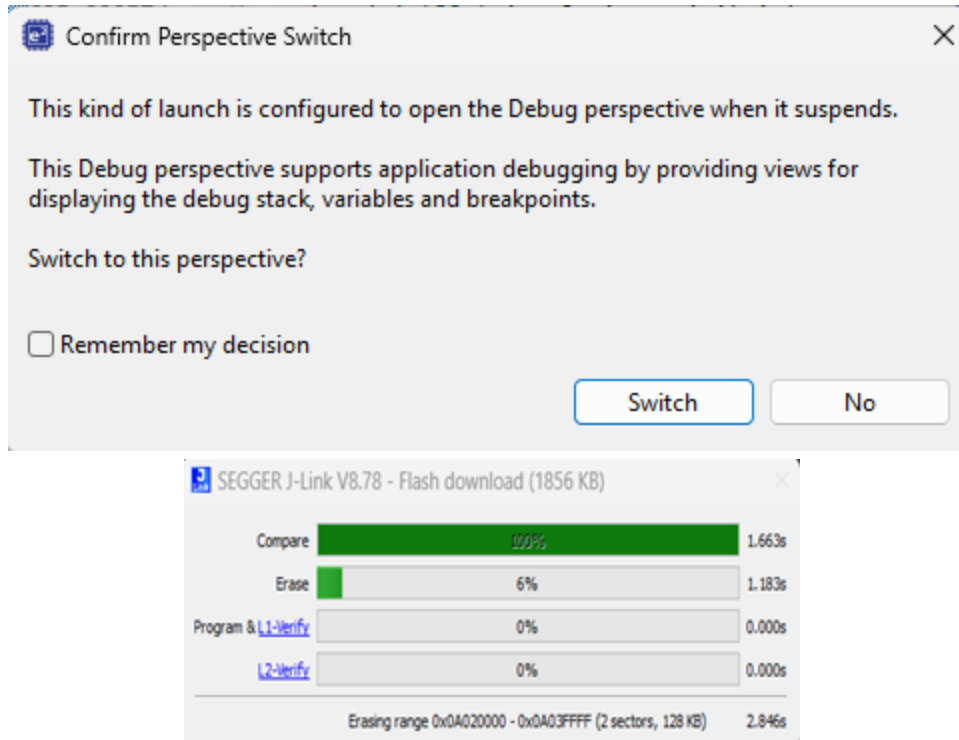


Figure 102. Confirm Perspective Switch and Segger J-Link

10. On Debug page, click Play.

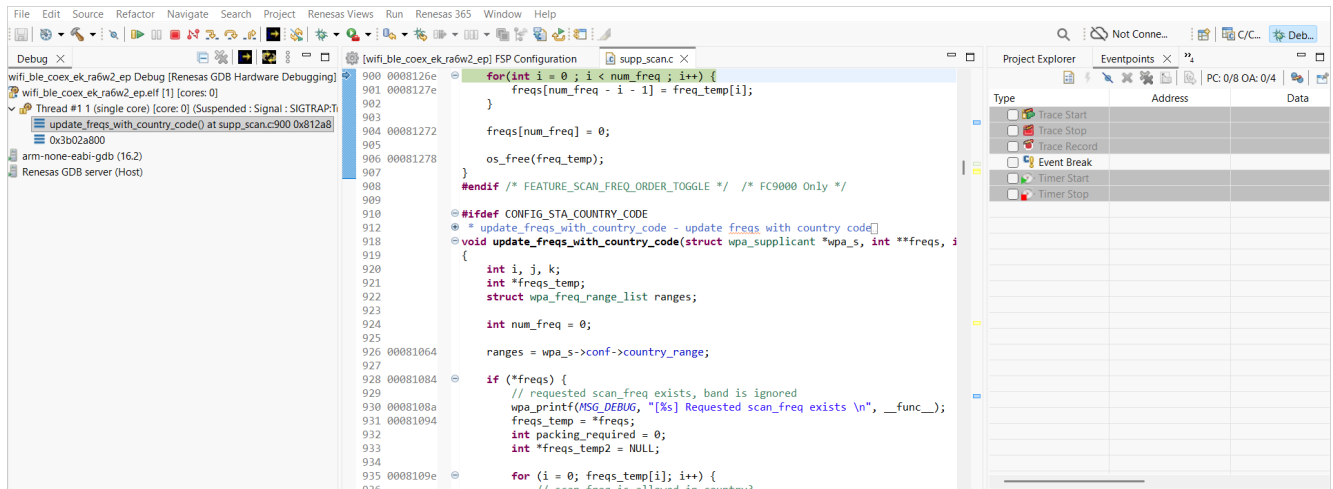


Figure 103. Debug Page

11. By putting a breakpoint in a file you can debug normally using debug interface. Go to C/C++ > Choose a breakpoint > Debug > Resume button.

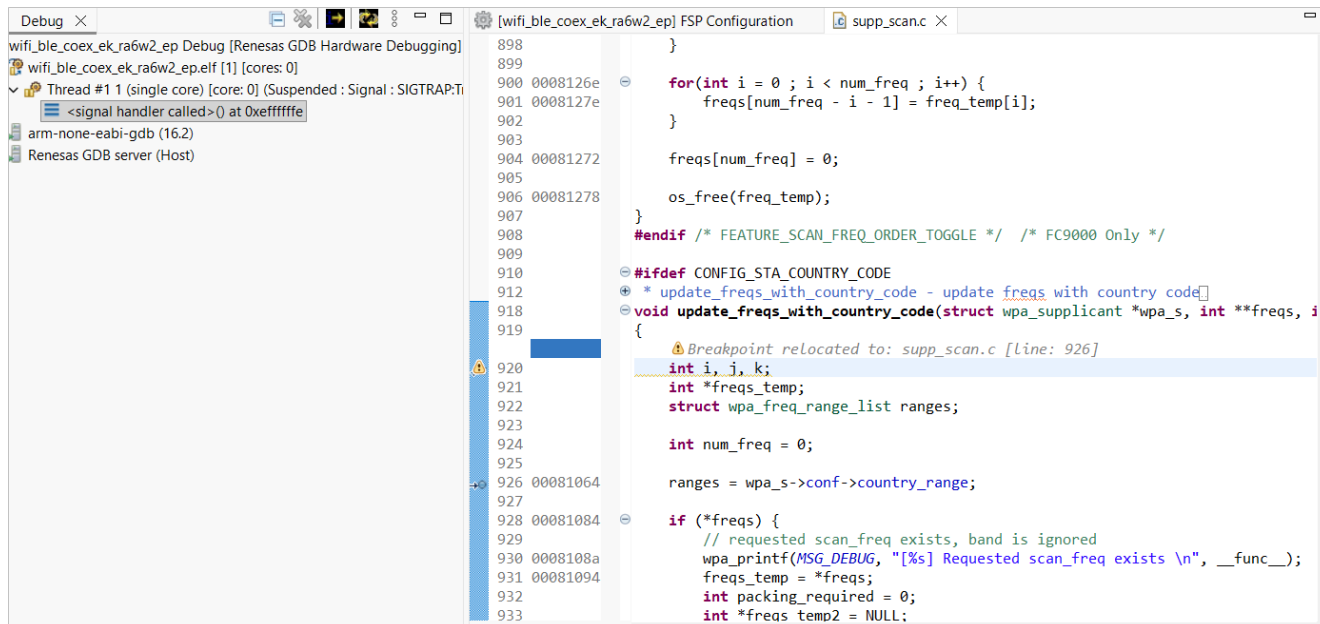


Figure 104. Debug by setting breakpoint

For more details about debugging in e² studio, see *JTAG Manual*.

After flashing successfully, for test procedures, see [Section 1 Test Procedures](#).

6.7 Configure Bluetooth[®] LE in RA6W2 Using Renesas QE

NOTE

Proceed with caution when using QE to regenerate the code in existing templates.

QE for Bluetooth LE provides user code protection during code generation. Code added within the following code block is retained after code generation. When implementing it in each program, implement it between these comments:

```
/* Start user code for XXXX. Do not edit comment generated here */
```

Implement user code here

```
/* End user code. Do not edit comment generated here */
```

Custom codes outside this block will be erased during QE generate action.

To Open Renesas QE in e² studio, click **Renesas Views > Renesas QE > R_BLE Custom Profile RA,RE,RX(QE)**.

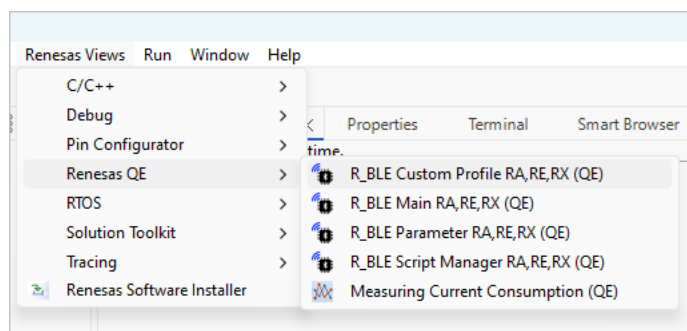


Figure 105. Renesas QE

To change Bluetooth[®] LE Local Name Using Renesas QE:

1. In **R_BLE Custom Profile** tab, select **Peripheral** tab and complete the following changes:
 - a. In the Project dropdown list, select the required Bluetooth LE project.
 - b. In the Module dropdown list, select **DA1453x**.
 - c. On the **Peripheral** tab, select the **Local Name** checkbox and give custom local name.
2. To generate Bluetooth LE code with current change, click **Generate Code**.

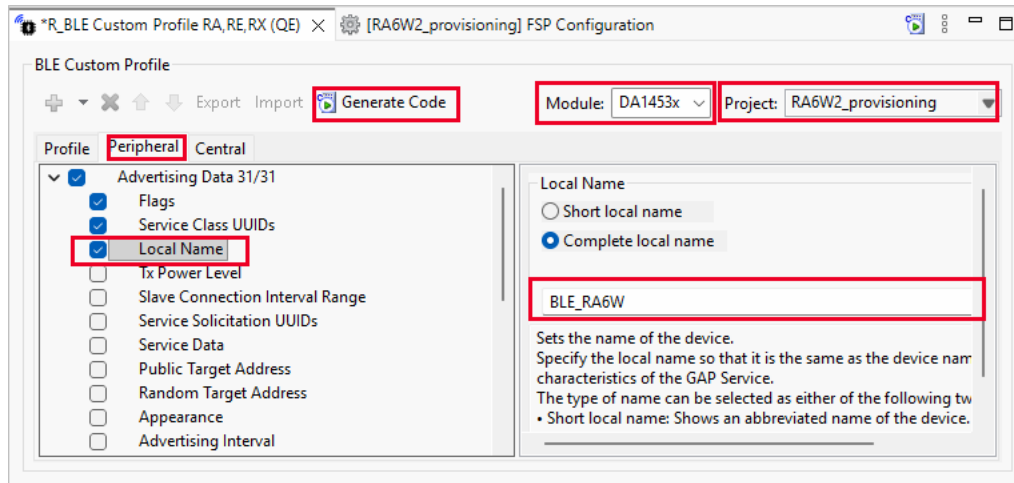


Figure 106. Changing local name

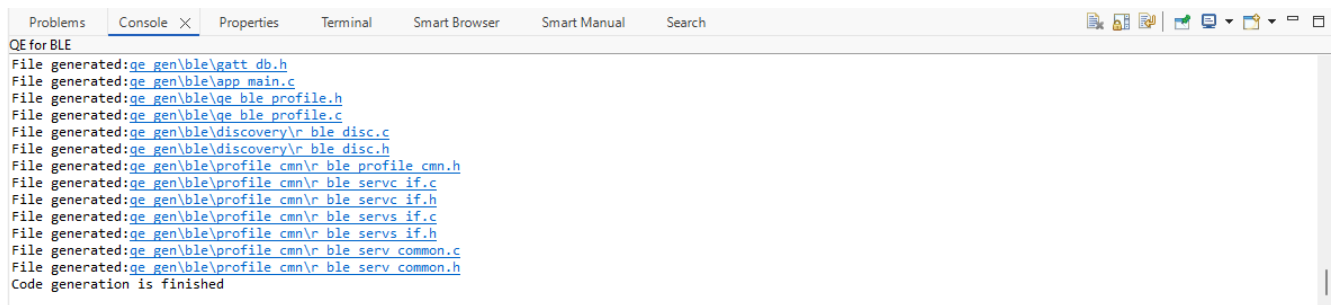


Figure 107. Successful code generation

3. To build the project again, right-click the project and click **Build Project**.
 When the image is loaded in the RA6W2 device, the change can be verified using Renesas SmartBond application.

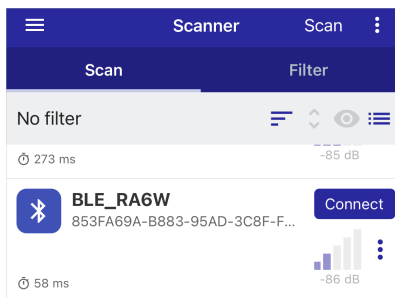


Figure 108. Changes reflected in SmartBond application

6.8 Run on Device

For manual firmware programming, see [Section 4.1 Firmware Image Programming](#).
 After flashing the image, to verify the proper operation, see [Section 5 Test Procedures](#).

7. Example Projects

Renesas provides several example projects that demonstrate different capabilities of the RAFW MCUs. These example projects can be a good starting point for you to develop custom applications.

Example projects (source code and project files) for RA6W2 are available in the RAFW FSP Examples GitHub. The link to GitHub is available on the Software and Tools section of RA6W2 web page:

- wifi_ble_coex_ek_ra6w2_ep.zip
- wifi_ble_provisioning_ek_ra6w2.zip
- wifi_ble_codeless_ek_ra6w2_ep.zip

wifi_ble_coex_ek_ra6w2_ep template

This is the basic template for Wi-Fi and Bluetooth LE. This template demonstrates the coexistence of Bluetooth LE and Wi-Fi in the RA6W2. For Bluetooth LE, the Renesas SmartBond™ app is available, which can be found in Google play store, and for Wi-Fi, a command-line interface is available as well.

wifi_ble_provisioning_ek_ra6w2_ep template

This is the basic template for demonstrating Wi-Fi provisioning using Bluetooth LE. This is done using the Renesas WiFiProvisioning app in play store. If the development environment is Windows, the application has a dependency on a JSON library, and it can be downloaded from <https://github.com/zserge/jsmn/blob/master/jsmn.h> and put to `e2_studio\workspace_2\<project_name>\thirdparty folder`.

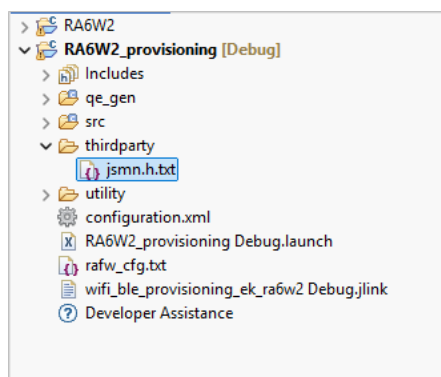


Figure 109. Dependency added in third-party folder

wifi_ble_codeless_ek_ra6w2_ep template

The CodeLess™ is a Bluetooth LE solution which uses AT commands (ASCII Instructions) to perform various Bluetooth LE tasks. The Codeless AT commands can be used to control Bluetooth LE connectivity such as connect/disconnect, start advertising, stop advertising, change roles (central/ peripheral), scan nearby devices, and interact with sensor for read/ write operations and raw data transfer. Renesas SmartConsole application can be used for testing codeless template.

Appendix A Configuration Modes Setup

A.1 Set up Soft AP Mode

Soft AP mode allows you to provision the RA6W2 through the Wi-Fi interface using a mobile application and configure it by running the Easy Setup Wi-Fi configuration wizard.

To configure the RA6W2 for operating in Soft AP mode:

1. Open the RA6W2 debug console and run the `setup` command in the `[/RA6W2-RRQ61051]` prompt.
2. To complete the setup, complete the following prompts:

```
[/RA6W2-RRQ61051] setup //Start the Easy Setup Wizard.
Stop all services for the setting.
Are you sure ? [Yes/No] : Y //Enter Y to stop the running services.
[ RA6W2-RRQ61051 EASY SETUP - V4 ]
Country Code List:
AD AE AF AI AL AM AR AS AT AU AW AZ BA BB BD BE BF BG BH BL
BM BN BO BR BS BT BY BZ CA CF CH CI CL CN CO CR CU CX CY CZ
DE DK DM DO DZ EC EE EG ES ET EU FI FM FR GA GB GD GE GF GH
GL GP GR GT GU GY HK HN HR HT HU ID IE IL IN IR IS IT JM JO
JP KE KH KN KP KR KW KY KZ LB LC LI LK LS LT LU LV MA MC MD
ME MF MH MK MN MO MP MQ MR MT MU MV MW MX MY NG NI NL NO NP
NZ OM PA PE PF PG PH PK PL PM PR PT PW PY QA RE RO RS RU RW
SA SE SG SI SK SN SR SV SY TC TD TG TH TN TR TT TW TZ UA UG
UK US UY UZ VA VC VE VI VN VU WF WS YE YT ZA ZW ALL
COUNTRY CODE ? [Quit] (Default KR) : US //Enter the country code.
SYSMODE(WLAN MODE) ?
  1. Station
  2. Soft-AP
  3. WiFi Direct
  4. WiFi Direct P2P GO Fixed
  5. Station & Soft-AP
MODE ? [1/2/3/4/5/Quit] (Default Station) : 2 //Enter 2 for Soft-AP mode.
BAND ?
  1. 2.4 GHz
  2. 5 GHz
BAND ? [1/2/Quit] (Default 1. 2.4GHz) : 1 //Enter 1 for 2.4 GHz Band
[ SOFT-AP CONFIGURATION ]
SSID ? (Default RA6W2-RRQ61051_9FFFFFFE) : TEST AP //Enter the SSID name.
CHANNEL ? [1~13, Auto:0/Quit] (Default Auto) : //Enter to select Auto channel selection.
AUTHENTICATION ?
  1. OPEN // No authentication or encryption;
unsecured network
  2. WEP(Unsupported) // Legacy RC4-based security; deprecated
and insecure
  3. WPA-PSK // Uses TKIP; deprecated with known
vulnerabilities
  4. WPA2-PSK // AES-CCMP encryption; widely used and
secure
  5. WPA/WPA2-PSK // Mixed mode for backward compatibility
(TKIP + AES)
  6. WPA3-SAE (WPA3-Personal) // Modern secure authentication using SAE;
resists brute-force attacks
  7. WPA2-PSK+WPA3-SAE (Recommend) // Transition mode supporting both WPA2 and
WPA3 clients
  8. WPA3-OWE // Enhanced Open ; no password but
encrypted traffic

AUTHENTICATION ? [1/3/4/5/6/7/8/Quit] : 4 //Enter 4 to select WPA2-PSK authentication.
PSK-KEY(ASCII characters 8~63 or Hexadecimal characters 64) ? [Quit]
:***** //Enter the password for the AP.
```

```

Do you want to set advanced WiFi configuration ? [No/Yes/Quit] (Default No) : N
//Enter N to skip this step.
=====
BAND      : 2.4 GHz
SSID      : TEST AP
CHANNEL   : AUTO(ACS)
AUTH      : WPA2PSK
ENCRYPTION: AES(CCMP)
PSK KEY   : 123abc456
KEY TYPE  : ASCII
WIFI MODE : 11b/g/n (2.4GHz)
PMF       : Default
=====
WIFI CONFIGURATION CONFIRM ? [Yes/No/Quit] : Y //Enter Y to confirm the WIFI
configuration.
IP ADDRESS ? [Quit] (Default 10.0.0.1) : //Enter to select the default IP Address.
Unique identifier assigned to a device on the
network.
SUBNET ? [Quit] (Default 255.255.255.0) : //Enter to select the default Subnet.
Defines network and host portions of the IP address
GATEWAY ? [Quit] (Default 10.0.0.1) : //Enter to select the default
Gateway.Default router address used to access external networks

=====
[WLAN1]
IP ADDRESS: 10.0.0.1
SUBNET : 255.255.255.0
GATEWAY : 10.0.0.1
=====
IP CONFIGURATION CONFIRM ? [Yes/No/Quit] : Y //Enter Y to confirm the IP configuration.
DHCP SERVER CONFIGURATION ? [Yes/No/Quit] : Y //Enter Y to confirm the DHCP Server
configuration. Automatically assigns IP, gateway, and subnet
mask to devices.
DHCP SERVER LEASE IP Count(MAX 10) ? [Quit] (Default 10) :
//Enter to select the default Lease Count.
DHCP SERVER LEASE TIME(60 ~ 86400 SEC) ? [Quit] (Default 1800) :
//Enter to select the default Lease Time.
=====
[DHCP SERVER]
Start IP : 10.0.0.2
END IP : 10.0.0.11
LEASE TIME: 1800
=====
DHCP SERVER CONFIGURATION CONFIRM ? [Yes/No/Quit] : Y //Enter Y to confirm the configuration.
[/RA6W2-RRQ61051] # >>> wpa_supplicant_deinit ...
[wpa_supplicant_deinit_iface] CTRL-EVENT-TERMINATING
>>> Request Supplicant start
>>> Renesas RA6W2-RRQ61051 wpa_supplicant 2.10 - Sep/2023
>>> Add SoftAP Inteface (softap1) ...
>>> MAC address (softap1) : ec:9f:0d:9f:ff:ff
[init_net_ifaces]: Switching WiFi mode to: Soft-AP
[init_net_ifaces]: Setting up AP (wlan1)
<<Please check MAC address.>>

```

```

Stop DHCP Server
INFO: DHCP Server is not running.
Start DHCP Server
>>> AP Operating Channel: AUTO
>>> DHCP Server Started
Soft-AP is Ready (ec:9f:0d:9f:ff:ff)
    
```

When all settings are complete, the configuration is saved. Then, the "Soft AP mode started successfully" message should be printed.

A.2 Set up Concurrent Mode

To configure the RA6W2 for operating in Concurrent mode (that is, configuring it for both Station and Soft AP modes):

1. Open the RA6W22 debug console and run the setup command in the [/RA6W2-RRQ61051] prompt.
2. Follow the prompts to complete the setup:

```

[/RA6W2-RRQ61051] # setup
Stop all services for the setting.
Are you sure ? [Yes/No] : y
>>> Network Interface (wlan0) : DOWN
>>> Network Interface (wlan0) : DOWN
[ RA6W2-RRQ61051 EASY SETUP - V4 ]
Country Code List:
AD AE AF AI AL AM AN AR AS AT AU AW AZ BA BB BD BE BF BG BH
BL BM BN BO BR BS BT BY BZ CA CF CH CI CL CN CO CR CU CX CY
CZ DE DK DM DO DZ EC EE EG ES ET EU FI FM FR GA GB GD GE GF
GH GL GP GR GT GU GY HK HN HR HT HU ID IE IL IN IR IS IT JM
JO JP KE KH KN KP KR KW KY KZ LB LC LI LK LS LT LU LV MA MC
MD ME MF MH MK MN MO MP MQ MR MT MU MV MW MX MY NG NI NL NO
NP NZ OM PA PE PF PG PH PK PL PM PR PT PW PY QA RE RO RS RU
RW SA SE SG SI SK SN SR SV SY TC TD TG TH TN TR TT TW TZ UA
UG UK US UY UZ VA VC VE VI VN VU WF WS YE YT ZA ZW ZZ
COUNTRY CODE ? [Quit] (Default KR, ZZ : for debug) : us
SYSMODE(WLAN MODE) ?
1. Station
2. Soft-AP
3. WiFi Direct
4. WiFi Direct P2P GO Fixed
5. Station & Soft-AP
MODE ? [1/2/3/4/5/Quit] (Default Station) : 5
BAND ?
1. 2.4 GHz
2. 5 GHz
3. AUTO
BAND ? [1/2/3/Quit] (Default 3. AUTO) : 1
[ STATION CONFIGURATION ]
=====
[NO] [SSID] [SIGNAL] [CH] [SECURITY]
-----
[ 0] WiFi_Net_2.4G -26 6 WPA2-ENT
[ 1] RenesasMatter -26 10 WPA2
[ 2] REL-GLOBAL -27 6 WPA2-ENT
[ 3] NETGEAR81 -36 3 WPA2
[ 4] GGG_AP_2G -36 11 WPA2
-----
[Enter] Rescan
    
```

```

=====
Select SSID ? (1~5/M1~M5/Manual/Quit) : 1
PSK-KEY(ASCII characters 8~63 or Hexadecimal characters 64) ? [Quit]
:*****
Do you want to set advanced WiFi configuration ? [No/Yes/Quit] (Default No) : n
=====
BAND      : 2.4 GHz
SSID      : RenesasMatter
Security  : WPA/WAP2-PSK
ENCRYPTION : TKIP/AES(CCMP)
Password  : *****
PMF       : Default
=====
WIFI CONFIGURATION CONFIRM ? [Yes/No/Quit] : y
IP Connection Type ? [Automatic IP/Static IP/Quit] : a
IP Connection Type: Automatic IP
IP CONFIGURATION CONFIRM ? [Yes/No/Quit] : y
SNTP Client enable ? [Yes/No/Quit] : n
[ SOFT-AP CONFIGURATION ]
<<Please check MAC address.>>
SSID ? (Default RA6W2_9FFFFE) :
AUTHENTICATION ?
    1. OPEN // No authentication or encryption;
unsecured network
    2. WEP(Unsupported) // Legacy RC4-based security; deprecated
and insecure
    3. WPA-PSK // Uses TKIP; deprecated with known
vulnerabilities
    4. WPA2-PSK // AES-CCMP encryption; widely used and
secure
    5. WPA/WPA2-PSK // Mixed mode for backward compatibility
(TKIP + AES)
    6. WPA3-SAE (WPA3-Personal) // Modern secure authentication using SAE;
resists brute-force attacks
    7. WPA2-PSK+WPA3-SAE (Recommend) // Transition mode supporting both WPA2 and
WPA3 clients
    8. WPA3-OWE // Enhanced Open ; no password but
encrypted traffic
AUTHENTICATION ? [1/3/4/5/6/7/8/Quit] : 4
PSK-KEY(ASCII characters 8~63 or Hexadecimal characters 64) ? [Quit]
:12345678
Do you want to set advanced WiFi configuration ? [No/Yes/Quit] (Default No) : n
=====
SSID      : RA6W2-RRQ61051_9FFFFE
Security  : WPA2PSK
ENCRYPTION : AES(CCMP)
Password  : 12345678
PMF       : Default
=====
WIFI CONFIGURATION CONFIRM ? [Yes/No/Quit] : y
IP ADDRESS ? [Quit] (Default 10.0.0.1) :
SUBNET ? [Quit] (Default 255.255.255.0) :
GATEWAY ? [Quit] (Default 10.0.0.1) :
=====
[WLAN1]
IP ADDRESS: 10.0.0.1
SUBNET : 255.255.255.0
GATEWAY : 10.0.0.1
=====

```

```

IP CONFIGURATION CONFIRM ? [Yes/No/Quit] : y
DHCP SERVER CONFIGURATION ? [Yes/No/Quit] : y
DHCP SERVER LEASE IP Count(MAX 10) ? [Quit] (Default 10) :
DHCP SERVER LEASE TIME(60 ~ 86400 SEC) ? [Quit] (Default 1800) :
=====
[DHCP SERVER]
Start IP   : 10.0.0.2
END IP    : 10.0.0.11
LEASE TIME: 1800
=====
DHCP SERVER CONFIGURATION CONFIRM ? [Yes/No/Quit] : y
>>> wpa_supplicant_deinit ...
[wpa_supplicant_deinit_iface] CTRL-EVENT-TERMINATING
>>> Request Supplicant start
>>> Renesas RA6W2-RRQ61051 wpa_supplicant 2.10 - Sep/2023
>>> MAC address (sta0) : ec:9f:0d:9f:ff:fe
>>> Add SoftAP Interface (softap1) ...
>>> MAC address (softap1) : ec:9f:0d:9f:ff:ff
>>> Start STA & SOFT-AP Concurrent mode...
[init_net_ifaces]: Switching WiFi mode to: Station & Soft-AP
[init_net_ifaces]: Setting up Concurrent mode (AP + STA)
<<Please check MAC address.>>
Stop DHCP Server
INFO: DHCP Server is not running.
Start DHCP Server
>>> AP Operating Channel: 1(2412)
Soft-AP is Ready (ec:9f:0d:9f:ff:ff)
>>> DHCP Server Started
Connection COMPLETE to ce:15:31:6e:b9:41
>>> Network Interface (wlan0) : UP
Wakeup source is 0x4
*****
*                RA6W2-RRQ61051 SDK Information
* -----
*
* - CHIP Name       : RA6W2-RRQ61051 (D3095B)
* - SKU Type       : 0x20, Dual Band (2.4 + 5 GHz) WI-FI 6
* - CPU Type       : Cortex-M33 (160MHz)
* - Kernel Version  : FreeRTOS V11.1.0
* - SFLASH Type    : 8 MB (Renesas AT25SL)
* - SDK Version    : V8.0.3.0.2
* - F/W Version    : RA6W2-RRQ61051-7a0e352c5e-1
* - Boot Index     : 0
* - F/W Build Time  : Apr 14 2026 12:33:57
*
*****
System Mode : Station & Soft-AP (4)
DPM TIM wake up range: 1 ~ 6000
<<Please check MAC address.>>
Network init...<<Please check MAC address.>>
<<Please check MAC address.>>
OK
Start DHCP Server
>>> Renesas RA6W2-RRQ61051 wpa_supplicant 2.10 - Sep/2023
>>> MAC address (sta0) : ec:9f:0d:9f:ff:fe
>>> Add SoftAP Interface (softap1) ...
>>> MAC address (softap1) : ec:9f:0d:9f:ff:ff
>>> Start STA & SOFT-AP Concurrent mode...
Stop DHCP Server
DHCP Server stopped.

```

```

>>> AP Operating Channel: 1(2412)
Soft-AP is Ready (ec:9f:0d:9f:ff:ff)
BD address from device: 48:23:35:f4:00:11
BD address from device: 48:23:35:f4:00:11
Legacy advertising started
Legacy advertising started
Connection COMPLETE to ce:15:31:6e:b9:41
>>> Network Interface (wlan0) : UP
    Assigned addr   : 192.168.137.86
      netmask      : 255.255.255.0
      gateway     : 192.168.137.1
    DHCP Server IP : 192.168.137.1
    Lease Time    : 168h 00m 00s
    Renewal Time  : 84h 00m 00s

```

A.3 Set up Station Mode with DPM Enabled

Dynamic Power Management (DPM) is a synthesis of breakthrough in ultra-low-power technologies that enable extremely low-power operation of the RA6W2. DPM shuts down all microelements on the chip when not in use, which allows a near zero level of power consumption when not actively transmitting or receiving data. DPM also enables Ultra-low-power Transmit and Receive modes when the MCU needs to be awake to exchange information with other devices. Advanced algorithms enable the device to stay asleep until the exact required moment to wake up to Transmit or Receive mode.

For more details about DPM, see *PMGR DPM Application Note*.

By default, the DPM functionality is enabled upon the device's connection to an Access Point. This can be reconfigured by running the Easy Setup Wi-Fi configuration wizard. DPM allows for considerably reduced power consumption by periodically entering various sleep modes when full functionality is not required.

To configure the RA6W2 for operating in Station + DPM mode:

1. Open the RA6W2 debug console and run the setup command in the [/RA6W2-RRQ61051] prompt.
2. To complete the setup, complete the following prompts:

```

[/RA6W2-RRQ61051/dpm] # setup
Stop all services for the setting.
Are you sure ? [Yes/No] : y
>>> Network Interface (wlan0) : DOWN
>>> Network Interface (wlan0) : DOWN
[ RA6W2 EASY SETUP ]
Country Code List:
AD AE AF AI AL AM AN AR AS AT AU AW AZ BA BB BD BE BF BG BH
BL BM BN BO BR BS BT BY BZ CA CF CH CI CL CN CO CR CU CX CY
CZ DE DK DM DO DZ EC EE EG ES ET EU FI FM FR GA GB GD GE GF
GH GL GP GR GT GU GY HK HN HR HT HU ID IE IL IN IR IS IT JM
JO JP KE KH KN KP KR KW KY KZ LB LC LI LK LS LT LU LV MA MC
MD ME MF MH MK MN MO MP MQ MR MT MU MV MW MX MY NG NI NL NO
NP NZ OM PA PE PF PG PH PK PL PM PR PT PW PY QA RE RO RS RU
RW SA SE SG SI SK SN SR SV SY TC TD TG TH TN TR TT TW TZ UA
UG UK US UY UZ VA VC VE VI VN VU WF WS YE YT ZA ZW ZZ
COUNTRY CODE ? [Quit] (Default KR, ZZ : for debug) : us
SYSMODE(WLAN MODE) ?
  1. Station
  2. Soft-AP
  3. WiFi Direct
  4. WiFi Direct P2P GO Fixed
  5. Station & Soft-AP

```

```

MODE ? [1/2/3/Quit] (Default Station) : 1
BAND ?
    1. 2.4 GHz
    2. 5 GHz
    3. AUTO
BAND ? [1/2/3/Quit] (Default 3. AUTO) : 1
[ STATION CONFIGURATION ]
=====
[NO] [SSID] [SIGNAL] [CH] [SECURITY]
-----
[ 0] REL-GLOBAL_2.4G -21 6 WPA2-ENT
[ 1] WiFi_Net_2.4G -22 6 WPA2-ENT
[ 2] REL-GLOBAL -22 6 WPA2-ENT
[ 3] WiFi_Public_2.4G -23 6 WPA2
[ 4] RenesasMatter -27 10 WPA2
-----
[Enter] Rescan
=====
Select SSID ? (1~5/M1~M5/Manual/Quit) : 4
PSK-KEY(ASCII characters 8~63 or Hexadecimal characters 64) ? [Quit]
:*****
Do you want to set advanced WiFi configuration ? [No/Yes/Quit] (Default No) : n
Enable DPM (Dynamic Power Management) ? [Yes/No/Manual/Quit] : y
DPM factors : Defaults ? [Yes/No/Quit] : y
=====
DPM MODE : Enable
Keep Alive Time : 30000 ms
User Wakeup Time : 0 ms
TIM Wakeup Count : 10 dtim
=====
DPM CONFIGURATION CONFIRM ? [Yes/No/Quit] : y
=====
BAND : 2.4 GHz
SSID : RenesasMatter
Security : WPA2PSK
ENCRYPTION : AES(CCMP)
Password : 12345678
PMF : Default
=====
WIFI CONFIGURATION CONFIRM ? [Yes/No/Quit] : y
IP Connection Type ? [Automatic IP/Static IP/Quit] : a
IP Connection Type: Automatic IP
IP CONFIGURATION CONFIRM ? [Yes/No/Quit] : y
SNTP Client enable ? [Yes/No/Quit] : n
[/RA6W2-RRQ61051/dpm] # ble
[/RA6W2-RRQ61051/ble] # ble_hibernate_enable
[/RA6W2-RRQ61051/ble] # reboot
>>> Network Interface (wlan0) : DOW
[wpa_supplicant_event_disassoc] CTRL-EVENT-DISCONNECTED bssid=ce:15:31:6e:b9:41 reason=3 locally_
generated=1
[/RA6W2-RRQ61051/ble] #
Rebooting...
U
Wakeup source is 0x4
*****
* RA6W2-RRQ61051 SDK Information
* -----
*
* - CHIP Name : RA6W2-RRQ61051 (D3095B)
* - SKU Type : 0x20, Dual Band (2.4 + 5 GHz) WI-FI 6
* - CPU Type : Cortex-M33 (160MHz)

```

```

* - Kernel Version   : FreeRTOS V11.1.0
* - SFLASH Type     : 8 MB (Renesas AT25SL)
* - SDK Version      : V8.0.3.0.2
* - F/W Version      : RA6W2-RRQ61051-7a0e352c5e-1
* - Boot Index       : 0
* - F/W Build Time   : Apr 14 2026 12:33:57
*
*****
System Mode : Station Only (0)
<<Please check MAC address.>>
Network init...<<Please check MAC address.>>
OK
>>> Renesas RA6W2-RRQ61051 wpa_supplicant 2.10 - Sep/2023
>>> MAC address (sta0) : ec:9f:0d:9f:ff:fe
>>> Start STA mode...
Connection COMPLETE to ce:15:31:6e:b9:41
>>> Network Interface (wlan0) : UP
    Assigned addr   : 192.168.137.86
    netmask         : 255.255.255.0
    gateway         : 192.168.137.1
    DHCP Server IP  : 192.168.137.1
    Lease Time      : 168h 00m 00s
    Renewal Time    : 140h 00m 00s
>>> Start DPM Power-Down !!!

```

When the RA6W2 is in DPM Sleep mode, user input is not accepted by the debug terminal. To re-enable the input, see [Appendix A.4 Disable DPM Mode](#).

A.4 Disable DPM Mode

When RA6W2 enters DPM Sleep mode, the debug terminal does not accept the input because the UART interfaces are powered down. To exit this state and restart the setup process, complete the following steps:

1. Copy the string `pmgr add_constraint PMGR_CONSTRAINT_SLEEP_PROHIBITED` to the clipboard.
For example, open Notepad, type `pmgr add_constraint PMGR_CONSTRAINT_SLEEP_PROHIBITED`, and then copy (Ctrl+C) the command string.
2. To restart the EVK, use the **RST_N** button.
3. After restarting, before the message `>>> Start DPM Power-Down !!!` appears on the console, paste the `pmgr add_constraint PMGR_CONSTRAINT_SLEEP_PROHIBITED` string in the terminal window, and press Enter.

When this procedure is done successfully, the UART console responds as normal. If DPM mode does not stop successfully, try the process again:

```

>>> Start DPM Power-Down !!!

Wakeup source is 0x4

*****
*                               RA6W2-RRQ61051 SDK Information
* -----
*
* - CHIP Name       : RA6W2-RRQ61051 (D3095B)
* - SKU Type        : 0x20, Dual Band (2.4 + 5 GHz) WI-FI 6
* - CPU Type        : Cortex-M33 (160MHz)
* - Kernel Version  : FreeRTOS V11.1.0
* - SFLASH Type     : 8 MB (Renesas AT25SL)

```

```
* - SDK Version      : V8.0.3.0.6
* - F/W Version     : RA6W2-RRQ61051-9092f23dda-1
* - FSP Version     : 2.0.1
* - Boot Index      : 0
*
*****
```

```
System Mode : Station Only (0)
Network init...OK
>>> Renesas RA6W2-RRQ61051 wpa_supplicant 2.10 - Sep/2023
>>> MAC address (sta0) : 74:90:50:b0:09:fe
>>> Start STA mode...
pmgr add_constraint PMGR_CONSTRAINT_SLEEP_PROHIBITED // pmgr command to disable DPM

[/RA6W2-RRQ61051/pmgr] #
Connection COMPLETE to 10:7c:61:9a:ca:58
  Assigned addr   : 192.168.50.163
    netmask      : 255.255.255.0
    gateway      : 192.168.50.1
  DHCP Server IP : 192.168.50.1
  Lease Time     : 24h 00m 00s
  Renewal Time   : 20h 00m 00s
```

DPM can be restarted at any time with the `pmgr remove_constraint PMGR_CONSTRAINT_SLEEP_PROHIBITED` command.

Appendix B AT Command Wi-Fi Provisioning

You can provision the Wi-Fi connection using AT commands through the AT command terminal. For AT command interface configuration, see Section [Section 4.2.3 Configure RA6W2 EVK AT Command Interface](#). To provision a Wi-Fi connection, complete the following steps:

1. To see nearby apps, enable echo output and then initiate a Wi-Fi scan.

```
ATE
```

```
AT+WFSCAN
```

2. Configure the desired Wi-Fi connection with the following command:

- AT+WFJAP=<SSID>,<Security>,<Encryption>,<Passphrase>
 - <SSID>: AP SSID
 - <Security>: Security protocol.
0 (OPEN), 1 (WEP), 2 (WPA), 3 (WPA2), 4 (WPA+WPA2), 5 (WPA3 OWE), 6 (WPA3 SAE), 7 (WPA2 RSN and WPA3 SAE)
 - <Encryption>:
0 (TKIP), 1 (AES), 2 (TKIP+AES)
 - <Key>: Passphrase. 8 ~ 63 characters are allowed

Example:

If selecting Dlink_AP_24G_FZ, the configuration selected should be as follows:

- <SSID>: Dlink_AP_24G_FZ
- <Security>: 4 for WPA+WPA2 Security protocol.
- <Encryption>: 2 for TKIP+AES encryption.
- <Key>: 12345678 (password of AP).

The example of the command: AT+WFJAP=Dlink_AP_24G_FZ,4,2,12345678

The RA6W2 reboots and connects to the given SSID, with DPM enabled by default.

The procedure is similar for a 5 GHz connection. In this example, the only changes are to <Security> (changed to WPA3), and <Encryption> (changed to AES).

```
AT+WFJAP=R15-5G,6,1,12345678
```

The additional useful commands for Wi-Fi configuration:

```
AT+WFSTAT // for getting the Wi-Fi configuration.  
ATF // for factory reset
```

Appendix C Flash Using flash_img_downloader Script

Programming firmware images to the EVK requires the flash downloader. The flash downloader (flash_img_downloader.zip) is provided with binary images (see [Figure 110](#)).

Name	Date modified	Type
binaries	4/15/2024 2:27 PM	File folder
flash_img_downloader_jtag.bat	4/15/2024 11:09 AM	Windows Batch F
flash_img_downloader_jtag_ble.bat	4/15/2024 11:09 AM	Windows Batch F
flash_img_downloader_uart.bat	4/15/2024 11:09 AM	Windows Batch F
flash_img_downloader_uart.sh	4/15/2024 11:09 AM	Shell Script
flash_img_downloader_uart_ble.bat	4/15/2024 11:09 AM	Windows Batch F
flash_img_downloader_uart_ble.sh	4/15/2024 11:09 AM	Shell Script
readme.txt	4/15/2024 11:09 AM	Text Document

Figure 110. Flash downloader

System requirements:

- OS (Windows 10 64 bit/Ubuntu 20.04 LTS 64 bit).
- Python 3.12.x and pycryptodome package.

NOTE

Install mandatory python library.

pycryptodome

- For Windows

Open a Windows command prompt and enter the following commands:

```
python -m pip install pycryptodome
```

- For Linux OS

Open a terminal window and enter the following commands:

```
python -m pip install pycryptodome
```

Check python version using `python -version`

Python 3.1.X

To program the firmware image through the UART, you have the following options:

- For Windows, use `flash_img_downloader_uart.bat` batch file.
- For Linux, use `flash_img_downloader_uart.sh` shell script file.
- Hardware: RA6W2 EVK, see [Figure 111](#).

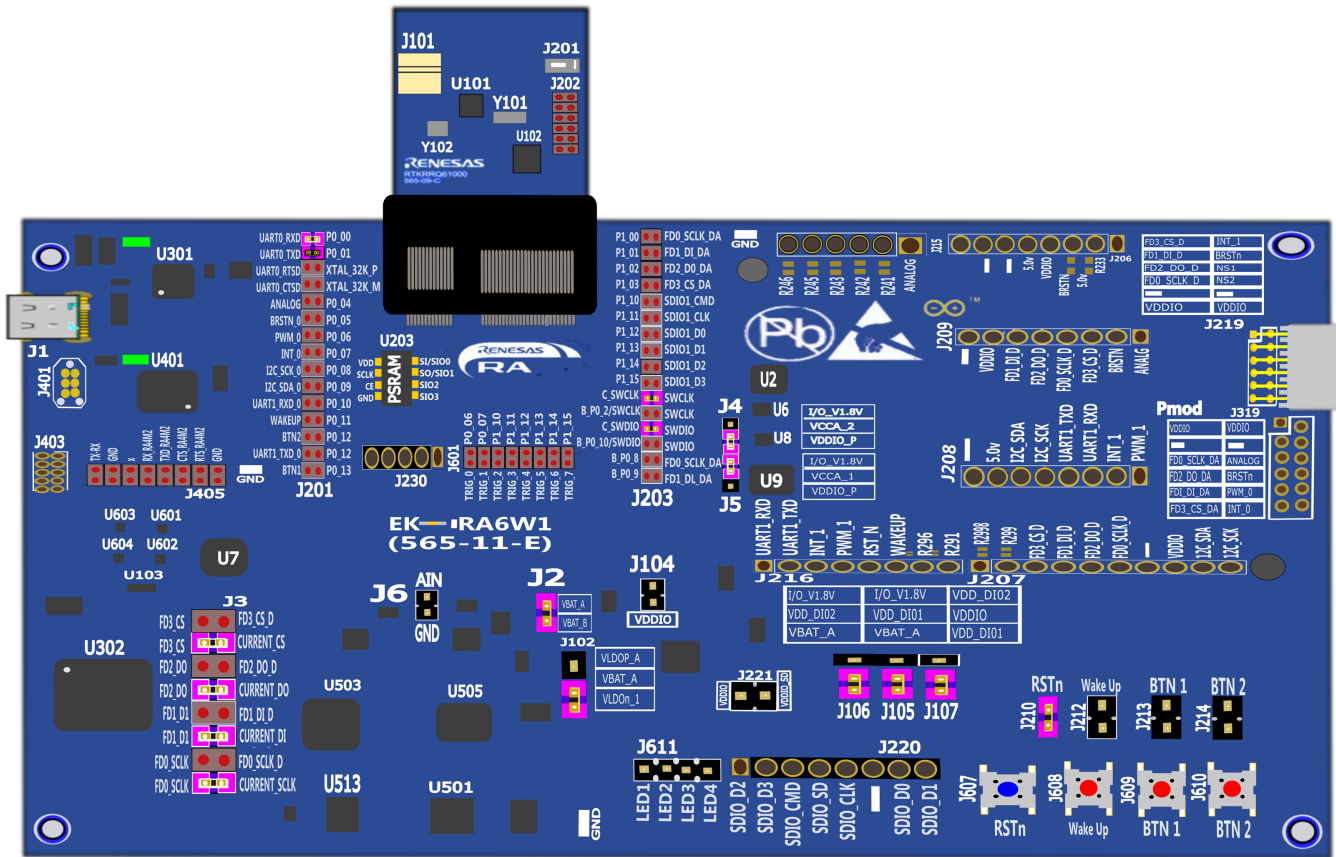


Figure 111. RA6W2 EVK hardware

- This tool is for both Windows and Linux and the programming can be done automatically.
- Software: Flash Downloader for UART.

C.1 Program Firmware Images for Windows

To program the firmware image using Windows:

1. Execute the batch script in the Windows command prompt.

Usage: flash_img_downloader_uart.bat [img full path]

Example: flash_img_downloader_uart.bat <full_path>/wifi_ble_coex_ek_ra6w2_ep.img

```
C:\Users\Developer\Downloads\Flash_img_downloader>Flash_img_downloader_uart.bat C:\Users\Developer\Downloads\wifi_ble_coex_ek_ra6w2_ep.img
```

Figure 112. Run flash downloader with UART

2. Enter COM port to use (lowest numbered COM port).

NOTE

Before running the flash downloader with UART, close any other instances of this COM port to make sure of COM port availability.

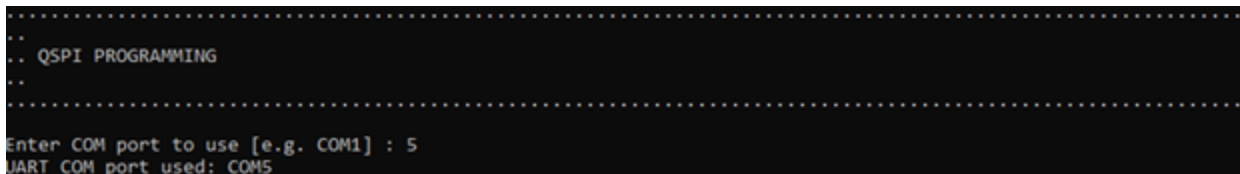


Figure 113. Enter COM port for UART

3. If prompted, to start programming the firmware, press the RST_N (Reset) button on the RA6W2 EVK.

```
Setting serial port baud rate to 115200.
Connecting to device...
Press RESET.
```

Figure 114. Reset RA6W2 EVK

The script finishes programming the firmware image through UART.

```
Writing to address: 0x00000000 offset: 0x001c7000 chunk size: 0x00001000
Writing to address: 0x00000000 offset: 0x001c8000 chunk size: 0x00001000
Writing to address: 0x00000000 offset: 0x001c9000 chunk size: 0x00001000
Writing to address: 0x00000000 offset: 0x001ca000 chunk size: 0x00001000
Writing to address: 0x00000000 offset: 0x001cb000 chunk size: 0x00001000
Writing to address: 0x00000000 offset: 0x001cc000 chunk size: 0x00001000
Writing to address: 0x00000000 offset: 0x001cd000 chunk size: 0x00001000
Writing to address: 0x00000000 offset: 0x001ce000 chunk size: 0x0000bf4
done.
end
.....
.. FINISHED
.....
```

Figure 115. Finished programming a firmware image with UART

4. After firmware programming is completed, open the Terminal Emulator and configure Tera Term Serial Terminal Application for Windows, see [Section 4.2 EK-RA6W2 Serial Debug Interface Configuration](#).
5. Press the Reset button on the EVK.
6. Check the booting status through UART.

```
Wakeup source is 0x4
*****
* RA6W2-RR061051 SDK Information
* -----
*
* - CHIP Name      : RA6W2-RR061051 (D3095B)
* - SKU Type      : 0x20, Dual Band (2.4 + 5 GHz) WI-FI 6
* - CPU Type      : Cortex-M33 (160MHz)
* - Kernel Version : FreeRTOS V11.1.0
* - SFLASH Type   : 8 MB (Renesas AT25SL)
* - SDK Version   : V8.0.3.0.2
* - F/W Version   : RA6W2-RR061051-7a0e352c5e-1
* - Boot Index    : 0
* - F/W Build Time : Apr 14 2026 12:33:57
*
*****
System Mode : Station Only (0)
Network init..OK
>>> Renesas RA6W2-RR061051 wpa_supplicant 2.10 - Sep/2023
>>> MAC address (sta0) : 74:90:50:c8:b8:ac
>>> Start STA mode...
```

Figure 116. Flash boot with downloaded image

C.2 Program Firmware Images for Linux

To program the firmware image using Linux:

1. Execute the Shell script in the Terminal.

Usage: flash_img_downloader_uart.sh [img full path]

Example: flash_img_downloader_uart.sh <full_path>/wlan_ble_coex_ek_ra6w2_ep.img

```
developer@TVMA-WKS0193:~/Downloads/Flash_img_downloader$ ./flash_img_downloader_uart.sh /home/developer/Downloads/wifi_ble_coex_ek_ra6w2_ep.img.bin
```

Figure 117. Run flash downloader with UART

NOTE
While programming, make sure the port of RA6W2 interface should be /dev/ttyUSB0. Also close any other minicom instances of this port to make sure of port availability.

2. If prompted, to start programming the firmware, press the RST_N (Reset) button on the RA6W2 EVK.

```
Setting serial port baud rate to 115200.
Connecting to device...
Press RESET.
```

Figure 118. Reset RA6W2 EVK

The script finishes programming the firmware image through UART.

```
Writing to address: 0x00000000 offset: 0x001cb000 chunk size: 0x00001000
Writing to address: 0x00000000 offset: 0x001cc000 chunk size: 0x00001000
Writing to address: 0x00000000 offset: 0x001cd000 chunk size: 0x00001000
Writing to address: 0x00000000 offset: 0x001ce000 chunk size: 0x00001000
Writing to address: 0x00000000 offset: 0x001cf000 chunk size: 0x00001000
Writing to address: 0x00000000 offset: 0x001d0000 chunk size: 0x000001cc
done.
end
.....
..
.. FINISHED!
..
.....
```

Figure 119. Finished programming a firmware image with UART

3. After firmware programming completes, open the Terminal Emulator and configure.
4. On the EVK, press the **Reset** button.
5. Check the booting status through UART.

```
Wakeup source is 0x4

*****
*
* RA6W2-RRQ61051 SDK Information
* -----
*
* - CHIP Name      : RA6W2-RRQ61051 (D3095B)
* - SKU Type       : 0x20, Dual Band (2.4 + 5 GHz) WI-FI 6
* - CPU Type       : Cortex-M33 (160MHz)
* - Kernel Version : FreeRTOS V11.1.0
* - SFLASH Type    : 8 MB (Renesas AT25SL)
* - SDK Version    : V8.0.3.0.2
* - F/W Version    : RA6W2-RRQ61051-7a0e352c5e-1
* - Boot Index     : 0
* - F/W Build Time : Apr 14 2026 12:33:57
*
*****

System Mode : Station Only (0)
```

Figure 120. Flash boot with downloaded image

Appendix D Python Integration in e² studio Windows

If Python 3 is already installed and it is not showing in the e² studio terminal, follow the steps:

1. In Windows, go to **Apps > Advanced app settings > App execution aliases > python3.exe**.

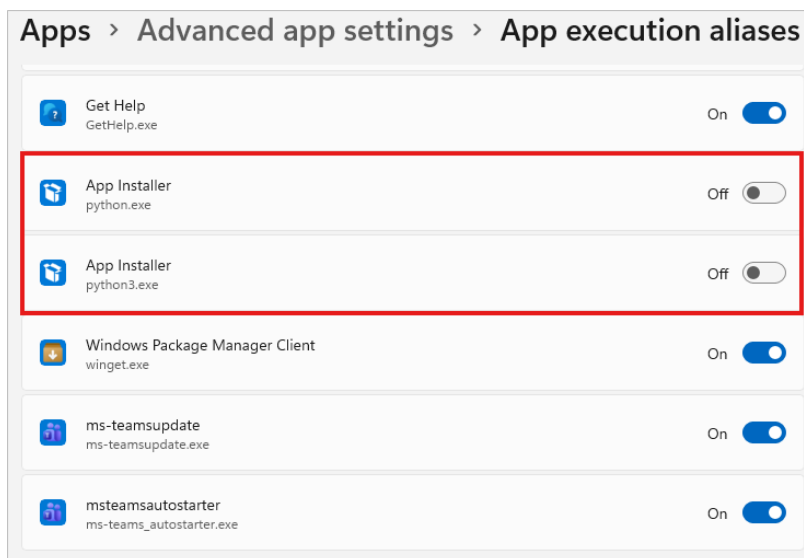


Figure 121. Application execution aliases

2. Create a `python3.bat` file with the following script.

```
@echo off  
python %*
```

3. Copy the `python3.bat` file to the already existing python3 installation location.

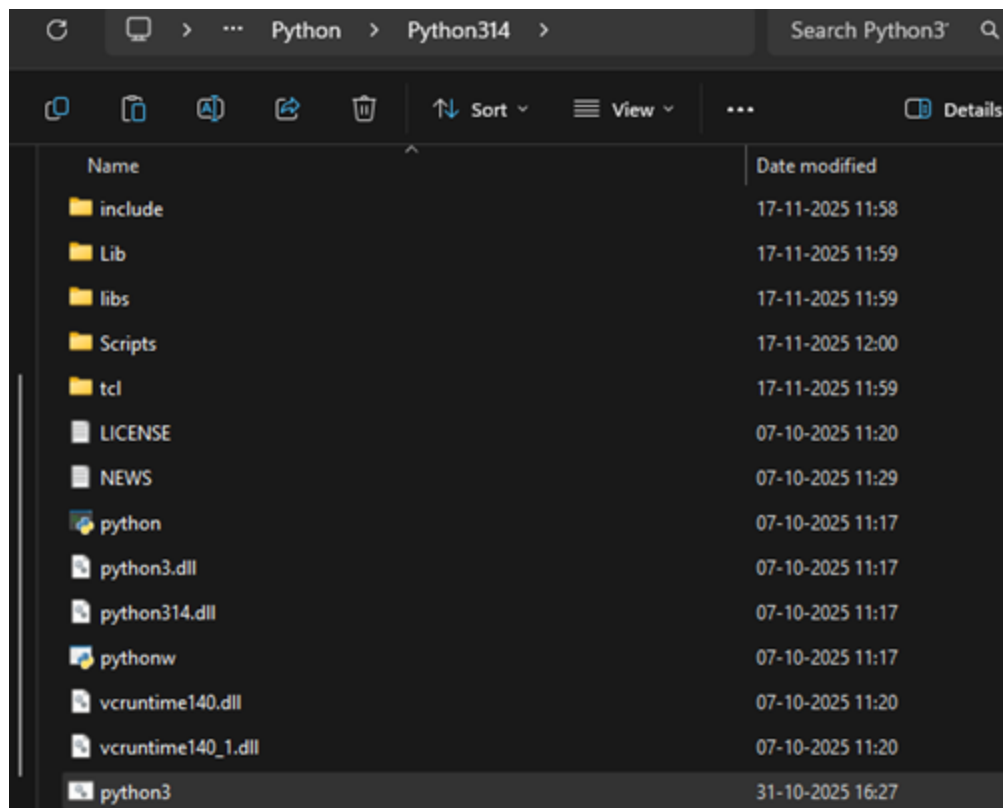


Figure 122. Python3 Installation folder

- Restart e² studio and check if Python 3 is properly integrated using the below command.

```
python3 --version
```

Appendix E SFlash Memory Maps

This section describes the memory maps for the external SFlash device and how to change the SFlash device memory map used in the SDK.

NOTE

The RA6W2 SDK currently supports the following SFlash types:

- **8-MB SFlash**

To use a different type of SFlash with the RA6W2, contact Renesas Electronics to confirm compatibility.

The RA6W2 SDK supports 8-MB SFlash.

Table 5. 8-MB SFlash map for RA6W2

Address	Name	Description	Size (kB)
0x0000_0000	Product Header		4
0x0000_1000	Product Header - Backup		4
0x0000_2000	RTOS #0	(64*1024 * 40)	2560
0x0028_2000	Reserved	RTOS binary size – Expandable area	508
0x0030_0000	NVRAM	NVRAM VEE Segment #1	40
0x0030_A000	NVRAM	Backup (Multiplier 8)	280
0x0035_0000	TLS_Cert_Base		704
0x0035_0000	TLS Certificate WPA_Enterprise	CA	4
0x0035_1000		Cert	4
0x0035_2000		Private key	4
0x0035_3000		Diffie-Hellmann key	4
0x0035_4000	TLS Certificate OTA_Update	CA	4
0x0035_5000		Cert	4
0x0035_6000		Private key	4
0x0035_7000		Diffie-Hellmann key	4
0x0035_8000	TLS Certificate HTTPs Client	Cert	4
0x0035_9000		Private key	4
0x0035_A000		Diffie-Hellmann key	4
0x0035_B000		CA	4
0x0035_C000	TLS Certificate HTTPs Server	Cert	4
0x0035_D000		Private key	4
0x0035_E000		Diffie-Hellmann key	4
0x0035_F000		Cert	4
0x0036_0000	TLS Certificate MQTTs Client	Cert	4
0x0036_1000		Private key	4
0x0036_2000		Diffie-Hellmann key	4
0x0036_3000		CA	4
0x0036_4000	TLS Certificate AT-CMD #0 ~ #15	AT command TLS Certificate Key #0 ~ #15	64
0x0037_4000	TLS Certificate AWS		20 or Unused
0x0037_9000	TLS Certificate Matter		20 or Unused
0x0037_E000	TLS Certificate MISC1		20 or Unused
0x0038_3000	TLS Certificate MISC2		20 or Unused
0x0038_8000	TLS Certificate MISC3		20 or Unused

Address	Name	Description	Size (kB)
0x0038_D000	TLS Certificate MISC4		20 or Unused
0x0039_2000	TLS Certificate MISC5		20 or Unused
0x0039_7000	TLS Certificate MISC6		20 or Unused
0x0039_C000	TLS Certificate MISC7		20 or Unused
0x003A_1000	TLS Certificate MISC8		20 or Unused
0x003F_E000	Secure Asset Product Area		4 or Unused
0x0040_0000	RTOS #1	(64*1024 * 40)	2560
0x0068_0000	Reserved	RTOS binary size – Expandable area	512
0x0070_0000	Bluetooth LE Firmware	DA14531 Bluetooth LE firmware area	128
0x0072_0000	User Area		892
0x007F_F000	Partition Table		4

8. Revision History

Revision	Date	Description
1.04	May 7, 2026	Updated the version of e2studio to 2015-12 Updated the FSP version to RAFW FSP 2.0.1 Updated SFlash Memory Map
1.03	Nov 28, 2025	Updated to Rev E EVK. Updated sections about EVK and its setup, test procedures, SDK and build setup. Added appendix about Python integration.
1.02	Aug 31, 2025	Added and updated setting up EK-RA6W2, test procedures, SDK and build setup, and using flash_img_downloader script.
1.01	May 30, 2025	<ul style="list-style-type: none"> ▪ Added and updated sections about configuring RA6W2 EVB AT Command Interface, measuring Current Consumption for Sleep 1, and Sample Projects. ▪ Changed the chip name from RRQ61400 to RA6W2.
1.00	Mar 13, 2025	First release.

RoHS Compliance

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