QuickConnect Beginners Kit

This comprehensive kit offers a user-friendly platform for experiencing the QuickConnect Platform. Complete support is available for all the included boards through the QuickConnect Studio. The modular boards are designed for seamless integration using industry-standard PMOD connectors. Featuring an MCU board, a Wi-Fi+BLE connectivity board, and a diverse assortment of sensors, the kit facilitates rapid prototyping. It also supports fast software development and customization with hardware prototyping.

Important: To ensure the QuickConnect Studio is set up correctly, complete the steps in the order listed in “Quick Start Procedure”.

Contents

1. Kit Information

1.1 How to Get the Kit

The QuickConnect boards can be found on the QuickConnect Platform site.

1.2 Kit Contents

Hardware Components:

- RA6E2 (R7FA6E2BB3CFM) MCU board
- PMOD Board with Ultra-Low Power Wi-Fi + Bluetooth® Low Energy Combo Module, DA16600MOD
- PMOD Board with Relative Humidity and Temperature Sensor, HS4001
- PMOD Board with Air Quality (TVOC) Sensor, ZMOD4410
- PMOD Board with Air Quality (NO2 and Ozone) Sensor, ZMOD4510
- PMOD Board with Digital Microphone, ICS43434
- USB Cable

2. QuickConnect Studio

The QuickConnect Studio (QCStudio) is an online, cloud-based embedded system design platform that enables users to graphically drag-and-drop devices and design blocks on the cloud to build their solutions.

After placing each block, users can generate, compile, and build the base software automatically. This significantly reduces the design complexity in system design and improves the time to market for customers.

2.1 Key Features

The following list highlights key features supported in this platform.

- Broad portfolio of Renesas and Partner devices
- Real-time code customization
- Remote debugging by connecting to remote board farms deployed globally
- Multi-region deployment to reduce latency
- Support for multiple concurrent users globally
- Real-time monitoring for cyber security threats

For more details, refer to the QuickConnect Studio landing page.

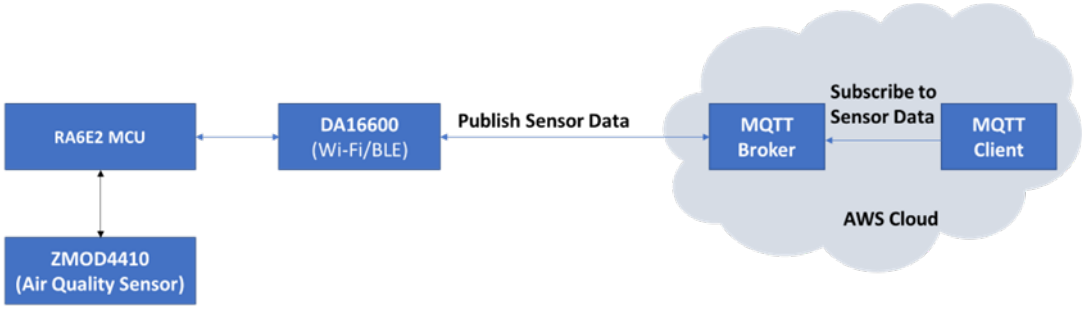
3. Quick Start Procedure

This section provides a step-by-step procedure for creating a reference application using QCStudio.

3.1 Application Overview

QCStudio users can use the QuickConnect Beginner Kit to develop a variety of solutions using the available hardware components. Showcased in this quick start guide are procedures for creating an Air Quality Data logger application using the QCStudio platform.

In this reference application, the RA6E2 MCU kit is used with the ZMOD4410 PMOD board and DA16600 Wireless PMOD board. The MCU periodically reads the Indoor Air Quality sensor data and publishes it to the AWS MQTT Broker. QCStudio users can use additional sensors to log sensor data if required.

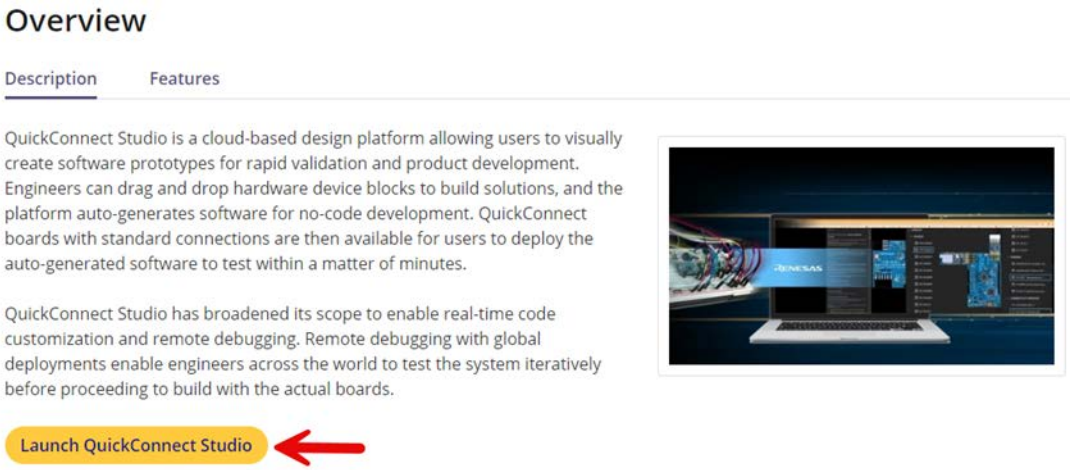


Note: The scope of the QCStudio platform and QuickConnect Beginner Kit is not limited to this reference application.

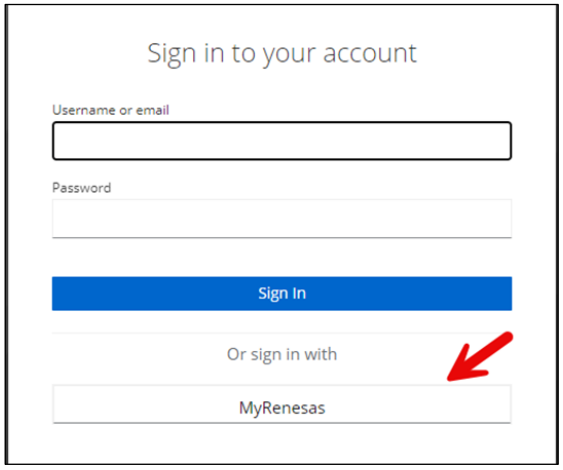
3.2 Steps to Create an Application using QCStudio

3.2.1. Launch QuickConnect Studio Workspace

1. Launch the QuickConnect Studio platform in a PC browser window.
   a. To launch a QCStudio user workspace, visit the QuickConnect Studio.
   b. Click on the **Launch QuickConnect Studio** button to launch a unique workspace in a browser window.



2. At the following screen, click on the **MyRenesas** button to log in using MyRenesas login credentials.

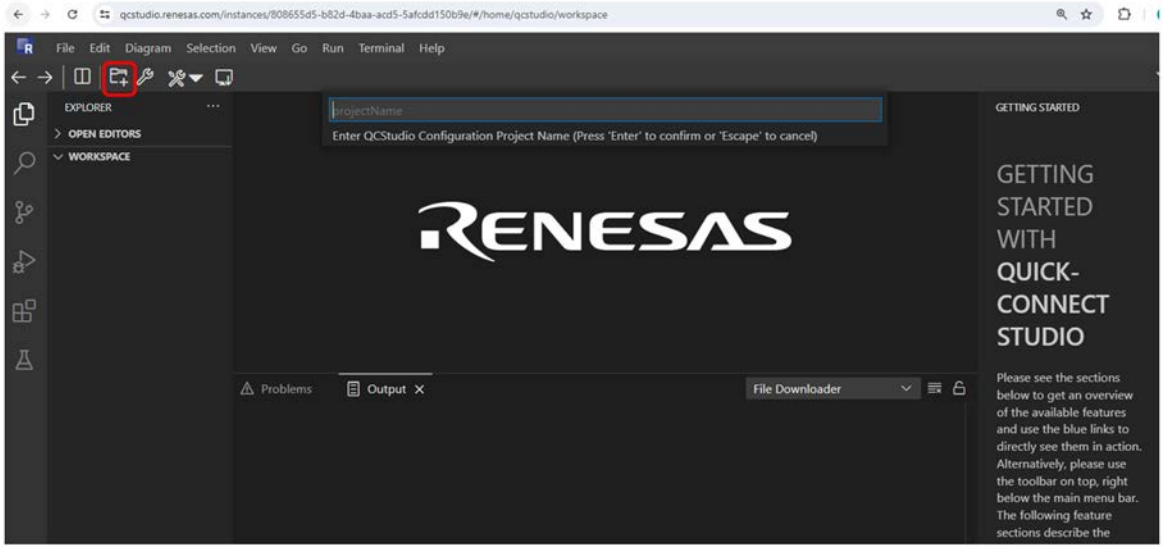


After a successful login, the user workspace loads in the browser window.
Note: New users can register for MyRenesas login credentials at the Renesas website.

3.2.2. Create QCStudio Application

Before creating a QCStudio application, a QCStudio workspace must be launched (see section 3.2.1).

1. Create a new project by clicking the **New Project** icon from the menu. Type in a project name in the highlighted window.

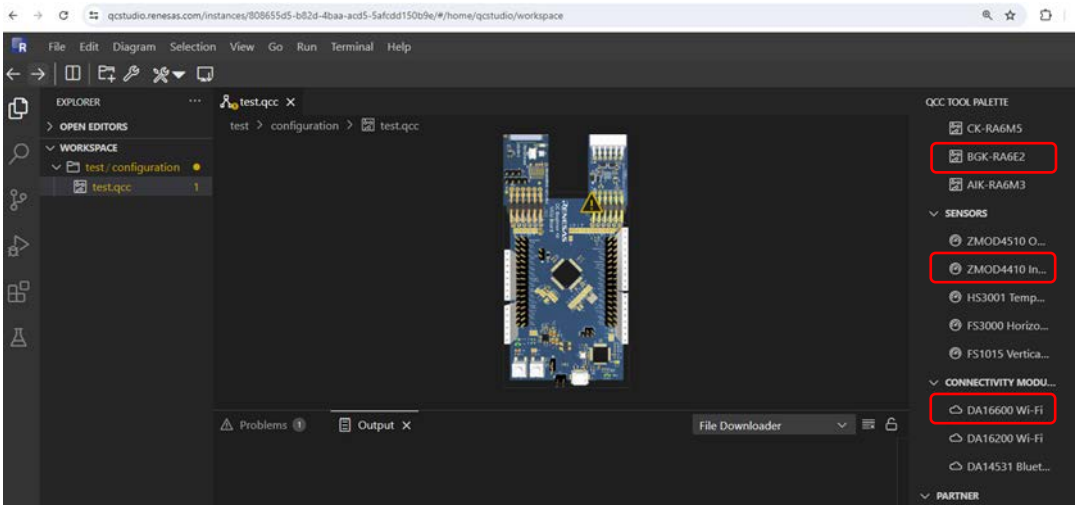


This creates a new QCStudio project. A menu with a list of supported devices is shown on the right side of the browser.

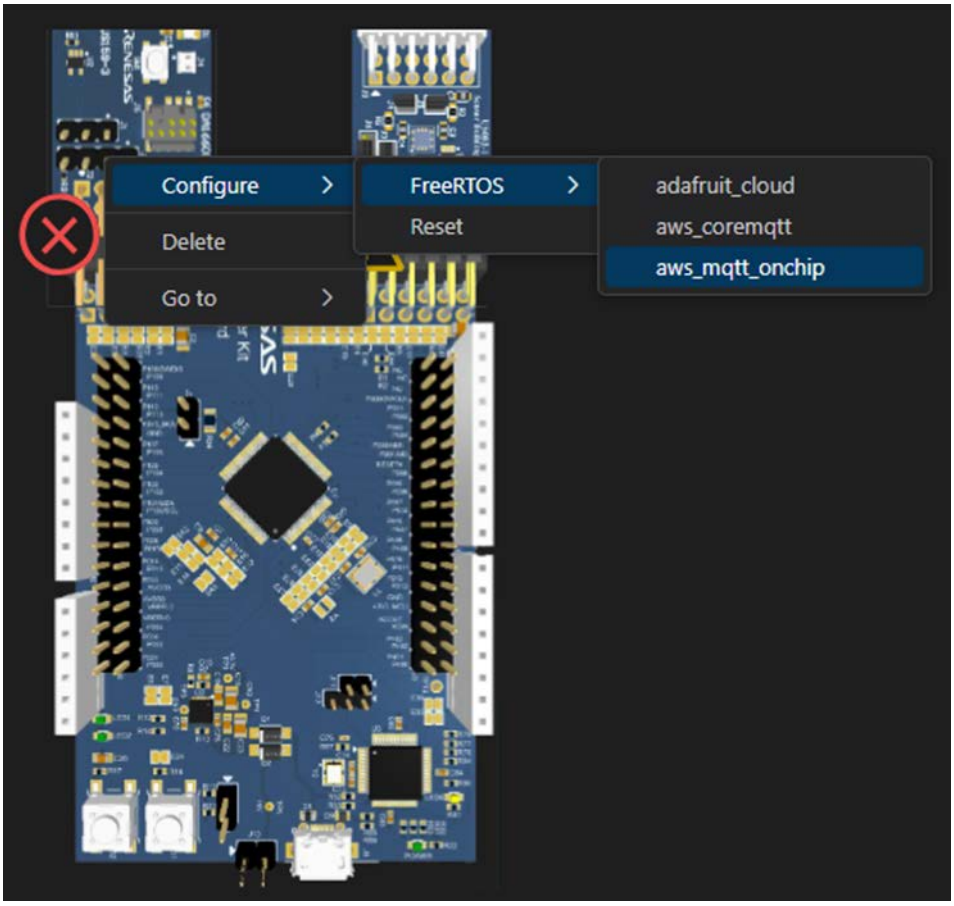
Note: The devices supported list changes periodically. Refer to the latest device list at the usage of this document.

2. Next, design the Air Quality data logger application by dragging and dropping the system blocks from the QCStudio tool palette.

   In this reference application, the following are used: the MCU board (BGK-RA6E2), the wireless module DA16600 PMOD board, and the Air Quality Sensor ZMOD4410 PMOD board.



3. Right-click on the wireless module (DA16600 PMOD board) and configure the module with **Configure** > **FreeRTOS** > **aws_mqtt_onchip**.



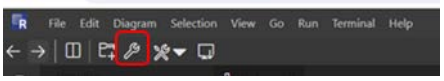
4. Finally, the QCStudio project is now ready to build and generate the application binary that can be tested on the actual hardware kit.

Note: QCStudio users can add additional compatible sensors to the design to include additional sensors into the application.

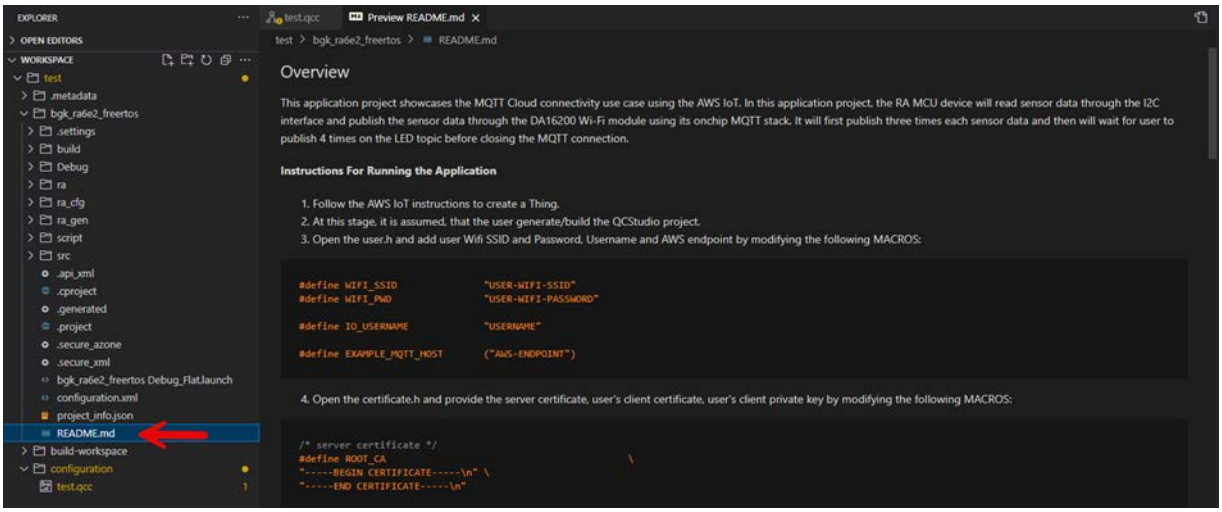
3.2.3. Generate and Build Application using QCStudio

Before generating and building an application, launch the QCStudio workspace and create a solution (see Create QCStudio Application).

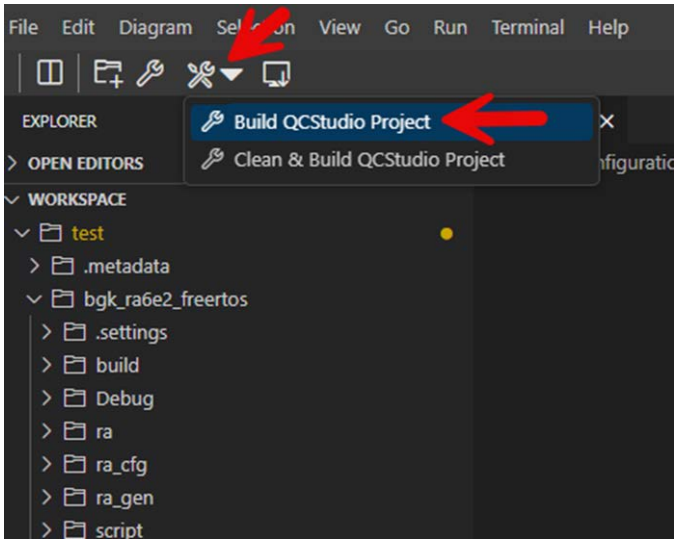
1. To generate and build projects, click on the Generate/Build QCS Project icon on the top left-hand side corner. QCStudio automatically generates the required software package including drivers, middleware, and network stacks required for the user-created system solution.



2. To run the application project, refer to the instructions in the readme file from the generated application project. The **README.md** file is found under the project directory.



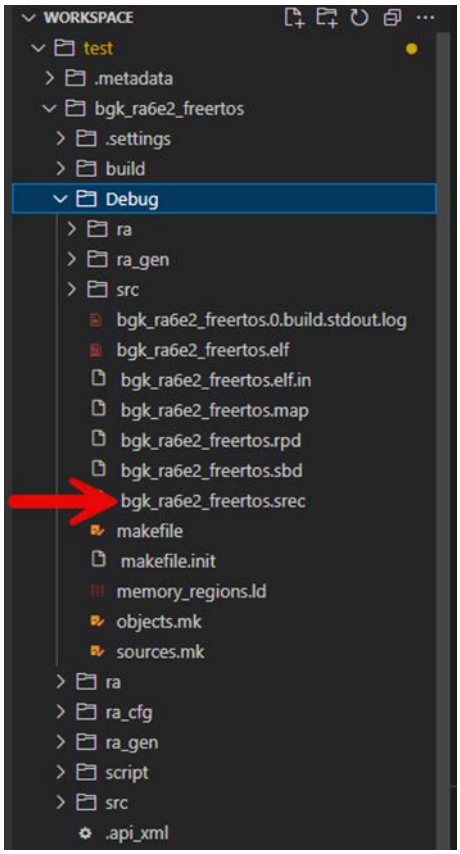
3. After making the changes in the corresponding .c and .h files, rebuilding the application project is required. To rebuild the application project, click on the tools icon to open the drop-down menu. Select the **Build QCStudio Project** option.



3.3 Programming Hardware and Viewing Results

Before programming the hardware and viewing results, launch the QCStudio workspace and create a solution (see Steps to Create an Application using QCStudio).

The application project output files can be found in the Debug folder.



1. Right-click on the **.srec** file and download it to the local PC.
2. Use the Jlink Flash programmer to program the **.srec** file into the chosen MCU kit. In this case, it is the QuickConnect Beginner kit. Download SEGGER - The Embedded Experts - Downloads - J-Link / J-Trace.

   Refer to the Appendix for more about flashing the code using J-Link.

4. Next Steps

By following the procedures in this document, users can design an Air Quality Data logger application using the QCStudio platform.

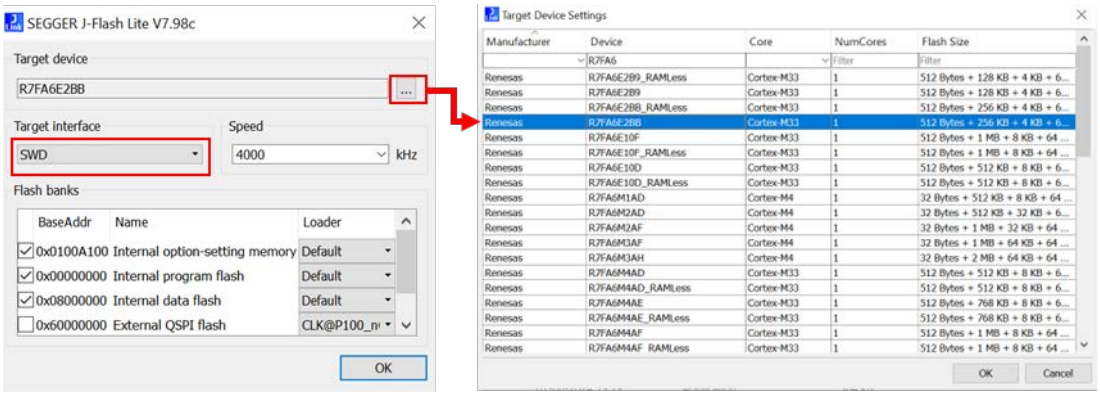
For next steps, the generated applications by the QCStudio platform can be used as reference applications while customizations can be added with unique value propositions.

Also, the remote debugging capability of the QCStudio platform can be used to download and debug a generated application. For more details, refer to the QCStudio landing page.

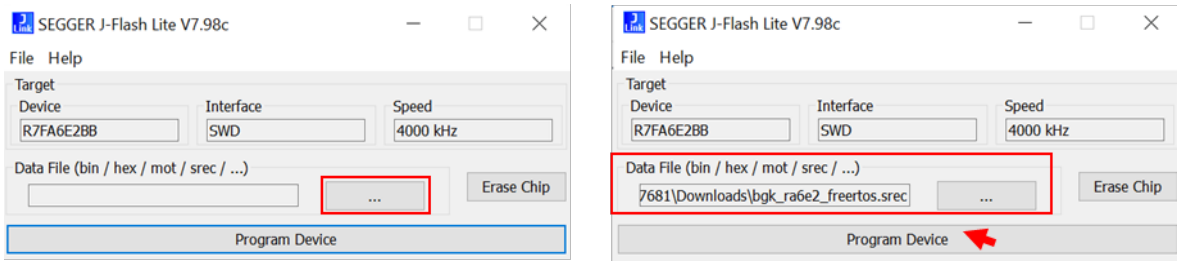
5. Appendix

5.1 Flashing Code to the Hardware using SEGGER J-Flash Lite

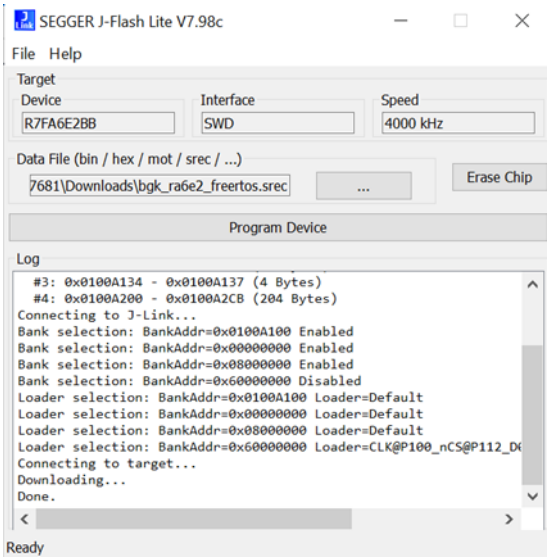
1. Open **SEGGER J-Flash Lite**:
   a. Navigate to the **Program Files** on your PC.
   b. Open the **SEGGER – Jlink** folder.
   c. Launch **JFlashLite.exe**.
2. Select **Target Device**:
   a. In the J-Flash Lite window, click on the **(…)** button next to the **Target Device** field.
   b. A new window will appear. Here, user can select the manufacturer and device.
   c. For this project, as we are using the **RA6E2 MCU**, search for the part number **R7FA6E2BB**.
   d. Select the target device and click **OK**.
   e. Ensure the target interface is set to **SWD**.
   f. Click **OK**.



3. Import the **.srec File**:
   a. In the main J-Flash Lite window, locate the **Data File (bin / Hex / mot / srec / …)** section.
   b. Click on the **(…)** button to import the **.srec** file.
   c. Select the **.srec** file that was downloaded by following the steps in the Quick Start procedure.



4. Program the Device:
   a. Click on Program Device.
   b. A prompt may appear asking if you want to update to the latest firmware version. Select No.
   c. The code will now be flashed to the MCU.
   d. Once the process is complete, the log section of the screen will display Done.



6. References

- RA6E2 - Entry-Line 200MHz Arm® Cortex®-M33 General Purpose Microcontroller | Renesas
- DA16600MOD - Ultra-Low Power Wi-Fi + Bluetooth® Low Energy Combo Modules for Battery Powered IoT Devices | Renesas
- HS4001 - Relative Humidity and Temperature Sensor, Digital Output, ±1.5% RH | Renesas
- ZMOD4410 - Firmware Configurable Indoor Air Quality (IAQ) Sensor with Embedded Artificial Intelligence (AI) | Renesas
- ZMOD4510 - Gas Sensor for O3 and NO2 | Renesas

Technical Updates/Technical News

- The latest information can be downloaded from the Renesas Electronics Website.

Website and Support

Renesas Electronics Website - https://www.renesas.com/

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7. Revision History

Revision	Date	Description
1.00	Aug 21, 2024	Initial release.

General Precautions in the Handling of Microprocessing Unit and Microcontroller Unit Products

The following usage notes are applicable to all Microprocessing unit and Microcontroller unit products from Renesas. For detailed usage notes on the products covered by this document, refer to the relevant sections of the document as well as any technical updates that have been issued for the products.

1. Precaution against Electrostatic Discharge (ESD)
   A strong electrical field, when exposed to a CMOS device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop the generation of static electricity as much as possible, and quickly dissipate it when it occurs. Environmental control must be adequate. When it is dry, a humidifier should be used. This is recommended to avoid using insulators that can easily build up static electricity. Semiconductor devices must be stored and transported in an anti-static container, static shielding bag or conductive material. All test and measurement tools including work benches and floors must be grounded. The operator must also be grounded using a wrist strap. Semiconductor devices must not be touched with bare hands. Similar precautions must be taken for printed circuit boards with mounted semiconductor devices.
2. Processing at power-on
   The state of the product is undefined at the time when power is supplied. The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the time when power is supplied. In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the time when power is supplied until the reset process is completed. In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the time when power is supplied until the power reaches the level at which resetting is specified.
3. Input of signal during power-off state
   Do not input signals or an I/O pull-up power supply while the device is powered off. The current injection that results from input of such a signal or I/O pull-up power supply may cause malfunction and the abnormal current that passes in the device at this time may cause degradation of internal elements. Follow the guideline for input signal during power-off state as described in your product documentation.
4. Handling of unused pins
   Handle unused pins in accordance with the directions given under handling of unused pins in the manual. The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of the LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible.
5. Clock signals
   After applying a reset, only release the reset line after the operating clock signal becomes stable. When switching the clock signal during program execution, wait until the target clock signal is stabilized. When the clock signal is generated with an external resonator or from an external oscillator during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Additionally, when switching to a clock signal produced with an external resonator or by an external oscillator while program execution is in progress, wait until the target clock signal is stable.
6. Voltage application waveform at input pin
   Waveform distortion due to input noise or a reflected wave may cause malfunction. If the input of the CMOS device stays in the area between V_{IL} (Max.) and V_{IH} (Min.) due to noise, for example, the device may malfunction. Take care to prevent chattering noise from entering the device when the input level is fixed, and also in the transition period when the input level passes through the area between V_{IL} (Max.) and V_{IH} (Min.).
7. Prohibition of access to reserved addresses
   Access to reserved addresses is prohibited. The reserved addresses are provided for possible future expansion of functions. Do not access these addresses as the correct operation of the LSI is not guaranteed.
8. Differences between products
   Before changing from one product to another, for example to a product with a different part number, confirm that the change will not lead to problems. The characteristics of a microprocessing unit or microcontroller unit products in the same group but having a different part number might differ in terms of internal memory capacity, layout pattern, and other factors, which can affect the ranges of electrical characteristics, such as characteristic values, operating margins, immunity to noise, and amount of radiated noise. When changing to a product with a different part number, implement a system-evaluation test for the given product.

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Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,
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