Wi-Fi HTTP Client Sample Code

Quick Start Guide of HTTP Client Sample Code

Rev.1.00
Feb, 2022

Introduction

This quick start guide describes the setup and use of HTTP client running on DA16200 Wi-Fi module. This guide mainly focuses on describing how to set up a HTTP web server in a PC, how to make Wi-Fi module as HTTP client by AT command for connecting HTTP server, and how to post a message to HTTP server.

Through this guide and related demo, you can easily start your development on DA16200, a Wi-Fi module, using AT command and EK-RA6M4, an evaluation kit for RA6M4 MCU group.

Target Device

EK-RA6M4 (R7FA6M4AF3CFB)

DA16200 PMOD

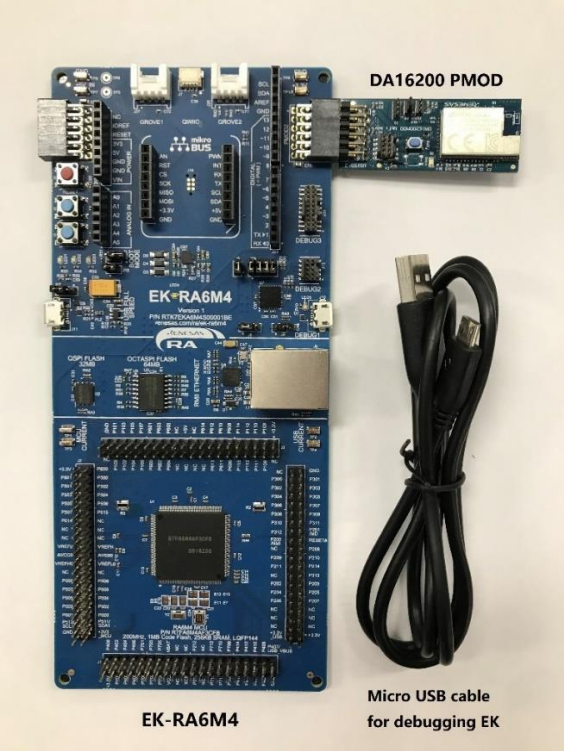
Contents

1. Kit Contents

To set up this demo, the following components are needed.

1.1 Hardware components

- EK-RA6M4
- DA16200 PMOD (US159-DA16200MEVZ)
- Micro USB cable
- A UART-USB bridge cable (if possible and optional)



1.2 Software components

Below software components are needed:

Category	Item	Remark
Firmware	DA16200_RA6M4_HTTP_client_SampleCode.zip	Compressed project file
	DA16200_RA6M4_HTTP_client_SampleCode.mot	Motorola S-record file for programming RA6M4 MCU
	"web" folder: httpserver.py, test.html, data.txt	A package for HTTP server setup
Software	e2 studio 2021-10, FSP v3.5.0	A GUI and related software package for RA6M4 development
	"Download_Tool" folder: SEGGER J-Link V7.52a	A flash programmer for downloading file to RA6M4, meanwhile a tool using J-Link RTT function to observe the state of the system.
	Python 3.10.2	A tools for HTTP server setup
	A web browser, for example Microsoft Edge	A browser for monitoring the posted message from HTTP client

2. Features

- Supply power to the kit by micro-USB cable
- Set the necessary modules of RA6M4 to establish connection between EK and DA16200 PMOD
- After installing python, pip, and flask, run the web server python file to setup the HTTP server on PC
- Initialize and control Wi-Fi module (DA16200) by AT command to act as a HTTP client
- After pressing S1 button, one message will post to HTTP server via DA16200 Wi-Fi
- Open the localhost IP address in a web browser to monitor the latest message posted from HTTP client

3. Setup the Demo

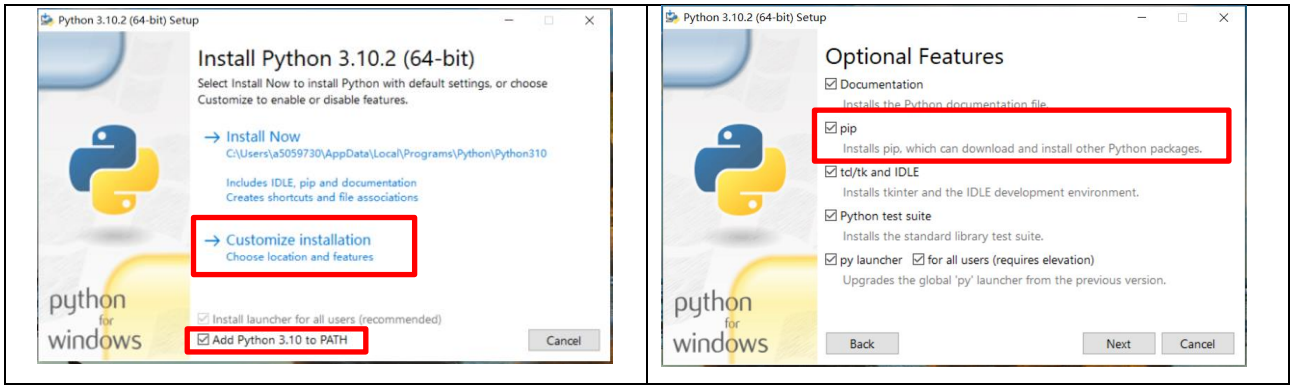
3.1 Setup HTTP server and confirm IP address

In this demo, we use Python and flask to set up a HTTP server on PC. So downloading python is necessary.

Step 1. Download Python that can run on your PC system and install it. The URL of Python downloading is show below.
Python Releases for Windows | Python.org

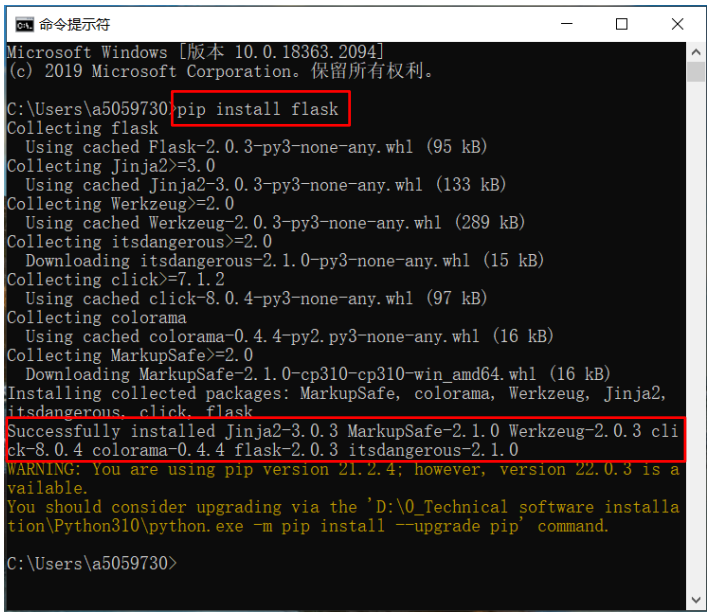
Here use Latest Python 3 Release - Python 3.10.2 installed on windows 64-bit system as an example.

Note that when installing the Python, you should check “Add python 3.10 to PATH” to add the environment variable to your PC, and select “Customize installation”, check the “pip” to install the pip together for the “flask” installation in the next step.



Step 2. Open the “Command prompt” window, input “pip install flask” command to install flask.

After install it successfully, the information will show as below.



Step 3. Connect a Wi-Fi that is same with DA16200 using. Or turn on the hotspot function on PC, and then set DA16200 Wi-Fi connect it.

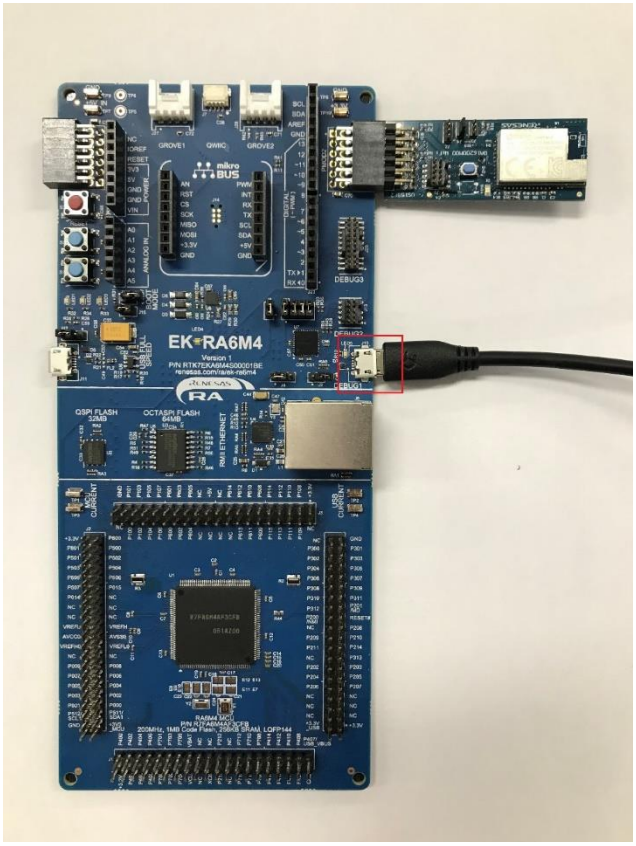
Step 4. Locate the path to the “web” folder for HTTP server setup, for example, D:\web. Input “httpserver.py” to run it. Then the HTTP server sets up. You can find the server IP address after the command run. For example the HTTP server IP is http://192.168.1.101:5000 in the below figure. You should set the IP address to the MCU source code, rebuild it and then download it again to match your environment.

Press “Ctrl + C” to stop the HTTP server if need.

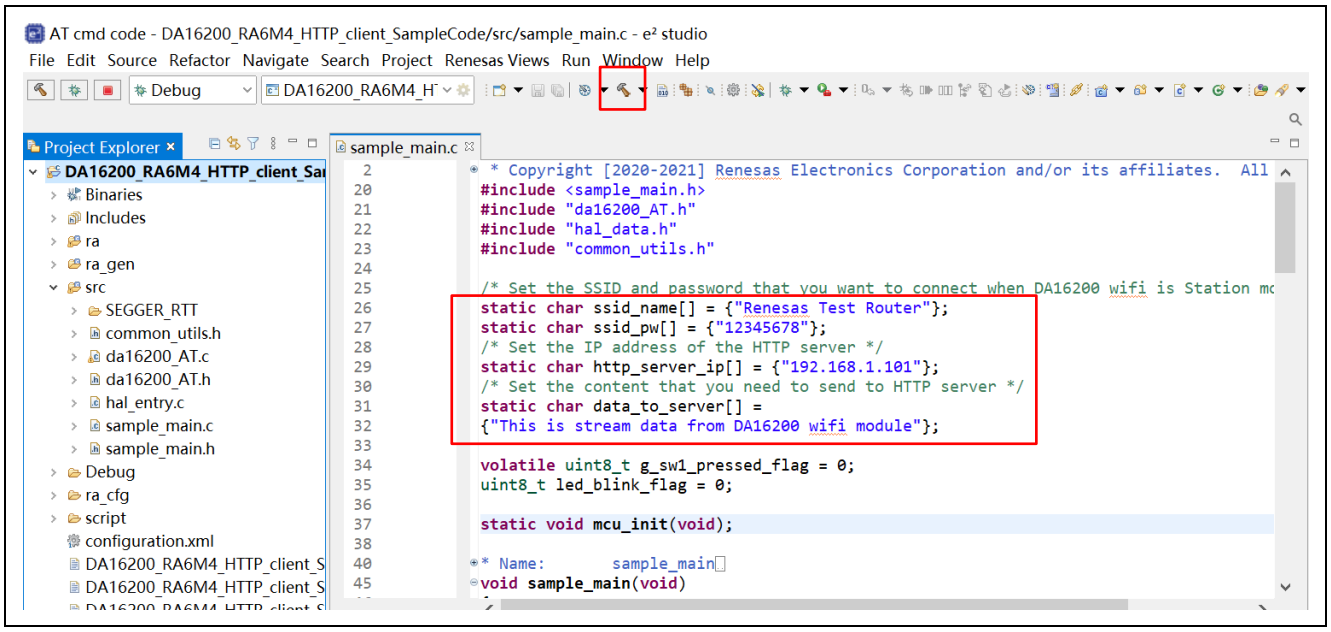
3.2 Rebuild MCU Code and Download to EK-RA6M4

Step 1. The EK-RA6M4 features a SEGGER J-Link On-Board debugger, using Renesas S124 Debug MCU and SEGGER J-Link® firmware to provide the on-board debug functionality, so all the customer needs for debugging is a Micro USB cable.

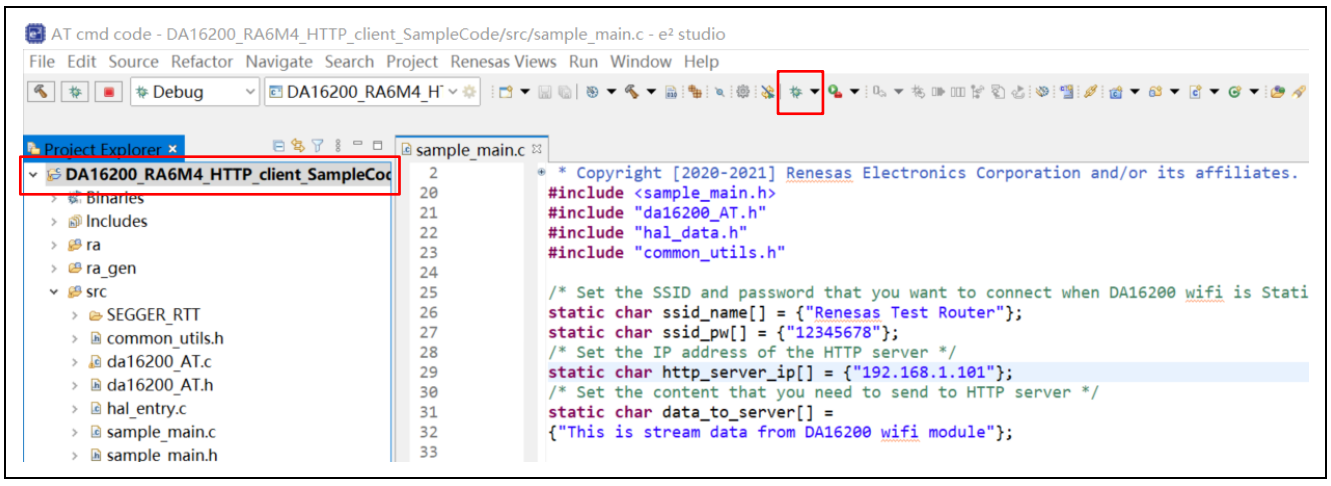
Insert Micro USB cable into Debug USB Micro-B connector (J10), establishing a debug channel.



Step 2. Import the “DA16200_RA6M4_HTTP_client_SampleCode” to e2studio, open the “sample_main.c” file, and set the ssid_name, ssid_pw, http_server_ip and data_to_server following with your test environment. Then build the project again to get the new mot file.



Step 3. Select the project to make it bold font status, and Click the “Debug” icon to download the new executable file to the EK-RA6M4 board.

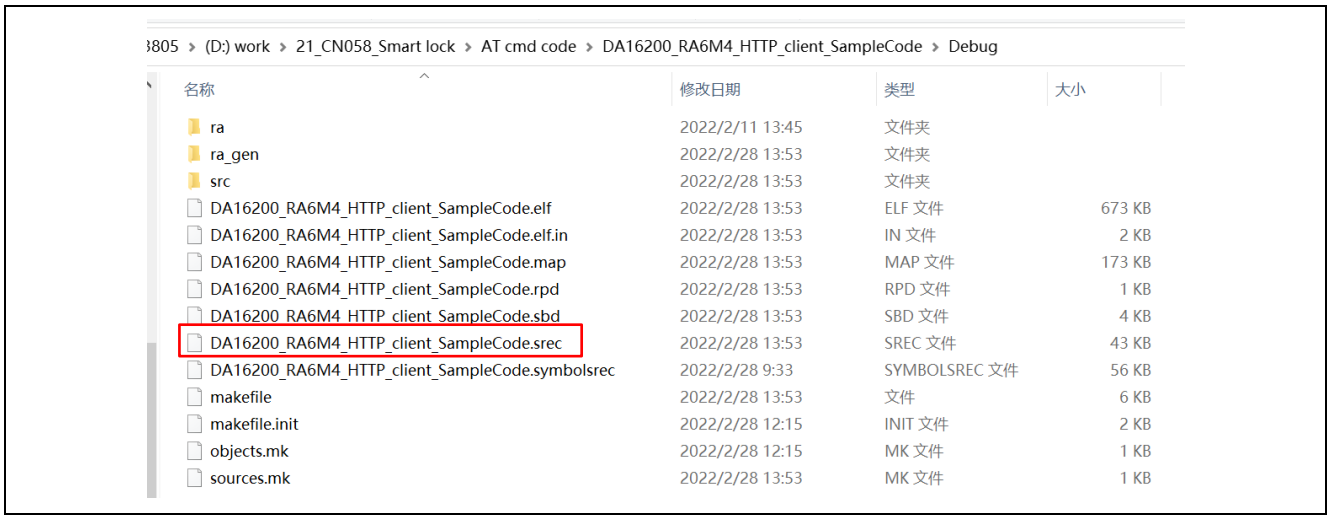


Note: about how to use e2studio and import the project, you can refer to “5. Customizing the Quick Start Example Project” chapter of EK-RA6M4 Quick Start Guide.

https://www.renesas.com/jp/zh/document/qsg/ek-ra6m4-quick-start-guide?language=en

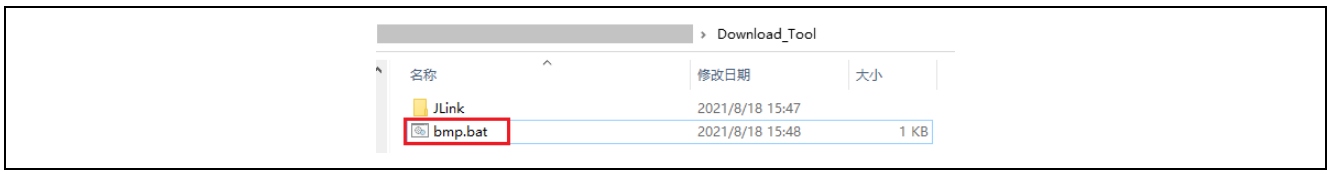
If you don't need to modify the source code again, you can also use JLink to download firmware to MCU directly.

Step 1. Open the "debug" file of the project, you can find a srec suffix file named as project name, you can modify its suffix from "srec" to "mot" to next step's downloading.

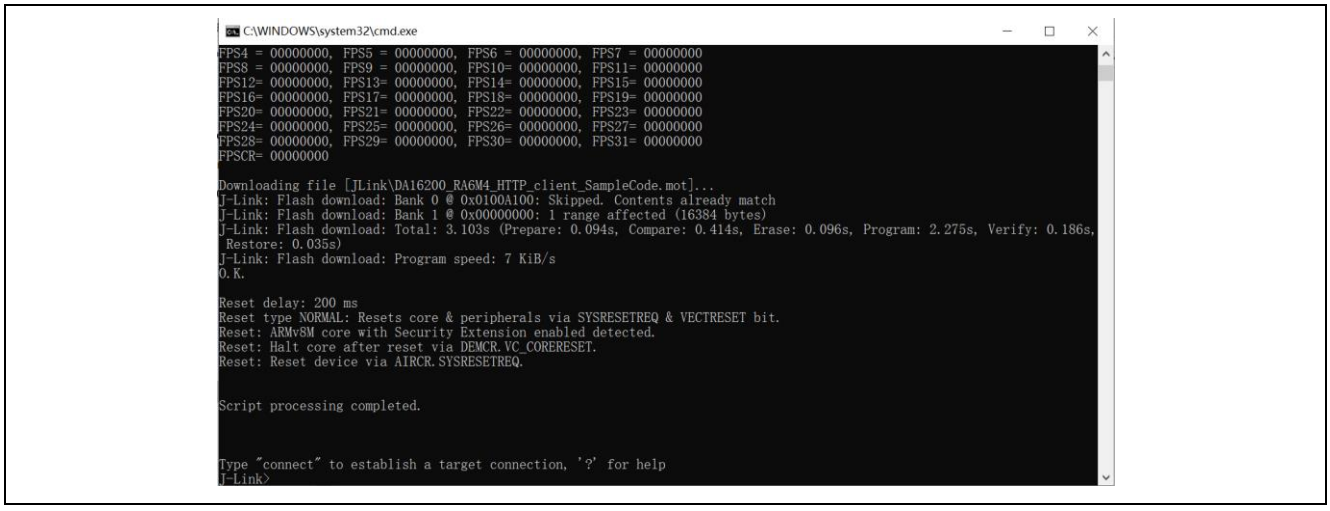


Step 2. Unzip "Download_Tool.zip" file, copy the latest mot file to the "Download_Tool/JLink" path, and overwrite the existed mot file.

Step 3. Click "bmp.bat" file in the "Download_Tool" folder, programming starts. This folder combines the version of J-Link v7.52a in JLink folder, involving all files at software installation and realizing all J-Link operations.



Once programming begins, "Flash download" interface appears, like the picture below.

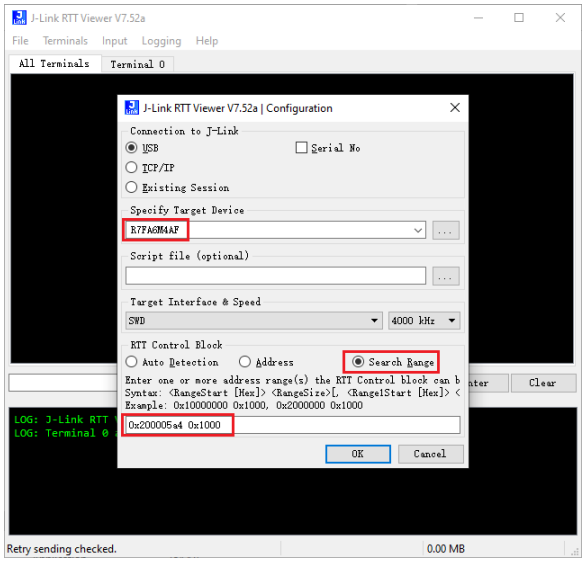


After programming, J-Link operation interface will exit automatically.

(Note: If you want the latest SEGGER J-Link version, please download from link below: https://www.segger.com/downloads/jlink)

3.3 Open JLinkRTT Viewer for Monitoring

Open “JLinkRTTViewer.exe” in “Download_Tool/JLink” path, specify target device as R7FA6M4AF, change RTT Control Block from “Auto Detection” to “Search Range” and input “0x200005a4 0x1000” to the blank block shown below.



The first address of “Search Range” can be found in “*.map” file after the demo code is built. Please open “*.map” file and search “_SEGGER_RTT”, then copy the address assigned by compiler to this place.

J-Link RTT Viewer serves as a tool to monitor the state of the system, especially the current stage of Wi-Fi and HTTP operation.

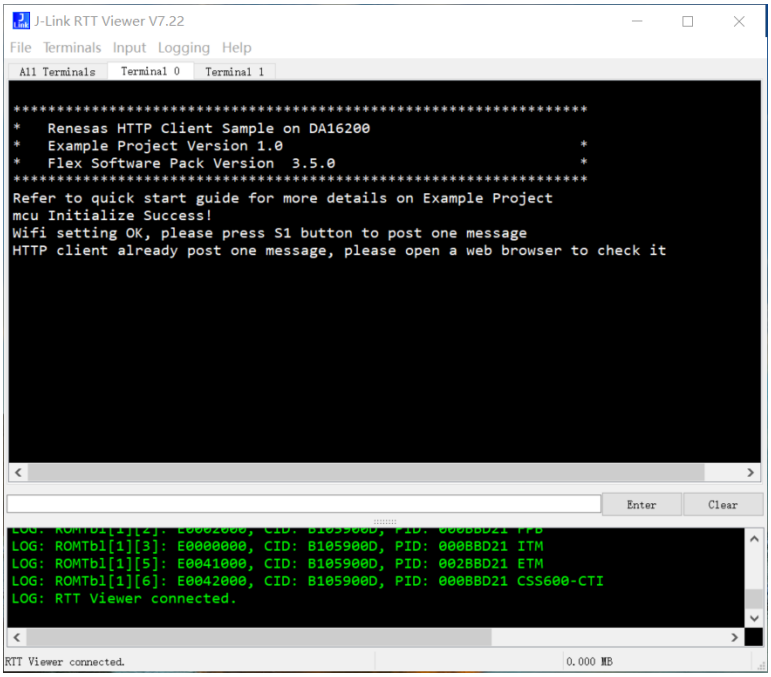
4. Run the Demo

Step 1. Power off the solution kit, insert DA16200 PMOD board into J25 (PMOD2 on EK), establishing the whole system just as the picture at chapter 1.1.

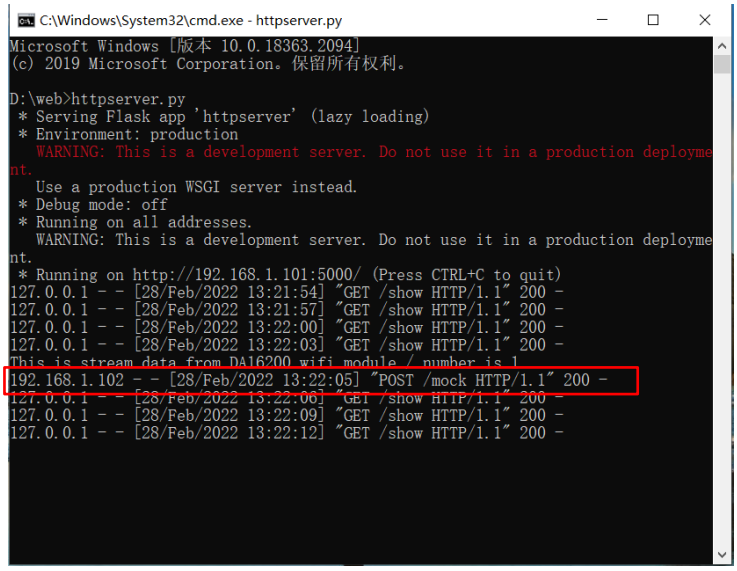
Step 2. Restart the system by pressing RESET button (S3) on EK-RA6M4 or powering off and on the system again, causing the program to run. MCU initialization and Wi-Fi setting is starting.

When Wi-Fi setting is in progress, Red LED on EK-RA6M4 blinks. After Wi-Fi setting finishes, Red LED lights.

J-Link RTT Viewer can be used to monitor the system running status.

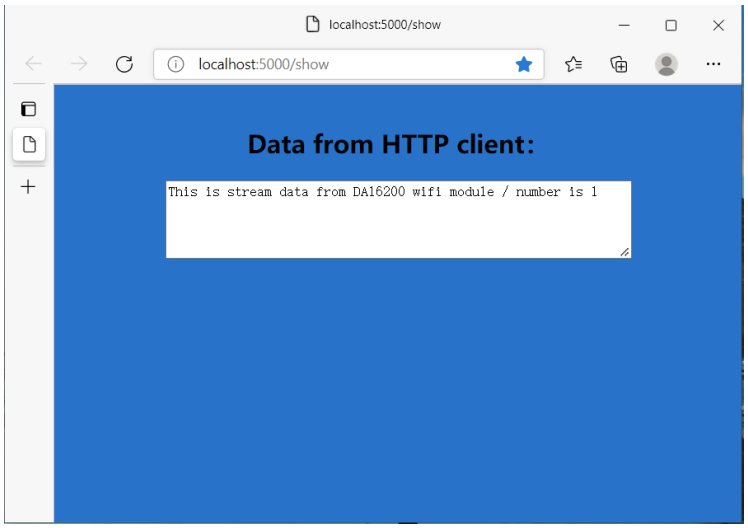


After Wi-Fi setting is completed, press S1 on EK-RA6M4 to post a message of "This is stream data from DA16200 Wi-Fi module / number is xx" to the HTTP server. POST command message can be found in the command prompt window for HTTP server as below.



After HTTP server handles the message successfully, blue LED of EK-RA6M4 lights for 2 seconds to indicate MCU already receives the response from HTTP server.

Open a web browser, input “localhost:5000/show” in the URL line, and press return button, you can find the posted message from the browser on the HTTP server PC. The number of “number is xx” will increase every time when you press S1 button to post message.



If you want to observe AT Command, use a UART to USB Bridge and connect RXD of UART part to P410 pin on EK-RA6M4 board, open serial tool such as Tera Term, and set the baud rate to 115200. Then AT command will pop up. It’s an auxiliary way to debug the program and of course as an option.

Summarize: All described above is a simplest demo for a beginner. If you want a more complex example, please refer to other samples.

5. Debug the Project

If you want to debug the project of this solution, please download e2 studio 2021-10 and fsp v3.5.0 from Renesas website, open “Code” folder, and import project into e2 studio.

6. Reference Documents

Renesas RA6M4 MCU

RA6M4 - 200MHz Arm® Cortex®-M33 TrustZone®, High Integration with Ethernet and OctaSPI | Renesas

EK-RA6M4

EK-RA6M4 - Evaluation Kit for RA6M4 MCU Group | Renesas

DA16200

DA16200 | Dialog (dialog-semiconductor.com)

DA16200MOD

DA16200 Modules | Dialog (dialog-semiconductor.com)

Technical Updates/Technical News

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

Website and Support

Renesas Electronics Website

http://www.renesas.com/

Inquiries

http://www.renesas.com/contact/

Revision History

		Description	
Rev.	**Date**	**Page**	**Summary**
1.00	Feb. 28, 2022	—	First edition issued

General Precautions in the Handling of Micro processing Unit and Microcontroller Unit Products

The following usage notes are applicable to all Micro processing 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 near 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 micro processing 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.

Notice

1. Descriptions of circuits, software and other related information in this document are provided only to illustrate the operation of semiconductor products and application examples. You are fully responsible for the incorporation or any other use of the circuits, software, and information in the design of your product or system. Renesas Electronics disclaims any and all liability for any losses and damages incurred by you or third parties arising from the use of these circuits, software, or information.
2. Renesas Electronics hereby expressly disclaims any warranties against and liability for infringement or any other claims involving patents, copyrights, or other intellectual property rights of third parties, by or arising from the use of Renesas Electronics products or technical information described in this document, including but not limited to, the product data, drawings, charts, programs, algorithms, and application examples.
3. No license, express, implied or otherwise, is granted hereby under any patents, copyrights or other intellectual property rights of Renesas Electronics or others.
4. You shall not alter, modify, copy, or reverse engineer any Renesas Electronics product, whether in whole or in part. Renesas Electronics disclaims any and all liability for any losses or damages incurred by you or third parties arising from such alteration, modification, copying or reverse engineering.
5. Renesas Electronics products are classified according to the following two quality grades: “Standard” and “High Quality”. The intended applications for each Renesas Electronics product depends on the product’s quality grade, as indicated below.
   "Standard": Computers; office equipment; communications equipment; test and measurement equipment; audio and visual equipment; home electronic appliances; machine tools; personal electronic equipment; industrial robots; etc.
   "High Quality": Transportation equipment (automobiles, trains, ships, etc.); traffic control (traffic lights); large-scale communication equipment; key financial terminal systems; safety control equipment; etc.

   Unless expressly designated as a high reliability product or a product for harsh environments in a Renesas Electronics data sheet or other Renesas Electronics document, Renesas Electronics products are not intended or authorized for use in products or systems that may pose a direct threat to human life or bodily injury (artificial life support devices or systems; surgical implantations; etc.), or may cause serious property damage (space system; undersea repeaters; nuclear power control systems; aircraft control systems; key plant systems; military equipment; etc.). Renesas Electronics disclaims any and all liability for any damages or losses incurred by you or any third parties arising from the use of any Renesas Electronics product that is inconsistent with any Renesas Electronics data sheet, user’s manual or other Renesas Electronics document.
6. When using Renesas Electronics products, refer to the latest product information (data sheets, user’s manuals, application notes, “General Notes for Handling and Using Semiconductor Devices” in the reliability handbook, etc.), and ensure that usage conditions are within the ranges specified by Renesas Electronics with respect to maximum ratings, operating power supply voltage range, heat dissipation characteristics, installation, etc. Renesas Electronics disclaims any and all liability for any malfunctions, failure or accident arising out of the use of Renesas Electronics products outside of such specified ranges.
7. Although Renesas Electronics endeavors to improve the quality and reliability of Renesas Electronics products, semiconductor products have specific characteristics, such as the occurrence of failure at a certain rate and malfunctions under certain use conditions. Unless designated as a high reliability product or a product for harsh environments in a Renesas Electronics data sheet or other Renesas Electronics document, Renesas Electronics products are not subject to radiation resistance design. You are responsible for implementing safety measures to guard against the possibility of bodily injury, injury or damage caused by fire, and/or danger to the public in the event of a failure or malfunction of Renesas Electronics products, such as safety design for hardware and software, including but not limited to redundancy, fire control and malfunction prevention, appropriate treatment for aging degradation or any other appropriate measures. Because the evaluation of microcomputer software alone is very difficult and impractical, you are responsible for evaluating the safety of the final products or systems manufactured by you.
8. Please contact a Renesas Electronics sales office for details as to environmental matters such as the environmental compatibility of each Renesas Electronics product. You are responsible for carefully and sufficiently investigating applicable laws and regulations that regulate the inclusion or use of controlled substances, including without limitation, the EU RoHS Directive, and using Renesas Electronics products in compliance with all these applicable laws and regulations. Renesas Electronics disclaims any and all liability for damages or losses occurring as a result of your noncompliance with applicable laws and regulations.
9. Renesas Electronics products and technologies shall not be used for or incorporated into any products or systems whose manufacture, use, or sale is prohibited under any applicable domestic or foreign laws or regulations. You shall comply with any applicable export control laws and regulations promulgated and administered by the governments of any countries asserting jurisdiction over the parties or transactions.
10. It is the responsibility of the buyer or distributor of Renesas Electronics products, or any other party who distributes, disposes of, or otherwise sells or transfers the product to a third party, to notify such third party in advance of the contents and conditions set forth in this document.
11. This document shall not be reprinted, reproduced or duplicated in any form, in whole or in part, without prior written consent of Renesas Electronics.
12. Please contact a Renesas Electronics sales office if you have any questions regarding the information contained in this document or Renesas Electronics products.

(Note1) “Renesas Electronics” as used in this document means Renesas Electronics Corporation and also includes its directly or indirectly controlled subsidiaries.

(Note2) “Renesas Electronics product(s)” means any product developed or manufactured by or for Renesas Electronics.

(Rev.4.0-1 November 2017)

Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,
Koto-ku, Tokyo 135-0061, Japan
www.renesas.com

Trademarks

Renesas and the Renesas logo are trademarks of Renesas Electronics Corporation. All trademarks and registered trademarks are the property of their respective owners.

Contact information

For further information on a product, technology, the most up-to-date version of a document, or your nearest sales office, please visit:
www.renesas.com/contact/.

IMPORTANT NOTICE AND DISCLAIMER

RENESAS ELECTRONICS CORPORATION AND ITS SUBSIDIARIES (“RENESAS”) PROVIDES TECHNICAL SPECIFICATIONS AND RELIABILITY DATA (INCLUDING DATASHEETS), DESIGN RESOURCES (INCLUDING REFERENCE DESIGNS), APPLICATION OR OTHER DESIGN ADVICE, WEB TOOLS, SAFETY INFORMATION, AND OTHER RESOURCES “AS IS” AND WITH ALL FAULTS, AND DISCLAIMS ALL WARRANTIES, EXPRESS OR IMPLIED, INCLUDING, WITHOUT LIMITATION, ANY IMPLIED WARRANTIES OF MERCHANTABILITY, FITNESS FOR A PARTICULAR PURPOSE, OR NON-INFRINGEMENT OF THIRD-PARTY INTELLECTUAL PROPERTY RIGHTS.

These resources are intended for developers who are designing with Renesas products. You are solely responsible for (1) selecting the appropriate products for your application, (2) designing, validating, and testing your application, and (3) ensuring your application meets applicable standards, and any other safety, security, or other requirements. These resources are subject to change without notice. Renesas grants you permission to use these resources only to develop an application that uses Renesas products. Other reproduction or use of these resources is strictly prohibited. No license is granted to any other Renesas intellectual property or to any third-party intellectual property. Renesas disclaims responsibility for, and you will fully indemnify Renesas and its representatives against, any claims, damages, costs, losses, or liabilities arising from your use of these resources. Renesas' products are provided only subject to Renesas' Terms and Conditions of Sale or other applicable terms agreed to in writing. No use of any Renesas resources expands or otherwise alters any applicable warranties or warranty disclaimers for these products.

(Disclaimer Rev.1.01)

Corporate Headquarters

TOYOSU FORESIA, 3-2-24 Toyosu,
Koto-ku, Tokyo 135-0061, Japan
www.renesas.com

Contact Information

For further information on a product, technology, the most up-to-date version of a document, or your nearest sales office, please visit www.renesas.com/contact-us/.

Trademarks

Renesas and the Renesas logo are trademarks of Renesas Electronics Corporation. All trademarks and registered trademarks are the property of their respective owners.