PUSR®
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Open Source IoT Gatewa

USR-M100-ARD

User Guide

V2.0

Be Honest & Do Best

Your Trustworthy Smart Industrial IoT Partner

Content

1. Introduction

1.1. Overview

USR-M100-ARD is an open source IoT gateway powered by Espressif's ESP32 module equipped with low power Xtensa® 32-bit LX6 MCU 240 MHz processor with 4MB pSRAM and up to 8MB SPI flash memory on-board. It integrates rich hardware interface: RS485/232, DO*2, DI*1, AI*1, downloading port, Wi-Fi, Ethernet port and BLE. PUSR provides basic source code demo for users to develop their own application. For the rich hardware interface and networking methods, this device can be applied in a variety of scenarios, especially scenarios where users need to collect or control serial devices and IO devices simultaneously, such as: Wastewater Treatment, Agricultural Irrigation, Solar Energy, Intelligent Farming etc.

1.2. Parameters table

USR-M100-ARD Parameters	
Chipset	ESP32-WROVER-E
Professor	Dual-core Xtensa® 32-bit LX6 MCU, 1.2GHz
RAM	8M
Flash	4M
Power Supply	9~36V
Hardware Interface	
RS232/485	1*RS232/485, Default parameter: 115200, N, 8, 1
DI	1*digital input
DO	2*digital output
AI	1*analog input(4~20mA)
Wi-Fi	
Stadard	IEEE802.11b/g/n
Speed	Up to 150Mbps
Frequency	2412 ~ 2484 MHz
Others	
BLE	Compatible with BEL4.2

Table 1. Parameters of USR-M100-ARD

USR-M100-ARD provides 2 indicators in total, the specific description is as follows.

Table 2. LED indicator

Name	Description
PWR	Steady on: power supply is normal. Off: No power supply or abnormal power supply.
WORK	Steady on: The system works normally.

1.3. Dimension

- DIN-Rail mounting and wall mounting supported.
- 79.6*58*110.0mm (L*W*H, accessories not included)

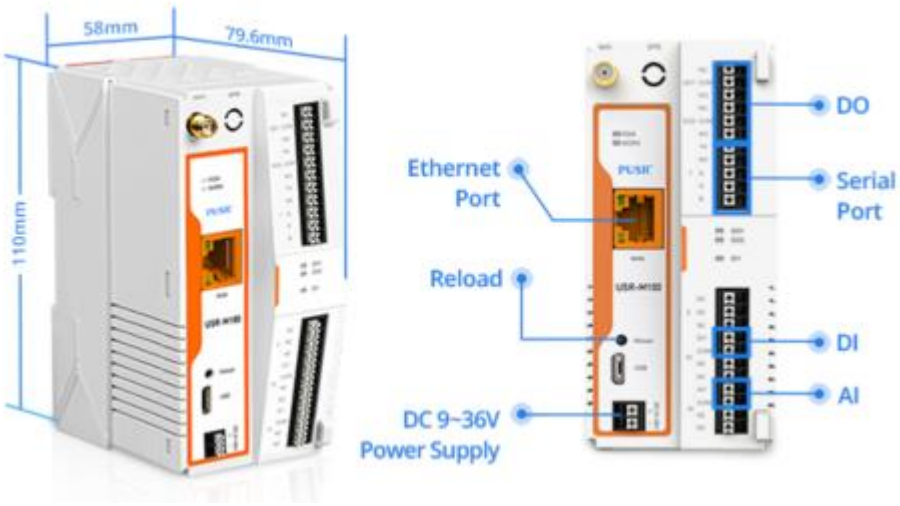


Figure 1. Dimension of USR-M100-ARD

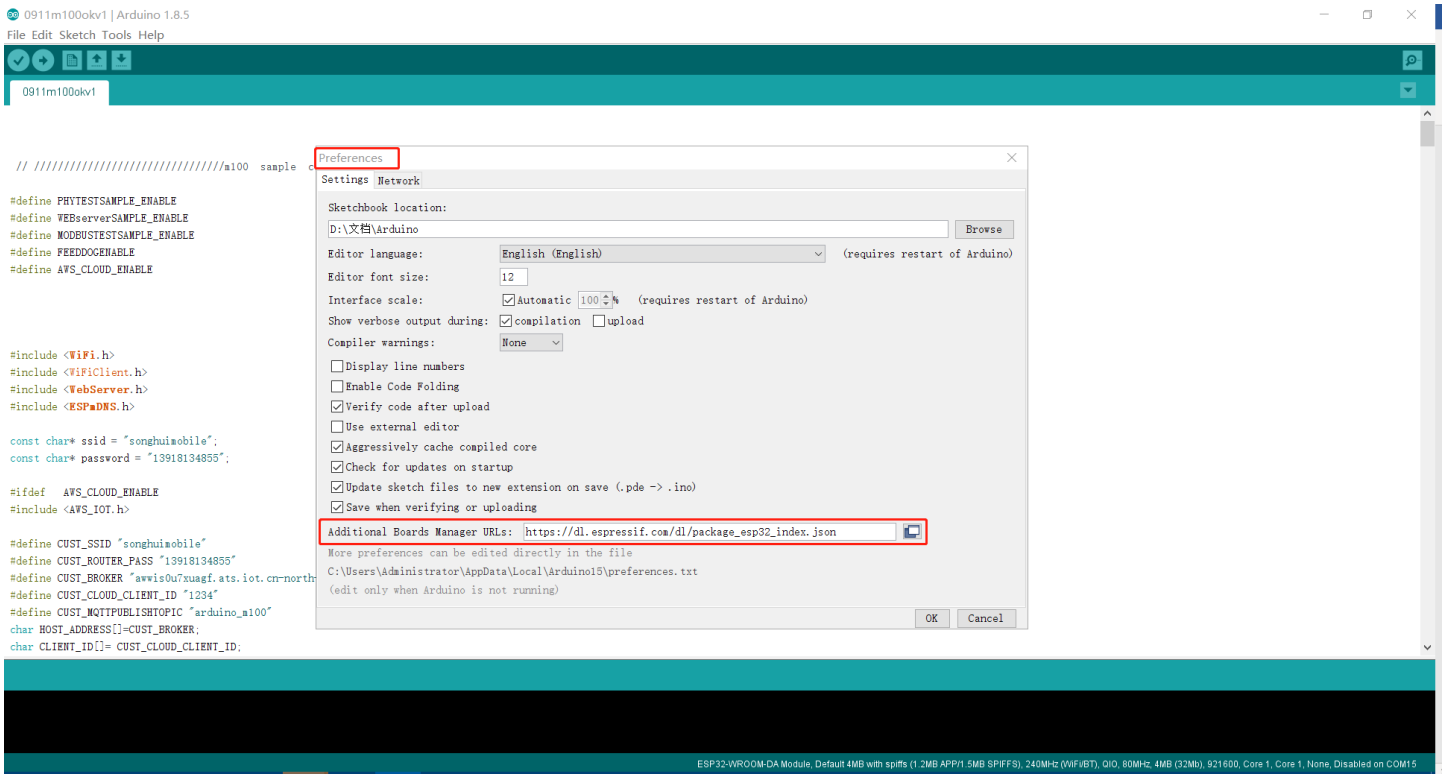
2. Arduino IDE Using

1> Download and install Arduino IDE: **https://www.arduino.cc/en/Main/Software**

2> After installing the IDE, add additional boards manager URLs:

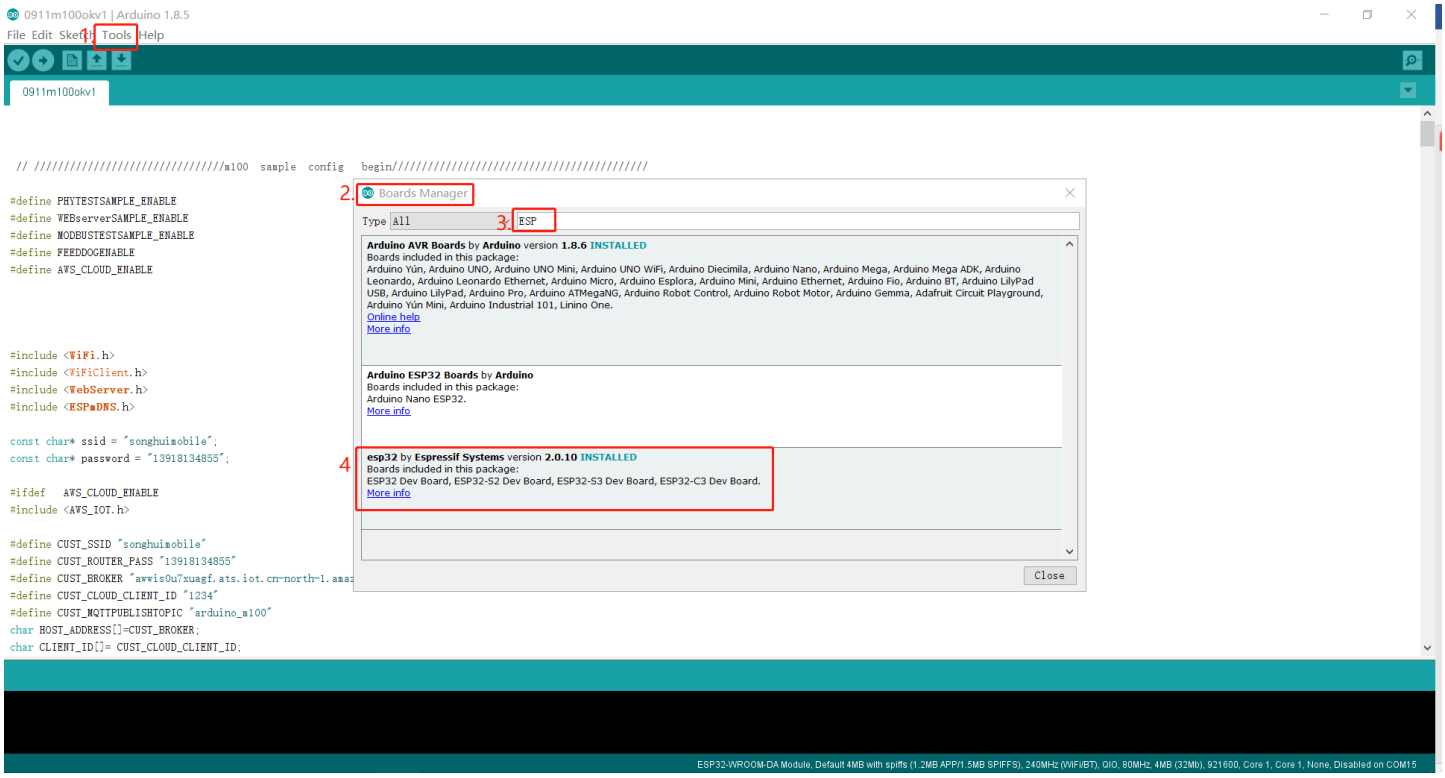
https://dl.espressif.com/dl/package_esp32_index.json

File->Preference-> Add Additional Boards Manager URLs



3> Install ESP32 Boards

Tools->Board Manager->Search “ESP”



4> Add library to installation path

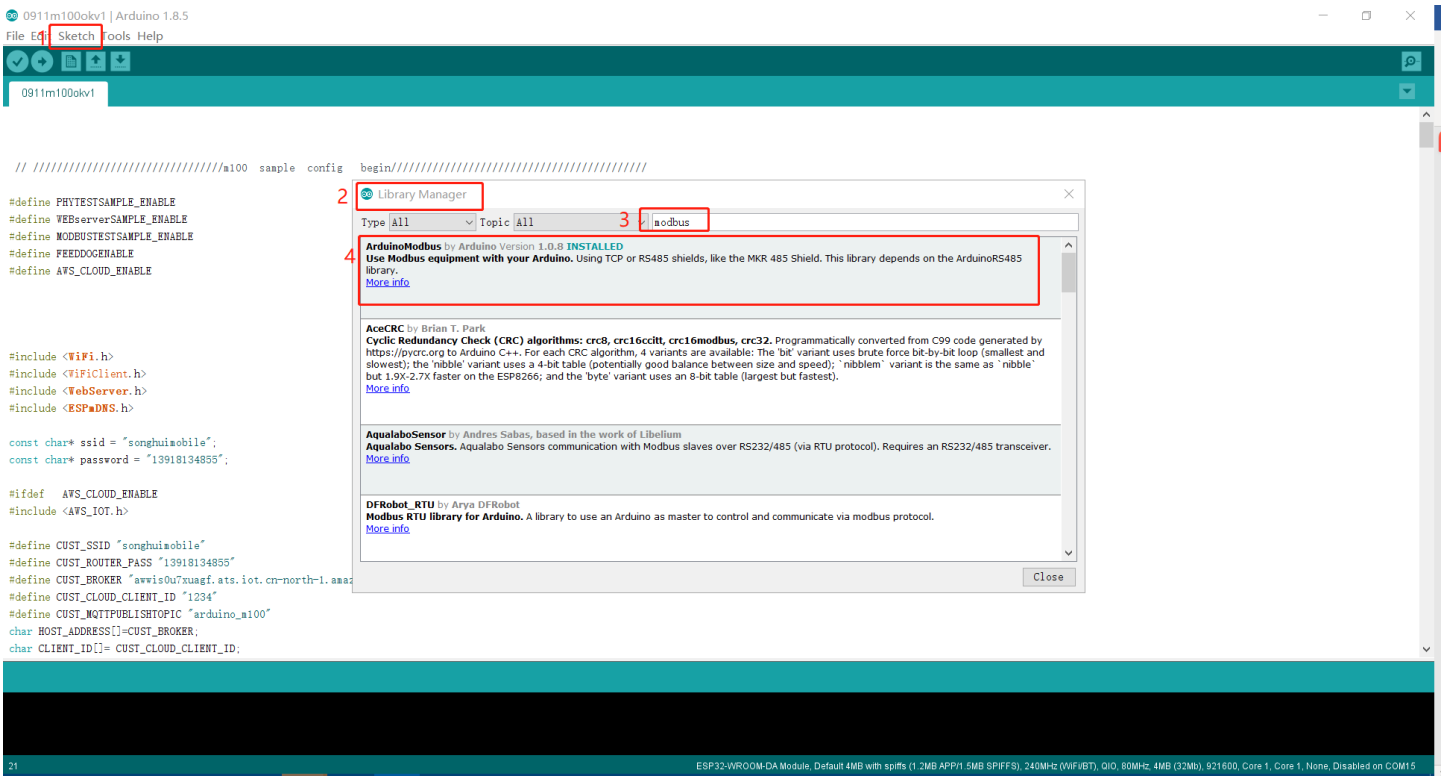
PUSR offers library source code of AWS, Modbus, users can download from Github: 插入代码连接

The downloaded libraries should be copied to the installation path of Arduino IDE.

Note: Users are strongly encouraged to use the AWS and Modbus libraries we provide.

Users can also download the other libraries needed on Arduino IDE.

Sketch->Library Manager->Search " Modbus" ->Install



3. Program burning

3.1. Programming via Arduino

1> Hardware connection

USR-M100-ARD*1

USB to TTL converter *1

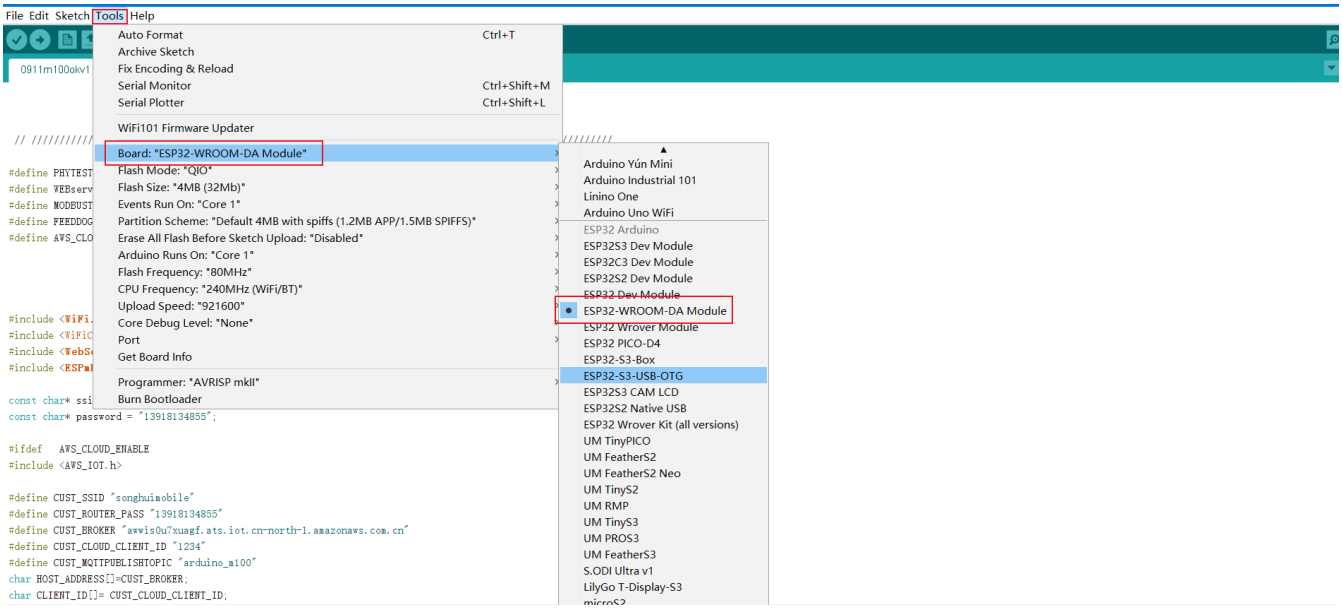
Wi-Fi antenna*1

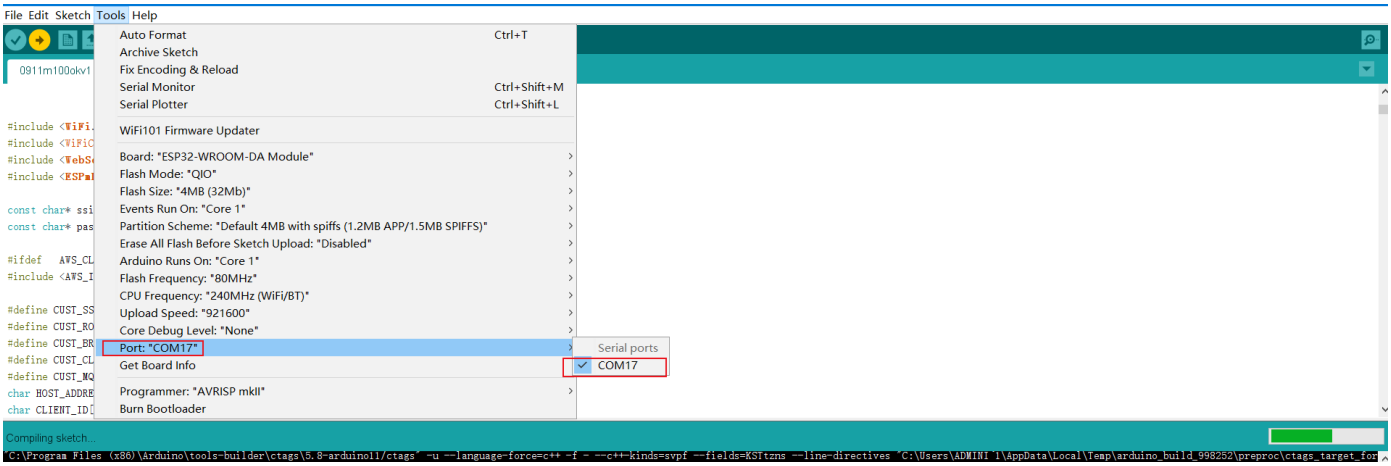
The hardware connection is like this:

2> Downloading parameters settings

Tools-->Board--> “ESP32-WROOM-DA Module”

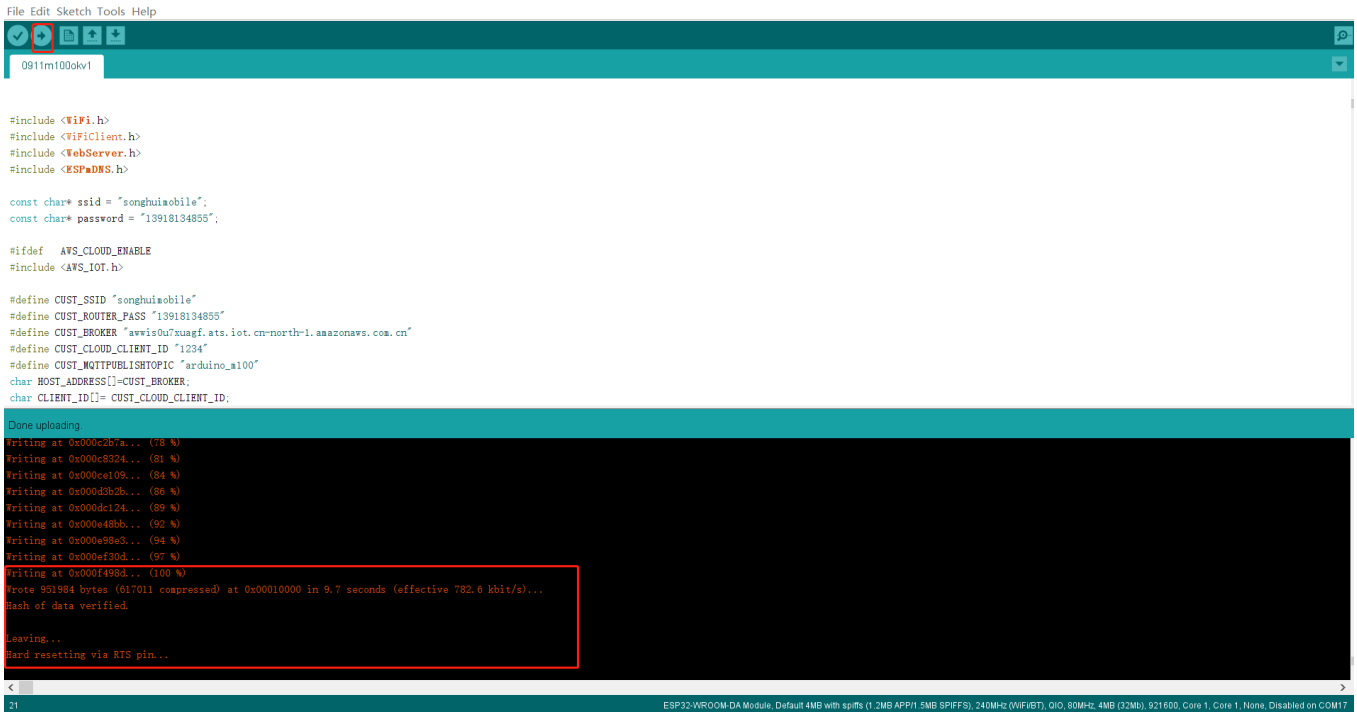
Tools-->Board-->Port-->Select the right COM





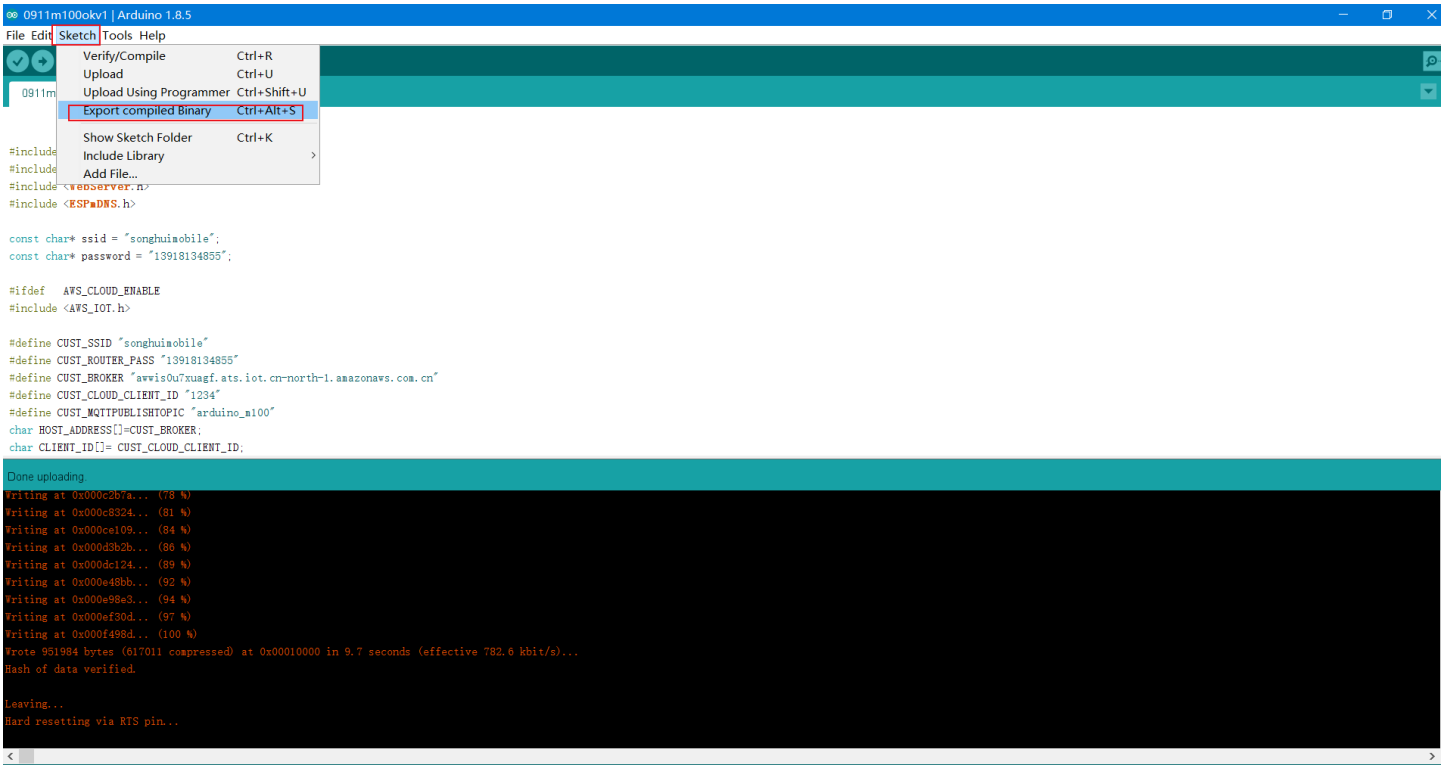
3> Users could edit, compile, and download code on the Arduino IDE.

Click the "Upload" button to compile the code first, When the compilation is about to be completed, press and hold the reload button, power on the USR-M100-ARD. Do not release the reload button during the program download process, otherwise the program will fail to be burned.

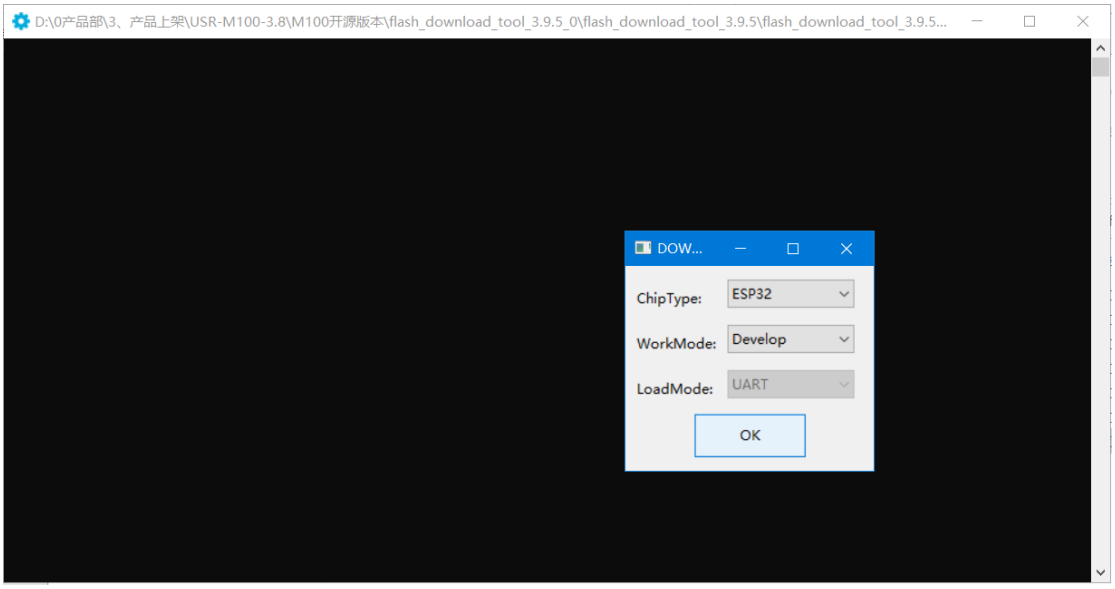


3.2. Programming via ESP32 download tool

1> Users can edit code on Arduino IDE, and export compiled binary file.



2> Open flash_download_tool, Chipset–ESP32

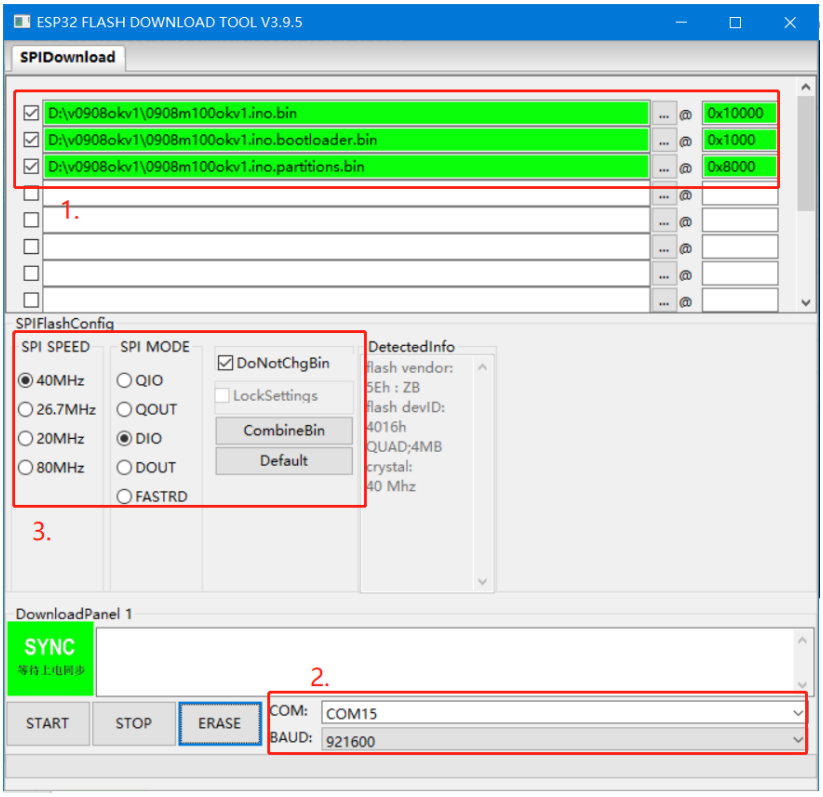


3> Load .bin file

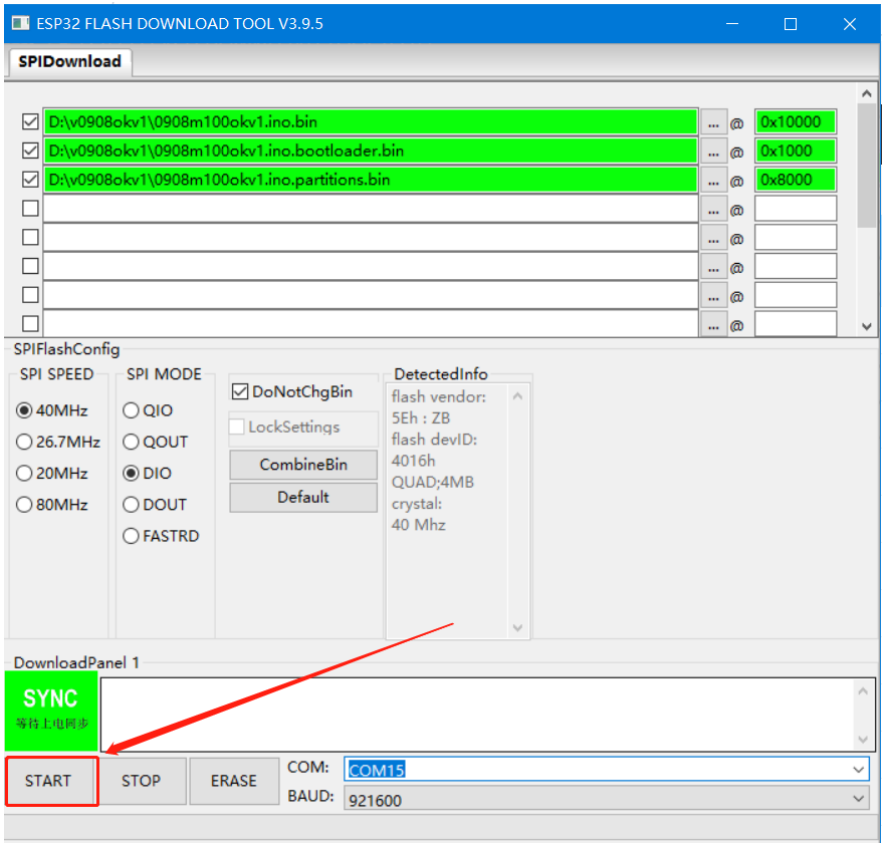
xxx.ino.bin	Start register address：0x10000
xxx.ino.bootloader.bin	Start register address：0x1000
xxx.ino.partitions.bin	Start register address：0x8000

Select COM port, BAUD is 921600.

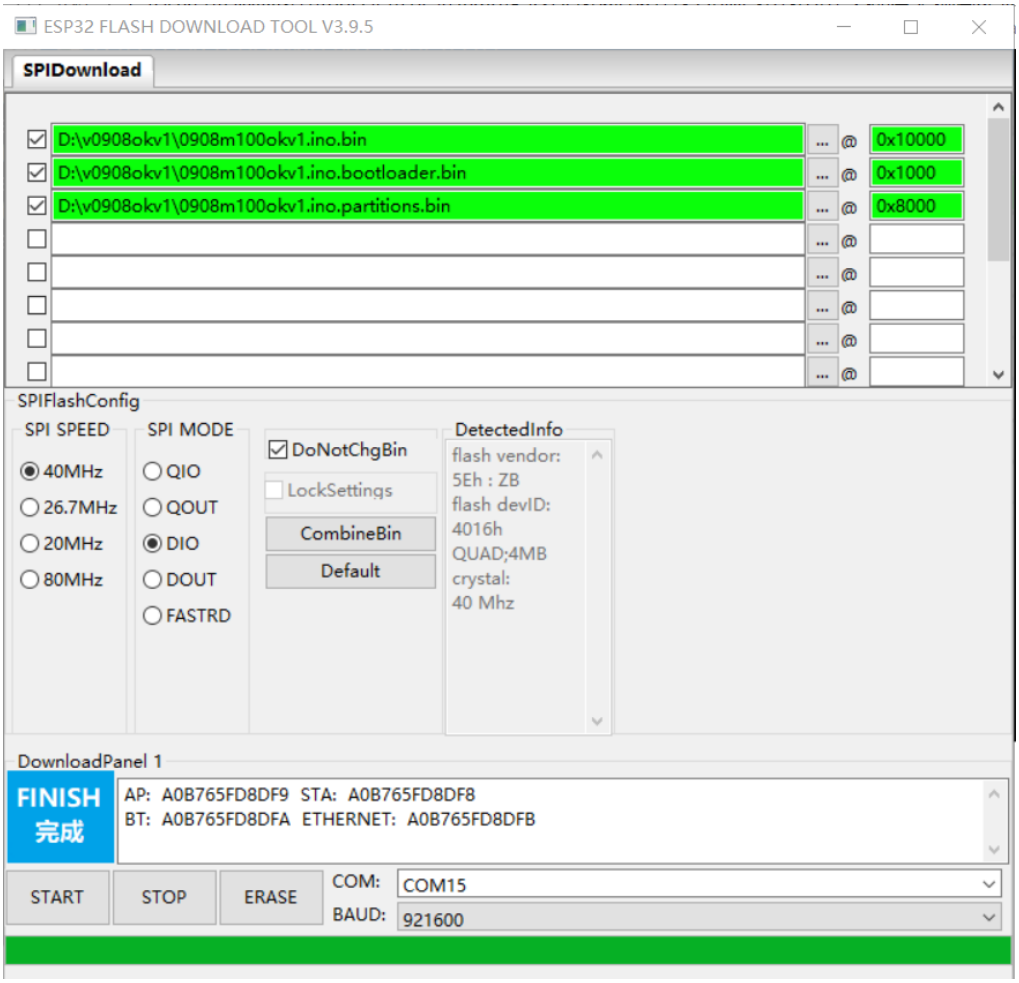
SPIFlashConfig: 40MHz，DIO，DoNotChgBin



4> Power off the USR-M100-ARD, hold on the reload button, power on the USR-M100-ARD device, click "START" button, it starts to programming.



5> Finished the programming.

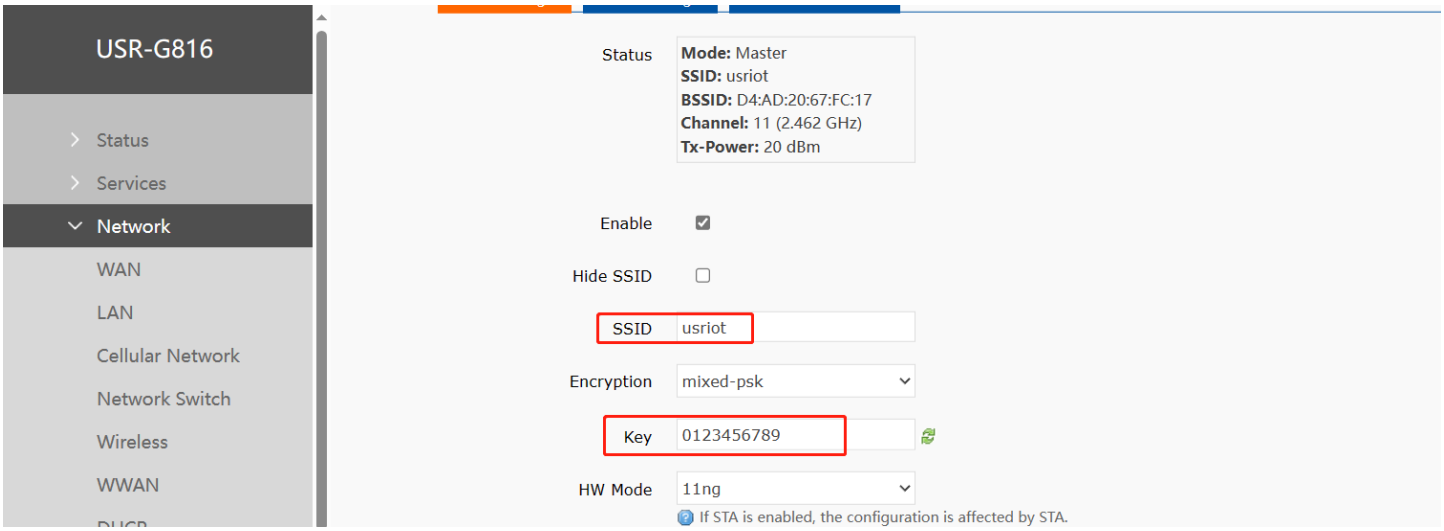


4. Functional Test

Note: All tests in this section are based on code provided by PUSR.

1> Preparatory Work

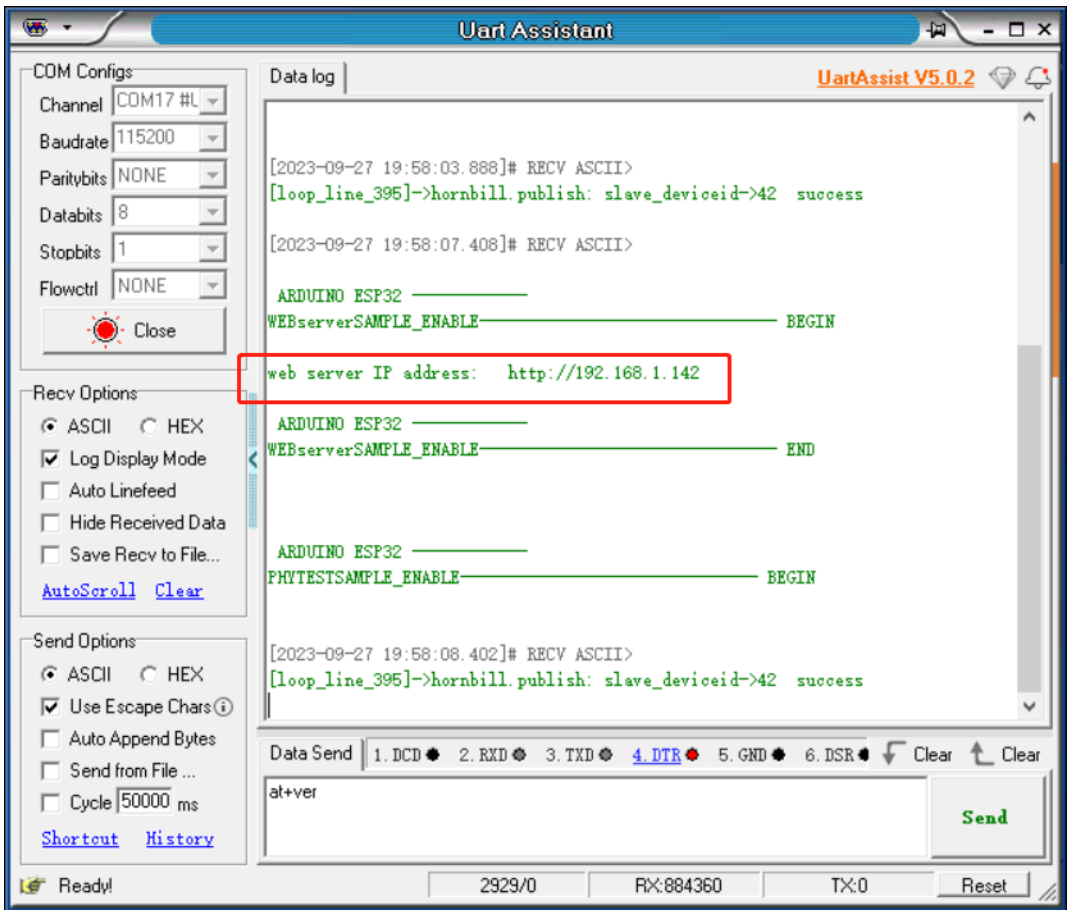
- Download the Modbus Slave tool and MQTTfx tool first.
- Find a router, change the SSID to “usriot” , and change the password to “0123456789” .



2> Power on the USR-M100-ARD device. If the work indicator is blinking, the Wi-Fi connection is successful.

3> Connect the USB to TTL to USB port, open the Uart Assistant tool, users can check the IP address.

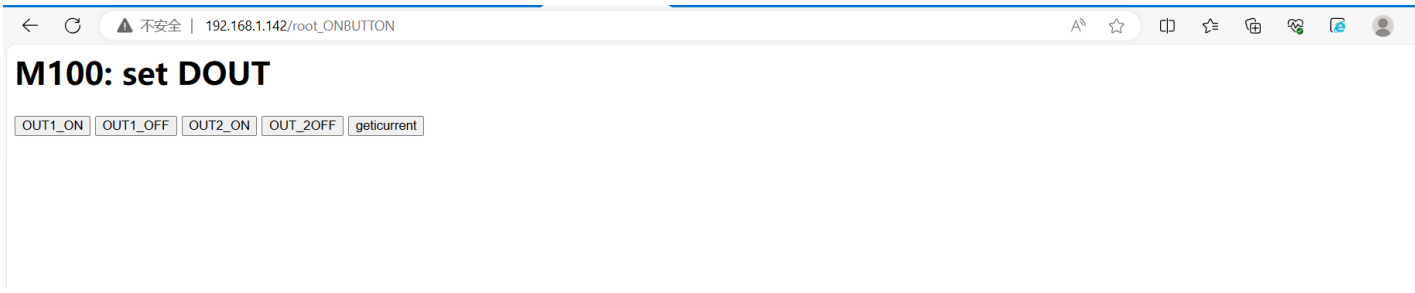
Note: After connecting the USB to TTL, the work indicator is steady on.



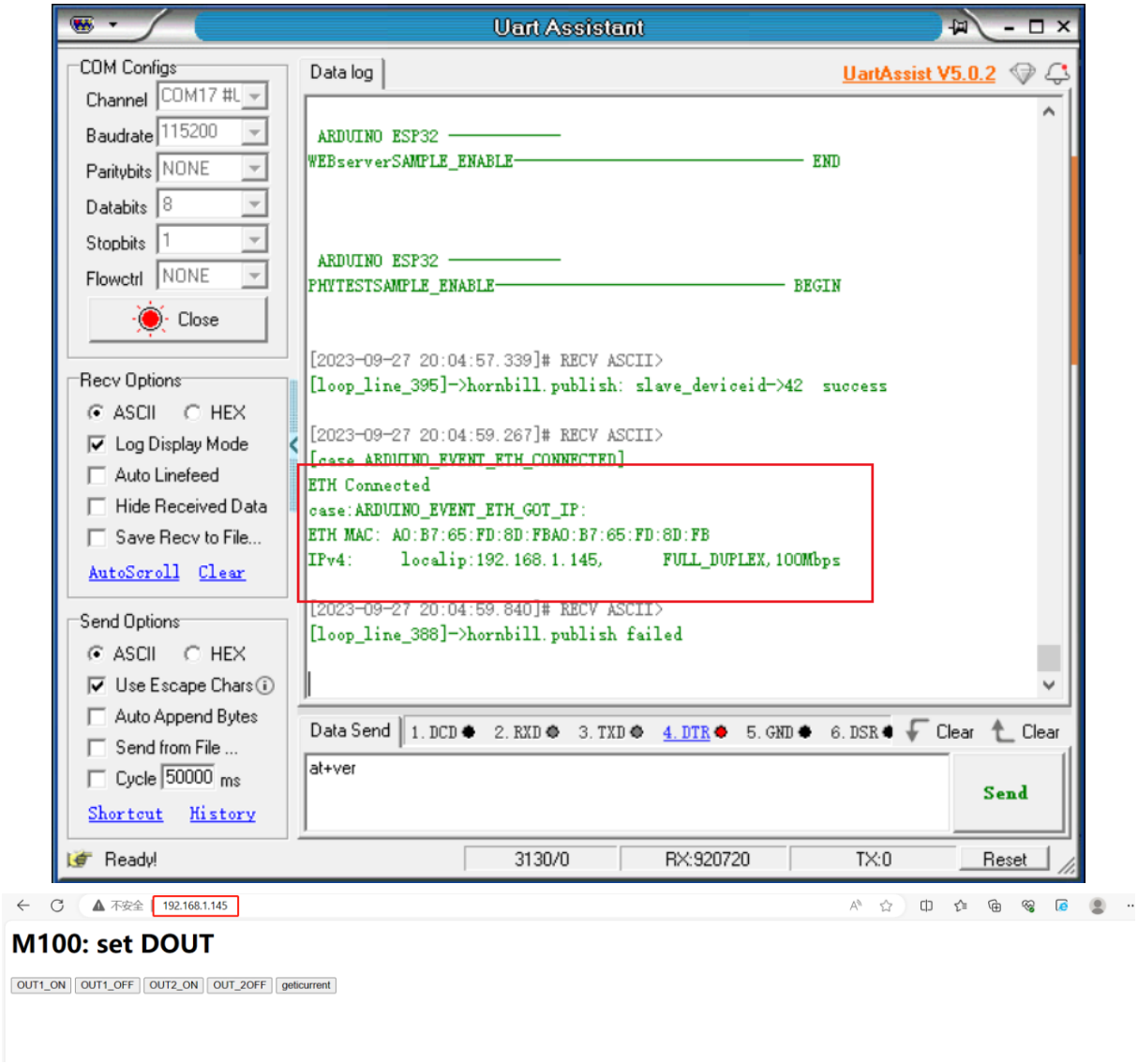
4> Connect the PC to the same router with the USR-M100-ARD device, and enter 192.168.1.142 on browser url blank. The IP address should be the one of USR-M100-ARD.

Click OUT1_ON button, the DO1 indicator will turn on.

Click OUT1_OFF button, the DO1 indicator will turn off.



5> Connect the Ethernet port to the LAN port of a router, the following information will be displayed on Uart Assistant tool. Via this IP address(192.168.1.145), users can access the built-in webpage to control the IO indicator also.



6> RS485 and AWS test

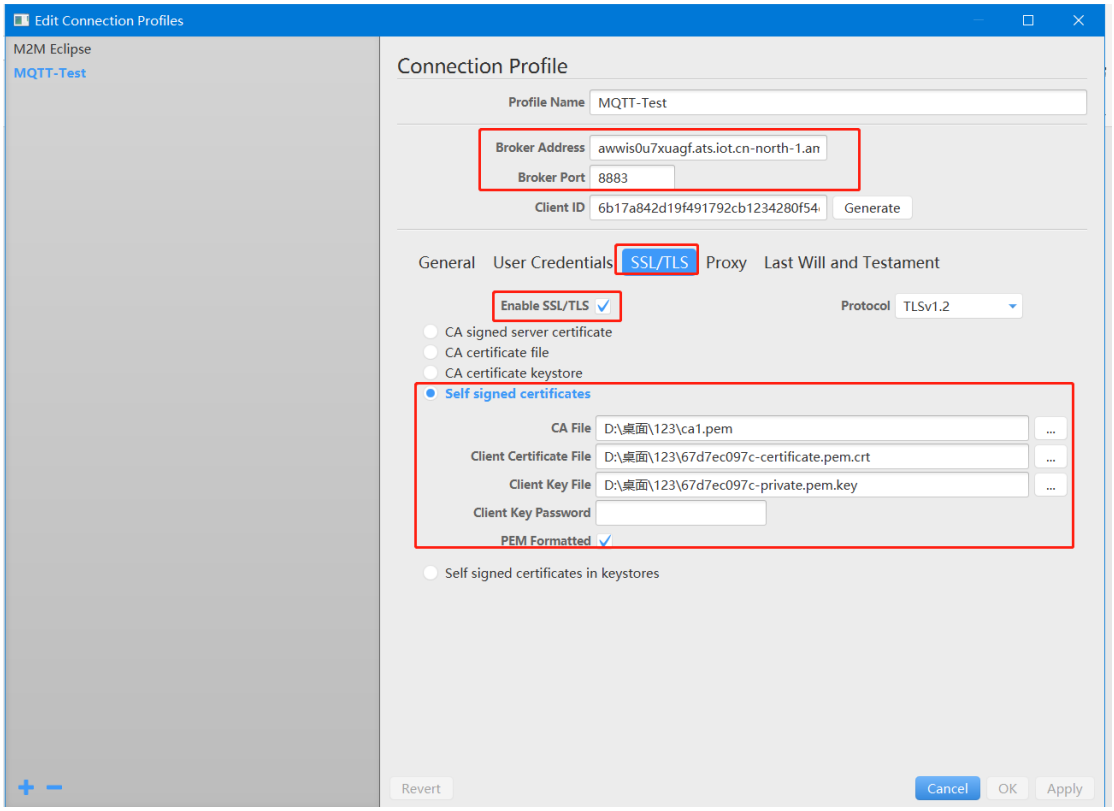
- Open MQTTfx.exe

  Broker Address: awwis0u7xuagf.ats.iot.cn-north-1.amazonaws.com.cn

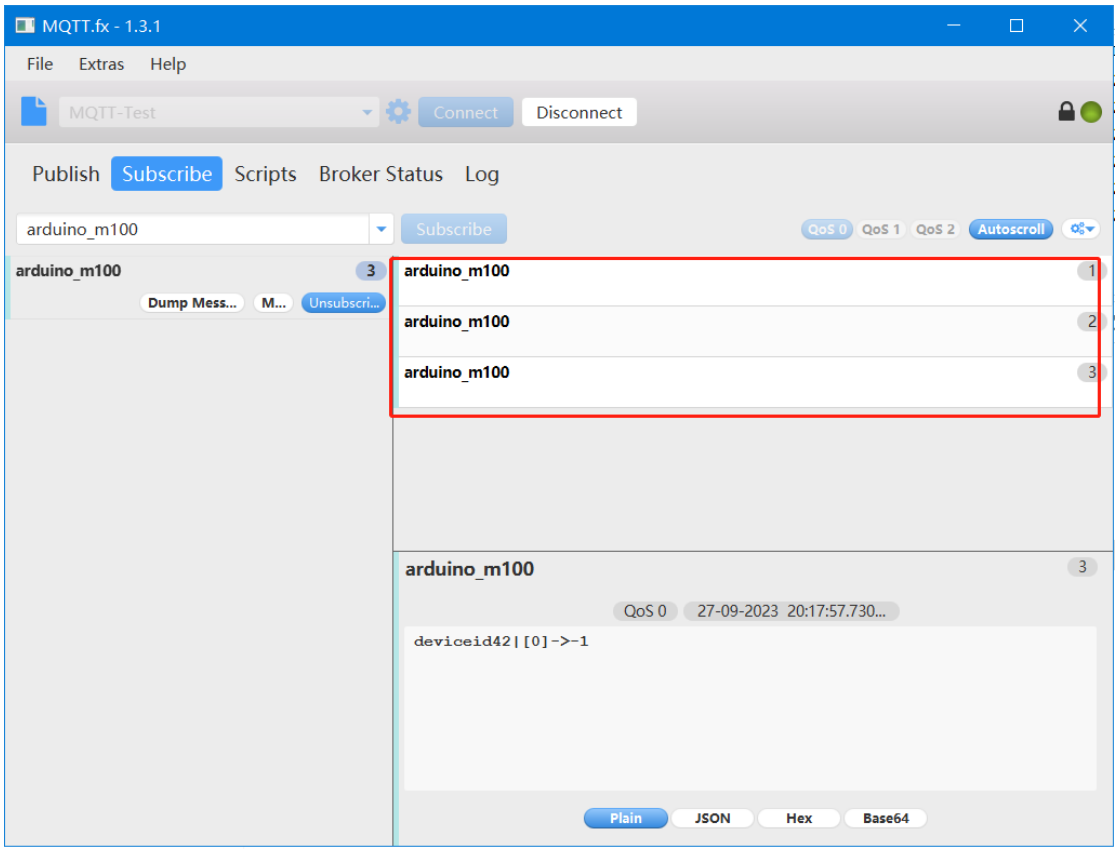
  Broker Port: 8883

  Client ID: Generate

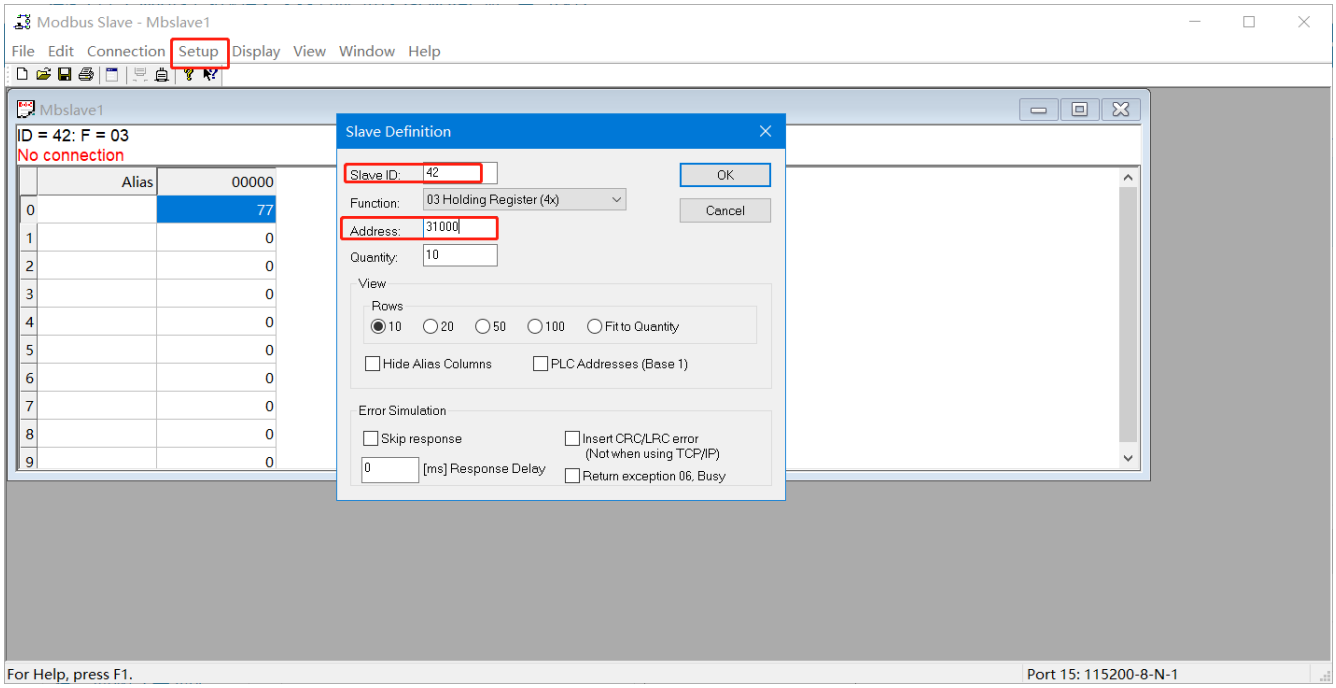
  SSL/TLS: Load the certificates, check the PEM Formatted



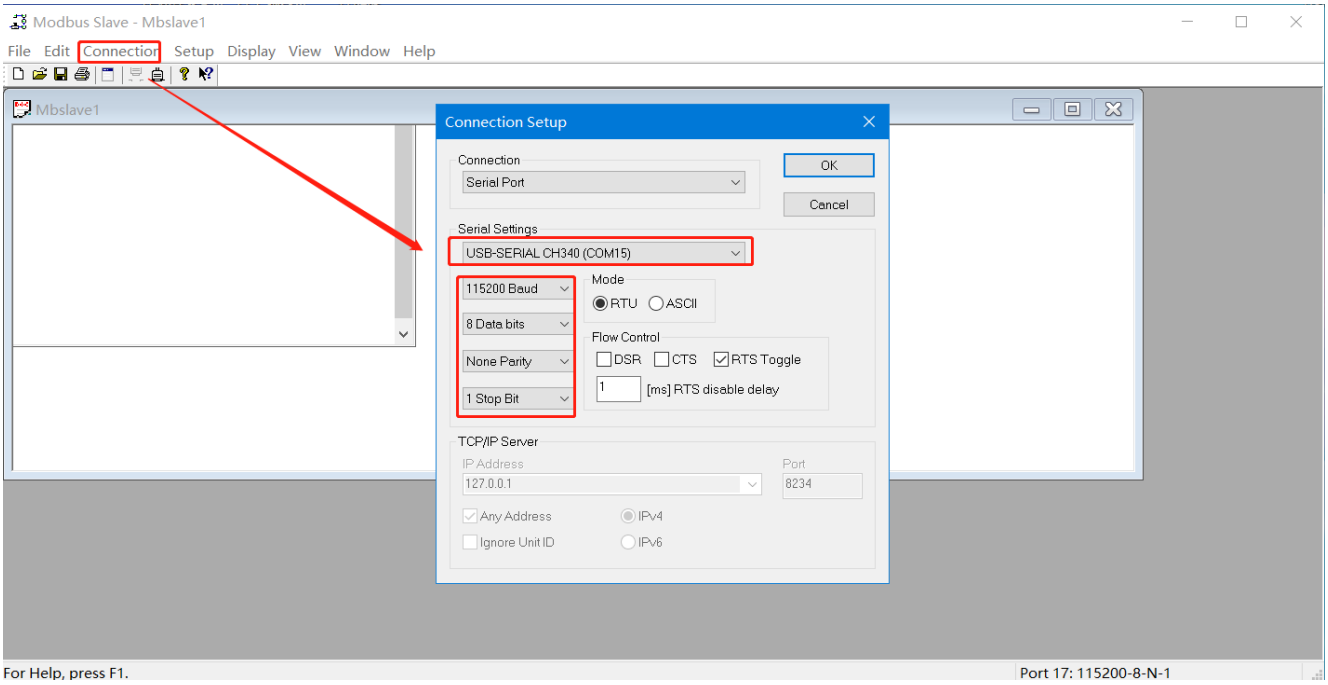
➢ Click "Connect" button to connect the AWS server, subscribe to the "Arduino_m100" topic.



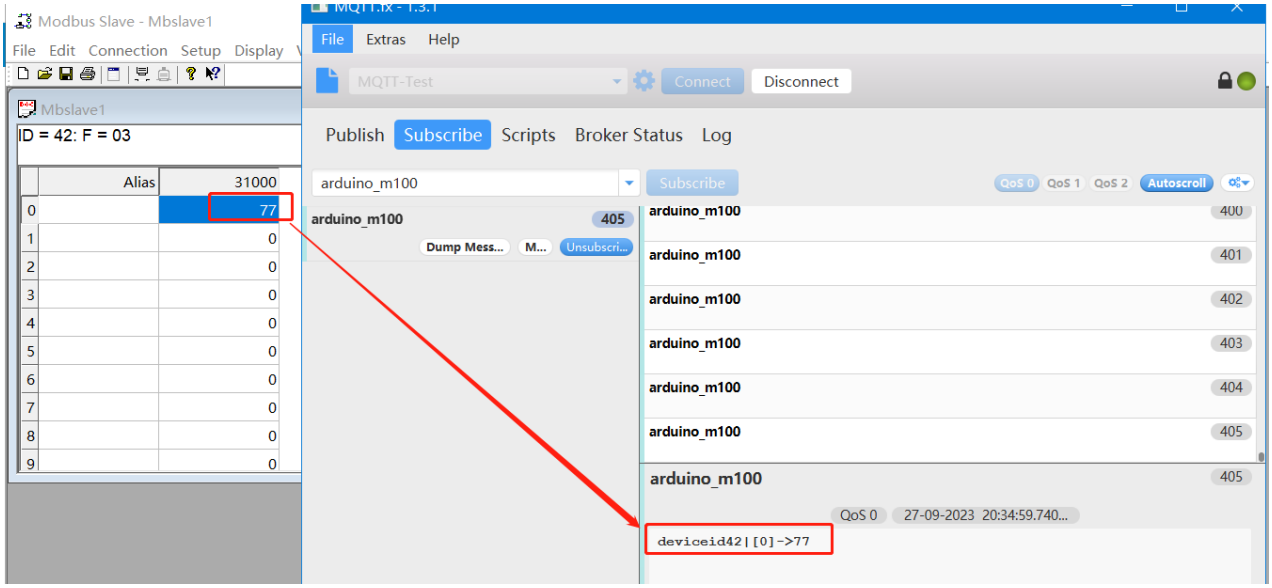
➢ Connect the PC and USR-M100-ARD device via USB to RS485, open Modbus Slave tool, set the Slave ID to 42, and set the address to 31000.



➢ Serial settings, distinguish the RS485 COM from the Download COM.



➢ Change the value of register to 77, and the changed data can be received by the MQTTfx. It means the device connect to AWS and can communicate with the RS485 device.



5. Contact Us

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