RTL8710AF Quick Start Guide

v1.0 - 21 May 2018

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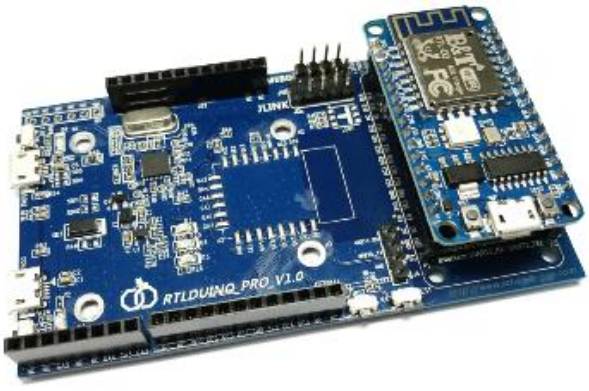
Realtek Ameba RTL8710AF board

1. About Ameba RTL8710AF

Ameba RTL8710AF is a highly integrated single-chip with low power consumption mechanism for IoT (Internet of Things). It combines an ARM®Cortex™-M3 MCU, Wi-Fi and provide a bunch of configurable GPIOs which are configured as digital peripherals for different applications and control usage.

RTL8710AF also integrates internal memory and flash to minimize IoT end-product size and reduce your development cost.

Ameba RTL8710AF Wireless Development Board is a convenient development kit for makers. It separate into 2 boards, **RTL8710AF WiFi base Board** is the main mother board with all functions included, and the other **RTL-00 module** is a smaller form factor, which if user wishes to go to development mode- there is a CMSIS-DAP mode and J-LINK debugger mode development interface provided. Otherwise, RTL-00 module can be used independently from the main board, and the occupied space is smaller. When the RTL-00 module is charge via the Micro USB interface, the result should be the same with the result that it is connected to the main board.



RTL8710AF Wireless Development board

RTL-00 module

2. Quick overview of Ameba RTL8710AF

- CPU : 32-bit ARM Cortex M3, up to 83MHz

- Memory : 1MB ROM, 512KB SRAM and 1MB flash

- Integrated with 802.11 b/g/n 1x1 Wi-Fi

- Hardware SSL engine

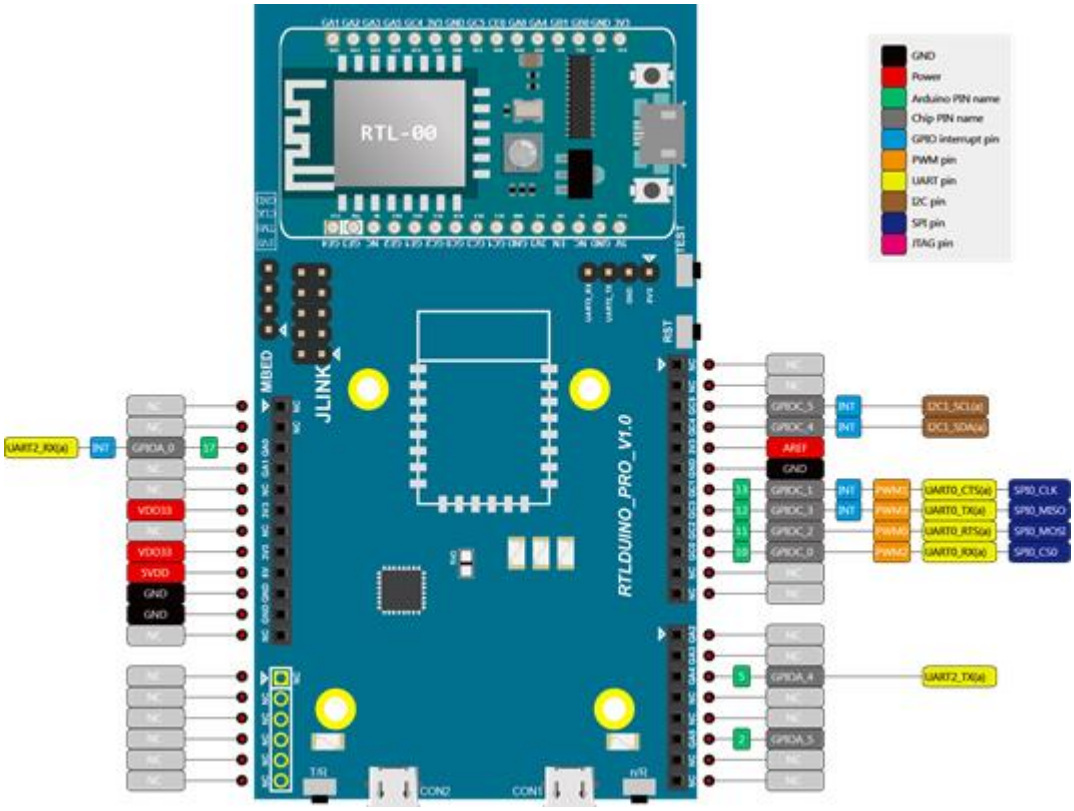
- Maximum 16 GPIOs

- 1 SPI Interfaces and support both master and slave mode

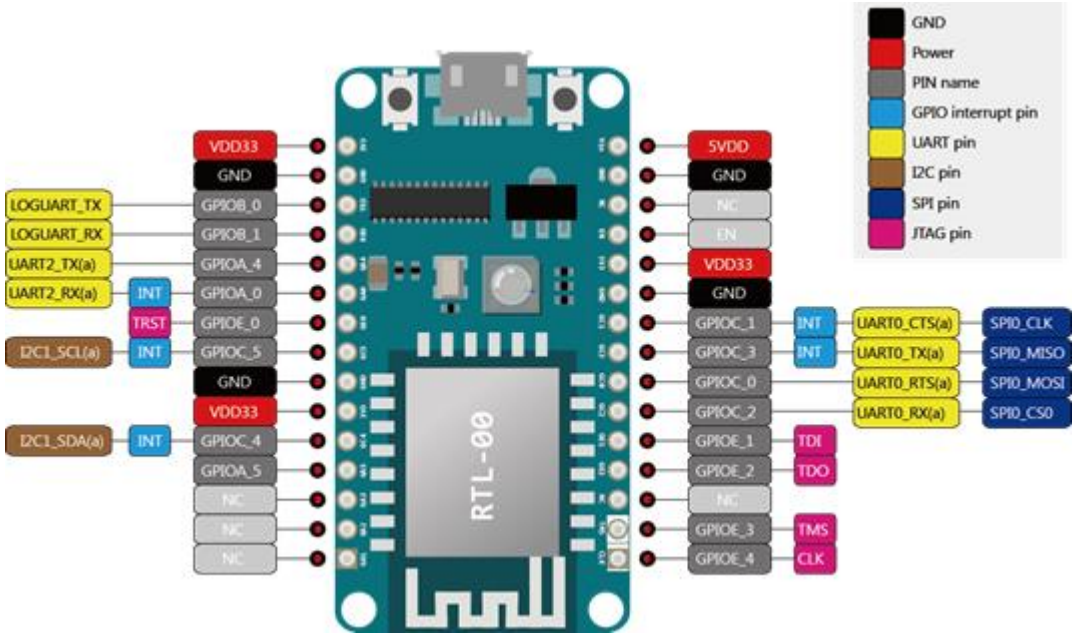
- 3 UART Interfaces including two HS-UART and one log UART

- 1 I2C Interfaces and support both master and slave mode

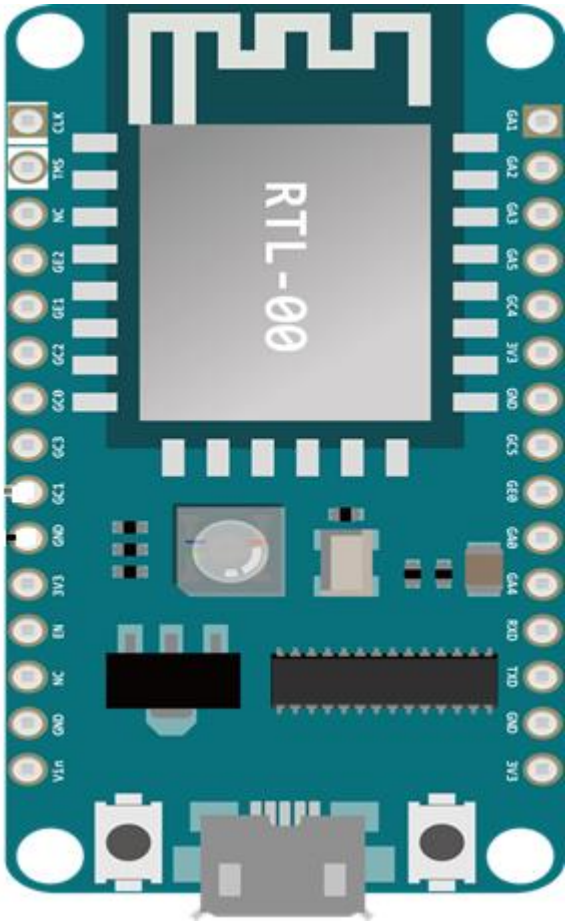
- 4 PWM interfaces



RTL-00 module (small board) pinout:



Close up view of RTL-00



3. Pre-Preparation

3.1 Software Preparation

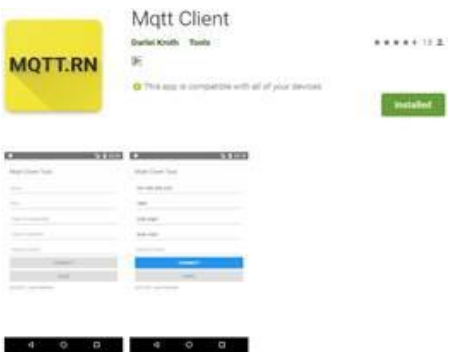
The following are the software installation required:

1. **Arduino IDE**
   Please use Arduino IDE with version 1.6.5 or later. (From version 1.6.5, Arduino IDE supports third-party hardware. Therefore, we can use Arduino IDE to develop applications on Ameba, and the examples of Arduino can run on Ameba too.) Arduino IDE can be downloaded on the Arduino website: https://www.arduino.cc/en/Main/Software
   For new users, we will recommend to install the latest IDE version version 1.8.5 (accurate as of May 2018) as directed in the above URL link.

2. **Mbed driver**
   If this is the first time you are using Realtek's Ameba boards, go to
   https://developer.mbed.org/handbook/Windows-serial-configuration
   download the driver "mbedWinSerial_16466.exe" in "Download latest driver" from MBED website.
   Kindly download the driver, and wait for the board that will be given during the workshop for installation.

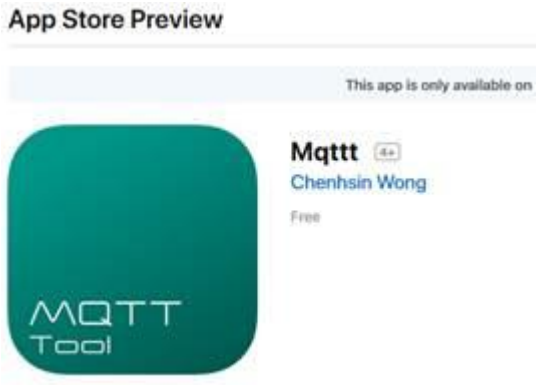
3. **Serial Monitor(Terminal Emulator) Program**
   You may choose to use Arduino IDE serial monitor or your own preferred serial monitor. Eg: Tera Term, Coolterm etc.

4. **MQTT Client**
   Mobile phone app -This is for running of MQTT examples via a mobile MQTT client app. For this workshop purpose, you may like to install the below to experience the example that we will be using for the workshop
   For Andriod users – at google playstore -> search for mqtt client -> select Mqtt Client app by Dariel Kroth
   https://play.google.com/store/apps/details?id=br.com.bintechnology.mqttclient



For iphone users – please download Mqttt app.

https://itunes.apple.com/in/app/mqttt/id1217080708?mt=8



5. **IFTTT**

   This is required for running of IFTTT examples if you have not set up an IFTTT account, kindly create an account with IFTTT. Go to https://ifttt.com to signup for an account.

3.2 Hardware Preparation:

1. 1 x Laptop/Computer: Windows XP/7/8/10 or MAC OS
2. WiFi
3. 1 x Ameba RTL8710AF Wireless Development Board

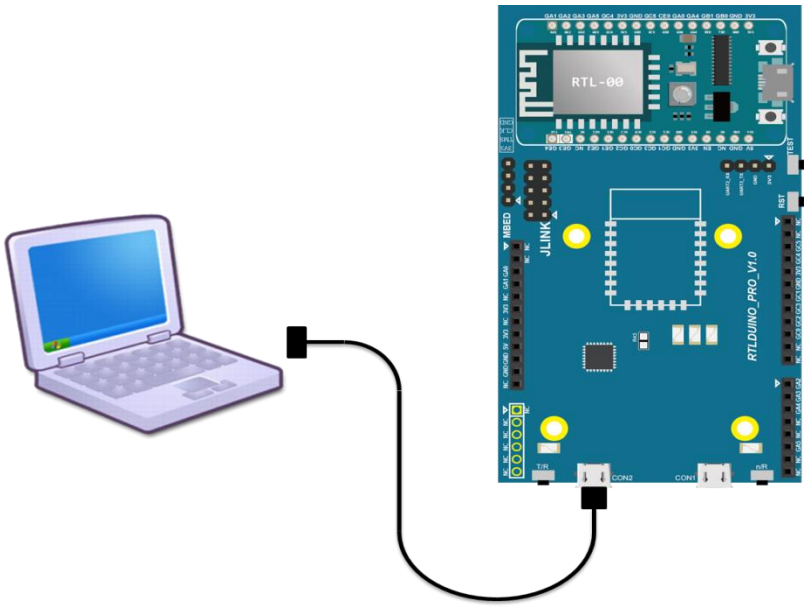
4. 1x Micro USB Cable

4. Start Up

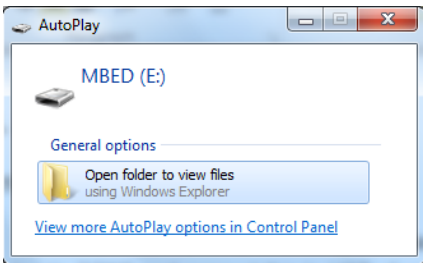
4.1 Connect the RTL8710AF board

1. Ensure the orientation for the RTL-00module small board is correct as shown below.

2. Connect RTL8710AF to the computer via Micro USB (on the board: locate CON2 and connect this to USB of your PC/laptop.



3. Thereafter, you will see “MBED” popup in Autoplay. Refer 4.2 if you have not install MBED driver yet. This Mbed installation is necessary before you can use the board.



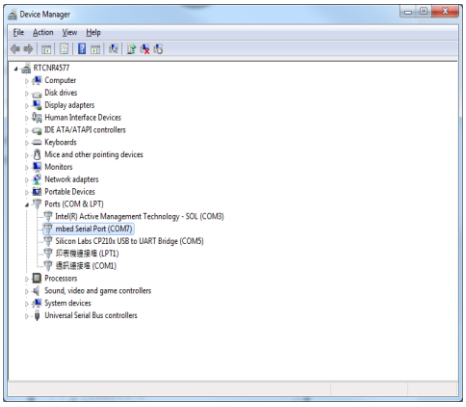
4.2 Install mbed driver for Ameba

Ameba uses the standard Arm MBED CMSIS DAP driver.

1. If this is the first time that you are using Ameba, install the USB driver for Ameba. You can get the installation file and related information at the following website:
   https://developer.mbed.org/handbook/Windows-serial-configuration

   Download and install "mbedWinSerial_16466.exe" in "Download latest driver".

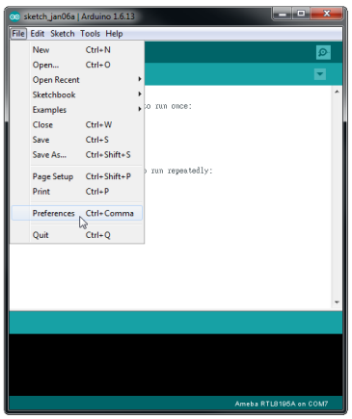
2. When installation is completed, "mbed Serial Port" will be seen under “Device Manager” -> “Ports” in your laptop/computer



4.3 Arduino IDE

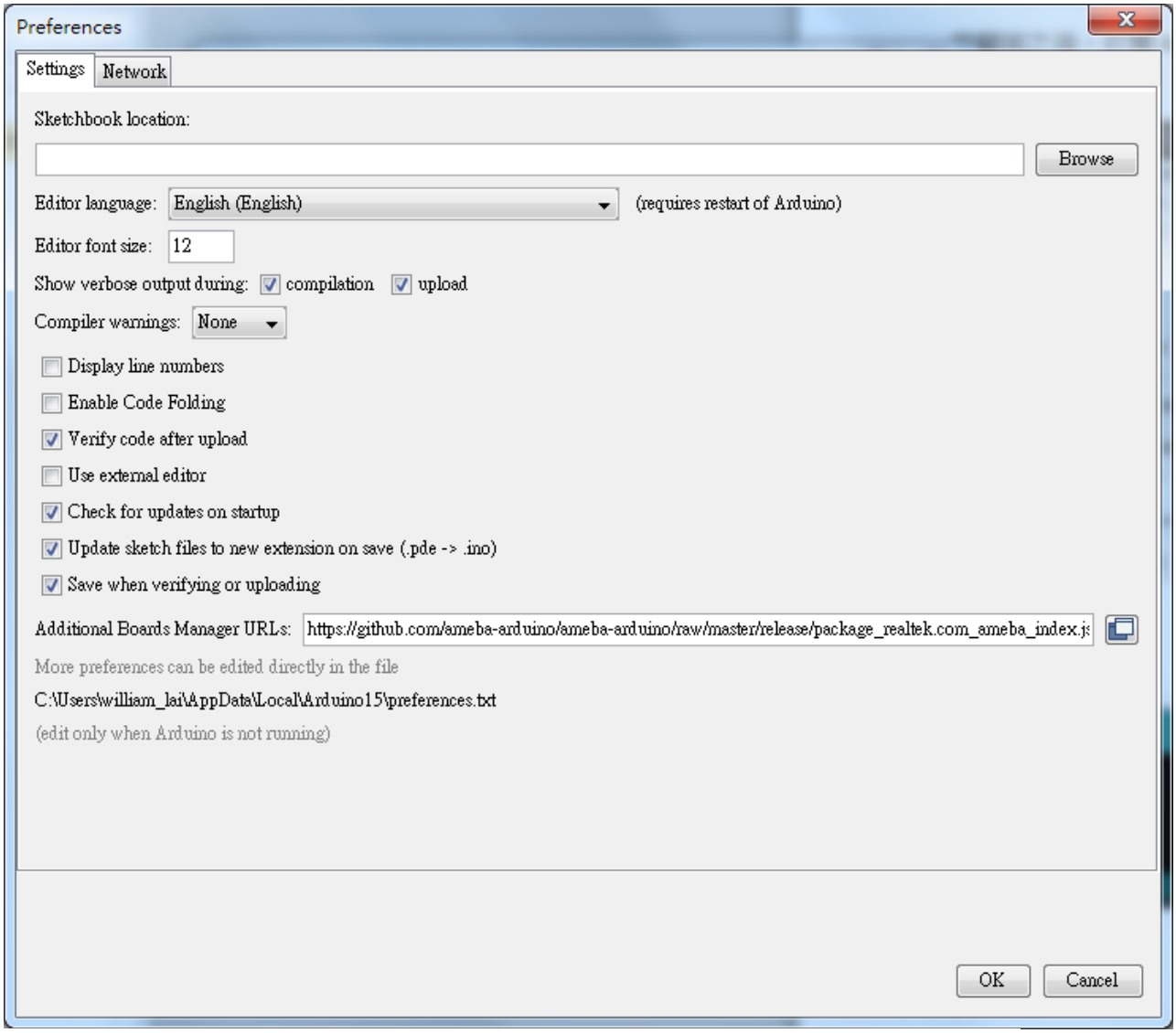
1. Open Arduino IDE.

2. In order to let Arduino IDE find out Ameba configuration file. Go to “File” -> “Preferences”



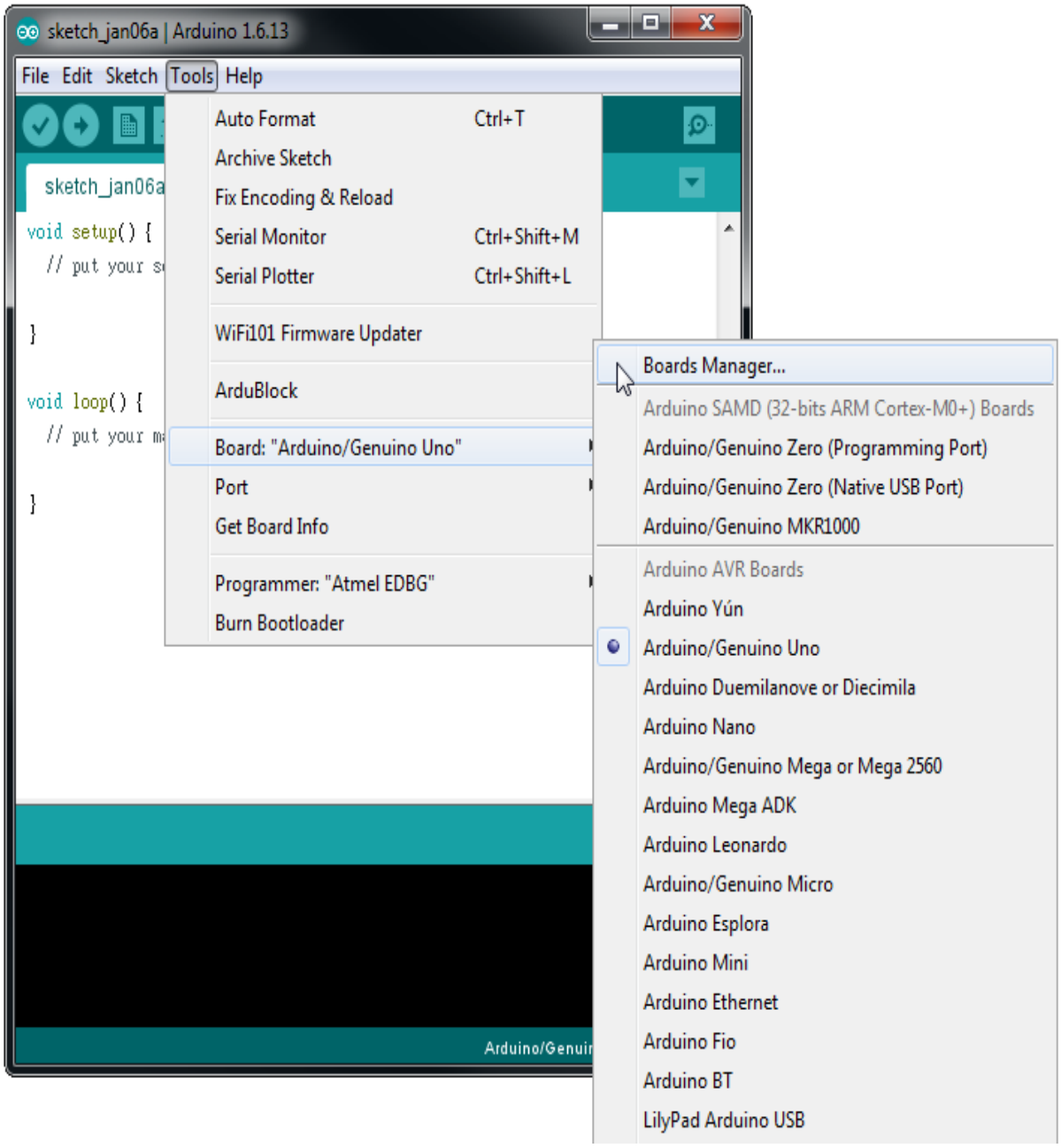
3. And paste the following URL into "Additional Boards Manager URLs" field:

```
https://github.com/Ameba8195/Arduino/raw/master/release/package_realtek.com_ameba_index.json
```



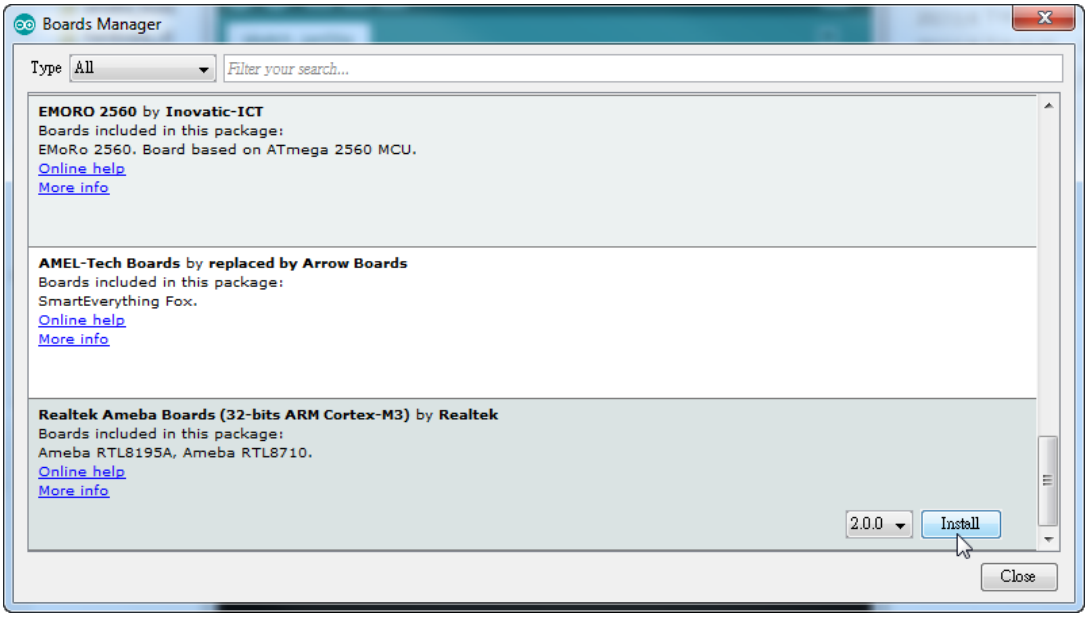
4. Please restart the Arduino IDE to activate the setting.

5. Next, go to "Tools" -> "Board" -> "Boards Manager":



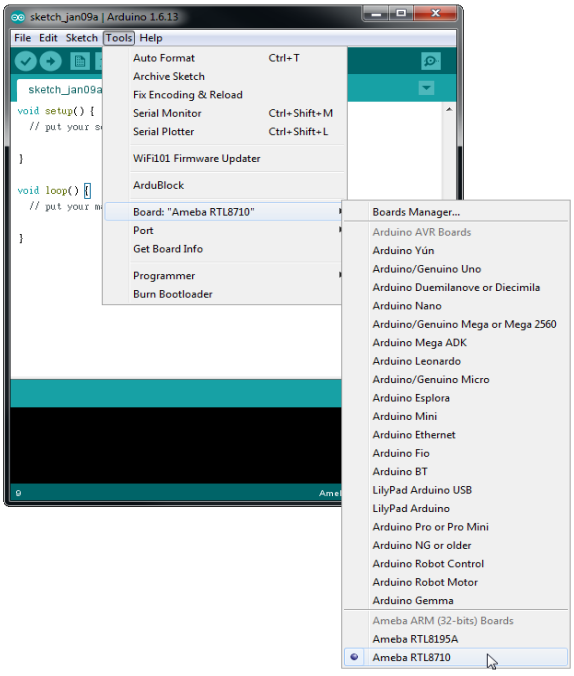
The "Boards Manager" requires about 10~20 seconds to refresh all hardware files (if the network is in bad condition, it may take longer). Every time the new hardware (example a board of another model number, not RTL8710AF) is connected, we need to reopen the Board Manager. So, we close the Boards Manager, and then open it again. Find "Realtek Ameba Boards" in the list, you will see Ameba RTL8710.

6. Select the latest Arduino version from the drop down list (v2.0.4- the latest as of May 2018) and click install. Thereafter, Arduino IDE starts to download required files for Ameba.



5. Select Ameba RTL8710 as current connected board in

"Tools" -> Board" -> "Ameba RTL8710"：

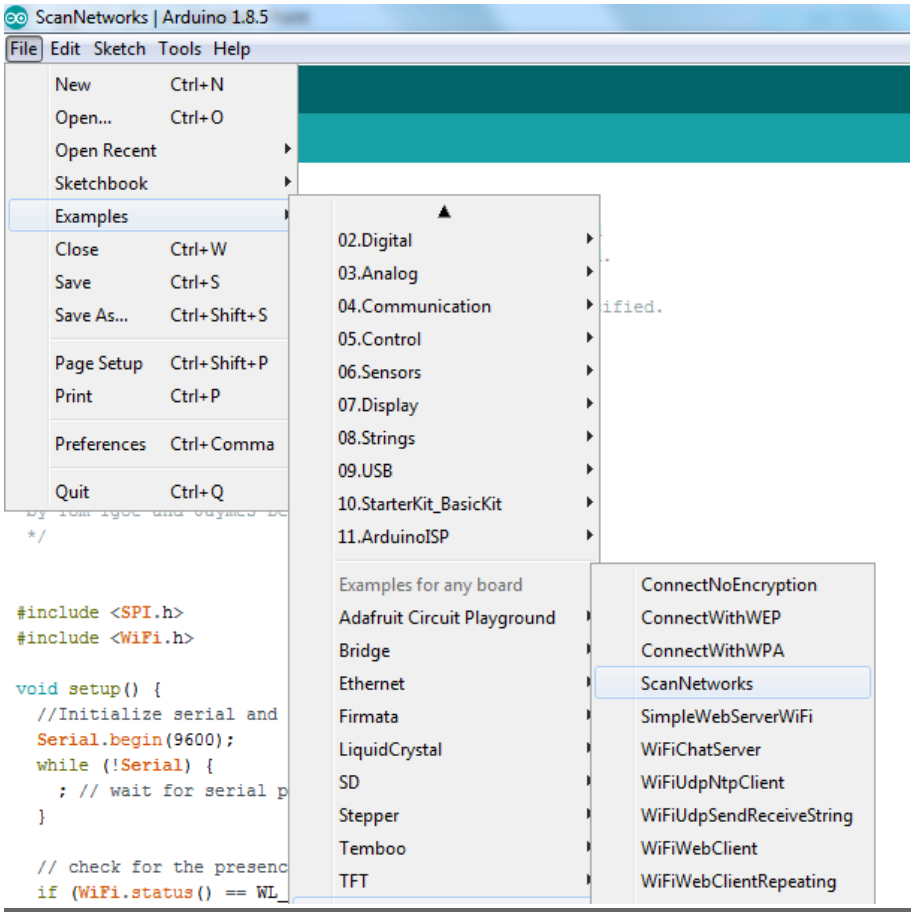


The development environment setting is completed and you are ready to compile, upload and run the examples.

4.3.1 Ready to go: Compile and Build

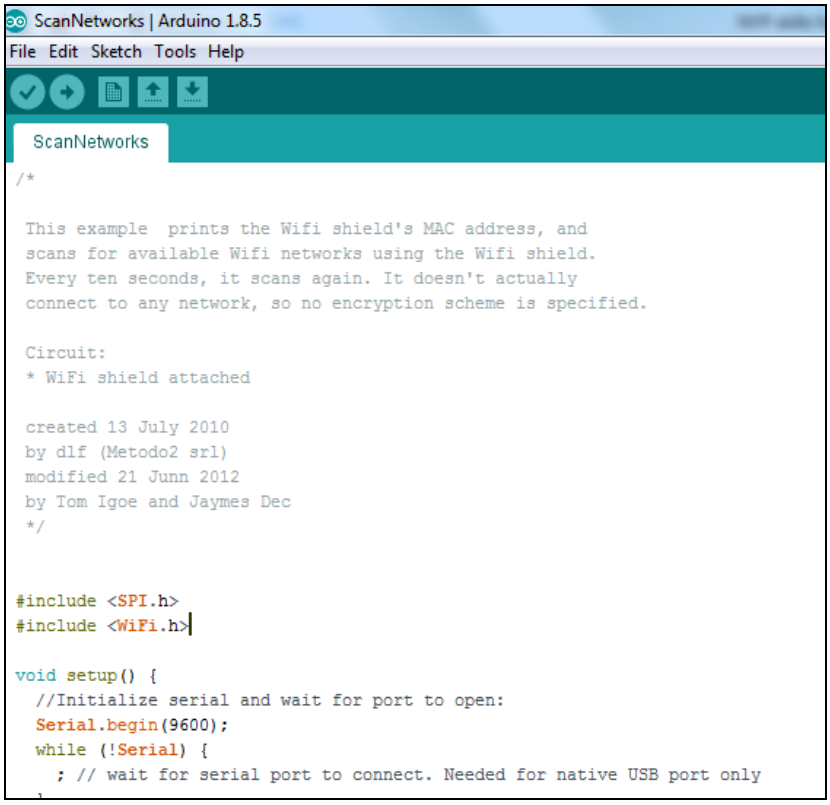
Arduino IDE provides many built-in examples, which can be compiled, uploaded and run directly on the boards. Here, we take the "ScanNetworks" example as the first example.

1. Under "File" -> "Examples" -> WiFi -> "ScanNetworks".

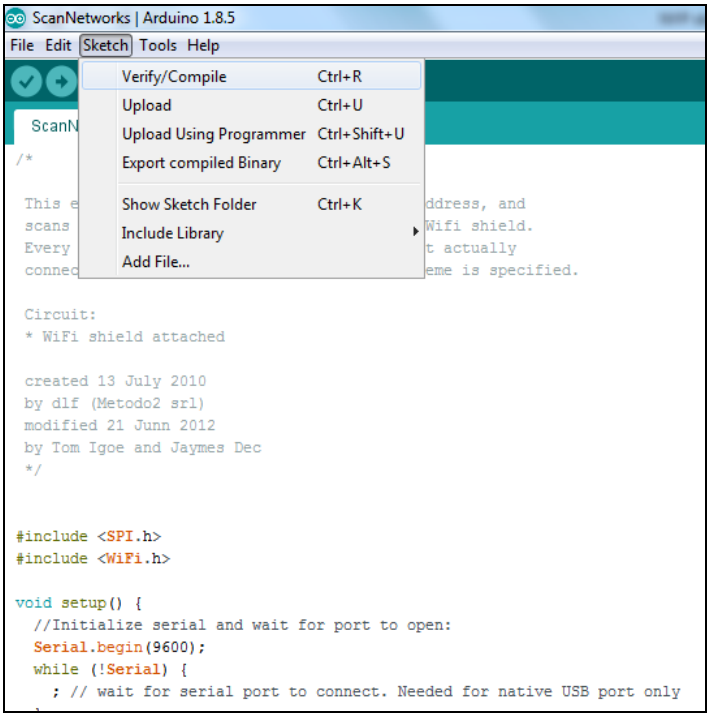


Arduino IDE opens a new window with the complete sample code.

This example prints the Wifi shield's MAC address, and scans for available Wifi networks using the Wifi shield. Every ten seconds, it scans again. It doesn't actually connect to any network, so no encryption scheme is specified.

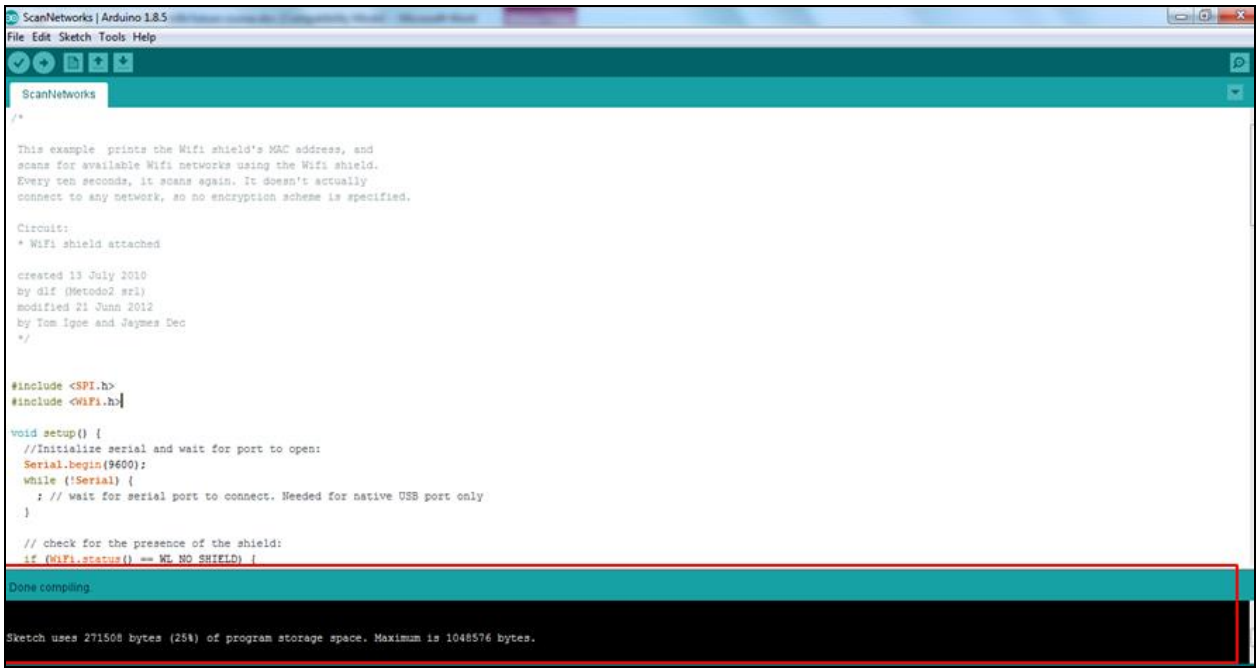


2. Next, compile the sample code. click "Sketch" -> "Verify/Compile" or you can also select the  icon on the top left as a shortcut icon to compile the code.

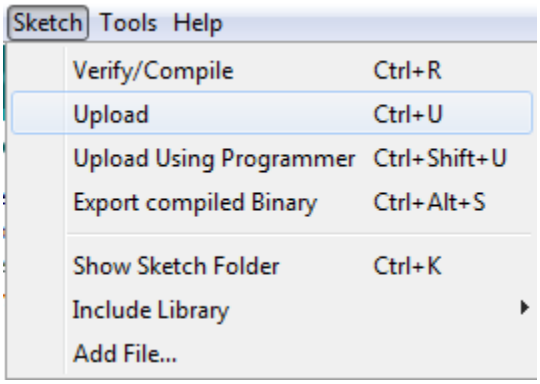


Arduino IDE prints the compiling messages in the bottom area of the

IDE window. When the compilation is finished, you will get the similar messages shown below, stating “Done compiling”.

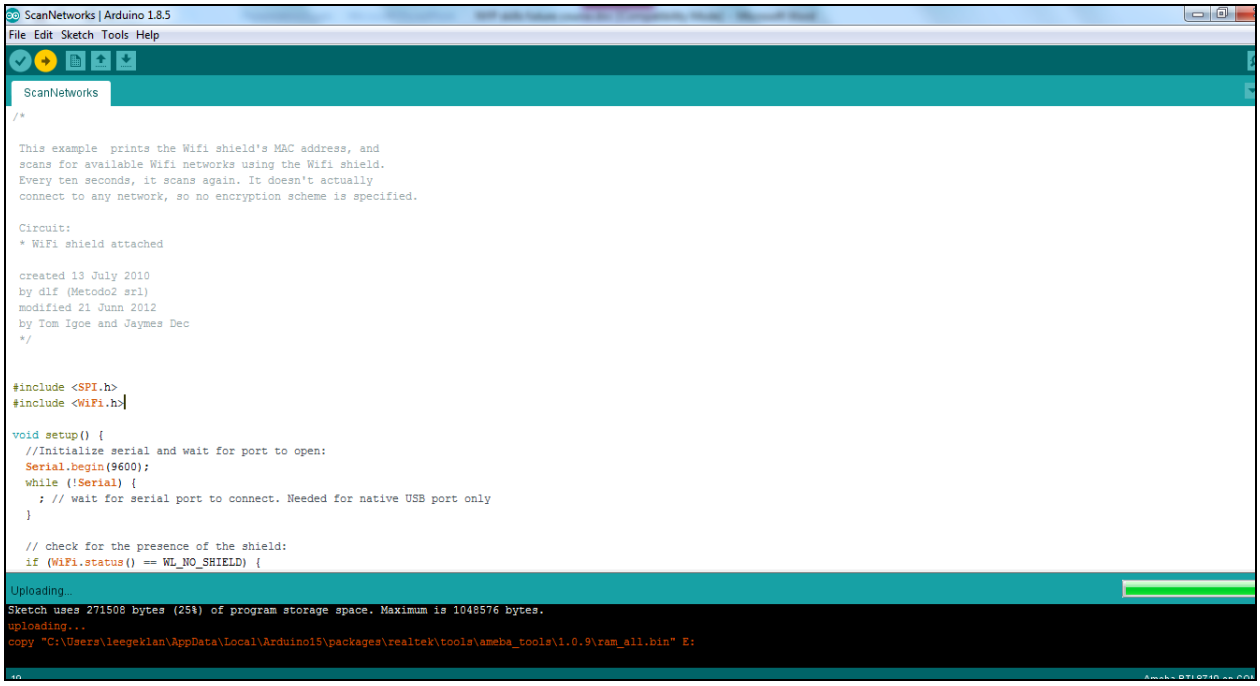


3. After the compilation is done, upload the compiled code to Ameba. With Ameba still connected to your computer, click "Sketch" -> "Upload" or select  icon on the top left as a shortcut icon for compilation.

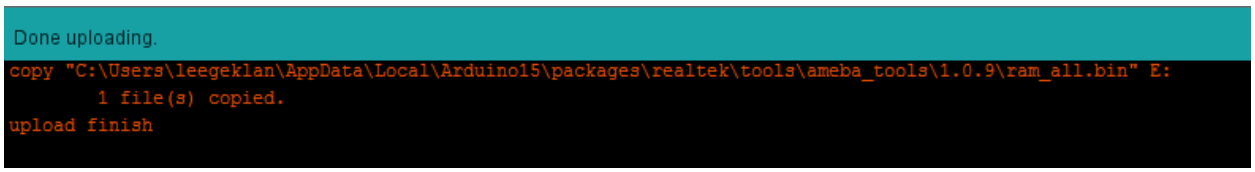


Again, during the uploading procedure the IDE prints messages at the bottom area of the IDE window. The ploading procedure requires a slightly longer time (about 30 seconds to 1 minute).

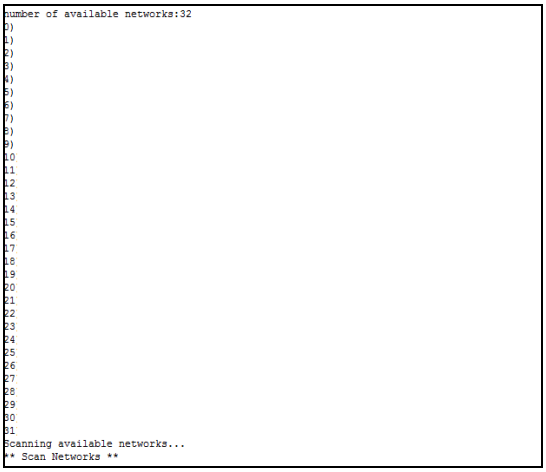
During the uploading process, D3 on the base board will be blinking/flashing in green.



4. When upload completed, D3 reverts to the original non flashing state. The "upload finish" message is printed.



5. Open the serial monitor to view the logs. Reset the board, a list of network will be seen on the serial monitor log files. (list of networks has been purposely ommited in this picture)

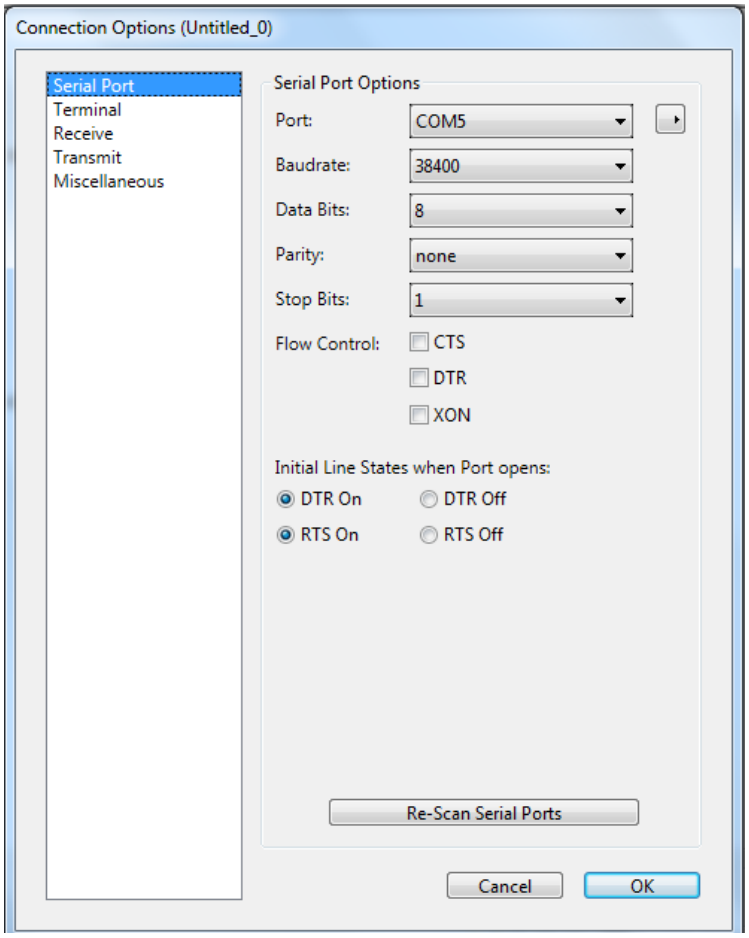


4.4 Using module RTL-00 independently

RTL-00 module can be used independently from the main board. The detachable module also uses micro usb to charge and the pins on it are compatible with the board.

When you unplug this module and charges it via the Micro USB, the result should be the same as what is seen when connecting to the main board.

To view the log files on RTL-00 module – select baud rate as 38400.
You will see the same logs on the serial monitor/emulator terminal as what you have seen on the RTL8710AF Wireless Development board



Note: For RTL-00 module - If you are unable to view the serial logs with the RTL-00 module, check that USB-SERIAL CH340 driver has been installed in your Operating System

5. Ameba Further References

https://www.amebaiot.com