RTL8710BN

Build and Debug Environment Setup – IAR

This document illustrates how to build Realtek low power Wi-Fi software under IAR SDK environment.

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1. Introduction

This document illustrates how to build Realtek low power Wi-Fi software under IAR SDK environment.

2. How to get IAR

IAR provides an IDE environment for code building, downloading, and debugging. Please check "IAR Embedded Workbench" on http://www.iar.com/, and trail version is available.

3. Ameba-Z Hardware Configuration

Hardware block diagram is shown in **Figure 3-1 Hardware block diagram**. The block **USB UART** is used to supply power and catch logs, UART baud is 115200. **SWD** means J-Link SWD interface, when it is connected to J-Link Adapter correctly, you can download images to Ameba-Z from IAR flash downloader. **Reset button** is used to reset Ameba-Z to run firmware after IAR completes downloading.

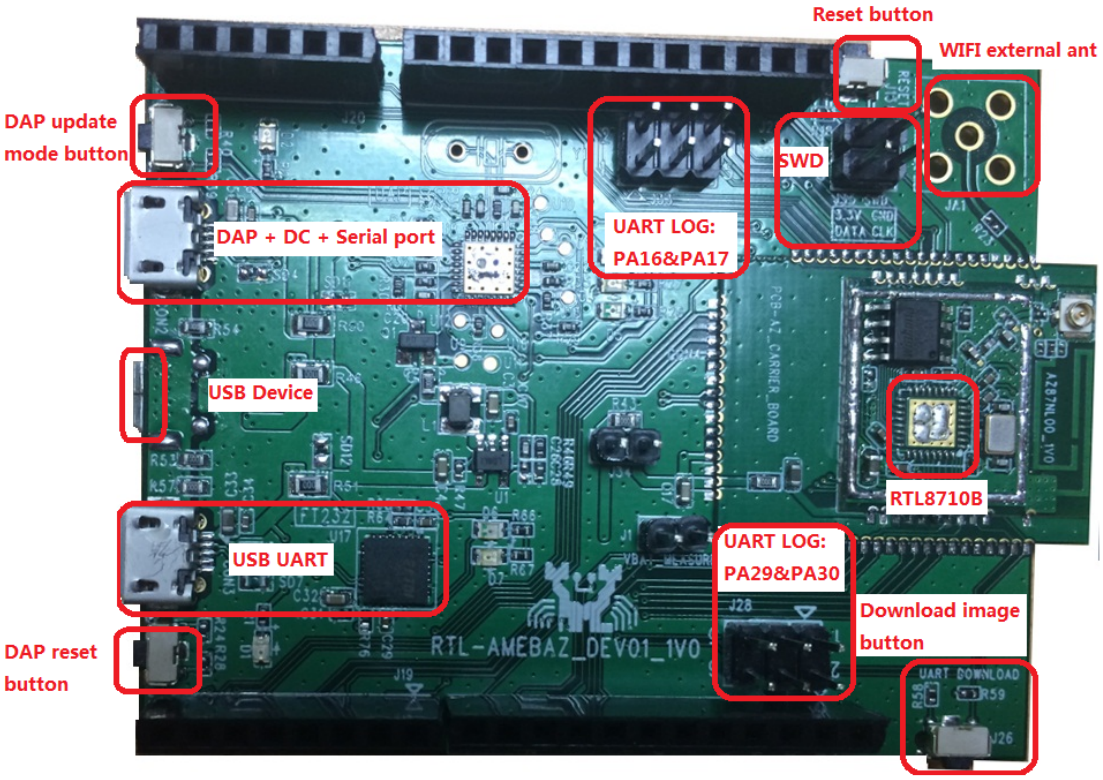


Figure 3-1 Hardware block diagram

The Dupont Line diagram between J-Link Adapter and Ameba-Z SWD is as follows:

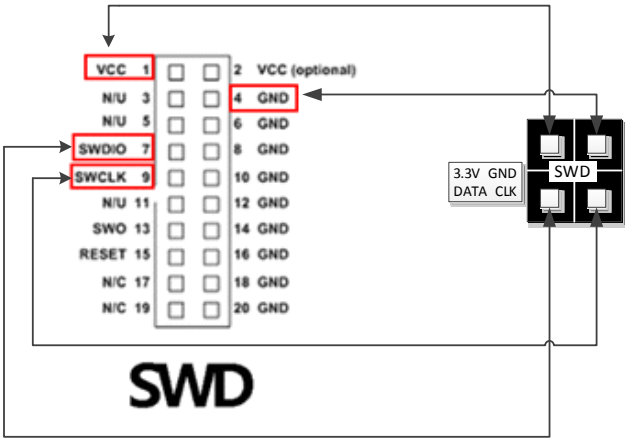


Figure 3-2 J-Link SWD connection

Please notice that DAP chip is not welding on the Ameba-Z demo board and so DAP function is not enabled which means MBED u disk copy is disabled.

Physical connection as shown below:

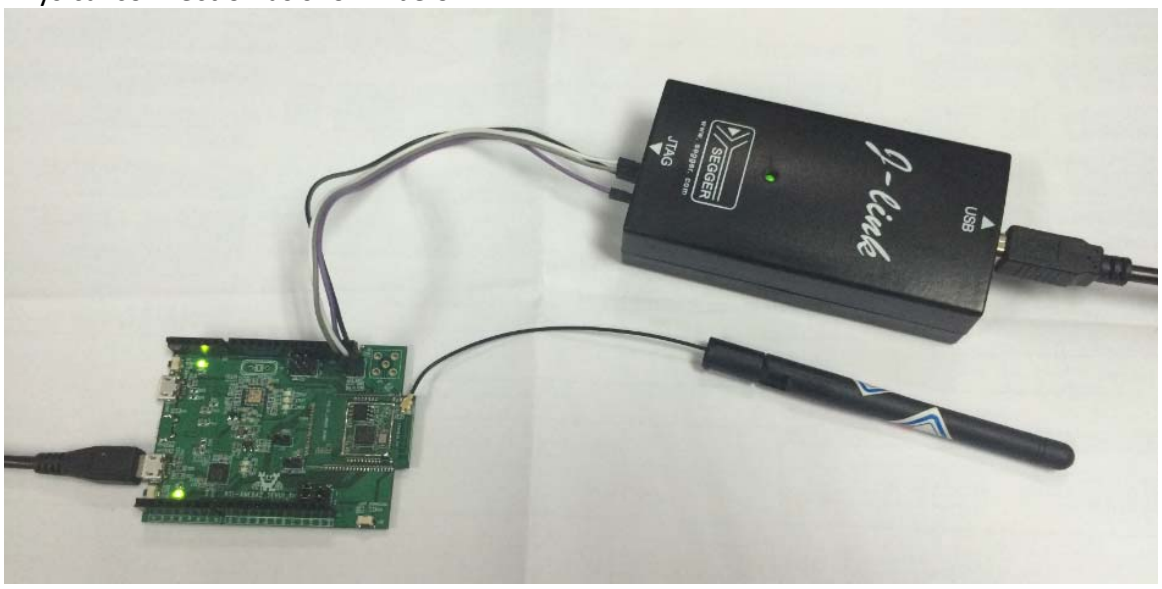


Figure 3-3 Physical connection

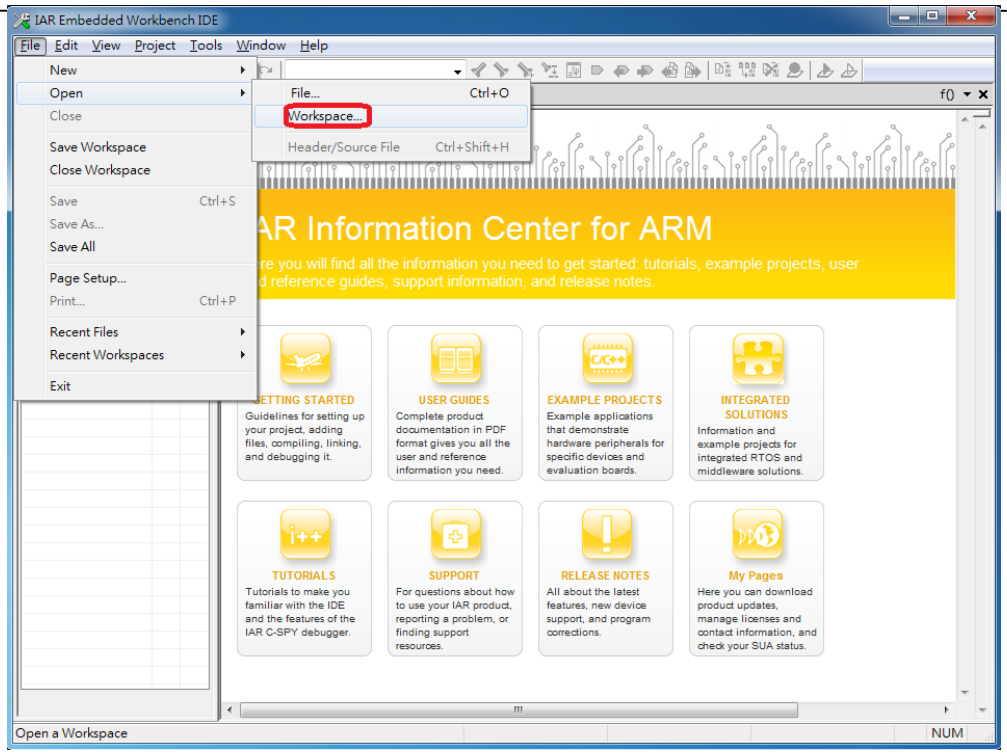
4. How to build and download code

Please make sure USB UART is connected to PC with USB line and SWD is connect to J-Link Adapter with Dupont Line before download code.

4.1 IAR build

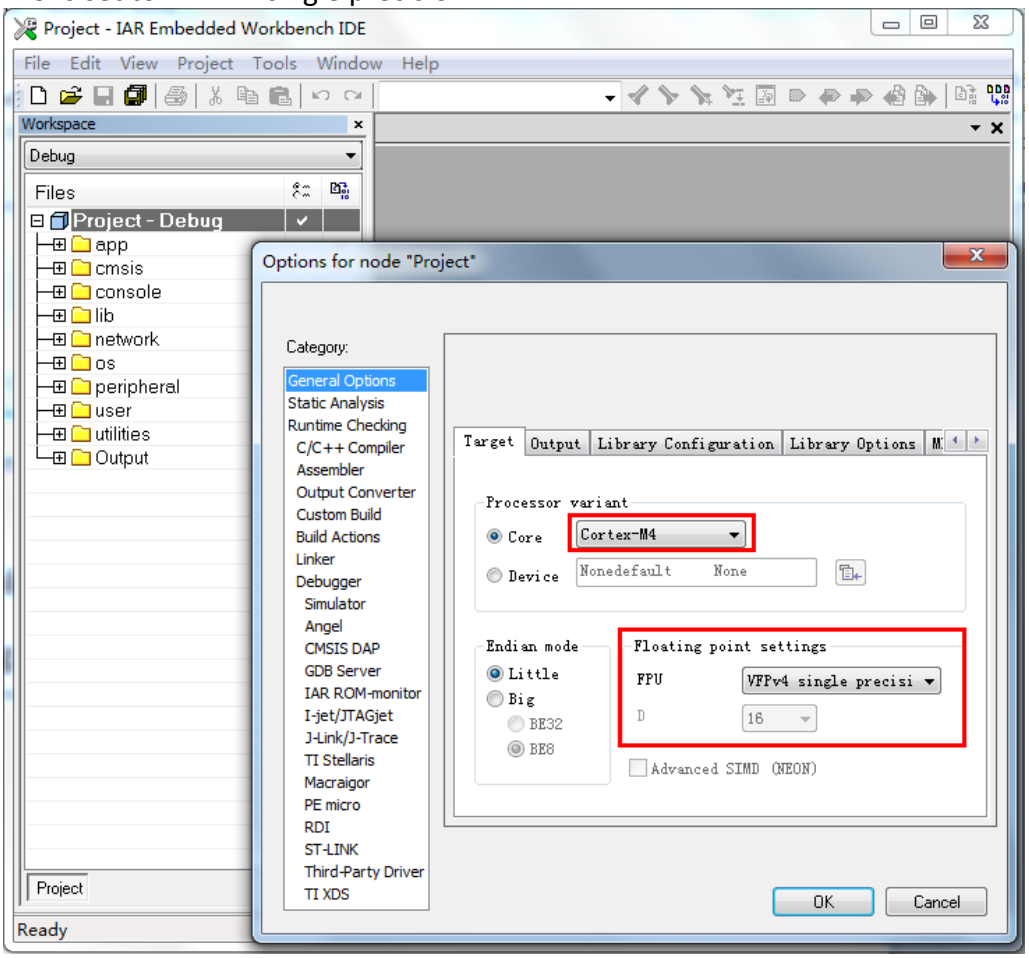
Step 1: Open IAR Workbench

Step 2: To open project, click File → Open → Workspace



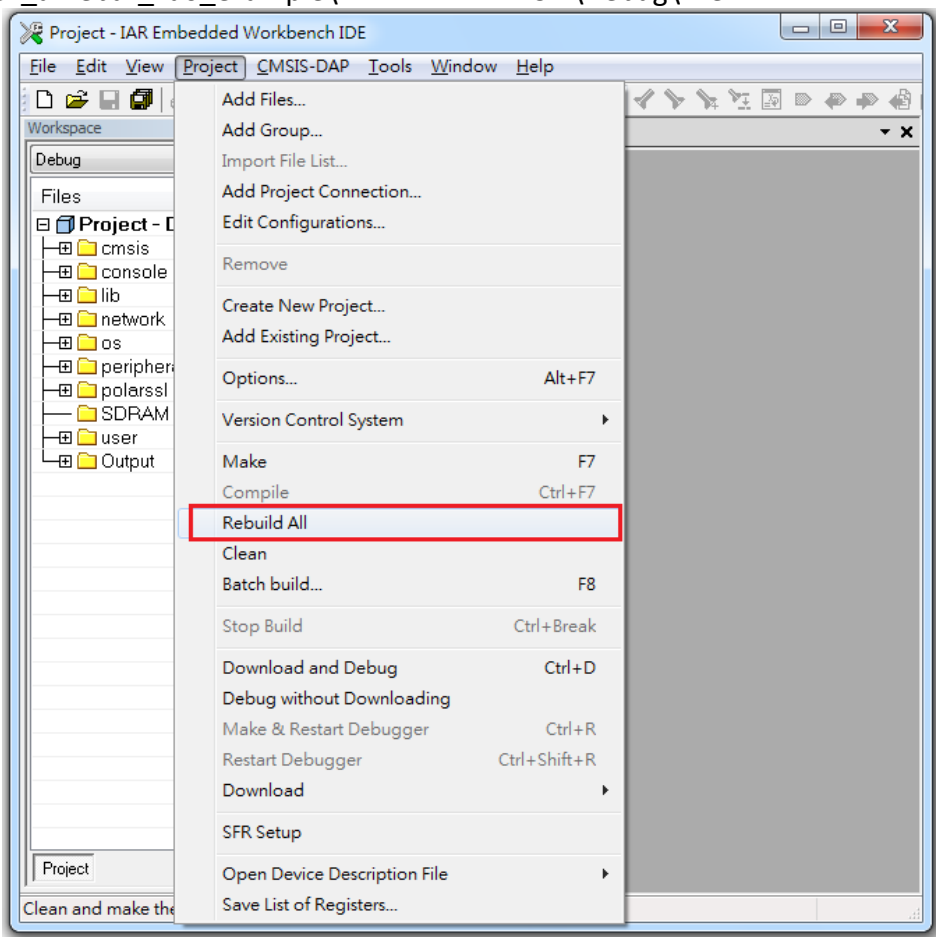
Step 3: Select Project.eww in project\realtek_amebaz_va0_example\EWARM-RELEASE

Click Project → Options, General Options->Target->Processor Variant->Core, make sure you have chosen **Cortex-M4f**. If your IAR not support this core, Please choose Cortex-M4 and Floating point settings->FPU is set to "VFPv4 single precision".



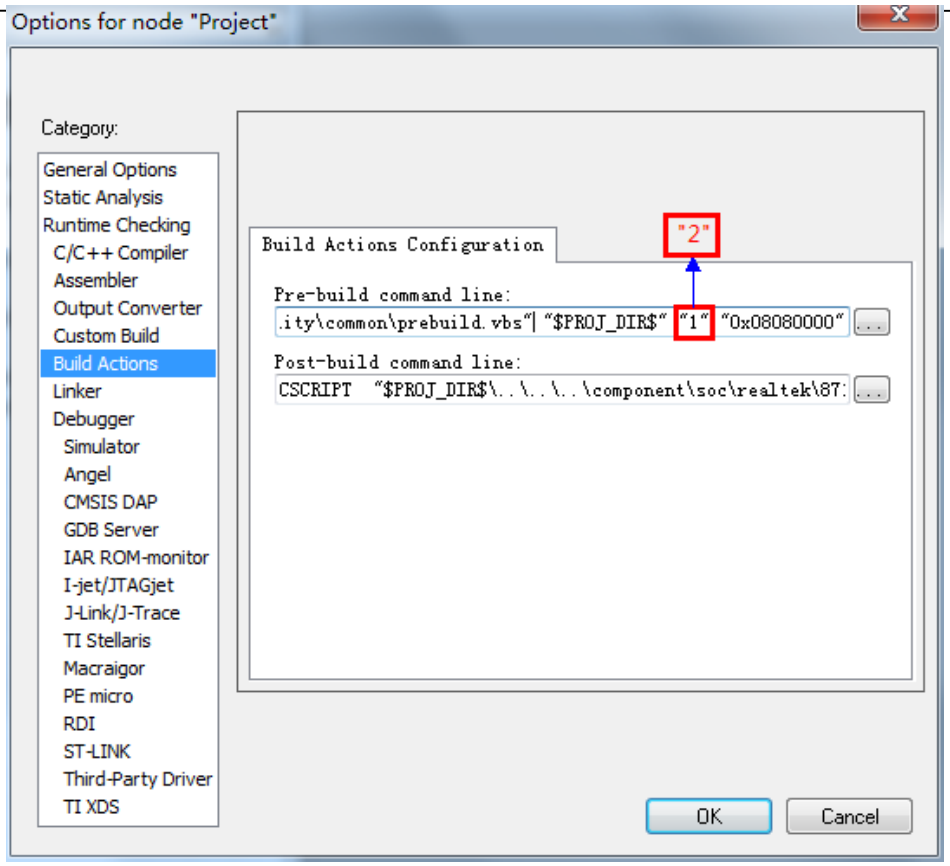
Step 4: To build project, click Project → Rebuild All

Then you will get boot_all.bin and image2_all_ota1.bin in project\realtek_amebaz_va0_example\EWARM-RELEASE \Debug\Exe.

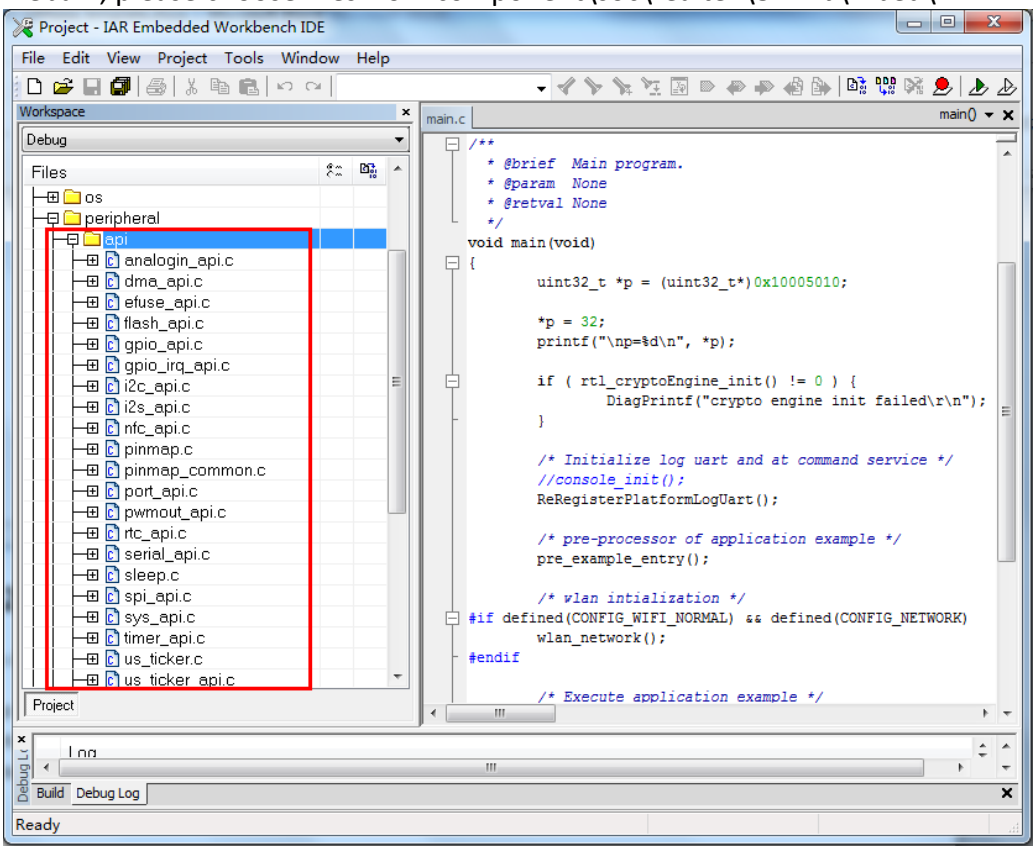


Step 5: To build image2_all_ota2.bin for OTA, click Project->Options->Build Actions->Build Actions Configuration->Pre-build command line, change the secondary parameter “1” to “2” shown as follows, then Click OK and make project “**Rebuild All**”.

Then you will get **image2_all_ota2.bin** in project\realtek_amebaz_va0_example\EWARM-RELEASE \Debug\Exe.

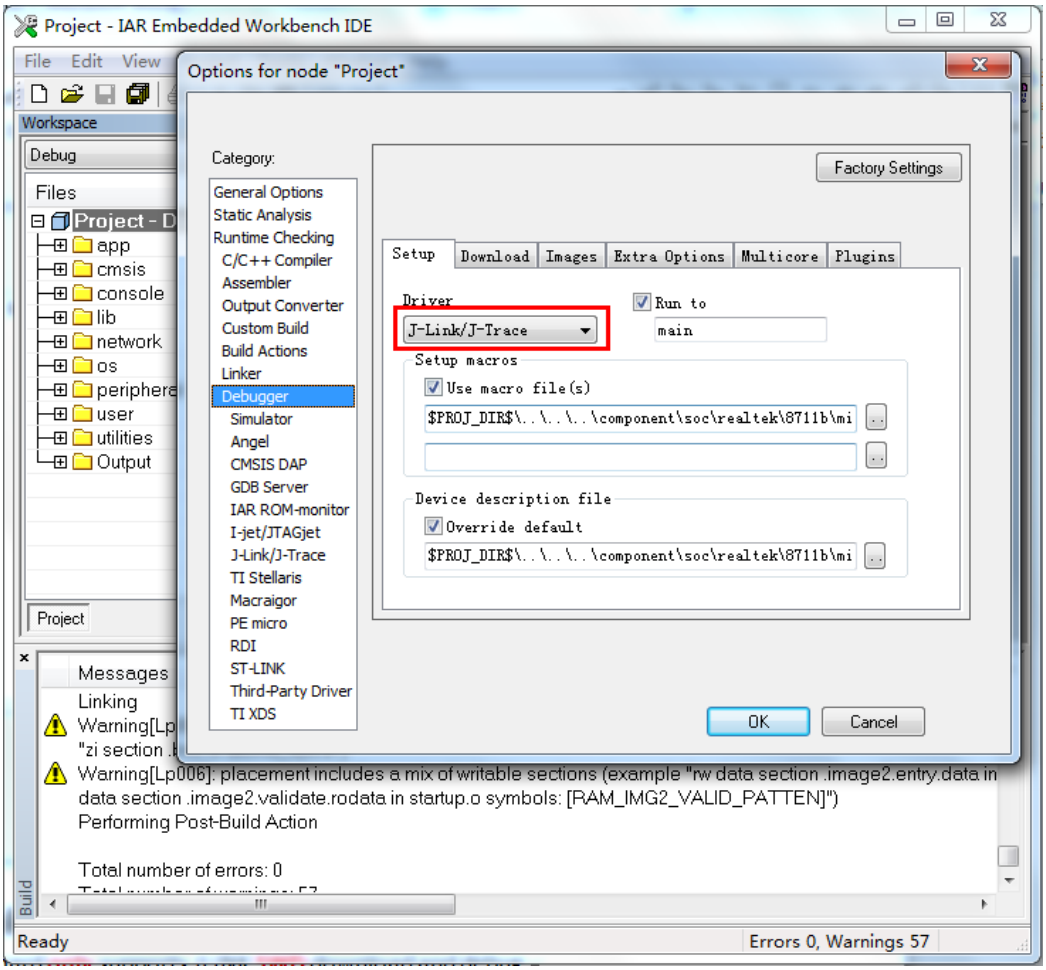


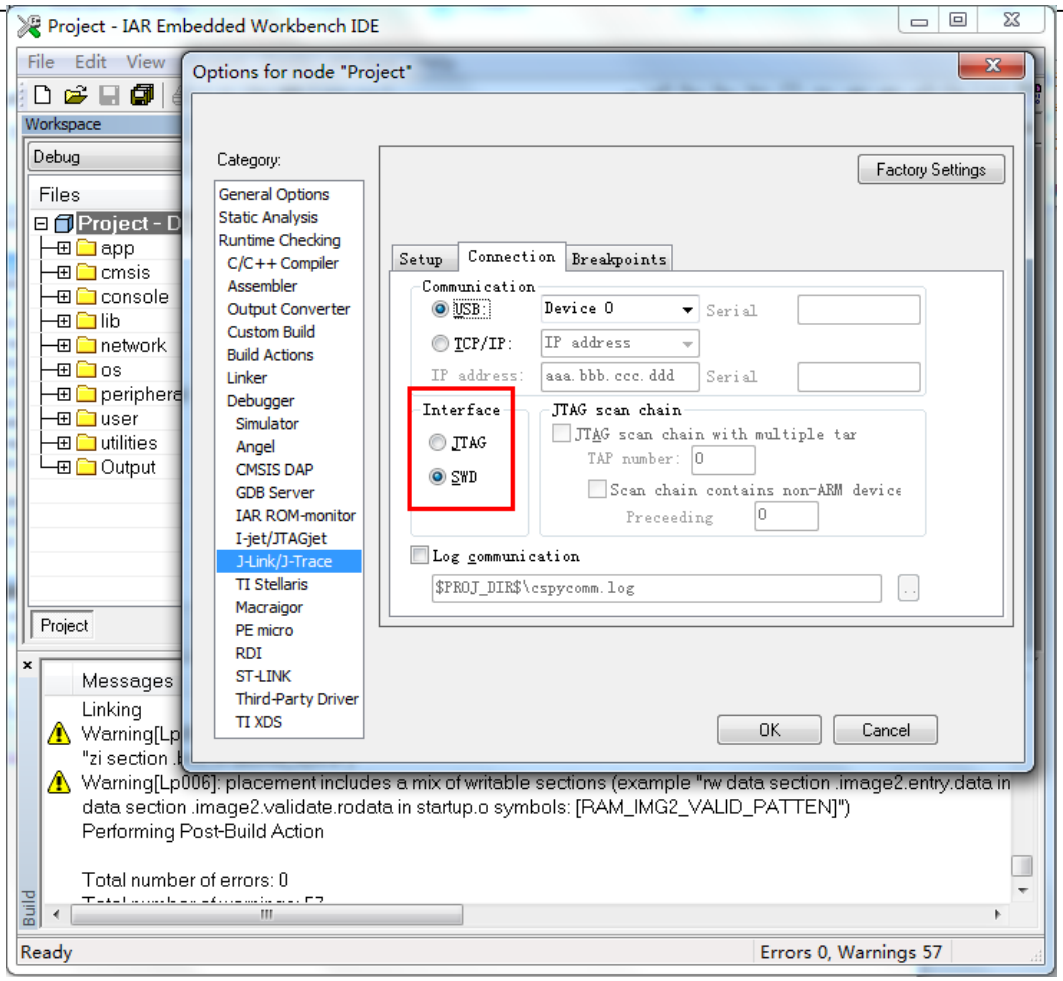
By the way, the mbed APIs include C files and Header files used by Ameba-Z is located in component\soc\realtek\8711b\mbed\. It will also be merged to component\common\mbed\ in next version. Now if you use Ameba-1, please choose files from component\common\mbed\ and if you use Ameba-Z, please choose files from component\soc\realtek\8711b\mbed\.



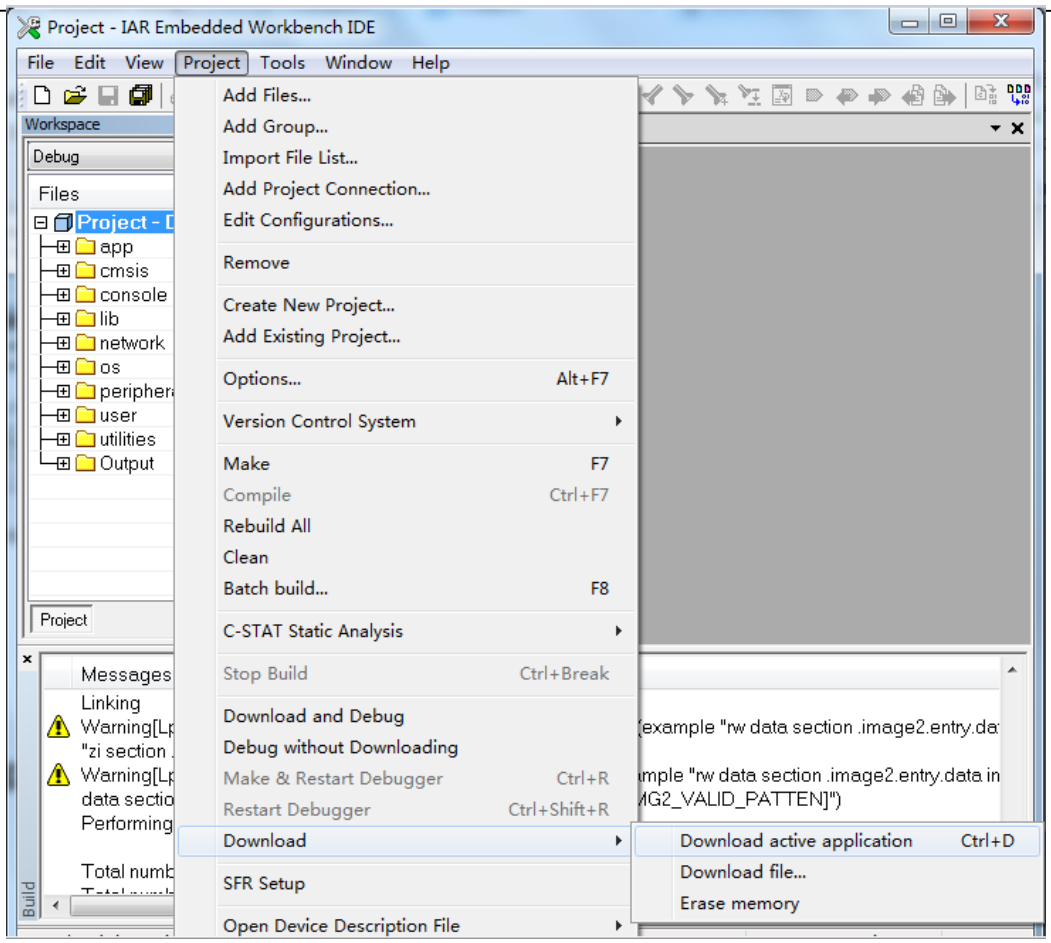
4.2 IAR download

The Ameba-Z demo board **only** supports JLINK **SWD** download and debug.
Please note that if you want use IAR download image to debug, please set the secondary parameter of prebuild.bat to "**1**" and build.
Step 1: Please check J-link debugger is setting correct. Click Project->Options->Debugger->Setup->Driver, and choose "J-Link/J-Trace". Then click Debugger->J-Link/J-Trace->Connection->Interface and choose "SWD".





Step 2: To download code, click Project->Download->Download active application.

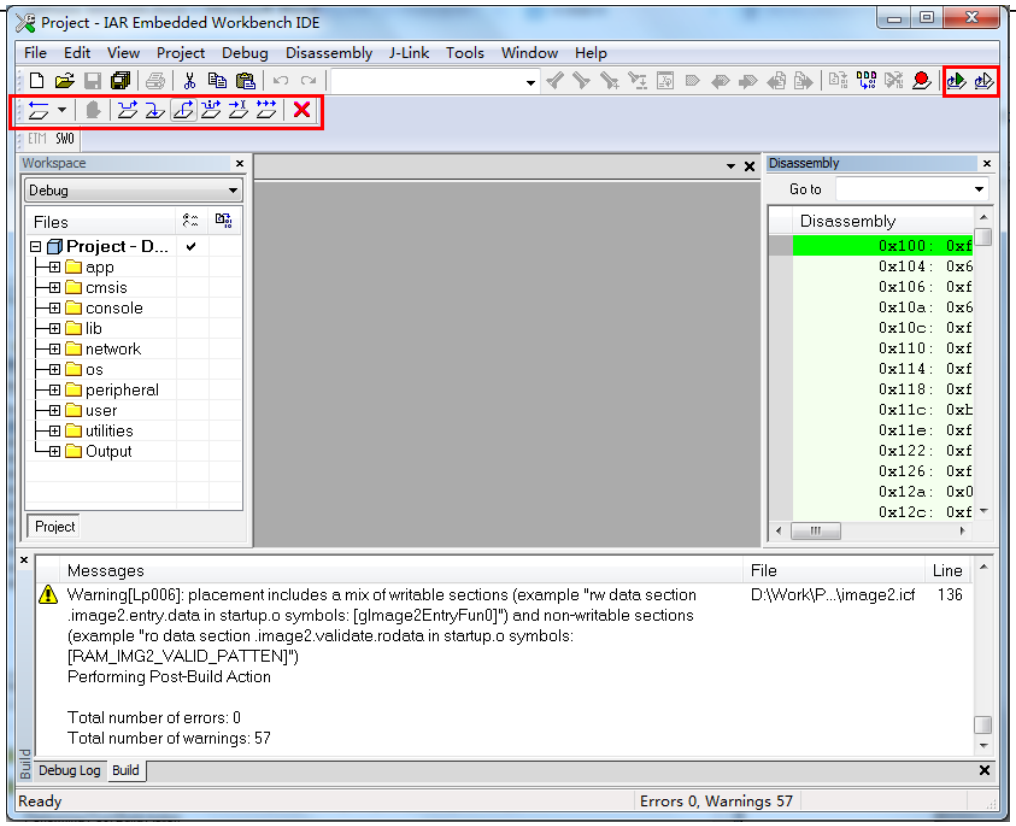


After firmware download, click Reset button to reboot the system.

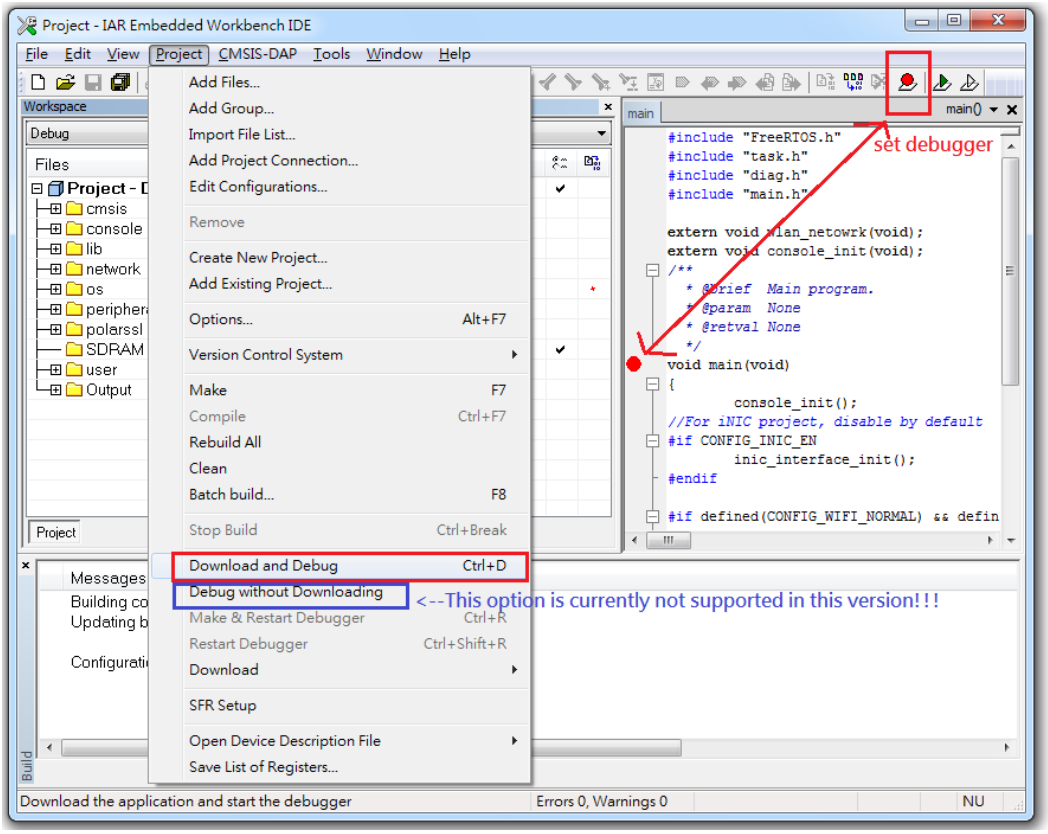
4.3 IAR debug

To debug or trace code step by step, click Project → Download and Debug or press one of the two buttons in the IAR menu.

Upper left corner of the toolbar shows step by step tracking tools.



How to set Break point is shown as follows:



By the way, ROM code and Boot loader code is provided by means of the symbol list tables, rom_symbol_v01_iar.icf and bootloader_symbol.icf. You can find it in project\realtek_amebaz_va0_example\EWARM-RELEASE. So if you are tracking to the function which is running in the ROM or boot loader area, the source code can't be located.

bootloader_symbol.icf (D:\Work\..._va0_example\EWARM-RELEASE) - GVIM

```
/* Bootloader symbol list */
define exported symbol BOOT_FLASH_InitDebugFlg = 0x08000021;
define exported symbol BOOT_FLASH_PhaseCalibration = 0x08000037;
define exported symbol BOOT_FLASH_GetOption = 0x080000e1;
define exported symbol BOOT_FLASH_Calibration = 0x080000f7;
define exported symbol BOOT_FLASH_GetVendor = 0x08000167;
define exported symbol BOOT_FLASH_Image1 = 0x08000233;
define exported symbol OTA_Valid = 0x080005c1;
define exported symbol OTA_Change = 0x080005e9;
define exported symbol OTA_Force1Check = 0x0800067b;
define exported symbol OTA_Select = 0x080006c3;
define exported symbol IMAGE1$$Base = 0x10002001;
define exported symbol RamStartTable = 0x10002001;
define exported symbol RAM_IMG1_VALID_PATTEN = 0x10002019;
define exported symbol BOOT_RAM_Image1p5 = 0x100020e1;
define exported symbol BOOT_RAM_WakeFromPG = 0x10002187;
define exported symbol BOOT_RAM_Image1 = 0x100021ed;
define exported symbol BOOT_System_Init1 = 0x10002269;
define exported symbol BOOT_System_Init2 = 0x1000226b;
define exported symbol SOCPS_SPSPin_Pull_RAM = 0x10002341;
define exported symbol SOCPS_PAD_CMD_RAM = 0x10002359;
define exported symbol SOCPS_SleepPG_RAM = 0x10002389;
define exported symbol SOCPS_FlashPin_PullUp_RAM = 0x100023ad;
define exported symbol SOCPS_DeepSleep_RAM = 0x100023d7;
<le\EWARM-RELEASE\bootloader_symbol.icf" 37L, 2116C          1,1          顶端
```

rom_symbol_v01_iar.icf (D:\Work...va0_example\EWARM-RELEASE) - GVIM1

```
define exported symbol __vectors_table = 0x0;
define exported symbol Reset_Handler = 0x101;
define exported symbol NMI_Handler = 0x115;
define exported symbol HardFault_Handler = 0x119;
define exported symbol MemManage_Handler = 0x12d;
define exported symbol BusFault_Handler = 0x131;
define exported symbol UsageFault_Handler = 0x135;
define exported symbol VSprintf = 0x201;
define exported symbol DiagPrintf = 0x4dd;
define exported symbol DiagSPrintf = 0x509;
define exported symbol DiagSnPrintf = 0x535;
define exported symbol prvDiagPrintf = 0x7ed;
define exported symbol prvDiagSPrintf = 0x821;
define exported symbol UARTIMG_Write = 0x855;
define exported symbol UARTIMG_Download = 0x901;
define exported symbol _memcmp = 0x991;
define exported symbol _memcpy = 0x9c5;
define exported symbol _memset = 0xa7d;
define exported symbol DumpForOneBytes = 0xae9;
define exported symbol CmdRomHelp = 0xc69;
define exported symbol CmdDumpWord = 0xccd;
define exported symbol CmdWriteWord = 0xd7d;
define exported symbol CmdFlash = 0xdd1;
define exported symbol CmdEfuse = 0x12c1;
<LEASE\rom_symbol_v01_iar.icf" [unix] 1424L, 71558C          1,1          顶端
```

5. Image tool download

Please reference AN0112 Realtek Ameba-Z Image Tool user manual.doc.pdf for details.
Assuming that the Image Tool on PC is Server, which sends images files to Ameba-Z (Client) through UART. Client or Server, whichever starts first will be ok.

Steps on Ameba-Z

Step 1: For QFN32, pins marked with “1”on the figure should be connected by jumper cap.
For QFN48 & QFN68, pins marked with “2”shouldbe connected by jumper cap.
Step 2: Push the Image Download Button and keep it pressed.
Step 3: Power on the board or press the Reset Button. Now Ameba-Z goes into UART DOWNLOAD mode.
Step 4: Finally release the Image Download Button. Now the client is ready for receiving data.

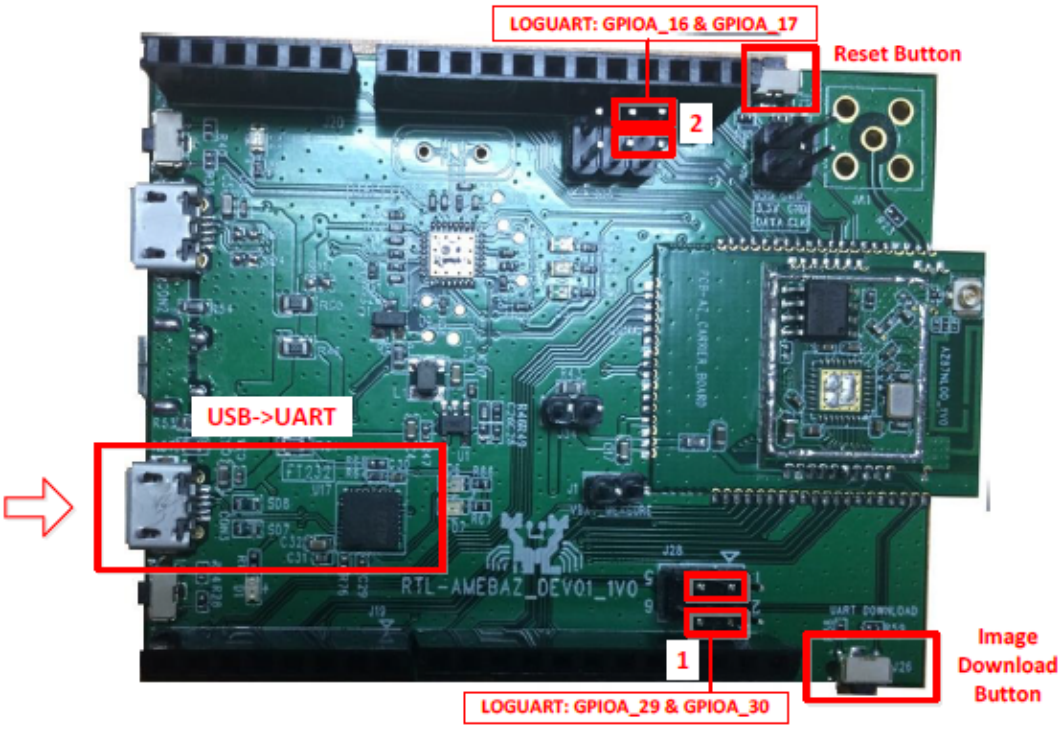


Figure 5-1 AmebaZ DEV

Steps on image tool

Step 1: Select serial port. The default baud rate is 1.5Mbps.
Step 2: Select transmission baud rate
Step 3: Open serial port
Step 4: Check the images to be transferred
Step 5: Select and load images files by browsing which are generated by IAR project.
Step 6: Input image addresses. The address which starts with 0x08 is for flash, and 0x10 for RAM.
Step 7: Push Download button to start. Now the server is ready to send data.

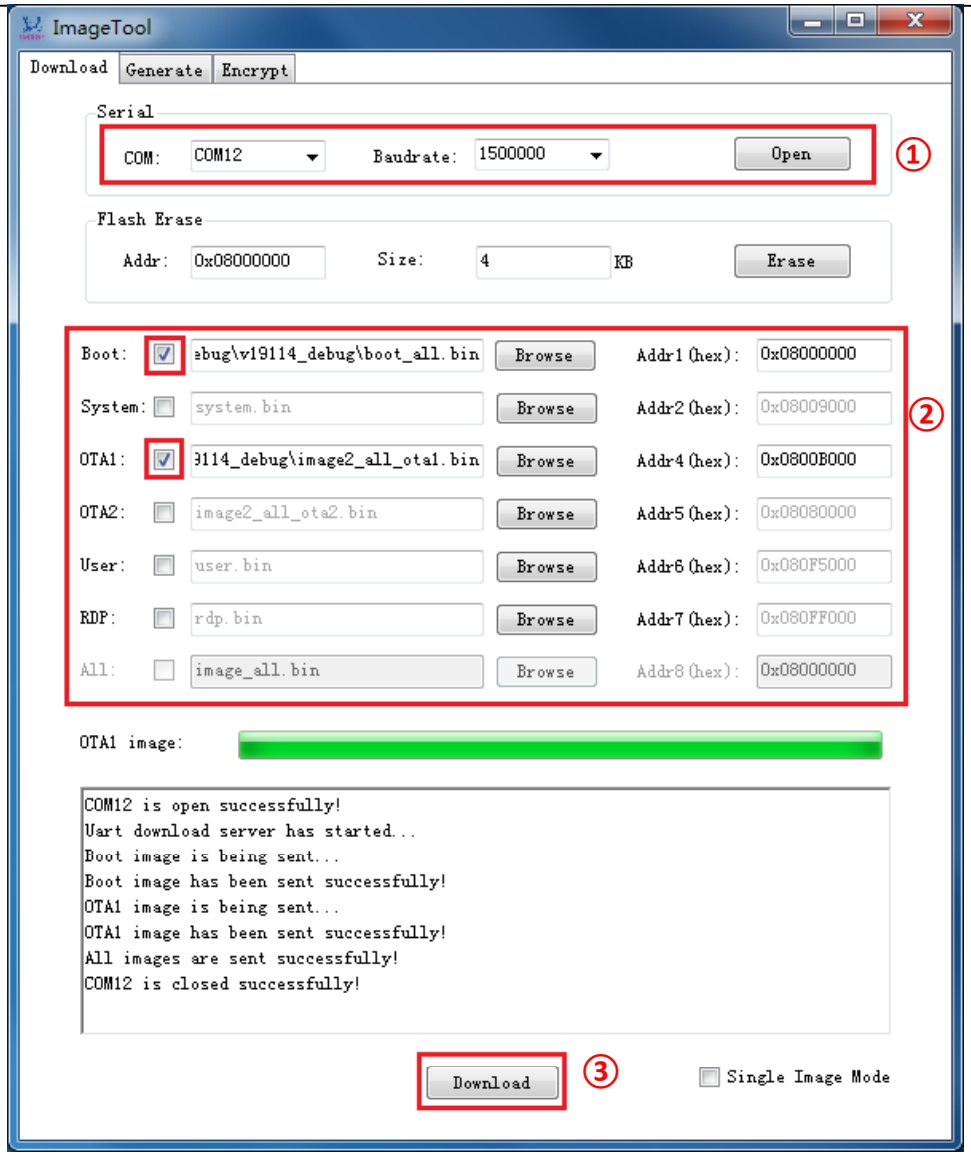


Figure 5-2 Image Download Tabpage

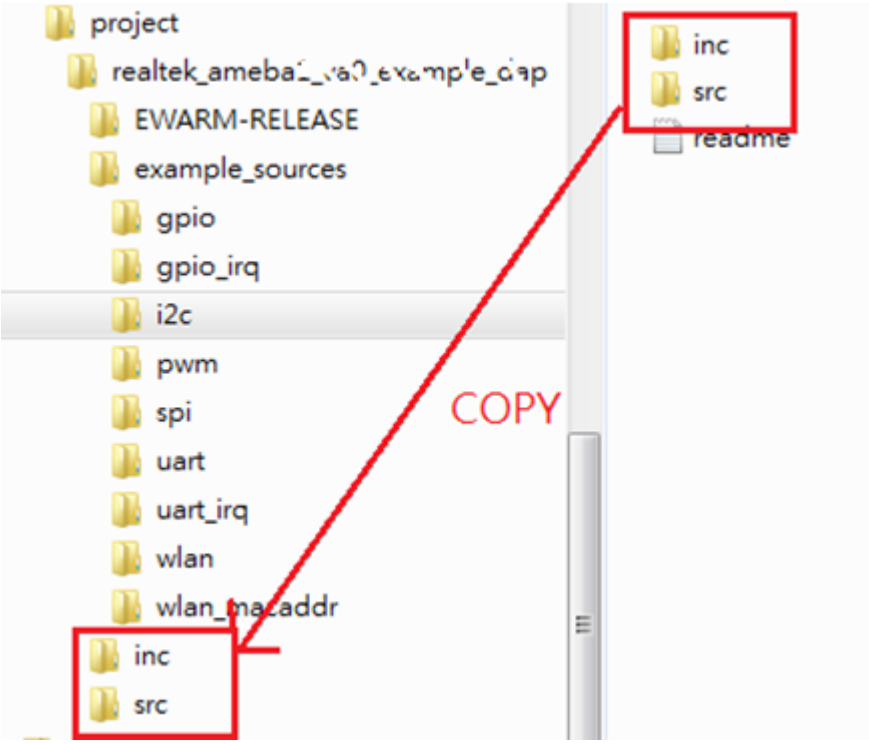
When the client and server are both ready, data transmission begins.

The progress bar will show the transmit progress of each image. You can also get the message of operation successful or errors occur from log window.

6. How to use peripheral sample code

There are several peripheral example code under folder “project\realtek_amebaz_va0_example \example_sources \”, you can copy & paste the example’s “inc” and “src” to project folder.

Ex. To use i2c example code, you can copy “src” and “inc” from “project\ realtek_amebaz_va0_example\example_sources\i2c\”.



Ameba API follows MBED API. User can check MBED website for peripheral API.

7. Warning

7.1 Federal Communication Commission Interference Statement

Federal Communication Commission Interference Statement
This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

IMPORTANT NOTE:
FCC Radiation Exposure Statement:
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

IEEE 802.11b or 802.11g operation of this product in the U.S.A. is firmware-limited to channels 1 through 13.

This module is intended for OEM integrator. The OEM integrator is responsible for the compliance to all the rules that apply to the product into which this certified RF module is integrated. Additional testing and certification may be necessary when multiple modules are used.

20cm minimum distance has to be able to be maintained between the antenna and the users for the host this module is integrated into. Under such configuration, the FCC radiation exposure limits set forth for an population/uncontrolled environment can be satisfied.

USERS MANUAL OF THE END PRODUCT:
In the users manual of the end product, the end user has to be informed to keep at least 20cm separation with the antenna while this end product is installed and operated. The end user has to be informed that the FCC radio-frequency exposure guidelines for an uncontrolled environment can be satisfied. The end user has to also be informed that any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment. If the size of the end product is smaller than 8x10cm, then additional FCC part 15.19 statement is required to be available in the users manual: This device complies with Part 15 of FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

LABEL OF THE END PRODUCT:
The final end product must be labeled in a visible area with the following " Contains TX FCC ID: TX2-RTL8710BN ". If the labelling area is larger than the palm of the hand, then the following FCC part 15.19 statement has to also be available on the label: This device complies with Part 15 of FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

Antenna list:

Ant.	Brand	Model Name (P/N)	Antenna Type	Connector	Gain (dBi)
1	REALTEK	Ameba-AM0001	Printed Antenna	N/A	2.9
2	JOYMAX	TWF-614XMPXX-500	Dipole Antenna	I-PEX	3.0
3	LYNwave	ALA110-222050-300010	PIFA Antenna	I-PEX	3.5

Note: The EUT has three type antennas.

7.2 NCC 警語

經型式認證合格之低功率射頻電機，非經許可，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。

低功率射頻電機之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。前項合法通信，指依電信法規定作業之無線電通信。低功率射頻電機須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

本模組於取得認證後將依規定於模組本體標示審驗合格標籤，並要求平台廠商於平台上標示「本產品內含射頻模組： CC XX xx LP yyy Zz」。