ESP8266

FLASH TOOL
User Manual

This document is for the Version 2.4 of ESP FLASH TOOL.

Date	Version	Notes
Nov. 2015	V1.0	First released.

Disclaimer and Copyright Notice

Table of Contents

1. Introduction

Espressif provides ESP8266 FLASH TOOL to download multiple SDK binaries to a SPI flash of ESP8266 board by simple configuration.

Download ESP8266 FLASH TOOL from:

http://bbs.espressif.com/viewtopic.php?f=5&t=433

Note：

For detailed information on SDK compilation , refer to "ESP8266 SDK User Manual"

2. Instructions

2.1. Binaries Download Procedures

Run ESP8266 FLASH TOOL on Windows XP or Windows 7. Normally the download takes 3.3 V power supply and output current at 500 mA at minimum. Take ESP LAUNCHER as an example (see Figure 1), the download procedures are listed as follows:
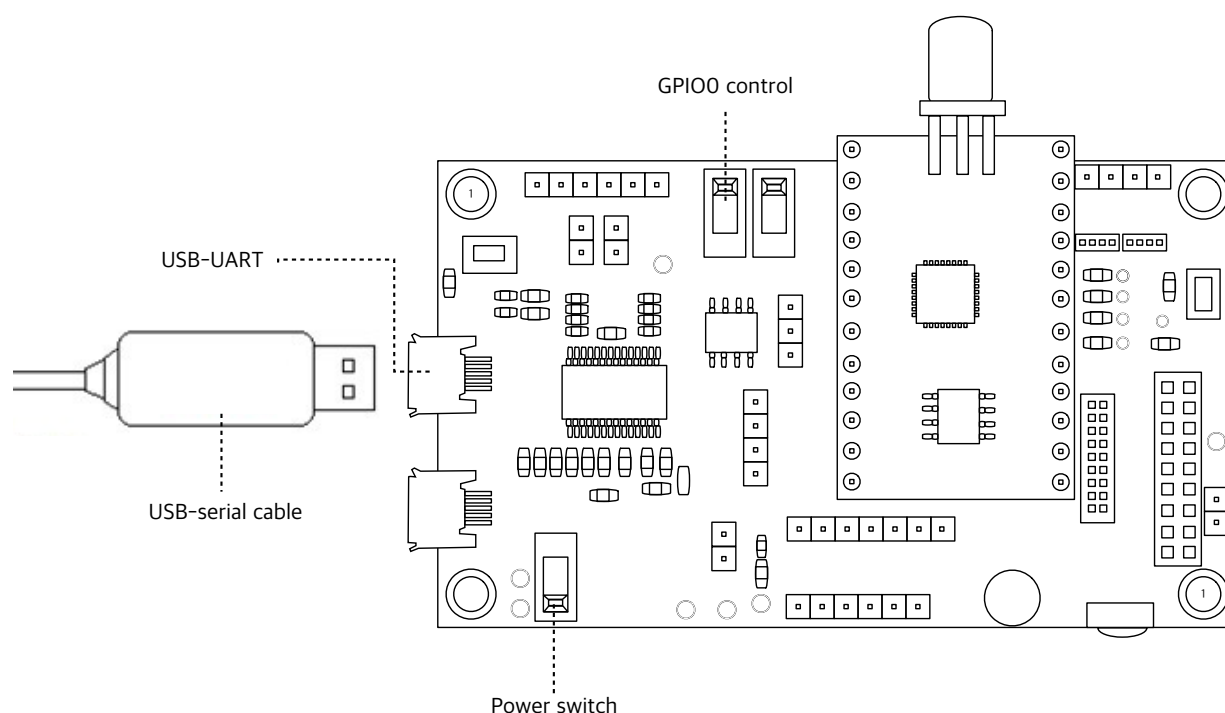
Figure 1 ESP-LAUNCHER

1. Connect USB-UART interface on ESP LAUNCHER to PC with a USB-serial cable, or connect GND, U0RXD, and U0TXD pins on ESP8266 board to PC with a serial cable.

> *Note:*
>
> *There are two USB-UART interfaces on ESP-LAUNCHER, use the upper one for download (see Figure 1).*
> *Refer to "ESP8266 Hardware Description" for more information on ESP-LAUNCHER.*

2. On ESP-LAUNCHER, pull down GPIO0 switch to enter UART Download mode, or on the ESP8266 board set the jumper as: MTDO : GPIO0 : GPIO2 : = 0 : 0 :1.

3. Pull up the power switch to power on the board.

4. Double-click **ESP_DOWNLOAD_TOOL.exe** to open ESP FLASH TOOL (see Figure 2).
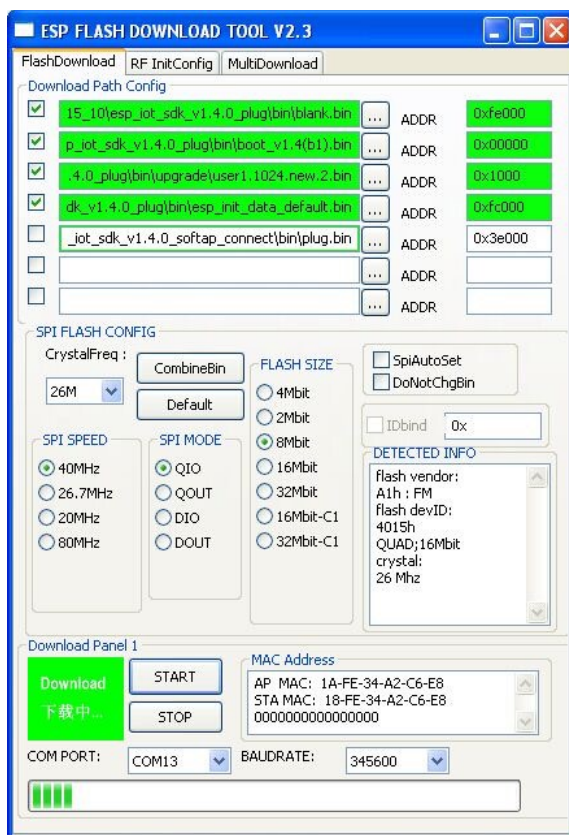
Figure 2 ESP FLASH DOWNLOAD TOOL - FlashDownload tab

5. In the **FlashDownload** tab, click […] in the **Download Path Config** panel, select the binary as required and set the corresponding download address in **ADDR** text box. Tick the files to confirm the selection.

> **Note：**
>
> *The binaries and addresses vary by SPI Flash types and actual requirements.Refer to Chapter 3 for details.*

6. Configure the SPI flash as follows.

SPI FLASH CONFIG	
CrystalFreq	Select the crystal frequency according to the crystal oscillator used.
CombineBin	Combine the selected binaries into target.bin with the address 0x0000 (optional).
Default	Set the SPI Flash to the default value (optional).
SPI SPEED	Select SPI read/writer speed. The maximum value is 80MHz.
SPI MODE	Select SPI mode according to the SPI Flash used. If the flash is Dual SPI, select **DIO** or **DOUT**. If the flash is **Quad SPI**, select **QIO** or **QOUT**.
FLASH SIZE	Select the flash size according to the flash type used.
SpiAutoSet	If the user selects **SpiAutoSet**, the binaries will be downloaded as default flash map. The flash map of the program area for 16 Mbit and 32 Mbit flashes will be 512 Kbyte + 512 Kbyte (optional).
DoNotChaBin	• If the user selects **DoNotChgBin**, the flash work frequency, mode, and flash map will be the same as the compilation without any changes. • If **DoNotChgBin** is not selected, the flash work frequency, mode, and flash map will be defined according to the final configuration on the flash tool.
Download Panel	
START	Click **START** button to start download. When the download completes, **FINISH** will be shown in the green status area.
STOP	Click **STOP** to stop download.
MAC Address	When the download successes, the MAC address of ESP8266 is displayed. If **target.bin** is downloaded, addresses of STA and AP are displayed.
COM PORT	Select COM port of ESP8266
BAUDRATE	Select baudrate of download. The default value is 115200.

> **Note：**
>
> It is suggested that users set the SPI size manually according to the actual use instead of selecting **SpiAutoSet.**

7. After download, pull up the GPIO0 switch on the ESP-LAUNCHER to enter Flash Boot mode, or on the ESP8266 board, set the jumper as: MTDO : GPIO0 : GPIO2 : = 0 : 1 :1.

⬅
END

> ⚠ *Notice*:
>
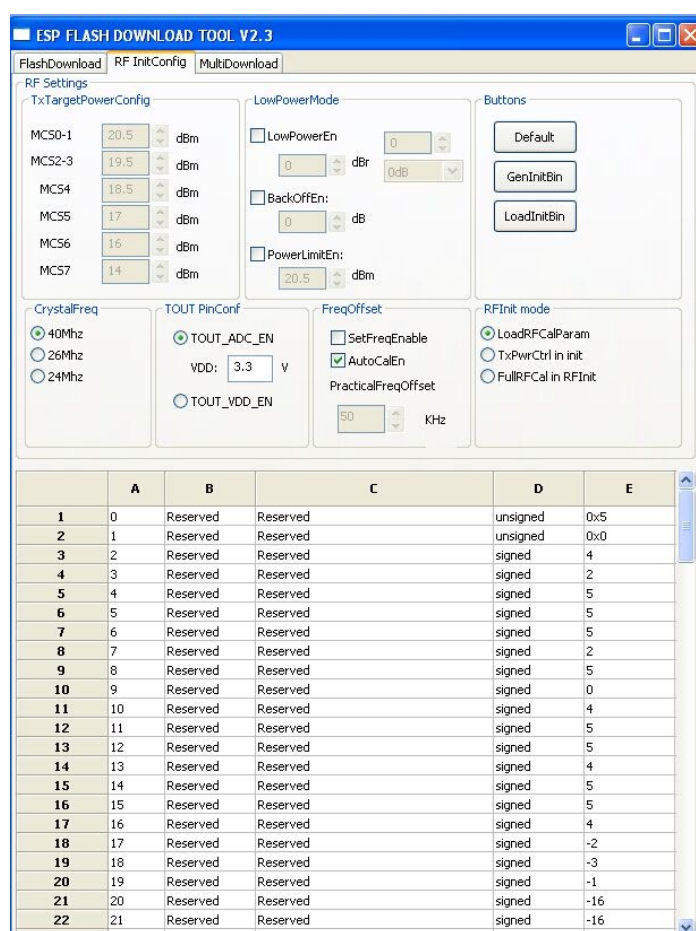> *Disconnet the power when setting the jumper.*

2.2. RF Initial Setting

Before download the binaries to flash, users can modify the RF setting in the **RF InitConfig** tab (see Figure 3). The newly generated **esp_init_data_setting.bin** can be downloaded to flash instead of **esp_init_data_default.bin.**

Figure 3 ESP FLASH DOWNLOAD TOOL - RF InitConfig tab

PowerLimtEn	Set the maximum output power.
BackOffEn	Set backoff value for each data rate.
LowPowerEn	Enable low-power mode and set a limited output value for all data rates.
CrystalFreq	Select the crystal oscillator frequency according to the actual crystal oscillator used. Mismatch may lead to errors.
TOUT PinConf	Set the TOUT pin configuration according to the actual TOUT pin status. Mismatch may lead to errors. • **TOUT_ADC_EN**: When the TOUT pin is connected to external circuit, measure the external voltage (0 V - 1 V) through internal embedded ADC. uint16 system_get_vdd33(void) cannot be used to measure VDD33 voltage at the same time. • **TOUT_VDD_EN**: When the TOUT pin is dangled, measure VDD33 voltage through uint16 system_get_vdd33(void).
FreqOff	• **SetFreqEnable**: Set the frequency offset manually. • **AutoCalEn**: Set the frequency offset automatically.
RFInt mode	• **LoadRFCalParam**: During the RF initialisation, load RF data from flash directly without any calibration. It takes about 2 ms and charges least initial current. • **TxPwrCtrl in init**: During the RF initialisation, only Tx Power calibration will be done, and other data are loaded from flash. It takes about 20 ms and charges small initial current. • **FullRFCal in RFInit**: All calibration will be done during the RF initialisation, which takes 200 ms and charges large initial current.

> ⚠ **Notice:**
>
> When **TOUT_ADC_EN** is selected, input the the actual voltage on VDD3P3 pin3 and pin4.

> **Note:**
>
> The user can modify 0 to 127 byte parameters of **esp_init_data_setting.bin** in the table area at the bottom.

When the RF initialisation configuration is done, click **GenInitBin** button to generate **esp_init_data_setting.bin**.

In addition, the user can click **Default** button to set the value to default, or click **LoadInitBin** button to import a binary from local.

3.   Binaries and Addresses

Once compilation succeeds, it shows the address for the binary to be written to the flash. The binaries and addresses vary by the compilation mode and flash size. This chapter lists the required binaries and responding addresses for flashes of different capacities (512/1024/2048/4096 KB) in both supporting cloud update (FOTA) and no cloud update scenarios.

3.1.   No Cloud Update

3.1.1.   512 KB Flash

bin	Address	Description
master_device_key.bin	0x3E000	Obtained from Espressif Cloud by users to get Espressif Cloud service
esp_init_data_default.bin	0x7C000	Contains default RF parameters provided in SDK
blank.bin	0x7E000	Contains default system parameters provided in SDK
eagle.flash.bin	0x00000	Compiled from SDK
eagle.irom0text.bin	0x40000	Compiled from SDK

3.1.2.   1024 KB Flash

bin	Address	Description
master_device_key.bin	0x3E000	Obtained from Espressif Cloud by users to get Espressif Cloud service
esp_init_data_default.bin	0xFC000	Contains default RF parameters provided in SDK
blank.bin	0xFE000	Contains default system parameters provided in SDK
eagle.flash.bin	0x00000	Compiled from SDK
eagle.irom0text.bin	0x40000	Compiled from SDK

3.1.3.   2048 KB Flash

bin	Address	Description
master_device_key.bin	0x3E000	Obtained from Espressif Cloud by users to get Espressif Cloud service
esp_init_data_default.bin	0x1FC000	Contains default RF parameters provided in SDK
blank.bin	0x1FE000	Contains default system parameters provided in SDK
eagle.flash.bin	0x00000	Compiled from SDK
eagle.irom0text.bin	0x40000	Compiled from SDK

3.1.4.   4096 KB Flash

bin	Address	Description
master_device_key.bin	0x3E000	Obtained from Espressif Cloud by users to get Espressif Cloud service
esp_init_data_default.bin	0x3FC000	Contains default RF parameters provided in SDK
blank.bin	0x3FE000	Contains default system parameters provided in SDK
eagle.flash.bin	0x00000	Compiled from SDK
eagle.irom0text.bin	0x40000	Compiled from SDK

3.2.   Support Cloud Update

Note:

User2.bin *does not need to be burned into Flash, it can be downloaded through Wi-Fi (FOTA).*

3.2.1. 512 KB Flash

bin	Address	Description
master_device_key.bin	0x3E000	Obtained from Espressif Cloud by users to get Espressif Cloud service
esp_init_data_default.bin	0x7C000	Contains default RF parameters provided in SDK
blank.bin	0x7E000	Contains default system parameters provided in SDK
boot.bin	0x00000	Boot loader provided in SDK. Latest version is recommended.
user1.bin	0x01000	Compiled from SDK
user2.bin	0x41000	Compiled from SDK, does not need to be burned into Flash

3.2.2. 1024 KB Flash

bin	Address	Description
master_device_key.bin	0x3E000 (suggest to revise)	Obtained from Espressif Cloud by users to get Espressif Cloud service. Located in user parameter area. The default address in IOT_Demo is 0x3E000, which can be changed by the user. When 1 MB Flash is used, it is suggested to change the address to 0x7E000. Refer to *http://bbs.espressif.com/viewtopic.php?f=10&t=305* for details
esp_init_data_default.bin	0xFC000	Contains default RF parameters provided in SDK
blank.bin	0xFE000	Contains default system parameters provided in SDK
boot.bin	0x00000	Boot loader provided in SDK. Latest version is recommended.
user1.bin	0x01000	Compiled from SDK
user2.bin	0x81000	Compiled from SDK, does not need to be burned into Flash

3.2.3. 2048 KB Flash

bin	Address	Description
master_device_key.bin	0x3E000 (suggest to revise)	Obtained from Espressif Cloud by users to get Espressif Cloud service. Located in user parameter area. The default address in IOT_Demo is 0x3E000, which can be changed by the user. If selecting 3 in STEP 5 during the compilation, it is suggested to change the address to 0x7E000. If selecting 5 in STEP 5 during the compilation, it is suggested to change the address to 0xFE000 Refer to *http://bbs.espressif.com/viewtopic.php?f=10&t=305* for details
esp_init_data_default.bin	0x1FC000	Contains default RF parameters provided in SDK
blank.bin	0x1FE000	Contains default system parameters provided in SDK
boot.bin	0x00000	Boot loader provided in SDK. Latest version is recommended.
user1.bin	0x01000	Compiled from SDK
user2.bin	0x81000	Compiled from SDK, does not need to be burned into Flash

3.2.4. 4096 KB Flash

bin	Address	Description
master_device_key.bin	0x3E000 (suggest to revise)	Obtained from Espressif Cloud by users to get Espressif Cloud service. Located in user parameter area. The default address in IOT_Demo is 0x3E000, which can be changed by the user. If selecting 4 in STEP 5 during the compilation, it is suggested to change the address to 0x7E000. If selecting 6 in STEP 5 during the compilation, it is suggested to change the address to 0xFE000 Refer to *http://bbs.espressif.com/viewtopic.php?f=10&t=305* for details
esp_init_data_default.bin	0x3FC000	Contains default RF parameters provided in SDK
blank.bin	0x3FE000	Contains default system parameters provided in SDK
boot.bin	0x00000	Boot loader provided in SDK. Latest version is recommended.
user1.bin	0x01000	Compiled from SDK
user2.bin	0x81000	Compiled from SDK, does not need to be burned into Flash

Note:

- *System parameter area is the last four sectors of flash, 4 KB per sector, that is the last 16 KB of flash.*
- *User parameter area depends on user's definition. In IOT_Demo the four sectors starting from 0x3C000 are defined as the user parameter area.*
- ***master_device_key.bin*** *is needed if Espressif Cloud is used, and it is only necessary for the initial download. In IOT _Demo, it is located in the third sector of user parameter area.*
- ***blank.bin*** *should be downloaded to the second last sector in the flash as the initialisation parameter.*
- ***esp_init_data_default.bin*** *stores default RF values and which should be written to the forth sector from the end of flash.*
- *The flash size applied in IOT_Demo is 512 KB.*