

OPL2500

ULTRA-LOW POWER 2.4GHZ WI-FI + BLUETOOTH SMART SOC

Patch Download Tool User Guide



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Table 1 : Document Description of Firmware Patch Download ToolKit _____ 2

1. INTRODUCTION

1.1. Scope of Document Application

This document file outlines the usage instruction of OPL1000 /OPL2500 Firmware Patch Procedure Download Tool

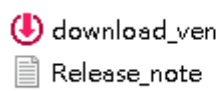
1.2. Abbreviations

| Abbreviation | Description |
|--------------|--|
| DevKit | OPL1000 Series/OPL2500 Development Board |
| FW | FiemWare: Operating Embodied Software on Processor |

2. TOOL KIT

OPL1000 Series/OPL2500 Firmware Patch Download Kit contains the following documents. As shown in Figure 1.

Figure 1 : Documents in Firmware Patch Download Tool



The function and description of these documents are outlined in Table 1.

Table 1 : Document Description of Firmware Patch Download ToolKit

| No, | Document name | Description |
|-----|------------------|---|
| 1 | download_ven.exe | Combination of Patch Firmware Documents, OTA image document generation and firmware download tool |
| 2 | Release_note | Release version notice |

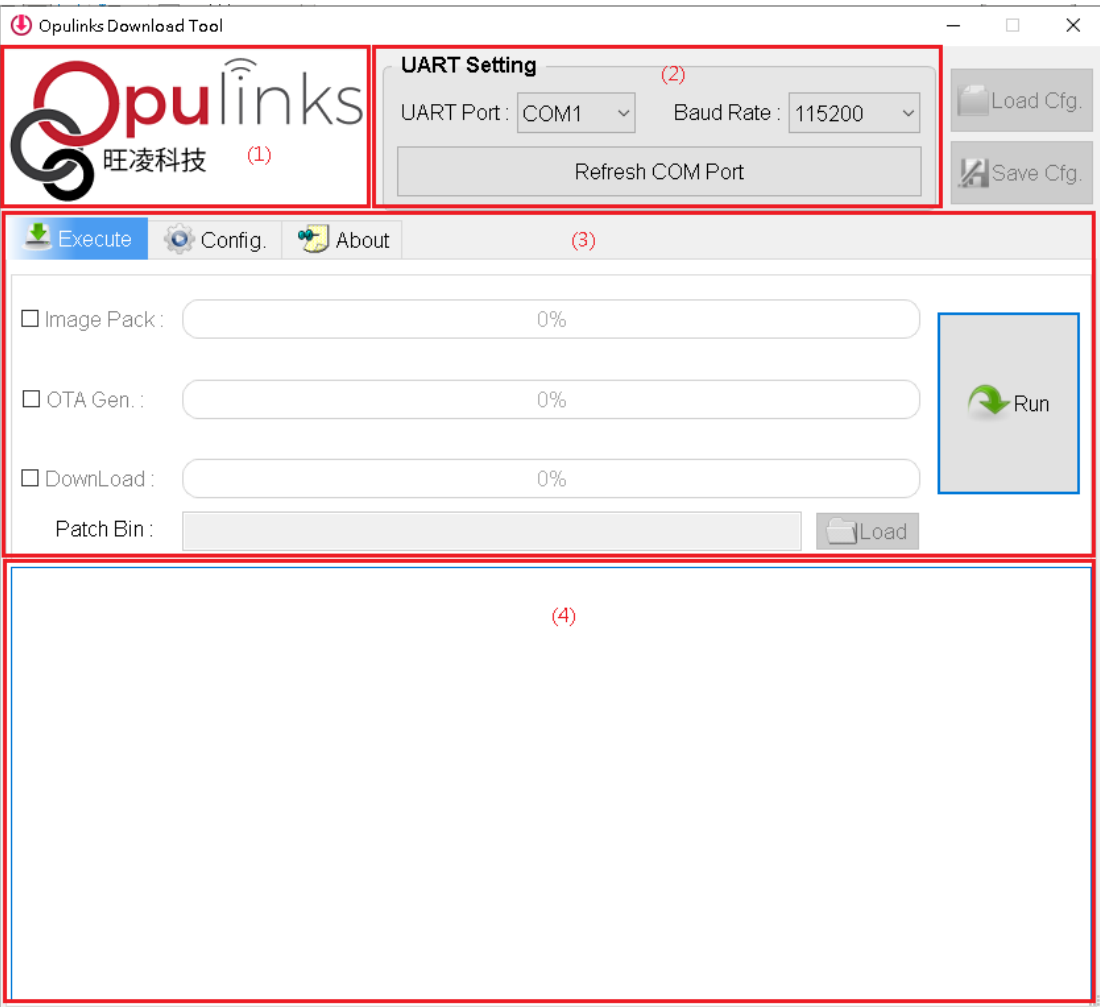
3. PATCH DOWNLOAD TOOL INTRODUCTION

The Download tool comprises of 4 components, as shown in Figure 2

Comprises of:

- 1. LOGO
- 2. Serial-Port Connection
- 3. Functional Utilization
- 4. LOG Prompt Window

Figure 2 : Patch Download Interface



3.1. Patch Download Wiring Technique

3.1.1. OPL1000

The micro-USB of the OPL1000 DevKit board is used for not only the power source but also firmware downloading. The USB-to-serial control chip used by the AT serial port is CH340. Connect DevKit to the computer via micro-USB after install driver, then download the firmware to device

Figure 3 : OPL1000 DevKit Wiring



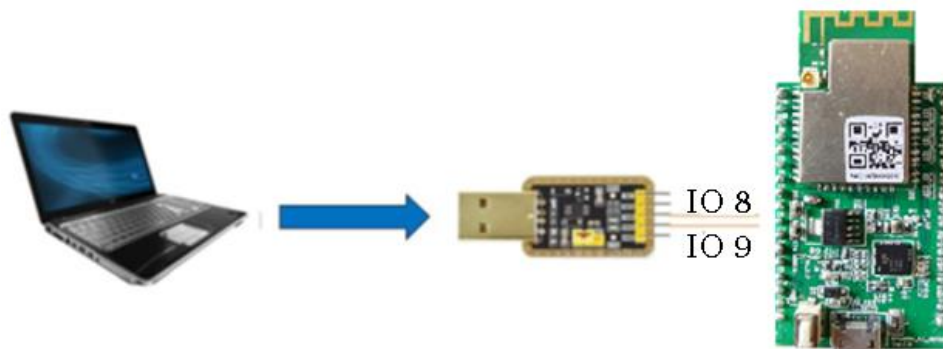
The pin headers on the OPL1000 DevKit are used for port expansion. For example, the APS (Debug_prg) serial port extends the M3 MCU serial port function and used to output the debug printing log.

APS serial connection applies pins IO8 and IO9. IO8 is the TX output signal of the APS serial port, which is connected to the input RX signal of the UART serial port switch board. IO9 is the APS serial port RX signal, which is connected to the TX signal of the UART serial port switch board.

Note: Cold upgrade is only required when hot upgrade is failed, or the internal procedure of the chip is violated.

The DEBUG serial port wiring is shown in Figure 4 below.

Figure 4: OPL1000 DEBUG serial port wiring



3.1.2. OPL2500

The micro-USB of the OPL1000 DevKit board is used for not only the power source but also firmware downloading. The USB-to-serial control chip used by the AT serial port is CH340. Connect DevKit to the computer via micro-USB after install driver, then download the firmware to device

Figure 5 : OPL2500 DevKit Wiring



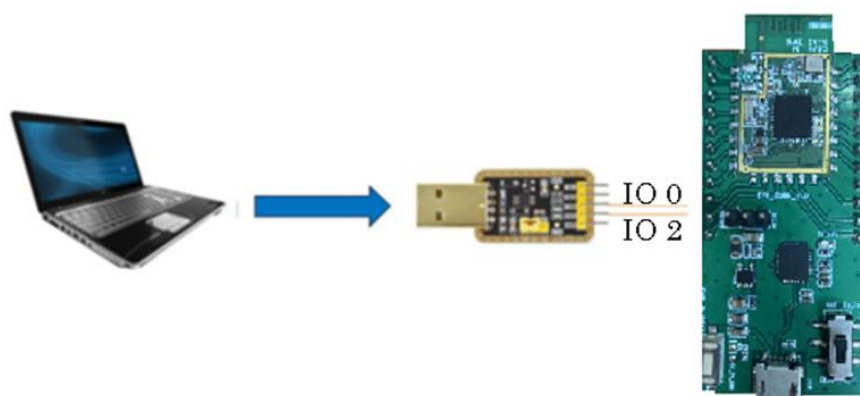
The pin headers on the OPL1000 DevKit are used for port expansion. For example, the APS (Debug_prg) serial port extends the M3 MCU serial port function and used to output the debug printing log.

APS serial connection applies pins IO0 and IO2. IO0 is the TX output signal of the APS serial port, which is connected to the input RX signal of the UART serial port switch board. IO2 is the APS serial port RX signal, which is connected to the TX signal of the UART serial port switch board.

Note: Cold upgrade is only required when hot upgrade is failed, or the internal procedure of the chip is violated.

The DEBUG serial port wiring is shown in Figure 6 below.

Figure 6 : OPL2500 DEBUG serial port wiring

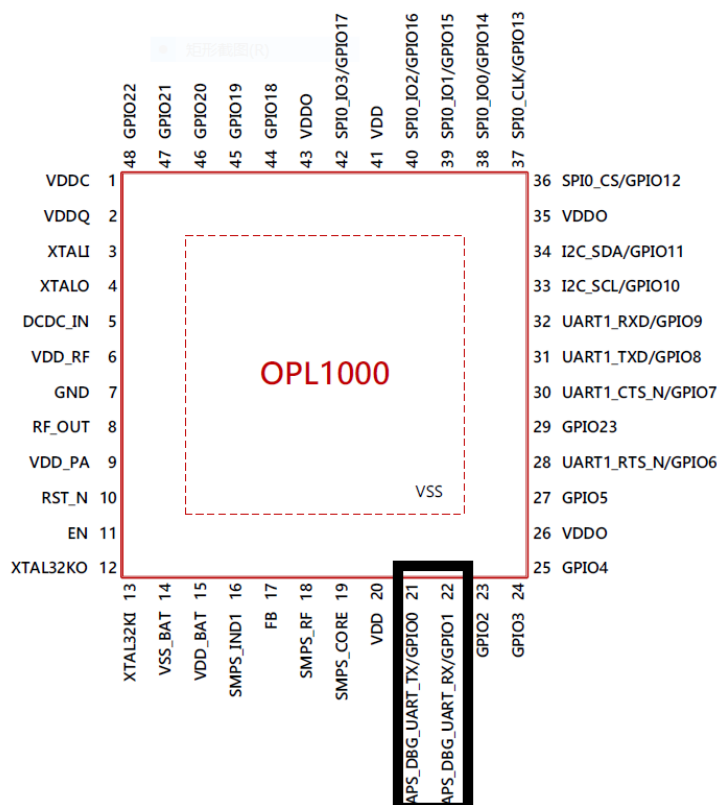


3.2. Module Wiring for Firmware Download

3.2.1. OPL1000

While applying OPL1000 module, the firmware download is performed via IO0 and IO1. The following figure shows the pin information of the OPL1000 device. IO0 is used for TX and IO1 is used for RX. IO0 is connected to the RX signal of the UART serial port switch board, and IO1 is connected to the TX signal of the UART serial port switch board.

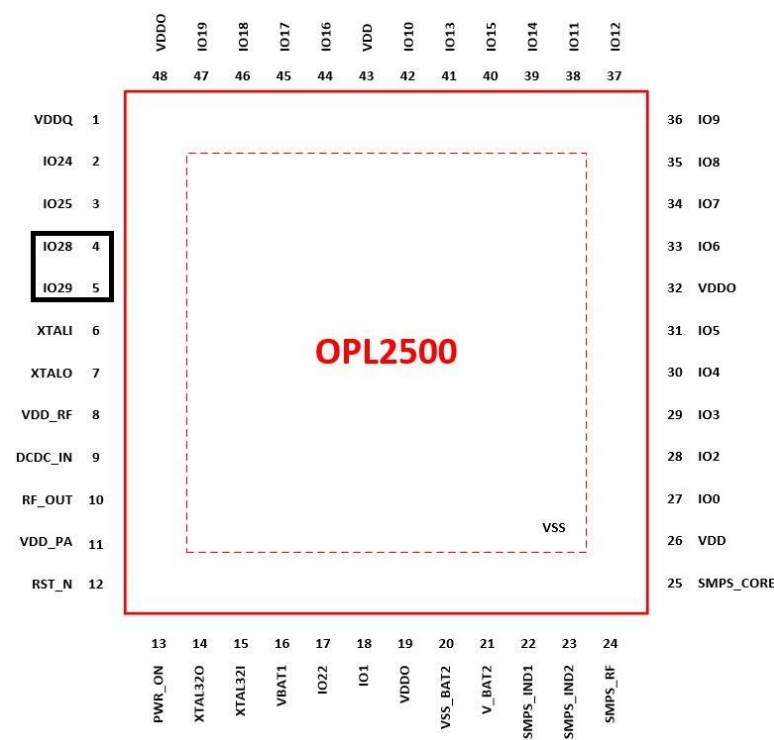
Figure 7 : Serial signal pins for firmware download of OPL1000 device



3.2.2. OPL2500

While applying OPL2500, the firmware download is performed via IO28 and IO29. The following figure shows the pin information of the OPL2500 device. IO28 is used for TX and IO29 is is used for RX. IO28 is connected to the RX signal of the UART serial port switch board, and IO29 is connected to the TX signal of the UART serial port switch board.

Figure 8 : Serial signal pins for firmware download of OPL2500 device

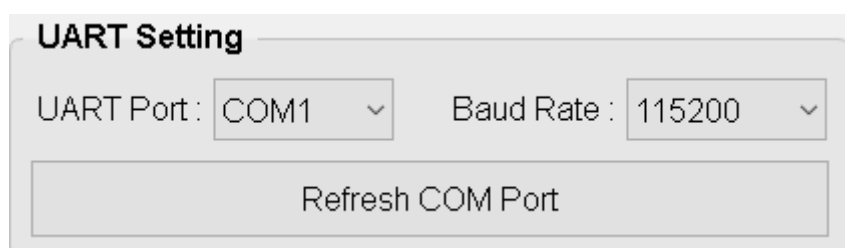


3.3. Serial-Port Selection and Port Update

As Download.exe. tool selects AT UART to download firmware, firmware is comprised of two types. One is pure Bin document, i.e., the firmware combined from M3 bin documents and M0 documents, and the other is embedded OTA loader and M3+M0 Bin documents. The latter supports OTA functionality

When selecting interface in the serial-port in Figure 9 , the UART serial-port that corresponds to Mini-USB, i.e., CP201x chip, should be selected. Users can activate device manager to check the serial-port number Mini-USB corresponds to. The Baud Rate is set to 115200.

Figure 9 : Serial-Port Selection Interface



For Figure 9, click "Refresh COM Port "button to refresh list of new serial-ports, while displaying the message of the identified serial-ports on message interface.

3.4. Bin Document Combination Functions

Note: Before utilizing the function of file combination, "PatchData.txt", "M3 Bin File", and "M0 Bin file" should be verified whether they are correct. For the first-time of procedure operation, "Load" button should be manually activated to select document, and during subsequent operation of procedure, document of previous execution of pack operation will be automatically imported.

Bin document combination: M0+M3.

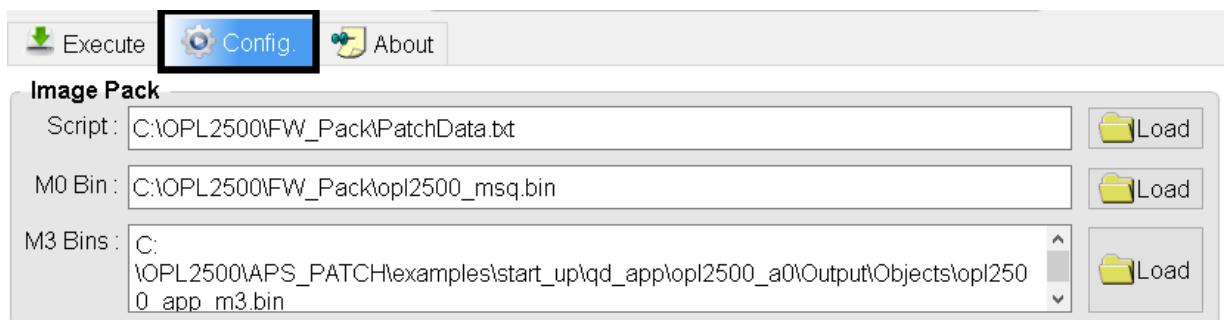
Note:


- Script document is designated under SDK folder "FW_Binary/PatchData.txt".
- (OPL1000) M0 Bin document is designated under SDK folder "FW_Binary/ opl1000_m0.bin".
- (OPL2500) M0 Bin document is designated under SDK folder "FW_Binary/ opl2500_msq.bin".
- M3 Bin document is generated by users.


3.4.1. Configuration Interface

Patch_download tool provides a Bin document combination function, as shown in Figure 10.

Figure 10 : Bin Document Combination Function (Config)



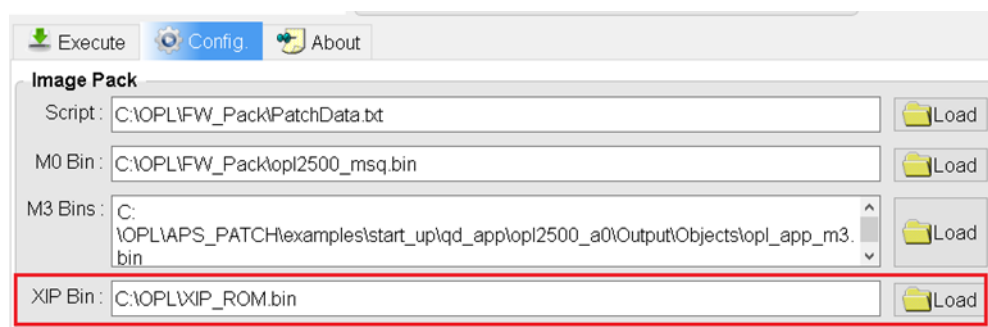
For using Bin document combination function, users need to click  in the Download Tool first, and select the firmware combination Script document, "PatchData.txt", from SDK software kit folder . Click the corresponding "Load" button to the Script, before selecting firmware combination Script document. This document designates the M3, M0 and MCU patch download parameters that need to be downloaded. After "PatchData.txt" is loaded successfully, the content of textual

frame of M3 Bin File and M0 Bin File needs to be selected or confirmed. If the path and document name are correct, click the  tab to prepare document combination.

3.4.2. XIP Configuration Interface

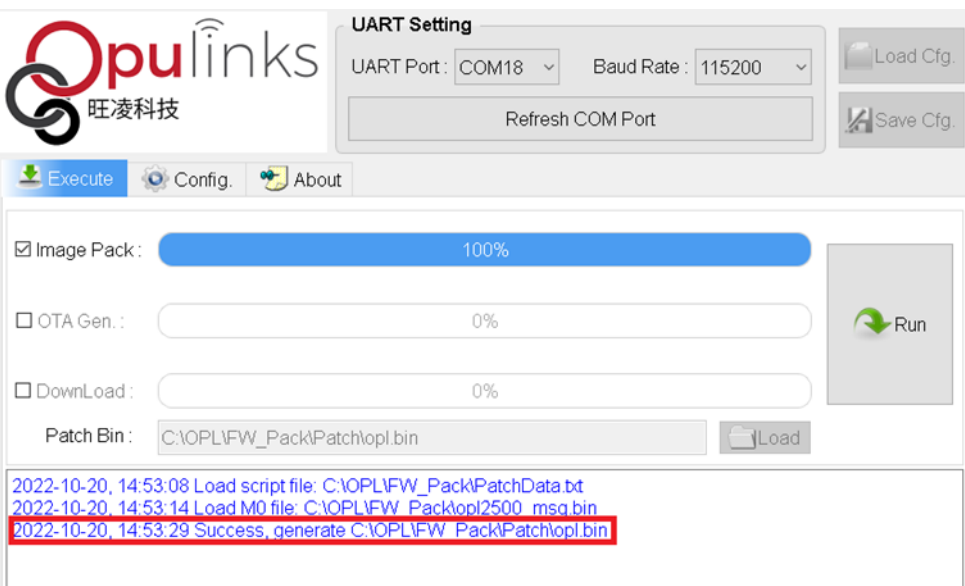
Download Tool also help developers to perform the XIP document merging function, as shown in Figure 11.

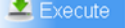
Figure 11 : XIP Bin Document Combination Function (Config)



3.4.3. Execution Interface

Figure 12 : Bin File Combination Function (Execute)



Under  tab, check Image Pack and press “Run” to execute the Pack operation. Every time Pack operation is executed, the procedure will automatically record the path of M3 and M0 Bin document used, of which the archived path will be imported automatically when the next time the procedure is activated.

The combined Bin document will be placed in the generated Patch document folder, named “opl.bin”, in the root directory

In the case of the download of OTA Image documents, “opl2500_ota_loader.bin” should be imported from the “OTA loader” list of options in the OTA Gen (If the chip is OPL1000 series, OTA loader should apply opl1000_ota_loader.bin file), before importing the “opl.bin” obtained in Figure 12 from “OPL Bin” list of options.

Figure 13 : Composite OTA Image Bin File (Config)

OTA Gen.

OTA loader : C:\OPL\FW_Pack\opl2500_ota_loader.bin Load

OPL Bin : C:\OPL\FW_Pack\Patch\opl.bin Load

OTA Header Setting

Product ID : OPL2500 Chip ID : A0 Firmware ID : 0001 Checksum : 0x00DAB2CE

Header Definition

| | | | | | |
|--------|--------|--------|------------|------------|--------------------|
| 0x09C4 | 0x0000 | 0x0001 | 0x00DAB2CE | 0x00026088 | 0x00 0x00 0x00 ... |
|--------|--------|--------|------------|------------|--------------------|

FileName
☐ File+Time

When importing “opl.bin”, the procedure will automatically calculate “check-sum”, and according to Production ID, Chip ID and Firmware ID, value in the “Header Definition” can be selected and filled in. Users can manually define Firmware ID. Firmware ID is used for designate various versions of OTA image documents.


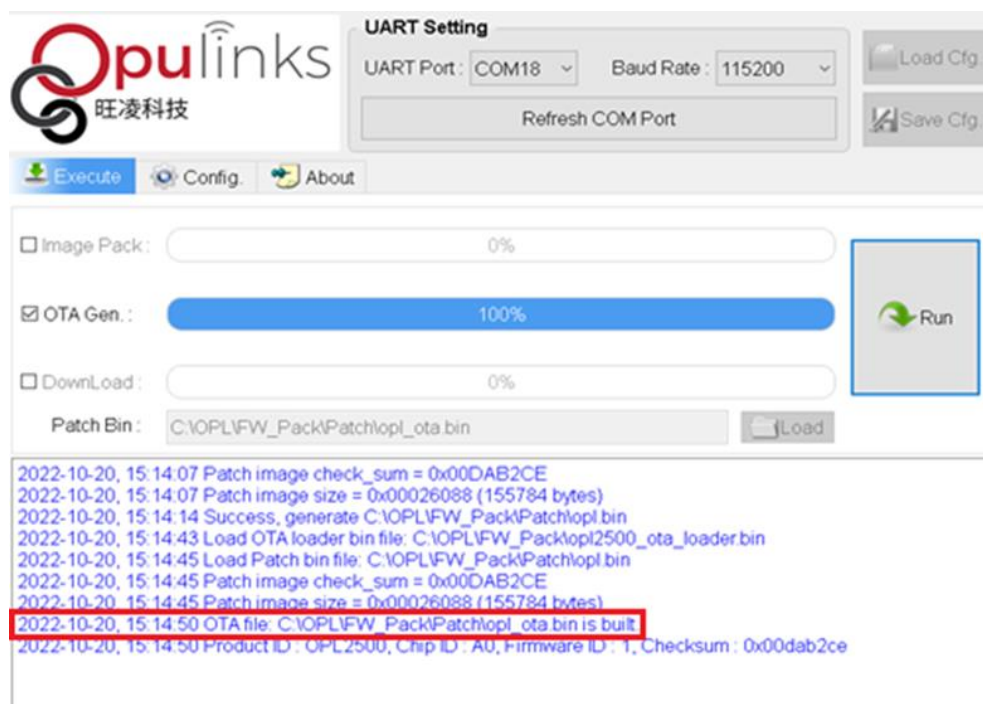
After the configuration of opl2500_ota_loader.bin and opl.bin, click  to execute the Build OTA Image action. Please refer to Figure 14

Figure 14 : Composite OTA Image bin File (Execute)



Check "OTA Gen", and click "Run". If OTA Image is generated successfully, the developer can see opl_ota.bin is built in the Log prompt box (the red box in Figure 14).

3.5. Patch Firmware Download Function

3.5.1. Configuration Interface


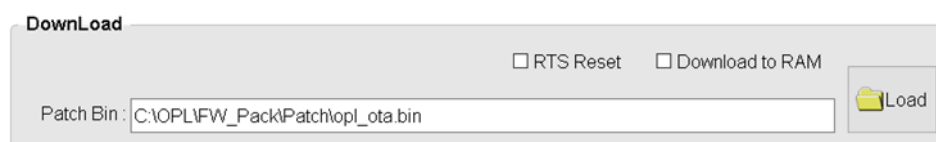
Click  tab, in the "Patch Bin" under "DownLoad", as shown in the Figure 15, the "Load" option is used to load the Patch document. The Patch document can be a pure M3+M0 Bin document combined by the "Image Pack" function, or an OTA Image document created by the "OTA Gen." function

Figure 15: Firmware Download Function (Config)



3.5.2. Execution Interface


After the "Patch Bin" is configured, click  tab, check "Download" in Figure 16, click "Run" button, and manually press the reset button on the DevKit board within 5 seconds, before the combined Bin documents downloaded to DevKit Flash . If the download is successful, message 'Download successful! Time elapsed: xx.xx seconds' will be prompted in the message prompt frame. (the red box in Figure 16).

Figure 16 : Firmware Download Function (Execute)

Execute

Config.

About

☐ Image Pack :

0%

☐ OTA Gen. :

0%

☒ DownLoad :

100%

Patch Bin :

C:\OPL\FW_Pack\Patch\opl_ota.bin

Load

Run

2022-10-20, 15:26:55 Patch image check_sum = 0x00DAB2CE
2022-10-20, 15:26:55 Patch image size = 0x00026088 (155784 bytes)
2022-10-20, 15:26:55 Product ID : OPL2500, Chip ID : A0, Firmware ID : 1, Checksum : 0x00DAB2CE
2022-10-20, 15:26:58 Open COM18 @115200 bps successfully.
2022-10-20, 15:26:58 Download C:\OPL\FW_Pack\Patch\opl_ota.bin with speed-up mode.
2022-10-20, 15:26:58 Product ID : OPL 2500, Chip ID : A0, Firmware ID : 1, Checksum : 0x00dab2ce
2022-10-20, 15:27:27 Download successful ! time elapsed: 28.87 seconds

3.6. Firmware Path Configuration Files Access

The Download Tool provides the mechanism to maintain the configuration files of firmware path.


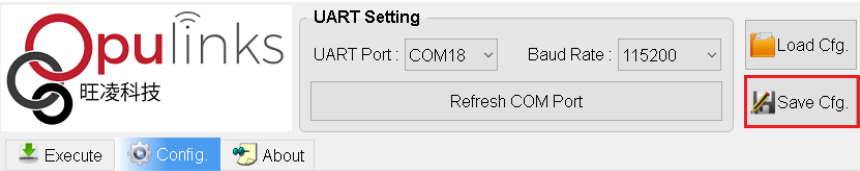
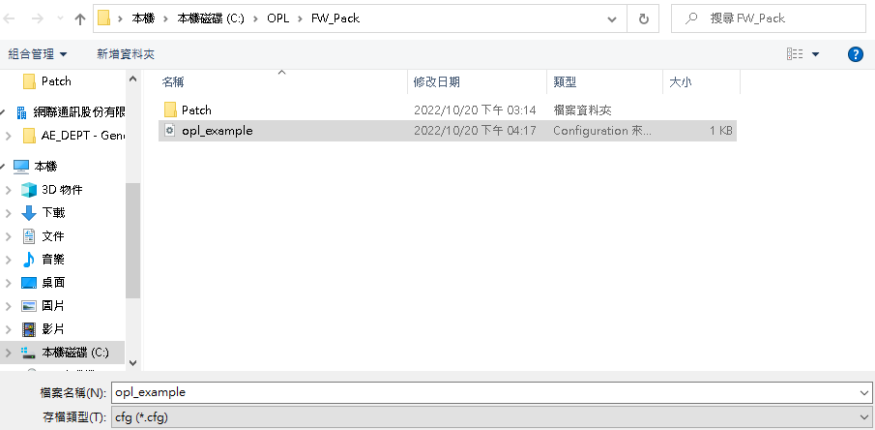
Click  tab and configure the path of Image Pack, OTA Gen and Download Load. Click “Save Cfg.” to save the current path configuration, as shown in Figure 17 below

Figure 17 : Path Configuration Files Access Interface



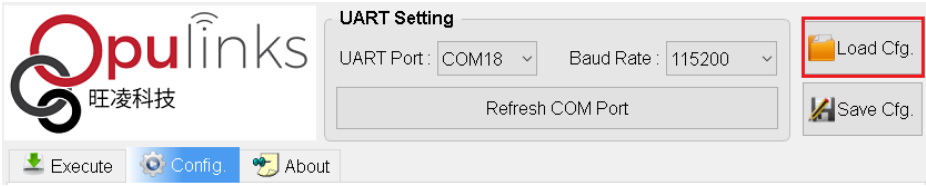
The xxx.cfg file (e.g. opl_example.cfg) will be created, as shown in Figure 18

Figure 18 : Path Configuration File Create



Click “Load Cfg.” to load the saved firmware path configuration, as shown in Figure 19

Figure 19 : Path Configuration Access Interface



Select the dedicated configuration file (e.g. opl_example.cfg), as shown in Figure 20

Figure 20 : Path Configuration File

| | | | |
|-------------|---------------------|--------------------|------|
| Patch | 2022/10/20 下午 03:14 | 檔案資料夾 | |
| opl_example | 2022/10/20 下午 04:17 | Configuration 來... | 1 KB |

3.7. The Advanced Execution of Download Tool

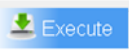
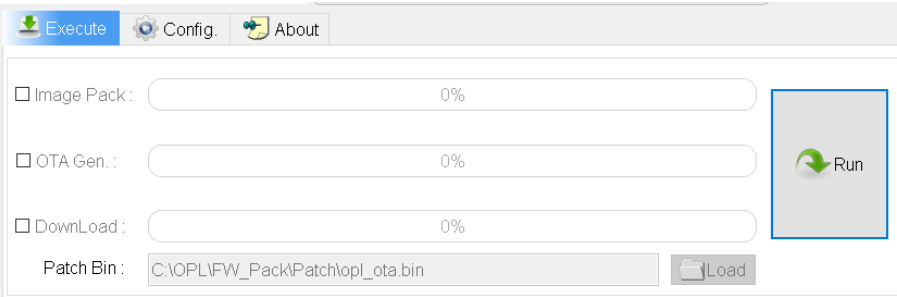
Download Tool can be executed in various combinations, suitable for both developers and non-developers. Click , you can choose to check "Image Pack", "OTA Gen", and "DownLoad". The detail respective functions described in sections 3.4 and 3.5. The combination usage is described in this section

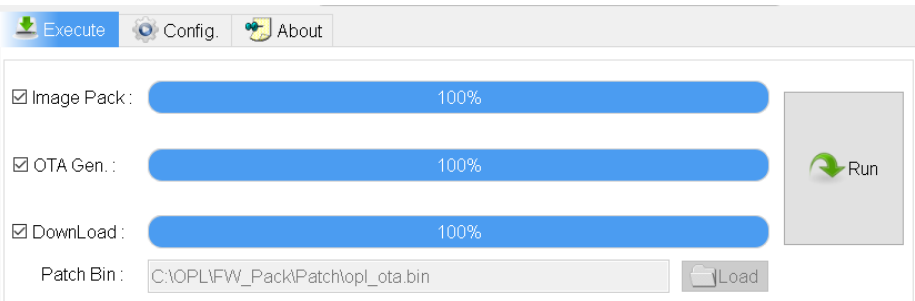
Figure 21 : Execution Interface



3.7.1. Image Pack 、OTA Gen and DownLoad

Check "Image Pack", "OTA Gen", "DownLoad" and then click "Run". "Image Pack", "OTA Gen" and "DownLoad" with the configured path will be executed in sequence, as shown in Figure 22

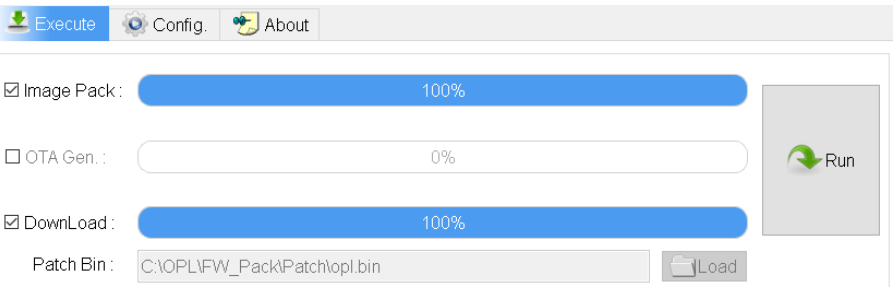
Figure 22 : Execution Interface



3.7.2. Image Pack and DownLoad

Check "Image Pack", "DownLoad" and then click "Run". "Image Pack" and "DownLoad" with the configured path will be executed in sequence, as shown in Figure 23. This combination is suitable for developers to perform quickly build/pack image, download and verification.

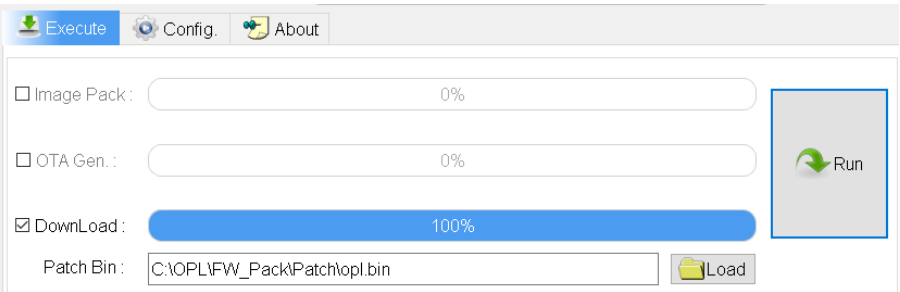
Figure 23 : Execution Interface



3.7.3. DownLoad

Check "DownLoad" only and then click "Run". DownLoad with the configured path will be executed, which is suitable for non-developers to imply download firmware image into the device, as shown in Figure 24

Figure 24 : Execution Interface





Note: When "DownLoad" is checked only, user can assign the patch firmware image by click "Load" button of "Patch Bin" in  page. This path setting will be updated synchronously with the "Patch Bin" setting of "DownLoad" configuration in  page, as shown in Figure 25.

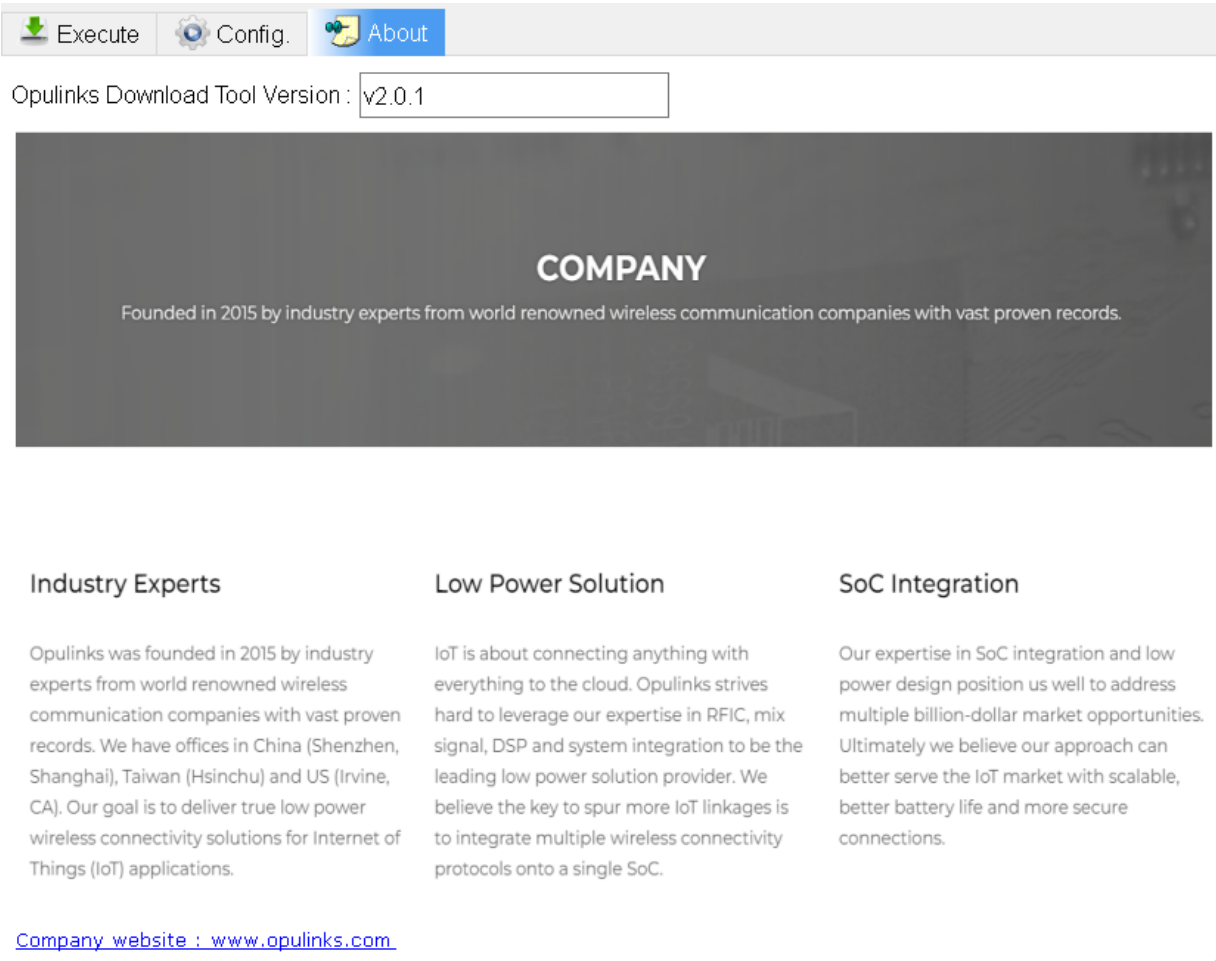
Figure 25 : Configuration Interface



3.8. Version Read

This interface is mainly used for checking the Download Tool software version, as shown in Figure 26.

Figure 26 : About Interface



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