Realtek
Ameba Application Note — MP Tool

This document describes the usage of 1-N MP Tool.

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USING THIS DOCUMENT

This document is intended for the software engineer's reference and provides detailed programming information.

Though every effort has been made to ensure that this document is current and accurate, more information may have become available subsequent to the production of this guide.

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1 Introduction

This document introduces how to use Ameba 1-N MP ImageTool to download images for several boards simultaneously.

The UI of the ImageTool is shown in *Figure 1-1*.

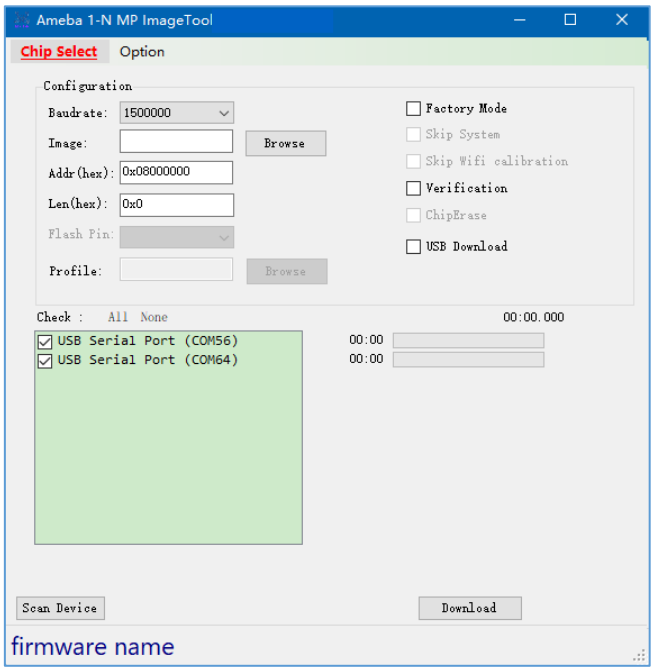

Figure 1-1 Ameba 1-N MP ImageTool

The tool will first download the flashloader code into SRAM, then the flashloader will handle the subsequent image download to Ameba Flash.

2 Environment Setup

2.1 Hardware Setup

To download images for several boards simultaneously, the equipment listed below are necessary.

- DUT (Ameba device with LOGUART interface and UART_DOWNLOAD button)
- USB hub & micro USB cable
- PC with 1-N MP ImageTool installed

NOTE

If using external UART to download images, USB to UART dongle must be used.

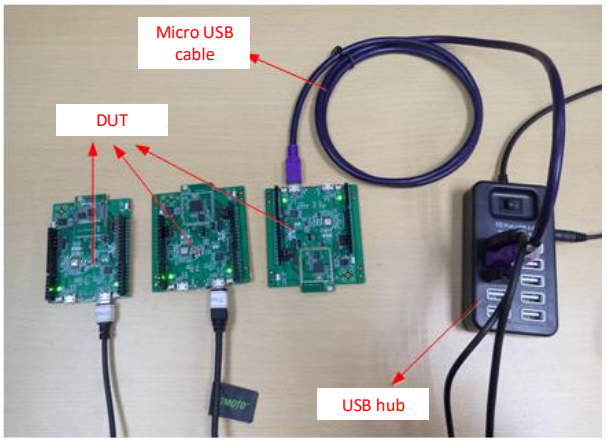

Figure 2-1 Hardware setup

2.2 Software Setup

- Environment requirements: EX. Winows XP, Winows 7 higher, Microsoft .NET Framework 3.5
- Software location:
  - Ameba_1-N_MP_ImageTool.exe: <SDK>/tools/Ameba/MP_ImageTool_1_N/Ameba_1-N_MP_ImageTool.exe
  - DeviceProfiles: <SDK>/tools/Ameba/DeviceProfiles

NOTE

Do not modify or delete the floader_rtl87xxx.bin files, because they are flashloader binary files.

3 Image Download

This tool can work in Windows Form Mode and Command Line Mode. The following sections introduce each mode.

Before image download, DUT must enter UART_DOWNLOAD mode. The method is:
(1) Connect LOGUART Tx pin to GND. If **UART_DOWNLOAD** button exists, push it down and keep it pressed.
(2) Power on the board again, or press the **Reset** button.
(3) Connect the LOGUART Tx pin back, or release the **UART_DOWNLOAD** button.
Now, DUT gets into UART_DOWNLOAD mode, and you can use this tool to download images.

3.1 GUI Mode

3.1.1 Normal Mode

The steps to download images in normal mode are as follows:
(1) Double click Ameba_1-N_MP_ImageTool.exe.
(2) Click **Chip Select** to select DUT type.
(3) Set the Configuration
- **Baudrate**: Select the baudrate for image download, default value is 1500000.
- **Image**: Click **Browse** button to choose the target image file.
- **Addr(hex)**: Input the destination address to download.
- **Leg(hex)**: Input image length to download.
- **Skip System**: Select whether to skip system data area or not.
- **Skip Wifi calibration**: If selected, skip Wi-Fi calibration when downloading images.
- **Verification**: Select whether to examine checksum after download is finished.
- **ChipErase**: Select whether to erase chip before download.
- **USB Download**: Help download images through USB for NAND flash. If selected, please click Profile **Browse** button to choose the target profile file.

NOTE

Once the chip is selected, some button/checkbox is gray and unable to be accessed, it means that the function is not supported for the selected IC.

(4) Click **Scan Device** button, the detected devices are listed in the box.
- If **USB Download** is checked, the devices detected and shown in the box are USB COMs.
- If **USB Download** is not checked, the devices detected and shown in the box are LOGUART COMs.

NOTE

If some devices are not present immediately, check if the driver is still installing and wait until the installation is finished. This situation is usually encountered when DUT is plugged into PC the first time.

(5) Tick in the checkbox to select the target devices.
(6) Get the DUTs into UART_DOWNLOAD mode.
(7) Click **Download** button.

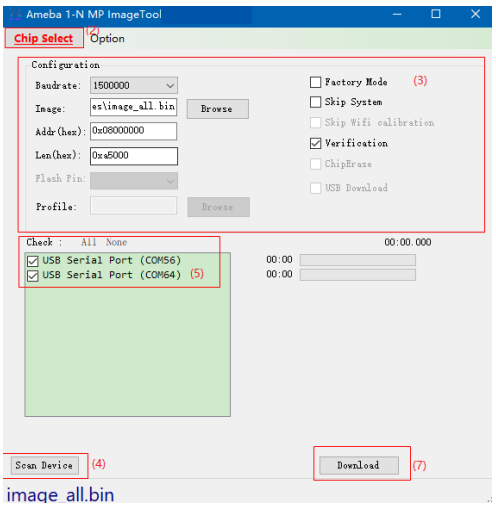

Figure 3-1 Ameba 1-N MP ImageTool operation

Once click **Download** button, image download starts.

- If the image download is in process, as *Figure 3-2* shows, a light bulb shows up at the end of each progress bar, and a stopwatch measures the elapsed time. When image download is finished, a green tick shows up.

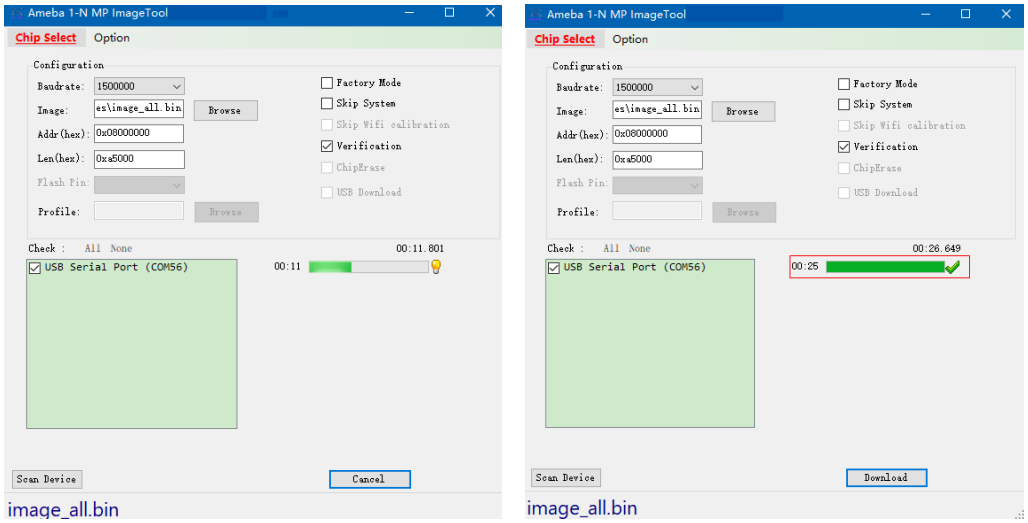

Figure 3-2 Image download is ok

- If some typical troubleshootings occur, refer to section *5* for help.

3.1.2 Factory Mode

If Factory Mode is enabled, the UI disables some functions. The configuration parameters are saved to Setting.ini and reloaded when the tool restarts the next time.

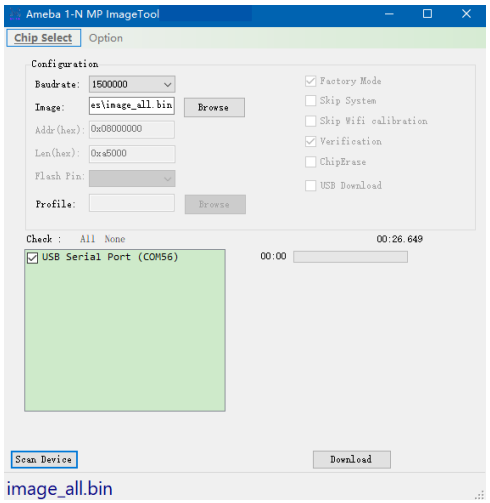

Figure 3-3 Factory mode

There are two ways to exit the factory mode:

(1) Close the tool
   a) Delete Setting.ini
   b) Edit Setting.ini and modify “FactoryMode” parameter value to “False”

(2) Open the tool again, and the modified parameters will be restored to normal mode.

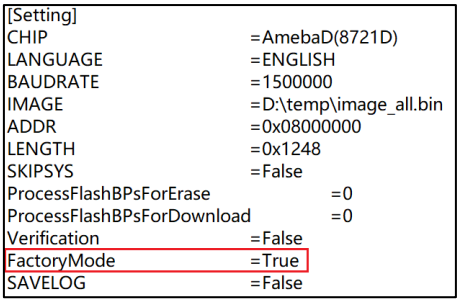

Figure 3-4 Parameters modification

3.2 Command Line Mode

This tool can also work in command line mode. Start cmd.exe in Windows and execute Ameba_1-N_MP_ImageTool.exe with defined parameters. The supported parameters can be achieved by typing `-help`.

```
$ Ameba_1-N_MP_ImageTool.exe -help
usage:
    -download <dev1> <dev2>
       E.g. -download
       E.g. -download COM1 COM2
    -scan device
    -add device <dev1> <dev2> ...
       E.g. -add device COM1 COM2 COM3
    -remove device <dev1> <dev2> ...
       E.g. -remove device COM1 COM2 COM3
    -show [device|setting]
       E.g. -show device
    -set [skipsys|savelog|verify|usbdownload] [True|False]
       E.g. -set skipsys False
    -set  [address|length|baudrate|ProcessFlashBPsForErase|ProcessFlashBPsForDownload]
<value>
       E.g. -set address 0x08000000
    -set [image|profile] <path>
       E.g. -set image D:\test\image_all.bin
    -set chip [rtl871xb|rtl872xd|rtl872xc|rtl8730a|rtl8720e]
       E.g. -set chip rtl871xb
    -combine             "image1_path;image2_path;image3_path;..."             -offset
"image1_offset;image2_offset;image3_offset;..." [-output "image_output_path"]
       E.g. -combine "E:\image1.bin;E:\image2.bin" -offset "0x00000000;0x00004000" -
output E:\image_all.bin
extra feature for RTL871XB/RTL872XD:
    -erase <address> <length>(KB) <dev1> <dev2>
       E.g. -erase 0x08000000 4 COM1 COM2
extra feature for RTL872XC:
    -set [skipwifi|chiperase] [True|False]
    -set [flashpin] <value>
    -verify <dev1> <dev2>
       E.g. -verify
       E.g. -verify COM1 COM2
```

- Scan devices

  You can use `-scan device` parameter to check serial ports connected to PC.

```
$ Ameba_1-N_MP_ImageTool.exe -scan device
USB Serial Port (COM65)
```

- Specify devices

  You can use `-add device` and `-remove device` to specify the devices that need to download to, and `-show device` to list the specified device names.

```
$ Ameba_1-N_MP_ImageTool.exe -add device COM4 COM5
COM4 added!
COM5 added!
$ Ameba_1-N_MP_ImageTool.exe -show device
COM4
COM5
$ Ameba_1-N_MP_ImageTool.exe -remove device COM5
```

```
COM5 removed!
$ Ameba_1-N_MP_ImageTool.exe -show device
COM4
```

- Configure

  To check the tool configuration, you can use `-show setting` as parameters.

```
$ Ameba_1-N_MP_ImageTool.exe -show setting
CHIP:                          RTL871XB
BAUDRATE:                      1500000
IMAGE:
ADDRESS:                       0x08000000
SKIP SYSTEM:                   False
LENGTH:                        0x0
ProcessFlashBPsForErase:       0
ProcessFlashBPsForDownload:    0
VERIFICATION:                  True
SAVELOG:                       True
```

- Select chip type

  You can use `-set chip` [rtl871xb|rtl872xc|rtl872xd|rtl8730a|rtl8720e|rtl8730e] as parameters.

```
$ Ameba_1-N_MP_ImageTool.exe -set chip rtl8730e
CHIP SELECT:    RTL8730E
```

- To select whether to save log or use USB download or not, you can use `-set [usbdownload|savelog] [true|false]` as parameters.

```
$ Ameba_1-N_MP_ImageTool.exe -set usbdownload true
USBDOWNLOAD:    True
```

- To select whether to examine checksum or not after download is finished, you can use `-set verify` [true|false] as parameters.

```
$ Ameba_1-N_MP_ImageTool.exe -set verify true
VERIFICATION:   True
```

- To choose file to download, you can use `-set [image|profile] <path>` as parameters.

```
$ Ameba_1-N_MP_ImageTool.exe -set image E:\MP_Image_Tool\image_all.bin
FILE PATH:  e:\mp_image_Tool\image_all.bin
$ Ameba_1-N_MP_ImageTool.exe -set profile E:\MP_Image_Tool\image_all.rdev
FILE PATH:  e:\mp_image_Tool\image_all.rdev
```

- To set download start address, you can use `-set address <value>` as parameters.

```
$ Ameba_1-N_MP_ImageTool.exe -set address 0x08000000
ADDRESS:    0X08000000
```

- To set download length, you can use `-set length <value>` as parameters.

```
$ Ameba_1-N_MP_ImageTool.exe -set length 0xa500
LENGTH: 0XA500
```

- To set download baudrate, you can use `-set baudrate <value>` as parameters.

```
$ Ameba_1-N_MP_ImageTool.exe -set baudrate 1500000
BAUDRATE:   1500000
```

NOTE

The value of baudrate only can be set as 115200, 128000, 153600, 230400, 380400, 460800, 500000, 921600, 1000000, 1382400, 1444400, and 1500000.

- To erase flash, you can use `-erase [address] <value> [length] <value>(KB) <dev1> <dev2>` as parameters.

```
$ Ameba_1-N_MP_ImageTool.exe -erase 0x08000000 1024 COM56
Flash erase done!
```

NOTE

Before erasing flash, you should set up device, such as setting images, setting baudrate, and so on.

- To select method to process flash BPs for erase/download, you can use `-set [processflashbpsforerase | processflashbpsfordownload] <value>` as parameters.

```
$ Ameba_1-N_MP_ImageTool.exe -set processflashbpsforerase 1
ProcessFlashForErase:   1
$ Ameba_1-N_MP_ImageTool.exe -set processflashbpsfordownload 1
ProcessFlashForDownload:    1
```

NOTE

The configurations need to be done only once before mass production (MP). These parameters would be saved into Setting.ini. When MP starts, the factory can download directly.

- Download image

  After configuration is finished, you can use `-download` or `-download <dev1>` to download images for devices.

  - `-download` is used to download image for all devices specified by `-add device` commands.

```
$ Ameba_1-N_MP_ImageTool.exe -download
```

  - `-download <dev1>` is used to download for specified device without modifying the device list.

```
$ Ameba_1-N_MP_ImageTool.exe -download COM4 COM5
```

```
1   COM4 SUCCESS
2   COM5 SUCCESS
```

If the print message shows that the download procedure is failed, you can check the log file located at /log to get the fail reason.

4 Optional Functions

4.1 GPIO/PWM Indication

The tool supports downloading image through USB for NAND flash. Since the device and USB port do not have a unique correspondence, the download failed devices cannot be well identified on the production line. If you need to download image through USB, the GPIO/PWM indication function can be used to indicate which devices have successfully downloaded the images, so as to redo the download processes for the failed devices.

According to the configuration parameters, the tool will send the corresponding query to the device, and the device will output high or low level through GPIO or output PWM through PWM channel.

The configuration methods are shown below:
(1) Turn off the running tool first.
(2) Open the Setting.ini file in the tool directory and configure the `ProgramConfig` (default: 0).
Refer to *Table 4-1* for bit field description of `ProgramConfig`.
(3) Save Setting.ini and reopen the tool to download.

Table 4-1 Bit field description of ProgramConfig

Bit	Description
[63:32]	Download indication configuration: ● For GPIO indication ■ Bit[63:33]: Reserved ■ Bit[32]: GPIO output level ● For PWM indication ■ Bit[63:57]: PWM duty cycle (0~100, unit: percent) ■ Bit[56:32]: PWM period (unit: us)
[31:30]	Download indication strategy: ● 0: Disable ● 1: GPIO indication after download success ● 2: PWM indication after download success ● 3: Reserved
[29:16]	Download indication PIN name, refer to the SoC-specific definition of PinName for MBED API ● GPIO: all GPIO pins can be selected ● PWM: PWM channels can be selected
[15:2]	Reserved
[1:0]	NAND Flash bit flip fail level: ● 2/3: Reserved ● 1: Fail at fatal bit flip error, i.e. bit flip count > ECC level ● 0: Fail at bit flip error, i.e. bit flip count >= ECC level

4.2 Read MAC

You can read the MAC of the device through the command line mode as below:

```
$ Ameba_1-N_MP_ImageTool.exe -readmac COM4
COM4    FF-FF-FF-FF-FF-FF
```

5 Troubleshooting

5.1 Download Fail

If image download is failed, enter the UART_DOWNLOAD mode to try again.

When transmission interrupts or verification fails, a red error sign shows up, you need to check the error log and try again. There are two ways to get the error messages:

- Hover the mouse cursor over the sign, the error message shows up, as Figure 5-1.

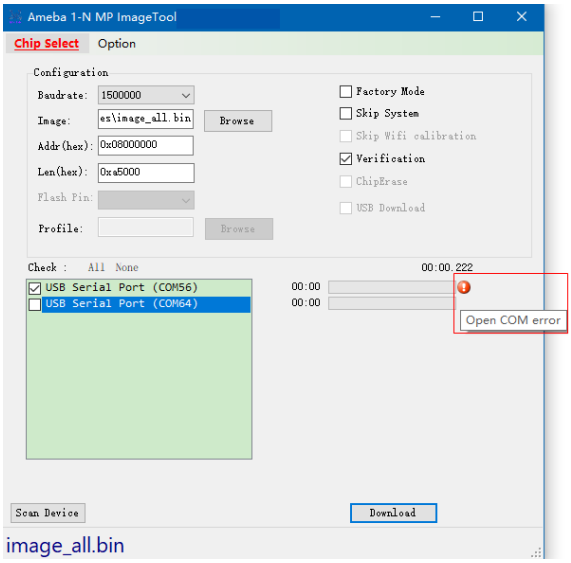

Figure 5-1 Download is fail

- Check the log file which locates at /log/ to get more detailed error messages.

```
Start Tool from UI
Scan Device Start
Scan Device End
Start to Download...
COM56 Open COM error
```

NOTE

Enable save log function first before download starts.

5.2 Flash Write Protected

If flash is write protected by flash BPs, that is to say, when flash block protection is detected during image download or flash erase, a pop up dialog will guide user to choose the follow-up actions.

- You can process flash BPs for download as needed, as Figure 5-2 shows.

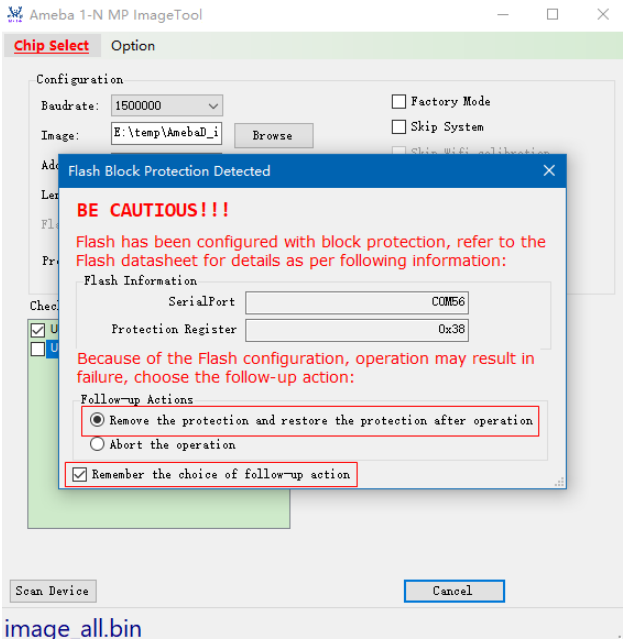

Figure 5-2 Flash block protection detected

- Or set `ProcessFlashBPsForErase` and `ProcessFlashBPsForDownload` to process flash block protection bits in Setting.ini to avoid download blocked error.
  The values of `ProcessFlashBPsForErase` and `ProcessFlashBPsForDownload` are:
  - 0: When detect flash block protection, tool pops new window to ask the customer what to do next when erase/download.
  - 1: Tool will remove the flash protection and restore the flash protection when erase/download.
  - 2: Tool will abort erase/download when detect flash block protection.

```
[Setting]
CHIP                        =AmebaD(8721D)
LANGUAGE                    =ENGLISH
BAUDRATE                    =1500000
IMAGE                       =D:\temp\image_all.bin
ADDR                        =0x08000000
LENGTH                      =0x1248
SKIPSYS                     =False
ProcessFlashBPsForErase     =0
ProcessFlashBPsForDownload  =0
Verification                =True
FactoryMode                 =False
SAVELOG                     =True
```

Figure 5-3 Setting.ini

5.3 Power-off Accident

If accidents happen when transmission is in progress such as DUT powers off by accident, which cause the download failed, try to enter the UART_DOWNLOAD mode and download again.

Revision History

Date	Version	Description
2023-04-10	v2.0	Added the chapter: *Optional Functions*
2022-09-20	v1.0	Initial release