



Application Note: OTP.BIN Firmware Burning User Guide

AN-FBD-EVK-UG-E1

Ver 1.0

2018/02/09

Brief:

This application note mainly introduces firmware burning into OTP method and steps for using EVK board.

lenze technology co., LTD



**Published by
lenze technology co., LTD**

**Room C,26th Floor,West Special Zone PressBuilding,NO,6008Shennan
Road,Futian District Shenzhen**

**© lenze technology co., LTD
All Right Reserved**

Legal Disclaimer

lenze technology co., LTD reserves the right to make changes without further notice to any products herein to improve reliability, function or design. lenze technology co., LTD disclaims any and all liability for any errors, inaccuracies or incompleteness contained herein or in any other disclosure relating to any product.

lenze technology co., LTD does not assume any liability arising out of the application or use of any product or circuit described herein; neither does it convey any license under its patent rights, nor the rights of others

The products shown herein are not designed for use in medical, life-saving, or life-sustaining applications. Customers using or selling lenze technology co., LTD products not expressly indicated for use in such applications do so entirely at their own risk and agree to fully indemnify lenze technology co., LTD for any damages arising or resulting from such use or sale.

Information:

For further information on the technology, product and business term, please contact lenze technology co., LTD Company (www.lenzotech.com).

For sales or technical support, please send email to the address of:



Revision History

Version	Major Changes	Date	Author
1.0	Initial release	2014/11	Y.H., Cynthia



Table of contents

1	Overview.....	4
2	EVK board.....	5
2.1	Check EVK board.....	5
2.2	Burn EVK.bin file into EVK board.....	错误! 未定义书签。
3	Burn firmware into target board.....	6
3.1	Connect target with EVK.....	6
3.2	Burn firmware into target.....	7

Table of figures

Figure 1	Connect EVK with PC.....	6
Figure 2	Burn “evk.bin” into EVK via WtcdB.....	错误! 未定义书签。
Figure 3	WtcdB interface after downloading “evk.bin” into EVK.....	错误! 未定义书签。
Figure 4	Connect dongle with EVK via USB.....	错误! 未定义书签。
Figure 5	Connect RC with EVK via SW.....	7
Figure 6	“dongle.bin” file burning process.....	8
Figure 7	Check downloaded content in OTP.....	错误! 未定义书签。
Figure 8	Check firmware burning result.....	错误! 未定义书签。

1 Overview

This application mainly introduces method and steps about how to use the EVK board to load firmware for target program or bin file, as well as firmware debugging. In this document, EVK board is the bin file loader and 2 platforms: EVK_LZjiqu_17H25_ and EVK_LZjiqu_17H26_ are used as the target BIN file generator .

1.1 naming rules

Eg:17H26_Lenze_ARGun_3432_171206.bin

The file name should contain Chip Version , company name, project name , CRC



and date of the generating the file.

1.2 choose the right platform:

If you want to load a BIN file into 17H25, then you need to select “EVK_LZjiqu_17H25_” platform;

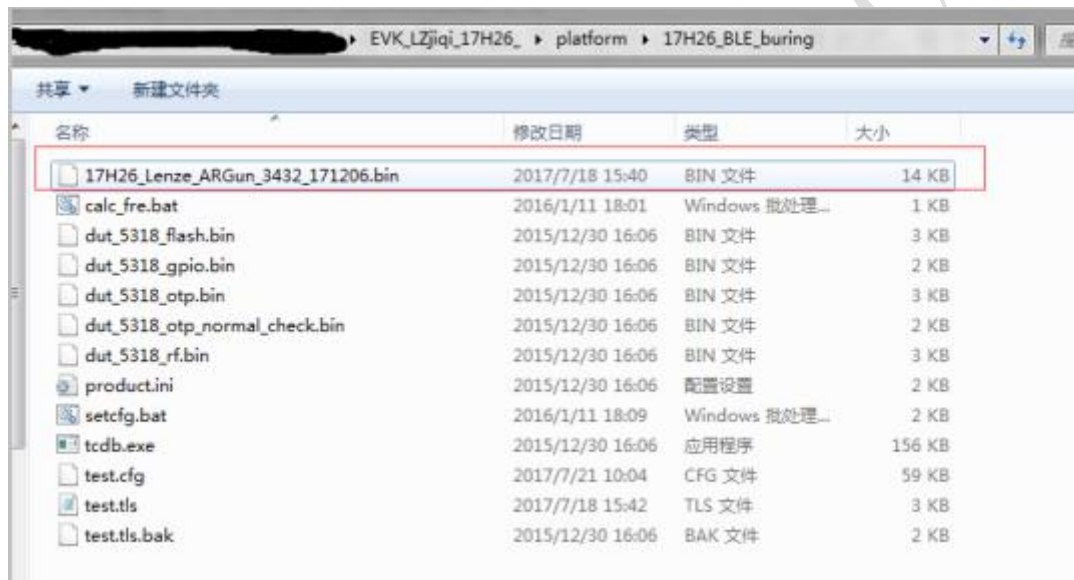
If you want to load a BIN file into 17H26, then you need to select “EVK_LZjiqu_17H26_” platform;

1.3 start making a bin file loading packet .

copy the target file we want to load ,in the path like below:

EVK_LZjiqu_17H2x_\platform\17H2x_BLE_buring

Here ,we use “EVK_LZjiqu_17H26_” as an example to show the basic procedure.



2 EVK Loading Tool

The EVK board acts as the adapter board used for firmware download by lenze.

2.1 Check EVK board

Before burning firmware into target board, user should check whether the EVK board is OK according to steps below:

- 1) Connect the EVK board with PC via a USB cable.



Figure 1 Connect EVK with PC

- 2) Observe the indicating LED light shown as **Figure 1**:
 - ✧ If the indicating light is off, it indicates that the EVK board and its connection with PC is OK, so user can skip steps in **Section 2.2** and burn firmware into target board directly.

3 Burn firmware into target board

3.1 Connect target with EVK

For the target board with USB interface, such as a dongle board shown in **Figure 4**, connect the target board with the EVK board via USB interface directly.

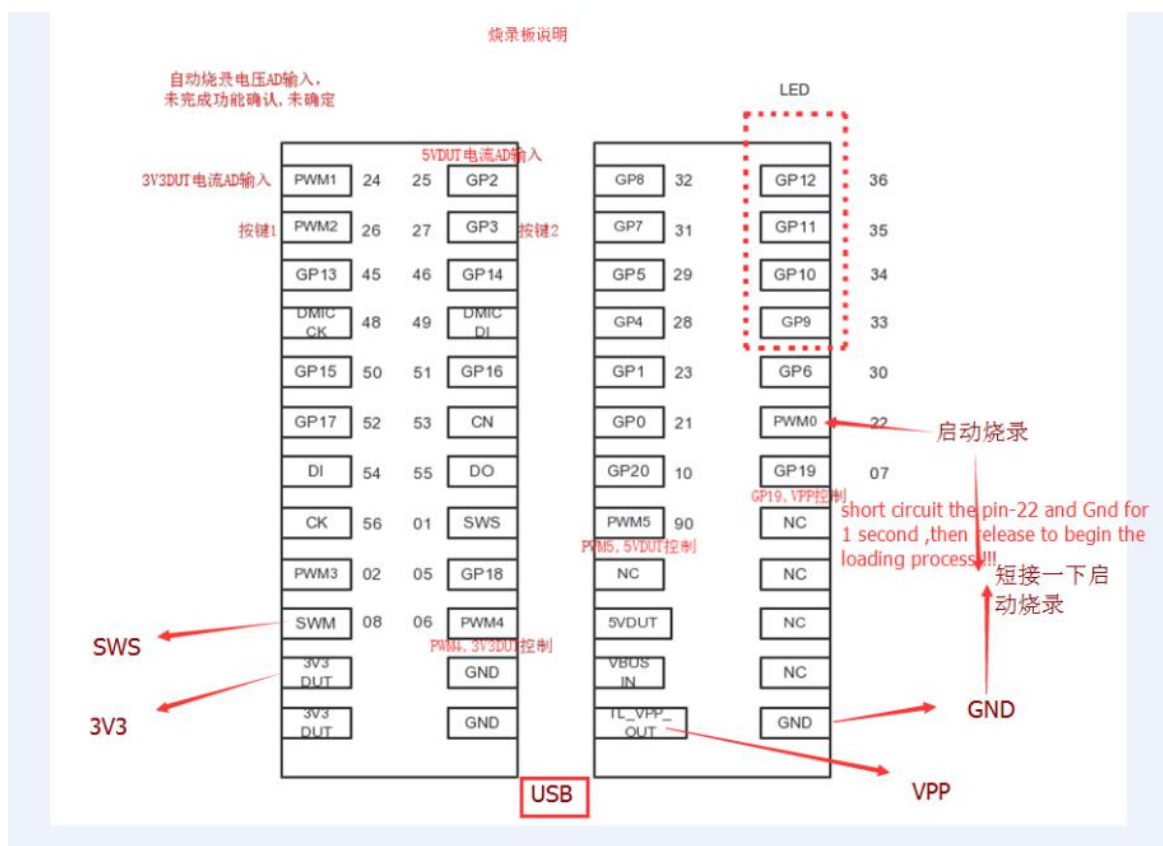
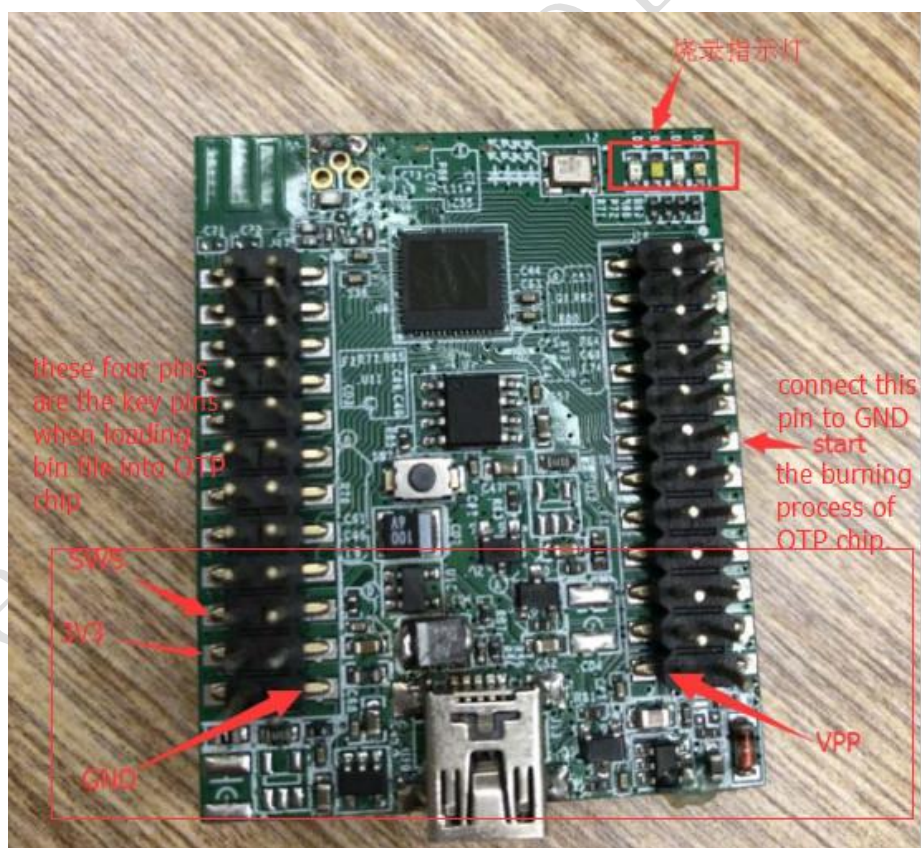


Figure 2 Connect each pin of empty otp board to the EVK via SW

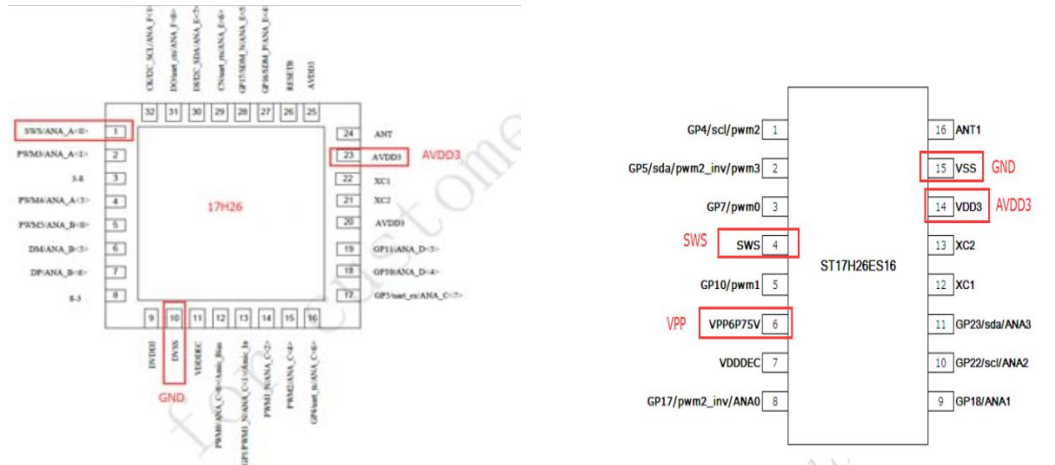




When loading the bin file into The 17H25 or 17H26, the IC **must connect to a 12MHZ crystal**, otherwise it may work abnormally.

These are **some key pins** need to connect when loading the bin file into the OTP chip .

For 17H25 connect (AVDD3/SWS/GND)3pins For 17H26 connect (VDD3/SWS/VPP/GND)



3.2 Burn firmware into target

It's **noted** that the firmware could be downloaded into the target board via Single Wire only. In this section an example introducing how to download "lenze_searching_mode.bin" file into the chip is given.

1) Firstly ,you have to unzip the content like below :

EVK_LZjqi_17H26_Finder_M_v7_5625_170207

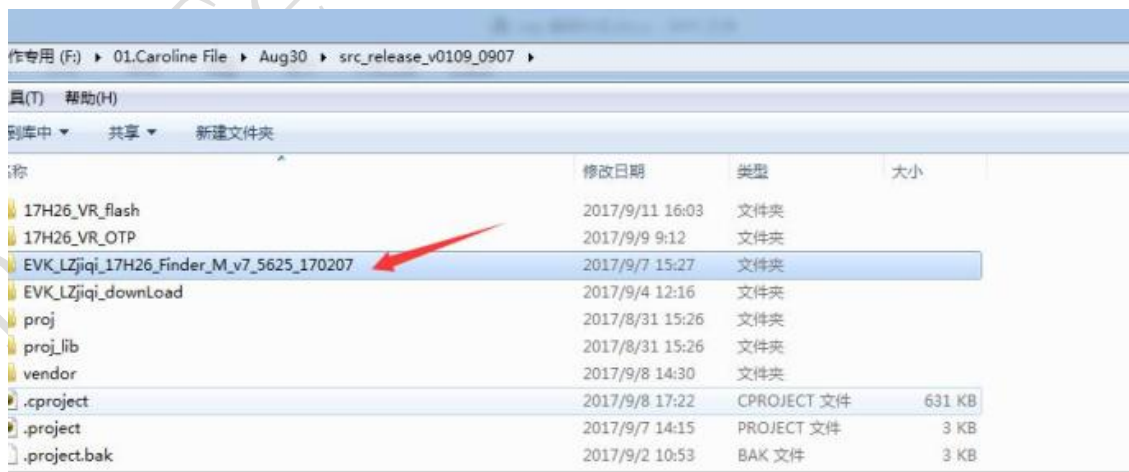
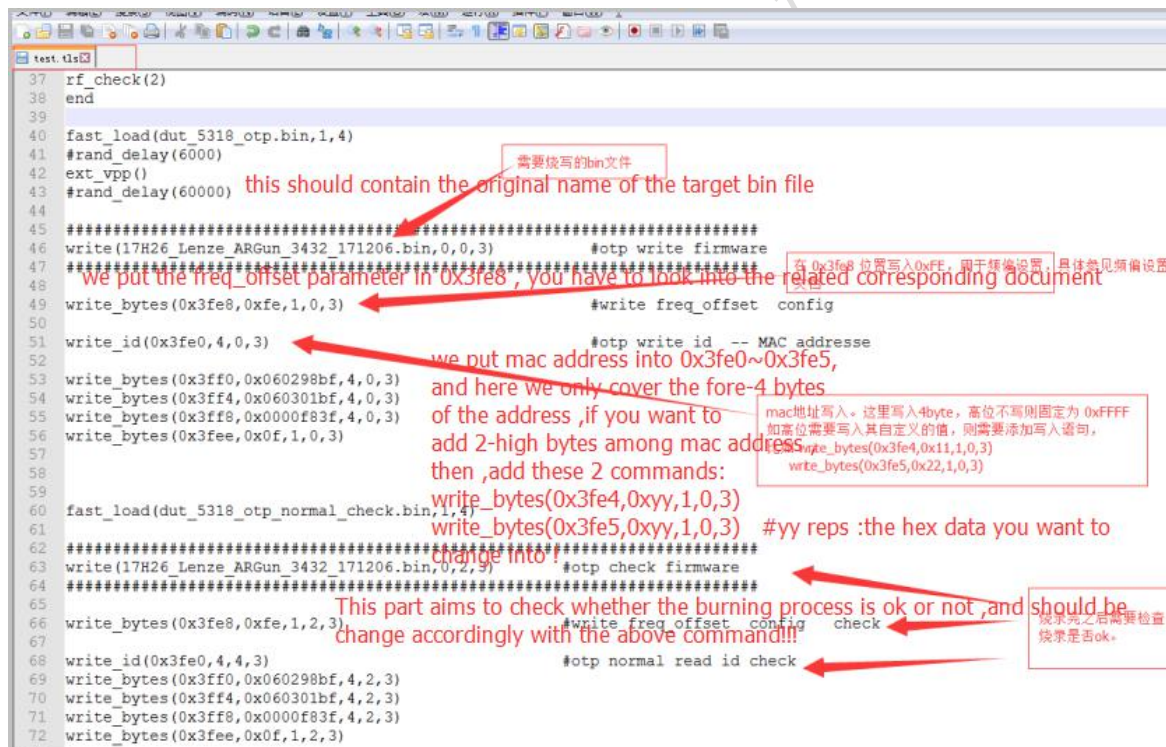
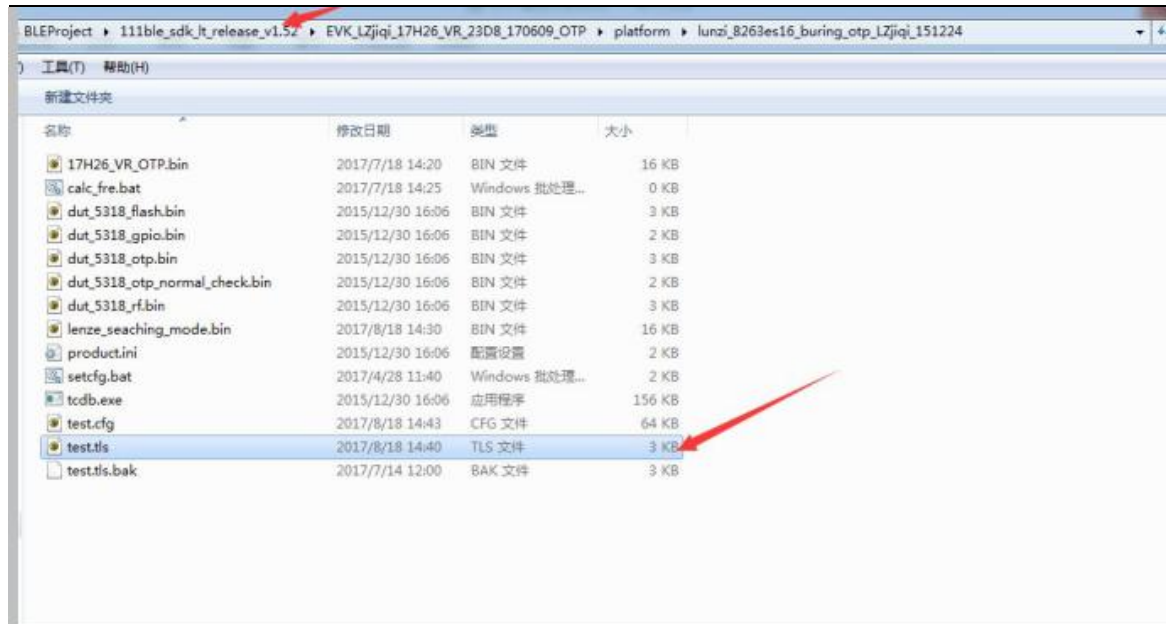
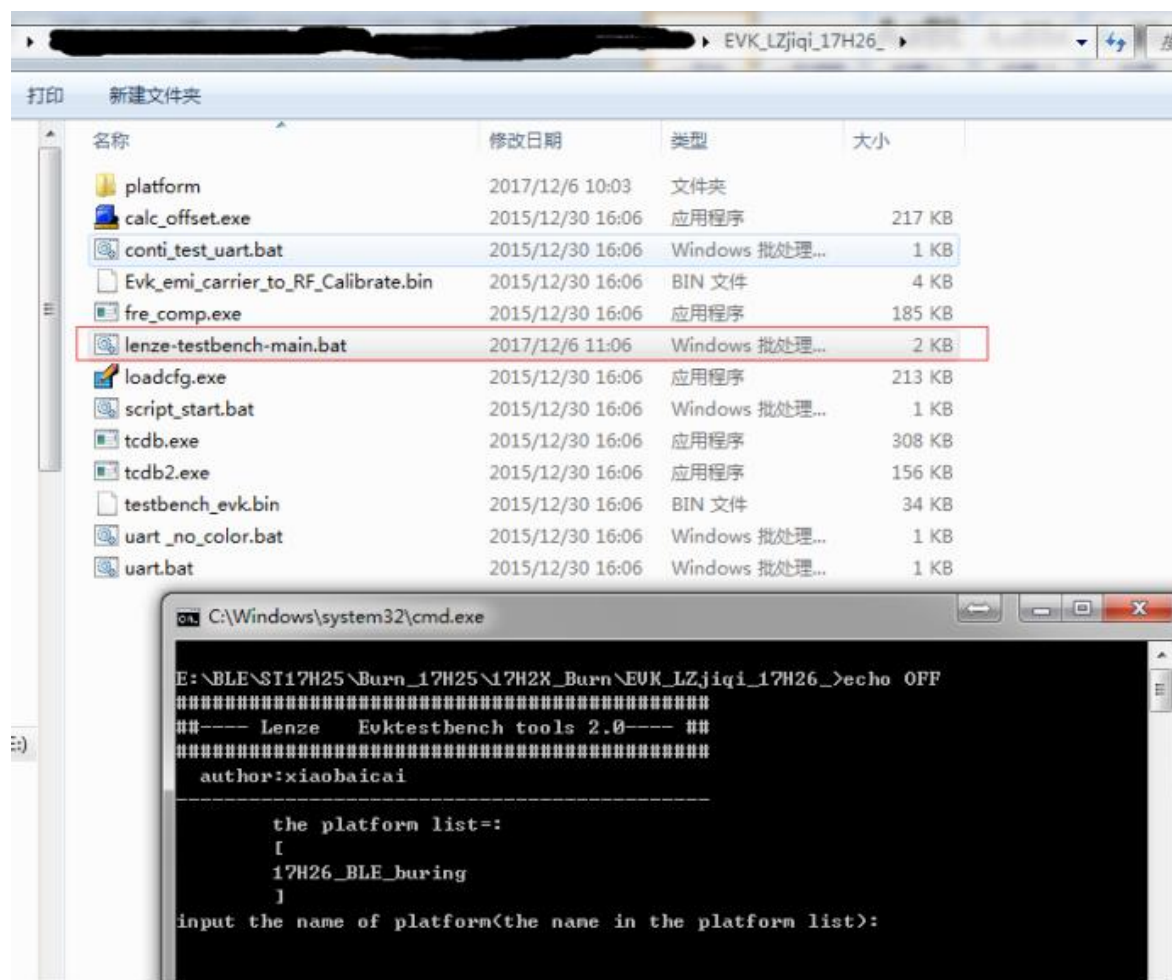


Figure 3 "lenze_searching_mode.bin" file burning process

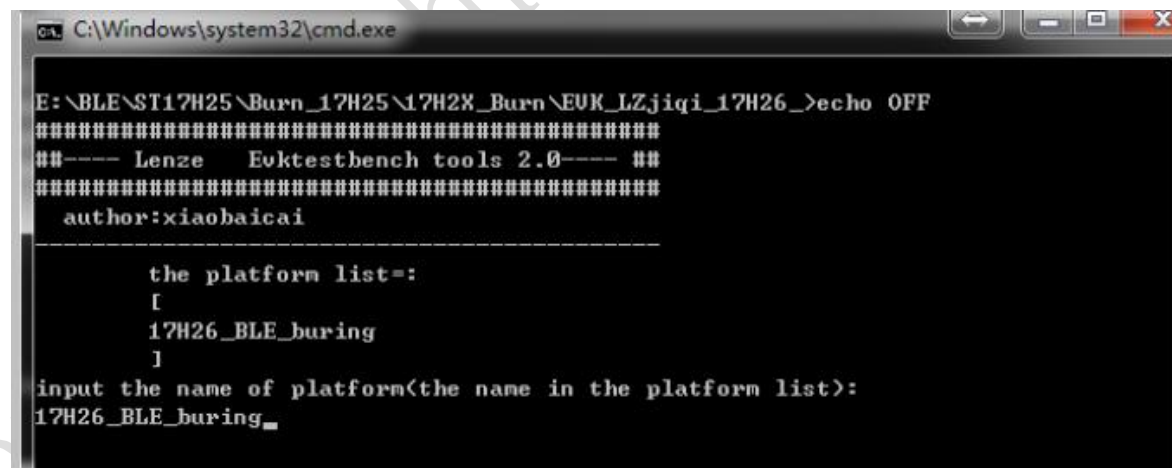
2) Reassure the name of the target ,in the following file ,which will help assigning a increasing step of 1 for each Mac address.



3) Go back to the interface like below where we double click the lenzetestbench_evk.bat file.



In the cmd window above ,we press the ‘tab’ on the keyboard ,then it will show the sub-folder in the platform folder:



- 4) To continue the dialog in the cmd window , press ‘enter’ on the keyboard ,then in the following step ,input ‘yes’,and press ‘enter’ to continue.



```
C:\Windows\system32\cmd.exe

F:\B1.Caroline File\Aug_18 BLEProject\111ble_sdk_lt_release_v1.52\EVK_LZjiqui_170
26_UR_23D8_170609_OTP>echo OFF
#####
##---- telink Evktestbench tools 2.8---- ##
#####
author:xiaodong.zong [version:2013-06-15]

the platform list=:
[
  lunzi_8263es16_buring_otp_LZjiqui_151224
]
input the name of platform(the name in the platform list):
lunzi_8263es16_buring_otp_LZjiqui_151224
do you want to write test_bench to EVK board? yes/no
yes_

press ->tab get the
filename
in following step press
yes
```

- 5) This step will take 30 secs to 1 min ,and after showing the ‘test_bench bin file write done’ ,means everything about loading otp.bin into the EVK board is done.

```
C:\Windows\system32\cmd.exe

Flash Sector (4K) Erase & Program at address 3000
Flash Sector (4K) Program at address 3400
Flash Sector (4K) Program at address 3800
Flash Sector (4K) Program at address 3c00
Flash Sector (4K) Erase & Program at address 4000
Flash Sector (4K) Program at address 4400
Flash Sector (4K) Program at address 4800
Flash Sector (4K) Program at address 4c00
Flash Sector (4K) Erase & Program at address 5000
Flash Sector (4K) Program at address 5400
Flash Sector (4K) Program at address 5800
Flash Sector (4K) Program at address 5c00
Flash Sector (4K) Erase & Program at address 6000
Flash Sector (4K) Program at address 6400
Flash Sector (4K) Program at address 6800
Flash Sector (4K) Program at address 6c00
Flash Sector (4K) Erase & Program at address 7000
Flash Sector (4K) Program at address 7400
Flash Sector (4K) Program at address 7800
Flash Sector (4K) Program at address 7c00
Flash Sector (4K) Erase & Program at address 8000
Flash Sector (4K) Program at address 8400
file download to 00000000: 34348 bytes
Total Time: 505 ms
test_bench bin file write done
```

- 6) At the following steps ,if you want to use the default configuration you can just press ‘enter’ on your keyboard.



```
C:\Windows\system32\cmd.exe
Flash Sector <4K> Program at address 3400
Flash Sector <4K> Program at address 3800
Flash Sector <4K> Program at address 3c00
Flash Sector <4K> Erase & Program at address 4000
Flash Sector <4K> Program at address 4400
Flash Sector <4K> Program at address 4800
Flash Sector <4K> Program at address 4c00
Flash Sector <4K> Erase & Program at address 5000
Flash Sector <4K> Program at address 5400
Flash Sector <4K> Program at address 5800
Flash Sector <4K> Program at address 5c00
Flash Sector <4K> Erase & Program at address 6000
Flash Sector <4K> Program at address 6400
Flash Sector <4K> Program at address 6800
Flash Sector <4K> Program at address 6c00
Flash Sector <4K> Erase & Program at address 7000
Flash Sector <4K> Program at address 7400
file download to 00000000: 30236 bytes
Total Time: 477 ms
test_bench bin file write done
do you want to write config parameter to EVK board? yes/no
do you want to write frequently compensation for the EVK board? yes/no
"### config done, please restart the EVK hardware..."
请按任意键继续. . .
press enter after the arrow shows up
5: 直接回车, 不配置板号与校验频偏
```

程序 down 完之后需要断电在烧录芯片测试。

7) Otherwise , if you want to configure the Board Number for your OTP chip, you can just input 'yes' on your keyboard.

```
C:\Windows\system32\cmd.exe
Flash Sector <4K> Erase & Program at address 8000
Flash Sector <4K> Program at address 8400
file download to 00000000: 34348 bytes
Total Time: 628 ms
test_bench bin file write done
do you want to write config parameter to EVK board? yes/no
yes
[loadcfg] config begin:
----telink tools: set config for EVK testbench----
please input the board number: 0 ~ 15
board number =
```

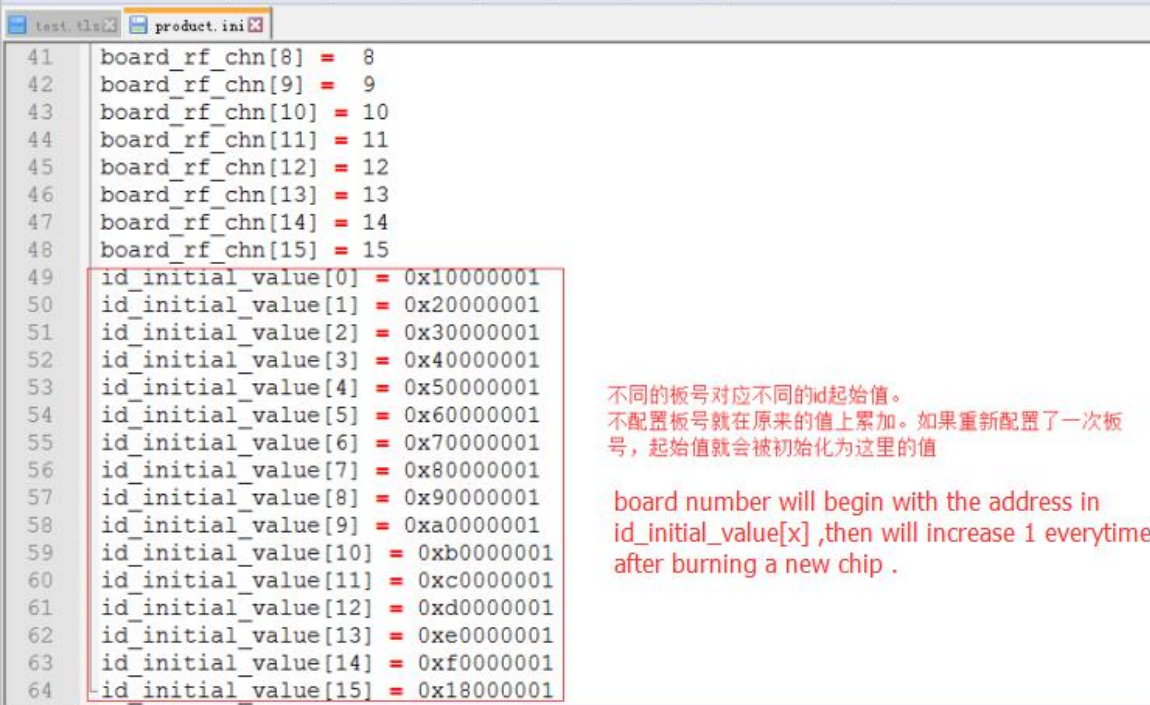
decide whether to config the EVK board number !

decide the board number begin with which number with range of (0~15)

是否需要配置板号

这里板号对应前面描述的 id 起始值

The default configuration of board number contains in 'EVK_LZjiqu_17H2x_\platform\17H2x_BLE_buring\product.ini '

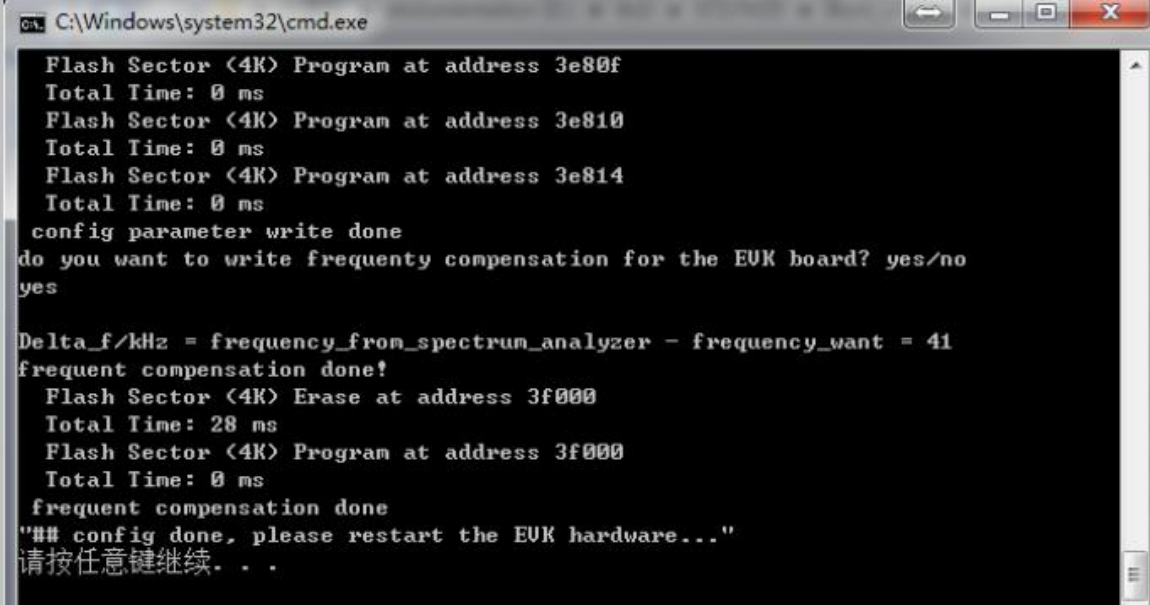


```
test.tls product.ini
41 board_rf_chn[8] = 8
42 board_rf_chn[9] = 9
43 board_rf_chn[10] = 10
44 board_rf_chn[11] = 11
45 board_rf_chn[12] = 12
46 board_rf_chn[13] = 13
47 board_rf_chn[14] = 14
48 board_rf_chn[15] = 15
49 id_initial_value[0] = 0x10000001
50 id_initial_value[1] = 0x20000001
51 id_initial_value[2] = 0x30000001
52 id_initial_value[3] = 0x40000001
53 id_initial_value[4] = 0x50000001
54 id_initial_value[5] = 0x60000001
55 id_initial_value[6] = 0x70000001
56 id_initial_value[7] = 0x80000001
57 id_initial_value[8] = 0x90000001
58 id_initial_value[9] = 0xa0000001
59 id_initial_value[10] = 0xb0000001
60 id_initial_value[11] = 0xc0000001
61 id_initial_value[12] = 0xd0000001
62 id_initial_value[13] = 0xe0000001
63 id_initial_value[14] = 0xf0000001
64 id_initial_value[15] = 0x18000001
```

不同的板号对应不同的id起始值。
不配置板号就在原来的值上累加。如果重新配置了一次板号，起始值就会被初始化为这里的值

board number will begin with the address in id_initial_value[x], then will increase 1 everytime after burning a new chip .

For every chip there is a unique number on the back of it ,which indicates the freq_offset .And you should be very careful with the positive or negative of the value is ,and **only press the number without KHZ behind it !!!** for example , on the chip it's -17khz freq_offset ,then you have to configure it as : -17 ,and press enter after that .



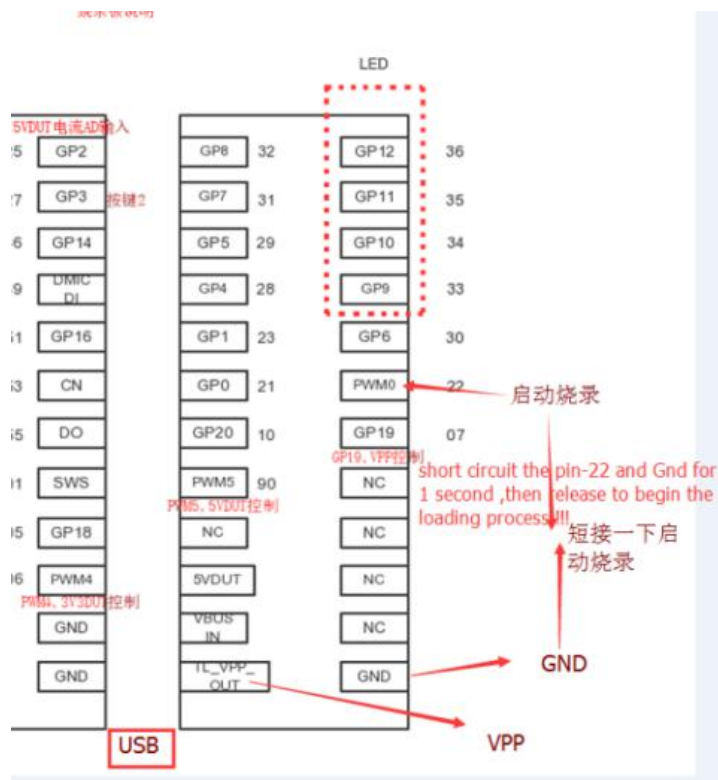
```
C:\Windows\system32\cmd.exe
Flash Sector <4K> Program at address 3e80f
Total Time: 0 ms
Flash Sector <4K> Program at address 3e810
Total Time: 0 ms
Flash Sector <4K> Program at address 3e814
Total Time: 0 ms
config parameter write done
do you want to write frequently compensation for the EVK board? yes/no
yes
Delta_f/kHz = frequency_from_spectrum_analyzer - frequency_want = 41
frequent compensation done!
Flash Sector <4K> Erase at address 3f000
Total Time: 28 ms
Flash Sector <4K> Program at address 3f000
Total Time: 0 ms
frequent compensation done
"## config done, please restart the EVK hardware..."
请按任意键继续. . .
```

8) final step , here we are ,before this step ,I suggest you to disconnect the EVK to computer to reset the EVK ,then reconnect to the pc :



名称	修改日期	类型	大小
ConEmu	2017/8/18 14:39	文件夹	
platform	2017/8/18 14:39	文件夹	
calc_offset.exe	2015/12/30 16:06	应用程序	217 KB
cont_test_uart.bat	2015/12/30 16:06	Windows 批处理...	1 KB
Evk_emi_carrier_to_RF_Calibrate.bin	2015/12/30 16:06	BIN 文件	4 KB
fre_comp.exe	2015/12/30 16:06	应用程序	185 KB
loadcfg.exe	2015/12/30 16:06	应用程序	213 KB
log.txt	2017/4/20 11:41	文本文档	1 KB
script_start.bat	2015/12/30 16:06	Windows 批处理...	1 KB
tcd.exe	2015/12/30 16:06	应用程序	308 KB
tcd2.exe	2015/12/30 16:06	应用程序	156 KB
testbench-main.bat	2015/12/30 16:06	Windows 批处理...	2 KB
testbench_evk.bin	2015/12/30 16:06	BIN 文件	34 KB
testbench_evk_release_note.xlsx	2015/12/30 16:06	Microsoft Excel ...	35 KB
uart_no_color.bat	2015/12/30 16:06	Windows 批处理...	1 KB
uart.bat	2015/12/30 16:06	Windows 批处理...	1 KB

Now ,click the 'uart_no_color.bat' where the arrow targeted ,and then **short circuit the pin22 and GND for 1 time and release them ,this will start the otp loading process.**



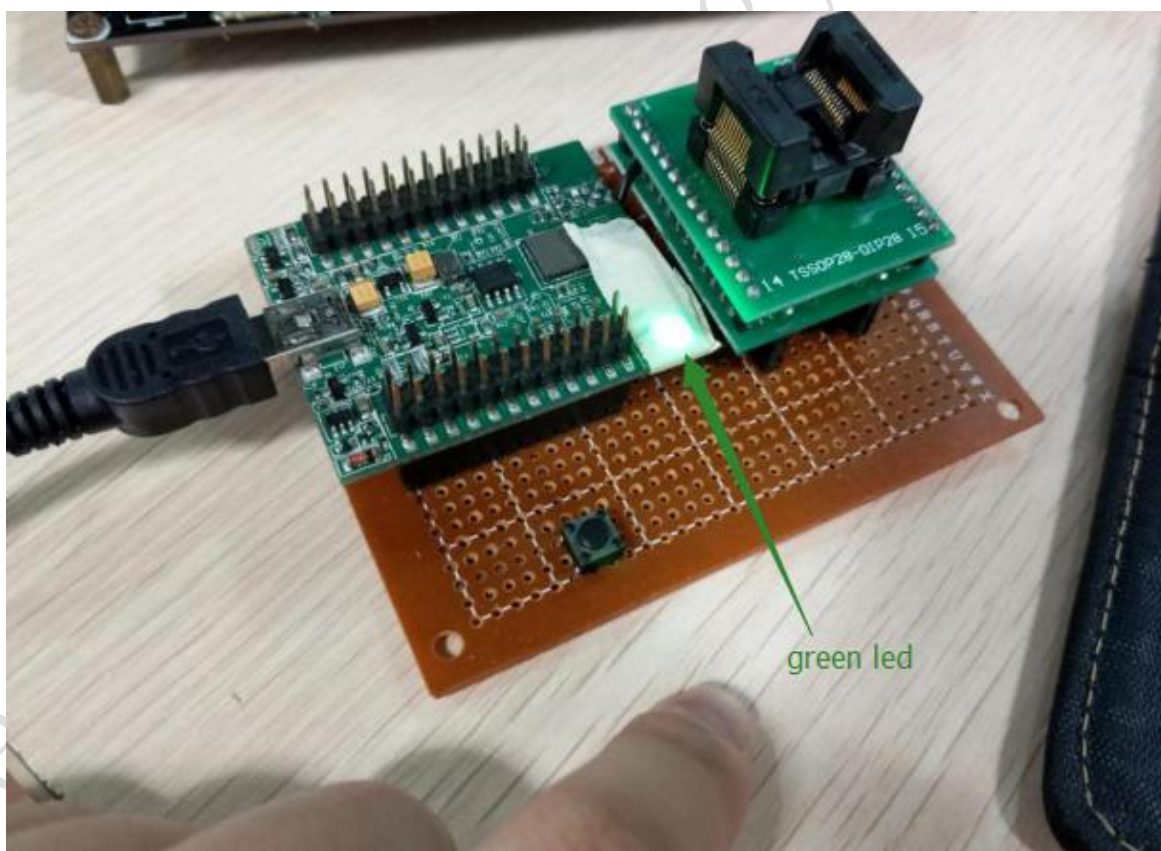
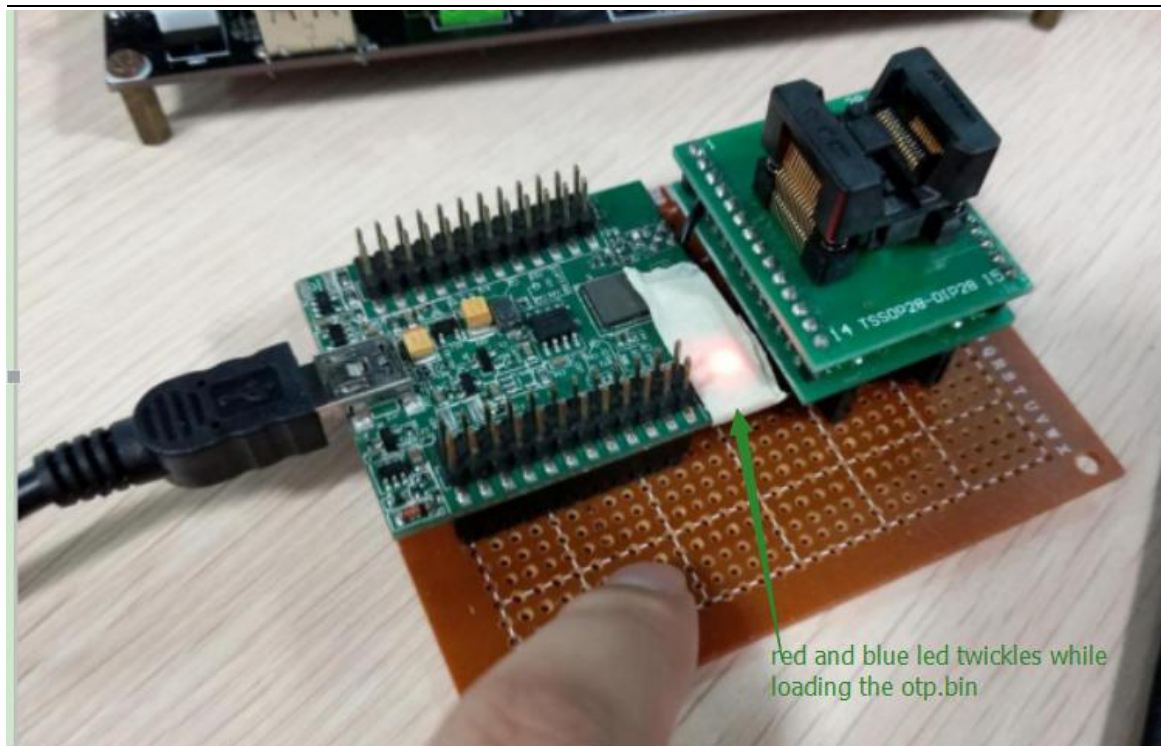
Almost at the same time , in the cmd.exe window ,you can see the status of loading the OTP.bin .



```
C:\Windows\system32\cmd.exe

+ [0m#### <ok!>
+ [0m#### <tls>: write
+ [33m  otp check file[lenze_seaching_mode.bin] in [0]
+ [0m#### <ok!>
+ [0m#### <tls>: write_id
+ [33m  ID already exist,use normal read id mode to check the existing id in mar
ginal read
      otp normal read check id ok: ID:[0x60000001]
+ [0m#### <ok!>
+ [0m#### <tls>: write_bytes
+ [33m  otp check bytes,adr:[0x3ff0] data:[0x60298bf] byte:[4]
+ [0m#### <ok!>
+ [0m#### <tls>: write_bytes
+ [33m  otp check bytes,adr:[0x3ff4] data:[0x60301bf] byte:[4]
+ [0m#### <ok!>
+ [0m#### <tls>: write_bytes
+ [33m  otp check bytes,adr:[0x3ff8] data:[0xf83f] byte:[4]
+ [0m#### <ok!>
+ [0m#### <tls>: write_bytes
+ [33m  otp check bytes,adr:[0x3fee] data:[0xf] byte:[1]
+ [0m#### <ok!>
+ [0m#### <tls>: stop
+ [33m+ [0m#### <ok!>
+ [32;1mBLE::script ok! run time[9479ms]
+ [0mBLE::-----
```

And during the otp loading process,the led on the EVK board will turning from off to red and blue,and finally ,green or white(where green means otp loading success ,and white means failure) .



Please refer to the document “*Application Note: lenze Tcdb User Guide*” to learn about memory access command format. For example, “rf 12345 -s 4” indicates reading 4-byte data from Flash address starting from 0x12345, which is equivalent to operation of example a).



And after you finish these steps ,Go ahead and test whether the function and the power consumption is normal ,and don't forget to save it with a name and date ,as below .

