

Realtek  
Bluetooth Mass Production Tool  
RTLBTAPP  
User Manual

**Draft v0.7**

**2018/04/02**

## Revision History

Date	Version	
2014/9/11	Draft v0.1	
2014/10/27	Draft v0.2	Add read/write efuse
2015/08/10	Draft v0.3	Add LE Test
2016/05/24	Draft v0.4	Certification TX
2016/06/07	Draft v0.5	Modify RF Test
2016/07/25	Draft v0.6	Modify UI
2019/04/02	Draft v0.7	Modify all page for new GUI

# Catalog

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# 1. Overview

This document is used to introduce RF test tool “RTLBTAPP” for Realtek Bluetooth chip series. Customers should comply with the steps and requirements under this document. Contact Realtek Bluetooth FAE if any problem arises in the use of MP flow.

Realtek

## 2. Files

MP tool package is provided to customers in binary format:

RTLBTAPP.exe	MP executable file
RtlBluetoothMP.dll	MP dll library
BTPatchCode\ Patch_rtl8723a.bin	RTL8723A firmware patch
BTPatchCode\ Patch_rtl8723b.bin	RTL8723B firmware patch
BTPatchCode\ Patch_rtl8821a.bin	RTL8821A firmware patch
BTPatchCode\ Patch_rtl8761a.bin	RTL8761A firmware patch
BTPatchCode\ Patch_rtl8703b.bin	RTL8703B firmware patch
BTPatchCode\ Patch_rtl8723d.bin	RTL8723D firmware patch
BTPatchCode\ Patch_rtl8822b.bin	RTL8822B firmware patch
BTPatchCode\ Patch_rtl8821c.bin	RTL8821C firmware patch
BTPatchCode\ Patch_rtl8822c.bin	RTL8822C firmware patch
.....	



Figure 1 File List

Double click “RTLBTAPP.exe” to open this tool. However, please use “Run Administrator” to open it in Vista/Windows7 or higher.

## 3. Hardware environment

Before use this tool, PC/NB should direct connected UART/USB port. The connection **between Bluetooth and HOST chip must be cut off.**

## 4. RTLBTAPP Main Page

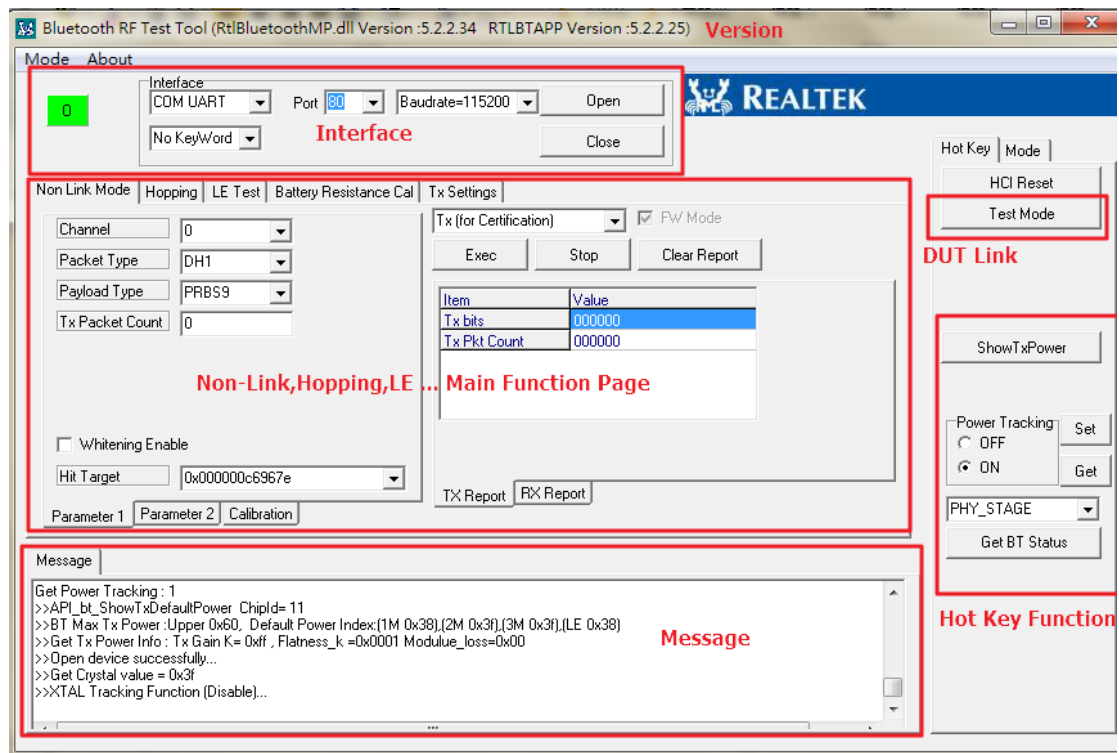


Figure 2 BTLBTAPP

This RF Tool is mainly divided into several blocks.

1. Interface block: Interface setting.
2. Message: Show execute message.
3. Main test page block: include all test page.
4. Hot key: Include DUT Link mode and common button.
5. Version information: Show Version number.

## 4.1 Interface block

Below is a description of opening the device:

### Step 1: Select correct interface.

- USB :

If the module interface is “USB”, please select “USB” and “Port =1” to Open.

- UART:

If the module interface is UART, please select “UART” and check COM port number in Device Manager. “RTLBTAPP” only supports COM port number is smaller than “99”. If COM port number is larger than “99”, open operation will fail.



Figure 3 Check COM port number

- SDIO:

If the module interface is SDIO, please select “SDIO”

- KeyWord:

If you need to transfer a special string first to open bt test mode (ex.Ameba D/ZII) you need to select a special string.

### Step 2: Click “Open”

After clicking “Open” button, the up left corner changes to green means it is successful to open BT Device and download firmware patch. You could double check it by the two lines in the “Message”. The firmware patch is downloaded one time only, after the device module is powered on. Therefore if you want to re-download firmware patch, first you should power off device and re-start.

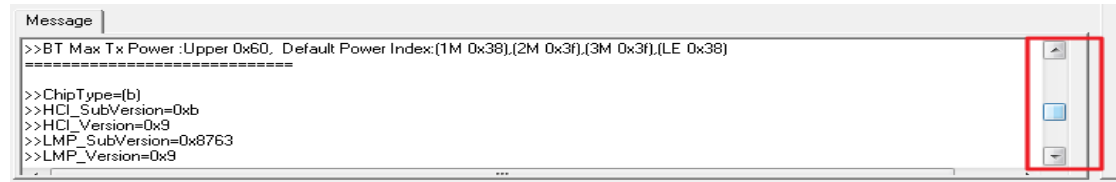
```
>>Is_After_PatchCode=0
=====
BLE Spec is BT5.0 ,Change GUI format is BT4.0
Get Power Tracking : 1
>>API_bt_ShowTxDefaultPower ChipId= 11
>>BT Max Tx Power :Upper 0x60, Default Power Index:(1M 0x38),(2M 0x3f),(3M 0x3f),(LE 0x38)
>>Get Tx Power Info : Tx Gain K= 0x1f , Flatness_k =0x0001 Modulue_loss=0x00
>>Open device successfully...
```

Figure 4 How to check if device was opened and patch was downloaded successfully

Note: This message will difference depending on the chip.

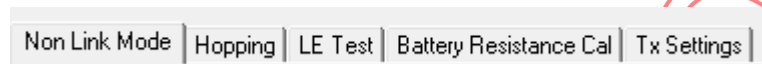
## 4.2 Message

You can use the up and down keys to see the current message.



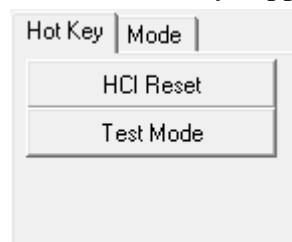
## 4.3 Main Test Page

This supports hotkey will difference depending on the chip.



## 4.4 Hot Key

This supports hotkey will difference depending on the chip. In general, the HCI RESET will definitely support it.



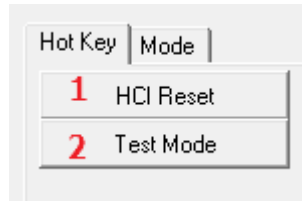


## 5. DUT singling (Link) Test Mode

### ➤ BR/EDR:

Enter link(singling) test mode by , please follow the below operations.

- **Step 1:** Click “HCI Reset” button to reset.
- **Step 2:** Click “Test Mode” button to enter DUT Test Mode (link test mode).
- **Step 3:** After testing, click “HCI Reset” button to exit DUT Test Mode



### ➤ BLE:

BLE must be connected directly to the instrument.

## 6. Non Link (Singling) Mode Test Page

Figure 5 How to set Non-Link(Singling) mode parameter

### 6.1 Non Link (Singling) Execute

Parameter No.	Name	Value Range
Parameter 1	Channel	0~78
Parameter 1	Packet Type	DH1, DH3, DH5 2DH1, 2DH3, 2DH5 3DH1, 3DH3, 3DH5
Parameter 1	Payload Type	ALL0,ALL1,0101,1010, 0x0_0xF,0000_1111,1111_0000, PRBS9
Parameter 1	Tx Packet Count (for packet tx)	0~0x FFF or 0~0x3FFFFFF 0 : Infinite Tx packet count
Parameter 1	Whitening Coeff Value	0x00~0x7F:Enable Whitening 0x80~0xFF:Disable Whitening
Parameter 1	HitTarget(Target BD_ADDR)	6 bytes
Parameter 2	PacketHeader	0x0~0x3FFFF(Realtek define)
Parameter 1	Tx Gain Index	1~7
	If is Tx level Page :	
	Fix Gain	Enable/Disable
	Tx Gain Index	1~Max Tx power

Realtek Debug

Parameter 1	Tx Gain Value	Realtek define	
Parameter 1	Tx DAC	Realtek define	

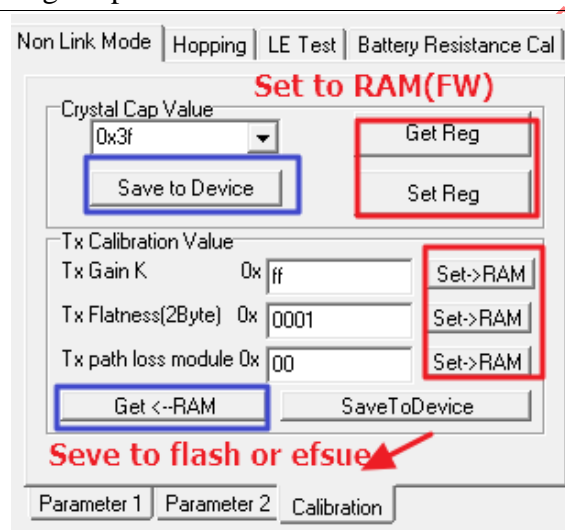
Use non-link test mode, please follow below step and select correct parameter

- **Step 1:** Select “Non Link Mode”.
- **Step 2:** Choose parameters in ”Parameter 1”, ”Parameter 2” and .
- **Step 3:** Select “Con-Tx”, “Pkt-Tx”、 “Pkt-Rx”、 ”LE Tx(Continues Tx)” or “Single Tone”.
- **Step 4:** Click “Exec” button.
- **Step 5:** After testing, click “Stop” button.

The green rectangle shows current information about TX/RX packet counts.

## 6.2 Calibration(Non-Singling) Setting

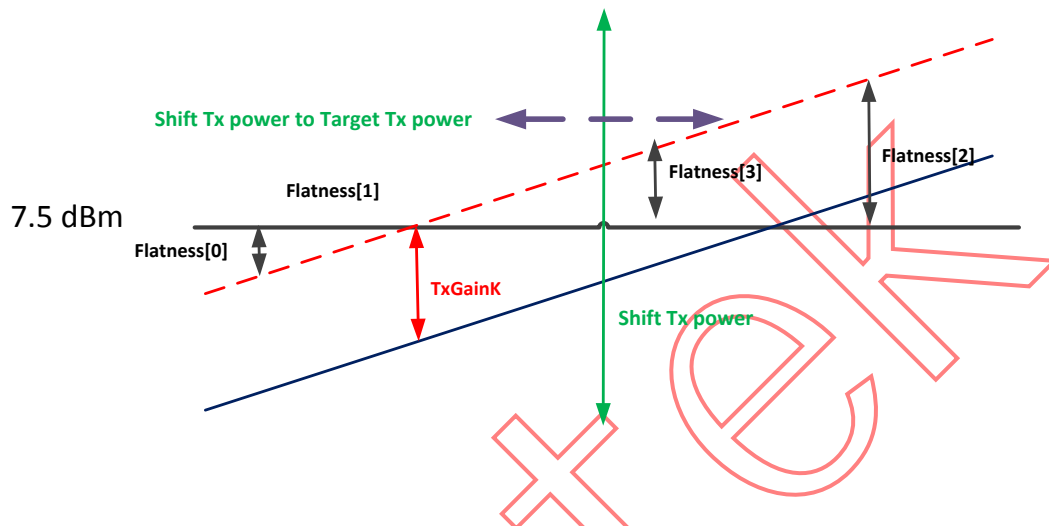
Page explanation below:

Non Link Mode   Hopping   LE Test   Battery Resistance Cal		Item	Explanation
		Crystal Cap	Crystal cap value 0x00~0x3F or 0x00~0x7F Note: depend on Cjip
		Tx gain k	2' complement -12~+12(Dec)
		TxFlatness K	2' complement -7~+7(Dec)
		Tx path loos module	2' complement -12~12(Dec)
		Note: The set is 2' complement	

- Save to device Button: Save to flash or efuse
- Set->RAM: Set to RAM or FW. Get <-RAM : Get data from RAM (FW)

## 6.2.1 Calibration frequency offset

The Tx power k setting show in “Tx calibration Value”. The simple illustration is below:



## 6.2.2 Calibration frequency offset

Before writing the proper crystal value to efuse, users should tune it. The following steps show how to change the crystal value directly.

- Step 1: Select new “XTAL CAP Value”.
- Step 2: Click “Set Reg”.
- Step 3: Click “Get Reg” from device.

By changing the crystal value and transmitting **signal tone** over and over again, users could find the most accurate one and write it to config file.

Crystal Cap Value

0x42 1

Get Reg

Save to Device

2 Set Reg

## 6.3 Step by step DUT Tx (Non-Singling) Setting

Follow below steps to enter non-link mode, DUT will enter TX mode, send packet to tester.

- **Step 1:** Choose “Channel”.
- **Step 2:** Choose “Packet Type”. Ex :3DH3
- **Step 3:** Set “Payload Type” = “PRBS9”;
- **Step 4:** Set “Tx Packet Count” = “0”;
- **Step 5:** Use default settings in “Parameter 2”.
- **Step 6:** Select “Pkt-Tx”.
- **Step 7:** Click “Exec” button and start to test.
- **Step 8:** After testing, click “Stop” button.

The green rectangle shows current TX packet counts and TX bits which are evaluated by TX times and are not completely correct.

Non Link Mode | Hopping | LE Test | Battery Resistance Cal | Tx Settings

Channel: 0 **1**  
 Packet Type: 3DH3 **2**  
 Payload Type: PRBS9 **3**  
 Tx Packet Count: 0 **4**

☐ Whitening Enable  
 Hit Target: 0x000000c6967e

Parameter 1 | Parameter 2 | Calibration

Tx (for Certification): 6 ☒ FW Mode  
 7 Exec Stop 8 Clear Report

Item	Value
Tx bits	12267648
Tx Pkt Count	2778

TX Report RX Report

Non Link Mode | Hopping | LE Test | Battery Resistance Cal

Packet Header: 0x39858

Parameter 1 | Parameter 2 | Calibration

Tx (for Certification): ☐ FW Mode  
 Exec Stop Clear Report

Item	Value
Tx bits	378164160
Tx Pkt Count	85635

TX Report RX Report

## 6.4 Step by step DUT Rx (Non-Singling) Setting

The step by step show as:

**Step 1:** Choose “Channel”.

**Step 2:** Choose “Packet Type”.

**Step 3:** Set “Payload Type” = “PRBS9”;

**Step 4:** Set “Hit Target” = “0xc6967e”;

**Step 5:** Use default settings in “Parameter 2”.

**Step 6:** Select “Pkt-Rx”.

**Step 7:** Click “Exec” button and start to test.

**Step 8:** After testing, click “Stop” button.

The green rectangle shows correct RSSI, RX bits, RX error bits, RX packet counts, ber and CFO.

Non Link Mode | Hopping | LE Test | Battery Resistance Cal

Channel: 0 **1**

Packet Type: 2DH5 **2**

Payload Type: PRBS9 **3**

Tx Packet Count: 0

☐ Whitening Enable

Hit Target: 0x000000c6967e **4**

Parameter 1 | Parameter 2 | Calibration

Packet Header: 0x3f870 **5**

Parameter 1 | Parameter 2 | Calibration

Pkt-Rx (for MP): 6 **6** ☒ FW Mode

Exec **7** Stop **8** Clear Report

Item	Value
Rssi	-90
Rx bits	000000
Rx Error bits	000000
Rx Pkt Count	000000
ber	000000
cfo	0

**result**

TX Report | RX Report

## 6.5 Step by step Single Carrier (Tone) Test

This mode only could transmit single carrier (tone).

- **Step 1:** Choose “Channel” and “Tx Gain Index” = “6”.
- **Step 2:** Select “Single Tone”.
- **Step 3:** Click “Exec” button and start to test.
- **Step 4:** After testing, click “Stop” button.

Non Link Mode | Hopping | LE Test | Battery Resistance Cal | Tx Settings

Channel: 0 **1** | Packet Type: 3DH5 | Payload Type: ALL'0 | Tx Packet Count: 0

Single Tone (for MP) **2** | ☒ FW Mode

Exec **3** | Stop **4** | Clear Report

Item	Value
Tx bits	691483776
Tx Pkt Count	156586

☐ Whitening Enable

Hit Target: 0x000000c6967e

Parameter 1 | Parameter 2 | Calibration

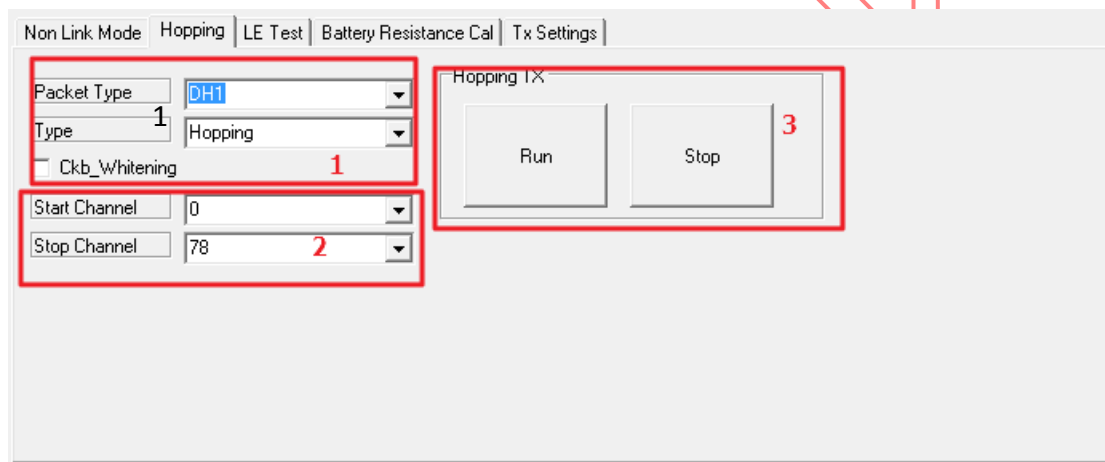
TX Report | RX Report

The green rectangle shows current TX packet counts and TX bits which are evaluated by TX times and are not completely correct.

## 7 Hopping Mode Test

Hopping Test supports three kinds of parameters that are “Packet Type”, “Channel”, and “Ckb\_Whitening”.

1. Packet Type: The “Packet Type” is from “DH1” to “3DH5”, “LE” for BT4.0, and “NULL” for null packet.
2. Channel: The number from “0” to “39” is to transmit fixed frequency. Only the option of “Hopping” will transmit hopping frequency.
3. Ckb\_Whitening : To select “Ckb\_Whitening” causes whitening enable.



**Figure 6 Set non-link mode parameter**

- **Step 1:** Select “Hopping”.
- **Step 2:** Choose “Packet Type”, “Channel” and “Ckb\_Whitening”
- **Step 3:** Click “Run” button.
- **Step 4:** After testing, click “Stop” button.

Name	Value Range
Packet Type	DH1, DH3, DH5, 2DH1, 2DH3, 2DH5, 3DH1, 3DH3, 3DH5, LE : For BT 4.0 NULL :For NULL packet
Start Channel	0~39 : Fix Channel Mode(Only)
End Channel	Hopping : Hopping Mode
Ckb_Whitening	Enable/Disable Whitening



## 8 LE DUT Tx/Rx Test

This page uses the hci command of the standard BT spec. Users can use this page to test the performance of BLE.

- **Step 1:** Select “LE PKT TX” or “LE PKT RX”
- **Step 2:** Select parameters:

Channel: 0~39

Data Len: 0~ 255 .If the BLE is BT4.0, then len rang is 0~39.

Payload type: PRBS9, 11110000, 101010, ALL'0, ALL1, PRBS15.....

PHY: LE1M, LE2M, LRS8, LRS2. The parameter depend on chip.

Modulation Index: stable Modulation ... . please refer BT Spec.

- **Step 3:** Click “Run” button.
- **Step 4:** After testing, click “Stop” button.

Non Link Mode | Hopping | LE Test | Battery Resistance Cal | Tx Settings

LE PKT TX (for MP) 1

Channel 0

Data Len 0xff 2

Payload Type Pseudo-Random bit sequence 9

PHY LE 1M PHY

Modulation Index stable modulation

Start 3 Stop 4

LE Rx Count 0 5

- **Step 5:** If is “LE PKT RX” then result. After executing the stop, the result will show here. Use this information to calculate PER.

## 9 Battery Resistance Cal Page

The Page Only support BT Soc BBPro series(RTL8763B...).

Non Link Mode | Hopping | LE Test | **Battery Resistance Cal** | Tx Settings

Step 1. Connect the adapter  
Step 2. Ensure the battery voltage level is within the range of 3.5V to 3.7V  
Step 3. Set up the battery into your final product (it is very important to ensure everything already connected)  
Step 4. Input Fast Charge Current and click "Battery Resistance Cal" button

Fast Charge Current (mA)  (20-400) **cc current**  
Avg. Times  (>20) **Avg. Times**

**Battery Resistance Cal** → **Battery Resistance (mΩ)** **FW Measures Result**

- Fast Charge Current: It is cc current, please to set. The ranges depend on chip.
- Avg. Time: Set average times.
- Battery Resistance Cal Button: Execute.
- Battery Resistance(mΩ) :FW measure result. This unit is m Ohm.

## 10 Tx Setting Page

The page support depends on chip. All "save to device "function Does not support combo chip(ex. RTL8822C,AmebaD/ZII ....).

- Save to device Button: Save to flash or refuse(**Does not support combo chip**)
- Set->RAM: Set to RAM or FW.

Figure 75 Test LE RF TX Test