

# **Bluetooth RF Test Tool RTLBTAPP User Manual**

**Draft v0.5**

**2018/08/23**

## Revision History

Date	Version	
2017/07/11	Draft v0.1	
2017/10/23	Draft v0.2	Add set/get frequency offset, Hopping, Select TPM/IQM
2018/01/30	Draft v0.3	Add save tx settings to device
2018/02/08	Draft v0.4	Add the range of hopping channels
2018/08/23	Draft v0.5	Add Tx debug and non-linkmode test.

REALTEK CONFIDENTIAL

## Catalog

<b>Revision History .....</b>	<b>2</b>
-------------------------------	----------

<b>Figure List .....</b>	<b>4</b>
--------------------------	----------

1. Overview .....	5
2. Files.....	6
3. Hardware environment .....	6
4. Open RTLBTAPP.....	6
5. Select TPM or IQM mode.....	8
6. Thermal Power Tracking Function .....	9
7. DUT (Link) Test Mode .....	10
8. BLE Direct Test Mode .....	11
9. Non-Singling Mode Test (MP) .....	13
10. LE DUT TX/RX Test (MP).....	15
11. Hopping Test (For Certification) .....	16
12. Set/Get frequency offset.....	17
13. Calibrates Tx Power Debug Function .....	18
14. Save Tx Settings to Device.....	19

## Figure List

Figure 1 File List .....	6
Figure 2 Open BTLBTAPP .....	6
Figure 3 Check COM port number .....	7
Figure 4 Device opens successfully .....	7
Figure 5 Select TPM or IQM mode .....	8
Figure 6 Thermal Power Tracking Function .....	9
Figure 7 Enter link test mode .....	10
Figure 8 How to set non-link mode parameter .....	13
Figure 9 LE Test .....	15
Figure 10 Hopping mode test .....	16
Figure 11 Get/Set crystal value directly .....	17
Figure 12 Calibrates Tx Power Debug Function .....	18
Figure 13 Save Tx Settings to Device .....	19

## 1. Overview

This document is used to introduce RF test tool “RTLBTAPP” for Realtek Bluetooth chip RTL876x series. Customers should comply with the steps and requirements under this document. Contact Realtek Bluetooth FAE if any problem arises in RF test flow.

REALTEK CONFIDENTIAL

## 2. Files

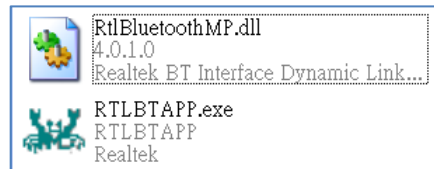
MP tool package is provided to customers in binary format:

**RTLBTAPP.exe**

MP executable file

**RtlBluetoothMP.dll**

MP dll library



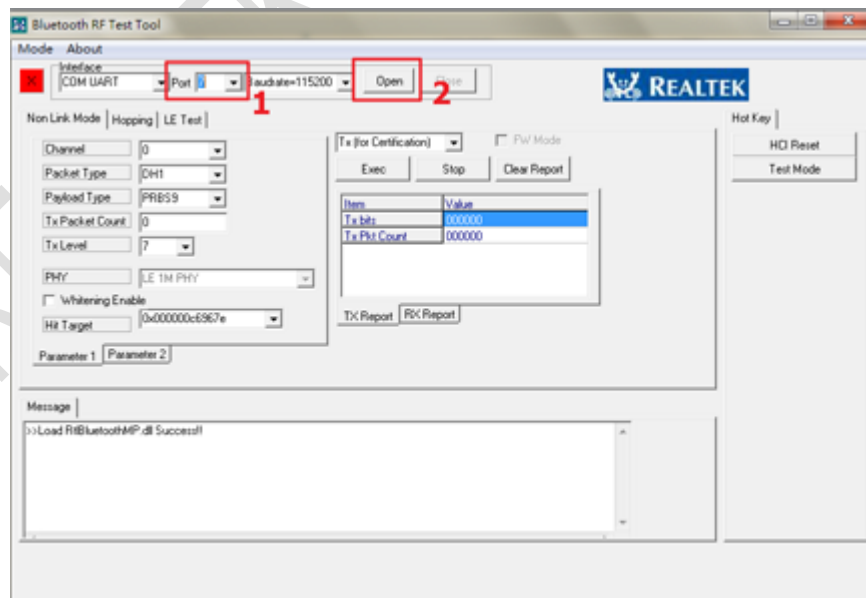
**Figure 1 File List**

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 should direct connected UART port. The connection between Bluetooth and HOST chip must be cut off.

## 4. Open RTLBTAPP

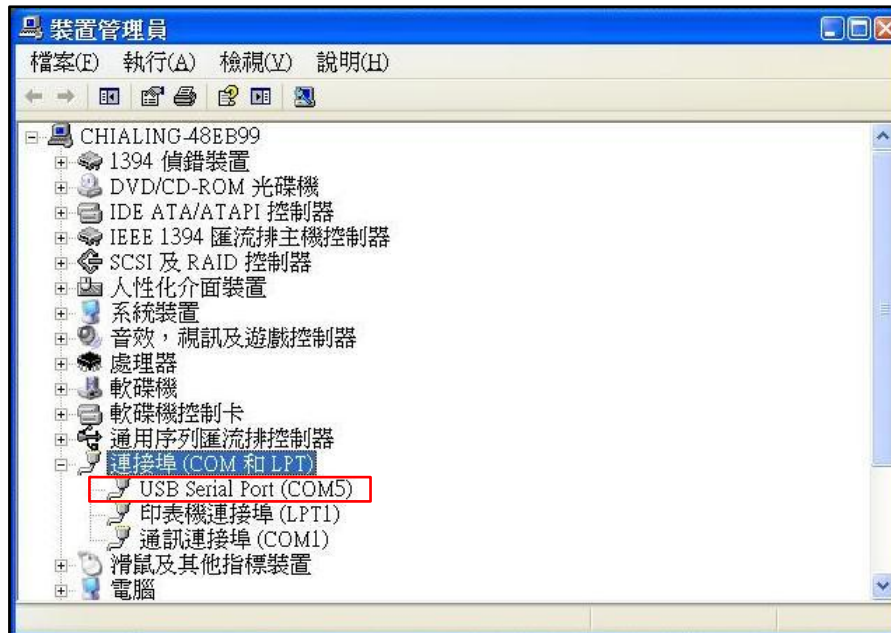


**Figure 2 Open BTLBTAPP**

**Step 1: Select correct interface.**

- UART: The baud rate default is 115200.

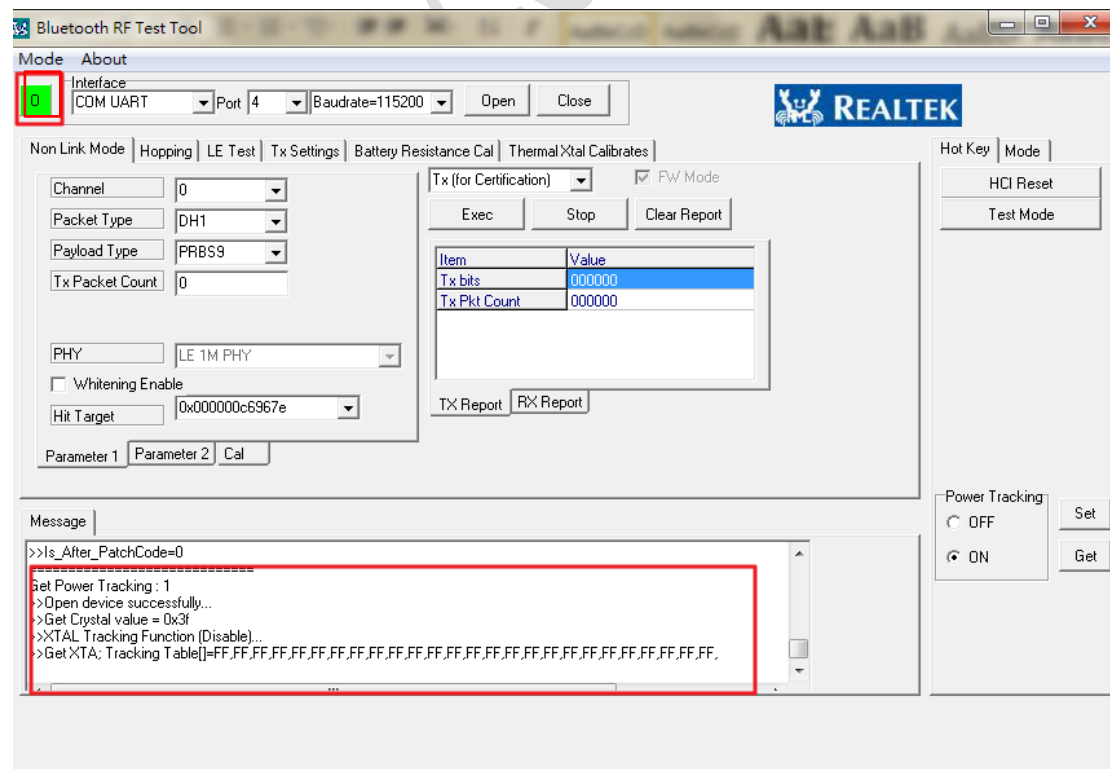
If the module interface is UART, please select “UART” and check COM port number in Device Manager.



**Figure 3 Check COM port number**

## Step 2: Click “Open”.

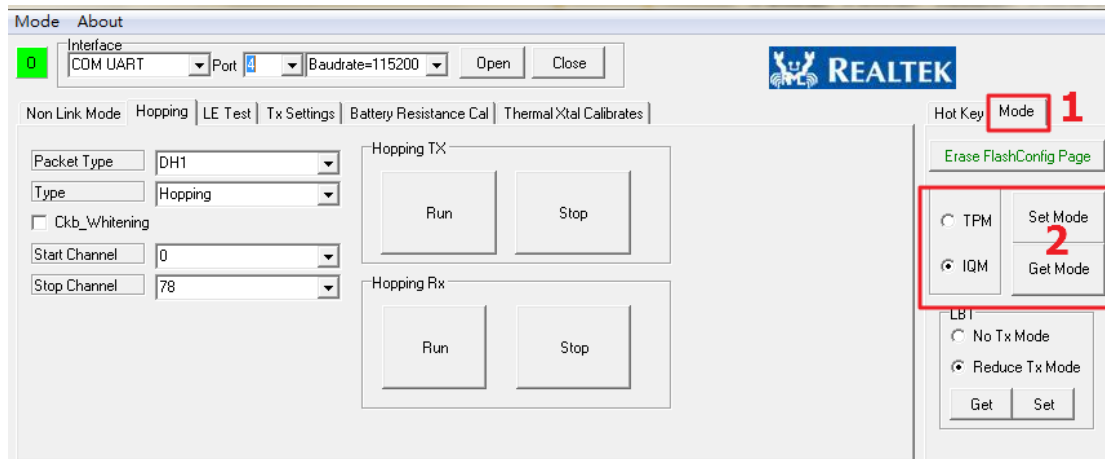
After clicking “Open” button, the up left corner changes to green means it is successful to open BT Device.



**Figure 4 Device opens successfully**

## 5. Select TPM or IQM mode

- Step1: Select TPM/IQM
- Step2: Set or get TPM/IQM mode

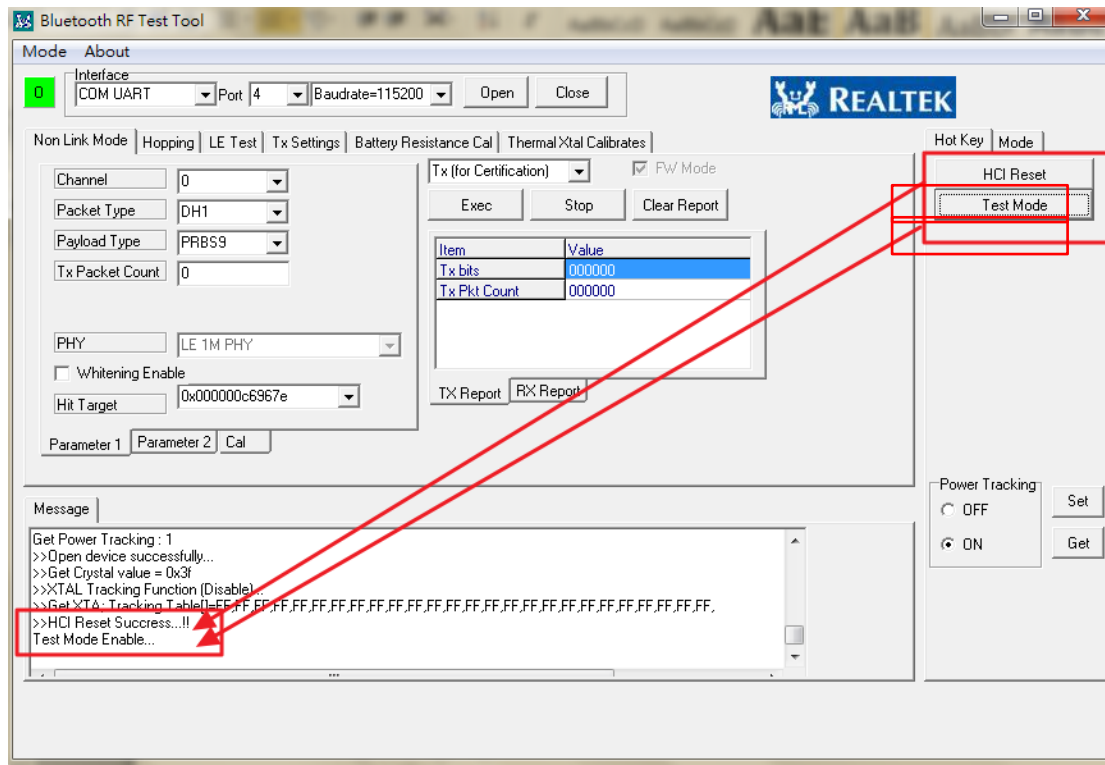


**Figure 5 Select TPM or IQM mode**





## 7. DUT (Link) Test Mode



**Figure 7 Enter link test mode**

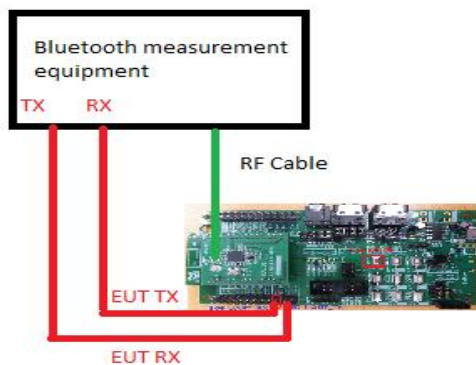
Enter link test mode, please follow the below operations.

- **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

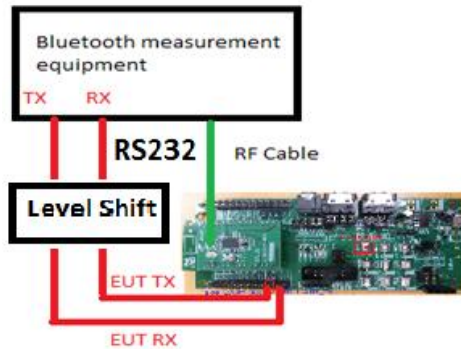
## 8. BLE Direct Test Mode

Test Realtek Bluetooth Low Energy Device Controlled through an HCI Uart Interface. This chapter describes the direct test mode mechanisms for testing Bluetooth Low Energy devices and explains how the direct test mode connection is established.

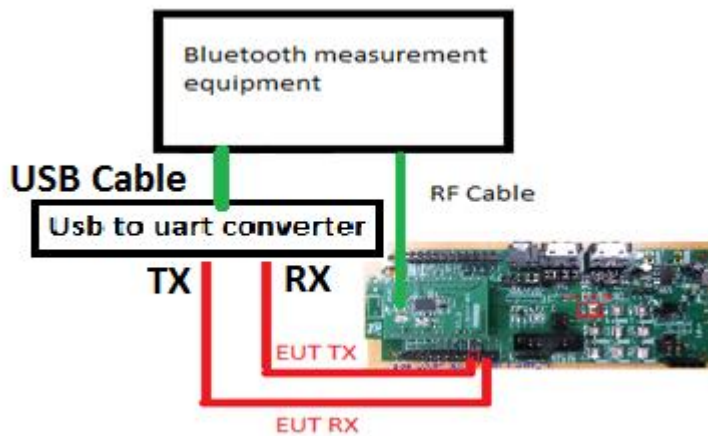
This Direct Test Mode MODE requires a direct connection to the Bluetooth measurement instrument. The Realtek Bluetooth Device uses the hci uart interface to connect to the Bluetooth measurement instrument.



If Bluetooth measurement instrument interface is RS232, you need a level shift board.



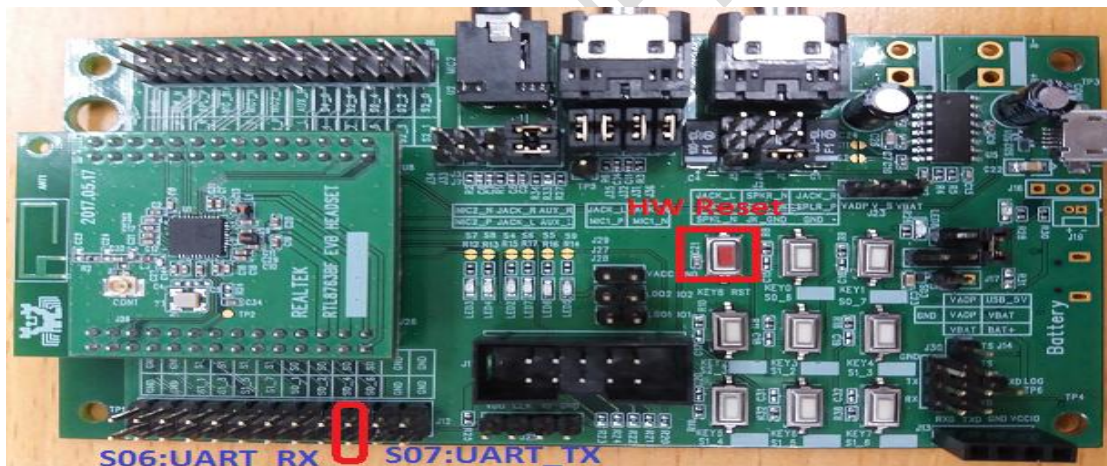
If Bluetooth measurement instrument interface has support USB converter UART board, such as FTDI USB converter board.



Realtek defines the uart pin as shown in the table below:

PIN Name	Interface
S06	UART RX
S07	UART TX

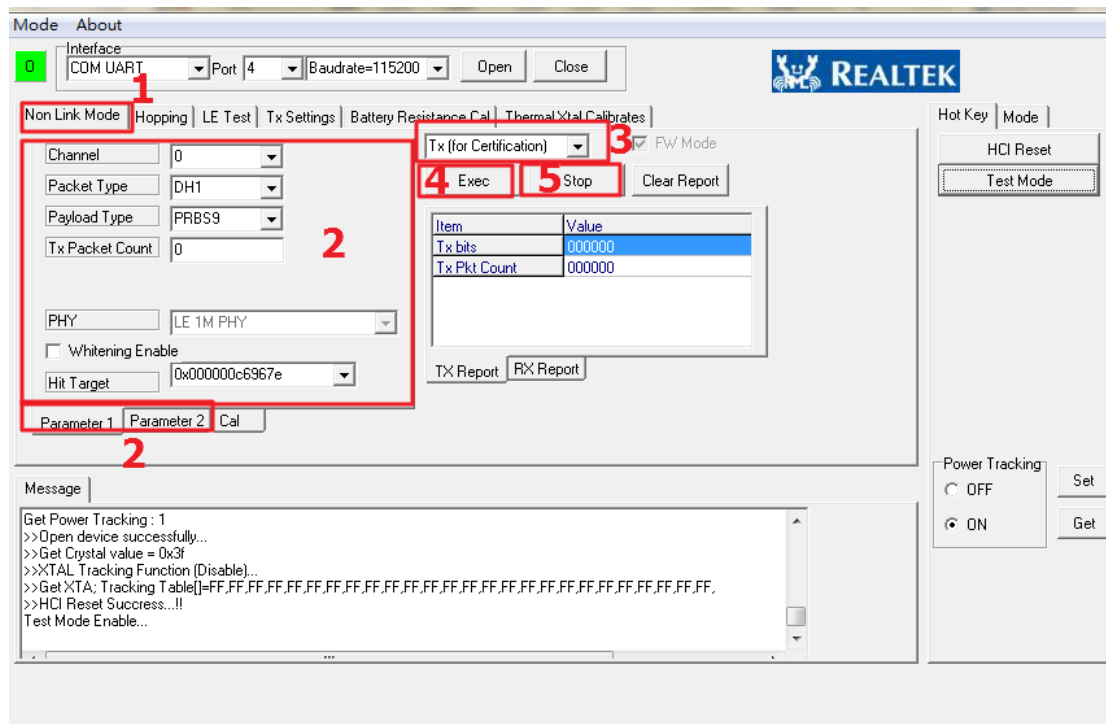
Reference EVB board define as:



### Configuration test environment step by step :

1. Connect an RF cable between the antenna connector on the EUT and Bluetooth measurement equipment.
2. Connect the HCI UART(RS232) TX to UART RX of Bluetooth measurement equipment ( level shift orusb converter board).
3. Connect the HCI UART(RS232) RX to UART TX of Bluetooth measurement equipment ( level shift orusb converter board).
4. Connect GND between the EUT and Bluetooth measurement equipment or connect USB Cable to Tester.
5. Push HW Reset pin and to begin test.

## 9. Non-Singling Mode Test (MP)



**Figure 8 How to set non-link mode parameter**

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)	0~0xFFFF 0 : infinite Tx packet count
Parameter 1	Tx Gain Level	Debug Mode : Default is disable ,if to debug then need to enable
Parameter 1	PHY	PHY Spec(BT4 ,BT5)
Parameter 1	Whitening Coeff Value	Enable Whitening Disable Whitening
Parameter 1	HitTarget	6 bytes
Parameter 2	PacketHeader	Spec define (default)

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” and ”Parameter 2”..
- **Step 3:** Select “Con-Tx”, “Pkt-Tx”, “Pkt-Rx”, or “Single Tone”.

Note: The LE Tx is only certification test .



- **Step 4:** Click “Exec” button.
- **Step 5:** After testing, click “Stop” button.

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

```
>>Get Crystal value = 0x3f  
>>XTAL Tracking Function (Disable)...  
>>Get XTAL Tracking Table[]=FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,FF,  
>>HCI Reset Success...!!  
Test Mode Enable...  
>>Enable TRX Thread Mode...!!  
>>ActionControlExecute(Tx (for Certification)) Success...!!
```

## 10. LE DUT TX/RX Test (MP)

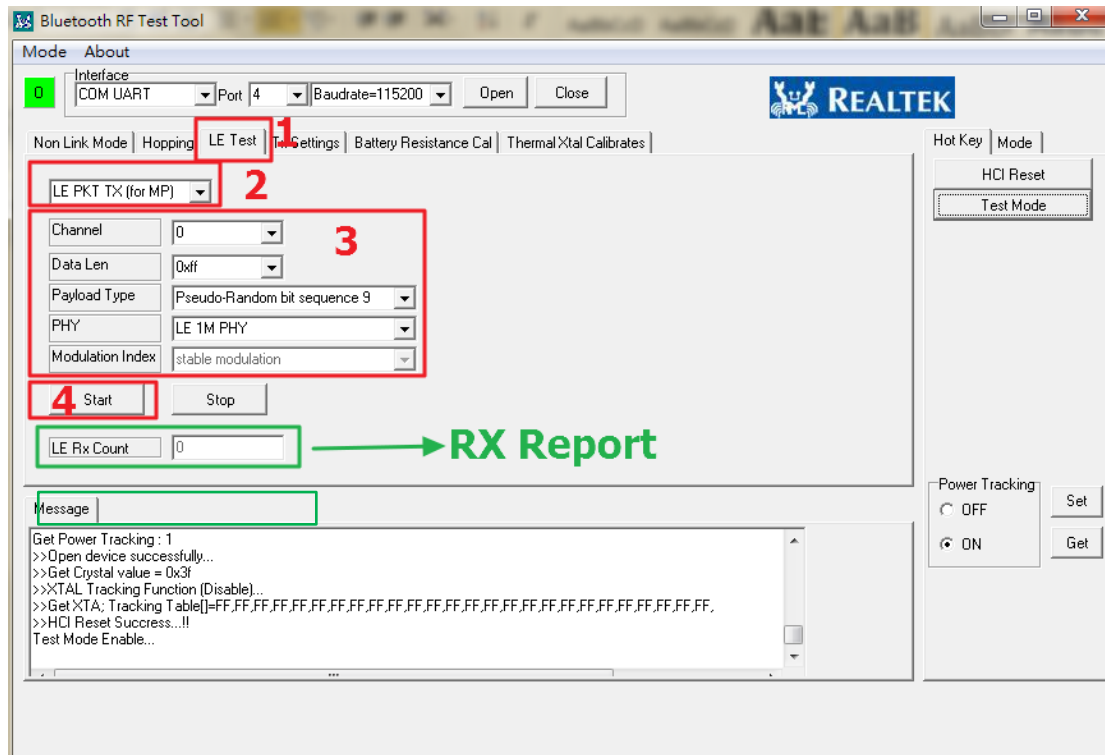


Figure 9 LE Test

- **Step 1:** Choose “LE Test”.
- **Step 2:** Choose “LE PKT TX” or “LE PKT RX”
- **Step 3:** Choose LE Test Parameters :
  - (a) Channel :0~39.
  - (b) Data length:0~0xFF
  - (c) PayType: PRBS9, 1111\_0000, 1010, PRBS15, ALL1, ALL0, 0000\_1111, 0101
  - (d) PHY: LE 1M PHY, LE 2M PHY, LE Coded PHY with S=8, LE Coded PHY with S=2
- **Step 4:** Click “Start” button and start to test. After testing, click “Stop” button.  
The green rectangle shows received LE Rx Packets in LE PKT RX mode.

## 11. Hopping Test (For Certification)

- Step1: Select “Hopping”
- Step 2: Choose “Packet Type”.  
Choose “Channel”.  
If whitening is enable, click the “Cbk\_Whitening” checkbox.
- Step 3: Click “Run” button and start to test.
- Step 4: After testing, click “Stop” button.

Name	Value Range
Packet Type	DH1, DH3, DH5, 2DH1, 2DH3, 2DH5, 3DH1, 3DH3, 3DH5 NULL : NULL packet
Type	Fix Channel or Hopping Mode
Ckb_Whitening	Enable/Disable Whitening
Start Channel	The range of hopping channels is between start channel and stop channel.
Stop Channel	

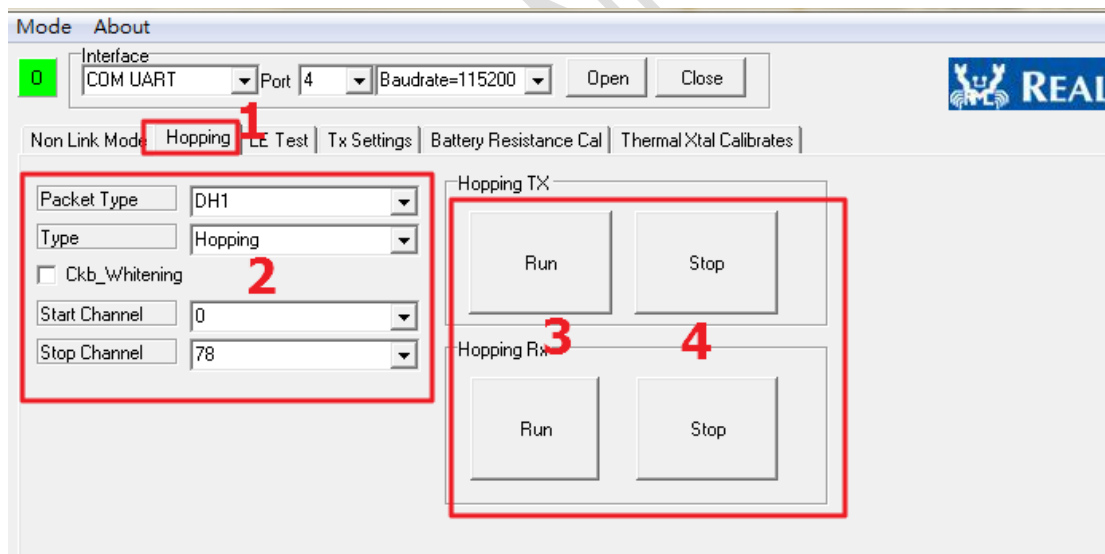


Figure 10 Hopping mode test



## 12. Set/Get frequency offset

The following steps show how to change the crystal value directly.

- Step 1: Select “Non Link Mode”.
- Step 2: Select “Cal”.
- Step 3: Set crystal value to register or get crystal value from register.

By changing the crystal value and transmitting signal tone over and over again, users could find the most accurate one.

- Step 4: Set the accurate crystal value to device.

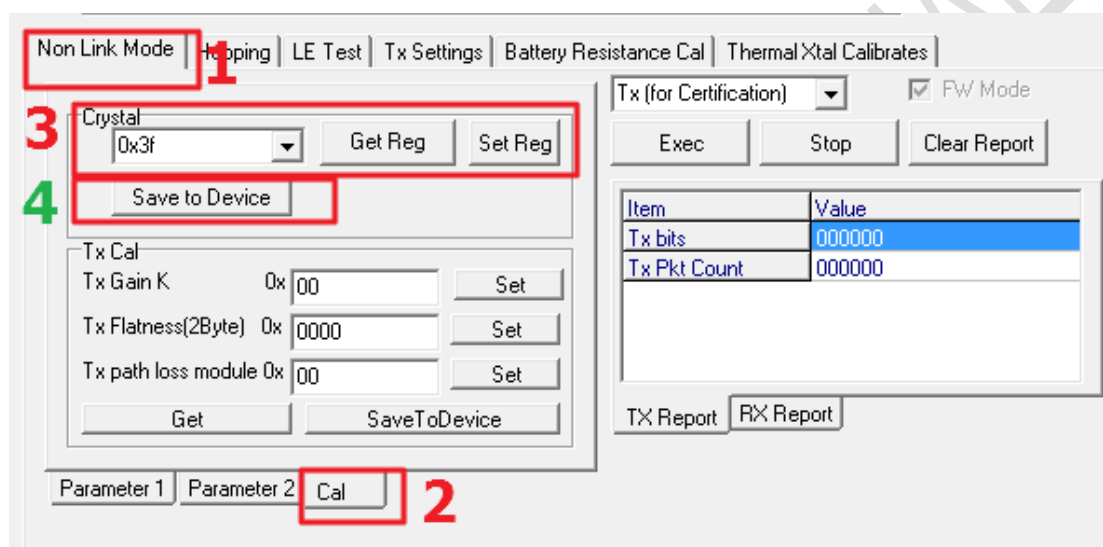


Figure 11 Get/Set crystal value directly

## 13. Calibrates Tx Power Debug Function

In Mass Production, the Tx calibration data must be recorded and written to flash. For debug, RF Tool can set to calibration data to RAM.

The Tx Gain K is tx power validation of chip. The Tx Flatness is compensation value between channels. The Tx path loss module is RF loss of module. Those define can refer “MP tool User guide for Realtek windows DLL\_RTL8763B “.

RF Tool have three function:

1. Set : Set value to RAM. If power off , then reset.
2. Get: Get current value of FW.
3. SaveToDevice: Writing RF parameter to device.

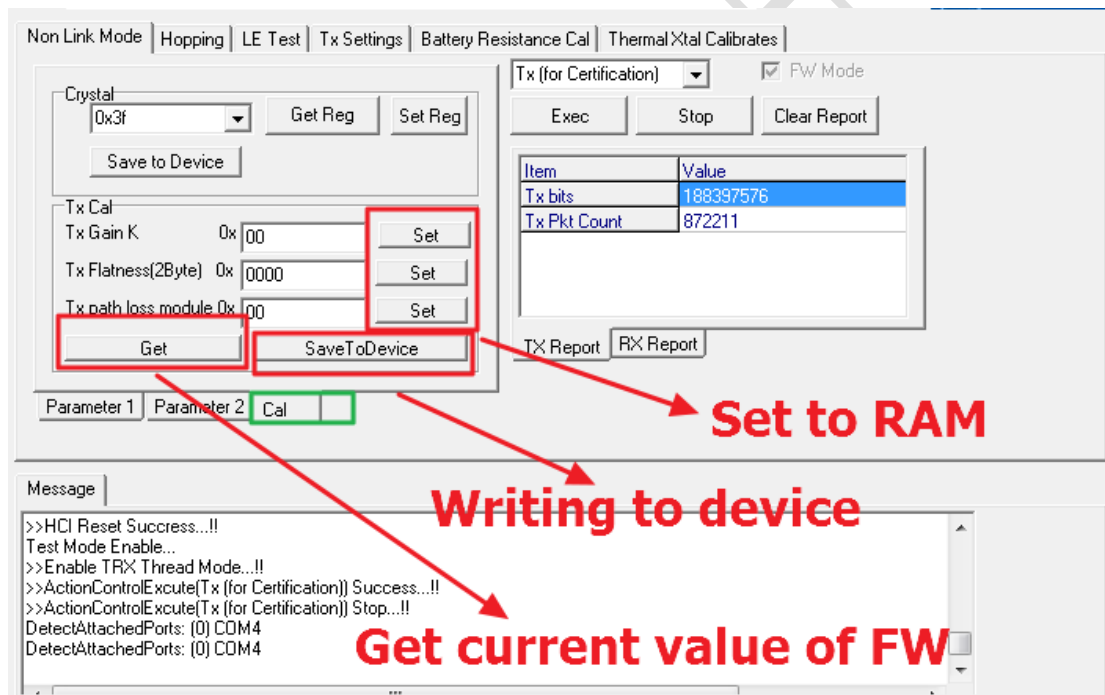
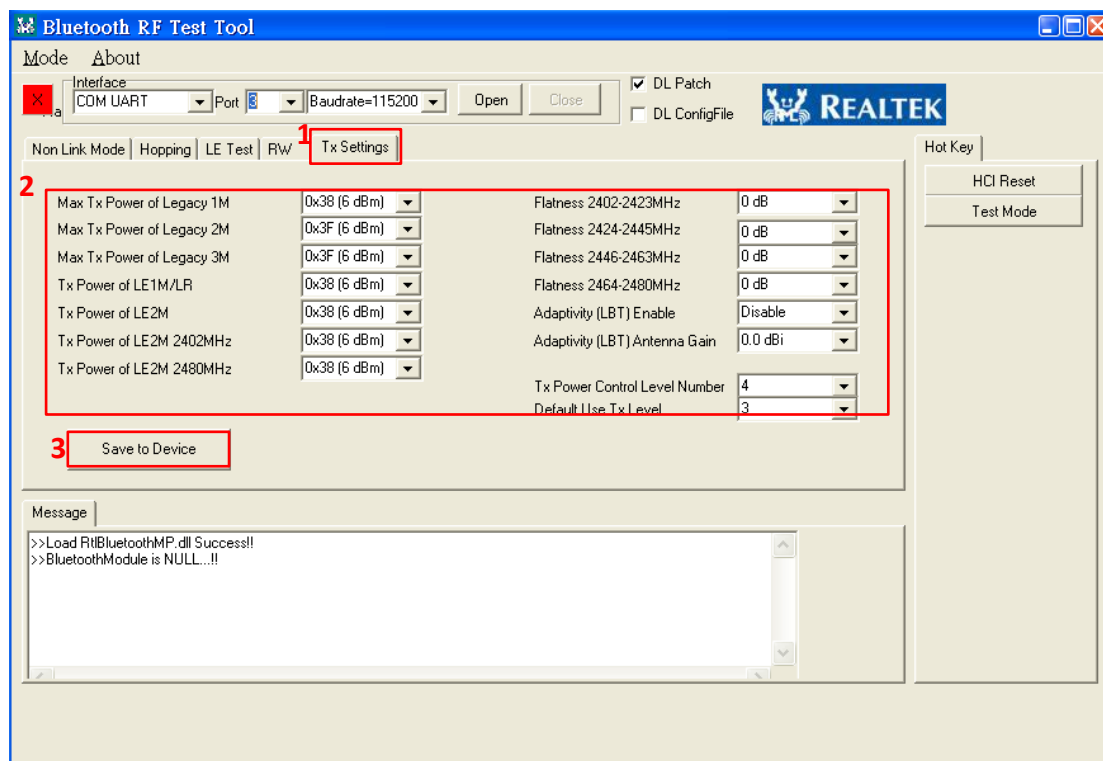


Figure 12 Calibrates Tx Power Debug Function

## 14. Save Tx Settings to Device

- Step1: Select “Tx Settings”
- Step2: Choose the suitable tx settings.
- Step3: Click “Save to Device” button to save them.



**Figure 13 Save Tx Settings to Device**

Name	Remarks
Max Tx Power of Legacy 1M	Decide the max tx power of legacy 1M (BR)
Max Tx Power of Legacy 2M	Decide the max tx power of legacy 2M (EDR)
Max Tx Power of Legacy 3M	Decide the max tx power of legacy 3M (EDR)
Tx Power of LE1M/LR	Decide the tx power of LE 1M and LE LR (BLE)
Tx Power of LE2M	Decide the tx power of LE 2M (BLE)
Tx Power of LE2M 2402MHz	Decide the tx power of LE 2M in 2402MHz(BLE)
Tx Power of LE2M 2480MHz	Decide the tx power of LE 2M in 2480MHz(BLE)
Flatness 2402-2423MHz	Fine tune tx power in 2402-2423MHz
Flatness 2424-2445MHz	Fine tune tx power in 2424-2445MHz
Flatness 2446-2463MHz	Fine tune tx power in 2446-2463MHz
Flatness 2464-2480MHz	Fine tune tx power in 2464-2480MHz

Adaptivity (LBT) Enable	Enable function for passing Adaptivity Test
Adaptivity (LBT) Antenna Gain	Adaptivity Test $EIRP = Tx\ Power + Antenna\ Gain$ (depending on antenna design)'
Tx Power Control Level Number	Decide the number of level for Power Control
Default Use Tx Power Level	Decide the default Tx power level of Basic Rate and Enhanced Data Rate, 0 represents the max power

REALTEK CONFIDENTIAL