



everyday genius

MT7920

Test-Mode Software Application Note

Part-1: QA-Tool User Guideline

Version:	V1.0
Release Date:	2024-04-18

© 2024 MediaTek Inc.

This document contains information that is proprietary to MediaTek Inc.

Unauthorized reproduction or disclosure of this information in whole or in part is strictly prohibited.

Specifications are subject to change without notice.



Document Revision History

Version	Date	Author	Change List
V1.0	20240418	Jerry Tai	Initial draft release.



Table of Contents

Document Revision History.....	2
Table of Contents	3
1 System overview	5
1.1 General Description.....	5
2 QA-Tool	6
2.1 How to install QA-tool	6
2.1.1 Install WinPcap	7
2.1.2 Windows 7 Security for new x64 signature mechanism	8
2.1.3 Windows 10 install note	9
2.1.4 QA-Tool Windows driver	10
2.1.5 Non MTK PID/VID driver install	12
2.2 How to use QA-tool	14
2.2.1 Launch QA-Tool	14
2.2.2 Start QA-Tool in BIN-file Mode.....	14
2.2.3 Start QA-Tool in E-fuse Mode.....	15
2.3 How to Use the QA-Tool	16
2.3.1 WIFI Packets Transmitting –1 stream.....	16
2.3.2 WIFI Packets Transmitting –2 stream.....	17
2.3.3 WIFI Packets Receiving –1 stream	18
2.3.4 WIFI Packets Receiving –2 stream	19
2.3.5 WIFI Packets 11ax RU TX (HE TB (trigger based)) Transmitting – 1 stream	20
2.3.6 WIFI Packets 11ax RU TX (HE TB (trigger based)) Transmitting – 2 stream	27
2.3.7 WIFI Packets 11ax RU RX (HE MU (multi user)) Receiving – 1 stream.....	34
2.3.8 WIFI Packets 11ax RU RX (HE MU (multi user)) Receiving – 2 stream.....	36



2.4 Read, Write E-fuse Table..... 38

2.4.1 Read a Value from E-fuse..... 38

2.4.2 Write a Value to E-fuse..... 39



1 System overview

1.1 General Description

MT7920 chip is highly integrated single chip which have built in 2x2 dual-band wireless LAN and Bluetooth combo radio. It can be configured in test-mode for performance validation, production testing and regulatory certification. There are two software tools, QA-Tool and Combo-Tool responsible for evaluating WIFI and Bluetooth signal and performance testing. This document is introducing how to install and use QA-Tool.



2 QA-Tool

Users have to install 3 major software before using QA-Tool.

- WinPcap
- Windows7 X64 security package
- QA-Tool Windows driver

MTK strongly recommends install QA-Tool on Windows 7-64bit operating system.

2.1 How to install QA-tool

Please follow the procedure listed in below to install QA-Tool

- 1st : Install WinPcap
- 2nd : Update Windows7 security package to register x64 signature mechanism
- 3rd : Instal QA-Tool Windows driver.

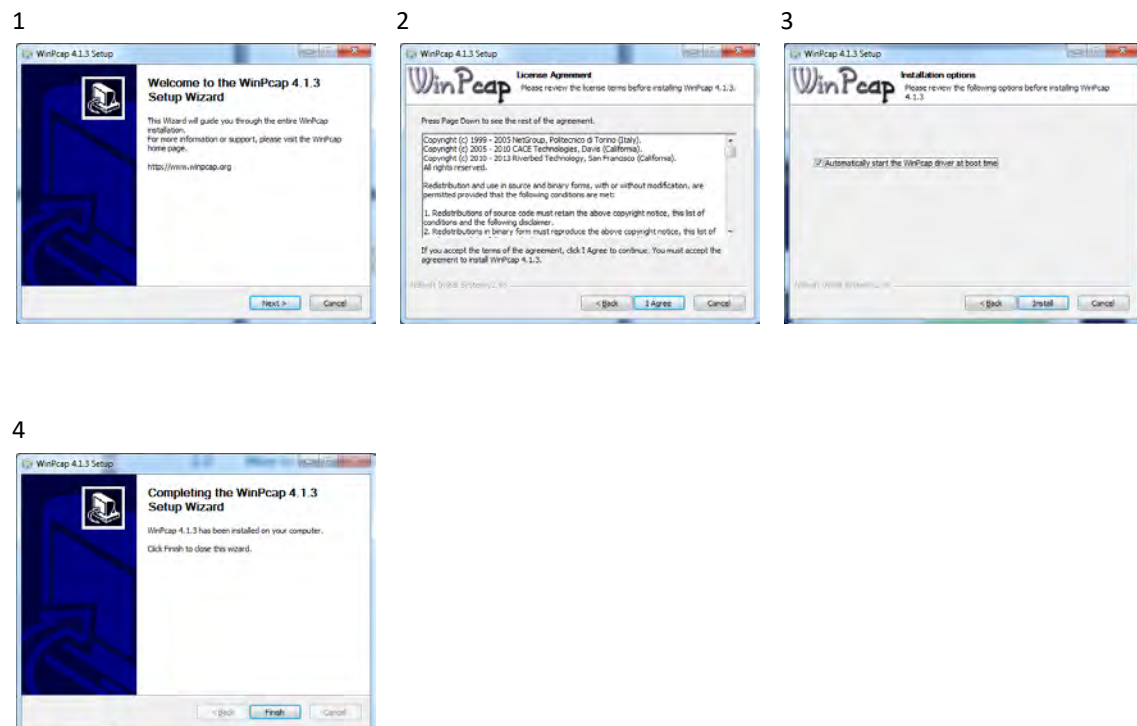
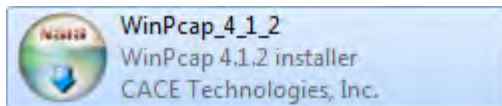


2.1.1 Install WinPcap

If users are the 1st time operating this tool, users should install WinPcap at first. Please follow below link and steps to install this software.

<https://www.winpcap.org/install/>

WinPcap version: 4.1.2 or later.





2.1.2 Windows 7 Security for new x64 signature mechanism

If you are the 1st time to use this tool, you should update Windows Security for new X64 signature mechanism at first. Please follow below link to install this software.

<https://www.microsoft.com/en-us/download/details.aspx?id=46148>

Security Update for Windows 7 for x64-based Systems (KB3033929)

Select Language:

English

Download

A security issue has been identified in a Microsoft software product that could affect your system.

- + Details
- + System Requirements
- + Install Instructions
- + Related Resources



2.1.3 Windows 10 install note

If users can't install the driver in Windows 10 due to driver integrity check. Try to disable the integrity check to allow installation.

- **Disable Driver Integrity Check**

1. Open cmd as Administrator.
2. Execute 'bcdedit /set nointegritychecks on'
3. Reboot
4. Then install again. If still fail, try do 'Disable Secure Boot' below.

NOTE: Re-enable the driver integrity check by executing 'bcdedit /set nointegritychecks off' and then rebooting.

- **Disable Secure Boot**

Please refer to:

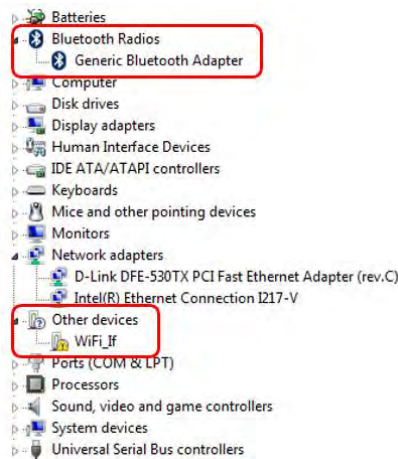
<https://docs.microsoft.com/en-us/windows-hardware/manufacture/desktop/disabling-secure-boot>

2.1.4 QA-Tool Windows driver

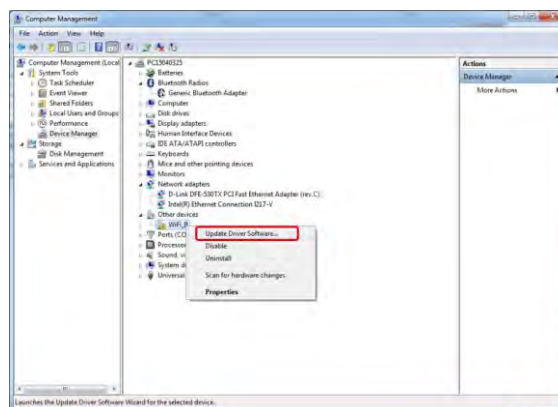
MT7920 supports USB, SDIO and PCIE interface. According to interface type of MT7920 on users' hand, please refer to steps shown below to install QA-Tool Windows driver:

USB interface:

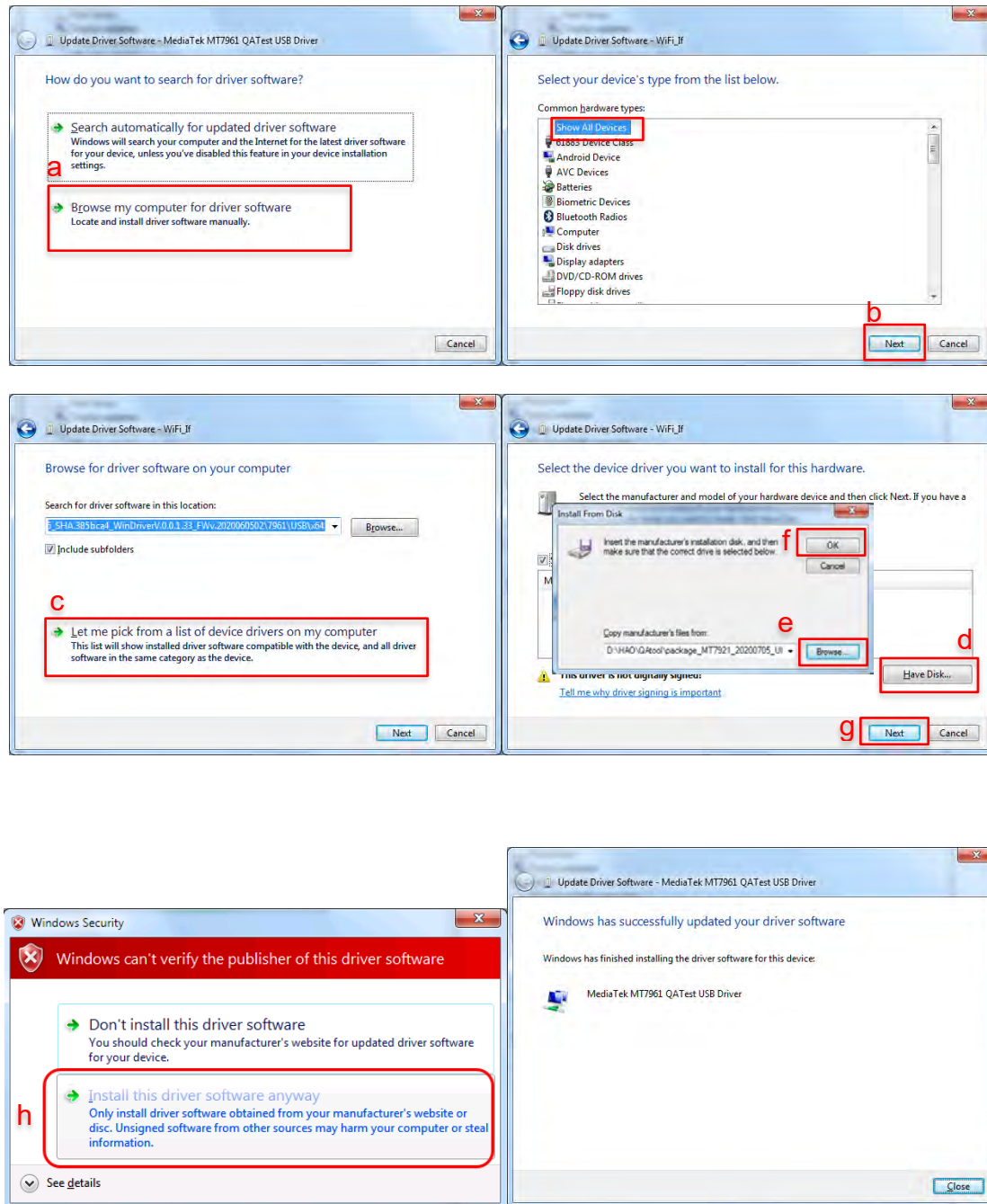
1. Connect DUT to PC/NB and check Windows Device Manager.
2. Window Device Manager would discover DUT shows "**Generic Bluetooth Adapter**"(BT device) and "**WiFi_If**"(WiFi device).



3. Right-click on "**WiFi_If**" Wifi device and Update Driver Software.



4. According user's Windows' OS to select and install test tool driver.



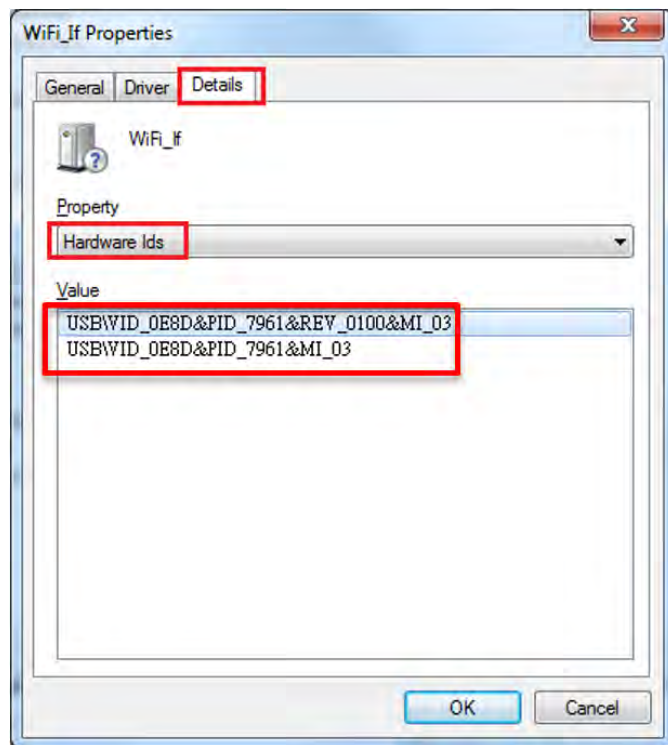
2.1.5 Non MTK PID/VID driver install

If user can't install driver in previous section due to change PID/VID by burning e-fuse.
Please follow below steps to add PID/VID permission in driver information file.

1. Check the PID/VID (User could skip this step if already have PID/VID)
 - a. Open Windows **Device Manager**.
 - b. Click right on "**WiFi_If**" and select **Properties**.



- c. Select **Detail** sheet and select **Hardware ids** item.
User can find PID/VID of DUT here. (For example, below VID = 0E8D/PID = 7961)



2. Open PID/VID permission file.
 - USB interface : ..\MT7961\USB\x64\MTKUQA7961.inf
 - SDIO interface : ..\MT7961\SDIO\x64\MTKSQA7961.inf
 - PCIE interface : ..\MT7961\SDIO\x64\MTKEQA7961.inf
3. Find x86 or x64 in the file.
4. Copy a line and modify new PID/VID of DUT in the file and save it.
(For example: %UsbDumpr_MT7603.DeviceDesc% =UsbDumpr_MT7603.ndi,
USB\VID_0E8D&PID_7961&REV_0100&MI_03)
5. Back to previous section and install driver again.

```

*****
;
; x86
*****
[Adapters]
; DisplayName          Section          DeviceID
; -----
%UsbDumpr_MT7603.DeviceDesc% =UsbDumpr_MT7603.ndi,      USB\VID_0E8D&PID_7961
%UsbDumpr_MT7603.DeviceDesc% =UsbDumpr_MT7603.ndi,      USB\VID_0E8D&PID_7961&REV_0100
%UsbDumpr_MT7603.DeviceDesc% =UsbDumpr_MT7603.ndi,      USB\VID_0E8D&PID_7961&MI_00
%UsbDumpr_MT7603.DeviceDesc% =UsbDumpr_MT7603.ndi,      USB\VID_0E8D&PID_7961&REV_0100&MI_00
%UsbDumpr_MT7603.DeviceDesc% =UsbDumpr_MT7603.ndi,      USB\VID_0E8D&PID_7961&MI_03
%UsbDumpr_MT7603.DeviceDesc% =UsbDumpr_MT7603.ndi,      USB\VID_0E8D&PID_7961&REV_0100&MI_03

*****
;
; x64
*****
[Adapters.NTAMD64]
; DisplayName          Section          DeviceID
; -----
%UsbDumpr_MT7603.DeviceDesc% =UsbDumpr_MT7603.ndi,      USB\VID_0E8D&PID_7961
%UsbDumpr_MT7603.DeviceDesc% =UsbDumpr_MT7603.ndi,      USB\VID_0E8D&PID_7961&REV_0100
%UsbDumpr_MT7603.DeviceDesc% =UsbDumpr_MT7603.ndi,      USB\VID_0E8D&PID_7961&MI_00
%UsbDumpr_MT7603.DeviceDesc% =UsbDumpr_MT7603.ndi,      USB\VID_0E8D&PID_7961&REV_0100&MI_00
%UsbDumpr_MT7603.DeviceDesc% =UsbDumpr_MT7603.ndi,      USB\VID_0E8D&PID_7961&MI_03
%UsbDumpr_MT7603.DeviceDesc% =UsbDumpr_MT7603.ndi,      USB\VID_0E8D&PID_7961&REV_0100&MI_03

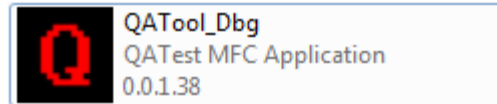
```



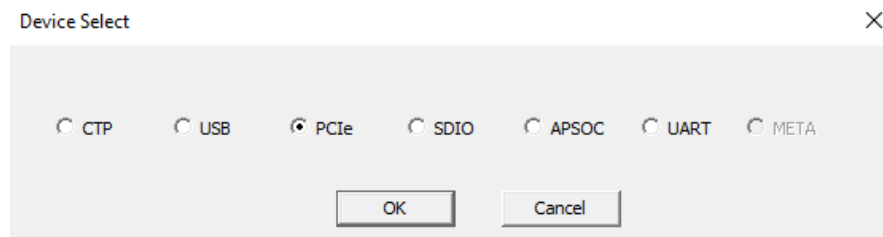

2.2 How to use QA-tool

2.2.1 Launch QA-Tool

Double-click on QA-Tool icon “QATool_Dbg.exe” and Device Select window will pop up.



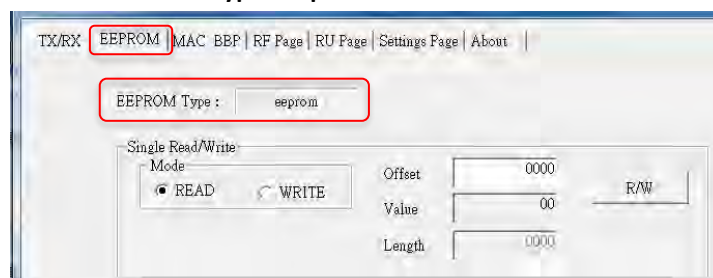
Select interface type and click “OK” button to lunch QA-Tool.



There are two modes, BIN-file mode and E-fuse mode, supported by QA-tool. Section 2.2.2 & 2.2.3 provide details about respective mode.

2.2.2 Start QA-Tool in BIN-file Mode

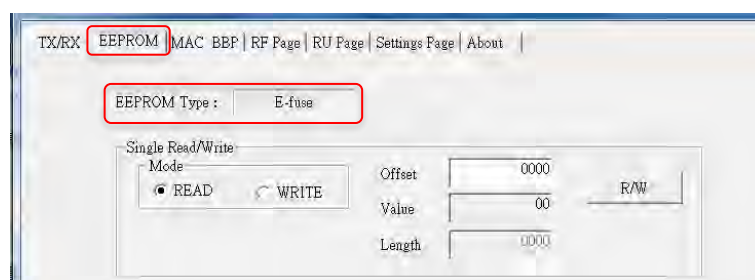
To start in BIN-file mode user can use “**eeeprom.bin**” while launching QA tool. If “QATool_Dbg.exe” accompanies “**eeeprom.bin**” file in the same folder, QA-tool will start in BIN-file mode. After QA-tool is launched, users can check “EEPROM” sheet to have **EEPROM Type : eeeprom** to know the mode of QA-Tool in operating.





2.2.3 Start QA-Tool in E-fuse Mode

If “eeprom.bin” file leaves the folder of “QATool_Dbg.exe”, QA-tool will starts in E-fuse mode. User also check EEPROM Type : E-fuse in “EEPROM” sheet.





2.3 How to Use the QA-Tool

All functionalities introduced in this section support both BIN-file mode and E-fuse mode.

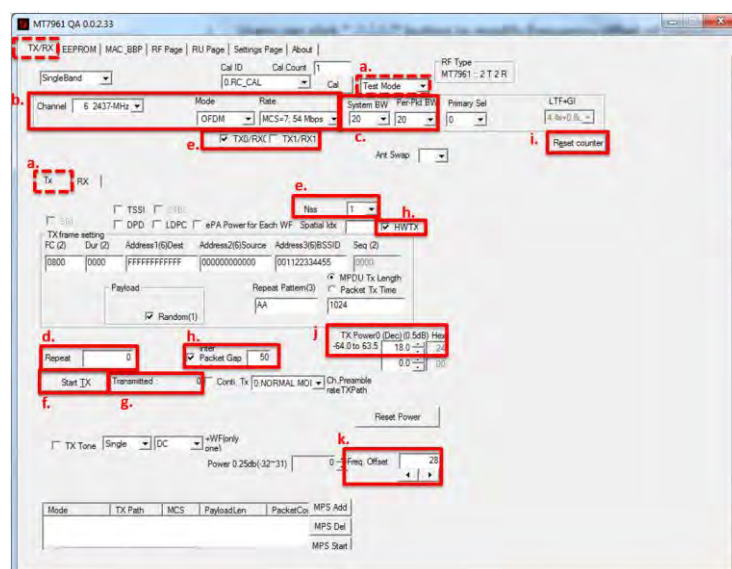
2.3.1 WIFI Packets Transmitting –1 stream

On TX/RX page:

- Select TX sub-page and “**Test Mode**” as following figure.
- Set Channel/Mode/Rate.
- Set BW. (Generally, System BW = Pre-Packet BW).
- Set packet number. (0 means infinite packets)
- Select “**Nss=1**” and choose “TX0 or TX1 only” to do transmitting.
- Click “**Start TX**” button to start packet transmitting and click “**Stop TX**” button to stop.
- The transmitted packets number is shown at “**Transmitted:**” area.
 - If users want to adjust packets duty cycle, click “**HWTX**” and adjust Inter Packet Gap to modify packets duty cycle.
 - Click “**Start TX**” button to start TX and click “**Stop TX**” button to stop TX. (Minimum/Maximum value of **Inter Packet Gap** is 34us/160us)
- Users can click “**Reset counter**” button to reset “**Transmitted:**” area.
- Users can click “” button to modify power level of transmitting signal.
- Users can click “” button to modify frequency offset of transmitting signal.

Note: Please *re-trigger "HWTX" if users change Channel/Mode/Rate/BW.

*Re-trigger "HWTX": click "**Stop TX**" button and un-click "HWTX", and then click "HWTX" and click "**Start TX**" bottom again.





An example of TX0 transmitting OFDM 54M infinite packets at 2437MHz

2.3.2 WIFI Packets Transmitting –2 stream

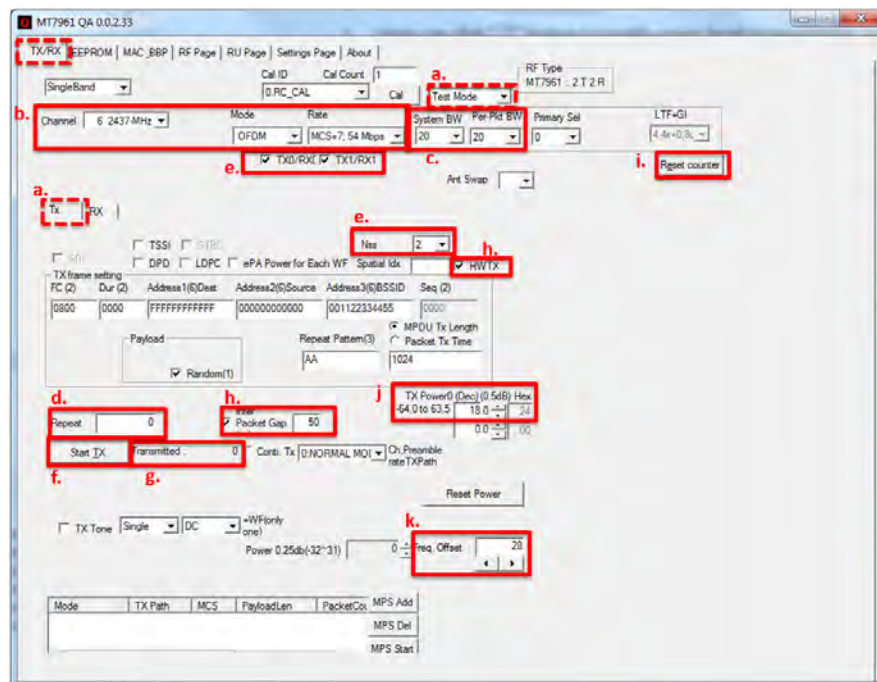
On TX/RX page:

- Select TX sub-page and “**Test Mode**” as following figure.
- Set Channel/Mode/Rate.
- Set BW. (Generally, System BW = Pre-Packet BW).
- Set packet number. (0 means infinite packets)
- Select “**Nss=2**” and choose both “TX0” and “TX1” to do transmitting.
- Click “**Start TX**” button to start packet transmitting and click “**Stop TX**” button to stop.
- The transmitted packets number is shown at “**Transmitted:**” area.
- If users want to adjust packets duty cycle, click “HWTX” and adjust Inter Packet Gap to modify packets duty cycle.
 - Click “Start TX” button to start TX and click “Stop TX” button to stop TX.

(Minimum/Maximum value of Inter Packet Gap is 34us/160us)
- Users can click “**Reset counter**” button to reset “**Transmitted:**” area.
- Users can click “” button to modify power level of transmitting signal.
- Users can click “” button to modify frequency offset of transmitting signal.

Note: Please *re-trigger "HWTX" if users change Channel/Mode/Rate/BW.

*Re-trigger "HWTX": click "**Stop TX**" button and un-click "HWTX", and then click "HWTX" and click "**Start TX**" bottom again.

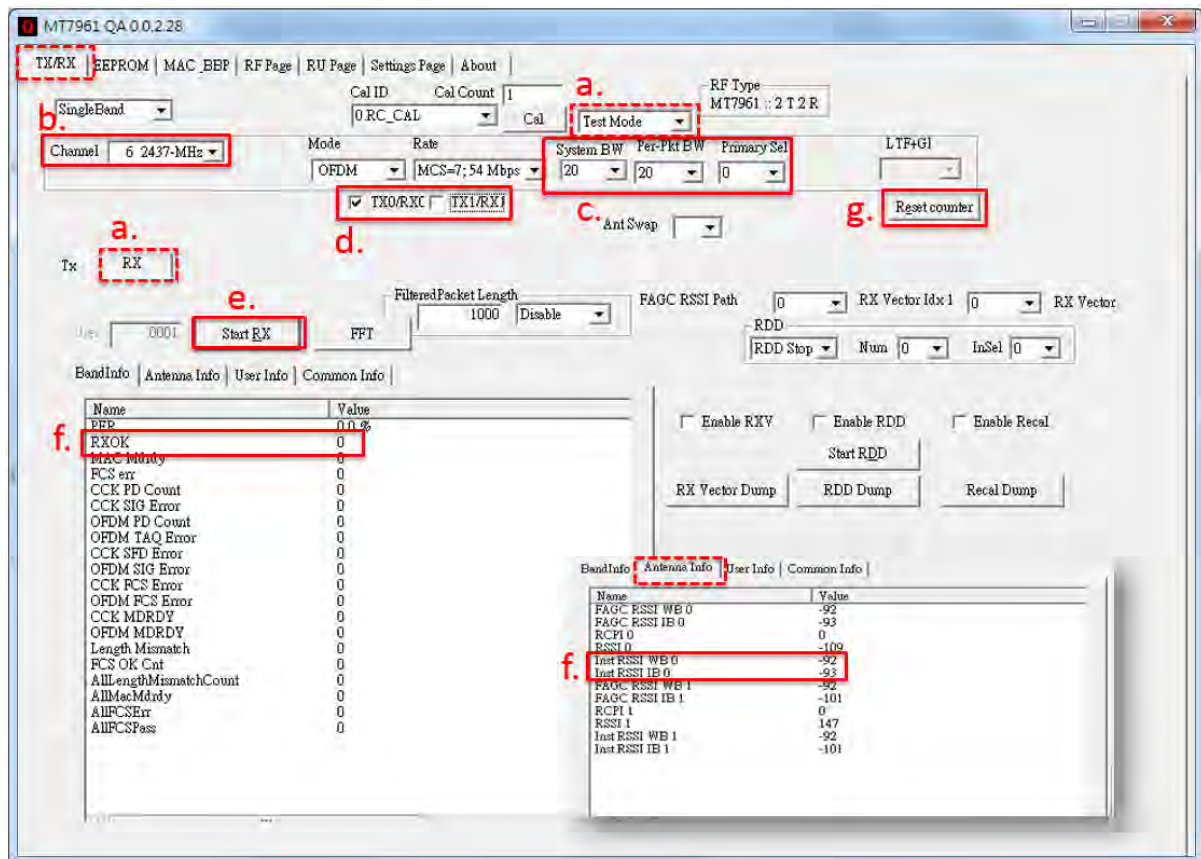


An example of 2TX transmitting OFDM 54M infinite packets at 2437MHz

2.3.3 WIFI Packets Receiving –1 stream

On TX/RX page

- Select RX sub-page and “Test Mode” as following figure.
- Set Channel frequency.
- Set BW. (Generally, System BW = Pre-Packet BW).
- Choose “RX0 or RX1 only” to do receiving.
- Click “**Start RX**” button to receive WIFI packets.
Enable WIFI signal generator to transmit packets. Click “**Stop RX**” button to stop receiving.
- Successful received packets number would be shown at “RX OK” area and RSSI shown at “inst RSSI IB 0” area.
- Users can click “**Reset counter**” button to reset counter value.

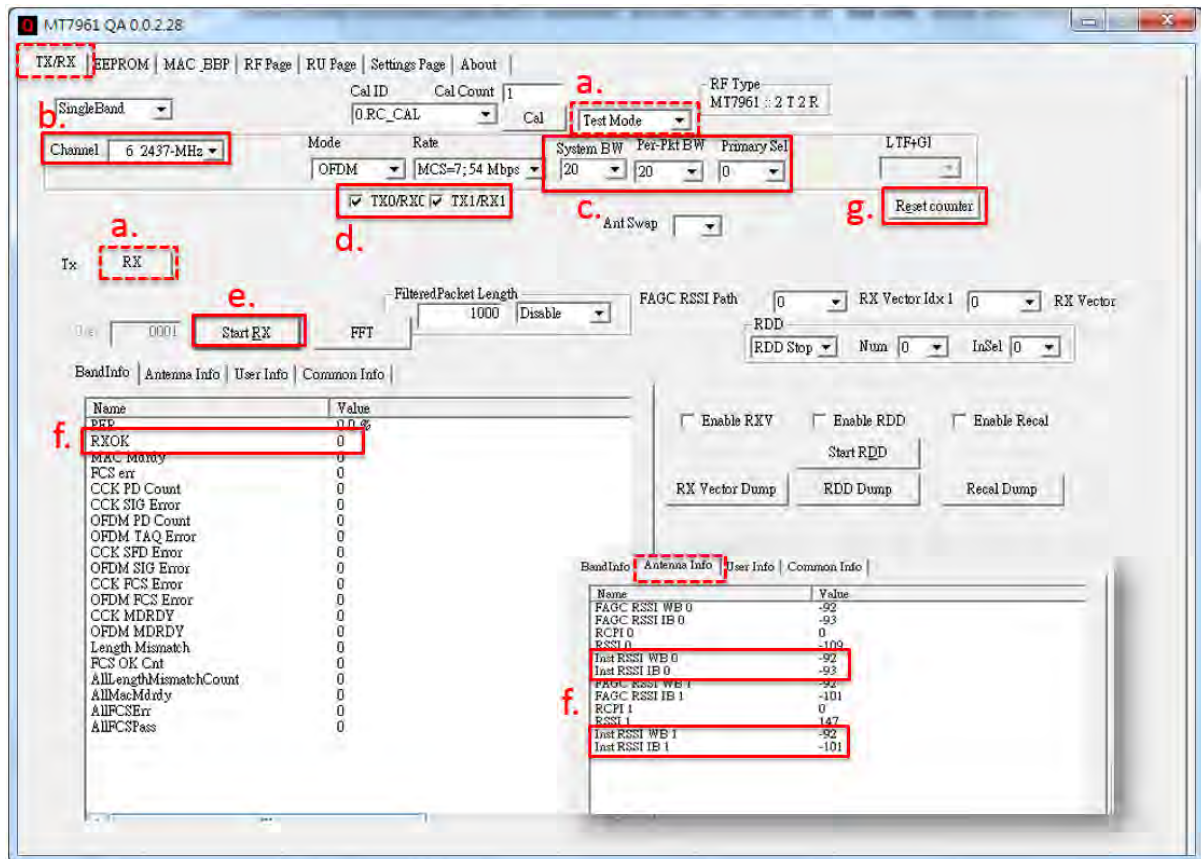


An example of WiFi packets receiving – RX0 (BW20 at 2437MHz)

2.3.4 WIFI Packets Receiving –2 stream

On TX/RX page

- Select RX sub-page and “Test Mode” as following figure.
- Set Channel frequency.
- Set BW. (Generally, System BW = Pre-Packet BW).
- Choose both “RX0” and “RX1” to do receiving.
- Click “Start RX” button to receive WIFI packets.
Enable WIFI signal generator to transmit packets. Click “Stop RX” button to stop receiving.
- Successful received packets number would be shown at “RX OK” area and RSSI shown at “inst RSSI IB 0” and “inst RSSI IB 1” area.
- Users can click “Reset counter” button to reset counter value.



An example of WiFi packets receiving – 2RX (BW20 at 2437MHz)

2.3.5 WIFI Packets 11ax RU TX (HE TB (trigger based)) Transmitting – 1 stream

On TX/RX page:

- Select TX sub-page and “Test Mode” as following figure.
- Set Channel and select HE_TB Mode.
- Set BW. (Generally, System BW = Pre-Packet BW).
- Set packet number. (0 means infinite packets)
- Select “Nss=1” and choose “TX0 or TX1 only” to do transmitting.
- Set LTF+GI index. (Generally, setting index 2)

MT7961 QA 0.0.2.33

TX/RX | EEPROM | MAC_BB | RF Page | RU Page | Settings Page | About

SingleBand | Cal ID | Cal Count | 1 | Cal | RF Type | MT7961 :: 2 T 2 R

Channel | 36 5180-MHz | Mode | HE_TB | Rate | MCS9=9 | System BW | 20 | Per-Pkt BW | 20 | Primary Sel | 0 | L-SIG Len |

Test Mode | LTF+GI | 2:4x+3:2 |

TX0/RX1 | TX1/RX1 |

Nss | 1 |

TX frame setting

FC (2)	Dur (2)	Address1(6)Dest	Address2(6)Source	Address3(6)BSSID	Seq (2)
0800	0000	FFFFFFFFFFFF	000000000000	001122334455	0000

Repeat | 0 |

TX Power0 (Dec) (0.5dB) Hex

-64.0 to 63.5 | 17.5 | 23 |

0.0 | 00 |

Start TX | Transmitted : | 0 | Conti. Tx | 0: NORMAL MOI | Ch. Preamble rate TX Path

TX Tone | Single | DC | +WF (only one) | Power 0.25db (-32~31) | 0 | Freq. Offset | 28

Mode	TX Path	MCS	PayloadLen	PacketCoi	MPS Add
					MPS Del
					MPS Start

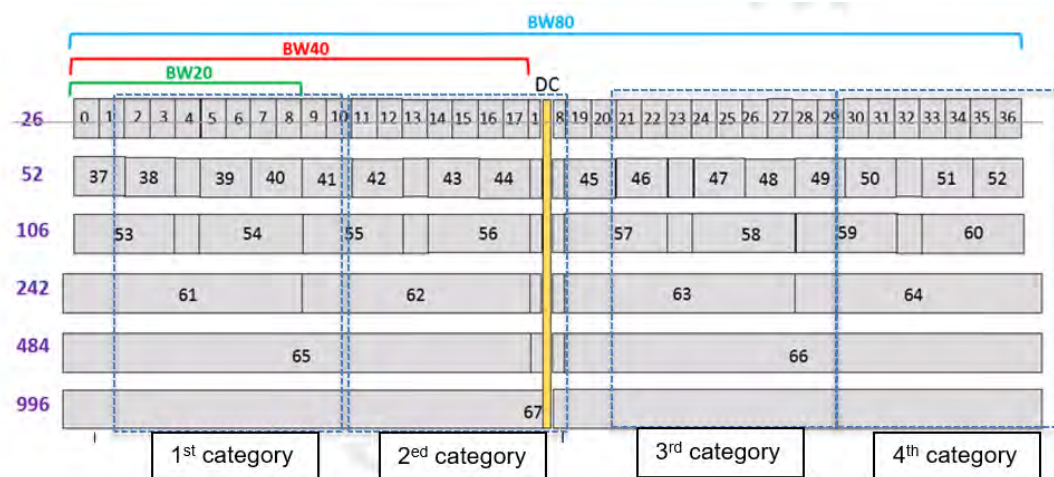
On RU page:

- g. Select RU sub-page
- h. Set Category

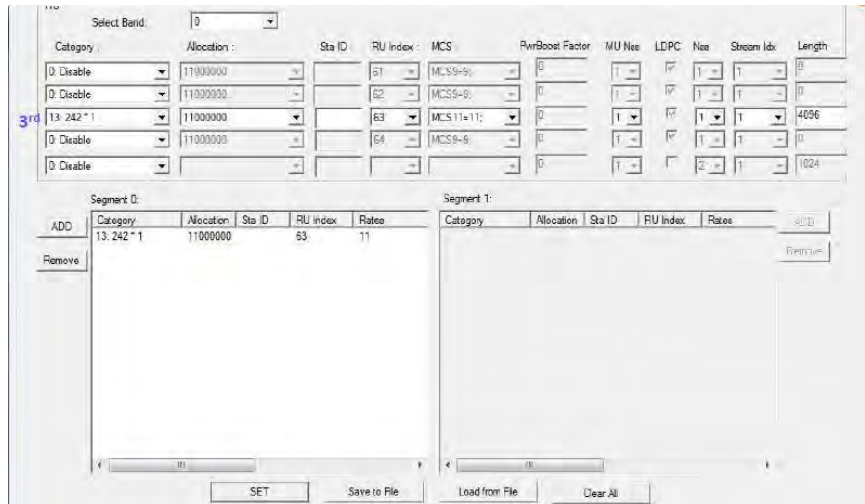
RU size	Category
RU26	26*9
RU52	52*4
RU106	106+106
RU242	242*1
RU484	484*1
RU996	996*1

- i. Set RU index (wanted TB RU location).

Refer to the RU Index from below (one category can only support 20Mhz bandwidth)



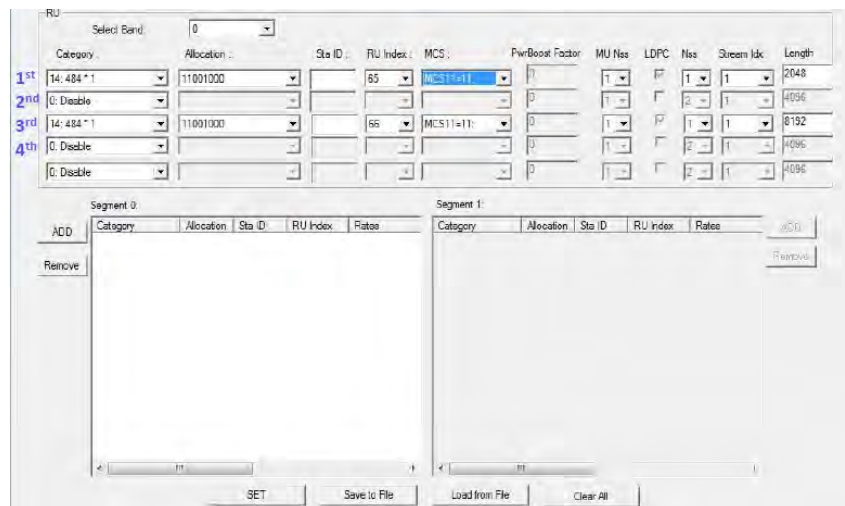

BW20(RU242) category



The screenshot shows the 'Select Band' dropdown set to '0'. The main table lists configurations for various categories. The '3rd' row is highlighted, showing '13: 242 * 1' with an allocation of '11000000', STA ID '63', RU Index '63', MCS '11', and a length of '4096'. Below the table, 'Segment 0' and 'Segment 1' sections are visible, each with an 'ADD' button and a 'Remove' button. The 'SET', 'Save to File', 'Load from File', and 'Clear All' buttons are at the bottom.

Category	Allocation	Sta ID	RU Index	MCS	PwrBoost Factor	MU Nss	LDPC	Nss	Stream Idx	Length
0: Disable	11000000		61	MCS9-9	0	1		1	1	0
0: Disable	11000000		62	MCS9-9	0	1		1	1	0
13: 242 * 1	11000000		63	MCS11+11	0	1		1	1	4096
0: Disable	11000000		64	MCS9-9	0	1		1	1	0
0: Disable					0	1		2	1	1024

BW20(RU242 index63) category



The screenshot shows the 'Select Band' dropdown set to '0'. The main table lists configurations for various categories. The '1st' row is highlighted, showing '14: 484 * 1' with an allocation of '11001000', STA ID '65', RU Index '65', MCS '11', and a length of '2048'. The '2nd' row is '0: Disable', the '3rd' row is '14: 484 * 1' with a length of '8192', and the '4th' row is '0: Disable' with a length of '4096'. Below the table, 'Segment 0' and 'Segment 1' sections are visible, each with an 'ADD' button and a 'Remove' button. The 'SET', 'Save to File', 'Load from File', and 'Clear All' buttons are at the bottom.

Category	Allocation	Sta ID	RU Index	MCS	PwrBoost Factor	MU Nss	LDPC	Nss	Stream Idx	Length
14: 484 * 1	11001000		65	MCS11+11	0	1		1	1	2048
0: Disable					0	1		2	1	4096
14: 484 * 1	11001000		66	MCS11+11	0	1		1	1	8192
0: Disable					0	1		2	1	4096
0: Disable					0	1		2	1	4096

BW40(RU484) category



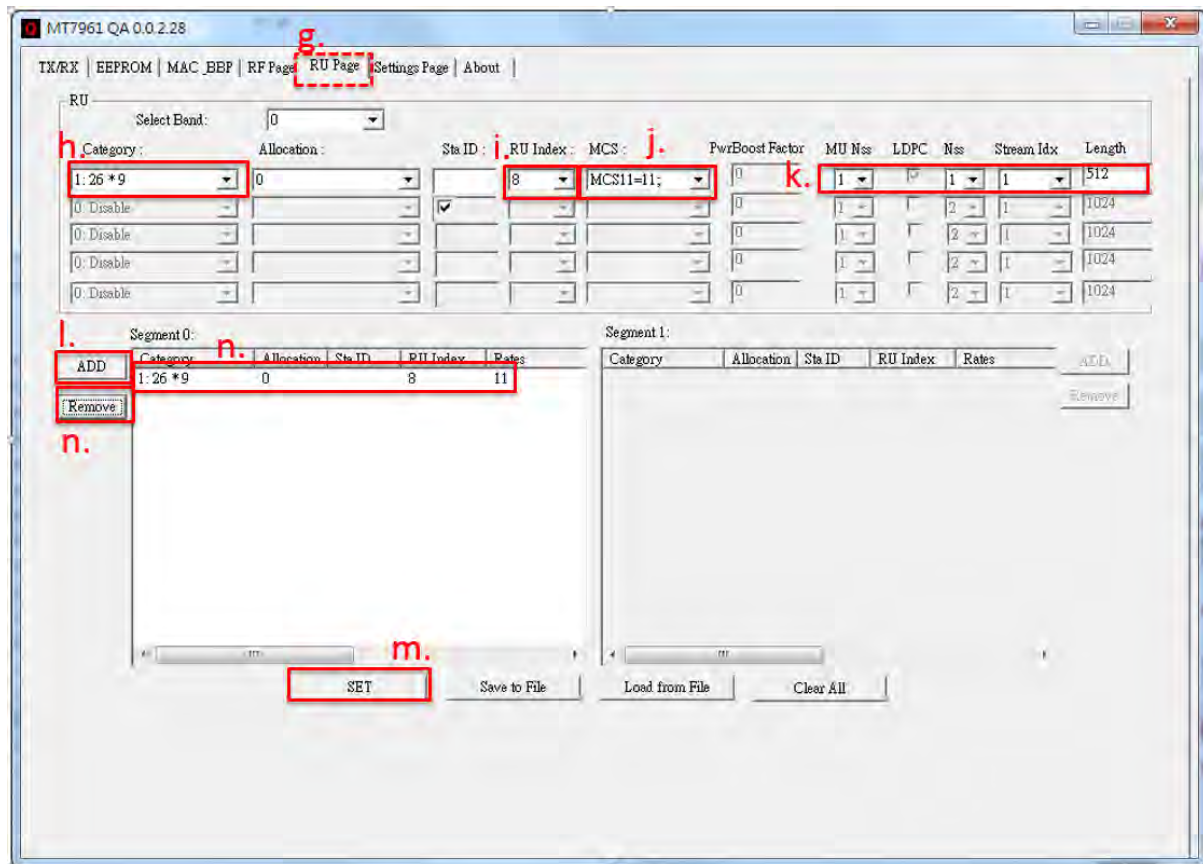
BW80(RU996) category

- j. Set data rate
 - k. Set MU NSS/LDPC/stream index/length
- “MU Nss=1”** for Antenna number.
- Set LDPC or non-LDPC to do transmitting.
- Set **“Nss=1”** to do transmitting.
- Set **“stream index=1”**

Refer to the **“Length”** from below table. (For example, set to 128 at RU26/MCS0.....)

RU size	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9	MCS10	MCS11
RU26	128	256	512	512	512	512	512	512	512	512	512	512
RU52	256	512	1024	1024	1024	1024	1024	1024	1024	1024	1024	1024
RU106	512	1024	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048
RU242	1024	2048	4096	4096	4096	4096	4096	4096	4096	4096	4096	4096
RU484	2048	4096	8192	8192	8192	8192	8192	8192	8192	8192	8192	8192
RU996	4096	8192	8192	8192	8192	8192	8192	8192	8192	8192	8192	8192

- l. Click **“ADD”** button to added test case.
- m. Click **“SET”** button to set test case.
- n. If user wanted to test another case can select origin test case and click **“Remove”** button to remove old case and resetting another case again.



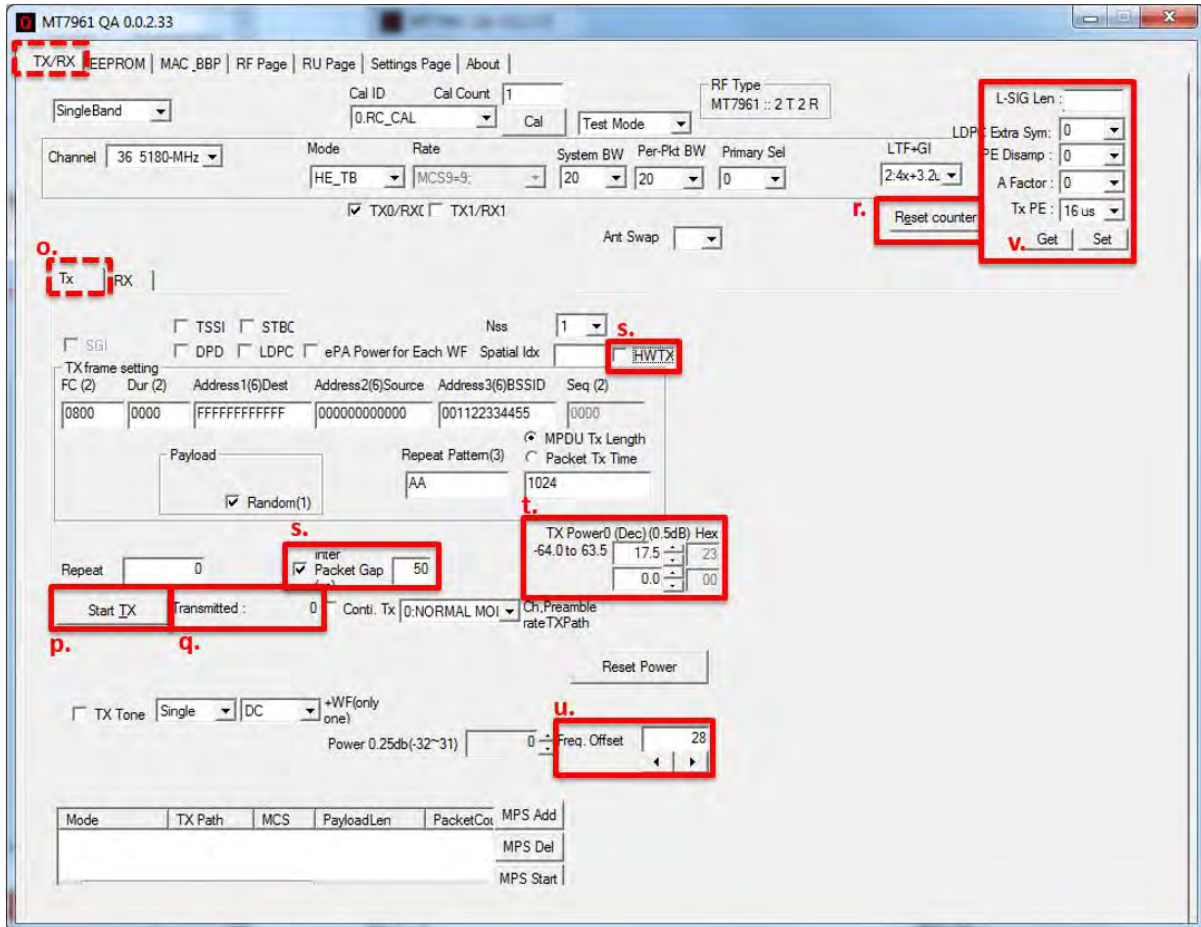
An example of TX0 transmitting HE_TB BW20 RU26 index8 MCS11 infinite packets.

On TX/RX page:

- o. Select TX sub-page
- p. Click "**Start TX**" button to start packet transmitting and click "**Stop TX**" button to stop.
- q. The transmitted packets number is shown at "**Transmitted :**" area.
- r. Users can click "**Reset counter**" button to reset "**Transmitted :**" area.
- s. 1. If users want to adjust packets duty cycle, click "HWTX" and adjust Inter Packet Gap to modify packets duty cycle. 2. Click "Start TX" button to start TX and click "Stop TX" button to stop TX.
(Minimum/Maximum value of Inter Packet Gap is 34us/160us)
- t. Users can click "**Power**" button to modify power level of transmitting signal.
- u. Users can click "**Frequency**" button to modify frequency offset of transmitting signal.
- v. Click "**GET**" button to get TB TX information and set on VSA.

Note: Please *re-trigger "HWTX" if users change Channel/Mode/Rate/BW.

*Re-trigger "HWTX": click "**Stop TX**" button and un-click "HWTX", and then click "HWTX" and click "**Start TX**" button again.



MT7961 QA 0.0.2.33

TX/RX | EEPROM | MAC_BB | RF Page | RU Page | Settings Page | About

SingleBand | Cal ID | Cal Count | 1 | RF Type | MT7961 :: 2 T 2 R

Channel | 36 5180-MHz | Mode | HE_TB | Rate | MCS9=9 | System BW | 20 | Per-Pkt BW | 20 | Primary Sel | 0

☒ TX0/RX0 ☐ TX1/RX1 | Ant Swap |

o. Tx | RX

☐ SGI | ☐ DPD | ☐ LDPC | ☐ ePA Power for Each WF | Spatial Idx | **S.** ☒ HWTX

TX frame setting

FC (2)	Dur (2)	Address1(6)Dest	Address2(6)Source	Address3(6)BSSID	Seq (2)
0800	0000	FFFFFFFFFFFF	000000000000	001122334455	0000

Payload | Repeat Pattern(3) | AA | MPDU Tx Length | 1024 | Packet Tx Time

☒ Random(1)

Repeat | 0 | **S.** ☒ Packet Gap | 50

p. Start TX | **q.** Transmitted : 0 | Conti. Tx | 0: NORMAL MO | Ch. Preamble rate TX Path

r. Reset counter

v. Get | Set

u. Freq. Offset | 28

TX Tone | Single | DC | +WF (only one) | Power 0.25db(-32~31) | 0

Mode	TX Path	MCS	PayloadLen	PacketCot	MPS Add

MPS Del | MPS Start

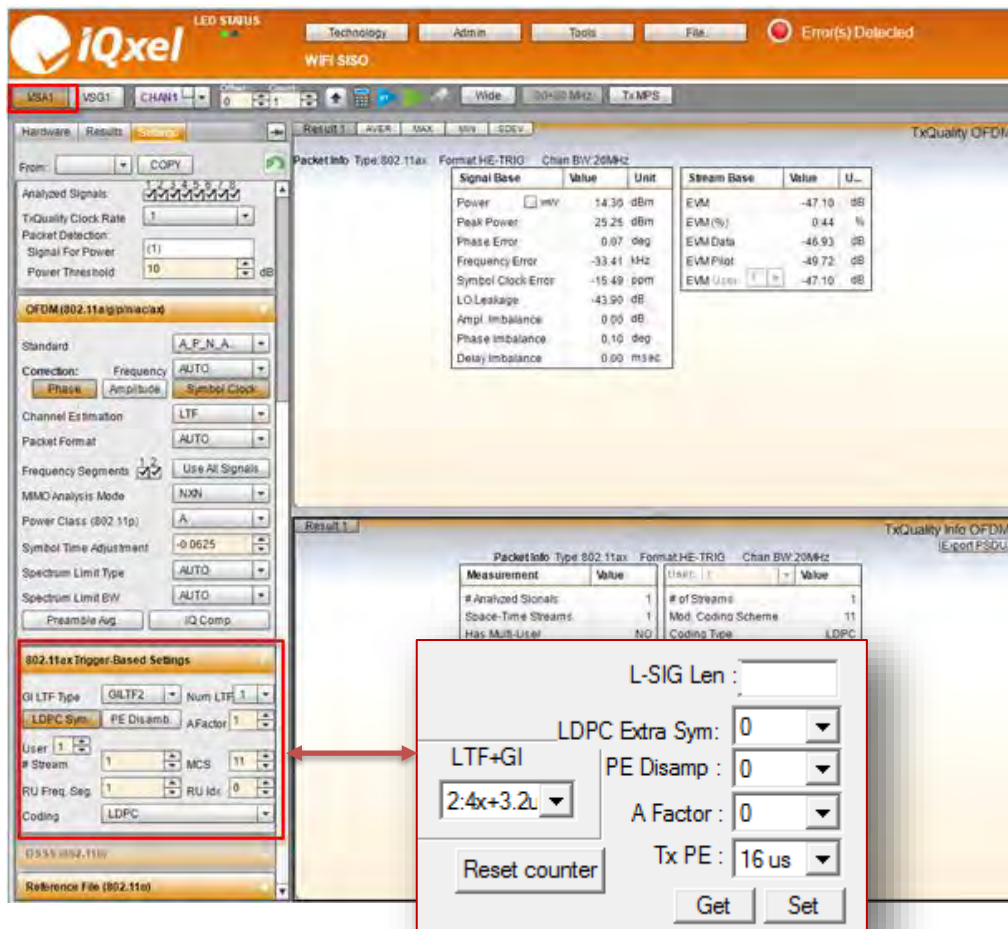
An example of TX0 transmitting HE_TB BW20 RU26 index8 MCS11 infinite packets at 5180MHz.

VSA setting:

Open Litepoint MW Web page select VSA

Setting RU info.

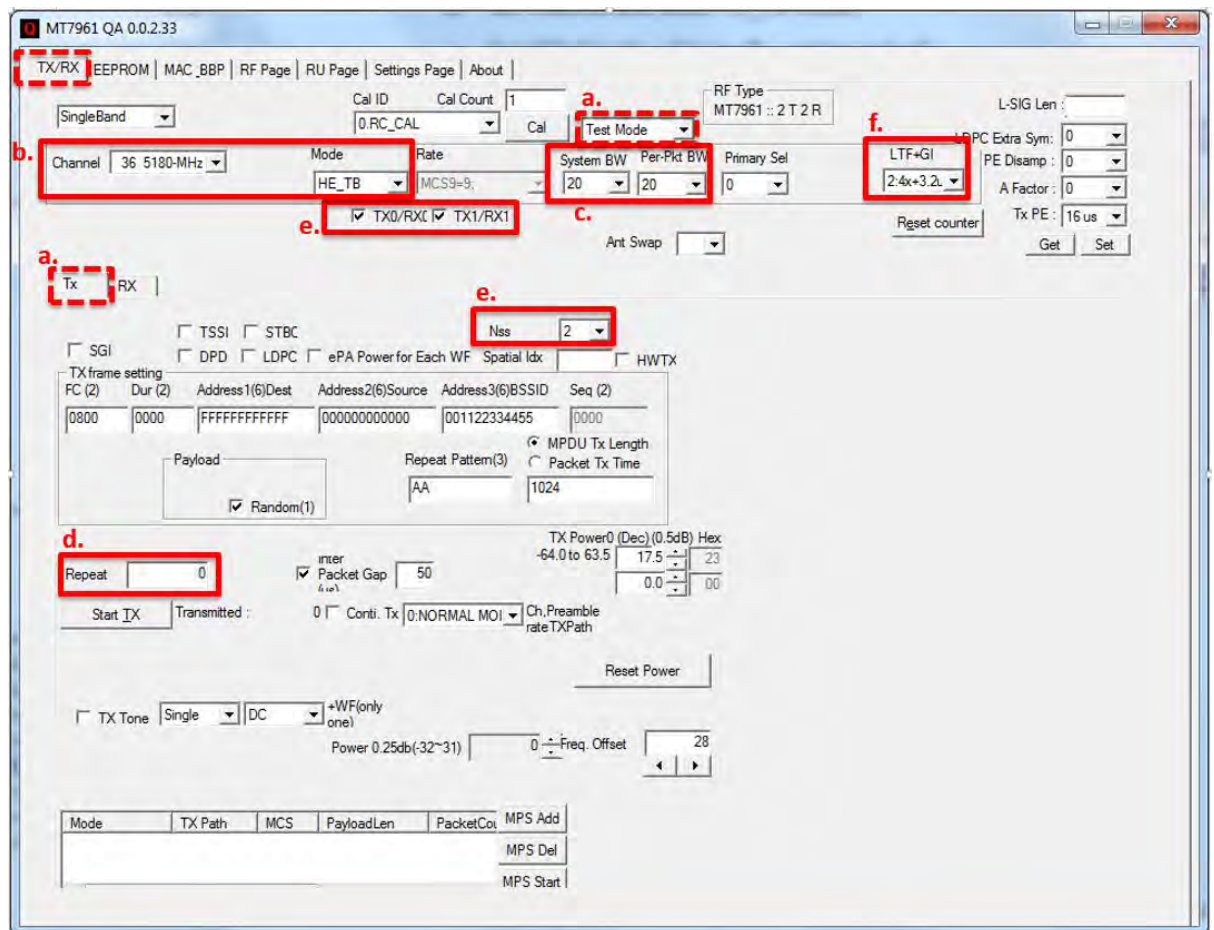
1. litepoint GI LTF Type align to QAtool LTF+GI
2. litepoint LDPC sym.(1=Orange light; 0=Gray light) align to QAtool LDPC Extra Sym
3. litepoint PE Disamb.(1=Orange light; 0=Gray light) align to QAtool Tx PE
4. A Factor:
 1. If QAtool A Factor set =0, set litepont A Factor =4
 2. If QAtool A Factor set =1, set litepont A Factor =1
 3. If QAtool A Factor set =2, set litepont A Factor =2
 4. If QAtool A Factor set =3, set litepont A Factor =3
5. Litepoint Stream setting (1 or 2) align to QAtool RU-page stream setting.
6. Litepoint MCS rate setting align to QAtool RU-page MCS setting.
7. Litepoint RU idx setting align to QAtool RU-page RU index setting.
8. If QAtool RU-page LDPC checked, set litepoint Coding : LDPC; Otherwise, set litepoint Coding : BCC.



2.3.6 WIFI Packets 11ax RU TX (HE TB (trigger based)) Transmitting – 2 stream

On TX/RX page:

- Select TX sub-page and “Test Mode” as following figure.
- Set Channel and select HE_TB Mode.
- Set BW. (Generally, System BW = Pre-Packet BW).
- Set packet number. (0 means infinite packets)
- Select “Nss=2” and choose both “TX0” and “TX1” to do transmitting.
- Set LTF+GI index. (Generally, setting index 2)



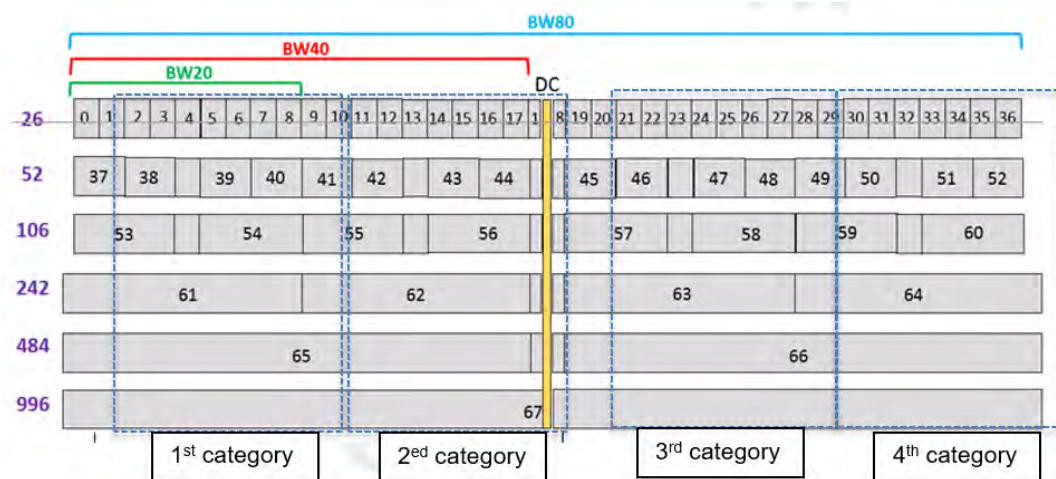
On RU page:

- g. Select RU sub-page
- h. Set Category

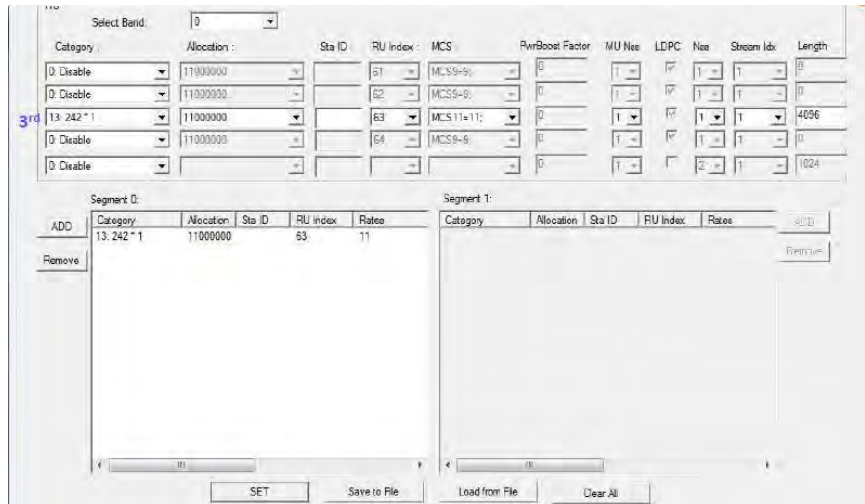
RU size	Category
RU26	26*9
RU52	52*4
RU106	106+106
RU242	242*1
RU484	484*1
RU996	996*1

- i. Set RU index (wanted TB RU location).

Refer to the RU Index from below (one category can only support 20Mhz bandwidth)




BW20(RU242) category

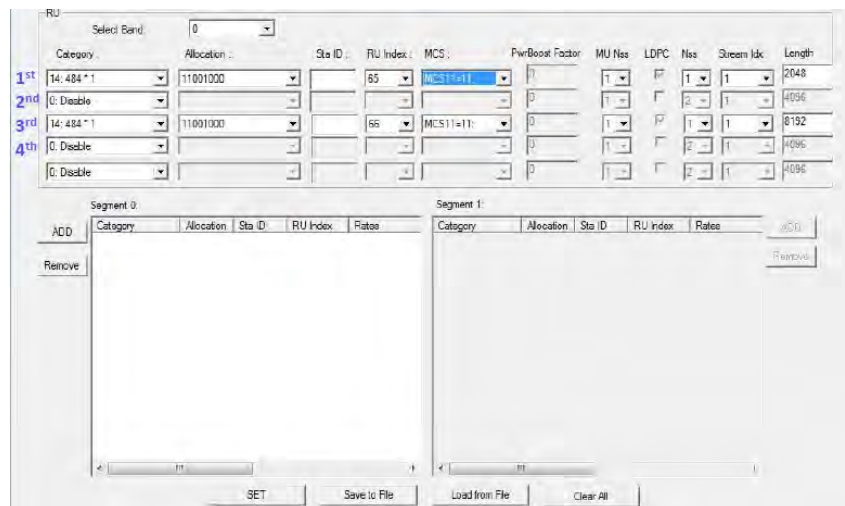


The screenshot shows the configuration window for the MT7920 SW Tool. The 'Select Band' dropdown is set to '0'. The 'Category' dropdown is set to '0: Disable'. The 'Allocation' dropdown is set to '11000000'. The 'Sta ID' dropdown is set to '63'. The 'RU Index' dropdown is set to '63'. The 'MCS' dropdown is set to 'MCS(1)=11'. The 'PwrBoost Factor' dropdown is set to '0'. The 'MU Mee' dropdown is set to '1'. The 'LDPC' dropdown is set to '1'. The 'Nss' dropdown is set to '1'. The 'Stream Idx' dropdown is set to '1'. The 'Length' dropdown is set to '4096'. The 'Segment 0' table shows the following data:

Category	Allocation	Sta ID	RU Index	Rate
13: 242 * 1	11000000	63	11	

The 'Segment 1' table is empty. The 'SET' button is highlighted.

BW20(RU242 index63) category



The screenshot shows the configuration window for the MT7920 SW Tool. The 'Select Band' dropdown is set to '0'. The 'Category' dropdown is set to '14: 484 * 1'. The 'Allocation' dropdown is set to '11001000'. The 'Sta ID' dropdown is set to '65'. The 'RU Index' dropdown is set to '65'. The 'MCS' dropdown is set to 'MCS(1)=11'. The 'PwrBoost Factor' dropdown is set to '0'. The 'MU Mee' dropdown is set to '1'. The 'LDPC' dropdown is set to '1'. The 'Nss' dropdown is set to '1'. The 'Stream Idx' dropdown is set to '1'. The 'Length' dropdown is set to '2048'. The 'Segment 0' table shows the following data:

Category	Allocation	Sta ID	RU Index	Rate
14: 484 * 1	11001000	65	11	

The 'Segment 1' table is empty. The 'SET' button is highlighted.

BW40(RU484) category



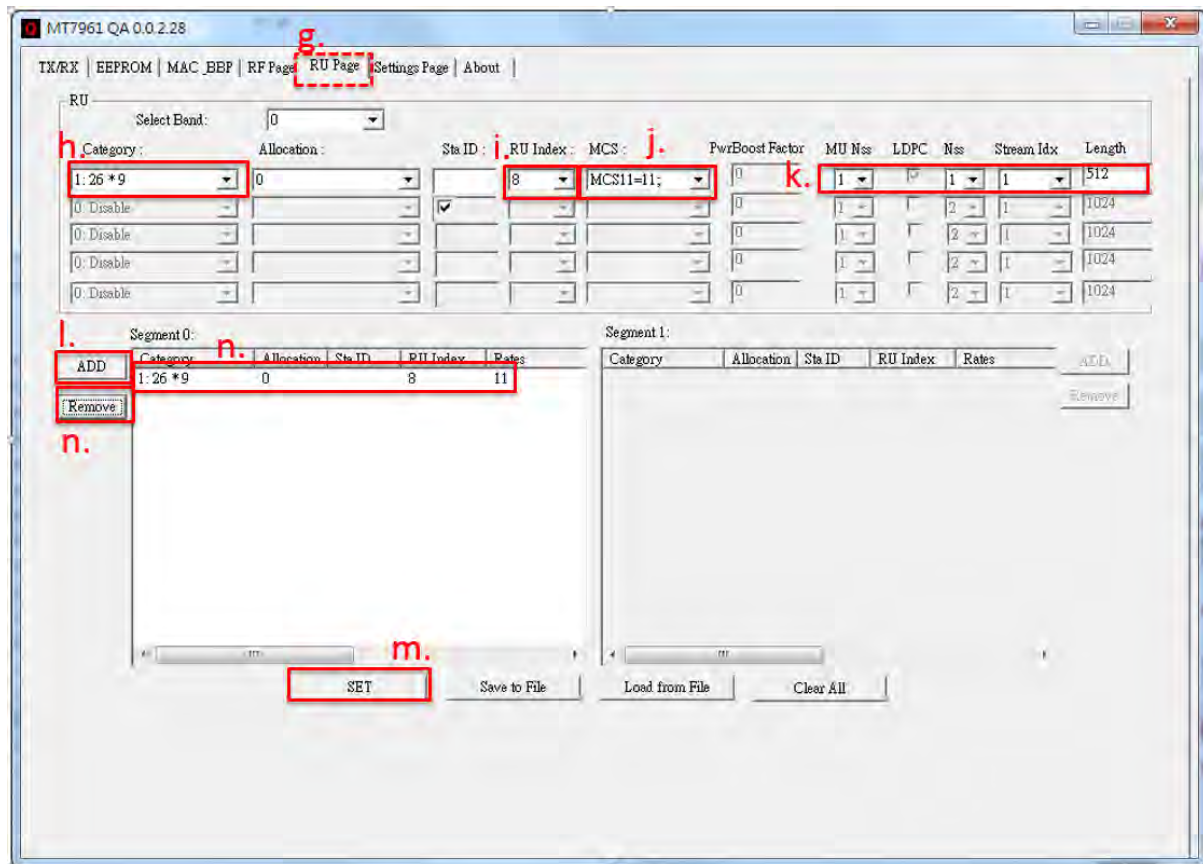
BW80(RU996) category

- j. Set data rate
- k. Set MU NSS/LDPC/stream index/length
- “MU Nss=2” for Antenna number.
- Set LDPC or non-LDPC to do transmitting.
- Set “Nss=2” to do transmitting.
- Set “stream index=1”

Refer to the “Length” from below table. (For example, set to 128 at RU26/MCS0.....)

RU size	MCS0	MCS1	MCS2	MCS3	MCS4	MCS5	MCS6	MCS7	MCS8	MCS9	MCS10	MCS11
RU26	128	256	512	512	512	512	512	512	512	512	512	512
RU52	256	512	1024	1024	1024	1024	1024	1024	1024	1024	1024	1024
RU106	512	1024	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048
RU242	1024	2048	4096	4096	4096	4096	4096	4096	4096	4096	4096	4096
RU484	2048	4096	8192	8192	8192	8192	8192	8192	8192	8192	8192	8192
RU996	4096	8192	8192	8192	8192	8192	8192	8192	8192	8192	8192	8192

- l. Click “**ADD**” button to added test case.
- m. Click “**SET**” button to set test case.
- n. If user wanted to test another case can select origin test case and click “**Remove**” button to remove old case and resetting another case again.



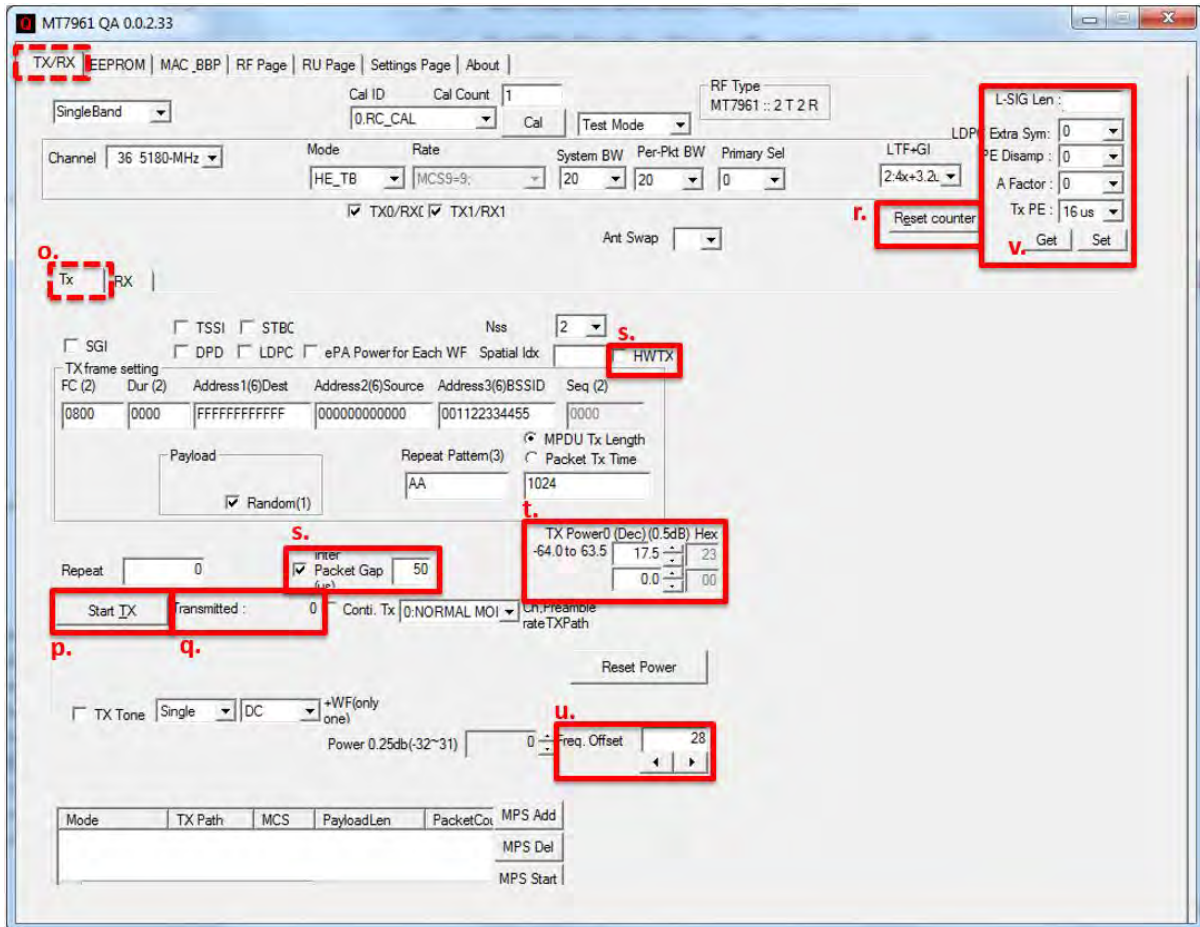
An example of 2TX transmitting HE_TB BW20 RU26 index8 MCS11 infinite packets.

On TX/RX page:

- o. Select TX sub-page
- p. Click "**Start TX**" button to start packet transmitting and click "**Stop TX**" button to stop.
- q. The transmitted packets number is shown at "**Transmitted :**" area.
- r. Users can click "**Reset counter**" button to reset "**Transmitted :**" area.
- s. 1. If users want to adjust packets duty cycle, click "HWTX" and adjust Inter Packet Gap to modify packets duty cycle. 2. Click "Start TX" button to start TX and click "Stop TX" button to stop TX.
(Minimum/Maximum value of Inter Packet Gap is 34us/160us)
- t. Users can click "**+**" button to modify power level of transmitting signal.
- u. Users can click "**←**" button to modify frequency offset of transmitting signal.
- v. Click "**GET**" button to get TB TX information and set on VSA.

Note: Please *re-trigger "HWTX" if users change Channel/Mode/Rate/BW.

*Re-trigger "HWTX": click "**Stop TX**" button and un-click "HWTX", and then click "HWTX" and click "**Start TX**" bottom again.



MT7961 QA 0.0.2.33

Tx/RX | EEPROM | MAC_BB | RF Page | RU Page | Settings Page | About

SingleBand | Cal ID | Cal Count | 1 | RF Type | MT7961 :: 2 T 2 R

Channel | 36 5180-MHz | Mode | HE_TB | Rate | MCS9=9 | System BW | 20 | Per-Pkt BW | 20 | Primary Sel | 0 | LTF+GI | 2-4x+3.2x | LDP |

☒ TX0/RX0 ☒ TX1/RX1 | Ant Swap |

o. Tx | RX

☐ SGI ☐ DPD ☐ LDPC ☐ ePA Power for Each WF ☐ Spatial Idx | Nss | 2 | s. HWTX

TX frame setting

FC (2)	Dur (2)	Address1(6)Dest	Address2(6)Source	Address3(6)BSSID	Seq (2)
0800	0000	FFFFFFFFFFFF	000000000000	001122334455	0000

Payload | Repeat Pattern(3) | AA | t. MPDU Tx Length | 1024 | Packet Tx Time |

☒ Random(1)

Repeat | 0 | s. Packet Gap | 50 | TX Power0 (Dec) (0.5dB) Hex | -64.0 to 63.5 | 17.5 | 23 | 0.0 | 00

p. Start TX | q. Transmitted : 0 | Cont. Tx | 0: NORMAL MO | CH. Preamble rate TX Path

Reset Power

☐ TX Tone | Single | DC | +WF (only one) | Power 0.25db (-32~31) | 0 | u. Freq. Offset | 28

Mode	TX Path	MCS	Payload Len	Packet Cox	MPS Add

MPS Del | MPS Start

v. L-SIG Len : | Extra Sym : 0 | PE Disamp : 0 | A Factor : 0 | Tx PE : 16 us | Get | Set

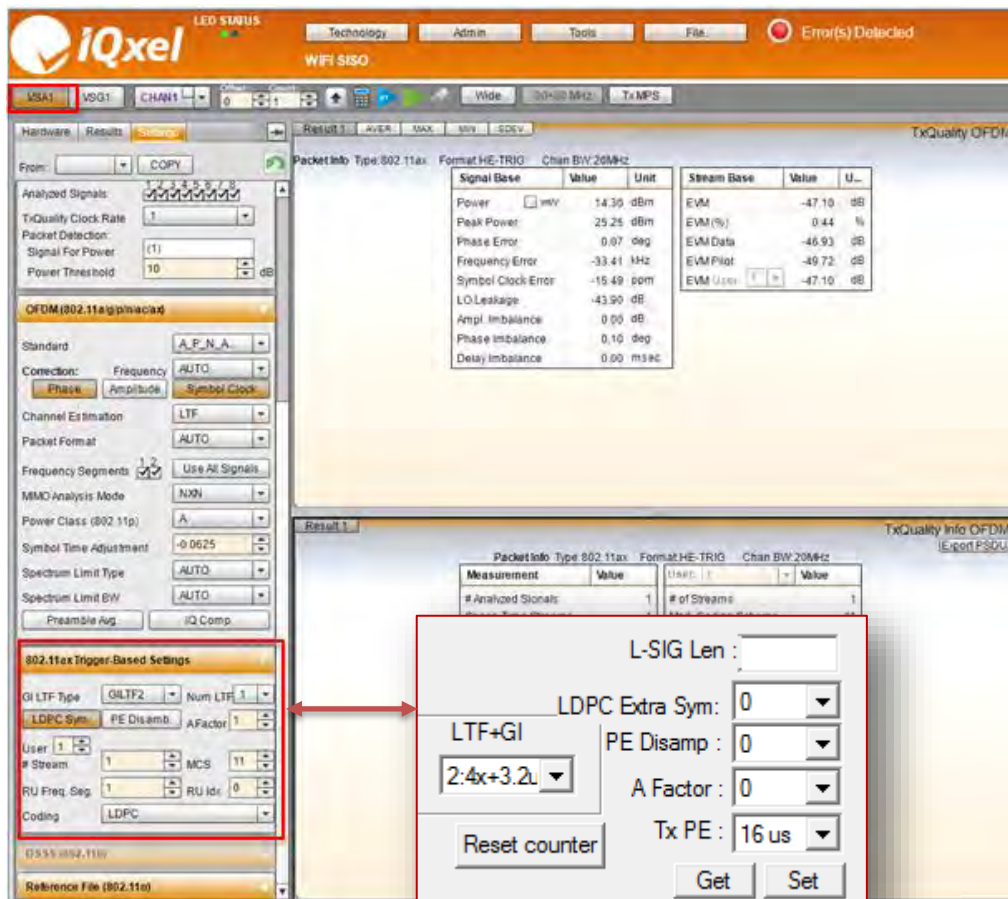
An example of 2TX transmitting HE_TB BW20 RU26 index8 MCS11 infinite packets at 5180MHz.

VSA setting:

Open Litepoint MW Web page and select VSA

Setting RU info.

1. litepoint GI LTF Type align to QAtool LTF+GI
2. litepoint LDPC sym.(1=Orange light; 0=Gray light) align to QAtool LDPC Extra Sym
3. litepoint PE Disamb.(1=Orange light; 0=Gray light) align to QAtool Tx PE
4. A Factor:
 1. If QAtool A Factor set =0, set litepont A Factor =4
 2. If QAtool A Factor set =1, set litepont A Factor =1
 3. If QAtool A Factor set =2, set litepont A Factor =2
 4. If QAtool A Factor set =3, set litepont A Factor =3
5. Litepoint Stream setting (1 or 2) align to QAtool RU-page stream setting.
6. Litepoint MCS rate setting align to QAtool RU-page MCS setting.
7. Litepoint RU idx setting align to QAtool RU-page RU index setting.
8. If QAtool RU-page LDPC checked, set litepoint Coding : LDPC; Otherwise, set litepoint Coding : BCC.

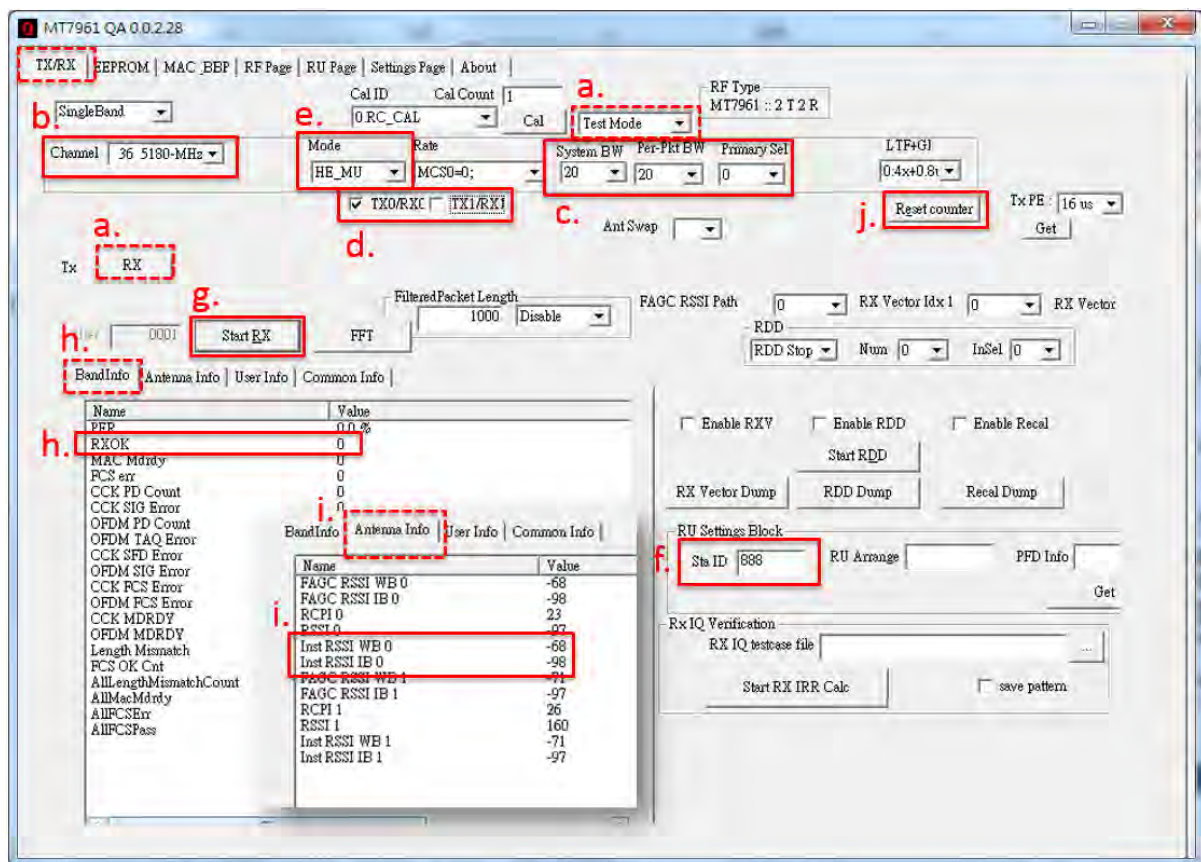


2.3.7 WIFI Packets 11ax RU RX (HE MU (multi user)) Receiving – 1 stream

On TX/RX page

- Select RX sub-page and “Test Mode” as following figure.
- Set Channel frequency.
- Set BW. (Generally, System BW = Pre-Packet BW).
- Choose “RX0 or RX1 only” to do receiving.
- Select HE_MU mode.
- Set RU Station ID(wanted RU location station ID)
- Click “**Start RX**” button to receive WIFI packets.
- Enable WIFI signal generator to transmit packets. Click “**Stop RX**” button to stop receiving.
- Successful received packets number would be shown at “RX OK” area
- RSSI shown at “inst RSSI IB R0” area.
- Users can click “**Reset counter**” button to reset counter value.

Note: Please contact equipment vendors (Litepoint....) if you have problem of generating waveform.

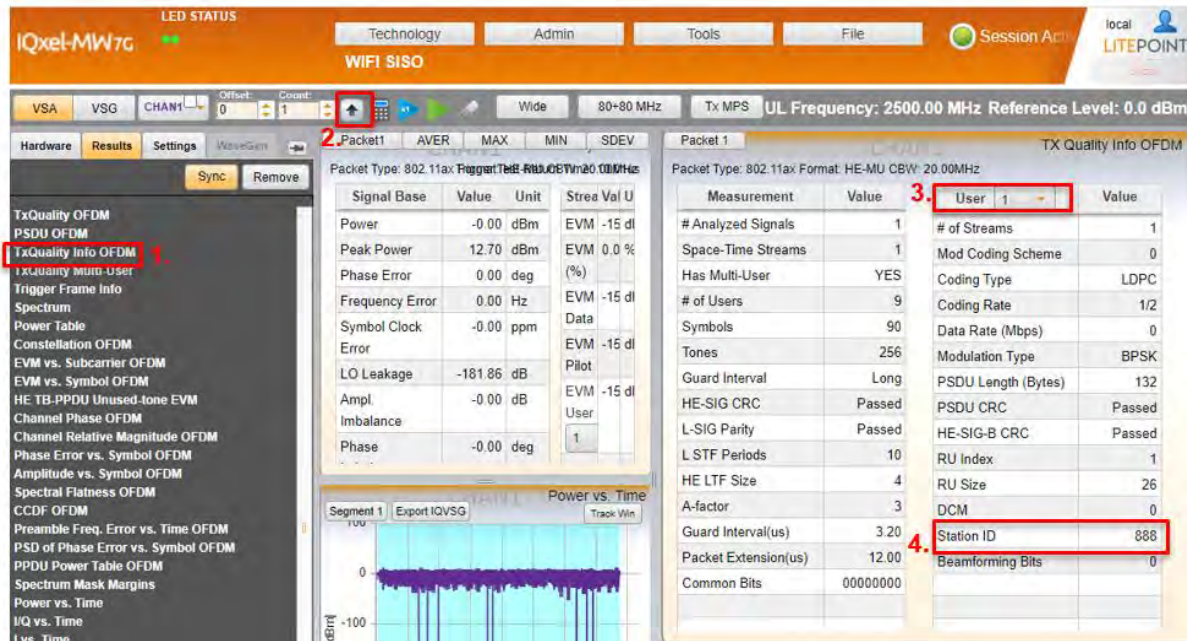


An example of WiFi packets receiving – RX0 (BW20 at 5180MHz)

Check Station ID of wanted RU:

Setting RU info.

1. Choose TxQuality Info OFDM
2. Load test waveform
3. Choose wanted RU user
4. RU Check Station ID

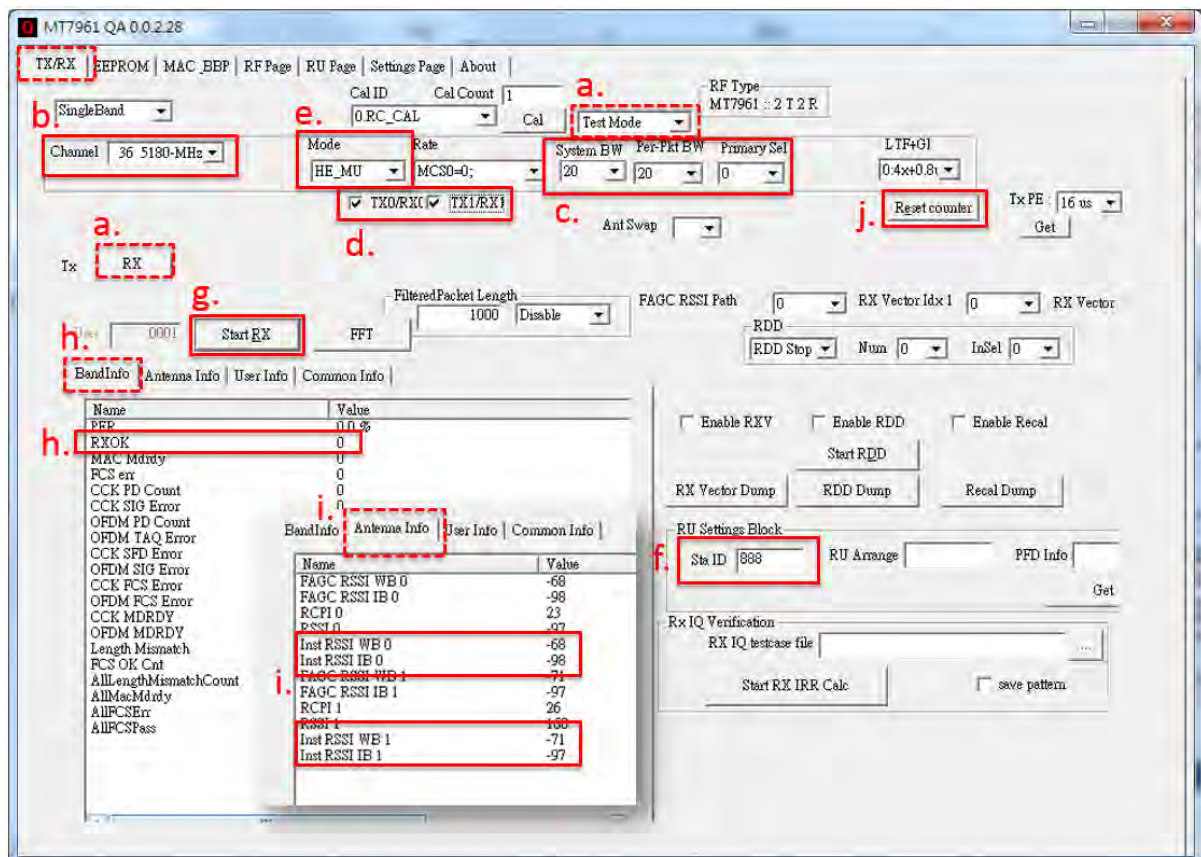


2.3.8 WIFI Packets 11ax RU RX (HE MU (multi user)) Receiving – 2 stream

On TX/RX page

- Select RX sub-page and “Test Mode” as following figure.
- Set Channel frequency.
- Set BW. (Generally, System BW = Pre-Packet BW).
- Choose both “RX0” and “RX1” to do receiving.
- Select HE_MU mode.
- Set RU Station ID(wanted RU location station ID)
- Click “**Start RX**” button to receive WIFI packets.
- Enable WIFI signal generator to transmit packets. Click “**Stop RX**” button to stop receiving.
- Successful received packets number would be shown at “RX OK” area
- RSSI shown at “inst RSSI IB R0” and “inst RSSI IB R1” area.
- Users can click “**Reset counter**” button to reset counter value.

Note: Please contact equipment vendors (Litepoint....) if you have problem of generating waveform.

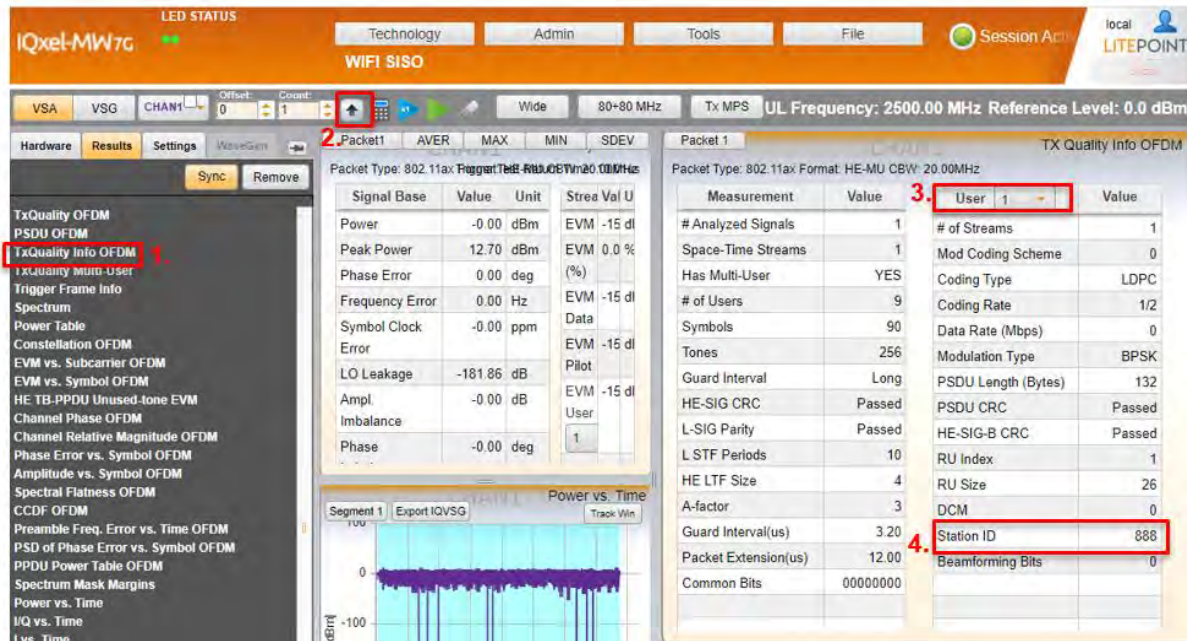


An example of WiFi packets receiving – 2RX (BW20 at 5180MHz)

Check Station ID of wanted RU:

Setting RU info.

1. Choose TxQuality Info OFDM
2. Load test waveform
3. Choose wanted RU user
4. RU Check Station ID



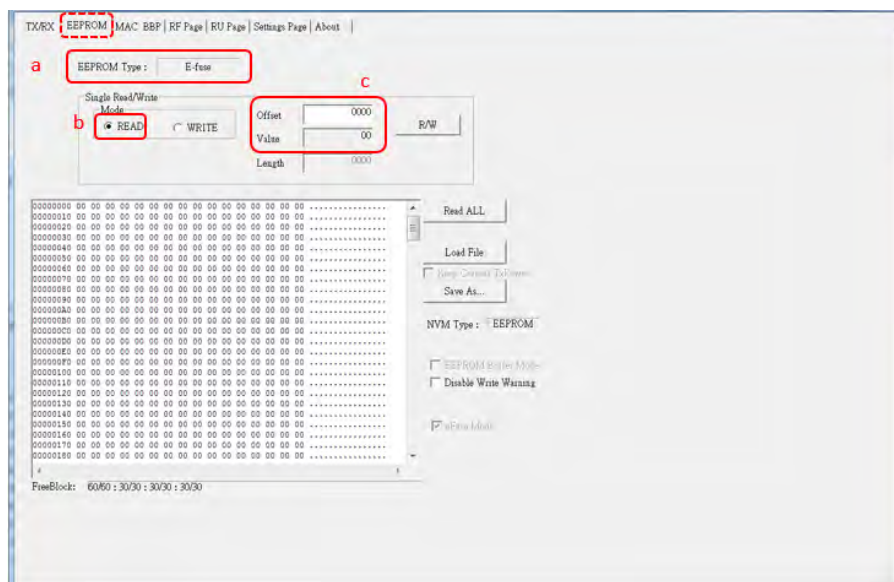
2.4 Read, Write E-fuse Table

2.4.1 Read a Value from E-fuse

Users can use QA-Tool to read a value from an address offset of E-fuse.

On EEPROM page:

- In E-fuse Mode, EEPROM Type is “E-fuse”.
- Select Single Read/Write is “**READ**”.
- Set address offset in “**Offset**” text box then click on “**R/W**” button. The value of assigned address offset would be shown in the “**Value**” text box.

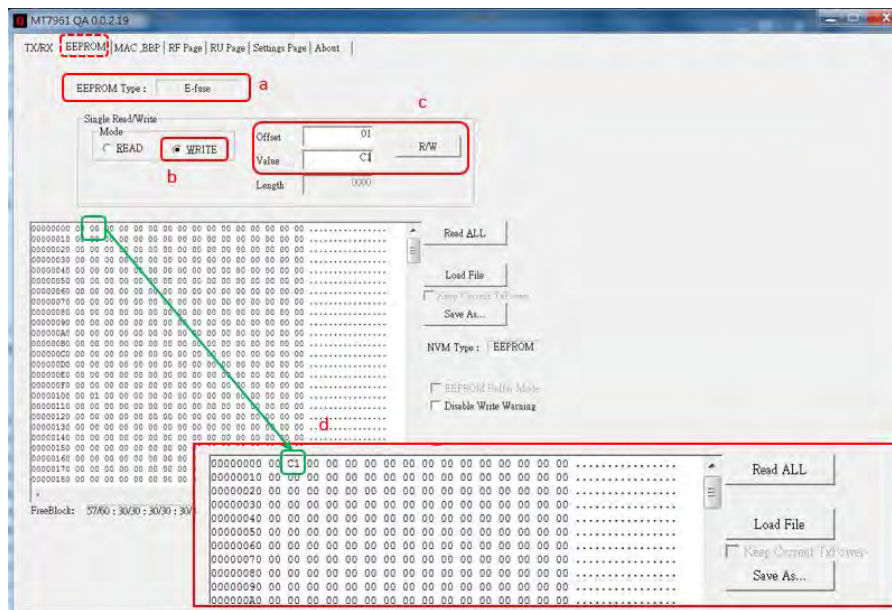


2.4.2 Write a Value to E-fuse

Users can use QA-Tool to write a value to an address offset of E-fuse.

On EEPROM page:

- In E-fuse Mode, EEPROM Type is "E-fuse".
- Select Single Read/Write mode is "WRITE"
- Set address offset and new value in "Offset" and "Value" text boxes then click on "R/W" button.
- Click "Read ALL" button to update e-fuse value in e-fuse table and check it.



This is an example writing 0xC1 to address offset_0x01 of E-fuse and check value is correctly updated.



Antenna

Antenna Number	Brand Name	Model Name	Ant. Type	Connector	Support	Max Peak Gain
1	PSA	RFMTA340718EMLB302	PIFA	I-Pex	2.4G+5G+BT	BT: 3.18 2.4G :3.18 5G 4.92
2	Cortec	AN2450-4902BRS	dipole	Reverse SMA	2.4G+5G+BT	BT: 2.92 2.4G :2.92 5G :4.67
3	HongBo	260-25096	monopole	MHF4L	2.4G+5G+BT	BT: 3.11 2.4G :3.11 5G :4.91 6G :4.87



Warning

FCC

Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

IMPORTANT NOTE:

This module is intended for OEM integrator. This module is only FCC authorized for the specific rule parts listed on the grant, and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed. Additional testing and certification may be necessary when multiple modules are used. OEM integrators that they must use the equivalent antennas or C2PC will be required.

This equipment complies with FCC mobile radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator & your body. If the module is installed in a portable host, a separate SAR evaluation is required to confirm compliance with relevant FCC portable RF exposure rules.

The host manufacturer should reference KDB Publication 996369 D04 Module Integration Guide.



USERS MANUAL OF THE END PRODUCT:

In the users manual of the end product, the end user has to be informed to keep at least 20cm separation with the antenna while this end product is installed and operated. The end user has to be informed that the FCC radio-frequency exposure guidelines for an uncontrolled environment can be satisfied.

The end user has to also be informed that any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

This device complies with Part 15 of FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC regulations restrict the operation of this device to indoor use only.

LABEL OF THE END PRODUCT:

The final end product must be labeled in a visible area with the following " Contains TX FCC ID: RAS-MT7920 ".

This device complies with Part 15 of FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC regulations restrict the operation of this device to indoor use only.

IC

PMN : 2TX 11ax (WiFi6) BW80 + BT/BLE Combo Card

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference.
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil contient des émetteurs / récepteurs exempts de licence qui sont conformes au (x) RSS (s) exemptés de licence d'Innovation, Sciences et Développement économique Canada. L'opération est soumise aux deux conditions suivantes:

- (1) Cet appareil ne doit pas provoquer d'interférences.*
- (2) Cet appareil doit accepter toute interférence, y compris les interférences susceptibles de provoquer un fonctionnement indésirable de l'appareil.*

This device and its antenna(s) must not be co-located with any other transmitters except in accordance with IC multi-transmitter product procedures.

Referring to the multi-transmitter policy, multiple-transmitter(s) and module(s) can be operated simultaneously without reassessment permissive change.

Cet appareil et son antenne (s) ne doit pas être co-localisés ou fonctionnement en association avec une autre antenne ou transmetteur.

This radio transmitter [7542A-MT7920] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Le présent émetteur radio (7542A-MT7920) a été approuvé par Innovation, Sciences et Développement économique Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal d'antenne. Les types d'antennes non inclus dans cette liste qui ont un gain supérieur au gain maximal indiqué pour tout type listé sont strictement interdits pour une utilisation avec cet appareil.

The device for operation in the band 5150–5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems.

les dispositifs fonctionnant dans la bande 5150-5250 MHz sont réservés uniquement pour une utilisation à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux.

The maximum antenna gain permitted for devices in the bands 5250-5350 MHz and 5470-5725 MHz shall be such that the equipment still complies with the e.i.r.p. limit.

le gain maximal d'antenne permis pour les dispositifs utilisant les bandes 5250-5350 MHz et 5470-5725 MHz doit se conformer à la limite de p.i.r.e.

The maximum antenna gain permitted for devices in the band 5725-5850 MHz shall be such that the equipment still complies with the e.i.r.p. limits specified for point-to-point and non-point-to-point operation as appropriate.

le gain maximal d'antenne permis (pour les dispositifs utilisant la bande 5725-5850 MHz) doit se conformer à la limite de p.i.r.e. spécifiée pour l'exploitation point à point et non point à point, selon le cas.

For indoor use only.

Pour une utilisation en intérieur uniquement.

IMPORTANT NOTE:

IC Radiation Exposure Statement:

This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance **20cm** between the radiator & your body.

*Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de **20 cm** de distance entre la source de rayonnement et votre corps.*

IMPORTANT NOTE:

This module is intended for OEM integrator. The OEM integrator is responsible for the compliance to all the rules that apply to the product into which this certified RF module is integrated.

Additional testing and certification may be necessary when multiple modules are used.

OEM integrators that they must use the equivalent antennas or C2PC will be required.

Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

USERS MANUAL OF THE END PRODUCT:

In the users manual of the end product, the end user has to be informed to keep at least **20cm** separation with the antenna while this end product is installed and operated. The end user has to be



informed that the IC radio-frequency exposure guidelines for an uncontrolled environment can be satisfied.

The end user has to also be informed that any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment. Operation is subject to the following two conditions: (1) this device may not cause harmful interference (2) this device must accept any interference received, including interference that may cause undesired operation.

Indoor use only.

LABEL OF THE END PRODUCT:

The final end product must be labeled in a visible area with the following " Contains IC: 7542A-MT7920 ".

The Host Model Number (HMN) must be indicated at any location on the exterior of the end product or product packaging or product literature which shall be available with the end product or online.

Indoor use only.

**NCC**

取得審驗證明之低功率射頻器材，非經核准，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。低功率射頻器材之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。前述合法通信，指依電信管理法規定作業之無線電通信。低功率射頻器材須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

應避免影響附近雷達系統之操作。

本模組於取得認證後將依規定於模組本體標示審驗合格標籤，並要求平台廠商於平台上標示「本產品內含射頻模組  CC XX xx LP yyy Z z。」



JP

5GHz band (W52, W53): Indoor use only (except communicate to high power radio)
W52/W53 屋内使用限定 ただし登録局に接続される場合は除く



CE

This equipment complies with EU radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance **20cm** between the radiator & your body.

The frequency and the maximum transmitted power in EU are listed below:

2412-2472MHz: 19.93 dBm
2402-2480MHz (BR/EDR): 15.35 dBm
2402-2480MHz (LE): 12.13 dBm
5180-5240MHz: 22.94 dBm
5260-5320MHz: 22.76 dBm
5500-5700: 22.92 dBm
5745-5825MHz: 13.96 dBm

The device is restricted to indoor use only when operating in the 5150 to 5350 MHz frequency range.

UK

This equipment complies with radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance **20cm** between the radiator & your body.

The frequency and the maximum transmitted power in UK are listed below:

2412-2472MHz: 19.93 dBm
2402-2480MHz (BR/EDR): 15.35dBm
2402-2480MHz (LE): 12.13 dBm
5180-5240MHz: 22.94 dBm
5260-5320MHz: 22.76 dBm
5500-5700MHz: 22.92 dBm
5745-5825MHz: 13.96 dBm

The device is restricted to indoor use only when operating in the 5150 to 5350 MHz frequency range.



everyday genius

MT7920

Test-Mode Software Application Note

Part-2: Combo-Tool

Version:	V0.2
Release Date:	2022-07-12

© 2024 MediaTek Inc.

This document contains information that is proprietary to MediaTek Inc.

Unauthorized reproduction or disclosure of this information in whole or in part is strictly prohibited.

Specifications are subject to change without notice.

Document Revision History

Version	Date	Author	Change List
V0.1	2021/01/29	Foquan	Initial Released.
V0.2	2022/07/12	Xingqi	Combo tool UART download by 3M baud rate update

Table of Contents

Document Revision History	2
Table of Contents	3
1 System overview	4
1.1 General Description	4
2 Combo-Tool	5
2.1 How to install Combo-Tool	6
2.1.1 Install BT driver	6
2.1.2 Install Combo-Tool	10
2.2 How to use Combo-Tool	11
2.2.1 SDIO/USB Interface	11
2.2.2 UART Interface	16
2.2.3 BDR/EDR Signaling Test Mode	20
2.2.4 BDR/EDR Non-signaling TX Setting	21
2.2.5 BDR/EDR Non-signaling RX Setting	22
2.2.6 BLE Direct Test Mode	23
2.2.7 BLE Non-Signaling TX Test Mode	25
2.2.8 BLE Non-Signaling RX Test Mode	26
2.2.9 CW-tone TX Setting	27
2.2.10 BLE Enhanced TX Test Mode	29
2.2.11 BLE Enhanced RX Test Mode	31
2.2.12 BT Run Script	32
2.2.13 BT Buffer Mode	33

1 System overview

1.1 General Description

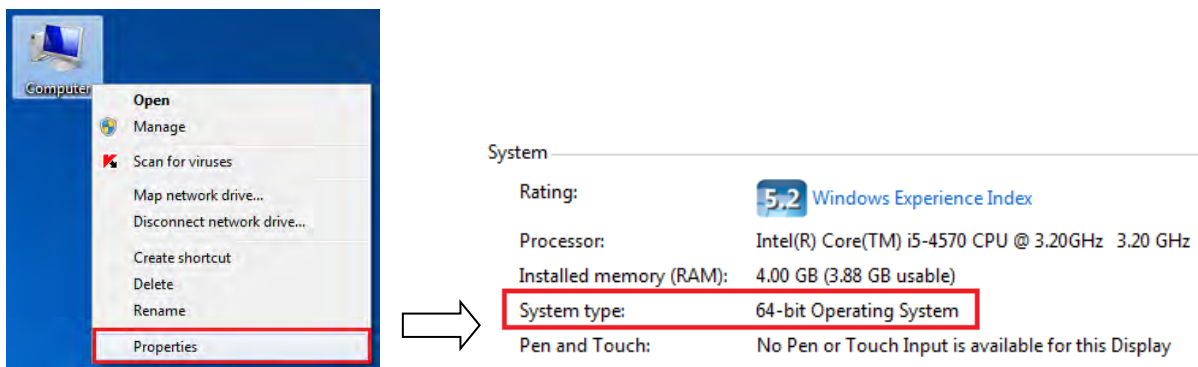
MT7920 chip is highly integrated single chip which have built in 2x2 dual-band wireless LAN and Bluetooth combo radio. It can be configured in test-mode for performance validation, production testing and regulatory certification. There are two software tools, QA-Tool and Combo-Tool responsible for evaluating WIFI and Bluetooth signal and performance testing. This document is introducing how to install and use Combo-Tool.

2 Combo-Tool

Combo-Tool installation package include 2 major software:

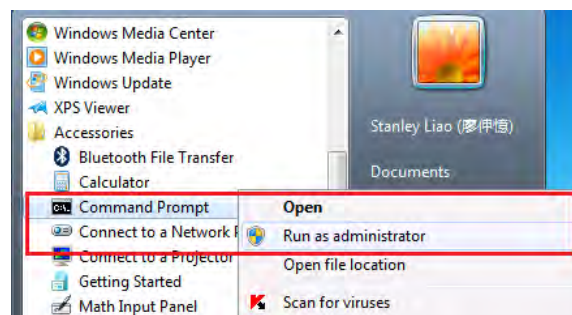
- BT driver
- Combo-Tool Windows installation package

Before doing installation, users should check computer system type by right-clicking Computer icon and selecting Properties to know OS type as following figures.

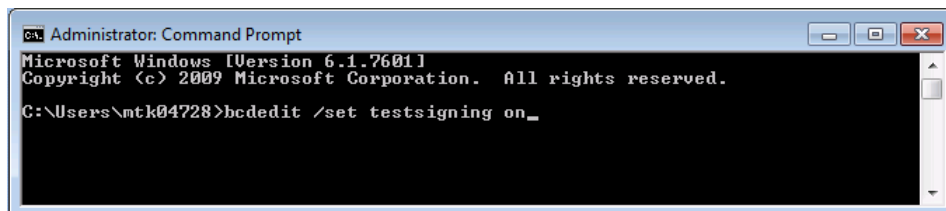


The OS type MTK strongly recommends use Windows7 64-bit operating system. Users should set Windows7 64-bit OS under test mode according to following steps:

1. Right-click “**Command Prompt**” in Accessories and select “**Run as administrator.**”



2. After command window pops out, entering command “**bcdedit /set testsigning on**” to enable test mode as following figure.



2.1 How to install Combo-Tool

Users should follow the procedure listed in below to install Combo-Tool

- 1st step: Install BT driver
- 2nd step: Install Combo-Tool

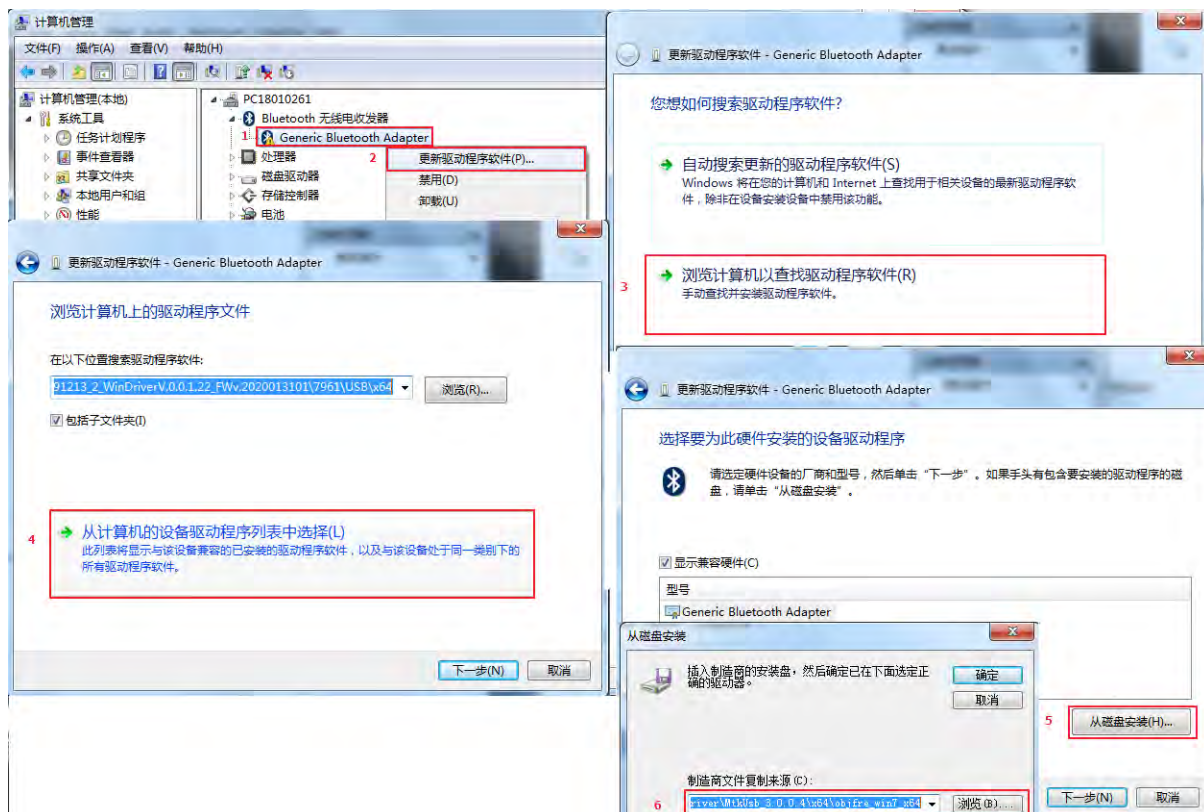
2.1.1 Install BT driver

BT driver is necessary for Combo-Tool. This driver should be well installed to make Bluetooth device and Combo-Tool working smoothly. Users can refer to following steps to install this driver.

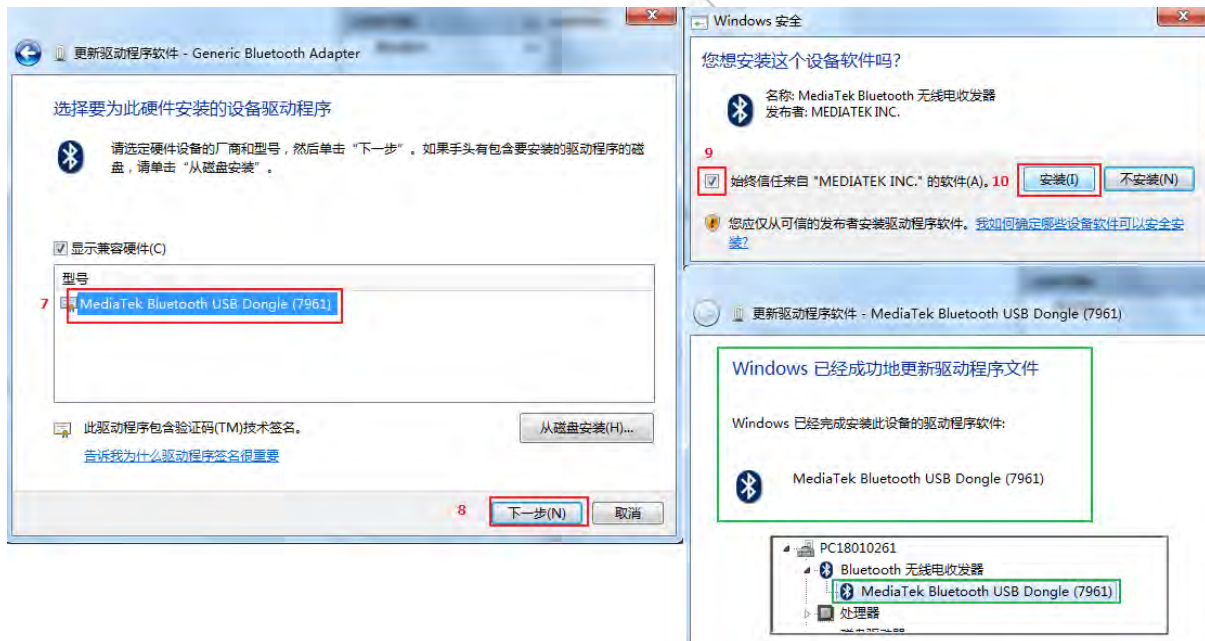
USB Interface:

1. In Window Device Manager, users can update driver software and select BT driver in the folder

...\\MtkUsb_3.0.0.4\\x64\\objfre_win7_x64\\mtkbtusb.inf



2. Select model “Mediatek Bluetooth USB Dongle (7961)” and click Install. Device Manager will also show a device “Mediatek Bluetooth USB Dongle (7961)” in Bluetooth Radios if installation is completed.



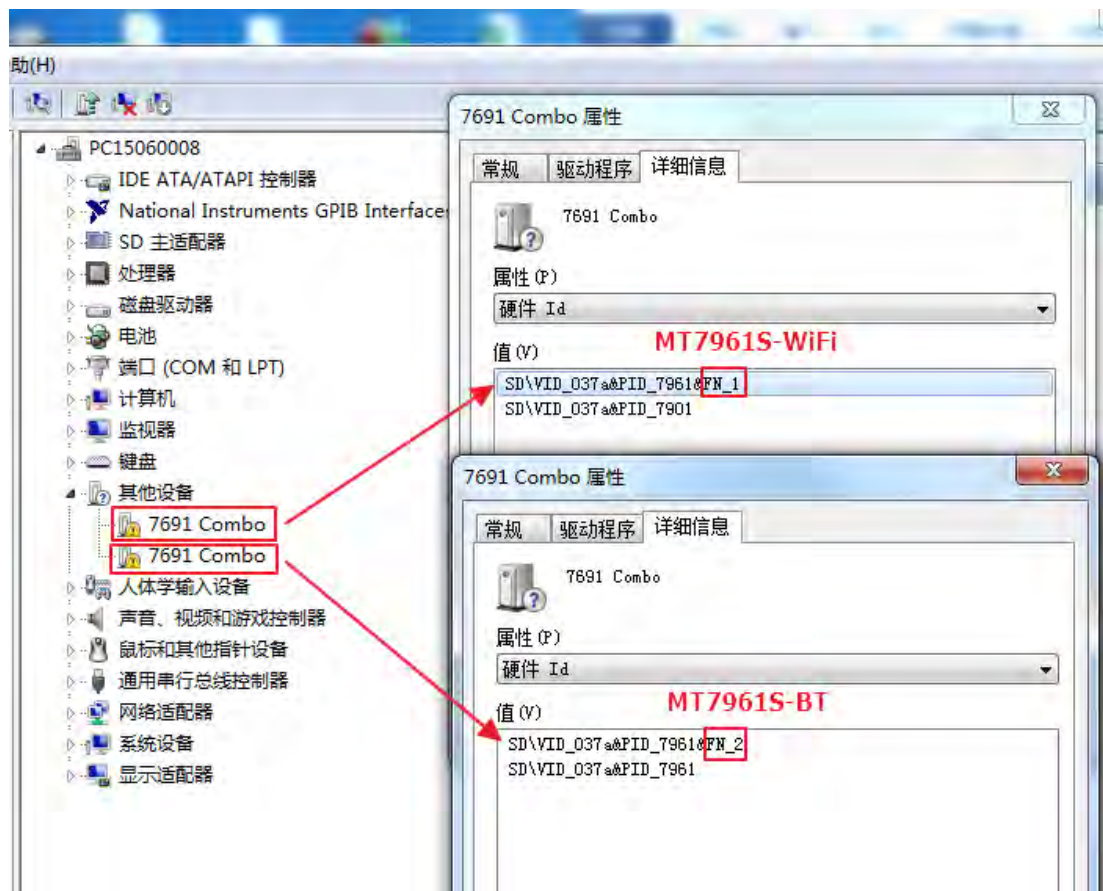
3. Right-click “MediaTek QA Test USB WDM Driver” (WiFi device) and select disable. User should plug-out and plug-in DUT again after this step.



SDIO interface:

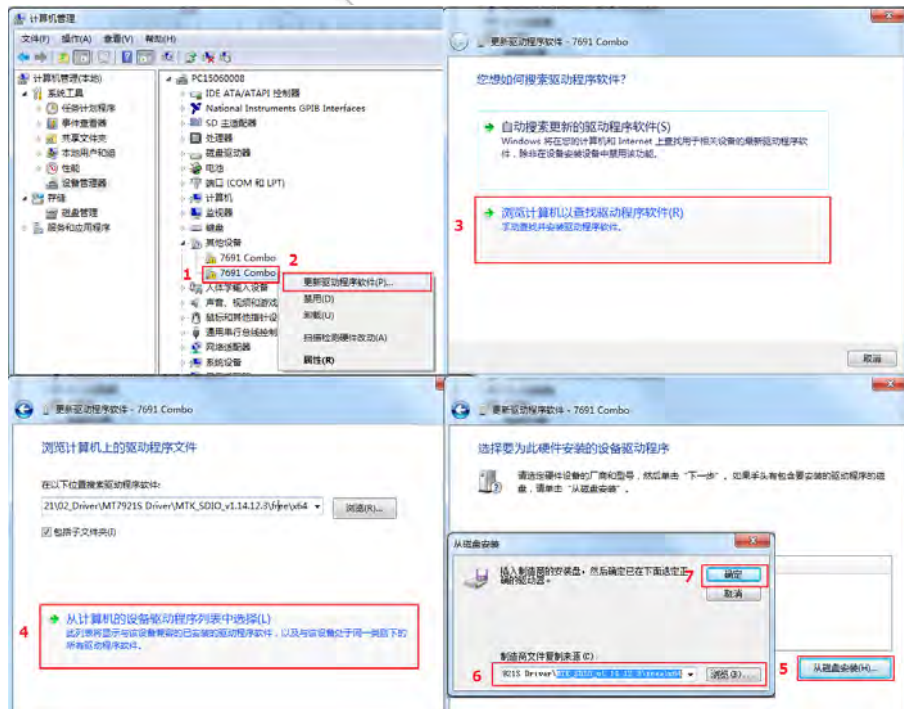
1. Connect DUT to PC/NB and check Windows Device Manager.
2. Window Device Manager would discover DUT shows two “7691 Combo”. User should check DUT VID and PID from “Hardware Ids” of Device Manager to know WiFi and BT device. Please refer to following figure and table to identify WiFi and BT devices:

Hardware Ids	Feature
SD\VID_037a&PID_7961&FN_1	MT7961S-WiFi
SD\VID_037a&PID_7961&FN_2	MT7961S-BT

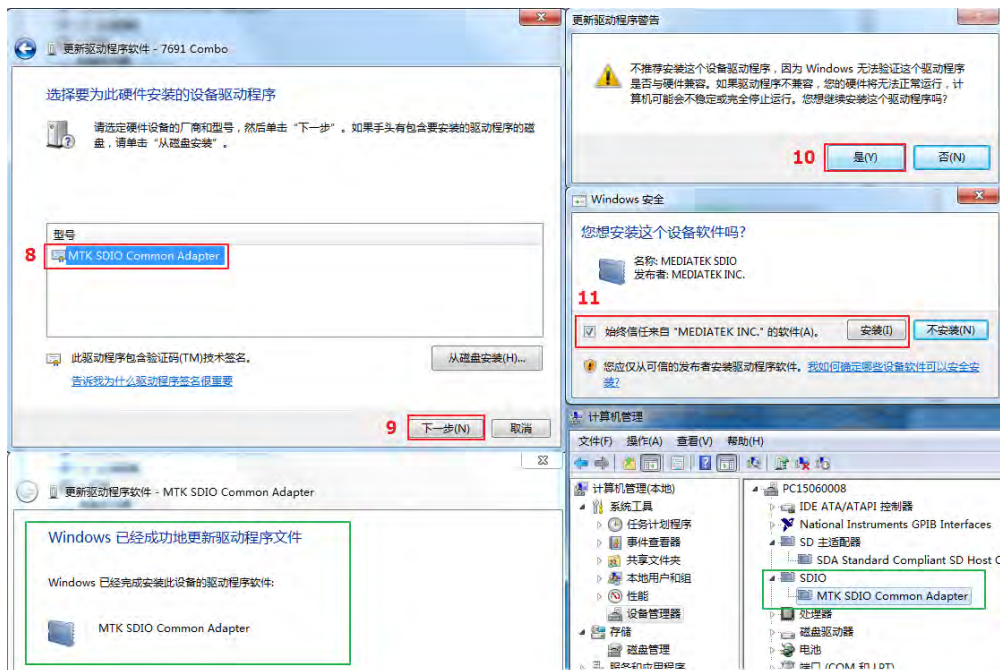


3. Right-click on “7691 Combo” BT device (SD\VID_037a&PID_7961&FN_2) and Update Driver Software.

...\\MTK_SDIO_v1.14.12.3\\free\\x64\\mtksdio.inf



4. Select model "Mediatek Bluetooth USB Dongle (7961)" and click Install. Device Manager will also show a device "MTK SDIO Common Adapter" in Bluetooth Radios if installation is completed.



UART interface:

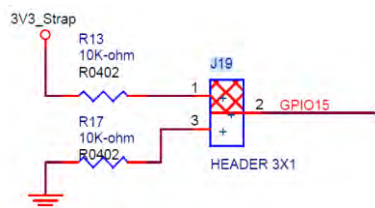
1. Connect DUT UART Interface (TXD/RXD/GND) to PC/NB UART TTL(if PC/NB doesn't have serial port, please use USB to Serial Cable ,such CH341, CP1202...)

MT7920 GPIO14 (UART_RXD) ⇔ PC UART_TXD

MT7920 GPIO15 (UART_TXD) ⇔ PC UART_RXD

MT7920 GND ⇔ PC UART_GND

2. Strap pin GPIO15 connects 10k pull-up resistor to power supply 3.3V.

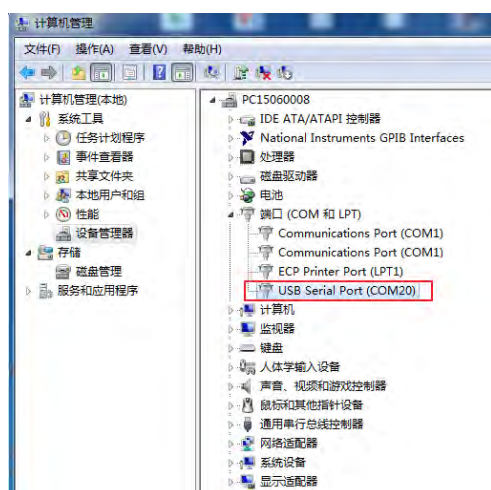


BT Host select

GPIO15 =1--> UART

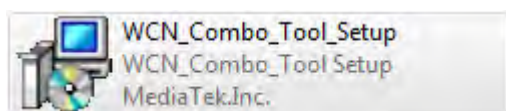
GPIO15 =0-> SDIO/USB

3. Install USB to Serial Cable driver (driver is provided by the usb-to-serial chip manufacturer, not MTK),



2.1.2 Install Combo-Tool

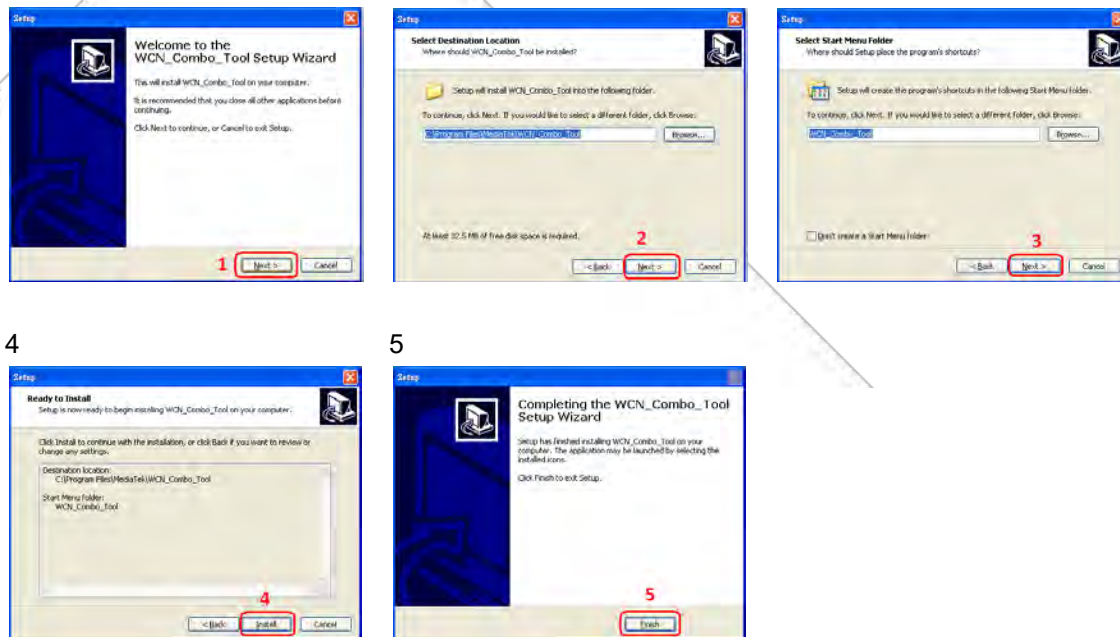
Double-click **WCN_Combo_Tool_Setup** icon in “..\Combo_Tool\” and follow below steps to install Combo-Tool.



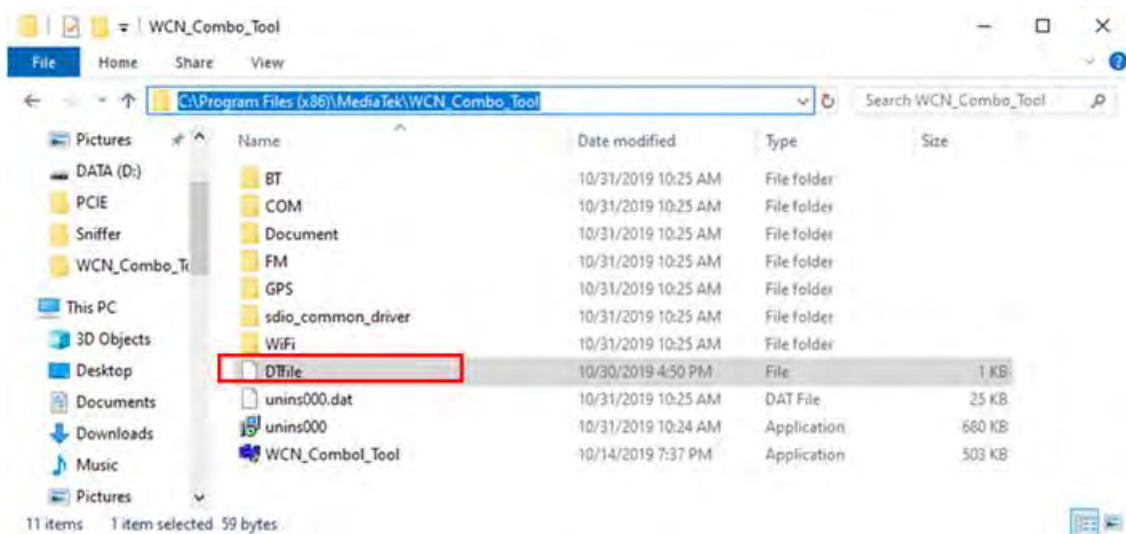
1

2

3



After installation finished, copy "DTFile" to "C:\Program Files (x86)\MediaTek\WCN_Combo_Tool" (as below screenshot).

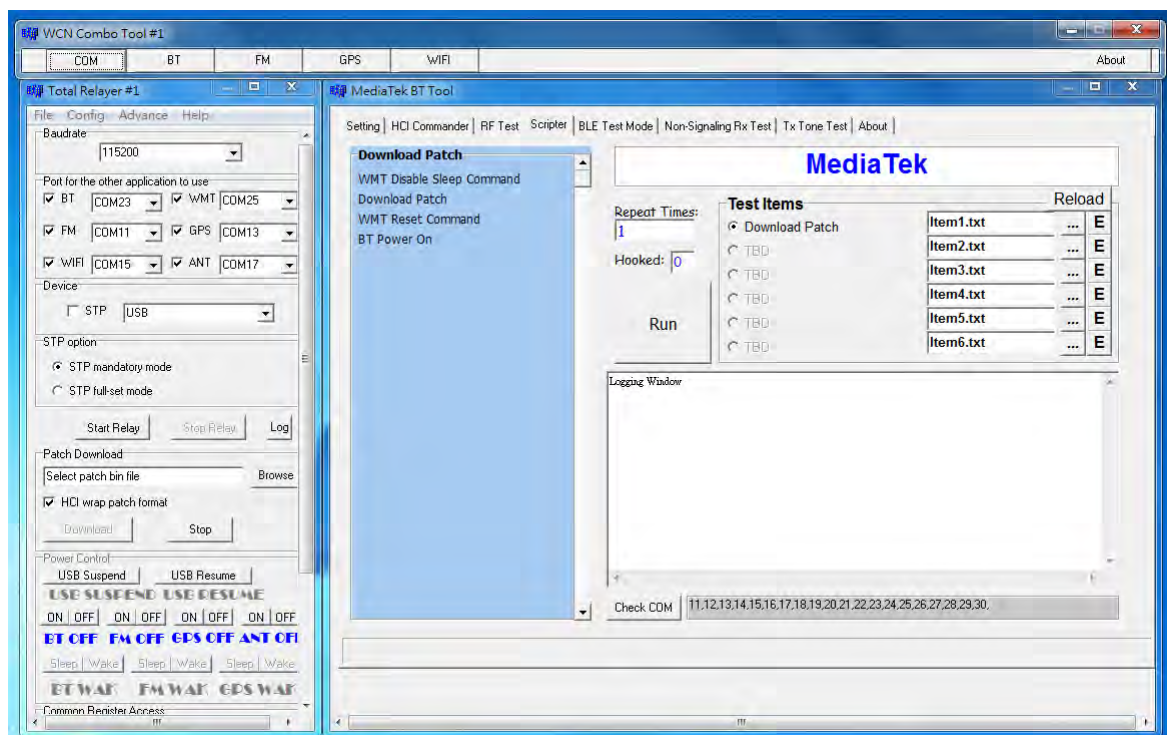
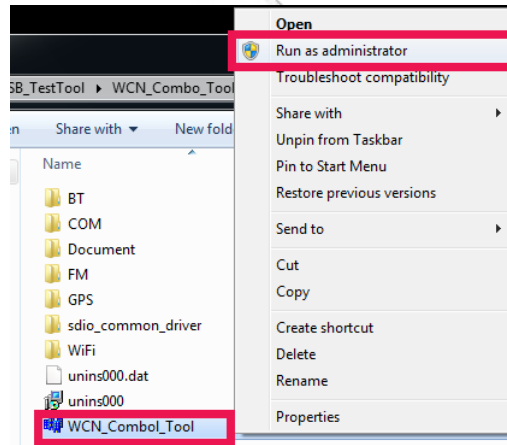


2.2 How to use Combo-Tool

2.2.1 SDIO/USB Interface

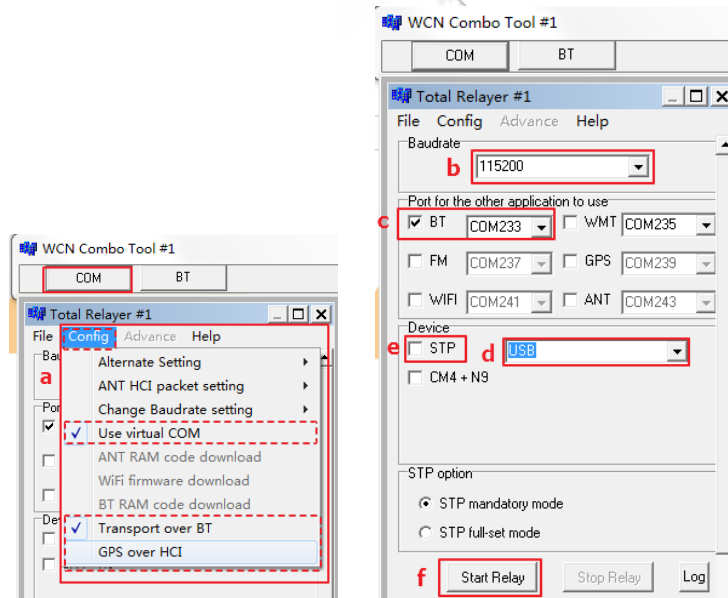
Users should follow the procedure listed in below to initiate DUT by Combo-Tool

1. Running WCN_Combo_Tool as administrator and the UI will pop out.



2. a. Select **COM** → Config → Enable “Transport over BT”, Disable “GPS over HCL”.
- b. Set Baudrate = 115200.

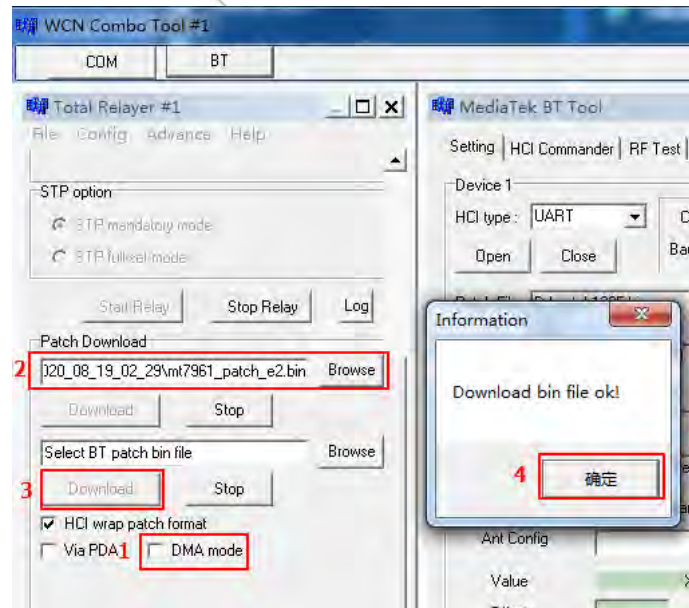
- c. Select BT port number.
- d. Select Device Interface (SDIO/USB).
- e. Uncheck "STP".
- f. Click "Start Relay".



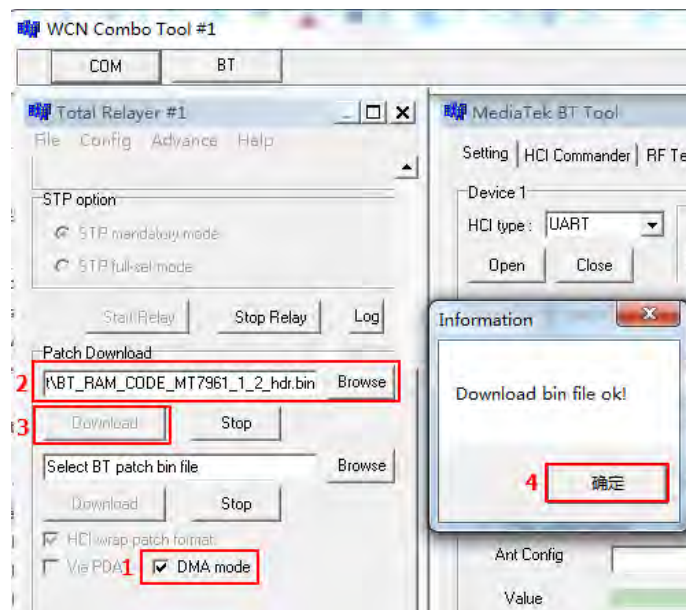
3. Click "Browse" and "Download" buttons to load BT patch in this step. Prompt box will pop up when download is completed.

There are two ways to download bt patch using combo tool, you can choose one of them(a method or b method):

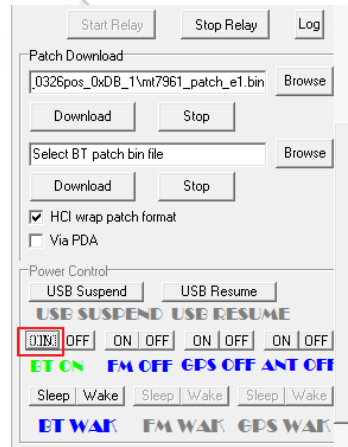
- a. UnCheck "DMA mode"=> Select "mt7961_patch_e2.bin"=> Click "Download" button



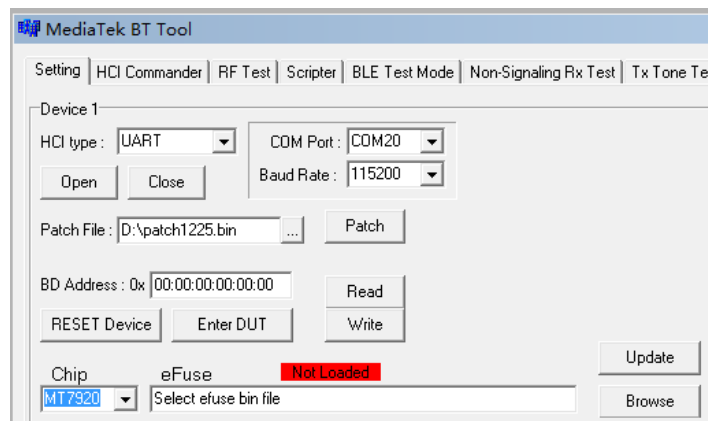
- b. Check "DMA mode"=> Select "BT_RAM_CODE_MT7961_1_2_hdr.bin"=> Click "Download" button



4. After patch download pops out "Download bin file ok!", click "ON" button to set BT ON as following figure.

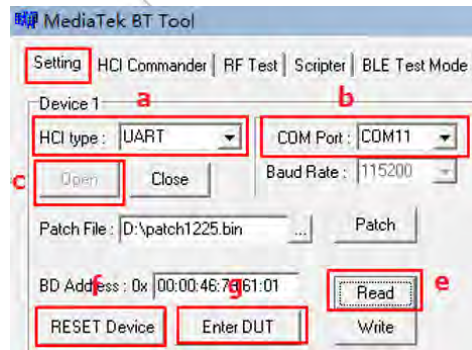


5. Select Chip ID.



6. On **Setting** page:

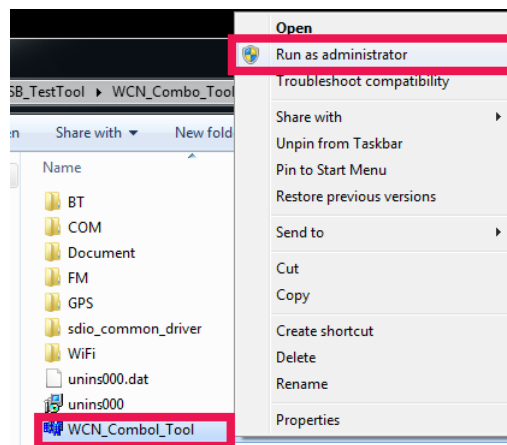
- a. Select HCI type : UART
- b. Select COM Port and Baud Rate identical to step-2
- c. Click "Open" button to open BT COM port; ("Close" button can also close BT COM port.)
- e. Click "Read" button. If users can get BD address, your DUT initiation is successful.
- f. Click "RESET Device" after Open is clicked.
- g. Click "Enter DUT" button, the device is entering Bluetooth test mode (signaling mode).

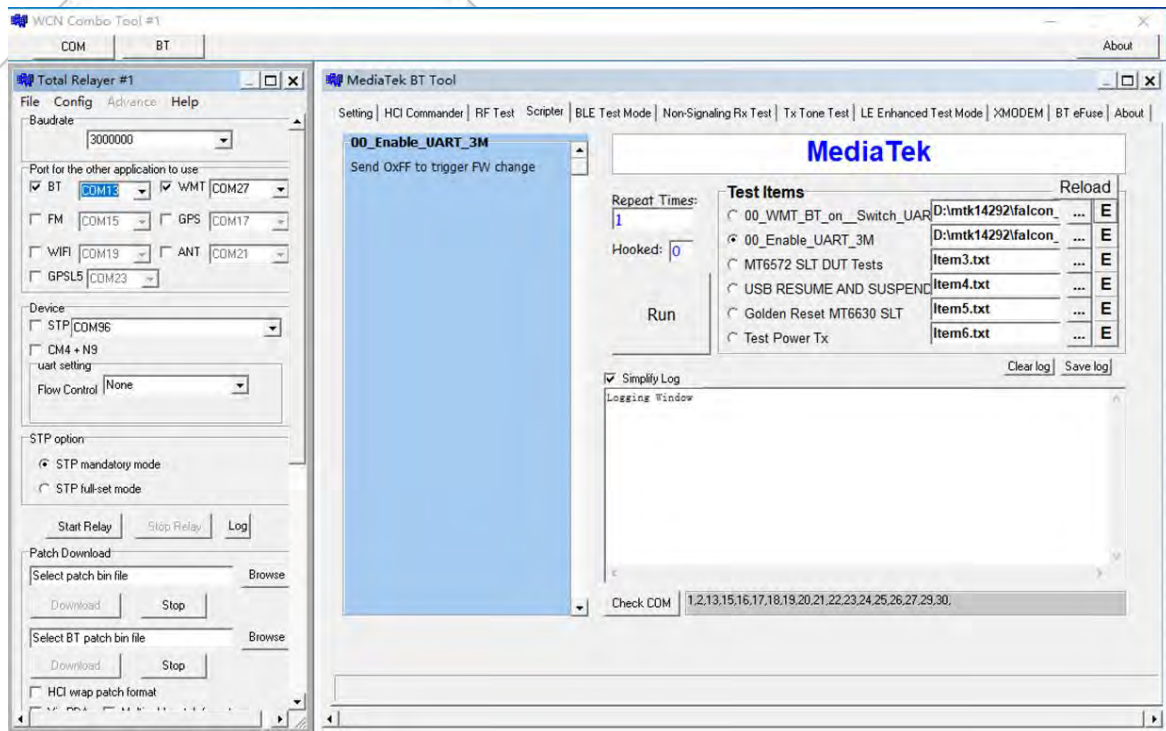


2.2.2 UART Interface

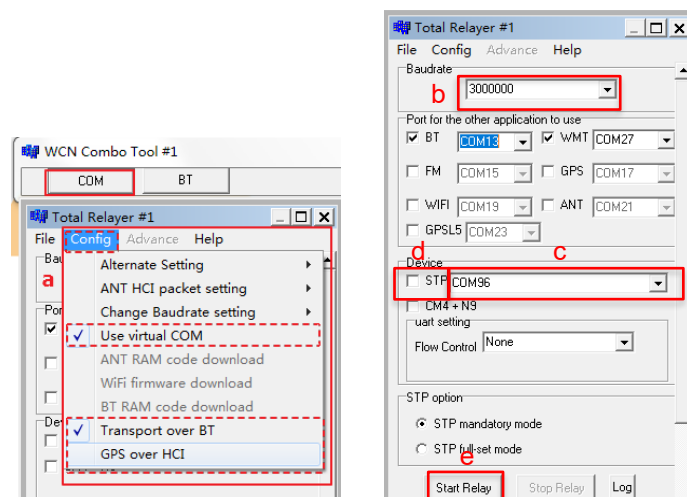
Users should follow the procedure listed in below to initiate DUT by Combo-Tool

1. Running WCN_Combo_Tool as administrator and the UI will pop out.

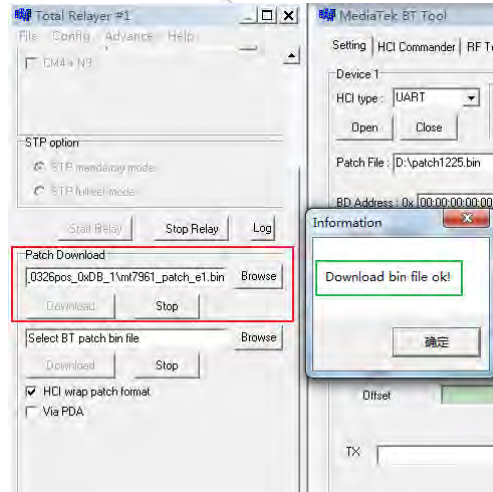




2. a. Select **COM** → Config → Enable “Transport over BT”, Disable “GPS over HCI”.
- b. Set Baudrate = 3000000.
- c. Select Device Interface (UART COM).
- d. Uncheck “STP”.
- e. Click “**Start Relay**”.



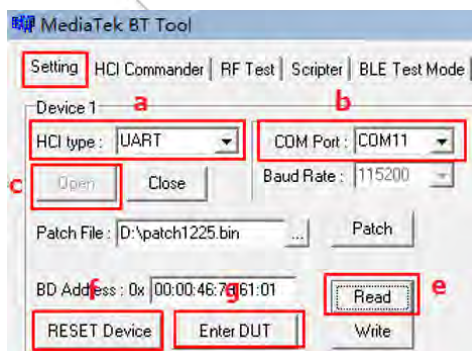
3. Click “Browse” and “Download” buttons to load BT patch in this step. Prompt box will pop up when download is completed.



4. After patch download pops out “Download bin file ok!”, click “ON” button to set BT ON as following figure.



5. On **Setting** page:
 - a. Select HCI type : UART
 - b. Select COM Port and Baud Rate identical to step-2
 - c. Click “Open” button to open BT COM port; (“Close” button can also close BT COM port.)
 - e. Click “Read” button. If users can get BD address, your DUT initiation is successful.
 - f. Click “RESET Device” after Open is clicked.
 - g. Click “Enter DUT” button, the device is entering Bluetooth test mode (signaling mode).



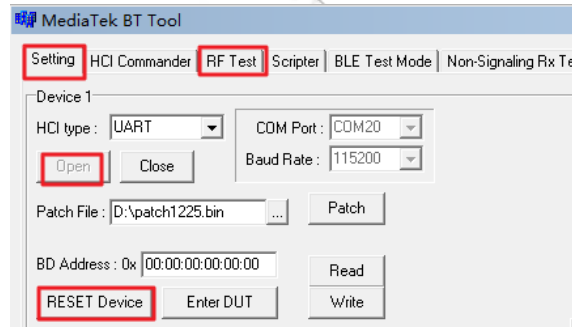
2.2.3 BDR/EDR Signaling Test Mode

If users can read BD Address successful on **Setting** page, the DUT is entering Bluetooth signaling test mode automatically. Users can use R&S® CBT Bluetooth Tester to create connection with DUT directly and perform testing. Users could have detailed information of this Bluetooth tester from this URL: https://www.rohde-schwarz.com/en/product/cbt_cbt32-productstartpage_63493-7927.html



2.2.4 BDR/EDR Non-signaling TX Setting

Ensuring Device is opened and “**RESET Device**” button is clicked on “**Setting**” page. After that, change the page to “**RF Test**”

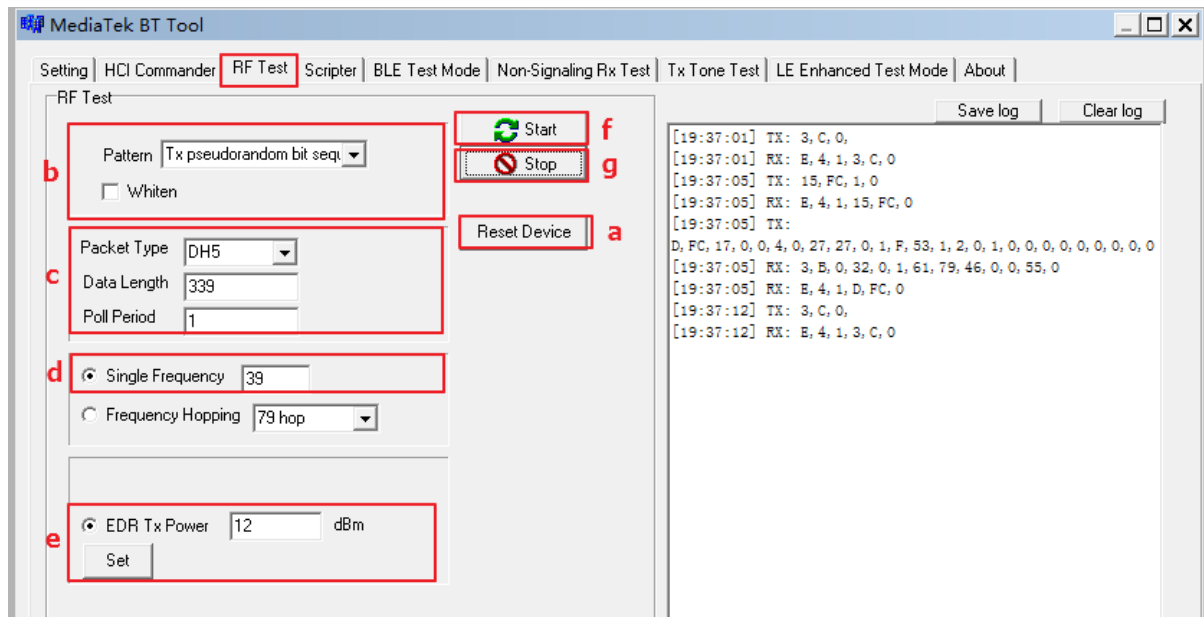


TX Setting

- Click “**RESET Device**” button to reset DUT again. HCI event would respond RX: E, 4, 1, 3, C, 0.
- Select Pattern type.
- Select Packet type.
- Set channel number (0~78) or frequency hopping.
- Set Tx Power dBm for power control (Option) .
- Click “**Start**” button to start transmitting.
- Click “**Stop**” button to stop transmitting.

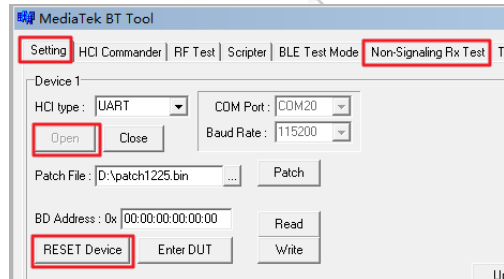
Note: If BT tester is CBT, user should configure BD address = 000000A5F0C3 on it.

Repeat a~g if Tx pattern, packet type, channel or power are changed.



2.2.5 BDR/EDR Non-signaling RX Setting

Ensuring Device is opened and “RESET Device” button is clicked on “Setting” page. After that, change the page to “Non-Signaling Rx Test”



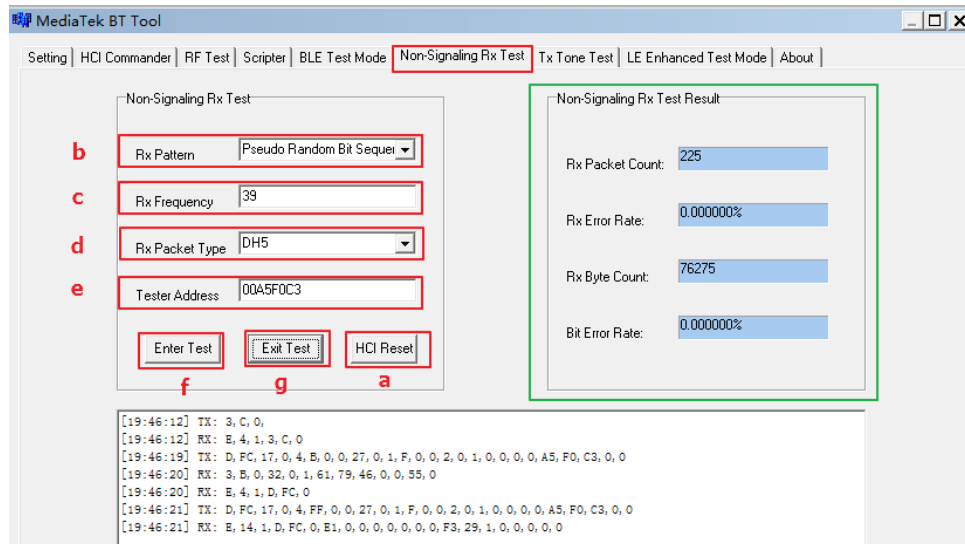
RX Setting

- Click “HCI Reset” button at first.
- Select Rx Pattern type.
- Set Rx channel number (0~78).
- Select Rx Packet type.
- Set BD address identical to CBT tester.

Setup TX parameters on CBT test and turn on transmitting.

- Click “Enter Test” button to start receiving.
- Click “Exit Test” button to stop receiving. RX test results are shown on right-side.

Repeat a~g if Rx pattern, packet type or channel are changed.

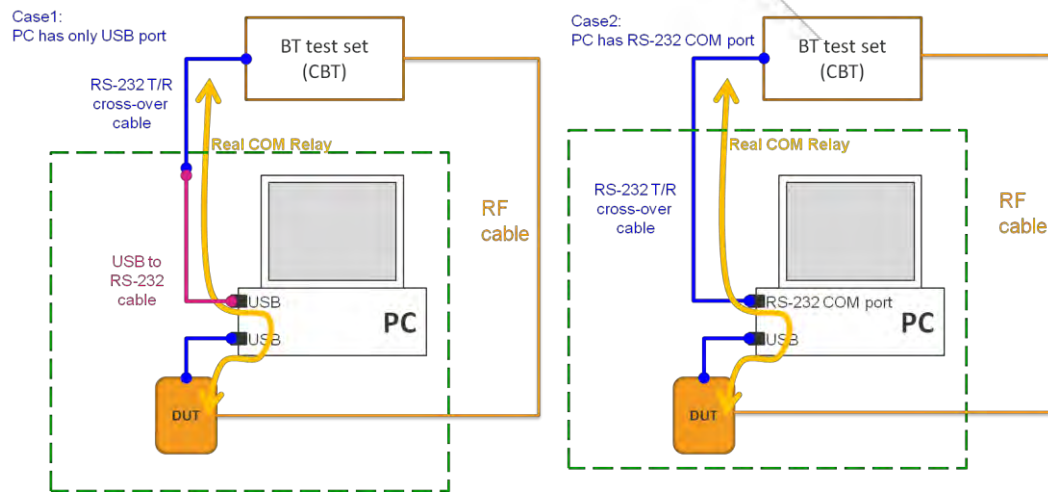


2.2.6 BLE Direct Test Mode

The picture below shows the setup for BLE direct test mode. The PC serves as a relay station. Then, the DUT and the CBT can transmit commands with each other.

Accessories:

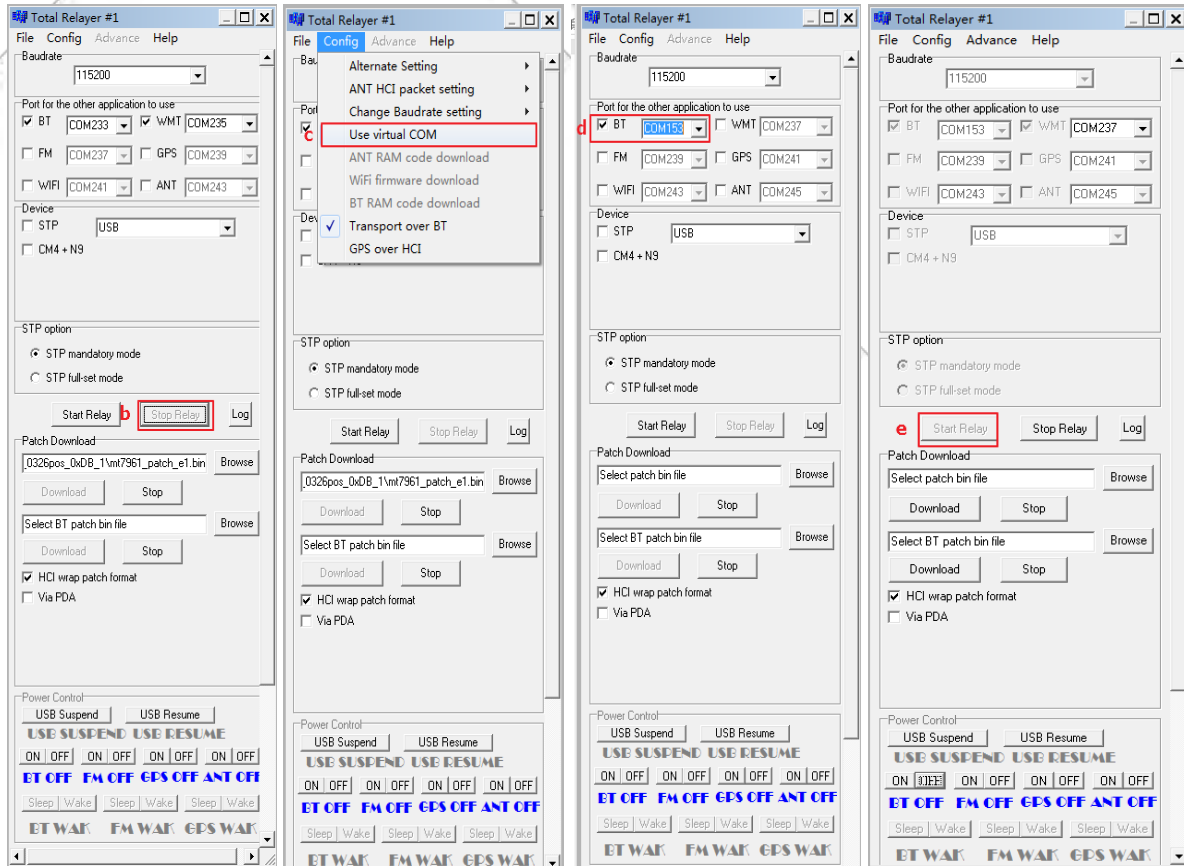
- 1 USB cable
- 1 USB-to-RS232 cable (Option if PC has no RS232 COM-port)
- 1 RS232 TX/RX cross-over cable.



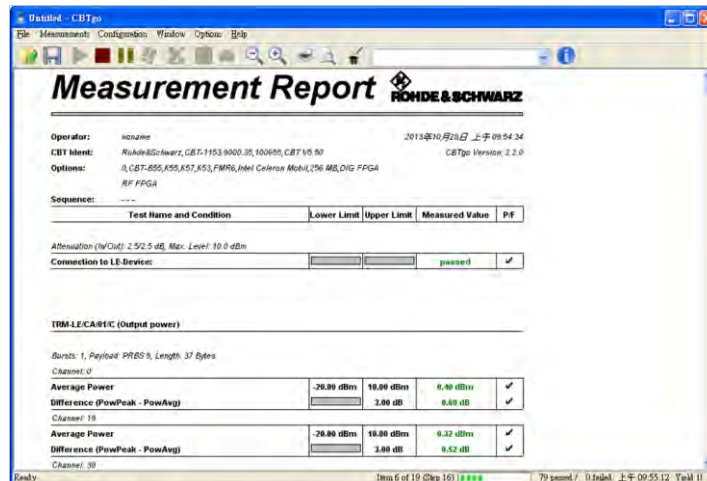
Combo-Tool Setting for BLE Direct Test Mode (Real COM Relay)

After inserting the DUT through the USB cable, please follow the steps to set the real COM relay correctly.

- Follow the step 1~4 in the beginning of Section 2.2 to download patch and BT on.
- Click "Stop Relay" to close BT COM port.
- Click "Config", then unselect "Use virtual COM".
- Select COM port of "USB to UART cable". For example: COM153 for "USB to UART cable", please choose "COM153".
- Press "Start Relay" for Real COM Relay.

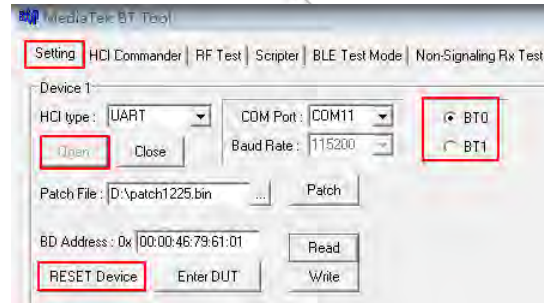


f. Click "Run" Button to run "BT LE test script" by CBTgo.



2.2.7 BLE Non-Signaling TX Test Mode

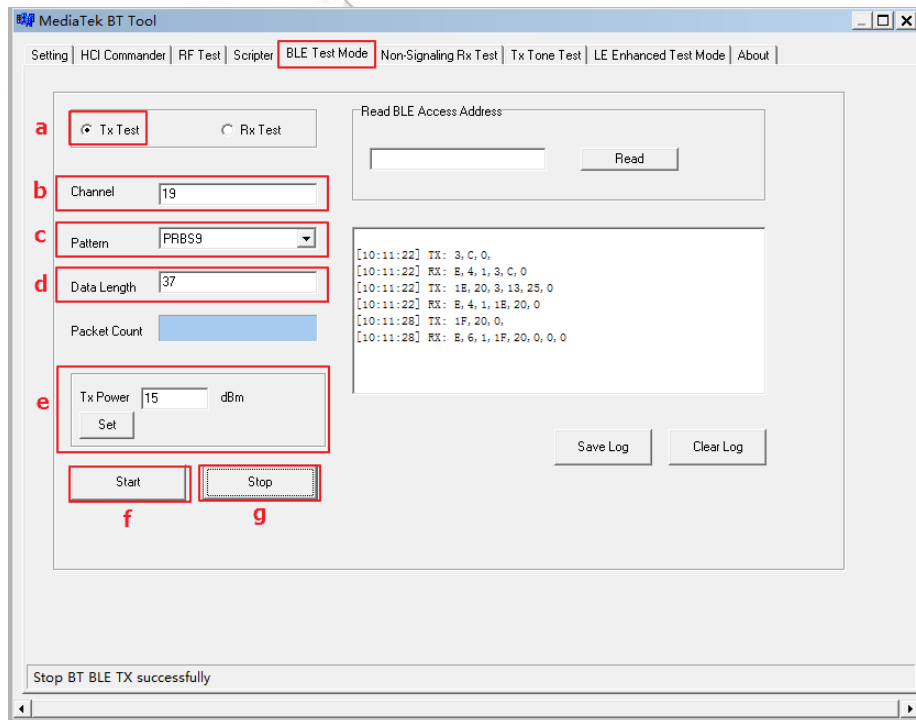
On “Setting” page, ensure Device is opened and “RESET Device” button is clicked



BLE Test Mode – TX

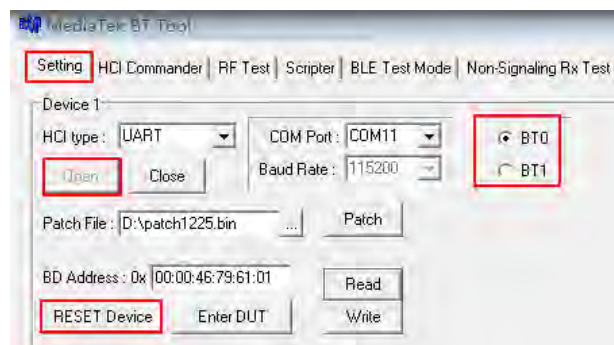
- Select TX Test.
- Set TX channel number.
- Select Pattern type.
- Select Payload length (37 – 255Bytes).
- Set BLE Tx Power dBm for power control (Option).
- Click **Start** button and TX signal is present on CBT accordingly.
- Click **Stop** to stop transmitting.

Users can repeat a ~ g to change channel number and pattern type.



2.2.8 BLE Non-Signaling RX Test Mode

On "Setting" page, ensure Device is opened and "RESET Device" button is clicked



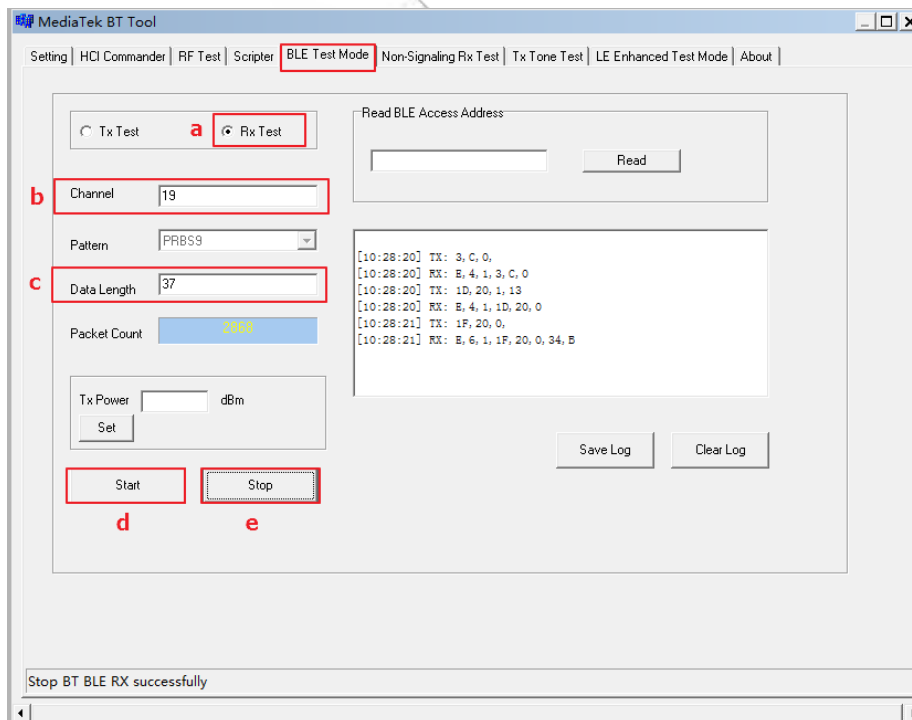
BLE Test Mode – RX

- Select RX Test.
- Set Rx channel number (0~39).
- Select length.

Turn on CBT packet generator.

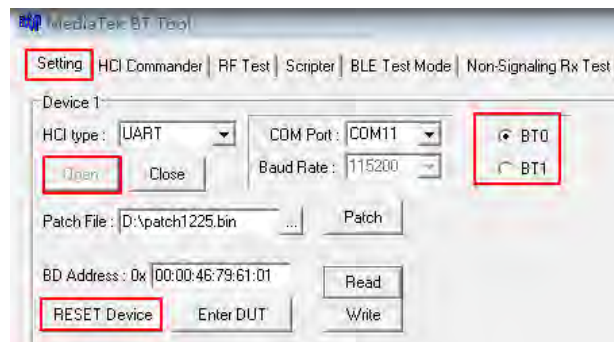
- Click "Start" button
- Click Stop button again. RX results are shown in Packet Count.

Users can repeat a ~ e to change channel number and pattern type.



2.2.9 CW-tone TX Setting

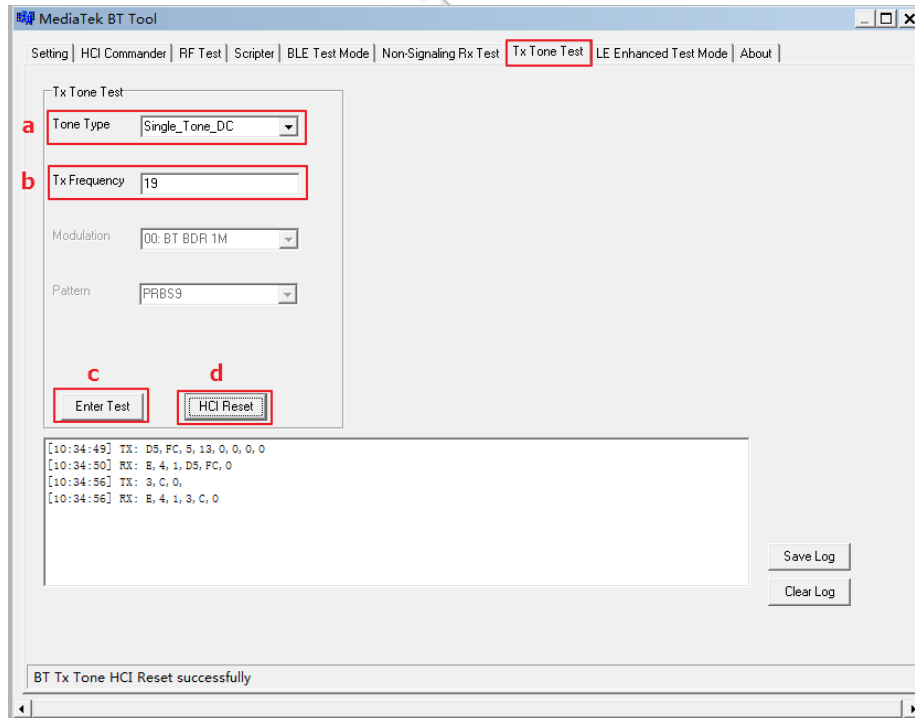
Ensuring Device is opened and “RESET Device” button is clicked on “Setting” page. After that, change page to “Tx Tone Test”



Non-modulated signal

- Select Tone Type: Single_Tone_DC
- Select Tx Frequency (channel) number: 0 ~ 78
- Click “Enter Test” button to start signal transmitting.
- Click “HCI Reset” button to stop signal transmitting

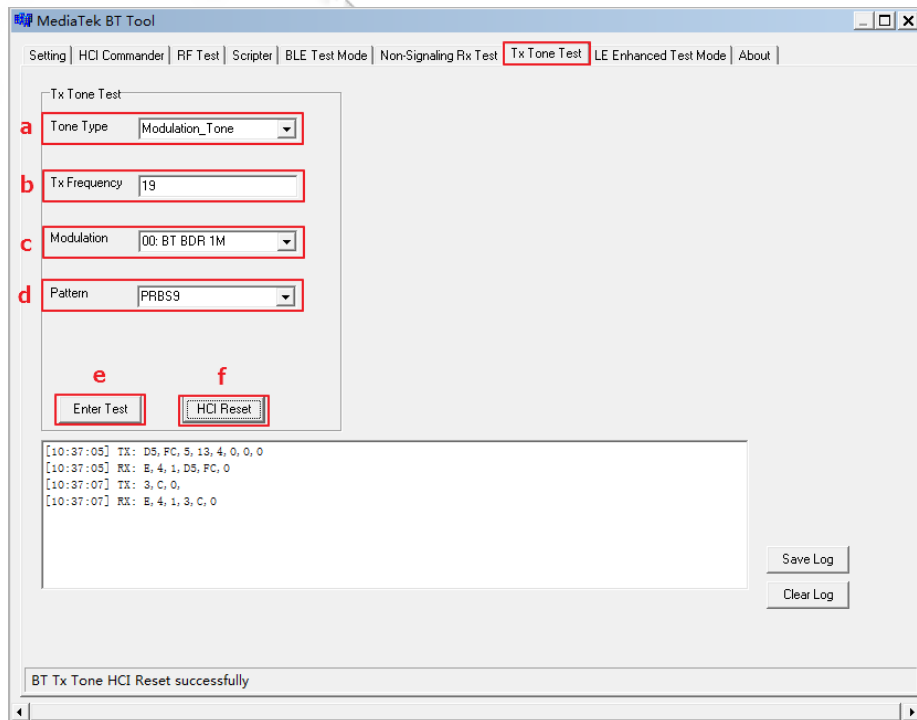
Repeat a ~ d if Tx channel is changed.



Modulated signal

- Select Tone Type: Modulation_Tone.
- Select Tx Frequency (channel) number: 0 ~ 78.
- Select Modulation Type.
- Select Pattern Type (default PRBS9).
- Click “Enter Test” button to start signal transmitting.
- Click “HCI Reset” button to stop signal transmitting

Repeat a ~ f if Tx channel is changed.



2.2.10 BLE Enhanced TX Test Mode

“LE Enhanced Test Mode” support part of BT5 LE feature test.

This BT5.0 testing can be executed with equipment likes R&S® CMW270/500 which support BT5.0 feature.

As CMW270/500, users could have detailed information of this Bluetooth tester from this URL:
https://www.rohde-schwarz.com/product/cmw270-productstartpage_63493-9552.html



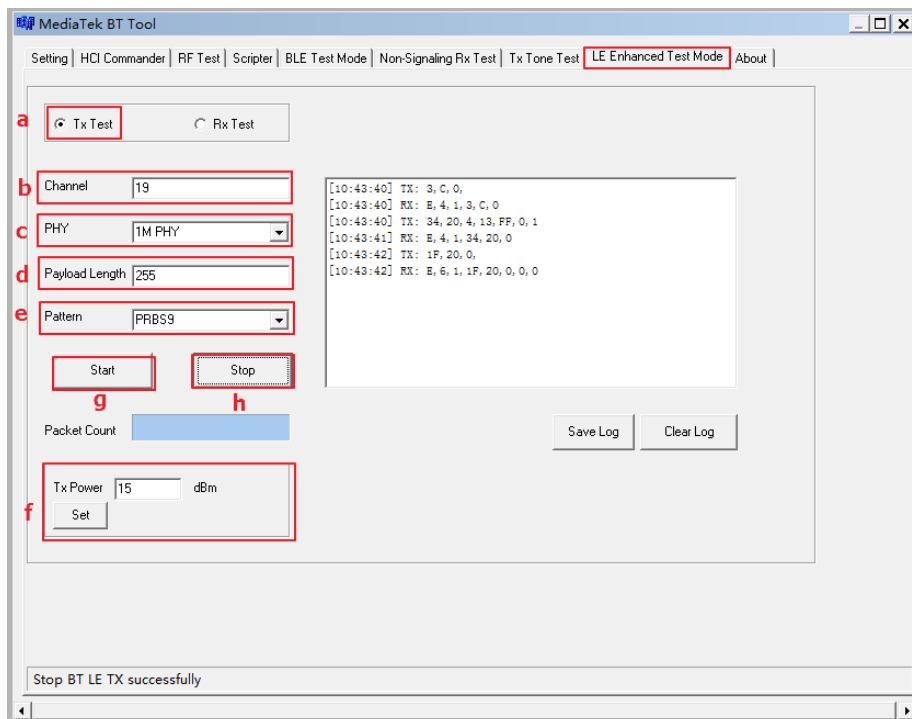
Ensuring Device is opened and “**RESET Device**” button is clicked on “**Setting**” page. After that, change the page to “**LE Enhanced Test Mode**”



BLE Test Mode – TX

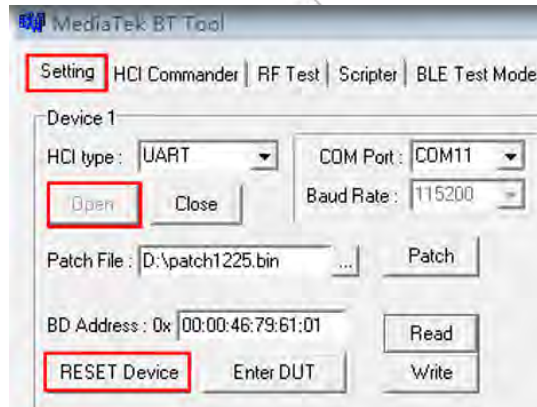
- Select TX Test.
- Set TX Channel number(0~39).
- Select Phy.
- Select Payload length (37 – 255Bytes).
- Select Pattern type.
- Set BLE Tx Power (Unit:dBm).
- Click **Start** button and TX signal is present on CBT accordingly.
- Click **Stop** to stop transmitting.

Users can repeat a ~ h to change channel number and pattern type.



2.2.11 BLE Enhanced RX Test Mode

Ensuring Device is opened and “RESET Device” button is clicked on “**Setting**” page. After that, change the page to “**LE Enhanced Test Mode**”



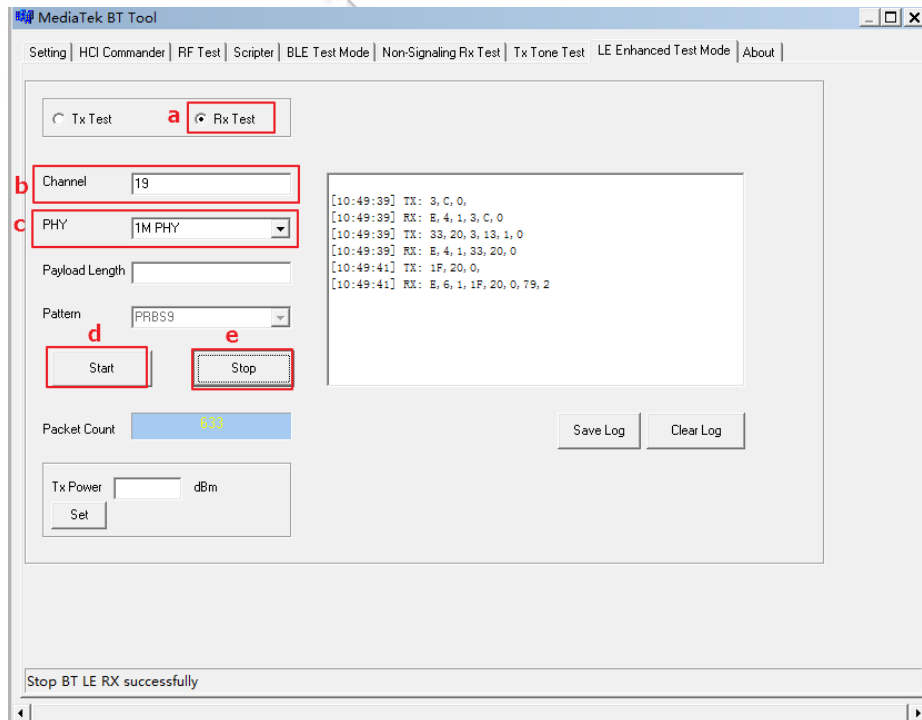
BLE Test Mode – RX

- Select RX Test.
- Set RX Channel number(0~39).
- Select Phy.

Turn on CMW270/500 packet generator.

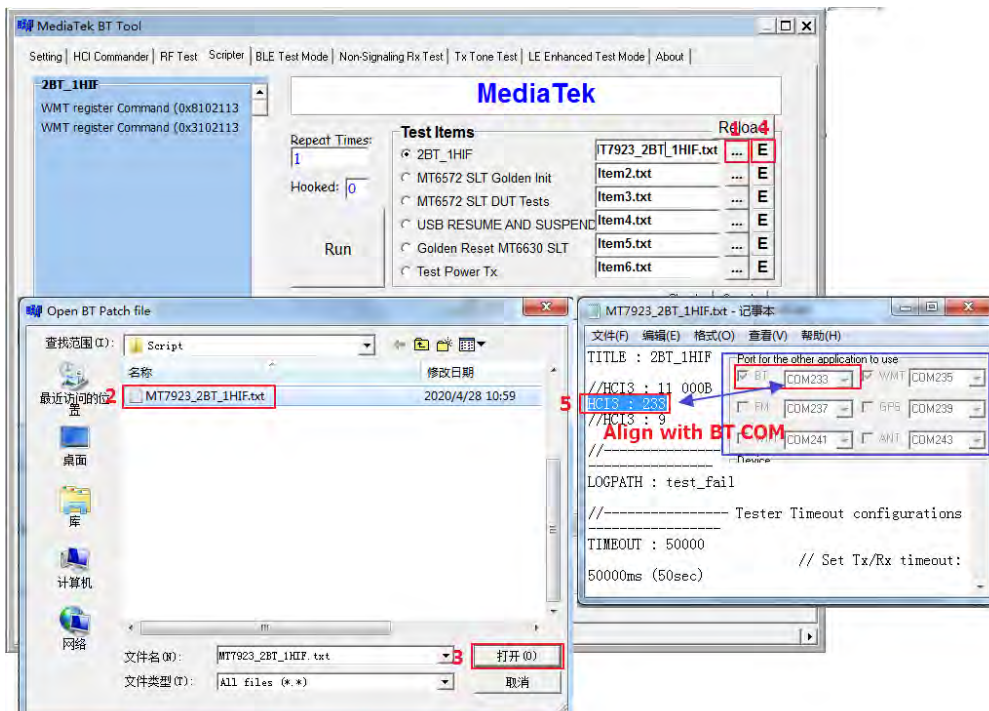
- Click “**Start**” button.
- Click **Stop** button again. RX results are shown in Packet Count.

Users can repeat a ~ e to change channel number and pattern type.

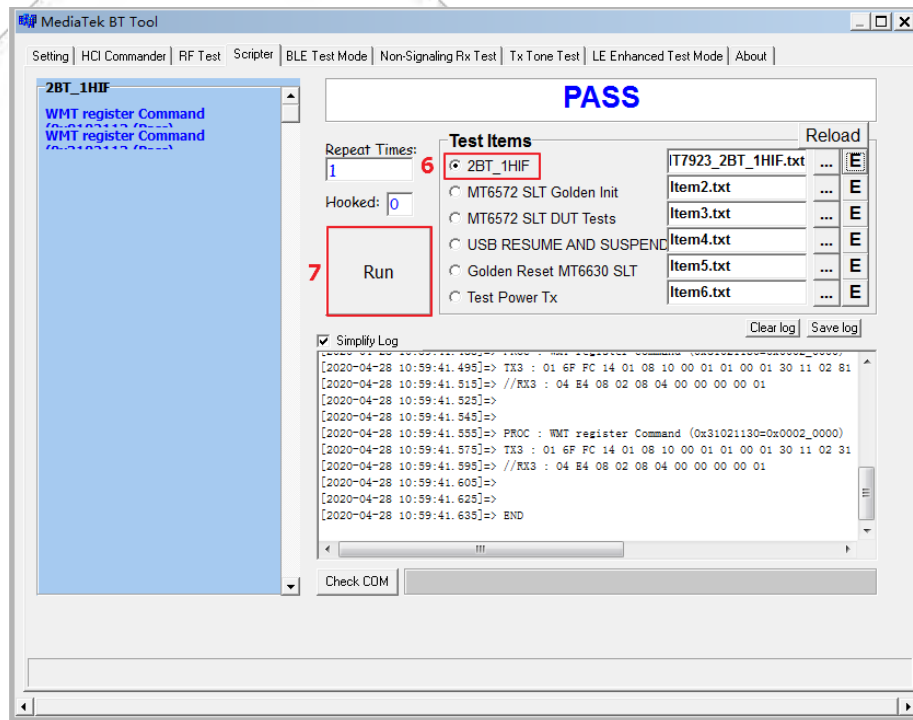


2.2.12 BT Run Script

1. On Script Page, Select Script file, and modify BT COM.



2. Run script.



2.2.13 BT Buffer Mode

2.2.13.1 BT buffer mode with EEPROM.bin

- Open BT COM.
- Select chip ID(MT7920).
- Select EEPROM.bin file.

Set Power Compensation

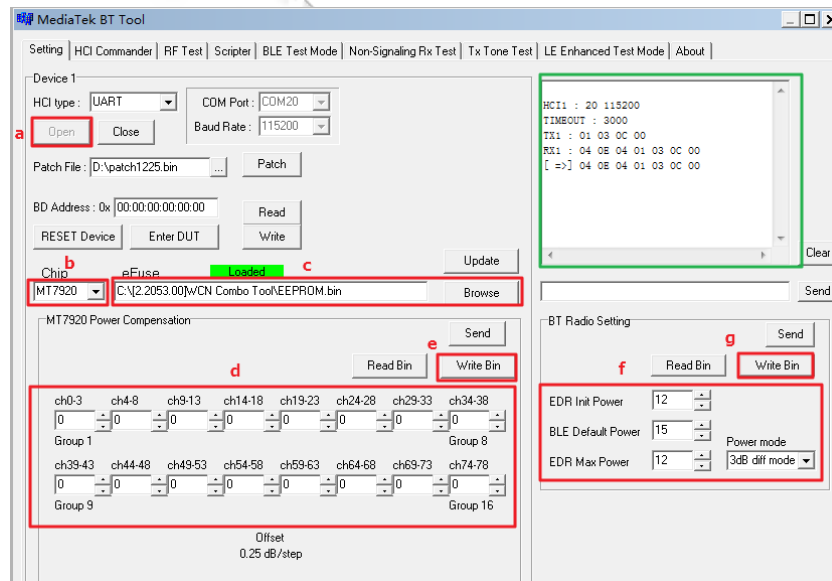
- Set Power compensation value by Groups (0.25dB/step. -3~+3dB).
- Update to EEPROM.bin file.

Set BT Radio Setting

- Set EDR init power(-32~12dBm)/BLE default power(-29~20dBm)/EDR max power(-32~12dBm).
Set Power mode(0dB diff or 3dB diff).
- Update to EEPROM.bin file.

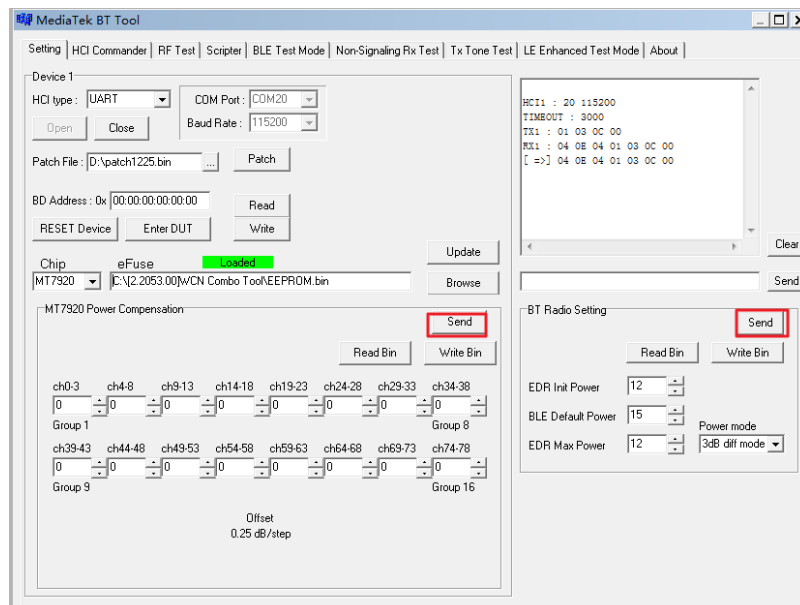
Update Power Compensation/BT Radio setting to DUT.

- Click "Update" button, then all setting will be sent to DUT by TCI cmd.

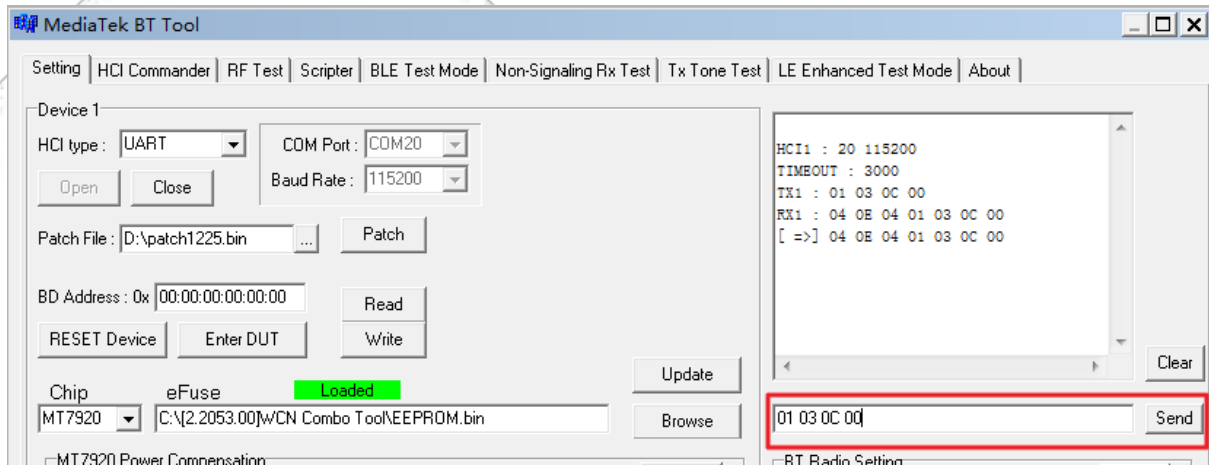


2.2.13.2 BT buffer mode without EEPROM.bin

If you don't want to use the EEPROM.bin file to update the parameters, you can also click the "Send" button after the parameter settings are completed



You can send raw TCI cmd to DUT as below



Antenna

Antenna Number	Brand Name	Model Name	Ant. Type	Connector	Support	Max Peak Gain
1	PSA	RFMTA340718EMLB302	PIFA	I-Pex	2.4G+5G+BT	BT: 3.18 2.4G :3.18 5G :4.92
2	Cortec	AN2450-4902BRS	dipole	Reverse SMA	2.4G+5G+BT	BT: 2.92 2.4G :2.92 5G :4.67
3	HongBo	260-25096	monopole	MHF4L	2.4G+5G+BT	BT: 3.11 2.4G :3.11 5G :4.91 6G :4.87

Warning

FCC

Federal Communication Commission Interference Statement

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a residential installation. This equipment generates, uses and can radiate radio frequency energy and, if not installed and used in accordance with the instructions, may cause harmful interference to radio communications. However, there is no guarantee that interference will not occur in a particular installation. If this equipment does cause harmful interference to radio or television reception, which can be determined by turning the equipment off and on, the user is encouraged to try to correct the interference by one of the following measures:

- Reorient or relocate the receiving antenna.
- Increase the separation between the equipment and receiver.
- Connect the equipment into an outlet on a circuit different from that to which the receiver is connected.
- Consult the dealer or an experienced radio/TV technician for help.

FCC Caution: Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

This device complies with Part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

IMPORTANT NOTE:

This module is intended for OEM integrator. This module is only FCC authorized for the specific rule parts listed on the grant, and that the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

Additional testing and certification may be necessary when multiple modules are used.

OEM integrators that they must use the equivalent antennas or C2PC will be required.

This equipment complies with FCC mobile radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with a minimum distance of 20cm between the radiator & your body. If the module is installed in a portable host, a separate SAR evaluation is required to confirm compliance with relevant FCC portable RF exposure rules.

The host manufacturer should reference KDB Publication 996369 D04 Module Integration Guide.

USERS MANUAL OF THE END PRODUCT:

In the users manual of the end product, the end user has to be informed to keep at least 20cm separation with the antenna while this end product is installed and operated. The end user has to be informed that the FCC radio-frequency exposure guidelines for an uncontrolled environment can be satisfied.

The end user has to also be informed that any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

This device complies with Part 15 of FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC regulations restrict the operation of this device to indoor use only.

LABEL OF THE END PRODUCT:

The final end product must be labeled in a visible area with the following " Contains TX FCC ID: RAS-MT7920 ".

This device complies with Part 15 of FCC rules. Operation is subject to the following two conditions: (1) this device may not cause harmful interference and (2) this device must accept any interference received, including interference that may cause undesired operation.

FCC regulations restrict the operation of this device to indoor use only.

IC

PMN : 2TX 11ax (WiFi6) BW80 + BT/BLE Combo Card

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

- (1) This device may not cause interference.
- (2) This device must accept any interference, including interference that may cause undesired operation of the device.

Cet appareil contient des émetteurs / récepteurs exempts de licence qui sont conformes au (x) RSS (s) exemptés de licence d'Innovation, Sciences et Développement économique Canada. L'opération est soumise aux deux conditions suivantes:

- (1) Cet appareil ne doit pas provoquer d'interférences.*
- (2) Cet appareil doit accepter toute interférence, y compris les interférences susceptibles de provoquer un fonctionnement indésirable de l'appareil.*

This device and its antenna(s) must not be co-located with any other transmitters except in accordance with IC multi-transmitter product procedures.

Referring to the multi-transmitter policy, multiple-transmitter(s) and module(s) can be operated simultaneously without reassessment permissive change.

Cet appareil et son antenne (s) ne doit pas être co-localisés ou fonctionnement en association avec une autre antenne ou transmetteur.

This radio transmitter [7542A-MT7920] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

Le présent émetteur radio (7542A-MT7920) a été approuvé par Innovation, Sciences et Développement économique Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal d'antenne. Les types d'antennes non inclus dans cette liste qui ont un gain supérieur au gain maximal indiqué pour tout type listé sont strictement interdits pour une utilisation avec cet appareil.

The device for operation in the band 5150–5250 MHz is only for indoor use to reduce the potential for harmful interference to co-channel mobile satellite systems.

les dispositifs fonctionnant dans la bande 5150-5250 MHz sont réservés uniquement pour une utilisation à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux.

The maximum antenna gain permitted for devices in the bands 5250-5350 MHz and 5470-5725 MHz shall be such that the equipment still complies with the e.i.r.p. limit.

le gain maximal d'antenne permis pour les dispositifs utilisant les bandes 5250-5350 MHz et 5470-5725 MHz doit se conformer à la limite de p.i.r.e.

The maximum antenna gain permitted for devices in the band 5725-5850 MHz shall be such that the equipment still complies with the e.i.r.p. limits specified for point-to-point and non-point-to-point operation as appropriate.

le gain maximal d'antenne permis (pour les dispositifs utilisant la bande 5725-5850 MHz) doit se conformer à la limite de p.i.r.e. spécifiée pour l'exploitation point à point et non point à point, selon le cas.

For indoor use only.

Pour une utilisation en intérieur uniquement.

IMPORTANT NOTE:

IC Radiation Exposure Statement:

This equipment complies with IC RSS-102 radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance **20cm** between the radiator & your body.

*Cet équipement est conforme aux limites d'exposition aux rayonnements IC établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé avec un minimum de **20 cm** de distance entre la source de rayonnement et votre corps.*

IMPORTANT NOTE:

This module is intended for OEM integrator. The OEM integrator is responsible for the compliance to all the rules that apply to the product into which this certified RF module is integrated.

Additional testing and certification may be necessary when multiple modules are used.

OEM integrators that they must use the equivalent antennas or C2PC will be required.

Any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment.

USERS MANUAL OF THE END PRODUCT:

In the users manual of the end product, the end user has to be informed to keep at least **20cm** separation with the antenna while this end product is installed and operated. The end user has to be

informed that the IC radio-frequency exposure guidelines for an uncontrolled environment can be satisfied.

The end user has to also be informed that any changes or modifications not expressly approved by the manufacturer could void the user's authority to operate this equipment. Operation is subject to the following two conditions: (1) this device may not cause harmful interference (2) this device must accept any interference received, including interference that may cause undesired operation.

Indoor use only.

LABEL OF THE END PRODUCT:

The final end product must be labeled in a visible area with the following " Contains IC: 7542A-MT7920 ".

The Host Model Number (HMN) must be indicated at any location on the exterior of the end product or product packaging or product literature which shall be available with the end product or online.

Indoor use only.

NCC

取得審驗證明之低功率射頻器材，非經核准，公司、商號或使用者均不得擅自變更頻率、加大功率或變更原設計之特性及功能。低功率射頻器材之使用不得影響飛航安全及干擾合法通信；經發現有干擾現象時，應立即停用，並改善至無干擾時方得繼續使用。前述合法通信，指依電信管理法規定作業之無線電通信。低功率射頻器材須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

應避免影響附近雷達系統之操作。

本模組於取得認證後將依規定於模組本體標示審驗合格標籤，並要求平台廠商於平台上標示「本產品內含射頻模組●CC XX xx LP yyy Z z。」

JP

5GHz band (W52, W53): Indoor use only (except communicate to high power radio)

W52/W53 屋内使用限定 ただし登録局に接続される場合は除く

CE

This equipment complies with EU radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance **20cm** between the radiator & your body.

The frequency and the maximum transmitted power in EU are listed below:

2412-2472MHz: 19.93 dBm
 2402-2480MHz (BR/EDR): 15.35 dBm
 2402-2480MHz (LE): 12.13 dBm
 5180-5240MHz: 22.94 dBm
 5260-5320MHz: 22.76 dBm
 5500-5700: 22.92 dBm
 5745-5825MHz: 13.96 dBm

The device is restricted to indoor use only when operating in the 5150 to 5350 MHz frequency range.

UK

This equipment complies with radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance **20cm** between the radiator & your body.

The frequency and the maximum transmitted power in UK are listed below:

2412-2472MHz: 19.93 dBm
 2402-2480MHz (BR/EDR): 15.35dBm
 2402-2480MHz (LE): 12.13 dBm
 5180-5240MHz: 22.94 dBm
 5260-5320MHz: 22.76 dBm
 5500-5700MHz: 22.92 dBm
 5745-5825MHz: 13.96 dBm

The device is restricted to indoor use only when operating in the 5150 to 5350 MHz frequency range.