MT7663

Test-Mode Software Application Note

Part-1: QA-Tool User Guideline

Version: V1.1

Release Date: 2019-04-12

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Specifications are subject to change without notice.

Document Revision History

Version	Date	Author	Change List
V1.0	20190308	Louis	• Initial release.
V1.1	20190412	Shihmis	• 2.3.6-2.3.8 Wording changed.

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1 System overview

1.1 General Description

MT7663 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.

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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.

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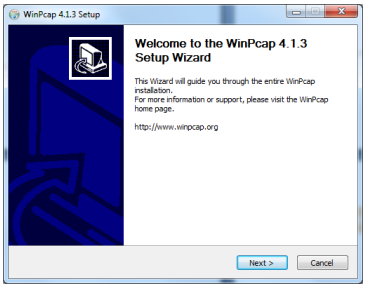
2.1.1 Install WinPcap

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.

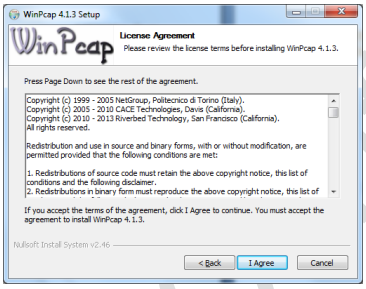
https://www.winpcap.org/install/

WinPcap version: 4.1.2 or later.

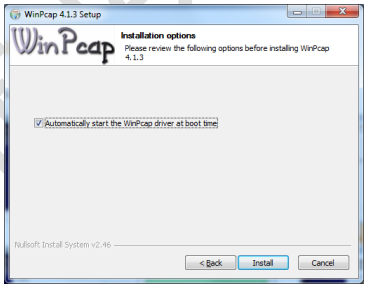
1



2



3



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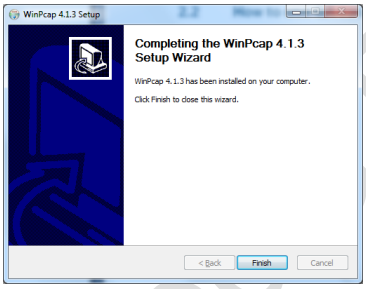

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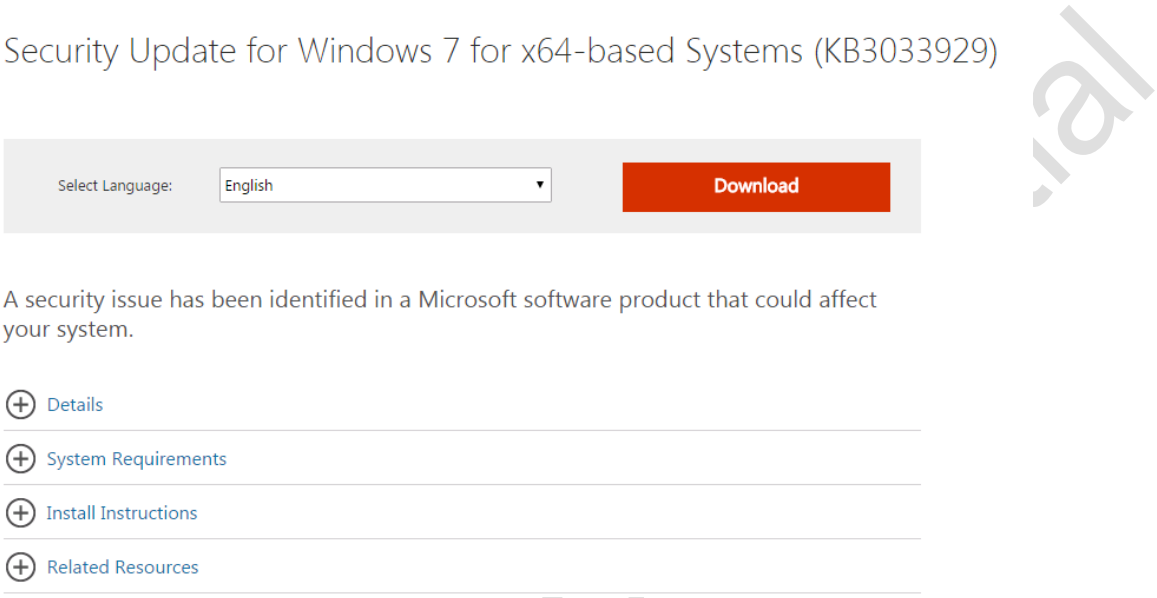
2.1.2 Windows 7 Security for new x64 signature mechanism

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



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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

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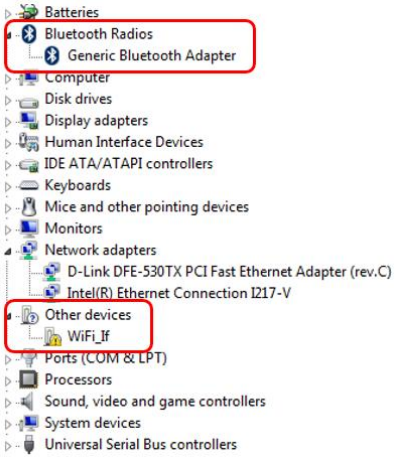
2.1.4 QA-Tool Windows driver

MT7663 supports USB and SDIO interface. According to interface type of MT7663 on users' hand, please refer to steps shown below to install QA-Tool Windows driver:

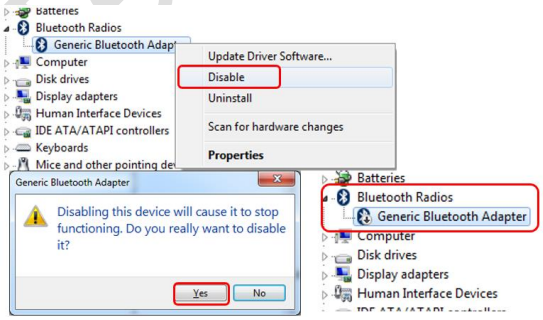
USB interface:

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 the "**Generic Bluetooth Adapter**" BT device and select disable as follows.



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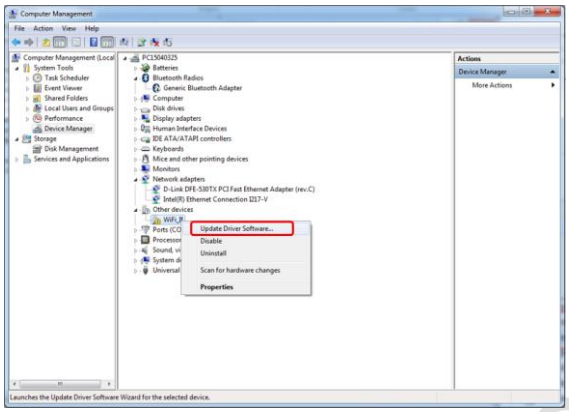
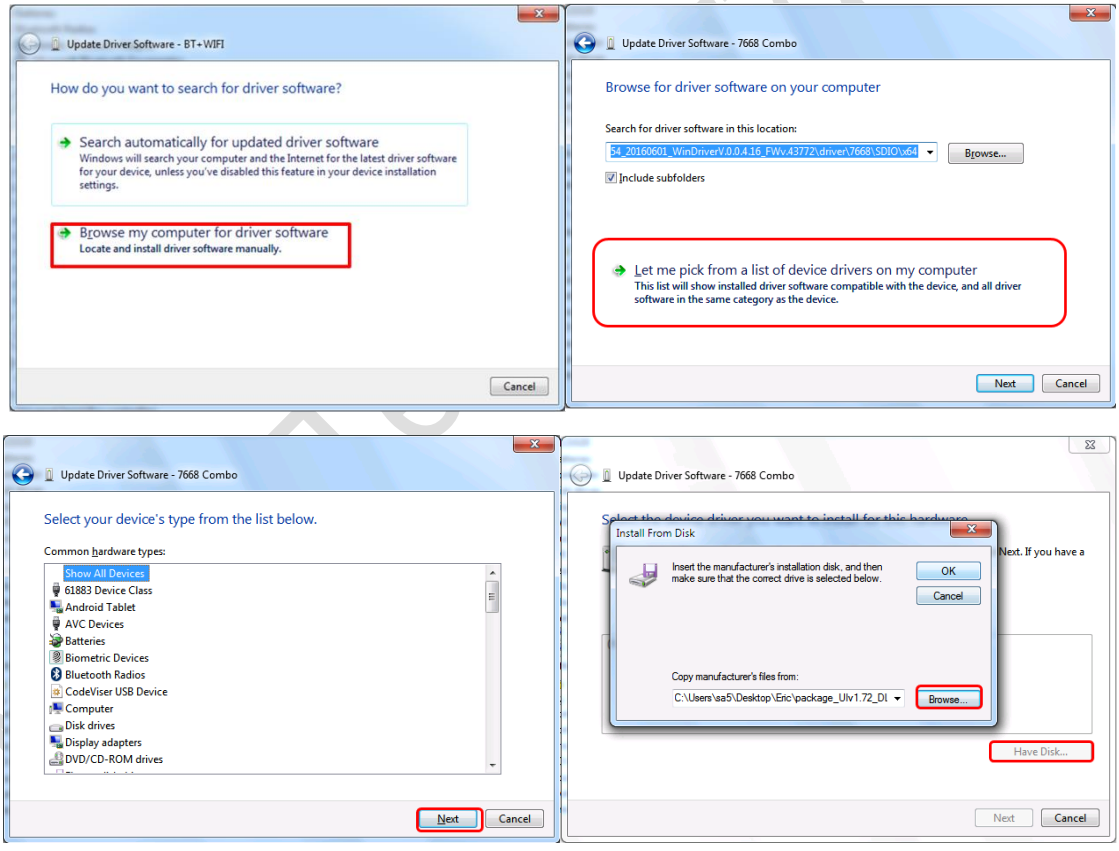
4. Right-click on "**WiFi_If**" Wifi device and Update Driver Software.



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



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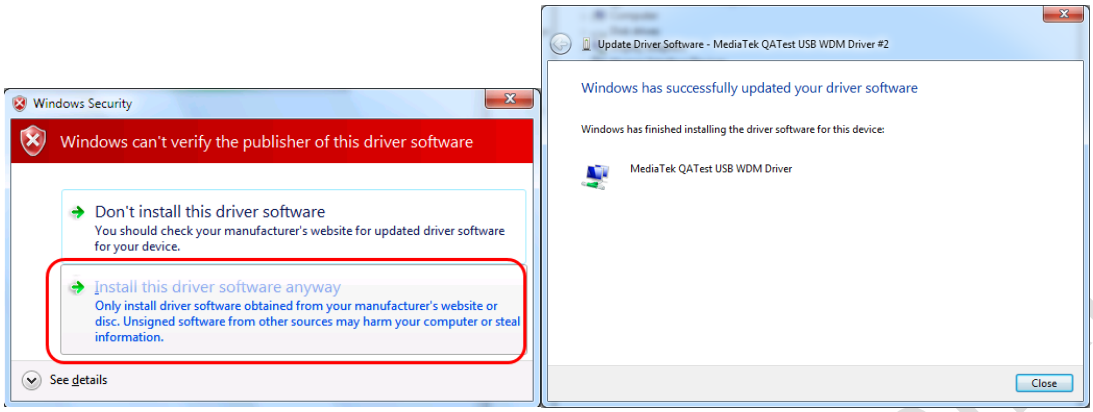

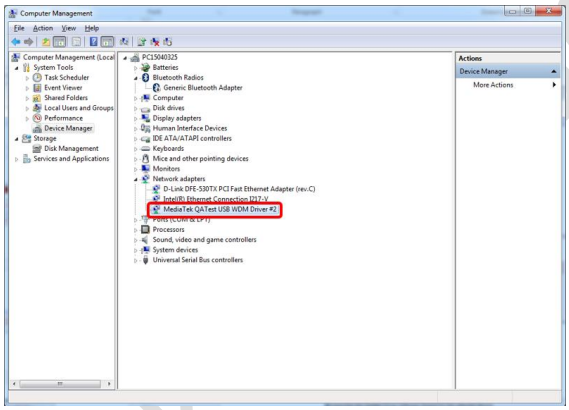

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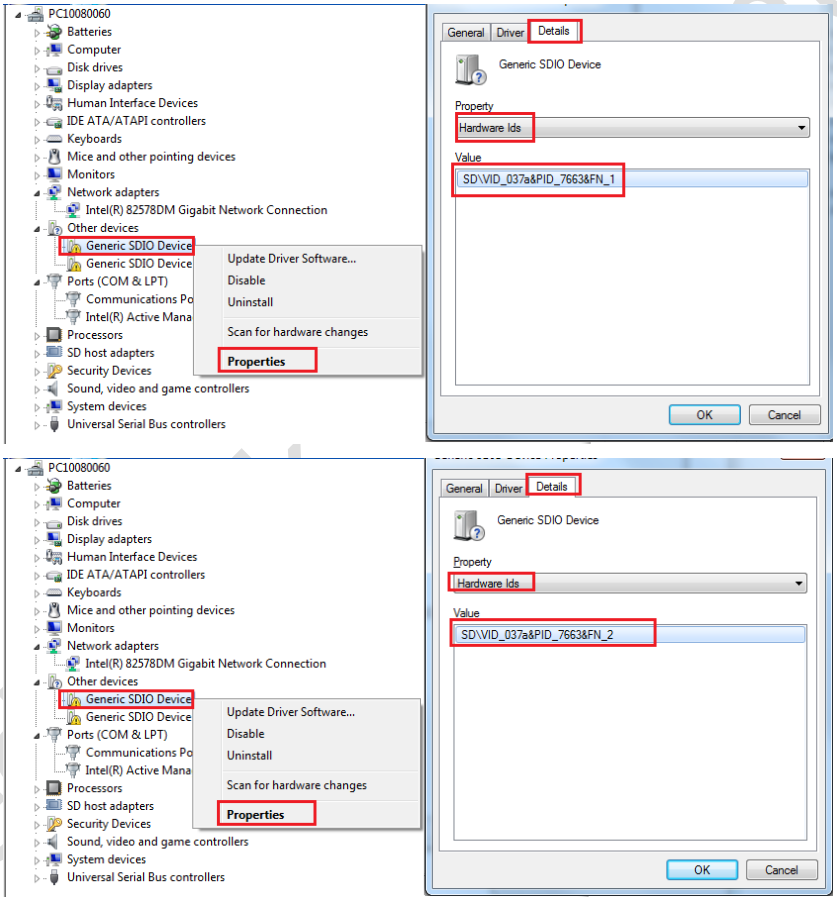
SDIO interface:

1. Connect DUT to PC/NB and check Windows Device Manager.
2. Window Device Manager would discover DUT shows two "**Generic SDIO Device**". 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_7663&FN_1	MT7663S-WiFi
SD\VID_037a&PID_7663&FN_2	MT7663S-BT



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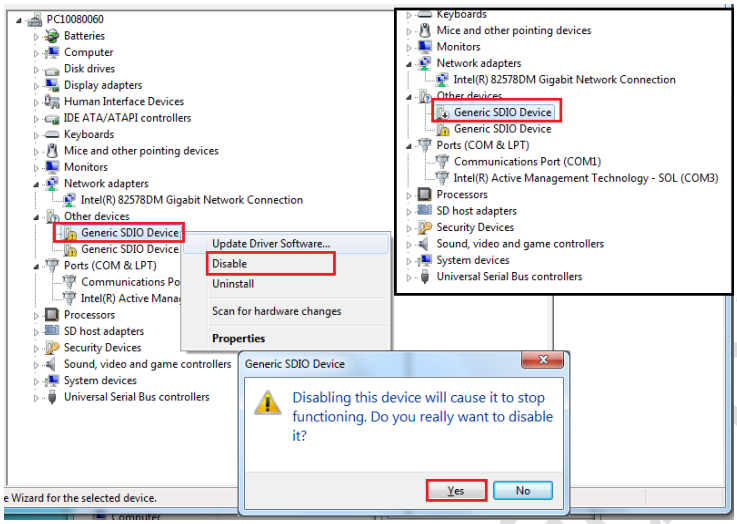
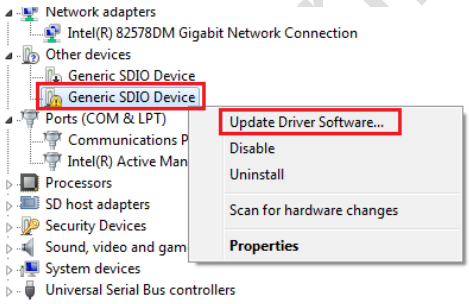
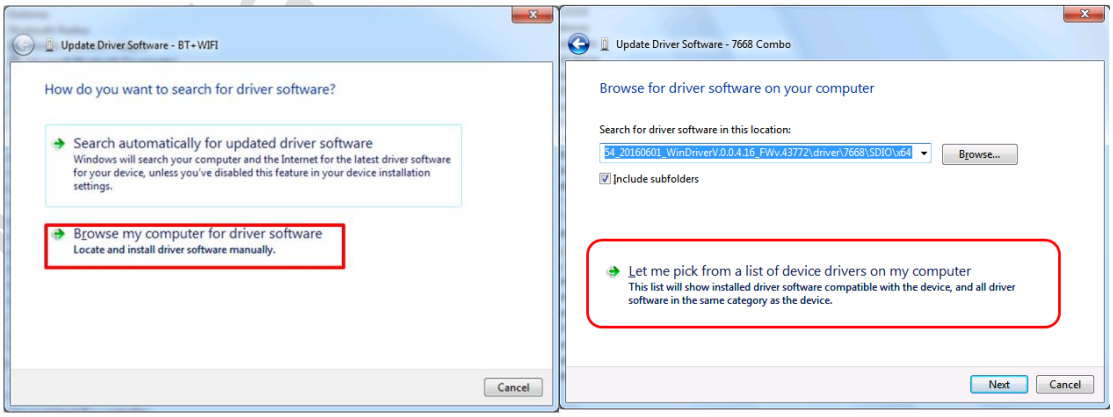
3. Right click the "**7663 Combo**" BT device (SD\VID_037a&PID_7663&FN_2) and select disable as follows.



4. Right-click on "**7663 Combo**" Wifi device (SD\VID_037a&PID_7663&FN_1) and Update Driver Software.



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



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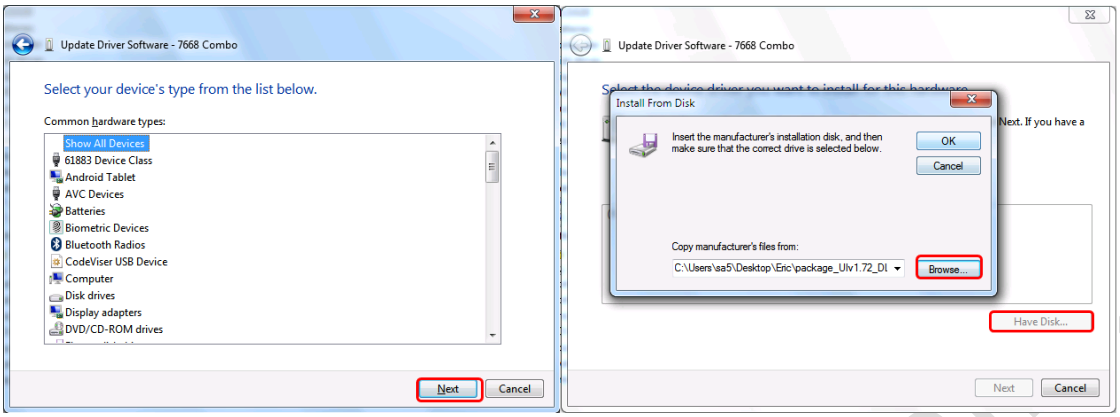

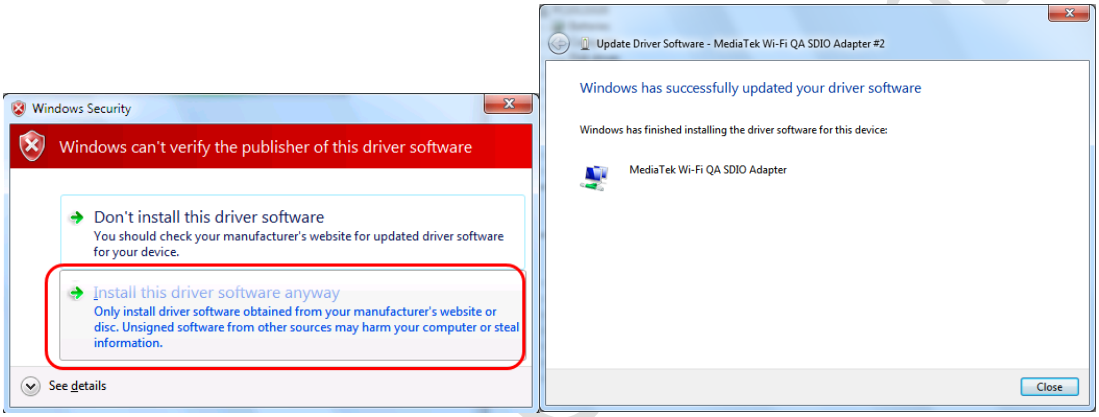

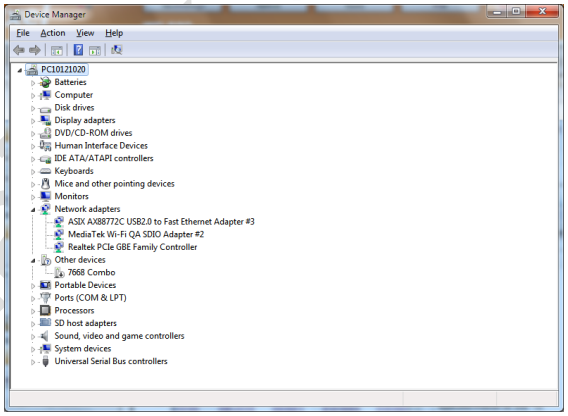

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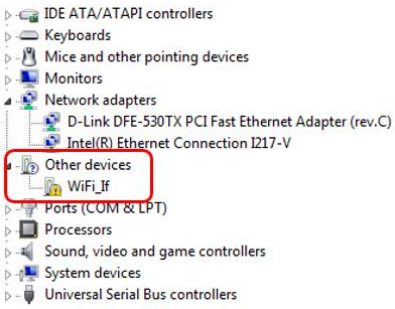
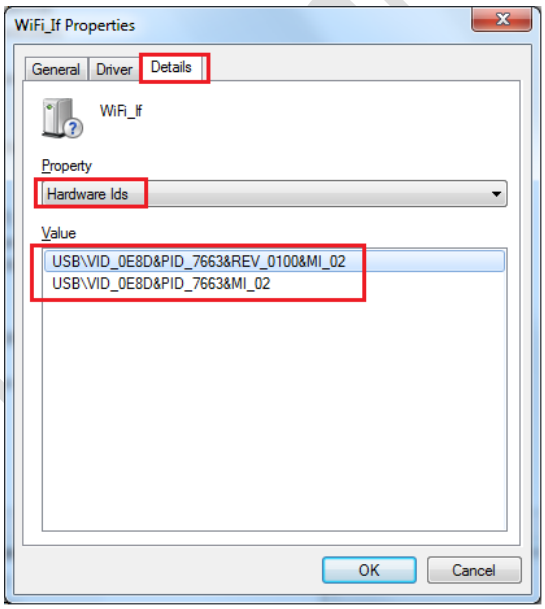
2.1.5 Non MTK PID/VID driver install

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**" (USB WiFi device) 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 = 7663)



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2. Open PID/VID permission file.
    - USB interface：..\driver\MT7663\USB\x64**MTKUQA3.inf**
    - SDIO interface：..\driver\MT7663\SDIO\x64**MTKSQA3.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_**FFFF**&PID_**EEEE**&REV_0100&MI_**02**)
5. Back to previous section and install driver again.

```
%UsbDumpr_MT7603.DeviceDesc%   =UsbDumpr_MT7603.ndi,      USB\VID_04DA&PID_2341&MI_02
%UsbDumpr_MT7603.DeviceDesc%   =UsbDumpr_MT7603.ndi,      USB\VID_04DA&PID_2341&REV_0100&MI_00

;*****************************************************************************************
; x64
;*****************************************************************************************
[Adapters.NTAMD64]
; DisplayName                  Section                 DeviceID
; -----------                  -------                 --------
;%UsbDumpr_MT7603.DeviceDesc%   =UsbDumpr_MT7603.ndi,      USB\VID_0E8D&PID_7603&MI_02
;%UsbDumpr_MT7632.DeviceDesc%   =UsbDumpr_MT7603.ndi,      USB\VID_0E8D&PID_7603&MI_02
;%UsbDumpr_MT7603.DeviceDesc%   =UsbDumpr_MT7603.ndi,      USB\VID_0E8D&PID_7603
;%UsbDumpr_MT7603.DeviceDesc%   =UsbDumpr_MT7603.ndi,      USB\VID_0E8D&PID_7606
;%UsbDumpr_MT7603.DeviceDesc%   =UsbDumpr_MT7603.ndi,      USB\VID_0E8D&PID_7636&MI_02
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;%UsbDumpr_MT7603.DeviceDesc%   =UsbDumpr_MT7603.ndi,      USB\VID_0E8D&PID_7607
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%UsbDumpr_MT7603.DeviceDesc%   =UsbDumpr_MT7603.ndi,      USB\VID_0E8D&PID_7668&REV_0100&MI_02
%UsbDumpr_MT7603.DeviceDesc%   =UsbDumpr_MT7603.ndi,      USB\VID_0E8D&PID_7668&MI_02
%UsbDumpr_MT7603.DeviceDesc%   =UsbDumpr_MT7603.ndi,      USB\VID_0E8D&PID_7668&REV_0100&MI_00
%UsbDumpr_MT7603.DeviceDesc%   =UsbDumpr_MT7603.ndi,      USB\VID_04DA&PID_3920&REV_0100&MI_02
%UsbDumpr_MT7603.DeviceDesc%   =UsbDumpr_MT7603.ndi,      USB\VID_04DA&PID_3920&MI_02
%UsbDumpr_MT7603.DeviceDesc%   =UsbDumpr_MT7603.ndi,      USB\VID_04DA&PID_3920&REV_0100&MI_00
%UsbDumpr_MT7603.DeviceDesc%   =UsbDumpr_MT7603.ndi,      USB\VID_04DA&PID_2341&REV_0100&MI_02
%UsbDumpr_MT7603.DeviceDesc%   =UsbDumpr_MT7603.ndi,      USB\VID_04DA&PID_2341&MI_02
%UsbDumpr_MT7603.DeviceDesc%   =UsbDumpr_MT7603.ndi,      USB\VID_04DA&PID_2341&REV_0100&MI_00
%UsbDumpr_MT7603.DeviceDesc%   =UsbDumpr_MT7603.ndi,      USB\VID_FFFF&PID_EEEE&REV_0100&MI_02
```

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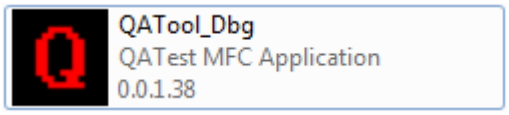
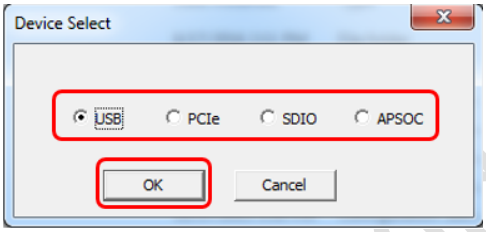
2.2 How to use QA-tool

2.2.1 Launch QA-Tool

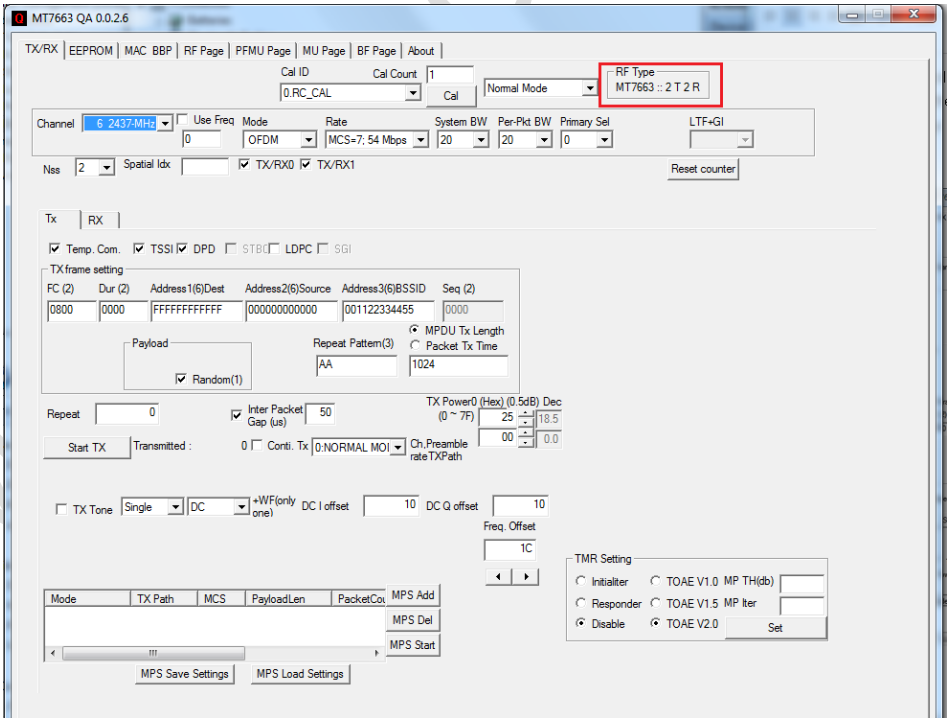
Double-click on QA-Tool icon “**QATool_Dbg.exe**” and Device Select window will pop up.



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



After QA-Tool UI pops out, users can check RF Type which should be shown **MT7663 :: 2T2R** to make sure the QA-Tool is working normally. 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.



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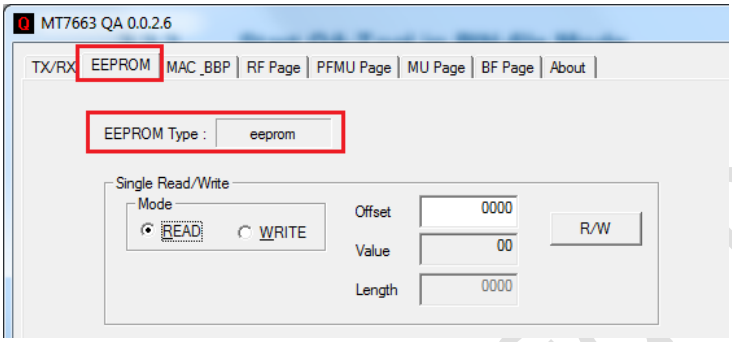
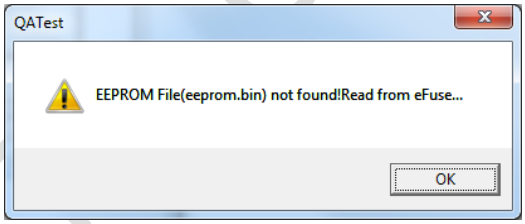
2.2.2 Start QA-Tool in BIN-file Mode

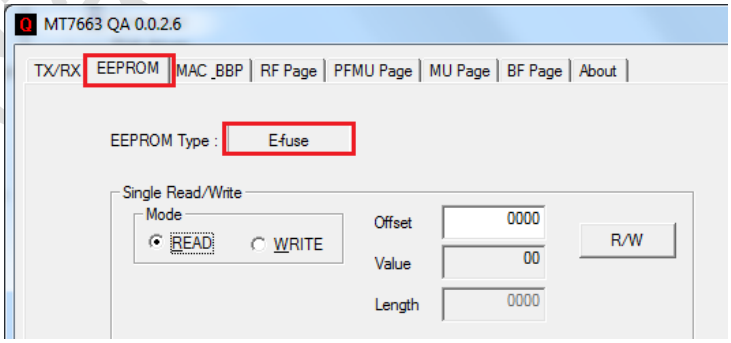
To start in BIN-file mode user can use "**eeprom.bin**" while launching QA tool. If "**QATool_Dbg.exe**" accompanies "**eeprom.bin**" file in the same folder, QA-tool will start in BIN-file mode. After QA-tool is launched, users can check "EEPROM" sheet to have **EEPROM Type : eeprom** to know the mode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





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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 –TX0

On TX/RX page:

a. Select TX sub-page and "**Normal Mode**" as following figure.

b. Set Channel/Mode/Rate.

c. Set BW. (Generally, System BW = Pre-Packet BW).

d. Set packet number. (0 means infinite packets)

e. Select **"Nss=1"** and choose "TX/RX0" to do transmitting.

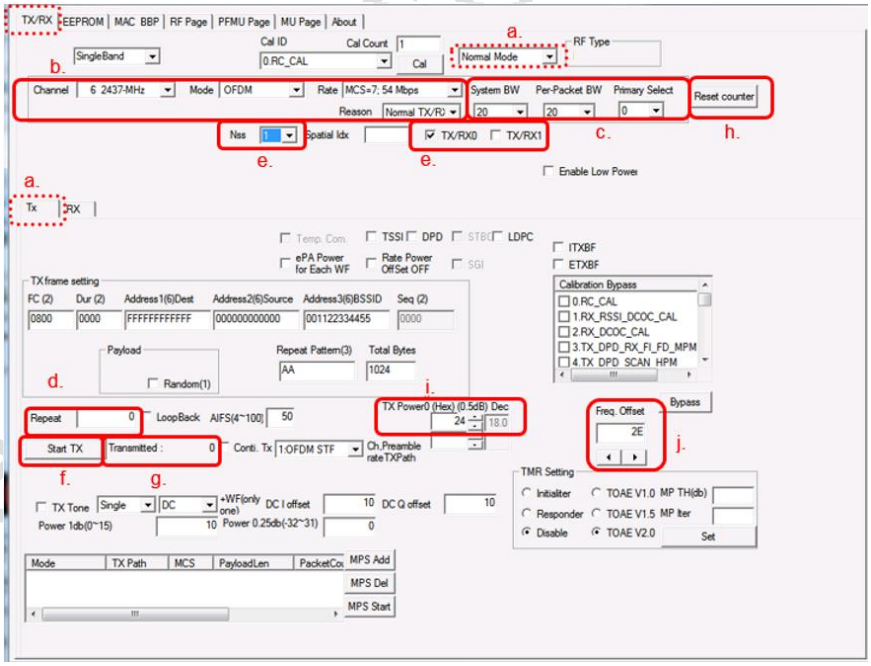
f. Click "**Start TX**" button to start packet transmitting and click "**Stop TX**" button to stop.

g. The transmitted packets number is shown at "**Transmitted :**" area.

h. Users can click "**Reset counter**" button to reset "**Transmitted :**" area.

i. Users can click " " button to modify power level of transmitting signal after clicking "**Stop TX**"

j. Users can click " " button to modify frequency offset of transmitting signal after clicking "**Stop TX**"



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

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2.3.2 WIFI Packets Transmitting –TX1

On TX/RX page:

a. Select TX sub-page and "**Normal Mode**" as following figure.

b. Set Channel/Mode/Rate.

c. Set BW. (Generally, System BW = Pre-Packet BW).

d. Set packet number. (0 means infinite packets)

e. Select **"Nss=1"** and choose "TX/RX1" to do transmitting.

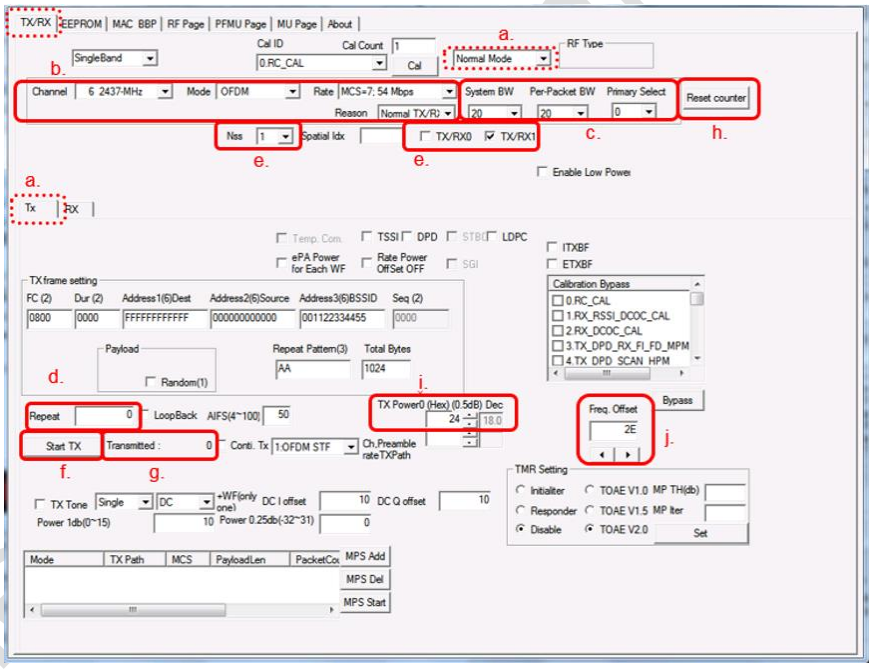
f. Click "**Start TX**" button to start packet transmitting and click "**Stop TX**" button to stop.

g. The transmitted packets number is shown at "**Transmitted :**" area.

h. Users can click "**Reset counter**" button to reset "**Transmitted :**" area.

i. Users can click " " button to modify power level of transmitting signal after clicking "**Stop TX**"

j. Users can click " " button to modify frequency offset of transmitting signal after clicking "**Stop TX**"



An example of TX1 transmitting OFDM 54M infinite packets at 2437MHz

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2.3.3 WIFI Packets Transmitting –2TX

On TX/RX page:

a. Select TX sub-page and "**Normal Mode**" as following figure.

b. Set Channel/Mode/Rate.

c. Set BW. (Generally, System BW = Pre-Packet BW).

d. Set packet number. (0 means infinite packets)

e. Select **"Nss=2"** and choose both "TX/RX0" and "TX/RX1" to do transmitting.

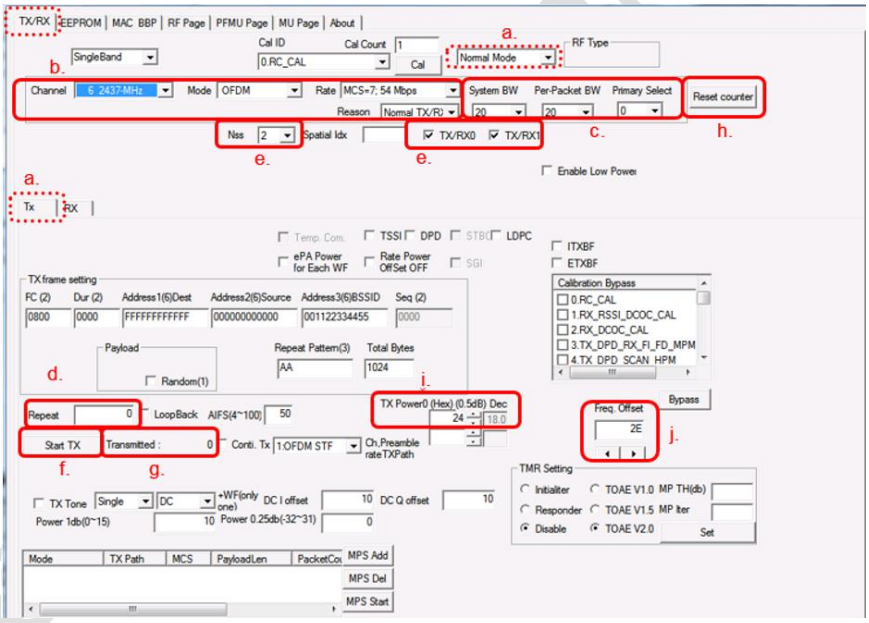
f. Click "**Start TX**" button to start packet transmitting and click "**Stop TX**" button to stop.

g. The transmitted packets number is shown at "**Transmitted :**" area.

h. Users can click "**Reset counter**" button to reset "**Transmitted :**" area.

i. Users can click " " button to modify power level of transmitting signal after clicking "**Stop TX**"

j. Users can click " " button to modify frequency offset of transmitting signal after clicking "**Stop TX**"



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

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2.3.4 WIFI Continuous Packet Transmitting

On TX/RX page:

a. Select TX sub-page as following figure.

b. Set Channel/Mode/Rate.

c. Set BW. (Generally, System BW = Pre-Packet BW).

d. Select **"Nss=1 or Nss=2"** and choose "**TX/RX0**"or "**TX/RX1**" to do transmitting.

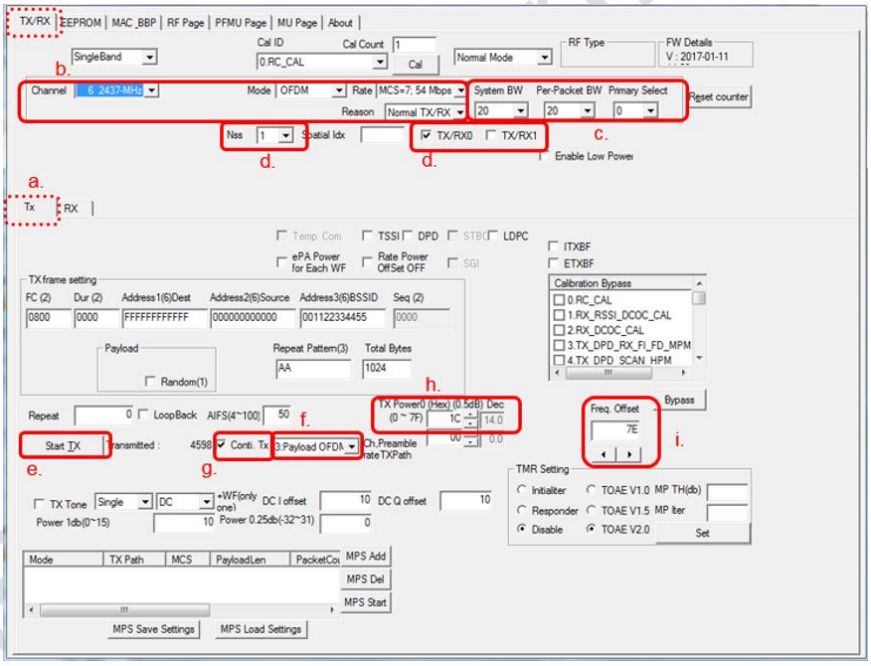
e. Click "**Start Tx**" and waiting for a while then click "**Stop Tx**".
(Please repeat this step if user change channel/BW/Rate)

f. Choose "**Payload OFDM**".

g. Check "**Conti. Tx**" to start Tx 100% duty packet transmitting and uncheck "**Conti. Tx**" to stop.

h. Users can click "▲▼" button to modify power level of transmitting signal after uncheck "**Conti. Tx**".

i. Users can click "◀ ▶" button to modify frequency offset of transmitting signal after uncheck "**Conti. Tx**".



An example of TX0 continuous packet transmitting (OFDM 54M at 2437MHz)

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2.3.5 WIFI Single Tone Transmitting

On TX/RX page:

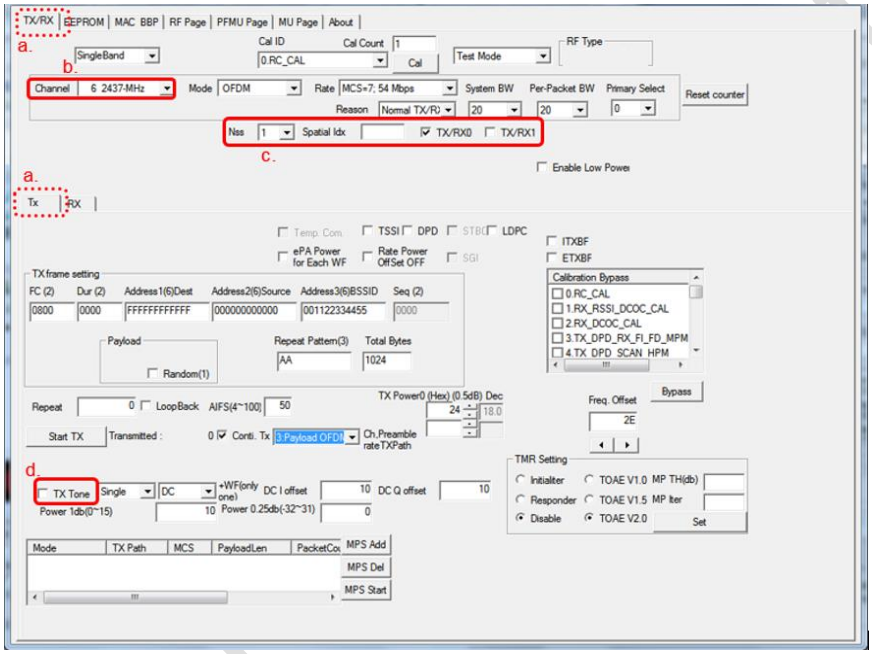
a. Select TX sub-page as following figure.

b. Set Channel.

c. Select **"Nss=1 or Nss=2"** and choose "**TX/RX0**"or "**TX/RX1**" to do transmitting.

d. Check "**TX Tone**" to start Tx single tone transmitting and uncheck "**TX Tone**" to stop.

e. Users should uncheck "**TX Tone**" before change channel.



An example of TX0 Tx single tone transmitting at 2437MHz.

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2.3.6 WIFI Packets Receiving –RX0

On TX/RX page

a. Select RX sub-page and “Normal Mode” as following figure.

b. Set Channel frequency.

c. Set BW. (Generally, System BW = Pre-Packet BW).

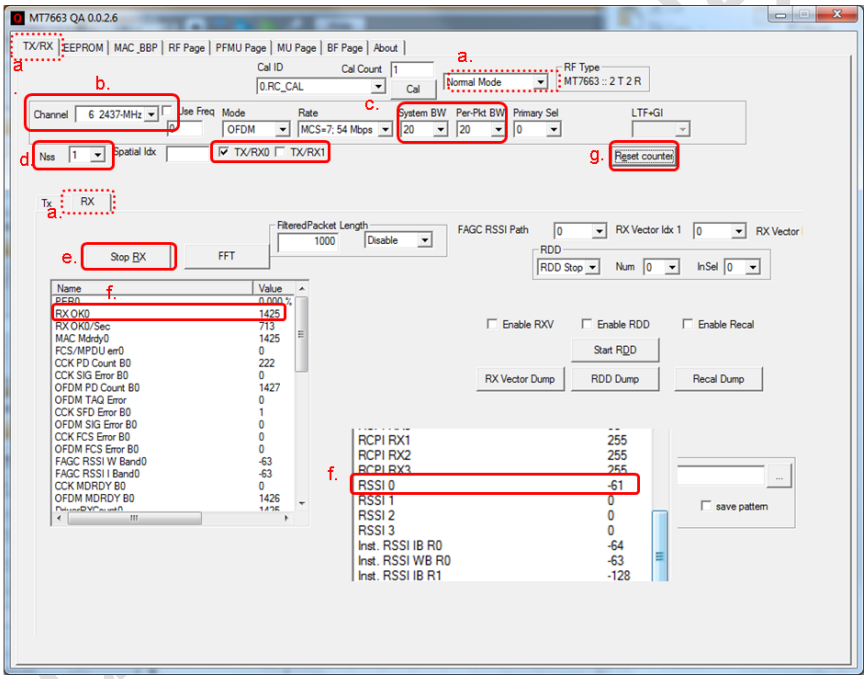
d. Select **“Nss=1”** and choose “TX/RX0” to do receiving.

e. Click “**Start RX**” button to receive WIFI packets.

Enable WIFI signal generator to transmit packets. Click “**Stop RX**” button to stop receiving.

f. Successful received packets number would be shown at “**RX OK**” area and RSSI shown at “**RSSI 0**” area.

g. Users can click “**Reset counter**” button to reset counter value.



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

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2.3.7 WIFI Packets Receiving –RX1

On TX/RX page

a. Select RX sub-page and “Normal Mode” as following figure.

b. Set Channel frequency.

c. Set BW. (Generally, System BW = Pre-Packet BW).

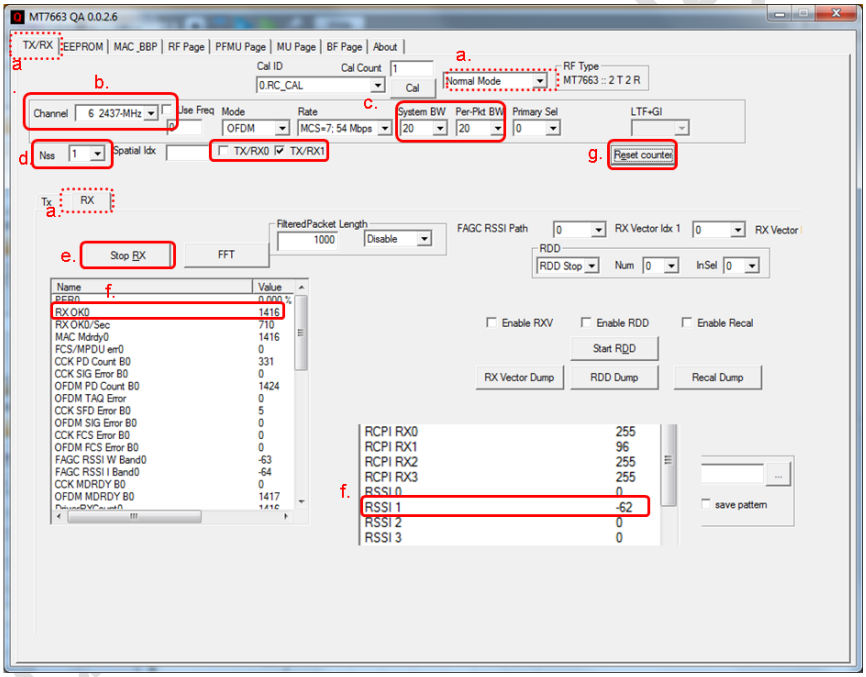
d. Select **“Nss=1”** and choose “TX/RX1” to do receiving.

e. Click “**Start RX**” button to receive WIFI packets.

Enable WIFI signal generator to transmit packets. Click “**Stop RX**” button to stop receiving.

f. Successful received packets number would be shown at “**RX OK**” area and RSSI shown at “**RSSI 1**” area.

g. Users can click “**Reset counter**” button to reset counter value.



An example of WiFi packets receiving – RX1 (BW20 at 2437MHz)

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2.3.8 WIFI Packets Receiving –2RX

On TX/RX page

a. Select RX sub-page and “Normal Mode” as following figure.

b. Set Channel frequency.

c. Set BW. (Generally, System BW = Pre-Packet BW).

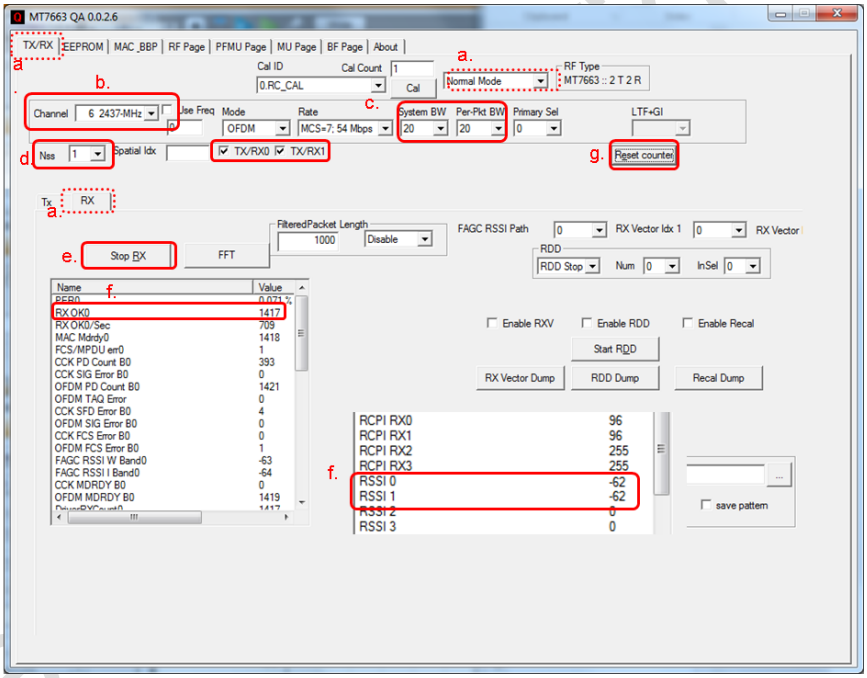
d. Select **“Nss=2”** and choose botj “TX/RX0” and “TX/RX1” to do receiving.

e. Click “**Start RX**” button to receive WIFI packets.

Enable WIFI signal generator to transmit packets. Click “**Stop RX**” button to stop receiving.

f. Successful received packets number would be shown at “**RX OK**” area and RSSI shown at “**RSSI 0/RSSI 1**” area.

g. Users can click “**Reset counter**” button to reset counter value.



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

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2.4 Read, Write E-fuse Table

2.4.1 Read a Value from E-fuse

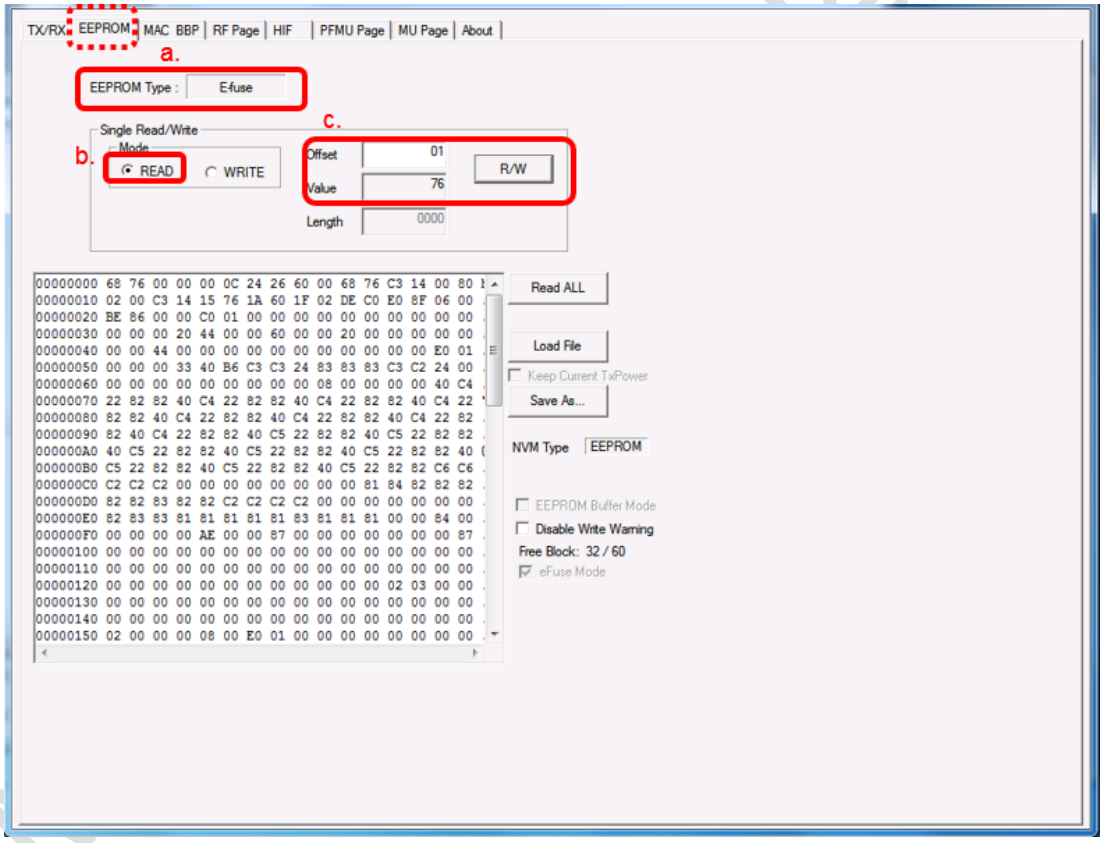
Users can use QA-Tool to read a value from an address offset of E-fuse.

On EEPROM page:

a. In E-fuse Mode, EEPROM Type is “E-fuse”.

b. Select Single Read/Write is “**READ**”.

c. 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.



This is an example to read address offset_0x01 and get value 0x76 from E-fuse

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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.

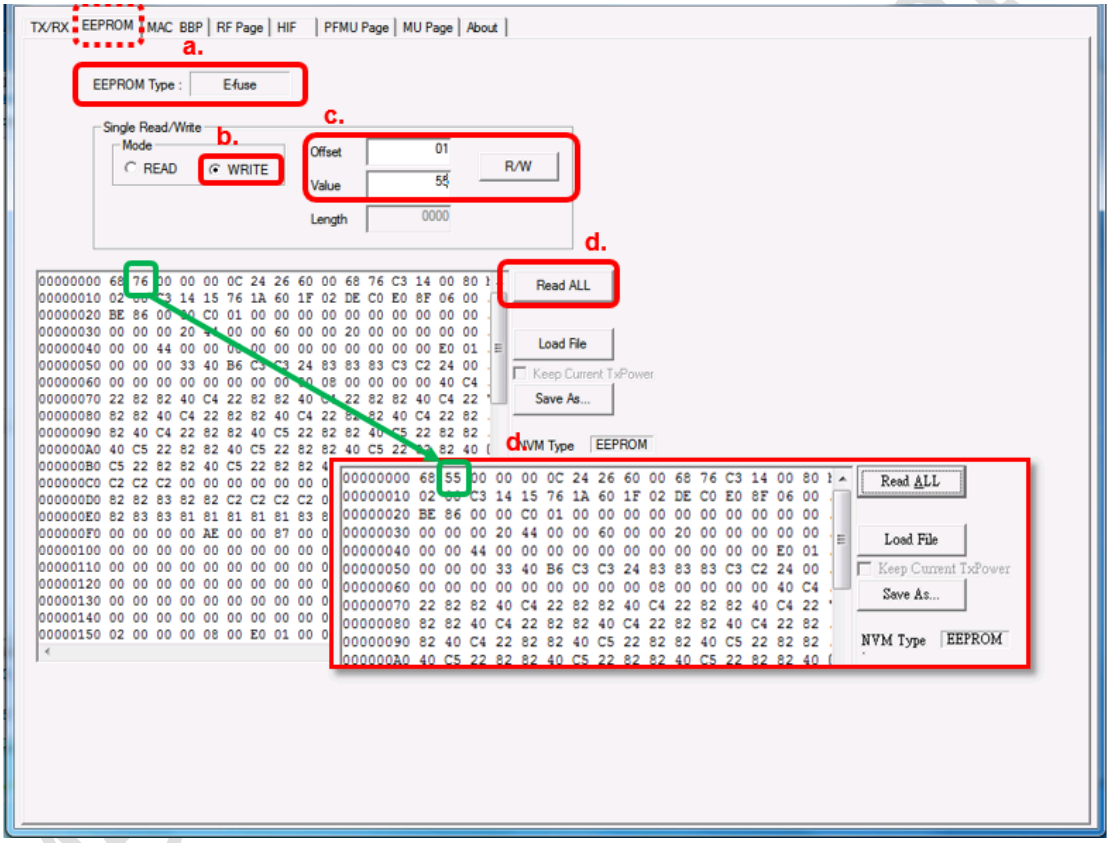
On EEPROM page:

a. In E-fuse Mode, EEPROM Type is “E-fuse”.

b. Select Single Read/Write mode is “**WRITE**”

c. Set address offset and new value in “**Offset**” and “**Value**” text boxes then click on ” **R/W** “ button.

d. Click “ **Read ALL** ” button to update e-fuse value in e-fuse table and check it.



This is an example writing 0x01 to address offset_0x55 of E-fuse and check value is correcttly updated.

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