(Realtek RTL8822CE)

Combo NGFF Type2230 Module User's Manual

Preliminary Version

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Realtek Semiconductor Corp.

No. 2, Innovation Road II, Hsinchu Science Park, Hsinchu 300, Taiwan

Tel.: +886-3-578-0211. Fax: +886-3-577-6047

www.realtek.com

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ENVIRONMENTAL

Operating

Operating Temperature: 0°C to +70 °C

Relative Humidity: 5-90% (non-condensing)

Storage

Temperature: -40°C to +80°C (non-operating)

Relevant Humidity: 5-95% (non-condensing)

MTBF caculation

Over 150,000hours

Warning

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.

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.

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.

IMPORTANT NOTE:
FCC Radiation Exposure Statement:(For portable device with PIFA antenna)
This equipment complies with FCC radiation exposure limits set forth for an uncontrolled environment. This equipment should be installed and operated with minimum distance 0.5cm between the radiator & your body.

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)		Host
					2.4GHz	5GHz	
1	PSA	RFDPA171320EMLB301	Dipole Antenna	I-PEX	3.14	5	Mobile
2	LYNwave	ALA110-222050-300011	PIFA Antenna	I-PEX	3.5	5	Portable Mobile

Table for Filed Antenna

Per using this module for portable device please follow company tune up and operation description information to use this for portable device power.

For FCC SAR power table please find in page 24.

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 0.5cm 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. If the size of the end product is smaller than 8x10cm, then additional FCC part 15.19 statement is required to be available in the users manual: 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.

For Mobile device Host (>20cm)

Radiation Exposure Statement:

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

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. If the size of the end product is smaller than 8x10cm, then additional FCC part 15.19 statement is required to be available in the users manual: 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.

LABEL OF THE END PRODUCT:

The final end product must be labeled in a visible area with the following " Contains TX2-RTL8822CE ". If the size of the end product is larger than 8x10cm, then the following FCC part 15.19 statement has to also be available on the label: 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.

Manual Information To the End User

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.

Industry Canada Statement

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)		Host
					2.4GHz	5GHz	
1	PSA	RFDPA171320EMLB301	Dipole Antenna	I-PEX	3.14	5	Mobile
2	LYNwave	ALA110-222050-300011	PIFA Antenna	I-PEX	3.5	5	Portable Mobile

Table for Filed Antenna

Per using this module for portable device please follow company tune up and operation description information to use this for portable device power.

For IC SAR power table please find in page 30.

This device complies with Industry Canada's licence-exempt RSSs.
Operation is subject to the following two conditions:
(1) This device may not cause interference; and
(2) This device must accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'Industrie Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) l'appareil ne doit pas produire de brouillage, et (2) l'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

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 (RTL8822CE) has been approved by Industry Canada to operate with the antenna types listed below with the maximum permissible gain indicated. Antenna types not included in this list, having a gain greater than the maximum gain indicated for that type, are strictly prohibited for use with this device.

Le présent émetteur radio (RTL8822CE) a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal d'antenne. Les types d'antenne non inclus dans cette liste, ou dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

Dynamic Frequency Selection (DFS) for devices operating in the bands 5250-5350 MHz, 5470-5600 MHz and 5650-5725 MHz.

Sélection dynamique de fréquences (DFS) pour les dispositifs fonctionnant dans les bandes 5250-5350 MHz, 5470-5600 MHz et 5650-5725 MHz.

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: (for portable device with PIFA)
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 0.5cm 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 0.5 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.

0.5cm minimum distance has to be able to be maintained between the antenna and the users for the host this module is integrated into. Under such configuration, the IC RSS-102 radiation exposure limits set forth for an population/uncontrolled environment can be satisfied.

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 0.5cm 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 and (2) this device must accept

any interference received, including interference that may cause undesired operation.

LABEL OF THE END PRODUCT:

The final end product must be labeled in a visible area with the following " Contains IC: 6317A-RTL8822CE".

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.

For Mobile device Host (>20cm)

Radiation Exposure Statement:

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

Déclaration d'exposition aux radiations:

Cet équipement est conforme aux limites d'exposition aux rayonnements ISED établies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé à plus de 20 cm entre le radiateur et votre corps.

NCC 警語

經型式認證合格之低功率射頻電機，非經許可，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。

低功率射頻電機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。前項合法通信，指依電信法規定作業之無線電通信。低功率射頻電機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。

1. 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。

2. 系統廠商應於平台上標示「本產品內含射頻模組：

XXXyyyLPDzzzz-x」字樣。

Installing the Wireless PCIe NGFF2230 module

Hardware

Installing PCIe NGFF2230 module to PCIe NGFF2230 connector and connect two external Wi-Fi antennas on I-PEX connectors.

Un-installing the Wireless PCIe NGFF2230 module

Hardware

Remove 2 external Wi-Fi Antennas from the Wireless PCIe NGFF1630 module board and remove the Wireless PCIe NGFF2230 module board from PCIe NGFF2230 connector port

Installing the Wireless PCIe NGFF2230 module

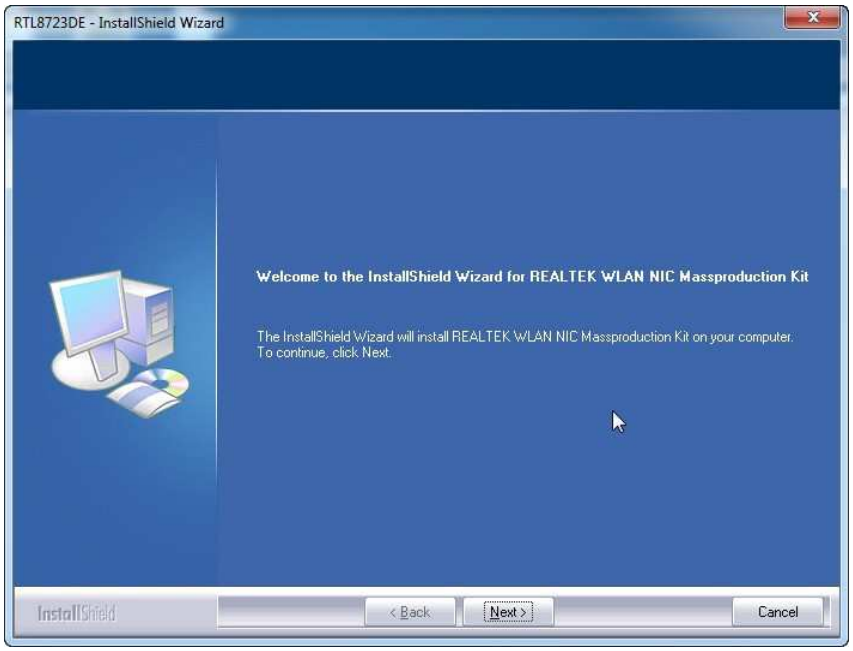
Software

Before you proceed with the installation, please notice following descriptions.

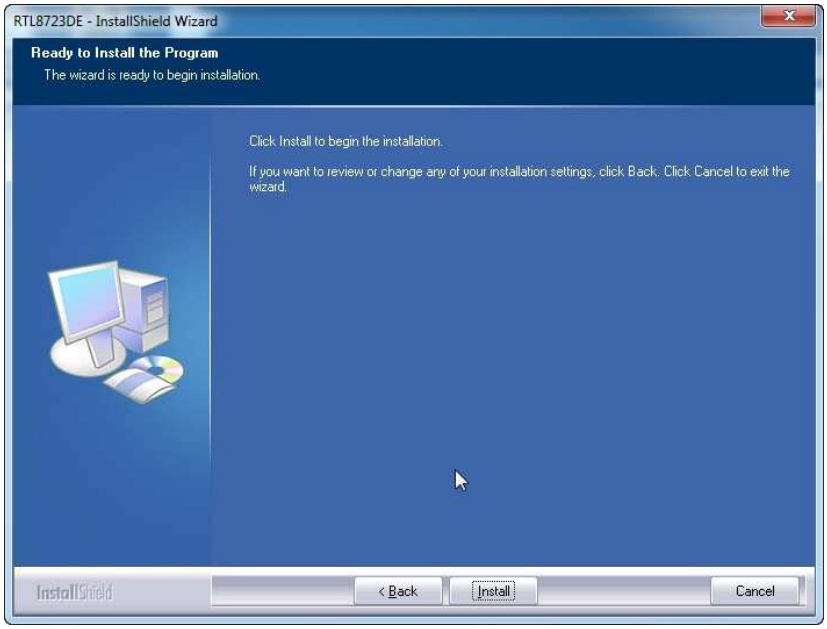
Note1: The following installation was operated under Windows 7.

Note2: If you have installed the WLAN driver & utility before, please uninstall the old version first.

A. Execute the "setup.exe", Click "Next" to process the installation

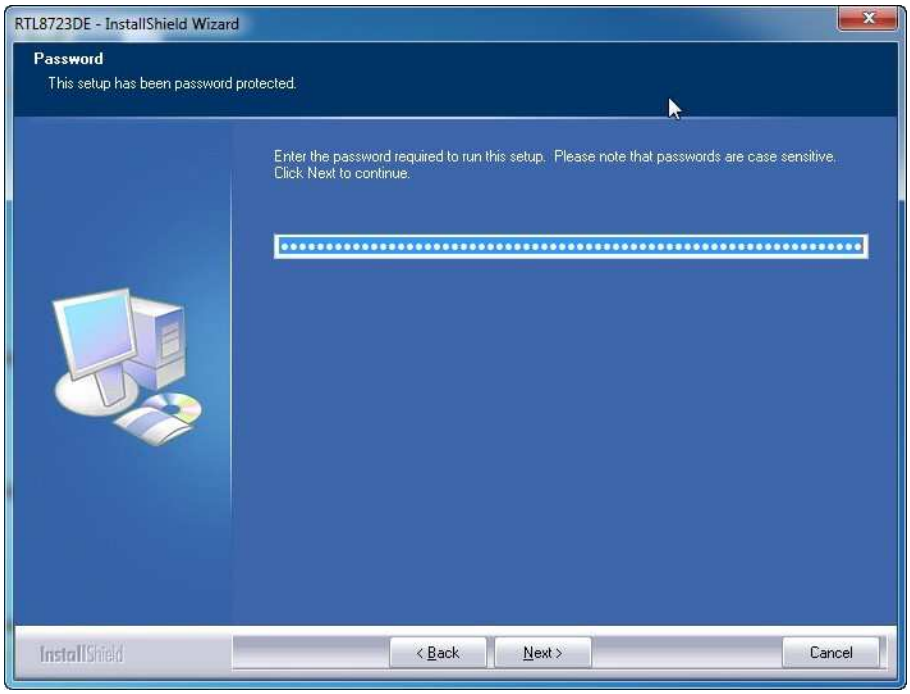


B. Click "Install" to process the installation

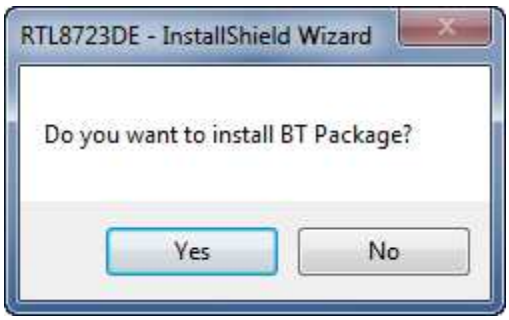


C. Click Install this driver software anyway

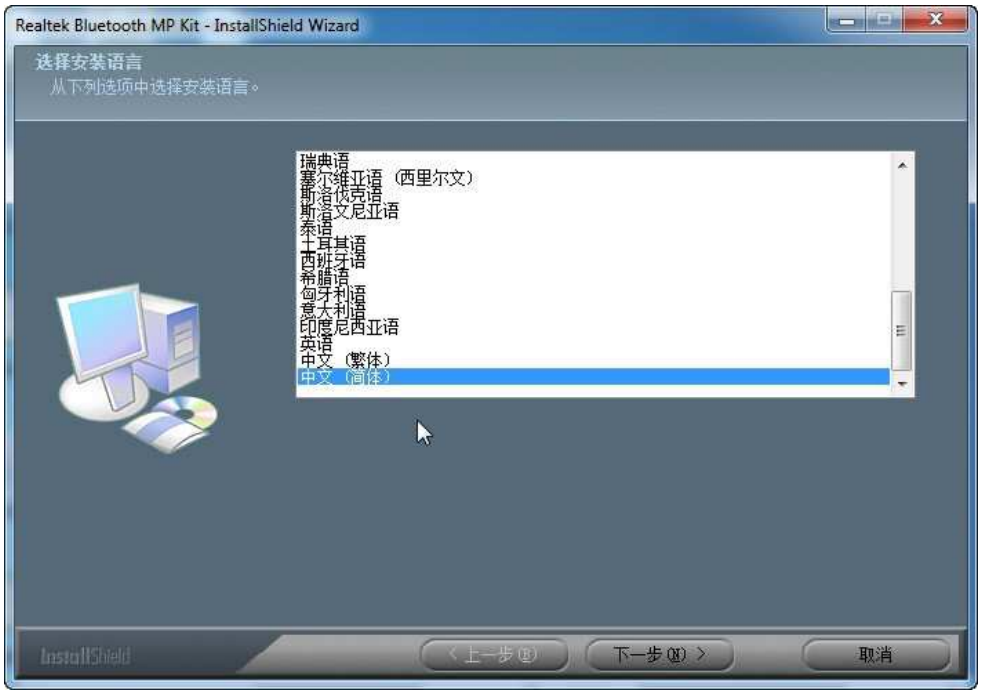
D. After step "C" please press Next button.



E. Please click "YES" to install BT package.



F. Please click "下一步"to continue.

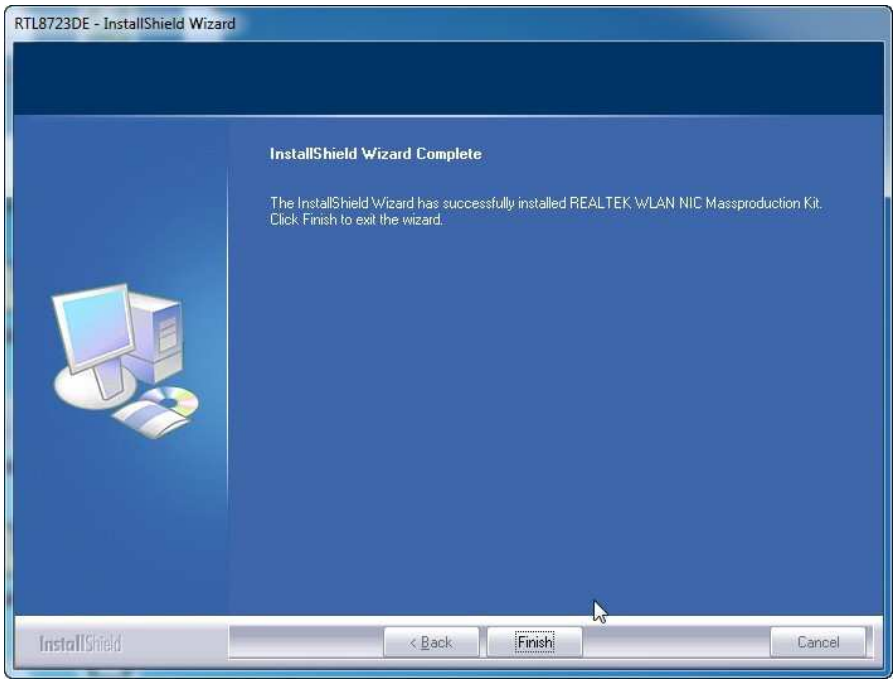


G. Please click "下一步"to continue.

H. Please click "安装"to start installation.

I. Please click "完成"to finish the installation.

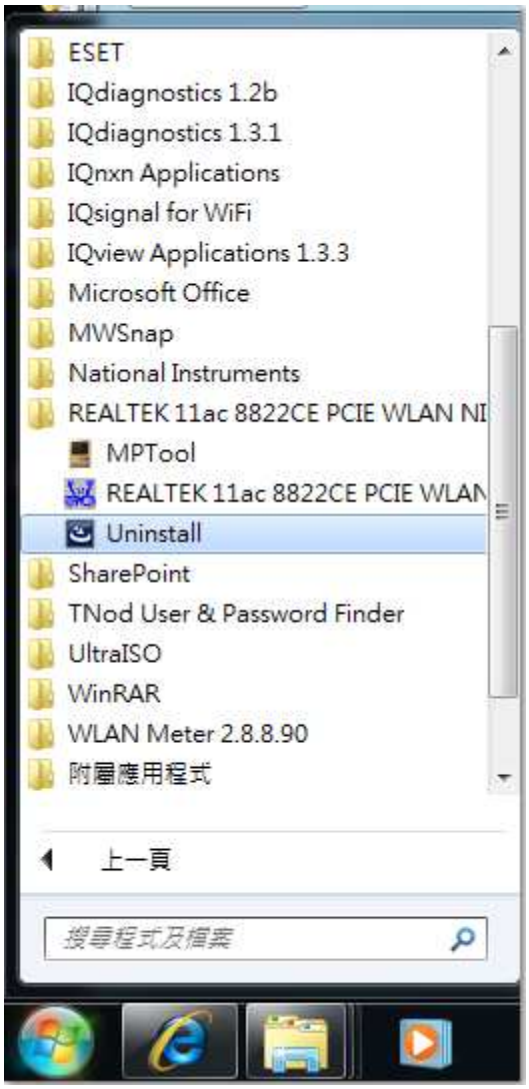
J. Press Finish button to complete the install process



Un-installing the Wireless PCIe NGFF2230 module

Software

A. Uninstall the RTL8822CE WLAN Driver from “Start”→ “All Programs”→ “REALTEK 11ac 8822CE PCIE WLAN NIC Massproduction kit”
Please click “Uninstall” to remove RTL8822CE WLAN driver.

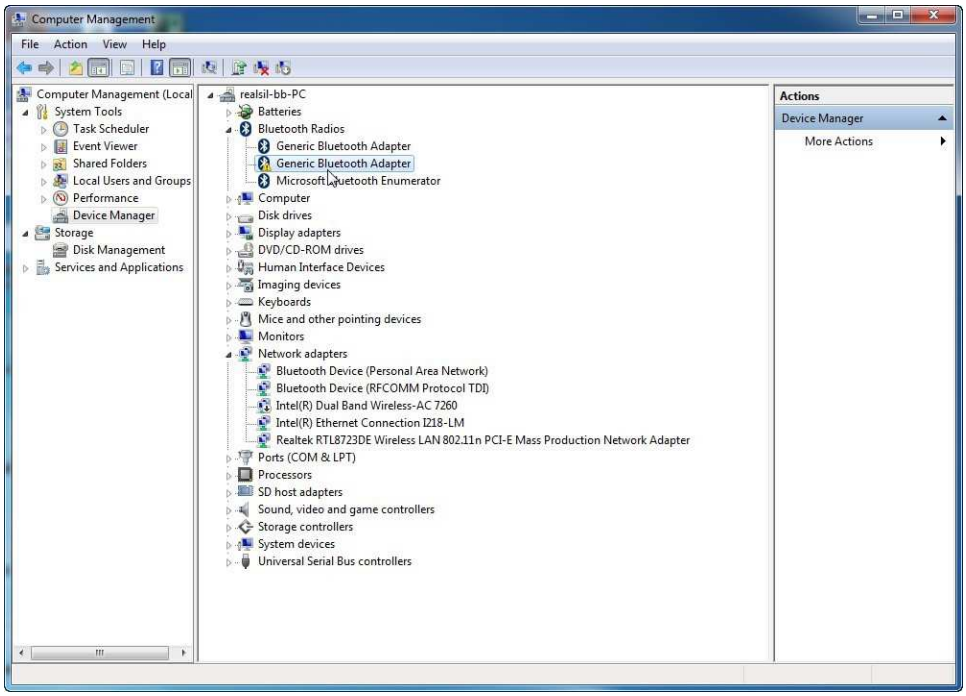


Installing the Bluetooth USB Module

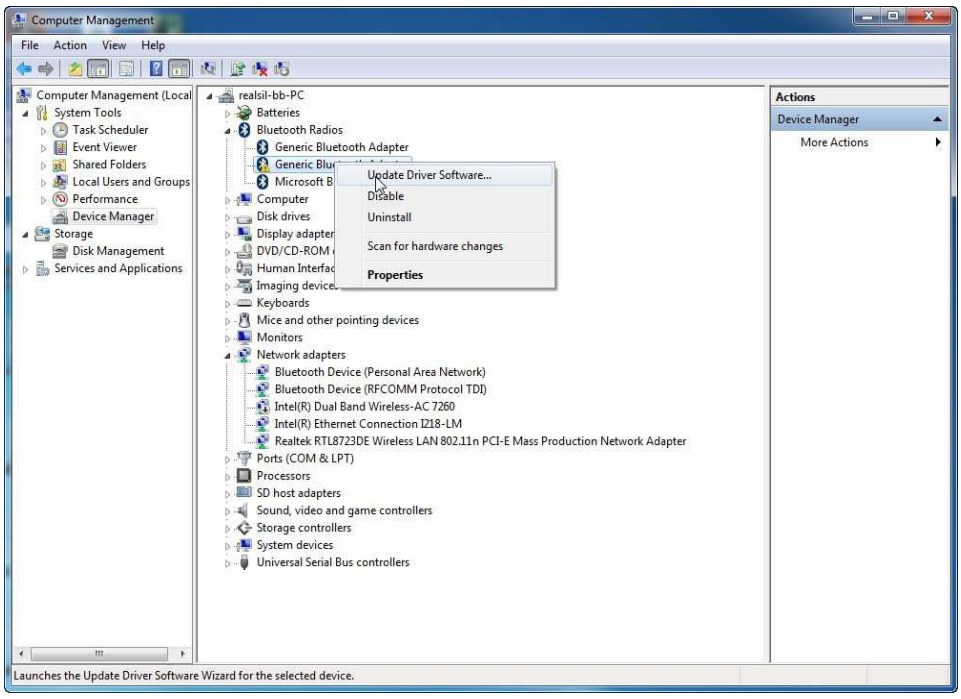
Software

A. Insert the NGFF2230 card into system connector.

B. Boot on system then the "Geniric Bluttooth Adapter" device will show up in device manager.

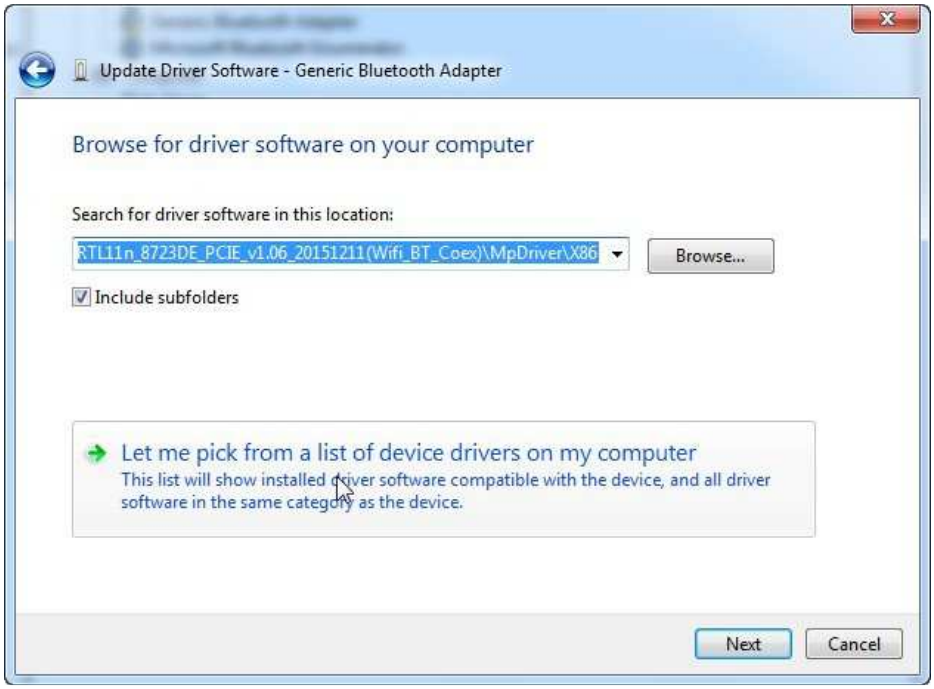


C. Click right button on "RT Bluetooth Radio" and select "Update Driver".



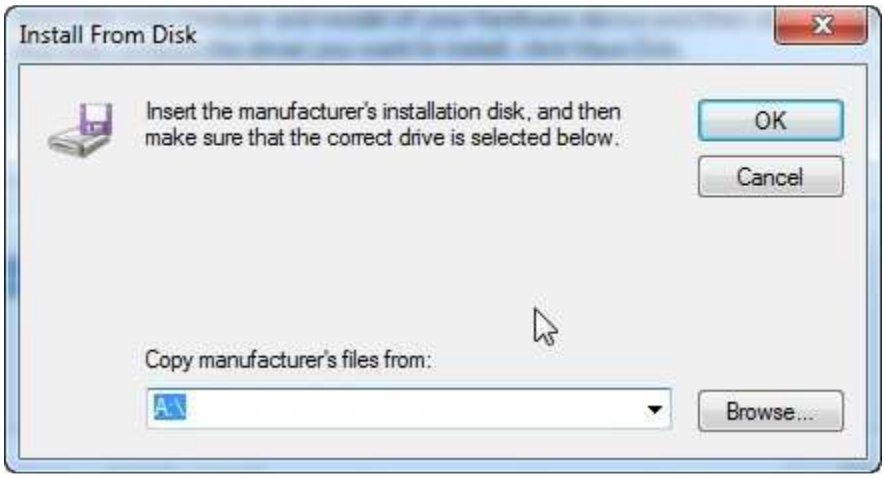
D. After select "Update Driver Software " then the Hardware Update Wizard will pop up, please select "Browse my computer for driver software" and press Next button.

E. After step "D" please Select "Let me pick from a list of device drivers on my computer ".

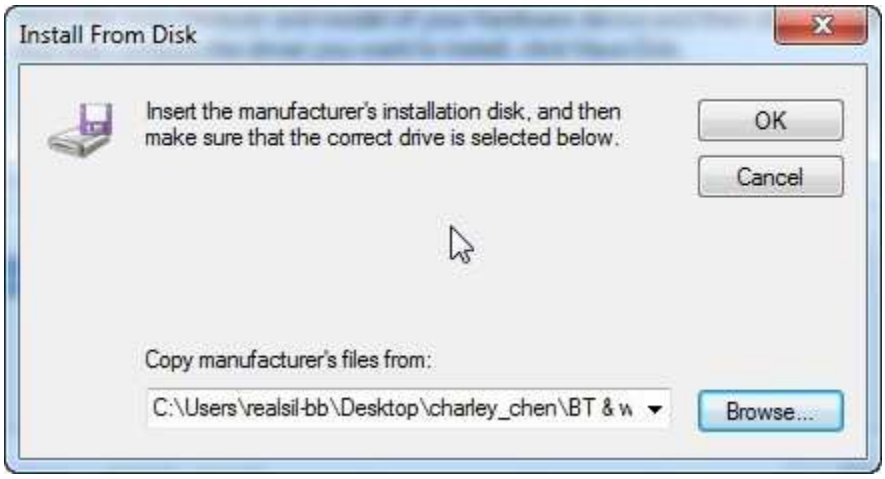


F. Finish step "E" then select "Have Disk.."

G. Now select browse to find the driver for device and press Next button.(The driver's locate is the same with WiFi driver)

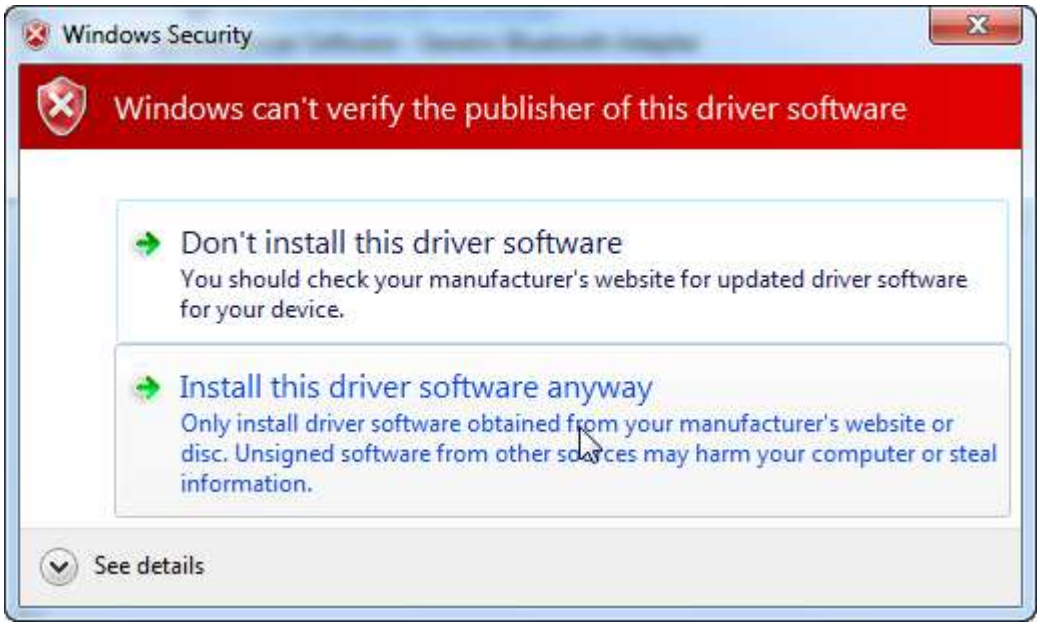


Locate File
Look in:
X86
Name
Date modified
Type
rtl2801BT
2015/9/15 14:24
Setup Infc
Type: Setup Information
Size: 13.2 KB
Date modified: 2015/9/15 14:24
Recent Places
Desktop
Libraries
Computer
Network
File name:
rtl2801BT
Open
Files of type:
Setup Information (*.inf)
Cancel


Install From Disk
Insert the manufacturer's installation disk, and then make sure that the correct drive is selected below.
OK
Cancel
Copy manufacturer's files from:
C:\Users\realsil-bb\Desktop\charley_chen\BT & w
Browse...

Update Driver Software - Generic Bluetooth Adapter
Select the device driver you want to install for this hardware.
Select the manufacturer and model of your hardware device and then click Next. If you have a disk that contains the driver you want to install, click Have Disk.
Show compatible hardware
Model
Realtek Bluetooth MP Test Driver
This driver is not digitally signed!
Tell me why driver signing is important
Have Disk...
Next
Cancel

H. Then click "Install this driver software anyway" to continue.



I. Press close button to complete the install process and you can see the Driver will be show up in Device Manager.

FCC SAR Power Table(For portable device with PIFA antenna)

Maximum Output Power

Maximum Target conducted Power
The maximum conducted average power(Unit:dBm) including tune -up tolerance is shown below.

Tri Antenna Port

<WLAN 2.4G>

Mode	Channel	Frequency (MHz)	Max. Tune up (Ant-0)	Max. Tune up (Ant-1)	Max. Tune up (Ant-0 + Ant-1)
802.11b	1	2412	15.5	15.5	17.0
	6	2437	15.5	15.5	17.0
	11	2462	15.5	15.5	17.0
	12	2467	15.5	15.5	17.0
	13	2472	15.5	15.5	17.0
802.11g	1	2412	15.5	15.5	17.0
	6	2437	15.5	15.5	17.0
	11	2462	15.5	15.5	17.0
	12	2467	15.5	15.5	17.0
	13	2472	15.5	15.5	17.0
802.11ac (VHT20)	1	2412	15.5	15.5	17.0
	6	2437	15.5	15.5	17.0
	11	2462	15.5	15.5	17.0
	12	2467	15.5	15.5	17.0
	13	2472	15.5	15.5	17.0
802.11ac (VHT40)	3	2422	15.5	15.5	17.0
	6	2437	15.5	15.5	17.0
	9	2452	15.5	15.5	17.0
	10	2457	15.5	15.5	17.0
	11	2462	15.5	15.5	17.0

<WLAN 5.2G>

Mode	Channel	Frequency (MHz)	Max. Tune up (Ant-0)	Max. Tune up (Ant-1)	Max. Tune up (Ant-0 + Ant-1)
802.11a	36	5180	12.5	12.5	15.5
	40	5200	12.5	12.5	15.5
	44	5220	12.5	12.5	15.5
	48	5240	12.5	12.5	15.5
802.11ac (VHT20)	36	5180	12.0	12.0	15.0
	40	5200	12.0	12.0	15.0
	44	5220	12.0	12.0	15.0
	48	5240	12.0	12.0	15.0
802.11ac (VHT40)	38	5190	12.0	12.0	15.0
	46	5230	12.0	12.0	15.0
802.11ac (VHT80)	42	5210	12.0	12.0	15.0

<WLAN 5.3G>

Mode	Channel	Frequency (MHz)	Max. Tune up (Ant-0)	Max. Tune up (Ant-1)	Max. Tune up (Ant-0 + Ant-1)
802.11a	52	5260	12.5	12.5	15.5
	56	5280	12.5	12.5	15.5
	60	5300	12.5	12.5	15.5
	64	5320	12.5	12.5	15.5
802.11ac (VHT20)	52	5260	12.0	12.0	15.0
	56	5280	12.0	12.0	15.0
	60	5300	12.0	12.0	15.0
	64	5320	12.0	12.0	15.0
802.11ac (VHT40)	54	5270	12.0	12.0	15.0
	62	5310	12.0	12.0	15.0
802.11ac (VHT80)	58	5290	12.0	12.0	15.0

<WLAN 5.6G>

Mode	Channel	Frequency (MHz)	Max. Tune up (Ant-0)	Max. Tune up (Ant-1)	Max. Tune up (Ant-0 + Ant-1)
802.11a	100	5500	13.0	13.0	16.0
	116	5580	13.0	13.0	16.0
	120	5600	13.0	13.0	16.0
	124	5620	13.0	13.0	16.0
	132	5660	13.0	13.0	16.0
	140	5700	13.0	13.0	16.0
	144	5720	13.0	13.0	16.0
802.11ac (VHT20)	100	5500	12.5	12.5	15.5
	116	5580	12.5	12.5	15.5
	120	5600	12.5	12.5	15.5
	124	5620	12.5	12.5	15.5
	132	5660	12.5	12.5	15.5
	140	5700	12.5	12.5	15.5
	144	5720	12.5	12.5	15.5
802.11ac (VHT40)	102	5510	12.5	12.5	15.5
	110	5550	12.5	12.5	15.5
	118	5590	12.5	12.5	15.5
	126	5630	12.5	12.5	15.5
	134	5670	12.5	12.5	15.5
	142	5710	12.5	12.5	15.5
802.11ac (VHT80)	106	5530	12.5	12.5	15.5
	122	5610	12.5	12.5	15.5
	138	5690	12.5	12.5	15.5

<WLAN 5.8G>

Mode	Channel	Frequency (MHz)	Max. Tune up (Ant-0)	Max. Tune up (Ant-1)	Max. Tune up (Ant-0 + Ant-1)
802.11a	149	5745	11.5	11.5	14.5
	153	5765	11.5	11.5	14.5
	157	5785	11.5	11.5	14.5
	161	5805	11.5	11.5	14.5
	165	5825	11.5	11.5	14.5
802.11n (HT20)	149	5745	11.0	11.0	14.0
	153	5765	11.0	11.0	14.0
	157	5785	11.0	11.0	14.0
	161	5805	11.0	11.0	14.0
	165	5825	11.0	11.0	14.0
802.11n (HT40)	151	5755	11.0	11.0	14.0
	159	5795	11.0	11.0	14.0
802.11ac (VHT80)	155	5775	11.0	11.0	14.0

<Bluetooth>

Mode	Channel	Frequency (MHz)	Max. Tune up (Ant-0)	Max. Tune up (Ant-2)
Bluetooth EDR	0	2402	13.0	13.0
	39	2441	13.0	13.0
	78	2480	13.0	13.0
Bluetooth LE	0	2402	12.0	11.5
	19	2440	12.0	11.5
	39	2480	12.0	11.5

Tri Antenna Port:

<WLAN 2.4G>

Mode	Channel	Frequency (MHz)	Max. Tune up (Ant-0)	Max. Tune up (Ant-1)	Max. Tune up (Ant-0 + Ant-1)
802.11b	1	2412	15.5	15.5	17.0
	6	2437	15.5	15.5	17.0
	11	2462	15.5	15.5	17.0
	12	2467	15.5	15.5	17.0
	13	2472	15.5	15.5	17.0
802.11g	1	2412	15.5	15.5	17.0
	6	2437	15.5	15.5	17.0
	11	2462	15.5	15.5	17.0
	12	2467	15.5	15.5	17.0
	13	2472	15.5	15.5	17.0
802.11ac (VHT20)	1	2412	15.5	15.5	17.0
	6	2437	15.5	15.5	17.0
	11	2462	15.5	15.5	17.0
	12	2467	15.5	15.5	17.0
	13	2472	15.5	15.5	17.0
802.11ac (VHT40)	3	2422	15.5	15.5	17.0
	6	2437	15.5	15.5	17.0
	9	2452	15.5	15.5	17.0
	10	2457	15.5	15.5	17.0
	11	2462	15.5	15.5	17.0

<WLAN 5.2G>

Mode	Channel	Frequency (MHz)	Max. Tune up (Ant-0)	Max. Tune up (Ant-1)	Max. Tune up (Ant-0 + Ant-1)
802.11a	36	5180	12.5	12.5	15.5
	40	5200	12.5	12.5	15.5
	44	5220	12.5	12.5	15.5
	48	5240	12.5	12.5	15.5
802.11ac (VHT20)	36	5180	12.0	12.0	15.0
	40	5200	12.0	12.0	15.0
	44	5220	12.0	12.0	15.0
	48	5240	12.0	12.0	15.0
802.11ac (VHT40)	38	5190	12.0	12.0	15.0
	46	5230	12.0	12.0	15.0
802.11ac (VHT80)	42	5210	12.0	12.0	15.0

<WLAN 5.3G>

Mode	Channel	Frequency (MHz)	Max. Tune up (Ant-0)	Max. Tune up (Ant-1)	Max. Tune up (Ant-0 + Ant-1)
802.11a	52	5260	12.5	12.5	15.5
	56	5280	12.5	12.5	15.5
	60	5300	12.5	12.5	15.5
	64	5320	12.5	12.5	15.5
802.11ac (VHT20)	52	5260	12.0	12.0	15.0
	56	5280	12.0	12.0	15.0
	60	5300	12.0	12.0	15.0
	64	5320	12.0	12.0	15.0
802.11ac (VHT40)	54	5270	12.0	12.0	15.0
	62	5310	12.0	12.0	15.0
802.11ac (VHT80)	58	5290	12.0	12.0	15.0

<WLAN 5.6G>

Mode	Channel	Frequency (MHz)	Max. Tune up (Ant-0)	Max. Tune up (Ant-1)	Max. Tune up (Ant-0 + Ant-1)
802.11a	100	5500	13.0	13.0	16.0
	116	5580	13.0	13.0	16.0
	120	5600	13.0	13.0	16.0
	124	5620	13.0	13.0	16.0
	132	5660	13.0	13.0	16.0
	140	5700	13.0	13.0	16.0
	144	5720	13.0	13.0	16.0
802.11ac (VHT20)	100	5500	12.5	12.5	15.5
	116	5580	12.5	12.5	15.5
	120	5600	12.5	12.5	15.5
	124	5620	12.5	12.5	15.5
	132	5660	12.5	12.5	15.5
	140	5700	12.5	12.5	15.5
	144	5720	12.5	12.5	15.5
802.11ac (VHT40)	102	5510	12.5	12.5	15.5
	110	5550	12.5	12.5	15.5
	118	5590	12.5	12.5	15.5
	126	5630	12.5	12.5	15.5
	134	5670	12.5	12.5	15.5
	142	5710	12.5	12.5	15.5
802.11ac (VHT80)	106	5530	12.5	12.5	15.5
	122	5610	12.5	12.5	15.5
	138	5690	12.5	12.5	15.5

<WLAN 5.8G>

Mode	Channel	Frequency (MHz)	Max. Tune up (Ant-0)	Max. Tune up (Ant-1)	Max. Tune up (Ant-0 + Ant-1)
802.11a	149	5745	11.5	11.5	14.5
	153	5765	11.5	11.5	14.5
	157	5785	11.5	11.5	14.5
	161	5805	11.5	11.5	14.5
	165	5825	11.5	11.5	14.5
802.11n (HT20)	149	5745	11.0	11.0	14.0
	153	5765	11.0	11.0	14.0
	157	5785	11.0	11.0	14.0
	161	5805	11.0	11.0	14.0
	165	5825	11.0	11.0	14.0
802.11n (HT40)	151	5755	11.0	11.0	14.0
	159	5795	11.0	11.0	14.0
802.11ac (VHT80)	155	5775	11.0	11.0	14.0

<Bluetooth>

Mode	Channel	Frequency (MHz)	Max. Tune up (Ant-0)
Bluetooth EDR	0	2402	13.0
	39	2441	13.0
	78	2480	13.0
Bluetooth LE	0	2402	12.0
	19	2440	12.0
	39	2480	12.0

Measured Conducted Power Reasult

The measuring conducted average power

Tri Antenna Port

<WLAN 2.4G>

Mode	Channel	Frequency (MHz)	Average Power (Ant-0)	Average Power (Ant-1)	Average Power (Ant-0 + Ant-1)
802.11b	1	2412	15.25	15.45	16.90
	6	2437	15.43	15.48	**16.91**
	11	2462	15.11	15.16	16.42
	12	2467	15.24	15.44	16.39
	13	2472	15.18	15.34	16.26

<WLAN 5.3G>

Mode	Channel	Frequency (MHz)	Average Power (Ant-0)	Average Power (Ant-1)	Average Power (Ant-0 + Ant-1)
802.11a	52	5260	12.30	12.29	**15.43**
	56	5280	12.23	12.20	15.28
	60	5300	12.38	12.37	15.18
	64	5320	12.33	12.25	15.23

<WLAN 5.6G>

Mode	Channel	Frequency (MHz)	Average Power (Ant-0)	Average Power (Ant-1)	Average Power (Ant-0 + Ant-1)
802.11a	100	5500	12.68	12.82	15.63
	116	5580	12.94	12.86	**15.72**
	120	5600	12.62	12.77	15.61
	124	5620	12.64	12.67	15.69
	132	5660	12.71	12.64	15.64
	140	5700	12.73	12.57	15.65
	144	5720	12.88	12.75	15.58

<WLAN 5.8G>

Mode	Channel	Frequency (MHz)	Average Power (Ant-0)	Average Power (Ant-1)	Average Power (Ant-0 + Ant-1)
802.11a	149	5745	11.28	11.37	14.33
	153	5765	11.36	11.19	14.32
	157	5785	11.41	11.28	**14.43**
	161	5805	11.25	11.25	14.35
	165	5825	11.33	11.31	14.32

<Bluetooth>

Mode	Channel	Frequency (MHz)	Average Power (Ant-0)	Average Power (Ant-2)
Bluetooth EDR	0	2402	**12.84**	12.33
	39	2441	12.65	12.28
	78	2480	12.65	**12.53**
Bluetooth LE	0	2402	11.63	11.34
	19	2440	11.51	11.23
	39	2480	11.20	10.82

Dual Antenna Port

<WLAN 2.4G>

Mode	Channel	Frequency (MHz)	Average Power (Ant-0)	Average Power (Ant-1)	Average Power (Ant-0 + Ant-1)
802.11b	1	2412	15.25	15.45	16.90
	6	2437	15.43	15.48	**16.91**
	11	2462	15.11	15.16	16.42
	12	2467	15.24	15.44	16.39
	13	2472	15.18	15.34	16.26

<WLAN 5.3G>

Mode	Channel	Frequency (MHz)	Average Power (Ant-0)	Average Power (Ant-1)	Average Power (Ant-0 + Ant-1)
802.11a	52	5260	12.30	12.29	**15.43**
	56	5280	12.23	12.20	15.28
	60	5300	12.38	12.37	15.18
	64	5320	12.33	12.25	15.23

<WLAN 5.6G>

Mode	Channel	Frequency (MHz)	Average Power (Ant-0)	Average Power (Ant-1)	Average Power (Ant-0 + Ant-1)
802.11a	100	5500	12.68	12.82	15.63
	116	5580	12.94	12.86	**15.72**
	120	5600	12.62	12.77	15.61
	124	5620	12.64	12.67	15.69
	132	5660	12.71	12.64	15.64
	140	5700	12.73	12.57	15.65
	144	5720	12.88	12.75	15.58

<WLAN 5.8G>

Mode	Channel	Frequency (MHz)	Average Power (Ant-0)	Average Power (Ant-1)	Average Power (Ant-0 + Ant-1)
802.11a	149	5745	11.28	11.37	14.33
	153	5765	11.36	11.19	14.32
	157	5785	11.41	11.28	**14.43**
	161	5805	11.25	11.25	14.35
	165	5825	11.33	11.31	14.32

<Bluetooth>

Mode	Channel	Frequency (MHz)	Average Power (Ant-0)
Bluetooth EDR	0	2402	**12.84**
	39	2441	12.65
	78	2480	12.65
Bluetooth LE	0	2402	11.63
	19	2440	11.51
	39	2480	11.20

IC SAR Power Table(For portable device with PIFA antenna)

Power of portable device with PIFA antenna :

Maximum Target Conducted Power:

The maximum conducted average power (Unit: dBm) including tune-up tolerance is shown as below.

Tri Antenna Port

<WLAN 2.4G>

Mode	Channel	Frequency (MHz)	Max. Tune up (Ant-0)	Max. Tune up (Ant-1)	Max. Tune up (Ant-0 + Ant-1)
802.11b	1	2412	15.5	15.5	17.0
	6	2437	15.5	15.5	17.0
	11	2462	15.5	15.5	17.0
	12	2467	15.5	15.5	17.0
	13	2472	15.5	15.5	17.0
802.11g	1	2412	15.5	15.5	17.0
	6	2437	15.5	15.5	17.0
	11	2462	15.5	15.5	17.0
	12	2467	15.5	15.5	17.0
	13	2472	15.5	15.5	17.0
802.11ac (VHT20)	1	2412	15.5	15.5	17.0
	6	2437	15.5	15.5	17.0
	11	2462	15.5	15.5	17.0
	12	2467	15.5	15.5	17.0
	13	2472	15.5	15.5	17.0
802.11ac (VHT40)	3	2422	15.5	15.5	17.0
	6	2437	15.5	15.5	17.0
	9	2452	15.5	15.5	17.0
	10	2457	15.5	15.5	17.0
	11	2462	15.5	15.5	17.0

<WLAN 5.2G>

Mode	Channel	Frequency (MHz)	Max. Tune up (Ant-0)	Max. Tune up (Ant-1)	Max. Tune up (Ant-0 + Ant-1)
802.11a	36	5180	12.5	12.5	15.5
	40	5200	12.5	12.5	15.5
	44	5220	12.5	12.5	15.5
	48	5240	12.5	12.5	15.5
802.11ac (VHT20)	36	5180	12.0	12.0	15.0
	40	5200	12.0	12.0	15.0
	44	5220	12.0	12.0	15.0
	48	5240	12.0	12.0	15.0
802.11ac (VHT40)	38	5190	12.0	12.0	15.0
	46	5230	12.0	12.0	15.0
802.11ac (VHT80)	42	5210	12.0	12.0	15.0

<WLAN 5.3G>

Mode	Channel	Frequency (MHz)	Max. Tune up (Ant-0)	Max. Tune up (Ant-1)	Max. Tune up (Ant-0 + Ant-1)
802.11a	52	5260	12.5	12.5	15.5
	56	5280	12.5	12.5	15.5
	60	5300	12.5	12.5	15.5
	64	5320	12.5	12.5	15.5
802.11ac (VHT20)	52	5260	12.0	12.0	15.0
	56	5280	12.0	12.0	15.0
	60	5300	12.0	12.0	15.0
	64	5320	12.0	12.0	15.0
802.11ac (VHT40)	54	5270	12.0	12.0	15.0
	62	5310	12.0	12.0	15.0
802.11ac (VHT80)	58	5290	12.0	12.0	15.0

<WLAN 5.6G>

Mode	Channel	Frequency (MHz)	Max. Tune up (Ant-0)	Max. Tune up (Ant-1)	Max. Tune up (Ant-0 + Ant-1)
802.11a	100	5500	13.0	13.0	16.0
	116	5580	13.0	13.0	16.0
	132	5660	13.0	13.0	16.0
	140	5700	13.0	13.0	16.0
	144	5720	13.0	13.0	16.0
802.11ac (VHT20)	100	5500	12.5	12.5	15.5
	116	5580	12.5	12.5	15.5
	132	5660	12.5	12.5	15.5
	140	5700	12.5	12.5	15.5
	144	5720	12.5	12.5	15.5
802.11ac (VHT40)	102	5510	12.5	12.5	15.5
	110	5550	12.5	12.5	15.5
	134	5670	12.5	12.5	15.5
	142	5710	12.5	12.5	15.5
802.11ac (VHT80)	106	5530	12.5	12.5	15.5
	138	5690	12.5	12.5	15.5

<WLAN 5.8G>

Mode	Channel	Frequency (MHz)	Max. Tune up (Ant-0)	Max. Tune up (Ant-1)	Max. Tune up (Ant-0 + Ant-1)
802.11a	149	5745	11.5	11.5	14.5
	153	5765	11.5	11.5	14.5
	157	5785	11.5	11.5	14.5
	161	5805	11.5	11.5	14.5
	165	5825	11.5	11.5	14.5
802.11n (HT20)	149	5745	11.0	11.0	14.0
	153	5765	11.0	11.0	14.0
	157	5785	11.0	11.0	14.0
	161	5805	11.0	11.0	14.0
	165	5825	11.0	11.0	14.0
802.11n (HT40)	151	5755	11.0	11.0	14.0
	159	5795	11.0	11.0	14.0
802.11ac (VHT80)	155	5775	11.0	11.0	14.0

<Bluetooth>

Mode	Channel	Frequency (MHz)	Max. Tune up (Ant-0)	Max. Tune up (Ant-2)
Bluetooth EDR	0	2402	13.0	13.0
	39	2441	13.0	13.0
	78	2480	13.0	13.0
Bluetooth LE	0	2402	12.0	11.5
	19	2440	12.0	11.5
	39	2480	12.0	11.5

Dual Antenna Port

<WLAN 2.4G>

Mode	Channel	Frequency (MHz)	Max. Tune up (Ant-0)	Max. Tune up (Ant-1)	Max. Tune up (Ant-0 + Ant-1)
802.11b	1	2412	15.5	15.5	17.0
	6	2437	15.5	15.5	17.0
	11	2462	15.5	15.5	17.0
	12	2467	15.5	15.5	17.0
	13	2472	15.5	15.5	17.0
802.11g	1	2412	15.5	15.5	17.0
	6	2437	15.5	15.5	17.0
	11	2462	15.5	15.5	17.0
	12	2467	15.5	15.5	17.0
	13	2472	15.5	15.5	17.0
802.11ac (VHT20)	1	2412	15.5	15.5	17.0
	6	2437	15.5	15.5	17.0
	11	2462	15.5	15.5	17.0
	12	2467	15.5	15.5	17.0
	13	2472	15.5	15.5	17.0
802.11ac (VHT40)	3	2422	15.5	15.5	17.0
	6	2437	15.5	15.5	17.0
	9	2452	15.5	15.5	17.0
	10	2457	15.5	15.5	17.0
	11	2462	15.5	15.5	17.0

<WLAN 5.2G>

Mode	Channel	Frequency (MHz)	Max. Tune up (Ant-0)	Max. Tune up (Ant-1)	Max. Tune up (Ant-0 + Ant-1)
802.11a	36	5180	12.5	12.5	15.5
	40	5200	12.5	12.5	15.5
	44	5220	12.5	12.5	15.5
	48	5240	12.5	12.5	15.5
802.11ac (VHT20)	36	5180	12.0	12.0	15.0
	40	5200	12.0	12.0	15.0
	44	5220	12.0	12.0	15.0
	48	5240	12.0	12.0	15.0
802.11ac (VHT40)	38	5190	12.0	12.0	15.0
	46	5230	12.0	12.0	15.0
802.11ac (VHT80)	42	5210	12.0	12.0	15.0

<WLAN 5.3G>

Mode	Channel	Frequency (MHz)	Max. Tune up (Ant-0)	Max. Tune up (Ant-1)	Max. Tune up (Ant-0 + Ant-1)
802.11a	52	5260	12.5	12.5	15.5
	56	5280	12.5	12.5	15.5
	60	5300	12.5	12.5	15.5
	64	5320	12.5	12.5	15.5
802.11ac (VHT20)	52	5260	12.0	12.0	15.0
	56	5280	12.0	12.0	15.0
	60	5300	12.0	12.0	15.0
	64	5320	12.0	12.0	15.0
802.11ac (VHT40)	54	5270	12.0	12.0	15.0
	62	5310	12.0	12.0	15.0
802.11ac (VHT80)	58	5290	12.0	12.0	15.0

<WLAN 5.6G>

Mode	Channel	Frequency (MHz)	Max. Tune up (Ant-0)	Max. Tune up (Ant-1)	Max. Tune up (Ant-0 + Ant-1)
802.11a	100	5500	13.0	13.0	16.0
	116	5580	13.0	13.0	16.0
	132	5660	13.0	13.0	16.0
	140	5700	13.0	13.0	16.0
	144	5720	13.0	13.0	16.0
802.11ac (VHT20)	100	5500	12.5	12.5	15.5
	116	5580	12.5	12.5	15.5
	132	5660	12.5	12.5	15.5
	140	5700	12.5	12.5	15.5
	144	5720	12.5	12.5	15.5
802.11ac (VHT40)	102	5510	12.5	12.5	15.5
	110	5550	12.5	12.5	15.5
	134	5670	12.5	12.5	15.5
	142	5710	12.5	12.5	15.5
802.11ac (VHT80)	106	5530	12.5	12.5	15.5
	138	5690	12.5	12.5	15.5

<WLAN 5.8G>

Mode	Channel	Frequency (MHz)	Max. Tune up (Ant-0)	Max. Tune up (Ant-1)	Max. Tune up (Ant-0 + Ant-1)
802.11a	149	5745	11.5	11.5	14.5
	153	5765	11.5	11.5	14.5
	157	5785	11.5	11.5	14.5
	161	5805	11.5	11.5	14.5
	165	5825	11.5	11.5	14.5
802.11n (HT20)	149	5745	11.0	11.0	14.0
	153	5765	11.0	11.0	14.0
	157	5785	11.0	11.0	14.0
	161	5805	11.0	11.0	14.0
	165	5825	11.0	11.0	14.0
802.11n (HT40)	151	5755	11.0	11.0	14.0
	159	5795	11.0	11.0	14.0
802.11ac (VHT80)	155	5775	11.0	11.0	14.0

<Bluetooth>

Mode	Channel	Frequency (MHz)	Max. Tune up (Ant-0)
Bluetooth EDR	0	2402	13.0
	39	2441	13.0
	78	2480	13.0
Bluetooth LE	0	2402	12.0
	19	2440	12.0
	39	2480	12.0

Measured Conducted Power:

The measuring conducted average power (Unit: dBm) is shown as below.

Tri Antenna Port

<WLAN 2.4G>

Mode	Channel	Frequency (MHz)	Average Power (Ant-0)	Average Power (Ant-1)	Average Power (Ant-0 + Ant-1)
802.11b	1	2412	15.25	15.45	16.90
	6	2437	15.43	15.48	**16.91**
	11	2462	15.11	15.16	16.42
	12	2467	15.24	15.44	16.39
	13	2472	15.18	15.34	16.26

<WLAN 5.3G>

Mode	Channel	Frequency (MHz)	Average Power (Ant-0)	Average Power (Ant-1)	Average Power (Ant-0 + Ant-1)
802.11a	52	5260	12.30	12.29	**15.43**
	56	5280	12.23	12.20	15.28
	60	5300	12.38	12.37	15.18
	64	5320	12.33	12.25	15.23

<WLAN 5.6G>

Mode	Channel	Frequency (MHz)	Average Power (Ant-0)	Average Power (Ant-1)	Average Power (Ant-0 + Ant-1)
802.11a	100	5500	12.68	12.82	15.63
	116	5580	12.94	12.86	**15.72**
	132	5660	12.71	12.64	15.64
	140	5700	12.73	12.57	15.65
	144	5720	12.88	12.75	15.58

<WLAN 5.8G>

Mode	Channel	Frequency (MHz)	Average Power (Ant-0)	Average Power (Ant-1)	Average Power (Ant-0 + Ant-1)
802.11a	149	5745	11.28	11.37	14.33
	153	5765	11.36	11.19	14.32
	157	5785	11.41	11.28	**14.43**
	161	5805	11.25	11.25	14.35
	165	5825	11.33	11.31	14.32

<Bluetooth>

Mode	Channel	Frequency (MHz)	Average Power (Ant-0)	Average Power (Ant-2)
Bluetooth EDR	0	2402	**12.84**	12.33
	39	2441	12.65	12.28
	78	2480	12.65	**12.53**
Bluetooth LE	0	2402	11.63	11.34
	19	2440	11.51	11.23
	39	2480	11.20	10.82

Dual Antenna Port

<WLAN 2.4G>

Mode	Channel	Frequency (MHz)	Average Power (Ant-0)	Average Power (Ant-1)	Average Power (Ant-0 + Ant-1)
802.11b	1	2412	15.25	15.45	16.90
	6	2437	15.43	15.48	**16.91**
	11	2462	15.11	15.16	16.42
	12	2467	15.24	15.44	16.39
	13	2472	15.18	15.34	16.26

<WLAN 5.3G>

Mode	Channel	Frequency (MHz)	Average Power (Ant-0)	Average Power (Ant-1)	Average Power (Ant-0 + Ant-1)
802.11a	52	5260	12.30	12.29	**15.43**
	56	5280	12.23	12.20	15.28
	60	5300	12.38	12.37	15.18
	64	5320	12.33	12.25	15.23

<WLAN 5.6G>

Mode	Channel	Frequency (MHz)	Average Power (Ant-0)	Average Power (Ant-1)	Average Power (Ant-0 + Ant-1)
802.11a	100	5500	12.68	12.82	15.63
	116	5580	12.94	12.86	**15.72**
	132	5660	12.71	12.64	15.64
	140	5700	12.73	12.57	15.65
	144	5720	12.88	12.75	15.58

<WLAN 5.8G>

Mode	Channel	Frequency (MHz)	Average Power (Ant-0)	Average Power (Ant-1)	Average Power (Ant-0 + Ant-1)
802.11a	149	5745	11.28	11.37	14.33
	153	5765	11.36	11.19	14.32
	157	5785	11.41	11.28	**14.43**
	161	5805	11.25	11.25	14.35
	165	5825	11.33	11.31	14.32

<Bluetooth>

Mode	Channel	Frequency (MHz)	Average Power (Ant-0)
Bluetooth EDR	0	2402	**12.84**
	39	2441	12.65
	78	2480	12.65
Bluetooth LE	0	2402	11.63
	19	2440	11.51
	39	2480	11.20