



MT7922A22M

Test-Mode Software Application Note

Part-1: QA-Tool User Guideline

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Document Revision History

Version	Date	Author	Change List
V0.1	20210303	Yi-Yan	Initial draft release.
V0.2	20210310	Yi-Yan	Add section 2.6
V0.3	20210728		Add 6GHZ SPEC. & antenna filling
V0.4	20230524		Add FCC statement
V0.5	20230711		Remove P.18 statement.

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1 System overview

1.1 General Description

MT7922A22M 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
- Windows7X64 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

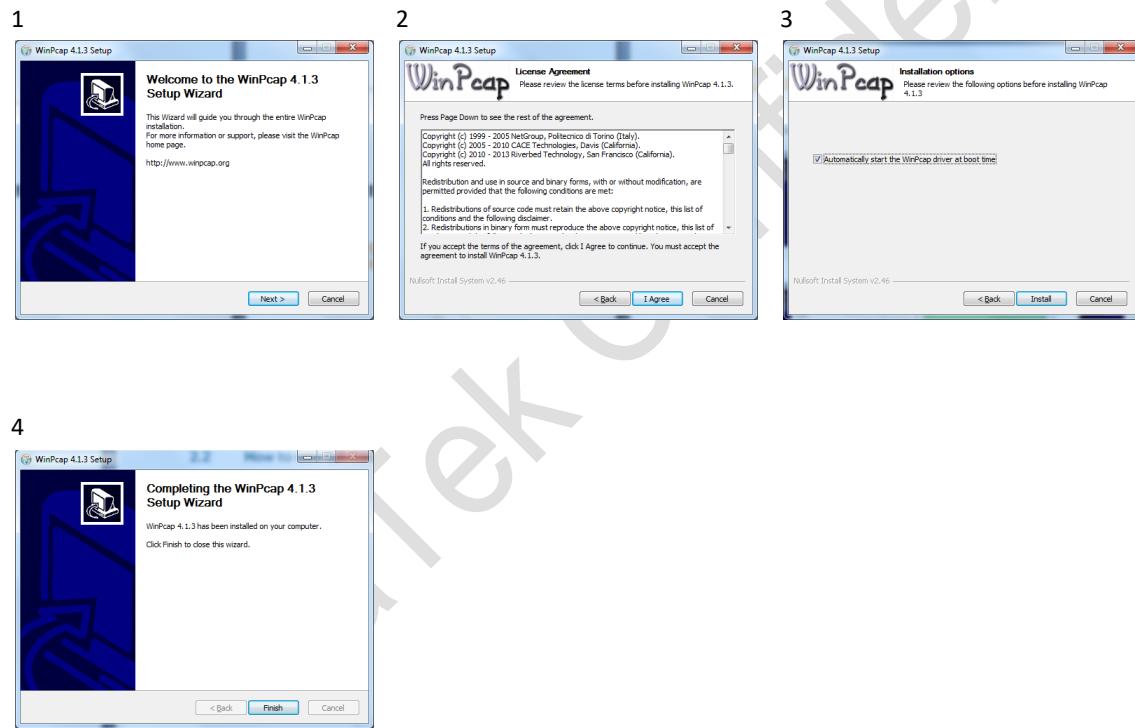
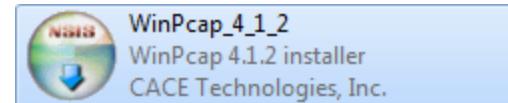
- 1st : Install WinPcap
- 2nd : Update Windows7security package to register x64 signature mechanism
- 3rd : Instal QA-Tool Windows driver.

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 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:

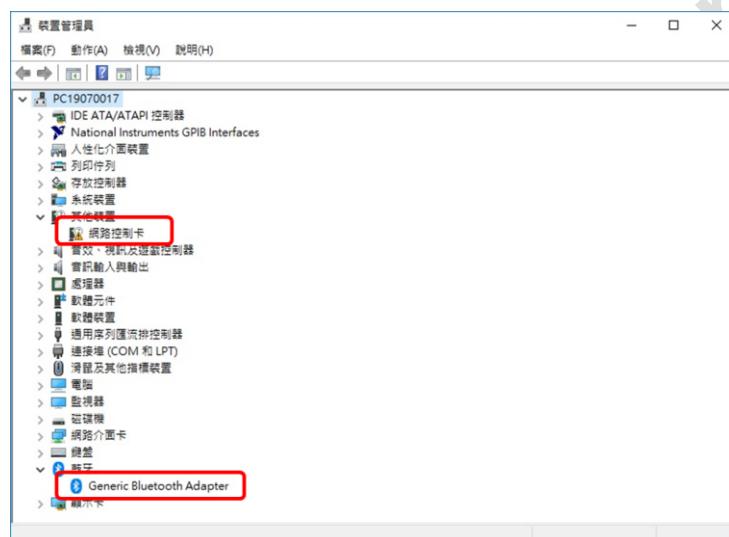
<https://docs.microsoft.com/en-us/windows-hardware/manufacture/desktop/disabling-secure-boot>

2.1.3 QA-Tool Windows driver

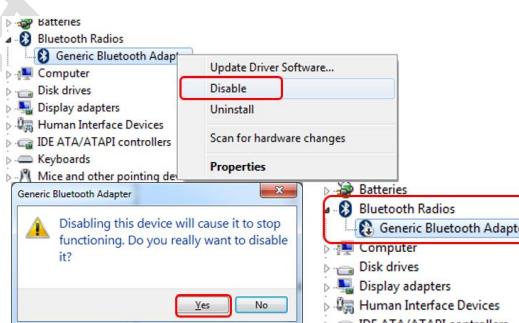
MT7922A22M supports USB, SDIO and PCIE interface. According to interface type of MT7922A22M on users' hand, please refer to steps shown below to install QA-Tool Windows driver:

USB interface:

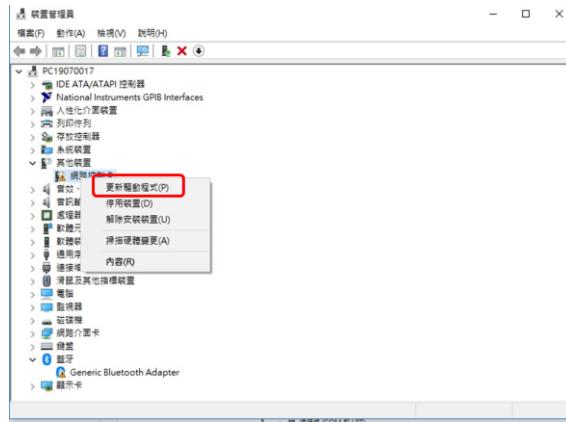
1. Connect DUT to PC/NB and check Windows Device Manager.
2. Window Device Manager would discover DUT shows “**Generic Bluetooth Adapter**”(BT device) and “**WiFi_If**”(WiFi device).



3. Right click the “**Generic Bluetooth Adapter**” BT device and select disable as follows.



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.





3 General Information & Integration Instructions

3.1 General Description of MT7922A22M

Product	2TX 11ax (WiFi6E) BW160 + BT/BLE Combo Card
Brand	MediaTek
Model	MT7922A22M
Power Supply Rating	3.3Vdc from host equipment
Modulation Type	GFSK, π/4-DQPSK, 8DPSK for FHSS CCK, DQPSK, DBPSK for DSSS 256QAM, 64QAM, 16QAM, BPSK, QPSK for OFDM 1024QAM, 256QAM, 64QAM, 16QAM, QPSK, BPSK for OFDM
Modulation Technology	BT EDR: FHSS BT LE: GFSK WLAN: DSSS, OFDM, OFDMA
Transfer Rate	BT EDR: up to 3 Mbps BT LE: up to 2 Mbps 802.11b: up to 11 Mbps 802.11g: up to 54 Mbps 802.11n: up to 300 Mbps VHT20/40: up to 400 Mbps 802.11ax: up to 573.5 Mbps 802.11a: up to 54/48/36/24/18/12/9/6 Mbps 802.11n: up to 300 Mbps 802.11ac: up to 1733.3 Mbps 802.11ax: up to 2401.9 Mbps
Operating Frequency	BT EDR: 2402MHz ~ 2480MHz BT LE: 2402MHz ~ 2480MHz 2.4GHz: 2.412 ~ 2.472GHz 5GHz: 5.18~5.32GHz, 5.50~5.72GHz, 5.745 ~ 5.825GHz, 5.845 ~ 5.885GHz 6GHz: 5.99~6.415GHz, 6.435~6.525GHz, 6.525~6.875GHz, 6.875~7.115GHz
Number of Channel	BT EDR: 79 BT LE: 40 2.4GHz: 802.11b, 802.11g, 802.11n (HT20), VHT20, 802.11ax (HE20): 13 802.11n (HT40), VHT40, 802.11ax (HE40): 9 5GHz: 5180~5320MHz 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20): 8 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40): 4 802.11ac (VHT80), 802.11ax (HE80): 2 802.11ac (VHT160), 802.11ax (HE160): 1 5500~5720MHz 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20): 12 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40): 6 802.11ac (VHT80), 802.11ax (HE80): 3 802.11ac (VHT160), 802.11ax (HE160): 1 5745~5825MHz 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20): 5 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40): 2 802.11ac (VHT80), 802.11ax (HE80): 1 5.845 ~ 5.885GHz 802.11a, 802.11n(HT20), 802.11ac(VHT20), 802.11ax(HE20):3 802.11n(HT40), 802.11ac(VHT40), 802.11ax(HE40):2

	802.11ac(VHT80), 802.11ax(HE80):1 802.11ac(VHT160), 802.11ax(HE160):1
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6GHz:

802.11a/ax (HE20): 59 802.11ax (HE40): 29 802.11ax (HE80): 14 802.11ax (HE160): 7
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3.2 Antenna information

The antennas mentioned below are covered in the certification scope and the HOST can only be used with the following antennas:

Ant. Set	RF Chain No.	Brand	Model	Ant. Net Gain (dBi)	Freq. Range (GHz)	Ant. Type	Connector Type
1	Chain0	PSA	RFMTA340718EMLB302	3.18 4.92	2.4~2.4835 5.15~5.85	PIFA	i-pex(MHF)
	Chain1	PSA	RFMTA340718EMLB302	3.18 4.92	2.4~2.4835 5.15~5.85	PIFA	i-pex(MHF)
2	Chain0	PSA	RFMTA311020EMMB301	1.71	2.4~2.4835	PIFA	i-pex(MHF)
				4.82	5.15~5.85		
				4.76	5.925~6.425		
				4.29	6.425~6.525		
				4.61	6.525~6.875		
	Chain1	PSA	RFMTA311020EMMB301	4.09	6.875~7.125		
				1.71	2.4~2.4835		
				4.82	5.15~5.85		
				4.76	5.925~6.425		
				4.29	6.425~6.525		
3	Chain0	VSO	JR2Q00340-1	4.61	6.525~6.875	Dipole	RP SMA PLUG
				4.09	6.875~7.125		
				1.62	2.4~2.4835		
				3.2	5.15~5.85		
	Chain1	VSO	JR2Q00340-1	3.93	5.925~6.425	Dipole	RP SMA PLUG
				3.61	6.425~6.525		
				3.61	6.525~6.875		
				3.14	6.875~7.125		
4	Chain0	Cortec	AN2450-4902BRS	2.42 3.87	2.4~2.4835 5.15~5.85	Dipole	RP SMA
	Chain1	Cortec	AN2450-4902BRS	2.42 3.87	2.4~2.4835 5.15~5.85	Dipole	RP SMA
5	Chain0	MSI	WA-P-LE-02-045	2.24	2.4~2.4835	PIFA	i-pex(MHF)
				2.68	5.15~5.85		
				3.01	5.925~6.425		
				-1.23	6.425~6.525		
	Chain1	MSI	WA-P-LE-02-046	-1.96	6.525~6.875	PIFA	i-pex(MHF)
				-3.68	6.875~7.125		
				-2.96	2.4~2.4835		
				1.16	5.15~5.85		
6	Chain0	PSA	RFPCA460632IMMB701	-13.2 -13.67 -13.67 -13.09	5.925~6.425 6.425~6.525 6.525~6.875 6.875~7.125	Dipole	IPEX
	Chain1	PSA	RFPCA460632IMMB701	-13.2 -13.67	5.925~6.425 6.425~6.525	Dipole	IPEX

				-13.67 -13.09	6.525~6.875 6.875~7.125		
7	Chain0	PSA	RFMTA421230IMMB701	-13.92 -13.91 -13.91 -14.46	5.925~6.425 6.425~6.525 6.525~6.875 6.875~7.125	PIFA	i-pex
	Chain1	PSA		-13.92 -13.91 -13.91 -14.46	5.925~6.425 6.425~6.525 6.525~6.875 6.875~7.125		
8	Chain0	HongBo	260-25105	3.1 3.33 4.23 4.22 4.01 3.07	2.4~2.4835 5.15~5.85 5.925~6.425 6.425~6.525 6.525~6.875 6.875~7.125	Monopole	ipex(MHF)
				3.1 3.33 4.23 4.22 4.01 3.07	2.4~2.4835 5.15~5.85 5.925~6.425 6.425~6.525 6.525~6.875 6.875~7.125		
9	Chain1	HongBo	260-25106	4.91 4.73 4.29 4.58 4.09	5.15~5.85 5.925~6.425 6.425~6.525 6.525~6.875 6.875~7.125	Monopole	ipex(MHF)
				4.91 4.73 4.29 4.58 4.09	5.15~5.85 5.925~6.425 6.425~6.525 6.525~6.875 6.875~7.125		

Only the above antennas are tested for compliance with the FCC rules, and all other antennas (even same type with lower gain) will require a re-assessment to be used with this module.

3.3 Host Integration instructions

The product is designed to be used with "NGFF (Next Generation Form Factor) M.2 2230" PCIE Bus, please install module into a M.2 2230 PCIE slot.

3.4 Host product testing guidance

HOST must follow the specific restrictions listed in "3.5 Regulatory notes" section below and section 3 of KDB996369 D04 V02 Module Integration Guide v01, to verify that the host product meets all the applicable rules.

FCC regulation requirements / installation restrictions

RF Software restrictions (Implement by MTK)

Indoor Client 6XD

1. Contention-Based Protocol, as demonstrated in the FCC test report, is permanently embedded in the module and is not host-dependent, can't change by anyone.
2. This Modular device will only associate and connect with a low-power indoor access point or subordinate device and never directly connect to other client devices. This feature is included in its firmware and can't change by anyone.
3. This Modular device will always initiate transmission under the control of a low-power indoor AP or subordinate except for brief transmissions before joining a network. These short messages will only occur if the client has detected an indoor AP or subordinate operating on a channel. These brief messages will have a time-out mechanism such that if it does not receive a response from an AP it will not continually repeat the request.
4. That transmissions will be lower or equal to the power advertised by the indoor low-power access point or subordinate and never above the maximum output power allowed by the FCC grant for equipment class 6XD.

Installation restrictions

1. When use and install this modular device, prohibited for control of or communications with unmanned aircraft systems, including drones.

Dual Client 6CD

1. This device not 6PP category and the maximum power does not exceed authorized values.
2. This device will only associate and connect with a low-power indoor Access Point, subordinate device, or standard access point and never directly link to any other client devices.
3. This device will always initiate transmission under the control of a low-power indoor AP or subordinate or standard client except access point for brief communications before joining a network. These quick messages will only occur if the client has detected an indoor AP, subordinate, or standard access point operating on a channel. These brief messages will have a time-out mechanism such that if it does not receive a response from an AP it will not continually repeat the request.
4. This device, when associated and connected with a low-power indoor access point, subordinate or standard access point device, will operate at a power lower as advertised by the indoor access point, subordinate, or standard access point:
 - i. lower than or equal to the power advertised by the low-power indoor access point or subordinate and never above the maximum output power allowed by the FCC grant for clients associated with indoor clients or subordinates.
 - ii. lower than or 6 dB below the power advertised by the standard access point.

5. Contention-based protocol as demonstrated in the test report is permanently embedded in the module and is not host-dependent based protocol demonstrated in the test report.

Installation restrictions

1. Prohibited for control of or communications with unmanned aircraft systems, including drones.

Federal Communication Commission Interference Statement

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.

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 transmitter must not be co-located or operating in conjunction with any other antenna or transmitter.

Transmitters in the 5.925-7.125 GHz band are prohibited from operating to control or communicate with unmanned aircraft systems.

This device meets all the other requirements specified in Part 15E, Section 15.407 of the FCC Rules.

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 minimum distance 20cm between the radiator & your body.

Radiation Exposure Statement:

The product comply with the FCC portable RF exposure limit set forth for an uncontrolled environment and are safe for intended operation as described in this manual.

The further RF exposure reduction can be achieved if the product can be kept as far as possible from the user body or set the device to lower output power if such function is available.

This module is intended for OEM integrators only. Per FCC KDB 996369 D03 OEM Manual v01 guidance, the following conditions must be strictly followed when using this certified module:

KDB 996369 D03 OEM Manual v01 rule sections:**2.2 List of applicable FCC rules**

This module has been tested for compliance to FCC Part 15 Subpart C (15.247) and Subpart E (15.407).

2.3 Summarize the specific operational use conditions

The module is tested for standalone mobile RF exposure use condition. Any other usage conditions such as co-location with other transmitter(s) will need a separate reassessment through a class II permissive change application or new certification.

2.4 Limited module procedures

Not applicable.

2.5 Trace antenna designs

Not applicable.

2.6 RF exposure considerations

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. A separate SAR/Power Density evaluation is required to confirm compliance with relevant FCC portable RF exposure rules.

This device was tested for typical body operations. To comply with RF exposure requirements, a minimum separation distance of 5 mm must be maintained between the user's body and including the antenna.

2.7 Antennas

The following antennas have been certified with this module.

Ant. Set	RF Chain No.	Brand	Model	Ant. Net Gain (dBi)	Freq. Range (GHz)	Ant. Type	Connector Type
1	Chain0	PSA	RFMTA340718EMLB302	3.18 4.92	2.4~2.4835 5.15~5.85	PIFA	i-pex(MHF)
	Chain1	PSA	RFMTA340718EMLB302	3.18 4.92	2.4~2.4835 5.15~5.85	PIFA	i-pex(MHF)
2	Chain0	PSA	RFMTA311020EMMB301	1.71	2.4~2.4835	PIFA	i-pex(MHF)
				4.82	5.15~5.85		
				4.76	5.925~6.425		
				4.29	6.425~6.525		
				4.61	6.525~6.875		
	Chain1	PSA	RFMTA311020EMMB301	4.09	6.875~7.125		
				1.71	2.4~2.4835		
				4.82	5.15~5.85		
				4.76	5.925~6.425		
				4.29	6.425~6.525		
3	Chain0	VSO	JR2Q00340-1	4.61	6.525~6.875	Dipole	RP SMA PLUG
				4.09	6.875~7.125		
				1.62	2.4~2.4835		
				3.2	5.15~5.85		
	Chain1	VSO	JR2Q00340-1	3.93	5.925~6.425	Dipole	RP SMA PLUG
				3.61	6.425~6.525		
				3.61	6.525~6.875		
				3.14	6.875~7.125		
4	Chain0	Cortec	AN2450-4902BRS	2.42 3.87	2.4~2.4835 5.15~5.85	Dipole	RP SMA
	Chain1	Cortec	AN2450-4902BRS	2.42 3.87	2.4~2.4835 5.15~5.85	Dipole	RP SMA
5	Chain0	MSI	WA-P-LE-02-045	2.24	2.4~2.4835	PIFA	i-pex(MHF)
				2.68	5.15~5.85		
				3.01	5.925~6.425		
				-1.23	6.425~6.525		
	Chain1	MSI	WA-P-LE-02-046	-1.96	6.525~6.875	PIFA	i-pex(MHF)
				-3.68	6.875~7.125		
				-2.96	2.4~2.4835		
				1.16	5.15~5.85		
6	Chain0	PSA	RFPCA460632IMMB701	0.99	5.925~6.425	Dipole	IPEX
				-2.31	6.425~6.525		
				-2.54	6.525~6.875		
				-7.44	6.875~7.125		
	Chain1	PSA	RFPCA460632IMMB701	-13.2	5.925~6.425	Dipole	IPEX
				-13.67	6.425~6.525		
				-13.67	6.525~6.875		
				-13.09	6.875~7.125		
	Chain0	PSA	RFMTA421230IMMB701	-13.92	5.925~6.425	PIFA	i-pex

7					-13.91 -13.91 -14.46	6.425~6.525 6.525~6.875 6.875~7.125		
	Chain1	PSA	RFMTA421230IMMB701		-13.92 -13.91 -13.91 -14.46	5.925~6.425 6.425~6.525 6.525~6.875 6.875~7.125	PIFA	i-pex
8	Chain0	HongBo	260-25105		3.1 3.33 4.23 4.22 4.01 3.07	2.4~2.4835 5.15~5.85 5.925~6.425 6.425~6.525 6.525~6.875 6.875~7.125	Monopole	ipex(MHF)
					3.1 3.33 4.23 4.22 4.01 3.07	2.4~2.4835 5.15~5.85 5.925~6.425 6.425~6.525 6.525~6.875 6.875~7.125	Monopole	ipex(MHF)
9	Chain1	HongBo	260-25106		4.91 4.73 4.29 4.58 4.09	5.15~5.85 5.925~6.425 6.425~6.525 6.525~6.875 6.875~7.125	Monopole	ipex(MHF)
					4.91 4.73 4.29 4.58 4.09	5.15~5.85 5.925~6.425 6.425~6.525 6.525~6.875 6.875~7.125	Monopole	ipex(MHF)

Note1: Use of other antenna types or the same type of antenna with higher gain than listed above must performed additional testing and appropriate permissive change approval.

Note2: In the 5.925-7.125GHz band, use of other similar type antennas and the antenna gain not higher/lower than listed above may only require a C1PC without any additional testing/submission.

Note3: Contact Hon Lin for additional guidance, if choose to use different antenna types or higher/lower gain antennas in the end system.

IMPORTANT: The final host product must have an integral antenna which is not removable by the end-user.

2.8 Label and compliance information

The final end product must be labeled in a visible area with the following: "Contains FCC ID: 2AQ68MT7922A22M". The grantee's FCC ID can be used only when all FCC compliance requirements are met.

2.9 Information on test modes and additional testing requirements

This transmitter is tested in a standalone mobile RF exposure condition and any co-located or simultaneous transmission with other transmitter(s) class II permissive change re-evaluation or new certification.

2.10 Additional testing, Part 15 Subpart B disclaimer

This transmitter module is tested as a subsystem and its certification does not cover the FCC Part 15 Subpart B (unintentional radiator) rule requirement applicable to the final host. The final host will still need to be reassessed for compliance to this portion of rule requirements if applicable.

As long as all conditions above are met, further transmitter test will not be required. However, the OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

IMPORTANT NOTE: In the event that these conditions can not be met (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID can not be used on the final product. In these circumstances, the OEM integrator will be responsible for re-evaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

Manual Information To the End User

The OEM integrator has to be aware not to provide information to the end user regarding how to install or remove this RF module in the user's manual of the end product which integrates this module.

The end user manual shall include all required regulatory information/warning as show in this manual.

OEM/Host manufacturer responsibilities

OEM/Host manufacturers are ultimately responsible for the compliance of the Host and Module. The final product must be reassessed against all the essential requirements of the FCC rule such as FCC Part 15 Subpart B before it can be placed on the US market. This includes reassessing the transmitter module for compliance with the Radio and EMF essential requirements of the FCC rules. This module must not be incorporated into any other device or system without retesting for compliance as multi-radio and combined equipment.

Modules: extended to host manufacturers by integration instructions.