

# everyday genius

# MT7927

# **Test-Mode Software Application Note**

# Part-1: QA-Tool User Guideline

Version: V0.3 Release Date: 2022-07-08

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# **Document Revision History**

Version	Date	Author	Change List
V0.1	20220607	Jack Pan	Initial draft release.
V0.2	20220608	Leon Hsu	Update Rx related test description.
V0.3	20220708	Jack Pan	Modify some description.

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# **1** System overview

# **1.1** General Description

MT7927 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.

Input rating: 3.3Vdc, Operating Temperature: -10~70°C

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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

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



# 2.1.1 Install WinPcap

If users are the 1<sup>st</sup> 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: 4.1.3 or later.



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# 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

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# 2.1.3 QA-Tool Windows driver

MT7927 supports USB, SDIO and PCIE interface. According to interface type of MT7927 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).

▲ 装置部連員         -           構築(F)         動作(A)         融明(H)           ■ ●         10         10         10           ●         ●         10         10         10           ●         ●         10         10         10           ●         ●         ●         10         10         10           ●         ●         ●         ●         ●         ●           ●	×
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3. Right click the "Generic Bluetooth Adapter" BT device and select disable as follows.

Generic Bluetooth Adap	Update Driver Software
<ul> <li>The compact of the comp</li></ul>	Disable Uninstall
<ul> <li>↓ 4mm ninterace Devices</li> <li>→ ar IDE ATA/ATAPI controllers</li> <li>→ Keyboards</li> <li>→ Mice and other pointing det</li> </ul>	Scan for hardware changes Properties
Generic Bluetooth Adapter           Image: Disabling this device w           Image: Disabling this device w           functioning. Do you re           it?	We Batteries       Ill cause it to stop       Bluetooth Radios       Subscription       Strain       Strain <t< td=""></t<>

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4. Right-click on "**WiFi\_If**" Wifi device and Update Driver Software.



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

×	×
← 量 更新驅動編式 - 網路控制卡	← 量 更新輻動程式・網路控制卡
您要如何搜尋驅動程式?	請從下列清單中選取您裝置的頻型。
	一般硬體購型(H):
→ 目動授辱更新的驅動程式軟體(S) 除卵經結構要裝設定中停用於測解,否則 Windows 將在您的電腦與網際網路上 使用用于在時間的中間的一個一個	■示所有装置 ■ 61883 装置
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→ 瀏覽讚獎上的驅動程式設體(8)	<ul> <li>▲ DVD/CD-ROM 光磁機</li> <li>▲ FS CFS 中場資料伺服器的道器</li> </ul>
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	➡ FS 加密醇攝器 ➡ FS 安全性加速程式醇攝器
	<ul> <li>♀ FS 系統復原時編器</li> <li>➡ FS 系統時編器</li> </ul>
取消	下一步(N) 取満
★ ■ 更新編飾程式 - MediaTek MT6639 QATest PCIe Driver #2	← ■ 更新編創程式 - MediaTek MT6639 QATest PCIe Driver #2
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在此位置或局理動程式。	「「「「「「「「「」」」」、「「」」、「「」」、「「」」、「」、「」、「」、「」
2000年2月11日日日1日1日1日1日1日1日1日1日1日1日1日1日1日1日1日1日1	
	MediaTek MT6639 QATest PCle Driver
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	福動程式已數位簽章。 從磁片安裝(H)
	<u>告訴我為什麼輕全國式做單很重要</u>
下一步(N) 取満	下一步(N) 取消
🕅 Windows #944	C 重 更新報題/編集 - Medialek MI0059 QA1est PCIe Driver #2
	Windows 已順利更新您的驅動程式
Windows 無法驗證DD驅動程式軟體的發行者	Windows 已完成安装道信装置的驅動程式:
	MediaTek MT6639 QATest PCIe Driver
→ 个安裝比驅動程式軟體(N) 您應該檢查製造商網站是否有適用於您裝置的更新驅動程式軟體	
→ 仍然安奘此駆動程式散體(1)	
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◇ 檢視鮮細資料(D)	
	製造の

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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.

		G	<b>QATo</b> QATe 0.0.1.3	ol_Dbg st MFC App 8				
Select interfac	e type and clic	ck "OK" but	ton to lun	ch QA-Tool			×	0
	С стр	₢ USB	C PCIe	C SDIO	C APSOC	C UART	C META	
				ОК	Cancel			

After QA-Tool UI pops out, users can check RF Type which should be shown **MT7927 : 2 T 2 R** 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.

		-
/RX Band 0   TX/RX Band 1   EEPROM   MAC BBP   F Ge 0	RF Page   PFMU Page   RU Page   About   al ID Cal Count   1	(FType v16639 :: 2 T 2 R
Channel 6 2437-MHz Vise Freq Mode	Rate System BW Per-Pkt BW  MCS=0; LP 1 N  20  20	Primary Sel LTF+GI
TX0/RX0 آھر TX1	/RX1 Ant Swap	Reset counter
	Nss 2	Applied Profile ID(0 ~
SGI DPD LDPC	Spatial Idx	
FC (2) Dur (2) Address1(6)Dest Address	s2(6)Source Address3(6)BSSID Seq (2)	
Payload	C MPDU Tx Length     C Packet Tx Time     AA     1024	
Repeat 0 F Inter Pac	TX Power0 (Dec) (0.5dB) Hex           -64.0 to 63.5         19.5          1         27	Reset Power
Start TX Transmitted : 0 T Co	onti. Tx 0:NORMAL MO  Ch,Preamble rateTXPath	
TX Tone Single ▼ DC ▼ +WF(a Power 0.25db(-32-3	0nly DC I offset 10 10 C Q offset 10 11) 0 ↔ XTAL Mode: AXM ♥ Freq. Offset 0 ↓ ↓	TMR Setting           C Initialiter         C TOAE V1.0         MP TH(db)           C Responder         C TOAE V1.5         MP Iter           C Disable         C TOAE V2.0         Set
Mode TX Path MCS PayloadLen	PacketCount Pco MPS Add MPS Del MPS Start	
MPS Save Settings MPS I	Load Settings	

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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.

/RX Band 0   TX/RX Band 1		C BBP RF Page	PFMU Page RU	Page About
EEPROM Type :	eeprom	)		
Single Read/Wr	ite	Offset	0000	RAW
G PEAD				i y v i
© READ	U WKITE	Value	00	

# 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.

		D:\PAN\MT66	39\MT	6639_HQ	A_202206	506\QAtool_	V20\QATc	ool_20220606	N X
		A Buff	er mod	e file not fo	ound! Rea	d from eFuse.			
	•							確定	
	2	0							
	MT6639 Q	A 0.0.2.91							
• C	TX/RX Ba	nd 0 TX/RX B	and	EEPRON	ЛАС	BBP RF Pa	ge PFM	U Page   RU	Page About
19	TX/RX Ba	ind 0   TX/RX B	and	EEPRON	ЛАС	BBP   RF Pa	ge PFM	U Page   RU	Page About
N	TX/RX Ba	eeprom Ty	and pe :	EEPRON E-fus	лас se	BBP RF Pa	ge PFM	U Page   RU	Page   About
N	TX/RX Ba	eeprom Type	and i pe:	EEPRON E-fus	лас se	BBP   RF Pa	ge   PFMI	U Page   RU	Page About
N	TX/RX Ba	EEPROM Ty Single Rea	and pe:	EEPRON E-fue	1 JAC	BBP   RF Pa	ge PFM	U Page   RU	Page About
N	TX/RX Ba	EEPROM Typ Single Rea Mode	and pe: [ d/Write	EEPRON E-fue e		BBP RF Pa	ge PFMI	U Page   RU	Page About
N	TX/RX Ba	EEPROM Tyr Single Rea Mode- © REA	and pe: [ d/Write	EEPRON E-fue e	nac se	BBP RF Pa	ge   PFMI	U Page   RU 0000 00	Page About

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# 2.3 How to Use the QA-Tool

## 2.3.1 WIFI Packets Transmitting –1 stream

On TX/RX page:

- a. Select TX sub-page and "Test Mode" as following figure.
- b. Select "Band0" for G band & "Band1" for A band
- c. Set Channel/Mode/Rate.
  - i. 802.11b CCK, 802.11g OFDM, 802.11n HT Mix Mode, 802.11ac VHT,
  - ii. 802.11ax HESU, 802.11ax RU HETB (need to set step g and RU Need to set in RU Page)
  - iii. 802.11be EHTSU, 802.11be RU EHTTB (need to set step g and RU Need to set in RU Page)
- d. Set BW. (Generally, System BW = Pre-Packet BW).
- e. Select TX0 or TX1 only
- f. Select "Nss=1" and choose "TX/RX0" to do transmitting.
- g. Set LFT+GI index. (Generally, setting index3) (this step for HESU, HETB(RU), EHTSU, EHTTB(RU))
- h. Set packet number. (0 means infinite packets)
- i. Click "Start TX" button to start packet transmitting and click "Stop TX" button to stop.
- j. The transmitted packets number is shown at "Transmitted:" area.
- k. Users can click "Reset counter" button to reset "Transmitted:" area.
- I. Users can click " ∃" button to modify power level of transmitting signal.
- m. Users can click "

If users want to adjust packets duty cycle

- n. click "HWTX"
- o. adjust packets lengths(L) to modify packets duty cycle (example 512)

(Make sure "**Transmitted:**" area have counter when start TX. If not, reduce the packet lengths) 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.

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# MT7927 SW Tool AN: Part-I Confidential B

MT6639 QA 0.0.2.91	
C.	
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a. Tx RX Tx RX SGI C DPD C LDPC Tx frame setting FC (2) Dur (2) Address1(6)Dest Address2(6)Source Address3(6)BSSID Seq (2) 0800 0000 Perfferffffff 00000000000 001122334455 0000 C MPDU Tx Length Repeat Pattern(3) C Packet Tx Time	
Image: Constraint of the start TX     TX Power0 (Dec) (0.5dB) Hex       Repeat     0       j.     ✓       Image: Constraint of the start TX     ✓       Start TX     Transmitted :       0     Conti. Tx       0     Continue       0     Continue       0     Continue       0     Continue       0     Continue       <	
Power 0.25db(-32~31) 0 TAL Mode: AXM Freq. Offset 0 0 C Initialiter C TOAE V1.0 MP TH(db) C Responder C TOAE V1.5 MP Iter Disable C TOAE V2.0 Set	
Mode     TX Path     MCS     PayloadLen     PacketCount     Pox     MPS Add       MPS Del     MPS Del       MPS Save Settings     MPS Load Settings	





## 2.3.2 WIFI Packets Transmitting –2 stream

On TX/RX page:

- a. Select TX sub-page and "Test Mode" as following figure.
- b. Select "Band0" for G band & "Band1" for A band
- c. Set Channel/Mode/Rate.
  - i. 802.11b CCK, 802.11g OFDM, 802.11n HT Mix Mode, 802.11ac VHT,
  - ii. 802.11ax HESU, 802.11ax RU HETB (need to set step g and RU Need to set in RU Page)
  - iii. 802.11be EHTSU, 802.11be RU EHTTB (need to set step g and RU Need to set in RU Page)
- d. Set BW. (Generally, System BW = Pre-Packet BW).
- e. Both TX0 and TX1
- f. Select "Nss=2" and choose both TXO and TX1 to do transmitting.
- g. Set LFT+GI index. (Generally, setting index3) (this step for HESU, HETB(RU), EHTSU, EHTTB(RU))
- h. Set packet number. (0 means infinite packets)
- i. Click "Start TX" button to start packet transmitting and click "Stop TX" button to stop.
- j. The transmitted packets number is shown at "Transmitted:" area.
- k. Users can click "**Reset counter**" button to reset "**Transmitted:**" area.
- I. Users can click " <sup>⊥</sup>" button to modify power level of transmitting signal.
- m. Users can click " • " button to modify frequency offset of transmitting signal.

If users want to adjust packets duty cycle

- n. click "HWTX"
- o. adjust packets lengths(L) to modify packets duty cycle (example 512)

(Make sure "**Transmitted:**" area have counter when start TX. If not, reduce the packet lengths) 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.

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C.	
Channel 62437-MHz Vise freq Mode Rate System BW Per-Pkt BW Primary Sel LTF+GI Vise freq Mode Rate System BW Per-Pkt BW Pimary Sel LTF+GI Vise freq Mode Rate System BW Per-Pkt BW Pimary Sel LTF+GI Vise freq Mode Rate System BW Per-Pkt BW Pimary Sel LTF+GI Vise freq Mode Rate System BW Per-Pkt BW Pimary Sel LTF+GI Vise freq Mode Rate System BW Per-Pkt BW Pimary Sel LTF+GI Vise freq Mode Rate System BW Per-Pkt BW Pimary Sel LTF+GI Vise freq Mode Rate System BW Per-Pkt BW Pimary Sel LTF+GI Vise freq Mode Rate System BW Per-Pkt BW Pimary Sel LTF+GI Vise freq Mode Rate System BW Per-Pkt BW Pimary Sel LTF+GI Vise freq Mode Rate System BW Per-Pkt BW Pimary Sel LTF+GI Vise freq Mode Rate System BW Per-Pkt BW Pimary Sel LTF+GI Vise freq Mode Rate System BW Per-Pkt BW Pimary Sel LTF+GI Vise freq Mode Rate System BW Per-Pkt BW Pimary Sel LTF+GI Vise freq Mode Rate System BW Per-Pkt BW Pimary Sel LTF+GI Vise freq Mode Rate System BW Per-Pkt BW Pimary Sel LTF+GI Vise freq Mode Rate System BW Per-Pkt BW Pimary Sel LTF+GI Vise freq Mode Rate System BW Per-Pkt BW Pimary Sel LTF+GI Vise freq Mode Rate System BW Per-Pkt BW Pimary Sel LTF+GI Vise freq Mode Rate System BW Per-Pkt BW Pimary Sel Vise freq Mode Rate System BW Per-Pkt BW Pimary Sel Vise freq Mode Rate System BW Per-Pkt BW Pimary Sel Vise freq Mode Rate System BW Per-Pkt BW Pimary Sel Vise freq Mode Rate System BW Per-Pkt BW Pimary Sel Vise freq Mode Rate System BW Per-Pkt BW Pimary Sel Vise freq Mode Rate System BW Per-Pkt BW Pimary Sel Vise freq Mode Rate System BW Per-Pkt BW Pimary Sel Vise freq Mode Rate System BW Per-Pkt BW Pimary Sel Vise freq Mode Rate System BW Per-Pkt BW Pimary Sel Vise freq Mode System BW Per-Pkt BW Pimary Sel Vise freq Mode System BW Per-Pkt BW Pimary Sel Vise freq Hot System BW Per-Pkt BW Pimary Sel Vise freq Hot System BW Per-Pkt BW Pimary Sel Vise freq Hot System BW Per-Pkt BW Pimary Sel Vise freq Hot System BW Per-Pkt BW Pimary Sel Vise freq Hot System BW Per-Pkt BW Pimary Sel Vise freq Hot System BW Per-Pkt BW Pimary Sel Vise freq Hot Sy	
a. Tx RX Tx RX SGI C DPD C LDPC Tx frame setting FC (2) Dur (2) Address1(6)Dest Address2(6)Source Address3(6)BSSID Seq (2) 0800 0000 Perfferffffff 00000000000 001122334455 0000 C MPDU Tx Length Repeat Pattern(3) C Packet Tx Time	
Image: Constraint of the start TX     TX Power0 (Dec) (0.5dB) Hex       Repeat     0       j.     ✓       Image: Constraint of the start TX     ✓       Start TX     Transmitted :       0     Conti. Tx       0     Continue       0     Continue       0     Continue       0     Continue       0     Continue       <	
Power 0.25db(-32~31) 0 TAL Mode: AXM Freq. Offset 0 0 C Initialiter C TOAE V1.0 MP TH(db) C Responder C TOAE V1.5 MP Iter Disable C TOAE V2.0 Set	
Mode     TX Path     MCS     PayloadLen     PacketCount     Pox     MPS Add       MPS Del     MPS Del       MPS Save Settings     MPS Load Settings	



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# 2.3.3 WIFI Packets 11ax RU TX (HE TB (trigger based)) Transmitting setting

On RU page:

- a. Select RU sub-page
- b. Select band(0:G-band, 1:A-band)
- c. Set Category

RU size	Category
RU26	26*9
RU52	52*4
RU106	106+106
RU242	242*1
RU484	484*1
RU996	996*1
RU996*2	996*2

d. Set RU index (wanted TB RU location).

### Refer to the RU Index from below

			R	W20			51	N40								BW	80																																										
26	0 1	2	3	4	5	6 3	8	9	10	11	12 1	13 3	14 1	5 16	17			19 20	21	22 2	3 24	25	26 2	7 2	8 25	30	31	32	33	34 3	36	0	1	2	4	5	6	7 8	9	10 1	11 12	13	14	15 1	6 17		19	20 21	22	23	24 25	26	27	28 29	30	31 3	2 33	34	35 36
52	37	1	38	-[	35		40	4	1	42		1	43		44	H		45	46			47	48		49	3	50	H	51		52		37	38		35	9	40	41	101 (	42		43		44	t	45		46		47	48	8	49	54		5	51	52
106		53		[		54		ĺ	5	ŝ				56					7			5	1			59	Ì			60			53				54			55				56				57		[		58			59			60	
242				61								52								6	J.;							64							61	8						62								63						10	4		
484								65																66								İ						ä	65														66						
996															67																							3	67																				
1992					_				_							_	_																																										
																		_														L															_												
															se	gm	en	t1													BW	/16	0												seg	mer	nt2												

- e. Set data rate
- f. 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	0	1	2	3	4	5	6	7	8	9	10	11	12	13
26	128	256	512	512	1024	1024	1024	1024	1024	2048	2048	2048	2048	2048
52	256	512	1024	1024	1024	1024	1024	1024	1024	1024	1024	1024	1024	1024
78	384	768	1536	1536	1536	1536	1536	1536	1536	1536	1536	1536	1536	1536
106	512	1024	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048	2048
132	768	1536	3072	3072	3072	3072	3072	3072	3072	3072	3072	3072	3072	3072
BW20 - 242	1024	2048	4096	4096	4096	4096	4096	16000	4096	16000	4096	16000	4096	4096
BW40 - 484	2048	4096	8192	8192	8192	8192	8192	8192	8192	8192	8192	8192	8192	8192
BW80 - 996	4096	8192	16384	16384	16384	16384	16384	16000	16384	16000	16384	16000	16384	16384
BW160 - 996*2	8192	16384	32768	32768	32768	32768	32768	16000	32768	16000	32768	16000	32768	32768

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- g. Click "ADD" button to added test case.
- h. Click "**SET**" button to set test case.
- i. 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.

MT6639 QA 0.0	.2.91			1	a				- 0	×
TX/RX Band 0	TX/RX Band 1	EEPROM MAC	BBP   RF Page   Pf	MU Page	RU Page	out				
RU			b		<u> </u>					
С.	Select Band:	0			d.	е.		t.		
Catego	ory :		llocation (binary):	Sta ID :	RU Index :	MCS:	PwrBoost Facto	MUNss LDPC Nss	Stream Idx Length	
1:26 * 9			<u> </u>			MCS11=11;			1 128	
Disable	2		<u> </u>	 		 	- 0		1 1024	
Disable	)			 		I			1 1024	
0: Disable	le		<u></u>			1	[0		1 + 1024	
Incenter		1 1			1	1	I-		I	
g.	Segment 0:			199		Segment 1:			g.	
ADD	Category 1: 26 * 9	Allocat Sta	ID   Rillindex 7	Rates 7	1 1	Category 1: 26 * 9	Allocat Sta ID 0	RUIndex   Rates 0 11	1 ADD	
Remove		1985au t	~				0.00-	-	Remove	
	-		g.					g.	i.	
11										
	<		-		>	<			>	
	Segment 2:	Allocat Sta	ID RU Index	Rates	LDPC	Category	Allocat Sta ID	RU Index Rates	LIDPC	
ADD		1			1.551.5				ADD	
Remove	1								Remove	
-	1									
	<			<b>C</b> 1	>	<	1		>	
			-	Save to	File	Load from File		Clear All		
			h.							

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## 2.3.4 VSA Setting

Open Litepoint MW Web page select VSA Setting RU info.

- 1. litepoint <u>GI LTF Type</u> align to QAtool <u>LTF+GI</u>
- 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.

VSAL VS01 CHAN1 - 0 51 5	10460 1842 TAMPS	
Hardware Results Result 1	AVER MAX MAN SOEV	ExQuality OFD
From: - COPY Packet Info	Type 502 11ax Format HE-TRIG Chan BW 20MHz	
Analyzed Signals	Signal base Value Unit Steam base Value U	
TyQuality Clock Rate	Power WW 14.30 dBm EVM47.10 dB	
Packet Detection	Phase Error 0.07 deg EMData -46.93 dB	
Signal For Power (1)	Frequency Error -33.41 kHz EVM Pilot -49.72 dB	
Power Threshold 10 T dB	Symbol Clock Error -15.49 ppm EVM User 1 + -47.10 d8	
	LO Leakape -43.90 dB	
OF DM (202.11a g Disacax)	Ampl. Imbalance 0.00 dB	
Standard A.P.N.A. +	Phase imbalance 0.10 deg	
	Delay imbalance 0.00 msec	
Correction: Frequency 6010		
Channel Estimation LTF   Packet Format AUTO		
Channel Estimation LTF  Packet Format AUTO Frequency Segments 202 Use All Signals MMA Analysis Mode NXN Power Class (802 11p) A Frequent		ality Info OF D1
Channel Estimation LTF  Packet Format AUTO Frequency Segments 20 Use All Signals MMO Analysis Node NXN Power Class (802 110) Symbol Time Adjustment	TXOL	ainy Info OFDN
Channel Estimation LTF  Packet Format AUTO Prequency Segments Use All Signals MMO Analysis Node NXN Power Ctass (802, 11p) A Symbol Time Adjustment Spectrum Limit Type AUTO	Packet Mo Type 802 11ax Format HE-TRIG Chan BW-20MHz Measurement Make User: 1 v Make	iality Info OFD1 Export PSDU
Channel Estimation LTF  Packet Format AUTO Frequency Segments Use All Signals MMO Analysis Mode NXN  Power Class (802 11p) Symbol Time Adjustment Spectrum Limit Type AUTO  Spectrum Limit Type AUTO	Packet Into Type 502 11ax Format HE-TRIG Chan BW 2014Hz Measurement Make User: 1 Value FAnalyzed Signals 1 Ver Streams 1	ality Info OFDN Epont PSDU
Channel Estimation LTF  Packet Format AUTO Frequency Segments Channel Construction AUTO Power Chass (802, 11p) A Power Chass (802, 11p) A Power Chass (802, 11p) A Besuet	Packet lalo Type 802 11ax Format HE-TRIG Chan BW-20MHz           Measurement         Malue         User: 1         v         Malue           # Analxod Signals         1         # of Streams         1           Souce-Time Streams         1         Mod Coding Scheme         11	iality Info OFDI
Channel Estimation LTF  Packet Format AUTO  Prequency Segments  AUTO  Power Class (802, 11p) A Power Class (802, 11p) A Symbol Time Adjustment  O 0625  Power Class (802, 11p) A Spectrum Limit Type AUTO  Preamble Aug IQ Comp	Packet Info Type 802 11ax Format HE-TRIG Chan BW-20MHz Measurement Make # Analized Signals t Souce-Time Streams 1 Has Multi-User NO Coding Scheme 11 Coding Type LDPC	iality Info OFDN Export PSDU
Channel Estimation LTF  Packet Format AUTO  Prequency Segments  AUTO  Power Class (802,11p) A Power Class (802,11p) A Symbol Time Adjustment  O 0625  Spectrum Limit Type AUTO  Preamble Aug IQ Comp  802.11ax Trigger-Based Settings GLTF Type GILTF2  Num LTF1  LDPC Sym. PE Disamb. AFactor 1	Packet kilo Type 802 11ax Format HE-TRIG Chan BW 20MHz Messurement Value #Analxed Signals 1 Souce-Time Streams 1 Has Multi-User NO Coding Scheme 11 Coding Tipe LOPC L-SIG Len :	iality Info OFDN Expert PSOU
Channel Estimation LTF  Packet Format AUTO Prequency Segments Use AI Signals MMO Analysis Node NVN Power Class (802,11p) A Result Result Result Result Class Result AFactor	Packetiko Type 802.11ax Format HE-TRIG Chan BW 2004kz  Measurement Value PAnalyzed Signals 1 Soace-Time Streams 1 Soace-Time Streams 1 Las Multi-User NO L-SIG Len : LDPC Extra Sym:	iality Info OFD1
Channel Estimation LTF  Packet Format AUTO Prequency Segments Wode NNN Prequency Segments Wode NNN Power Class (802 11p) A Pow	Packet lefts Type 802.11ax Format HE-TRIG Chan BW 2004/c Wresurement Walker User: 1 Voluce # / natyced Signals 1 Voluce / of Steams 1 Souce-Time Steams 1 Has Multi-User NO Coding Scheme 11 Has Multi-User NO Coding Scheme LOPC L-SIG Len : LDPC Extra Sym: 0 v LTF+GI PE Disamp : 0 v	iality Info OFDI
Channel Estimation LTF  Packet Format AUTO Prequency Segments USE AUSIGNAL Power Class (802 11p) Symbol Time Adjustment Spectrum Limit Type AUTO Preamble Aug IO Comp  802.11ax Trigger-Based Settings GLTF Type GLTF2 Num LTF LDPC Bym PE Disamb. AFactor 1 User 1 Steps 1 RU Freq. Seg	Packet lefts Type 802 11av       Format HE-TRHO       Chan BW 2004Hz         Messurement       Value       # of Streams       1         Souce-Time Streams       1       Wed. Coding Scheme       11         Hass Multi-User       Nol       Coding Scheme       10         LDPC       Extra Sym:       0       ✓         LTF+G1       PE Disamp       :       0       ✓	iainy Info OFDh Espon PSDL
Channel Estimation LTF  Packet Format AUTO  Frequency Segments	Packetiko Type 802.11ax Format HE-TRIG Chan BW 2004viz Messurement Walke P Analyzed Signals 1 Soace-Time Streams 1 Has Multi-User No L-SIG Len : LDPC Extra Sym: 0 LTF+G1 PE Disamp : 0 A Factor : 0	iality Info OFDI

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### 2.3.5 WIFI Packets Receiving –1 stream

On TX/RX page

- a. Select **"Band0"** for G band & **"Band1"** for A band.
- b. Select RX sub-page and "Test Mode" as following figure.
- c. Set Channel frequency.
- d. Set BW. (Generally, System BW = Pre-Packet BW).
- e. Choose "TX0/RX0" or TX1/RX1 to do receiving.
- f. Select HE\_MU and EHT mode and Set RU Station ID (wanted RU location station ID) (this step for HETB(RU), EHTTB(RU) and the default sat ID is "888")
- g. Click "Start RX" button to receive WIFI packets.
   Enable WIFI signal generator to transmit packets. Click "Stop RX" button to stop receiving.
- h. Successful received packets number would be shown at "RX OK" area and RSSI shown at "inst RSSI IB
   0" area.
- i. Users can click "Reset counter" button to reset counter value.



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### 2.3.6 WIFI Packets Receiving –2 stream

On TX/RX page

- a. Select **"Band0"** for G band & **"Band1"** for A band.
- b. Select RX sub-page and "Test Mode" as following figure.
- c. Set Channel frequency.
- d. Set BW. (Generally, System BW = Pre-Packet BW).
- e. Choose "TX0/RX0" and TX1/RX1 to do receiving.
- f. Select HE\_MU mode and Set RU Station ID (wanted RU location station ID) (this step for HETB(RU), EHTTB(RU) and the default sat ID is "888")
- g. Click "Start RX" button to receive WIFI packets.
  - Enable WIFI signal generator to transmit packets. Click "Stop RX" button to stop receiving.
- h. Successful received packets number would be shown at "RX OK" area and RSSI shown at "inst RSSI IB
   0" area.
- i. Users can click "Reset counter" button to reset counter value.



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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.

a. 📋	EEP	RON	И Ту	pe	: [		E-f	fuse												
-	-	_			_	_	_	_	-	-	·				(	2.				
[	-Sir	ngle	Rea	Abe	Vrite	e —					1			_						
	[	Mo	ode	-							C	offse	et				0000	100		
b.		6	RE	AD		C	w	RIT											F	R/W
		-	_	-	2						V	alu	е				00	-		
											-	_		-	_	_	0000			
											L	eng	th				0000			
l																				
0000000	39	66	07	00	00	00	00	00	00	00	00	00	00	00	00	00	9f		~	Read ALL
00000010	39	66	C3	14	00	00	80	02	39	66	C3	14	00	00	00	00	9f	9f.		Read ALL
0000020	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00				
0000030	00	00	00	00	00	01	00	00	00	00	00	00	01	00	02	00				
00000040	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00				Load File
0000050	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00				Load File
0000060	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00				Keen Current TyBower
0000070	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00				
0800000	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00				Save As
00000090	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00				
0A00000	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00				
00000B0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00				NVM Type FEPROM
00000000	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00				in in type
000000D0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00				
00000E0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00				
000000F0	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00				FEPROM Buffer Mode
00000100	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00				I CENTRON DUITER MODE
00000110	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00				Disable Write Warning
0000120	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00				Contraction of the second s
0000130	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00				
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0000150	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00				🔽 eEuse Mode
0000160	00	00	00	00	00	00	00	00	00	00	00	00	00	00	08	00				
0000170	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00	00				
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																		2	*	
C																		-		

This is an example to read address offset\_0x01 and get value 0x00 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.

TX/RX Ban	d 0 TX/R	X Band 1	EEPROM M	AC BBP RF	Page PF	MU Page   RI	U Page A	bout	
-	_			-					
	EEPROM	Type :	E-fuse	a.					
L .									
	Single F	Read/Write		-					
	C	READ	G MIDITE	Offset		02	RA	v 1	
		INCAD	W WRITE	Value		08		C.	
			b			0000			
			<b>.</b>	Length		0000			
00000000	39 66 0	00 00 0	00 00 00 00	00 00 00 0	00 00 00	00 9f		Read ALL	
00000010	) 39 66 0 ) 00 00 0	3 14 00 0 00 00 00 0	00 80 02 39 00 00 00 00	66 C3 14 0	00 00 00	00 9f	.9f		
00000030	00 00 0	00 00 00 00	01 00 00 00	00 00 00 0	01 00 02	00			
00000040			00 00 00 00 00 00 00 00 00	00 00 00 0	00 00 00	00		Load File	
00000060	00 00 0	00 00 00 00	00 00 00 00	00 00 00 0	00 00 00	00		Keen Current TyDo	MOY
00000070	00 00 0	00 00 00 0	00 00 00 00	00 00 00 0	00 00 00	00	····· '	Neep concile txi o	WIGI
000000000			00 00 00 00			00		Save As	
000000A0	00 00 0	00 00 00 0	00 00 00 00	00 00 00 0	00 00 00	00	–		
000000B0	00 00 0	00 00 00 0	00 00 00 00	00 00 00 0	00 00 00	00	N	VM Type EEPRO	DM
000000000				00 00 00 0		00			
000000E0	00 00 0	00 00 00 00	0 00 00 00	00 00 00 0	00 00 00	00			
000000F0	00 00 0	00 00 00 0	00 00 00	00 00 00 0	00 00 00	00	···· F	EEPROM Buffer N	Vlode
00000100				00 00 00 0		00	····	Disable Write Wa	mina
00000120	00 00 0	00 00 00 00	00 00 00 00	00 00 00 0	00 00 00	00		Disable time tr	anning .
00000130	00 00 0	0 00 00 00	00 00 00 00	00 00 00 0	00 00 00	00			
00000140				00 00 00 0	00 00 00	00	••••	N/ I	
00000160	00 00 0	0 00 00 00		00 00 00 0	00 00 08	00		eruse iviode	
00000170	00 00 0	00 00 00 00	00 00 00 00	00 00 00 0	00 00 00	00			
00000180	00 00 0	00 00 00 00	00 00 00 00	00 00 00 0	00 00 00	00	····· ~		
<			1	,			>		
FreeBlock	: 35/60 :	40/60:8/3	0:13/30:19	/30				a.	
		000000	00 39 66 08	00 00 00	00 00 00	00 00 00 0	00 00 00	00 9f	Read All
		000000	10 39 66 C3	14 00 00	80 02 39	66 C3 14 (	00 00 00	00 9f9f.	HER ALL
		000000	30 00 00 00 00	00 00 00	00 00 00	00 00 00 0	01 00 02	00	
		000000	40 00 00 00	00 00 00	00 00 00	00 00 00 0	00 00 00	00	Load File
		000000	50 00 00 00	00 00 00	00 00 00	00 00 00 0	00 00 00	00	coacrile
		000000	50 00 00 00 70 00 00 00		00 00 00		00 00 00	00	Keep Current TxPowe
		000000	80 00 00 00	00 00 00	00 00 00	00 00 00 0	00 00 00	00	Save As
									-

This is an example writing 0x01 to address offset\_0x55 of E-fuse and check value is correcttly updated.

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#### 2.5 Homologation suggest setting

1. Normal Test item, we suggest Packet lengths use 512 Byte

Tx	RX						
Ter	np. Com. 🕞	TSSI	🗖 STBC		Nss		2 🗸
E SGI	Γ	DPD			Spatia	al Idx	HWTX
FC (2)	ne setting Dur (2)	Addre	ess1(6)Dest	Address2(6)Source	Address3(6)B	SSID	Seq (2)
0800	0000	FFFFF	FFFFFFF	000000000000	0011223344	55	0000
1	Pa	yload –	Random(1	Repe AA	at Pattern(3)	€ М С Ра 512	PDU Tx Length acket Tx Time

2. SAR test item, we suggest use HWTX, and adjust packet lengths that duty meet test conditions (duty 85%)

FC (2)	Dur (2)	Address1(6)Dest	Address2(6)Source	Address3(6)BSSID	Seq (2)
0800	0000	FFFFFFFFFFF	000000000000000000000000000000000000000	001122334455	0000
		🔲 Random(1)	<u> </u>		
		-			

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# 2.6 RU Setting example

### RU index setting under QA Tool



# Ex: RU Index 61 Can find it at RU242 1st ROW

RU	Select Band:	1	•		1s	t row	1							
Category :			Allocation (bin	nary): Sta ID :	RU In	dex ·	MCS :	Pv	vrBoost Factor	MU Ns	LDPC	Nss	Stream l	dx Length
11: RU242*1		•	001000000	•	61	-	MCS7=7;	•	0	1 🔻		2 💌	1	▼ 1024
11: RU242*1		•	001000000	•	62	-	MCS7=7;	-	0	1 🔻		2 🔻	1	▼ 1024
11: RU242*1		•	001000000	•	63	•	MCS7=7;	-	0	1 🔻		2 💌	1	• 1024
11: RU242*1		•	001000000	•	64	•	MCS7=7;	-	0	1 💌		2 💌	1	▼ 1024
0: Disable		•		<u> </u>		Ŧ		~	0	1 🔻	Г	2 🔻	1	▼ 512

Comment 1

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# **3** General Information & Integration Instructions

# **3.1 General Description of MT7927**

Product	2TX 11be (WiFi7) BW320 + BT/BLE Combo Card
Brand	MediaTek
Model	MT7927
Power Supply Rating	3.3Vdc from host equipment
Modulation Type	GFSK, π/4-DQPSK, 8DPSK CCK, DQPSK, DBPSK for DSSS 64QAM, 16QAM, QPSK, BPSK for OFDM 256QAM for OFDM in VHT mode 1024QAM for OFDM in 11ax mode 4096QAM for OFDM in 11be mode
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 2.4GHz: 802.11b: up to 11 Mbps 802.11g: up to 54 Mbps 802.11n: up to 300 Mbps VHT: up to 400 Mbps 802.11ax: up to 573.5 Mbps 802.11be: up to 688.2 Mbps 5GHz: 802.11a: up to 54 Mbps 802.11a: up to 54 Mbps 802.11a: up to 1733.3 Mbps 802.11a: up to 1733.3 Mbps 802.11a: up to 1441.2 Mbps 6GHz 802.11a: up to 54 Mbps 802.11a: up to 54 Mbps
Operating Frequency	BT EDR: 2402MHz ~ 2480MHz BT LE: 2402MHz ~ 2480MHz 2.4GHz: 2.412 ~ 2.472GHz 5GHz: 5.18~5.25GHz, 5.25~5.32GHz, 5.5 ~ 5.72GHz, 5745~5825GHz 6GHz: 5.955~6.425GHz, 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), 802.11be (EHT20): 13 802.11n (HT40), VHT40, 802.11ax (HE40), 802.11be (EHT40): 9 5GHz:

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U-NII-1: 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20), 802.11be (EHT20): 4 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40), 802.11be (EHT40): 2 802.11ac (VHT80), 802.11ax (HE80), 802.11be (EHT80): 1 U-NII-2A: 802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20): 4 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40): 2 802.11ac (VHT80), 802.11ax (HE80): 1 802.11ac (VHT160), 802.11ax (HE160): 1 U-NII-2C:
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
II.NII.3:
802.11a, 802.11n (HT20), 802.11ac (VHT20), 802.11ax (HE20), 802.11be (EHT20): 5 802.11n (HT40), 802.11ac (VHT40), 802.11ax (HE40), 802.11be (EHT40): 2 802.11ac (VHT80), 802.11ax (HE80), 802.11be (EHT80): 1
For 1TX
5.955 ~ 6.425GHz: 65.163 mW (EIRP: 22.9 dBm / 194.984 mW)
6.425 ~ 6.525GHz: 33.806 mW (EIRP: 19.58 dBm / 90.782 mW)
6.525 ~ 6.855GHz: 68.077 mW (EIRP: 22.94 dBm / 196.789 mW)
6.875 ~ 7.115GHz: 69.663 mW (EIRP: 22.52 dBm / 178.649 mW)
For 2TX
5.955 ~ 6.425GHz: 65.66 mW (EIRP: 22.93 dBm / 196.336 mW)
6.425 ~ 6.525GHz: 35.177 mW (EIRP: 20.22 dBm / 105.196 mW)
6.525 ~ 6.855GHz: 68.169 mW (EIRP: 22.95 dBm / 197.242 mW)
6.875 ~ 7.115GHz: 69.78 mW (EIRP: 22.53 dBm / 179.061 mW)

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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	Cable Length(mm)
1	Chain0	PSA	RFMTA340718EMLB302	3.18 4.92	2.4~2.4835 5.15~5.85	PIFA	i-pex(MHF)	200
	Chain1	PSA	RFMTA340718EMLB302	3.18 4.92	2.4~2.4835 5.15~5.85	PIFA	i-pex(MHF)	200
2	Chain0	PSA	RFMTA311020EMMB301	1.71	2.4~2.4835	PIFA		
				4.82	5.15~5.85		i-pex(MHF)	
				4.76	5.925~6.425			
				4.29	6.425~6.525			200
				4.61	6.525~6.875			
				4.09	6.875~7.125			
	Chain1	PSA	RFMTA311020EMMB301	1.71	2.4~2.4835	PIFA i-ş		
				4.82	5.15~5.85			200
				4.76	5.925~6.425			
				4.29	6.425~6.525		i-pex(MITF)	
				4.61	6.525~6.875			
				4.09	6.875~7.125			
3	Chain0	PSA	RFMTA421208IMMB701	-4.99	5.925~7.125	PIFA	IPEX	300
	Chain1	PSA	RFMTA421208IMMB701	-4.99	5.925~7.125	PIFA	IPEX	300

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.



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# **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.

# **3.5** 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.
- 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 include 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.
- 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.

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- 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.
- 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.

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#### 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.

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.



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 a including the antenna.

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		<u> </u>						
Ant. Set	RF Chain No.	Brand	Model	Ant. Net Gain (dBi)	Freq. Range (GHz)	Ant. Type	Connector Type	Cable Length(mm)
1	Chain0	PSA	RFMTA340718EMLB302	3.18 4.92	2.4~2.4835 5.15~5.85	PIFA	i-pex(MHF)	200
	Chain1	PSA	RFMTA340718EMLB302	3.18 4.92	2.4~2.4835 5.15~5.85	PIFA	i-pex(MHF)	200
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			200
				4.61	6.525~6.875			
				4.09	6.875~7.125			
	Chain1	PSA	RFMTA311020EMMB301	1.71	2.4~2.4835	PIFA i-pex(MHF		
				4.82	5.15~5.85			200
				4.76	5.925~6.425			
				4.29	6.425~6.525		I-pex(MITF)	
				4.61	6.525~6.875			
				4.09	6.875~7.125			
3	Chain0	PSA	RFMTA421208IMMB701	-4.99	5.925~7.125	PIFA	IPEX	300
	Chain1	PSA	RFMTA421208IMMB701	-4.99	5.925~7.125	PIFA	IPEX	300

## 2.7 Antennas

The following antennas have been certified with this module.

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 MTK 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: RAS-MT7927". The grantee's FCC ID can be used only when all FCC compliance requirements are met.

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## 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.

FCC Rule Part	Frequency Band	Test Items (worst channel)
FCC Part 15C	2402 MHz - 2480 MHz	1. radiated emission - Band edge and Harmonics
BT/BT LE		2. Conducted output power
		3. RF Exposure
FCC Part 15C	2412 MHz - 2472 MHz	1. radiated emission - Band edge and Harmonics
WLAN 2.4G		2. Conducted output power
		3. RF Exposure
FCC Part 15E	5180 MHz - 5825 MHz	1. radiated emission - Band edge and Harmonics
WLAN 5G		2. Conducted output power
		3. RF Exposure
FCC Part 15E	5845 MHz - 5885 MHz	1. radiated emission - Band edge and Harmonics
WLAN 5.9G		2. EIRP
		3. RF Exposure
FCC Part 15E	Under control by Low-	1. Radiated versus Conducted Measurement
WLAN 6G	power indoor access point	For Radiated measurement:
	5955 MHz - 7115 MHz	The level of unwanted emissions was measured
		when radiated by the cabinet or structure of the
	Under control by Standard	equipment with the antenna connector(s)
	power access point	terminated by a specified load (cabinet
	5955 MHz - 6425 MHz	radiation)
	6525 MHz - 6875 MHz	For Conducted measurement:
		The level of unwanted emissions was measured
		as their power in a specified load (conducted
		spurious emissions).
		2. EIRP
		3. RF Exposure

Verification test items as below:

More detail test items (e.g., modes / channel / EUT setup configurations / .....) please contact MTK personnel or send request letter via <u>https://corp.mediatek.com/about/contact-us</u>.



#### 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 <u>can not be met</u> (for example certain laptop configurations or co-location with another transmitter), then the FCC authorization is no longer considered valid and the FCC ID <u>can not</u> 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.

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