



Model: MT7921

2TX 11ax (WiFi6) + BLE Combo Card

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 | 20200217 | Jane | Initial draft release. |
| V0.2 | 20200227 | Jian-Lun | 2 nd draft release. Added 2.3.9~2.3.17 |
| V0.3 | 20200724 | TW | Add section 2.5 for dual-band dual concurrent (DBDC) operation |
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1 System overview

1.1 General Description

MT7921 chip is highly integrated single chip which have built in 2x2 dual-band wireless LAN and Bluetooth combo radio. It can be configured in test-mode for performance validation, production testing and regulatory certification. There are two software tools, QA-Tool and Combo-Tool responsible for evaluating WIFI and Bluetooth signal and performance testing. This document is introducing how to install and use QA-Tool.

2 QA-Tool

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

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

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

2.1 How to install QA-tool

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

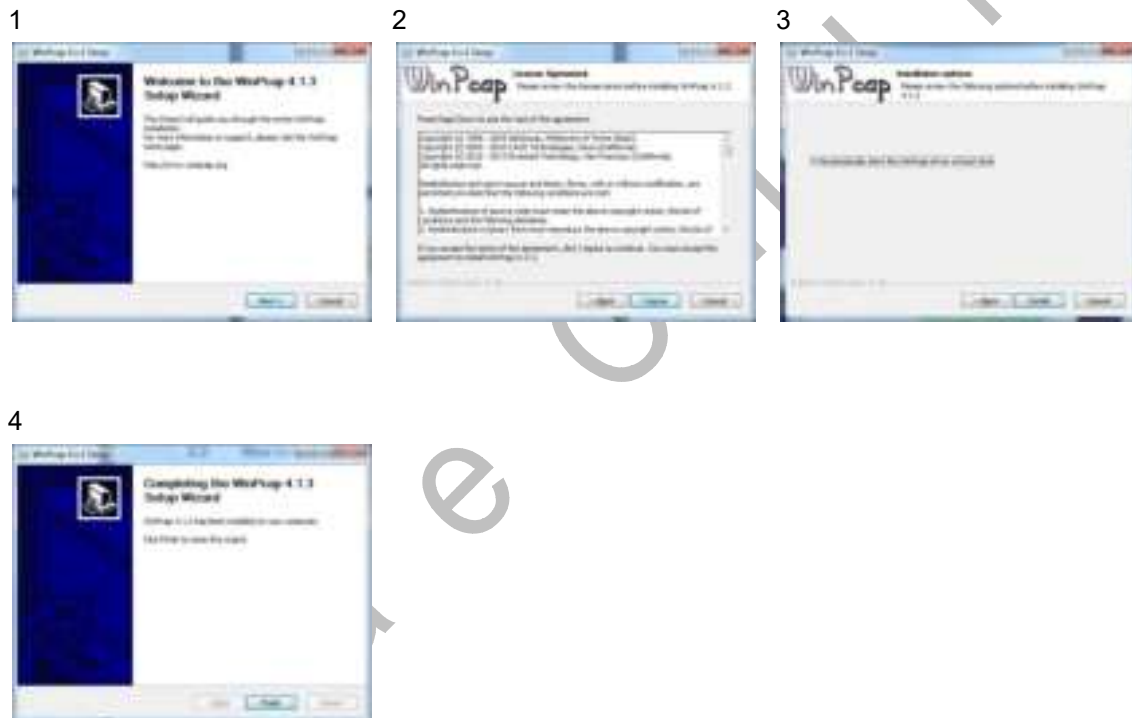
- 1st : Install WinPcap
- 2nd : Update Windows7 security package to register x64 signature mechanism
- 3rd : Instal QA-Tool Windows driver.

2.1.1 Install WinPcap

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

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

WinPcap version: 4.1.2 or later.



2.1.2 Windows 7 Security for new x64 signature mechanism

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

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

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

Select language:

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

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



2.1.3 Windows 10 install note

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

- **Disable Driver Integrity Check**

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

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

- **Disable Secure Boot**

Please refer to:

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

2.1.4 QA-Tool Windows driver

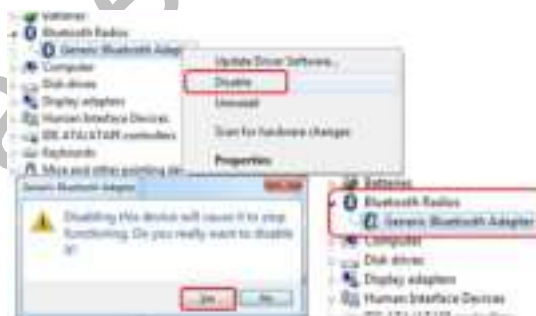
MT7921 supports USB, SDIO and PCIE interface. According to interface type of MT7921 on users' hand, please refer to steps shown below to install QA-Tool Windows driver:

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).



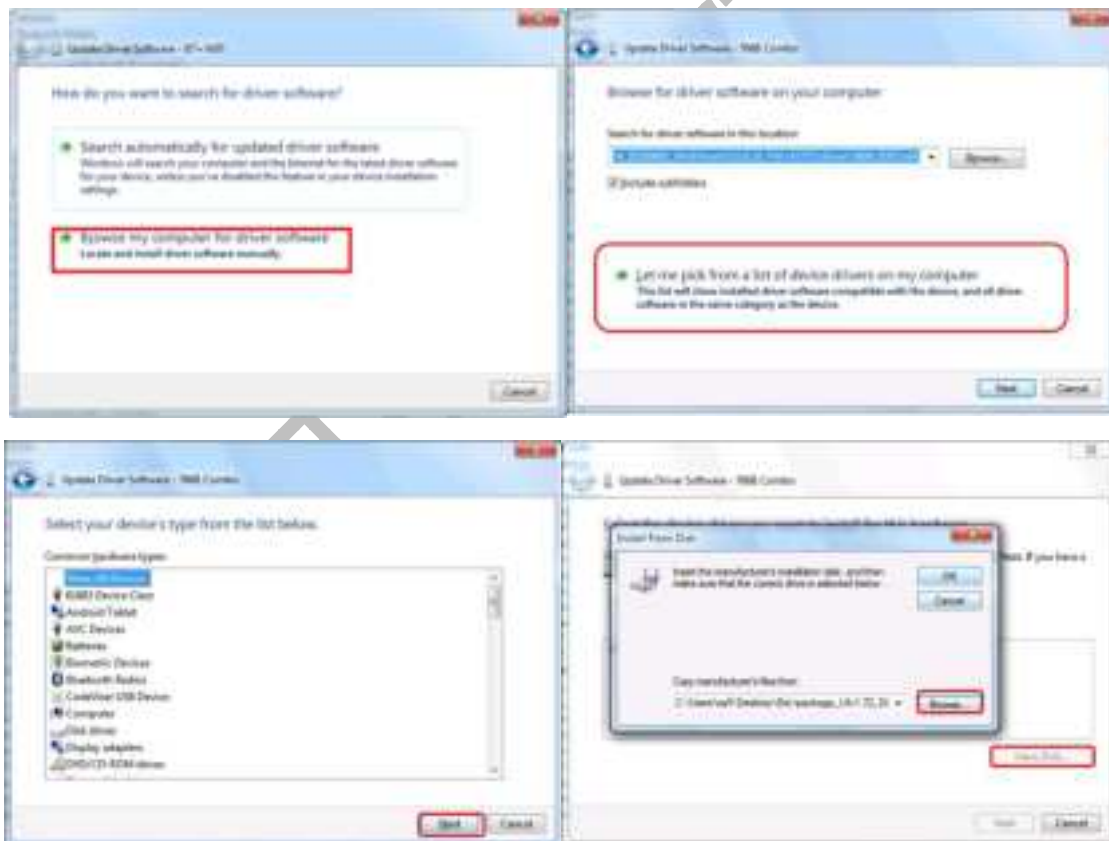
3. Right click the **"Generic Bluetooth Adapter"** BT device and select disable as follows.

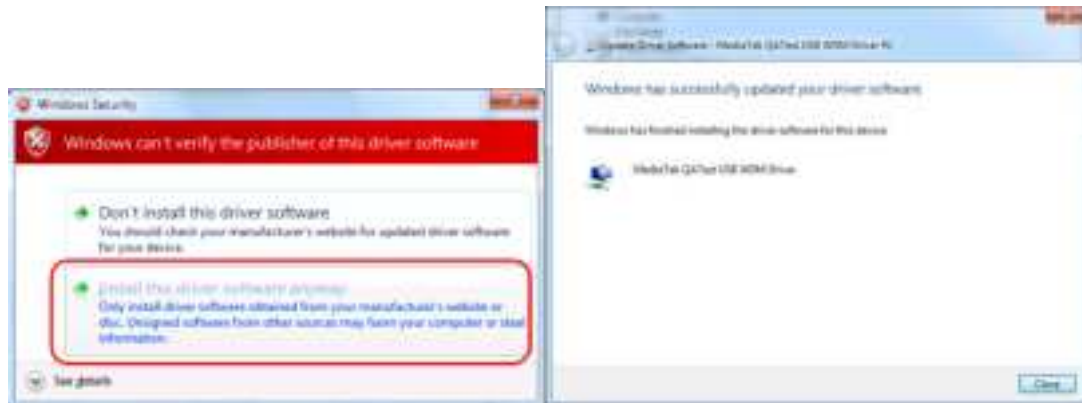


4. Right-click on “WiFi_IF” Wifi device and Update Driver Software.



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

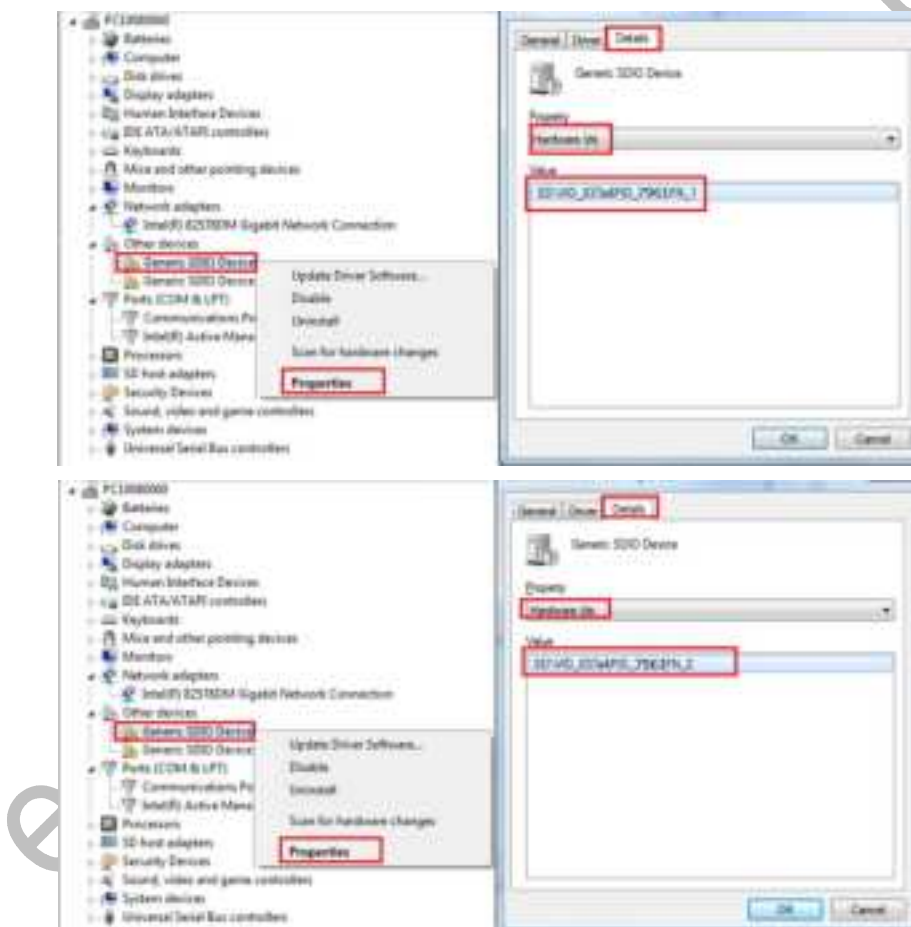




SDIO interface:

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

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



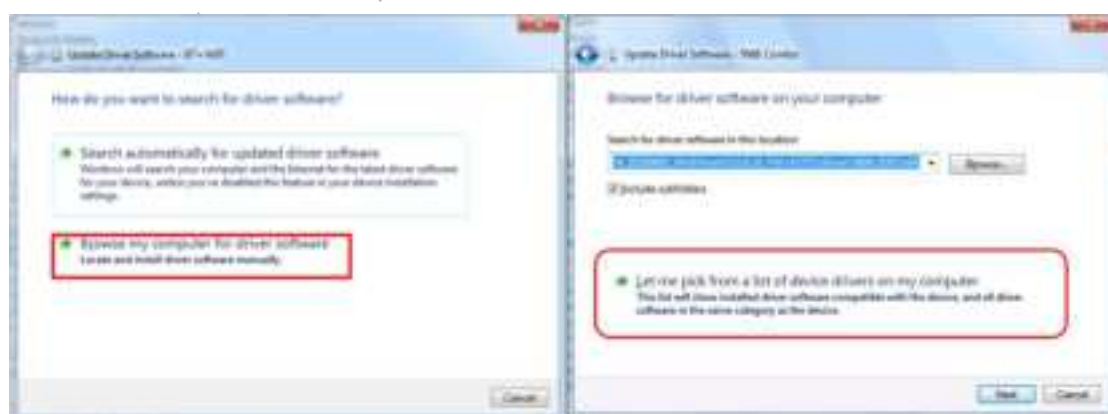
- Right click the “7961 Combo” BT device (SD\VID_037a&PID_7961&FN_2) and select disable as follows.

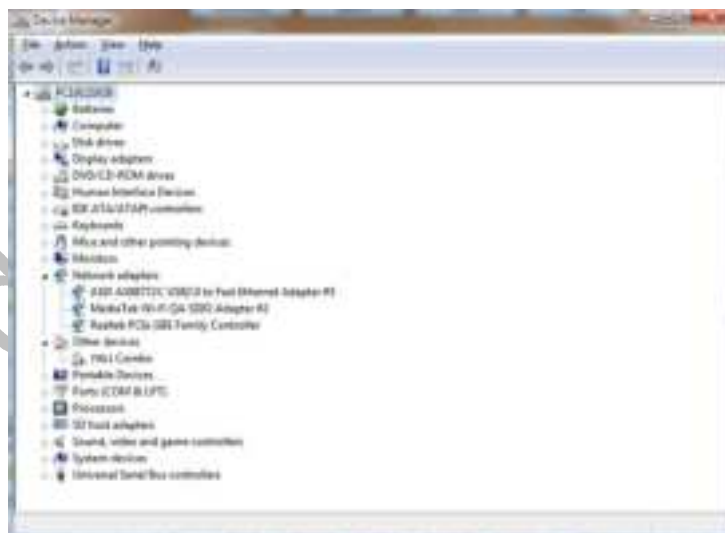
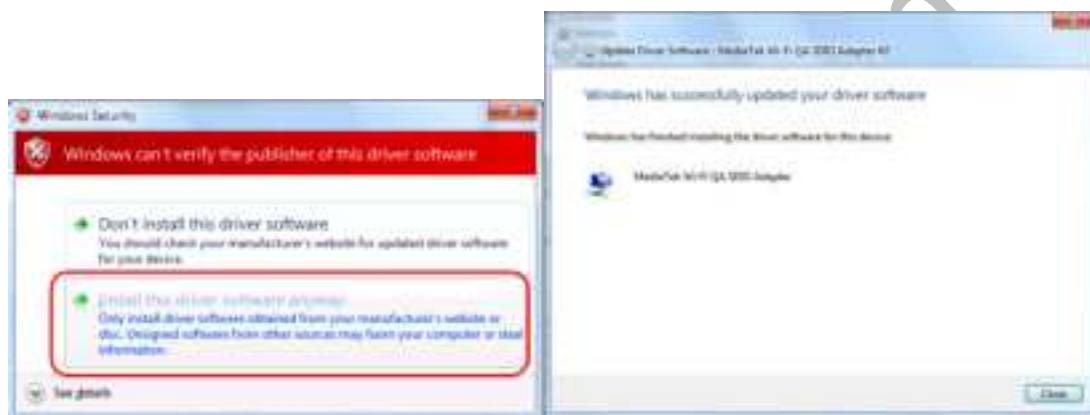
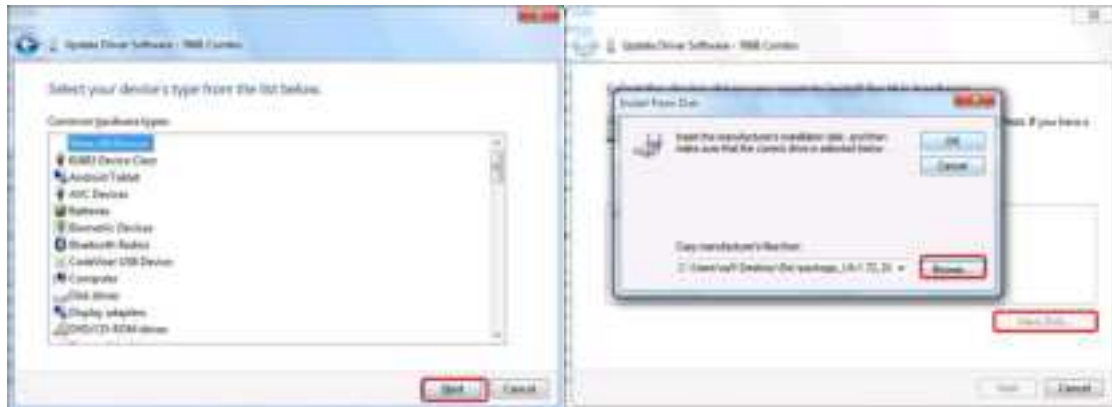


- Right-click on “7961 Combo” Wifi device (SD\VID_037a&PID_7961&FN_1) and Update Driver Software.



- According user’s Windows’ OS to select and install test tool driver.







MT7921 support only below dual-band dual-concurrent (DBDC) mode operation:

- (Tab TX/RX) TX0/RX0 transceiver is operating in 5GHz (A-band)
- (Tab TX/RX Band 1) TX1/RX1 transceiver is operation in 2.4GHz (G-band)

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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. For specific portable application, please follow grant condition(s).

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

2.3 Summarize the specific operational use conditions

The module is tested for standalone mobile and portable 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.

2.6 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 evaluation is required to confirm compliance with relevant FCC portable RF exposure rules.

2.7 Antennas

The following antennas have been certified for use with this module; antennas of the same type with equal or lower gain may also be used with this module.

| Antenna Net Gain (dBi) | Frequency range (GHz) | Antenna Type | Connector Type |
|------------------------|-------------------------|--------------|----------------|
| 2.42 3.87 | 2.4~2.4835 5.15~5.85 | Dipole | R-SMA |
| 2.42 3.87 | 2.4~2.4835 5.15~5.85 | Dipole | R-SMA |
| 3.18 4.92 | 2.4~2.4835 5.15~5.85 | PIFA | i-pex(MHF) |
| 3.18 4.92 | 2.4~2.4835 5.15~5.85 | PIFA | i-pex(MHF) |

2.8 Label and compliance information

The final end product must be labeled in a visible area with the following: "Contains FCC ID: RAS-MT7921". 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 and portable 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.

Body-worn Operation

This device was tested for typical body-worn operations. To comply with RF exposure requirements, a minimum separation distance of 8 mm must be maintained between the user's body, including the antenna.

The SAR evaluations is according to KDB 616217, and the module approach distance is 8 mm for notebook.



Industry Canada statement:

This device complies with ISED's licence-exempt RSSs. 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.

Le présent appareil est conforme aux CNR d'ISED applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes : (1) le dispositif ne doit pas produire de brouillage préjudiciable, et (2) ce dispositif doit accepter tout brouillage reçu, y compris un brouillage susceptible de provoquer un fonctionnement indésirable.

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.

This device is intended only for OEM integrators under the following conditions: (For module device use)

- 1) The antenna must be installed and operated with greater than 20cm between the antenna and users, and
- 2) The transmitter module may not be co-located with any other transmitter or antenna.

As long as **2** 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.

Cet appareil est conçu uniquement pour les intégrateurs OEM dans les conditions suivantes: (Pour utilisation de dispositif module)

- 1) L'antenne doit être installée et exploitée avec plus de 20 cm entre l'antenne et les utilisateurs, et
- 2) Le module émetteur peut ne pas être coïmplanté avec un autre émetteur ou antenne.

Tant que les **2** conditions ci-dessus sont remplies, des essais supplémentaires sur l'émetteur ne seront pas nécessaires. Toutefois, l'intégrateur OEM est toujours responsable des essais sur son produit final pour toutes exigences de conformité supplémentaires requises pour ce module installé.

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 Canada authorization is no longer considered valid and the IC 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 Canada authorization.

NOTE

Dans le cas où ces conditions ne peuvent être satisfaites (par exemple pour certaines configurations d'ordinateur portable ou de certaines co-localisation avec un autre émetteur), l'autorisation du Canada n'est plus considéré comme valide et l'ID IC ne peut pas être utilisé sur le produit final. Dans ces circonstances, l'intégrateur OEM sera chargé de réévaluer le produit final (y compris l'émetteur) et l'obtention d'une autorisation distincte au Canada.

IMPORTANTE:**End Product Labeling**

This transmitter module is authorized only for use in device where the antenna may be installed and operated with greater than 20cm between the antenna and users. The final end product must be labeled in a visible area with the following: "Contains IC:7542A-MT7921".

Plaque signalétique du produit final

Ce module émetteur est autorisé uniquement pour une utilisation dans un appareil où l'antenne peut être installée et utilisée à plus de 20 cm entre l'antenne et les utilisateurs. Le produit final doit être étiqueté dans un endroit visible avec l'inscription suivante: "Contient des IC: 7542A-MT7921".

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.

Manuel d'information à l'utilisateur final

L'intégrateur OEM doit être conscient de ne pas fournir des informations à l'utilisateur final quant à la façon d'installer ou de supprimer ce module RF dans le manuel de l'utilisateur du produit final qui intègre ce module.

Le manuel de l'utilisateur final doit inclure toutes les informations réglementaires requises et avertissements comme indiqué dans ce manuel.

**Caution :**

- (i) 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;
- (ii) for devices with detachable antenna(s), 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;
- (iii) for devices with detachable antenna(s), 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 as appropriate;
- (iv) where applicable, antenna type(s), antenna models(s), and worst-case tilt angle(s) necessary to remain compliant with the e.i.r.p. elevation mask requirement set forth in section 6.2.2.3 shall be clearly indicated.

Avertissement:

Le guide d'utilisation des dispositifs pour réseaux locaux doit inclure des instructions précises sur les restrictions susmentionnées, notamment :

- (i) 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;
- (ii) pour les dispositifs munis d'antennes amovibles, le gain maximal d'antenne permis pour les dispositifs utilisant les bandes de 5 250 à 5 350 MHz et de 5 470 à 5 725 MHz doit être conforme à la limite de la p.i.r.e.;
- (iii) pour les dispositifs munis d'antennes amovibles, le gain maximal d'antenne permis (pour les dispositifs utilisant la bande de 5 725 à 5 850 MHz) doit être conforme à la limite de la p.i.r.e. spécifiée, selon le cas;
- (iv) lorsqu'il y a lieu, les types d'antennes (s'il y en a plusieurs), les numéros de modèle de l'antenne et les pires angles d'inclinaison nécessaires pour rester conforme à l'exigence de la p.i.r.e. applicable au masque d'élévation, énoncée à la section 6.2.2.3, doivent être clairement indiqués

DETACHABLE ANTENNA USAGE

This radio transmitter (IC: 7542A-MT7921 / Model: MT7921) has been approved by ISED to operate with the antenna type listed below with 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 (IC: 7542A-MT7921 / Model: MT7921) a été approuvé par ISED pour fonctionner avec les types d'antenne énumérés ci-dessous et ayant un gain admissible maximal. Les types d'antenne non inclus dans cette liste, et dont le gain est supérieur au gain maximal indiqué, sont strictement interdits pour l'exploitation de l'émetteur.

Approved antenna(s) list

| Antenna Net Gain (dBi) | Frequency range (GHz) | Antenna Type | Connector Type |
|------------------------|-------------------------|--------------|----------------|
| 2.42 3.87 | 2.4~2.4835 5.15~5.85 | Dipole | R-SMA |
| 2.42 3.87 | 2.4~2.4835 5.15~5.85 | Dipole | R-SMA |
| 3.18 4.92 | 2.4~2.4835 5.15~5.85 | PIFA | i-pex(MHF) |
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低功率射頻器材須忍受合法通信或工業、科學及醫療用電波輻射性電機設備之干擾。

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。

系統廠商應於平台上標示「內含射頻模組(組件)：XXXyyyLPDzzzz-x」字樣。

應避免影響附近雷達系統之操作。

高增益指向性天線只得應用於固定式點對點系統。