

WIFI Module

Model No.: NM01

Release 0.2

2017/08/17

1. INTRODUCTION

1.1. PURPOSE

This document contains the product specification of 802.11 a/b/g/n/ ac Dual Band WiFi Module for Vivint

2. SPECIFICATION

2.1. SYSTEM AND HARDWARE SPECIFICATION

NM01		
H.1	Processor	<ul style="list-style-type: none">• MTK WiFi soc
H.2	System ROM	<ul style="list-style-type: none">• 8MB SPI Flash
H.3	System RAM	<ul style="list-style-type: none">• 128MB DDR 2
H.4	Host Interface	<ul style="list-style-type: none">• MII• I²C• SPI• UARTx2• USB• JTAG
H.5	WiFi Interface	<ul style="list-style-type: none">• IPEX connector x2
H.6	Environment	<ul style="list-style-type: none">• Operation: Temp: 0°C ~ 40°C Humidity: 20% ~ 85% non-condensing• Storage: Temp: -25°C ~ 70°C Humidity: 5% ~ 95% non-condensing
H.7	Certification	<ul style="list-style-type: none">• FCC/IC class B
Wireless		
H.9	Frequency range	<ul style="list-style-type: none">• Frequency FCC Frequency range: 2412~2462MHz, FCC Frequency range: 5180~5240MHz, 5260~5320MHz, 5500~5700MHz, 5745~5825MHz ISED Frequency range: 2412~2462MHz, ISED Frequency range: 5180~5240MHz, 5260~5320MHz, 5500~5580MHz, 5660~5700MHz, 5745~5825MHz


	Output Power (FCC)	2.4GHz: 553.367mW 5.18 ~ 5.24GHz: 99.054mW 5.26 ~ 5.32GHz: 102.513mW 5.50 ~ 5.70GHz: 75.778mW 5.745 ~ 5.825GHz: 74.479mW
	Output Power (ISED)	2.4GHz: 553.367mW 5.18 ~ 5.24GHz: 87.619mW 5.26 ~ 5.32GHz: 102.513mW 5.50 ~ 5.58GHz & 5.66 ~ 5.7GHz: 75.778mW 5.745 ~ 5.825GHz: 74.479mW
H.12	Sensitivity	<ul style="list-style-type: none"> 802.11b (2.4GHz) : -76dBm 802.11g (2.4GHz) : -65dBm 802.11n (2.4GHz) : -61dBm 802.11a (5GHz) : -65dBm 802.11n (5GHz) : -61dBm 802.11ac (5GHz): -51dBm

Antenna Spec.

No.	PCB Chain No	Brand	Model	Antenna Gain(dBi)	Frequency range	Antenna Type	Connector type	Cable Length (mm)	Cable Loss (dB)	excluding cable loss Antenna Gain(dBi)
1	Chain 0	NA	TE 2108517-1	2.5	2.4~2.4835GHz	PIFA	I-pex	60	0.5	3
				2	5.15~5.85GHz				1	
2	Chain 1	NA	TE 2108517-1	2	2.4~2.4835GHz	PIFA	I-pex	230	1	3
				1.5	5.15~5.85GHz				1.5	

2.2. SOFTWARE REQUIREMENTS

F.1	OS	<ul style="list-style-type: none"> OpenWRT Barrier Breaker 14.07
F.2	Test features	<ul style="list-style-type: none"> Active Rx mode: independently selectable for 2.4 GHz and 5 GHz Constant Tx: unmodulated carrier independently selectable for 2.4 GHz and 5 GHz (MTK driver will support constant Tx w/ modulated but un-modulated in test mode if

		<p>possible).</p> <ul style="list-style-type: none"> • Constant Tx: modulated Carrier independently selectable for 2.4 GHz and 5 GHz • Select fixed Tx Channel: all TX channels for 2.4 GHz and 5 GHz operation • Select fixed bit rate: independently selectable for 2.4 GHz and 5 GHz transmit only • Select fixed Tx Mode: b/g/n/ac • Select fixed Tx power level: independently selectable for 2.4 GHz and 5 GHz • Select communication to pass through only antenna 1 or antenna 2 • Enable/disable wired and/or wireless modes and connections
F.4	netv script	 <p>netv_manual.pdf</p>

3. CERTIFICATIONS/TEST REPORTS REQUIREMENT

EMC/RF Certificates and Test Reports (All Certification require to meet latest version)

3.1 Emission & Immunity for EMI/EMS

Required	EMI/EMC Test Report	Class A	Class B	Region
	CE Report (EMC Directive of 2004/108/EC) for ITE (Information Technology Equipment) EN 55022 & EN 55024 EN 61000-3-2 EN 61000-3-3 EN 61000-4-2/3/4/5/6/8/11 (ESD/RS/FET/Surge/CS/Magnetic/Dip)			European Union
	FCC report FCC CFR 47 Part 15 Subpart B & ANSI C63.4 (including ITE & Home Plug) IC report ICES-003 (ITE)			US Canada
	C-Tick Report AS/NZS CISPR 22 (ITE)			New Zealand & Australia
	VCCI Report V-3 & V4			JAPAN
	KCC report KN22/24 (ITE)			KOREA
	Anatel			Brazil
	BSMI			Taiwan
	CCC			China
	Others			

Note:

1. All regulation will be followed the latest edition.

3.2 Radio Frequency & Human Exposure/SAR

Required	RF Test Report	Categories	Region
	CE Report (R&TTE Directive of 1999/5/EC) EN 300 328 for wireless 2.4GHz	802.11 ac/b/g/n	European Union

	EN 301 893 for wireless 5 GHz + DFS EN 50385 (Human exposure, distance between 20 cm) EN 50371(output power less than 20 mw) EN 62311(output power more than 20 mw)		
✓	FCC report FCC CFR 47, Part 2, FCC CFR 47, Part 15 Subpart C for 2.4GHz FCC CFR 47, Part 15 Subpart E for 5 GHz + DFS FCC OET Bulletin 65 Supplement C. (Human Exposure) IEEE STD. 1528 (SAR)	802.11 ac/b/g/n	US/ FCC ID
✓	IC report RSS-GEN RSS-102 RSS-247	802.11 ac/b/g/n	Canada/ IC ID
	C-Tick Report AS/NZS4771 for 2.4G & 5GHz AS/NZS 4268 for 2.4G & 5GHz	802.11 ac/b/g/n	New Zealand & Australia (ACN 052 202 838 & Z567)
	NCC Report LP0002(低功率射頻電機技術規範)for 2.4G & 5GHz	802.11 ac/b/g/n	Taiwan (XXXXXXXXXX ...)
	Others		

Note:

1. All regulations will be followed the latest edition.

3.3 Safety

Required	Certifications	Standard No.	Region
	cUL Listed Mark UL file number should be under vendor own	UL/CSA 60950-1	North/ South America
	CSA International Mark, see *) CSA file number should be under vendor own	IEC60950-1 UL60950-1 CSA60950-1 EN 60950-1	North/ South America
	CB Report	IEC60950-1	Worldwide

		EN60950-1	
	CE (LVD report)	EN60950-1	European Union
	CCC	GB4943-2001, GB9254-1998, GB17625.1-2003	China

Note:

1. All regulations will be followed the latest edition.
2. * The CSA international had been covered EN 60950-1, therefore CSA international report could be replacement the LVD report.

Setup Diagram

IP: 192.168.1.XX

Cmd key in telnet 192.168.1.1

The image shows a screenshot of a Windows command prompt window. The title bar reads '系統管理員: 命令提示字元'. The window content displays the following text:

```
Microsoft Windows [版本 6.1.7601]
Copyright (c) 2009 Microsoft Corporation. All rights reserved.

C:\Users\JOSE>telnet 192.168.1.1
```

```

ca Telnet 192.168.1.1
-----
BusyBox v1.22.1 (2017-03-06 09:32:32 CST) built-in shell (ash)
Enter 'help' for a list of built-in commands.

|-----|-----|-----|-----|-----|-----|
|  _  |  _  |  _  |  _  |  _  |  _  |
|-----|-----|-----|-----|-----|-----|
|_! W I R E L E S S   F R E E D O M

-----
BARRIER BREAKER (Barrier Breaker, unknown)
-----
* 1/2 oz Galliano      Pour all ingredients into
* 4 oz cold Coffee    an irish coffee mug filled
* 1 1/2 oz Dark Rum   with crushed ice. Stir.
* 2 tsp. Creme de Cacao
-----
MTK OpenWrt SDK U3.4
revision : 8f8e4f1e
benchmark : APSoC SDK 5.0.1.0
kernel : 144992
-----
root@OpenWrt:/#

```

- iwpriv rai0 set ATECHANNEL=155 ;Set ATE Channel, decimal.
Value:
802.11a: [36 -173]. Please follow 5GHz channel setting.
Decimal value.
- iwpriv rai0 set ATETXBW=2 ;Set ATE Tx and Rx Bandwidth.
Value:
0: 20MHz
1: 40MHz
2: 80MHz
- iwpriv rai0 set ATETXMODE=4 ;Set ATE Tx Mode.
Value:
0: CCK 802.11b
1: OFDM 802.11g
2: HT_MIX 802.11b/g/n
3: Green Field 802.11n

4. ENVIRONMENTAL IMPACT REQUIREMENT

- RoHS Compliance: All Components Compliant with RoHS Directive

5. WARNING STATEMENT

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.

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 device is intended only for OEM integrators under the following conditions:

- 1) The antenna must be installed such that 20 cm is maintained between the antenna and users.
- 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

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.

End Product Labeling

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: "Contains FCC ID: 2AAAS-NM01". The grantee's FCC ID can be used only when all FCC compliance requirements are met.

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.

Industry Canada statement:

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

accept any interference, including interference that may cause undesired operation of the device.

Le présent appareil est conforme aux CNR d'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 minimum distance 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 avec un minimum de 20 cm de distance entre la source de rayonnement 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 such that 20 cm is maintained between the antenna and users.
- 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 de telle sorte qu'une distance de 20 cm est respectée entre l'antenne et les utilisateurs.
- 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 requis 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 IMPORTANTE:

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.

End Product Labeling

This transmitter module is authorized only for use in device where the antenna may be installed such that 20 cm may be maintained between the antenna and users. The final end product must be labeled in a visible area with the following: "Contains IC: 10941A-NM01".

Plaque signalétique du produit final

Ce module émetteur est autorisé uniquement pour une utilisation dans un dispositif où l'antenne peut être installée de telle sorte qu'une distance de 20cm peut être maintenue entre l'antenne et les utilisateurs. Le produit final doit être étiqueté dans un endroit visible avec l'inscription suivante: "Contient des IC: 10941A-NM01".

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) 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) the maximum antenna gain permitted for devices in the band 5725-5850 MHz shall be such that the equipment still complies with the e.i.r.p. limits specified for point-to-point and non-point-to-point operation as appropriate; and
- (iv) the 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.
- (v) Users should also be advised that high-power radars are allocated as primary users (i.e. priority users) of the bands 5250-5350 MHz and 5650-5850 MHz and that these radars could cause interference and/or damage to LE-LAN devices.

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) le gain maximal d'antenne permis pour les dispositifs utilisant les bandes de 5250 à 5350 MHz et de 5470 à 5725 MHz doit être conforme à la limite de la p.i.r.e.;
- (iii) le gain maximal d'antenne permis (pour les dispositifs utilisant la bande de 5725 à 5850 MHz) doit être conforme à la limite de la p.i.r.e. spécifiée pour l'exploitation point à point et l'exploitation non point à point, selon le cas;
- (iv) les pires angles d'inclinaison nécessaires pour rester conforme à l'exigence de la p.i.r.e. applicable au masque d'élévation, et énoncée à la section 6.2.2 3), doivent être clairement indiqués.

(v) De plus, les utilisateurs devraient aussi être avisés que les utilisateurs de radars de haute puissance sont désignés utilisateurs principaux (c.-à-d., qu'ils ont la priorité) pour les bandes 5250-5350 MHz et 5650-5850 MHz et que ces radars pourraient causer du brouillage et/ou des dommages aux dispositifs LAN-EL.

DETACHABLE ANTENNA USAGE

This radio transmitter (IC: 10941A-NM01 / Model: NM01) 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: 10941A-NM01 / Model: NM01) 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

No.	PCB Chain No	Brand	Model	Antenna Gain(dBi)	Frequency range	Antenna Type	Connector type	Cable Length (mm)	Cable Loss (dB)	excluding cable loss Antenna Gain(dBi)
1	Chain 0	NA	TE 2108517-1	2.5	2.4~2.4835GHz	PIFA	I-pex	60	0.5	3
				2	5.15~5.85GHz				1	
2	Chain 1	NA	TE 2108517-1	2	2.4~2.4835GHz	PIFA	I-pex	230	1	3
				1.5	5.15~5.85GHz				1.5	