WBU058-LGA

IEEE 802.11 a/b/g/n/ac/ax 2x2
+ Bluetooth v5.2 Wireless Adapter

Ver.: 06
2022/02/17

CHAPTER 1. MODULE OVERVIEW

The Foxconn WBU058-LGA is a highly integrated module which features a high performance 2x2 dual-band WLAN subsystem and a Bluetooth v5.2 subsystem. The WLAN subsystem contains the 802.11a/b/g/n/ac/ax radio, baseband that are designed to meet feature-rich wireless connectivity at high standards, and delivering reliable, cost-effective throughput from an extended distance.

Optimized RF architecture and baseband algorithms provide superb performance and low power consumption. Intelligent MAC design deploys a high efficient offload engine and hardware data processing accelerators which fully offloads Wi-Fi task of the host processor.

1-1 Key Characteristic

- Integrate high efficiency power management unit with single 3.3V power supply input
- 32-bit RISC MCU for Wi-Fi/Bluetooth protocols and Wi-Fi offload
- Embedded SRAM/ROM
- IEEE 802.11 a/b/g/n/ac/ax compliant
- Support 20MHz, 40MHz, 80Mhz bandwidth in 2.4GHz, 5GHz, 6GHz band
- Support Bluetooth 5.2
- Dual-band 2T2R mode
- data rate up to 800Mbps with USB3.0
- Support MU-MIMO RX
- Support uplink MU-OFDMA TX and downlink MU-OFDMA RX
- Support DBDC (dual band dual concurrent
- Support STBC, LDPC, TX Beamformer and RX Beamformee
- Greenfield, mixed mode, legacy modes support
- IEEE 802.11 d/e/h/i/j/k/mc/r/v/w support
- Security support for WFA WPA/WPA2/WPA3 personal, WPS2.0, WAPI
- QoS support of WFA WMM, WMM PS
- Bluetooth v5.2 with BLE (BT low energy)
- Supports BT/BLE dual mode
- Integrated BALUN and PA with 15dBm(class 1) transmit power
- Supports BT/Wi-Fi coexistence
- Supports 7 BT links and 16 BLE link
- Contains dual BT controllers
- Advanced FDD/TDD mode Wi-Fi/Bluetooth coexistence scheme

CHAPTER 2. ELECTRICAL AND RF SPECIFICAITONS

2-1 Recommended Operation Rating

Table 2 Operation Rating

Parameter	Condition	Min	Typ.	Max.	Unit
DVDD	3.3	3.0V	3.3V	3.6V	V
RF Interface	Zo		50		Ohm

2-2 Digital IO Pin DC Characteristic

Table 3 CN1 UART IO Characteristic

Symbol	Parameter	Conditions	Min.	Typ.	Max	Units
V_{IH}	High-level input Voltage		Vcc*0.7	-	-	V
V_{IL}	Low-level input Voltage		-	-	Vcc*0.3	V
V_{OH}	High-level output Voltage	I_{OH}=-2mA,V_I= V_{IH}	3.8	-	-	V
V_{OL}	Low-level output Voltage	I_{OH}= 2mA,V_I = V_{IL}	-	-	0.55	V

2-4 RF input and Output characteristic

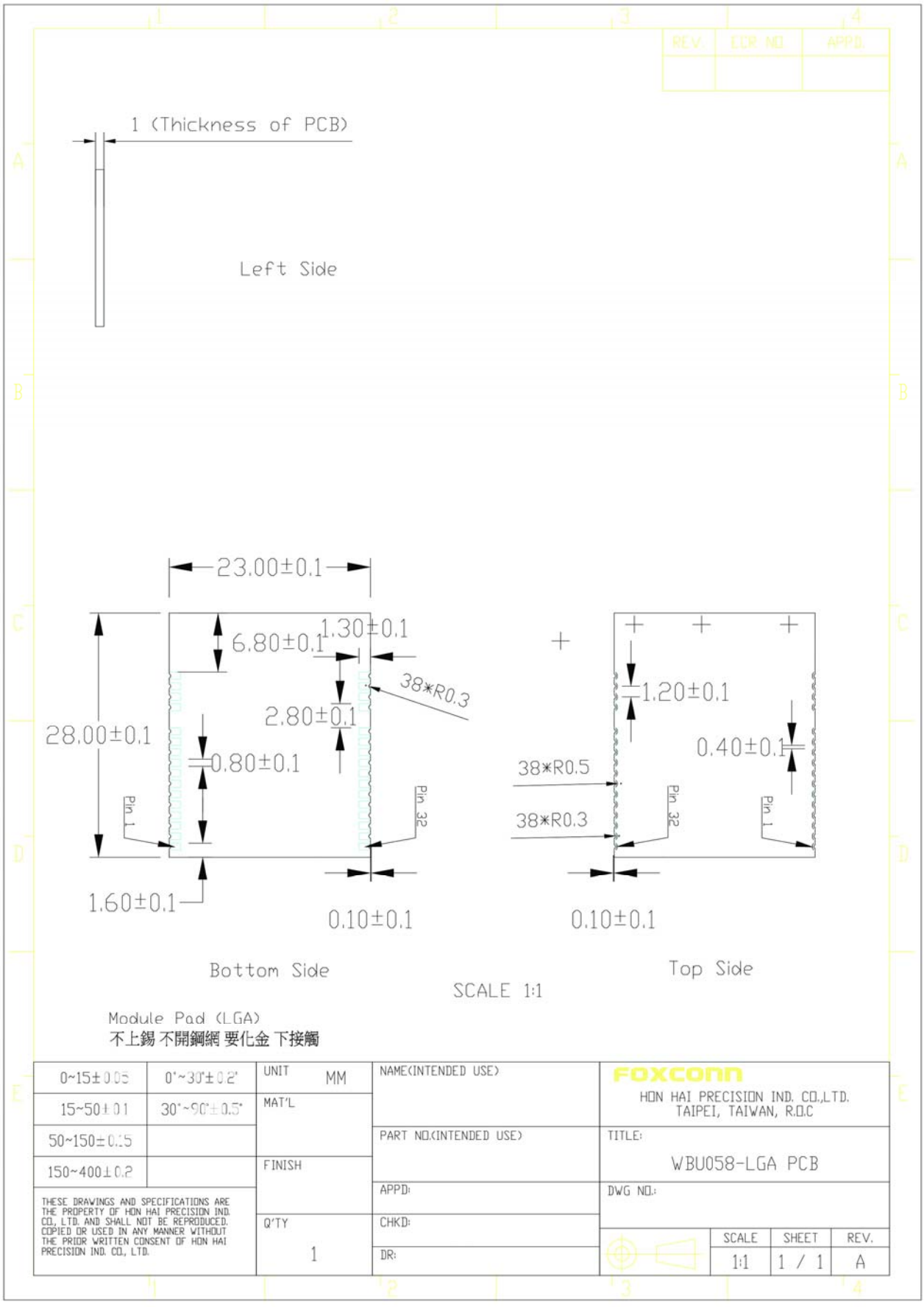
- RF Input and Output characteristic (Ta=25˚C)
- Transmitting and receiving frequency:

  2.4GHz: 2412-2484MHz

  5GHz: 4905-5915MHz

  6GHz: 5930-7110MHz
- Wireless system IEEE 802.11a/b/g/n/ac/ax
- Wireless system Bluetooth v5.2 Basic Data Rate / Enhanced data rate / Low Energy

2-5 MECHANICAL SPECIFICATION



CHAPTER 3. ADDITIONAL INFORMATION

3-1 Environment Specifications

Operating Conditions

Operation Temperature : -10 ~ 80℃

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

Storage Conditions

Non-Operation Temperature : -20 ~ 85℃ (Typ. 25℃)

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

3-2 Guarantee period / Failure rate

Guarantee period

Guarantee period is 12 months after manufacture's factory shipment

Failure rate

600fit

CHAPTER 4: REGULATORY STATEMENT

FCC 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.

Operations in the 6GHz bands:

(1) The operation of this device is prohibited on oil platforms, cars, trains, boats, and aircraft, except that operation of this device is permitted in large aircraft while flying above 10,000 feet.
(2) Operation of transmitters in the 5.925-7.125 GHz band is prohibited for control of or communications with unmanned aircraft systems.

This device meets all the other requirements specified in Part15C, Section 15.247 and 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 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, and

2) The transmitter module may not be co-located with any other transmitter or antenna.

The OEM integrator is still responsible for testing their end-product for any additional compliance requirements required with this module installed.

3) PFF restriction:

• FCC regulations restrict the operation of this device to indoor use only.

• Operation of transmitters in the 5.925-7.125 GHz band is prohibited for control of or communications with unmanned aircraft systems.

• This device is limited to under control of a low-power indoor access point (6ID) or subordinate(6PP).

• This device cannot have a direct connection to the internet.

Indoor Client Declaration

We, Hon Hai Precision Industry Co., Ltd., will document the physical restrictions associated with the equipment classes for host products (wired power, integral antenna, non-weatherized enclosure) as conditions-of-use through the host manufacture's integration instructions.

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 reevaluating the end product (including the transmitter) and obtaining a separate FCC authorization.

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

End Product Labeling

The host product must be labeled in a visible area with the following " Contains FCC ID: RX3-WBU058LGA ".

The end product shall bear the following 15.19 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 device to indoor use only.

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. The antenna must be installed such that 20 cm can be maintained between the antenna and users.

WLAN Type : PIFA, External

BT Type : PIFA, External

			Band MHz/[dBi]				
Functionality	SN/Model #	Cable Length	2400-2483.5	5150-5250	5250-5350	5470-5725	5725-5850
WLAN0 WLAN1 (1TX/SISO)	79012F500-600-G	200mm	**1.62**	**3.22**	**3.22**	**3.58**	**3.39**
	79012F300-600-G	400mm	-0.73	1.83	1.83	2.56	2.45
	79012F400-600-G	450mm	0.51	2.32	2.32	2.21	2.07
BT0 BT1 (1TX)	79012F200-600-G	300mm	0.09				
	79012F700-600-G	450mm	**0.78**				
	79012F600-600-G	650mm	-0.02				

			Band MHz/[dBi]			
Functionality	SN/Model #	Cable Length	5925-6425	6425-6525	6525-6875	6875-7125
WLAN0 WLAN1 (1TX/SISO)	79012F500-600-G	200mm	**4.34**	**3.52**	**4.59**	**4.95**
	79012F300-600-G	400mm	2.54	2.44	3.35	2.57
	79012F400-600-G	450mm	3.53	3.21	3.91	4.18
BT0 BT1 (1TX)	79012F200-600-G	300mm				
	79012F700-600-G	450mm				
	79012F600-600-G	650mm				

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 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.

Manual Information To the End User

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

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.

The host integrator must follow the integration instructions provided in this document and ensure that the composite-system end product complies with the requirements by a technical assessment or evaluation to the rules and to KDB Publication 996369.

The host integrator installing this module into their product must ensure that the final composite product complies with the requirements by a technical assessment or evaluation to the rules, including the transmitter operation and should refer to guidance in KDB 996369.

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.

ISED Statement:

This Class B digital apparatus complies with Canadian ICES-003.

Cet appareil numérique de classe B est conforme à la norme canadienne ICES-003.

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

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

RF 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 a minimum distance of 20 centimeters between the radiator and your body.
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.

Operations in the 6GHz bands:
(1) Operation in the band 5925-7125 MHz shall be limited to indoor use only.
(2) Operation on oil platforms, cars, trains, boats and aircraft shall be prohibited except for on large aircraft flying above 10,000 ft.

Déclaration d'exposition aux radiations:
Cet appareil est conforme aux limites d'exposition aux rayonnements définies pour un environnement non contrôlé. Cet équipement doit être installé et utilisé à une distance minimale de 20 centimètres entre le radiateur et votre corps.
Le fonctionnement dans la bande 5150-5250 MHz est uniquement destiné à une utilisation en intérieur afin *de réduire le potentiel d'interférences nuisibles aux systèmes mobiles par satellite dans le même canal..*

Opérations dans les bandes 6 GHz :
(1) bande 5925-7125 MHz Utilisation limitée à l'intérieur seulement.
(2) Utilisation interdite à bord de plateformes de forage pétrolier, de voitures, de trains, de bateaux et d'aéronefs, sauf à bord d'un gros aéronef volant à plus de 10 000 pieds d'altitude.

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

The transmitter module may not be co-located with any other transmitter or antenna.

As long as above conditions is 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.

Operation shall be limited to indoor use only; and

Operation on oil platforms, cars, trains, boats and aircraft shall be prohibited except for on large aircraft flying above 10,000 ft.

This device is limited to under control an indoor access point or an indoor subordinate device and shall not be capable of initiating a network.

Cet appareil est conçu uniquement pour les intégrateurs OEM dans les conditions suivantes:

Le module émetteur peut ne pas être coïmplanté avec un autre émetteur ou antenne.

Tant que les 1 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.

Utilisation limitée à l'intérieur seulement;

Utilisation interdite à bord de plateformes de forage pétrolier, de voitures, de trains, de bateaux et d'aéronefs, sauf à bord d'un gros aéronef volant à plus de 10 000 pieds d'altitude.

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.

Required 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: 2878F-WBU058LGA".

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: 2878F-WBU058LGA ".

Manual Information To the End User

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

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.

The following text, or an equivalent notice, that shall be displayed in a conspicuous location, either in the user manual or on the device, or both:

This device contains licence-exempt transmitter(s)/receiver(s) that comply with Innovation, Science and Economic Development Canada's licence-exempt RSS(s). Operation is subject to the following two conditions:

1. This device may not cause interference.
2. This device must accept any interference, including interference that may cause undesired operation of the device.

Manuel d'information à l'utilisateur final

Le manuel de l'utilisateur final doit inclure toutes les informations/avertissements réglementaires requis, comme indiqué dans ce document.

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.

l'énoncé qui suit, ou l'équivalent, à un endroit bien en vue dans le manuel d'utilisation ou sur l'appareil, ou encore aux deux endroits :
L'émetteur/récepteur exempt de licence contenu dans le présent appareil est conforme aux CNR d'Innovation, Sciences et Développement économique Canada applicables aux appareils radio exempts de licence. L'exploitation est autorisée aux deux conditions suivantes :

1. *L'appareil ne doit pas produire de brouillage;*
2. *L'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement*

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. The antenna must be installed such that 20 cm can be maintained between the antenna and users.

This radio transmitter [2878F-WBU058LGA] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed below, with the maximum permissible gain indicated. Antenna types not included in this list that have a gain greater than the maximum gain indicated for any type listed are strictly prohibited for use with this device.

WLAN Type : PIFA, External

BT Type : PIFA, External

ANTENNE

Les antennes suivantes ont été certifiées pour une utilisation avec ce module; des antennes du même type à gain égal ou inférieur peuvent également être utilisées avec ce module. L'antenne doit être installée de telle sorte que 20 cm puissent être maintenus entre l'antenne et les utilisateurs.

Cet émetteur radio [2878F-WBU058LGA] a été approuvé par Innovation, Sciences et Développement économique Canada pour fonctionner avec les types d'antenne énumérés ci-dessous, avec le gain maximal autorisé indiqué. Les types d'antenne non inclus dans cette liste qui ont un gain supérieur au gain maximum indiqué pour tout type répertorié sont strictement interdits pour l'utilisation avec cet appareil.

Type de WLAN: PIFA, externe

Type de BT: PIFA, externe

			Band MHz/[dBi]				
Functionality	SN/Model #	Cable Length	2400-2483.5	5150-5250	5250-5350	5470-5725	5725-5850
WLAN0 WLAN1 (1TX/SISO)	79012F500-600-G	200mm	**1.62**	**3.22**	**3.22**	**3.58**	**3.39**
	79012F300-600-G	400mm	-0.73	1.83	1.83	2.56	2.45
	79012F400-600-G	450mm	0.51	2.32	2.32	2.21	2.07
BT0 BT1 (1TX)	79012F200-600-G	300mm	0.09				
	79012F700-600-G	450mm	**0.78**				
	79012F600-600-G	650mm	-0.02				

			Band MHz/[dBi]			
Functionality	SN/Model #	Cable Length	5925-6425	6425-6525	6525-6875	6875-7125
WLAN0 WLAN1 (1TX/SISO)	79012F500-600-G	200mm	**4.34**	**3.52**	**4.59**	**4.95**
	79012F300-600-G	400mm	2.54	2.44	3.35	2.57
	79012F400-600-G	450mm	3.53	3.21	3.91	4.18
BT0 BT1 (1TX)	79012F200-600-G	300mm				
	79012F700-600-G	450mm				
	79012F600-600-G	650mm				