

WNFB265AX

802.11ax/ac/a/b/g/n Industrial Grade

2T2R Wi-Fi+Bluetooth 5.3 Combo

M.2 2230 Module



Wi-Fi+Bluetooth Combo Solution M.2 2230 Module

WNFB265AX is a 802.11ax Wi-Fi 6+Bluetooth 5.3 M.2 2230 (KEY E) Module, 802.11ax allow efficient allocation of low data-rate connections, improve the battery life of IoT sensors, and extend the range of Wi-Fi signals. **WNFB265AX** module brings steady, high-speed Wi-Fi connectivity for Remote control, Smart manufacturing, shop, home, TV etc. The new 802.11ax standard with its unique features such as OFDMA, 1024QAM, Target Wake Time (TWT). 802.11ax (Wi-Fi 6) enables smooth streaming of high-resolution videos, fewer dropped connections and faster connections farther away from the router and in dense environments.

WNFB265AX 2230 (KEY E) module can support Multi-User MIMO (MU-MIMO) technology to increase channel capacity when simultaneously servicing multiple devices using the same frequency chunks and can accomplish up to speed of 1200Mbps with dual stream. Bluetooth 5 features including Low-Energy 2 Mbps and Low-Energy Long Range. Furthermore the included PCIe interface for Wi-Fi, UART/PCM interface for Bluetooth.

Embedded Application

Applications include medical devices, security systems, industrial PC, Remote control, digital signs, STB, embedded / tablet PC's, smart devices, Smart manufacturing, shop, Home, TV, etc.

Key Feature

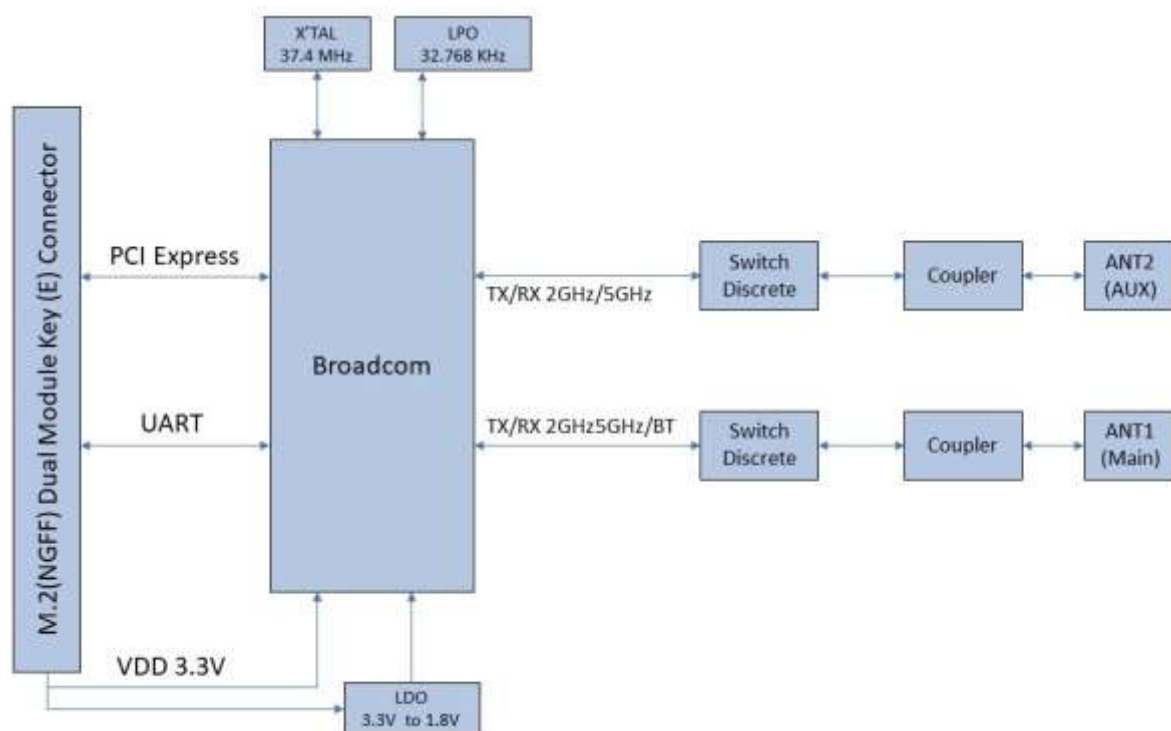
- Dual-stream spatial multiplexing up to 1200 Mbps data rate.
- Wi-Fi 6 features including 1024-QAM Modulation, OFDMA, MU-MIMO, and WPA3.
- IEEE 802.11ax beam forming.
- BT host digital interface: HCI UART (up to 4 Mbps), PCM for audio data.
- BT 5.3 features including Low-Energy 2 Mbps and Low-Energy Long Range.
- Supports PCIe v3.0 compliant and runs at Gen2 speeds.

Specification

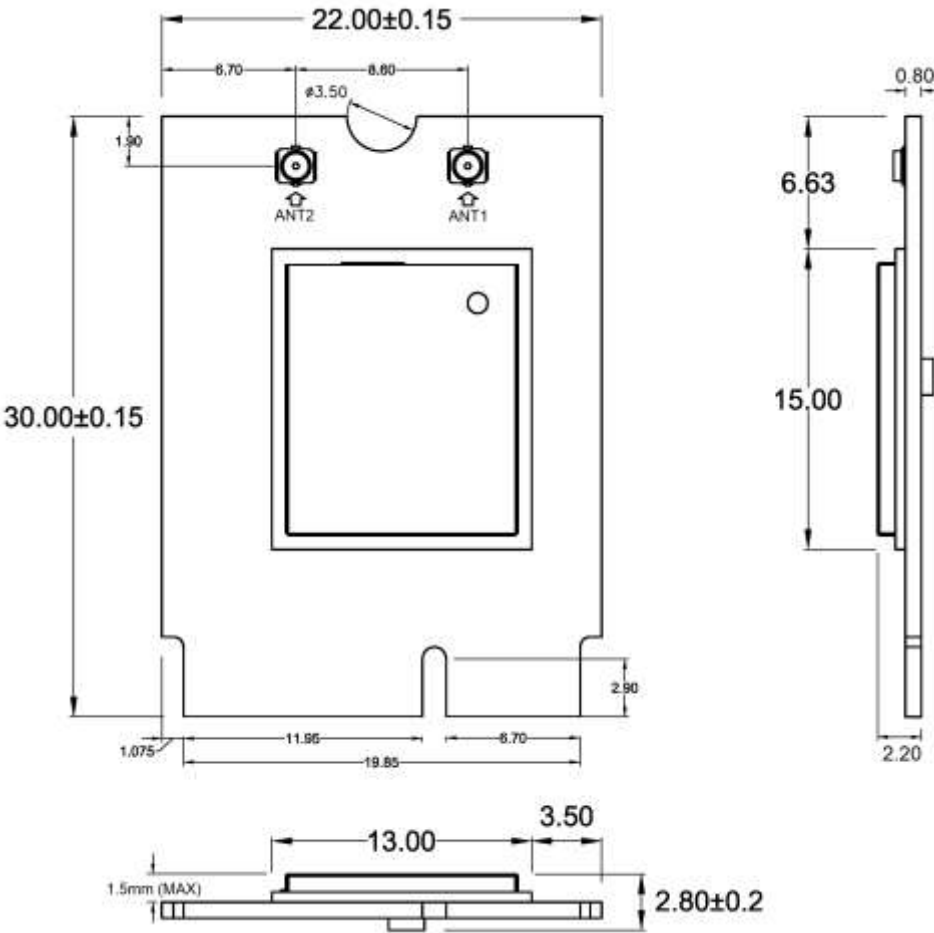
Standards	IEEE 802.11ax/ac/a/b/g/n (2T2R) Bluetooth V5.3, V5.0, V4.2, V4.1, V4.0 LE, V3.0+HS, V2.1+EDR
Chipset	Broadcom
Data Rate	802.11b: 11Mbps 802.11a/g: 54Mbps 802.11n: MCS0~15 802.11ac: MCS0~9 802.11ax: HE0~11 Bluetooth: 1 Mbps, 2Mbps and Up to 3Mbps
Operating Frequency	IEEE 802.11ax/ac/a/b/g/n ISM Band, 2.400GHz~2.4835GHz, 5.150GHz~5.850GHz *Subject to local regulations
Interface	WLAN: PCIe Bluetooth: UART
Form Factor	M.2 2230 E KEY
Antenna	2 x IPEX MHF4 connectors ANT1 for WLAN/BT, ANT2 for WLAN
Modulation	Wi-Fi: 802.11b: DSSS (DBPSK, DQPSK, CCK) 802.11g: OFDM (BPSK, QPSK, 16-QAM, 64-QAM) 802.11n: OFDM (BPSK, QPSK, 16-QAM, 64-QAM) 802.11a: OFDM (BPSK, QPSK, 16-QAM, 64-QAM) 802.11ac: OFDM (BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM) 802.11ax: OFDMA (BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM, 1024-QAM) Bluetooth: Header: GFSK Payload 2M: $\pi/4$ -DQPSK Payload 3M: 8-DPSK
Power Consumption	TX Mode: 660mA (Max.) RX Mode: 201mA (Max.)
Operating Voltage	DC 3.3V
Operating Temperature Range	-40°C~85°C
Storage Temperature Range	-40°C~105°C

Humidity (Non-Condensing)	10%~95% (Operating) 5%~95% (Storing)
Dimension L x W x H (in mm)	30mm(±0.15mm) x 22mm(±0.15mm) x 2.8mm(±0.2mm)
Weight (g)	≤3.5g
Driver Support	Linux, Android
Security	64/128-bits WEP, WPA, WPA2, WPA3, 802.1x

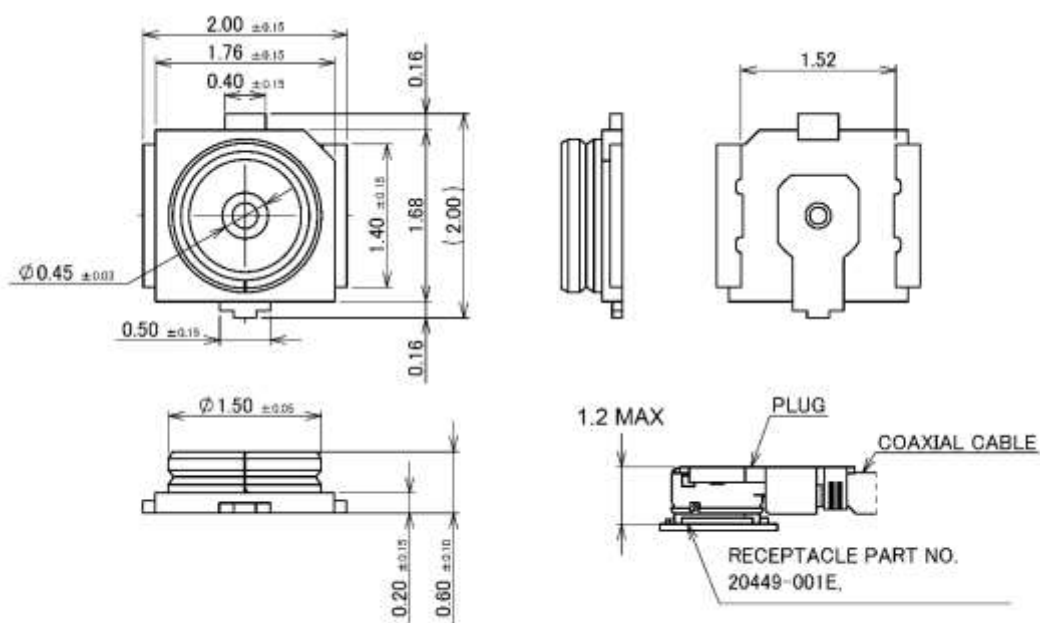
Block Diagram



Mechanical Diagram (mm)



MHF4 Connector spec



Unit: mm

Pin Assignment

The following section illustrate signal pin-outs for the module connector.

TOP			
Pin#	Pin Name	Type	Description
1	GND	G	Ground connections
3	USB_D+	NC	No Connection
5	USB_D-	NC	No Connection
7	GND	G	Ground connections
9	SDIO_CLK(1.8V)	NC	No Connection
11	SDIO_CMD(1.8V)	NC	No Connection
13	SDIO_DATA0(1.8V)	NC	No Connection
15	SDIO_DATA1(1.8V)	NC	No Connection
17	SDIO_DATA2(1.8V)	NC	No Connection
19	SDIO_DATA3(1.8V)	NC	No Connection
21	SDIO_WAKE#(1.8V)	NC	No Connection
23	SDIO_RESET# (1.8V)	NC	No Connection
25	NOTCH FOR KEY E	NC	No Connection
27	NOTCH FOR KEY E	NC	No Connection
29	NOTCH FOR KEY E	NC	No Connection
31	NOTCH FOR KEY E	NC	No Connection
33	GND	G	Ground connections
35	PERp0	I	PCI Express receive data-Positive
37	PERn0	I	PCI Express receive data-Negative
39	GND	G	Ground connections
41	PETp0	O	PCI Express transmit data-Positive
43	PETn0	O	PCI Express transmit data-Negative
45	GND	G	Ground connections
47	REFCLKp0	I	PCI Express differential clock input-Positive
49	REFCLKn0	I	PCI Express differential clock input-Negative
51	GND	G	Ground connections
53	CLKREQ0#(3.3V)	I/O	PCIe clock request
55	PEWAKE0#(3.3V)	OD	PEWAKE0#(1.8V) PCIe PME Wake
57	GND	G	Ground connections
59	RESERVED	NC	No Connection
61	RESERVED	NC	No Connection

TOP			
Pin#	Pin Name	Type	Description
63	GND	G	Ground connections
65	RESERVED	NC	No Connection
67	RESERVED	NC	No Connection
69	GND	G	Ground connections
71	RESERVED	NC	No Connection
73	RESERVED	NC	No Connection
75	GND	G	Ground connections

Note: Power (P), Ground (G), Open-Drain (OD), Input(I), Output(O), Do Not Connect (DNC), No Connection (NC)

Pin Assignment

The following section illustrate signal pin-outs for the module connector.

BOTTOM			
Pin#	Pin Name	Type	Description
2	3.3 V	P	VDD system power supply input
4	3.3 V	P	VDD system power supply input
6	LED_1#	NC	No Connection
8	PCM_CLK (1.8V)	I/O	PCM clock
10	PCM_SYNC (1.8V)	I/O	PCM sync signal
12	PCM_OUT (1.8V)	O	PCM Data output
14	PCM_IN (1.8V)	I	PCM data input
16	LED_2#	NC	No Connection
18	GND	G	Ground connections
20	UART_WAKE#(3.3V)	O	BT_HOST_WAKE(1.8V) Bluetooth wake up Host
22	UART_TXD(1.8V)	O	Bluetooth UART interface
24	NOTCH FOR KEY E	NC	No Connection
26	NOTCH FOR KEY E	NC	No Connection
28	NOTCH FOR KEY E	NC	No Connection
30	NOTCH FOR KEY E	NC	No Connection
32	UART_RXD(1.8V)	I	Bluetooth UART interface
34	UART_RTS(1.8V)	O	Bluetooth UART interface
36	UART_CTS(1.8V)	I	Bluetooth UART interface
38	VENDOR DEFINED	I	BT_DEV_WAKE(1.8V) HOST wake-up Bluetooth device

BOTTOM			
Pin#	Pin Name	Type	Description
40	VENDOR DEFINED	O	WL_HOST_WAKE(1.8V) WLAN wake up HOST
42	VENDOR DEFINED	NC	No Connection
44	COEX3(1.8V)	NC	No Connection
46	COEX_TXD(1.8V)	NC	No Connection
48	COEX_RXD(1.8V)	NC	No Connection
50	SUSCLK(3.3V)	NC	No Connection
52	PERST0#(3.3V)	I	PCIe host indication to reset the device
54	W_DISABLE2#(3.3V)	I	BT_REG_ON(3.3V) Used by PMU to power up or power down the internal module regulators used by the Bluetooth section. (must be connect to CPU'S GPIO)
56	W_DISABLE1#(3.3V)	I	WL_REG_ON(3.3V) Used by PMU to power up or power down the internal module regulators used by the WLAN section. (must be connect to CPU'S GPIO)
58	I2C_DATA(1.8V)	NC	No Connection
60	I2C_CLK(1.8V)	NC	No Connection
62	ALERT#(1.8V)	NC	No Connection
64	RESERVED	NC	No Connection
66	UIM_SWP	NC	No Connection
68	UIM_POWER_SNK	NC	No Connection
70	UIM_POWER_SRC	NC	No Connection
72	3.3 V	P	VDD system power supply input
74	3.3 V	P	VDD system power supply input

Note: Power (P), Ground (G), Open-Drain (OD), Input(I), Output(O), Do Not Connect (DNC), No Connection (NC)

Certification

Dipole Ant.

■ FCC

■ IC

Federal Communication Commission Interference Statement:

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 or more 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.

Any changes or modifications not expressly approved by the party responsible for compliance could void your authority to operate the equipment.

KDB 996369 D03 OEM Manual v01r01:**2.2:**

CFR 47 FCC PART 15 SUBPART C (15.247) and SUBPART E (15.407) has been investigated. It is applicable to the modular transmitter.

2.3:

The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product.

2.4 :

This module is not limited module

2.5:

Antenna is not trace antenna designs

2.6 :

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

The product complies 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.

2.7:

This radio transmitter VPQ-WNFB265AXIBT has been approved by Federal Communications Commission 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.

The following unique antenna connector (RP-SMA) must be used on the Part 15 authorized transmitters and used in separation distance of at least 20 cm

Antenna Type	Antenna Model	Maximum Gain (dBi)		Remark
		2.4 GHz	5GHz	
Dipole	AD-103AG	2.02 dBi	2.03 dBi	
Dipole	AD-302N	3.14 dBi	2.73 dBi	
Dipole	AD-303N	3.14 dBi	3.24 dBi	

The following unique antenna connector (RP-SMA) can be used on the Part 15 authorized transmitters and used in the portable device only that are limited to use for SAR requirement, **the power shall be reduced in order to comply with SAR requirements as following table:**

Antenna Type	Antenna Model	Maximum Gain (dBi)		Remark
		2.4 GHz	5GHz	
Dipole	FXP831.07.0100C	3 dBi	5.5 dBi	

Band	Tune-up Limit (dBm)	
	Chain 1	Chain 2
Wi-Fi 2.4GHz	7	7
Wi-Fi 5.2GHz	2	2
Wi-Fi 5.3GHz	2	2
Wi-Fi 5.5GHz	1	1
Wi-Fi 5.8GHz	1	1
Bluetooth	6	N/A

2.8:

If the FCC identification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: “Contains Transmitter Module FCC ID: VPQ-WNFB265AXIBT” Or “Contains FCC ID: VPQ-WNFB265AXIBT”

2.9:

The devices must be installed and used in strict accordance with the manufacturer's instructions as described in the user documentation that comes with the product."

2.10:

The modular transmitter is only FCC authorized for the specific rule parts (i.e., FCC transmitter rules) listed on the grant, and the host product manufacturer is responsible for compliance to any other FCC rules that apply to the host not covered by the modular transmitter grant of certification. The final host product still requires Part 15 Subpart B compliance testing with the modular transmitter installed.

Industry Canada statement:

This device complies with Industry Canada license-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'Industrie 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'utilisateur de l'appareil doit accepter tout brouillage radioélectrique subi, même si le brouillage est susceptible d'en compromettre le fonctionnement.

Caution:

1) 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;

2) 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;

3) 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 specified for point-to-point and non-point-to-point operation as appropriate; and

Avertissement:

1) Le dispositif fonctionnant dans la bande 5150-5250 MHz est réservé uniquement pour une utilisation à l'intérieur afin de réduire les risques de brouillage préjudiciable aux systèmes de satellites mobiles utilisant les mêmes canaux;

2) Le gain maximal d'antenne permis pour les dispositifs avec antenne(s) amovible(s) utilisant les bandes 5250-5350 MHz et 5470-5725 MHz doit se conformer à la limitation P.I.R.E.;

3) Le gain maximal d'antenne permis pour les dispositifs avec antenne(s) amovible(s) utilisant la bande 5725-5850 MHz doit se conformer à la limitation P.I.R.E. spécifiée pour l'exploitation point à point et non point à point, selon le cas.

Radiation Exposure Statement:

The radiated output power of the Wireless Device is below the Industry Canada (IC) radio frequency exposure limits. The Wireless Device should be used in such a manner such that the potential for human contact during normal operation is minimized.

This device has been evaluated for and shown compliant with the IC Specific Absorption Rate ("SAR") limits when operated in portable exposure conditions.

Informations concernant l'exposition aux fréquences radio (RF)

La puissance de sortie émise par cet appareil sans fil est inférieure à la limite d'exposition aux fréquences radio d'Industrie Canada (IC). Utilisez l'appareil sans fil de façon à minimiser les contacts humains lors d'un fonctionnement normal. Cet appareil a été évalué et démontré conforme aux limites de DAS (Débit d'absorption spécifique) d'IC lorsqu'il est utilisé dans des conditions d'exposition à des appareils portables.

This radio transmitter (IC: 7392A-NFB265AXIBT has been approved by Industry Canada to operate with the antenna types listed below with the 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: 7392A-NFB265AXIBT a été approuvé par Industrie Canada pour fonctionner avec les types d'antenne énumérés cidessous 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.

The following unique antenna connector (RP-SMA) must be used in separation distance of at least 20 cm.

Antenna Type	Antenna Model	Maximum Gain (dBi)		Remark
		2.4 GHz	5GHz	
Dipole	AD-103AG	2.02 dBi	2.03 dBi	
Dipole	AD-302N	3.14 dBi	2.73 dBi	
Dipole	AD-303N	3.14 dBi	3.24 dBi	

The following unique antenna connector (RP-SMA) must be used in the portable device only that are limited to use for SAR requirement.

Antenna Type	Antenna Model	Maximum Gain (dBi)		Remark
		2.4 GHz	5GHz	
Dipole	FXP831.07.0100C	3 dBi	5.5 dBi	

If the ISED certification number is not visible when the module is installed inside another device, then the outside of the device into which the module is installed must also display a label referring to the enclosed module. This exterior label can use wording such as the following: "Contains IC: 7392A-NFB265AXIBT".

Si le numéro de certification ISDE n'est pas visible lorsque le module est installé à l'intérieur d'un autre appareil, alors l'extérieur de l'appareil dans lequel le module est installé doit également afficher une étiquette faisant référence au module inclus. Cette étiquette extérieure peut utiliser un libellé comme celui-ci: " Contient IC: 7392A-NFB265AXIBT".

Plaque signalétique du produit final:

Le produit final doit être étiqueté dans un endroit visible avec l'inscription suivante: "Contient des IC: 7392A-NFB265AXIBT ".

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 manue

The end user manual shall include FCC Part 15 /ISED RSS GEN compliance statements related to the transmitter as show in this manual.

Host manufacturer is responsible for compliance of the host system with module installed with all other applicable requirements for the system such as Part 15 B, ICES 003.

Host manufacturer is strongly recommended to confirm compliance with FCC/ISED requirements for the transmitter when the module is installed in the host.

Must have on the host device a label showing Contains FCC ID: 7392A-NFB265AXIBT, Contains IC: 7392A-NFB265AXIBT

The use condition limitations extend to professional users, then instructions must state that this information also extends to the host manufacturer's instruction manual.

If the end product will involve the Multiple simultaneously transmitting condition or different operational conditions for a stand-alone modular transmitter in a host, host manufacturer have to consult with module manufacturer for the installation method in end system.

le manuel de l'utilisateur final doit inclure la partie 15 / (fac rss gen déclarations de conformité relatives à l'émetteur que de montrer dans ce manuel.

le fabricant est responsable de la conformité de l'hôte, le système d'accueil avec le module installé avec toutes les autres exigences applicables du système comme la partie 15 b, ices - 003. accueillir le fabricant est fortement recommandé de confirmer la conformité avec les exigences de la fcc / (émetteur lorsque le module est installé dans l'hôte.

le dispositif d'accueil doivent avoir une étiquette indiquant contient FCC ID: VPQ-WNFB265AXIBT, contient IC : 7392A-NFB265AXIBT