Honeywell

Revision

1

USER MANUAL

HWB11AC-PRT, WIFI & BT Module

MODEL NO: HWB11AC-PRT

802.11a/b/g/n/ac

+

BT 5.0

System on Module

Table of Contents

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Chapter

1

FCC ID: HD5-HWB11
IC: 1693B-HWB11
Model Name: HWB11AC-PRT

1. Introduction

This document specifies the details for a WiFi 802.11a/b/g/n/ac with BT5.0 module called with Honeywell Part No.

50180228-001	RFSOM WBT, SOM MODULE, WIFI 802.11AC BT 5.0 - NA
50180227-001	RFSOM WBT, SOM MODULE, WIFI 802.11AC BT 5.0 - ROW

This HWB11AC-PRT module is a Wi-Fi/BT system on module which will be placed inside the Honeywell products like printers, barcode scanners, RFID readers etc. To enable wireless connectivity. This module includes MAC & physical layer of 802.11a/b/g/n/ac and the Bluetooth modem.

This module operates on 5.0V DC Power supply with internal on-board regulation to generate 3.3v for powering ON all the circuits. The entire RF circuits is enclosed in RF shield of dimension 25mm X 25mm.

The module uses internal power amplifier and LNA for 2.4GHz frequency band and an external front end chip for 5GHz frequency band. All filters and diplexers are included in the module to ensure maximum power flatness and optimum VSWR. The module has one antenna chain for 1X1 output.

The module supports range of data rates from 1Mbps in 802.11b mode to MCS9 in 802.11ac mode. This chipset also supports concurrent operation of Bluetooth (Version5.0) for wireless connectivity during browsing or other device applications. Along with both standard and high speed (HS) Bluetooth data rates, Bluetooth low energy modes are also supported. Hardware WAPI acceleration engine, AES, TKIP, WPA and WPA2 are supported to provide the latest security requirement on your network.

The Device communicates with HOST using SDIO interface for WIFI and UART interface for BLUETOOTH.

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HWB11AC-PRT – System on Module Features

- *IEEE 802.11 a/b/g/n/ac WLAN*
- *Bluetooth 5.0 + HS*
- *Bluetooth-WLAN coexistence*
- *WiFi Wake on Wireless (WoW)*
- *20/40 MHz bandwidth at 2.4GHz*
- *20/40/80 MHz bandwidth at 5GHz*
- *Internal PA/LNA*
- *Module Size: 80 mm x 37 mm x 18mm, (LxWxH) Board*
- *802.11d/e/h/i/k/r*
- *Low Current consumption in IEEE PS and Deep Sleep*
- *WiFi Security methods: OPEN, WEP, WPA2-PSK, WPA2-1X PEAP-MSCHAPV2, PEAP-TLS, EAP-TTLS)*

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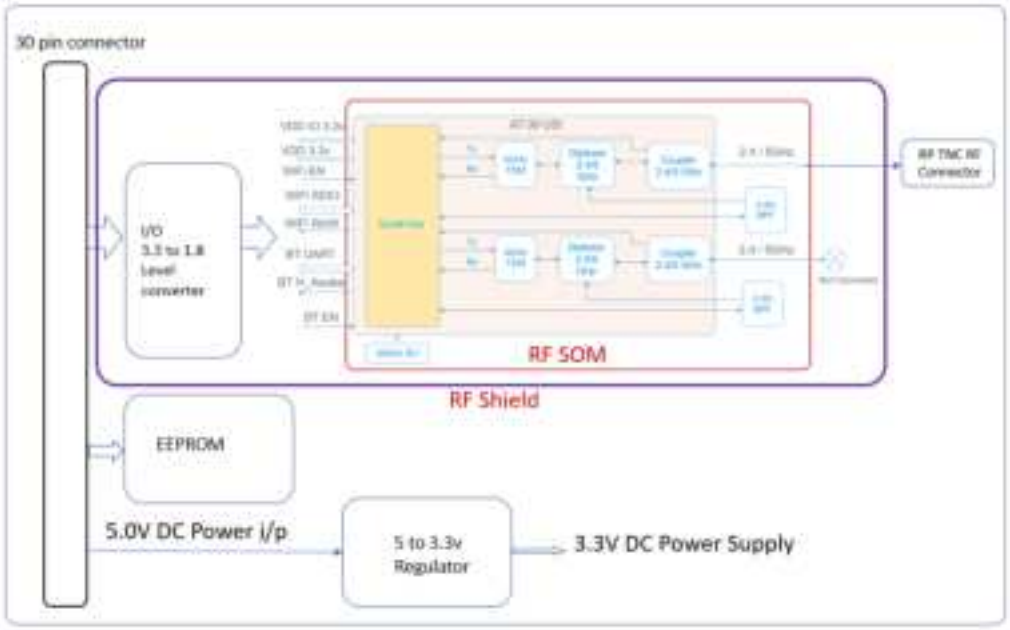
Chapter 2

2. Block Diagram



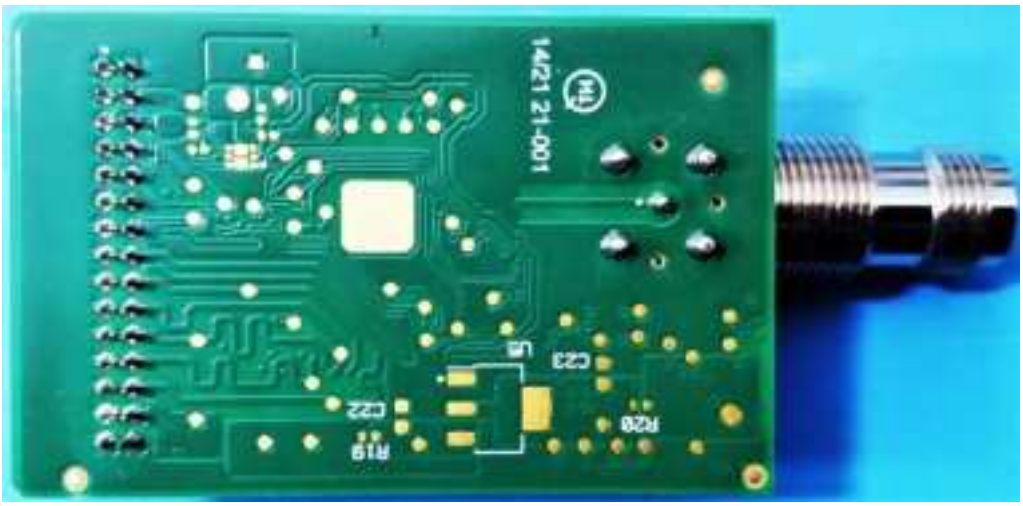
HWB11AC-PRT module is designed based on Qualcomm QCA6174A chipset solution. It supports generic SDIO, UART interface to connect the WLAN/BT to the host processor. A simplified block diagram of the HWB11AC-PRT module is depicted in above picture.

3. Technical Specifications

Recommended Operating Condition

Operating Temperature:	-20° to 60°C
Humidity	Max 95% (Non-condensing, relative humidity)
Storage Temperature:	- 30° to +70°C
Power Supply:	+5.0V DC, 0.5A
I/O Voltage levels	3.3v for Digital IOs, 1.8v for SDIO stream
Current Consumption	Tx output power @ 19 dBm on 11b 1M (single stream): 420mA (typ) Tx output power @ 15 dBm on 11n MCS0_HT20 (single stream-5g): 470mA (typ)

4. Footprint, Front & Back view



Bottom View of HWB11AC-PRT Module

Top View of HWB11AC-PRT Module

5. Pin Configurations of Module

S No	PINOUT	Signal Type
1	GND	Ground
2	GND	Ground
3	BT_UART_CTS_3V3	Input/Output
4	1.8V Dig I/O PS	Input/Output
5	BT_UART_RTS_3V3	Input/Output
6	BT_HOST_WAKE_3V3	Input/Output
7	BT_UART_TX_3V3	Input/Output
8	EEPROM_SDA	Input/Output
9	BT_UART_RX_3V3	Input/Output
10	EEPROM_SCL	Input/Output
11	BT_EN_3V3	Input/Output
12	WIFI_WAKE_ON_3V3	Input/Output
13	GND	Ground
14	WL_EN_3V3	Input/Output
15	GND	Ground
16	SDIO_CLK	Input/Output
17	GND	Ground
18	SDIO_D3	Input/Output
19	GND	Ground
20	SDIO_D2	Input/Output
21	GND	Ground
22	SDIO_D1	Input/Output
23	GND	Ground
24	SDIO_D0	Input/Output
25	GND	Ground
26	SDIO_CMD	Input/Output
27	5.0v DC Power Supply	5.0v DC Power Supply
28	5.0v DC Power Supply	5.0v DC Power Supply
29	GND	Ground
30	GND	Ground

6. Wireless Specifications

WLAN

The HWB11AC-PRT module complies with the following features and standards.

Features	Description
WLAN Standards	IEEE 802 11a/b/g/n/ac
Antenna Port	Support 1 streaming with Ant 0 (Ant1 is disabled)
Frequency Band	2.400 GHz – 2.484 GHz 4.900 GHz – 5.835 GHz*
Number of Sub Channels	1~ 11Channels 36~ 48,52~ 64, 100~ 140, 149~ 165 Channels
Modulation	DSSS, CCK, OFDM, BPSK, QPSK,16QAM, 64QAM
Supported data rates	1, 2, 5.5, 11 (Mbps) 6, 9, 12, 18, 24, 36, 48, 54 (Mbps) HT20_MCS0 ~ HT20_MCS7 VHT80_MCS0 ~ VHT80_MCS9
*Note: Band 5600 MHz to 5650 MHz is not supported for Canada	

BLUETOOTH

The Radio specification is compliant with the Bluetooth 5.0 + EDR specification

Features	Description
Frequency Band	2400 MHz ~ 2483.5 MHz
Number of Channels	79 channels
Modulation	FHSS (Frequency Hopping Spread Spectrum), GFSK, DPSK
Supported data rates	BLE -1Mbps BT – 1Mbps, 2Mbps, 3Mbps
Antenna Port	Single Antenna for Wi-Fi and BT

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WLAN Radio Specifications
IEEE Specifications

WiFi TX EVM follow the IEEE spec that as list in the table below:

Characteristics	**IEEE Spec**		**Unit**
RF Average Output EVM (11b)	@1 Mbps	35	%
	@11 Mbps	35	%
RF Average Output EVM (11a/g)	@6 Mbps	-5	dB
	@54 Mbps	-25	dB
RF Average Output EVM (11n)	@ MCS0	-5	dB
	@ MCS7	-27	dB
RF Average Output EVM (11ac)	@ MCS0	-5	dB
	@ MCS9	-32	dB

Wi-Fi 2.4 GHz Power Table (FCC/IC)

802.11b _1Mbps	
Channel Frequency (MHz)	Power level
2412	17.5
2437	19
2462	19
802.11b _11Mbps	
Channel Frequency (MHz)	Power level
2412	17.5
2437	19
2462	19
802.11g_6Mbps	
Channel Frequency (MHz)	Power level
2412	13.5
2437	17
2462	14
802.11g_54Mbps	
Channel Frequency (MHz)	Power level
2412	13.5
2437	16.5
2462	14

802.11n_HT 20_MCS0	
Channel Frequency (MHz)	Power level
2412	16
2437	16
2462	16
802.11n_HT 20_MCS7	
Channel Frequency (MHz)	Power level
2412	16
2437	16
2462	14
802.11n_40_MCS0	
Channel Frequency (MHz)	Power level
2422	15
2437	15
2452	15
802.11n_40_MCS7	
Channel Frequency (MHz)	Power level
2422	15
2437	15
2452	13

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Wi-Fi 5 GHz Power Table (FCC/IC)

6Mbps	
5180	17
5240	17
5260	17
5320	17
5500	17
5700	17
5745	17
5825	17
54Mbps	
5180	17
5240	17
5260	17
5320	17
5500	17
5700	17
5745	16
5825	16
VHT20_MCS0	
5180	16
5240	16
5260	16
5320	16
5500	16
5700	16
5745	16
5825	16
VHT20_MCS8	
5180	15
5240	15
5260	15
5320	15
5500	15
5700	15
5745	15
5825	15

HT20_MCS0	
5180	16
5240	16
5260	16
5320	16
5500	16
5700	16
5745	16
5825	16
HT20_MCS7	
5180	16
5240	16
5260	16
5320	16
5500	16
5700	16
5745	16
5825	16
HT40_MCS0	
5190	15
5230	15
5270	15
5510	15
5590	15
5670	15
5755	15
5795	15
HT40_MCS7	
5190	15
5230	15
5270	15
5510	15
5590	15
5670	15
5755	15
5795	15

VHT40_MCS0	
5190	15
5230	15
5270	15
5510	15
5590	15
5670	15
5755	15
5795	15
VHT40_MCS9	
5190	15
5230	15
5270	15
5510	15
5590	15
5670	15
5755	15
5795	15
ac_VHT80_MCS0	
5210	14
5290	14
5530	14
5690	14
5755	14
ac_VHT80_MCS9	
5210	14
5290	14
5530	14
5690	14
5755	14

Note: Band 5600 MHz to 5650 MHz is not supported for Canada

Wi-Fi 2.4 GHz Power Table (ETSI)

802.11b _1Mbps	
Channel Frequency (MHz)	Power level
2412	11.00
2437	11.00
2472	11.00
802.11b _11Mbps	
Channel Frequency (MHz)	Power level
2412	11.00
2437	11.00
2472	11.00
802.11g_6Mbps	
Channel Frequency (MHz)	Power level
2412	12.00
2437	12.00
2472	12.00
802.11g_54Mbps	
Channel Frequency (MHz)	Power level
2412	12.00
2437	12.00
2472	12.00

802.11n_HT 20_MCS0	
Channel Frequency (MHz)	Power level
2412	12.00
2437	12.00
2472	12.00
802.11n_HT 20_MCS7	
Channel Frequency (MHz)	Power level
2412	12.00
2437	12.00
2472	12.00
802.11n_40_MCS0	
Channel Frequency (MHz)	Power level
2422	12.00
2437	12.00
2462	12.00
802.11n_40_MCS7	
Channel Frequency (MHz)	Power level
2422	12.00
2437	12.00
2462	12.00

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Wi-Fi 5 GHz Power Table (ETSI)

802.11a_6Mbps	
Channel Frequency (MHz)	Power level
5180	16.00
5240	16.00
5260	16.00
5320	14.00
5500	14.00
5680	14.00

802.11a_54Mbps	
Channel Frequency (MHz)	Power level
5180	16.00
5240	16.00
5260	15.50
5320	14.00
5500	14.00
5680	14.00

802.11ac_VHT20_MCS0	
Channel Frequency (MHz)	Power level
5180	15.50
5240	15.50
5260	15.50
5320	14.00
5500	14.50
5680	14.50

802.11n_VHT40_MCS0	
Channel Frequency (MHz)	Power level
5190	16.00
5230	16.00
5270	16.00
5310	16.00
5510	15.00
5670	15.00

802.11n_VHT40_MCS9	
Channel Frequency (MHz)	Power level
5190	16.00
5230	16.00
5270	16.00
5310	16.00
5510	15.00
5670	15.00

802.11n_HT20_MCS7	
Channel Frequency (MHz)	Power level
5180	15.00
5240	15.00
5260	15.00
5320	14.00
5500	15.00
5680	15.00

802.11n_HT40_MCS0	
Channel Frequency (MHz)	Power level
5190	16.00
5230	16.00
5270	15.50
5310	16.00
5510	15.00
5670	15.00

802.11n_HT40_MCS7	
Channel Frequency (MHz)	Power level
5190	16.00
5230	16.00
5270	15.50
5310	16.00
5510	15.00
5670	15.00

802.11n_VHT80_MCS0	
Channel Frequency (MHz)	Power level
5210	14.00
5290	14.00
5530	14.00
5610	14.00

802.11n_VHT80_MCS9	
Channel Frequency (MHz)	Power level
5210	14.00
5290	14.00
5530	14.00
5610	14.00

BT & BLE 2.4GHz (ETSI & FCC/IC)

BLE 2.4GHz

1Mbps	
Channel Frequency (MHz)	Power level
2402	4.00
2440	4.00
2480	4.00

1Mbps, 2Mbps & 3Mbps

Channel Frequency	Power Level
2402	9 dBm
2440	9 dBm
2480	9 dBm

The HWB11AC-PRT module 2.4GHz Wi-Fi Sensitivity as list in the table below:

Receiver Characteristics	Typ.	Max.	Unit
PER <8%, Rx Sensitivity @ 1 Mbps	-97	-82	dBm
PER <8%, Rx Sensitivity @ 11 Mbps	-89	-76	dBm
PER <10%, Rx Sensitivity @ 6 Mbps	-91	-82	dBm
PER <10%, Rx Sensitivity @ 54 Mbps	-76	-65	dBm
PER <10%, Rx Sensitivity @ MCS0_HT20	-91	-82	dBm
PER <10%, Rx Sensitivity @ MCS7_HT20	-73	-64	dBm

The HWB11AC-PRT module 5GHz Wi-Fi Sensitivity as list in the table below:

Receiver Characteristics	Typ.	Max.	Unit
PER <10%, Rx Sensitivity @ 6 Mbps	-94	-82	dBm
PER <10%, Rx Sensitivity @ 54 Mbps	-78	-65	dBm
PER <10%, Rx Sensitivity @ MCS0_HT20	-93	-82	dBm
PER <10%, Rx Sensitivity @ MCS7_HT20	-75	-64	dBm
PER <10%, Rx Sensitivity @ MCS0_VHT80	-87	-76	dBm
PER <10%, Rx Sensitivity @ MCS7_VHT80	-62	-51	dBm

BLUETOOTH Radio Characteristics

Parameter	Conditions	Min.	Typ.	Max	Unit
Basic Rate					
Output Power	Average Power	8	9	10	dBm
Frequency Range		2400	…	2483.5	MHz
Sensitivity (BER)	BER ≦0.1%		-92	-70	dBm
Maximum Input Level	BER ≦0.1%			-20	dBm
EDR					
Relative Power	π/4-DQPSK	-4	0	1.0	dBm
	8DPSK	-4	0	1.0	dBm
EDR Sensitivity (BER)	π/4-DQPSK	…	-91	-70	dBm
	BER ≦0.01%				
	8DPSK	…	-86	-70	dBm
	BER ≦0.01%				
BLE					
BLE Output Power	Average Power	-4	2	6	dBm
BLE Sensitivity (PER)	PER ≦30.8%	…	-95	-70	dBm
BLE Maximum Input Level	PER ≦30.8%	…	…	-10	dBm

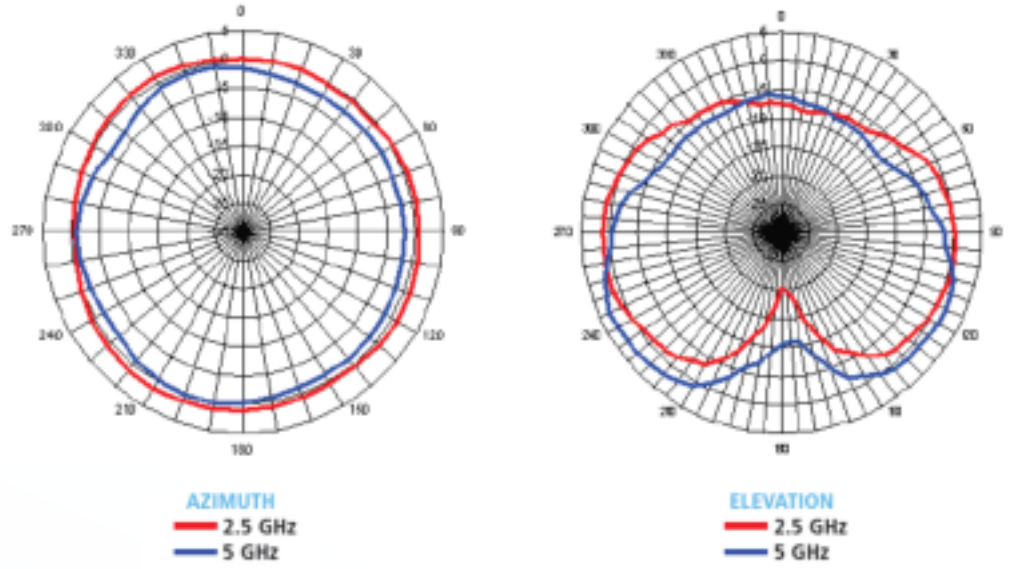
7. Antenna Type & Specifications

Module to be used with Antenna part no: MAF94367, Make: Laird Technologies

Honeywell part no: 805-833-001

PARAMETER	SPECIFICATION	
Antenna type	Right-angle duck style	
Frequency	2.4-2.5GHz	4.9-5.875GHz
Average Efficiency	67%	76%
Gain	2.35	3.37
VSWR	< 2:1	< 2:1
Input Impedance	50 OHM	
Polarization	Vertical	
Size	141mm	
Connector	RPTNC	
RoHS compliant	Yes	

ANTENNA PATTERNS



This radio transmitter [IC:1693B-HWB11] has been approved by Innovation, Science and Economic Development Canada to operate with the antenna types listed above, with the maximum permissiblegain 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.

— Le présent émetteur radio [IC:1693B-HWB11] a été approuvé par Innovation, Sciences et Développement économique 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 pour tout type figurant sur la liste, sont trictement interdits pour l'exploitation de l'émetteur

8. RF Layout & Design Guidelines

RF Layout & Design Guidelines

I. Do not run antenna cables directly above or directly below the radio module.

II. Do not run any high-speed digital lines below the radio.

III. Use proper electro-static-discharge (ESD) procedures when installing the HWB11AC-PRT module.

IV. Use non-conductive labels and to be pasted over the EMI shield provided on the module.

9. Agency Approvals

FCC:

Model: **HWB11AC-PRT**
FCC ID: **HD5-HWB11**

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. However, there is no guarantee that interference will not occur in a installation. If this equipment does cause harmful interference to radio or 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 technician for help.
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 my cause undesired operation.

Caution:
MODIFICATION: Any changes or modifications not expressly approved by the grantee of this device could void the user's authority to operate the device.
INSTALL & OPERATION: The equipment should be installed and operated with minimum distance 20cm between the radiator & your body.

Industry Canada

Model: HWB11AC-PRT
IC: 1693B-HWB11
This device complies with Industry Canada 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.
Changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate the equipment.

Leprésent appareil est conforme aux CNR d'Industrie Canada applicable aux appareils 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 radioélectrique subi, meme si le brouillage est susceptible d'en compromettre le fonctionnement."
Cet équipement doit être installé et utilisé avec une distance minimale de 20cm entre le radiateur et votre corps.

Note:

Within the 5.15 to 5.25 GHz band, UNII devices will be restricted to indoor operations only.

Dans la bande de 5,15 à 5,25 GHz, les appareils UNII seront restreints aux opérations intérieures.

10. Labelling Guidelines for Products

The proposed FCC IC label format is to be placed on the module. If it is not visible when the module is installed into the system, “Contains FCC ID: HD5-HWB11, Contains IC:1693B-HWB11” shall be placed on the outside of final host system.

Étiquetage le format proposé de l'étiquette IC de fac doit être placé sur le module.Si le module n'est pas visible lorsqu'il est installé dans le système, contenant l'ID FCC ID: HD5-HWB11, contenant l'IC: 1693B-HWB11 doit être placé à l'extérieur du système hôte final.