

DHUR-AZ53 a/b/g/n/ac 1x1 Module User Manual

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Product Introduction

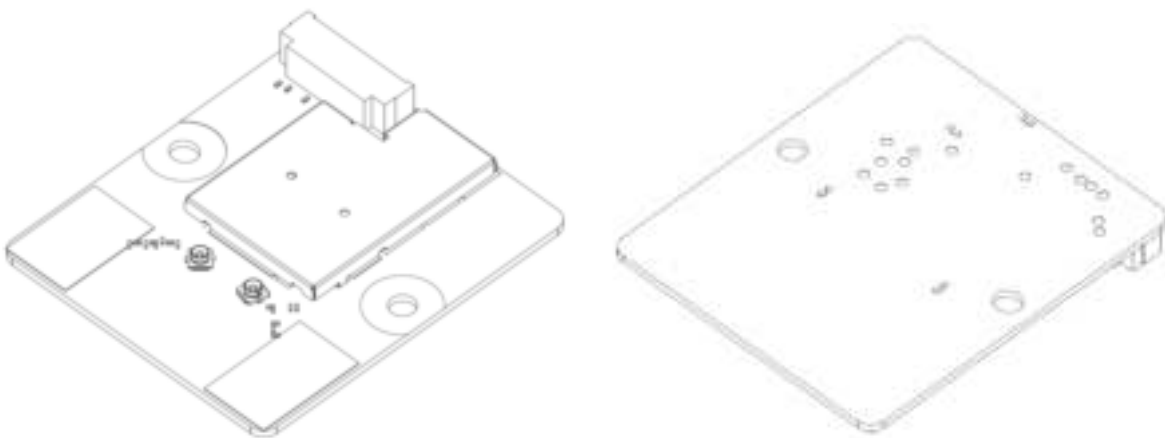
DHUR-AZ53 is an 802.11 a/b/g/n/ac WLAN/Bluetooth 5.0 combo module with USB interface based on MediaTek MT7653BUN chipset solution.

1-1. Features

- IEEE 802.11a/b/g/n/ac compatible + Bluetooth 5.0.
- Support 20MHz, 40MHz and 80MHz bandwidth in 2.4GHz band and 5GHz band.
- Support MU-MIMO TX/RX, STBC, LDPC, TX Beamformer and RX Beamformee.
- Supports Bluetooth 5 dual mode for 4x the range, 2x the speed
- Support SCO and eSCO link with re-transmission, up to 7 BT link 16 BLE link.
- 1 Wi-Fi external antenna and 1 BT external antenna
- PCB 4 Layers with 46.5 x 40 x1.0 mm³

1-2.Interfaces and Power supply

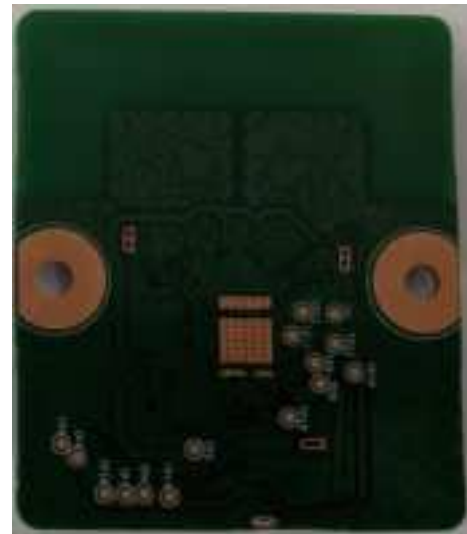
- Power supply with VCC 5.0
- 10 pin wire to board
- USB 2.0 Interface



2 Product Photo



Top Side



Bottom Side

3. Product Specification

3-1. Electrical Specification

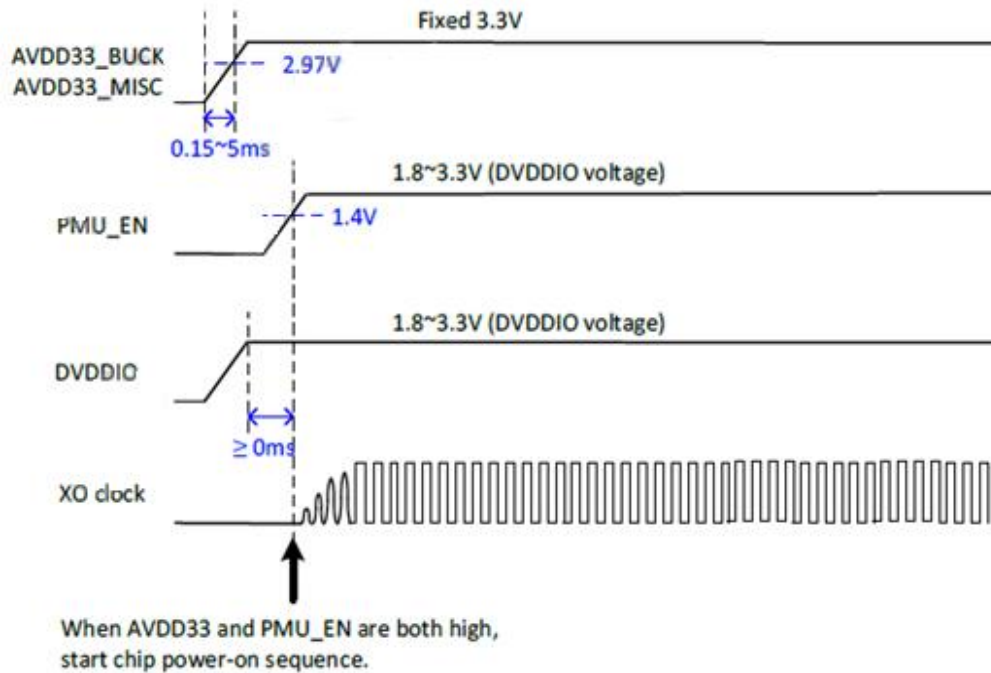
3-1-1. Absolute Maximum Ratings

Symbol (Board level)	Description	Min.	Max.	Units
5V	5V power supply	0	6.0	V
RESET	Controlled by SOC, GPIO input	-0.3	3.63	V
BT_WAKE_HOST	BT wake up host, GPIO output	-0.3	3.63	V
WoWLAN	Wake on Wireless LAN, GPIO output	-0.3	3.63	V
BT_IR	BT_IR signal from MT7658, GPIO output	-0.3	3.63	V
GPIO_X	BT_IR signal select, GPIO output	-0.3	3.63	V
H _{storage}	Storage humidity	5	85	%RH
T _{storage}	Storage temperature	-40	85	°C

3-1-2. Recommended Operating Conditions

Symbol (Board level)	Status	Description	Min.	Typ.	Max.	Units
5V	--	5V power supply	4.5	5.0	5.5	V
RESET	V _{IH}	3.3V Supply Voltage	2.97	3.3	3.63	V
WoWLAN	V _{OH}	Wake on wireless LAN	2.97	3.3	3.63	V
BT_WAKE_HOST	V _{IH}	BT wake up host	2.97	3.3	3.63	V
BT_IR	V _{OH}	BT_IR signal form MT7658	2.97	3.3	3.63	V
GPIO_X	V _{IH}	BT_IR signal select	2.97	3.3	3.63	V
T _{operating}	--	Operating temperature	-10	--	60	°C
H _{operating}	--	Operating humidity	5	--	95	%RH

3-2. Chip Sequence



3-3. Wi-Fi Portion

Item	Key specifications
Main chipset	MT7653BUN
TX/RX	1T1R
Frequency range	2.400 ~ 2.497GHz, 5.15GHz ~ 5.85GHz
Modulation technique	➤ 802.11 a/b/g DSSS (DBPSK, DQPSK, CCK) OFDM (BPSK, QPSK, 16-QAM, 64-QAM) DSSS (Direct Sequence Spread Spectrum) with DBPSK (Differential Binary Phase Shift Keying 1Mbps), DQPSK (Differential Quaternary Phase Shift Keying 2Mbps), CCK (Complementary Code Keying 5.5&11Mbps), OFDM (Orthogonal Frequency Division Multiplexing with BPSK for 6,9Mbps 、 QPSK for 12,18Mbps 、 16QAM for 24,36Mbps 、 64QAM for 48,54Mbps) ➤ 802.11n a/g OFDM (BPSK, QPSK, 16-QAM, 64-QAM) ➤ 802.11 ac OFDM (BPSK, QPSK, 16-QAM, 64-QAM, 256-QAM)
Host interface	➤ USB2.0

Power consumption @25 °C	Description	Current	
		average	Unit
	Sleep mode, radio off	1.23	mA
	2.4GHz RX Power saving, DTIM=1	2.39	mA
	2.4GHz RX Active, HT20, MCS7	107	mA
	2.4GHz TX CCK, 11Mbps	413	mA
	2.4GHz TX HT20, MCS7	342	mA
	2.4GHz TX HT20, MCS0	365	mA
	5GHz VHT80 RX Listen, 1RX	129	mA
	5GHz RX Active, VHT80, MCS9, Nss=1	150	mA
	5GHz TX VHT80, MCS9, Nss=1	405	mA
	5GHz TX VHT80, MCS0, Nss=1	426	mA

Output power (per chain; 2.4G tolerance +/-2.5 dB, 5G tolerance +/-3,0dB)	➤ 802.11a								
	Test Frequencies	6-36_Target	48_Target	54_Target					
	5180	15.5	15.5	14.5					
	5320	15.5	15.5	14.5					
	5500	15.5	15.5	14.5					
	5600	15.5	15.5	14.5					
	5700	15.5	15.5	14.5					
	5825	15.5	15.5	14.5					
	➤ 802.11b								
	Test Frequencies	1/2_Target	5.5_Target	11_Target					
	2412	18.5	18.5	18.5					
	2472	18.5	18.5	18.5					
	2484	18.5	18.5	18.5					
	➤ 802.11g								
	Test Frequencies	6-12_Target	18_Target	24_Target	36_Target	48_Target	54_Target		
	2412	16.5	16.5	16.5	16.5	16.5	15.5		
	2442	16.5	16.5	16.5	16.5	16.5	15.5		
	2472	16.5	16.5	16.5	16.5	16.5	15.5		
	➤ 802.11n								
	Freq. Range: HT20								
	Test Freq	MCS 0	MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7
	5180	15	15	15	15	15	15	15	15
	5240	15	15	15	15	15	15	15	15
	5320	15	15	15	15	15	15	15	15
	5500	15	15	15	15	15	15	15	15
	5700	15	15	15	15	15	15	15	15
	5745	15	15	15	15	15	15	15	15
	5825	15	15	15	15	15	15	15	15
	Freq. Range: HT40								
	Test Freq	MCS 0	MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7
	5190	15	15	15	15	15	15	15	15
	5230	15	15	15	15	15	15	15	15
	5270	15	15	15	15	15	15	15	15
	5510	15	15	15	15	15	15	15	15
	5670	15	15	15	15	15	15	15	15
	5755	15	15	15	15	15	15	15	15
	5795	15	15	15	15	15	15	15	15
	Freq. Range: HT20								
	Test Freq	MCS 0	MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7
	2412	16	16	16	16	16	16	16	16
	2437	16	16	16	16	16	16	16	16
	2472	16	16	16	16	16	16	16	16
	Freq. Range: HT40								
	Test Freq	MCS 0	MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7
	2412	16	16	16	16	16	16	16	16
	2437	16	16	16	16	16	16	16	16
	2472	16	16	16	16	16	16	16	16

	➤ 802.11ac Freq. Range: VHT20 <table><tr><td>Test Freq</td><td>MCS 0</td><td>MCS 1</td><td>MCS 2</td><td>MCS 3</td><td>MCS 4</td><td>MCS 5</td><td>MCS 6</td><td>MCS 7</td><td>MCS 8</td><td>MCS 9</td></tr><tr><td>5180</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td></tr><tr><td>5240</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td></tr><tr><td>5320</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td></tr><tr><td>5500</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td></tr><tr><td>5700</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td></tr><tr><td>5745</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td></tr><tr><td>5825</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td><td>15</td></tr></table> Freq. Range: VHT40 <table><tr><td>Test Freq</td><td>MCS 0</td><td>MCS 1</td><td>MCS 2</td><td>MCS 3</td><td>MCS 4</td><td>MCS 5</td><td>MCS 6</td><td>MCS 7</td><td>MCS 8</td><td>MCS 9</td></tr><tr><td>5210</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td></tr><tr><td>5290</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td></tr><tr><td>5530</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td></tr><tr><td>5610</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td></tr><tr><td>5690</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td></tr><tr><td>5775</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td></tr></table> Freq. Range: VHT80 <table><tr><td>Test Freq</td><td>MCS 0</td><td>MCS 1</td><td>MCS 2</td><td>MCS 3</td><td>MCS 4</td><td>MCS 5</td><td>MCS 6</td><td>MCS 7</td><td>MCS 8</td><td>MCS 9</td></tr><tr><td>5210</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td></tr><tr><td>5290</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td></tr><tr><td>5530</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td></tr><tr><td>5610</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td></tr><tr><td>5690</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td></tr><tr><td>5775</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td><td>14</td></tr></table>										Test Freq	MCS 0	MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7	MCS 8	MCS 9	5180	15	15	15	15	15	15	15	15	15	15	5240	15	15	15	15	15	15	15	15	15	15	5320	15	15	15	15	15	15	15	15	15	15	5500	15	15	15	15	15	15	15	15	15	15	5700	15	15	15	15	15	15	15	15	15	15	5745	15	15	15	15	15	15	15	15	15	15	5825	15	15	15	15	15	15	15	15	15	15	Test Freq	MCS 0	MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7	MCS 8	MCS 9	5210	14	14	14	14	14	14	14	14	14	14	5290	14	14	14	14	14	14	14	14	14	14	5530	14	14	14	14	14	14	14	14	14	14	5610	14	14	14	14	14	14	14	14	14	14	5690	14	14	14	14	14	14	14	14	14	14	5775	14	14	14	14	14	14	14	14	14	14	Test Freq	MCS 0	MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7	MCS 8	MCS 9	5210	14	14	14	14	14	14	14	14	14	14	5290	14	14	14	14	14	14	14	14	14	14	5530	14	14	14	14	14	14	14	14	14	14	5610	14	14	14	14	14	14	14	14	14	14	5690	14	14	14	14	14	14	14	14	14	14	5775	14	14	14	14	14	14	14	14	14	14
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	<table><tr><td>Modulation</td><td>Code Rate</td><td>IEEE Spec (1Rx dBm)</td><td>Typical (1Rx dBm)</td></tr><tr><td>BPSK</td><td>1/2</td><td>-82</td><td>-94</td></tr><tr><td>BPSK</td><td>3/4</td><td>-81</td><td>-90</td></tr><tr><td>QPSK</td><td>1/2</td><td>-79</td><td>-91</td></tr><tr><td>QPSK</td><td>3/4</td><td>-77</td><td>-88</td></tr><tr><td>16-QAM</td><td>1/2</td><td>-74</td><td>-84</td></tr><tr><td>16-QAM</td><td>3/4</td><td>-70</td><td>-82</td></tr><tr><td>64-QAM</td><td>2/3</td><td>-66</td><td>-79</td></tr><tr><td>64-QAM</td><td>3/4</td><td>-65</td><td>-76</td></tr></table>										Modulation	Code Rate	IEEE Spec (1Rx dBm)	Typical (1Rx dBm)	BPSK	1/2	-82	-94	BPSK	3/4	-81	-90	QPSK	1/2	-79	-91	QPSK	3/4	-77	-88	16-QAM	1/2	-74	-84	16-QAM	3/4	-70	-82	64-QAM	2/3	-66	-79	64-QAM	3/4	-65	-76																																																																																																																																																																																																														
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➤ **802.11ng (HT20)**

Modulation	Code Rate	IEEE Spec (1Rx dBm)	Typical (1Rx dBm)
(MCS0) BPSK	1/2	-82	-94
(MCS1) QPSK	1/2	-79	-91
(MCS2) QPSK	3/4	-77	-88
(MCS3) 16-QAM	1/2	-74	-82
(MCS4) 16-QAM	3/4	-70	-81
(MCS5) 64-QAM	2/3	-66	-79
(MCS6) 64-QAM	3/4	-65	-77
(MCS7) 64-QAM	5/6	-64	-74

(HT40)

Modulation	Code Rate	IEEE Spec (1Rx dBm)	Typical (1Rx dBm)
(MCS0) BPSK	1/2	-79	-88
(MCS1) QPSK	1/2	-76	-86
(MCS2) QPSK	3/4	-74	-84
(MCS3) 16-QAM	1/2	-71	-81
(MCS4) 16-QAM	3/4	-67	-78
(MCS5) 64-QAM	2/3	-63	-74
(MCS6) 64-QAM	3/4	-62	-69
(MCS7) 64-QAM	5/6	-61	-65

➤ **802.11na (HT20)**

Modulation	Code Rate	IEEE Spec (1Rx dBm)	Typical (1Rx dBm)
(MCS0) BPSK	1/2	-82	-89
(MCS1) QPSK	1/2	-79	-86
(MCS2) QPSK	3/4	-77	-84
(MCS3) 16-QAM	1/2	-74	-82
(MCS4) 16-QAM	3/4	-70	-79
(MCS5) 64-QAM	2/3	-66	-74
(MCS6) 64-QAM	3/4	-65	-73
(MCS7) 64-QAM	5/6	-64	-66

➤ **(HT40)**

Modulation	Code Rate	IEEE Spec (1Rx dBm)	Typical (1Rx dBm)
(MCS0) BPSK	1/2	-79	-86
(MCS1) QPSK	1/2	-76	-84
(MCS2) QPSK	3/4	-74	-82
(MCS3) 16-QAM	1/2	-71	-80
(MCS4) 16-QAM	3/4	-67	-80
(MCS5) 64-QAM	2/3	-63	-78
(MCS6) 64-QAM	3/4	-62	-76
(MCS7) 64-QAM	5/6	-61	-73

➤ **802.11ac (HT80)**

Modulation	Code Rate	IEEE Spec (1Rx dBm)	Typical (1Rx dBm)
(MCS0) BPSK	1/2	-76	-88
(MCS1) QPSK	1/2	-73	-86
(MCS2) QPSK	3/4	-71	-83
(MCS3) 16-QAM	1/2	-68	-80
(MCS4) 16-QAM	3/4	-64	-78
(MCS5) 64-QAM	2/3	-60	-76
(MCS6) 64-QAM	3/4	-59	-73
(MCS7) 64-QAM	5/6	-58	-71
(MCS8) 256-QAM	3/4	-53	-65
(MCS9) 256-QAM	5/6	-51	-59

Transmit spectrum mask	For transmitted spectral mask for 11b shall be less than -50dBm for 22MHz<f<fc+22MHz. For transmitted spectral mask for 11g shall be less than -40dBm for fc-30MHz<f<fc+30MHz. For transmitted spectral mask for 11n 20MHz shall be less than -45dBm for fc-30MHz<f<fc+30MHz. For transmitted spectral mask for 11n 40MHz shall be less than -45dBm for fc-60MHz<f<fc+60MHz.
Transmit spectrum flatness	For 802.11g the average energy of the constellations in each of spectral lines -16..-1 and +1..+16 will deviate no more than +/- 2dB from their average energy. For 802.11n 40MHz mode, the average energy of the constellations in each of spectral lines -42..-2 and +2..+42 will deviate no more than +/- 2dB from their average energy. The transmitted spectral flatness should be within +/- 4dB.
Transmit center frequency tolerance	The transmitted center frequency tolerance shall be ±20 ppm maximum.
Carrier suppression	802.11a: The leakage of the center frequency component shall not exceed -15 dB relative to overall transmitted power or, equivalently, +2 dB relative to the average energy of the rest of the sub-carriers. 802.11b: The RF carrier suppression, measured at the channel center frequency, shall be at least 15 dB below the peak SIN(x)/x power spectrum. 802.11g: The leakage of the center frequency component shall not exceed -15 dB relative to overall transmitted power or, equivalently, +2 dB relative to the average energy of the rest of the sub-carriers. 802.11n: For all 20 MHz modes of transmission, the leakage of center frequency component shall not exceed -15 dB relative to overall transmitted power or, equivalently, +2 dB relative to the average energy of rest of sub-carriers. For all 40 MHz modes of transmission, the center frequency leakage shall not exceed -18 dB relative to overall transmitted power, or, equivalently, +2 dB relative to the average energy of rest of sub-carriers.
Transmit power on ramp and power down ramp time	➤ The transmitting power-on ramp for 10% to 90% of maximum power m shall be no greater than 2 μs. ➤ The transmitting power-down ramp for 90% to 10% of maximum power shall be no greater than 2 μs.
Receiver maximum input level	➤ 802.11a Modulation Code Rate IEEE Spec (1Rx dBm) >-30 ➤ 802.11b Modulation DBPSK IEEE Spec (1Rx dBm) >-10 DQPSK >-10 CCK >-10 ➤ 802.11g Modulation Code Rate IEEE Spec (1Rx dBm) >-20 ➤ 802.11na Modulation Code Rate IEEE Spec (1Rx dBm) >-30 ➤ 802.11ng Modulation Code Rate IEEE Spec (1Rx dBm) >-20 ➤ 802.11ac Modulation Code Rate IEEE Spec (1Rx dBm) >-30
PCB dimension	➤ 46.0+/-0.1mm x 40.00+/-0.1mm x 1.0+/-0.1mm 4L FR4

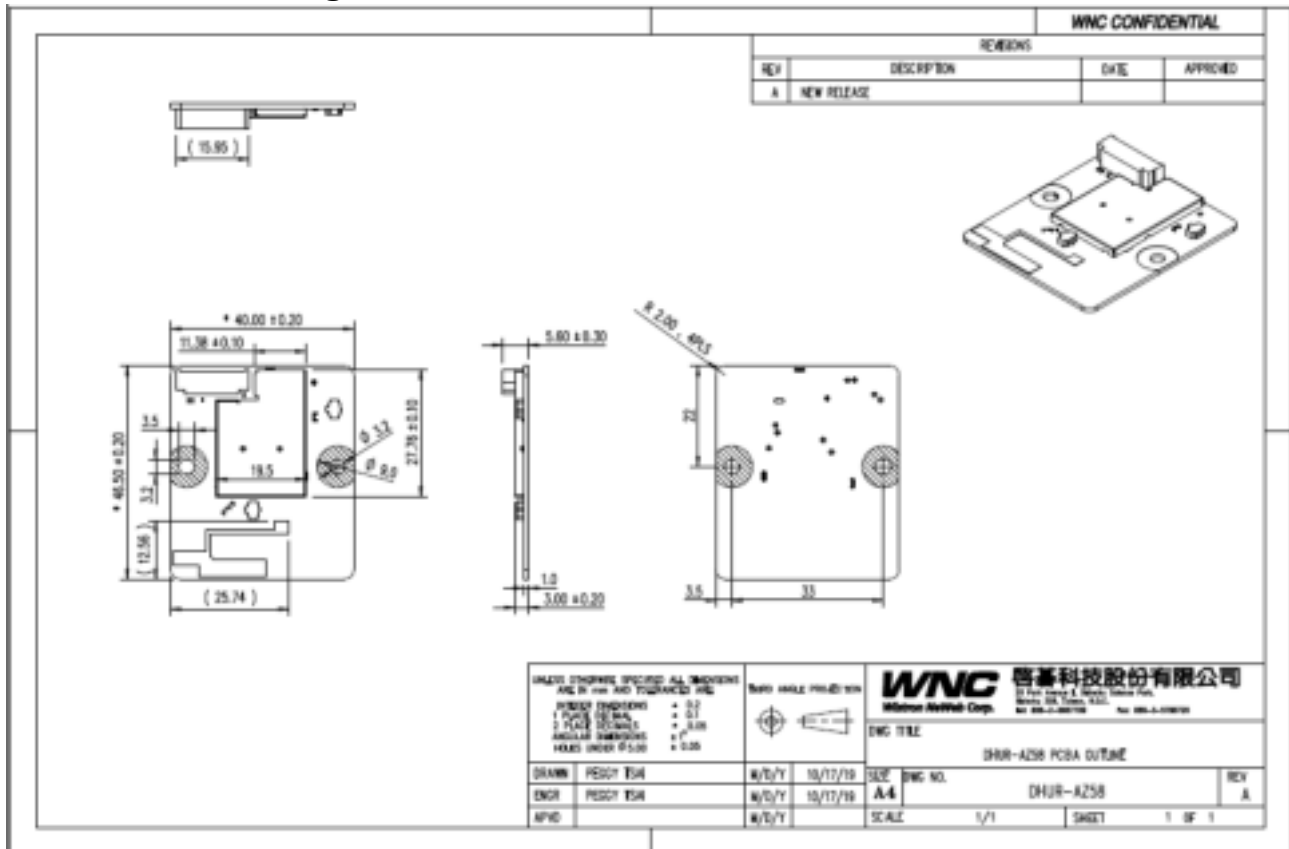
Transfer data rate	➤ 802.11a: 6, 9, 12, 18, 24, 36, 48, 54Mbps ➤ 802.11b: 1, 2, 5.5, 11Mbps ➤ 802.11g: 6, 9, 12, 18, 24, 36, 48, 54Mbps ➤ 802.11n: @800GI(400GI) ● 20MHz BW ▪ 1 Nss: 65(72.2) Mbps maximal ● 40MHz BW ▪ 1 Nss: 135(150) Mbps maximal ➤ 802.11ac: @800GI(400GI) ● 80MHz BW ▪ 1 Nss: 390(433.3) Mbps maximal
Security	WEP, WPA, WPA2, AES, TKIP
Operation temperature	-10° ~ 60° C
Storage temperature	- 45° ~ 85° C, R.H:90% (non-condensing)
Antenna	➤ 1 RF connector on module for Wi-Fi external antenna.

3.4 BT Portion

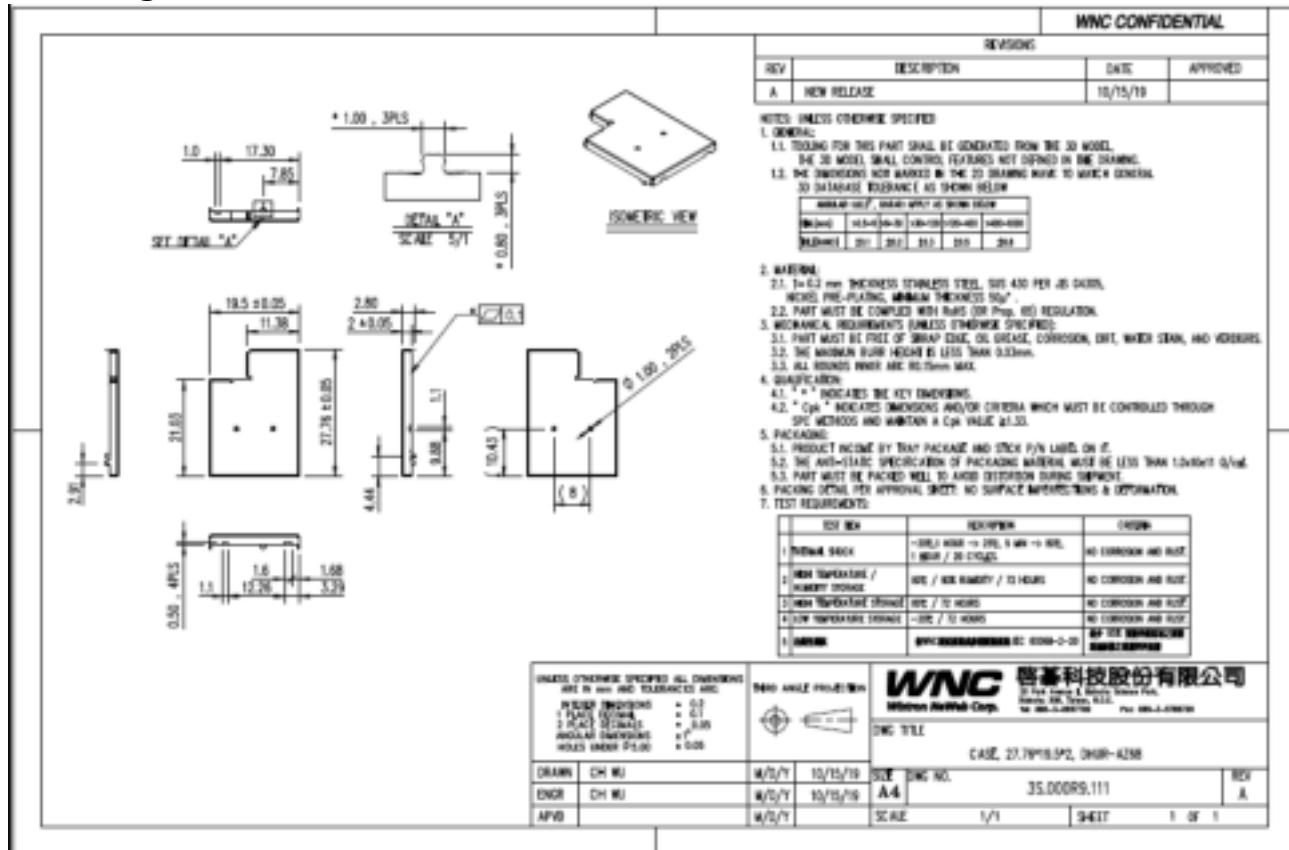
Item	Key specifications			
Main chipset	➤ MT7653BUN			
Compliance	➤ Bluetooth 5.0			
Frequency range	➤ 2400 ~ 2483.5MHz			
Initial carrier frequency tolerance	➤ +/- 40kHz (typical)			
Modulation technique	➤ Frequency hopping, 1600 hops/sec			
Channel spacing	➤ 1MHz			
Channels support	➤ 79 channels			
Power consumption @25 ° C				
	Description	Current		
		average	Unit	
		Sleep mode, radio off	1.73	mA
		Bluetooth TX	86.5	mA
		Bluetooth RX	29.4	mA
		Bluetooth SCO connection, HV3 packets + sniff mode + scan (Page scan interval = 1.28sec, inquiry scan interval = 2.56s, sniff interval = 500ms)	3.2	mA
		Bluetooth page scan + inquiry scan (Page scan interval = 1.28s, inquiry scan interval = 2.56s)	2.14	mA
		Bluetooth page scan (Page scan interval = 1.28s)	1.92	mA
	Note :			
※The maximum current consumption would be impacted by radiation environment and the driver mechanism.				
Output power (dBm)	➤ + 4 dBm ≤ Output Power ≤ +10dBm （ Class I Device ）			

Sensitivity	➤ -80 dBm (typ.) for pi/4-DQPSK, 0.1%BER
Operation temperature	➤ -10° ~ 60° C
Storage temperature	➤ -45° ~ 85° C, R.H. : 90% (non-condensing)
Antenna	➤ 1 RF connector on module for BT external antenna.

4. Mechanical Drawing



5. Shielding cover Information



6. Connector Information

Material:
 Insulation: High temperature plastic UL 94V-0, Color Nature(Halogen-Free)
 Contact : Phosphor Bronze
 Fixed Tab : Phosphor Bronze with Tin Plated

Dimension

Circuits	A	B	C
2	1.25(.049)	5.75(.228)	3.85(.152)
3	2.50(.098)	7.00(.276)	5.10(.201)
4	3.75(.146)	8.25(.325)	6.35(.250)
5	5.00(.197)	9.50(.374)	7.60(.299)
6	6.25(.246)	10.75(.423)	8.85(.348)
7	7.50(.295)	12.00(.472)	10.10(.398)
8	8.75(.344)	13.25(.522)	11.35(.447)
9	10.00(.394)	14.50(.571)	12.60(.496)
10	11.25(.443)	15.75(.620)	13.85(.545)
11	12.50(.492)	17.00(.669)	15.10(.594)
12	13.75(.541)	18.25(.718)	16.35(.644)
13	15.00(.591)	19.50(.768)	17.60(.693)
14	16.25(.640)	20.75(.817)	18.85(.742)
15	17.50(.689)	22.00(.866)	20.10(.791)
16	18.75(.738)	23.25(.915)	21.35(.840)
17	20.00(.787)	24.50(.964)	22.60(.890)
18	21.25(.837)	25.75(1.014)	23.85(.939)
19	22.50(.886)	27.00(1.063)	25.10(.988)
20	23.75(.935)	28.25(1.112)	26.35(1.037)

ORDERING CODE:
 C140 ** M * H RO -NH
 ① ② ③ ④ ⑤ ⑥ ⑦

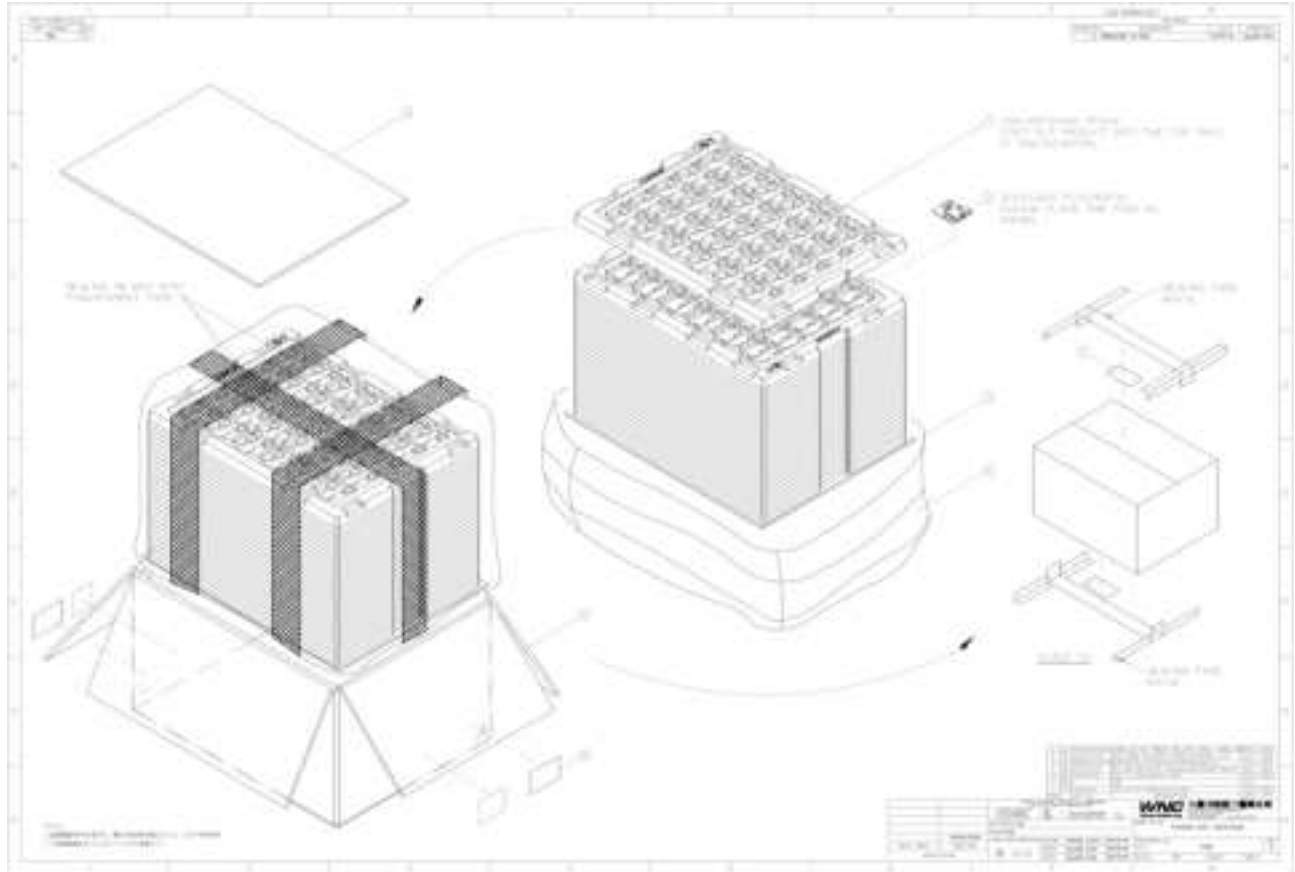
① SERIES NO.:
 ② NO. OF CIRCUITS:
 ③ CONTACTS TYPE: M= SMT
 ④ PLATING OPTION:
 1= TIN OVER NICKEL PLATED
 2= GOLD FLASH PLATING OVER 1.27μm(50μ") NICKEL
 ⑤ TAIL STYLE: H= RIGHT ANGLE
 ⑥ OPTION: RO= TAPE & REEL PACKING
 ⑦ -NH= FOR LEAD FREE IR PROCESSES AND HALOGEN-FREE

Recommended P.C. Board layout

7. Coaxial RF Connector

[illegible]

8. Packing



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 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 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.

IMPORTANT NOTE:

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

Country Code selection feature to be disabled for products marketed to the US/CANADA

Integration instructions for host product manufacturers

Applicable FCC rules to module

FCC Part 15.247

Summarize the specific operational use conditions

The module is must be installed in mobile device.

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
- 3) For all products market in US, OEM has to limit the operation channels in CH1 to CH11 for 2.4G band
by supplied firmware programming tool. OEM shall not supply any tool or info to the end-user regarding
to Regulatory Domain change.

As long as 3 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. 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.

Limited module procedures

Not applicable

Trace antenna designs

Not applicable

RF exposure considerations

20 cm separation distance and co-located issue shall be met as mentioned in "Summarize the specific operational use conditions".

Product manufacturer shall provide below text in end-product manual

"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."

Antennas

Brand	Model	Type	Peak gain (dBi)					
			Connector	2400~2483.5MHz	5150~5250MHz	5250~5350MHz	5470~5725MHz	5725~5850MHz
WNC	WF1_ANT	PIFA	NA	3.16	2.17	1.71	1.49	1.61
WNC	81.EK615.GAA	PIFA	IPEX	2.26	6.34	6.34	6.54	6.93
WNC	81.EK615.GAF	PIFA	IPEX	3.09	4.23	4.23	5.35	4.06

Label and Compliance Information

Product manufacturers need to provide a physical or e-label stating
"Contains FCC ID: NKR-DHURAZ53" with finished product

Information on Test Modes and Additional Testing Requirements

Test tool: QA Tool, Version: V0.02.6 for WLAN ; WCn Combo Tool, Version: V2.1749.00 for BT
shall be used to set the module to transmit continuously.

Additional Testing, Part 15 Subpart B Disclaimer

The module is only FCC authorized for the specific rule parts listed on the grant, and that 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

Pin Assignment

Pin Assignment				
Pin No.	Pin name	Remark	I/O	
1	RESET	Reset controlled by main SOC	I	
2	BT_WAKE_HOST	BT wake up host	O	
3	GND	GND	-	
4	WoWLAN	Wake on Wireless LAN	O	
5	GND	GND	-	
6	USB_DM	USB Communication signal USB_DM	I/O	
7	USB_DP	USB Communication signal USB_DP	I/O	
8	5V	VDD 5V	I	
9	BT_IR	BT_IR signal for MT7668	O	
10	GPIO_X	BT_IR signal select	O	

Wire to board connector: CI4010M1HR0-NH

Industry Canada statement:

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*

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.*

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; and

Operations in the 5.25-5.35GHz band are restricted to indoor usage only.

Avertissement:

- (i) les dispositifs fonctionnant dans la bande de 5 150 à 5 250 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;

Les opérations dans la bande de 5.25-5.35GHz sont limités à un usage intérieur seulement.

Radiation Exposure Statement:

This equipment complies with Canada 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 Canada limites d'exposition aux radiations dans un environnement non contrôlé. Cet équipement doit être installé et utilisé à distance minimum de 20cm entre le radiateur et votre corps.

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

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

As long as 1 condition 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:

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

Tant que les 1 condition 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

The final end product must be labeled in a visible area with the following: "Contains IC: 4441A-DHURAZ53".

Plaque signalétique du produit final

Le produit final doit être étiqueté dans un endroit visible avec l'inscription suivante: "Contient des IC: 4441A-DHURAZ53".

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.