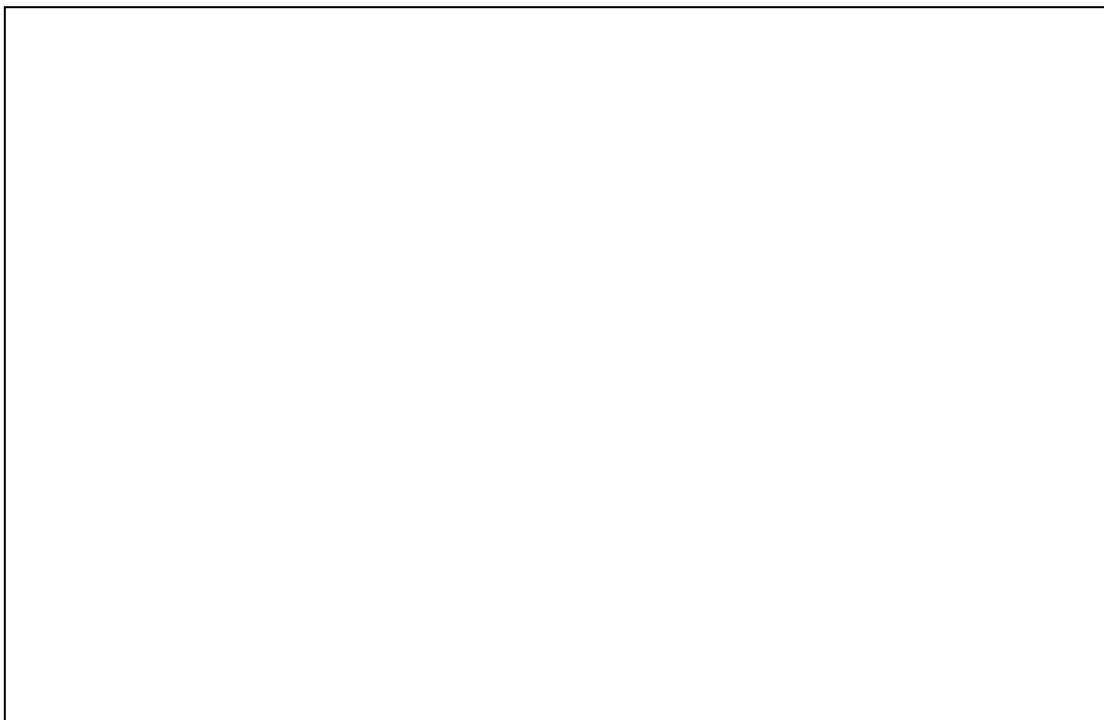


To Wistron

Date: 2017/12/19

Delivery Specifications

Product Description	WLAN 802.11ac a/b/g/n + Bluetooth 4.1 Combo Module
Customer Part Number	054.03007.M001
WNC Part Number	91DHUA13.G11
WNC Model Name	DHUA-W8S
Issue Version :	V1.0
Manufacturer	Wistron NeWeb Corporation (WNC) Address: 20 Park Avenue II Road, Hsinchu Science Park, Hsinchu 308, Taiwan, R.O.C. (ZIP Code: 308) Tel: +886-3-666-7799
Production Factory	Wistron NeWeb (Kunshan) Corporation Address: 789 Yujinxiang Road, Comprehensive Free Trade Zone, Kunshan City, Jiangsu Province, P.R.C (ZIP Code: 215300) Tel: 0086-512-5772-2688
Production Country	People's Republic of China
PO Reception & Invoice Release Company	ANC holding Corporation P.O. Box 3152, Road Town, Tortola, British Virgin Islands



Revision History

Version	Change history	Date
V1.0	Initial version	2017/12/19

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1. Product Introduction

DHUA-W8S is a WLAN / Bluetooth combo USB module based on Qualcomm Atheros QCA9378-7 chipset solution.

Features

- [WLAN] IEEE 802.11 ac/a/b/g/n compliance
- [WLAN] Supports 20 MHz at 2.4GHz and 20/40/80 MHz at 5 GHz.
- [WLAN] The maximum data rate up to 867 Mbps (5GHz, 80MHz, NSS2,MCS9, SGI)
- [BT] Bluetooth 4.1 (BDR/EDR/LE)
- [BT] Bluetooth class-1 or 2 transmitter operation
- Wake on WLAN/Bluetooth function
- Single-side SMT process (stamp module)
- Two RF connector for external antenna

Interfaces and Power supply

- 14 pins I/O stamp module
- WLAN / Bluetooth RF interface
- USB interface (USB 2.0 for WLAN, and USB 1.1 for Bluetooth)
- 3.3V/1.5A power supply required

2. Product Photograph

Top side

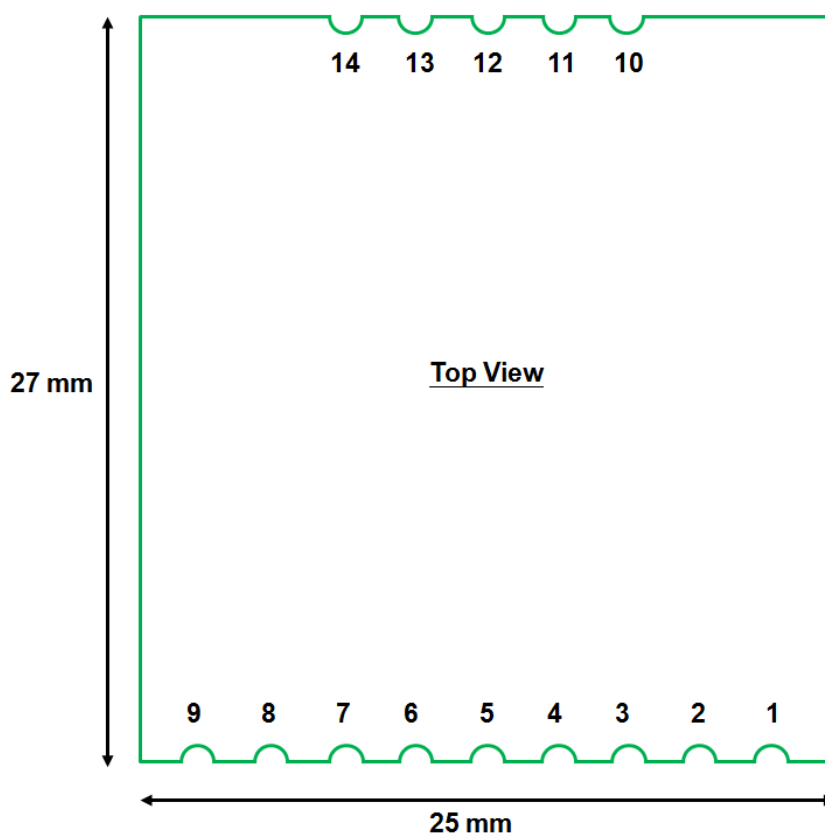


Bottom side



4. I/O Pin Definition

Pin No.	Pin name	Remark	I/O
1	+3.3V		I
2	+3.3V		I
3	USB_D-		I/O
4	USB_D+		I/O
5	GND		-
6	RESET#		I
7	WOWLAN#		O
8	GND		-
9	WOBT#		O
10	GND		-
11	GND		-
12	GND		-
13	GND		-
14	GND		-



5. Product Specification

5.1 WLAN portion

Item	Key specifications																																
Main chipset	QCA QCA9378-7																																
TX/RX	2T2R																																
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), and CCK (Complementary Code Keying 5.5&11Mbps), and 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	➤ USB 2.0																																
Operation voltage	➤ 3.3 V DC +/-5% (including voltage ripple)																																
Current consumption @3.3V, 25° C	<table><tr><th rowspan="2">Mode</th><th colspan="2">Average</th><th colspan="2">Peak</th></tr><tr><th>2.4 GHz</th><th>5 GHz</th><th>2.4 GHz</th><th>5 GHz</th></tr><tr><td>WLAN Tx</td><td>850 mA</td><td>1080 mA</td><td>960 mA</td><td>1260 mA</td></tr><tr><td>WLAN Rx</td><td>160 mA</td><td>160 mA</td><td>280 mA</td><td>280 mA</td></tr><tr><td>Driver disable</td><td colspan="2">110 mA</td><td colspan="2">220 mA</td></tr><tr><td>Standby WLAN+BT</td><td colspan="2">100 mA</td><td colspan="2">200 mA</td></tr></table>				Mode	Average		Peak		2.4 GHz	5 GHz	2.4 GHz	5 GHz	WLAN Tx	850 mA	1080 mA	960 mA	1260 mA	WLAN Rx	160 mA	160 mA	280 mA	280 mA	Driver disable	110 mA		220 mA		Standby WLAN+BT	100 mA		200 mA	
	Mode	Average		Peak																													
		2.4 GHz	5 GHz	2.4 GHz	5 GHz																												
	WLAN Tx	850 mA	1080 mA	960 mA	1260 mA																												
	WLAN Rx	160 mA	160 mA	280 mA	280 mA																												
	Driver disable	110 mA		220 mA																													
	Standby WLAN+BT	100 mA		200 mA																													
*WLAN Tx/Rx means continuous Tx/Rx																																	
**Current consumption, measured on PC platform.																																	
The maximum power-on inrush current consumption is 1.5A within 10us.																																	

Output power (for each chain; tolerance +1.5/-1.5 dB)	➤ 802.11a										
	Test Frequencies	6-12_Target	18_Target	24_Target	36_Target	48_Target	54_Target				
	5180	14	14	14	13	12	12				
	5320	14	14	14	13	12	12				
	5500	14	14	14	13	12	12				
	5600	14	14	14	13	12	12				
	5700	14	14	14	13	12	12				
	5825	14	14	14	13	12	12				
	➤ 802.11b										
	Test Frequencies	1/2_Target	5.5_Target	11_Target							
	2412	15	15	15							
	2442	15	15	15							
	2472	15	15	15							
	➤ 802.11g										
	Test Frequencies	6-12_Target	18_Target	24_Target	36_Target	48_Target	54_Target				
	2412	14	14	14	14	14	14				
	2442	14	14	14	14	14	14				
	2472	14	14	14	14	14	14				
	➤ 802.11n										
	Freq. Range: HT20										
	Test Freq	MCS 0/8	MCS 1/9	MCS 2/10	MCS 3/11	MCS 4/12	MCS 5/13	MCS 6/14	MCS 7/15		
	5180	11	11	11	11	11	11	11	11		
	5240	11	11	11	11	11	11	11	11		
	5320	11	11	11	11	11	11	11	11		
	5500	11	11	11	11	11	11	11	11		
	5700	11	11	11	11	11	11	11	11		
	5745	11	11	11	11	11	11	11	11		
	5825	11	11	11	11	11	11	11	11		
	Freq. Range: HT40										
	Test Freq	MCS 0/8	MCS 1/9	MCS 2/10	MCS 3/11	MCS 4/12	MCS 5/13	MCS 6/14	MCS 7/15		
	5190	11	11	11	11	11	11	11	11		
	5230	11	11	11	11	11	11	11	11		
	5270	11	11	11	11	11	11	11	11		
	5510	11	11	11	11	11	11	11	11		
	5670	11	11	11	11	11	11	11	11		
	5755	11	11	11	11	11	11	11	11		
	5795	11	11	11	11	11	11	11	11		
	Freq. Range: HT20										
	Test Freq	MCS 0/8	MCS 1/9	MCS 2/10	MCS 3/11	MCS 4/12	MCS 5/13	MCS 6/14	MCS 7/15		
	2412	14	14	14	14	14	14	14	14		
	2447	14	14	14	14	14	14	14	14		
	2472	14	14	14	14	14	14	14	14		
	Freq. Range: HT40										
	Test Freq	MCS 0/8	MCS 1/9	MCS 2/10	MCS 3/11	MCS 4/12	MCS 5/13	MCS 6/14	MCS 7/15		
	2422	14	14	14	14	14	14	14	14		
	2447	14	14	14	14	14	14	14	14		
	2462	14	14	14	14	14	14	14	14		
	➤ 802.11ac										
	Freq. Range: HT80										
	Test Freq	MCS 0	MCS 1	MCS 2	MCS 3	MCS 4	MCS 5	MCS 6	MCS 7	MCS 8	MCS 9
	5210	8	8	8	8	8	8	8	8	7	7
	5290	8	8	8	8	8	8	8	8	7	7
	5530	8	8	8	8	8	8	8	8	7	7
	5610	8	8	8	8	8	8	8	8	7	7
	5690	8	8	8	8	8	8	8	8	7	7
	5775	8	8	8	8	8	8	8	8	7	7

EVM	The transmit modulation accuracy is measured using error vector magnitude (EVM). EVM is the magnitude of the phase difference as a function of time between an ideal reference signal and the measured transmitted signal.			
	➤ 802.11a			
	Modulation	Code Rate	Relative constellation error (dB) IEEE Spec (1Tx dB)	Relative constellation error (dB) Typical (1Tx dB)
	BPSK	1/2	-5	-15
	BPSK	3/4	-8	-18
	QPSK	1/2	-10	-20
	QPSK	3/4	-13	-22
	16-QAM	1/2	-16	-24
	16-QAM	3/4	-19	-26
	64-QAM	2/3	-22	-28
	64-QAM	3/4	-25	-30
	➤ 802.11b			
	Modulation	Code Rate	Relative constellation error (dB) IEEE Spec (1Tx dB)	Relative constellation error (dB) Typical (1Tx dB)
	DBPSK		-10	-12
	DQPSK		-10	-12
	CCK		-10	-12
	➤ 802.11g			
	Modulation	Code Rate	Relative constellation error (dB) IEEE Spec (1Tx dB)	Relative constellation error (dB) Typical (1Tx dB)
	BPSK	1/2	-5	-15
	BPSK	3/4	-8	-18
	QPSK	1/2	-10	-20
	QPSK	3/4	-13	-22
	16-QAM	1/2	-16	-24
	16-QAM	3/4	-19	-26
	64-QAM	2/3	-22	-28
	64-QAM	3/4	-25	-30
	➤ 802.11ng (HT20)			
	Modulation	Code Rate	Relative constellation error (dB) IEEE Spec (1Tx dB)	Relative constellation error (dB) Typical (1Tx dB)
	(MCS0) BPSK	1/2	-5	-15
	(MCS1) QPSK	1/2	-10	-18
	(MCS2) QPSK	3/4	-13	-20
	(MCS3) 16-QAM	1/2	-16	-22
	(MCS4) 16-QAM	3/4	-19	-24
	(MCS5) 64-QAM	2/3	-22	-26
	(MCS6) 64-QAM	3/4	-25	-28
	(MCS7) 64-QAM	5/6	-27	-30
	(MCS8) BPSK	1/2	-5	-15
	(MCS9) QPSK	1/2	-10	-18
	(MCS10) QPSK	3/4	-13	-20
	(MCS11) 16-QAM	1/2	-16	-22
	(MCS12) 16-QAM	3/4	-19	-24
	(MCS13) 64-QAM	2/3	-22	-26
	(MCS14) 64-QAM	3/4	-25	-28
	(MCS15) 64-QAM	5/6	-27	-30
	(HT40)			
	Modulation	Code Rate	Relative constellation error (dB) IEEE Spec (1Tx dB)	Relative constellation error (dB) Typical (1Tx dB)
	(MCS0) BPSK	1/2	-5	-15
	(MCS1) QPSK	1/2	-10	-18
	(MCS2) QPSK	3/4	-13	-20
	(MCS3) 16-QAM	1/2	-16	-22

	(MCS4) 16-QAM	3/4	-19	-24
	(MCS5) 64-QAM	2/3	-22	-26
	(MCS6) 64-QAM	3/4	-25	-28
	(MCS7) 64-QAM	5/6	-27	-30
	(MCS8) BPSK	1/2	-5	-15
	(MCS9) QPSK	1/2	-10	-18
	(MCS10) QPSK	3/4	-13	-20
	(MCS11) 16-QAM	1/2	-16	-22
	(MCS12) 16-QAM	3/4	-19	-24
	(MCS13) 64-QAM	2/3	-22	-26
	(MCS14) 64-QAM	3/4	-25	-28
	(MCS15) 64-QAM	5/6	-27	-30
➤ 802.11na (HT20)				
	Modulation	Code Rate	Relative constellation error (dB) IEEE Spec (1Tx dB)	Relative constellation error (dB) Typical (1Tx dB)
	(MCS0) BPSK	1/2	-5	-15
	(MCS1) QPSK	1/2	-10	-18
	(MCS2) QPSK	3/4	-13	-20
	(MCS3) 16-QAM	1/2	-16	-22
	(MCS4) 16-QAM	3/4	-19	-24
	(MCS5) 64-QAM	2/3	-22	-26
	(MCS6) 64-QAM	3/4	-25	-28
	(MCS7) 64-QAM	5/6	-27	-30
	(MCS8) BPSK	1/2	-5	-15
	(MCS9) QPSK	1/2	-10	-18
	(MCS10) QPSK	3/4	-13	-20
	(MCS11) 16-QAM	1/2	-16	-22
	(MCS12) 16-QAM	3/4	-19	-24
	(MCS13) 64-QAM	2/3	-22	-26
	(MCS14) 64-QAM	3/4	-25	-28
	(MCS15) 64-QAM	5/6	-27	-30
(HT40)				
	Modulation	Code Rate	Relative constellation error (dB) IEEE Spec (1Tx dB)	Relative constellation error (dB) Typical (1Tx dB)
	(MCS0) BPSK	1/2	-5	-15
	(MCS1) QPSK	1/2	-10	-18
	(MCS2) QPSK	3/4	-13	-20
	(MCS3) 16-QAM	1/2	-16	-22
	(MCS4) 16-QAM	3/4	-19	-24
	(MCS5) 64-QAM	2/3	-22	-26
	(MCS6) 64-QAM	3/4	-25	-28
	(MCS7) 64-QAM	5/6	-27	-30
	(MCS8) BPSK	1/2	-5	-15
	(MCS9) QPSK	1/2	-10	-18
	(MCS10) QPSK	3/4	-13	-20
	(MCS11) 16-QAM	1/2	-16	-22
	(MCS12) 16-QAM	3/4	-19	-24
	(MCS13) 64-QAM	2/3	-22	-26
	(MCS14) 64-QAM	3/4	-25	-28
	(MCS15) 64-QAM	5/6	-27	-30
➤ 802.11ac (HT80)				
	Modulation	Code Rate	Relative constellation error (dB) IEEE Spec (1Tx dB)	Relative constellation error (dB) Typical (1Tx dB)
	(MCS0) BPSK	1/2	-5	-15
	(MCS1) QPSK	1/2	-10	-18
	(MCS2) QPSK	3/4	-13	-20
	(MCS3) 16-QAM	1/2	-16	-22
	(MCS4) 16-QAM	3/4	-19	-24

	(MCS5) 64-QAM	2/3	-22	-26
	(MCS6) 64-QAM	3/4	-25	-28
	(MCS7) 64-QAM	5/6	-27	-30
	(MCS8) 256-QAM	3/4	-30	-32
	(MCS9) 256-QAM	5/6	-32	-33.5
Sensitivity	➤ 802.11a			
	Modulation	Code Rate	IEEE Spec (1Rx dBm)	Typical (1Rx dBm)
	BPSK	1/2	-82	-88
	BPSK	3/4	-81	-86
	QPSK	1/2	-79	-84
	QPSK	3/4	-77	-82
	16-QAM	1/2	-74	-78
	16-QAM	3/4	-70	-76
	64-QAM	2/3	-66	-72
	64-QAM	3/4	-65	-70
	➤ 802.11b			
	Modulation	Code Rate	IEEE Spec (1Rx dBm)	Typical (1Rx dBm)
	DBPSK		not specified	-92
	DQPSK		not specified	-90
	CCK		not specified	-86
	➤ 802.11g			
	Modulation	Code Rate	IEEE Spec (1Rx dBm)	Typical (1Rx dBm)
	BPSK	1/2	-82	-90
	BPSK	3/4	-81	-88
	QPSK	1/2	-79	-86
	QPSK	3/4	-77	-84
	16-QAM	1/2	-74	-82
	16-QAM	3/4	-70	-78
	64-QAM	2/3	-66	-74
	64-QAM	3/4	-65	-72
	➤ 802.11ng (HT20)			
	Modulation	Code Rate	IEEE Spec (1Rx dBm)	Typical (1Rx dBm)
	(MCS0) BPSK	1/2	-82	-88
	(MCS1) QPSK	1/2	-79	-86
	(MCS2) QPSK	3/4	-77	-82
	(MCS3) 16-QAM	1/2	-74	-80
	(MCS4) 16-QAM	3/4	-70	-76
	(MCS5) 64-QAM	2/3	-66	-73
	(MCS6) 64-QAM	3/4	-65	-71
	(MCS7) 64-QAM	5/6	-64	-69
	(HT40)			
	Modulation	Code Rate	IEEE Spec (1Rx dBm)	Typical (1Rx dBm)
	(MCS0) BPSK	1/2	-79	-86
	(MCS1) QPSK	1/2	-76	-82
	(MCS2) QPSK	3/4	-74	-80
	(MCS3) 16-QAM	1/2	-71	-77
	(MCS4) 16-QAM	3/4	-67	-74
	(MCS5) 64-QAM	2/3	-63	-69
	(MCS6) 64-QAM	3/4	-62	-68
	(MCS7) 64-QAM	5/6	-61	-66
	➤ 802.11na (HT20)			
	Modulation	Code Rate	IEEE Spec (1Rx dBm)	Typical (1Rx dBm)
	(MCS0) BPSK	1/2	-82	-86
	(MCS1) QPSK	1/2	-79	-84
	(MCS2) QPSK	3/4	-77	-82
	(MCS3) 16-QAM	1/2	-74	-80

	(MCS4) 16-QAM 3/4 -70 -77 (MCS5) 64-QAM 2/3 -66 -71 (MCS6) 64-QAM 3/4 -65 -70 (MCS7) 64-QAM 5/6 -64 -69 (HT40) Modulation Code Rate IEEE Spec (1Rx dBm) Typical (1Rx dBm) (MCS0) BPSK 1/2 -79 -84 (MCS1) QPSK 1/2 -76 -80 (MCS2) QPSK 3/4 -74 -78 (MCS3) 16-QAM 1/2 -71 -75 (MCS4) 16-QAM 3/4 -67 -71 (MCS5) 64-QAM 2/3 -63 -67 (MCS6) 64-QAM 3/4 -62 -66 (MCS7) 64-QAM 5/6 -61 -64 ➤ 802.11ac (HT80) Modulation Code Rate IEEE Spec (1Rx dBm) Typical (1Rx dBm) (MCS0) BPSK 1/2 -76 -80 (MCS1) QPSK 1/2 -73 -77 (MCS2) QPSK 3/4 -71 -75 (MCS3) 16-QAM 1/2 -68 -72 (MCS4) 16-QAM 3/4 -64 -68 (MCS5) 64-QAM 2/3 -60 -64 (MCS6) 64-QAM 3/4 -59 -63 (MCS7) 64-QAM 5/6 -58 -62 (MCS8) 256-QAM 3/4 -53 -59 (MCS9) 256-QAM 5/6 -51 -56
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 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. 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 the rest of the 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	➤ 100+/-0.2mm x 18.00+/-0.2mm 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 ▪ 2 Nss: 130(144.444) Mbps maximal ● 40MHz BW ▪ 1 Nss: 135(150) Mbps maximal ▪ 2 Nss: 270(300) Mbps maximal ➤ 802.11ac: @800GI(400GI) ● 80MHz BW ▪ 1 Nss: 390(433.3) Mbps maximal ▪ 2 Nss: 780(866.7) Mbps maximal
Security	WEP, WPA ,WPA2 ,AES, TKIP
Operation temperature	-10° ~ 60° C
Storage temperature	- 35° ~ 70° C ,R.H:90%
RF port	2 RF connector for external antenna (ANT-0 and ANT1)
PID/VID	PID: 9378, VID: 0CF3

5.2 BT portion

Item	Key specifications		
Main chipset	➤ QCA QCA9378-7		
Compliance	➤ Bluetooth v4.1 LE		
Frequency range	➤ 2402 ~ 2480 MHz		
Initial carrier frequency tolerance	➤ +/- 20 kHz (typical)		
Modulation technique	➤ Frequency hopping, 1600 hops/sec		
Channel spacing	➤ 1 MHz		
Channels support	➤ 79 channels for Bluetooth, 40 channels for BLE		
Operation voltage	➤ 3.3V +/- 5% (including voltage ripple)		
Current consumption @3.3V, 25° C		Avg (mA)	Max (mA)
	Idle mode	160	310
	Continuous DH5 TX	220	370
	Continuous 2DH5 TX	220	370
	Continuous 3DH5 TX	220	370
*Measured on PC platform.			
Output power (dBm)	➤ Class 1, BT output power is adjusted by FW .		
Sensitivity	➤ -80 dBm (typ.) for pi/4-DQPSK, 0.1%BER		
Operation temperature	➤ -10° ~ 60° C		
Storage temperature	➤ -35° ~ 70° C , R.H. : 90%		
RF port	➤ 1 RF connector (co-used with WLAN ANT-0) for external antenna		
PID/VID	➤ PID: 3004, VID: 0CF3		

5.3 EEPROM Information

5.3.1 WLAN Information

- WLAN MAC Address
- Tx calibration parameters
- Vendor ID
- Product ID

5.3.2 BT Information

- BT MAC Address
- Vendor ID
- Product ID

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

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.

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: NKR-DHUAW8S".

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 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.

This radio transmitter (IC: 4441A-DHUAW8S) 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: 4441A-DHUAW8S) a été approuvé par Industrie Canada 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.

Wi Fi Antenna info.

Model	Antenna		Peak gain (dBi)				
	Type	Connector	2400~2483.5MHz	5150~5250MHz	5250~5350MHz	5470~5725MHz	5725~5850MHz
025.9019W.0001	PIFA	UFL	-1.9	2.2	2.5	3.2	3.4
025.9019V.0001	PIFA	UFL	-3.5	3.1	3.3	3.7	3.9
025.9019U.0001	PIFA	UFL	-3.4	0.7	1.1	1.4	1.2

BT Antenna info.

Type	Connector	Peak Gain(dBi)
PIFA	UFL	-1.9

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

Avertissement:

- (i) les dispositifs fonctionnant dans la bande de 5150 à 5250MHz 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 5250 à 5350MHz et de 5470 à 5725 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 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;

Les opérations dans la bande de 5.25-5.35GHz sont limitées 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-DHUAW8S".

Plaque signalétique du produit final

Le produit final doit être étiqueté dans un endroit visible avec l'inscription suivante: "Contient des IC: 4441A-DHUAW8S".

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.