

Maximum Permissible Exposure Report

Product Information

EUT	: X-brain Smart gateway
Model Number	: XUS100, XEU100
Model Declaration	: PCB board, structure and internal of these model(s) are the same, : Only models name is different for these models.
Test Model	: XUS100
Power Supply	: DC 12.0V by adapter
Hardware version	: V2
Software version	: 7.1.2

Z-Wave

Channel Number	: Channel 1: 908.4MHz / Channel 2: 916MHz
Modulation Technology	: FSK
Antenna Type And Gain	: Internal Antenna 0.5dBi[Antenna 0]

2.4G Band RF Function

Channel Number	: Channel 1: 2405MHz / Channel 2: 2413MHz : Channel 3: 2422MHz / Channel 4: 2430MHz : Channel 5: 2440MHz / Channel 6: 2450MHz : Channel 7: 2460MHz / Channel 8: 2470MHz
Modulation Technology	: GFSK
Antenna Type And Gain	: Internal Antenna 0.0dBi[Antenna 1]

Bluetooth

Bluetooth Version	: V4.1
Frequency Range	: 2402-2480MHz
Channel Number	: 79 Channels for Bluetooth V3.0(DSS) : 40 Channels for Bluetooth V4.1(DTS)
Modulation Technology	: GFSK, $\pi/4$ -DQPSK, 8-DPSK for Bluetooth V3.0(DSS) : GFSK for Bluetooth V4.1(DTS)
Data Rates	: Bluetooth V3.0(DSS): 1~3Mbps : Bluetooth V4.1(DTS): 1Mbps
Antenna Type And Gain	: Internal Antenna 0.0dBi[Antenna 2]

Wlan

WLAN	: Supported IEEE 802.11a/b/g/n/ac IEEE 802.11b:2412-2462MHz IEEE 802.11g:2412-2462MHz IEEE 802.11n HT20:2412-2462MHz / 5180-5240MHz / 5745-5825MHz
WLAN FCC Operation Frequency	: IEEE 802.11n HT40:2422-2452MHz / 5190-5230MHz / 5755-5795MHz IEEE 802.11a: 5180-5240MHz / 5745-5825MHz IEEE 802.11ac VHT20: 5180-5240MHz / 5745-5825MHz IEEE 802.11ac VHT40: 5190-5230MHz / 5755-5795MHz IEEE 802.11ac VHT80: 5210MHz / 5775MHz
WLAN Channel Number	: 11 Channels for 2412-2462MHz(IEEE 802.11b/g/n HT20) : 7 Channels for 2422-2452MHz(IEEE 802.11n HT40) : 4 Channels for 5180-5240MHz (IEEE 802.11a/ac VHT20/n HT20)

	2 Channels for 5190-5230MHz (IEEE 802.11ac VHT40/n HT40)
	1 Channels for 5210MHz (IEEE 802.11ac VHT80)
	5 Channels for 5745-5825MHz(IEEE 802.11a/ac VHT20/n HT20)
	2 Channels for 5755-5795MHz(IEEE 802.11ac VHT40/n HT40)
	1 Channels for 5775MHz(IEEE 802.11ac VHT80)
	IEEE 802.11b: DSSS(CCK,DQPSK,DBPSK)
	IEEE 802.11g: OFDM (64QAM, 16QAM, QPSK, BPSK)
WLAN Modulation Technology	: IEEE 802.11n: OFDM (64QAM, 16QAM, QPSK, BPSK)
	IEEE 802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK)
	IEEE 802.11ac: OFDM (256QAM, 64QAM, 16QAM, QPSK, BPSK)
	Three Antennas:
	Internal Antenna 3 and Antenna 4:
	3.81dBi(Max.), for TX/RX (WLAN 2.4G Band),
Antenna Type And Gain	: Internal Antenna 5 and Antenna 6:
	4.03 dBi(Max.), for TX/RX (WLAN 5G Band)
	802.11n(2.4G Band) support 2T2R.[Antenna 3 and Antenna 4]
	802.11n/ac(5G Band) support 2T2R.[Antenna 5 and Antenna 6]
	6.81 dBi for MIMO(2.4G Band)
Directional Gain	: 7.03 dBi for MIMO(5G Band)

Note: Antenna position refer to EUT Photos.

2. Evaluation Method

Systems operating under the provisions of FCC 47 CFR section shall be operated in a manner that ensures that the public is not exposed to radio frequency energy level in excess of the Commission's guidelines. In accordance with 47 CFR FCC Part 2 Subpart J, section 2.1091 this device has been defined as mobile device whereby a distance of 0.2m normally can be maintained between the user and the device, and below RF Permissible Exposure limit shall comply with.

In accordance with KDB447498D01 for Simultaneous transmission MPE test exclusion applies when the sum of the MPE ratios for all simultaneous transmitting antennas incorporated in a host device, based on the calculated/estimated, numerically modelled or measured field strengths or power density, is ≤ 1.0 . The MPE ratio of each antenna is determined at the minimum test separation distance required by the operating configurations and exposure conditions of the host device, according to the ratio of field strengths or power density to MPE limit, at the test frequency. Either the maximum peak or spatially averaged results from measurements or numerical simulations may be used to determine the MPE ratios. Spatial averaging does not apply when MPE is estimated using simple calculations based on far-field plane-wave equivalent conditions. The antenna installation and operating requirements for the host device must meet the minimum test separation distances required by all antennas, in both standalone and simultaneous transmission operations, to satisfy compliance.

3. Limit

3. 1 Refer evaluation method

[ANSI C95.1-1999](#): IEEE Standard for Safety Levels with Respect to Human Exposure to Radio Frequency Electromagnetic Fields, 3 kHz to 300 GHz.

[FCC KDB publication 447498 D01 General 1 RF Exposure Guidance v06](#): Mobile and Portable Devices RF Exposure Procedures and Equipment Authorization Policies.

[FCC CFR 47 part1 1.1310](#): Radiofrequency radiation exposure limits.

[FCC CFR 47 part2 2.1091](#): Radiofrequency radiation exposure evaluation: mobile devices

3.2 Limit

Limits for Maximum Permissible Exposure (MPE)/Controlled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	6
3.0 – 30	1842/f	4.89/f	(900/f ²)*	6
30 – 300	61.4	0.163	1.0	6
300 – 1500	/	/	f/300	6
1500 – 100,000	/	/	5	6

Limits for Maximum Permissible Exposure (MPE)/Uncontrolled Exposure

Frequency Range(MHz)	Electric Field Strength(V/m)	Magnetic Field Strength(A/m)	Power Density (mW/cm ²)	Averaging Time (minute)
Limits for Occupational/Controlled Exposure				
0.3 – 3.0	614	1.63	(100) *	30
3.0 – 30	824/f	2.19/f	(180/f ²)*	30
30 – 300	27.5	0.073	0.2	30
300 – 1500	/	/	f/1500	30
1500 – 100,000	/	/	1.0	30

F=frequency in MHz

*=Plane-wave equivalent power density

4. MPE Calculation Method

Predication of MPE limit at a given distance

Equation from page 18 of OET Bulletin 65, Edition 97-01

$$S = PG/4\pi R^2$$

Where: S=power density

P=power input to antenna

G=power gain of the antenna in the direction of interest relative to an isotropic radiator

R=distance to the center of radiation of the antenna

5. Antenna Information

This Product can only use antennas certificated as follows provided by manufacturer;

Internal Identification	Antenna Description	Antenna type and antenna number	Operate frequency band	Maximum antenna gain
Antenna 0	Z-Wave Antenna	Internal Antenna	902-928MHz	0.5 dBi
Antenna 1	2.4G Band RF Antenna	Internal Antenna	2400 MHz – 2500 MHz	0.0 dBi
Antenna 2	Bluetooth Antenna	Internal Antenna	2400 MHz – 2500 MHz	0.0 dBi
Antenna 3	WiFi 2.4G Antenna	Internal Antenna	2400 MHz – 2500 MHz	3.81 dBi
Antenna 4	WiFi 2.4G Antenna	Internal Antenna	2400 MHz – 2500 MHz	3.81 dBi
Antenna 5	WiFi 5G Antenna	Internal Antenna	5150 MHz – 5900 MHz	4.03 dBi
Antenna 6	WiFi 5G Antenna	Internal Antenna	5150 MHz – 5900 MHz	4.03 dBi

6. Conducted Power

2.4G Band:

Bluetooth(BDR+EDR)

Test Mode	Channel	Frequency (MHz)	Measured Peak Output Power (dBm)
GFSK	00	2402	1.39
	39	2441	3.12
	78	2480	3.57
$\pi/4$ -DQPSK	00	2402	0.65
	39	2441	2.40
	78	2480	2.76
8-DPSK	00	2402	0.69
	39	2441	2.46
	78	2480	2.79

Bluetooth(BLE)

Test Mode	Channel	Frequency (MHz)	Measured Peak Output Power (dBm)
GFSK	00	2402	-4.55
	39	2441	-2.54
	78	2480	-2.50

WiFi 2.4GHz Band

Test Mode	Channel	Frequency (MHz)	Measured Peak Output Power (dBm)		
			Antenna 0	Antenna 1	Sum
IEEE 802.11b	1	2412	19.57	19.59	-/-
	6	2437	20.40	19.80	-/-
	11	2462	20.89	20.69	-/-
IEEE 802.11g	1	2412	16.49	16.11	-/-
	6	2437	16.87	16.45	-/-
	11	2462	17.33	17.12	-/-
IEEE 802.11n HT20	1	2412	15.50	15.31	18.42
	6	2437	15.72	15.62	18.68
	11	2462	16.18	16.47	19.34
IEEE 802.11n HT40	3	2422	18.06	18.16	21.12
	6	2437	18.56	18.43	21.51
	9	2452	18.67	18.43	21.56

Z-Wave:

Test Mode	Channel	Frequency (MHz)	Measured ERP Power (dBm)
Z-Wave	01	908.4	-11.48
	02	916.0	-11.14

2.4G Band RF Function

Test Mode	Channel	Frequency (MHz)	Measured EIRP Power (dBm)
2.4G Band RF	01	2405	-9.59
	04	2430	-10.43
	08	2470	-10.08

5G Band
UNII-1 Band

Test Mode	Channel	Frequency (MHz)	Measured Conducted Average Power (dBm)		
			Antenna 0	Antenna 1	Sum
IEEE 802.11a	36	5180	10.97	10.98	/
	40	5200	11.03	11.28	/
	48	5240	10.63	10.76	/
IEEE 802.11n HT20	36	5180	9.23	9.30	12.28
	40	5200	8.98	9.25	12.13
	48	5240	8.97	9.09	12.04
IEEE 802.11ac VHT20	36	5180	9.84	10.00	12.93
	40	5200	9.55	9.76	12.66
	48	5240	9.53	9.60	12.58
IEEE 802.11n HT40	38	5190	9.00	9.10	12.06
	46	5230	9.19	9.36	12.29
IEEE 802.11ac VHT40	38	5190	10.25	10.44	13.36
	46	5230	10.36	10.53	13.46
IEEE 802.11ac VHT80	42	5210	12.01	12.10	15.06

UNII-3 Band

Test Mode	Channel	Frequency (MHz)	Measured Conducted Average Power (dBm)		
			Antenna 0	Antenna 1	Sum
IEEE 802.11a	149	5745	16.19	13.61	/
	157	5785	17.00	13.38	/
	165	5825	16.88	13.91	/
IEEE 802.11n HT20	149	5745	15.36	15.13	18.25
	157	5785	16.07	15.82	18.96
	165	5825	16.16	16.21	19.19
IEEE 802.11ac VHT20	149	5745	14.98	15.02	18.01
	157	5785	16.11	15.20	18.69
	165	5825	16.46	16.14	19.31
IEEE 802.11n HT40	151	5755	14.88	15.14	18.02
	159	5795	15.84	15.68	18.77
IEEE 802.11ac VHT40	151	5755	15.17	15.62	18.41
	159	5795	16.03	15.42	18.74
IEEE 802.11ac VHT80	155	5775	15.59	15.18	18.40

7. Manufacturing Tolerance

Z-Wave Function

IEEE 802.11a (Maximum)			
Channel	Channel 1	Channel 2	
Target (dBm)	-11.0	-11.0	
Tolerance $\pm$ (dB)	1.0	1.0	

2.4G Band RF Function(2405MHz – 2470MHz)

IEEE 802.11a (Maximum)			
Channel	Channel 1	Channel 4	Channel 8
Target (dBm)	-10.0	-10.0	-10.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0

Bluetooth(BDR+EDR)

GFSK (Peak)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	1.0	3.0	3.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
$\pi/4$ -DQPSK (Peak)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	1.0	3.0	3.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
8-DPSK (Peak)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	1.0	3.0	3.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0

Bluetooth(BLE)

GFSK (Peak)			
Channel	Channel 0	Channel 39	Channel 78
Target (dBm)	-4.0	-2.0	-2.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0

WiFi 2.4GHz Band – Antenna 0

IEEE 802.11b (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	20.0	20.0	20.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11g (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	16.5	16.5	16.5
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11n HT20 (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	16.0	16.0	16.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11n HT40 (Peak)			
Channel	Channel 3	Channel 6	Channel 9
Target (dBm)	18.0	18.0	18.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0

WiFi 2.4GHz Band – Antenna 1

IEEE 802.11b (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	20	20	20
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11g (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	16.5	16.5	16.5
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11n HT20 (Peak)			
Channel	Channel 1	Channel 6	Channel 11
Target (dBm)	16.0	16.0	16.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11n HT40 (Peak)			
Channel	Channel 3	Channel 6	Channel 9
Target (dBm)	18.0	18.0	18.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0

UNII-1 Band – Antenna 0

IEEE 802.11a (Maximum)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	9.5	9.5	9.5
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11n HT20 (Maximum)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	9.0	9.0	9.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11ac VHT20 (Maximum)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	9.5	9.5	9.5
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11n HT40 (Maximum)			
Channel	Channel 38	Channel 46	--
Target (dBm)	9.0	9.0	--
Tolerance $\pm$ (dB)	1.0	1.0	--
IEEE 802.11ac VHT40 (Maximum)			
Channel	Channel 38	Channel 46	--
Target (dBm)	10.0	10.0	--
Tolerance $\pm$ (dB)	1.0	1.0	--
IEEE 802.11ac VHT80 (Maximum)			
Channel	Channel 42	--	--
Target (dBm)	11.5	--	--
Tolerance $\pm$ (dB)	1.0	--	--

UNII-1 Band – Antenna 1

IEEE 802.11a (Maximum)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	9.5	9.5	9.5
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11n HT20 (Maximum)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	9.0	9.0	9.0
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11ac VHT20 (Maximum)			
Channel	Channel 36	Channel 40	Channel 48
Target (dBm)	9.5	9.5	9.5
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11n HT40 (Maximum)			
Channel	Channel 38	Channel 46	--
Target (dBm)	9.0	9.0	--
Tolerance $\pm$ (dB)	1.0	1.0	--
IEEE 802.11ac VHT40 (Maximum)			
Channel	Channel 38	Channel 46	--
Target (dBm)	10.0	10.0	--
Tolerance $\pm$ (dB)	1.0	1.0	--
IEEE 802.11ac VHT80 (Maximum)			
Channel	Channel 42	--	--
Target (dBm)	11.5	--	--
Tolerance $\pm$ (dB)	1.0	--	--

UNII-3 Band – Antenna 0

IEEE 802.11a (Maximum)			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	16.5	16.5	16.5
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11n HT20 (Maximum)			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	15.5	15.5	15.5
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11ac VHT20 (Maximum)			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	15.5	15.5	15.5
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11n HT40 (Maximum)			
Channel	Channel 151	Channel 159	--
Target (dBm)	15.5	15.5	--
Tolerance $\pm$ (dB)	1.0	1.0	--
IEEE 802.11ac VHT40 (Maximum)			
Channel	Channel 151	Channel 159	--
Target (dBm)	15.5	15.5	--
Tolerance $\pm$ (dB)	1.0	1.0	--
IEEE 802.11ac VHT80 (Maximum)			
Channel	Channel 155	--	--
Target (dBm)	15.0	--	--
Tolerance $\pm$ (dB)	1.0	--	--

UNII-3 Band – Antenna 1

IEEE 802.11a (Maximum)			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	13.5	13.5	13.5
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11n HT20 (Maximum)			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	15.5	15.5	15.5
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11ac VHT20 (Maximum)			
Channel	Channel 149	Channel 157	Channel 165
Target (dBm)	15.5	15.5	15.5
Tolerance $\pm$ (dB)	1.0	1.0	1.0
IEEE 802.11n HT40 (Maximum)			
Channel	Channel 151	Channel 159	--
Target (dBm)	15.5	15.5	--
Tolerance $\pm$ (dB)	1.0	1.0	--
IEEE 802.11ac VHT40 (Maximum)			
Channel	Channel 151	Channel 159	--
Target (dBm)	15.5	15.5	--
Tolerance $\pm$ (dB)	1.0	1.0	--
IEEE 802.11ac VHT80 (Maximum)			
Channel	Channel 155	--	--
Target (dBm)	15.0	--	--
Tolerance $\pm$ (dB)	1.0	--	--

8. Measurement Results

8.1 Standalone MPE

As declared by the Applicant, the EUT is a wireless device used in a fix application, at least 20 cm from any body part of the user or nearby persons; from the maximum EUT RF output power, the minimum separation distance, $r=20\text{cm}$, as well as the gain of the used antenna refer to antenna information, the RF power density can be obtained.

Z-Wave (BDR+EDR)

Frequency	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW					
908.4	-10.00	0.1000	0.5	1.1220	100%	0.0000	0.6056
916.0	-10.00	0.1000	0.5	1.1220	100%	0.0000	0.6107

2.4G Band RF

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW					
GFSK	-9.00	0.1259	0.00	1.0000	100%	0.0000	1.0000

Bluetooth(BDR+EDR)

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW					
GFSK	2.00	1.5849	0.00	1.0000	100%	0.0003	1.0000
$\pi/4$ -DQPSK	4.00	2.5119	0.00	1.0000	100%	0.0005	1.0000
8-DPSK	4.00	2.5119	0.00	1.0000	100%	0.0005	1.0000

Bluetooth(BLE)

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW					
GFSK	-1.00	0.7943	0.00	1.0000	100%	0.0002	1.0000

WiFi 2.4GHz Band – Ant 0

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW					
IEEE 802.11b	21.00	125.8925	3.81	2.4044	100%	0.0602	1.0000
IEEE 802.11g	17.50	56.2341	3.81	2.4044	100%	0.0269	1.0000
IEEE 802.11n HT20	17.00	50.1187	3.81	2.4044	100%	0.0240	1.0000
IEEE 802.11n HT40	19.00	79.4328	3.81	2.4044	100%	0.0380	1.0000

WiFi 2.4GHz Band – Ant 1

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW					
IEEE 802.11b	21.00	125.8925	3.81	2.4044	100%	0.0602	1.0000
IEEE 802.11g	17.50	56.2341	3.81	2.4044	100%	0.0269	1.0000
IEEE 802.11n HT20	17.00	50.1187	3.81	2.4044	100%	0.0240	1.0000
IEEE 802.11n HT40	19.00	79.4328	3.81	2.4044	100%	0.0380	1.0000

UNII-1 Band – Ant 0

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW					
IEEE 802.11a	10.50	11.2202	4.03	2.5293	100%	0.0056	1.0000
IEEE 802.11n HT20	10.00	10.0000	4.03	2.5293	100%	0.0050	1.0000
IEEE 802.11ac VHT20	10.50	11.2202	4.03	2.5293	100%	0.0056	1.0000
IEEE 802.11n HT40	10.00	10.0000	4.03	2.5293	100%	0.0050	1.0000
IEEE 802.11ac VHT40	11.00	12.5893	4.03	2.5293	100%	0.0063	1.0000
IEEE 802.11ac VHT80	12.50	17.7828	4.03	2.5293	100%	0.0090	1.0000

UNII-1 Band – Ant 1

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW					
IEEE 802.11a	10.50	11.2202	4.03	2.5293	100%	0.0056	1.0000
IEEE 802.11n HT20	10.00	10.0000	4.03	2.5293	100%	0.0050	1.0000
IEEE 802.11ac VHT20	10.50	11.2202	4.03	2.5293	100%	0.0056	1.0000
IEEE 802.11n HT40	10.00	10.0000	4.03	2.5293	100%	0.0050	1.0000
IEEE 802.11ac VHT40	11.00	12.5893	4.03	2.5293	100%	0.0063	1.0000
IEEE 802.11ac VHT80	12.50	17.7828	4.03	2.5293	100%	0.0090	1.0000

UNII-3 Band – Ant 0

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW					
IEEE 802.11a	17.50	56.2341	4.03	2.5293	100%	0.0283	1.0000
IEEE 802.11n HT20	16.50	44.6684	4.03	2.5293	100%	0.0225	1.0000
IEEE 802.11ac VHT20	16.50	44.6684	4.03	2.5293	100%	0.0225	1.0000
IEEE 802.11n HT40	16.50	44.6684	4.03	2.5293	100%	0.0225	1.0000
IEEE 802.11ac VHT40	16.50	44.6684	4.03	2.5293	100%	0.0225	1.0000
IEEE 802.11ac VHT80	16.00	39.8107	4.03	2.5293	100%	0.0200	1.0000

UNII-3 Band – Ant 1

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW					
IEEE 802.11a	14.50	28.1838	4.03	2.5293	100%	0.0142	1.0000
IEEE 802.11n HT20	16.50	44.6684	4.03	2.5293	100%	0.0225	1.0000
IEEE 802.11ac VHT20	16.50	44.6684	4.03	2.5293	100%	0.0225	1.0000
IEEE 802.11n HT40	16.50	44.6684	4.03	2.5293	100%	0.0225	1.0000
IEEE 802.11ac VHT40	16.50	44.6684	4.03	2.5293	100%	0.0225	1.0000
IEEE 802.11ac VHT80	16.00	39.8107	4.03	2.5293	100%	0.0200	1.0000

Remark:

1. Output power including tune-up tolerance;
2. MPE evaluate distance is 20cm from user manual provide by manufacturer;

8.2 Simultaneous Transmission MPE

The sample support 802.11n/ac 2T2R, need consider simultaneous transmission;

WiFi 2.4GHz Band

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW					
IEEE 802.11n HT20	17.00	50.1187	6.81	4.7973	100%	0.0479	1.0000
IEEE 802.11n HT40	19.00	79.4328	6.81	4.7973	100%	0.0758	1.0000

UNII-1 Band

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW					
IEEE 802.11n HT20	10.50	11.2202	7.03	5.0466	100%	0.0113	1.0000
IEEE 802.11ac VHT20	10.00	10.0000	7.03	5.0466	100%	0.0100	1.0000
IEEE 802.11n HT40	10.50	11.2202	7.03	5.0466	100%	0.0113	1.0000
IEEE 802.11ac VHT40	10.00	10.0000	7.03	5.0466	100%	0.0100	1.0000
IEEE 802.11ac VHT80	11.00	12.5893	7.03	5.0466	100%	0.0126	1.0000

UNII-3 Band

Modulation Type	Output power		Antenna Gain (dBi)	Antenna Gain (linear)	Duty Cycle	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
	dBm	mW					
IEEE 802.11n HT20	17.5	56.2341	7.03	5.0466	100%	0.0565	1.0000
IEEE 802.11ac VHT20	16.5	44.6684	7.03	5.0466	100%	0.0449	1.0000
IEEE 802.11n HT40	16.5	44.6684	7.03	5.0466	100%	0.0449	1.0000
IEEE 802.11ac VHT40	16.5	44.6684	7.03	5.0466	100%	0.0449	1.0000
IEEE 802.11ac VHT80	16.5	44.6684	7.03	5.0466	100%	0.0449	1.0000

The Bluetooth and 2.4G band RF can work Simultaneous with Wlan 2.4GHz Band , need consider simultaneous transmission;

Output power and Antenna Gain [Bluetooth]		Output power and Antenna Gain [2.4G Band RF]		Output power and Antenna [Wlan Ant.0]		Output power and Antenna [Wlan Ant.1]		Duty Cycle	MPE (mW/cm ²)	MPE Limits (mW/cm ²)
mW	Ant. Gain (Liner)	mW	Ant. Gain (Liner)	mW	Ant. Gain (Liner)	mW	Ant. Gain (Liner)			
2.2387	1.4997	0.1259	1.0000	125.8925	2.4044	--	--	1.0000	0.0609	1.0000
2.2387	1.4997	0.1259	1.0000	125.8925	2.4044	--	--	1.0000	0.0609	1.0000
2.2387	1.4997	0.1259	1.0000	125.8925	2.4044	--	--	1.0000	0.0609	1.0000
2.2387	1.4997	0.1259	1.0000	--	--	125.8925	2.4044	1.0000	0.0609	1.0000
2.2387	1.4997	0.1259	1.0000	--	--	125.8925	2.4044	1.0000	0.0609	1.0000
2.2387	1.4997	0.1259	1.0000	--	--	125.8925	2.4044	1.0000	0.0609	1.0000
2.2387	1.4997	0.1259	1.0000	56.2341	2.4044	--	--	1.0000	0.0276	1.0000
2.2387	1.4997	0.1259	1.0000	56.2341	2.4044	--	--	1.0000	0.0276	1.0000
2.2387	1.4997	0.1259	1.0000	56.2341	2.4044	--	--	1.0000	0.0276	1.0000
2.2387	1.4997	0.1259	1.0000	--	--	56.2341	2.4044	1.0000	0.0276	1.0000
2.2387	1.4997	0.1259	1.0000	--	--	56.2341	2.4044	1.0000	0.0276	1.0000
2.2387	1.4997	0.1259	1.0000	--	--	56.2341	2.4044	1.0000	0.0276	1.0000
2.2387	1.4997	0.1259	1.0000	50.1187	2.4044	50.1187	2.4044	1.0000	0.0487	1.0000
2.2387	1.4997	0.1259	1.0000	50.1187	2.4044	50.1187	2.4044	1.0000	0.0487	1.0000
2.2387	1.4997	0.1259	1.0000	50.1187	2.4044	50.1187	2.4044	1.0000	0.0487	1.0000
2.2387	1.4997	0.1259	1.0000	79.4328	2.4044	79.4328	2.4044	1.0000	0.0767	1.0000
2.2387	1.4997	0.1259	1.0000	79.4328	2.4044	79.4328	2.4044	1.0000	0.0767	1.0000
2.2387	1.4997	0.1259	1.0000	79.4328	2.4044	79.4328	2.4044	1.0000	0.0767	1.0000

Remark:

1. Output power including tune-up tolerance;
2. MPE evaluate distance is 20cm from user manual provide by manufacturer;

9. Conclusion

The measurement results comply with the FCC Limit per 47 CFR 2.1091 for the uncontrolled RF Exposure of mobile device.

-----THE END OF REPORT-----