

FCC RF EXPOSURE REPORT

FCC ID: 2ABZM-IUAPACLR

Project No. : 2005C193
Equipment : 802.11ac Dual-Band Long Range Access Point
Brand Name : IP-COM
Test Model : iUAP-AC-LR
Series Model : N/A
Applicant : SHENZHEN IP-COM NETWORKS CO.,LTD.
Address : Room 101, Unit A, First Floor, Tower E3, No. 1001, Zhongshanyuan Road, Nanshan District, Shenzhen, China. 518052
Manufacturer : SHENZHEN IP-COM NETWORKS CO.,LTD.
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Date of Receipt : May 29, 2020
Date of Test : Jun. 02, 2020 ~ Jul. 14, 2020
Issued Date : Jul. 22, 2020
Report Version : R01
Test Sample : Engineering Sample No.: DG20200529165
Standard(s) : FCC Guidelines for Human Exposure IEEE C95.1 & FCC Part 2.1091
FCC Title 47 Part 2.1091, OET Bulletin 65 Supplement C

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc.

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REPORT ISSUED HISTORY

Report Version	Description	Issued Date
R00	Original Issue	Jul. 17, 2020
R01	Updated the data of WLAN 5GHz UNII-1 Non Beamforming.	Jul. 22, 2020

1. TEST FACILITY

The test facilities used to collect the test data in this report is at the location of No.3,Jinshagang 1st Road, Shixia, Dalang Town, Dongguan, Guangdong, China.

BTL's Test Firm Registration Number for FCC: 357015

BTL's Designation Number for FCC: CN1240

2. MPE CALCULATION METHOD

Calculation Method of RF Safety Distance:

$$S = \frac{PG}{4\pi^2} = \frac{EIRP}{4\pi^2}$$

where:

S = power density

P = power input to the 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

Table for Filed Antenna:

For WLAN 2.4G:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)
1	N/A	N/A	PIFA	N/A	5
2	N/A	N/A	PIFA	N/A	4.8
3	N/A	N/A	PIFA	N/A	4.3

Note:

- 1) This EUT supports CDD, and antenna gains are not equal, so the Directional gain $= 10\log[(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N]$ dBi, that is Directional gain $= 10\log[(10^{5/20} + 10^{4.8/20} + 10^{4.3/20})^2 / 3]$ dBi = 9.48. So the output power limit is $30 - (9.48 - 6) = 26.52$, the power spectral density limit is $8 - (9.48 - 6) = 4.52$.
- 2) Beamforming Gain: 4.5dB. So the Directional gain $= 4.5 + 5 = 9.50$ dB. So the output power limit is $30 - (9.50 - 6) = 26.50$.

Table for Antenna Configuration:

For Non Beamforming:

Operating Mode	1TX	3TX
IEEE 802.11b	V (Ant. 1)	-
IEEE 802.11g	V (Ant. 1)	-
IEEE 802.11n(HT20)	-	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11n(HT40)	-	V (Ant. 1+Ant. 2+Ant. 3)

For Beamforming:

Operating Mode	3TX
IEEE 802.11n(HT20)	V (Ant. 1+Ant. 2+Ant. 3)
IEEE 802.11n(HT40)	V (Ant. 1+Ant. 2+Ant. 3)

For WLAN 5G:

Ant.	Brand	Model Name	Antenna Type	Connector	Gain (dBi)	Note
1	N/A	N/A	PIFA	N/A	4.7	UNII-1
2	N/A	N/A	PIFA	N/A	4.7	UNII-1
1	N/A	N/A	PIFA	N/A	5	UNII-3
2	N/A	N/A	PIFA	N/A	4.5	UNII-3

Note:

- 1) This EUT supports CDD, and all antennas have the same gain for UNII-1, all antenna gains are not equal for UNII-3. So,
 - a) For UNII-1, Directional gain = $G_{ANT} + \text{Array Gain}$:
 For Output Power measurements, Array Gain = 0 dB ($N_{ANT} \leq 4$), so the Directional gain=4.7.
 For power spectral density measurements, $N_{ANT} = 2$, $N_{SS} = 1$.
 Then Directional gain = $G_{ANT} + \text{Array Gain} = G_{ANT} + 10 \log (N_{ANT} / N_{SS})$ dB = $4.7 + 10 \log (2/1)$ dB = 7.71.
 So the power spectral density limit is $17 - (7.71 - 6) = 15.29$.
 - b) For UNII-3, Directional gain = $10 \log [(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20})^2 / N]$ dB:
 The Directional gain = $10 \log [(10^{5/20} + 10^{4.5/20})^2 / 2]$ dB = 7.76. So the output power limit is $30 - (7.76 - 6) = 28.24$, the power spectral density limit is $30 - (7.76 - 6) = 28.24$.
- 2) Beamforming Gain: 3dB.
 - a) For UNII-1: The Directional gain = $3 + 4.7 = 7.70$ dB. So the output power limit is $30 - (7.70 - 6) = 28.30$.
 - b) For UNII-3: The Directional gain = $3 + 5 = 8.00$ dB. So the output power limit is $30 - (8.00 - 6) = 28.00$.

Table for Antenna Configuration:

For Non Beamforming:

Operating Mode TX Mode	1TX	2TX
IEEE 802.11a	V (ANT 1)	-
IEEE 802.11n (HT20)	-	V (ANT 1 + ANT 2)
IEEE 802.11n (HT40)	-	V (ANT 1 + ANT 2)
IEEE 802.11ac(VHT20)	-	V (ANT 1 + ANT 2)
IEEE 802.11ac(VHT40)	-	V (ANT 1 + ANT 2)
IEEE 802.11ac(VHT80)	-	V (ANT 1 + ANT 2)

For Beamforming:

Operating Mode TX Mode	2TX
IEEE 802.11n (HT20)	V (ANT 1 + ANT 2)
IEEE 802.11n (HT40)	V (ANT 1 + ANT 2)
IEEE 802.11ac(VHT20)	V (ANT 1 + ANT 2)
IEEE 802.11ac(VHT40)	V (ANT 1 + ANT 2)
IEEE 802.11ac(VHT80)	V (ANT 1 + ANT 2)

3. TEST RESULTS

For 2.4GHz Non Beamforming:

Antenna Gain (dBi)	Antenna Gain (numeric)	Max. Average Output Power (dBm)	Max. Average Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
5	3.1623	23.53	225.4239	0.14189	1	Complies

For 2.4GHz Beamforming:

Directional Gain (dBi)	Directional Gain (numeric)	Max. Average Output Power (dBm)	Max. Average Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
9.50	8.9125	17.57	57.1479	0.10138	1	Complies

For 5GHz UNII-1 Non Beamforming:

Directional Gain (dBi)	Directional Gain (numeric)	Max. Output Power (dBm)	Max. Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
7.71	5.9020	27.67	584.7901	0.68699	1	Complies

For 5GHz UNII-1 Beamforming:

Directional Gain (dBi)	Directional Gain (numeric)	Max. Output Power (dBm)	Max. Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
7.70	5.8884	27.21	526.0173	0.61652	1	Complies

For 5GHz UNII-3 Non Beamforming:

Directional Gain (dBi)	Directional Gain (numeric)	Max. Output Power (dBm)	Max. Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
7.76	5.9704	28.13	650.1297	0.77259	1	Complies

For 5GHz UNII-3 Beamforming:

Directional Gain (dBi)	Directional Gain (numeric)	Max. Output Power (dBm)	Max. Output Power (mW)	Power Density (S) (mW/cm ²)	Limit of Power Density (S) (mW/cm ²)	Test Result
8.00	6.3096	27.67	584.7901	0.73443	1	Complies

For the max simultaneous transmission MPE:

Power Density (S) (mW/cm ²)	Power Density (S) (mW/cm ²)	Total	Limit of Power Density (S) (mW/cm ²)	Test Result
2.4GHz	5GHz			
0.14189	0.77259	0.91448	1	Complies

Note: The calculated distance is 20 cm.

End of Test Report