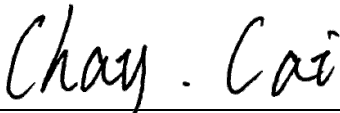


FCC RF EXPOSURE REPORT

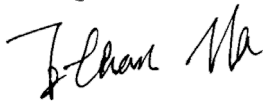
FCC ID: TE7C2300V2

Project No. : 2004C247
Equipment : AC2300 MU-MIMO Wi-Fi Router
Brand Name : tp-link
Test Model : Archer C2300
Series Model : N/A
Applicant : TP-Link Technologies Co., Ltd.
Address : Building 24(floors1,3,4,5) and 28(floors1-4) Central Science and Technology Park, Shennan Rd, Nanshan, Shenzhen, China
Manufacturer : TP-Link Technologies Co., Ltd.
Address : Building 24(floors1,3,4,5) and 28(floors1-4) Central Science and Technology Park, Shennan Rd, Nanshan, Shenzhen, China
Date of Receipt : Apr. 29, 2020
Date of Test : May 06, 2020 ~ Jun. 11, 2020
Issued Date : Jun. 17, 2020
Report Version : R00
Test Sample : Engineering Sample No.: DG2020042868
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.



Prepared by : Chay Cai



Approved by : Ethan Ma



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REPORT ISSUED HISTORY

Report Version	Description	Issued Date
R00	Original Issue	Jun. 17, 2020

1. MPE CALCULATION METHOD

Calculation Method of RF Safety Distance:

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

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 2.4GHz:

Ant.	Brand	P/N	Antenna Type	Connector	Gain (dBi)
1	TP-LINK	3101501579	Dipole	I-PEX	2.98
2	TP-LINK	3101501578	Dipole	I-PEX	2.98
3	TP-LINK	3101501578	Dipole	I-PEX	2.98
4	TP-LINK	3101501724	PCB	I-PEX	2.98

Note:

This EUT supports CDD, and all antennas have the same gain, then,

1) Non Beamforming function, Directional gain = G_{ANT} +Array Gain,

For power measurements, Array Gain = 0 dB ($N_{ANT} \leq 4$), so the Directional gain=2.98.

For power spectral density measurements, $N_{ANT} = 4$, $N_{SS} = 1$. So Directional gain = G_{ANT} + Array Gain = $G_{ANT}+10\log(N_{ANT}/N_{SS})$ dB = $2.98+10\log(4/1)$ dBi=9.00. Then, the power spectral density limit is $8-(9.00-6)=5.00$.

2) Beamforming function, Beamforming Gain: 6dB. So the Directional gain=6+2.98=8.98.

Then, the average output power limit is $30-(8.98-6)=27.02$, the power spectral density limit is $8-(8.98-6)=5.02$.

Table for Antenna Configuration:

For Non Beamforming:

Operating Mode	TX Mode	4TX
802.11b		V (Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4)
802.11g		V (Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4)
IEEE 802.11n (HT20)		V (Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4)
IEEE 802.11n (HT40)		V (Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4)

For Beamforming:

Operating Mode	TX Mode	4TX
IEEE 802.11n (HT20)		V (Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4)
IEEE 802.11n (HT40)		V (Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4)

For WLAN 5GHz:

Ant.	Brand	P/N	Antenna Type	Connector	Gain (dBi)	Note
1	TP-LINK	3101501579	Dipole	I-PEX	2.97	UNII-1
2	TP-LINK	3101501578	Dipole	I-PEX	2.98	UNII-1
3	TP-LINK	3101501578	Dipole	I-PEX	2.98	UNII-1
4	TP-LINK	3101501724	PCB	I-PEX	2.98	UNII-1
1	TP-LINK	3101501579	Dipole	I-PEX	3.64	UNII-3
2	TP-LINK	3101501578	Dipole	I-PEX	3.64	UNII-3
3	TP-LINK	3101501578	Dipole	I-PEX	3.64	UNII-3
4	TP-LINK	3101501724	PCB	I-PEX	3.64	UNII-3

Note:

This EUT supports CDD, the antenna gains are not equal for UNII-1, and all antennas have the same gain for UNII-3, then,

1) Non Beamforming function:

a) For UNII-1, Directional gain = $10 \log \left[\left(10^{G1/20} + 10^{G2/20} + \dots + 10^{GN/20} \right)^2 / N \right]$ dBi. So Directional gain = $10 \log \left[\left(10^{2.97/20} + 10^{2.98/20} + 10^{2.98/20} + 10^{2.98/20} \right)^2 / 4 \right] = 9.00$. Then, the average output power limit is $30 - (9 - 6) = 27.00$, the power spectral density limit is $17 - (9 - 6) = 14.00$.

b) For UNII-3, Directional gain = $G_{ANT} + \text{Array Gain}$.

For power measurements, Array Gain = 0 dB ($N_{ANT} \leq 4$), so the Directional gain = 3.64.

For power spectral density measurements, $N_{ANT} = 4$, $N_{SS} = 1$. So Directional gain = $G_{ANT} + \text{Array Gain} = G_{ANT} + 10 \log (N_{ANT} / N_{SS})$ dB = $3.64 + 10 \log (4/1)$ dBi = 9.66. Then, the power spectral density limit is $30 - (9.66 - 6) = 26.34$.

2) Beamforming function, Beamforming Gain: 6dB. So,

a) For UNII-1:

The Directional gain = $2.98 + 6 = 8.98$. Then, the average output power limit is $30 - (8.98 - 6) = 27.02$, the power spectral density limit is $17 - (8.98 - 6) = 14.02$.

b) For UNII-3:

The Directional gain = $3.64 + 6 = 9.64$. Then, the average output power limit is $30 - (9.64 - 6) = 26.36$, the power spectral density limit is $30 - (9.64 - 6) = 26.36$.

Table for Antenna Configuration:

For Non Beamforming:

Operating Mode	TX Mode	4TX
IEEE 802.11a		V (Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4)
IEEE 802.11n (HT20)		V (Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4)
IEEE 802.11n (HT40)		V (Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4)
IEEE 802.11ac (VHT20)		V (Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4)
IEEE 802.11ac (VHT40)		V (Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4)
IEEE 802.11ac (VHT80)		V (Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4)

For Beamforming:

Operating Mode	TX Mode	4TX
IEEE 802.11n (HT20)		V (Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4)
IEEE 802.11n (HT40)		V (Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4)
IEEE 802.11ac (VHT20)		V (Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4)
IEEE 802.11ac (VHT40)		V (Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4)
IEEE 802.11ac (VHT80)		V (Ant. 1 + Ant. 2 + Ant. 3 + Ant. 4)

2. TEST RESULTS

For 2.4GHz Non 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
2.98	1.9861	29.70	933.2543	0.16397	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
8.98	7.9068	27.2	524.8075	0.36709	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
9.00	7.9433	26.68	465.5861	0.32717	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
3.64	2.3121	29.88	972.7472	0.19896	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
8.98	7.9068	26.58	454.9881	0.31825	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
9.64	9.2045	26.09	406.4433	0.33095	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			
0.36709	0.33095	0.69804	1	Complies

Note: The calculated distance is 30 cm.
Output power including tune up tolerance.

End of Test Report