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.

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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}+10log (N_{ANT}/ N_{SS}) dB =2.98+10log(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=10log $[(10^{G1/20}+10^{G2/20}+...10^{GN/20})^2/N]$dBi. So Directional gain=10log $[(10^{2.97/20}+10^{2.98/20}+10^{2.98/20}+10^{2.98/20})^2/4]$=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}+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} + Array Gain = G_{ANT}+10log (N_{ANT}/ N_{SS}) dB =3.64+10log(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