

FCC RF EXPOSURE REPORT

FCC ID: TE7A8

Project No. : 2002C057
Equipment : 1) AC1900 MU-MIMO Wi-Fi Router
2) AC1350 MU-MIMO Wi-Fi Router
Brand Name : tp-link
Test Model : Archer A8
Series Model : Archer C59
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 : Feb. 21, 2020
Date of Test : Feb. 24, 2020 ~ Mar. 10, 2020
Issued Date : Mar. 19, 2020
Report Version : R00
Test Sample : Engineering Sample No.: DG20200224105
Standard(s) : FCC Guidelines for Human Exposure IEEE C95.1
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	Mar. 19, 2020

1. 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

Antenna Specification:

For 2.4GHz:

Ant.	Brand	P/N	Antenna Type	Connector	Gain (dBi)
1		3101503110	Dipole	N/A	3
2		3101503111	Dipole	N/A	3
3		3101503109	Dipole	N/A	3

Note:

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

- For Non-Beamforming function, Directional gain = $G_{ANT} + \text{Array Gain}$, where Array Gain is as follows:

For power spectral density measurements, $N_{ANT} = 3$, $N_{SS} = 1$.




So Directional gain = $G_{ANT} + \text{Array Gain} = G_{ANT} + 10 \log (N_{ANT} / N_{SS}) \text{ dB} = 3 + 10 \log (3/1) \text{ dBi} = 7.77$.

For power measurements, Array Gain = 0 dB ($N_{ANT} \leq 4$), so the Directional gain=3.

- For Beamforming function, Beamforming Gain: 4.77 dB.

So Directional gain = $4.77 + 3 = 7.77$. Then, the average output power limit is $30 - (7.77 - 6) = 28.23$.

For 5GHz:

Ant.	rand	P/N	Antenna Type	Connector	Gain (dBi)
1		3101503109	Dipole	N/A	3
2		3101503111	Dipole	N/A	3
3		3101503110	Dipole	N/A	3

Note:

This EUT supports CDD, and all antennas have the same gain, Directional gain = $G_{ANT} + \text{Array Gain}$, where Array Gain is as follows:

- For Non-Beamforming function ,

UNII-1 and UNII-3 power spectral density measurements, $N_{ANT} = 3$, $N_{SS} = 1$.

So Directional gain = $G_{ANT} + \text{Array Gain} = G_{ANT} + 10 \log (N_{ANT} / N_{SS}) \text{ dB} = 3 + 10 \log (3/1) \text{ dBi} = 7.77$.

Then, UNII-1 and UNII-3 power measurements, Array Gain = 0 dB ($N_{ANT} \leq 4$), so the Directional gain=3.

- For Beamforming function, Beamforming Gain: 4.77 dB. So Directional gain = $4.77 + 3.00 = 7.77$.

Then, UNII-1 and UNII-3 output power limit is $30 - (7.77 - 6) = 28.23$.

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
3	1.9953	26.29	425.5984	0.10818	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
7.77	5.9841	26.14	411.1497	0.31342	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
3	1.9953	27.05	506.9907	0.12886	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	1.9953	28.05	638.2635	0.16223	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
7.77	5.9841	27.02	503.5006	0.38382	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
7.77	5.9841	28.04	636.7955	0.48543	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			
0.31342	0.48543	0.79885	1	Complies

Note: The calculated distance is 25 cm.
Output power including tune up tolerance.

End of Test Report