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.

Prepared by : Chay Cai

Approved by : Ethan Ma

Certificate #5123.02

Add: No.3, Jinshagang 1st Road, Shixia, Dalang Town,Dongguan, Guangdong, China.

Tel: +86-769-8318-3000

Web: www.newbtl.com

REPORT ISSUED HISTORY

Report Version	Description	Issued Date
R00	Original Issue	Mar. 19, 2020

1. MPE CALCULATION METHOD

Calculation Method of RF Safety Distance:

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

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

Antenna Specification:
For 2.4GHz:

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

Note:
This EUT supports CDD, and all antennas have the same gain
1. For Non-Beamforming function, Directional gain = G_{ANT}+Array Gain, where Array Gain is as follows:
   For power spectral density measurements, N_{ANT} = 3, N_{SS} = 1.
   So Directional gain = G_{ANT} + Array Gain = G_{ANT} + 10 log (N_{ANT}/ N_{SS}) dB =3+10log(3/1)dBi=7.77.
   For power measurements, Array Gain = 0 dB (N_{ANT} ≤ 4), so the Directional gain=3.

2. 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	TP-LINK	3101503109	Dipole	N/A	3
2	TP-LINK	3101503111	Dipole	N/A	3
3	TP-LINK	3101503110	Dipole	N/A	3

Note:
This EUT supports CDD, and all antennas have the same gain, Directional gain = G_{ANT}+Array Gain, where Array Gain is as follows:
1. For Non-Beamforming function ,
   UNII-1 and UNII-3 power spectral density measurements, N_{ANT} = 3, N_{SS} = 1.
   So Directional gain = G_{ANT} + Array Gain = G_{ANT} + 10 log (N_{ANT}/ N_{SS}) dB =3+10log(3/1)dBi=7.77.
   Then, UNII-1 and UNII-3 power measurements, Array Gain = 0 dB (N_{ANT} ≤ 4), so the Directional gain=3.

2. 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.

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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) 2.4GHz	Power Density (S) (mW/cm^2) 5GHz	Total	Limit of Power Density (S) (mW/cm^2)	Test Result
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