FCC RF EXPOSURE REPORT

FCC ID: TE7M9PLUSV2

Project No.	:	1908C067
Equipment	:	AC2200 Smart Home Mesh Wi-Fi System
Brand Name	:	tp-link
Test Model	:	Deco M9 Plus
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	:	Aug. 09, 2019
Date of Test	:	Aug. 09, 2019 ~ Nov. 09, 2019
Issued Date	:	Nov. 29, 2019
Report Version	:	R00
Test Sample	:	Engineering Sample No.: DG19081571
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	Nov. 29, 2019

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 LE:

Ant.	Brand	P/N	Antenna Type	Connector	Gain (dBi)
1	TP-LINK	N/A	PCB	N/A	1.26

For Zigbee:

Ant.	Brand	P/N	Antenna Type	Connector	Gain (dBi)
1	TP-LINK	3101502636	PCB	I-PEX	1.20

For 2.4GHz

Ant.	Brand	P/N	Antenna Type	Connector	Gain (dBi)
1	TP-LINK	3101502635	PCB	I-PEX	1.20
2	TP-LINK	3101502634	PCB	I-PEX	1.20

Note:
This EUT supports CDD, and all antennas have the same gain,
(1) For Non Beamforming function, Directional gain=G_{ANT}+Array Gain,
For output power measurements, Array Gain=0 ($N_{ANT} \leq 4$), so, Directional gain=1.20
For power spectral density measurements, Array Gain=10log(N_{ANT}/N_{SS}) dB,
so Directional gain=1.20+10log(2/1)=4.21

(2) For Beamforming function, Beamforming Gain: 3.0 dB, so Directional gain=3.0+1.20=4.20.

For 5GHz:
For UNII-1:

Ant.	Brand	P/N	Antenna Type	Connector	Gain (dBi)
1	TP-LINK	3101502551	Internal	I-PEX	0.80
2	TP-LINK	3101502551	Internal	I-PEX	0.80

Note:
This EUT supports CDD, and all antennas have the same gain,
(1) For Non Beamforming function, Directional gain=G_{ANT}+Array Gain,
For output power measurements, Array Gain=0 ($N_{ANT} \leq 4$), so, Directional gain=0.8
For power spectral density measurements, Array Gain=10log(N_{ANT}/N_{SS}) dB
Directional gain=0.8+10log(2/1)=3.81.

(2) For Beamforming function, Beamforming gain: 3.0 dB, so Directional gain=3.0+0.8=3.80

For UNII-3:

Ant.	Brand	P/N	Antenna Type	Connector	Gain (dBi)
3	TP-LINK	3101502637	Internal	I-PEX	0.80
4	TP-LINK	3101502552	Internal	I-PEX	0.80

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

(1) For Non Beamforming function, Directional gain=G_{ANT}+Array Gain,
For output power measurements, Array Gain=0 ($N_{ANT} \leq 4$), so, Directional gain=0.8
For power spectral density measurements, Array Gain=10log(N_{ANT}/N_{SS}) dB
Directional gain=0.8+10log(2/1)=3.81.

(2) For Beamforming function, Beamforming gain: 3.0 dB, so Directional gain=3.0+0.8=3.80

The worst case for 2TX as follow:

For 2.4GHz:
For Non Beamforming:

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

For 5GHz:
For Non Beamforming:

Operating Mode / TX Mode	2TX
IEEE 802.11a	V (Ant. 1 + Ant. 2)
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)

2. TEST RESULTS

For LE:

Antenna Gain (dBi)	Antenna Gain (numeric)	Max. Peak Output Power (dBm)	Max. Peak Output Power (mW)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)	Test Result
1.26	1.3366	9.35	8.6099	0.00229	1	Complies

For Zigbee:

Antenna Gain (dBi)	Antenna Gain (numeric)	Max. Peak Output Power (dBm)	Max. Peak Output Power (mW)	Power Density (S) (mW/cm^2)	Limit of Power Density (S) (mW/cm^2)	Test Result
1.20	1.3183	19.95	98.8553	0.02594	1	Complies

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
1.20	1.3183	28.60	724.4360	0.19009	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
4.20	2.6303	26.50	446.6836	0.23386	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
0.8	1.2023	29.14	820.3515	0.19631	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
0.8	1.2023	29.54	899.4976	0.21525	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
3.80	2.3988	27.11	514.0437	0.24544	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
3.80	2.3988	27.36	544.5027	0.25999	1	Complies

For the max simultaneous transmission MPE:

Power Density (S) (mW/cm^2)	Power Density (S) (mW/cm^2)	Power Density (S) (mW/cm^2)	Power Density (S) (mW/cm^2)	Total	Limit of Power Density (S) (mW/cm^2)	Test Result
LE	Zigbee	2.4GHz	5GHz			
0.00229	0.02594	0.23386	0.25999	0.52208	1	Complies

Note: The calculated distance is 20 cm.
Output power including tune up tolerance.

End of Test Report