

MPE REPORT

案 號：1908C067
產 品 名 稱：AC2200智慧家庭Mesh Wi-Fi系統
型 號：Deco M9 Plus
商 標 / 廠 牌：tp-link
申請廠商（名稱）：聯洲國際有限公司
申請廠商（地址）：新北市板橋區中山路一段 156 號 13 樓
According to：LP0002 第 5.20.2 節

報 告 簽 署 人：



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報告發行歷史紀錄

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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		N/A	PCB	N/A	1.26

For Zigbee:

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

For 2.4GHz

Ant.	Brand	P/N	Antenna Type	Connector	Gain (dBi)
1		3101502635	PCB	I-PEX	1.20
2		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= $10\log(N_{ANT}/N_{SS})$ dB,

so Directional gain= $1.20+10\log(2/1)=4.21$

(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		3101502551	Internal	I-PEX	0.8
2		3101502551	Internal	I-PEX	0.8

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= $10\log(N_{ANT}/N_{SS})$ dB

Directional gain= $0.8+10\log(2/1)=3.81$.

(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= $G_{ANT} + \text{Array Gain}$,

For output power measurements, Array Gain=0 ($N_{ANT} \leq 4$), so, Directional gain=0.8

For power spectral density measurements, Array Gain= $10\log(N_{ANT}/N_{SS})$ dB

Directional gain= $0.8 + 10\log(2/1) = 3.81$.

(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	8.85	7.6736	0.00204	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	19.45	88.1049	0.02312	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	28.39	690.2398	0.18111	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	26.27	423.6430	0.22179	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	28.64	731.1391	0.17496	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	29.04	801.6781	0.19184	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	26.61	458.1419	0.21875	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	26.86	485.2885	0.23171	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			
0.00204	0.02312	0.22179	0.23171	0.47866	1	Complies

Note: The evaluated distance is 20cm.

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