

MPE REPORT

報告編號：BTL-NCC-3-2008C188C
產品名稱：AX1800 雙頻 Wi-Fi 6 路由器
廠牌：tp-link
主型：Archer AX20
系列型：Archer AX21
申請人名稱：聯洲國際有限公司
申請人地址：新北市板橋區中山路一段 156 號 13 樓
製造廠商：普聯技術有限公司
器材型式：WLAN 2.4GHz, WLAN 5GHz
樣品編號：DG2020090140
檢驗標準：低功率射頻器材技術規範: NCC LP0002(109-07-01) 第6.20.2節
檢驗結果：符合

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實驗室名稱：東研信超股份有限公司
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電話：(02)2641-8198
傳真：(02)2641-8698
認可登錄編號：0659
認可範圍：9 kHz - 40 GHz
認可有效期限：2018/08/21~2021/08/20

本測試報告內所記載之測試結果以及待測試設備系統之組成，係依照上述檢驗標準所規定之量測方法實施。

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報告發行歷史紀錄

報告版本	內容	發行日期
R00	這是一份補充報告，引用的測試數據來自測試報告 (BTL-NCC-3-2008C188)，其差異為增加系列型號，其餘保持不變，並未影響測試結果。	110 年 01 月 27 日

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

Table for Filed Antenna:

For 2.4GHz:

代號	廠牌	P/N	類型	連接頭	增益值 (dBi)
1	tp-link	3101502647	Dipole	Weld	3.82
2	tp-link	3101502557	Dipole	Weld	3.82

Note:

- 1) This EUT supports CDD, and all antennas have the same gain, Directional gain = G_{ANT} +Array Gain.
For power measurements, Array Gain=0dB ($N_{ANT} \leq 4$), so the Directional gain=3.82.
For power spectral density measurements, $N_{ANT}=2$, $N_{SS} = 1$.
So the Directional gain= G_{ANT} +Array Gain= $G_{ANT}+10\log(N_{ANT}/N_{SS})$ dBi=3.82+10log(2/1)dBi=6.83.
Then, the power spectral density limit is 8-(6.83-6)=7.17.
- 2) Beamforming Gain: 3 dB. So Directional gain = 3+3.82=6.82. Then, the power limit is 30-(6.82-6)=29.18.

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)
IEEE 802.11ax (HE20)		V (Ant. 1+ Ant. 2)
IEEE 802.11ax (HE40)		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 802.11ax (HE20)		V (Ant. 1+ Ant. 2)
IEEE 802.11ax (HE40)		V (Ant. 1+ Ant. 2)

For 5GHz:

代號	廠牌	P/N	類型	連接頭	增益值 (dBi)	備註
1	tp-link	3101503061	Dipole	I-PEX	2.17	UNII-1
2	tp-link	3101502648	Dipole	I-PEX	2.17	
1	tp-link	3101503061	Dipole	I-PEX	2.94	UNII-3
2	tp-link	3101502648	Dipole	I-PEX	2.94	

Note:

- 1) This EUT supports CDD, and all antennas have the same gain, Directional gain = $G_{ANT} + \text{Array Gain}$.
For power measurements, Array Gain=0dB ($N_{ANT} \leq 4$), so the UNII-1 Directional gain=2.17, the UNII-3 Directional gain=2.94.
For power spectral density measurements, $N_{ANT}=2$, $N_{SS} = 1$.
So the UNII-1 Directional gain= $G_{ANT} + \text{Array Gain} = G_{ANT} + 10\log(N_{ANT}/N_{SS})\text{dBi} = 2.17 + 10\log(2/1)\text{dBi} = 5.18$,
the UNII-3 Directional gain= $G_{ANT} + \text{Array Gain} = G_{ANT} + 10\log(N_{ANT}/N_{SS})\text{dBi} = 2.94 + 10\log(2/1)\text{dBi} = 5.95$.
- 2) Beamforming Gain: 3 dB. So the UNII-1 Directional gain = $3 + 2.17 = 5.17$, the UNII-3 Directional gain = $3 + 2.94 = 5.94$.

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)
	IEEE 802.11ax (HE20)	V (Ant. 1 + Ant. 2)
	IEEE 802.11ax (HE40)	V (Ant. 1 + Ant. 2)
	IEEE 802.11ax (HE80)	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)
	IEEE 802.11ax (HE20)	V (Ant. 1 + Ant. 2)
	IEEE 802.11ax (HE40)	V (Ant. 1 + Ant. 2)
	IEEE 802.11ax (HE80)	V (Ant. 1 + Ant. 2)

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
3.82	2.4099	29.16	824.1381	0.25301	1	Complies

For 2.4GHz With 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
6.82	4.8084	28.97	788.8601	0.48320	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
2.17	1.6482	29.27	845.2788	0.17747	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
2.94	1.9679	29.22	835.6030	0.20947	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
5.17	3.2885	28.36	685.4882	0.28716	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
5.94	3.9264	28.92	779.8301	0.39006	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			
0.48320	0.39006	0.87326	1	Complies

Note:

(1) The evaluated distance is 25cm.

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