

FCC RF EXPOSURE REPORT

FCC ID: 2AXJ4HX220

Project No. : 2110C026
Equipment : AX1800 Whole Home Mesh Wi-Fi AP
Brand Name : tp-link
Test Model : HX220
Series Model : HX220-G5
Applicant : TP-Link Corporation Limited
Address : Room 901, 9/F. , New East Ocean Centre, 9 Science Museum Road,
Tsim Sha Tsui, Kowloon, Hong Kong
Manufacturer : TP-Link Corporation Limited
Address : Room 901, 9/F. , New East Ocean Centre, 9 Science Museum Road,
Tsim Sha Tsui, Kowloon, Hong Kong
Date of Receipt : Oct. 12, 2021
Date of Test : Oct. 14, 2021 ~ Dec. 17, 2021
Issued Date : Dec. 17, 2021
Report Version : R00
Test Sample : Engineering Sample No.: DG2021101145
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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TESTING CERT #5123.02

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REPORT ISSUED HISTORY

| Report Version | Description | Issued Date |
|----------------|----------------|---------------|
| R00 | Original Issue | Dec. 17, 2021 |

1. TEST FACILITY

The test facilities used to collect the test data in this report is at the location of No. 3 Jinshagang 1st Rd. Shixia, Dalang Town, Dongguan City, Guangdong, People's Republic of China.

BTL's Registration Number for FCC: 357015

BTL's Designation Number for FCC: CN1240

2. 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

For 2.4GHz:

Antenna Specification:

| Ant. | Brand | P/N | Antenna Type | Connector | Gain (dBi) |
|------|---------|------------|--------------|-----------|------------|
| 1 | tp-link | 3101504017 | Dipole | WELD | 1 |
| 2 | tp-link | 3101504018 | Dipole | WELD | 1 |

Note:

- 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 Directional gain=1. For power spectral density measurements, $N_{ANT}=2$, $N_{SS} = 1$. So the Directional gain= $G_{ANT} + \text{Array Gain} = G_{ANT} + 10\log(N_{ANT}/N_{SS})\text{dBi} = 1 + 10\log(2/1)\text{dBi} = 4.01$.
- Beamforming Gain: 3dB. Directional gain = 3+1=4.
- The antenna gain and beamforming gain are provided by the manufacturer.

Table for Antenna Configuration:

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:

Antenna Specification:

| Ant. | Brand | P/N | Antenna Type | Connector | Gain (dBi) |
|------|---------|------------|--------------|-----------|------------|
| 1 | tp-link | 3101503823 | Dipole | WELD | 1 |
| 2 | tp-link | 3101504020 | Dipole | WELD | 1 |

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 Directional gain=1. For power spectral density measurements, $N_{ANT}=2$, $N_{SS} = 1$. So the Directional gain= $G_{ANT} + \text{Array Gain} = G_{ANT} + 10\log(N_{ANT}/N_{SS})\text{dBi} = 1 + 10\log(2/1)\text{dBi} = 4.01$.
- 2) Beamforming Gain: 3dB. Directional gain = 3+1=4.
- 3) The antenna gain and beamforming gain are provided by the manufacturer.

Table for Antenna Configuration:

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) |

3. 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 |
|------------------------|----------------------------|---------------------------------|--------------------------------|-----------------------------------------|--------------------------------------------------|-------------|
| 1 | 1.2589 | 24.08 | 255.8586 | 0.06411 | 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 | 2.5119 | 23.65 | 231.7395 | 0.11586 | 1 | Complies |

For 5GHz 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 |
|------------------------|----------------------------|-------------------------|------------------------|-----------------------------------------|--------------------------------------------------|-------------|
| 1 | 1.2589 | 24.78 | 300.6076 | 0.07533 | 1 | Complies |

For 5GHz 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 |
|------------------------|----------------------------|-------------------------|------------------------|-----------------------------------------|--------------------------------------------------|-------------|
| 4 | 2.5119 | 24.59 | 287.7398 | 0.14386 | 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 | | | |
| 0.11586 | 0.14386 | 0.25972 | 1 | Complies |

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

End of Test Report