# FCC RF EXPOSURE REPORT

## FCC ID: 2BCGWA8V2

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|---|---|---|
| **Project No.** | : | 2505G009 |
| **Equipment** | : | AC1900 MU-MIMO Wi-Fi Router |
| **Brand Name** | : | tp-link |
| **Test Model** | : | Archer A8 |
| **Series Model** | : | N/A |
| **Applicant** | : | TP-LINK CORPORATION PTE. LTD. |
| **Address** | : | 7 Temasek Boulevard #29-03 Suntec Tower One, Singapore 038987 |
| **Manufacturer** | : | TP-LINK CORPORATION PTE. LTD. |
| **Address** | : | 7 Temasek Boulevard #29-03 Suntec Tower One, Singapore 038987 |
| **Date of Receipt** | : | Feb. 21, 2020<br>Jul. 07, 2022 |
| **Date of Test** | : | Feb. 24, 2020 ~ Mar. 10, 2020 |
| **Issued Date** | : | Jul. 01, 2025 |
| **Report Version** | : | R00 |
| **Test Sample** | : | Engineering Sample No.: DG20200224105 |
| **Standard(s)** | : | FCC Guidelines for Human Exposure IEEE C95.1 & FCC Part 2.1091<br>FCC Title 47 Part 2.1091 |

The above equipment has been tested and found compliance with the requirement of the relative standards by BTL Inc. (Dongguan)

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## REPORT ISSUED HISTORY

| Report No. | Version | Description | Issued Date | Note |
|---|---|---|---|---|
| BTL-FCCP-3-2505G009 | R00 | This is a copy report which referencing test data are provided from the original test report (BTL-FCCP-3-2002C05 & BTL-FCCP-3-2002C057A).<br>1. Changed PCB board (The LAN port plug-in transformer is changed to a surface mount capacitor separated transformer, and the WAN port 18-pin transformer is changed to 20-pin).<br>The above changes do not affect the test results. The rest are kept the same. | Jul. 01, 2025 | Valid |

Remark: For the original report (BTL-FCCP-3-2002C057A), the test data, data evaluation, and equipment configuration contained was accredited by the Authority of A2LA according to the ISO/IEC 17025 quality assessment standard and technical standard(s).

## 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 ($N_{ANT} \leq 4$), 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.
3. The antenna gain and beamforming gain are provided by the manufacturer.

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 ($N_{ANT} \leq 4$), 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.
3. The antenna gain and beamforming gain are provided by the manufacturer.

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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:**

| Ratio | | Total | Limit of Ratio | Test Result |
|---|---|---|---|---|
| 2.4GHz | 5GHz | | | |
| 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**