# RF Exposure Evaluation Declaration

| | |
|---|---|
| **FCC ID:** | TE7GX90 |
| **APPLICANT:** | TP-Link Technologies Co., Ltd. |
| **Application Type:** | Certification |
| **Product:** | AX6600 Tri-Band Wi-Fi 6 Gaming Router |
| **Model No.:** | Archer GX90 |
| **Trademark:** | tp-link |
| **FCC Classification:** | Digital Transmission System (DTS)<br>Unlicensed National Information Infrastructure (NII) |
| **Test Procedure(s):** | KDB 447498 D01v06 |
| **Test Date:** | May 19, 2020 |

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Approved By:
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3261

# Revision History

| Report No. | Version | Description | Issue Date | Note |
|---|---|---|---|---|
| 2004TW0002-U4 | Rev. 01 | Initial report | 06-05-2020 | Valid |
| | | | | |

# 1. PRODUCT INFORMATION

## 1.1. Equipment Description

| | |
|---|---|
| Product Name | AX6600 Tri-Band Wi-Fi 6 Gaming Router |
| Model No. | Archer GX90 |
| Brand Name: | tp-link |
| Wi-Fi Specification: | 802.11a/b/g/n/ac/ax |

## 1.2. Description of Available Antennas

| Antenna Type | Frequency Band (MHz) | $T_X$ Paths | Number of spatial streams | Max Antenna Gain (dBi) | Beamforming Directional Gain (dBi) | CDD Directional Gain (dBi) | |
|---|---|---|---|---|---|---|---|
| | | | | | | For Power | For PSD |
| Omni Antenna | 2412 ~ 2462 | 2 | 1 | 1.42 | 4.43 | 1.42 | 4.43 |
| | 5150 ~ 5250 | 2 | 1 | 1.27 | 4.28 | 1.27 | 4.28 |
| | 5470 ~ 5725 | 4 | 1 | 1.63 | 7.65 | 1.63 | 7.65 |
| | | 4 | 2 | 1.63 | -- | 1.63 | 4.64 |
| | 5725 ~ 5850 | 4 | 1 | 1.33 | 7.35 | 1.33 | 7.35 |

Note:

1. The EUT supports Cyclic Delay Diversity (CDD) mode, and CDD signals are correlated.

   If all antennas have the same gain, $G_{ANT}$, Directional gain = $G_{ANT}$ + Array Gain, where Array Gain is as follows.

   - For power spectral density (PSD) measurements on all devices,

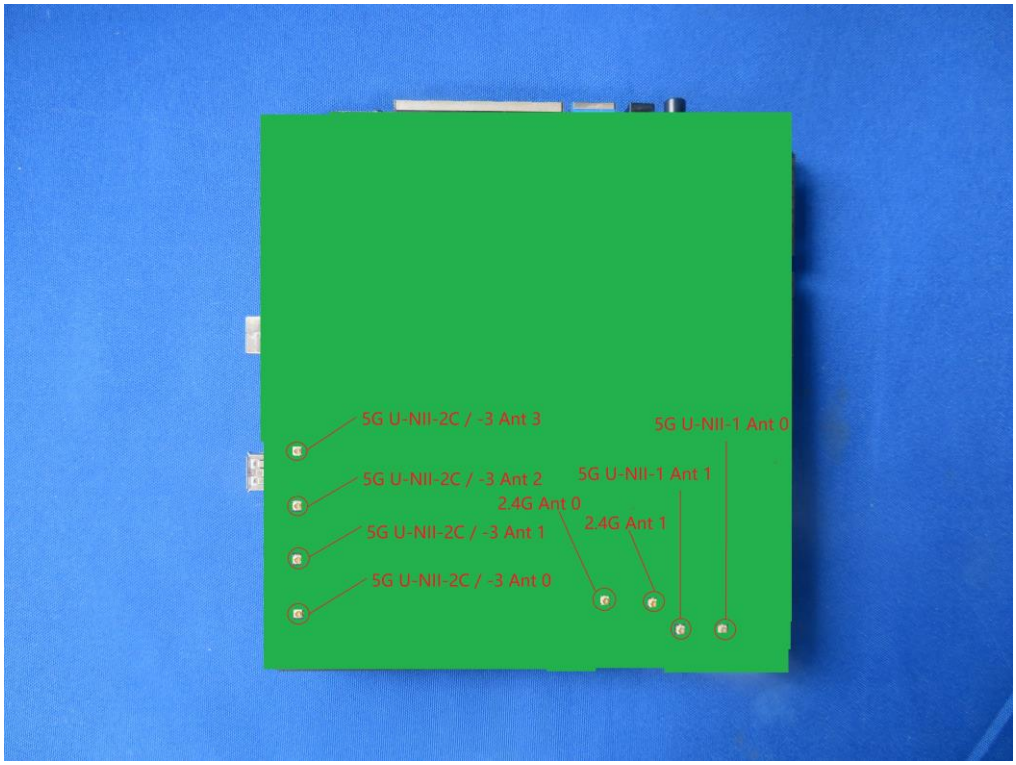
   Array Gain = 10 log ($N_{ANT}$/ $N_{SS}$) dB;

   - For power measurements on IEEE 802.11 devices,

   Array Gain = 0 dB for $N_{ANT} \leq 4$;

2. The EUT also supports Beam Forming mode, and the Beam Forming support 802.11ac/ax, not include 802.11a/b/g/n. BF Directional gain = $G_{ANT}$ + 10 log ($N_{ANT}$).

## 1.3. Description of Antenna RF Port

| Antenna RF Port | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| Software Control Port | 2.4GHz RF Port | | 5GHz RF Port | | | | | |
| | | | U-NII - 1 | | U-NII – 2C / -3 | | | |
| | Ant 0 | Ant 1 | Ant 0 | Ant 1 | Ant 0 | Ant 1 | Ant 2 | Ant 3 |
|  | | | | | | | | |

# 2. RF Exposure Evaluation

## 2.1. Limits

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

| Frequency Range (MHz) | Electric Field Strength (V/m) | Magnetic Field Strength (A/m) | Power Density ($mW/cm^2$) | Average Time (Minutes) |
|---|---|---|---|---|
| (A) Limits for Occupational/ Control Exposures | | | | |
| 300-1500 | -- | -- | f/300 | 6 |
| 1500-100,000 | -- | -- | 5 | 6 |
| (B) Limits for General Population/ Uncontrolled Exposures | | | | |
| 300-1500 | -- | -- | f/1500 | 6 |
| 1500-100,000 | -- | -- | 1 | 30 |

f= Frequency in MHz

Calculation Formula: $Pd = (Pout*G)/(4*pi*r^2)$

Where
Pd = power density in $mW/cm^2$
Pout = output power to antenna in mW
G = gain of antenna in linear scale
Pi = 3.1416
r = distance between observation point and center of the radiator in cm

Pd is the limit of MPE, $1mW/cm^2$. If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.

## 2.2. Test Result of RF Exposure Evaluation

| | |
|---|---|
| Product | AX6600 Tri-Band Wi-Fi 6 Gaming Router |
| Test Item | RF Exposure Evaluation |

Antenna Gain: Refer to clause 1.2.

| Test Mode | Frequency Band (MHz) | Conducted Power (dBm) | Antenna Gain (dBi) | Maximum EIRP (dBm) |
|---|---|---|---|---|
| 802.11b/g/n/ax | 2412 ~ 2462 | 29.72 | 4.43 | 34.15 |
| 802.11a/n/ac/ax | 5180 ~ 5240 | 27.80 | 4.28 | 32.08 |
| 802.11a/n/ac/ax | 5500 ~ 5720, 5745 ~ 5825 | 28.37 | 7.35 | 35.72 |

| Test Mode | Frequency Band (MHz) | Maximum EIRP (dBm) | Safety Distance (cm) | Power Density ($mW/cm^2$) | Limit of Power Density ($mW/cm^2$) |
|---|---|---|---|---|---|
| 802.11b/g/n/ax | 2412 ~ 2462 | 34.15 | 25.5 | 0.3182 | 1 |
| 802.11a/n/ac/ax | 5180 ~ 5240 | 32.08 | 25.5 | 0.1976 | 1 |
| 802.11a/n/ac/ax | 5500 ~ 5720, 5745 ~ 5825 | 35.72 | 25.5 | 0.4568 | 1 |

**CONCLUSION:**

The WLAN 2.4GHz Band, WLAN 5GHz Low Band(U-NII-1) and WLAN 5GHz upper Band(U-NII-2C/-3) can transmit simultaneously.

The max Power Density at R (25.5 cm) = $0.3182mW/cm^2 + 0.1976mW/cm^2 + 0.4568mW/cm^2 = 0.9726mW/cm^2 < 1mW/cm^2$.

So the safety distance is 25.5cm for device installed without any other radio equipment.

The End

# Appendix A - EUT Photograph

Refer to “2004TW0002-UE” file.