

## RF Exposure Evaluation Declaration

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**FCC ID:** TE7AX50

**APPLICANT:** TP-Link Technologies Co., Ltd.

**Application Type:** Certification

**Product:** AX3000 Gigabit Wi-Fi Router

**Model No.:** Archer AX50, Archer AX3000

**Trademark:** tp-link

**FCC Classification:** Digital Transmission System (DTS)  
Unlicensed National Information Infrastructure (NII)

**Test Procedure(s):** KDB 447498 D01v06

**Test Date:** December 20, 2019

Reviewed By:



( Paddy Chen )

Approved By:



(Chenz Ker)



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standards through the calibration of the equipment and evaluated measurement uncertainty herein.

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### Revision History

Report No.	Version	Description	Issue Date	Note
1912TW0111-U2	Rev. 01	Initial report	12-20-2019	Valid

## 1. PRODUCT INFORMATION

### 1.1. Equipment Description

Product Name	AX3000 Gigabit Wi-Fi 6 Router
Model No.	Archer AX50, Archer AX3000
Brand Name:	tp-link
Wi-Fi Specification:	802.11a/b/g/n/ac/ax

Note: These models are different in the USB interface, Archer AX50 supports USB 3.0, Archer AX3000 supports USB2.0. Others are the same. So Archer AX50 is chosen for the tests.

### 1.2. Description of Available Antennas

Antenna Type	Frequency Band (MHz)	TX Paths	Max Antenna Gain (dBi)	BF Directional Gain (dBi)	CDD Directional Gain (dBi)	
					For Power	For PSD
Dipole Antenna	2400 ~ 2500	2	2.0	5.01	2.0	5.01
	5150 ~ 5850	2	3.0	6.01	3.0	6.01

Note:

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

For CDD transmissions, directional gain is calculated as follows,  $N_{ANT} = 2$ ,  $N_{SS} = 1$ .

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

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

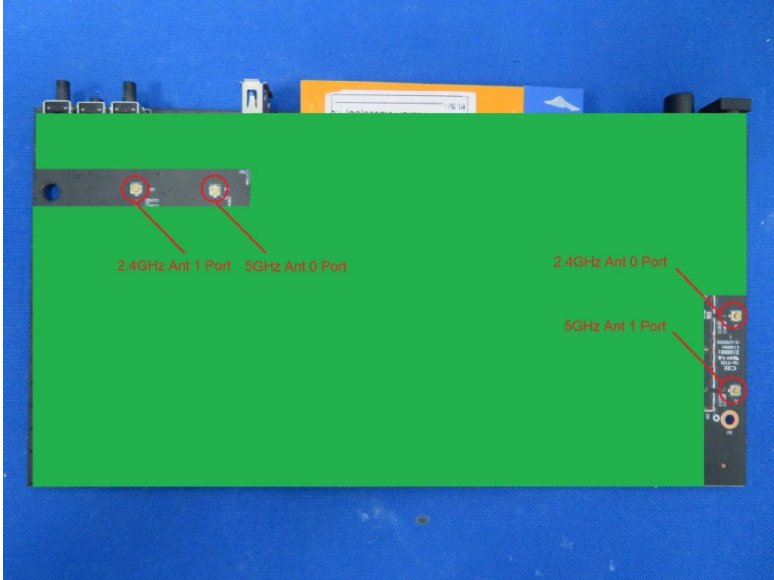
Array Gain =  $10 \log (N_{ANT} / N_{SS}) \text{ dB} = 3.01$ ;

- 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	
	Ant 0	Ant 1	Ant 0	Ant 1
				

## 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 <sup>2</sup> )	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:  $P_d = (P_{out} * G) / (4 * \pi * r^2)$

Where

$P_d$  = power density in mW/cm<sup>2</sup>

$P_{out}$  = 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

$P_d$  is the limit of MPE, 1mW/cm<sup>2</sup>. 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	AX3000 Gigabit Wi-Fi 6 Router
Test Item	RF Exposure Evaluation

Antenna Gain: Refer to clause 1.2.

Test Mode	Frequency Band (MHz)	Max Conducted Power (dBm)	Antenna Gain (dBi)	Maximum EIRP (dBm)
802.11b/g/n/ax	2412 ~ 2462	29.79	2.00	31.79
802.11 a/n/ac/ax	5180 ~ 5320, 5500 ~ 5720, 5745 ~ 5825	29.71	3.00	32.71

Test Mode	Frequency Band (MHz)	Maximum EIRP (dBm)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )
802.11b/g/n/ax	2412 ~ 2462	31.79	0.3004	1
802.11 a/n/ac/ax	5180 ~ 5320, 5500 ~ 5720, 5745 ~ 5825	32.71	0.3713	1

### CONCLUSION:

Both of the WLAN 2.4GHz Band and WLAN 5GHz Band can transmit simultaneously.

The max Power Density at R (20 cm) =  $0.3004\text{mW/cm}^2 + 0.3713\text{mW/cm}^2 = 0.6717\text{mW/cm}^2 < 1\text{mW/cm}^2$ .

So the safety distance is 20cm for **AX3000 Gigabit Wi-Fi 6 Router** installed without any other radio equipment.

\_\_\_\_\_ The End \_\_\_\_\_

## **Appendix A - EUT Photograph**

Refer to “1912TW0111-UE” file.