

RF Exposure Evaluation Declaration

FCC ID: TE7AX90
APPLICANT: TP-Link Technologies Co., Ltd.
Application Type: Certification
Product: AX6600 Tri-Band Wi-Fi 6 Router
Model No.: Archer AX90
Trademark: tp-link
FCC Classification: Digital Transmission System (DTS)
Unlicensed National Information Infrastructure (NII)
Test Procedure(s): KDB 447498 D01v06
Test Date: May 15, 2020

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Testing Laboratory
3261

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
2004TW0003-U4	Rev. 01	Initial report	05-27-2020	Valid

1. PRODUCT INFORMATION

1.1. Equipment Description

Product Name	AX6600 Tri-Band Wi-Fi 6 Router
Model No.	Archer AX90
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
Monopole Antenna	2412 ~ 2462	2	1	3.52	6.53	3.52	6.53
	5150 ~ 5250	2	1	3.54	6.55	3.54	6.55
	5470 ~ 5725	4	1	3.20	9.22	3.20	9.22
		4	2	3.20	--	3.20	6.21
	5725 ~ 5850	4	1	3.20	9.22	3.20	9.22

Note:

- 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,

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

- For power measurements on IEEE 802.11 devices,

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

- 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
<p>The photograph shows a green PCB with various antenna ports. On the left side, there are two pairs of ports labeled '2.4G Ant 0' and '2.4G Ant 1'. On the right side, there are four ports labeled '5G U-NII-2C / -3 Ant 0', '5G U-NII-2C / -3 Ant 1', '5G U-NII-2C / -3 Ant 2', and '5G U-NII-2C / -3 Ant 3'. A white label at the top left of the board contains the following text: 研发处 (R&D Dept), 编号: F09081984 (Serial No.), 机型: Archer AX800US 1.0 (Model).</p>								

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

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

r = distance between observation point and center of the radiator in cm

P_d is the limit of MPE, 1mW/cm². 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 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	29.22	3.52	32.74
802.11a/n/ac/ax	5180 ~ 5240	28.24	6.55	34.79
802.11a/n/ac/ax	5500 ~ 5720, 5745 ~ 5825	26.66	9.22	35.88

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	32.74	26.5	0.2130	1
802.11a/n/ac/ax	5180 ~ 5240	34.79	26.5	0.3414	1
802.11a/n/ac/ax	5500 ~ 5720, 5745 ~ 5825	35.88	26.5	0.4388	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 (26.5 cm) = $0.2130\text{mW}/\text{cm}^2 + 0.3414\text{mW}/\text{cm}^2 + 0.4388\text{mW}/\text{cm}^2 = 0.9932\text{mW}/\text{cm}^2 < 1\text{mW}/\text{cm}^2$.

So the safety distance is 26.5cm for device installed without any other radio equipment.

————— The End —————

Appendix A - EUT Photograph

Refer to "2004TW0003-UE" file.