

RF Exposure Evaluation Declaration

FCC ID: TE7AX11000

APPLICANT: TP-Link Technologies Co., Ltd.

Application Type: Certification

Product: AX11000 MU-MIMO Tri-Band Gaming Router

Model No.: Archer AX11000

Trademark: tp-link

FCC Classification: FCC Part 15 Spread Spectrum Transmitter(DSS)
Digital Transmission System (DTS)
Unlicensed National Information Infrastructure (NII)

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
1811TW0112-U7	Rev. 01	Initial Report	12-05-2018	Valid

1. PRODUCT INFORMATION

1.1. Equipment Description

Product Name:	AX11000 MU-MIMO Tri-Band Gaming Router
Model No.:	Archer AX11000
Brand Name:	tp-link
Wi-Fi Specification:	802.11a/b/g/n/ac/ax
Bluetooth Specification:	v4.1 dual mode
Accessories	
Adapter:	MODEL: S065PQ1200500 INPUT: 100 - 240V ~ 50/60Hz 1800mA OUTPUT: DC 12.0V 5000mA

1.2. Description of Available Antennas

Antenna Type	Frequency	TX Paths	Max Antenna Gain (dBi)	BF Directional Gain (dBi)	CDD Directional Gain (dBi)	
	Band (MHz)					For Power
Wi-Fi External Antenna						
Dipole Antenna	2400 ~ 2500	4	1.8	7.82	1.8	7.82
	5150 ~ 5850	4	1.8	7.82	1.8	7.82
Bluetooth Internal Antenna						
Dipole Antenna	2400 ~ 2500	1	1.8	--	--	--

Note:

- The EUT supports Cyclic Delay Diversity (CDD) mode, and CDD signals are correlated.
For CDD transmissions, directional gain is calculated as follows, $N_{ANT} = 4$, $N_{SS} = 1$.
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 = $10 \log (N_{ANT} / N_{SS})$ dB = 6.02;
 - For power measurements on IEEE 802.11 devices,
Array Gain = 0 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 = $G_{ANT} + 10 \log (N_{ANT})$.

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

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	AX11000 MU-MIMO Tri-Band Gaming 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)
BT	2402 ~ 2480	8.97	1.80	10.77
802.11b/g/n/ac/ax	2412 ~ 2462	28.11	7.82	35.93
802.11 a/n/ac/ax	5180 ~ 5320	27.79	7.82	35.61
802.11 a/n/ac/ax	5500 ~ 5700, 5745 ~ 5825	28.07	7.82	35.89

Test Mode	Frequency Band (MHz)	Maximum EIRP (dBm)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)	Power Density at R = 31 cm (mW/cm ²)
Bluetooth	2402 ~ 2480	10.77	0.0024	1	0.0010
802.11b/g/n/ac/ax	2412 ~ 2462	35.93	0.7793	1	0.3244
802.11a/n/ac/ax	5180 ~ 5320	35.61	0.7240	1	0.3013
802.11a/n/ac/ax	5500 ~ 5700, 5745 ~ 5825	35.89	0.7722	1	0.3214

CONCULISON:

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

The max Power Density at R (20 cm) = $0.0024\text{mW/cm}^2 + 0.7793\text{mW/cm}^2 + 0.7240\text{mW/cm}^2 + 0.7722\text{mW/cm}^2 = 2.2779\text{mW/cm}^2 > 1\text{mW/cm}^2$.

The max Power Density at R (31 cm) = $0.0024\text{mW/cm}^2 + 0.5046\text{mW/cm}^2 + 0.4908\text{mW/cm}^2 = 0.9481\text{mW/cm}^2 < 1\text{mW/cm}^2$.

Therefore, the Min Safety Distance is 31cm.

The End

Appendix A - Test Setup Photograph

Refer to “1811TW0112-UT” file.

Appendix B - EUT Photograph

Refer to “1811TW0112-UE” file.