



RF Exposure Evaluation Declaration

FCC ID: TE7A10

APPLICANT: TP-Link Technologies Co., Ltd.

Application Type: Certification

Product: AC2300 Wireless MU-MIMO Gigabit Router

Model No.: Archer A10

Trademark: tp-link

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

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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
1803TW0102-U4	Rev. 01	Initial report	03-20-2018	Valid

1. PRODUCT INFORMATION

1.1. Equipment Description

Product Name:	AC2300 Wireless MU-MIMO Gigabit Router
Model No.:	Archer A10
Brand Name:	tp-link
Frequency Range:	802.11b/g/n-HT20: 2412 ~ 2462MHz 802.11n-HT40: 2422 ~ 2452MHz 802.11a/n-HT20/ac-VHT20: 5180 ~ 5240MHz, 5745 ~ 5825MHz 802.11n-HT40/ac-VHT40: 5190 ~ 5230MHz, 5755 ~ 5795MHz 802.11ac-VHT80: 5210MHz, 5775MHz
Type of Modulation:	802.11b: DSSS 802.11a/g/n/ac: OFDM

1.2. Antenna Description

Antenna Type	Frequency Band (MHz)	TX Paths	Max Antenna Gain (dBi)	CDD Directional Gain (dBi)	
				For Power	For PSD
Dipole Antenna (External)	2412 ~ 2462	4	1.0	1.0	7.02
PCB Antenna (Built-in)	5150 ~ 5850	4	1.0	1.0	7.02

Note 1: The EUT supports Cyclic Delay Diversity (CDD) technology for 802.11a/b/g/n/ac mode, and the transmitter output signal is correlated.

For CDD transmissions, directional gain is calculated as follows, $N_{ANT} = 4$, $N_{SS} = 1$.

Three 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 $N_{ANT} \leq 4$;

Note 2: The EUT also supports Beam Forming technology, and the Beam Forming only support 802.11ac mode. Three antennas have the same gain, G_{ANT} :

Directional gain = $G_{ANT} + 10 \log (N_{ANT} / N_{SS})$ dBi, where N_{SS} = the number of independent spatial streams of data and G_{ANT} is the antenna gain in dBi.

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	AC2300 Wireless MU-MIMO Gigabit Router
Test Item	RF Exposure Evaluation

Antenna Gain: Refer to clause 1.2.

Test Mode	Frequency Band (MHz)	Maximum Average Output Power (dBm)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)
802.11b/g/n	2412 ~ 2462	27.04	0.1267	1
802.11a/n/ac	5180 ~ 5240	28.53	0.1785	1
	5745 ~ 5825	29.00	0.1989	1

CONCLUSION:

Both of the WLAN 2.4GHz Band and WLAN 5GHz Band can transmit simultaneously. Therefore, the Max Power Density at R (20 cm) = $0.1267\text{mW/cm}^2 + 0.1989\text{mW/cm}^2 = 0.3256\text{mW/cm}^2 < 1\text{mW/cm}^2$.

So the EUT complies with the requirement.

The End