



RF Exposure Evaluation Report

APPLICANT : TP-Link Technologies Co., Ltd.
EQUIPMENT : AC1750 Wireless Dual Band Gigabit Router
BRAND NAME : TP-Link
MODEL NAME : Archer C8
FCC ID : TE7C8V4
STANDARD : 47 CFR Part 2.1091

We, SPORTON INTERNATIONAL (ShenZhen) INC., would like to declare that the device has been evaluated in accordance with 47 CFR Part 2.1091, and pass the limit. Without written approval of SPORTON INTERNATIONAL (ShenZhen) INC., the test report shall not be reproduced except in full.

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**Revision History**

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA721809	Rev. 01	Initial issue of report	Jun. 12, 2017
FA721809	Rev. 02	Added WLAN2.4GHz and WLAN 5GHz co-located MPE evaluation.	Jul. 18, 2017



1. Administration Data

1.1. Testing Laboratory

Testing Site	
Test Site	SPORTON International (ShenZhen) INC.
Test Site Location	1/F, 2/F, Bldg 5, Shiling Industrial Zone, Xinwei Village, Xili, Nanshan District, Shenzhen City, Guangdong Province, China TEL: +86-755-8637-9589 FAX: +86-755-8637-9595

Applicant	
Company Name	TP-Link Technologies Co., Ltd.
Address	Building 24 (floors 1,3,4,5) and 28 (floors1-4) Central Science and Technology Park, Shennan Rd, Nanshan, Shenzhen, China

Manufacturer	
Company Name	TP-Link Technologies Co., Ltd.
Address	Building 24 (floors 1,3,4,5) and 28 (floors1-4) Central Science and Technology Park, Shennan Rd, Nanshan, Shenzhen, China

2. Description of Equipment Under Test (EUT)

Product Feature & Specification				
EUT Type	AC1750 Wireless Dual Band Gigabit Router			
Brand Name	TP-Link			
Model Name	Archer C8			
FCC ID	TE7C8V4			
Wireless Technology and Frequency Range	WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz WLAN 5.2GHz Band: 5180 MHz ~ 5240 MHz WLAN 5.8GHz Band: 5745 MHz ~ 5825 MHz			
Mode	WLAN 2.4GHz 802.11b/g/n HT20/HT40 WLAN 5GHz 802.11a/n HT20/HT40 WLAN 5GHz 802.11ac VHT20/VHT40/VHT80			
Antenna Type	WLAN Ant.1: Omni Antenna WLAN Ant.2: Omni Antenna WLAN Ant.3: Omni Antenna			
Antenna Gain	WLAN 2.4GHz: Ant. 1: 3.37 dBi Ant. 2: 3.37 dBi Ant. 3: 3.37 dBi WLAN 5.2GHz: Ant. 1: 5.19 dBi Ant. 2: 5.19 dBi Ant. 3: 5.19 dBi WLAN 5.8GHz: Ant. 1: 4.56 dBi Ant. 2: 4.56 dBi Ant. 3: 4.56 dBi			
Antenna Function for Transmitter		Ant. 1	Ant. 2	Ant. 3
	802.11 b/g/a/n/ac MIMO	V	V	V
EUT Stage	Identical Prototype			
Remark:				
1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.				
2. For WLAN2.4GHz and WLAN 5GHz, MIMO power is higher than SISO power, so chose MIMO power to do MPE evaluation.				

3. Maximum RF average output power among production units

<WLAN 2.4GHz Antenna 1+2+3>

Mode		Maximum Average Power (dBm)
2.4GHz	802.11b	26.5
	802.11g	26.0
	802.11n-HT20	26.0
	802.11n-HT40	23.0

<WLAN 5GHz Antenna 1+2+3>

Mode		Maximum Average Power (dBm)
5.2GHz	802.11a	24.5
	802.11n-HT20	24.5
	802.11n-HT40	25.5
	802.11ac-VHT20	24.5
	802.11ac-VHT40	25.5
	802.11ac-VHT80	18.0
5.8GHz	802.11a	26.5
	802.11n-HT20	26.0
	802.11n-HT40	25.5
	802.11ac-VHT20	26.0
	802.11ac-VHT40	24.0
	802.11ac-VHT80	26.0

4. RF Exposure Limit Introduction

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f ²)	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1.0	30

The MPE was calculated at 20cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$S = \frac{PG}{4\pi R^2}$$

Where:

S = Power Density

P = Output Power at Antenna Terminals

G = Gain of Transmit Antenna (linear gain)

R = Distance from Transmitting Antenna

5. Radio Frequency Radiation Exposure Evaluation

5.1. Standalone Power Density Calculation

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
WLAN2.4GHz 802.11b	2412.0	3.37	26.5	29.87	0.97	970.51	0.19	1.00	0.19
WLAN2.4GHz 802.11g	2412.0	3.37	26	29.37	0.86	864.97	0.17	1.00	0.17
WLAN2.4GHz 802.11n-HT20	2412.0	3.37	26	29.37	0.86	864.97	0.17	1.00	0.17
WLAN2.4GHz 802.11n-HT40	2422.0	3.37	23	26.37	0.43	433.51	0.09	1.00	0.09
WLAN5.2GHz 802.11a	5180.0	9.96	24.5	34.46	2.79	2792.54	0.56	1.00	0.56
WLAN5.2GHz 802.11n-HT20	5180.0	9.96	24.5	34.46	2.79	2792.54	0.56	1.00	0.56
WLAN5.2GHz 802.11n-HT40	5190.0	9.96	25.5	35.46	3.52	3515.60	0.70	1.00	0.70
WLAN5.2GHz 802.11ac-VHT20	5180.0	9.96	24.5	34.46	2.79	2792.54	0.56	1.00	0.56
WLAN5.2GHz 802.11ac-VHT40	5190.0	9.96	25.5	35.46	3.52	3515.60	0.70	1.00	0.70
WLAN5.2GHz 802.11ac-VHT80	5210.0	9.96	18	27.96	0.63	625.17	0.12	1.00	0.12
WLAN5.8GHz 802.11a	5745.0	9.33	26.5	35.83	3.83	3828.25	0.76	1.00	0.76
WLAN5.8GHz 802.11n-HT20	5745.0	9.33	26	35.33	3.41	3411.93	0.68	1.00	0.68
WLAN5.8GHz 802.11n-HT40	5755.0	9.33	25.5	34.83	3.04	3040.89	0.61	1.00	0.61
WLAN5.8GHz 802.11ac-VHT20	5745.0	9.33	26	35.33	3.41	3411.93	0.68	1.00	0.68
WLAN5.8GHz 802.11ac-VHT40	5755.0	9.33	24	33.33	2.15	2152.78	0.43	1.00	0.43
WLAN5.8GHz 802.11ac-VHT80	5775.0	9.33	26	35.33	3.41	3411.93	0.68	1.00	0.68

Note:

- For conservativeness, the lowest frequency of each band is used to determine the MPE limit of that band.
- WLAN 2.4GHz does not support beamforming mode, so antenna gain for WLAN 2.4GHz MIMO is 3.37dBi.
- WLAN 5GHz supports beamforming mode, so antenna gain is calculated from the maximum SISO added 10log 3.

5.2. Collocated Power Density Calculation

Power Density / Limit		Σ (Power Density / Limit) of WLAN 2.4GHz+WLAN 5GHz
WLAN 2.4GHz 3x3Tx	WLAN 5GHz 3x3Tx	
0.19	0.76	
		0.95

Remark: The simultaneously analysis above of 3 transmitters can cover others combination of 2 transmitters, therefore in this section did not additional to evaluate 2TX combination of simultaneously transmission. The result is less than 1.0 and compliant.

Conclusion:

According to 47 CFR §2.1091, the RF exposure analysis concludes that the RF Exposure is FCC compliant.