



RF Exposure Evaluation Report

APPLICANT : TP-LINK TECHNOLOGIES CO., LTD.
EQUIPMENT : AC1200 Wireless Dual Band DOCSIS 3.0 Cable
Modem Router
BRAND NAME : TP-LINK
MODEL NAME : Archer CR500
MARKETING NAME : AC1200 Wireless Dual Band DOCSIS 3.0 Cable
Modem Router
FCC ID : TE7CR500V1
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
FA631009-01	Rev. 01	This project is FCC change ID application; The difference between previous and current is changing the FCC ID: TE7CR700V2 to TE7CR500V1, equipment name and model name. Based on the similarity between two products, the test result is not affected; all test cases were leveraged from original report (Sporton Report Number FA631009).	Sep. 27, 2016

**1. Administration Data****1.1. Testing Laboratory**

Testing Laboratory	
Test Site	SPORTON INTERNATIONAL (SHENZHEN) INC.
Test Site Location	1F & 2F,Building A, Morning Business Center, No. 4003 ShiGu Rd., Xili Town, Nanshan District, Shenzhen, Guangdong, P. R. 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	AC1200 Wireless Dual Band DOCSIS 3.0 Cable Modem Router			
Brand Name	TP-LINK			
Model Name	Archer CR500			
Marketing Name	AC1200 Wireless Dual Band DOCSIS 3.0 Cable Modem Router			
FCC ID	TE7CR500V1			
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	Omni Directional Antenna			
Antenna Function for Transmitter		Ant. 1	Ant. 2	Ant. 3
	802.11 a/b/g/n/ac SISO	V	V	V
	802.11 a/b/g/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. Since each SISO antenna power is less than per chain MIMO antenna power, we only evaluate MPE in MIMO antenna mode.				
3. WLAN2.4GHz and WLAN5GHz share the different antenna, and can transmit simultaneously.				
4. There are six antennas, three for WLAN 2.4GHz, the remaining three for WLAN 5GHz.				

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	29.56
	802.11g	27.42
	802.11n-HT20	27.98
	802.11n-HT40	25.52

<WLAN 5GHz Antenna 1+2+3>

Mode		Maximum Average Power (dBm)
5.2GHz	802.11a	26.78
	802.11n-HT20	26.92
	802.11n-HT40	27.03
	802.11ac-VHT20	26.83
	802.11ac-VHT40	26.79
	802.11ac-VHT80	17.01
5.8GHz	802.11a	28.22
	802.11n-HT20	28.14
	802.11n-HT40	28.01
	802.11ac-VHT20	28.06
	802.11ac-VHT40	28.04
	802.11ac-VHT80	27.90

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 28cm 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 28cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
WLAN2.4GHz 802.11b	2412.0	7.10	29.56	36.66	4.63	4634.47	0.47	1.00	0.47
WLAN2.4GHz 802.11g	2412.0	7.10	27.42	34.52	2.83	2831.39	0.29	1.00	0.29
WLAN2.4GHz 802.11n-HT20	2412.0	7.10	27.98	35.08	3.22	3221.07	0.33	1.00	0.33
WLAN2.4GHz 802.11n-HT40	2422.0	7.10	25.52	32.62	1.83	1828.10	0.19	1.00	0.19
WLAN5.2GHz 802.11a	5180.0	7.99	26.78	34.77	3.00	2999.16	0.30	1.00	0.30
WLAN5.2GHz 802.11n-HT20	5180.0	7.99	26.92	34.91	3.10	3097.42	0.31	1.00	0.31
WLAN5.2GHz 802.11n-HT40	5190.0	7.99	27.03	35.02	3.18	3176.87	0.32	1.00	0.32
WLAN5.2GHz 802.11ac-VHT20	5180.0	7.99	26.83	34.82	3.03	3033.89	0.31	1.00	0.31
WLAN5.2GHz 802.11ac-VHT40	5190.0	7.99	26.79	34.78	3.01	3006.08	0.31	1.00	0.31
WLAN5.2GHz 802.11ac-VHT80	5210.0	7.99	17.01	25.00	0.32	316.23	0.03	1.00	0.03
WLAN5.8GHz 802.11a	5745.0	8.89	28.22	37.11	5.14	5140.44	0.52	1.00	0.52
WLAN5.8GHz 802.11n-HT20	5745.0	8.89	28.14	37.03	5.05	5046.61	0.51	1.00	0.51
WLAN5.8GHz 802.11n-HT40	5755.0	8.89	28.01	36.90	4.90	4897.79	0.50	1.00	0.50
WLAN5.8GHz 802.11ac-VHT20	5745.0	8.89	28.06	36.95	4.95	4954.50	0.50	1.00	0.50
WLAN5.8GHz 802.11ac-VHT40	5755.0	8.89	28.04	36.93	4.93	4931.74	0.50	1.00	0.50
WLAN5.8GHz 802.11ac-VHT80	5775.0	8.89	27.90	36.79	4.78	4775.29	0.48	1.00	0.48

Note: For conservativeness, the lowest frequency of each band is used to determine the MPE limit of that band .

**5.2. Collocated Power Density Calculation**

Mode	Frequency	Power Density / Limit	Σ (Power Density / Limit) of WLAN 2.4GHz+WLAN 5GHz
WLAN2.4GHz	2412MHz ~ 2462MHz	0.47	0.99
WLAN5GHz	5180 MHz ~ 5240 MHz	0.32	
	5745 MHz ~ 5825 MHz	0.52	

Note:

Σ (Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for WLAN 2.4GHz+WLAN 5GHz.

Conclusion:

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