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Report No.: 1611RSU03604
Report Version:　　V01
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RF Exposure Evaluation Declaration

FCC ID:　　　　　　TE7C9V4

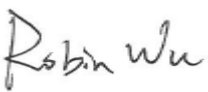**APPLICANT:**　　　　TP-Link Technologies Co., Ltd.

Application Type:　　Certification

Product:　　　　　　AC1900 Wireless Dual Band Gigabit Router

Model No.:　　　　　Archer C9

Trademark:　　　　　TP-Link

FCC Classification: Digital Transmission System (DTS)

　　　　　　　　　　　　Unlicensed National Information Infrastructure (UNII)

Reviewed By Manager　:　*Robin Wu*

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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
1611RSU03604	Rev. 01	Initial report	12-21-2016	Valid

1. PRODUCT INFORMATION

1.1. Equipment Description

Product Name:	AC1900 Wireless Dual Band Gigabit Router
Model No.:	Archer C9
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	Per Chain Max Antenna Gain (dBi)	Beam-forming Gain (dBi)	CDD Directional Gain (dBi)	
					For Power	For PSD
Dipole Antenna	2412 ~ 2462	3	2.09	N/A	2.07	6.86
	5150 ~ 5250	3	1.68	6.45	1.68	6.45
	5725 ~ 5850	3	1.62	6.39	1.62	6.39

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, $N_{ANT} = 3$, $N_{SS} = 1$.

Three 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,
    Array Gain = 10 log (N_{ANT}/ N_{SS}) dB = 4.77;
- 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: $Pd = (Pout*G)/(4*pi*r^2)$

Where

Pd = power density in mW/cm^2

Pout = output power to antenna in mW

G = gain of antenna in linear scale

Pi = 3.1416

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

Pd 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	AC1900 Wireless Dual Band 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	29.62	0.2949	1
802.11a/n/ac	5180 ~ 5240	24.58	0.0571	1
	5745 ~ 5825	29.61	0.2641	1

CONCULISON:

Both of the WLAN 2.4GHz Band and WLAN 5GHz Band can transmit simultaneously. Therefore, the Max Power Density at R (20 cm) = 0.2949mW/cm^2+ 0.2641mW/cm^2 = 0.5590mW/cm^2 < 1mW/cm^2.

So the EUT complies with the requirement.

—————————————— The End ——————————————