



# RF EXPOSURE REPORT

**REPORT NO.:** SA140626C16A

**MODEL NO.:** C9

**FCC ID:** TE7C9

**RECEIVED:** Sep. 03, 2014

**TESTED:** Sep. 18, 2014

**ISSUED:** Oct. 09, 2014

**APPLICANT:** TP-LINK TECHNOLOGIES CO., LTD.

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**ISSUED BY:** Bureau Veritas Consumer Products Services  
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## RELEASE CONTROL RECORD

ISSUE NO.	REASON FOR CHANGE	DATE ISSUED
SA140626C16A	Original release	Oct. 09, 2014



A D T

## 1. CERTIFICATION

**PRODUCT:** AC1900 Wireless Dual Band Gigabit Router  
**BRAND NAME:** TP-LINK  
**MODEL NO.:** C9  
**TEST SAMPLE:** PROTOTYPE  
**APPLICANT:** TP-LINK TECHNOLOGIES CO., LTD.  
**TESTED DATE:** Sep. 18, 2014  
**STANDARDS:** FCC Part 2 (Section 2.1091)  
KDB 447498 D03  
IEEE C95.1

The above equipment (Model: C9) has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

**PREPARED BY** :  , **DATE:** Oct. 09, 2014  
(Elsie Hsu, Specialist )

**APPROVED BY** :  , **DATE:** Oct. 09, 2014  
( May Chen, Manager )

## 2. RF EXPOSURE LIMIT

### LIMITS FOR MAXIMUM PERMISSIBLE EXPOSURE (MPE)

FREQUENCY RANGE (MHz)	ELECTRIC FIELD STRENGTH (V/m)	MAGNETIC FIELD STRENGTH (A/m)	POWER DENSITY (mW/cm <sup>2</sup> )	AVERAGE TIME (minutes)
<b>LIMITS FOR GENERAL POPULATION / UNCONTROLLED EXPOSURE</b>				
300-1500	...	...	F/1500	30
1500-100,000	...	...	1.0	30

F = Frequency in MHz

### 3. MPE CALCULATION FORMULA

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

where

$P_d$  = power density in mW/cm<sup>2</sup>

$P_{out}$  = 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

### 4. CLASSIFICATION

The antenna of this product, under normal use condition, is at least 27cm away from the body of the user. So, this device is classified as **Mobile Device**.

## 5. ANTENNA GAIN

1. The antennas provided to the EUT, please refer to the following table:

Transmitter Circuit	Peak Gain (dBi)	Frequency range (MHz to MHz)	Ant. Type	Connector Type
Chain 0	2.4GHz: 2.1 5GHz:1.7	2400~2483.5	Omni directional	R-SMA
Chain 1		5150~5250		
Chain 2		5250~5350 5470~5725 5725~585		

## 6. CALCULATION RESULT OF MAXIMUM CONDUCTED POWER

### For WLAN 2.4GHz (15.247)

#### 802.11b

FREQUENCY (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
2412 - 2462	563.777	6.87	27	0.29934	1

**NOTE:** Directional gain = 2.1dBi + 10log(3) = 6.87dBi

#### 802.11g

FREQUENCY (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
2412 - 2462	980.641	6.87	27	0.52068	1

**NOTE:** Directional gain = 2.1dBi + 10log(3) = 6.87dBi

#### 802.11n (HT20)

FREQUENCY (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
2412 - 2462	880.076	6.87	27	0.46728	1

**NOTE:** Directional gain = 2.1dBi + 10log(3) = 6.87dBi

#### 802.11n (HT40)

FREQUENCY (MHz)	CONDUCTED POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
2422 - 2452	352.236	6.87	27	0.18702	1

**NOTE:** Directional gain = 2.1dBi + 10log(3) = 6.87dBi

## For WLAN 5GHz (15.247)

### 802.11a

FREQUENCY (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
5745 - 5825	894.156	6.47	27	0.43299	1

**NOTE:** Directional gain = 1.7dBi + 10log(3) = 6.47dBi

### 802.11ac (VHT20)

FREQUENCY (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
5745 - 5825	888.31	6.47	27	0.43016	1

**NOTE:** Directional gain = 1.7dBi + 10log(3) = 6.47dBi

### 802.11ac (VHT40)

FREQUENCY (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
5755 - 5795	866.479	6.47	27	0.41958	1

**NOTE:** Directional gain = 1.7dBi + 10log(3) = 6.47dBi

### 802.11ac (VHT80)

FREQUENCY (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
5775	426.245	6.47	27	0.20641	1

**NOTE:** Directional gain = 1.7dBi + 10log(3) = 6.47dBi



## For WLAN 5GHz (15.407)

### 802.11a

FREQUENCY (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
5180 – 5240	183.92	6.47	27	0.08906	1

**NOTE:** Directional gain = 1.7dBi + 10log(3) = 6.47dBi

### 802.11ac (VHT20)

FREQUENCY (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
5180 – 5240	178.434	6.47	27	0.08641	1

**NOTE:** Directional gain = 1.7dBi + 10log(3) = 6.47dBi

### 802.11ac (VHT40)

FREQUENCY (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
5190 – 5230	108.435	6.47	27	0.05251	1

**NOTE:** Directional gain = 1.7dBi + 10log(3) = 6.47dBi

### 802.11ac (VHT80)

FREQUENCY (MHz)	MAX POWER (mW)	ANTENNA GAIN (dBi)	DISTANCE (cm)	POWER DENSITY (mW/cm <sup>2</sup> )	LIMIT (mW/cm <sup>2</sup> )
5210	91.922	6.47	27	0.04451	1

**NOTE:** Directional gain = 1.7dBi + 10log(3) = 6.47dBi

## CONCLUSION:

Both of the 2.4GHz and 5GHz can transmit simultaneously, the formula of calculated the MPE is:

$$CPD_1 / LPD_1 + CPD_2 / LPD_2 + \dots \text{etc.} < 1$$

**CPD = Calculation power density**

**LPD = Limit of power density**

Therefore, the worst-case situation is  $0.52068 / 1 + 0.43299 / 1 = 0.954$ , which is less than "1". This confirmed that the device comply with FCC 1.1310 MPE limit.

**-- END ---**