RF Exposure Evaluation Declaration

Product Name : AC1750 Wireless Dual Band
Gigabit Router

Model No. : Archer C7

FCC ID : TE7C7V2

Applicant : 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

Date of Receipt : Mar. 16, 2016

Issued Date : May. 27, 2016

Report No. : 1612064R-RF-US-P20V01

Report Version : V1.0

Test Report Certification

Issued Date : May. 27, 2016
Report No. : 1612064R-RF-US-P20V01

Product Name	:	AC1750 Wireless Dual Band Gigabit Router
Applicant	:	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	:	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
Model No.	:	Archer C7
FCC ID	:	TE7C7V2
Brand Name	:	AC 100-240V, 50/60Hz
EUT Voltage	:	TP-LINK
Applicable Standard	:	KDB 447498D01V06
		FCC Part1.1310(b)
Test Result	:	Complied
Performed Location	:	Quietek Corporation - Suzhou EMC Laboratory
		No.99 Hongye Rd., Suzhou Industrial Park, Suzhou, 215006, Jiangsu, China
		TEL: +86-512-6251-5088 / FAX: +86-512-6251-5098
		FCC Registration Number: 800392

Documented By :

(Senior Adm. Specialist: Alice Ni)

Reviewed By :

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(Engineering Manager : Harry Zhao)

Laboratory Information

We, **QuieTek Corporation**, are an independent EMC and safety consultancy that was established the whole facility in our laboratories. The test facility has been accredited/accepted(audited or listed) by the following related bodies in compliance with ISO 17025, EN 45001 and specified testing scope:

Taiwan R.O.C.	**:**	**BSMI, NCC, TAF**
USA	**:**	**FCC**
Japan	**:**	**VCCI**
China	**:**	**CNAS**

The related certificate for our laboratories about the test site and management system can be downloaded from QuieTek Corporation's Web Site : http://www.quietek.com/english/about/certificates.aspx?bval=5
The address and introduction of QuieTek Corporation's laboratories can be founded in our Web site :
http://www.quietek.com/index_en.aspx
If you have any comments, Please don't hesitate to contact us. Our contact information is as below:

HsinChu Testing Laboratory :
No.75-2, 3rd Lin, Wangye Keng, Yonghxing Tsuen, Qionglin Shiang, Hsinchu County 307, Taiwan, R.O.C.
TEL:+886-3-592-8858 / FAX:+886-3-592-8859   E-Mail : service@quietek.com

LinKou Testing Laboratory :
No.5-22, Ruishukeng, Linkou Dist., New Taipei City 24451, Taiwan, R.O.C.
TEL : 886-2-8601-3788 / FAX : 886-2-8601-3789   E-Mail : service@quietek.com

Suzhou Testing Laboratory :
No.99 Hongye Rd., Suzhou Industrial Park, Suzhou, 215006, Jiangsu, China
TEL : +86-512-6251-5088 / FAX : 86-512-6251-5098   E-Mail : service@quietek.com

History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
1612064R-RF-US-P20V01	V1.0	Initial Issued Report	May. 27, 2016

1. RF Exposure Evaluation

1.1. 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/cm2)	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

Friis Formula

Friis transmission formula: $Pd = (Pout*G)/(4*pi*r2)$

Where

Pd = power density in mW/cm2

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 id the limit of MPE, 1 mW/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.

1.2. Test Procedure

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

The temperature and related humidity: 18℃ and 78％ RH.

1.3. Test Result of RF Exposure Evaluation

Product	:	AC1750 Wireless Dual Band Gigabit Router
Test Item	:	RF Exposure Evaluation
Test Site	:	AC-6

2.4G Antenna：

Model No.	N/A						
Antenna manufacturer	TP-LINK						
Antenna Delivery	☐ 1*TX+1*RX		☐ 2*TX+2*RX		☒ 3*TX+3*RX		
Antenna technology	☐ SISO						
	☒	MIMO	☐	Basic			
			☒	CDD			
			☐	Beam-forming			
Antenna Type	☐ External		☐	Dipole			
	☒	Internal	☒	PIFA			
			☐	PCB			
			☐	Ceramic Chip Antenna			
			☐	Metal plate type F antenna			

Antenna Technology	Ant Gain (dBi)	Directional Gain (dBi)	
		For Power	For PSD
☒ CDD	Ant 0: 3.81 Ant 1: 2.44 Ant 2: 3.67	3.3	8.1
☐ Beam-forming	N/A	N/A	N/A

5G Antenna：

Antenna Model	Dipole Antenna				
Antenna Manufacturer	TPlink				
Antenna Delivery	☐ 1*TX+1*RX		☐ 2*TX+2*RX		☒ 3*TX+3*RX
Antenna Technology	☐ SISO				
	☒	MIMO	☐	Basic methodology with NANT transmit antennas	
			☐	Sectorized antenna systems	
			☐	Cross-polarized antennas	
			☐	Unequal antenna gains, with equal transmit powers	
			☐	Spatial Multiplexing	
			☒	Cyclic Delay Diversity (CDD)	
Antenna Type	Dipole Antenna				

Antenna Gain				
Antenna Technology	Ant Gain		Directional Gain	
			For Power	For PSD
☒ CDD	Ant0: 4.1 Ant1: 4.1 Ant2: 4.1		4.1	8.87

● Output Power into Antenna & RF Exposure Evaluation Distance:

Standlone modes

2.4GHz:

Test Mode	Frequency Band (MHz)	Maximum Output Power to Antenna (dBm)	Directional Gain (dBi)	Power Density at R = 23 cm (mW/cm2)
802.11b/g/n(20MHz) with CDD	2412 - 2462	25.51	8.1	0.3454
802.11n(40MHz) with CDD	2422 - 2452	17.17	8.1	0.0506

5GHz:

Test Mode	Frequency Band (MHz)	Maximum Output Power to Antenna (dBm)	Antenna Gain (dBi)	Power Density at R = 23 cm (mW/cm2)
802.11a/n(20MHz)/ac(20MHz)	5180 - 5240 5745 - 5825	25.60	8.87	0.4211
802.11n(40MHz)/ac(40MHz)	5190 - 5230 5755 - 5795	25.26	8.87	0.3893
802.11ac(80MHz)	5210 5775	26.95	8.87	0.5746

Simultaneous transmission:

Test Mode	Frequency Band (MHz)	Maximum Output Power to Antenna (dBm)	Directional Gain (dBi)	Power Density at R = 23 cm (mW/cm2)
802.11b/g/n(20MHz) with CDD	2412 - 2462	25.51	8.1	0.3454
802.11ac(80MHz)	5210 5775	26.95	8.87	0.5746
Simultaneous transmission power density				0.92

So according to transmission formula: Pd = (Pout*G)/(4*pi*r^2) and the power density limit according to KDB 447498D01V06 and FCC Part1.1310(b), the limit is 1mW/cm^2

Safety Distance Calculation Formula:

The power flux:

$$S = \frac{P*G_{(\theta,\phi)}}{4*\pi*r^2}$$

So safety distance as following:

$$r = \sqrt{\frac{P*G}{4*\pi*S}}$$

P = input power of the antenna

G = antenna gain relative to an isotropic antenna

θ, Φ = elevation and azimuth angles.

r = distance from the antenna to the point of investigation

Test Mode	Frequency Range (MHz)	Maximum EIRP (dBm)	Limit of Power Density S(mW/cm^2)	Safety Distance r(cm)
802.11b/g/n(20MHz) with CDD	2412 - 2462	33.61	1	
802.11ac(80MHz)	5210 5775	35.82	1	17.43

Note: The safety distance is 23cm for AC1750 Wireless Dual Band Gigabit Router without any other radio equipment.

——————————————— The End ———————————————