

RF Exposure Evaluation Declaration

Product Name : AC1200 Wireless Dual Band
Gigabit Access Point

Model No. : EAP320

FCC ID : TE7EAP320

Applicant : TP-LINK TECHNOLOGIES CO., LTD.

Address : Building 24(floors1,3,4,5) and 28(floors1-4) Central
Science and Technology Park, Shennan Rd,
Nanshan, Shenzhen, China

Date of Receipt : Feb. 22, 2016

Issued Date : Nov. 04, 2016

Report No. : 1622053R-RF-US-P20V01

Report Version : V1.2

The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration of the equipment and evaluated measurement uncertainty herein.

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Test Report Certification

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Science and Technology Park, Shennan Rd, Nanshan,
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Manufacturer : TP-LINK TECHNOLOGIES CO., LTD.
Address : Building 24(floors1,3,4,5) and 28(floors1-4) Central
Science and Technology Park, Shennan Rd, Nanshan,
Shenzhen, China
Model No. : EAP320
FCC ID : TE7EAP320
Brand Name : TP-LINK
EUT Voltage : AC 100-240V, 50/60Hz
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

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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:

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History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
1622053R-RF-US-P20V01	V1.0	Initial Issued Report	May. 13, 2016
1622053R-RF-US-P20V01	V1.1	Modified some data on Page 8 & 9	Oct. 24, 2016
1622053R-RF-US-P20V01	V1.2	Modified some typo on Page 8&9	Nov. 04, 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/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

Friis Formula

Friis transmission formula: $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot r^2)$

Where

P_d = power density in mW/cm²

P_{out} = output power to antenna in mW

G = gain of antenna in linear scale

π = 3.1416

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

P_d is 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°C and 78% RH.

1.3. Test Result of RF Exposure Evaluation

Product	:	AC1200 Wireless Dual Band Gigabit Access Point
Test Item	:	RF Exposure Evaluation
Test Site	:	AC-6

● Antenna Gain:

Model No.	N/A				
Antenna manufacturer	TP-LINK				
Frequency Range	2400~2483.5MHz				
Antenna Delivery	<input type="checkbox"/>	1*TX+1*RX	<input checked="" type="checkbox"/>	2*TX+2*RX	<input type="checkbox"/> 3*TX+3*RX
Antenna technology	<input type="checkbox"/>	SISO			
	<input checked="" type="checkbox"/>	MIMO	<input type="checkbox"/>	Basic	
			<input checked="" type="checkbox"/>	CDD	
			<input checked="" type="checkbox"/>	Beam-forming	
Antenna Type	<input type="checkbox"/>	External	<input type="checkbox"/>	Dipole	
	<input checked="" type="checkbox"/>	Internal	<input checked="" type="checkbox"/>	PIFA	
			<input type="checkbox"/>	PCB	
			<input type="checkbox"/>	Ceramic Chip Antenna	
			<input type="checkbox"/>	Metal plate type F antenna	
Antenna Technology		Ant Gain (dBi)		Directional Gain (dBi)	
				For Power	For PSD
<input checked="" type="checkbox"/>	CDD	Ant0: 4.49 Ant1: 4.96		4.73	7.74
<input checked="" type="checkbox"/>	Beam-forming	Ant0: 4.49 Ant1: 4.96		7.74	7.74

Antenna Model	PIFA Antenna			
Antenna Manufacturer	TPlink			
Frequency Range	5150~5250MHz, 5725~5825MHz			
Antenna Delivery	<input type="checkbox"/> 1*TX+1*RX	<input checked="" type="checkbox"/> 2*TX+2*RX	<input type="checkbox"/> 3*TX+3*RX	
Antenna Technology	<input type="checkbox"/> SISO			
	<input checked="" type="checkbox"/> MIMO	<input type="checkbox"/>	Basic methodology with NANT transmit antennas	
		<input type="checkbox"/>	Sectorized antenna systems	
		<input type="checkbox"/>	Cross-polarized antennas	
		<input type="checkbox"/>	Unequal antenna gains, with equal transmit powers	
		<input checked="" type="checkbox"/>	Spatial Multiplexing	
		<input checked="" type="checkbox"/>	Cyclic Delay Diversity (CDD)	
Antenna Type	PIFA Antenna			
Antenna Gain				
Antenna Technology		Ant Gain (dBi)	Directional Gain (dBi)	
			For Power	For PSD
<input checked="" type="checkbox"/> CDD		Ant0: 6.19 Ant1: 5.51	5.86	8.87
<input checked="" type="checkbox"/> Beam-forming		Ant0: 6.19 Ant1: 5.51	8.87	8.87

- Output Power into Antenna & RF Exposure Evaluation Distance:

Standalone modes

Test Mode	Frequency Band (MHz)	Maximum Output Power to Antenna (dBm)	Directional Gain (dBi)	Power Density at R = 24 cm (mW/cm ²)
802.11b/g/n(20MHz) with CDD	2412 ~ 2462 MHz	27.82	4.73	0.2485
802.11n(40MHz) with CDD	2422 ~ 2452 MHz	22.43	4.73	0.0718
802.11g/n(20MHz) with Beamforming	2412 ~ 2462 MHz	27.40	7.74	0.4512
802.11n(40MHz) with Beamforming	2422 ~ 2452 MHz	22.09	7.74	0.1329
802.11a/n/ac (20MHz) with CDD	5180-5240MHz 5745-5825 MHz	27.66	5.86	0.3107
802.11n/ac (40MHz) with CDD	5190-5230MHz 5755-5795 MHz	28.23	5.86	0.3543
802.11ac(80MHz) with CDD	5210MHz 5775MHz	22.94	5.86	0.1048
802.11a/n/ac (20MHz) with Beamforming	5180-5240MHz 5745-5825 MHz	26.89	8.87	0.5204
802.11n/ac (40MHz) with Beamforming	5190-5230MHz 5755-5795 MHz	26.86	8.87	0.5169
802.11ac(80MHz) with Beamforming	5210MHz 5775MHz	23.19	8.87	0.2220

Simultaneous transmission:

Frequency Band (MHz)	Maximum Output Power to Antenna (dBm)	Directional Gain (dBi)	Power Density at R = 24 cm (mW/cm ²)
2412 ~ 2462	27.40	7.74	0.4512
5180-5240 5745-5825	26.89	8.87	0.5204
Simultaneous transmission power density			0.9716

So according to transmission formula: $P_d = (P_{out} * G) / (4 * \pi * r^2)$ and the power density limit according to KDB 447498D01V06 and FCC Part1.1310(b), the limit is 1mW/cm²

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

Frequency Range (MHz)	Maximum EIRP (dBm)	Limit of Power Density S(mW/cm ²)	Safety Distance r(cm)
2412 ~ 2462	35.14	1	23.66
5180-5240 5745-5825	35.76	1	

Note: The safety distance is 23.66cm for AC1200 Wireless Dual Band Gigabit Access Point without any other radio equipment.

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