



中国认可  
国际互认  
检测  
TESTING  
CNAS L5311



## RF Exposure Evaluation Declaration

Product Name : 2.4GHz 300Mbps Outdoor Wireless Base Station  
Model No. : WBS210  
FCC ID : TE7WBS210

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. 23, 2016  
Issued Date : Jun. 06, 2016  
Report No. : 1622072R-RF-US-P20V01  
Report Version : V1.0

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.

This report must not be used to claim product endorsement by TAF or any agency of the government.

The test report shall not be reproduced without the written approval of Quietek Corporation.

# Test Report Certification

Issued Date : Jun. 06, 2016

Report No. : 1622072R-RF-US-P20V01



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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  
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. : WBS210  
FCC ID : TE7WBS210  
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

Documented By : Kathy Feng  
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Reviewed By : Frank He  
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Approved By : Harry Zhao  
(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:

<b>Taiwan R.O.C.</b>	<b>:</b>	<b>BSMI, NCC, TAF</b>
<b>USA</b>	<b>:</b>	<b>FCC</b>
<b>Japan</b>	<b>:</b>	<b>VCCI</b>
<b>China</b>	<b>:</b>	<b>CNAS</b>

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](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 :**

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TEL : +86-512-6251-5088 / FAX : 86-512-6251-5098 E-Mail : [service@quietek.com](mailto:service@quietek.com)

### History of This Test Report

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
1622072R-RF-US-P20V01	V1.0	Initial Issued Report	Jun. 06, 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 <sup>2</sup> )	Average Time (Minutes)
<b>(A) Limits for Occupational/ Control Exposures</b>				
300-1500	--	--	F/300	6
1500-100,000	--	--	5	6
<b>(B) Limits for General Population/ Uncontrolled Exposures</b>				
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/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

$P_d$  is the limit of MPE, 1 mW/cm<sup>2</sup>. 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	:	2.4GHz 300Mbps Outdoor Wireless Base Station
Test Item	:	RF Exposure Evaluation
Test Site	:	AC-6

● **Antenna Gain:**

Model No.	N/A					
Antenna manufacturer	TP-LINK					
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 type="checkbox"/>	Sectorized		
			<input type="checkbox"/>	Beam-forming		
Antenna Type	<input checked="" type="checkbox"/>	External	<input checked="" type="checkbox"/>	Dipole		
			<input type="checkbox"/>	Sectorized		
	<input type="checkbox"/>	Internal	<input 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: 2.0 Ant1: 2.0			2.0	5.0	

Model No.	N/A					
Antenna manufacturer	TP-LINK					
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 type="checkbox"/>	CDD		
			<input checked="" type="checkbox"/>	Sectorized		
			<input type="checkbox"/>	Beam-forming		
Antenna Type	<input checked="" type="checkbox"/>	External	<input type="checkbox"/>	Dipole		
			<input checked="" type="checkbox"/>	Sectorized		
	<input type="checkbox"/>	Internal	<input type="checkbox"/>	PIFA		
			<input type="checkbox"/>	PCB		
			<input type="checkbox"/>	Ceramic Chip Antenna		
			<input type="checkbox"/>	Metal plate type F antenna		
	Ant Gain(dBi)					
15.0						

- Output Power into Antenna & RF Exposure Evaluation Distance:

**For Dipole Antenna**

Test Mode	Frequency Band (MHz)	Maximum Output Power to Antenna (dBm)	Directional Gain (dBi)	Power Density at R = 20cm (mW/cm <sup>2</sup> )
802.11b/g/n(20MHz) with CDD	2412 ~ 2462 MHz	26.80	5	0.3011
802.11n(40MHz) with CDD	2422 ~ 2452 MHz	21.74	5	0.0939

**For Sectorized Antenna**

Test Mode	Frequency Band (MHz)	Maximum Output Power to Antenna (dBm)	Antenna Gain (dBi)	Power Density at R = 20cm (mW/cm <sup>2</sup> )
802.11b/g/n(20MHz)	2412 ~ 2462 MHz	17.31	15	0.3387
802.11n(40MHz)	2422 ~ 2452 MHz	10.86	15	0.0767

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/cm<sup>2</sup>

**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 <sup>2</sup> )	Safety Distance r(cm)
2412 ~ 2462	26.80	1	6.17

Note: The safety distance is 6.17cm for 2.4GHz 300Mbps Outdoor Wireless Base Station without any other radio equipment.

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