RF Exposure Evaluation Declaration

Product Name	:	Smart Wi-Fi Light Switch
Model No.	:	HS200
FCC ID	:	TE7HS200

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	:	Jan. 30, 2016
Issued Date	:	Apr. 22, 2016
Report No.	:	1612066R-RF-US-P20V01
Report Version	:	V1.1

Test Report Certification

Issued Date : Apr. 22, 2016
Report No. : 1612066R-RF-US-P20V01

Product Name	:	Smart Wi-Fi Light Switch
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.	:	HS200
FCC ID	:	TE7HS200
EUT Voltage	:	AC 100-240V, 50/60Hz
Brand Name	:	TP-LINK
Applicable Standard	:	KDB 447498D01V06 FCC Part1.1310(b) FCC Part2 (Section 2.1091) KDB 447498 D03 IEEE C95.1
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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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
1612066R-RF-US-P20V01	V1.0	Initial Issued Report	Mar. 09, 2016
1612066R-RF-US-P20V01	V1.1	Modified the EIRP to conducted power.	Apr. 22, 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	:	Smart Wi-Fi Light Switch
Test Item	:	RF Exposure Evaluation
Test Site	:	AC-6

- Antenna information:

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 Gain	3.28dBi						

- Output Power into Antenna & RF Exposure Evaluation Distance:

2.4GHz:

Test Mode	Frequency Band (MHz)	Maximum Output Power to Antenna (dBm)	Antenna Gain (dBi)	Power Density at R = 20 cm (mW/cm2)
802.11b	2412 - 2462	16.52	3.28	0.018999
802.11g	2412 - 2462	20.85	3.28	0.051491
802.11n(20MHz)	2412 - 2462	21.22	3.28	0.056070
802.11n(40MHz)	2422 - 2452	16.35	3.28	0.018270

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 Output Power to Antenna (dBm)	Limit of Power Density S(mW/cm^2)	Safety Distance r(cm)
802.11n(20MHz)	2412 - 2462	21.22	1	3.25

Note: The safety distance is 3.25cm for the router without any other radio equipment.

The End