RF Exposure Evaluation Report

APPLICANT	:	TP-LINK TECHNOLOGIES CO., LTD.
EQUIPMENT	:	300Mbps High Power Wireless N Router
BRAND NAME	:	TP-LINK
MODEL NAME	:	TL-WR841HP
FCC ID	:	TE7WR841HPV3
STANDARD	:	47 CFR Part 2.1091

We, SPORTON INTERNATIONAL (SHENZHEN) INC., would like to declare that the device has been evaluated in accordance with 47 CFR Part 2.1091, and pass the limit. Without written approval of SPORTON INTERNATIONAL (SHENZHEN) INC., the test report shall not be reproduced except in full.

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SPORTON INTERNATIONAL (SHENZHEN) INC.

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Revision History

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA611301	Rev. 01	Initial issue of report	Mar. 09, 2016

1. Administration Data

1.1. Testing Laboratory

Testing Laboratory	
Test Site	SPORTON International (SHENZHEN) Inc.
Test Site Location	1F & 2F, Building A, Morning Business Center, No. 4003 ShiGu Rd., Xili Town, Nanshan District, Shenzhen, Guangdong, P. R. China TEL: 86-755-8637-9589 FAX: 86-755-8637-9595

Applicant	
Company Name	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	
Company Name	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

2. Description of Equipment Under Test (EUT)

<table>
<tr><th colspan="2">Product Feature & Specification</th></tr>
<tr><td>EUT Type</td><td>300Mbps High Power Wireless N Router</td></tr>
<tr><td>Brand Name</td><td>TP-LINK</td></tr>
<tr><td>Model Name</td><td>TL-WR841HP</td></tr>
<tr><td>FCC ID</td><td>TE7WR841HPV3</td></tr>
<tr><td>Wireless Technology and Frequency Range</td><td>WLAN 2.4GHz Band: 2412 MHz ~ 2462 MHz</td></tr>
<tr><td>Mode</td><td>· 802.11b/g/n HT20/HT40</td></tr>
<tr><td>Antenna Type</td><td>WLAN: Dipole Antenna</td></tr>
<tr><td>Antenna Function for Transmitter</td><td>
<table>
<tr><td></td><td>Antenna 1</td><td>Antenna 2</td></tr>
<tr><td>802.11 b/g/n SISO</td><td>V</td><td>V</td></tr>
<tr><td>802.11 b/g/n MIMO</td><td>V</td><td>V</td></tr>
</table>
</td></tr>
<tr><td>EUT Stage</td><td>Identical Prototype</td></tr>
</table>

Remark: The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.

3. Maximum RF average output power

<2.4GHz WLAN Antenna 1>

Mode		Maximum Average Power (dBm)
2.4GHz	802.11b	24.46
	802.11g	26.87
	802.11n-HT20	28.10
	802.11n-HT40	18.08

<2.4GHz WLAN Antenna 2>

Mode		Maximum Average Power (dBm)
2.4GHz	802.11b	23.78
	802.11g	26.28
	802.11n-HT20	28.01
	802.11n-HT40	19.86

<2.4GHz WLAN Antenna 1+2>

Mode		Maximum Average Power (dBm)
2.4GHz	802.11b	27.57
	802.11g	27.58
	802.11n-HT20	28.46
	802.11n-HT40	21.49

4. RF Exposure Limit Introduction

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm^2)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f2)	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f2)	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1.0	30

The MPE was calculated at 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$S = \frac{PG}{4\pi R^2}$$

Where:
S = Power Density
P = Output Power at Antenna Terminals
G = Gain of Transmit Antenna (linear gain)
R = Distance from Transmitting Antenna

5. Radio Frequency Radiation Exposure Evaluation

5.1. Standalone Power Density Calculation

Band	Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum ERP/EIRP (dBm)	Maximum EIRP (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm2)	Limit (mW/cm2)
WLAN2.4GHz 802.11b Antenna 1	2412.0	7.50	24.46	31.960	1.570	1570.363	0.313	1.000
WLAN2.4GHz 802.11g Antenna 1	2412.0	7.50	26.87	34.370	2.735	2735.269	0.544	1.000
WLAN2.4GHz 802.11n-HT20 Antenna 1	2412.0	7.50	28.10	35.600	3.631	3630.781	0.723	1.000
WLAN2.4GHz 802.11n-HT40 Antenna 1	2412.0	7.50	18.08	25.580	0.361	361.410	0.072	1.000
WLAN2.4GHz 802.11b Antenna 2	2412.0	7.50	23.78	31.280	1.343	1342.765	0.267	1.000
WLAN2.4GHz 802.11g Antenna 2	2412.0	7.50	26.28	33.780	2.388	2387.811	0.475	1.000
WLAN2.4GHz 802.11n-HT20 Antenna 2	2412.0	7.50	28.01	35.510	3.556	3556.313	0.708	1.000
WLAN2.4GHz 802.11n-HT40 Antenna 2	2412.0	7.50	19.86	27.360	0.545	544.503	0.108	1.000
WLAN2.4GHz 802.11b Antenna 1+2	2412.0	7.50	27.57	35.070	3.214	3213.661	0.640	1.000
WLAN2.4GHz 802.11g Antenna 1+2	2412.0	7.50	27.58	35.080	3.221	3221.069	0.641	1.000
WLAN2.4GHz 802.11n-HT20 Antenna 1+2	2412.0	7.50	28.46	35.960	3.945	3944.573	0.785	1.000
WLAN2.4GHz 802.11n-HT40 Antenna 1+2	2412.0	7.50	21.49	28.990	0.793	792.501	0.158	1.000

Note: For conservativeness, the lowest frequency of each band is used to determine the MPE limit of that band

Conclusion:

According to 47 CFR §2.1091, the RF exposure analysis concludes that the RF Exposure is FCC compliant.