

RF Exposure Evaluation Declaration

Product Name : 300Mbps Wireless N Mini Router

Model No. : TL-WR810N

FCC ID : TE7WR810NV2

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 : May. 17, 2016

Issued Date : Aug. 25, 2016

Report No. : 1652060R-RF-US-P20V01

Report Version : V1.1

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, CNAS 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 : Aug. 25, 2016

Report No. : 1652060R-RF-US-P20V01



Product Name : 300Mbps Wireless N Mini Router
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. : TL-WR810N
FCC ID : TE7WR810NV2
Brand Name : TP-LINK
EUT Voltage : 100-240V~50/60Hz 0.15A
Applicable Standard : KDB 447498D01V06
FCC Part1.1310(b)
FCC Part2 (Section 2.1091)
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

(Adm. Specialist: Kathy Feng)

Reviewed By :

Frank He

(Senior Engineer: Frank He)

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:

| | | |
|----------------------|----------|-----------------------|
| 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 |
|-----------------------|---------|-------------------------------------|---------------|
| 1652060R-RF-US-P20V01 | V1.0 | Initial Issued Report | Aug. 15, 2016 |
| 1652060R-RF-US-P20V01 | V1.1 | Modify the FCC ID on page 1and 2 | Aug. 25, 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 | : | 300Mbps Wireless N Mini Router |
| Test Item | : | RF Exposure Evaluation |
| Test Site | : | AC-6 |

● Antenna Information:

| | | | | | | | | | |
|---|-------------------------------------|----------------|-------------------------------------|-------------------------------------|-----------|------------------------|--------------------------|-----------|--|
| 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 checked="" type="checkbox"/> | Basic | | | | | |
| | | | <input checked="" type="checkbox"/> | CDD | | | | | |
| | | | <input type="checkbox"/> | Sectorized | | | | | |
| | | | <input type="checkbox"/> | Beam-forming | | | | | |
| Antenna Type | <input type="checkbox"/> | External | <input type="checkbox"/> | Dipole | | | | | |
| | | | <input type="checkbox"/> | Sectorized | | | | | |
| | <input checked="" type="checkbox"/> | Internal | <input type="checkbox"/> | PIFA | | | | | |
| | | | <input checked="" 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 | Ant0:1 Ant1: 1 | | | | 1 | | 4 | | |

- Output Power into Antenna & RF Exposure Evaluation Distance:

| Test Mode | Frequency Band (MHz) | Maximum Output Power to Antenna (dBm) | Directional Gain (dBi) | Power Density at R = 20 cm (mW/cm ²) |
|--------------------|----------------------|---------------------------------------|------------------------|--|
| 802.11b/g/n(20MHz) | 2412 ~ 2462 MHz | 24.55 | 1 | 0.0714 |
| 802.11n(40MHz) | 2422 ~ 2452 MHz | 20.11 | 1 | 0.0257 |

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 | 25.55 | 1 | 5.34 |

Note: The safety distance is 5.34 for 300Mbps Wireless N Mini Router without any other radio equipment.

_____ The End _____