



RF Exposure Evaluation Declaration

Product Name : ROUTER WI-FI ADSL2+
Model No. : RTSA04NU
FCC ID : 2AFTVRTSA04NU

Applicant : OBSERVA TELECOM

Address : Calle Monte Esquinza 28, 1ºdcha, 28010-Madrid
(Spain)

Date of Receipt : Sep. 11, 2015
Issued Date : Dec. 16, 2015
Report No. : 1590342R-RF-US-P20V01
Report Version : V1.3

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 any agency of the government.

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

Test Report Certification

Issued Date : Dec. 16, 2015

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Product Name : ROUTER WI-FI ADSL2+
Applicant : OBSERVA TELECOM
Address : Calle Monte Esquinza 28, 1° dcha, 28010-Madrid
(Spain)
Manufacturer : ROUTER WI-FI ADSL2+
Address : Calle Monte Esquinza 28, 1° dcha, 28010-Madrid
(Spain)
Model No. : RTSA04NU
FCC ID : 2AFTVRTSA04NU
EUT Voltage : 100-240V~50/60Hz
Brand Name : Observa Telecom
Applicable Standard : KDB 447498D01V06
FCC Part1.1310(2)
FCC Part2(section 2.1091)
Test Result : Complied
Performed Location : 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; IC Lab Code: 4075B

Documented By : Elaine Wang
Reviewed By : Frank He
Approved By : 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/tw/ctg/cts/accreditations.htm>
The address and introduction of Quietek Corporation's laboratories can be founded in our Web site :
<http://www.quietek.com/>

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
1590342R-RF-US-P20V01	V1.0	Initial Issued Report	Nov. 25, 2015
1590342R-RF-US-P20V01	V1.1	Modify power	Dec. 01, 2015
1590342R-RF-US-P20V01	V1.2	Add evaluate 3G module	Dec. 14, 2015
1590342R-RF-US-P20V01	V1.3	Modified the limit of MPE simultaneously evaluation	Dec. 16, 2015

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	:	ROUTER WI-FI ADSL2+
Test Item	:	RF Exposure Evaluation
Test Site	:	AC-6

- Antenna Gain:

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 2.5dBi for 2.4GHz Antenna 1 and 3.4dBi for 2.4GHz Antenna 2 in logarithm scale.

According to KDB 662911 D01v02r01, F)2)d

If transmit signals are correlated, then

$$\text{Directional gain} = 10 \log[(10^{G_1/20} + 10^{G_2/20} + \dots + 10^{G_N/20})^2 / N_{ANT}] \text{ dBi}$$

Note: The EUT has two antennas, they transmit signals are correlated with each other. Direction gain is 5.97dBi.

Standalone modes

WIFI

2400~2483.5MHz:

- Output Power(EIRP) & RF Exposure Evaluation Distance:

Frequency Band (MHz)	Maximum Output Power (mW)	Power Density at R = 34.5 cm (mW/cm ²)	Power Density Limit (mW/cm ²)
2412 - 2462	1161.4486	0.0777	1.0

3G module:

Band II/V:

- Output Power(ERP/EIRP) & RF Exposure Evaluation Distance:

Frequency Band (MHz)	Maximum Output Power (mW)	Power Density at R = 34.5 cm (mW/cm ²)	Power Density Limit (mW/cm ²)
Band II	2000	0.1337	1.0
Band V	7000	0.4680	0.5493

Simultaneous transmission:

Output Power(ERP/EIRP) & RF Power Density

Test Mode	Frequency Band (MHz)	Maximum Output Power (mW)	Power Density at R = 34.5 cm (mW/cm ²)
802.11n(20MHz)	2412 - 2462	1161.4486	0.0777
WCDMA Band V	824~845	7000	0.4680
Simultaneous transmission power density			0.5457

The limit is different for WIFI and 3G Band V module, so the lower limit would be more compatibly.

The sum of the MPE ratios for all simultaneously transmitting antennas incorporated in a host device is ≤ 0.5493 .

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

Note: The safety distance is 34.5 cm for the router with any 3G module and without other radio equipment.

_____ The End _____