

# RF Exposure Evaluation Declaration

**Product: 802.11n ADSL2+ 4-port WiFi Gateway**

**Test Item: RF Exposure Evaluation Declaration**

## 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)
(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:  $P_d = (P_{out} * G) / (4 * \pi * r^2)$

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. EUT Operation condition

Software provided by client enabled the EUT to transmit and receive data at lowest, middle and highest channel individually.

## 1.4. Test Result of RF Exposure Evaluation

### Antenna Gain:

Ant0:

antenna type: Dipole antenna

antenna gain:3.5dBi

Ant1:

antenna type: Dipole antenna

antenna gain: 3.5dBi

### Output Power Into Antenna & RF Exposure Evaluation Distance:

1) 802.11b

Test date:

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )
01	2412.00	158.1248	0.0704025
06	2437.00	156.6751	0.0697797
11	2462.00	158.1248	0.0704254

2) 802.11g

Test date:

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )
01	2412.00	230.1442	0.1025013
06	2437.00	241.5461	0.1075794
11	2462.00	154.8817	0.0689810

3) 802.11n(20MHz) (An0)

Test date:

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )
01	2412.00	76.2079	0.0339414
06	2437.00	245.4709	0.1093274
11	2462.00	86.2979	0.0384352

4) 802.11n(20MHz) (An1)

Test date:

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )
01	2412.00	66.9885	0.0298352
06	2437.00	339.6253	0.1512618
11	2462.00	88.3080	0.0393305

3) 802.11n(20MHz) (An1 and An0)

Test date:

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )
01	2412.00	142.8894	0.0636399
06	2437.00	584.7901	0.2604529
11	2462.00	174.5822	0.0777551

5) 802.11n(40MHz) (An0)

Test date:

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )
03	2422.00	70.1455	0.0312413
06	2437.00	84.1395	0.0374739
09	2452.00	58.8844	0.0262258

6) 802.11n(40MHz) (An1)

Test date:

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )
03	2422.00	97.9490	0.0436244
06	2437.00	104.9542	0.0467443
09	2452.00	55.3350	0.0246450

7) 802.11n(40MHz) (An1 and An0)

Test date:

Channel	Channel Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm <sup>2</sup> )
03	2422.00	157.3983	0.0701018
06	2437.00	189.2344	0.0842809
09	2452.00	114.2878	0.0509013

Note:

The power density Pd (4th column) at a distance of 20 cm calculated from the Friis transmission formula is far below the limit of 1 mW/cm<sup>2</sup>.