

RF Exposure Evaluation declaration

Product Name	802.11 a/b/g/n module
Model No.	WN4502B
FCC ID	PPQ-WN4502B

Applicant	LITE-ON TECHNOLOGY CORP.
Address	4F, 90, Chien 1 Road, Chung Ho, Taipei Hsien 235, Taiwan, R.O.C.

Date of Receipt	March 08, 2011
Date of Declaration	March 23, 2011
Report No.	113119R-RFUSP32V01-A

The declaration results relate only to the samples calculated.

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

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 : 802.11 a/b/g/n module
 Test Item : RF Exposure Evaluation
 Test Site : No.3 OATS

802.11b (1Mbps) Output Power Into Antenna & RF Exposure Evaluation Distance (2.75dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
1	2412.00	182.3896	0.068349
6	2437.00	188.3649	0.070588
11	2462.00	149.9685	0.056199

The RF exposure at 20 cm is below limit.

802.11g (6Mbps) Output Power Into Antenna & RF Exposure Evaluation Distance (2.75dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
1	2412.00	349.1403	0.130837
6	2437.00	528.4453	0.198030
11	2462.00	307.6097	0.115274

The RF exposure at 20 cm is below limit.

802.11a (6Mbps) Output Power Into Antenna & RF Exposure Evaluation Distance (4.5dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
149	5745.00	156.6751	0.087848
157	5785.00	137.7209	0.077220
165	5825.00	122.4616	0.068664

The RF exposure at 20 cm is below limit.

802.11n-20MHz_14.4Mbps - 2.4G Band
Output Power Into Antenna & RF Exposure Evaluation Distance (2.75dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
01	2412.00	475.3352	0.178127
06	2437.00	753.3556	0.282313
11	2462.00	396.2780	0.148501

The RF exposure at 20 cm is below limit.

802.11n-40MHz_30Mbps - 2.4G Band
Output Power Into Antenna & RF Exposure Evaluation Distance (2.75dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
01	2422.00	156.6751	0.058712
04	2437.00	137.7209	0.051610
07	2452.00	122.4616	0.045891

The RF exposure at 20 cm is below limit.

802.11n-20MHz_14.4Mbps - 5G Band
Output Power Into Antenna & RF Exposure Evaluation Distance (4.5dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
149	5745.00	514.0437	0.288224
157	5785.00	450.8167	0.252773
165	5825.00	399.0249	0.223733

The RF exposure at 20 cm is below limit.

802.11n-40MHz_30Mbps - 5G Band
Output Power Into Antenna & RF Exposure Evaluation Distance (4.5dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
151	5755.00	469.8941	0.263470
159	5795.00	418.7936	0.234818

The RF exposure at 20 cm is below limit.

802.11a (6Mbps) Output Power Into Antenna & RF Exposure Evaluation Distance (4.5dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
36	5180.00	32.9610	0.018481
44	5220.00	47.2063	0.026469
48	5240.00	45.2898	0.025394

The RF exposure at 20 cm is below limit.

802.11a (6Mbps) Output Power Into Antenna & RF Exposure Evaluation Distance (4.5dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
52	5260.00	55.4626	0.031098
60	5300.00	48.0839	0.026961
64	5320.00	45.8142	0.025688

The RF exposure at 20 cm is below limit.

802.11a (6Mbps) Output Power Into Antenna & RF Exposure Evaluation Distance (4.5dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
100	5500.00	48.1948	0.027023
120	5600.00	58.4790	0.032789
140	5700.00	63.6796	0.035705

The RF exposure at 20 cm is below limit.

802.11n-20MHz_14.4Mbps
Output Power Into Antenna & RF Exposure Evaluation Distance (4.5dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
36	5180.00	49.2040	0.027589
44	5220.00	45.9198	0.025747
48	5240.00	44.4631	0.024930

The RF exposure at 20 cm is below limit.

802.11n-20MHz_14.4Mbps
Output Power Into Antenna & RF Exposure Evaluation Distance (4.5dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
52	5260.00	67.1429	0.037647
60	5300.00	72.7780	0.040807
64	5320.00	59.1562	0.033169

The RF exposure at 20 cm is below limit.

802.11n-20MHz_14.4Mbps
Output Power Into Antenna & RF Exposure Evaluation Distance (4.5dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
100	5500.00	45.4988	0.025511
120	5600.00	117.7606	0.066028
140	5700.00	130.3167	0.073069

The RF exposure at 20 cm is below limit.

802.11n-40MHz_30Mbps
Output Power Into Antenna & RF Exposure Evaluation Distance (4.5dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
38	5190.00	25.4097	0.014247
46	5230.00	48.0839	0.026961

The RF exposure at 20 cm is below limit.

802.11n-40MHz_30Mbps
Output Power Into Antenna & RF Exposure Evaluation Distance (4.5dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
54	5270.00	82.4138	0.046209
62	5310.00	25.3513	0.014214

The RF exposure at 20 cm is below limit.

802.11n-40MHz_30Mbps**Output Power Into Antenna & RF Exposure Evaluation Distance (4.5dBi):**

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
102	5510.00	23.4963	0.013174
118	5590.00	106.9055	0.059942
134	5670.00	115.6112	0.064823

The RF exposure at 20 cm is below limit.