

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

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 (4.26dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
1	2412.00	92.8966	0.049287
6	2437.00	95.4993	0.050668
11	2462.00	71.6143	0.037995

The RF exposure at 20 cm is below limit.

802.11g (6Mbps) Output Power Into Antenna & RF Exposure Evaluation Distance (4.26dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
1	2412.00	197.2423	0.104648
6	2437.00	528.4453	0.280369
11	2462.00	159.5879	0.084670

The RF exposure at 20 cm is below limit.

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

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
149	5745.00	156.6751	0.124088
157	5785.00	137.7209	0.109076
165	5825.00	122.4616	0.096991

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 (4.26dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
01	2412.00	243.7811	0.129339
06	2437.00	753.3556	0.399697
11	2462.00	219.7860	0.116609

The RF exposure at 20 cm is below limit.

802.11n-40MHz_30Mbps - 2.4G Band
Output Power Into Antenna & RF Exposure Evaluation Distance (4.26dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
01	2422.00	221.3095	0.117417
04	2437.00	690.2398	0.366210
07	2452.00	160.3245	0.085061

The RF exposure at 20 cm is below limit.

802.11n-20MHz_14.4Mbps - 5G Band
Output Power Into Antenna & RF Exposure Evaluation Distance (6dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
149	5745.00	514.0437	0.407128
157	5785.00	450.8167	0.357051
165	5825.00	399.0249	0.316032

The RF exposure at 20 cm is below limit.

802.11n-40MHz_30Mbps - 5G Band
Output Power Into Antenna & RF Exposure Evaluation Distance (6dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
151	5755.00	469.8941	0.372161
159	5795.00	418.7936	0.331689

The RF exposure at 20 cm is below limit.

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

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
36	5180.00	20.4644	0.016208
44	5220.00	47.2063	0.037388
48	5240.00	45.2898	0.035870

The RF exposure at 20 cm is below limit.

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

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
52	5260.00	55.4626	0.043927
60	5300.00	48.0839	0.038083
64	5320.00	22.9615	0.018186

The RF exposure at 20 cm is below limit.

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

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
100	5500.00	30.6902	0.024307
120	5600.00	58.4790	0.046316
140	5700.00	63.6796	0.050435

The RF exposure at 20 cm is below limit.

802.11n-20MHz_14.4Mbps
Output Power Into Antenna & RF Exposure Evaluation Distance (6dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
36	5180.00	38.5478	0.030530
44	5220.00	45.9198	0.036369
48	5240.00	44.4631	0.035215

The RF exposure at 20 cm is below limit.

802.11n-20MHz_14.4Mbps
Output Power Into Antenna & RF Exposure Evaluation Distance (6dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
52	5260.00	67.1429	0.053178
60	5300.00	72.7780	0.057641
64	5320.00	28.0543	0.022219

The RF exposure at 20 cm is below limit.

802.11n-20MHz_14.4Mbps
Output Power Into Antenna & RF Exposure Evaluation Distance (6dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
100	5500.00	21.7270	0.017208
120	5600.00	117.7606	0.093268
140	5700.00	93.5406	0.074085

The RF exposure at 20 cm is below limit.

802.11n-40MHz_30Mbps
Output Power Into Antenna & RF Exposure Evaluation Distance (6dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
38	5190.00	11.5611	0.009157
46	5230.00	48.0839	0.038083

The RF exposure at 20 cm is below limit.

802.11n-40MHz_30Mbps
Output Power Into Antenna & RF Exposure Evaluation Distance (6dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
54	5270.00	82.4138	0.065273
62	5310.00	14.7231	0.011661

The RF exposure at 20 cm is below limit.

802.11n-40MHz_30Mbps**Output Power Into Antenna & RF Exposure Evaluation Distance (6dBi):**

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)
102	5510.00	14.7911	0.011715
118	5590.00	106.9055	0.084670
134	5670.00	115.6112	0.091565

The RF exposure at 20 cm is below limit.