RF Exposure Evaluation declaration

Product Name : MOXA IEEE 802.11 a/b/g/n PCI-e

Model No. : WAPN002

FCC ID : SLE-WAPN002

Applicant : Moxa Inc.

Address : Fl.4. No.135. Lane 235, Baoqiao Rd. Xindian Dist, New Taipei City, Taiwan.

Date of Receipt : Oct. 21, 2011

Date of Declaration : Nov. 23, 2011

Report No. : 11A306R-RFUSP28V01

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: $Pd = (Pout*G)/(4*pi*r^2)$

Where

Pd = power density in mW/cm^2

Pout = 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

Pd id the limit of MPE, 1 mW/cm^2. 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℃and 78％ RH.

1.3. Test Result of RF Exposure Evaluation

Product : MOXA IEEE 802.11 a/b/g/n PCI-e
Test Item : RF Exposure Evaluation
Test Site : No.3 OATS

Antenna Gain

Antenna Gain: The maximum Gain measured in fully anechoic chamber is 5 dBi For 2.4GHz, 2dBi For 5GHz in **logarithm scale.**

802.11b

Output Power Into Antenna & RF Exposure Evaluation Distance (5 dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm2)
1	2412.00	88.9201	0.055941
6	2437.00	105.9254	0.066639
11	2462.00	45.2898	0.028492

802.11g

Output Power Into Antenna & RF Exposure Evaluation Distance (5 dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm2)
1	2412.00	295.1209	0.185665
6	2437.00	353.9973	0.222705
11	2462.00	218.2730	0.137319

802.11n-20BW_14.4Mbps(2.4G Band)

Output Power Into Antenna & RF Exposure Evaluation Distance (5 dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm2)
1	2412.00	208.9296	0.131441
6	2437.00	209.8940	0.132048
11	2462.00	233.8837	0.147140

802.11n-40BW_30Mbps(2.4G Band)

Output Power Into Antenna & RF Exposure Evaluation Distance (5 dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm2)
1	2422.00	269.7739	0.169719
4	2437.00	271.6439	0.170895
7	2452.00	236.5920	0.148844

802.11a

Output Power Into Antenna & RF Exposure Evaluation Distance (2 dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm2)
149	5745.00	161.0646	0.050784
157	5785.00	142.8894	0.045054
165	5825.00	131.8257	0.041565

802.11n-20BW_14.4Mbps(5G Band)

Output Power Into Antenna & RF Exposure Evaluation Distance (2 dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm2)
149	5745.00	194.0886	0.061197
157	5785.00	177.4189	0.055941
165	5825.00	182.3896	0.057508

802.11n-40BW_30Mbps(5G Band)

Output Power Into Antenna & RF Exposure Evaluation Distance (2 dBi):

Channel	Frequency (MHz)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm2)
151	5755.00	226.9865	0.071570
159	5795.00	204.1738	0.064377

The distance r (4th column) calculated from the Fries transmission formula is far shorter than 20 cm separation requirement.