

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
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Date of Receipt : Oct. 21, 2011

Date of Declaration : Nov. 23, 2011

Report No. : 11A306R-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 : 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 2 dBi in logarithm scale.

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/cm ²)
36	5180.00	43.6516	0.013764
44	5220.00	45.7088	0.014412
48	5240.00	47.8630	0.015091

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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/cm ²)
52	5260.00	50.1187	0.015803
60	5300.00	54.9541	0.017327
64	5320.00	48.4172	0.015266

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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/cm ²)
100	5500.00	47.8630	0.015091
120	5600.00	47.8630	0.015091
140	5700.00	10.0693	0.003175

802.11n-20BW
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/cm ²)
36	5180.00	20.4644	0.006453
44	5220.00	20.7014	0.006527
48	5240.00	20.9411	0.006603

802.11n-20BW
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/cm ²)
52	5260.00	20.7014	0.006527
60	5300.00	21.9280	0.006914
64	5320.00	21.7270	0.006851

802.11n-20BW
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/cm ²)
100	5500.00	21.6770	0.006835
120	5600.00	21.4783	0.006772
140	5700.00	20.6538	0.006512

802.11n-40BW

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/cm ²)
38	5190.00	21.4289	0.006757
46	5230.00	20.5589	0.006482

802.11n-40BW

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/cm ²)
54	5270.00	20.6063	0.006497
62	5310.00	19.8609	0.006262

802.11n-40BW

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/cm ²)
102	5510.00	21.1836	0.006679
118	5590.00	22.1820	0.006994
134	5670.00	21.2814	0.006710

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