

## RF Exposure Evaluation declaration

Product Name	Moxa IEEE 802.11a/b/g/n MiniPCI Module
Model No.	WAPN001
FCC ID	SLE-WAPN001

Applicant	Moxa Inc.
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Report No.	107007R-RFUSP46V01

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 <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. Test Result of RF Exposure Evaluation

Product : Moxa IEEE 802.11 a/b/g/n MiniPCI Module  
 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 <sup>2</sup> )
36	5180	45.0817	0.014214
44	5220	47.2063	0.014884
48	5240	49.2040	0.015514

#### 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 <sup>2</sup> )
52	5260	50.1187	0.015803
60	5300	53.7032	0.016933
64	5320	49.4311	0.015586

#### 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 <sup>2</sup> )
100	5500	49.6592	0.015658
120	5600	49.7737	0.015694
140	5700	10.0693	0.003175

The distance  $r$  (4<sup>th</sup> column) calculated from the Friis transmission formula is far shorter than 20 cm separation requirement.

**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 <sup>2</sup> )
36	5180	20.5589	0.006482
44	5220	20.8930	0.006588
48	5240	20.2302	0.006379

**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 <sup>2</sup> )
52	5260	20.0447	0.006320
60	5300	20.3704	0.006423
64	5320	21.1836	0.006679

**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 <sup>2</sup> )
100	5500	20.5116	0.006467
120	5600	20.4174	0.006438
140	5700	20.0447	0.006320

The distance  $r$  (4<sup>th</sup> column) calculated from the Friis transmission formula is far shorter than 20 cm separation requirement.

**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 <sup>2</sup> )
38	5190	20.3236	0.006408
46	5230	20.1372	0.006349

**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 <sup>2</sup> )
54	5270	20.4174	0.006438
62	5310	19.7242	0.006219

**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 <sup>2</sup> )
102	5510	21.3796	0.006741
118	5590	22.3872	0.007059
134	5670	21.0863	0.006649

The distance  $r$  (4<sup>th</sup> column) calculated from the Friis transmission formula is far shorter than 20 cm separation requirement.