

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-RFUSP42V01

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

Where

Pd = power density in mW/cm²

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 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 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 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/cm ²)
1	2412.00	113.2400	0.071241
6	2437.00	109.3956	0.068823
11	2462.00	44.7713	0.028166

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/cm ²)
1	2412.00	302.6913	0.190428
6	2437.00	349.9452	0.220156
11	2462.00	221.8196	0.139550

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

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/cm ²)
1	2412.00	208.9296	0.131441
6	2437.00	204.6445	0.128745
11	2462.00	216.2719	0.136060

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/cm ²)
1	2422.00	163.3052	0.102738
4	2437.00	164.0590	0.103212
7	2452.00	174.5822	0.109832

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

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)
149	5745.00	158.4893	0.049972
157	5785.00	177.8279	0.056070
165	5825.00	199.5262	0.062912

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/cm ²)
149	5745.00	216.2719	0.068192
157	5785.00	207.9697	0.065574
165	5825.00	171.7908	0.054166

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/cm ²)
151	5755	174.9847	0.055173
159	5795	159.9558	0.050435

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