

RF Exposure Evaluation Report

Product Name : Moxa 2.4/4.9/5 GHz

Model No. : WAPN008-1

FCC ID : SLE-WAPN008-1

Applicant : Moxa Inc.

Address : FL.4, NO. 135. LANE 235, BAOQIAO RD.

XINDIAN DIST.,NEW TAIPEI CITY, TAIWAN

Date of Receipt : Feb. 27, 2019

Date of Declaration : Oct. 22, 2019

Report No. : 1920271R-SAUSP03V00

Report Version : V2.0

The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standard through the calibration report of the equipment and evaluated measurement uncertainty herein.

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Issued Date: Oct. 22, 2019

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Applicant	Moxa Inc.
Address	FL.4, NO. 135. LANE 235, BAOQIAO RD. XINDIAN DIST.,NEW TAIPEI CITY, TAIWAN
Manufacturer	Moxa Inc.
Model No.	WAPN008-1
FCC ID.	SLE-WAPN008-1
Trade Name	MOXA
Applicable Standard	FCC 47 CFR 1.1310
Test Result	Complied

Documented By : 
(Senior Engineering Adm. Specialist / Anita Chou)

Tested By : 
(Engineer / Wen Lee)

Approved By : 
(Director / Vincent Lin)

1. GENERAL INFORMATION

1.1. EUT Description

Product Name	Moxa 2.4/4.9/5 GHz
Trade Name	MOXA
Model No.	WAPN008-1
FCC ID.	SLE-WAPN008-1
Frequency Range	2.4G: 2400-2483.5MHz 5G: 5725-5850MHz
Center Frequency	2.4G: 5M-BW: 2404-2479MHz, 20M-BW: 2414-2464MHz 5G: 5M-BW: 5730-5845MHz, 20M-BW: 5740-5840MHz
Number of Channels	2.4G: 5M-BW: 31, 20M-BW: 6 5G: 5M-BW: 24, 20M-BW: 11
Data Speed	5M-BW: 1.625-36.1Mbps, 20M-BW: 6.5-144.4Mbps
Type of Modulation	OFDM
Antenna Type	Dipole Antenna, Panel Antenna, Railway Antenna
Antenna Gain	Refer to the table "Antenna List"

Antenna List (FOR 2.4G)

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	MOXA	ANT-WDB-ANM-0306	Dipole	3.8dBi For 2.4GHz
2	MOXA	ANT-WDB-ARM-0202	Dipole	1.8dBi For 2.4GHz
3	MOXA	ANT-WDB-ARM-02	Dipole	2.04dBi For 2.4GHz
4	MOXA	ANT-WDB-ANM-0502	Dipole	4.62dBi For 2.4GHz
5	MOXA	ANT-WDB-PNF-1518	Panel	15dBi For 2.4GHz

Antenna List (FOR 5G)

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	MOXA	ANT-WDB-ANM-0306	Dipole	6.3dBi For 5GHz
2	MOXA	ANT-WDB-ARM-0202	Dipole	1.8dBi For 5GHz
3	MOXA	ANT-WDB-ARM-02	Dipole	0.81dBi For 5GHz
4	MOXA	ANT-WDB-ANM-0502	Dipole	2dBi For 5GHz
5	MOXA	ANT-WSB5-ANF-12	Dipole	12dBi For 5GHz
6	MOXA	ANT-WSB5-PNF-18	Panel	18dBi For 5GHz
7	MOXA	ANT-WDB-PNF-1518	Panel	18dBi For 5GHz
8	Huber+Suhner	1356.17.0042	Railway	13dBi For 5GHz
9	Huber+Suhner	1356.17.0077	Dipole	14dBi For 5GHz

2. RF Exposure Evaluation

2.1. 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

2.2. Test Result of RF Exposure Evaluation

Product : Moxa 2.4/4.9/5 GHz
 Test Item : RF Exposure Evaluation

WLAN 2.4G Peak Gain: 3.8 dBi (Antenna: ANT-WDB-ANM-0306)

Band	Frequency	Conducted Peak Power (dBm)	Worst Case Duty Cycle (%)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)	Pass/Fail
20M-BW	2444	29.74	80.36	1172.1	0.56	1	Pass

Note: The conducted output power is refer to report No.: 1920271R-RFUSP27V00 from the DEKRA.

WLAN 5G Peak Gain: 6.3 dBi (Antenna: ANT-WDB-ANM-0306)

Band	Frequency	Conducted Peak Power (dBm)	Worst Case Duty Cycle (%)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)	Pass/Fail
20M-BW	5780.00	20.53	86.45	130.7	0.11	1	Pass

Note: The conducted output power is refer to report No.: 1920271R-RFUSP29V00 from the DEKRA.

WLAN 2.4G Peak Gain: 1.8 dBi (Antenna: ANT-WDB-ARM-0202)

Band	Frequency	Conducted Peak Power (dBm)	Worst Case Duty Cycle (%)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)	Pass/Fail
20M-BW	2444	29.79	80.36	1185.7	0.36	1	Pass

Note: The conducted output power is refer to report No.: 1920271R-RFUSP27V00 from the DEKRA.

WLAN 5G Peak Gain: 1.8 dBi (Antenna: ANT-WDB-ARM-0202)

Band	Frequency	Conducted Peak Power (dBm)	Worst Case Duty Cycle (%)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)	Pass/Fail
20M-BW	5780.00	20.52	86.45	130.4	0.04	1	Pass

Note: The conducted output power is refer to report No.: 1920271R-RFUSP29V00 from the DEKRA.

WLAN 2.4G Peak Gain: 2.04 dBi (Antenna: ANT-WDB-ARM-02)

Band	Frequency	Conducted Peak Power (dBm)	Worst Case Duty Cycle (%)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)	Pass/Fail
20M-BW	2444	29.77	80.36	1180.2	0.38	1	Pass

Note: The conducted output power is refer to report No.: 1920271R-RFUSP27V00 from the DEKRA.

WLAN 5G Peak Gain: 0.81 dBi (Antenna: ANT-WDB-ARM-02)

Band	Frequency	Conducted Peak Power (dBm)	Worst Case Duty Cycle (%)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)	Pass/Fail
20M-BW	5780.00	20.51	86.45	130.1	0.03	1	Pass

Note: The conducted output power is refer to report No.: 1920271R-RFUSP29V00 from the DEKRA.

WLAN 2.4G Peak Gain: 4.62 dBi (Antenna: ANT-WDB-ANM-0502)

Band	Frequency	Conducted Peak Power (dBm)	Worst Case Duty Cycle (%)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)	Pass/Fail
20M-BW	2444	29.83	80.36	1196.6	0.69	1	Pass

Note: The conducted output power is refer to report No.: 1920271R-RFUSP27V00 from the DEKRA.

WLAN 5G Peak Gain: 2 dBi (Antenna: ANT-WDB-ANM-0502)

Band	Frequency	Conducted Peak Power (dBm)	Worst Case Duty Cycle (%)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)	Pass/Fail
20M-BW	5780.00	20.48	86.45	129.2	0.04	1	Pass

Note: The conducted output power is refer to report No.: 1920271R-RFUSP29V00 from the DEKRA.

WLAN 2.4G Peak Gain: 15 dBi (Antenna: ANT-WDB-PNF-1518)

Band	Frequency	Conducted Peak Power (dBm)	Worst Case Duty Cycle (%)	Output Power to Antenna (mW)	Power Density at R = 50 cm (mW/cm ²)	Limit (mW/cm ²)	Pass/Fail
20M-BW	2444	26.23	80.36	522.3	0.53	1	Pass

Note1: The conducted output power is refer to report No.: 1920271R-RFUSP27V00 from the DEKRA.

Note2: The safety distance is **50cm**, for MOXA WAPN008-1(Antenna: ANT-WDB-PNF-1518) installed without any other radio equipment.

WLAN 5G Peak Gain: 18 dBi (Antenna: ANT-WDB-PNF-1518)

Band	Frequency	Conducted Peak Power (dBm)	Worst Case Duty Cycle (%)	Output Power to Antenna (mW)	Power Density at R = 50 cm (mW/cm ²)	Limit (mW/cm ²)	Pass/Fail
20M-BW	5780.00	20.54	86.45	131.0	0.26	1	Pass

Note1: The conducted output power is refer to report No.: 1920271R-RFUSP29V00 from the DEKRA.

Note2: The safety distance is **50cm**, for MOXA WAPN008-1(Antenna: ANT-WDB-PNF-1518) installed without any other radio equipment.

WLAN 5G Peak Gain: 12 dBi (Antenna: ANT-WSB5-ANF-12)

Band	Frequency	Conducted Peak Power (dBm)	Worst Case Duty Cycle (%)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)	Pass/Fail
20M-BW	5780.00	20.48	86.45	129.2	0.41	1	Pass

Note: The conducted output power is refer to report No.: 1920271R-RFUSP29V00 from the DEKRA.

WLAN 5G Peak Gain: 18 dBi (Antenna: ANT-WSB5-PNF-18)

Band	Frequency	Conducted Peak Power (dBm)	Worst Case Duty Cycle (%)	Output Power to Antenna (mW)	Power Density at R = 30 cm (mW/cm ²)	Limit (mW/cm ²)	Pass/Fail
20M-BW	5780.00	20.50	86.45	129.8	0.72	1	Pass

Note1: The conducted output power is refer to report No.: 1920271R-RFUSP29V00 from the DEKRA.

Note2: The safety distance is **30cm**, for MOXA WAPN008-1(Antenna: ANT-WSB5-PNF-18) installed without any other radio equipment.

WLAN 5G Peak Gain: 13 dBi (Antenna: 1356.17.0042)

Band	Frequency	Conducted Peak Power (dBm)	Worst Case Duty Cycle (%)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)	Pass/Fail
20M-BW	5780.00	20.44	86.45	128.0	0.51	1	Pass

Note: The conducted output power is refer to report No.: 1920271R-RFUSP29V00 from the DEKRA.

WLAN 5G Peak Gain: 14 dBi (Antenna: 1356.17.0077)

Band	Frequency	Conducted Peak Power (dBm)	Worst Case Duty Cycle (%)	Output Power to Antenna (mW)	Power Density at R = 20 cm (mW/cm ²)	Limit (mW/cm ²)	Pass/Fail
20M-BW	5780.00	20.48	86.45	129.2	0.65	1	Pass

Note: The conducted output power is refer to report No.: 1920271R-RFUSP29V00 from the DEKRA.