

# RF Exposure Evaluation Report

Product Name : Wireless module

Model No. : WAPC003

FCC ID : SLE-WAPC003

Applicant : Moxa Inc.

Address : No. 1111, Heping Rd., Bade Dist., Taoyuan City 334004, Taiwan

Date of Receipt : Aug. 03, 2021

Date of Declaration : Oct. 20, 2021

Report No. : 2180161R-RFUSMPEV01-A

Report Version : V1.0



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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Measurement uncertainties evaluated for each testing system and associated connections are given here to provide the system information for reference. Compliance determinations do not take into account measurement uncertainties for each testing system, but are based on the results of the compliance measurement.

Issued Date: Oct. 20, 2021

Report No.: 2180161R-RFUSMPEV01-A



Product Name	Wireless module	
Applicant	Moxa Inc.	
Address	No. 1111, Heping Rd., Bade Dist., Taoyuan City 334004, Taiwan	
Manufacturer	Moxa Inc.	
Model No.	WAPC003	
FCC ID.	SLE-WAPC003	
EUT Rated Voltage	12-48 VDC, PoE	
EUT Test Voltage	24VDC	
Trade Name	MOXA	
Applicable Standard	KDB 447498 D01 v06	<input checked="" type="checkbox"/> Minimum test separation distance $\geq 20$ cm <input type="checkbox"/> For low power devices
Test Result	Complied	

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Tested By : wenLee  
 ( Supervisor / Wen Lee )

Approved By : Tim Sung  
 ( Manager / Tim Sung )

**Revision History**

<b>Report No.</b>	<b>Version</b>	<b>Description</b>	<b>Issued Date</b>
2180161R-RFUSMPEV01-A	V1.0	Initial issue of report.	Oct. 20, 2021

## 1. GENERAL INFORMATION

### 1.1. EUT Description

Product Name	Wireless module
Trade Name	MOXA
Model No.	WAPC003
FCC ID.	SLE-WAPC003
Frequency Range	802.11b/g/n/ac-20MHz: 2412-2462MHz, 802.11n/ac-40MHz: 2422-2452MHz 802.11a/n/ac-20MHz: 5180-5320MHz, 5500-5700MHz, 5745-5825MHz 802.11n/ac-40MHz: 5190-5310, 5510-5670MHz, 5755-5795MHz 802.11ac-20MHz: 5720MHz, 802.11ac-40MHz: 5710MHz 802.11ac-80MHz: 5210-5290MHz, 5530-5690MHz, 5775MHz
Number of Channels	802.11b/g/n-20MHz: 11, n-40MHz: 7 802.11a/n/ac-20MHz: 24; 802.11n/ac-40MHz: 11, 802.11ac-80MHz: 6
Data Speed	802.11b: 1-11Mbps, 802.11a/g: 6-54Mbps, 802.11n: up to 300Mbps, 802.11ac-80MHz: up to 866.7Mbps
Type of Modulation	802.11b: DSSS (DBPSK, DQPSK, CCK) 802.11g/n/ac: OFDM (BPSK, QPSK, 16QAM, 64QAM, 256QAM)
Antenna Type	Dipole Antenna, Panel Antenna
Antenna Gain	Refer to the table "Antenna List"
Channel Control	Auto

Note:

1. This is to request a Class II permissive change for FCC ID: SLE-WAPC003, originally granted on 07/02/2021.

The major change filed under this application is:

Change #1: Additional Chassis added, Product name: Wireless AP/bridge/client, Brand: MOXA,  
Model number: AWK-3252A.

Change #2: Add DFS master function.

**For 2.4G**

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	MOXA	ANT-WDB-ANM-0306	Dipole	3.80 dBi For 2.4GHz
2	MOXA	ANT-WDB-ANM-0502	Dipole	4.62 dBi For 2.4GHz
3	MOXA	ANT-WDB-ARM-02	Dipole	2.04 dBi For 2.4GHz
4	MOXA	ANT-WDB-ARM-0202	Dipole	1.80 dBi For 2.4GHz
5	MOXA	ANT-WSB-AHRM-05-1.5m	Dipole	5.00 dBi For 2.4GHz
6	MOXA	MAT-WDB-CA-RM-2-0205	Dipole	2.50 dBi For 2.4GHz
7	MOXA	MAT-WDB-DA-RM-2-0203-1m	Dipole	2.45 dBi For 2.4GHz
8	MOXA	MAT-WDB-PA-NF-2-0708	Panel	7.63 dBi For 2.4GHz
9	MOXA	ANT-WDB-PNF-1011	Panel	10.33 dBi For 2.4GHz
10	MOXA	ANT-WDB-ONM-0707	Dipole	7.10 dBi For 2.4GHz
11	MOXA	ANT-WDB-ONF-0709	Dipole	7.40 dBi For 2.4GHz
12	MOXA	ANT-WSB-PNF-12-02	Panel	12.34 dBi For 2.4GHz

**For 5G**

No.	Manufacturer	Part No.	Antenna Type	Peak Gain
1	MOXA	ANT-WDB-ANM-0306	Dipole	5.7dBi For 5.15~5.25GHz 5.7dBi For 5.25~5.35GHz 6.3dBi For 5.47~5.725GHz 6.3dBi For 5.725~5.825GHz
2	MOXA	ANT-WDB-ANM-0502	Dipole	1.41dBi For 5GHz
3	MOXA	ANT-WDB-ARM-02	Dipole	0.81dBi For 5.15~5.25GHz 0.36Bi For 5.25~5.35GHz 0.36dBi For 5.47~5.725GHz -0.39dBi For 5.725~5.825GHz
4	MOXA	ANT-WDB-ARM-0202	Dipole	1.8dBi For 5GHz
5	MOXA	MAT-WDB-CA-RM-2-0205	Dipole	5.7dBi For 5.15~5.25GHz 5.76Bi For 5.25~5.35GHz 5.7dBi For 5.47~5.725GHz 5.2dBi For 5.725~5.825GHz
6	MOXA	MAT-WDB-DA-RM-2-0203-1m	Dipole	2.72dBi For 5.15~5.25GHz 2.72dBi For 5.25~5.35GHz 2.72dBi For 5.47~5.725GHz 2.34dBi For 5.725~5.825GHz
7	MOXA	MAT-WDB-PA-NF-2-0708	Panel	8.77dBi For 5.15~5.25GHz 8.77dBi For 5.25~5.35GHz 8.61dBi For 5.47~5.725GHz 8.18dBi For 5.725~5.825GHz
8	MOXA	ANT-WDB-PNF-1011	Panel	12.04dBi For 5.15~5.25GHz 12.04dBi For 5.25~5.35GHz 11.06dBi For 5.47~5.725GHz 11.06dBi For 5.725~5.825GHz
9	MOXA	ANT-WDB-ONM-0707	Dipole	7.3dBi For 5.15~5.25GHz 7.3dBi For 5.25~5.35GHz 7.5dBi For 5.47~5.725GHz 7.6dBi For 5.725~5.825GHz
10	MOXA	ANT-WDB-ONF-0709	Dipole	8.61dBi For 5.15~5.25GHz 8.15dBi For 5.25~5.35GHz 8.87dBi For 5.47~5.725GHz 8.87dBi For 5.725~5.825GHz
11	MOXA	ANT-WSB5-PNF-16	Panel	16.38dBi For 5.15~5.25GHz 16.38dBi For 5.25~5.35GHz 16.94dBi For 5.47~5.725GHz 16.94dBi For 5.725~5.825GHz

## 2. RF Exposure Evaluation

### 2.1. Standard Applicable

According to KDB 447498 D01 (7.1), A minimum test separation distance  $\geq 20$  cm is required between the antenna and radiating structures of the device and nearby persons to apply mobile device exposure limits.

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

Where

Pd = power density in mW/cm<sup>2</sup>

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

### 2.3. Test Result of RF Exposure Evaluation

Product : Wireless module  
 Test Item : RF Exposure Evaluation

#### WLAN 2.4G Peak Gain: 7.40dBi (Dipole Ant no.11)

Band	Frequency	Conducted Peak Power (dBm)	Duty Cycle (%)	Output Power to Antenna (mW)	Power Density at R = 50 cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Pass/Fail
WLAN 2.4G	2462	28.58	93.93	767.707	0.1343	1	Pass

Note: The conducted output power is refer to report No.: 2110552R-E3032110118 from the DEKRA.

#### WLAN 2.4G Peak Gain: 12.34dBi (Panel Ant no.12)

Band	Frequency	Conducted Peak Power (dBm)	Duty Cycle (%)	Output Power to Antenna (mW)	Power Density at R = 50 cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Pass/Fail
WLAN 2.4G	2437	27.92	93.93	659.471	0.3598	1	Pass

Note: The conducted output power is refer to report No.: 2110552R-E3032110118 from the DEKRA.

#### WLAN 5G Peak Gain: 8.87dBi (Dipole Ant no.10)

Band	Frequency	Conducted Peak Power (dBm)	Duty Cycle (%)	Output Power to Antenna (mW)	Power Density at R = 50 cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Pass/Fail
WLAN 5G	5785	26.83	85.87	561.253	0.1377	1	Pass

Note: The conducted output power is refer to report No.: 2110552R-E3032110128 from the DEKRA.

#### WLAN 5G Peak Gain: 16.94dBi (Panel Ant no.11)

Band	Frequency	Conducted Peak Power (dBm)	Duty Cycle (%)	Output Power to Antenna (mW)	Power Density at R = 50 cm (mW/cm <sup>2</sup> )	Limit (mW/cm <sup>2</sup> )	Pass/Fail
WLAN 5G	5785	26.83	85.87	561.253	0.8831	1	Pass

Note: The conducted output power is refer to report No.: 2110552R-E3032110128 from the DEKRA.