

RF Exposure Report

Report No.: SA151022E06

FCC ID: 2AD8UFZCWM2A1

Test Model: WM2A-AC210m

Received Date: Oct. 22, 2015

Test Date: Dec. 02 to 16, 2015

Issued Date: Jan. 21, 2016

Applicant: Nokia Solutions and Networks.OY

Address: Karaportti 3, P.O. Box 226, Nokia Group, Finland.

Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
Hsin Chu Laboratory

Lab Address: E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,
Taiwan R.O.C.

Test Location (1): E-2, No.1, Li Hsin 1st Road, Hsinchu Science Park, Hsinchu City 300,
Taiwan R.O.C.

Test Location (2): No. 49, Ln. 206, Wende Rd., Shangshan Tsuen, Chiung Lin Hsiang, Hsin
Chu Hsien 307, Taiwan R.O.C.

This report is for your exclusive use. Any copying or replication of this report to or for any other person or entity, or use of our name or trademark, is permitted only with our prior written permission. This report sets forth our findings solely with respect to the test samples identified herein. The results set forth in this report are not indicative or representative of the quality or characteristics of the lot from which a test sample was taken or any similar or identical product unless specifically and expressly noted. Our report includes all of the tests requested by you and the results thereof based upon the information that you provided to us. You have 60 days from date of issuance of this report to notify us of any material error or omission caused by our negligence, provided, however, that such notice shall be in writing and shall specifically address the issue you wish to raise. A failure to raise such issue within the prescribed time shall constitute your unqualified acceptance of the completeness of this report, the tests conducted and the correctness of the report contents. Unless specific mention, the uncertainty of measurement has been explicitly taken into account to declare the compliance or non-compliance to the specification. The report must not be used by the client to claim product certification, approval, or endorsement by any government agencies.

Table of Contents

Release Control Record	3
1 Certificate of Conformity	4
2 RF Exposure	5
2.1 Limits for Maximum Permissible Exposure (MPE).....	5
2.2 MPE Calculation Formula	5
2.3 Classification	5
3 Antenna Gain	6
4 Calculation Result	7
5 Brief Summary of results	8



A D T

Release Control Record

Issue No.	Description	Date Issued
SA151022E06	Original release.	Jan. 21, 2016



A D T

1 Certificate of Conformity

Product: Wi-Fi AP Module 802.11 ac

Brand: Nokia

Test Model: WM2A-AC210m

Hardware Version: AM2

Sample Status: MASS-PRODUCTION

Applicant: Nokia Solutions and Networks.OY

Test Date: Dec. 02 to 16, 2015

Standards: FCC Part 2 (Section 2.1091)
447498 D01 GENERAL RF EXPOSURE GUIDANCE V06
IEEE STD C95.1-2005
FCC 47 CFR § 1.13.10

The above equipment has been tested by **Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch**, and found compliance with the requirement of the above standards. The test record, data evaluation & Equipment Under Test (EUT) configurations represented herein are true and accurate accounts of the measurements of the sample's EMC characteristics under the conditions specified in this report.

Prepared by : , **Date:** Jan. 21, 2016
Elsie Hsu / Specialist

Approved by : , **Date:** Jan. 21, 2016
May Chen / Manager

2 RF Exposure

2.1 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 Exposure				
300-1500	F/1500	30
1500-100,000	1.0	30

F = Frequency in MHz

2.2 MPE Calculation Formula

$$P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot r^2)$$

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

2.3 Classification

The antenna of this product, under normal use condition, is at least 20cm away from the body of the user.

So, this device is classified as **fixed device**.

3 Antenna Gain

Antenna No	PCB Chain No.	Brand	Model	Antenna Type	Gain(dBi)	Frequency (GHz to GHz)
1	U20	Galtronics	NA	PIFA	5.17	2.4~2.4835
					6.03	5.15~5.25
					6.17	5.25~5.35
					5.57	5.47~5.725
					5.18	5.725~5.85
2	U21	Galtronics	NA	PIFA	4.27	2.4~2.4835
					5.1	5.15~5.25
					4.91	5.25~5.35
					5.23	5.47~5.725
					5.73	5.725~5.85

Cable Spec.

Antenna No	Brand	Model	Connector Type	Cable Loss(dB)	Cable Length (cm)
1	NA	NA	MMCX	0	30.6
2	NA	NA	MMCX	0	9.1

4 Calculation Result

For 1TX Chain 0 Mode:

Frequency Band (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
2412-2462	89.536	5.17	20	0.05858	1
5180-5240	182.81	6.03	20	0.14579	1
5745-5825	163.682	5.18	20	0.10733	1

For 1TX Chain 1 Mode:

Frequency Band (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
2412-2462	89.125	4.27	20	0.04739	1
5180-5240	196.789	5.10	20	0.12669	1
5745-5825	163.305	5.73	20	0.12154	1

For 2TX Mode:

Frequency Band (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm ²)	Limit (mW/cm ²)
2412-2462	199.467	7.74	20	0.23583	1
5180-5240	368.481	8.59	20	0.52984	1
5745-5825	384.025	8.47	20	0.53714	1

NOTE:

2412-2462MHz : Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 7.74\text{dBi}$

5180-5240MHz: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 8.59\text{dBi}$

5745-5825MHz: Directional gain = $10 \log[(10^{G1/20} + 10^{G2/20})^2 / 2] = 8.47\text{dBi}$

Conclusion:

The formula of calculated the MPE is:

$CPD1 / LPD1 + CPD2 / LPD2 + \dots \text{etc.} < 1$

CPD = Calculation power density

LPD = Limit of power density

Therefore, the worst-case situation is $0.23583 / 1 + 0.53714 / 1 = 0.773$, which is less than "1". This confirmed that the device comply with FCC 1.1310 MPE limit.

5 Brief Summary of results

The wireless device described within this report has been shown to be capable of compliance with the basic restrictions related to human exposure to electromagnetic fields for both General public and Occupational. The calculations shown in this report were made in accordance the procedures specified in the applied test specification(s)

Configuration	Required Compliance Boundary(m)	
	Occupational	General Population
2.4GHz WiFi + 5GHz WiFi	0.2	0.2

--- END ---