



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

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Applicant: Nokia Solutions and Networks.OY

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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 |



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Release Control Record

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



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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:** _____
Elsie Hsu / Specialist

Approved by : _____, **Date:** _____
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

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

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

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 ---