

RF Exposure Report

Report No.: SA160815E05D

FCC ID: 2AD8UFW2RADPM01

Test Model: FW2RADPM01

Received Date: Sep. 14, 2018

Test Date: Oct. 18, 2018

Issued Date: Mar. 08, 2019

Applicant: Nokia Solutions and Networks, OY

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Issued By: Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch
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Release Control Record

Issue No.	Description	Date Issued
SA160815E05D	Original release.	Mar. 08, 2019

1 Certificate of Conformity

Product: Nokia FW2R LTE module

Brand: Nokia

Test Model: FW2RADPM01

Test Sample S/N: EB171810287

Hardware Version: 95.1659T00 X36

Sample Status: MASS-PRODUCTION

Applicant: Nokia Solutions and Networks, OY

Test Date: Oct. 18, 2018


Standards: FCC Part 2 (Section 2.1091)


KDB 447498 D01 General RF Exposure Guidance v06

IEEE C95.1-1992

FCC Part 1 (Section 1.1310)

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:** _____ Mar. 08, 2019
Claire Kuan / Specialist

Approved by :  _____, **Date:** _____ Mar. 08, 2019
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

2 F = Frequency in MHz

2.1 MPE Calculation 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 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** and installations by professional service personnel.

2.3 Antenna Gain

1. The antennas provided to the EUT, please refer to the following table:

Antenna spec.					
Antenna No	Brand	Model	Antenna Type	Gain(dBi)	Frequency range (MHz)
1	Nokia	NA	Loop (LAA#4(Main))	7.67	5250~ 5750
2	Nokia	NA	Loop (LAA#2(DIV))	3.66	5250~ 5750

Cable Spec.						
Antenna No	Brand	Model	Connector Type	Cable Loss(dB)	Cable Length (mm)	Note
1	NA	NA	Right angle MMCX Plug	peak gain included	263	This cable will be equipped with Loop(LAA#4) antenna
2	NA	NA	Right angle MMCX Plug	peak gain included	263	This cable will be equipped with Loop(LAA#2) antenna

2. Directional gain(composite gain) :

Frequency range (MHz)	Directional Gain(dBi)
5250 ~ 5750	6.11

Note:

1. Directional gain calculation is based on FCC document KDB662911

all transmit signals are *completely uncorrelated*

Directional gain = $10 \log[(10_{G1/10} + 10_{G2/10} + \dots + 10_{GN/10})/N_{ANT}]$ dBi,

where

N_{ANT} = the total number of antennas

2. Two directional gain values are calculated, directional gain values based on actual measurement data.

2.4 Calculation Result of Maximum Conducted Power

LAA Frequency 5180-5240 MHz & 5745-5825 MHz copied from the original test report (Report No.: SA160815E05B)

For General Population

Operation Mode	Evaluation Frequency (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/m ²)	Limit (mW /m ²)
LAA	5180-5240	581.477	7.66	20	0.67493	1
LAA	5299.8+5340	240.189	6.11	20	0.19511	1
LAA	5660+5699.9	218.794	6.11	20	0.04353	1
LAA	5745-5825	582.879	7.66	20	0.67656	1

Note:

- For Frequency 5180-5240 MHz & 5745-5825 MHz: Directional gain = 7.66dBi
- For Frequency 5299.8+5340 MHz & 5660+5699.9 MHz: Directional gain = 6.11dB

For Occupational Population

Operation Mode	Evaluation Frequency (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/m ²)	Limit (mW /m ²)
LAA	5180-5240	581.477	7.66	20	0.67493	5
LAA	5299.8+5340	240.189	6.11	20	0.19511	5
LAA	5660+5699.9	218.794	6.11	20	0.04353	5
LAA	5745-5825	582.879	7.66	20	0.67656	5

Note:

- For Frequency 5180-5240 MHz & 5745-5825 MHz: Directional gain = 7.66dBi
- For Frequency 5299.8+5340 MHz & 5660+5699.9 MHz: Directional gain = 6.11dB

3 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
5GHz LAA	0.2	0.2

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