RF Exposure Report

Report No.:	SA150326E02C
FCC ID:	2AD8UFZPFWID01
Test Model:	FWID
Received Date:	Mar. 26, 2015
Test Date:	Apr. 01 to 17, 2015
Issued Date:	July 27, 2015
Applicant:	Nokia Solutions and Networks
Address:	1455 West Shure Drive, Arlington Heights, IL 60004, USA
Issued By:	Bureau Veritas Consumer Products Services (H.K.) Ltd., Taoyuan Branch Hsin Chu Laboratory
Lab Address:	No. 81-1, Lu Liao Keng, 9th Ling,Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, Taiwan R.O.C.
Test Location (1):	No. 81-1, Lu Liao Keng, 9th Ling,Wu Lung Tsuen, Chiung Lin Hsiang, Hsin Chu Hsien 307, 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.

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Release Control Record

Issue No.	Description	Date Issued
SA150326E02C	Original release.	July 27, 2015

1 Certificate of Conformity

Product:	Flexi Zone Indoor Pico BTS
Brand:	Nokia
Test Model:	FWID
Test Sample S/N:	EA150710164
Hardware Version:	473150A.X33 (Confirmation that the hardware version 473150A.X33 is fully identical with 473150A.101)
Software Version:	Operating SW: FB_FZM_PS_LFS_OS_2014_05_59-0-g927a301 WiFi module SW: 9.8.1.0.14302702
Sample Status:	ENGINEERING SAMPLE
Applicant:	Nokia Solutions and Networks
Test Date:	Apr. 01 to 17, 2015
Standards:	RSS-102 Issue 5 (2015-03) ICNIRP 1998 FCC 47 CFR § 1.13.10 Canada's RF safety code 6 Australian Radiation Protection Series Publication No. 3 EN 50385:2002

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:** July 27, 2015

(Midoli Peng, Specialist)

Approved by : _____ , **Date:** July 27, 2015

(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)
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/cm^2

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 station and installations by professional service persionnel device.

3 Antenna Gain

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

LTE Antenna Spec.							
Antenna No	Brand	Model	Antenna Type	Antenna Connector	Gain(dBi) <Including cable loss>	Cable Length (mm)	Frequency (MHz)
Internal LTE (Main)	TongDa	T-543-8141050-6	PIFA	i-pex(MHF)	4.9	50	1710~2390 (Band 4)
Internal LTE (Aux)		T-543-8141050-7			4.6	190	1710~2390 (Band 4)
GPS Antenna Spec.							
Antenna No	Brand	Model	Antenna Type	Antenna Connector	Gain(dBi) <Including cable loss>	Cable Length (mm)	Frequency (MHz)
External GPS Ant	TongDa	T-543-8141037-9	ElecPatch	SMA Male	4.0	9140 ± 100	GPS：1575.42 ± 3 MHz Glonass：1602 ± 8 MHz
BT Antenna Spec.							
Antenna No	Brand	Model	Antenna Type	Antenna Connector	Gain(dBi) <Including cable loss>	Cable Length (mm)	Frequency (MHz)
Internal BT Ant	INPAQ	Fz PICO	Chip	NA	-1.22	NA	2400~2500

4 Calculation Result (For FCC)

Calculation for Maximum Conducted Power

For BT

Frequency Band (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
2402-2480	8.730	-1.22	20	0.00131	1

For LTE

Frequency Band (MHz)	EIRP Power (mW)	Distance (cm)	Power Density (mW/cm^2)	Limit (mW/cm^2)
2112.5-2152.5	1183.9	20	0.236	1

Conclusion:

The formula of calculated the MPE is:

CPD1 / LPD1 + CPD2 / LPD2 + ……etc. < 1

CPD = Calculation power density

LPD = Limit of power density

BT + LTE = 0.00131 + 0.236 = 0.237

Therefore the maximum calculations of above situations are less than the "1" limit.

5 Calculation Result (For Canada)

Calculation for Maximum Conducted Power

For BT

Frequency Band (MHz)	Max Power (mW)	Antenna Gain (dBi)	Distance (cm)	Power Density (W/m^2)	Limit (W/m^2)
2402-2480	8.730	-1.22	0.2	0.0131	5.4100

For LTE

Frequency Band (MHz)	EIRP Power (mW)	Distance (cm)	Power Density (W/m^2)	Limit (W/m^2)
2112.5-2152.5	1055.2	0.2	2.10	4.9565

Conclusion:

The formula of calculated the MPE is:

CPD1 / LPD1 + CPD2 / LPD2 + ……etc. < 10

CPD = Calculation power density

LPD = Limit of power density

BT + LTE = 0.0131/5.4100 + 2.10/4.9325 = 0.426

Therefore the maximum calculations of above situations are less than the “1” limit.

6 Calculation Result (For Europe)

Calculation for maximum EIRP

BT

Output Power EIRP (dBm)	Output Power EIRP (mW)	E-Field Strength (V/m)	E-Field Strength Limit (V/m)	Pass / Fail
8.82	7.621	2.391	61	Pass

LTE

Output Power EIRP (dBm)	Output Power EIRP (mW)	E-Field Strength (V/m)	E-Field Strength Limit (V/m)	Pass / Fail
32.94	1967.886	38.418	61	Pass

Conclusion:

Both of the BT and LTE can transmit simultaneously, the formula of calculated the exposure is:

$(CEF1 / LEF1)^2 + (CEF2 / LEF2)^2 + \ldots\ldots\ldots etc. < 1$

CEF = Calculation E-Field Strength

LEF = Limit of E-Field Strength

Therefore, the calculation of this situation is $(2.391 / 61)^{2+} + (38.418 / 61)^2 = 0.39817$, which is less than the "1" limit.

7 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
LTE FDD Band 4+ Bluetooth	0.2	0.2

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