

RF Exposure Evaluation Report

APPLICANT : Shenzhen Gongjin Electronics Co.,Ltd.
EQUIPMENT : Nokia Smart Node
BRAND NAME : Nokia
MODEL NAME : Nokia Multi-Standard Smart Node B2B14B66 (SN4IBN)
FCC ID : V4V1SN4IBN
STANDARD : 47 CFR Part 2.1091
FCC KDB 447498 D01 v06

The product evaluation date was started from Nov. 07, 2023 and completed on Nov. 07, 2023. We, Sporton International Inc. (Kunshan), would like to declare that the device has been evaluated in accordance with 47 CFR Part 2.1091 and FCC KDB 447498 D01 v06, and pass the limit. Without written approval of Sporton International Inc. (Kunshan), the test report shall not be reproduced except in full.



Approved by: Si Zhang

Sporton International Inc. (Kunshan)

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People's Republic of China***



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**Revision History**

REPORT NO.	VERSION	DESCRIPTION	ISSUED DATE
FA151309-02	Rev. 01	Initial issue of report.	Nov. 30, 2023



1. Administration Data

1.1. Testing Laboratory

Sporton International Inc. (Kunshan) is accredited to ISO/IEC 17025:2017 by American Association for Laboratory Accreditation with Certificate Number 5145.02.

Testing Laboratory			
Test Firm	Sporton International Inc. (Kunshan)		
Test Site Location	No. 1098, Pengxi North Road, Kunshan Economic Development Zone Jiangsu Province 215300 People's Republic of China TEL : +86-512-57900158		
Test Site No.	Sporton Site No.	FCC Designation No.	FCC Test Firm Registration No.
	SAR01-KS	CN1257	314309

Applicant	
Company Name	Shenzhen Gongjin Electronics Co.,Ltd.
Address	No.2 Danzi North Road, Kengzi Street, Pingshan District, Shenzhen, Guangdong, 518122, P.R. China

Manufacturer	
Company Name	Shenzhen Gongjin Electronics Co.,Ltd.
Address	No.2 Danzi North Road, Kengzi Street, Pingshan District, Shenzhen, Guangdong, 518122, P.R. China

2. Description of Equipment Under Test (EUT)

Product Feature & Specification	
EUT Type	Nokia Smart Node
Brand Name	Nokia
Model Name	Nokia Multi-Standard Smart Node B2B14B66 (SN4IBN)
FCC ID	V4V1SN4IBN
Tx Frequency	LTE Band 2 : 1930 MHz ~ 1990 MHz LTE Band 14: 758 MHz ~ 768 MHz LTE Band 66 : 2110 MHz~ 2180 MHz
Rx Frequency	LTE Band 2 : 1850 MHz ~ 1910 MHz LTE Band 14: 788 MHz ~ 798 MHz LTE Band 66 : 1710 MHz ~ 1780 MHz
Mode	LTE: QPSK, 16QAM, 64QAM NB-IOT Category NB1 : QPSK
Antenna Gain	<SISO Ant. 1/2> LTE Band 2 : 3.20 dBi <SISO Ant. 3/4> LTE Band 14 : 1.20 dBi LTE Band 66 : 2.90 dBi <MIMO Ant. 1+2> LTE Band 2 : 6.21 dBi <MIMO Ant. 3+4> LTE Band 14 : 4.21 dBi LTE Band 66 : 5.91 dBi
Antenna Type	WWAN: Dipole Antenna
HW Version	V03
SW Version	56850
EUT Stage	Production Unit

Remark:

1. The above EUT's information was declared by manufacturer. Please refer to the specifications or user's manual for more detailed description.
2. MIMO Gain = SISO Gain + Array Gain($10\log 2$) for LTE band 2/14/66.
3. The device supports inter-band uplink carrier aggregation for 2A-66A and 2A-14A.
4. NB-IOT limited to LTE band 2/band 66.
5. LTE only support full RB mode.
6. LTE supports Category NB1 (guard band) and can only be used with LTE at the same time.
7. This is a variant report. The change note could be referred to Nokia Multi-Standard Smart Node B2B14B66 (SN4IBN)_Class II Permissive Change letter which is exhibit separately. According to the differences, the change has no influence on the results, all the results are leveraged from original reports (Sporton Report Number FA151309) .

Comments and Explanations:

1. The declared of product specification for EUT presented in the report are provided by the manufacturer, and the manufacturer takes all the responsibilities for the accuracy of product specification.
2. The maximum RF output tune up power, antenna gain also the safe distance used for evaluate RF exposure were declared by manufacturer.

**3. Maximum RF average output tune up power among production units****<LTE>**

Mode		Maximum Average power(dBm)		
		Ant 1	Ant 2	MIMO
LTE	Band 2	24.00	24.00	27.00
NB-IOT	Band 2	23.00	23.00	26.00

Mode		Maximum Average power(dBm)		
		Ant 3	Ant 4	MIMO
LTE	Band 14	23.00	23.00	26.00
	Band66	23.00	23.00	26.00
NB-IOT	Band66	23.00	23.00	26.00

4. RF Exposure Limit Introduction

According to ANSI/IEEE C95.1-1992, the criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radio frequency (RF) radiation as specified in §1.1310.

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm ²)	Averaging time (minutes)
(A) Limits for Occupational/Controlled Exposures				
0.3-3.0	614	1.63	*(100)	6
3.0-30	1842/f	4.89/f	*(900/f ²)	6
30-300	61.4	0.163	1.0	6
300-1500			f/300	6
1500-100,000			5	6
(B) Limits for General Population/Uncontrolled Exposure				
0.3-1.34	614	1.63	*(100)	30
1.34-30	824/f	2.19/f	*(180/f ²)	30
30-300	27.5	0.073	0.2	30
300-1500			f/1500	30
1500-100,000			1.0	30

The MPE was calculated at 20 cm to show compliance with the power density limit.

The following formula was used to calculate the Power Density:

$$S = \frac{PG}{4\pi R^2}$$

Where:

S = Power Density

P = Output Power at Antenna Terminals

G = Gain of Transmit Antenna (linear gain)

R = Distance from Transmitting Antenna



5. Radio Frequency Radiation Exposure Evaluation

5.1. Standalone Power Density Calculation

Band		Frequency (MHz)	Antenna Gain (dBi)	Maximum Power (dBm)	Maximum EIRP (dBm)	Maximum EIRP (W)	Average EIRP (mW)	Power Density at 20cm (mW/cm ²)	Limit (mW/cm ²)	Power Density / Limit
SISO	LTE Band 2	1932.5	3.20	24.00	27.200	0.525	524.807	0.104	1.000	0.104
	LTE Band 14	760.5	1.20	23.00	24.200	0.263	263.027	0.052	0.507	0.103
	LTE Band 66	2112.5	2.90	23.00	25.900	0.389	389.045	0.077	1.000	0.077
MIMO	LTE Band 2	1932.5	6.21	27.00	33.210	2.094	2094.112	0.417	1.000	0.417
	LTE Band 14	760.5	4.21	26.00	30.210	1.050	1049.542	0.209	0.507	0.412
	LTE Band 66	2112.5	5.91	26.00	31.910	1.552	1552.387	0.309	1.000	0.309
NB-IOT	LTE Band 2	1935	6.21	26.00	32.210	1.663	1663.413	0.331	1.000	0.331
	LTE Band 66	2115	5.91	26.00	31.910	1.552	1552.387	0.309	1.000	0.309

Note:

1. For conservativeness, the lowest frequency of each band is used to determine the MPE limit of that band.
2. Chose the maximum power to do MPE analysis.

**5.2. Collocated Power Density Calculation**

WWAN LTE B2 Power Density / Limit	WWAN LTE B14 Power Density / Limit	Σ (Power Density / Limit) of WWAN+WWAN (CA_2A-14A)
0.104	0.103	0.207
WWAN LTE B2 Power Density / Limit	WWAN LTE B66 Power Density / Limit	Σ (Power Density / Limit) of WWAN+WWAN (CA_2A-66A)
0.104	0.077	0.181

Note:

1. The device supports inter-band uplink carrier aggregation for 2A-66A and 2A-14A.
2. Σ (Power Density / Limit): This is a summation of [(power density for each transmitter/antenna included in the simultaneous transmission)/ (corresponding MPE limit)], for inter band CA uplink, summed the single LTE together.
3. The aggregated (power density /limit) is smaller than 1, and MPE of 2 collocated transmitters is compliant.

Conclusion:

According to 47 CFR §2.1091, the RF exposure analysis concludes that the RF Exposure is FCC compliant.

-----THE END-----