

Report No.: KSCR220700126703

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## 1 Cover Page

# RF MPE REPORT

**Application No.:** KSCR2207001267AT **FCC ID:** 2ADZR5G1801WA

Applicant: Nokia Shanghai Bell Co., Ltd.

Address of Applicant: 388#, Ningqiao Road, China (Shanghai) Pilot Free Trade Zone, Shanghai

201206, China

Manufacturer: Nokia Solutions and Networks Oy
Address of Manufacturer: Karakaari 7 02610 Espoo Finland

**Equipment Under Test (EUT):** 

**EUT Name:** Nokia FastMile 5G Gateway 2

**Model No.:** 5G18-01W-A

Standard(s): FCC Rules 47 CFR §2.1091

KDB 447498 D01 V06

**Date of Receipt:** 2022-07-22

**Date of Test:** 2022-07-30 to 2022-09-13

**Date of Issue:** 2022-09-13

Test Result: Pass\*

Eric Lin EMC Lab Manager

Tom fin



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<sup>\*</sup> In the configuration tested, the EUT complied with the standards specified above.



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Revision Record							
Version Description Date Remark							
00	Original	2022-09-26	/				

Authorized for issue by:		
	Damon zhou	
	Damon Zhou / Project Engineer	
	Eria Li	
	Eric Lin / Reviewer	



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## 3 General Information

### 3.1 General Description of E.U.T.

AC/DC Adapter 1:

Model: ADS-24FUA-12B 12024EPCU
Input: 100-240V~50/60Hz 0.7A MAX
Output: DC 12V 2.0A
AC/DC Adapter 2:
Model: RD1202000-C55-154MG
Input: 100-240V~50/60Hz 1.0A MAX
Output: DC 12V 2.0A

3.2 Technical Specifications

Hardware Version:	3TG0224	3TG02241Bxxx (x:A~Z)						
Software Version:	5GGW2-	OMNI-2_D2203	300B31T0301E0133					
Sample Type:	Mobile pr	oduction						
	ANT	Type	MPN of 1 <sup>st</sup> source	MPN of 2 <sup>nd</sup> source				
Antenna Type:	Ant 0	Monopole	VT-LMH-0	N66NKACM-PK1- LG1X110BUR2				
	Ant 1	Monopole	VT-LMH-1	N66NKACN-PK1- LB1X160BUR2				
	Ant 2	Monopole	VT-MH-2	N65NKACC-PK1- LR1X120BU				
	Ant 3	Dipole	VT-MH-3	N65NKACD-PK1- LA1X55BU				
	W1	Dipole	VT-WF-1	N03NKACE-PK1- LE1X90BUR1				
	W2	W2 Dipole VT-WF-2 N03NKACF-PK1 LW1X120BUR3						
	Note: The customer provides two antennas of the same specification and type but with different manufacturers							
Extreme temp. Tolerance:	-30°C to +55°C							
Extreme vol. Limits:	10.8V DC	to 13.2V DC (	nominal: 12V DC)					



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### 3.2.1 WiFi 2.4GHz

Operation Frequency:	802.11b/g/n(HT20)/ax(HE20): 2412MHz to 2462MHz						
Operation Frequency.	802.11n(HT40)/ax(HE40): 2422MHz to 2452MHz						
	802.11b: DSS	SS (CCK, D	QPSK, DBP	SK),			
Modulation Type:	802.11g/n: OI	FDM (64Q <i>i</i>	AM, 16QAM,	QPSK, BPSK)			
	802.11ax: OF	DM (BPS	K, QPSK, 16	6QAM, 64QAM, 256	6QAM)		
Channel Spacing:	5MHz						
Number of Channels:	802.11b/g/n(HT20): 11, 802.11n(HT40):7						
Adaptive Type:	LBE under LBT based DAA						
		TX Antenna gain (dBi)					
	Frequency (MHz)	W1	W2	Non- Beamforming gain	Beamforming gain		
Antenna Gain:	2412	5	5	5	6.2		
	2442	5.5	5.3	5.5	6.6		
	2472	4.4	5.4	5.4	5.7		
	Provided by the	he manufa	cturer				

#### Note:

The antenna gain value is provided by the customer. The test lab will not be responsible for wrong test result due to incorrect information about antenna gain values.



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### 3.2.2 WiFi 5GHz

Operation Fraguency	U-NII-1: 5180-5240MHz						
Operation Frequency:	U-NII-3: 5745-5825MHz						
	802.11a: OFDM (64QAM, 16QAM, QPSK, BPSK)						
Modulation Type:	802.11n: OF	OM (BPSK, QPS	SK, 16QAM, 64	QAM)			
Modulation Type:	802.11ac: OF	DM (BPSK, QF	PSK, 16QAM, 6	4QAM, 256QAI	M)		
	802.11ax: OF	DM (BPSK, C	PSK, 16QAM,	64QAM, 256Q	AM)		
	802.11a/n20/a	ac20/ax20: 20M	1Hz				
Channel Spacing:	802.11n40/ad	40/ax40: 40MH	lz				
	802.11ac80/ax80: 80MHz						
Adaptive Type:	LBE under LE	BT based DAA					
		TX Antenna gain (dBi)					
	Frequency (MHz)	W1	W2	Non- Beamformin g gain	Beamformin g gain		
	5180	3.9	4.9	4.9	6.1		
Antenna Gain:	5240	4.4	5.4	5.4	6.2		
	5320	4.4	5.4	5.4	5.8		
	5700	5.2	5.4	5.4	6		
	5825	5.7	4.8	5.7	6.5		
	Provided by the	he manufacture	r				

#### Note:

The antenna gain value is provided by the customer. The test lab will not be responsible for wrong test result due to incorrect information about antenna gain values.



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### 3.2.3 LTE

LTE Operation Frequency Band:	LTE Band 2,4,5,7,25,26,38,41,42,66
LTE Modulation Type:	QPSK,16QAM,64QAM,256QAM
Antenna Gain:	Band 2: 5.1dBi (Provided by the manufacturer) Band 4: 5.4dBi (Provided by the manufacturer) Band 5: 3.9dBi (Provided by the manufacturer)s Band 7: 4.8dBi (Provided by the manufacturer) Band 25: 5.1dBi (Provided by the manufacturer) Band 26: 3.9dBi (Provided by the manufacturer) Band 38: 5.2dBi (Provided by the manufacturer) Band 41: 5.3dBi (Provided by the manufacturer) Band 42: 8dBi (Provided by the manufacturer) Band 66: 5.4dBi (Provided by the manufacturer)
LTE CA Band under	CA_7C, CA_5A-66A, CA_4A-5A, CA_4A-7A, CA_2A-4A, CA_2A-7A,
test	CA_2A-41A, CA_2A-66A, CA_25A-41A, CA_2A-38A

#### Note:

The antenna gain value is provided by the customer. The test lab will not be responsible for wrong test result due to incorrect information about antenna gain values.

### 3.2.4 5GNR

5GNR Operation Frequency Band:	n2, n5, n7, n25, n38, n41, n66, n78
5GNR Modulation	DFTs-OFDM: BPSK\QPSK\16QAM\64QAM\256QAM
Type:	CP-OFDM: QPSK\16QAM\64QAM\256QAM
SCS information:	15/30KHz
	N2: 5.1dBi (Provided by the manufacturer)
	N5: 3.9dBi (Provided by the manufacturer)
	N7: 4.8dBi (Provided by the manufacturer)
A - 1 O - ' -	N25: 5.1dBi (Provided by the manufacturer)
Antenna Gain:	N38: 6.4dBi (Provided by the manufacturer)
	N41: 6.4dBi (Provided by the manufacturer)
	N66: 5.4dBi (Provided by the manufacturer)
	N78: 8dBi (Provided by the manufacturer)
LTE CA Band under	CA_7C, CA_5A-66A, CA_4A-5A, CA_4A-7A, CA_2A-4A, CA_2A-7A,
test	CA_2A-41A, CA_2A-66A, CA_25A-41A, CA_2A-38A
	DC_66A_n78, DC_7A_n78A, DC_2A_n78A, DC_5A_n78A, DC_38A_n78A,
	DC_66A_n7A, DC_5A_n38A, DC_2A_n38A, DC_26A_n38A,
	DC_41A_n38A,DC_66A_n38A, DC_5A_n41A, DC_2A_n41A,
ENDC under test	DC_26A_n41A, DC_66A_n41A, DC_41A_n41A, DC_26A_n78A,
	DC_41A_n78A, DC_7A_n7A, DC_2A_n7A, DC_7A_n2A, DC_2A_n66A,
	DC_5A_n66A, DC_7A_n66A, DC_2A_n2A, DC_66A_n66A, DC_66A_n25A,
	DC_66A_n2A
5GNR CA under test	CA_n38A-n78A, CA_n41A-n78A

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### 3.3 Test Location

All tests were performed at:

Compliance Certification Services (Kunshan) Inc.

No.10 Weiye Rd, Innovation park, Eco&Tec, Development Zone, Kunshan City, Jiangsu, China.

Tel: +86 512 5735 5888 Fax: +86 512 5737 0818

No tests were sub-contracted.

#### Note:

- 1. SGS is not responsible for wrong test results due to incorrect information (e.g., max. internal working frequency, antenna gain, cable loss, etc) is provided by the applicant. (If applicable).
- 2. SGS is not responsible for the authenticity, integrity and the validity of the conclusion based on results of the data provided by applicant. (If applicable).



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### 3.4 Test Facility

The test facility is recognized, certified, or accredited by the following organizations:

#### CNAS

CNAS has accredited Compliance Certification Services (Kunshan) Inc. to ISO/IEC 17025:2017 General Requirements for the Competence of Testing and Calibration Laboratories (CNAS-CL01 Accreditation Criteria for the Competence of Testing and Calibration Laboratories) for the competence in the field of testing.

### A2LA

Compliance Certification Services (Kunshan) Inc. is accredited by the American Association for Laboratory Accreditation (A2LA). Certificate No. 2541.01.

### • FCC

Compliance Certification Services (Kunshan) Inc. has been recognized as an accredited testing laboratory.

Designation Number: CN1172.

#### • ISED

Compliance Certification Services (Kunshan) Inc. has been recognized by Innovation, Science and Economic Development Canada (ISED) as an accredited testing laboratory.

Company Number: 2324E

### VCCI

The 3m and 10m Semi-anechoic chamber and Shielded Room of Compliance Certification Services (Kunshan) Inc. has been registered in accordance with the Regulations for Voluntary Control Measures with Registration No.: R-20134, R-11600, C-11707, T-11499, G-10216 respectively.



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## 4 Test Standards and Limits

### 4.1 FCC Radiofrequency radiation exposure limits:

According to §1.1310, the limit for general population/uncontrolled exposures

Frequency range (MHz)	Electric field strength (V/m)	Magnetic field strength (A/m)	Power density (mW/cm²)	Averaging time (minutes)		
Limits for General Population/Uncontrolled Exposure						
0.3-1.34	614	1.63	*(100)	30		
1.34-30	824/f	2.19/f *(180/f2)		30		
30-300	27.5	0.073	0.2	30		
300-1500	/	/	f/1500	30		
1500-100,000	/	/	1.0	30		



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## 4.2 Maximum transmit power

The Power Data is based on the RF Test Report KSCR220600126701.

MPE Calculation

According to the formula  $S=P/4\pi R^2$ , we can calculate S which is MPE.

Note:

1)P (mW)

2)R = distance to the center of radiation of antenna (in centimeter)

3)MPE limit = 1mW/cm<sup>2</sup>

Test Mode	Frequency Band (MHz)	Max E.I.R.P (dBm)	Operation Distance R(cm)	Power Density (mW/cm²)	Limit of Power Density S(mW/cm²)	Result
LTE Band 2	1910	31.1	23	0.194	1.00	Pass
LTE Band 4	1755	29.9	23	0.147	1.00	Pass
LTE Band 5	849	27.75	23	0.147	0.57	Pass
LTE Band 7	2570	30.8	23	0.181	1.00	Pass
LTE Band 25	1915	31.1	23	0.194	1.00	Pass
LTE Band 26	849	27.75	23	0.147	0.57	Pass
LTE Band 38	2620	31.2	23	0.198	1.00	Pass
LTE Band 41	2690	32.3	23	0.255	1.00	Pass
LTE Band 42 (3450-3550MHz)	3550	30	23	0.150	1.00	Pass
LTE Band 42 (3550-3600MHz)	3600	23	23	0.030	1.00	Pass
LTE Band 66	1780	29.9	23	0.147	1.00	Pass
5G NR n2	1910	31.1	23	0.194	1.00	Pass
5G NR n5	849	27.75	23	0.147	0.57	Pass
5G NR n7	2570	30.8	23	0.181	1.00	Pass
5G NR n25	1915	31.1	23	0.194	1.00	Pass
5G NR n38	2620	32.4	23	0.261	1.00	Pass
5G NR n41	2690	32.9	23	0.261	1.00	Pass
5G NR n66	1780	29.9	23	0.147	1.00	Pass
5G NR n78 (3450-3550MHz)	3550	30	23	0.150	1.00	Pass
5G NR n78 (3550-3700MHz)	3700	23	23	0.030	1.00	Pass
WIFI 2.4G	2483.5	33.2	23	0.314	1.00	Pass
U-NII-1	5250	33.2	23	0.314	1.00	Pass
U-NII-3	5850	34.5	23	0.424	1.00	Pass

### Note:

For the maximum power of NSA mode is the same as SA total power level, so SA standalone total power level MPE can represent NSA mode MPE.



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#### Simultaneous transmission:

SA+ wifi 2.4GHz + wifi 5GHz/ NSA (LTE+ 5GNR)+ wifi 2.4GHz + wifi 5GHz

Wireless Configure	Frequency Range (MHz)	Maximum EIRP (dBm)	Limit of Power Density S(mW/cm2)	Power Density S at R = 23 cm (mW/cm2)	Ratio	Limit
5G NR	2690	32.9	1.0	0.261		
WIFI 2.4G	2483.5	33.2	1.0	0.314	0.999	1
WIFI 5G	5850	34.5	1.0	0.424		

### LTE+ wifi 2.4GHz + wifi 5GHz

Wireless Configure	Frequency Range (MHz)	Maximum EIRP (dBm)	Limit of Power Density S(mW/cm2)	Power Density S at R = 23 cm (mW/cm2)	Ratio	Limit
LTE	2690	32.3	1.0	0.255		
WIFI 2.4G	2483.5	33.2	1.0	0.314	0.993	1
WIFI 5G	5850	34.5	1.0	0.424		

### Note:

For the maximum power of NSA mode is the same as SA total power level, so SA standalone total power level MPE can represent NSA mode MPE.

The EUT support simultaneously transmit with:

- (1) 5GNR+ wifi 2.4GHz + wifi 5GHz
- (2) LTE+ wifi 2.4GHz + wifi 5GHz
- (3) ENDC (LTE+ 5GNR)+ wifi 2.4GHz + wifi 5GHz

According to the KDB447498 section 7.2 determine the device is exclusion from SAR test.

--End of the Report--



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