

Report No.: SUCR240300006905
Rev.: 01
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TEST REPORT

Application No.: SUCR2403000069TL
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
EUT Description: FastMile 5G mmWave Receiver
Model No.: 5Gmm28-B
Trade Mark: Nokia
FCC ID: 2ADZR5GMM28B
Standards: 47 CFR Part 2.1091
FCC KDB 447498 D01 v06
Date of Receipt: 2024/03/27
Date of Issue: 2024/07/24

Test Result:	PASS*
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* In the configuration tested, the EUT complied with the standards specified above.

Authorized Signature:



Cloud Peng
Technical Manager



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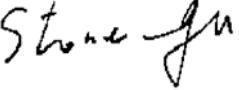
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1 Version

Revision Record

Version	Chapter	Date	Modifier	Remark
01		2024/07/24		Original

Prepared By	
	(Nick Hu) / Test Engineer
Checked By	
	(Stone Gu) / Reviewer



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2 General Information

2.1 Client Information

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

2.2 Test Facility

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

• **A2LA (Certificate No. 6336.01)**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. is accredited by the American Association for Laboratory Accreditation(A2LA). Certificate No. 6336.01.

• **Innovation, Science and Economic Development Canada**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. has been recognized by ISED as an accredited testing laboratory.

CAB identifier: CN0120.

IC#: 27594.

• **FCC –Designation Number: CN1312**

SGS-CSTC STANDARDS TECHNICAL SERVICES (SUZHOU) CO., LTD. has been recognized as an accredited testing laboratory.

Designation Number: CN1312.

Test Firm Registration Number: 717327

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2.3 General Description of EUT

EUT Description:	FastMile 5G mmWave Receiver			
Model No.:	5Gmm28-B			
Trade Mark:	Nokia			
Hardware Version:	3TG02974Axxx(x:A~Z)			
Software Version:	5GmmReceiver-360-1_D240200BieT0601E0600			
Power Supply:	54VDC			
Antenna Type:	Description	Tpye	Vendor_1	Vendor_2
	ANT0	Internal Antenna	0	SPD A-0
	ANT1		1	SPD A-1
	ANT2		2	SPD A-2
	ANT3		3	SPD A-3
	ANT4		4 GPS	SPD 4-GPS
	ANT6		6	SPD A-6
	ANT8		8	SPD A-8
	ANT9		9	SPD A-9
	ANT T		T	SPD A-T
Note:				
EUT 1 corresponding to Vendor_1, and EUT 2 corresponding to Vendor_2.				
Antenna Gain:	LTE Band 2:	2.6dBi	LTE Band 4:	2.3dBi
	LTE Band 5:	2dBi	LTE Band 7:	3dBi
	LTE Band 12:	0.35dBi	LTE Band 13:	0.8dBi
	LTE Band 25:	2.8dBi	LTE Band 26:	2dBi
	LTE Band 38:	3dBi	LTE Band 41:	3.2dBi
	LTE Band 42:	3.5dBi	LTE Band 48:	3.4dBi
	LTE Band 66:	2.5dBi	LTE Band 71:	0.2dBi
	NR Band n2:	2.6dBi	NR Band n5:	2dBi
	NR Band n7:	3dBi	NR Band n12:	0.35dBi
	NR Band n25:	2.8dBi	NR Band n26:	2dBi
	NR Band n38:	2.2dBi	NR Band n41:	3.4dBi
	NR Band n48:	3.4dBi	NR Band n66:	2.5dBi
	NR Band n71:	0.2dBi	NR Band n77:	3.7dBi
	NR Band n258:	25dBi	NR Band n260:	25dBi
	NR Band n261:	25dBi	Bluetooth:	3.85dBi



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NR Band n38 MIMO:	1.4dBi	NR Band n41 MIMO:	1.4dBi
NR Band n48 MIMO:	2.2dBi	NR Band n77 MIMO:	2.2dBi
<p>LTE UL CA:</p> <p>LTE CA_48C;</p> <p>CA_2A-5A; CA_2A-12A; CA_2A-71A; CA_4A-5A; CA_4A-12A; CA_66A-71A</p> <p>EN-DC FR1:</p> <p>DC_2A_n41a;DC_2A_n66A;DC_2A_n71A; DC_66A_n41A; DC_66A_n71A</p> <p>FR1 CA:</p> <p>CA_n71A-n77A;CA_n66A-n77A;CA_n2A-n77A;CA_n5A-n77A;CA_n66A-n71A;</p> <p>CA_n48A-n66A;CA_n48A-n71A;CA_n25A-n41A;CA_n41A-n66A;CA_n25A-n77A;</p> <p>ENDC FR2:</p> <p>DC_2A_n261A;DC_5A_n261A;DC_66A_n261A;DC_2A_n260A;DC_66A_n260A;</p> <p>DC_12A_n260A;DC_12A_n261A;DC_5A_n258A;DC_12A_n258A;DC_66A_n258A;</p> <p>DC_48A_n260A;DC_71A_n258A;DC_2A_n258A</p> <p>FR1+FR2 DC:</p> <p>DC_n66A-n260A;DC_n66A-n261A;DC_n77A-n260A;DC_n77A-n261A;</p> <p>DC_n48A-n260A;DC_n48A-n261A;DC_n25A-n258A;DC_n25A-n260A;</p> <p>DC_n25A-n261A;DC_n41A-n258A;DC_n41A-n260A;DC_n41A-n261A;</p> <p>DC_n66A-n258A;</p>			
<p>Note:</p> <p>The antenna gain are derived from provided by the manufacturer.</p>			

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3 RF Exposure Evaluation

3.1 RF Exposure Compliance Requirement

3.1.1 Limits

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

F=frequency in MHz

*=Plane-wave equivalent power density

RF exposure compliance will need to be determined with respect to 1.1307(c) and (d) of the FCC rules. The emissions should be within the limits at 300kHz in Table 1 of 1.1310(use the 300kHz limits for 150kHz:614V/m,1.63A/m).

Friis Formula

Friis transmission formula: $P_d = (P_{out} \cdot G) / (4 \cdot \pi \cdot R^2)$

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

Pd is the limit of MPE, 1 mW/cm². If we know the maximum gain of the antenna and the total power input to the antenna, through the calculation, we will know the distance r where the MPE limit is reached.



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3.1.2 Test Procedure

Software provided by client enabled the EUT to transmit data at lowest, middle and highest channel individually

3.1.3 EUT RF Exposure Evaluation

The MPE was calculated at 51cm to show compliance with the power density limit.

This confirmed that the device comply with MPE limit.

Operating Band	Frequency (MHz)	Duty cycle	Antenna Gain (dBi)	Max Conducted Power (dBm)	Calculate EIRP (dBm)	Average EIRP(ERP) (mW)	Power Density at R = 51 cm (mW/cm ²)	Limit (mW/cm ²)	conclusion
LTE B2	1850.7	100%	2.60	25.00	27.60	575.44	0.0176	1.0000	Pass
LTE B4	1710.7	100%	2.30	25.00	27.30	537.03	0.0164	1.0000	Pass
LTE B5	824.7	100%	2.00	25.00	27.00	501.19	0.0153	0.5498	Pass
LTE B7	2502.5	100%	3.00	24.50	27.50	562.34	0.0172	1.0000	Pass
LTE B12	699.7	100%	0.35	25.00	25.35	342.77	0.0105	0.4665	Pass
LTE B13	779.5	100%	0.80	25.00	25.80	380.19	0.0116	0.5197	Pass
LTE B25	1850.7	100%	2.80	25.00	27.80	602.56	0.0184	1.0000	Pass
LTE B26(814-824)	814.7	100%	2.00	25.00	27.00	501.19	0.0153	0.5431	Pass
LTE B26(824-849)	824.7	100%	2.00	25.00	27.00	501.19	0.0153	0.5498	Pass
LTE B38	2572.5	25%	3.00	24.00	20.98	125.30	0.0153	1.0000	Pass
LTE B41	2498.5	25%	3.20	25.00	22.18	165.17	0.0202	1.0000	Pass
LTE B42	3452.5	25%	3.50	24.50	21.98	157.74	0.0193	1.0000	Pass
LTE B48/48C	3552.5	25%	3.40	19.60	16.98	49.88	0.0061	1.0000	Pass
LTE B66	1710.7	100%	2.50	25.00	27.50	562.34	0.0172	1.0000	Pass
LTE B71	665.5	100%	0.20	24.50	24.70	295.12	0.0090	0.4437	Pass
NR Band n2	1852.5	100%	2.60	24.50	28.10	645.65	0.0157	1.0000	Pass
NR Band n5	826.5	100%	2.00	24.50	27.50	562.34	0.0137	0.5510	Pass
NR Band n7	2502.5	100%	3.00	24.50	28.50	707.95	0.0172	1.0000	Pass
NR Band n12	701.5	100%	0.35	24.50	25.85	384.59	0.0093	0.4677	Pass
NR Band n25	1852.5	100%	2.80	24.50	28.30	676.08	0.0164	1.0000	Pass
NR Band n26 (814-824)	816.5	100%	2.00	24.50	27.50	562.34	0.0137	0.5443	Pass
NR Band n26 (824-849)	826.5	100%	2.00	24.50	27.50	562.34	0.0137	0.5510	Pass
NR Band n38	2580.0	25%	2.20	24.50	26.95	495.45	0.0143	1.0000	Pass
NR Band n38 (MIMO)	2580.0	25%	1.40	24.50	26.15	412.10	0.0119	1.0000	Pass
NR Band n41	2506.0	25%	3.40	26.50	30.15	1035.14	0.0299	1.0000	Pass

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NR Band n41 (MIMO)	2506.0	25%	1.40	28.50	30.15	1035.14	0.0299	1.0000	Pass
NR Band n48	3560.0	25%	3.40	19.40	23.05	201.84	0.0058	1.0000	Pass
NR Band n48 (MIMO)	3560.0	25%	2.20	19.40	21.85	153.11	0.0044	1.0000	Pass
NR Band n66	2112.5	100%	2.50	24.50	28.00	630.96	0.0153	1.0000	Pass
NR Band n71	665.5	100%	0.20	24.00	25.20	331.13	0.0080	0.4437	Pass
NR Band n77 (3450-3550)	3460.0	25%	3.70	26.00	29.95	988.55	0.0286	1.0000	Pass
NR Band n77 (3450-3550)(MIMO)	3460.0	25%	2.20	24.50	26.95	495.45	0.0143	1.0000	Pass
NR Band n77 (3700-3980)	3710.0	25%	3.70	26.00	29.95	988.55	0.0286	1.0000	Pass
NR Band n77 (3700-3980)(MIMO)	3710.0	25%	2.20	24.50	26.95	495.45	0.0143	1.0000	Pass
FR2 n258-a	24275.0	25%	25.00	51.00	44.98	31477.48	0.9629	1.0000	Pass
FR2 n258-b	24775.0	25%	25.00	51.00	44.98	31477.48	0.9629	1.0000	Pass
FR2 n260	37025.0	25%	25.00	51.00	44.98	31477.48	0.9629	1.0000	Pass
FR2 n261	27525.0	25%	25.00	51.00	44.98	31477.48	0.9629	1.0000	Pass
BLE	2402.0	100%	3.85	4.00	8.85	7.67	0.0001	1.0000	Pass

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Due to the EUT support NR ENDC and CA

Both LTE and NR/LTE band can transmit simultaneously, the formula of the calculated the MPE is:

$$\sum_{i=1}^n \frac{S_{E_i} \text{ (duty factor)}}{MPE_{E_i}} < 1$$

NOTE The corresponding MEs must be expressed in terms of power density in the above summation
Therefore, the worst-case(;DC_5A_n258A;) situation is $0.0279+0.9629=0.9908$, which is less than "1",
this confirmed that the device comply with MPE limit.



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3.1.4 Exposure calculations for multiple sources

To ensure compliance with the MPE for a controlled environment, the sum of the ratios of the power density to the corresponding MPE should not exceed unity. That is

$$\sum_{i=1}^n \frac{S_i}{MPE_i} \leq 1$$

The product also has multiple transmitters. The Simultaneous Transmission Possibilities are as below:

Simultaneous Tx Combination	Configuration
1	WWAN+BLE

No.	Mode	Power Density (mW/cm ²)	MPE Limit (mW/cm ²)	Result Ratio	Total Ratio	Limit	Result
1	FR2 n258-a	0.9629	1.0000	0.9629	0.9630	1.00	Pass
	Bluetooth BLE	0.0001	1.0000	0.0001			

---End of Report---



SGS-CSTC Standards Technical Services (Suzhou) Co., Ltd.
Wireless Laboratory

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