





RF Exposure Evaluation Declaration

FCC ID: 2AD8UAWHQN01
Applicant: Nokia Solutions and Networks, OY

Application Type: Certification
Product: AirScale Micro RRH
Model No.: AWHQN
Brand Name: Nokia
Test Procedure(s): KDB 447498 D01v06

Reviewed By: 
Paddy Chen
Approved By: 
Chenz Ker



The test results relate only to the samples tested.

The test results shown in the test report are traceable to the national/international standards through the calibration of the equipment and evaluated measurement uncertainty herein.

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Revision History

Report No.	Version	Description	Issue Date	Note
2201TW0001-U2	Rev. 01	Initial Report	02-09-2022	Valid

General Information

Applicant:	Nokia Solutions and Networks, OY
Applicant Address:	2000 W. Lucent Lane, Naperville, Illinois, United States, 60563
Manufacturer:	Nokia Solutions and Networks, OY
Manufacturer Address:	2000 W. Lucent Lane, Naperville, Illinois, United States, 60563
Test Site:	MRT Technology (Taiwan) Co., Ltd
Test Site Address:	No. 38, Fuxing Second Rd., Guishan Dist., Taoyuan City 333, Taiwan (R.O.C)


Test Facility / Accreditations

Measurements were performed at MRT Laboratory located in Fuxing Rd., Taoyuan, Taiwan (R.O.C)

- MRT facility is a FCC registered (Reg. No. 153292) test facility with the site description report on file and is designated by the FCC as an Accredited Test Film.
- MRT facility is an IC registered (MRT Reg. No. 21723-1) test laboratory with the site description on file at Industry Canada.
- MRT Lab is accredited to ISO 17025 by the American Association for Laboratory Accreditation (TAF) under the American Association for Laboratory Accreditation Program (TAF Cert. No. 3261) in EMC, Telecommunications and Radio testing for FCC, Industry Taiwan, EU and TELEC Rules.

1. PRODUCT INFORMATION

1.1. Equipment Description

Product Name	AirScale Micro RRH
Model No.	AWHQN
Brand Name	Nokia
Test Device Serial No.	EB2144R0553
Operating Band (s)	5G NR: n77
Power Supply Rating	48Vdc or AC to DC Adapter
Accessories	
AC to DC Adapter	Model: BLP0554FPXXXZ01A Input: 100-240V ~ 50/60Hz, 7.0A Output: 54V  9.3A
The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.	

1.2. Antenna Information

Band Support	Antenna Type	Nokia Code	Antenna Gain
n77	Directional Antenna (Internal)	P567454	14.5dBi
Remark: 1. The transmit signals are completely uncorrelated with each other, directional gain = G_{ANT} dBi, G_{ANT} is the antenna gain in dBi; 2. The information of EUT was provided by the manufacturer, and the accuracy of the information shall be the responsibility of the manufacturer.			

1.3. EIRP Test Result

Test Engineer	Peter Xu	Test Site	SR2
Test Date	2021/12/20 ~ 2022/01/08	Test Configuration	n77
Test Item	EIRP (Reported only)		

Frequency (MHz)	Channel BW (MHz)	Output Power (dBm)				Total Power (dBm)	EIRP (dBm)
		Ant 1	Ant 2	Ant 3	Ant 4		
QPSK							
3720.00	40	42.86	43.44	43.46	43.27	49.28	63.78
3750.00	40	42.56	43.07	43.18	42.96	48.97	63.47
3780.00	40	42.48	43.09	43.10	42.97	48.94	63.44
3750.00	100	42.78	43.32	43.36	43.16	49.18	63.68
16QAM							
3720.00	40	42.84	43.33	43.36	43.18	49.20	63.70
3750.00	40	42.82	43.45	43.51	43.37	49.32	63.82
3780.00	40	42.00	43.10	43.28	43.09	48.92	63.42
3750.00	100	42.73	43.29	43.32	43.21	49.16	63.66
64QAM							
3720.00	40	42.49	43.44	43.47	43.25	49.20	63.70
3750.00	40	42.97	43.55	43.57	43.46	49.41	63.91
3780.00	40	42.61	43.22	43.27	43.15	49.09	63.59
3750.00	100	42.69	43.28	43.29	43.15	49.13	63.63
256QAM							
3720.00	40	42.77	43.49	43.48	43.20	49.27	63.77
3750.00	40	42.67	43.30	43.31	43.22	49.15	63.65
3780.00	40	42.60	43.13	43.20	43.14	49.04	63.54
3750.00	100	42.62	43.33	43.33	43.26	49.17	63.67
Note 1: Total Power (dBm) = 10*log*{10^[ANT 1 Power (dBm) / 10] + 10^[ANT 2 Power (dBm) / 10] + 10^[ANT 3 Power (dBm) / 10] + 10^[ANT 4 Power (dBm) / 10]} (dBm).							
Note 2: EIRP (dBm) = Total Power (dBm) + Antenna Gain (dBi)							

2. RF Exposure Evaluation

2.1. Limits

According to FCC 1.1310: The criteria listed in the following table shall be used to evaluate the environment impact of human exposure to radio frequency (RF) radiation as specified in 1.1307(b)

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 Exposures				
300-1500	--	--	f/1500	6
1500-100,000	--	--	1	30

f= Frequency in MHz

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

P_d is the limit of MPE, 1mW/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.

2.2. Test Result of RF Exposure Evaluation

Product	AirScale Micro RRH
Test Item	RF Exposure Evaluation

Test Mode	Frequency Band (MHz)	Maximum EIRP (dBm)	Tune up factor (dB)	Compliance Distance (cm)	Power Density (mW/cm ²)	Limit of Power Density (mW/cm ²)
Uncontrolled Environment						
n77	3700 ~ 3800	64.50	1.0	480	0.9734	1
Controlled Environment						
n77	3700 ~ 3800	64.50	1.0	220	4.6339	5

2.3. Summary of Test Result

The wireless device described within this report has been shown to be capable of compliance with 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 specifications

Configuration	Required Compliance Boundary (cm)	
	Uncontrolled Environment	Controlled Environment
n77	480	220