EXHIBIT 13

RF EXPOSURE ASSESSMENT

Section 27.52 RF Exposure Requirement

Licensees and manufacturers are subject to the radio frequency radiation exposure requirements specified in sections 1.1307(b), 2.1091, and 2.1093 of this chapter, as appropriate. Technical information showing the basis for this statement must be submitted to the Commission upon request.

Section 1.1307 (b) Environmental Assessment Requirement for Equipment Authorization

Commission actions granting construction permits, licenses to transmit or renewals thereof, equipment authorizations or modifications in existing facilities, require the preparation of an Environmental Assessment (EA) if the particular facility, operation or transmitter would cause human exposure to levels of radiofrequency radiation in excess of the limits in §§ 1.1310 and 2.1093 of this chapter.

Response

The RF exposure assessment report is attached.

Global Product Compliance Laboratory
600-700 Mountain Avenue
Room 5B-108
Murray Hill, New Jersey 07974-0636 USA

RF Exposure Assessment Report

(FCC ID: 2AD8UAWHKB01)

Regulation

47 CFR FCC Sections 1.1307 and 1.1310

Client

Nokia Solutions and Networks Oy

Product Evaluated

Nokia AirScale Micro RRH AWHKB 4T4R B24/n24 8W

GPCL Report Number
TR2022-0083 MPE

Date Issued
August 10, 2022

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Revisions

Date	Revision	Section	Change
8/10/2022	0		Initial
12/19/2020	1	3.2	Changed maxi ant gain to the maxi ant gain - cable loss allowed.

The results documented in this report refer exclusively to the product specified, under the conditions and modes of operation as described herein.

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1. ATTESTATION OF TEST RESULTS

Company Name (Manufacturer)	Nokia Solutions and Network, OY 2000 W. Lucent Lane Naperville, IL 60563
FCC ID	2AD8UAWHKB01
Product Name	AirScale Micro RRH AWHKB B24/n24 4T4R 8W
Model Name	AWHKB
Test Requirement(s)	47 CFR FCC Sections 25.149, 1.1307 and 1.1310
Other Reference(s)	FCC OET Bulletin 65, KDB 447498 D01
Frequency Band	E-UTRAN B24, NR n24: 1526-1536MHz (DL) 1627.5-1637.5 MHz/1646.5-1656.5 MHz (UL)
Test Report Number	TR2022-0083 MPE
Test Laboratory	Global Product Compliance Laboratory 600-700 Mountain Avenue Room 5B-108 Murray Hill, New Jersey 07974-0636 USA

The above product has been evaluated and found to be in compliance with the Commission's Rules and Regulations set forth in the above standards. The data and the descriptions about the test setup, procedures and configuration presented in this report are accurate.

2. SUMMARY OF THE TEST RESULTS

Applied Standard(s): FCC 1.1310		
Configuration	**Exposure Environement**	**Proposed RF Safety Distance (cm)**
AWHKB	General Population/Uncontrolled	29
	Occupational/Controlled	20

3. GENERAL INFORMATION

3.1 Product Descriptions

The Nokia AirScale AWHKB is a variant of 5G/LTE micro Remote Radio Head (mRRH), operating in B24/n24 with 1526-1536MHz (DL) and 1627.5-1637.5 MHz/1646.5-1656.5 MHz (UL), under the regulations of FCC Title 47 Part 25, Satellite Communications. It supports LTE and NR technologies, 5MHz and 10MHz carriers and 4xMIMOs with 2W per port.

FCC 20-48 Order and Authorization specified that Ligado's ATC base stations operating in the 1526-1536 MHz band shall not exceed an EIRP of 9.8 dBW (10 W) with a +/- 45 degree cross-polarized base station antenna for downlink power level in Section II(H)(2).

The AWHKB has external antennas. The AWHKB is typically installed on poles or walls in fixed locations. Therefore, AWHKB is neither a portable nor a mobile wireless device. The specifications of AWHKB with their antennas are provided below:

Table 3.1.1 Product Specifications on AWHKB

Product	Technologies	Transmitting Frequency (MHz)	Max Output Power EIRP (W)
AWHKB	LTE/NR, 5/10MHz BW, Q16/64/256QAM	1526-1536	10

3.2 Antenna Information

The information on the antennas to be used by EUT is given below:

Table 3.2.1 Antenna Data from Manufacturers

Ant	Ant Type	Max Gain* (dBi)
1	Directional, ±45° Cross-polarized	16.0

*The 25.253(d)(8) specified that a peak antenna gain including cable loss allowed is 16 dBi.

4. REQUIRED EVALUATION AND RESULTS

4.1 Regulatory Requirements

The assessment in this report was performed for AWHKB mRRH, operatng in 1.5GHz b24/n24.

The regulatory requirements for the RF exposure compliance of RF transceivers were specified in 47 CFR FCC Parts 25 and 1.

The FCC 25.149 and 1.1310 sets out the requirements and measurement techniques used to evaluate RF exposure compliance of radiocommunication apparatus.

I. FCC Section 25.149(a)(5) and 25.149 (c)(3) RF Exposure Requirements

FCC Section 25.149(a)(5) stated that ATC base stations and mobile terminals shall comply with FCC Part 1, Subpart I - Procedures Implementing the National Environmental Policy Act of 1969, including the guidelines for human exposure to radio frequency electromagnetic fields as defined in 1.1307(b) and 1.1310 for PCS networks.

FCC Section 25.149(c)(3) stated that Licensees and manufacturers shall ensure compliance with the Commission's radio frequency exposure requirements in 1.1307(b), 2.1091, and 2.1093, as appropriate. Applications for equipment authorization of mobile or portable devices operating under this section must contain a statement confirming compliance with these requirements. Technical information showing the basis for this statement must be submitted to the Commission upon request.

II. FCC Section 1.1307(b) Evaluation Environmental Assessment Requirement for Equipment Authorization

Commission actions granting construction permits, licenses to transmit or renewals thereof, equipment authorizations or modifications in existing facilities, require the preparation of an Environmental Assessment (EA) if the particular facility, operation or transmitter would cause human exposure to levels of radiofrequency radiation in excess of the limits in FCC Sections 1.1310 and 2.1093.

III. FCC Section 1.1310 Radio Frequency Radiation Exposure Limits

At operating frequencies less than or equal to 6 GHz, the limits for maximum permissible exposure (MPE), derived from whole-body SAR limits and listed in Table 1 of Section 1.1310, may be used instead of whole-body SAR limits to evaluate the environmental impact of human exposure to RF radiation as specified in Section 1.1307(b), except for portable devices as defined in § 2.1093 as these evaluations shall be performed according to the SAR provisions in Section 2.1093 of this chapter.

At operating frequencies above 6 GHz, the MPE limits shall be used in all cases to evaluate the environmental impact of human exposure to RF radiation as specified in Section 1.1307(b).

The MPE limits listed in Table 1 of Section 1.1310 are for continuous exposure, that is, for indefinite time periods. Exposure levels higher than the limits are permitted for shorter exposure times, as long as the average exposure over the specified averaging time in Table 1 is less than the limits. Detailed information regarding procedures for evaluating compliance with all of these exposure limits can be found in the FCC's OET Bulletin 65, “Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields,” and in supplements to Bulletin 65.

The exposure limits specified for occupational/controlled exposure and general population/uncontrolled exposure, which are tabulated below shall be met.

Table 4.1.1 Limits for Occupational/Controlled Exposure and General Population/Uncontrolled Exposure (FCC Section 1.1310 Table 1(B))

Frequency Range (MHz)	Electric Field Strength (E) (V/m)	Magentic Field Strength (H) (A/m)	Power Density (S) (mW/cm^2)	Average Time $\|E\|^2$, $\|H\|^2$ or S (minutes)
(A) Limits for Occupational/Controlled Exposure				
300 - 1500			f/300	6
1500 – 100,000			5.0	6
(B) Limits for General Population/Uncontrolled Exposure				
300 - 1500			f/1500	30
1500 – 100,000			1.0	30

Note: f = frequency in MHz.

4.2 RF Exposure Assessment

The regulatory requirements and limits were provided in Section 4.1. The product specifications on RF transceivers and antennas were provided in Section 3.

The limits at the operation frequencies of transmitters installed in AWHKB Base Station were calculated and provided in Table 4.2.1.

Table 4.2.1 Power Density Limits for Occupational/Controlled Exposure and General Population/Uncontrolled for AWHKB

Environment	Frequency Range (MHz)	Min Power Density (S) (mW/cm^2)
Occupational/Controlled	1526-1536	5
General Population/Uncontrolled	1526-1536	1

Per IEEE C95.3 Annex B Equation (37) or FCC's OST/OET Bulletin Number 65, the appropriate safety distance can be calculated based on the relationship between power density limit and EIRP (equivalent or effective isotopically radiated power), i.e.,

$$S = \frac{EIRP}{4\pi R^2}, \quad (1)$$

where S is the power density in mW/cm^2, R is the distance to the center of radiation of the antenna in cm and EIRP is in mW.

When all transmitters or channels operate simultaneously, the EIRP and thus power density from all transmitters gives the worst-case scenario.

The RF exposure assessment was conducted on the AWHKB base station, where the maximum EIRP allowed is 10W.

Table 4.2.2(a) Minimum RF Safety Distances for AWHKB for Uncontrolled Exposure

AWHKB	Max EIRP (dBm)	Max EIRP (mW)	Limit of Pwr Density S (mW/cm^2)	RF Safety Distance (cm)
1	40	10000	1	28.2

Table 4.2.2(b) Minimum RF Safety Distances for AWHKB for Controlled Exposure

AWHKB	Max EIRP (dBm)	Max EIRP (mW)	Limit of Pwr Density S (mW/cm^2)	RF Safety Distance (cm)
1	40	10000	5	12.6

Since,

$$\frac{S}{LPD} \leq 1,$$

$$\frac{EIRP}{4\pi R^2 \cdot LPD} \leq 1,$$

then

$$R \geq \sqrt{\frac{EIRP}{4\pi \cdot LPD}}. \quad (2)$$

From Equation (2), the minimum distance R = 28.2 cm for uncontrolled exposure and 12.6cm for controlled exposure with the 40dBm EIRP, the maximum allowed.

Table 4.2.3 Power Density at the Minimum RF Safety Distance

Exposure Environment	Max EIRP (dBm)	Max EIRP (mW)	RF Safety Distance (cm)	Power Density S (mW/cm^2)	Limit of Power Density S (mW/cm^2)	S/LPD
Uncontrolled	40	10000	29	0.946	1	0.946
Controlled	40	10000	20	1.989	5	0.398

Therefore,

Table 4.2.4 Proposed RF Safety Distances for AWHKB

Exposure	RF Safety Distance (cm)
General Population/Uncontrolled	29
Occupational/Controlled	20

Only the general population/uncontrolled exposure environment will be considered for UNII devices.

1. REFERENCES

[1]. Title 47 Code of Federal Regulations (CFR) Parts 1, 2 and 15.

[2]. FCC OET Bulletin 65 and Supplements, Evaluating Compliance with FCC Guidelines for Human Exposure to Radiofrequency Electromagnetic Fields, August 1997

[3]. KDB 447498 D01, RF Exposure Procedures and Equipment Authorization Policies for Mobile and Portable Devices, Oct 2015, V06

[4]. IEEE C95.3, IEEE Recommended Practice for Measurements and Computations of Radio Frequency Electromagnetic Fields with Respect to Human Exposure to Such Fields, 100 kHz–300 GHz, 2002 (R2008).

[5]. FCC Order and Authorization 20-48, April 19, 2022