

**EXHIBIT 13****RF EXPOSURE ASSESSMENT****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.

**Section 1.1310 Radio Frequency Radiation Exposure Limits**

The criteria listed in Table 1 shall be used to evaluate the environmental impact of human exposure to radiofrequency (RF) radiation as specified in Section 1.1307(b), except in the case of portable devices which shall be evaluated according to the provisions of § 2.1093 of this chapter. Further information on evaluating compliance with these limits can be found in the FCC's OST/OET Bulletin Number 65, "Evaluating Compliance with FCC-Specified Guidelines for Human Exposure to Radiofrequency Radiation."

**Product Description**

The Nokia **AHCC AirScale RRH 4T4R B26A (AHCC)** is a Remote Radio Head that is typically installed on poles or walls in fixed locations. Therefore, the AHCC is neither a portable nor a mobile wireless device.

The AHCC is part of AirScale Micro RRH Rel5.1 Quasar Program. It is a 2x40W or 4x25W remote RF head designed to support LTE-FDD operation using 1.4 MHz, 3.0 MHz and 5.0 MHz bandwidths with single and multiple carriers. The product supports LTE with QPSK, 16QAM, 64QAM and 256QAM modulations plus NBIoT.

<b>Product:</b>	<b>AHCC AirScale RRH 4T4R B26A</b>
<b>Rated RF Output Power:</b>	100W total from 4xMIMO (The worst case measured output power was 44.42 dBm per port for 4x operation)
<b>Frequency Band:</b>	3GPP band 26A
<b>Down-Link:</b>	862.6 - 869 MHz    Up-link: 817.6 - 824MHz

The AHCC can have either directly-connected omnidirectional stick antennas supplied by Nokia or customer-supplied remote antennas. In this evaluation, only Nokia supplied antennas were evaluated. The customers will be responsible for the RF exposure compliance with installing customer-supplied antennas.

The FCC requires the evaluation and documentation of the environmental impact of human exposure to radiofrequency (RF) radiation as specified in Title 47CFR Section 1.1307(b). The safe distances documented herein are applicable only with the Nokia supplied antenna. The information on Nokia supplied antennas is provided in Table 13.1.

If the product is installed with other antenna(s), then per FCC Rules the RF exposure compliance shall be addressed at the time of licensing, as required by the responsible FCC Bureau(s), including antenna co-location requirements of Part 1.1307(b)(3).

The limits specified in FCC Section 1.1310 Table 1(B) for occupational/controlled exposure and general population/uncontrolled exposure, which are tabulated below in Table 13.2, shall be met.

All of the transmitters installed in the **AHCC AirScale RRH 4T4R B26A (AHCC)** operate in the frequency range of 862.6 MHz – 869.0 MHz. The maximum power density thus needs to be less than 0.579 mW/cm<sup>2</sup> for general population/uncontrolled environment and 2.90 mW/cm<sup>2</sup> for occupational/controlled environment.

Per FCC's OST/OET Bulletin Number 65, the appropriate EIRP (equivalent or effective isotropically radiated power) limits can be calculated based on the relationship between power density and EIRP, i.e.,

$$\text{Power Density} = S = \text{EIRP} / (4\pi R^2)$$

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

When all transmitters operate simultaneously, the EIRP and thus power density from all transmitters gives the worst-case scenario. The worst case measured power was used for the calculations.

**Table 13.1 AHCC Antenna**

Transmitter	Antenna	Model	Antenna Gain (dBi)
AHCC	Directional	Standard 800.0 MHz	Peak: <b>15.0</b>

**Table 13.2 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)	Magnetic Field Strength (H) (A/m)	Power Density (S) (mW/cm <sup>2</sup> )	Average Time  E  <sup>2</sup> ,  H  <sup>2</sup> 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; \*Plane-wave equivalent power density.

**Table 13.3 (a) Minimum RF Safety Distances for Uncontrolled Exposure**

Module	Freq Band (MHz)	Maxi Total $P_{out}$ (4x4) (dBm)	Antenna Gain (dBi)	Maximum Total EIRP (dBm)	Maximum Total EIRP (mW)	Limit of Power Density S (mW/cm <sup>2</sup> )	Minimum RF Safety Distance (cm)
AHCC B26A	869	50.42	15	65.42	3483373.150	0.579	691.9

**Table 13.3 (b) Power Density at the Proposed Minimum RF Safety Distance**

Module	Freq Band (MHz)	Maxi Total $P_{out}$ (4x4) (dBm)	Maxi Antenna Gain (dBi)	Maximum Total EIRP (dBm)	Maximum Total EIRP (mW)	Proposed RF Safety Distance (cm)	Power Density (S) at proposed Distance (mW/cm <sup>2</sup> )
AHCC B26A	869	50.42	15	65.42	3483373.15	700	0.5657

**Table 13.4 (a) Minimum RF Safety Distances for Controlled Exposure**

Module	Freq Band (GHz)	Maxi Total $P_{out}$ (2x2) (dBm)	Antenna Gain	Maximum Total EIRP (dBm)	Maximum Total EIRP (mW)	Limit of Power Density S (mW/cm <sup>2</sup> )	Minimum RF Safety Distance (cm)
AHCC B26A	0.869	50.42	15	65.42	3483373.2	2.897	309.3

**Table 13.4 (b) Power Density at the Proposed Minimum RF Safety Distance**

Module	Freq Band (GHz)	Maxi Total $P_{out}$ (2x2) (dBm)	Antenna Gain (dBi)	Maximum Total EIRP (dBm)	Maximum Total EIRP (mW)	RF Safety Distance (cm)	Power Density (S) at proposed Distance (mW/cm <sup>2</sup> )
AHCC B26A	869	50.42	15	65.42	3483373.2	310	2.8845

Therefore, the RF safety distance for the Nokia **AHCC AirScale RRH 4T4R B26A (AHCC)** shall be larger than 310 cm (3.1m) for occupational/controlled exposure and larger than 700cm (7.0m) for general population/uncontrolled exposure.

**Summary of Results**

The results are summarized below in Tables 13.5.

**Table 13.5 Minimum RF Safety Distances for MBO B66 RF Module**

<b>Exposure Category</b>	<b>RF Safety Distance (m)</b>	<b>RF Safety Distance (cm)</b>	<b>Total Power Density S at RF Safety Distance (mW/cm<sup>2</sup>)</b>	<b>FCC Required Power Density Limit "S" (mW/cm<sup>2</sup>)</b>
Occupational/Controlled	3.1	310	2.885	2.897
General Population/Uncontrolled	7.0	700	0.5657	0.5793