NOKIA

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Nokia AirScale Radio Units Description

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Issue 03 DRAFT
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Summary of changes

A list of changes between document issues. You can navigate through the respective changed topics.

In this summary of changes:

Changes between issues 03 DRAFT (2019-07-30, 5G19A) and 03 DRAFT (2019-08-29, 5G19A)

AirScale MAA 32T32R 96 AE n78 80 W (CPRI Step D) (AEQN)

- Chapter has been added.

Changes between issues 02D (2019-06-27, 5G19) and 02E (2019-07-17, 5G19)

Compliance statements

- Compliance statements matrix has been added.

1 Compliance statements

Table 1 Compliance statements for AirScale Radio Units

Feature name	RSS-310 compliant	EU RoHS compliant	CE marking compliant	Directive 2014/53/EU (RED) Article 10.10 compliant	FCC Part 15 compliant	Remarks
5GC000515 (AEUA)	No	No	No	No	Yes	Completed US-certifications
5GC001269 (AEUF)	No	No	No	No	Yes	Completed US-certifications
5GC001267 (AEWF)	No	No	No	No	Yes	Completed US-certifications
5GC001492 (AEQN)	No	No	No	No	No	Completed Australian, South-Korean cerifications
5GC001138 (AAHF)	No	No	No	No	Yes	Completed US-certifications
5GC001210 (AAHJ)	No	No	No	No	Yes	Completed US-certifications
5GC001506 (AEHA)	No	No	No	No	No	-
5GC000562 (AEQA)	No	No	No	No	No	Completed South-Korean certifications
5GC000664 (AEQD)	No	Yes	Yes	Yes	No	Completed EU-certifications

1.1 RSS-310 compliance

This equipment complies with RSS-310 of Industry Canada. Operation is subject to the condition that this device does not cause harmful interference.

Note: This compliance statement is not applicable to all HW units described in this document.

1.2 EU compliance

1.2.1 EU RoHS statement

This equipment complies with the European Union RoHS Directive 2011/65/EU on the restriction of the use of certain hazardous substances in electrical and electronic equipment. The directive applies to the use of lead, mercury, cadmium, hexavalent chromium, Polybrominated Biphenyls (PBB), and Polybrominated Diphenyl Ethers (PBDE) in electrical and electronic equipment.

Note: This compliance statement is not applicable to all HW units described in this document.

1.2.2 CE marking

Hereby, Nokia declares that radio equipment type Flexi Multiradio Base Station, Flexi Multiradio 10 Base Station and Nokia AirScale Base Station is in compliance with Directive 2014/53/EC. The full text of the EU declaration of conformity is available at the following internet address: **https://online.networks.nokia.com**

Figure 1 CE marking

This declaration is only valid for configurations (combinations of software, firmware, and hardware) provided and/or supported by Nokia.

Note: This compliance statement is not applicable to all HW units described in this document.

1.2.3 Directive 2014/53/EU (RED) Article 10.10 compliance

The radio frequency usage in EU is restricted and before taking the radio equipment in use in the commercial network the operator is to apply the band license from the local regulator.

As an evidence for the restriction, the packaging is to have the RED Article 10.10-marking describing the impacted countries.

Figure 2 RED Article 10.10-marking

Restrictions in			
AT	BE	BG	HR
CY	CZ	DK	EE
FI	FR	DE	EL
HU	IE	IT	LV
LT	LU	MT	NL
PL	PT	RO	SK
SI	ES	SE	UK

Note: This compliance statement is not applicable to all HW units described in this document.

1.3 FCC Part 15 compliance

This equipment has been tested and found to comply with the limits for a Class B digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manuals, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense. Changes or modifications not expressly approved by the party responsible for compliance could void the user´s authority to operate the equipment.

Note: This compliance statement is not applicable to all HW units described in this document.

2 AirScale Radio support for BTS

General information on massive AirScale Radio and MIMO Adaptive Antenna (MAA) support for system modules.

In 5G, AirScale Radio Units and Massive MIMO Adaptive Antennas support AirScale System Module and AirScale System Module Outdoor (ASOD). AirScale System Module consists of a high capacity indoor AirScale Subrack (AMIA) or a high capacity outdoor AirScale Subrack (AMOB) with AirScale Common (ASIA or ASIK) and AirScale Capacity (ABIA or ABIL) plug-in units.

For more information, see the following documents:

- *Installing and Cabling Nokia AirScale Radio Units*
- *Installing and Cabling Nokia AirScale System Module Outdoor (ASOD)*
- *AirScale System Module — AMIA Installing and Cabling Manual*

3 Nokia AirScale TDD MAAs

3.1 AirScale MAA 2T2R 512 AE n257 (AEUA)

AEUA (474214A) is introduced by 5GC000515: AEUA AirScale MAA 2T2R 512AE n257.

Functional description

Table 2 AEUA functional specification

Property	Value
Total TX RF output power	28 dBm (2 beams), 31 dBm with an optional fan unit
QAM	QPSK, 16 QAM, 64 QAM
Number of TXRX	2TX2RX
Outdoor installation	Yes
Beamforming	Analog, 2TRX, 256 antenna elements per polarization
Number of streams/beams	2
SW supported technology	5G NR
Duplex mode, supported standard	TDD, 3GPP
Frequency range	26.5 to 29.5 GHz, 3GPP band n257 27.50 to 28.35 GHz, 3GPP band n261
Max. iBW (instantaneous bandwidth)/oBW (occupied bandwidth)	800 MHz/800 MHz
Carrier configurations	Up to 8x 100/200/400 MHz (in the limit of oBW)

Band n257 Antenna Specification

Table 3 AEUA antenna characteristics

Property	Value
Antenna gain	26 dBi (boresight), 29 dBi with an optional fan unit
Total average EIRP	54 dBm, 60 dBm with an optional fan unit
Noise figure	7.5 dB
Horizontal steering range	90° (3 dB), 120° (8 dB)
Horizontal beamwidth	6.5° (3 dB, boresight)
Vertical steering range	22.5° (1 dB) , 45° (2 dB)
Vertical beamwidth	8.6° (3 dB), 4.3° with an optional fan unit
Side lobe suppression	more or equal to 20 dB
Main lobe accuracy and granularity	less than 2º

Interfaces

Figure 3 AEUA interfaces

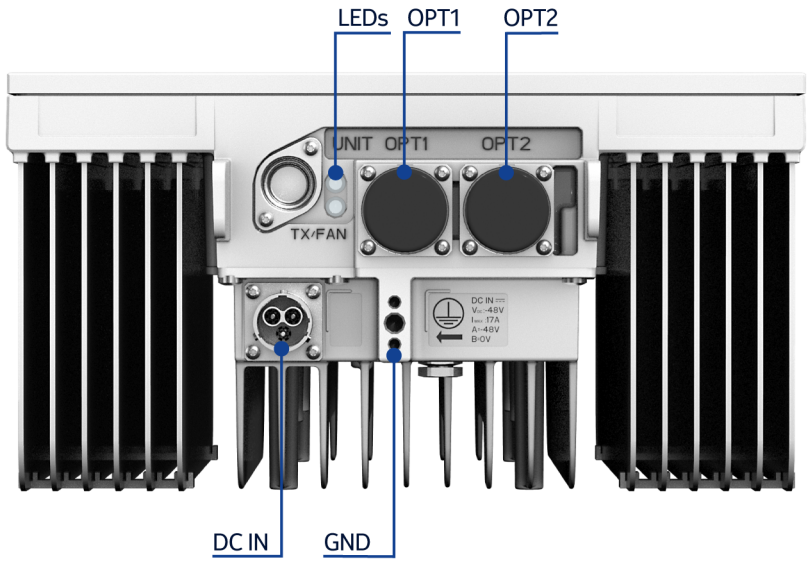


Table 4 AEUA interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power Connector	AC	1	2-pole connector	AC 100 V to 230 V
Optical interface	OPT	2	QSFP+ CONN 38F SINGLE ANG P0.8 10G	2 x QSFP+ (8 x 9.8 Gbps each), R2CT IP seal
Grounding	⏚	1	2 x screw, M5	-
Operational state visual indication (2 pcs) unit and TX/fan status	LED	2	-	Showing status of a unit and TX/fan

Electrical specifications

Table 5 AEUA electrical specifications

Property	Value
Nominal supply voltage	-
Nominal input voltage range	100 to 230 V AC
Extended input voltage range	90 to 264 V AC

Power consumption

Table 6 AEUA power consumption

Property	Value [W]
Maximum power consumption with an optional fan unit	550
Typical power consumption without optional fan unit	370

Related optional items

- AMPB Pole Mounting Kit (474688A)
- AMPD AirScale Tilt Mounting Kit (474941A)
- Radio Bracket AMPx (089172A)
- Bracket Sub-assembly (088755A)
- AFMA Airscale Fan MAA unit (474443A)
- FOCZ QSFP+ 4x10G 10 km SM (474335A)
- FOCX QSFP+ MPO 4x10 300 m MM (474333A)
- ACPB Fiber-Protection Plug, R2CT (474384A)
- APPF Conn 3 Pole Female AC Plug 1.0–3.3 mm^2 18-12 AWG (474893A)

Installation options

- Pole
- Wall

Tilt options

- Mechanical (horizontal ±30°, vertical ±15°)

Dimensions and weight

Table 7 AEUA dimensions and weight

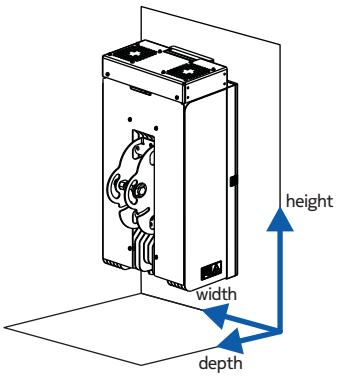
Property	Value	Dimensions orientation
Height	475 mm (18.70 in.) With optional fan: 522 mm (20.55 in.)	
Width	305 mm (12.00 in.) With optional fan: 305 mm (11.97 in.)	
Depth (without bracket)	159 mm (6.26 in) With optional fan: 160 mm (6.30 in.)	
Depth	239 mm (9.41 in.) With optional fan: 241 mm (9.49 in.)	

Table 7 AEUA dimensions and weight (Cont.)

Property	Value	Dimensions orientation
Weight	22 kg (48.50 lb) With optional fan: 24 kg (52.91 lb)	

Environmental specifications

Table 8 AEUA environmental specifications

Property	Value
Maximum operational outdoor temperature (in the shade) with fan or 10.8 km/h (6.7 mph) wind	55°C (131°F)
Maximum operational outdoor temperature (in the sun) with fan or 10.8 km/h (6.7 mph) wind	50°C (122°F)
Maximum indoor temperature	45°C (113°F)
Minimum operational temperature	–40°C (–40°F)
Cooling method	Passive, alternative active cooling with an optional fan unit
IP rating	IP65

Feature interdependencies

There are no correlations between the *5GC000515: AEUA AirScale MAA 2T2R 512AE n257* feature and any other feature.

Warnings, cautions or notes related to the product

Note: AEUA can be installed as a part of a Common Bonding Network (CBN), an Isolated Bonding Network (IBN), or both.

Risk of RF exposure.

To prevent RF exposure, place an RF absorber or blanket in front of the radome surface or keep 1.5 m (4.92 ft) distance from the radome surface in controlled environment and 3 m (9.84 ft) distance from the radome surface in uncontrolled environment (as labeled on the front panel).

NOTICE: The radio unit without a fan should always be mounted in a vertical orientation with connectors on the bottom side to ensure convection cooling.

3.2 AirScale MAA 2T2R 512 AE n257 (AEUF)

AEUF (474864A) is introduced by 5GC001269: AEUF AirScale MAA 2T2R 512AE n257.

Functional description

Table 9 AEUF functional specification

Property	Value
Total TX RF output power	28 dBm (2 beams), 31 dBm with an optional fan unit
QAM	QPSK, 16 QAM, 64 QAM
Number of TXRX	2TX2RX
Outdoor installation	Yes
Beamforming	Analog, 2TRX, 256 antenna elements per polarization
Number of MIMO sterams/beams	2
SW supported technology	5G NR
Duplex mode, supported standard	TDD, 3GPP
Frequency range	26.5 to 29.5 GHz, 3GPP band n257 27.50 to 28.35 GHz, 3GPP band n261
Max. iBW (instantaneous bandwidth)/oBW (occupied bandwidth)	800 MHz/800 MHz
Carrier configurations	Up to 8x 100/200/400 MHz (in the limit of oBW)

Band n257 Antenna Specification

Table 10 AEUF antenna characteristics

Property	Value
Antenna gain	26 dBi (boresight), 29 dBi with an optional fan unit
Total average EIRP	54 dBm, 60 dBm with an optional fan unit
Noise figure	7.5 dB
Horizontal sector width	90° (3 dB), 120° (8 dB)
Horizontal beamwidth	6.5° (3 dB)
Vertical sector width	22.5° (1 dB) , 45° (2 dB)
Vertical beamwidth	8.6° (3 dB), 4.3° with an optional fan unit
Side lobe suppression	more or equal to 20 dB
Main lobe accuracy and granularity	less than 2º

Interfaces

Figure 4 AEUF interfaces

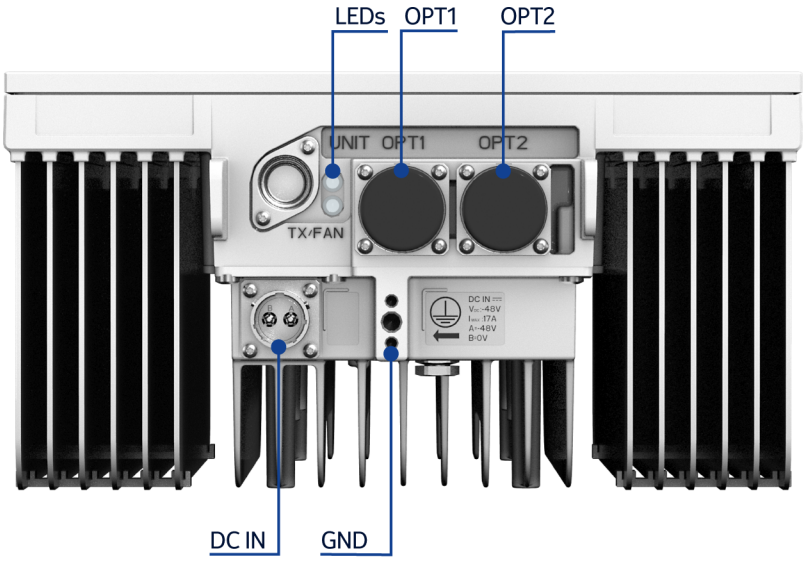


Table 11 AEUF interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power Connector	DC	1	2-pole connector	50 A max.
Optical interface	OPT	2	QSFP+ CONN 38F SINGLE ANG P0.8 10G	2 x QSFP+ (8 x 9.8 Gbps each), R2CT IP seal
Grounding	⏚	1	2 x screw, M5	-
Operational state visual indication (2 pcs) Unit and TX/fan status	LED	2	-	Showing status of a unit and TX/fan

Electrical specifications

Table 12 AEUF electrical specifications

Property	Value
Nominal supply voltage	–48.0 V DC
Nominal input voltage range	–40.5 V DC to –57.0 V DC
Extended input voltage range	-

Power consumption

Information on the estimated power consumption [W] at 48 VDC input in 23°C, RF output power per TX. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin.

Table 13 AEUF power consumption

Property	Value [W]
Maximum power consumption with an optional fan unit	550
Typical power consumption without optional fan unit	370

Related optional items

- AMPB Pole Mounting Kit (474688A)
- AMPD AirScale Tilt Mounting Kit (474941A)
- Radio Bracket AMPx (089172A)
- Bracket Sub-assembly (088755A)
- AFMA Airscale Fan MAA unit (474443A)
- ASAB AirScale MDR26-open EAC cable 5 m (474621A)
- FOCZ QSFP+ 4x10G 10 km SM (474335A)
- FOCX QSFP+ MPO 4x10 300 m MM (474333A)
- APPA AirScale 2 26 A DC plug 3.3-10 mm² (474281A)
- ACPB Fiber-Protection Plug, R2CT (474384A)

Installation options

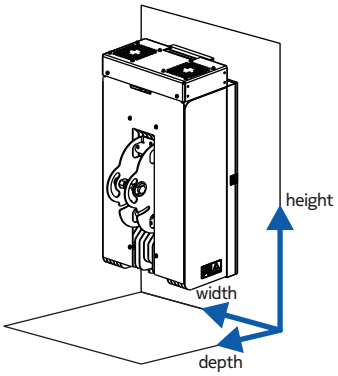
- Pole
- Wall

Tilt options

- Mechanical (horizontal ±30°, vertical ±15°)

Dimensions and weight

Table 14 AEUF dimensions and weight

Property	Value	Dimensions orientation
Height	475 mm (18.70 in.) With optional fan: 522 mm (20.55 in.)	
Width	305 mm (12.00 in.)	
Depth (without bracket)	159 mm (6.26 in) With optional fan: 160 mm (6.30 in.)	
Depth	239 mm (9.41 in.)	
Weight	22 kg (48.50 lb) With optional fan: 24 kg (52.91 lb)	

Environmental specifications

Table 15 AEUF environmental specifications

Property	Value
Maximum operational outdoor temperature (in the shade) with fan or 10.8 km/h (6.7 mph) wind	55°C (131°F)
Maximum operational outdoor temperature (in the sun) with fan or 10.8 km/h (6.7 mph) wind	50°C (122°F)
Maximum indoor temperature	45°C (113°F)
Minimum operational temperature	–40°C (–40°F)
Cooling method	Passive, alternative active cooling with an optional fan unit
IP rating	IP65

Feature interdependencies

There are no correlations between the *5GC001269: AEUF AirScale MAA 2T2R 512AE n257* feature and any other feature.

Warnings, cautions or notes related to the product

Risk of RF exposure.

To prevent RF exposure, place an RF absorber or blanket in front of the radome surface or keep 1.5 m (4.92 ft) distance from the radome surface in controlled environment and 3 m (9.84 ft) distance from the radome surface in uncontrolled environment (as labeled on the front panel).

NOTICE: The radio unit without a fan should always be mounted in a vertical orientation with connectors on the bottom side to ensure convection cooling.

3.3 AirScale MAA 2T2R 512 AE n260 (AEWF)

AEWF (474870A) is introduced by 5GC001267: AEWF AirScale MAA 2T2R 512AE n260.

Functional description

Table 16 AEWF functional specification

Property	Value
Total TX RF output power	25 dBm (2 beams), 28 dBm with an optional fan unit
QAM	QPSK, 16 QAM, 64 QAM
Number of TXRX	2TX2RX
Outdoor installation	Yes

Table 16 AEWF functional specification (Cont.)

Property	Value
Beamforming	Analog, 2TRX, 256 antenna elements per polarization
Number of streams/beams	2
SW supported technology	5G NR
Duplex mode, supported standard	TDD, 3GPP
Frequency range	37.0 to 40.0 GHz, 3GPP band n260
Max. iBW (instantaneous bandwidth)/oBW (occupied bandwidth)	800 MHz/800 MHz
Carrier configurations	Up to 8x 100/200/400 MHz (in the limit of oBW)

Band n260 Antenna Specification

Table 17 AEWF antenna characteristics

Property	Value
Antenna gain	26 dBi (boresight), 29 dBi with an optional fan unit
Total average EIRP	51 dBm, 57 dBm with an optional fan unit)
Noise figure	7.5 dB
Horizontal steering range	90° (3 dB), 120° (8 dB)
Horizontal beamwidth	6.5° (3 dB, boresight, middle frequency)
Vertical steering range	22.5° (1.5 dB), 45° (2 dB)
Vertical beamwidth	8.6° (3 dB, boresight, middle frequency)
Side lobe suppression	more or equal to 20 dB
Main lobe accuracy and granularity	less than 2º

Interfaces

Figure 5 AEWF interfaces

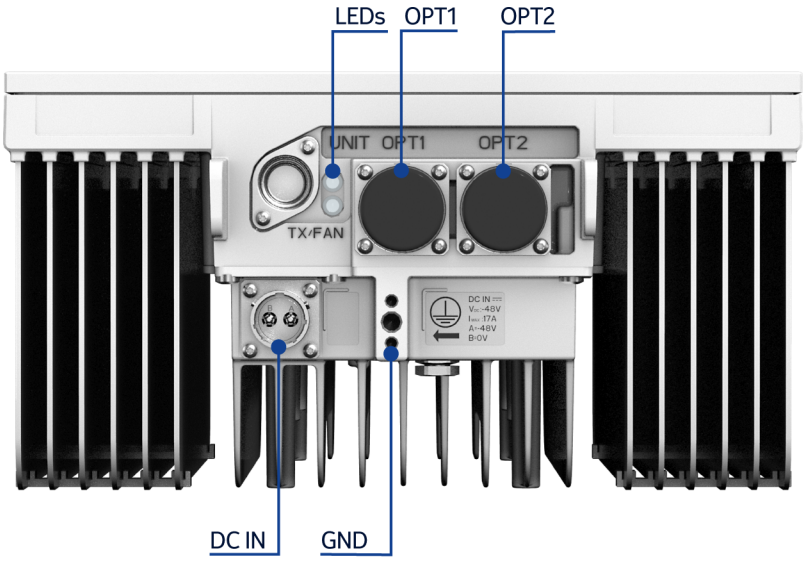


Table 18 AEWF interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power Connector	DC	1	2-pole connector	55 A max.
Optical interface	OPT	2	QSFP+ CONN 38F SINGLE ANG P0.8 10G	2 x QSFP+ (8 x 9.8 Gbps each), R2CT IP seal
Grounding	⏚	1	2 x M5 or 1 x M8 screw	-
Operational state visual indication (2 pcs) unit and TX/fan status	LED	2	-	Showing status of a unit and TX/fan

Electrical specifications

Table 19 AEWF electrical specifications

Property	Value
Nominal supply voltage	–48.0 V DC
Nominal input voltage range	–40.5 V DC to –57.0 V DC
Extended input voltage range	–36.0 V DC to –60.0 V DC

Power consumption

Information on the estimated power consumption [W] at 48 VDC input in 23°C, RF output power per TX. Non-committed estimated values depend on the final product HW and SW optimization with +/– 10% margin.

Table 20 AEWF power consumption

Property	Value [W]
Maximum power consumption with an optional fan unit	550
Typical power consumption without optional fan unit	370

Related optional items

- AMPB Pole Mounting Kit (474688A)
- AMPD AirScale Tilt Mounting Kit (474941A)
- Radio Bracket AMPx (089172A)
- Bracket Sub-assembly (088755A)
- AFMA Airscale Fan MAA unit (474443A)
- ASAB AirScale MDR26-open EAC cable 5 m (474621A)
- FOCZ QSFP+ 4x10G 10 km SM (474335A)
- FOCX QSFP+ MPO 4x10 300 m MM (474333A)
- APPA AirScale 2 26 A DC plug 3.3–10 mm² (474281A)
- ACPB Fiber-Protection Plug, R2CT (474384A)

Installation options

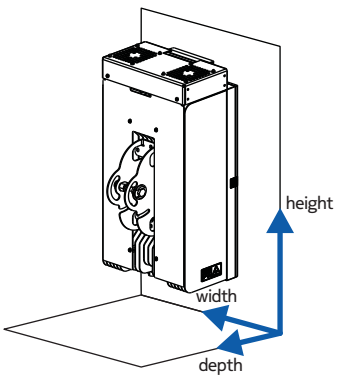
- Pole
- Wall

Tilt options

- Mechanical (horizontal ±30°, vertical ±15°)

Dimensions and weight

Table 21 AEWF dimensions and weight

Property	Value	Dimensions orientation
Height	475 mm (18.70 in.) With optional fan: 522 mm (20.55 in.)	
Width	305 mm (12.00 in.)	
Depth	159 mm (6.26 in) With optional fan: 160 mm (6.30 in.)	
Weight	22 kg (48.50 lb) With optional fan: 24 kg (52.91 lb)	

Environmental specifications

Table 22 AEWF environmental specifications

Property	Value
Maximum operational outdoor temperature (in the shade) with fan or 10.8 km/h (6.7 mph) wind	55°C (131°F)
Maximum operational outdoor temperature (in the sun) with fan or 10.8 km/h (6.7 mph) wind	50°C (122°F)
Maximum indoor temperature	45°C (113°F)
Minimum operational temperature	–40°C (–40°F)
Cooling method	Passive, active cooling with an optional fan unit
IP rating	IP65

Feature interdependencies

There are no correlations between the *5GC001267: AEWF AirScale MAA 2T2R 512AE n260* feature and any other feature.

Warnings, cautions or notes related to the product

Risk of RF exposure.

To prevent RF exposure, place an RF absorber or blanket in front of the radome surface or keep 1.5 m (4.92 ft) distance from the radome surface in controlled environment and 3 m (9.84 ft) distance from the radome surface in uncontrolled environment (as labeled on the front panel).

NOTICE: The radio unit without a fan should always be mounted in a vertical orientation with connectors on the bottom side to ensure convection cooling.

3.4 AirScale MAA 32T32R 96 AE n78 80 W (CPRI Step D) (AEQN)

AEQN (474736A) is introduced by 5GC001822: AEQN AirScale MAA 32T32R 96AE n78 80W (CPRI).

Functional description

Table 23 AEQN functional specification

Property	Value
Output power	80 W
Output power of the cell per TX	2.5 W
QAM	QPSK, 16 QAM, 64 QAM (UL) 256 QAM (DL)
Number of TXRX	32TX32RX

Table 23 AEQN functional specification (Cont.)

Property	Value
Outdoor installation	Yes
Beamforming	Digital, 32TRX, 6x8 dual polarized phased array (±45° X-polarized)
Number of streams/beams	4 (HW ready to support up to 8)
SW supported technology	5G NR
Duplex mode, supported standard	TDD, 3GPP
Frequency range	3.4 to 3.7 GHz, band n78
Max. iBW (instantaneous bandwidth)/oBW (occupied bandwidth)	100 MHz/100 MHz
Carrier configurations	60, 80, 100 MHz
TX EVM / RX EVM	TX/RX EVM < 2.5% with 1.5 dB back off and EVM < 4.5% without back-off

Band n78 antenna specification

Table 24 AEQN antenna characteristics

Property	Value
Total TX RF output power	more or equal to 34 dBm
Antenna gain (boresight)	22.5 dBi
Total average EIRP	more or equal to 71.5 dBm
Horizontal coverage angle	±45° (3 dB), ±60° (6 dB), reduction compared to boresight
Horizontal beamwidth	15° (boresight)
Vertical steering angle	-2° to +8°[1)]
Vertical beamwidth	10° (boresight)
Vertical pre-tilt	+3°
Side lobe suppression	more or equal to 18 dB (with power tapering)
Main lobe accuracy and granularity	less than 2º

Interfaces

1) (+ means down)

Figure 6 AEQN interfaces

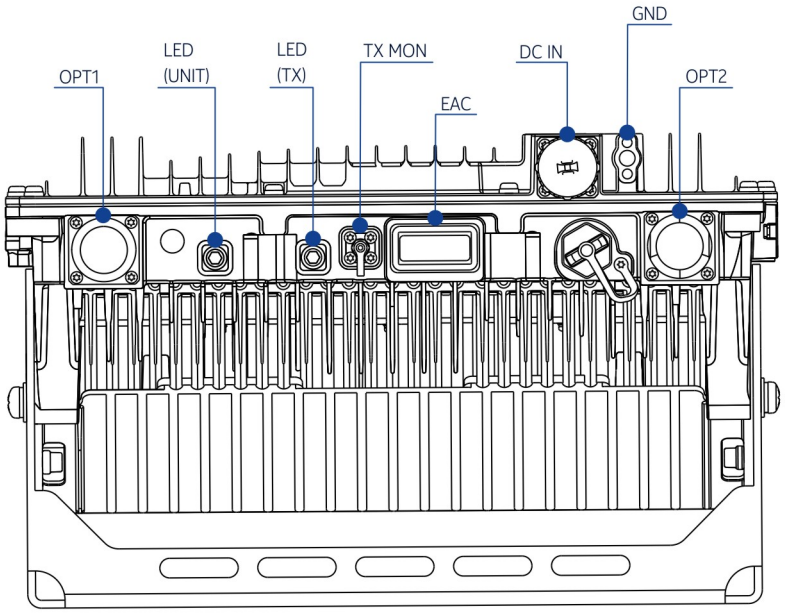


Table 25 AEQN interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power Connector	DC IN	1	2-pole connector	APPB, APPC, 55 A max
Optical interface	OPT	2	SFP28	9.8 Gbps, CPRI, R2CT IP seal
Grounding	GND	1	2 x screw, M5 (2 GND) 1 x screw, M8 (1 GND)	-
External Alarm Connector	EAC	1	MDR-26	EAC
TX Monitoring Connector	TX MON	1	SMA	-
Operational state visual indication (2 pcs) unit and TX status	LED TX/UNIT	2	-	Showing status of a unit and TX/fan

Electrical specifications

Table 26 AEQN electrical specifications

Property	Value
Nominal supply voltage	–48.0 V DC
Nominal input voltage range	–40.5 V DC to –57.0 V DC

Table 26 AEQN electrical specifications (Cont.)

Property	Value
Extended input voltage range	–36.0 V DC to –60.0 V DC

Power consumption

Information on the estimated power consumption [W] at 48 VDC input in 23°C, RF output power per TX. Non-committed estimated values depend on the final product HW and SW optimization with +/– 10% margin.

Table 27 AEQN power consumption

Property	Value [W]
Maximum power consumption with an optional fan unit	785

Related optional items

- FPKA Flexi Pole Mounting Kit (471649A)
- FPKC Flexi Pole Mounting Kit (472821A)
- ACPB AirScale2 Fiber connector R2CT (474384A)
- ASAA AirScale 2 MDR26-open EAC cable 5 m (474288A)
- APPB AirScale2 55 A DC plug 3.3–10 mm2 12-8 AWG (474282A)
- APPC AirScale2 55A DC plug 10–16 mm^2 (474283A)

Installation options

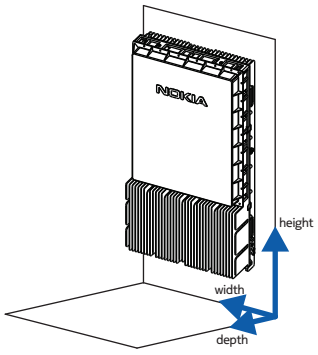
- Pole
- Wall

Tilt options

- Possible in two axis

Dimensions and weight

Table 28 AEQN dimensions and weight

Property	Value	Dimensions orientation
Height	700 mm (27.56 in.)	
Width	380 mm (14.96 in.)	
Depth	185 mm (7.28 in.)	
Weight	21.5 kg (47.40 lb)	

Environmental specifications

Table 29 AEQN environmental specifications

Property	Value
Maximum operational outdoor temperature (in the shade)	55°C (131°F)
Maximum operational outdoor temperature (in the sun)	55°C (131°F)
Maximum indoor temperature	45°C (113°F)
Minimum operational temperature	–40°C (–40°F)
Cooling method	Convection
IP rating	IP65

Feature interdependencies

There are no correlations between the *5GC001822: AEQN AirScale MAA 32T32R 96AE n78 80W (CPRI)* feature and any other feature.

Warnings, cautions or notes related to the product

Risk of RF exposure.

To prevent RF exposure, place an RF absorber or blanket in front of the radome surface or keep 1.5 m (4.92 ft) distance from the radome surface in controlled environment and 3 m (9.84 ft) distance from the radome surface in uncontrolled environment (as labeled on the front panel).

NOTICE: The radio unit without a fan should always be mounted in a vertical orientation with connectors on the bottom side to ensure convection cooling.

3.5 AirScale MAA 64T64R 128 AE n41 120 W (AAHF)

AAHF (474715A) is introduced by 5GC001138: AAHF AirScale MAA 64T64R 128AE B41 120W.

Functional description

Table 30 AAHF functional specification

Property	Value
Output power	4x30 W
Total TX RF output power	120 W
QAM	BPSK, QPSK, 16 QAM, 64 QAM, 256 QAM (DL) BPSK, QPSK, 16 QAM, 64 QAM (UL)
Number of TXRX	64TX64RX

Table 30 AAHF functional specification (Cont.)

Property	Value
Outdoor installation	Yes
Beamforming	Digital, 64TRX, 4x8 dual polarized phased array
Number of streams/beams	up to 16
SW supported technology	5G NR, TD-LTE
Duplex mode, supported standard	TDD, 3GPP
Frequency range	2496 - 2690 MHz, band n41
Max. iBW (instantaneous bandwidth)/oBW (occupied bandwidth)	Full Panel mode: 60 MHz/60 MHz Split Panel mode: 60 MHz per each sub-panel/120 MHz
Concurrent operation	Yes
Carrier configurations	Full Panel mode: 5G NR 60 MHz Split Panel mode (one sub-panel to 5G, other one to LTE): 5G NR 40 MHz/60 MHz plus 3 * LTE 20 MHz or LTE 20 MHz + 20 MHz + 10 MHz
TX EVM / RX EVM	RX EVM < 2.5 % (64 QAM), TX EVM < 5% (64 QAM) and < 3.5% (256 QAM) with 1.5 dB back off
PIM cancellation	No

Band 41 Antenna Specification

Table 31 AAHF antenna characteristics for Full Panel mode using 64 TXRX

Property	Value
Antenna gain (boresight)	more or equal to 24 dBi
Total average EIRP	74.7 dBm
Horizontal steering angle	±60°
Horizontal beamwidth	12.5° ± 3º
Vertical steering angle	±10°
Vertical beamwidth	9º ± 1º
Side lobe suppression	less or equal to -13 dB (boresight, tolerance 2 dB)
Main lobe accuracy and granularity	less than 2º

Table 32 AAHF antenna characteristics for Split Panel mode using 2 * 32 TXRX

Property	Value
Antenna gain (boresight)	more or equal to 21 dBi
Total average EIRP	68.7 dBm

Table 32 AAHF antenna characteristics for Split Panel mode using 2 * 32 TXRX (Cont.)

Property	Value
Horizontal steering angle	±60°
Horizontal beamwidth	26° ± 4°
Vertical steering angle	±10°
Vertical beamwidth	9° ± 1°
Side lobe suppression	less or equal to –13 dB (boresight, tolerance 2 dB)
Main lobe accuracy and granularity	less than 2°

Interfaces

Figure 7 AAHF interfaces

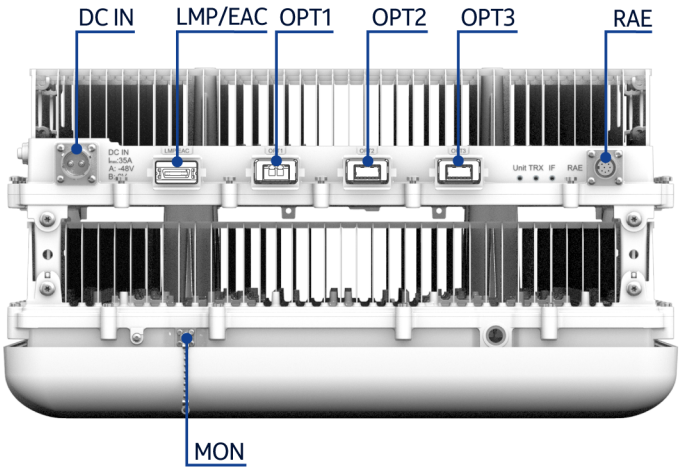


Table 33 AAHF interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power Connector	DC IN	1	2-pole connector	APPB, APPC, 55 A max.
Optical interface	OPT	3	QSFP+	3x QSFP (4 x 9.8 Gbps each), AOPB and AOPA OCTIS IP seal
Remote Antenna Extension	RAE	1	RAE cable assembly	AISG control signal to the antenna line devices
Local Management Port/External Alarm Connector	LMP/EAC	1	MDR-26	LMP+EAC

Table 33 AAHF interfaces (Cont.)

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Monitor	MON	1	SMA	-
Grounding	GND	1	2x M5 screw	-

Antenna Line Devices (ALDs) support

Table 34 AAHF interface for ALD support

Property	Value
AISG	RAE: AISG 3.0
CWA (for non-AISG installations)	No
Voltage	10-30 V
Power per port	-

Note: Separate SW feature is required for ALD control.

Electrical specifications

Table 35 AAHF electrical specifications

Property	Value
Nominal supply voltage	–48.0 V DC
Nominal input voltage range	–40.5 V DC to –57.0 V DC
Extended input voltage range	-

Power consumption

Information on the estimated power consumption [W] at 48 VDC input in 23°C, RF output power per TX. Non-committed estimated values depend on the final product HW and SW optimization with +/– 10% margin.

Table 36 AAHF power consumption

Property	Value [W]
Typical power consumption (3x40 W output power)	864 (74.3% DL duty cycle, 30% RF load)
Maximum power consumption (3x40 W output power)	1052 (74.3% DL duty cycle, 100% RF load)

Related optional items

- FPKA Flexi Pole Mounting Kit (471649A)
- FPKB Flexi Pole Mounting Kit (472804A)
- FPKC Flexi Pole Mounting Kit (472821A)
- Bracket with v angle +/-5 degree 70 kg (090607A)
- ASAB AirScale MDR26-open EAC cable 5 m (474621A)

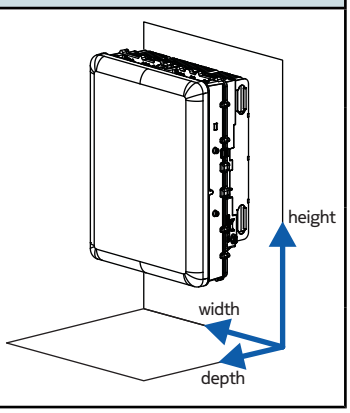
- AOPA AirScale OCTIS Plug Kit QSFP+ (474686A)
- AOPB AirScale OCTIS Artic. Ext Kit QSFP+ (474697A)
- APPB AirScale2 55A DC plug 3.3–10 mm^2 (474282A)
- APPC AirScale2 55A DC plug 10-16 mm^2 (474283A)
- ASAA AirScale 2 MDR26-open EAC cable 5 m (474288A)

Installation options

- Pole
- Wall

Dimensions and weight

Table 37 AAHF dimensions and weight

Property	Value	Dimensions orientation
Height	With front covers: 651 mm (25.6 in.)	
Width	With front covers: 501 mm (19.7 in.)	
Depth	With front covers: 260 mm (10.3 in.)	
Weight	47 kg (103.6 lb)	

Environmental specifications

Table 38 AAHF environmental specifications

Property	Value
Maximum operational outdoor temperature (in the shade) with fan or 10.8 km/h (6.7 mph) wind	55°C (131°F)
Maximum operational outdoor temperature (in the sun) with fan or 10.8 km/h (6.7 mph) wind	50°C (122°F)
Maximum indoor temperature	45°C (113°F)
Minimum operational temperature	–40°C (–40°F)
Cooling method	Convection
IP rating	IP65

Table 39 AAHF wind conditions

Direction	Drag coefficient for the shape C_D	Wind force F(N) 241 km/h (67 m/s) (150 mph)
Front	1.14	988

Table 39 AAHF wind conditions (Cont.)

Direction	Drag coefficient for the shape C_D	Wind force F(N) 241 km/h (67 m/s) (150 mph)
Rear	1.64	1422
Side	0.52	234

Feature interdependencies

The *5GC001116: TD-LTE Co-existence Subframe Configuration* feature is needed for live network operation of the *5GC001138: AAHF AirScale MAA 64T64R 128AE B41 120W* feature.

Warnings, cautions or notes related to the product

Risk of RF exposure.

To prevent RF exposure, place an RF absorber or blanket in front of the radome surface or keep 1.5 m (4.92 ft) distance from the radome surface in controlled environment and 3 m (9.84 ft) distance from the radome surface in uncontrolled environment (as labeled on the front panel).

NOTICE: The radio unit without a fan should always be mounted in a vertical orientation with connectors on the bottom side to ensure convection cooling.

Note: The minimum start-up voltage is –40.5 V DC. If the input voltage is below/beyond the extended limits, the unit might shut down.

3.6 AirScale MAA 64T64R 128 AE B41 120 W (AAHJ)

AAHJ (474795A) is introduced by 5GC001210: AAHJ AirScale MAA 64T64R 128AE B41 120W.

Functional description

Table 40 AAHJ functional specification

Property	Value
Output power	4x30 W
Total TX RF output power	120 W
QAM	BPSK, QPSK, 16 QAM, 64 QAM, 256 QAM (DL) BPSK, QPSK, 16 QAM, 64 QAM (UL)
Number of TXRX	64TX64RX
Outdoor installation	Yes

Table 40 AAHJ functional specification (Cont.)

Property	Value
Beamforming	Digital, 64TRX, 4x8 dual polarized phased array
Number of streams/beams	up to 16
SW supported technology	5G NR, TD-LTE
Duplex mode, supported standard	TDD, 3GPP
Frequency range	2590 to 2690 MHz, band n41
Max. iBW (instantaneous bandwidth)/oBW (occupied bandwidth)	Full Panel mode: 60 MHz/60 MHz Split Panel mode: 60 MHz per each sub-panel/100 MHz
Concurrent operation	Yes
Carrier configurations	Full Panel mode: 5G NR 60 MHz Split Panel mode (one sub-panel to 5G, other one to LTE): 5G NR 40 MHz/60 MHz plus 3 * LTE 20 MHz or LTE 20 MHz + 20 MHz + 10 MHz
TX EVM / RX EVM	RX EVM < 2.5 % (64 QAM), TX EVM < 5% (64 QAM) and < 3.5% (256 QAM) with 1.5 dB back off
PIM cancellation	No

Band 41 Antenna Specification

Table 41 AAHJ antenna characteristics for Full Panel mode using 64 TXRX

Property	Value
Antenna gain (boresight)	more or equal to 24 dBi
Total average EIRP	74.7 dBm
Horizontal steering angle	±60°
Horizontal beamwidth	12.5° ± 3º
Vertical steering angle	±10°
Vertical beamwidth	9º ± 1º
Side lobe suppression	less or equal to –13 dB (boresight, tolerance 2 dB)
Main lobe accuracy and granularity	less than 2º

Table 42 AAHJ antenna characteristics for Split Panel mode using 2x 32 TXRX

Property	Value
Antenna gain (boresight)	more or equal to 21 dBi
Total average EIRP	68.7 dBm
Horizontal steering angle	±60°

Table 42 AAHJ antenna characteristics for Split Panel mode using 2x 32 TXRX (Cont.)

Property	Value
Horizontal beamwidth	26° ± 4°
Vertical steering angle	±10°
Vertical beamwidth	9° ± 1°
Side lobe suppression	less or equal to –13 dB (boresight, tolerance 2 dB)
Main lobe accuracy and granularity	less than 2°

Interfaces

Figure 8 AAHJ interfaces

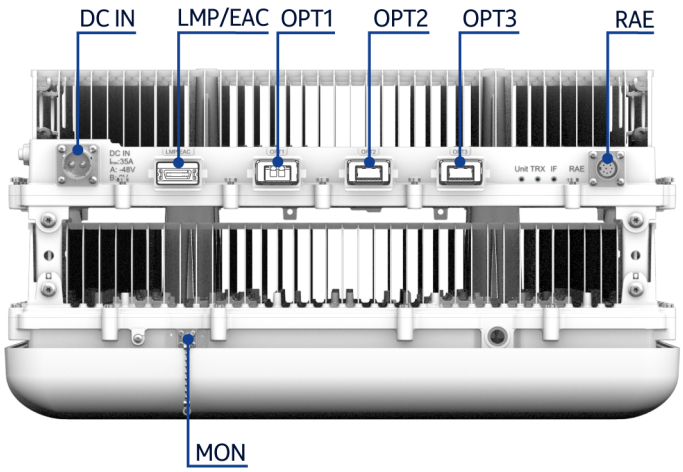


Table 43 AAHJ interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power Connector	DC IN	1	2-pole connector	APPB, APPC, 55 A max.
Optical interface	OPT	3	QSFP+	3x QSFP (4 x 9.8 Gbps each), AOPB and AOPA OCTIS IP seal
Remote Antenna Extension	RAE	1	RAE cable assembly	AISG control signal to the antenna line devices
Local Management Port/External Alarm Connector	LMP/EAC	1	MDR-26	LMP+EAC
Monitor	MON	1	SMA	-

Table 43 AAHJ interfaces (Cont.)

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Grounding	GND	1	2x M5 screw	-

Antenna Line Devices (ALDs) support

Table 44 AAHJ interface for ALD support

Property	Value
AISG	RAE: AISG 3.0
CWA (for non-AISG installations)	No
Voltage	10-30 V
Power per port	-

Note: Separate SW feature is required for ALD control.

Electrical specifications

Table 45 AAHJ electrical specifications

Property	Value
Nominal supply voltage	–48.0 V DC
Nominal input voltage range	–40.5 V DC to –57.0 V DC
Extended input voltage range	-

Power consumption

Information on the estimated power consumption [W] at 48 VDC input in 23°C, RF output power per TX. Non-committed estimated values depend on the final product HW and SW optimization with +/– 10% margin.

Table 46 AAHJ power consumption

Property	Value [W]
Typical power consumption (3x40 W output power)	864 (74.3% DL duty cycle, 30% RF load)
Maximum power consumption (3x40 W output power)	1052 (74.3% DL duty cycle, 100% RF load)

Related optional items

- FPKA Flexi Pole Mounting Kit (471649A)
- FPKB Flexi Pole Mounting Kit (472804A)
- FPKC Flexi Pole Mounting Kit (472821A)
- Bracket with v angle +/-5 degree 70 kg (090607A)
- ASAB AirScale MDR26-open EAC cable 5 m (474621A)
- AOPA AirScale OCTIS Plug Kit QSFP+ (474686A)

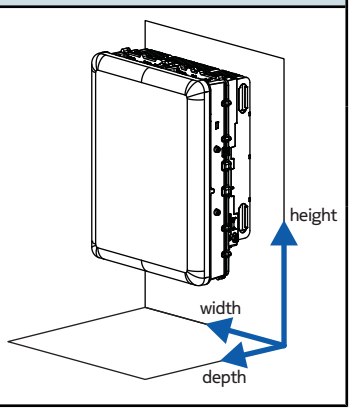
- AOPB AirScale OCTIS Artic. Ext Kit QSFP+ (474697A)
- APPB AirScale2 55A DC plug 3.3–10 mm^2 (474282A)
- APPC AirScale2 55A DC plug 10-16 mm^2 (474283A)
- ASAA AirScale 2 MDR26-open EAC cable 5 m (474288A)

Installation options

- Pole
- Wall

Dimensions and weight

Table 47 AAHJ dimensions and weight

Property	Value	Dimensions orientation
Height	With front covers: 651 mm (25.6 in.)	
Width	With front covers: 501 mm (19.7 in.)	
Depth	With front covers: 260 mm (10.3 in.)	
Weight	47 kg (103.6 lb)	

Environmental specifications

Table 48 AAHJ environmental specifications

Property	Value
Maximum operational outdoor temperature (in the shade) with fan or 10.8 km/h (6.7 mph) wind	55°C (131°F)
Maximum operational outdoor temperature (in the sun) with fan or 10.8 km/h (6.7 mph) wind	50°C (122°F)
Maximum indoor temperature	45°C (113°F)
Minimum operational temperature	–40°C (–40°F)
Cooling method	Convection
IP rating	IP65

Table 49 AAHJ wind conditions

Direction	Drag coefficient for the shape C_D	Wind force F(N) 241 km/h (67 m/s) (150 mph)
Front	1.14	988
Rear	1.64	1422

Table 49 AAHJ wind conditions (Cont.)

Direction	Drag coefficient for the shape C_D	Wind force F(N) 241 km/h (67 m/s) (150 mph)
Side	0.52	234

Feature interdependencies

The *5GC001116: TD-LTE Co-existence Subframe Configuration* feature is needed for live network operation of the *5GC001210: AAHJ AirScale MAA 64T64R 128AE B41 120W* feature.

Warnings, cautions or notes related to the product

Risk of RF exposure.

To prevent RF exposure, place an RF absorber or blanket in front of the radome surface or keep 1.5 m (4.92 ft) distance from the radome surface in controlled environment and 3 m (9.84 ft) distance from the radome surface in uncontrolled environment (as labeled on the front panel).

NOTICE: The radio unit without a fan should always be mounted in a vertical orientation with connectors on the bottom side to ensure convection cooling.

Note: The minimum start-up voltage is –40.5 V DC. If the input voltage is below/beyond the extended limits, the unit might shut down.

3.7 AirScale MAA 64T64R 128 AE B41 200 W (AEHA)

AEHA (475026A) is introduced by 5GC001506: AEHA AirScale MAA 64T64R 128AE B41 200W.

Functional description

Table 50 AEHA functional specification

Property	Value
Output power	200 W
Total TX RF output power	more or equal to 35 dBm
Output power of the cell per TX	23 to 35 dBm
QAM	QPSK, 16 QAM, 64 QAM (UL) 256 QAM (DL)
Number of TXRX	64TX64RX
Outdoor installation	Yes
Beamforming	Digital, 64TRX, 8x8 dual polarized phased array (±45° X-polarized)

Table 50 AEHA functional specification (Cont.)

Property	Value
Number of streams/beams	2 (HW ready up to 16)
SW supported technology	5G NR
Duplex mode, supported standard	TDD, 3GPP
Frequency range	25.15 to 26.75 GHz, band 41
Max. iBW (instantaneous bandwidth)/oBW (occupied bandwidth)	100 MHz/100 MHz
Carrier configurations	60, 80, 100 MHz

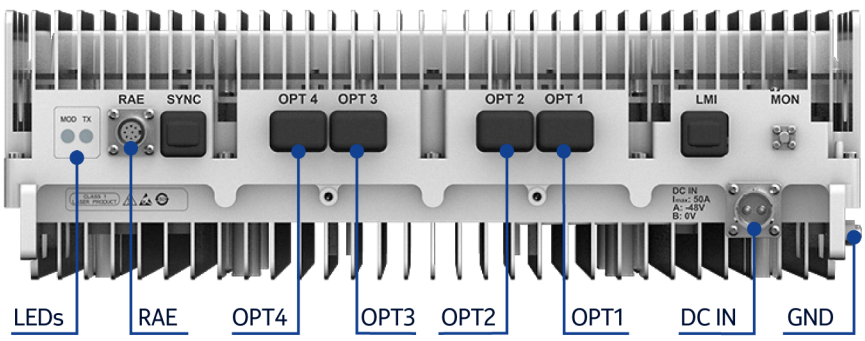
Band 41 Antenna Specification

Table 51 AEHA antenna characteristics

Property	Value
Antenna gain (boresight)	24 dBi
Total average EIRP	more or equal to 77.5 dBm
Noise figure	less or equal to 3 dB (target), less or equal to 3.5 dB (max.)
Horizontal sector width	90° (3 dB), 120° (8 dB)
Horizontal beamwidth	15° (boresight)
Vertical sector width	22.5° (1 dB) , 45° (2 dB)
Vertical beamwidth	9° (boresight)
Horizontal coverage angle	±45° (3 dB), ±60° (6 dB)
Vertical steering angle	+/-11°[2)]
Side lobe suppression	more or equal to 20 dB
Main lobe accuracy and granularity	less than 2º

Interfaces

Figure 9 AEHA interfaces



2) + means down

Table 52 AEHA interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power Connector	DC	1	2-pole connector	APPB, APPC, 50 A max
Optical interface	OPT	4	SFP28, QSFP+	4 x 9.8 Gbps CPRI, NOKIA IP seal
Grounding	GND	1	2 x screw, M5	-
Remote Antenna Extension	RAE	1	RAE cable assembly	AISG control signal to the antenna line devices
Operational state visual indication (2 pcs) unit and TX status	MOD, TX	2	-	MOD LED indicates unit work state TX LED indicates TX power emmission state

Antenna Line Devices (ALDs) support

Table 53 AEHA ALD support

Property	Value
AISG	RAE: AISG 2.0
CWA (for non-AISG installations)	No
Voltage	10-30 V
Power per port	-

Electrical specifications

Table 54 AEHA electrical specifications

Property	Value
Nominal supply voltage	–48.0 V DC
Nominal input voltage range	–40.5 V DC to –57.0 V DC
Extended input voltage range	-

Power consumption

Information on the estimated power consumption [W] at 48 VDC input in 23°C, RF output power per TX. Non-committed estimated values depend on the final product HW and SW optimization with +/– 10% margin.

Table 55 AEHA power consumption

Property	Value [W]
Maximum power consumption with an optional fan unit	1500 (with 75% DL duty cycle, 70% traffic load)

Related optional items

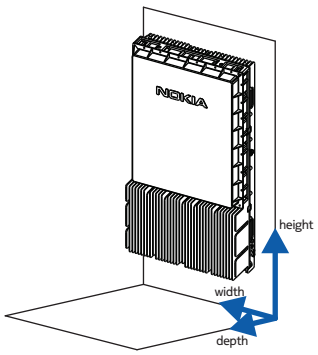
- FPKA Flexi Pole Mounting Kit (471649A)
- ASAA AirScale 2 MDR26-open EAC cable 5 m (474288A)
- APPB AirScale2 55A DC plug 3.3-10 mm2 (474282A)
- APPC AirScale2 55A DC plug 10–16 mm^2 (474283A)

Installation options

- Pole
- Wall

Dimensions and weight

Table 56 AEHA dimensions and weight

Property	Value	Dimensions orientation
Height	984 mm (38.74 in.)	
Width	515 mm (20.28 in.)	
Depth	224 mm (8.82 in.)	
Weight	47 kg (103.61 lb)	

Environmental specifications

Table 57 AEHA environmental specifications

Property	Value
Maximum operational outdoor temperature (in the shade) with fan or 10.8 km/h (6.7 mph) wind	55°C (131°F)
Maximum operational outdoor temperature (in the sun) with fan or 10.8 km/h (6.7 mph) wind	50°C (122°F)
Maximum indoor temperature	45°C (113°F)
Minimum operational temperature	–40°C (–40°F)
Cooling method	Convection
IP rating	IP65

Feature interdependencies

There are no correlations between the *5GC001506: AEHA AirScale MAA 64T64R 128AE B41 200W* feature and any other feature.

Warnings, cautions or notes related to the product

Risk of RF exposure.

To prevent from RF exposure, place an RF absorber or blanket in front of the radome surface or keep 1.5 m (4.92 ft) distance from the radome surface in controlled environment and 3 m (9.84 ft) distance from the radome surface in uncontrolled environment (as labeled on the front panel).

NOTICE: The radio unit without a fan should always be mounted in a vertical orientation with connectors on the bottom side to ensure convection cooling.

3.8 AirScale MAA 64T64R 128 AE B43 200 W (AEQD)

AEQD (474473A) is introduced by 5GC000664: AEQD AirScale MAA 64T64R 128AE B43 200W.

Functional description

Table 58 AEQD functional specification

Property	Value
Output power	200 W
Total TX RF output power	more or equal to 35 dBm
Output power of the cell per TX	23 to 35 dBm
QAM	QPSK, 16 QAM, 64 QAM, 256 QAM
Number of TXRX	64TX64RX
Outdoor installation	Yes
Beamforming	Digital, 64TRX, 4x12 dual polarized phased array
Number of streams/beams	16
SW supported technology	5G NR, TD-LTE
Duplex mode, supported standard	TDD, 3GPP
Frequency range	3.6 to 3.8 GHz, band 43
Max. iBW (instantaneous bandwidth)/oBW (occupied bandwidth)	100 MHz/100 MHz (2 carriers)
Carrier configurations	1x60 MHz/1x80 MHz/1x100 MHz
TX EVM / RX EVM	RX EVM < 5% (64 QAM), TX EVM < 3.5 % (256 QAM) with 1.5 dB back off and EVM < 5% (64 QAM) at Pnom
PIM cancellation	No

Band 43 Antenna Specification

Table 59 AEQD antenna characteristics

Property	Value
Antenna gain (boresight)	24 dBi (target) 22.5 dBi (min.)
Total average EIRP	76 dBm
Horizontal steering angle	90° (3 dB), 120° (6 dB)
Horizontal beamwidth	12.5° (boresight)
Vertical steering angle	22.5°
Vertical beamwidth	9° (boresight)
Side lobe suppression	less or equal to –16 dB (boresight, tolerance 2 dB)
Main lobe accuracy and granularity	less than 2º

Interfaces

Figure 10 AEQD interfaces

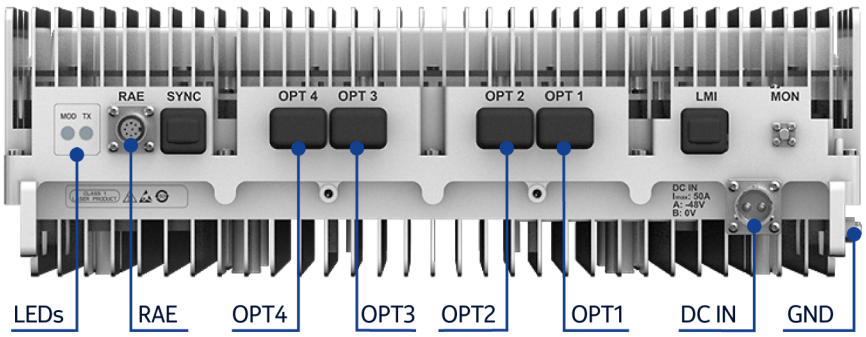


Table 60 AEQD interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power Connector	DC IN	1	2-pole connector	APPB, APPC, 50 A max.
Optical interface	OPT	4	QSFP+ CONN 38F SINGLE ANG P0.8 10G	4 x 9.8 Gbps CPRI, NOKIA IP seal
Grounding	GND	1	screw, M8	-
Remote Antenna Extension	RAE	1	RAE cable assembly	AISG control signal to the antenna line devices
Operational state visual indication (2 pcs) unit and TX status	LED MOD, TX	2	-	MOD LED indicates unit work state

Table 60 AEQD interfaces (Cont.)

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
				TX LED indicates TX power emmission state

Antenna Line Devices (ALDs) support

Table 61 AEQD ALD support

Property	Value
AISG	RAE: AISG 2.0
CWA (for non-AISG installations)	No
Voltage	10 – 30 V
Power per port	-

Electrical specifications

Table 62 AEQD electrical specifications

Property	Value
Nominal supply voltage	–48.0 V DC
Nominal input voltage range	–40.5 V DC to –57.0 V DC
Extended input voltage range	-

Power consumption

Information on the estimated power consumption [W] at 48 VDC input in 23°C, RF output power per TX. Non-committed estimated values depend on the final product HW and SW optimization with +/– 10% margin.

Table 63 AEQD power consumption

Property	Value [W]
Typical power consumption	1400 (75% DL duty cycle)

Related optional items

- FPKA Flexi Pole Mounting Kit (471649A)
- FPKC Flexi Pole Mounting Kit (472821A)
- Bracket with v angle +/-5 degree 70 kg (090607A)
- APPB AirScale2 55A DC plug 3.3-10 mm2 (474282A)
- APPC AirScale2 55A DC plug 10–16 mm^2 (474283A)
- ASAA AirScale 2 MDR26-open EAC cable 5 m (474288A)

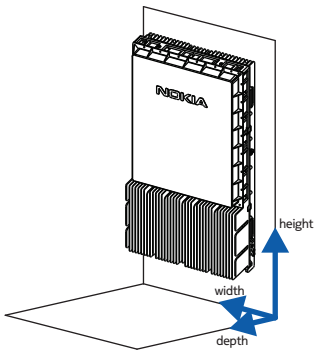
Installation options

- Pole

- Wall

Dimensions and weight

Table 64 AEQD dimensions and weight

Property	Value	Dimensions orientation
Height	900 mm (35.4 in.)	
Width	480 mm (18.9 in.)	
Depth	185 mm (7.28 in.)	
Weight	40 kg (88.2 lb)	

Environmental specifications

Table 65 AEQD environmental specifications

Property	Value
Maximum operational outdoor temperature (in the shade) with fan or 10.8 km/h (6.7 mph) wind	55°C (131°F)
Maximum operational outdoor temperature (in the sun) with fan or 10.8 km/h (6.7 mph) wind	50°C (122°F)
Maximum indoor temperature	45°C (113°F)
Minimum operational temperature	–40°C (–40°F)
Cooling method	Convection
IP rating	IP65

Table 66 AEQD wind conditions

Direction	Drag coefficient for the shape C_D	Wind force F(N) 241 km/h (67 m/s) (150 mph)
Front	1.72	1975
Rear	1.28	1470
Side	0.98	422

Feature interdependencies

There are no correlations between the *5GC000664: AEQD AirScale MAA 64T64R 128AE B43 200W* feature and any other feature.

Warnings, cautions or notes related to the product

Risk of RF exposure.

To prevent RF exposure, place an RF absorber or blanket in front of the radome surface or keep 1.5 m (4.92 ft) distance from the radome surface in controlled environment and 3 m (9.84 ft) distance from the radome surface in uncontrolled environment (as labeled on the front panel).

NOTICE: The radio unit without a fan should always be mounted in a vertical orientation with connectors on the bottom side to ensure convection cooling.

3.9 AirScale MAA 64T64R 192 AE B42 200 W (AEQA)

AEQA (474212A) is introduced by 5GC000562: AEQA AirScale MAA 64T64R 192AE B42 200W.

Functional description

Table 67 AEQA functional specification

Property	Value
Output power	200 W
Total TX RF output power	more or equal to 35 dBm
Output power of the cell per TX	23 to 35 dBm
QAM	QPSK, 16 QAM, 64 QAM, 256 QAM
Number of TXRX	64TX64RX
Outdoor installation	Yes
Beamforming	Digital, 64TRX, 4x12 dual polarized phased array
Number of streams/beams	16
SW supported technology	5G NR
Duplex mode, supported standard	TDD, 3GPP
Frequency range	3.4 to 3.6 GHz, band 42
Max. iBW (instantaneous bandwidth)/oBW (occupied bandwidth)	100 MHz/100 MHz (2 carriers)
Carrier configurations	100 MHz (2 x 100 MHz with 2 RU)
TX EVM / RX EVM	RX EVM < 5 % (64 QAM), TX EVM < 3.5% (256 QAM) with 1.5 dB back off and EVM < 5% (64 QAM) at Pnom
PIM cancellation	No

Band 42 Antenna Specification

Table 68 AEQA antenna characteristics

Property	Value
Antenna gain (boresight)	25.5 dBi
Total average EIRP	more or equal to 77.5 dBm
Noise figure	less or equal to 3 dB (target), less or equal to 3.5 dB (max.)
Horizontal sector width	90° (3 dB), 120° (8 dB)
Horizontal beamwidth	15° (boresight)
Vertical sector width	22.5° (1 dB) , 45° (2 dB)
Vertical beamwidth	8.6° (3 dB), 4.3° with optional fan unit
Side lobe suppression	more or equal to 20 dB
Main lobe accuracy and granularity	less than 2º

Interfaces

Figure 11 AEQA interfaces

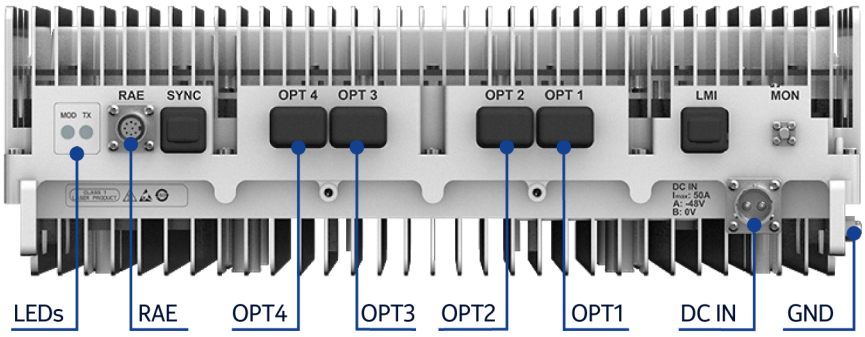


Table 69 AEQA interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power Connector	DC	1	2-pole connector	APPB, APPC, 50 A max
Optical interface	OPT	4	QSFP+ CONN 38F SINGLE ANG P0.8 10G	4 x 9.8 Gbps CPRI, NOKIA IP seal
Grounding	GND	1	2 x screw, M5	-
Remote Antenna Extension	RAE	1	RAE cable assembly	AISG control signal to the antenna line devices
Operational state visual indication (2 pcs) unit and TX status	LED MOD, TX	2	-	MOD LED indicates unit work state

Table 69 AEQA interfaces (Cont.)

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
				TX LED indicates TX power emmission state

Antenna Line Devices (ALDs) support

Table 70 AEQA ALD support

Property	Value
AISG	RAE: AISG 2.0
CWA (for non-AISG installations)	No
Voltage	10–30 V
Power per port	-

Electrical specifications

Table 71 AEQA electrical specifications

Property	Value
Nominal supply voltage	–48.0 V DC
Nominal input voltage range	–40.5 V DC to –57.0 V DC
Extended input voltage range	-

Power consumption

Information on the estimated power consumption [W] at 48 VDC input in 23°C, RF output power per TX. Non-committed estimated values depend on the final product HW and SW optimization with +/– 10% margin.

Table 72 AEQA power consumption

Property	Value [W]
Maximum power consumption with an optional fan unit	1500 (with 75% DL duty cycle, 70% traffic load)

Related optional items

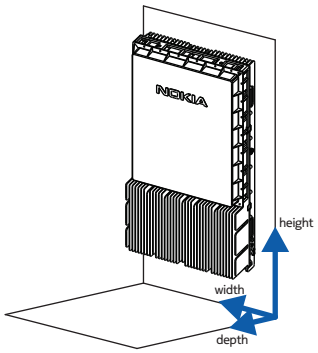
- FPKA Flexi Pole Mounting Kit (471649A)
- ASAA AirScale 2 MDR26-open EAC cable 5 m (474288A)
- FPKC Flexi Pole Mounting Kit (472821A)
- Bracket with v angle +/-5 degree 70 kg (090607A)
- APPB AirScale2 55A DC plug 3.3-10 mm2 (474282A)
- APPC AirScale2 55A DC plug 10–16 mm^2 (474283A)

Installation options

- Pole
- Wall

Dimensions and weight

Table 73 AEQA dimensions and weight

Property	Value	Dimensions orientation
Height	1110 mm (43.70 in.)	
Width	480 mm (18.90 in.)	
Depth	185 mm (7.28 in)	
Weight	47 kg (103.61 lb)	

Environmental specifications

Table 74 AEQA environmental specifications

Property	Value
Maximum operational outdoor temperature (in the shade) with fan or 10.8 km/h (6.7 mph) wind	55°C (131°F)
Maximum operational outdoor temperature (in the sun) with fan or 10.8 km/h (6.7 mph) wind	50°C (122°F)
Maximum indoor temperature	45°C (113°F)
Minimum operational temperature	–40°C (–40°F)
Cooling method	Convection
IP rating	IP65

Table 75 AEQA wind conditions

Direction	Drag coefficient for the shape C_D	Wind force F(N) 241 km/h (67 m/s) (150 mph)
Front	1.74	2465
Rear	1.30	1841
Side	1.00	531

Feature interdependencies

There are no correlations between the *5GC000562: AEQA AirScale MAA 64T64R 192AE B42 200W* feature and any other feature.

Warnings, cautions or notes related to the product

Risk of RF exposure.

To prevent RF exposure, place an RF absorber or blanket in front of the radome surface or keep 1.5 m (4.92 ft) distance from the radome surface in controlled environment and 3 m (9.84 ft) distance from the radome surface in uncontrolled environment (as labeled on the front panel).

NOTICE: The radio unit without a fan should always be mounted in a vertical orientation with connectors on the bottom side to ensure convection cooling.

4 Nokia AirScale Remote Radio Heads

4.1 AirScale Dual RRH 4T4R B12/n71 240 W (AHLOA)

AHLOA (474331A) is introduced by 5GC000719: AHLOA AirScale Dual RRH 4T4R B12/n71 240W.

Functional description

Table 76 AHLOA functional specification

Property	Value
Output power	4x60 W (can be shared between bands)
QAM	up to 256 QAM (DL) up to 64 QAM (UL)
Number of TXRX	4TX4RX
Outdoor installation	Yes
SW supported technologies	5G NR, FDD-LTE
Concurrent operation	Yes
TX frequency range	B71/n71: 617 to 652 MHz B85 (including B12, LTE only): 728 to 746 MHz B17 (LTE only): 734 to 745 MHz
RX frequency range	B71/n71: 663 to 698 MHz B85 (including B12, LTE only): 698 to 716 MHz B17 (LTE only): 704 to 715 MHz
DL instantaneous bandwidth	B71/n71: 35 MHz B85 (LTE only): 728 to 746 MHz
UL instantaneous bandwidth	B71: 35 MHz B85 (LTE only): 698 to 716 MHz
DL filter bandwidth	B71: 35 MHz B85 (including B12, LTE only): 728 to 746 MHz
UL filter bandwidth	B71: 35 MHz B85 (including B12, LTE only): 698 to 716 MHz
Number of carriers per pipe	Up to 4
Supported bandwidths	5, 10, 15, 20 MHz
PIM cancellation	HW prepared

Interfaces

Figure 12 Style A AHLOA interfaces

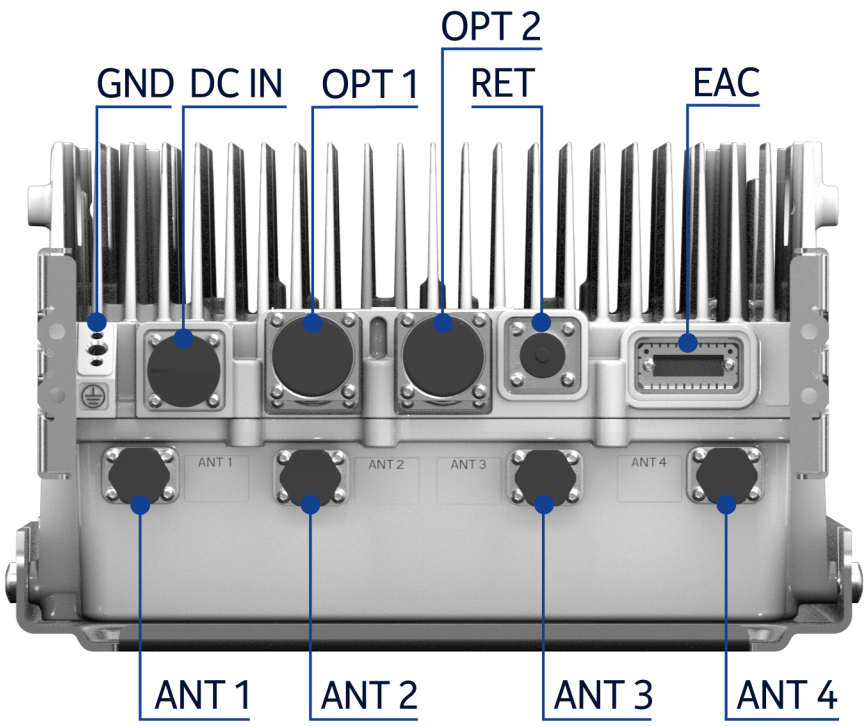


Figure 13 Style B AHLOA interfaces

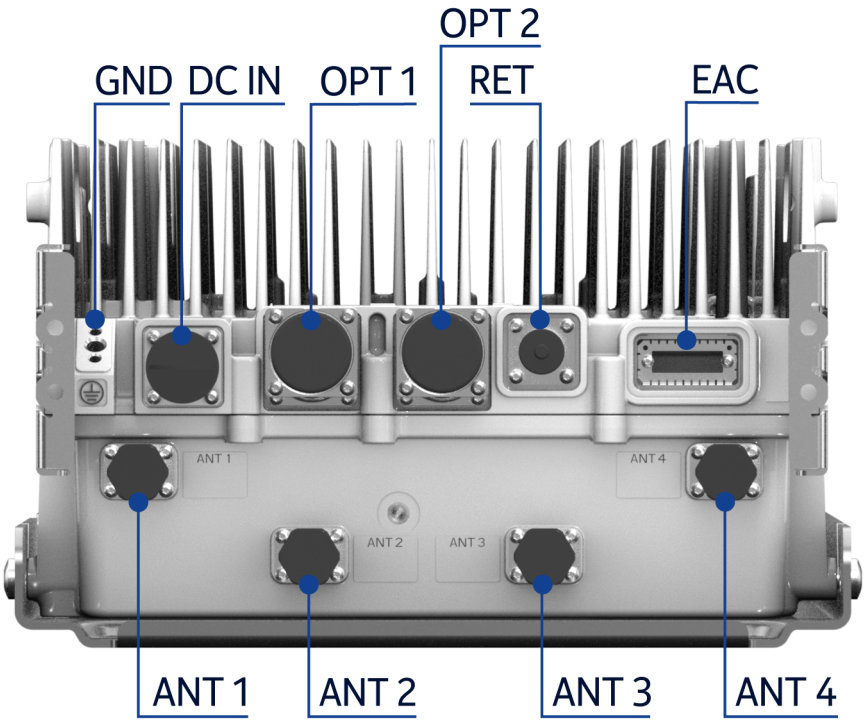


Table 77 AHLOA interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power Connector	DC IN	1	4-key high power circular connector	APPB, APPC, supports grounding for shielded cables
Antenna Connector	ANT	4	4.3-10	AISG on all ports, BiasT support on ANT1 & ANT3 Has features that prevent damage if mating with a 4.1-9.5 connector is attempted
Remote Electrical Tilt	RET	1	AISG C485	8-pin circular
External Alarm Connection	EAC	1	MDR-26	4 alarm inputs and 1 control output
Optical interface	OPT	2	SFP28, SFP+ (R2CT)	9.8 Gbps, CPRI, R2CT IP seal
Grounding	⏚	1	M8 or dual M5 screws	-

Table 77 AHLOA interfaces (Cont.)

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Fan	FAN	1	Microfit 2x3	Located on fin side

Antenna Line Devices (ALDs) support

Table 78 AHLOA interface for ALD support

Property	Value
AISG	2.0, 3.0
CWA (for non-AISG installations)	No
Voltage	14.5 V (ANT1 and ANT3 only)
Power per port	30 W, 45 W total

Note: Separate SW feature is required for ALD support.

Electrical specifications

Table 79 AHLOA electrical specifications

Property	Value
Nominal supply voltage	–48.0 V DC
Nominal input voltage range	–40.5 V DC to –57.0 V DC
Extended input voltage range	–36.0 V DC to –40.5 V DC –57.0 V DC to –60.0 V DC

Power consumption

Information on the estimated power consumption [W] at 48 VDC input in 23°C, RF output power per TX. Non-committed estimated values depend on the final product HW and SW optimization with +/– 10% margin.

Table 80 AHLOA power consumption

Property	Value [W]
Typical power consumption (4x60 W output power)	670 [ETSI Busy Hour Load at 8TX at 30 W (both bands active)] 515 [ETSI Busy Hour Load at 4TX at 30 W (one band active)]

Power Backoff

Table 81 Recommended AHLOA power backoff in 256 QAM mode (carrier spacing over 100 MHz)

Single carrier [dB]	Dual carrier [dB]	Triple carrier [dB]	Quad carrier [dB]
0	0.8	0.8	0.8

Related optional items

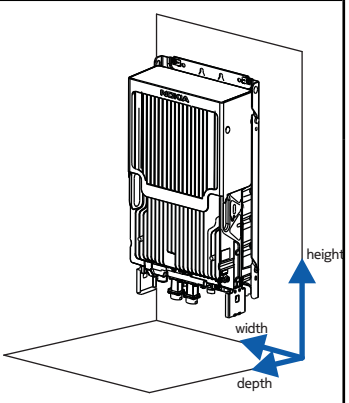
- FPKA Flexi Pole Mounting Kit (471649A)
- FPKC Flexi Pole Mounting Kit (472821A)
- AMFD AirScale 2 FPKx Fixing Adapter 600 (474293A)
- AMPA Pole Mounting Kit 30–120 mm (473879A)
- AMBH AirScale Book Mount Kit 176–200 (474280A)
- AMRC AirScale one clip rail 600 mm (474583A)
- AMRD AirScale one clip bracket over 200 (474580A)
- ASFC AirScale 2 Fan Unit 600 (474484A)
- APPB AirScale2 55A DC plug 3.3-10 mm^2 (474282A)
- APPC AirScale2 55A DC plug 10-16 mm^2 (474283A)
- ASAA AirScale 2 MDR26-open EAC cable 5 m (474288A)
- APAF AirScale AC PSU 1150 W

Installation options

- Wall
- Pole
- Vertical book mount
- Horizontal book mount (fan is required)
- One-clip mounting (with AMRC and AMRD)

Dimensions and weight

Table 82 AHLOA dimensions and weight

Property	Value	Dimensions orientation
Height	Core RRH: 560 mm (22.0 in.) With upper and lower mounting brackets: 675 mm (26.6 in.)	
Width	Core RRH: 308 mm (12.1 in.) With mounting brackets: 327 mm (12.9 in.)	
Depth	Core RRH: 189 mm (7.4 in.) With mounting brackets: 205 mm (8.1 in.)	
Weight	38 kg (83.8 lb)	

Environmental specifications

Table 83 AHLOA environmental specifications

Property	Value
Maximum operational outdoor temperature (in the shade) with fan or 10.8 km/h (6.7 mph) wind	55°C (131°F)
Maximum operational outdoor temperature (in the sun) with fan or 10.8 km/h (6.7 mph) wind	50°C (122°F)
Maximum indoor temperature	45°C (113°F)
Minimum operational temperature	–40°C (–40°F)
Cooling method	Convection
IP rating	IP65

Feature interdependencies

The following features are a prerequisite for the *5GC000719: AHLOA AirScale Dual RRH 4T4R B12/n71 240W* feature:

- *5GC000726: NR-LTE FDD Concurrent Operation for CPRI RUs*
- *5GC000836: FDD Lower Layer Support - 5-20 MHz Cell Bandwidth*
- *5GC000998: DU Configurations: Legacy FDD CPRI Radios (I)*

Warnings, cautions or notes related to the product

WARNING! Risk of electric shock.

Before turning RF power on, RF ports have to be terminated by nominal 50Ω load (for example, feeder with antenna). However, if these conditions are not met, the plastic caps that are delivered within the unused RF ports should remain in place. The plastic caps isolate RF power from the environment, and thus provide electric shock security in case RF power is accidentally on.

NOTICE: The RRH without a fan should always be mounted in a vertical orientation with connectors on the bottom side to ensure convection cooling.

Note: The minimum startup voltage is –40.5 V DC. If the input voltage is below/beyond extended limits, unit might shut down.

5 Radio units LEDs description

Table 84 LEDs for MAAs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded • Major alarm affecting the whole RF module • Major/Critical alarm affecting a module subcomponent or antenna carrier	Major/critical alarm
Yellow, stable	• Until software download begins • The carriers are blocked from BTS • There is no connection to any system module	No alarm
Yellow, blinking	• Software download in progress • Configuration in progress: RF resources are being setup, but not yet activated	No alarm
Green, stable	• Software configuration is complete or supervisory: RF resources activated and transmission is possible • Working normally, no alarm on the RF module	No alarm
Green, blinking	Software downloading and updating	No alarm
Stable Red for less than 5 seconds and changes to Stable Yellow	Switched ON, but the next conditions are not reached yet	No alarm
Stable Red for less than 5 seconds	The module is in the process of resetting	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting	No alarm

Table 85 LEDs for RRHs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault

Table 85 LEDs for RRHs (Cont.)

LED color	Description	Alarm
Red, blinking	Operation degraded • Major alarm affecting the whole RF module • Major/Critical alarm affecting a module subcomponent or antenna carrier	Major/critical alarm
Yellow, stable	• Until software download begins • The carriers are blocked from BTS • There is no connection to any system module	No alarm
Yellow, blinking	• Software download in progress • Configuration in progress: RF resources are being setup, but not yet activated	No alarm
Green, stable	• Software configuration is complete or supervisory: RF resources activated and transmission is possible • Working normally, no alarm on the RF module	No alarm
Green, blinking	Software downloading and updating	No alarm
Stable Red for less than 5 seconds and changes to Stable Yellow	Switched ON, but the next conditions are not reached yet	No alarm
Stable Red for less than 5 seconds	The module is in the process of resetting	No alarm
Periodic Red and Green	Antenna line faulty/degraded due to external factors (for example, VSWR minor/major values exceeded, Antenna line device faulty/degraded)	Alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting	No alarm

6 Compliance with EMC, RF and safety

EMC emission, EMC immunity, RF, and safety standards for BTS.

In Europe, this means compliance with Directive 2014/53/EU of the European Parliament and of the Council of 16 April 2014 on the harmonisation of the laws of the Member States relating to the making available on the market of radio equipment and repealing Directive 1999/5/EC Text with EEA relevance.

In other market areas additional compliance is fulfilled according to relevant authority requirements.

EMC emission

- Common:
  - ETSI EN 301 489-1: ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU
  - ETSI EN 301 489-50: ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 50: Specific conditions for Cellular Communication Base Station (BS), repeater and ancillary equipment; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU
  - EN 55032: Electromagnetic compatibility of multimedia equipment - Emission Requirements
  - ICES-003: Information Technology Equipment (ITE) – Limits and Methods of Measurement
  - FCC Code of Federal Regulations (CFR) 47, Part 15 Radio Frequency Devices
- MSR:
  - 3GPP TS 37.113: 3rd Generation Partnership Project; Technical Specification Group Radio Access Network; E-UTRA, UTRA and GSM/EDGE; Multi-Standard Radio (MSR) Base Station (BS) Electromagnetic Compatibility (EMC)
- GSM/EDGE:
  - 3GPP TS 51.021: 3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Base Station System (BSS) equipment specification; Radio aspects - Section 8 Radiated Spurious Emissions
- WCDMA:
  - 3GPP TS 25.113: 3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Base Station (BS) and repeater ElectroMagnetic Compatibility (EMC)
- LTE:
  - 3GPP TS 36.113: 3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) and repeater ElectroMagnetic Compatibility (EMC)

- 5G:
  - 3GPP TS 38.113: 3rd Generation Partnership Project; Technical Specification Group Radio Access Network; NR; Base Station (BS) ElectroMagnetic Compatibility (EMC)

EMC immunity

- Common:
  - ETSI EN 301 489-1: ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU and the essential requirements of article 6 of Directive 2014/30/EU
  - ETSI EN 301 489-50: ElectroMagnetic Compatibility (EMC) standard for radio equipment and services; Part 50: Specific conditions for Cellular Communication Base Station (BS), repeater and ancillary equipment; Harmonised Standard covering the essential requirements of article 3.1(b) of Directive 2014/53/EU
  - IEC 61000-4-8/EN 61000-4-8: Electromagnetic compatibility (EMC) – Part 4-8: Testing and measurement techniques – Power frequency magnetic field immunity test
  - IEC 61000-4-9 / EN 61000-4-9: Electromagnetic compatibility (EMC). Part 4-9: Testing and measurement techniques. Pulse magnetic field immunity test

- MSR:
  - 3GPP TS 37.113: 3rd Generation Partnership Project; Technical Specification Group Radio Access Network; E-UTRA, UTRA and GSM/EDGE; Multi-Standard Radio (MSR) Base Station (BS) Electromagnetic Compatibility (EMC)

- WCDMA:
  - 3GPP TS 25.113: 3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Base Station (BS) and repeater ElectroMagnetic Compatibility (EMC)

- LTE:
  - 3GPP TS 36.113: 3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) and repeaterElectroMagnetic Compatibility (EMC)

- 5G:
  - 3GPP TS 38.113: 3rd Generation Partnership Project; Technical Specification Group Radio Access Network; NR; Base Station (BS) ElectroMagnetic Compatibility (EMC)

RF

- Common:

  - ETSI EN 301 908-1: IMT cellular networks; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive; Part 1: Introduction and common requirements
  - FCC Code of Federal Regulations (CFR) 47, Part 2: Frequency Allocations and Radio Treaty Matters; General Rules and Regulations
  - FCC Code of Federal Regulations (CFR) 47, Part 22: Public mobile Services (2110-2130MHz and 2160-2180MHz)
  - FCC Code of Federal Regulations (CFR) 47, Part 24: Personal Communication Services
  - FCC Code of Federal Regulations (CFR) 47, Part 25: Satellite Communications
  - FCC Code of Federal Regulations (CFR) 47, Part 27: Miscellaneous Wireless Communications Services (758-763MHz and 788-793MHz) (1710-1755MHz and 2110-2155MHz)
  - FCC Code of Federal Regulations (CFR) 47, Part 90: Private Land Mobile Radio Services
  - RSS-Gen: General Requirements and Information for the Certification of Radio Apparaturs
  - RSS-130: Mobile Broadband Services (MBS) Equipment Operating in the Frequency Bands 698-756 MHz and 777-787 MHz
  - RSS-132: Cellular Telephones Employing New Technologies Operating in the Bands 824-849 MHz and 869-894 MHz
  - RSS-133: 2GHz Personal Communications Services
  - RSS-139: Advanced Wireless Services Equipment Operating in the Bands 1710-1755 MHz and 2110-2155 MHz
  - RSS-195: Wireless Communication Service (WCS) Equipment Operating in the Bands 2305-2320 MHz and 2345-2360 MHz
  - RSS-199: Broadband Radio Service (BRS) Equipment Operating in the Band 2500-2690

- MSR:
  - ETSI EN 301 908-18: IMT cellular networks; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive; Part 18: E-UTRA, UTRA and GSM/EDGE Multi-Standard Radio (MSR) Base Station (BS)
  - 3GPP TS 37.141: 3rd Generation Partnership Project; Technical Specification Group Radio Access Network; E-UTRA, UTRA and GSM/EDGE; Multi-Standard Radio (MSR) Base Station (BS) conformance testing

- GSM/EDGE:
  - ETSI EN 301 502: Global System for Mobile communications (GSM); Harmonized EN for Base Station Equipment covering the essential requirements of article 3.2 of the R&TTE Directive
  - 3GPP TS 51.021: 3rd Generation Partnership Project; Technical Specification Group GSM/EDGE Radio Access Network; Base Station System (BSS) equipment specification; Radio aspects

- WCDMA:

- ETSI EN 301 908-3: IMT cellular networks; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive; Part 3: CDMA Direct Spread (UTRA FDD) Base Stations (BS)
- 3GPP TS 25.141: 3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Base Station (BS) conformance testing (FDD)
- Telec-T112

- LTE:
  - ETSI EN 301 908-14: IMT cellular networks; Harmonized EN covering the essential requirements of article 3.2 of the R&TTE Directive; Part 14: Evolved Universal Terrestrial Radio Access (E-UTRA) Base Stations (BS)
  - 3GPP TS 36.141: 3rd Generation Partnership Project; Technical Specification Group Radio Access Network; Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) conformance testing
  - Telec-T139
  - Telec-T146
  - Telec-T156

- 5G:
  - 3GPP TS 38.141-1: 3rd Generation Partnership Project; Technical Specification Group RAN; NR; Base Station (BS) conformance testing Part 1: Conducted conformance testing
  - 3GPP TS 38.141-2: 3rd Generation Partnership Project; Technical Specification Group RAN; NR; Base Station (BS) conformance testing Part 2: Radiated conformance testing

Safety

- EN 50385: Product standard to demonstrate the compliances of radio base stations and fixed terminal stations for wireless telecommunications systems with the basic restrictions or the reference levels related to human exposure to radio frequency electromagnetic fields (110 MHz - 100 GHz) - General public
- IEC 60950-1/EN 60950-1/UL 60950-1/CSA C22.2 No. 60950-1: Information technology equipment - Safety - Part 1: General requirements
- IEC 60950-22/EN 60950-22: Information technology equipment - Safety - Part 22: Equipment installed outdoor