

# **LTE Radio Access, Rel. FDD- LTE 16A, Operating Documentation, Issue 01**

## **Flexi Multiradio BTS RF Module and Remote Radio Head Description**

**DN0951745**

**Issue 20**

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## Summary of changes

Changes between document issues are cumulative. Therefore, the latest document issue contains all changes made to previous issues.

This document is common for all Radio Access Technologies (RAT). You may find here information about solutions that are not available or supported in a specific SW release or RAT. Table *RAT releases covered by the document* lists all SW releases covered by the content of this document. For features supported in your SW release, see respective feature documentation chapter in the system library.

**Table 1** Releases covered by the document

Product	Release
GSM/EDGE (BSS)	RG40 (BSS), GSM 16
WCDMA RAN	RU50, RU50 EP1, WCDMA 16
Long Term Evolution	RL70, FDD-LTE 15A, FDD-LTE 16, FDD-LTE 16A

### Changes between issues 19 (2016-05-23) and 20 (2016-06-23) Flexi RF Module 3TX 850 (FXCB)

- Table 105: FXCB power consumption: LTE mode has been added.

### Flexi RFM 3-pipe 1800 240 W (FXEF)

- Table 141: FXEF power consumption: GSM mode has been added.
- Figure 33: FXEF functional block diagram has been updated.

### Flexi RF Module 3TX 1900 (FXFC)

- Table 150: FXFC power consumption: LTE mode has been added.

### Flexi RFM 3-pipe 2100 240 W (FRGX)

- Figure 43: FRGX functional block diagram has been updated.
- Table 188: FXEF power consumption has been added.

### Flexi RF Module 6TX 2600 (FRHC)

- Table 224: FRHC power consumption has been updated.

### Flexi RFM 6-pipe 1450 360 W (FRSA)

- Table 269: FRSA power consumption: LTE mode has been updated.

### Flexi RFM 6-pipe 1800 360 W (FXED)

- Table 278: FXED power consumption: GSM mode has been updated.

### Flexi RRH 2-pipe 700/840 100 W (FHPC)

- Table 401: FHPC interfaces: RF external connector number of interfaces has been updated.
- Table 405: FHPC installation and mechanical specifications: information on Flexi Pole Mounting Bracket (FMFC) has been added.
- Figure 91: FHPC functional block diagram has been updated.

### Flexi RRH 2-pipe 1800 120 W (FHEF)

- [Table 423: FHEF power consumption](#) has been updated.

#### **Flexi RRH 2-pipe 450 80 W (FRAA)**

- [Table 487: FRAA installation and mechanical specifications](#): information on book mount has been updated.

#### **Flexi RRH 2-pipe 850 80 W (FRCC)**

- [Table 496: FRCC installation and mechanical specifications](#): information on book mount has been updated.

#### **Flexi RRH 2-pipe 850 120 W (FRCG)**

- [Table 505: FRCG installation and mechanical specifications](#): information on book mount has been updated.

#### **Flexi RRH 2-pipe 873 120 W (FRCJ)**

- [Table 513: FRCJ installation and mechanical specifications](#): information on book mount and Book Mount HW Kit have been updated.
- [Figure 114: FRCJ interfaces](#) has been updated.

#### **Flexi RRH 2-pipe 2100 120 W (FRGY)**

- [Table 521: FRGY power consumption](#): MSR mode has been added.
- [Table 522: FRGY installation and mechanical specifications](#): information on book mount has been updated.

#### **Flexi RRH 4-pipe 2300 120 W (FRNC)**

- 
- [Figure 118: FRNC interfaces](#) has been updated.
- [Table 531: FRNC installation and mechanical specifications](#): information on book mount has been updated.

#### **Flexi RRH 4-pipe 720/730 160 W (FRBG)**

- [Table 540: FRBG installation and mechanical specifications](#): information on book mount has been updated.

#### **Flexi RRH 4-pipe 720/750 160 W (FRBE)**

- [Table 549: FRBE installation and mechanical specifications](#): information on book mount has been updated.

#### **Flexi RRH 4-pipe 760 160 W (FRBF)**

- [Table 558: FRBF installation and mechanical specifications](#): information on book mount has been updated.

#### **Flexi RRH 4-pipe 1800 160 W (FHED)**

- [Table 567: FHED installation and mechanical specifications](#): information on book mount has been updated.

#### **Flexi RRH 4-pipe 1800 160 W (FHEH)**

- [Table 576: FHEH installation and mechanical specifications](#): information on book mount has been updated.

#### **Flexi RRH 4-pipe 2600 160 W (FRHG)**

- [Table 594: FRHG installation and mechanical specifications](#): information on book mount has been updated.

**Changes between issues 18 (2016-04-22) and 19 (2016-05-23)  
Flexi RF Module 3TX 1800 (FXEB)**

- [Table 119: FXEB functional specification](#): DL instantaneous bandwidth has been updated.
- [Table 123: FXEB power consumption](#): MSR mode has been added.

**Flexi RFM 3-pipe 1800 240 W (FXEF)**

- [Table 141: FXEF power consumption](#): GSM mode has been removed and LTE mode has been updated.

**Flexi RFM 6-pipe 700 240 W (FRPD)**

- Information on Fast Delivery Mode support has been added.

**Flexi RRH 4-pipe 2100 120 W (FHGB)**

- [Table 455: FHGB functional specification](#): 2x60 W mode has been added.
- [Table 459: FHGB power consumption](#) has been updated.

**Changes between issues 17 (2016-04-12) and 18 (2016-04-22)  
Flexi RRHs Rel.4 compatibility with Nokia AirScale Radios**

- Chapter has been added.

**Flexi RF Module 3TX 850 (FXCB)**

- [Table 105: FXCB power consumption](#): WCDMA mode has been updated.

**Flexi RFM 3-pipe 1800 240 W (FXEF)**

- Chapter has been added.

**Flexi RFM 6-pipe 700 240 W (FRPD)**

- Chapter has been added.

**Flexi RFM 6-pipe 1450 360 W (FRSA)**

- Chapter has been added.

**Flexi RRH 2-pipe 450 80 W (FRAA)**

- [Table 487: FRAA installation and mechanical specifications](#): book mount installation option and Corona 2T2R Book Mount HW Kit (FMFH) have been added.

**Flexi RRH 2-pipe 850 80 W (FRCC)**

- [Table 496: FRCC installation and mechanical specifications](#): book mount installation option and Corona 4T4R Book Mount HW Kit (FMFB) have been added.

**Flexi RRH 2-pipe 850 120 W (FRCG)**

- [Table 505: FRCG installation and mechanical specifications](#): book mount installation option and Corona 4T4R Book Mount HW Kit (FMFB) have been added.

**Flexi RRH 2-pipe 873 120 W (FRCJ)**

- Chapter has been added.

**Flexi RRH 2-pipe 2100 120 W (FRGY)**



- [Table 522: FRGY installation and mechanical specifications](#): book mount installation option and Corona 2T2R Book Mount HW Kit (FMFH) have been added.

**Flexi RRH 4-pipe 2300 120 W (FRNC)**

- [Table 531: FRNC installation and mechanical specifications](#): book mount installation option and Corona 4T4R Book Mount HW Kit (FMFB) have been added.

**Flexi RRH 4-pipe 720/730 160 W (FRBG)**

- [Table 540: FRBG installation and mechanical specifications](#): book mount installation option and Corona 4T4R Book Mount HW Kit (FMFB) have been added.

**Flexi RRH 4-pipe 720/750 160 W (FRBE)**

- [Table 549: FRBE installation and mechanical specifications](#): book mount installation option and Corona 4T4R Book Mount HW Kit (FMFB) have been added.

**Flexi RRH 4-pipe 760 160 W (FRBF)**

- [Table 558: FRBF installation and mechanical specifications](#): book mount installation option and Corona 4T4R Book Mount HW Kit (FMFB) have been added.

**Flexi RRH 4-pipe 1800 160 W (FHED)**

- [Table 567: FHED installation and mechanical specifications](#): book mount installation option and Corona 4T4R Book Mount HW Kit (FMFB) have been added.

**Flexi RRH 4-pipe 1800 160 W (FHEH)**

- [Table 576: FHEH installation and mechanical specifications](#): book mount installation option and Corona 4T4R Book Mount HW Kit (FMFB) have been added.

**Flexi RRH 4-pipe 1900 160 W (FHFB)**

- [Table 585: FHFB installation and mechanical specifications](#): book mount installation option and Corona 4T4R Book Mount HW Kit (FMFB) have been added.

**Flexi RRH 4-pipe 2600 160 W (FRHG)**

- [Table 594: FRHG installation and mechanical specifications](#): book mount installation option and Corona 4T4R Book Mount HW Kit (FMFB) have been added.

# 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.

## 2 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.

### 3 CE marking

#### Declaration of Conformity with Regard to the EU Directive 1999/5/EC (R&TTE Directive)

Hereby, Nokia declares that this equipment is in compliance with the essential requirements and other relevant provisions of Directive: 1999/5/EC.

Figure 1 List of countries respecting EU Directive 1999/5/EC

<b>CE Ⓢ R&amp;TTE Directive 1995/5/EC</b>							
AT	✓	FR	✓	LV	✓	LI	✓
BE	✓	DE	✓	LT	✓	RO	✓
BG	✓	GB	✓	LU	✓	SK	✓
CY	✓	GR	✓	MT	✓	SI	✓
CZ	✓	HU	✓	NL	✓	ES	✓
DK	✓	IS	✓	NO	✓	SE	✓
EE	✓	IE	✓	PL	✓	CH	✓
FI	✓	IT	✓	PT	✓	TR	✓

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

## 4 FCC Part 15 compliance

This equipment has been tested and found to comply with the limits for a Class A 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, might 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.

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## 5 RF Performance

*The topic describes the radios RF sensitivity and TX output power tolerance.*

### **RF sensitivity**

Nokia Flexi radios have superior field proven RX sensitivity which correlates as top uplink performance without any compromises to the uplink coverage. Accuracy was maintained during the Uplink performance tests by following 3GPP standard 36.104 and using real commercial radio hardware units. The receiver sensitivity results of up to -106.6 dBm have been measured using commercial radio hardware under realistic circumstances, ultimately this produces accurate mean -106.3 dBm.

### **TX output power tolerance**

Nokia Flexi radios power amplifier design brings benefits to the wider operating and instantaneous bandwidth radio units. This design produces a competitive output power tolerance which is less than +/-0.8dB. The benefit produces robust power amplifier design is the high maximum downlink throughput levels in real operating environments.

## 6 Flexi RRHs Rel.4 compatibility with Nokia AirScale Radios

*Flexi RRHs Rel.4 are compatible with Nokia AirScale Radio via conversion kit.*

Flexi RRHs Rel.4 have forward-compatibility with Nokia AirScale Radios. Using a conversion kit, Flexi RRH Rel.4 can be installed with AirScale Radio in a book mount option. The conversion kits are:

- Corona 2T2R Book Mount HW Kit (FMFH)
- Corona 4T4R Book Mount HW Kit (FMFB)

FMFH and FMFB are optional items.

For more information on AirScale Radios, see *Nokia AirScale Radio Description DN09236379*.

## 7 Descriptions of 3TX RF Modules

### 7.1 Flexi RF Module 3TX 800 (FRMA)

*FRMA technical specifications.*

#### Functional description

Table 2 FRMA functional specification

Property	Value
Output power	3x60 W
MIMO	2TX
Outdoor installation	Yes
SW supported technology	FDD-LTE
TX frequency range	791-821 MHz
RX frequency range	832-862 MHz
DL instantaneous bandwidth	20 MHz
UL instantaneous bandwidth	20 MHz
DL filter bandwidth	30 MHz
UL filter bandwidth	30 MHz

#### Interfaces

Figure 2 FRMA interfaces

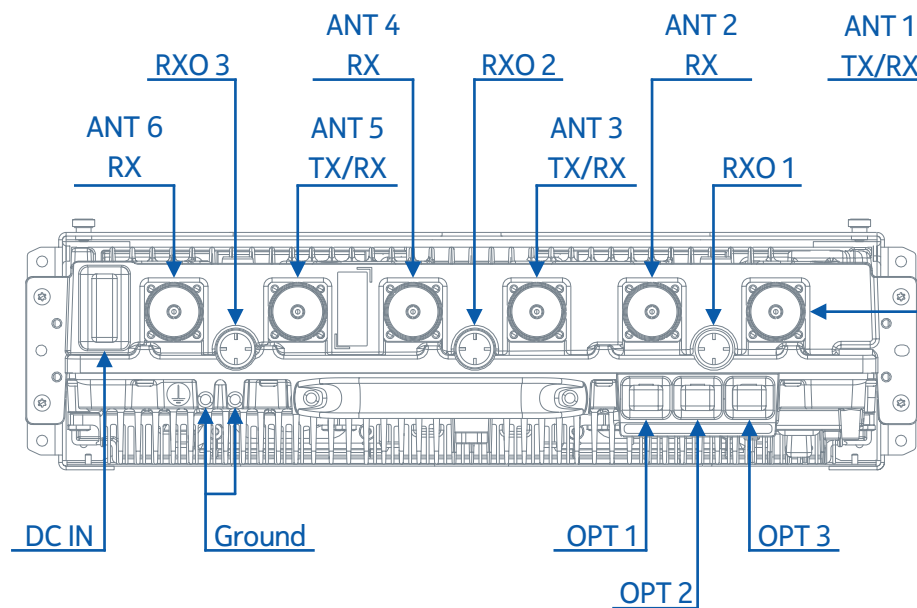




Table 3 FRMA interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	2-pin multibeam XL	-
Antenna connector	ANT	6	7/16	-
RF output connector	RxO	3	QMA </td <td>-</td>	-
Optical interface	OPT	3	SFP	3 Gbps

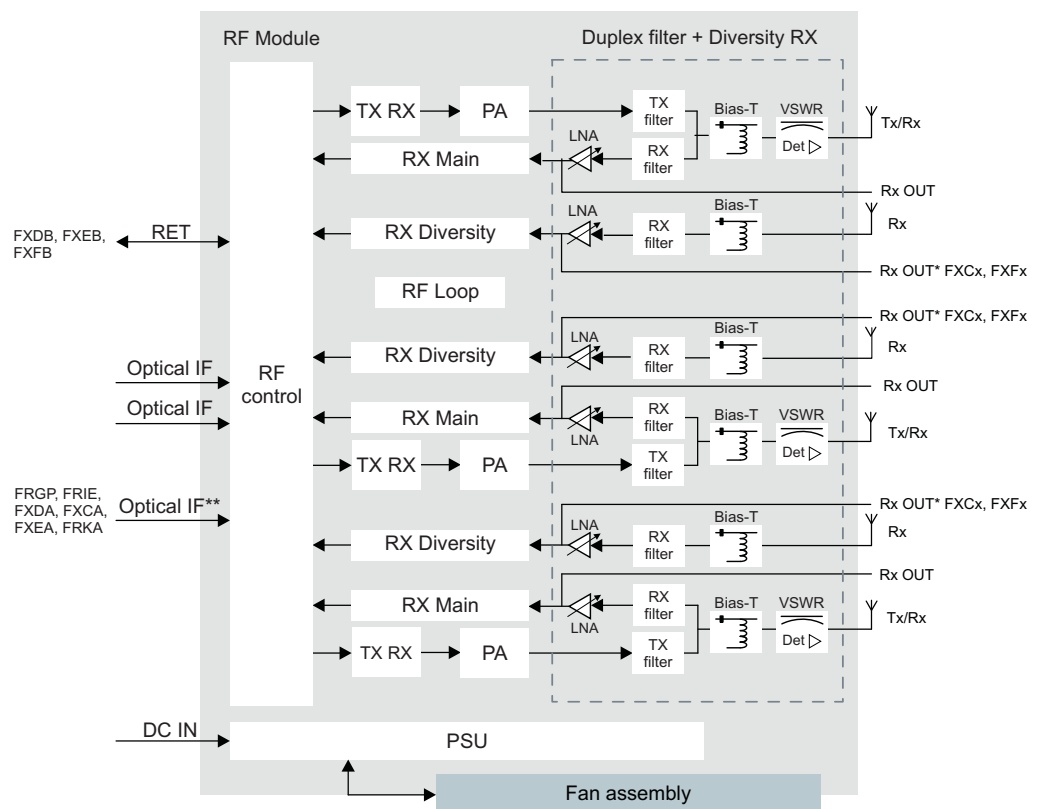
**Antenna Line Devices (ALDs) support**

Table 4 FRMA ALD support

ALD support via antenna ports	Value
AISG	ANT1, ANT3, ANT5: AISG 2.0
Proprietary AISG 1.1	No
CWA (for non-AISG installations)	No
Voltage	ANT1, ANT3, ANT5: 24 V
Power per port	30 W

**Functional block diagram**

Figure 3 FRMA functional block diagram



**Electrical specifications**

*Table 5* FRMA 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**

*Table 6* FRMA power consumption

Number of TXs	RF output power per TX [W]	Estimated power consumption [W] at 48VDC input at 23°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin	
		50% RF Load	100% RF Load
3	60	669	943
	40	510	673
	20	374	450

**Installation and mechanical specifications**

*Table 7* FRMA installation and mechanical specifications

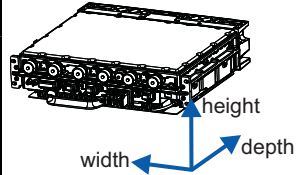
Property	Value
Installation options	<ul style="list-style-type: none"> <li>• floor/stack installation</li> <li>• pole installation</li> <li>• wall installation</li> <li>• 19" rack/cabinet</li> </ul>
IP rating	IP65
Related optional items	FRMA includes casing <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Pole Kit (FPKA)</li> <li>• Flexi Pole Kit (FPKC)</li> <li>• Flexi Mounting Covers for Back and Front (FMCx)</li> </ul> Pole installation <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Pole Kit (FPKA)</li> <li>• Flexi Pole Kit (FPKC)</li> <li>• Pole Mounting Kit (VMPB)</li> <li>• Flexi Mounting Covers for Back and Front (FMCx)</li> </ul>

**Table 7** FRMA installation and mechanical specifications (Cont.)

Property	Value
	Floor/Wall installation <ul style="list-style-type: none"> <li>Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>Flexi Mounting Covers for Back and Front (FMCx)</li> </ul> Outdoor 19" rack <ul style="list-style-type: none"> <li>Flexi Mounting Covers for Back and Front (FMCx)</li> </ul> Cabinet/indoor 19" rack <ul style="list-style-type: none"> <li>No optional items needed</li> </ul>

**Dimensions and weight**

**Table 8** FRMA dimensions and weight

Property	Value	Dimensions orientation
Height	133 mm/ 3U (5.2 in.)	
Depth	Without front covers: 422 mm (16.6 in.) With front covers: 560 mm (22.1 in.)	
Width	Without front covers: 447 mm (17.6 in.) With front covers: 492 mm (19.4 in.)	
Weight	25 kg (55.1 lb)	
Volume	25 l	

**Environmental specifications**

**Table 9** FRMA environmental specifications

Property	Value
Maximum operational outdoor temperature (at constant high ambient temperature maximum output power might be limited)	+55°C (131°F)
Minimum operational temperature (including cold start)	-35°C (-31°F)

**LEDs**

Table 10 FRMA LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Major alarm affecting the whole RF Module</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm
RF Module fan/TX status LED: Red	At least one fan is faulty or degraded	-
RF Module fan/TX status LED: Green	All fans are working	-

Table 10 FRMA LEDs (Cont.)

LED color	Description	Alarm
RF Module fan/TX status LED: Color set according to fan status, stable	RF transmission is ON	-
RF Module fan/TX status LED: Color set according to fan status, blinking	RF transmission is OFF	-

**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 50 Ω 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.



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

## 7.2 Flexi RF Module 3TX 800 (FRMD)

*FRMD technical specifications.*

**Functional description**

Table 11 FRMD functional specification

Property	Value
Output power	3x60 W
MIMO	2TX
Outdoor installation	Yes
SW supported technology	FDD-LTE
TX frequency range	791-806 MHz
RX frequency range	832-847 MHz
DL instantaneous bandwidth	15 MHz
UL instantaneous bandwidth	15 MHz
DL filter bandwidth	15 MHz
UL filter bandwidth	15 MHz

**Interfaces**

Figure 4 FRMD interfaces

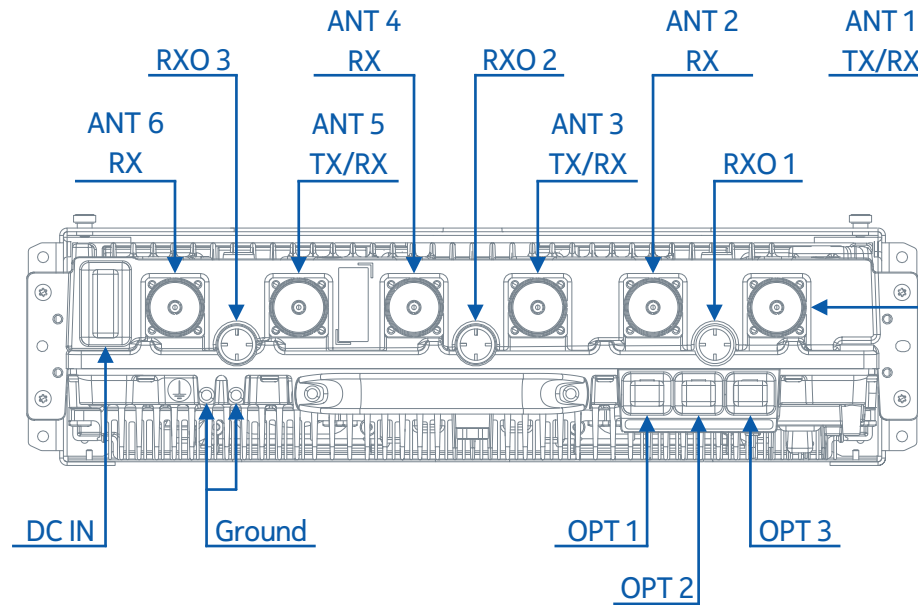


Table 12 FRMD interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	2-pin multibeam XL	-
Antenna connector	ANT	6	7/16	-
RF output connector	RxO	3	QMA	-
Optical interface	OPT	3	SFP	3 Gbps

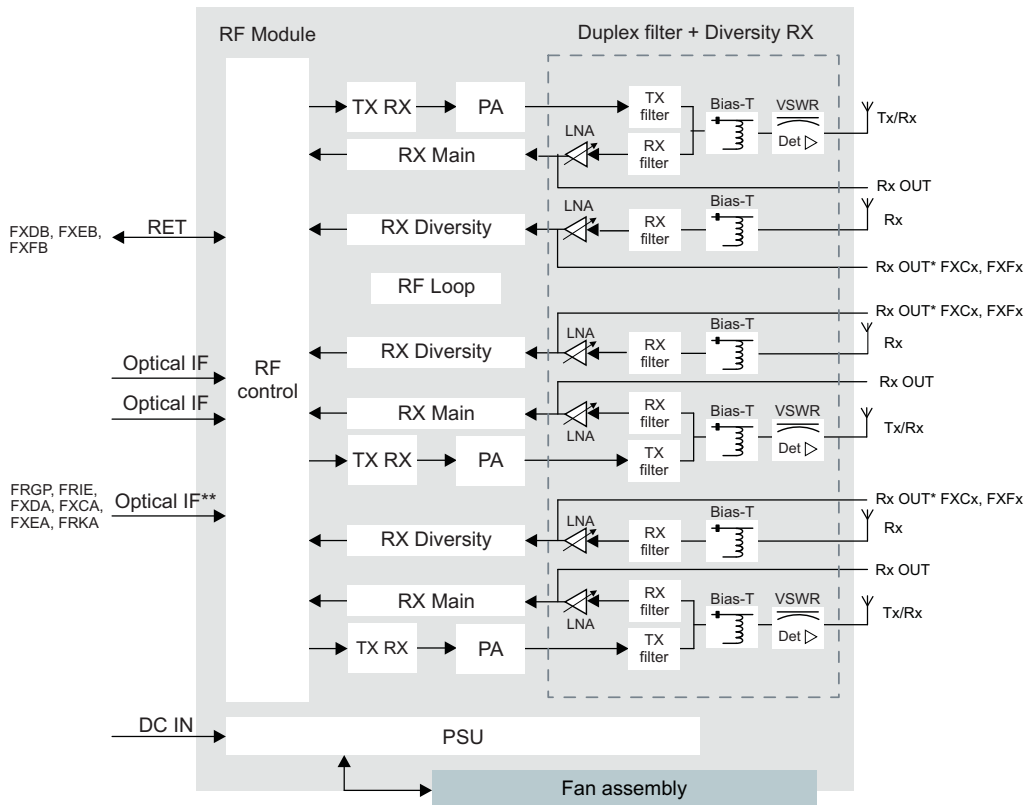
**Antenna Line Devices (ALDs) support**

Table 13 FRMD ALD support

ALD support via antenna ports	Value
AISG	ANT1, ANT3, ANT5: AISG 2.0
Proprietary AISG 1.1	No
CWA (for non-AISG installations)	No
Voltage	ANT1, ANT3, ANT5: 24 V
Power per port	30 W

**Functional block diagram**

Figure 5 FRMD functional block diagram



**Electrical specifications**

Table 14 FRMD 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**

Table 15 FRMD power consumption

Number of TXs	RF output power per TX [W]	Estimated power consumption [W] at 48VDC input at 23°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin	
		50% RF Load	100% RF Load
3	60	621	826
	40	486	616
	20	369	435

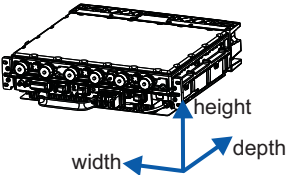
**Installation and mechanical specifications**

**Table 16** FRMD installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• floor/stack installation</li> <li>• pole installation</li> <li>• wall installation</li> <li>• 19" rack/cabinet</li> </ul>
IP rating	IP65
Related optional items	<p>Pole installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Pole Kit (FPKA)</li> <li>• Flexi Pole Kit (FPKC)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Floor/Wall installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Outdoor 19" rack</p> <ul style="list-style-type: none"> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Cabinet/indoor 19" rack</p> <ul style="list-style-type: none"> <li>• No optional items needed</li> </ul>

**Dimensions and weight**

**Table 17** FRMD dimensions and weight

Property	Value	Dimensions orientation
Height	133 mm/ 3U (5.2 in.)	
Depth	Without front covers: 422 mm (16.6 in.) With front covers: 560 mm (22.1 in.)	
Width	Without front covers: 447 mm (17.6 in.) With front covers: 492 mm (19.4 in.)	
Weight	25 kg (55.1 lb)	
Volume	25 l	

**Environmental specifications**



**Table 18** FRMD environmental specifications

Property	Value
Maximum operational outdoor temperature (at constant high ambient temperature maximum output power might be limited)	+55°C (131°F)
Minimum operational temperature (including cold start)	-35°C (-31°F)

**LEDs**

**Table 19** FRMD LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Major alarm affecting the whole RF Module</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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

Table 19 FRMD LEDs (Cont.)

LED color	Description	Alarm
Periodic Red and Green	Antenna line device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm
RF Module fan/TX status LED: Red	At least one fan is faulty or degraded	-
RF Module fan/TX status LED: Green	All fans are working	-
RF Module fan/TX status LED: Color set according to fan status, stable	RF transmission is ON	-
RF Module fan/TX status LED: Color set according to fan status, blinking	RF transmission is OFF	-

**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 50 Ω 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.



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

### 7.3 Flexi RFM 3-pipe 850 180 W (FXCA)

*FXCA technical specifications.*

**Functional description**

Table 20 FXCA functional specification

Property	Value
Output power	3x60 W
MIMO	No
Outdoor installation	Yes
SW supported technologies	GSM, WCDMA, FDD-LTE
TX frequency range	869-894 MHz 30x version: 852-894 MHz
RX frequency range	824-849 MHz 30x version: 807-849 MHz

Table 20 FXCA functional specification (Cont.)

Property	Value
DL instantaneous bandwidth	15 MHz, 18 MHz in GSM dedicated mode
UL instantaneous bandwidth	15 MHz, 18 MHz in GSM dedicated mode
DL filter bandwidth	15 MHz, 18 MHz in GSM dedicated mode
UL filter bandwidth	15 MHz, 18 MHz in GSM dedicated mode

**Interfaces**

Figure 6 FXCA interfaces

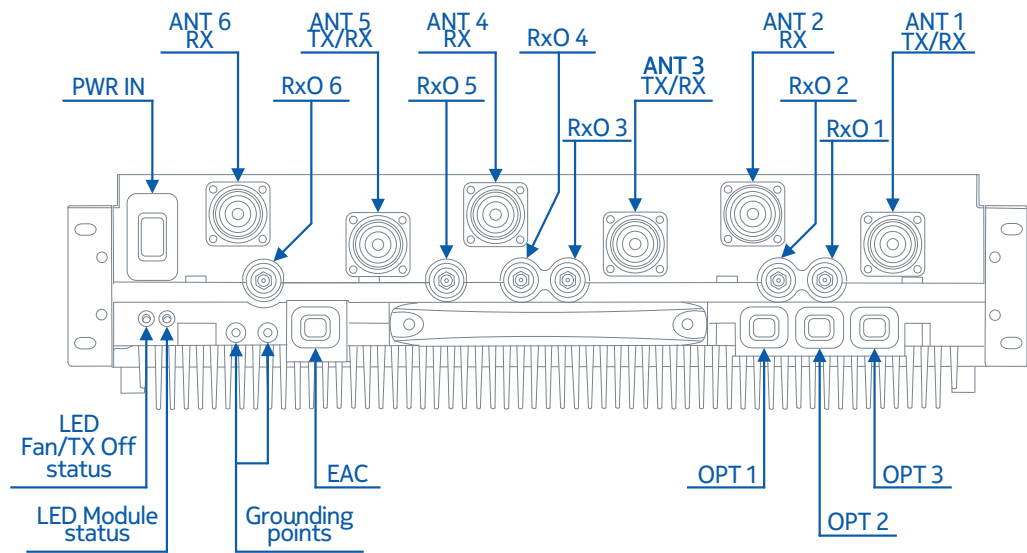


Table 21 FXCA interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	2-pin multibeam XL	-
Antenna connector	ANT	6	7/16	-
RF output connector	RxO	3	QMA	-
External Alarm Connection	EAC	1	RJ45	-
Optical interface	OPT	3	SFP	3 Gbps

**Antenna Line Devices (ALDs) support**

Table 22 FXCA ALD support

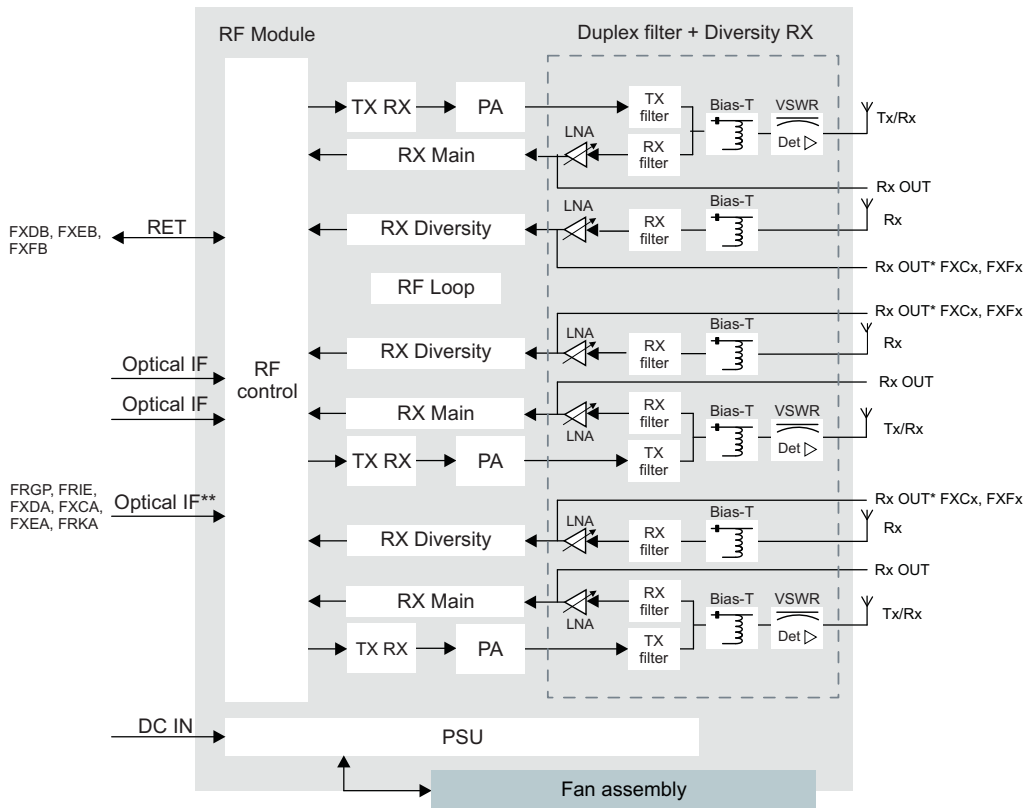
ALD support via antenna ports	Value
AISG	ANT1, ANT3, ANT5: AISG 2.0
Proprietary AISG 1.1	Yes
CWA (for non-AISG installations)	Yes

Table 22 FXCA ALD support (Cont.)

ALD support via antenna ports	Value
Voltage	ANT1, ANT3, ANT5: 24 V or 12 V ANT2, ANT4, ANT6: 12 V
Power per port	30 W

Functional block diagram

Figure 7 FXCA functional block diagram



Electrical specifications

Table 23 FXCA 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

Table 24 FXCA power consumption

Number of TXs	RF output power per TX [W]	Estimated power consumption [W] at 48VDC input at 23°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin	
		50% RF Load	100% RF Load
3	60	545	794
	40	468	644
	20	393	494

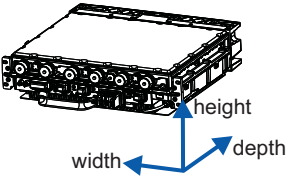
**Installation and mechanical specifications**

Table 25 FXCA installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• floor/stack installation</li> <li>• pole installation</li> <li>• wall installation</li> <li>• 19" rack/cabinet</li> </ul>
IP rating	IP65
Related optional items	<p>Pole installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Pole Kit (FPKA)</li> <li>• Flexi Pole Kit (FPKC)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Floor/Wall installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Outdoor 19" rack</p> <ul style="list-style-type: none"> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Cabinet/indoor 19" rack</p> <ul style="list-style-type: none"> <li>• No optional items needed</li> </ul>

**Dimensions and weight**

**Table 26** FXCA dimensions and weight

Property	Value	Dimensions orientation
Height	133 mm/ 3U (5.2 in.)	
Depth	Without front covers: 422 mm (16.6 in.) With front covers: 560 mm (22.1 in.)	
Width	Without front covers: 447 mm (17.6 in.) With front covers: 492 mm (19.4 in.)	
Weight	25 kg (55.1 lb)	
Volume	25 l	

**Environmental specifications**

**Table 27** FXCA environmental specifications

Property	Value
Maximum operational outdoor temperature (at constant high ambient temperature maximum output power might be limited)	+55°C (131°F)
Minimum operational temperature (including cold start)	-35°C (-31°F)

**LEDs**

**Table 28** FXCA LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Major alarm affecting the whole RF Module</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm

Table 28 FXCA LEDs (Cont.)

LED color	Description	Alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm
RF Module fan/TX status LED: Red	At least one fan is faulty or degraded	-
RF Module fan/TX status LED: Green	All fans are working	-
RF Module fan/TX status LED: Color set according to fan status, stable	RF transmission is ON	-
RF Module fan/TX status LED: Color set according to fan status, blinking	RF transmission is OFF	-

**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 50 Ω 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.



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

## 7.4 Flexi RF Module 3TX 900 (FXDA)

*FXDA technical specifications.*

### Functional description

Table 29 FXDA functional specification

Property	Value
Output power	3x60 W
MIMO	2TX
Outdoor installation	Yes
SW supported technologies	GSM, WCDMA, FDD-LTE
TX frequency range	925-960 MHz
RX frequency range	880-915 MHz
DL instantaneous bandwidth	20 MHz
UL instantaneous bandwidth	20 MHz
DL filter bandwidth	20 MHz
UL filter bandwidth	20 MHz

### Interfaces

Figure 8 FXDA interfaces

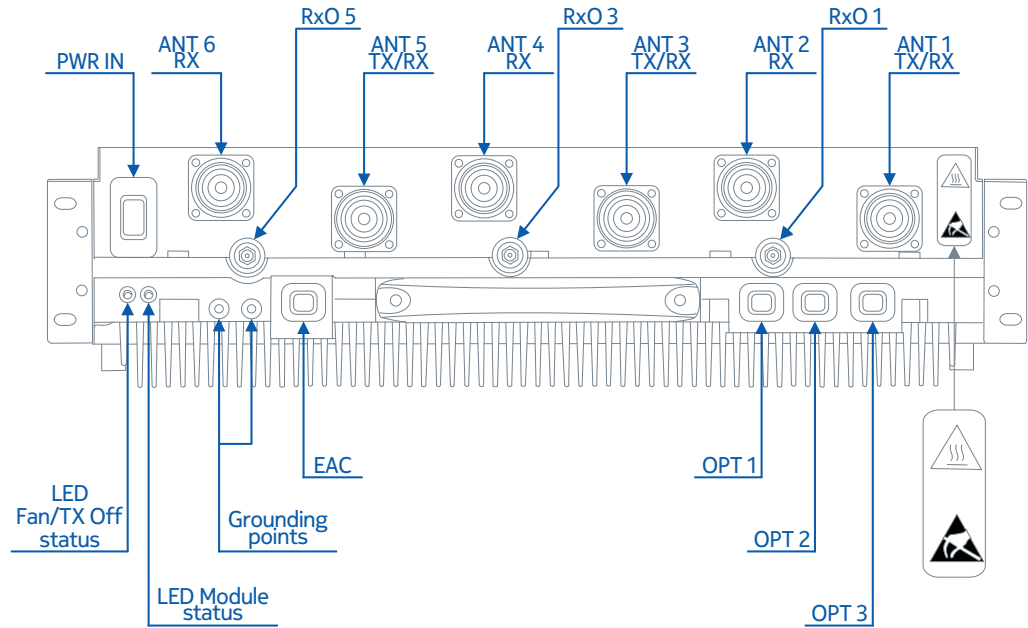


Table 30 FXDA interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	PWR IN	1	2-pin multibeam XL	-



*Table 30* FXDA interfaces (Cont.)

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Antenna connector	ANT	6	7/16	-
RF output connector	RxO	3	QMA	-
External Alarm Connection	EAC	1	RJ45	-
Optical interface	OPT	3	SFP	3 Gbps

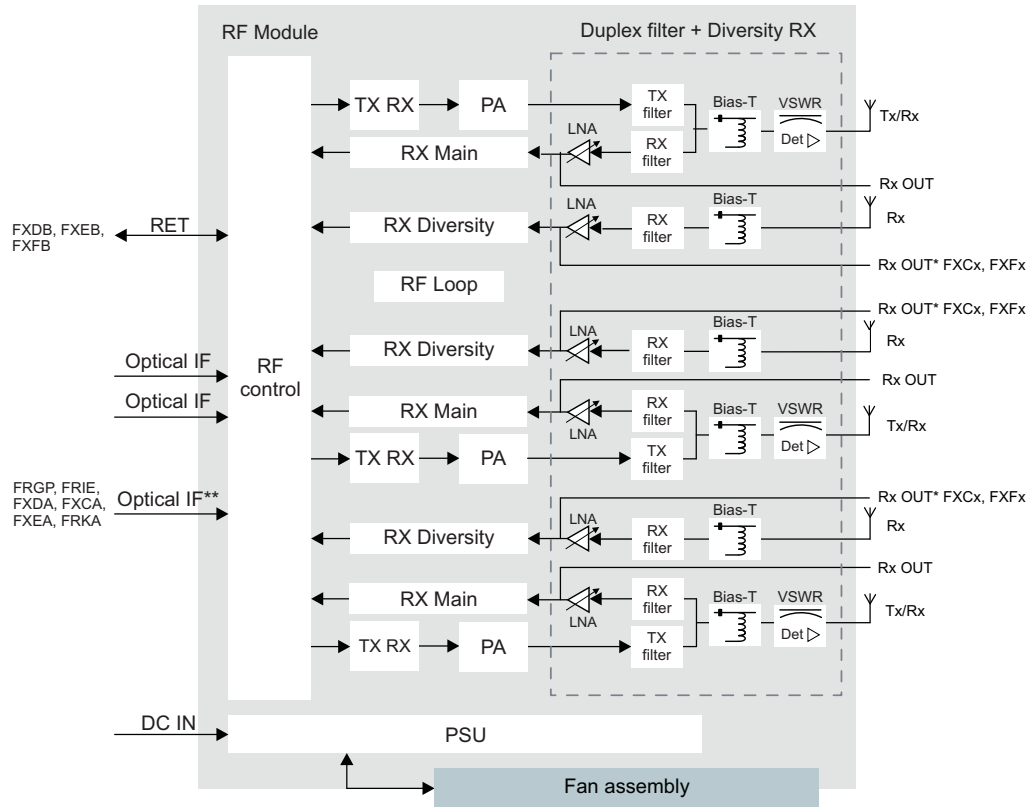
**Antenna Line Devices (ALDs) support**

*Table 31* FXDA ALD support

ALD support via antenna ports	Value
AISG	ANT1, ANT3, ANT5: AISG 2.0
Proprietary AISG 1.1	Yes
CWA (for non-AISG installations)	Yes
Voltage	ANT1, ANT3, ANT5: 24 V or 12 V ANT2, ANT4, ANT6: 12 V
Power per port	30 W

**Functional block diagram**

Figure 9 FXDA functional block diagram



**Electrical specifications**

Table 32 FXDA 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**

Table 33 FXDA power consumption

Number of TXs	RF output power per TX [W]	Estimated power consumption [W] at 48VDC input at 23°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin	
		50% RF Load	100% RF Load
3	60	700	932
	40	533	672
	20	447	523

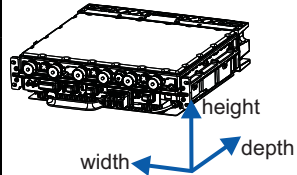
**Installation and mechanical specifications**

**Table 34** FXDA installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• floor/stack installation</li> <li>• pole installation</li> <li>• wall installation</li> <li>• 19" rack/cabinet</li> </ul>
IP rating	IP65
Related optional items	<p>Pole installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Pole Kit (FPKA)</li> <li>• Flexi Pole Kit (FPKC)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Floor/Wall installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Outdoor 19" rack</p> <ul style="list-style-type: none"> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Cabinet/indoor 19" rack</p> <ul style="list-style-type: none"> <li>• No optional items needed</li> </ul>

**Dimensions and weight**

**Table 35** FXDA dimensions and weight

Property	Value	Dimensions orientation
Height	133 mm/ 3U (5.2 in.)	
Depth	Without front covers: 422 mm (16.6 in.) With front covers: 560 mm (22.1 in.)	
Width	Without front covers: 447 mm (17.6 in.) With front covers: 492 mm (19.4 in.)	
Weight	25 kg (55.1 lb)	
Volume	25 l	

**Environmental specifications**

**Table 36** FXDA environmental specifications

Property	Value
Maximum operational outdoor temperature (at constant high ambient temperature maximum output power might be limited)	+55°C (131°F)
Minimum operational temperature (including cold start)	-35°C (-31°F)

**LEDs**

**Table 37** FXDA LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Major alarm affecting the whole RF Module</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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

Table 37 FXDA LEDs (Cont.)

LED color	Description	Alarm
Periodic Red and Green	Antenna line device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm
RF Module fan/TX status LED: Red	At least one fan is faulty or degraded	-
RF Module fan/TX status LED: Green	All fans are working	-
RF Module fan/TX status LED: Color set according to fan status, stable	RF transmission is ON	-
RF Module fan/TX status LED: Color set according to fan status, blinking	RF transmission is OFF	-

**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 50 Ω 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.



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

## 7.5 Flexi RF Module 3TX 900 (FXDJ)

*FXDJ technical specifications.*

**Functional description**

Table 38 FXDJ functional specification

Property	Value
Output power	3x60 W
MIMO	No
Outdoor installation	Yes
SW supported technologies	GMS, WCDMA
TX frequency range	935-960 MHz
RX frequency range	890-915 MHz
DL instantaneous bandwidth	12.5 MHz
UL instantaneous bandwidth	12.5 MHz
DL filter bandwidth	12.5 MHz

Table 38 FXDJ functional specification (Cont.)

Property	Value
UL filter bandwidth	12.5 MHz

**Interfaces**

Figure 10 FXDJ interfaces

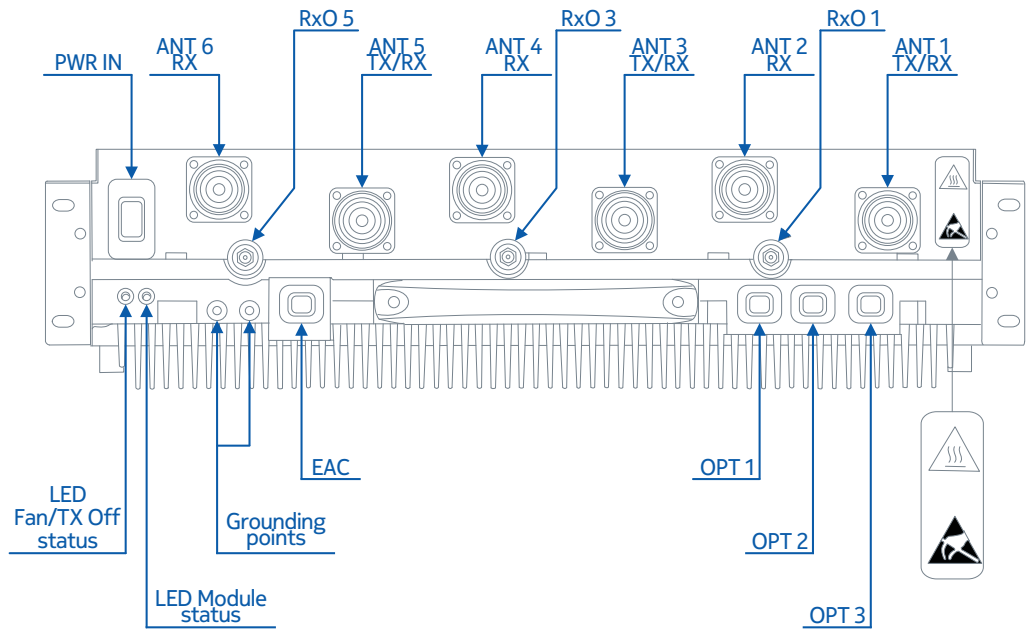


Table 39 FXDJ interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	PWR IN	1	2-pin multibeam XL	-
Antenna connector	ANT	6	7/16	-
RF output connector	RxO	3	QMA	-
External Alarm Connection	EAC	1	RJ45	-
Optical interface	OPT	3	SFP	3 Gbps

**Antenna Line Devices (ALDs) support**

Table 40 FXDJ ALD support

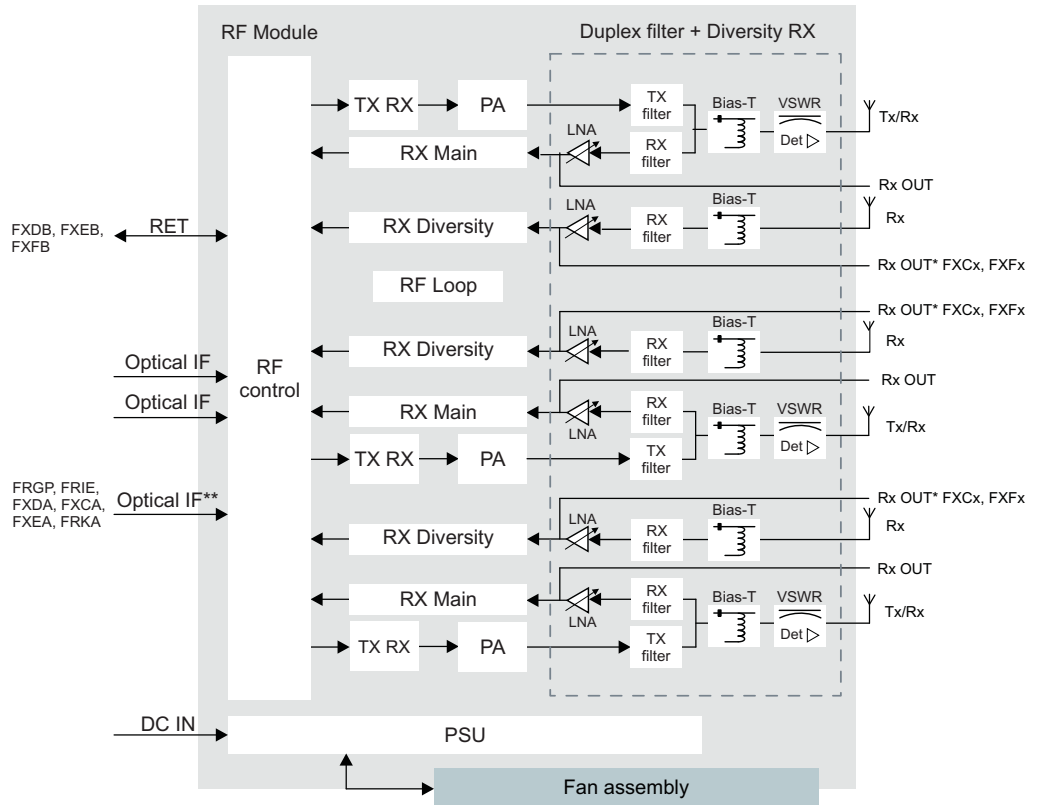
ALD support via antenna ports	Value
AISG	ANT1, ANT3, ANT5: AISG 2.0
Proprietary AISG 1.1	Yes
CWA (for non-AISG installations)	Yes
Voltage	ANT1, ANT3, ANT5: 24 V or 12 V

Table 40 FXDJ ALD support (Cont.)

ALD support via antenna ports	Value
	ANT2, ANT4, ANT6: 12 V
Power per port	30 W

**Functional block diagram**

Figure 11 FXDJ functional block diagram



**Electrical specifications**

Table 41 FXDJ 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**

**Table 42** FXDJ power consumption

Number of TXs	RF output power per TX [W]	Estimated power consumption [W] at 48VDC input at 23°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin	
		50% RF Load	100% RF Load
3	60	700	932
	40	533	672
	20	447	523

**Installation and mechanical specifications**

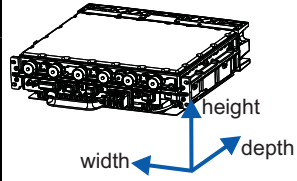
**Table 43** FXDJ installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• floor/stack installation</li> <li>• pole installation</li> <li>• wall installation</li> <li>• 19" rack/cabinet</li> </ul>
IP rating	IP65
Related optional items	<p>Pole installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Pole Kit (FPKA)</li> <li>• Flexi Pole Kit (FPKC)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Floor/Wall installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Outdoor 19" rack</p> <ul style="list-style-type: none"> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Cabinet/indoor 19" rack</p> <ul style="list-style-type: none"> <li>• No optional items needed</li> </ul>

**Dimensions and weight**



Table 44 FXDJ dimensions and weight

Property	Value	Dimensions orientation
Height	133 mm/ 3U (5.2 in.)	
Depth	Without front covers: 422 mm (16.6 in.) With front covers: 560 mm (22.1 in.)	
Width	Without front covers: 447 mm (17.6 in.) With front covers: 492 mm (19.4 in.)	
Weight	25 kg (55.1 lb)	
Volume	25 l	

**Environmental specifications**

Table 45 FXDJ environmental specifications

Property	Value
Maximum operational outdoor temperature (at constant high ambient temperature maximum output power might be limited)	+55°C (131°F)
Minimum operational temperature (including cold start)	-35°C (-31°F)

**LEDs**

Table 46 FXDJ LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Major alarm affecting the whole RF Module</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm

Table 46 FXDJ LEDs (Cont.)

LED color	Description	Alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm
RF Module fan/TX status LED: Red	At least one fan is faulty or degraded	-
RF Module fan/TX status LED: Green	All fans are working	-
RF Module fan/TX status LED: Color set according to fan status, stable	RF transmission is ON	-
RF Module fan/TX status LED: Color set according to fan status, blinking	RF transmission is OFF	-

**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 50 Ω 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.



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

## 7.6 Flexi RFM 3-pipe 1500 180 W (FRKA)

*FRKA technical specifications.*

### Functional description

Table 47 FRKA functional specification

Property	Value
Output power	3x60 W
MIMO	2TX
Outdoor installation	Yes
SW supported technology	FDD-LTE
TX frequency range	1485.9-1495.9 MHz
RX frequency range	1427.9-1437.8 MHz
DL instantaneous bandwidth	10 MHz
UL instantaneous bandwidth	10 MHz
DL filter bandwidth	10 MHz
UL filter bandwidth	10 MHz

### Interfaces

Figure 12 FRKA interfaces

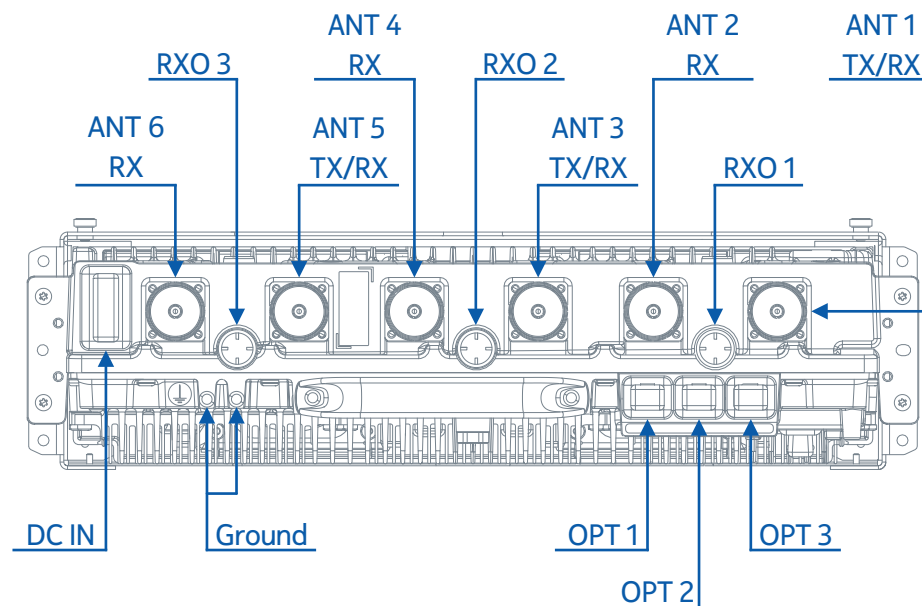


Table 48 FRKA interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	2-pin multibeam XL	-

Table 48 FRKA interfaces (Cont.)

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Antenna connector	ANT	6	7/16	-
RF output connector	RxO	3	QMA <td>-</td>	-
Optical interface	OPT	3	SFP	3 Gbps

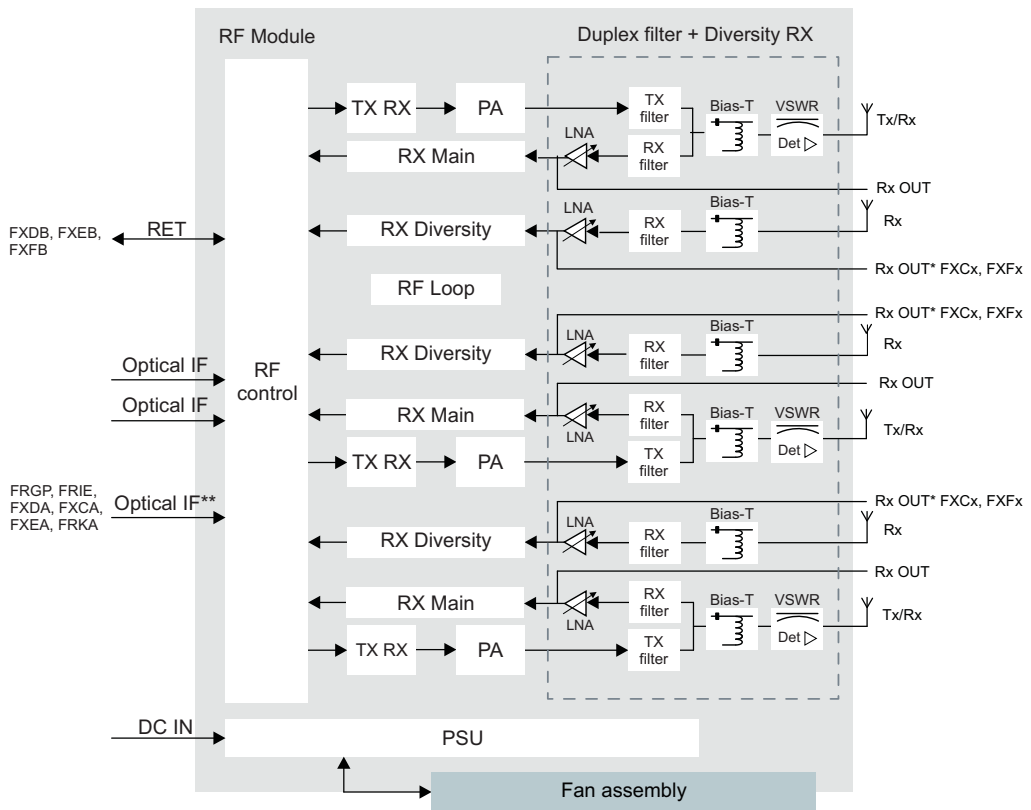
**Antenna Line Devices (ALDs) support**

Table 49 FRKA ALD support

ALD support via antenna ports	Value
AISG	ANT1, ANT3, ANT5: AISG 2.0
Proprietary AISG 1.1	Yes
CWA (for non-AISG installations)	Yes
Voltage	ANT1, ANT3, ANT5: 28 V or 12 V ANT2, ANT4, ANT6: 12 V
Power per port	30 W

**Functional block diagram**

Figure 13 FRKA functional block diagram



**Electrical specifications**

Table 50 FRKA electrical specifications

Property	Value
Nominal supply voltage	-48.0 V DC
Nominal input voltage range	38.0 V DC to 60.0 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**

Table 51 FRKA power consumption

Number of TXs	RF output power per TX [W]	Estimated power consumption [W] at 48VDC input at 23°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin	
		50% RF Load	100% RF Load
3	60	640	880
	40	460	605
	20	385	480

**Installation and mechanical specifications**

Table 52 FRKA installation and mechanical specifications

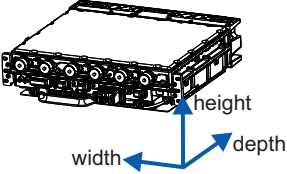
Property	Value
Installation options	<ul style="list-style-type: none"> <li>floor/stack installation</li> <li>pole installation</li> <li>wall installation</li> <li>19" rack/cabinet</li> </ul>
IP rating	IP65
Related optional items	<p>FRKA includes casing</p> <ul style="list-style-type: none"> <li>Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>Flexi Pole Kit (FPKA)</li> <li>Flexi Pole Kit (FPKC)</li> <li>Flexi Mounting Covers for Back and Front (FMCx)</li> </ul> <p>Pole installation</p> <ul style="list-style-type: none"> <li>Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>Flexi Pole Kit (FPKA)</li> <li>Flexi Pole Kit (FPKC)</li> <li>Flexi Mounting Covers for Back and Front (FMCx)</li> </ul> <p>Floor/Wall installation</p>

**Table 52** FRKA installation and mechanical specifications (Cont.)

Property	Value
	<ul style="list-style-type: none"> <li>Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>Flexi Mounting Covers for Back and Front (FMCx)</li> </ul>
	Outdoor 19" rack <ul style="list-style-type: none"> <li>Flexi Mounting Covers for Back and Front (FMCx)</li> </ul>
	Cabinet/indoor 19" rack <ul style="list-style-type: none"> <li>No optional items needed</li> </ul>

**Dimensions and weight**

**Table 53** FRKA dimensions and weight

Property	Value	Dimensions orientation
Height	133 mm/ 3U (5.2 in.)	
Depth	Without front covers: 422 mm (16.6 in.) With front covers: 560 mm (22.1 in.)	
Width	Without front covers: 447 mm (17.6 in.) With front covers: 492 mm (19.4 in.)	
Weight	25 kg (55.1 lb)	
Volume	25 l	

**Environmental specifications**

**Table 54** FRKA environmental specifications

Property	Value
Maximum operational outdoor temperature (at constant high ambient temperature maximum output power might be limited)	+55°C (131°F)
Minimum operational temperature (including cold start)	-35°C (-31°F)

**LEDs**

Table 55 FRKA LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Major alarm affecting the whole RF Module</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm
RF Module fan/TX status LED: Red	At least one fan is faulty or degraded	
RF Module fan/TX status LED: Green	All fans are working	

Table 55 FRKA LEDs (Cont.)

LED color	Description	Alarm
RF Module fan/TX status LED: Color set according to fan status, stable	RF transmission is ON	
RF Module fan/TX status LED: Color set according to fan status, blinking	RF transmission is OFF	

**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 50 Ω 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.



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

## 7.7 Flexi RF Module 3TX 1800 (FXEA)

*FXEA technical specifications.*

**Functional description**

Table 56 FXEA functional specification

Property	Value
Output power	3x60 W
MIMO	2TX
Outdoor installation	Yes
SW supported technologies	GSM, WCDMA, FDD-LTE
TX frequency range	1805-1880 MHz
RX frequency range	1710-1785 MHz
DL instantaneous bandwidth	A.10x version: 20 MHz A.20x version: 25 MHz
UL instantaneous bandwidth	30 MHz
DL filter bandwidth	30 MHz
UL filter bandwidth	30 MHz

**Interfaces**



Figure 14 FXEA interfaces

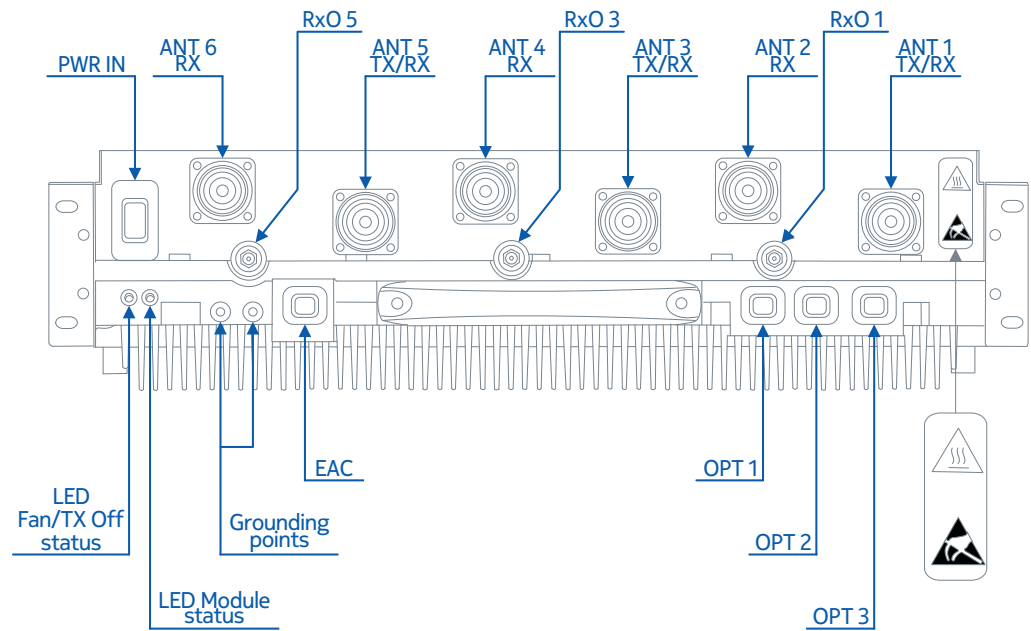


Table 57 FXEA interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	PWR IN	1	2-pin multibeam XL	-
Antenna connector	ANT	6	7/16	-
RF output connector	RxO	3	QMA	-
External Alarm Connection	EAC	1	RJ45	-
Optical interface	OPT	3	SFP	3 Gbps

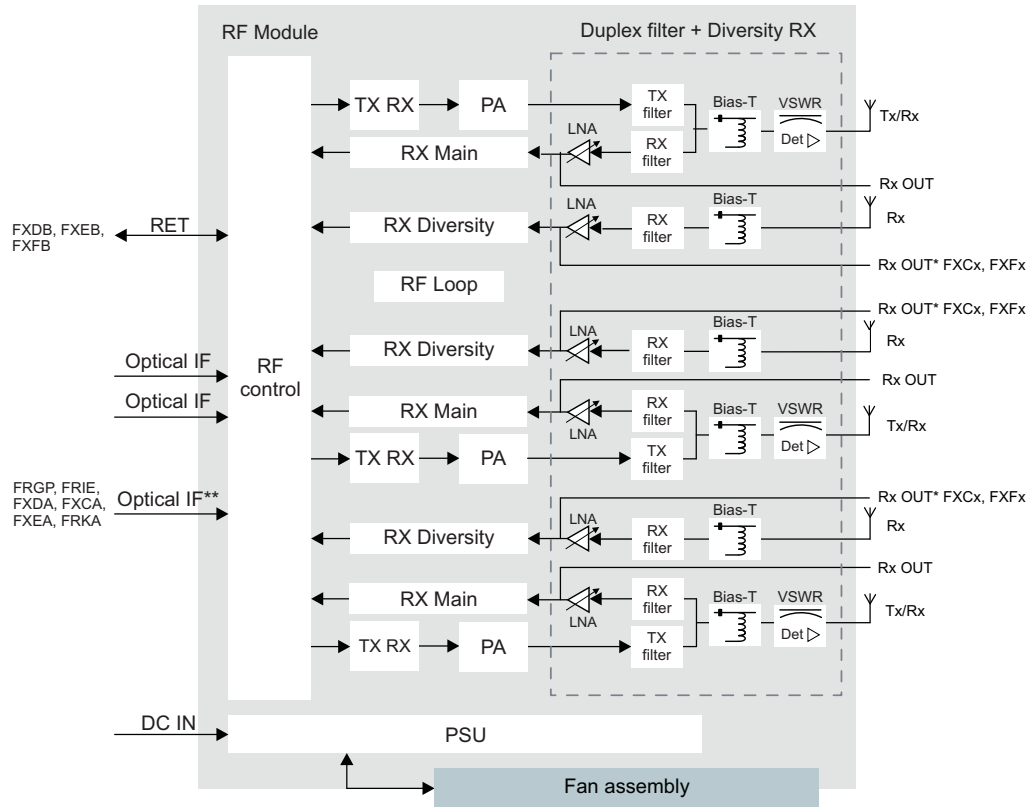
**Antenna Line Devices (ALDs) support**

Table 58 FXEA ALD support

ALD support via antenna ports	Value
AISG	ANT1, ANT3, ANT5: AISG 2.0
Proprietary AISG 1.1	Yes
CWA (for non-AISG installations)	Yes
Voltage	ANT1, ANT3, ANT5: 24 V or 13 V ANT2, ANT4, ANT6: 13 V
Power per port	30 W

**Functional block diagram**

Figure 15 FXEA functional block diagram



**Electrical specifications**

Table 59 FXEA 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**

Table 60 FXEA power consumption

Number of TXs	RF output power per TX [W]	Estimated power consumption [W] at 48VDC input at 23°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin	
		50% RF Load	100% RF Load
3	60	679	909
	40	565	719
	20	466	555

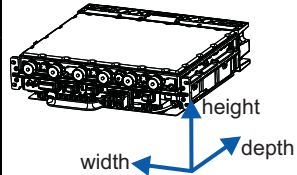
**Installation and mechanical specifications**

**Table 61** FXEA installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• floor/stack installation</li> <li>• pole installation</li> <li>• wall installation</li> <li>• 19" rack/cabinet</li> </ul>
IP rating	IP65
Related optional items	<p>Pole installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Pole Kit (FPKA)</li> <li>• Flexi Pole Kit (FPKC)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Floor/Wall installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Outdoor 19" rack</p> <ul style="list-style-type: none"> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Cabinet/indoor 19" rack</p> <ul style="list-style-type: none"> <li>• No optional items needed</li> </ul>

**Dimensions and weight**

**Table 62** FXEA dimensions and weight

Property	Value	Dimensions orientation
Height	133 mm/ 3U (5.2 in.)	
Depth	Without front covers: 422 mm (16.6 in.) With front covers: 560 mm (22.1 in.)	
Width	Without front covers: 447 mm (17.6 in.) With front covers: 492 mm (19.4 in.)	
Weight	25 kg (55.1 lb)	
Volume	25 l	

**Environmental specifications**

**Table 63** FXEA environmental specifications

Property	Value
Maximum operational outdoor temperature (at constant high ambient temperature maximum output power might be limited)	+55°C (131°F)
Minimum operational temperature (including cold start)	-35°C (-31°F)

**LEDs**

**Table 64** FXEA LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Major alarm affecting the whole RF Module</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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

Table 64 FXEA LEDs (Cont.)

LED color	Description	Alarm
Periodic Red and Green	Antenna line device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm
RF Module fan/TX status LED: Red	At least one fan is faulty or degraded	-
RF Module fan/TX status LED: Green	All fans are working	-
RF Module fan/TX status LED: Color set according to fan status, stable	RF transmission is ON	-
RF Module fan/TX status LED: Color set according to fan status, blinking	RF transmission is OFF	-

**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 50 Ω 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.



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

## 7.8 Flexi RF Module 3TX 1900 (FXFB)

*FXFB technical specifications.*

**Functional description**

Table 65 FXFB functional specification

Property	Value
Output power	3x60 W
MIMO	2TX
Outdoor installation	Yes
SW supported technologies	GSM, WCDMA, FDD-LTE
TX frequency range	1930-1990 MHz
RX frequency range	1850-1910 MHz
DL instantaneous bandwidth	20 MHz
UL instantaneous bandwidth	20 MHz
DL filter bandwidth	20 MHz

Table 65 FXFB functional specification (Cont.)

Property	Value
UL filter bandwidth	20 MHz

**Interfaces**

Figure 16 FXFB interfaces

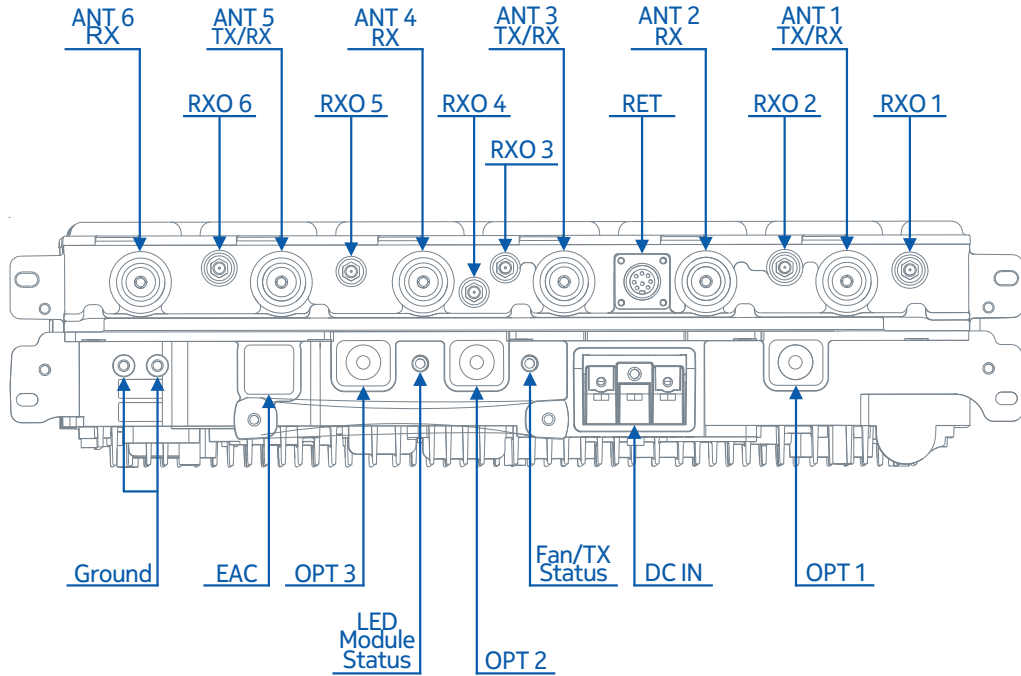


Table 66 FXFB interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	PWR IN	1	Screw-terminal	-
Antenna connector	ANT	6	7/16	-
RF output connector	RxO	6	QMA	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	RJ45	-
Optical interface	OPT	3	SFP	3 Gbps

**Antenna Line Devices (ALDs) support**

Table 67 FXFB ALD support

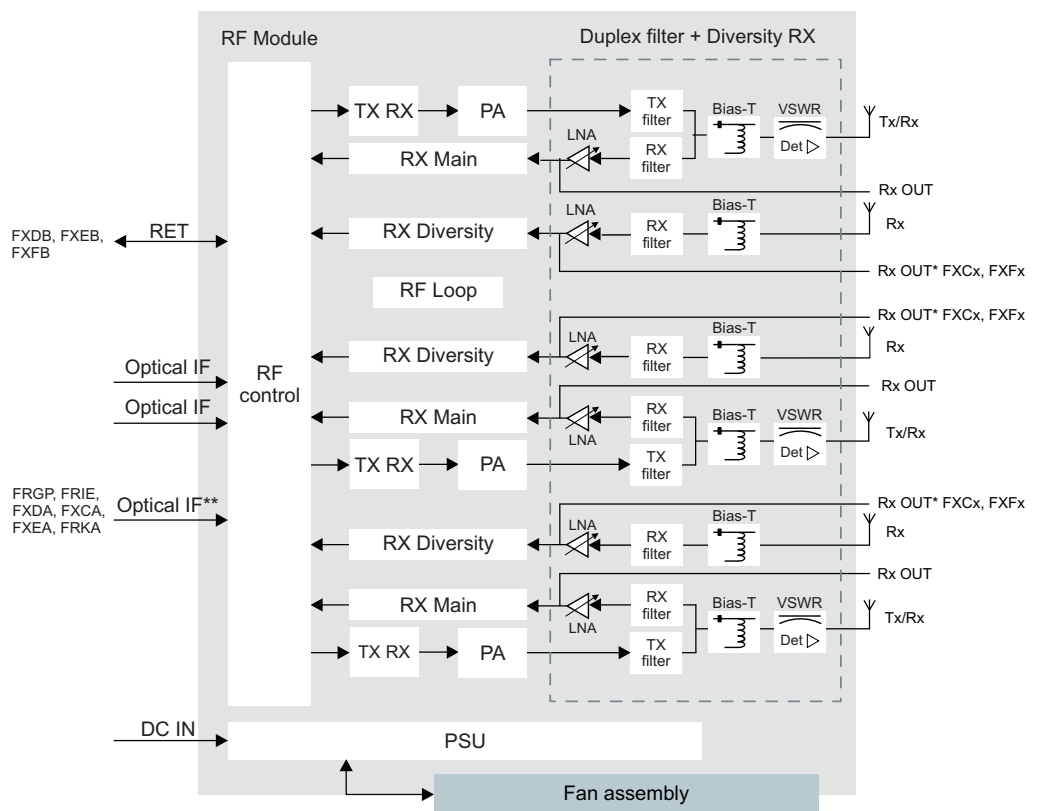
ALD support via antenna ports	Value
AISG	ANT1, ANT3, ANT5, RET: AISG: 2.0
Proprietary AISG 1.1	No

Table 67 FXFB ALD support (Cont.)

ALD support via antenna ports	Value
CWA (for non-AISG installations)	Yes
Voltage	ANT1, ANT3, ANT5: 24 V or 13 V ANT2, ANT4, ANT6: 13 V RET: 24 V
Power per port	30 W

**Functional block diagram**

Figure 17 FXFB functional block diagram



**Electrical specifications**

Table 68 FXFB 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**

**Table 69** FXFB power consumption

Number of TXs	RF output power per TX [W]	Estimated power consumption [W] at 48VDC input at 23°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin	
		50% RF Load	100% RF Load
3	60	709	977
	40	612	776
	20	508	599

**Installation and mechanical specifications**

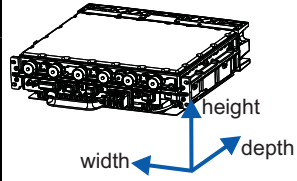
**Table 70** FXFB installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• floor/stack installation</li> <li>• pole installation</li> <li>• wall installation</li> <li>• 19" rack/cabinet</li> </ul>
IP rating	IP65
Related optional items	<p>Pole installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Pole Kit (FPKA)</li> <li>• Flexi Pole Kit (FPKC)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Floor/Wall installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Outdoor 19" rack</p> <ul style="list-style-type: none"> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Cabinet/indoor 19" rack</p> <ul style="list-style-type: none"> <li>• No optional items needed</li> </ul>

**Dimensions and weight**



Table 71 FXFB dimensions and weight

Property	Value	Dimensions orientation
Height	133 mm/ 3U (5.2 in.)	
Depth	Without front covers: 422 mm (16.6 in.) With front covers: 560 mm (22.1 in.)	
Width	Without front covers: 447 mm (17.6 in.) With front covers: 492 mm (19.4 in.)	
Weight	25 kg (55.1 lb)	
Volume	25 l	

**Environmental specifications**

Table 72 FXFB environmental specifications

Property	Value
Maximum operational outdoor temperature (at constant high ambient temperature maximum output power might be limited)	+55°C (131°F)
Minimum operational temperature (including cold start)	-35°C (-31°F)

**LEDs**

Table 73 FXFB LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Major alarm affecting the whole RF Module</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm

Table 73 FXFB LEDs (Cont.)

LED color	Description	Alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm
RF Module fan/TX status LED: Red	At least one fan is faulty or degraded	-
RF Module fan/TX status LED: Green	All fans are working	-
RF Module fan/TX status LED: Color set according to fan status, stable	RF transmission is ON	-
RF Module fan/TX status LED: Color set according to fan status, blinking	RF transmission is OFF	-

**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 50 Ω 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.



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

## 7.9 Flexi RF Module 3TX 2100 (FRGP)

*FRGP technical specifications.*

### Functional description

Table 74 FRGP functional specification

Property	Value
Output power	3x60 W
MIMO	2TX
Outdoor installation	Yes
SW supported technologies	WCDMA, FDD-LTE
TX frequency range	2110-2170 MHz
RX frequency range	1920-1980 MHz
DL instantaneous bandwidth	20 MHz
UL instantaneous bandwidth	20 MHz
DL filter bandwidth	20 MHz
UL filter bandwidth	20 MHz

### Interfaces

Figure 18 FRGP interfaces

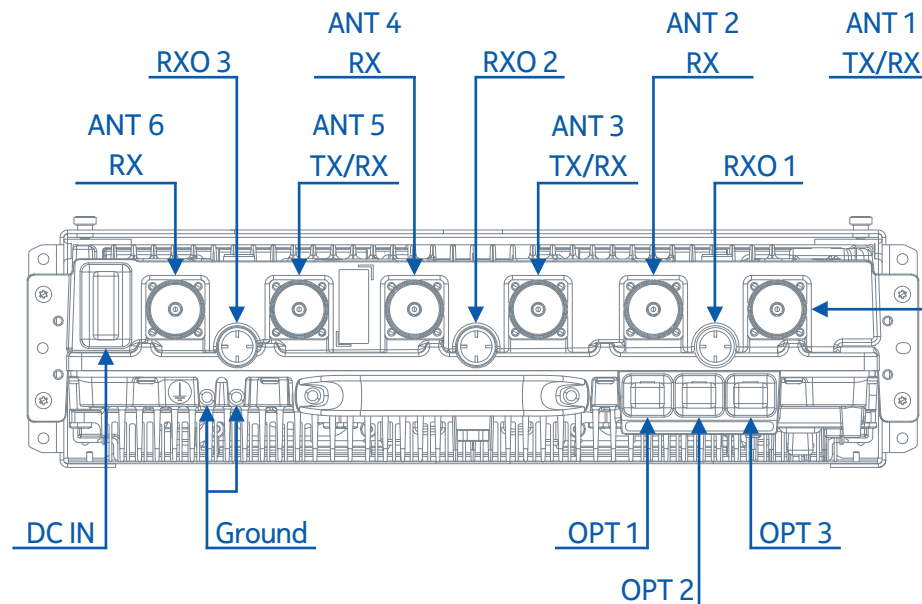


Table 75 FRGP interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	2-pin multibeam XL	-

Table 75 FRGP interfaces (Cont.)

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Antenna connector	ANT	6	7/16	-
RF output connector	RxO	3	QMA <td>-</td>	-
Optical interface	OPT	3	SFP	3 Gbps

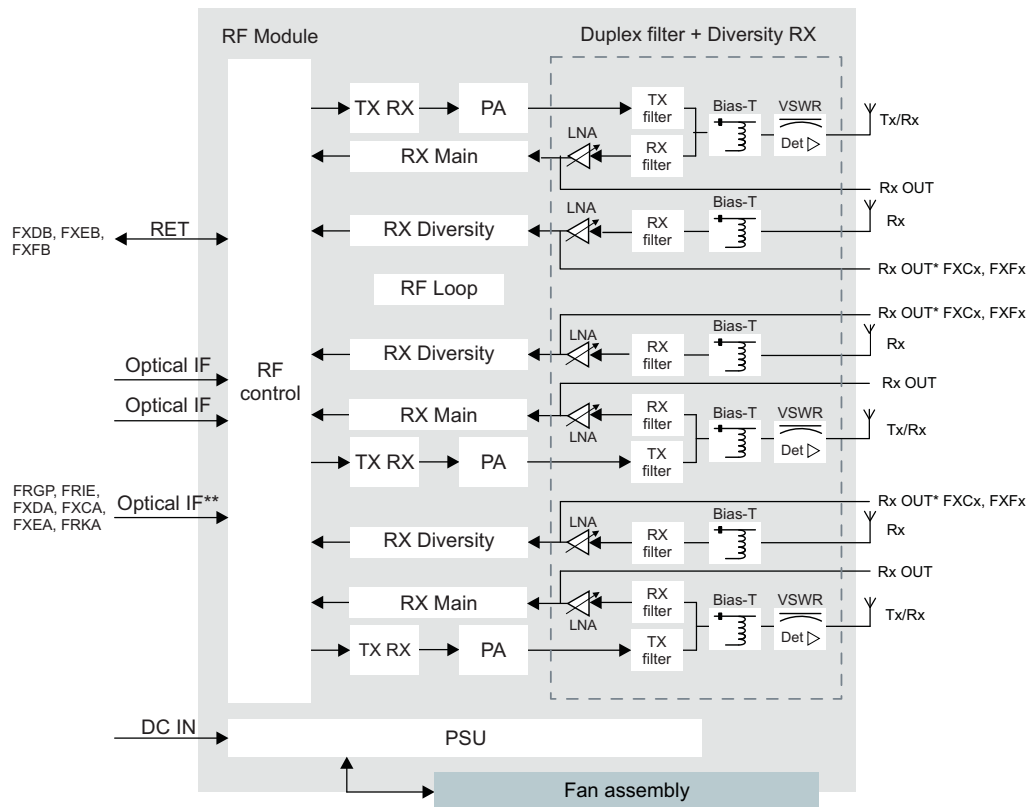
**Antenna Line Devices (ALDs) support**

Table 76 FRGP ALD support

ALD support via antenna ports	Value
AISG	ANT1, ANT3, ANT5: AISG 2.0
Proprietary AISG 1.1	Yes
CWA (for non-AISG installations)	Yes
Voltage	ANT1, ANT3, ANT5: 24 V or 12 V ANT2, ANT4, ANT6: 12 V
Power per port	30 W

**Functional block diagram**

Figure 19 FRGP functional block diagram



**Electrical specifications**

Table 77 FRGP electrical specifications

Property	Value
Nominal supply voltage	-48.0 V DC
Nominal input voltage range	38.0 V DC to 60.0 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**

Table 78 FRGP power consumption

Number of TXs	RF output power per TX [W]	Estimated power consumption [W] at 48VDC input at 23°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin	
		50% RF Load	100% RF Load
3	60	557	759
	40	427	553
	20	317	384

**Installation and mechanical specifications**

Table 79 FRGP installation and mechanical specifications

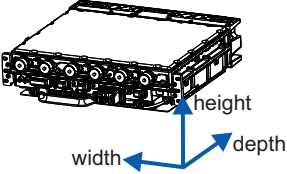
Property	Value
Installation options	<ul style="list-style-type: none"> <li>• floor/stack installation</li> <li>• pole installation</li> <li>• wall installation</li> <li>• 19" rack/cabinet</li> </ul>
IP rating	IP65
Related optional items	<p>FRGP includes casing</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Pole Kit (FPKA)</li> <li>• Flexi Pole Kit (FPKC)</li> <li>• Flexi Mounting Covers for Back and Front (FMCx)</li> </ul> <p>Pole installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Pole Kit (FPKA)</li> <li>• Flexi Pole Kit (FPKC)</li> <li>• Flexi Mounting Covers for Back and Front (FMCx)</li> </ul> <p>Floor/Wall installation</p>

**Table 79** FRGP installation and mechanical specifications (Cont.)

Property	Value
	<ul style="list-style-type: none"> <li>Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>Flexi Mounting Covers for Back and Front (FMCx)</li> </ul>
	Outdoor 19" rack <ul style="list-style-type: none"> <li>Flexi Mounting Covers for Back and Front (FMCx)</li> </ul>
	Cabinet/indoor 19" rack <ul style="list-style-type: none"> <li>No optional items needed</li> </ul>

**Dimensions and weight**

**Table 80** FRGP dimensions and weight

Property	Value	Dimensions orientation
Height	133 mm/ 3U (5.2 in.)	
Depth	Without front covers: 422 mm (16.6 in.) With front covers: 560 mm (22.1 in.)	
Width	Without front covers: 447 mm (17.6 in.) With front covers: 492 mm (19.4 in.)	
Weight	25 kg (55.1 lb)	
Volume	25 l	

**Environmental specifications**

**Table 81** FRGP environmental specifications

Property	Value
Maximum operational outdoor temperature (at constant high ambient temperature maximum output power might be limited)	+55°C (131°F)
Minimum operational temperature (including cold start)	-35°C (-31°F)

**LEDs**

Table 82 FRGP LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Major alarm affecting the whole RF Module</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm
RF Module fan/TX status LED: Red	At least one fan is faulty or degraded	-
RF Module fan/TX status LED: Green	All fans are working	-

Table 82 FRGP LEDs (Cont.)

LED color	Description	Alarm
RF Module fan/TX status LED: Color set according to fan status, stable	RF transmission is ON	-
RF Module fan/TX status LED: Color set according to fan status, blinking	RF transmission is OFF	-

**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 50 Ω 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.



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

## 7.10 Flexi RF Module 3TX 2600 (FRHA)

*FRHA technical specifications.*

**Functional description**

Table 83 FRHA functional specification

Property	Value
Output power	3x60 W
MIMO	2TX
Outdoor installation	Yes
SW supported technology	FDD-LTE
TX frequency range	2620-2690 MHz
RX frequency range	2500-2570 MHz
DL instantaneous bandwidth	20 MHz
UL instantaneous bandwidth	20 MHz
DL filter bandwidth	70 MHz
UL filter bandwidth	70 MHz

**Interfaces**



Figure 20 FRHA interfaces

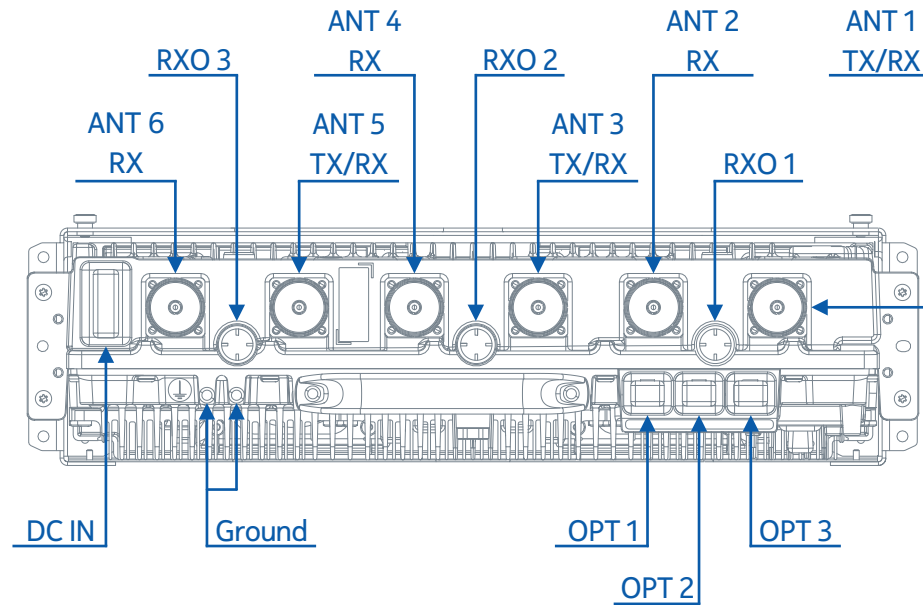


Table 84 FRHA interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	2-pin multibeam XL	-
Antenna connector	ANT	6	7/16	-
RF output connector	RxO	3	QMA	-
Optical interface	OPT	3	SFP	3 Gbps

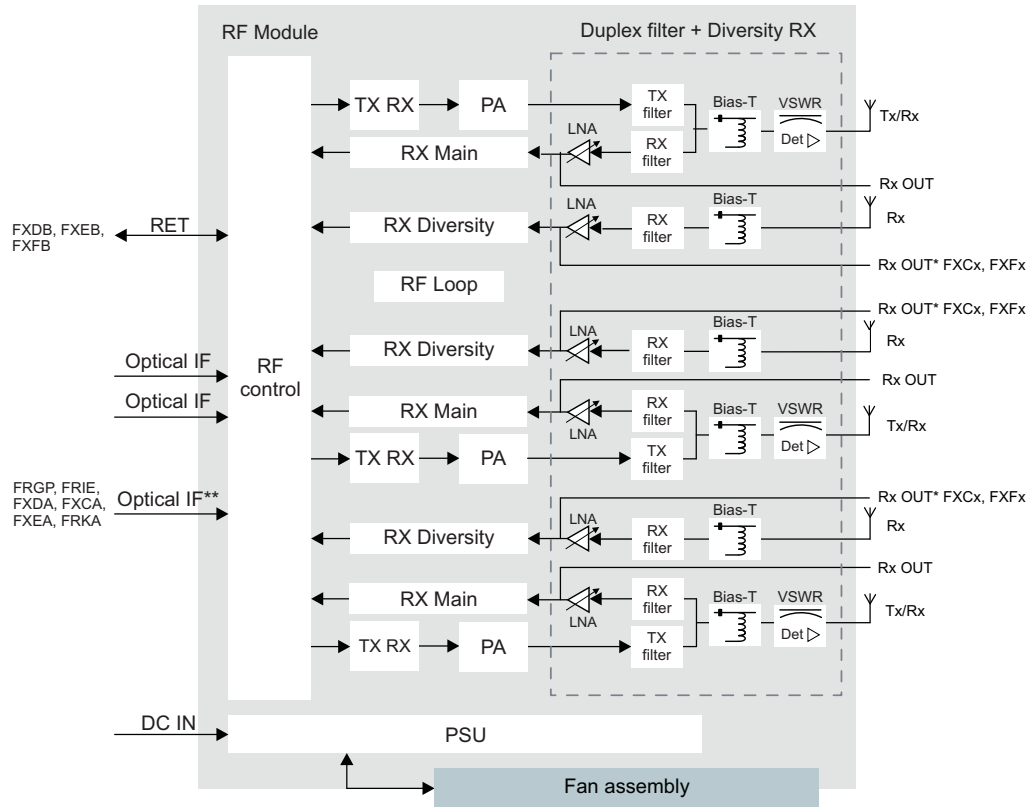
**Antenna Line Devices (ALDs) support**

Table 85 FRHA ALD support

ALD support via antenna ports	Value
AISG	ANT1, ANT3, ANT5: AISG 2.0
Proprietary AISG 1.1	No
CWA (for non-AISG installations)	No
Voltage	ANT1, ANT3, ANT5: 24 V
Power per port	30 W

**Functional block diagram**

Figure 21 FRHA functional block diagram



**Electrical specifications**

Table 86 FRHA electrical specifications

Property	Value
Nominal supply voltage	-48.0 V DC
Nominal input voltage range	38.0 V DC to 60.0 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**

Table 87 FRHA power consumption

Number of TXs	RF output power per TX [W]	Estimated power consumption [W] at 48VDC input at 23°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin	
		50% RF Load	100% RF Load
3	60	806	1130
	40	622	825
	20	462	580

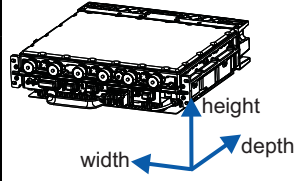
**Installation and mechanical specifications**

**Table 88** FRHA installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• floor/stack installation</li> <li>• pole installation</li> <li>• wall installation</li> <li>• 19" rack/cabinet</li> </ul>
IP rating	IP65
Related optional items	<p>Pole installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Pole Kit (FPKA)</li> <li>• Flexi Pole Kit (FPKC)</li> <li>• Flexi Mounting Covers for Back and Front (FMCx)</li> </ul> <p>Floor/Wall installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Mounting Covers for Back and Front (FMCx)</li> </ul> <p>Outdoor 19" rack</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Covers for Back and Front (FMCx)</li> </ul> <p>Cabinet/indoor 19" rack</p> <ul style="list-style-type: none"> <li>• No optional items needed</li> </ul>

**Dimensions and weight**

**Table 89** FRHA dimensions and weight

Property	Value	Dimensions orientation
Height	133 mm/ 3U (5.2 in.)	
Depth	Without front covers: 422 mm (16.6 in.) With front covers: 560 mm (22.1 in.)	
Width	Without front covers: 447 mm (17.6 in.) With front covers: 492 mm (19.4 in.)	
Weight	25 kg (55.1 lb)	
Volume	25 l	

**Environmental specifications**

**Table 90** FRHA environmental specifications

Property	Value
Maximum operational outdoor temperature (at constant high ambient temperature maximum output power might be limited)	+55°C (131°F)
Minimum operational temperature (including cold start)	-35°C (-31°F)

**LEDs**

**Table 91** FRHA LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Major alarm affecting the whole RF Module</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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

Table 91 FRHA LEDs (Cont.)

LED color	Description	Alarm
Periodic Red and Green	Antenna line device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm
RF Module fan/TX status LED: Red	At least one fan is faulty or degraded	-
RF Module fan/TX status LED: Green	All fans are working	-
RF Module fan/TX status LED: Color set according to fan status, stable	RF transmission is ON	-
RF Module fan/TX status LED: Color set according to fan status, blinking	RF transmission is OFF	-

**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 50 Ω 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.



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

## 7.11 Flexi RF Module 3TX 1700/2100 (FRIE)

*FRIE technical specifications.*

**Functional description**

Table 92 FRIE functional specification

Property	Value
Output power	3x60 W
MIMO	2TX
Outdoor installation	Yes
SW supported technologies	WCDMA, FDD-LTE
TX frequency range	2110-2170 MHz
RX frequency range	1710-1770 MHz
DL instantaneous bandwidth	20 MHz
UL instantaneous bandwidth	20 MHz
DL filter bandwidth	45 MHz

Table 92 FRIE functional specification (Cont.)

Property	Value
UL filter bandwidth	45 MHz

**Interfaces**

Figure 22 FRIE interfaces

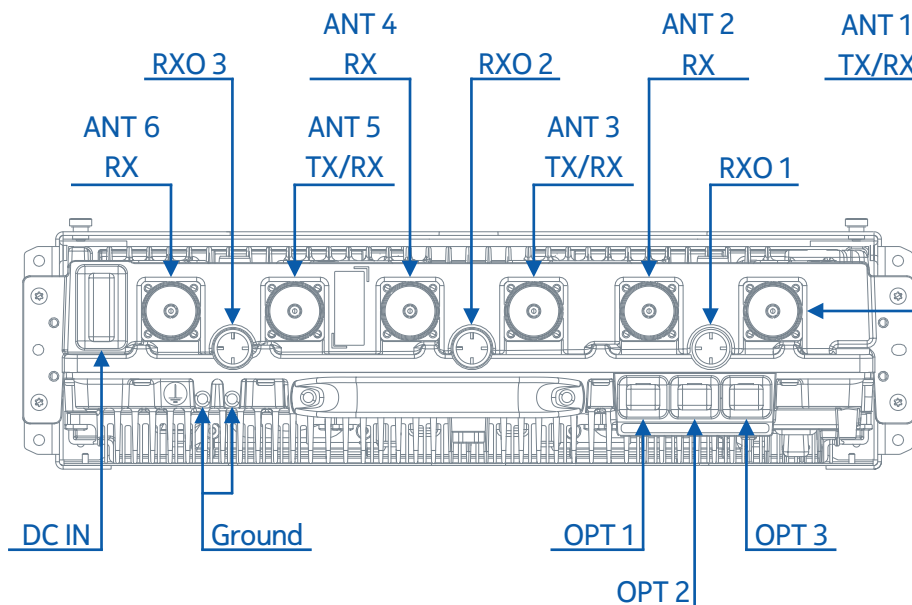


Table 93 FRIE interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	2-pin multibeam XL	-
Antenna connector	ANT	6	7/16	-
RF output connector	RxO	3	QMA	-
External Alarm Connection	EAC	1	RJ45	-
Optical interface	OPT	3	SFP	3 Gbps

**Antenna Line Devices (ALDs) support**

Table 94 FRIE ALD support

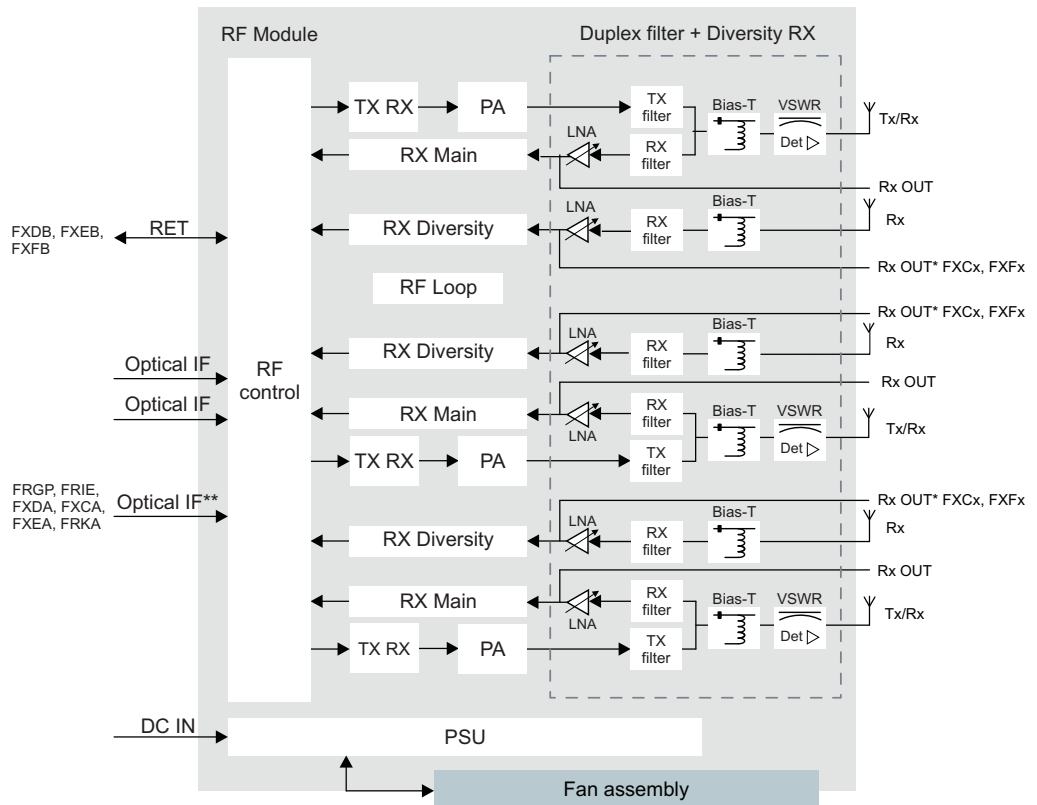
ALD support via antenna ports	Value
AISG	ANT1, ANT3, ANT5: AISG 2.0
Proprietary AISG 1.1	No
CWA (for non-AISG installations)	Yes
Voltage	ANT1, ANT3, ANT5: 24 V or 12 V

Table 94 FRIE ALD support (Cont.)

ALD support via antenna ports	Value
	ANT2, ANT4, ANT6: 12 V
Power per port	30 W

**Functional block diagram**

Figure 23 FRIE functional block diagram



**Electrical specifications**

Table 95 FRIE 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**

**Table 96** FRIE power consumption

Number of TXs	RF output power per TX [W]	Estimated power consumption [W] at 48VDC input at 23°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin	
		50% RF Load	100% RF Load
3	60	590	805
	40	465	610
	20	345	420

**Installation and mechanical specifications**

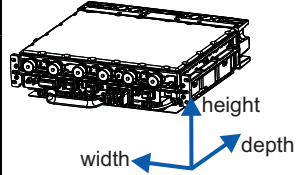
**Table 97** FRIE installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• floor/stack installation</li> <li>• pole installation</li> <li>• wall installation</li> <li>• 19" rack/cabinet</li> </ul>
IP rating	IP65
Related optional items	<p>FRIE includes casing</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Pole Kit (FPKA)</li> <li>• Flexi Pole Kit (FPKC)</li> <li>• Flexi Mounting Covers for Back and Front (FMCx)</li> </ul> <p>Pole installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Pole Kit (FPKA)</li> <li>• Flexi Pole Kit (FPKC)</li> <li>• Flexi Mounting Covers for Back and Front (FMCx)</li> </ul> <p>Floor/Wall installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Mounting Covers for Back and Front (FMCx)</li> </ul> <p>Outdoor 19" rack</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Covers for Back and Front (FMCx)</li> </ul> <p>Cabinet/indoor 19" rack</p> <ul style="list-style-type: none"> <li>• No optional items needed</li> </ul>



**Dimensions and weight**

*Table 98* FRIE dimensions and weight

Property	Value	Dimensions orientation
Height	133 mm/ 3U (5.2 in.)	
Depth	Without front covers: 422 mm (16.6 in.) With front covers: 560 mm (22.1 in.)	
Width	Without front covers: 447 mm (17.6 in.) With front covers: 492 mm (19.4 in.)	
Weight	25 kg (55.1 lb)	
Volume	25 l	

**Environmental specifications**

*Table 99* FRIE environmental specifications

Property	Value
Maximum operational outdoor temperature (at constant high ambient temperature maximum output power might be limited)	+55°C (131°F)
Minimum operational temperature (including cold start)	-35°C (-31°F)

**LEDs**

*Table 100* FRIE LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Major alarm affecting the whole RF Module</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm

Table 100 FRIE LEDs (Cont.)

LED color	Description	Alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm
RF Module fan/TX status LED: Red	At least one fan is faulty or degraded	-
RF Module fan/TX status LED: Green	All fans are working	-
RF Module fan/TX status LED: Color set according to fan status, stable	RF transmission is ON	-
RF Module fan/TX status LED: Color set according to fan status, blinking	RF transmission is OFF	-

**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 50 Ω 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.



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

## 7.12 Flexi RF Module 3TX 850 (FXCB)

*FXCB technical specifications.*

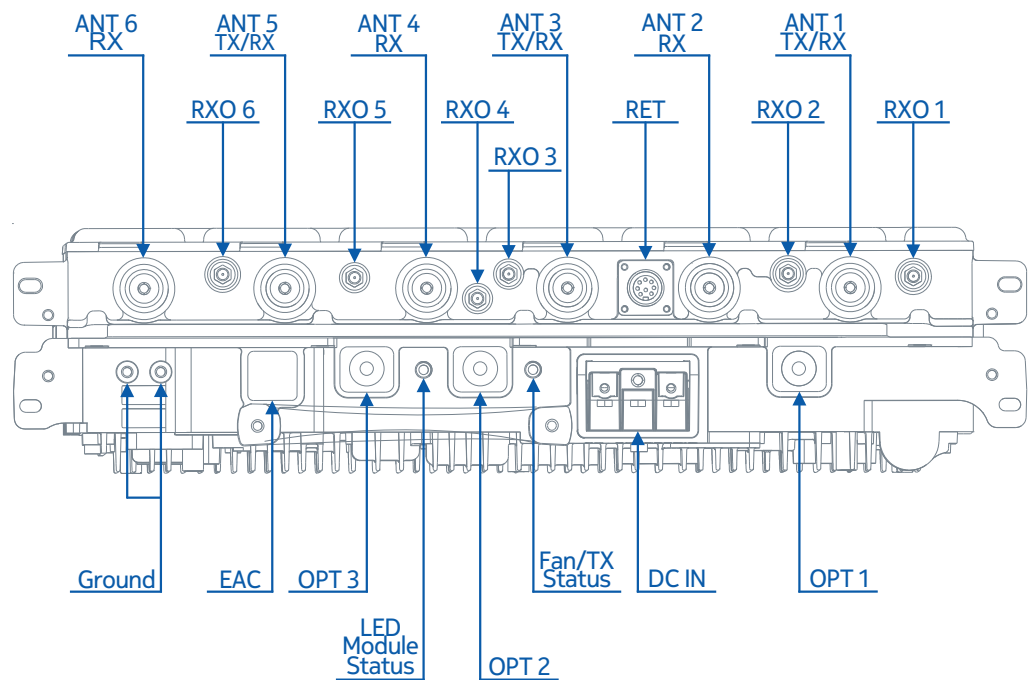
### Functional description

Table 101 FXCB functional specification

Property	Value
Output power	3x80 W
MIMO	No
Outdoor installation	Yes
SW supported technologies	GSM, WCDMA, FDD-LTE
TX frequency range	869-894 MHz
RX frequency range	824-849 MHz
DL instantaneous bandwidth	25 MHz
UL instantaneous bandwidth	25 MHz
DL filter bandwidth	25 MHz
UL filter bandwidth	25 MHz

### Interfaces

Figure 24 FXCB interfaces



*Table 102* FXCB interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	Screw-interminal	-
Antenna connector	ANT	6	7/16	-
RF output connector	RxO	6	QMA	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	RJ45	-
Optical interface	OPT	3	SFP	3 Gbps or 6 Gbps

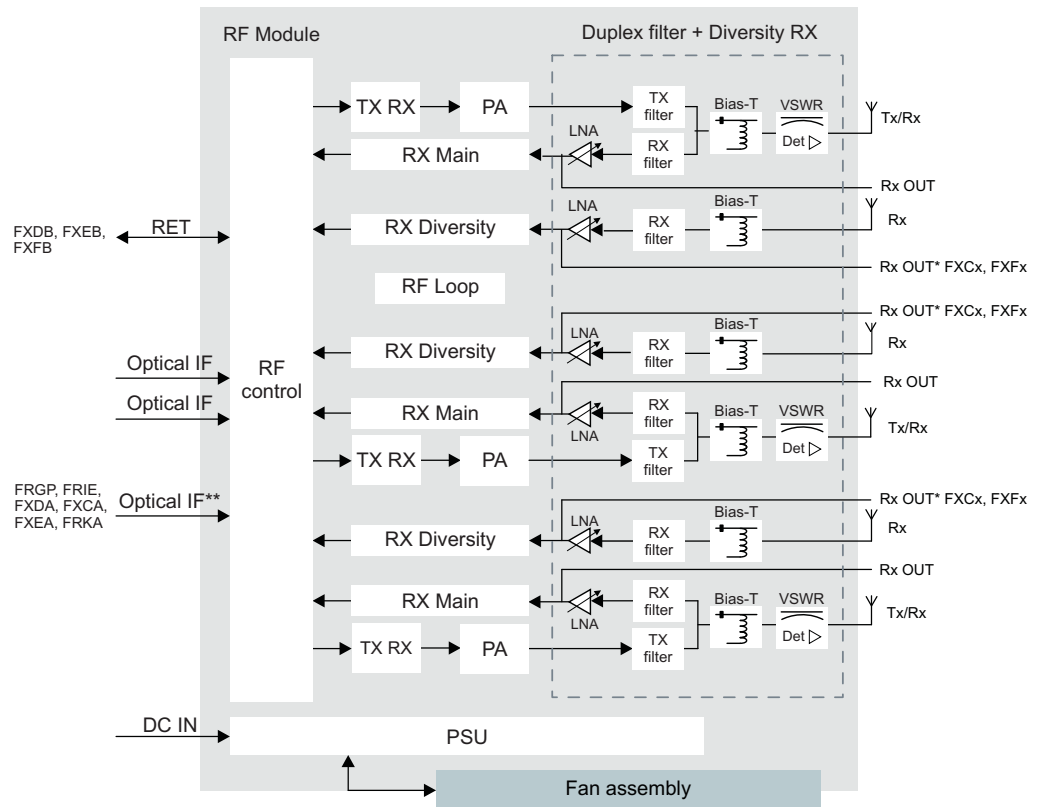
**Antenna Line Devices (ALDs) support**

*Table 103* FXCB ALD support

ALD support via antenna ports	Value
AISG	ANT1, ANT3, ANT5, RET: AISG 2.0
Proprietary AISG 1.1	No
CWA (for non-AISG installations)	Yes
Voltage	ANT1, ANT3, ANT5: 24 V or 13 V ANT2, ANT4, ANT6: 13 V RET: 24 V
Power per port	30 W

**Functional block diagram**

Figure 25 FXCB functional block diagram



**Electrical specifications**

Table 104 FXCB 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**

Table 105 FXCB power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h					
			Power consumption ETSI 202706 average load P <sub>RRH</sub> , static	Power consumption ETSI 202706 busy hour load P <sub>BH</sub> , RRH, static	Power consumption 100% RF power load P <sub>100%</sub> RRH	Power consumption Typical as 25% TCH load, 60% DTX, 4 dB PC	Power consumption Busy as 50% TCH load, 60% DTX, 4 dB PC	Power consumption Max load (2% GoS), 60% DTX, 4 dB PC
GSM	1/1/1	20	460	460	460	460	460	460
	2/2/2	20	474	492	580	470	474	478
	4/4/4	20	606	699	872	517	543	572
WCDMA	1/1/1	20	330	372	455			
	2/2/2	20	393	460	600			
	3/3/3	20	503	604	820			
	4/4/4	20	559	684	947			
LTE	1/1/1 2T2R	20+20	656	750	916			
	1/1/1 2T2R	40+40	778	929	1211			
	1/1/1 2T2R	60+60	957	1176	1598			
	1/1/1 2T2R	80+80	1058	1330	1848			
MSR	GSM 2/2/2 WCDMA 1/1/1	20 20	638	697	829			

**Installation and mechanical specifications**

Table 106 FXCB installation and mechanical specifications

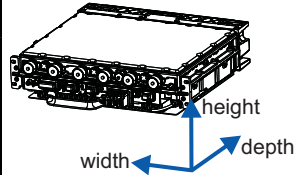
Property	Value
Installation options	<ul style="list-style-type: none"> <li>• floor/stack installation</li> <li>• pole installation</li> <li>• wall installation</li> <li>• 19" rack/cabinet</li> </ul>
IP rating	IP65

Table 106 FXCB installation and mechanical specifications (Cont.)

Property	Value
Related optional items	<p>Pole installation</p> <ul style="list-style-type: none"> <li>Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>Flexi Pole Kit (FPKA)</li> <li>Flexi Pole Kit (FPKC)</li> <li>Flexi Module Casing (EMHx)</li> </ul> <p>Floor/Wall installation</p> <ul style="list-style-type: none"> <li>Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>Flexi Module Casing (EMHx)</li> </ul> <p>Outdoor 19" rack</p> <ul style="list-style-type: none"> <li>Flexi Module Casing (EMHx)</li> </ul> <p>Cabinet/indoor 19" rack</p> <ul style="list-style-type: none"> <li>No optional items needed</li> </ul>

**Dimensions and weight**

Table 107 FXCB dimensions and weight

Property	Value	Dimensions orientation
Height	Core RFM: 115 mm (4.5 in.)	 <p>A perspective diagram of the FXCB module. Three blue arrows indicate the dimensions: 'height' points upwards from the top surface, 'depth' points from the front face towards the back, and 'width' points from the left side towards the right.</p>
Depth	Core RFM: 400 mm (15.7 in.) Without front covers: 422 mm (16.6 in.) With front covers: 560 mm (22.1 in.)	
Width	Core RFM: 420 mm (16.5 in.) Without front covers: 447 mm (17.6 in.) With front covers: 492 mm (19.4 in.)	
Weight	25 kg (55.1 lb)	
Volume	19.3 l	

**Environmental specifications**

**Table 108** FXCB environmental specifications

Property	Value
Maximum operational outdoor temperature (at constant high ambient temperature maximum output power might be limited)	+55°C (131°F)
Minimum operational temperature (including cold start)	-35°C (-31°F)

**LEDs**

**Table 109** FXCB LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Major alarm affecting the whole RF Module</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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



Table 109 FXCB LEDs (Cont.)

LED color	Description	Alarm
Periodic Red and Green	Antenna line device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm
RF Module fan/TX status LED: Red	At least one fan is faulty or degraded	-
RF Module fan/TX status LED: Green	All fans are working	-
RF Module fan/TX status LED: Color set according to fan status, stable	RF transmission is ON	-
RF Module fan/TX status LED: Color set according to fan status, blinking	RF transmission is OFF	-

**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 50 Ω 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.



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

## 7.13 Flexi RF Module 3TX 900 (FXDB)

*FXDB technical specifications.*

**Functional description**

Table 110 FXDB functional specification

Property	Value
Output power	3x80 W
MIMO	2TX
Outdoor installation	Yes
SW supported technologies	GSM, WCDMA, FDD-LTE
TX frequency range	925-960 MHz
RX frequency range	880-915 MHz
DL instantaneous bandwidth	35 MHz
UL instantaneous bandwidth	35 MHz
DL filter bandwidth	35 MHz

Table 110 FXDB functional specification (Cont.)

Property	Value
UL filter bandwidth	35 MHz

**Interfaces**

Figure 26 FXDB interfaces

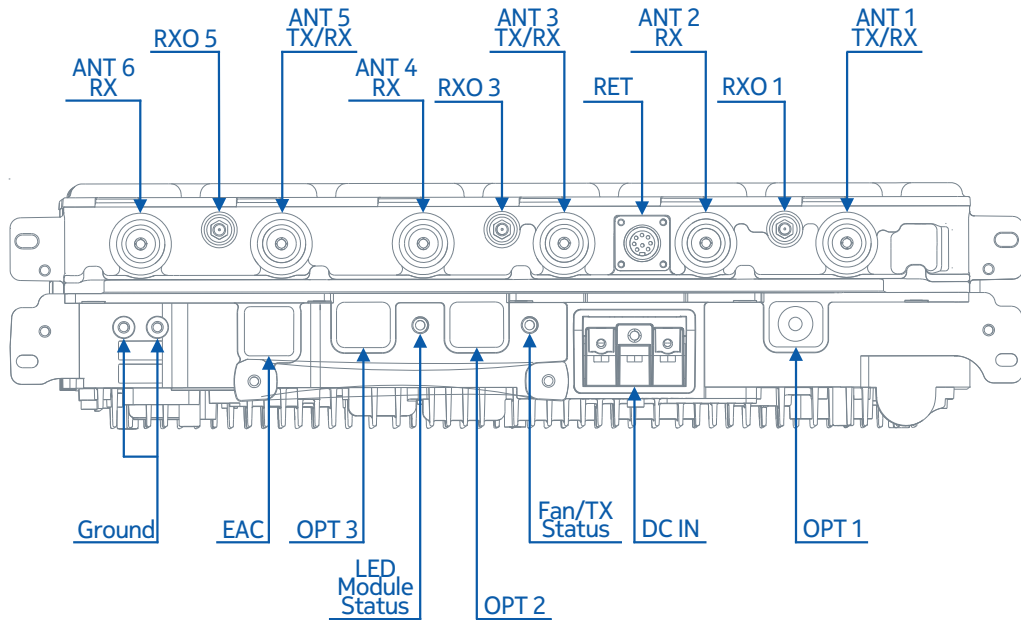


Table 111 FXDB interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	Screw-interterminal	-
Antenna connector	ANT	6	7/16	-
RF output connector	RxO	3	QMA	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	RJ45	-
Optical interface	OPT	3	SFP	3 Gbps or 6 Gbps

**Antenna Line Devices (ALDs) support**

Table 112 FXDB ALD support

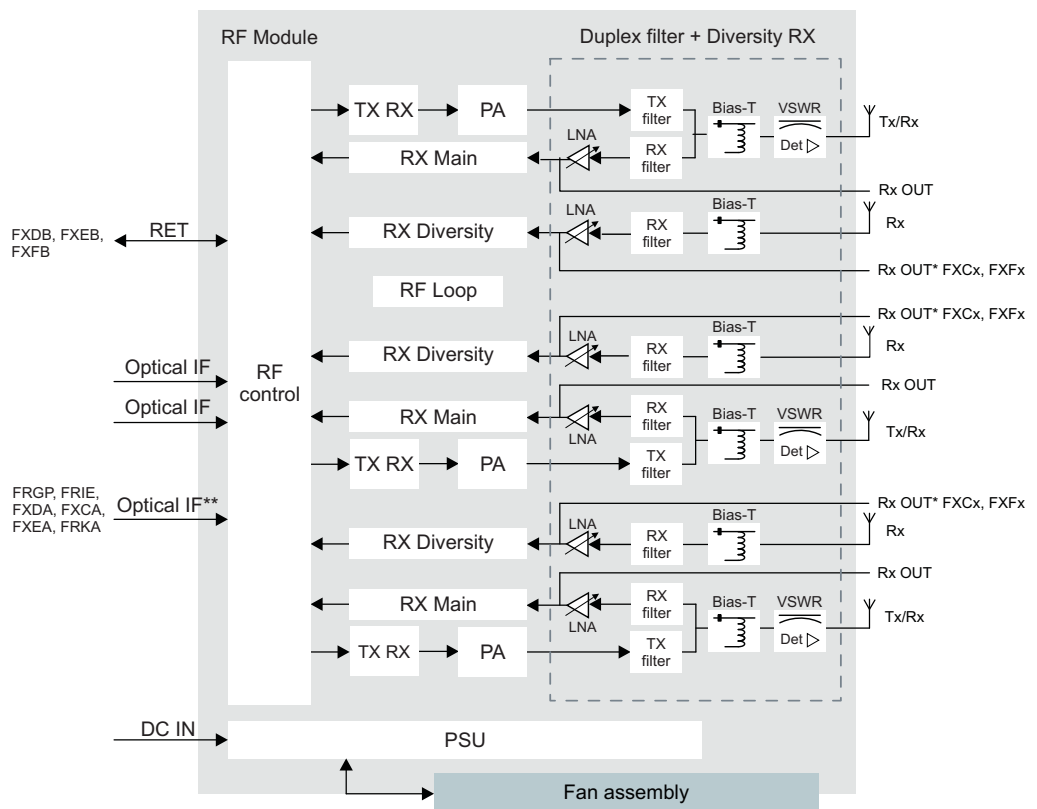
ALD support via antenna ports	Value
AISG	ANT1, ANT3, ANT5. RET: AISG 2.0
Proprietary AISG 1.1	No
CWA (for non-AISG installations)	Yes

Table 112 FXDB ALD support (Cont.)

ALD support via antenna ports	Value
Voltage	ANT1, ANT3, ANT5: 24 V or 13 V ANT2, ANT4, ANT6: 13 V RET: 24 V
Power per port	30 W

**Functional block diagram**

Figure 27 FXDB functional block diagram



**Electrical specifications**

Table 113 FXDB 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**

Table 114 FXDB power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h					
			Power consumption ETSI 202706 average load P <sub>RRH</sub> , static	Power consumption ETSI 202706 busy hour load P <sub>BH</sub> , RRH, static	Power consumption 100% RF power load P <sub>100%</sub> RRH	Power consumption Typical as 25% TCH load, 60% DTX, 4 dB PC	Power consumption Busy as 50% TCH load, 60% DTX, 4 dB PC	Power consumption Max load (2% GoS), 60% DTX, 4 dB PC
GSM	1/1/1	20	460	460	460	460	460	460
	2/2/2	20	473	492	586	480	485	490
	4/4/4	20	629	731	930	534	561	592
WCDMA	1/1/1	20	331	372	453			
	2/2/2	20	393	460	606			
	3/3/3	20	486	588	813			
	4/4/4	20	543	671	952			
LTE	1/1/1 2T2R	20+20	665	753	916			
	1/1/1 2T2R	40+40	787	932	1223			
	1/1/1 2T2R	60+60	983	1209	1661			
	1/1/1 2T2R	80+80	1098	1381	1939			
MSR	GSM 2/2/2 WCDMA 1/1/1	20 20	584	637	827			

**Installation and mechanical specifications**

Table 115 FXDB installation and mechanical specifications

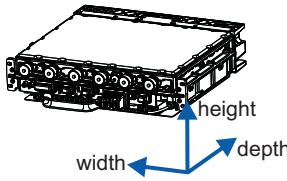
Property	Value
Installation options	<ul style="list-style-type: none"> <li>• floor/stack installation</li> <li>• pole installation</li> <li>• wall installation</li> <li>• 19" rack/cabinet</li> </ul>
IP rating	IP65

**Table 115** FXDB installation and mechanical specifications (Cont.)

Property	Value
Related optional items	<p>Pole installation</p> <ul style="list-style-type: none"> <li>Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>Flexi Pole Kit (FPKA)</li> <li>Flexi Pole Kit (FPKC)</li> <li>Flexi Module Casing (EMHx)</li> </ul> <p>Floor/Wall installation</p> <ul style="list-style-type: none"> <li>Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>Flexi Module Casing (EMHx)</li> </ul> <p>Outdoor 19" rack</p> <ul style="list-style-type: none"> <li>Flexi Module Casing (EMHx)</li> </ul> <p>Cabinet/indoor 19" rack</p> <ul style="list-style-type: none"> <li>No optional items needed</li> </ul>

**Dimensions and weight**

**Table 116** FXDB dimensions and weight

Property	Value	Dimensions orientation
Height	Core RFM: 115 mm (4.5 in.)	
Depth	Core RFM: 400 mm (15.7 in.) Without front covers: 422 mm (16.6 in.) With front covers: 560 mm (22.1 in.)	
Width	Core RFM: 420 mm (16.5 in.) Without front covers: 447 mm (17.6 in.) With front covers: 492 mm (19.4 in.)	
Weight	25 kg (55.1 lb)	
Volume	19.3 l	

**Environmental specifications**

**Table 117** FXDB environmental specifications

Property	Value
Maximum operational outdoor temperature (at constant high ambient temperature maximum output power might be limited)	+55°C (131°F)
Minimum operational temperature (including cold start)	-35°C (-31°F)

**LEDs**

**Table 118** FXDB LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Major alarm affecting the whole RF Module</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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

Table 118 FXDB LEDs (Cont.)

LED color	Description	Alarm
Periodic Red and Green	Antenna line device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm
RF Module fan/TX status LED: Red	All fans are faulty	-
RF Module fan/TX status LED: Green	All fans are working	-
RF Module fan/TX status LED: Color set according to fan status, stable	RF transmission is ON	-
RF Module fan/TX status LED: Color set according to fan status, blinking	RF transmission is OFF	-

**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 50 Ω 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.



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

## 7.14 Flexi RF Module 3TX 1800 (FXEB)

*FXEB technical specifications.*

**Functional description**

Table 119 FXEB functional specification

Property	Value
Output power	3x80 W
MIMO	2TX
Outdoor installation	Yes
SW supported technologies	GSM, FDD-LTE
TX frequency range	1805-1880 MHz
RX frequency range	1710-1785 MHz
DL instantaneous bandwidth	35 MHz in GSM 50 MHz in LTE
UL instantaneous bandwidth	60 MHz

Table 119 FXEB functional specification (Cont.)

Property	Value
DL filter bandwidth	75 MHz
UL filter bandwidth	75 MHz

**Interfaces**

Figure 28 FXEB interfaces

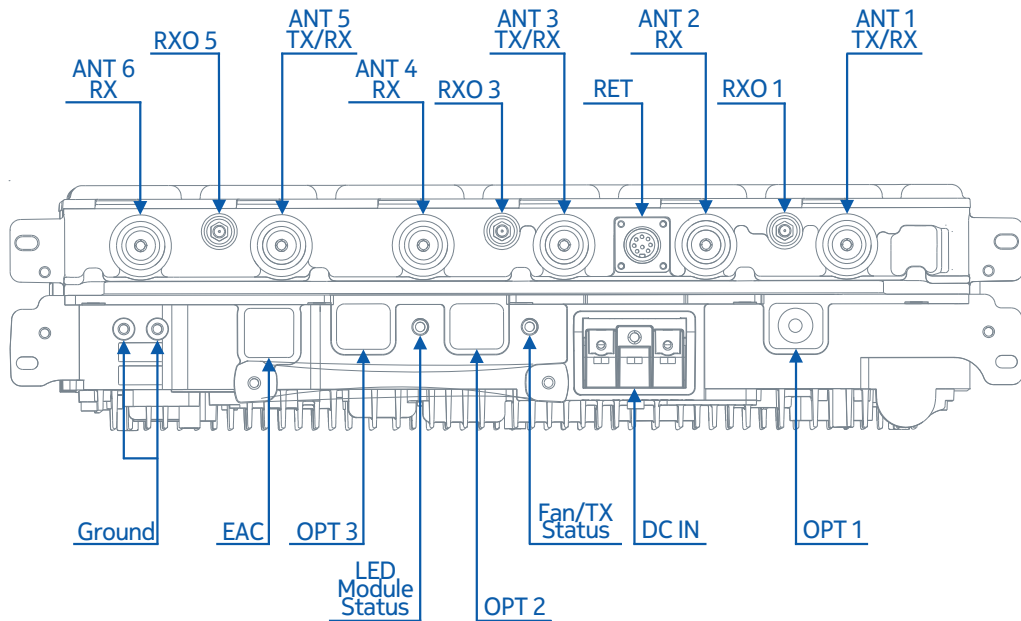


Table 120 FXEB interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	Screw-interterminal	-
Antenna connector	ANT	6	7/16	-
RF output connector	RxO	3	QMA	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	RJ45	-
Optical interface	OPT	3	SFP	3 Gbps or 6 Gbps

**Antenna Line Devices (ALDs) support**

Table 121 FXEB ALD support

ALD support via antenna ports	Value
AISG	ANT1, ANT3, ANT5, RET: AISG 2.0
Proprietary AISG 1.1	No

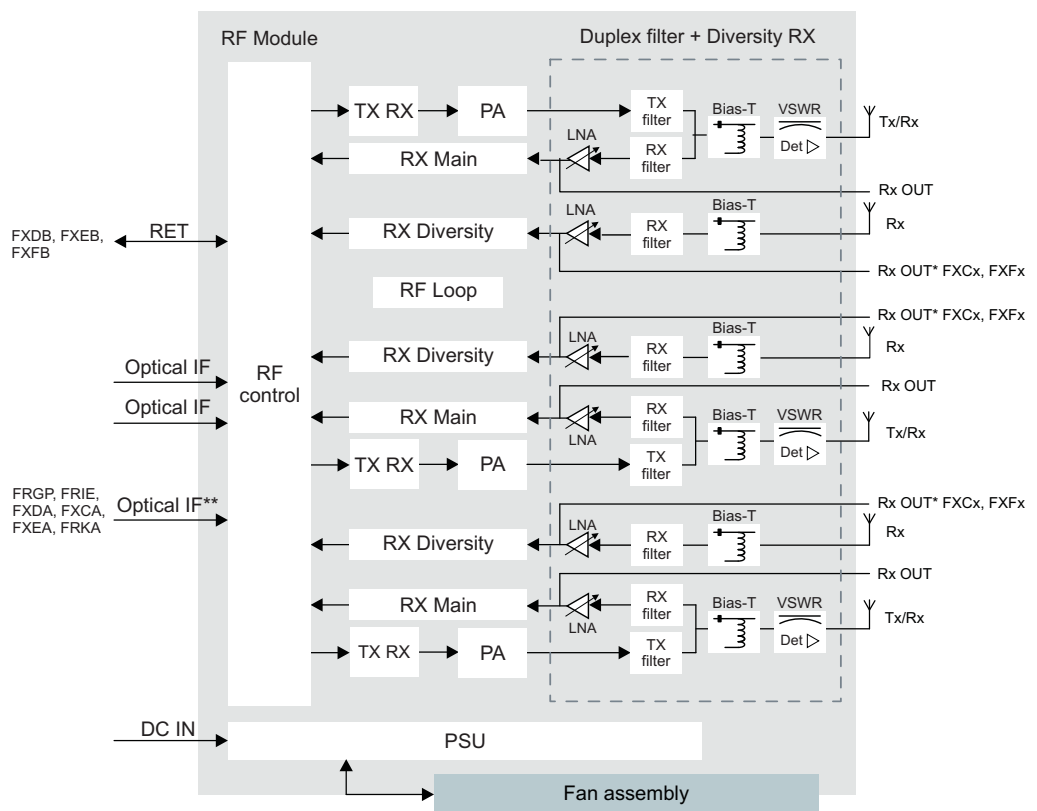


Table 121 FXEB ALD support (Cont.)

ALD support via antenna ports	Value
CWA (for non-AISG installations)	Yes
Voltage	ANT1, ANT3, ANT5: 24 V or 13 V ANT2, ANT4, ANT6: 13 V RET: 24 V
Power per port	30 W

**Functional block diagram**

Figure 29 FXEB functional block diagram



**Electrical specifications**

Table 122 FXEB 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**

Table 123 FXEB power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h					
			Power consumption ETSI 202706 average load P <sub>RRH</sub> , static	Power consumption ETSI 202706 busy hour load P <sub>BH</sub> , RRH, static	Power consumption 100% RF power load P <sub>100%</sub> RRH	Power consumption Typical as 25% TCH load, 60% DTX, 4 dB PC	Power consumption Busy as 50% TCH load, 60% DTX, 4 dB PC	Power consumption Max load (2% GoS), 60% DTX, 4 dB PC
GSM	1/1/1	20	438	438	438	438	438	438
	2/2/2	20	454	481	601	452	457	463
	4/4/4	20	596	709	957	491	520	554
	8/8/8	20	998	1387	1869			
LTE	1/1/1 2T2R	20+20	657	728	891			
	1/1/1 2T2R	40+40	770	907	1226			
	1/1/1 2T2R	60+60	915	1118	1589			
	1/1/1 2T2R	80+80	1022	1284	1900			
MSR	GSM 2/2/2	20 20+20	836	937	1206			
	LTE 1/1/1 2T2R							
	GSM 4/4/4	20 20+20	1002	1198	1592			
	LTE 1/1/1 2T2R							

**Installation and mechanical specifications**

Table 124 FXEB installation and mechanical specifications

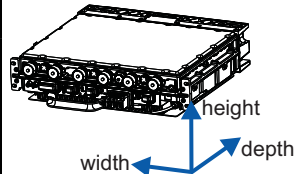
Property	Value
Installation options	<ul style="list-style-type: none"> <li>• floor/stack installation</li> <li>• pole installation</li> <li>• wall installation</li> </ul>

Table 124 FXEB installation and mechanical specifications (Cont.)

Property	Value
	<ul style="list-style-type: none"> <li>19" rack/cabinet</li> </ul>
IP rating	IP65
Related optional items	<p>Pole installation</p> <ul style="list-style-type: none"> <li>Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>Flexi Pole Kit (FPKA)</li> <li>Flexi Pole Kit (FPKC)</li> <li>Flexi Module Casing (EMHx)</li> </ul> <p>Floor/Wall installation</p> <ul style="list-style-type: none"> <li>Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>Flexi Module Casing (EMHx)</li> </ul> <p>Outdoor 19" rack</p> <ul style="list-style-type: none"> <li>Flexi Module Casing (EMHx)</li> </ul> <p>Cabinet/indoor 19" rack</p> <ul style="list-style-type: none"> <li>No optional items needed</li> </ul>

**Dimensions and weight**

Table 125 FXEB dimensions and weight

Property	Value	Dimensions orientation
Height	Core RFM: 115 mm (4.5 in.)	
Depth	Core RFM: 400 mm (15.7 in.)	
	Without front covers: 422 mm (16.6 in.) With front covers: 560 mm (22.1 in.)	
Width	Core RFM: 420 mm (16.5 in.)	
	Without front covers: 447 mm (17.6 in.) With front covers: 492 mm (19.4 in.)	
Weight	25 kg (55.1 lb)	
Volume	19.3 l	

**Environmental specifications**

**Table 126** FXEB environmental specifications

Property	Value
Maximum operational outdoor temperature (at constant high ambient temperature maximum output power might be limited)	+55°C (131°F)
Minimum operational temperature (including cold start)	-35°C (-31°F)

**LEDs**

**Table 127** FXEB LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Major alarm affecting the whole RF Module</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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

Table 127 FXEB LEDs (Cont.)

LED color	Description	Alarm
Periodic Red and Green	Antenna line device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm
RF Module fan/TX status LED: Red	At least one fan is faulty or degraded	-
RF Module fan/TX status LED: Green	All fans are working	-
RF Module fan/TX status LED: Color set according to fan status, stable	RF transmission is ON	-
RF Module fan/TX status LED: Color set according to fan status, blinking	RF transmission is OFF	-

**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 50 Ω 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.



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

## 7.15 Flexi RFM 3-pipe 1800 240 W (FXEE)

*FXEE technical specifications.*

**Functional description**

Table 128 FXEE functional specification

Property	Value
Output power	3x80 W
MIMO	2TX
Outdoor installation	Yes
SW supported technology	GSM, FDD-LTE
TX frequency range	1805-1880 MHz
RX frequency range	1710-1785 MHz
DL instantaneous bandwidth	75 MHz in LTE, LTE/GSM Sharing
UL instantaneous bandwidth	60 MHz
DL filter bandwidth	75 MHz

Table 128 FXEE functional specification (Cont.)

Property	Value
UL filter bandwidth	75 MHz

**Interfaces**

Figure 30 FXEE interfaces

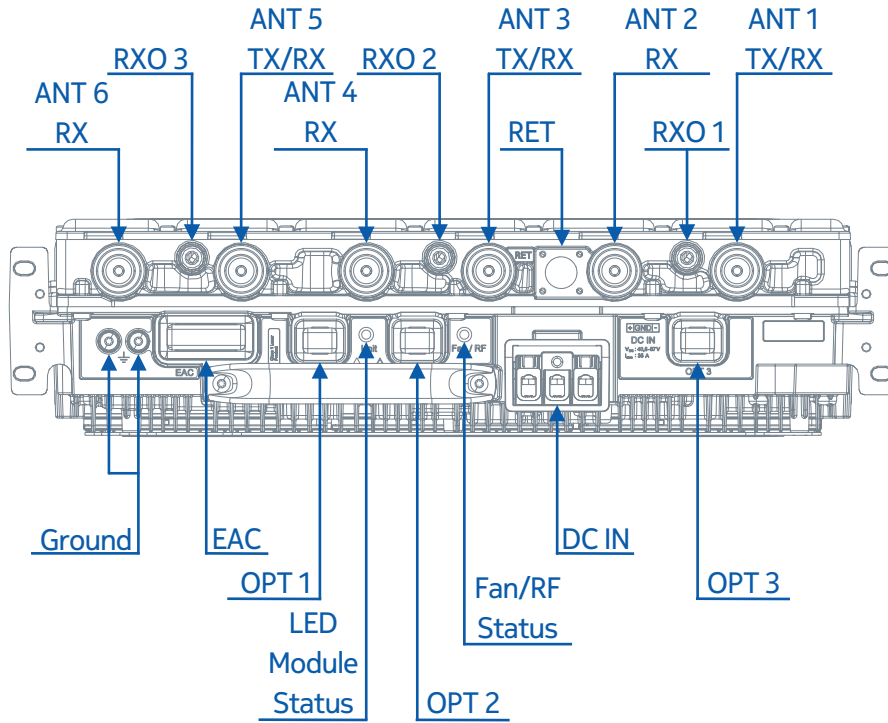


Table 129 FXEE interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	3-pole screw terminal	-
Antenna connector	ANT	6	7/16	-
RF output connector	RxO	3	QMA	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	MDR36	-
Optical interface	OPT	3	SFP	3 Gbps to 6 Gbps

**Antenna Line Devices (ALDs) support**

Table 130 FXEE ALD support

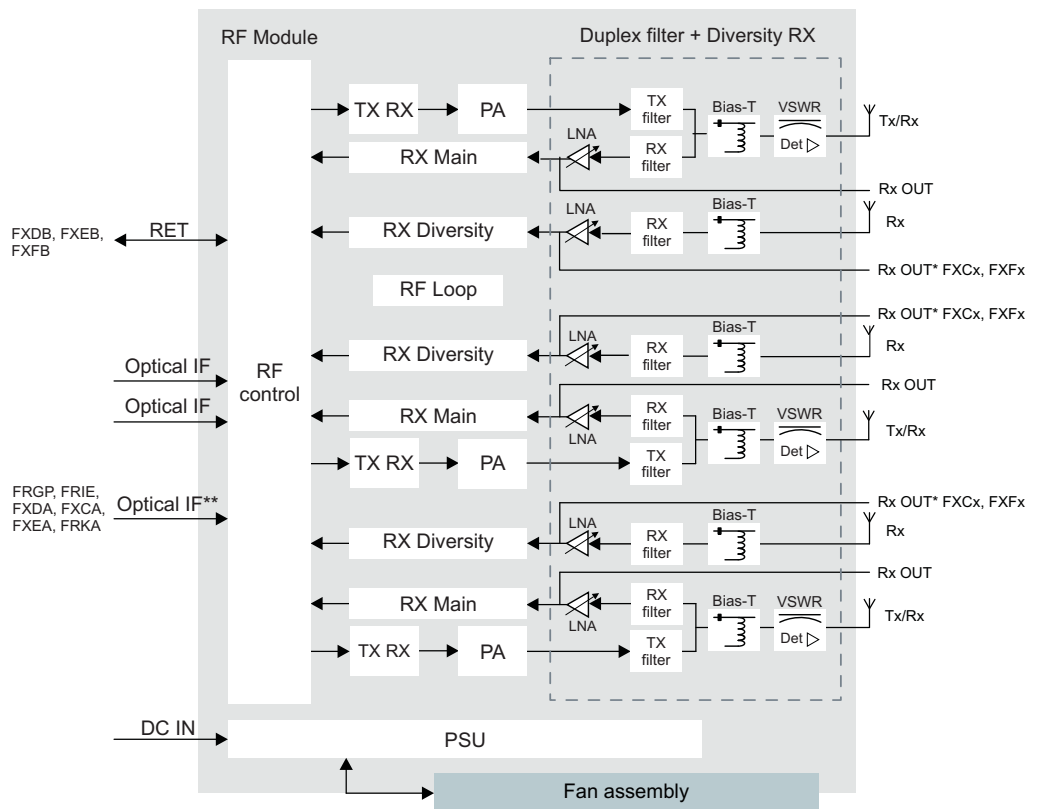
ALD support via antenna ports	Value
AISG	ANT1, ANT3, ANT5, RET: AISG 2.0

Table 130 FXEE ALD support (Cont.)

ALD support via antenna ports	Value
Proprietary AISG1.1	No
CWA (for non-AISG installations)	Yes
Voltage	ANT1, ANT3, ANT5: 25 V or 12 V ANT2, ANT4, ANT6: 12 V RET: 25 V
Power per port	30 W

**Functional block diagram**

Figure 31 FXEE functional block diagram



**Electrical specifications**

Table 131 FXEE 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**

Table 132 FXEE power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h					
			Power consumption ETSI 202706 average load P <sub>RRH</sub> , static	Power consumption ETSI 202706 busy hour load P <sub>BH</sub> , RRH, static	Power consumption 100% RF power load P <sub>100%</sub> , RRH	Power consumption Typical as 25% TCH load, 60% DTX, 4 dB PC	Power consumption Busy as 50% TCH load, 60% DTX, 4 dB PC	Power consumption Max load (2% GoS), 60% DTX, 4 dB PC
GSM	1/1/1	20	492	492	492	492	492	492
	2/2/2	20	520	545	633	518	523	528
	4/4/4	20	674	766	962	583	609	639
LTE	1/1/1 2T2R	20+20	701	774	936			
	1/1/1 2T2R	40+40	815	957	1246			
	1/1/1 2T2R	60+60	960	1149	1559			
	1/1/1 2T2R	80+80	1108	1346	1886			

**Installation and mechanical specifications**

Table 133 FXEE installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• floor/stack installation</li> <li>• pole installation</li> <li>• wall installation</li> <li>• 19" rack/cabinet</li> </ul>
IP rating	IP65
Related optional items	Pole installation <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Pole Kit (FPKA)</li> <li>• Flexi Pole Kit (FPKC)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> Floor/Wall installation

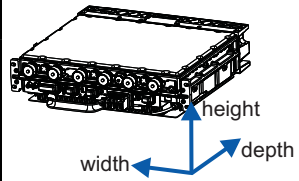


**Table 133** FXEE installation and mechanical specifications (Cont.)

Property	Value
	<ul style="list-style-type: none"> <li>Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>Flexi Module Casing (EMHx)</li> </ul> <p>Outdoor 19" rack</p> <ul style="list-style-type: none"> <li>Flexi Module Casing (EMHx)</li> </ul> <p>Cabinet/indoor 19" rack</p> <ul style="list-style-type: none"> <li>No optional items needed</li> </ul>

**Dimensions and weight**

**Table 134** FXEE dimensions and weight

Property	Value	Dimensions orientation
Height	Core RFM: 115 mm (4.5 in.)	
Depth	Core RFM: 400 mm (15.7 in.) Without front covers: 422 mm (16.6 in.) With front covers: 560 mm (22.1 in.)	
Width	Core RFM: 420 mm (16.5 in.) Without front covers: 447 mm (17.6 in.) With front covers: 492 mm (19.4 in.)	
Weight	25 kg (55.1 lb)	
Volume	19.3 l	

**Environmental specifications**

**Table 135** FXEE environmental specifications

Property	Value
Maximum operational outdoor temperature (at constant high ambient temperature maximum output power might be limited)	+55°C (131°F)
Minimum operational temperature (including cold start)	-35°C (-31°F)

**LEDs**

Table 136 FXEE LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Major alarm affecting the whole RF Module</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm
RF Module fan/TX status LED: Red	At least one fan is faulty or degraded	
RF Module fan/TX status LED: Green	All fans are working	

Table 136 FXEE LEDs (Cont.)

LED color	Description	Alarm
RF Module fan/TX status LED: Color set according to fan status, stable	RF transmission is ON	
RF Module fan/TX status LED: Color set according to fan status, blinking	RF transmission is OFF	

**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 50 Ω 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.



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

## 7.16 Flexi RFM 3-pipe 1800 240 W (FXEF)

*FXEF technical specifications.*



**Note:** This is module is supported in FDD-LTE 16A.

**Functional description**

Table 137 FXEF functional specification

Property	Value
Output power	3x80 W
MIMO	2TX
Outdoor installation	Yes
SW supported technology	GSM, FDD-LTE
TX frequency range	1805-1880 MHz
RX frequency range	1710-1785 MHz
DL instantaneous bandwidth	75 MHz
UL instantaneous bandwidth	75 MHz in LTE, LTE/GSM Sharing
DL filter bandwidth	75 MHz
UL filter bandwidth	75 MHz

**Interfaces**

Figure 32 FXEF interfaces

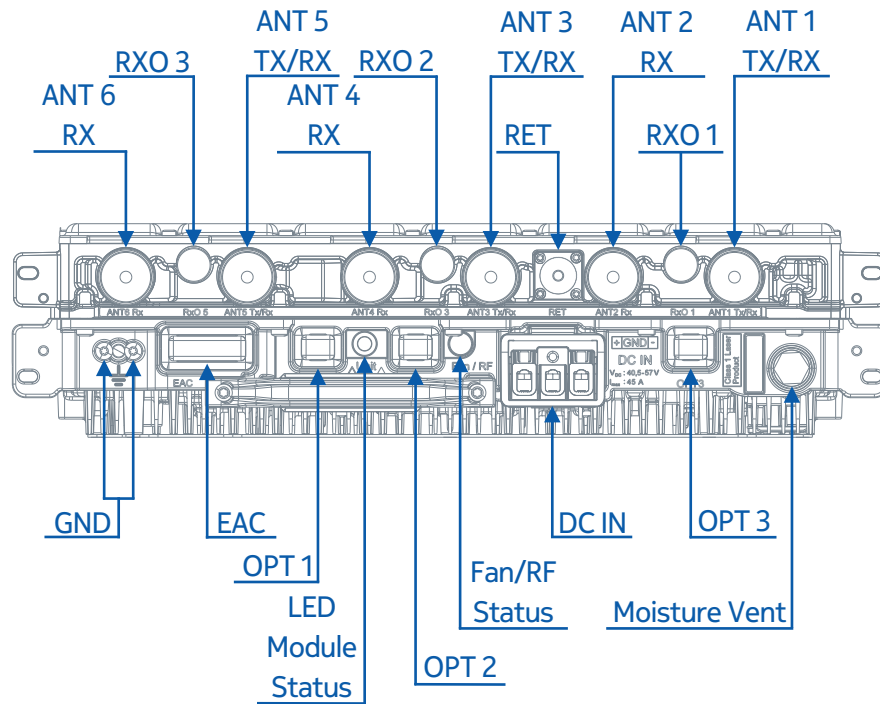


Table 138 FXEF interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	3-pole screw terminal	-
Antenna connector	ANT	6	7/16	-
RF output connector	RxO	3	QMA	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	MDR36	-
Optical interface	OPT	3	SFP	3 Gbps to 6 Gbps
Ground		1	M8 or dual M5 screws	
Moisture Vent	Moisture Vent	1		

**Antenna Line Devices (ALDs) support**

Table 139 FXEF ALD support

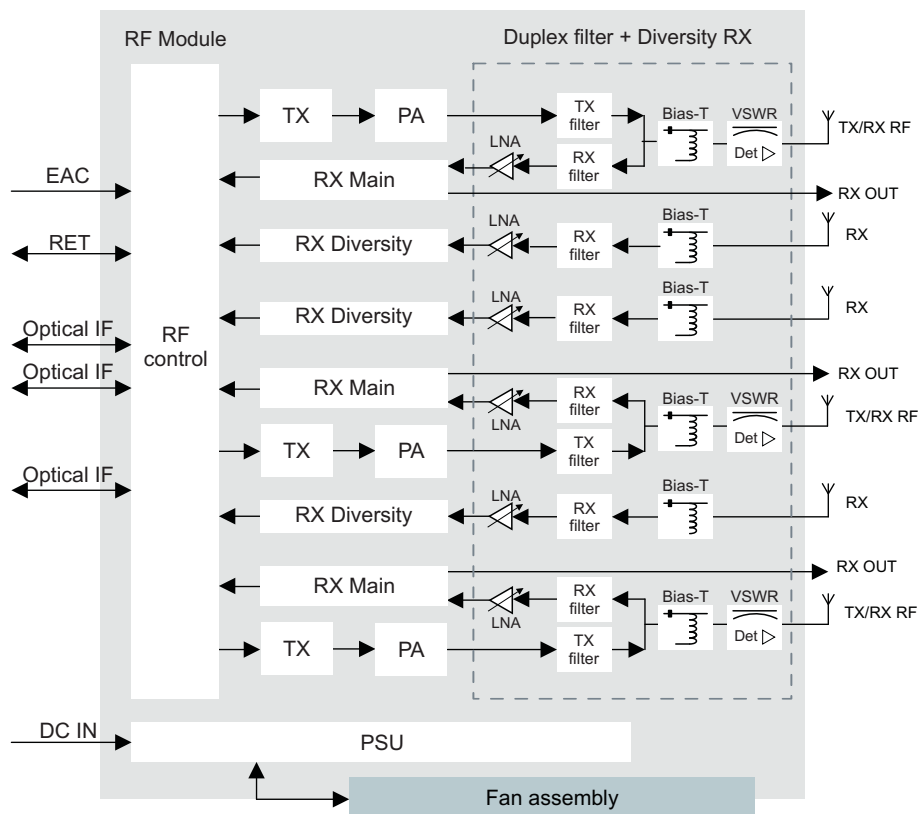
ALD support via antenna ports	Value
AISG	ANT1, ANT3, ANT5, RET: AISG 2.0
Proprietary AISG1.1	No
CWA (for non-AISG installations)	Yes

Table 139 FXEF ALD support (Cont.)

ALD support via antenna ports	Value
Voltage	ANT1, ANT3, ANT5: 25 V or 12 V ANT2, ANT4, ANT6: 12 V RET: 25 V
Power per port	30 W

**Functional block diagram**

Figure 33 FXEF functional block diagram



**Electrical specifications**

Table 140 FXEF 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**

Table 141 FXEF power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h					
			Power consumption ETSI 202706 average load P <sub>RRH</sub> , static	Power consumption ETSI 202706 busy hour load P <sub>BH</sub> , RRH, static	Power consumption 100% RF power load P <sub>100%</sub> RRH	Power consumption Typical as 25% TCH load, 60% DTX, 4 dB PC	Power consumption Busy as 50% TCH load, 60% DTX, 4 dB PC	Power consumption Max load (2% GoS), 60% DTX, 4 dB PC
GSM	1/1/1	20	451	451	451	451	451	451
	2/2/2	20	457	469	550	455	458	461
	4/4/4	20	638	728	925	549	574	602
LTE	1/1/1 2T2R	20+20	579	649	789			
	1/1/1 2T2R	40+40	733	812	1089			
	1/1/1 2T2R	60+60	838	1018	1435			
	1/1/1 2T2R	80+80	1003	1244	1808			

**Installation and mechanical specifications**

Table 142 FXEF installation and mechanical specifications

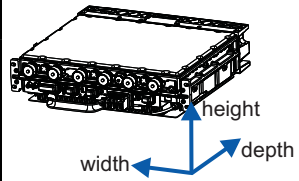
Property	Value
Installation options	<ul style="list-style-type: none"> <li>• floor/stack installation</li> <li>• pole installation</li> <li>• wall installation</li> <li>• 19" rack/cabinet</li> </ul>
IP rating	IP65
Related optional items	Pole installation <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Pole Kit (FPKA)</li> <li>• Flexi Pole Kit (FPKC)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> Floor/Wall installation

Table 142 FXEF installation and mechanical specifications (Cont.)

Property	Value
	<ul style="list-style-type: none"> <li>Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>Flexi Module Casing (EMHx)</li> </ul> <p>Outdoor 19" rack</p> <ul style="list-style-type: none"> <li>Flexi Module Casing (EMHx)</li> </ul> <p>Cabinet/indoor 19" rack</p> <ul style="list-style-type: none"> <li>No optional items needed</li> </ul>

**Dimensions and weight**

Table 143 FXEF dimensions and weight

Property	Value	Dimensions orientation
Height	Core RFM: 118 mm (4.6 in.)	
Depth	Core RFM: 404 mm (15.9 in.) Without front covers: 422 mm (16.6 in.) With front covers: 560 mm (22.1 in.)	
Width	Core RFM: 441 mm (17.4 in.) Without front covers: 447 mm (17.6 in.) With front covers: 492 mm (19.4 in.)	
Weight	25 kg (55.1 lb)	
Volume	19.3 l	

**Environmental specifications**

Table 144 FXEF environmental specifications

Property	Value
Maximum operational outdoor temperature (at constant high ambient temperature maximum output power might be limited)	+55°C (131°F)
Minimum operational temperature (including cold start)	-35°C (-31°F)

**LEDs**

Table 145 FXEF LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Major alarm affecting the whole RF Module</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm
RF Module fan/TX status LED: Red	At least one fan is faulty or degraded	-
RF Module fan/TX status LED: Green	All fans are working	-



Table 145 FXEF LEDs (Cont.)

LED color	Description	Alarm
RF Module fan/TX status LED: Color set according to fan status, stable	RF transmission is ON	-
RF Module fan/TX status LED: Color set according to fan status, blinking	RF transmission is OFF	-

**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 50 Ω 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.



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

## 7.17 Flexi RF Module 3TX 1900 (FXFC)

*FXFC technical specifications.*

**Functional description**

Table 146 FXFC functional specification

Property	Value
Output power	3x80 W
MIMO	2TX
Outdoor installation	Yes
SW supported technologies	GSM, WCDMA, FDD-LTE
TX frequency range	1930-1990 MHz
RX frequency range	1850-1910 MHz
DL instantaneous bandwidth	50 MHz
UL instantaneous bandwidth	60 MHz
DL filter bandwidth	60 MHz
UL filter bandwidth	60 MHz

**Interfaces**

Figure 34 FXFC interfaces

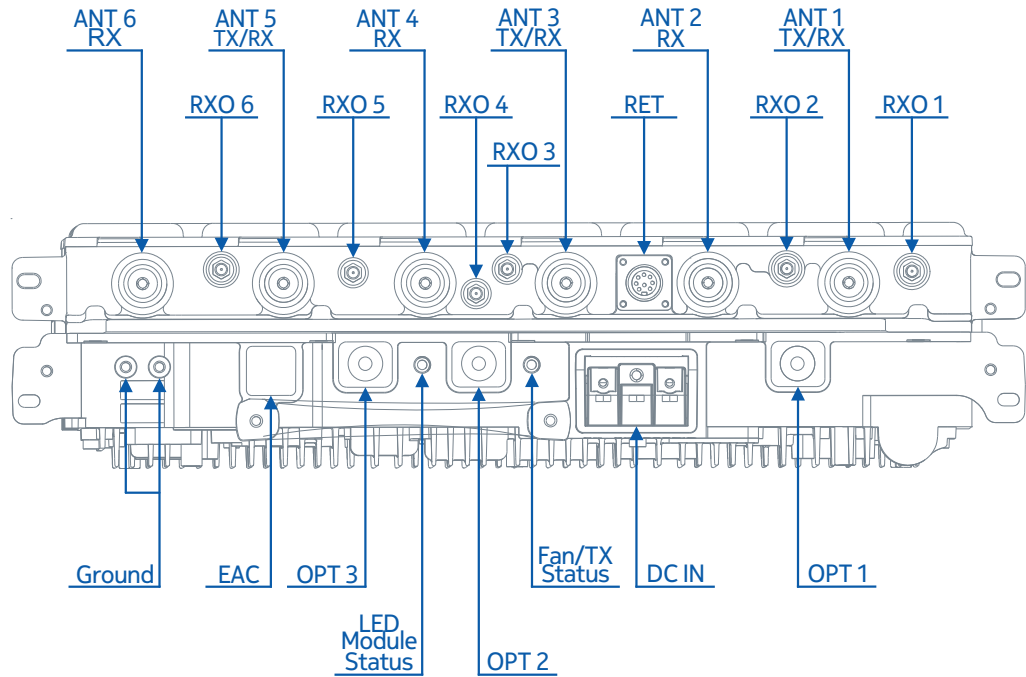


Table 147 FXFC interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	Screw-interminal	-
Antenna connector	ANT	6	7/16	-
RF output connector	RxO	6	QMA	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	RJ45	-
Optical interface	OPT	3	SFP	3 Gbps or 6 Gbps

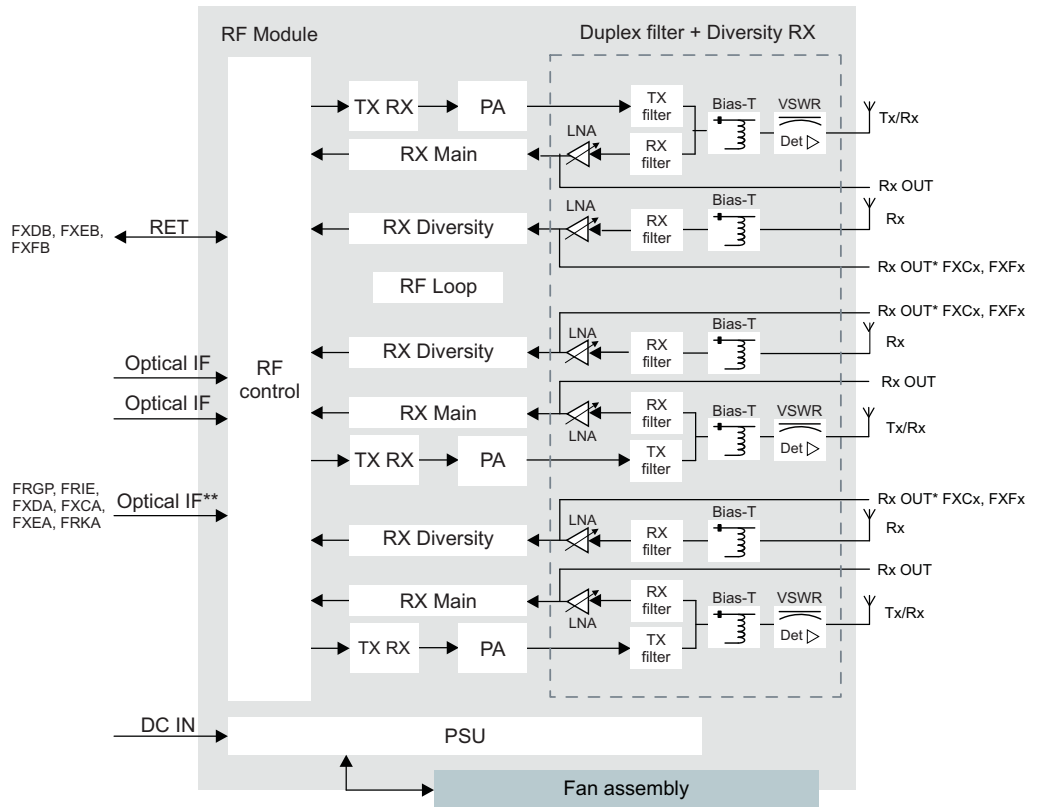
**Antenna Line Devices (ALDs) support**

Table 148 FXFC ALD support

ALD support via antenna ports	Value
AISG	ANT1, ANT3, ANT5, RET: AISG 2.0
Proprietary AISG 1.1	No
CWA (for non-AISG installations)	Yes
Voltage	ANT1, ANT3, ANT5: 24 V or 13 V ANT2, ANT4, ANT6: 13 V RET: 24 V
Power per port	30 W

**Functional block diagram**

*Figure 35* FXFC functional block diagram



**Electrical specifications**

*Table 149* FXFC 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**

Table 150 FXFC power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h					
			Power consumption ETSI 202706 average load P <sub>RRH</sub> , static	Power consumption ETSI 202706 busy hour load P <sub>BH</sub> , RRH, static	Power consumption 100% RF power load P <sub>100%</sub> RRH	Power consumption Typical as 25% TCH load, 60% DTX, 4 dB PC	Power consumption Busy as 50% TCH load, 60% DTX, 4 dB PC	Power consumption Max load (2% GoS), 60% DTX, 4 dB PC
GSM	1/1/1	20	483	483	483	483	483	483
	2/2/2	20	498	527	653	496	502	508
	4/4/4	20	674	799	1060	557	590	628
WCDMA	1/1/1	20	318	353	428			
	2/2/2	20	377	439	587			
	3/3/3	20	465	554	778			
	4/4/4	20	515	641	923			
LTE	1/1/1 2T2R	20+20	736	820	988			
	1/1/1 2T2R	40+40	857	1008	1342			
	1/1/1 2T2R	60+60	1018	1242	1744			
	1/1/1 2T2R	80+80	1139	1434	2080			

**Installation and mechanical specifications**

Table 151 FXFC installation and mechanical specifications

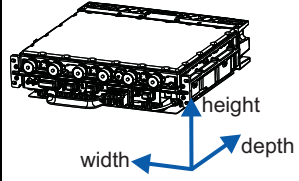
Property	Value
Installation options	<ul style="list-style-type: none"> <li>• floor/stack installation</li> <li>• pole installation</li> <li>• wall installation</li> <li>• 19" rack/cabinet</li> </ul>
IP rating	IP65
Related optional items	Pole installation <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Pole Kit (FPKA)</li> </ul>

**Table 151** FXFC installation and mechanical specifications (Cont.)

Property	Value
	<ul style="list-style-type: none"> <li>Flexi Pole Kit (FPKC)</li> <li>Flexi Module Casing (EMHx)</li> </ul> <p>Floor/Wall installation</p> <ul style="list-style-type: none"> <li>Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>Flexi Module Casing (EMHx)</li> </ul> <p>Outdoor 19" rack</p> <ul style="list-style-type: none"> <li>Flexi Module Casing (EMHx)</li> </ul> <p>Cabinet/indoor 19" rack</p> <ul style="list-style-type: none"> <li>No optional items needed</li> </ul>

**Dimensions and weight**

**Table 152** FXFC dimensions and weight

Property	Value	Dimensions orientation
Height	Core RFM: 115 mm (4.5 in.)	
Depth	Core RFM: 400 mm (15.7 in.)	
	Without front covers: 422 mm (16.6 in.) With front covers: 560 mm (22.1 in.)	
Width	Core RFM: 420 mm (16.5 in.)	
	Without front covers: 447 mm (17.6 in.) With front covers: 492 mm (19.4 in.)	
Weight	25 kg (55.1 lb)	
Volume	19.3 l	

**Environmental specifications**

**Table 153** FXFC environmental specifications

Property	Value
Maximum operational outdoor temperature (at constant high ambient temperature maximum output power might be limited)	+55°C (131°F)
Minimum operational temperature (including cold start)	-35°C (-31°F)

**LEDs**

Table 154 FXFC LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Major alarm affecting the whole RF Module</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm
RF Module fan/TX status LED: Red	At least one fan is faulty or degraded	-
RF Module fan/TX status LED: Green	All fans are working	-

Table 154 FXFC LEDs (Cont.)

LED color	Description	Alarm
RF Module fan/TX status LED: Color set according to fan status, stable	RF transmission is ON	-
RF Module fan/TX status LED: Color set according to fan status, blinking	RF transmission is OFF	-

**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 50 Ω 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.



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

## 7.18 Flexi RFM 3-pipe 900 240 W (FXJB)

*FXJB technical specifications.*

**Functional description**

Table 155 FXJB functional specification

Property	Value
Output power	3x80 W
MIMO	2TX
Outdoor installation	Yes
SW supported technologies	GSM, WCDMA
TX frequency range	935-960 MHz
RX frequency range	890-915 MHz
DL instantaneous bandwidth	25 MHz
UL instantaneous bandwidth	25 MHz
DL filter bandwidth	25 MHz
UL filter bandwidth	25 MHz

**Interfaces**

Figure 36 FXJB interfaces

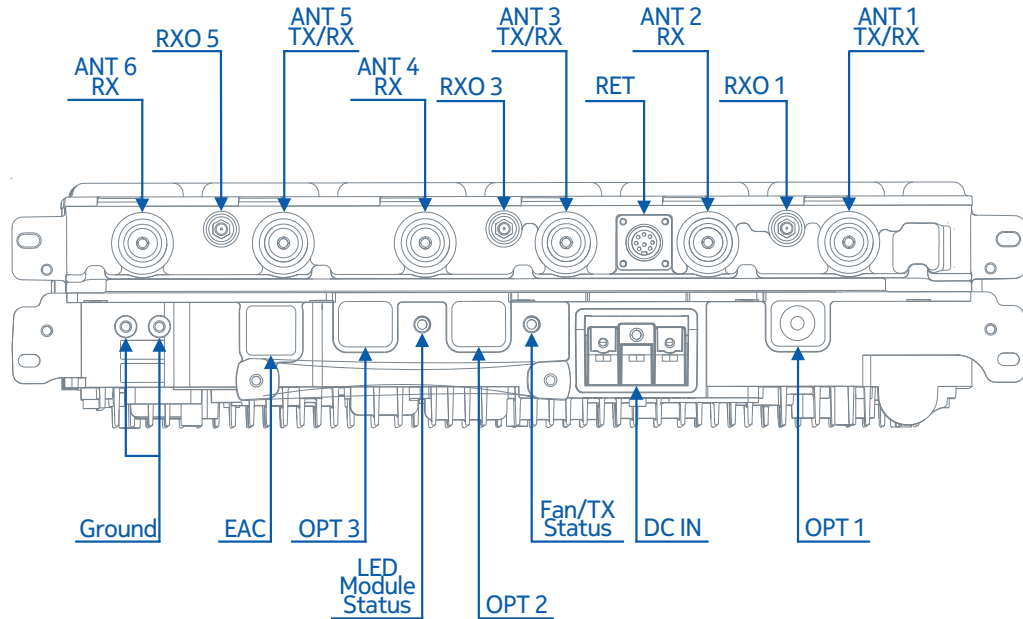


Table 156 FXJB interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	Screw-interterminal	-
Antenna connector	ANT	6	7/16	-
RF optical connector	RxO	3	QMA	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	RJ45	-
Optical interface	OPT	3	SFP	3 Gbps or 6 Gbps

**Antenna Line Devices (ALDs) support**

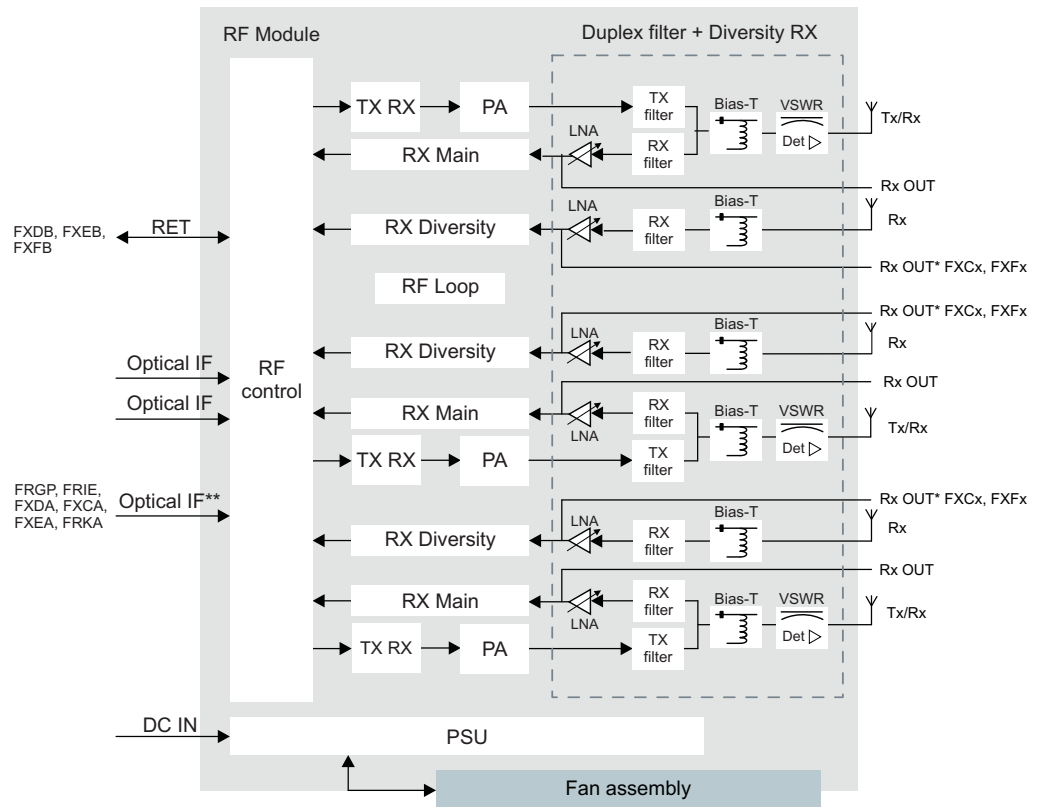
Table 157 FXJB ALD support

ALD support via antenna ports	Value
AISG	ANT1, ANT3, ANT5, RET: AISG 2.0
Proprietary AISG 1.1	No
CWA (for non-AISG installations)	Yes
Voltage	ANT1, ANT3, ANT5: 24 V ANT2, ANT4, ANT6: 12 V RET: 24 V
Power per port	30 W

**Functional block diagram**



Figure 37 FXJB functional block diagram



**Electrical specifications**

Table 158 FXJB 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**

Table 159 FXJB power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h					
			Power consumption ETSI 202706 average load P <sub>RRH</sub> , static	Power consumption ETSI 202706 busy hour load P <sub>BH</sub> , RRH, static	Power consumption 100% RF power load P <sub>100%</sub> RRH	Power consumption Typical as 25% TCH load, 60% DTX, 4 dB PC	Power consumption Busy as 50% TCH load, 60% DTX, 4 dB PC	Power consumption Max load (2% GoS), 60% DTX, 4 dB PC
GSM	1/1/1	20	467	467	467	467	467	467
	2/2/2	20	497	519	625	470	474	478
	4/4/4	20	671	783	987	569	598	632
WCDMA	1/1/1	20	321	359	437			
	2/2/2	20	379	441	575			
	3/3/3	20	481	577	794			
	4/4/4	20	534	657	923			

**Installation and mechanical specifications**

Table 160 FXJB installation and mechanical specifications

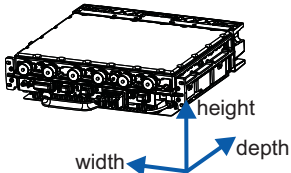
Property	Value
Installation options	<ul style="list-style-type: none"> <li>• floor/stack installation</li> <li>• pole installation</li> <li>• wall installation</li> <li>• 19" rack/cabinet</li> </ul>
IP rating	IP65
Related optional items	<p>Pole installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Pole Kit (FPKA)</li> <li>• Flexi Pole Kit (FPKC)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Floor/Wall installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Outdoor 19" rack</p>

Table 160 FXJB installation and mechanical specifications (Cont.)

Property	Value
	<ul style="list-style-type: none"> <li>Flexi Module Casing (EMHx)</li> </ul> Cabinet/indoor 19" rack <ul style="list-style-type: none"> <li>No optional items needed</li> </ul>

**Dimensions and weight**

Table 161 FXJB dimensions and weight

Property	Value	Dimensions orientation
Height	Core RFM: 115 mm (4.5 in.)	
Depth	Core RFM: 400 mm (15.7 in.)	
	Without front covers: 422 mm (16.6 in.) With front covers: 560 mm (22.1 in.)	
Width	Core RFM: 420 mm (16.5 in.)	
	Without front covers: 447 mm (17.6 in.) With front covers: 492 mm (19.4 in.)	
Weight	25 kg (55.1 lb)	
Volume	19.3 l	

**Environmental specifications**

Table 162 FXJB environmental specifications

Property	Value
Maximum operational outdoor temperature (at constant high ambient temperature maximum output power might be limited)	+55°C (131°F)
Minimum operational temperature (including cold start)	-35°C (-31°F)

**LEDs**

Table 163 FXJB LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded	Major/critical alarm

Table 163 FXJB LEDs (Cont.)

LED color	Description	Alarm
	<ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Major alarm affecting the whole RF Module</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm
RF Module fan/TX status LED: Red	At least one fan is faulty or degraded	-
RF Module fan/TX status LED: Green	All fans are working	-
RF Module fan/TX status LED: Color set according to fan status, stable	RF transmission is ON	-
RF Module fan/TX status LED: Color set according to fan status, blinking	RF transmission is OFF	-

**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 50 Ω 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.



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

## 7.19 Flexi RF Module 3TX 2100 (FRGT)

*FRGT technical specifications.*

**Functional description**

*Table 164* FRGT functional specification

Property	Value
Output power	3x80 W
MIMO	2TX
Outdoor installation	Yes
SW supported technologies	WCDMA, FDD-LTE
TX frequency range	2110-2170 MHz
RX frequency range	1920-1980 MHz
DL instantaneous bandwidth	60 MHz
UL instantaneous bandwidth	60 MHz
DL filter bandwidth	60 MHz
UL filter bandwidth	60 MHz

*Table 165* FRGT output power in RU40 release and onwards

DL bandwidth	Output power
0-20 MHz	80 W
20-45 MHz	70 W (BTS can be commissioned as 80 W (for example 4x20 W per pipe) and RFM internal power control limits the total power to 70 W when needed.)
45-60 MHz	60 W

**Interfaces**

Figure 38 FRGT interfaces

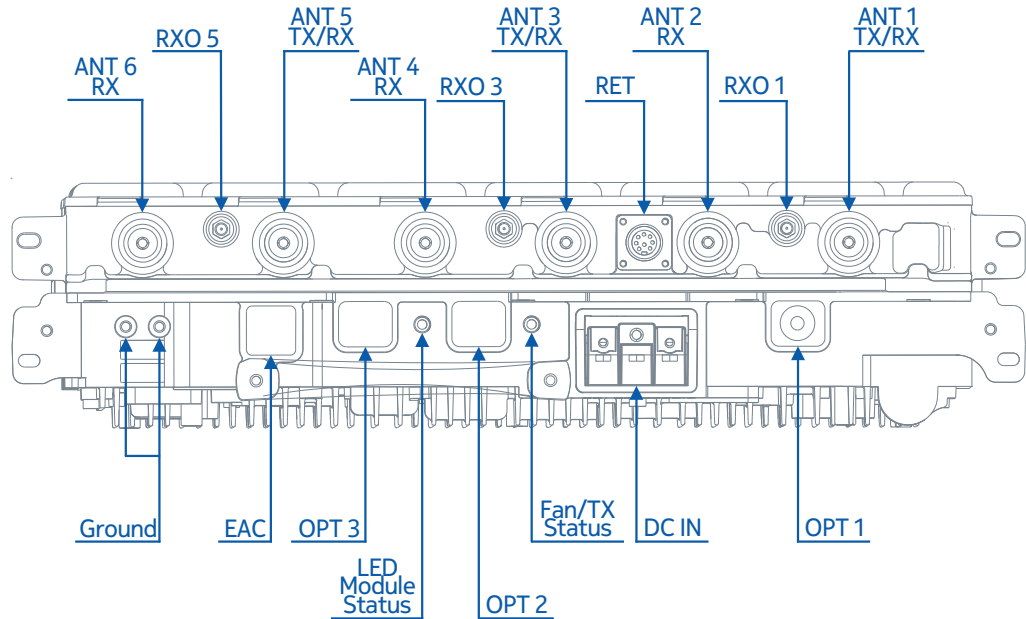


Table 166 FRGT interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	Screw-interterminal	-
Antenna connector	ANT	6	7/16	-
RF output connector	RxO	3	QMA	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	RJ45	-
Optical interface	OPT	3	SFP	3 Gbps or 6 Gbps

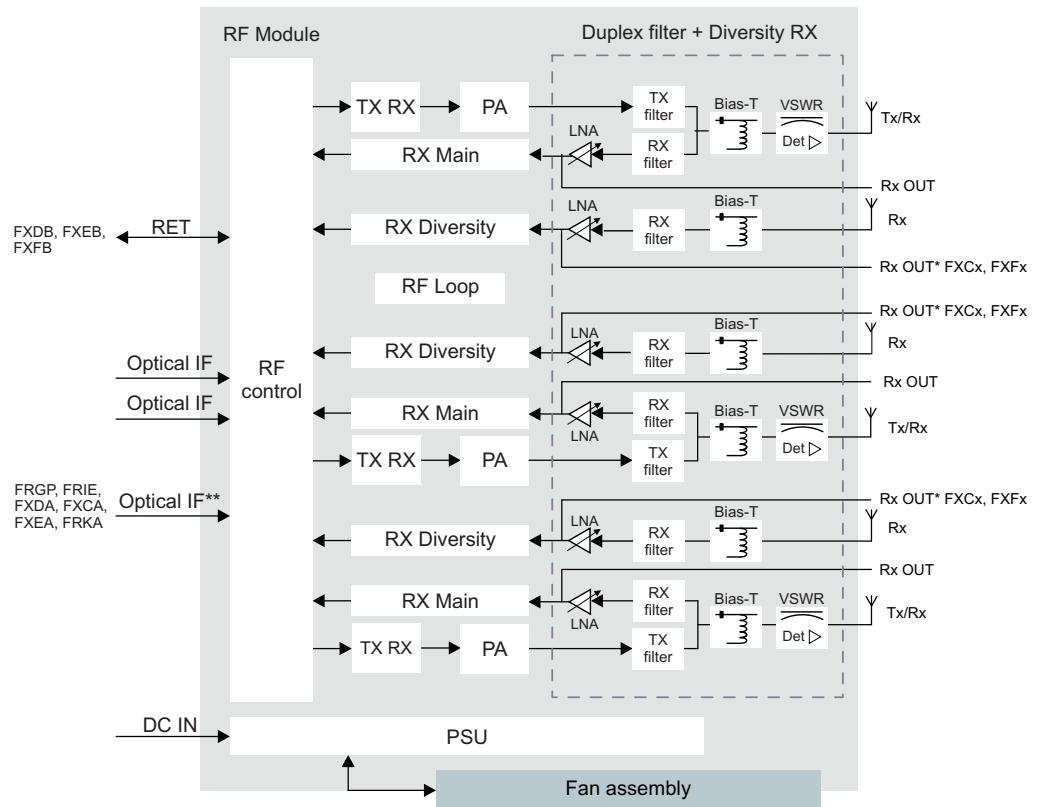
**Antenna Line Devices (ALDs) support**

Table 167 FRGT ALD support

ALD support via antenna ports	Value
AISG	ANT1, ANT3, ANT5, RET: AISG 2.0
Proprietary AISG 1.1	No
CWA (for non-AISG installations)	Yes
Voltage	ANT1, ANT3, ANT5: 24 V or 12 V ANT2, ANT4, ANT6: 12 V RET: 24 V
Power per port	30 W

**Functional block diagram**

Figure 39 FRGT functional block diagram



**Electrical specifications**

Table 168 FRGT 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**

Table 169 FRGT power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h		
			Power consumption ETSI 202706 average load $P_{RRH, static}$	Power consumption ETSI 202706 busy hour load $P_{BH RRH, static}$	Power consumption 100% RF power load $P_{100\% RRH}$
WCDMA	1/1/1	20	287	316	386
	2/2/2	20	356	414	547
	3/3/3	20	437	522	729
	4/4/4	20	494	608	885
LTE	1/1/1 2T2R	20+20	580	651	796
	1/1/1 2T2R	40+40	711	843	1117
	1/1/1 2T2R	60+60	818	1010	1427
	1/1/1 2T2R	80+80	976	1232	1803

**Installation and mechanical specifications**

Table 170 FRGT installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• floor/stack installation</li> <li>• pole installation</li> <li>• wall installation</li> <li>• 19" rack/cabinet</li> </ul>
IP rating	IP65
Related optional items	<p>Pole installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Pole Kit (FPKA)</li> <li>• Flexi Pole Kit (FPKC)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Floor/Wall installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Outdoor 19" rack</p>

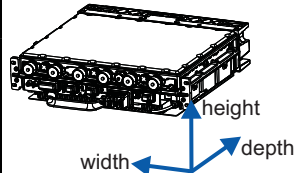


Table 170 FRGT installation and mechanical specifications (Cont.)

Property	Value
	<ul style="list-style-type: none"> <li>Flexi Module Casing (EMHx)</li> </ul> Cabinet/indoor 19" rack <ul style="list-style-type: none"> <li>No optional items needed</li> </ul>

**Dimensions and weight**

Table 171 FRGT dimensions and weight

Property	Value	Dimensions orientation
Height	Core RFM: 115 mm (4.5 in.)	
Depth	Core RFM: 400 mm (15.7 in.) Without front covers: 422 mm (16.6 in.) With front covers: 560 mm (22.1 in.)	
Width	Core RFM: 420 mm (16.5 in.) Without front covers: 447 mm (17.6 in.) With front covers: 492 mm (19.4 in.)	
Weight	25 kg (55.1 lb)	
Volume	19.3 l	

**Environmental specifications**

Table 172 FRGT environmental specifications

Property	Value
Maximum operational outdoor temperature (at constant high ambient temperature maximum output power might be limited)	+55°C (131°F)
Minimum operational temperature (including cold start)	-35°C (-31°F)

**LEDs**

Table 173 FRGT LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded	Major/critical alarm

Table 173 FRGT LEDs (Cont.)

LED color	Description	Alarm
	<ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Major alarm affecting the whole RF Module</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm
RF Module fan/TX status LED: Red	At least one fan is faulty or degraded	-
RF Module fan/TX status LED: Green	All fans are working	-
RF Module fan/TX status LED: Color set according to fan status, stable	RF transmission is ON	-
RF Module fan/TX status LED: Color set according to fan status, blinking	RF transmission is OFF	-

**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 50 Ω 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.



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

## 7.20 Flexi RF Module 3TX 2100 (FRGS)

*FRGS technical specifications.*

**Functional description**

*Table 174* FRGS functional specification

Property	Value
Output power	3x80 W
MIMO	2TX
Outdoor installation	Yes
SW supported technologies	WCDMA, FDD-LTE
TX frequency range	2130-2170 MHz
RX frequency range	1940-1980 MHz
DL instantaneous bandwidth	40 MHz
UL instantaneous bandwidth	40 MHz
DL filter bandwidth	40 MHz
UL filter bandwidth	40 MHz

*Table 175* FRGS output power in RU40

DL bandwidth	Output power
0-20 MHz	80 W
20-40 MHz	70 W (BTS can be commissioned as 80 W (for example 4x20 W per pipe) and RFM internal power control limits the total power to 70 W when needed.)

**Interfaces**

Figure 40 FRGS interfaces

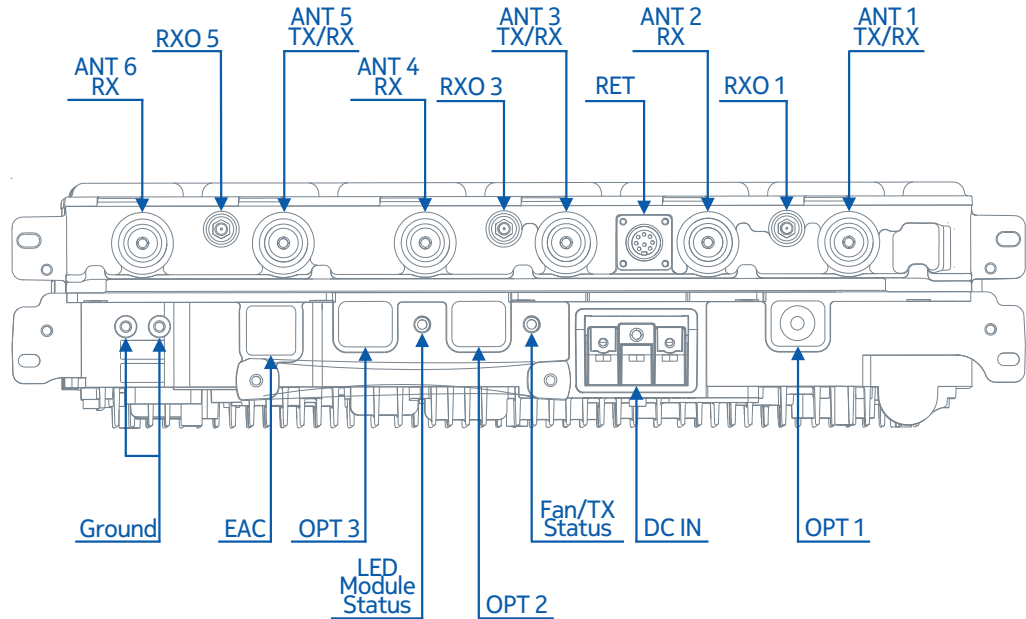


Table 176 FRGS interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	Screw-interterminal	-
Antenna connector	ANT	6	7/16	-
RF output connector	RxO	3	QMA	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	RJ45	-
Optical interface	OPT	3	SFP	3 Gbps or 6 Gbps

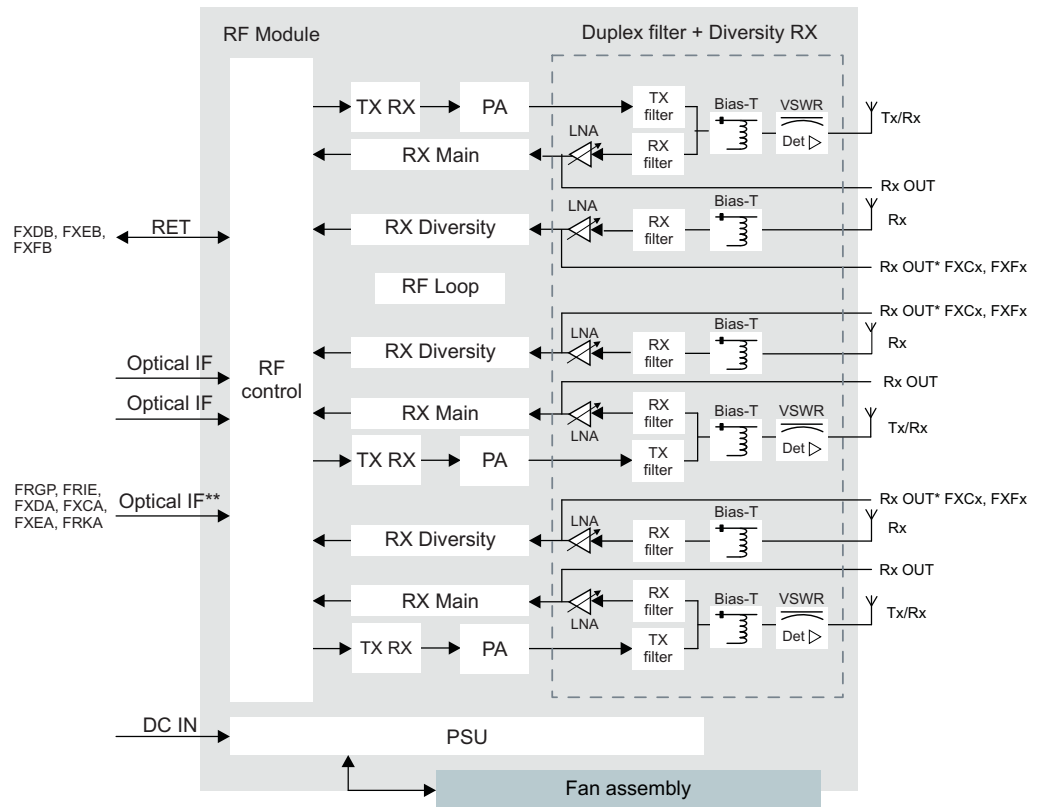
**Antenna Line Devices (ALDs) support**

Table 177 FRGS ALD support

ALD support via antenna ports	Value
AISG	ANT1, ANT3, ANT5, RET: AISG 2.0
Proprietary AISG 1.1	No
CWA (for non-AISG installations)	Yes
Voltage	ANT1, ANT3, ANT5: 24 V or 12 V ANT2, ANT4, ANT6: 12 V RET: 24 V
Power per port	30 W

**Functional block diagram**

Figure 41 FRGS functional block diagram



**Electrical specifications**

Table 178 FRGS 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**

Table 179 FRGS power consumption

Number of TXs	RF output power per TX [W]	Estimated power consumption [W] at 48VDC input at 23°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin	
		50% RF Load	100% RF Load
3	80	595	892
	60	524	738
	40	405	541
	20	314	381

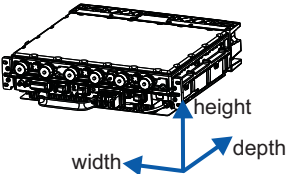
**Installation and mechanical specifications**

**Table 180** FRGS installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• floor/stack installation</li> <li>• pole installation</li> <li>• wall installation</li> <li>• 19" rack/cabinet</li> </ul>
IP rating	IP65
Related optional items	<p>Pole installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Pole Kit (FPKA)</li> <li>• Flexi Pole Kit (FPKC)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Floor/Wall installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Outdoor 19" rack</p> <ul style="list-style-type: none"> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Cabinet/indoor 19" rack</p> <ul style="list-style-type: none"> <li>• No optional items needed</li> </ul>

**Dimensions and weight**

**Table 181** FRGS dimensions and weight

Property	Value	Dimensions orientation
Height	Core RFM: 115 mm (4.5 in.)	
Depth	Core RFM: 400 mm (15.7 in.) Without front covers: 422 mm (16.6 in.) With front covers: 560 mm (22.1 in.)	
Width	Core RFM: 420 mm (16.5 in.) Without front covers: 447 mm (17.6 in.) With front covers: 492 mm (19.4 in.)	
Weight	25 kg (55.1 lb)	
Volume	19.3 l	

**Environmental specifications**

*Table 182* FRGS environmental specifications

Property	Value
Maximum operational outdoor temperature (at constant high ambient temperature maximum output power might be limited)	+55°C (131°F)
Minimum operational temperature (including cold start)	-35°C (-31°F)

**LEDs**

*Table 183* FRGS LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Major alarm affecting the whole RF Module</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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

Table 183 FRGS LEDs (Cont.)

LED color	Description	Alarm
Periodic Red and Green	Antenna line device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm
RF Module fan/TX status LED: Red	At least one fan is faulty or degraded	-
RF Module fan/TX status LED: Green	All fans are working	-
RF Module fan/TX status LED: Color set according to fan status, stable	RF transmission is ON	-
RF Module fan/TX status LED: Color set according to fan status, blinking	RF transmission is OFF	-

**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 50 Ω 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.



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

## 7.21 Flexi RFM 3-pipe 2100 240 W (FRGX)

*FRGX technical specifications.*

**Functional description**

Table 184 FRGX functional specification

Property	Value
Output power	3x80 W
MIMO	2TX
Outdoor installation	Yes
SW supported technology	WCDMA, FDD-LTE
TX frequency range	2110-2170 MHz
RX frequency range	1920-1980 MHz
DL instantaneous bandwidth	60 MHz
UL instantaneous bandwidth	60 MHz
DL filter bandwidth	60 MHz



Table 184 FRGX functional specification (Cont.)

Property	Value
UL filter bandwidth	60 MHz

**Interfaces**

Figure 42 FRGX interfaces

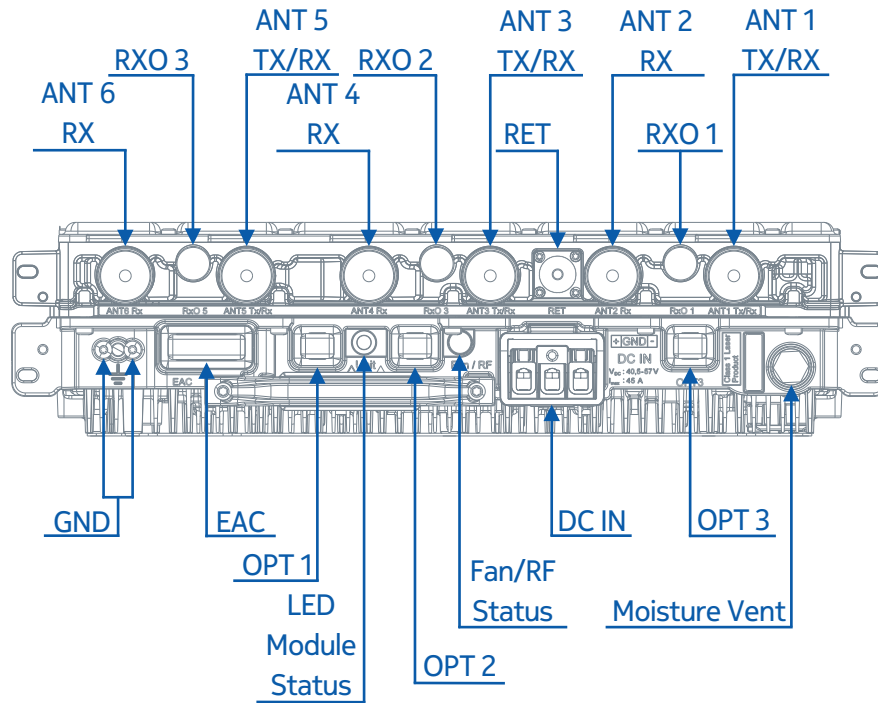


Table 185 FRGX interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	3-pole screw terminal	-
Antenna connector	ANT	6	7/16	-
RF output connector	RxO	3	QMA	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	MDR36	-
Optical interface	OPT	3	SFP	3 Gbps to 6 Gbps
Ground		1	M8 or dual M5 screws	-
Moisture Vent	-	1	Core Vent	-

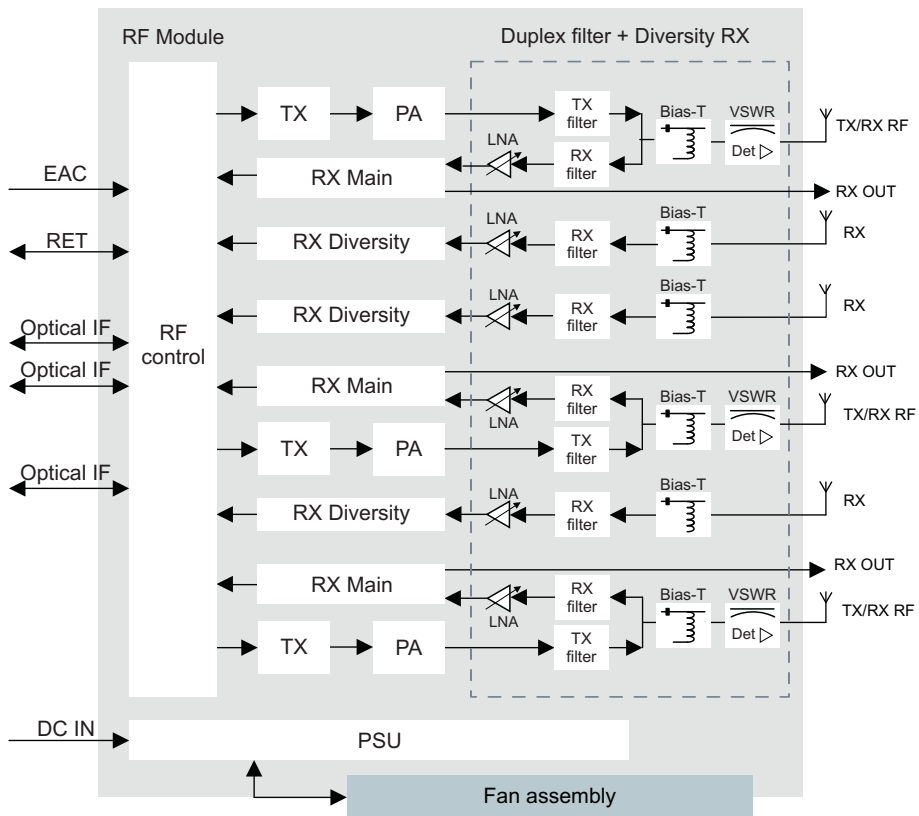
**Antenna Line Devices (ALDs) support**

Table 186 FRGX ALD support

ALD support via antenna ports	Value
AISG	ANT1, ANT3, ANT5, RET: AISG 2.0
Proprietary AISG1.1	No
CWA (for non-AISG installations)	Yes
Voltage	ANT1, ANT3, ANT5: 25 V or 12 V ANT2, ANT4, ANT6: 12 V RET: 25 V
Power per port	30 W

Functional block diagram

Figure 43 FRGX functional block diagram




Electrical specifications

Table 187 FRGX 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**

*Table 188* FXEF power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h		
			Power consumption ETSI 202706 average load $P_{RRH, static}$	Power consumption ETSI 202706 busy hour load $P_{BH, RRH, static}$	Power consumption 100% RF power load $P_{100\% RRH}$
			 Note: Values preliminary estimated.		
WCDMA	1/1/1	20	295	331	404
	2/2/2	20	364	424	561
	3/3/3	20	442	526	730
	4/4/4	20	524	634	909
LTE	1/1/1 2T2R	20+20	584	664	811
	1/1/1 2T2R	40+40	719	853	1129
	1/1/1 2T2R	60+60	872	1063	1481
	1/1/1 2T2R	80+80	1027	1277	1833

**Installation and mechanical specifications**

*Table 189* FRGX installation and mechanical specifications

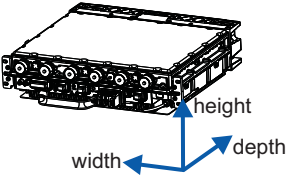
Property	Value
Installation options	<ul style="list-style-type: none"> <li>• floor/stack installation</li> <li>• pole installation</li> <li>• wall installation</li> <li>• 19" rack/cabinet</li> </ul>
IP rating	IP65
Related optional items	Pole installation <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Pole Kit (FPKA)</li> <li>• Flexi Pole Kit (FPKC)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> Floor/Wall installation

**Table 189** FRGX installation and mechanical specifications (Cont.)

Property	Value
	<ul style="list-style-type: none"> <li>Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>Flexi Module Casing (EMHx)</li> </ul> Outdoor 19" rack <ul style="list-style-type: none"> <li>Flexi Module Casing (EMHx)</li> </ul> Cabinet/indoor 19" rack <ul style="list-style-type: none"> <li>No optional items needed</li> </ul>

**Dimensions and weight**

**Table 190** FRGX dimensions and weight

Property	Value	Dimensions orientation
Height	Core RFM: 118 mm (4.6 in.)	
Depth	Core RFM: 404 mm (15.9 in.) Without front covers: 422 mm (16.6 in.) With front covers: 560 mm (22.1 in.)	
Width	Core RFM: 441 mm (17.4 in.) Without front covers: 447 mm (17.6 in.) With front covers: 492 mm (19.4 in.)	
Weight	25 kg (55.1 lb)	
Volume	19.3 l	

**Environmental specifications**

**Table 191** FRGX environmental specifications

Property	Value
Maximum operational outdoor temperature (at constant high ambient temperature maximum output power might be limited)	+55°C (131°F)
Minimum operational temperature (including cold start)	-35°C (-31°F)

**LEDs**

Table 192 FRGX LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Major alarm affecting the whole RF Module</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm
RF Module fan/TX status LED: Red	At least one fan is faulty or degraded	
RF Module fan/TX status LED: Green	All fans are working	

Table 192 FRGX LEDs (Cont.)

LED color	Description	Alarm
RF Module fan/TX status LED: Color set according to fan status, stable	RF transmission is ON	
RF Module fan/TX status LED: Color set according to fan status, blinking	RF transmission is OFF	



**WARNING! Risk of electric shock!**

Before turning RF power on, RF ports have to be terminated by nominal 50 Ω 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.



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

## 8 Descriptions of 6TX RF Modules

### 8.1 Flexi RF Module 6TX 700 (FRPA)

*FRPA technical specifications.*

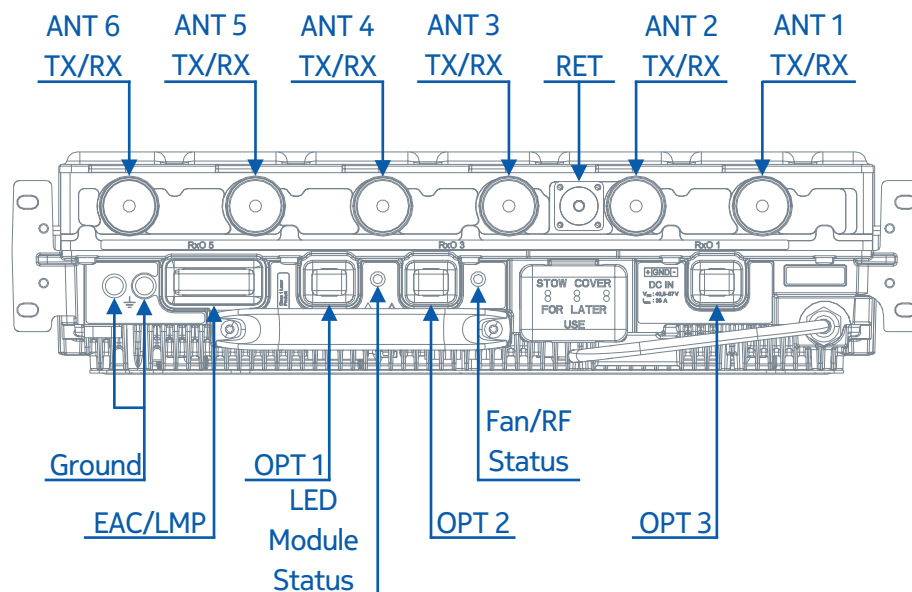
#### Functional description

Table 193 FRPA functional specification

Property	Value
Output power	6x40 W
MIMO	2TX
Outdoor installation	Yes
SW supported technology	FDD-LTE
TX frequency range	758-793 MHz
RX frequency range	703-738 MHz
DL instantaneous bandwidth	35 MHz
UL instantaneous bandwidth	35 MHz
DL filter bandwidth	35 MHz
UL filter bandwidth	35 MHz

#### Interfaces

Figure 44 FRPA interfaces



*Table 194* FRPA interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	Screw-interminal	-
Antenna connector	ANT	6	7/16	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	MDR36	-
Optical interface	OPT	3	SFP	3 Gbps or 6 Gbps

**Antenna Line Devices (ALDs) support**

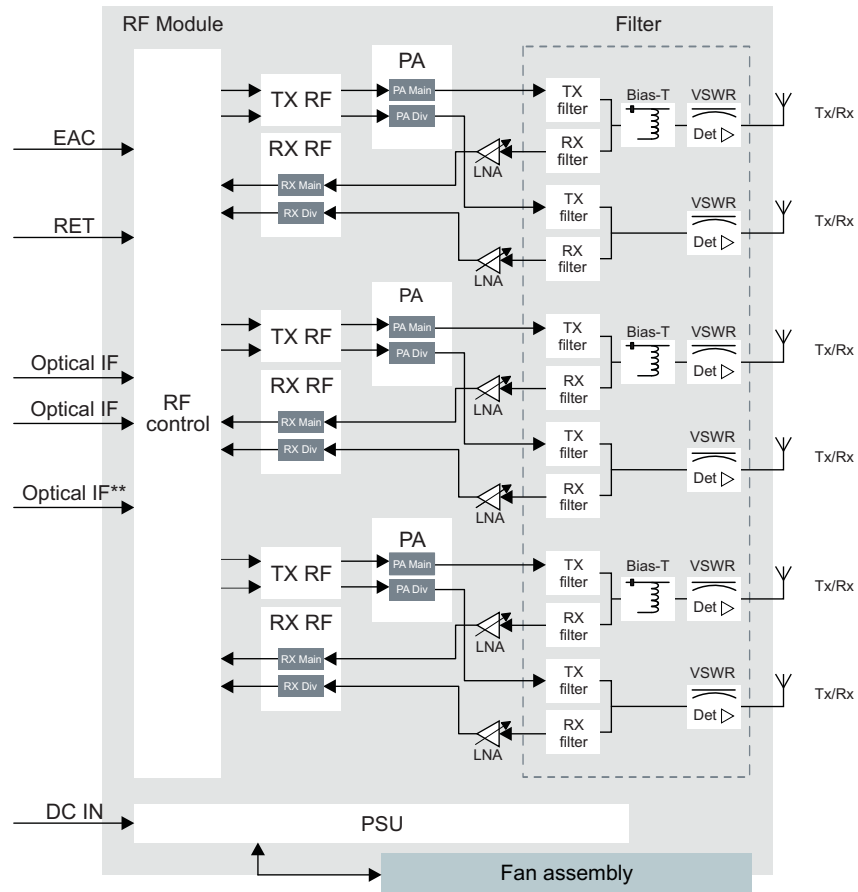
*Table 195* FRPA ALD support

ALD support via antenna ports	Value
AISG	ANT1, ANT3, ANT5, RET: AISG 2.0
Proprietary AISG 1.1	No
CWA (for non-AISG installations)	No
Voltage	ANT1, ANT3, ANT5: 25 V RET: 25 V
Power per port	30 W

**Functional block diagram**



Figure 45 FRPA functional block diagram



**Electrical specifications**

Table 196 FRPA 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**

Table 197 FRPA power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h		
			Power consumption ETSI 202706 average load $P_{RRH, static}$	Power consumption ETSI 202706 busy hour load $P_{BH, RRH, static}$	Power consumption 100% RF power load $P_{100\% RRH}$
LTE	1/1/1 2T2R	20+20	399	453	568
	1/1/1 2T2R	40+40	576	692	934

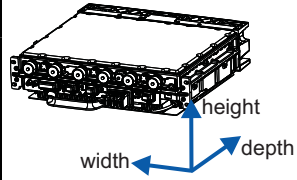
**Installation and mechanical specifications**

Table 198 FRPA installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• floor/stack installation</li> <li>• pole installation</li> <li>• wall installation</li> <li>• 19" rack/cabinet</li> </ul>
IP rating	IP65
Related optional items	<p>Pole installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Pole Kit (FPKA)</li> <li>• Flexi Pole Kit (FPKC)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Floor/Wall installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Outdoor 19" rack</p> <ul style="list-style-type: none"> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Cabinet/indoor 19" rack</p> <ul style="list-style-type: none"> <li>• No optional items needed</li> </ul>

**Dimensions and weight**

Table 199 FRPA dimensions and weight

Property	Value	Dimensions orientation
Height	Core RFM: 115 mm (4.5 in.)	
Depth	Core RFM: 400 mm (15.7 in.) Without front covers: 422 mm (16.6 in.) With front covers: 560 mm (22.1 in.)	
Width	Core RFM: 420 mm (16.5 in.) Without front covers: 447 mm (17.6 in.) With front covers: 492 mm (19.4 in.)	
Weight	24 kg (52.9 lb)	
Volume	19.3 l	

**Environmental specifications**

Table 200 FRPA environmental specifications

Property	Value
Maximum operational outdoor temperature (at constant high ambient temperature maximum output power might be limited)	+55°C (131°F)
Minimum operational temperature (including cold start)	-35°C (-31°F)

**LEDs**

Table 201 FRPA LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Major alarm affecting the whole RF Module</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> </ul>	No alarm

Table 201 FRPA LEDs (Cont.)

LED color	Description	Alarm
	<ul style="list-style-type: none"> <li>There is no connection to any System Module</li> </ul>	
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm
RF Module fan/TX status LED: Red	At least one fan is faulty or degraded	-
RF Module fan/TX status LED: Green	All fans are working	-
RF Module fan/TX status LED: Color set according to fan status, stable	RF transmission is ON	-
RF Module fan/TX status LED: Color set according to fan status, blinking	RF transmission is OFF	-

**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 50 Ω 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.



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

## 8.2 Flexi RF Module 6TX 700 (FRPB)

FRPB technical specifications.

### Functional description

Table 202 FRPB functional specification

Property	Value
Output power	6x40 W
MIMO	2TX
Outdoor installation	Yes
SW supported technology	FDD-LTE
TX frequency range	773-803 MHz
RX frequency range	718-748 MHz
DL instantaneous bandwidth	30 MHz
UL instantaneous bandwidth	30 MHz
DL filter bandwidth	30 MHz
UL filter bandwidth	30 MHz

### Interfaces

Figure 46 FRPB interfaces

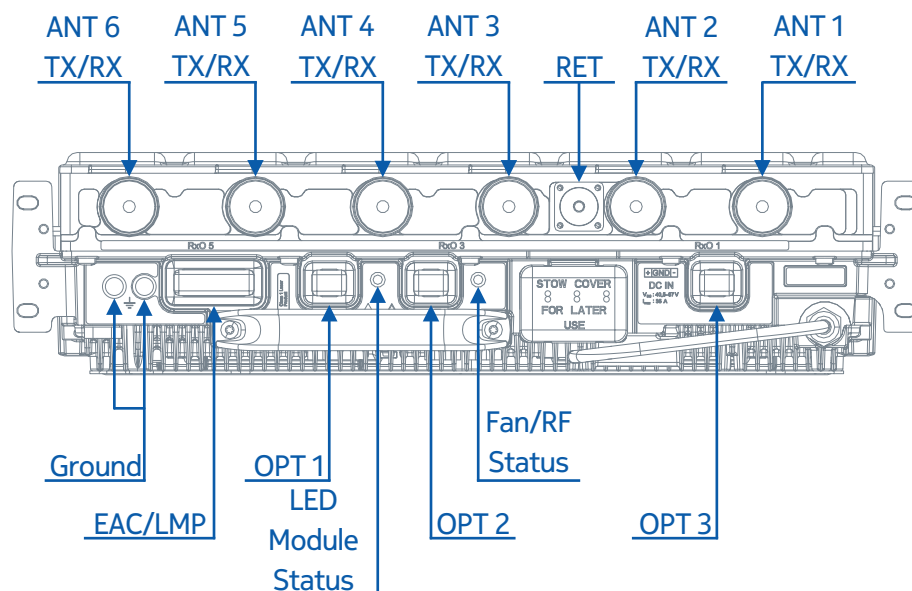


Table 203 FRPB interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	Screw-interminal	-

*Table 203* FRPB interfaces (Cont.)

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Antenna connector	ANT	6	7/16	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	MDR36	-
Optical interface	OPT	3	SFP	3 Gbps or 6 Gbps

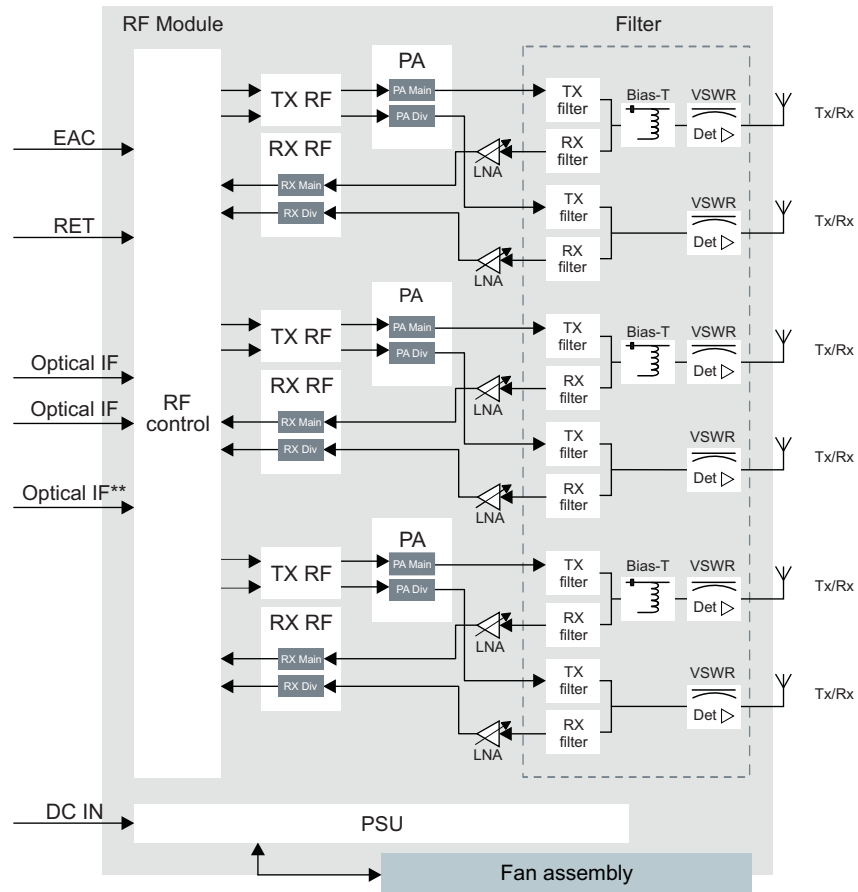
**Antenna Line Devices (ALDs) support**

*Table 204* FRPB ALD support

ALD support via antenna ports	Value
AISG	ANT1, ANT3, ANT5, RET: AISG 2.0
Proprietary AISG 1.1	No
CWA (for non-AISG installations)	No
Voltage	ANT1, ANT3, ANT5: 25 V RET: 25 V
Power per port	30 W

**Functional block diagram**

Figure 47 FRPB functional block diagram



**Electrical specifications**

Table 205 FRPB 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**

Table 206 FRPB power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h		
			Power consumption ETSI 202706 average load $P_{RRH, static}$	Power consumption ETSI 202706 busy hour load $P_{BH, RRH, static}$	Power consumption 100% RF power load $P_{100\% RRH}$
LTE	1/1/1 2T2R	20+20	399	453	568
	1/1/1 2T2R	40+40	576	692	934

**Installation and mechanical specifications**

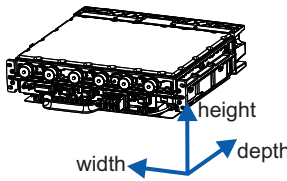
Table 207 FRBP installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• floor/stack installation</li> <li>• pole installation</li> <li>• wall installation</li> <li>• 19" rack/cabinet</li> </ul>
IP rating	IP65
Related optional items	<p>Pole installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Pole Kit (FPKA)</li> <li>• Flexi Pole Kit (FPKC)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Floor/Wall installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Outdoor 19" rack</p> <ul style="list-style-type: none"> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Cabinet/indoor 19" rack</p> <ul style="list-style-type: none"> <li>• No optional items needed</li> </ul>

**Dimensions and weight**



Table 208 FRPB dimensions and weight

Property	Value	Dimensions orientation
Height	Core RFM: 115 mm (4.5 in.)	
Depth	Core RFM: 400 mm (15.7 in.) Without front covers: 422 mm (16.6 in.) With front covers: 560 mm (22.1 in.)	
Width	Core RFM: 420 mm (16.5 in.) Without front covers: 447 mm (17.6 in.) With front covers: 492 mm (19.4 in.)	
Weight	24 kg (52.9 lb)	
Volume	19.3 l	

**Environmental specifications**

Table 209 FRPB environmental specifications

Property	Value
Maximum operational outdoor temperature (at constant high ambient temperature maximum output power might be limited)	+55°C (131°F)
Minimum operational temperature (including cold start)	-35°C (-31°F)

**LEDs**

Table 210 FRPB LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Major alarm affecting the whole RF Module</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> </ul>	No alarm

Table 210 FRPB LEDs (Cont.)

LED color	Description	Alarm
	<ul style="list-style-type: none"> <li>There is no connection to any System Module</li> </ul>	
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm
RF Module fan/TX status LED: Red	At least one fan is faulty or degraded	-
RF Module fan/TX status LED: Green	All fans are working	-
RF Module fan/TX status LED: Color set according to fan status, stable	RF transmission is ON	-
RF Module fan/TX status LED: Color set according to fan status, blinking	RF transmission is OFF	-

**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 50 Ω 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.



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

### 8.3 Flexi RFM 6-pipe 700 240 W (FRPD)

*FRPD technical specifications.*



**Note:** This HW variant supports Fast Delivery Mode on top of FL16 release.

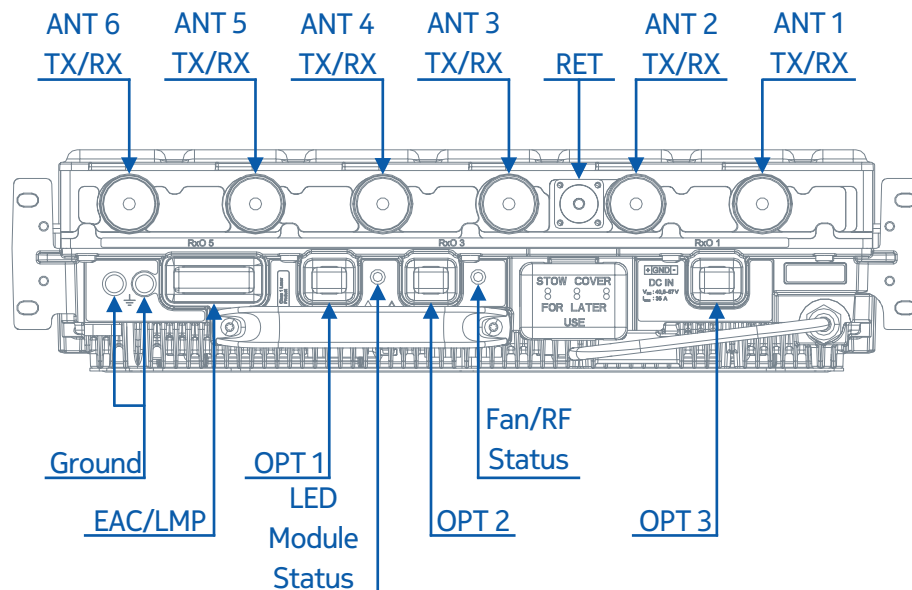
#### Functional description

Table 211 FRPD functional specification

Property	Value
Output power	6x40 W
MIMO	2TX
Outdoor installation	Yes
SW supported technology	FDD-LTE
TX frequency range	758-788 MHz
RX frequency range	703-733 MHz
DL instantaneous bandwidth	30 MHz
UL instantaneous bandwidth	30 MHz
DL filter bandwidth	30 MHz
UL filter bandwidth	30 MHz

#### Interfaces

Figure 48 FRPD interfaces



*Table 212* FRPD interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power Connector	DC IN	1	3-pole screw terminal	-
Antenna connector	ANT	6	7/16	-
Remote Electrical Tilt	RET	1	8-pin circular	RS-485
External Alarm Connection	EAC	1	MDR36	-
Optical interface	OPT	3	SFP	1.5 Gbps to 6 Gbps, OBSAI

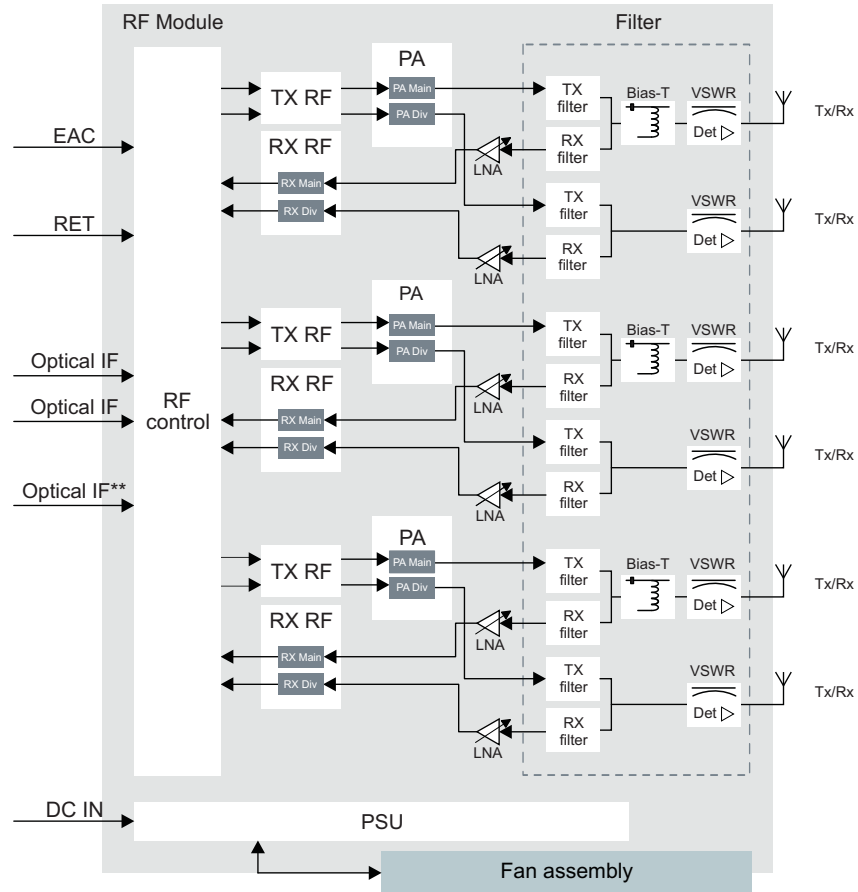
**Antenna Line Devices (ALDs) support**

*Table 213* FRPD ALD support

ALD support via antenna ports	Value
AISG	ANT1, ANT3, ANT5, RET: AISG 2.0
Proprietary AISG1.1	No
CWA (for non-AISG installations)	No
Voltage	ANT1, ANT3, ANT5: 24 V RET: 24 V
Power per port	30 W

**Functional block diagram**

Figure 49 FRPD functional block diagram



**Electrical specifications**

Table 214 FRPD 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**

Table 215 FRPD power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 6h busy hour load) / 24h		
			Power consumption ETSI 202706 average load $P_{RRH, static}$	Power consumption ETSI 202706 busy hour load $P_{BH, RRH, static}$	Power consumption 100% RF power load $P_{100\% RRH}$
LTE	1/1/1 2T2R	20+20	419	476	591
	1/1/1 2T2R	40+40	610	735	981

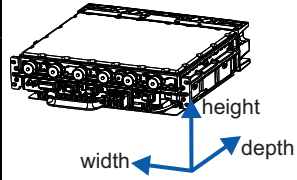
**Installation and mechanical specifications**

Table 216 FRPD installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• floor/stack installation</li> <li>• pole installation</li> <li>• wall installation</li> <li>• 19" rack/cabinet</li> </ul>
IP rating	IP65
Related optional items	<p>Pole installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Pole Kit (FPKA)</li> <li>• Flexi Pole Kit (FPKC)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Floor/Wall installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Outdoor 19" rack</p> <ul style="list-style-type: none"> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Cabinet/indoor 19" rack</p> <ul style="list-style-type: none"> <li>• No optional items needed</li> </ul>

**Dimensions and weight**

Table 217 FRPD dimensions and weight

Property	Value	Dimensions orientation
Height	Core RFM: 115 mm (4.5 in.)	
Depth	Core RFM: 400 mm (15.7 in.) Without front covers: 422 mm (16.6 in.) With front covers: 560 mm (22.1 in.)	
Width	Core RFM: 420 mm (16.5 in.) Without front covers: 447 mm (17.6 in.) With front covers: 492 mm (19.4 in.)	
Weight	24 kg (52.9 lb)	
Volume	19.3 l	

**Environmental specifications**

Table 218 FRPD environmental specifications

Property	Value
Maximum operational outdoor temperature (at constant high ambient temperature maximum output power might be limited)	+55°C (131°F)
Minimum operational temperature (including cold start)	-35°C (-31°F)

**LEDs**

Table 219 FRPD LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Major alarm affecting the whole RF Module</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> </ul>	No alarm

Table 219 FRPD LEDs (Cont.)

LED color	Description	Alarm
	<ul style="list-style-type: none"> <li>There is no connection to any System Module</li> </ul>	
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm
RF Module fan/TX status LED: Red	At least one fan is faulty or degraded	
RF Module fan/TX status LED: Green	All fans are working	
RF Module fan/TX status LED: Color set according to fan status, stable	RF transmission is ON	
RF Module fan/TX status LED: Color set according to fan status, blinking	RF transmission is OFF	

**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 50 Ω 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.



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



## 8.4 Flexi RF Module 6TX 2600 (FRHC)

*FRHC technical specifications.*

### Functional description

Table 220 FRHC functional specification

Property	Value
Output power	6x40 W
MIMO	2TX
Outdoor installation	Yes
SW supported technology	FDD-LTE
TX frequency range	2620-2675 MHz
RX frequency range	2500-2555 MHz
DL instantaneous bandwidth	40 MHz
UL instantaneous bandwidth	40 MHz
DL filter bandwidth	55 MHz
UL filter bandwidth	55 MHz

### Interfaces

Figure 50 FRHC interfaces

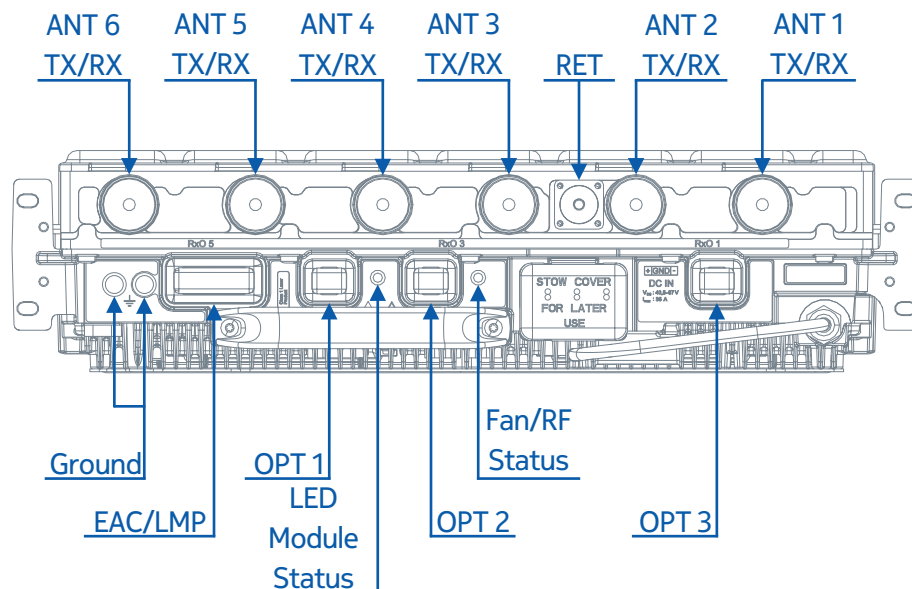


Table 221 FRHC interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	Screw-interminal	-

*Table 221* FRHC interfaces (Cont.)

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Antenna connector	ANT	6	7/16	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	MDR36	-
Optical interface	OPT	3	SFP	3 Gbps or 6 Gbps

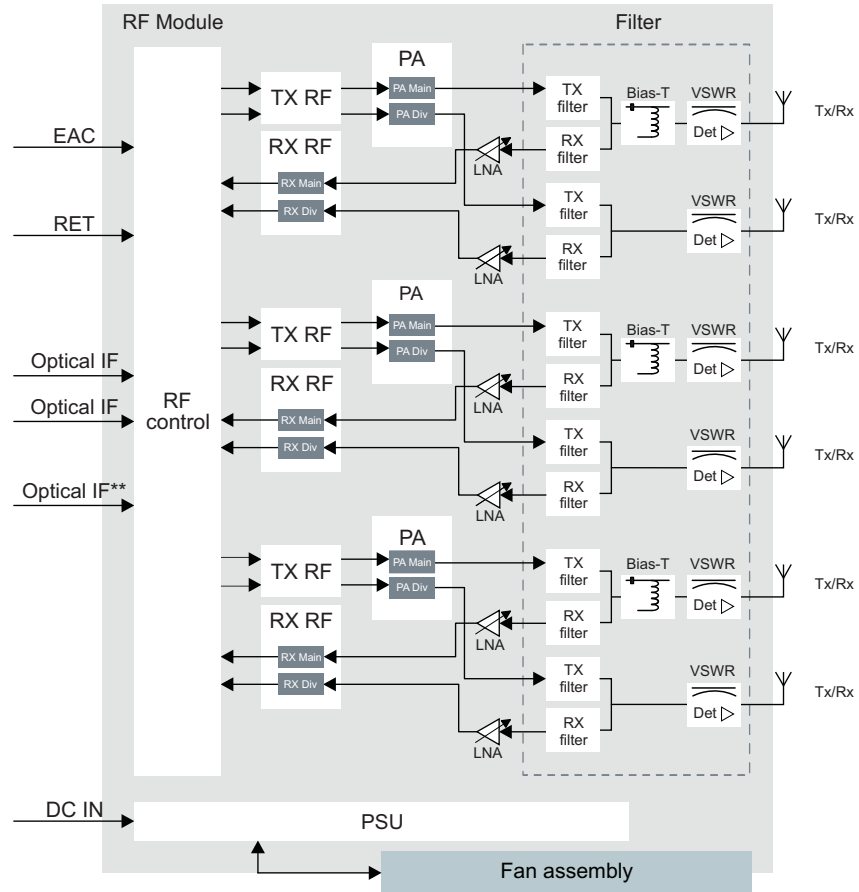
**Antenna Line Devices (ALDs) support**

*Table 222* FRHC ALD support

ALD support via antenna ports	Value
AISG	ANT1, ANT3, ANT5, RET: AISG 2.0
Proprietary AISG 1.1	No
CWA (for non-AISG installations)	No
Voltage	ANT1, ANT3, ANT5: 25 V RET: 25 V
Power per port	30 W

**Functional block diagram**

Figure 51 FRHC functional block diagram



**Electrical specifications**

Table 223 FRHC 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**

Table 224 FRHC power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h		
			Power consumption ETSI 202706 average load $P_{RRH, static}$	Power consumption ETSI 202706 busy hour load $P_{BH, RRH, static}$	Power consumption 100% RF power load $P_{100\% RRH}$
LTE	1/1/1 2T2R	20+20	470	553	740
	1/1/1 2T2R	40+40	657	800	1131

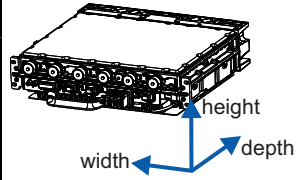
**Installation and mechanical specifications**

Table 225 FRHC installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• floor/stack installation</li> <li>• pole installation</li> <li>• wall installation</li> <li>• 19" rack/cabinet</li> </ul>
IP rating	IP65
Related optional items	<p>Pole installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Pole Kit (FPKA)</li> <li>• Flexi Pole Kit (FPKC)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Floor/Wall installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Outdoor 19" rack</p> <ul style="list-style-type: none"> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Cabinet/indoor 19" rack</p> <ul style="list-style-type: none"> <li>• No optional items needed</li> </ul>

**Dimensions and weight**

Table 226 FRHC dimensions and weight

Property	Value	Dimensions orientation
Height	Core RFM: 115 mm (4.5 in.)	
Depth	Core RFM: 400 mm (15.7 in.) Without front covers: 422 mm (16.6 in.) With front covers: 560 mm (22.1 in.)	
Width	Core RFM: 420 mm (16.5 in.) Without front covers: 447 mm (17.6 in.) With front covers: 492 mm (19.4 in.)	
Weight	24 kg (52.9 lb)	
Volume	19.3 l	

**Environmental specifications**

Table 227 FRHC environmental specifications

Property	Value
Maximum operational outdoor temperature (at constant high ambient temperature maximum output power might be limited)	+55°C (131°F)
Minimum operational temperature (including cold start)	-35°C (-31°F)

**LEDs**

Table 228 FRHC LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Major alarm affecting the whole RF Module</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> </ul>	No alarm

Table 228 FRHC LEDs (Cont.)

LED color	Description	Alarm
	<ul style="list-style-type: none"> <li>There is no connection to any System Module</li> </ul>	
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm
RF Module fan/TX status LED: Red	At least one fan is faulty or degraded	-
RF Module fan/TX status LED: Green	All fans are working	-
RF Module fan/TX status LED: Color set according to fan status, stable	RF transmission is ON	-
RF Module fan/TX status LED: Color set according to fan status, blinking	RF transmission is OFF	-

**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 50 Ω 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.



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

## 8.5 Flexi RF Module 6TX 2600 (FRHF)

*FRHF technical specifications.*

### Functional description

Table 229 FRHF functional specification

Property	Value
Output power	6x40 W
MIMO	2TX
Outdoor installation	Yes
SW supported technology	FDD-LTE
TX frequency range	2640-2690 MHz
RX frequency range	2520-2570 MHz
DL instantaneous bandwidth	40 MHz
UL instantaneous bandwidth	40 MHz
DL filter bandwidth	50 MHz
UL filter bandwidth	50 MHz

### Interfaces

Figure 52 FRHF interfaces

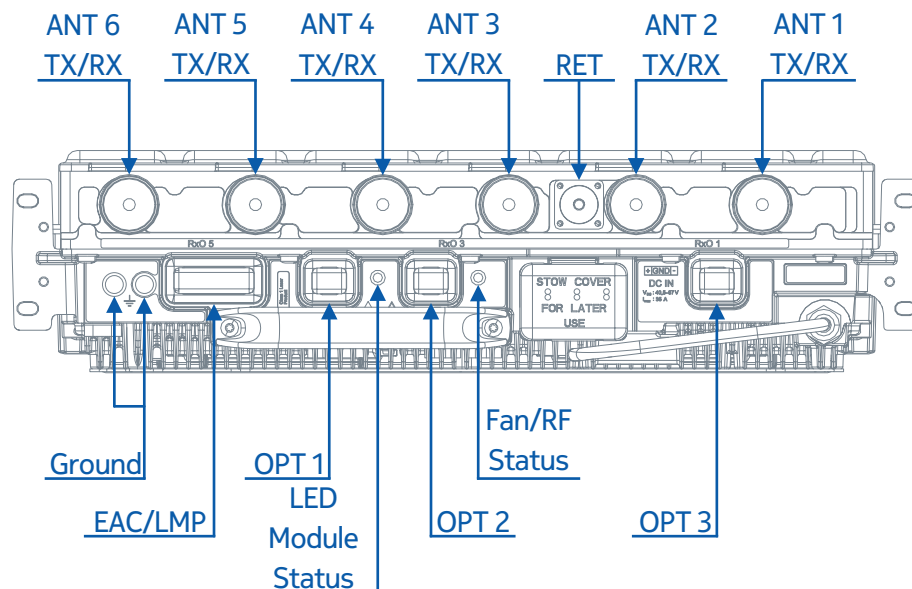


Table 230 FRHF interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	Screw-interminal	-

*Table 230* FRHF interfaces (Cont.)

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Antenna connector	ANT	6	7/16	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	MDR36	-
Optical interface	OPT	3	SFP	3 Gbps or 6 Gbps

**Antenna Line Devices (ALDs) support**

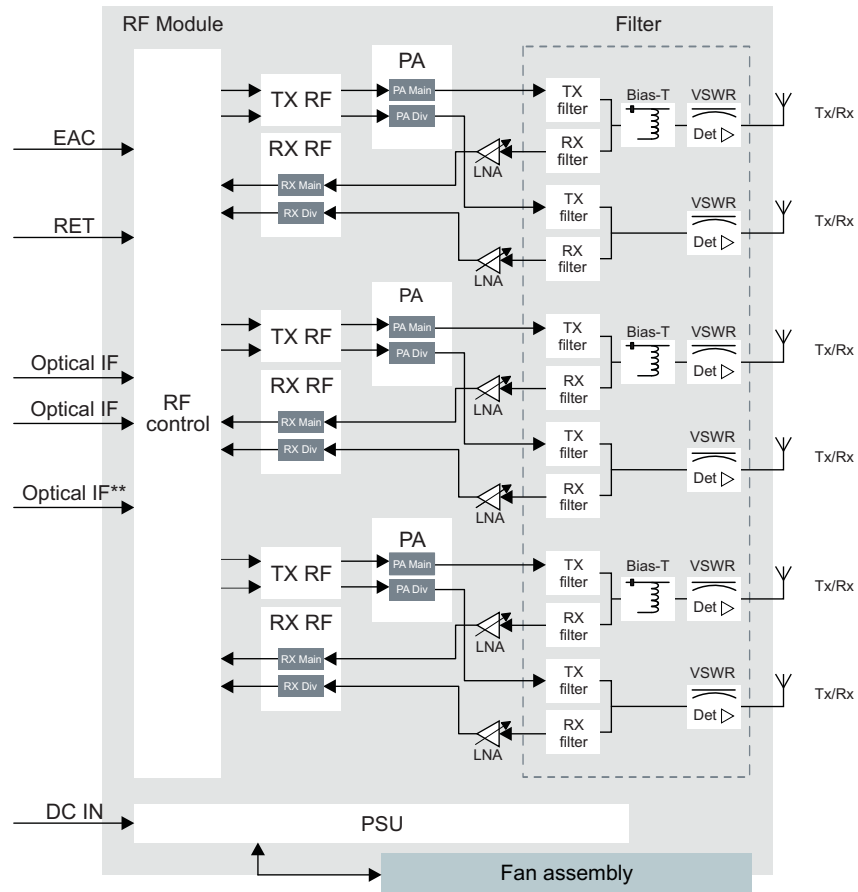
*Table 231* FRHF ALD support

ALD support via antenna ports	Value
AISG	ANT1, ANT3, ANT5, RET: AISG 2.0
Proprietary AISG 1.1	No
CWA (for non-AISG installations)	No
Voltage	ANT1, ANT3, ANT5: 25 V RET: 25 V
Power per port	30 W

**Functional block diagram**



Figure 53 FRHF functional block diagram



**Electrical specifications**

Table 232 FRHF 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**

Table 233 FRHF power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h		
			Power consumption ETSI 202706 average load $P_{RRH, static}$	Power consumption ETSI 202706 busy hour load $P_{BH, RRH, static}$	Power consumption 100% RF power load $P_{100\% RRH}$
LTE	1/1/1 2T2R	20+20	476	566	769
	1/1/1 2T2R	40+40	641	790	1142

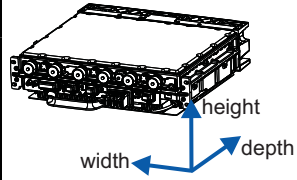
**Installation and mechanical specifications**

Table 234 FRHF installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• floor/stack installation</li> <li>• pole installation</li> <li>• wall installation</li> <li>• 19" rack/cabinet</li> </ul>
IP rating	IP65
Related optional items	<p>Pole installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Pole Kit (FPKA)</li> <li>• Flexi Pole Kit (FPKC)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Floor/Wall installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Outdoor 19" rack</p> <ul style="list-style-type: none"> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Cabinet/indoor 19" rack</p> <ul style="list-style-type: none"> <li>• No optional items needed</li> </ul>

**Dimensions and weight**

Table 235 FRHF dimensions and weight

Property	Value	Dimensions orientation
Height	Core RFM: 115 mm (4.5 in.)	
Depth	Core RFM: 400 mm (15.7 in.) Without front covers: 422 mm (16.6 in.) With front covers: 560 mm (22.1 in.)	
Width	Core RFM: 420 mm (16.5 in.) Without front covers: 447 mm (17.6 in.) With front covers: 492 mm (19.4 in.)	
Weight	24 kg (52.9 lb)	
Volume	19.3 l	

**Environmental specifications**

Table 236 FRHF environmental specifications

Property	Value
Maximum operational outdoor temperature (at constant high ambient temperature maximum output power might be limited)	+55°C (131°F)
Minimum operational temperature (including cold start)	-35°C (-31°F)

**LEDs**

Table 237 FRHF LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Major alarm affecting the whole RF Module</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> </ul>	No alarm

Table 237 FRHF LEDs (Cont.)

LED color	Description	Alarm
	<ul style="list-style-type: none"> <li>There is no connection to any System Module</li> </ul>	
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm
RF Module fan/TX status LED: Red	At least one fan is faulty or degraded	-
RF Module fan/TX status LED: Green	All fans are working	-
RF Module fan/TX status LED: Color set according to fan status, stable	RF transmission is ON	-
RF Module fan/TX status LED: Color set according to fan status, blinking	RF transmission is OFF	-

**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 50 Ω 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.



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

## 8.6 Flexi RF Module 6TX 800 (FRMC)

*FRMC technical specifications.*

### Functional description

Table 238 FRMC functional specification

Property	Value
Output power	6x40 W
MIMO	2TX
Outdoor installation	Yes
SW supported technology	FDD-LTE
TX frequency range	801-821 MHz
RX frequency range	832-862 MHz
DL instantaneous bandwidth	20 MHz
UL instantaneous bandwidth	30 MHz
DL filter bandwidth	20 MHz
UL filter bandwidth	30 MHz

### Interfaces

Figure 54 FRMC interfaces

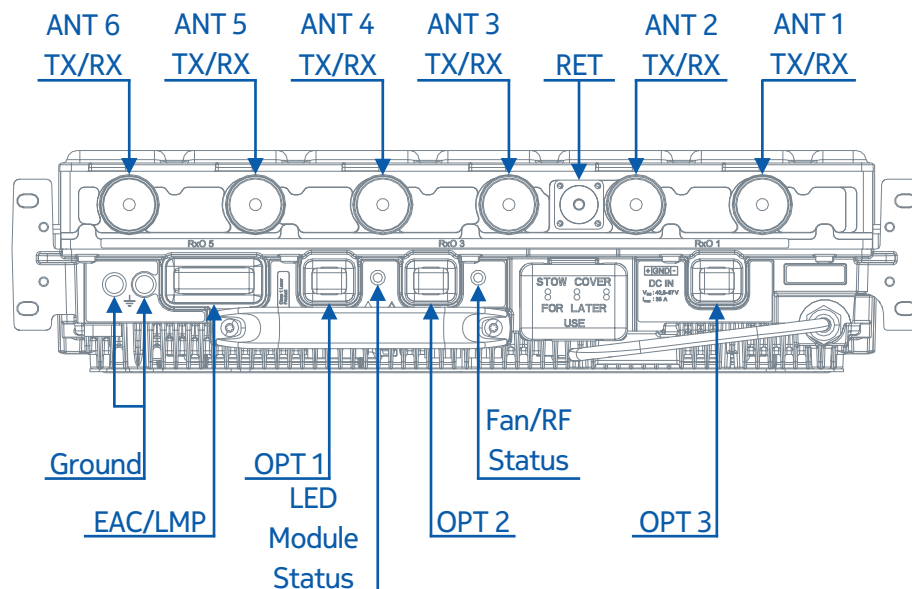


Table 239 FRMC interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	Screw-terminal	-

*Table 239* FRMC interfaces (Cont.)

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Antenna connector	ANT	6	7/16	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	MDR36	-
Optical interface	OPT	3	SFP	3 Gbps or 6 Gbps

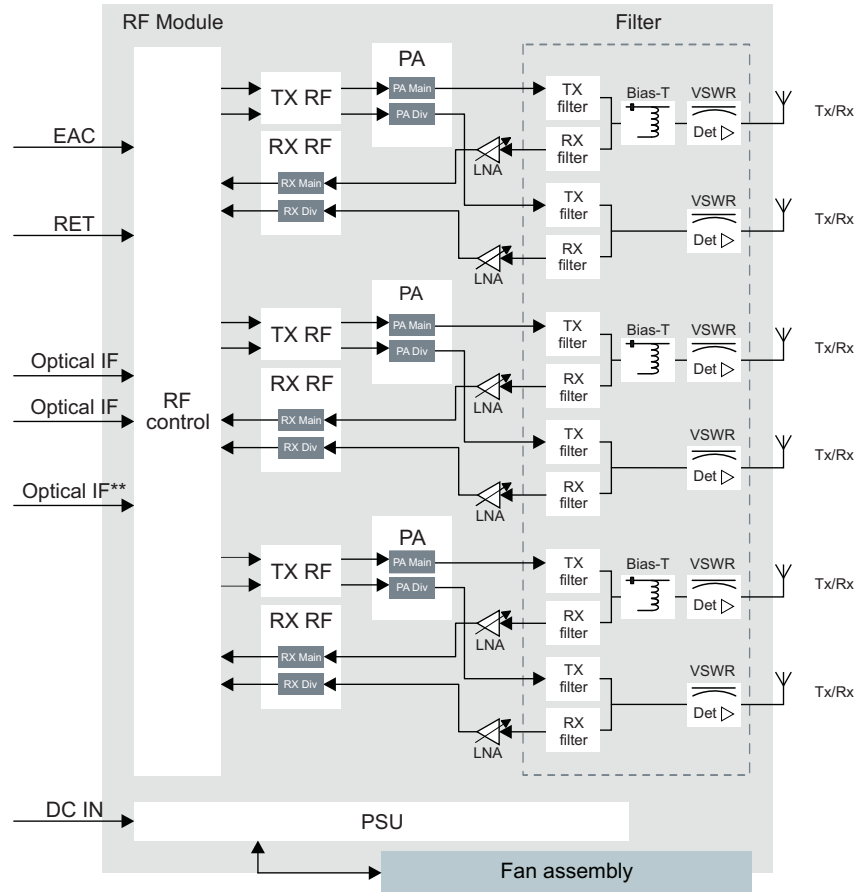
**Antenna Line Devices (ALDs) support**

*Table 240* FRMC ALD support

ALD support via antenna ports	Value
AISG	ANT1, ANT3, ANT5, RET: AISG 2.0
Proprietary AISG 1.1	No
CWA (for non-AISG installations)	No
Voltage	ANT1, ANT3, ANT5: 25 V RET: 25 V
Power per port	30 W

**Functional block diagram**

Figure 55 FRMC functional block diagram



**Electrical specifications**

Table 241 FRMC 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**

Table 242 FRMC power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h		
			Power consumption ETSI 202706 average load $P_{RRH, static}$	Power consumption ETSI 202706 busy hour load $P_{BH, RRH, static}$	Power consumption 100% RF power load $P_{100\% RRH}$
LTE	1/1/1 2T2R	20+20	418	479	616
	1/1/1 2T2R	40+40	591	714	987

**Installation and mechanical specifications**

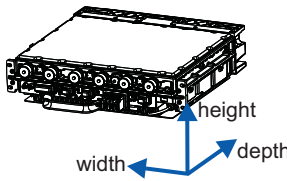
Table 243 FRMC installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• floor/stack installation</li> <li>• pole installation</li> <li>• wall installation</li> <li>• 19" rack/cabinet</li> </ul>
IP rating	IP65
Related optional items	<p>Pole installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Pole Kit (FPKA)</li> <li>• Flexi Pole Kit (FPKC)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Floor/Wall installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Outdoor 19" rack</p> <ul style="list-style-type: none"> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Cabinet/indoor 19" rack</p> <ul style="list-style-type: none"> <li>• No optional items needed</li> </ul>

**Dimensions and weight**



Table 244 FRMC dimensions and weight

Property	Value	Dimensions orientation
Height	Core RFM: 115 mm (4.5 in.)	
Depth	Core RFM: 400 mm (15.7 in.) Without front covers: 422 mm (16.6 in.) With front covers: 560 mm (22.1 in.)	
Width	Core RFM: 420 mm (16.5 in.) Without front covers: 447 mm (17.6 in.) With front covers: 492 mm (19.4 in.)	
Weight	24 kg (52.9 lb)	
Volume	19.3 l	

**Environmental specifications**

Table 245 FRMC environmental specifications

Property	Value
Maximum operational outdoor temperature (at constant high ambient temperature maximum output power might be limited)	+55°C (131°F)
Minimum operational temperature (including cold start)	-35°C (-31°F)

**LEDs**

Table 246 FRMC LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Major alarm affecting the whole RF Module</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> </ul>	No alarm

Table 246 FRMC LEDs (Cont.)

LED color	Description	Alarm
	<ul style="list-style-type: none"> <li>There is no connection to any System Module</li> </ul>	
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm
RF Module fan/TX status LED: Red	All fans are faulty	-
RF Module fan/TX status LED: Green	All fans are working	-
RF Module fan/TX status LED: Color set according to fan status, stable	RF transmission is ON	-
RF Module fan/TX status LED: Color set according to fan status, blinking	RF transmission is OFF	-

**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 50 Ω 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.



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

## 8.7 Flexi RFM 6-pipe 800 240 W (FRME)

*FRME technical specifications.*

### Functional description

Table 247 FRME functional specification

Property	Value
Output power	6x40 W
MIMO	2TX
Outdoor installation	Yes
SW supported technology	FDD-LTE
TX frequency range	791-811 MHz
RX frequency range	832-862 MHz
DL instantaneous bandwidth	20 MHz
UL instantaneous bandwidth	30 MHz
DL filter bandwidth	20 MHz
UL filter bandwidth	30 MHz

### Interfaces

Figure 56 FRME interfaces

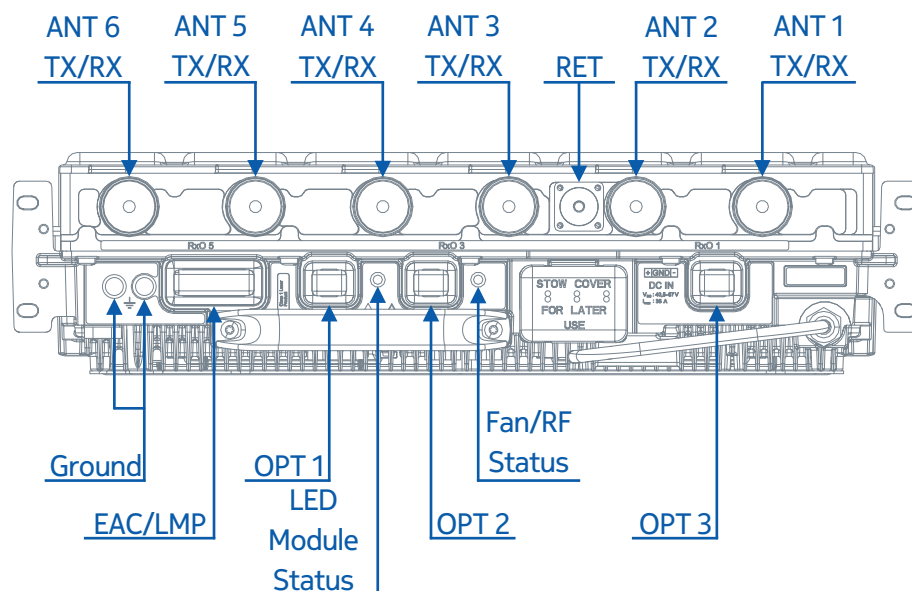


Table 248 FRME interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	Screw terminal	-

*Table 248* FRME interfaces (Cont.)

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Antenna connector	ANT	6	7/16	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	MDR36	-
Optical interface	OPT	3	SFP	1.5 Gbps to 6 Gbps, OBSAI

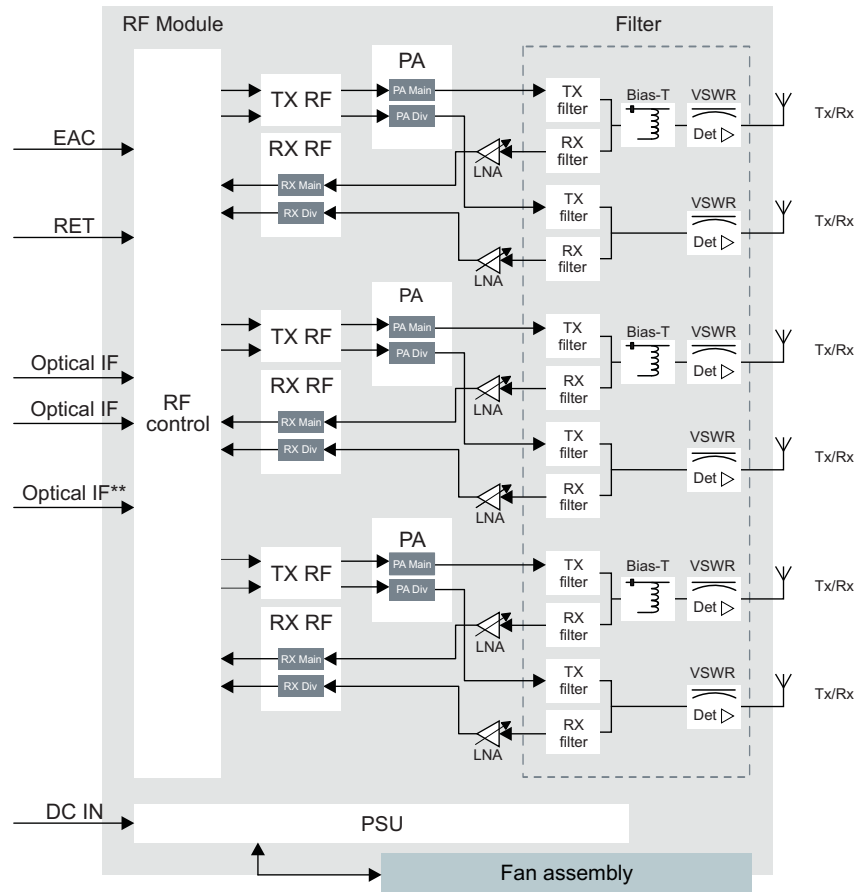
**Antenna Line Devices (ALDs) support**

*Table 249* FRME ALD support

ALD support via antenna ports	Value
AISG	ANT1, ANT3, ANT5, RET: AISG 2.0
Legacy Siemens equipment	No
CWA (for non-AISG installations)	No
Voltage	ANT1, ANT3, ANT5: 25 V RET: 25 V
Power per port	30 W

**Functional block diagram**

Figure 57 FRME functional block diagram



**Electrical specifications**

Table 250 FRME 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**

Table 251 FRME power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h		
			Power consumption ETSI 202706 average load $P_{RRH, static}$	Power consumption ETSI 202706 busy hour load $P_{BH, RRH, static}$	Power consumption 100% RF power load $P_{100\% RRH}$
LTE	1/1/1 2T2R	20+20	409	467	605
	1/1/1 2T2R	40+40	596	722	997

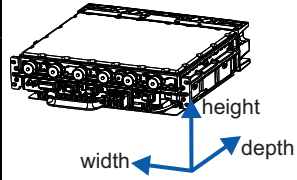
**Installation and mechanical specifications**

Table 252 FRME installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• floor/stack installation</li> <li>• pole installation</li> <li>• wall installation</li> <li>• 19" rack/cabinet</li> </ul>
IP rating	IP65
Related optional items	<p>Pole installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Pole Kit (FPKA)</li> <li>• Flexi Pole Kit (FPKC)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Floor/Wall installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Outdoor 19" rack</p> <ul style="list-style-type: none"> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Cabinet/indoor 19" rack</p> <ul style="list-style-type: none"> <li>• No optional items needed</li> </ul>

**Dimensions and weight**

Table 253 FRME dimensions and weight

Property	Value	Dimensions orientation
Height	Core RFM: 115 mm (4.5 in.)	
Depth	Core RFM: 400 mm (15.7 in.) Without front covers: 422 mm (16.6 in.) With front covers: 560 mm (22.1 in.)	
Width	Core RFM: 420 mm (16.5 in.) Without front covers: 447 mm (17.6 in.) With front covers: 492 mm (19.4 in.)	
Weight	24 kg (52.9 lb)	
Volume	19.3 l	

**Environmental specifications**

Table 254 FRME environmental specifications

Property	Value
Maximum operational outdoor temperature (at constant high ambient temperature maximum output power might be limited)	+55°C (131°F)
Minimum operational temperature (including cold start)	-35°C (-31°F)

**LEDs**

Table 255 FRME LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Major alarm affecting the whole RF Module</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> </ul>	No alarm

Table 255 FRME LEDs (Cont.)

LED color	Description	Alarm
	<ul style="list-style-type: none"> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm
RF Module fan/TX status LED: Red	All fans are faulty	-
RF Module fan/TX status LED: Green	All fans are working	-
RF Module fan/TX status LED: Color set according to fan status, stable	RF transmission is ON	-
RF Module fan/TX status LED: Color set according to fan status, blinking	RF transmission is OFF	-

**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 50 Ω 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.





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

## 8.8 Flexi RFM 6-pipe 800 360 W (FRMF)

*FRMF technical specifications.*

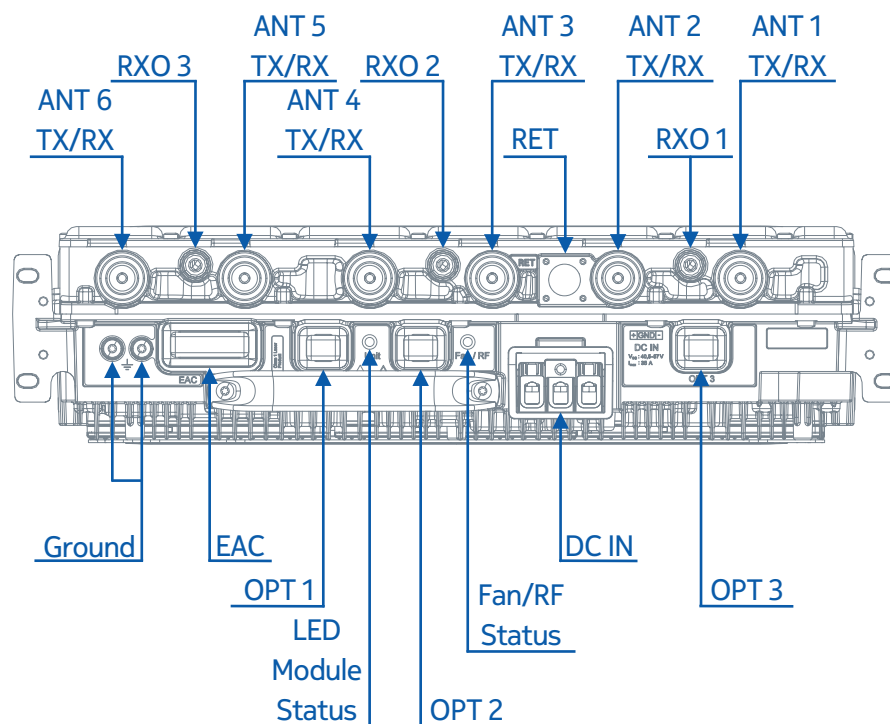
### Functional description

Table 256 FRMF functional specification

Property	Value
Output power	6x60 W
MIMO	2TX
Outdoor installation	Yes
SW supported technology	FDD-LTE
TX frequency range	791-821 MHz
RX frequency range	832-862 MHz
DL instantaneous bandwidth	30 MHz
UL instantaneous bandwidth	30 MHz
DL filter bandwidth	30 MHz
UL filter bandwidth	30 MHz

### Interfaces

Figure 58 FRMF interfaces



*Table 257* FRMF interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	3-pole screw terminal	-
Antenna connector	ANT	6	7/16	-
RF output connector	RxO	3	QMA	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	MDR36	-
Optical interface	OPT	3	SFP	3 Gbps or 6 Gbps

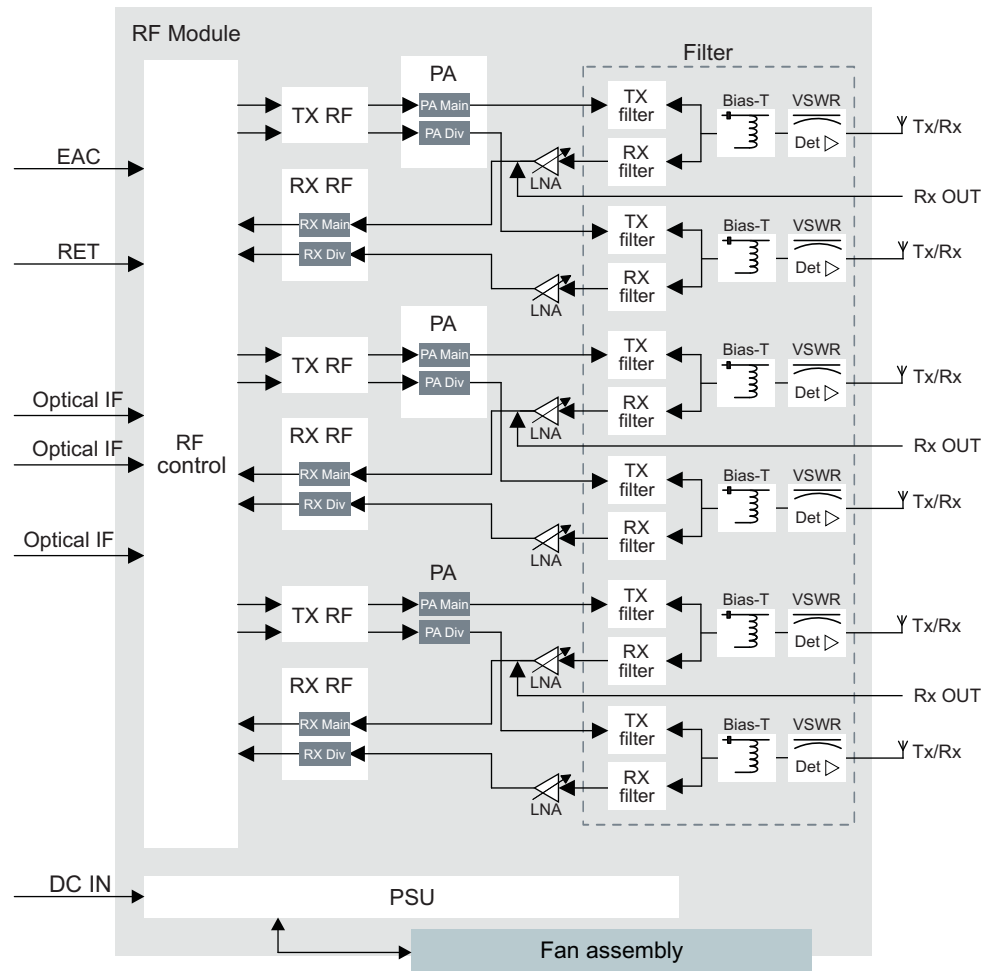
**Antenna Line Devices (ALDs) support**

*Table 258* FRMF ALD support

ALD support via antenna ports	Value
AISG	ANT1, ANT3, ANT5, RET: AISG 2.0
Legacy Siemens equipment	No
CWA (for non-AISG installations)	No
Voltage	ANT1, ANT3, ANT5: 25 V RET: 25 V
Power per port	30 W

**Functional block diagram**

Figure 59 FRMF functional block diagram



**Electrical specifications**

Table 259 FRMF 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**

Table 260 FRMF power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h		
			Power consumption ETSI 202706 average load $P_{RRH, static}$	Power consumption ETSI 202706 busy hour load $P_{BH, RRH, static}$	Power consumption 100% RF power load $P_{100\% RRH}$
LTE	1/1/1 2T2R	20+20	466	533	665
	1/1/1 2T2R	40+40	606	733	985
	1/1/1 2T2R	60+60	755	942	1326

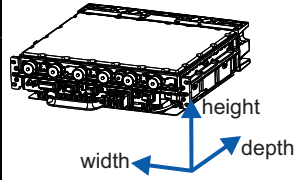
**Installation and mechanical specifications**

Table 261 FRMF installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• floor/stack installation</li> <li>• pole installation</li> <li>• wall installation</li> <li>• 19" rack/cabinet</li> </ul>
IP rating	IP65
Related optional items	<p>Pole installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Pole Kit (FPKA)</li> <li>• Flexi Pole Kit (FPKC)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Floor/Wall installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Outdoor 19" rack</p> <ul style="list-style-type: none"> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Cabinet/indoor 19" rack</p> <ul style="list-style-type: none"> <li>• No optional items needed</li> </ul>

**Dimensions and weight**

Table 262 FRMF dimensions and weight

Property	Value	Dimensions orientation
Height	Core RFM: 115 mm (4.5 in.)	
Depth	Core RFM: 400 mm (15.7 in.) Without front covers: 422 mm (16.6 in.) With front covers: 560 mm (22.1 in.)	
Width	Core RFM: 420 mm (16.5 in.) Without front covers: 447 mm (17.6 in.) With front covers: 492 mm (19.4 in.)	
Weight	24 kg (52.9 lb)	
Volume	19.3 l	

**Environmental specifications**

Table 263 FRMF environmental specifications

Property	Value
Maximum operational outdoor temperature (at constant high ambient temperature maximum output power might be limited)	+55°C (131°F)
Minimum operational temperature (including cold start)	-35°C (-31°F)

**LEDs**

Table 264 FRMF LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Major alarm affecting the whole RF Module</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> </ul>	No alarm

Table 264 FRMF LEDs (Cont.)

LED color	Description	Alarm
	<ul style="list-style-type: none"> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm
RF Module fan/TX status LED: Red	At least one fan is faulty or degraded	
RF Module fan/TX status LED: Green	All fans are working	
RF Module fan/TX status LED: Color set according to fan status, stable	RF transmission is ON	
RF Module fan/TX status LED: Color set according to fan status, blinking	RF transmission is OFF	

**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 50 Ω 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.



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

## 8.9 Flexi RFM 6-pipe 1450 360 W (FRSA)

*FRSA technical specifications.*



**Note:** This module is supported in FDD-LTE 16A.

### Functional description

Table 265 FRSA functional specification

Property	Value
Output power	6x60 W
MIMO	2TX
Outdoor installation	Yes
SW supported technology	FDD-LTE
TX frequency range	1452-1492 MHz
RX frequency range	832-862 MHz
DL instantaneous bandwidth	40 MHz
UL instantaneous bandwidth	30 MHz
DL filter bandwidth	40 MHz
UL filter bandwidth	30 MHz

### Interfaces

Figure 60 FRSA interfaces

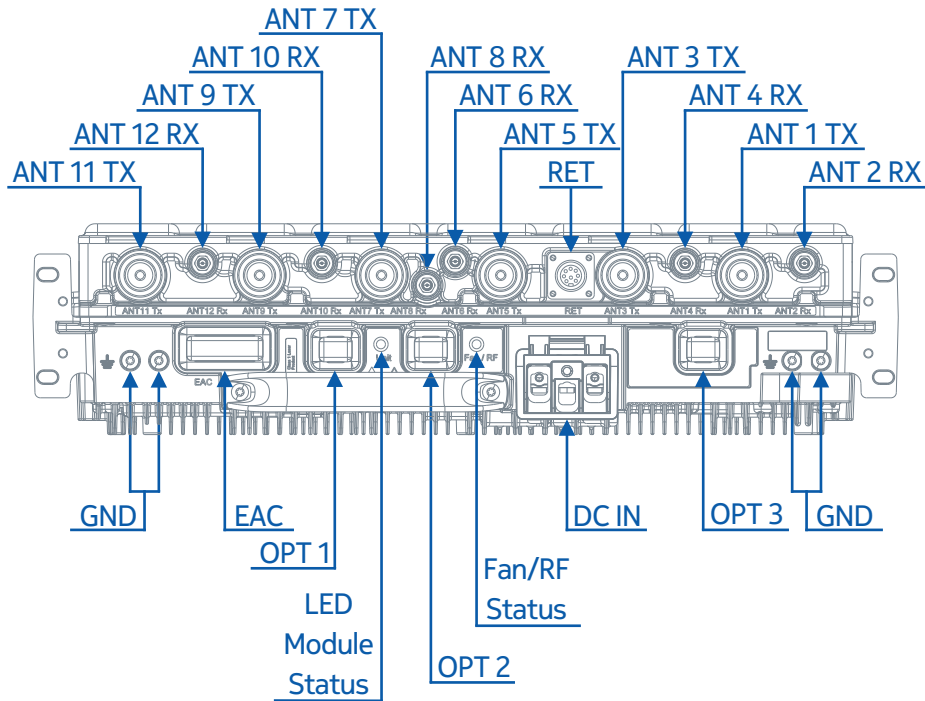


Table 266 FRSA interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	3-pole screw terminal	-
Antenna connector	ANT TX	6	7/16	-
Antenna connector	ANT RX	6	QMA	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	MDR36	-
Optical interface	OPT	3	SFP	1.5 Gbps or 6 Gbps

**Antenna Line Devices (ALDs) support**



**Note:** ALD support is for TX antenna ports (band 32) only.

Table 267 FRSA ALD support

ALD support via antenna ports	Value
AISG	ANT1, ANT3, ANT5, RET: AISG 2.0
Proprietary AISG 1.1	No
CWA (for non-AISG installations)	Yes
Voltage	ANT1, ANT3, ANT5: 25 V

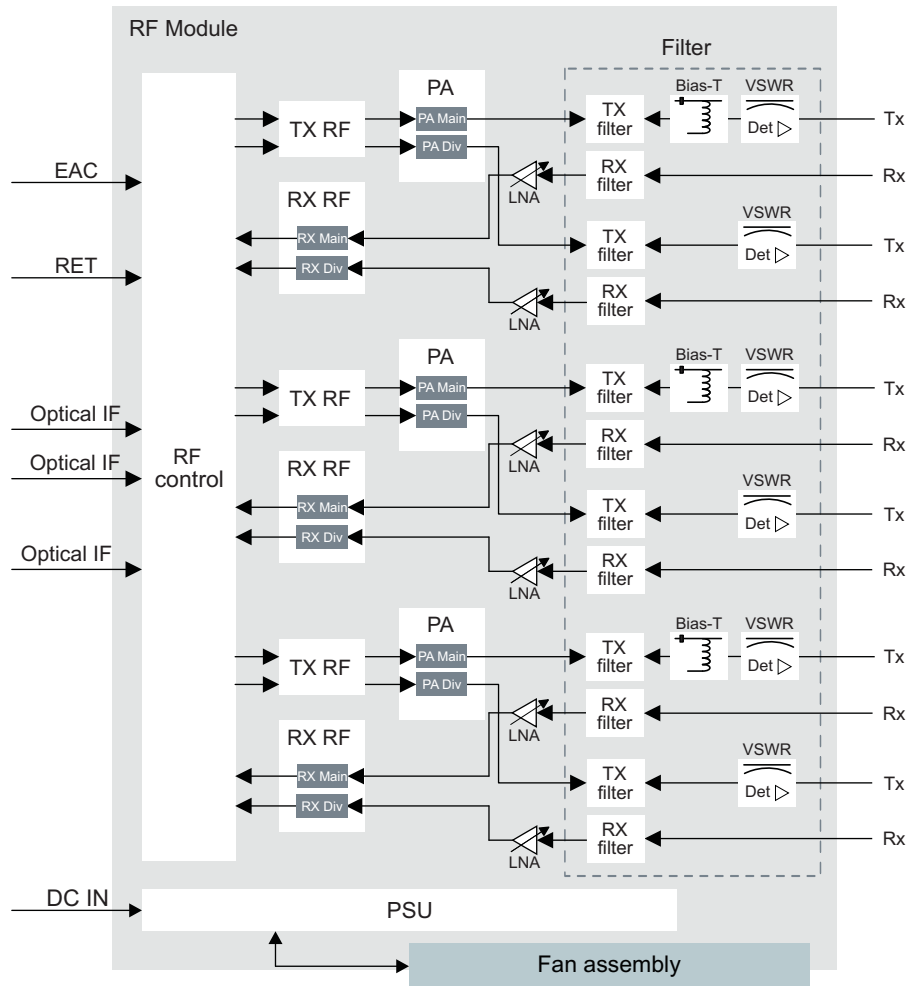


Table 267 FRSA ALD support (Cont.)

ALD support via antenna ports	Value
	RET: 25 V
Power per port	30 W

**Functional block diagram**

Figure 61 FRSA functional block diagram




**Electrical specifications**

Table 268 FRSA 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**

*Table 269* FRSA power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h		
			Power consumption ETSI ES 202706 average load $P_{RRH, static}$	Power consumption ETSI ES 202706 busy hour load $P_{BH, RRH, static}$	Power consumption 100% RF power load $P_{100\% RRH}$
			 <b>Note: Values estimated.</b>		
LTE	1/1/1 2T2R	20+20	414	478	610
	1/1/1 2T2R	40+40	540	661	935
	1/1/1 2T2R	60+60	704	893	1328

**Installation and mechanical specifications**

*Table 270* FRSA installation and mechanical specifications

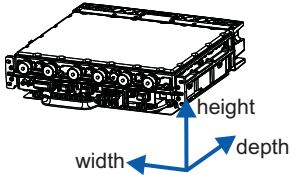
Property	Value
Installation options	<ul style="list-style-type: none"> <li>• floor/stack installation</li> <li>• pole installation</li> <li>• wall installation</li> <li>• 19" rack/cabinet</li> </ul>
IP rating	IP65
Related optional items	<p>Pole installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Pole Kit (FPKA)</li> <li>• Flexi Pole Kit (FPKC)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Floor/Wall installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Outdoor 19" rack</p> <ul style="list-style-type: none"> <li>• Flexi Module Casing (EMHx)</li> </ul>

Table 270 FRSA installation and mechanical specifications (Cont.)

Property	Value
	Cabinet/indoor 19" rack <ul style="list-style-type: none"> <li>No optional items needed</li> </ul>

**Dimensions and weight**

Table 271 FRSA dimensions and weight

Property	Value	Dimensions orientation
Height	Core RFM: 115 mm (4.5 in.)	
Depth	Core RFM: 400 mm (15.7 in.)	
	Without front covers: 422 mm (16.6 in.) With front covers: 560 mm (22.1 in.)	
Width	Core RFM: 420 mm (16.5 in.)	
	Without front covers: 447 mm (17.6 in.) With front covers: 492 mm (19.4 in.)	
Weight	24 kg (52.9 lb)	
Volume	19.3 l	

**Environmental specifications**

Table 272 FRSA environmental specifications

Property	Value
Maximum operational outdoor temperature (at constant high ambient temperature maximum output power might be limited)	+55°C (131°F)
Minimum operational temperature (including cold start)	-35°C (-31°F)

**LEDs**

Table 273 FRSA LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> </ul>	Major/critical alarm

Table 273 FRSA LEDs (Cont.)

LED color	Description	Alarm
	<ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm
RF Module fan/TX status LED: Red	At least one fan is faulty or degraded	-
RF Module fan/TX status LED: Green	All fans are working	-
RF Module fan/TX status LED: Color set according to fan status, stable	RF transmission is ON	-
RF Module fan/TX status LED: Color set according to fan status, blinking	RF transmission is OFF	-

**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 50 Ω 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.



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

## 8.10 Flexi RFM 6-pipe 1800 360 W (FXED)

*FXED technical specifications.*

### Functional description

Table 274 FXED functional specification

Property	Value
Output power	6x60 W
MIMO	2TX
Outdoor installation	Yes
SW supported technology	GSM, FDD-LTE
TX frequency range	1805-1880 MHz
RX frequency range	1710-1785 MHz
DL instantaneous bandwidth	60 MHz in LTE, LTE/GSM Sharing 40 MHz in GSM* <small>*Single-RAT GSM support enabled on version A20x onwards.</small>
UL instantaneous bandwidth	60 MHz
DL filter bandwidth	75 MHz
UL filter bandwidth	75 MHz

### Interfaces

Figure 62 FXED interfaces

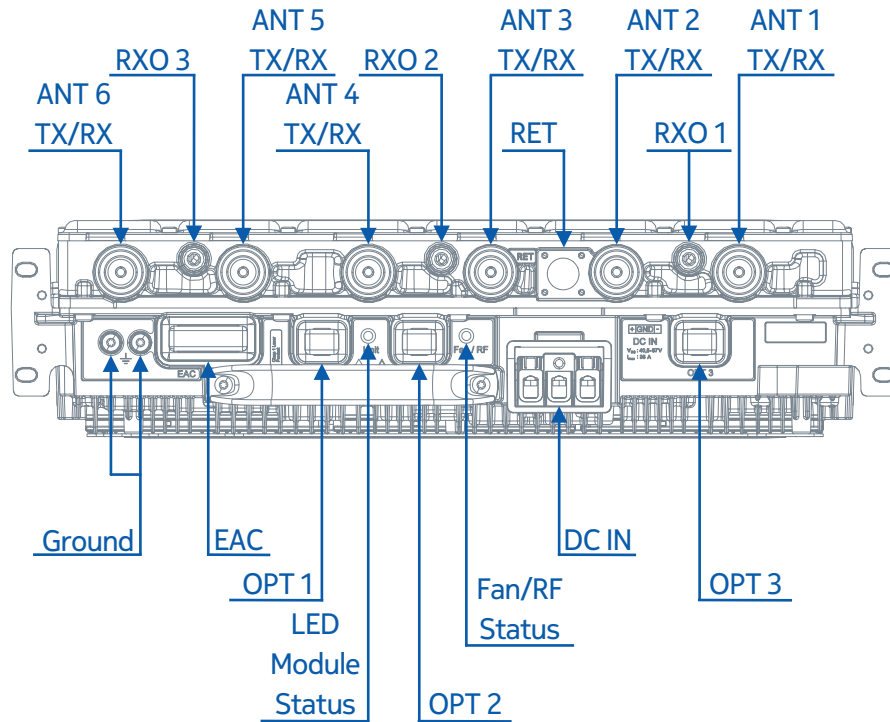


Table 275 FXED interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	3-pole screw terminal	-
Antenna connector	ANT	6	7/16	-
RF output connector	RxO	3	QMA	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	MDR36	-
Optical interface	OPT	3	SFP	3 Gbps or 6 Gbps

**Antenna Line Devices (ALDs) support**

Table 276 FXED ALD support

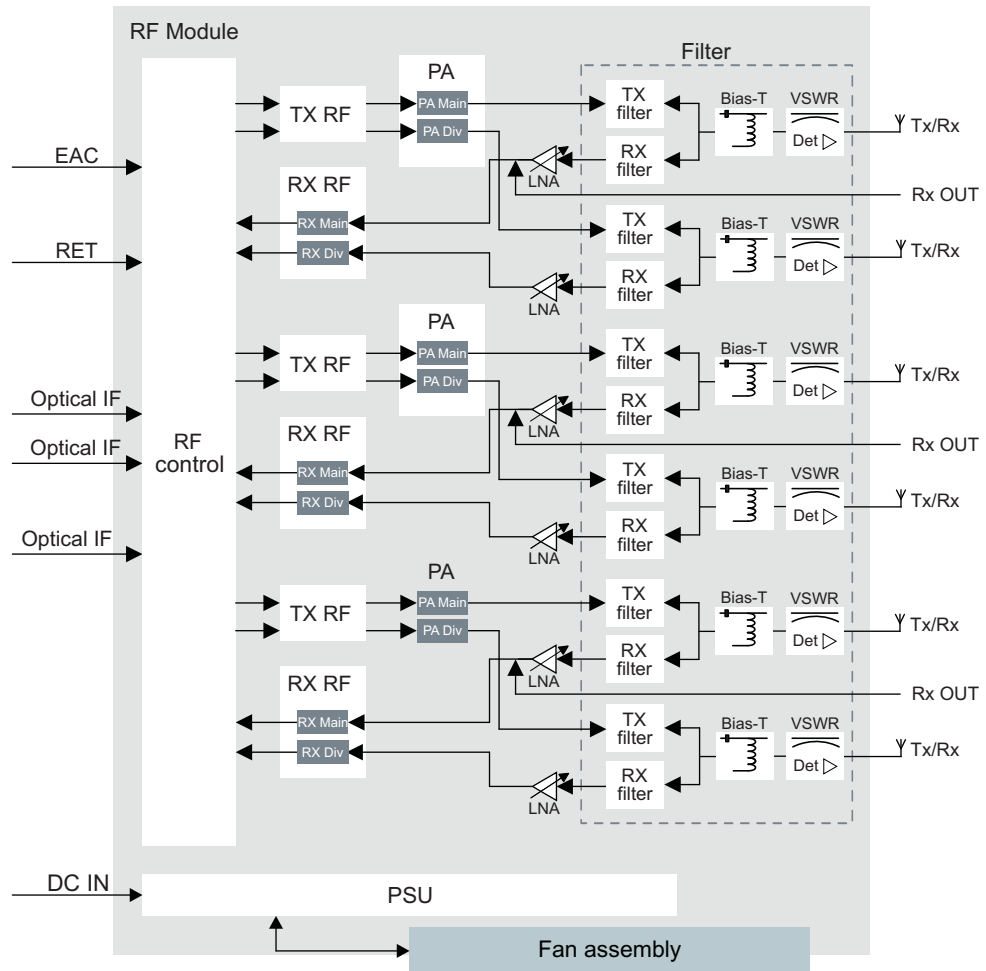
ALD support via antenna ports	Value
AISG	ANT1, ANT3, ANT5, RET: AISG 2.0
Proprietary AISG 1.1	No
CWA (for non-AISG installations)	Yes
Voltage	ANT1, ANT3, ANT5: 25 V or 12 V ANT2, ANT4, ANT6: 12 V

Table 276 FXED ALD support (Cont.)

ALD support via antenna ports	Value
	RET: 25 V
Power per port	30 W

**Functional block diagram**

Figure 63 FXED functional block diagram



**Electrical specifications**

Table 277 FXED 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**

Table 278 FXED power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h					
			Power consumption ETSI 202706 average load $P_{RRH}$ , static	Power consumption ETSI 202706 busy hour load $P_{BH}$ , RRH, static	Power consumption 100% RF power load $P_{100\%}$ , RRH	Power consumption Typical as 25% TCH load, 60% DTX, 4 dB PC	Power consumption Busy as 50% TCH load, 60% DTX, 4 dB PC	Power consumption Max load (2% GoS), 60% DTX, 4 dB PC
GSM	1/1/1	20	390	390	390	390	390	390
	2/2/2	20	422	451	547	447	452	457
	4/4/4	20	549	666	935	635	661	691
LTE	1/1/1 2T2R	20+20	415	487	634			
	1/1/1 2T2R	40+40	537	664	957			
	1/1/1 2T2R	60+60	676	865	1310			
MSR	GSM 2/2/2	20 20+20	651	742	1010			
	LTE 1/1/1 2T2R 10 MHz							
	GSM 4/4/4	20 20+20	802	976	1410			
	LTE 1/1/1 2T2R 10 MHz							
	GSM 4/4/4	15 40+40	715	854	1170			
	LTE 1/1/1 2T2R 20 MHz							

**Installation and mechanical specifications**

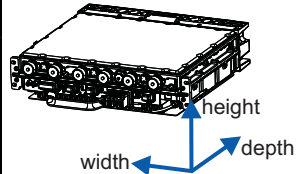


**Table 279** FXED installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• floor/stack installation</li> <li>• pole installation</li> <li>• wall installation</li> <li>• 19" rack/cabinet</li> </ul>
IP rating	IP65
Related optional items	<p>Pole installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Pole Kit (FPKA)</li> <li>• Flexi Pole Kit (FPKC)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Floor/Wall installation</p> <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Outdoor 19" rack</p> <ul style="list-style-type: none"> <li>• Flexi Module Casing (EMHx)</li> </ul> <p>Cabinet/indoor 19" rack</p> <ul style="list-style-type: none"> <li>• No optional items needed</li> </ul>

**Dimensions and weight**

**Table 280** FXED dimensions and weight

Property	Value	Dimensions orientation
Height	Core RFM: 115 mm (4.5 in.)	 <p>A perspective diagram of the FXED module. Three blue arrows indicate the dimensions: 'height' points to the vertical thickness, 'depth' points to the front-to-back length, and 'width' points to the side-to-side length.</p>
Depth	Core RFM: 400 mm (15.7 in.)	
	Without front covers: 422 mm (16.6 in.) With front covers: 560 mm (22.1 in.)	
Width	Core RFM: 420 mm (16.5 in.)	
	Without front covers: 447 mm (17.6 in.) With front covers: 492 mm (19.4 in.)	
Weight	24 kg (52.9 lb)	
Volume	19.3 l	

**Environmental specifications**

*Table 281* FXED environmental specifications

Property	Value
Maximum operational outdoor temperature (at constant high ambient temperature maximum output power might be limited)	+55°C (131°F)
Minimum operational temperature (including cold start)	-35°C (-31°F)

**LEDs**

*Table 282* FXED LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Major alarm affecting the whole RF Module</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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

Table 282 FXED LEDs (Cont.)

LED color	Description	Alarm
Periodic Red and Green	Antenna line device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm
RF Module fan/TX status LED: Red	At least one fan is faulty or degraded	-
RF Module fan/TX status LED: Green	All fans are working	-
RF Module fan/TX status LED: Color set according to fan status, stable	RF transmission is ON	-
RF Module fan/TX status LED: Color set according to fan status, blinking	RF transmission is OFF	-

**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 50 Ω 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.



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

## 8.11 Flexi RFM 6-pipe 2100 360 W (FRGU)

*FRGU technical specifications.*

**Functional description**

Table 283 FRGU functional specification

Property	Value
Output power	6x60 W
MIMO	4TX
Outdoor installation	Yes
SW supported technology	WCDMA, FDD-LTE
TX frequency range	2110-2170 MHz
RX frequency range	1920-1980 MHz
DL instantaneous bandwidth	60 MHz
UL instantaneous bandwidth	60 MHz
DL filter bandwidth	60 MHz

Table 283 FRGU functional specification (Cont.)

Property	Value
UL filter bandwidth	60 MHz

**Interfaces**

Figure 64 FRGU interfaces

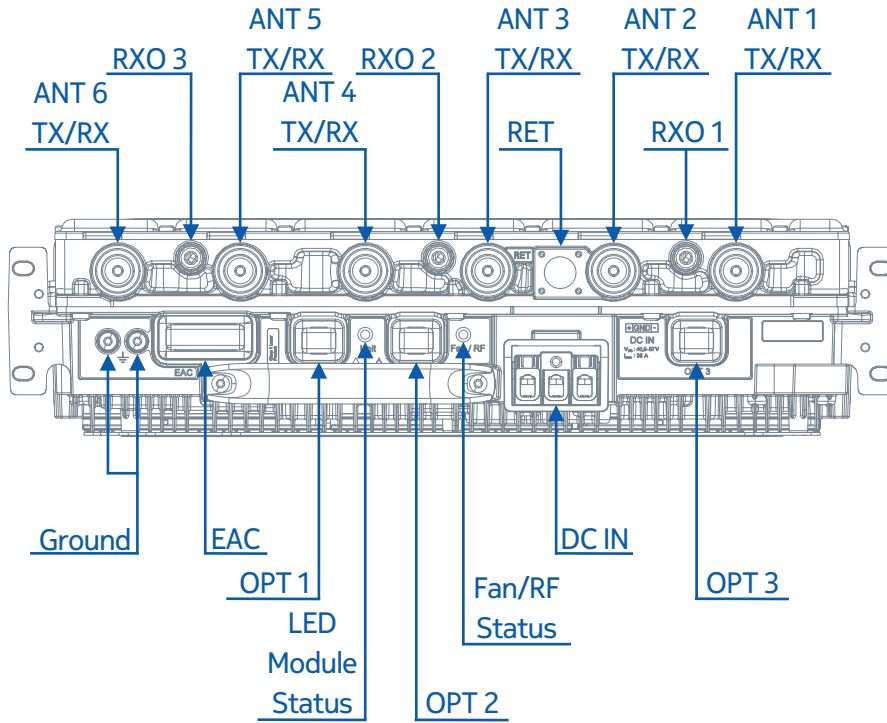


Table 284 FRGU interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	3-pole screw terminal	-
Antenna connector	ANT	6	7/16	-
RF output connector	RxO	3	QMA	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	MDR36	-
Optical interface	OPT	3	SFP	1.5 Gbps to 6 Gbps

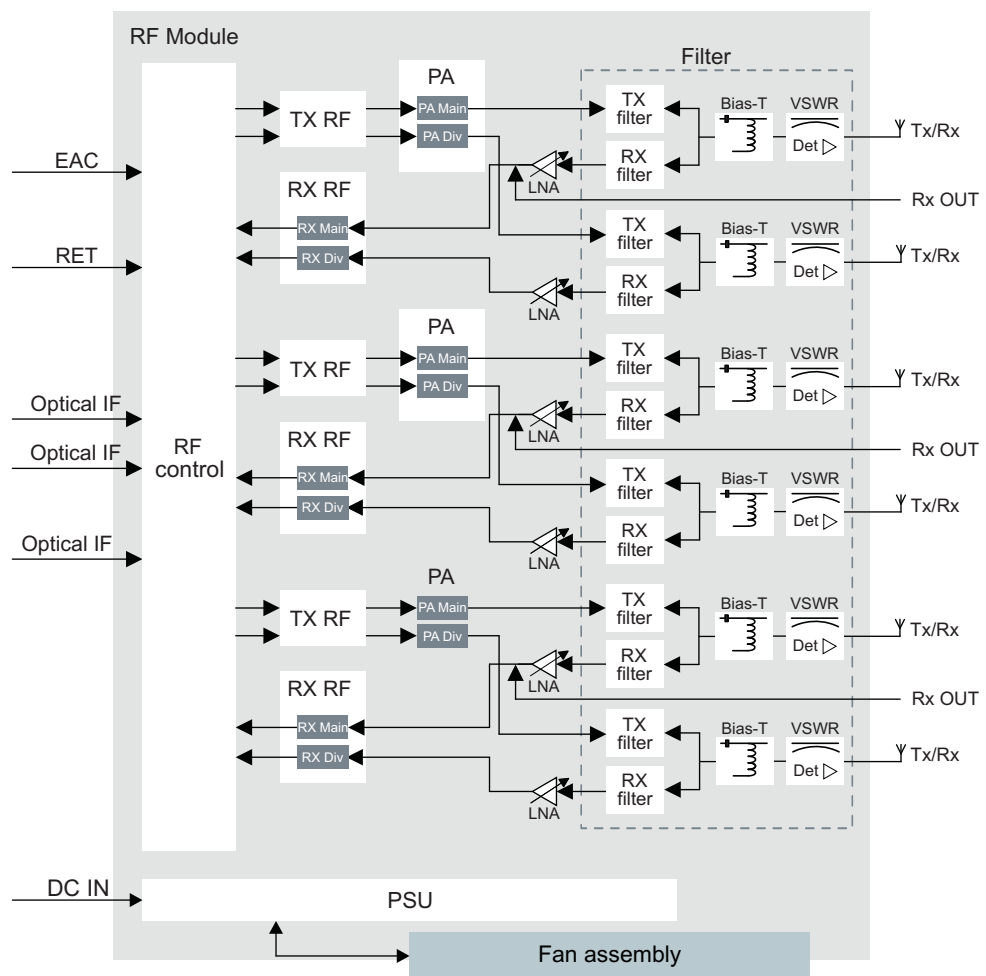
**Antenna Line Devices (ALDs) support**

Table 285 FRGU ALD support

ALD support via antenna ports	Value
AISG	ANT1, ANT3, ANT5, RET: AISG 2.0
Proprietary AISG 1.1	No
CWA (for non-AISG installations)	Yes
Voltage	ANT1, ANT3, ANT5: 25 V or 12 V ANT2, ANT4, ANT6: 12 V RET: 25 V
Power per port	30 W

**Functional block diagram**

Figure 65 FRGU functional block diagram



**Electrical specifications**

**Table 286** FRGU 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**

**Table 287** FRGU power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h		
			Power consumption ETSI 202706 average load $P_{RRH, static}$	Power consumption ETSI 202706 busy hour load $P_{BH, RRH, static}$	Power consumption 100% RF power load $P_{100\% RRH}$
WCDMA	1/1/1	20	282	313	386
	2/2/2	20	344	400	538
	3/3/3	20	409	489	689
LTE	1/1/1 2T2R	20+20	470	538	692
	1/1/1 2T2R	40+40	598	723	1020
	1/1/1 2T2R	60+60	739	923	1377

**Installation and mechanical specifications**

**Table 288** FRGU installation and mechanical specifications

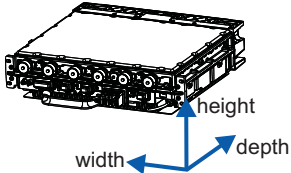
Property	Value
Installation options	<ul style="list-style-type: none"> <li>• floor/stack installation</li> <li>• pole installation</li> <li>• wall installation</li> <li>• 19" rack/cabinet</li> </ul>
IP rating	IP65
Related optional items	Pole installation <ul style="list-style-type: none"> <li>• Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>• Flexi Pole Kit (FPKA)</li> <li>• Flexi Pole Kit (FPKC)</li> <li>• Flexi Module Casing (EMHx)</li> </ul>

**Table 288** FRGU installation and mechanical specifications (Cont.)

Property	Value
	Floor/Wall installation <ul style="list-style-type: none"> <li>Flexi Mounting Kit for Floor, Wall and Pole (FMFA)</li> <li>Flexi Module Casing (EMHx)</li> </ul> Outdoor 19" rack <ul style="list-style-type: none"> <li>Flexi Module Casing (EMHx)</li> </ul> Cabinet/indoor 19" rack <ul style="list-style-type: none"> <li>No optional items needed</li> </ul>

**Dimensions and weight**

**Table 289** FRGU dimensions and weight

Property	Value	Dimensions orientation
Height	Core RFM: 115 mm (4.5 in.)	
Depth	Core RFM: 400 mm (15.7 in.)	
	Without front covers: 422 mm (16.6 in.) With front covers: 560 mm (22.1 in.)	
Width	Core RFM: 420 mm (16.5 in.)	
	Without front covers: 447 mm (17.6 in.) With front covers: 492 mm (19.4 in.)	
Weight	24 kg (52.9 lb)	
Volume	19.3 l	

**Environmental specifications**

**Table 290** FRGU environmental specifications

Property	Value
Maximum operational outdoor temperature (at constant high ambient temperature maximum output power might be limited)	+55°C (131°F)
Minimum operational temperature (including cold start)	-35°C (-31°F)

**LEDs**

Table 291 FRGU LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Major alarm affecting the whole RF Module</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm
RF Module fan/TX status LED: Red	At least one fan is faulty or degraded	-
RF Module fan/TX status LED: Green	All fans are working	-



Table 291 FRGU LEDs (Cont.)

LED color	Description	Alarm
RF Module fan/TX status LED: Color set according to fan status, stable	RF transmission is ON	-
RF Module fan/TX status LED: Color set according to fan status, blinking	RF transmission is OFF	-

**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 50 Ω 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.



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

## 9 Descriptions of Flexi Metro RRH

### 9.1 Flexi Metro RRH 2-pipe 900H 10 W (FHDG)

*FHDG technical specifications.*

#### Functional description

Table 292 FHDG functional specification

Property	Value
Output power	2x5 W
MIMO	2TX
Outdoor installation	Yes
SW supported technologies	FDD-LTE
TX frequency range	945-960 MHz
RX frequency range	900-915 MHz
DL instantaneous bandwidth (supported but not tested due to limitation of UE)	15 MHz
UL instantaneous bandwidth (supported but not tested due to limitation of UE)	15 MHz
DL filter bandwidth	15 MHz
UL filter bandwidth	15 MHz

#### Interfaces

Figure 66 FHDG interfaces

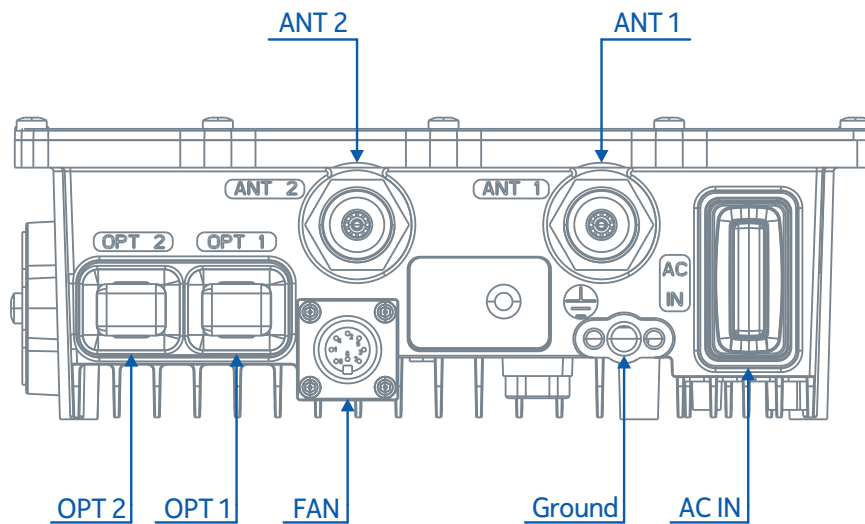


Table 293 FHDG interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	AC IN	1	MicroFit 1x3P Plug	-
Antenna connector	ANT	2	4.3-10	-
Fan control	FAN	1	8-pin circular	Power and control for fan option
Optical interface	OPT	2	SFP	1.5 Gbps to 6 Gbps, OBSAI
Local Management Port	LMP	1	2x15 pin header	-

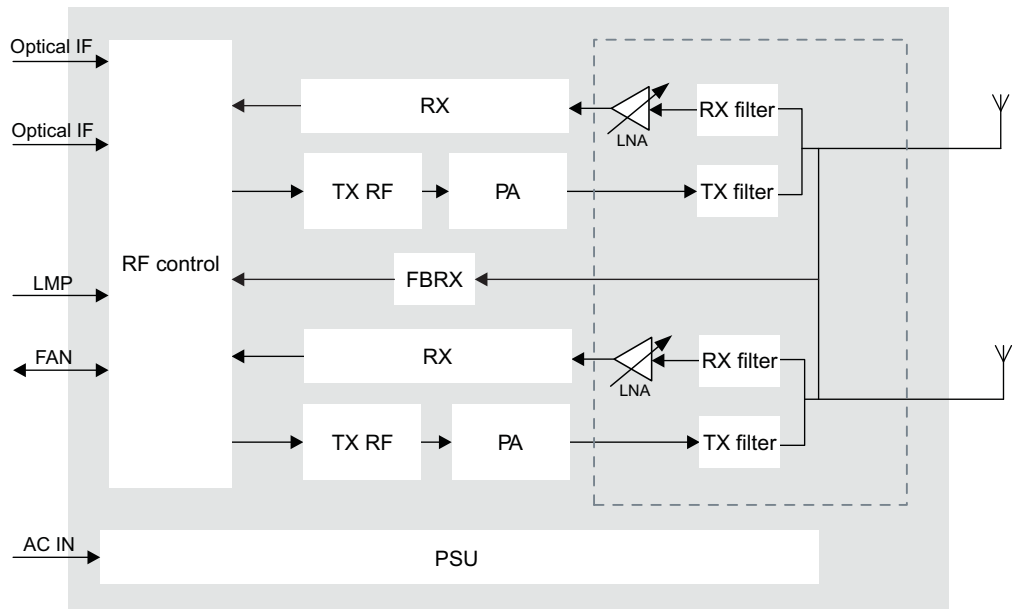
**Antenna Line Devices (ALDs) support**

Table 294 FHDG ALD support

ALD support via antenna ports	Value
AISG	None

**Functional block diagram**

Figure 67 FHDG functional block diagram



**Electrical specifications**

Table 295 FHDG electrical specifications

Property	Value
Nominal input voltage range	100 V AC to 240 V AC
Extended input voltage range	88 V AC to 276 V DC

**Power consumption**

*Table 296* FHDG power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h		
			Power consumption ETSI 202706 average load $P_{RRH, static}$	Power consumption ETSI 202706 busy hour load $P_{BH, RRH, static}$	Power consumption 100% RF power load $P_{100\% RRH}$
LTE	1/1/1 2T2R	5+5	196	213	246

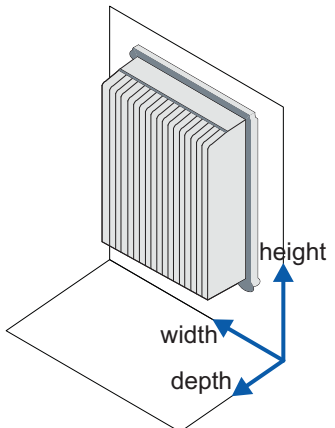
**Installation and mechanical specifications**

*Table 297* FHDG installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• pole/wall installation</li> <li>• rooftop installation</li> <li>• bookshelf/stacking installation</li> </ul>
IP rating	IP65
Related optional items	<ul style="list-style-type: none"> <li>• Flexi Metro Wall/Pole/Stacking Mounting Kit (FMDB)</li> <li>• Flexi Metro Wall/Bookshelf Mounting Kit (FMDD)</li> <li>• Flexi Metro Visual Cover (FMDE)</li> <li>• Flexi Metro Fan Assembly Kit (FMDF)</li> <li>• Flexi Pole Mounting Kit (FPKA), not recommended</li> </ul>

**Dimensions and weight**

Table 298 FHDG dimensions and weight

Property	Value	Dimensions orientation
Height	Without mounting brackets, flange, screw boss and connectors: 269 mm (10.6 in.)	 <p>The diagram shows a perspective view of the FHDG. Three blue arrows indicate the dimensions: 'height' points to the vertical thickness, 'width' points to the front horizontal edge, and 'depth' points to the side horizontal edge.</p>
Depth	Without mounting brackets, flange, screw boss and connectors: 77 mm (3.0 in.)	
Width	Without mounting brackets, flange, screw boss and connectors: 202 mm (7.9 in.)	
Weight	Without mounting brackets: <5 kg (11.0 lb)	
Volume	<5 l	

**Environmental specifications**

Table 299 FHDG environmental specifications

Property	Value
Maximum operational ambient temperature (at constant high ambient temperature, maximum output power might be limited)	+55°C (131°F)
Maximum operational ambient temperature	+45°C (113°F)
Minimum operational temperature (including cold start)	-40°C (-40°F)

**LEDs**

Table 300 FHDG LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Critical alarm affecting fans</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> </ul>	No alarm

Table 300 FHDG LEDs (Cont.)

LED color	Description	Alarm
	<ul style="list-style-type: none"> <li>There is no connection to any System Module</li> </ul>	
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm

**Warnings, cautions or notes related to the product**



**NOTICE:** The RRH should always be mounted in a vertical orientation with connectors on the bottom side to ensure convection cooling.



**Note:** The RRH with optional fan module can be mounted in horizontal orientation.

## 9.2 Flexi Metro RRH 2-pipe 1800 10 W (FHEE)

*FHEE technical specifications.*

**Functional description**

Table 301 FHEE functional specification

Property	Value
Output power	2x5 W
MIMO	2TX

Table 301 FHEE functional specification (Cont.)

Property	Value
Outdoor installation	Yes
SW supported technology	FDD-LTE
TX frequency range	1805-1880 MHz
RX frequency range	1710-1785 MHz
DL instantaneous bandwidth	60 MHz
UL instantaneous bandwidth	60 MHz
DL filter bandwidth	75 MHz
UL filter bandwidth	75 MHz

**Interfaces**

Figure 68 FHEE interfaces

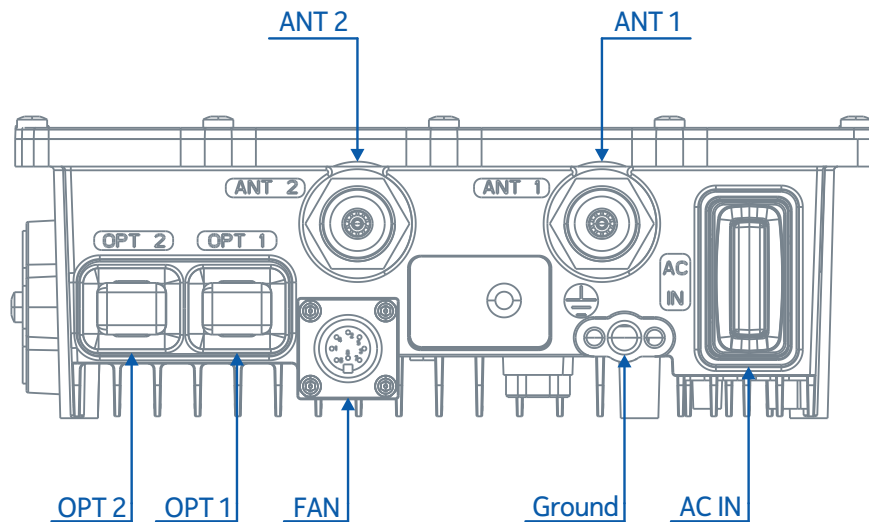


Table 302 FHEE interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	AC IN	1	MicroFit 1x3P Plug	-
Antenna connector	ANT	2	4.3-10	-
Fan control	FAN	1	8-pin circular	Power and control for fan option
Optical interface	OPT	2	SFP	1.5 Gbps to 6 Gbps, OBSAI
Local Management Port	LMP	1	2x15 pin header	-

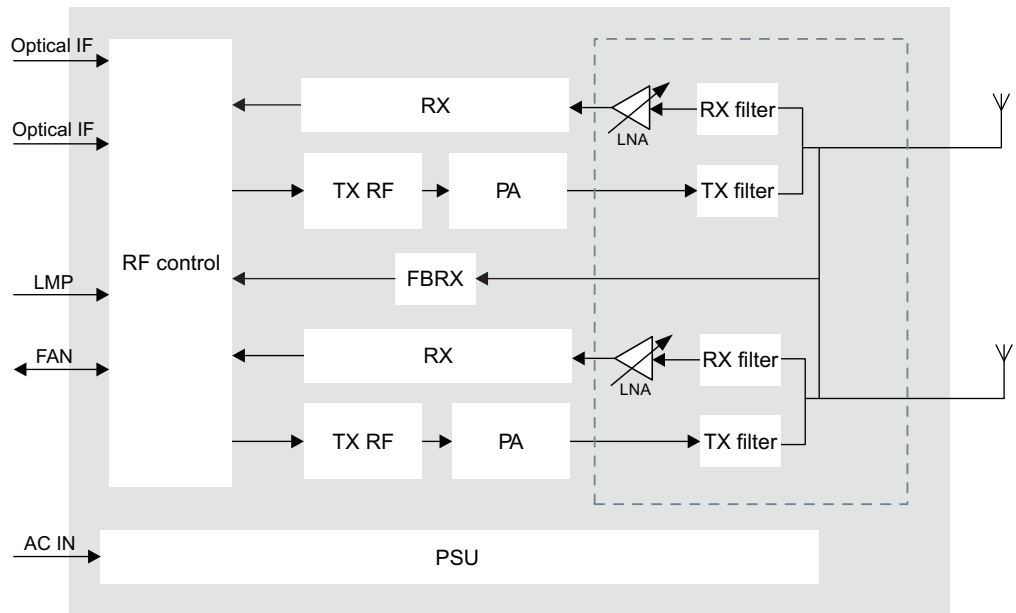
**Antenna Line Devices (ALDs) support**

Table 303 FHEE ALD support

ALD support via antenna ports	Value
AISG	None

**Functional block diagram**

Figure 69 FHEE functional block diagram



**Electrical specifications**


Table 304 FHEE electrical specifications

Property	Value
Nominal input voltage range	100 V AC to 240 V AC
Extended input voltage range	88 V AC to 276 V DC

**Power consumption**



Table 305 FHEE power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 230VAC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h		
			Power consumption ETSI 202706 average load $P_{RRH, static}$	Power consumption ETSI 202706 busy hour load $P_{BH, RRH, static}$	Power consumption 100% RF power load $P_{100\% RRH}$
			 Note: Values preliminary estimated.		
LTE	1/1/1 2T2R	5+5	217	238	272

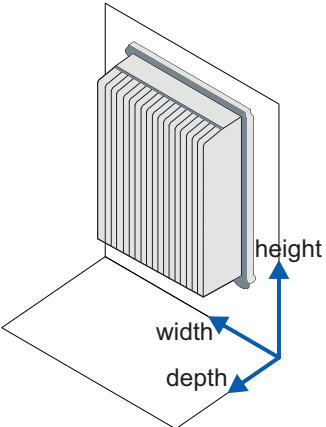
**Installation and mechanical specifications**

Table 306 FHEE installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• pole/wall installation</li> <li>• rooftop installation</li> <li>• bookshelf/stacking installation</li> </ul>
IP rating	IP65
Related optional items	<ul style="list-style-type: none"> <li>• Flexi Metro Wall/Pole/Stacking Mounting Kit (FMDB)</li> <li>• Flexi Metro Wall/Bookshelf Mounting Kit (FMDD)</li> <li>• Flexi Metro Visual Cover (FMDE)</li> <li>• Flexi Metro Integrated Antenna (1.7G-2.2G) (FAGH)</li> <li>• Flexi Metro Fan Assembly Kit (FMDf)</li> <li>• Flexi Pole Mounting Kit (FPKA), not recommended</li> </ul>

**Dimensions and weight**

**Table 307** FHEE dimensions and weight

Property	Value	Dimensions orientation
Height	Without mounting brackets, flange, screw boss and connectors: 269 mm (10.6 in.)	
Depth	Without mounting brackets, flange, screw boss and connectors: 77 mm (3.0 in.)	
Width	Without mounting brackets, flange, screw boss and connectors: 202 mm (7.9 in.)	
Weight	Without mounting brackets: <5 kg (11.0 lb)	
Volume	<5 l	

**Environmental specifications**

**Table 308** FHEE environmental specifications

Property	Value
Maximum operational ambient temperature (at constant high ambient temperature, maximum output power might be limited)	+55°C (131°F)
Maximum operational ambient temperature	+45°C (113°F)
Minimum operational temperature (including cold start)	-40°C (-40°F)

**LEDs**

**Table 309** FHEE LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Critical alarm affecting fans</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> </ul>	No alarm

Table 309 FHEE LEDs (Cont.)

LED color	Description	Alarm
	<ul style="list-style-type: none"> <li>There is no connection to any System Module</li> </ul>	
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm

**Warnings, cautions or notes related to the product**



**NOTICE:** The RRH should always be mounted in a vertical orientation with connectors on the bottom side to ensure convection cooling. The RRH with optional fan module can be mounted in horizontal orientation.



**Note:** The RRH with optional fan module can be mounted in horizontal orientation.

### 9.3 Flexi Metro RRH 2-pipe 1800L 10 W (FHEI)

*FHEI technical specifications.*

**Functional description**

Table 310 FHEI functional specification

Property	Value
Output power	2x5 W
MIMO	2TX

Table 310 FHEI functional specification (Cont.)

Property	Value
Outdoor installation	Yes
SW supported technology	FDD-LTE
TX frequency range	1805-1865 MHz
RX frequency range	1710-1770 MHz
DL instantaneous bandwidth	60 MHz
UL instantaneous bandwidth	60 MHz
DL filter bandwidth	60 MHz
UL filter bandwidth	60 MHz

**Interfaces**

Figure 70 FHEI interfaces

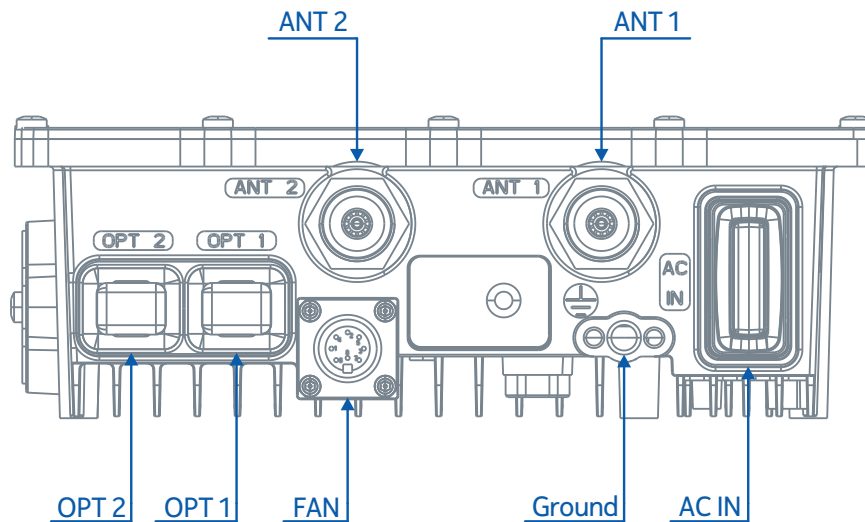


Table 311 FHEI interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	AC IN	1	MicroFit 1x3P Plug	-
Antenna connector	ANT	2	4.3-10	-
Fan control	FAN	1	8-pin circular	Power and control for fan option
Optical interface	OPT	2	SFP	1.5 Gbps to 6 Gbps, OBSAI
Local Management Port	LMP	1	2x15 pin header	-

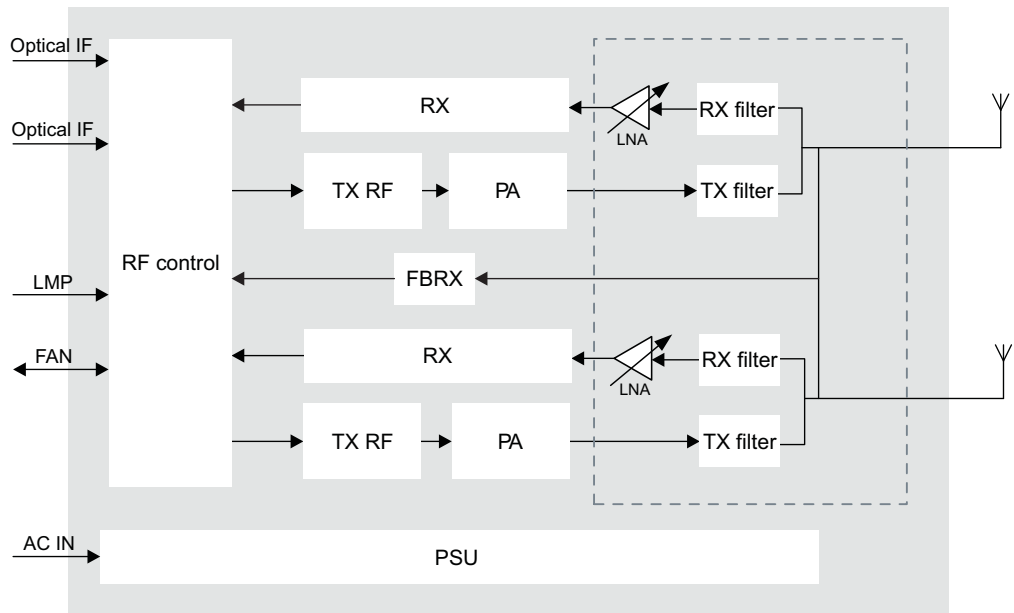
**Antenna Line Devices (ALDs) support**

Table 312 FHEI ALD support

ALD support via antenna ports	Value
AISG	None

**Functional block diagram**

Figure 71 FHEI functional block diagram




**Electrical specifications**

Table 313 FHEI electrical specifications

Property	Value
Nominal input voltage range	100 V AC to 240 V AC
Extended input voltage range	88 V AC to 276 V DC

**Power consumption**

Table 314 FHEI power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h Values preliminary estimated.		
			Power consumption ETSI 202706 average load $P_{RRH, static}$	Power consumption ETSI 202706 busy hour load $P_{BH RRH, static}$	Power consumption 100% RF power load $P_{100\% RRH}$
			 Note: Values preliminary estimated.		
LTE	1/1/1 2T2R	5+5	217	238	272

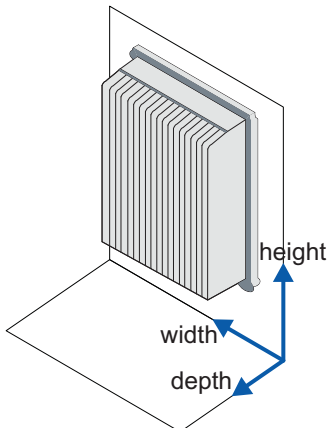
**Installation and mechanical specifications**

Table 315 FHEI installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• pole/wall installation</li> <li>• rooftop installation</li> <li>• bookshelf/stacking installation</li> </ul>
IP rating	IP65
Related optional items	<ul style="list-style-type: none"> <li>• Flexi Metro Wall/Pole/Stacking Mounting Kit (FMDB)</li> <li>• Flexi Metro Wall/Bookshelf Mounting Kit (FMDD)</li> <li>• Flexi Metro Visual Cover (FMDE)</li> <li>• Flexi Metro Fan Assembly Kit (FMDF)</li> <li>• Flexi Pole Mounting Kit (FPKA), not recommended</li> <li>• Flexi Metro Integrated Antenna (1.7G-2.2G) (FAGH)</li> </ul>

**Dimensions and weight**

Table 316 FHEI dimensions and weight

Property	Value	Dimensions orientation
Height	Without mounting brackets, flange, screw boss and connectors: 269 mm (10.6 in.)	
Depth	Without mounting brackets, flange, screw boss and connectors: 82.7 mm (3.2 in.)	
Width	Without mounting brackets, flange, screw boss and connectors: 202 mm (7.9 in.)	
Weight	Without mounting brackets: 5 kg (11.0 lb)	
Volume	4.2 l	

**Environmental specifications**

Table 317 FHEI environmental specifications

Property	Value
Maximum operational ambient temperature (at constant high ambient temperature, maximum output power might be limited)	+55°C (131°F)
Maximum operational ambient temperature	+45°C (113°F)
Minimum operational temperature (including cold start)	-40°C (-40°F)

**LEDs**

Table 318 FHEI LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Critical alarm affecting fans</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> </ul>	No alarm

Table 318 FHEI LEDs (Cont.)

LED color	Description	Alarm
	<ul style="list-style-type: none"> <li>There is no connection to any System Module</li> </ul>	
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm

**Warnings, cautions or notes related to the product**



**NOTICE:** The RRH should always be mounted in a vertical orientation with connectors on the bottom side to ensure convection cooling.



**Note:** The RRH with optional fan module can be mounted in horizontal orientation.

## 9.4 Flexi Metro RRH 2-pipe 2100 10 W (FHGA)

*FHGA technical specifications.*

**Functional description**

Table 319 FHGA functional specification

Property	Value
Output power	2x5 W
MIMO	2TX
Outdoor installation	Yes



Table 319 FHGA functional specification (Cont.)

Property	Value
SW supported technologies	FDD-LTE
TX frequency range	2110-2170 MHz
RX frequency range	1920-1980 MHz
DL instantaneous bandwidth	60 MHz
UL instantaneous bandwidth	60 MHz
DL filter bandwidth	60 MHz
UL filter bandwidth	60 MHz

**Interfaces**

Figure 72 FHGA interfaces

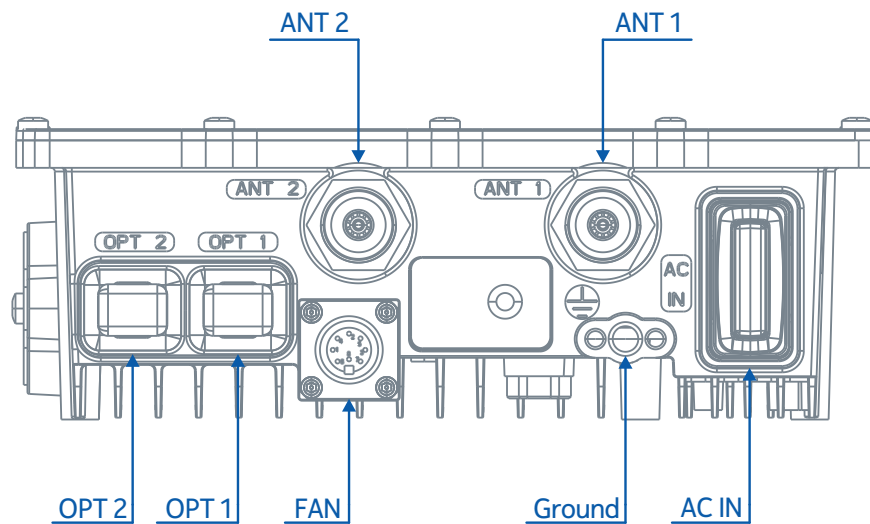


Table 320 FHGA interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	AC IN	1	MicroFit 1x3P Plug	-
Antenna connector	ANT	2	4.3-10	-
Fan control	FAN	1	8-pin circular	Power and control for fan option
Optical interface	OPT	2	SFP	1.5 Gbps to 6 Gbps, OBSAI
Local Management Port	LMP	1	2x15 pin header	-

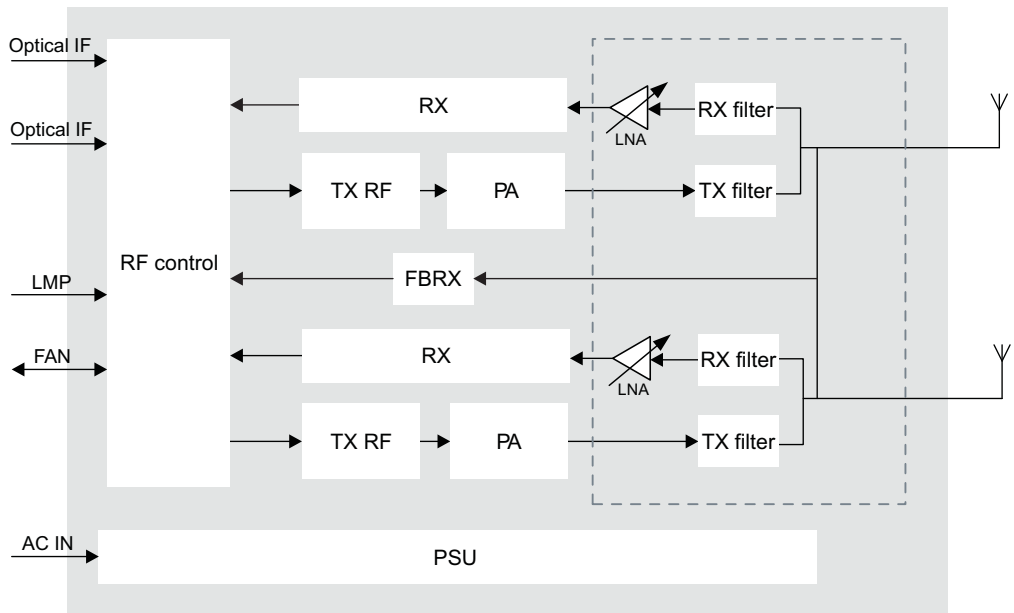
**Antenna Line Devices (ALDs) support**

Table 321 FHGA ALD support

ALD support via antenna ports	Value
AISG	None

Functional block diagram

Figure 73 FHGA functional block diagram



Electrical specifications

Table 322 FHGA electrical specifications

Property	Value
Nominal input voltage range	100 V AC to 240 V AC
Extended input voltage range	88 V AC to 276 V DC

Power consumption

Table 323 FHGA power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h		
			Power consumption ETSI 202706 average load $P_{RRH, static}$	Power consumption ETSI 202706 busy hour load $P_{BH, RRH, static}$	Power consumption 100% RF power load $P_{100\% RRH}$
LTE	1/1/1 2T2R	5+5	215	232	260

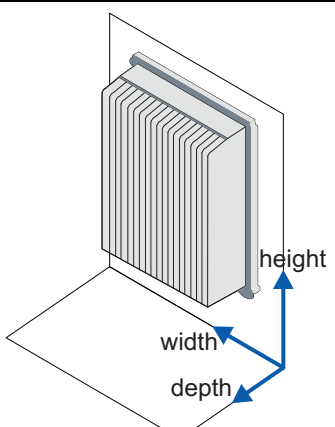
**Installation and mechanical specifications**

*Table 324* FHGA installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• pole/wall installation</li> <li>• rooftop installation</li> <li>• bookshelf/stacking installation</li> </ul>
IP rating	IP65
Related optional items	<ul style="list-style-type: none"> <li>• Flexi Metro Wall/Pole/Stacking Mounting Kit (FMDB)</li> <li>• Flexi Metro Wall/Bookshelf Mounting Kit (FMDD)</li> <li>• Flexi Metro Visual Cover (FMDE)</li> <li>• Flexi Metro Integrated Antenna (1.7G-2.2G) (FAGH)</li> <li>• Flexi Metro Fan Assembly Kit (FMDF)</li> <li>• Flexi Pole Mounting Kit (FPKA), not recommended</li> </ul>

**Dimensions and weight**

*Table 325* FHGA dimensions and weight

Property	Value	Dimensions orientation
Height	Without mounting brackets, flange, screw boss and connectors: 269 mm (10.6 in.)	
Depth	Without mounting brackets, flange, screw boss and connectors: 77 mm (3.0 in.)	
Width	Without mounting brackets, flange, screw boss and connectors: 202 mm (7.9 in.)	
Weight	Without mounting brackets: <5 kg (11.0 lb)	
Volume	4.2 l	

**Environmental specifications**

*Table 326* FHGA environmental specifications

Property	Value
Maximum operational ambient temperature (at constant high ambient temperature, maximum output power might be limited)	+55°C (131°F)
Maximum operational ambient temperature	+45°C (113°F)
Minimum operational temperature (including cold start)	-40°C (-40°F)

**LEDs**

*Table 327* FHGA LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Critical alarm affecting fans</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm

**Warnings, cautions or notes related to the product**



*NOTICE:* The RRH should always be mounted in a vertical orientation with connectors on the bottom side to ensure convection cooling. The RRH with optional fan module can be mounted in horizontal orientation.



**Note:** The RRH with optional fan module can be mounted in horizontal orientation.

# 10 Flexi Remote Radio Head 1TX 2100 (FRGG)

FRGG technical specifications.

## Functional description

Table 328 FRGG functional specification

Property	Value
Output power	1x60 W
MIMO	1TX
Outdoor installation	Yes
SW supported technology	WCDMA
TX frequency range	2110-2170 MHz
RX frequency range	1920-1980 MHz
DL instantaneous bandwidth	20 MHz
UL instantaneous bandwidth	45 MHz
DL filter bandwidth	20 MHz
UL filter bandwidth	20 MHz

## Interfaces

Figure 74 FRGG (471882A) interfaces

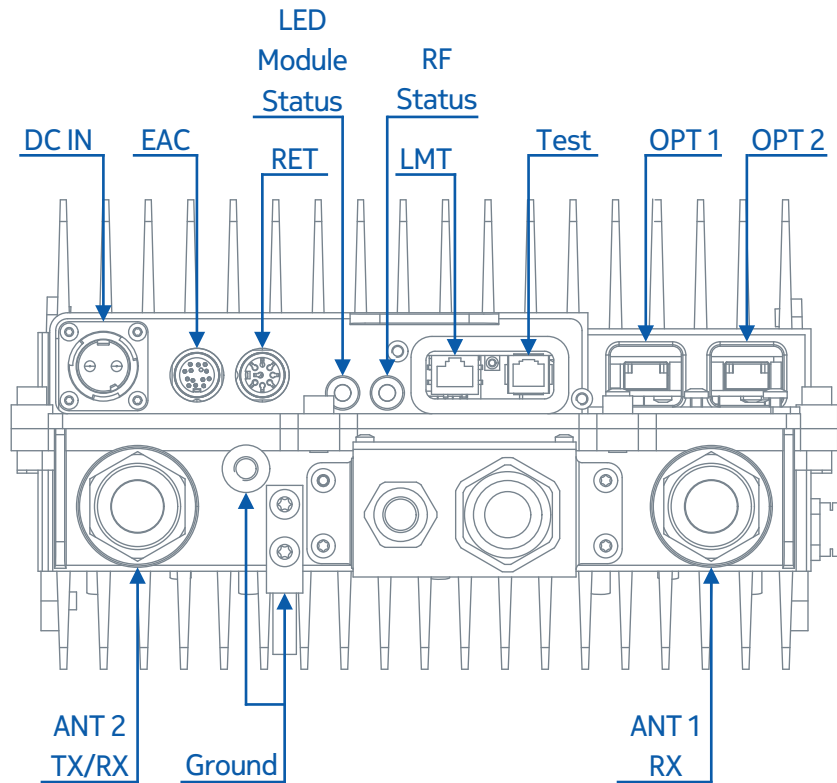


Table 329 FRGG (471882A) interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power Connector	DC IN	1	2-pin ITT Cannon	Optional DC connection box (FPOC) 16mm <sup>2</sup>
Antenna connector	ANT	2	7/16, female	-
Remote Electrical Tilt	RET	1	8-pin Amphenol C 091 D	-
External Alarm Connection	EAC	1	14-pin Amphenol C 091 D	-
Optical interface	OPT	2	SFP	OBSAI
Local Maintenance Terminal	LMT	1	RJ-45	-

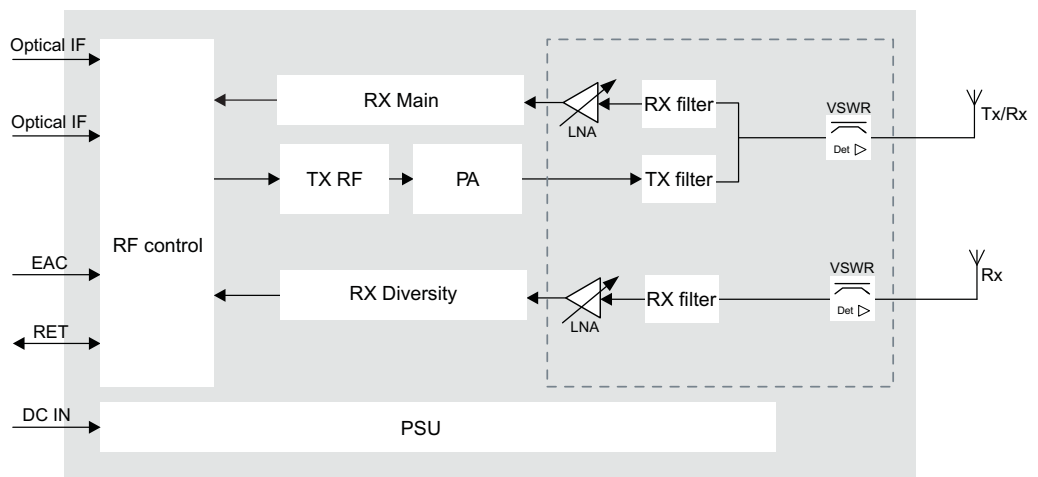
**Antenna Line Devices (ALDs) support**

Table 330 FRGG ALD support

ALD support via antenna ports	Value
AISG	RET: AISG 2.0
Proprietary AISG1.1	No
CWA (for non-AISG installations)	No
Voltage	ANT1: 28.5 V or 12 V ANT2: 12 V
Power per port	30 W

**Functional block diagram**

Figure 75 FRGG functional block diagram



**Electrical specifications**

*Table 331* FRGG 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**

*Table 332* FRGG power consumption

Number of TXs	RF output power per TX [W]	Estimated power consumption [W] at 48VDC input at 23°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin	
		50% RF Load	100% RF Load
1	60	212	290
	40	183	240
	20	150	184

**Installation and mechanical specifications**

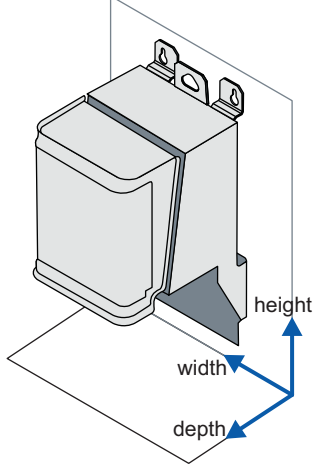
*Table 333* FRGG installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>pole/wall installation</li> <li>directly on the wall installation</li> </ul>
IP rating	IP65
Related optional items	<ul style="list-style-type: none"> <li>Flexi Pole Mounting Kit (FPKA/C)</li> </ul>

**Dimensions and weight**



Table 334 FRGG dimensions and weight

Property	Value	Dimensions orientation
Height	450 mm (17.7 in.) With solar shield: 500 mm (19.7 in.)	
Depth	159 mm (6.3 in.) With solar shield: 174 mm (6.8 in.)	
Width	260 mm (10.2 in.) With solar shield: 280.5 mm (11.0 in.)	
Weight	15.9 kg (35.0 lb)	
Volume	17.9 l	

**Environmental specifications**

Table 335 FRGG environmental specifications

Property	Value
Maximum operational outdoor temperature in the shade (at constant high ambient temperature, maximum output power might be limited)	+55°C (131°F)
Maximum operational outdoor temperature in the sun (according to GR-487-Core specification)	+50°C (122°F)
Maximum indoor temperature (this is valid for fanless products)	+45°C (113°F)
Minimum operational temperature (including cold start)	-40°C (-40°F)

**LEDs**

Table 336 FRGG LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Critical alarm affecting fans</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm

Table 336 FRGG LEDs (Cont.)

LED color	Description	Alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm

**Warnings, cautions or notes related to the product**



**NOTICE:** The RRH should always be mounted in a vertical orientation with connectors on the bottom side to ensure proper cooling.



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

# 11 Descriptions of 2TX RRHs

## 11.1 Flexi Remote Radio Head 2TX 850 (FHCA)

*FHCA technical specifications.*

### Functional description

Table 337 FHCA functional specification

Property	Value
Output power	2x20 W
MIMO	2TX
Outdoor installation	Yes
SW supported technology	FDD-LTE
TX frequency range	869-894 MHz
RX frequency range	824-849 MHz
DL instantaneous bandwidth	15 MHz
UL instantaneous bandwidth	15 MHz
DL filter bandwidth	25 MHz
UL filter bandwidth	25 MHz

### Interfaces

Figure 76 FHCA interfaces

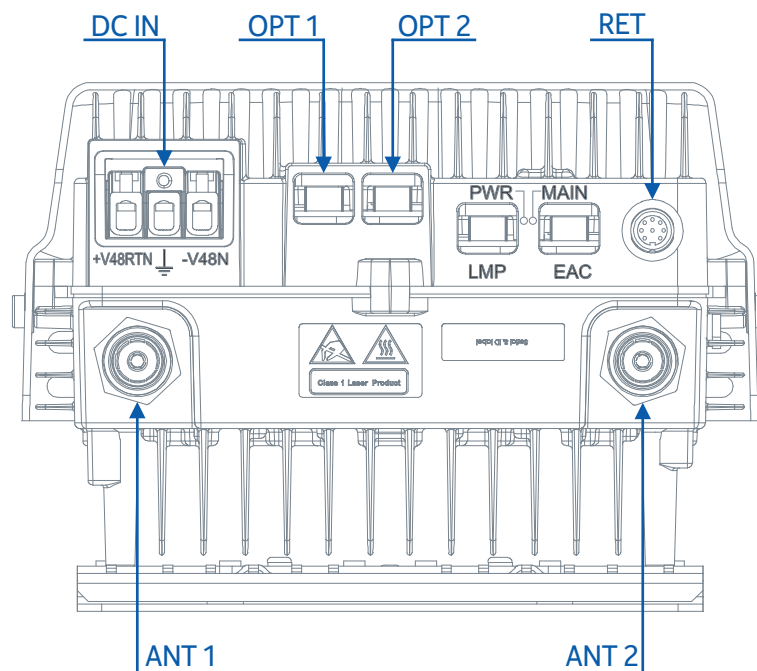


Table 338 FHCA interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	3-pole screw terminal	-
Antenna connector	ANT	2	7/16	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	D-sub MDR14	-
Optical interface	OPT	2	SFP	6 Gbps

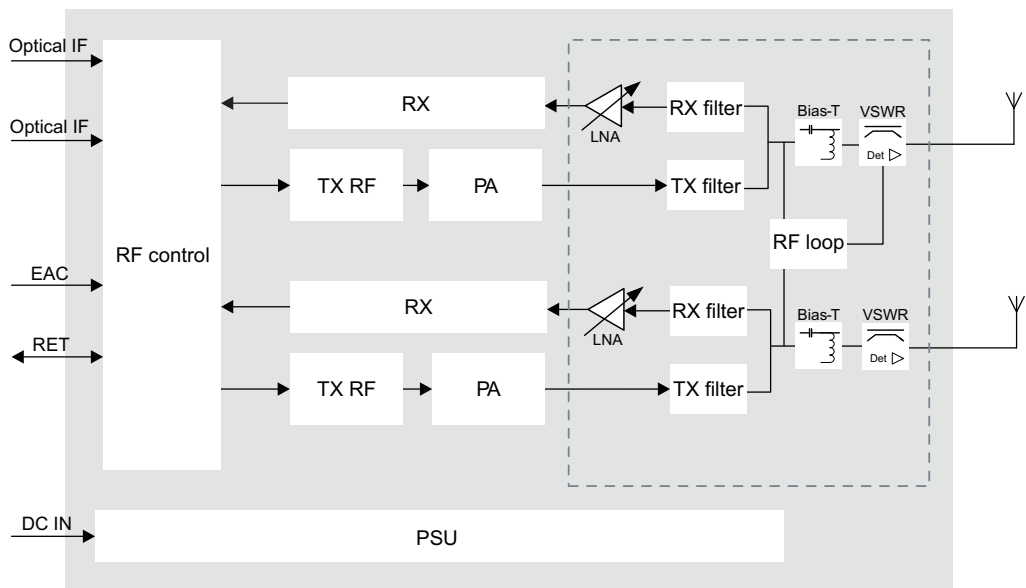
**Antenna Line Devices (ALDs) support**

Table 339 FHCA ALD support

ALD support via antenna ports	Value
AISG	ANT1, ANT2, RET: AISG 2.0
Proprietary AISG 1.1	No
CWA (for non-AISG installations)	No
Voltage	ANT1, ANT2: 14.5 V RET: 14.5 V
Power per port	17 W

**Functional block diagram**

Figure 77 FHCA functional block diagram



**Electrical specifications**

Table 340 FHCA 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**

Table 341 FHCA power consumption

Number of TXs	RF output power per TX [W]	Estimated power consumption [W] at 48VDC input at 23°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin	
		50% RF Load	100% RF Load
2	20	200	240

**Installation and mechanical specifications**

Table 342 FHCA installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>pole/wall installation</li> <li>directly on the wall installation</li> </ul>
IP rating	IP65
Related optional items	<ul style="list-style-type: none"> <li>Flexi Pole Mounting Kit (FPKA/C)</li> </ul>

**Dimensions and weight**

Table 343 FHCA dimensions and weight

Property	Value	Dimensions orientation
Height	As delivered, cable tie point recessed: 579 mm (22.7 in.) As installed, cable tie point released due to brackets and solar shields: 733 mm (28.8 in.)	<p>The diagram shows a 3D perspective view of the FHCA unit. Three blue arrows indicate the dimensions: 'height' points to the top of the unit, 'width' points to the front face, and 'depth' points to the side of the unit.</p>
Depth	215 mm (8.4 in.)	
Width	358 mm (14.1 in.)	
Weight	20 kg (44 lb)	
Volume	18 l	

**Environmental specifications**

**Table 344** FHCA environmental specifications

Property	Value
Maximum operational outdoor temperature in the shade (at constant high ambient temperature, maximum output power might be limited)	+55°C (131°F)
Maximum operational outdoor temperature in the sun (according to GR-487-Core specification)	+50°C (122°F)
Maximum indoor temperature (this is valid for fanless products)	+45°C (113°F)
Minimum operational temperature (including cold start)	-40°C (-40°F)

**LEDs**

**Table 345** FHCA LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Critical alarm affecting fans</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	No alarm

Table 345 FHCA LEDs (Cont.)

LED color	Description	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm

**Warnings, cautions or notes related to the product**



**NOTICE:** The RRH should always be mounted in a vertical orientation with connectors on the bottom side to ensure proper cooling.



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

## 11.2 Flexi Remote Radio Head 2TX 730 (FRLB)

*FRLB technical specifications.*

**Functional description**

Table 346 FRLB functional specification

Property	Value
Output power	2x30 W
MIMO	2TX
Outdoor installation	Yes
SW supported technology	FDD-LTE
TX frequency range	729-745 MHz
RX frequency range	699-715 MHz
DL instantaneous bandwidth	16 MHz
UL instantaneous bandwidth	16 MHz
DL filter bandwidth	16 MHz
UL filter bandwidth	16 MHz

**Interfaces**

Figure 78 FRLB interfaces

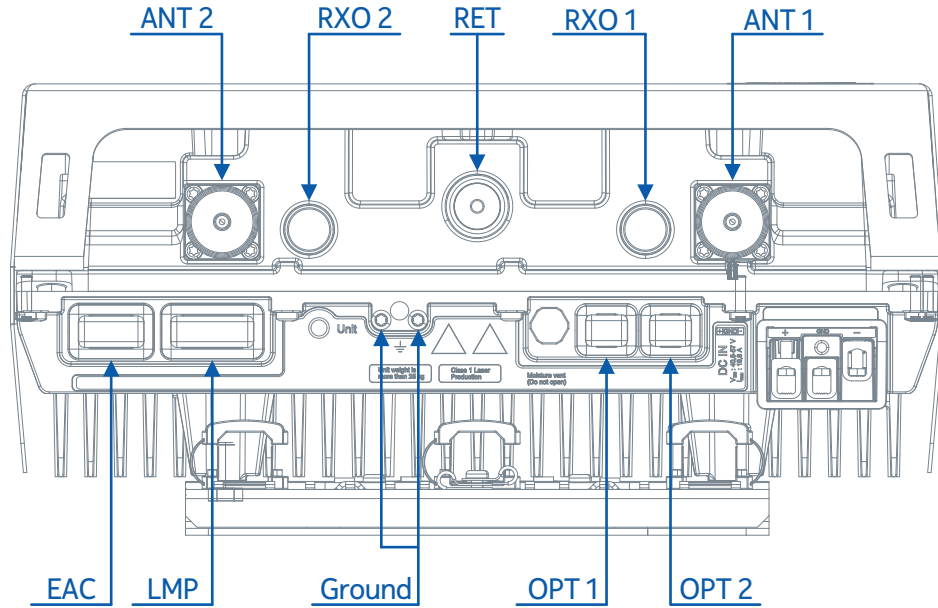


Table 347 FRLB interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	3-pole screw terminal	-
Antenna connector	ANT	2	7/16	-
RF external connector	Rx EXT	2	QMA	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	D-sub MDR14	-
Optical interface	OPT	2	SFP	3 Gbps
Local Management Port	LMP	1	2x15 pin header	-

**Antenna Line Devices (ALDs) support**

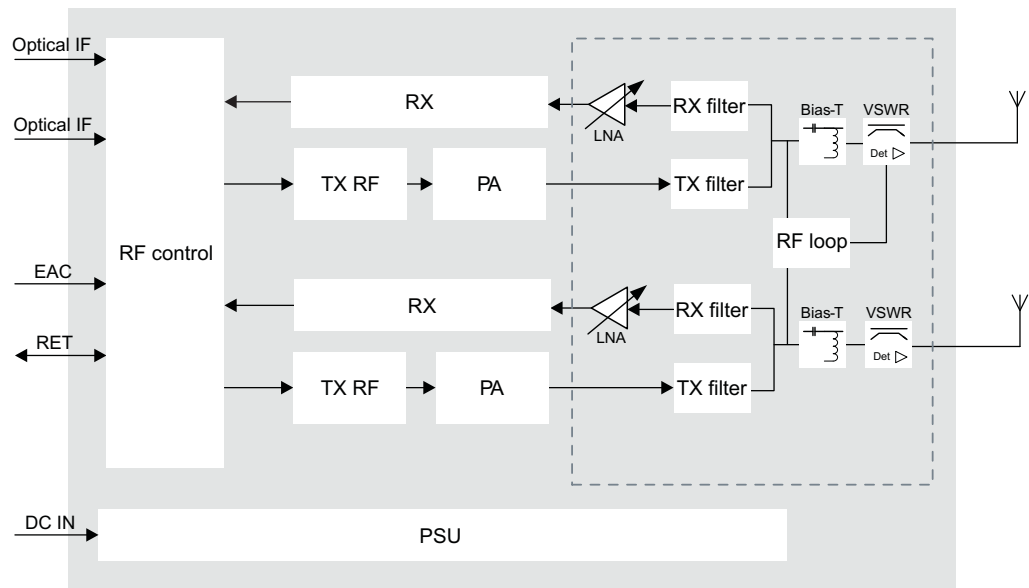
Table 348 FRLB ALD support

ALD support via antenna ports	Value
AISG	ANT1, ANT2, RET: AISG 2.0
Proprietary AISG 1.1	No
CWA (for non-AISG installations)	No
Voltage	ANT1, ANT2: 24 V RET: 24 V
Power per port	30 W



**Functional block diagram**

*Figure 79* FRLB functional block diagram



**Electrical specifications**

*Table 349* FRLB 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**

*Table 350* FRLB power consumption

Number of TXs	RF output power per TX [W]	Estimated power consumption [W] at 48VDC input at 23°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin	
		50% RF Load	100% RF Load
2	30	248	321
	20	192	239

**Installation and mechanical specifications**

*Table 351* FRLB installation and mechanical specifications

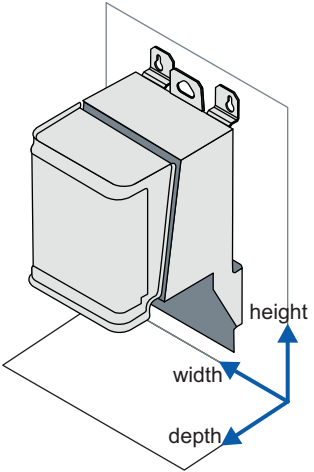
Property	Value
Installation options	<ul style="list-style-type: none"> <li>pole/wall installation</li> <li>directly on the wall installation</li> </ul>

**Table 351** FRLB installation and mechanical specifications (Cont.)

Property	Value
IP rating	IP65
Related optional items	<ul style="list-style-type: none"> <li>Flexi Pole Mounting Kit (FPKA/C)</li> </ul>

**Dimensions and weight**

**Table 352** FRLB dimensions and weight

Property	Value	Dimensions orientation
Height	400 mm (15.7 in.)	
Depth	150 mm (5.9 in.)	
Width	400 mm (15.7 in.)	
Weight	Without solar shield and mounting shroud: 27 kg (59.5 lb)	
Volume	25 l	

**Environmental specifications**

**Table 353** FRLB environmental specifications

Property	Value
Maximum operational outdoor temperature in the shade (at constant high ambient temperature, maximum output power might be limited)	+55°C (131°F)
Maximum operational outdoor temperature in the sun (according to GR-487-Core specification)	+50°C (122°F)
Maximum indoor temperature (this is valid for fanless products)	+45°C (113°F)
Minimum operational temperature (including cold start)	-40°C (-40°F)

**LEDs**

Table 354 FRLB LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Critical alarm affecting fans</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm

**Warnings, cautions or notes related to the product**



**NOTICE:** The RRH should always be mounted in a vertical orientation with connectors on the bottom side to ensure proper cooling.



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

## 11.3 Flexi RRH 2-pipe 900 80 W (FHDA)

*FHDA technical specifications.*

### Functional description

Table 355 FHDA functional specification

Property	Value
Output power	2x40 W
MIMO	2TX
Outdoor installation	Yes
SW supported technologies	GSM, WCDMA
TX frequency range	925-960 MHz
RX frequency range	880-915 MHz
DL instantaneous bandwidth	A.10x version: 25 MHz A.20x version: 30.2 MHz
UL instantaneous bandwidth	35 MHz
DL filter bandwidth	35 MHz
UL filter bandwidth	35 MHz

### Interfaces

Figure 80 FHDA interfaces

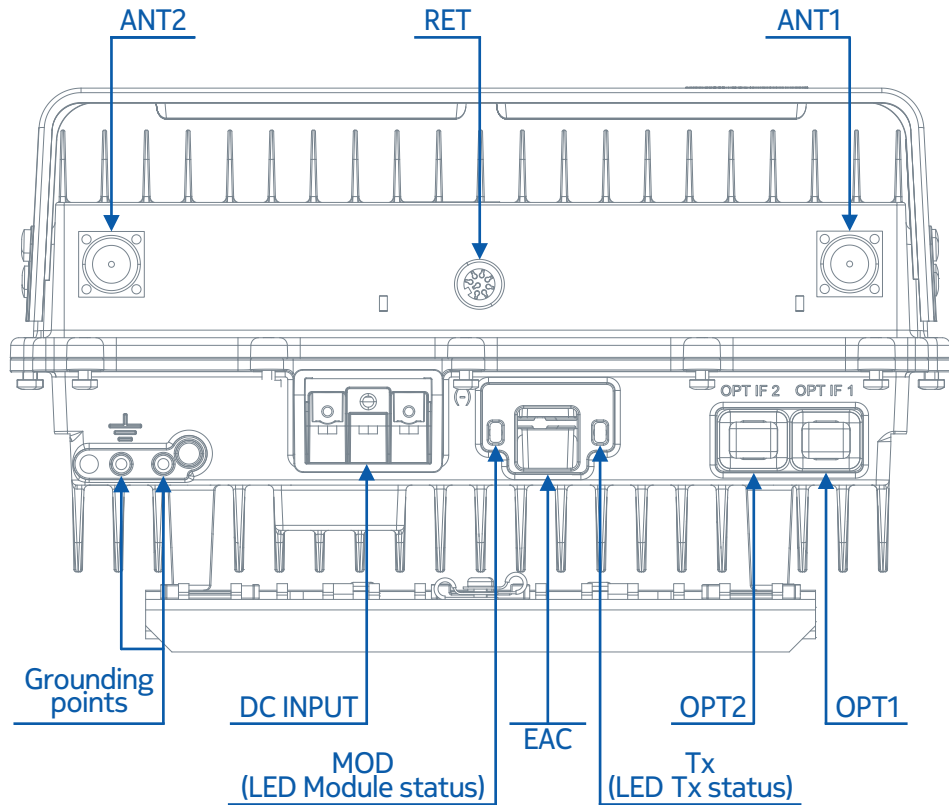


Table 356 FHDA interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	3-pole screw terminal	-
Antenna connector	ANT	2	7/16	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	RJ45	-
Optical interface	OPT	2	SFP	3 Gbps
Local Management Port	LMP	1	2x15 pin header	-

**Antenna Line Devices (ALDs) support**

Table 357 FHDA ALD support

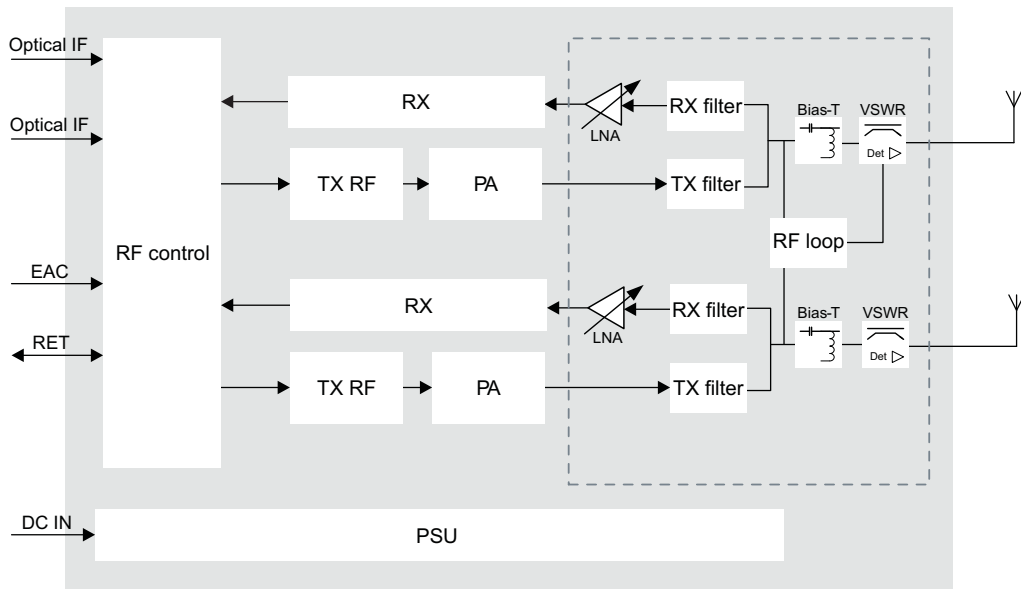
ALD support via antenna ports	Value
AISG	ANT1, ANT2, RET: AISG 2.0
Proprietary AISG 1.1	No
CWA (for non-AISG installations)	No

Table 357 FHDA ALD support (Cont.)

ALD support via antenna ports	Value
Voltage	ANT1, ANT2: 14.5 V RET: 14.5 V
Power per port	30 W

**Functional block diagram**

Figure 81 FHDA functional block diagram



**Electrical specifications**

Table 358 FHDA 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**

Table 359 FHDA power consumption

Number of TXs	RF output power per TX [W]	Estimated power consumption [W] at 48VDC input at 23°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin	
		50% RF Load	100% RF Load
2	40	305	344
	20	192	233

**Installation and mechanical specifications**

*Table 360* FHDA installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• pole/wall installation</li> <li>• directly on the wall installation</li> </ul>
IP rating	IP65
Related optional items	<ul style="list-style-type: none"> <li>• Flexi Pole Mounting Kit (FPKA/C)</li> </ul>

**Dimensions and weight**

*Table 361* FHDA dimensions and weight

Property	Value	Dimensions orientation
Height	As delivered, cable tie point recessed: 579 mm (22.7 in.)  As installed, cable tie point released due to brackets and solar shields: 733 mm (28.8 in.)	
Depth	215 mm (8.4 in.)	
Width	358 mm (14.1 in.)	
Weight	20 kg (44.0 lb)	
Volume	25 l	

**Environmental specifications**

*Table 362* FHDA environmental specifications

Property	Value
Maximum operational outdoor temperature in the shade (at constant high ambient temperature, maximum output power might be limited)	+55°C (131°F)
Maximum operational outdoor temperature in the sun (according to GR-487-Core specification)	+50°C (122°F)
Maximum indoor temperature (this is valid for fanless products)	+45°C (113°F)
Minimum operational temperature (including cold start)	-40°C (-40°F)

**LEDs**

Table 363 FHDA LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Critical alarm affecting fans</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm

**Warnings, cautions or notes related to the product**



**NOTICE:** The RRH should always be mounted in a vertical orientation with connectors on the bottom side to ensure proper cooling.





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

## 11.4 Flexi Remote Radio Head 2TX 1800 (FHEA)

*FHEA technical specifications.*

### Functional description

Table 364 FHEA functional specification

Property	Value
Output power	2x40 W
MIMO	2TX
Outdoor installation	Yes
SW supported technologies	GSM, FDD-LTE
TX frequency range	1805-1880 MHz
RX frequency range	1710-1785 MHz
DL instantaneous bandwidth	A.10x version: 23 MHz A.20x version: 25 MHz
UL instantaneous bandwidth	40 MHz
DL filter bandwidth	75 MHz
UL filter bandwidth	75 MHz

### Interfaces

Figure 82 FHEA interfaces

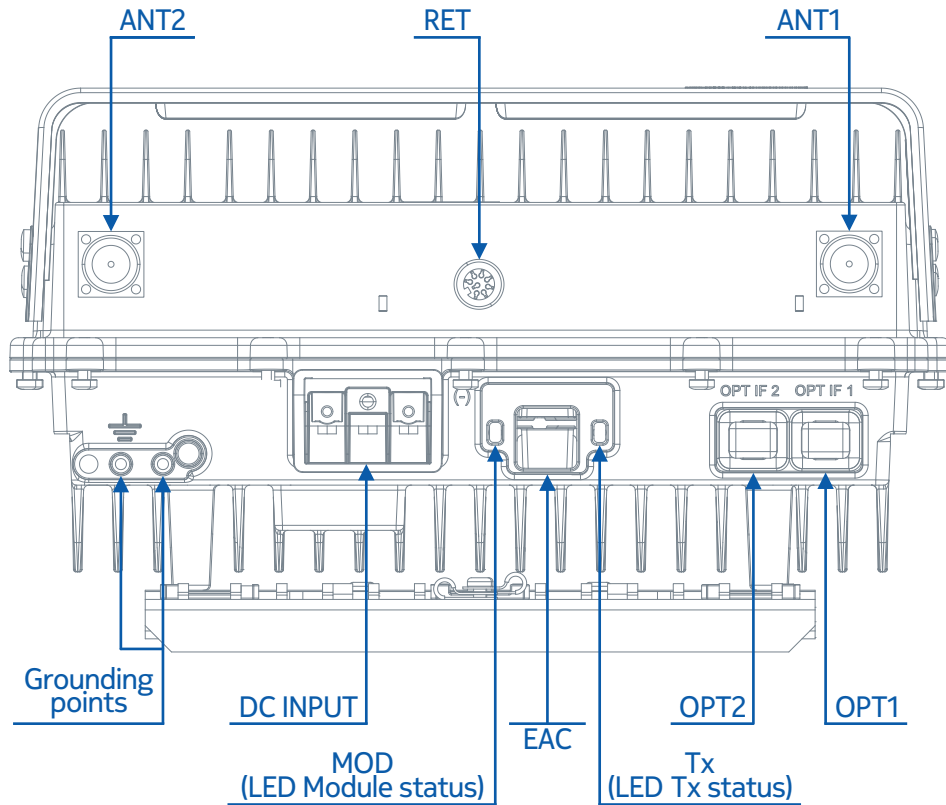


Table 365 FHEA interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	3-pole screw terminal	-
Antenna connector	ANT	2	7/16	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	RJ45	-
Optical interface	OPT	2	SFP	3 Gbps
Local Management Port	LMP	1	2x15 pin header	-

**Antenna Line Devices (ALDs) support**

Table 366 FHEA ALD support

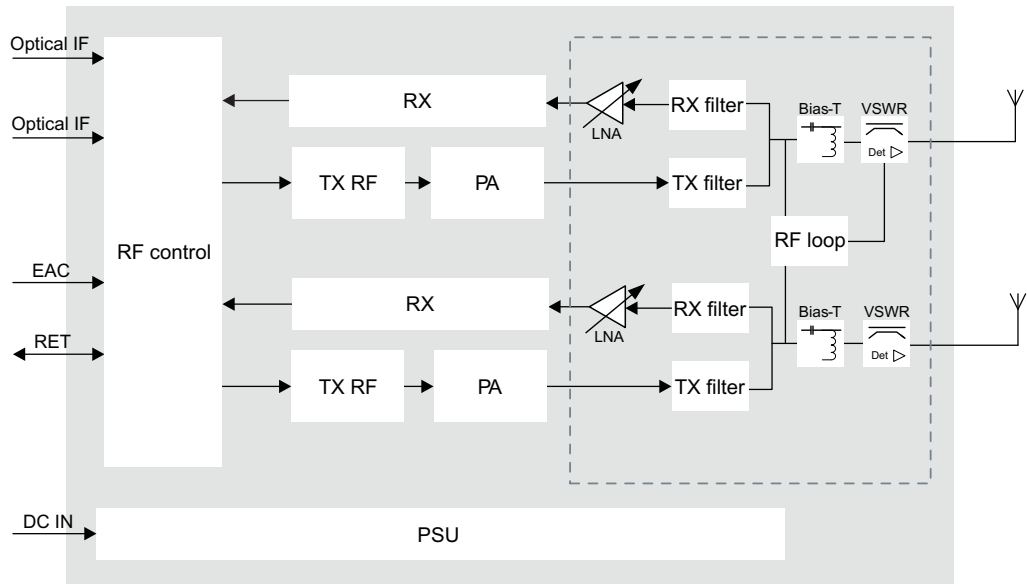
ALD support via antenna ports	Value
AISG	ANT1, ANT2, RET: AISG 2.0
Proprietary AISG 1.1	No
CWA (for non-AISG installations)	No
Voltage	ANT1, ANT2: 14.5 V

Table 366 FHEA ALD support (Cont.)

ALD support via antenna ports	Value
	RET: 14.5 V
Power per port	30 W

**Functional block diagram**

Figure 83 FHEA functional block diagram



**Electrical specifications**

Table 367 FHEA 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**

Table 368 FHEA power consumption

Number of TXs	RF output power per TX [W]	Estimated power consumption [W] at 48VDC input at 23°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin	
		50% RF Load	100% RF Load
2	40	303	397
	20	225	275

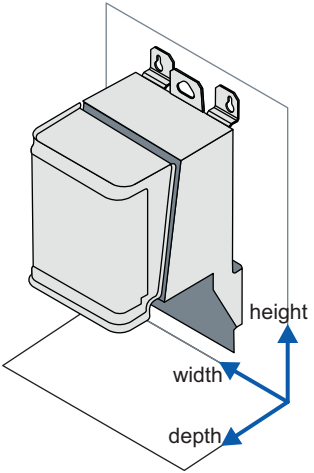
**Installation and mechanical specifications**

**Table 369** FHEA installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• pole/wall installation</li> <li>• directly on the wall installation</li> </ul>
IP rating	IP65
Related optional items	<ul style="list-style-type: none"> <li>• Flexi Pole Mounting Kit (FPKA/C)</li> </ul>

**Dimensions and weight**

**Table 370** FHEA dimensions and weight

Property	Value	Dimensions orientation
Height	As delivered, cable tie point recessed: 579 mm (22.7 in.) As installed, cable tie point released due to brackets and solar shields: 733 mm (28.8 in.)	
Depth	215 mm (8.4 in.)	
Width	358 mm (14.1 in.)	
Weight	20 kg (44.0 lb)	
Volume	25 l	

**Environmental specifications**

**Table 371** FHEA environmental specifications

Property	Value
Maximum operational outdoor temperature in the shade (at constant high ambient temperature, maximum output power might be limited)	+55°C (131°F)
Maximum operational outdoor temperature in the sun (according to GR-487-Core specification)	+50°C (122°F)
Maximum indoor temperature (this is valid for fanless products)	+45°C (113°F)
Minimum operational temperature (including cold start)	-40°C (-40°F)

**LEDs**

Table 372 FHEA LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Critical alarm affecting fans</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm

**Warnings, cautions or notes related to the product**



**NOTICE:** The RRH should always be mounted in a vertical orientation with connectors on the bottom side to ensure proper cooling.



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

## 11.5 Flexi Remote Radio Head 2TX 2100 (FRGQ)

*FRGQ technical specifications.*

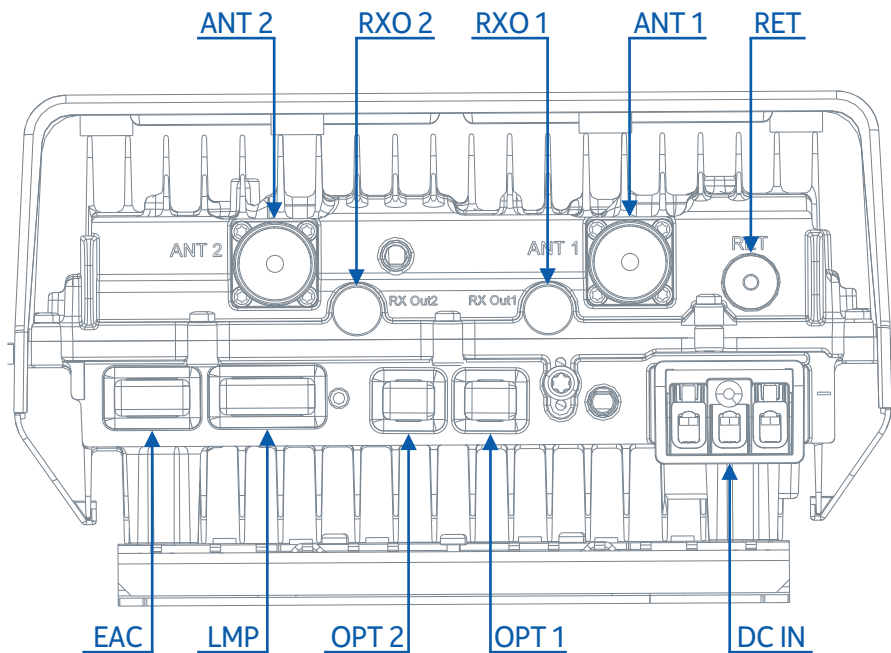
### Functional description

Table 373 FRGQ functional specification

Property	Value
Output power	2x40 W
MIMO	2TX
Outdoor installation	Yes
SW supported technologies	WCDMA, FDD-LTE
TX frequency range	2110-2170 MHz
RX frequency range	1920-1980 MHz
DL instantaneous bandwidth	20 MHz
UL instantaneous bandwidth	60 MHz
DL filter bandwidth	60 MHz
UL filter bandwidth	60 MHz

### Interfaces

Figure 84 FRGQ interfaces



*Table 374* FRGQ interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	3-pole screw terminal	-
Antenna connector	ANT	2	7/16	-
RF external connector	Rx EXT	2	QMA	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	D-sub MDR14	-
Optical interface	OPT	2	SFP	3 Gbps
Local Management Port	LMP	1	2x15 pin header	-

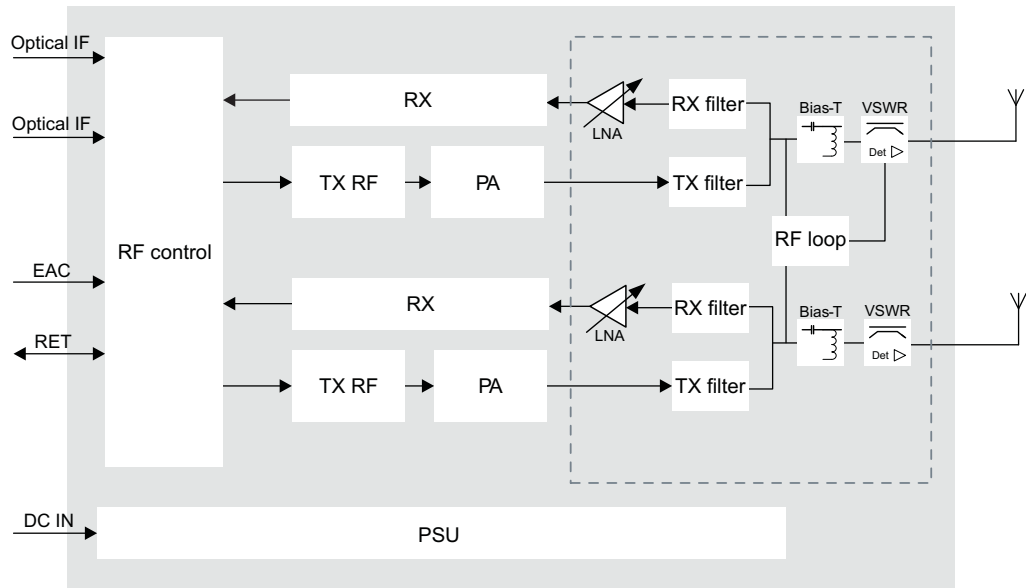
**Antenna Line Devices (ALDs) support**

*Table 375* FRGQ ALD support

ALD support via antenna ports	Value
AISG	ANT1, ANT2, RET: AISG 2.0
Proprietary AISG 1.1	No
CWA (for non-AISG installations)	No
Voltage	ANT1, ANT2: 14.5 V RET: 14.5 V
Power per port	30 W

**Functional block diagram**

Figure 85 FRGQ functional block diagram



**Electrical specifications**

Table 376 FRGQ 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**

Table 377 FRGQ power consumption

Number of TXs	RF output power per TX [W]	Estimated power consumption [W] at 48VDC input at 23°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin	
		50% RF Load	100% RF Load
2	40	292	382
	30	265	334
	20	212	259

**Installation and mechanical specifications**

Table 378 FRGQ installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>pole/wall installation</li> <li>directly on the wall installation</li> </ul>

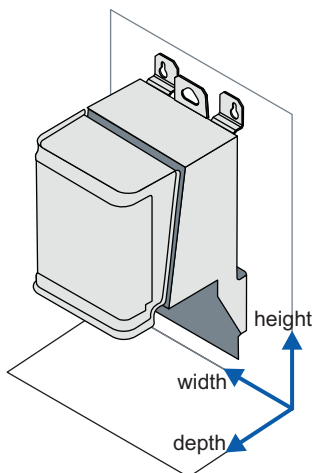


**Table 378** FRGQ installation and mechanical specifications (Cont.)

Property	Value
IP rating	IP65
Related optional items	<ul style="list-style-type: none"> <li>Flexi Pole Mounting Kit (FPKA/C)</li> </ul>

**Dimensions and weight**

**Table 379** FRGQ dimensions and weight

Property	Value	Dimensions orientation
Height	486 mm (19.1 in.)	 <p>The diagram shows a 3D perspective view of the FRGQ unit. Three blue arrows indicate the dimensions: 'height' points upwards from the base to the top, 'width' points from the front face to the back face, and 'depth' points from the top surface to the bottom surface.</p>
Depth	155 mm (6.1 in.)	
Width	324 mm (12.8 in.)	
Weight	17 kg (37.5 lb)	
Volume	21 l	

**Environmental specifications**

**Table 380** FRGQ environmental specifications

Property	Value
Maximum operational outdoor temperature in the shade (at constant high ambient temperature, maximum output power might be limited)	+55°C (131°F)
Maximum operational outdoor temperature in the sun (according to GR-487-Core specification)	+50°C (122°F)
Maximum indoor temperature (this is valid for fanless products)	+45°C (113°F)
Minimum operational temperature (including cold start)	-40°C (-40°F)

**LEDs**

Table 381 FRGQ LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Critical alarm affecting fans</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm

**Warnings, cautions or notes related to the product**



**NOTICE:** The RRH should always be mounted in a vertical orientation with connectors on the bottom side to ensure proper cooling.



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

## 11.6 Flexi Remote Radio Head 2TX 2600 (FRHB)

*FRHB technical specifications.*

### Functional description

Table 382 FRHB functional specification

Property	Value
Output power	2x40 W
MIMO	2TX
Outdoor installation	Yes
SW supported technology	FDD-LTE
TX frequency range	2620-2690 MHz
RX frequency range	2500-2570 MHz
DL instantaneous bandwidth	20 MHz
UL instantaneous bandwidth	20 MHz
DL filter bandwidth	70 MHz
UL filter bandwidth	70 MHz

### Interfaces

Figure 86 FRHB interfaces

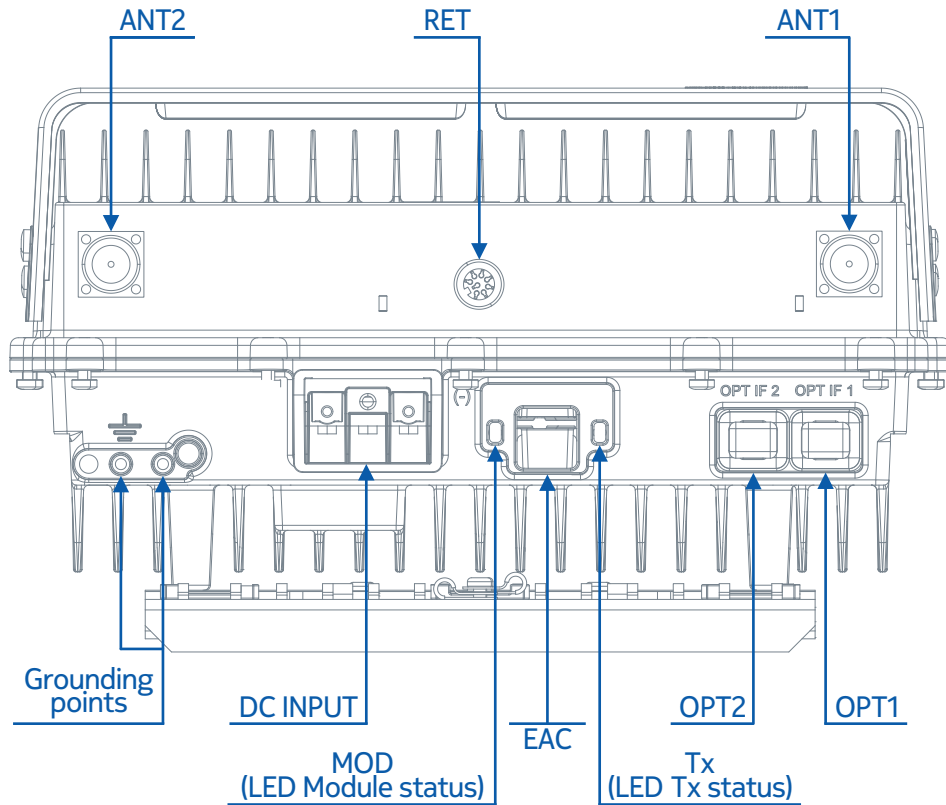


Table 383 FRHB interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	3-pole screw terminal	-
Antenna connector	ANT	2	7/16	-
RF external connector	Rx EXT	2	SMA	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	D-sub MDR14	-
Optical interface	OPT	2	SFP	3 Gbps
Local Management Port	LMP	1	2x15 pin header	-

**Antenna Line Devices (ALDs) support**

Table 384 FRHB ALD support

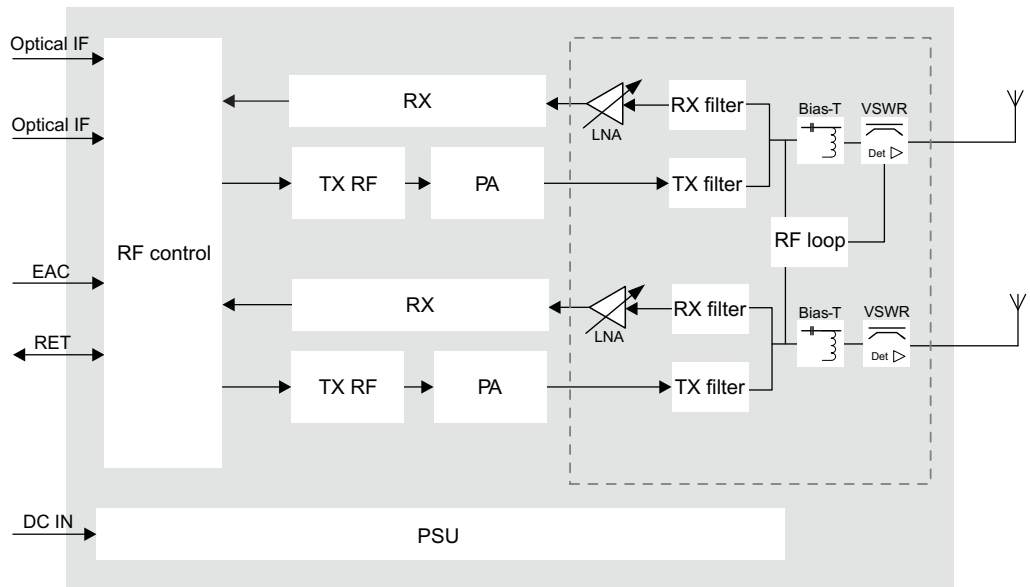
ALD support via antenna ports	Value
AISG	ANT1, RET: AISG 2.0
Proprietary AISG 1.1	No

Table 384 FRHB ALD support (Cont.)

ALD support via antenna ports	Value
CWA (for non-AISG installations)	No
Voltage	ANT1: 14.5 V RET: 14.5 V
Power per port	30 W

**Functional block diagram**

Figure 87 FRHB functional block diagram



**Electrical specifications**

Table 385 FRHB 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**

Table 386 FRHB power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h		
			Power consumption ETSI 202706 average load $P_{RRH, static}$	Power consumption ETSI 202706 busy hour load $P_{BH, RRH, static}$	Power consumption 100% RF power load $P_{100\% RRH}$
LTE	1/1/1 2T2R	20+20	597	687	873
	1/1/1 2T2R	40+40	797	945	1263

**Installation and mechanical specifications**

Table 387 FRHB installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• pole/wall installation</li> <li>• directly on the wall installation</li> </ul>
IP rating	IP65
Related optional items	<ul style="list-style-type: none"> <li>• Flexi Pole Mounting Kit (FPKA/C)</li> </ul>

**Dimensions and weight**

Table 388 FRHB dimensions and weight

Property	Value	Dimensions orientation
Height	514 mm (20.3 in.)	
Depth	148 mm (5.8 in.)	
Width	326 mm (12.8 in.)	
Weight	Without solar shield and mounting shroud: 17.3 kg (38.1 lb)	
Volume	20 l	

**Environmental specifications**

**Table 389** FRHB environmental specifications

Property	Value
Maximum operational outdoor temperature in the shade (at constant high ambient temperature, maximum output power might be limited)	+55°C (131°F)
Maximum operational outdoor temperature in the sun (according to GR-487-Core specification)	+50°C (122°F)
Maximum indoor temperature (this is valid for fanless products)	+45°C (113°F)
Minimum operational temperature (including cold start)	-40°C (-40°F)

**LEDs**

**Table 390** FRHB LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Critical alarm affecting fans</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	No alarm
Green, blinking	Software downloading and updating	No alarm

Table 390 FRHB LEDs (Cont.)

LED color	Description	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm

**Warnings, cautions or notes related to the product**



**NOTICE:** The RRH should always be mounted in a vertical orientation with connectors on the bottom side to ensure proper cooling.



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

## 11.7 Flexi Remote Radio Head 2TX 800EU (FRMB)

*FRMB technical specifications.*

**Functional description**

Table 391 FRMB functional specification

Property	Value
Output power	2x40 W
MIMO	2TX
Outdoor installation	Yes
SW supported technology	FDD-LTE
TX frequency range	791-821 MHz
RX frequency range	832-862 MHz
DL instantaneous bandwidth	20 MHz
UL instantaneous bandwidth	20 MHz
DL filter bandwidth	30 MHz
UL filter bandwidth	30 MHz

**Interfaces**



Figure 88 FRMB interfaces

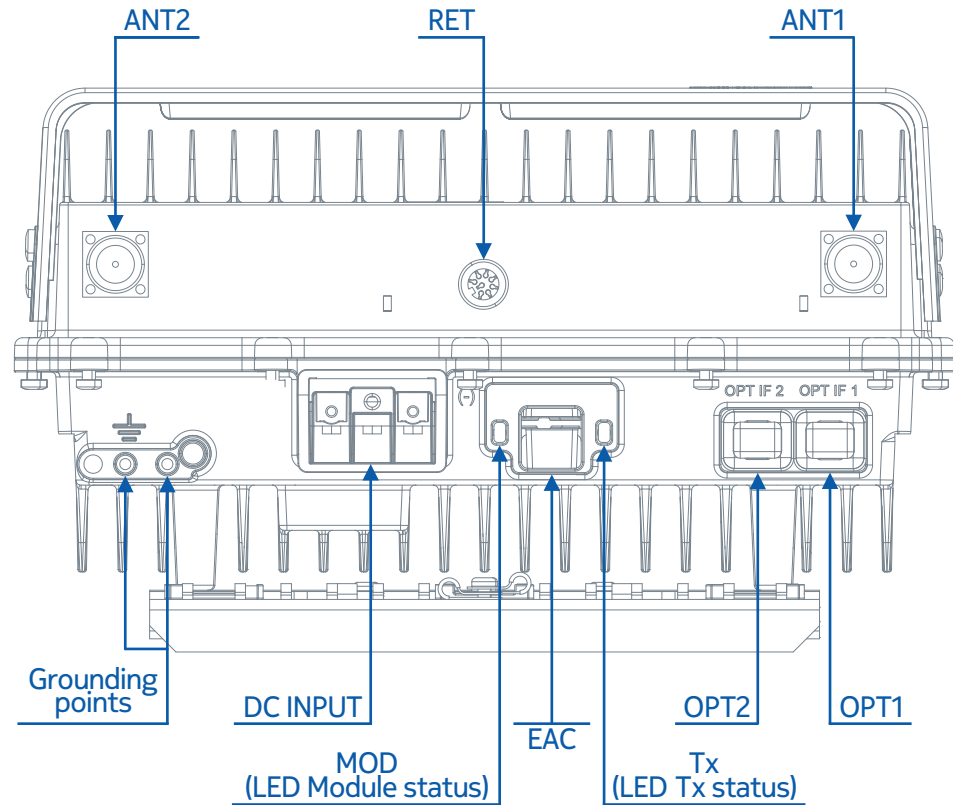


Table 392 FRMB interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	3-pole screw terminal	-
Antenna connector	ANT	2	7/16	-
RF external connector	Rx EXT	2	SMA	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	D-sub MDR14	-
Optical interface	OPT	2	SFP	3 Gbps
Local Management Port	LMP	1	2x15 pin header	-

**Antenna Line Devices (ALDs) support**

Table 393 FRMB ALD support

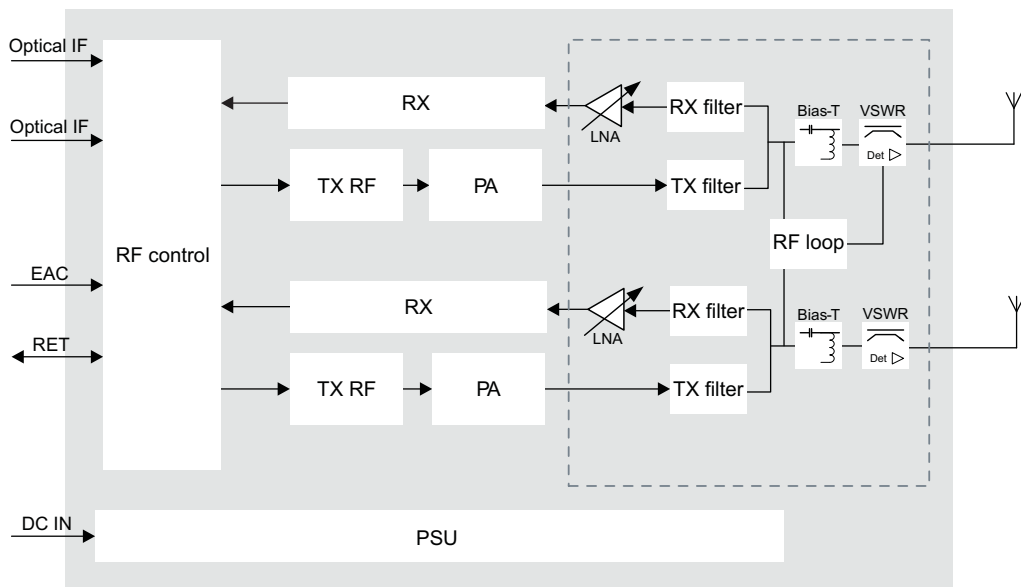
ALD support via antenna ports	Value
AISG	ANT1, RET: AISG 2.0
Proprietary AISG 1.1	No

Table 393 FRMB ALD support (Cont.)

ALD support via antenna ports	Value
CWA (for non-AISG installations)	No
Voltage	ANT1: 14.5 V RET: 14.5 V
Power per port	30 W

**Functional block diagram**

Figure 89 FRMB functional block diagram



**Electrical specifications**

Table 394 FRMB 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**

Table 395 FRMB power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h		
			Power consumption ETSI 202706 average load $P_{RRH, static}$	Power consumption ETSI 202706 busy hour load $P_{BH, RRH, static}$	Power consumption 100% RF power load $P_{100\% RRH}$
LTE	1/1/1 2T2R	20+20	486	549	667
	1/1/1 2T2R	40+40	750	896	1170

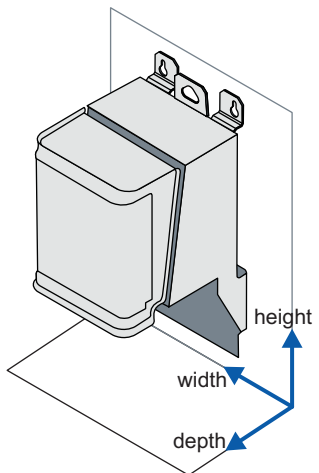
**Installation and mechanical specifications**

Table 396 FRMB installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• pole/wall installation</li> <li>• directly on the wall installation</li> </ul>
IP rating	IP65
Related optional items	<ul style="list-style-type: none"> <li>• Flexi Pole Mounting Kit (FPKA/C)</li> </ul>

**Dimensions and weight**

Table 397 FRMB dimensions and weight

Property	Value	Dimensions orientation
Height	514 mm (20.3 in.)	
Depth	148 mm (5.8 in.)	
Width	326 mm (12.8 in.)	
Weight	Without solar shield and mounting shroud: 17.3 kg (38.1 lb)	
Volume	21 l	

**Environmental specifications**

**Table 398** FRMB environmental specifications

Property	Value
Maximum operational outdoor temperature in the shade (at constant high ambient temperature, maximum output power might be limited)	+55°C (131°F)
Maximum operational outdoor temperature in the sun (according to GR-487-Core specification)	+50°C (122°F)
Maximum indoor temperature (this is valid for fanless products)	+45°C (113°F)
Minimum operational temperature (including cold start)	-40°C (-40°F)

**LEDs**

**Table 399** FRMB LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Critical alarm affecting fans</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	No alarm

Table 399 FRMB LEDs (Cont.)

LED color	Description	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm

**Warnings, cautions or notes related to the product**



**NOTICE:** The RRH should always be mounted in a vertical orientation with connectors on the bottom side to ensure proper cooling.



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

## 11.8 Flexi RRH 2-pipe 700/840 100 W (FHPC)

*FHPC technical specifications.*

**Functional description**

Table 400 FHPC functional specification

Property	Value
Output power	B18: 2x30 W, B28: 2x20 W
MIMO	2TX
Outdoor installation	Yes
SW supported technology	FDD-LTE
TX frequency range	B18: 860-875 MHz B28: 773-783 MHz
RX frequency range	B18: 815-830 MHz B28: 718-728 MHz
DL instantaneous bandwidth	B18: 15 MHz B28: 10 MHz
UL instantaneous bandwidth	B18: 15 MHz B28: 10 MHz

Table 400 FHPC functional specification (Cont.)

Property	Value
DL filter bandwidth	B18: 15 MHz B28: 10 MHz
UL filter bandwidth	B18: 15 MHz B28: 10 MHz

**Interfaces**

Figure 90 FHPC interfaces

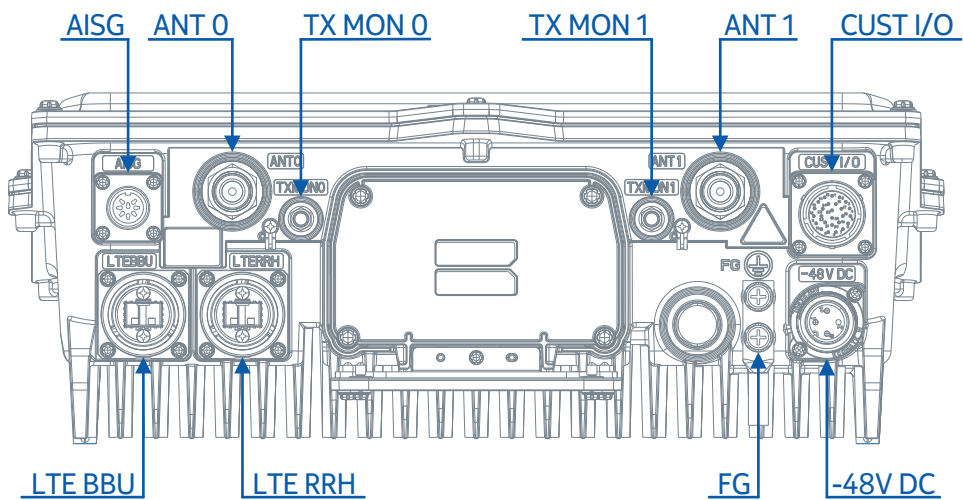


Table 401 FHPC interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	-48V DC	1	Amphenol C016 20C003 100 12	-
Antenna connector	ANT 0 ANT 1	2	N-type	Connection to antenna line
RF external connector	TX MON 0 TX MON 1 RX MON 0 RX MON 1	4	SMA-J	RX MON interfaces are inside of maintenance cover
Antenna Control Interface	AISG	1	DDK AIC-M16R-8SC	-
Optical interface	LTE BBU LTE RRH	2	SFP	CPRI interface to/from FSM CPRI interface to/from RRH 2.4 Gbps

Table 401 FHPC interfaces (Cont.)

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Customer Input/Output Connection	CUST I/O	1	Amphenol PJ02S-21-26P	-
Grounding cable connection	FG	1	M6 blind holes with 16 mm spacing	-
Frequency Reference Output	10 MHz	1	SMA-J	Inside of maintenance cover

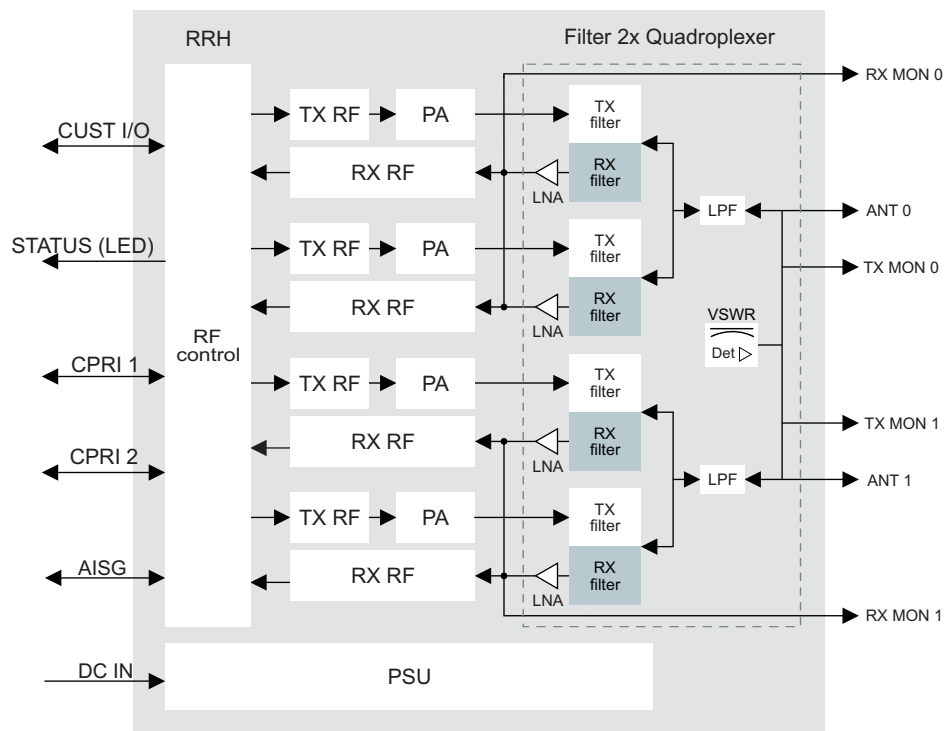
**Antenna Line Devices (ALDs) support**

Table 402 FHPC ALD support

ALD support via antenna ports	Value
AISG	RET: AISG 2.0
Legacy Siemens equipment	No
CWA (for non-AISG installations)	No
Voltage	RET: 27 V
Power per port	30 W

**Functional block diagram**

Figure 91 FHPC functional block diagram



**Electrical specifications**

*Table 403* FHPC electrical specifications

Property	Value
Nominal supply voltage	-48.0 V DC
Nominal input voltage range	-40.0 V DC to -56.0 V DC

**Power consumption**

*Table 404* FHPC power consumption

Number of TXs	RF output power per TX [W]		Estimated power consumption [W] without AISG at 48VDC input at 23°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin	
	700 MHz	800 MHz	50% RF Load	100% RF Load
2	20+20	-	155	220
	-	30+30	199	310
	20+20	30+30	275	455
	20+20	20+20	253	408

**Installation and mechanical specifications**

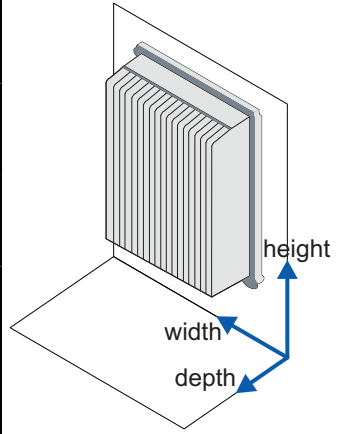
*Table 405* FHPC installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>pole/wall installation</li> <li>directly on the wall installation</li> </ul>
IP rating	IP65
Related optional items	<ul style="list-style-type: none"> <li>Flexi Pole Mounting Kit (FPKA/C)</li> <li>Flexi Pole Mounting Bracket (FMFC)</li> </ul>

**Dimensions and weight**



Table 406 FHPC dimensions and weight

Property	Value	Dimensions orientation
Height	460 mm (18.1 in.)	 <p>The diagram shows a perspective view of the FHPC (Fanless Heat Conduction Plate) with three blue arrows indicating dimensions: 'height' pointing upwards, 'width' pointing to the right, and 'depth' pointing into the page.</p>
Depth	136 mm (5.3 in.)	
Width	350 mm (13.8 in.)	
Weight	19.9 kg (43.9 lb)	
Volume	21.9 l	

**Environmental specifications**

Table 407 FHPC environmental specifications

Property	Value
Maximum operational outdoor temperature in the shade (at constant high ambient temperature, maximum output power might be limited)	+50°C (122°F)
Maximum operational outdoor temperature in the sun	+45°C (113°F)
Maximum indoor temperature (this is valid for fanless products)	+45°C (113°F)
Minimum operational temperature (including cold start)	-30°C (-22°F)

**LEDs**

Table 408 FHPC LEDs (RRH Status)

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm

**Table 408** FHPC LEDs (RRH Status) (Cont.)

LED color	Description	Alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm

**Table 409** FHPC LEDs (TX Status)

LED color	Description	Alarm
Yellow, stable	O&M control is missing	No alarm
Green, stable	Transmission ON	No alarm
Green, blinking	Transmission OFF	No alarm

**Warnings, cautions or notes related to the product**



**NOTICE:** The RRH should always be mounted in a vertical orientation with connectors on the bottom side to ensure proper cooling.



**Note:** The minimum startup voltage is 40.0 V DC. If the input voltage is below/beyond extended limits, unit might shut down.

## 11.9 Flexi Remote Radio Head 2TX 1800 (FHEB)

*FHEB technical specifications.*

### Functional description

Table 410 FHEB functional specification

Property	Value
Output power	2x60 W
MIMO	2TX
Outdoor installation	Yes
SW supported technologies	GSM, FDD-LTE
TX frequency range	1805-1880 MHz
RX frequency range	1710-1785 MHz
DL instantaneous bandwidth	For WCDMA/LTE when shared with GSM: 35/40 MHz  LTE: 40 MHz
UL instantaneous bandwidth	60 MHz
DL filter bandwidth	75 MHz
UL filter bandwidth	75 MHz

**Interfaces**

Figure 92 FHEB interfaces

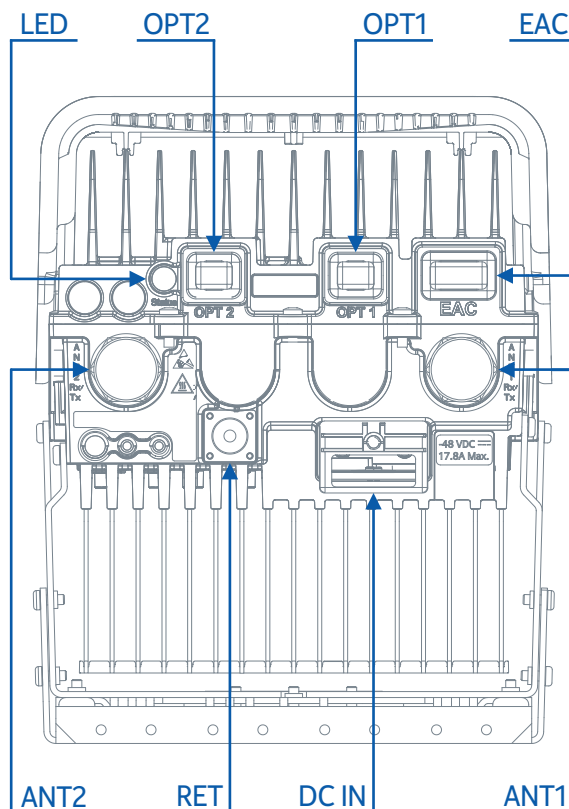


Table 411 FHEB interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	3-pole screw terminal	-
Antenna connector	ANT	2	7/16	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	D-sub MDR14	-
Optical interface	OPT	2	SFP	6 Gbps

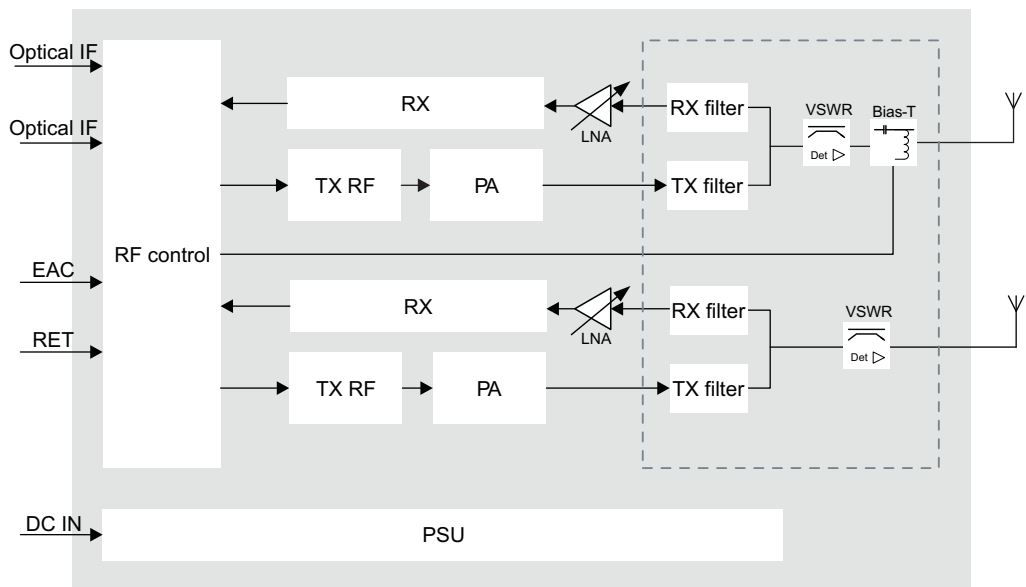
**Antenna Line Devices (ALDs) support**

Table 412 FHEB ALD support

ALD support via antenna ports	Value
AISG	ANT1, RET: AISG 2.0
Proprietary AISG 1.1	No
CWA (for non-AISG installations)	No
Voltage	ANT1: 14.5 V RET: 14.5 V
Power per port	15 W

**Functional block diagram**

Figure 93 FHEB functional block diagram



**Electrical specifications**

Table 413 FHEB 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**

Table 414 FHEB power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h					
			Power consumption ETSI 202706 average load $P_{RRH}$ , static	Power consumption ETSI 202706 busy hour load $P_{BH}$ , static	Power consumption 100% RF power load $P_{100\%}$ , RRH	Power consumption Typical as 25% TCH load, 60% DTX, 4 dB PC	Power consumption Busy as 50% TCH load, 60% DTX, 4 dB PC	Power consumption Max load (2% GoS), 60% DTX, 4 dB PC
GSM	1/1/1	20	538	538	538	538	538	538
	2/2/2	20	547	567	655	546	549	553
	4/4/4	20	884	1019	1267	777	801	829
	8/8/8	15	973	1226	1521			
LTE	1/1/1 2T2R	20+20	553	641	789			
	1/1/1 2T2R	40+40	689	831	1079			
	1/1/1 2T2R	60+60	875	1082	1462			

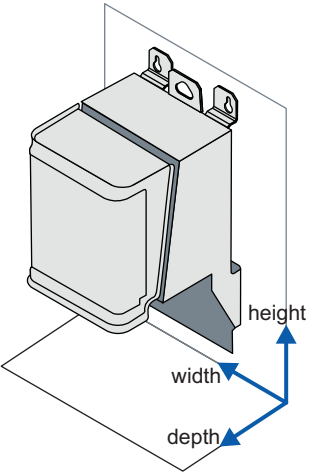
**Installation and mechanical specifications**

Table 415 FHEB installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>pole/wall installation</li> <li>directly on the wall installation</li> </ul>
IP rating	IP65
Related optional items	<ul style="list-style-type: none"> <li>Flexi Pole Mounting Kit (FPKA/C)</li> </ul>

**Dimensions and weight**

*Table 416* FHEB dimensions and weight

Property	HW version	Value	Dimensions orientation
Height	A.101	As delivered, cable tie point recessed: 335.2 mm (13.2 in.)	
	A.102	With lower mounting bracket in the "FMFA" position: 571 mm (22.5 in.) With lower mounting bracket in the alternative "ALT" position: 621 mm (24.4 in.)	
	A.103	As delivered, cable tie point recessed: 425.8 mm (16.8 in.) With upper and lower mounting brackets: 572.1 mm (22.5 in.)	
Depth	A.101	324 mm (12.8 in.)	
	A.102		
	A.103	287 mm (11.3 in.)	
Width	A.101	260 mm (10.2 in.)	
	A.102		
	A.103	256.7 mm (10.1 in.)	
Weight	A.101	17.3 kg (38.1 lb)	
	A.102		
	A.103	16.3 kg (35.9 lb)	
Volume	A.101	21 l	
	A.102		
	A.103	19.1 l	

**Environmental specifications**

*Table 417* FHEB environmental specifications

Property	Value
Maximum operational outdoor temperature in the shade, assuming wind speed is 3 m/s (at constant high ambient temperature, maximum output power might be limited)	+55°C (131°F)
Maximum operational outdoor temperature in the sun, assuming wind speed is 3 m/s	+50°C (122°F)

Table 417 FHEB environmental specifications (Cont.)

Property	Value
Maximum indoor temperature, assuming wind speed is 0 m/s (this is valid for fanless products)	+40°C (104°F)
Minimum operational temperature (including cold start)	-40°C (-40°F)

**LEDs**

Table 418 FHEB LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Critical alarm affecting fans</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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

Table 418 FHEB LEDs (Cont.)

LED color	Description	Alarm
Periodic Red and Green	Antenna line device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm

**Warnings, cautions or notes related to the product**



**NOTICE:** The RRH should always be mounted in a vertical orientation with connectors on the bottom side to ensure proper cooling.



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

## 11.10 Flexi RRH 2-pipe 1800 120 W (FHEF)

*FHEF technical specifications.*

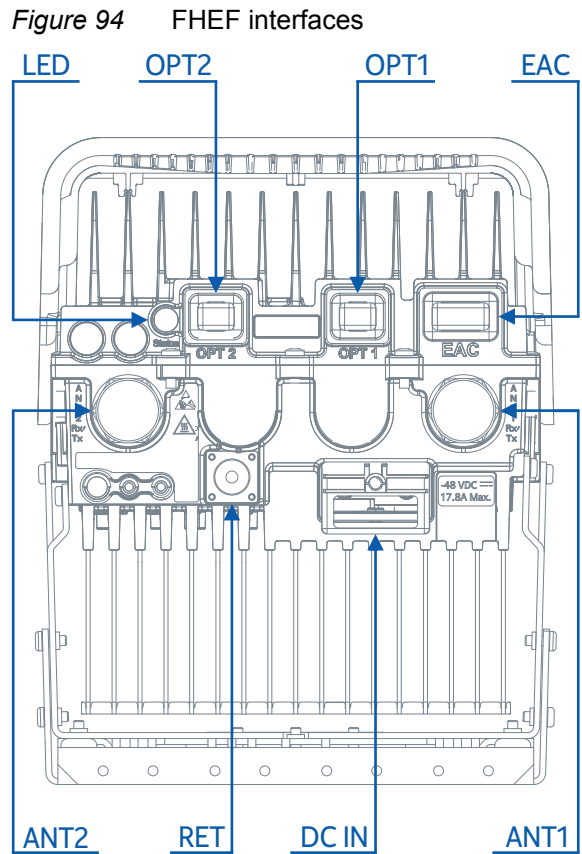
**Functional description**

Table 419 FHEF functional specification

Property	Value
Output power	2x60 W
MIMO	2TX
Outdoor installation	Yes
SW supported technologies	GSM, FDD-LTE
TX frequency range	1805-1860 MHz
RX frequency range	1710-1765 MHz
DL instantaneous bandwidth	For WCDMA/LTE when shared with GSM: 35/40 MHz LTE: 40 MHz
UL instantaneous bandwidth	55 MHz
DL filter bandwidth	55 MHz
UL filter bandwidth	55 MHz

**Interfaces**





**Table 420 FHEF interfaces**

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	3-pole screw terminal	-
Antenna connector	ANT	2	7/16	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	D-sub MDR14	-
Optical interface	OPT	2	SFP	6 Gbps, OBSAI

**Antenna Line Devices (ALDs) support**

**Table 421 FHEF ALD support**

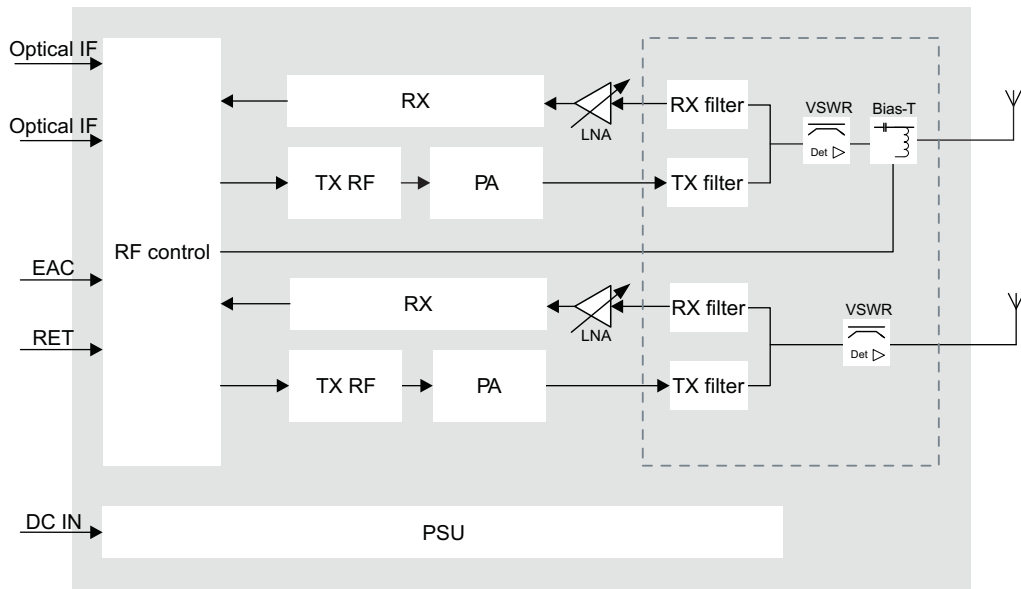
ALD support via antenna ports	Value
AISG	ANT1, RET: AISG 2.0
Proprietary AISG 1.1	No
CWA (for non-AISG installations)	No
Voltage	ANT1: 14.5 V RET: 14.5 V

Table 421 FHEF ALD support (Cont.)

ALD support via antenna ports	Value
Power per port	15 W

**Functional block diagram**

Figure 95 FHEF functional block diagram



**Electrical specifications**

Table 422 FHEF 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**

Table 423 FHEF power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h		
			Power consumption ETSI ES 202706 average load $P_{RRH, static}$	Power consumption ETSI ES 202706 busy hour load $P_{BH, RRH, static}$	Power consumption 100% RF power load $P_{100\% RRH}$
LTE	1/1/1 2T2R	20+20	565	650	801
	1/1/1 2T2R	40+40	703	844	1107
	1/1/1 2T2R	60+60	883	1091	1479

**Installation and mechanical specifications**

Table 424 FHEF installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>pole/wall installation</li> <li>directly on the wall installation</li> </ul>
IP rating	IP65
Related optional items	<ul style="list-style-type: none"> <li>Flexi Pole Mounting Kit (FPKA/C)</li> </ul>

**Dimensions and weight**

Table 425 FHEF dimensions and weight

Property	HW version	Value	Dimensions orientation
Height	A.101	As delivered, cable tie point recessed: 335.2 mm (13.2 in.) With lower mounting bracket in the "FMFA" position: 571 mm (22.5 in.) With lower mounting bracket in the alternative "ALT" position: 621 mm (24.4 in.)	
	A.102	As delivered, cable tie point recessed: 425.8 mm (16.8 in.) With upper and lower mounting brackets: 572.1 mm (22.5 in.)	
Depth	A.101	324 mm (12.8 in.)	

**Table 425** FHEF dimensions and weight (Cont.)

Property	HW version	Value	Dimensions orientation
Width	A.102	287 mm (11.3 in.)	
	A.101	260 mm (10.2 in.)	
	A.102	256.7 mm (10.1 in.)	
Weight	A.101	17.3 kg (38.1 lb)	
	A.102	16.3 kg (35.9 lb)	
Volume	A.101	21 l	
	A.102	19.1 l	

**Environmental specifications**

**Table 426** FHEF environmental specifications

Property	Value
Maximum operational outdoor temperature in the shade, assuming wind speed is 3 m/s (at constant high ambient temperature, maximum output power might be limited)	+55°C (131°F)
Maximum operational outdoor temperature in the sun, assuming wind speed is 3 m/s	+50°C (122°F)
Maximum indoor temperature, assuming wind speed is 0 m/s (this is valid for fanless products)	+40°C (104°F)
Minimum operational temperature (including cold start)	-40°C (-40°F)

**LEDs**

**Table 427** FHEF LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>• Major alarm affecting the whole RF Module</li> <li>• Critical alarm affecting fans</li> <li>• Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>• Until software download begins</li> </ul>	No alarm

Table 427 FHEF LEDs (Cont.)

LED color	Description	Alarm
	<ul style="list-style-type: none"> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm

**Warnings, cautions or notes related to the product**



**NOTICE:** The RRH should always be mounted in a vertical orientation with connectors on the bottom side to ensure proper cooling.



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

## 11.11 Flexi Remote Radio Head 2TX 900 (FHDB)

*FHDB technical specifications.*

**Functional description**

Table 428 FHDB functional specification

Property	Value
Output power	2x60 W

Table 428 FHDB functional specification (Cont.)

Property	Value
MIMO	2TX
Outdoor installation	Yes
SW supported technologies	GSM, WCDMA, FDD-LTE
TX frequency range	925-960 MHz
RX frequency range	880-915 MHz
DL instantaneous bandwidth	35 MHz
UL instantaneous bandwidth	35 MHz
DL filter bandwidth	35 MHz
UL filter bandwidth	35 MHz

**Interfaces**

Figure 96 FHDB interfaces

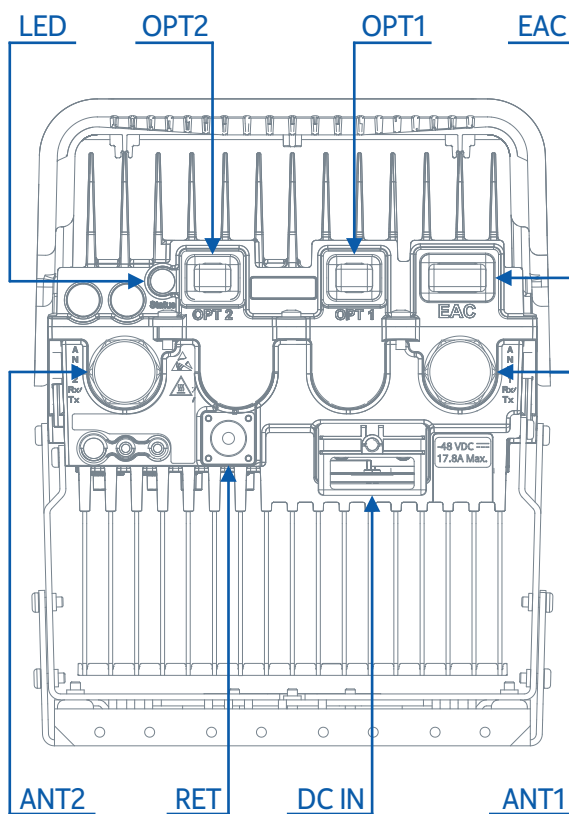


Table 429 FHDB interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	3-pole screw terminal	-
Antenna connector	ANT	2	7/16	-

Table 429 FHDB interfaces (Cont.)

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	D-sub MDR14	-
Optical interface	OPT	2	SFP	6 Gbps

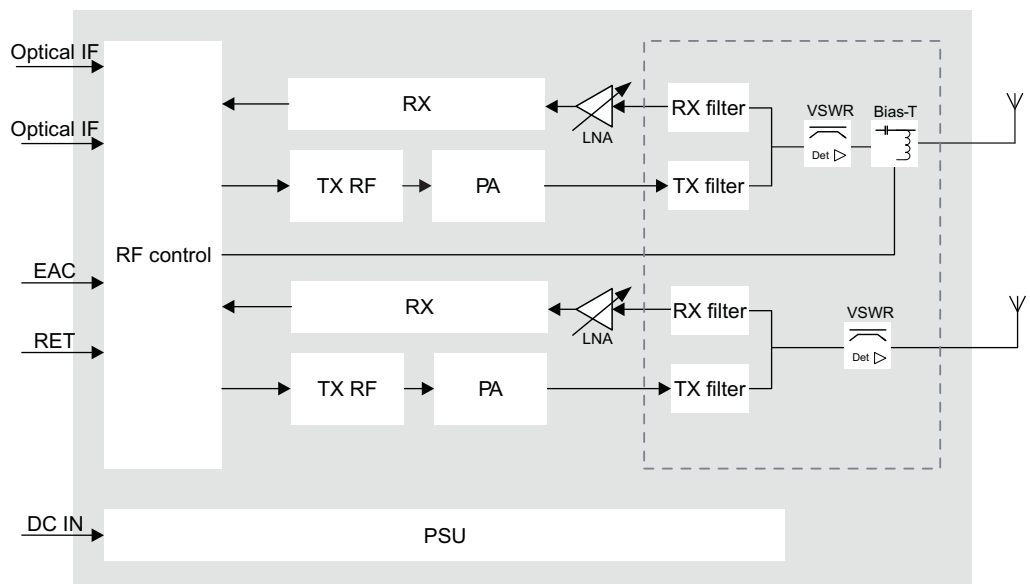
**Antenna Line Devices (ALDs) support**

Table 430 FHDB ALD support

ALD support via antenna ports	Value
AISG	ANT1, RET: AISG 2.0
Proprietary AISG 1.1	No
CWA (for non-AISG installations)	No
Voltage	ANT1: 14.5 V RET: 14.5 V
Power per port	15 W

**Functional block diagram**

Figure 97 FHDB functional block diagram



**Electrical specifications**

Table 431 FHDB 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 431 FHDB electrical specifications (Cont.)

Property	Value
Extended input voltage range	-36.0 V DC to -40.5 V DC -57.0 V DC to -60.0 V DC

**Power consumption**

Table 432 FHDB power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h					
			Power consumption ETSI 202706 average load $P_{RRH,static}$	Power consumption ETSI 202706 busy hour load $P_{BH,RRH,static}$	Power consumption 100% RF power load $P_{100\%RRH}$	Power consumption Typical as 25% TCH load, 60% DTX, 4 dB PC	Power consumption Busy as 50% TCH load, 60% DTX, 4 dB PC	Power consumption Max load (2% GoS), 60% DTX, 4 dB PC
GSM	1/1/1	20	477	477	477	477	477	477
	2/2/2	20	501	521	615	500	503	507
	4/4/4	20	658	823	1115	658	751	779
	8/8/8	15	804	1062	1401			
WCDMA	1/1/1	20	333	363	426			
	2/2/2	20	410	462	578			
	3/3/3	20	490	567	736			
	4/4/4	20	669	783	1026			
LTE	1/1/1	20+20	513	582	720			
	1/1/1	40+40	654	780	1044			
	1/1/1	60+60	830	1024	1422			
MSR	GSM 2/2/2 WCDMA 1/1/1	20 20	633	727	948			
	GSM 4/4/4 WCDMA 1/1/1	20 20	714	874	1258			

**Installation and mechanical specifications**



**Table 433** FHDB installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>pole/wall installation</li> <li>directly on the wall installation</li> </ul>
IP rating	IP65
Related optional items	<ul style="list-style-type: none"> <li>Flexi Pole Mounting Kit (FPKA/C)</li> </ul>

**Dimensions and weight**

**Table 434** FHDB dimensions and weight

Property	HW version	Value	Dimensions orientation
Height	A.101	As delivered, cable tie point recessed: 335.2 mm (13.2 in.)	
	A.102	With lower mounting bracket in the "FMFA" position: 571 mm (22.5 in.)  With lower mounting bracket in the alternative "ALT" position: 621 mm (24.4 in.)	
	A.103	As delivered, cable tie point recessed: 425.8 mm (16.8 in.)  With upper and lower mounting brackets: 572.1 mm (22.5 in.)	
Depth	A.101	324 mm (12.8 in.)	
	A.102		
	A.103	287 mm (11.3 in.)	
Width	A.101	260 mm (10.2 in.)	
	A.102		
	A.103	256.7 mm (10.1 in.)	
Weight	A.101	17.3 kg (38.1 lb)	
	A.102		
	A.103	16.3 kg (35.9 lb)	
Volume	A.101	21 l	
	A.102		
	A.103	19.1 l	

**Environmental specifications**

**Table 435** FHDB environmental specifications

Property	Value
Maximum operational outdoor temperature in the shade, assuming wind speed is 3 m/s (at constant high ambient temperature, maximum output power might be limited)	+55°C (131°F)
Maximum operational outdoor temperature in the sun, assuming wind speed is 3 m/s	+50°C (122°F)
Maximum indoor temperature, assuming wind speed is 0 m/s (this is valid for fanless products)	+40°C (104°F)
Minimum operational temperature (including cold start)	-40°C (-40°F)

**LEDs**

**Table 436** FHDB LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Critical alarm affecting fans</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	No alarm

Table 436 FHDB LEDs (Cont.)

LED color	Description	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm

**Warnings, cautions or notes related to the product**



**NOTICE:** The RRH should always be mounted in a vertical orientation with connectors on the bottom side to ensure proper cooling.



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

## 11.12 Flexi RRH 2-pipe 1800 120 W (FHEG)

*FHEG technical specifications.*

**Functional description**

Table 437 FHEG functional specification

Property	Value
Output power	2x60 W
MIMO	2TX
Outdoor installation	Yes
SW supported technology	FDD-LTE
TX frequency range	1850-1880 MHz
RX frequency range	1755-1785 MHz
DL instantaneous bandwidth	30 MHz
UL instantaneous bandwidth	30 MHz
DL filter bandwidth	30 MHz
UL filter bandwidth	30 MHz

**Interfaces**

Figure 98 FHEG interfaces

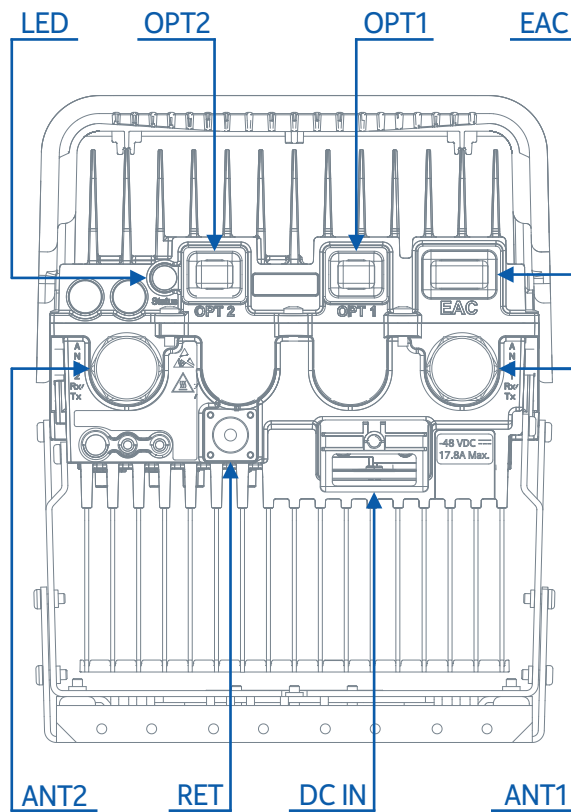


Table 438 FHEG interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	3-pole screw terminal	-
Antenna connector	ANT	2	7/16	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	D-sub MDR14	-
Optical interface	OPT	2	SFP	6 Gbps, OBSAI

**Antenna Line Devices (ALDs) support**

Table 439 FHEG ALD support

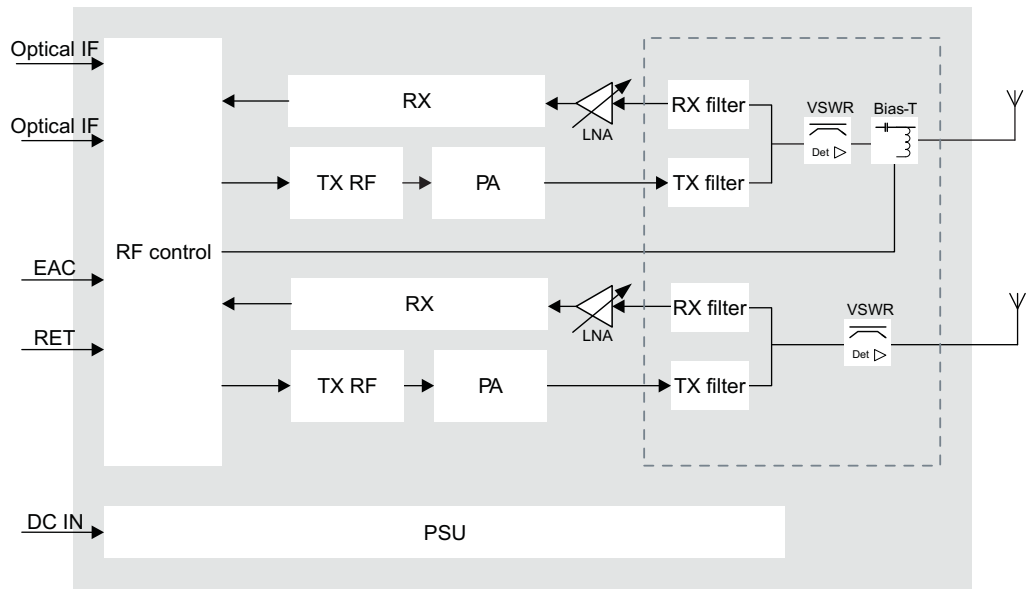
ALD support via antenna ports	Value
AISG	ANT1, RET: AISG 2.0
Proprietary AISG 1.1	No
CWA (for non-AISG installations)	No
Voltage	ANT1: 14.5 V RET: 14.5 V

Table 439 FHEG ALD support (Cont.)

ALD support via antenna ports	Value
Power per port	15 W

**Functional block diagram**

Figure 99 FHEG functional block diagram



**Electrical specifications**

Table 440 FHEG 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**

Table 441 FHEG power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h		
			Power consumption ETSI 202706 average load $P_{RRH, static}$	Power consumption ETSI 202706 busy hour load $P_{BH, RRH, static}$	Power consumption 100% RF power load $P_{100\% RRH}$
LTE	1/1/1 2T2R	20+20	563	663	846
	1/1/1 2T2R	40+40	718	887	1193
	1/1/1 2T2R	60+60	915	1161	1619

**Installation and mechanical specifications**

Table 442 FHEG installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• pole/wall installation</li> <li>• directly on the wall installation</li> </ul>
IP rating	IP65
Related optional items	<ul style="list-style-type: none"> <li>• Flexi Pole Mounting Kit (FPKA/C)</li> </ul>

**Dimensions and weight**

Table 443 FHEG dimensions and weight

Property	HW version	Value	Dimensions orientation
Height	A.101	version As delivered, cable tie point recessed: 335.2 mm (13.2 in.) With lower mounting bracket in the "FMFA" position: 571 mm (22.5 in.) With lower mounting bracket in the alternative "ALT" position: 621 mm (24.4 in.)	
	A.102	As delivered, cable tie point recessed: 425.8 mm (16.8 in.) With upper and lower mounting brackets: 572.1 mm (22.5 in.)	
Depth	A.101	324 mm (12.8 in.)	

Table 443 FHEG dimensions and weight (Cont.)

Property	HW version	Value	Dimensions orientation
Width	A.102	287 mm (11.3 in.)	
	A.101	260 mm (10.2 in.)	
	A.102	256.7 mm (10.1 in.)	
Weight	A.101	17.3 kg (38.1 lb)	
	A.102	16.3 kg (35.9 lb)	
Volume	A.101	21 l	
	A.102	19.1 l	

**Environmental specifications**

Table 444 FHEG environmental specifications

Property	Value
Maximum operational outdoor temperature in the shade, assuming wind speed is 3 m/s (at constant high ambient temperature, maximum output power might be limited)	+55°C (131°F)
Maximum operational outdoor temperature in the sun, assuming wind speed is 3 m/s	+50°C (122°F)
Maximum indoor temperature, assuming wind speed is 0 m/s (this is valid for fanless products)	+40°C (104°F)
Minimum operational temperature (including cold start)	-40°C (-40°F)

**LEDs**

Table 445 FHEG LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Critical alarm affecting fans</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> </ul>	No alarm

Table 445 FHEG LEDs (Cont.)

LED color	Description	Alarm
	<ul style="list-style-type: none"> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm

**Warnings, cautions or notes related to the product**



**NOTICE:** The RRH should always be mounted in a vertical orientation with connectors on the bottom side to ensure proper cooling.



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



## 12 Descriptions of 4TX RRHs

### 12.1 Flexi Remote Radio Head 4TX 1700/2100 (FRIG)

*FRIG technical specifications.*

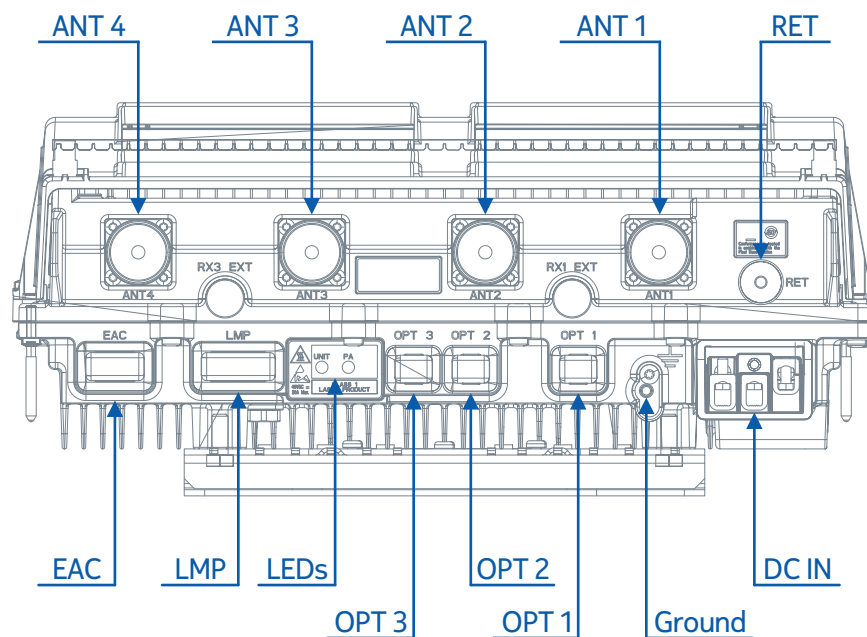
#### Functional description

Table 446 FRIG functional specification

Property	Value
Output power	4x30 W/2x60 W
MIMO	4TX
Outdoor installation	Yes
SW supported technology	FDD-LTE
TX frequency range	2110-2155 MHz
RX frequency range	1710-1755 MHz
DL instantaneous bandwidth	45 MHz
UL instantaneous bandwidth	45 MHz
DL filter bandwidth	45 MHz
UL filter bandwidth	45 MHz

#### Interfaces

Figure 100 FRIG interfaces



*Table 447* FRIG interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	3-pole screw terminal	-
Antenna connector	ANT	4	7/16	-
RF external connector	Rx EXT	2	QMA	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	D-sub MDR14	-
Optical interface	OPT	3	SFP	6 Gbps
Local Management Port	LMP	1	2x15 pin header	-

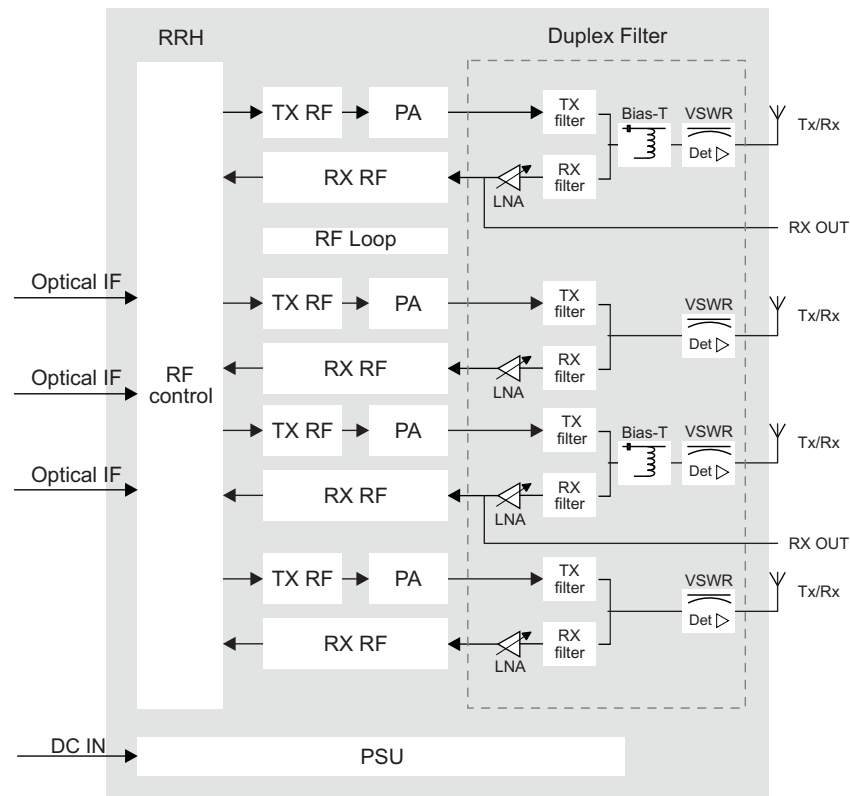
**Antenna Line Devices (ALDs) support**

*Table 448* FRIG ALD support

ALD support via antenna ports	Value
AISG	ANT1, ANT3, RET: AISG 2.0
Proprietary AISG 1.1	No
CWA (for non-AISG installations)	No
Voltage	ANT1, ANT3: 15.5 V RET: 15.5 V
Power per port	30 W

**Functional block diagram**

Figure 101 FRIG functional block diagram



**Electrical specifications**

Table 449 FRIG 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**

Table 450 FRIG power consumption

Number of TXs	RF output power per TX [W]	Estimated power consumption [W] at 48VDC input at 23°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin	
		50% RF Load	100% RF Load
4	30	479	673
	20	417	533
	10	355	415
2	60	394	595

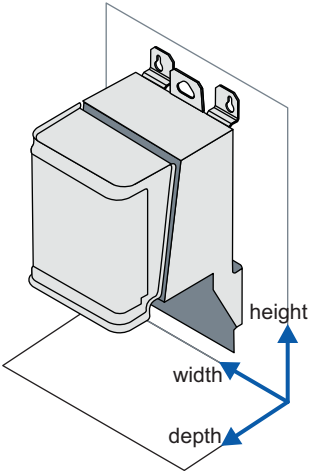
**Installation and mechanical specifications**

**Table 451** FRIG installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• pole/wall installation</li> <li>• directly on the wall installation</li> </ul>
IP rating	IP65
Related optional items	<ul style="list-style-type: none"> <li>• Flexi Pole Mounting Kit (FPKA/C)</li> </ul>

**Dimensions and weight**

**Table 452** FRIG dimensions and weight

Property	Value	Dimensions orientation
Height	459.5 mm (18.1 in.)	
Depth	2x60 W version: 133.4 mm (5.2 in.) 4x30 W version: 162.3 mm (6.4 in.)	
Width	400 mm (15.7 in.)	
Weight	23.7 kg (52.5 lb)	
Volume	26 l	

**Environmental specifications**

**Table 453** FRIG environmental specifications

Property	Value
Maximum operational outdoor temperature in the shade (at constant high ambient temperature, maximum output power might be limited)	+55°C (131°F)
Maximum operational outdoor temperature in the sun (according to GR-487-Core specification)	+50°C (122°F)
Maximum indoor temperature (this is valid for fanless products)	+45°C (113°F)
Minimum operational temperature (including cold start)	-40°C (-40°F)

**LEDs**

Table 454 FRIG LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Critical alarm affecting fans</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm

**Warnings, cautions or notes related to the product**



**NOTICE:** The RRH should always be mounted in a vertical orientation with connectors on the bottom side to ensure proper cooling.



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

## 12.2 Flexi RRH 4-pipe 2100 120 W (FHGB)

*FHGB technical specifications.*

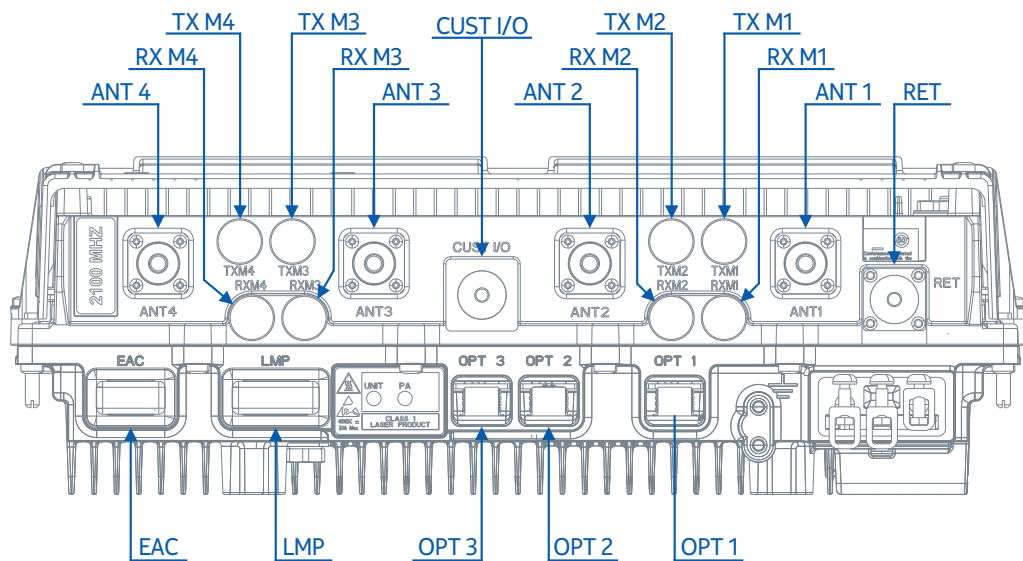
### Functional description

Table 455 FHGB functional specification

Property	Value
Output power	4x30 W/2x60 W
MIMO	4TX
Outdoor installation	Yes
SW supported technology	FDD-LTE
TX frequency range	2110-2130 MHz
RX frequency range	1920-1940 MHz
DL instantaneous bandwidth	20 MHz
UL instantaneous bandwidth	20 MHz
DL filter bandwidth	20 MHz
UL filter bandwidth	20 MHz

### Interfaces

Figure 102 FHGB interfaces



*Table 456* FHGB interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	3-pole screw terminal	-
Antenna connector	ANT	4	N-type, female	-
RF external connector	RXM TXM	8	QMA	-
Remote Electrical Tilt	RET	1	8-pin circular	RS-485
External Alarm Connection	EAC	1	22-pole circular	-
Optical interface	OPT	3	SFP	6 Gbps, OBSAI
Local Management Port	LMP	1	2x15 pin header	-

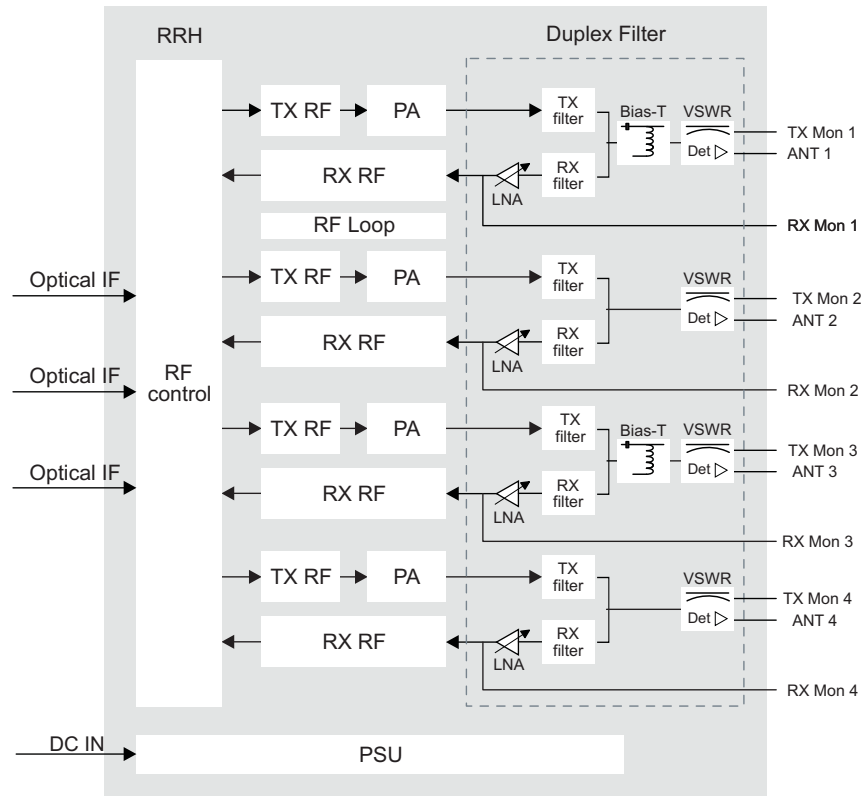
**Antenna Line Devices (ALDs) support**

*Table 457* FHGB ALD support

ALD support via antenna ports	Value
AISG	ANT1, ANT3, RET: AISG 2.0
Legacy Siemens equipment	No
CWA (for non-AISG installations)	No
Voltage	ANT1, ANT3: 27 V RET: 27 V
Power per port	30 W

**Functional block diagram**

Figure 103 FHGB functional block diagram



**Electrical specifications**

Table 458 FHGB 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**



Table 459 FHGB power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h		
			Power consumption ETSI 202706 average load $P_{RRH, static}$	Power consumption ETSI 202706 busy hour load $P_{BH, RRH, static}$	Power consumption 100% RF power load $P_{100\% RRH}$
LTE	1/1/1 2T2R	2x20	676	744	904
	1/1/1 2T2R	2x30	758	859	1098
	1/1/1 2T2R	2x40	880	1010	1355
	1/1/1 2T2R	2x60	990	1185	1790
	1/1/1 4T4R	4x20	1055	1199	1523
	1/1/1 4T4R	4x30	1222	1434	1990

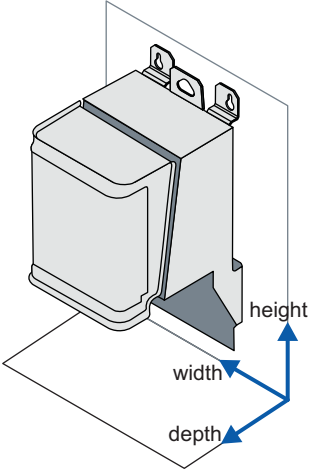
**Installation and mechanical specifications**

Table 460 FHGB installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>pole/wall installation</li> <li>directly on the wall installation</li> </ul>
IP rating	IP65
Related optional items	<ul style="list-style-type: none"> <li>Flexi Pole Mounting Kit (FPKA/C)</li> </ul>

**Dimensions and weight**

**Table 461** FHGB dimensions and weight

Property	Value	Dimensions orientation
Height	Including handle and connectors: 564 mm (22.2 in.)	
Depth	133 mm (5.2 in.)	
Width	387 mm (15.2 in.)	
Weight	max. 24 kg (52.9 lb)	
Volume	max. 27 l	

**Environmental specifications**

**Table 462** FHGB environmental specifications

Property	Value
Maximum operational outdoor temperature in the shade (at constant high ambient temperature, maximum output power might be limited)	+55°C (131°F)
Maximum operational outdoor temperature in the sun (according to GR-487-Core specification)	+50°C (122°F)
Maximum indoor temperature (this is valid for fanless products)	+45°C (113°F)
Minimum operational temperature (including cold start)	-35°C (-31°F)

**LEDs**

**Table 463** FHGB LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>• Major alarm affecting the whole RF Module</li> <li>• Critical alarm affecting fans</li> <li>• Major/Critical alarm affecting a module</li> </ul>	Major/critical alarm

Table 463 FHGB LEDs (Cont.)

LED color	Description	Alarm
	subcomponent or antenna carrier	
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm

**Warnings, cautions or notes related to the product**



**NOTICE:** The RRH should always be mounted in a vertical orientation with connectors on the bottom side to ensure proper cooling.



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

## 12.3 Flexi Remote Radio Head 4TX 2600 (FRHD)

*FRHD technical specifications.*

### Functional description

Table 464 FRHD functional specification

Property	Value
Output power	4x30 W
MIMO	4TX
Outdoor installation	Yes
SW supported technology	FDD-LTE
TX frequency range	2640-2690 MHz
RX frequency range	2520-2570 MHz
DL instantaneous bandwidth	40 MHz
UL instantaneous bandwidth	40 MHz
DL filter bandwidth	50 MHz
UL filter bandwidth	50 MHz

Interfaces

Figure 104 FRHD interfaces

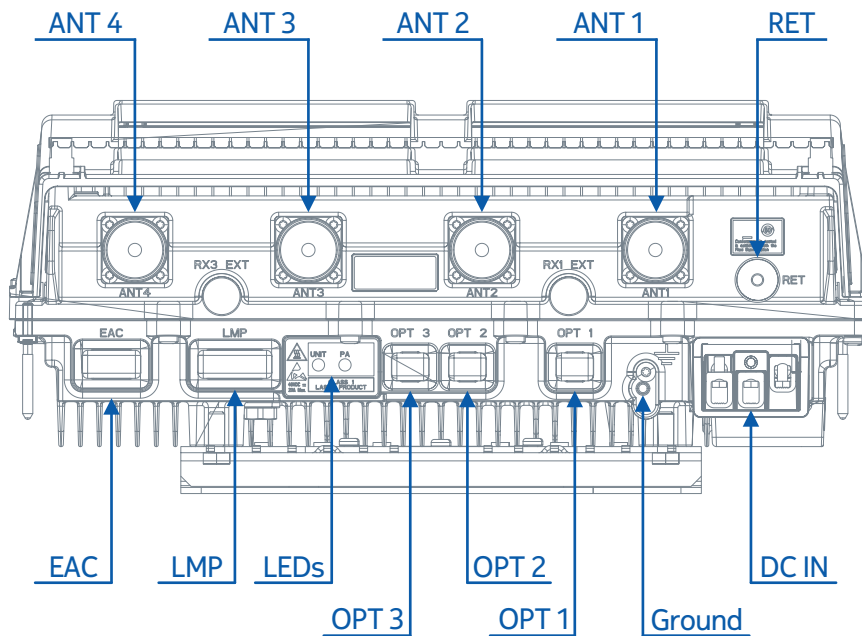


Table 465 FRHD interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	3-pole screw terminal	-
Antenna connector	ANT	4	7/16	-
RF external connector	Rx EXT	2	QMA	-
Remote Electrical Tilt	RET	1	8-pin circular	-

Table 465 FRHD interfaces (Cont.)

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
External Alarm Connection	EAC	1	D-sub MDR14	-
Optical interface	OPT	3	SFP	6 Gbps
Local Management Port	LMP	1	2x15 pin header	-

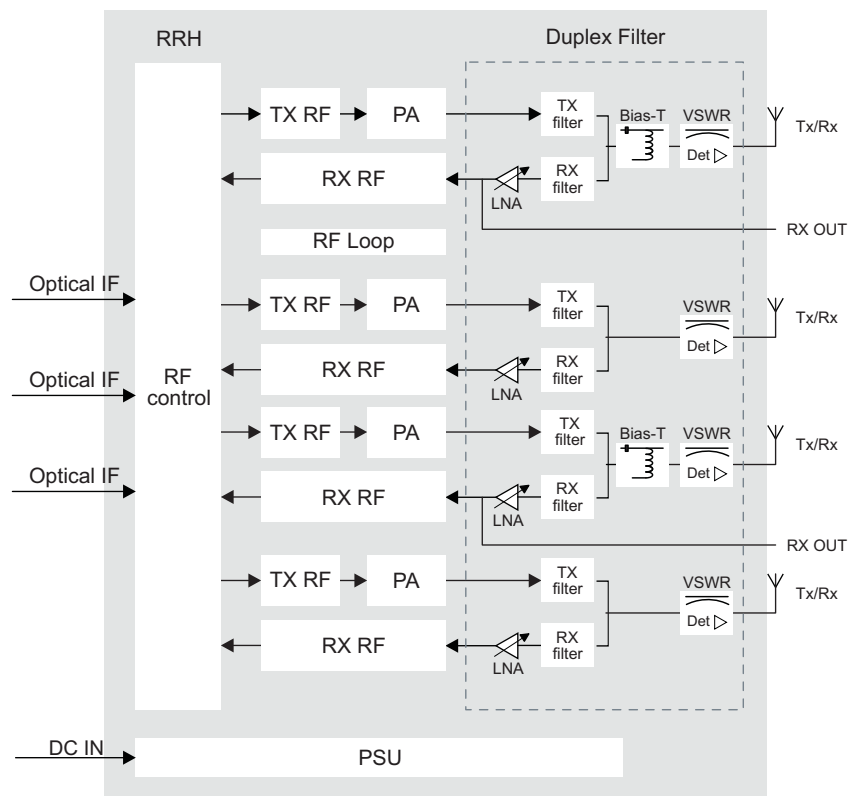
**Antenna Line Devices (ALDs) support**

Table 466 FRHD ALD support

ALD support via antenna ports	Value
AISG	ANT1, ANT3, RET: AISG 2.0
Proprietary AISG 1.1	No
CWA (for non-AISG installations)	No
Voltage	ANT1, ANT3: 15.5 V RET: 15.5 V
Power per port	30 W

**Functional block diagram**

Figure 105 FRHD functional block diagram



**Electrical specifications**

**Table 467** FRHD 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**

**Table 468** FRHD power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h		
			Power consumption ETSI 202706 average load $P_{RRH, static}$	Power consumption ETSI 202706 busy hour load $P_{BH, RRH, static}$	Power consumption 100% RF power load $P_{100\% RRH}$
LTE	1/1/1 2T2R	2x20	661	744	915
	1/1/1 2T2R	2x30	722	840	1095
	1/1/1 4T4R	4x20	1091	1266	1623
	1/1/1 4T4R	4x30	1227	1476	2019

**Installation and mechanical specifications**

**Table 469** FRHD installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>pole/wall installation</li> <li>directly on the wall installation</li> </ul>
IP rating	IP65
Related optional items	<ul style="list-style-type: none"> <li>Flexi Pole Mounting Kit (FPKA/C)</li> </ul>

**Dimensions and weight**

Table 470 FRHD dimensions and weight

Property	Value	Dimensions orientation
Height	578 mm (22.7 in.)	<p>The diagram shows a 3D perspective view of the FRHD. Three blue arrows indicate the dimensions: 'height' points vertically upwards from the base to the top; 'width' points horizontally across the front face; and 'depth' points horizontally from the front face into the back of the device.</p>
Depth	201.5 mm (7.9 in.)	
Width	400 mm (15.7 in.)	
Weight	max. 28.5 kg (62.8 lb)	
Volume	27 l	

**Environmental specifications**

Table 471 FRHD environmental specifications

Property	Value
Maximum operational outdoor temperature in the shade (at constant high ambient temperature, maximum output power might be limited)	+55°C (131°F)
Maximum operational outdoor temperature in the sun (according to GR-487-Core specification)	+50°C (122°F)
Maximum indoor temperature (this is valid for fanless products)	+45°C (113°F)
Minimum operational temperature (including cold start)	-40°C (-40°F)

**LEDs**

Table 472 FRHD LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Critical alarm affecting fans</li> <li>Major/Critical alarm affecting a module</li> </ul>	Major/critical alarm

Table 472 FRHD LEDs (Cont.)

LED color	Description	Alarm
	subcomponent or antenna carrier	
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm

**Warnings, cautions or notes related to the product**



**NOTICE:** The RRH should always be mounted in a vertical orientation with connectors on the bottom side to ensure proper cooling.



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

## 12.4 Flexi Remote Radio Head 4TX 2600 (FRHE)

*FRHE technical specifications.*

### Functional description



Table 473 FRHE functional specification

Property	Value
Output power	4x30 W
MIMO	4TX
Outdoor installation	Yes
SW supported technology	FDD-LTE
TX frequency range	2620-2675 MHz
RX frequency range	2500-2555 MHz
DL instantaneous bandwidth	40 MHz
UL instantaneous bandwidth	40 MHz
DL filter bandwidth	55 MHz
UL filter bandwidth	55 MHz

**Interfaces**

Figure 106 FRHE interfaces

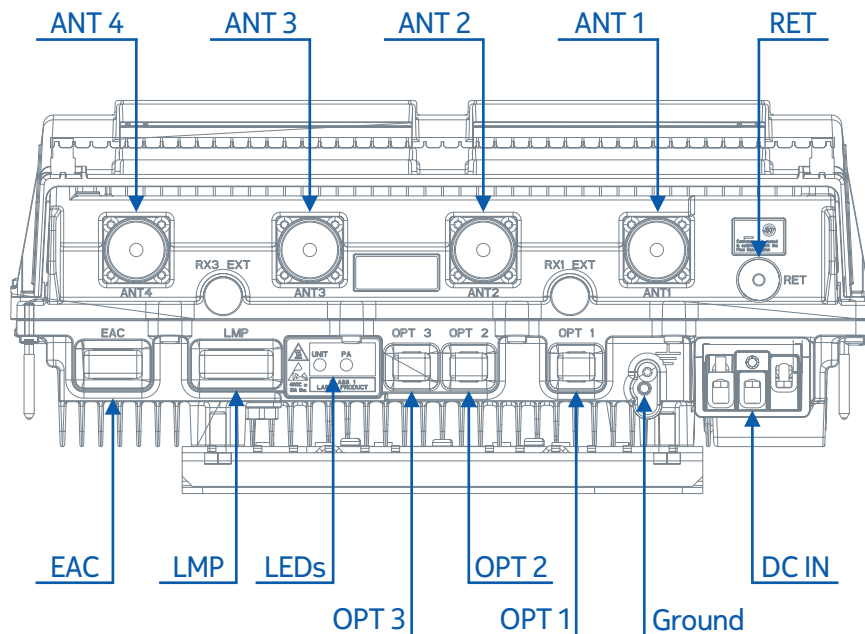


Table 474 FRHE interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	3-pole screw terminal	-
Antenna connector	ANT	4	7/16	-
RF external connector	Rx EXT	2	QMA	-
Remote Electrical Tilt	RET	1	8-pin circular	-

Table 474 FRHE interfaces (Cont.)

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
External Alarm Connection	EAC	1	D-sub MDR14	-
Optical interface	OPT	3	SFP	6 Gbps
Local Management Port	LMP	1	2x15 pin header	-

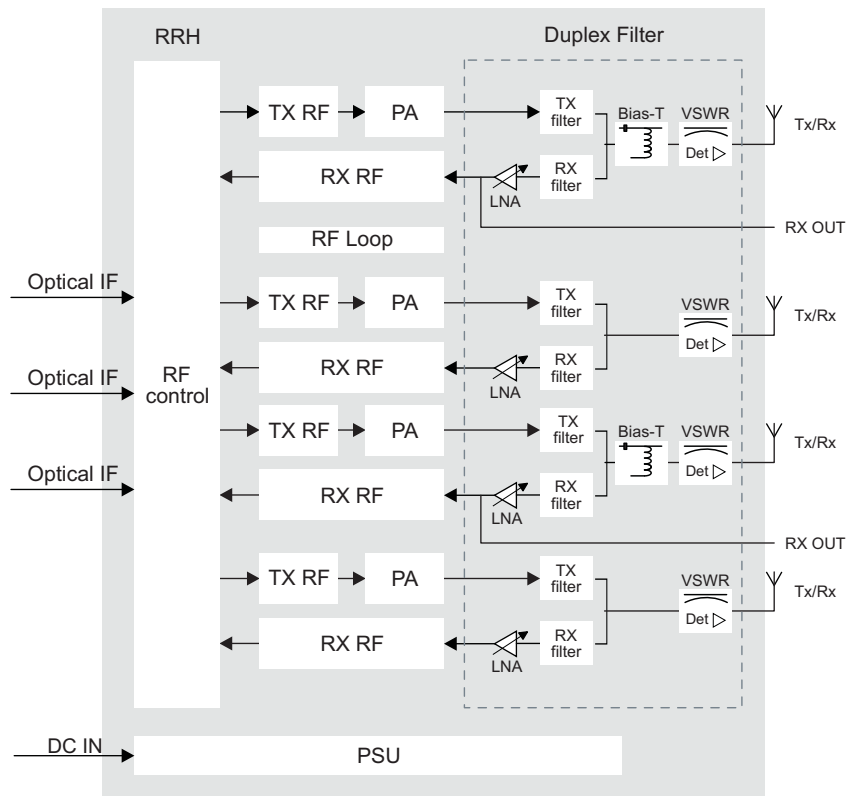
**Antenna Line Devices (ALDs) support**

Table 475 FRHE ALD support

ALD support via antenna ports	Value
AISG	ANT1, ANT3, RET: AISG 2.0
Proprietary AISG 1.1	No
CWA (for non-AISG installations)	No
Voltage	ANT1, ANT3: 15.5 V RET: 14.5 V
Power per port	30 W

**Functional block diagram**

Figure 107 FRHE functional block diagram



**Electrical specifications**

Table 476 FRHE 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**

Table 477 FRHE power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h		
			Power consumption ETSI 202706 average load $P_{RRH, static}$	Power consumption ETSI 202706 busy hour load $P_{BH, RRH, static}$	Power consumption 100% RF power load $P_{100\% RRH}$
LTE	1/1/1 2T2R	2x20	661	744	915
	1/1/1 2T2R	2x30	722	840	1095
	1/1/1 4T4R	4x20	1091	1266	1623
	1/1/1 4T4R	4x30	1227	1476	2019

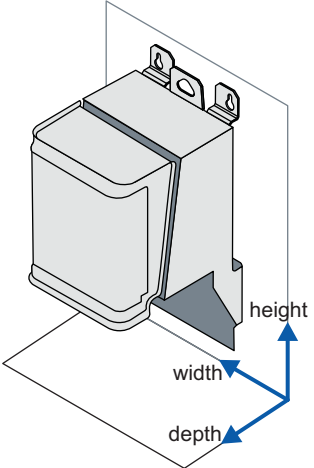
**Installation and mechanical specifications**

Table 478 FRHE installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>pole/wall installation</li> <li>directly on the wall installation</li> </ul>
IP rating	IP65
Related optional items	<ul style="list-style-type: none"> <li>Flexi Pole Mounting Kit (FPKA/C)</li> </ul>

**Dimensions and weight**

**Table 479** FRHE dimensions and weight

Property	Value	Dimensions orientation
Height	578 mm (22.7 in.)	
Depth	201.5 mm (7.9 in.)	
Width	400 mm (15.7 in.)	
Weight	max. 28.5 kg (62.8 lb)	
Volume	27 l	

**Environmental specifications**

**Table 480** FRHE environmental specifications

Property	Value
Maximum operational outdoor temperature in the shade (at constant high ambient temperature, maximum output power might be limited)	+55°C (131°F)
Maximum operational outdoor temperature in the sun (according to GR-487-Core specification)	+50°C (122°F)
Maximum indoor temperature (this is valid for fanless products)	+45°C (113°F)
Minimum operational temperature (including cold start)	-40°C (-40°F)

**LEDs**

**Table 481** FRHE LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>• Major alarm affecting the whole RF Module</li> <li>• Critical alarm affecting fans</li> <li>• Major/Critical alarm affecting a module</li> </ul>	Major/critical alarm

Table 481 FRHE LEDs (Cont.)

LED color	Description	Alarm
	subcomponent or antenna carrier	
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm

**Warnings, cautions or notes related to the product**



**NOTICE:** The RRH should always be mounted in a vertical orientation with connectors on the bottom side to ensure proper cooling.



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

## 13 Descriptions of RRHs Rel. 4.0

### 13.1 Flexi RRH 2-pipe 450 80 W (FRAA)

*FRAA technical specifications.*

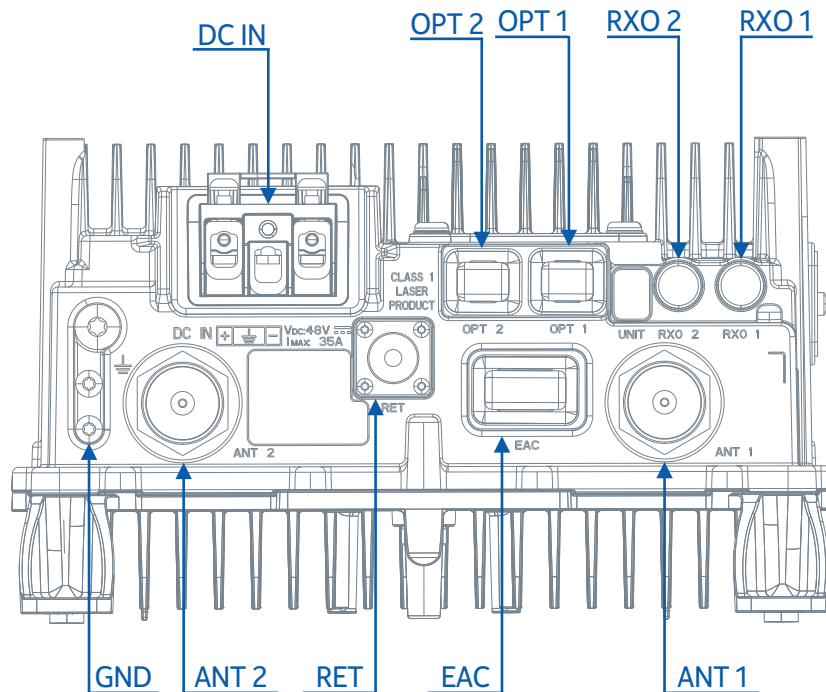
#### Functional description

Table 482 FRAA functional specification

Property	Value
Output power	2x40 W
MIMO	2TX
Outdoor installation	Yes
SW supported technology	FDD-LTE
TX frequency range	462.5-467.5 MHz
RX frequency range	452.5-457.5 MHz
DL instantaneous bandwidth	5 MHz
UL instantaneous bandwidth	5 MHz
DL filter bandwidth	5 MHz
UL filter bandwidth	5 MHz

#### Interfaces

Figure 108 FRAA interfaces



**Table 483** FRAA interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	3-pole screw terminal	-
Antenna connector	ANT	2	4.3-10	-
RF external connector	RXO	2	QMA	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	D-sub MDR14	-
Optical interface	OPT	2	SFP	6 Gbps, OBSAI
Grounding	Ground symbol	1	M8 or dual M5 screws	GND

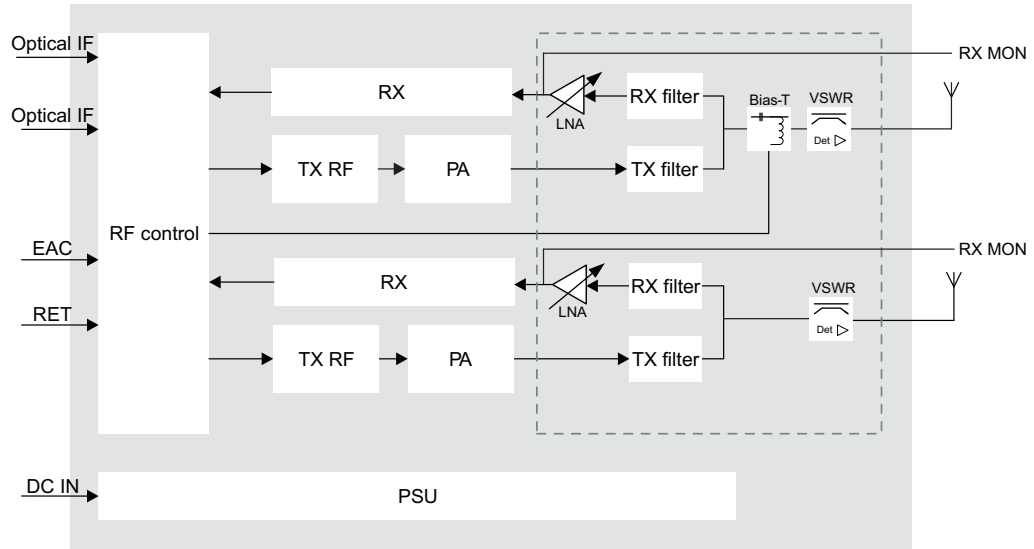
**Antenna Line Devices (ALDs) support**

**Table 484** FRAA ALD support

ALD support via antenna ports	Value
AISG	ANT1, RET: AISG 2.0
Proprietary AISG 1.1	No
CWA (for non-AISG installations)	No
Voltage	ANT1: 14.5 V RET: 14.5 V
Power per port	40 W
Power	30 W

**Functional block diagram**

Figure 109 FRAA functional block diagram



**Electrical specifications**

Table 485 FRAA 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**

Table 486 FRAA power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h		
			Power consumption ETSI 202706 average load $P_{RRH, static}$	Power consumption ETSI 202706 busy hour load $P_{BH, RRH, static}$	Power consumption 100% RF power load $P_{100\% RRH}$
LTE	1/1/1	20+20	477	553	700
	1/1/1	40+40	644	792	1053

**Installation and mechanical specifications**

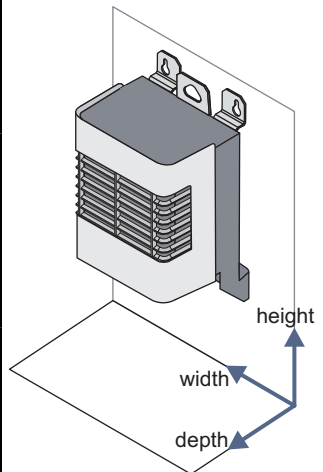


**Table 487** FRAA installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• pole/wall installation</li> <li>• directly on the wall installation</li> <li>• vertical book mount</li> </ul>
IP rating	IP65
Related optional items	<ul style="list-style-type: none"> <li>• Flexi Pole Mounting Kit (FPKA/C)</li> <li>• Corona 2T2R Book Mount HW Kit (FMFH)</li> </ul>

**Dimensions and weight**

**Table 488** FRAA dimensions and weight

Property	Value	Dimensions orientation
Height	Core RRH: 371 mm (14.6 in) With upper and lower mounting brackets: 721 mm (28.4 in)	 <p>The diagram shows a 3D perspective view of the FRAA unit. It is a rectangular device with a front panel featuring a series of horizontal ventilation slats. On top, there are several connectors and a mounting bracket. Three blue arrows indicate the dimensions: 'height' points vertically upwards from the base to the top of the unit; 'width' points horizontally across the front face; and 'depth' points horizontally from the front face towards the back of the unit.</p>
Depth	Core RRH depth without plastic cover: 169 mm (6.6 in) With plastic cover and mounting brackets: 215 mm (8.5 in)	
Width	Core RRH: 291 mm (11.5 in) With plastic cover and mounting brackets: 302 mm (11.9 in)	
Weight	Core RRH: 14.5 kg (32.0 lb) With plastic cover and mounting brackets: 16.2 kg (35.7 lb)	
Volume	With cover: 18 l Without cover: 15 l	

**Environmental specifications**

**Table 489** FRAA environmental specifications

Property	Value
Maximum operational outdoor temperature in the shade, assuming wind speed is 3 m/s (at constant high ambient temperature, maximum output power might be limited)	+55°C (131°F)
Maximum operational outdoor temperature in the sun, assuming wind speed is 3 m/s (at	+50°C (122°F)

**Table 489** FRAA environmental specifications (Cont.)

Property	Value
constant high ambient temperature, maximum output power might be limited)	
Maximum indoor temperature, assuming wind speed is 0 m/s, valid for fanless products (at constant high ambient temperature, maximum output power might be limited)	+45°C (113°F)
Minimum operational temperature (including cold start)	-40°C (-40°F)

**LEDs**

**Table 490** FRAA LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Critical alarm affecting fans</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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

Table 490 FRAA LEDs (Cont.)

LED color	Description	Alarm
Stable Red for less than 5 seconds	The module is in the process of resetting	No alarm
Periodic Red and Green	Antenna line device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm

**Warnings, cautions or notes related to the product**



**NOTICE:** The RRH should always be mounted in a vertical orientation with connectors on the bottom side to ensure proper cooling.



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

## 13.2 Flexi RRH 2-pipe 850 80 W (FRCC)

*FRCC technical specifications.*

**Functional description**

Table 491 FRCC functional specification

Property	Value
Output power	2x40 W
MIMO	2TX
Outdoor installation	Yes
SW supported technology	FDD-LTE
TX frequency range	862.6-869 MHz
RX frequency range	817.6-824 MHz
DL instantaneous bandwidth	6.4 MHz
UL instantaneous bandwidth	6.4 MHz
DL filter bandwidth	6.4 MHz
UL filter bandwidth	6.4 MHz

**Interfaces**

Figure 110 FRCC interfaces

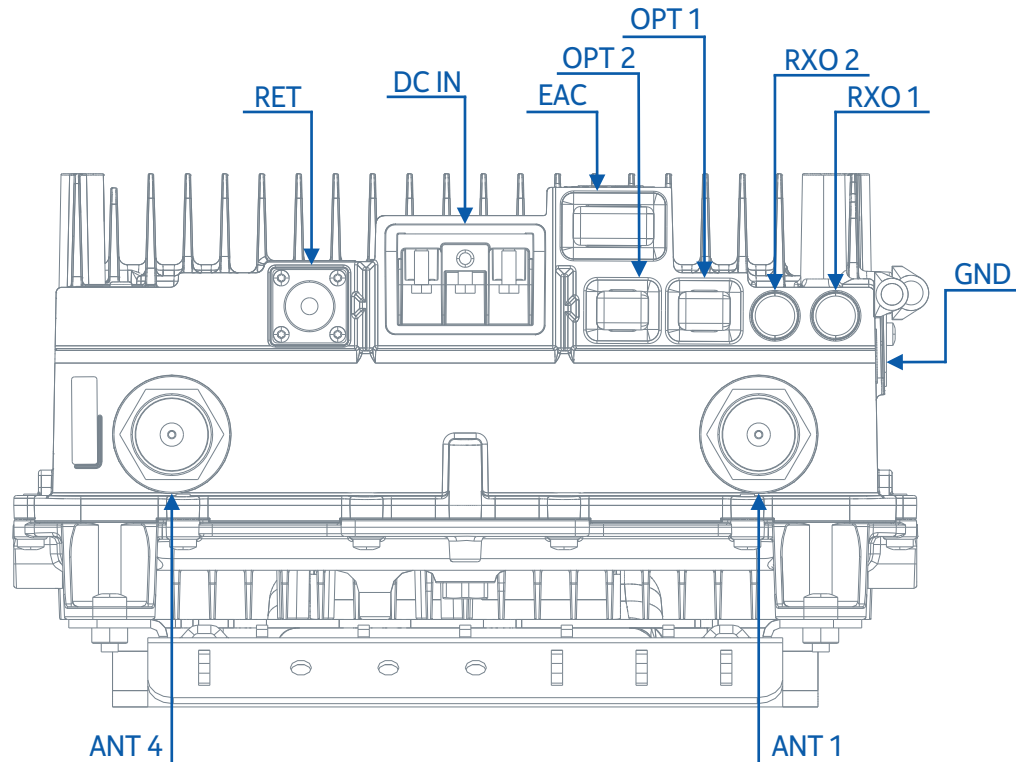


Table 492 FRCC interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	3-pole screw terminal	-
Antenna connector	ANT 1 ANT 4	2	7/16	For ANT 4, SW displays ANT 2
RF external connector	Rx EXT	2	QMA	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	D-sub MDR14	-
Optical interface	OPT	2	SFP	6 Gbps, OBSAI
Grounding	Ground symbol	1	M8 or dual M5 screws	GND

**Antenna Line Devices (ALDs) support**

Table 493 FRCC ALD support

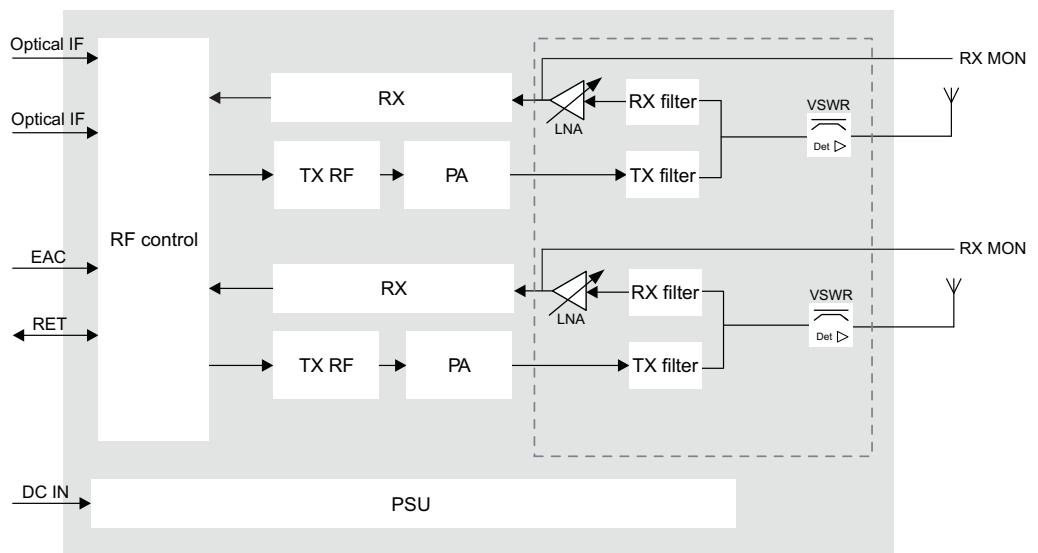
ALD support via antenna ports	Value
AISG	RET: AISG 2.0
Legacy Siemens equipment	No

Table 493 FRCC ALD support (Cont.)

ALD support via antenna ports	Value
CWA (for non-AISG installations)	No
Voltage	RET: 14.5 V
Power per port	40 W
Power	30 W

**Functional block diagram**

Figure 111 FRCC functional block diagram



**Electrical specifications**

Table 494 FRCC 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**

Table 495 FRCC power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h		
			Power consumption ETSI 202706 average load $P_{RRH, static}$	Power consumption ETSI 202706 busy hour load $P_{BH RRH, static}$	Power consumption 100% RF power load $P_{100\% RRH}$
LTE	1/1/1 2T2R	20+20	573	624	736
	1/1/1 2T2R	40+40	746	836	1016

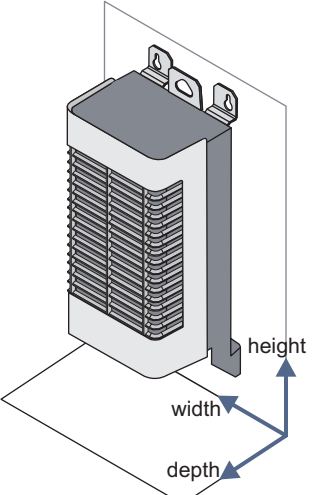
**Installation and mechanical specifications**

Table 496 FRCC installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• pole/wall installation</li> <li>• directly on the wall installation</li> <li>• vertical book mount</li> </ul>
IP rating	IP65
Related optional items	<ul style="list-style-type: none"> <li>• Flexi Pole Mounting Kit (FPKA/C)</li> <li>• Corona 4T4R Book Mount HW Kit (FMFB)</li> </ul>

**Dimensions and weight**

Table 497 FRCC dimensions and weight

Property	Value	Dimensions orientation
Height	Core RRH: 583 mm (23.0 in) With upper and lower mounting brackets: 888 mm (35.0 in)	
Depth	Core RRH: 158 mm (6.2 in) With plastic cover and mounting brackets: 200 mm (7.9 in)	
Width	Core RRH: 320 mm (12.6 in) With plastic cover and mounting brackets: 331 mm (13.0 in)	
Weight	Core RRH: 22 kg (48.5 lbs)	

**Table 497** FRCC dimensions and weight (Cont.)

Property	Value	Dimensions orientation
	With plastic cover and mounting brackets: 24 kg (53.0 lb)	
Volume	With cover: 33 l Without cover: 27 l	

**Environmental specifications**

**Table 498** FRCC environmental specifications

Property	Value
Maximum operational outdoor temperature in the shade, assuming wind speed is 3 m/s (at constant high ambient temperature, maximum output power might be limited)	+55°C (131°F)
Maximum operational outdoor temperature in the sun, assuming wind speed is 3 m/s (at constant high ambient temperature, maximum output power might be limited)	+50°C (122°F)
Maximum indoor temperature, assuming wind speed is 0 m/s, valid for fanless products (at constant high ambient temperature, maximum output power might be limited)	+45°C (113°F)
Minimum operational temperature (including cold start)	-40°C (-40°F)

**LEDs**

**Table 499** FRCC LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>• Major alarm affecting the whole RF Module</li> <li>• Critical alarm affecting fans</li> <li>• Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>• Until software download begins</li> </ul>	No alarm

Table 499 FRCC LEDs (Cont.)

LED color	Description	Alarm
	<ul style="list-style-type: none"> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm

**Warnings, cautions or notes related to the product**



**NOTICE:** The RRH should always be mounted in a vertical orientation with connectors on the bottom side to ensure proper cooling.



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

### 13.3 Flexi RRH 2-pipe 850 120 W (FRCG)

*FRCG technical specifications.*

**Functional description**

Table 500 FRCG functional specification

Property	Value
Output power	2x60 W



Table 500 FRCG functional specification (Cont.)

Property	Value
MIMO	2TX
Outdoor installation	Yes
SW supported technologies	WCDMA, FDD-LTE
TX frequency range	869-894 MHz
RX frequency range	824-849 MHz
DL instantaneous bandwidth	25 MHz
UL instantaneous bandwidth	25 MHz
DL filter bandwidth	25 MHz
UL filter bandwidth	25 MHz

**Interfaces**

Figure 112 FRCG interfaces

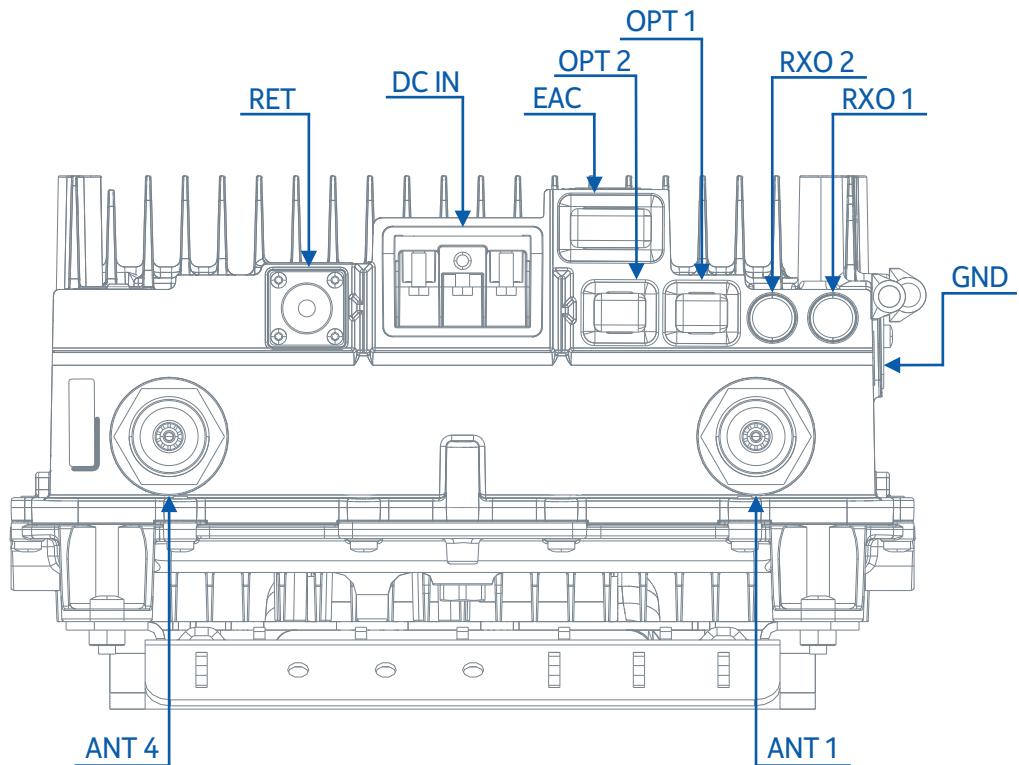


Table 501 FRCG interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	3-pole screw terminal	-
Antenna connector	ANT 1 ANT 4	2	4.3-10	For ANT 4, SW displays ANT 2

Table 501 FRCG interfaces (Cont.)

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
RF external connector	Rx EXT	2	QMA	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	D-sub MDR14	-
Optical interface	OPT	2	SFP	6 Gbps, OBSAI
Grounding	Ground symbol	1	M8 or dual M5 screws	GND

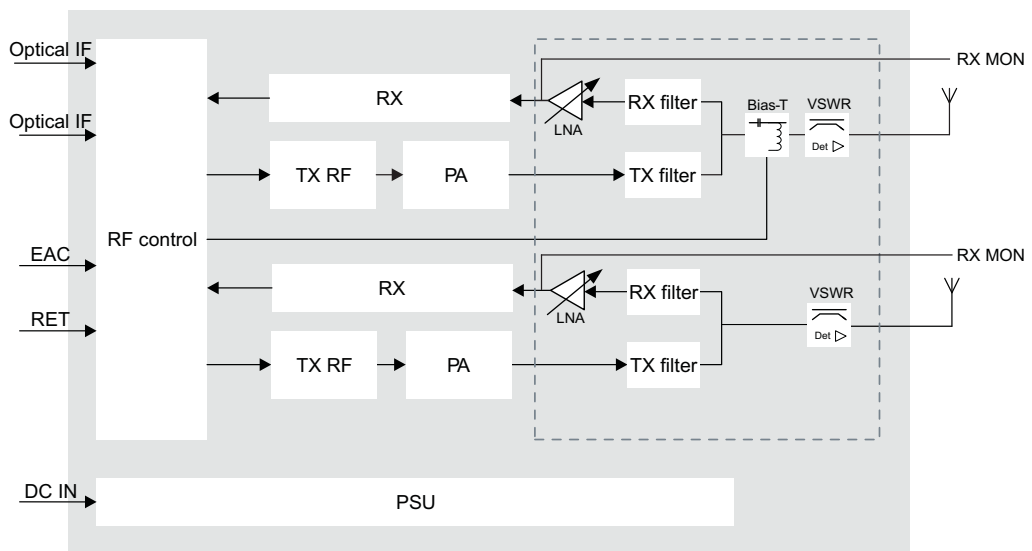
**Antenna Line Devices (ALDs) support**

Table 502 FRCG ALD support

ALD support via antenna ports	Value
AISG	ANT1, RET: AISG 2.0
Legacy Siemens equipment	No
CWA (for non-AISG installations)	No
Voltage	ANT1: 14.5 V RET: 14.5 V
Power per port	40 W
Power	30 W

**Functional block diagram**

Figure 113 FRCG functional block diagram



**Electrical specifications**

Table 503 FRCG 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**

Table 504 FRCG power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h		
			Power consumption ETSI 202706 average load $P_{RRH, static}$	Power consumption ETSI 202706 busy hour load $P_{BH, RRH, static}$	Power consumption 100% RF power load $P_{100\% RRH}$
WCDMA	1/1/1	20	304	336	402
	2/2/2	20	391	447	564
	3/3/3	20	434	511	679
LTE	1/1/1 2T2R	20+20	544	630	783
	1/1/1 2T2R	40+40	656	795	1060
	1/1/1 2T2R	60+60	752	937	1310

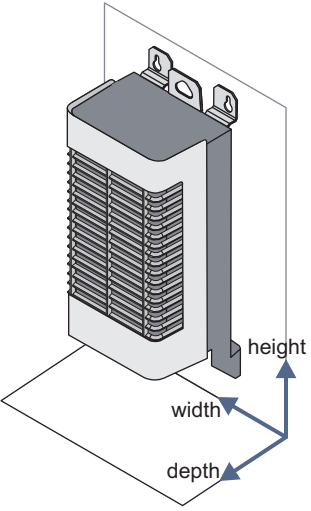
**Installation and mechanical specifications**

Table 505 FRCG installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>pole/wall installation</li> <li>directly on the wall installation</li> <li>vertical book mount</li> </ul>
IP rating	IP65
Related optional items	<ul style="list-style-type: none"> <li>Flexi Pole Mounting Kit (FPKA/C)</li> <li>Corona 4T4R Book Mount HW Kit (FMFB)</li> </ul>

**Dimensions and weight**

**Table 506** FRCG dimensions and weight

Property	Value	Dimensions orientation
Height	Core RRH: 583 mm (23.0 in) With upper and lower mounting brackets: 888 mm (35.0 in)	
Depth	Core RRH: 158 mm (6.2 in) With plastic cover and mounting brackets: 200 mm (7.9 in)	
Width	Core RRH: 320 mm (12.6 in) With plastic cover and mounting brackets: 331 mm (13.0 in)	
Weight	Core RRH: 22 kg (48.5 lb) With plastic cover and mounting brackets: 24 kg (53.0 lb)	
Volume	With cover: 33 l Without cover: 27 l	

**Environmental specifications**

**Table 507** FRCG environmental specifications

Property	Value
Maximum operational outdoor temperature in the shade, assuming wind speed is 3 m/s (at constant high ambient temperature, maximum output power might be limited)	+55°C (131°F)
Maximum operational outdoor temperature in the sun, assuming wind speed is 3 m/s (at constant high ambient temperature, maximum output power might be limited)	+50°C (122°F)
Maximum indoor temperature, assuming wind speed is 0 m/s, valid for fanless products (at constant high ambient temperature, maximum output power might be limited)	+45°C (113°F)
Minimum operational temperature (including cold start)	-40°C (-40°F)

**LEDs**

Table 508 FRCG LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Critical alarm affecting fans</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm

**Warnings, cautions or notes related to the product**



**NOTICE:** The RRH should always be mounted in a vertical orientation with connectors on the bottom side to ensure proper cooling.



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

## 13.4 Flexi RRH 2-pipe 873 120 W (FRCJ)

*FRCJ technical specifications.*



**Note:** This module is supported in FDD-LTE 16A.

### Functional description

Table 509 FRCJ functional specification

Property	Value
Output power	2x60 W
MIMO	2TX
Outdoor installation	Yes
SW supported technology	FDD-LTE
TX frequency range	869-880 MHz
RX frequency range	824-835 MHz
DL instantaneous bandwidth	11 MHz
UL instantaneous bandwidth	11 MHz
DL filter bandwidth	11 MHz
UL filter bandwidth	11 MHz

### Interfaces

Figure 114 FRCJ interfaces

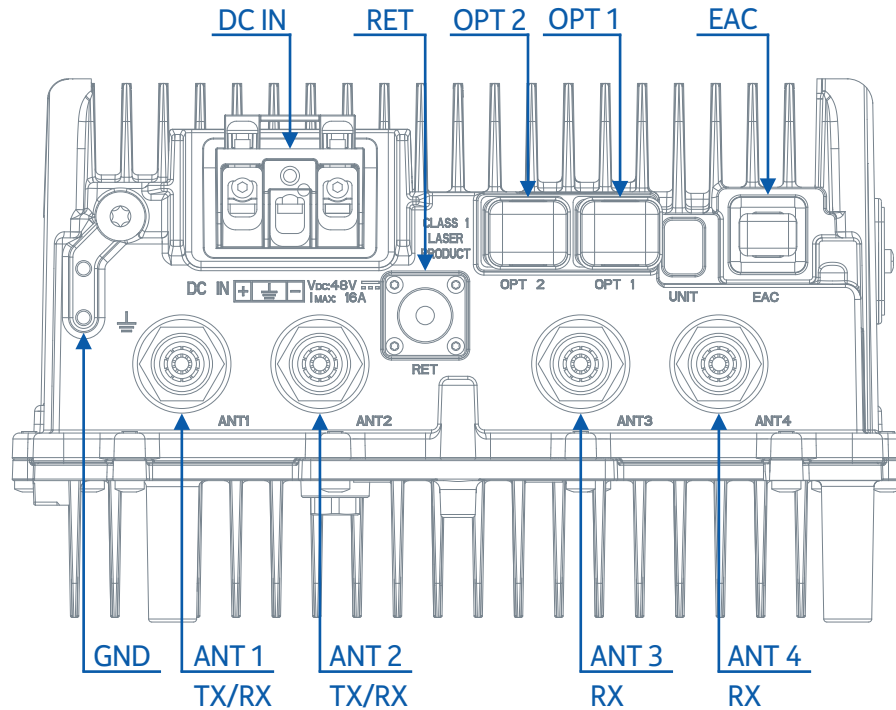


Table 510 FRCJ interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	3-pole screw terminal	-
Antenna connector	ANT	4	4.3-10	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	RJ45	-
Optical interface	OPT	2	SFP	3 Gbps to 6 Gbps, OBSAI
Grounding		1	M8 or dual M5 screws	GND

**Antenna Line Devices (ALDs) support**

Table 511 FRCJ ALD support

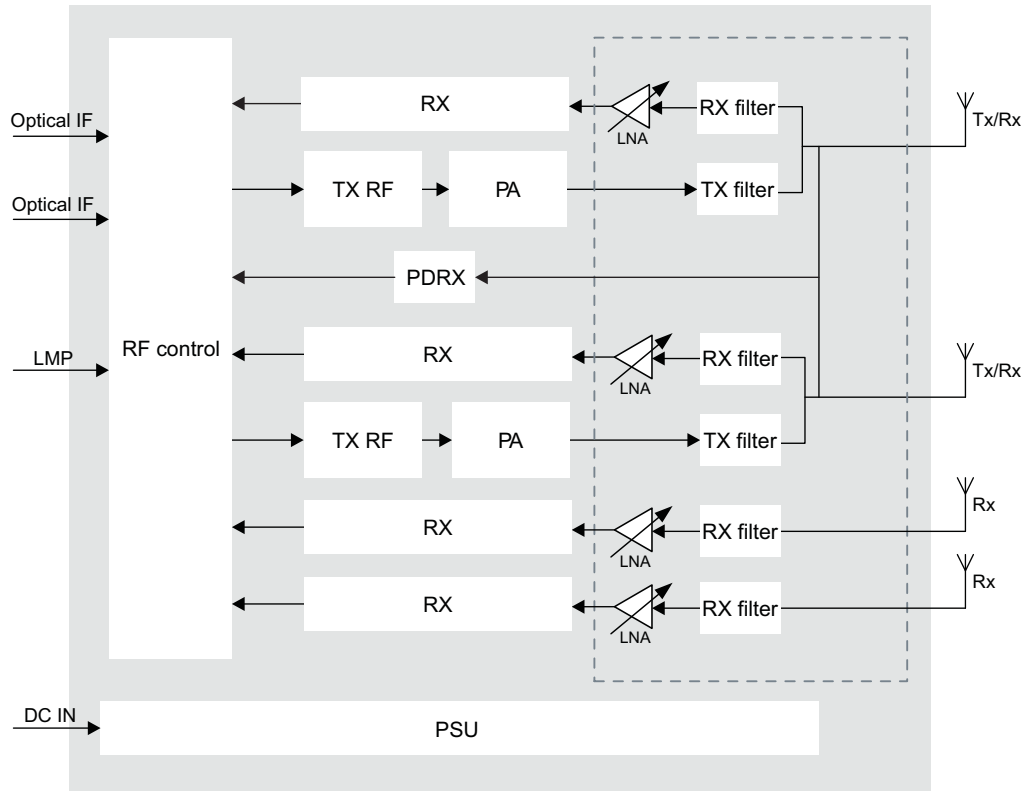
ALD support via antenna ports	Value
AISG	ANT1, ANT3, RET: AISG 2.0
Proprietary AISG 1.1	No
CWA (for non-AISG installations)	No
Voltage	ANT1, ANT3: 14.5 V RET: 14.5 V

Table 511 FRCJ ALD support (Cont.)

ALD support via antenna ports	Value
Power per port	40 W
Power	60 W

**Functional block diagram**

Figure 115 FRCJ functional block diagram



**Electrical specifications**

Table 512 FRCJ 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**



**Note:** This information will be provided in further releases.

**Installation and mechanical specifications**

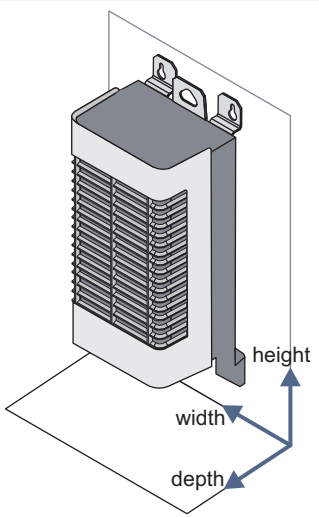


**Table 513** FRCJ installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• pole/wall installation</li> <li>• vertical book mount</li> <li>• inside the Radio Antenna System (RAS)</li> </ul>
IP rating	IP65
Related optional items	<ul style="list-style-type: none"> <li>• Flexi Pole Mounting Kit (FPKA/C)</li> <li>• Flexi Power AC/DC Submodule 230V (FPAD/E)</li> <li>• Corona 4T4R Book Mount HW Kit (FMFB)</li> </ul>

**Dimensions and weight**

**Table 514** FRCJ dimensions and weight

Property	Value	Dimensions orientation
Height	Core RRH: 315 mm (12.4 in) With plastic cover: 333 mm (13.1 in) With upper and lower mounting brackets: 499 mm (19.7 in)	 <p>The diagram shows a 3D perspective view of the FRCJ unit. It is a rectangular device with a series of horizontal ventilation slats on the front face. Three blue arrows indicate the dimensions: 'height' points to the vertical dimension, 'width' points to the horizontal dimension of the front face, and 'depth' points to the depth of the unit.</p>
Depth	Core RRH depth without plastic cover: 174 mm (6.8 in) With plastic cover: 186 mm (7.3 in) With plastic cover and mounting brackets: 210 mm (8.3 in)	
Width	Core RRH: 264 mm (10.4 in) With plastic cover: 302 mm (11.9 in) With plastic cover and mounting brackets: 302 mm (11.9 in)	
Weight	Core RRH: 12.8 kg (28.2 lb) With plastic cover: 13.5 kg (29.8 lb) With plastic cover and mounting brackets: 14.2 kg (31.3 lb)	
Volume	With cover: 19 l Without cover: 12.7 l	

**Environmental specifications**

**Table 515** FRCJ environmental specifications

Property	Value
Maximum operational outdoor temperature in the shade, assuming wind speed is 3 m/s (at constant high ambient temperature, maximum output power might be limited)	+55°C (131°F)
Maximum operational outdoor temperature in the sun, assuming wind speed is 3 m/s (at constant high ambient temperature, maximum output power might be limited)	+50°C (122°F)
Maximum indoor temperature, assuming wind speed is 0 m/s, valid for fanless products (at constant high ambient temperature, maximum output power might be limited)	+45°C (113°F)
Minimum operational temperature (including cold start)	-40°C (-40°F)

**LEDs**

**Table 516** FRCJ LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Critical alarm affecting fans</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated</li> </ul>	No alarm

Table 516 FRCJ LEDs (Cont.)

LED color	Description	Alarm
	and transmission is possible <ul style="list-style-type: none"> <li>Working normally, no alarm on the RF Module</li> </ul>	
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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm

**Warnings, cautions or notes related to the product**



**NOTICE:** The RRH should always be mounted in a vertical orientation with connectors on the bottom side to ensure proper cooling.



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

## 13.5 Flexi RRH 2-pipe 2100 120 W (FRGY)

*FRGY technical specifications.*

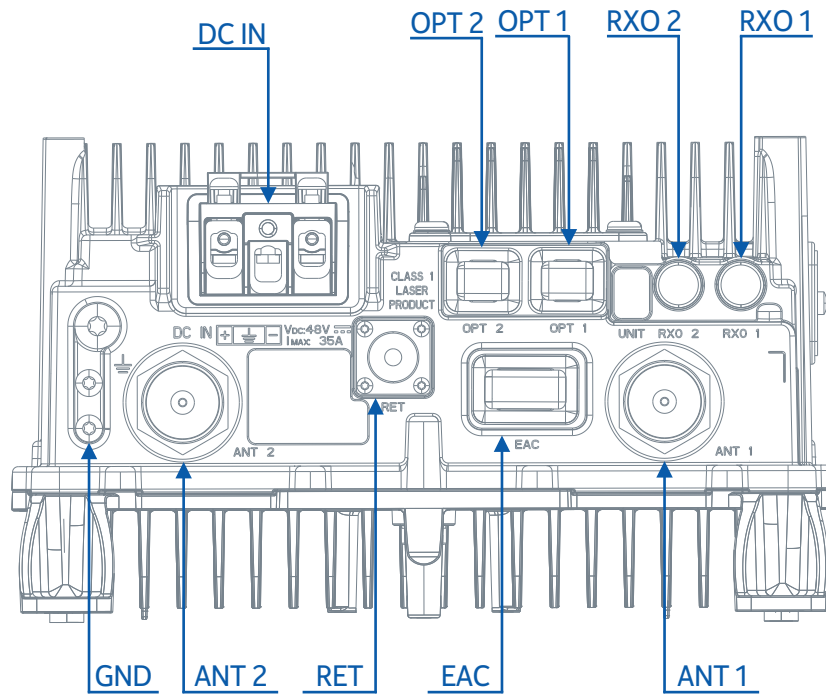
**Functional description**

Table 517 FRGY functional specification

Property	Value
Output power	2x60 W
MIMO	2TX
Outdoor installation	Yes
SW supported technology	WCDMA, FDD-LTE
TX frequency range	2110-2170 MHz
RX frequency range	1920-1980 MHz
DL instantaneous bandwidth	60 MHz
UL instantaneous bandwidth	60 MHz
DL filter bandwidth	60 MHz
UL filter bandwidth	60 MHz

**Interfaces**

*Figure 116* FRGY interfaces



*Table 518* FRGY interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	3-pole screw terminal	-
Antenna connector	ANT	2	7/16	-
RF external connector	RXO	2	QMA	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	D-sub MDR14	-
Optical interface	OPT	2	SFP	6 Gbps, OBSAI
Grounding	Ground symbol	1	M8 or dual M5 screws	GND

**Antenna Line Devices (ALDs) support**

*Table 519* FRGY ALD support

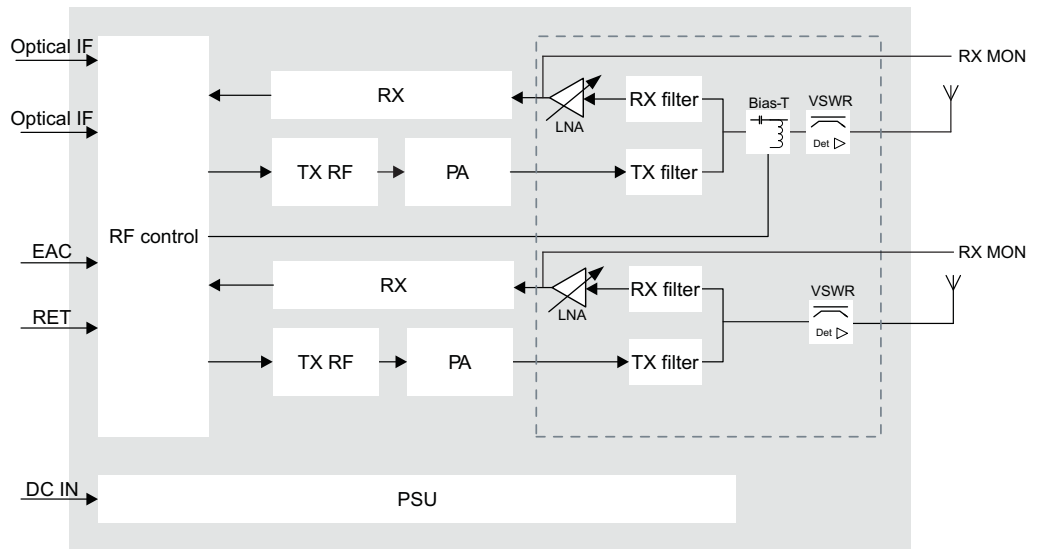
ALD support via antenna ports	Value
AISG	ANT1, RET: AISG 2.0
Proprietary AISG 1.1	No
CWA (for non-AISG installations)	No

Table 519 FRGY ALD support (Cont.)

ALD support via antenna ports	Value
Voltage	ANT1: 14.5 V RET: 14.5 V
Power per port	40 W
Power	30 W

**Functional block diagram**

Figure 117 FRGY functional block diagram



**Electrical specifications**

Table 520 FRGY 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**

Table 521 FRGY power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h		
			Power consumption ETSI 202706 average load $P_{RRH, static}$	Power consumption ETSI 202706 busy hour load $P_{BH, RRH, static}$	Power consumption 100% RF power load $P_{100\% RRH}$
WCDMA	1/1/1	20	324	357	452
	2/2/2	20	422	482	626
	3/3/3	20	486	572	788
	4/4/4	20	618	744	1052
LTE	1/1/1	20+20	457	533	701
	1/1/1	40+40	658	799	1126
	1/1/1	60+60	800	1015	1536
MSR	WCDMA 2/2/2	40	850	1116	1441
	LTE 1/1/1 2T2R 10 MHz	20+20			

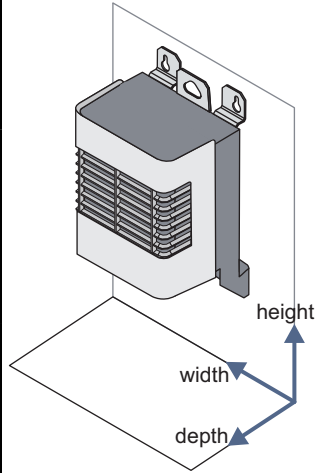
**Installation and mechanical specifications**

Table 522 FRGY installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• pole/wall installation</li> <li>• directly on the wall installation</li> <li>• vertical book mount</li> </ul>
IP rating	IP65
Related optional items	<ul style="list-style-type: none"> <li>• Flexi Pole Mounting Kit (FPKA/C)</li> <li>• Corona 2T2R Book Mount HW Kit (FMFH)</li> </ul>

**Dimensions and weight**

Table 523 FRGY dimensions and weight

Property	Value	Dimensions orientation
Height	Core RRH: 371 mm (14.6 in) With upper and lower mounting brackets: 721 mm (28.4 in)	
Depth	Core RRH depth without plastic cover: 169 mm (6.6 in) With plastic cover and mounting brackets: 215 mm (8.5 in)	
Width	Core RRH: 291 mm (11.5 in) With plastic cover and mounting brackets: 302 mm (11.9 in)	
Weight	Core RRH: 14.5 kg (32.0 lb) With plastic cover and mounting brackets: 16.2 kg (35.7 lb)	
Volume	With cover: 18 l Without cover: 15 l	

**Environmental specifications**

Table 524 FRGY environmental specifications

Property	Value
Maximum operational outdoor temperature in the shade, assuming wind speed is 3 m/s (at constant high ambient temperature, maximum output power might be limited)	+55°C (131°F)
Maximum operational outdoor temperature in the sun, assuming wind speed is 3 m/s (at constant high ambient temperature, maximum output power might be limited)	+50°C (122°F)
Maximum indoor temperature, assuming wind speed is 0 m/s, valid for fanless products (at constant high ambient temperature, maximum output power might be limited)	+45°C (113°F)
Minimum operational temperature (including cold start)	-40°C (-40°F)

**LEDs**

Table 525 FRGY LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Critical alarm affecting fans</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm

**Warnings, cautions or notes related to the product**



**NOTICE:** The RRH should always be mounted in a vertical orientation with connectors on the bottom side to ensure proper cooling.





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

## 13.6 Flexi RRH 4-pipe 2300 120 W (FRNC)

*FRNC technical specifications.*

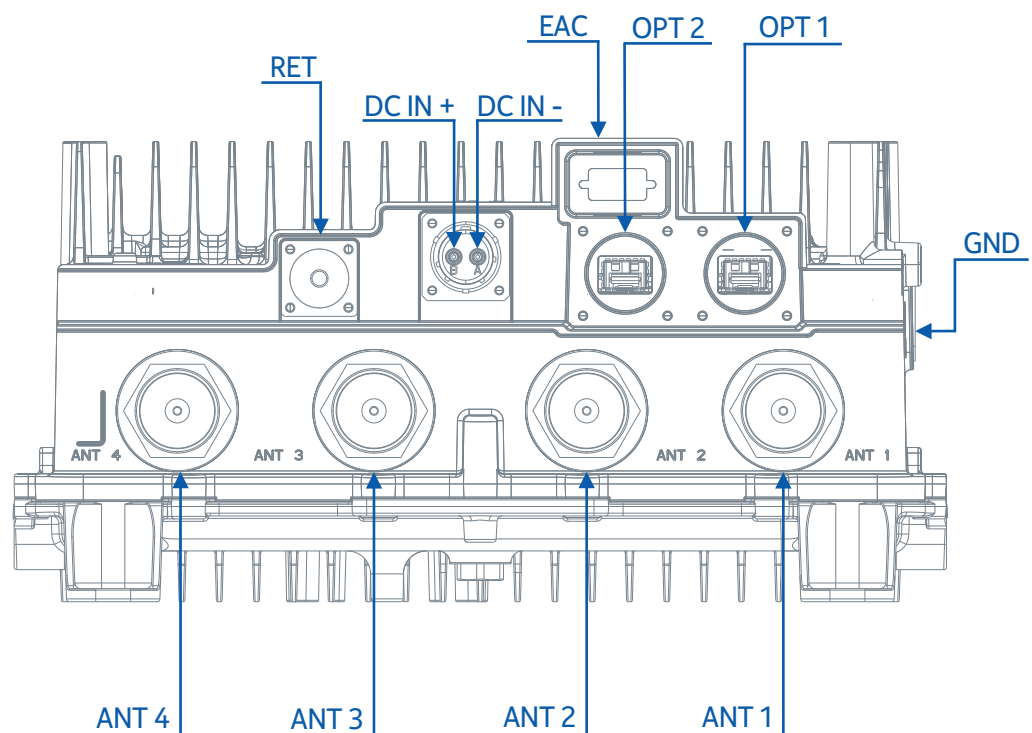
### Functional description

Table 526 FRNC functional specification

Property	Value
Output power	4x30 W
MIMO	4TX
Outdoor installation	Yes
SW supported technology	FDD-LTE
TX frequency range	2350-2360 MHz
RX frequency range	2305-2315 MHz
DL instantaneous bandwidth	10 MHz
UL instantaneous bandwidth	10 MHz
DL filter bandwidth	10 MHz
UL filter bandwidth	10 MHz

### Interfaces

Figure 118 FRNC interfaces



*Table 527* FRNC interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	2-pin circular	-
Antenna connector	ANT	4	4.3-10	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	D-sub MDR14	-
Optical interface	OPT1, OPT2, CHAIN/EXT	2	SFP	6 Gbps, OBSAI
Grounding	Ground symbol	1	M8 or dual M5 screws	GND

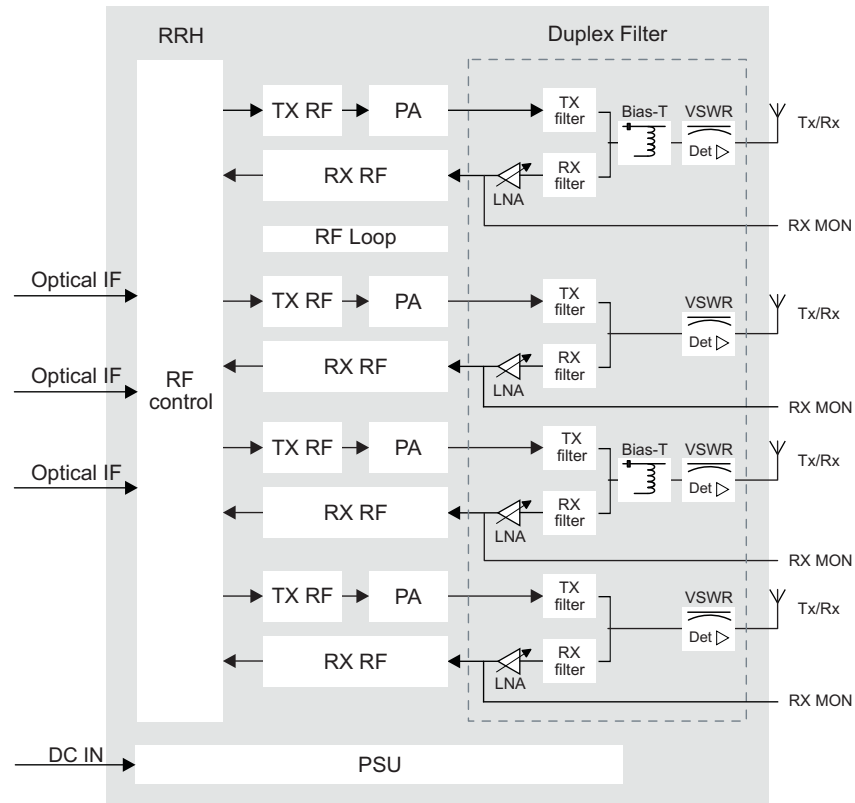
**Antenna Line Devices (ALDs) support**

*Table 528* FRNC ALD support

ALD support via antenna ports	Value
AISG	ANT1, ANT3, RET: AISG 2.0
Legacy Siemens equipment	No
CWA (for non-AISG installations)	No
Voltage	ANT1, ANT3: 14.5 V RET: 14.5 V
Power per port	40 W
Power	60 W

**Functional block diagram**

Figure 119 FRNC functional block diagram



**Electrical specifications**

Table 529 FRNC 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**

Table 530 FRNC power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h		
			Power consumption ETSI 202706 average load $P_{RRH, static}$	Power consumption ETSI 202706 busy hour load $P_{BH, RRH, static}$	Power consumption 100% RF power load $P_{100\% RRH}$
LTE	1/1/1 2T2R	2x20	593	684	885
	1/1/1 2T2R	2x30	661	789	1065
	1/1/1 4T4R	4x20	873	1050	1443
	1/1/1 4T4R	4x30	1030	1296	1866

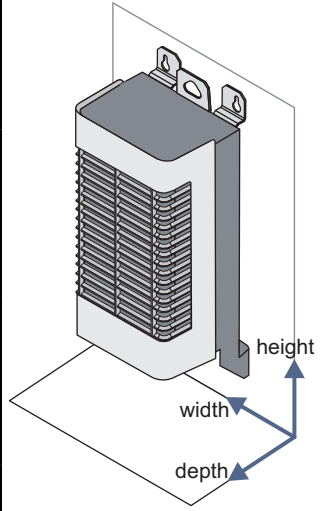
**Installation and mechanical specifications**

Table 531 FRNC installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• pole/wall installation</li> <li>• directly on the wall installation</li> <li>• vertical book mount</li> </ul>
IP rating	IP65
Related optional items	<ul style="list-style-type: none"> <li>• Flexi Pole Mounting Kit (FPKA/C)</li> <li>• Fiber Cable IP Boot (FMNA)</li> </ul> <p><b>i</b> <b>Note:</b> If using Nokia fiber cables with FRNC/FMNA, use flexible-ended fiber cable.</p> <ul style="list-style-type: none"> <li>• 2 way DC Input Cable Connector (FMNB)</li> <li>• Corona 4T4R Book Mount HW Kit (FMFB)</li> </ul>

**Dimensions and weight**

Table 532 FRNC dimensions and weight

Property	Value	Dimensions orientation
Height	Core RRH: 583 mm (23.0 in) With upper and lower mounting brackets: 888 mm (35.0 in)	
Depth	Core RRH: 158 mm (6.2 in) With plastic cover and mounting brackets: 200 mm (7.9 in)	
Width	Core RRH: 320 mm (12.6 in) With plastic cover and mounting brackets: 331 mm (13.0 in)	
Weight	Core RRH: 23 kg (50.7 lb) With plastic cover and mounting brackets: 25 kg (55.1 lb)	
Volume	With cover: 33 l Without cover: 27 l	

**Environmental specifications**

Table 533 FRNC environmental specifications

Property	Value
Maximum operational outdoor temperature in the shade, assuming wind speed is 3 m/s (at constant high ambient temperature, maximum output power might be limited)	+55°C (131°F)
Maximum operational outdoor temperature in the sun, assuming wind speed is 3 m/s (at constant high ambient temperature, maximum output power might be limited)	+50°C (122°F)
Maximum indoor temperature, assuming wind speed is 0 m/s, valid for fanless products (at constant high ambient temperature, maximum output power might be limited)	+45°C (113°F)
Minimum operational temperature (including cold start)	-40°C (-40°F)

**LEDs**

Table 534 FRNC LEDs

LED color	Description	Alarm
Red, stable	Critical alarm affecting the whole RF module or all antenna carriers	Fault
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Critical alarm affecting fans</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm

**Warnings, cautions or notes related to the product**



**NOTICE:** The RRH should always be mounted in a vertical orientation with connectors on the bottom side to ensure proper cooling.



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

## 13.7 Flexi RRH 4-pipe 720/730 160 W (FRBG)

*FRBG technical specifications.*

### Functional description

Table 535 FRBG functional specification

Property	Value
Output power	4x40 W (B12 or B17: 2x40 W, B29: 2x40 W)
MIMO	2TX on B12, B17 and B29
Outdoor installation	Yes
SW supported technology	FDD-LTE
TX frequency range	B12: 729-745 MHz B17: 734-745 MHz B29: 718-728 MHz
RX frequency range	B12: 699-715 MHz B17: 704-715 MHz
DL instantaneous bandwidth	B12: 16 MHz B17: 11 MHz B29: 10 MHz
UL instantaneous bandwidth	B12: 16 MHz B17: 11 MHz
DL filter bandwidth	B12: 16 MHz B17: 11 MHz B29: 10 MHz
UL filter bandwidth	B12: 16 MHz B17: 11 MHz

### Interfaces

Figure 120 FRBG interfaces

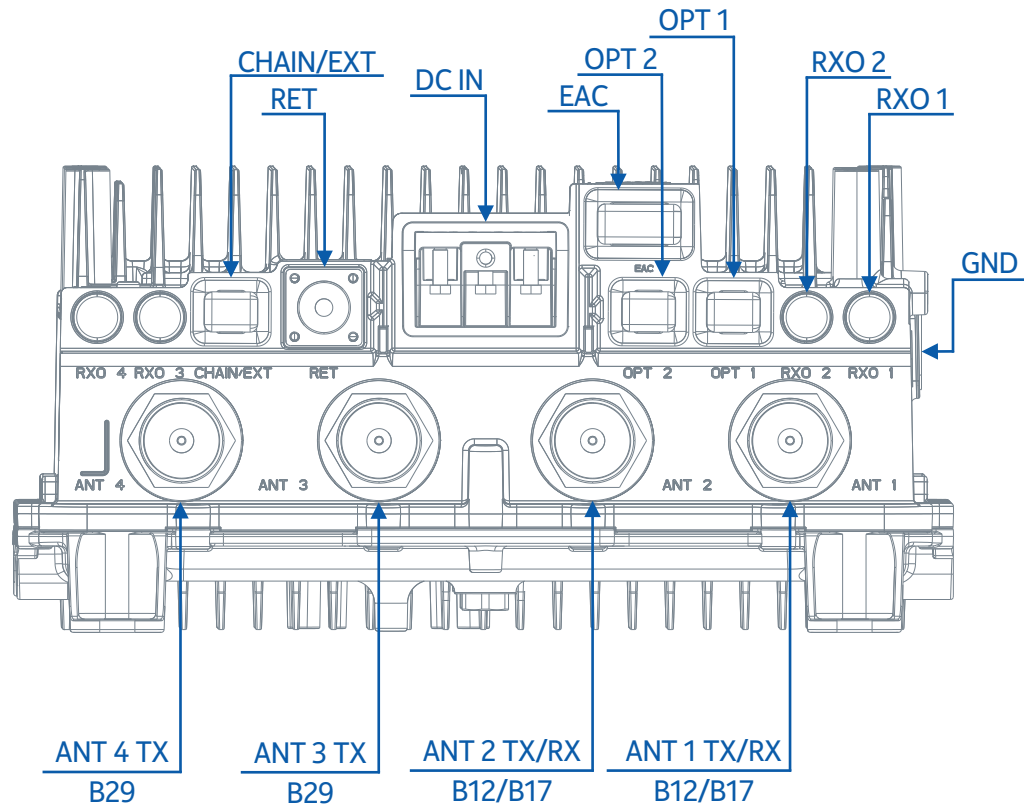


Table 536 FRBG interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	3-pole screw terminal	-
Antenna connector	ANT	4	7/16	-
RF external connector	Rx EXT	2	QMA	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	D-sub MDR14	-
Optical interface	OPT1, OPT2, CHAIN/EXT	3	SFP	6 Gbps, OBSAI
Grounding	Ground symbol	1	M8 or dual M5 screws	GND

**Antenna Line Devices (ALDs) support**

Table 537 FRBG ALD support

ALD support via antenna ports	Value
AISG	ANT1, RET: AISG 2.0

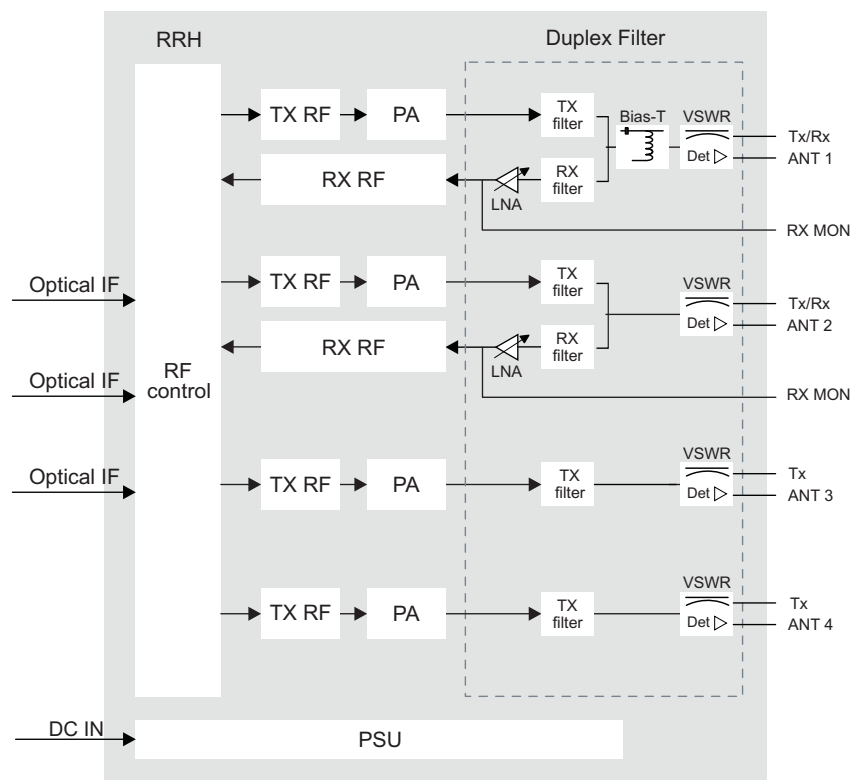


Table 537 FRBG ALD support (Cont.)

ALD support via antenna ports	Value
Legacy Siemens equipment	No
CWA (for non-AISG installations)	No
Voltage	ANT1: 14.5 V RET: 14.5 V
Power per port	40 W
Power	60 W

**Functional block diagram**

Figure 121 FRBG functional block diagram



**Electrical specifications**

Table 538 FRBG 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**

**Table 539** FRBG power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h		
			Power consumption ETSI 202706 average load $P_{RRH, static}$	Power consumption ETSI 202706 busy hour load $P_{BH, RRH, static}$	Power consumption 100% RF power load $P_{100\% RRH}$
LTE	1/1/1 2T2R	2x20	560	630	768
	1/1/1 2T2R	2x40	685	801	1092
	1/1/1 4T4R	4x20	834	972	1248
	1/1/1 4T4R	4x40	1090	1341	1932

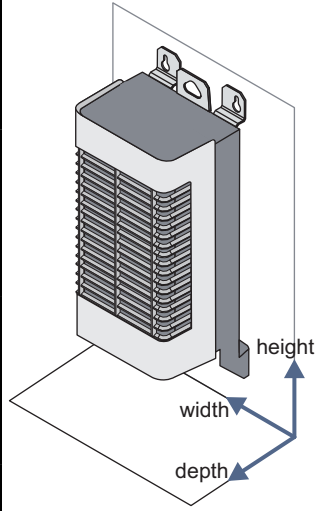
**Installation and mechanical specifications**

**Table 540** FRBG installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• pole/wall installation</li> <li>• directly on the wall installation</li> <li>• vertical book mount</li> </ul>
IP rating	IP65
Related optional items	<ul style="list-style-type: none"> <li>• Flexi Pole Mounting Kit (FPKA/C)</li> <li>• Corona 4T4R Book Mount HW Kit (FMFB)</li> </ul>

**Dimensions and weight**

Table 541 FRBG dimensions and weight

Property	Value	Dimensions orientation
Height	Core RRH: 583 mm (23.0 in) With upper and lower mounting brackets: 888 mm (35.0 in)	
Depth	Core RRH: 158 mm (6.2 in) With plastic cover and mounting brackets: 200 mm (7.9 in)	
Width	Core RRH: 320 mm (12.6 in) With plastic cover and mounting brackets: 331 mm (13.0 in)	
Weight	Core RRH: 24 kg (52.9 lb) With plastic cover and mounting brackets: 26 kg (57.3 lb)	
Volume	With cover: 33 l Without cover: 27 l	

**Environmental specifications**

Table 542 FRBG environmental specifications

Property	Value
Maximum operational outdoor temperature in the shade, assuming wind speed is 3 m/s (at constant high ambient temperature, maximum output power might be limited)	+55°C (131°F)
Maximum operational outdoor temperature in the sun, assuming wind speed is 3 m/s (at constant high ambient temperature, maximum output power might be limited)	+50°C (122°F)
Maximum indoor temperature, assuming wind speed is 0 m/s, valid for fanless products (at constant high ambient temperature, maximum output power might be limited)	+45°C (113°F)
Minimum operational temperature (including cold start)	-40°C (-40°F)

**LEDs**

Table 543 FRBG LEDs

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

Table 543 FRBG LEDs (Cont.)

LED color	Description	Alarm
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Critical alarm affecting fans</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm

**Warnings, cautions or notes related to the product**



**NOTICE:** The RRH should always be mounted in a vertical orientation with connectors on the bottom side to ensure proper cooling.



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

## 13.8 Flexi RRH 4-pipe 720/750 160 W (FRBE)

*FRBE technical specifications.*

### Functional description

*Table 544* FRBE functional specification

Property	Value
Output power	B13: 2x40 W, B29: 2x40 W
MIMO	2TX on B13 and B29
Outdoor installation	yes
SW supported technology	FDD-LTE
TX frequency range	B13: 746-756 MHz B29: 718-728 MHz
RX frequency range	B13: 777-787 MHz
DL instantaneous bandwidth	B13: 10 MHz B29: 10 MHz
UL instantaneous bandwidth	10 MHz
DL filter bandwidth	B13: 10 MHz B29: 10 MHz
UL filter bandwidth	10 MHz

### Interfaces

Figure 122 FRBE interfaces

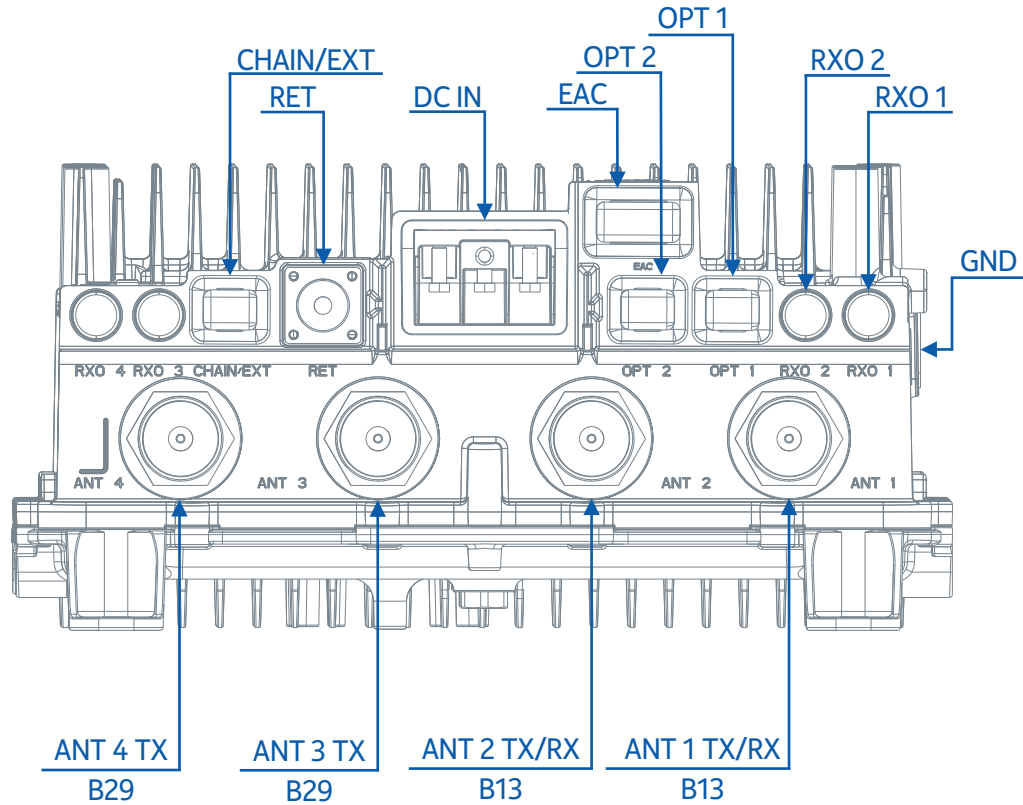


Table 545 FRBE interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	3-pole screw terminal	-
Antenna connector	ANT	4	7/16	-
RF external connector	Rx EXT	2	QMA	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	D-sub MDR14	-
Optical interface	OPT1, OPT2, CHAIN/EXT	3	SFP	6 Gbps, OBSAI
Grounding	Ground symbol	1	M8 or dual M5 screws	GND

**Antenna Line Devices (ALDs) support**

Table 546 FRBE ALD support

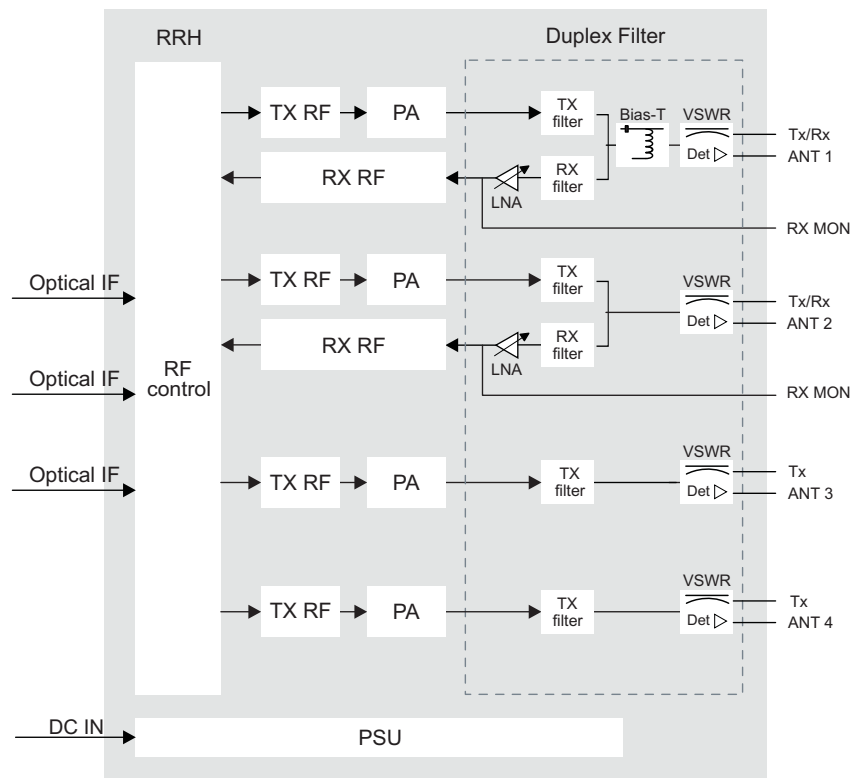
ALD support via antenna ports	Value
AISG	ANT1, RET: AISG 2.0

Table 546 FRBE ALD support (Cont.)

ALD support via antenna ports	Value
Legacy Siemens equipment	No
CWA (for non-AISG installations)	No
Voltage	ANT1: 14.5 V RET: 14.5 V
Power per port	40 W
Power	60 W

**Functional block diagram**

Figure 123 FRBE functional block diagram



**Electrical specifications**

Table 547 FRBE 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**

**Table 548** FRBE power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h		
			Power consumption ETSI 202706 average load $P_{RRH, static}$	Power consumption ETSI 202706 busy hour load $P_{BH, RRH, static}$	Power consumption 100% RF power load $P_{100\% RRH}$
LTE	1/1/1 2T2R	2x20	599	674	798
	1/1/1 2T2R	2x40	705	823	1043
	1/1/1 4T4R	4x20	853	837	1238
	1/1/1 4T4R	4x40	1079	1305	1836

**Installation and mechanical specifications**

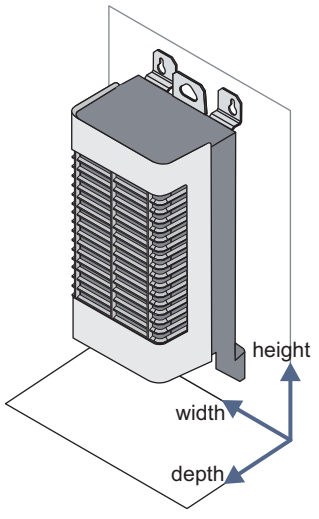
**Table 549** FRBE installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• pole/wall installation</li> <li>• directly on the wall installation</li> <li>• vertical book mount</li> </ul>
IP rating	IP65
Related optional items	<ul style="list-style-type: none"> <li>• Flexi Pole Mounting Kit (FPKA/C)</li> <li>• Corona 4T4R Book Mount HW Kit (FMFB)</li> </ul>

**Dimensions and weight**



Table 550 FRBE dimensions and weight

Property	Value	Dimensions orientation
Height	Core RRH: 583 mm (23.0 in) With upper and lower mounting brackets: 888 mm (35.0 in)	
Depth	Core RRH: 158 mm (6.2 in) With plastic cover and mounting brackets: 200 mm (7.9 in)	
Width	Core RRH: 320 mm (12.6 in) With plastic cover and mounting brackets: 331 mm (13.0 in)	
Weight	Core RRH: 24 kg (52.9 lb) With plastic cover and mounting brackets: 26 kg (57.3 lb)	
Volume	With cover: 33 l Without cover: 27 l	

**Environmental specifications**

Table 551 FRBE environmental specifications

Property	Value
Maximum operational outdoor temperature in the shade, assuming wind speed is 3 m/s (at constant high ambient temperature, maximum output power might be limited)	+55°C (131°F)
Maximum operational outdoor temperature in the sun, assuming wind speed is 3 m/s (at constant high ambient temperature, maximum output power might be limited)	+50°C (122°F)
Maximum indoor temperature, assuming wind speed is 0 m/s, valid for fanless products (at constant high ambient temperature, maximum output power might be limited)	+45°C (113°F)
Minimum operational temperature (including cold start)	-40°C (-40°F)

**LEDs**

Table 552 FRBE LEDs

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

Table 552 FRBE LEDs (Cont.)

LED color	Description	Alarm
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Critical alarm affecting fans</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm

**Warnings, cautions or notes related to the product**



**NOTICE:** The RRH should always be mounted in a vertical orientation with connectors on the bottom side to ensure proper cooling.



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

### 13.9 Flexi RRH 4-pipe 760 160 W (FRBF)

*FRBF technical specifications.*

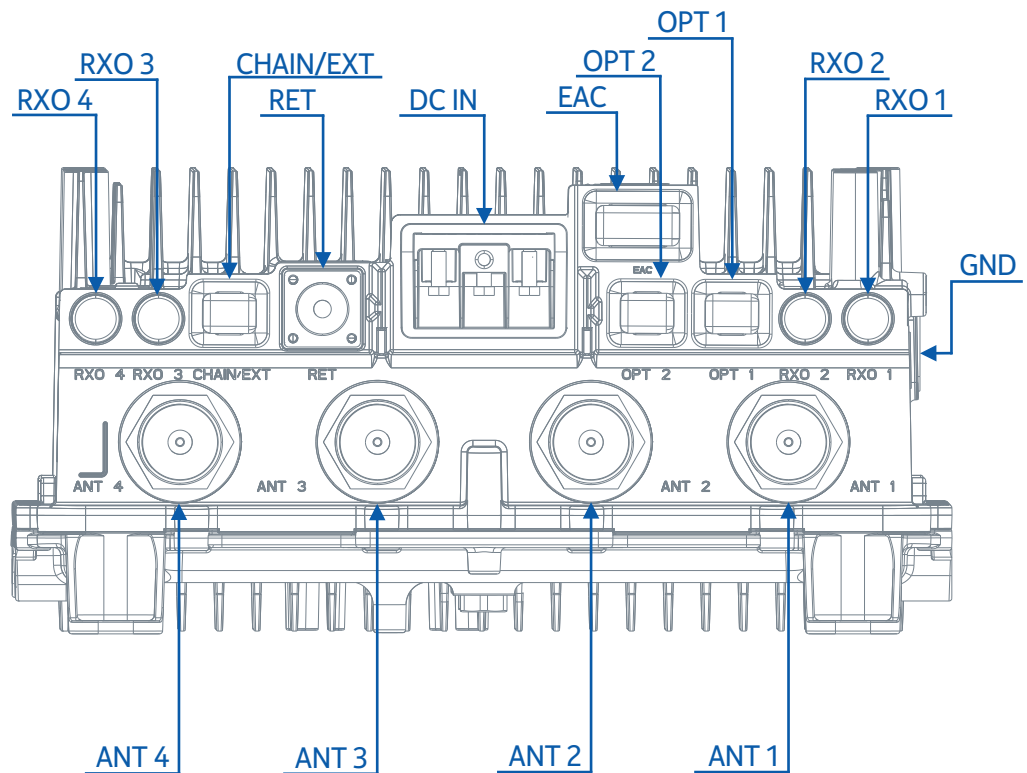
#### Functional description

Table 553 FRBF functional specification

Property	Value
Output power	4x40 W
MIMO	4TX
Outdoor installation	Yes
SW supported technology	FDD-LTE
TX frequency range	758-768 MHz
RX frequency range	788-798 MHz
DL instantaneous bandwidth	10 MHz
UL instantaneous bandwidth	10 MHz
DL filter bandwidth	10 MHz
UL filter bandwidth	10 MHz

#### Interfaces

Figure 124 FRBF interfaces



*Table 554* FRBF interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	3-pole screw terminal	-
Antenna connector	ANT	4	7/16	-
RF external connector	Rx EXT	4	QMA	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	D-sub MDR14	-
Optical interface	OPT1, OPT2, CHAIN/EXT	3	SFP	6 Gbps, OBSAI
Grounding	Ground symbol	1	M8 or dual M5 screws	GND

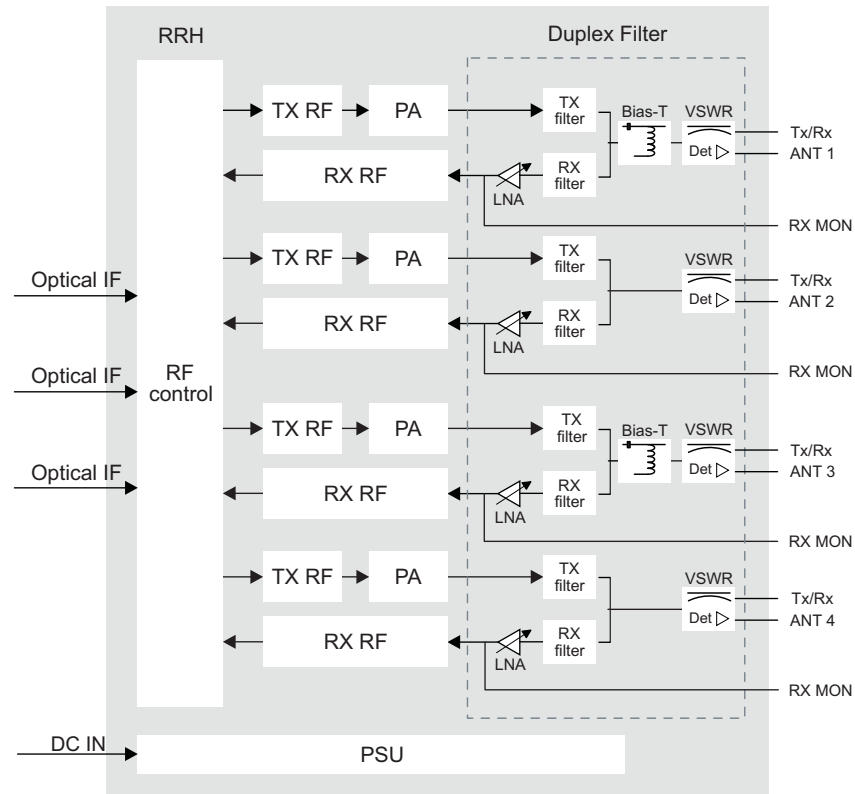
**Antenna Line Devices (ALDs) support**

*Table 555* FRBF ALD support

ALD support via antenna ports	Value
AISG	ANT1, ANT3, RET: AISG 2.0
Legacy Siemens equipment	No
CWA (for non-AISG installations)	No
Voltage	ANT1, ANT3: 14.5 V RET: 14.5 V
Power per port	40 W
Power	60 W

**Functional block diagram**

Figure 125 FRBF functional block diagram



**Electrical specifications**

Table 556 FRBF 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**

Table 557 FRBF power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h		
			Power consumption ETSI 202706 average load $P_{RRH, static}$	Power consumption ETSI 202706 busy hour load $P_{BH, RRH, static}$	Power consumption 100% RF power load $P_{100\% RRH}$
LTE	1/1/1 2T2R	20+20	630	708	864
	1/1/1 2T2R	40+40	778	924	1227
	1/1/1 4T4R	4x20	918	1068	1359
	1/1/1 4T4R	4x40	1219	1506	2127

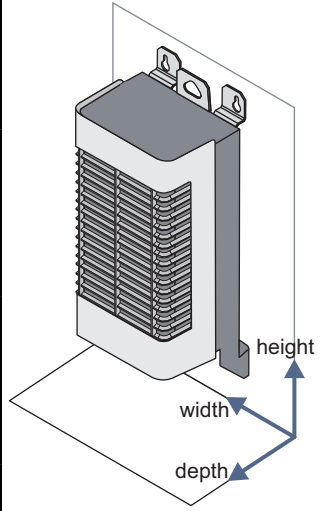
**Installation and mechanical specifications**

Table 558 FRBF installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• pole/wall installation</li> <li>• directly on the wall installation</li> <li>• vertical book mount</li> </ul>
IP rating	IP65
Related optional items	<ul style="list-style-type: none"> <li>• Flexi Pole Mounting Kit (FPKA/C)</li> <li>• Corona 4T4R Book Mount HW Kit (FMFB)</li> </ul>

**Dimensions and weight**

Table 559 FRBF dimensions and weight

Property	Value	Dimensions orientation
Height	Core RRH: 583 mm (23.0 in) With upper and lower mounting brackets: 888 mm (35.0 in)	
Depth	Core RRH: 158 mm (6.2 in) With plastic cover and mounting brackets: 200 mm (7.9 in)	
Width	Core RRH: 320 mm (12.6 in) With plastic cover and mounting brackets: 331 mm (13.0 in)	
Weight	Core RRH: 24 kg (52.9 lb) With plastic cover and mounting brackets: 26 kg (57.3 lb)	
Volume	With cover: 33 l Without cover: 27 l	

**Environmental specifications**

Table 560 FRBF environmental specifications

Property	Value
Maximum operational outdoor temperature in the shade, assuming wind speed is 3 m/s (at constant high ambient temperature, maximum output power might be limited)	+55°C (131°F)
Maximum operational outdoor temperature in the sun, assuming wind speed is 3 m/s (at constant high ambient temperature, maximum output power might be limited)	+50°C (122°F)
Maximum indoor temperature, assuming wind speed is 0 m/s, valid for fanless products (at constant high ambient temperature, maximum output power might be limited)	+45°C (113°F)
Minimum operational temperature (including cold start)	-40°C (-40°F)

**LEDs**

Table 561 FRBF LEDs

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

Table 561 FRBF LEDs (Cont.)

LED color	Description	Alarm
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Critical alarm affecting fans</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm

**Warnings, cautions or notes related to the product**



**NOTICE:** The RRH should always be mounted in a vertical orientation with connectors on the bottom side to ensure proper cooling.



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



## 13.10 Flexi RRH 4-pipe 1800 160 W (FHED)

*FHED technical specifications.*

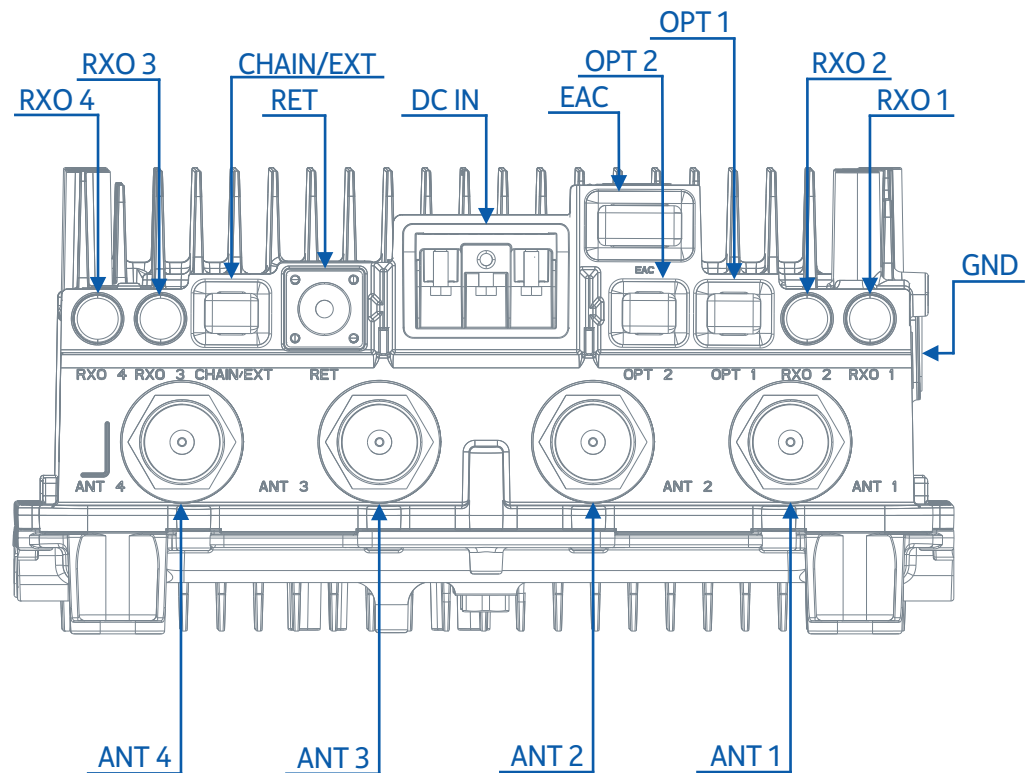
### Functional description

Table 562 FHED functional specification

Property	Value
Output power	4x40 W
MIMO	4TX
Outdoor installation	Yes
SW supported technology	FDD-LTE
TX frequency range	1805-1880 MHz
RX frequency range	1710-1785 MHz
DL instantaneous bandwidth	65 MHz
UL instantaneous bandwidth	65 MHz
DL filter bandwidth	75 MHz
UL filter bandwidth	75 MHz

### Interfaces

Figure 126 FHED interfaces



**Table 563** FHED interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	3-pole screw terminal	-
Antenna connector	ANT	4	4.3-10	-
RF external connector	RXO	4	QMA	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	D-sub MDR14	-
Optical interface	OPT1, OPT2, CHAIN/EXT	3	SFP	6 Gbps, OBSAI
Grounding	Ground symbol	1	M8 or dual M5 screws	GND

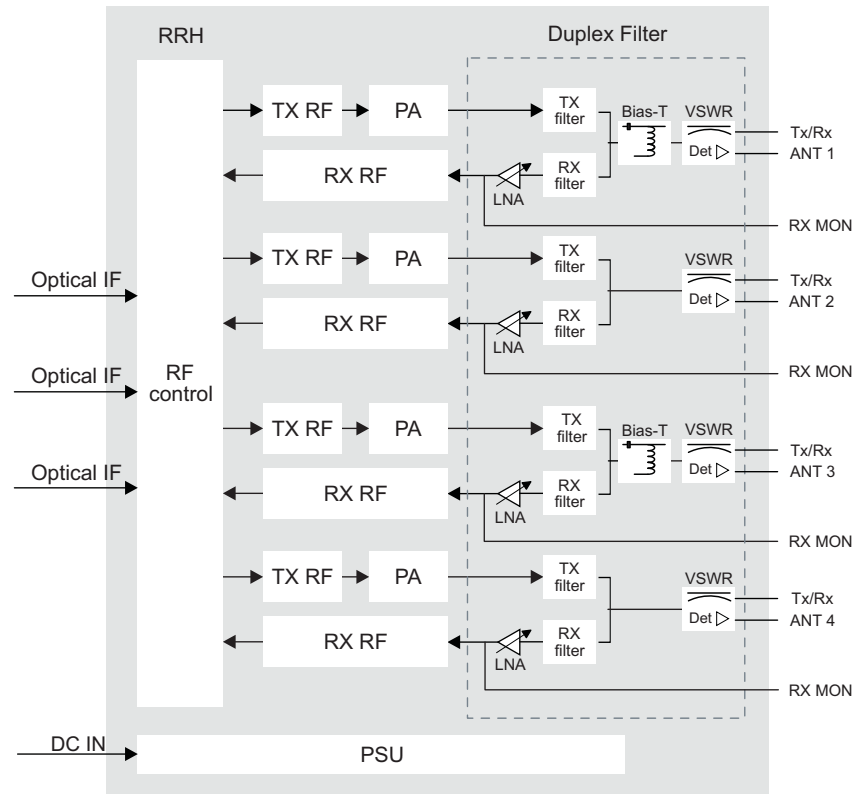
**Antenna Line Devices (ALDs) support**

**Table 564** FHED ALD support

ALD support via antenna ports	Value
AISG	ANT1, ANT3, RET: AISG 2.0
Proprietary AISG 1.1	No
CWA (for non-AISG installations)	No
Voltage	ANT1, ANT3: 14.5 V RET: 14.5 V
Power per port	40 W
Power	60 W

**Functional block diagram**

Figure 127 FHED functional block diagram



**Electrical specifications**

Table 565 FHED 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**

**Table 566** FHED power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h Values preliminary estimated.		
			Power consumption ETSI 202706 average load $P_{RRH, static}$	Power consumption ETSI 202706 busy hour load $P_{BH RRH, static}$	Power consumption 100% RF power load $P_{100\% RRH}$
LTE	1/1/1 2T2R	20+20	627	693	836
	1/1/1 2T2R	40+40	766	891	1175
	1/1/1 4T4R	4x20	895	1000	1331
	1/1/1 4T4R	4x40	1222	1501	2115

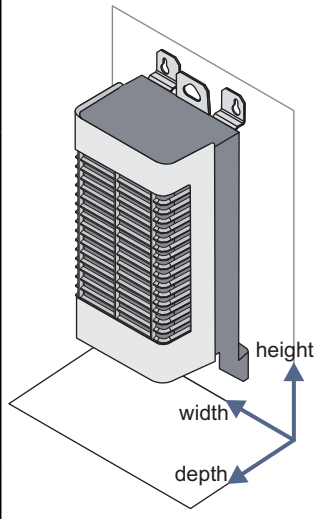
**Installation and mechanical specifications**

**Table 567** FHED installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• pole/wall installation</li> <li>• directly on the wall installation</li> <li>• vertical book mount</li> </ul>
IP rating	IP65
Related optional items	<ul style="list-style-type: none"> <li>• Flexi Pole Mounting Kit (FPKA/C)</li> <li>• Corona 4T4R Book Mount HW Kit (FMFB)</li> </ul>

**Dimensions and weight**

Table 568 FHED dimensions and weight

Property	Value	Dimensions orientation
Height	Core RRH: 583 mm (23.0 in) With upper and lower mounting brackets: 888 mm (35.0 in)	
Depth	Core RRH: 158 mm (6.2 in) With plastic cover and mounting brackets: 200 mm (7.9 in)	
Width	Core RRH: 320 mm (12.6 in) With plastic cover and mounting brackets: 331 mm (13.0 in)	
Weight	Core RRH: 24 kg (52.9 lb) With plastic cover and mounting brackets: 26 kg (57.3 lb)	
Volume	With cover: 33 l Without cover: 27 l	

**Environmental specifications**

Table 569 FHED environmental specifications

Property	Value
Maximum operational outdoor temperature in the shade, assuming wind speed is 3 m/s (at constant high ambient temperature, maximum output power might be limited)	+55°C (131°F)
Maximum operational outdoor temperature in the sun, assuming wind speed is 3 m/s (at constant high ambient temperature, maximum output power might be limited)	+50°C (122°F)
Maximum indoor temperature, assuming wind speed is 0 m/s, valid for fanless products (at constant high ambient temperature, maximum output power might be limited)	+45°C (113°F)
Minimum operational temperature (including cold start)	-40°C (-40°F)

**LEDs**

Table 570 FHED LEDs

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

Table 570 FHED LEDs (Cont.)

LED color	Description	Alarm
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Critical alarm affecting fans</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm

**Warnings, cautions or notes related to the product**



**NOTICE:** The RRH should always be mounted in a vertical orientation with connectors on the bottom side to ensure proper cooling.



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

## 13.11 Flexi RRH 4-pipe 1800 160 W (FHEH)

*FHEH technical specifications.*

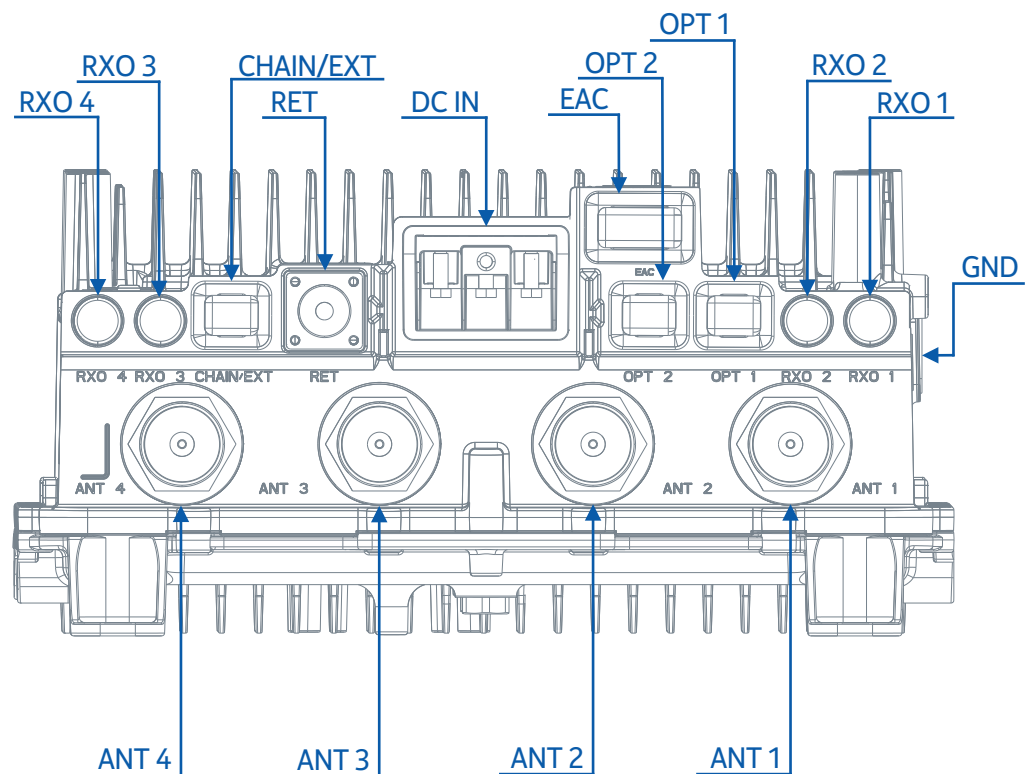
### Functional description

Table 571 FHEH functional specification

Property	Value
Output power	4x40 W
MIMO	4TX
Outdoor installation	Yes
SW supported technology	FDD-LTE
TX frequency range	1850-1880 MHz
RX frequency range	1755-1785 MHz
DL instantaneous bandwidth	30 MHz
UL instantaneous bandwidth	30 MHz
DL filter bandwidth	30 MHz
UL filter bandwidth	30 MHz

### Interfaces

Figure 128 FHEH interfaces



*Table 572* FHEH interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	3-pole screw terminal	-
Antenna connector	ANT	4	7/16	-
RF external connector	RXO	4	QMA	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	D-sub MDR14	-
Optical interface	OPT1, OPT2, CHAIN/EXT	3	SFP	6 Gbps, OBSAI
Grounding	Ground symbol	1	M8 or dual M5 screws	GND

**Antenna Line Devices (ALDs) support**

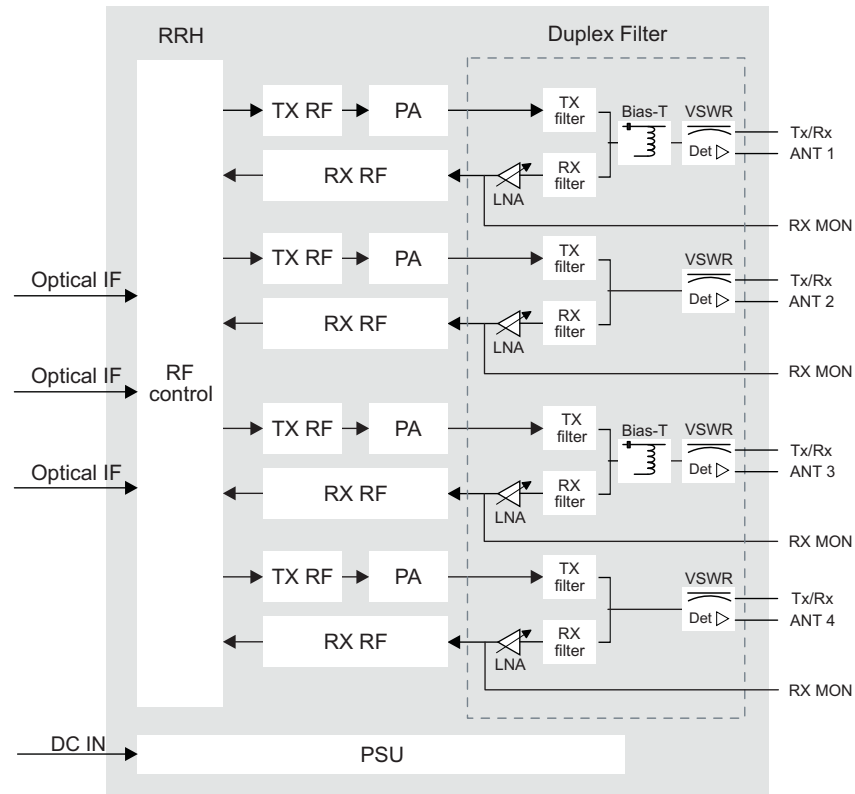
*Table 573* FHEH ALD support

ALD support via antenna ports	Value
AISG	ANT1, ANT3, RET: AISG 2.0
Proprietary AISG 1.1	No
CWA (for non-AISG installations)	No
Voltage	ANT1, ANT3: 14.5 V RET: 14.5 V
Power per port	40 W
Power	60 W

**Functional block diagram**



Figure 129 FHEH functional block diagram



**Electrical specifications**

Table 574 FHEH 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**

*Table 575* FHEH power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h Values preliminary estimated.		
			Power consumption ETSI 202706 average load $P_{RRH, static}$	Power consumption ETSI 202706 busy hour load $P_{BH RRH, static}$	Power consumption 100% RF power load $P_{100\% RRH}$
LTE	1/1/1 2T2R	20+20	615	679	766
	1/1/1 2T2R	40+40	758	897	1172
	1/1/1 4T4R	4x20	895	1043	1338
	1/1/1 4T4R	4x40	1264	1574	2018

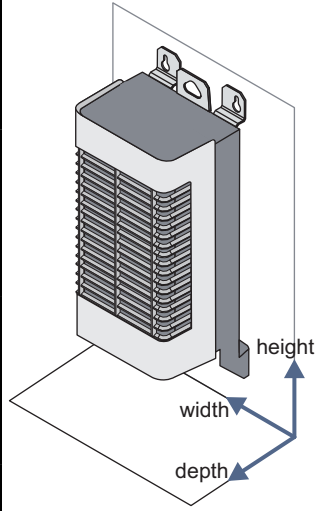
**Installation and mechanical specifications**

*Table 576* FHEH installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• pole/wall installation</li> <li>• directly on the wall installation</li> <li>• vertical book mount</li> </ul>
IP rating	IP65
Related optional items	<ul style="list-style-type: none"> <li>• Flexi Pole Mounting Kit (FPKA/C)</li> <li>• Corona 4T4R Book Mount HW Kit (FMFB)</li> </ul>

**Dimensions and weight**

Table 577 FHEH dimensions and weight

Property	Value	Dimensions orientation
Height	Core RRH: 583 mm (23.0 in) With upper and lower mounting brackets: 888 mm (35.0 in)	
Depth	Core RRH: 158 mm (6.2 in) With plastic cover and mounting brackets: 200 mm (7.9 in)	
Width	Core RRH: 320 mm (12.6 in) With plastic cover and mounting brackets: 331 mm (13.0 in)	
Weight	Core RRH: 24 kg (52.9 lb) With plastic cover and mounting brackets: 26 kg (57.3 lb)	
Volume	With cover: 33 l Without cover: 27 l	

**Environmental specifications**

Table 578 FHEH environmental specifications

Property	Value
Maximum operational outdoor temperature in the shade, assuming wind speed is 3 m/s (at constant high ambient temperature, maximum output power might be limited)	+55°C (131°F)
Maximum operational outdoor temperature in the sun, assuming wind speed is 3 m/s (at constant high ambient temperature, maximum output power might be limited)	+50°C (122°F)
Maximum indoor temperature, assuming wind speed is 0 m/s, valid for fanless products (at constant high ambient temperature, maximum output power might be limited)	+45°C (113°F)
Minimum operational temperature (including cold start)	-40°C (-40°F)

**LEDs**

Table 579 FHEH LEDs

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

Table 579 FHEH LEDs (Cont.)

LED color	Description	Alarm
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Critical alarm affecting fans</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm

**Warnings, cautions or notes related to the product**



**NOTICE:** The RRH should always be mounted in a vertical orientation with connectors on the bottom side to ensure proper cooling.



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

## 13.12 Flexi RRH 4-pipe 1900 160 W (FHFB)

*FHFB technical specifications.*

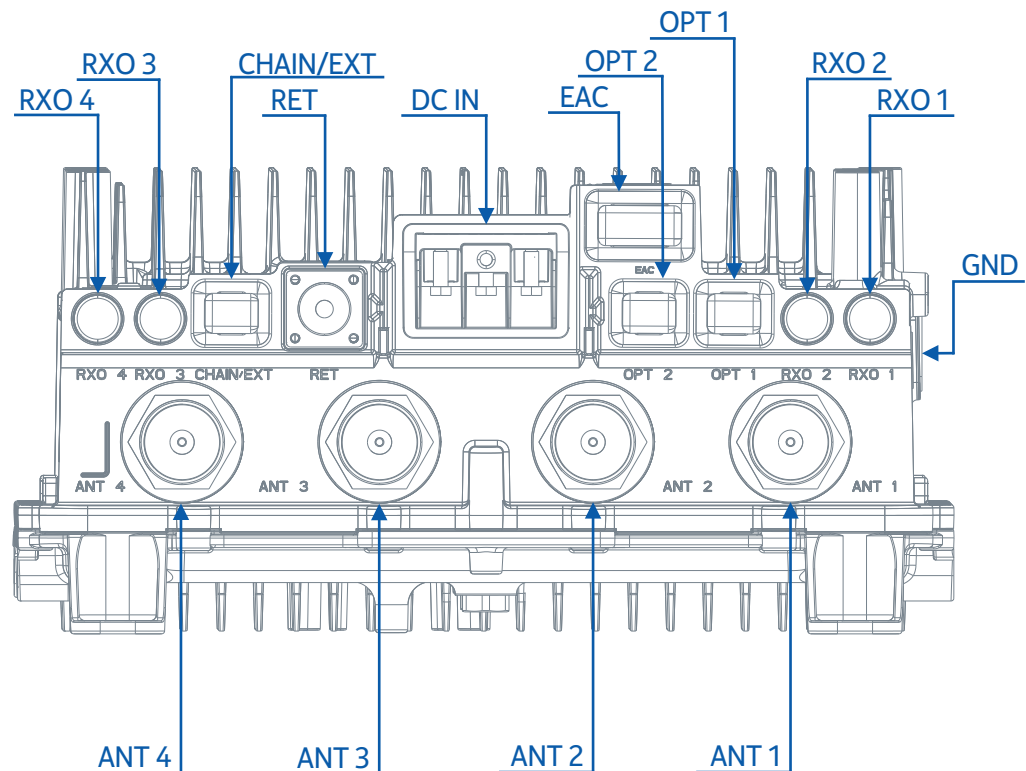
### Functional description

Table 580 FHFB functional specification

Property	Value
Output power	4x40 W
MIMO	4TX
Outdoor installation	Yes
SW supported technology	WCDMA, FDD-LTE
TX frequency range	1930-1995 MHz
RX frequency range	1850-1915 MHz
DL instantaneous bandwidth	65 MHz
UL instantaneous bandwidth	65 MHz
DL filter bandwidth	65 MHz
UL filter bandwidth	65 MHz

### Interfaces

Figure 130 FHFB interfaces



*Table 581* FHFB interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	3-pole screw terminal	-
Antenna connector	ANT	4	7/16	-
RF external connector	RXO	4	QMA	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	D-sub MDR14	-
Optical interface	OPT1, OPT2, CHAIN/EXT	3	SFP	6 Gbps, OBSAI
Grounding	Ground symbol	1	M8 or dual M5 screws	GND

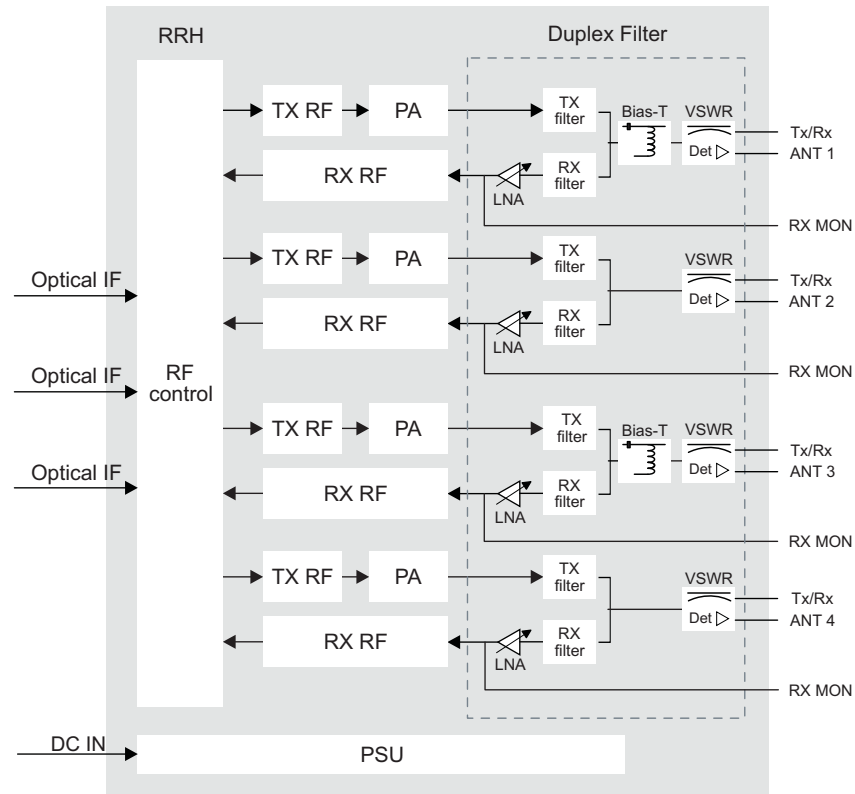
**Antenna Line Devices (ALDs) support**

*Table 582* FHFB ALD support

ALD support via antenna ports	Value
AISG	ANT1, ANT3, RET: AISG 2.0
Proprietary AISG 1.1	No
CWA (for non-AISG installations)	No
Voltage	ANT1, ANT3: 14.5 V RET: 14.5 V
Power per port	40 W
Power	60 W

**Functional block diagram**

Figure 131 FHFB functional block diagram



**Electrical specifications**

Table 583 FHFB 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**

*Table 584* FHFB power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h		
			Power consumption ETSI 202706 average load $P_{RRH, static}$	Power consumption ETSI 202706 busy hour load $P_{BH RRH, static}$	Power consumption 100% RF power load $P_{100\% RRH}$
WCDMA	1/1/1	20	507	537	611
	2/2/2	20	590	646	782
	3/3/3	20	715	803	1016
	4/4/4	20	800	915	1196
LTE	1/1/1 4T4R	4x20	891	1037	1357
	1/1/1 4T4R	4x40	1229	1500	2088

**Installation and mechanical specifications**

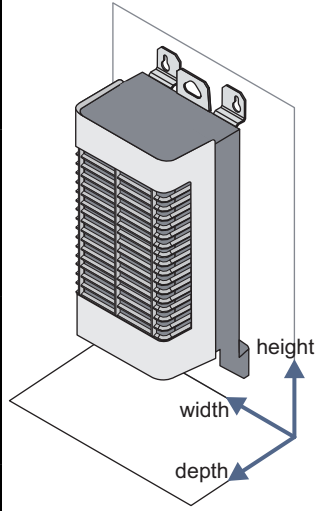
*Table 585* FHFB installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• pole/wall installation</li> <li>• directly on the wall installation</li> </ul>
IP rating	IP65
Related optional items	<ul style="list-style-type: none"> <li>• Flexi Pole Mounting Kit (FPKA/C)</li> </ul>

**Dimensions and weight**



Table 586 FHFB dimensions and weight

Property	Value	Dimensions orientation
Height	Core RRH: 583 mm (23.0 in) With upper and lower mounting brackets: 888 mm (35.0 in)	
Depth	Core RRH: 158 mm (6.2 in) With plastic cover and mounting brackets: 200 mm (7.9 in)	
Width	Core RRH: 320 mm (12.6 in) With plastic cover and mounting brackets: 331 mm (13.0 in)	
Weight	Core RRH: 23 kg (50.7 lb) With plastic cover and mounting brackets: 25 kg (55.1 lb)	
Volume	With cover: 33 l Without cover: 27 l	

**Environmental specifications**

Table 587 FHFB environmental specifications

Property	Value
Maximum operational outdoor temperature in the shade, assuming wind speed is 3 m/s (at constant high ambient temperature, maximum output power might be limited)	+55°C (131°F)
Maximum operational outdoor temperature in the sun, assuming wind speed is 3 m/s (at constant high ambient temperature, maximum output power might be limited)	+50°C (122°F)
Maximum indoor temperature, assuming wind speed is 0 m/s, valid for fanless products (at constant high ambient temperature, maximum output power might be limited)	+45°C (113°F)
Minimum operational temperature (including cold start)	-40°C (-40°F)

**LEDs**

Table 588 FHFB LEDs

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

Table 588 FHFB LEDs (Cont.)

LED color	Description	Alarm
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Critical alarm affecting fans</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm

**Warnings, cautions or notes related to the product**



**NOTICE:** The RRH should always be mounted in a vertical orientation with connectors on the bottom side to ensure proper cooling.



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

### 13.13 Flexi RRH 4-pipe 2600 160 W (FRHG)

*FRHG technical specifications.*

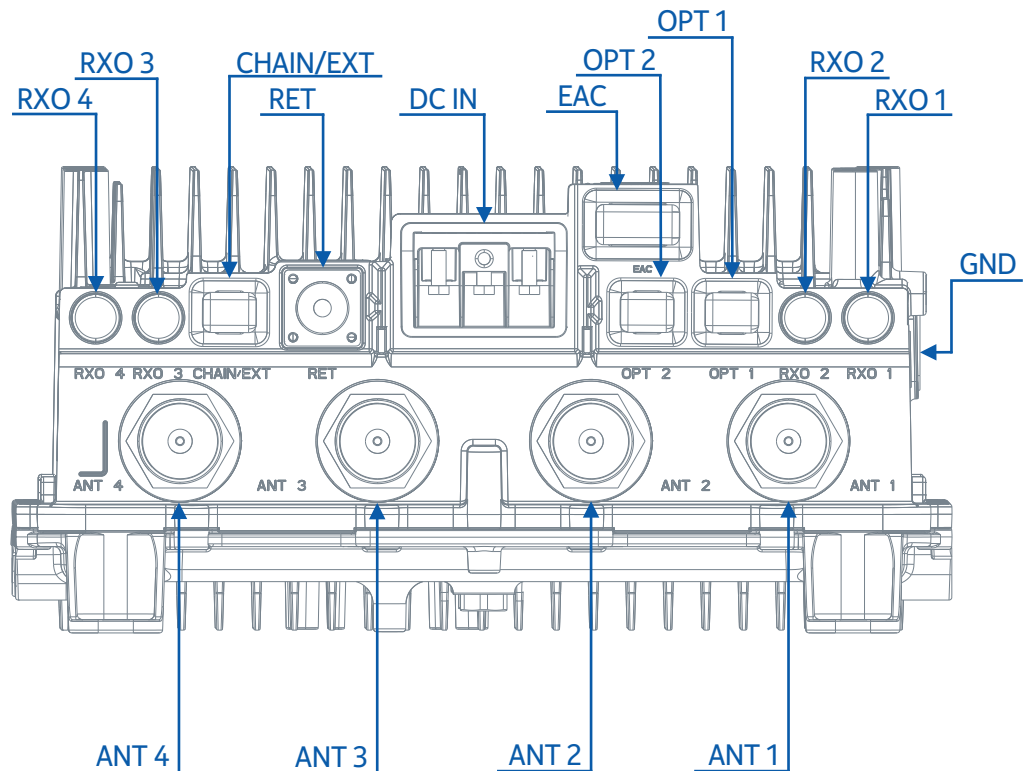
#### Functional description

Table 589 FRHG functional specification

Property	Value
Output power	4x40 W
MIMO	4TX
Outdoor installation	Yes
SW supported technology	FDD-LTE
TX frequency range	2620-2690 MHz
RX frequency range	2500-2570 MHz
DL instantaneous bandwidth	65 MHz
UL instantaneous bandwidth	65 MHz
DL filter bandwidth	70 MHz
UL filter bandwidth	70 MHz

#### Interfaces

Figure 132 FRHG interfaces



*Table 590* FRHG interfaces

Interface	Label on the HW	Number of interfaces	Connector type	Additional info
Power connector	DC IN	1	3-pole screw terminal	-
Antenna connector	ANT	4	4.3-10	-
RF external connector	RXO	4	QMA	-
Remote Electrical Tilt	RET	1	8-pin circular	-
External Alarm Connection	EAC	1	D-sub MDR14	-
Optical interface	OPT1, OPT2, CHAIN/EXT	3	SFP	6 Gbps, OBSAI
Grounding	Ground symbol	1	M8 or dual M5 screws	GND

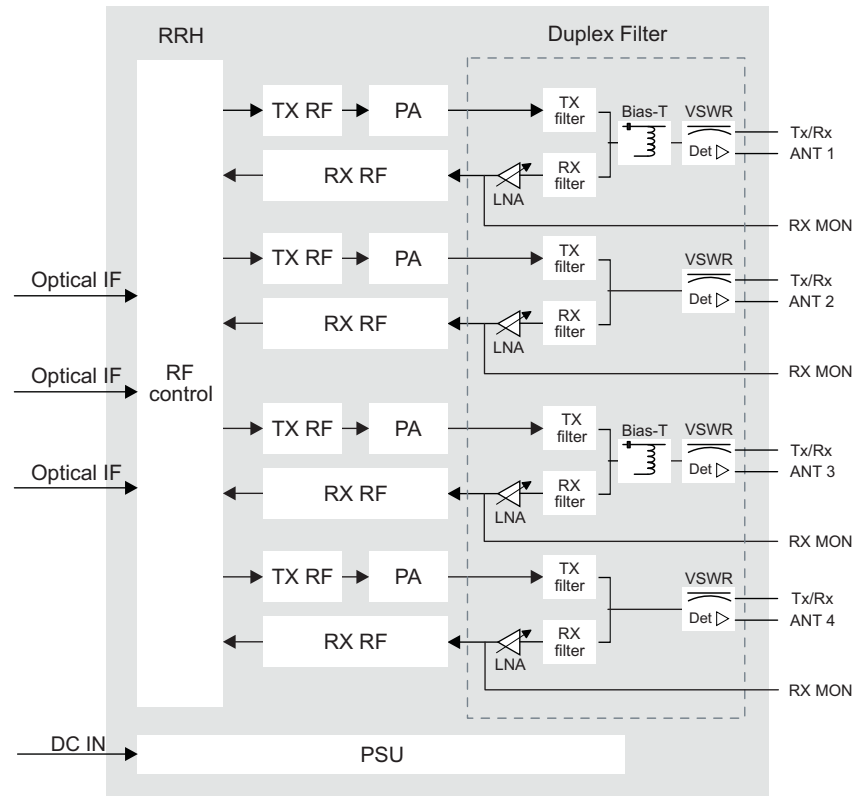
**Antenna Line Devices (ALDs) support**

*Table 591* FRHG ALD support

ALD support via antenna ports	Value
AISG	ANT1, ANT3, RET: AISG 2.0
Proprietary AISG 1.1	No
CWA (for non-AISG installations)	No
Voltage	ANT1, ANT3: 14.5 V RET: 14.5 V
Power per port	40 W
Power	60 W

**Functional block diagram**

Figure 133 FRHG functional block diagram



**Electrical specifications**

Table 592 FRHG 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**

**Table 593** FRHG power consumption

Mode	Configuration	Output power per carrier [W]	Estimated power consumption [W] at 48VDC input at 25°C. Non-committed estimated values depend on the final product HW and SW optimization with +/- 10% margin. Average = (6h low hour load, 10h medium hour load and 8h busy hour load) / 24h		
			Power consumption ETSI 202706 average load $P_{RRH, static}$	Power consumption ETSI 202706 busy hour load $P_{BH, RRH, static}$	Power consumption 100% RF power load $P_{100\% RRH}$
LTE	1/1/1 2T2R	2x20	626	712	884
	1/1/1 2T2R	2x40	732	898	1216
	1/1/1 4T4R	4x20	942	1117	1466
	1/1/1 4T4R	4x40	1160	1431	2141

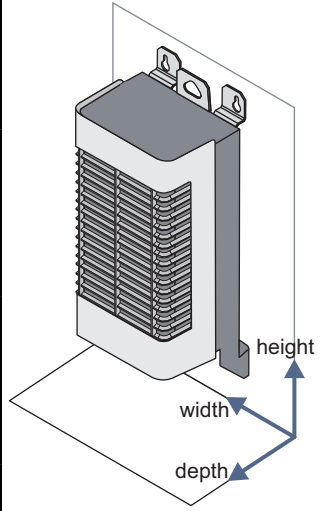
**Installation and mechanical specifications**

**Table 594** FRHG installation and mechanical specifications

Property	Value
Installation options	<ul style="list-style-type: none"> <li>• pole/wall installation</li> <li>• directly on the wall installation</li> <li>• vertical book mount</li> </ul>
IP rating	IP65
Related optional items	<ul style="list-style-type: none"> <li>• Flexi Pole Mounting Kit (FPKA/C)</li> <li>• Corona 4T4R Book Mount HW Kit (FMFB)</li> </ul>

**Dimensions and weight**

Table 595 FRHG dimensions and weight

Property	Value	Dimensions orientation
Height	Core RRH: 583 mm (23.0 in) With upper and lower mounting brackets: 888 mm (35.0 in)	
Depth	Core RRH: 158 mm (6.2 in) With plastic cover and mounting brackets: 200 mm (7.9 in)	
Width	Core RRH: 320 mm (12.6 in) With plastic cover and mounting brackets: 331 mm (13.0 in)	
Weight	Core RRH: 24 kg (52.9 lb) With plastic cover and mounting brackets: 26 kg (57.3 lb)	
Volume	With cover: 33 l Without cover: 27 l	

**Environmental specifications**

Table 596 FRHG environmental specifications

Property	Value
Maximum operational outdoor temperature in the shade, assuming wind speed is 3 m/s (at constant high ambient temperature, maximum output power might be limited)	+55°C (131°F)
Maximum operational outdoor temperature in the sun, assuming wind speed is 3 m/s (at constant high ambient temperature, maximum output power might be limited)	+50°C (122°F)
Maximum indoor temperature, assuming wind speed is 0 m/s, valid for fanless products (at constant high ambient temperature, maximum output power might be limited)	+45°C (113°F)
Minimum operational temperature (including cold start)	-40°C (-40°F)

**LEDs**

Table 597 FRHG LEDs

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

Table 597 FRHG LEDs (Cont.)

LED color	Description	Alarm
Red, blinking	Operation degraded <ul style="list-style-type: none"> <li>Major alarm affecting the whole RF Module</li> <li>Critical alarm affecting fans</li> <li>Major/Critical alarm affecting a module subcomponent or antenna carrier</li> </ul>	Major/critical alarm
Yellow, stable	<ul style="list-style-type: none"> <li>Until software download begins</li> <li>The carriers are blocked from BTS</li> <li>There is no connection to any System Module</li> </ul>	No alarm
Yellow, blinking	<ul style="list-style-type: none"> <li>Software download in progress</li> <li>Configuration in progress: RF resources are being setup, but not yet activated</li> </ul>	No alarm
Green, stable	<ul style="list-style-type: none"> <li>Software configuration is complete or supervisory: RF resources activated and transmission is possible</li> <li>Working normally, no alarm on the RF Module</li> </ul>	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 device faulty/degraded	No alarm
Blinking Colors (Red, Yellow, and Green), each color stable for 0.5 second	Module highlighting (Flexi BTS SM functionality that can help identifying faulty module)	No alarm

**Warnings, cautions or notes related to the product**



**NOTICE:** The RRH should always be mounted in a vertical orientation with connectors on the bottom side to ensure proper cooling.



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



## 14 Compliance with EMC, RF and safety

*EMC mission, EMC immunity, RF, and safety standards for Flexi BTS.*

In Europe, this means compliance with Directive 1999/5/EC of the European Parliament and of the Council of 9 March 1999 on radio equipment and telecommunications terminal equipment and the mutual recognition of their conformity.

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

### **EMC emission**

- Common:
  - ETSI EN 301 489-1: Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements
  - ETSI EN 301 489-50: Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 50: Specific conditions for Cellular Communication Base Station (BS), repeater and ancillary equipment
  - EN 55022: Information technology equipment - Radio disturbance characteristics - Limits and methods of measurement
  - 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:
  - ETSI EN 301 489-8: Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic compatibility (EMC) standard for radio equipment services; Part 8: Specific conditions for GSM base stations
- WCDMA:
  - 3GPP TS 25.113: 3rd Generation Partnership Project; Technical Specification Group Radio Access Networks; Base station and Repeater electromagnetic compatibility (EMC)
  - ETSI EN 301 489-23: Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 23: Specific conditions for IMT-2000 CDMA, Direct Spread (UTRA and E-UTRA) Base Station (BS) radio, repeater and ancillary equipment
- LTE:

- 3GPP TS 36.113: 3rd Generation Partnership Project; Technical Specification Group Radio Access Networks; Evolved Universal Terrestrial Radio Access (E-UTRA); Base Station (BS) and Repeater electromagnetic compatibility (EMC)

### **EMC immunity**

- Common:
  - ETSI EN 301 489-1: Electromagnetic Compatibility and Radio Spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 1: Common technical requirements
  - ETSI EN 301 489-50: Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 50: Specific conditions for Cellular Communication Base Station (BS), repeater and ancillary equipment
  - 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)
- GSM/EDGE:
  - ETSI EN 301 489-8: Electromagnetic compatibility and Radio spectrum Matters (ERM); Electromagnetic compatibility (EMC) standard for radio equipment services; Part 8: Specific conditions for GSM base stations
- WCDMA:
  - ETSI EN 301 489-23: Electromagnetic Compatibility and Radio Spectrum Matters (ERM); Electromagnetic Compatibility (EMC) standard for radio equipment and services; Part 23: Specific conditions for IMT-2000 CDMA, Direct Spread (UTRA and E-UTRA) Base Station (BS) radio, repeater and ancillary equipment
  - 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)

### **RF**

- Common:

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- 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 Apparatus
  - 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:

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- 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

### **Safety**

- EN 50383: Basic Standards for the calculation and measurement of the electromagnetic field strength and SAR related to human exposure from radio base stations and fixed terminal stations for wireless telecommunications system (110 MHz - 40 GHz)
- EN 50384: Product standard to demonstrate the compliance 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 - 40 GHz) - Occupational
- 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 - 40 GHz) - General public
- EN 60215: Safety requirements for radio transmitting equipment
- 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

## 15 Avoiding Passive Intermodulation during RF Module and RRH operation

In wideband frequencies when several transmitting and receiving signals are sharing same hardware there could be noted effect called Passive Intermodulation (PIM) Interference. Using RF Modules might cause a potential risk of generating third-order intermodulation that results in distortions in own receiver (RX) channel. Antenna Line Devices (ALD) have important role in preventing Passive Intermodulation generation, even if used RF Module and RRH performance at the antenna connector complies with 3GPP requirements. Poor PIM performance of ALD might degrade significantly the reference sensitivity. ALDs, like MHAs, provided by Nokia have high PIM requirements.

The risk might be high in the following cases:

- maximum bandwidth (BW) used for the carriers is more than 0.5 x duplex separation of the band
- carriers in configuration are wideband in nature (for example WCDMA or LTE), or combination of wideband and narrow band carriers (for example RF sharing GSM-WCDMA or GSM-LTE).
- antenna line PIM performance is poor, or not on the required level for the configuration.

*Table 598* Typical reference sensitivity degradation with different Antenna line PIM performance.

PIM performance	Typical degradation	Note
-140 dBc @ 2x43 dBm	~10 dB	High degradation, carrier configuration unusable in many cases
-153 dBc @ 2x43 dBm	~2 dB	Modest degradation, tolerable in many cases
-161 dBc @ 2x43 dBm	~0.2 dB	Minimal degradation, however, difficult to reach on the typical site environment.

When using wideband carrier configurations where PIM products fall into own receiver band, it is recommended that antenna line PIM performance is at least -153 dBc measured with 2 x 43dB test signals.

However, this kind of performance might be very difficult to achieve and maintain over time in outdoor environment due to mechanisms behind the PIM including corrosion, oxidation, material imperfections, and defects in workmanship. Some of these parameters might change, and can degrade performance during operation. Taking that into consideration, it is highly recommended not to use carrier configurations which are generating intermodulation results in landing in own receiver channels.