

**Nokia Siemens Networks Antenna Systems,
Product Documentation, v. 1**

**Masthead Amplifier (MHA)
Product Description**

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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.

Changes between issues 10-1 and 10-2

The document has been renamed from *Nokia MHA Product Description* to *Masthead Amplifier (MHA) Product Description*. References to 'Nokia' have been removed. Product line 'Nokia Antenna Line' has been renamed to 'Antenna Systems'.

Changes between issues 10-0 and 10-1

Editorial changes have been carried out: in Section *Nokia MHA product ordering codes* MGTA has been changed to MDGA.

Changes between issues 9-0 and 10-0

Editorial changes have been carried out: titles of specification sections have been changed and harmonised.

Summary of changes has been introduced.

Editorial changes have been done.

WMHD figure has been updated.

1

Masthead Amplifier unit description

A Masthead Amplifier (MHA) system is made up of a Dual MHA unit, an external or internal Bias-T, and jumper cables.

The main benefits of the MHA are:

- reduces system noise figure,
- increases uplink capacity,
- compensates for feeder and combiner losses in the uplink direction, increasing coverage for suburban, rural and road sites where antennas are in very high positions and the feeder lines are long,
- allows mobiles to reduce transmission power level,
- improves mobile station battery lifetime,
- provides support for Advanced AISG monitoring and control of antenna line equipment,
- has built in AISG support for Remote Antenna Tilt Motors.



Note

Due to the construction of a Dual MHA, the terminology can vary between “MHA” and “Dual MHA”. However, the context is the best source in determining which unit is in question.

This document describes the MHA unit, which is a component of the whole MHA subsystem.

For MHA installation instructions, see *Mounting Dual MHA units*.

The MHA is a dual unit that includes two MHAs in a single enclosure. An MHA is a weatherproofed enclosure rated to IP67, including the 7-16 connectors. MHA is grounded by an M8 grounding stud and strap, which provides the discharge path for the lightning suppression circuits in the MHA.

The MHA connects to a BTS receive antenna. The MHA compensates for antenna feeder line losses between the receiver antenna and the front end of the BTS receiver. It amplifies the uplink signal from the mobile as received by the BTS RX antenna. This is achieved by the use of a Low Noise Amplifier (LNA) inside the MHA.

The MHA is connected to the BTS through the antenna feeder line and the Bias-T, which is directly connected to the BTS antenna connector. Using an LNA with a low noise figure reduces the overall noise contribution of the antenna feeder, the net effect being an improvement in BTS receive sensitivity.

The MHA unit is designed for duplex operation so it can be used with a TX/RX antenna line. This requires the use of duplex filters within the unit to provide a transmit-only path and a receive-only path. The receive path is through the LNA section, with RX filters on the input and output of the LNA. A TX filter provides the duplex path for the TX signals. A Bias-T circuit in the MHA de-couples the DC voltage supply provided through the antenna line and powers the LNA.

The MHA unit has a RET connector that is used to support AISG DC power and control. This is a two-way communication port that will support AISG enabled devices.

A dual MHA has the following external connectors:

- 2 pieces of 7-16 DIN female (marked BTS) to connect the Bias-T with a jumper cable
- 2 pieces of 7-16 DIN female (marked antenna) to connect the antenna with a flexible jumper cable
- RET connector
- M8 grounding stud

MHA Components

The Dual MHA unit is designed specifically for Antenna Systems to be used with UltraSite / MetroSite / Flexi EDGE/WCDMA Base Stations. The MHA sub-unit consists of the following components:

- dual low noise amplifiers (LNA)
- temperature stability circuits
- high Q, low loss RX and TX duplex filters
- supervision circuitry to monitor the status of the amplifiers and to send alarm signals to the BTS in the event of failure
- current extraction circuitry at the BTS port for DC feed through the coaxial feeder
- lightning protection circuitry at all ports
- path for AISG DC Power and control from BTS 1 to ANT 1
- Bias-T circuits that convert AISG DC power from coax to separate DC power and data lines, and backwards.

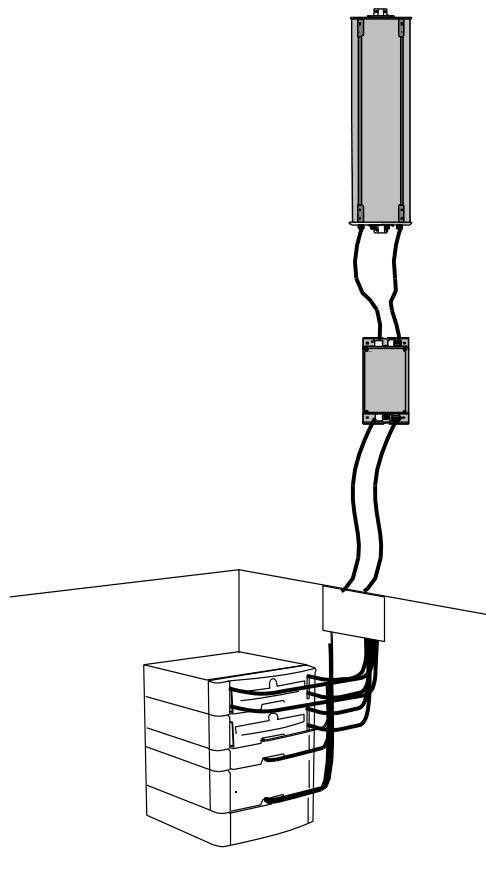


Figure 1. WCDMA Flexi Antenna Line, optimized

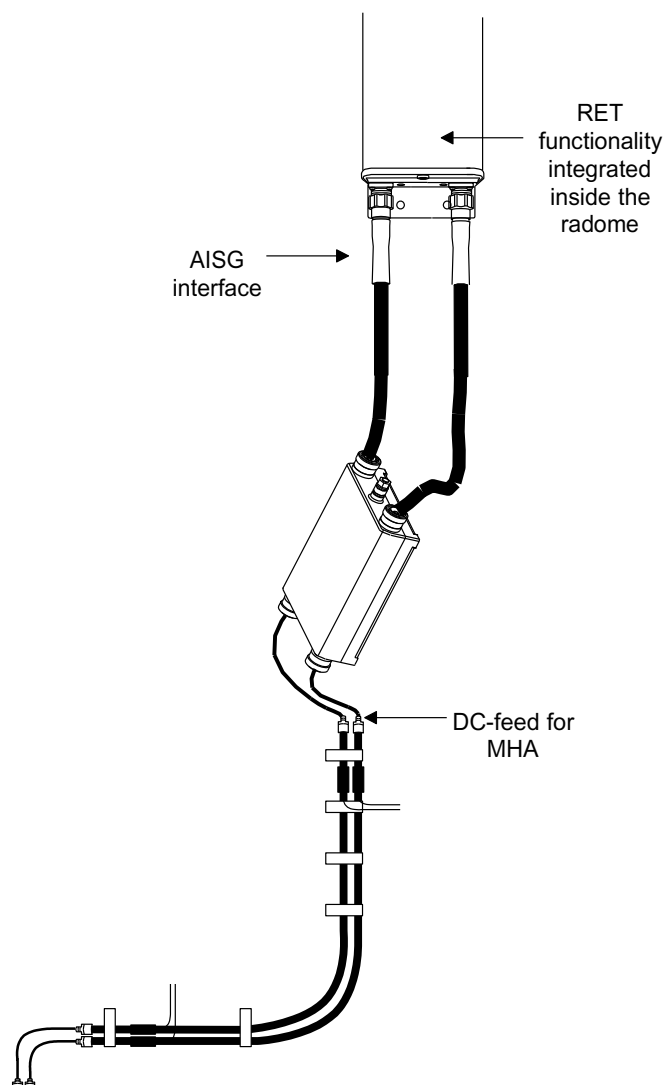


Figure 2. Antenna with electrically adjustable tilt and MHA

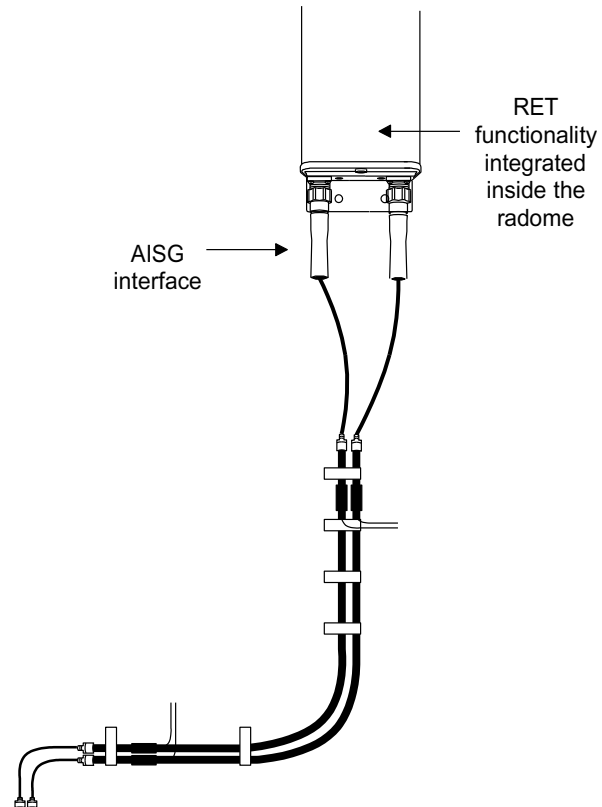


Figure 3. 3GPP (integrated) Tilt Antenna, no MHA

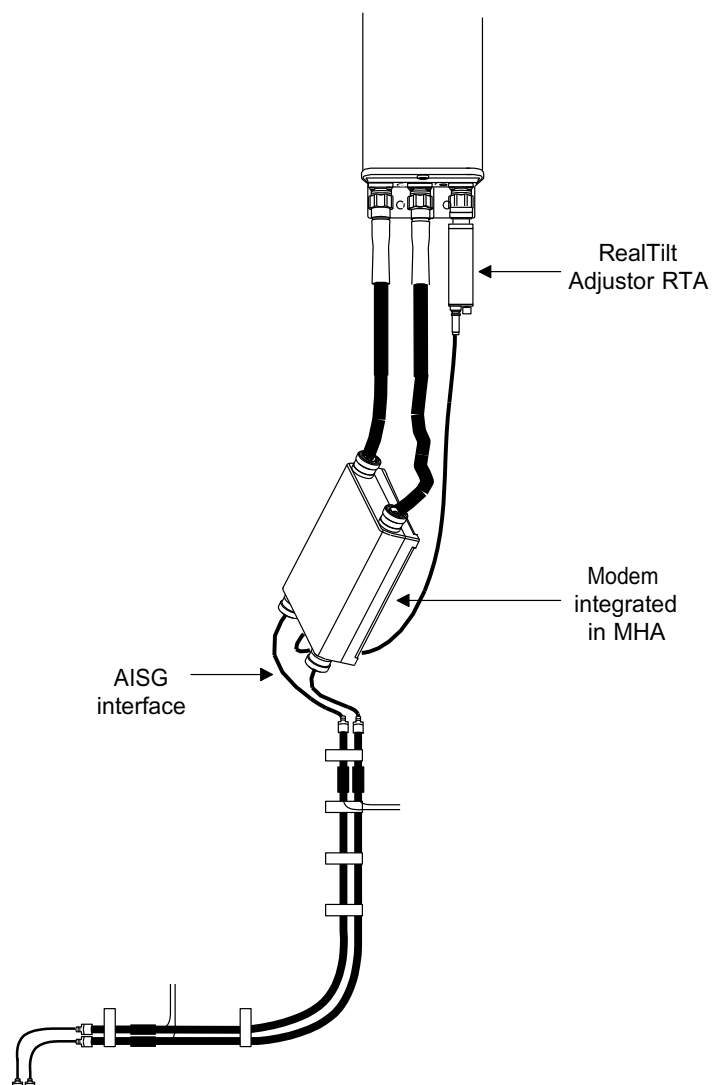


Figure 4. 3GPP (integrated) Tilt Antenna with MHA

2

Masthead Amplifier monitoring and alarms

If the MHA unit fails, a bypass mode ensures that the antenna line sector continues operating. Alarms are sent to the BTS via the DC feeders so if the power to the MHA is switched off the alarms are switched off. If MHA power is lost, the MHA no longer amplifies the Rx signal, but the bypass operation is still able to pass through the Rx path (with minor loss).

The current MHAs support three alarm modes:

- Current alarm mode (current window alarm mode)
- AISG mode
- Current alarm with AISG support mode for WMHC and WMHD only

The used mode depends on the used HW and BTS SW version.

Current Alarm Mode

The MHA has a current consumption range for a particular voltage range while operating with no faults. If the MHA has an internal failure, for example, an LNA defect, the MHA places the LNA in bypass and increase current consumption.

The BTS operating software confirms the alarms and performs a recovery action applicable to the version of BTS operating software being used. To identify the specific software recovery action, please refer to the *BTS Software User Manual* for information.



Note

Current Alarm Mode is not supported with FLJA MHAs.

AISG mode

The MHA relies on a two-way AISG communication between antenna line equipment and BTS for commands and alarms. AISG communication can report failures for any AISG-enabled device connected. Current is consumed as needed.

3

Reliability, maintainability and warranty

The MHA system is tested and validated by Nokia Siemens Networks. A test report is available for inspection only.

Design reliability - Mean Time Between Failure (MTBF)

Generally, MHAs have calculated MTBF minimum 600.000 hours at room temperature; while WMHD and FLJA MHAs have 700.000 hours in the same circumstances. These calculations do not represent the expected field reliability as it can be affected by different environmental conditions including handling, maintenance, and interaction with other network elements.



Note

An MTBF does not indicate a period of operation without failure but can be used to estimate the expected number of failures in a given time period.

Maintainability - Mean Active Replacement Time

The mean active replacement time (MART) for an MHA is less than 30 minutes.

Warranty

If the ambient temperature of the MHA during operation goes beyond the normal operating range of the MHA (-40°C to +55°C), permanent damage may occur to the MHA, and the unit warranty is invalid.

4 Masthead Amplifier technical specifications

4.1 MDTA dual 850 MHz 32 dB MHA specifications



Figure 5. MDTA Dual 850 MHz MDTA MHA

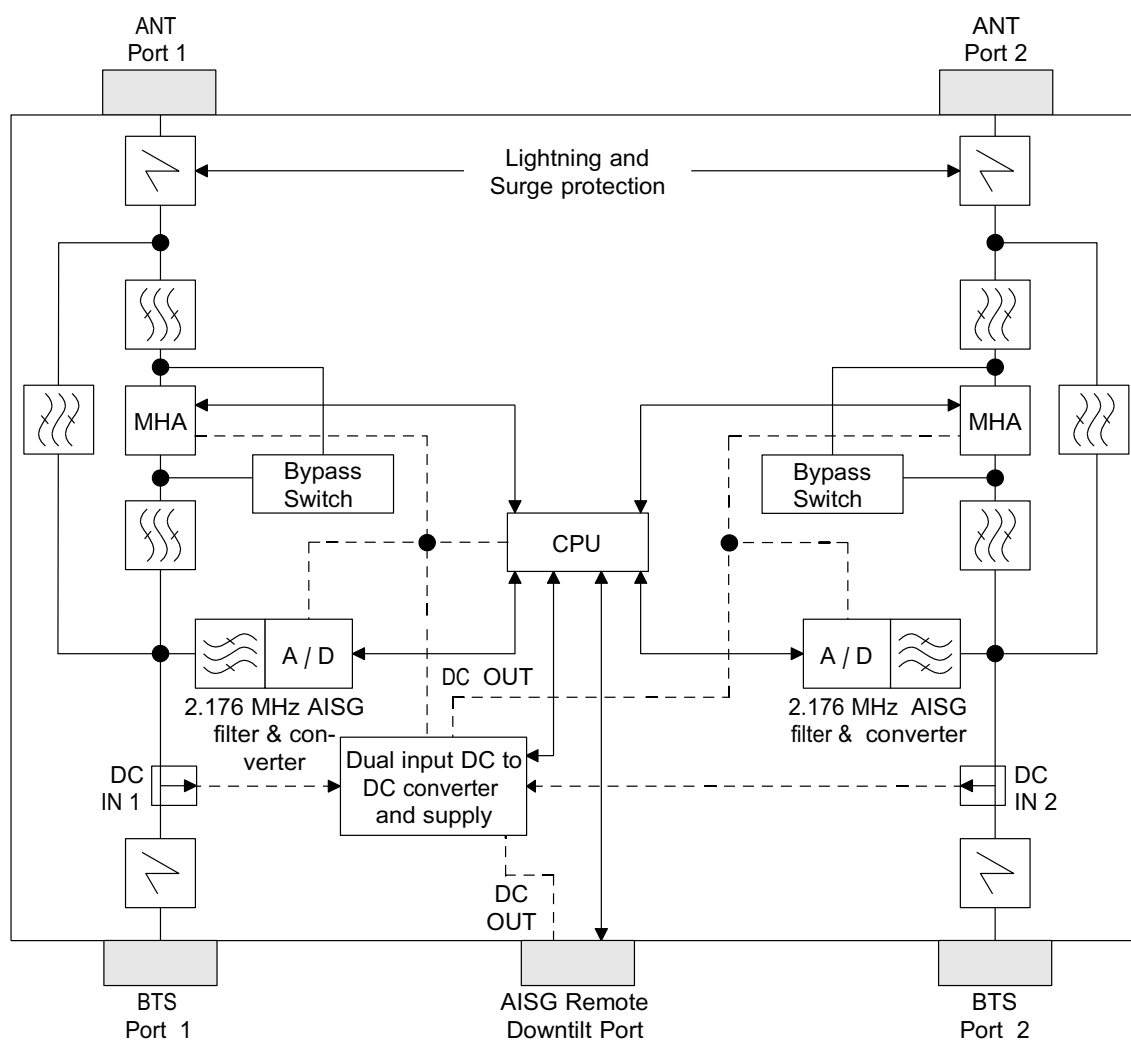


Figure 6. MDTA block diagram

Mechanical specifications

Table 1. MDTA mechanical specifications

Parameter	Details
Size (H x W x D mm)	350 x 250 x 100 mm (without inline-connectors and mounting brackets)
Weight	9 kg approx.

Table 1. MDTA mechanical specifications (cont.)

Parameter	Details
RF ANT connector	DIN Type 7-16 female
RF BTS connector	DIN Type 7-16 female
Colour	Light grey: NCS 1502R
Grounding	M8 threaded stud, washer and nut
Pole diameter allowed by MHA installation bands	40-110 mm

Environmental specifications

Table 2. MDTA environmental specifications

Parameter	Details
Operating standard	ETS 300 019-1-4, class 4.1, class 4M5
Operating temperature	-40° C to +55° C
Storage standard	ETS 300 019-1-1, class 1.3E, class 1M4
Transportation standard	ETS 300 019-1-2, class 2.3
Storage and transportation temperature	-40° C to +70° C
IP class	IP67

Electrical specifications

Table 3. MDTA DC interface specifications

Parameters	Details
Operational voltage range	7.0 to 13.0 VDC
Operational current range	300 mA - 750 mA
Alarm current range	800 mA - 900 mA
Maximum continuous current	1000 mA

Table 4. MDTA receive path electrical specifications

Parameter	Details
Receiver Frequency Range	824 - 849 MHz
Return loss, RX, BTS and ANT	16 dB min.
Nominal RX band gain	32 dBm min.
Gain variation over frequency (at 25°C)	+/- 1 dB
Noise figure at 22°C +/- 2°C (71.6°F)	1.9 dB max
Noise figure over operating temperature	2.2 dB max
Bypass mode insertion loss	4 dB max
Bypass mode return loss	12 dB min
Others	According to GSM 11.21 and 3GPP 25.104 with Nokia Siemens Networks BTS

Table 5. MDTA transmit path electrical specifications

Parameter	Details
Transmitter Frequency Range	869 - 894 MHz
Return loss, TX, BTS and ANT	18 dB min
TX insertion loss, over temperature range	0.8 dB max
Others	According to GSM 11.21 and 3GPP 25.104 with Nokia Siemens Networks BTS

Table 6. MDTA Dual MHA power handling

MHA input	Power level
Maximum input power from BTS port	+49 dBm
Peak power handling: 2 μ s	+52 dBm
Maximum input power to ANT port	+5 dBm
Interferers in GSM 1800/1900 MHz	+16 dBm min
Interferers in WCDMA 2100 MHz	+16 dBm min

4.2 MDGA dual 900 MHz 32 dB MHA specifications

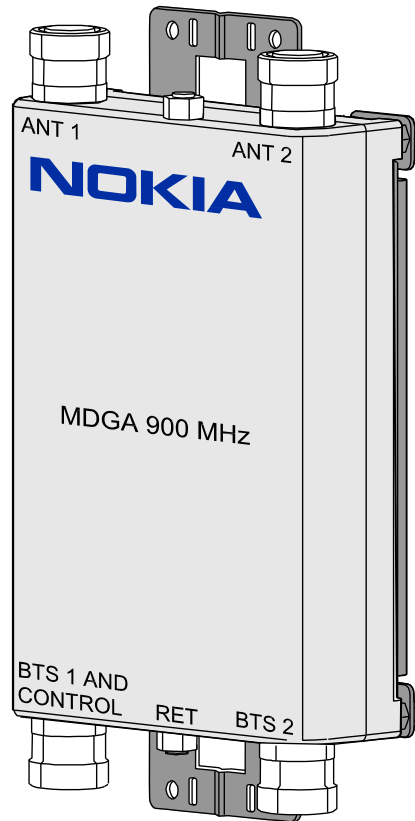


Figure 7. Dual 900 MHz MDGA MHA

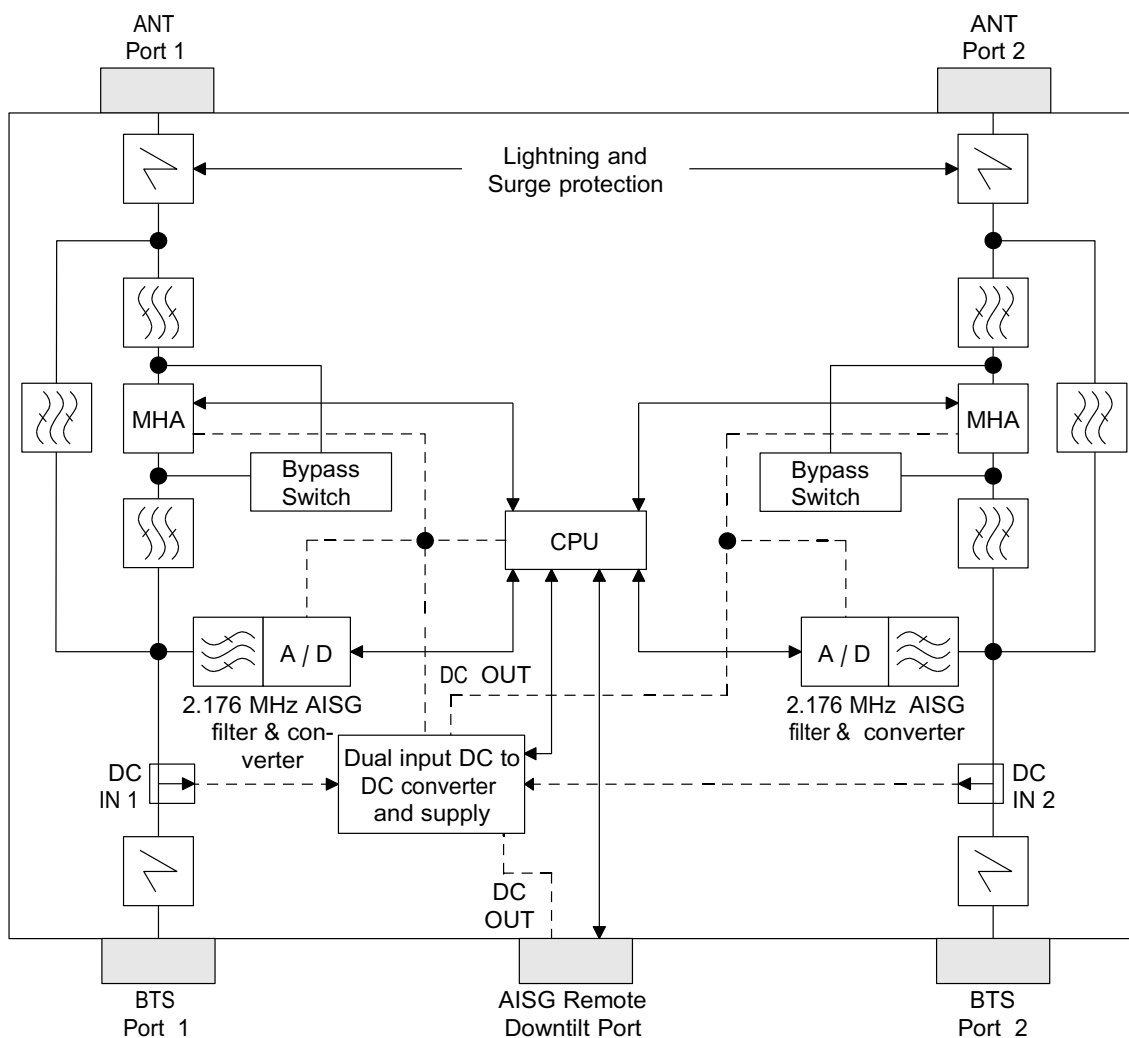


Figure 8. MDGA block diagram

Mechanical specifications

Table 7. MDGA mechanical specifications

Parameter	Details
Size (H x W x D mm)	350 x 250 x 100 mm (without inline-connectors and mounting brackets)
Weight	9 kg approx.

Table 7. MDGA mechanical specifications (cont.)

Parameter	Details
RF ANT connector	DIN Type 7-16 female
RF BTS connector	DIN Type 7-16 female
Colour	Light grey: NCS 1502R
Grounding	M8 threaded stud, washer and nut
Pole diameter allowed by MHA installation bands	40-110 mm

Environmental specifications

Table 8. MDGA environmental specifications

Parameter	Details
Operating standard	ETS 300 019-1-4, class 4.1, class 4M5
Operating temperature	-40° C to +55° C
Storage standard	ETS 300 019-1-1, class 1.3E, class 1M4
Transportation standard	ETS 300 019-1-2, class 2.3
Storage and transportation temperature	-40° C to +70° C
IP class	IP67

Electrical specifications

Table 9. MDGA DC interface specifications

Parameters	Details
Operational voltage range	7.0 to 13.0 VDC
Operational current range	300 mA - 750 mA
Alarm current range	800 mA - 900 mA
Maximum continuous current	1000 mA

Table 10. MDGA receive path electrical specifications

Parameter	Details
Receiver Frequency Range	880 - 915 MHz
Return loss, RX, BTS and ANT	16 dB min.
Nominal RX band gain	32 dBm min.
Gain variation over frequency (at 25°C)	+/- 1 dB
Noise figure at 22°C +/- 2°C (71.6°F)	1.9 dB max
Noise figure over operating temperature	2.2 dB max
Bypass mode insertion loss	4 dB max
Bypass mode return loss	12 dB min
Others	According to GSM 11.21 and 3GPP 25.104 with Nokia Siemens Networks BTS

Table 11. MDGA transmit path electrical specifications

Parameter	Details
Transmitter Frequency Range	925 - 960 MHz
Return loss, TX, BTS and ANT	18 dB min
TX insertion loss, over temperature range	0.8 dB max
Others	According to GSM 11.21 and 3GPP 25.104 with Nokia Siemens Networks BTS

4.3 MDDA dual 1800 MHz 12/33 dB MHA specifications

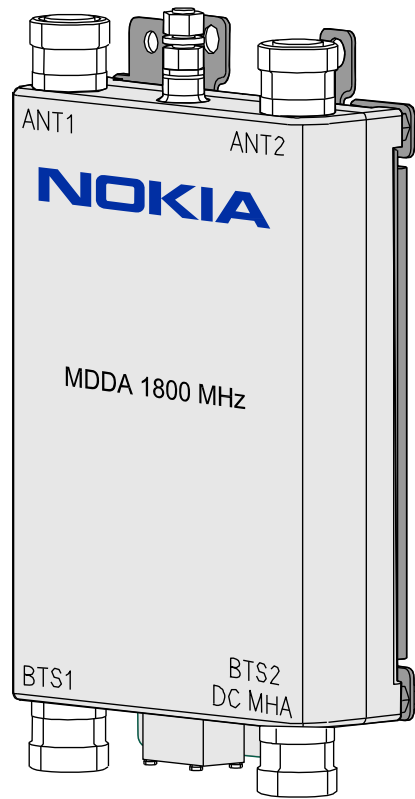


Figure 9. Dual 1800 MHz 12/33 dB MHA MDDA

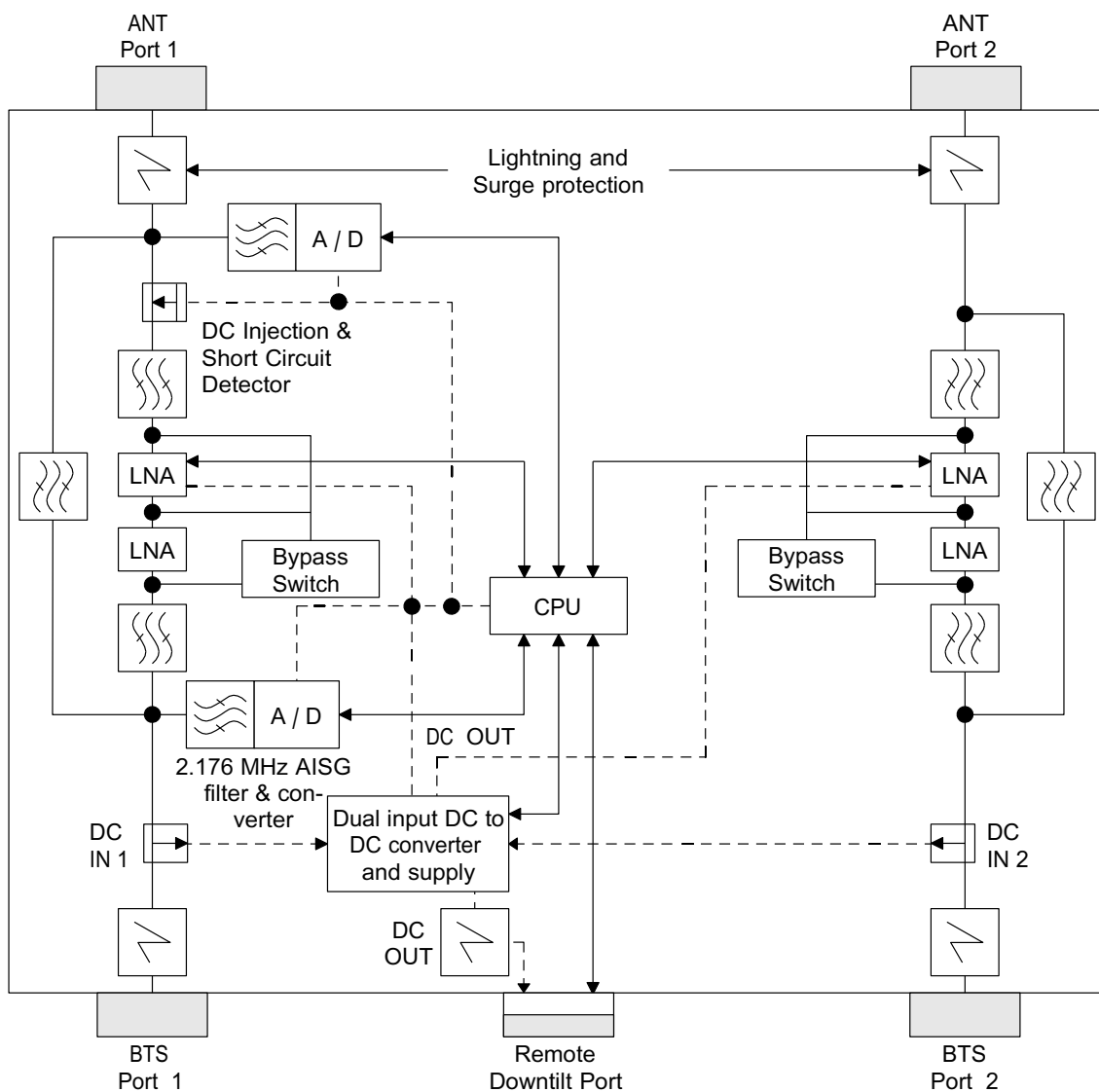


Figure 10. MDDA block diagram

Mechanical specifications

Table 12. MDDA mechanical specifications

Parameter	Details
Size (H x W x D mm)	295 x 210 x 65 mm (without inline-connectors and mounting brackets)

Table 12. MDDA mechanical specifications (cont.)

Parameter	Details
Weight	5 kg approx.
RF ANT connector	DIN Type 7-16 female
RF BTS connector	DIN Type 7-16 female
Colour	Light grey: NCS 1502R
Grounding	M8 threaded stud, washer and nut
Pole diameter allowed by MHA installation bands	40-110 mm

Environmental specifications

Table 13. MDDA environmental specifications

Parameter	Details
Operating standard	ETS 300 019-1-4, class 4.1, class 4M5
Operating temperature	-40° C to +55° C
Storage standard	ETS 300 019-1-1, class 1.3E, class 1M4
Transportation standard	ETS 300 019-1-2, class 2.3
Storage and transportation temperature	-40° C to +70° C
IP class	IP67

Dual 1800 MHz 12/33 dB MHA MDDA electrical specifications

Table 14. MDDA DC interface specifications with high gain

Parameters	Details
Operational voltage range	7.0 to 13.0 VDC
Operational current range	300 mA - 750 mA
Alarm current range	800 mA - 900 mA
Maximum continuous current	1000 mA

Table 15. MDDA DC interface specifications with low gain

Parameters	Details
Operational voltage range	7.0 to 13.0 VDC
Operational current range	100 mA - 190 mA
Alarm current range	230 mA - 295 mA
Maximum continuous current	500 mA

Table 16. MDDA receive path electrical specifications

Parameter	Details
Receiver Frequency Range	1710 - 1785 MHz
Duplex separation	190 MHz
Duplex filter bandwidth	60 MHz
Return loss, RX, BTS and ANT	18 dB min
Nominal RX band gain	12/33 dB
Gain variation over frequency (at 25°C)	+/- 0.8 dB
Gain variation over frequency (over entire operating temperature range)	+/- 1.0 dB
Noise figure at 22°C +/- 2°C (71.6°F)	1.9 dB max
Noise figure over operating temperature	2.2 dB max
Others	According to GSM 11.21 and 3GPP 25.104 with Nokia Siemens Networks BTS

Table 17. MDDA transmit path electrical specifications

Parameter	Details
Transmitter Frequency Range	1805 - 1880 MHz
Return loss, TX, BTS and ANT	18 dB min
TX insertion loss at room temperature	0.7 dB max
TX insertion loss, over temperature range	
Others	According to GSM 11.21 and 3GPP 25.104 with Nokia BTS

Table 18. MDDA dual MHA power handling

MHA input	Power level
Maximum input power from BTS port	+49 dBm
Peak power handling: 2 μ s	+52.5 dBm
Maximum input power to ANT port	+5 dBm
Interferers in GSM 900 MHz	+20 dBm min
Interferers in WCDMA 2100 MHz	+16 dBm min
Interferers in 2.62 - 2.69 GHz	+16 dBm min

4.4 MDPA dual 1900 MHz 12/33 dB MHA specifications

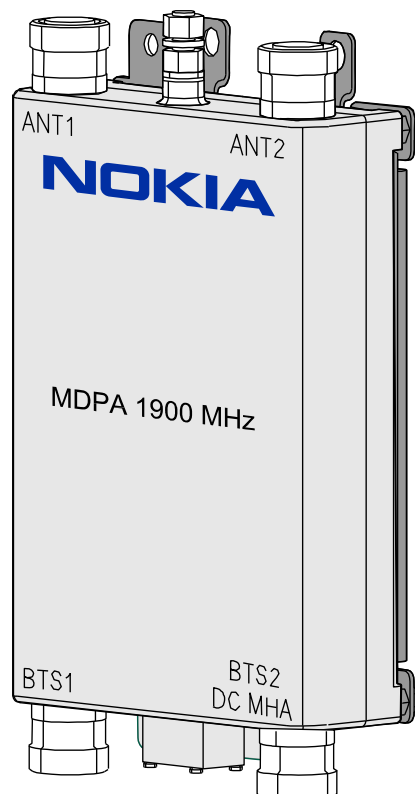


Figure 11. Dual 1900 MHz 12/33 dB MHA MDPA

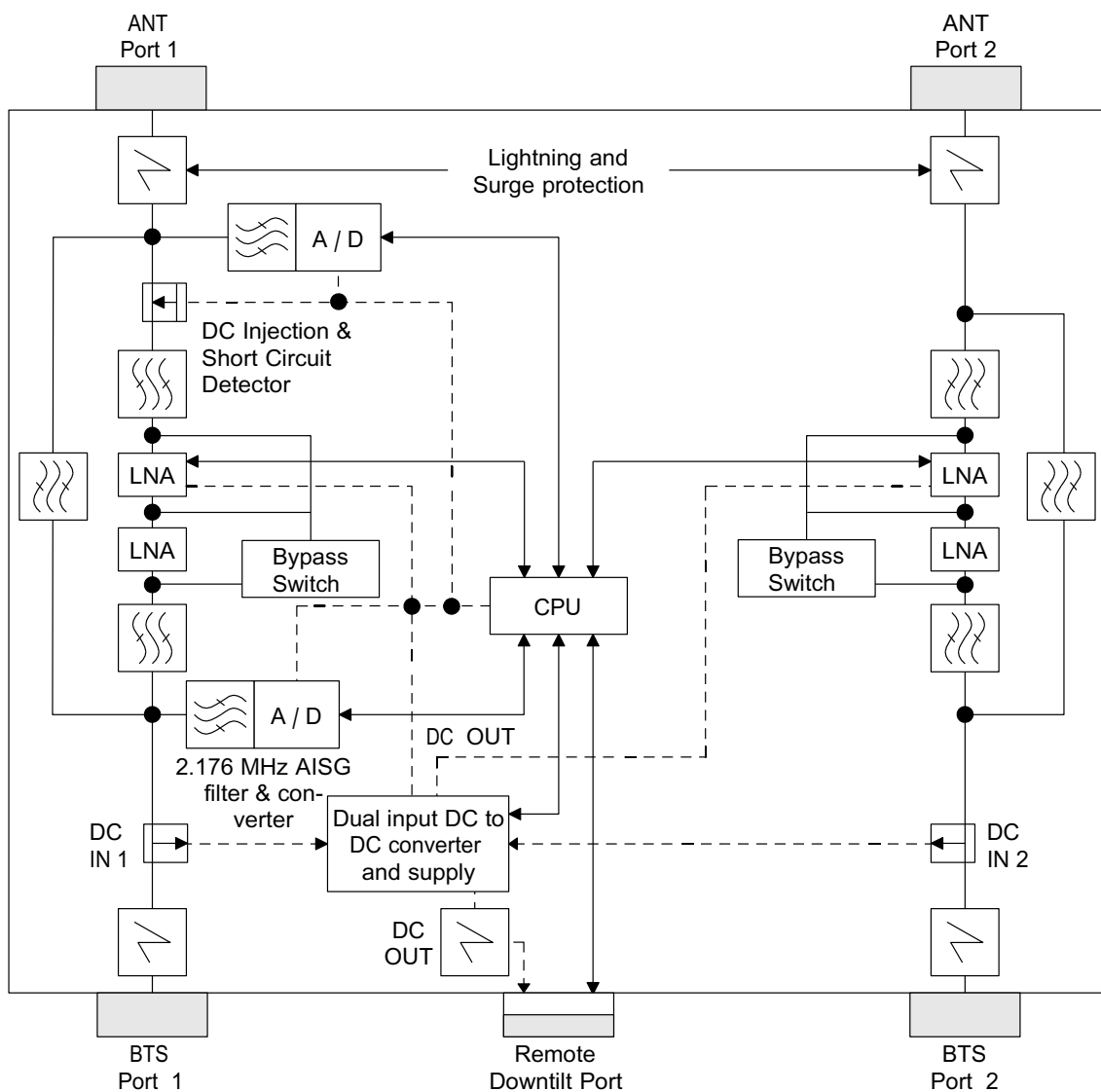


Figure 12. MDPA block diagram

Mechanical specifications

Table 19. MDPA mechanical specifications

Parameter	Details
Size (H x W x D mm)	295 x 210 x 65 mm (without inline-connectors and mounting brackets)

Table 19. MDPA mechanical specifications (cont.)

Parameter	Details
Weight	5 kg approx.
RF ANT connector	DIN Type 7-16 female
RF BTS connector	DIN Type 7-16 female
Colour	Light grey: NCS 1502R
Grounding	M8 threaded stud, washer and nut
Pole diameter allowed by MHA installation bands	40-110 mm

Environmental specifications

Table 20. MDPA environmental specifications

Parameter	Details
Operating standard	ETS 300 019-1-4, class 4.1, class 4M5
Operating temperature	-40° C to +55° C
Storage standard	ETS 300 019-1-1, class 1.3E, class 1M4
Transportation standard	ETS 300 019-1-2, class 2.3
Storage and transportation temperature	-40° C to +70° C
IP class	IP67

Electrical specifications

Table 21. MDPA DC interface specifications with high gain

Parameters	Details
Operational voltage range	7.0 to 13.0 VDC
Operational current range	300 mA - 750 mA
Alarm current range	800 mA - 900 mA
Maximum continuous current	1000 mA

Table 22. MDPA DC interface specifications with low gain

Parameters	Details
Operational voltage range	7.0 to 13.0 VDC
Operational current range	100 mA - 190 mA
Alarm current range	230 mA - 295 mA
Maximum continuous current	500 mA

Table 23. MDPA receive path electrical specifications

Parameter	Details
Receiver Frequency Range	1850 - 1910 MHz
Duplex separation	190 MHz
Duplex filter bandwidth	60 MHz
Return loss, RX, BTS and ANT	18 dB min
Nominal RX band gain	12/33 dB
Gain variation over frequency (at 25°C)	+/- 0.8 dB
Gain variation over frequency (over entire operating temperature range)	+/- 1.0 dB
Noise figure at 22°C +/- 2°C (71.6°F)	1.9 dB max
Noise figure over operating temperature	2.2 dB max
Others	According to GSM 11.21 and 3GPP 25.104 with Nokia Siemens Networks BTS

Table 24. MDPA transmit path electrical specifications

Parameter	Details
Transmitter Frequency Range	1930 - 1990 MHz
Return loss, TX, BTS and ANT	18 dB min
TX insertion loss at room temperature	0.7 dB max
TX insertion loss, over temperature range	
Others	According to GSM 11.21 and 3GPP 25.104 with Nokia Siemens Networks BTS

Table 25. MDPA dual MHA power handling

MHA input	Power level
Maximum input power from BTS port	+49 dBm
Peak power handling: 2 μ s	+52.5 dBm
Maximum input power to ANT port	+5 dBm
Interferers in GSM 850 MHz	+20 dBm min
Interferers in WCDMA 2100 MHz	+16 dBm min
Interferers in 2.62 - 2.69 GHz	+16 dBm min

4.5 FLJA dual 2.0 GHz 12 dB MHA specifications

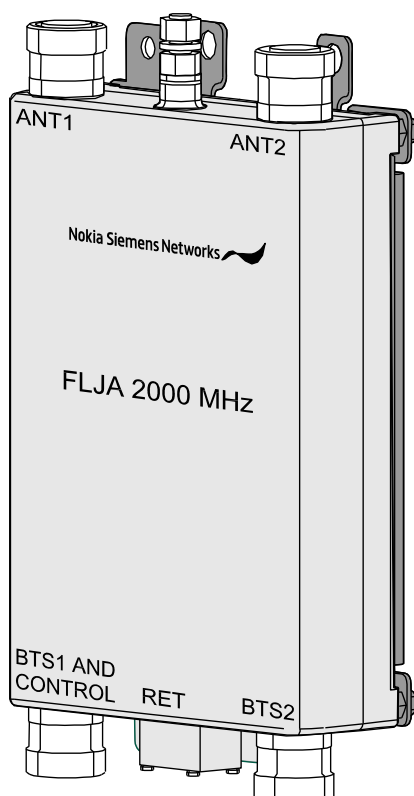


Figure 13. FLJA dual 2.0 GHz 12 dB MHA

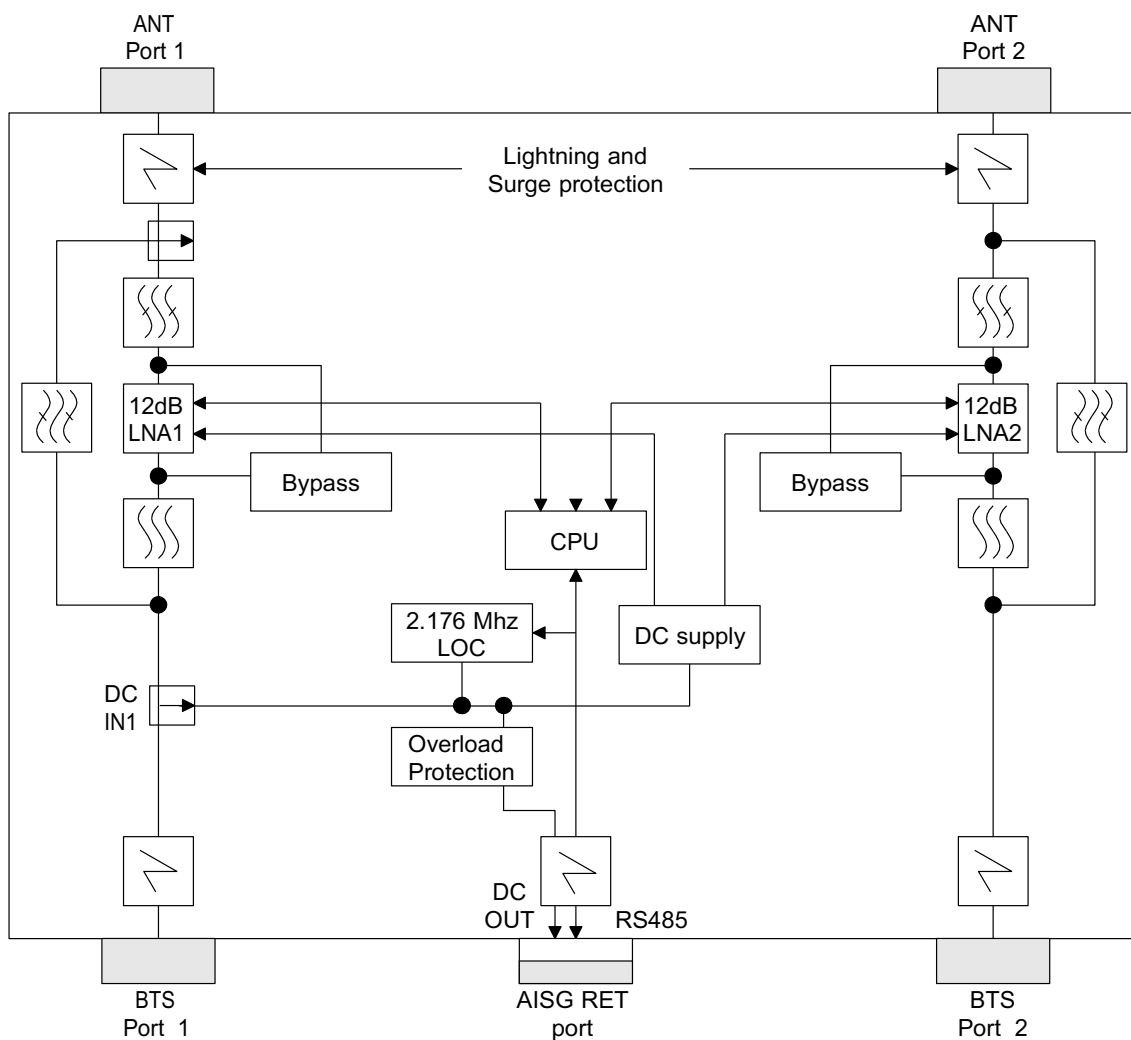


Figure 14. FLJA block diagram

Mechanical specifications

Table 26. FLJA mechanical specifications

Parameter	Details
Size (H x W x D mm)	295 x 210 x 60 mm (without inline-connectors and mounting brackets)
Weight	5.6 kg

Table 26. FLJA mechanical specifications (cont.)

Parameter	Details
RF ANT connector	DIN Type 7-16, female, solid outer ring
RF BTS connector	DIN Type 7-16, female, solid outer ring
RET connector	AISG-specified female RET connector
Colour	RAL 7047
Grounding	Stud, M8, for lightning discharge path
Pole diameter allowed by MHA installation bands	40-110 mm

Environmental specifications

Table 27. FLJA environmental specifications

Parameter	Details
Operating standard	ETS 300 019-1-4 V2.1.2 or later, class 4.1E
Operating temperature	-40° C to +55° C
Storage standard	ETS 300 019-1-1 V2.1.4 or later, class 1.3E, (IEC 1M4)
Transportation standard	ETSI EN 300 019-1-2 V2.1.4 or later, class 2.3
Storage and transportation temperature	-40° C to +70° C
IP class	IP67

Electrical specifications

Table 28. FLJA interface specifications

Parameters	Details
Operational voltage range	10 to 30 VDC
Operational power range	2.5W
Maximum continuous current	2.5W

Table 29. FLJA receive path electrical specifications

Parameter	Details
Receiver Frequency Range	2000 – 2020 MHz
AISG signal carrier band	2.176MHz +/-0.1MHz
AISG carrier band at BTS1	10 dB min.
Return loss, RX, BTS and ANT	16 dB min, 12.0 dB min. (RX Bypass Mode)
Nominal RX band gain	12 dB
Gain variation over frequency (at 25°C)	+/- 0.6 dB
Gain variation over frequency (over entire operating temperature range)	+/- 1.0 dB
Noise figure at 22°C+/- 2°C (71.6°F)	1.7 dB max
Noise figure over operating temperature	1.9 dB max
Others	

Table 30. FLJA transmit path electrical specifications

Parameter	Details
Transmitter Frequency Range	2180 – 2200 MHz
AISG signal carrier band	2.176MHz +/-0.1MHz
AISG carrier band at BTS1	10 dB min.
Return loss, TX, BTS and ANT	18 dB min
TX insertion loss at room temperature	0.4 dB max.
TX insertion loss over temperature range	0.5 dB max.

Table 31. FLJA power handling

MHA input	Power level
Maximum input power from BTS port	+49 dBm
Peak power handling: 2 µs	+62 dBm
Maximum input power to ANT port	+5 dBm
Interferers in GSM / WCDMA 850 MHz	+20 dBm
Interferers in FDD band 1.7 / 2.1GHz	+20dBm

Table 31. FLJA power handling (cont.)

MHA input	Power level
Interferers in PCS 1900 band 1.93 to 1.99 GHz	+1 dBm
Interferers in 3GPP band 7 2.62 to 2.59 GHz	+16 dBm
Interferers in Wimax band: 2.496 to 2.69 GHz	+13 dBm

4.6 WMHC dual 2.1 GHz 12 dB MHA specifications

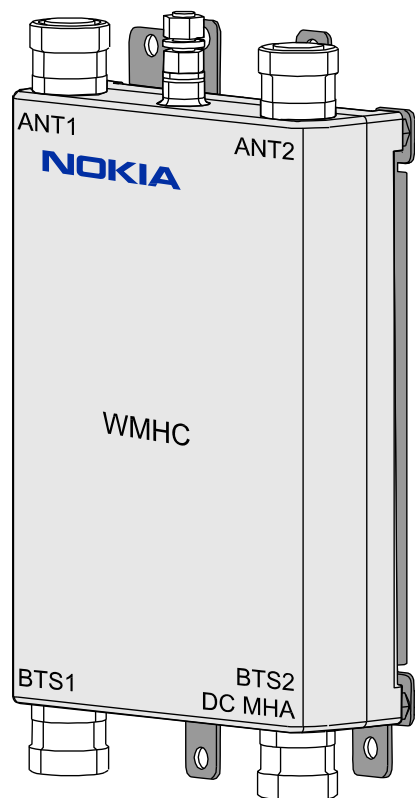


Figure 15. Dual 2.1 GHz 12 dB MHA WMHC

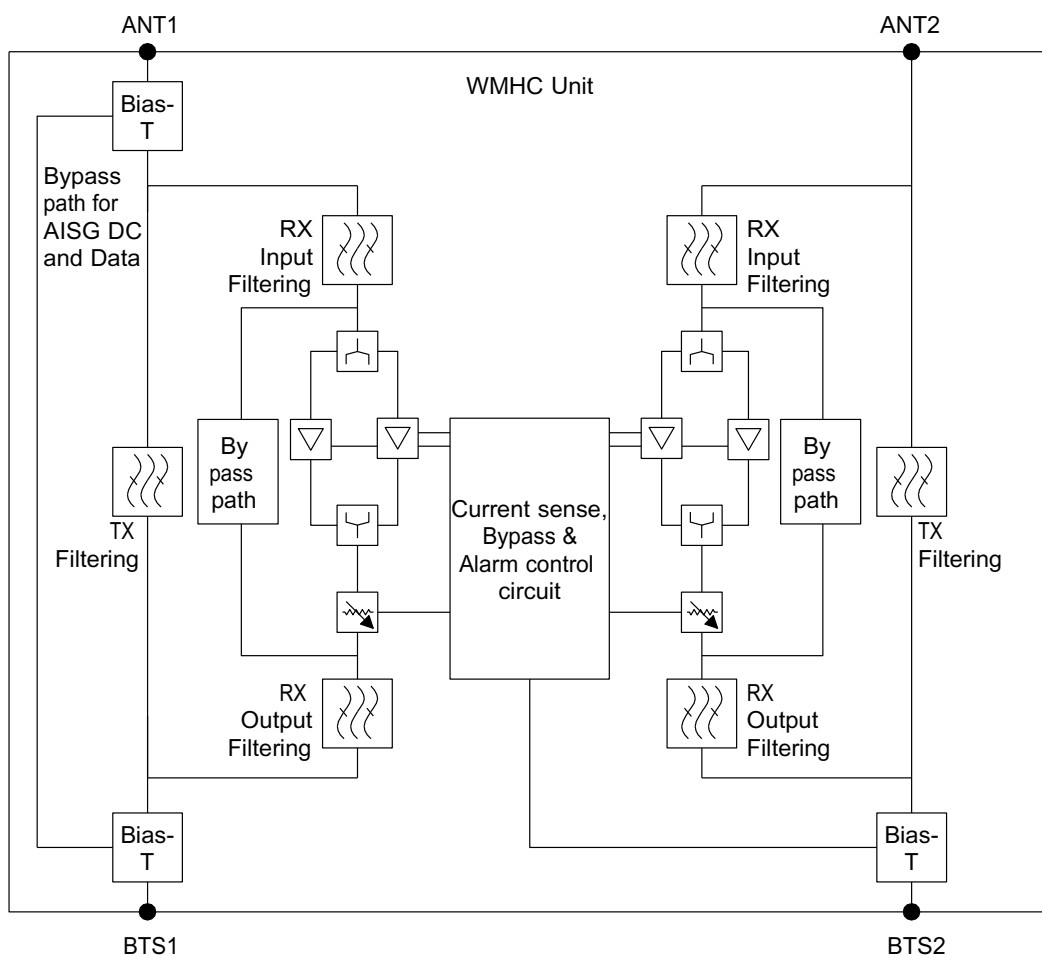


Figure 16. WMHC block diagram

Mechanical specifications

Table 32. WMHC mechanical specifications

Parameter	Details
Size (H x W x D mm)	190 x 150 x 50 mm (without inline-connectors and mounting brackets)
Weight	3.5 kg max
RF ANT connector	DIN Type 7-16 female
RF BTS connector	DIN Type 7-16 female

Table 32. WMHC mechanical specifications (cont.)

Parameter	Details
RET connector	Only in WMHD
Colour	Light grey: NCS 1502R
Grounding	M8 threaded stud, washer and nut
Pole diameter allowed by MHA installation bands	40-110 mm

Environmental specifications

Table 33. WMHC environmental specifications

Parameter	Details
Operating standard	ETS 300 019-1-4, class 4.1, class 4M5
Operating temperature	-40° C to +55° C
Storage standard	ETS 300 019-1-1, class 1.3E, class 1M4
Transportation standard	ETS 300 019-1-2, class 2.3
Storage and transportation temperature	-40° C to +70° C
IP class	IP67

Electrical specifications

Table 34. WHMC DC interface specification

Parameters	Details
Operational voltage range	7.0 to 13.0 VDC
Operational current range	100 mA - 190 mA
Maximum continuous current	350 mA

Table 35. WHMC receive path electrical specification

Parameter	Details
Receiver Frequency Range	1920 - 1980 MHz

Table 35. WHMC receive path electrical specification (cont.)

Parameter	Details
Return loss, RX, BTS and ANT	16 dB min
Nominal RX band gain	12 dB
Gain variation over frequency (at 25°C)	+/- 0.5 dB
Noise figure at 25°C	1.7 dB max
Noise figure over operating temperature	1.9 dB max
Bypass mode insertion loss	2.7 dB max
Bypass mode return loss	12 dB min
Others	According to 3GPP 25.104 with Nokia Siemens Networks WCDMA BTS

Table 36. WHMC transmit path electrical specifications

Parameter	Details
Transmitter Frequency Range	2110-2170 MHz
Return loss, TX, BTS and ANT	18 dB min
TX insertion loss at room temperature	0.4 dB max
TX insertion loss, over temperature range	0.5 dB max
Others	According to 3GPP 25.104 with Nokia Siemens Networks WCDMA BTS

Table 37. WMHC Dual MHA power handling

MHA input	Power level
Maximum input power from BTS port	+49 dBm
Peak power handling: 2 μ s	+52.5 dBm
Maximum input power to ANT port	+5 dBm
Interferers in GSM 850 MHz	+20 dBm min
Interferers in WCDMA 2100 MHz	+16 dBm min
Interferers in 2.62 - 2.69 GHz	+16 dBm min

4.7 WMHD dual 2.1 GHz 12 dB MHA specifications

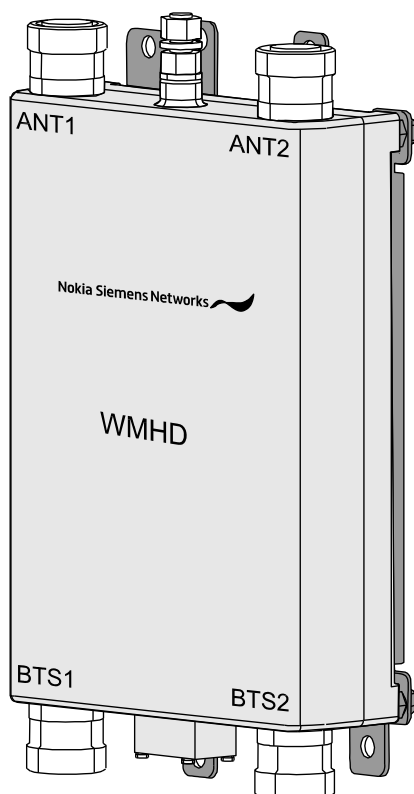


Figure 17. Dual 2.1 GHz 12 dB MHA WMHD

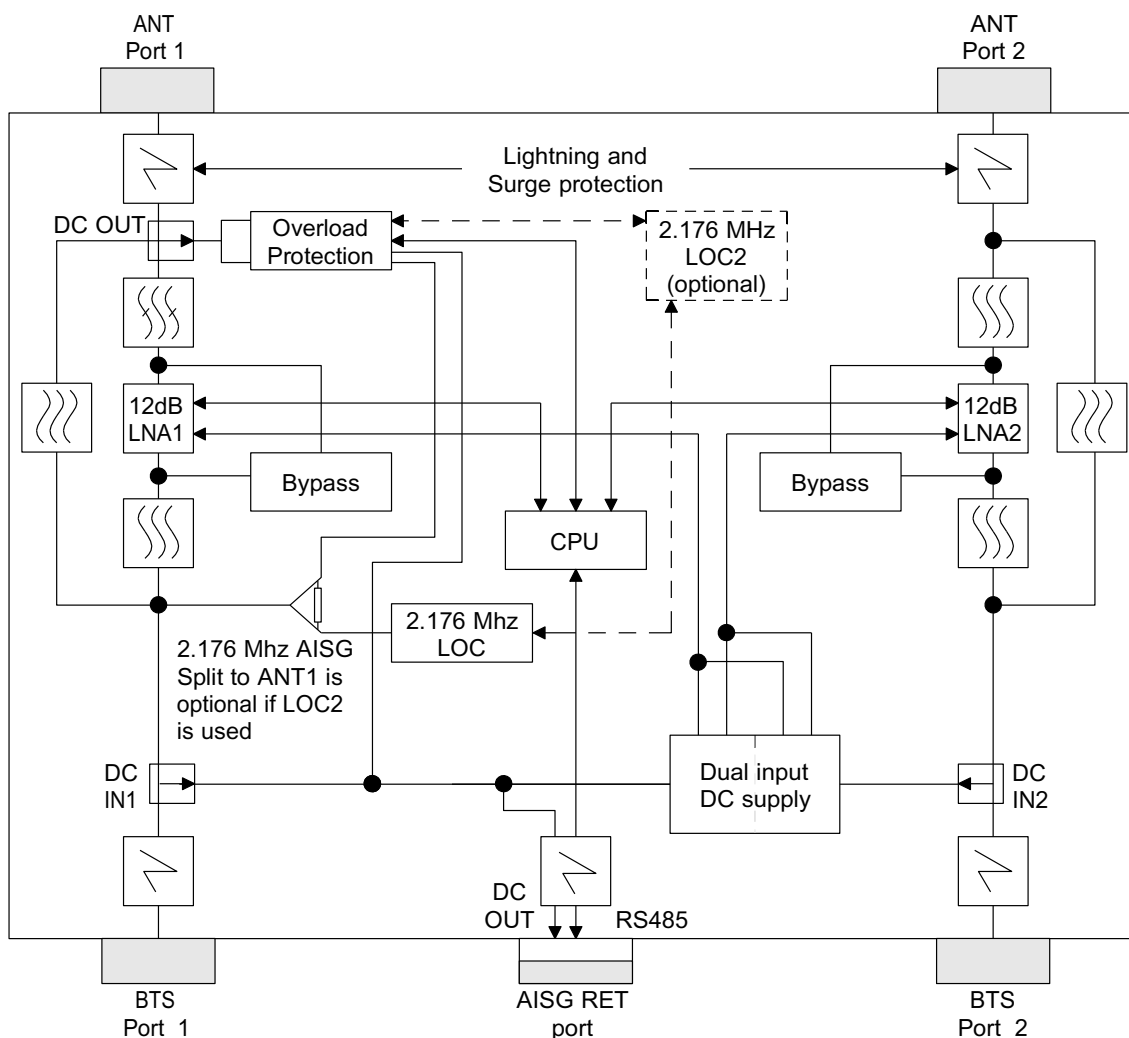


Figure 18. WMHD block diagram

Mechanical specifications

Table 38. WMHD mechanical specifications

Parameter	Details
Size (H x W x D mm)	190 x 150 x 50 mm (without inline-connectors and mounting brackets)
Weight	3.5 kg max

Table 38. WMHD mechanical specifications (cont.)

Parameter	Details
RF ANT connector	DIN Type 7-16 female
RF BTS connector	DIN Type 7-16 female
RET connector	Only in WMHD
Colour	Light grey: NCS 1502R
Grounding	M8 threaded stud, washer and nut
Pole diameter allowed by MHA installation bands	40-110 mm

Environmental specifications

Table 39. WMHD environmental specifications

Parameter	Details
Operating standard	ETS 300 019-1-4, class 4.1, class 4M5
Operating temperature	-40° C to +55° C
Storage standard	ETS 300 019-1-1, class 1.3E, class 1M4
Transportation standard	ETS 300 019-1-2, class 2.3
Storage and transportation temperature	-40° C to +70° C
IP class	IP67

Electrical specifications

Table 40. WHMD DC interface specifications

Parameters	Details
Operational voltage range	7.0 to 13.0 VDC
Operational current range	100 mA - 190 mA
Maximum continuous current	350 mA

Table 41. WHMD receive path electrical specification

Parameter	Details
Receiver Frequency Range	1920 - 1980 MHz
Return loss, RX, BTS and ANT	16 dB min
Nominal RX band gain	12 dB
Gain variation over frequency (at 25°C)	+/- 0.5 dB
Noise figure at 25°C	1.7 dB max
Noise figure over operating temperature	1.9 dB max
Bypass mode insertion loss	2.7 dB max
Bypass mode return loss	12 dB min
Others	According to 3GPP 25.104 with Nokia Siemens Networks WCDMA BTS

Table 42. WHMD transmit path electrical specifications

Parameter	Details
Transmitter Frequency Range	2110-2170 MHz
Return loss, TX, BTS and ANT	18 dB min
TX insertion loss at room temperature	0.4 dB max
TX insertion loss, over temperature range	0.5 dB max
Others	According to 3GPP 25.104 with Nokia Siemens Networks WCDMA BTS

Table 43. WMHD Dual MHA power handling

MHA input	Power level
Maximum input power from BTS port	+49 dBm
Peak power handling: 2 μ s	+62 dBm
Maximum input power to ANT port	+5 dBm
Interferers in GSM 900 transmit bands	+20 dBm min
Interferers in GSM 1800/1900 MHz	+16 dBm min
Interferers in WCDMA 2100	+16 dBm min
Interferers in 2.62 - 2.69 GHz	+16 dBm min

5 Approval and regulatory specifications

EMC

The MHAs and the Bias-Ts meet the requirements stated in ETSI 301 489-1 and ETSI 301 489-23.

The equipment complies with the European EMC directives 89/336/EEC and 92/31/EEC for both spurious emissions and immunity.

Masthead Amplifier lightning protection

The lightning protection immunity levels are tested at the Antenna and the BTS ports.

Table 44. Masthead Amplifier lightning protection

Protection	Standard
Meeting standard	IEC 801-5 and IEC 61312
Over current pulse between the centre conductor and the shield of the antenna and the BTS port respectively	3 kA, 10/350 µs pulse (IEC 61312)
Over current pulse between the shield of the antenna and the shield of the BTS port	20 kA, 10/350 µs pulse (IEC 61312-1)

FLJA WCDMA 2000MHZ DUAL MHA Lightning protection

Table 45. FLJA WCDMA 2.0 GHZ DUAL MHA lightning protection

Protection	Standard
Meeting standard	EN60950-1 and IEC60950-1, UL 60950 and UL50

Table 45. FLJA WCDMA 2.0 GHZ DUAL MHA lightning protection (cont.)

Protection	Standard
Over current pulse between the centre conductor and the shield of the antenna and the BTS port respectively	3 kA, 10/350 μ s pulse (IEC 62305-4)
Over current pulse between the shield of the antenna and the shield of the BTS port	20 kA, 10/350 μ s pulse (IEC 62305-4)
RET port, all used pins	5kA, 8/20 μ s pulse

6

Masthead Amplifier product ordering codes

To order any of the products listed, please contact your local Nokia Siemens Networks office.

Table 46. Product ordering codes

Product	Ordering Code
Masthead Amplifier, Dual, 850 MHz, RX 824 - 849 MHz (MDTA)	CS7299112
Masthead Amplifier, Dual, 900 MHz, RX 880 - 915MHz (MDGA)	CS7299111
Masthead Amplifier, Dual, 1800 MHz, RX 1710 - 1785 MHz (MDDA)	CS7299220
Masthead Amplifier, Dual, 1900 MHz, 1850 - 1910 MHz (MDPA)	CS7299320
Masthead Amplifier WCDMA, Dual, 2.1 GHz, RX 1920 - 1980 MHz (WMHC)	470057A
Masthead Amplifier WCDMA, 2.1 GHz, AISG, Dual MHA, RX 1920 - 1980 MHz (WMHD)	471443A
Masthead Amplifier WCDMA BTS FLJA WCDMA 2000MHZ Dual MHA	471671A