



PHOENIX  
**TESTLAB**

Königswinkel 10  
32825 Blomberg, Germany  
Phone: +49 (0) 52 35 / 95 00-0  
Fax: +49 (0) 52 35 / 95 00-10  
office@phoenix-testlab.de  
www.phoenix-testlab.de

# Antenna Report

Report Number:

**F231195E4**

Equipment under Test (EUT):

**TrackSense Pro SKY Module  
Antenna**

Applicant:

**Ellab A/S**

Manufacturer:

**Ellab A/S**

## References

[1] None (According customer requirements)

## Disclaimer

Tested and  
written by

[Redacted signature area]

Signature

Reviewed and  
approved by:

[Redacted signature area]

Signature

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# 1 Identification

## 1.1 Applicant

Name:	Ellab A/S
Address:	Trollesmindealle 25, 3400 Hilleroed
Country:	Denmark
Name for contact purposes:	James Jacobsson
Phone:	+45-4452-0500
eMail address:	JJA@ELLAB.COM
Applicant represented during the test by the following person:	None

## 1.2 Manufacturer

Name:	Ellab A/S
Address:	Trollesmindealle 25, 3400 Hilleroed
Country:	Denmark
Name for contact purposes:	James Jacobsson
Phone:	+45-4452-0500
eMail address:	JJA@ELLAB.COM
Manufacturer represented during the test by the following person:	None

## 1.3 Test Laboratory

The tests were carried out by: **PHOENIX TESTLAB GmbH**  
**Königswinkel 10**  
**32825 Blomberg**  
**Germany**

#### 1.4 AUT (Antenna under test)

Test object: *	2.4 GHz antenna on module PCB
Model name: *	Johanson Technology 2450AT18D0100

	AUT number		
	1	2	3
Serial number: *	-	-	-
PCB identifier: *	-	-	-
Hardware version: *	-	-	-
Software version: *	-	-	-

\* Declared by the applicant

One EUT was used for all tests.

Note: PHOENIX TESTLAB GmbH does not take samples. The samples used for tests are provided exclusively by the applicant.

## 1.5 Technical Data of Equipment

General	
Frequency Range *	2405 MHz to 2475 MHz

\* Declared by the applicant

Ports / Connectors				
Identification	Connector		Length during test	Shielding (Yes / No)
	EUT	Ancillary		
---	---	---	---	---

Equipment used for testing	
Ellab Sky module	

## 1.6 Dates

Date of receipt of test sample:	17.07.2023
Start of test:	18.08.2023
End of test:	18.08.2023

## 2 Operational States

During the antenna chart measurements, the antenna was supplied with a rf-signal with a level as shown in the chapter below its antenna connector.

## 3 Additional Information

Conducted measurements were done with a modified sample as provided by the applicant

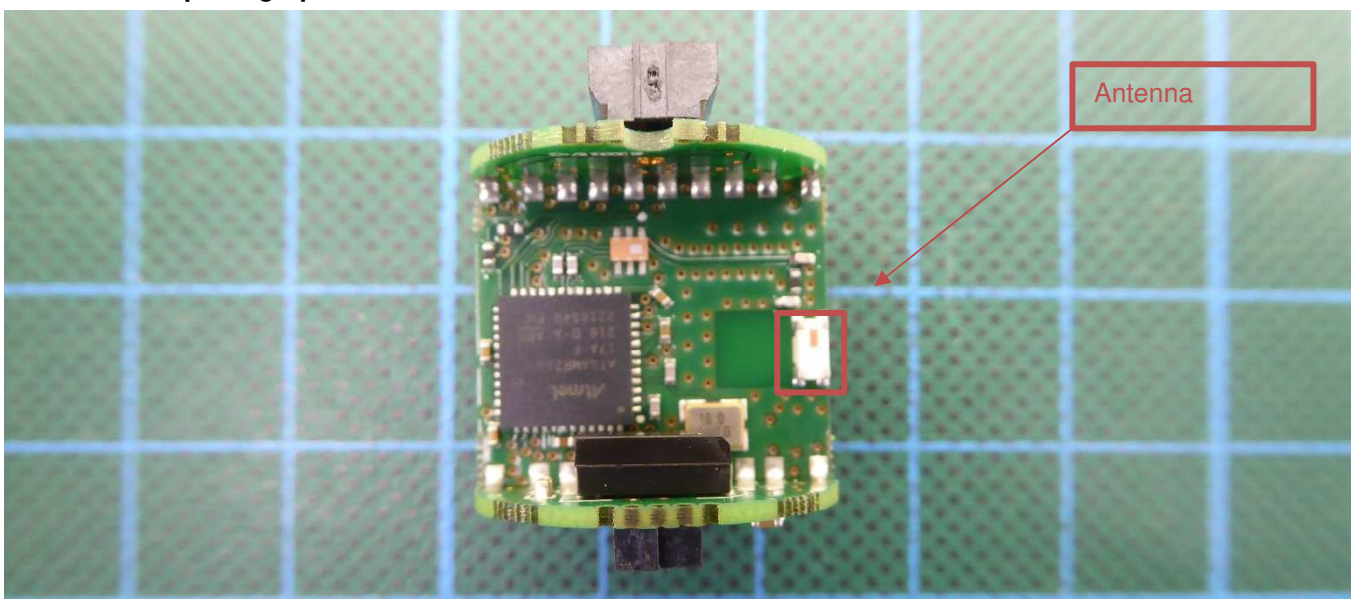
## 4 Antenna photographs

### 4.1 External photographs



AUT installed in host

### 4.2 Internal photographs



AUT on radio PCB



## 5 Antenna Charts

### 5.1 Results (Max. Gain)

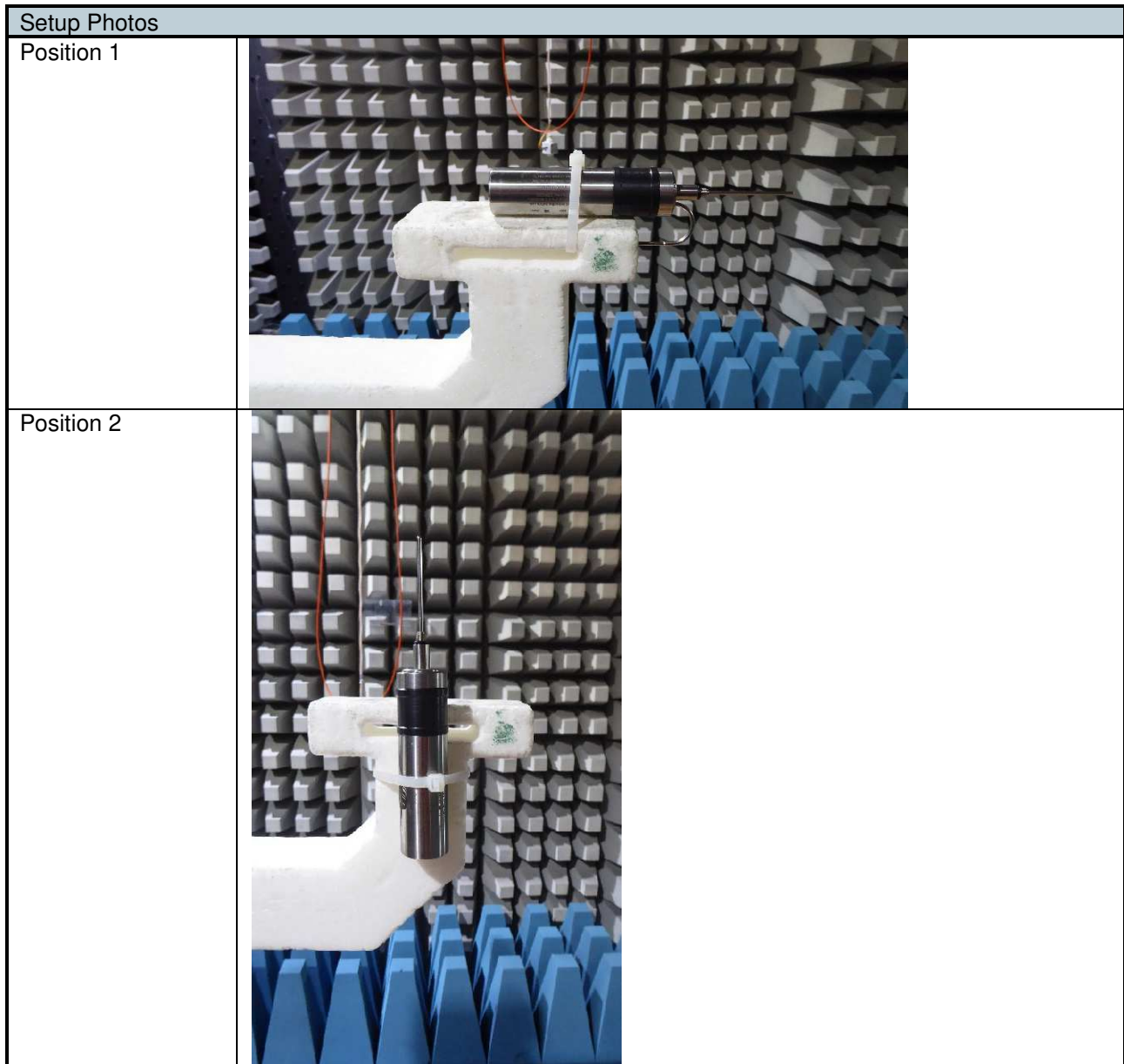
		Antenna gain calculation		
		$f_{low}$	$f_{mid}$	$f_{high}$
Conducted output power [dB $\mu$ V]		111.4	111.3	111.1
Conducted output power [dBm]		4.4	4.3	4.1
Radiated EIRP [dBm EIRP]		8.5	7.6	5.8
Antenna Gain [dBi]		4.1	3.3	1.7
Position		Position 1	Position 1	Position 1
Position of maximum gain	Azimuth	220	220	220
	Elevation	0	0	0
	Polarisation	H	H	H

Conducted $f_{low}$	
Conducted $f_{mid}$	
Conducted $f_{high}$	

Test equipment (please refer to chapter 7 for details)
1 - 11

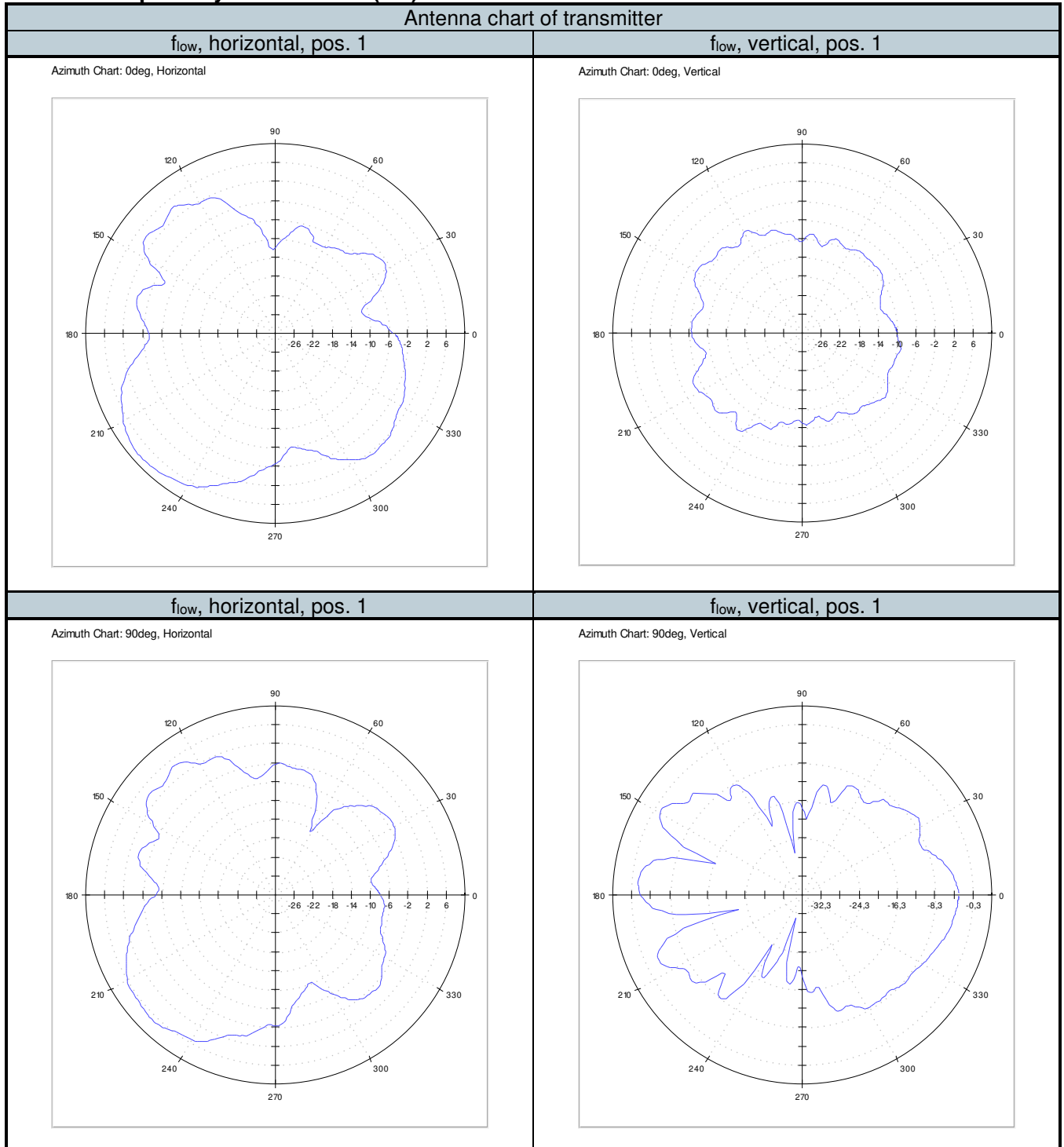
## 5.2 Antenna Diagrams EUT Position 1

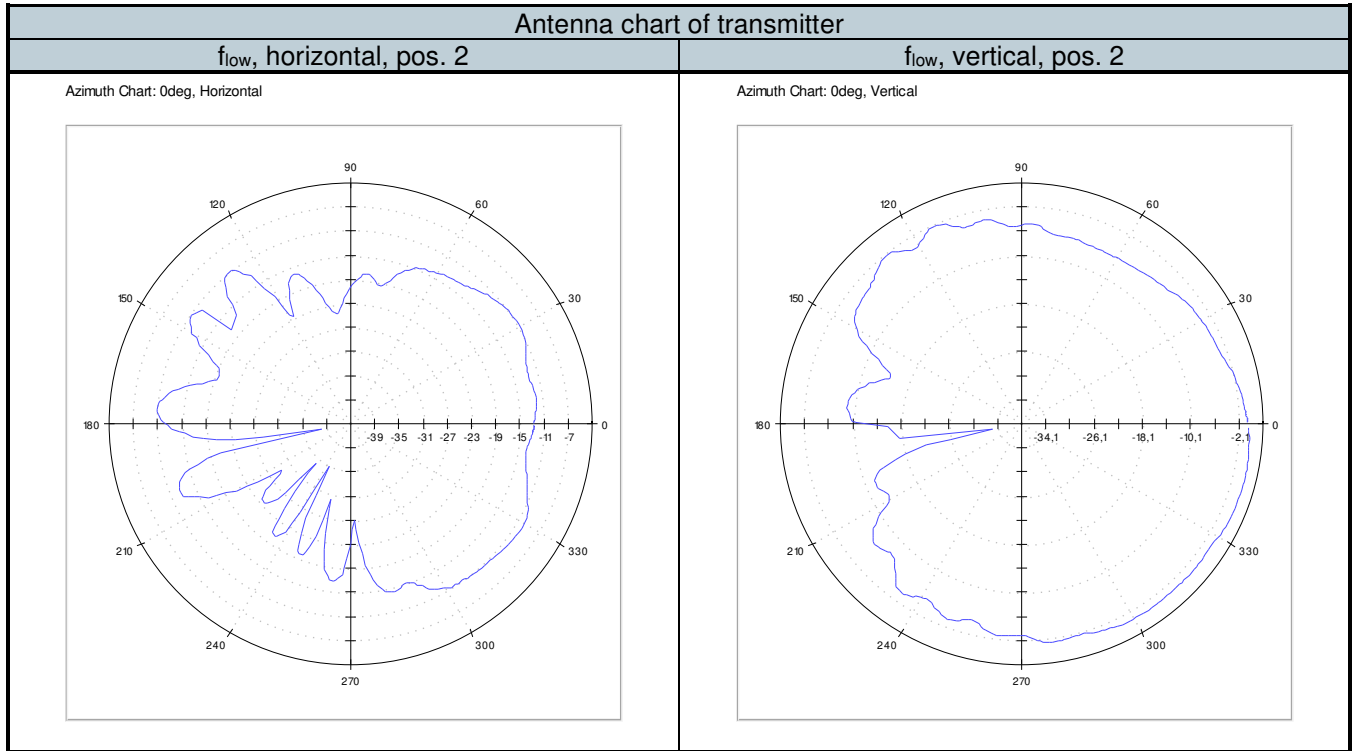
### 5.2.1 Test Setup Photos



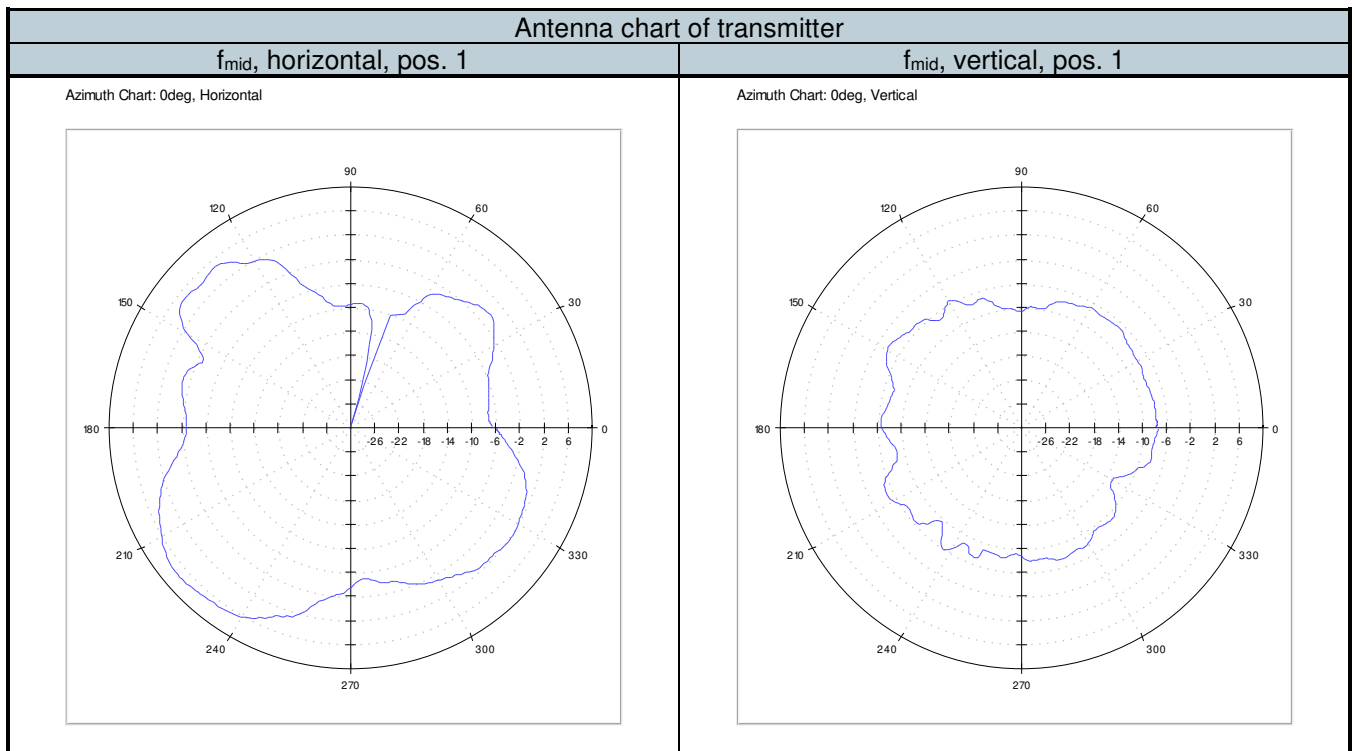
## 5.2.2 Azimuth charts of transmitter

### 5.2.2.1 Frequency near bottom ( $f_{low}$ )





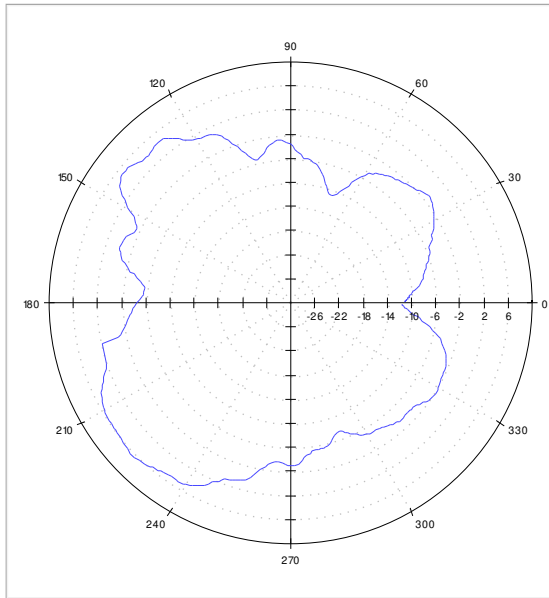
### 5.2.2.2 Frequency near middle ( $f_{mid}$ )



Antenna chart of transmitter

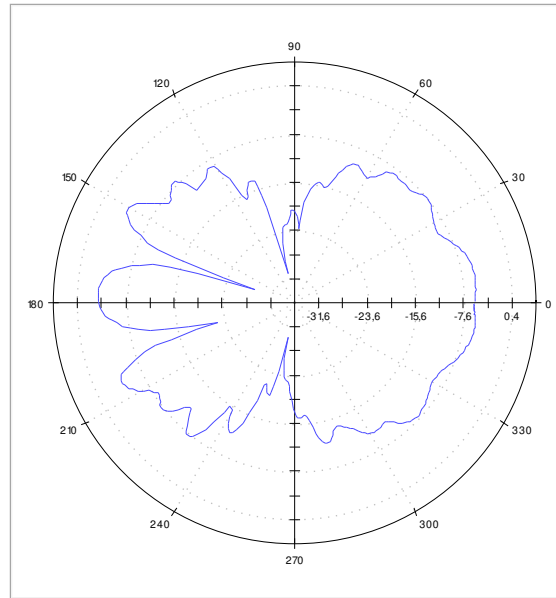
$f_{mid}$ , horizontal, pos. 1

Azimuth Chart: 90deg, Horizontal



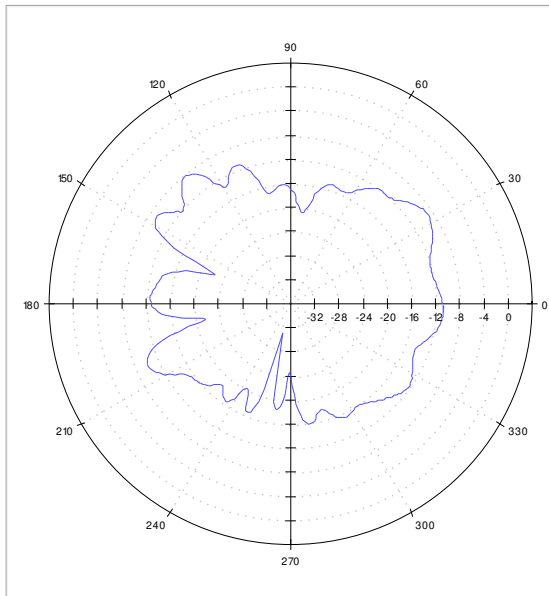
$f_{mid}$ , vertical, pos. 1

Azimuth Chart: 90deg, Vertical



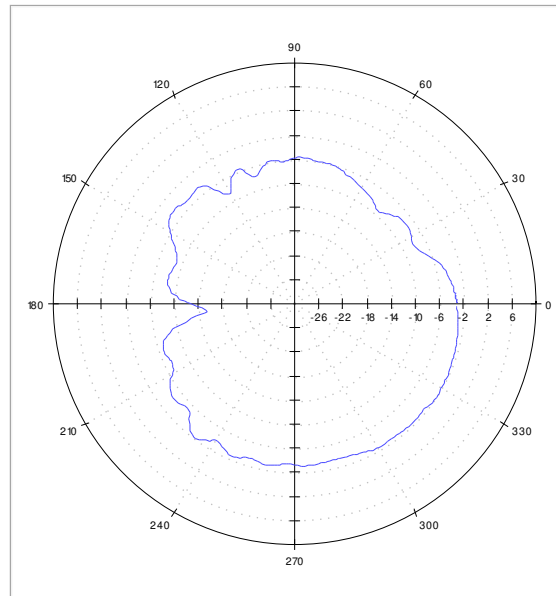
$f_{mid}$ , horizontal, pos. 2

Azimuth Chart: 0deg, Horizontal

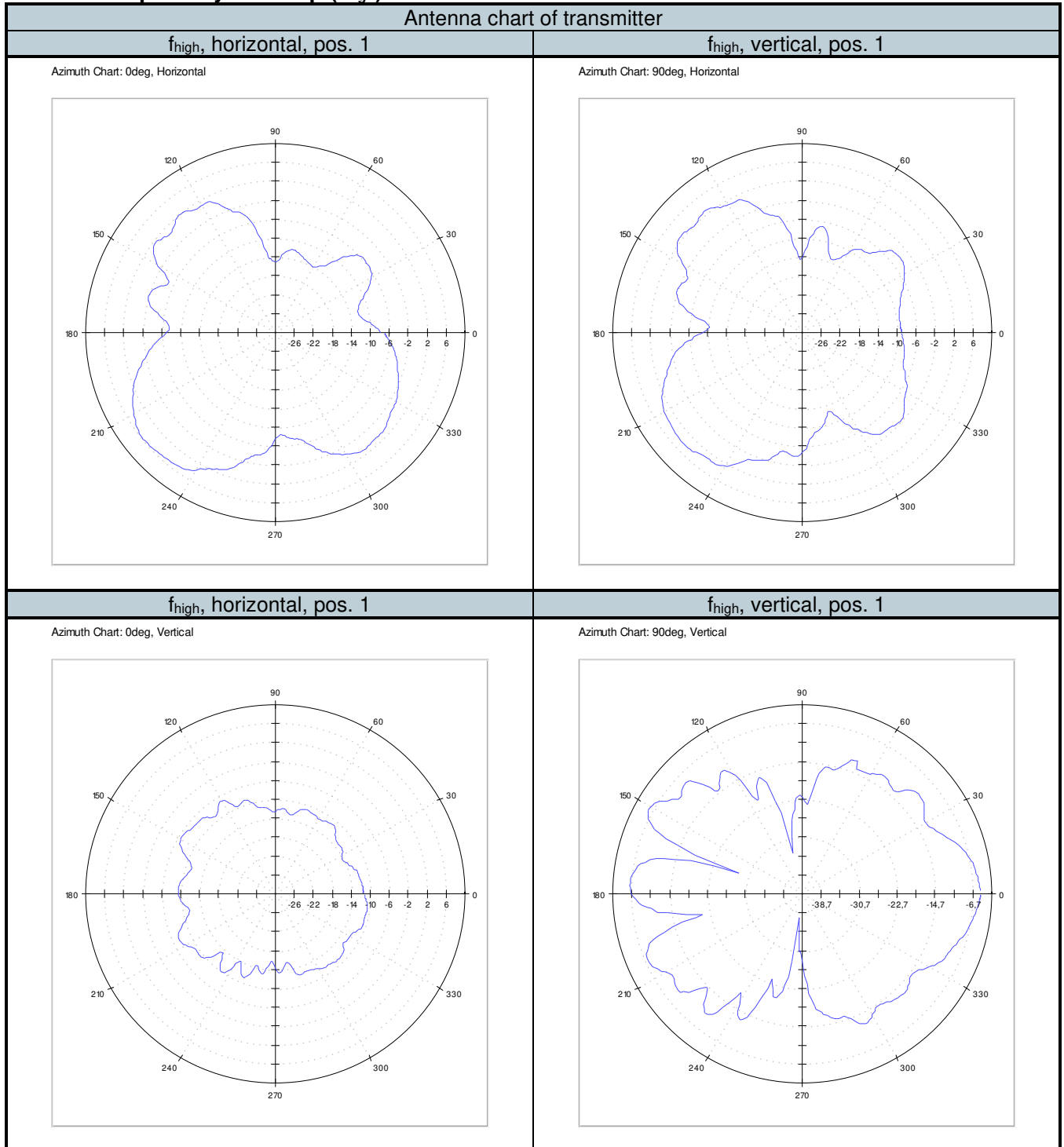


$f_{mid}$ , vertical, pos. 2

Azimuth Chart: 0deg, Vertical



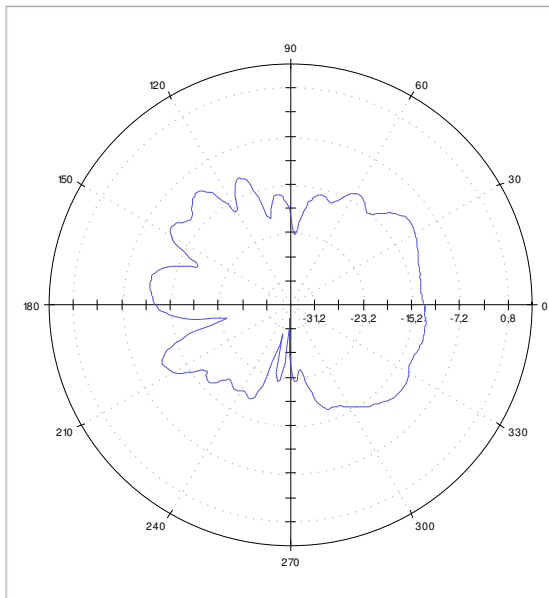
### 5.2.2.3 Frequency near top ( $f_{high}$ )



Antenna chart of transmitter

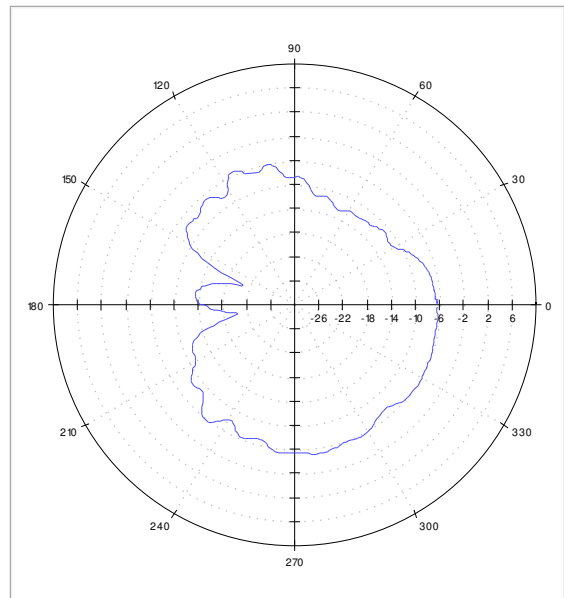
$f_{high}$ , horizontal, pos. 2

Azimuth Chart: 0deg, Horizontal



$f_{high}$ , vertical, pos. 2

Azimuth Chart: 0deg, Vertical



## 6 Test Equipment used for Tests

No.	Test equipment	Type	Manufacturer	Serial No.	PM. No.	Cal. Date	Cal Due
1	Antenna (Horn)	3115	EMCO Elektronik GmbH	9609-4918	480183	23.02.2021	02.2024
2	RF-Cable	SF102/11SK/11S K 500.0	Huber+Suhner	521885/2	483401	Calibration not necessary	
3	Antenna support	AS620P	Deisel	620/375	480325	Calibration not necessary	
4	Fully anechoic chamber M20	B831 17-E2439-T232	Albatross Projects	103	480303	Calibration not necessary	
5	Turntable	DS420 HE	Deisel	420/620/00	480315	Calibration not necessary	
6	Multiple Control Unit	MCU	Maturo GmbH	MCU/043/97110 7	480832	Calibration not necessary	
7	Positioners	TDF 1.5- 10Kg	Maturo	15920215	482034	Calibration not necessary	
8	Antenna (Horn)	3115	EMCO Elektronik GmbH	9609-4922	480184	14.11.2022	11.2025
9	CW Generator Microwave	83650L	Agilent	3844A00554	480333	22.02.2022	02.2024
10	Software	EMC32 V10.60.20	Rohde & Schwarz		483261	Calibration not necessary	
11	EMI Receiver / Spectrum Analyser	ESW44	Rohde & Schwarz	101635	482467	22.02.2022	02.2024

## 7 Report History

Report Number	Date	Comment
F231195E4	15.12.2023	Initial Test Report
-	-	-
-	-	-