



# TAOGLAS®



# Datasheet

## Bolt

**Part No:**  
A.120.A.101111

## Description

All-Band GNSS Active Permanent Mount Antenna

## Features:

Dual Stage LNA

Bands Covered:

- GPS (L1/L2/L5)
- IRNSS (L5)
- QZSS (L1/L2C/L5/L6)
- Galileo (E1/E5a/E5b/E6)
- GLONASS (G1/G2/G3)
- BeiDou (B1/B2a/B2b/B3)
- L-Band

Dimensions:  $\varnothing$ 94 x 26mm

Cable: 1m RG-174, Connector: SMA(M)

Permanent Mount, IP67 Waterproof Rated Enclosure

RoHS & REACH Compliant

<b>1.</b>	<b>Introduction</b>	<b>2</b>
<b>2.</b>	<b>Specification</b>	<b>3</b>
<b>3.</b>	<b>Antenna Characteristics</b>	<b>5</b>
<b>4.</b>	<b>Radiation Patterns</b>	<b>8</b>
<b>5.</b>	<b>Active Circuitry Performance</b>	<b>16</b>
<b>6.</b>	<b>Field Test Results</b>	<b>21</b>
<b>7.</b>	<b>Mechanical Drawing</b>	<b>22</b>
<b>8.</b>	<b>Packaging</b>	<b>23</b>
<hr/>		
	Changelog	24

Taoglas makes no warranties based on the accuracy or completeness of the contents of this document and reserves the right to make changes to specifications and product descriptions at any time without notice. Taoglas reserves all rights to this document and the information contained herein. Reproduction, use or disclosure to third parties without express permission is strictly prohibited.



# 1. Introduction



The Taoglas Bolt A.120 is an active multi-band GNSS antenna has been carefully designed to work well on the full GNSS spectrum and the L-Band for correction services. This allows the user to achieve higher location accuracy, as well as stability of position tracking in urban environments meaning a better overall GNSS system for the user.

The A.120 Bolt has excellent performance across the full bandwidth of the antenna and its design has an even gain across the hemisphere giving almost excellent, broad axial ratio which in turn makes it resilient to multipath rejection and excellent phase centre stability.

The LNA used in the A.120 ensures excellent out of band rejection and provides excellent positioning stability and reliability of GNSS signals. The robust, covert, permanent mount IP67 rated ASA enclosure is just 26mm in height designed for ease of installation. It can be mounted on any surface; however, performance can be affected when mounted on metal surfaces.

Typical Applications Include:

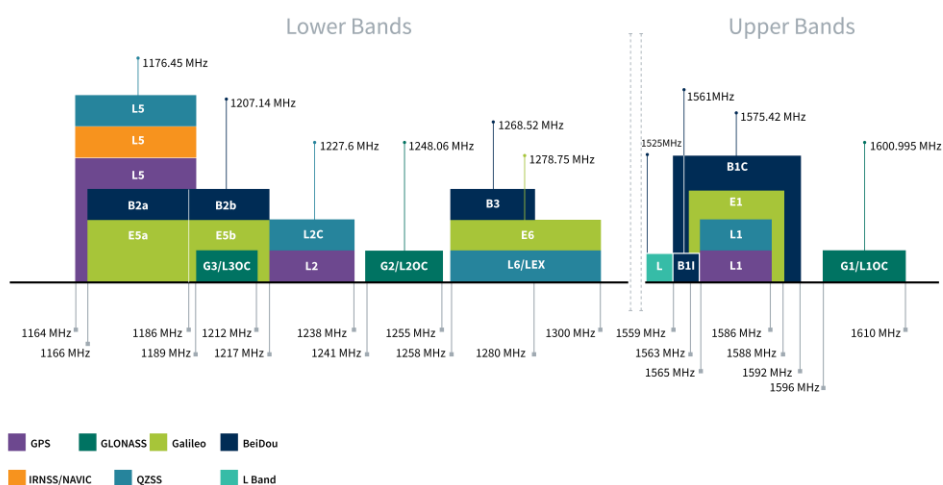
- Autonomous Driving
- Precision Positioning for Robotics
- Precision Agriculture
- Telematics & Asset Tracking

The A.120 is the latest external addition to an ongoing product road map of high precision antennas by Taoglas. For RTK applications when used on the base and/or the rover, the A.120 can achieve genuine cm-level accuracy.

Cable and connectors are customizable. Please contact your regional Taoglas customer support team for further information.

## 2. Specification

GNSS Frequency Bands					
GPS	L1 1575.42 MHz	L2 1227.6 MHz	L5 1176.45 MHz		
	■	■	■		
GLONASS	G1 1602 MHz	G2 1248 MHz	G3 1207 MHz		
	■	■	■		
Galileo	E1 1575.24 MHz	E5a 1176.45 MHz	E5b 1201.5 MHz	E6 1278.75 MHz	
	■	■	■	■	
BeiDou	B1C 1575.42 MHz	B1I 1561 MHz	B2a 1176.45 MHz	B2b 1207.14 MHz	B3 1268.52 MHz
	■	■	■	■	■
L-Band	L-Band 1542 MHz				
	■				
QZSS (Regional)	L1 1575.42 MHz	L2C 1227.6 MHz	L5 1176.45 MHz	L6 1278.75e6	
	■	■	■	■	
IRNSS (Regional)	L5 1176.45 MHz				
	■				
SBAS	L1/E1/B1 1575.42 MHz	L5/B2a/E5a 1176.45 MHz	G1 1602 MHz	G2 1248 MHz	G3 1207 MHz
	■	■	■	■	■



GNSS Bands and Constellations

GNSS Electrical										
Frequency (MHz)	1176.45	1201.55	1227.6	1248	1268.52	1278.75	1542	1561	1575.42	1602
VSWR (max.)	1.5:1		1.5:1	1.5:1	1.5:1	1.5:1	1.5:1	1.5:1	1.5:1	1.5:1
Passive Antenna Efficiency (%)	20	31	40	40	30	20	38	53	50	38
Passive Antenna Gain at Zenith (dBic)	-1.5	0.5	1.8	1.2	-0.1	-1.5	2.6	4.2	4.0	2.7
Axial Ratio (dB)	0.71	0.24	0.22	0.4	0.43	1.24	1.29	1.3	1.31	1.37
PCO	1.10	1.00	0.95	1.03	1.13	1.15	0.49	0.33	0.28	0.30
PCV	0.06	0.05	0.08	0.11	0.16	0.24	0.29	0.40	0.40	0.35
Polarization	RHCP									
Impedance	50Ω									

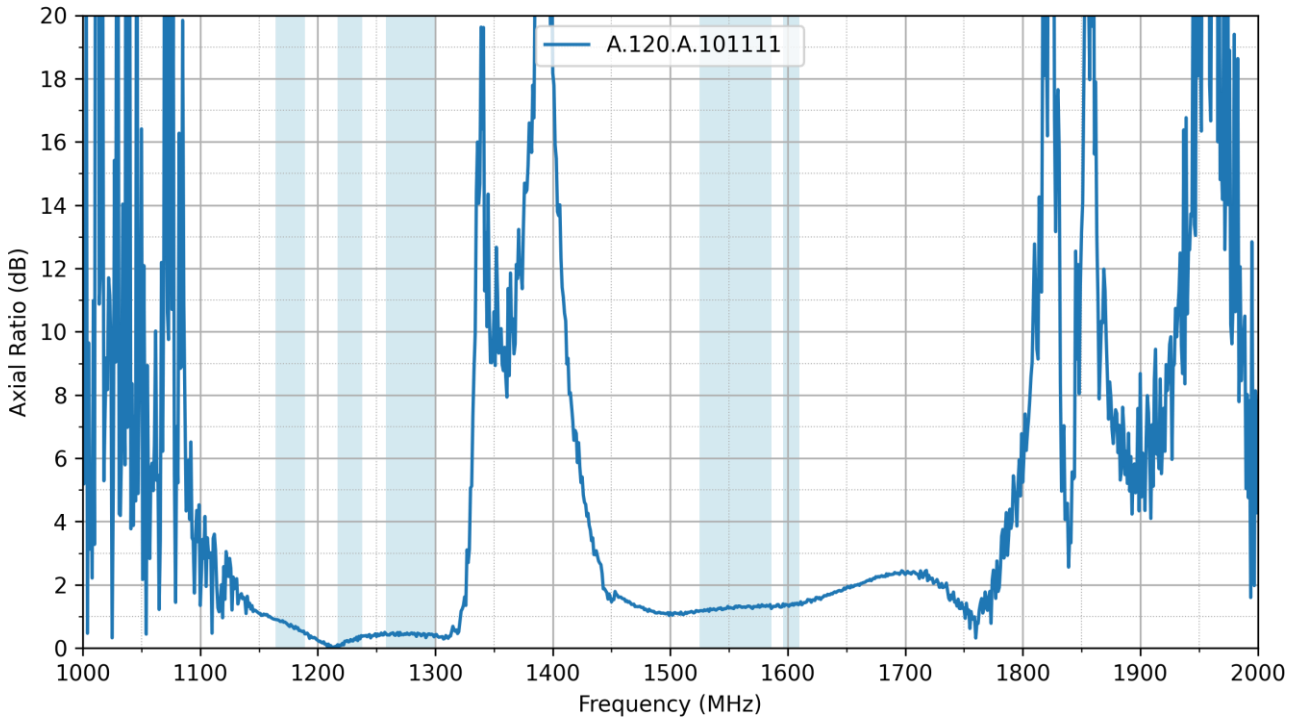
LNA and Filter Electrical Properties										
Frequency (MHz)	1176.45	1201.55	1227.6	1248	1268.52	1278.75	1542	1561	1575.42	1602
Gain (dB)	27.6	28.8	28.7	26.7	23.1	21.7	30.2	30.2	30.7	29.8
Noise Figure (dB)	3.1	3.1	3.1	3.1	3.1	3.1	1.7	1.6	1.6	1.6
Group Delay (ns)	12.6	10.3	10.3	11.4	12.8	8.6	8.0	7.8	7.7	8.3
P1dB (dBm)	-24.5	-24.3	-24.2	-22.8	-21.8	-21.0	-25.5	-24.9	-24.6	-24.2

Mechanical	
Dimensions	94.3mm, Height: 26mm
Weight	283.5g
Material	ASA
Connector	SMA(M)
Cable	RG-174
Thread Diameter	M20

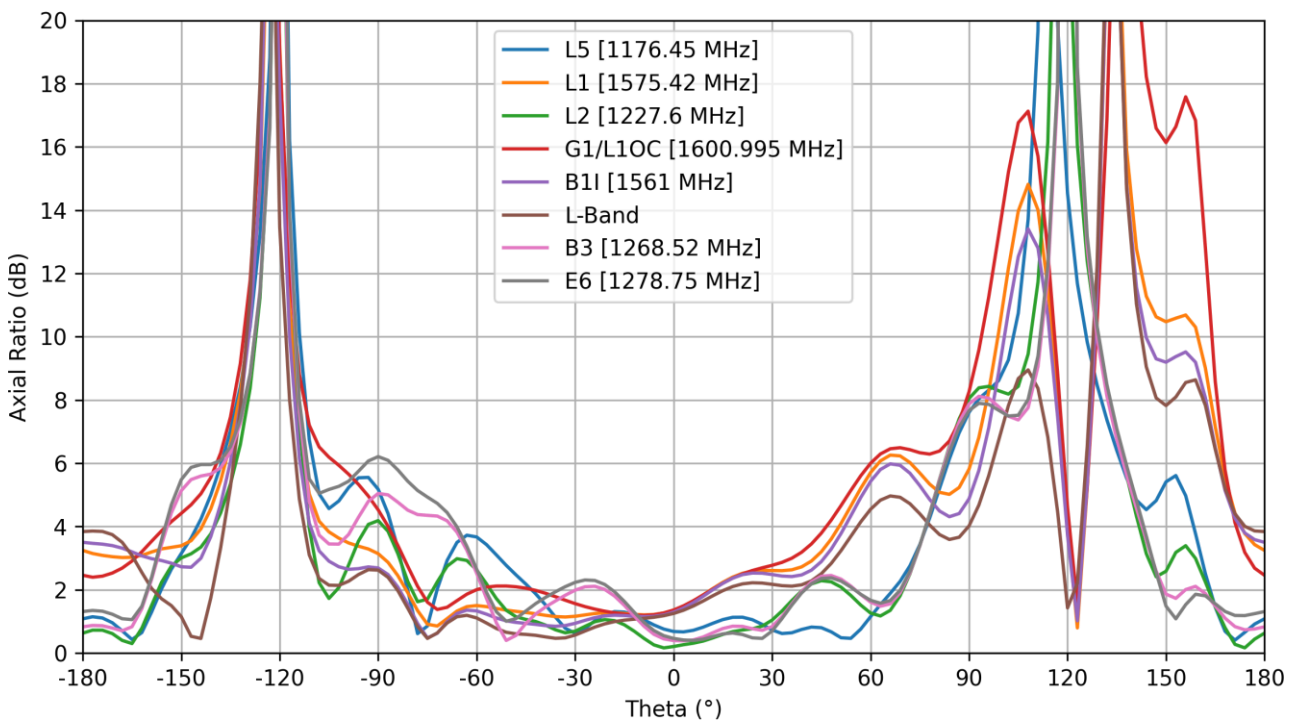
Environmental	
Operation Temperature	-40°C - +85°C
Storage Temperature	-40°C - +85°C

### 3. Antenna Characteristics

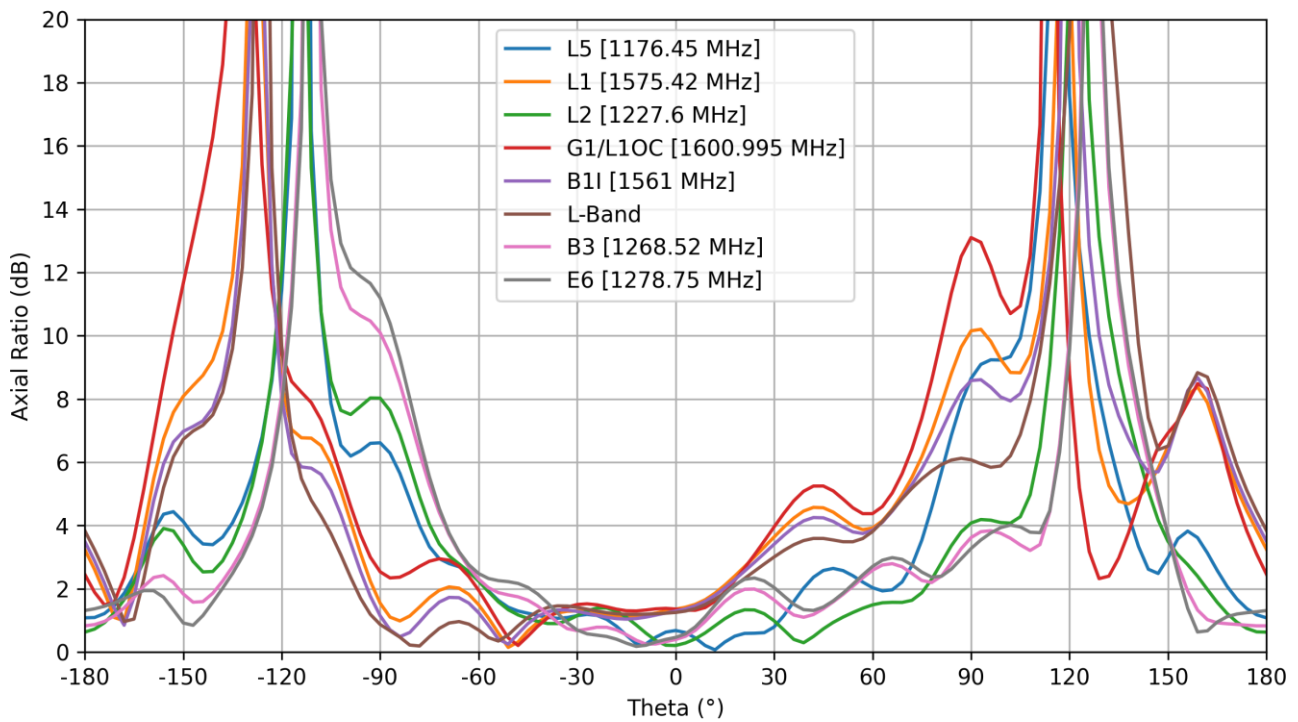
#### 3.1 Axial Ratio



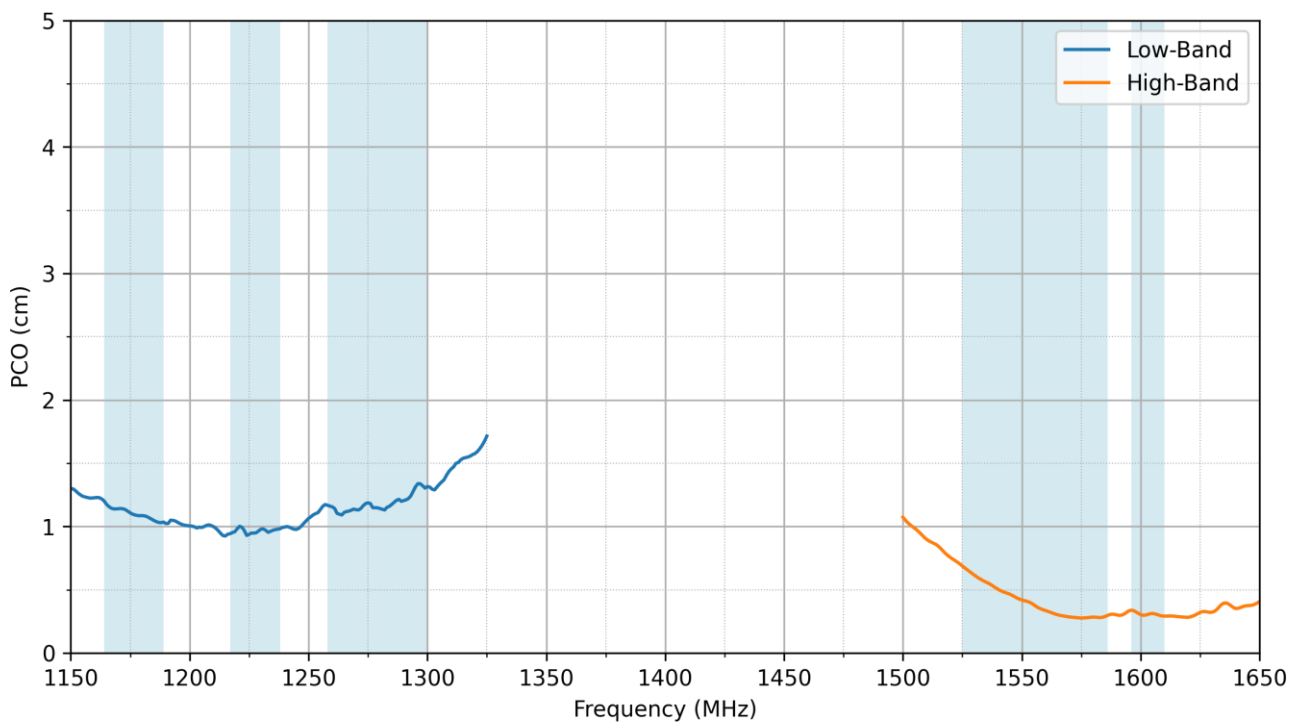
#### 3.2 Axial Ratio vs Angle for Phi=0



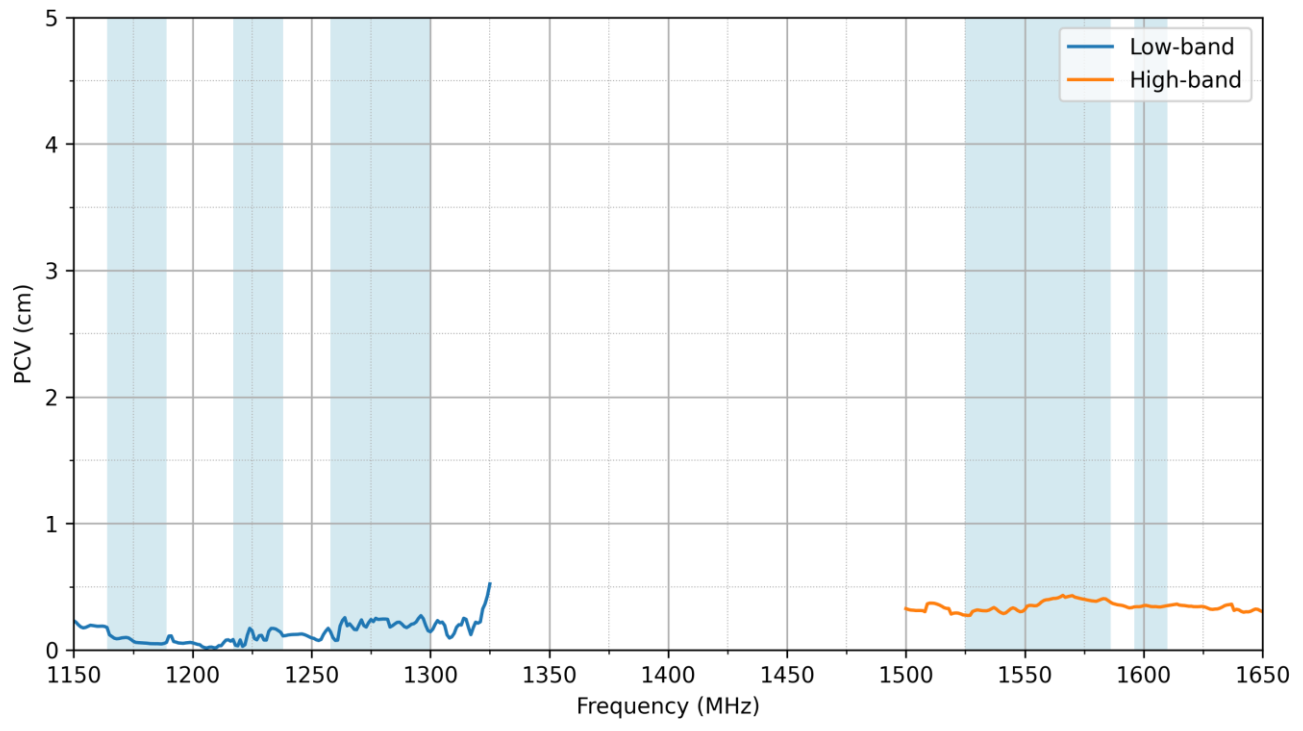
### 3.3 Axial Ratio vs Angle for Phi=90



### 3.4 PCO



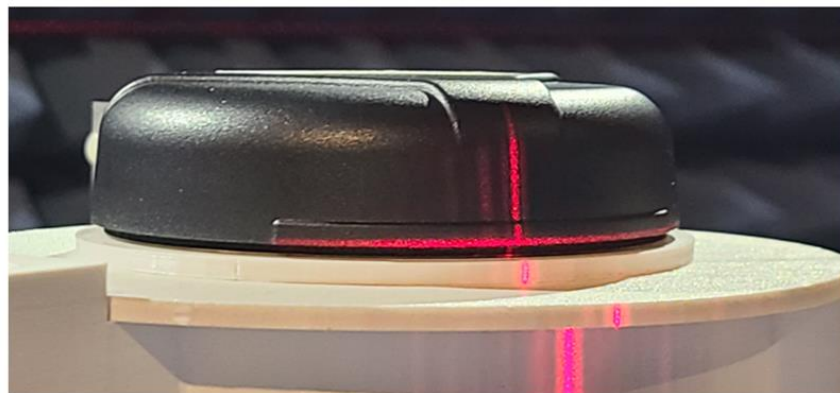
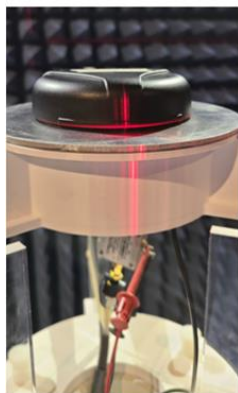
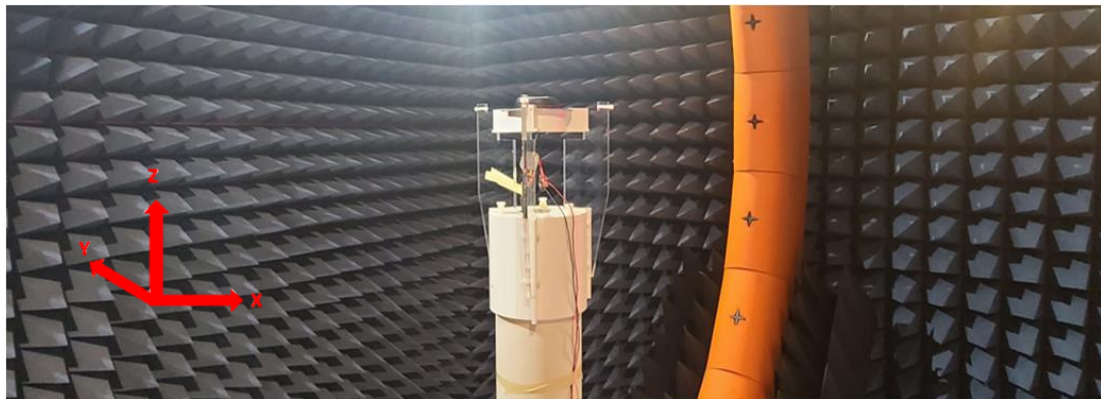
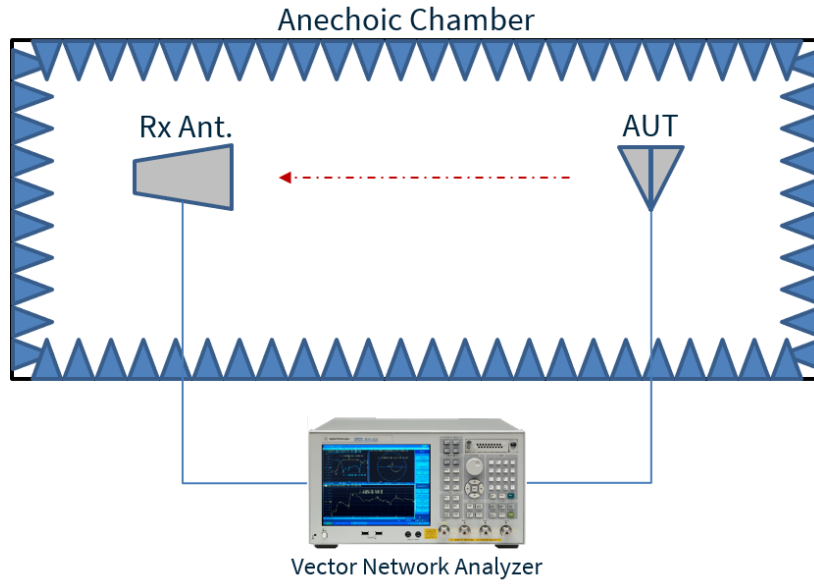
**3.5** PCV



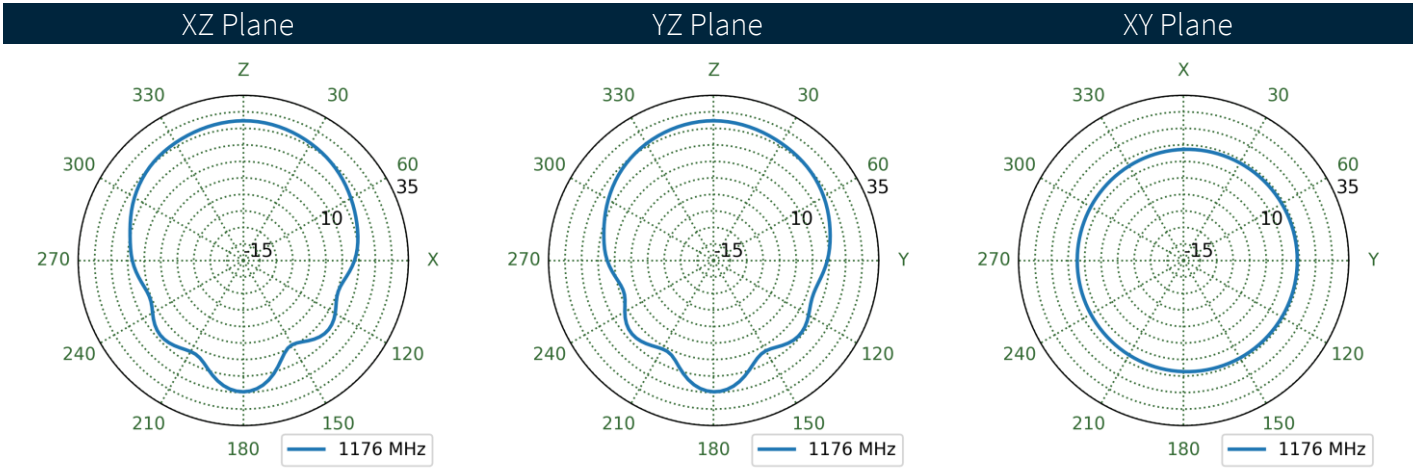
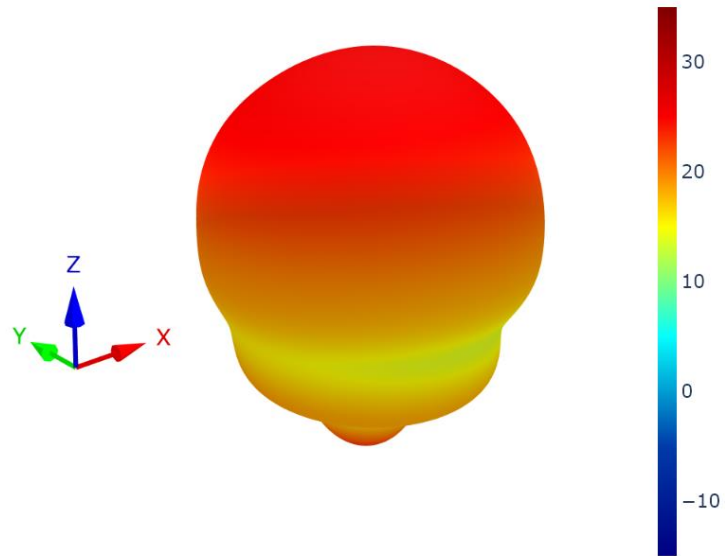


## 4. Radiation Patterns

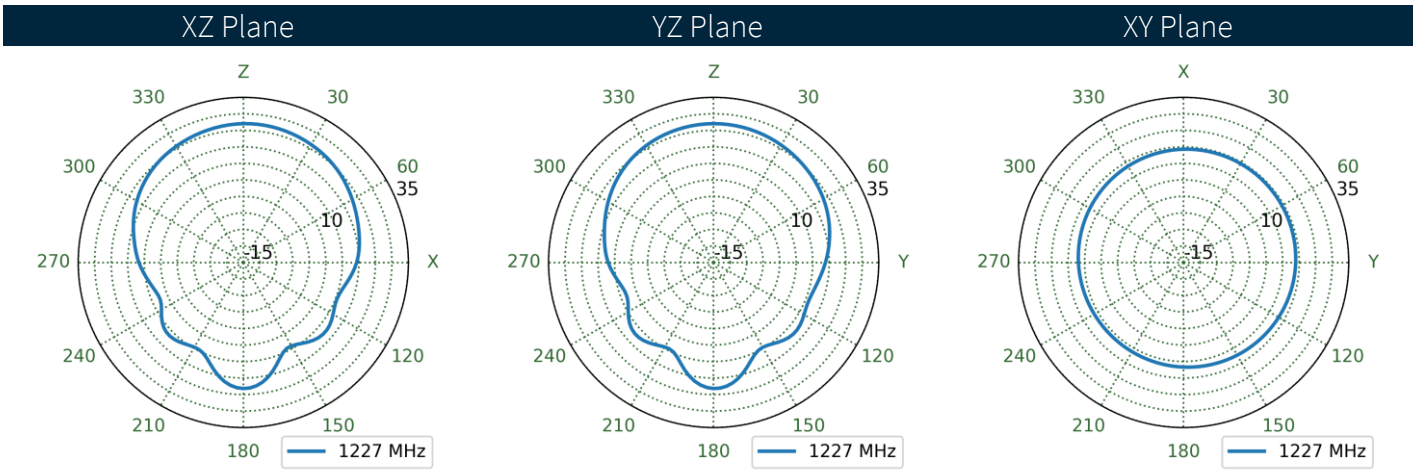
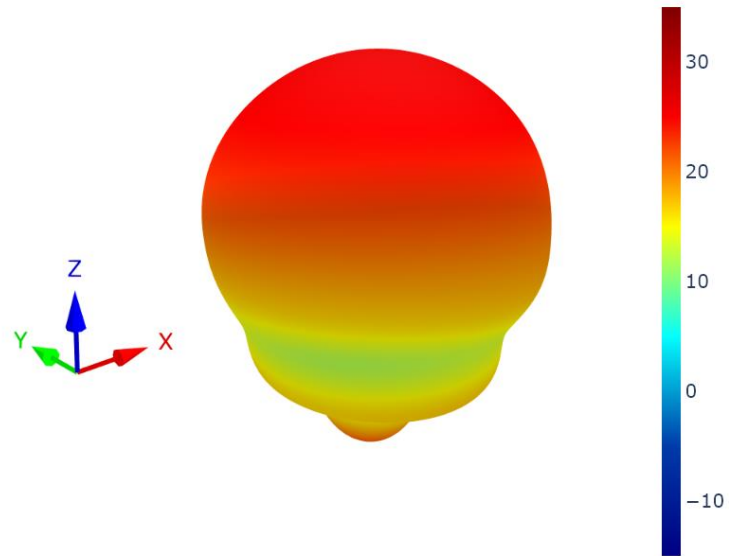
### 4.1 Test Setup



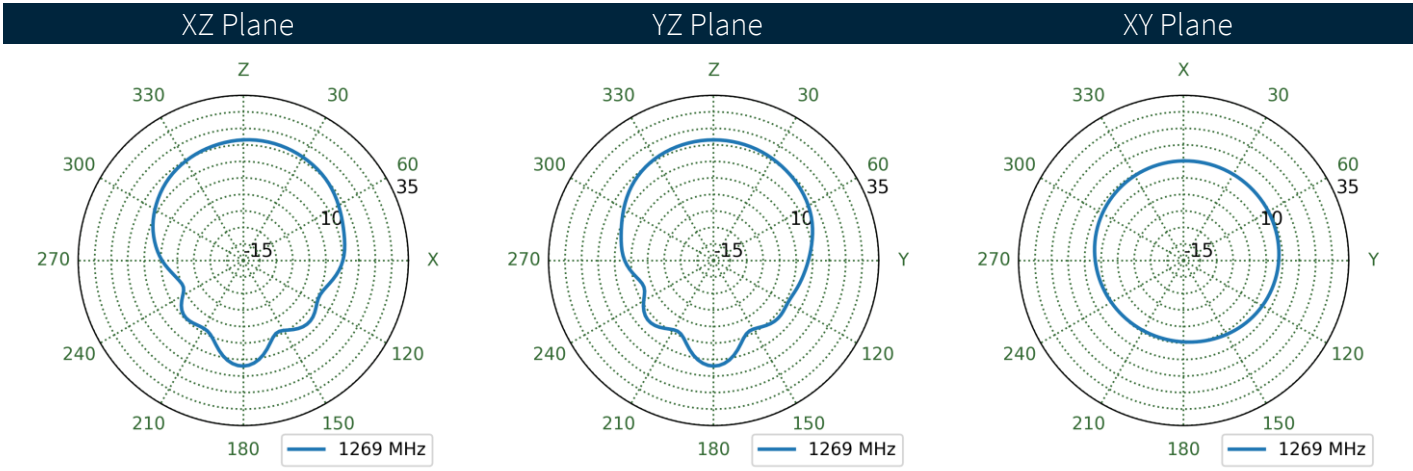
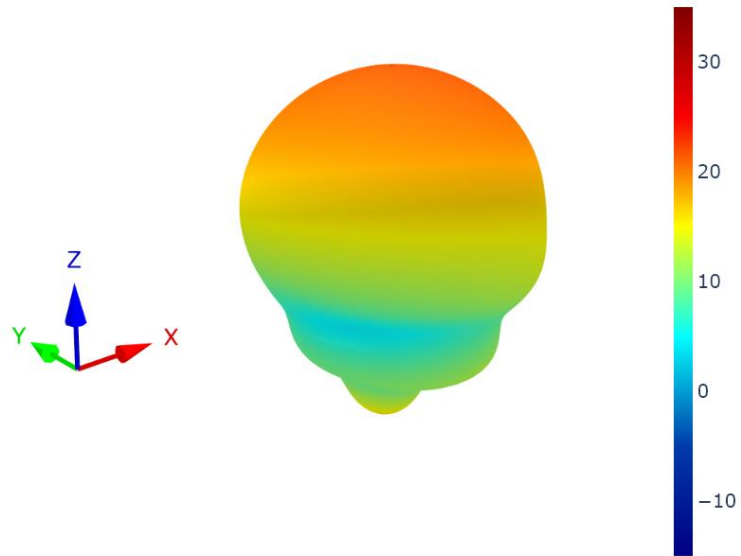
4.2 Patterns at 1176 MHz



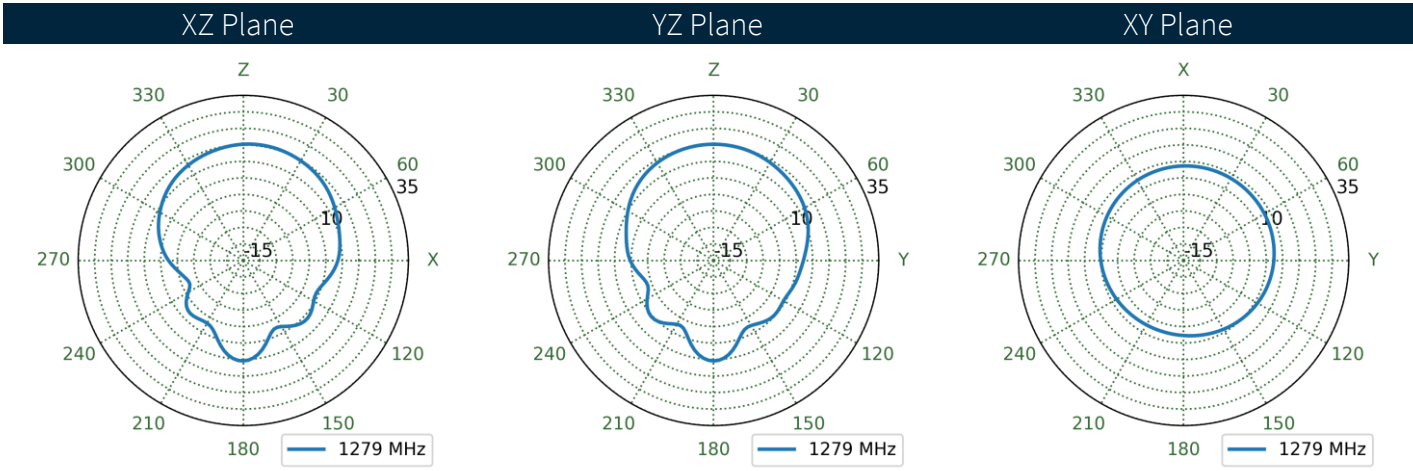
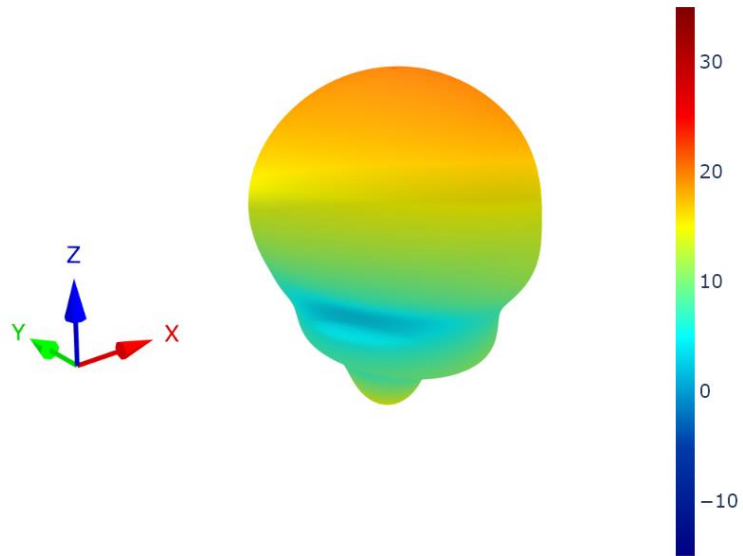
4.3 Patterns at 1227 MHz



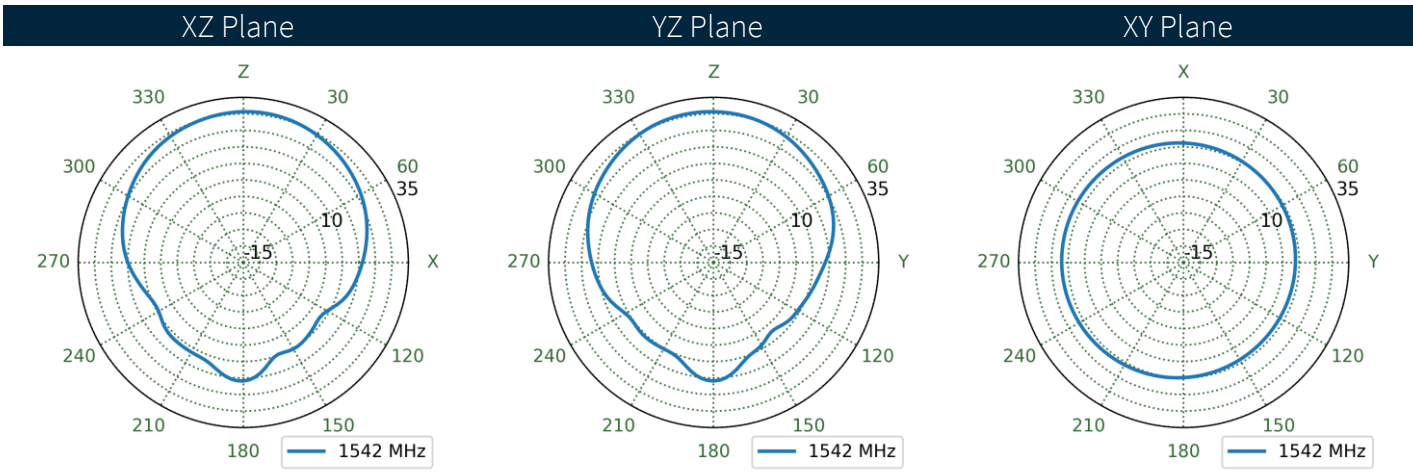
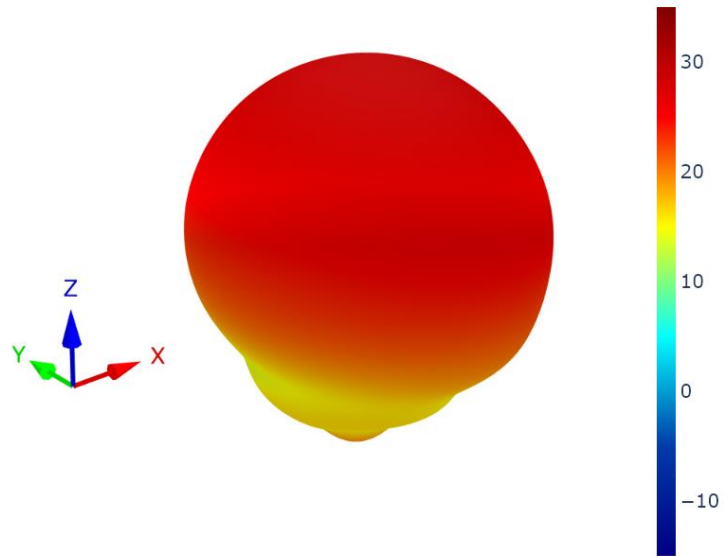
4.4 Patterns at 1269 MHz



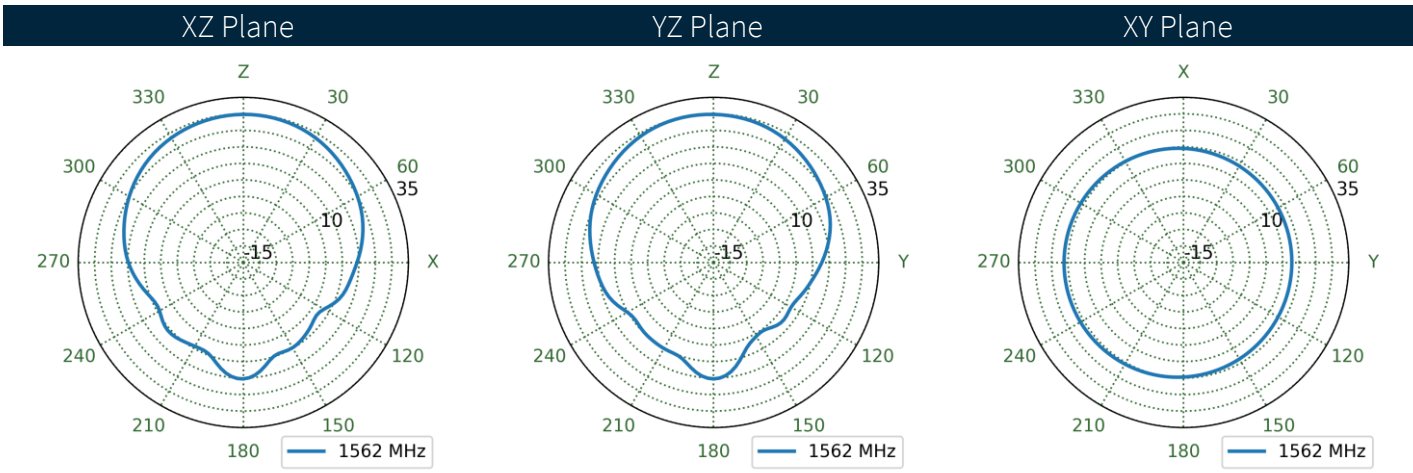
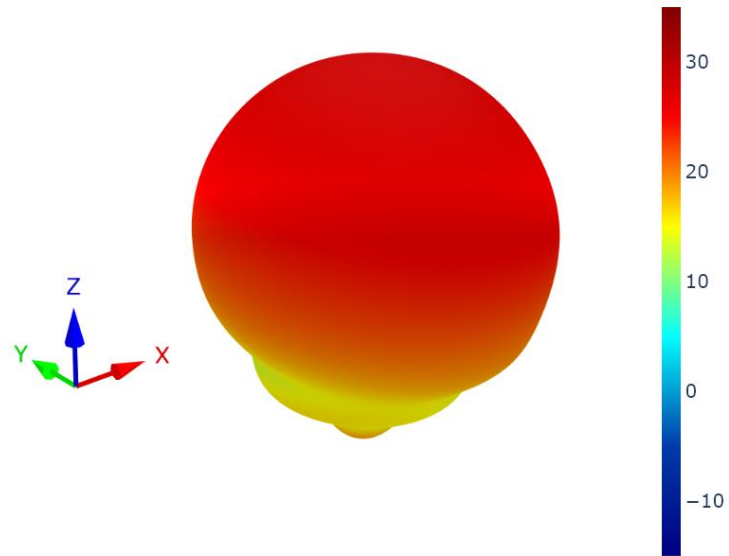
4.5 Patterns at 1279 MHz



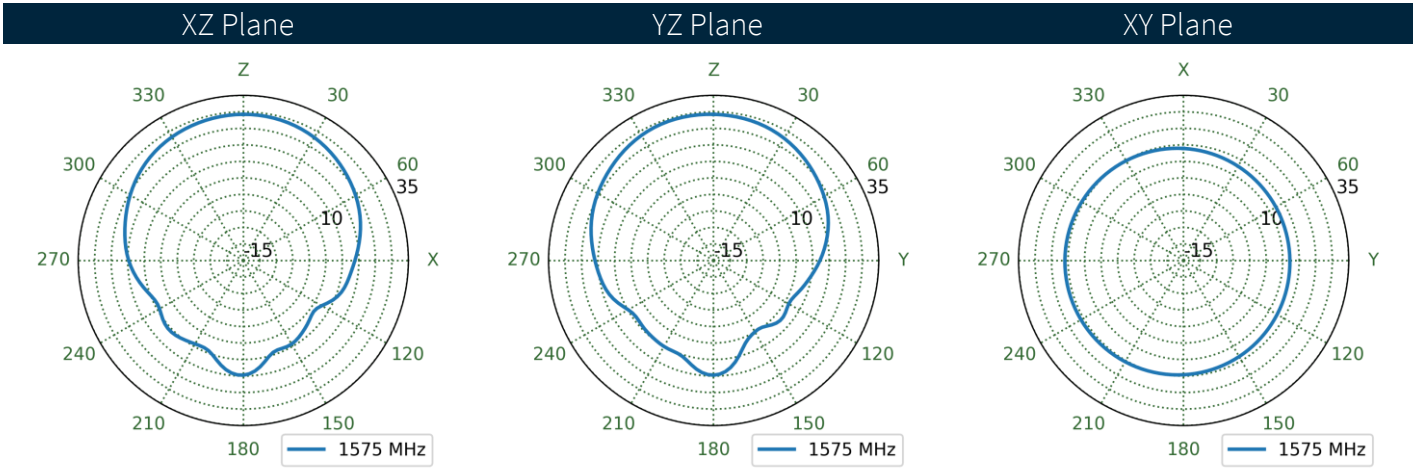
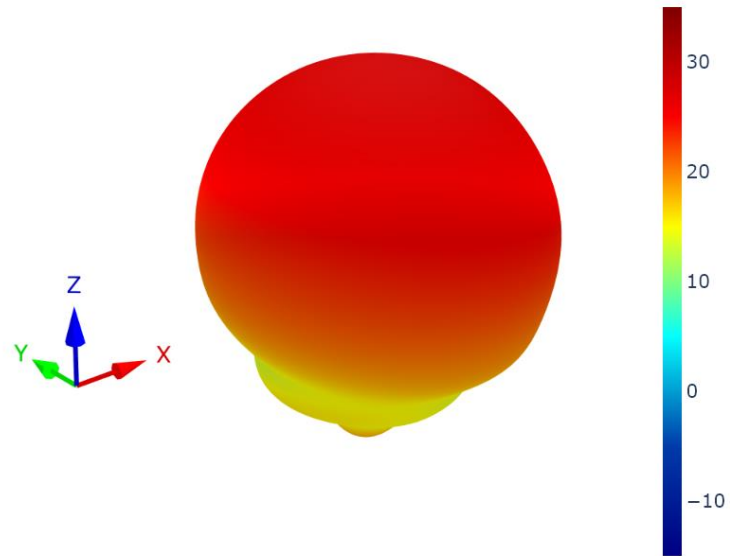
4.6 Patterns at 1542 MHz



4.7 Patterns at 1562 MHz

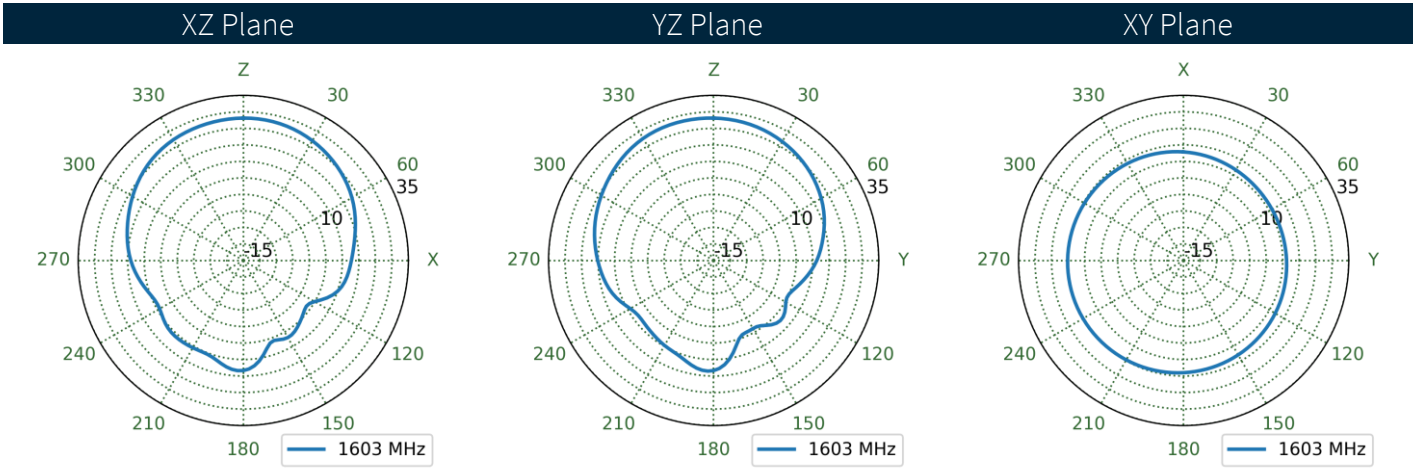
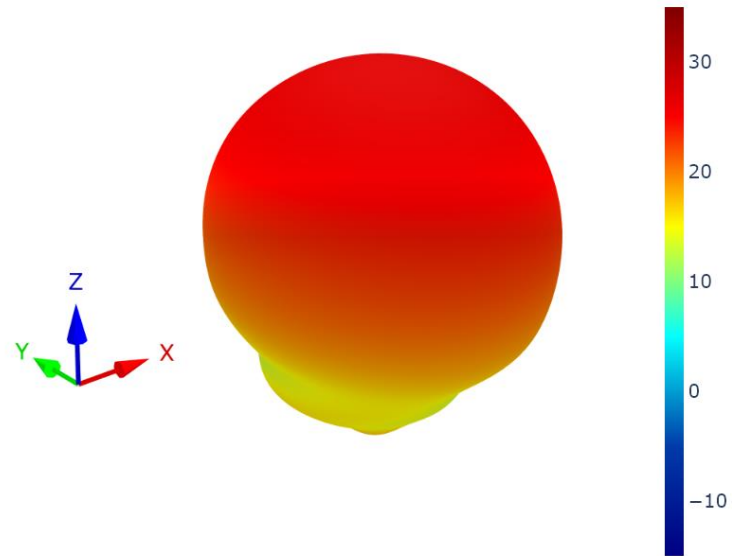


4.8 Patterns at 1575 MHz



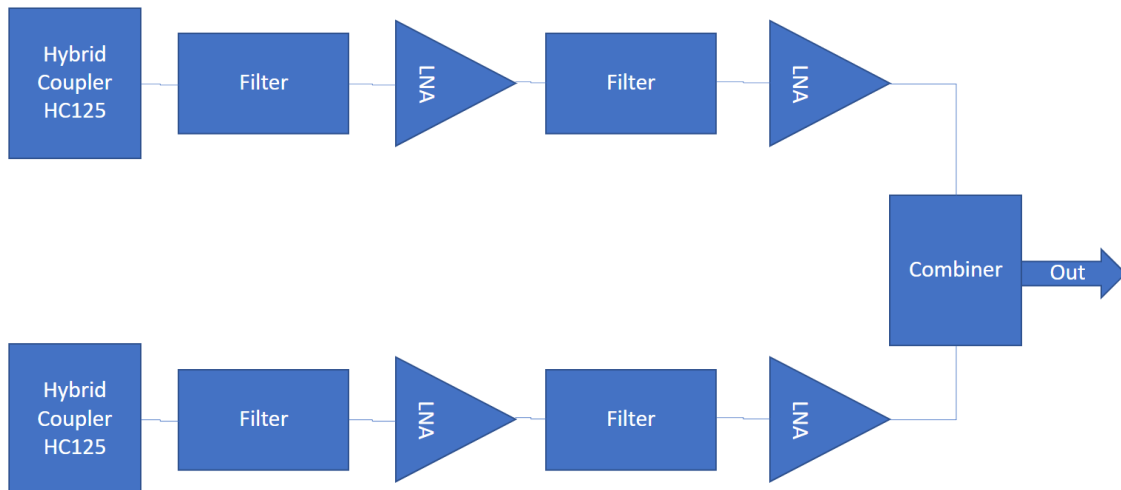


4.9 Patterns at 1603 MHz

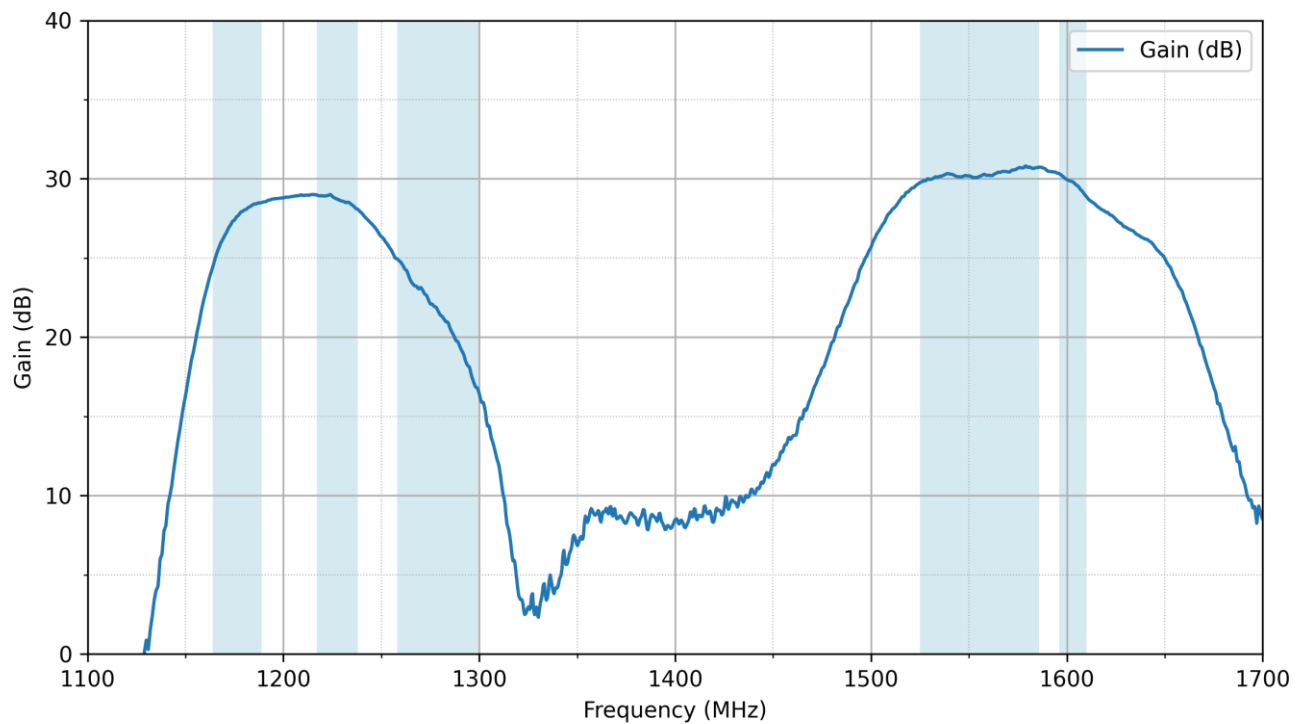


## 5. Active Circuitry Performance

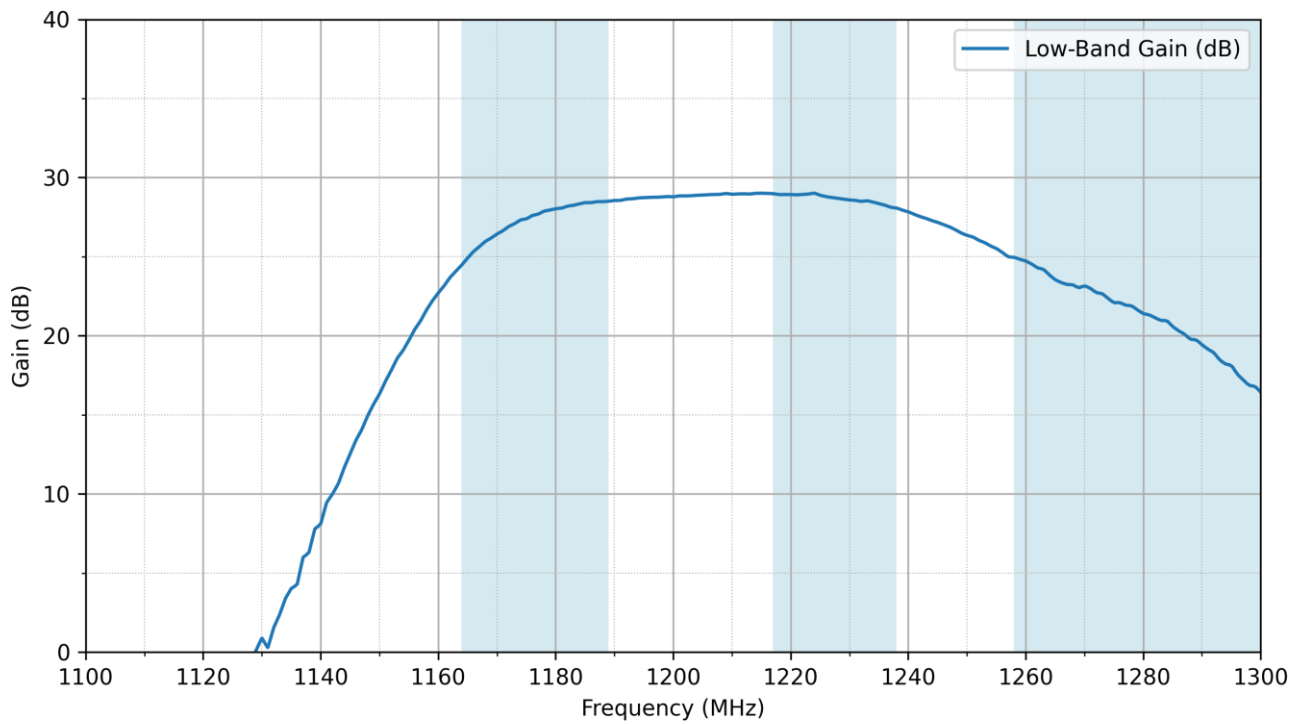
### 5.1 Block Diagram



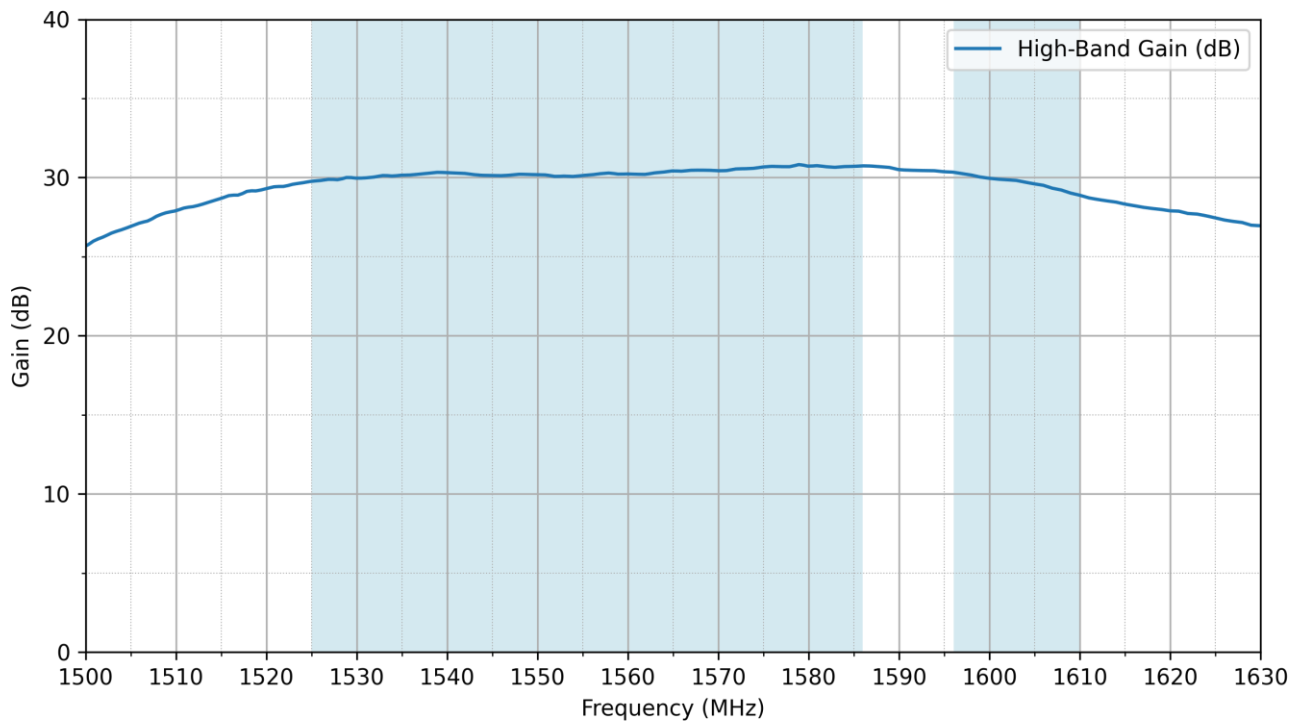
### 5.2 Wideband Gain Plot



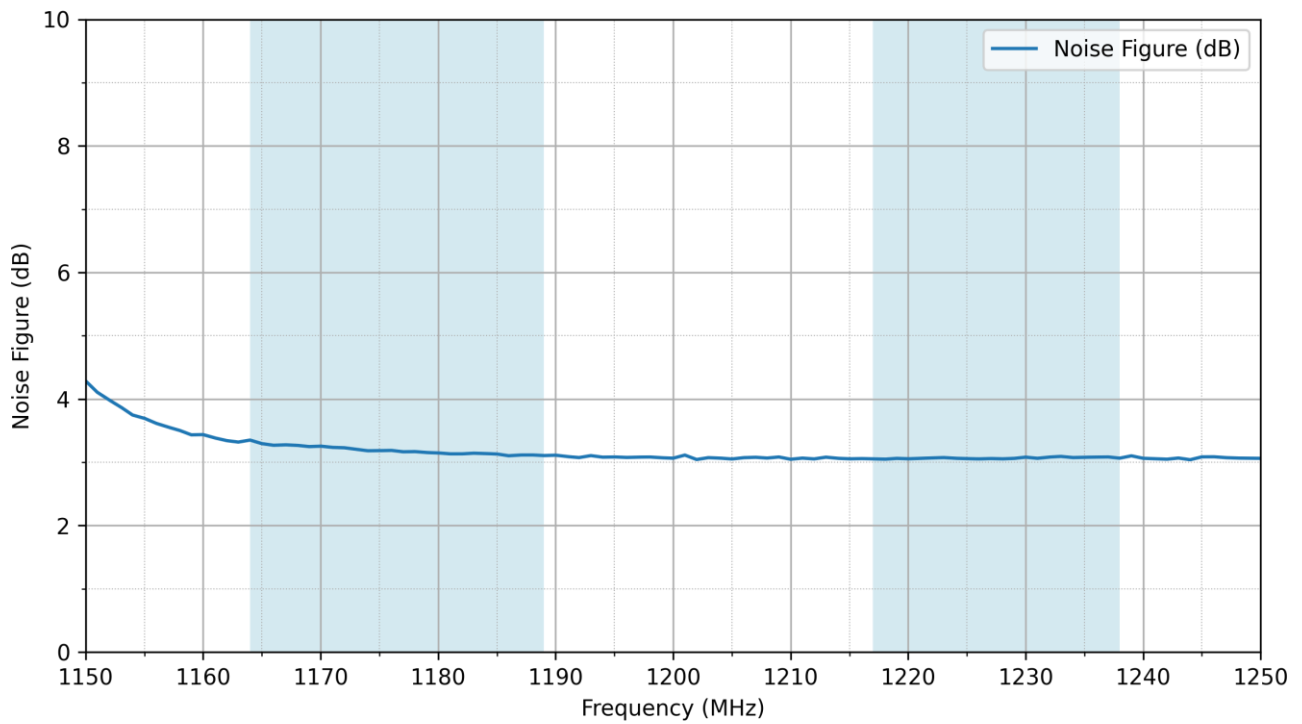
### 5.3 Gain Plot – Low-Band



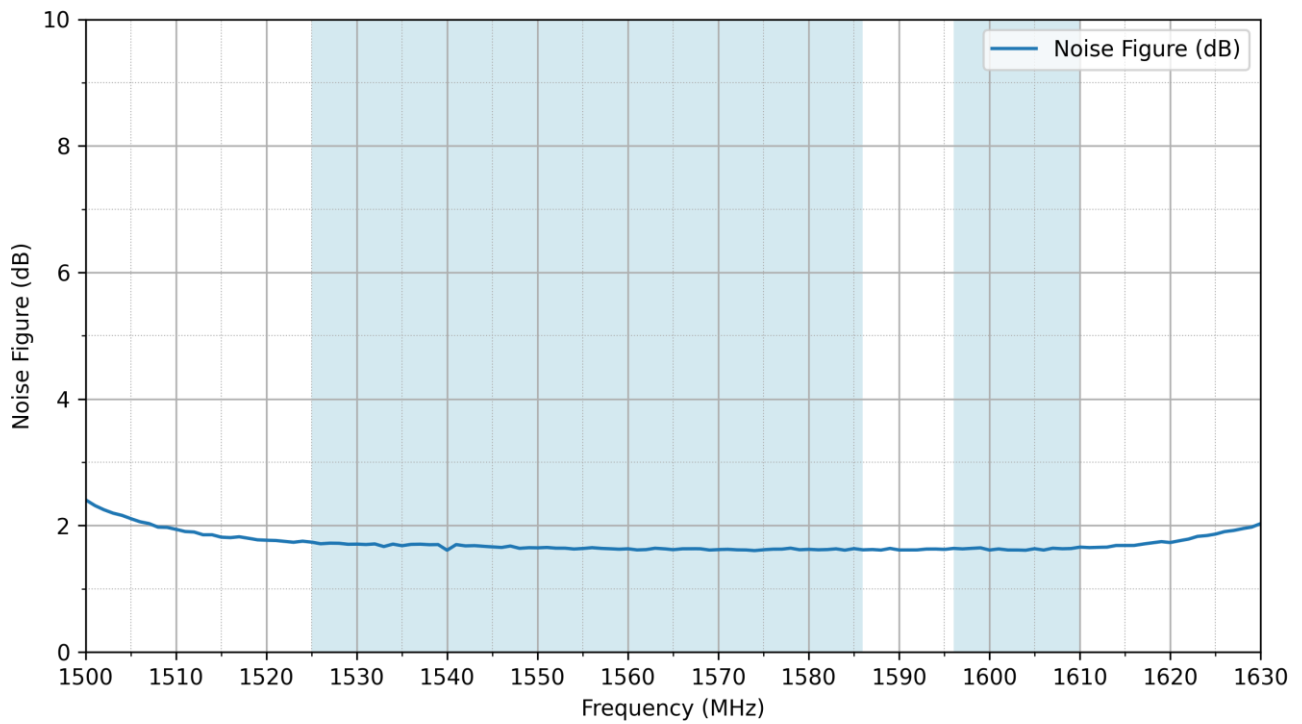
### 5.4 Gain Plot – High-Band



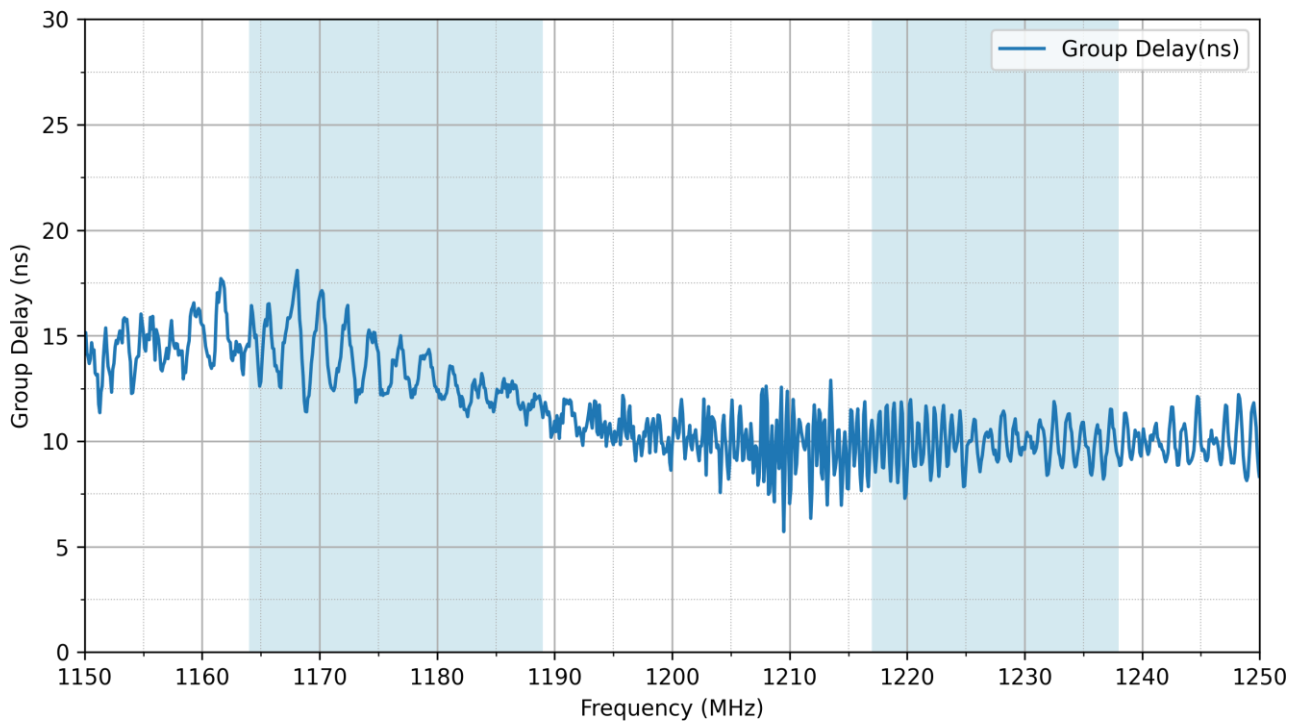
## 5.5 Noise Figure (Low-Band)



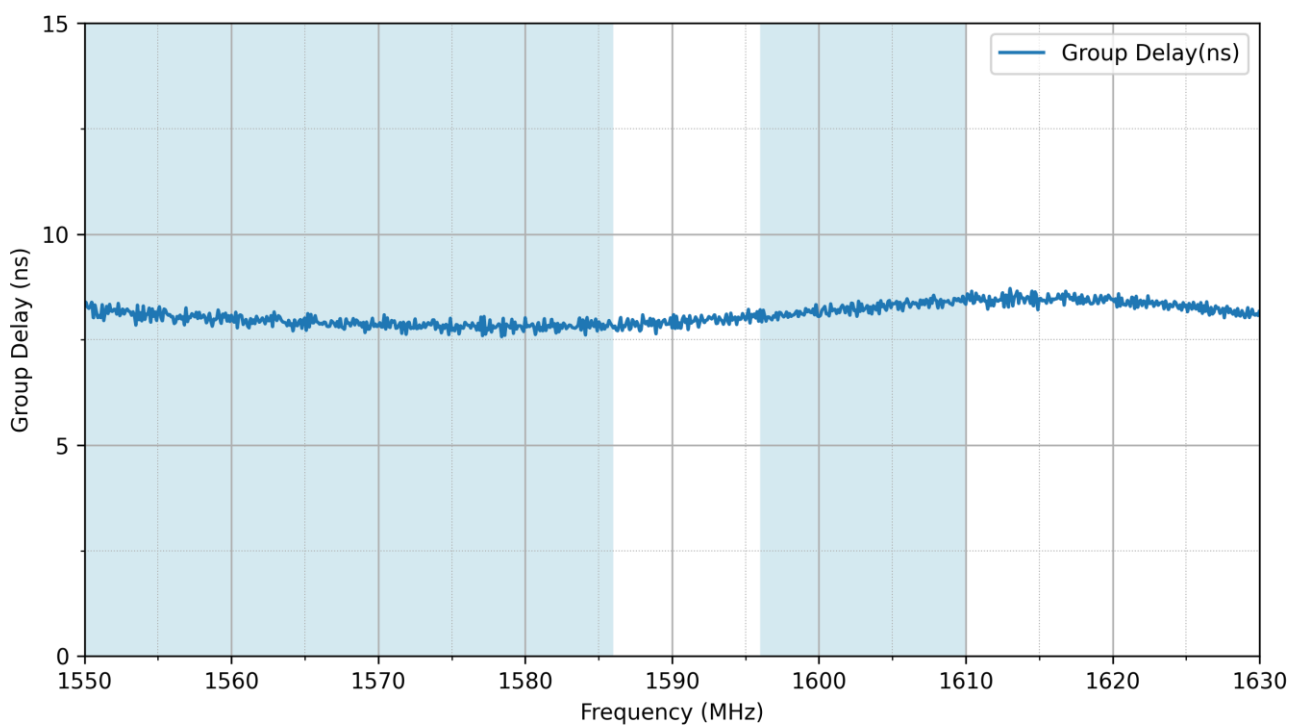
## 5.6 Noise Figure (High-Band)



### 5.7 Group Delay (Low-Band)



### 5.8 Group Delay (High-Band)



## 6. Field Test Results

In this section Taoglas will present the field test result for AA.120 antenna. The test was performed when the antenna was mounted on a static rooftop test set up in an open sky environment for at least 6 hours.

Taoglas will show the field test results using the following receiver:

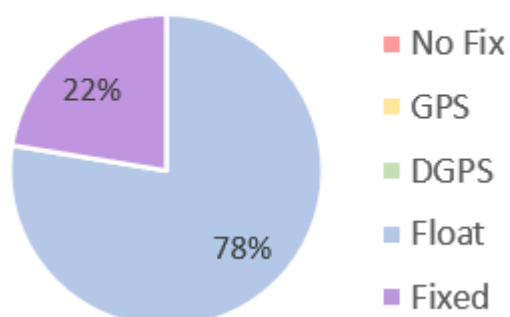
### 6.1 Septentrio AsteRx-U S/N

#### Receiver features:

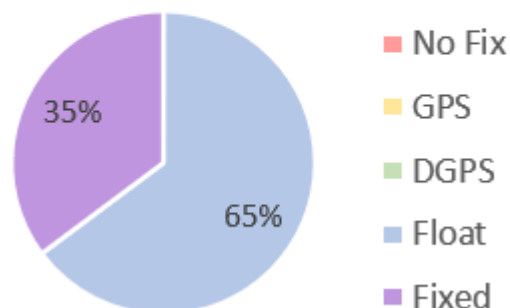
- Multi-band GNSS: 544 channels
- GPS: L1, L2, L5 GLONASS: L1, L2, L3 Galileo: E1, E5ab, AltBoc, E6 BeiDou: B1, B2, B3 NavIC: L51 QZSS: L1, L2, L5, L6
- SBAS: EGNOS, WAAS, GAGAN, MSAS, SDCM(L1, L5)
- RTK (base and rover), Integrated dual-channel L-band receiver, Support for PPP
- Nav. update rate up to 100 Hz
- Position accuracy = RTK 0.6 cm + 0.5 ppm

Positioning Accuracy Table (2D Accuracy)					
Test Condition	Correction Service	CEP (50%)	DRMS (68%)	2DRMS (95-98.2%)	TTF (sec)
Free Space	PPP-RTK DISABLED	28.44 cm	34.22 cm	68.44 cm	42s
	PPP-RTK ENABLED	3.55 cm	4.38 cm	8.76 cm	43s
30x30 cm Ground Plane	PPP-RTK DISABLED	32.08 cm	38.83 cm	77.63 cm	52s
	PPP-RTK ENABLED	5.39 cm	6.58 cm	13.16 cm	46s

SwiftNav Correction  
Free Space



SwiftNav Correction 30x30cm  
Ground Plane



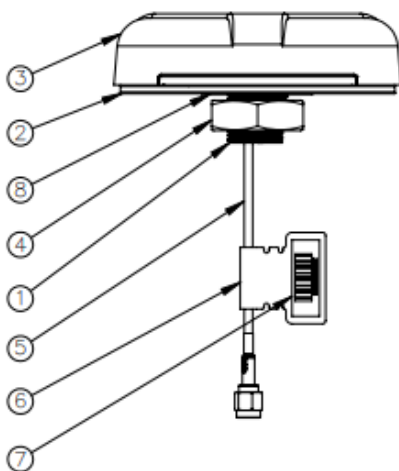
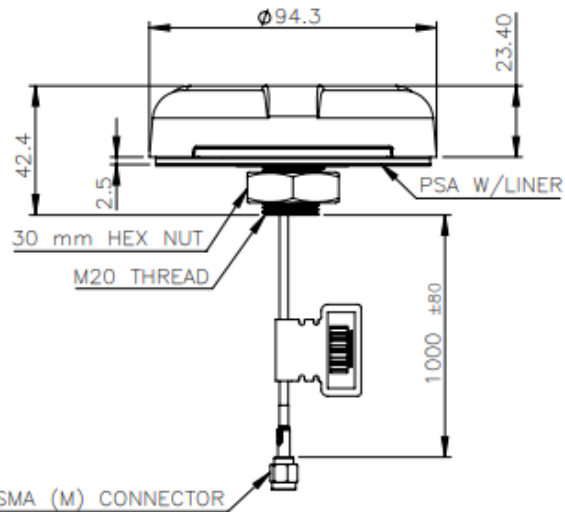
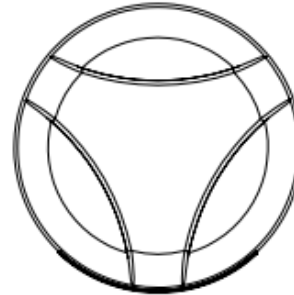
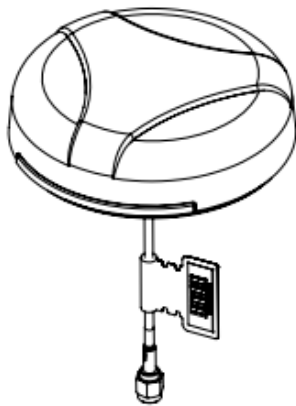
# 7. Mechanical Drawing

ISO NO.: EDW-22-8-0247

STATE: Released

- NOTES:
1. All material must be RoHS compliant.
  2. Use this drawing together with the corresponding 3D CAD database file to fully describe the part.
  3. Critical dimensions are indicated by an inspection symbol  $\square$ .

REV	ZONE	DESCRIPTION	ENG	APPROVED	DATE
D01	All	Initial design	G. Samson	I. Mendez	3/24/2022



	Name	Material	Finish	QTY.
1	Mini ST Base	Zinc Alloy	Ni Plated	1
2	Adhesive Foam	3M 9448HK+CR4305	Black	1
3	Antenna Top Housing	ASA	Black	1
4	Nut M20X 1.5 X 9.5H Cut	SAE 1010	Ni-Zn Plated	1
5	Cable Assy RG-174 with SMA (M) Connector	NA	NA	1
6	Label (48*30)	PEPA	White	1
7	Barcode Label	PET	White	1
8	Washer OD 36.5 x ID 21.3 Cut	Steel	Ni-Zn Plated	1

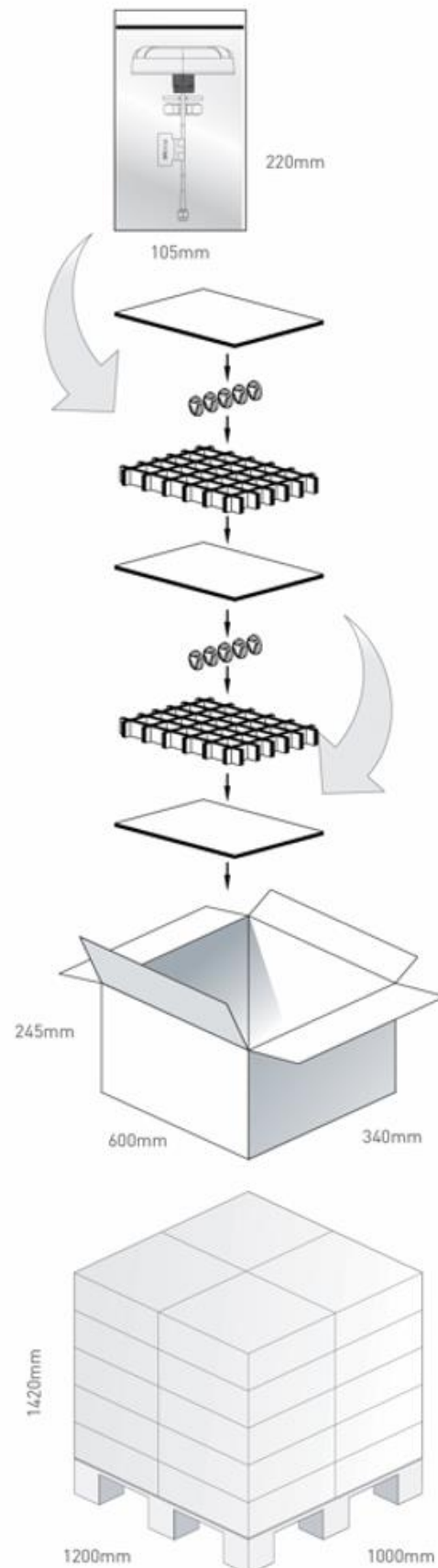
APPROVED BY: P. Frank	<p>The Design Centre This drawing and its inherent design concepts are property of Taoglas. Not to be copied or given to third parties without the written consent of Taoglas.</p>
CHECK BY: I. Mendez	
DRAWN BY: G. Samson	
DATE: 3/24/2022	
UNLESS OTHERWISE SPECIFIED TOLERANCES ON:	TITLE: Full-band GNSS Active Antenna (1166-1280 MHz + 1525-1610MHz) Dual Stage, Perm. Mount PART NO.: A.120.A.101111
THIRD ANGLE PROJECTION	UNIT: mm SCALE: 1:5 PAGES: 1/1 REV: D01

## 8. Packaging

A.120.A.101111 Per PE Bag  
 Bag Dimensions – 232\*183mm  
 Total Weight – 283.5g

50 pc Per Carton In Bulk Packaging  
 Carton Dimensions – 600\*340\*245mm  
 Weight – 13Kg

Pallet Dimensions 1200\*1000\*1420mm  
 20 Cartons Per Pallet  
 4 Cartons Per Layer  
 5 Layers





Changelog for the datasheet

**SPE-23-8-242 – A.120.A.101111**

<b>Revision: A (Original First Release)</b>	
Date:	2023-08-29
Notes:	Initial Release
Author:	Gary West

**Previous Revisions**




[www.taoglas.com](http://www.taoglas.com)

