



# TAOGLAS®



# Datasheet

**Part No:**

*XAHP.60.W.301111*

**Description**

Active Multiband High Precision GNSS White Permanent Mount

**Features:**

Embedded Active Antenna  
Covering: L1/L2/L5/L6 + L-Band  
Permanent mount, robust IP67 rated enclosure  
Dims: Ø94 x 57mm  
Cable: 3m RG-174 with SMA(M) ST connector  
RoHS & Reach Compliant

|           |                                |           |
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## 1. Introduction



The Taoglas XAHP.60 is a Permanent Mount active multi-band GNSS antenna that has been carefully designed for high performance cm-level positional accuracy on the full GNSS spectrum. Bands covered include GPS/QZSS L1/L2/L5, GLONASS G1/G2/G3, Galileo E1/E5a/E5b/E6, BeiDou B1/B2a/B2b/B3, L-Band, QZSS L6, NAVIC L5, as well as SBAS (WAAS/EGNOS/GAGAN/SDCM/SNAS). This allows the user to achieve higher location accuracy, as well as stability of position tracking in urban environments with their device.

The XAHP.60 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 XAHP.60 ensures excellent out of band rejection and provides excellent positioning stability and reliability of GNSS signals.

Typical applications for the XAHP.60 include:

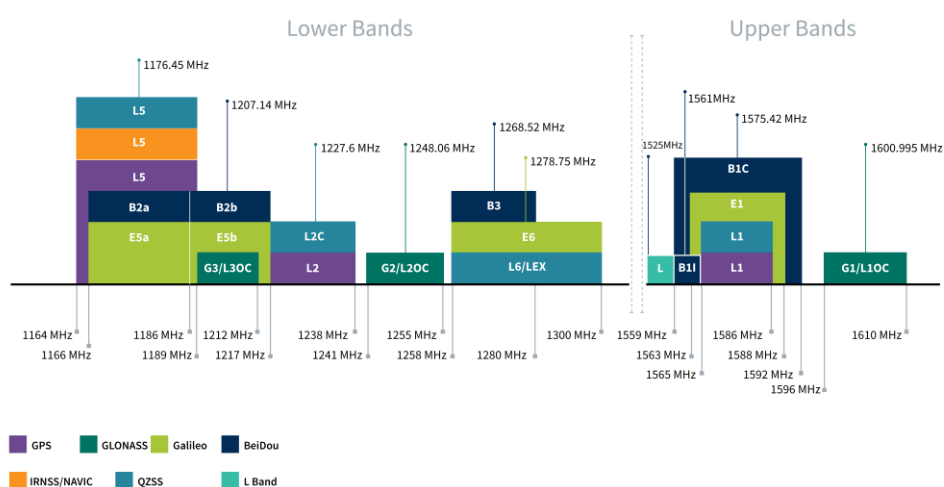
- Autonomous Driving
- Precision Positioning for Robotics
- Precision Agriculture
- Inventory Management & Container tracking
- Telematics & Asset Tracking
- Timing Accuracy Synchronization

The XAHP.60 is the latest 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 XAHP.60 can achieve genuine cm-level accuracy.

Cable and connectors are fully customizable, and the XAHP.60 is also available in black (XAHP.60.A.301111). Please contact your regional Taoglas customer support team for further information.

## 2. Specification

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



GNSS Bands and Constellations

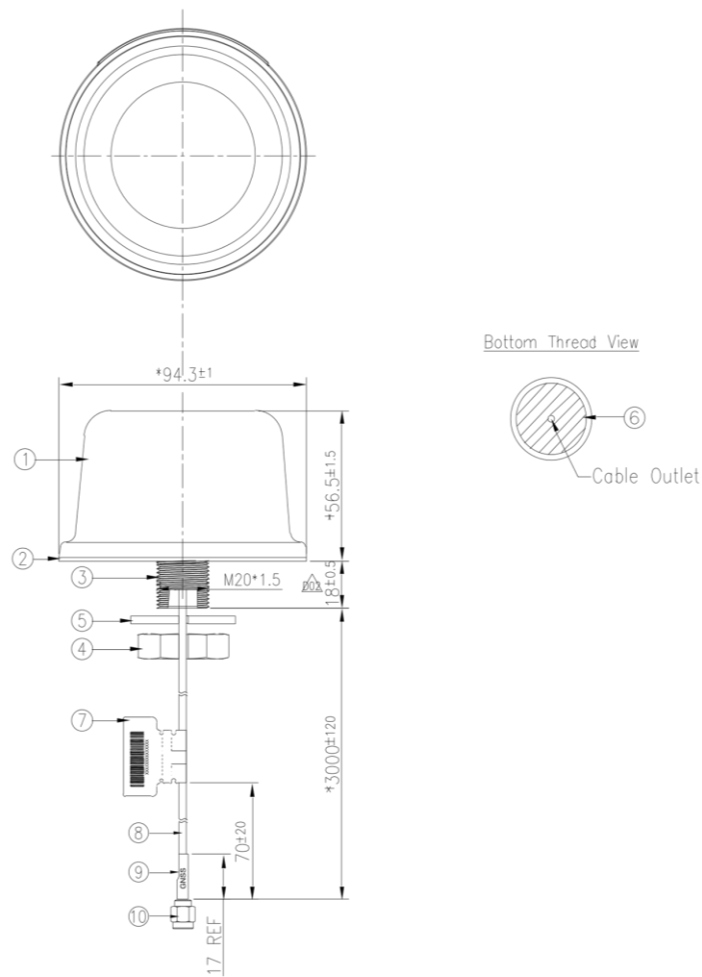
| GNSS Electrical                      |         |       |        |       |         |       |       |         |       |
|--------------------------------------|---------|-------|--------|-------|---------|-------|-------|---------|-------|
| Frequency (MHz)                      | 1176.45 | 1207  | 1227.6 | 1248  | 1278.75 | 1542  | 1561  | 1575.42 | 1603  |
| VSWR (max.)                          | 2.0:1   | 2.0:1 | 2.0:1  | 2.0:1 | 2.0:1   | 2.0:1 | 2.0:1 | 2.0:1   | 2.0:1 |
| Passive Antenna Efficiency (%)       | 65.84   | 66.6  | 72.85  | 75.74 | 67.42   | 60.04 | 55.58 | 52.95   | 47.65 |
| Passive Antenna Gain at Zenith (dBi) | 6.67    | 6.24  | 6.76   | 6.76  | 6.27    | 4.74  | 3.74  | 3.74    | 2.57  |
| Axial Ratio (dB)                     | 2.94    | 3.08  | 1.7    | 0.89  | 0.66    | 1.84  | 1.63  | 1.51    | 1.27  |
| PCO_x (cm)                           | 0.05    | 0.49  | 0.49   | 0.45  | 0.45    | 0.22  | 0.23  | 0.2     | 0.15  |
| PCO_y (cm)                           | -1.68   | -1.34 | -1.14  | -1.27 | -1.33   | -1.16 | -1.24 | -1.27   | -1.28 |
| PCV (cm)                             | 0.5     | 0.6   | 0.6    | 0.6   | 0.5     | 0.1   | 0.1   | 0.1     | 0.1   |
| Group Delay Mean (ns)                | 9.65    | 10.69 | 10.89  | 12.47 | 12.17   | 11.23 | 11.3  | 10.85   | 10.8  |
| Polarization                         | RHCP    |       |        |       |         |       |       |         |       |
| Impedance                            | 50 Ω    |       |        |       |         |       |       |         |       |
| Tested on a 30x30cm Ground Plane     |         |       |        |       |         |       |       |         |       |

| LNA and Filter Electrical Properties    |                                                            |      |        |      |      |      |      |         |      |
|-----------------------------------------|------------------------------------------------------------|------|--------|------|------|------|------|---------|------|
| Frequency (MHz)                         | 1176.45                                                    | 1207 | 1227.6 | 1248 | 1278 | 1542 | 1561 | 1575.42 | 1603 |
| VSWR (max.)                             | 2.0:1                                                      |      |        |      |      |      |      |         |      |
| Gain (dB)                               | 27.3                                                       | 25.3 | 25.9   | 25.3 | 25.0 | 27.1 | 27.2 | 26.2    | 26.2 |
| Noise (dB)                              | 3.7                                                        | 3.1  | 4.8    | 3.9  | 4    | 3.8  | 4.2  | 4.3     | 3.8  |
| Voltage In                              | 1.8V ~ 5.5V                                                |      |        |      |      |      |      |         |      |
| ESD                                     | 20KV for Contact and 30KV for Air                          |      |        |      |      |      |      |         |      |
| Out Of Band Rejection                   | 70dB for frequencies <1GHz<br>60dB for frequencies <1.7GHz |      |        |      |      |      |      |         |      |
| Power Consumption (mA)                  | 22                                                         |      |        |      |      |      |      |         |      |
| LTE Band 13 interference filter circuit |                                                            |      |        |      |      |      |      |         |      |

| Mechanical              |              |
|-------------------------|--------------|
| Dimensions              | Ø94 x 57mm   |
| Weight                  | 395g         |
| Connector               | SMA(M) ST    |
| Cable                   | 3m of RG-174 |
| Maximum Assembly Torque | 30 N•m       |

| Environmental         |                            |
|-----------------------|----------------------------|
| Operation Temperature | -40°C to 85°C              |
| IP Rating             | IP67                       |
| Relative Humidity     | Non-condensing 65°C 95% RH |
| RoHS Compliant        | Yes                        |
| REACH Compliant       | Yes                        |

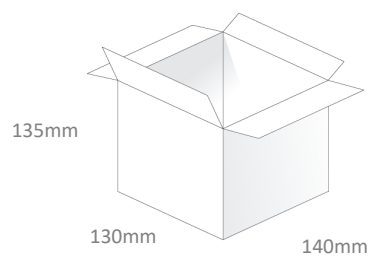
### 3. Mechanical Drawing



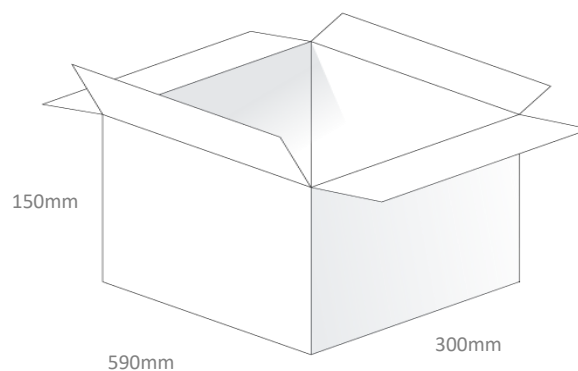
|    | Name                             | Material         | Finish            | Qty |
|----|----------------------------------|------------------|-------------------|-----|
| 1  | Mix S1 Short Case                | ASA/CAM6 PW-878B | White             | 1   |
| 2  | Adhesive Foam Mix S1 (Back Foam) | 3M9448BK+CR4305  | Black/White Liner | 1   |
| 3  | Mix S1 Base                      | Zinc Alloy       | Ni Plated         | 1   |
| 4  | Nut_M20x1.5Px9.5H Cut            | Steel Carbon     | Zn-Ni Plated      | 1   |
| 5  | Washer_Cul                       | Steel Carbon     | Zn-Ni Plated      | 1   |
| 6  | Case Rubber                      | Silicone Rubber  | Black             | 1   |
| 7  | Empty Label                      | PEPA             | White             | 1   |
| 8  | RG174 Coaxial Cable              | PVC              | Black             | 1   |
| 9  | Heat Shrink Tube (DSS)           | PE               | Blue/White/Yell   | 1   |
| 10 | SMN(W/S)                         | Brass            | Au Plated         | 1   |

## 4. Packaging

1pc XAHP.60.W.301111 per Small Box  
 Dimensions – 135 x 30 x 140mm  
 Weight - 395g



8pcs XAHP.60.W.301111 per Carton  
 Dimensions – 588 x 296 x 142mm  
 Weight – 4Kg





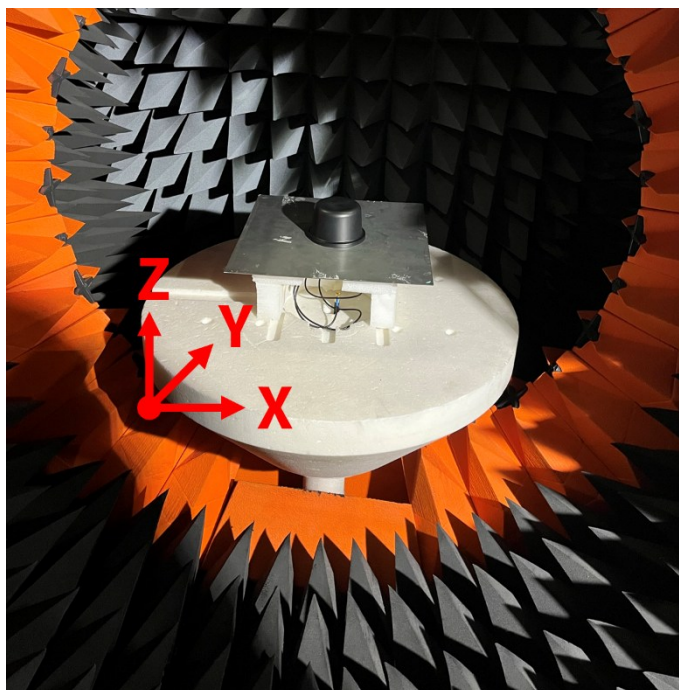
## 5. Antenna Characteristics

### 5.1 Test Setup

AUT

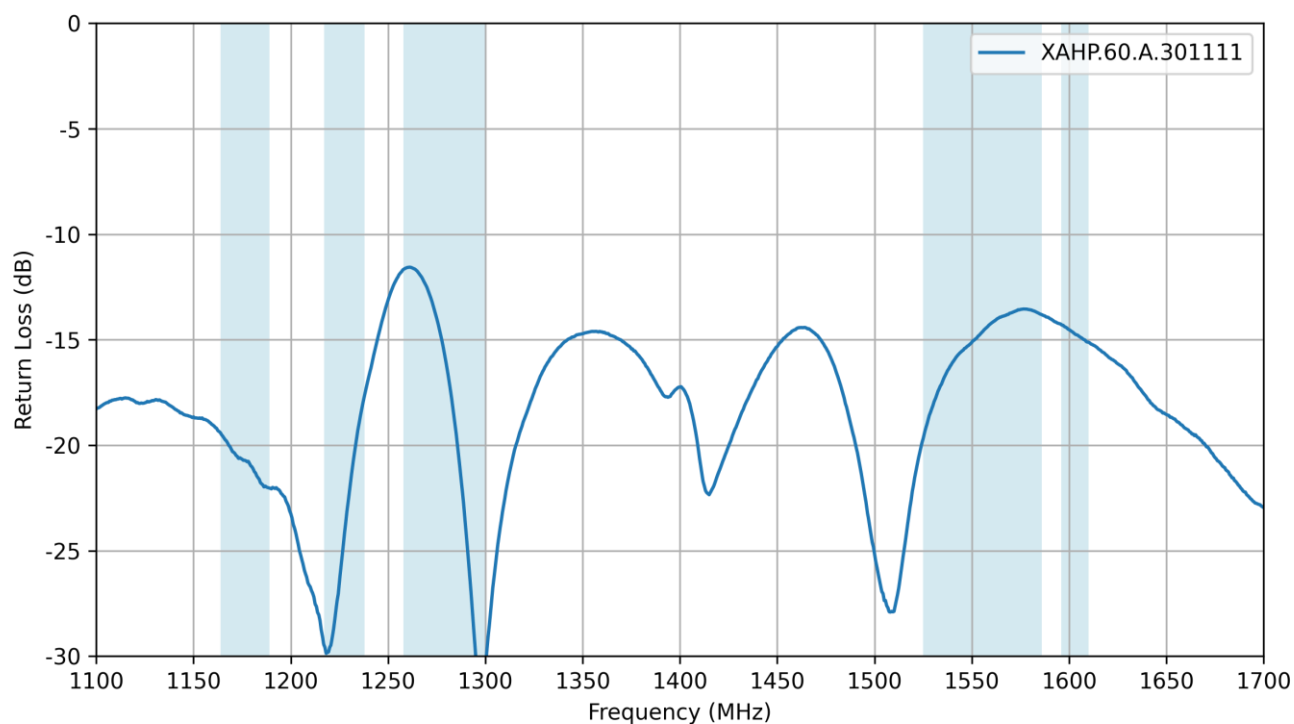


Vector Network Analyzer

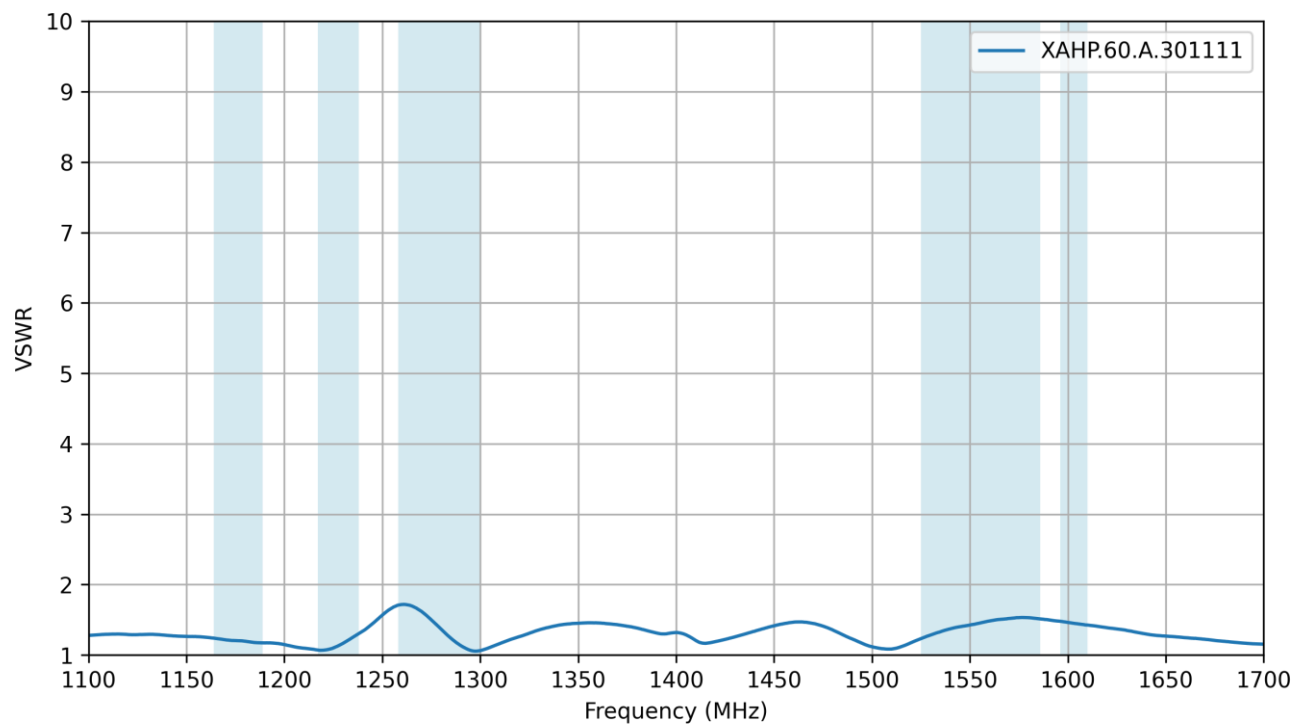


VNA Test Set-up on a 30x30cm Ground Plane

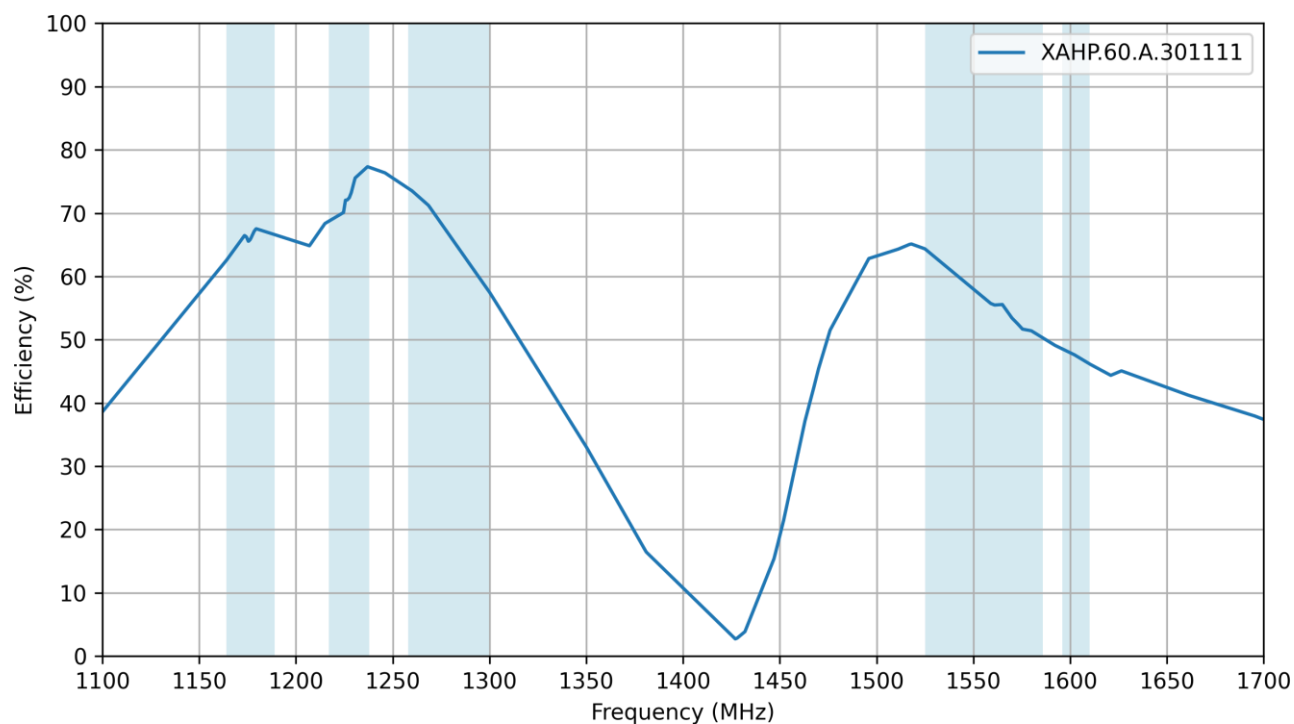
## 5.2 Return Loss



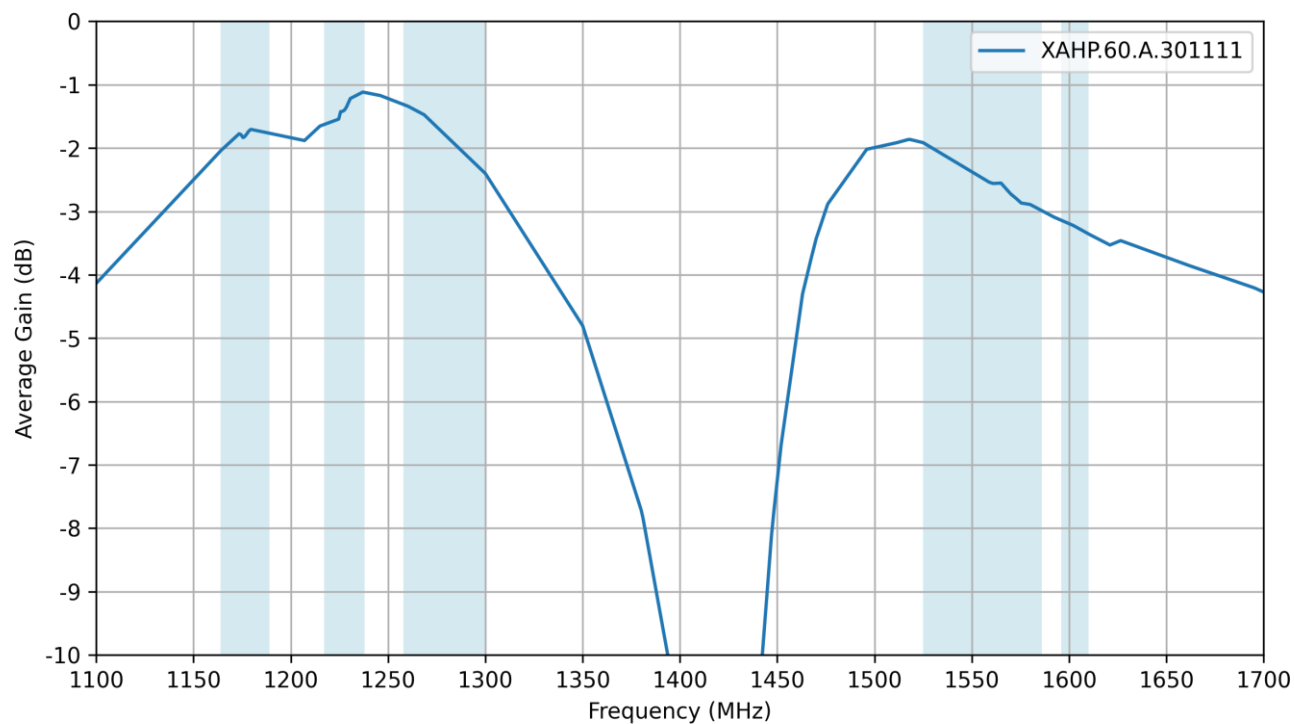
## 5.3 VSWR



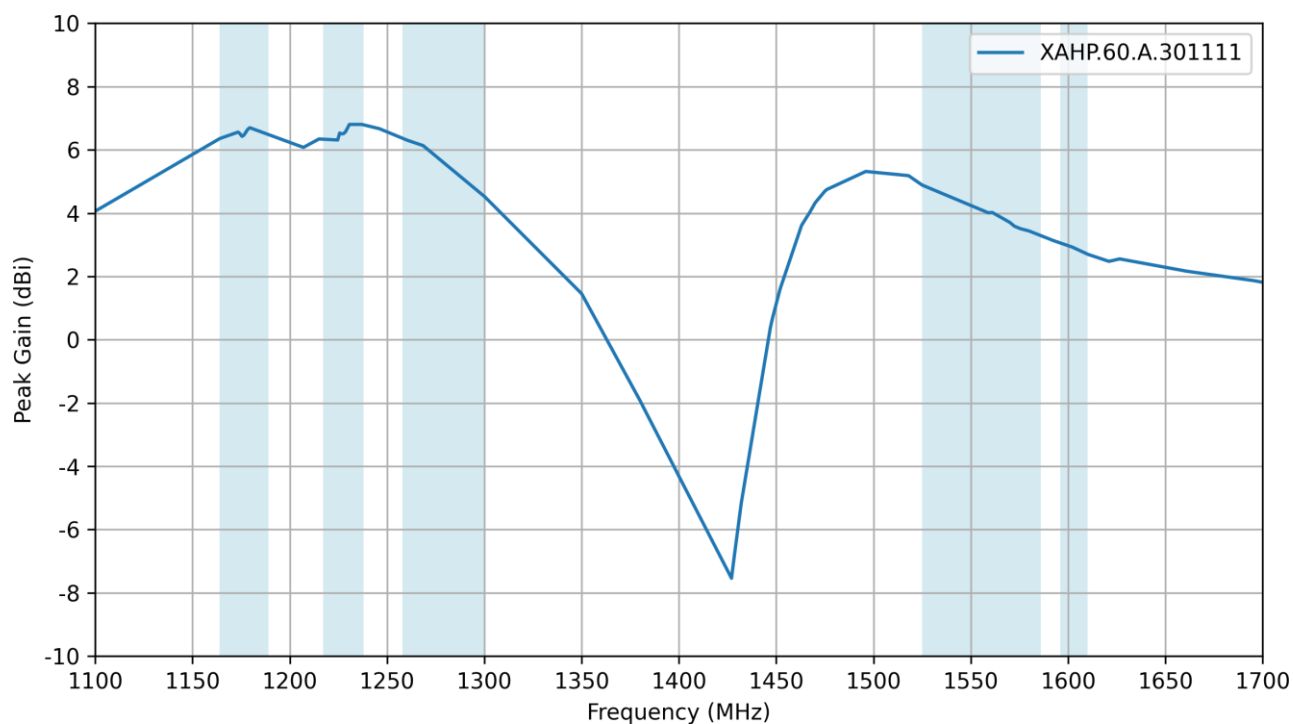
## 5.4 Efficiency



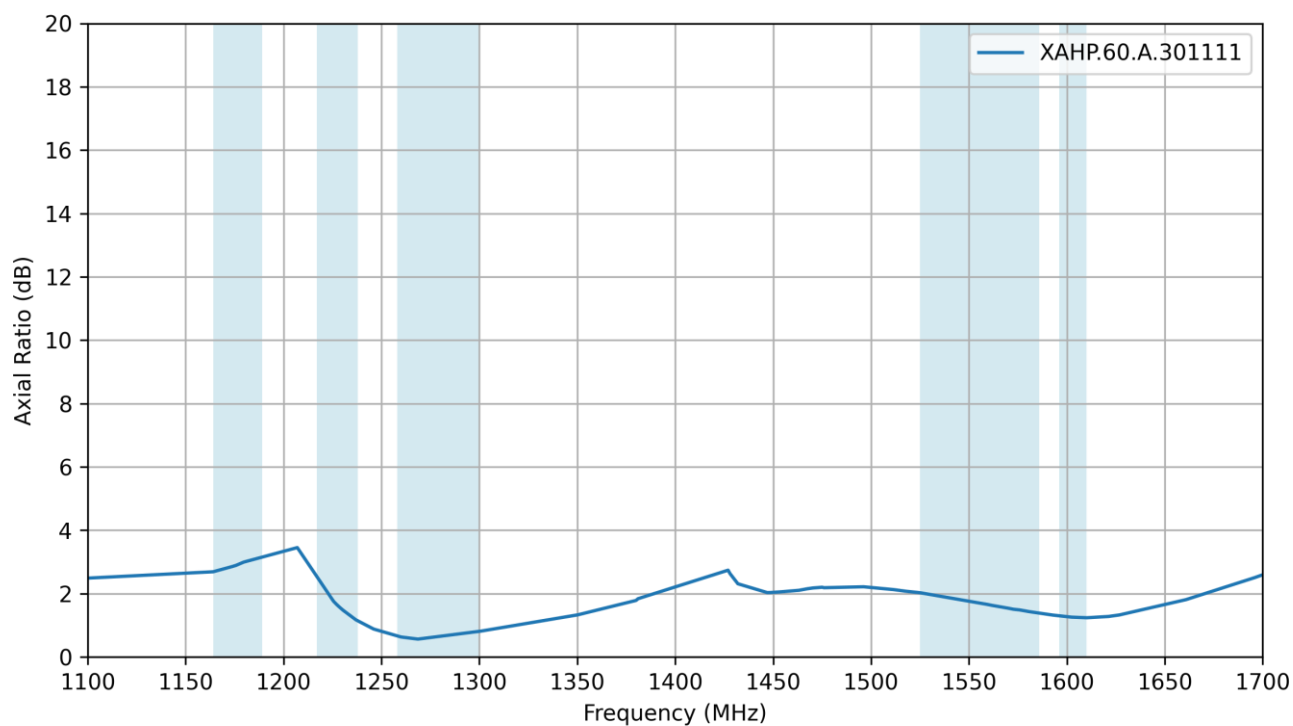
## 5.5 Average Gain



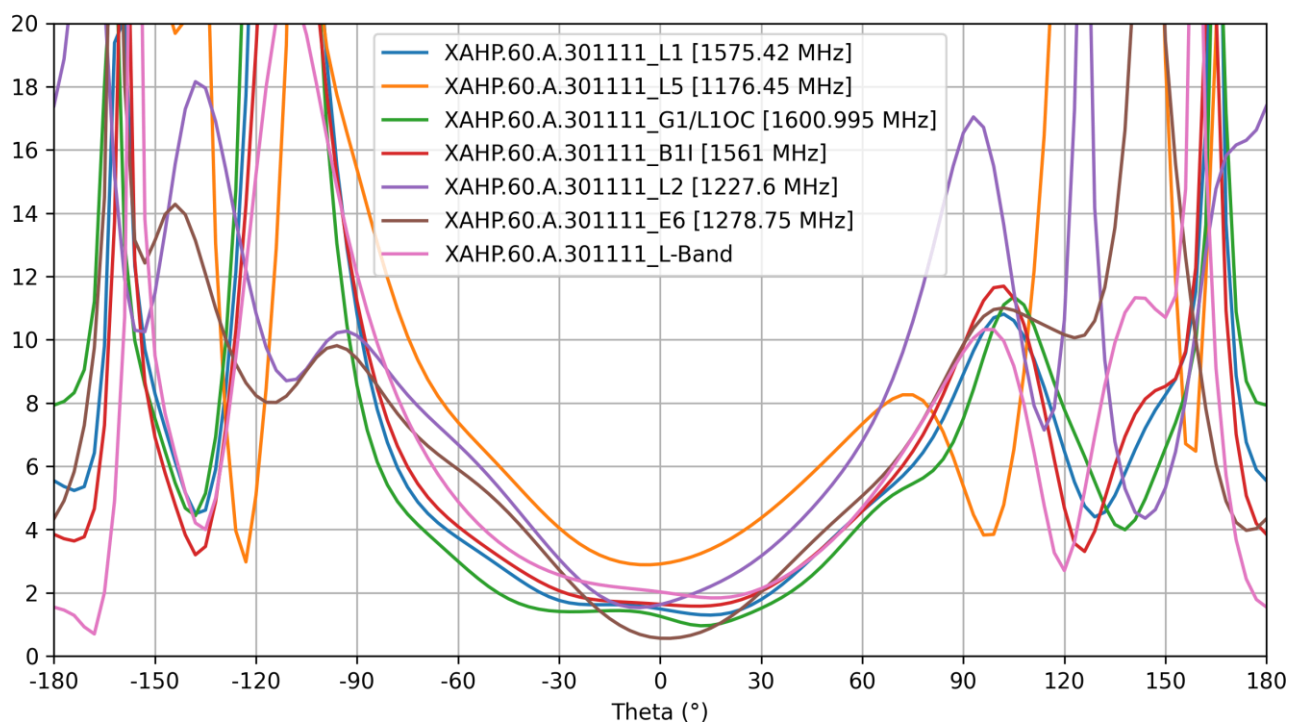
## 5.6 Peak Gain



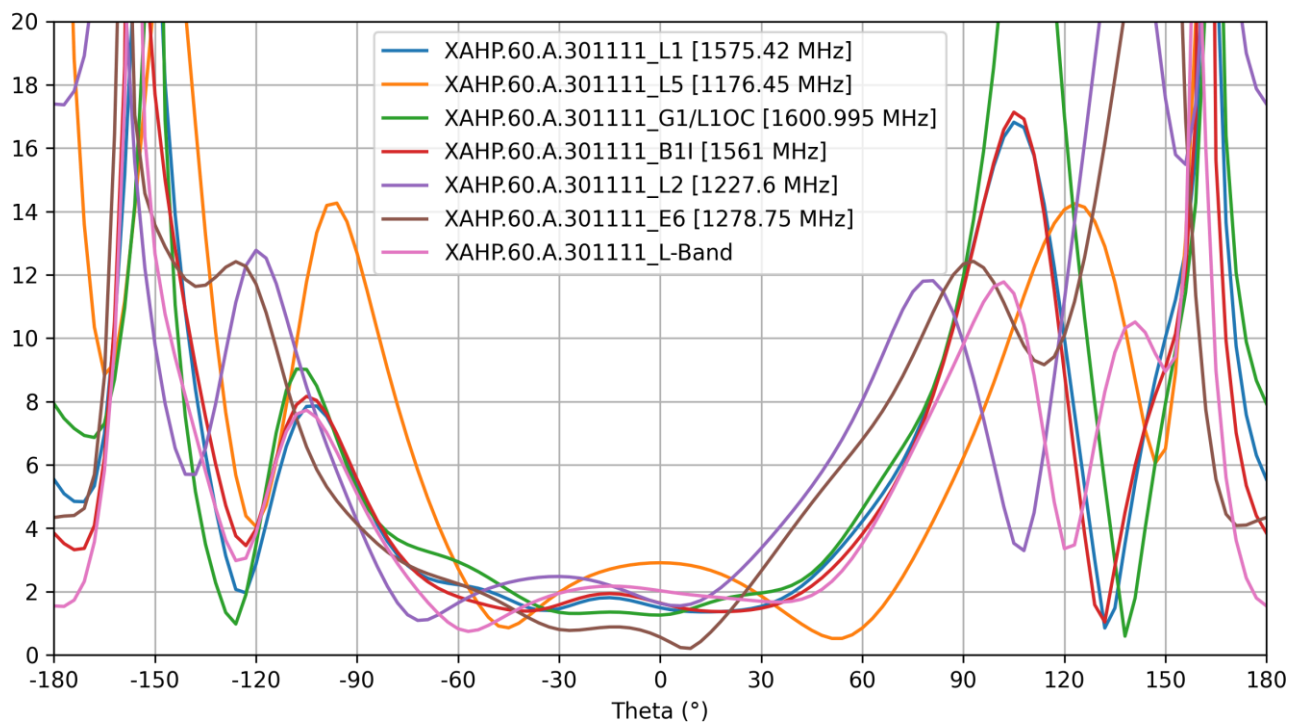
## 5.7 Axial Ratio



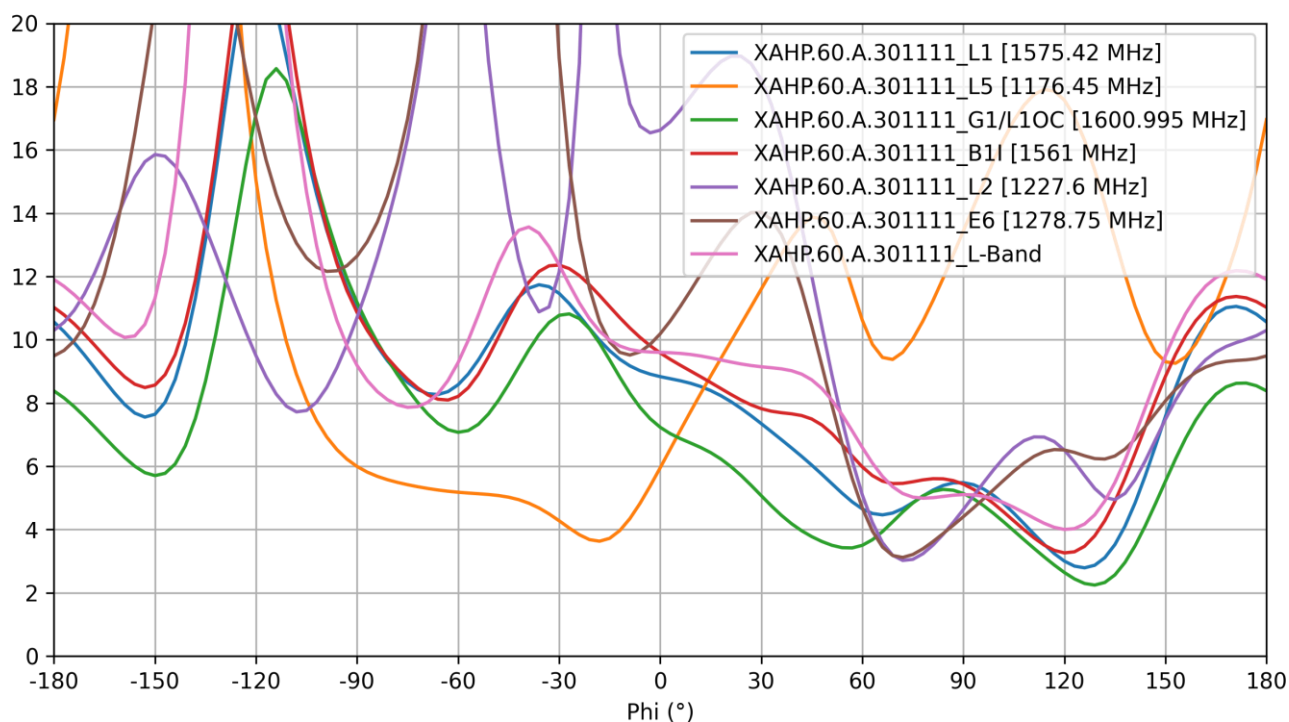
## 5.8 AR vs Angle for Phi=0



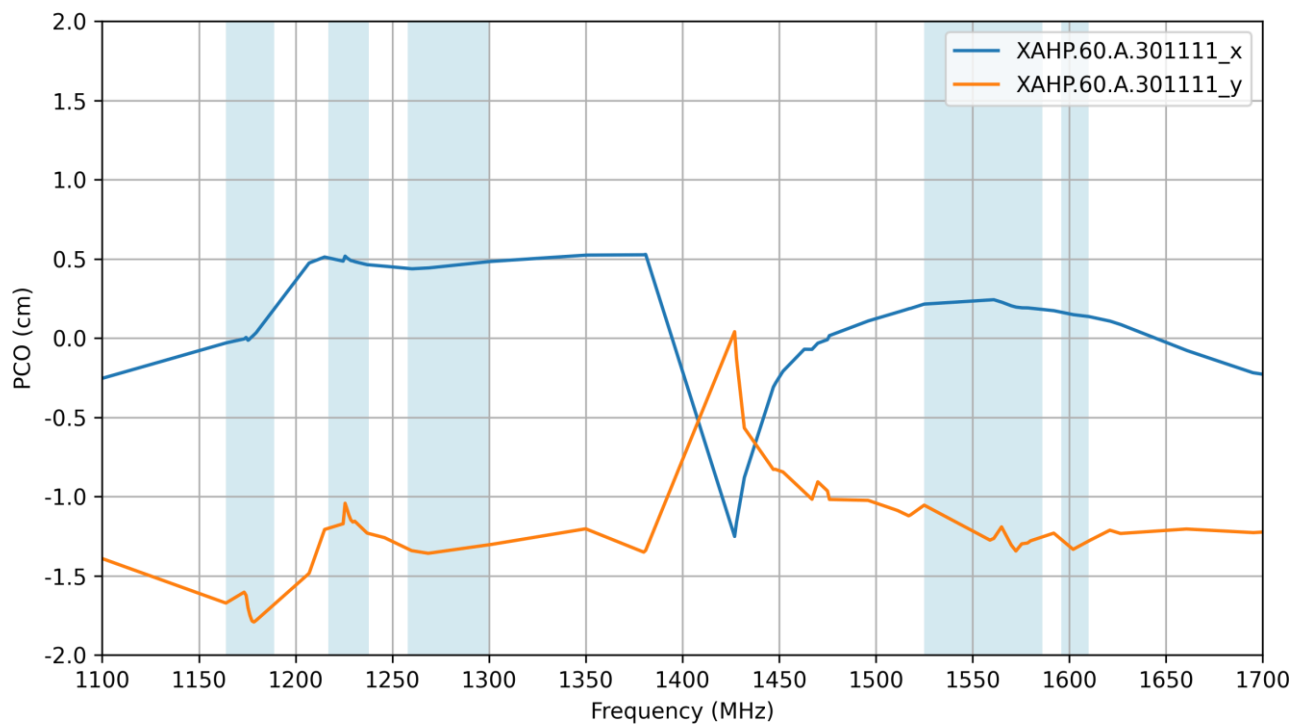
## 5.9 AR vs Angle for Phi=90



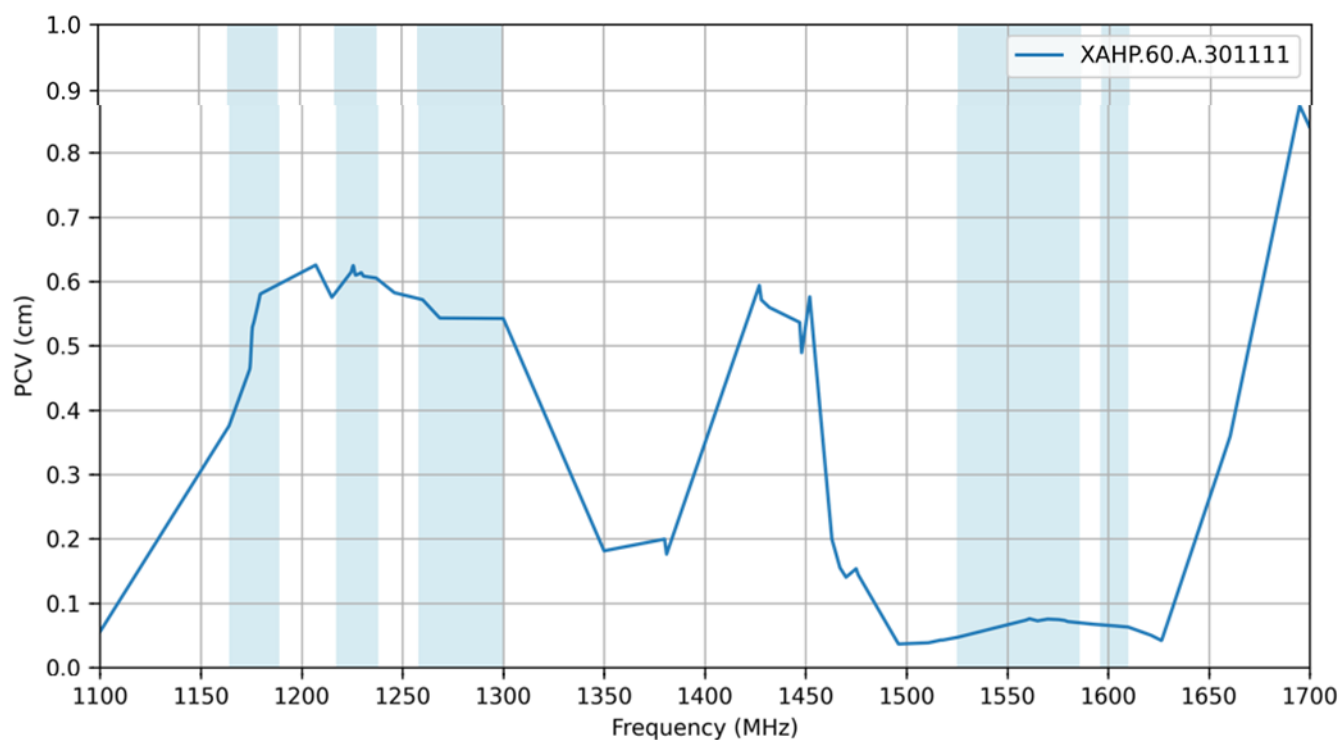
## 5.10 AR vs Angle for Theta=90



## 5.11 PCO

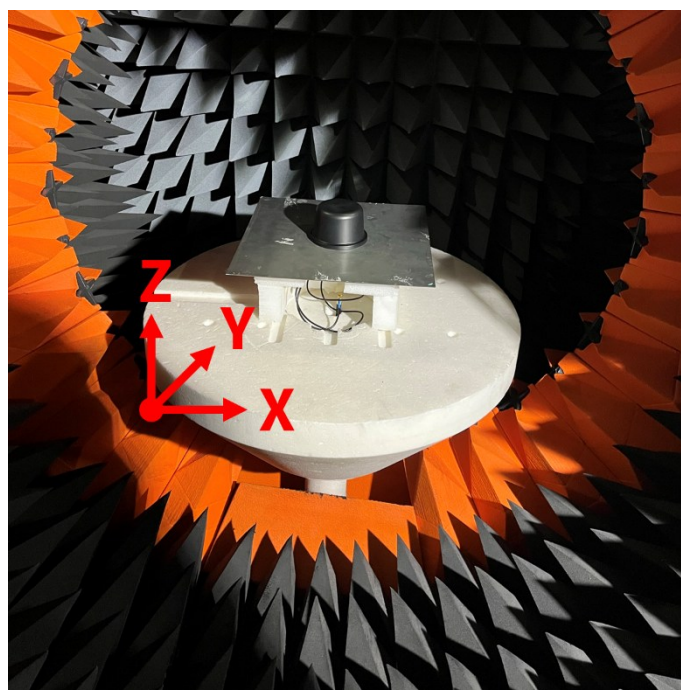
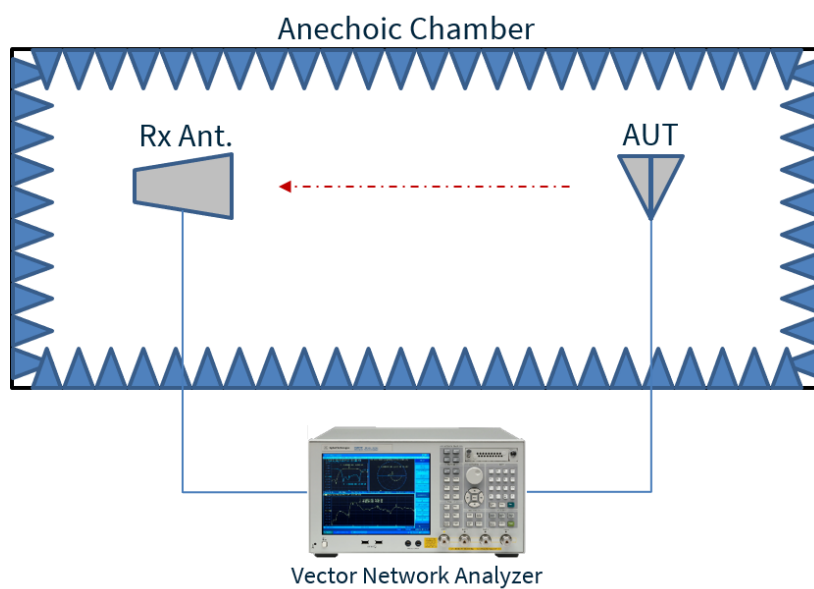


## 5.12 PCV



## 6. Radiation Patterns

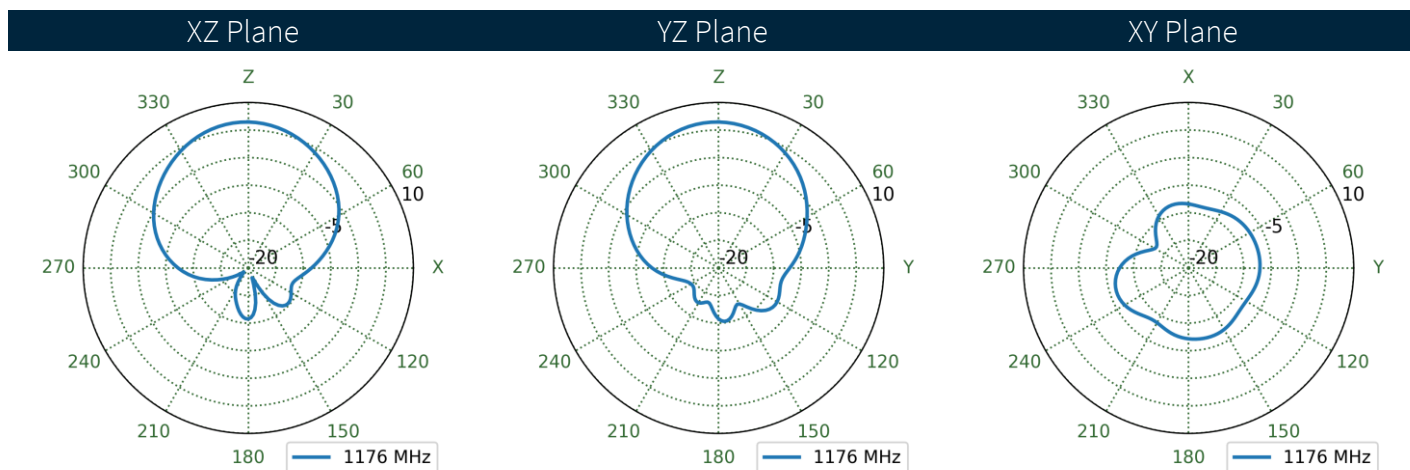
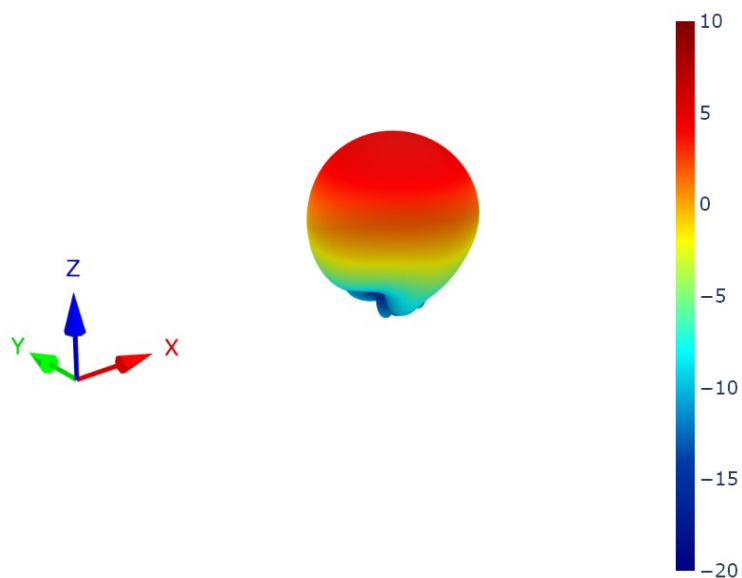
### 6.1 Test Setup



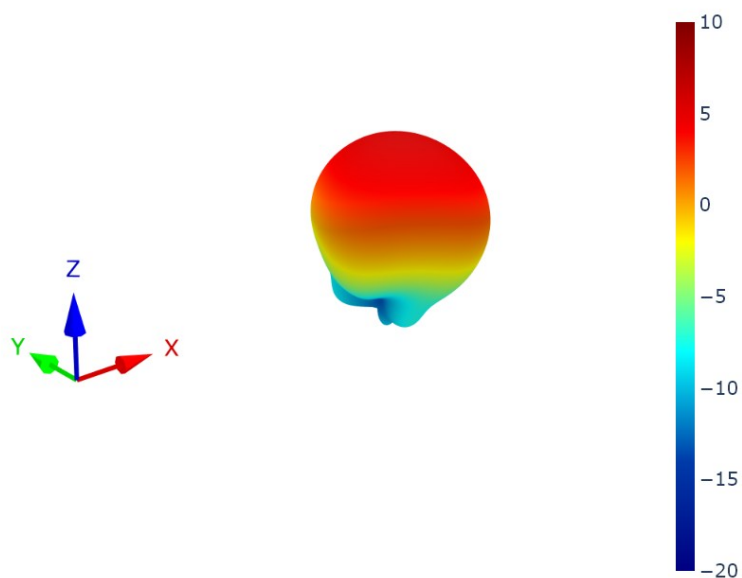
Chamber Test Set-up on a 30x30cm Ground Plane



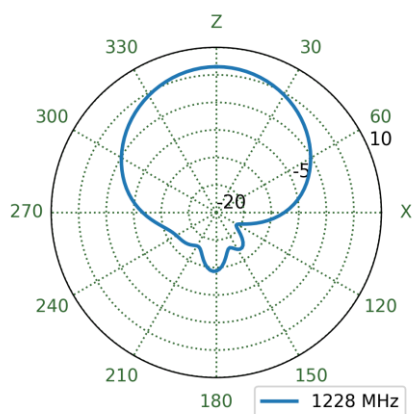
## 6.2 Patterns at 1176 MHz



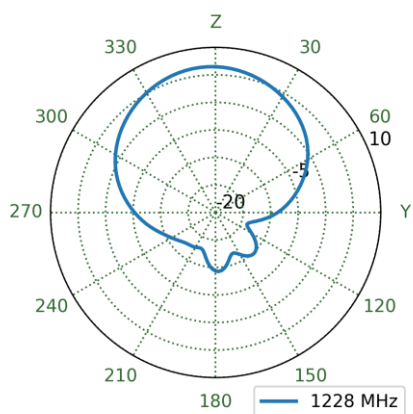
## 6.3 Patterns at 1228 MHz



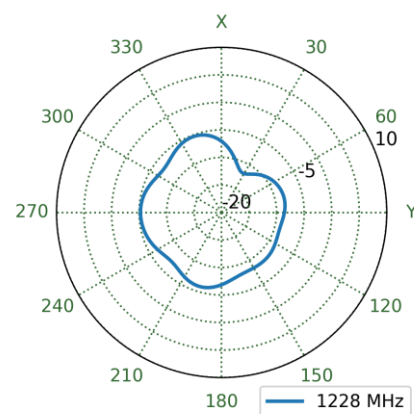
XZ Plane



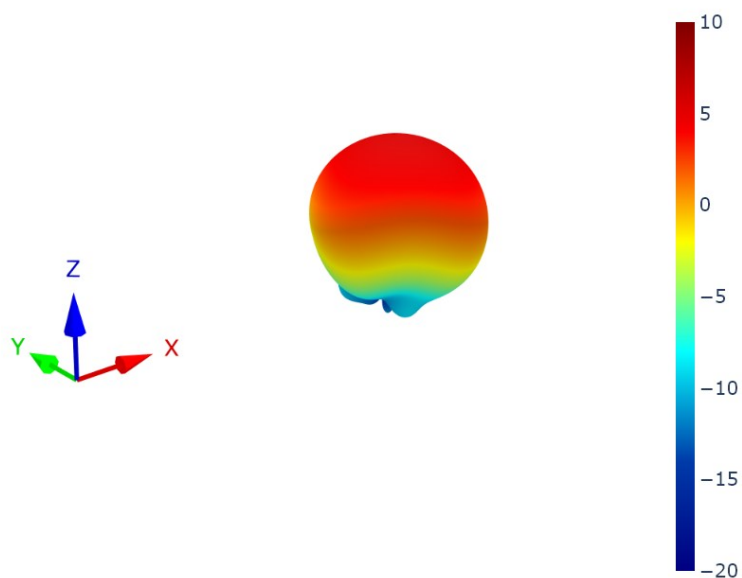
YZ Plane



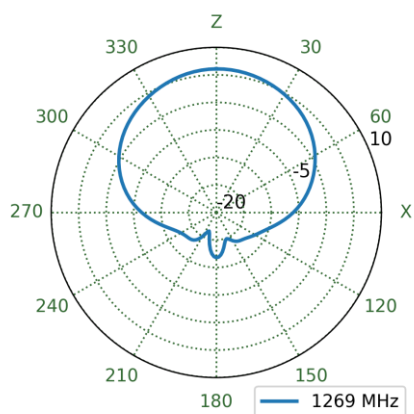
XY Plane



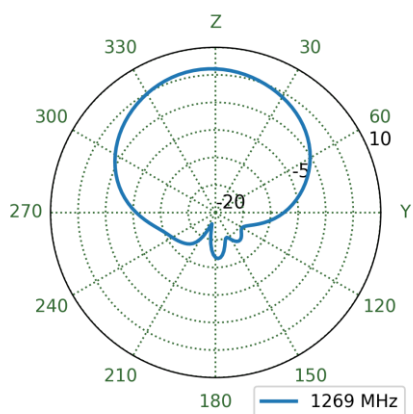
## 6.4 Patterns at 1278 MHz



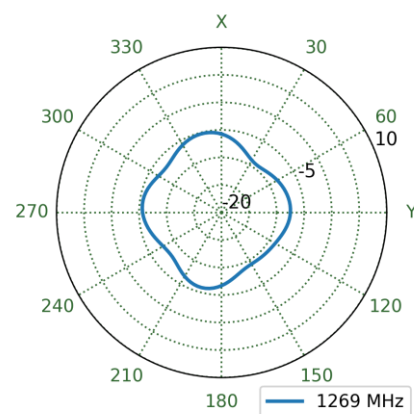
XZ Plane



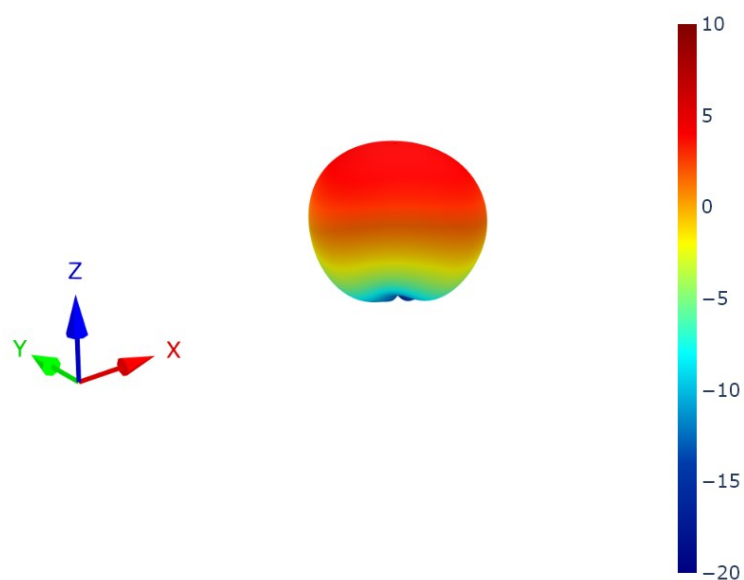
YZ Plane



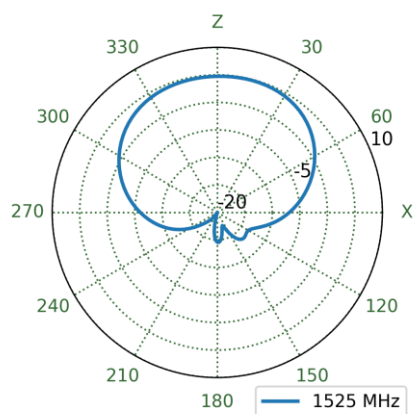
XY Plane



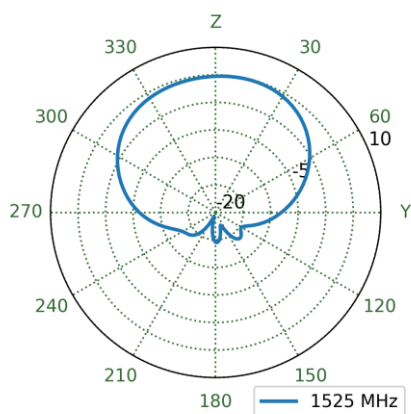
## 6.5 Patterns at 1542 MHz



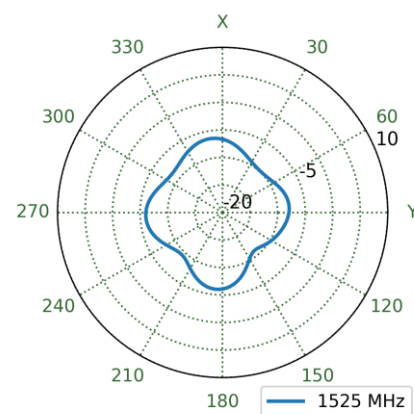
XZ Plane



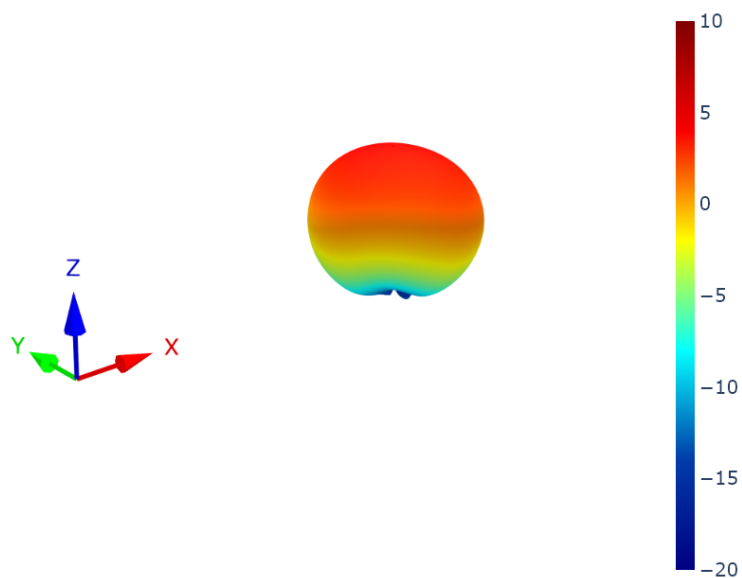
YZ Plane



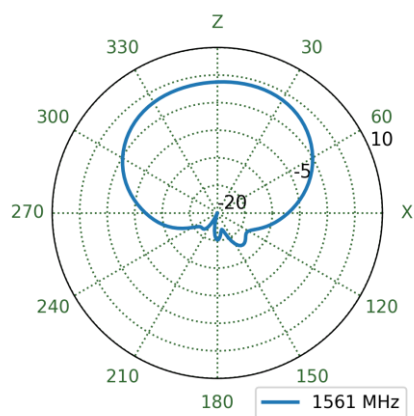
XY Plane



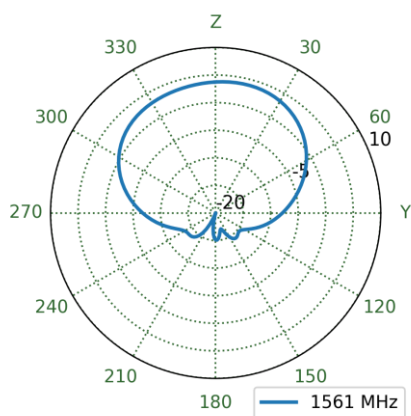
## 6.6 Patterns at 1561 MHz



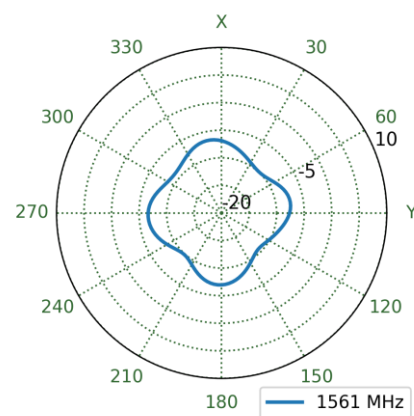
XZ Plane



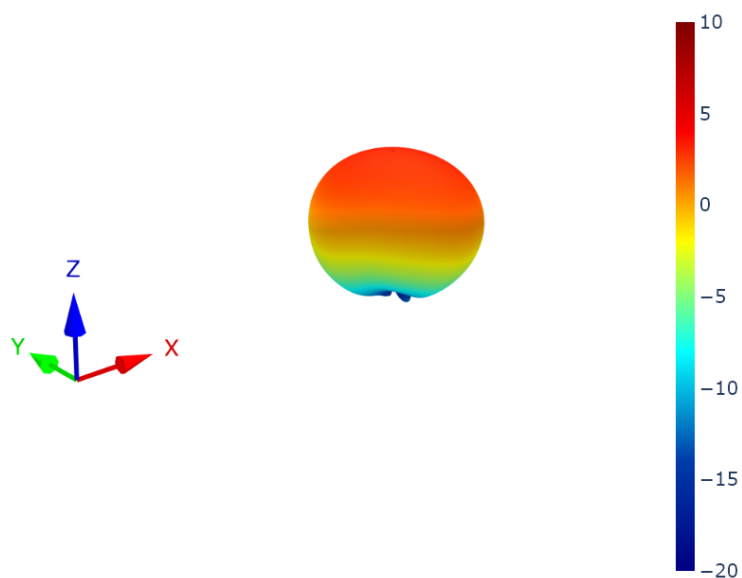
YZ Plane



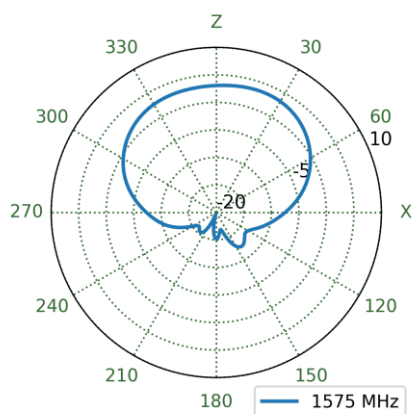
XY Plane



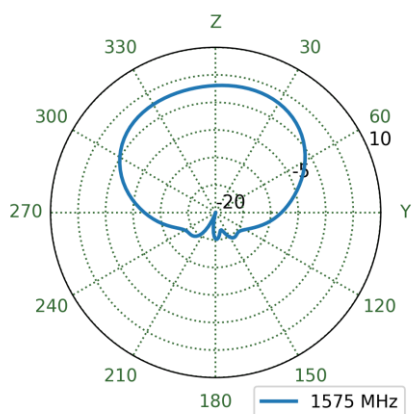
## 6.7 Patterns at 1576 MHz



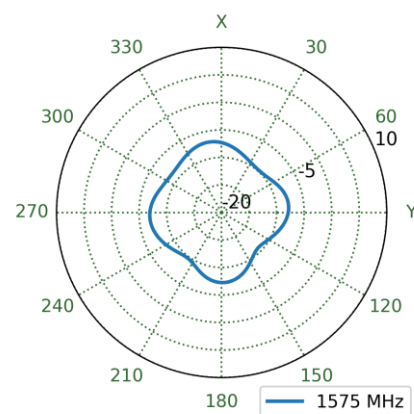
XZ Plane



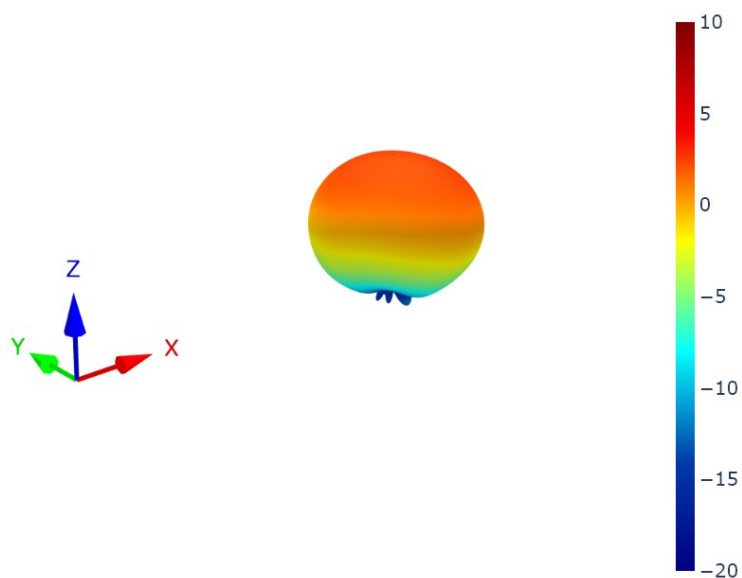
YZ Plane



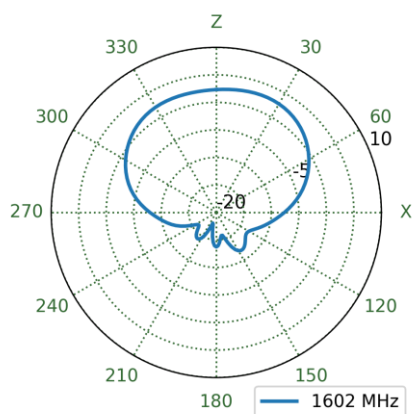
XY Plane



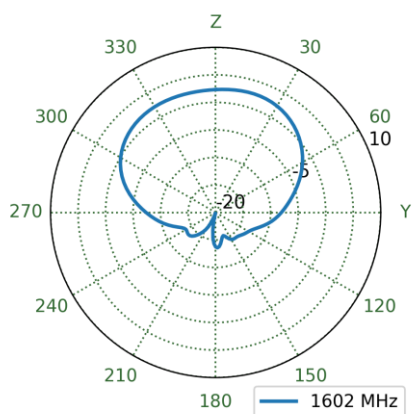
## 6.8 Patterns at 1602 MHz



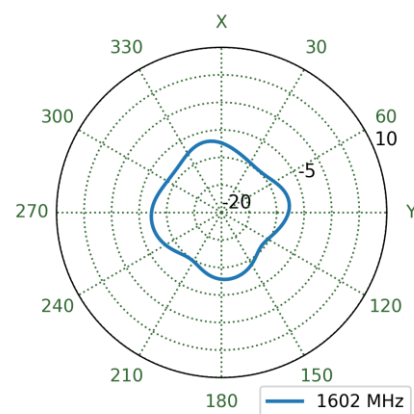
XZ Plane



YZ Plane

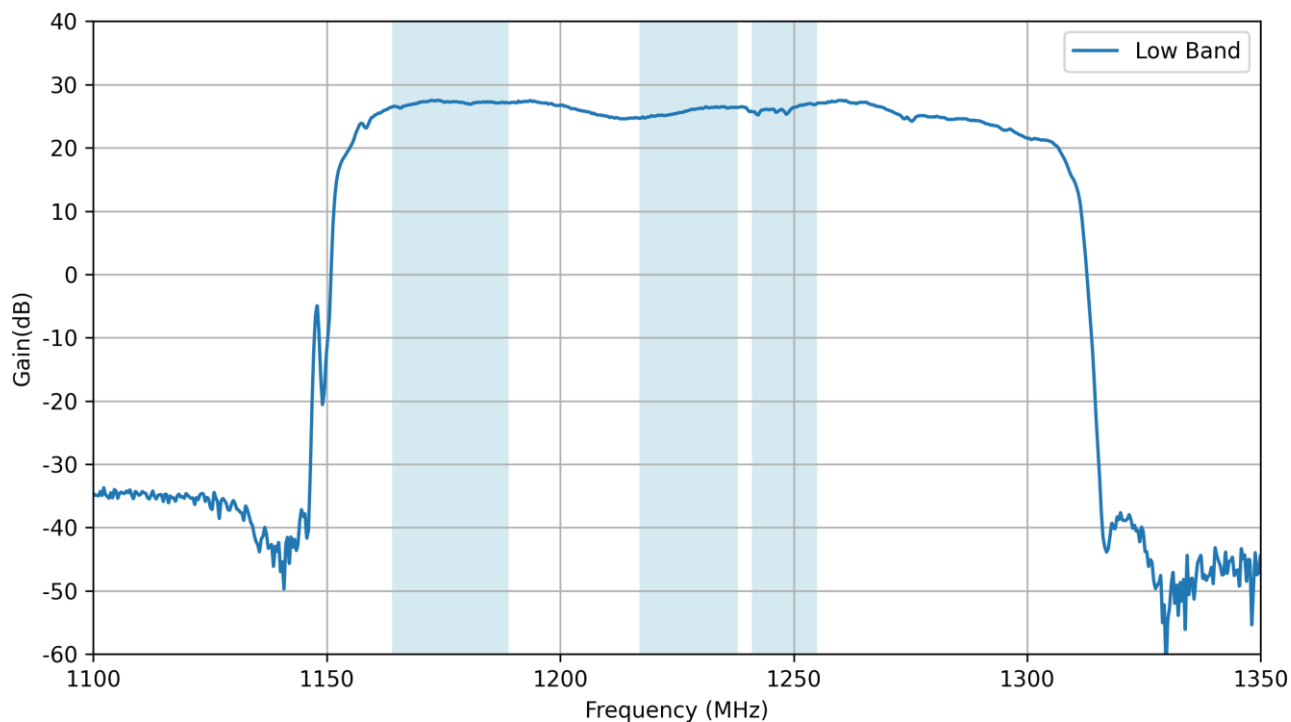


XY Plane

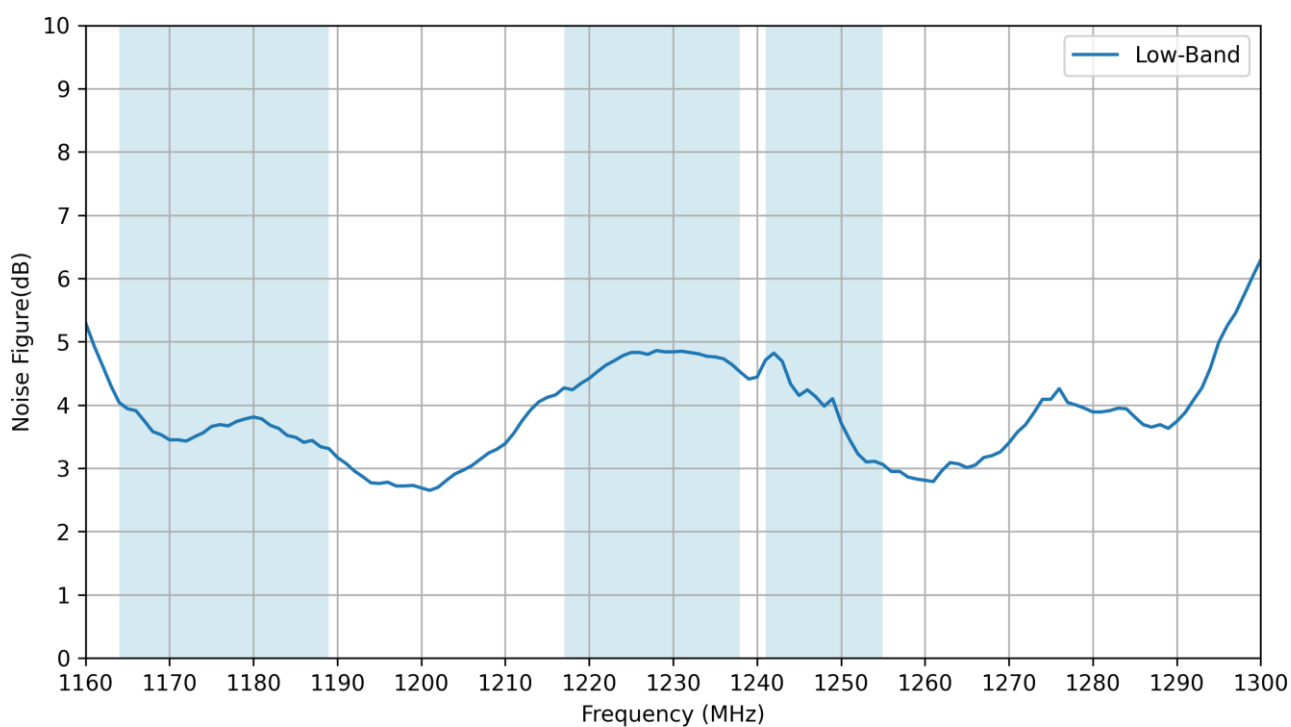


## 7. LNA Characteristics

### 7.1 Low-Band - Gain

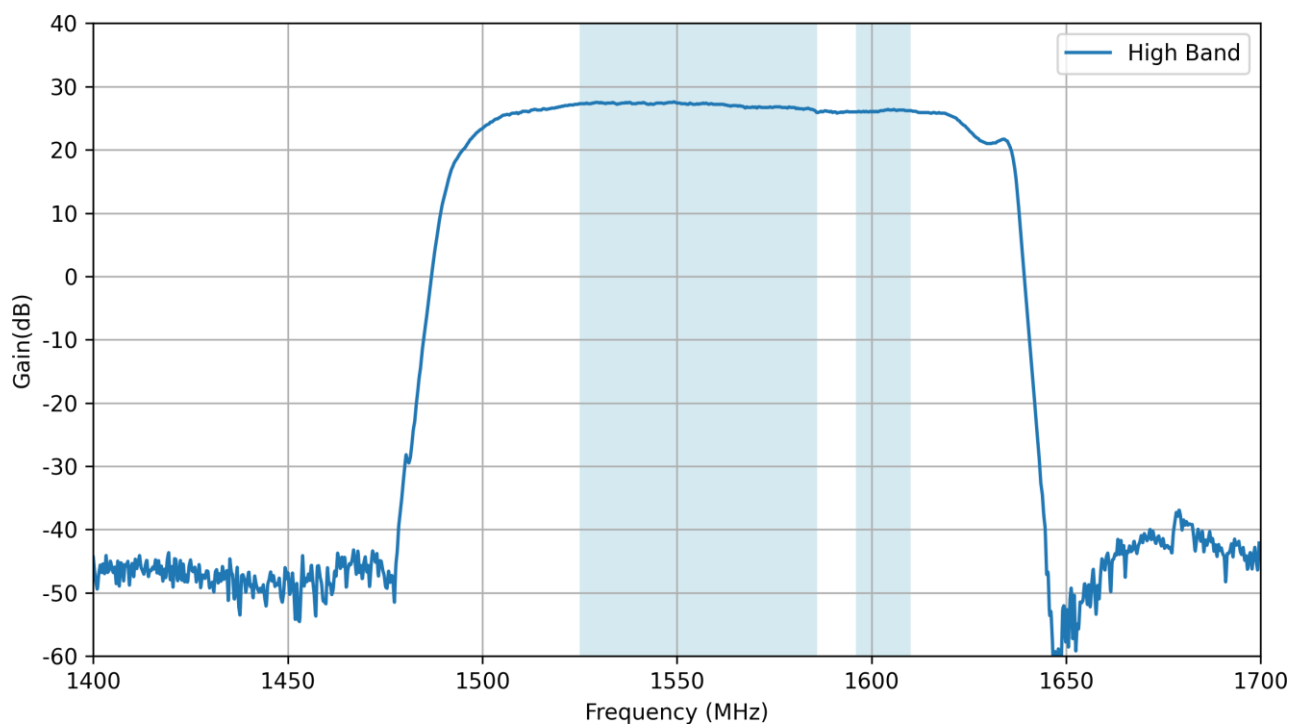


### 7.2 Low-Band – Noise Figure

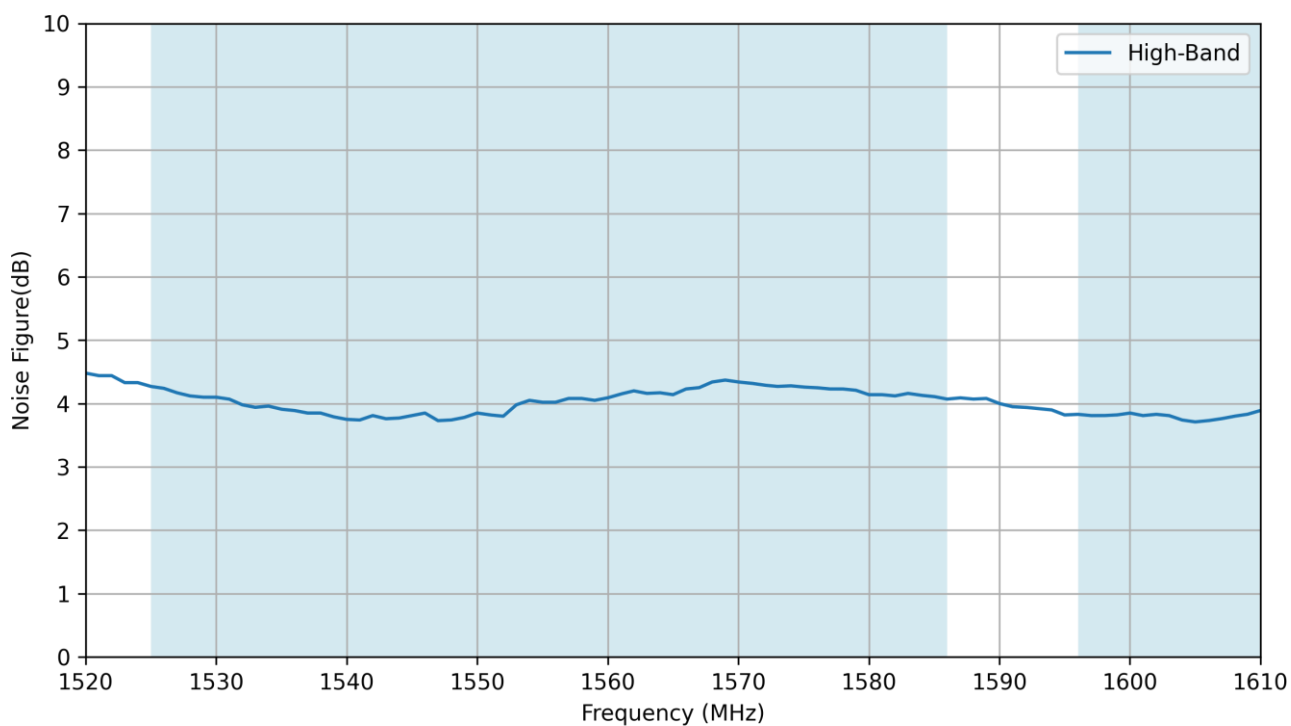




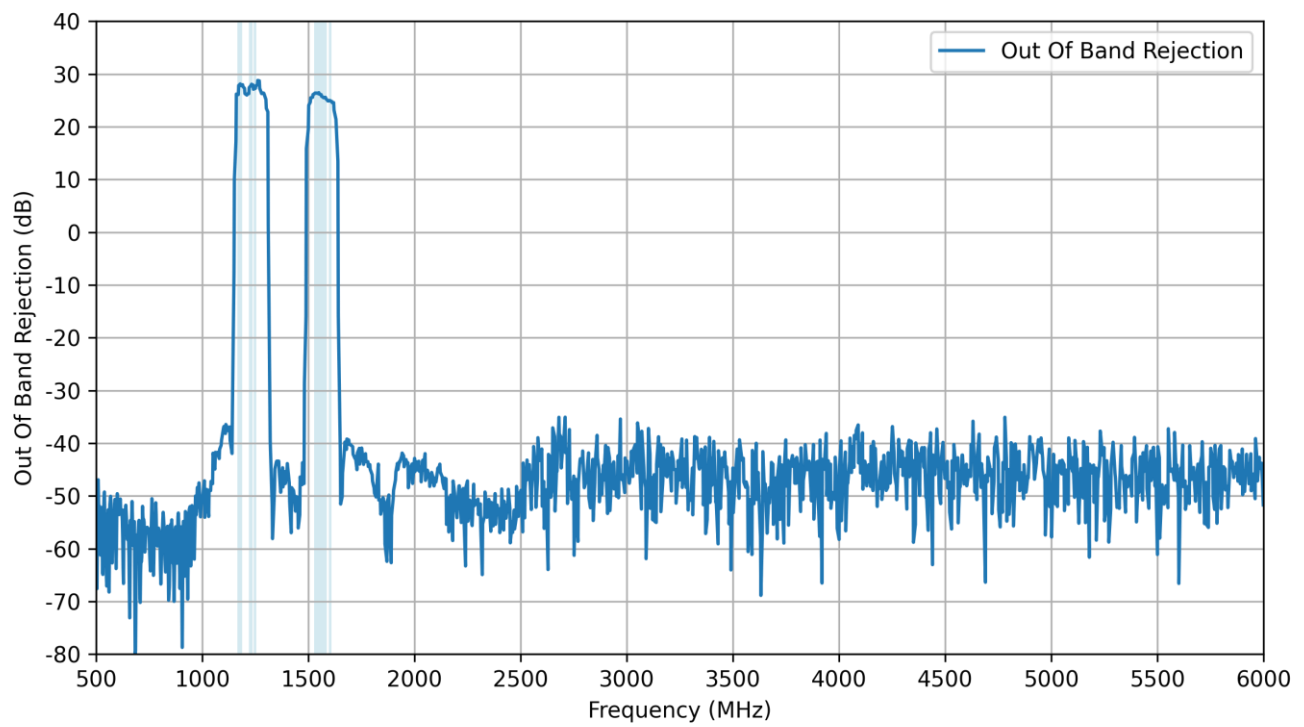
### 7.3 High-Band Gain



### 7.4 High-Band Noise Figure



## 7.5 Out Of Band Rejection



Changelog for the datasheet

SPE-24-8-251 – XAHP.60.W.301111

Revision: B (Current Version)

|         |                          |
|---------|--------------------------|
| Date:   | 2025-02-13               |
| Notes:  | Added max torque figure. |
| Author: | Conor McGrath            |

Previous Revisions

Revision: A (Initial Release)

|         |                           |
|---------|---------------------------|
| Date:   | 2024-10-03                |
| Notes:  | Initial Datasheet Release |
| Author: | Cesar Sousa               |



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