



TAOGLAS®



Datasheet

Magma X2

Part No:
AA.215.201111

Description

GNSS L1/L5/L-Band External Magnetic Mount Antenna

Features:

- Low-profile Housing
- Antenna Covering L1,L5 and L-Band
- IP67 Waterproof Enclosure
- High Magnetic Strength
- Dims: 63.2mm x 67.2mm x 26.5 mm
- Cable: 2m of RG174
- Connector: SMA(M)ST
- Custom Cables and Connectors Available
- RoHS & Reach Compliant

| | | |
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IATF16949



1. Introduction



Taoglas Magma X2 Multiband L1/L5/L-band GNSS Magnetic Mount Antenna

The Taoglas Magma X2 AA.215, is a compact, multi-band GNSS, high-performance antenna, for fast fix, high-precision GNSS accuracy. The AA.215 utilizes an advanced 45*45*10mm, wide-band dual-stacked ceramic patch antenna with optimized gain for GPS L1/L5, Galileo, GLONASS, BeiDou, and L-Band bands.

Typical Applications Include:

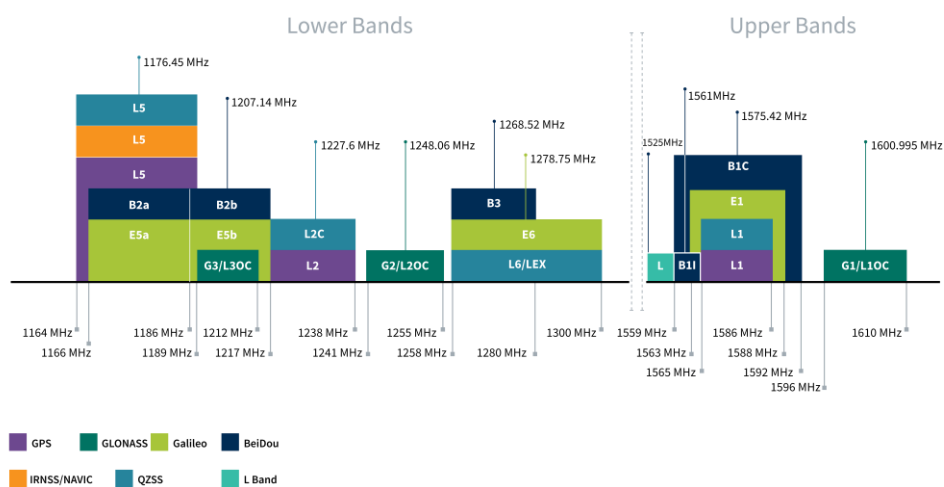
- Precision Agriculture
- Navigation
- Robotics and Autonomous Vehicles
- Transportation and Telematics

The Magma X2 exhibits excellent radiation patterns and has been optimized to cover the bands required for the next generation of L1/L5 GNSS receivers that are currently on the market. The AA.215 has been designed as a premium solution for high-precision GNSS systems by including L-Band coverage, for when GNSS correction services are utilized. L-Band correction services use GNSS systems to decode satellite transmissions and will output a correction stream, enabling a high-precision system to reach genuine cm-level accuracy.

The robust ABS enclosure is IP67-rated and features a neodymium magnet providing exceptionally strong holding force relative to the antenna's size, allowing the product to be used with confidence in harsh environments where precise positioning is required. The AA.215 comes with 2m of RG-174 cable and SMA(M) connector as standard but as with all Taoglas products, cable and connectors are fully customizable depending on your requirements. For further information please contact your regional Taoglas customer support team to request these services or additional support to integrate and test this antenna's performance with your device.

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 | 1542 | 1561 | 1575.42 | 1602 |
| VSWR (max.) | 1:1 | 1:1 | 1:1 | 1:1 | 1:1 |
| Passive Antenna Efficiency (%) | 82.7 | 71.46 | 83.97 | 82.51 | 65.57 |
| Passive Antenna Gain (dB) | -0.83 | -1.46 | -0.78 | -0.78 | -2.14 |
| Peak Gain (dBi) | 4.82 | 4.9 | 5.02 | 5.04 | 4.59 |
| Axial Ratio (dB) | 7.47 | 0.56 | 0.81 | 0.86 | 1.59 |
| PCO x (cm) | -1.14 | -0.67 | -0.71 | -0.72 | -0.62 |
| PCO y (cm) | 5.21 | 3.57 | 3.59 | 3.55 | 3.61 |
| PCV (cm) | 0.05 | 0.01 | 0.015 | 0.015 | 0.012 |
| Polarization | RHCP | | | | |
| Impedance | 50 Ω | | | | |
| Cable | RG174 | | | | |
| Connector | SMA(M) | | | | |
| Antenna properties were measured with the antenna mounted on 70*70mm Ground Plane with Hybrid Coupler | | | | | |

| LNA and Filter Electrical Properties | | | | | |
|--------------------------------------|---|-------|------|---------|------|
| Frequency (MHz) | 1176.45 | 1542 | 1561 | 1575.42 | 1602 |
| Gain (dB) | 26.2 | 27.1 | 26.3 | 25.8 | 25.5 |
| Noise Figure (dB) | 1.8 | 1.9 | 1.82 | 1.8 | 1.93 |
| Group Delay Mean (ns) | 8.56 | -0.28 | 1.79 | 0.96 | 1.54 |
| Out Of Band Rejection (dB) | > 70dB @ LTE low band; > 60dB @ LTE high band | | | | |

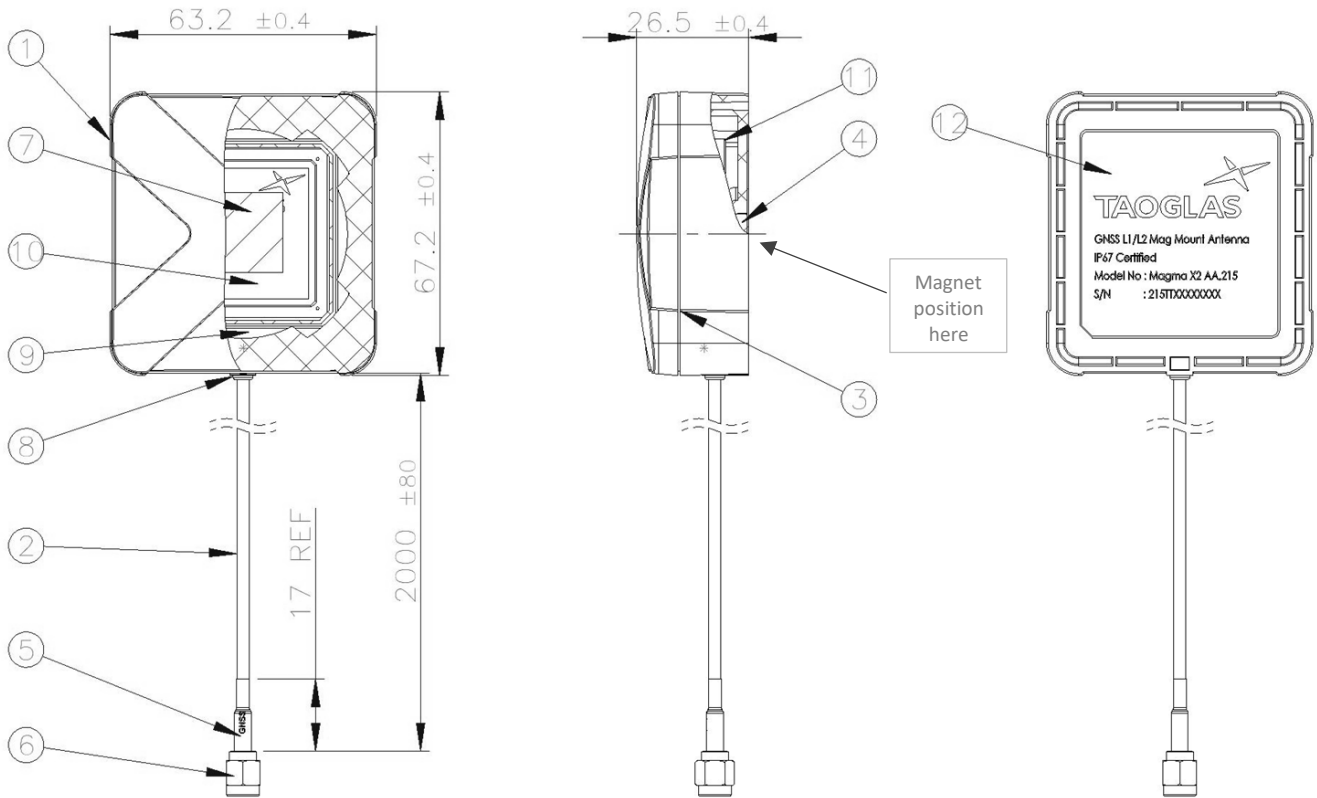
Mechanical

| | |
|-------------------|--------------------------|
| Dimensions | 63.2mm x 67.2mm x 26.5mm |
| Weight | 165g |
| Material | ABS |
| Connector | SMA(M) ST |
| Cable | 2m RG174 Coaxial |

Environmental

| | |
|-----------------------------------|---------------|
| Temperature Range | -40°C to 85°C |
| Relative Humidity | 20% to 65% |
| RoHS & REACH Compliant | Yes |

3. Mechanical Drawing



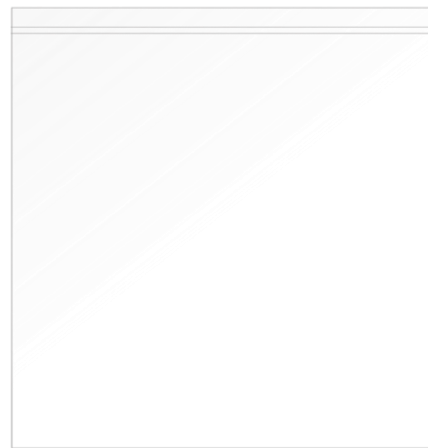
| | Name | Material | Finish | Qty |
|----|--|-----------------------------------|----------------------|-----|
| 1 | Top Housing | ABS | Black | 1 |
| 2 | RG174 Coaxial Cable | PVC | Black | 1 |
| 3 | Bottom Housing | ABS | Black | 1 |
| 4 | Ø18*3t N48M NdFeB Ni Plated | N48M NdFeB | Ni Plated | 1 |
| 5 | Heat Shrink Tube (GNSS) | PE | Blue Tube/White Text | 1 |
| 6 | SMA(M)ST | Brass | Au Plated | 1 |
| 7 | 3M Double Adhesive + Foam (4T) (19X19) | 3M 9448HK + CR4305 4t + 3M 9448HK | White liner | 1 |
| 8 | Silicon Rubber | Silicone | Black | 1 |
| 9 | PCB_AA.212_Du al Layer | Composite 1t | Black | 1 |
| 10 | GNSS L1.L2 L-Band Dual Feed Stacked 45*45*10mm Patch | Ceramic | Clear | 1 |
| 11 | Shielding Case | STPE | N/A | 1 |
| 12 | AA.215 Label | PET | Matte Silver | 1 |

4. Packaging

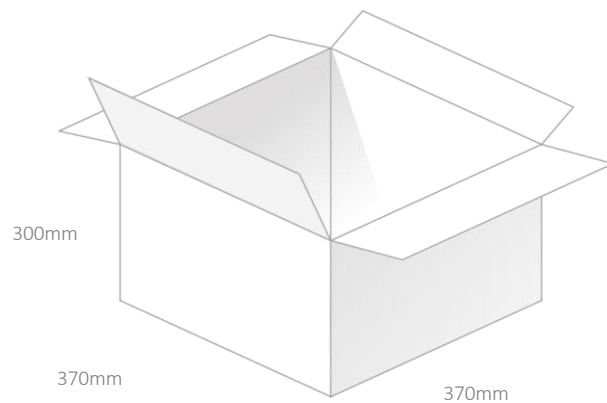
1pcs AA.215 per Small PE Bag
Weight - 165g



10pcs AA.215 per Large PE Bag
Weight - 1650g



100pcs AA.215 per carton
Dimensions - 370*370*300mm
Weight - 17Kg



5. Antenna Characteristics

5.1 Test Setup

AUT

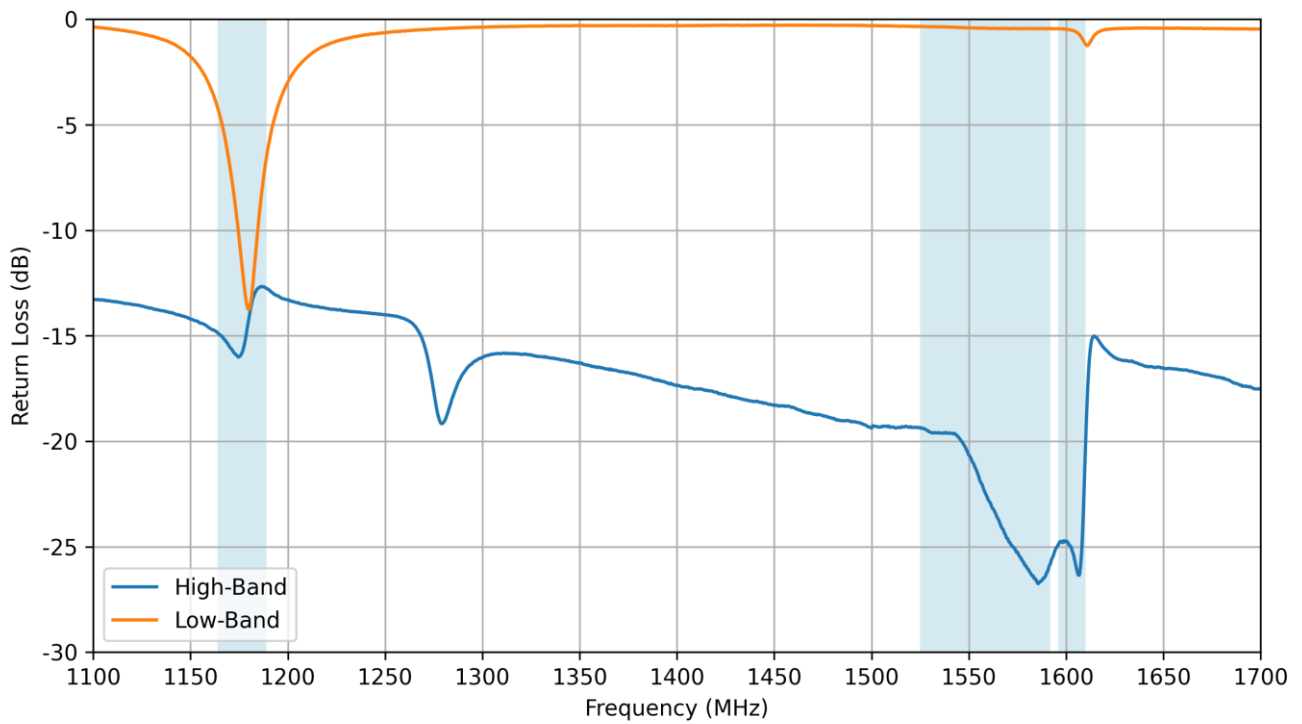


Vector Network Analyzer

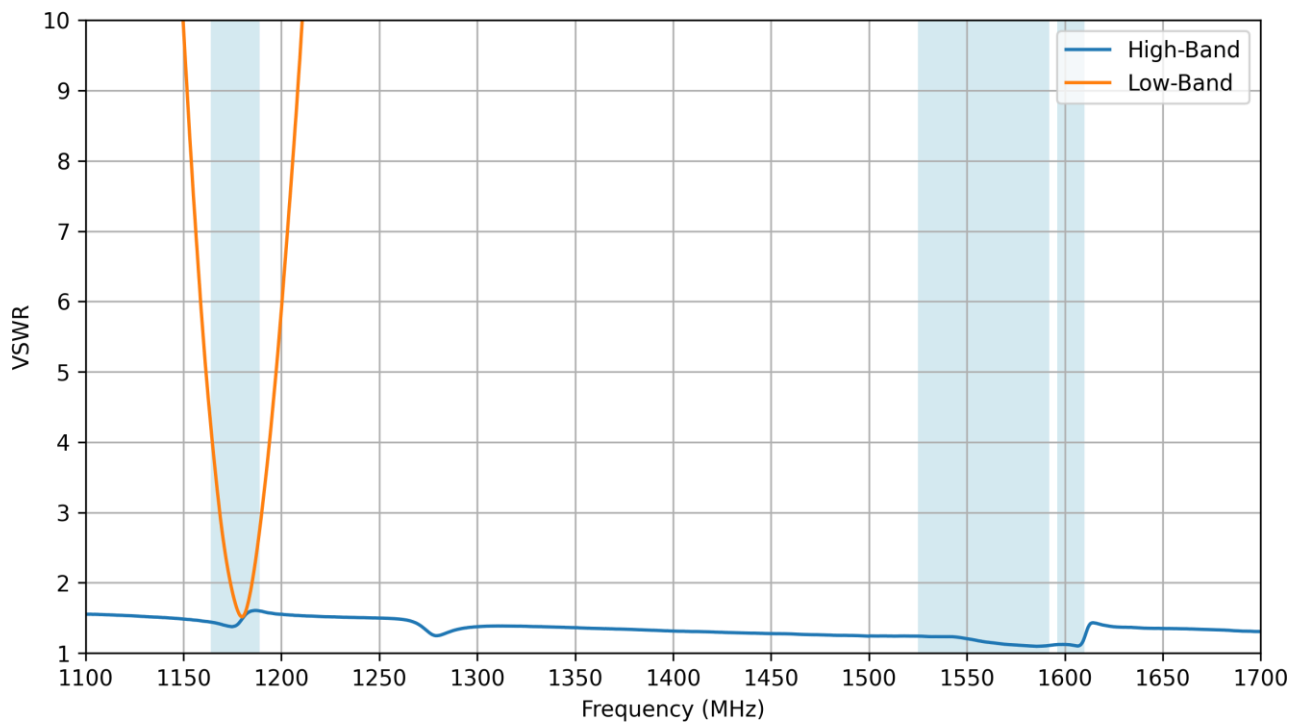


AA.215.201111 VNA Test Set-up

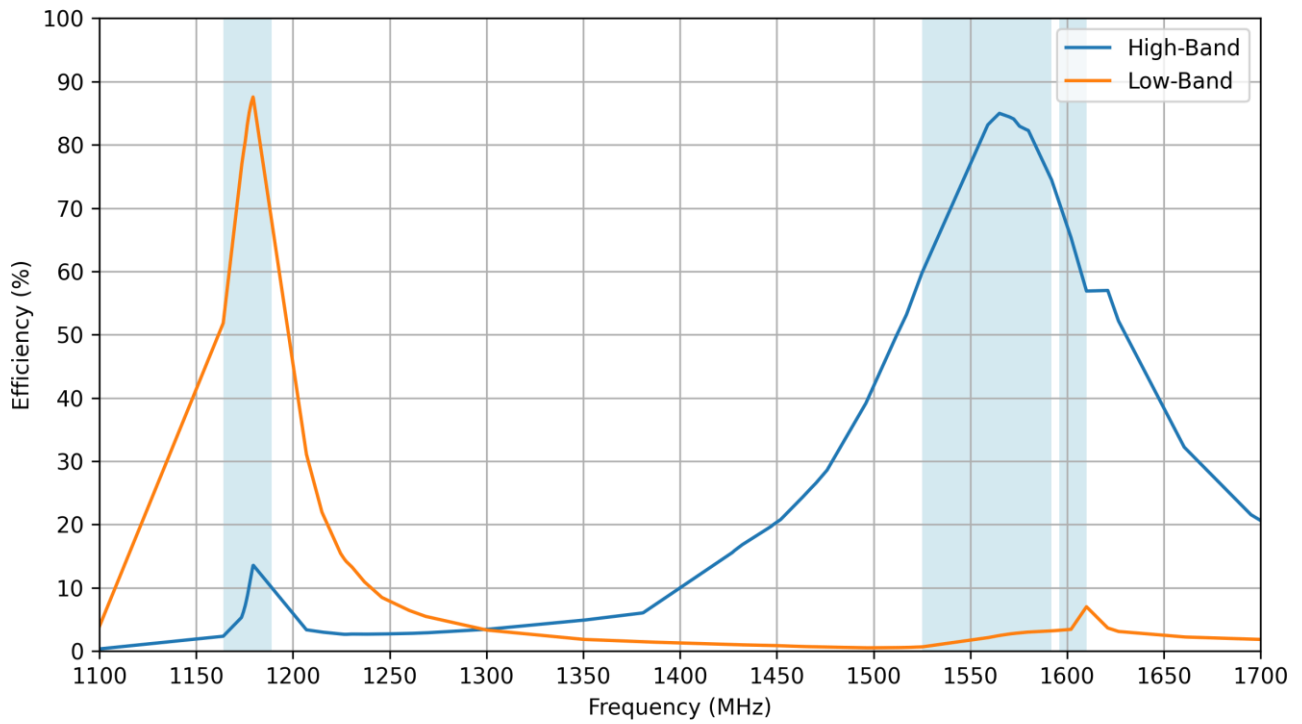
5.2 Return Loss



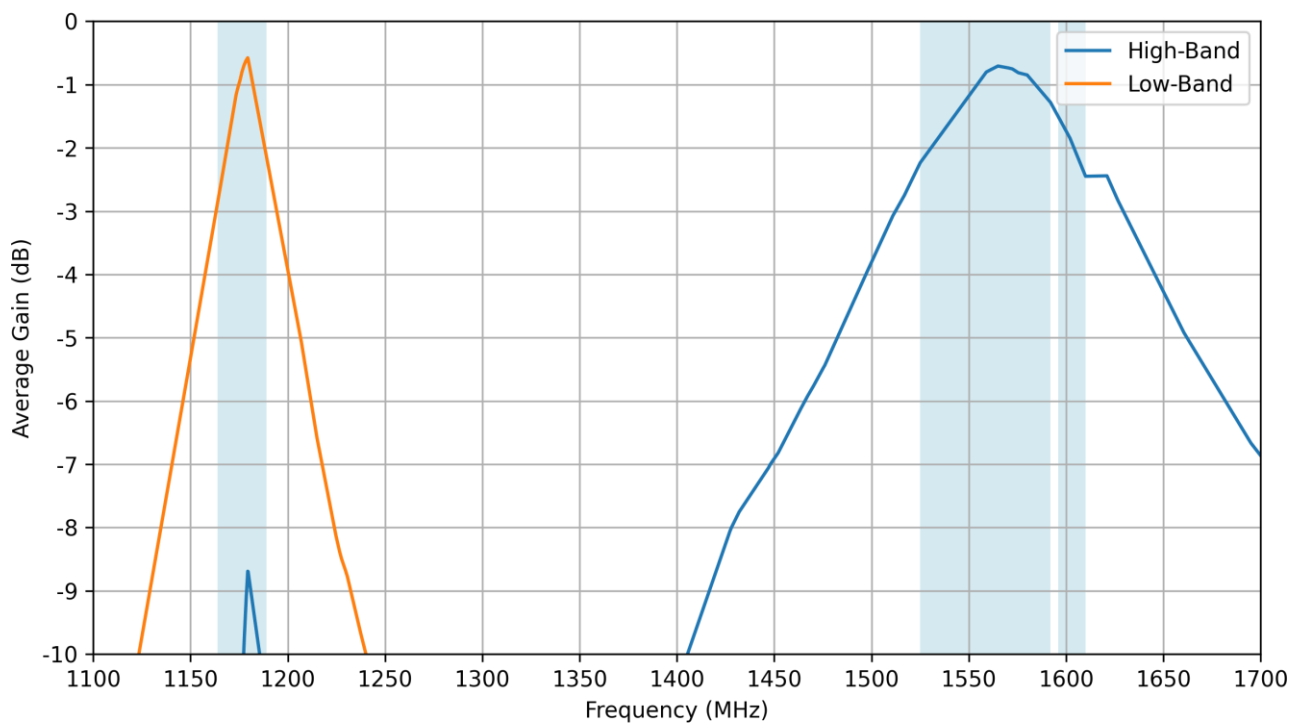
5.3 VSWR



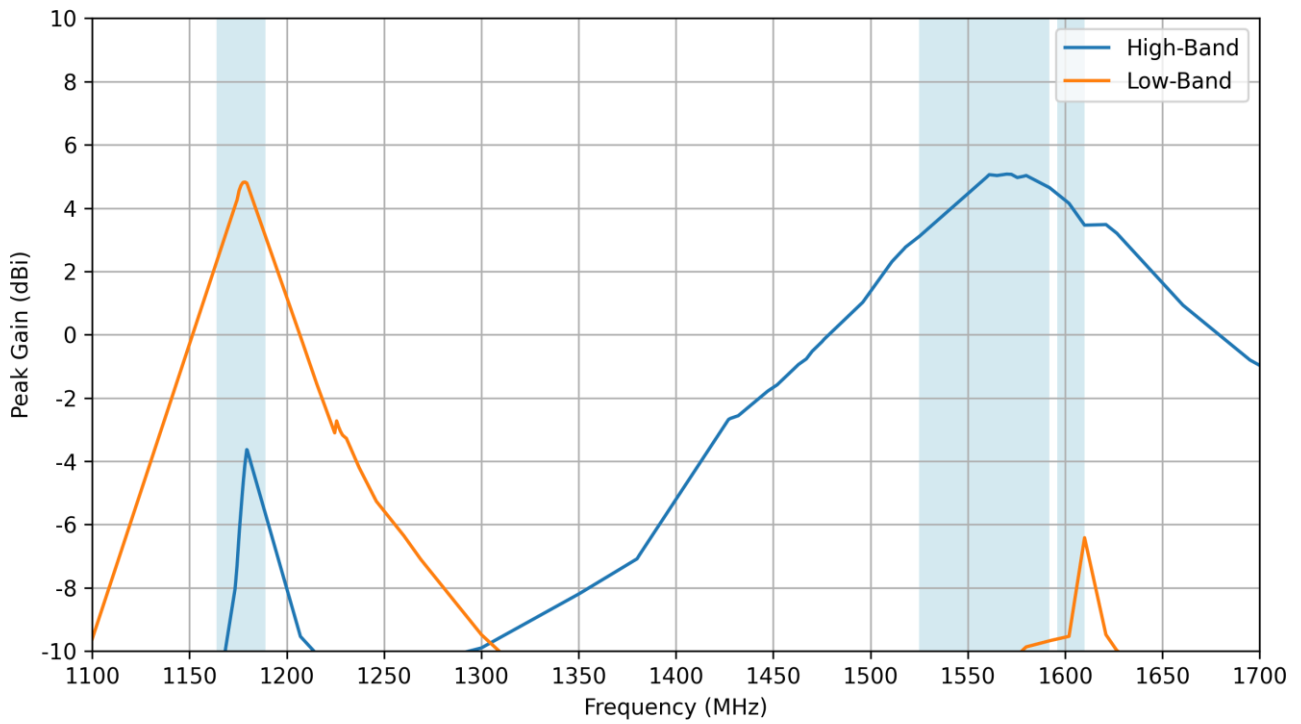
5.4 Efficiency



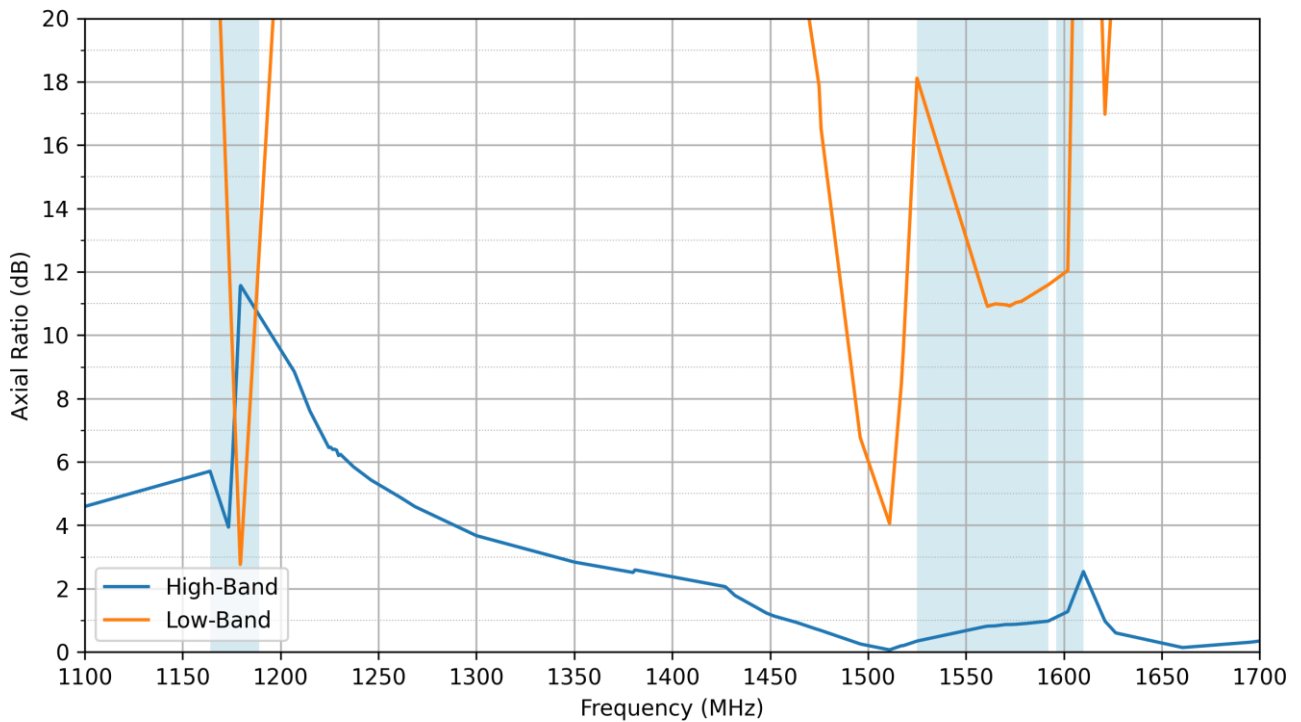
5.5 Average Gain



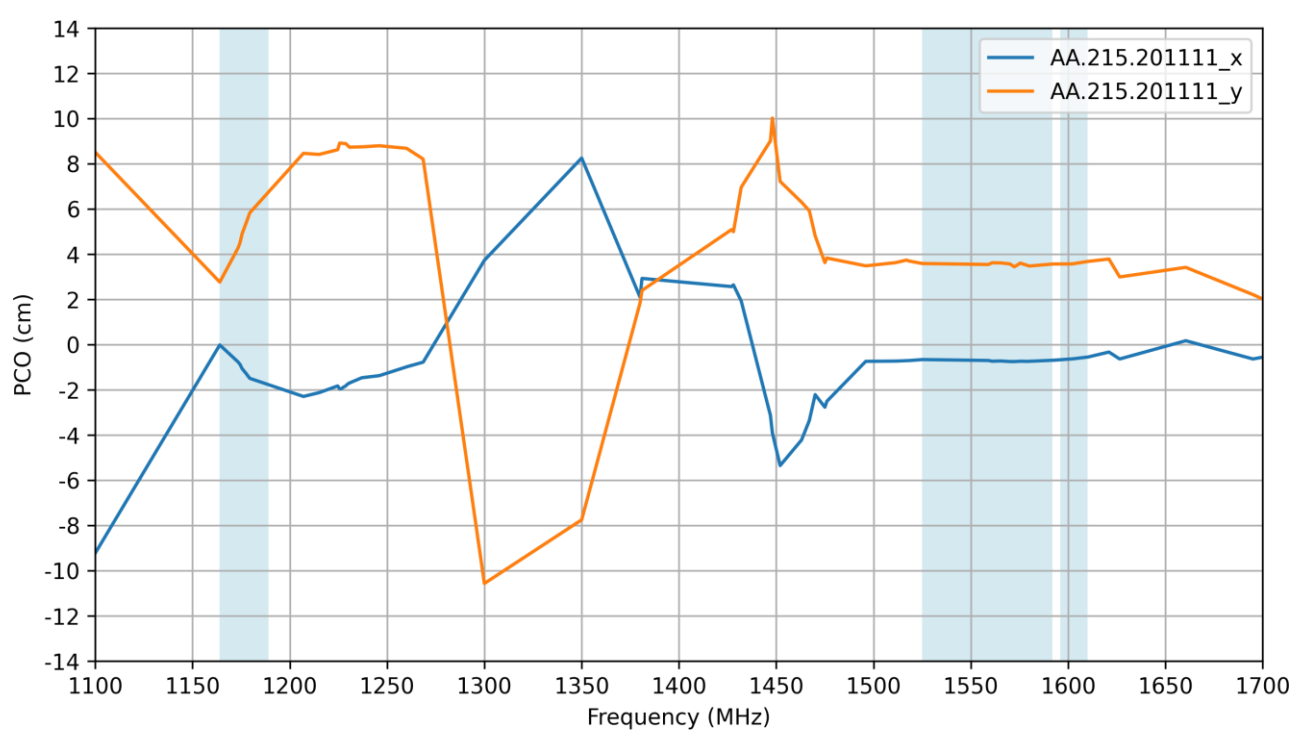
5.6 Peak Gain



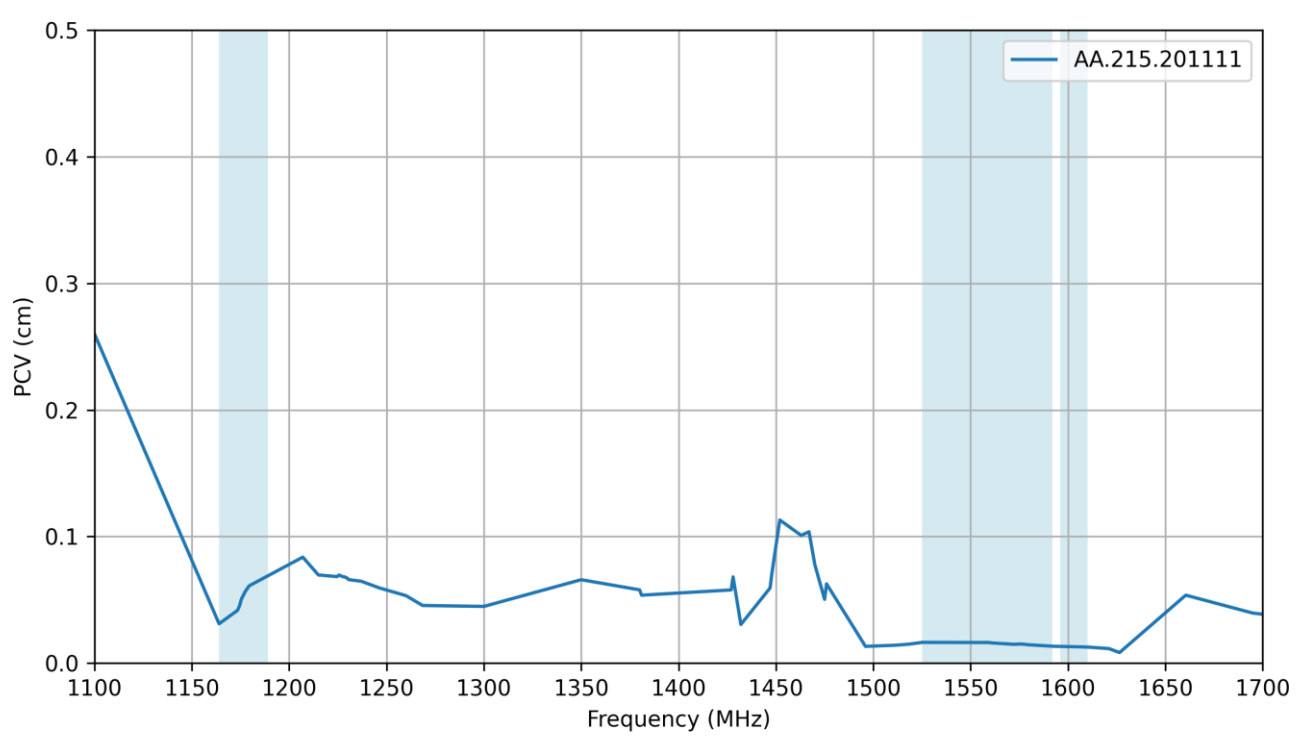
5.7 Axial Ratio



5.8 PCO

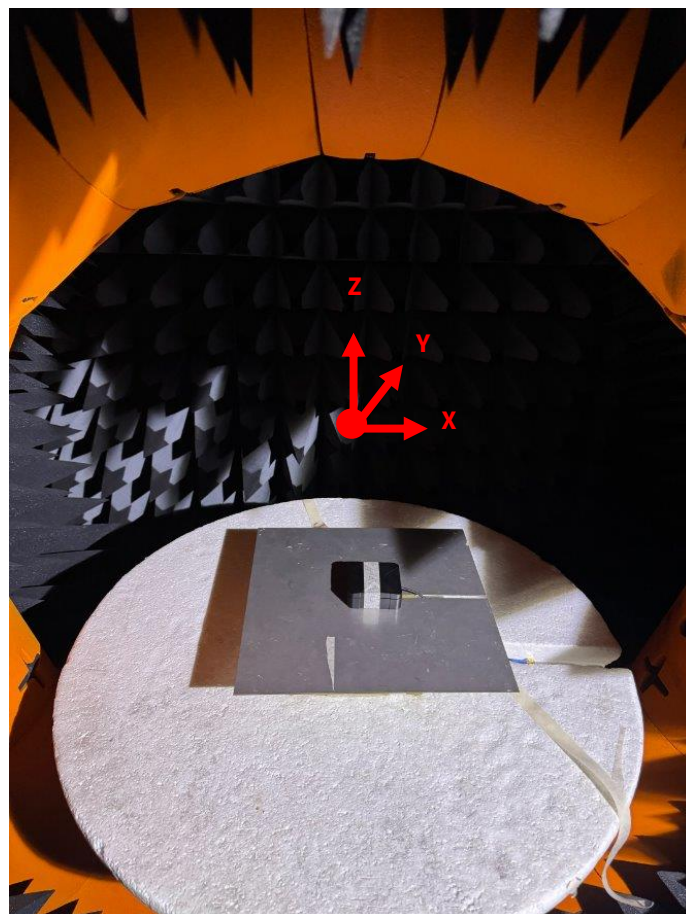
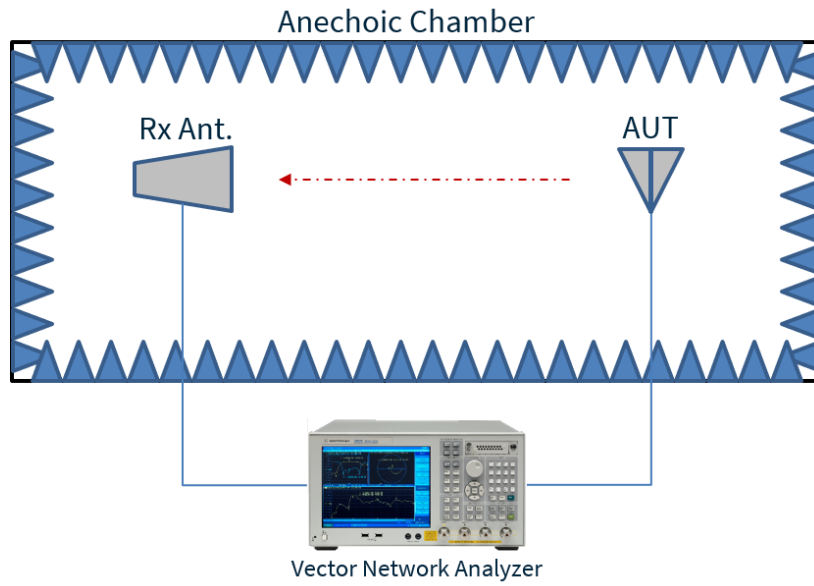


5.9 PCV



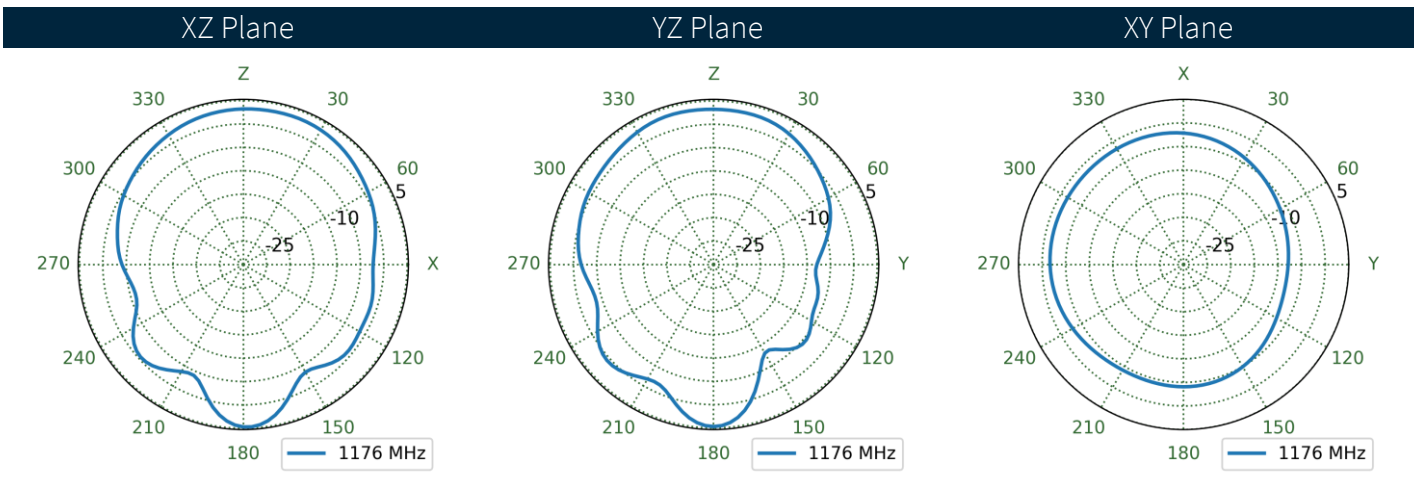
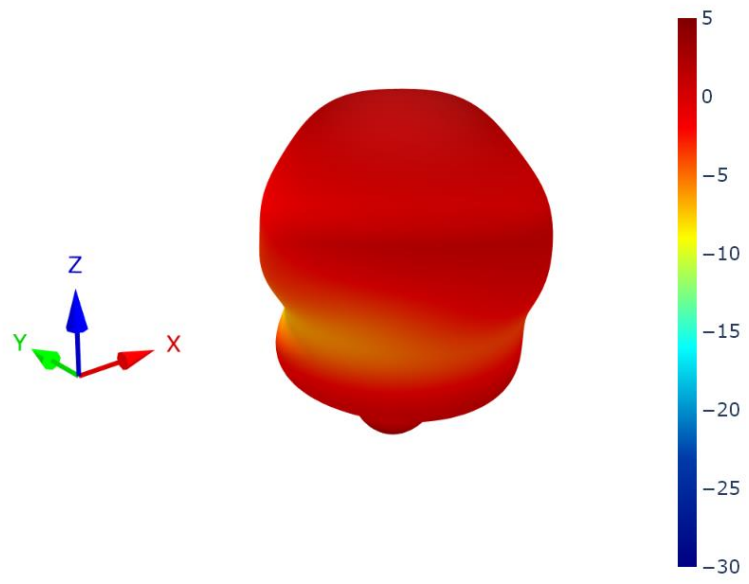
6. Radiation Patterns

6.1 Test Setup

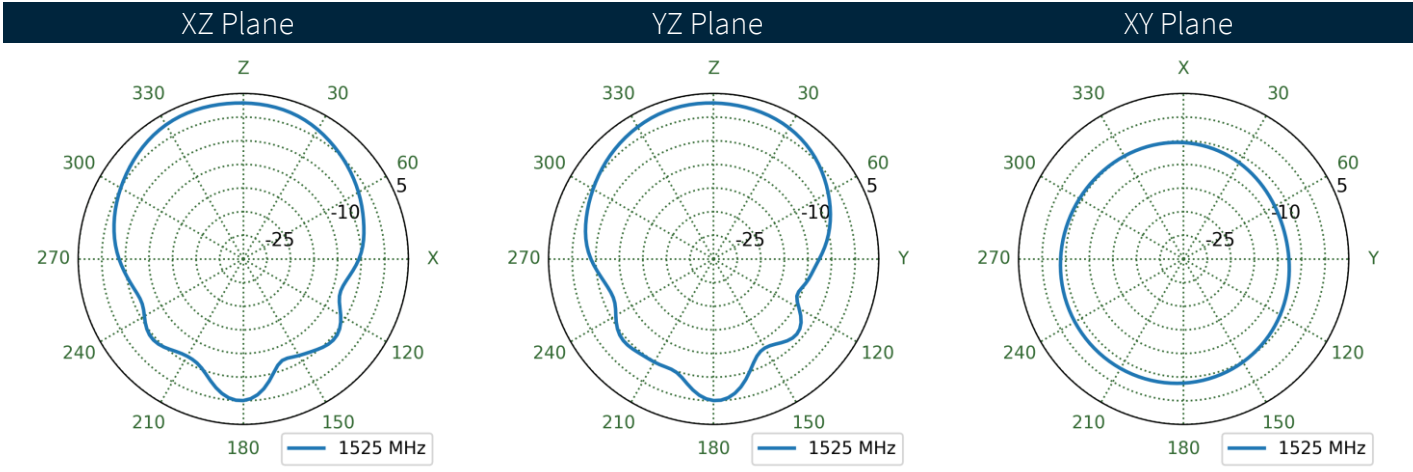
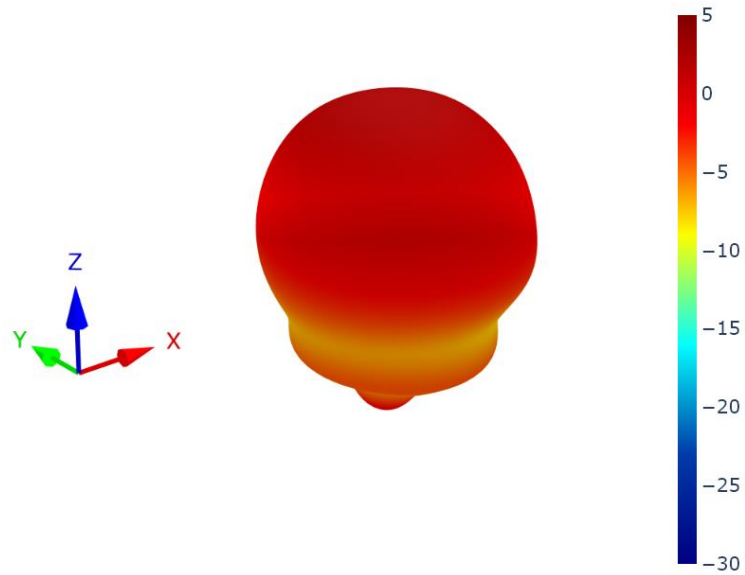


AA.215.201111 Chamber Test Set-up

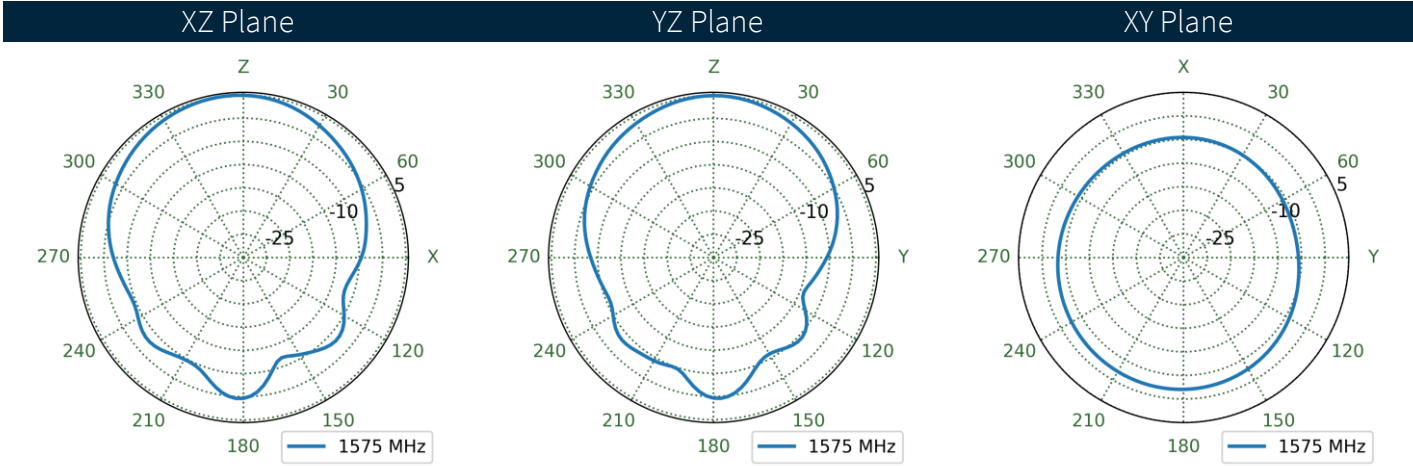
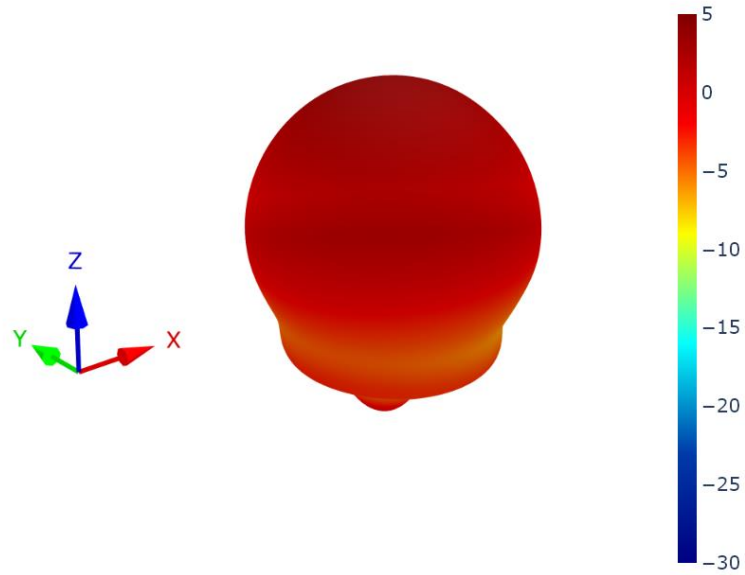
6.2 Patterns at 1176 MHz



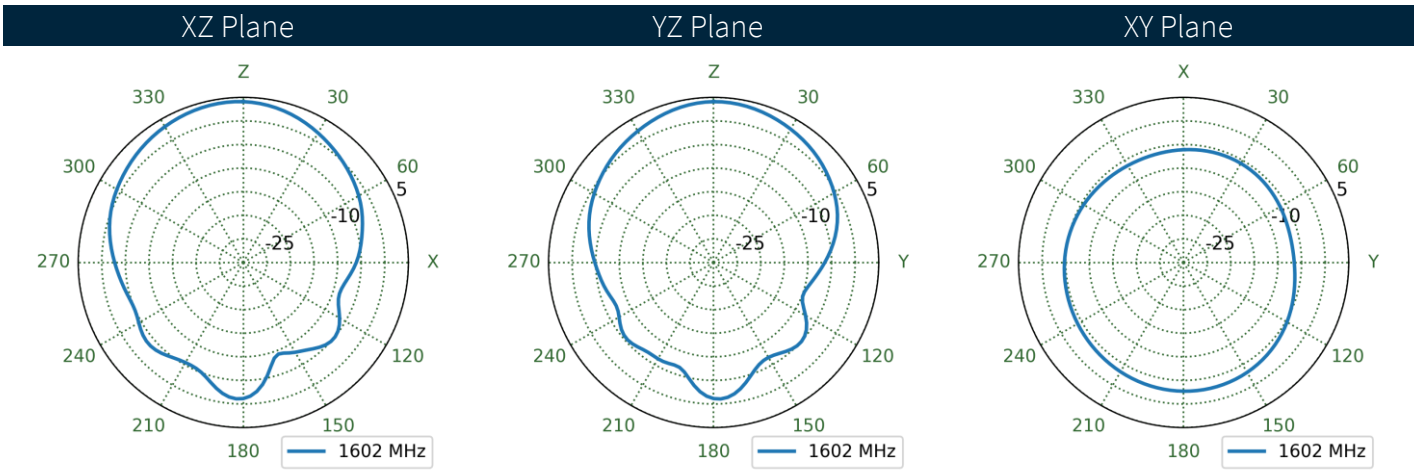
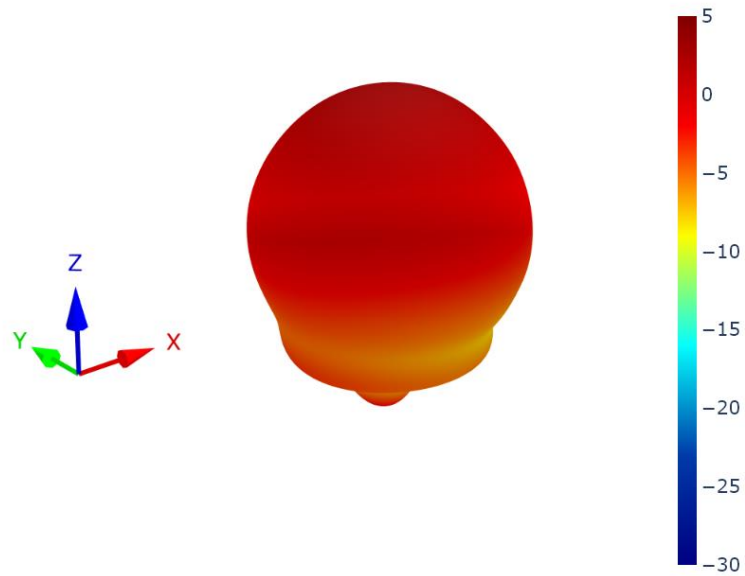
6.3 Patterns at 1525 MHz



6.4 Patterns at 1575 MHz

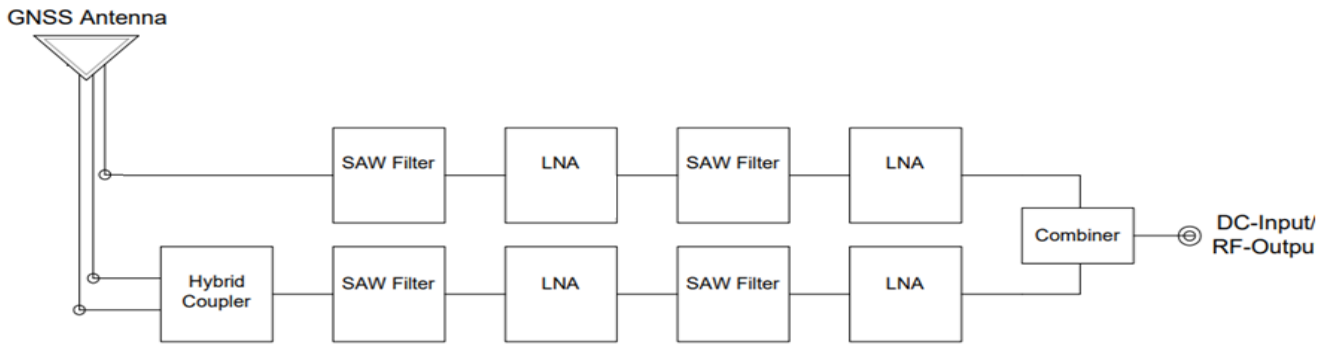


6.5 Patterns at 1602 MHz

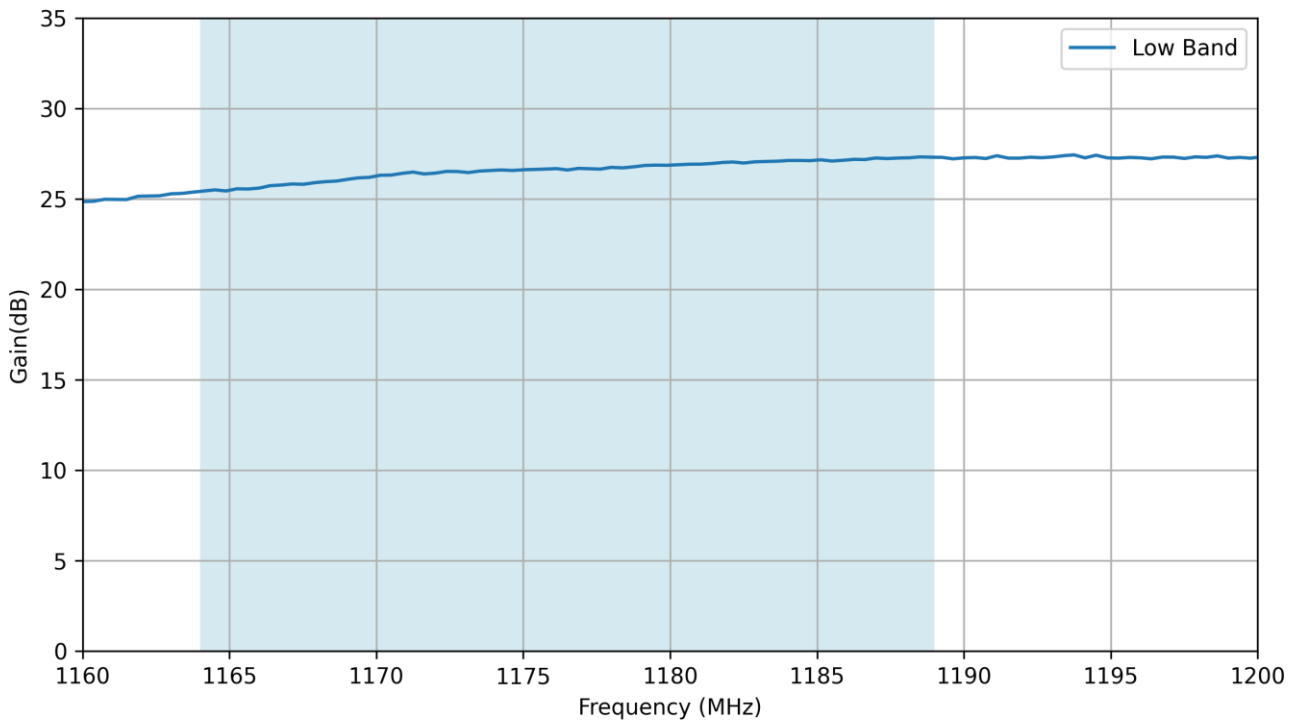


7. LNA Characteristics

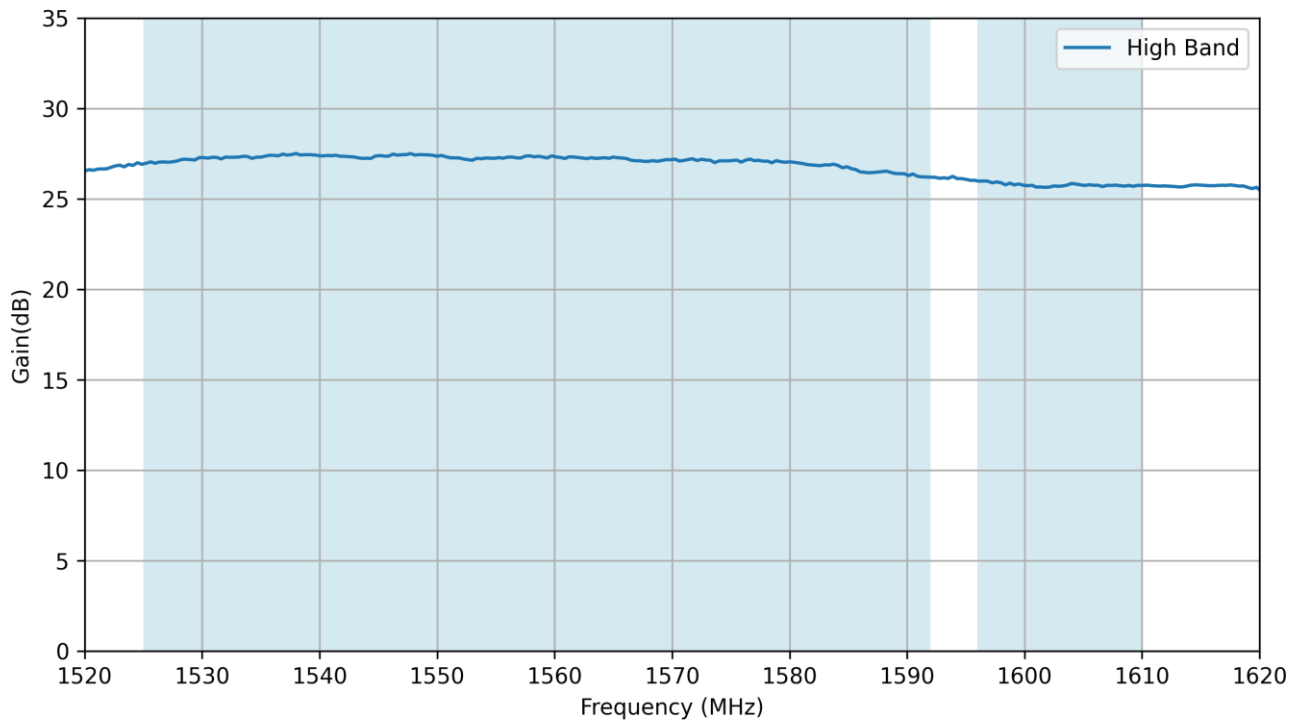
7.1 Block Diagram



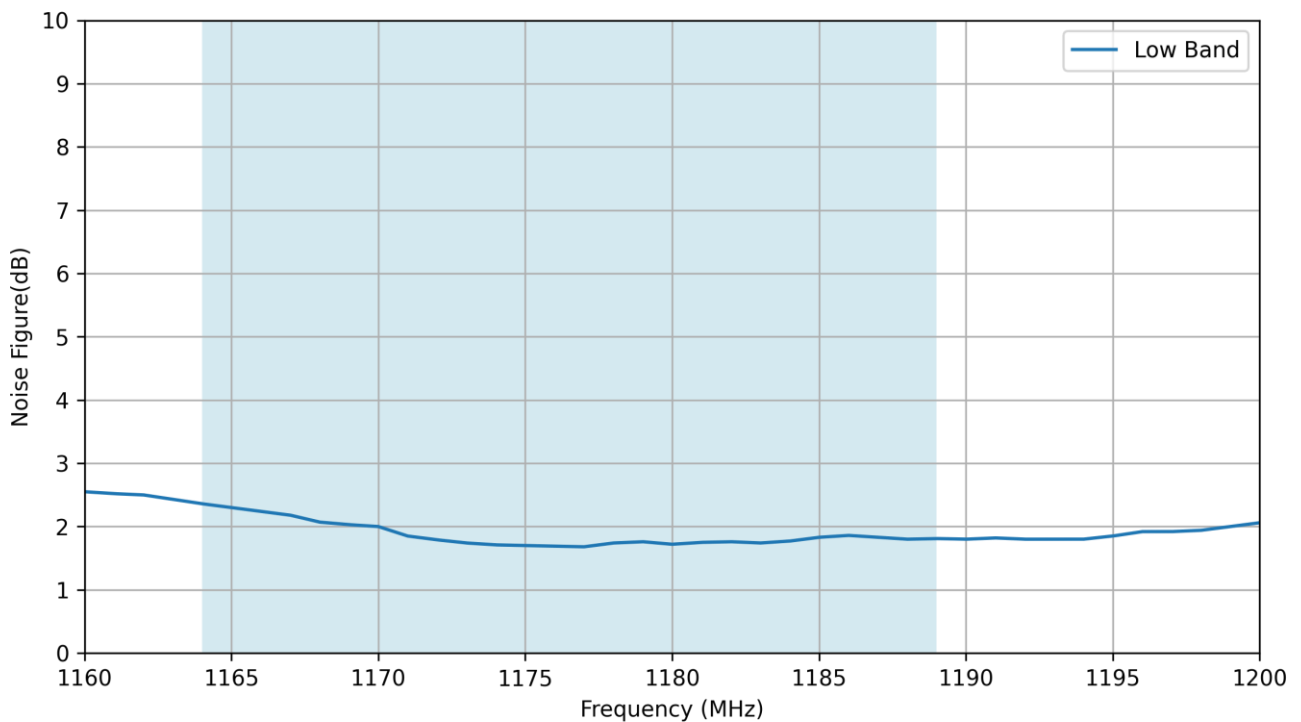
7.2 Gain Low-Band



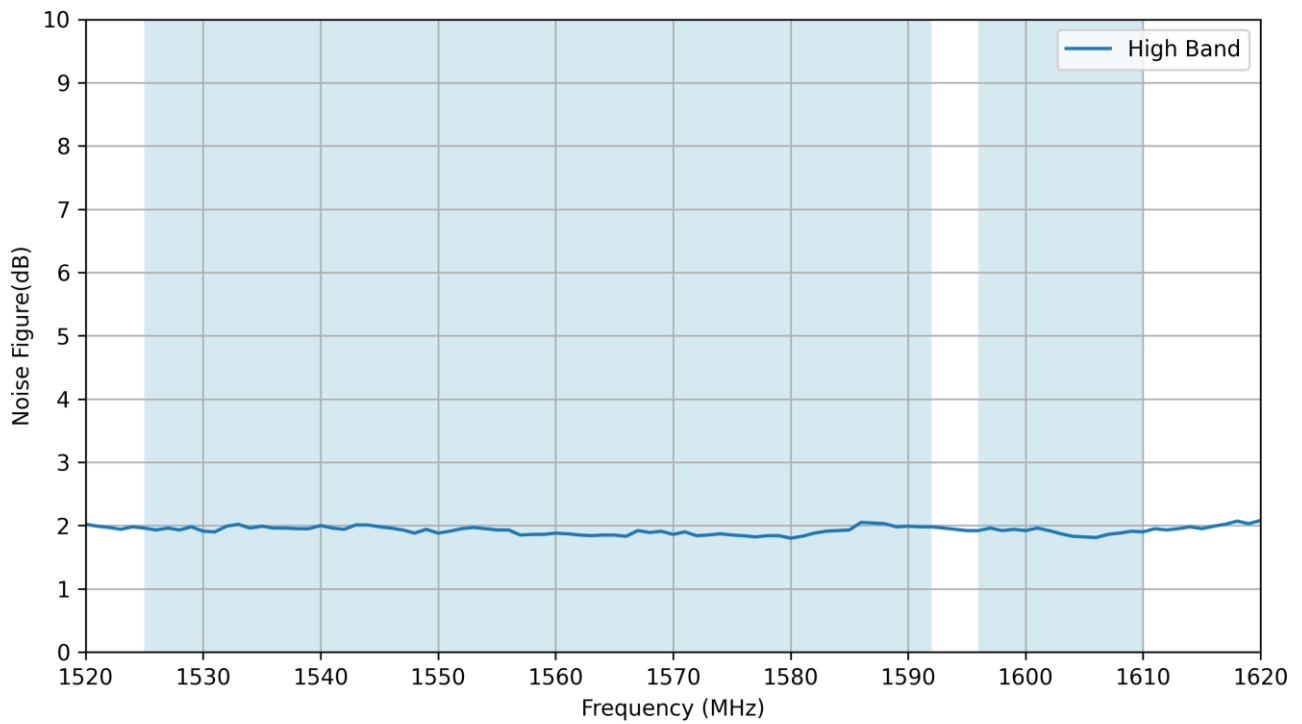
7.3 Gain High-Band



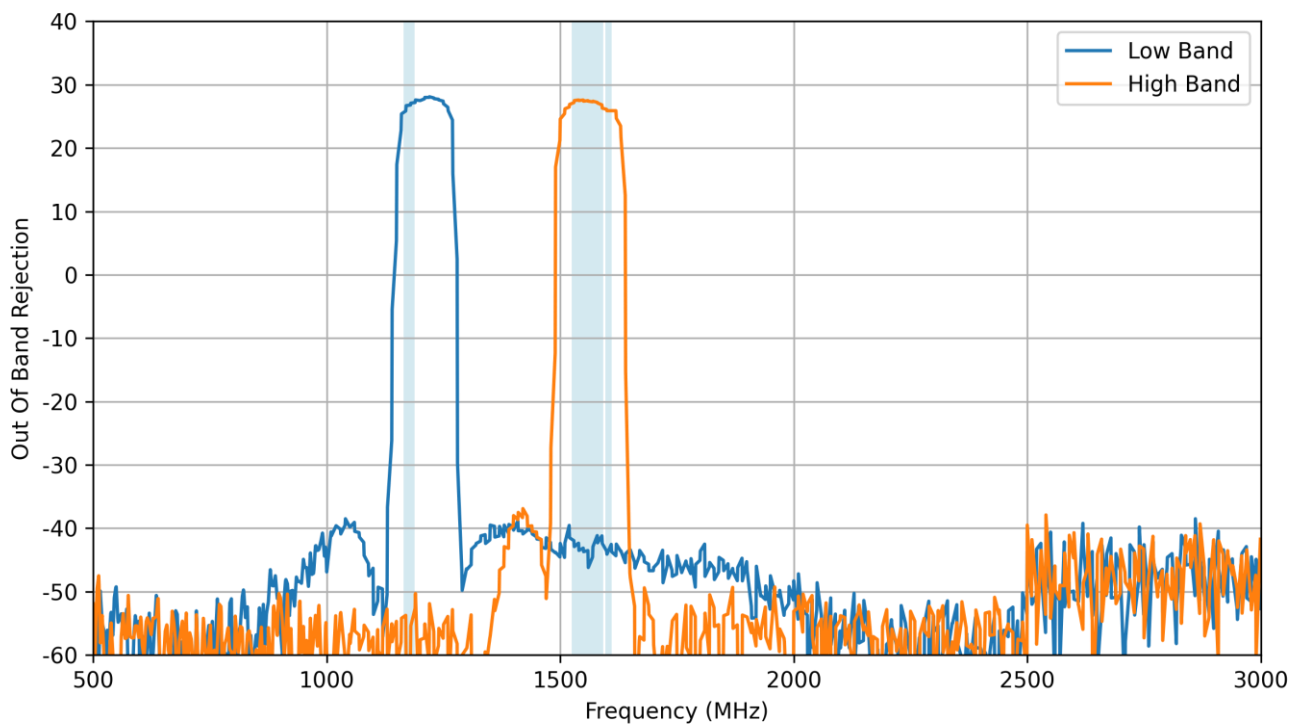
7.4 Noise Figure Low-Band



7.5 Noise Figure High-Band



7.6 Out Of Band Rejection



Changelog for the datasheet

SPE-24-8-127 – AA.215.201111

Revision: A (Original First Release)

Date: 2024-06-14

Notes: Initial Release

Author: Gary West

Previous Revisions

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