TAOGLAS

Datasheet

Part No:
EAHP.60.01.0100D

Description

Embedded Active Lightweight Antenna for GNSS L1/L2/L5/L6 and L-Band

Features:

Embedded Active Antenna
Covering: L1/L2/L5 + L-Band
Dims: Ø75 x 44mm
Cable:100mm of RG174
Connector: SMA(M) ST connector
RoHS & Reach Compliant

1. Introduction

The Taoglas EAHP.60 is a lightweight, embedded active multi-band GNSS antenna that has been carefully designed for high performance cm-level positional accuracy covering the full GNSS spectrum for maximum compatibility. Bands covered include GPS/QZSS L1/L2/L5/L6, 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 use all constellations and bands to achieve higher location accuracy, as well as stability of position tracking in urban environments when used in their device.

The EAHP.60 has excellent performance across the full bandwidth of the antenna and its design has exhibits even gain across the hemisphere giving almost excellent, broad axial ratio. This makes the antenna resilient to interference and multipath rejection and provides excellent phase centre stability. The LNA used in the EAHP.60 ensures excellent out of band rejection and provides excellent positioning stability and reliability of GNSS signals.

Typical applications for the EAHP.60 include:

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

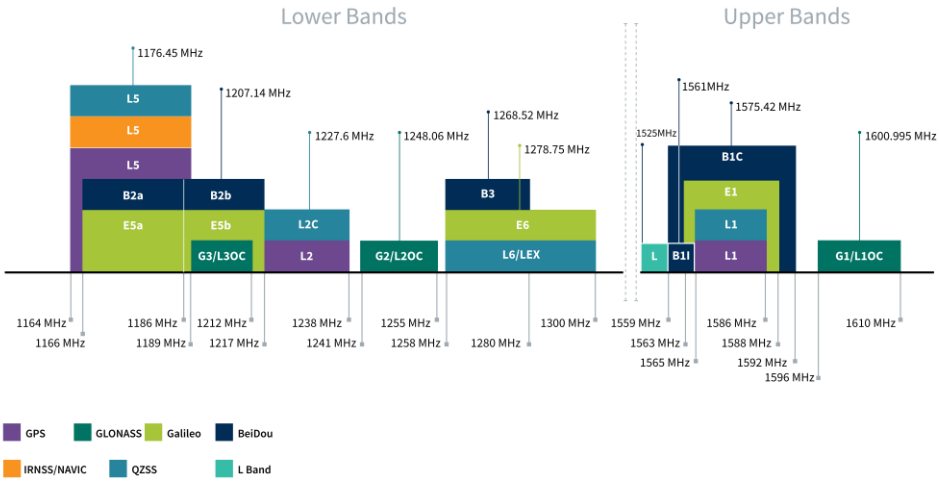
The EAHP.60 is lightweight and compact and can be mechanically integrated into a device using screws with the mounting holes through the PCB. The standard product is supplied with 100mm of RG-174 cable with an SMA(M) connector but can be fully customized for your application.

The EAHP.60 is the latest addition to an ongoing product road map of high precision antennas by Taoglas that allows you to achieve genuine cm-level accuracy for your application.

For samples, or more information how to integrate the EAHP.60 into your device, please contact your regional Taoglas customer support team.

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

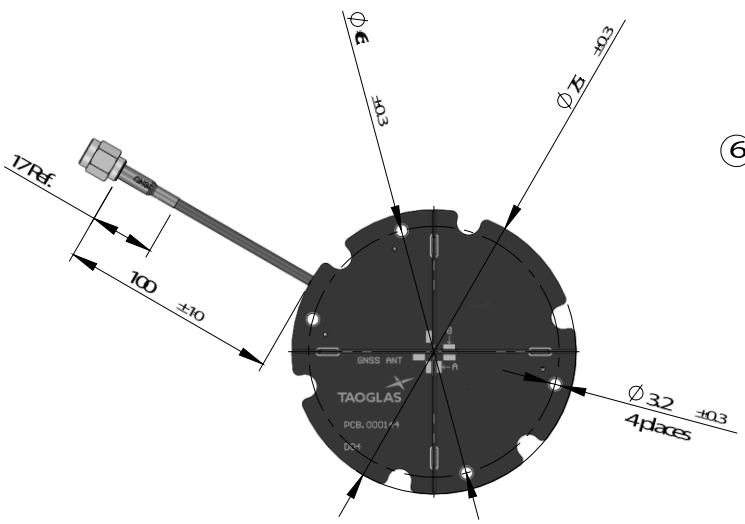
GNSS Electrical									
Frequency (MHz)	**1176.45**	**1207**	**1227.6**	**1248**	**1278.75**	**1542**	**1561**	**1575.42**	**1603**
VSWR (max.)	1.2:1	1.1:1	1.1:1	1.5:1	1.4:1	1.4:1	1.5:1	1.3:1	1.4:1
Passive Antenna Efficiency (%)	65.84	66.6	72.85	75.74	67.42	60.04	55.58	52.95	47.65
Passive Antenna Gain 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									

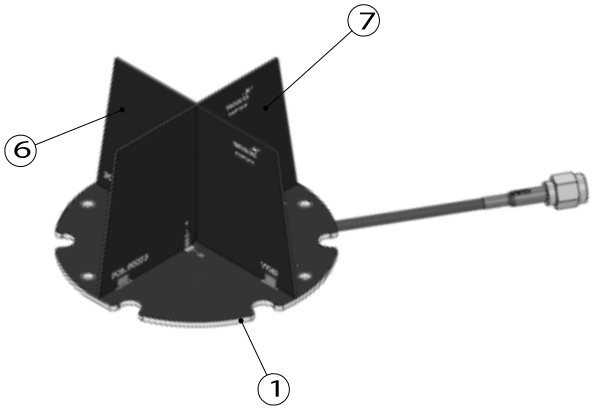
LNA and Filter Electrical Properties									
Frequency (MHz)	**1176.45**	**1207**	**1227.6**	**1248**	**1278**	**1542**	**1561**	**1575.42**	**1603**
Gain (dB)	27.3	25.3	25.9	25.3	25.0	27.1	27.2	26.2	26.2
Noise (dB)	3.7	3.1	4.8	3.9	4	3.8	4.2	4.3	3.8
Voltage In	1.8V~5.5V								
ESD	±20KV for Contact and ±25KV for Air								
Out Of Band Rejection	70dB for frequencies <1GHz 60dB for frequencies <1.7GHz								
Power Consumption (mA)	18 ± 3								
LTE Band 13 interference filter circuit INCLUDED									

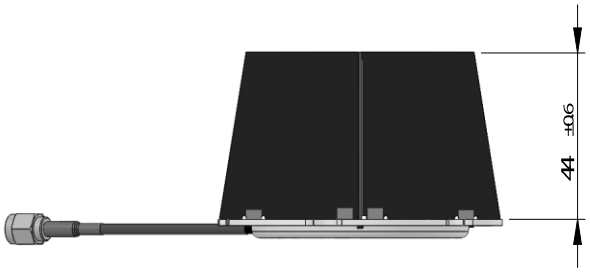
Mechanical	
Dimensions	Ø75 x 44mm
Weight	75g
Connector	SMA(M) ST
Cable	RG-174

Environmental	
Operation Temperature	-40°C to 85°C
Storage Temperature	-40°C to 85°C
Relative Humidity	Non-condensing 65°C 95% RH

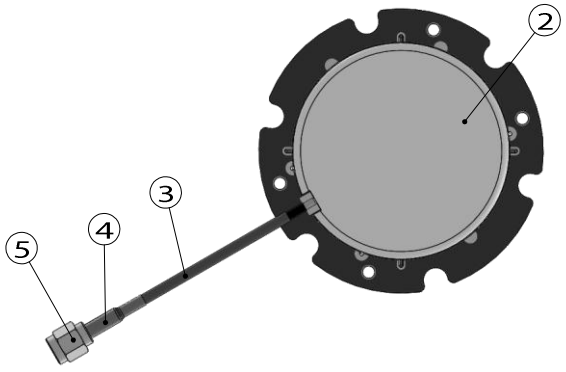
3. Mechanical Drawing







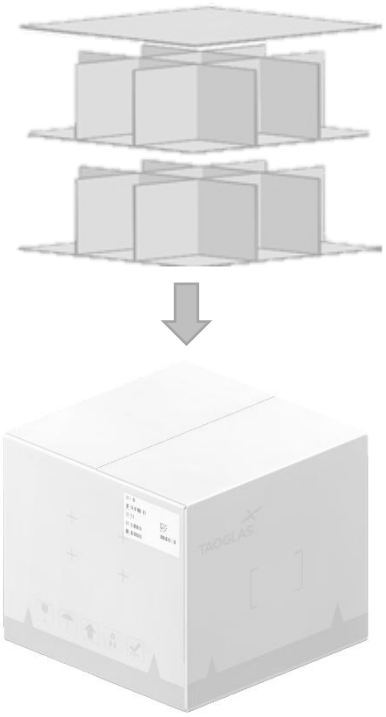
	Name	Material	Finish	Qty
1	PCB_XAHP/EAHP.60			1
2	Shielding case	SPTE 0.2t	Tin Plated	1
3	RG-174 cable	PVC	Black	1
4	Heat Shrink Tube(GNSS)	PE	Blue Tube/White Text	1
5	SMA(M) ST Plug_for RG-316/RG-174	Brass	Au Plated	1
6	XAH-P.60-A	FR4 0.8t	Black	1
7	XAH-P.60-B	FR4 0.8t	Black	1



4. Packaging

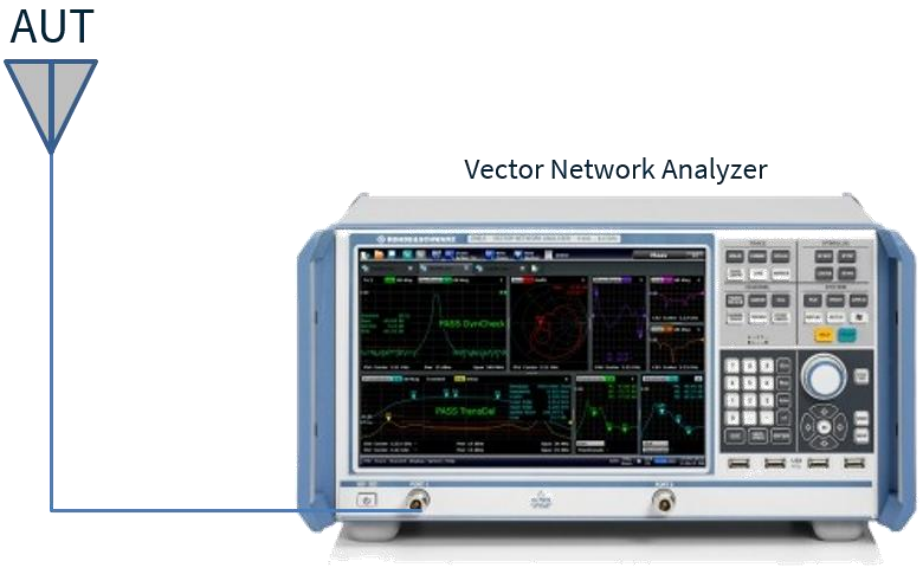
1 pcs per static bag
Bag dimensions: 180x250mm
Weight: 0.35kg

36pcs per carton
Carton Dimensions: 370x370x300mm
Weight: 2.5kg



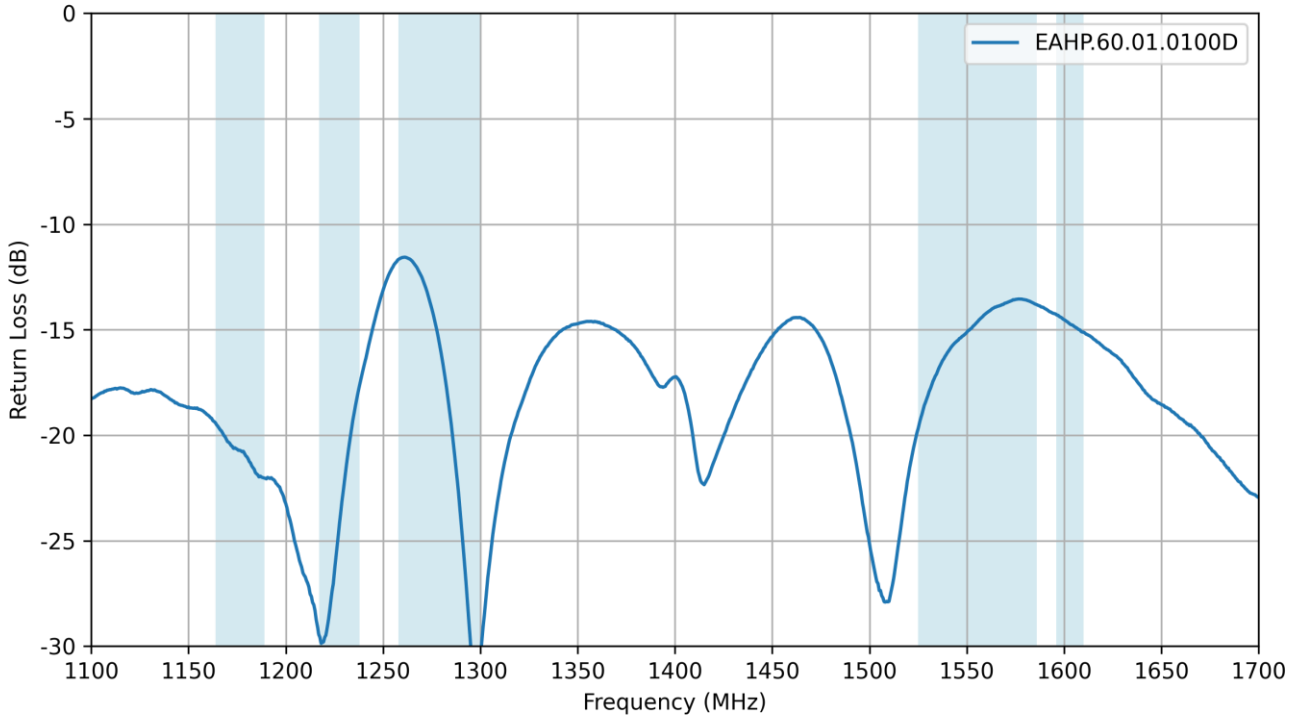
5. Antenna Characteristics

5.1 Test Setup

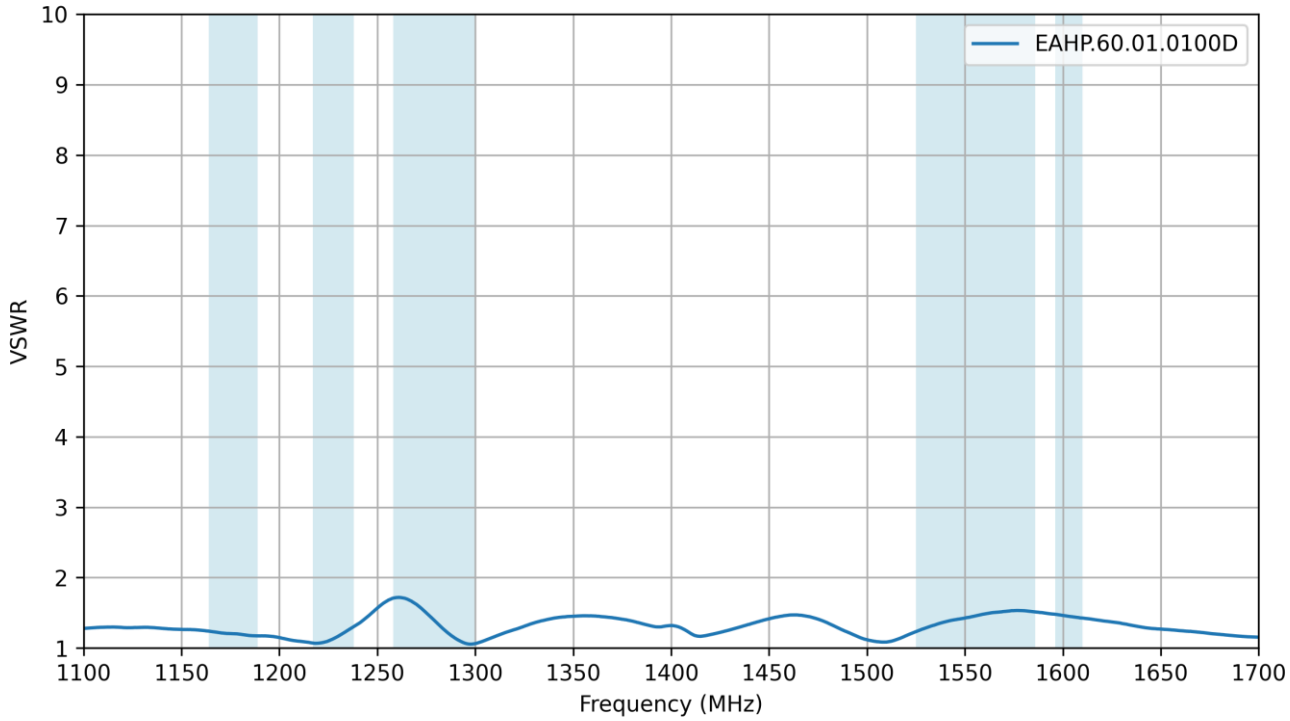


VNA Test Set-up on a 30x30cm Ground Plane

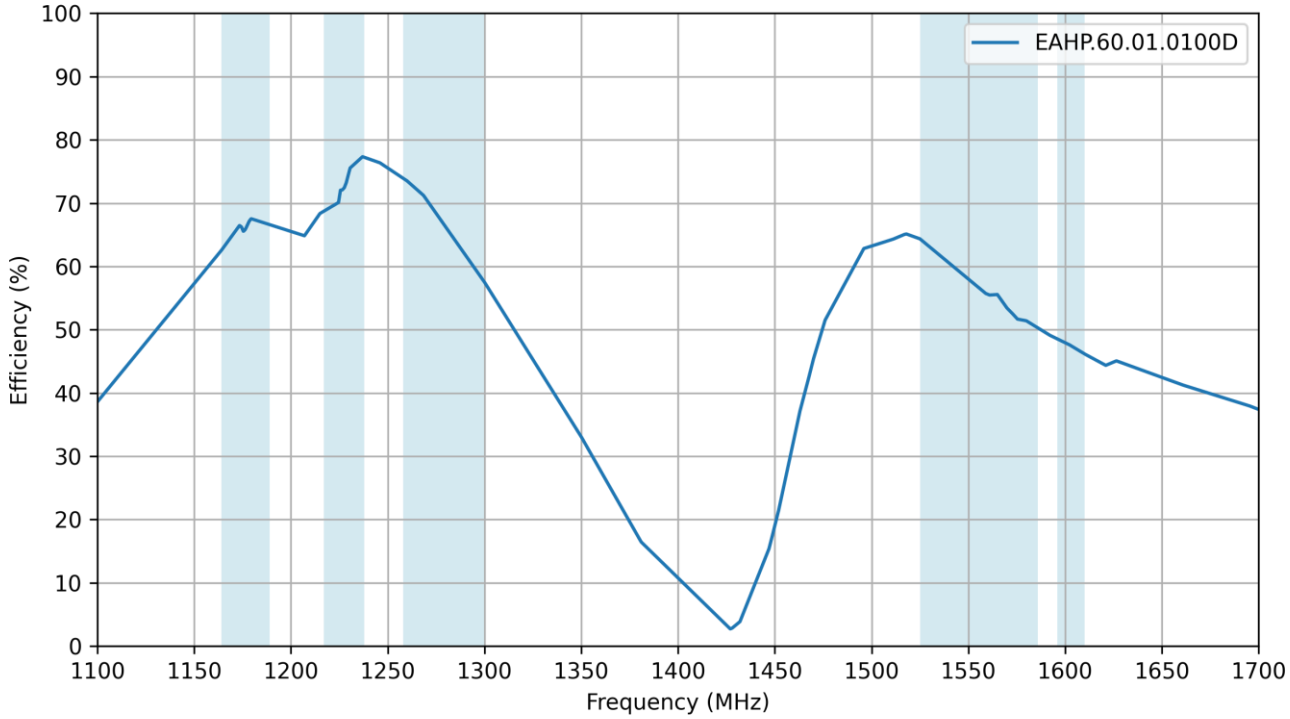
5.2 Return Loss



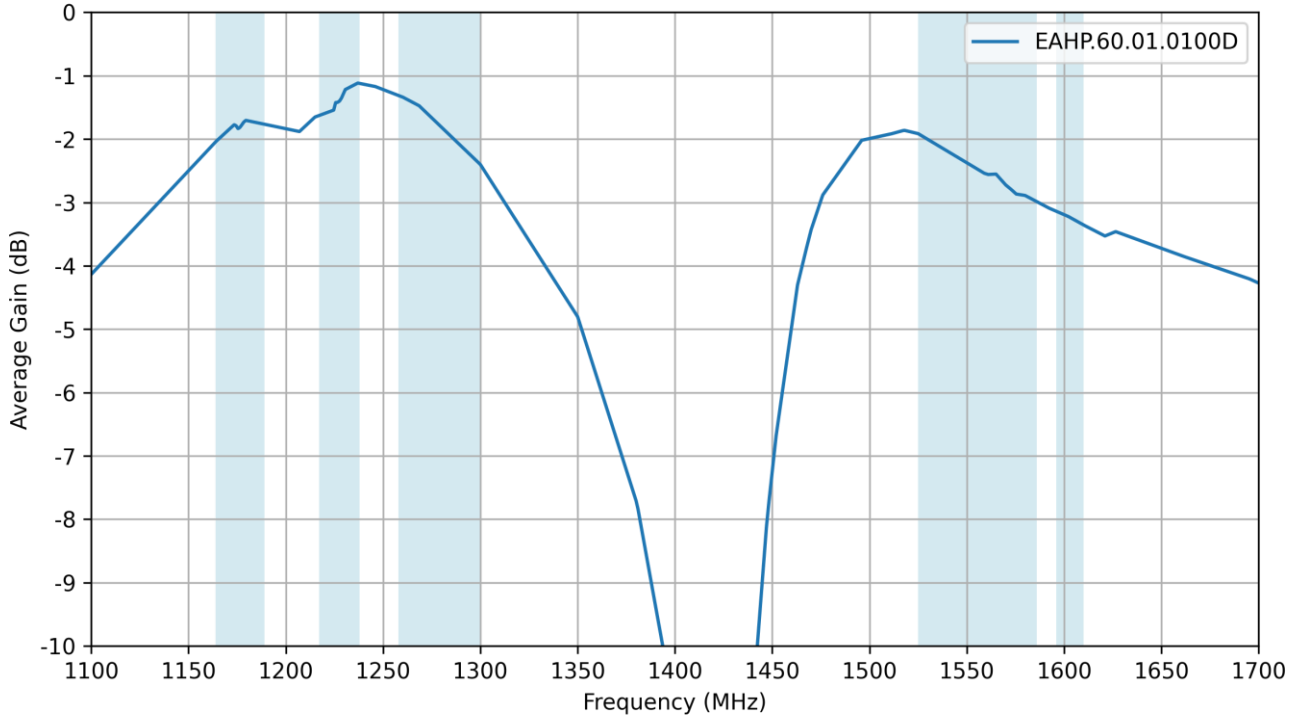
5.3 VSWR



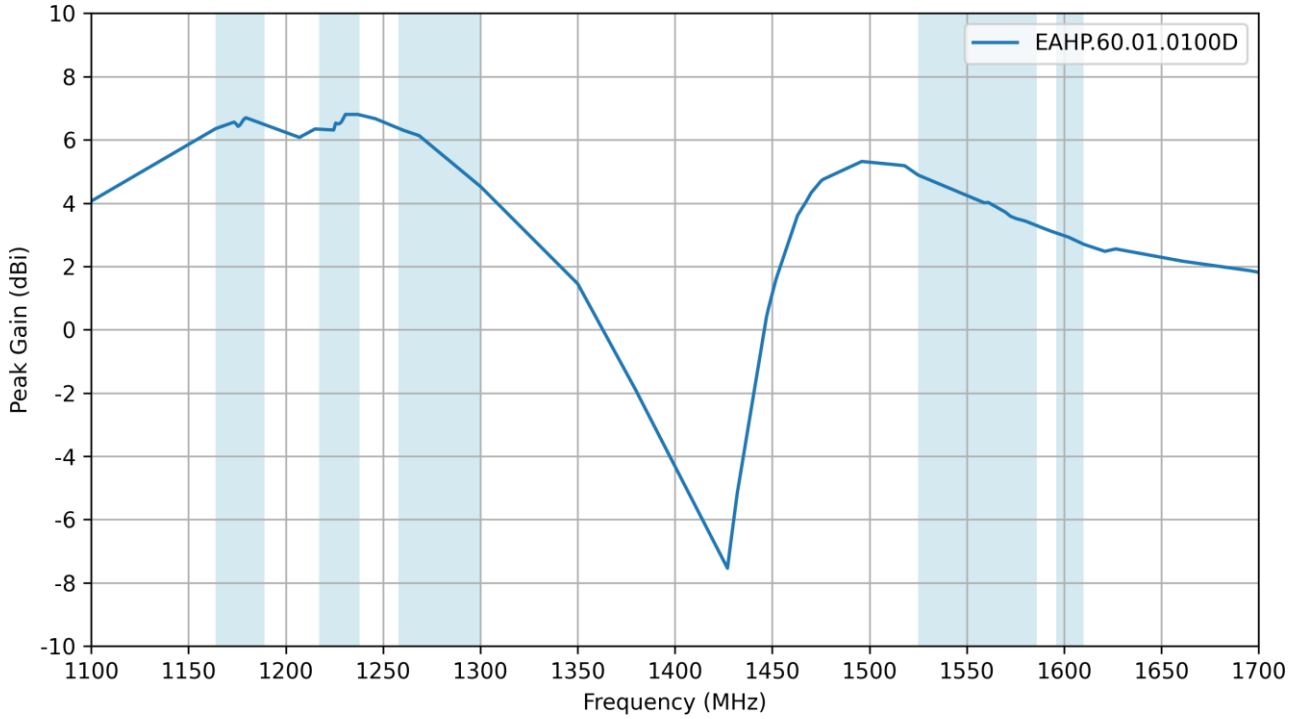
5.4 Efficiency



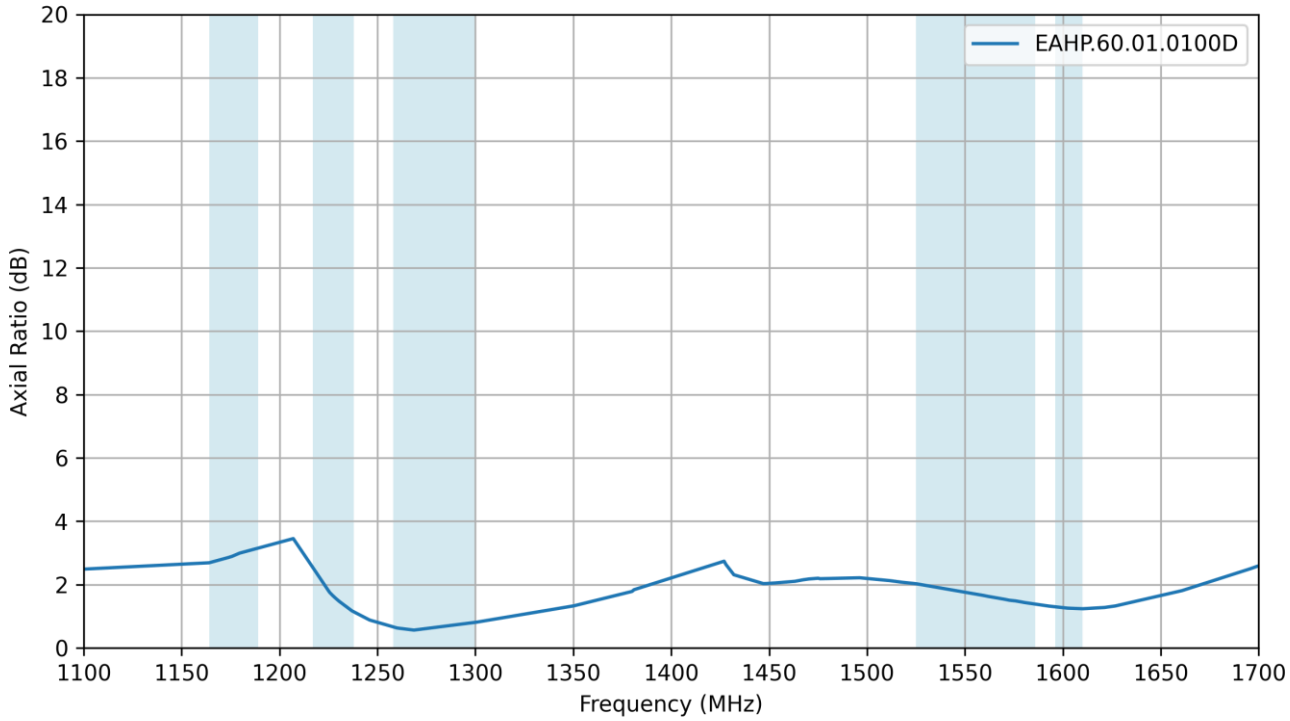
5.5 Average Gain



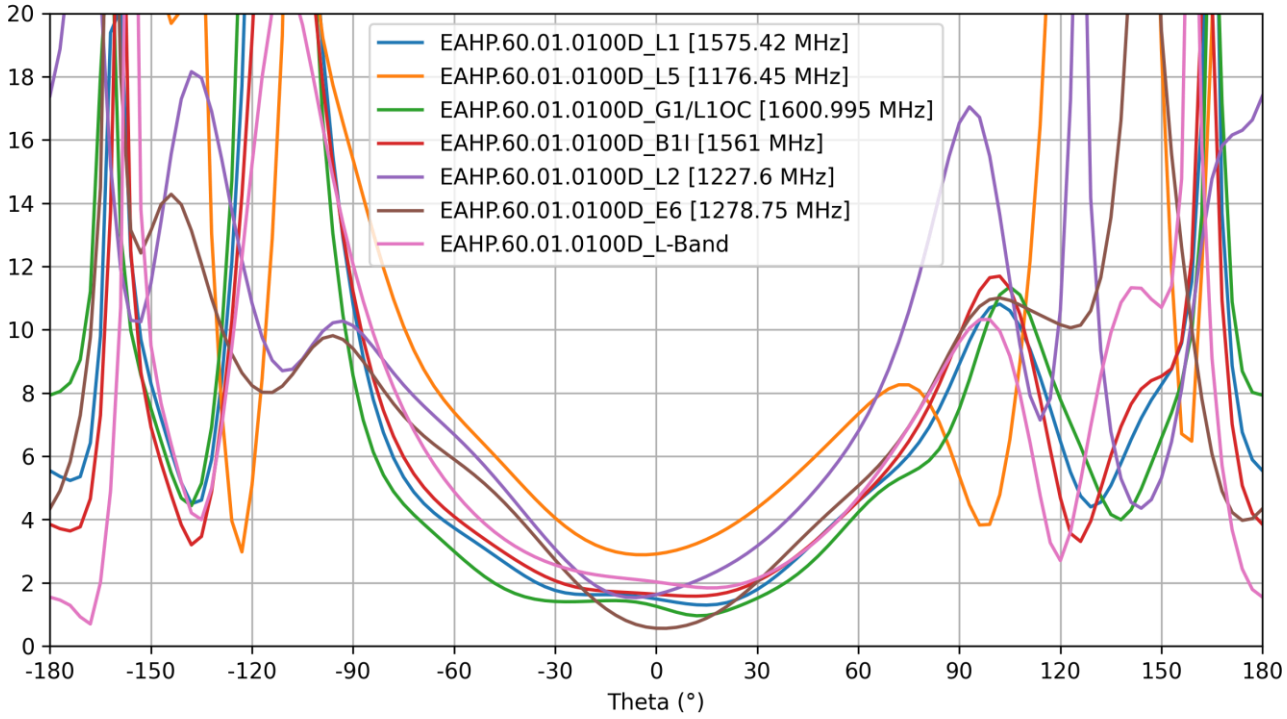
5.6 Peak Gain



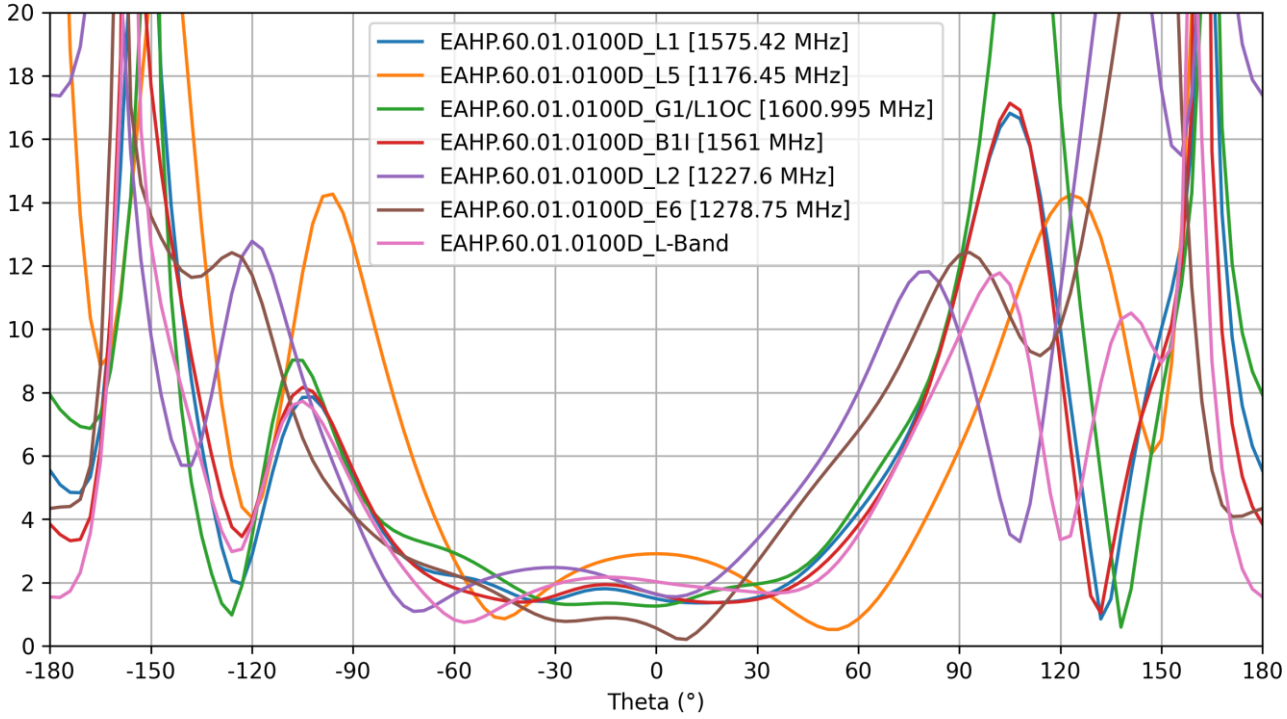
5.7 Axial Ratio



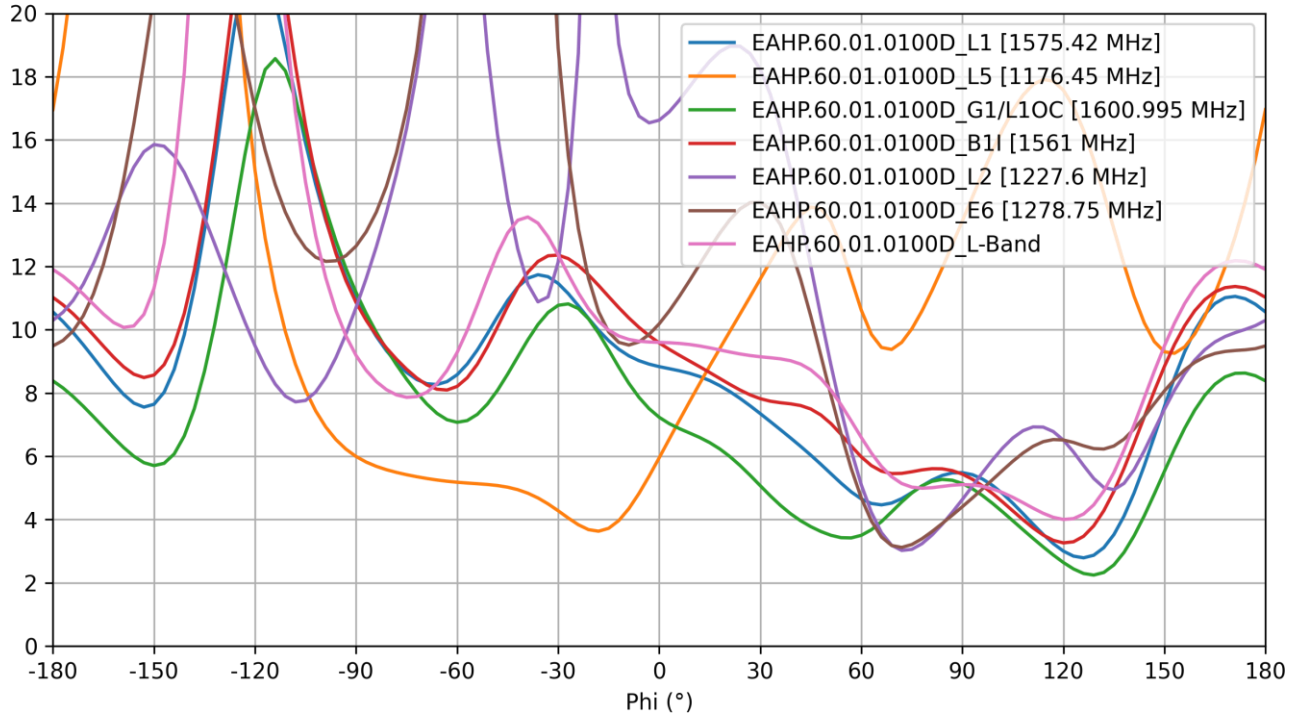
5.8 AR vs Angle for Phi=0



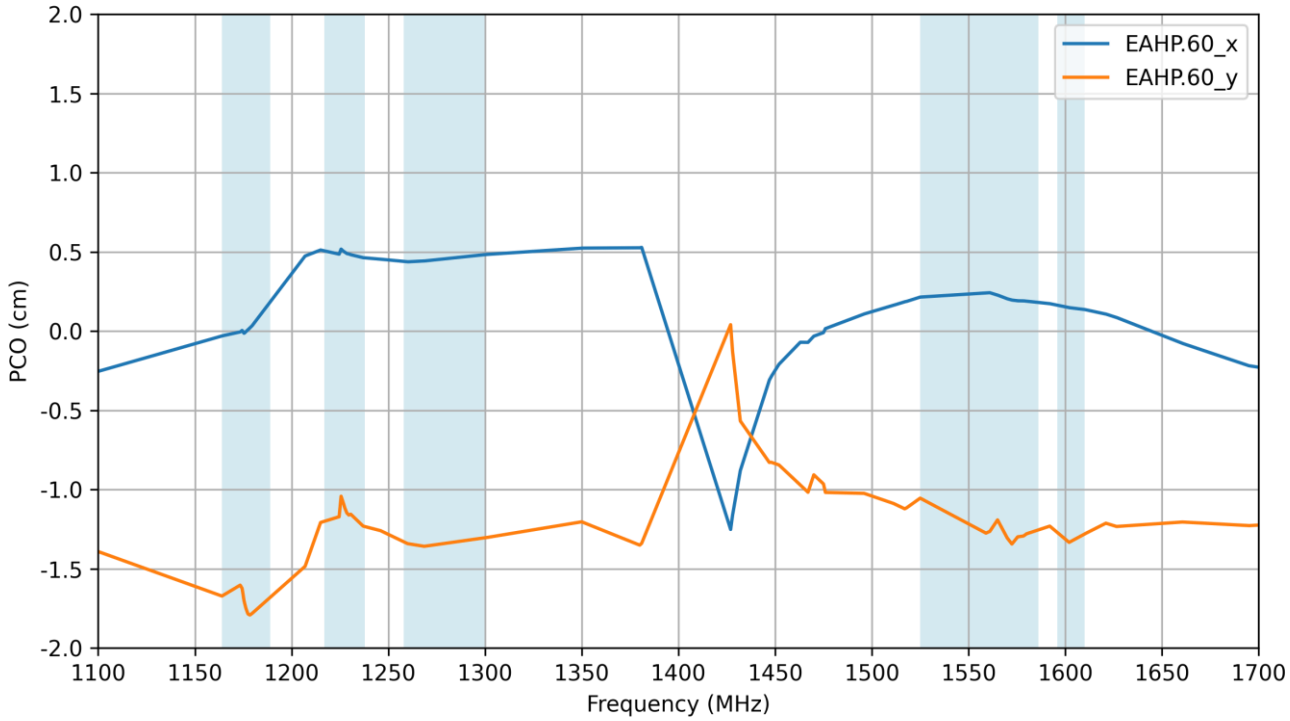
5.9 AR vs Angle for Phi=90



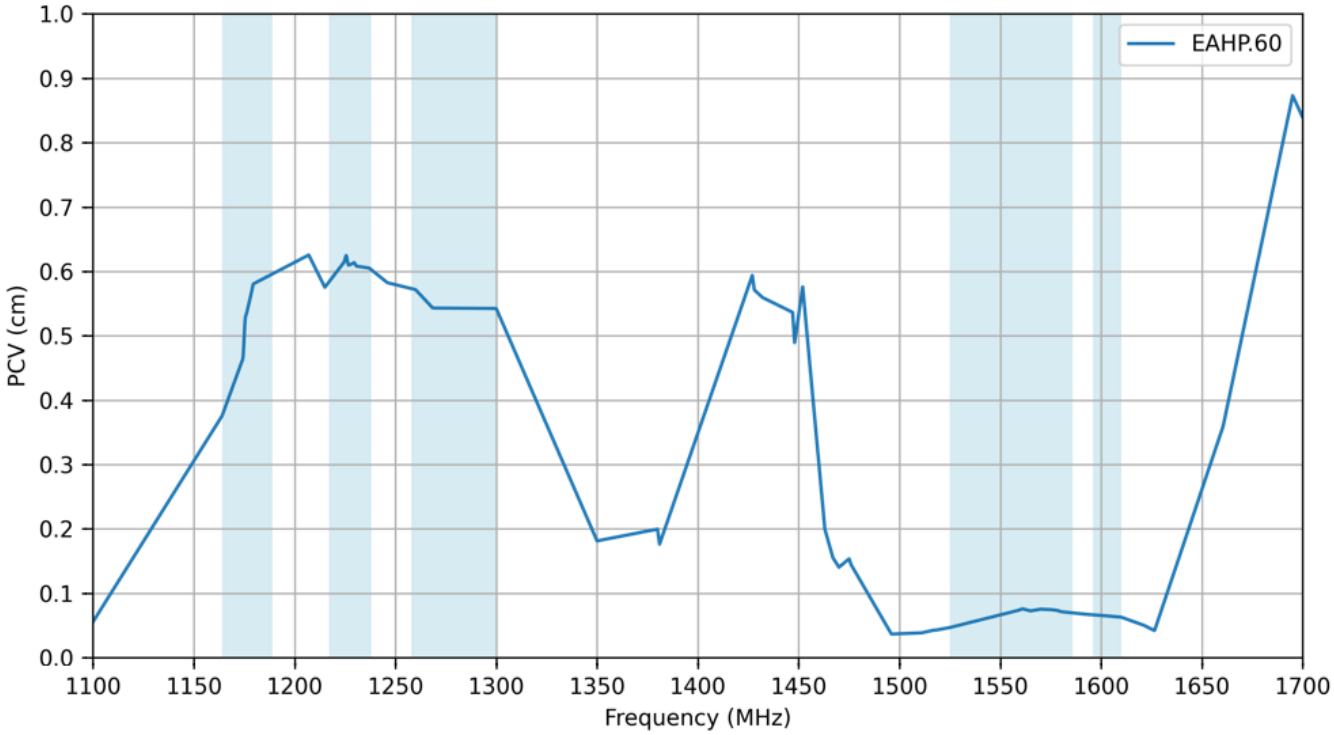
5.10 AR vs Angle for Theta=90



5.11 PCO

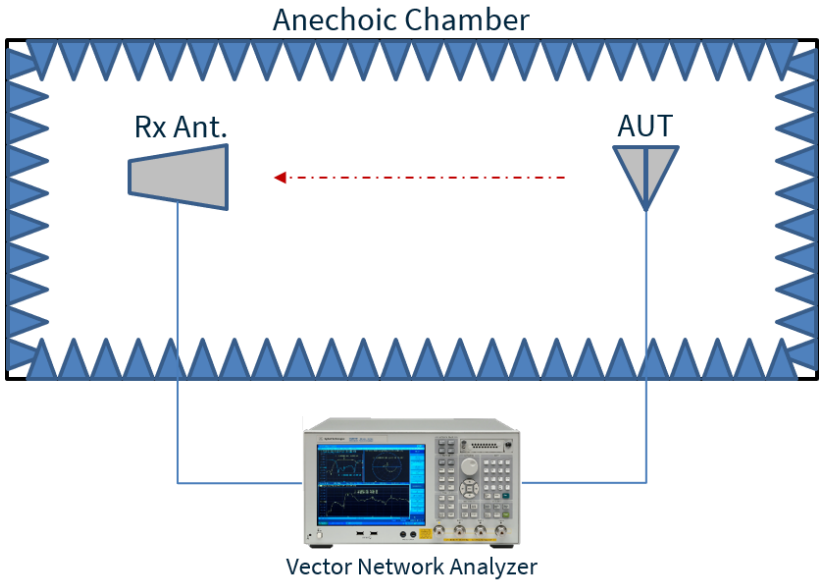


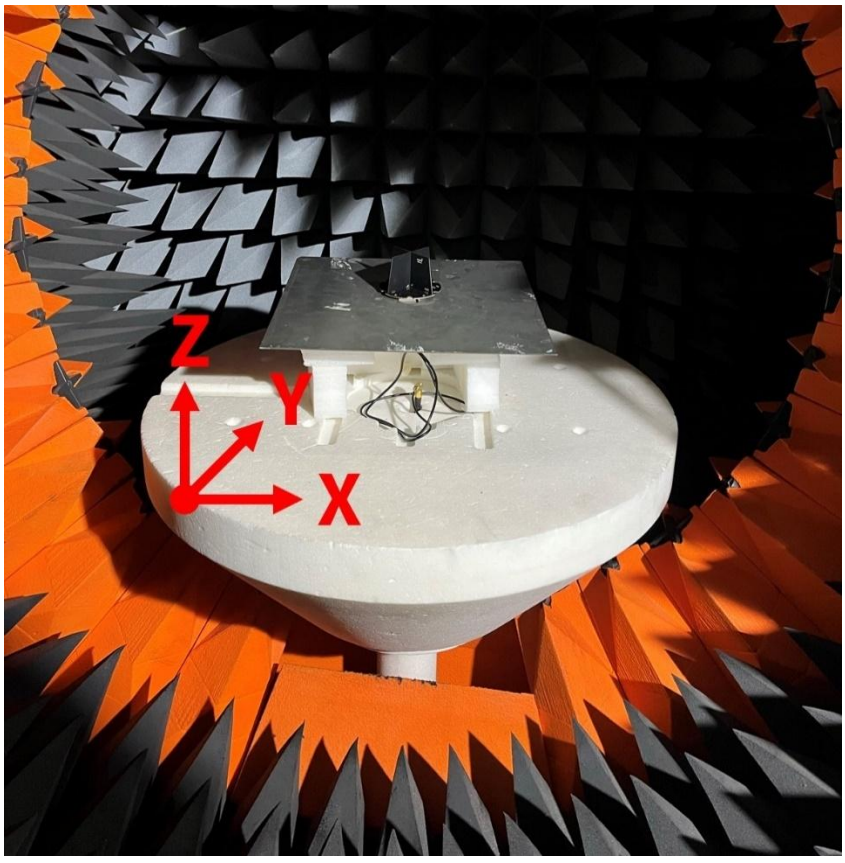
5.12 PCV


EAHP.60
PCV (cm)
Frequency (MHz)
1.0
0.9
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
1100
1150
1200
1250
1300
1350
1400
1450
1500
1550
1600
1650
1700

6. Radiation Patterns

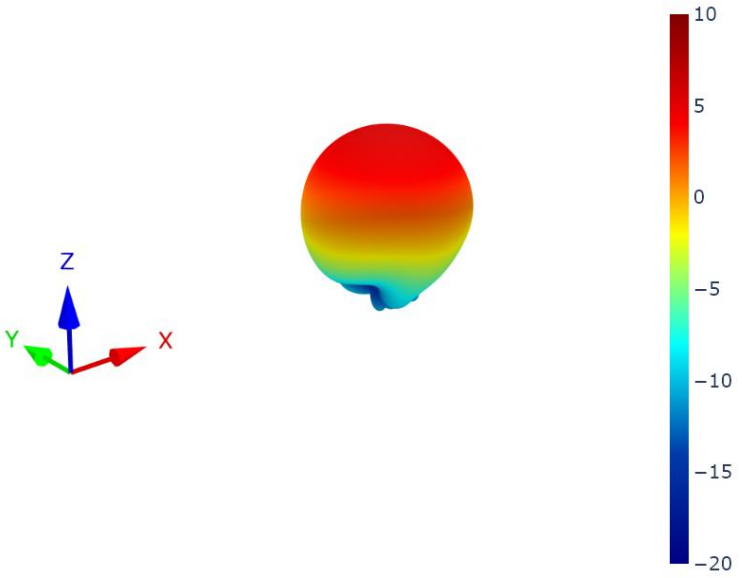
6.1 Test Setup



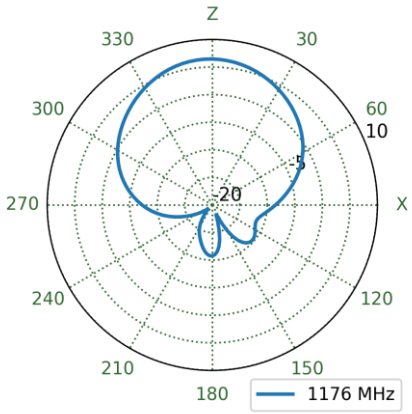


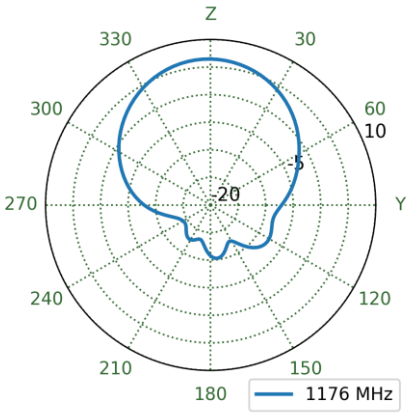
Chamber Test Set-up on a 30x30cm Ground Plane

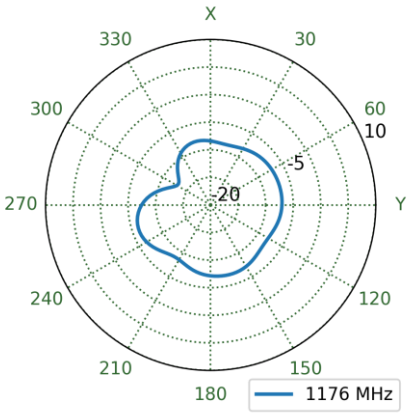
6.2 Patterns at 1176 MHz



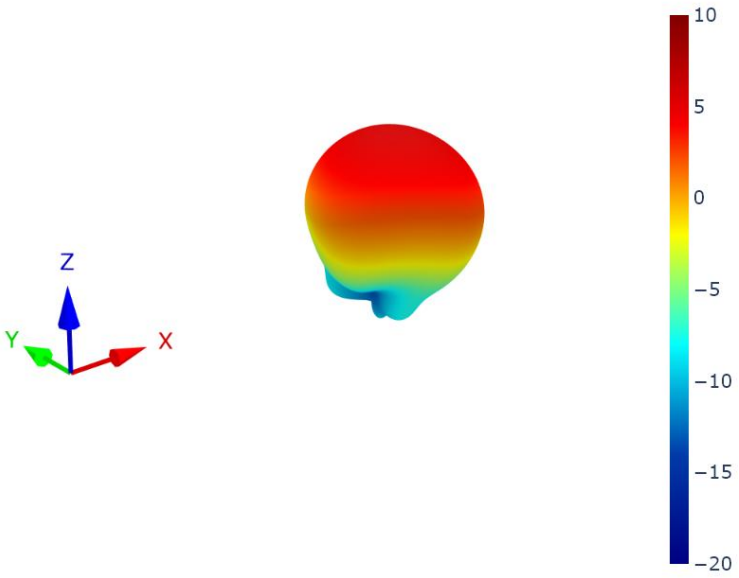
XZ Plane	YZ Plane	XY Plane

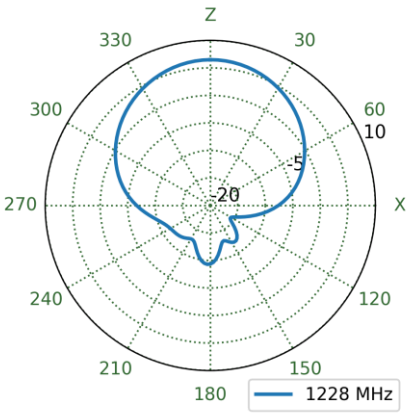
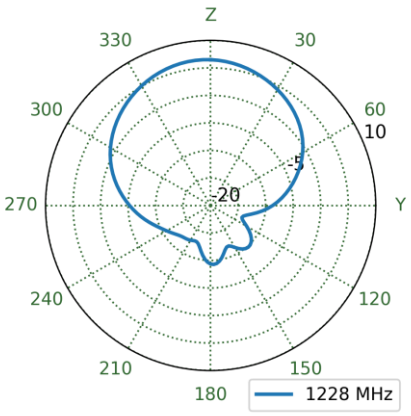
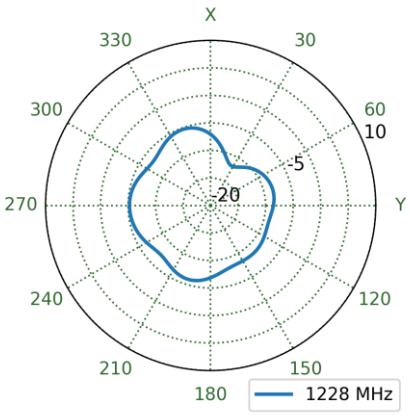




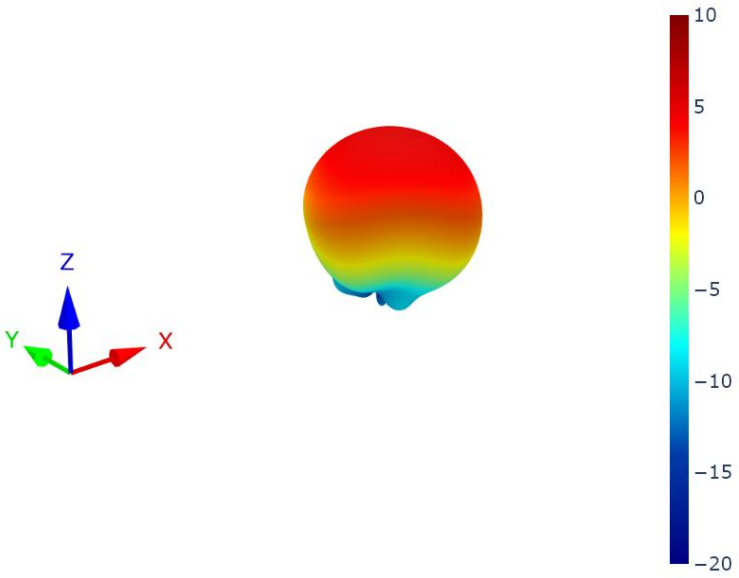


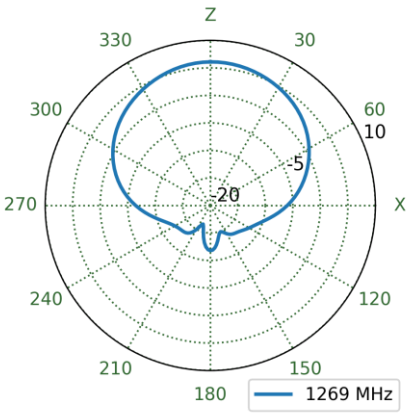
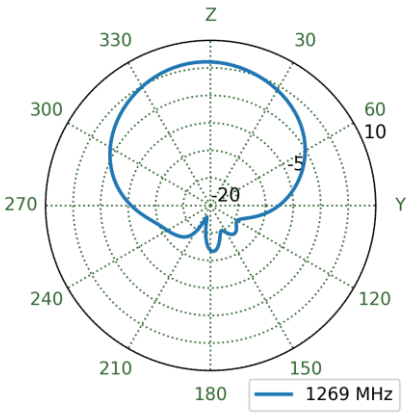
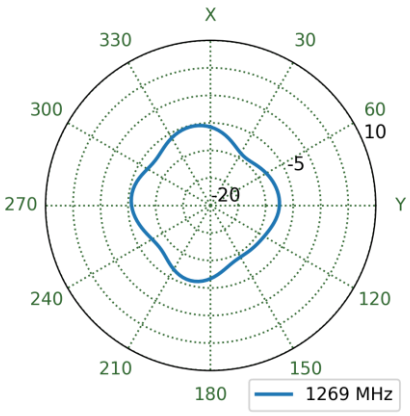
6.3 Patterns at 1228 MHz



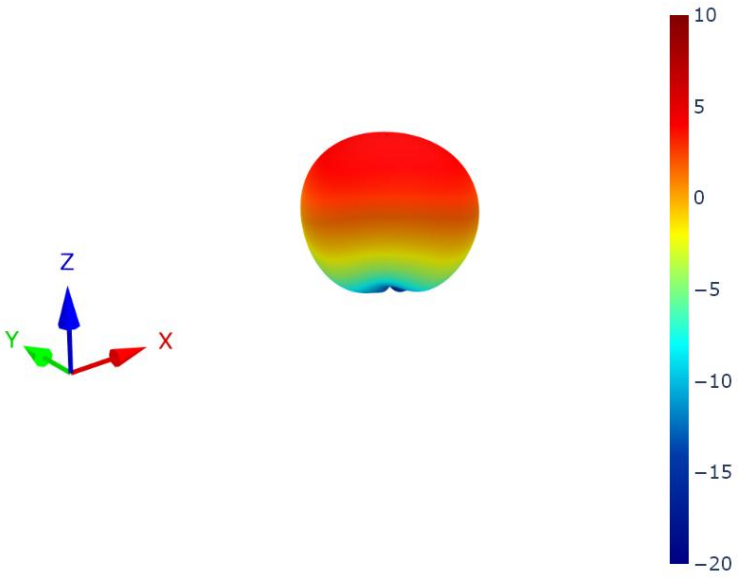
XZ Plane	YZ Plane	XY Plane
		

6.4 Patterns at 1278 MHz

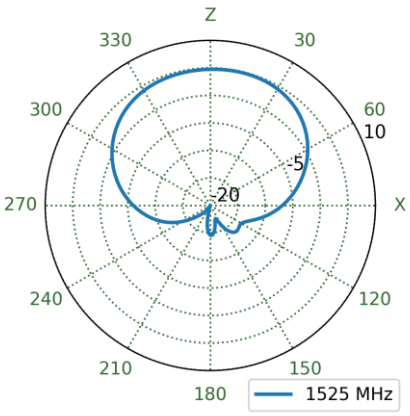


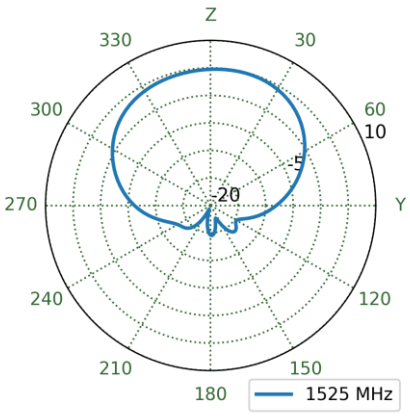
XZ Plane	YZ Plane	XY Plane
		

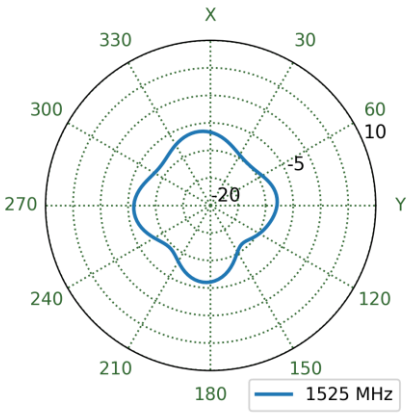
6.5 Patterns at 1542 MHz



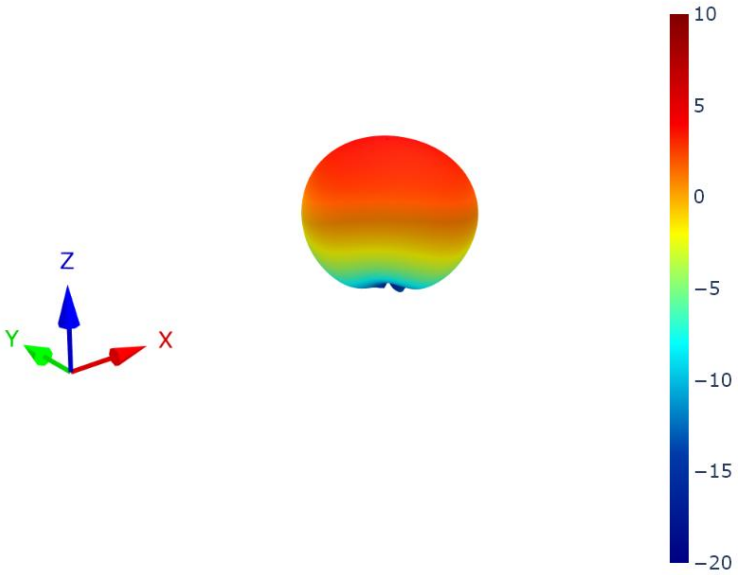
XZ Plane	YZ Plane	XY Plane



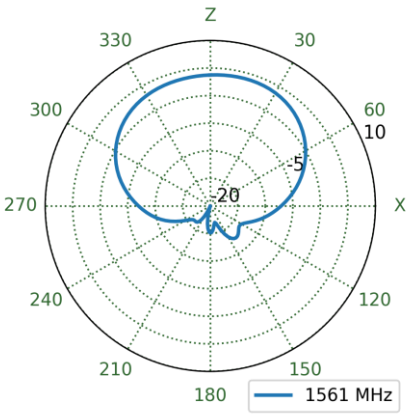


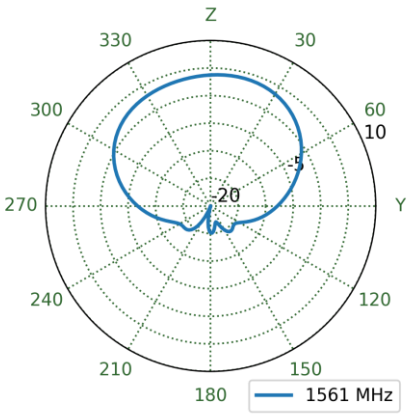


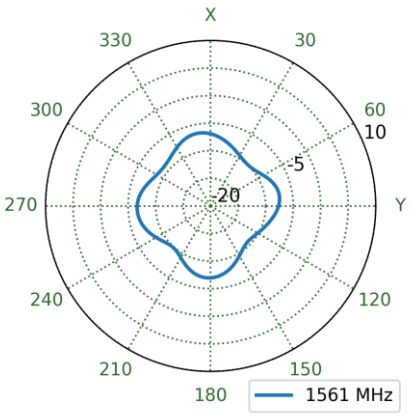
6.6 Patterns at 1561 MHz



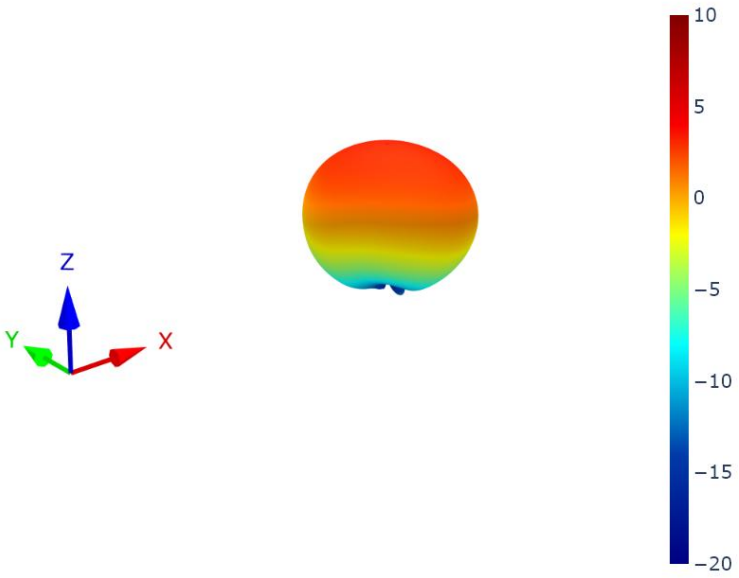
XZ Plane	YZ Plane	XY Plane



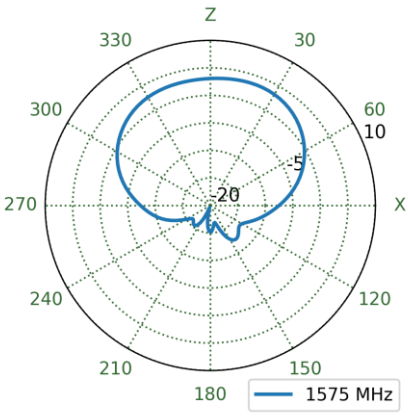


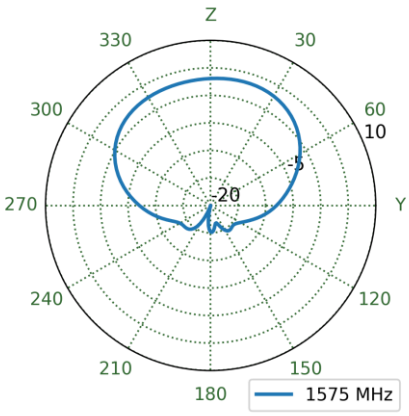


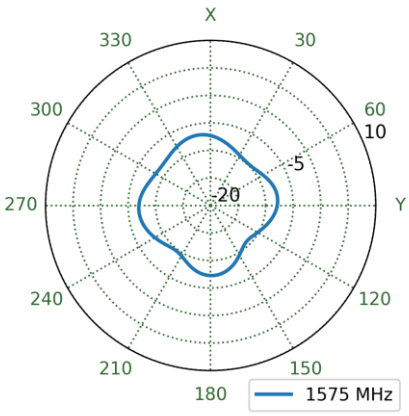
6.7 Patterns at 1576 MHz



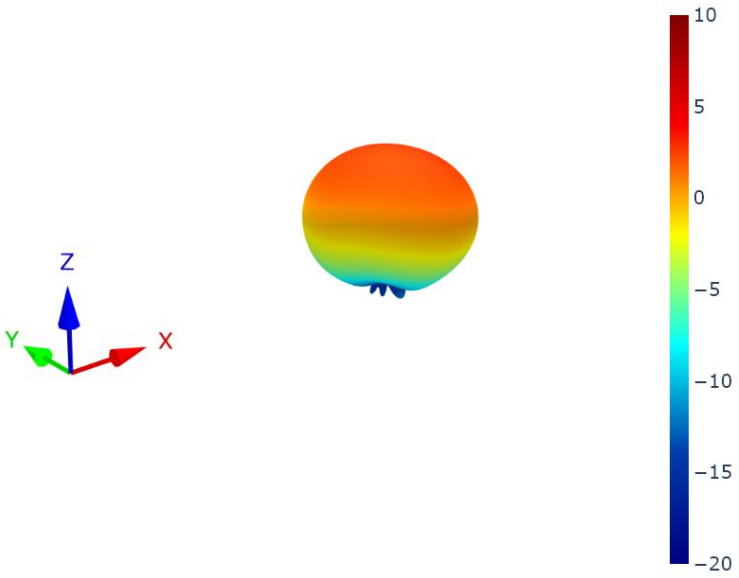
XZ Plane	YZ Plane	XY Plane

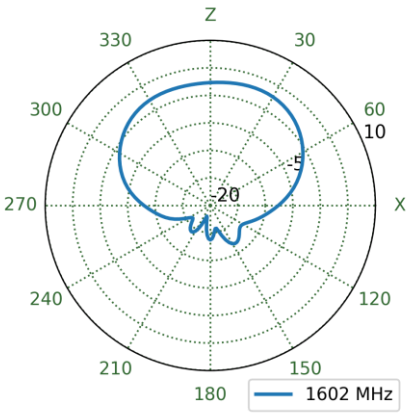
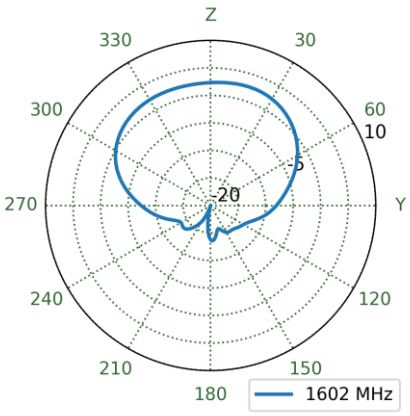
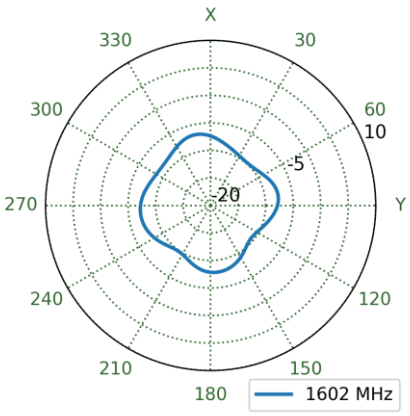






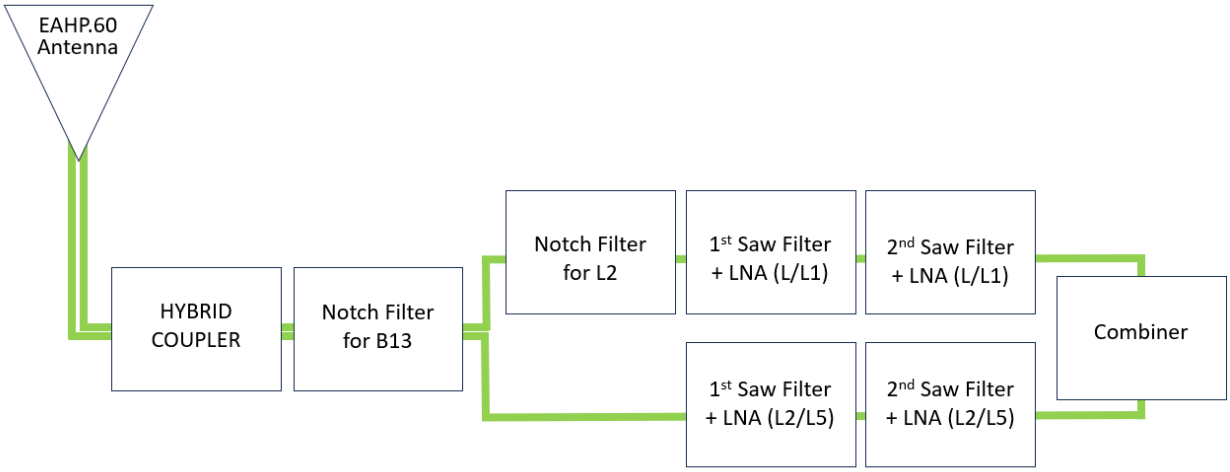
6.8 Patterns at 1602 MHz



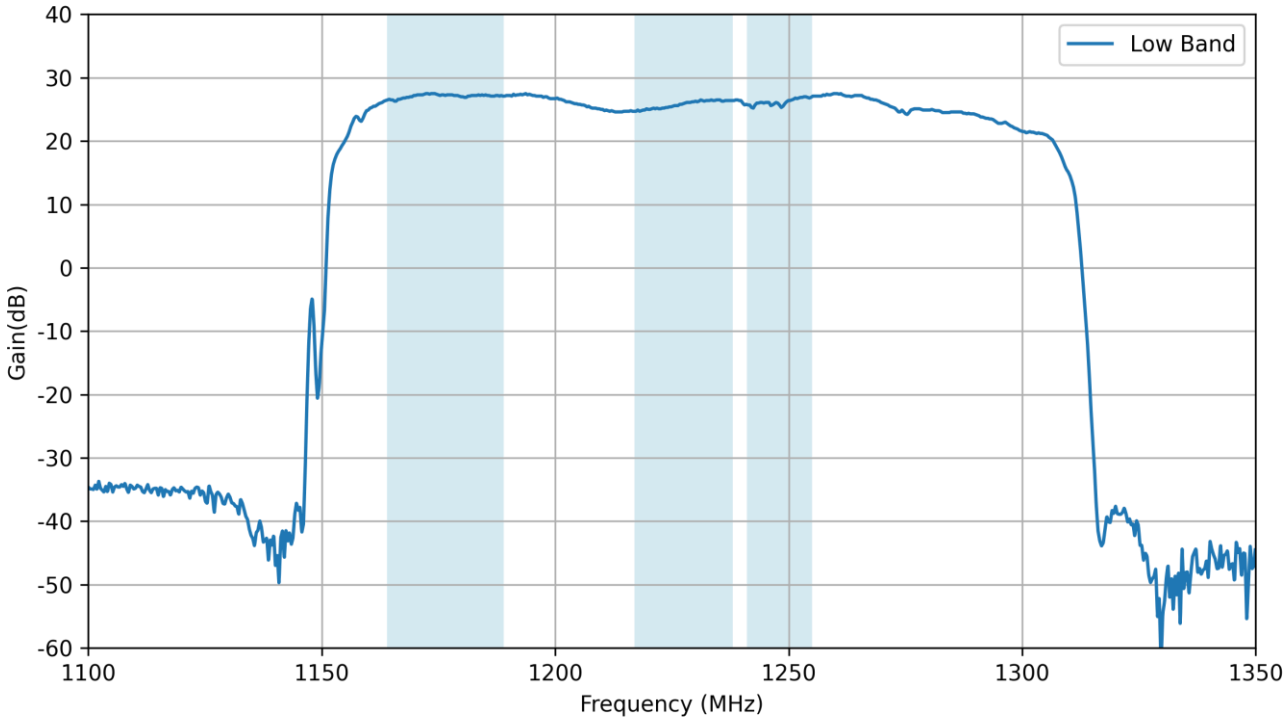
XZ Plane	YZ Plane	XY Plane
		

7. LNA Characteristics

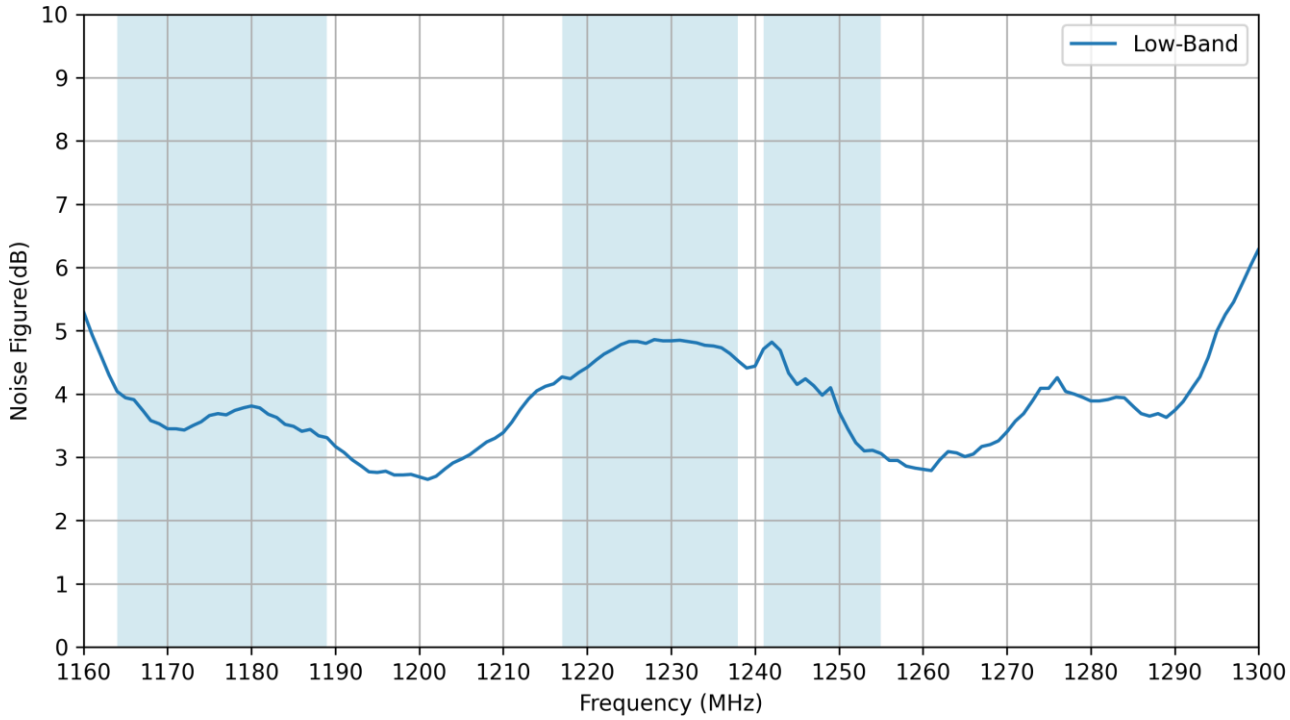
7.1 Block Diagram



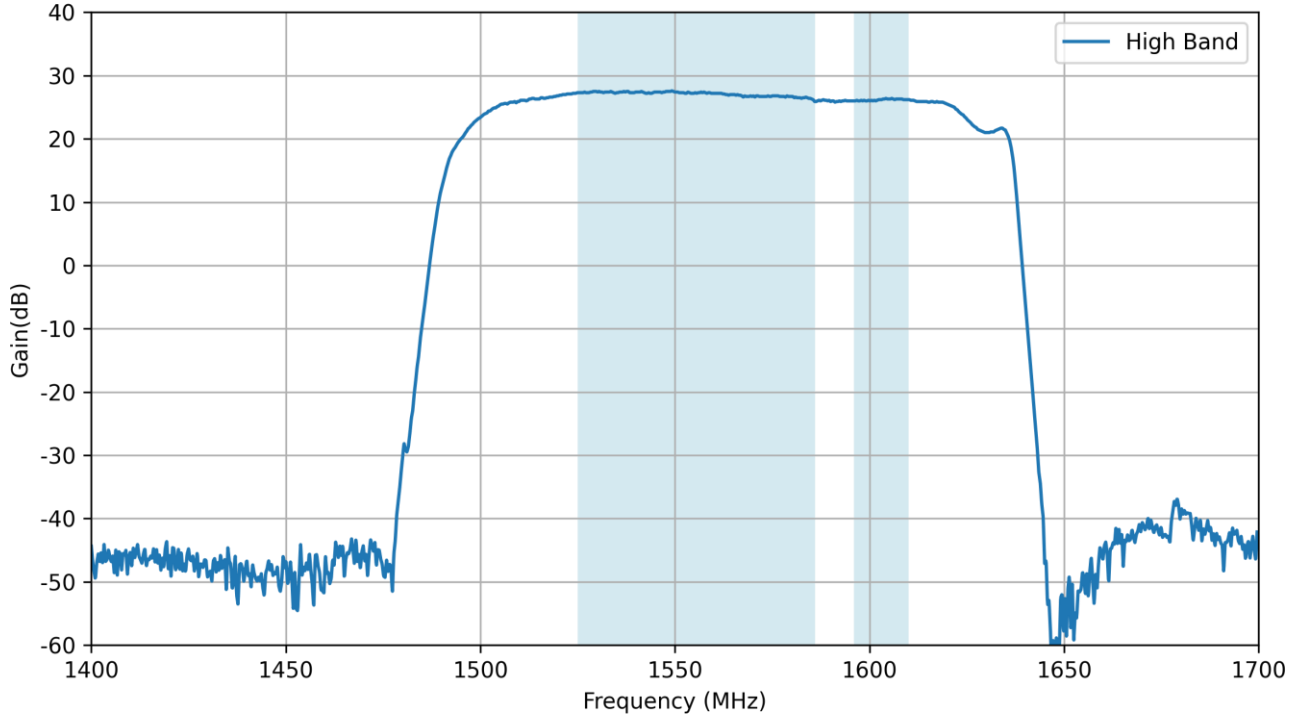
7.2 Low-Band - Gain



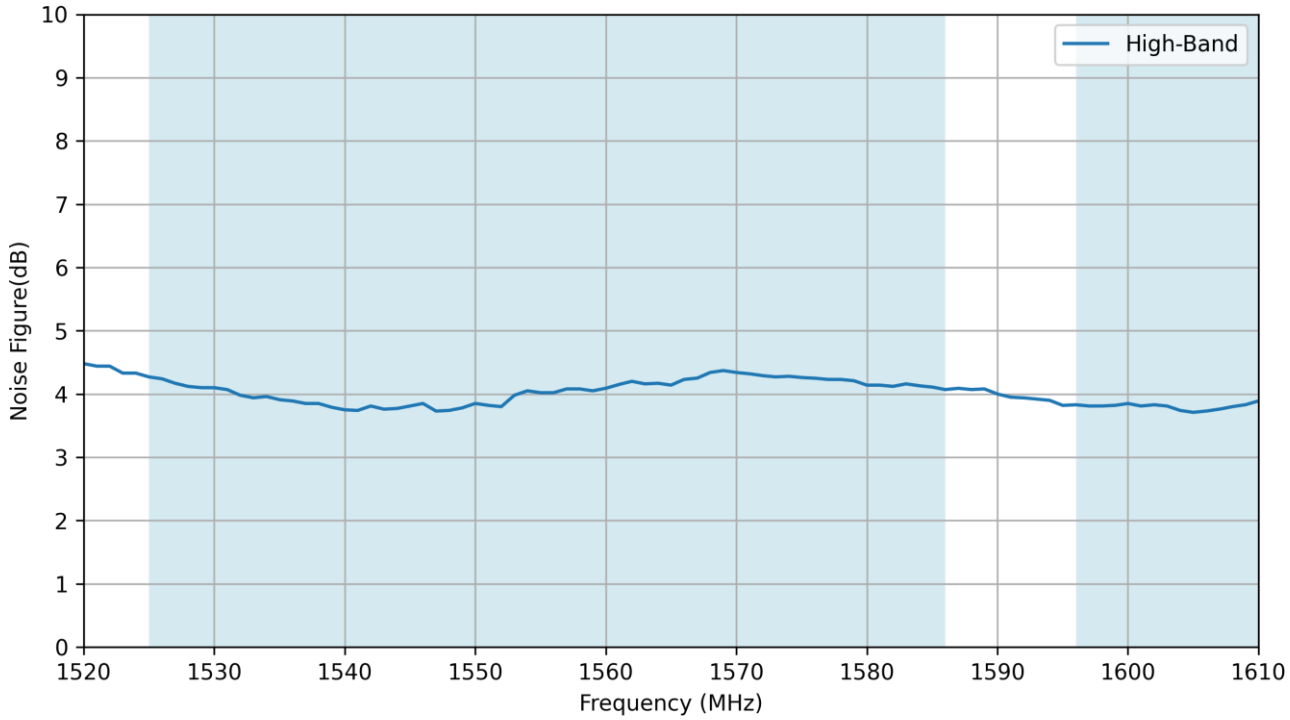
7.3 Low-Band – Noise Figure



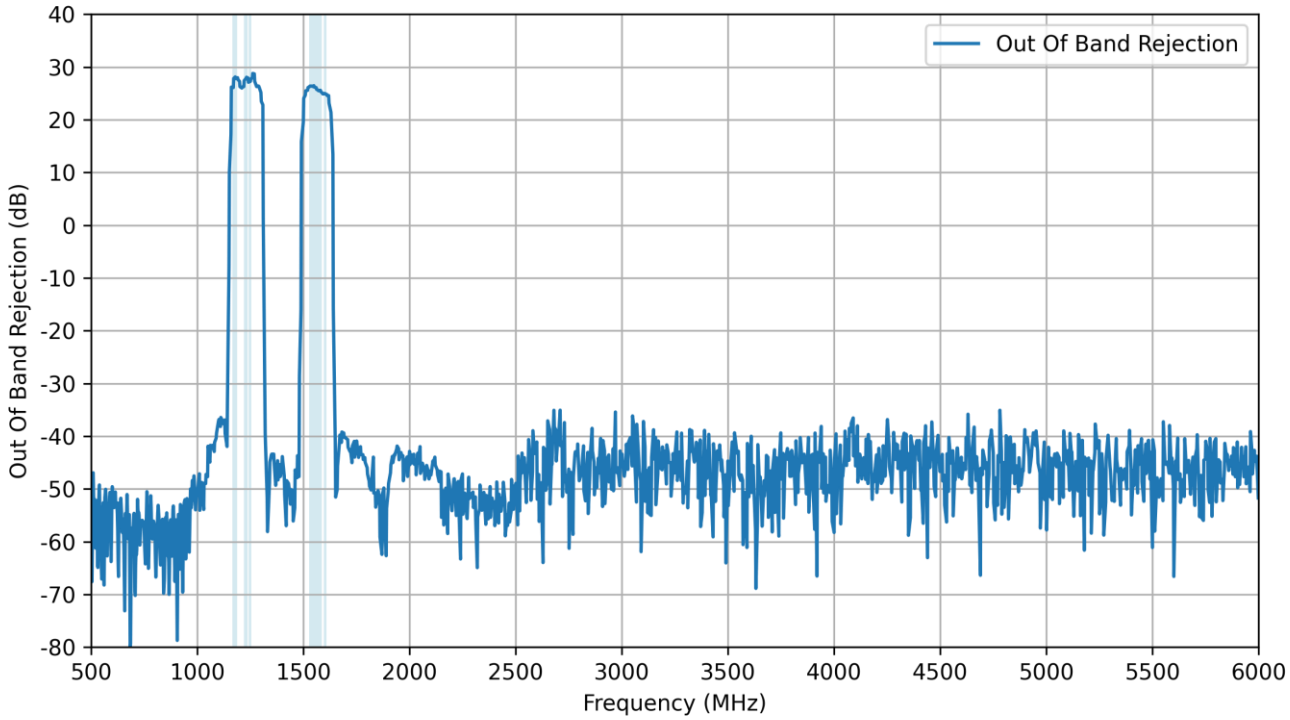
7.4 High-Band Gain



7.5 High-Band Nosie Figure



7.6 Out Of Band Rejection



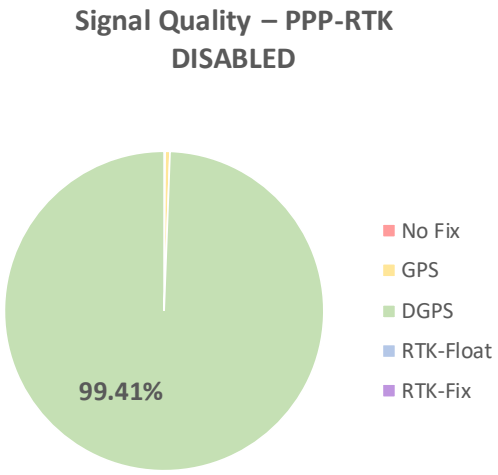
8. Field Test Results

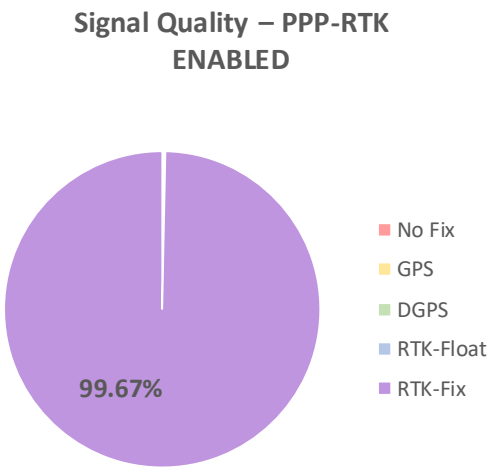
8.1 U-blox - ZED-X20P

Receiver features:

- Multi-band GNSS: 672 channels
- GPS L1C/A, L2C, L5
- GALILEO E1B/C, E5a, E6
- BEIDOU B1I, B1C, B2a, B3I
- QZSS L1C/A, L1C/B, L2C, L5, L6
- NavIC L1, L5
- SBAS L1C/A RTK (base and rover), Integrated dual-channel L-band receiver, Support for PPP
- Nav. update rate up to 25 Hz
- Position accuracy = RTK 0.01 m + 1 ppm CEP

Positioning Accuracy Table (2D Accuracy)					
Test Condition	**Correction Service**	**CEP (50%)**	**DRMS (68%)**	**2DRMS (95-98.2%)**	**TTFF (sec)**
30x30 cm Ground Plane	PPP-RTK DISABLED	16.26	36.98	73.96	20
	PPP-RTK ENABLED	1.35	2.61	5.22	19





Changelog for the datasheet

SPE-24-8-246 – EAHP.60.01.0100D

Revision: B (Current Release)	
Date:	2025-07-28
Notes:	Added U-Blox ZED-X20P Field Testing Results.
Author:	Gary West

Previous Revisions

Revision: A (Initial Release)	
Date:	2024-10-03
Notes:	Initial Datasheet Release
Author:	Gary West

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