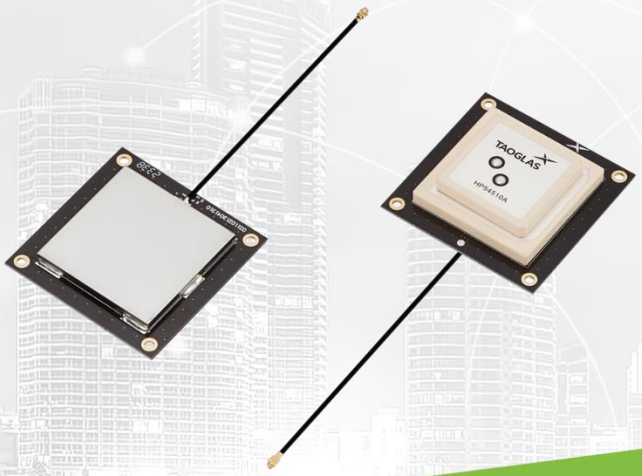
TAOGLAS®



Datasheet

Levity Series

Part No:
AHP54510.07.0100C

Description

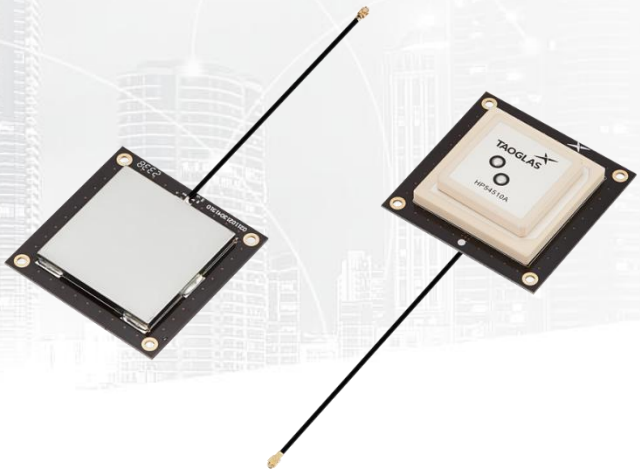
Active L1/L5/L-Band Multiband GNSS Hight Precision Antenna

45x45x10mm Dual Feed Stacked Patch

Features:

L1, L5, L-Band GNSS Bands Covered
Ceramic Patch Element
Cable: 100mm ø1.37
Connector: IPEX MHFI (U.FL)
Overall dimension: 60x60x15mm
RoHS & Reach Compliant

1. Introduction



The Taoglas Levity Series AHP54510, is a multi-band GNSS, high-performance directional antenna for high precision GPS and BeiDou accuracy and fast positioning. It utilizes a 45x45x10mm advanced wide-band dual stacked ceramic patch antenna with optimized gain for GPS L1/L5, Galileo, GLONASS, BeiDou, and L-Band bands.

Typical Applications Include:

- Wearables
- Transportation
- Precision Agriculture
- Navigation
- Robotics
- Autonomous Vehicles

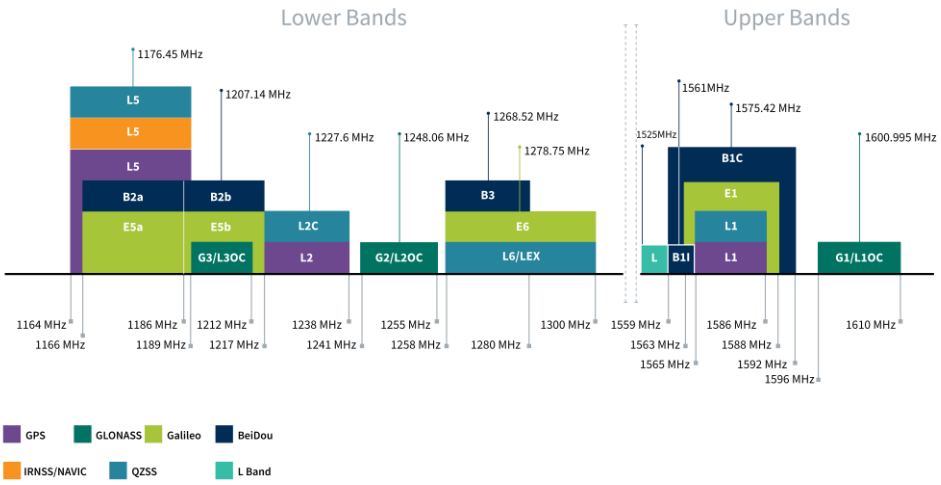
The AHP54510 has been tuned and tested on a 60x60mm ground plane and exhibits excellent radiation patterns. The AHP54510 has been optimized to cover the bands required for the next generation of L1/L5 GNSS receivers that are currently on the market. It is supplied with 4 corner screw holes for easy installation in customer devices.

The AHP54510 has been designed to be a premium solution for high precision GNSS systems, by including the L-Band for High Precision GNSS correction services. The L-Band correction service is utilized in High Precision GNSS systems to decode the satellite transmission and outputs a correction stream, enabling a high precision system to reach genuine centimeter level accuracy.

The cable and connector are fully customizable, 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 in 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)	GPS L5	L Band	BeiDou_B1	GPS_L1C	GLONASS_L1
	1166-1186	1525-1559	1559-1563	1563-1587	1593-1610
Efficiency (%)	82.7	71.5	83.5	83.5	61.1
Average Gain (dB)	-2.33		-1.64	-2.17	-2.04
Peak Gain (dBi)	4.82	4.94	5.06	5.08	4.15
Polarization	RHCP				
Impedance	50 Ω				
Radiation Pattern	Directional				

*Tested on a 70x70mm Ground plane

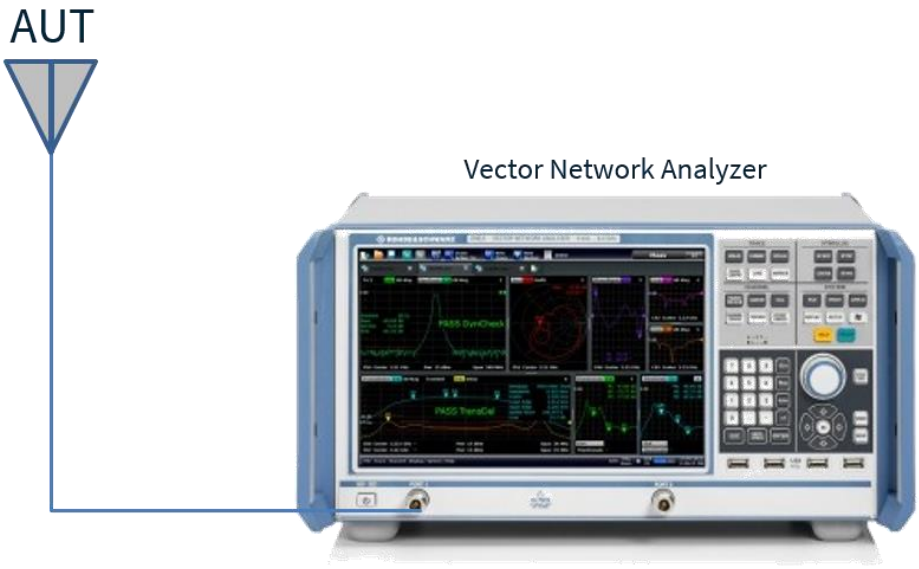
LNA and Filter Electrical Properties					
Frequency (MHz)	GPS L5	L Band	BeiDou_B1	GPS_L1C	GLONASS_L1
	1166-1186	1525-1559	1559-1563	1563-1587	1593-1610
LNA Gain(dB)	26.6	27.4	27.3	27.2	25.7
Noise Figure(dB)	1.7	1.9	1.9	1.9	1.9
Input Voltage (V)	+ 1.8 to 5.5				
Current consumption (mA)	18 ± 3				
Outer Band Attenuation (dB)	> 70dB @ 700-960 MHz; > 60dB @ 1710-2170 MHz				

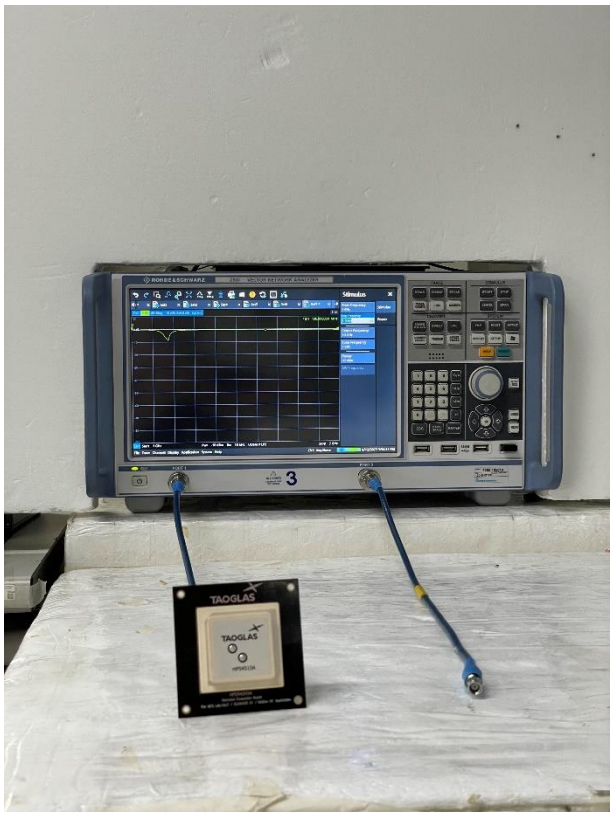
Mechanical	
Dimensions	45x45x10mm
Total Dimension (Including Shielding Case)	60x60x15mm
Connector	IPEX MHFI (U.FL)
Cable	1.37mm Coaxial Cable
Material	Ceramic
Weight	70g

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

3. Antenna Characteristics

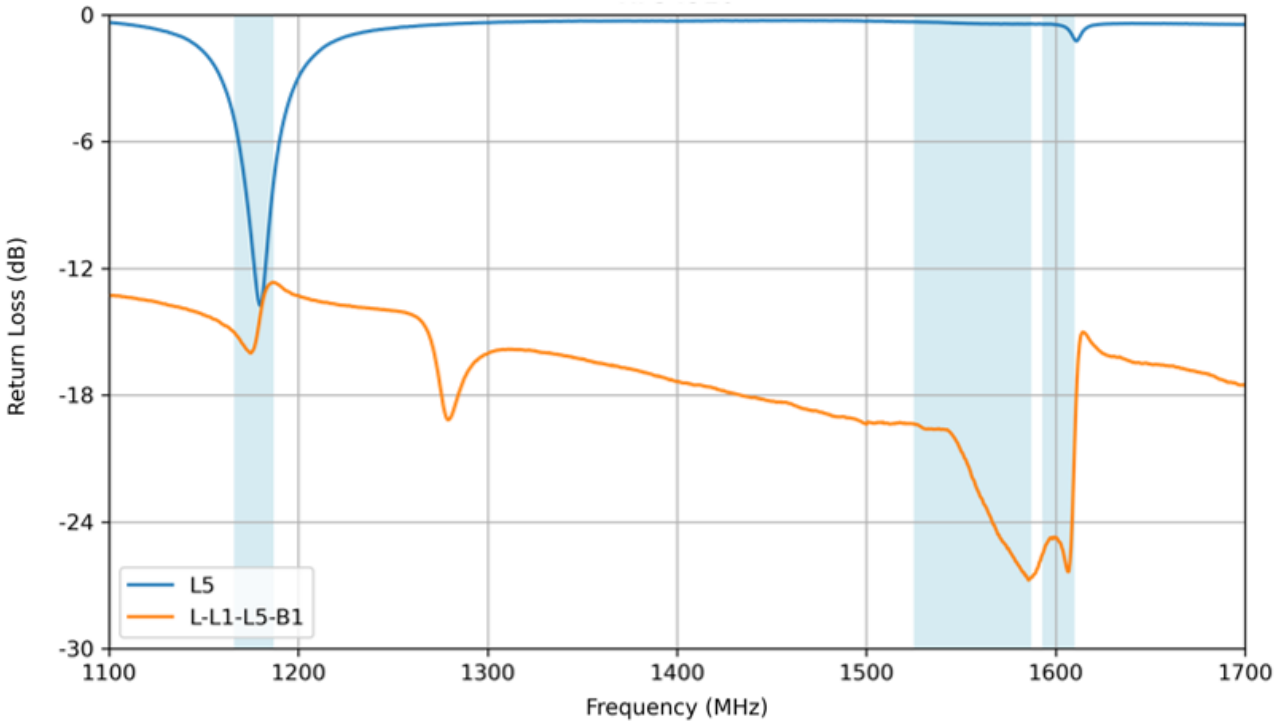
3.1 Test Setup



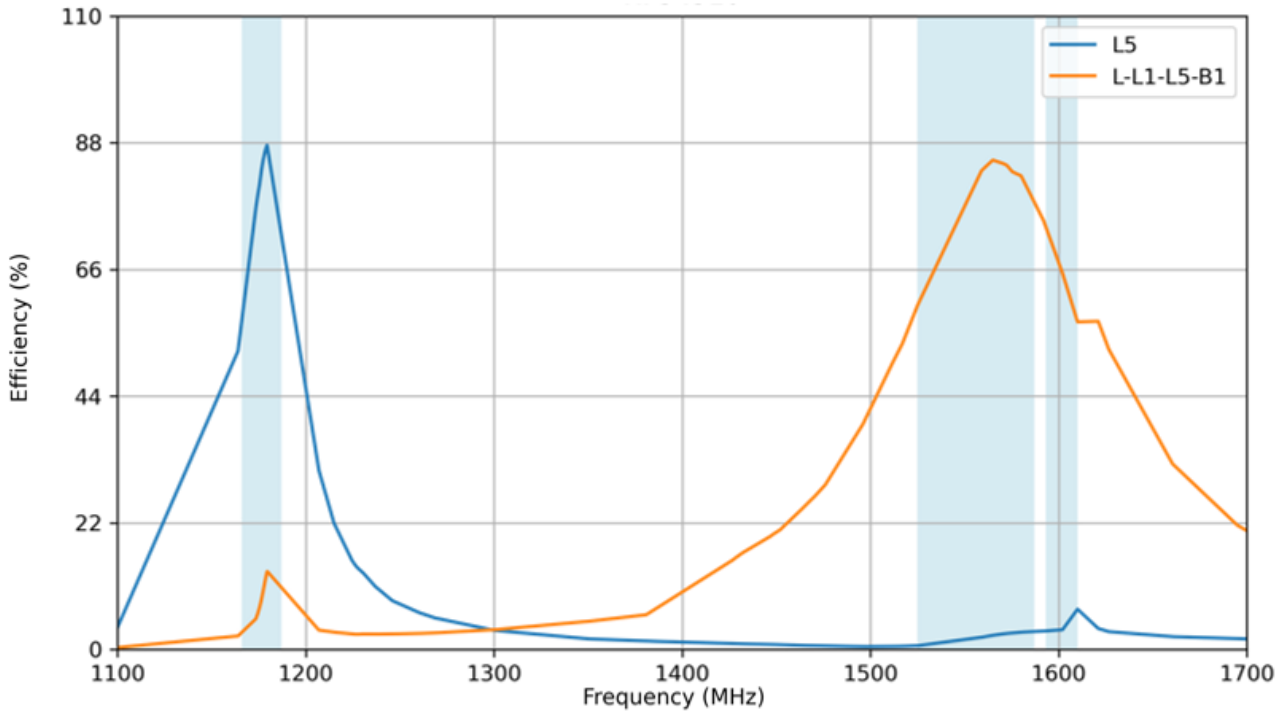


VNA Test Setup – Tested on 70x70mm ground plane

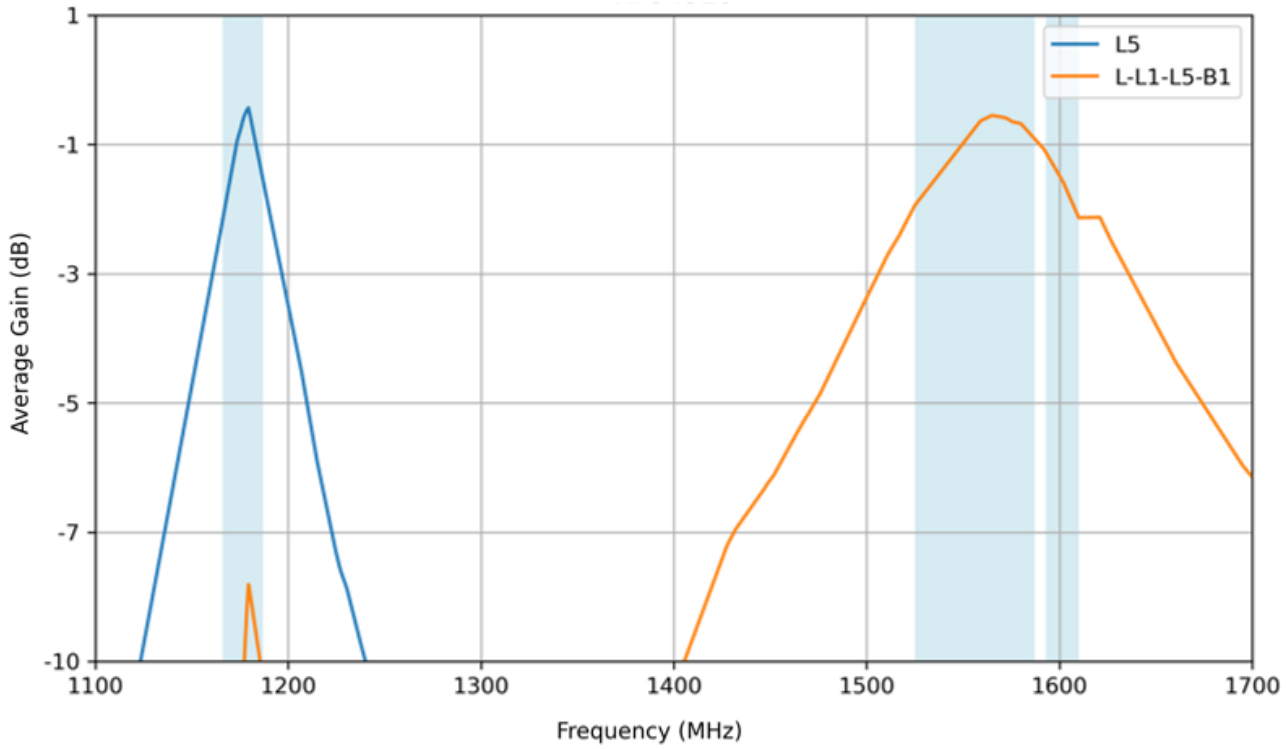
3.2 Return Loss



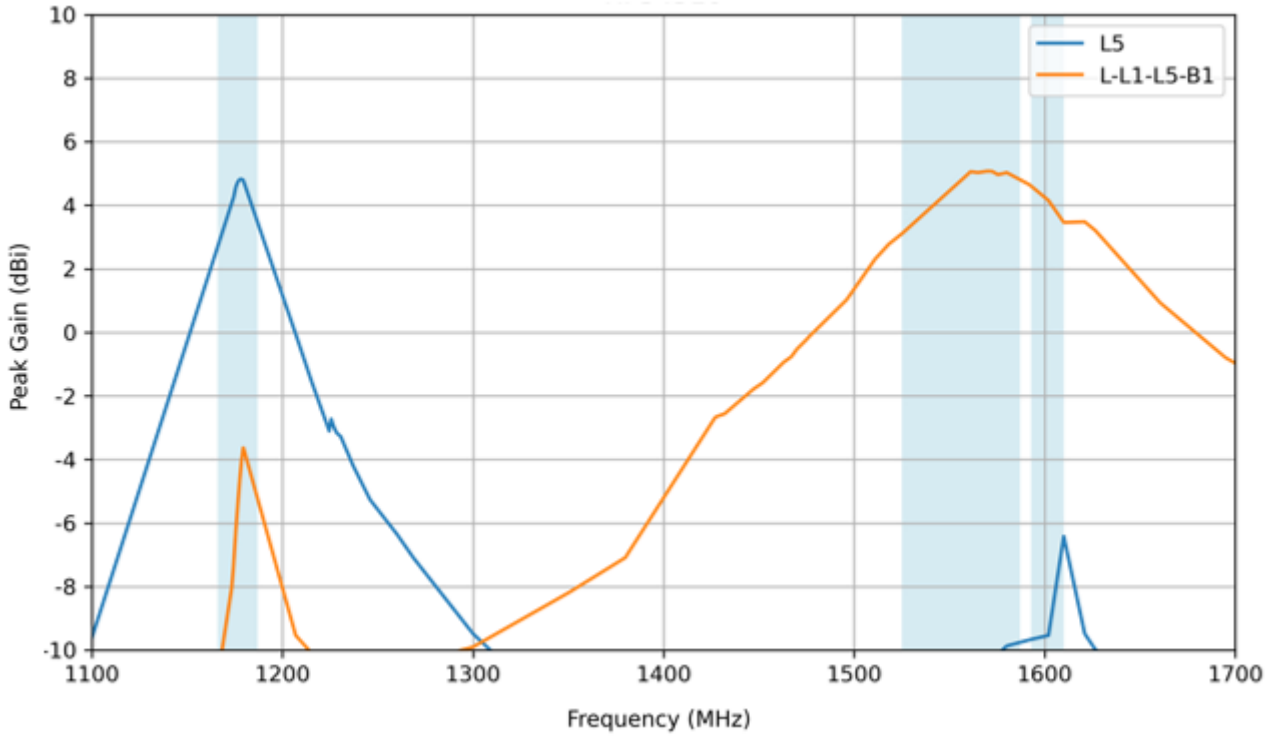
3.3 Efficiency



3.4 Average Gain

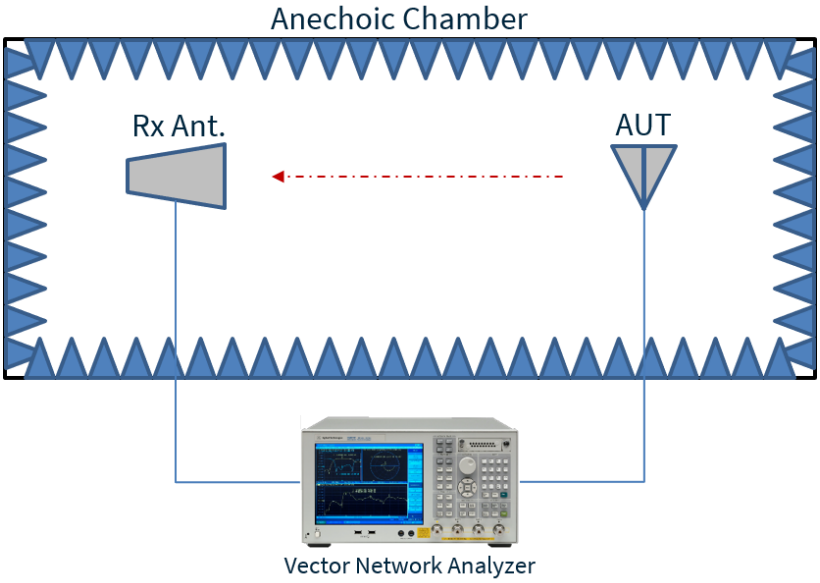


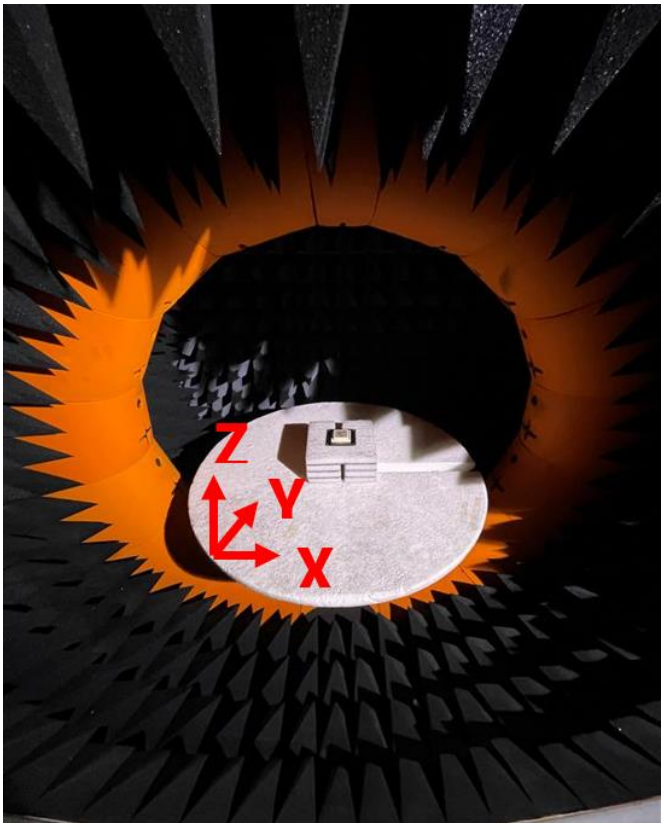
3.5 Peak Gain



4. Radiation Patterns

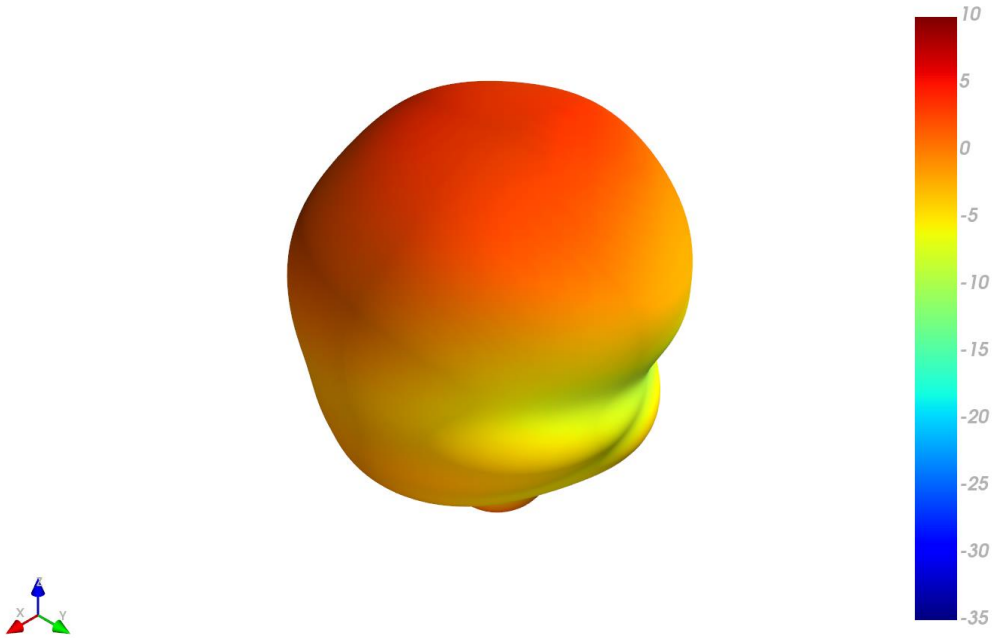
4.1 Test Setup

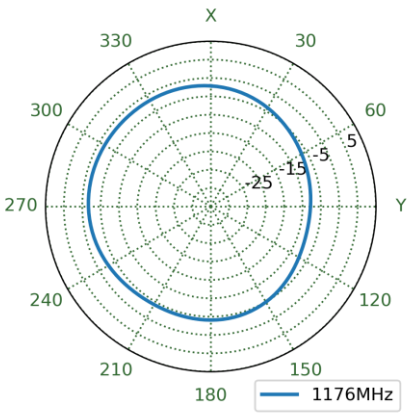
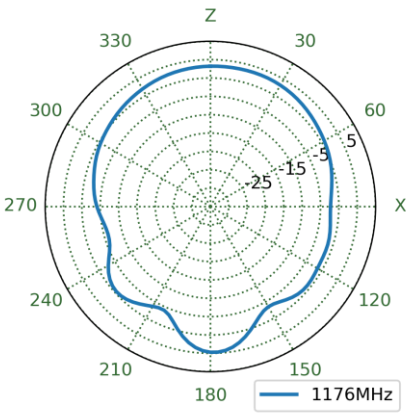
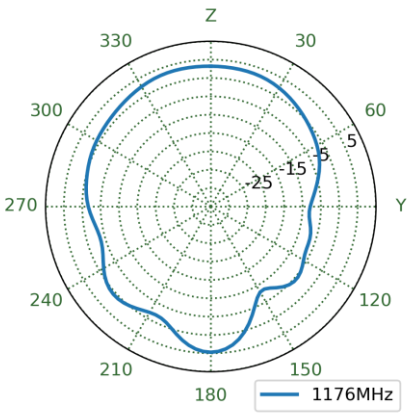




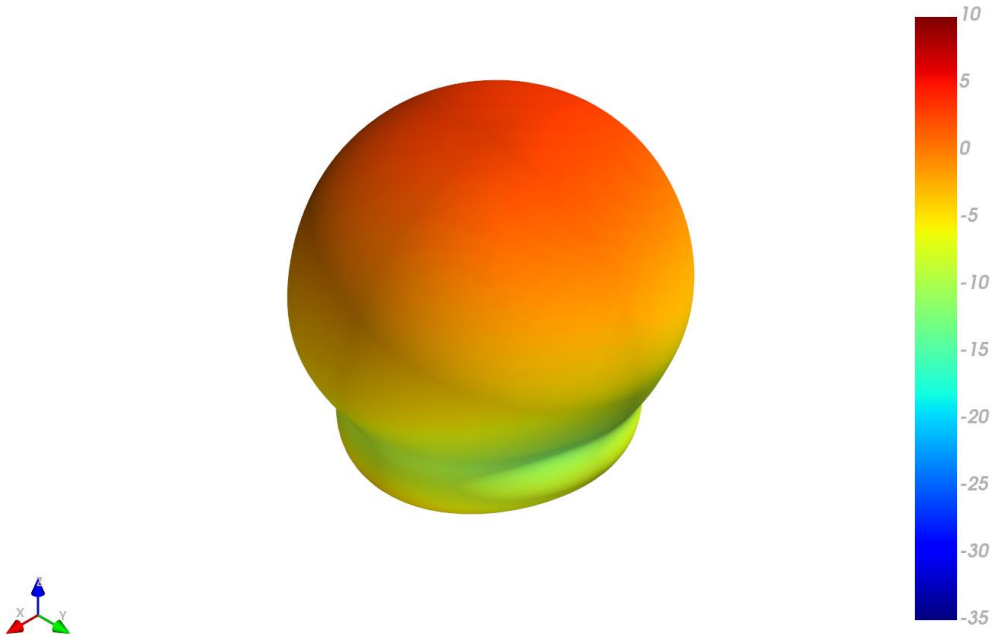
Chamber Test Setup – Tested on 70x70mm Evaluation Board.

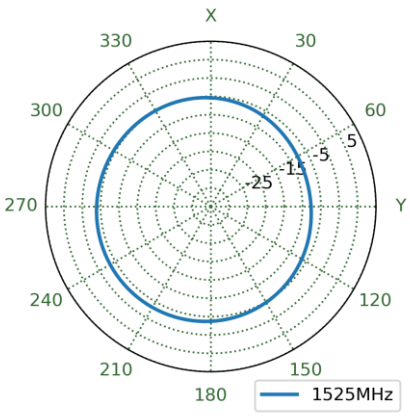
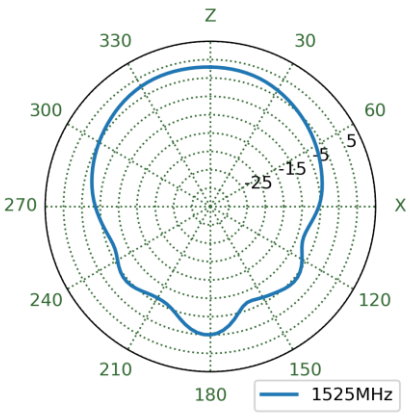
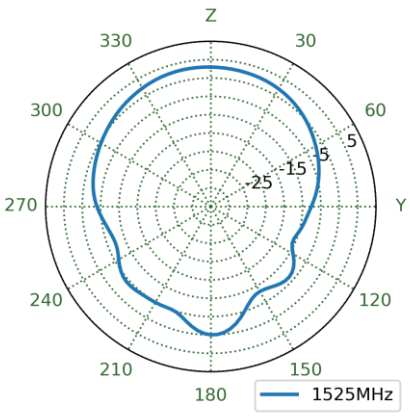
4.2 Patterns at 1176 MHz



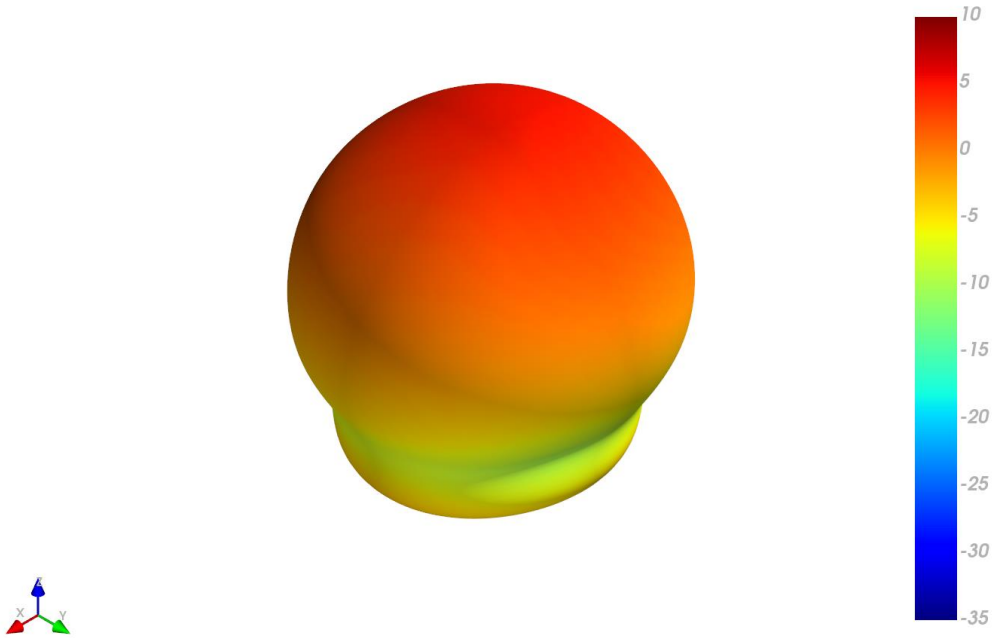
XY Plane	XZ Plane	YZ Plane
		

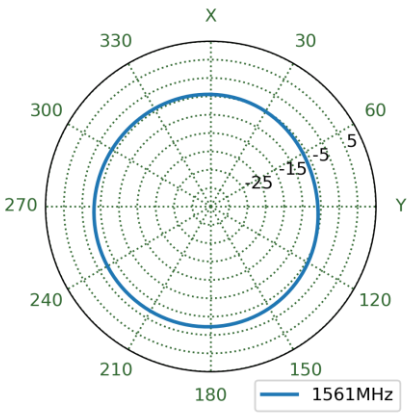
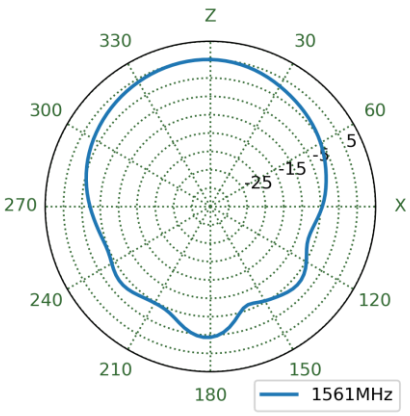
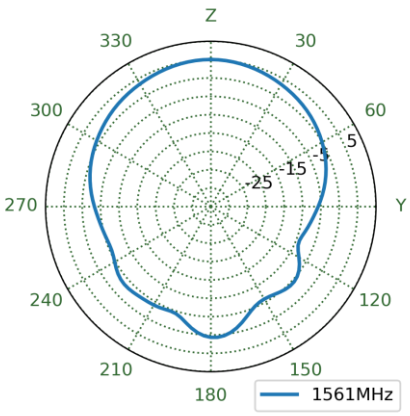
4.3 Patterns at 1525 MHz



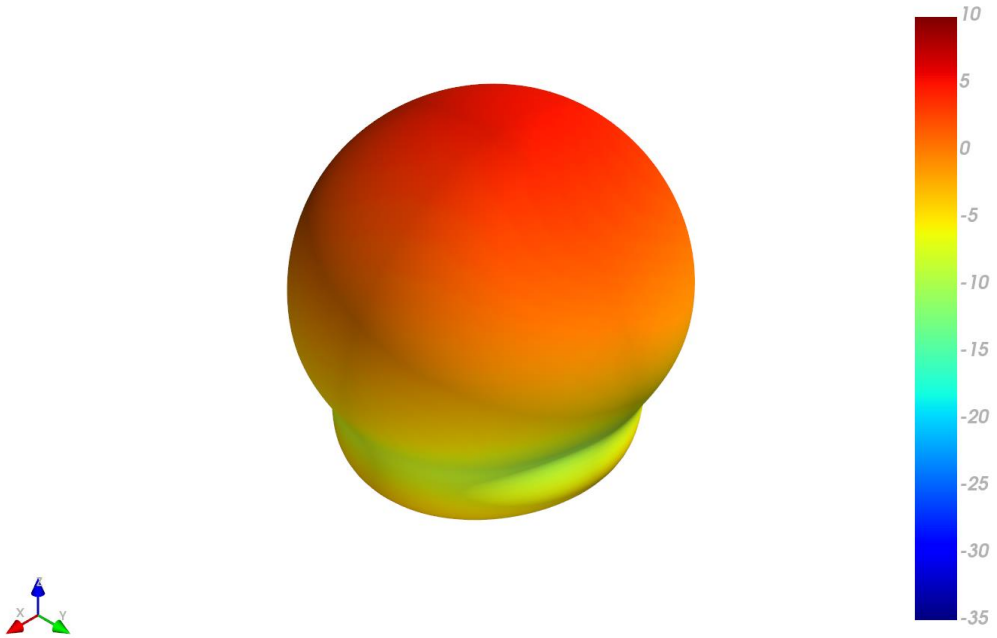
XY Plane	XZ Plane	YZ Plane
		

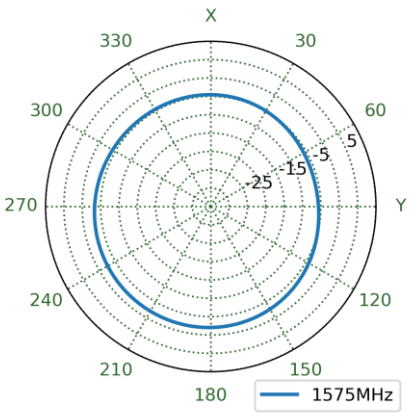
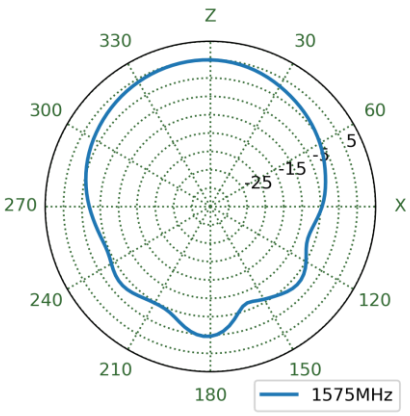
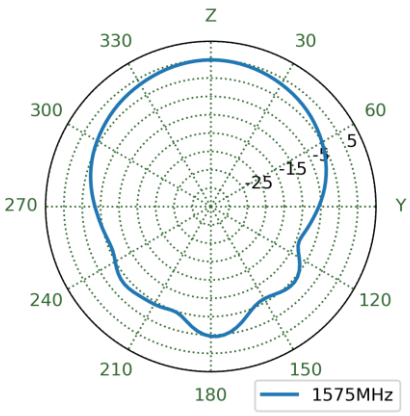
4.4 Patterns at 1561 MHz



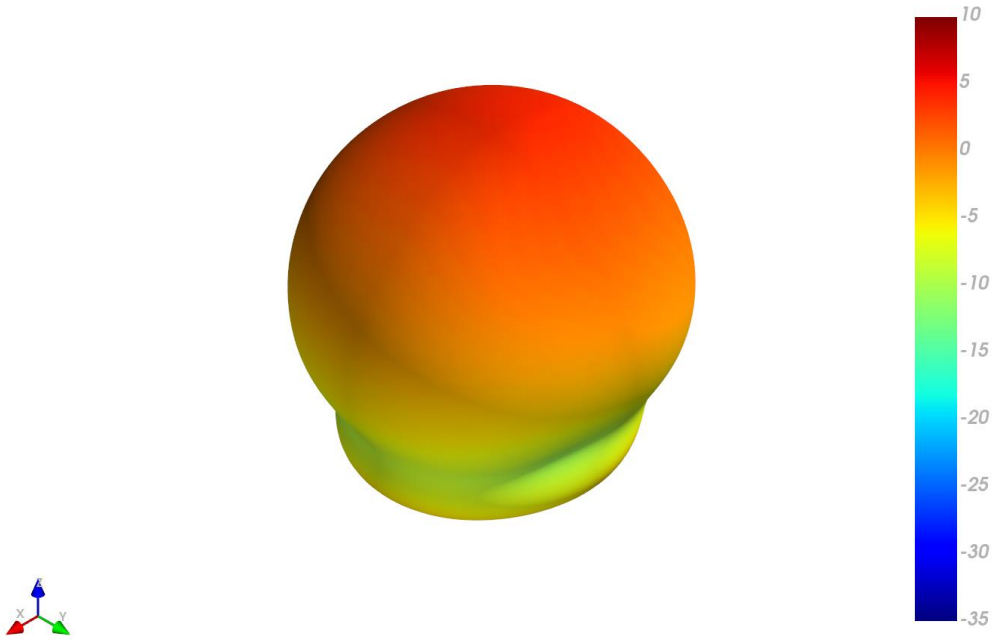
XY Plane	XZ Plane	YZ Plane
		

4.5 Patterns at 1575 MHz

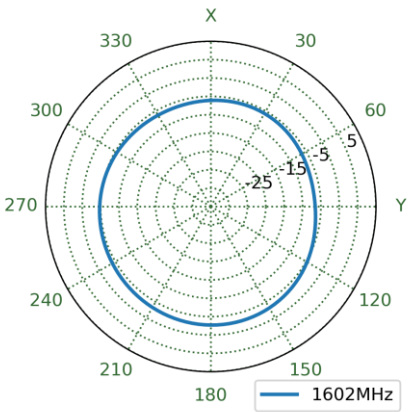


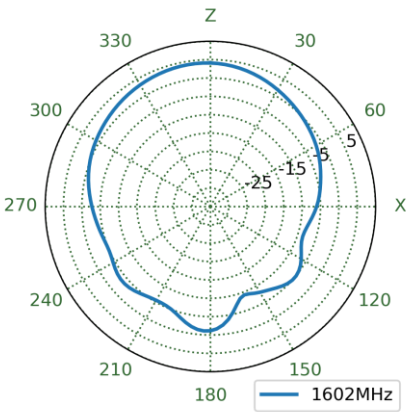
XY Plane	XZ Plane	YZ Plane
		

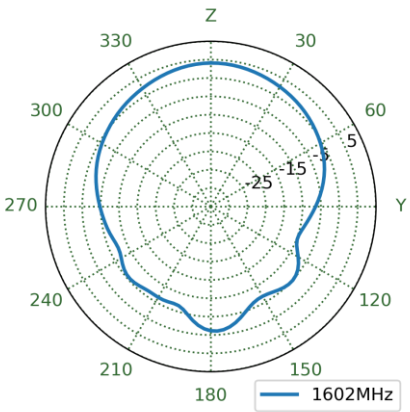
4.6 Patterns at 1602 MHz



XY Plane	XZ Plane	YZ Plane

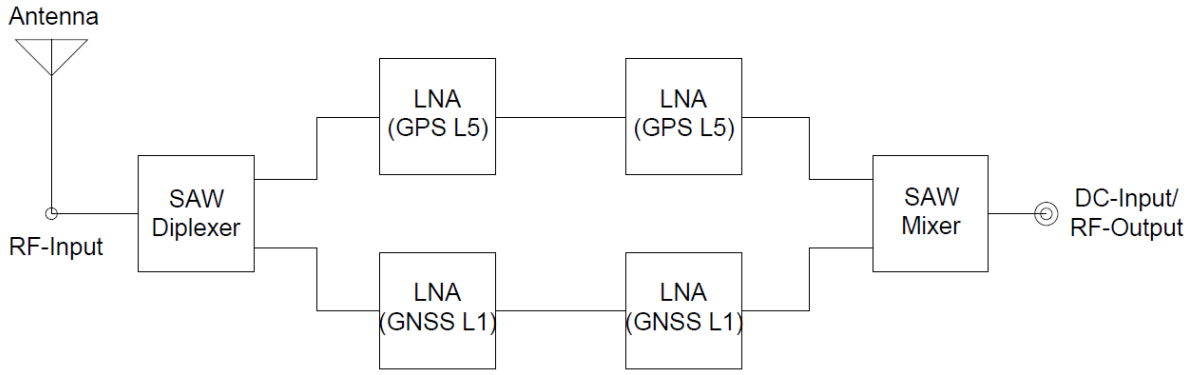




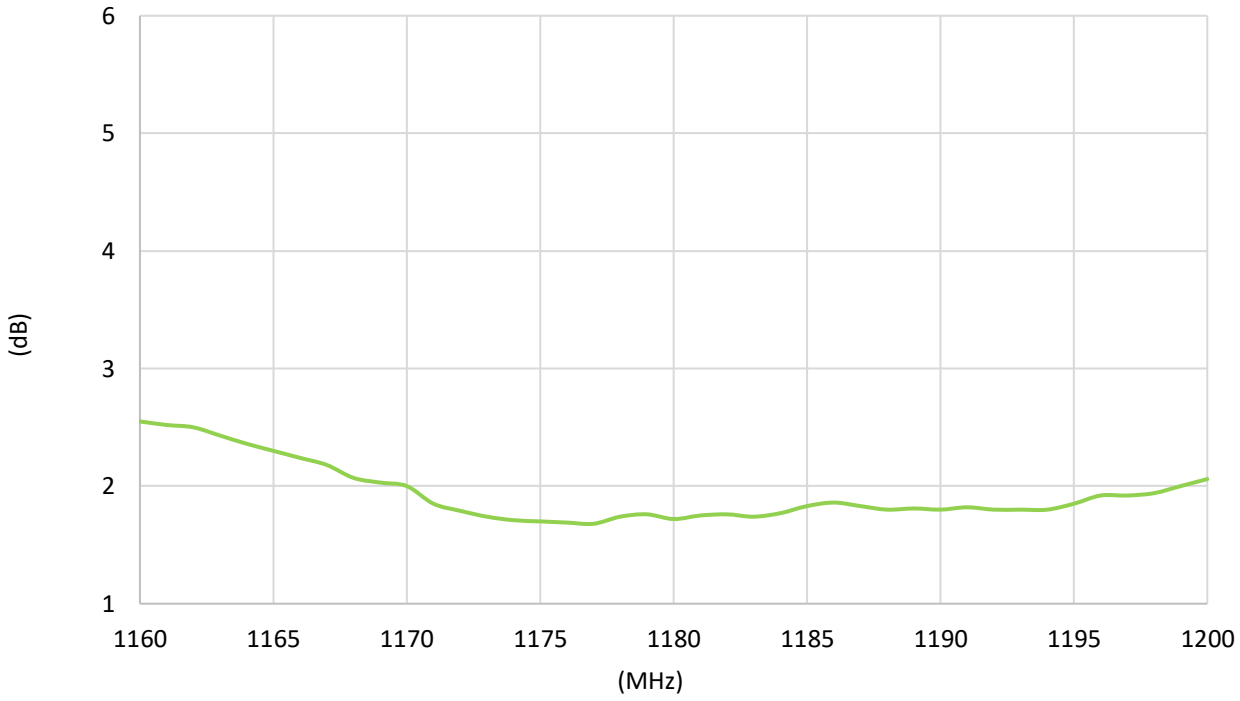


5. LNA Characteristics

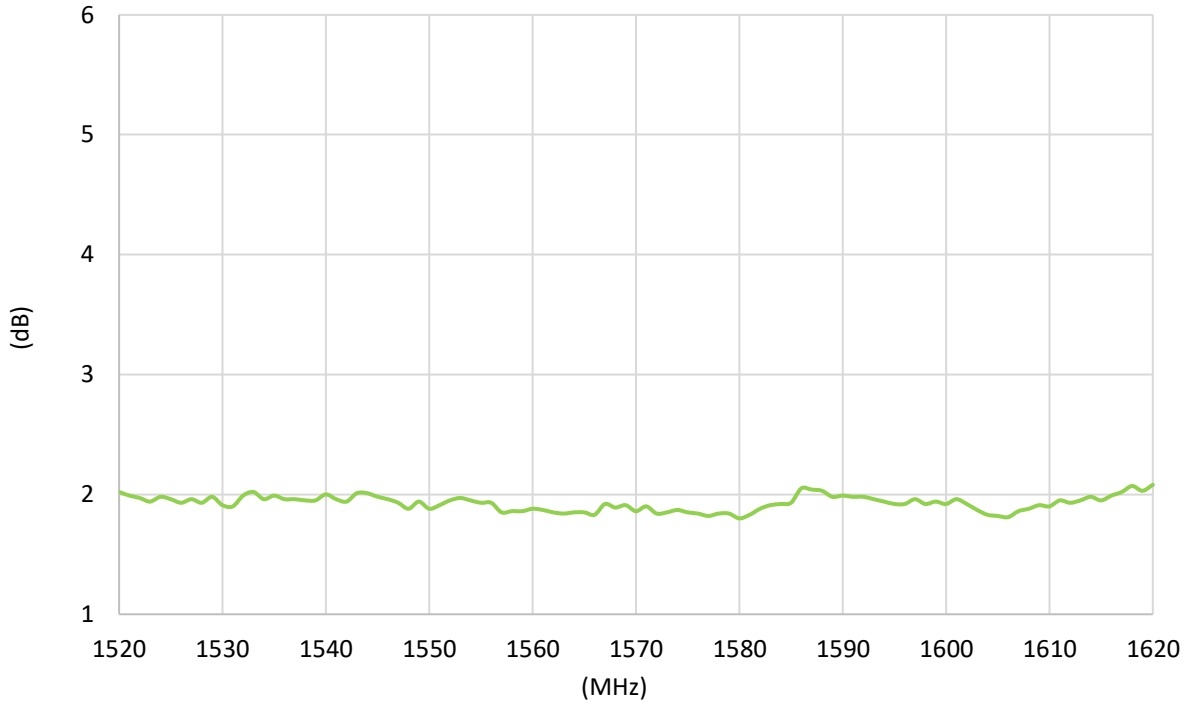
5.1 Block Diagram



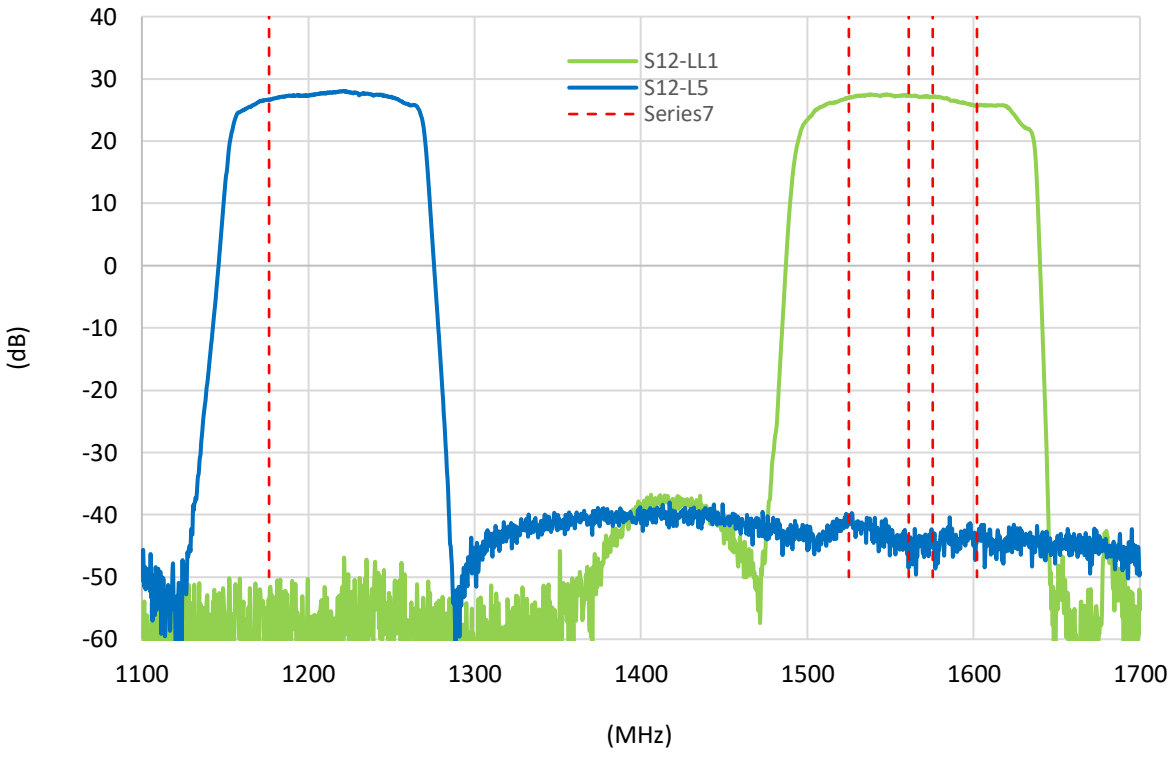
5.2 Noise Figure – Low-Band



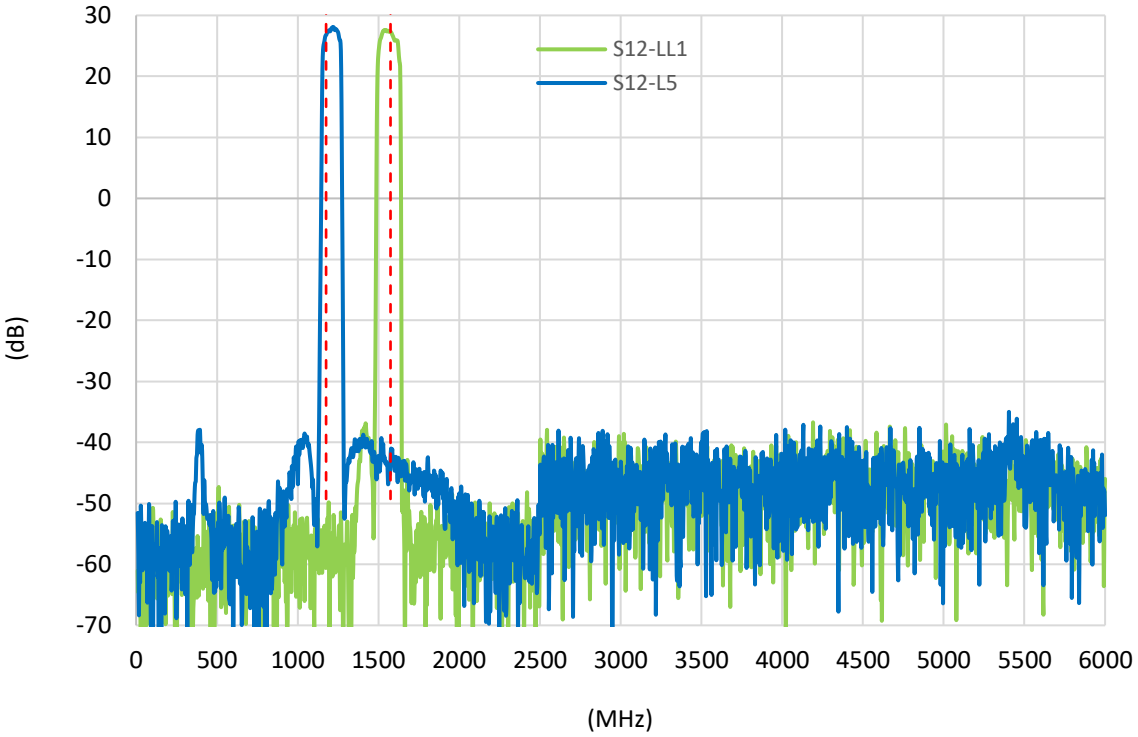
5.3 Noise Figure – High-Band



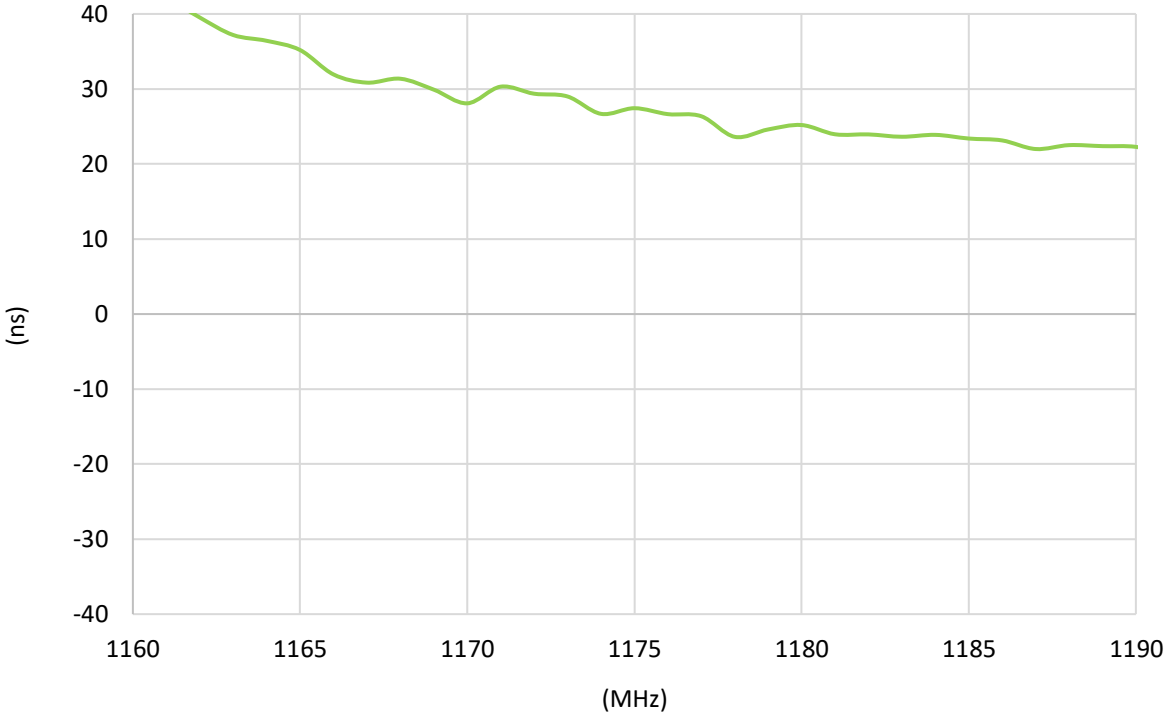
5.4 LNA Gain



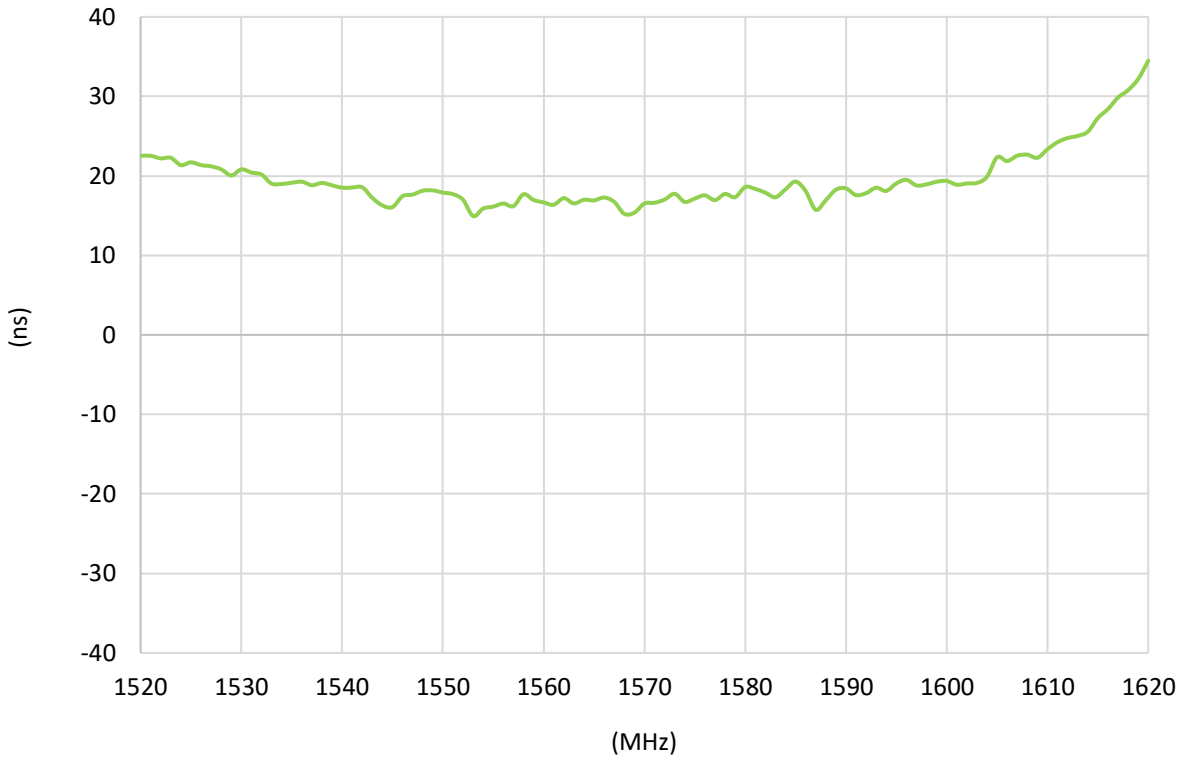
5.5 Out-band rejection



5.6 Group Delay – Low-Band



5.7 Group Delay – High-Band



6. Field test Results

6.1 Septentrio AsteRx-U S/N

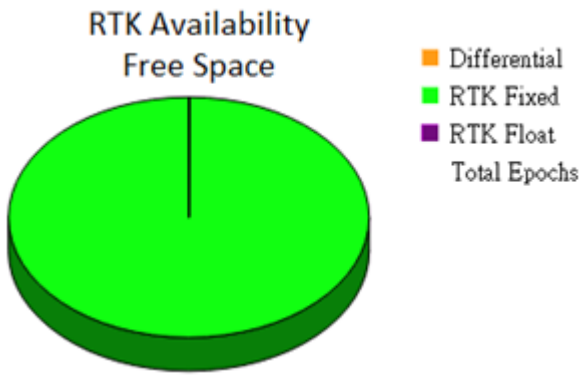
In this section Taoglas will present the field test result for AHP54510 antenna. The test was performed when the antenna was mounted on a static rooftop test set up in an open sky environment for at least 6 hours. Taoglas will show the field test results using the following receivers:

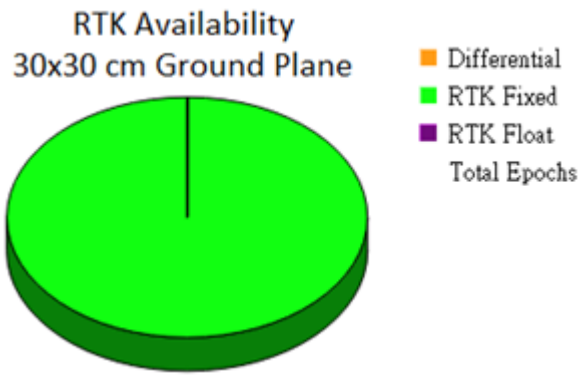
Receiver: Septentrio AsteRx-U S/N

Receiver Features:

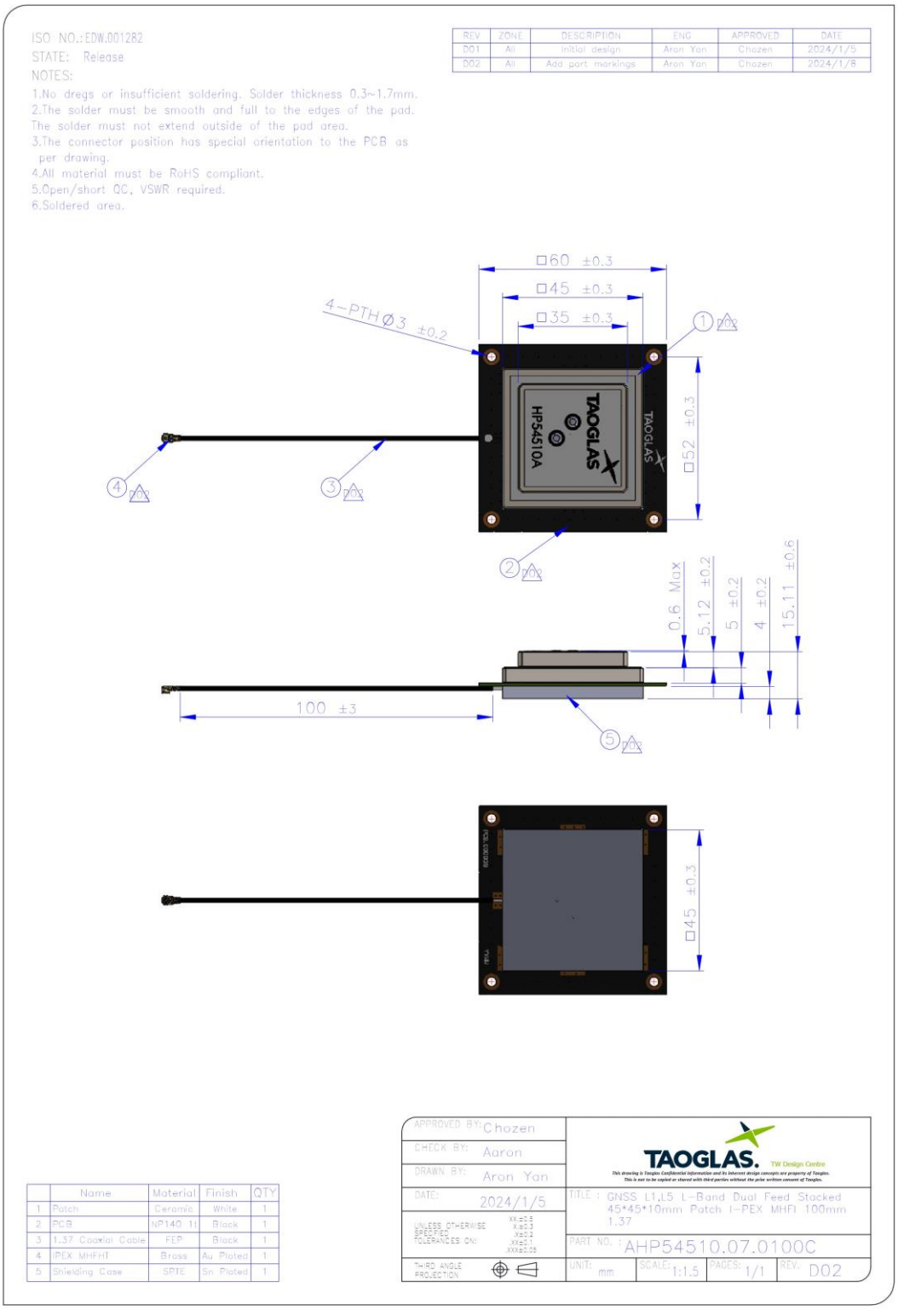
- Multi-band GNSS: 544 channels
- GPS: L1, L5 GLONASS: G1 Galileo: E1, E5a, BeiDou: B1, B2a QZSS: L1, L5 IRNSS: L5 L Band
- SBAS: EGNOS, WAAS, GAGAN, MSAS, SDCM(L1, L5)
- RTK (base and rover), Integrated dual-channel L-band receiver, Support for PPP
- Nav. update rate up to 100 Hz
- Position accuracy = RTK 0.6 cm + 0.5 ppm

Positioning Accuracy Table (2D Accuracy)			
Test Condition	**Correction Service**	**DRMS (68%)**	**2DRMS (95-98.2%)**
Free Space	RTK Disabled	115 cm	230 cm
	RTK Enabled	3.92 cm	7.84 cm
30x30 cm Ground Plane	RTK Disabled	99 cm	197 cm
	RTK Enabled	0.98 cm	1.97 cm





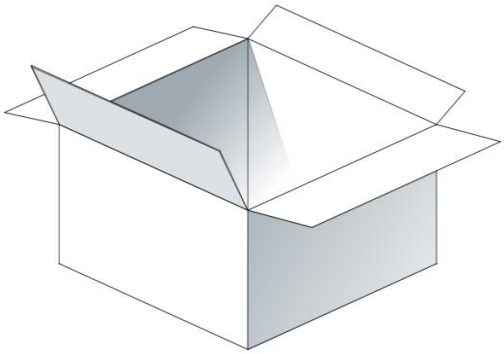
7. Mechanical Drawing



8. Packaging

1 PCS AHP54510 per PE Bag

60pcs AHP54510 per Carton
Dimensions: 390x320x290 mm



Changelog for the datasheet

SPE-24-8-007– AHP54510.07.0100C

Revision: B (Current Version)	
Date:	2024-12-11
Notes:	Added Levity Series to datasheet description.
Author:	Conor McGrath

Previous Revisions

Revision: A (Original First Release)	
Date:	2024-01-12
Notes:	Initial Release
Author:	Cesar Sousa

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