TAOGLAS

Datasheet

Colosseum X Active Multiband GNSS Antenna

Part No:
XAHP.50.A.301111

Description:

Active Multiband High Precision GNSS Permanent Mount

Features:

Bands Covered:

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

Excellent out-of-band rejection

Permanent mount, robust IP67 rated enclosure

Cable: 3m RG-174

Connector: SMA(M) Straight

CE Certified

Dimensions: Ø94 x 57mm

RoHS & Reach Compliant

Ireland ISO 9001: 2015 Certified

Taiwan ISO 9001: 2015 Certified

1. Introduction

The Taoglas Colosseum X XAHP.50 is an active multi-band GNSS antenna has been carefully designed to work well on the full GNSS spectrum including GPS/QZSS L1/L2/L5, GLONASS G1/G2/G3, Galileo E1/E5a/E5b/E6, BeiDou B1/B2a/B2b/B3, 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. The XAHP.50 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.50 ensures excellent out of band rejection and provides excellent positioning stability and reliability of GNSS signals. The robust, vandal resistant, permanent mount IP67 rated ASA enclosure is just 57mm in height and 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
- Inventory Management & Container tracking
- Telematics & Asset Tracking
- Timing Accuracy Synchronization

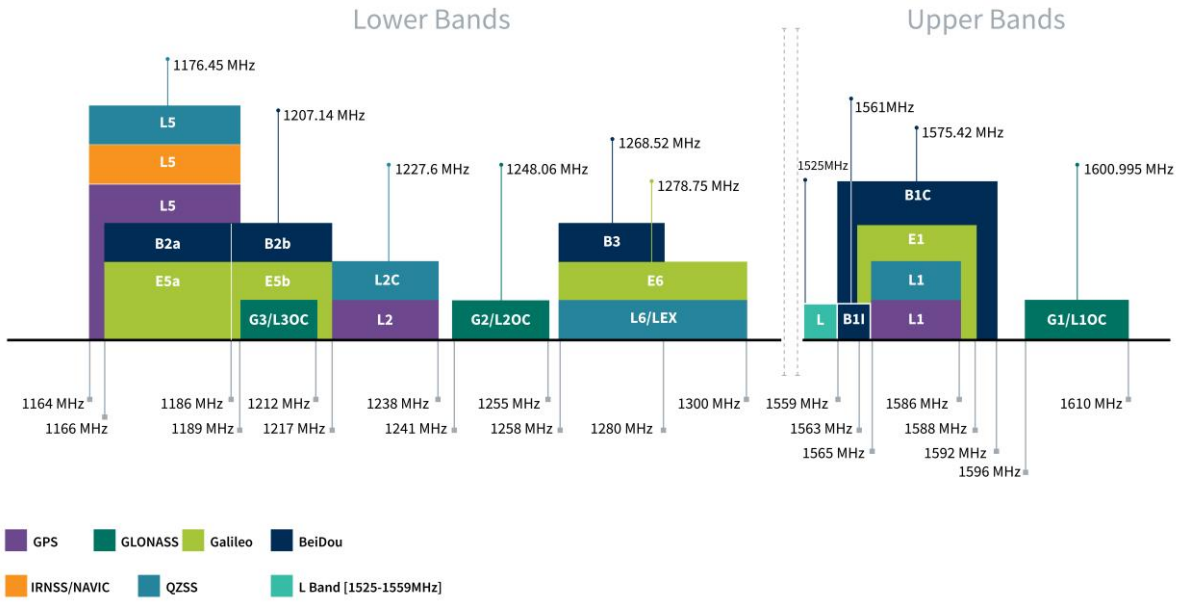
The XAHP.50 is the latest external addition to an ongoing product road map of high precision antennas by Taoglas. For RTK applications when used on the base and/or the rover, the XAHP.50 can achieve genuine cm-level accuracy.

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

2. Specifications

GNSS Frequency Bands Covered							
GPS	L1	L2	L5				
	■	■	■				
GLONASS	G1	G2	G3				
	■	■	■				
Galileo	E1	E5a	E5b	E6			
	■	■	■	■			
BeiDou	B1	B2a	B2b	B3			
	■	■	■	■			
QZSS (Regional)	L1	L2C	L5	L6			
	■	■	■	■			
IRNSS (Regional)	L5						
	■						
SBAS	L1/E1/B1	L5/B2a/E5a	G1	G2	G3		
	■	■	■	■	■		

*SBAS systems: WASS(L1/L5), EGNOSS(E1/E5a), SDCM(G1/G2/G3), SNAS(B1,B2a), GAGAN(L1/L5), QZSS(L1/L5), KAZZ(L1/L5).



GNSS Bands and Constellations

GNSS Electrical						
Frequency (MHz)	**1176.45**	**1227.6**	**1278.75**	**1561**	**1575.42**	**1602**
VSWR (max.)	1.3:1	1.3:1	1.5:1	1.5:1	1.5:1	1.4:1
Passive Antenna Efficiency (%)	72	77	53	35	45	53
Passive Antenna Gain at Zenith (dBi)	7.4	6.2	6.8	3.2	4.2	4.2
Axial Ratio (dB) Ground Plane	1.2	0.6	0.2	1.2	1.2	1.3
Group Delay	5	5	4	15	15	15
PCO (cm)	0.5	0.01	0.6	1	1	1
PCV (cm)	1.9	1.1	1.04	0.6	0.6	0.6
Polarization	Right-Hand Circularly Polarized (RHCP)					
Impedance	50Ω					
Cable	3m RG-174 as Standard					
Connector	SMA(M)ST as Standard					

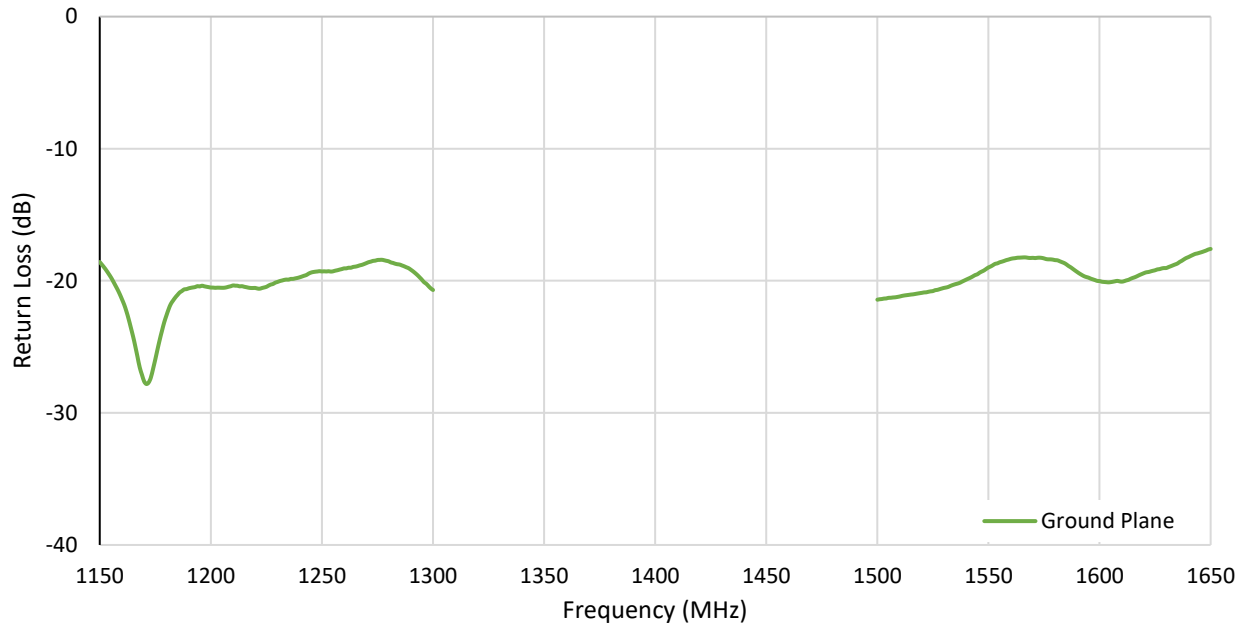
Note: The antenna was tested on a 30X30 cm ground plane

LNA and Filter Electrical Properties							
Frequency (MHz)	**L5 1176.45**	**GAL E5b 1207**	**GPS L2 1227**	**L6/E6 1278.75**	**B1 1561**	**L1 1575.42**	**L1PT 1602**
Gain (typical)	25 dB	26 dB	25 dB	22 dB	27 dB	28 dB	28 dB
Noise Figure (typical)	4.0 dB	3.7 dB	3.8 dB	4.5 dB	3.1 dB	2.6 dB	2.6 dB
Group Delay Variation (typical)	9.4 ns	4.0 ns	3.7 ns	1.3 ns	3.0 ns	10 ns	8.8 ns
Current Draw (typical)	< 20 mA						
Input Voltage	+1.8 to +5 VDC						
Out-Of-Band Attenuation (dB)	100 - 900 MHz				> 50		
	900 - 1000 MHz				> 30		
	1350 - 1520 MHz				> 25		
	1700 - 2000 MHz				> 35		
	2000 - 6000 MHz				> 45		

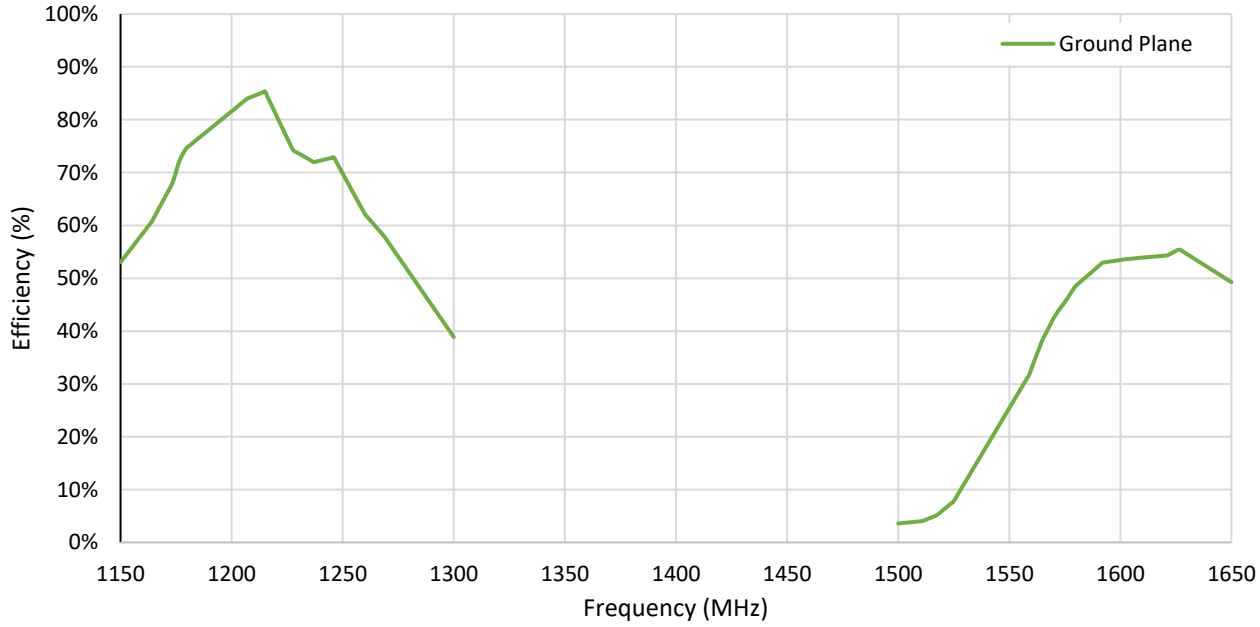
Mechanical	
Height	58 mm
Planner Dimension	95 mm diameter
Casing	ASA
Cable	3m of RG-174 as standard
Connector	SMA(M)ST as standard
Base and Thread	Zinc Alloy
Weight	395g
Environmental	
Protection	IP67
Temperature Range	-40°C to 85°C
Humidity	Non-condensing 65°C 95% RH
RoHS Compliant	Yes
REACH Compliant	Yes

3. Antenna Characteristics

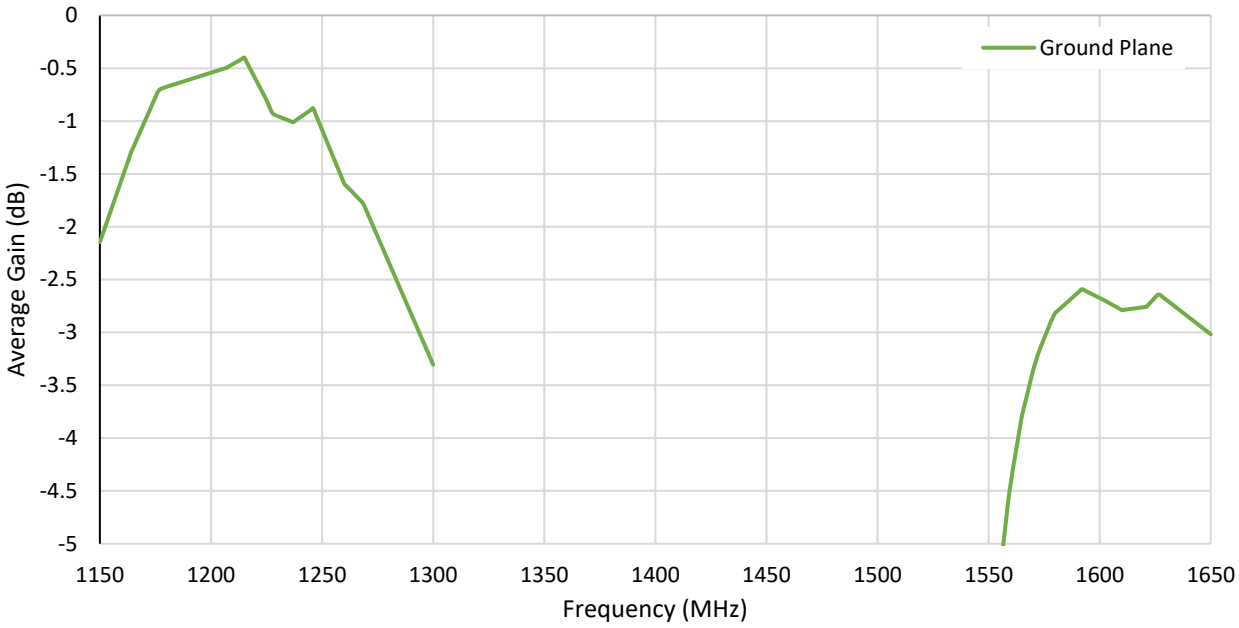
3.1 Return Loss



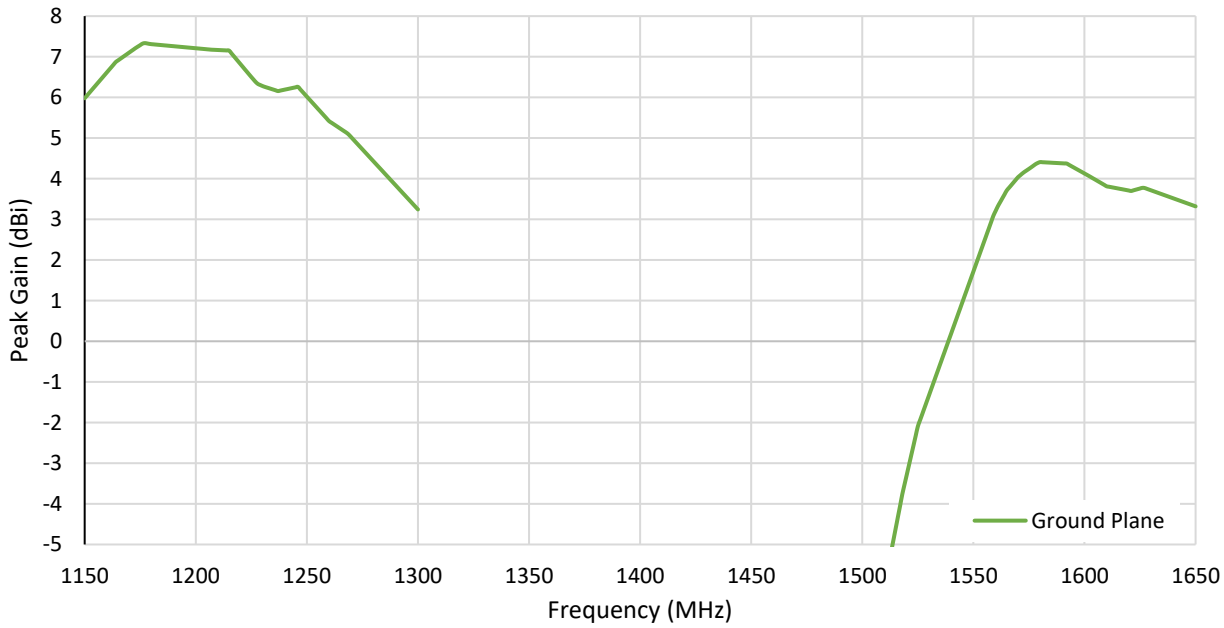
3.2 Efficiency



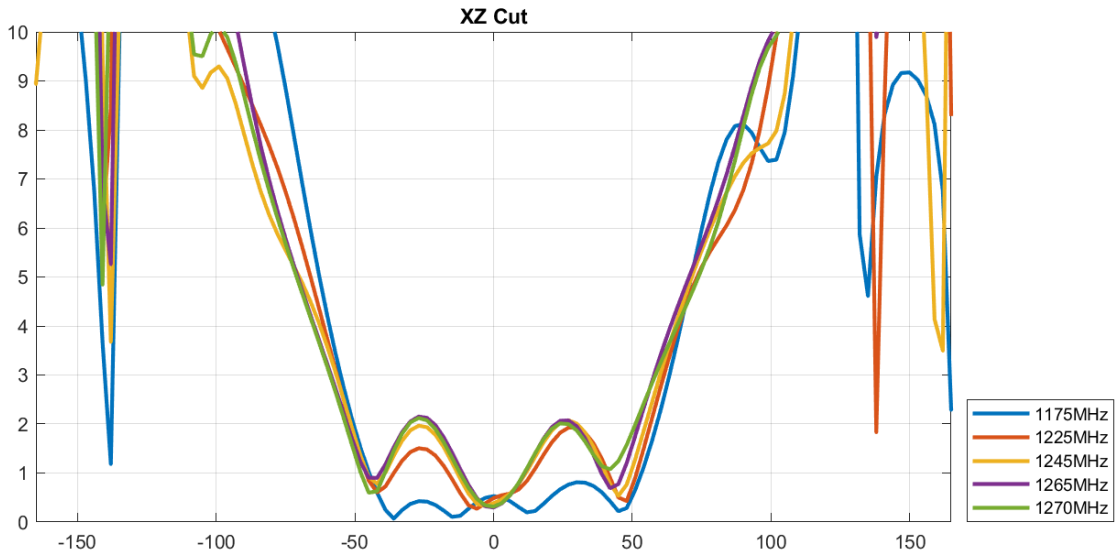
3.3 Average Gain

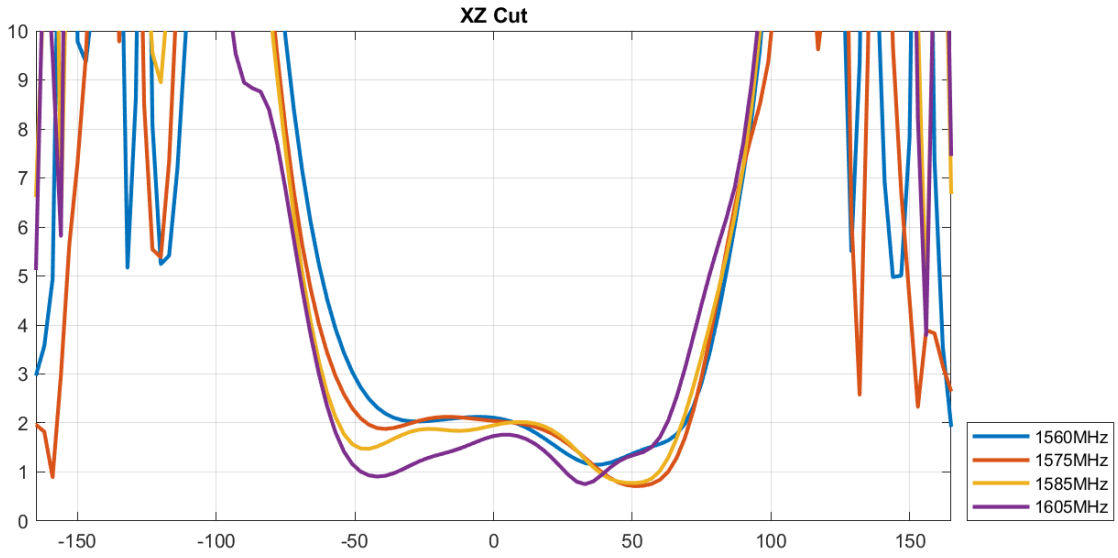


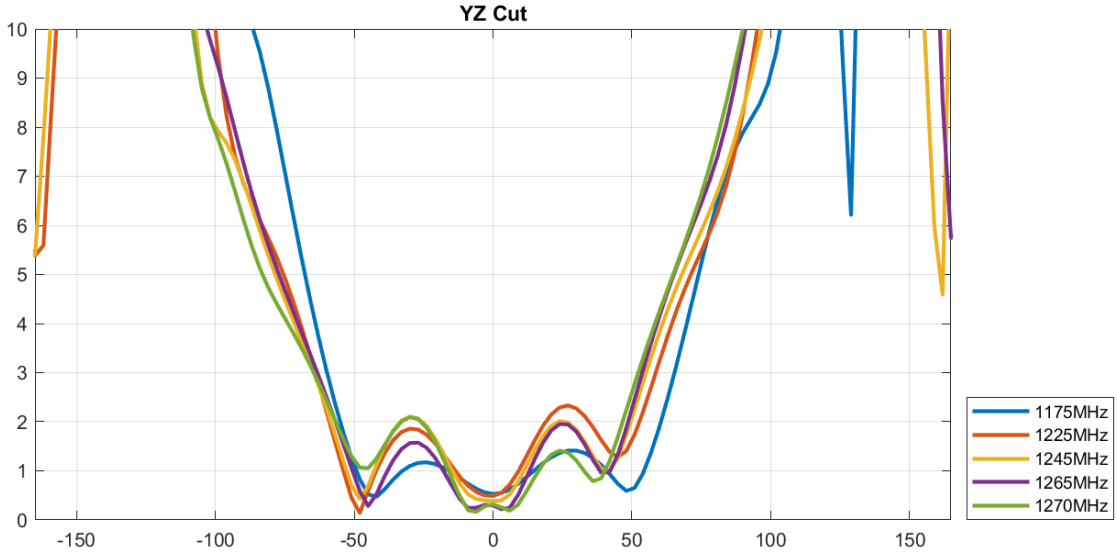
3.4 Peak Gain

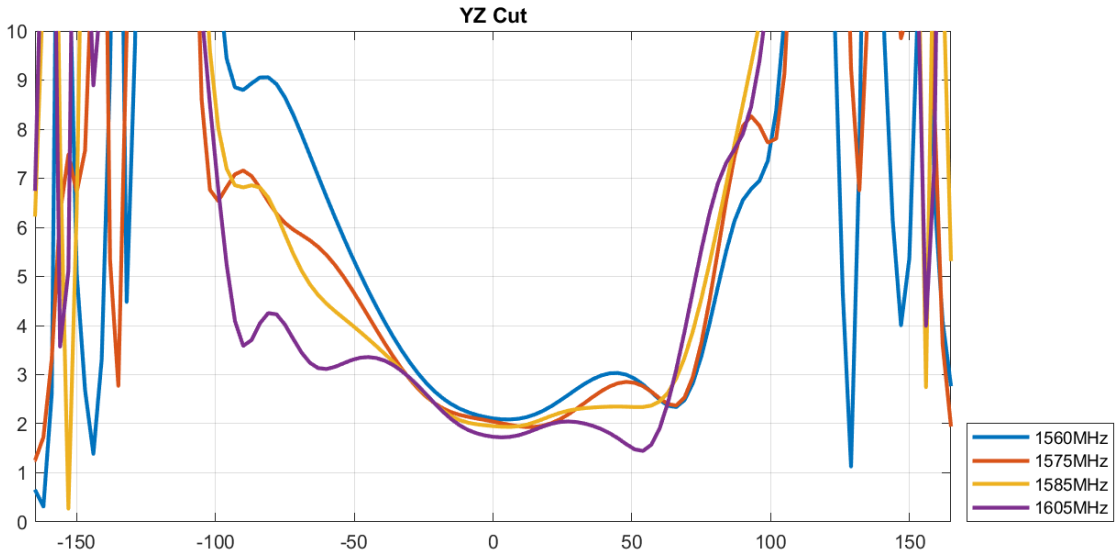


3.5 Axial Ratio



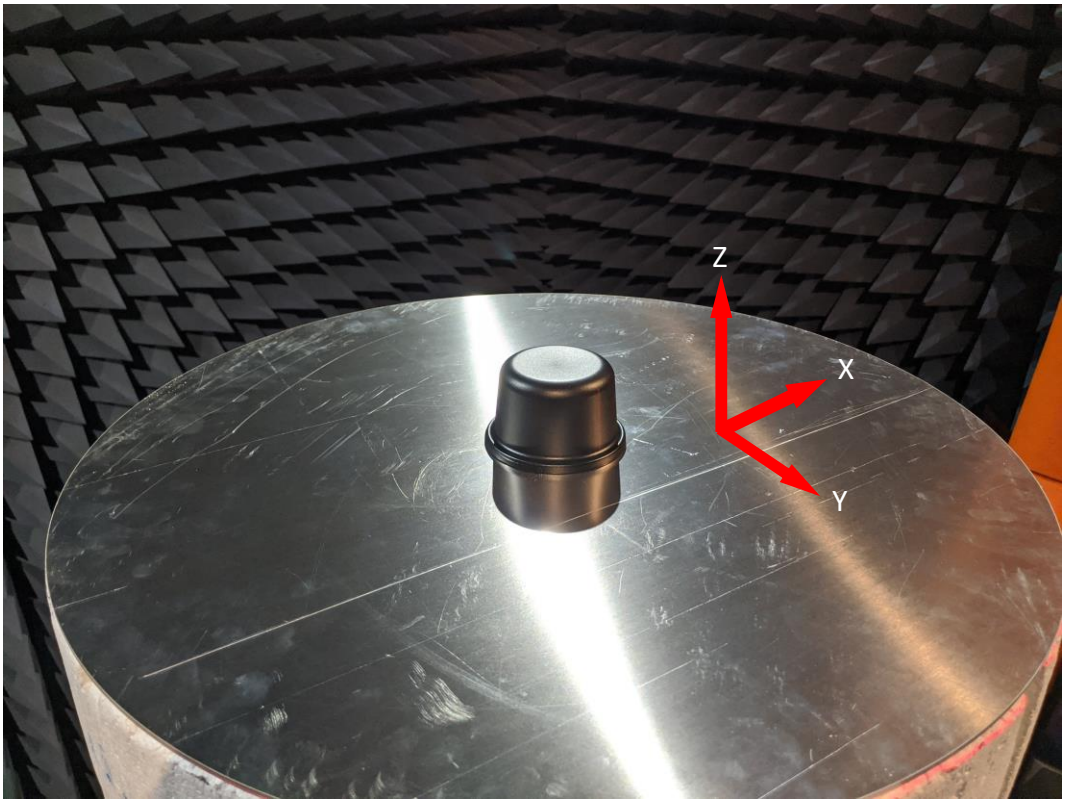



YZ Cut
10
9
8
7
6
5
4
3
2
1
0
-150
-100
-50
0
50
100
150
1175MHz
1225MHz
1245MHz
1265MHz
1270MHz

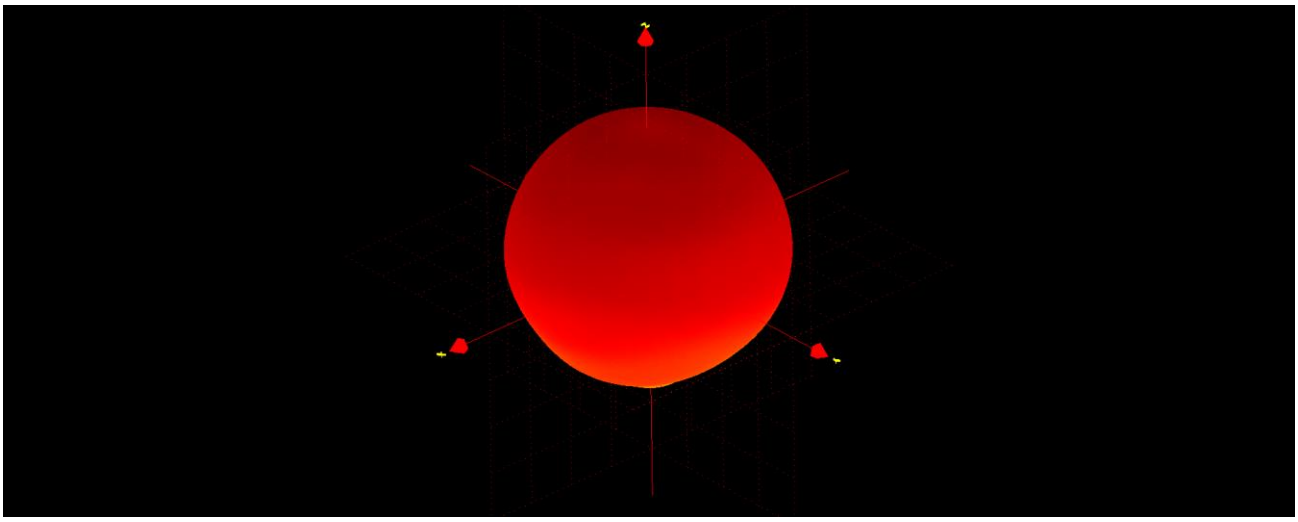

YZ Cut
10
9
8
7
6
5
4
3
2
1
0
-150
-100
-50
0
50
100
150
1560MHz
1575MHz
1585MHz
1605MHz

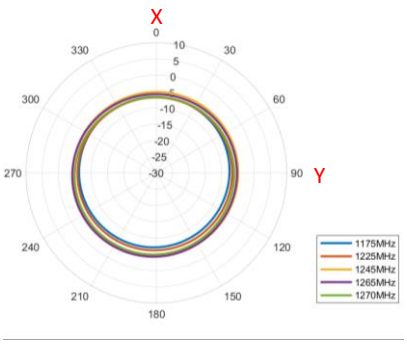
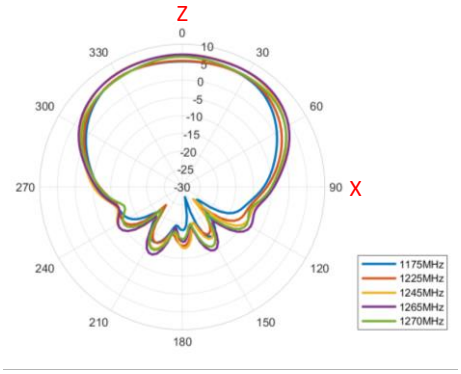
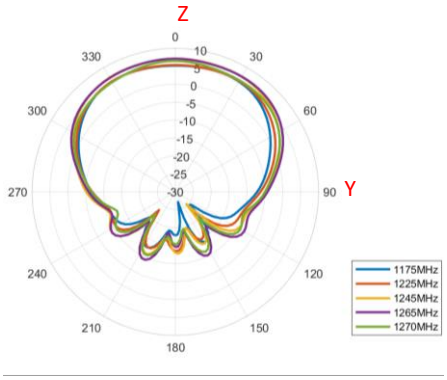
4. Radiation Patterns

4.1 Test Setup



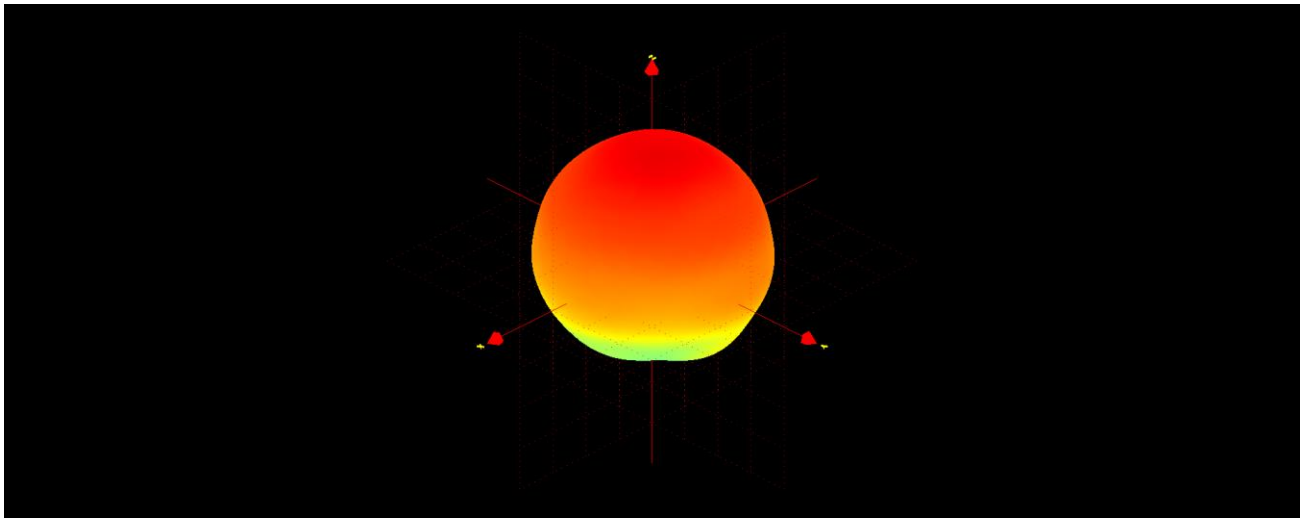
4.2 L2 & L5 3D and 2D Radiation Patterns

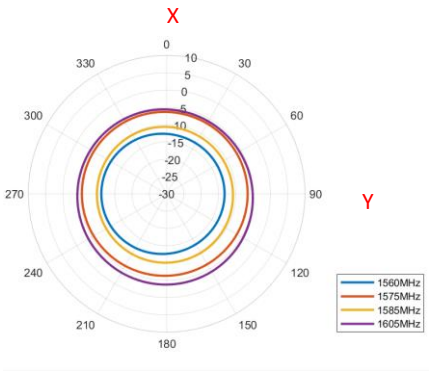
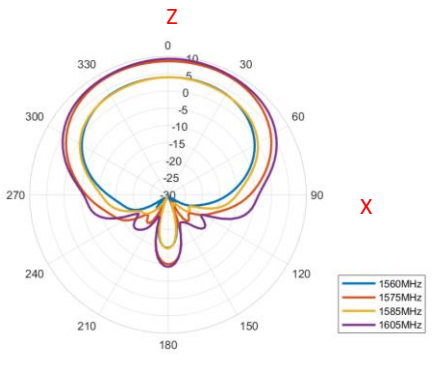
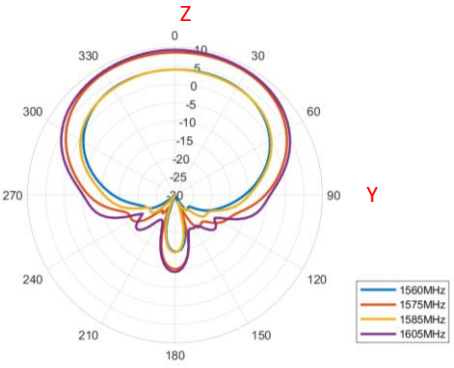


XY Plane*	XZ Plane*	YZ Plane*
		

***2D Radiation Patterns:** Show the total gain including LNA + antenna with a 20dB attenuator

4.3 L1 3D and 2D Radiation Patterns

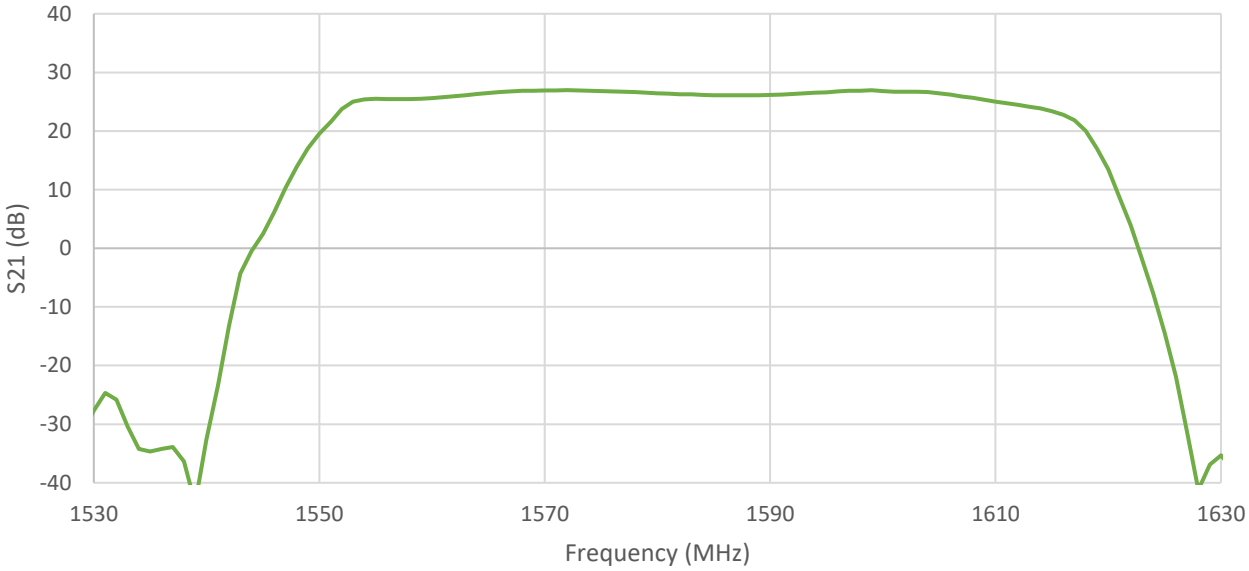


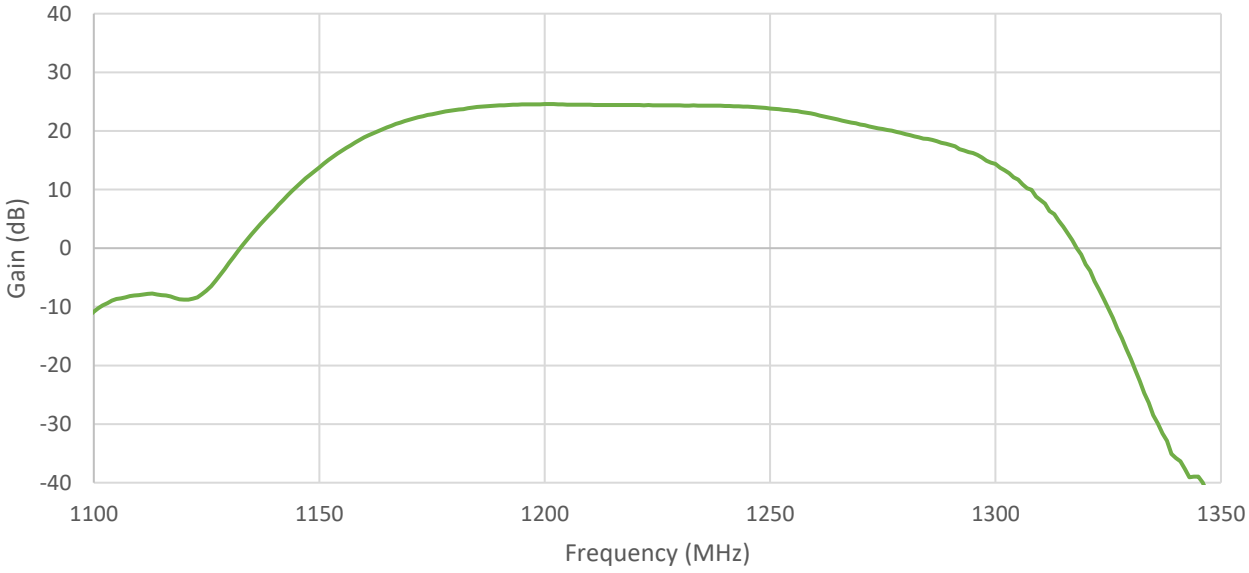
XY Plane*	XZ Plane*	YZ Plane*
		

***2D Radiation Patterns:** Show the total gain including LNA + antenna with a 20dB attenuator

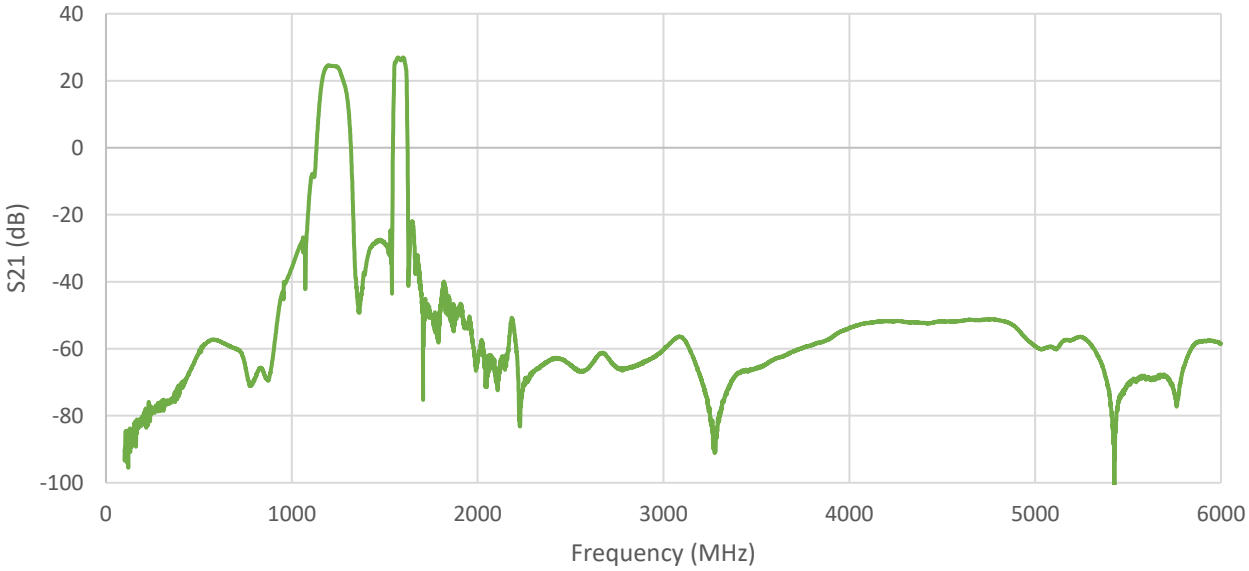
5. LNA Characteristics

5.1 LNA In-Band S21





5.2 LNA Wideband S21



6. Field Test Results

In this section Taoglas will present the field test result for XAHP.50 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.

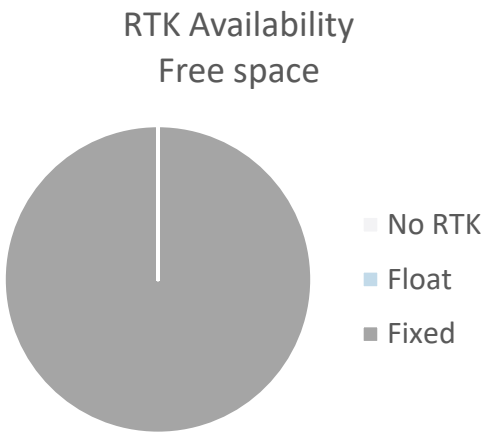
Taoglas will show the field test results using the following receivers:

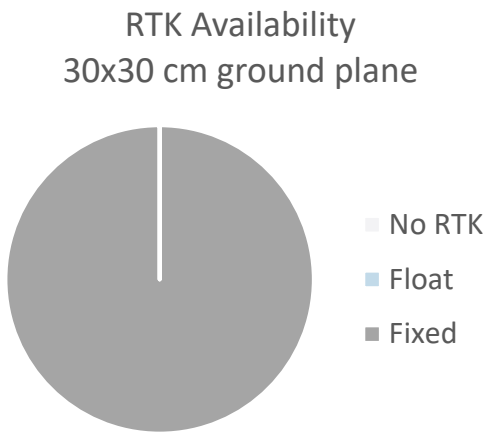
6.1 Ublox ZED-F9P

Receiver features:

- Multi-band GNSS: 184-channel GPS L1C/A L2C, GLONASS: L1OF L2OF, Galileo: E1B/C E5b, BeiDou: B1I B2I, QZSS: L1C/A L2C
- Multi-band RTK with fast convergence times and reliable performance
- Nav. update rate RTK up to 20 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)**
Free Space	RTK DISABLED	47.08 cm	56.53 cm	113.06 cm	20
	RTK ENABLED	1.51 cm	1.83 cm	3.66 cm	20
30x30 cm Ground Plane	RTK DISABLED	46.69 cm	54.83 cm	110.65 cm	19
	RTK ENABLED	0.47 cm	0.57 cm	1.14 cm	19



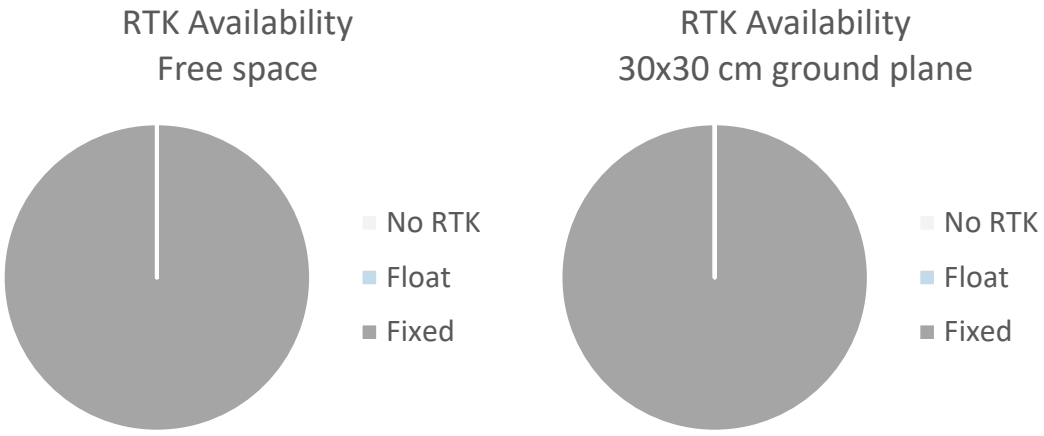


6.2 Septentrio AsteRx-U S/N

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

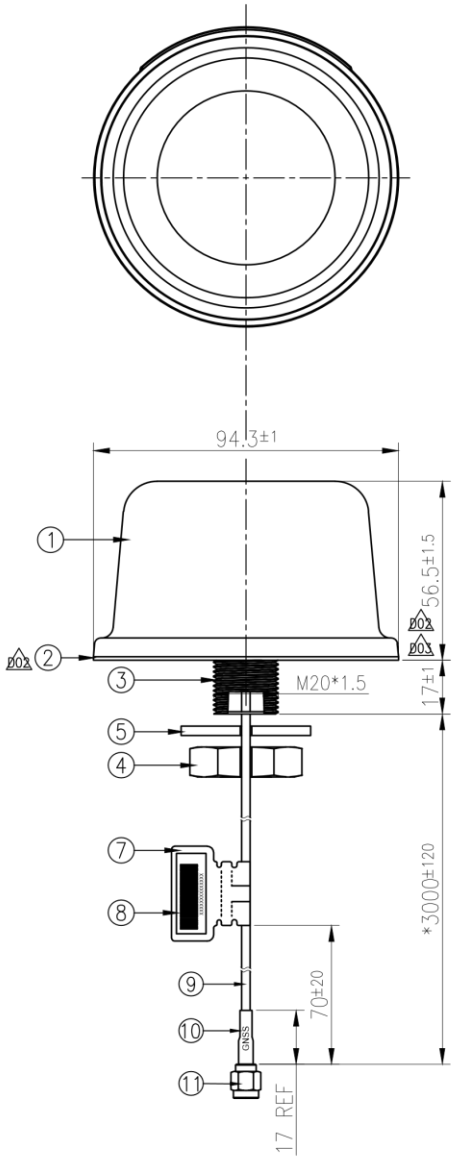
Positioning Accuracy Table (2D Accuracy)				
Test Condition	**Correction Service**	**CEP (50%)**	**DRMS (68%)**	**2DRMS (95-98.2%)**
Free Space	RTK DISABLED	39.22 cm	47.08 cm	94.17 cm
	RTK ENABLED	0.99 cm	1.2 cm	2.4 cm
30x30 cm Ground Plane	RTK DISABLED	37.08 cm	45.04 cm	90.08 cm
	RTK ENABLED	0.96 cm	1.16 cm	2.31 cm



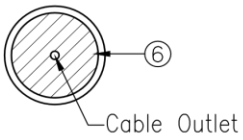
7. Mechanical Drawing (Units: mm)

ISO NO.: EDW-20-8-0376
STATE: Release
NOTES: 1. All material must be RoHS compliant.

REV.	DESCRIPTION	ENG.	APPROVED	DATE
D01	Initial Design	Joey	Clark	2020/04/30
D02	Modify the adhesive Foam Mini ST	Aron Yan	Aaron	2020/09/25
D03	Modify the dimensional	Aron Yan	Aaron	2020/10/07



Bottom Thread View



	Name	Material	Finish	QTY
1	Mini ST Short Case	ASA	Black	1
D02 2	Adhesive Foam Mini ST(Black Foam)	3M9448HK+CR4305	Black/White Liner	1
3	Mini ST Base	Zinc Alloy	Ni Plated	1
4	Nut_M20x1.5Px9.5H Cut	Steel Carbon	Zn-Ni Plated	1
5	Washer_Cut	Steel Carbon	Zn-Ni Plated	1
6	Cable Rubber	Silicone Rubber	Black	1
7	Empty Label	PEPA	White	1
8	Barcode Label	PET	White	1
9	RG174 Coaxial Cable	PVC	Black	1
10	Heat Shrink Tube (GNSS)	PE	Blue Tube/White Text	1
11	SMA(M)ST	Brass	Au Plated	1

APPROVED BY:	Clark
CHECK BY:	Aaron
DRAWN BY:	Joey
DATE:	2020/04/30
UNLESS OTHERWISE SPECFIED TOLERANCES ON:	XX.±0.5 X.±0.3 .X±0.2 .XX±0.1 .XXX±0.05
THIRD ANGLE PROJECTION	

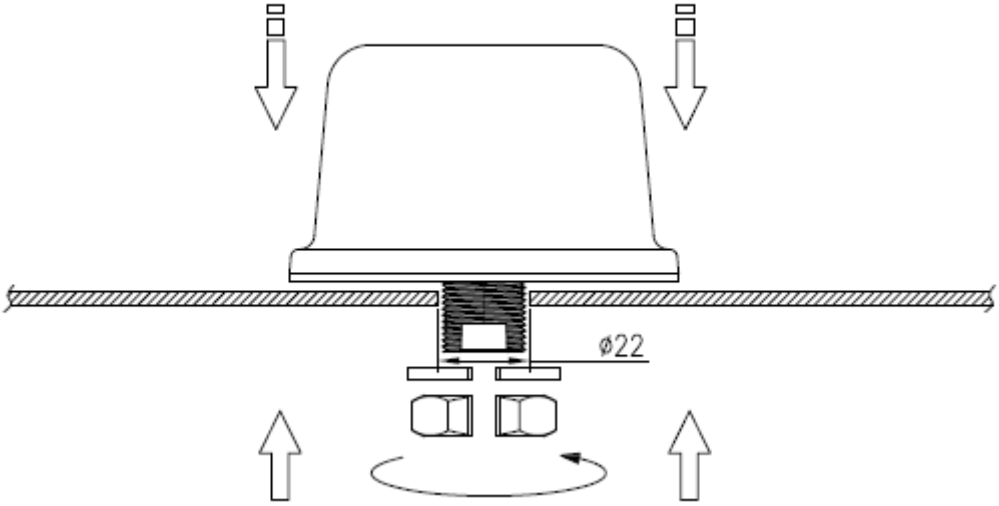
TAOGLAS. TW Design Centre

TITLE : Active Multi-band GNSS Permanent Mount Antenna with 3m RG-174 & SMA(M)

PART NO. : XAHP.50.A.301111

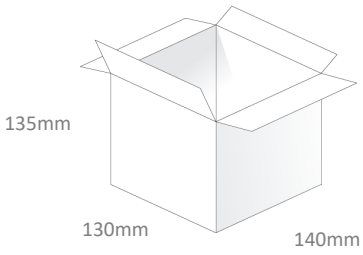
UNIT:	SCALE:	PAGES:	REV.
mm	1:2	1/1	D03

8. Installation Guidelines

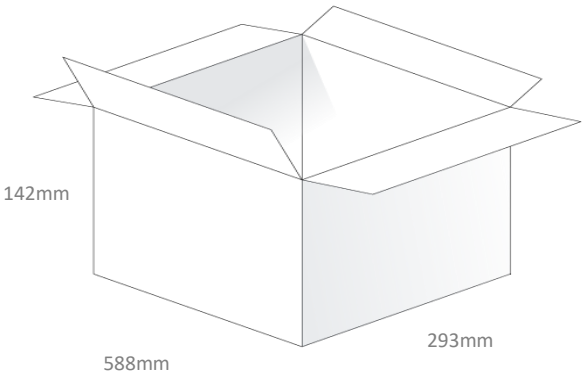


9. Packaging

1pc XAHP.50.A.301111 per Small Box
Dimensions - 135*130*140mm
Weight - 395g



8pcs XAHP.50.A.301111 per Carton
Dimensions - 588*296*142mm
Weight – 3.9Kg



Changelog for the datasheet

SPE-20-8-037 – XAHP.50.A.301111

Revision: F (Current Version)	
Date:	2022-02-21
Changes:	Updated GNSS Bands & Constellations Graphics
Changes Made by:	Cesar Sousa

Previous Revisions

Revision: E	
Date:	2021-11-03
Changes:	Updated Installation information
Changes Made by:	Jack Conroy

Revision: D	
Date:	2020-11-04
Changes:	Updated Drawing
Changes Made by:	Jack Conroy

Revision: C	
Date:	2020-09-30
Changes:	Updated Drawing
Changes Made by:	Jack Conroy

Revision: B	
Date:	2020-05-28
Changes:	Updated to include Field Test data
Changes Made by:	Victor Pinazo

Revision: A (Original First Release)	
Date:	2020-04-30
Notes:	Initial Release
Author:	Eric Johnson

TAOGLAS®

www.taoglas.com