TAOGLAS

Datasheet

Part No:
ADFGP.50A.07.0100C

Description:

Embedded Active GNSS Dual Stacked Patch Antenna with 100mm of 1.37 & IPEX MHFI

Features:

Embedded Dual Patch, Dual Feed 4-Pin Assembly

Covering Bands:

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

Low Axial Ratio

Cable: 100mm of 1. 37mm

Connector: IPEX MHFI (U.FL)

Dimensions: 50 x 50 x 16.8mm

RoHS & Reach Compliant

1. Introduction

The ADFGP.50A, with Taoglas Sure Technology, is a precision-engineered active dual patch, dual-feed antenna for GPS (L1/L2/L5), GLONASS (G1/G2/G5), Galileo (E1/E5a/E5b) and BeiDou (B1/B2). The antenna comes mounted on a 50*50 mm PCB (ground plane). It consists of two stacked patches, 50mm, and 40mm in width and is 16.8mm thick. It has been tuned and tested on a 50*50mm ground plane specifically for GPS L1: 1575.42MHz, L2: 1227.6MHz and L5: 1176.45MHz as well as the GLONASS, Galileo, BeiDou and IRNSS bands shown in Section 2.

Each patch element uses two orthogonal feeds that are combined in a hybrid coupler to ensure optimal axial ratio. The antenna exhibits excellent gain and good radiation pattern stability leading to a reliable GNSS fix in areas of weaker signal strength. All these elements combined ensure the best possible positional accuracy for your device.

Both patch elements have a dual pin feed to ensure a low axial ratio and should be used in conjunction with a hybrid coupler. The ADFGP.50A includes LNAs and front-end SAW filters to reduce out of band noise, such as from nearby cellular transceivers. It offers better protection from nearby radiated power surges and greatly reduces the probability of damaging your GNSS receiver from nearby transmissions.

Features:

- Multi-GNSS, high-performance antenna
- Excellent signal to noise ratio (C/N0)
- Good 2DRMS and fast TTFF
- Axial ratio < 2dB typ. across all bands
- Phase stability provides excellent Phase Center Variation (PCV)

Benefits:

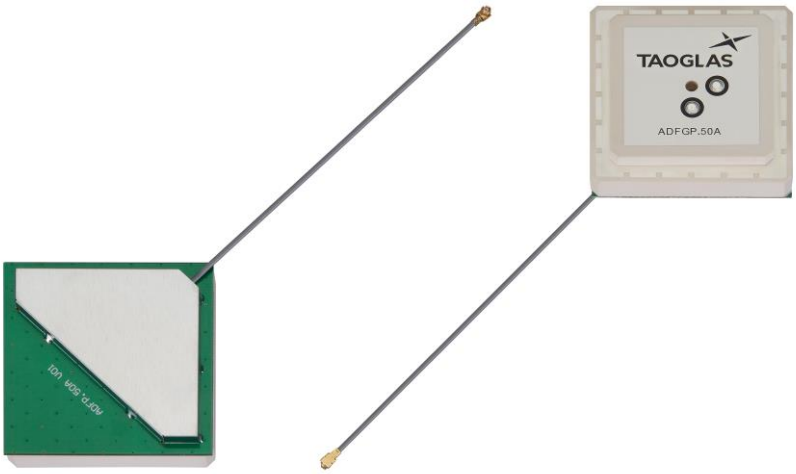
- Excellent positional accuracy
- Great for use in difficult environments
- Multiband improves the receiver's position estimation in terms of accuracy and reliability
- Ideal antenna solution for multiband RTK systems.

The ADFGP.50A is connected via an IPEX MHFI connector and works well without modifications in most environments, however, it can be tuned and optimized for different ground planes and enclosures if required. It is manufactured and tested in a TS16949 first tier automotive approved facility.

Typical applications include:

- High accuracy positioning and navigation systems
- UAVs, Robotics & Autonomous Vehicles
- Micro-Mobility Solutions
- Mapping & GIS
- Transportation & Telematics
- Precision Agriculture
- Public Safety, Search & Rescue
- RTK Systems

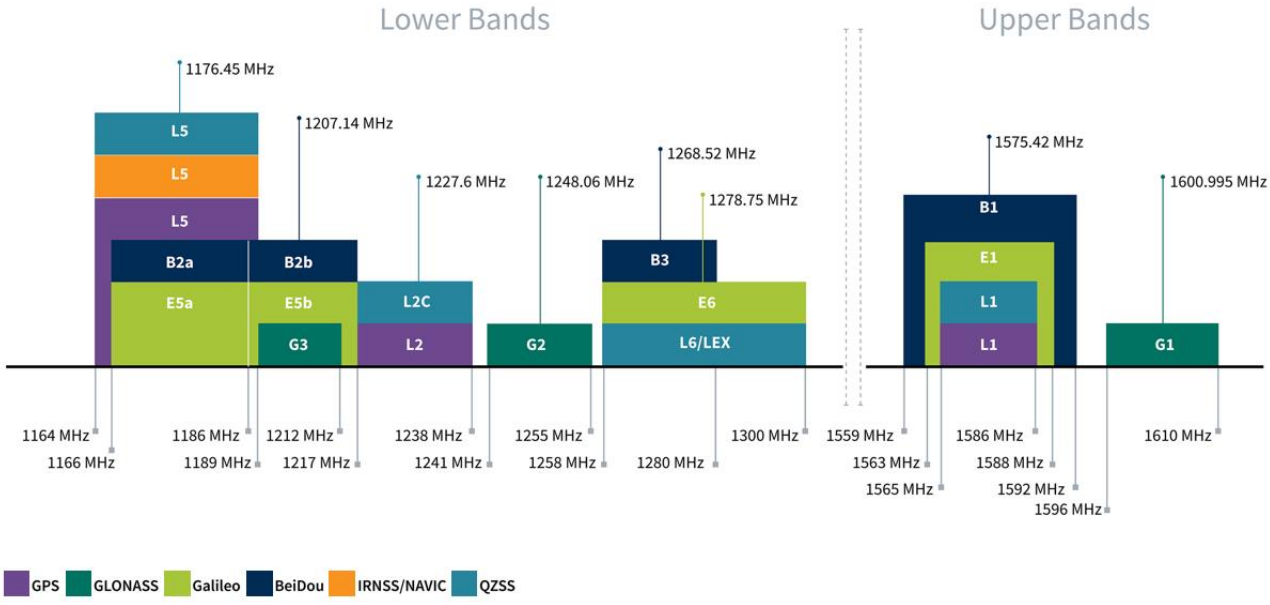
Custom antenna modifications are subject to possible NRE and minimum order quantity. For further information or support to test and integrate Taoglas Sure technology please contact your regional Taoglas customer support team.



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**	**1561**	**1575.42**	**1602**
VSWR (max.)	2.0:1	2.0:1	2.0:1	2.0:1	2.0:1
Efficiency (%)	39.1%	43.7%	51.3%	62.8%	57.5%
Peak Gain at Zenith (dBi)	0.7	1.6	2.4	3.4	3.2
Axial Ratio (dB)	2.6	1.9	1.9	1.8	1.4
Group Delay	11	11	20	20	20
PCO (cm)	1	1.1	1.1	1.2	1.2
PCV (cm)	6	9	6	6	6
Polarization	RHCP				
Impedance	50Ω				

Note. The patch antenna test with hybrid coupler XC1400P-03S

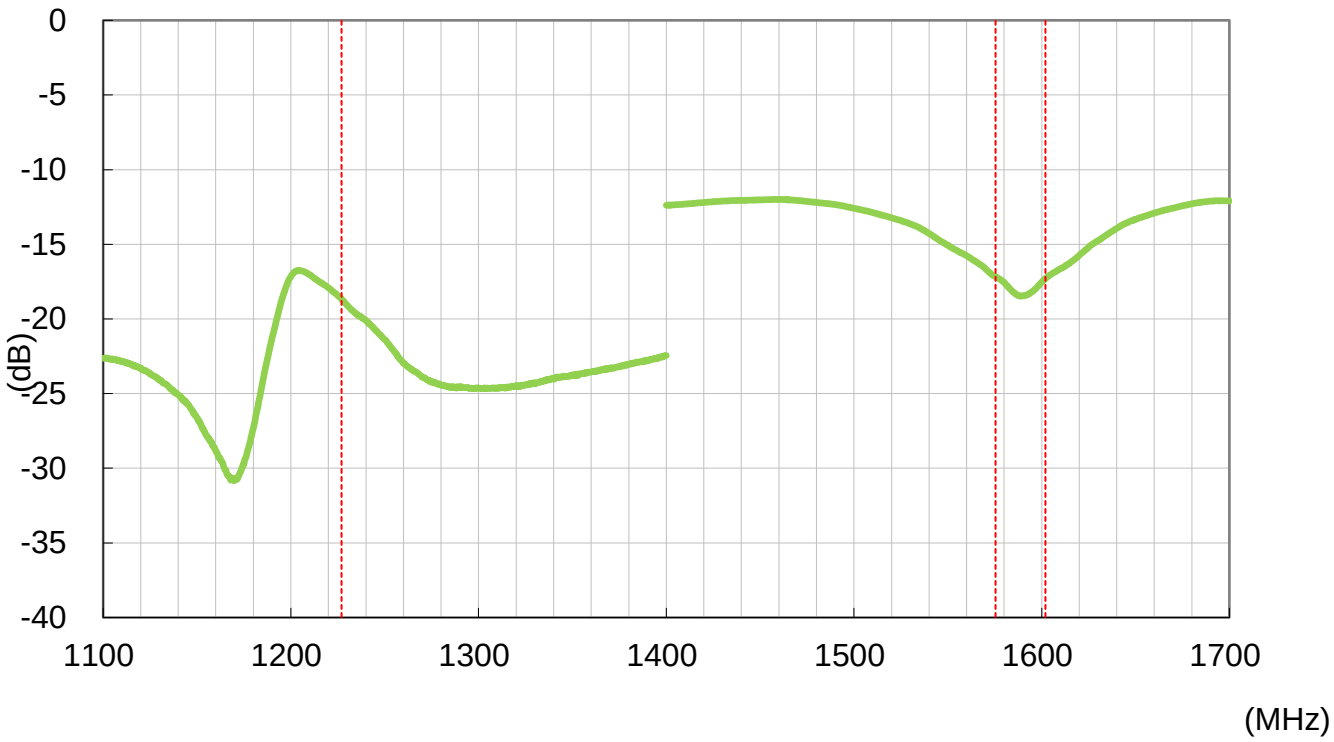
LNA and Filter Electrical Properties					
Frequency (MHz)	**1176.45**	**1227.6**	**1561**	**1575.42**	**1602**
VSWR (max.)	2.0:1	2.0:1	2.0:1	2.0:1	2.0:1
Gain@1.8V (Typ.)	24.1dB	24.6dB	23.6dB	24.2 dB	23.7 dB
Gain@3.0V (Typ.)	24.1dB	24.6dB	23.7dB	24.2 dB	23.8 dB
Gain@5.5V (Typ.)	24.2dB	24.6dB	23.7dB	24.2 dB	23.8 dB
Noise@1.8V (Typ.)	5.15 dB	3.97 dB	2.74 dB	2.68 dB	2.72 dB
Noise@3.0V (Typ.)	5.15 dB	4.13 dB	2.75 dB	2.67 dB	2.74 dB
Noise@5.5V (Typ.)	5.12 dB	4.03 dB	2.72 dB	2.77 dB	2.81 dB
Power consumption@1.8V (Typ.)	17.95 mA				
Power consumption@3.0V (Typ.)	18.02 mA				
Power consumption@5.5V (Typ.)	18.05 mA				

Total Specification (Through Antenna, SAW Filter and LNA)					
Frequency (MHz)	**1176.45**	**1227.6**	**1561**	**1575.42**	**1602**
Gain@3V (dBi)	24.8	26.2	26.1	27.6	27
Output Impedance	50 Ω				

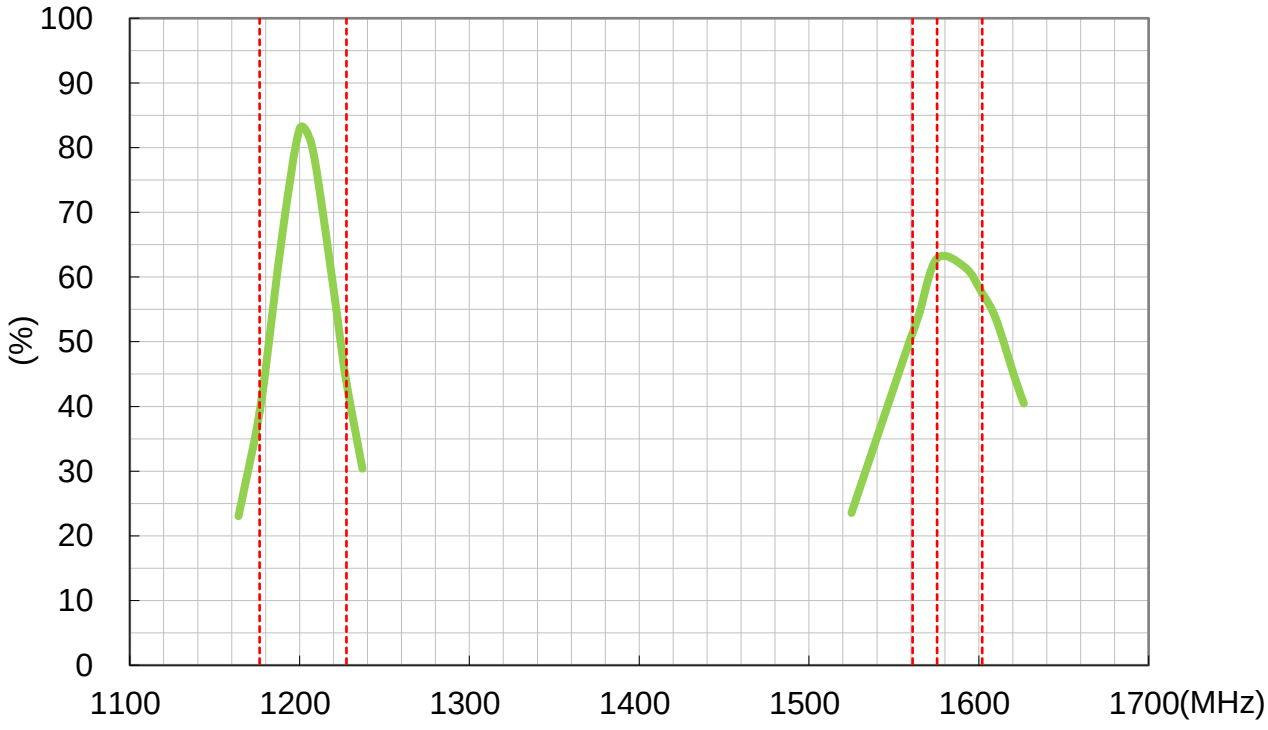
Mechanical	
Dimensions	50 x 50 x 16.8mm
Connector	IPEX MHFI (U.FL)
Cable	Coaxial Cable ø1.37: Length 100mm
Weight	95.5g
Environmental	
Operation Temperature	-40°C to 85°C
Storage Temperature	-40°C to 85°C
Humidity	Non-condensing 65°C 95% RH

3. Antenna Characteristics

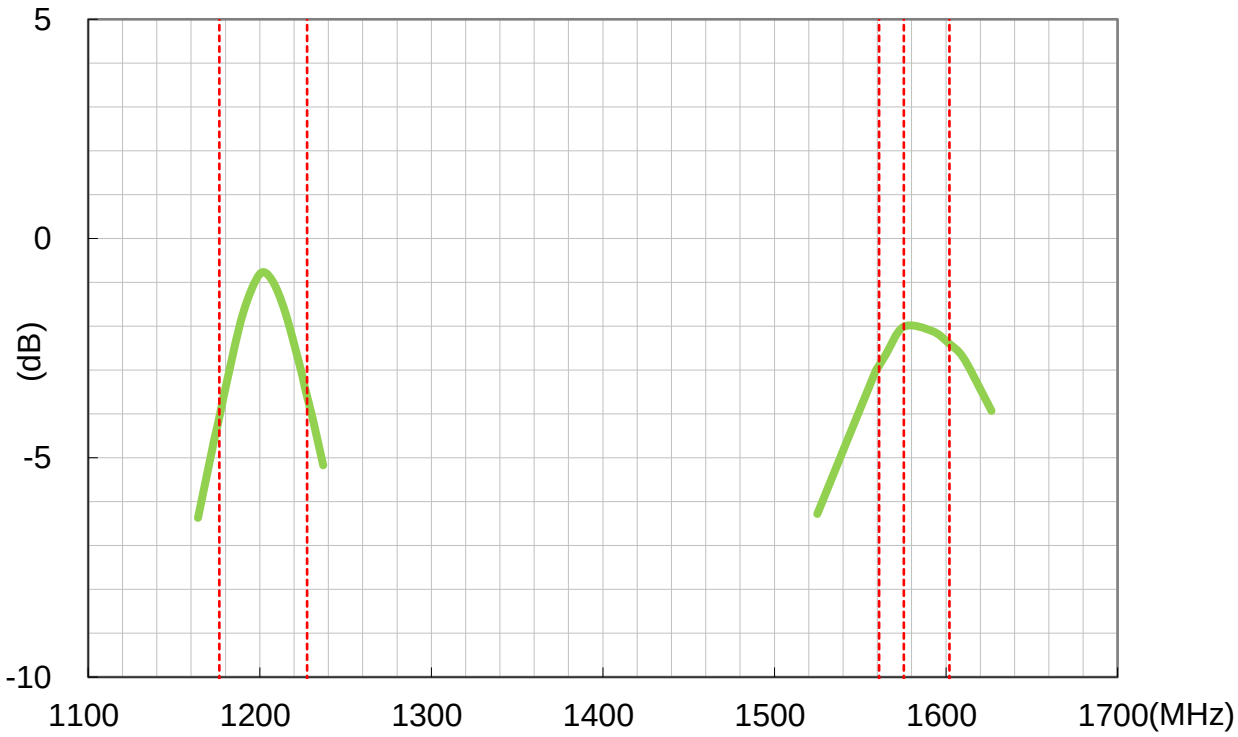
3.1 Return Loss



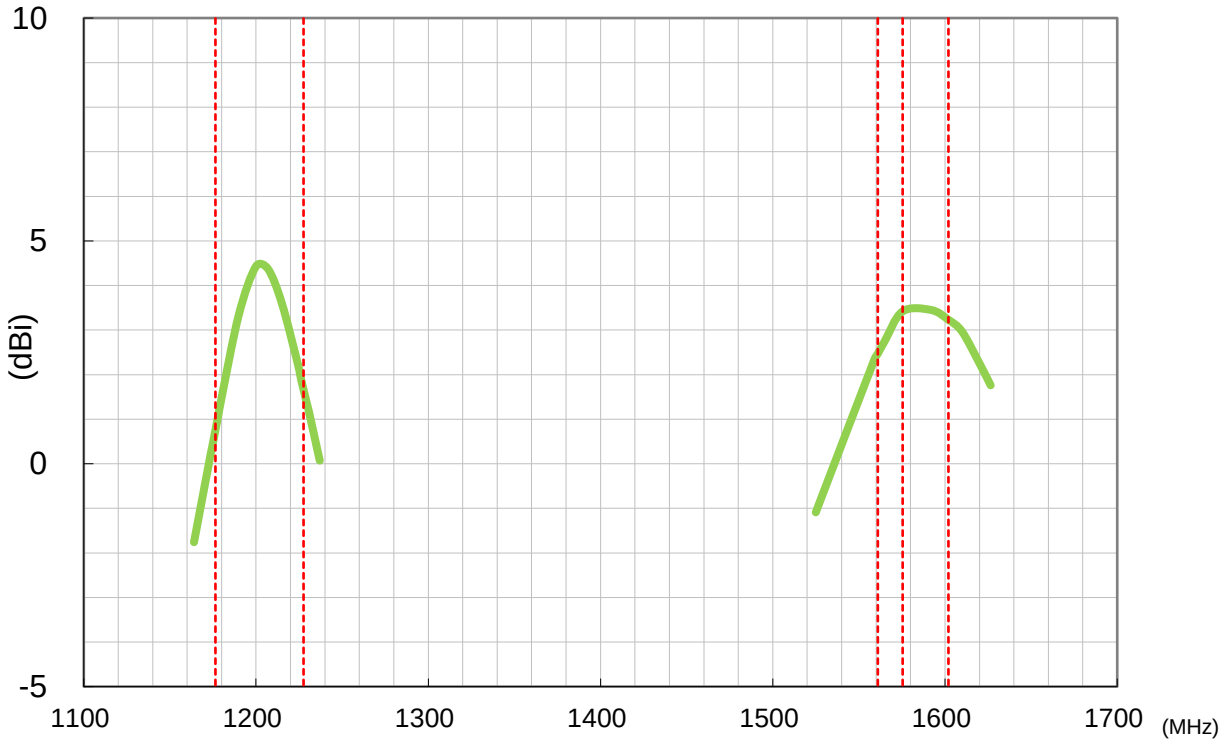
3.2 Efficiency



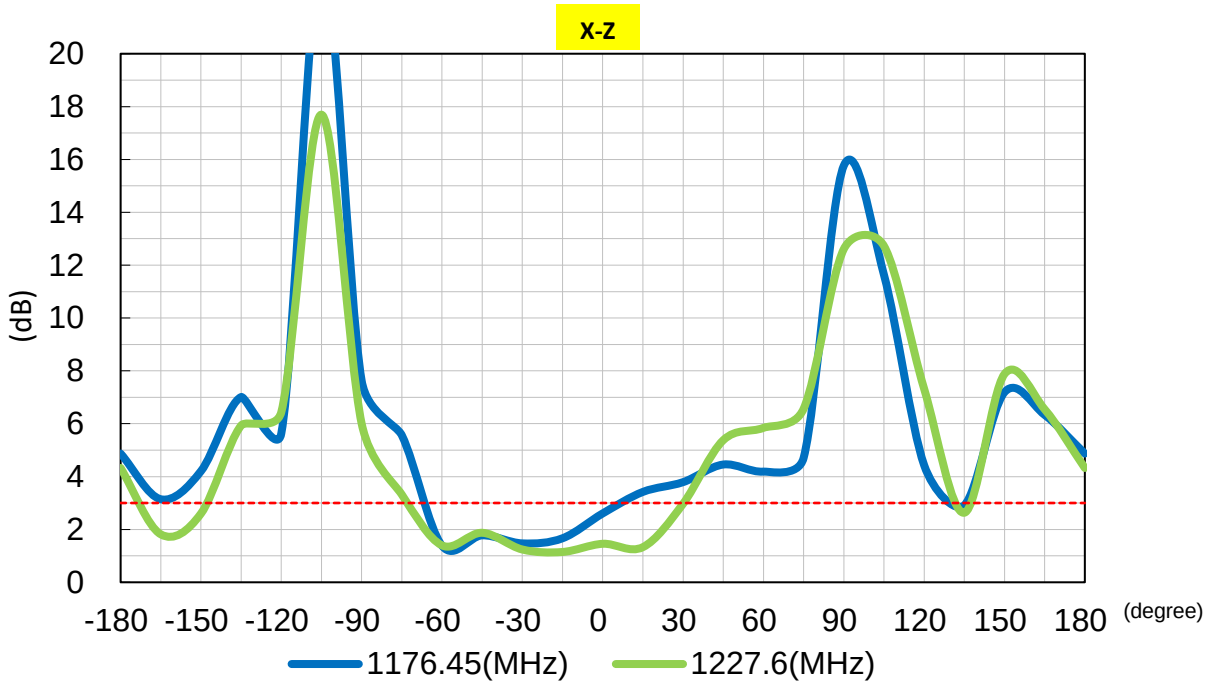
3.3 Average Gain

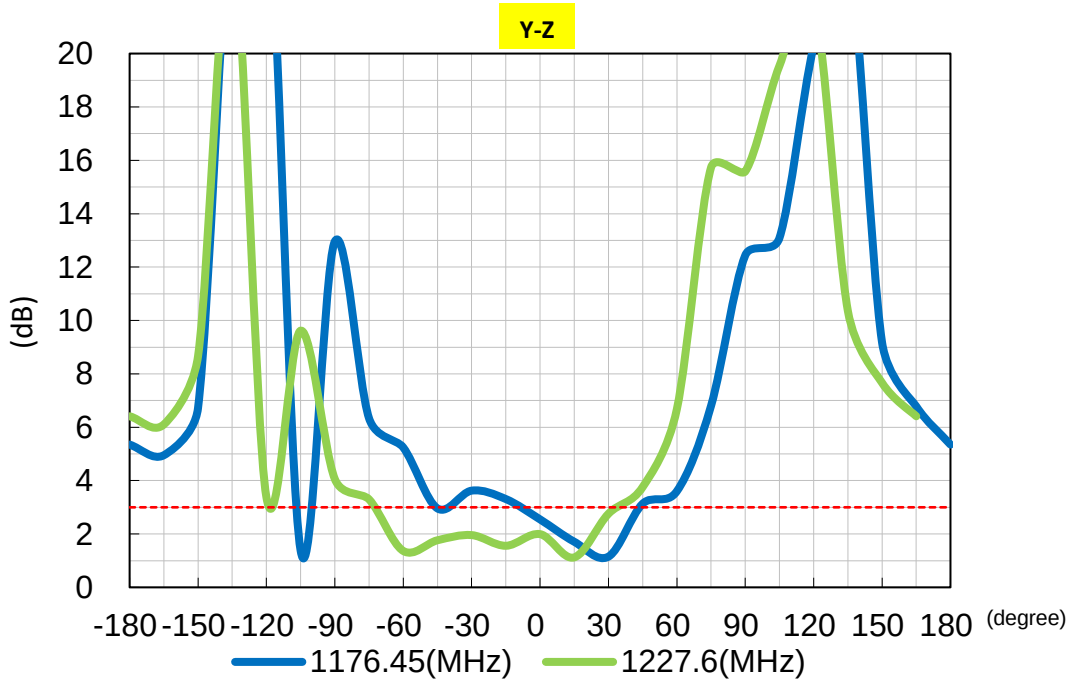


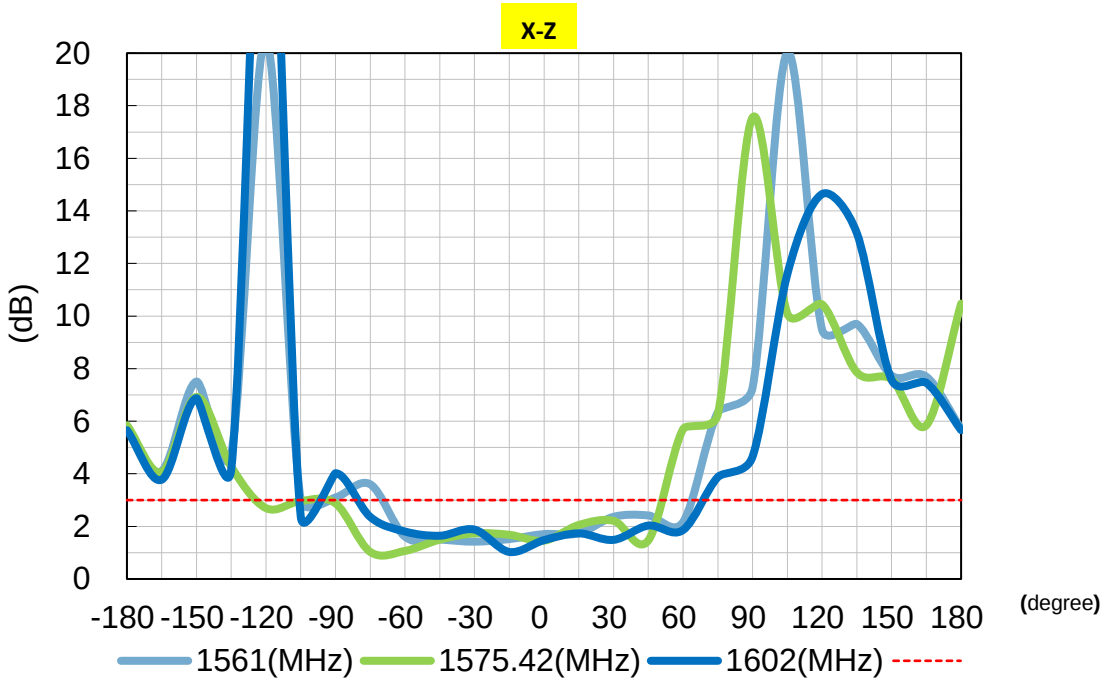
3.4 Peak Gain

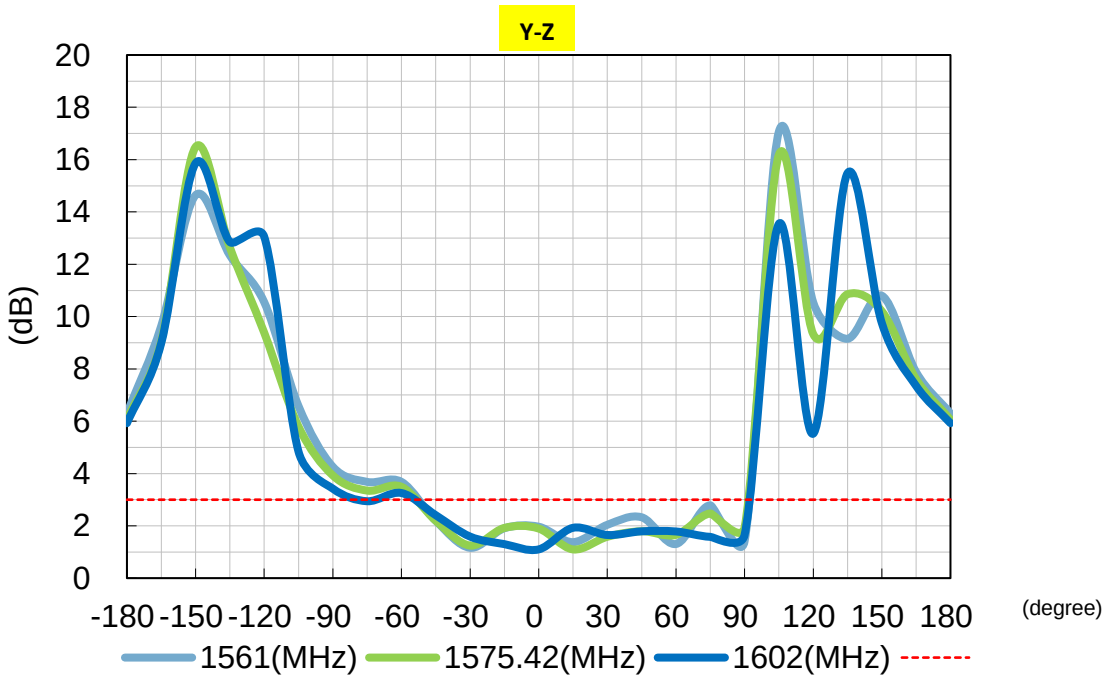


3.5 Axial Ratio



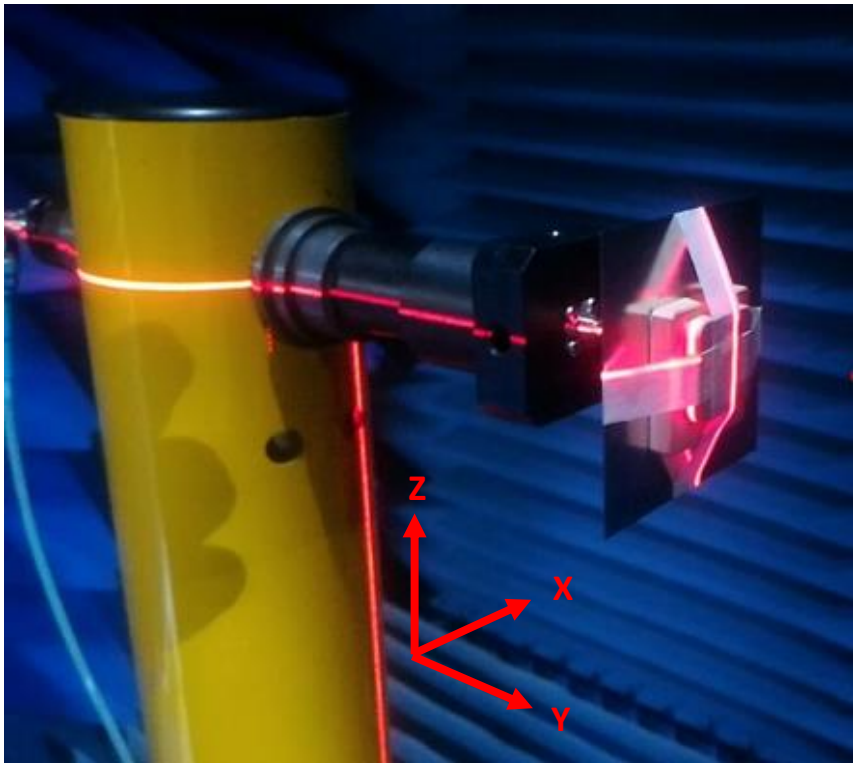



X-Z
20
18
16
14
12
10
8
6
4
2
0
(dB)
-180 -150 -120 -90 -60 -30 0 30 60 90 120 150 180
(degree)
1561(MHz)
1575.42(MHz)
1602(MHz)

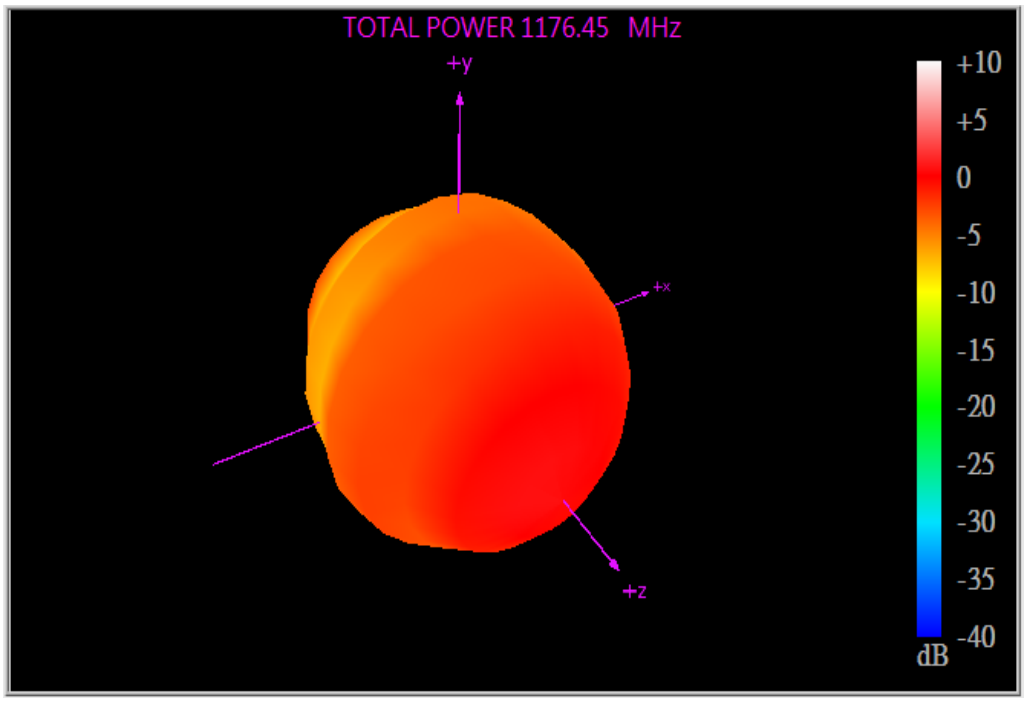

Y-Z
20
18
16
14
12
10
8
6
4
2
0
(dB)
-180 -150 -120 -90 -60 -30 0 30 60 90 120 150 180
(degree)
1561(MHz)
1575.42(MHz)
1602(MHz)

4. Radiation Patterns

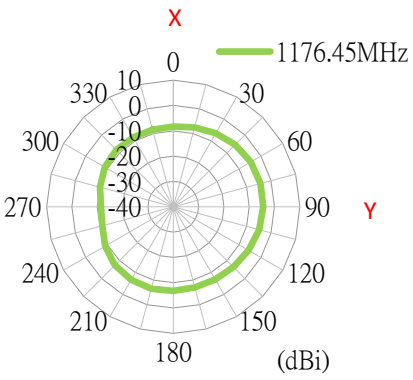
4.1 Test Setup

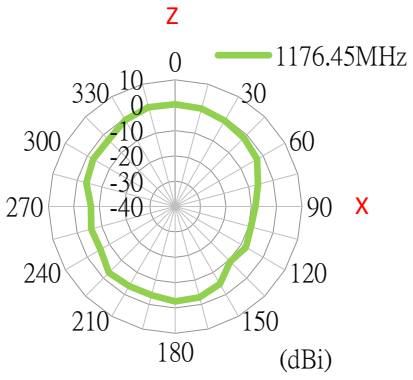


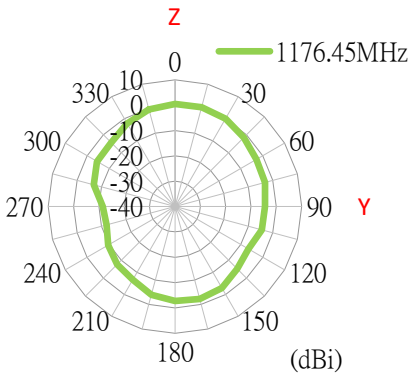
4.2 1176.45MHz 3D and 2D Radiation Patterns



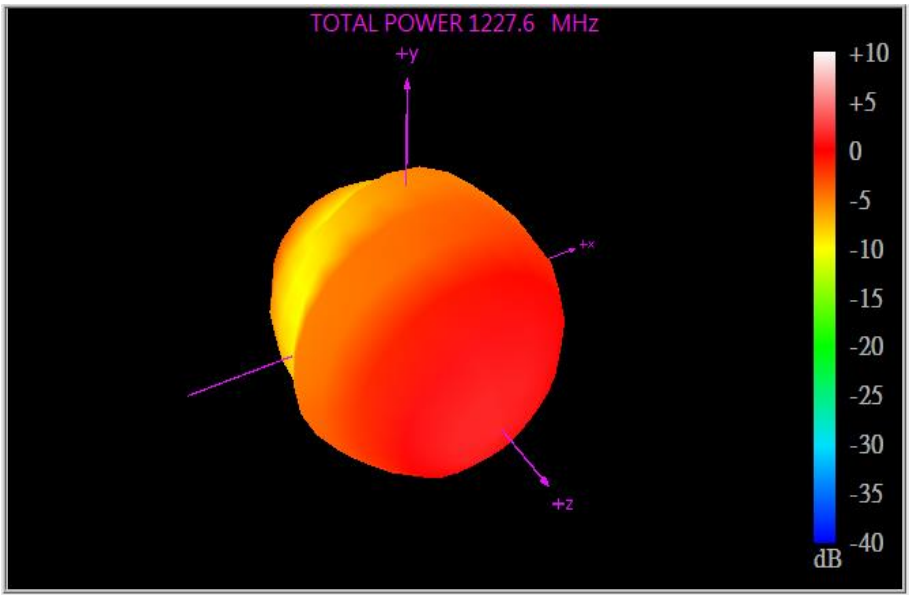
XY Plane	XZ Plane	YZ Plane

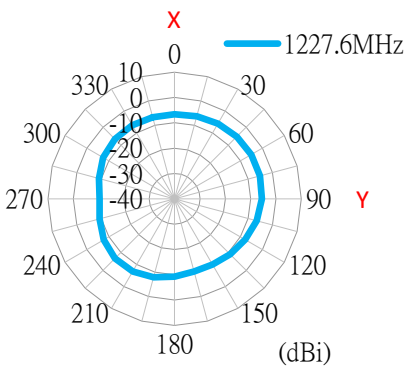
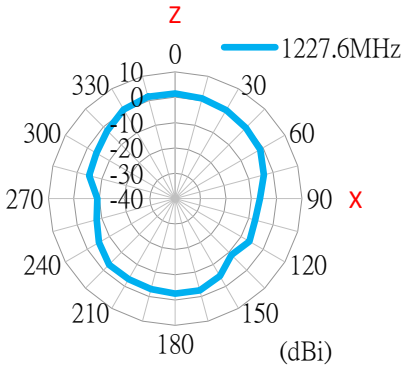
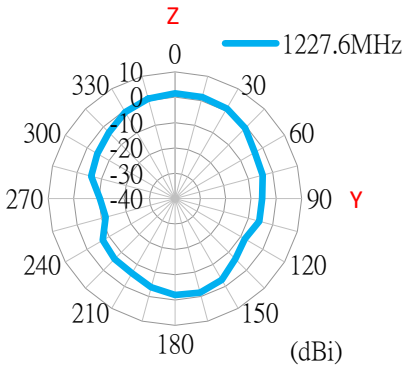




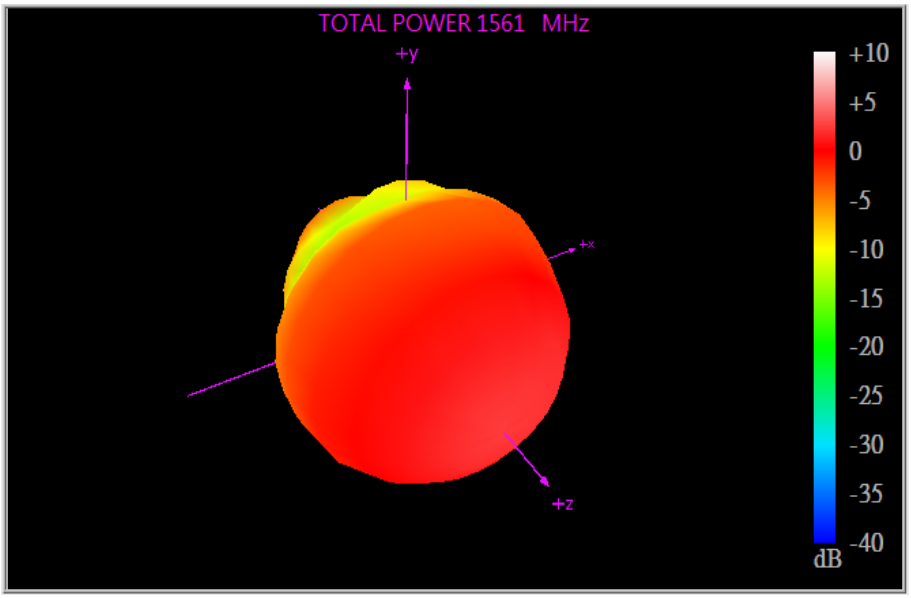


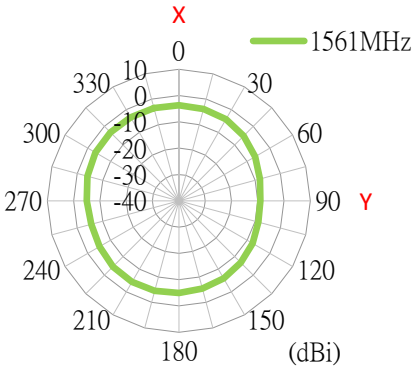
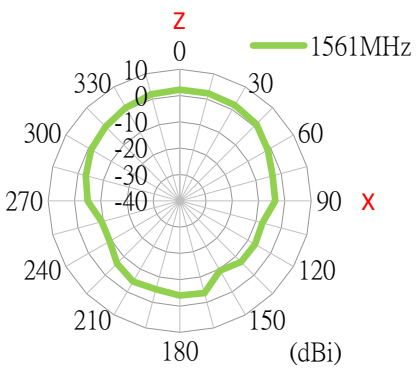
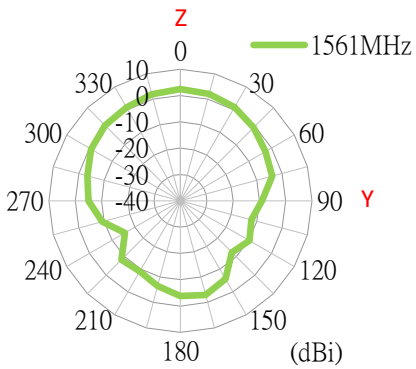
4.3 1227.6MHz 3D and 2D Radiation Patterns



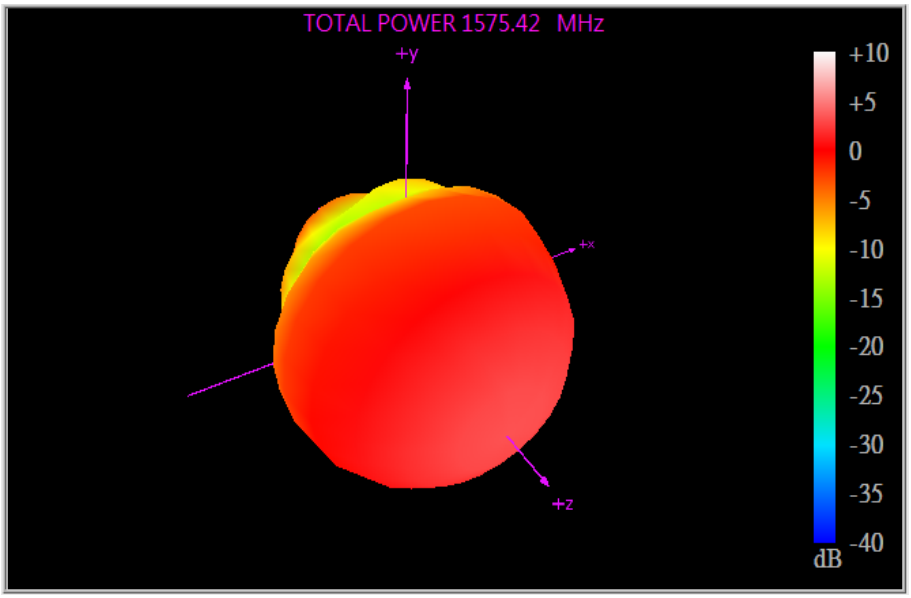
XY Plane	XZ Plane	YZ Plane
		

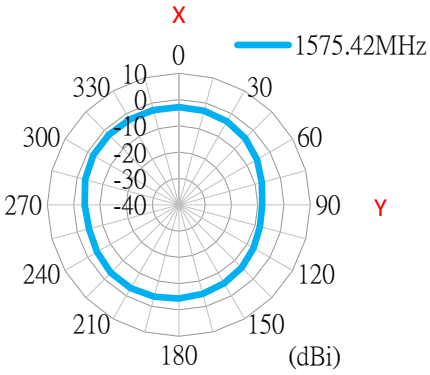
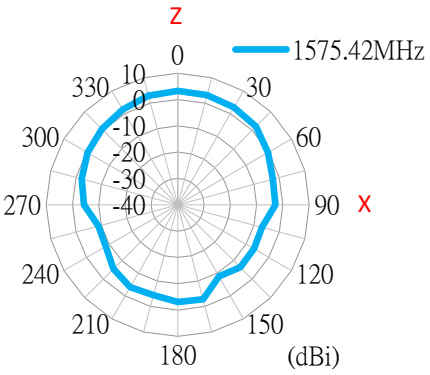
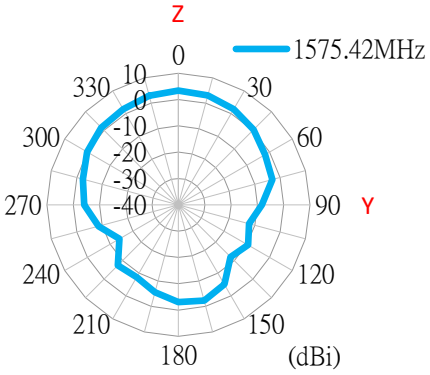
4.4 1561MHz 3D and 2D Radiation Patterns



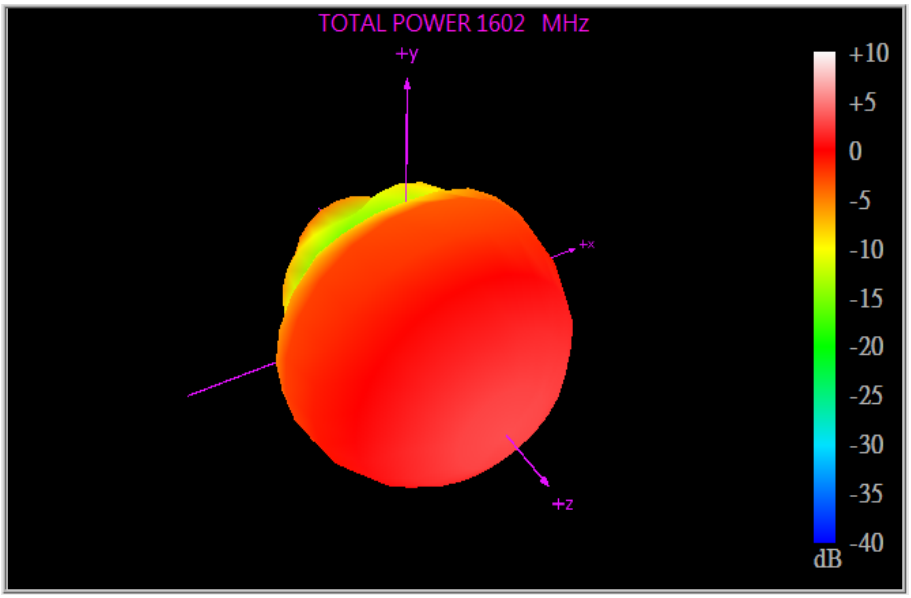
XY Plane	XZ Plane	YZ Plane
		

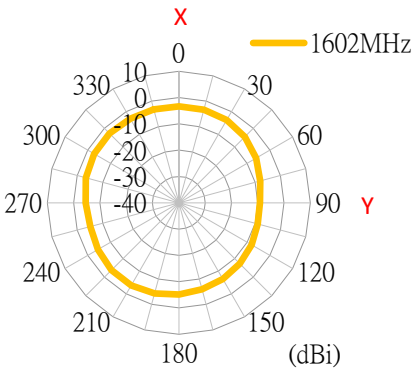
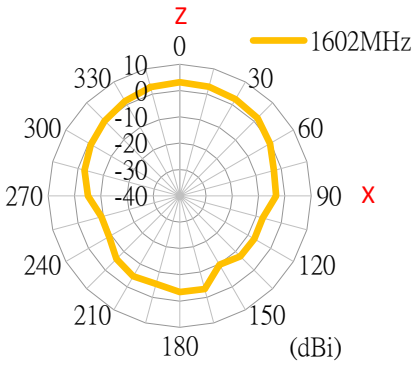
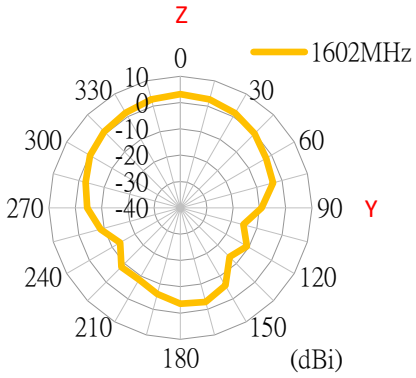
4.5 1575.42MHz 3D and 2D Radiation Patterns



XY Plane	XZ Plane	YZ Plane
		

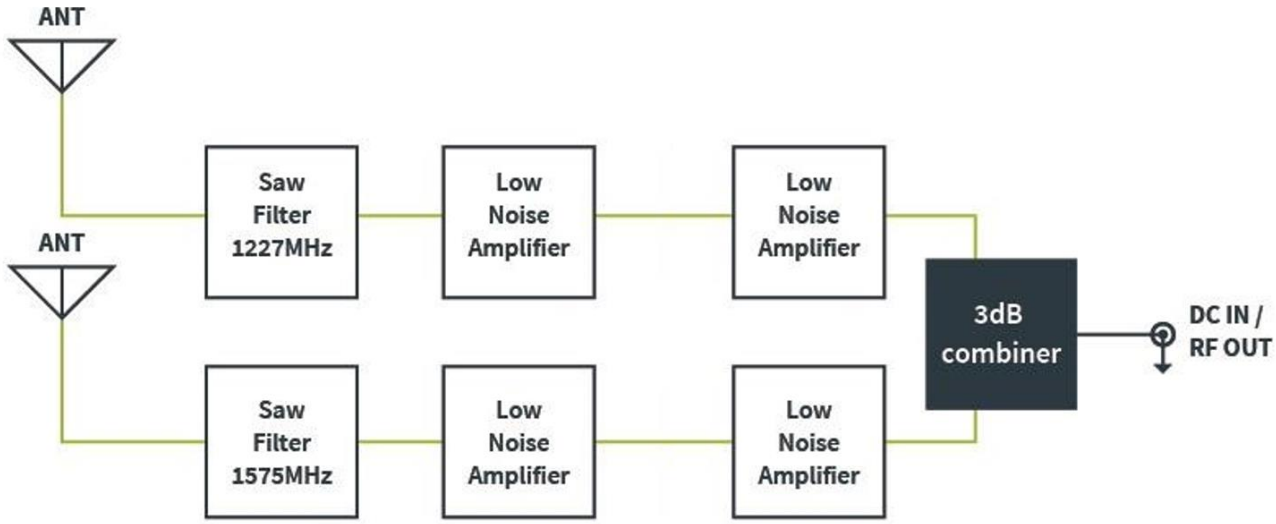
4.6 1602MHz 3D and 2D Radiation Patterns



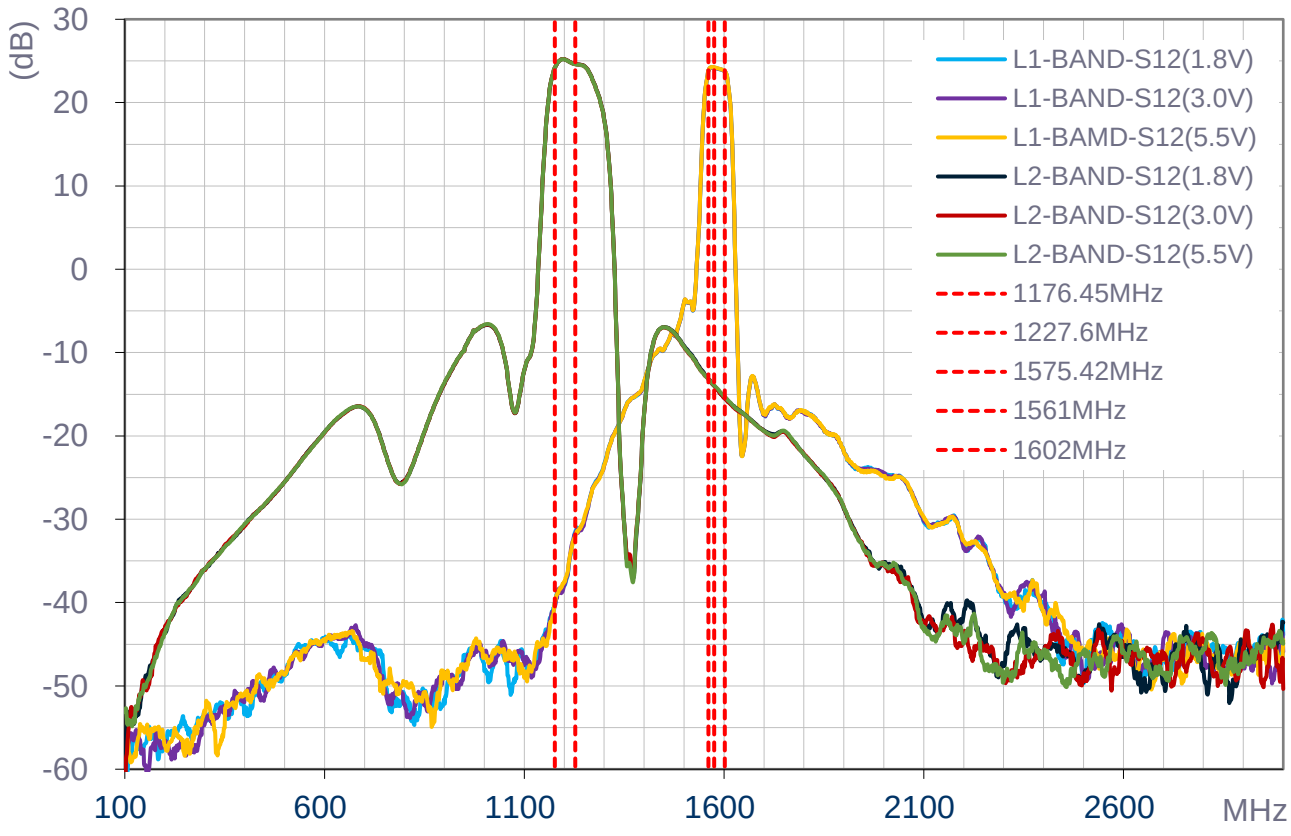
XY Plane	XZ Plane	YZ Plane
		

5. LNA Characteristics

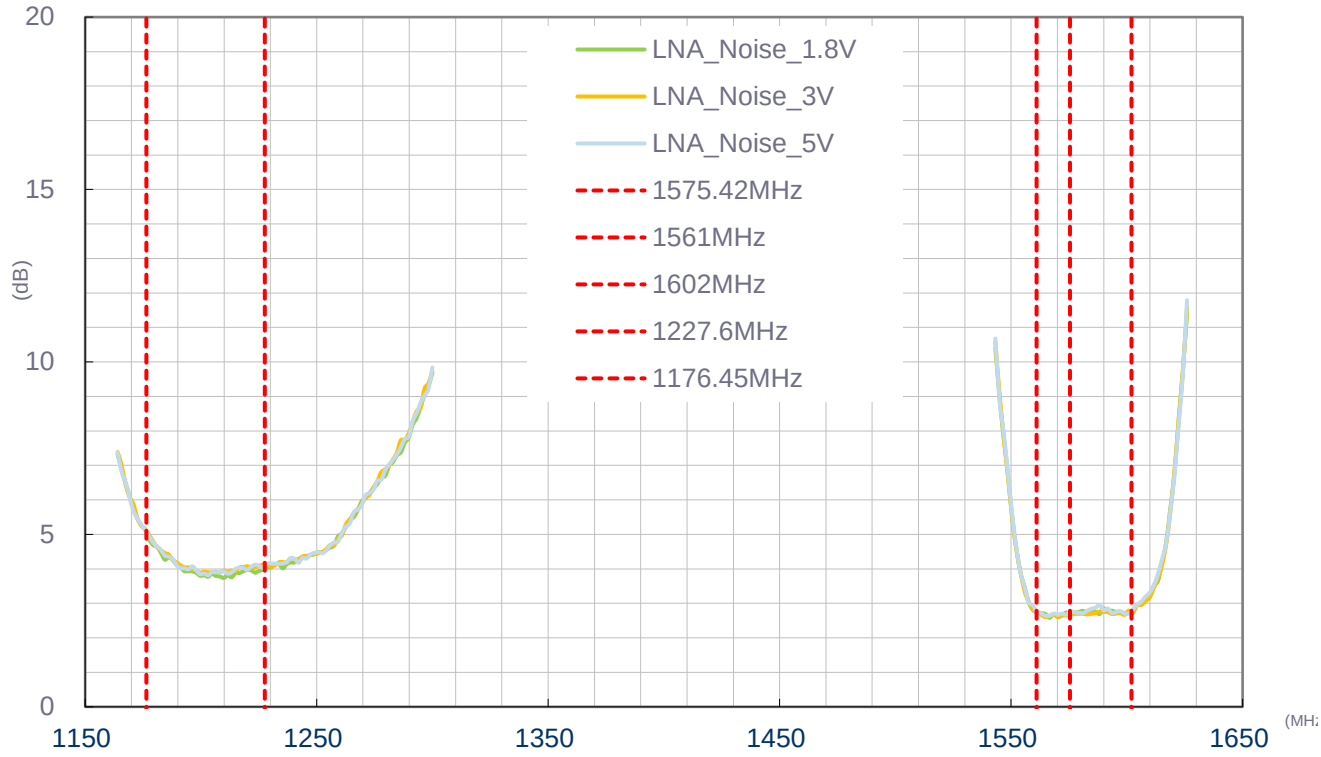
5.1 Block Diagram (Active Antenna)



5.2 LNA Gain



5.3 Noise Figure @3.0V



6. Field Test Results

6.1 Rooftop test

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

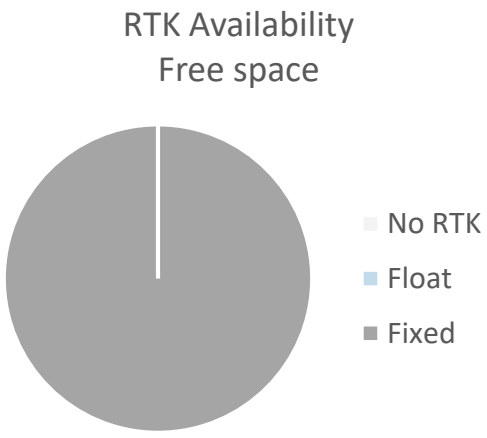
Taoglas will show the field test results using the following receiver:

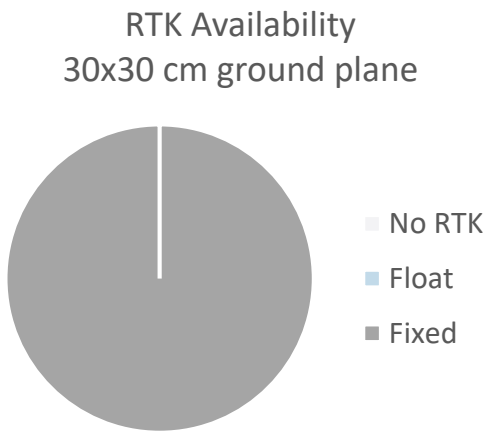
1. **U-blox ZED-F9P**

   Receiver features:

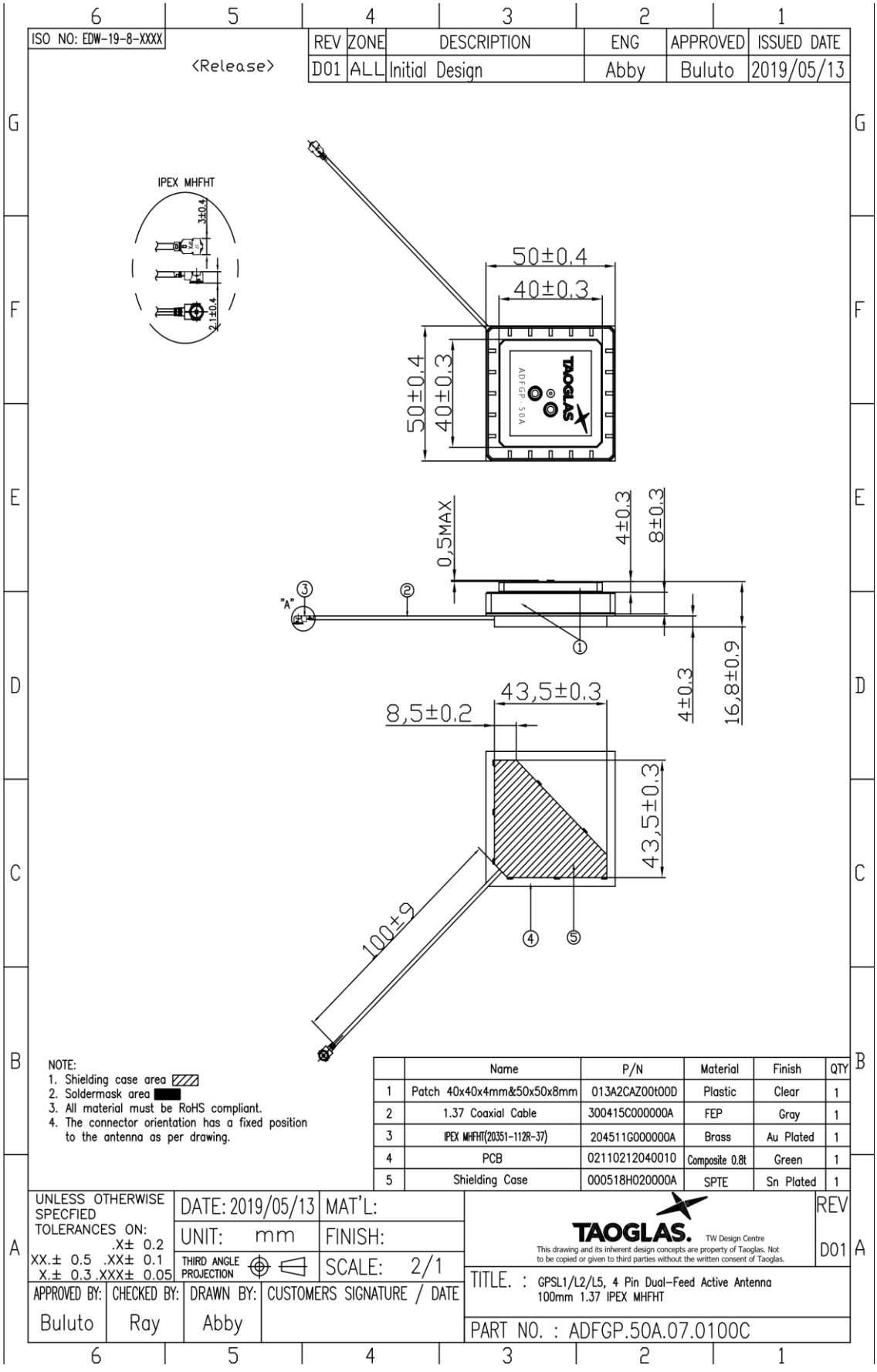
   - Multi-band GNSS: 184-channel GPS L1C/A L2C, GLONASS: L1OF L2OF, Galileo: E1B/C E5b, BeiDou: B1I B2I, QZSS: L1C/A L2C
   - Multi-band RTK with fast convergence times and reliable performance
   - Nav. update rate RTK up to 20 Hz
   - Position accuracy = RTK 0.01 m + 1 ppm CEP

Positioning Accuracy Table (2D Accuracy)					
Test Condition	**Correction Service**	**CEP (50%)**	**DRMS (68%)**	**2DRMS (95-98.2%)**	**TTFF (sec)**
Free Space	RTK DISABLED	56.42 cm	73.23 cm	146.46 cm	15
	RTL ENABLED	0.9 cm	1.08 cm	2.16 cm	15
30x30 cm Ground Plane	RTK DISABLED	46.69 cm	58.83 cm	117.65 cm	12
	RTL ENABLED	0.8 cm	0.96 cm	1.93 cm	12



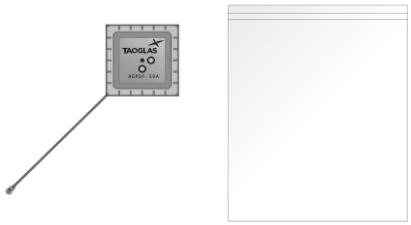


7. Mechanical Drawing (Units: mm)

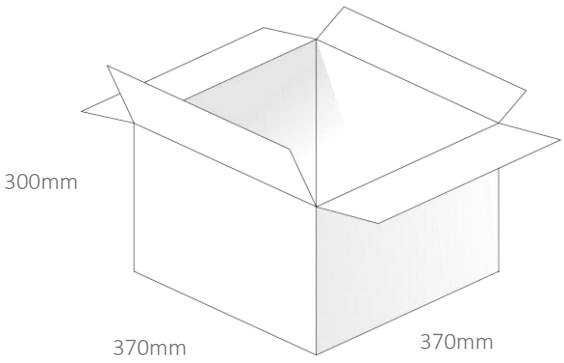


8. Packaging

1pcs ADFGP.50A.07.0100C per small PE Bag
Weight: 100g



100pcs ADFGP.25A.07.0060A per Large PE Bag Dimensions: 370*370*300 mm
Weight: 11Kg



Changelog for the datasheet

SPE-19-8-133 – ADFGP.50A.07.0100C

Revision: C (Current Version)	
Date:	2020-05-29
Changes:	Added Field Test Section
Changes Made by:	Victor Pinazo

Previous Revisions

Revision: A	
Date:	2019-10-17
Changes:	Initial Release
Changes Made by:	Jack Conroy

Revision: B	
Date:	2020-03-02
Changes:	Updated Introduction
Changes Made by:	Yu Kai Yeung

TAOGLAS®

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