



TAOGLAS®



Datasheet

Bolt

Part No:
A.85.A.101111

Description:

Bolt-Multi-Bands Low Profile
GPS(L5)/ GPS(L1), Galileo(E1), GLONASS(G1), BeiDou(B1)
Permanent Mount Antenna with High Out of Band Rejection

Features:

30dB GPS(L5) Gain, 28dB GNSS(L1) Gain
>80dB@850/900MHz,
>65dB@1,800/1,900MHz
Lightning Induced Surge Protection
Wideband Input Voltage
Permanent (Screw) Mount
Low Profile, Vandal Resistant Design
IP67 Rated, UV Resistant Enclosure
Cable: 1m RG-174
Connector: SMA (M) ST
Dimensions: Diameter: 94.3mm, Height: 25.4mm
RoHS & Reach Compliant

| | |
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1. Introduction



The Bolt, A.85 is a high gain GNSS L1/L5 (GPS/GLONASS/Galileo/BeiDou) antenna that features very high out of band rejection and can handle large bursts of power from nearby transmitters allowing the antenna to always remain operational. These characteristics make the A.85 ideal for applications where the antenna will be placed near high-power transmitters.

Typical Applications Include:

- Commercial Transportation
- Asset and Container Tracking
- Small Cell GNSS Towers
- Precision Agriculture

The A.85 Bolt L1 and L5 GNSS permanent mount antenna utilizes a very high efficiency (>60%) patch antenna that has been tuned for best possible performance within the enclosure to maximize signal quality. The internal LNAs have very low noise figure to maintain excellent signal quality throughout the entire signal chain. The signal chain also features carefully selected and placed SAW filters that collectively allow for very sharp signal attenuation outside of the intended frequency bands without negatively impacting in-band signal quality.

The A.85 features excellent rejection across all non-GNSS frequencies to prevent overdriving or damaging your GPS receiver. At the 850/900MHz cellular bands, for example, the A.85 exhibits greater than 50dB of rejection. At the 1800/1900MHz cellular bands, it exhibits >65dB, making it best in class when out of band interference is a concern. Even with this excellent out of band attenuation, the A.85 maintains a low noise figure of 4dB and high gain of >21dB, making it an ideal solution for applications with longer cable runs where high cable loss is a concern.

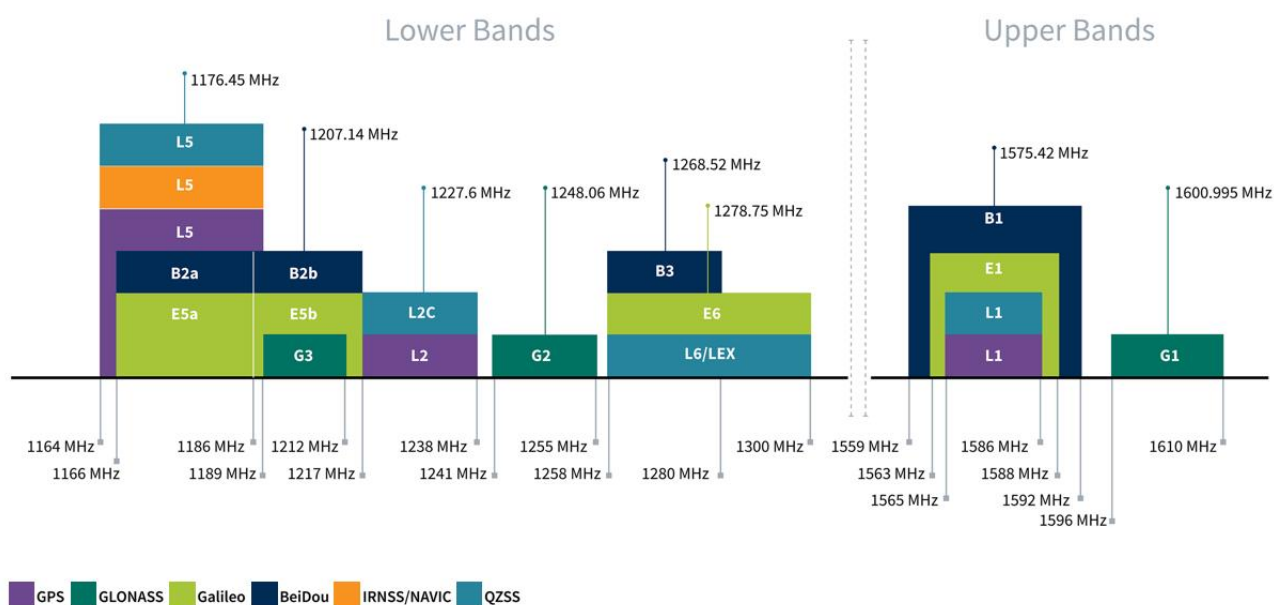
Cable lengths and connector types are customizable. Contact your regional Taoglas customer support team for further information.

2. Specifications

| GNSS Frequency Bands Covered | | | | | | | |
|------------------------------|-------------------------------|---------------------------|------------------|--------------------|------------------|---------------|------------------|
| GPS/QZSS | L1 1575.42MHz | L2 1227.6MHz | L5 1176.45MHz | L6 1278.75MHz | | | |
| | ■ | □ | □ | □ | | | |
| GLONASS | L5R 1176.45MHz | L3PT 1201.5MHz | L2PT 1246MHz | L1CR 1575.42MHz | L1PT 1602MHz | | |
| | ■ | □ | □ | ■ | ■ | | |
| Galileo | E5a 1176.45MHz | E5b 1201.5MHz | E4 1215MHz | E3 1256MHz | E6 1278.75MHz | E2 1561MHz | E1 1575.42MHz |
| | ■ | □ | □ | □ | □ | ■ | ■ |
| BeiDou | B1 1561MHz | B2 1207.14MHz | B3 1268.52MHz | | | | |
| | ■ | □ | □ | | | | |
| Compass | E5B(B2)/ E6(B3) 1268.56MHz | E2(B1) 1561MHz | | | | | |
| | □ | ■ | | | | | |
| SBAS | Omnistar 1542.5MHz | WAAS/EGN OS 1575.42MHz | | | | | |
| | □ | ■ | | | | | |

■ GNSS Frequency Bands Covered. □ GNSS Frequency Bands Not Covered.

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



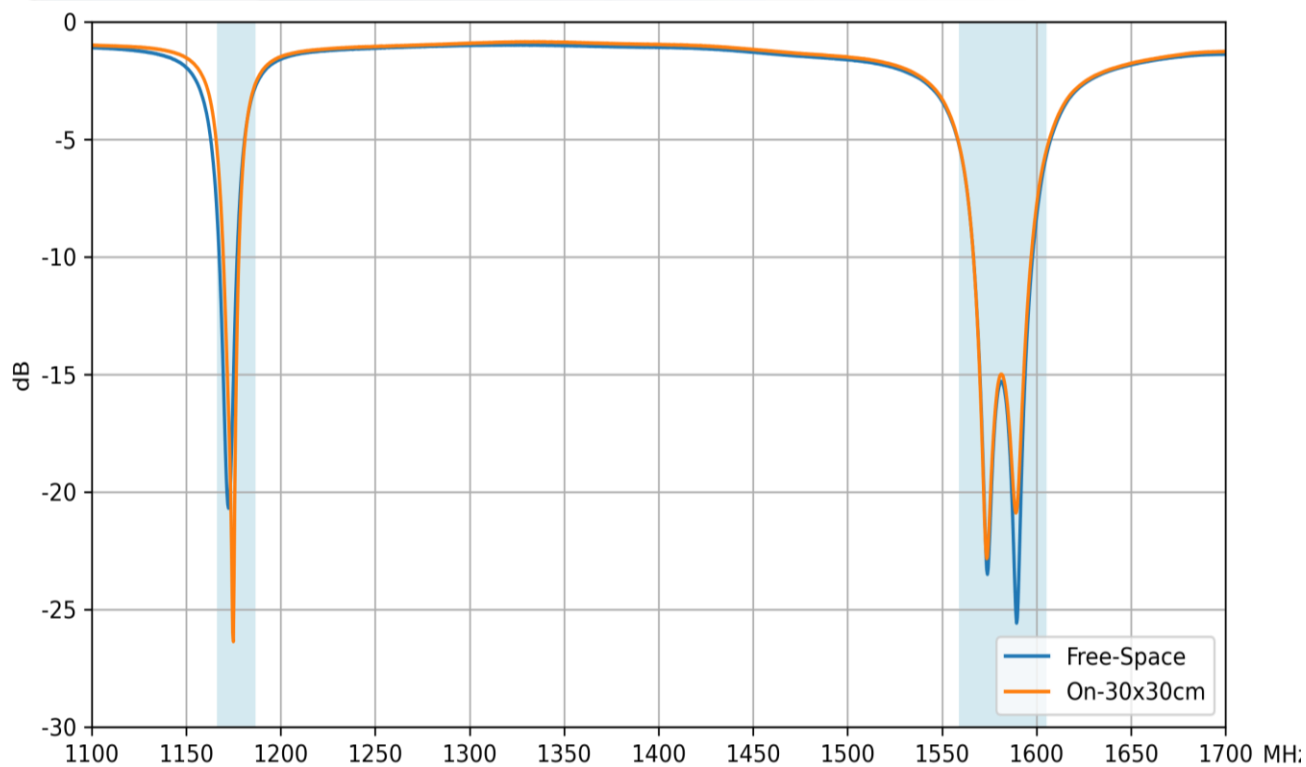
GNSS Bands and Constellations

| Electrical | | | | | |
|---|--|--|------------|-----------|------------|
| Frequency (MHz) | GPS_L5 | BeiDou_B1 | Galileo_E1 | GPS_L1C | GLONASS_L1 |
| | 1166-1186 | 1559-1563 | 1563-1587 | 1569-1581 | 1569-1605 |
| Efficiency (%) | | | | | |
| Free-Space | 61.5 | 41.5 | 68.0 | 68.0 | 62.9 |
| On-30x30cm | 51.4 | 35.5 | 57.7 | 57.7 | 54.4 |
| Average Gain (dB) | | | | | |
| Free-Space | -2.11 | -3.82 | -1.67 | -1.67 | -2.01 |
| On-30x30cm | -2.89 | -4.50 | -2.39 | -2.39 | -2.64 |
| Peak Gain (dBi) | | | | | |
| Free-Space | 3.70 | 0.52 | 2.72 | 2.72 | 2.83 |
| On-30x30cm | 2.78 | 2.34 | 4.40 | 4.40 | 4.50 |
| PCO (cm) | | | | | |
| Free-Space | 1.0 | 0.9 | 0.9 | 0.9 | 0.9 |
| On-30x30cm | 1.8 | 1.4 | 1.4 | 1.4 | 1.4 |
| PCV (cm) | | | | | |
| Free-Space | 2.3 | 1.2 | 1.2 | 1.2 | 1.2 |
| On-30x30cm | 6.3 | 8.6 | 8.6 | 8.6 | 8.6 |
| Impedance | | 50 Ω | | | |
| Polarization | | Right-Hand Circularly Polarized (RHCP) | | | |
| Radiation Pattern | | Omni-Directional | | | |
| Max. input power | | 5 W | | | |
| LNA and Filter Electrical Properties | | | | | |
| Frequency (MHz) | 1176.45 | 1561 | 1575.42 | 1602 | |
| Return Loss (dB) | -7 | -9 | -15 | -12 | |
| Gain @ 3V (dB) | 30 | 28 | 28 | 28 | |
| Noise @ 3V (dB) | 2.5 | 2.6 | 2.4 | 2.2 | |
| Group Delay (ns) | 28.1 | 26.7 | 25.2 | 28.0 | |
| DC Power Input (V) | 1.8 ~ 5.5 | | | | |
| Power consumption @3V (mA) | 18 | | | | |
| Outer Band Attenuation (dB) (reference level from 0dB) | 40 @ Fc +/-100MHz 50 @ Fc +/-200MHz | | | | |
| Field Test Result | | | | | |
| RTK Accuracy (cm) | 1.9 | | | | |
| CN Value (dB-Hz) | 40+ | | | | |
| Non RTK Accuracy (cm) | 42.8 | | | | |

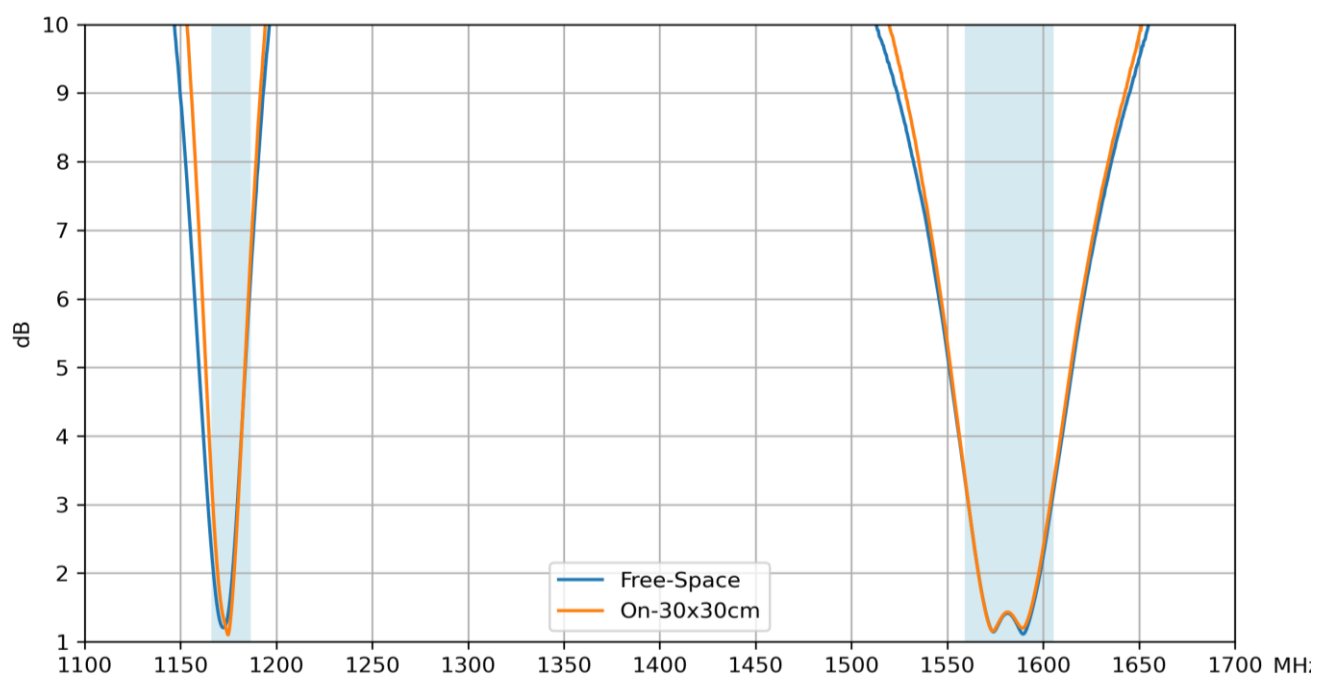
| Mechanical | |
|-------------------|----------------------------|
| Dimensions | 94.3mm, Height: 25.4mm |
| Weight | 283.5g |
| Material | ASA |
| Connector | SMA(M)ST as standard |
| Cable | 1m of RG-174 as standard |
| Environmental | |
| Waterproof Rating | IP65 |
| Temperature Range | -40°C to 85°C |
| Humidity | Non-condensing 65°C 95% RH |

3. Antenna Characteristics

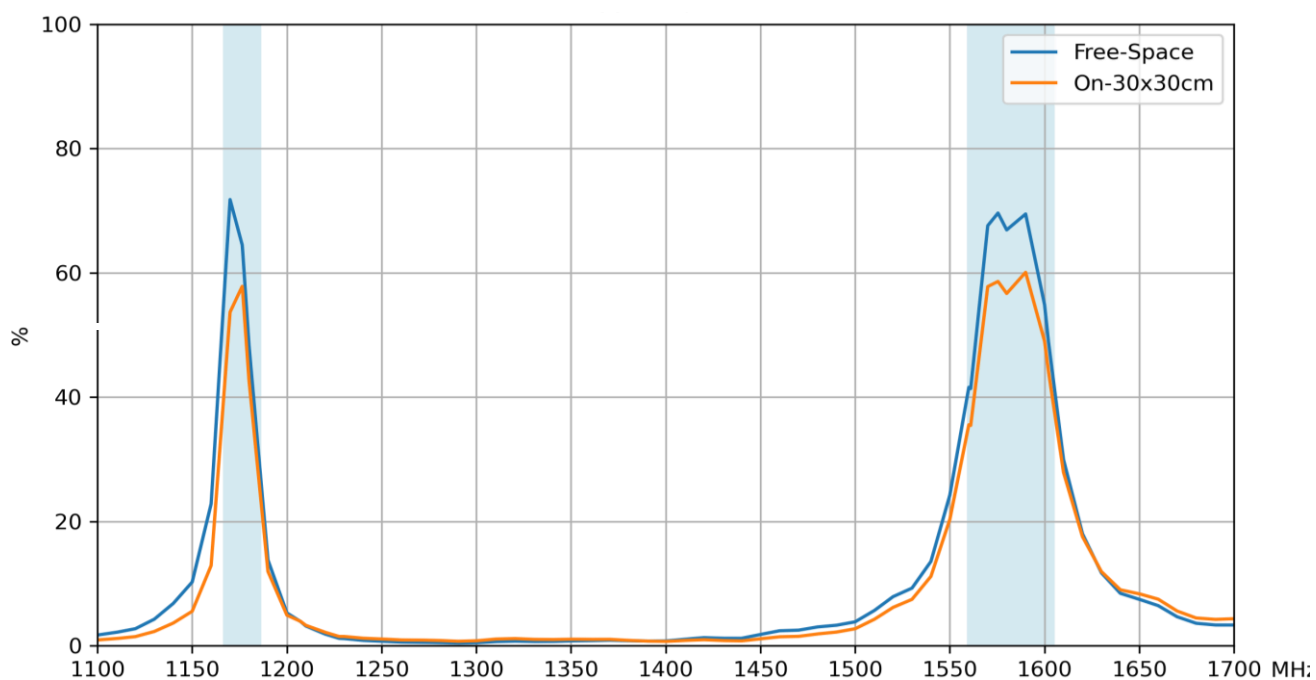
3.1 Return Loss



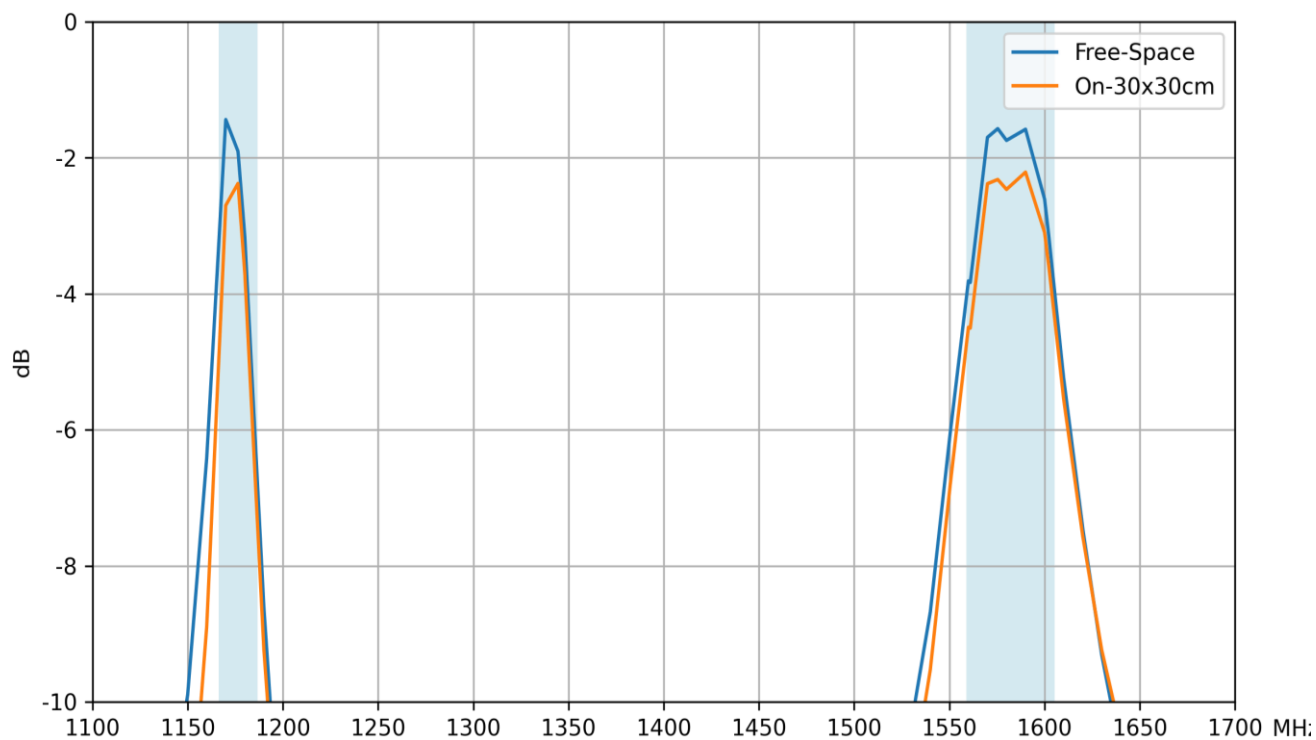
3.2 VSWR



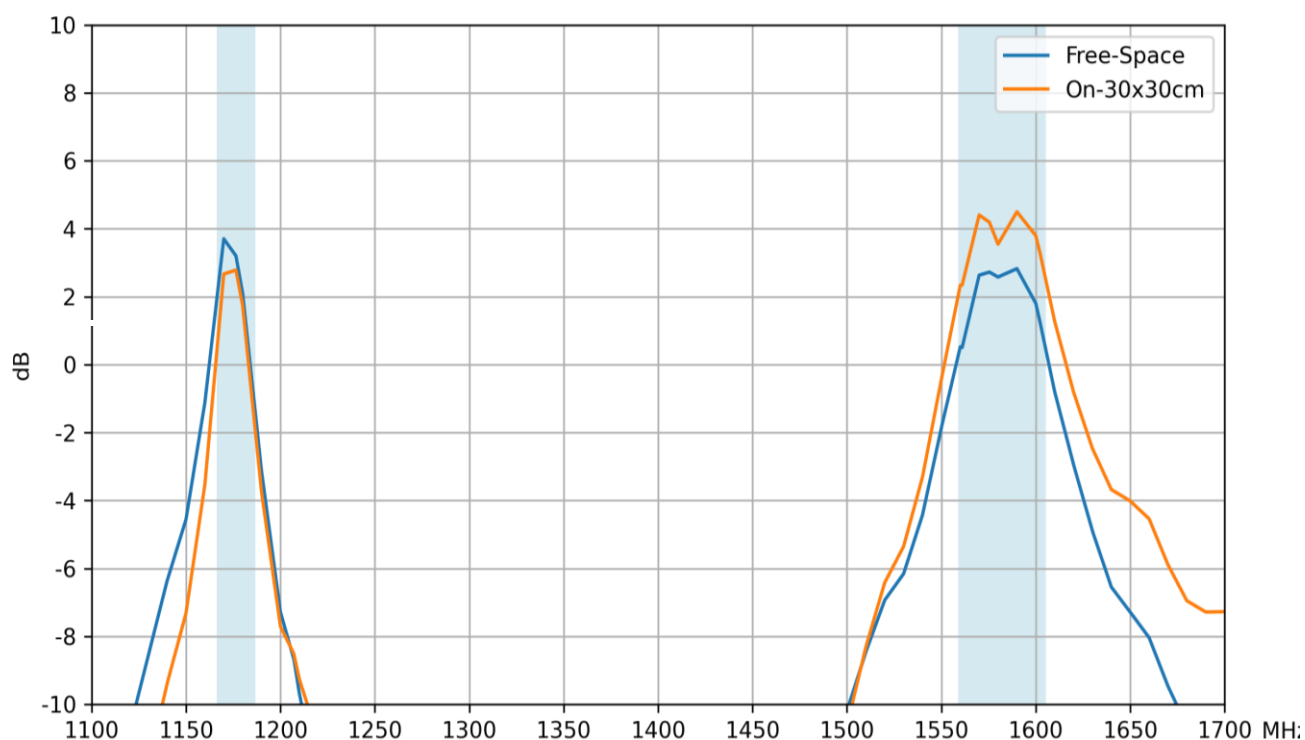
3.3 Efficiency



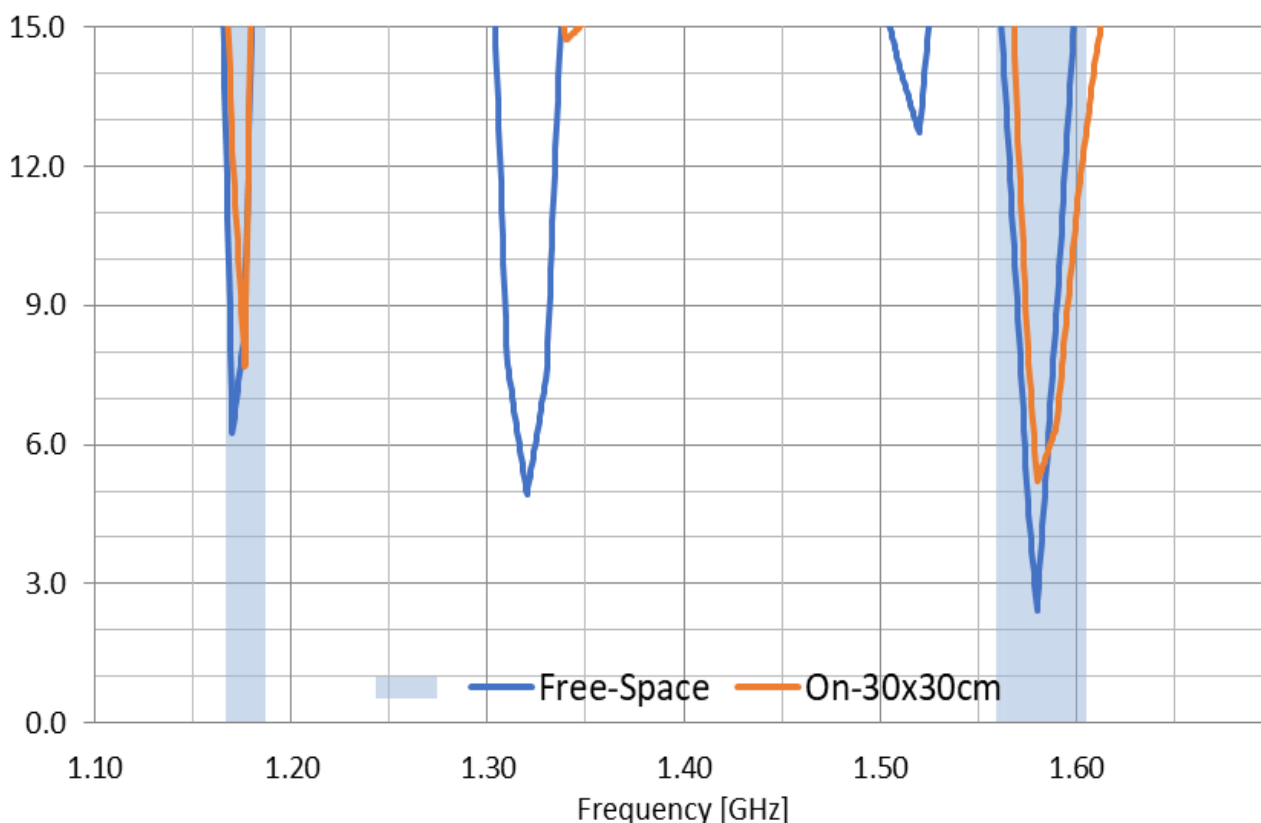
3.4 Average Gain



3.5 Peak Gain

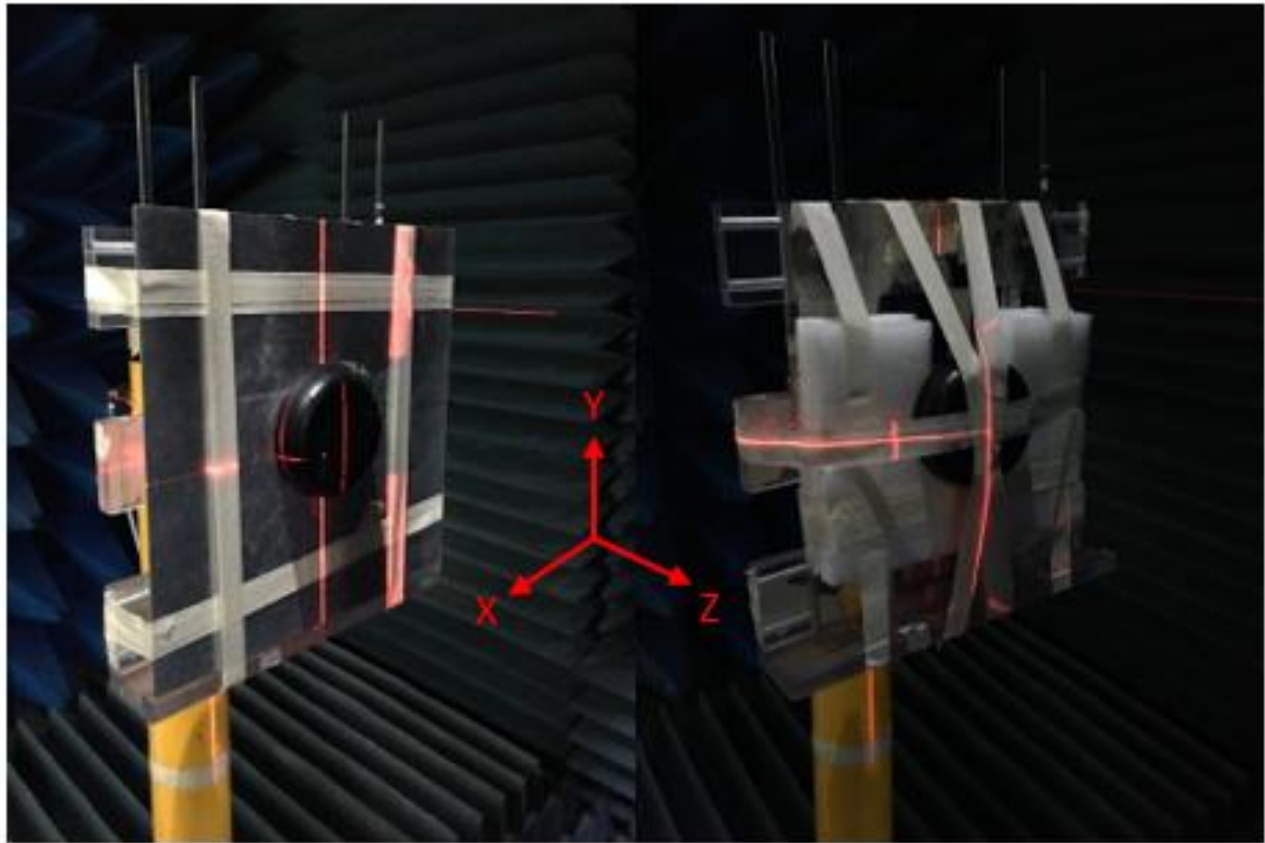


3.6 Axial Ratio



4. Radiation Patterns

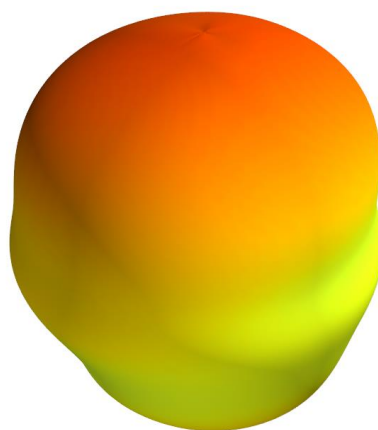
4.1 Test Setup



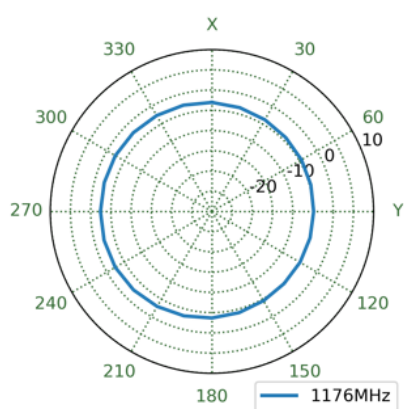
30x30cm Groundplane

Freespace

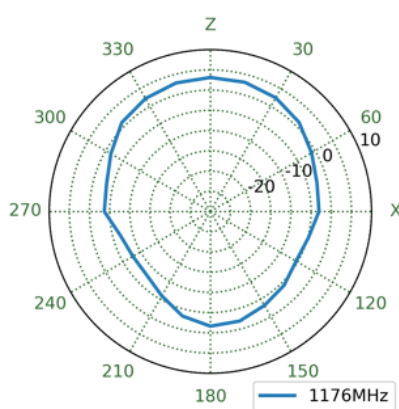
4.2 1176MHz 3D and 2D Radiation Patterns (Freespace)



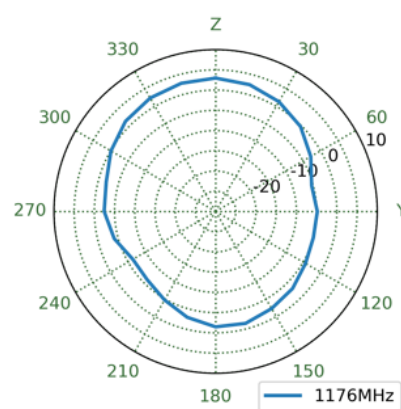
XY Plane



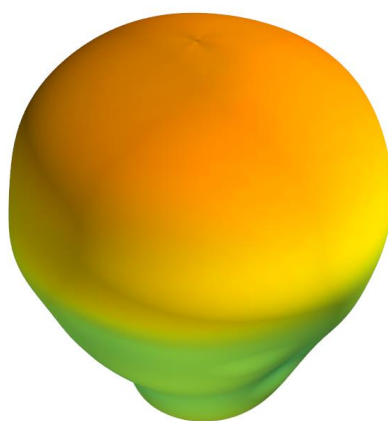
XZ Plane



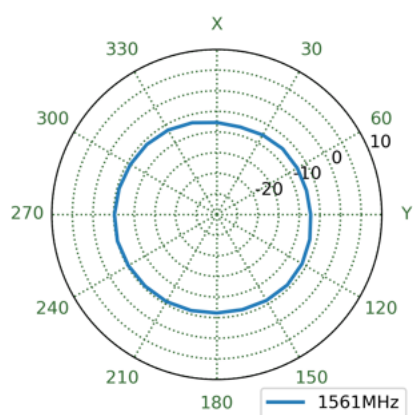
YZ Plane



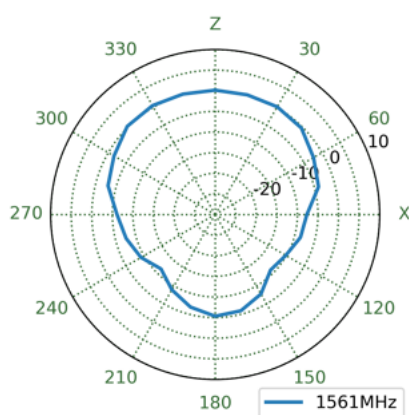
1561MHz



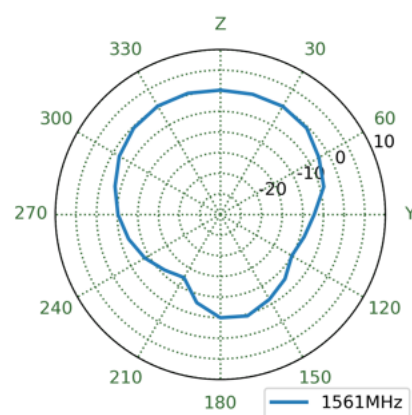
XY Plane



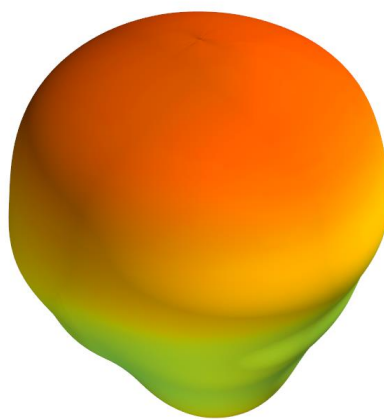
XZ Plane



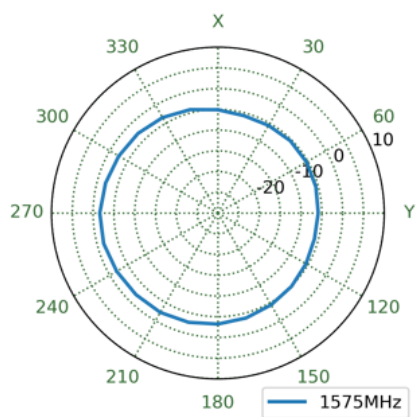
YZ Plane



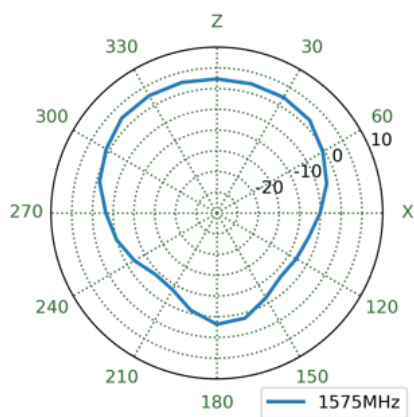
1575MHz



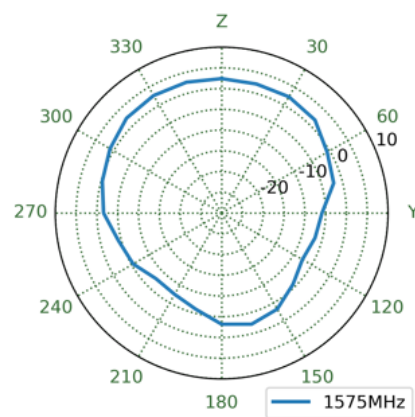
XY Plane



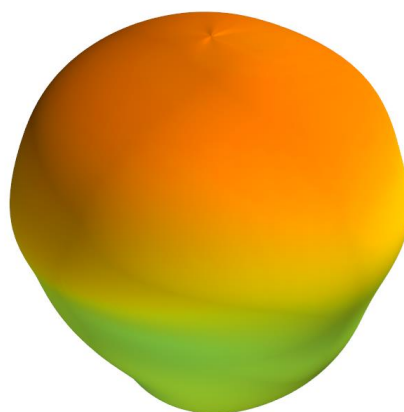
XZ Plane



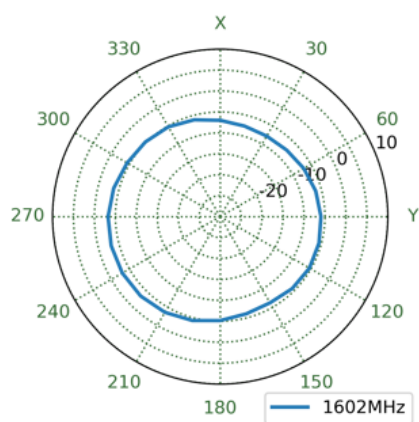
YZ Plane



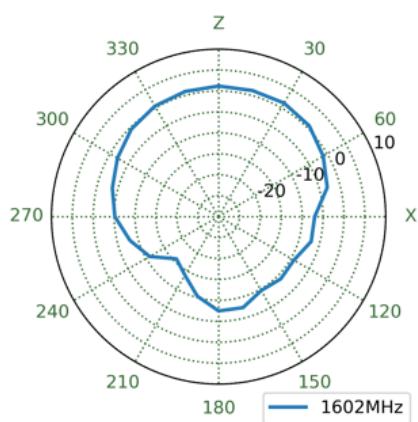
1602MHz



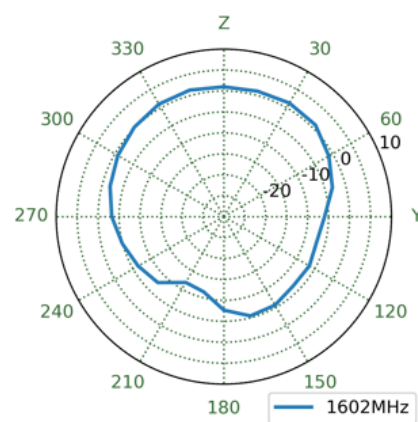
XY Plane



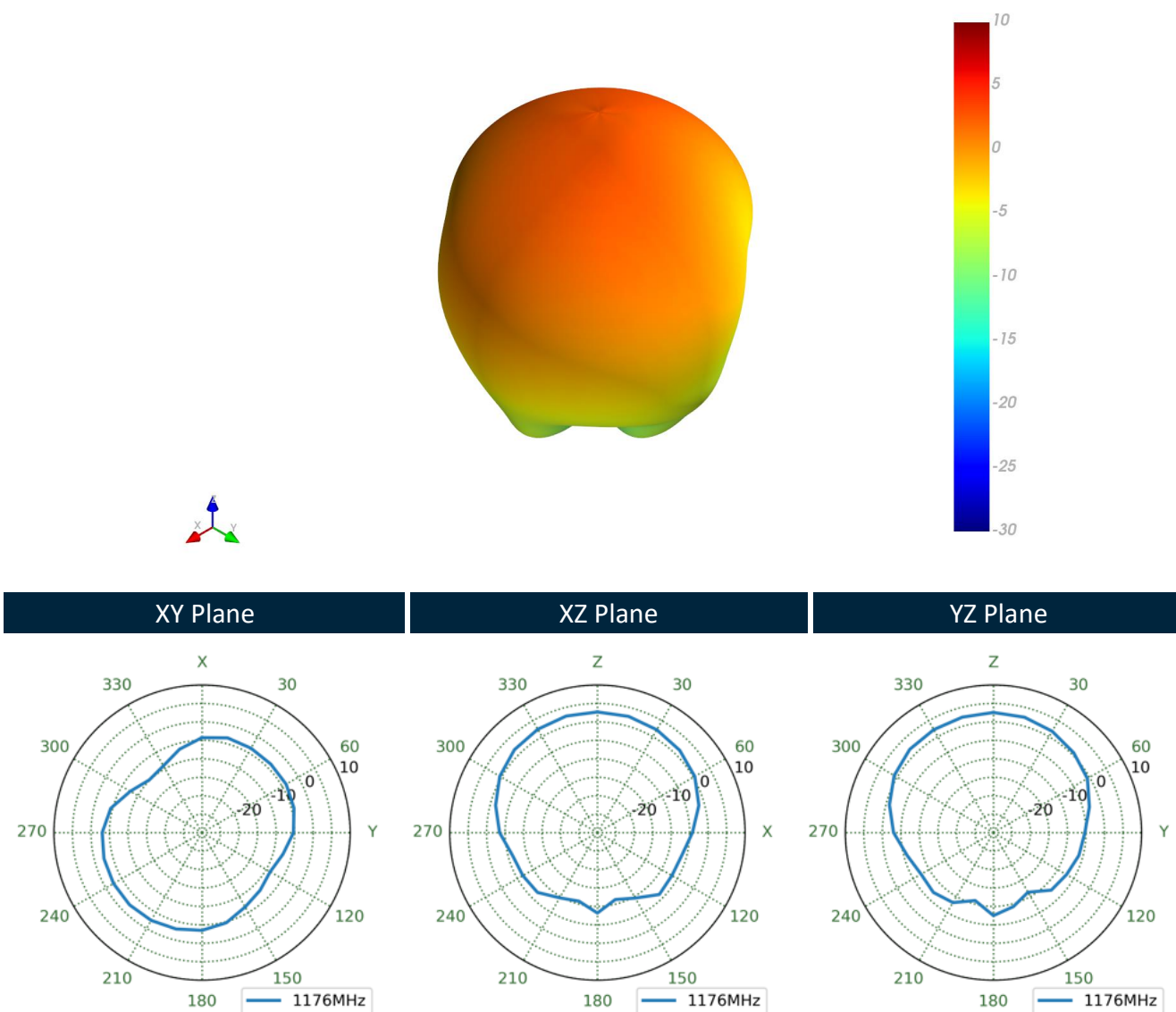
XZ Plane



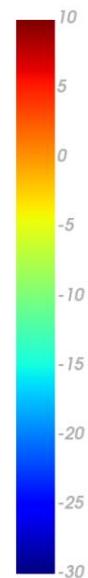
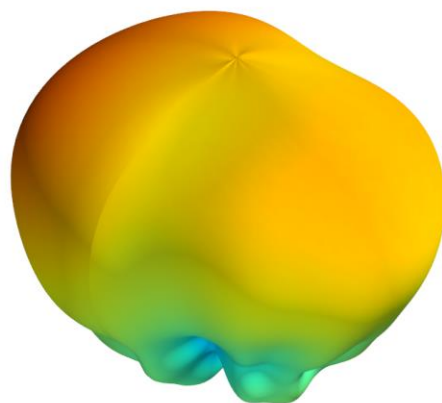
YZ Plane



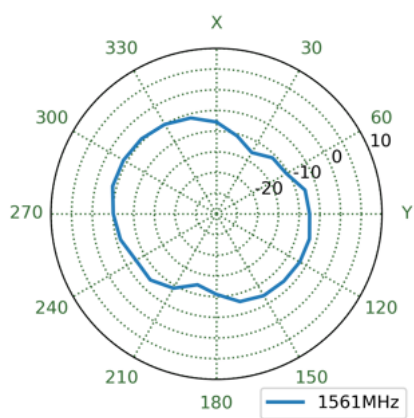
4.3 1176MHz 3D and 2D Radiation Patterns (30x30cm Groundplane)



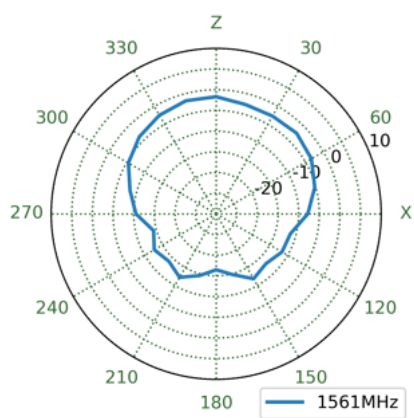
1561MHz



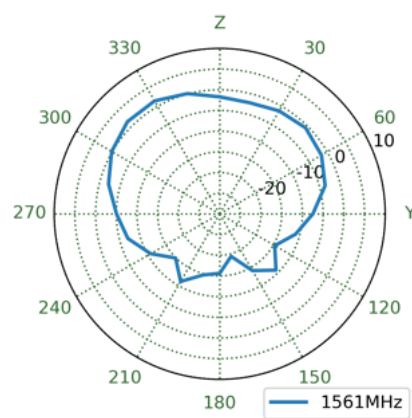
XY Plane



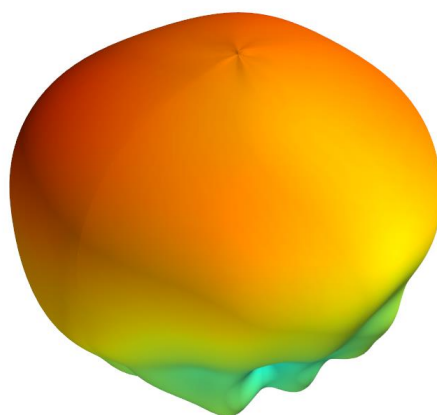
XZ Plane



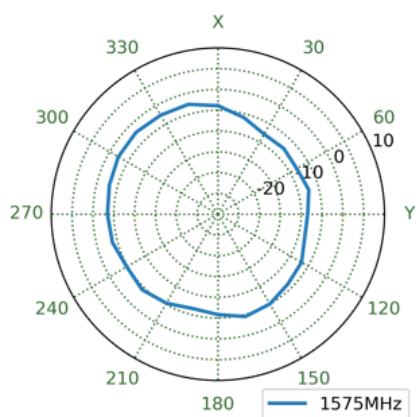
YZ Plane



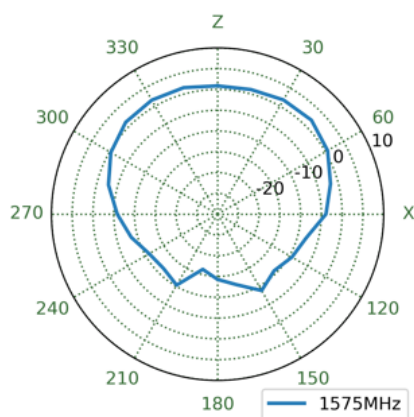
1575MHz



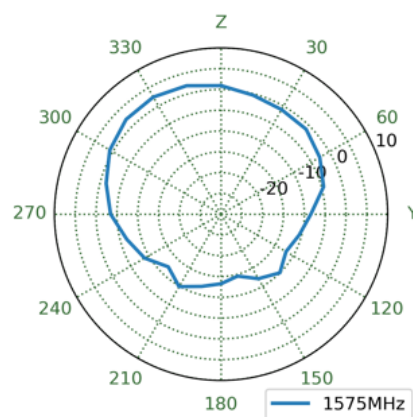
XY Plane



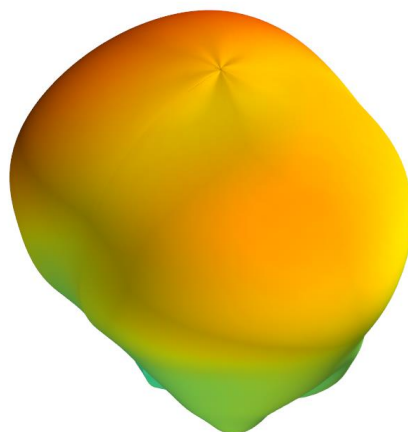
XZ Plane



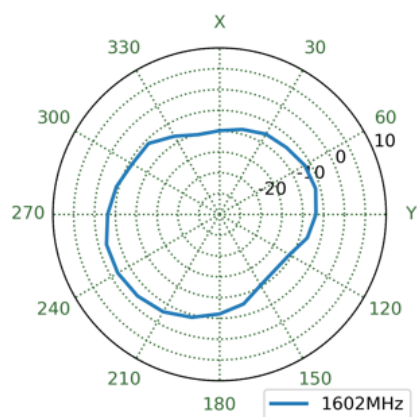
YZ Plane



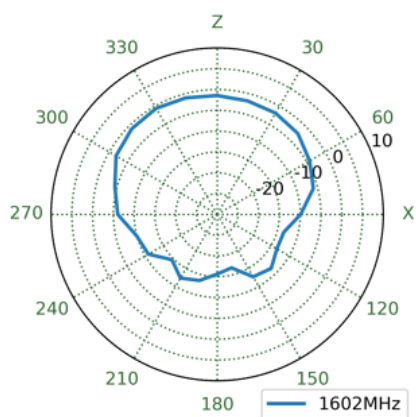
1602MHz



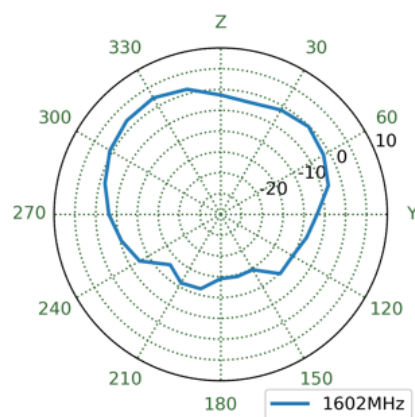
XY Plane



XZ Plane

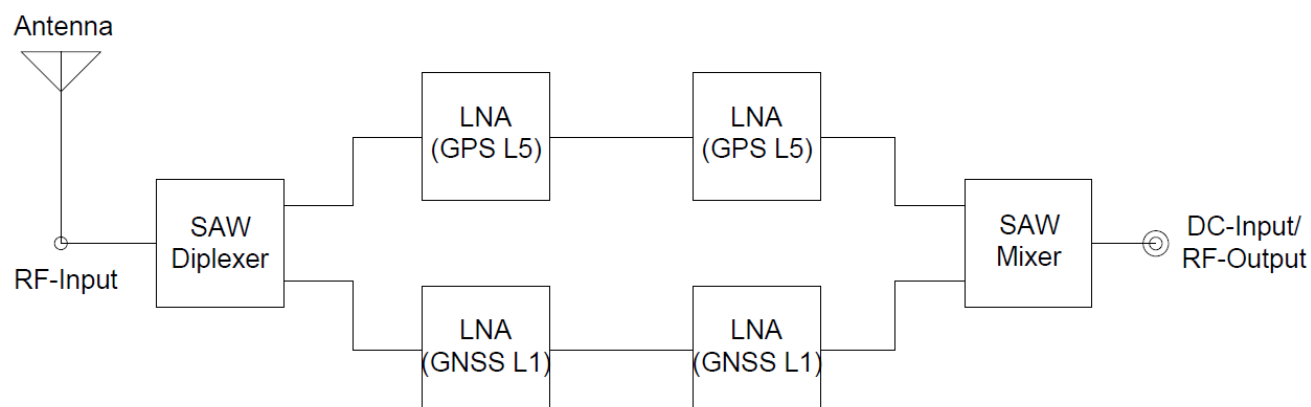


YZ Plane

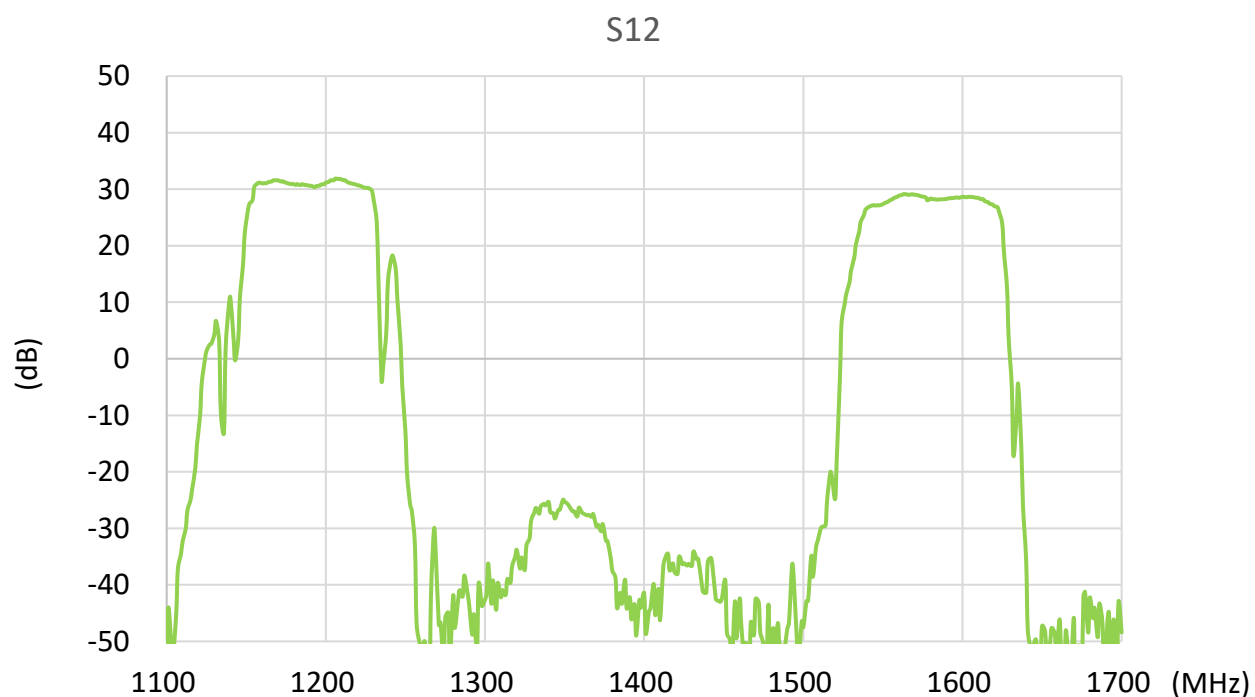


5. Active Characteristics

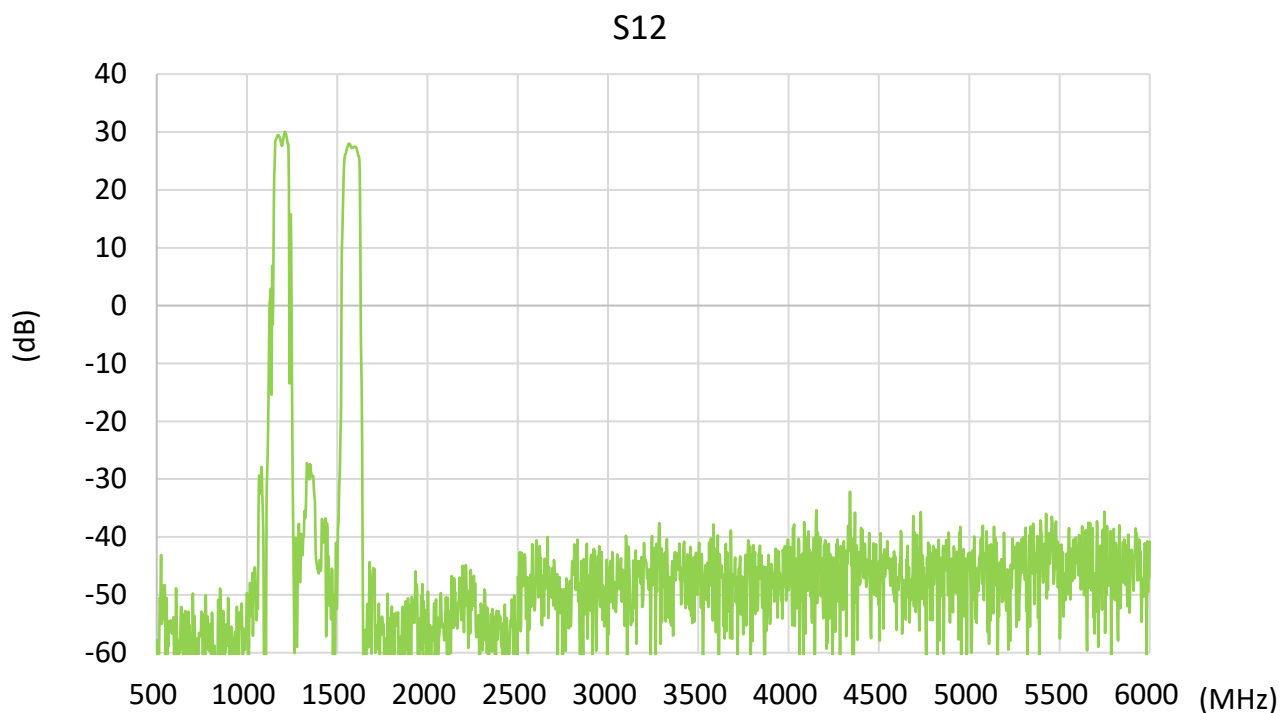
5.1 Block Diagram (LNA)



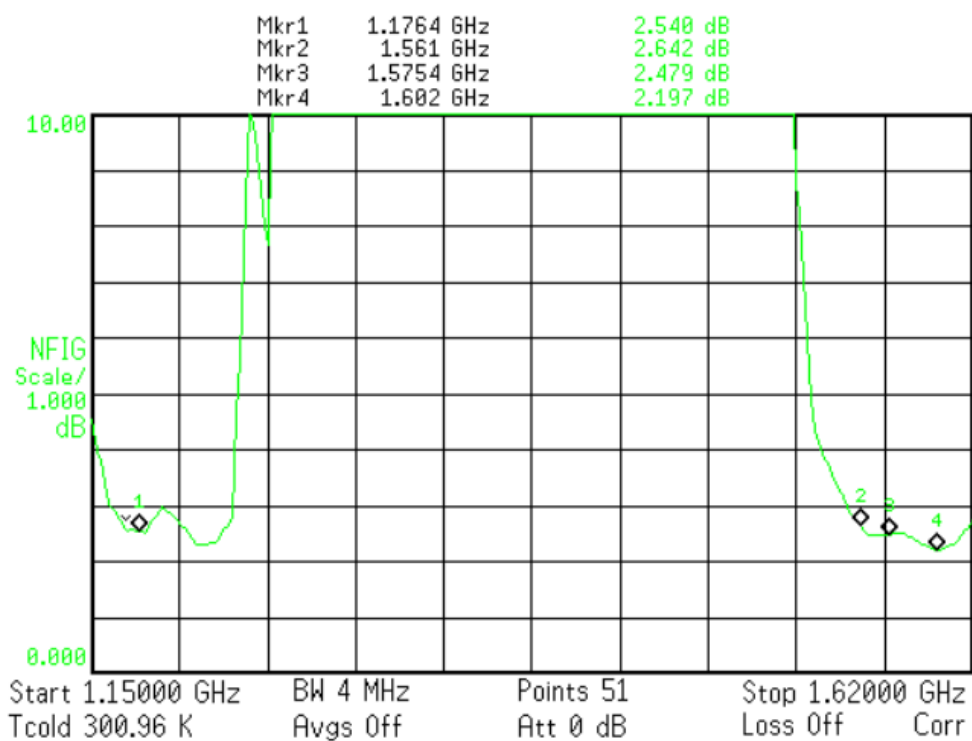
5.2 LNA – Out of Band Rejection 1.1GHz to 1.7GHz



5.3 LNA - Out of band Rejection 0.5GHz to 6GHz



5.4 Noise Figure @3.0V



6. Field Test Results

6.1 Rooftop test

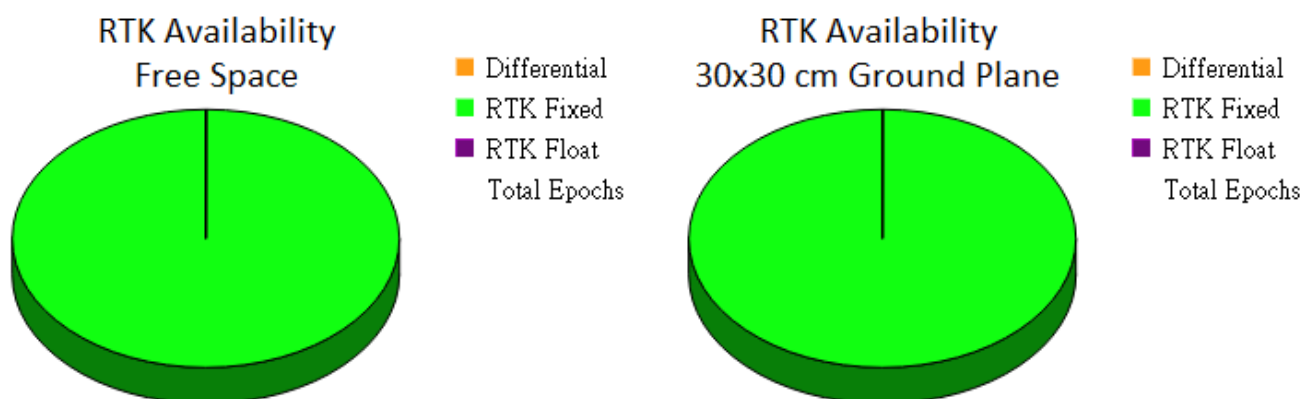
In this section Taoglas will present the field test result for A.85 antenna. The test was performed when the antenna was mounted on a static rooftop test set up in an open sky environment for at least 6 hours.

Receiver: Septentrio AsteRx-U S/N

Receiver Features:

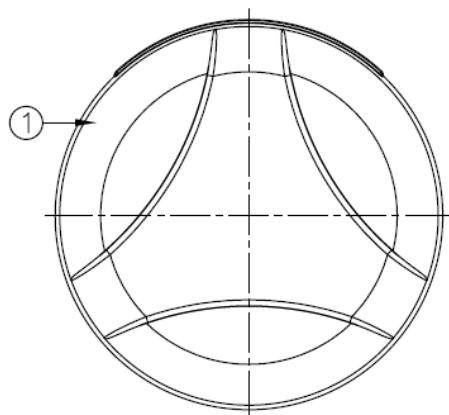
- Multi-band GNSS: 544 channels
- GPS: L1, L2, L5 GLONASS: L1, L2, L3 Galileo: E1, E5ab, AltBoc, E6 BeiDou: B1, B2, B3 NavIC: L51 QZSS: L1, L2, L5, L6
- SBAS: EGNOS, WAAS, GAGAN, MSAS, SDCM(L1, L5)
- RTK (base and rover), Integrated dual-channel L-band receiver, Support for PPP
- Nav. update rate up 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 | 61.8 cm | 74.1 cm | 148.1 cm |
| | RTK Enabled | 0.7 cm | 0.9 cm | 1.8 cm |
| 30x30 cm Ground Plane | RTK Disabled | 35.5 cm | 42.8 cm | 85.5 cm |
| | RTK Enabled | 1.6 cm | 1.9 cm | 3.8 cm |

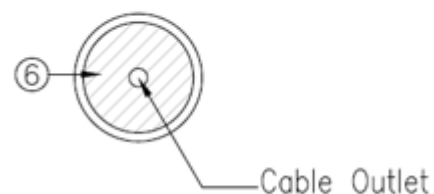


7. Mechanical Drawing (Units: mm)

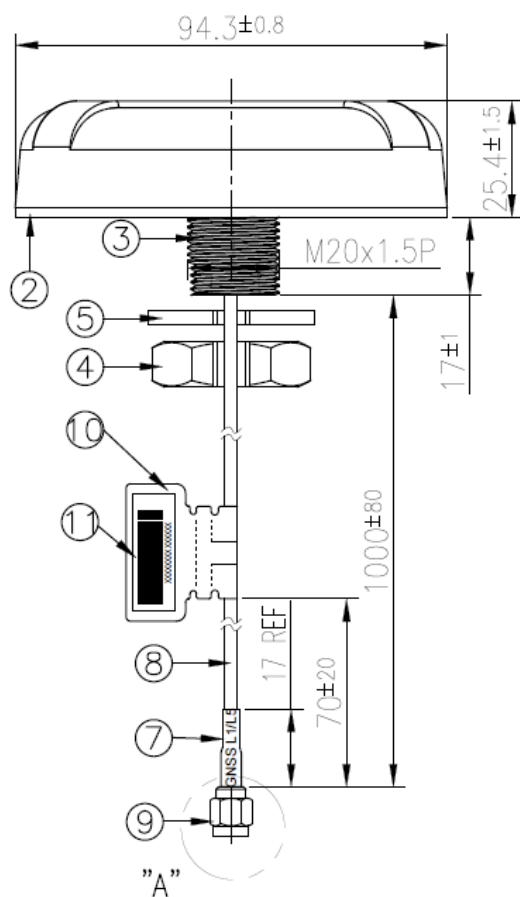
Top View



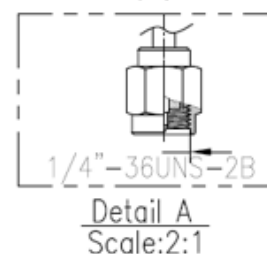
Bottom
Thread View



Front View



SMA(M)ST



| | Name | Material | Finish | QTY |
|----|-----------------------------------|-----------------|-----------------------|-----|
| 1 | Housing | ASA | Black | 1 |
| 2 | Double Sided Adhesive(Black Foam) | 3M9448+CR4305 | White Liner | 1 |
| 3 | Mini ST Base | Zinc Alloy | Ni Plated | 1 |
| 4 | Nut_M20x1.5Px9.5H Cut | Steel Carbon | Ni-Zn plated | 1 |
| 5 | Washer_Cut | Steel Carbon | Ni-Zn plated | 1 |
| 6 | Cable Rubber For RG-174 | Silicone Rubber | Black | 1 |
| 7 | Heat Shrink Tube (GNSS L1/L5) | PE | Blue Tube /White Text | 1 |
| 8 | RG174 Coaxial Cable | PVC | Black | 1 |
| 9 | SMA(M)ST | Brass | Au Plated | 1 |
| 10 | Empty Label | PEPA | White | 1 |
| 11 | Barcode Label | PET | White | 1 |

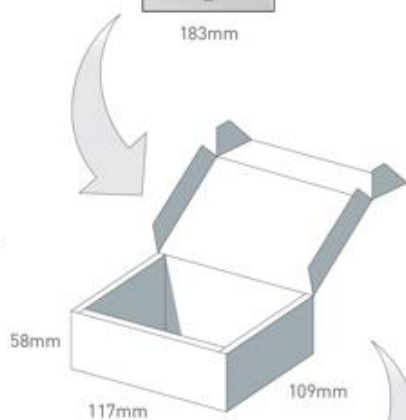
8. Packaging

8.1 Individual Packaging

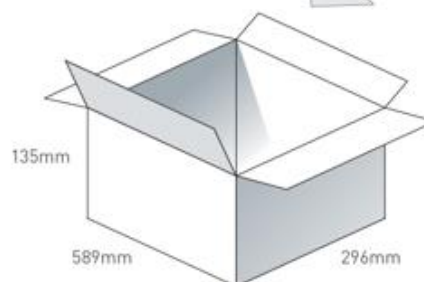
A.85.A.101111 Per PE bag
Bag Dimensions – 232*183mm
Total Weight – 283.5g



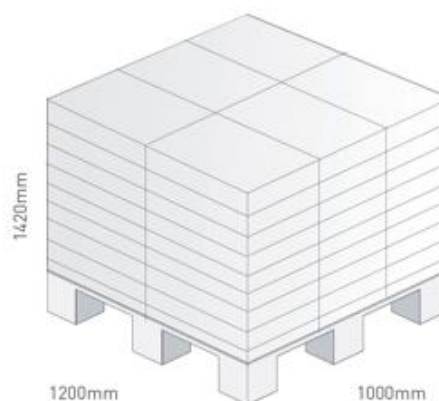
1pcs/PE Bags Per Inner Carton
Inner Carton Dimensions – 117*109*58mm
Weight – 310g



25 Inner Cartons Per Outer Carton
Carton Dimensions – 589*296*135mm
Weight – 8Kg



Pallet Dimensions 1200*1000*1420mm
54 Cartons Per Pallet
6 Cartons Per Layer
9 Layers

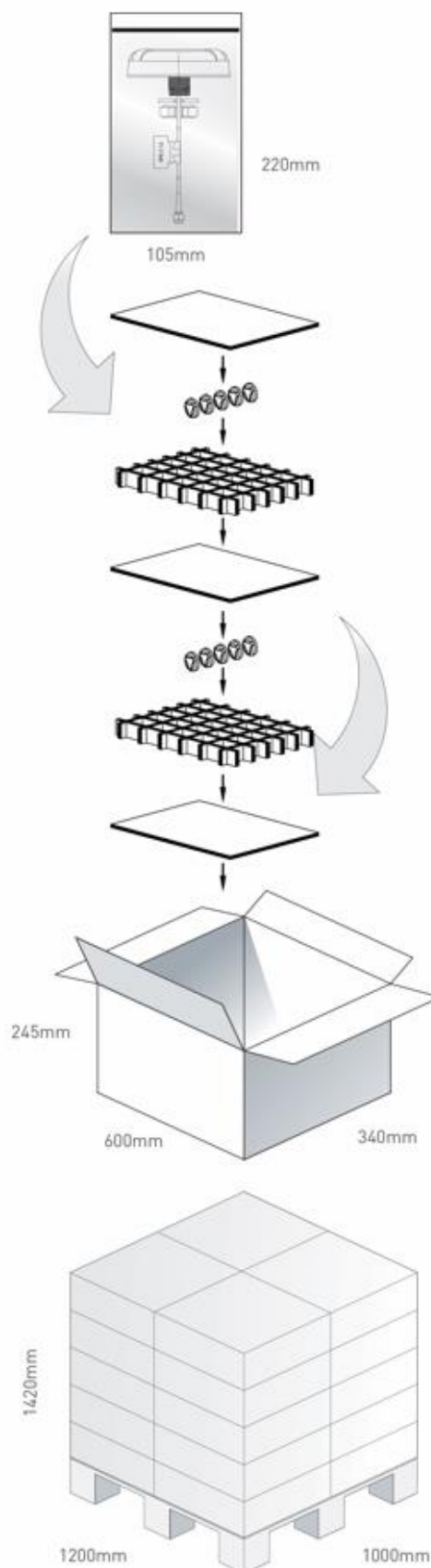


8.2 Bulk Packaging

A.85.A.101111 Per PE bag
Bag Dimensions – 232*183mm
Total Weight – 283.5g

50 Pc Per Carton In Bulk Packaging
Carton Dimensions – 600*340*245mm
Weight – 13Kg

Pallet Dimensions 1200*1000*1420mm
20 Cartons Per Pallet
4 Cartons Per Layer
5 Layers



Changelog for the datasheet

SPE-22-8-112 – A.85.A.101111

| Revision: A (Original First Release) | |
|--------------------------------------|---------------------------|
| Date: | 2022-07-19 |
| Notes: | Initial Datasheet Release |
| Author: | Gary West |

Previous Revisions

| | |
|--|--|
| | |
| | |
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