



# TAOGLAS®



# Datasheet

## QHA.50.A.301111 - Colosseum

### Description:

GPS L1, L2, L5 Passive Quad Helix Antenna

Including GLONASS, Galileo, BeiDou & QZSS Band Operation

### Features:

Permanent Mount Robust Enclosure

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

IP67 Rated Waterproof ASA Enclosure

Cable: 3m RG-174

Connector: SMA(M)ST

Dimensions:  $\varnothing$ 94 x 57mm

RoHS & REACH Compliant

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## 1. Introduction



The Colosseum QHA.50.A.301111 is a passive Quad Helix Antenna which has been carefully designed to work across all major GNSS bands, leading to higher location accuracy and stability of tracking in urban environments. The quad helix antenna design has an even gain across the hemisphere giving almost perfect Axial Ratio which makes it resilient to multipath rejection.

The QHA.50 is a new passive GNSS external product which has been added to Taoglas' already extensive High Precision antenna range. The Colosseum QHA.50 covers all major GNSS bands including: GPS L1/L2/L5/L6, GLONASS L1/L2/L3, Galileo E5A/E5B/E6, BeiDou B1/B1-2/B2/B3. The QHA.50 is a new passive GNSS external product which has been added to Taoglas' already extensive High Precision antenna range.

Typical Applications include:

- Agriculture
- Asset Tracking
- Autonomous Driving

The QHA.50, IP67 rated enclosure is manufactured from UV resistant ASA making it an ideal solution for external applications operating in harsh environments.

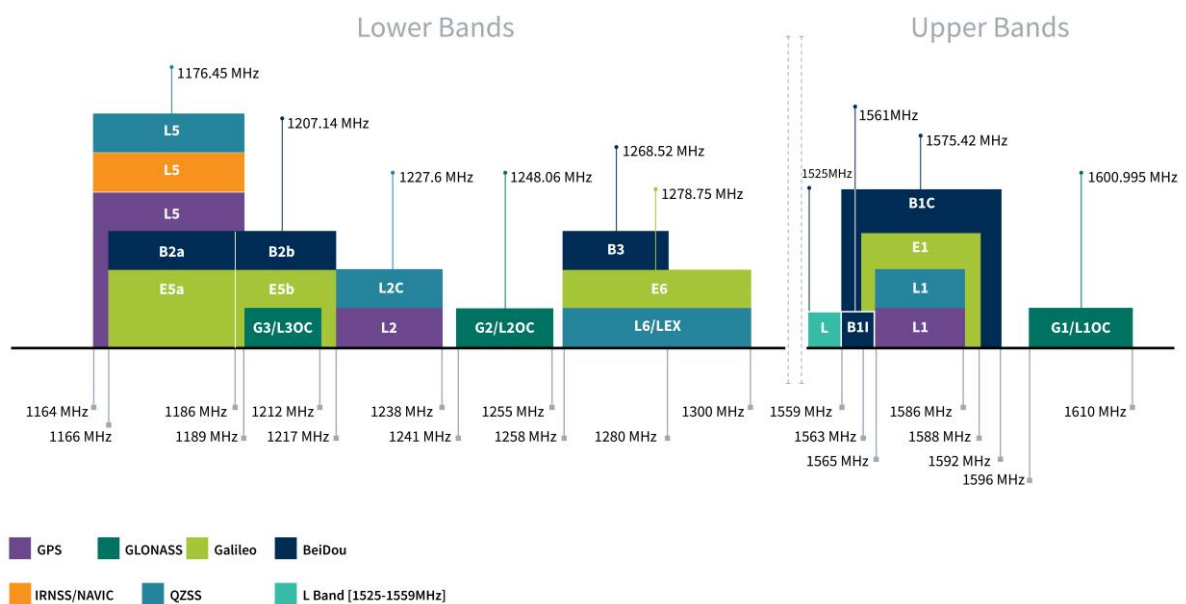
For Cable runs longer than 3 meters, Taoglas recommends using the Active version of the Colosseum, AQHA.50.A.301111.

The Cable length and connector are fully customizable. For Further information 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), EGNOS(E1/E5a), SDCM(G1/G2/G3), SNAS(B1,B2a), GAGAN(L1/L5), QZSS(L1/L5), KAZZ(L1/L5).

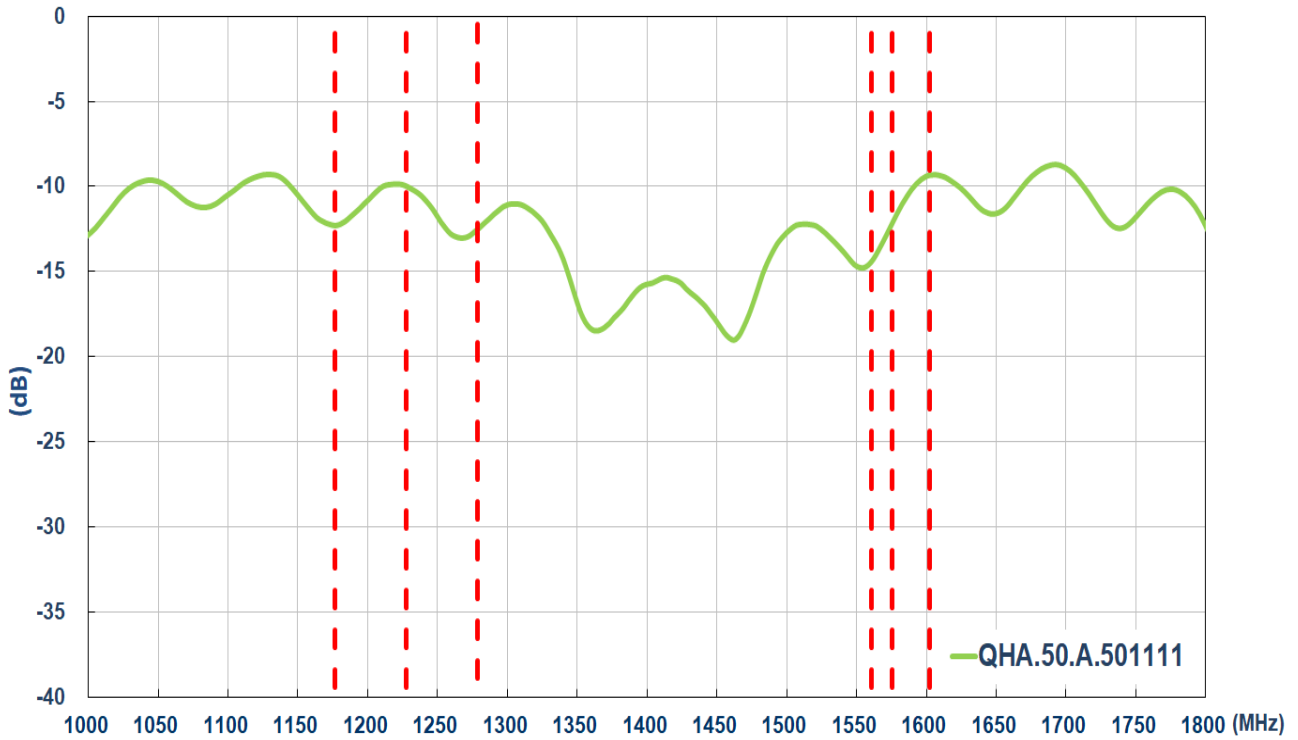


GNSS Bands and Constellations

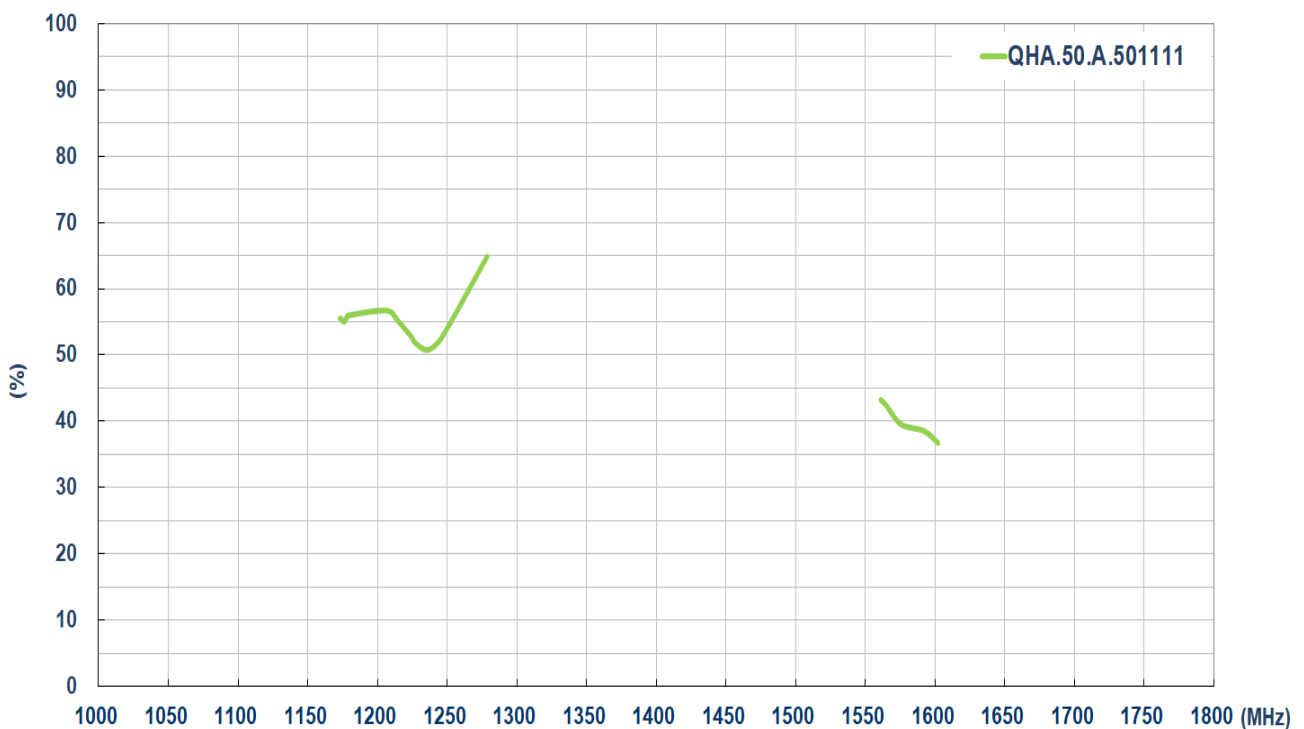
GNSS Electrical						
Frequency (MHz)	1176.45 MHz	1227.6 MHz	1278.8 MHz	1561 MHz	1575.42 MHz	1602 MHz
Efficiency (%)	55.1	51.8	64.9	43.3	39.6	36.8
Average Gain (dB)	-2.6	-2.9	-1.9	-3.6	-4.0	-4.4
Peak Gain (dBi)	0.9	0.9	2.0	0.3	-0.2	-0.4
Return loss (dB)	< -10	< -10	< -10	< -10	< -10	< -10
Group Delay	0.5	0.4	0.6	0.8	0.8	0.8
PCO	5	5.5	5.9	5	5	5
PCV	1.8	1.8	1.8	1.4	1.4	1.6
Polarization	RHCP					
Impedance	50Ω					
Mechanical						
Dimensions (mm)	Diameter: 94.3mm, Height: 57.4 mm					
Weight (g)	251.7 g					
Base and thread	Zinc Alloy					
Cable	3m RG-174					
Connector	SMA(M)ST					
Ingress Protection Rating	IP67					
Maximum Assembly Torque	39.2 N•m					
Regulatory Compliance	CE, RoHS, Reach					
Environmental						
Operating Temperature	-30°C ~ +80°C					
Storage Temperature	-30°C ~ +80°C					
Humidity RH	Non-condensing 65°C 95% RH					

### 3. Antenna Characteristics

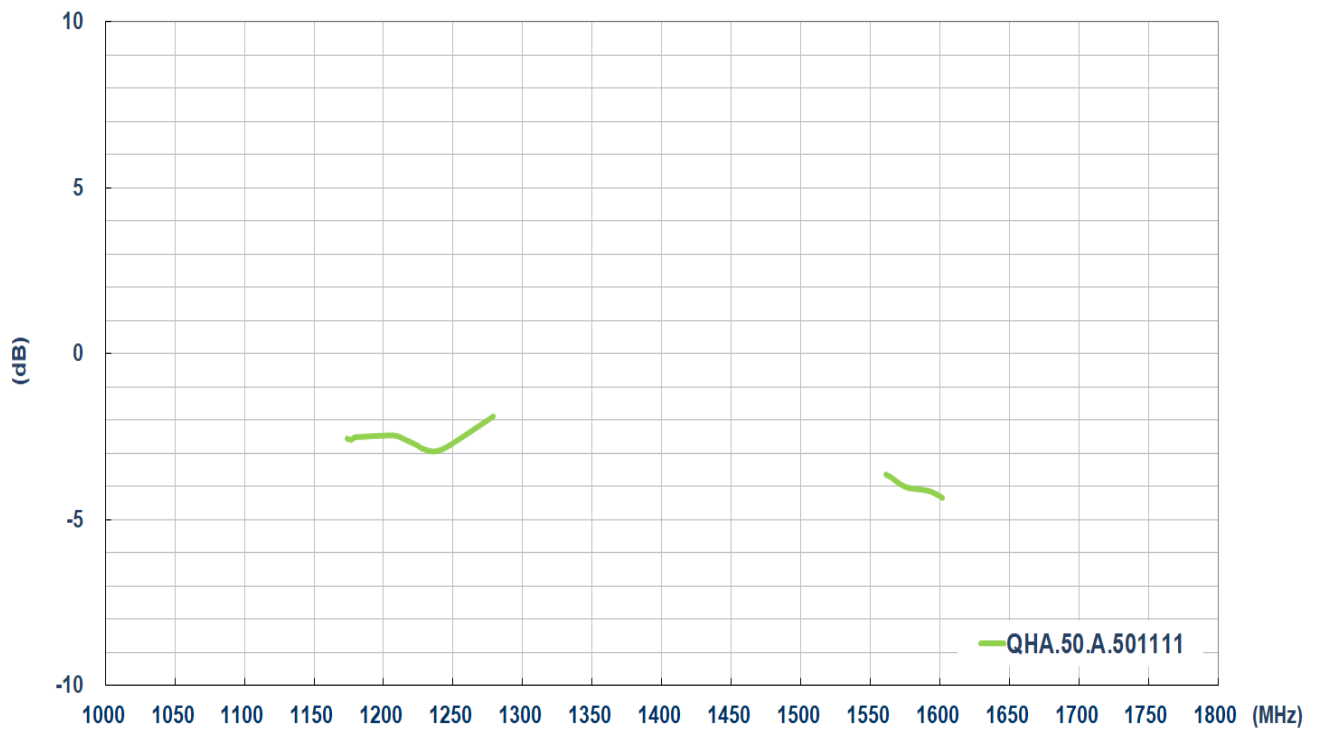
#### 3.1 Return Loss



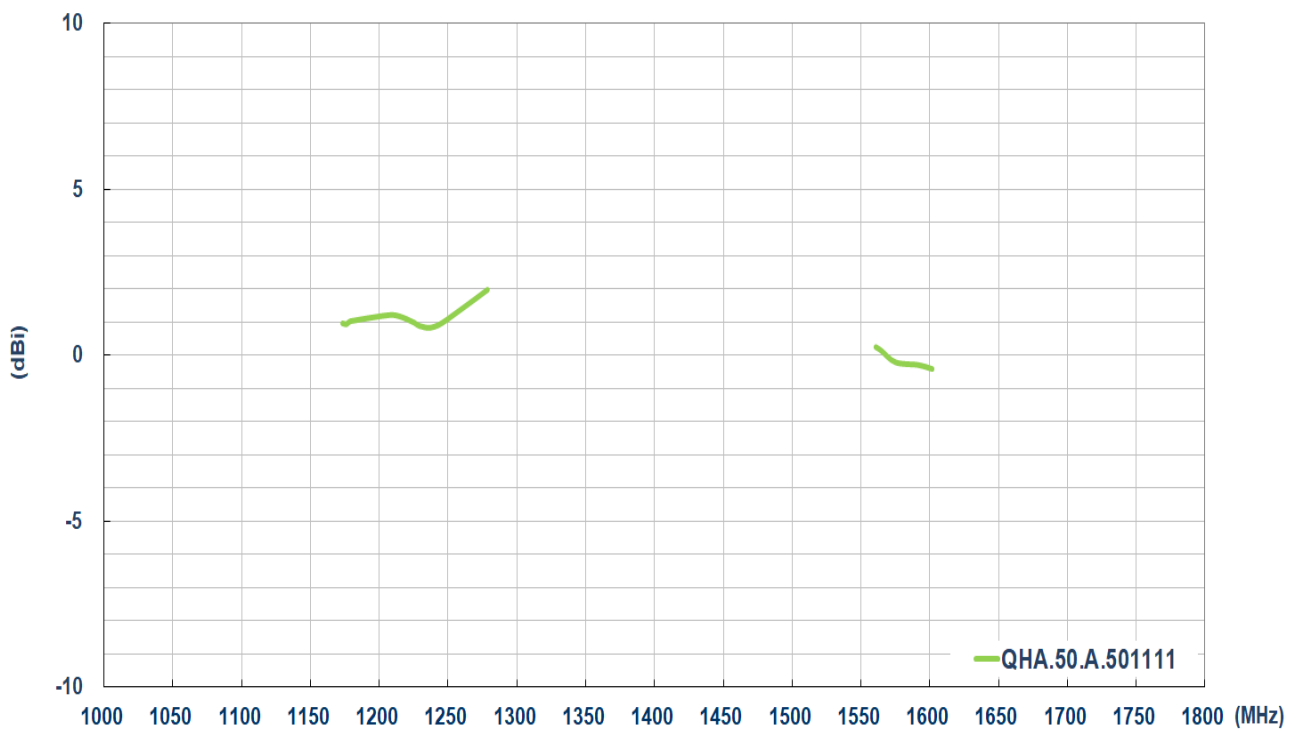
#### 3.2 Efficiency



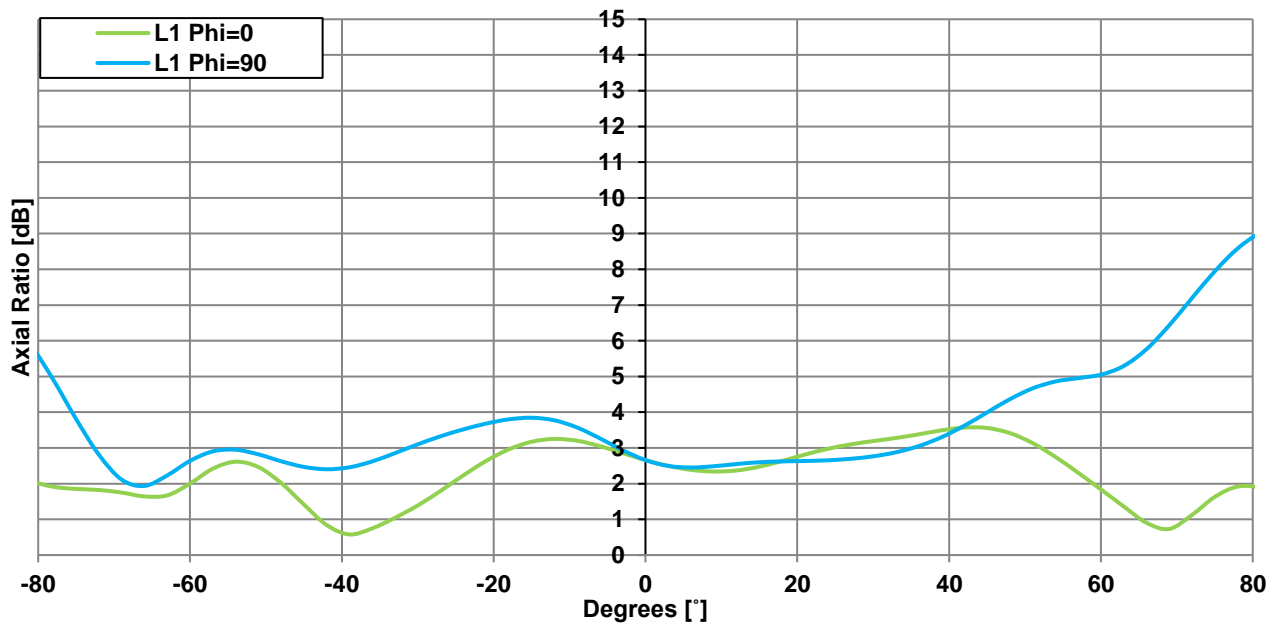
### 3.3 Average Gain



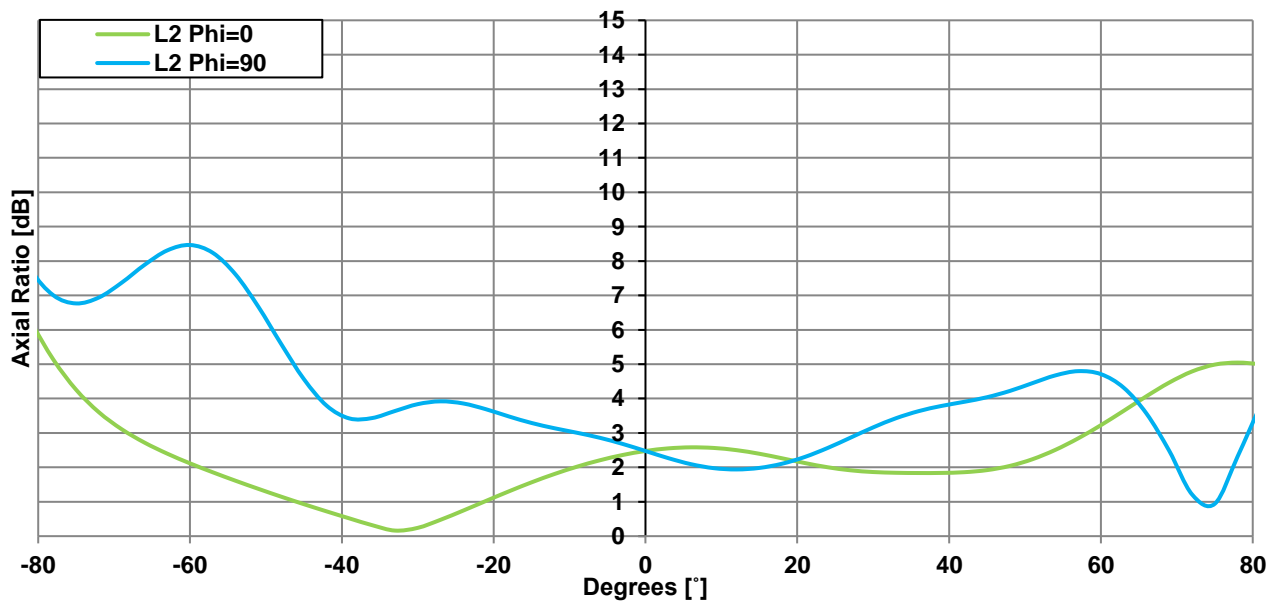
### 3.4 Peak Gain



### 3.5 Axial Ratio @ L1

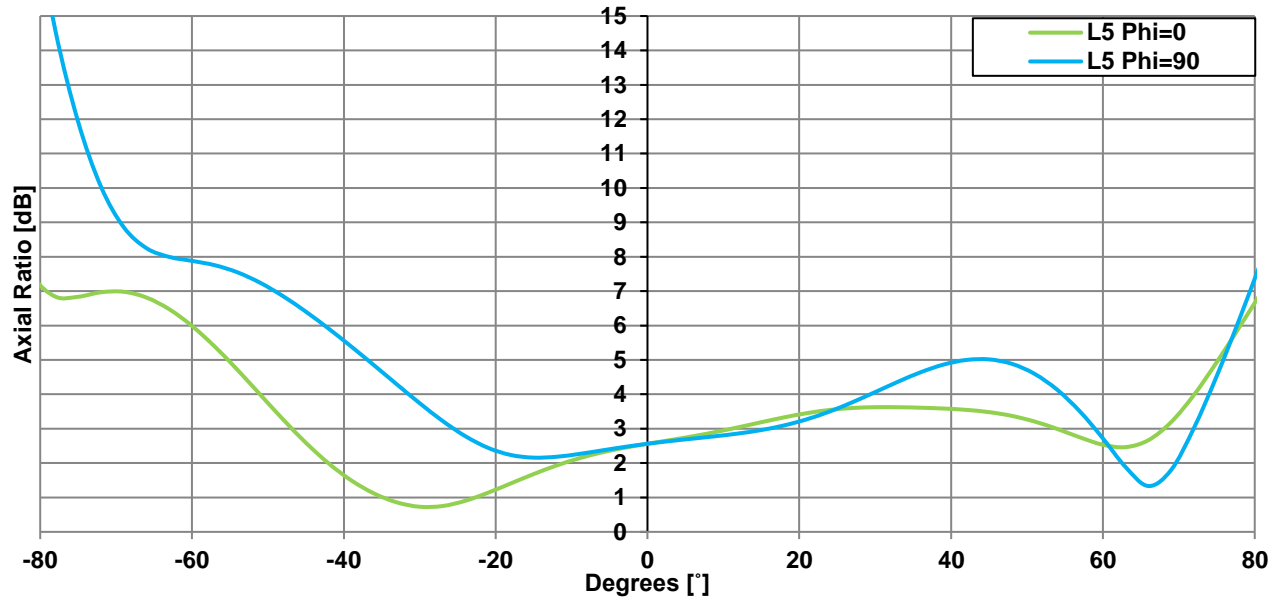


### 3.6 Axial Ratio @ L2





### 3.7 Axial Ratio @ L5



## 4. Radiation Patterns

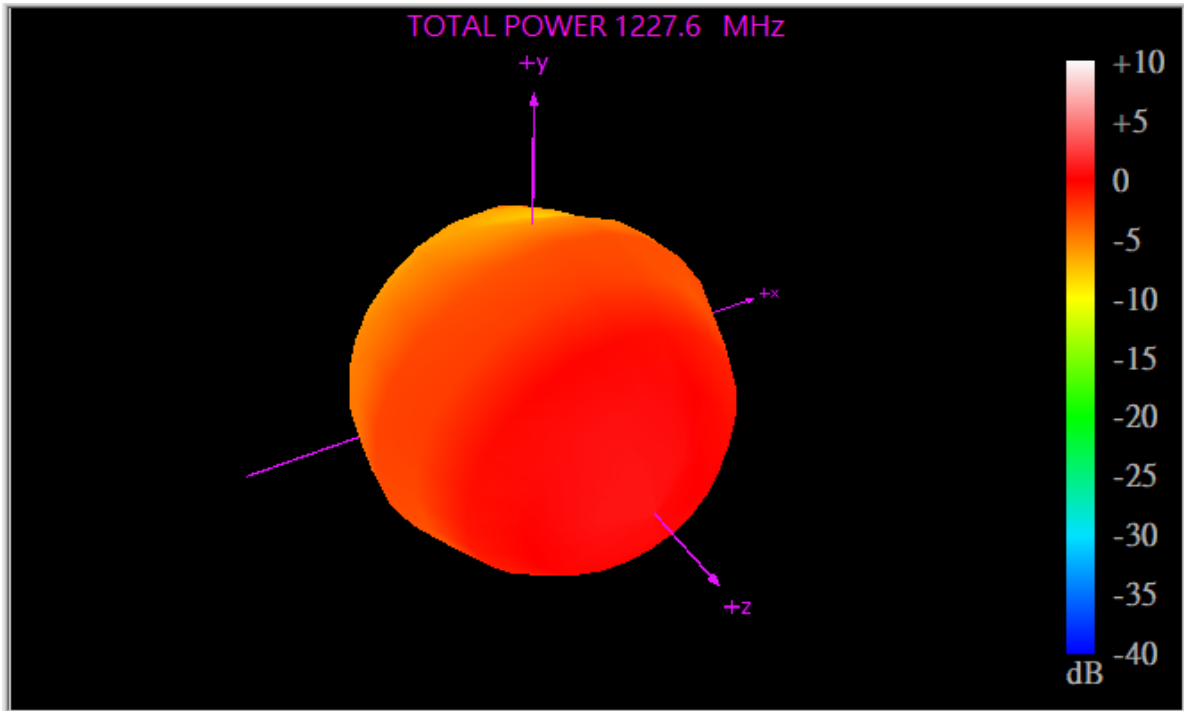
### 4.1 Test Setup



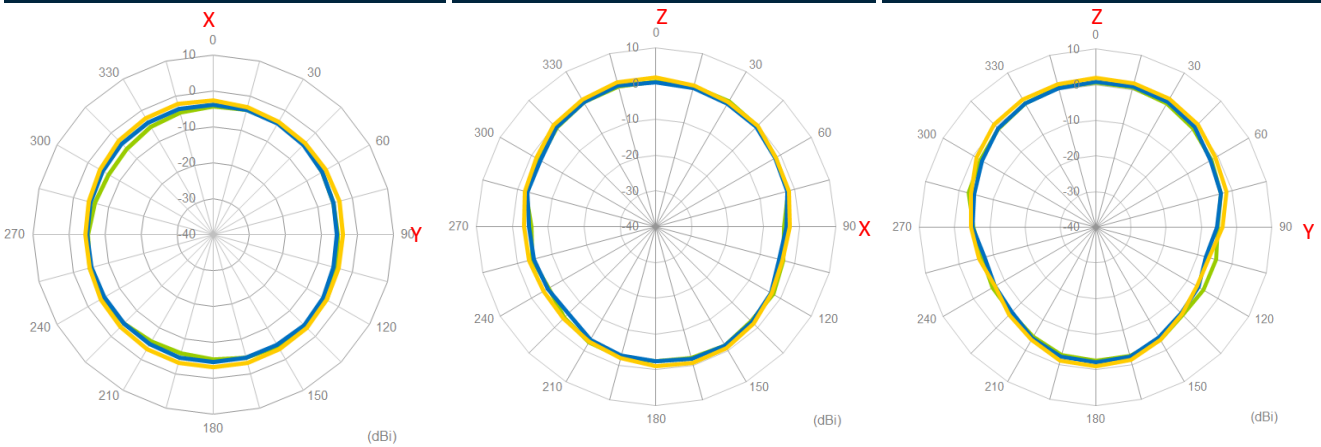
Free Space

4.2 Radiation Patterns - Free Space

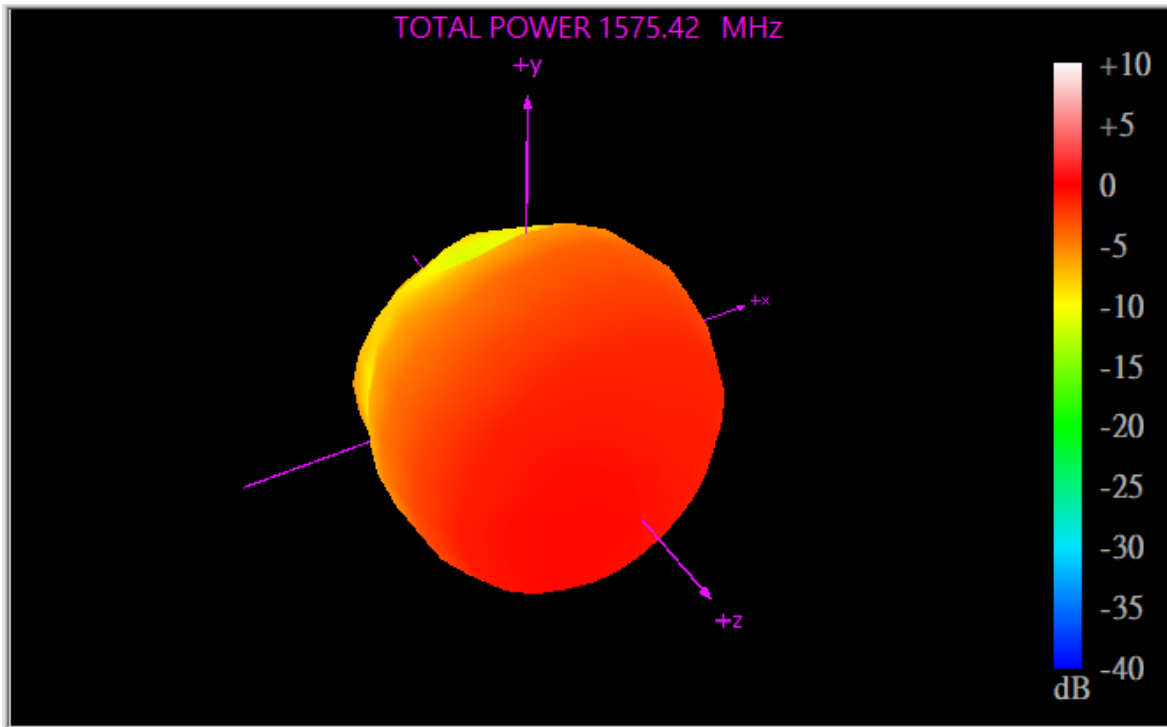
1227.6MHz



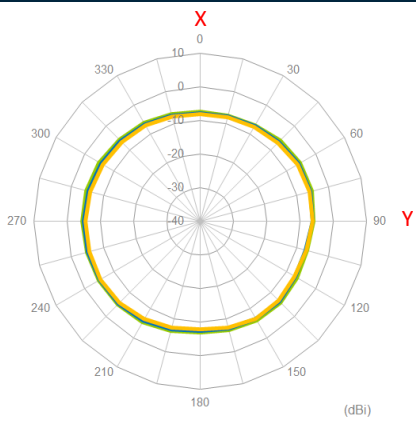
XY Plane      XZ Plane      YZ Plane



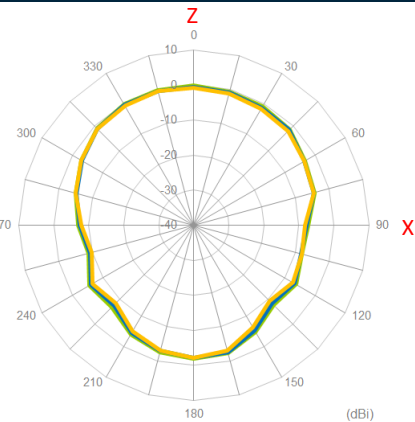
1575.42MHz



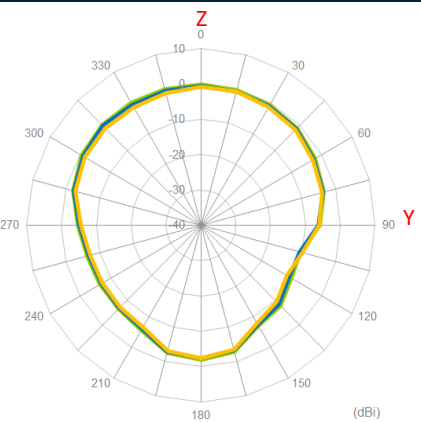
XY Plane



XZ Plane



YZ Plane



—1561MHz —1575.42MHz —1602MHz

## 5. Field Test Results

### 5.1 Rooftop test

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

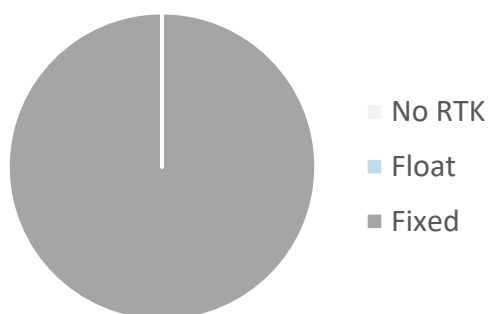
#### 1. **U-blox ZED-F9P**

##### Receiver features:

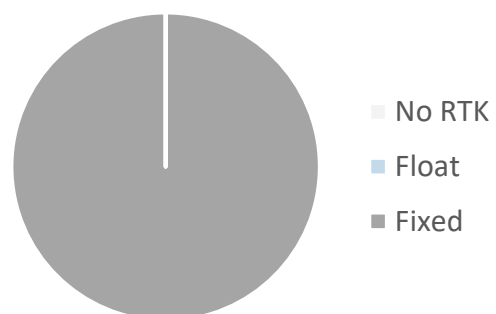
- Multi-band GNSS: 184-channel GPS L1C/A L2C, GLONASS: L1OF L2OF, Galileo: E1B/C E5b, BeiDou: B1I B2I, QZSS: L1C/A L2C
- Multi-band RTK with fast convergence times and reliable performance
- Nav. update rate RTK up to 20 Hz
- Position accuracy = RTK 0.01 m + 1 ppm CEP

Positioning Accuracy Table (2D Accuracy)					
Test Condition	Correction Service	CEP (50%)	DRMS (68%)	2DRMS (95-98.2%)	TTF (sec)
Free Space	RTK DISABLED	66.97 cm	81.64 cm	163.27 cm	25
	RTL ENABLED	1.09 cm	1.32 cm	2.64 cm	25
30x30 cm Ground Plane	RTK DISABLED	55.64 cm	68.55 cm	137.1 cm	24.2
	RTL ENABLED	1.04 cm	1.24 cm	2.48 cm	24.2

RTK Availability  
Free space



RTK Availability  
30x30 cm ground plane



# 5. Mechanical Drawing (Units: mm)

6	5	4	3	2	1
ISO NO: IDW-19-8-0803		<Release>		REV	ZONE
				ENG	APPROVED
				ISSUED DATE	
		ALL		Initial Design	Rachel
				Aaron	2019/06/20

**Top View**

**Bottom Thread View**

Cable Outlet

**Front View**

**Detail A**

Scale: 2:1

Name	P/N	Material	Finish	QTY
1 Mini ST Short Case	000114K000092A	ASA/CHIMEI PW-978B	Black	1
2 Adhesive Foam Mini ST(Black Foam)	001015C020000A	3M9448HK+CR4305	White Liner	1
3 Mini ST Base	000314K000092A	Zinc Alloy	Ni Plated	1
4 Nut_M20x1.5Px9.5H Cut	000413E030061A	Steel Carbon	Zn-Ni Plated	1
5 Washer_Cut	000413E040061A	Steel Carbon	Zn-Ni Plated	1
6 Cable Rubber	000718F000000A	Silicone Rubber	Black	1
7 Empty Label	001015G000000A	PEPA	White	1
8 Barcode Label	001015G010000A	PET	White	1
9 RG174 Coaxial Cable	301315C000000A	PVC	Black	1
10 Heat Shrink Tube (GNSS L1/L2/L5)	001318G100000A	PE	Blue Tube/White Text	1
11 SMA(M)ST	200212G000002A	Brass	Au Plated	1

NOTES:  
1." \* " Critical Dimensions.

UNLESS OTHERWISE SPECIFIED TOLERANCES ON:  
 .X± 0.2  
 XX± 0.5 .XX± 0.1  
 X.± 0.3 .XXX± 0.05

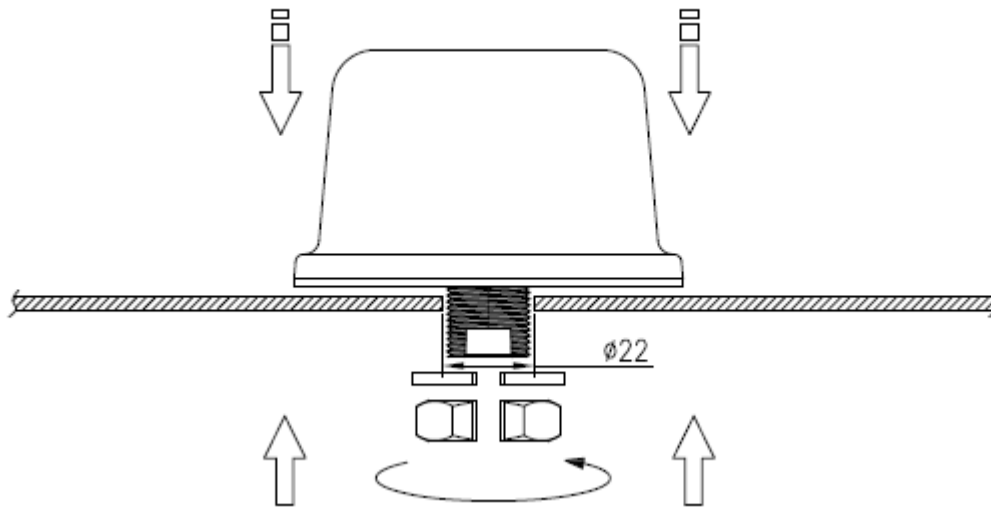
DATE: 2019/06/20 MAT'L:  
 UNIT: mm FINISH:  
 THIRD ANGLE PROJECTION SCALE: 1/2

APPROVED BY: A Aaron  
 CHECKED BY: H Haley  
 DRAWN BY: R Rachel  
 CUSTOMERS SIGNATURE / DATE

TITLE: :Colosseum - Screwmount Passive GNSS L1/L2/L5 with 3000mm RG-174 & SMA(M)  
 PART NO. : QHA.50.A.301111

REV D01

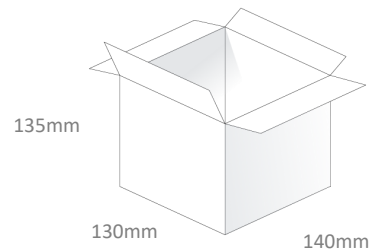
## 7. Installation Instructions



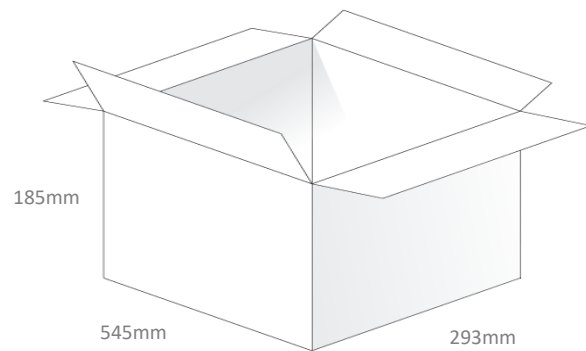
Recommended torque for mounting is 29.4N•m  
 Maximum torque for mounting is 39.2 N•m

## 8. Packaging

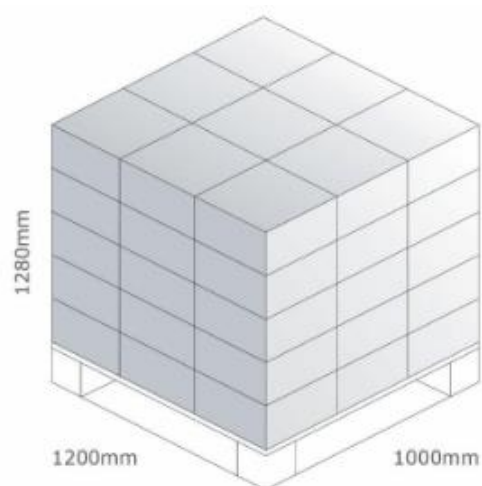
1pc QHA.50.A.301111 per Small Box  
 Dimensions - 135\*130\*140mm  
 Weight - 395g



8pcs QHA.50.A.301111 per Carton  
 Dimensions - 545\*293\*185mm  
 Weight - 3.94Kg



Pallet Dimensions:  
 1100\*1100\*1400mm  
 45 Cartons Per Pallet  
 9 Cartons Per Layer, 5 Layers





Changelog for the datasheet

**SPE-19-8-102 – QHA.50.301111**

**Revision: F (Current Version)**

Date:	2022-02-21
Changes:	Updated GNSS Bands & Constellations Graphics
Changes Made by:	Cesar Sousa

**Previous Revisions**

**Revision: D**

Date:	2020-06-02
Changes:	Added Field Test Results
Changes Made by:	Jack Conroy

**Revision: C**

Date:	2020-03-31
Changes:	Updated RTK Data
Changes Made by:	Jack Conroy

**Revision: B**

Date:	2019-11-20
Changes:	Installation Instructions included
Changes Made by:	Russell Meyler

**Revision: A**

Date:	2019-09-06
Changes:	Initial Specification Release
Changes Made by:	Jack Conroy