TAOGLAS

Datasheet

Active GNSS Surface Mount 18mm Patch

Part No:
ASGGB184.A

Description:

GPS/GLONASS/BeiDou/Galileo SMD Active Patch
with Embedded Active Circuitry

Features:

Covers bands:

- GPS L1
- GLONASS G1
- Galileo E1
- BeiDou B1

Embedded Active Circuitry

SMD Antenna – No Cable and Connector Required

Dimensions: 18*18*6.5mm

Designed for a 70*70mm Ground plane

RoHS & Reach Compliant

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1. Introduction

The Taoglas ASGGB184.A is a single band active GNSS patch covering GPS/GLONASS/BeiDou/Galileo. With hidden active circuitry embedded between the ceramic patch and PCB base, it has been designed to allow the user to mount it directly onto their device PCB. This eliminates the need for using a cable and connector thus speeding up the assembly process by allowing successfully solder surface mount components to a circuit board via the SMD process. The ASGGB184 measures just 18 x 18 x 6.45mm and is optimized for a ground plane size of 70*70mm being required for operation however smaller ground planes can be used.

The ASGGB184 also includes a two-stage LNA and a front-end SAW filter to reduce out of band noise such as from nearby cellular transceivers and this improves the probability of the wireless device passing radiated spurious emissions certification. As with many high performance Taoglas patches, the ASGGB series is produced in a TS16949 automotive quality approved facility and each patch produced is 100% tested for gain (S21) and return loss (S11) to ensure total consistency of performance. If the user device can accommodate it, a larger patch, the 25x25mm ASGGB254.A is also available with better performance figures.

Typical applications include:

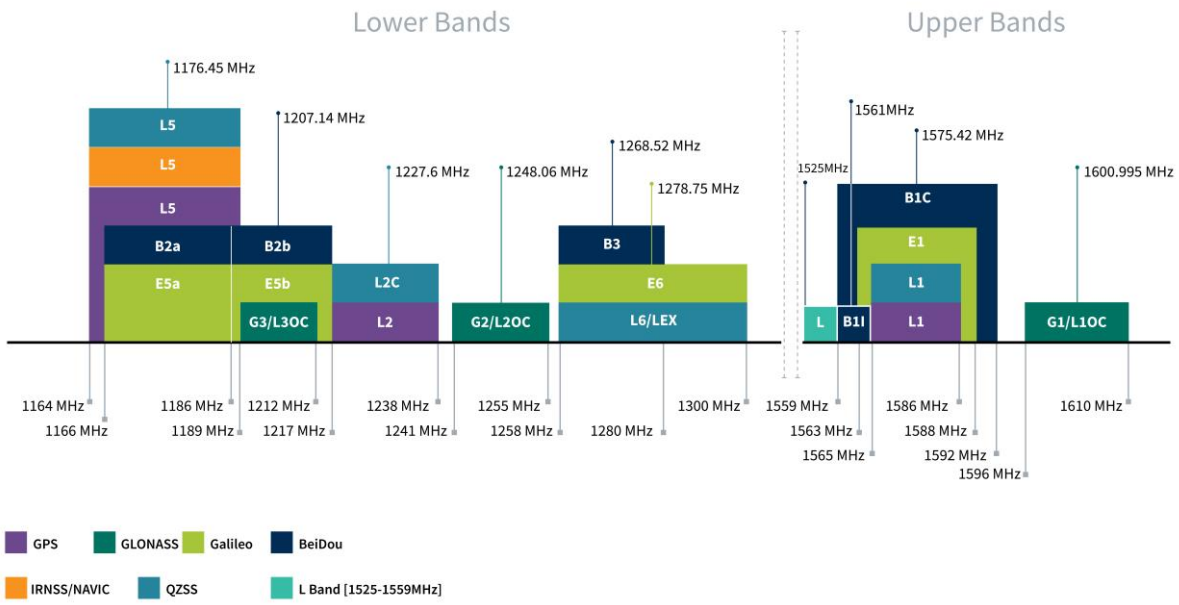
- Navigation
- Commercial Transportation
- Asset Tracking

Taoglas also offers custom tuning service based on minimum order quantities, contact your regional Taoglas customer support team for further information.

2. Specifications

GNSS Electrical					
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 Electrical			
Frequency (MHz)	**1561**	**1575.42**	**1602**
Return Loss (max)	-4	-10	-10
Passive Antenna Efficiency (%)	31.5	61.9	60.3
Passive Antenna Gain at Zenith (dBi)	0.6	3.9	4.1
Average Gain (dB)	-5.2	-2.1	-2.2
Axial Ratio (dB)	17	11	17
Polarization	RHCP		
Impedance	50Ω		

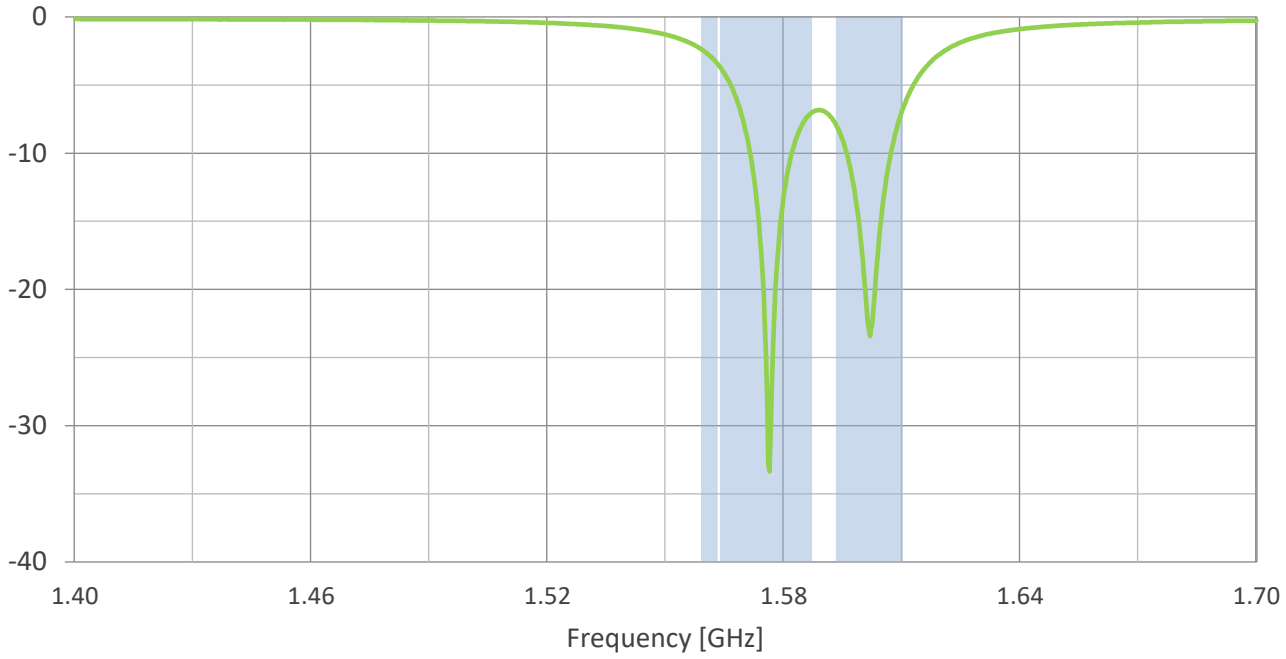
LNA and Filter Electrical Properties			
Frequency (MHz)	**1561**	**1575.42**	**1602**
VSWR (max.)	2:1	2:1	2:1
Gain@1.8V (Typ.)	28.91	29.10	28.56
Gain@3.0V (Typ.)	29.04	29.22	28.69
Gain@5.5V (Typ.)	29.76	29.88	29.36
Noise@1.8V (Typ.)	2.42	2.16	2.55
Noise@3.0V (Typ.)	2.46	2.18	2.50
Noise@5.5V (Typ.)	2.50	2.19	2.57
Current consumption@1.8V (Typ.)	8 mA		
Current consumption@3.0V (Typ.)	13 mA		
Current consumption@5.5V (Typ.)	18 mA		

Total Specification (Through Antenna, SAW Filter and LNA)			
Frequency (MHz)	1561	1575.42	1602
Gain@3V (dBi)	30±5 dBi	30±5 dBi	30±5 dBi
Output Impedance	50 Ω		

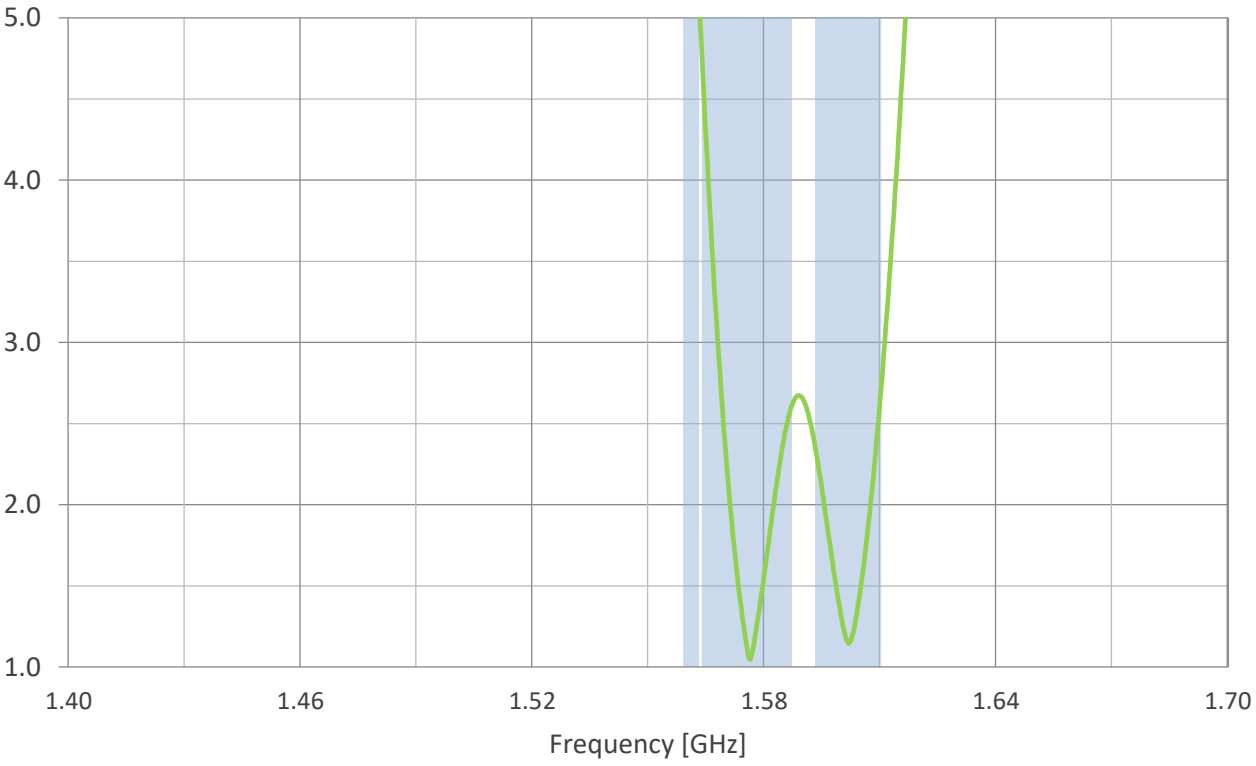
Mechanical	
Height	6.45mm
Planner Dimension	18*18mm
Material	Ceramic
Ground Plane Size	70*70mm
Weight	9g
Environmental	
Temperature Range	-40°C to 85°C
Moisture Sensitivity Level (MSL)	3 (168 Hours)

3. Antenna Characteristics

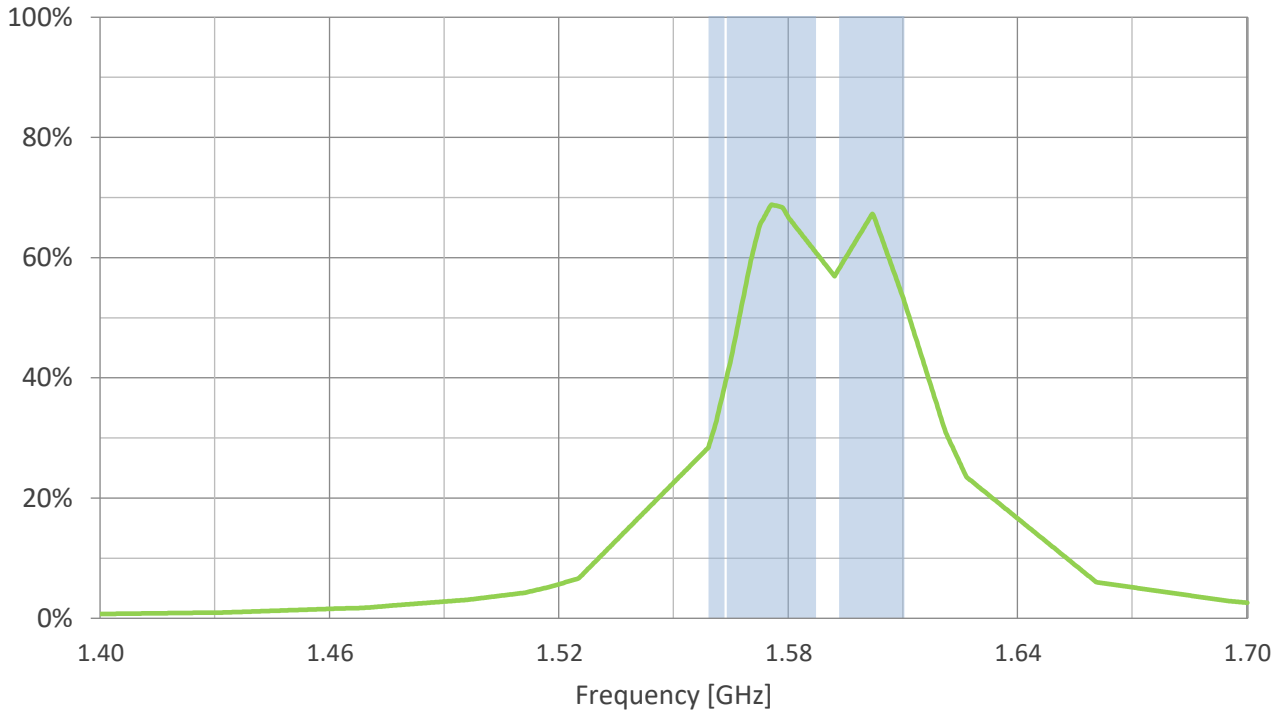
3.1 Return Loss



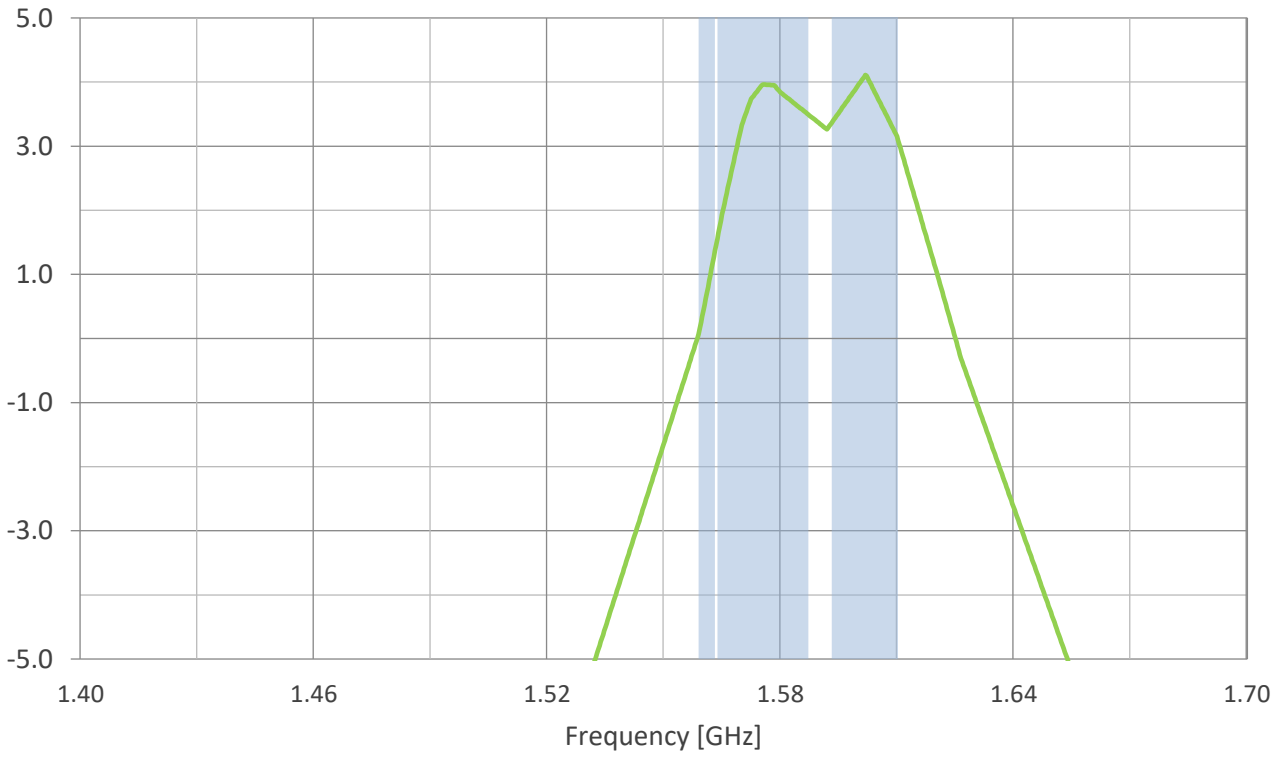
3.2 VSWR



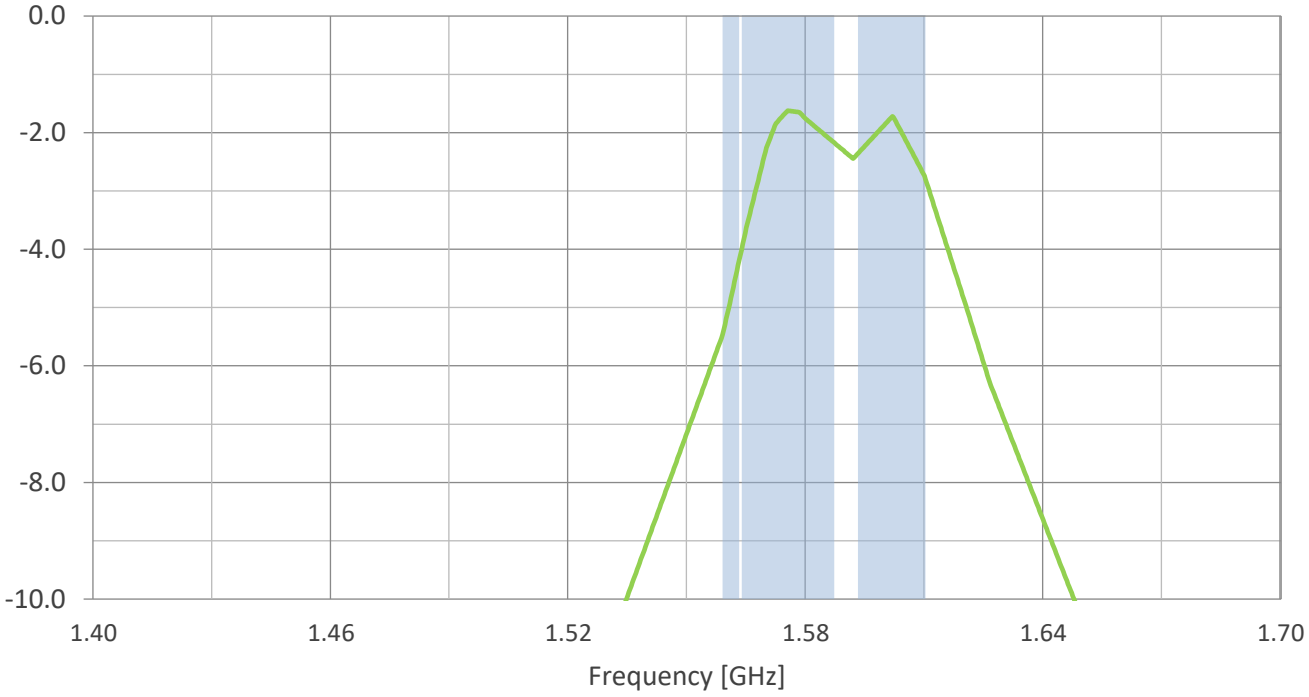
3.3 Efficiency



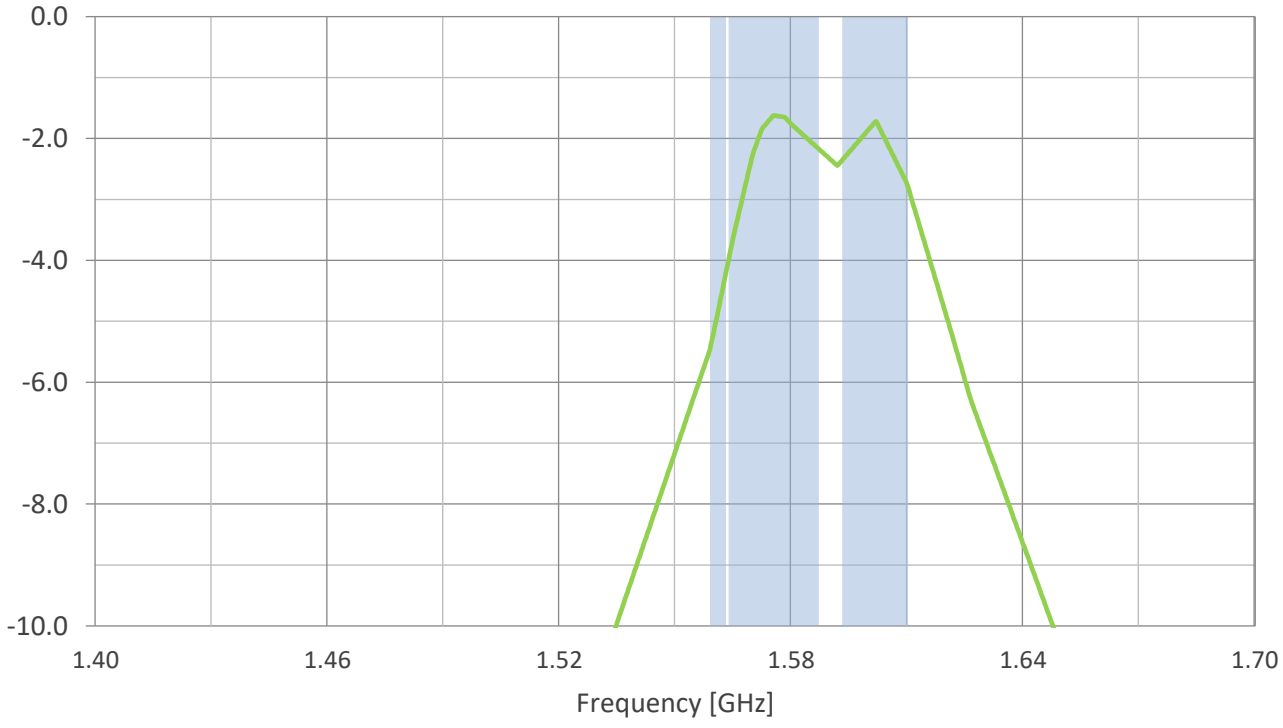
3.4 Peak Gain



3.5 Average Gain



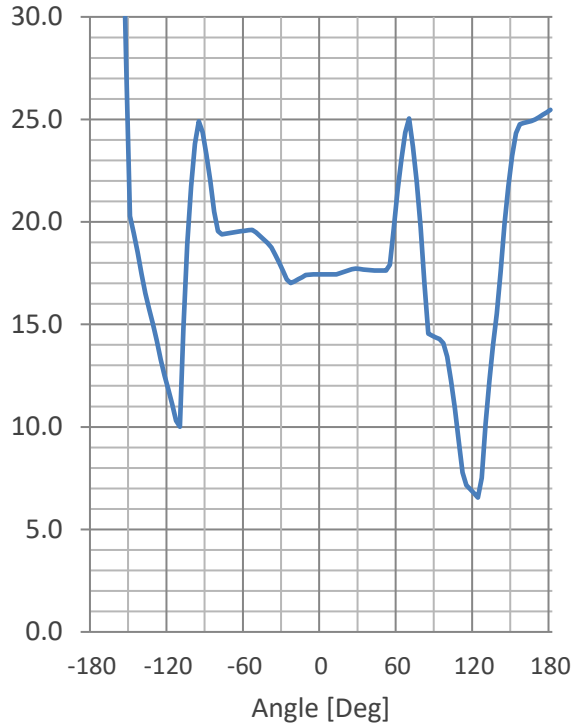
3.6 Axial Ratio vs Frequency



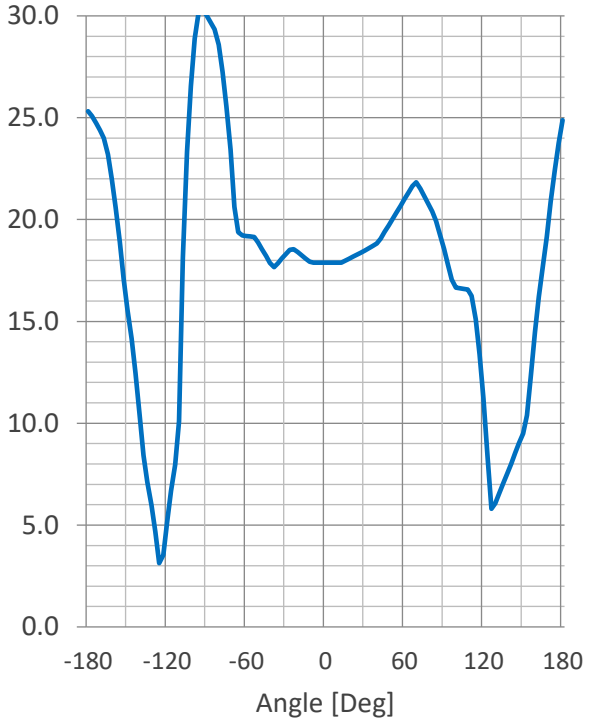
3.7 Axial Ratio Degrees

1561MHz

Phi = 0

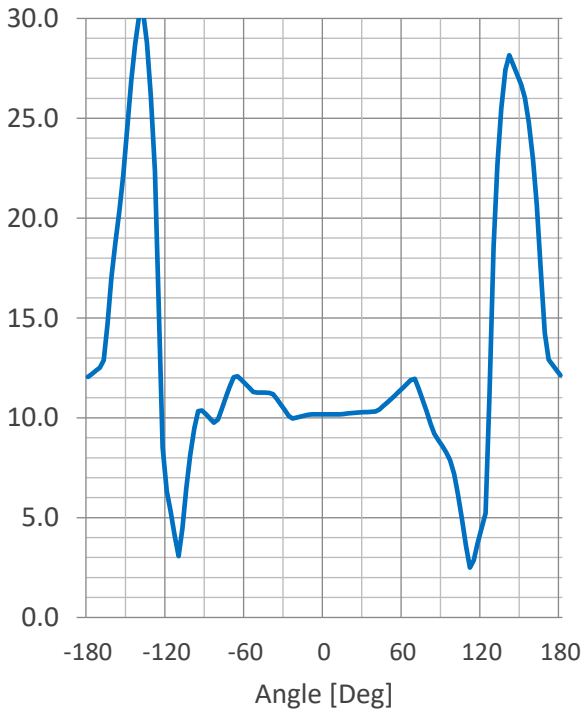


Phi = 90

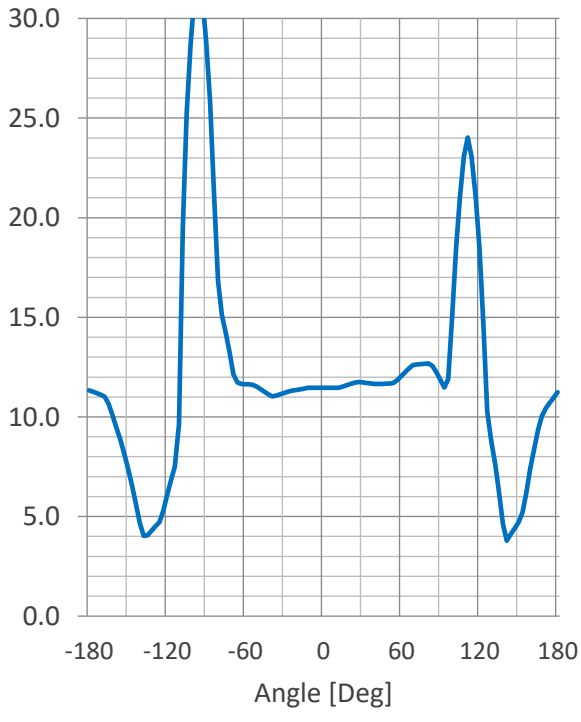


1575.42MHz

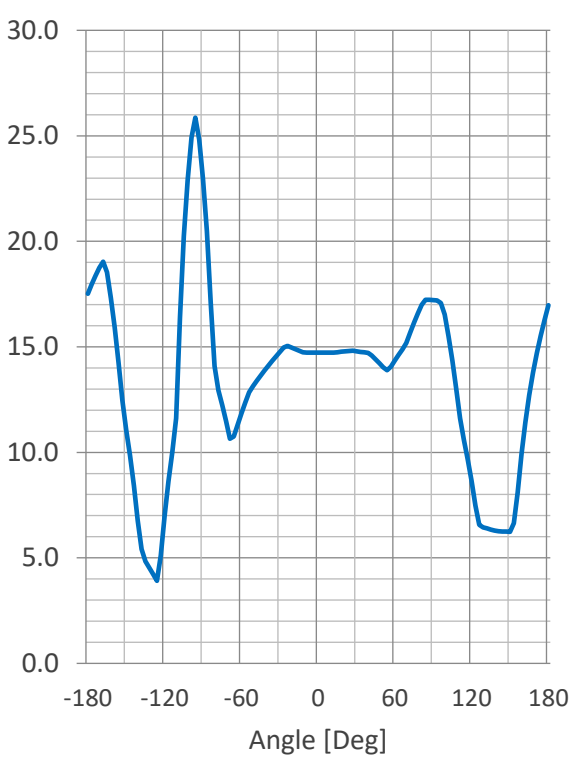
Phi = 0

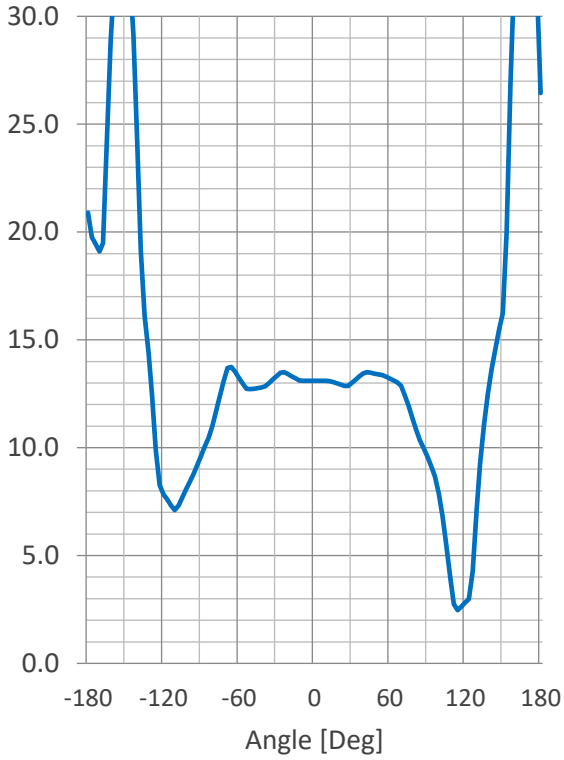


Phi = 90



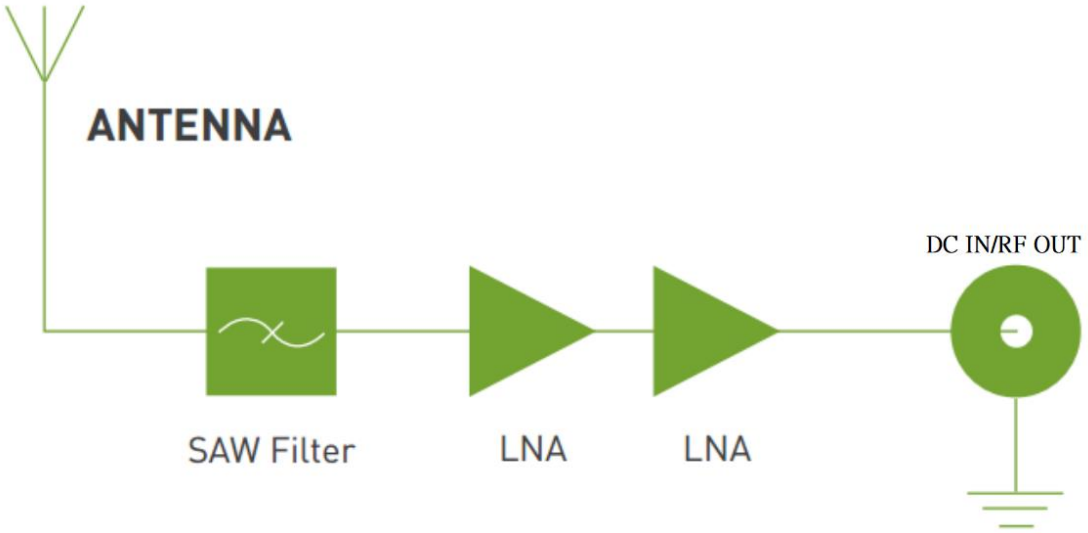
1602MHz	
Phi = 0	Phi = 90



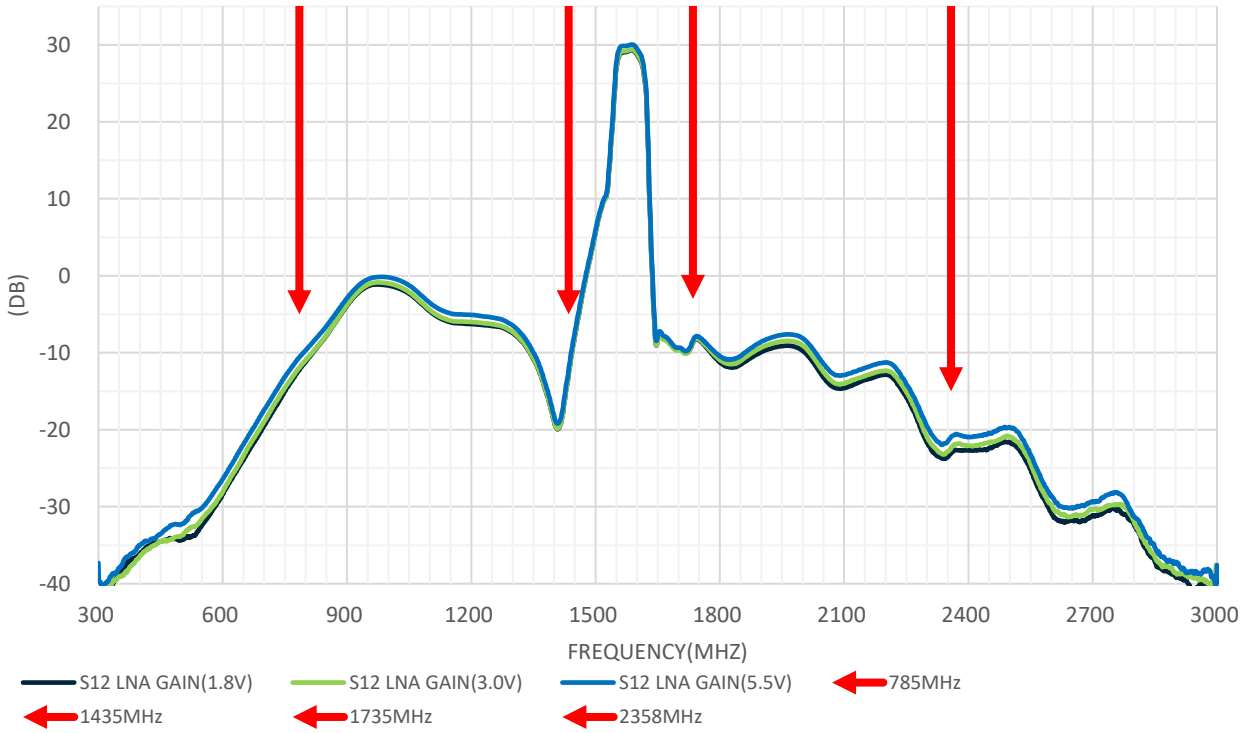


4. LNA Characteristics

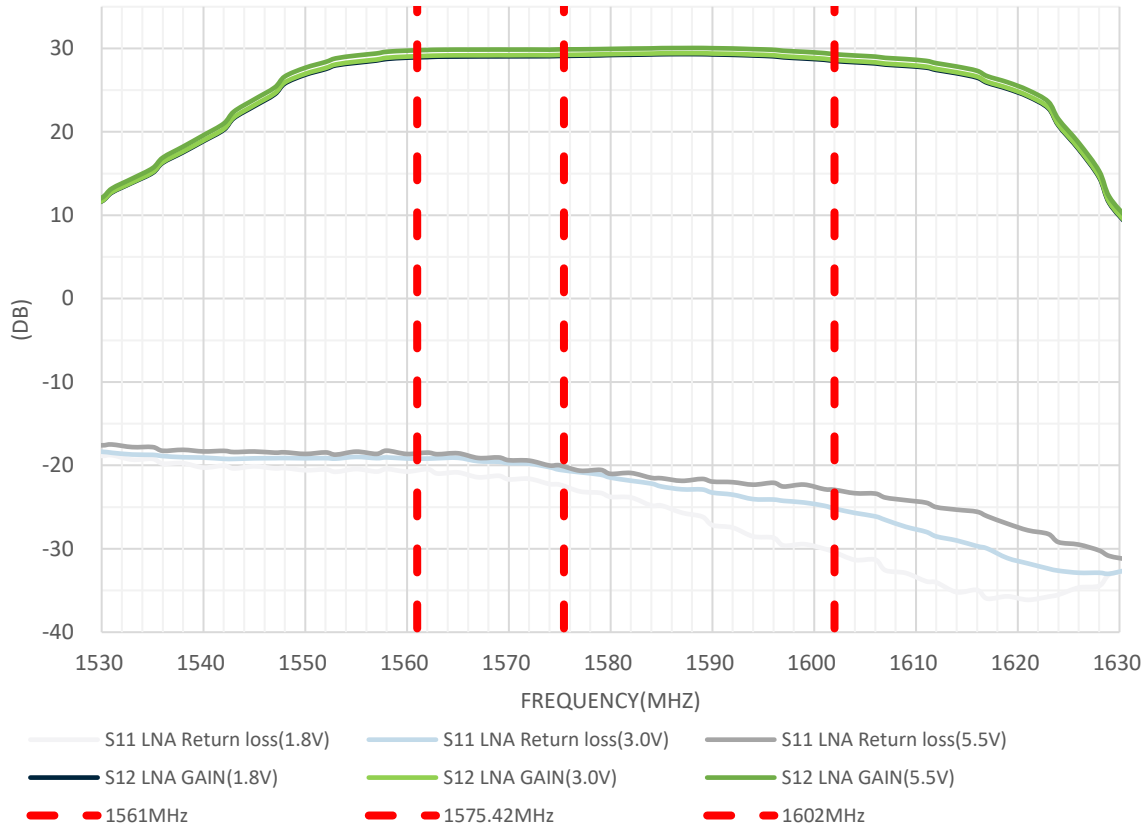
4.1 LNA Block Diagram



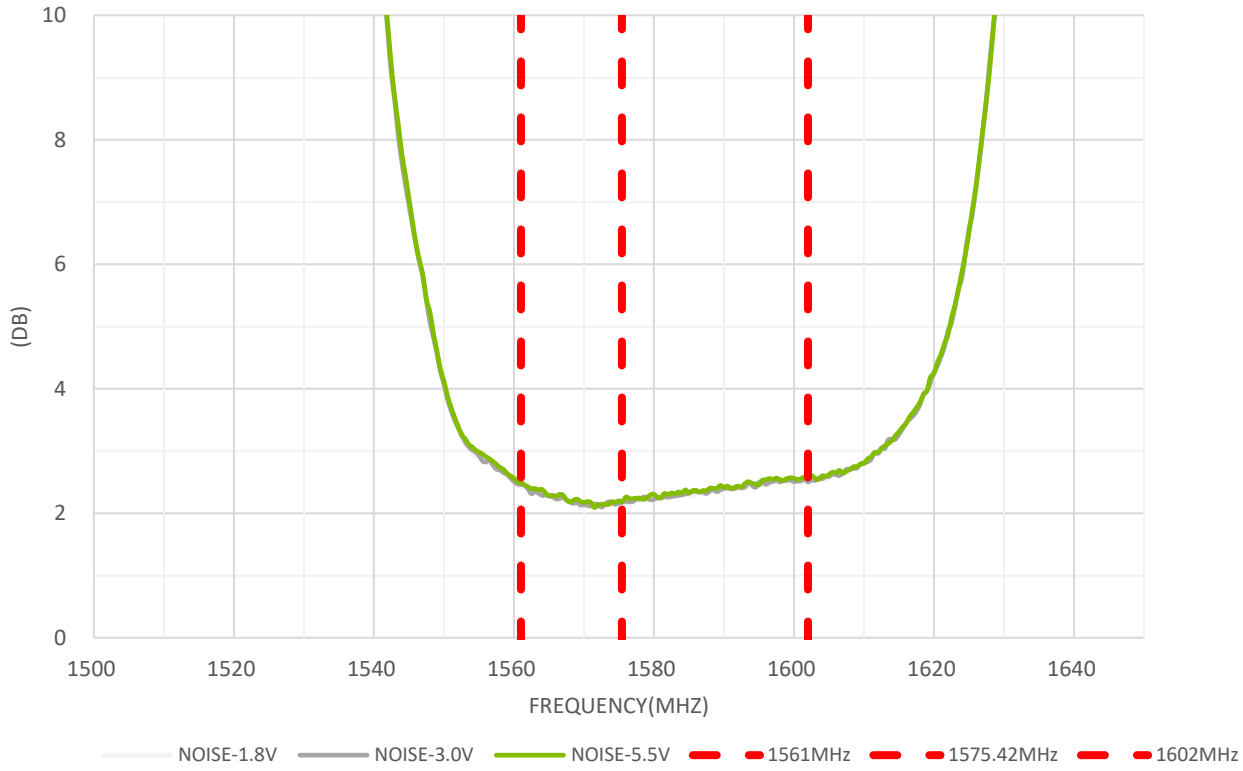
4.2 LNA Gain Wideband



4.3 LNA Gain Narrow band

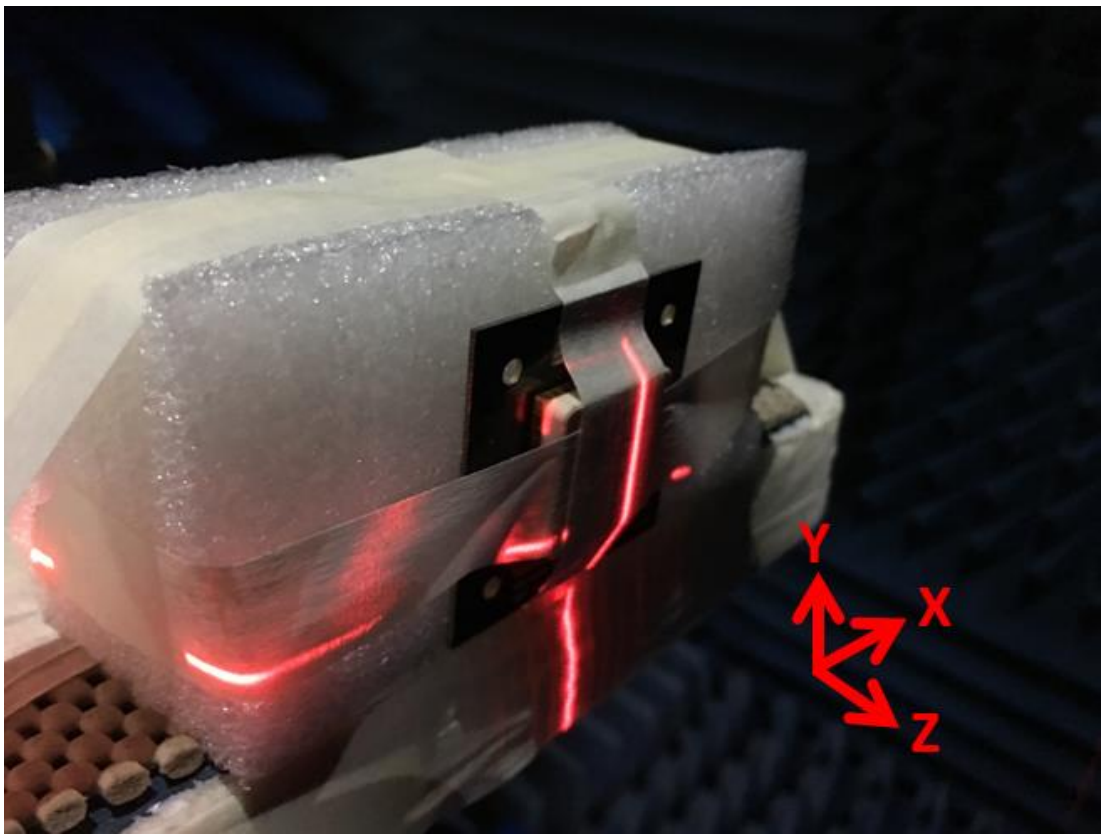


4.4 Noise Figure

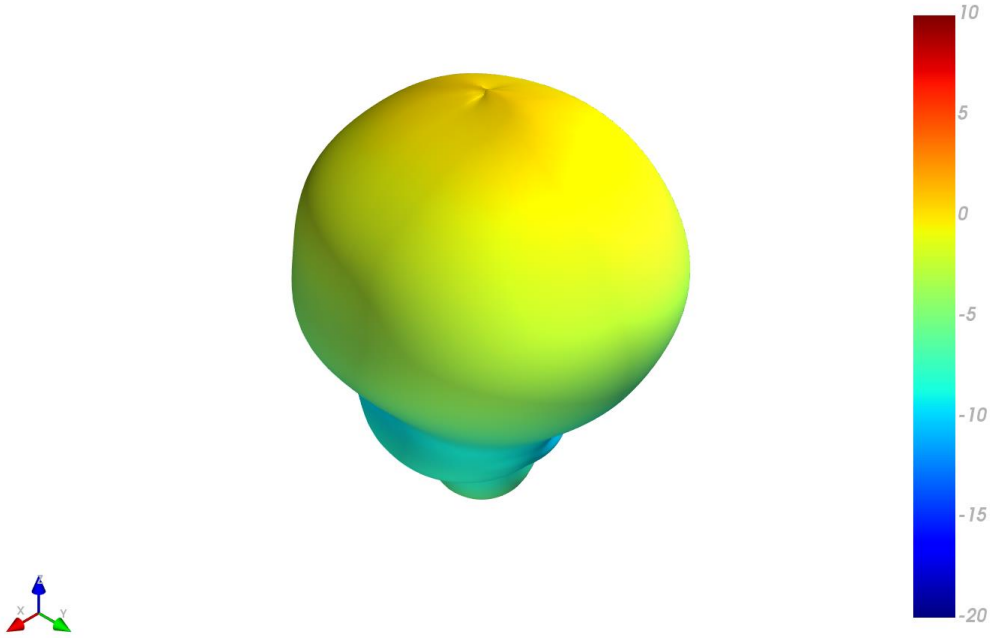


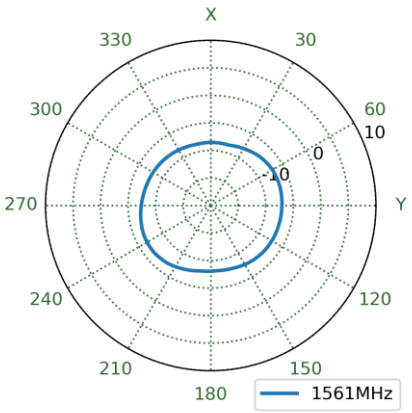
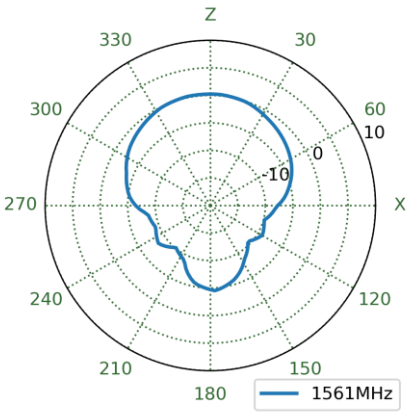
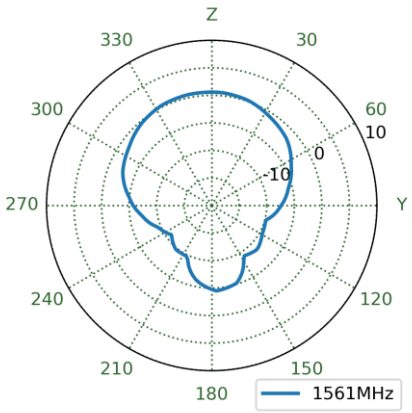
5. Radiation Patterns

5.1 Test Setup – on 70*70mm Ground Plane

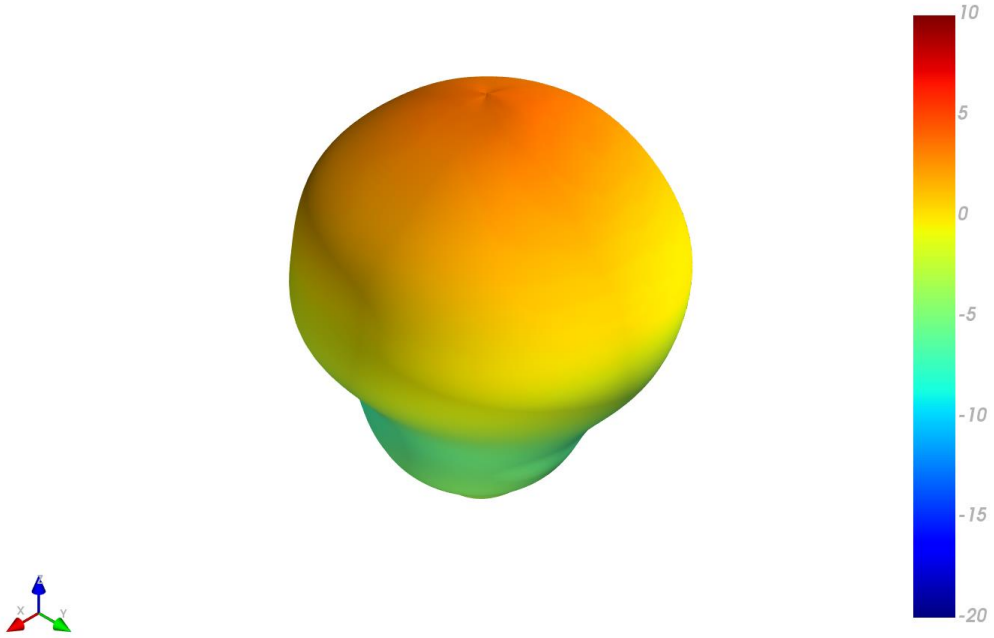


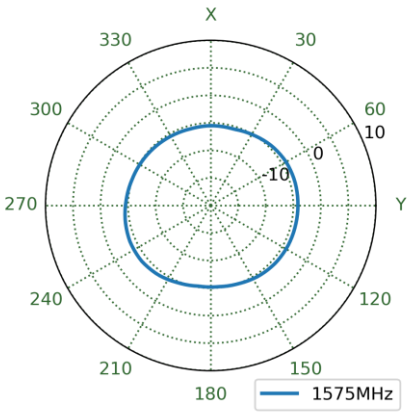
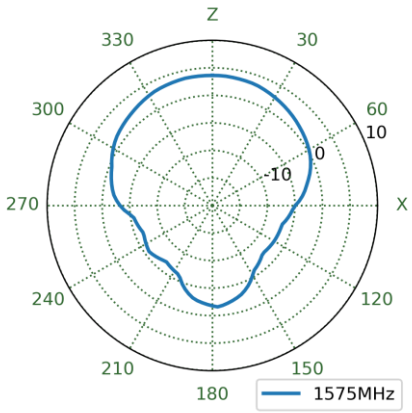
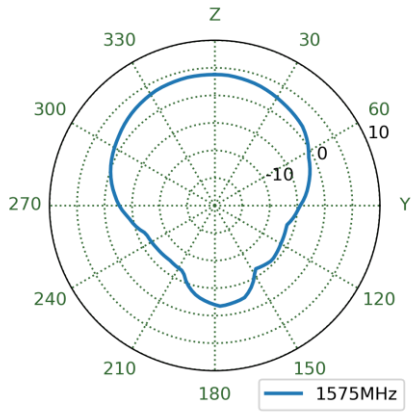
5.2 1561MHz 3D and 2D Radiation Patterns



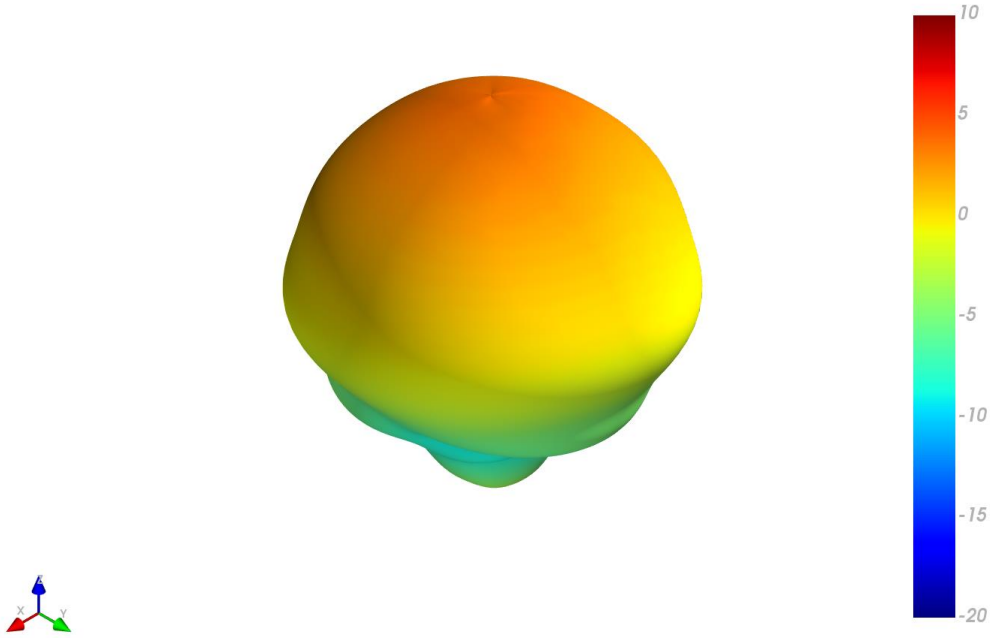
XY Plane	XZ Plane	YZ Plane
		

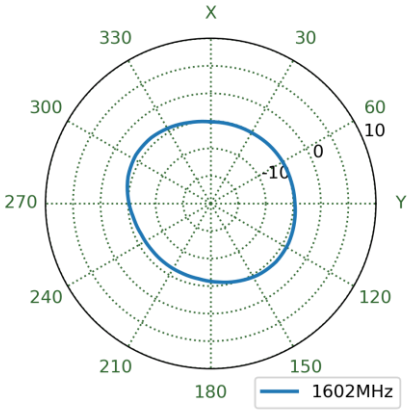
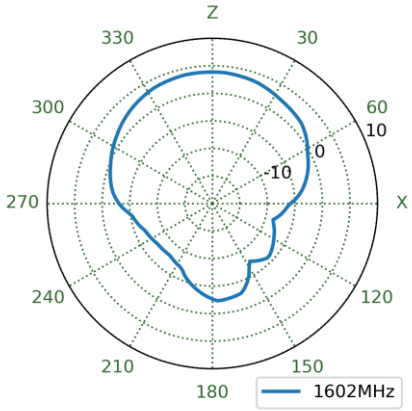
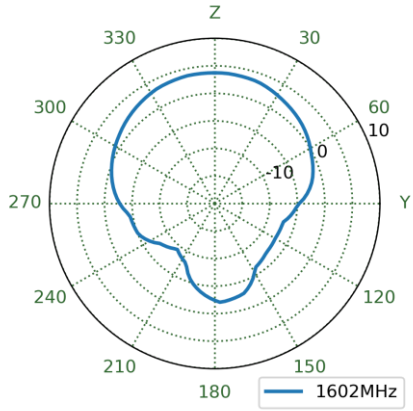
5.3 1575.42MHz 3D and 2D Radiation Patterns



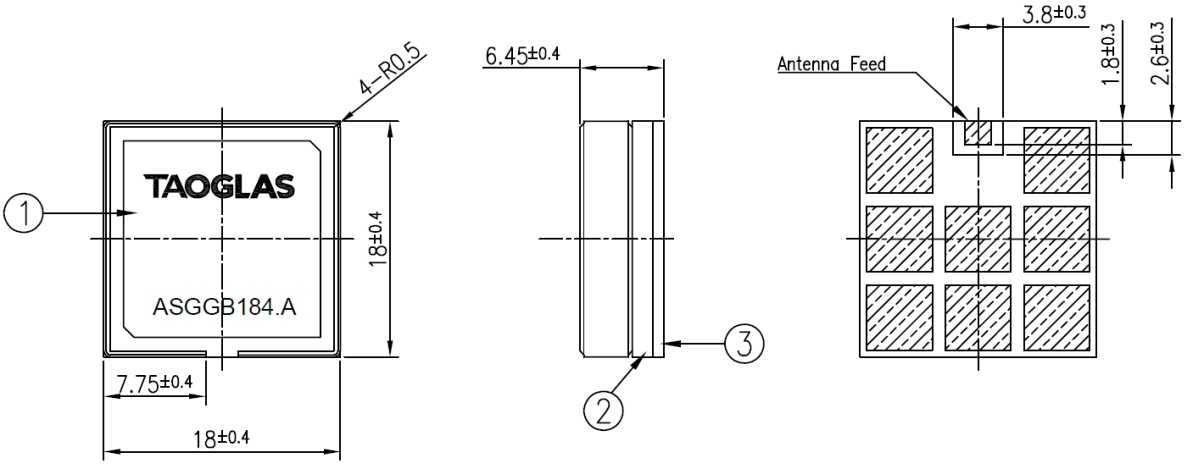
XY Plane	XZ Plane	YZ Plane
		

5.4 1602MHz 3D and 2D Radiation Patterns



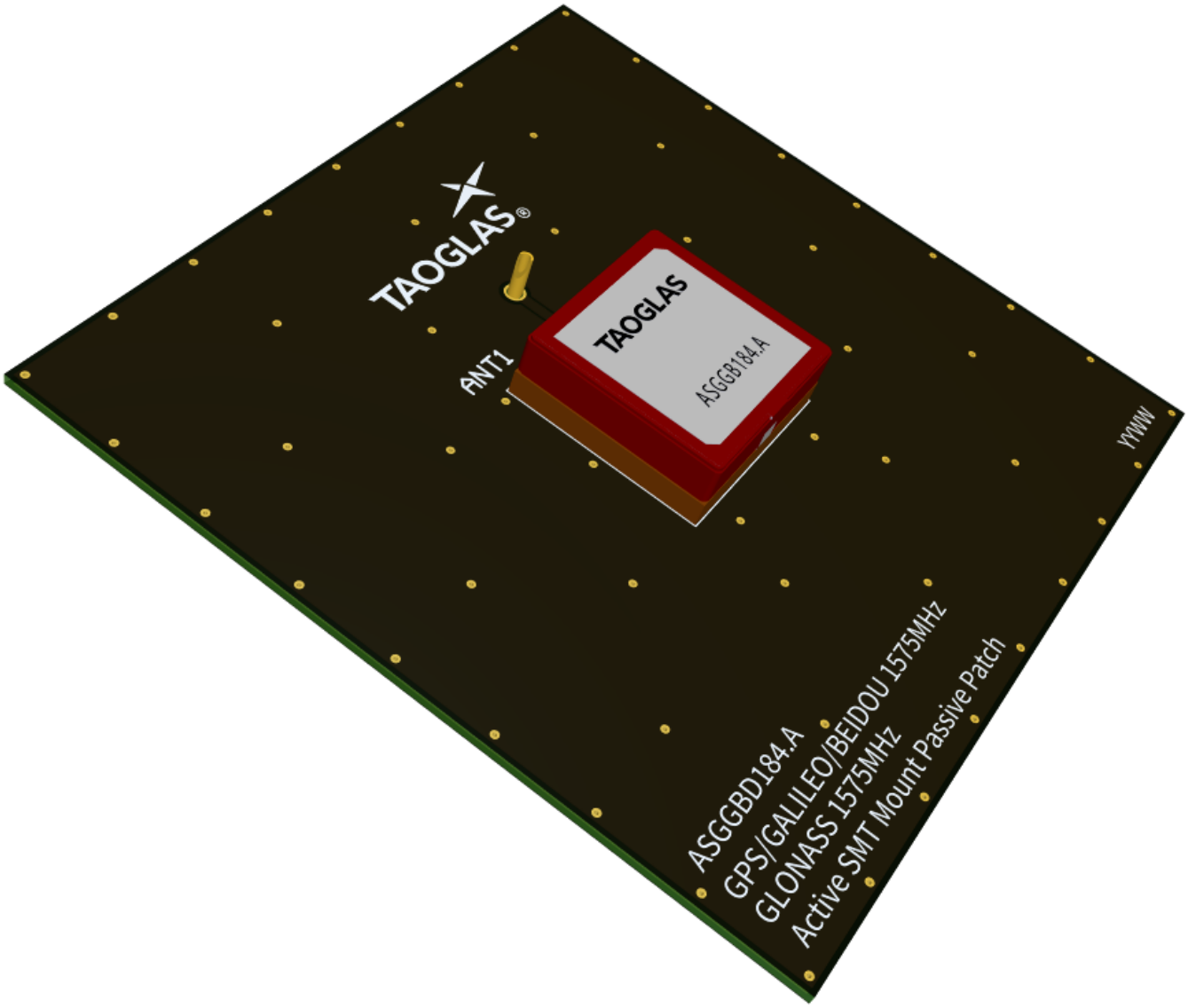
XY Plane	XZ Plane	YZ Plane
		

6. Mechanical Drawing (Units: mm)



Top View Side View Bottom View

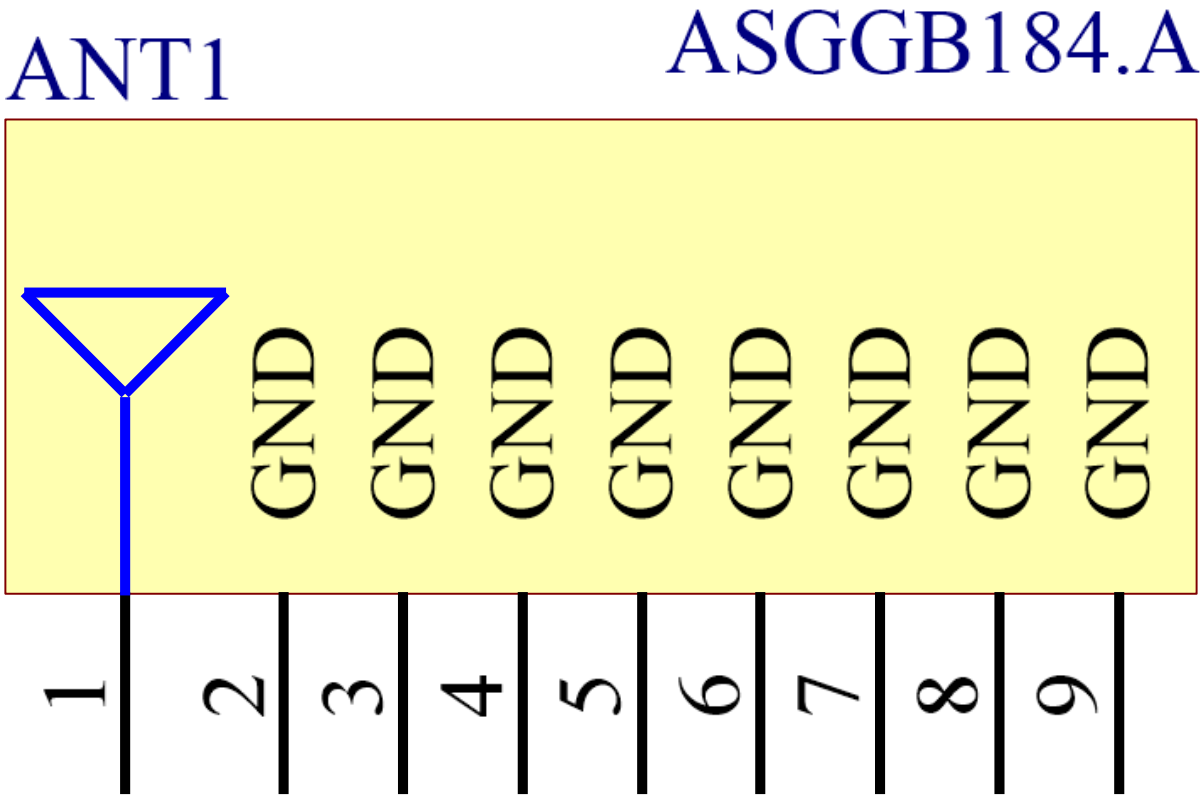
7. Antenna Integration Guide



7.1 Schematic Symbol and Pin Definition

The circuit symbol for the antenna is shown below. The antenna has 1 pin as an RF Feed and 8 pins used for ground.

Pin	Description
1	RF Feed
2, 3, 4, 5, 6, 7, 8,9	Ground

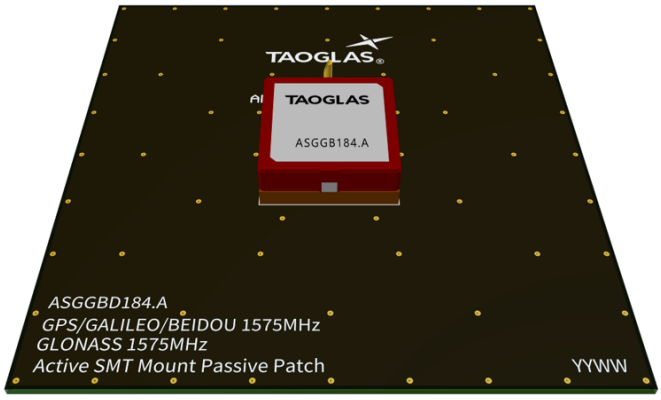


Please note you can download the design files, 3D model, 2D drawings and CST simulation files from the website here:

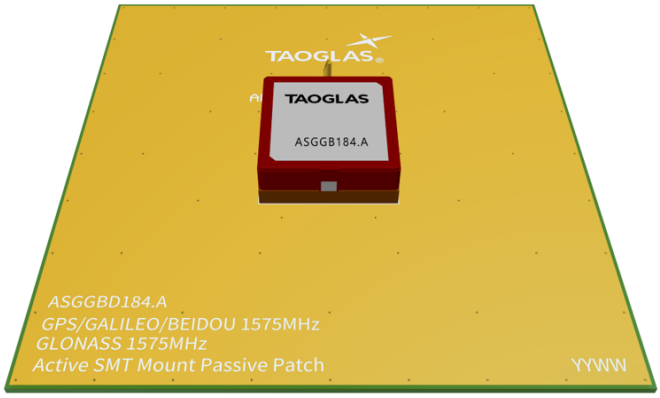
https://www.taoglas.com/product/active-gnss-surface-mount-18mm-patch/

7.2 Antenna Integration

The antenna should be placed at the center of the ground plane with a length and width of 70mm. Maintaining a square symmetric ground plane shape and symmetric environment around the antenna is critical to maintaining the excellent axial ratio and phase center performance shown in this datasheet.



Top Side w/ Solder Mask



Top Side w/o Solder Mask

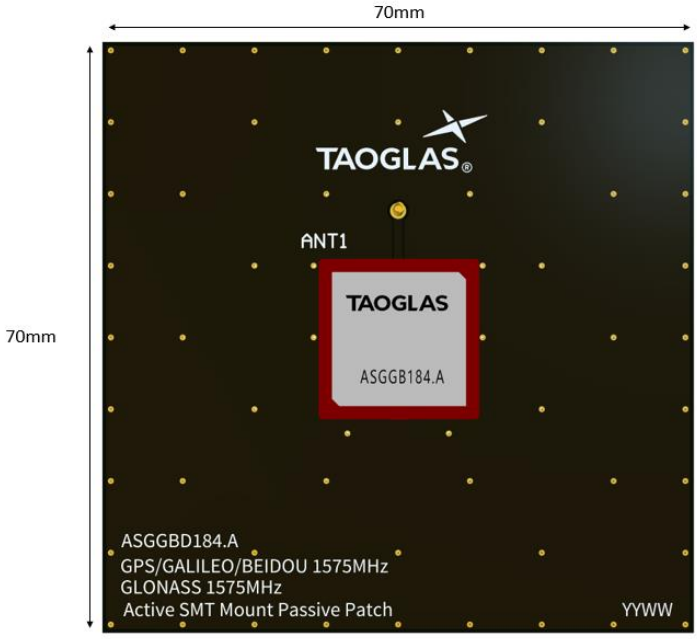
7.3 PCB Layout

The footprint and clearance on the PCB must comply with the antenna specification. The PCB layout shown in the diagram below demonstrates the antenna footprint. Note there are no thermal reliefs in the footprint and the copper keep out around the feed pad is applied for all layers.

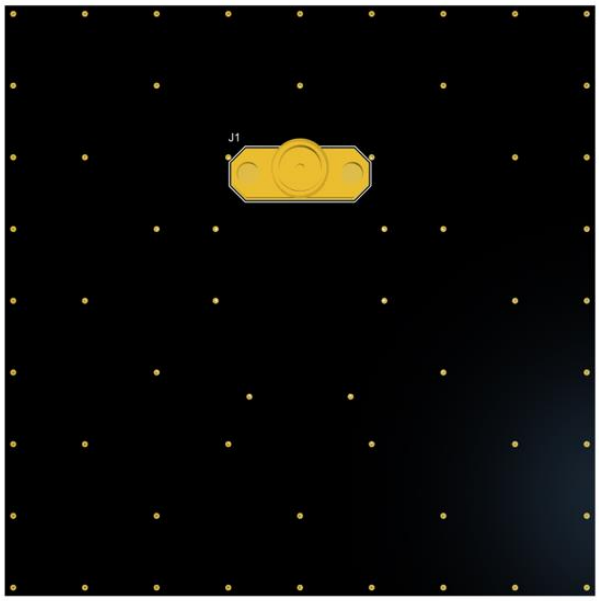
Topside

Bottom Side

7.4 Evaluation Board

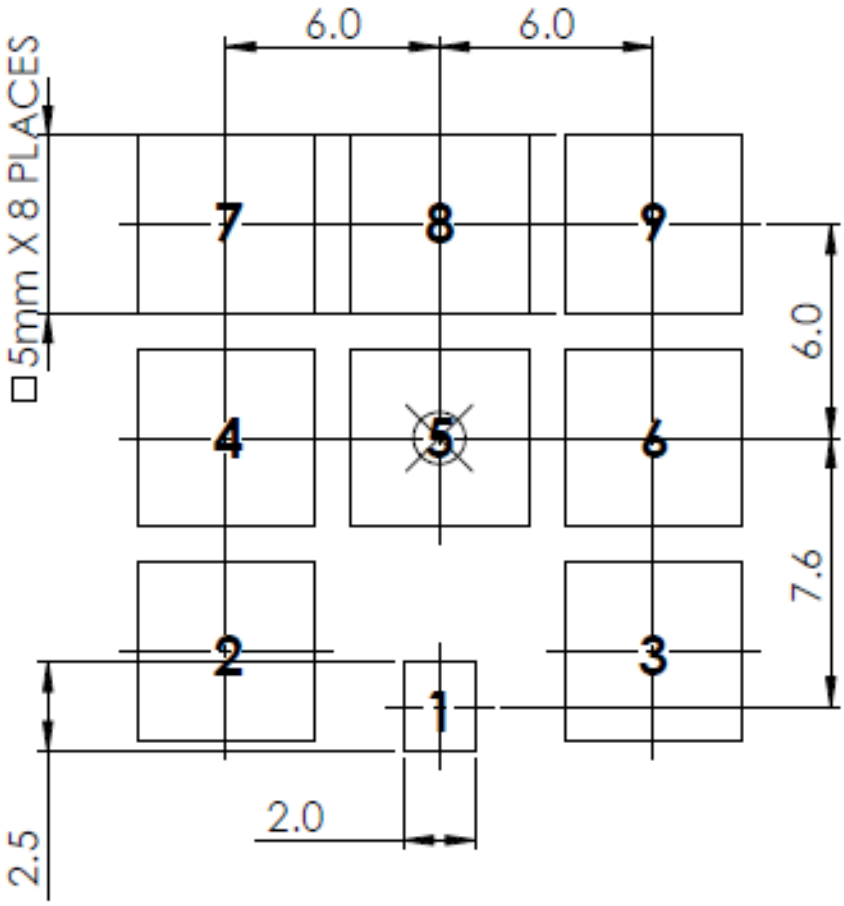


Topside



Bottom Side

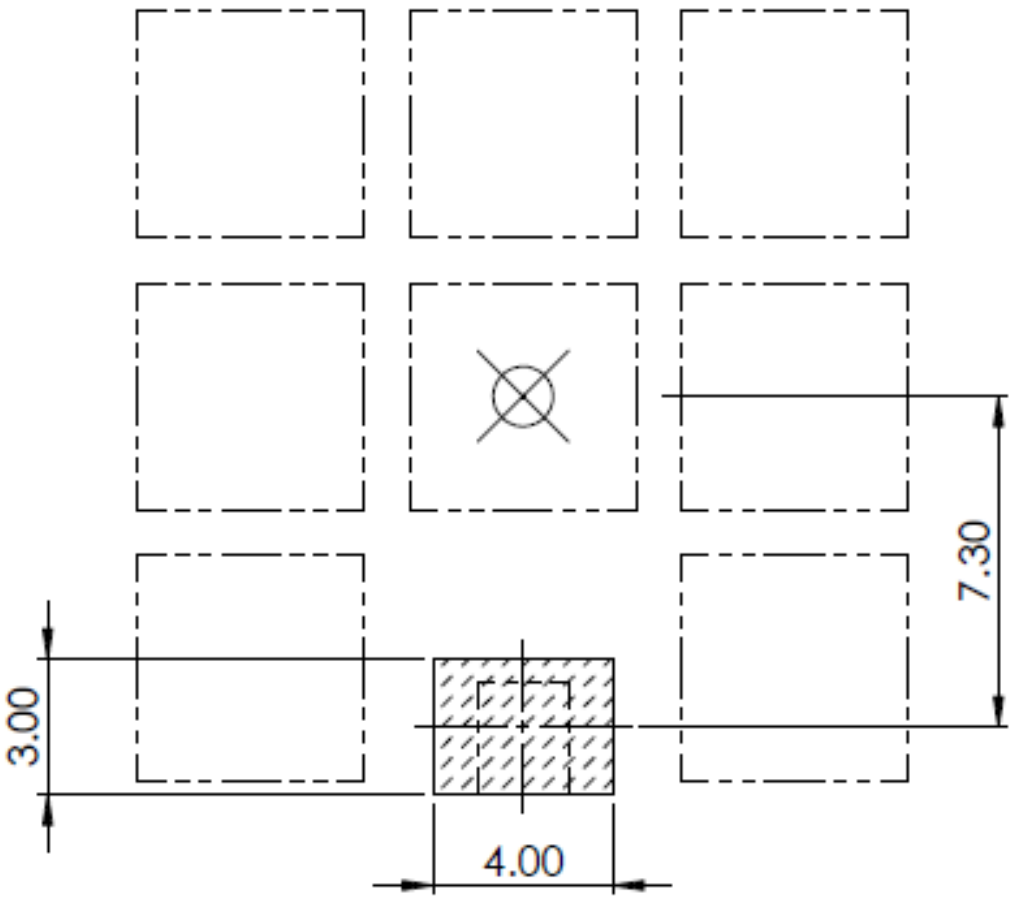
7.5 Footprint



PCB FOOTPRINT

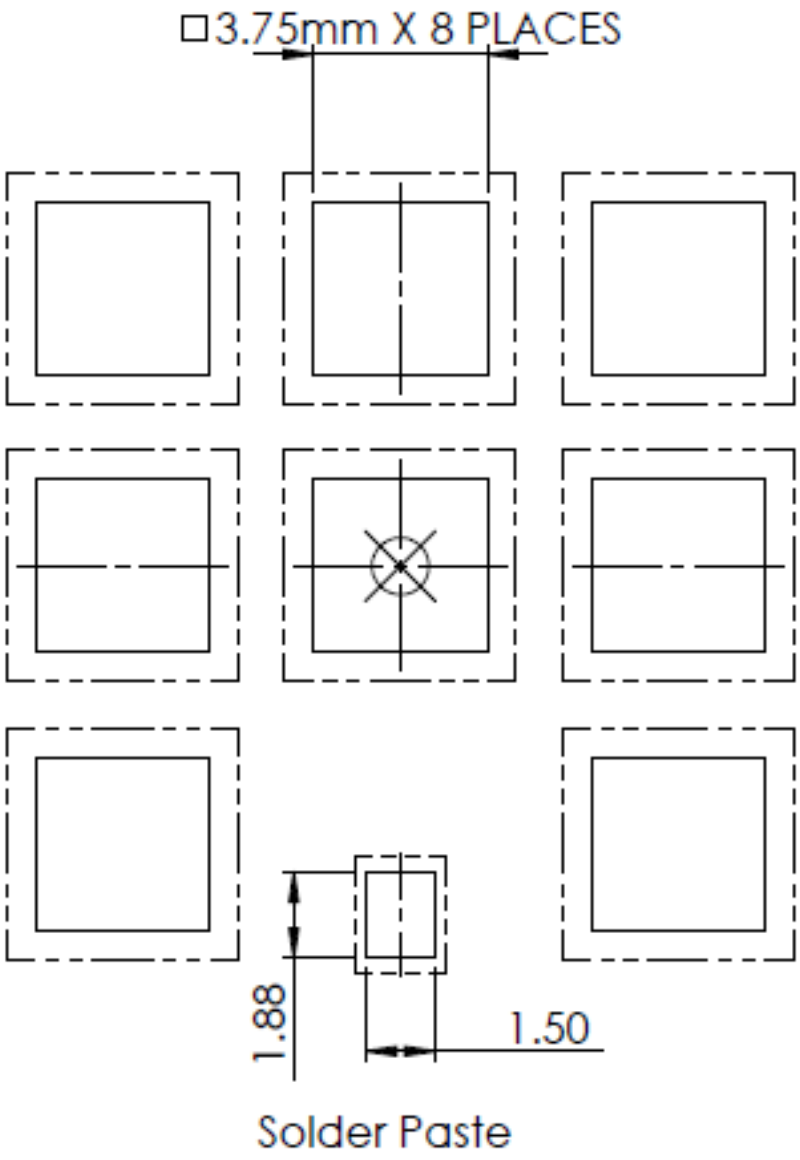
PIN:	DESCRIPTION:
1	RF Feed
2,3,4,5,6,7,8,9	Ground

7.6 PCB Keep Out



PCB Keep Out Area All Layers

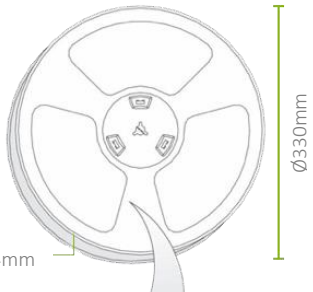
7.7 Solder Paste



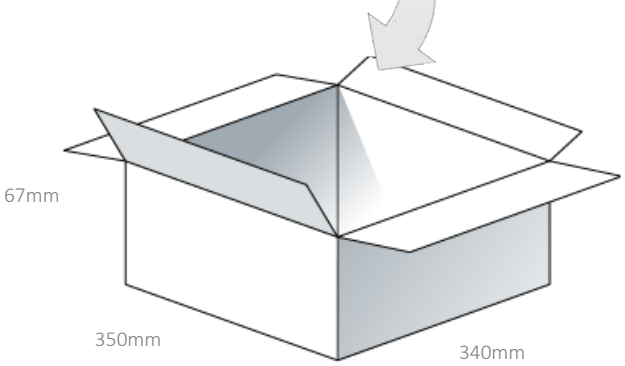
Solder Paste

8. Packaging

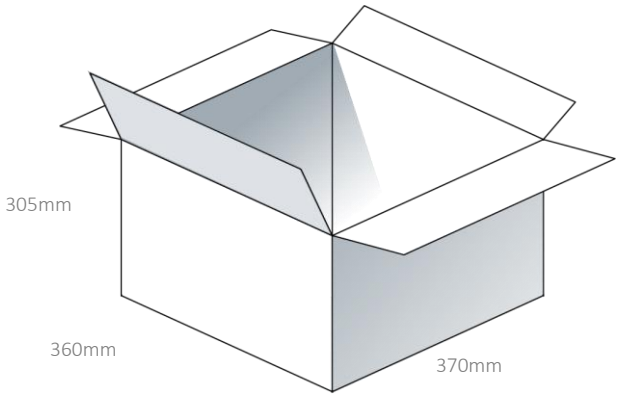
200pcs ASGGB184.A per Tape & Reel
Dimensions - Ø330*28.4
Weight – 2.2Kg



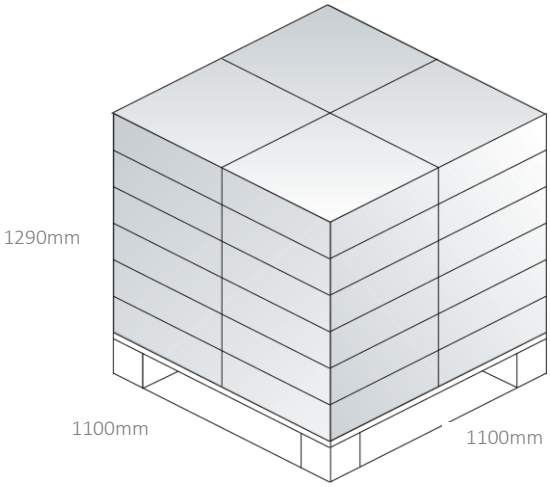
200pcs ASGGB184.A per carton
Dimensions - 350*340*67mm
Weight – 2.4Kg



800pcs ASGGB184.A per carton
Dimensions - 360*370*3055mm
Weight – 10 Kg

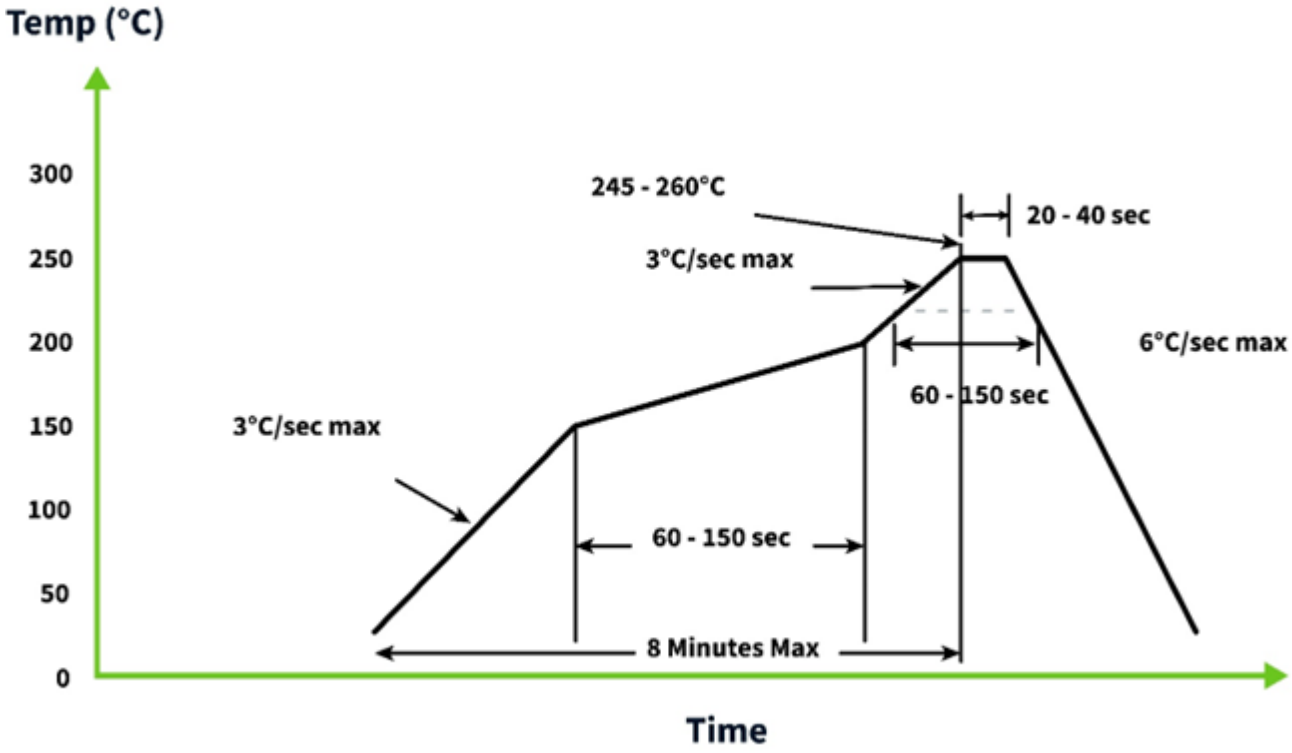


Pallet Dimensions:
1100*1100*1300mm
36 Cartons Per Pallet
9 Cartons Per Layer, 4 Layers



9. Solder Reflow Profile

The ASGGB184.A can be assembled by following the recommended soldering temperatures are as follows:



*Temperatures listed within a tolerance of +/- 10º C

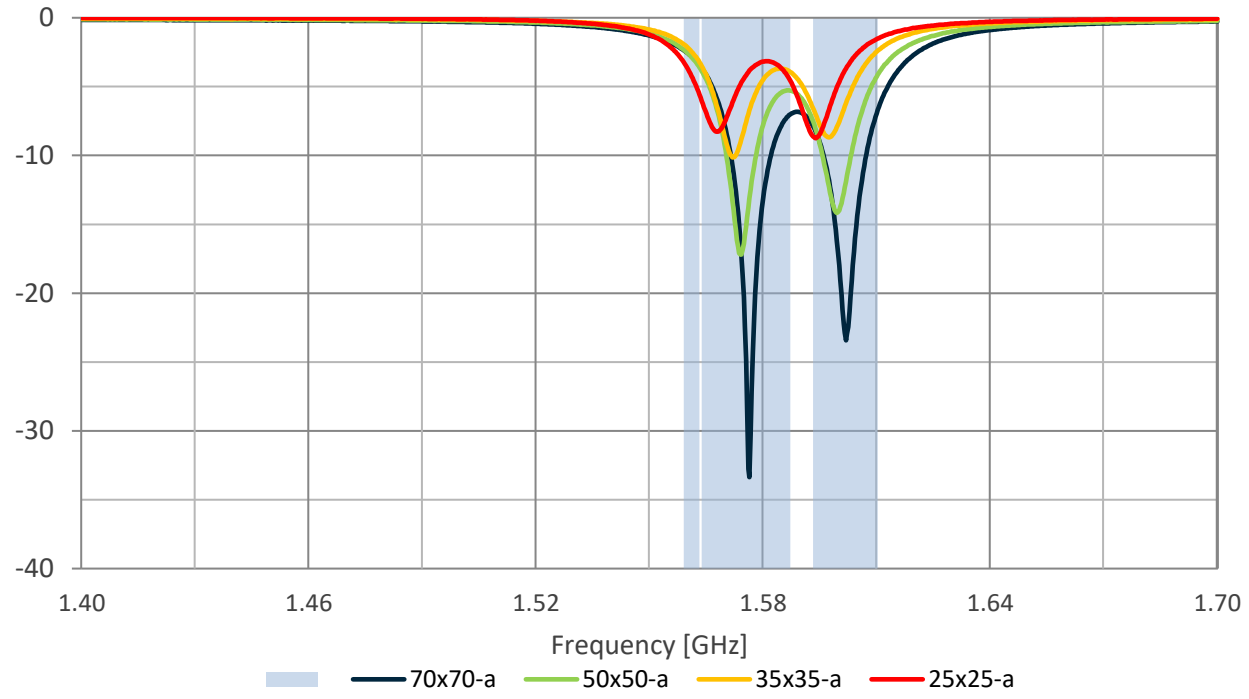
Smaller components are typically mounted on the first pass, however, we do advise mounting the ASGGB184.A when placing larger components on the board during subsequent reflows.

Note: Soldering flux classified ROL0 under IPC J-STD-004 is recommended.

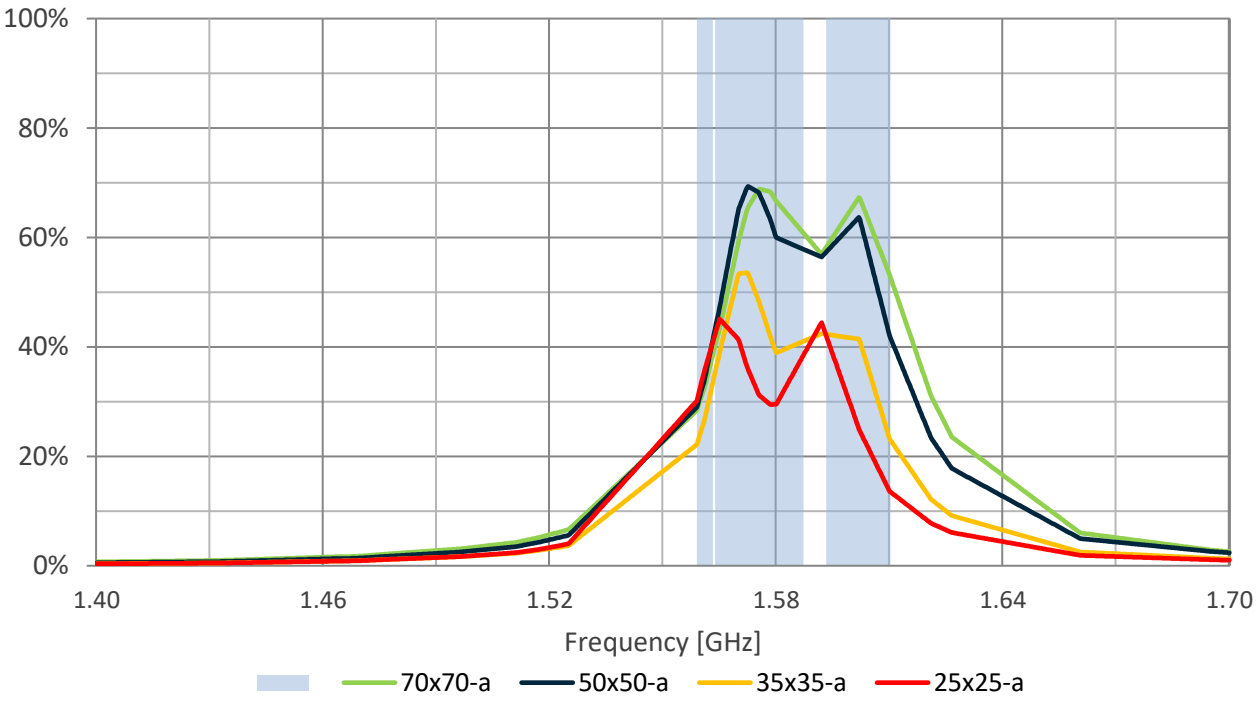
10. Application Note

The ASGGB184.A performance varies at different ground plane sizes, the results are shown in this section.

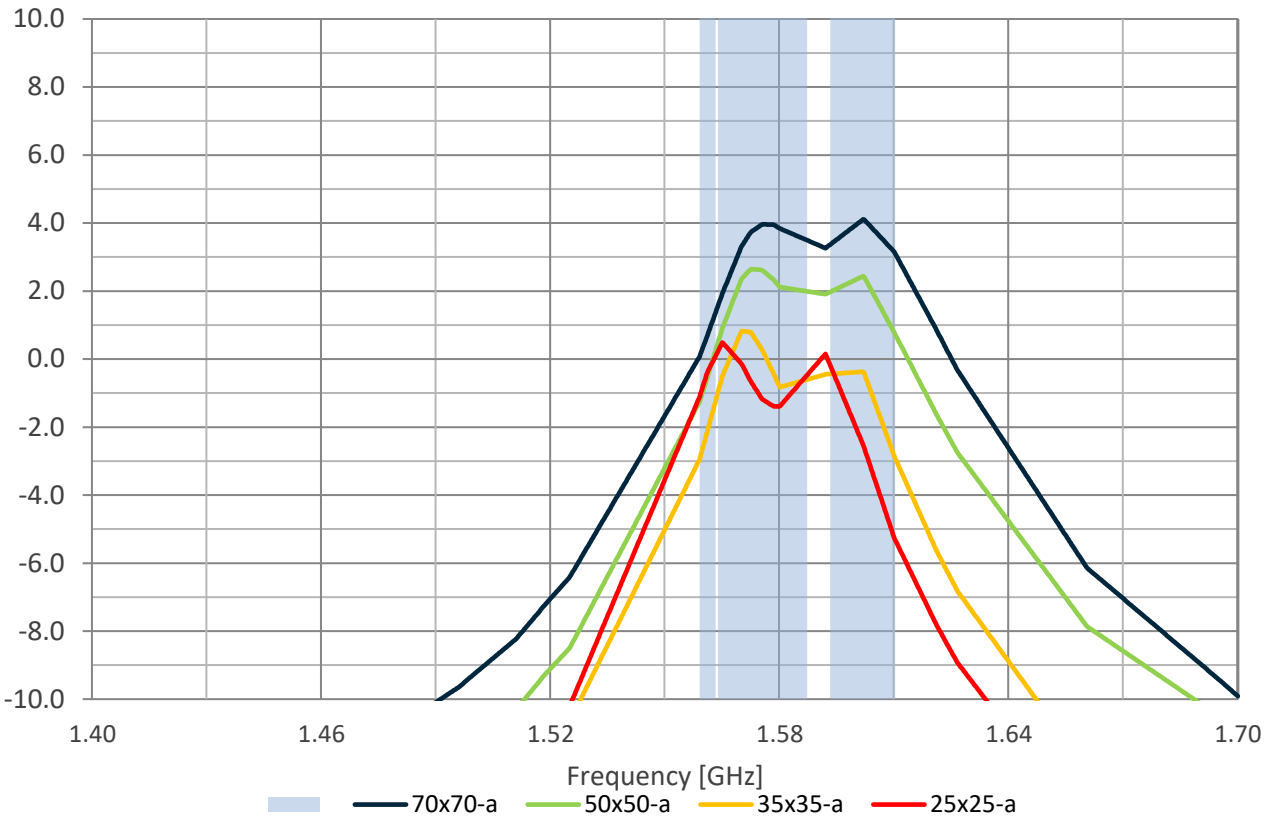
10.1 Return Loss



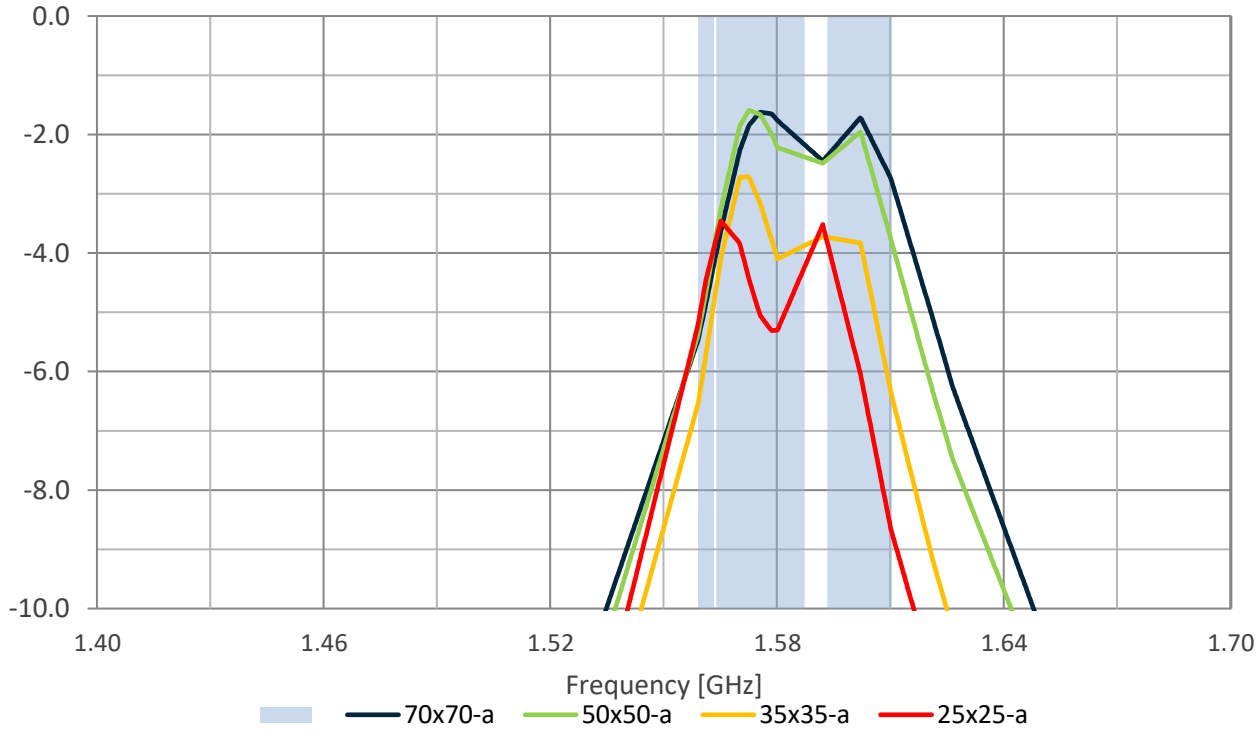
10.2 Efficiency



10.3 Peak Gain

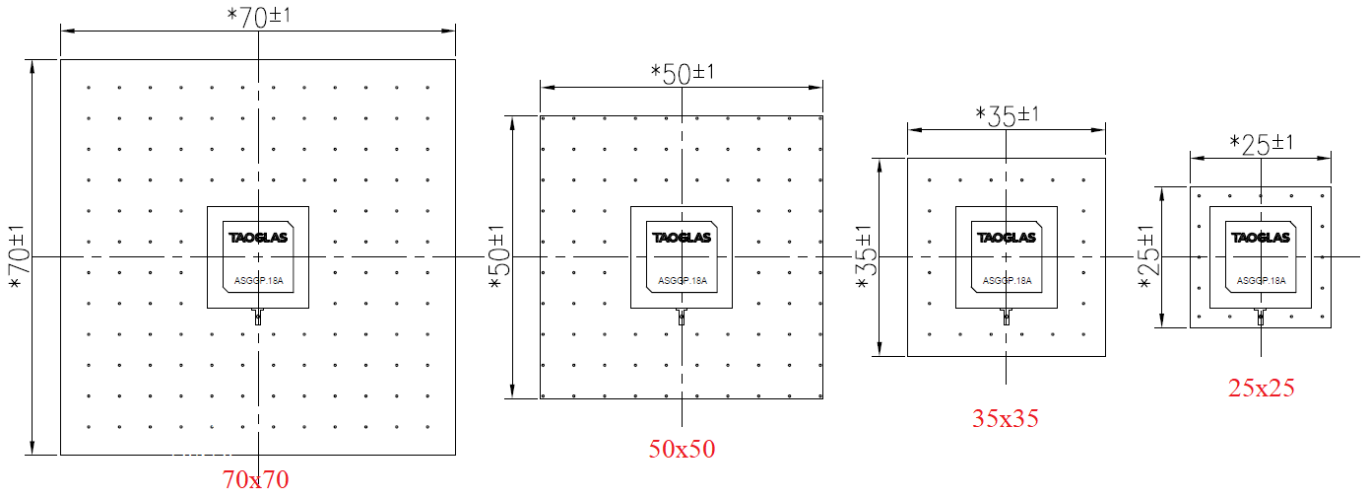


10.4 Average Gain



10.5 Performance Table

		BeiDou 1559-1563 MHz	GPS 1564-1587 MHz	GLONASS 1593-1610 MHz
Efficiency avg. for the freq. band	70x70(mm)	30.50	61.97	60.32
	50x50(mm)	31.51	62.20	52.92
	35x35(mm)	24.43	45.85	32.31
	25x25(mm)	32.95	35.44	19.22
Avg. Gain avg. for the freq. band	70x70(mm)	-5.17	-2.13	-2.23
	50x50(mm)	-5.03	-2.10	-2.86
	35x35(mm)	-6.14	-3.43	-5.09
	25x25(mm)	-4.84	-4.57	-7.35
Peak Gain for Gtotal	70x70(mm)	0.68	3.96	4.12
	50x50(mm)	-0.55	2.65	2.45
	35x35(mm)	-2.14	0.82	-0.37
	25x25(mm)	-0.40	0.49	-2.56
AR at Zenith avg. for the freq. band	70x70(mm)	17.86	11.16	17.43
	50x50(mm)	20.66	13.37	21.18
	35x35(mm)	30.89	17.61	28.02
	25x25(mm)	17.70	13.48	30.11



Changelog for the datasheet

SPE-20-8-107 – ASGGB184.A

Revision: F (Current Version)	
Date:	2023-10-31
Notes:	Updated Solder Reflow Profile
Author:	Cesar Sousa

Previous Revisions

Revision: E	
Date:	2023-02-22
Notes:	Updated GNSS Bands & Constellations Graphics
Author:	Cesar Sousa

Revision: D	
Date:	2023-01-27
Notes:	Updated current consumption in spec table.
Author:	Gary West

Revision: C	
Date:	2022-06-08
Notes:	Added antenna integration guide
Author:	Gary West

Revision: B	
Date:	2021-09-02
Notes:	Added MSL rating.
Author:	Erik Landi

Revision: A (Original First Release)	
Date:	2020-10-28
Notes:	
Author:	Jack Conroy