



TAOGLAS®



Datasheet

Magma X

Part No:
AA.178.B.301111

Description

Magma X Active GPS L1/L5 Magnetic Mount Antenna

Features:

- Magnetic Mount Antenna
- Covers GPS L1 / L5 Bands along with BeiDou B1, IRNSS L5 and GLONASS G1
- Excellent Out-Of-Band Rejection
- Low Noise Figure
- Cable: 3m of RG-174
- Connector: SMA(M) ST
- IP67 Waterproof Rated Enclosure
- Dimensions: 49.8 x 52.4 x 17.1mm
- RoHS & Reach Compliant

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1. Introduction



The Taoglas **MagmaX2 AA.178.B** is an external, IP67 rated, magnetic mount, high-performance multiband GNSS antenna. Utilizing an internal, active stacked patch, the GNSS antenna supports both L1 and L5 bands. It is an economical, after market solution for the highest accuracy centimeter-level tracking applications.

Typical applications include:

- UAVs and Robotics
- Transportation and Autonomous Vehicles
- Marine and Agriculture
- Navigation

This compact antenna exhibits excellent radiation patterns on both L1 and L5 bands and with a low noise figure to preserve signal quality, which helps minimize time to first fix. It also features excellent out-of-band rejection to prevent out-of-band signals from overdriving or damaging its LNAs. The AA.175 features very tight Phase Centre Offset (PSO) at just $\pm 2\text{cm}$ at the L1 Band and $\pm 5\text{cm}$ at the L2. The precision of antenna phase center directly affects the accuracy of GNSS positioning systems and can ensure that the accuracy of the receiver can really achieve cm-level accuracy.

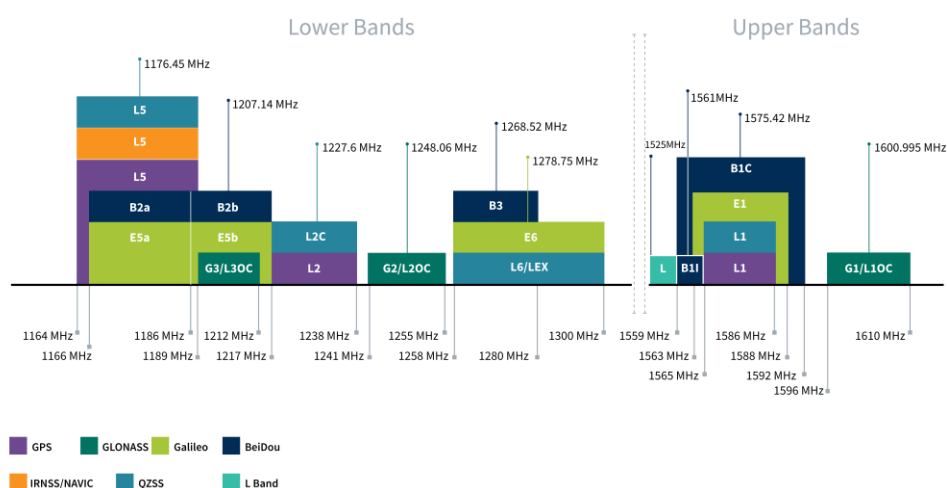
This antenna has been tuned and tested on a 70 x 70 mm ground plane, and has a 2 stage LNA ensuring good signal strength. It can operate with an input voltage ranging from 1.8 to 5 volts.

The enclosure is made from robust ABS material and is IP67 rated to endure the most challenging of environments. It is supplied with 3m RG-164 cable and SMA(M) connector, both of which can be customized to suit your application.

Contact your regional Taoglas customer support team to request these services or additional support to integrate and test this antenna's performance in your device.

2. Specification

GNSS Frequency Bands					
GPS	L1 1575.42 MHz	L2 1227.6 MHz	L5 1176.45 MHz		
	■	□	■		
GLONASS	G1 1602 MHz	G2 1248 MHz	G3 1207 MHz		
	■	□	□		
Galileo	E1 1575.24 MHz	E5a 1176.45 MHz	E5b 1201.5 MHz	E6 1278.75 MHz	
	■	■	□	□	
BeiDou	B1C 1575.42 MHz	B1I 1561 MHz	B2a 1176.45 MHz	B2b 1207.14 MHz	B3 1268.52 MHz
	■	■	■	□	□
L-Band	L-Band 1542 MHz				
	□				
QZSS (Regional)	L1 1575.42 MHz	L2C 1227.6 MHz	L5 1176.45 MHz	L6 1278.75e6	
	■	□	■	□	
IRNSS (Regional)	L5 1176.45 MHz				
	■				
SBAS	L1/E1/B1 1575.42 MHz	L5/B2a/E5a 1176.45 MHz	G1 1602 MHz	G2 1248 MHz	G3 1207 MHz
	■	■	■	□	□



GNSS Bands and Constellations

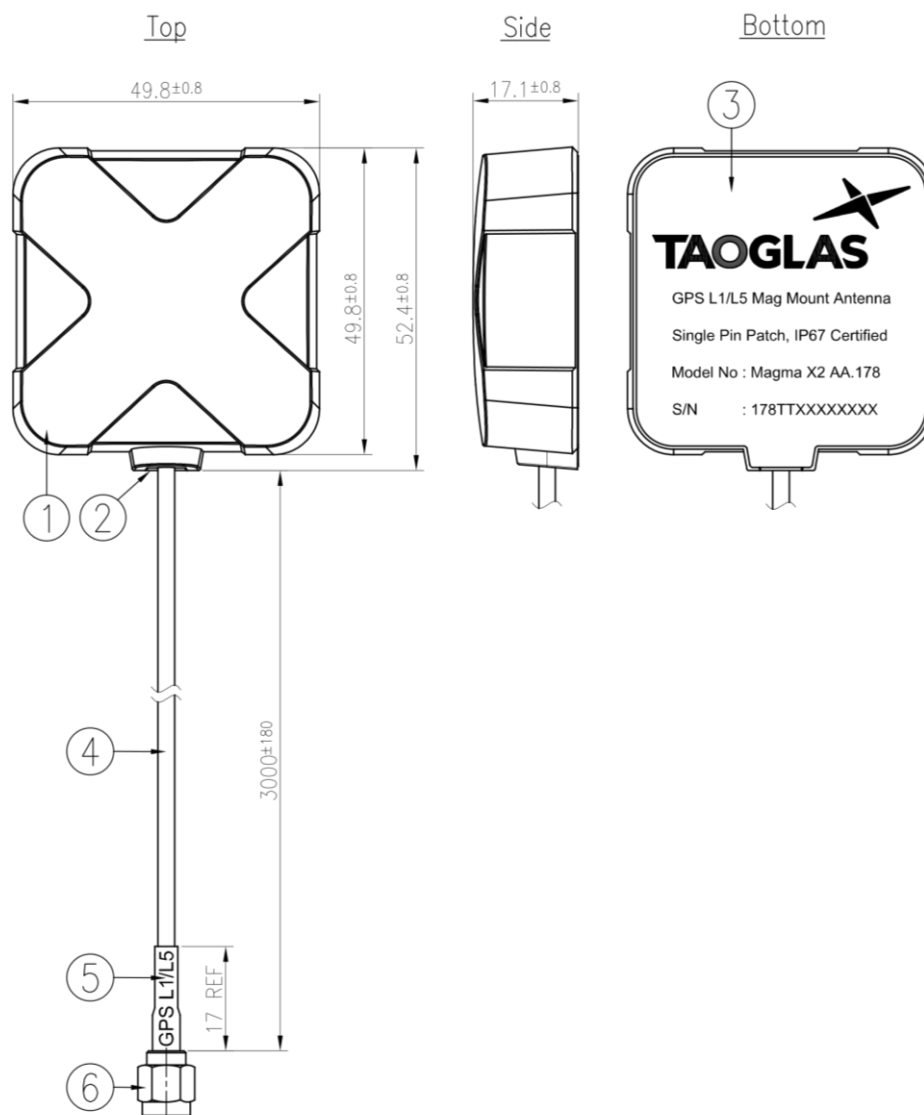
GNSS Electrical				
Frequency (MHz)	1176.45	1561	1575.42	1602
VSWR (max.)	3:1	3:1	4:1	3:1
Passive Antenna Efficiency (%) (Without cable loss)	51.88	48.85	42.12	44.43
Passive Antenna Gain at Zenith (dBic) (Without cable loss)	0.26	0.46	0.46	-0.5
Axial Ratio (dB)	10.5	13.7	19.32	7.52
PCO_x (cm)	0.72	-2.37	-2.63	-3.9
PCO_y (cm)	-0.36	-5.74	-5.67	-4.62
PCV (cm)	0.02	1.87	1.85	1.81
Group Delay Mean (ns)	37.46	27.65	35.88	43.96
Polarization	RHCP			
Impedance	50 Ω			

LNA and Filter Electrical Properties				
Frequency (MHz)	1176.45	1561	1575.42	1602
Gain (dB)	29.67	28.82	28.12	28.58
Noise (dB)	2.92	2.78	2.99	2.31
Input Voltage(V)	+ 1.8 to 5.5			
Current Consumption (mA)	5 $\pm$ 2			
IEC61000-4-2 (ESD protection)	$\pm$ 30 kV air / $\pm$ 20Kv contact discharge			

Mechanical	
Housing Dimensions	49.8 x 52.4 x 17.1mm
Housing Material	ABS
Cable	3m RG-174 (Customizable)
Connector	SMA(M) ST (Customizable)
Waterproof	IP67
Weight	98g
Magnetic Pull Force	Pull horizontal max pull force(kgf): 0.52 Pull vertical max pull force(kgf): 0.48

Environmental	
Operation Temperature	-40°C ~ +85°C
Storage Temperature	-40°C ~ +90°C
Humidity	Non-condensing 65°C 95% RH

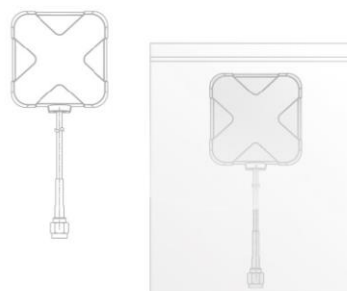
3. Mechanical Drawing



	Name	Material	Finish	QTY
1	Top Housing	ABS	Black	1
2	Bottom Housing	ABS	Black	1
3	Sticker Bottom	PET	Silver	1
4	RG174 Coaxial Cable	PVC	Black	1
5	Heat Shrink Tube (GPS L1/L5)	PE	Blue Tube/White Text	1
6	SMA(M)ST	Brass	Au Plated	1

4. Packaging

1 pcs AA.178.B.301111 per PE Bag
Bag Dimensions: 100x230mm
Weight: 94g



10 pcs AA.178.B.301111 per Large PE Bag
Bag Dimensions: 220x460mm
Weight: 0.97Kg

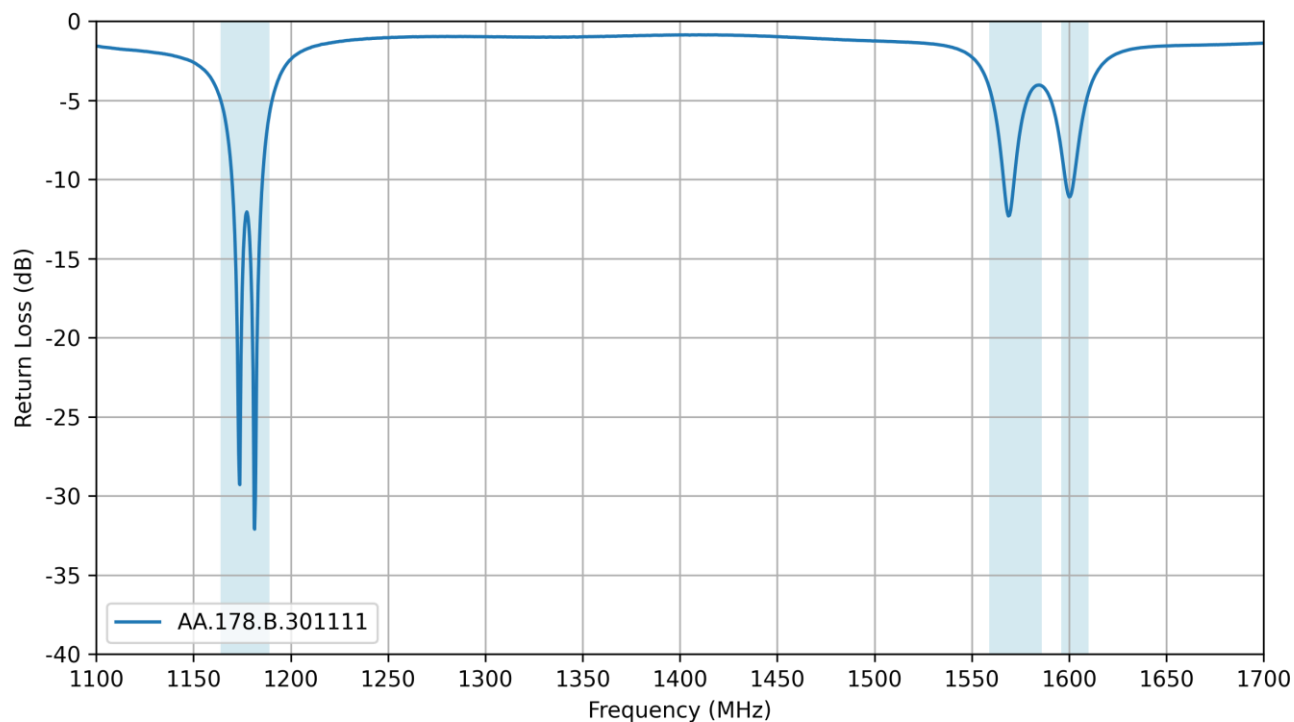


100pcs AA.178.B.301111 per Carton
Carton Dimensions-370 x 370 x 300mm
Weight: 10.5Kg

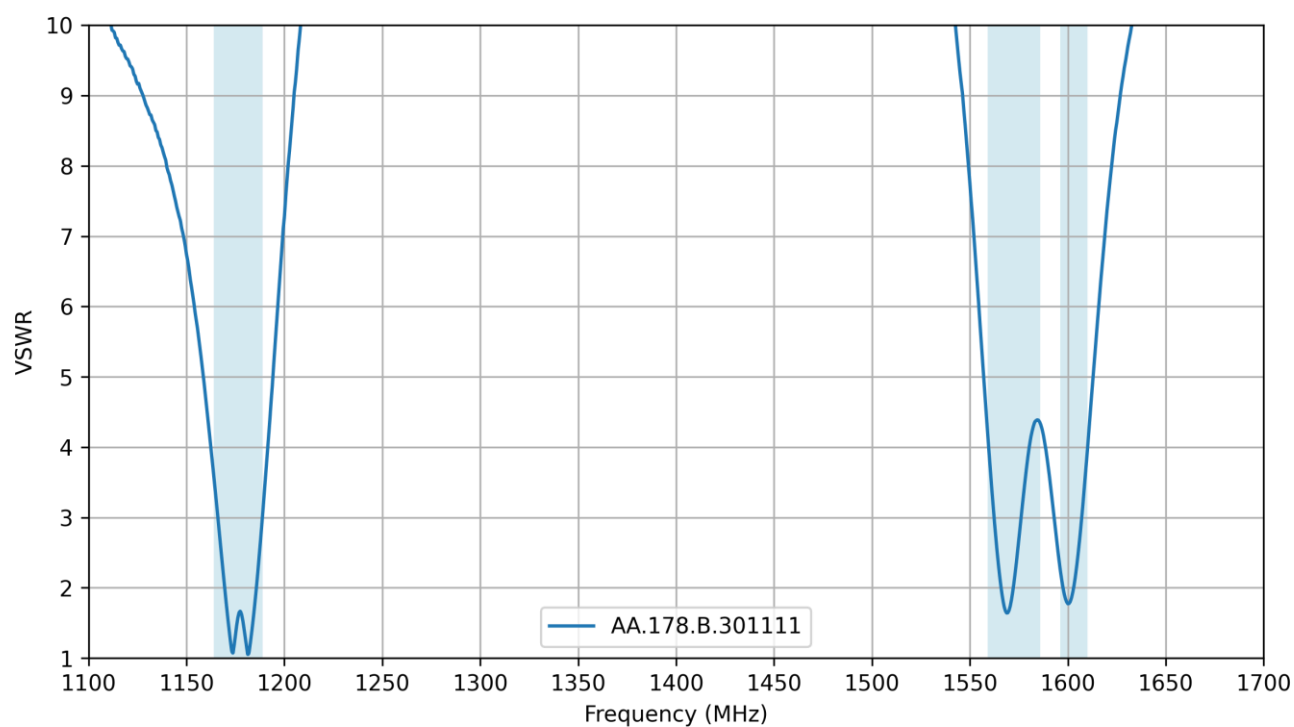


5. Antenna Characteristics

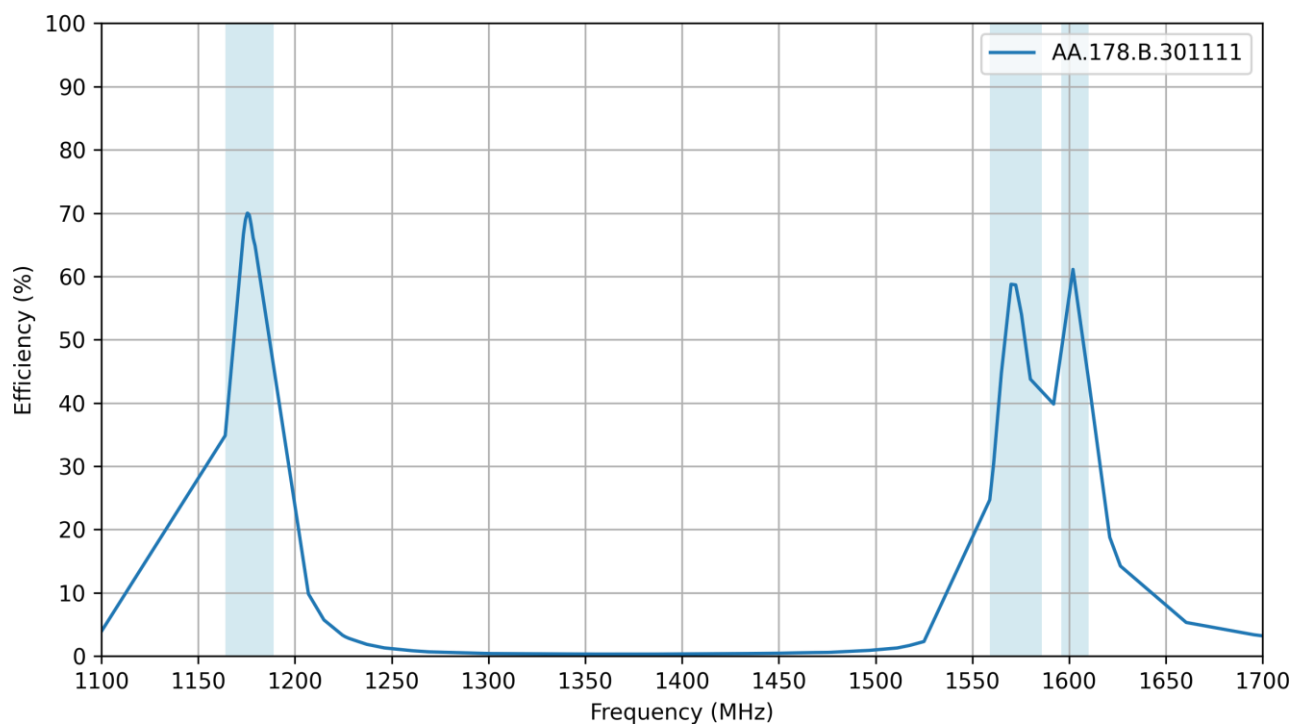
5.1 Return Loss



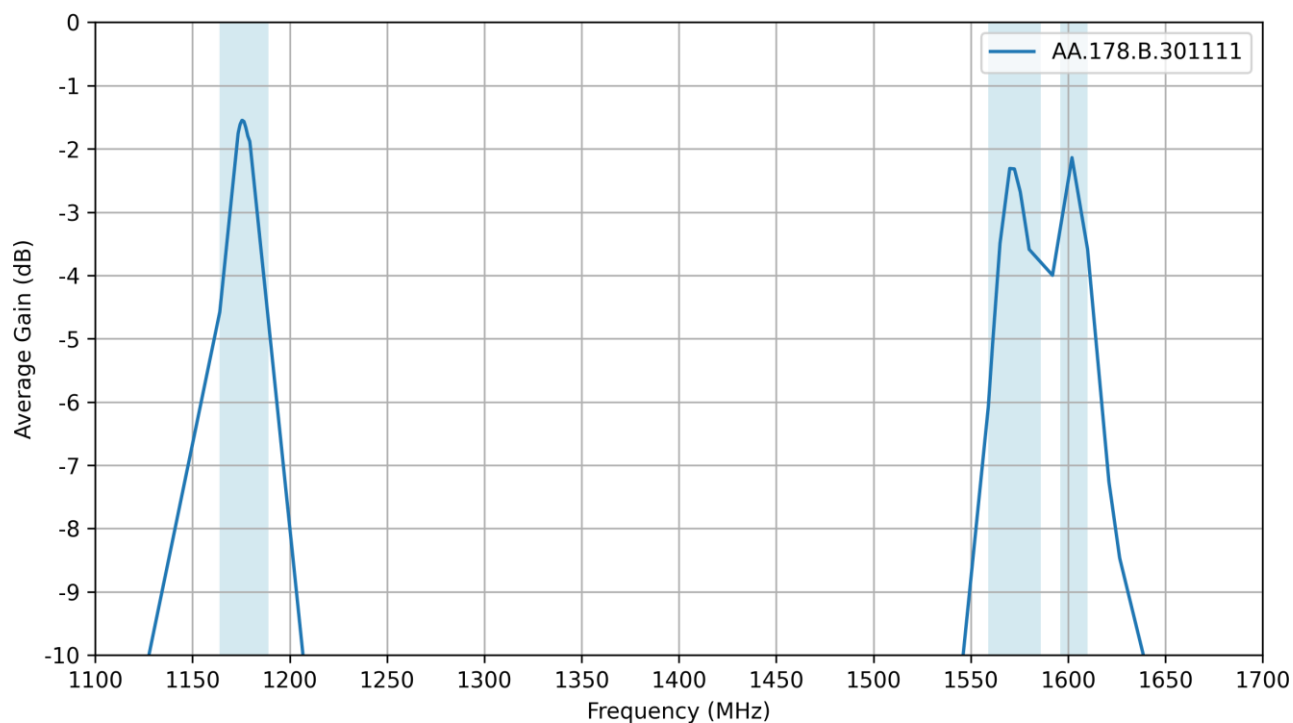
5.2 VSWR



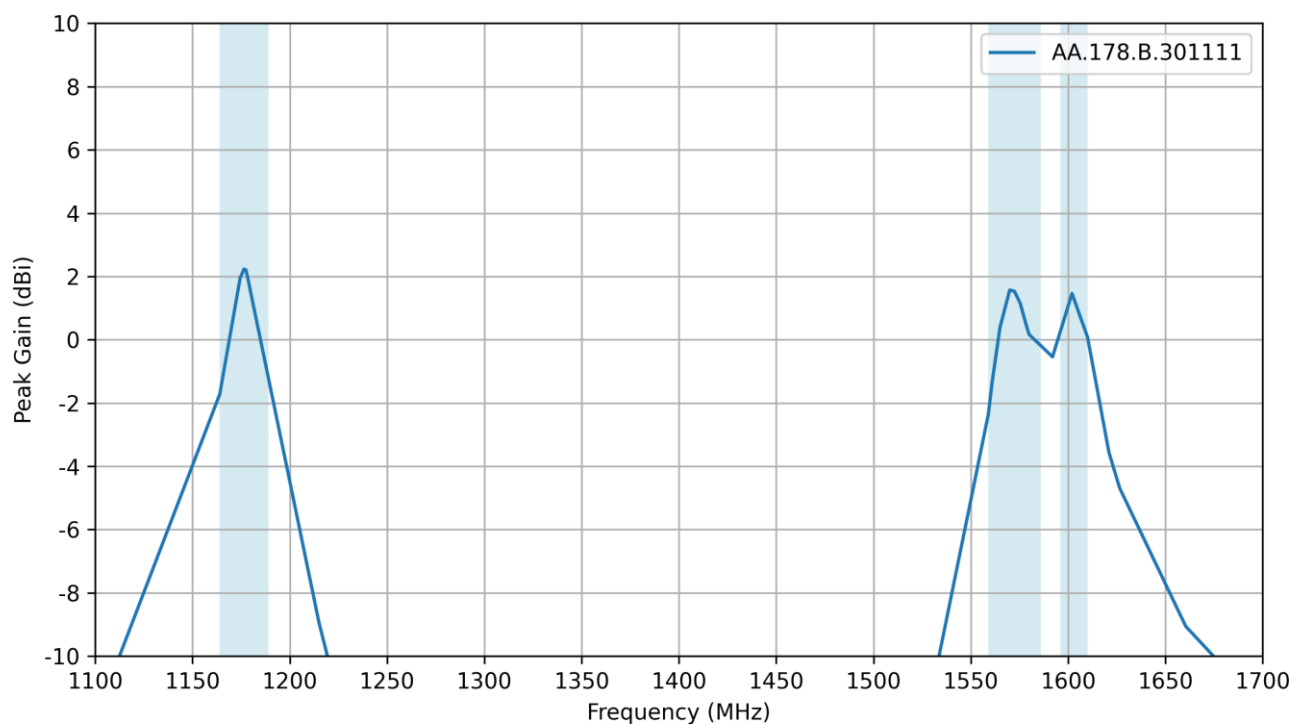
5.3 Efficiency



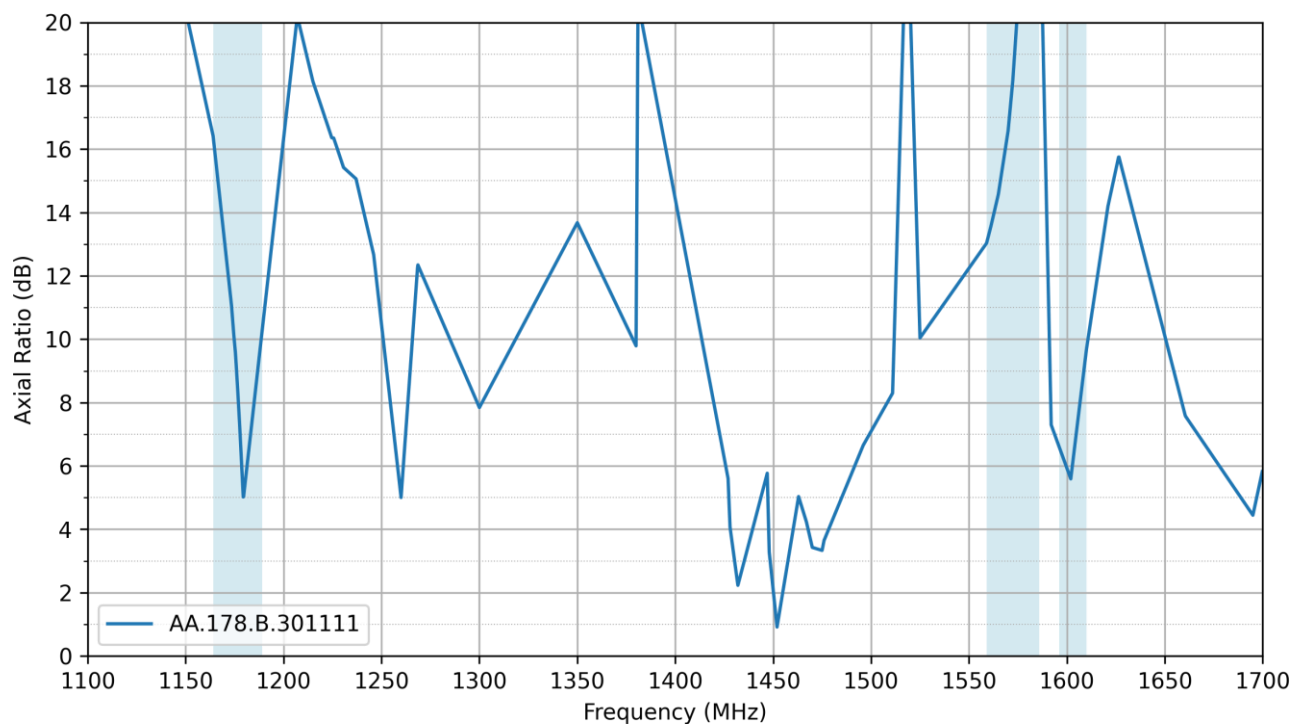
5.4 Average Gain



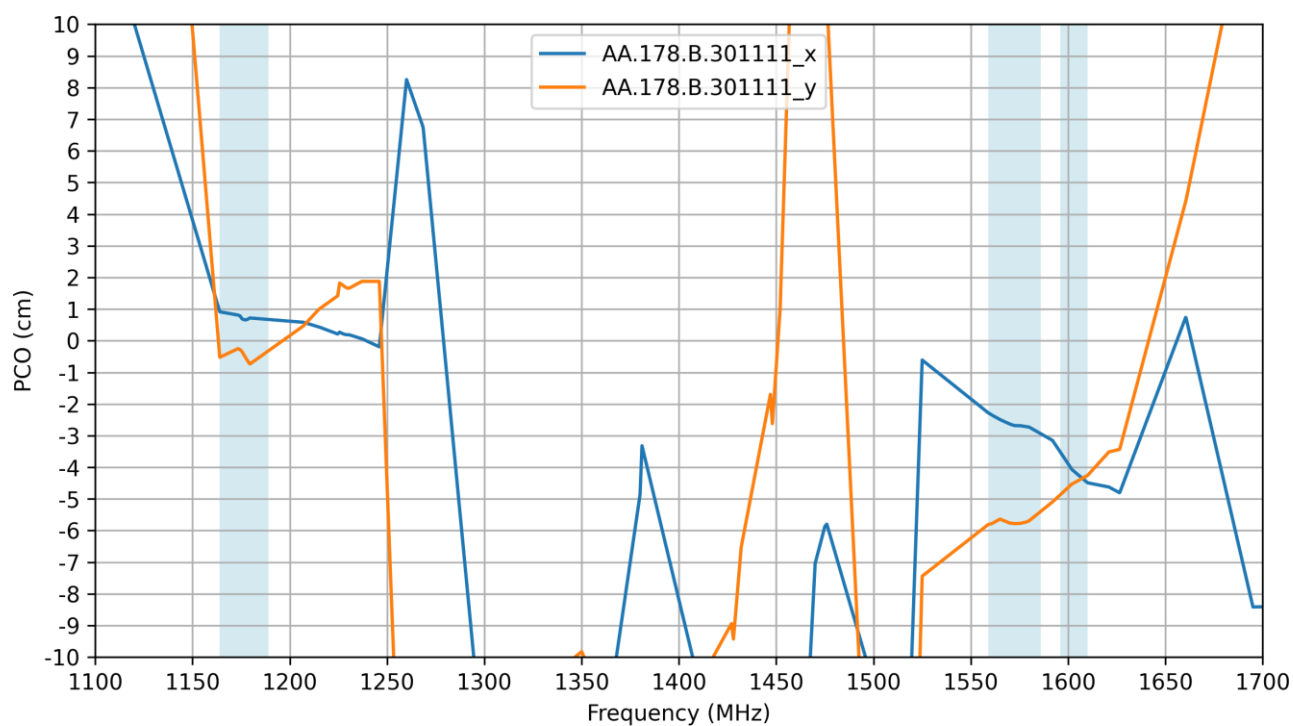
5.5 Peak Gain



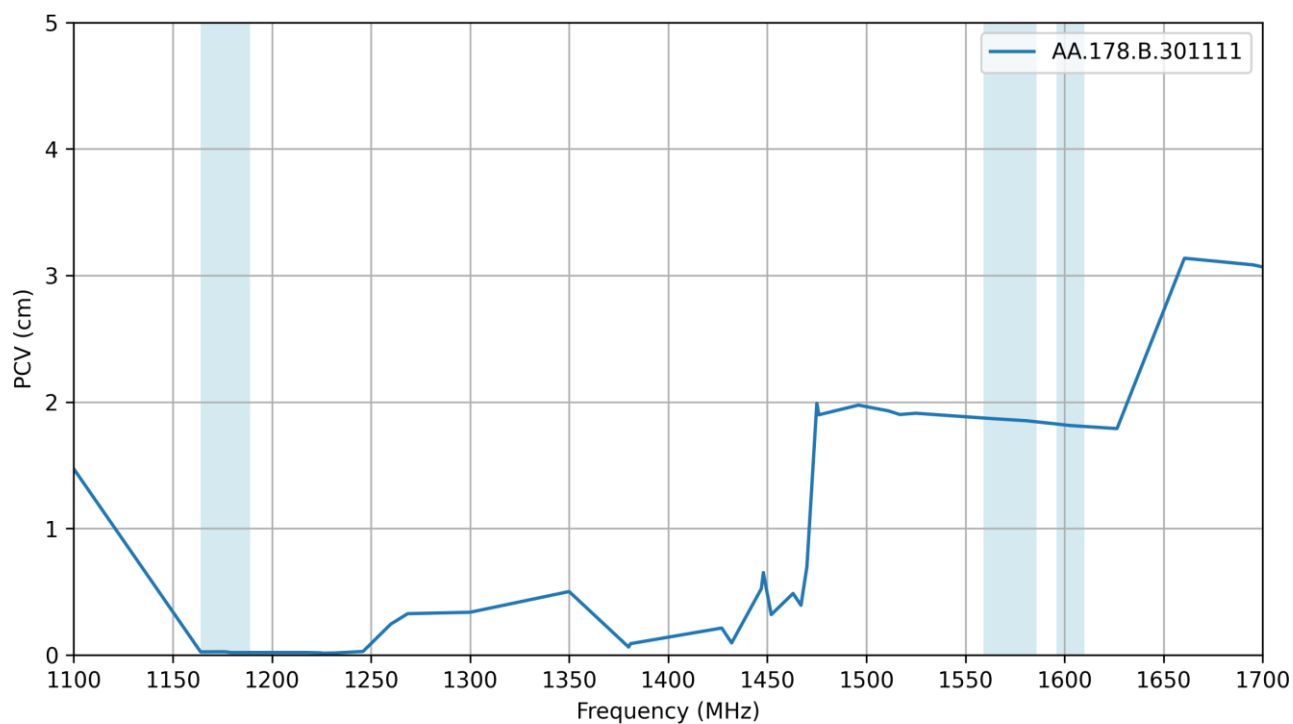
5.6 Axial Ratio



5.7 PCO

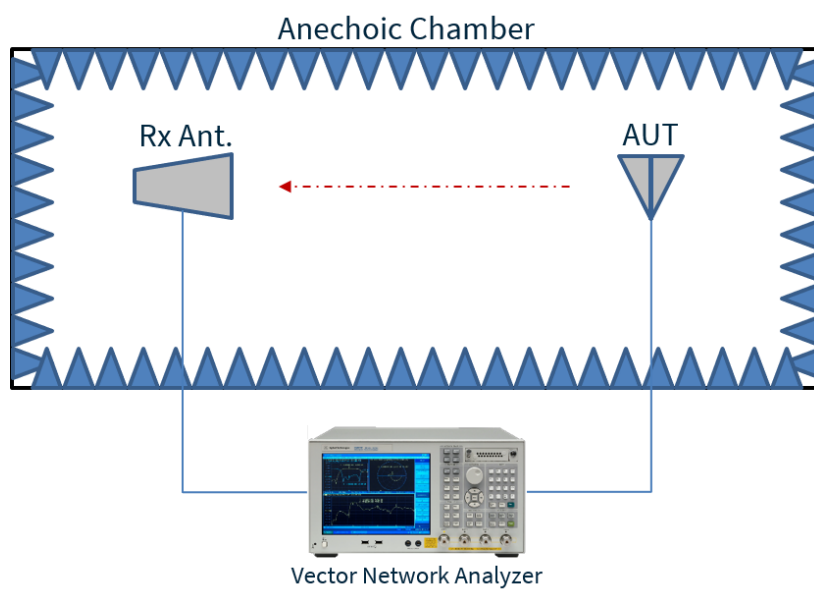


5.8 PCV



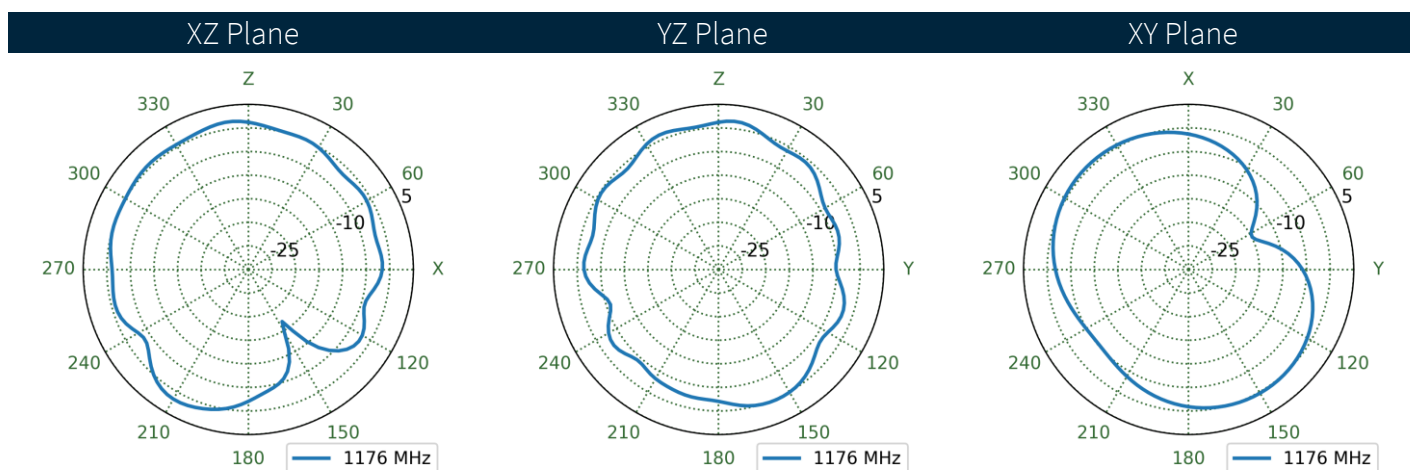
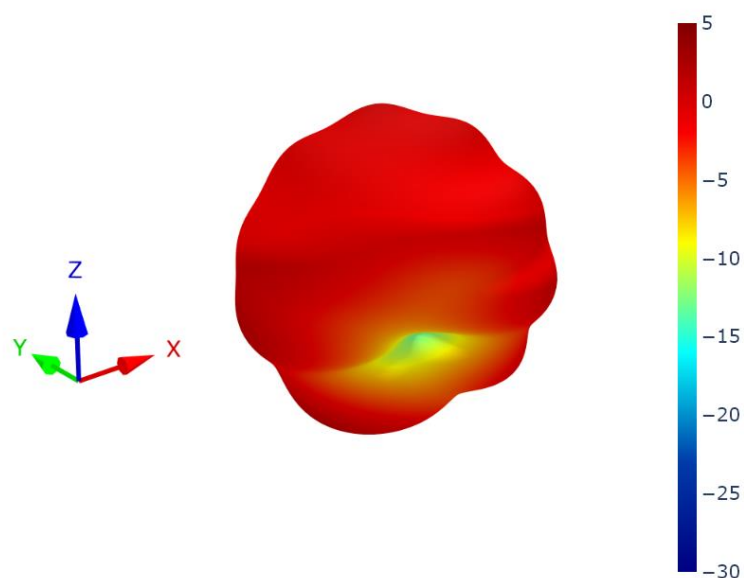
6. Radiation Patterns

6.1 Test Setup

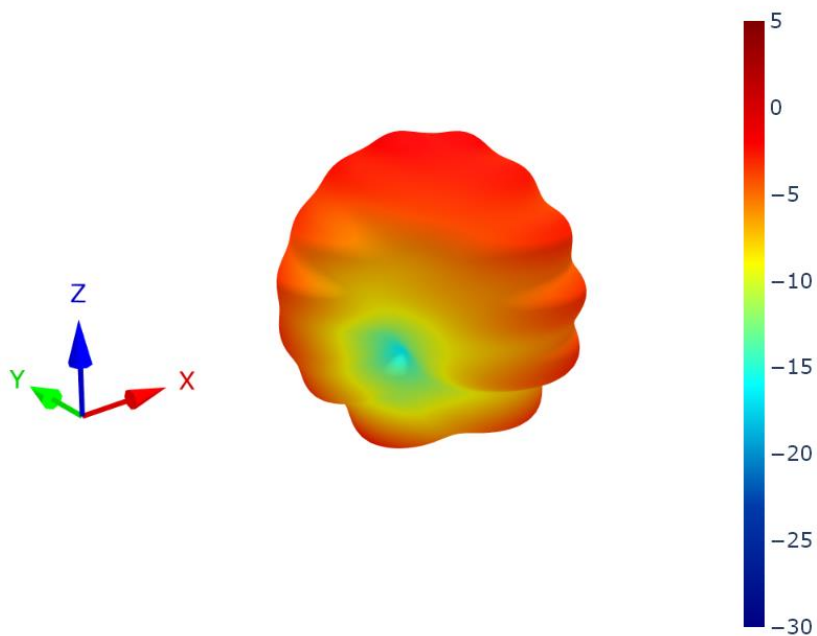


Chamber Test-Setup

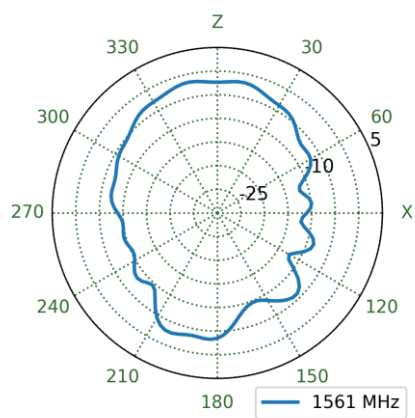
6.2 Patterns at 1176 MHz



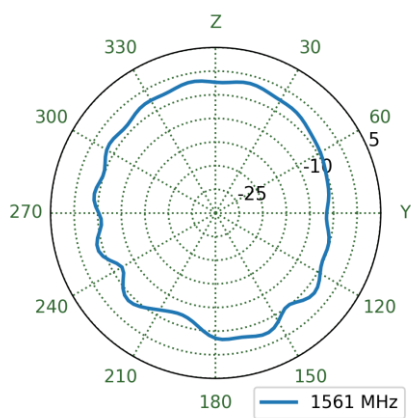
6.3 Patterns at 1561 MHz



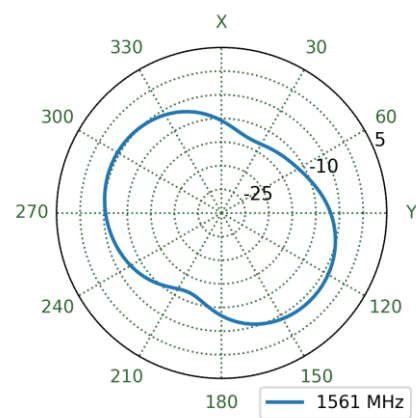
XZ Plane



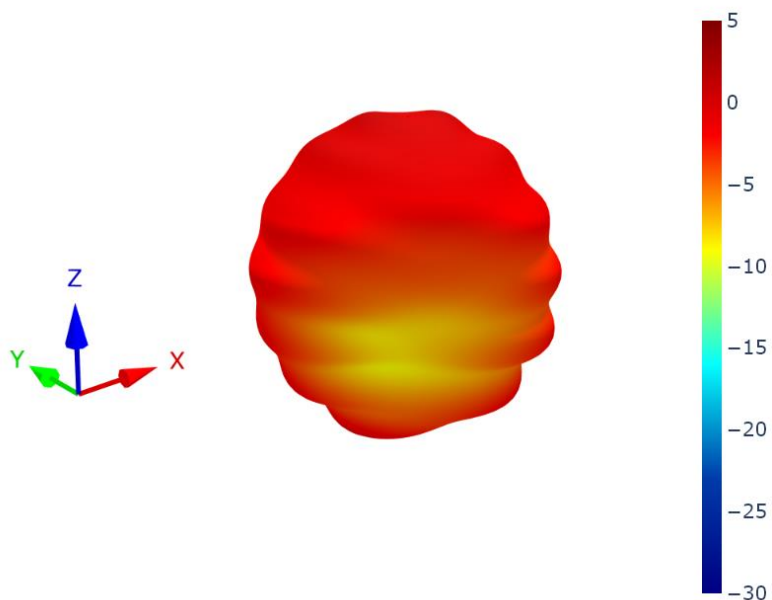
YZ Plane



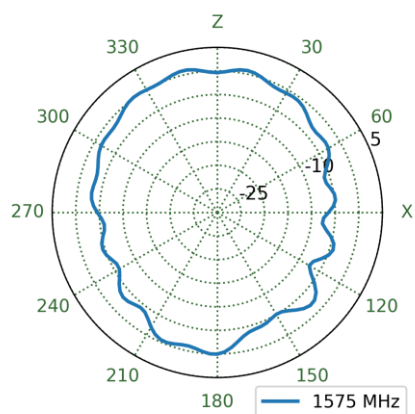
XY Plane



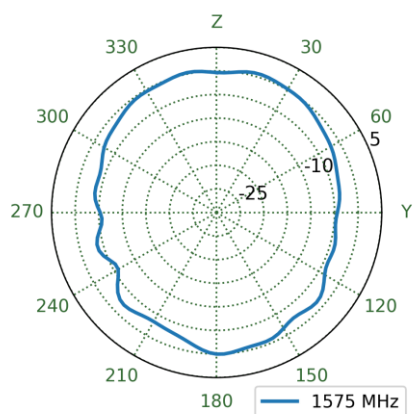
6.4 Patterns at 1575 MHz



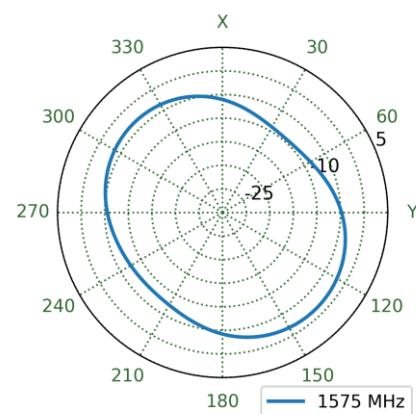
XZ Plane



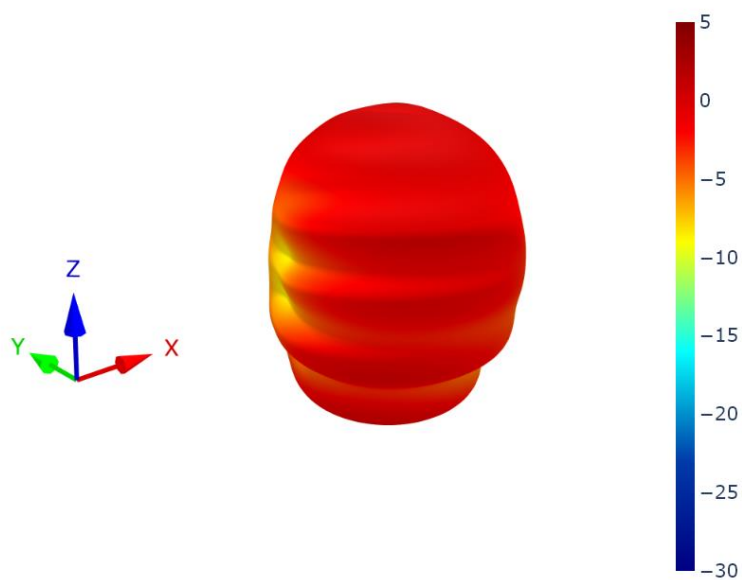
YZ Plane



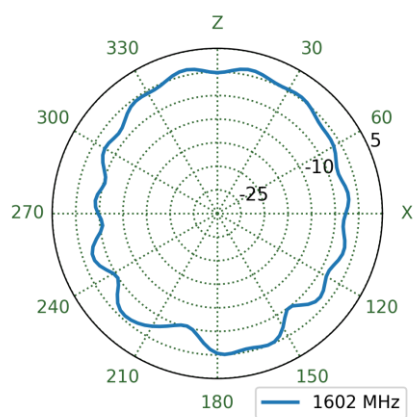
XY Plane



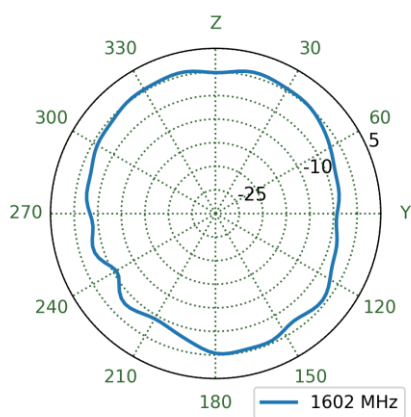
6.5 Patterns at 1602 MHz



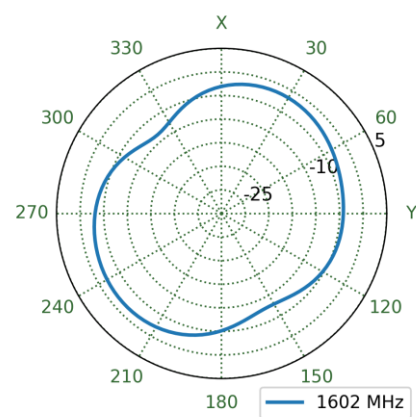
XZ Plane



YZ Plane

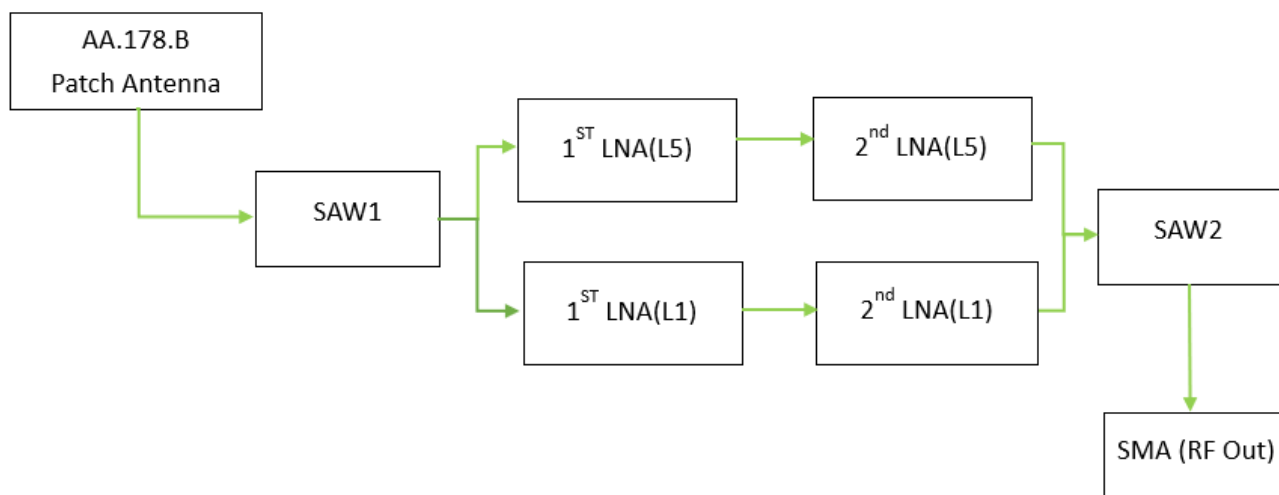


XY Plane

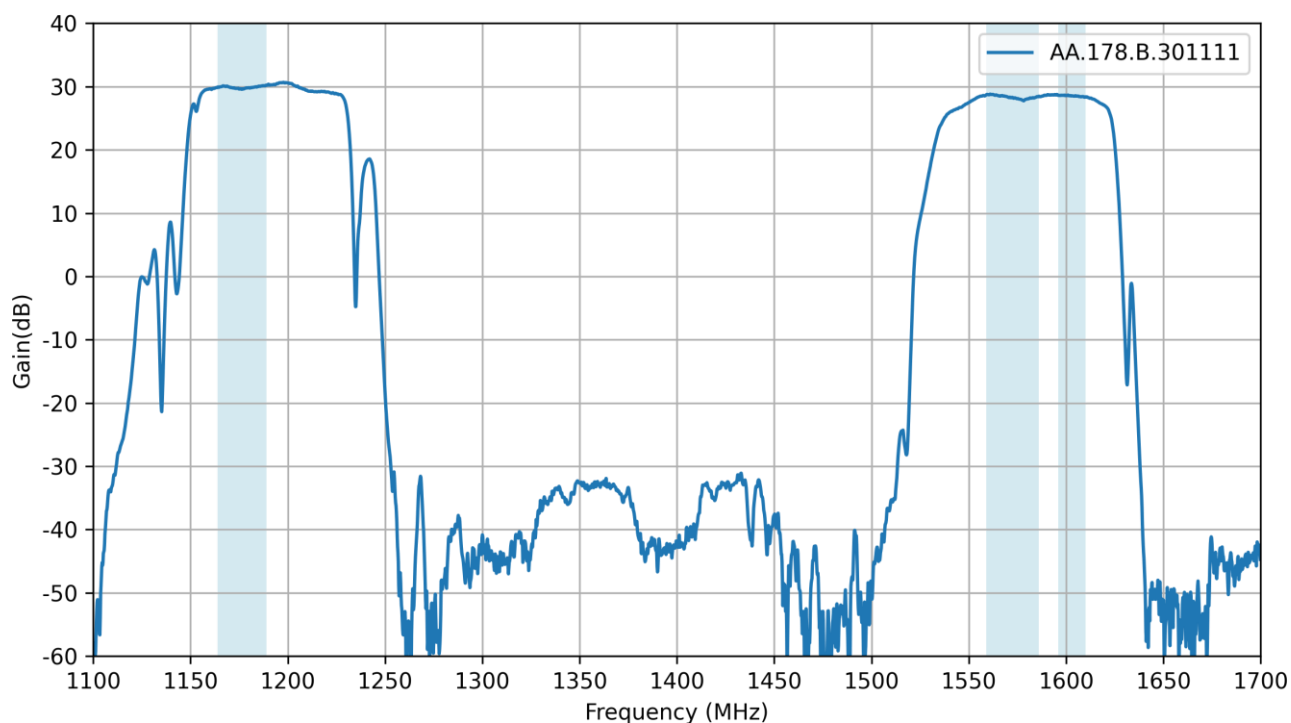


7. LNA Characteristics

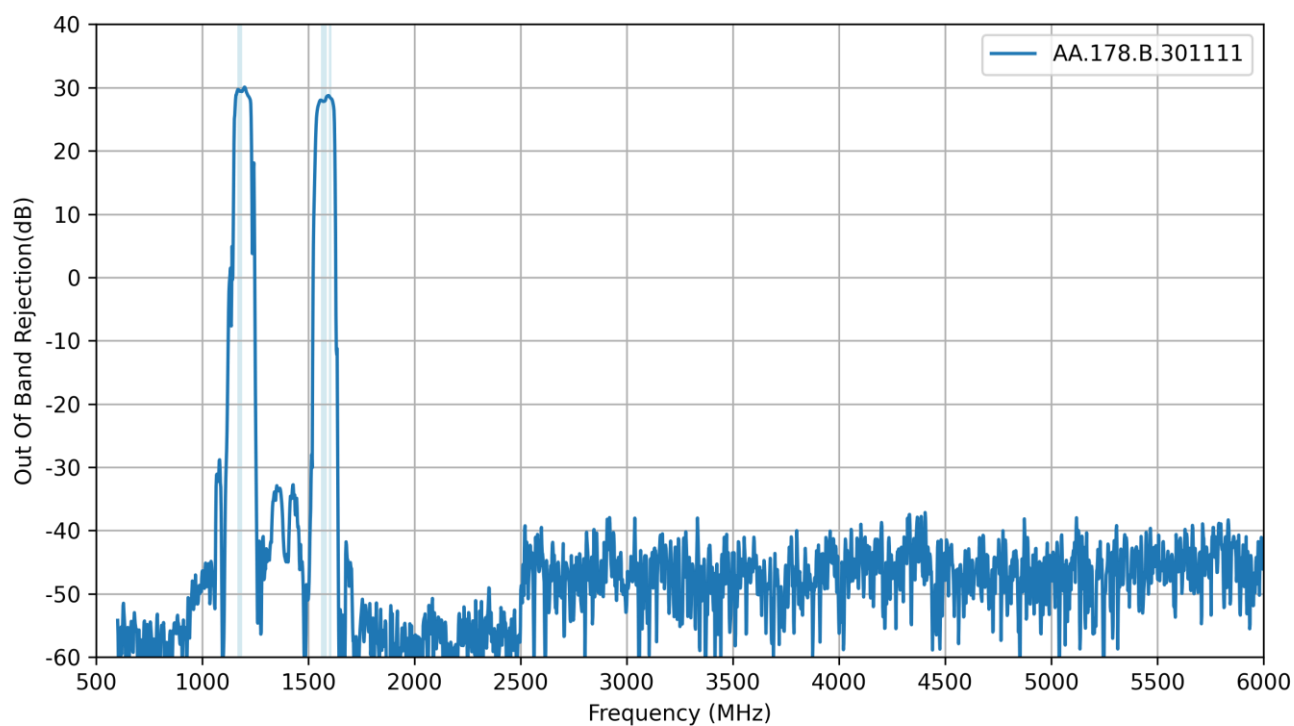
7.1 Block Diagram



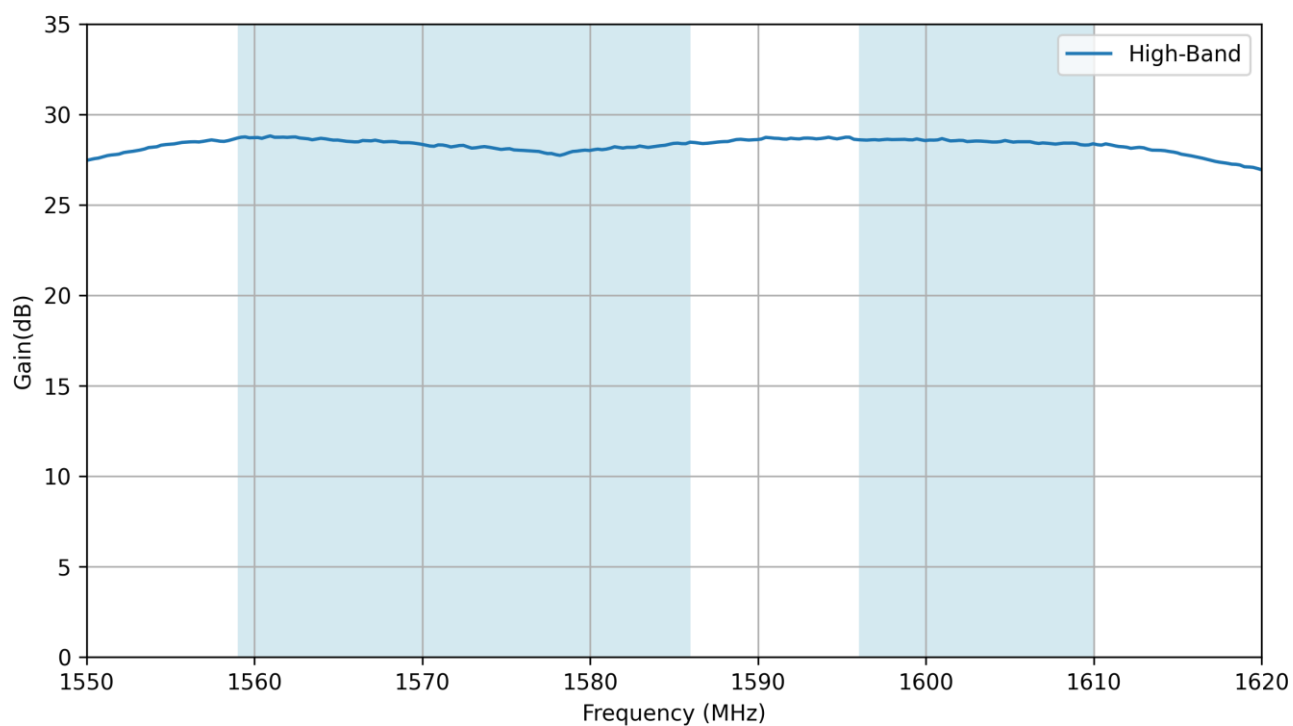
7.2 Gain - Wideband



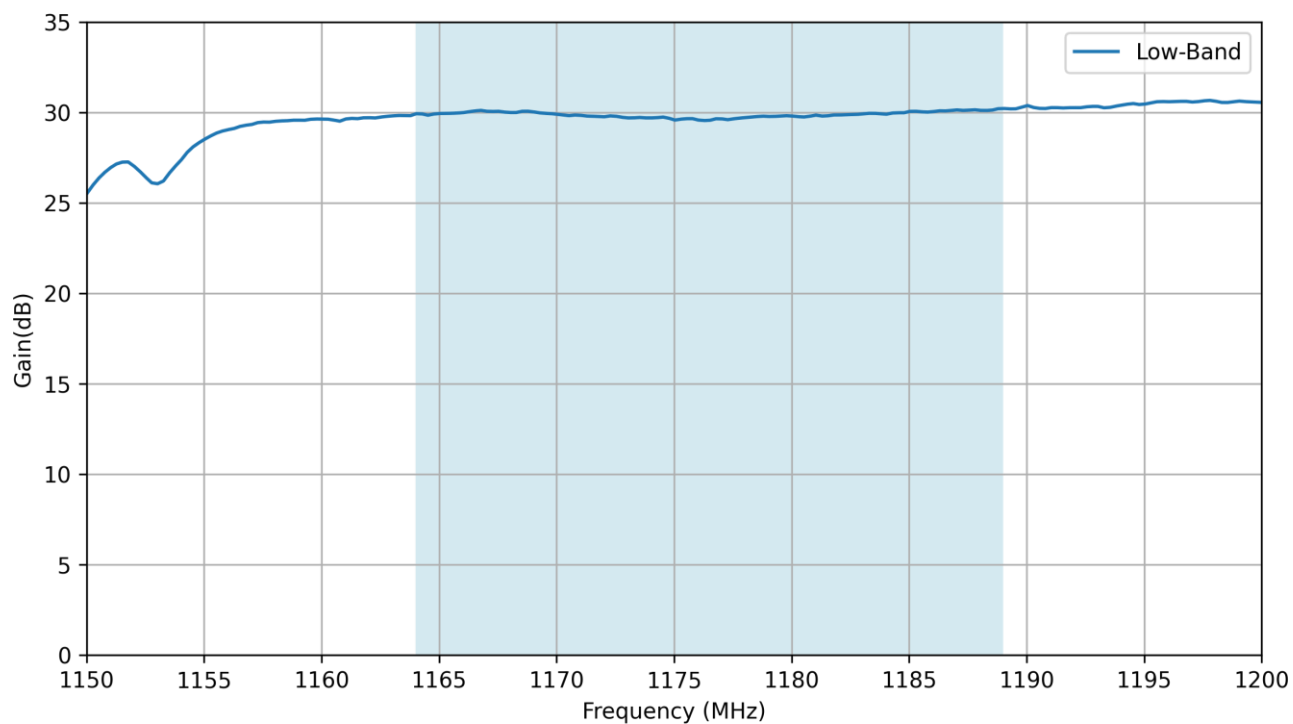
7.3 Out Of Band Rejection



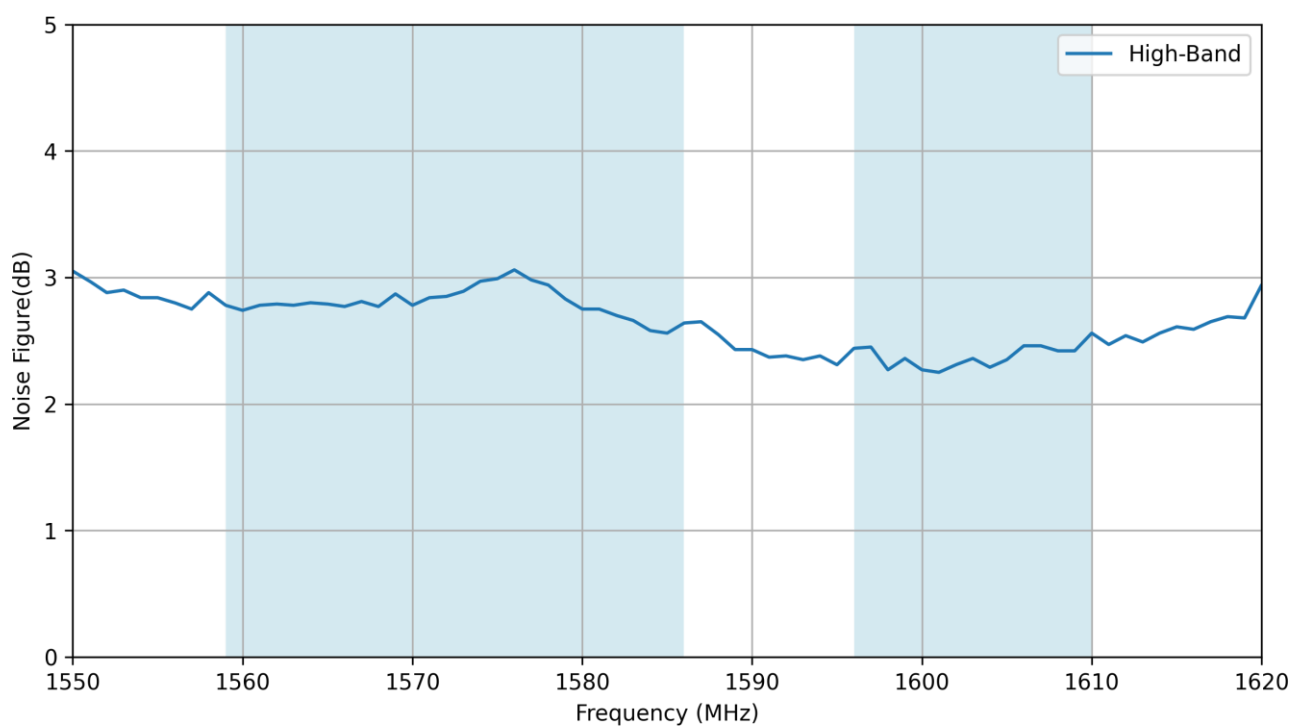
7.4 Gain – High-Band



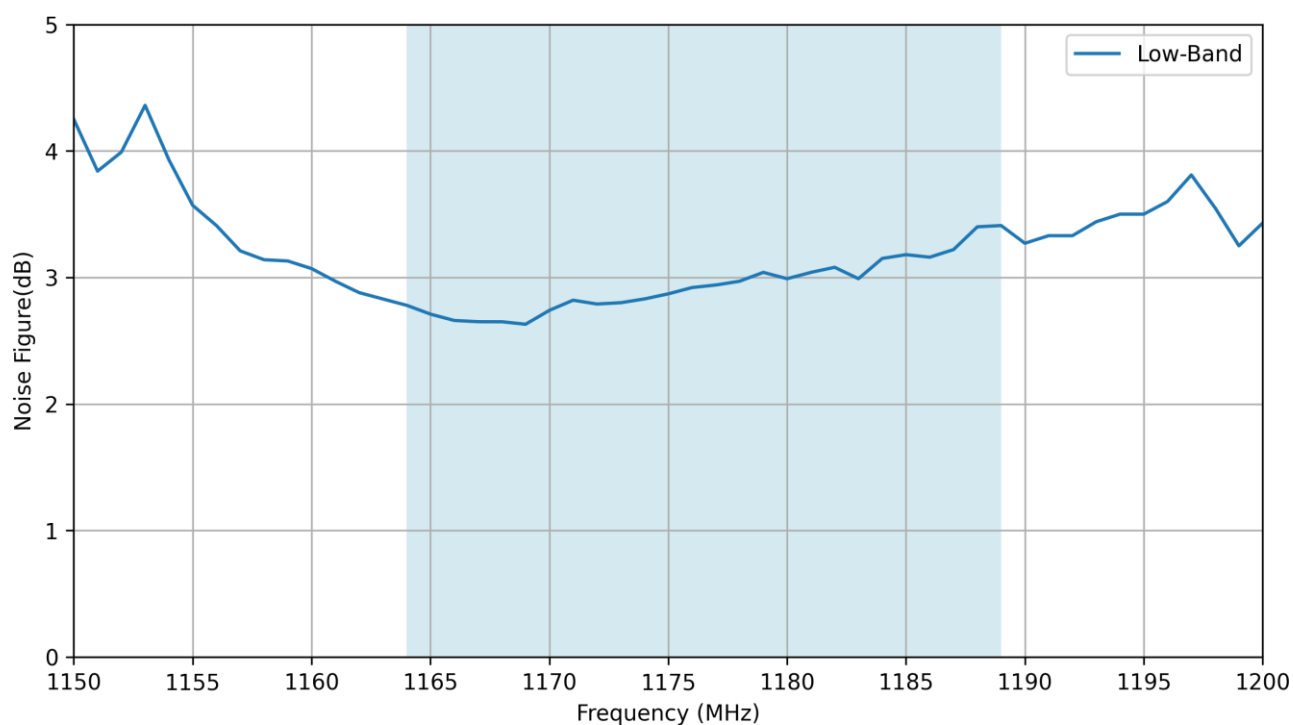
7.5 Gain – Low-Band



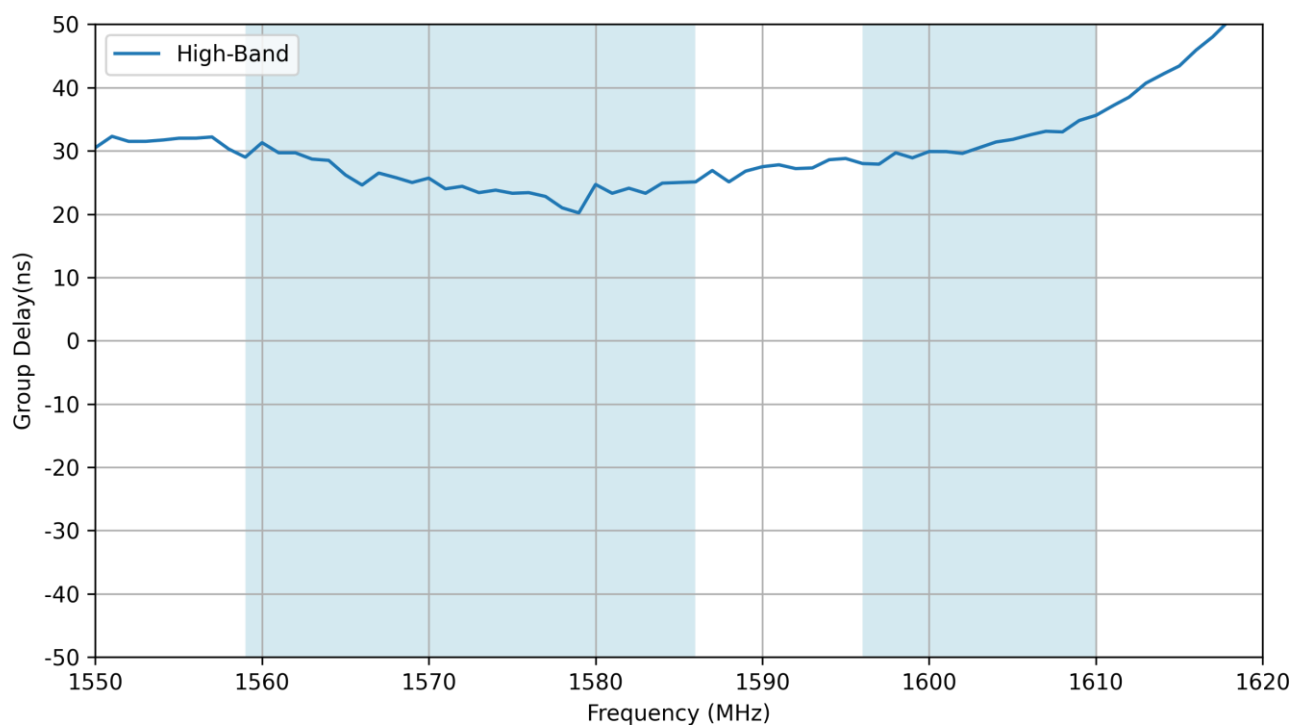
7.6 Noise Figure – High-Band



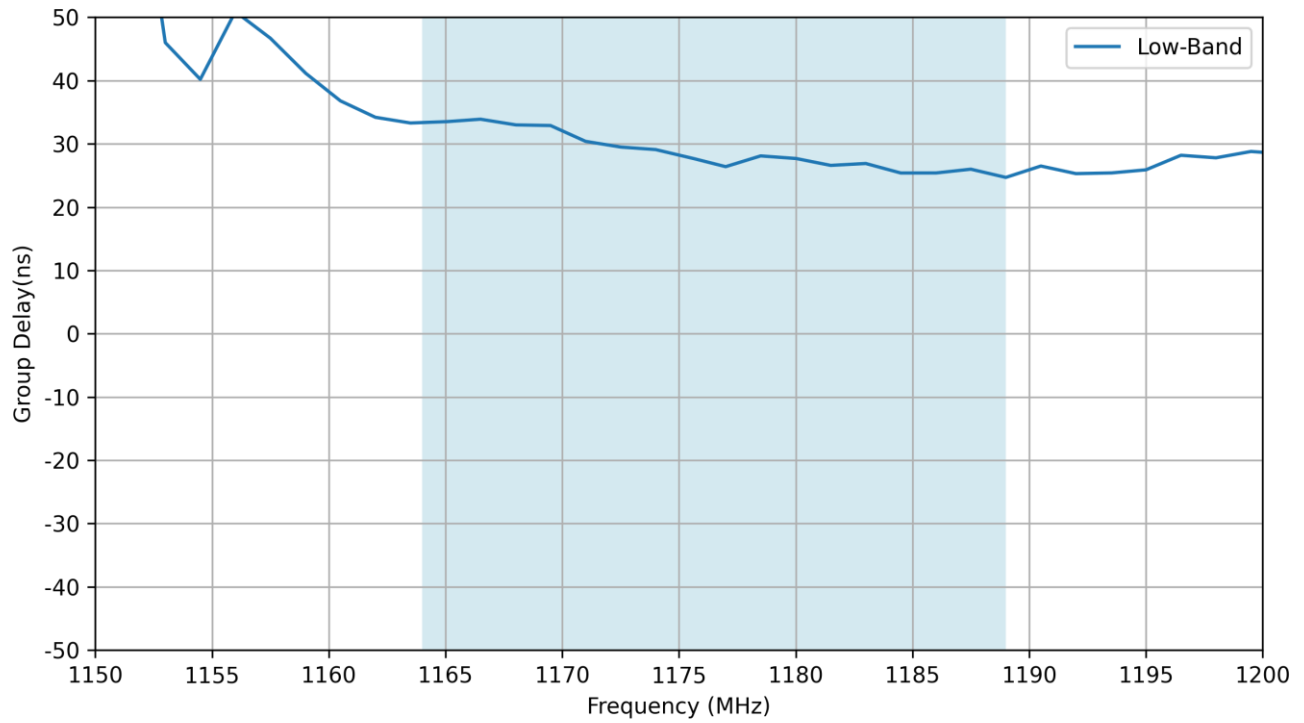
7.7 Noise Figure – Low-Band



7.8 Group Delay - High-Band



7.9 Group Delay - Low-Band



Changelog for the datasheet

SPE-24-8-134 – AA.178.B.301111

Revision: A (Original First Release)	
Date:	2024-06-25
Notes:	Initial Release
Author:	Gary West

Previous Revisions

