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Datasheet

Magma X

Part No:
AA.175.B.301111

Description

MagmaX2 Active GPS L1/L2 Magnetic Mount Antenna

Features:

Magnetic Mount Antenna
Covers GPS L1 / L2 Bands along with BeiDou B1I and GLONASS G1
Excellent Out-Of-Band Rejection
Low Noise Figure
Cable: 3m of RG-174
Connector: SMA(M)
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.175.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 L2 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 L2 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 ±2cm at the L1 Band and ±5cm 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, working at GPS L1 (1575.42MHz), GPS L2 (1227.6MHz) and GLONASS L1(1602MHz) with a 2 stage LNA ensuring good signal strength. It can operate with an input voltage ranging from 1.8 to 5 volts.

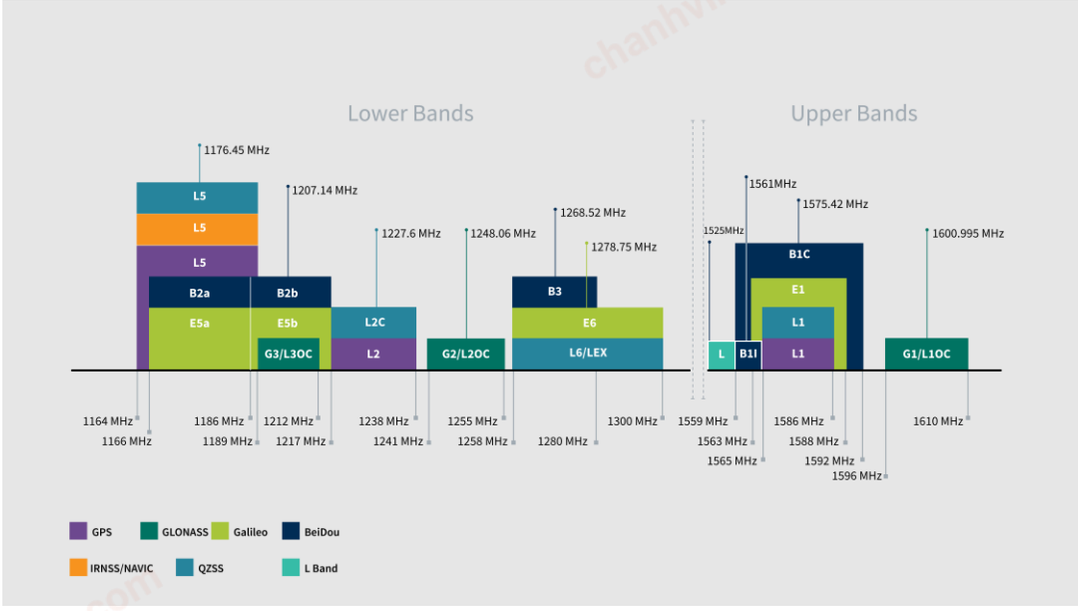
The enclosure is made from robust ABS material and is IP67 rated to endure the most challenging of environments. It is supplied with 3m RG-164 cable and SMA(M) connector, both of which can be customized to suit your application.

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.

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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	1/E1/B1 1575.42 MHz	L5/B2a/E5a 1176.45 MHz	G1 1602 MHz	G2 1248 MHz	G3 1207 MHz
	■	□	■	□	□



GNSS Bands and Constellations

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GNSS Electrical				
Frequency (MHz)	L2 1227MHz	B1I 1561MHz	L1 1575.42MHz	G1/L1OC 1602MHz
	1217-1238 MHz	1559-1565 MHz	1565-1586 MHz	1596-1610 MHz
VSWR	3:1	2:1	4:1	4:1
Passive Antenna Efficiency (%)	66.4	45.88	46.04	49.63
Passive Antenna Peak Gain (dBi)	1.27	0.04	0.04	0.06
Axial Ratio (dB)	11.36	15.41	23.14	12.79
PCO x (cm)	1.68	0.94	1.55	-0.03
PCO y (cm)	2.62	2.47	3.1	5.37
PCV (cm)	0.02	0.03	0.03	0.01
Polarization	RHCP			
Impedance	50 Ω			
*Tested on a 30x30cm Ground Plane				

LNA and Filter Electrical Properties				
Frequency (MHz)	L2 1227MHz	B1I 1561MHz	L1 1575.42MHz	G1/L1OC 1602MHz
	1217-1238 MHz	1559-1565 MHz	1565-1586 MHz	1596-1610 MHz
Gain (dB)	28.03	27.32	28	26.8
Noise (dB)	3.11	3.8	3.26	3.88
Group delay (ns)	20.35	29.67	24.62	26.22
Input Voltage(V)	+ 1.8 to 5.5			
Current Consumption (mA)	5 ± 2			
Out of Band Rejection	> 45dB @ <1GHz and > 60dB @ 1.7~6GHz			
ESD Protection (IEC61000-4-2)	± 30 kV air / ± 20Kv contact discharge			

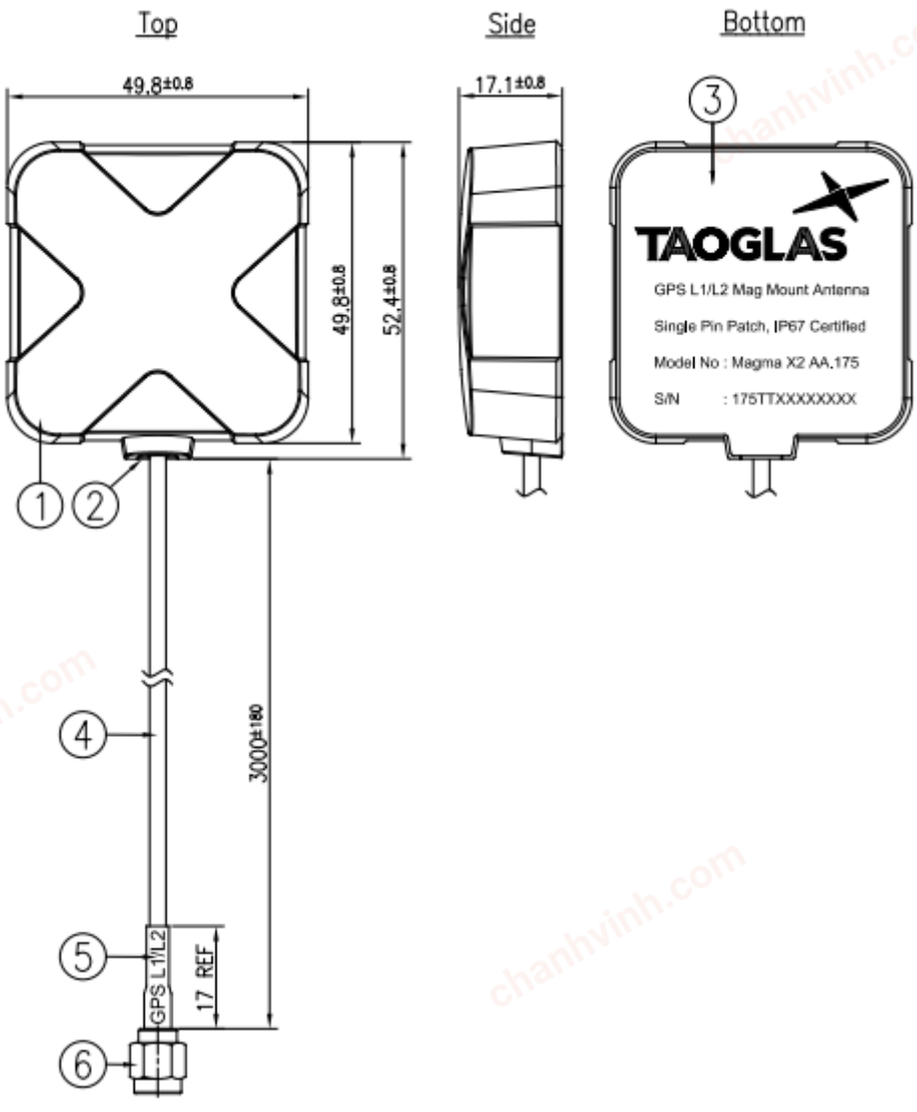
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Mechanical	
Housing Dimensions	49.8 x 52.4 x 17.1mm
Housing Material	ABS
Cable	3m RG-174 (Customizable)
Connector	SMA(M) (Customizable)
Waterproof	IP67
Weight	98g
Magnetic Pull Force	Pull horizontal max pull force(kgf): 0.52 Pull vertical max pull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

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

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3. Mechanical Drawing

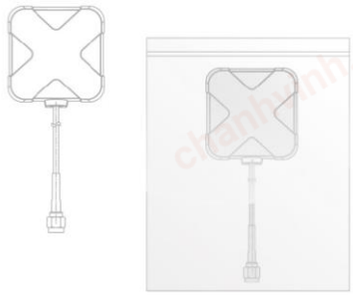


	Name	Material	Finish	QTY
1	Top Housing	ABS	Black	1
2	Bottom Housing	ABS	Black	1
3	Sticker Bottom	PET	Silver	1
4	RG174 Coaxial Cable	PVC	Black	1
5	Heat Shrink Tube (GPS L1/L2)	PE	Blue Tube/White Text	1
6	SMA(M)ST	Brass	Au Plated	1

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4. Packaging

1 pcs AA.175.B.301111 per PE Bag
Bag Dimensions: 100x230mm
Weight: 94g



10 pcs AA.175.B.301111 per Large PE Bag
Bag Dimensions: 220x460mm
Weight: 0.97Kg

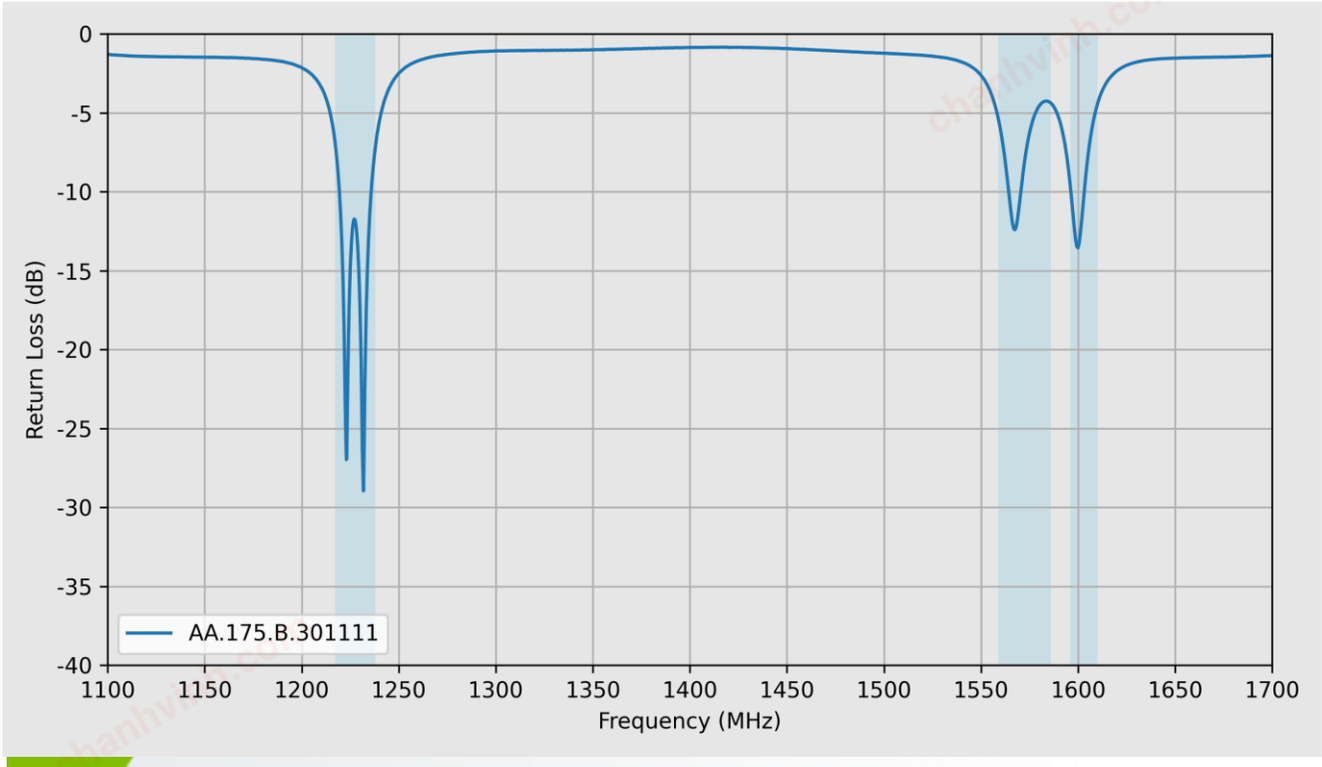
100pcs AA.175.B.301111 per Carton
Carton Dimensions-370 x 370 x 300mm
Weight: 10.5Kg



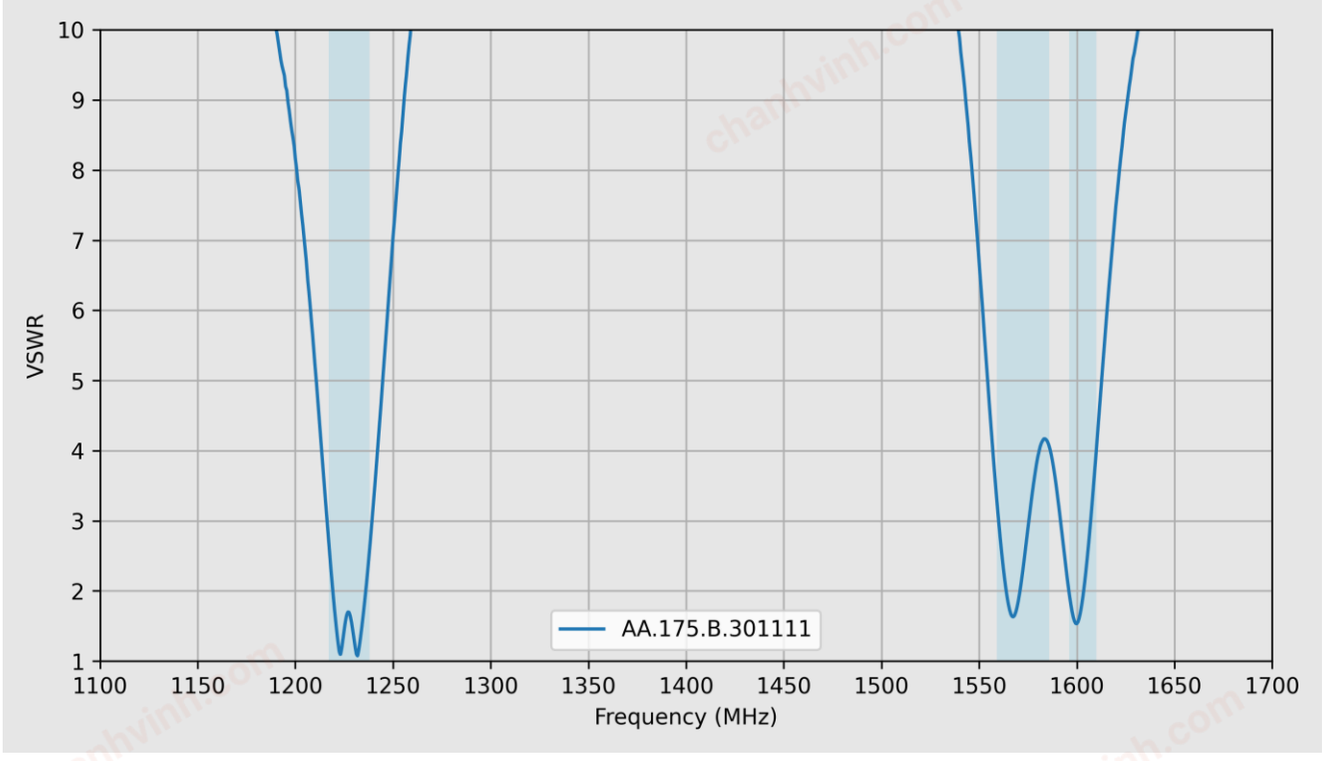
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5. Antenna Characteristics

5.1 Return Loss

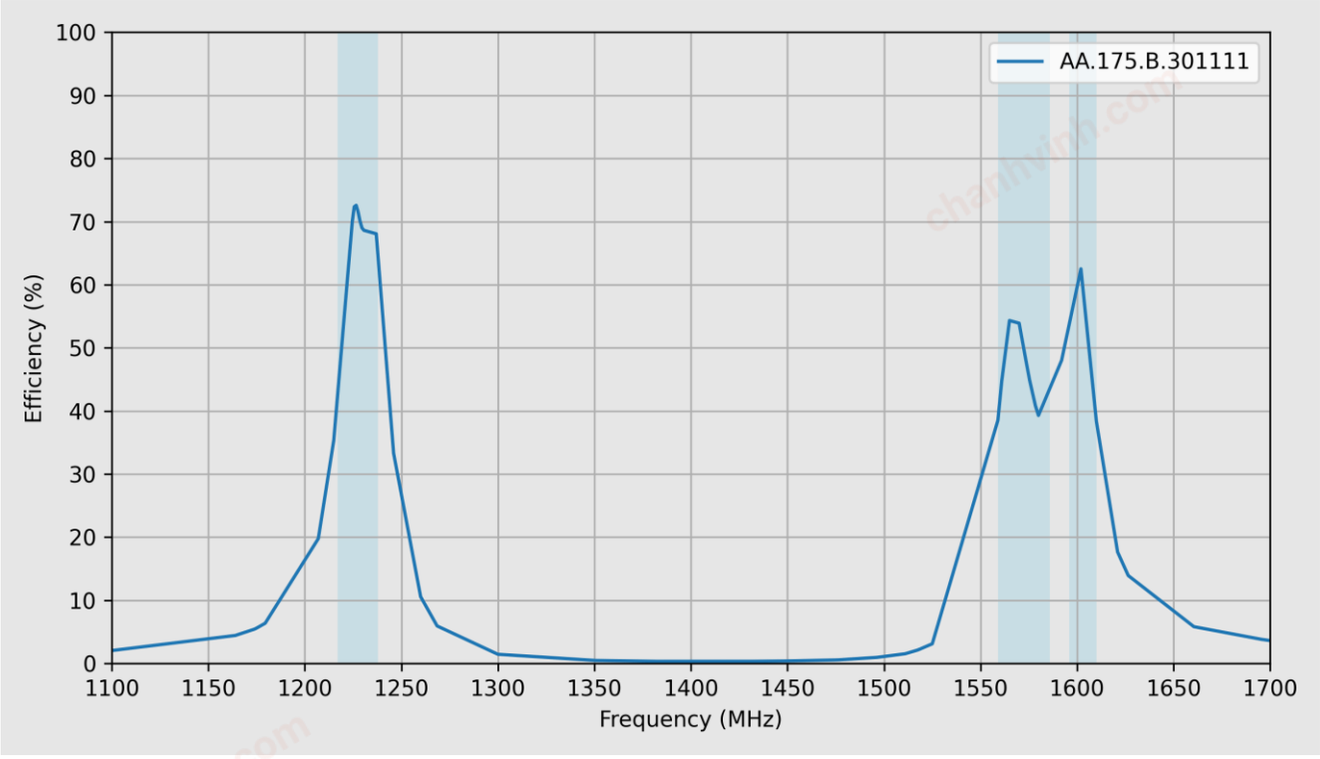


5.2 VSWR

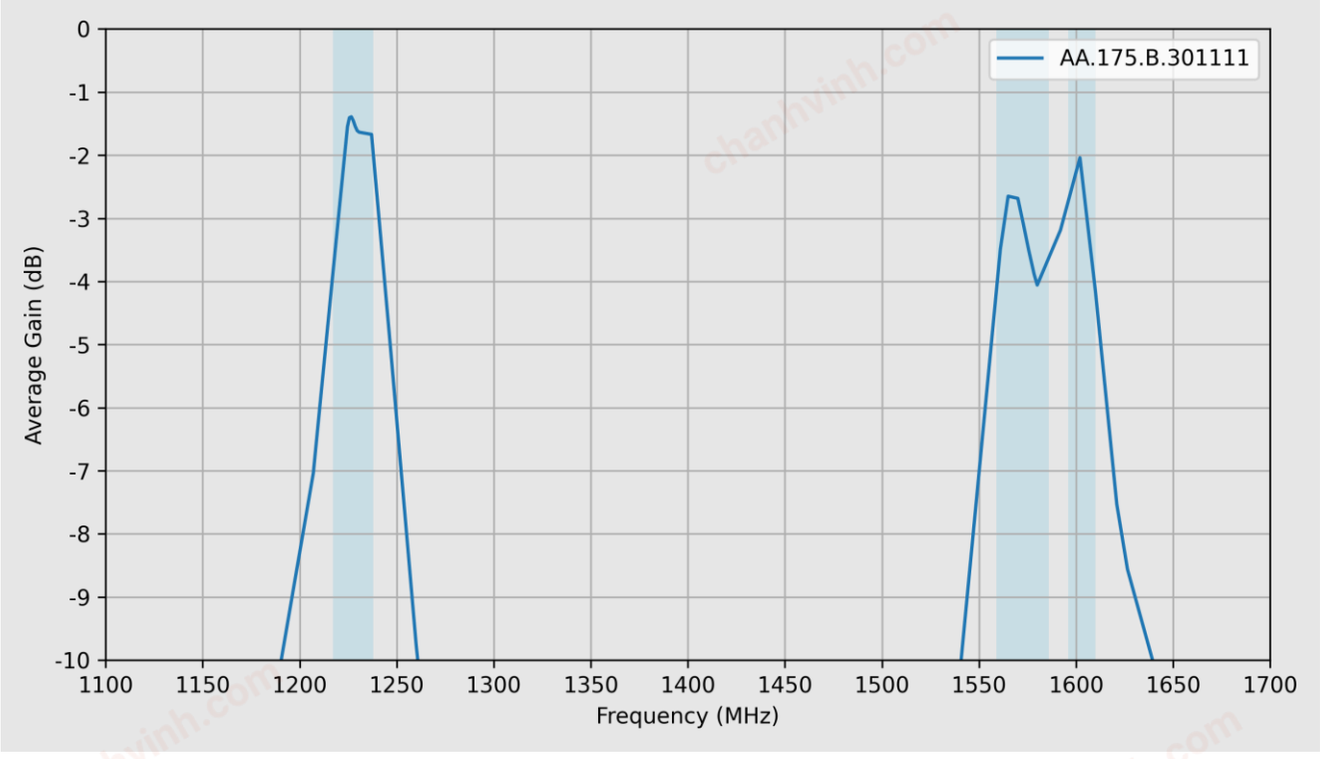


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5.3 Efficiency

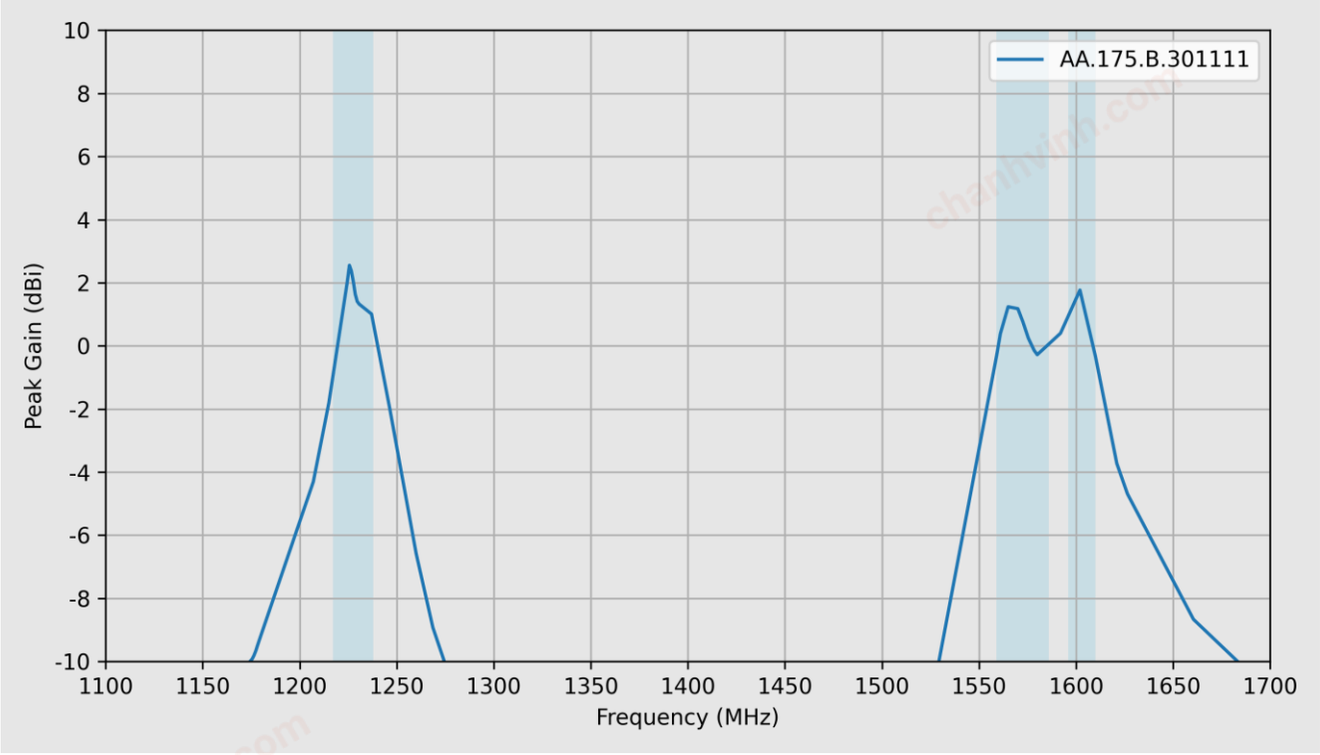


5.4 Average Gain

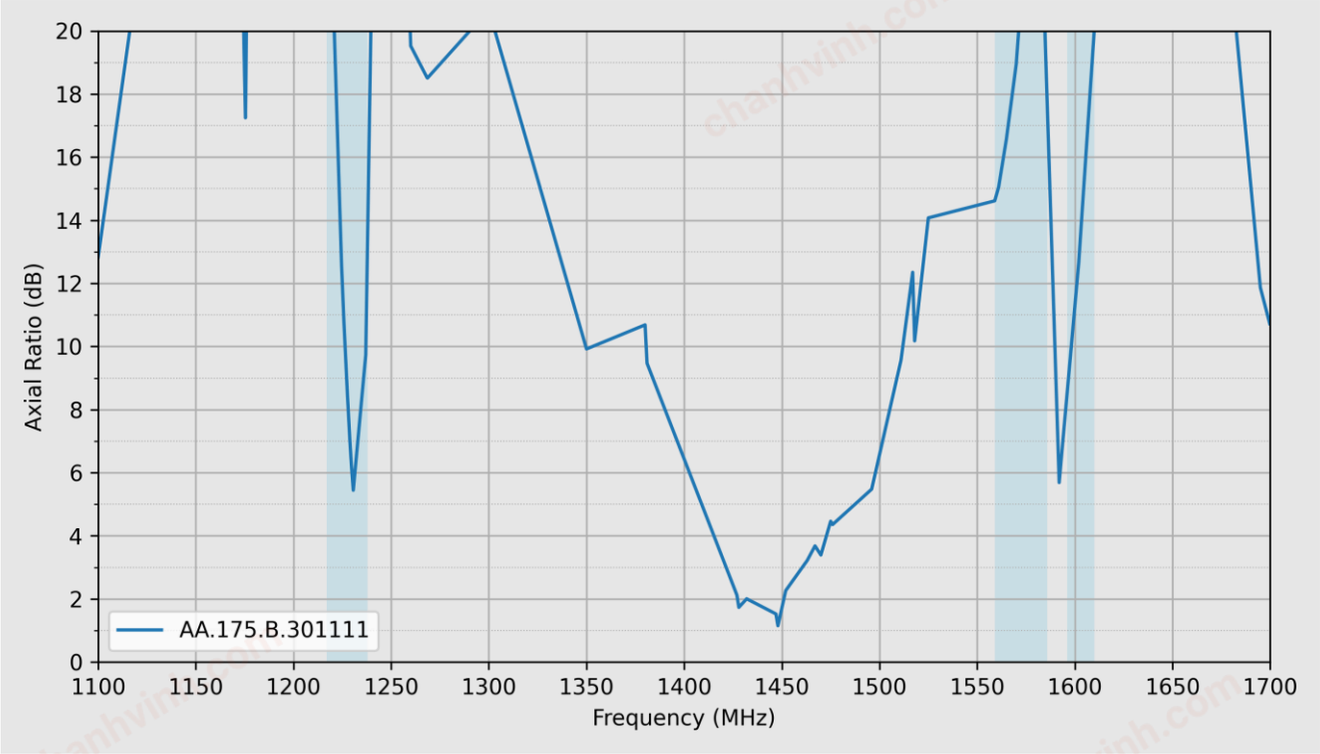


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5.5 Peak Gain

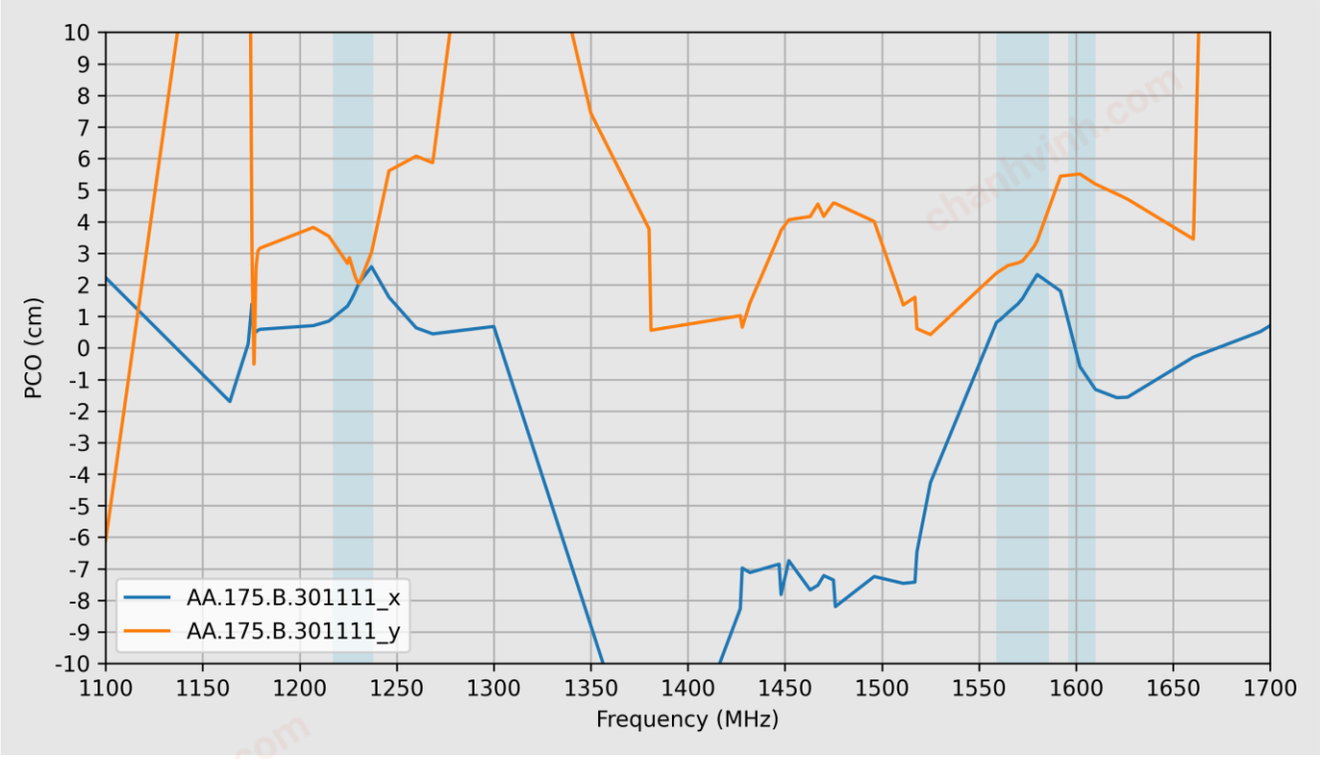


5.6 Axial Ratio

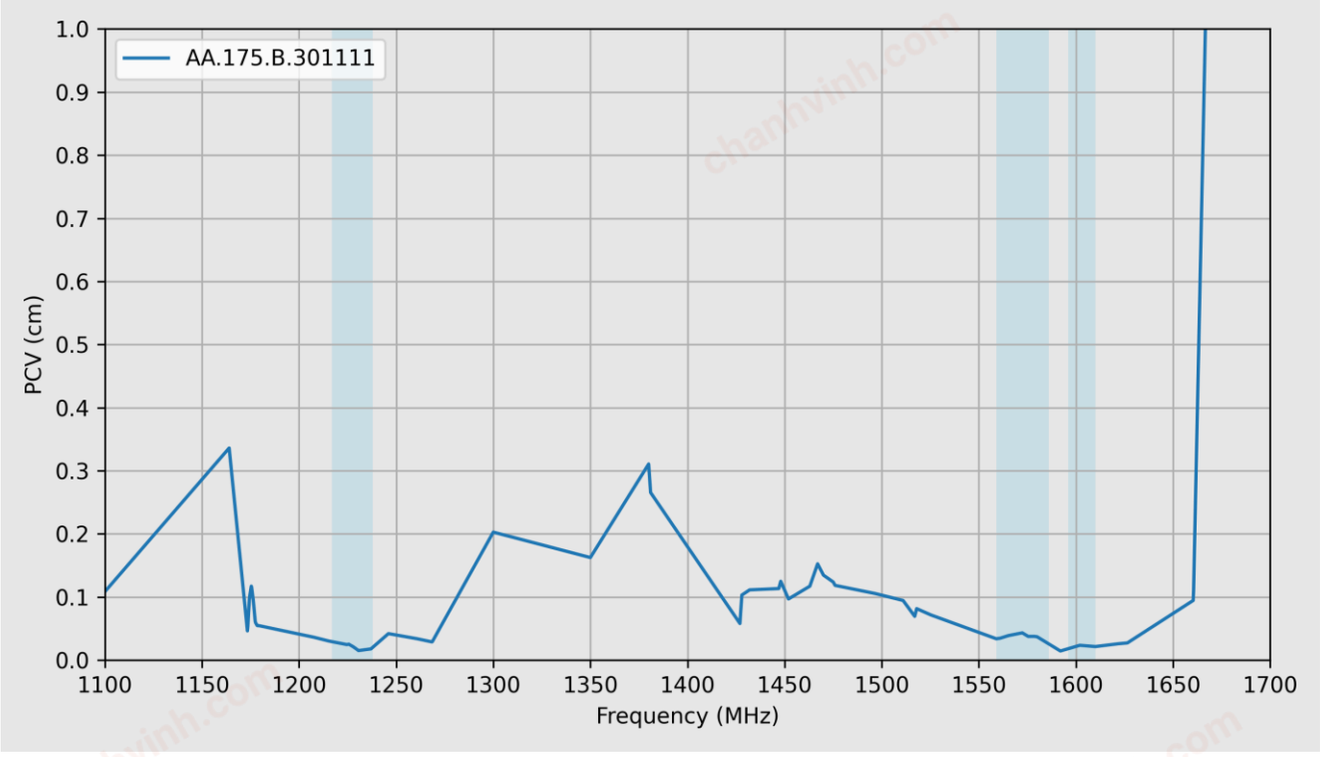


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5.7 PCO



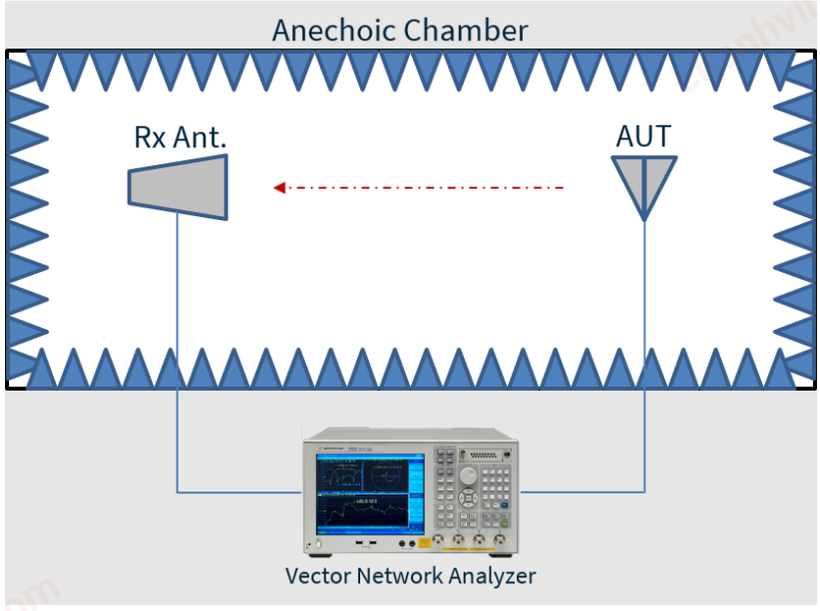
5.8 PCV

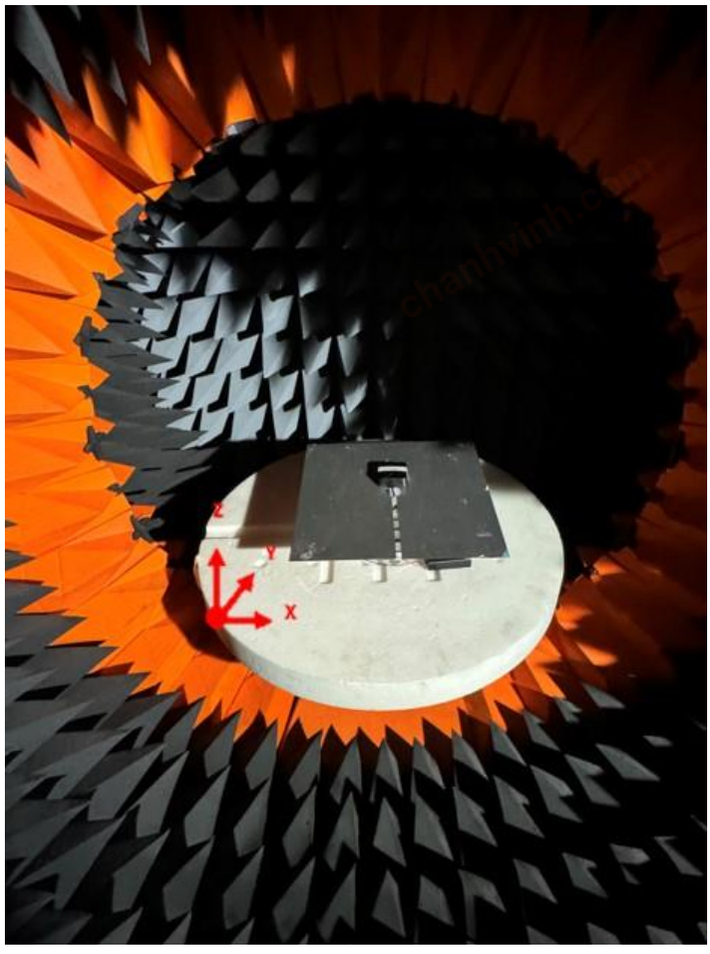


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6. Radiation Patterns

6.1 Test Setup

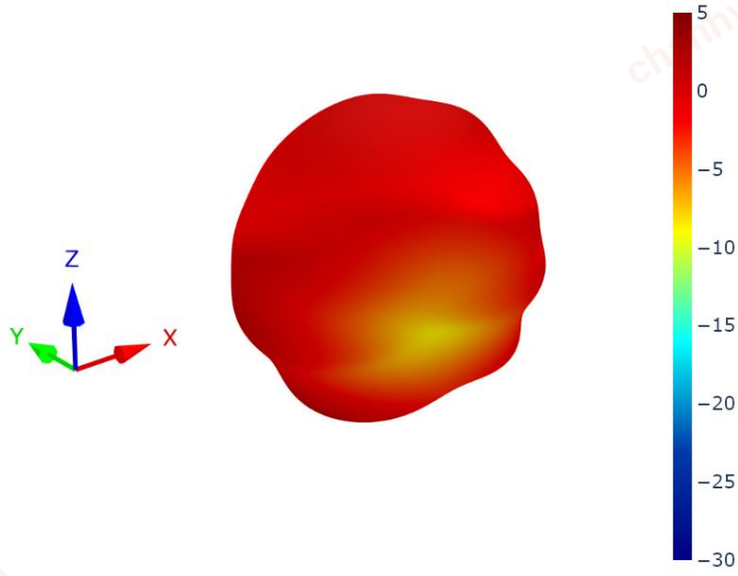


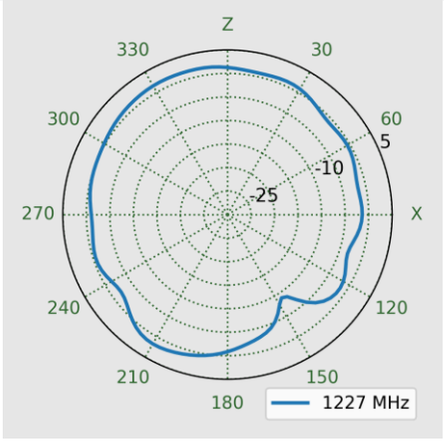
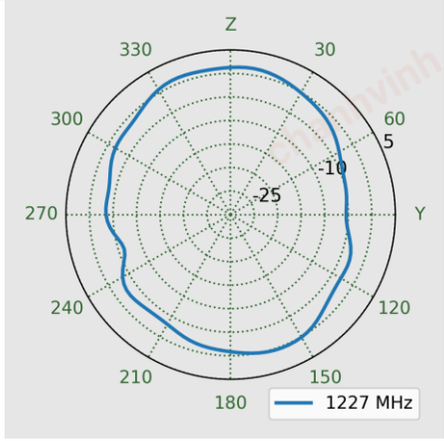
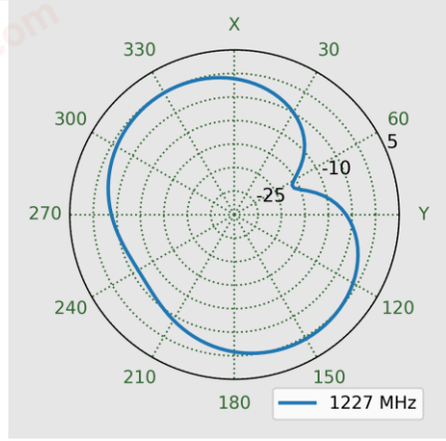


Test Set-up on a 30x30cm Metal Ground Plane

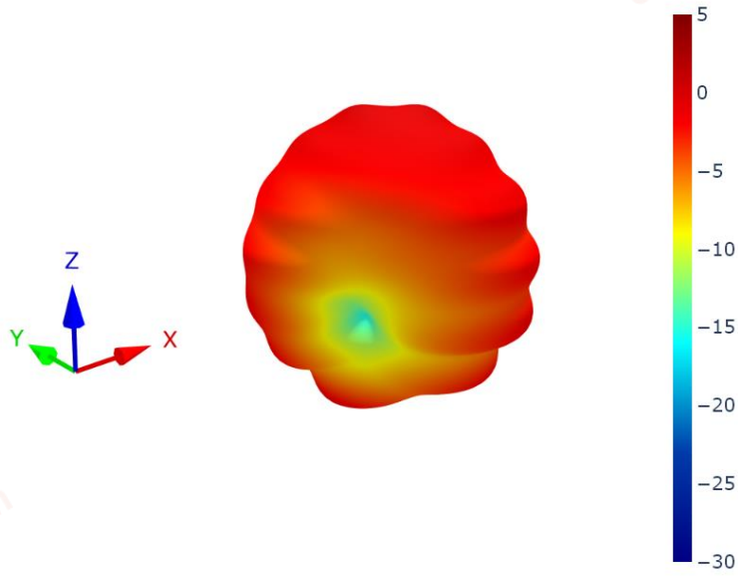
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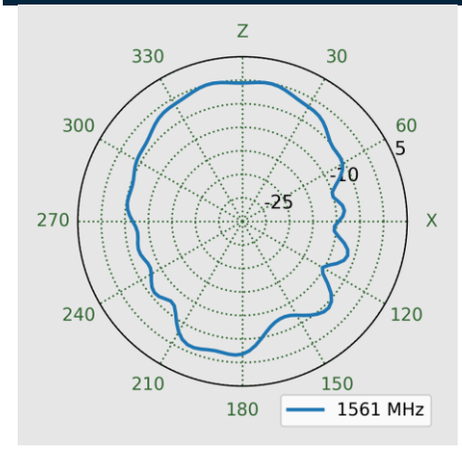
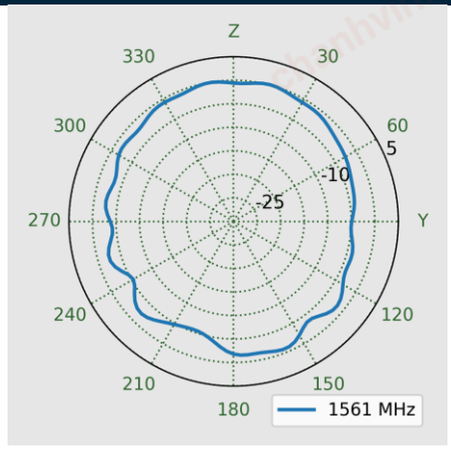
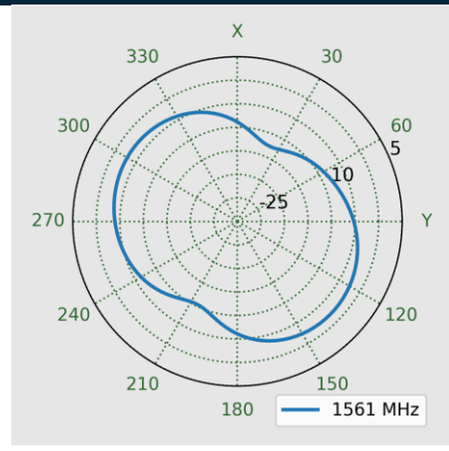
6.2 Patterns at 1227 MHz



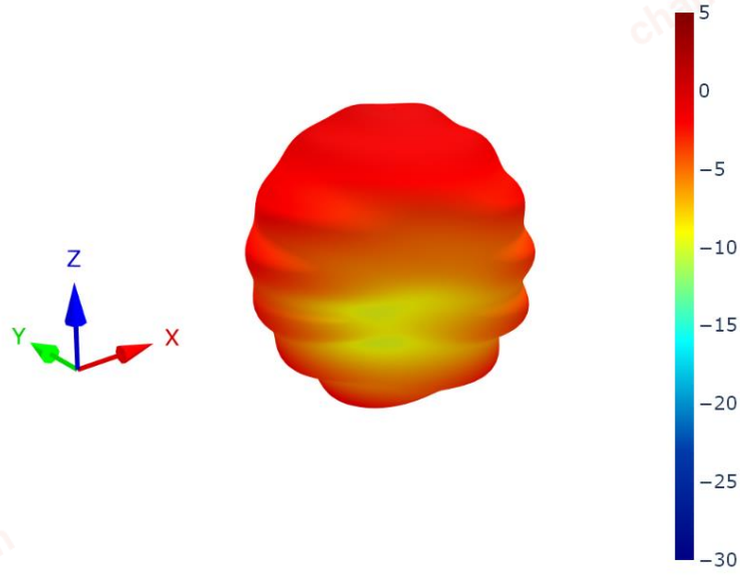
XZ Plane	YZ Plane	XY Plane
		

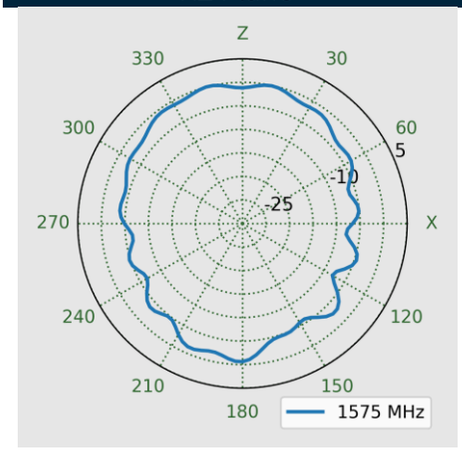
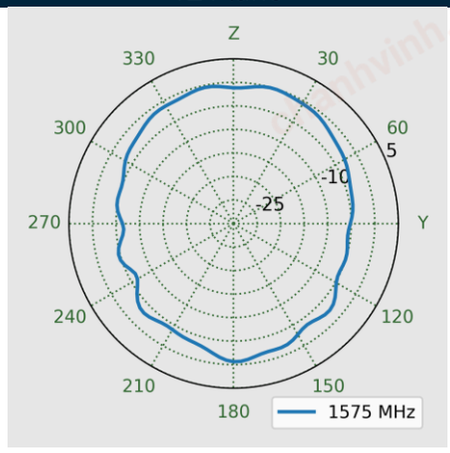
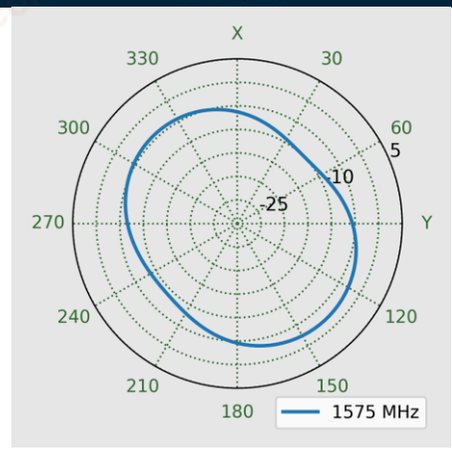
6.3 Patterns at 1561 MHz



XZ Plane	YZ Plane	XY Plane
		

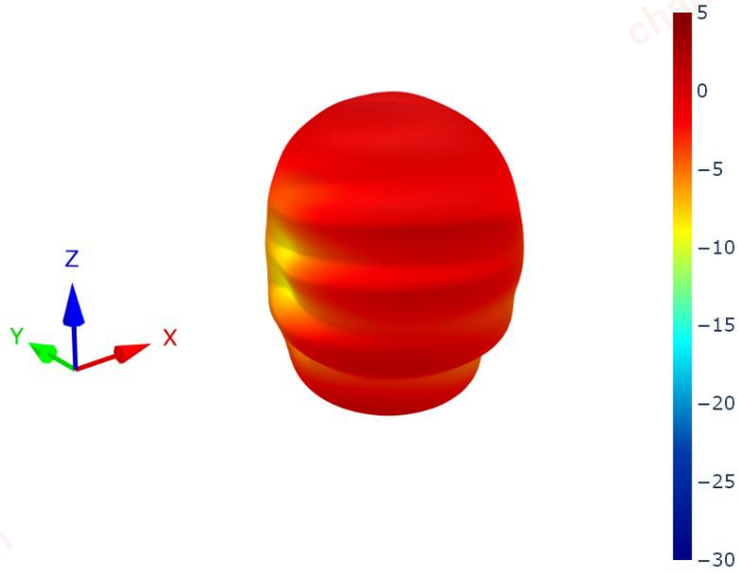
6.4 Patterns at 1575 MHz



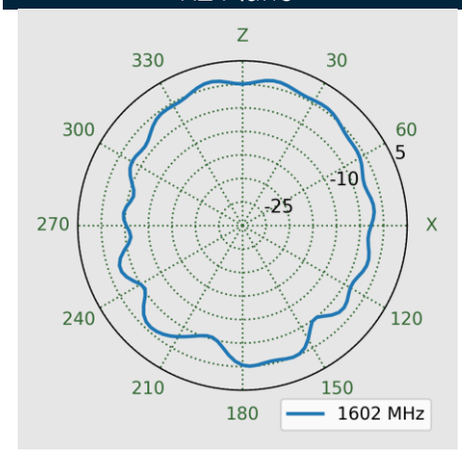
XZ Plane	YZ Plane	XY Plane
		

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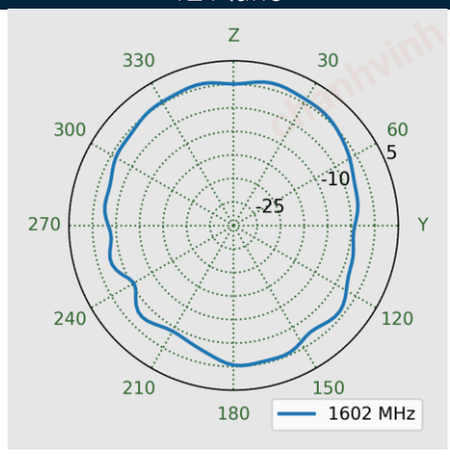
6.5 Patterns at 1602 MHz



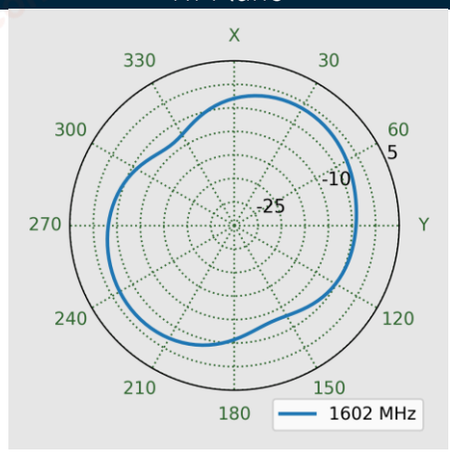
XZ Plane



YZ Plane



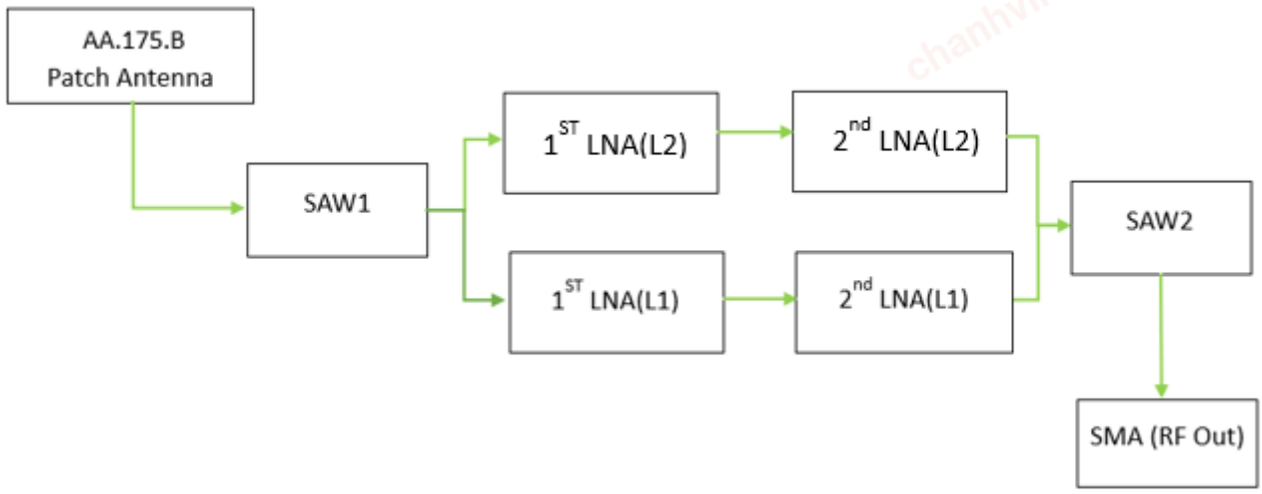
XY Plane



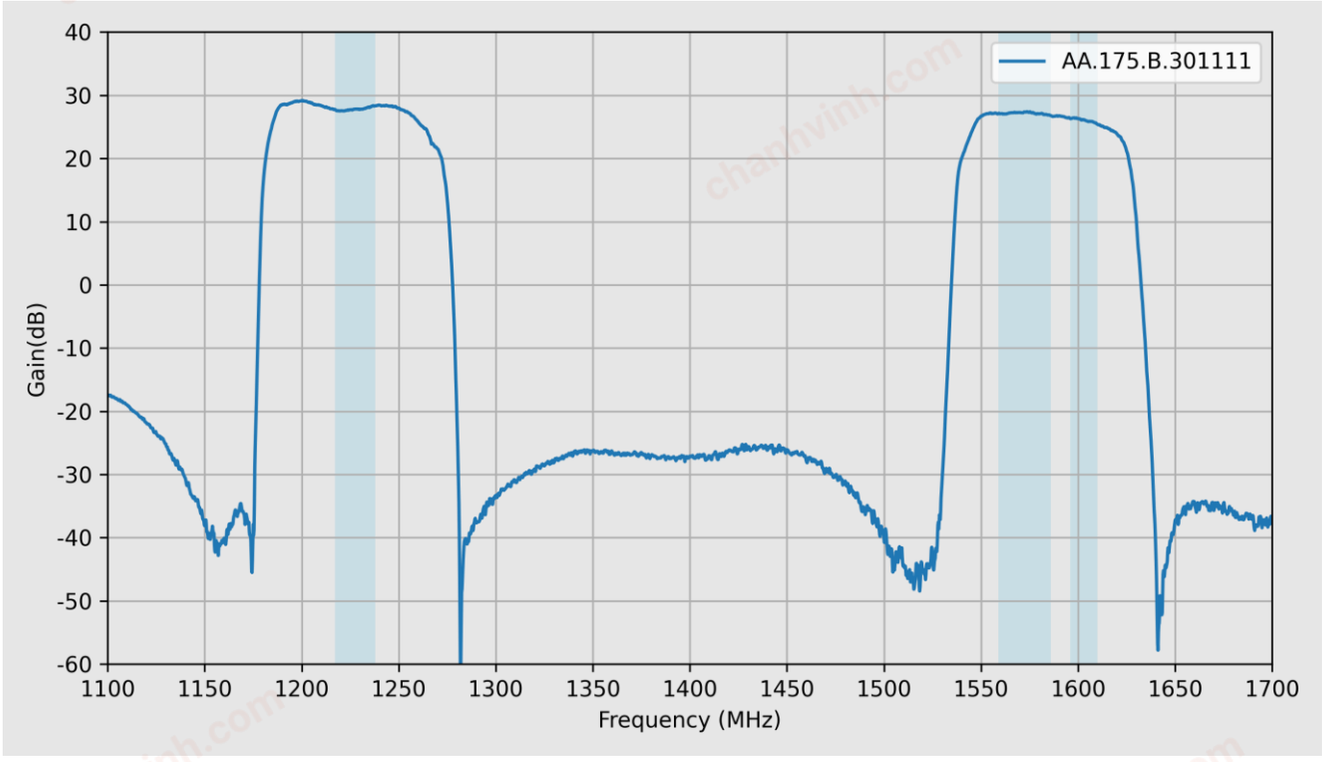
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7. LNA Characteristics

7.1 Block Diagram

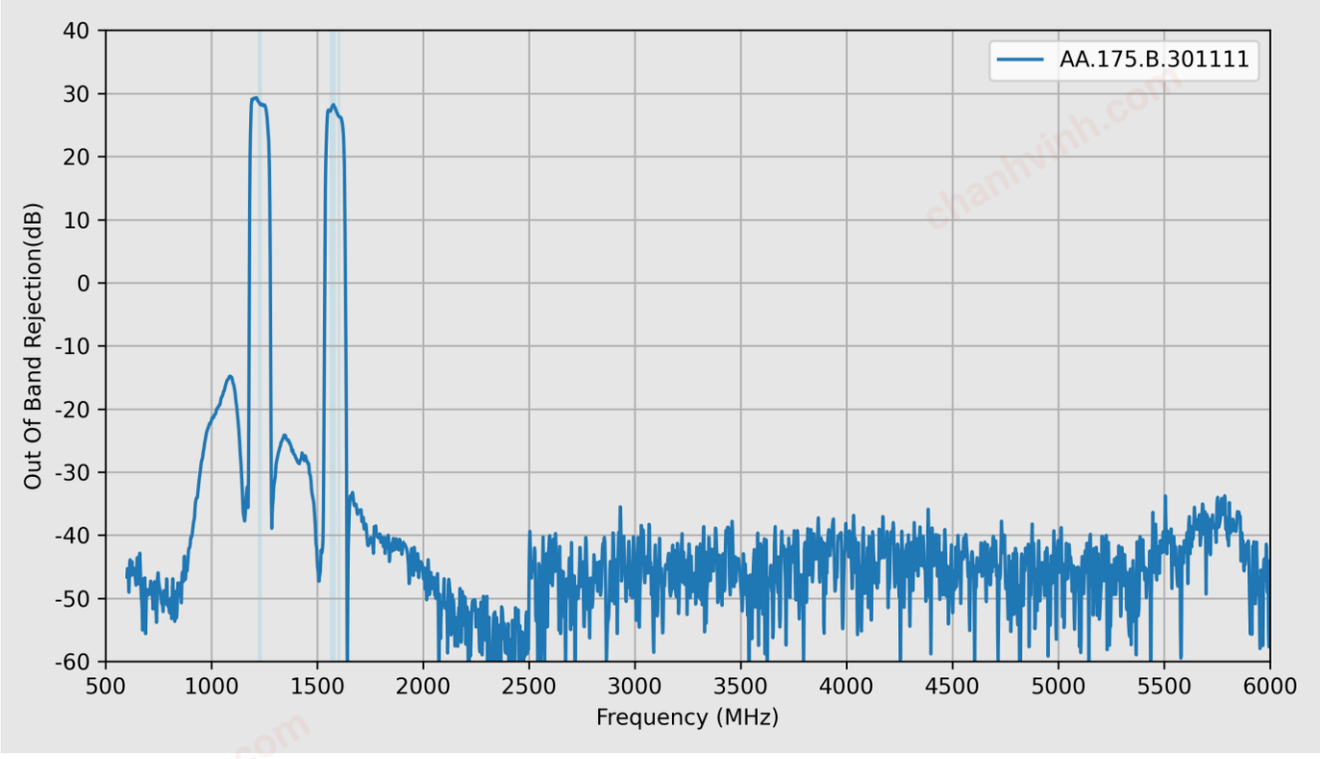


7.2 LNA Wide-Band Gain

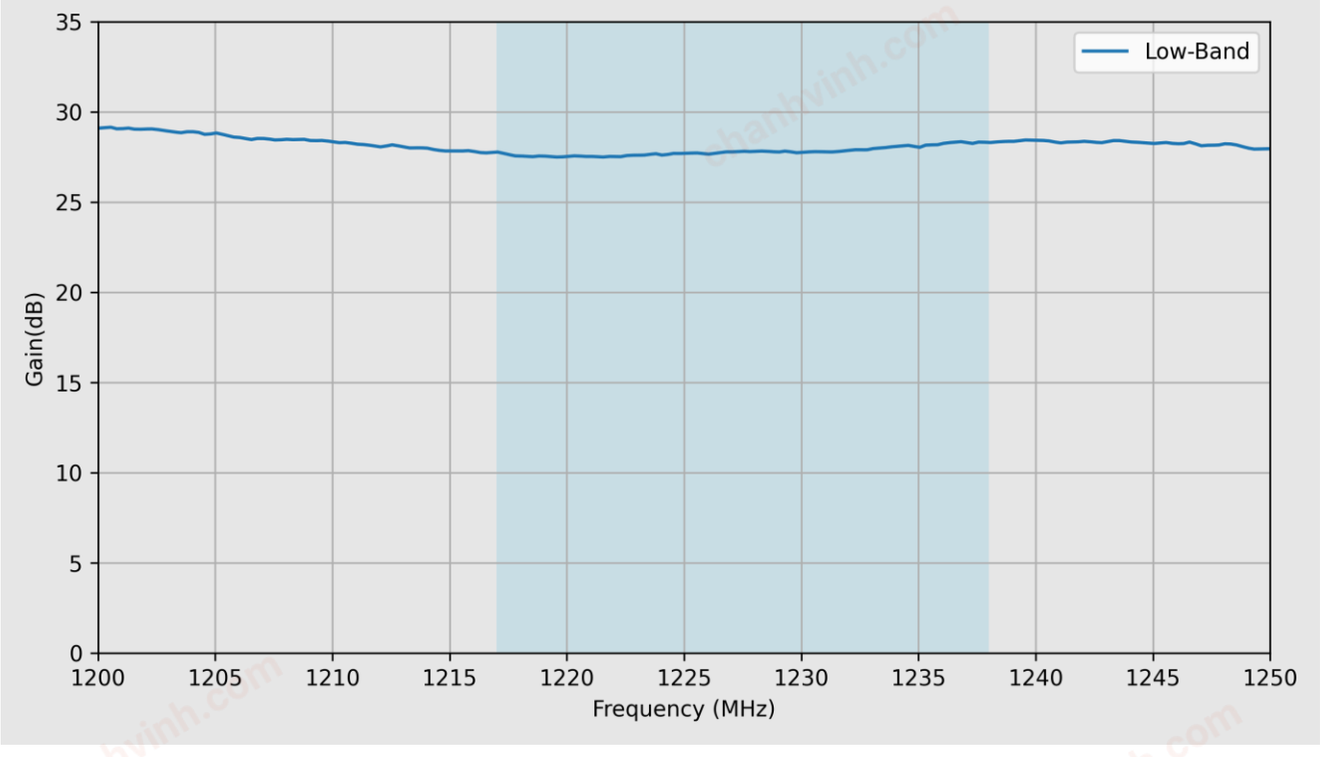


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7.3 Out Of Band Rejection

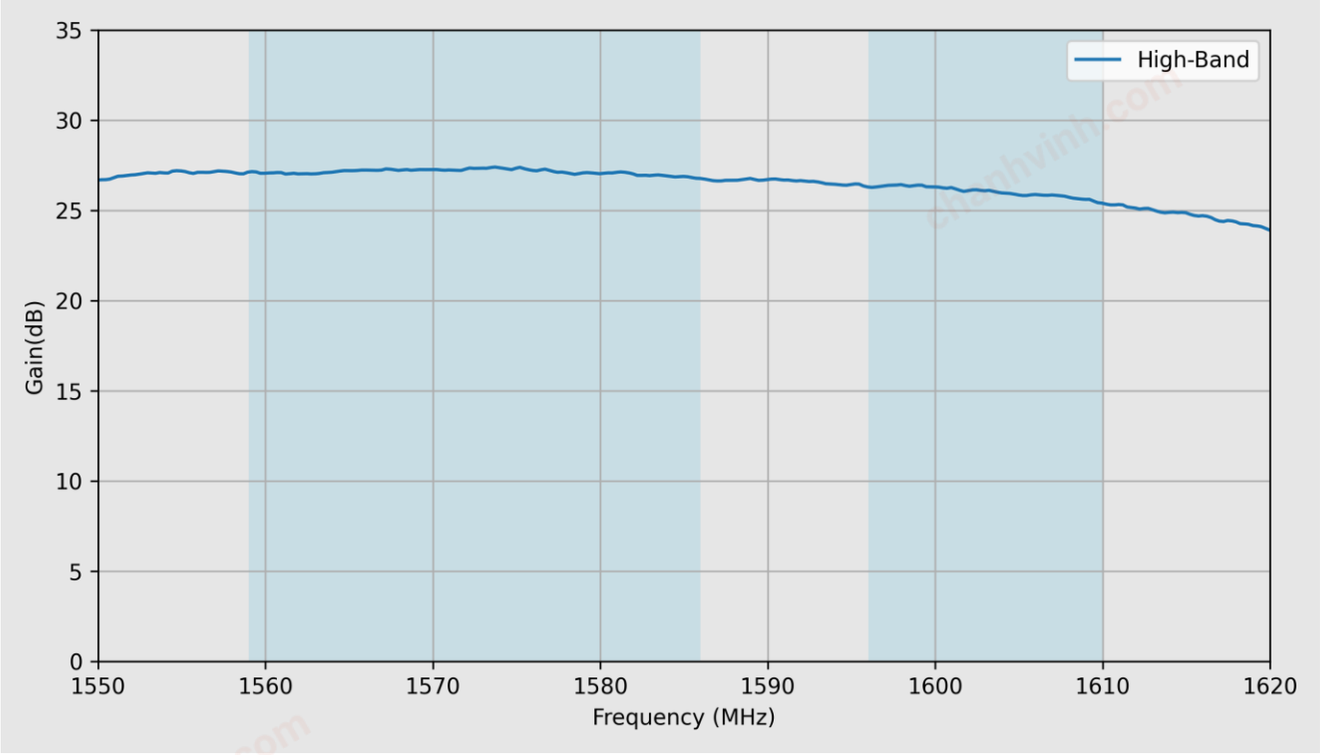


7.4 Gain – Low-Band

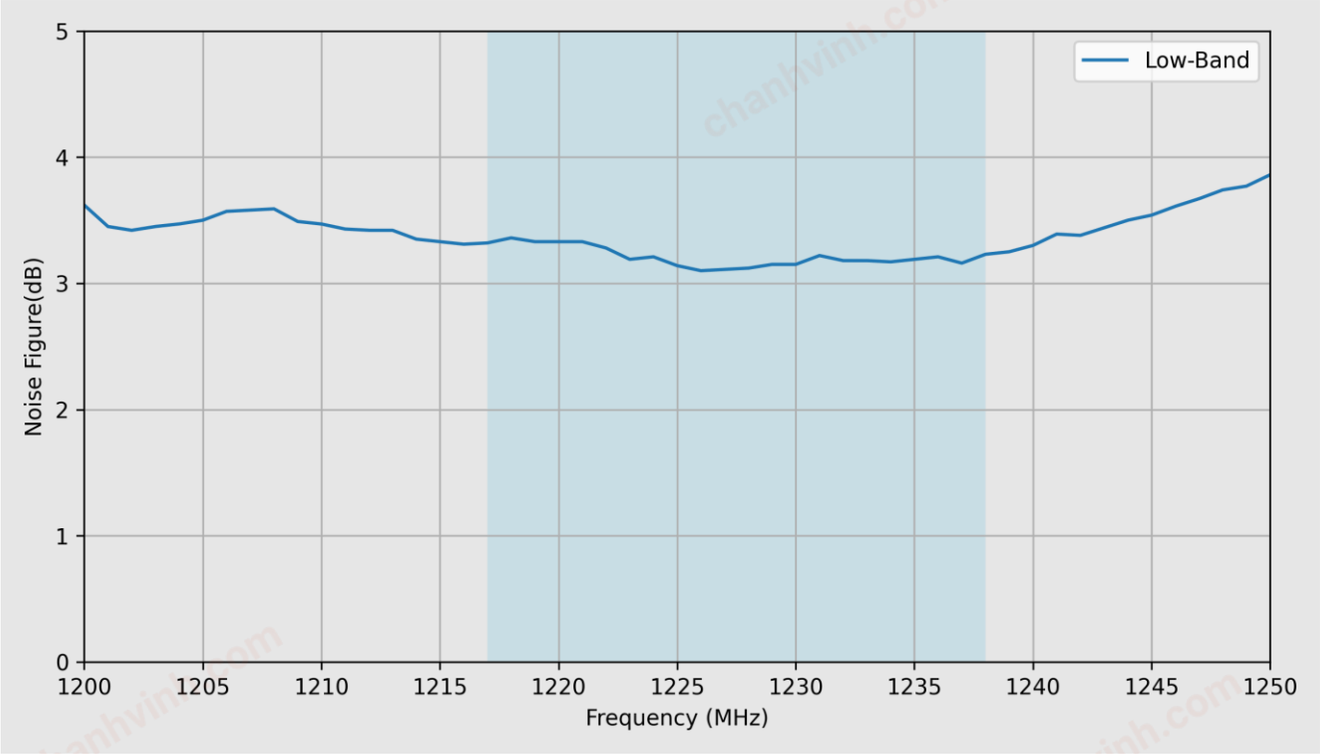


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7.5 Gain – High-Band

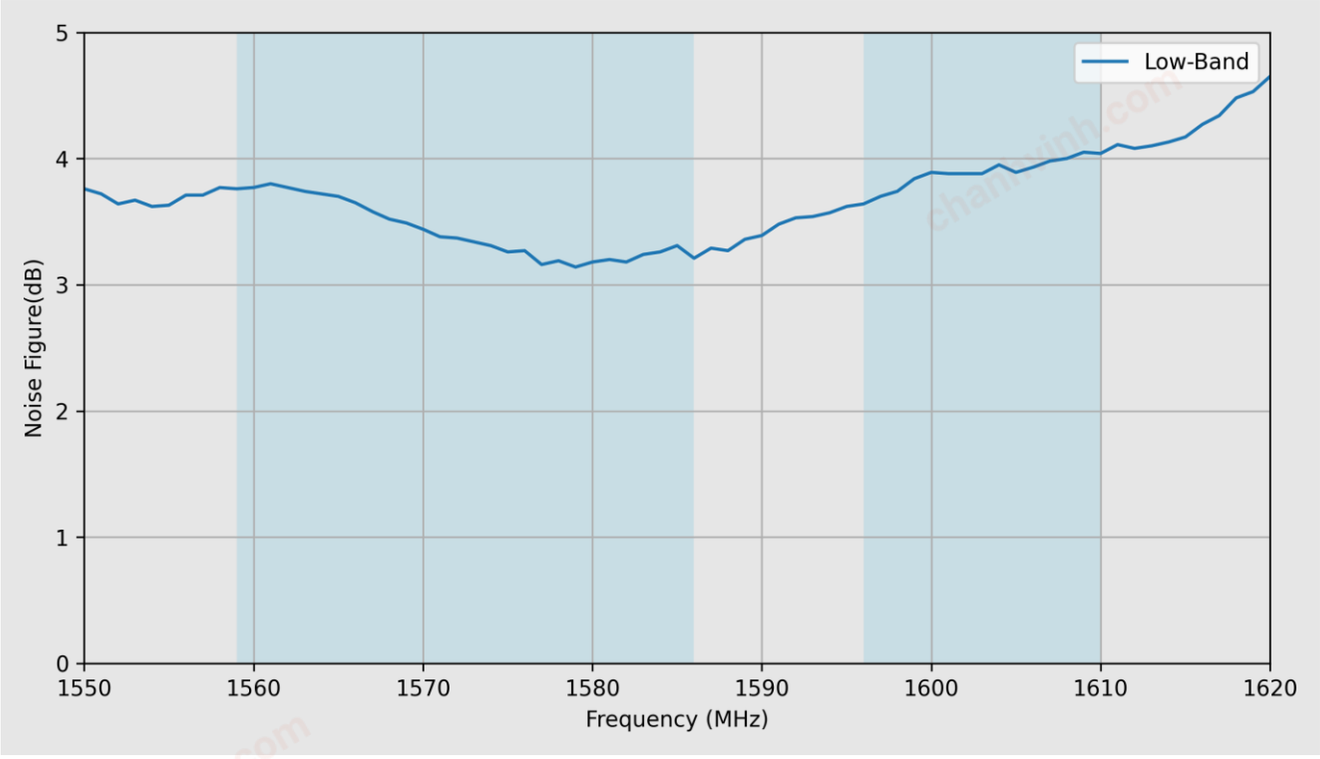


7.6 Noise Figure – Low-Band

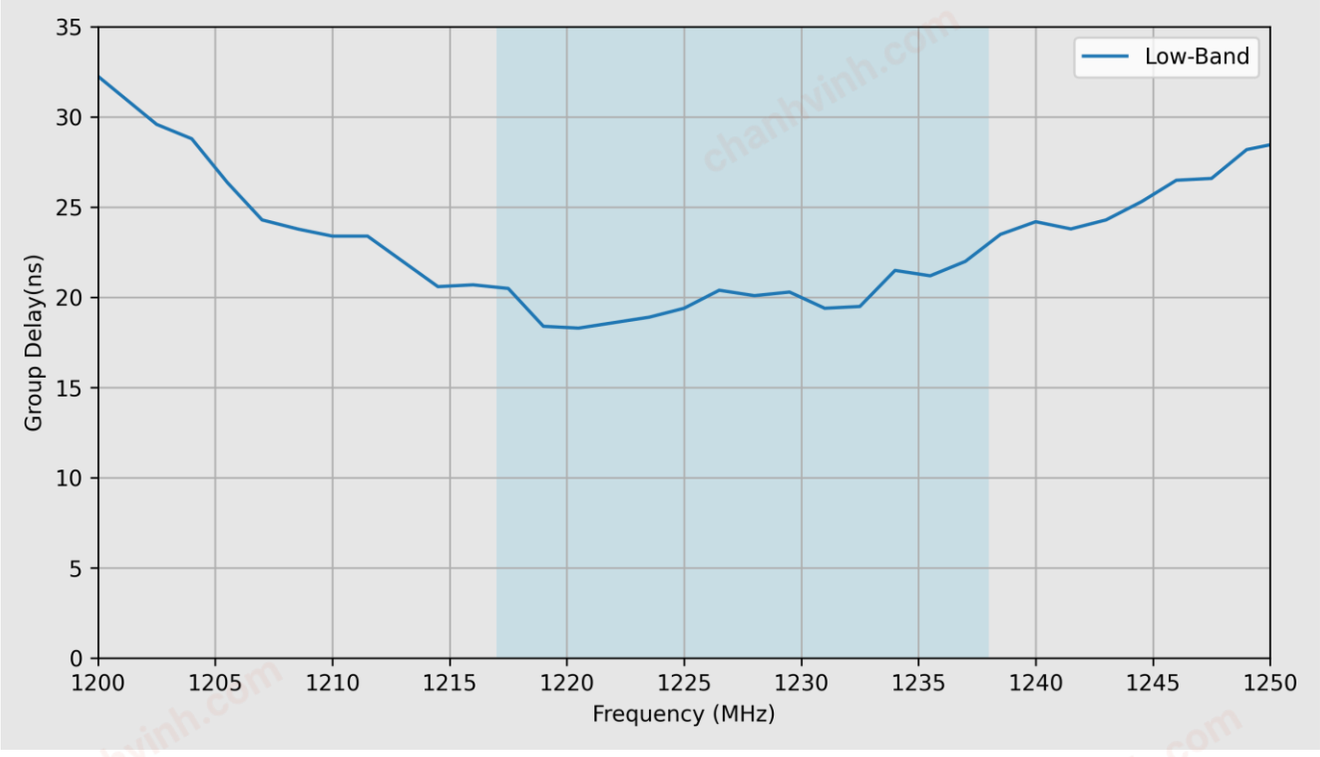


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7.7 Noise Figure – High-Band

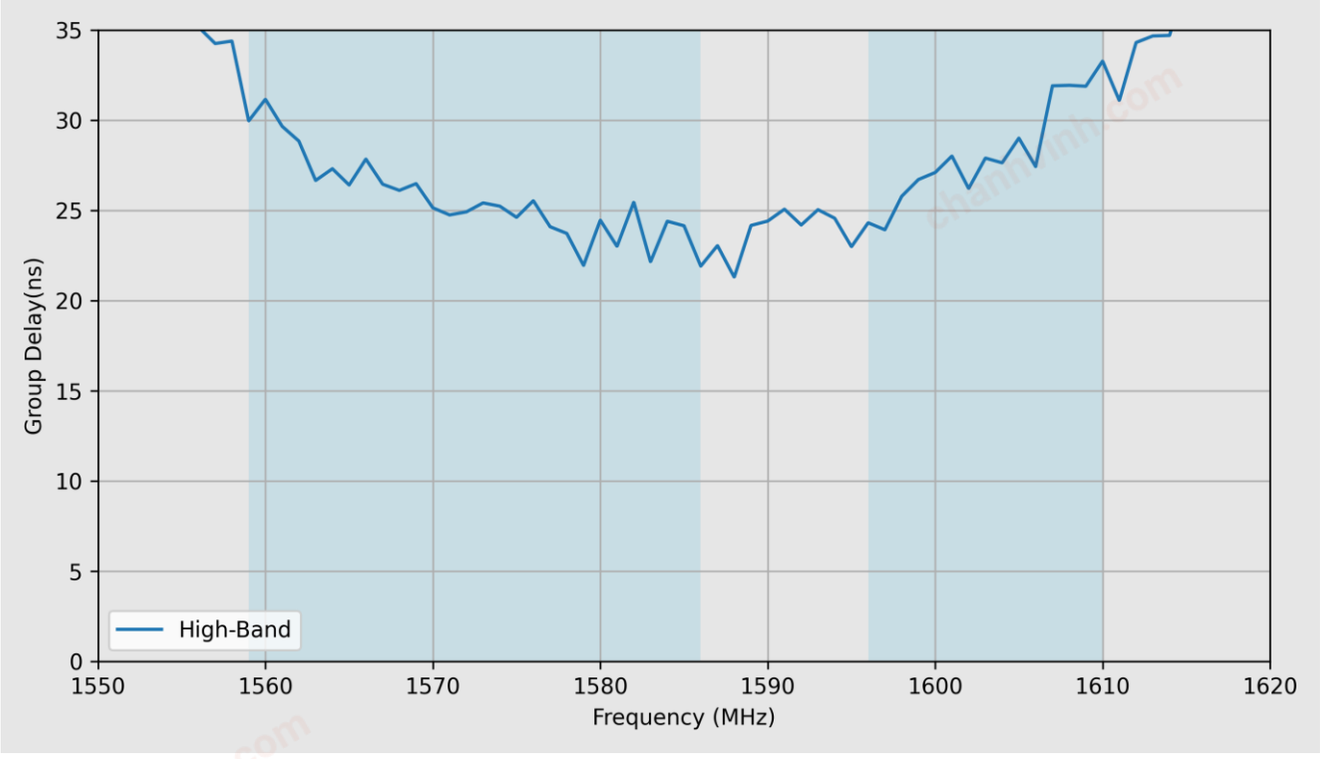


7.8 Group Delay – Low-Band



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7.9 Group Delay – High-Band



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Changelog for the datasheet

SPE-24-8-166 - AA.175.B.301111

Revision: A (Original First Release)	
Date:	2024-07-22
Notes:	Initial Release
Author:	Gary West

Previous Revisions

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