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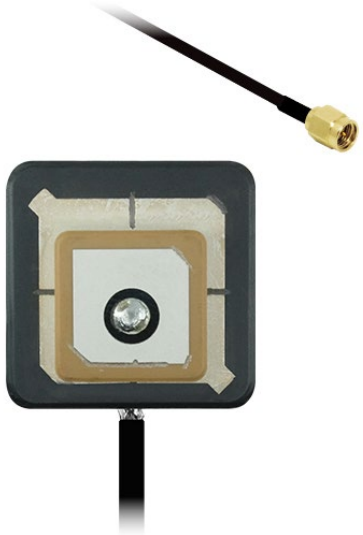
Enabling Industrial IoT

Echo 52

Embedded Active High Accuracy Multi-Constellation GNSS L1 / L2 / L5 Ceramic Patch Antenna



Key Features

- Covers GPS (L1, L2, L5), Galileo (E1, E5a), BeiDou (B1C, B2a), QZSS (L1, L5) and NavIC (L5) bands
- Integrated 2-stage Low Noise Amplifier for strong signal reception and low noise figure (≤ 1.3 dB)
- Top-hemisphere RHCP gain up to 25 dBiC peak and 21 dBiC average
- Wideband coverage across 1176 MHz, 1227 MHz and 1575 MHz bands with VSWR ≤ 1.5
- Compact 25 × 25 × 12.5 mm embedded ceramic design, ground-plane independent
- MHF1 / UMCC / U.FL / SMA connector options with 1.13 mm mini coax cable

General Description

The Echo 52 is an embedded multi-band GNSS antenna that delivers high accuracy positioning across the L1 (1575 MHz), L2 (1227 MHz) and L5 (1176 MHz) bands. It supports all major constellations including GPS, Galileo, BeiDou, QZSS and NavIC, enabling broad global compatibility for navigation, location and timing applications.

Its stacked ceramic patch structure and two-stage LNA provide strong RHCP gain with excellent axial purity, yielding robust performance even in low-signal or multipath environments. The antenna's directional pattern ensures maximum efficiency in the upper hemisphere, making it ideal for embedded GNSS modules and compact systems requiring precision tracking or RTK capability.

Available with MHF1/UMCC/U.FL or SMA connectors and 1.13 mm miniature coax cable as standard. Alternative lengths and connector types can be specified for high-volume orders.

Typical Applications

- High-precision GNSS receivers and RTK modules
- UAV and drone navigation systems
- Automotive and smart transport applications
- Asset and fleet tracking devices
- Timing and synchronisation equipment

E Embedded | GPS Position | GNSS GLONASS | GNSS BEIDOU | GNSS GALILEO

GNSS NavIC | GNSS QZSS | LNA Active | RHCP

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Electrical Specifications

Impedance:	50 Ω
Polarisation:	RHCP
Frequency Range:	1176.45 MHz (L5 / E5a / B2a / L5 NavIC), 1227.6 MHz (L2 / B2), 1575.42 MHz (L1 / E1 / B1C)
VSWR:	≤ 1.5
Ground Plane Independent:	Yes
RHCP Gain (Top Hemisphere):	21 ± 2 dBiC (avg), 25 ± 1 dBiC (peak)
Noise Figure:	≤ 1.3 dB
Input Voltage:	2.7 – 3.3 V DC (typ. 3.0 V)
Current Consumption:	10 ± 2 mA @ 3.0 V (≤ 15 mA @ 3.3 V)

Environmental Specifications

Operational Temperature Range:	–40 °C to +85 °C
Storage Temperature Range:	–40 °C to +85 °C
ESD Protection:	2 kV HBM
Ingress Protection:	None

Mechanical Specifications

Dimension:	25.1 × 25.1 × 12.5 mm
Weight:	18.5 g
Material:	Stacked Ceramic Patch (Upper Yellow / Lower Black)
Connector:	MHF1 / UMCC / U.FL / SMA Male
Cable:	1.13 mm mini coax
Mounting Methods:	Embedded – adhesive or mechanical fixing (adhesive not supplied)

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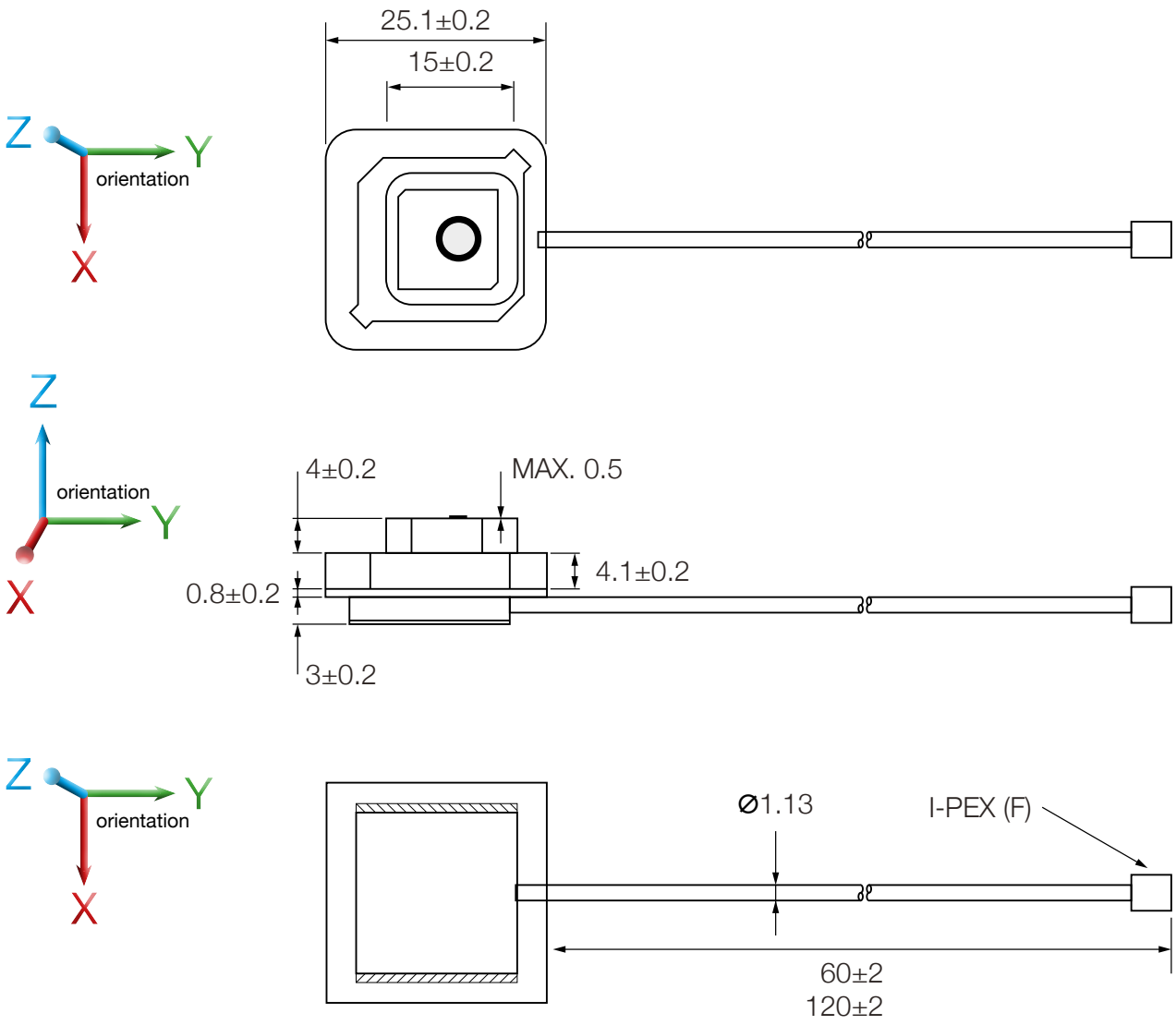
Dimensional Drawing

Unit: mm



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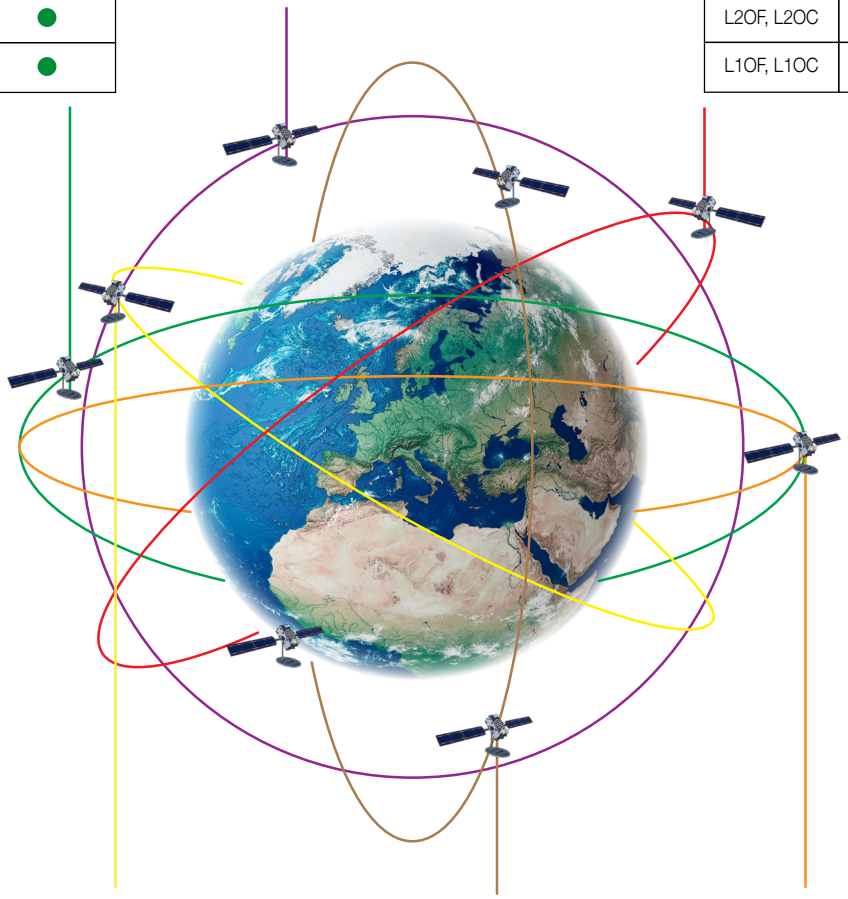
Spectrum Coverage

GPS		
Band	Frequency	Use Indicator
L5	1176.45	●
L2	1227.6	●
L1	1575.42	●

NavIC		
Band	Frequency	Use Indicator
L5	1176.45	●

GLONASS		
Band	Frequency	Use Indicator
L3OC	1202.025	●
L2OF, L2OC	1246	●
L1OF, L1OC	1602	●



Galileo		
Band	Frequency	Use Indicator
E5a	1176.45	●
E5b	1207.14	●
E6-I, E6-Q	1278.75	●
E1-I, E1-Q	1575.42	●

BeiDou		
Band	Frequency	Use Indicator
B2a	1176.45	●
B2I, B2b	1207.14	●
B3I	1268.52	●
B1I	1561.098	●
B1C	1575.42	●

QZSS		
Band	Frequency	Use Indicator
L5	1176.45	●
L2	1227.6	●
L6	1278.75	●
L1	1575.42	●

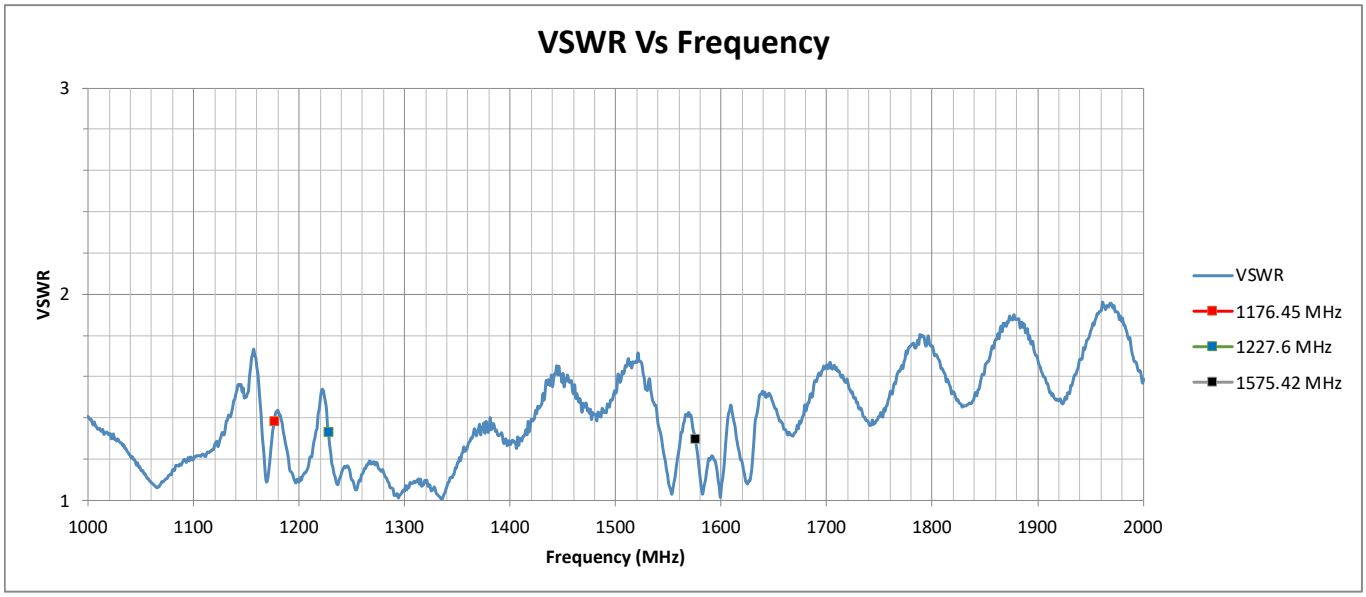
● Suitable band ● Adequate band in good signal conditions ● Likely to be unsuitable

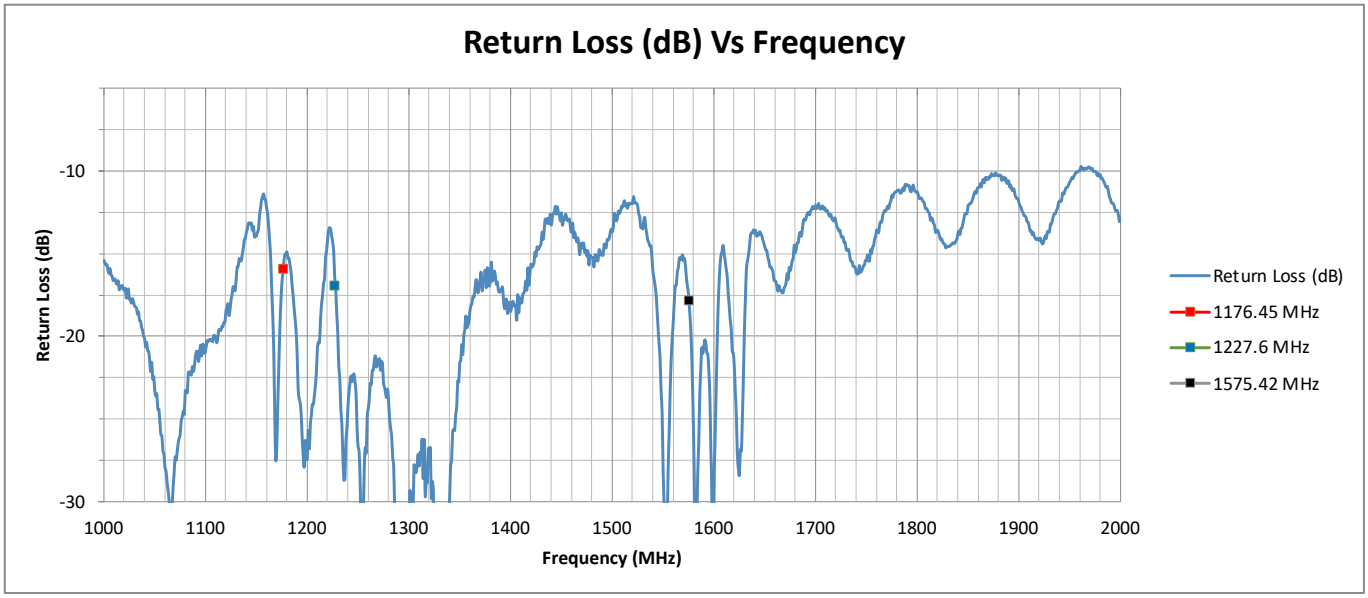
GNSS Standards Band Support

	Electrical Interface		Spherical RF Measurements			
Centre Frequency (MHz)	VSWR	Return Loss (dB)	Average RHCP Gain (dBiC)	Peak RHCP Gain (dBiC)	Median Axial Ratio (dB)	Minimum Axial Ratio (dB)
1176.45	1.3830	-15.8899	20.01	27.94	18.78	1.32
1202.025	1.0960	-26.7892	12.59	19.04	21.21	1.03
1207.14	1.1433	-23.5012	13.96	20.49	19.81	0.68
1227.6	1.3315	-16.9542	21.23	28.53	15.81	1.20
1246	1.1661	-22.3046	9.96	19.76	15.53	0.32
1561.098	1.2957	-17.8084	22.09	29.92	17.26	0.43
1575.42	1.2942	-17.8560	20.05	27.36	19.13	0.18
1602	1.1381	-23.7943	24.20	29.52	13.05	0.73

	Top hemisphere RF Measurements				Zenith RF Measurements	
Centre Frequency (MHz)	Average RHCP Gain (dBiC)	Peak RHCP Gain (dBiC)	Median Axial Ratio (dB)	Minimum Axial Ratio (dB)	RHCP Gain at Zenith (dBiC)	Axial Ratio at Zenith (dB)
1176.45	20.42	25.15	20.93	1.90	24.70	42.13
1202.025	13.84	19.04	23.40	1.03	17.72	33.98
1207.14	15.92	20.49	20.77	1.55	19.92	18.34
1227.6	22.15	26.43	16.47	1.20	24.06	14.77
1246	10.50	16.56	18.06	0.32	8.95	9.50
1561.098	23.15	26.36	19.51	1.87	24.79	17.98
1575.42	21.19	24.65	22.96	4.68	24.56	36.34
1602	25.75	29.52	12.61	3.05	27.23	10.46

Electrical


VSWR Vs Frequency
VSWR
3
2
1
1000
1100
1200
1300
1400
1500
1600
1700
1800
1900
2000
Frequency (MHz)
VSWR
1176.45 MHz
1227.6 MHz
1575.42 MHz


Return Loss (dB) Vs Frequency
Return Loss (dB)
-10
-20
-30
1000
1100
1200
1300
1400
1500
1600
1700
1800
1900
2000
Frequency (MHz)
Return Loss (dB)
1176.45 MHz
1227.6 MHz
1575.42 MHz

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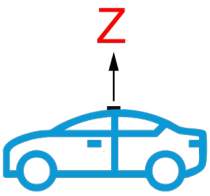
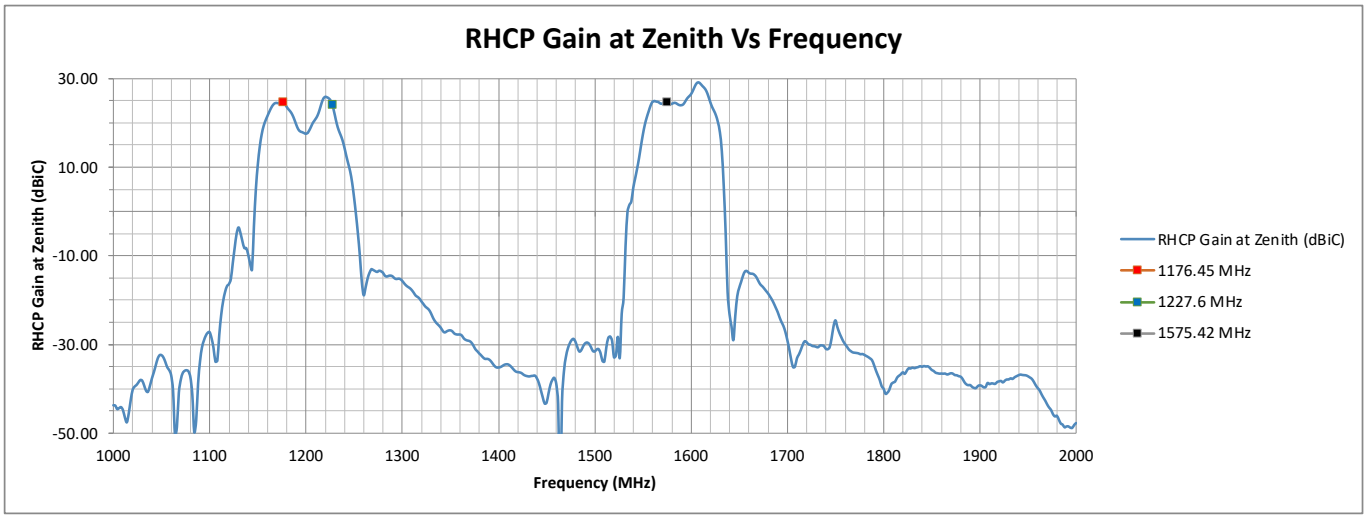
RF Zenith

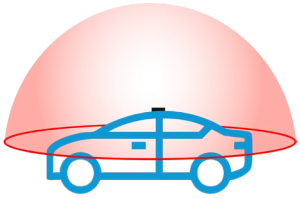
This page presents the RHCP Gain at Zenith and the Axial Ratio at Zenith as a function of frequency. These measurements indicate how well the antenna performs when receiving signals directly from satellites overhead (zenith direction). A higher RHCP gain ensures strong signal reception, while a lower axial ratio signifies better polarization purity for optimal GNSS performance.

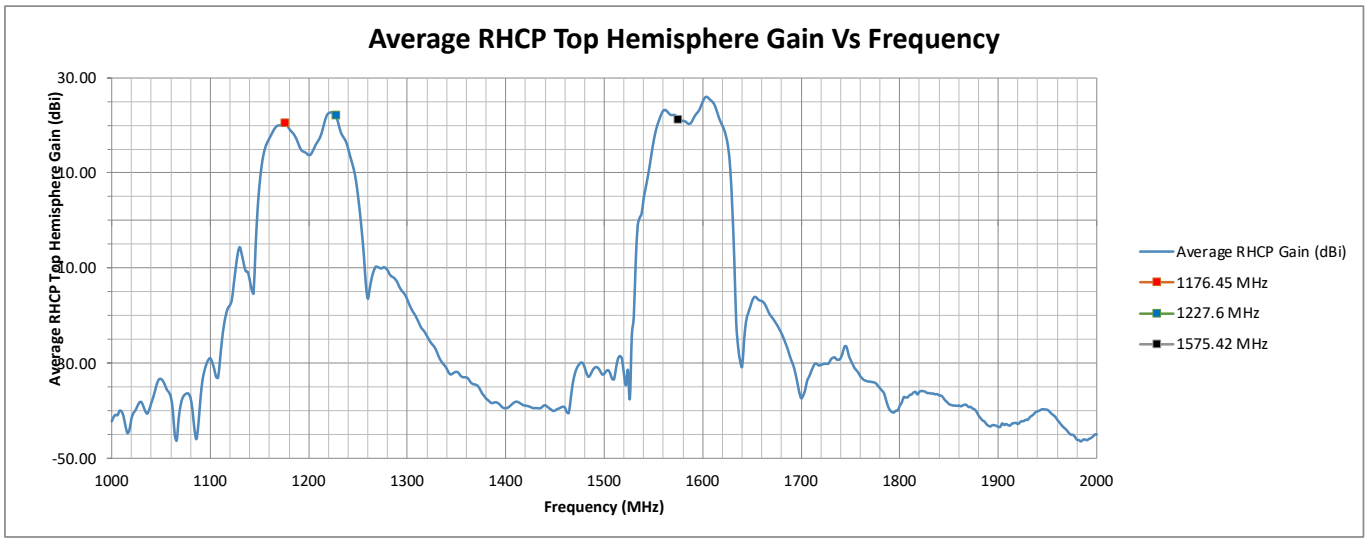


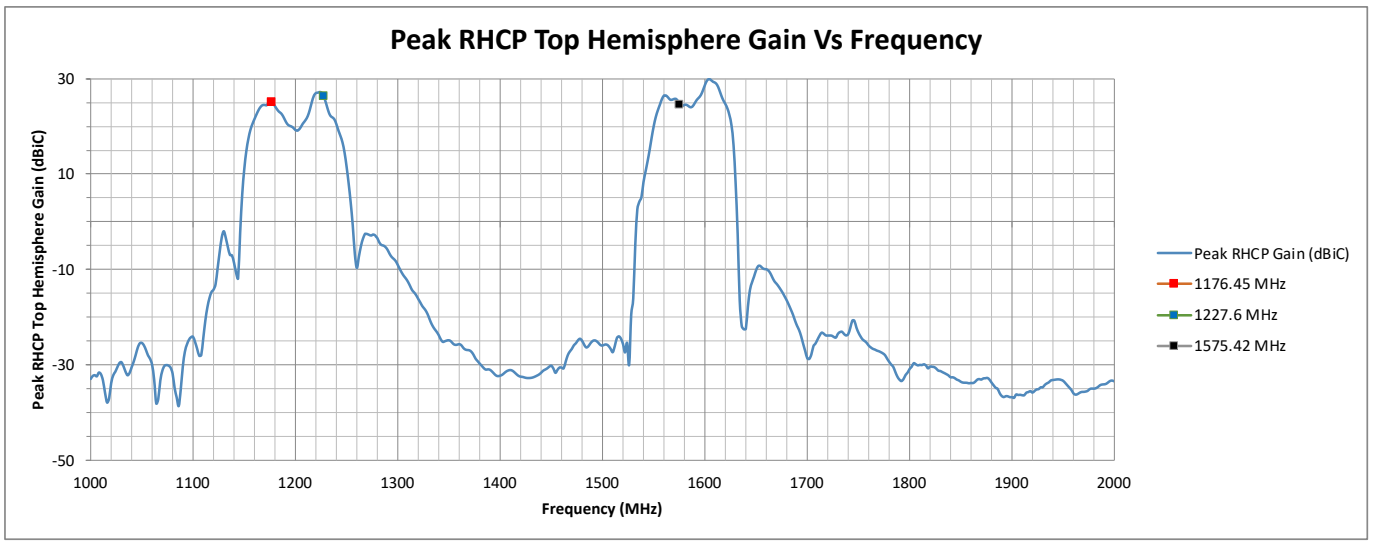


RF Top Hemisphere

The graphs on this page showcase the Average and Peak RHCP Gain in the Top Hemisphere. These measurements assess how effectively the antenna receives signals from satellites positioned in the upper half of the sky. Strong RHCP gain in this region is critical for reliable GNSS reception, especially in environments where satellites may not always be directly overhead.

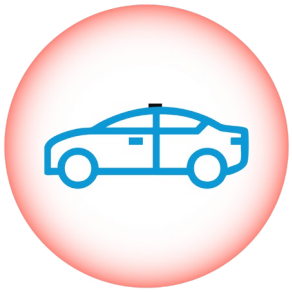


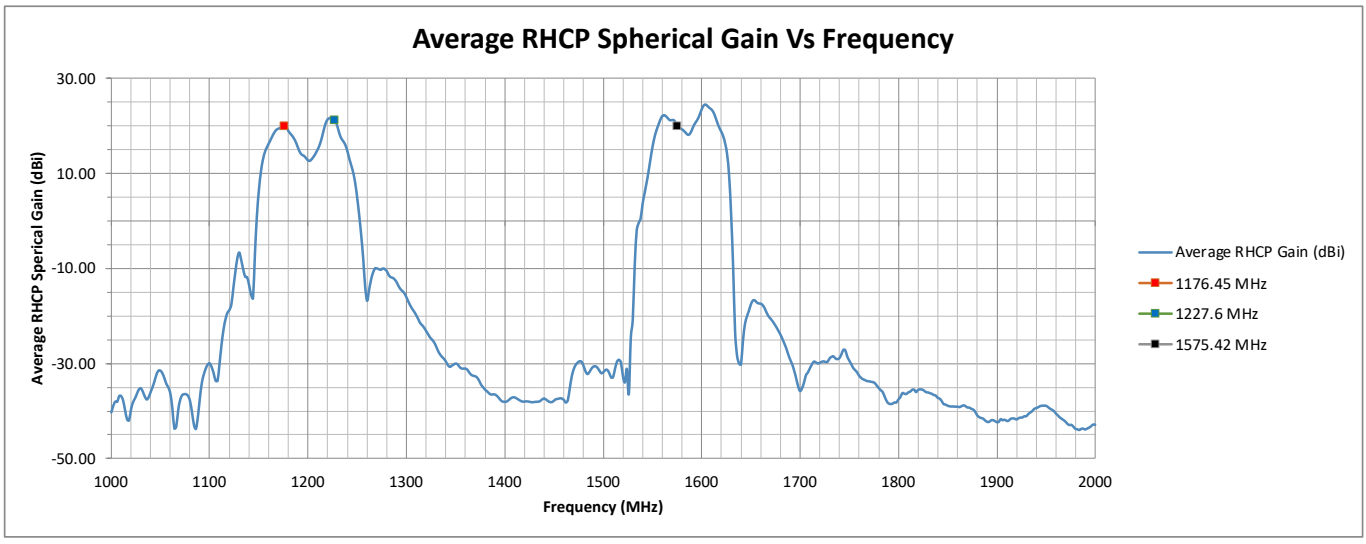


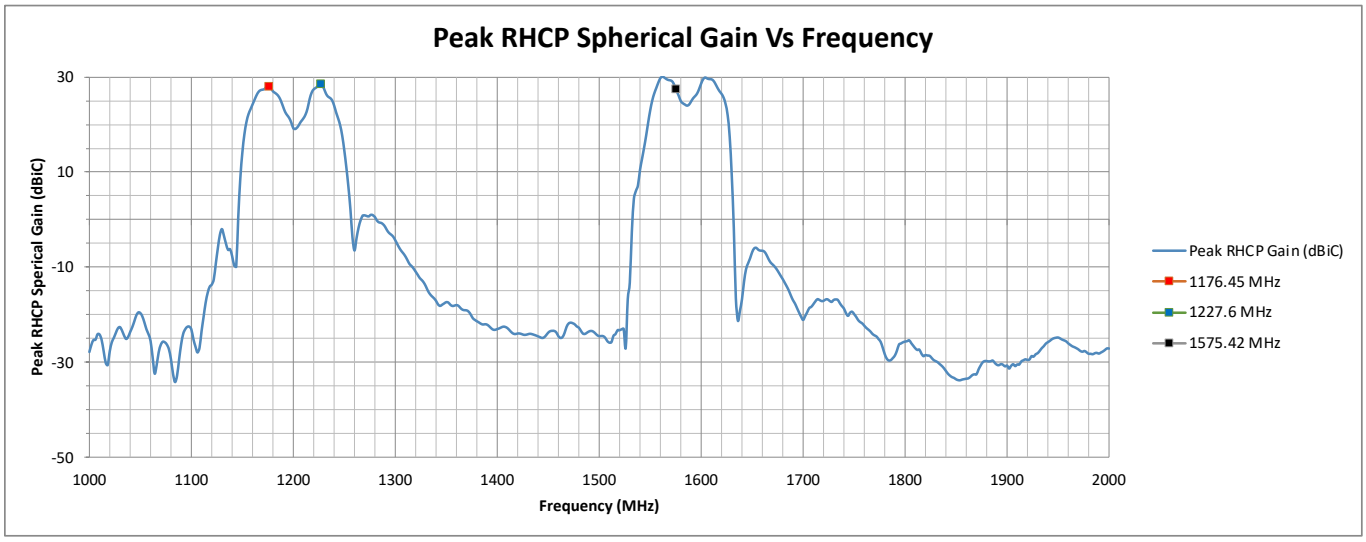


RF Spherical

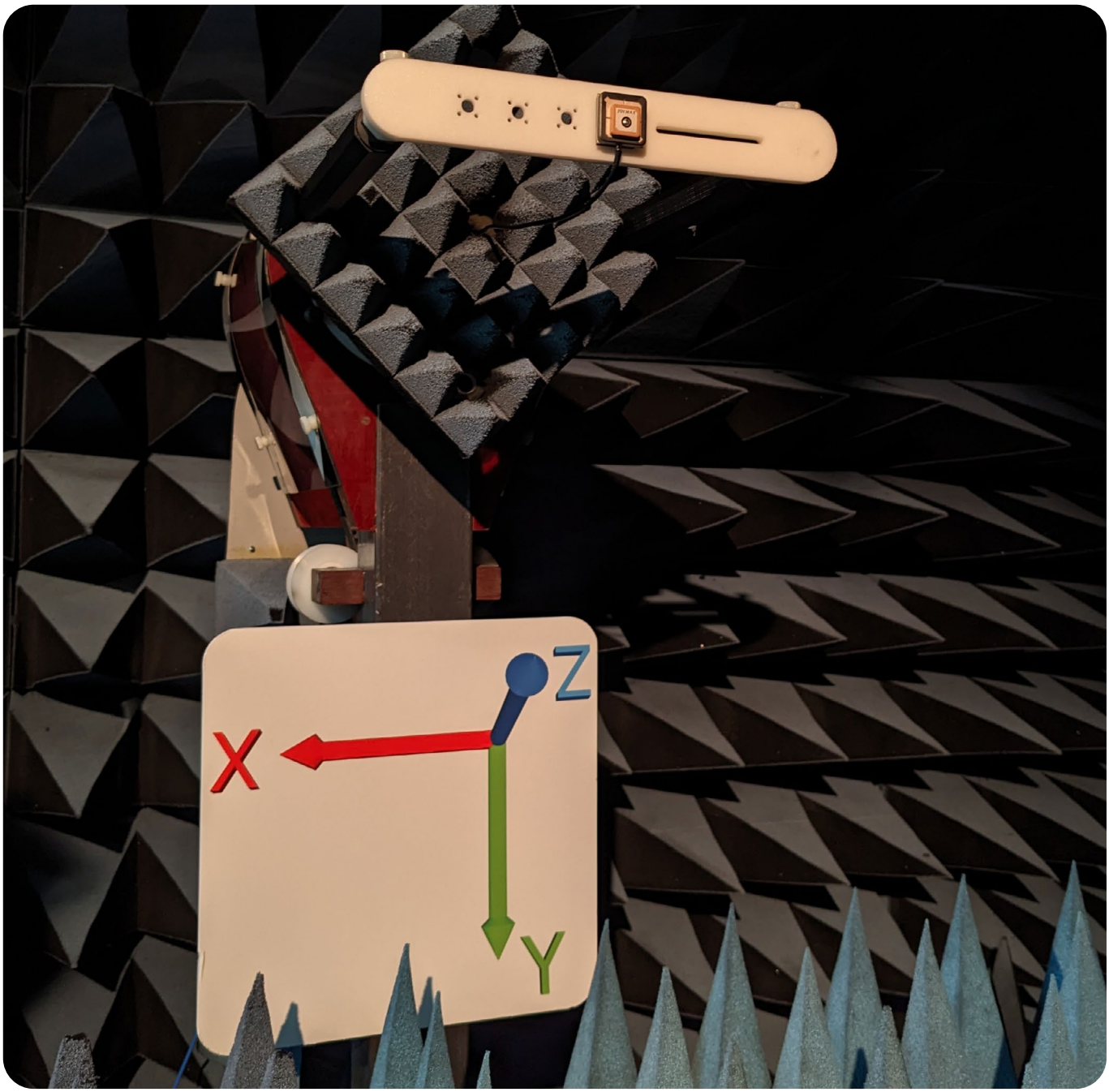
This page displays the Average and Peak RHCP Gain across the entire spherical coverage of the antenna. These metrics provide a comprehensive view of the antenna's ability to receive signals from satellites at all elevations and directions. Consistently high gain across the sphere ensures strong and stable GNSS reception in a variety of operating conditions.







Test Setup (in freespace)



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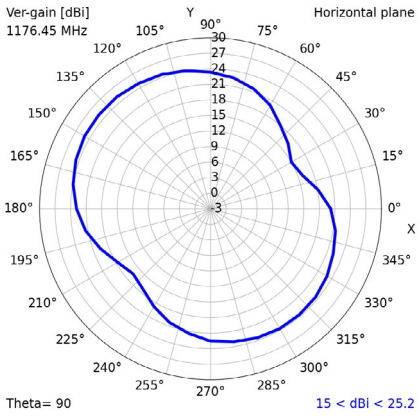
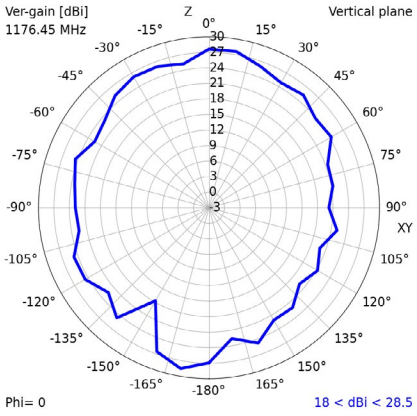
2D Radiation Plots

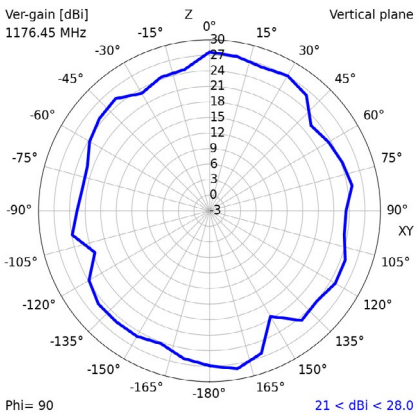
1176.45 MHz XY



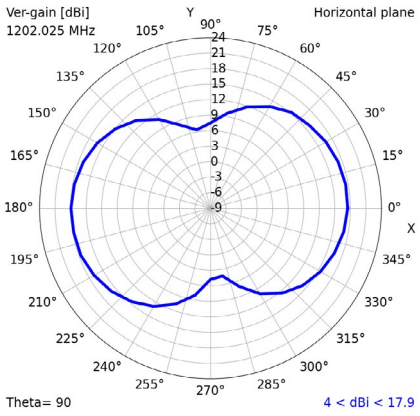
XZ



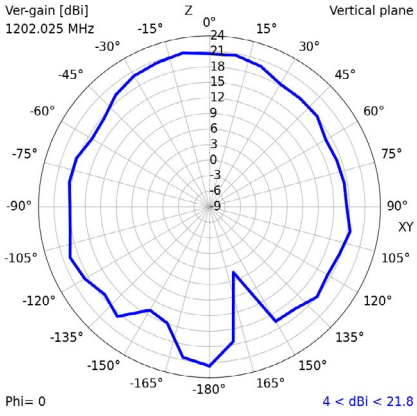
YZ



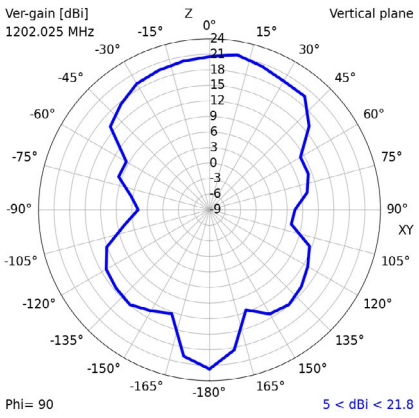
1202.025 MHz XY



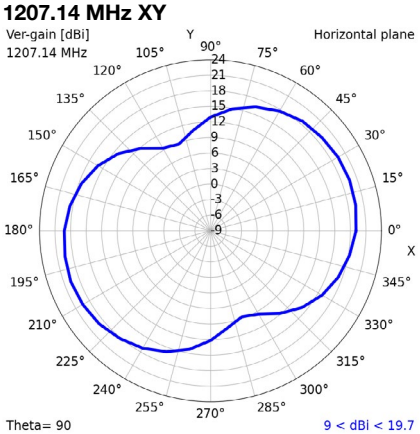
XZ



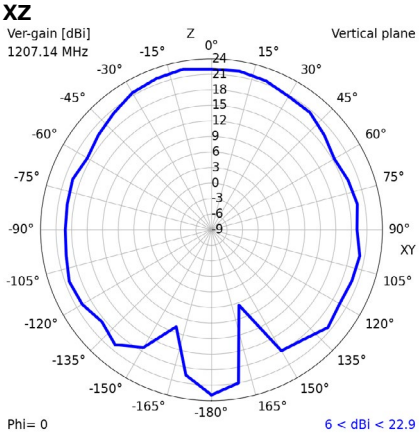
YZ



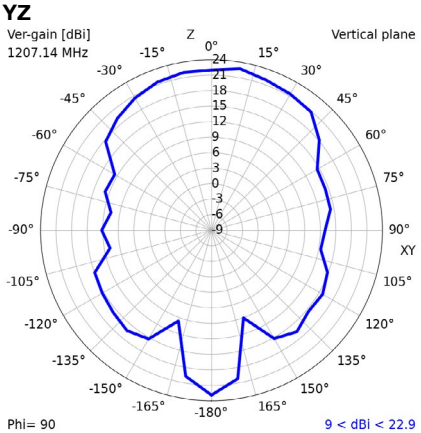
1207.14 MHz XY



XZ



YZ



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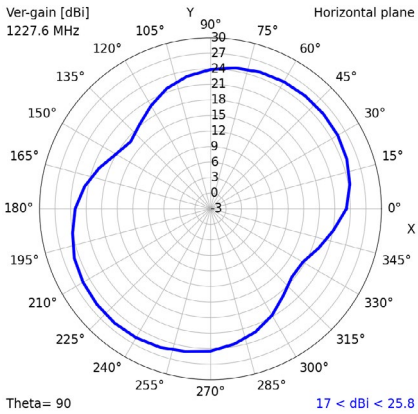
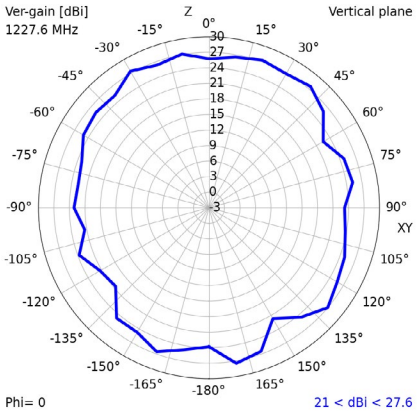
2D Radiation Plots

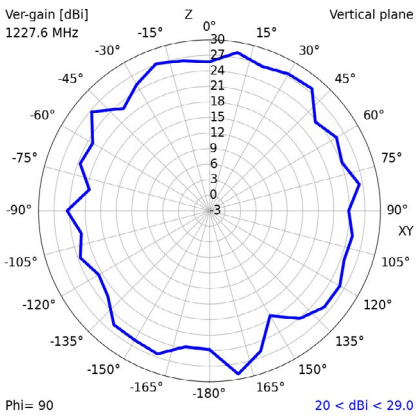
1227.6 MHz XY



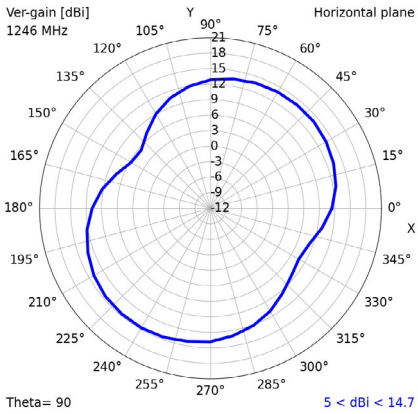
XZ



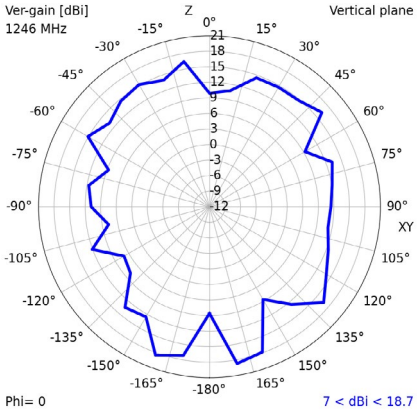
YZ



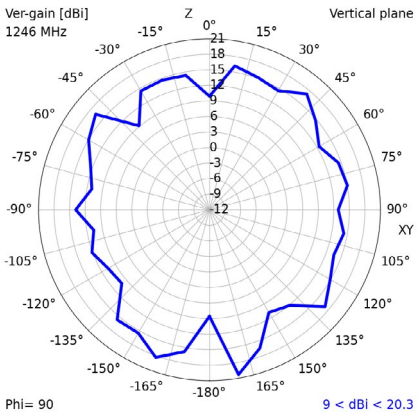
1246 MHz XY



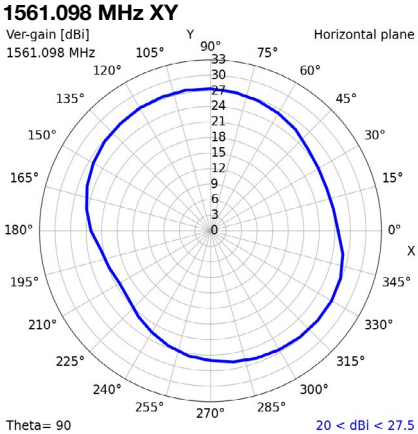
XZ



YZ



1561.098 MHz XY



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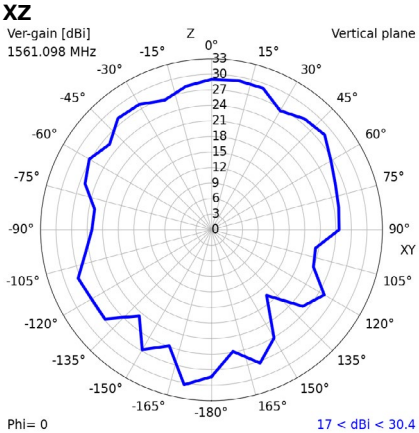

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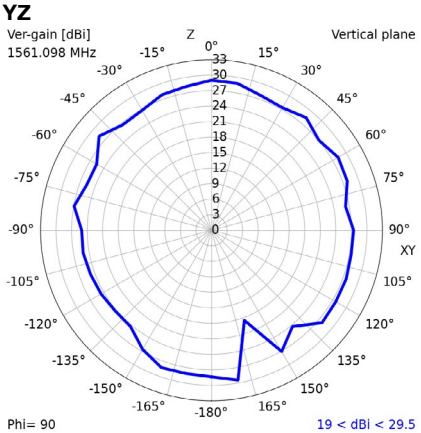

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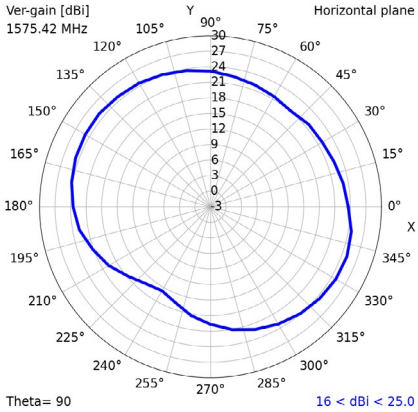
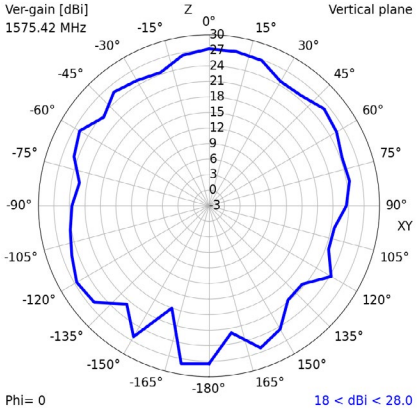
2D Radiation Plots

1575.42 MHz XY



XZ



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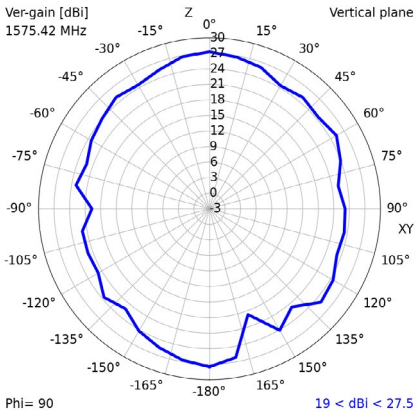
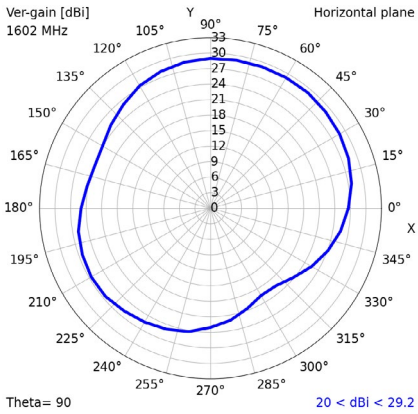


1602 MHz XY



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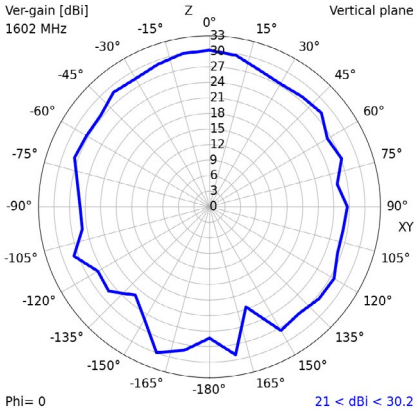

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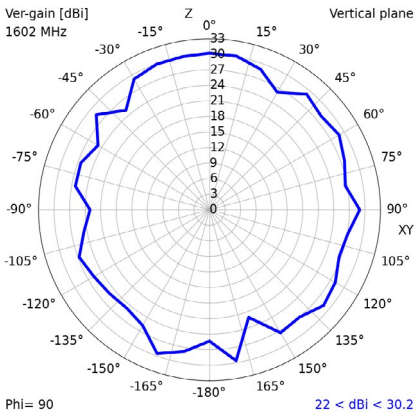

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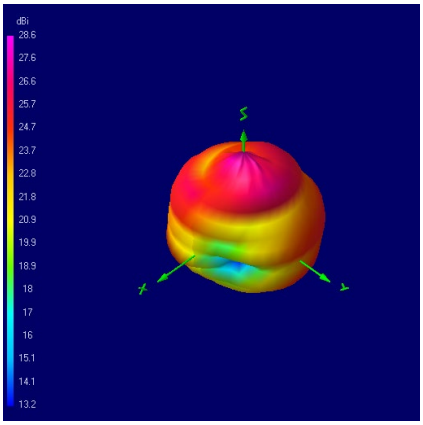
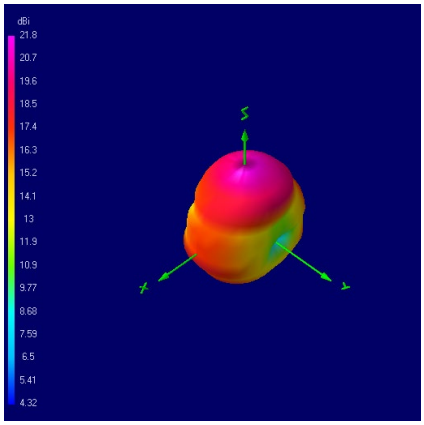
Embedded Active High Accuracy Multi-Constellation GNSS L1 / L2 / L5 Ceramic Patch Antenna

3D Radiation Plots

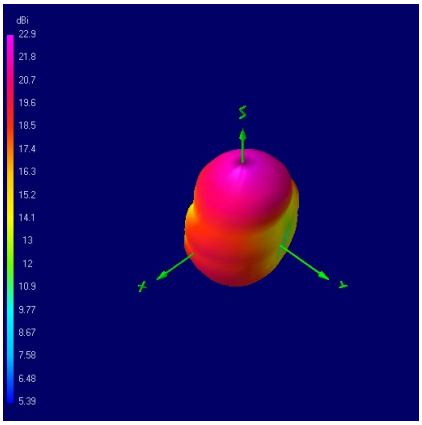
1176.45 MHz



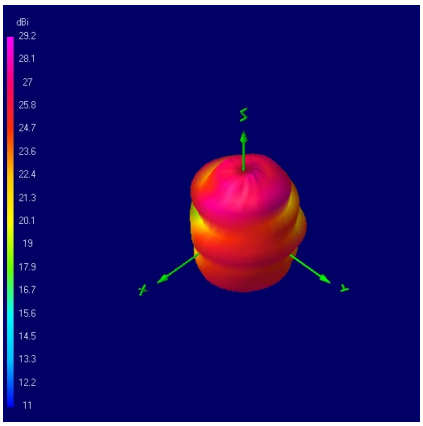
1202.025 MHz



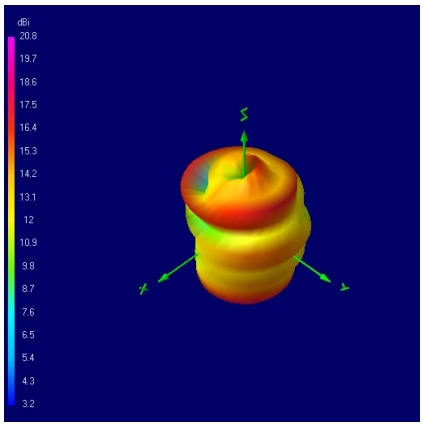
1207.14 MHz



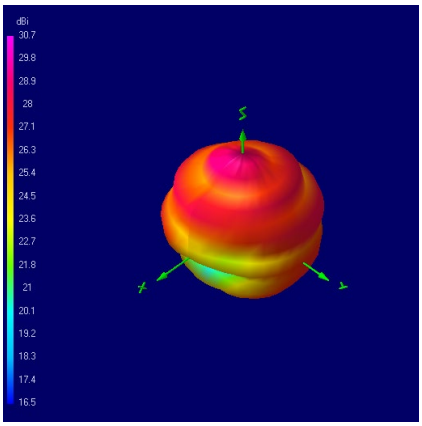
1227.6 MHz



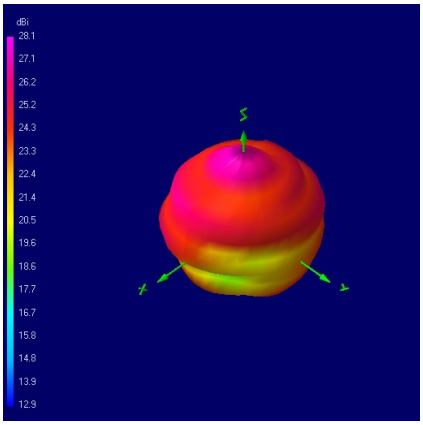
1246 MHz



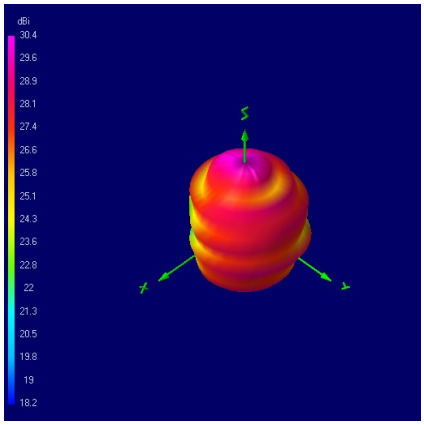
1561.098 MHz



1575.42 MHz



1602 MHz



NOTE: All 3D radiation plots are shown with Theta = 45 and Phi = 45.

Ordering Details:

Part Number	Description
ECHO52/0.1M/UFL/S/S/28	Embedded Active Multi-Band GNSS L1/L2/L5 Antenna with 0.1 m Cable and U.FL Connector
ECHO52/0.1M/MHF4/S/S/28	Embedded Active Multi-Band GNSS L1/L2/L5 Antenna with 0.1 m Cable and MHF4 Connector
ECHO52/1M/SMAM/S/S/32	Embedded Active Multi-Band GNSS L1/L2/L5 Antenna with 1 m Cable and SMA Male Connector
ECHO52/3M/SMAM/S/S/32	Embedded Active Multi-Band GNSS L1/L2/L5 Antenna with 3 m Cable and SMA Male Connector

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