M10HCT-A-SMA

L1-L2-L5 ACTIVE GNSS ANTENNA

Part #: 100-00282-02

Description

M10HCT-A-SMA is a L1-L2-L5 active GNSS antenna solution intended to cover all GPS, Galileo, Glonass, BeiDou bands including L-Band correction services coverage. Low profile RHCP, wide band antenna is ideal solution for high-precision applications, such as autonomous vehicle navigation, smart survey devices, and maritime positioning. This antenna is built on proprietary Maxtena Helicore® technology. This technology provides exceptional pattern control, polarization purity and high efficiency in a very compact form factor. Low axial ratio ensures that the antenna captures RHCP signal well and mitigates the reflected LHCP signals. Antenna ensures high signal-to-noise ratio (SNR) and GNSS signal tracking from all elevation angles in all types of environments. The antenna is ground plane independent and comes in three versions: Screw mount, magnet mount and embedded. The embedded version is custom tuned to the applications enclosure.

Active Circuit Performance

Parameter	Specification
Conducted gain	34.5 dB @ upper band 35.4 dB @ lower band
Noise figure	3.1 dB @ upper band 2.9 dB @ upper band
Voltage	2.3 V - 16 V
Current	40 mA (max.)
Out of band rejection	≥ 70 dB @ ≥ 1700 MHz ≥ 35 dB @ ≥ 1650 MHz ≥ 35 dB @ 1450 - 1520 MHz ≥ 60 dB @ 1350 - 1450 MHz ≥ 80 dB @ ≤ 1125 MHz
Group delay variation	< 3 ns @ L1 < 4 ns @ L2 < 22 ns @ L5
EMI Immunity Out of Band	30 kV
Output P1dB	12.5 dBm @ upper band 13.1 dBm @ lower band

Features

- Full GPS, Galileo, Glonass, BeiDou bands coverage including L-Band correction services coverage
- Low Axial Ratio
- Low Noise Figure
- Ground plane independent
- Low power consumption
- Low phase center variation over azimuth and elevation and among different samples
- Rugged IP67 rating
- RoHs compliant
- Automotive grade electronics

Applications

- UAV/Drones
- Unmanned Ground Vehicles (UGV)
- Unmanned Systems
- High Precision Navigation
- Military & Security
- Agriculture & FarmTech
- Marine systems

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Passive antenna performance

Parameter	Specification
Frequency Range	1164 - 1300 MHz 1539 - 1610 MHz
Peak gain	3.4 dBic @ upper band 3.3 dBic @ lower band
Peak efficiency	80 % @ upper band 75 % @ lower band
Axial Ratio	0.5 dB (max.) @ zenith
Polarization	RHCP
Beamwidth	120°

Mechanical specification

Parameter	Specification
Antenna Dimensions	Ø80 x 40 mm
Weight	123 g
Operating Temperature	-40 °C to 85 °C
Mounting Type	Magnet Mount
Connector	SMA
Radome/Color	Black
Housing material	ABS/PC
Certificates	IP67

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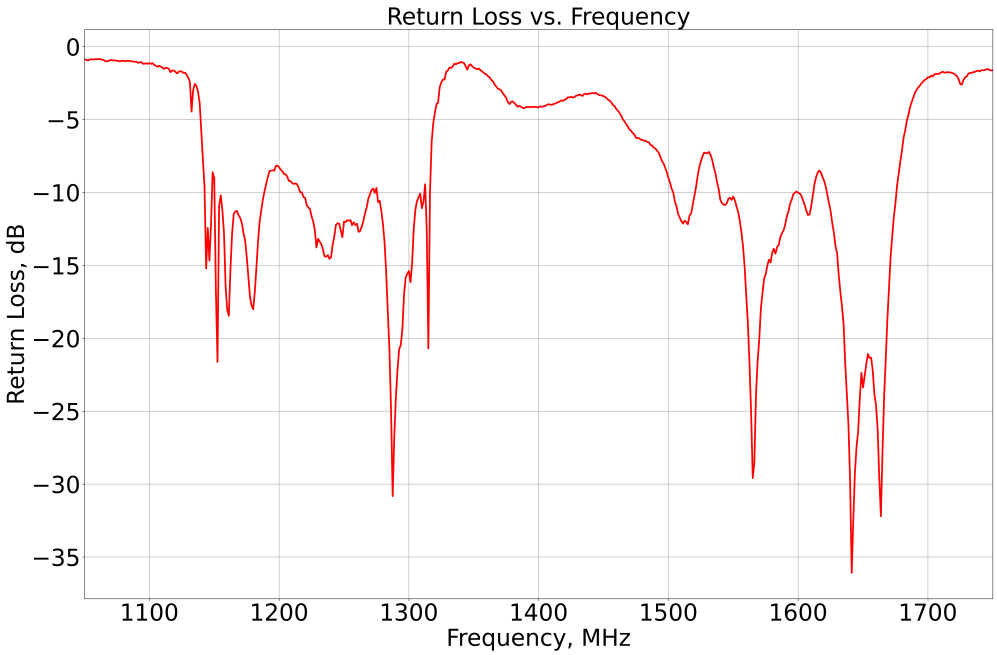
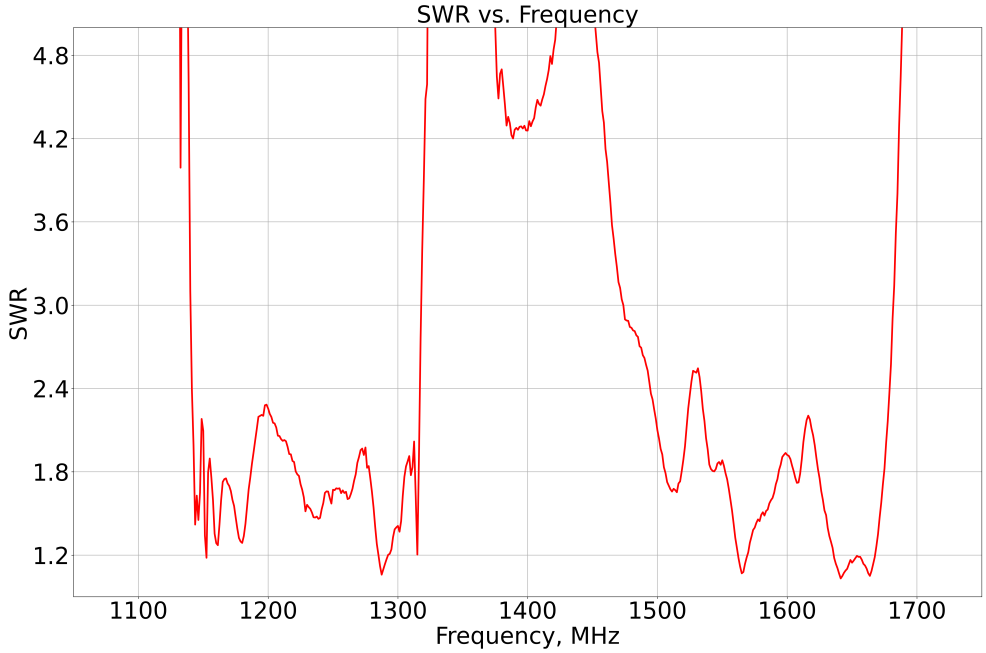
Antenna Characteristics

Return Loss



VSWR



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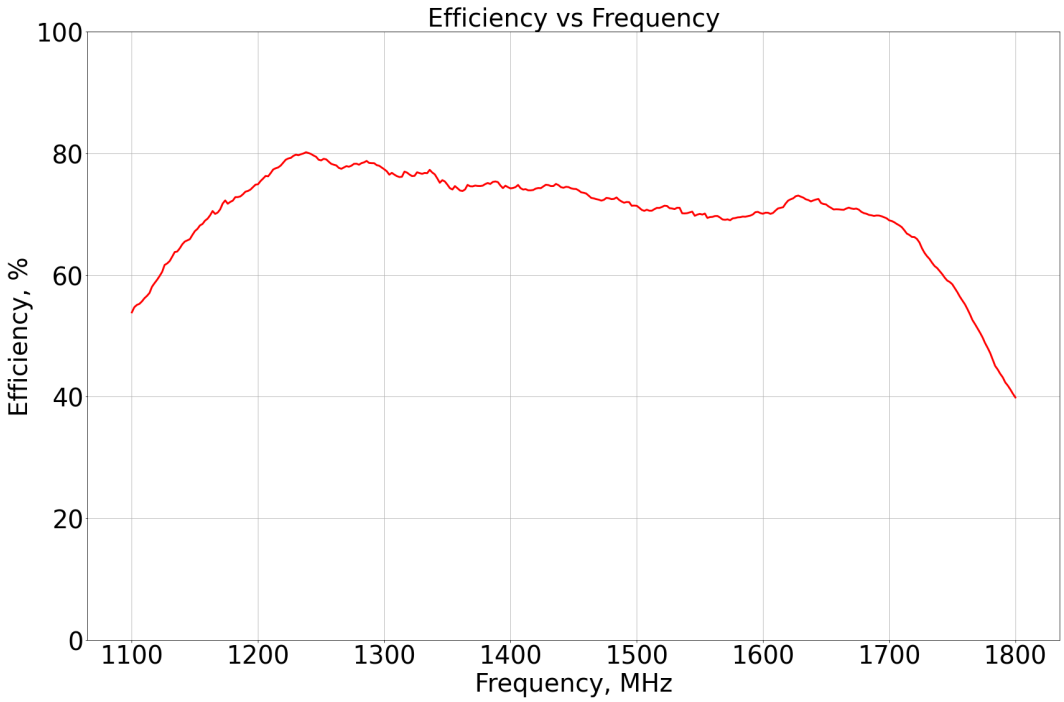
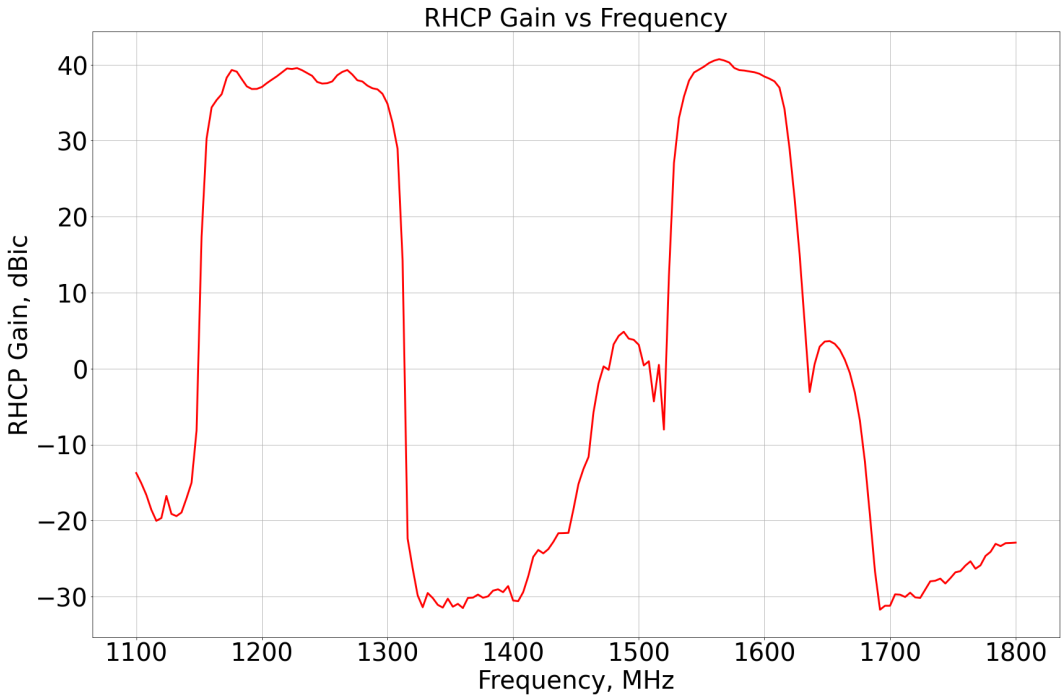
Efficiency



Gain



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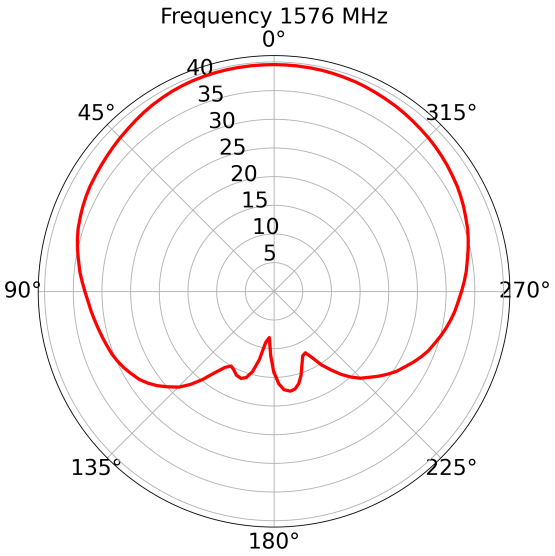
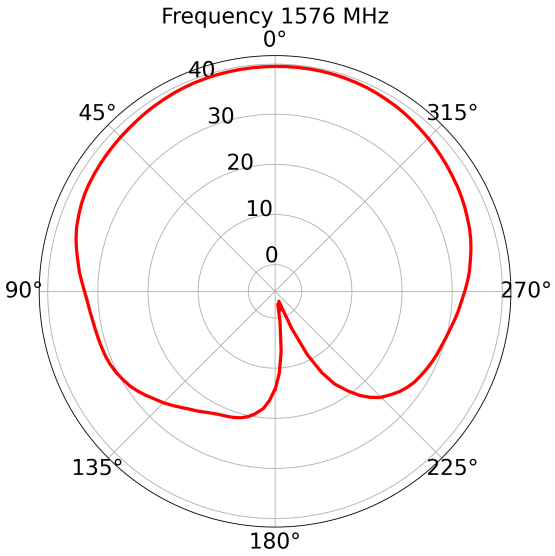
2D Radiation Patterns

Maxtena's M10HCT-A-SMA has unique features that make it the best option for high-accuracy GNSS applications Full hemispherical coverage is achieved by an exceptionally large 3 dB beamwidth, ensuring full view of sky and satellites in lower elevation angles. Highly symmetric radiation pattern guarantees there will be no direction of weak reception or blind spots.

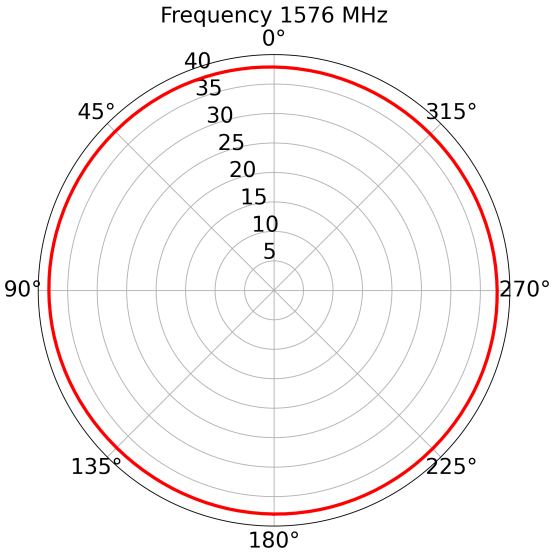
L1 band



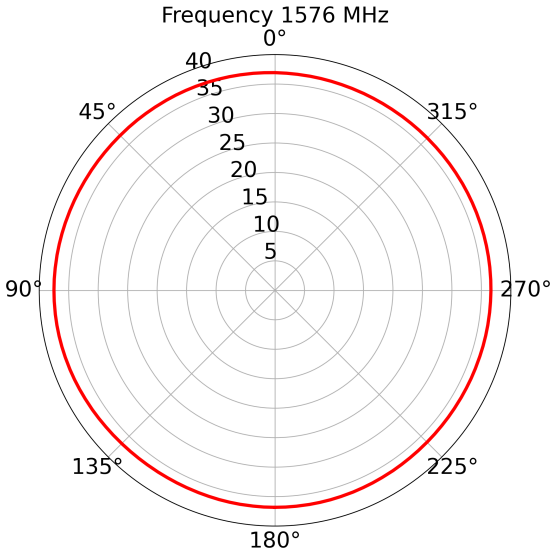
RHCP [dBic], Elevation cut Φ = 0°



RHCP [dBic], Elevation cut Φ = 90°



RHCP [dBic], Azimuth cut Θ = 45°



RHCP [dBic], Azimuth cut Θ = 60°

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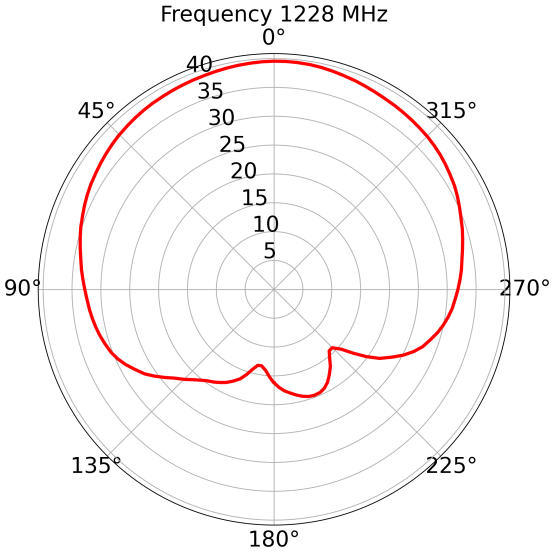
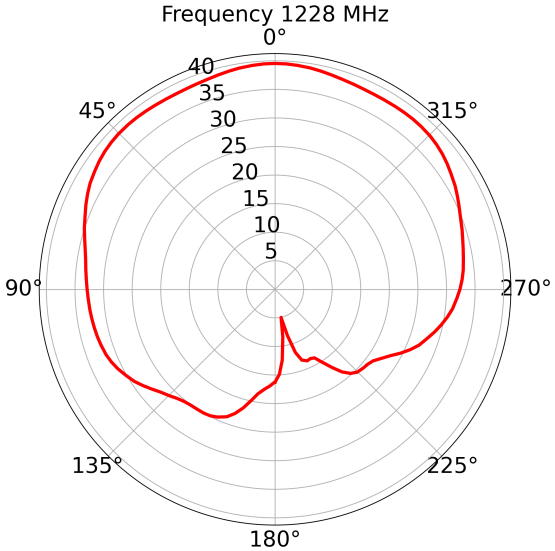
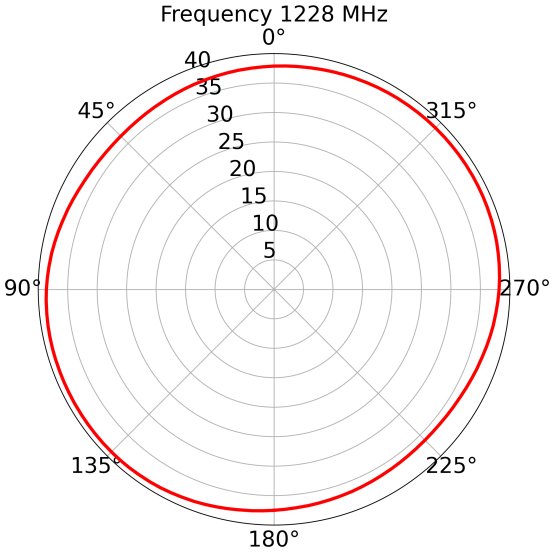
L2 band



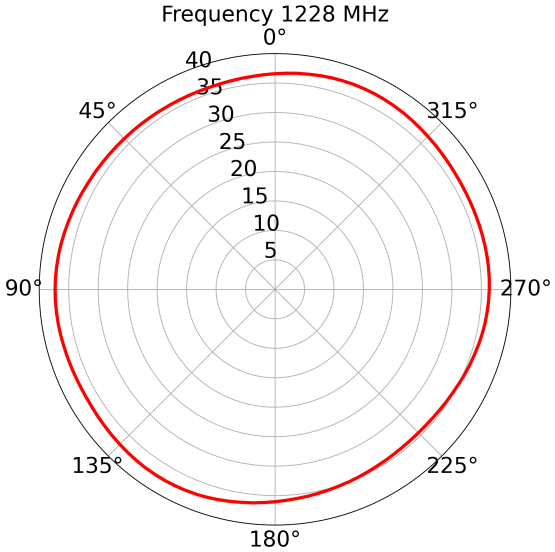
RHCP [dBic], Elevation cut Φ = 0°



RHCP [dBic], Elevation cut Φ = 90°



RHCP [dBic], Azimuth cut Θ = 45°



RHCP [dBic], Azimuth cut Θ = 60°

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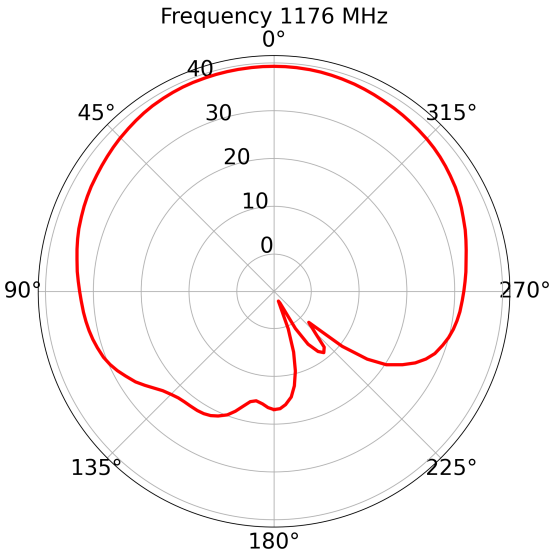
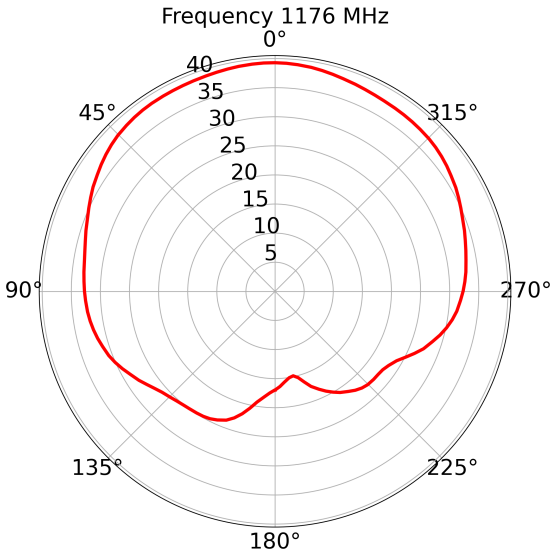
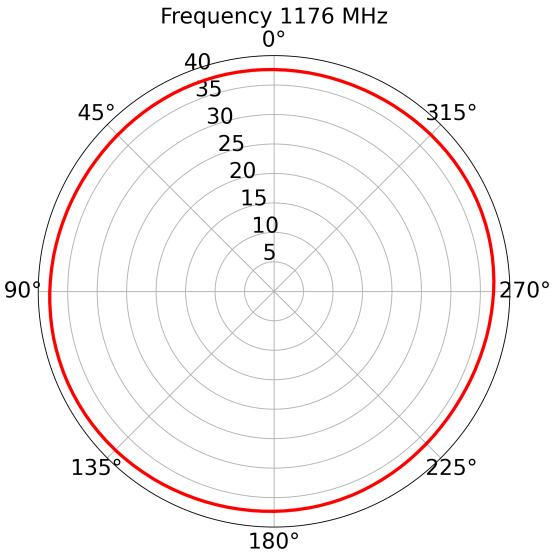
L5 band



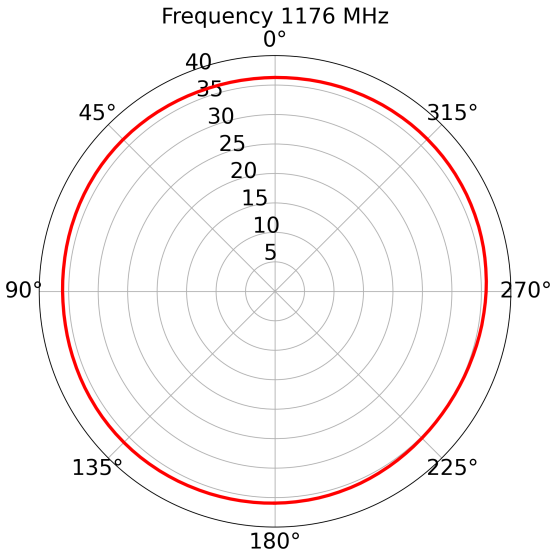
RHCP [dBic], Elevation cut Φ = 0°



RHCP [dBic], Elevation cut Φ = 90°



RHCP [dBic], Azimuth cut Θ = 45°



RHCP [dBic], Azimuth cut Θ = 60°

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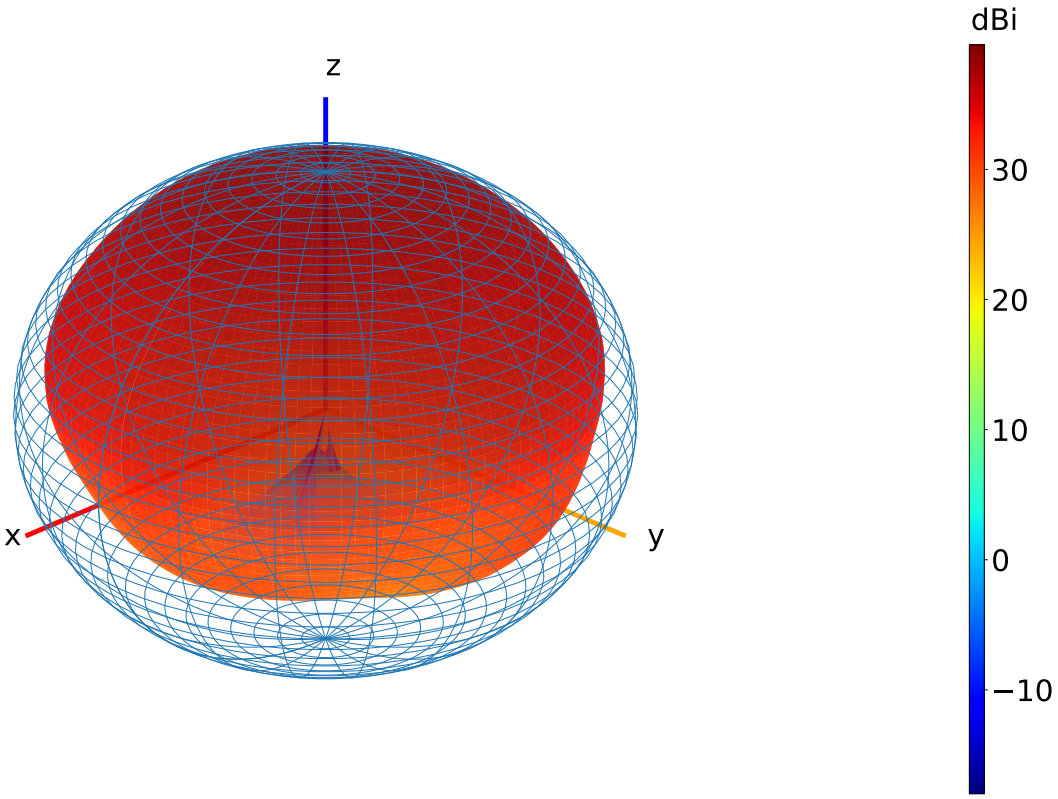
3D Radiation Patterns

L1 band



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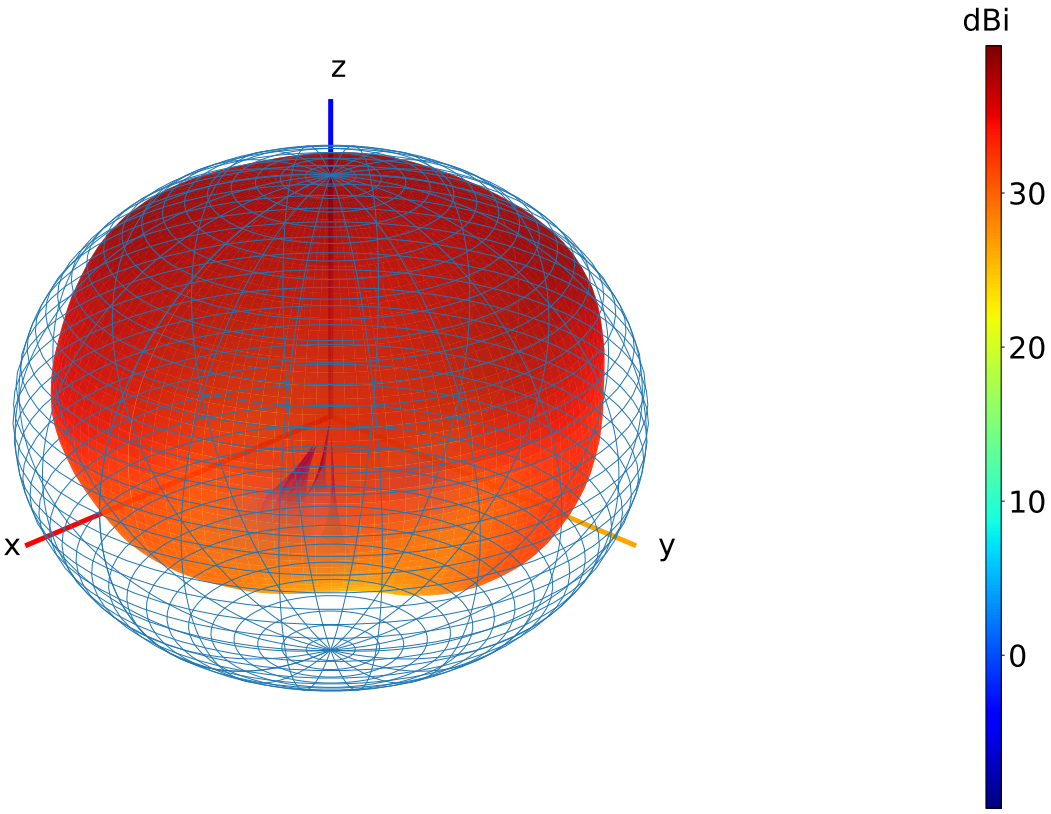
L2 band



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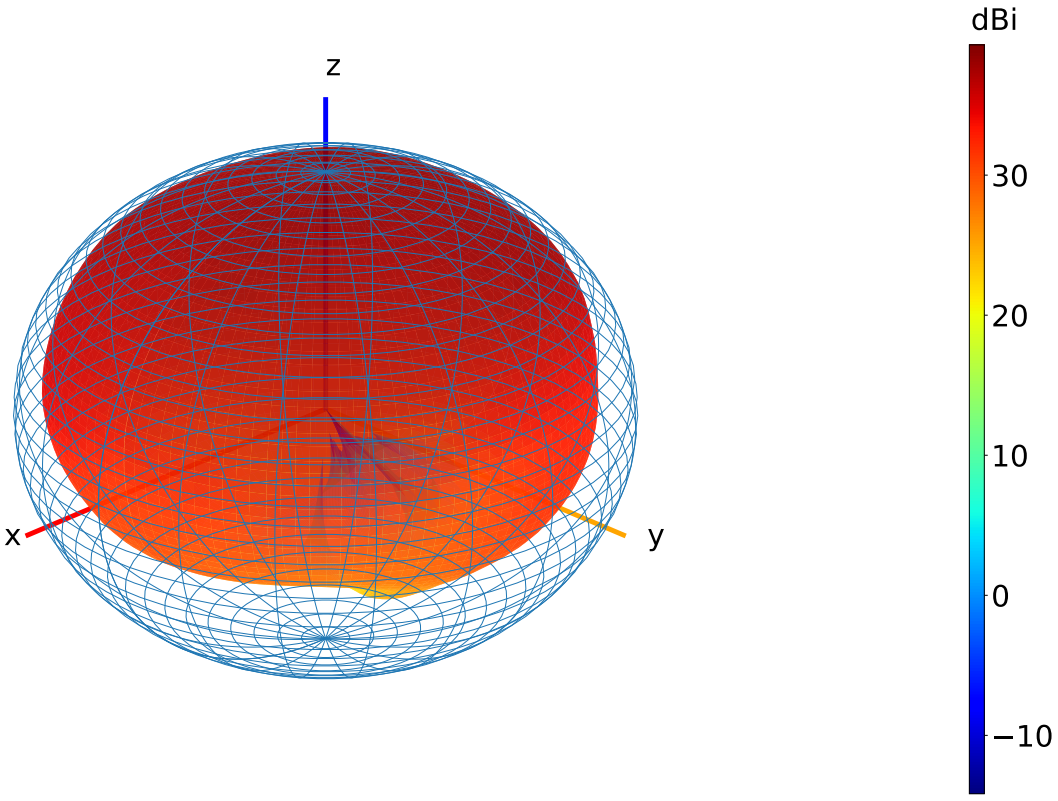
L5 band



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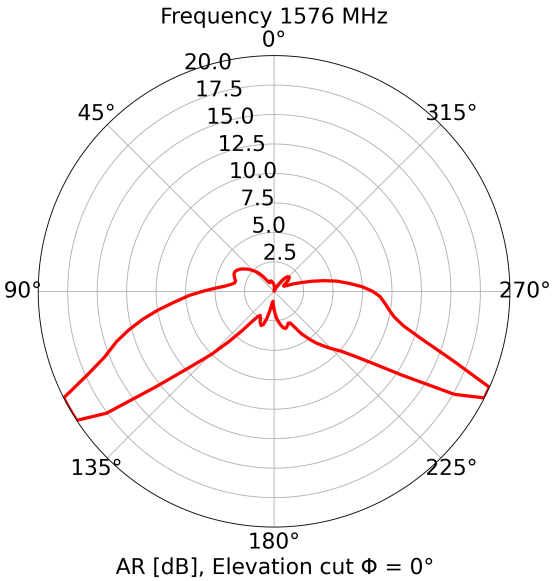
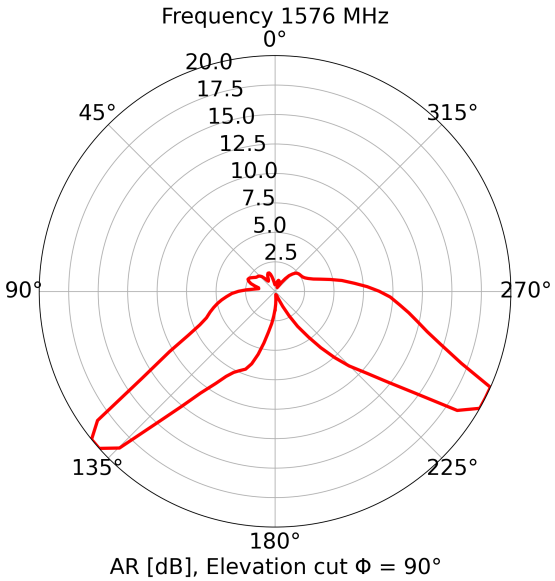
Axial Ratio

Axial Ratio is a very important parameter for high-accuracy GNSS applications. Ideally GNSS signals travel directly from the GNSS satellite to the receiver antenna. But buildings, trees, water, and road surfaces can cause GNSS signals reflection. Reflected signals change from right hand circular polarization to left hand circular polarization. A low axial ratio at the zenith and other elevation angles ensures multipath error is mitigated.

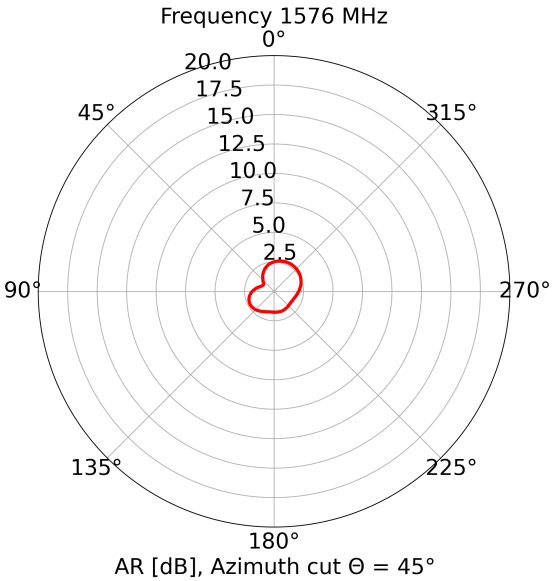
L1 band



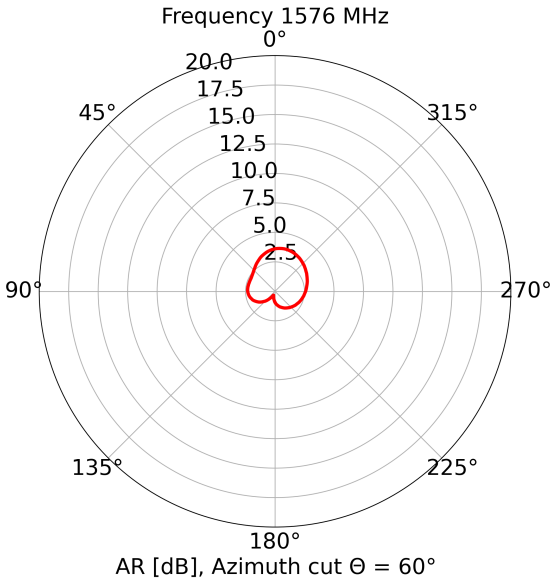
AR [dB], Elevation cut Φ = 0°



AR [dB], Elevation cut Φ = 90°



AR [dB], Azimuth cut Θ = 45°



AR [dB], Azimuth cut Θ = 60°

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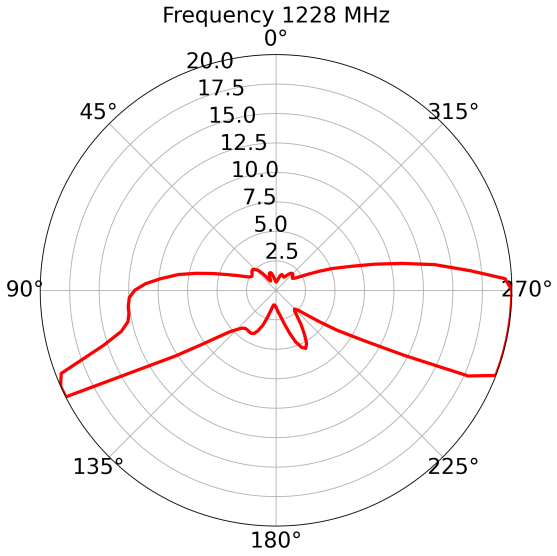
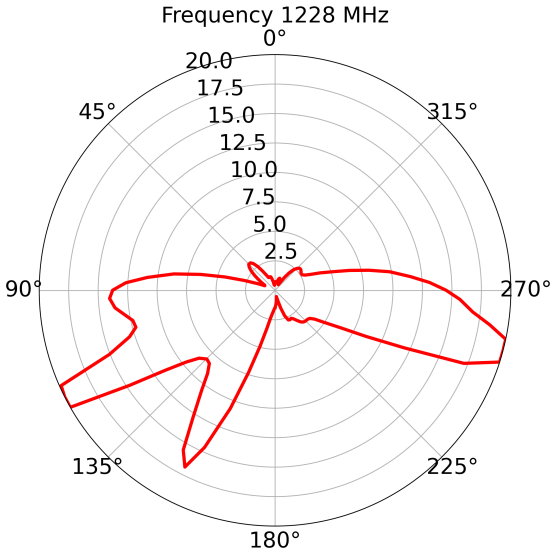
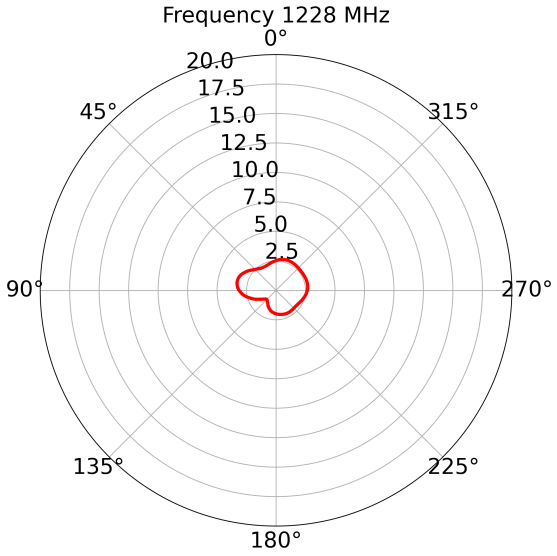
L2 band



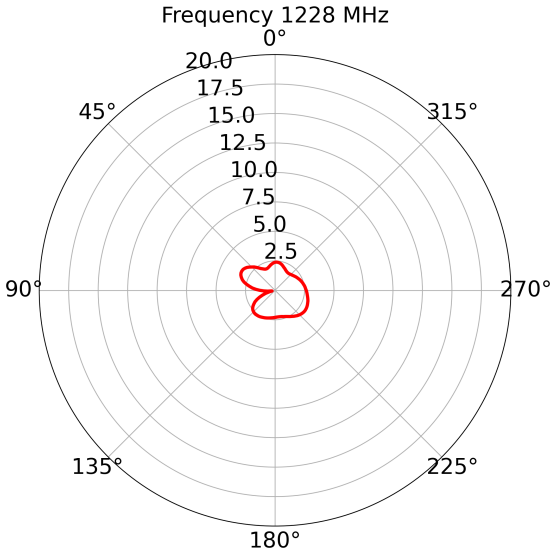
AR [dB], Elevation cut Φ = 0°



AR [dB], Elevation cut Φ = 90°



AR [dB], Azimuth cut Θ = 45°



AR [dB], Azimuth cut Θ = 60°

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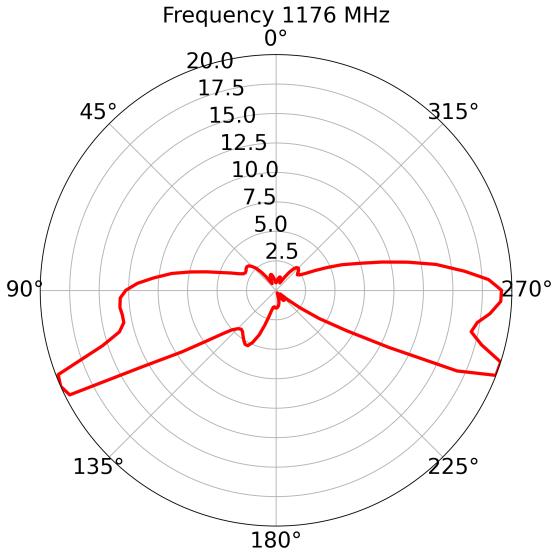
L5 band



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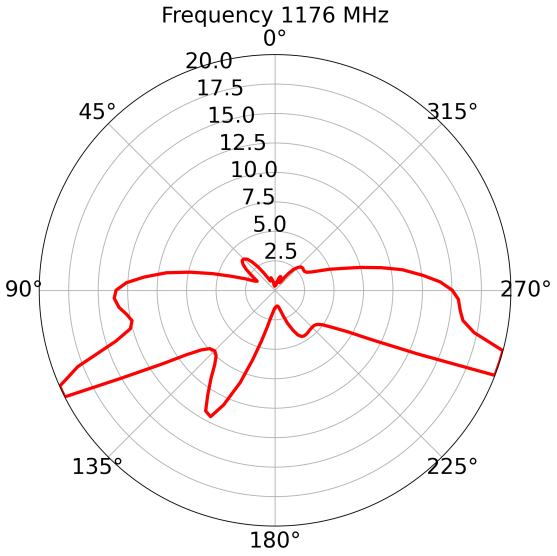
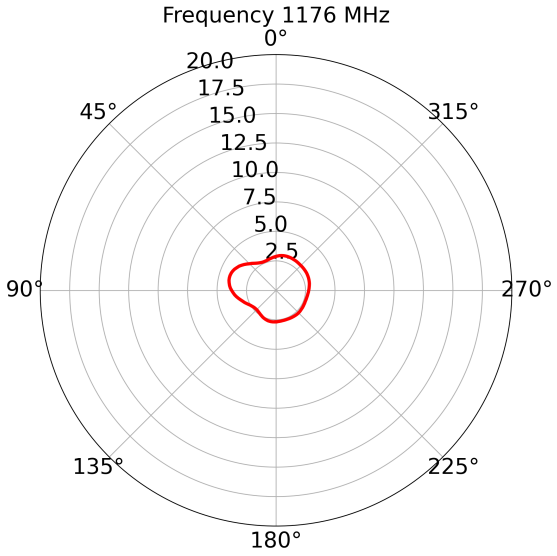
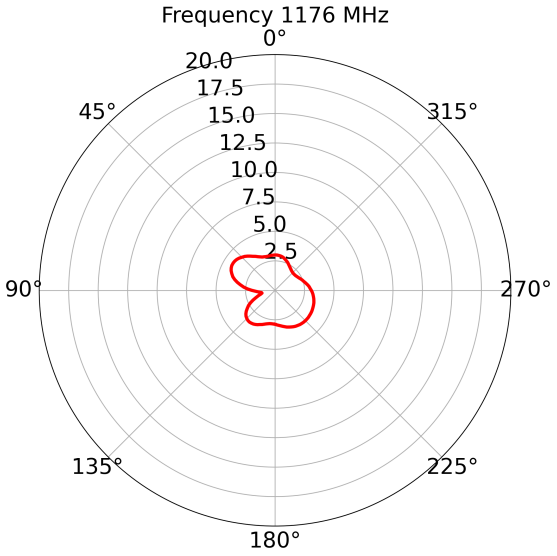


AR [dB], Elevation cut Φ = 90°



AR [dB], Azimuth cut Θ = 45°



AR [dB], Azimuth cut Θ = 60°

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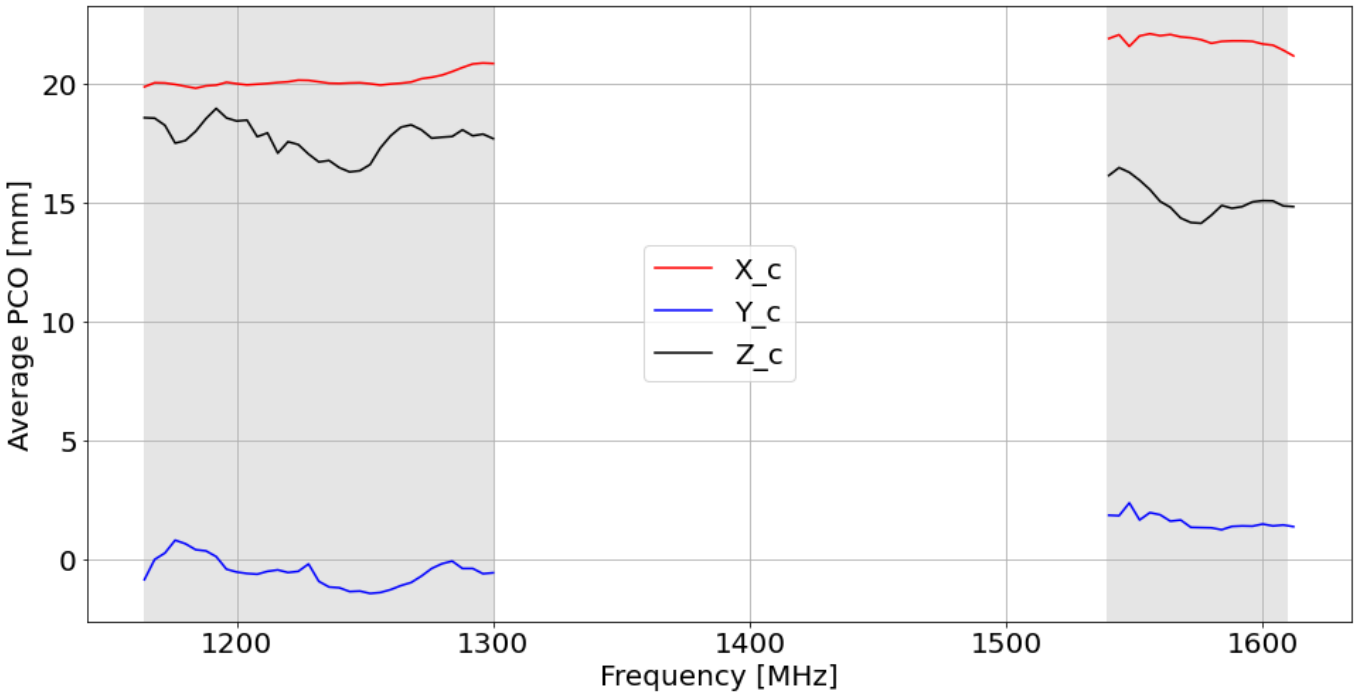
Phase center offset

Phase center offset and phase center variation values are important parameter in GPS precise positioning. Maxtena's M10HCT-A-SMA has minimal phase center variation over azimuth and elevation in all GNSS bands.

PCO	L1 band	L2 band	L5 band
x-axis	21.9 mm	20.2 mm	20 mm
y-axis	1.4 mm	-0.7 mm	0.8 mm
z-axis	14.2 mm	17.1 mm	17.5 mm



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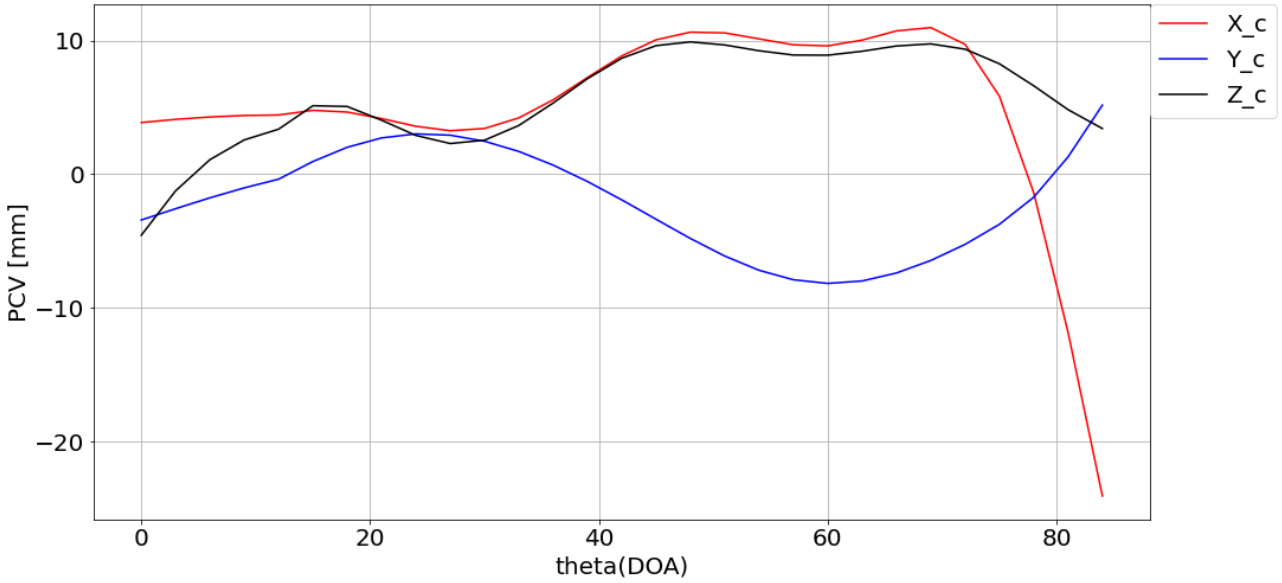
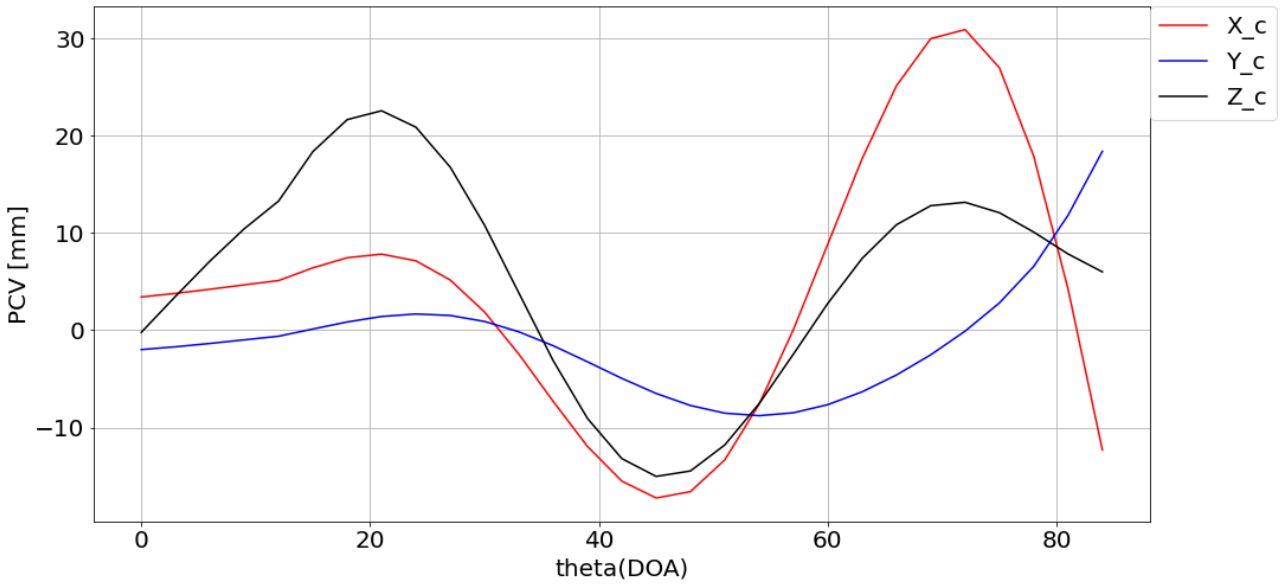
Phase center variation

L1 band



L2 band



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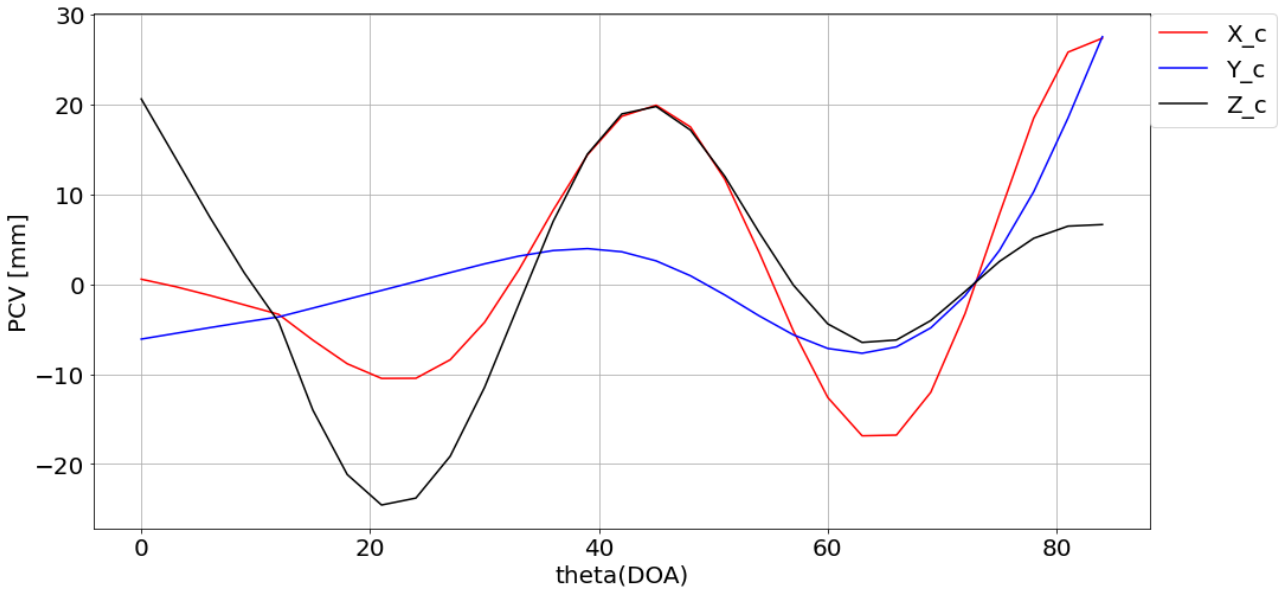
L5 band



Rooftop Testing

For this test Maxtena used u-blox ZED-F9P receiver. Receiver was flashed with the latest firmware version. The test was performed in an open sky environment for 24 hours. Measurements were done without ground plane under the antenna.

Receiver features

- Receiver supports the GNSS and their signals as follows: GPS L1C/A L2C, GLO L1OF L2OF, GAL E1B/C E5b, BDS B1I B2I, QZSS L1C/A L1S L2C, SBAS L1C/A
- Horizontal position accuracy RTK= 0.01 m + 1 ppm CEP
- Vertical position accuracy RTK= 0.01 m + 1 ppm CEP
- Navigation update rate RTK up to 20 MHz

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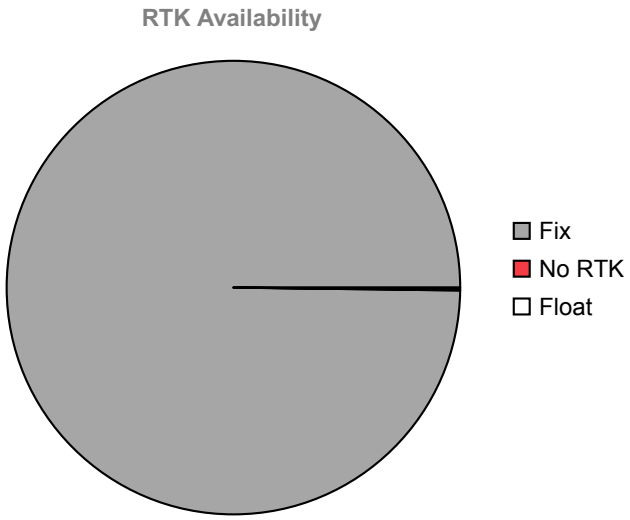
Positioning Accuracy					
Test Conditions	Correction Service	CEP (50 %)	DRMS (68 %)	2DRMS (95-98.2 %)	TTFF (sec)
Free space	RTK	0.66 cm	0.66 cm	1.3 cm	99.6



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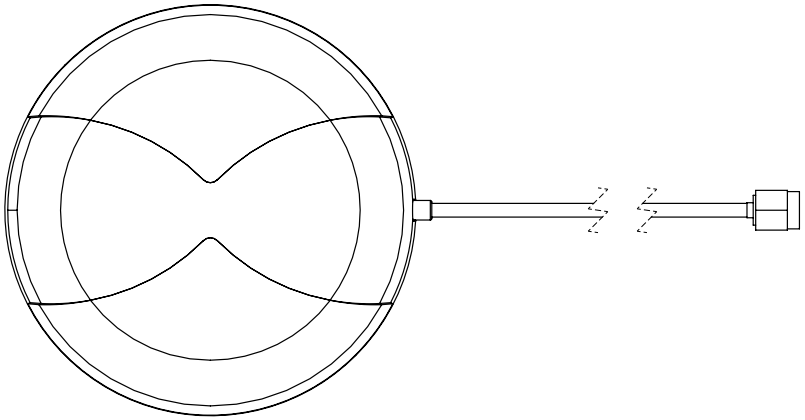
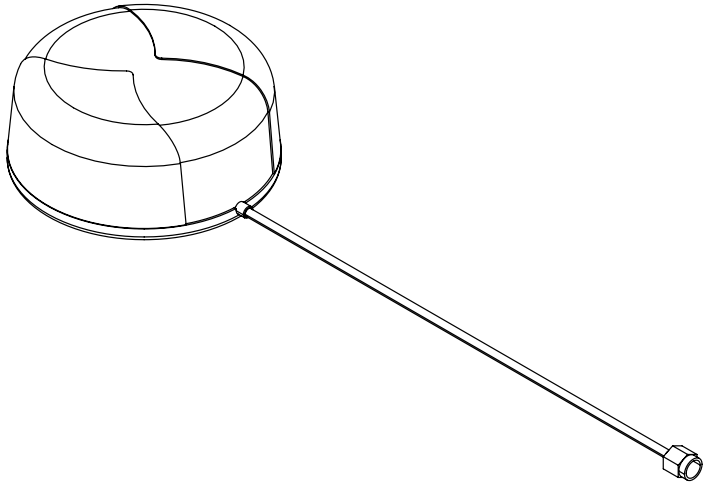
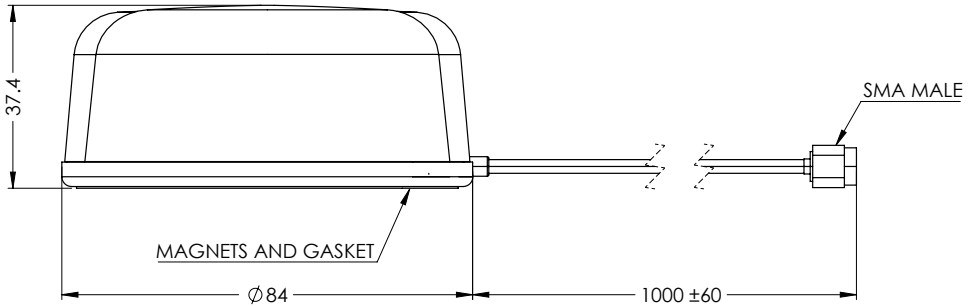
DRAWING REVISION HISTORY			
REV	DESCRIPTION	DATE	BY
1	INITIAL RELEASE	2023-06-01	MP







NOTES:

1. CONNECTOR: SMA MALE
2. MOUNTING TYPE: MAGNET MOUNT
3. MATERIALS:
   - RADOME: PC
   - BASE: ALUMINUM
   - RADOME COLOR: BLACK
4. CERTIFICATIONS: IP67

ITEM 100-00282-02 REVISION HISTORY			
REV	DESCRIPTION	DATE	BY
1	INITIAL RELEASE	2023-06-01	MP

UNLESS OTHERWISE SPECIFIED:		NAME	DATE
DIMENSIONS ARE IN MM TOLERANCES: FRACTIONAL ± ANGULAR: MACH ± .5° BEND ± .5° INTEGER ± 1 ONE PLACE DECIMAL ± 1.0 TWO PLACE DECIMAL ± .50 INTERPRET GEOMETRIC TOLERANCING PER:	DRAWN	MP	2023-06-01
	CHECKED	ZX	2023-06-02
	ENG APPR.	NPC	2023-06-05
	MFG APPR.		
	Q.A.		

THIRD ANGLE PROJECTION

DO NOT SCALE DRAWING

CAD MAINTAINED. CHANGES SHALL BE INCORPORATED BY THE DESIGN ACTIVITY.

MAXTENA, INC

TITLE:
100-00282-02
M10HCT-A-SMA

SIZE	DWG. NO.	REV
B	117-00714-02	1

CAGE CODE: 5KQH7 | SCALE: NONE | SHEET 1 OF 1