

**Description: MiMo LTE, MiMo WiFi, GNSS
Vehicle Mount Antenna****Series: Panther****PART NUMBER: GPSMB501, GPSMB502, GPSMB501R,
GPSMB502R****Features:**

- Supports MIMO Cellular LTE 617-960/1695-7125MHz
- Supports MIMO WiFi and DSRC 2400-2500MHz/5150-7125MHz
- Supports Beidou, GPS, Galileo, GLONASS
- Direct Mount and optional Magnetic Mount features
- See GPSMBMM for magnetic mount details

**Applications:**

- Telematics
- Location based services
- First Responders(Police, Ambulance, Fire)
- Government
- Energy(Utility Vehicles)
- Fleet Management
- Railroad

All dimensions are in mm / inches

Issue: 2331

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For more information:

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12220 World Trade Drive
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Pulse/Larsen Antennas
18110 SE 34th St Bldg 2 Suite 250
Vancouver, WA 98683
USA
Tel: 1-360-944-7551

Europe Headquarters
Pulse GmbH & Do, KG
Zeppelinstrasse 15
Herrenberg, Germany
Tel: 49 7032 7806 0

Pulse (Suzhou) Wireless Products Co, Inc.
99 Huo Ju Road(#29 Bldg,4th Phase
Suzhou New District
Jiangsu Province, Suzhou 215009 PR China
Tel: 86 512 6807 9998



**Description: MiMo LTE, MiMo WiFi, GNSS
Vehicle Mount Antenna****Series: Panther****PART NUMBER: GPSMB501, GPSMB502, GPSMB501R,
GPSMB502R****This document covers all product variants of the following product family**

Model No.	Color	Remark
GPSMB501	Black	
GPSMB502	White	
GPSMB501R	Black	Compliant with EN 50155, EN 61373, EN45545-2, railroad application.
GPSMB502R	White	Compliant with EN 50155, EN 61373, EN45545-2, railroad application.

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**Description: MiMo LTE, MiMo WiFi, GNSS
Vehicle Mount Antenna**

**PART NUMBER: GPSMB501, GPSMB502, GPSMB501R,
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Series: Panther

ELECTRICAL SPECIFICATIONS

Frequency (5G FR1)	617 - 960 / 1695 - 7125	MHz
Frequency (WiFi&DSRC)	2400 - 2500/ 4900 - 7125	MHz
Frequency (Beidou, GPS, Galileo, Glonass)	1561.098±2.046/ 1575.42±1.023/ 1602.5625±4	MHz
Nominal Impedance	50	Ω
Return Loss (5G FR1)	< -10	
Return Loss (WiFi&DSRC)	< -10	
Gain* (5G FR1 antenna, < 2170 MHz)	4	dBi ± 3.5 dB
Gain* (5G FR1 antenna, > 2170 MHz)	5	dBi ± 3 dB
Gain* (WiFi antenna, < 2500 MHz)	4.5	dBi ± 2.5 dB
Gain* (WiFi antenna, > 4900 MHz)	5	dBi ± 3 dB
Isolation 5G FR1 to 5G FR 2 **	10 or better	dB
Isolation WiFi to WiFi **	30 or better	dB
GNSS antenna RHCP gain	1	dBic ± 2 dB
LNA gain	30	dB ± 2 dB
Noise Figure	2.5 (cascade)	dB
Current	8	mA ± 2 mA
V _{dc}	3-5	V _{dc}
LNA and filter attenuation		
	@ 824 MHz	70 dB
	@ 960 MHz	65 dB
	@ 1710 MHz	60 dB
	@ 2170 MHz	65 dB

*Measured on 2ft GND plane and with 4 inch cables

**In free space with 17ft cables

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Vehicle Mount Antenna****Series: Panther****PART NUMBER: GPSMB501, GPSMB502, GPSMB501R,
GPSMB502R****ELECTRICAL SPECIFICATIONS**

Connector type(s)	SMA (5G FR1 and GPS) / SMA-RP (WiFi)
Cable type(s)	RG-58 (5G FR1 and WiFi) / RG-174 (GPS)
Length	17 FEET

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**Description: MiMo LTE, MiMo WiFi, GNSS
Vehicle Mount Antenna****Series: Panther****PART NUMBER: GPSMB501, GPSMB502, GPSMB501R,
GPSMB502R****MECHANICAL SPECIFICATIONS**

Plastic radome for GPSMB501/GPSMB502	ABS/PC Material UV Stabilized, UL-94HB
for GPSMB501R/GPSMB502R	PC material, EN45545 R6 HL3 compliant
Color	Black, White
Ingress Protection	IP67
Weight	~1340 g
Fixing system	Roof mounting (Also Magnet mounting accessory available, GPSMBMM) Recommended fastening torque 1518ft-lb (20-25Nm).

ENVIRONMENTAL SPECIFICATIONS

Operating temperature	MIL-STD 810G -40/+85° C
Humidity	95%RH @ +25°C for 12h and 55°C for 12h
Vibration	MIL-STD 810G, section 514.6 , 5-500 Hz, 60min/axis
Thermal Shocks	MIL-STD 810G, section 503.5, -40 to +85°C, 3 cycles
Drop Test	Minimum of one drop per axis – 4, 1 meter drops

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Series: Panther

Tests for railroad certification per EN50155, EN61373, EN45545-2

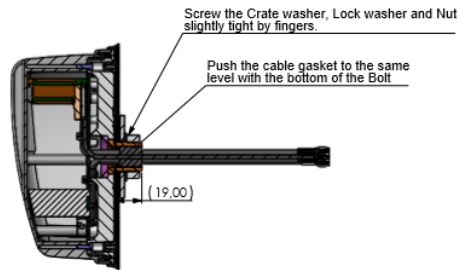
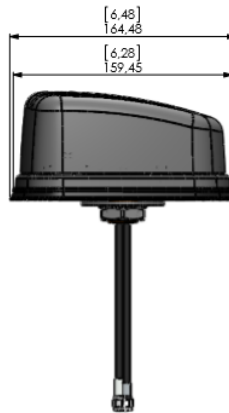
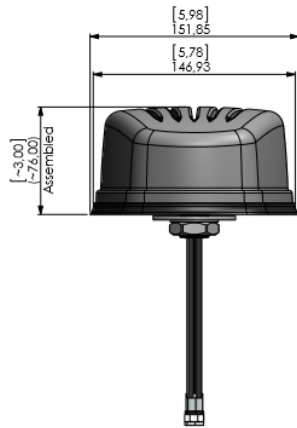
NO	T SN IN STAND	TEST DESCRIPTION	REFER STANDARD	TEST REPORT NO	RESULT(PASS/FAIL)
1	12.2.3	Cooling test	EN 50155	DD20170919002	PASS
2	12.2.4	Dry heat test			
3	12.2.5	Damp heat test, cyclic			
4	12.2.6	Supply overvoltages	EN 50155	W01714200900E	PASS
5	12.2.7	Surges, electrostatic discharge and transient burst susceptibility tests	EN 50155	E1710056-01E	PASS
6	12.2.8	Radio interference			
7	12.2.9	Insulation test	EN 50155	E17110014-01E	PASS
8	12.2.10	Salt mist test	EN 50155	DD20170919002	PASS
9	12.2.11	Vibration	EN 61373		
		Shock, and bump test	EN 61373		
10	12.2.12	Watertightness test	EN 50155		
11	12.2.14	Low temperature storage test	EN 50155	TC 18 02 000528	HL1&HL2
12	/	fire & smoke	EN 45545-2 R15&R16		
			EN 45545-2 R15&R16	TC.18.04.001633	HL1&HL2&HL3

Description: MiMo LTE, MiMo WiFi, GNSS Vehicle Mount Antenna

Series: Panther

**PART NUMBER: GPSMB501, GPSMB502, GPSMB501R,
GPSMB502R**

MECHANICAL DRAWING



SECTION A-A

Tolerances of linear dimensions MEDIUM ISO 2768-m	
Dimension	Tolerance
0,5 - 3	± 0,1
3 - 6	± 0,1
6 - 30	± 0,2
30 - 120	± 0,3
120 - 400	± 0,5
400 - 1000	± 0,8
1000 - 2000	± 1,2
2000 - 4000	± 2

Tolerances of angular dimensions MEDIUM ISO 2768-m	
Dimension of chamfer side (millimeter)	Tolerance
up to 10	± 1°
10 - 30	± 0°30'
30 - 120	± 0°20'
120 - 400	± 0°15'
over 400	± 0°5'

Tolerances of radii and chamfers MEDIUM ISO 2768-m	
Radius chamfer height	Tolerance
0,5 - 3	± 0,2
3 - 6	± 0,3
over 6	± 1

Reference dimensions are given in millimeters (mm) unless otherwise stated. All dimensions are in millimeters (mm).

No riveting plates allowed to use.

Functional Characters (cc):
Please specify studies required, total 0 pcs.
Process capability studies required and ongoing statistical process control required, total 0 pcs.

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Fax: +358 207 938 801
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Sheet number:	2/2
General tolerance:	
Customer number:	
Date:	04.05.2018
Drawn:	Jukka
Check:	
Appro:	
Product:	GPSMB501
Part name:	Antenna Assembly
Document number:	GPSMB501
Part Version:	
Document Version:	A
Issue Date:	15.09.2016 Jarko
Issue Date:	02.07.2015 Jarko
Issue Date:	

Please follow Pulse limits of hazardous substances (RoHS, halogens) in the document Pulse Hazardous Substances (HS) limits and Vendor Survey Questionnaire, Material Composition (ICM-3AN-2016).

Issue	Description
P01	Cable Tie corrected around GPS antenna.
A	Cable Tie changed/added around GPS antenna, A-Release.

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Issue: 2331

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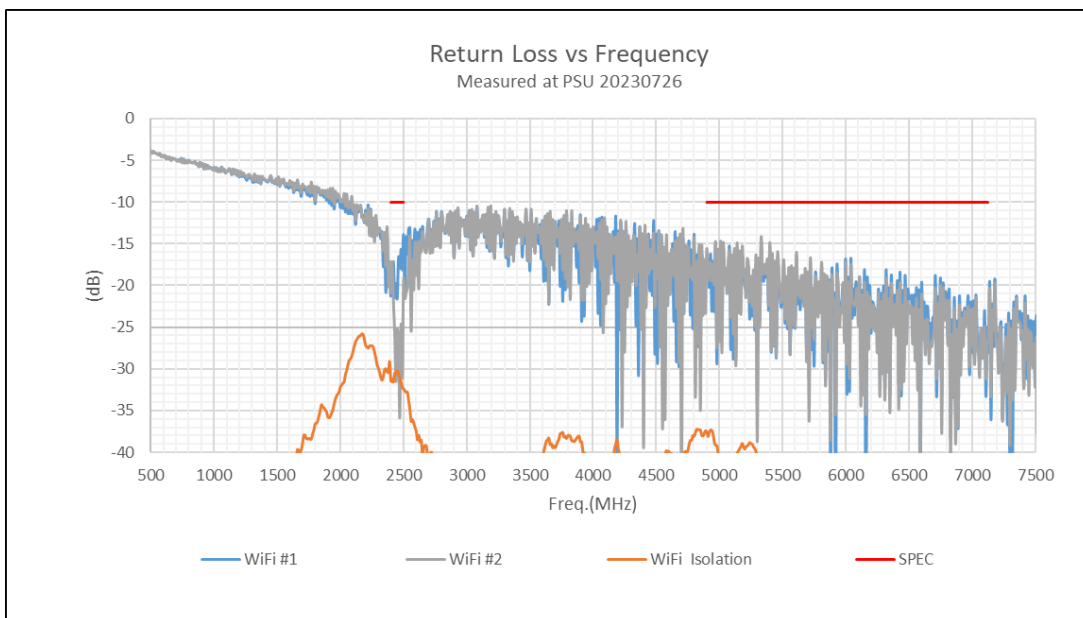
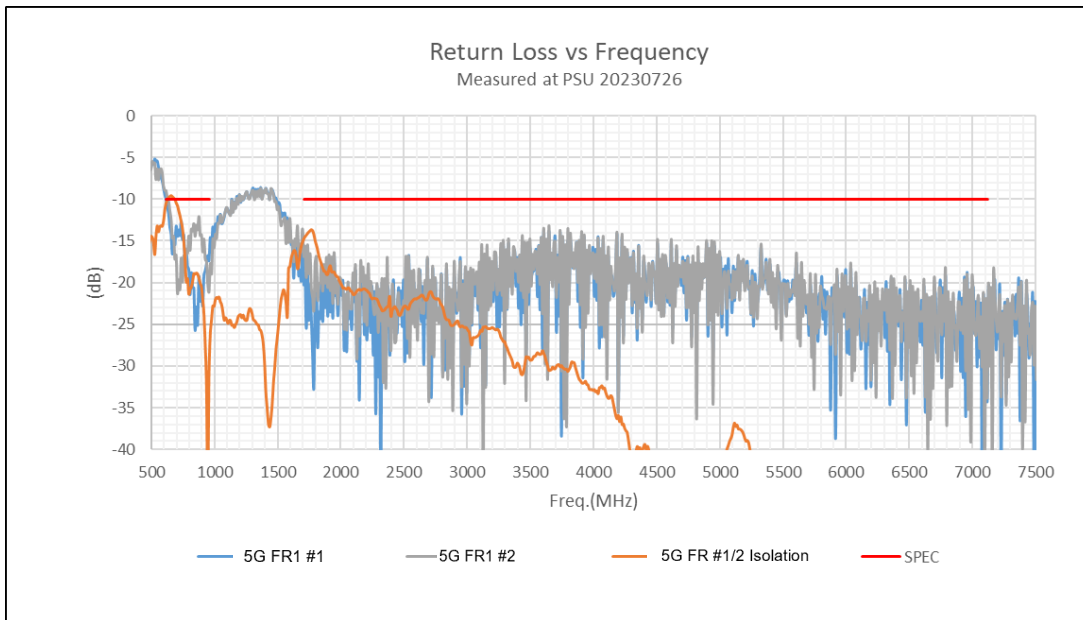
Description: MiMo LTE, MiMo WiFi, GNSS Vehicle Mount Antenna

**PART NUMBER: GPSMB501, GPSMB502, GPSMB501R,
GPSMB502R**

Series: Panther

CHARTS

Return Loss and isolation with 2ft metal plate and 17ft cables



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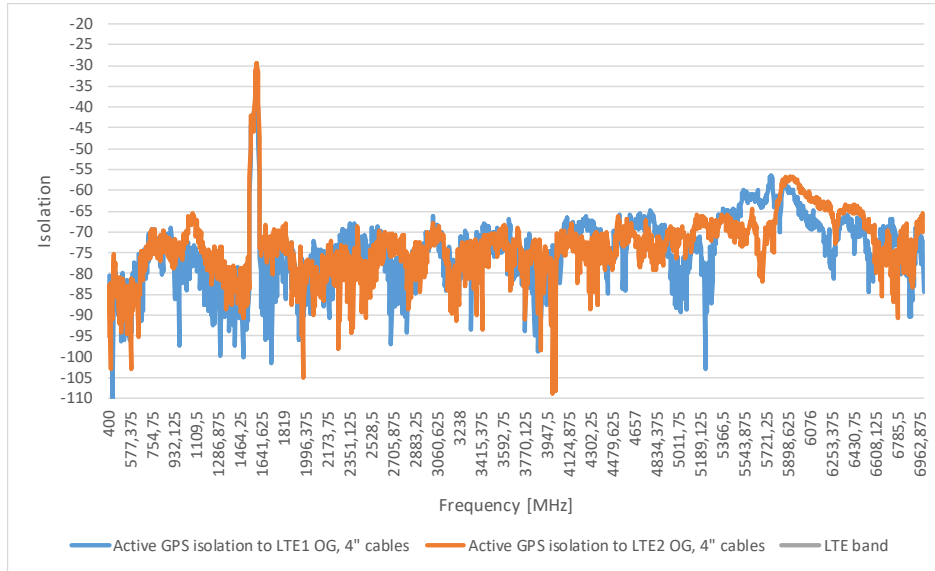
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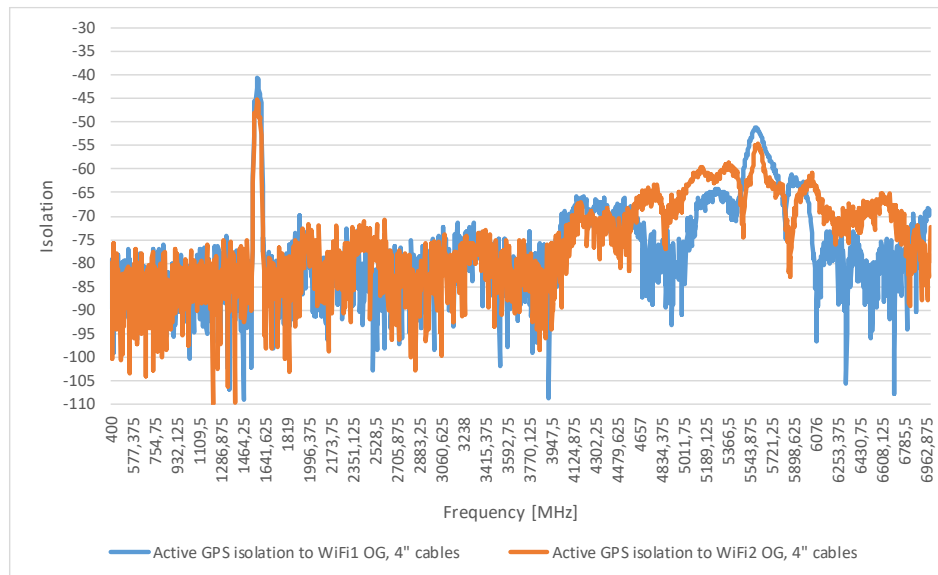
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GPS isolation to 5G FR #1 and #2 antenna*



GPS isolation to WiFi 1 and WiFi 2 antenna*



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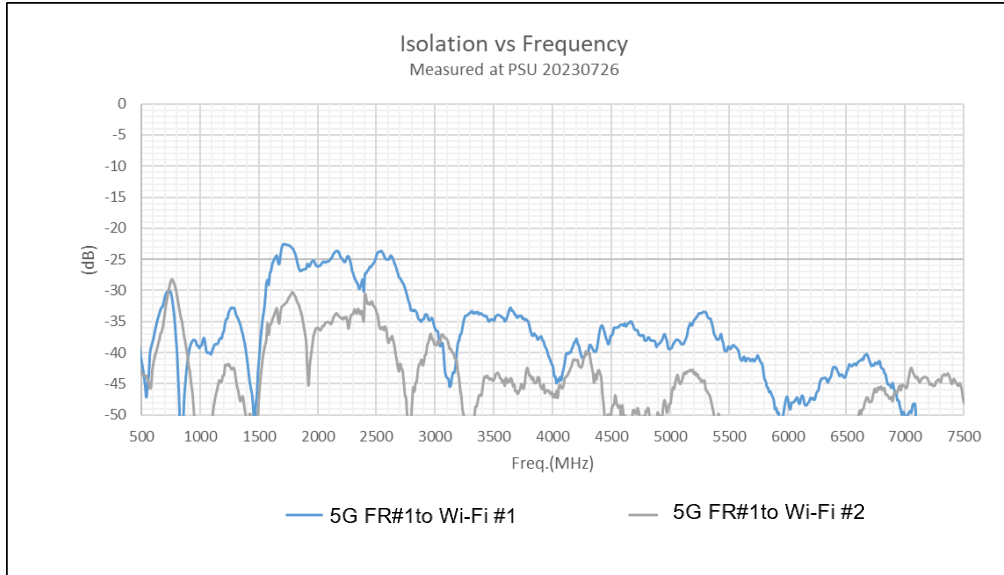
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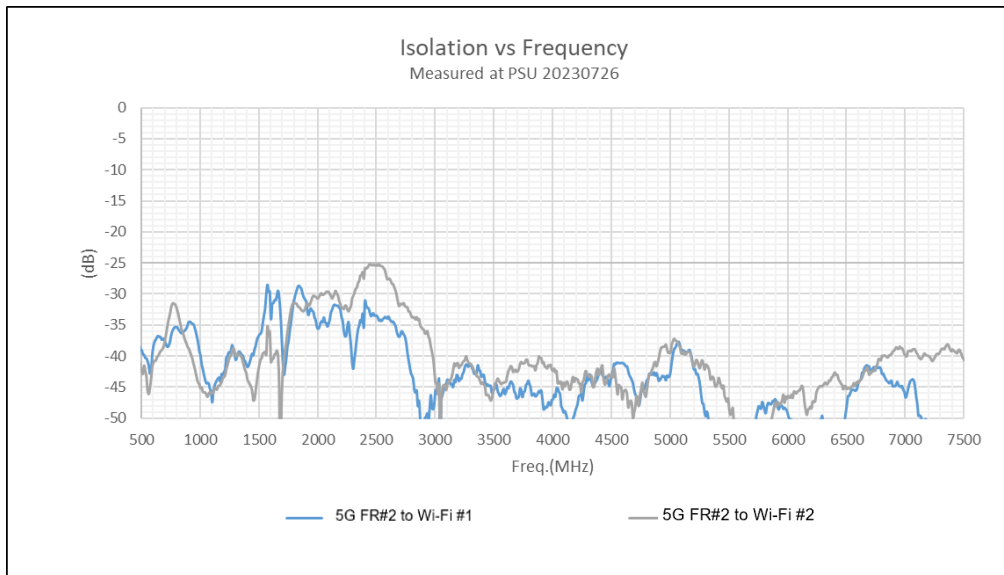
Series: Panther

CHARTS

Isolation characteristics, FR #1 to WiFi with 17ft cable**



Isolation characteristics, FR #2 to WiFi with 17ft cable**



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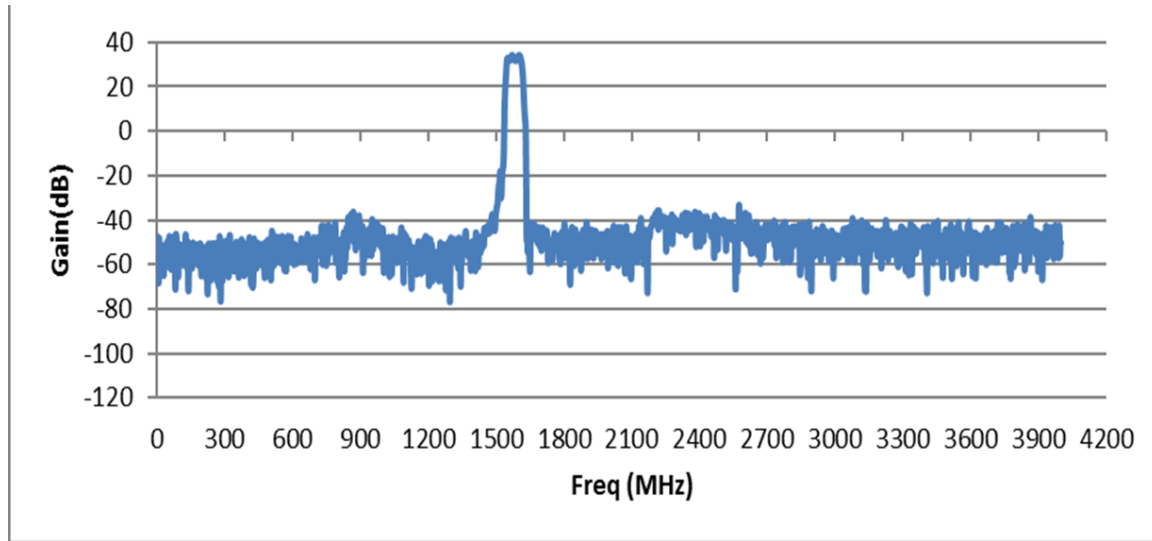
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Series: Panther

**PART NUMBER: GPSMB501, GPSMB502, GPSMB501R,
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GNSS LNA performance



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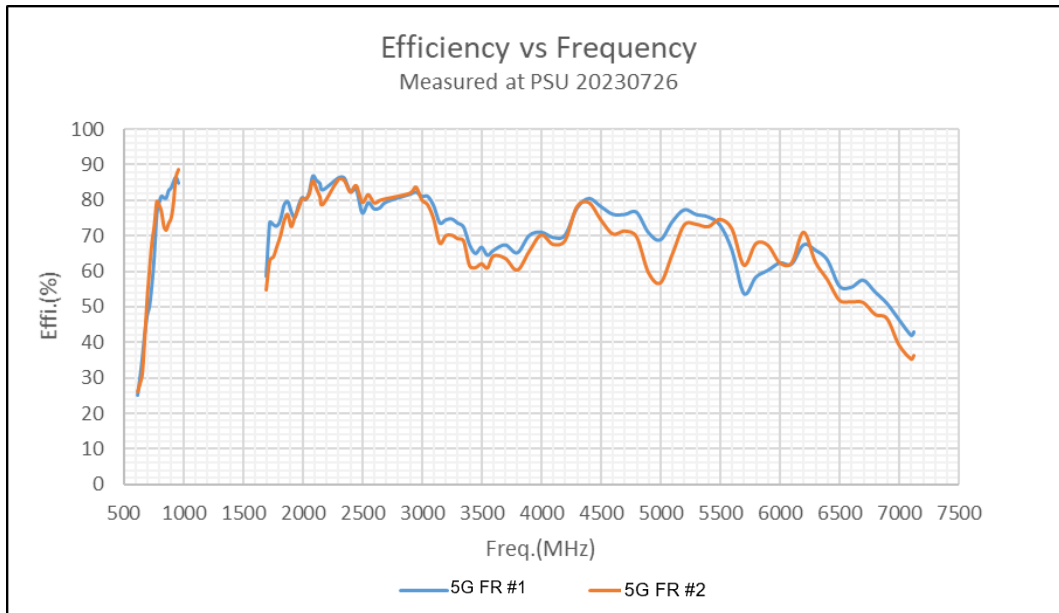
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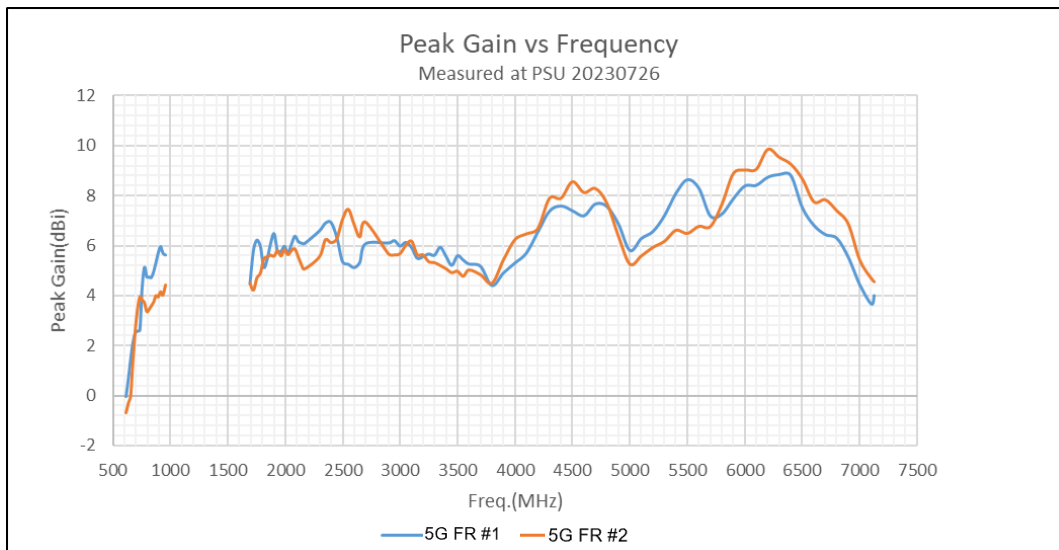
Series: Panther

CHARTS

5G FR antenna total efficiency with 2ft metal plate and 4inch cables



Maximum 3D gain, LTE antenna with 2ft metal plate and 4inch cables



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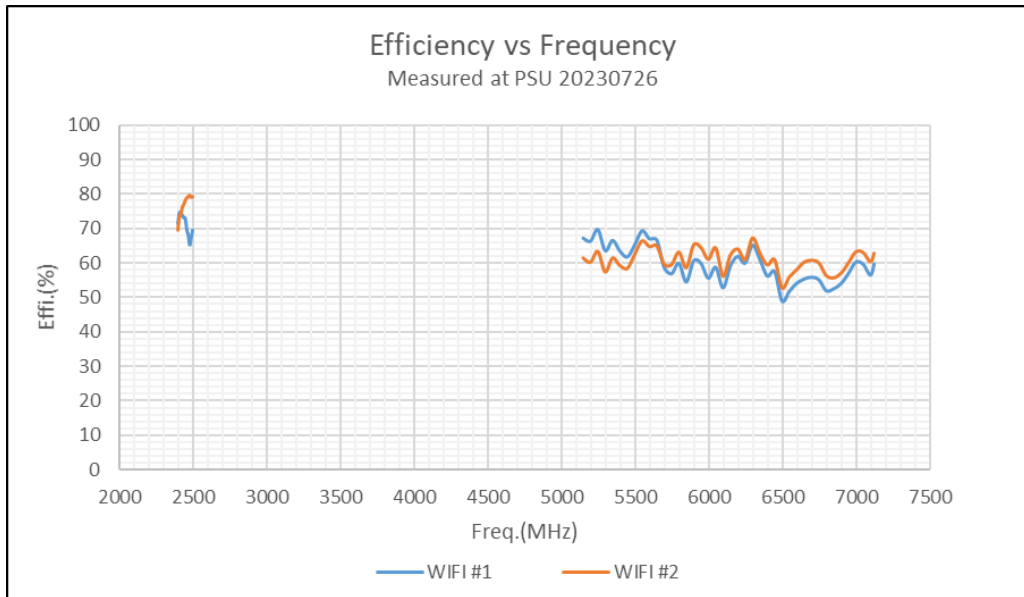
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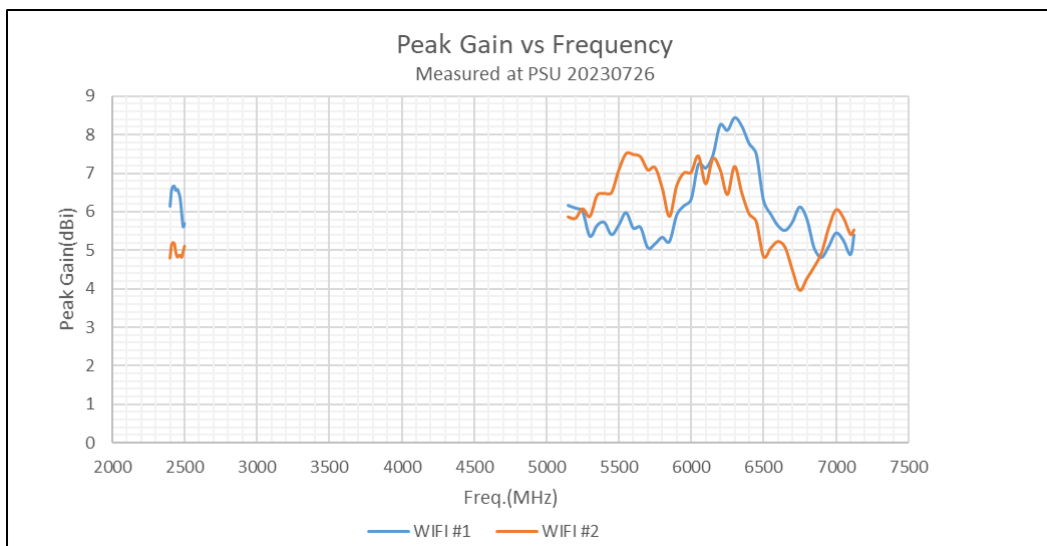
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CHARTS

WiFi antenna total efficiency with 2ft metal plate and 4inch cables



Maximum 3D gain, WiFi antenna with 2ft metal plate and 4inch cables



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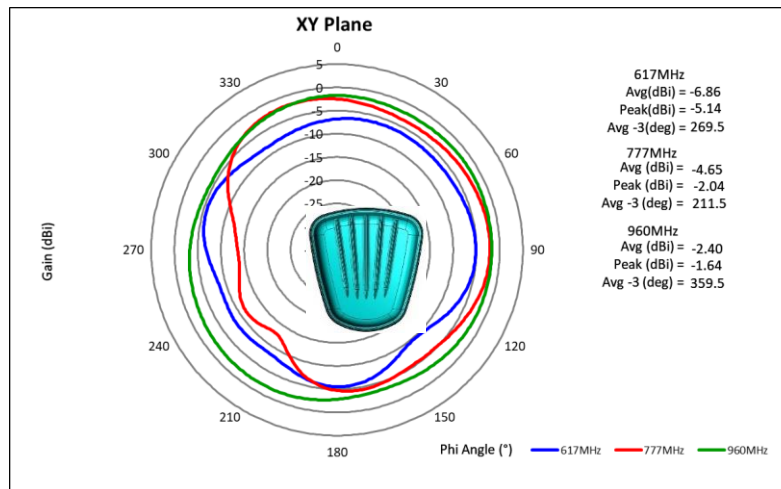
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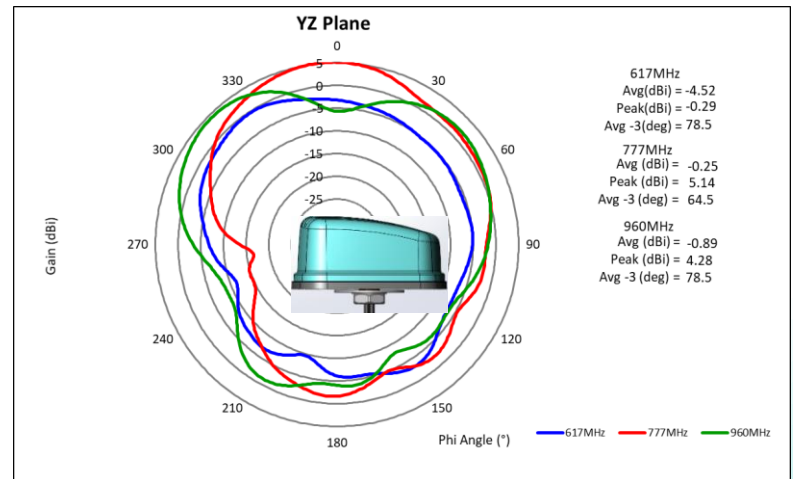
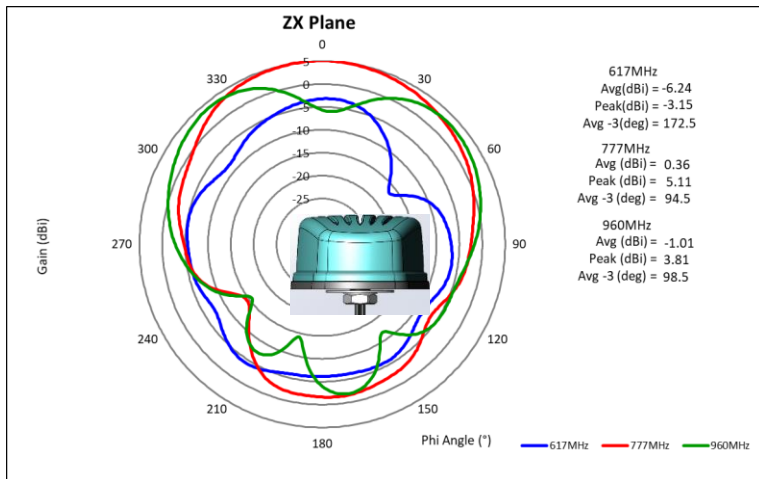
PART NUMBER: GPSMB501, GPSMB502, GPSMB501R,
GPSMB502R

CHARTS

FR #1 antenna radiation pattern with 2ft metal plate and 4inch cables



Horizontal plot



Vertical plot front view

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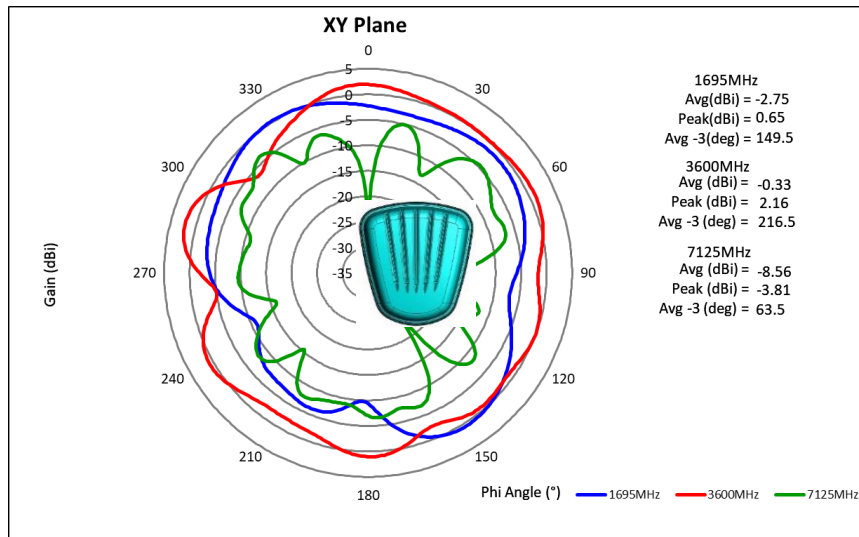
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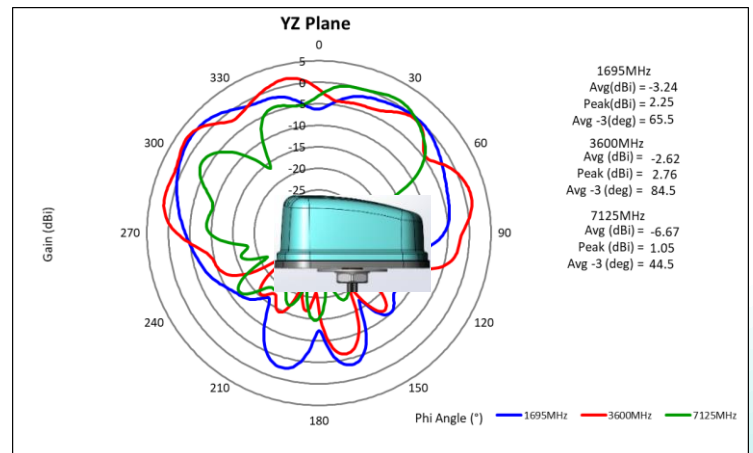
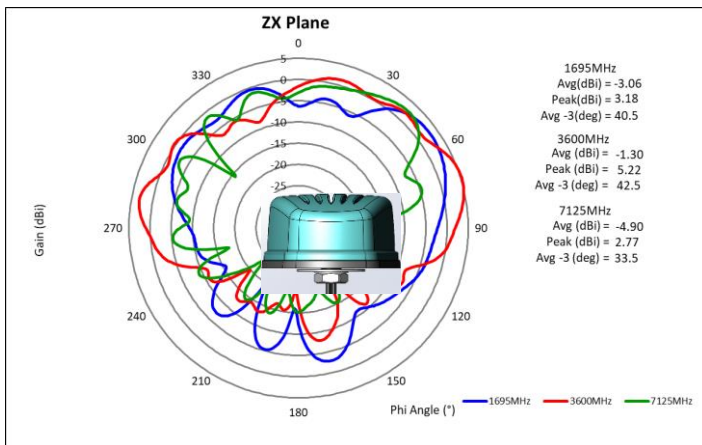
Series: Panther

CHARTS

FR #1 antenna radiation pattern with 2ft metal plate and 4inch cables



Horizontal plot



Vertical plot front view

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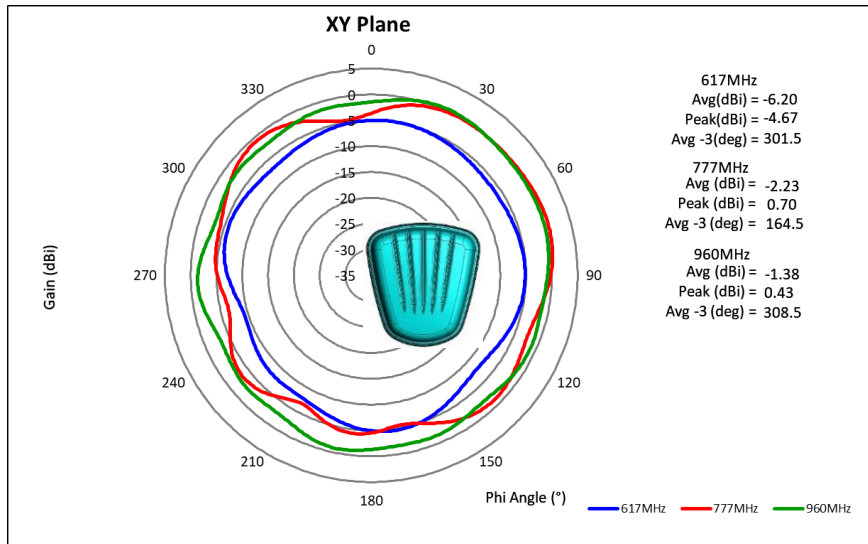
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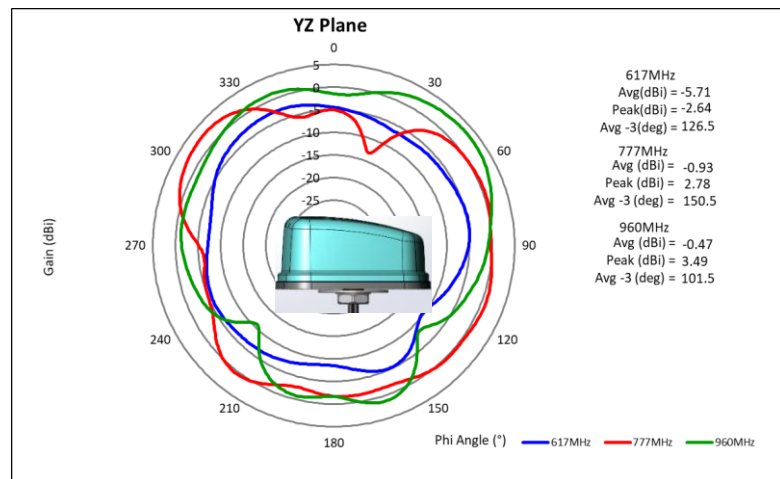
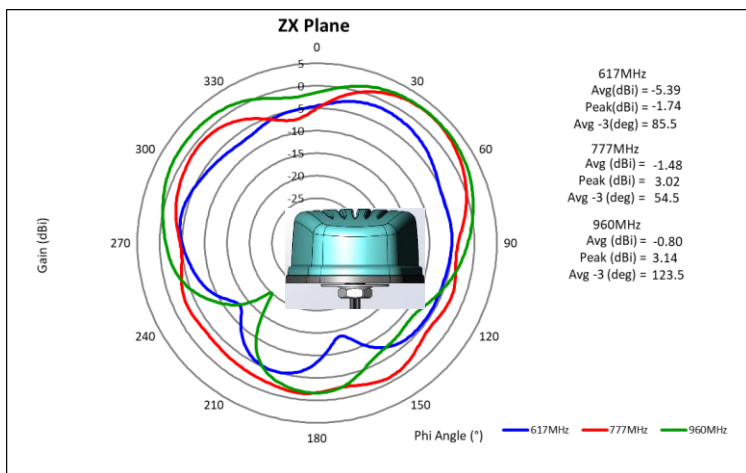
PART NUMBER: GPSMB501, GPSMB502, GPSMB501R,
GPSMB502R

CHARTS

FR #2 antenna radiation pattern with 2ft metal plate and 4inch cables



Horizontal plot



Vertical plot front view

Issue: 2331

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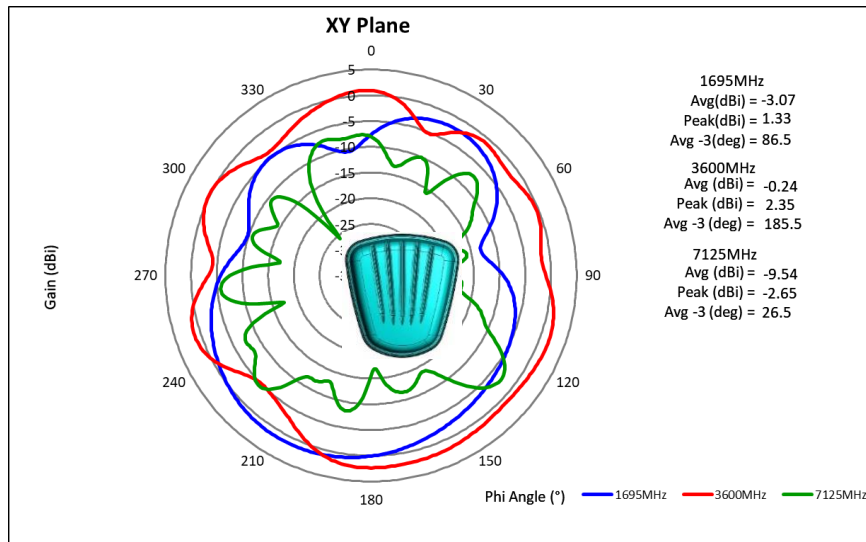
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Series: Panther

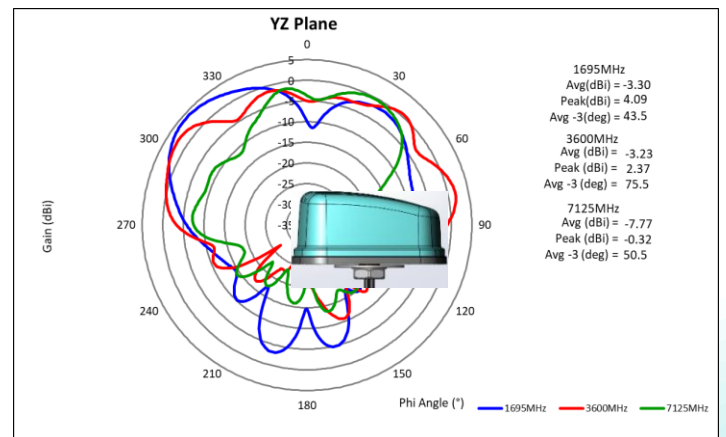
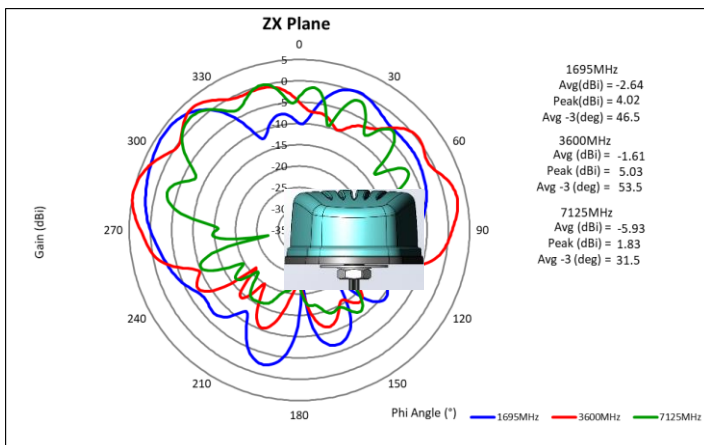
PART NUMBER: GPSMB501, GPSMB502, GPSMB501R,
GPSMB502R

CHARTS

FR #2 antenna radiation pattern with 2ft metal plate and 4inch cables



Horizontal plot



Vertical plot front view

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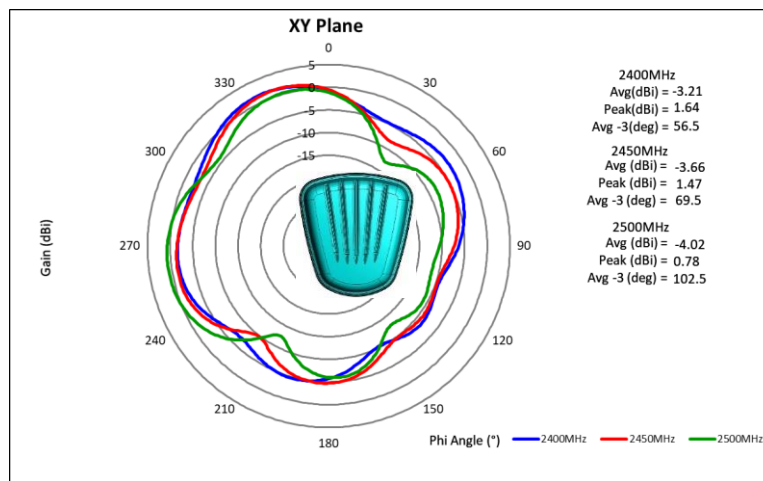
Description: MiMo LTE, MiMo WiFi, GNSS Vehicle Mount Antenna

**PART NUMBER: GPSMB501, GPSMB502, GPSMB501R,
GPSMB502R**

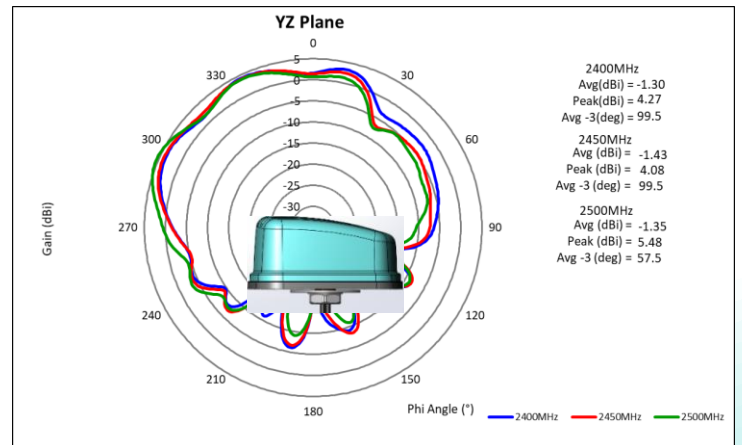
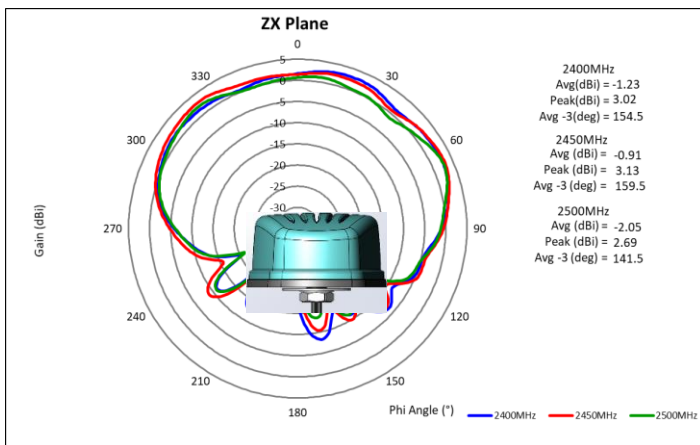
Series: Panther

CHARTS

WiFi #1 antenna radiation pattern with 2ft metal plate and 4inch cables



Horizontal plot



Vertical plot front view

Issue: 2331

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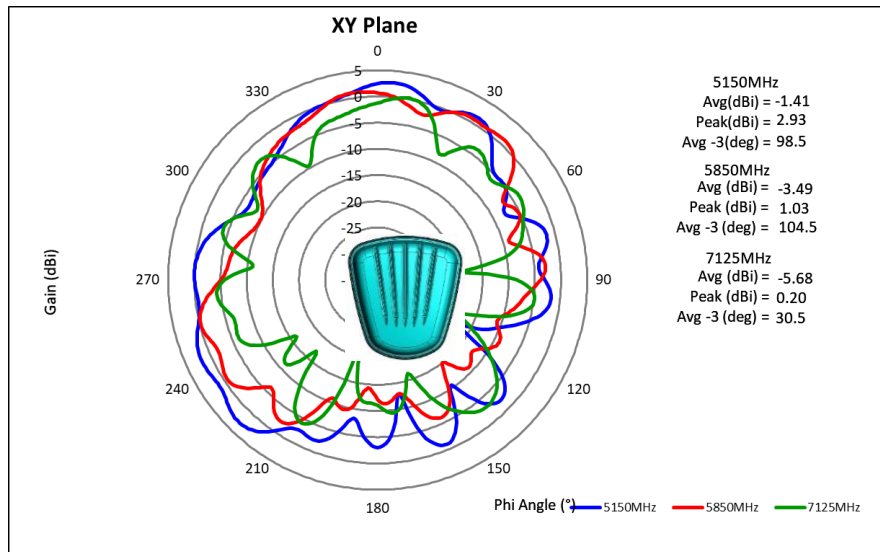
Description: MiMo LTE, MiMo WiFi, GNSS Vehicle Mount Antenna

**PART NUMBER: GPSMB501, GPSMB502, GPSMB501R,
GPSMB502R**

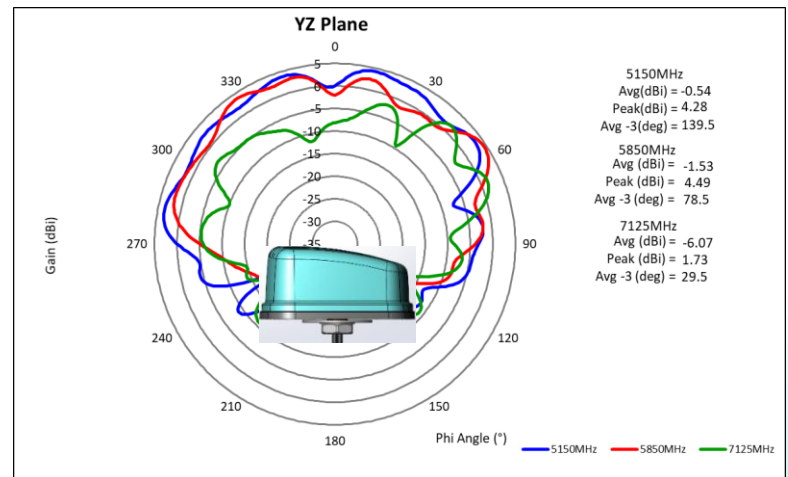
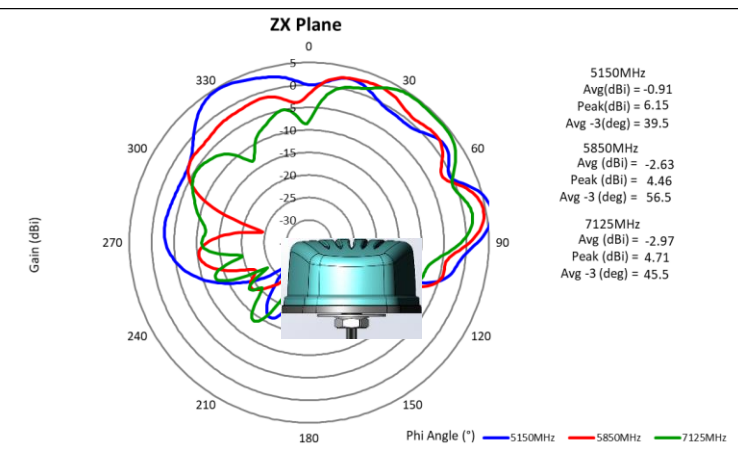
Series: Panther

CHARTS

WiFi #1 antenna radiation pattern with 2ft metal plate and 4inch cables



Horizontal plot



Vertical plot front view

Issue: 2331

In the effort to improve our products, we reserve the right to make changes judged to be necessary.

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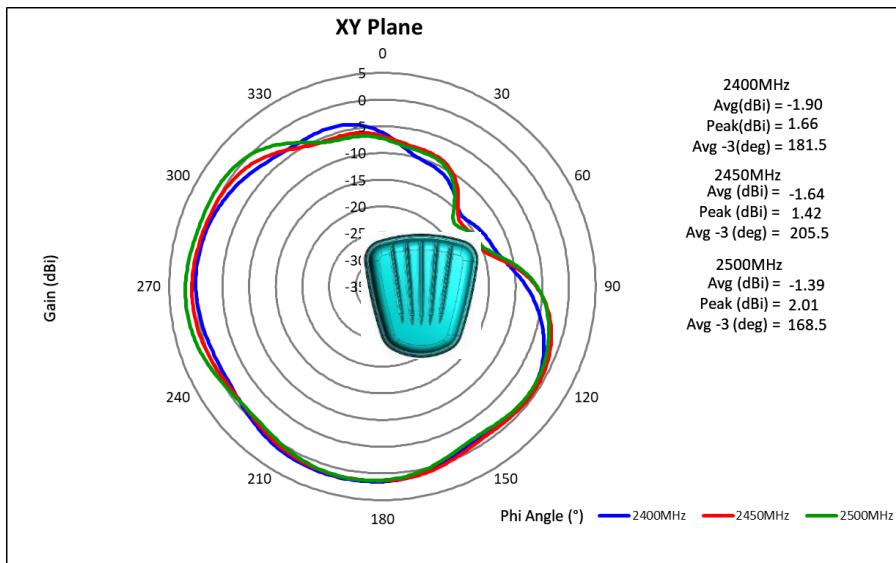
Description: MiMo LTE, MiMo WiFi, GNSS Vehicle Mount Antenna

Series: Panther

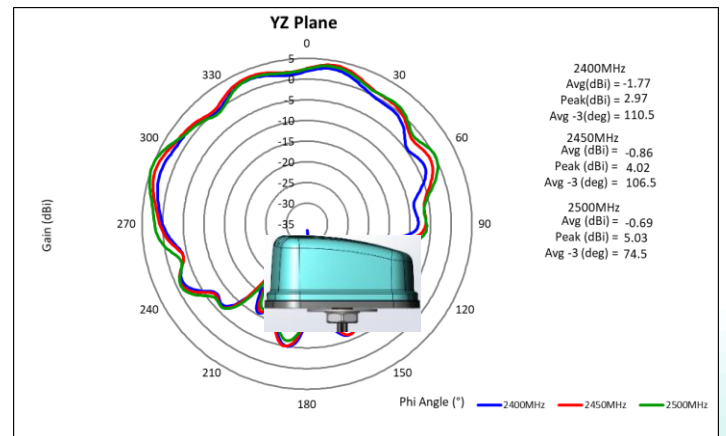
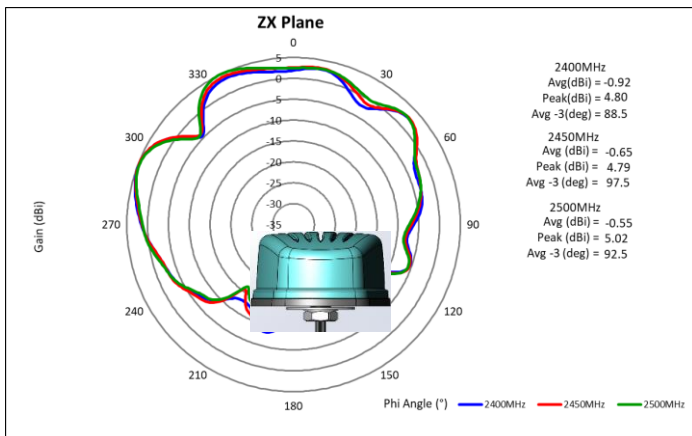
PART NUMBER: GPSMB501, GPSMB502, GPSMB501R,
GPSMB502R

CHARTS

WiFi #2 antenna radiation pattern with 2ft metal plate and 4inch cables



Horizontal plot



Vertical plot front view

Issue: 2331

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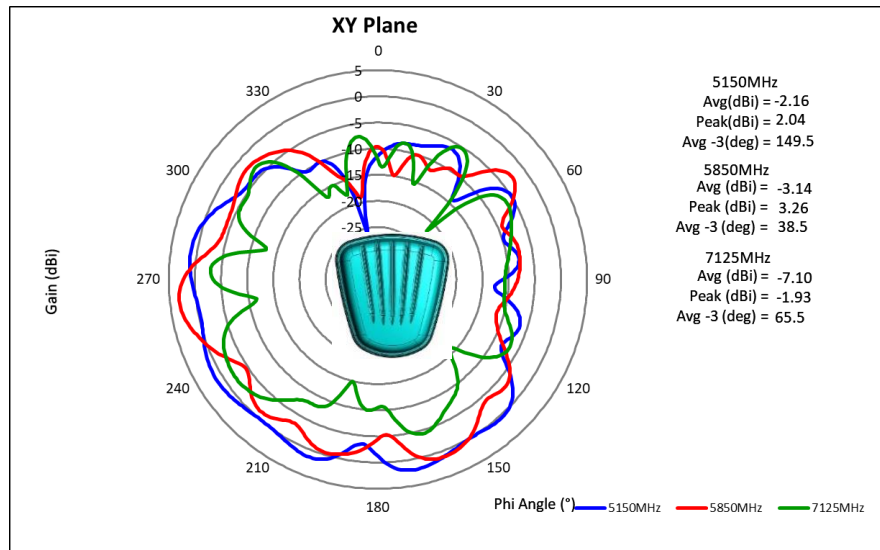
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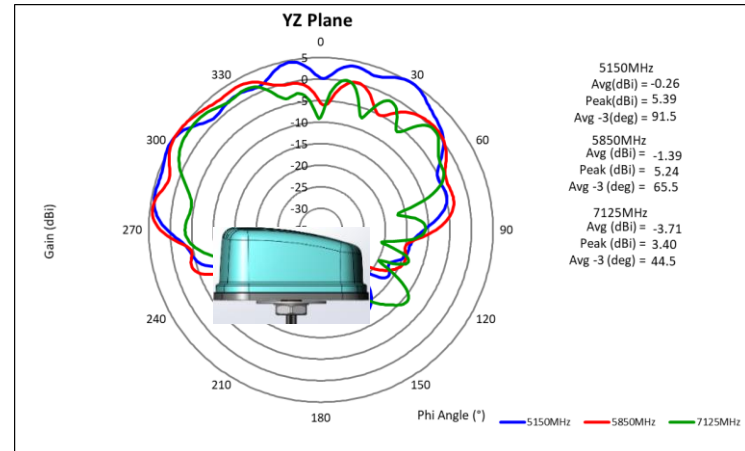
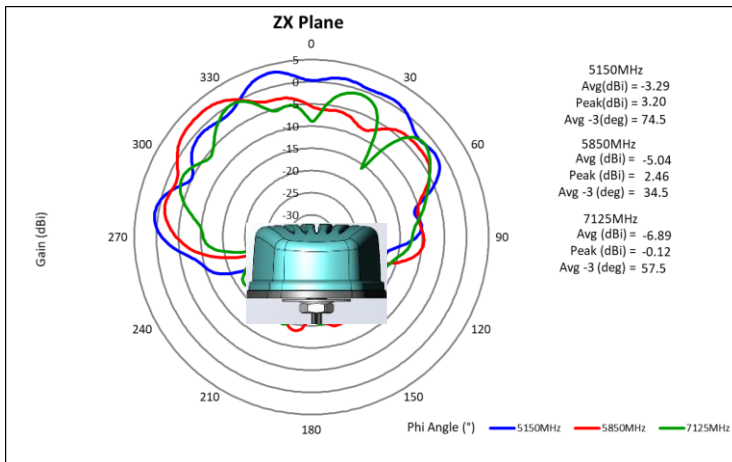
Series: Panther

CHARTS

WiFi #2 antenna radiation pattern with 2ft metal plate and 4inch cables



Horizontal plot



Vertical plot front view

Issue: 2331

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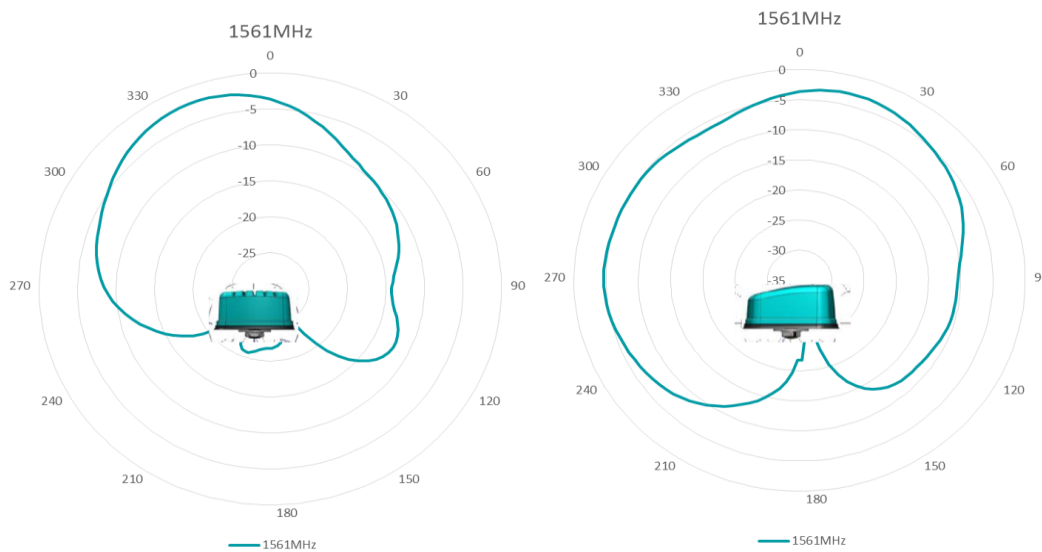
Description: MiMo LTE, MiMo WiFi, GNSS Vehicle Mount Antenna

Series: Panther

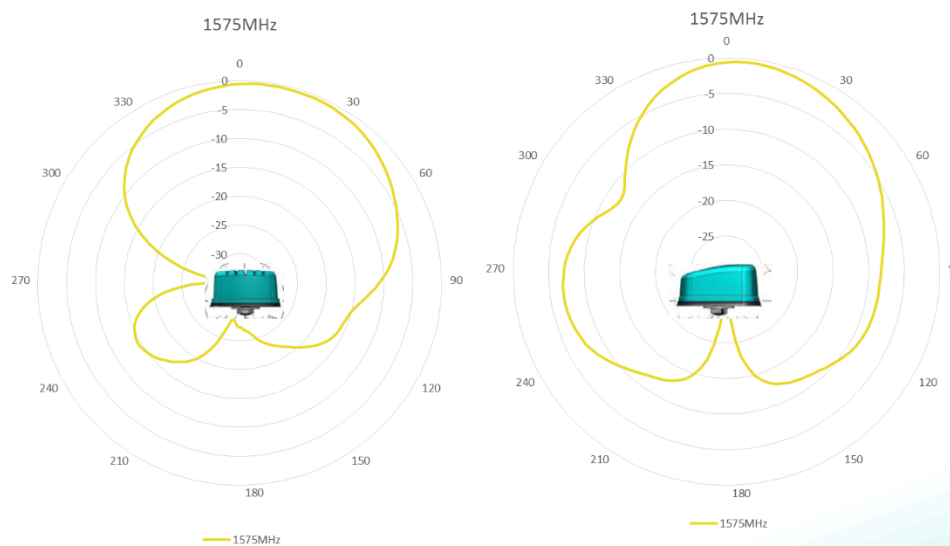
PART NUMBER: GPSMB501, GPSMB502, GPSMB501R,
GPSMB502R

CHARTS

BD2 RHCP patterns, measured with 4inch cables in free space



GPS & Galileo RHCP patterns, measured with 4inch cables in free space



Issue: 2331

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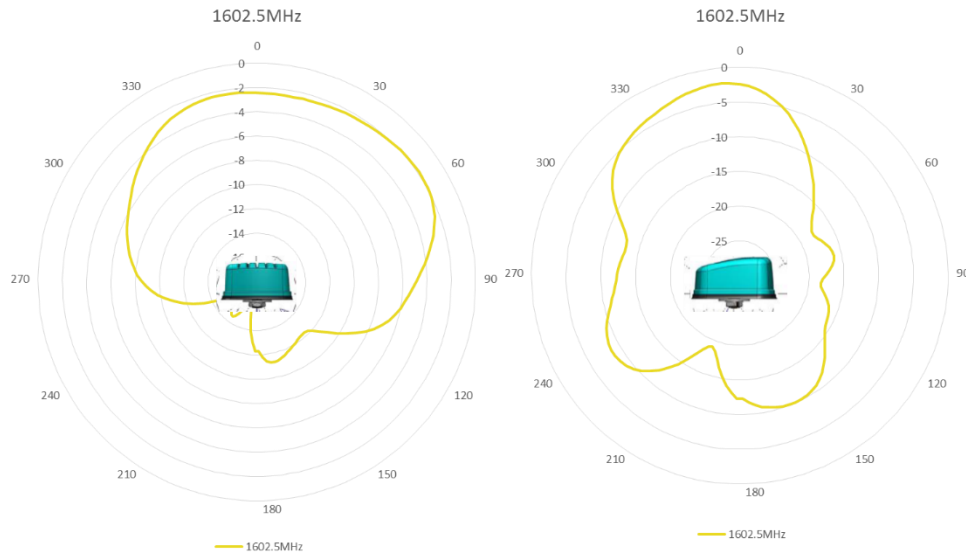
Description: MiMo LTE, MiMo WiFi, GNSS Vehicle Mount Antenna

Series: Panther

PART NUMBER: GPSMB501, GPSMB502, GPSMB501R,
GPSMB502R

CHARTS

GLONASS RHCP patterns, measured with 4inch cables in free space



Issue: 2331

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Description: MiMo LTE, MiMo WiFi, GNSS
Vehicle Mount Antenna

Series: Panther

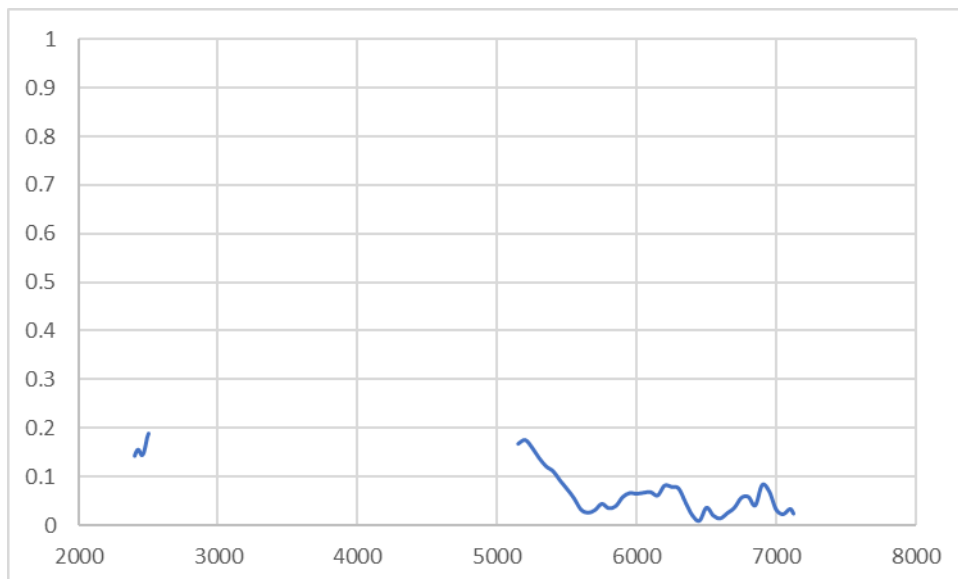
PART NUMBER: GPSMB501, GPSMB502, GPSMB501R,
GPSMB502R

CHARTS

Envelope correlation coefficient – LTE 1 to LTE 2



Envelope correlation coefficient – WiFi 1 to WiFi 2



Issue: 2331

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**Description: MiMo LTE, MiMo WiFi, GNSS
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PACKAGING

One antenna pack in one PE bag, 6 antennae in one box