

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

**Series: Panther**

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



**Features:**

- Supports MIMO Cellular LTE 698-960/1695-2170/2300-2700/2900-3600MHz
- Supports MIMO WiFi and DSRC 2400-2500MHz/4900-5925MHz
- 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: 1823

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For more information:

Pulse Worldwide Headquarters  
12220 World Trade Drive  
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Tel:1-858-674-8100

Pulse/Larsen Antennas  
18110 SE 34<sup>th</sup> 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,4<sup>th</sup> Phase  
Suzhou New District  
Jiangsu Province, Suzhou 215009 PR China  
Tel: 86 512 6807 9998



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**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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**ELECTRICAL SPECIFICATIONS**

Frequency (LTE)	698 - 960 / 1695 – 2170 / 2300 - 2700 / 2900 – 3600	MHz
Frequency (WiFi&DSRC)	2400 – 2500/ 4900 – 5925	MHz
Frequency (Beidou, GPS, Galileo, Glonass)	1561.098±2.046/ 1575.42±1.023/ 1602.5625±4	MHz
Nominal Impedance	50	Ω
VSWR (LTE)	< 1.5	
VSWR (WiFi&DSRC)	< 1.4	
Gain* (LTE antenna, < 2170 MHz)	4	dBi ± 2.5 dB
Gain* (LTE antenna, > 2170 MHz)	5	dBi ± 2 dB
Gain* (WiFi antenna, < 2500 MHz)	4.5	dBi ± 1.5 dB
Gain* (WiFi antenna, > 4900 MHz)	5	dBi ± 2 dB
Isolation LTE to LTE **	15 or better	dB
Isolation WiFi to WiFi **	40 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 <sub>dc</sub>	3-5	V <sub>dc</sub>
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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**ELECTRICAL SPECIFICATIONS**

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

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**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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**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

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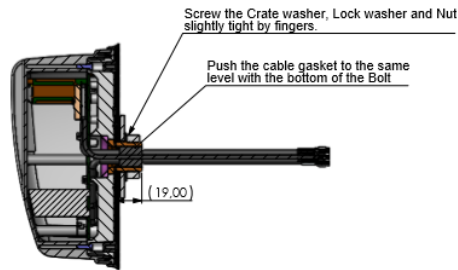
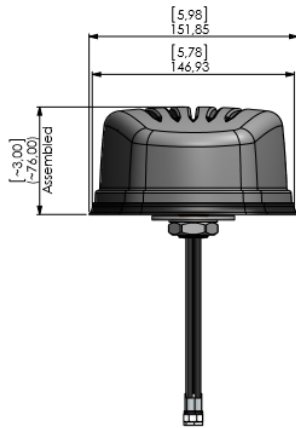


### Description: MiMo LTE, MiMo WiFi, GNSS Vehicle Mount Antenna

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## 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°10'

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

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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Sheet number:	2/2
General tolerance:	
Customer number:	
Date:	04.05.2018
Drawn:	Jukka
Check:	
Approve:	
Document number:	GPSMB501
Part Version:	A
Document Version:	A
Issue:	15.09.2016 Jarko
Issue:	02.07.2015 Jarko
Issue:	Date Name

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.

Product:  
GPSMB501  
Item Name:  
Antenna Assembly

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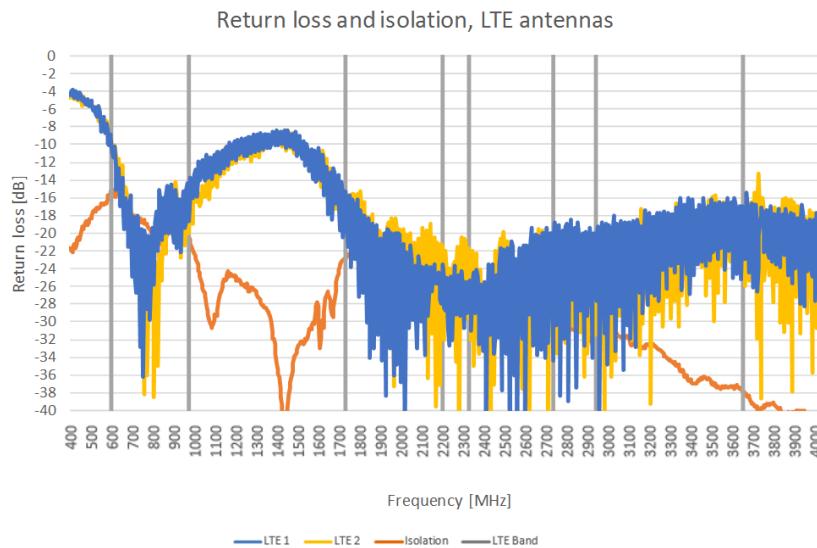
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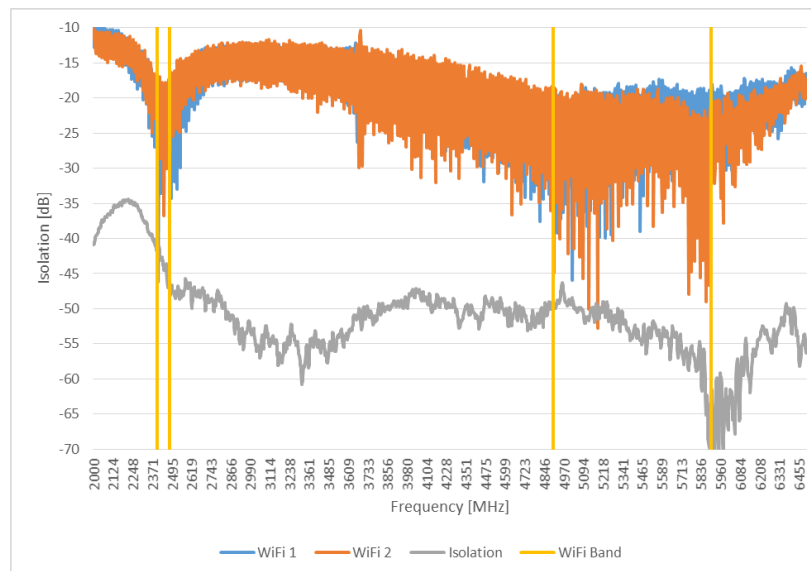
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**CHARTS**

**Return Loss and isolation in free space, LTE antennas\*\***



**Return Loss and isolation in free space, WiFi antennas\*\***



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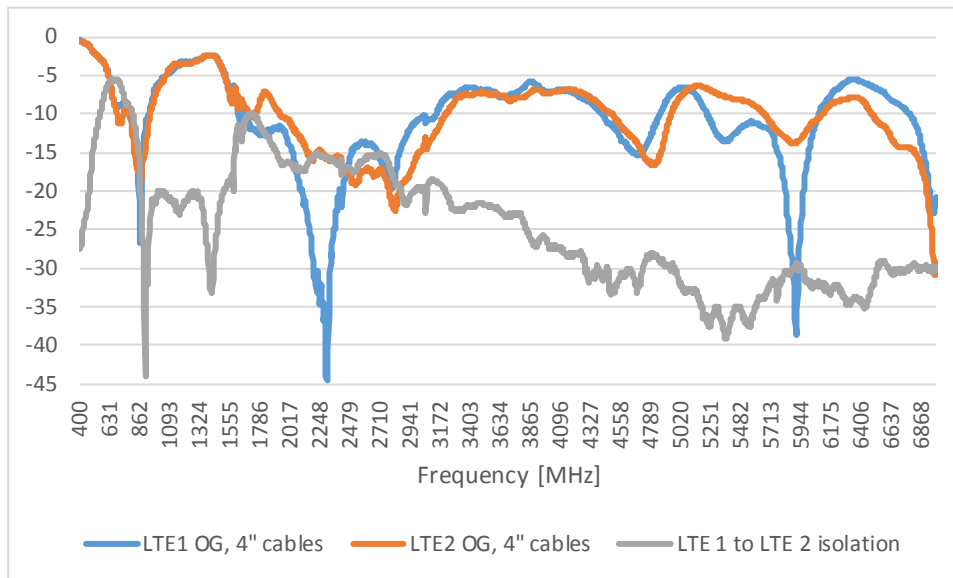
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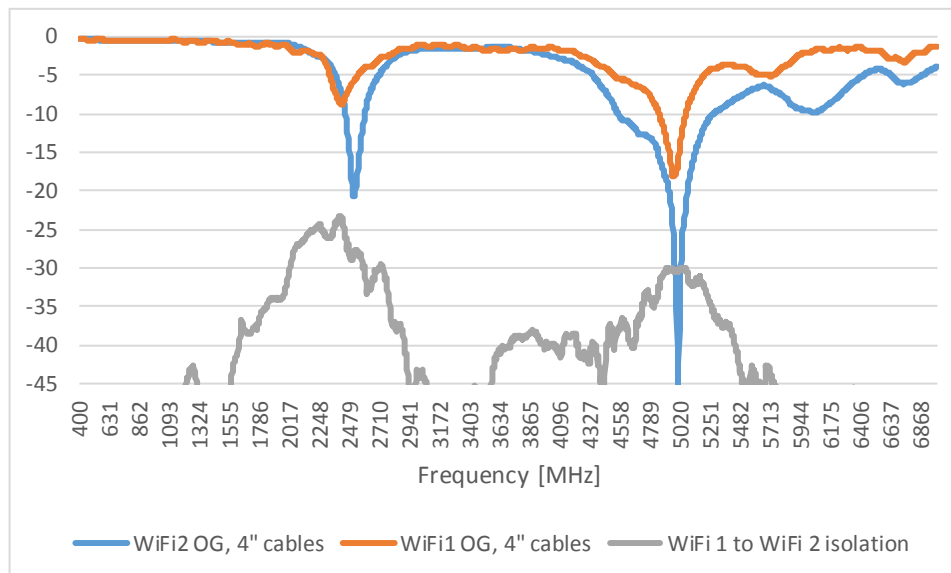
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**Return Loss and isolation, LTE antennas\***



**Return Loss and isolation, WiFi antennas\***



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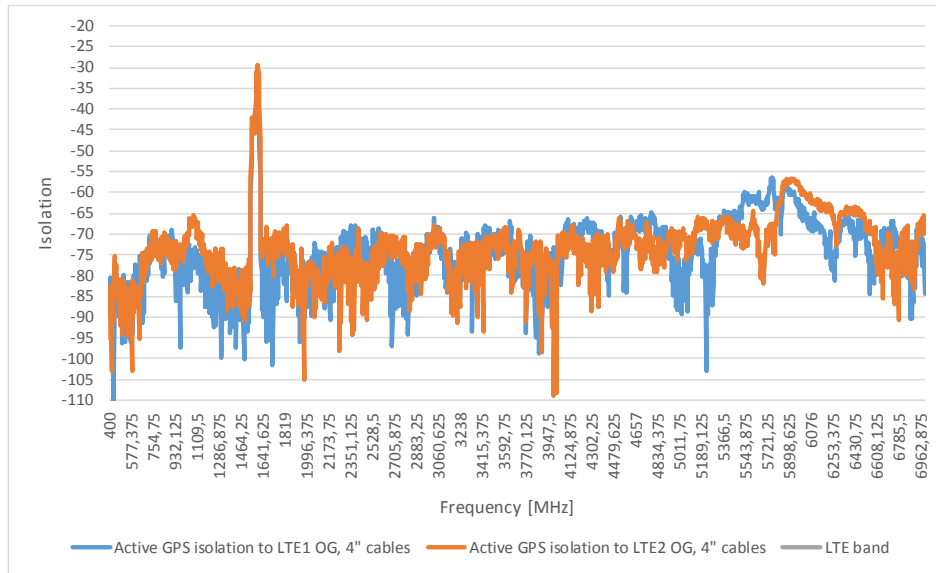
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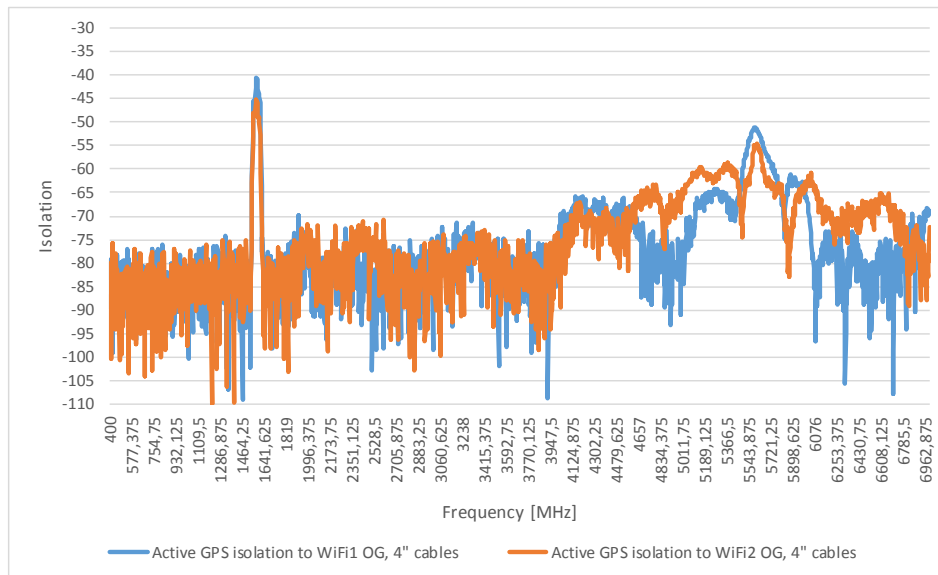
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**CHARTS**

**GPS isolation to LTE 1 and LTE 2 antenna\***



**GPS isolation to WiFi 1 and WiFi 2 antenna\***



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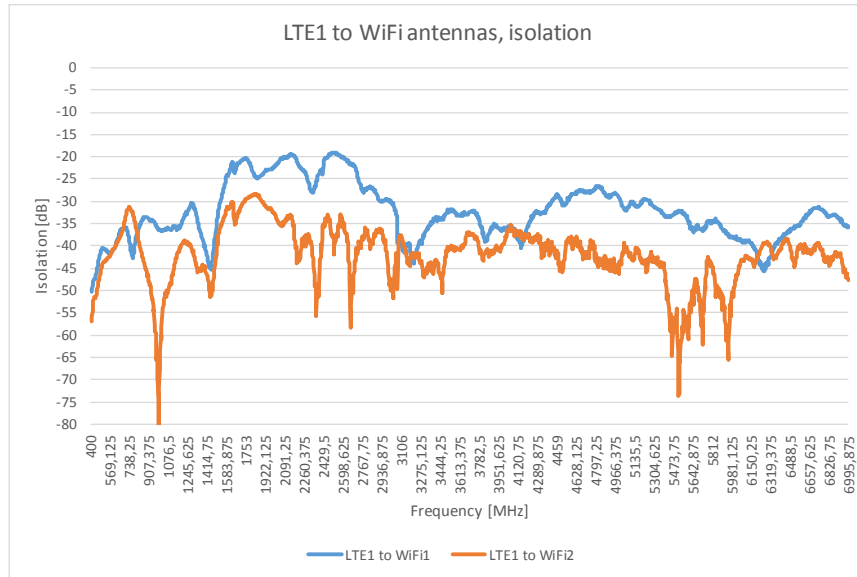
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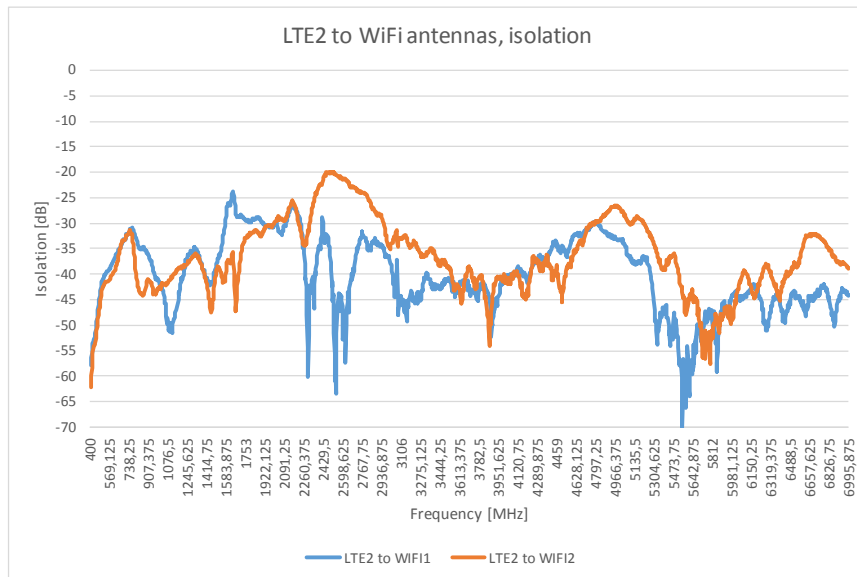
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**CHARTS**

**Isolation characteristics, LTE 1 to WiFi 1 and WiFi 2\***



**Isolation characteristics, LTE 2 to WiFi 1 and WiFi 2\***



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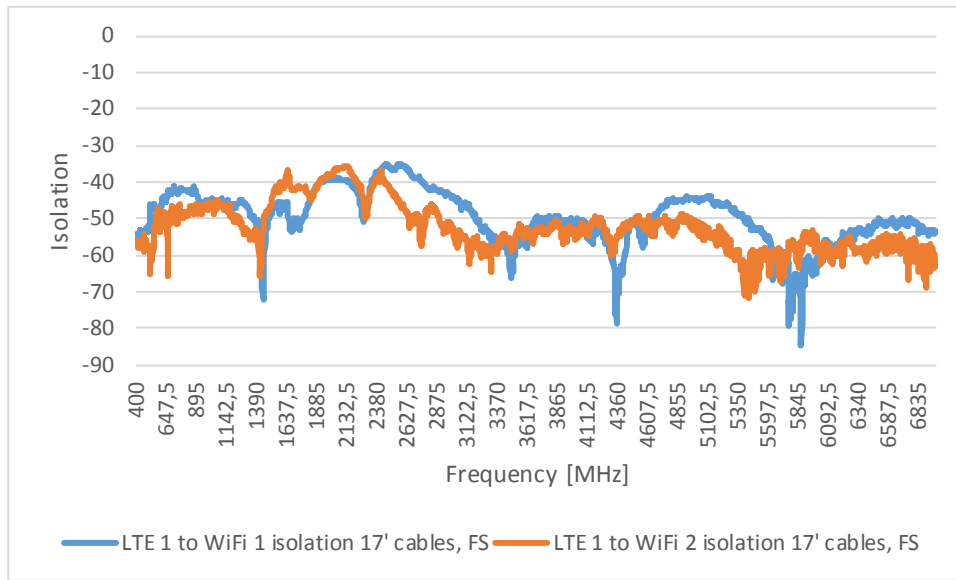
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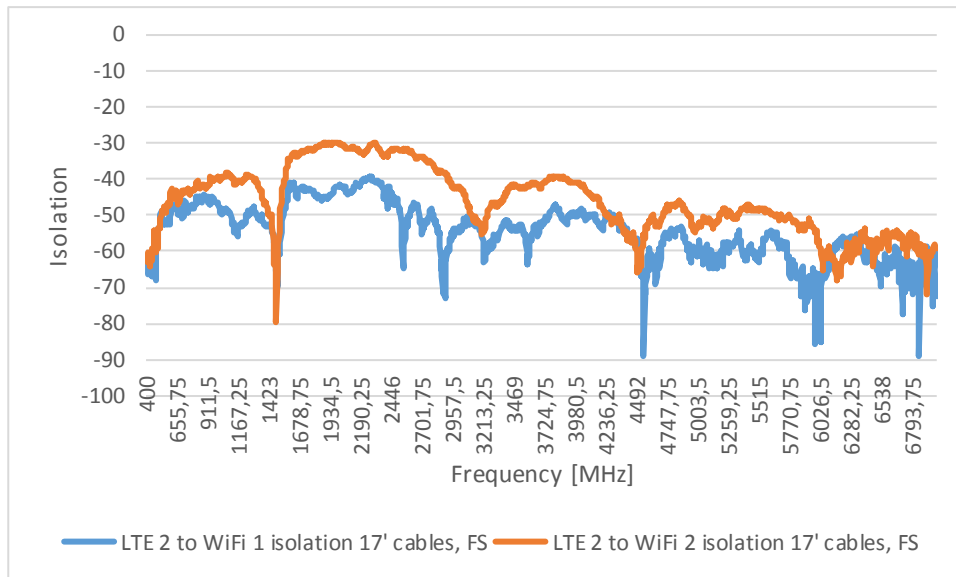
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**CHARTS**

Isolation characteristics, LTE 1 to WiFi 1 and WiFi 2\*\*



Isolation characteristics, LTE 2 to WiFi 1 and WiFi 2\*\*



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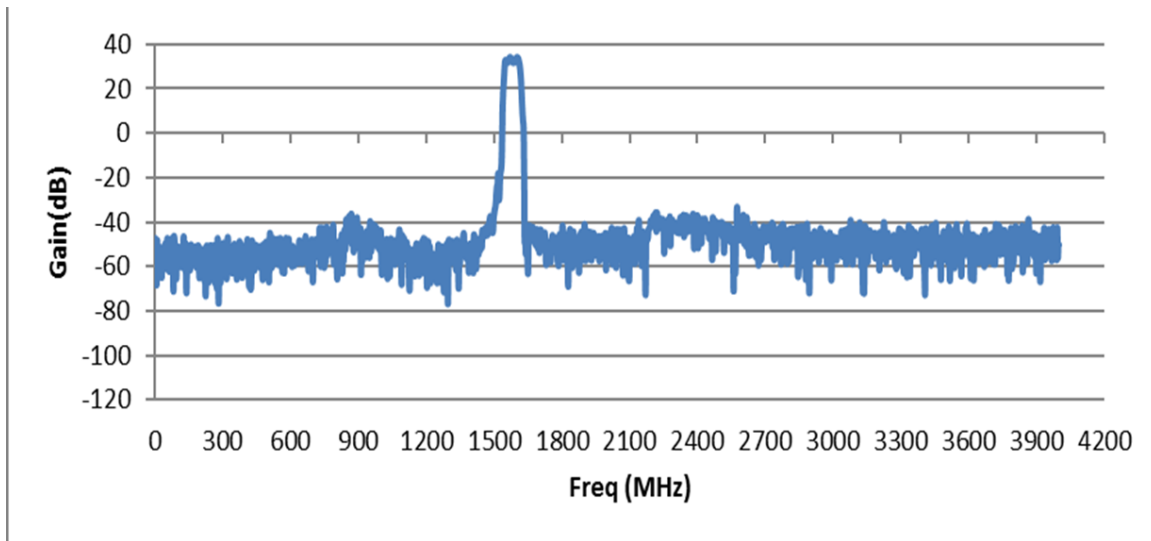
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**CHARTS**

**GNSS LNA performance**



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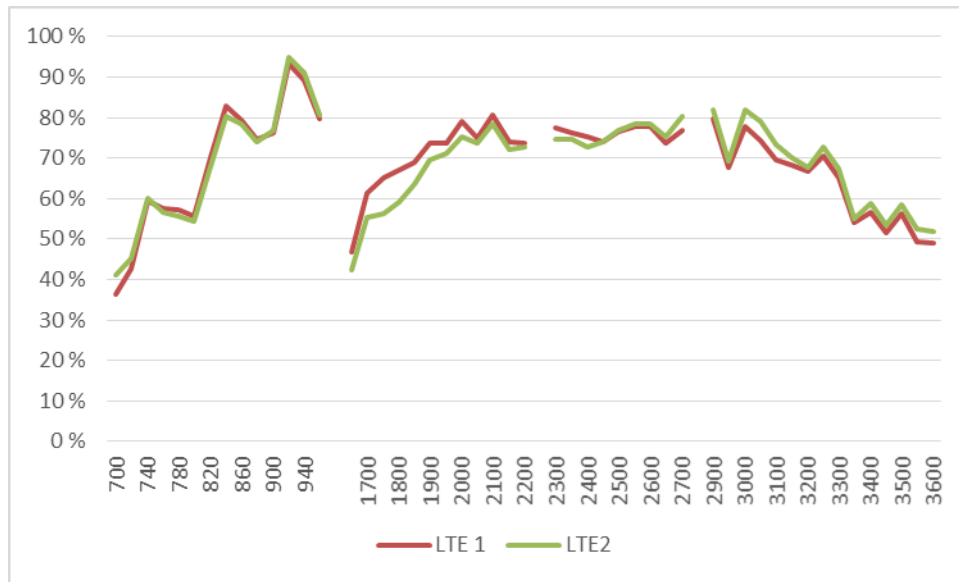
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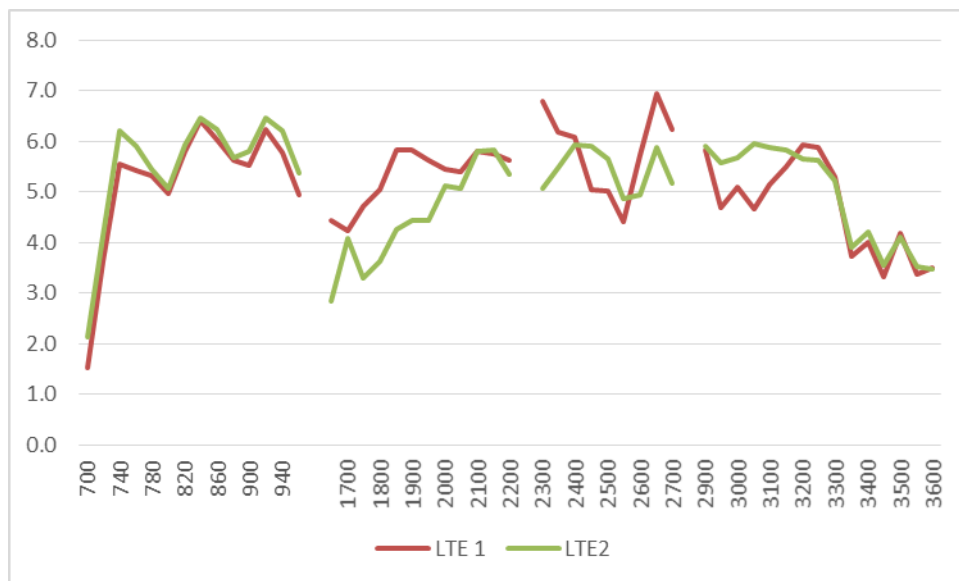
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**CHARTS**

LTE 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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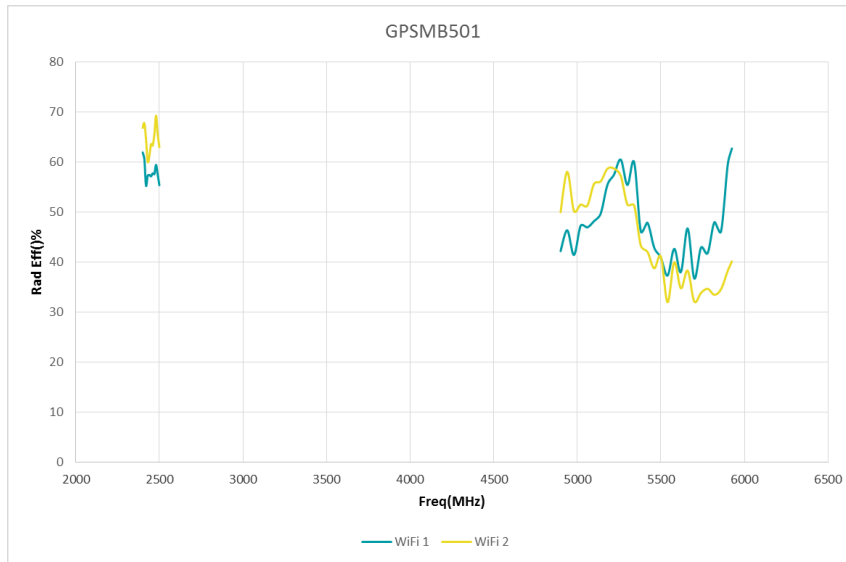
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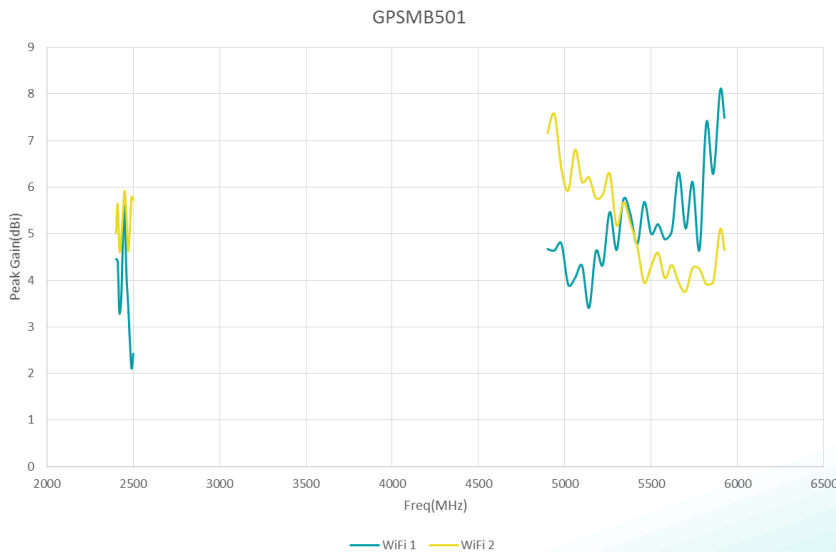
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**CHARTS**

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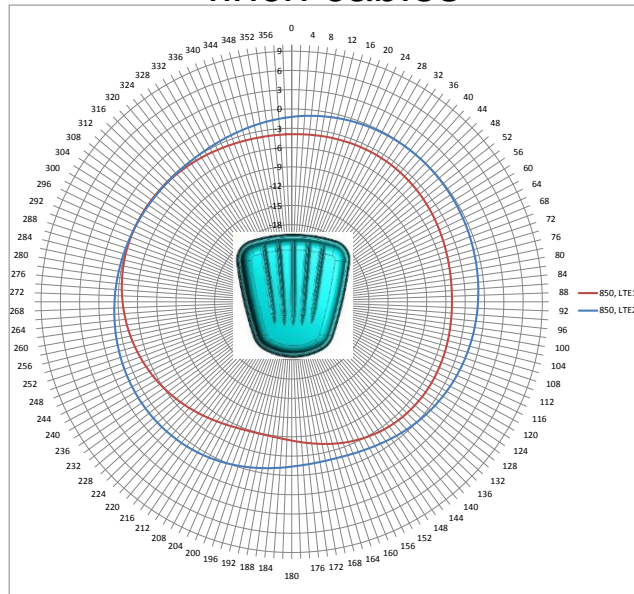
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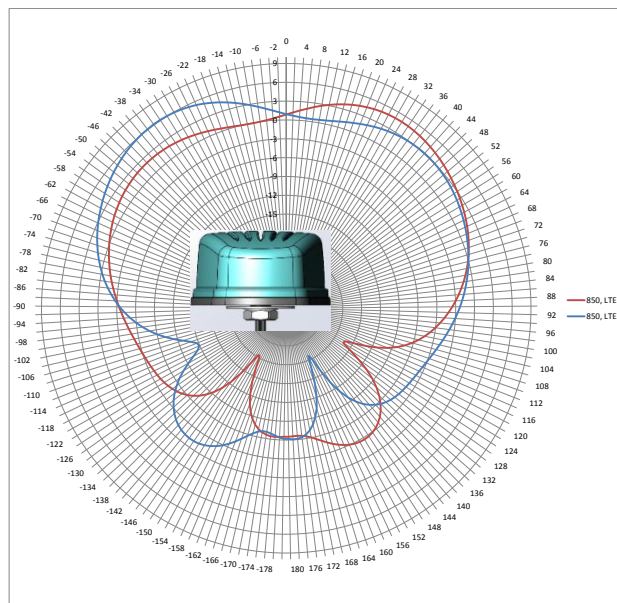
**PART NUMBER: GPSMB501, GPSMB502, GPSMB501R,  
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**CHARTS**

LTE antenna radiation pattern at 850MHz with 2ft metal plate and 4inch cables



Horizontal plot



Vertical plot front view

Issue: 1823

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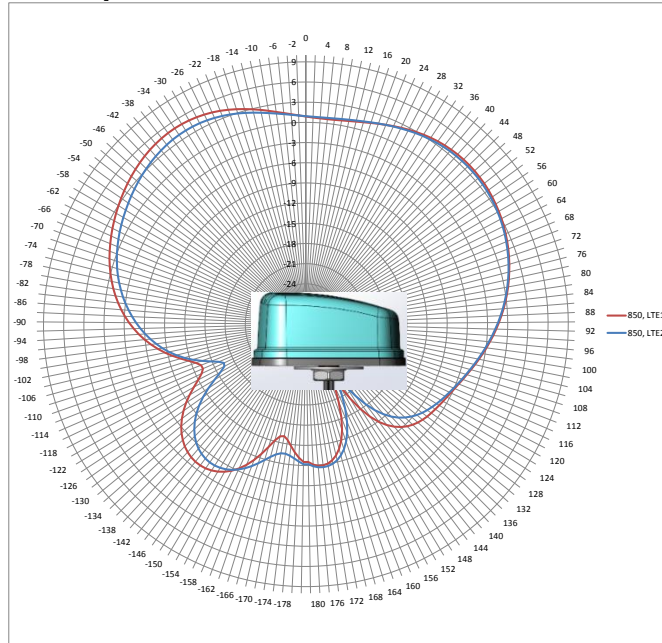
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Series: Panther

CHARTS

LTE antenna radiation pattern at 850MHz with 2ft metal plate and



Vertical plot side view

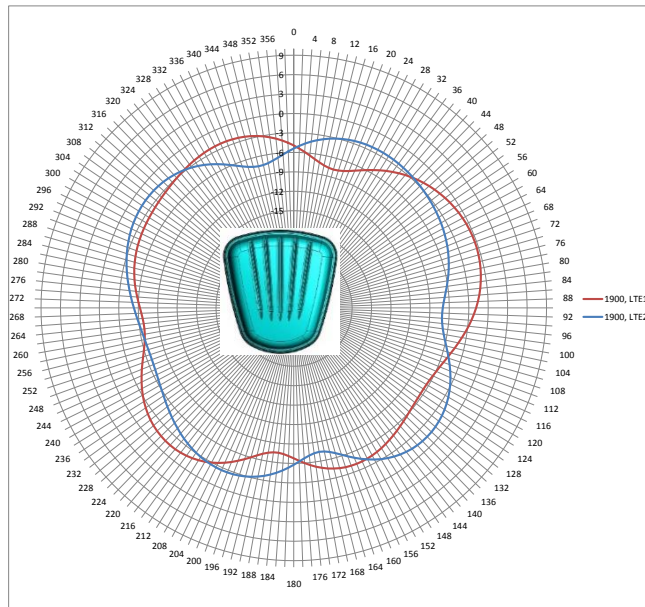
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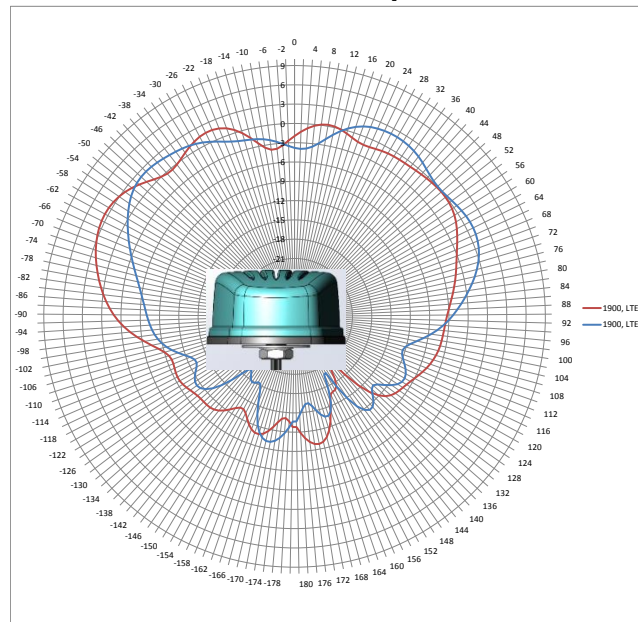
**PART NUMBER: GPSMB501, GPSMB502, GPSMB501R,  
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**CHARTS**

LTE antenna radiation pattern at 1900MHz with 2ft metal plate and 4inch cables



**Horizontal plot**



**Vertical plot front view**

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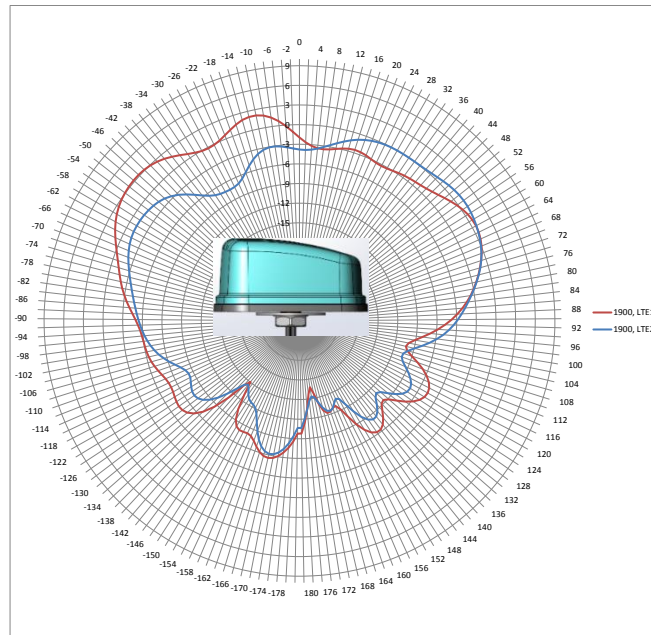
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**CHARTS**

**LTE antenna radiation pattern at 1900MHz with 2ft metal plate and  
4inch cables**



**Vertical plot side view**



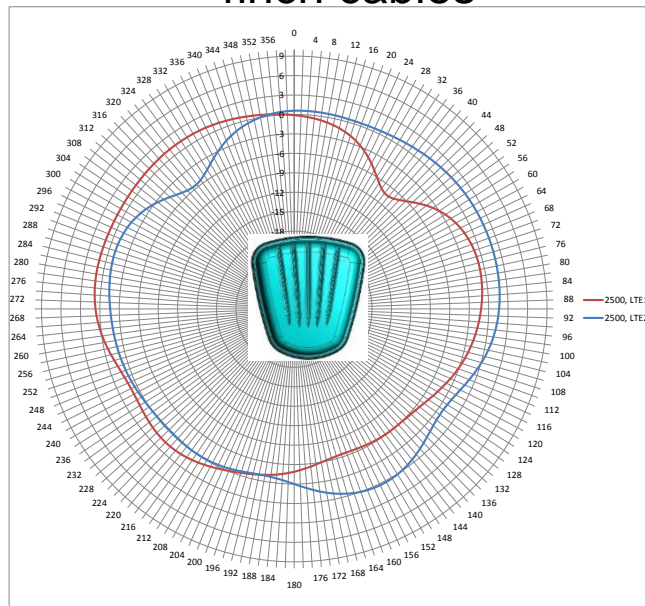
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Vehicle Mount Antenna**

**Series: Panther**

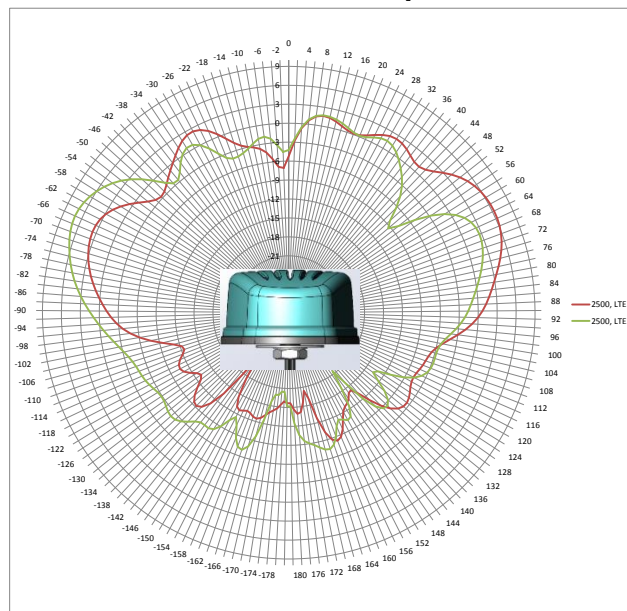
**PART NUMBER: GPSMB501, GPSMB502, GPSMB501R,  
GPSMB502R**

**CHARTS**

LTE antenna radiation pattern at 2500MHz with 2ft metal plate and 4inch cables



**Horizontal plot**



**Vertical plot front view**

Issue: 1823

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

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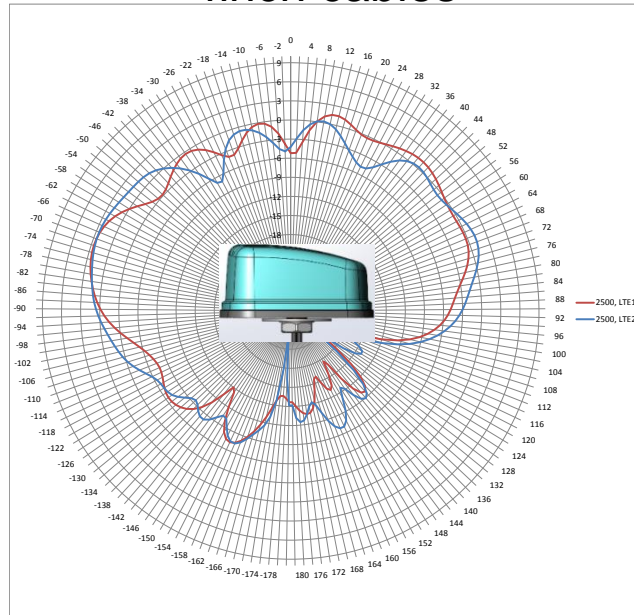
**Description: MiMo LTE, MiMo WiFi, GNSS  
Vehicle Mount Antenna**

**Series: Panther**

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

**CHARTS**

LTE antenna radiation pattern at 2500MHz with 2ft metal plate and 4inch cables



Vertical plot side view

Issue: 1823

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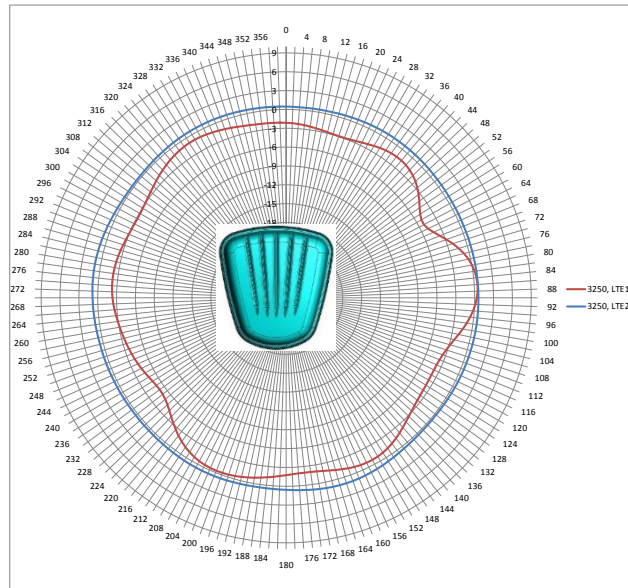
**Description: MiMo LTE, MiMo WiFi, GNSS  
Vehicle Mount Antenna**

**Series: Panther**

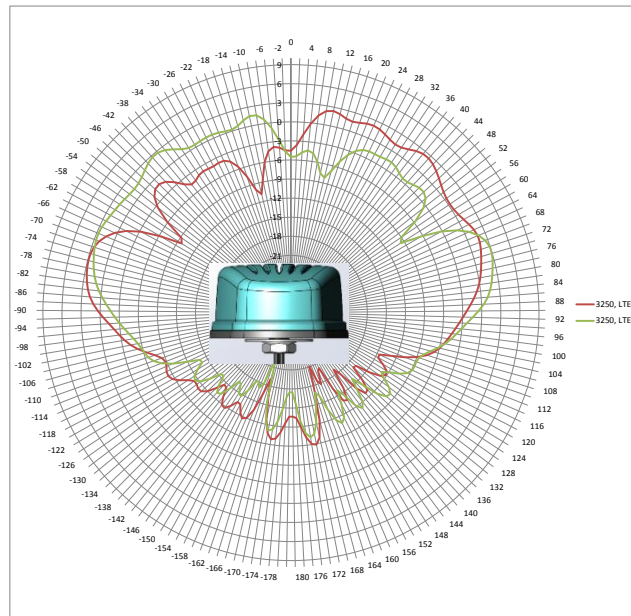
**PART NUMBER: GPSMB501, GPSMB502, GPSMB501R,  
GPSMB502R**

**CHARTS**

LTE antenna radiation pattern at 3250MHz with 2ft metal plate and 4inch cables



Horizontal plot



Vertical plot front view

Issue: 1823

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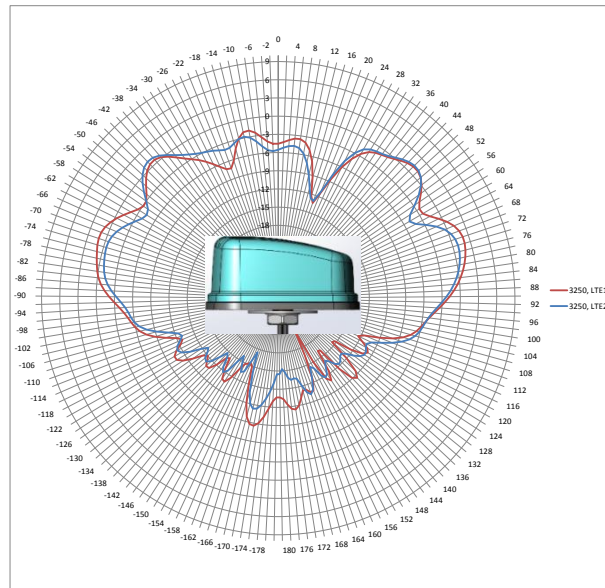
**Description: MiMo LTE, MiMo WiFi, GNSS  
Vehicle Mount Antenna**

**Series: Panther**

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

**CHARTS**

**LTE antenna radiation pattern at 3250MHz with 2ft metal plate and  
4inch cables**



**Vertical plot side view**

Issue: 1823

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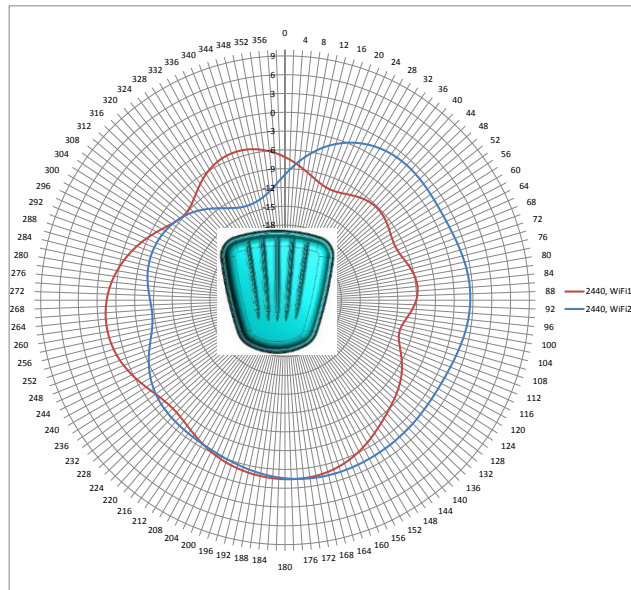
**Description: MiMo LTE, MiMo WiFi, GNSS  
Vehicle Mount Antenna**

**Series: Panther**

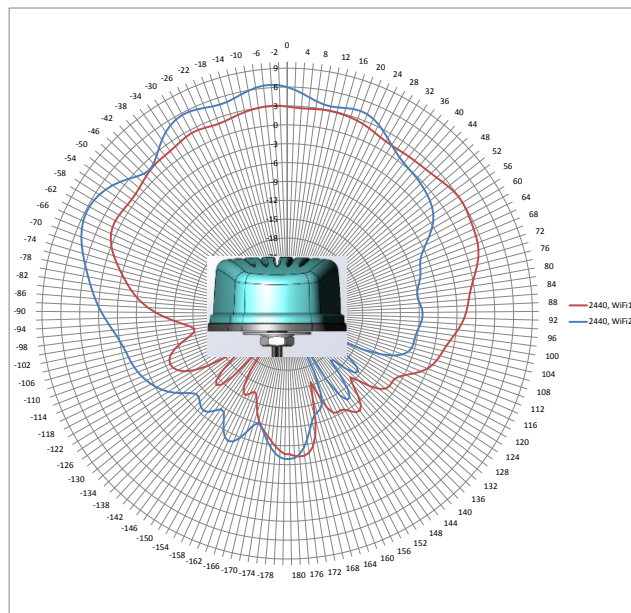
**PART NUMBER: GPSMB501, GPSMB502, GPSMB501R,  
GPSMB502R**

**CHARTS**

WiFi antenna radiation pattern at 2440MHz with 2ft metal plate and 4inch cables



**Horizontal plot**



**Vertical plot front view**

Issue: 1823

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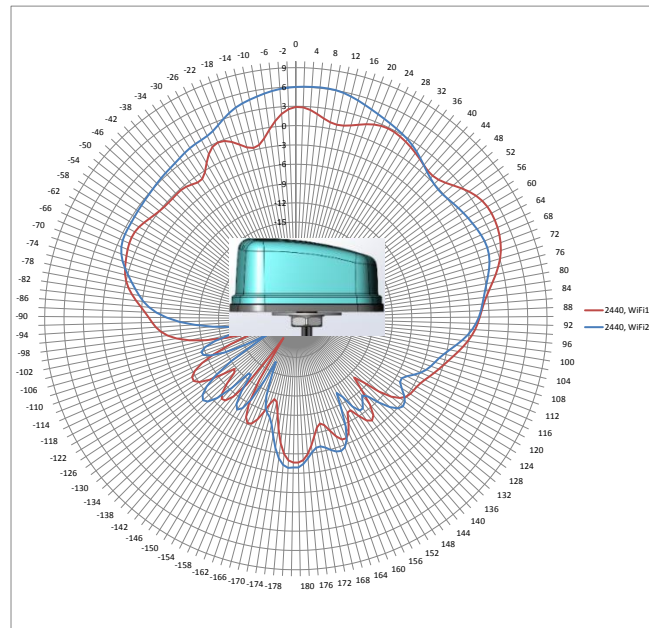
**Description: MiMo LTE, MiMo WiFi, GNSS  
Vehicle Mount Antenna**

**Series: Panther**

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

**CHARTS**

WiFi antenna radiation pattern at 2440MHz with 2ft metal plate and 4inch cables



Vertical plot side view

Issue: 1823

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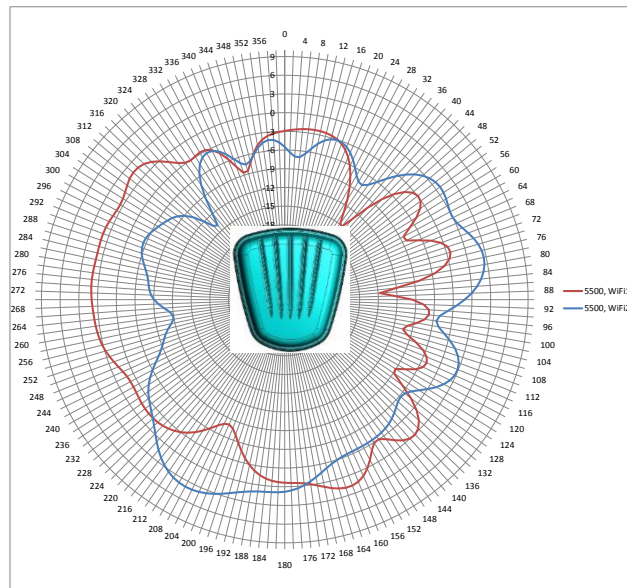
**Description: MiMo LTE, MiMo WiFi, GNSS  
Vehicle Mount Antenna**

**Series: Panther**

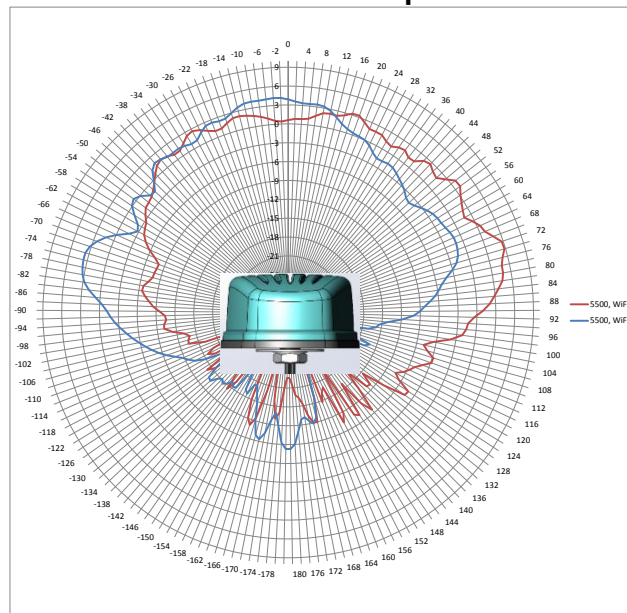
**PART NUMBER: GPSMB501, GPSMB502, GPSMB501R,  
GPSMB502R**

**CHARTS**

WiFi antenna radiation pattern at 5500MHz with 2ft metal plate and 4inch cables



**Horizontal plot**



**Vertical plot front view**

Issue: 1823

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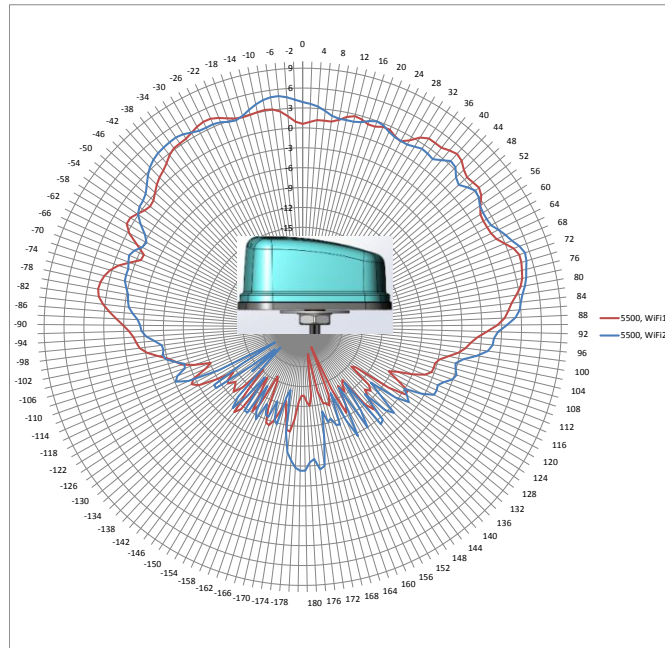
**Description: MiMo LTE, MiMo WiFi, GNSS  
Vehicle Mount Antenna**

**Series: Panther**

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

**CHARTS**

WiFi antenna radiation pattern at 5500MHz with 2ft metal plate and 4inch cables



Vertical plot side view

Issue: 1823

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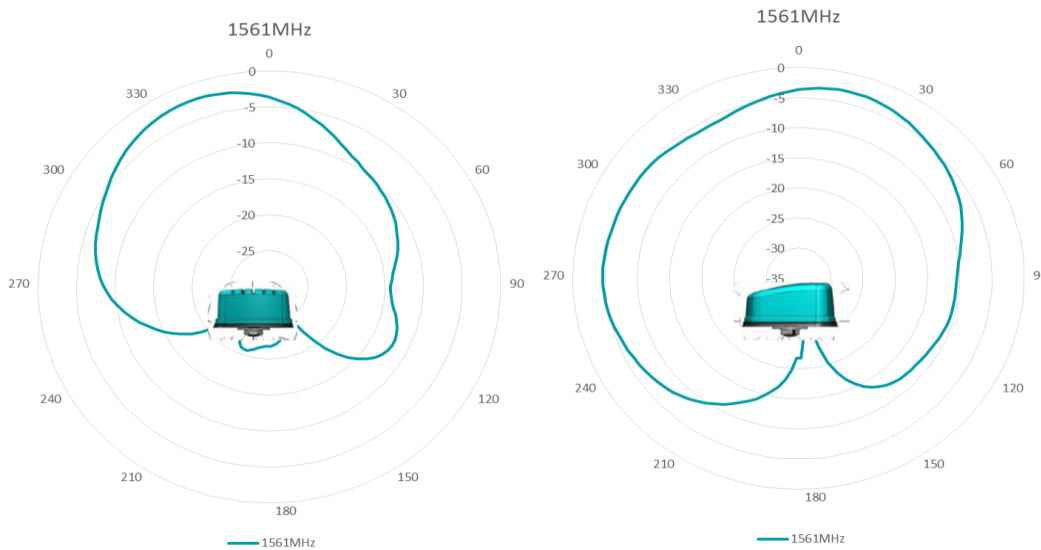
**Description: MiMo LTE, MiMo WiFi, GNSS  
Vehicle Mount Antenna**

**Series: Panther**

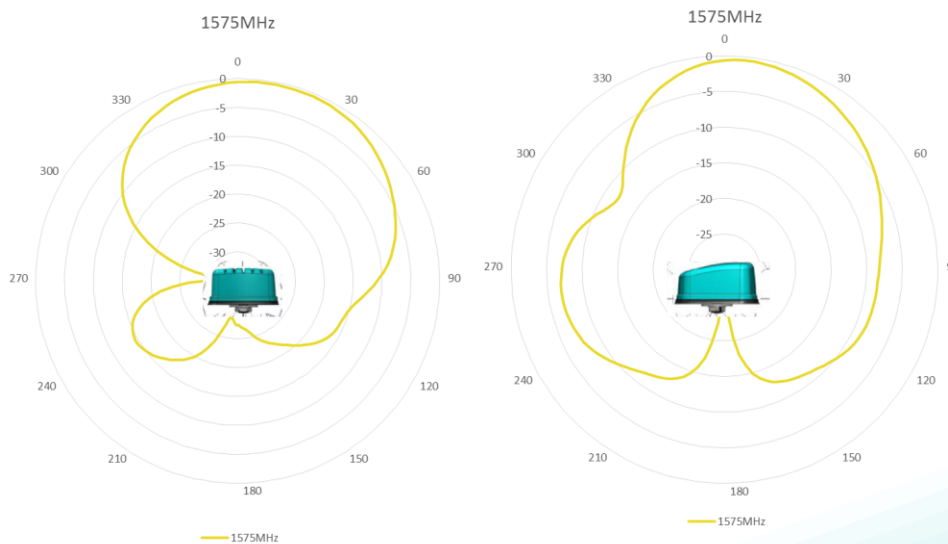
**PART NUMBER: GPSMB501, GPSMB502, GPSMB501R,  
GPSMB502R**

**CHARTS**

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



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



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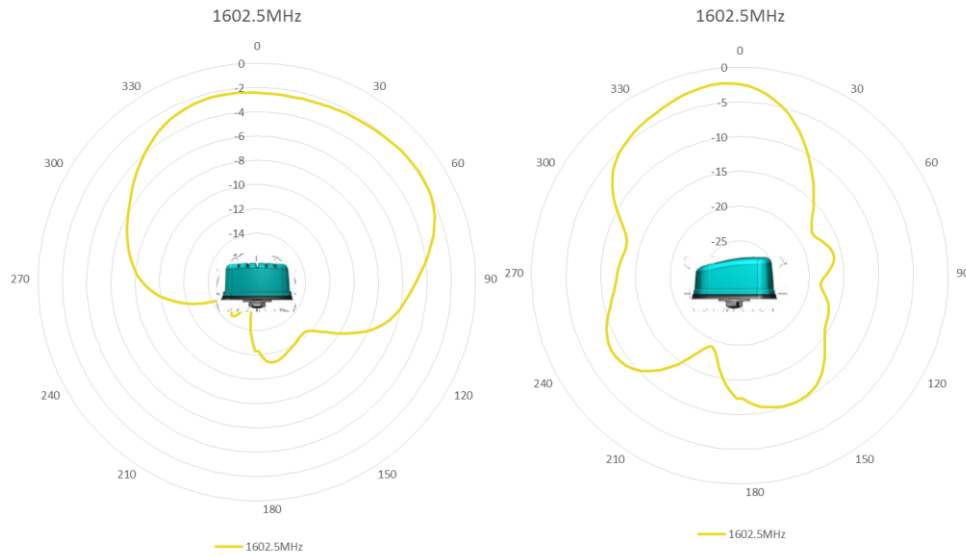
**Description: MiMo LTE, MiMo WiFi, GNSS  
Vehicle Mount Antenna**

**Series: Panther**

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

**CHARTS**

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



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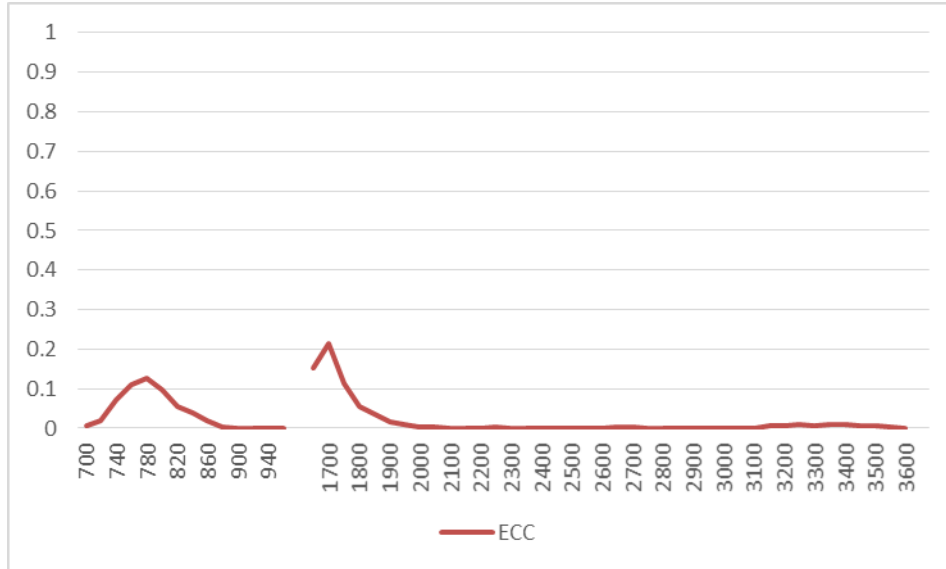
**Description: MiMo LTE, MiMo WiFi, GNSS  
Vehicle Mount Antenna**

**Series: Panther**

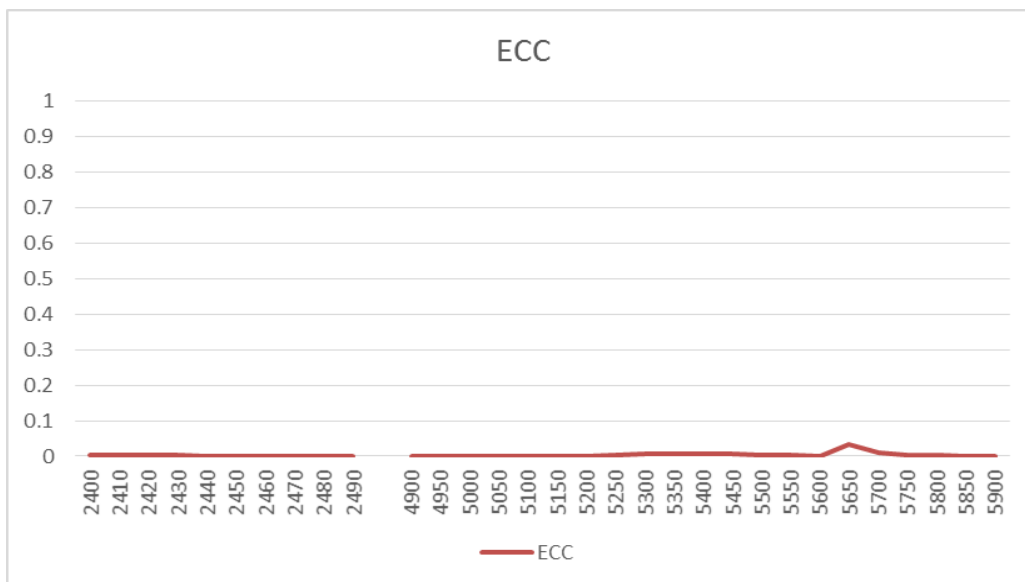
**PART NUMBER: GPSMB501, GPSMB502, GPSMB501R,  
GPSMB502R**

**CHARTS**

**Envelope correlation coefficient – LTE 1 to LTE 2**



**Envelope correlation coefficient – WiFi 1 to WiFi 2**



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**Series: Panther**

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GPSMB502R**

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

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