

# 4X4 MiMo 4G/5G Transit Antenna

TRNM[X]4-6-60-[X]

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## Low Profile Transit Antenna

4x4 MiMo 617-960/1427-6000MHz

Up to 4x4 MiMo WiFi 6e (Optional)

GPS/GNSS 26dB LNA (Optional)

Meets Railway Standards EN50155, EN45545-2 and EN50124-1

The TRNM[X]4-6-60-[X] MiMo antenna series is designed for use on trains, trams and buses underground or over ground. Incorporating four wide band elements covering the frequency range 617MHz to 6000MHz, the TRNM[X]4-6-60-[X] series is versatile and future proof.

The TRNM[X]4-6-60-[X] series covers global 4G/5G frequencies with 4x4 MiMo, optional up to 4x4 MiMo Wifi 6e and optional GPS/GNSS.

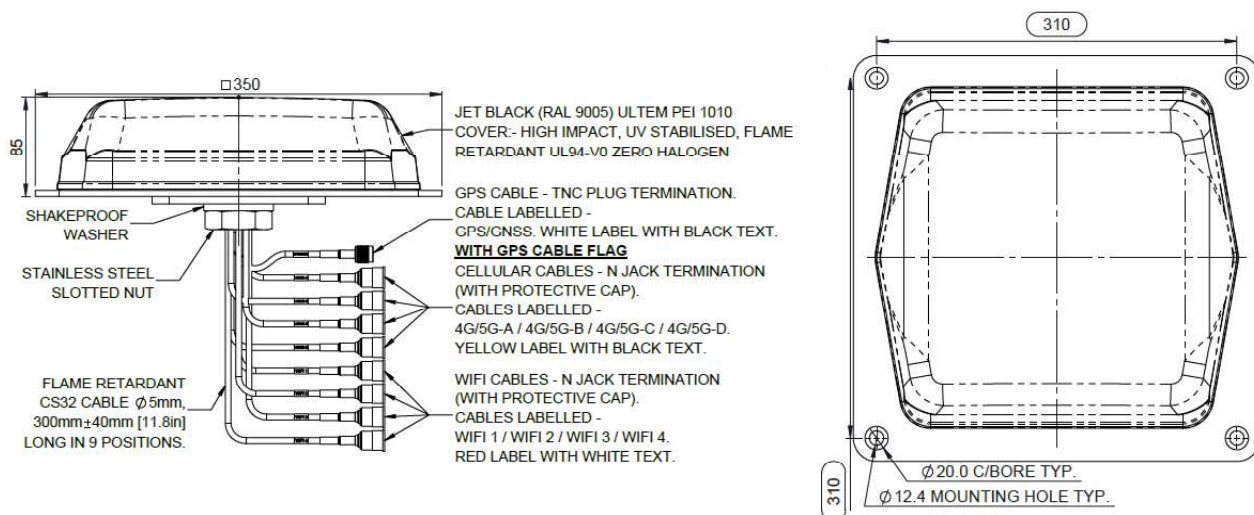
Housed in a high impact, flame retardant Ultem housing, the antenna is fully weatherproof ensuring a long service life with no compromise in performance.

The TRNM[X]4-6-60-[X] antenna meets stringent industry standards including EN50155, EN45545-2 (HL 1-3), EN50124-1\* and is ingress protected to IP69k when correctly installed.

\*Whole assembly compliant to 27.5 KV AC Insulation Test. Cell/LTE elements tested to 40KA AC Short Circuit Test.

## Technical Drawing

TRNMG4-6-60-Q Shown



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## Transit Antenna

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### Product Data

Part No.	TRNMG4-6-60-Q		TRNMG4-6-60-T		TRNMG4-6-60-D		TRNMG4-6-60		TRNM4-6-60	
Electrical Data										
Frequency Range (MHz)	Cell /LTE	4x 617-960 / 1427-6000								
	WiFi	4x 2396-7125	3x 2396-7125	2x 2396-7125	-	-				
	GPS/GNSS	1x 1562-1612								
Typical VSWR*	Cell Elements	< 2:1								
	WiFi Elements	< 2:1			-		-			
Correlation Co-efficient	Cell Elements	<0.1								
	Wifi Elerments	<0.1			-		-			
Pattern	Omni-directional									
Impedance	50Ω									
Max Input Power (W)	60									
GPS/GNSS Data										
Frequency Range (MHz)	1559-1612									-
Impedance	50Ω									-
LNA Gain	26dB									-
Voltage / Current	3-5v 15ma Typical									-
Polarisation	Right Hand Circular									-
Mechanical Data										
Dimensions (mm)	Height	85 (3.34")								
	Width	350 (13.78")								
	Length	350 (13.78")								
Environmental Specification										
Operating Temp (°C)	-40° / +85°C ( -40° / +185°F )									
Radome Material	Ultem 1010									
Radome Flame Retardance Rating	V0 (UL 94)									
Base Material	Cast Aluminium (corrosion protected & powder coated)									
Rail Industry Approvals										
Flammability	EN45545-2:2020 - HL3 External									
Environmental	EN50155:2021 -Low temperature, dry heat, salt mist, damp heat cyclic, shock, random vibration, long life random vibration									
EMC/EMI	EN 50121-3-2:2016 A1: 2019 - EMC / EMI									
Insulation / Short Circuit	EN 50124-1:2017 - Insulation Test - (27.5KV AC 50Hz 1 min)   EN50388:2012 / EN50122-1:2022 - (40kA 50Hz AC 100ms ) - Cell elements only									
Ingress Protection / Vandal Protection	ISO 20653: 2013 - IP69K   EN 62262:2002 - IK07									
Mounting Data										
Fixing	4 × mounting holes to suit M12 bolts 1x M33 central mounting bush									
Termination Data										
Cable Type	C32 (Compliant to UN ECE R118 & EN45545-2)									
Cable Diameter (mm)	5 (0.2")									
Cable Length (m)	0.5m (20")									
Termination	4G/5G	4x N Socket (f)								
	WiFi	4x N Socket (f)	3x N Socket (f)	2x N Socket (f)	-	-				
	GPS/GNSS	1x TNC Plug (m)								

\*Across 90% of relevant bands when measured on a 600 x 600mm (2' x 2') ground plane with 0.5m (20") of CS32 cable

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W: www.panorama-antennas.com

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Page 2

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# 4X4 MiMo 4G/5G

## Transit Antenna

TRNM[X]4-6-60-[X]

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### Electrical Data- Cell

Measurement Conditions	4G/5G Antennas				
TRNMG4-6-60-Q measured on 600x600mm (2'x2') ground plane with 0.5m (20") CS32 Pigtails	Frequency Range (MHz)	LTE Bands	Antenna Element	Peak Gain (dBi)	Efficiency (%)
	617-698	71	Cell A	5.8	80
			Cell B	6.0	79
			Cell C	6.1	78
			Cell D	5.7	80
	699-798	12,13, 14 17,28	Cell A	6.9	82
			Cell B	6.9	82
			Cell C	7.0	82
			Cell D	6.7	81
	807- 862	5,19,20,26,27	Cell A	7.2	81
			Cell B	7.3	81
			Cell C	7.5	81
			Cell D	7.1	81
	880-960	8	Cell A	7.2	84
			Cell B	7.3	84
			Cell C	7.5	84
			Cell D	7.1	84
	1427-1518	11, 21, 74,75,76	Cell A	7.9	86
			Cell B	8.0	86
			Cell C	8.2	87
			Cell D	8.1	86
	1710-1920	2,3,4,9,25,35, 39,66	Cell A	7.3	76
			Cell B	7.1	77
			Cell C	7.1	77
			Cell D	7.1	77
	1920-2170	1,23	Cell A	8.1	76
			Cell B	8.6	77
			Cell C	8.8	77
			Cell D	8.2	77
	2300-2400	30,40	Cell A	9.1	80
			Cell B	9.2	81
			Cell C	9.5	81
			Cell D	9.1	82
	2496-2690	7,38,41	Cell A	8.4	82
			Cell B	8.4	83
			Cell C	8.5	83
			Cell D	8.7	84
	3300-4200	22,42,43,48,77, 78,79	Cell A	7.4	69
			Cell B	7.2	69
			Cell C	7.3	68
			Cell D	7.3	70
	4400-5000	79	Cell A	7.1	65
			Cell B	7.3	63
			Cell C	7.6	67
			Cell D	8.0	69


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## Transit Antenna

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### Electrical Data - WiFi

Measurement Conditions	WiFi Antennas				
TRNMG4-6-60-Q measured on 600x600mm (2'x2') ground plane with 0.5m (20") CS32 Pigtailed	Frequency Range (MHz)	WiFi Bands	Antenna Element	Peak Gain (dBi)	Efficiency (%)
	2396-2485	2.5GHz	WiFi 1	8.2	71
			WiFi 2	8.3	70
			WiFi 3	7.8	71
			WiFi 4	7.9	71
	5150-5250	UNII-1	WiFi 1	7.8	70
			WiFi 2	7.0	68
			WiFi 3	8.0	68
			WiFi 4	7.0	69
	5250-5350	UNII-2A	WiFi 1	7.6	69
			WiFi 2	6.6	68
			WiFi 3	7.2	68
			WiFi 4	7.2	69
	5470-5725	UNII-2B	WiFi 1	7.9	64
			WiFi 2	7.1	62
			WiFi 3	7.7	64
			WiFi 4	7.3	61
	5725-5900	UNII-3	WiFi 1	8.4	62
			WiFi 2	7.7	58
			WiFi 3	8.5	60
			WiFi 4	8.1	59
	5845-5885	UNII-4	WiFi 1	8.2	60
			WiFi 2	7.5	56
			WiFi 3	8.3	58
			WiFi 4	7.8	57
	5935-6415	UNII-5	WiFi 1	9.0	66
			WiFi 2	9.0	58
			WiFi 3	9.1	61
			WiFi 4	9.2	59
	6435-6515	UNII-6	WiFi 1	7.6	69
			WiFi 2	7.6	58
			WiFi 3	7.5	62
			WiFi 4	7.9	60
	6535-6875	UNII-7	WiFi 1	8.1	71
			WiFi 2	7.0	61
			WiFi 3	8.3	65
			WiFi 4	7.4	62
	6875-7125	UNII-8	WiFi 1	8.3	69
			WiFi 2	7.8	62
			WiFi 3	8.3	66
			WiFi 4	7.7	61

# 4X4 MiMo 4G/5G

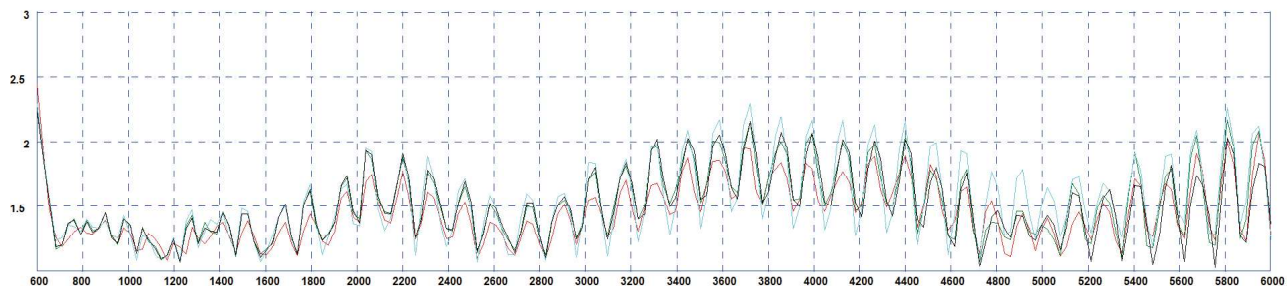
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TRNM[X]4-6-60-[X]

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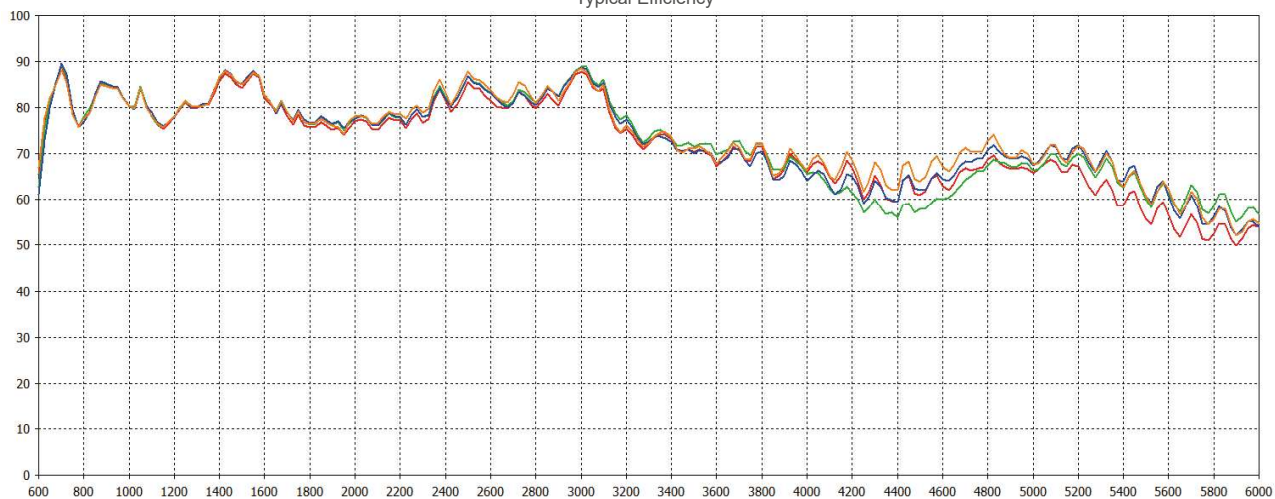
### Electrical Data- Cell

Typical VSWR \*



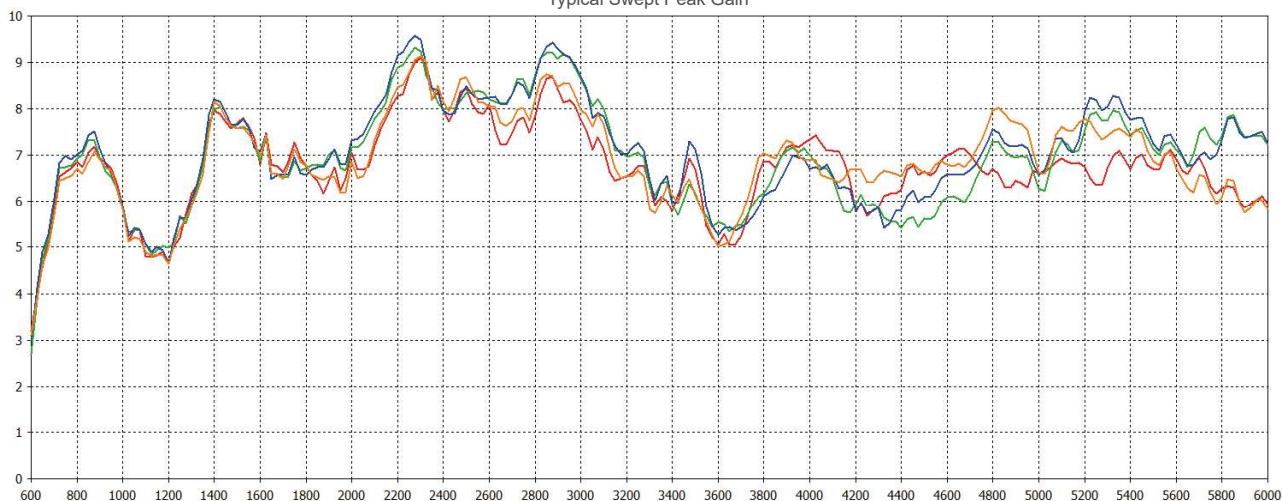
\*VSWR measured with 0.5m (1.5') of CS32 cable

Typical Efficiency\*



\*Efficiency measured with 0.5m (1.5') of CS32 cable

Typical Swept Peak Gain\*



\* Swept peak gain measured with 0.5m (1.5') of CS32 cable

# 4X4 MiMo 4G/5G

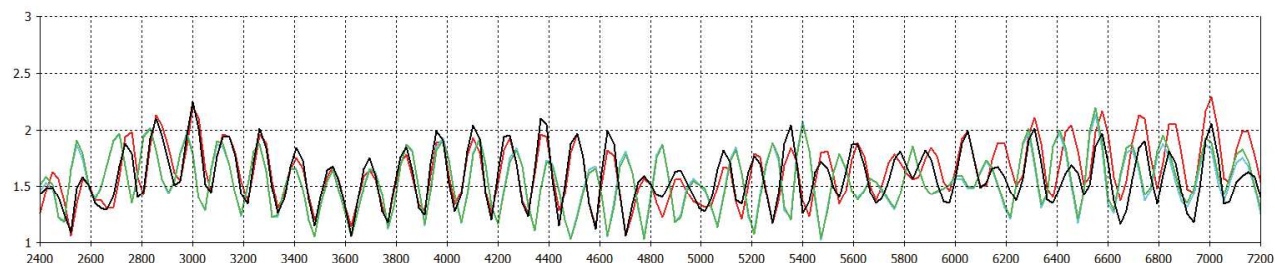
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TRNM[X]4-6-60-[X]

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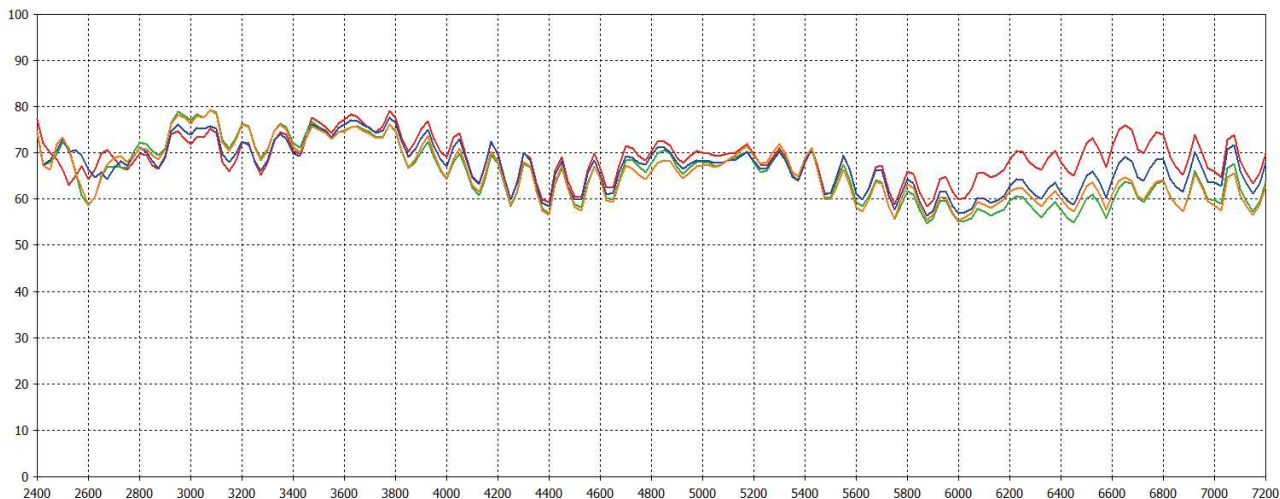
### Electrical Data - WiFi

Typical VSWR \*



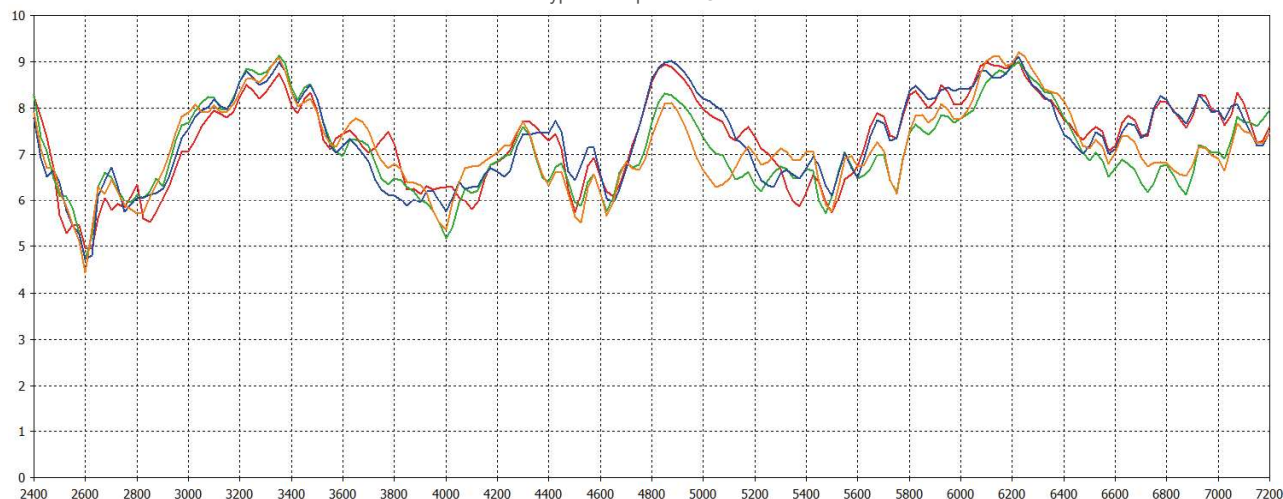
\*VSWR measured with 0.5m (1.5') of CS32 cable

Typical Efficiency\*



\*Efficiency measured with 0.5m (1.5') of CS32 cable

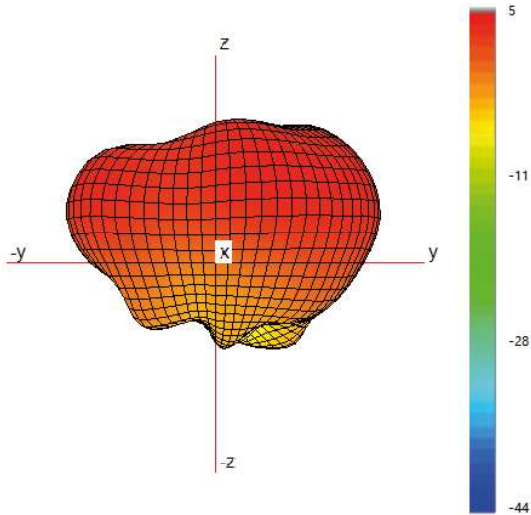
Typical Swept Peak Gain\*



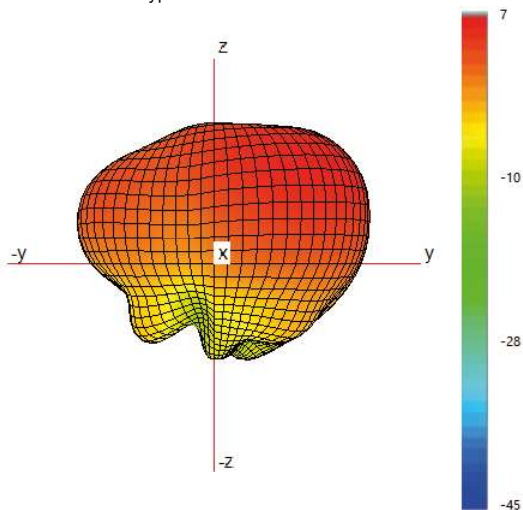
\* Swept peak gain measured with 0.5m (1.5') of CS32 cable

### 3D Patterns -Cell A

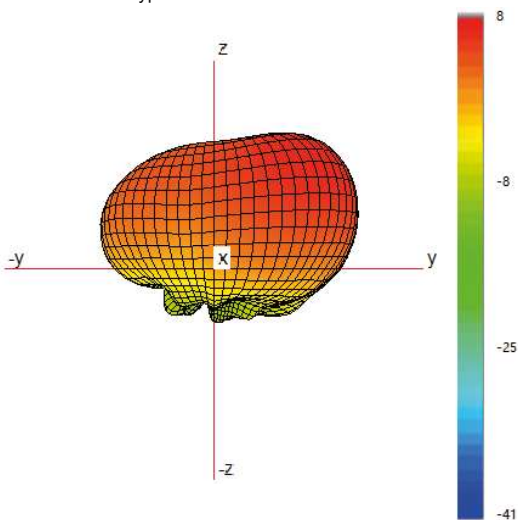
Typical 3D Pattern- Cell A - 650 MHz



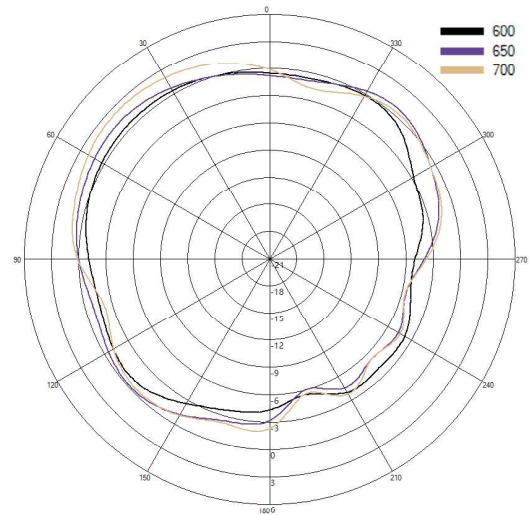
Typical 3D Pattern- Cell A - 750 MHz



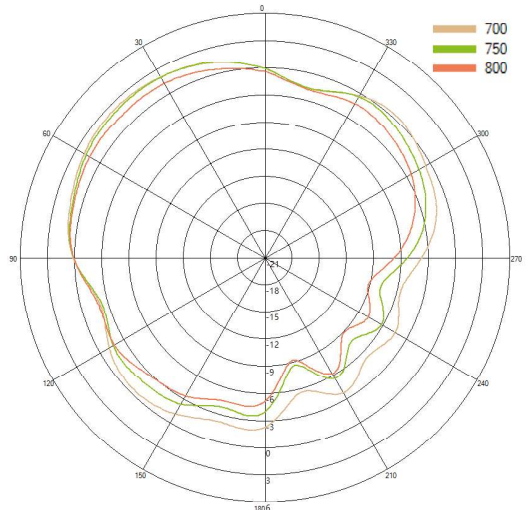
Typical 3D Pattern- Cell A - 850 MHz



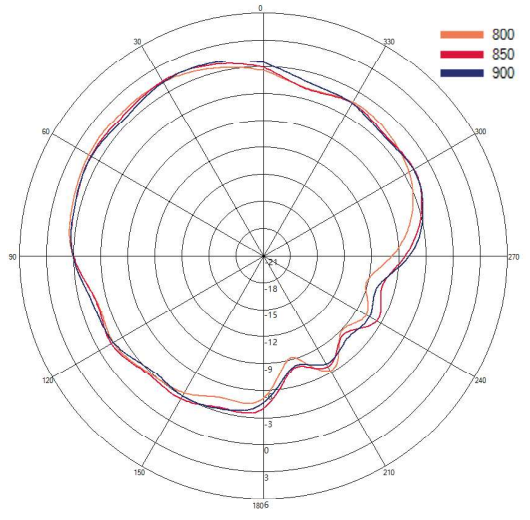
Typical H Plane- Cell A - Patterns- 600-700MHz



Typical H Plane- Cell A - Patterns- 700-800MHz

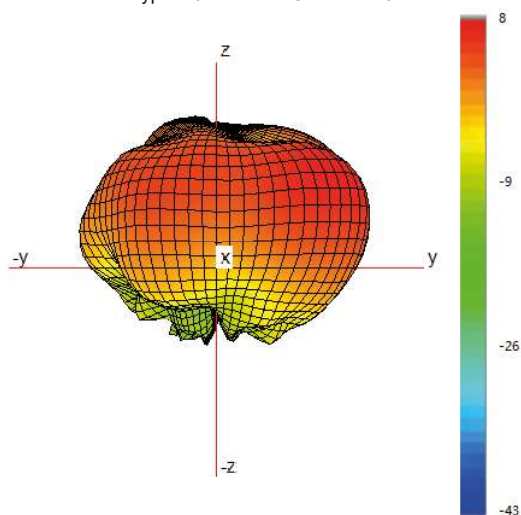


Typical H Plane- Cell A - Patterns- 800-900MHz

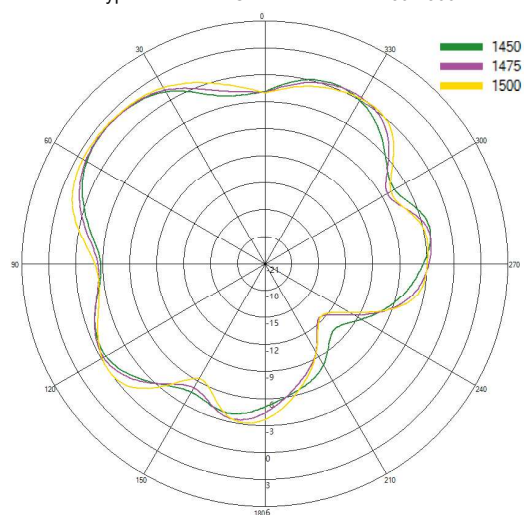


### 3D Patterns Cell A

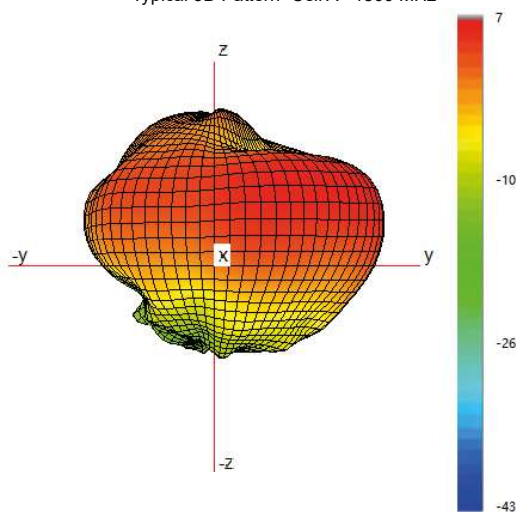
Typical 3D Pattern- Cell A - 1475 MHz



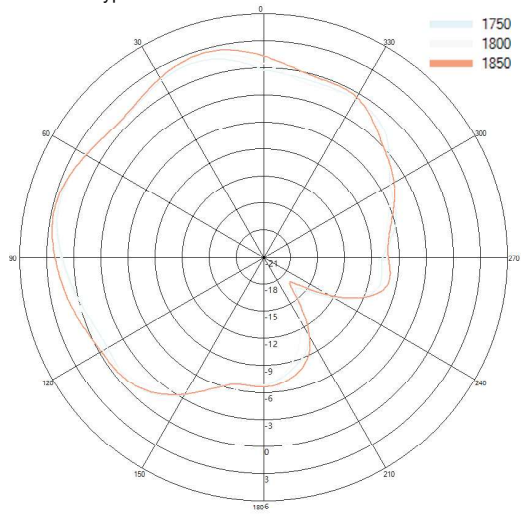
Typical H Plane- Cell A- Patterns- 1450-1500 MHz



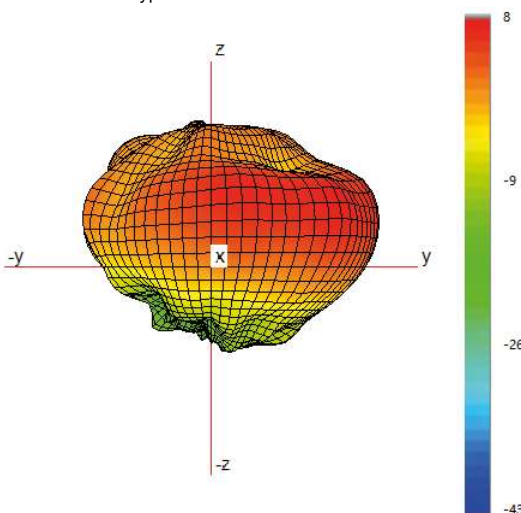
Typical 3D Pattern- Cell A - 1800 MHz



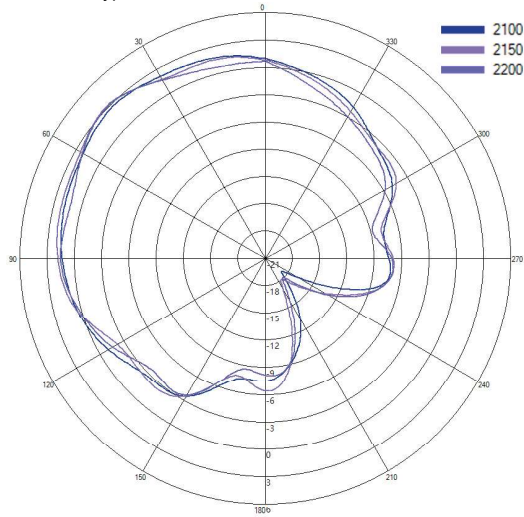
Typical H Plane- Cell A- Patterns- 1750-1850 MHz



Typical 3D Pattern- Cell A - 2150 MHz

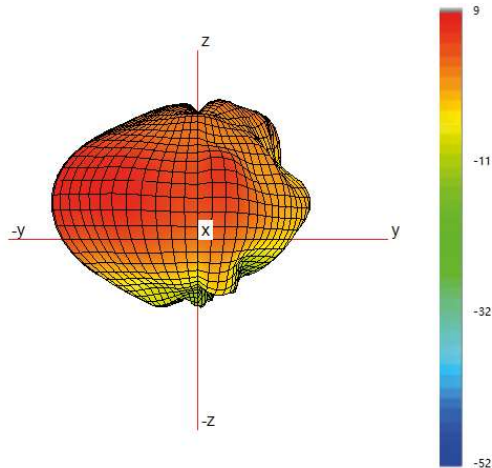


Typical H Plane- Cell A- Patterns- 2100-2200 MHz

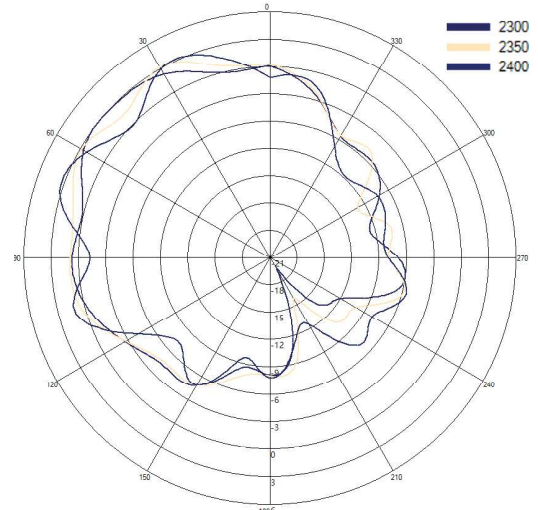


### 3D Patterns -Cell A

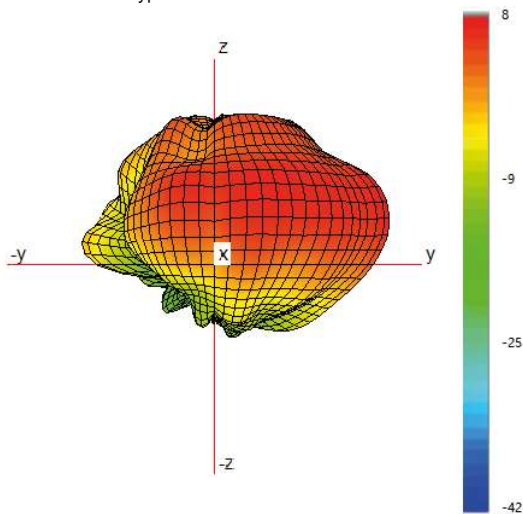
Typical 3D Pattern- Cell A - 2350 MHz



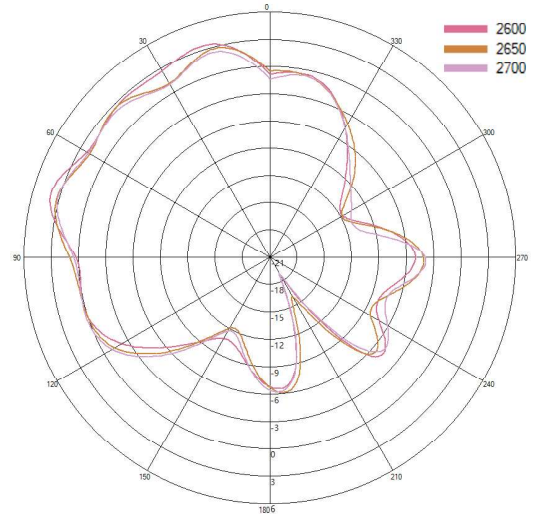
Typical H Plane- Cell A - Patterns- 2300-2400 MHz



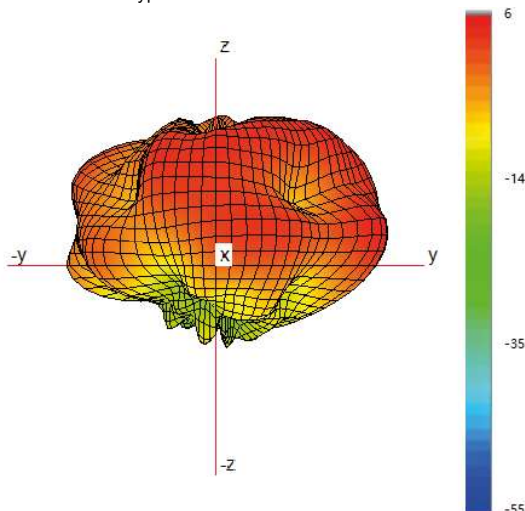
Typical 3D Pattern- Cell A - 2650 MHz



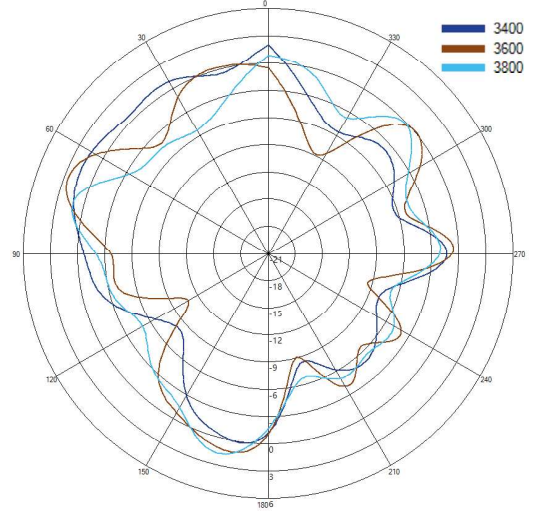
Typical H Plane- Cell A - Patterns- 2600-2700 MHz



Typical 3D Pattern- Cell A - 3600 MHz



Typical H Plane- Cell A - Patterns- 3400-3800 MHz



# 4X4 MiMo 4G/5G

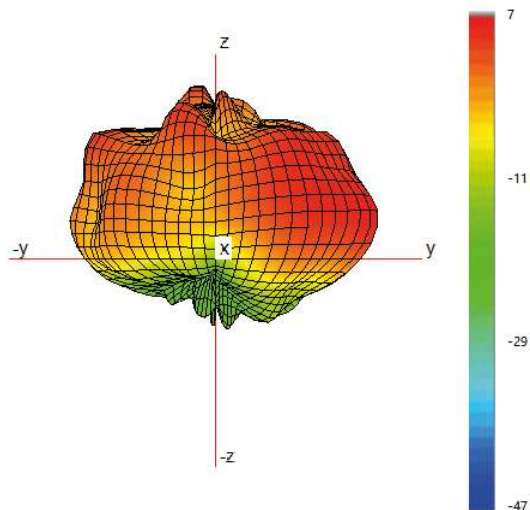
## Transit Antenna

TRNM[X]4-6-60-[X]

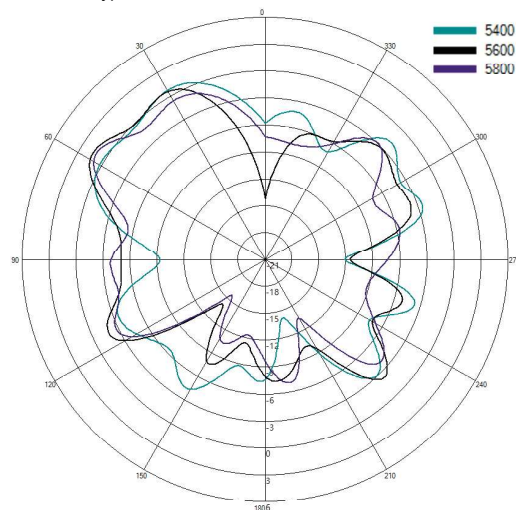
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### 3D Patterns Cell A

Typical 3D Pattern- Cell A - 5600 MHz

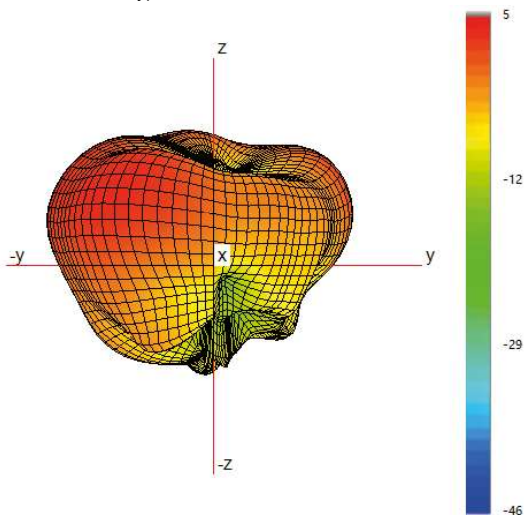


Typical H Plane- Cell A - Patterns- 5400-5800 MHz

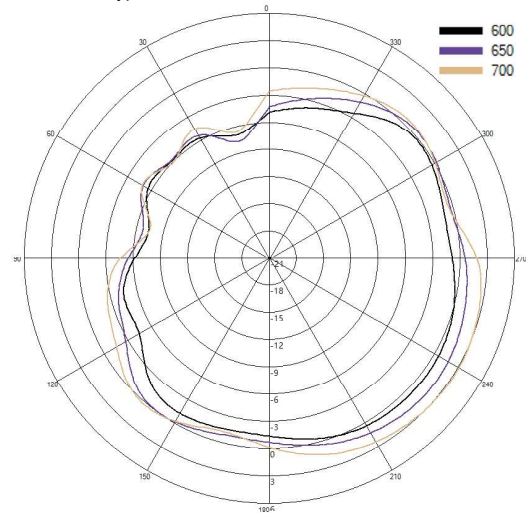


### 3D Patterns -Cell B

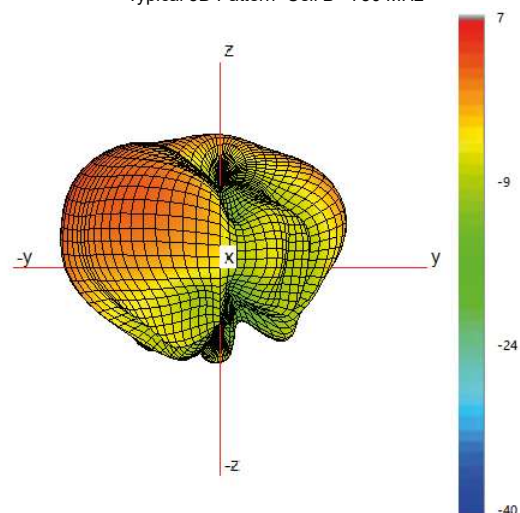
Typical 3D Pattern- Cell B - 650 MHz



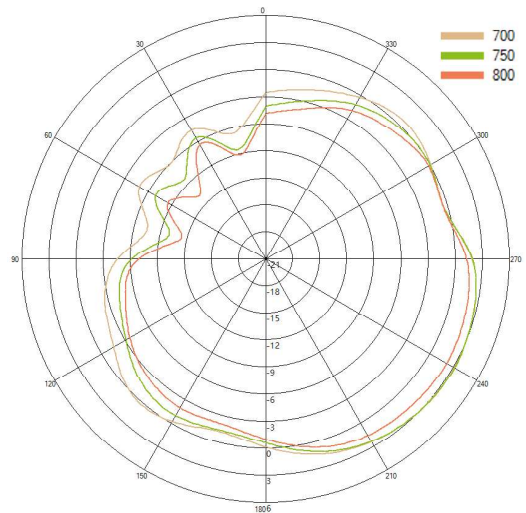
Typical H Plane- Cell B - Patterns- 600-700MHz



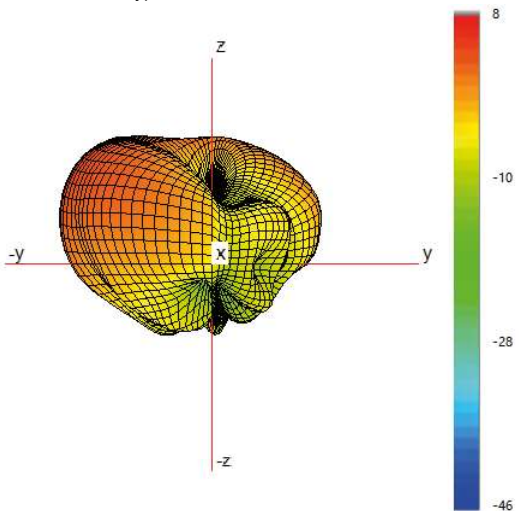
Typical 3D Pattern- Cell B - 750 MHz



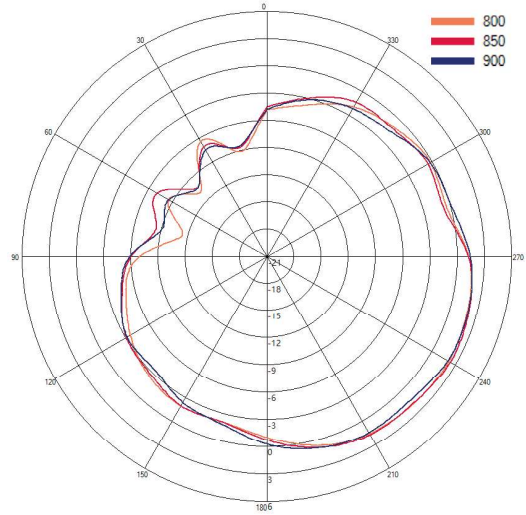
Typical H Plane- Cell B - Patterns- 700-800MHz



Typical 3D Pattern- Cell B - 850 MHz

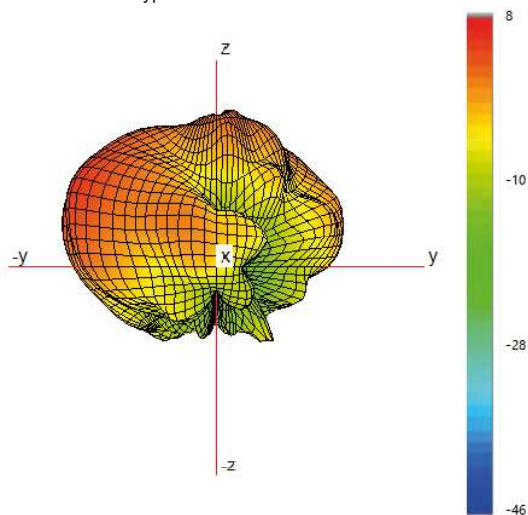


Typical H Plane- Cell B - Patterns- 800-900MHz

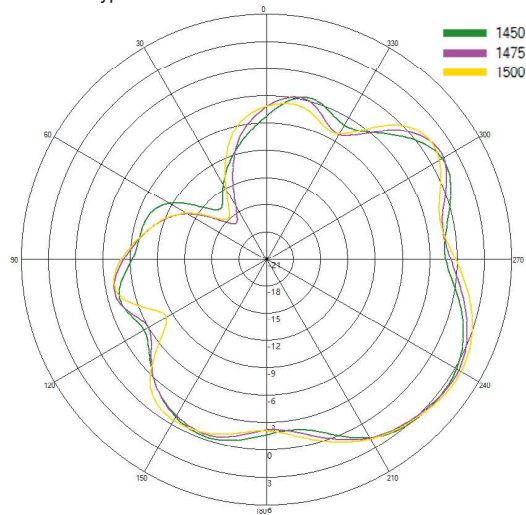


### 3D Patterns Cell B

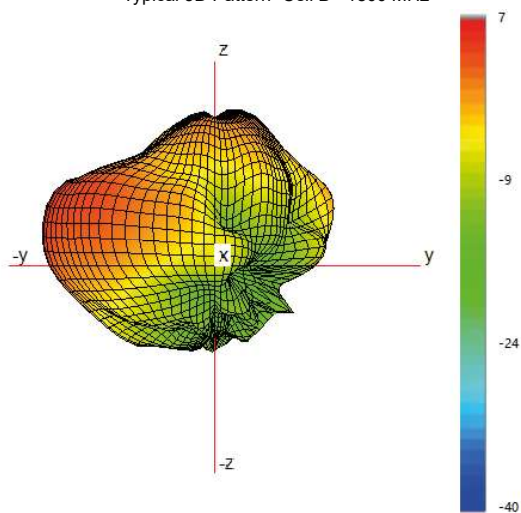
Typical 3D Pattern- Cell B - 1475 MHz



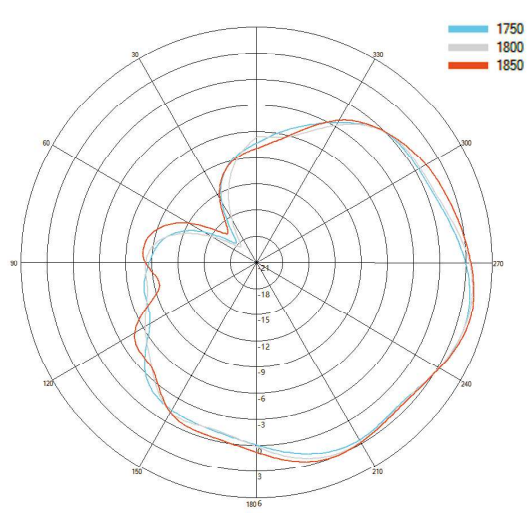
Typical H Plane- Cell B- Patterns- 1450-1500 MHz



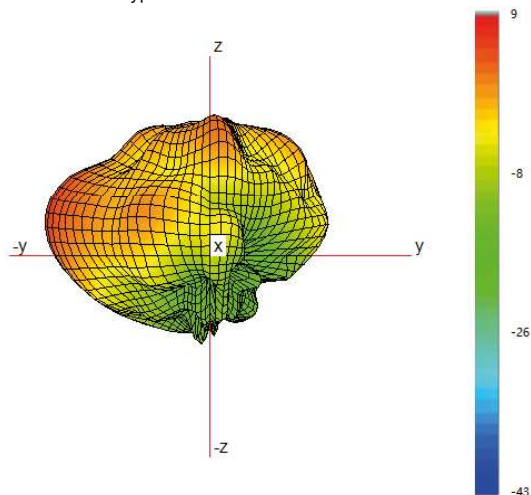
Typical 3D Pattern- Cell B - 1800 MHz



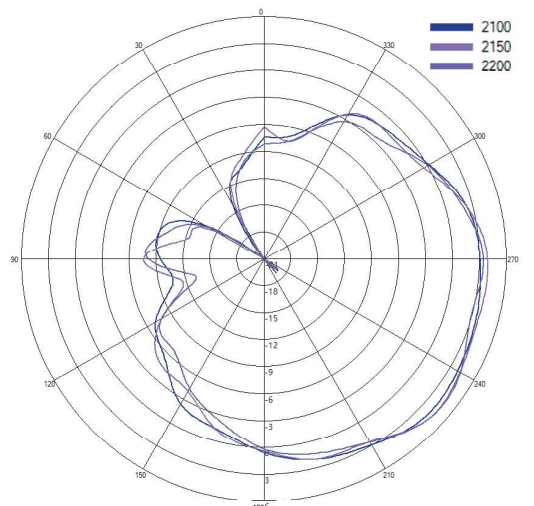
Typical H Plane- Cell B- Patterns- 1750-1850 MHz



Typical 3D Pattern- Cell B - 2150 MHz

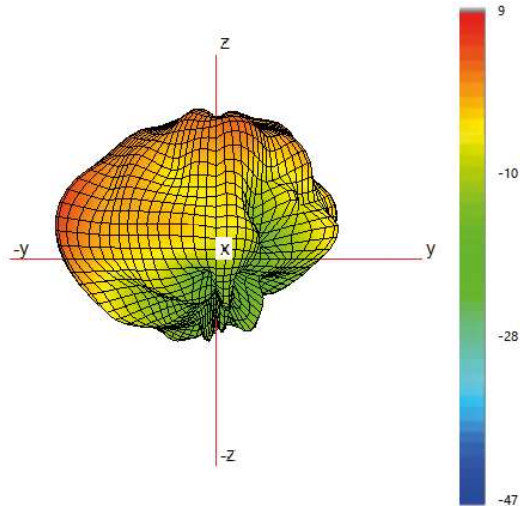


Typical H Plane- Cell B- Patterns- 2100-2200 MHz

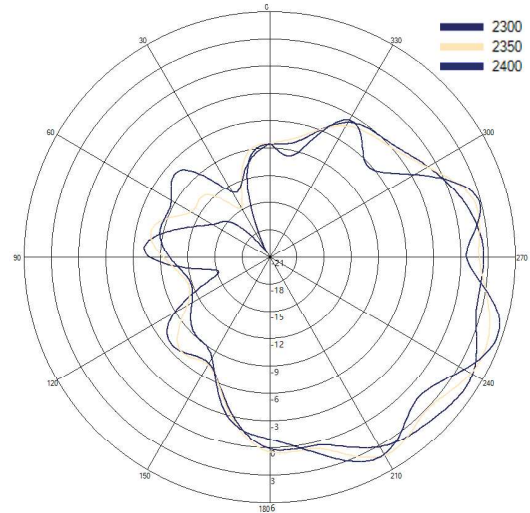


### 3D Patterns -Cell B

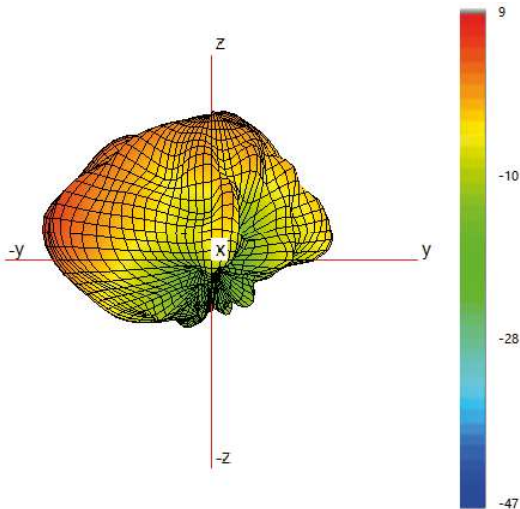
Typical 3D Pattern- Cell B - 2350 MHz



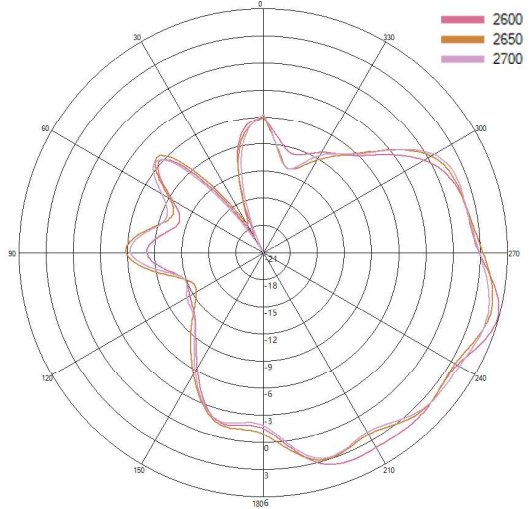
Typical H Plane- Cell B - Patterns- 2300-2400 MHz



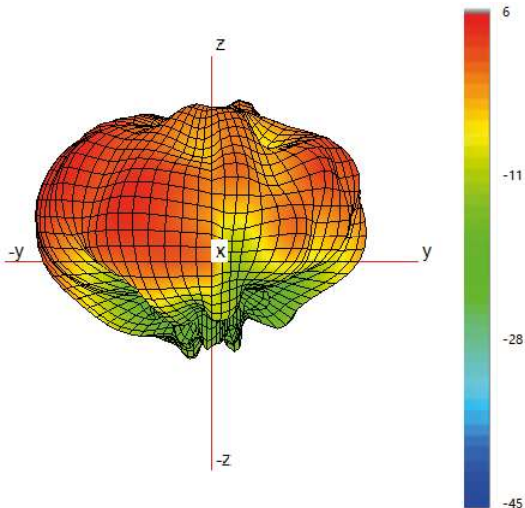
Typical 3D Pattern- Cell B - 2650 MHz



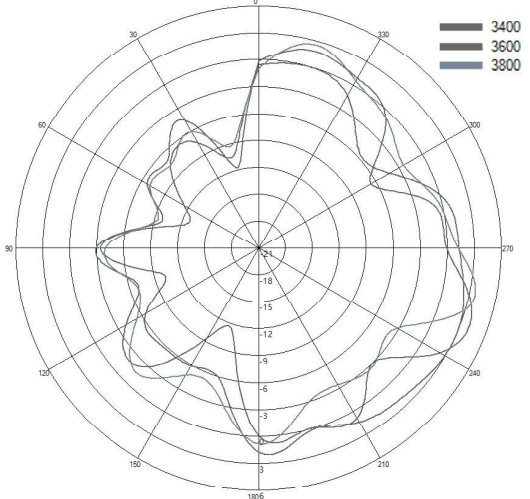
Typical H Plane- Cell B - Patterns- 2600-2700 MHz



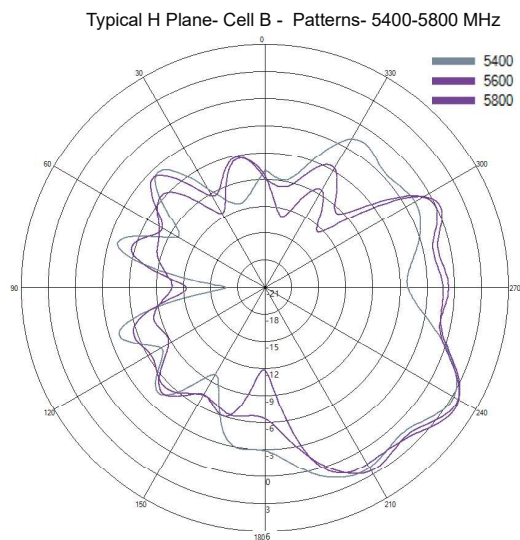
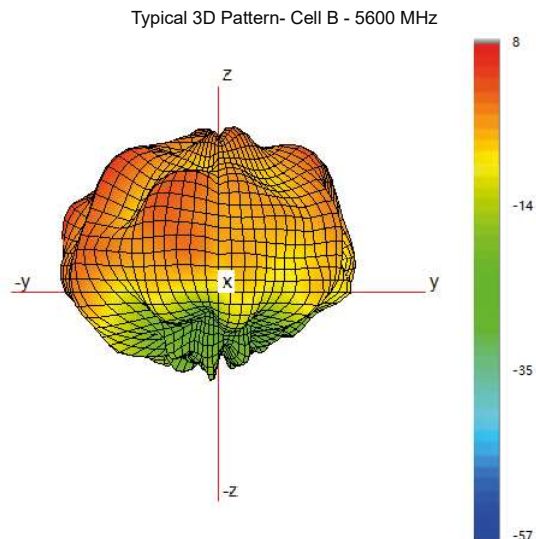
Typical 3D Pattern- Cell B - 3600 MHz



Typical H Plane- Cell B - Patterns- 3400-3800 MHz

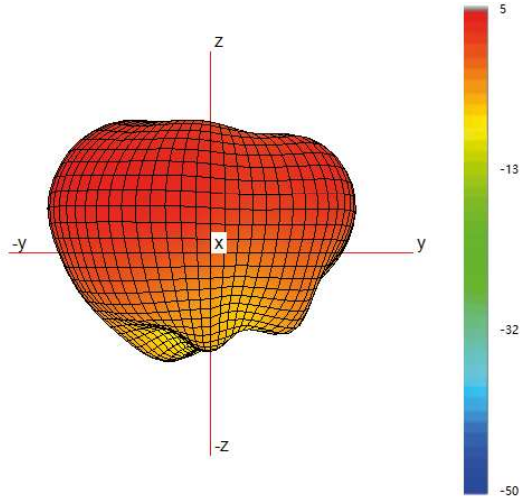


### 3D Patterns Cell B

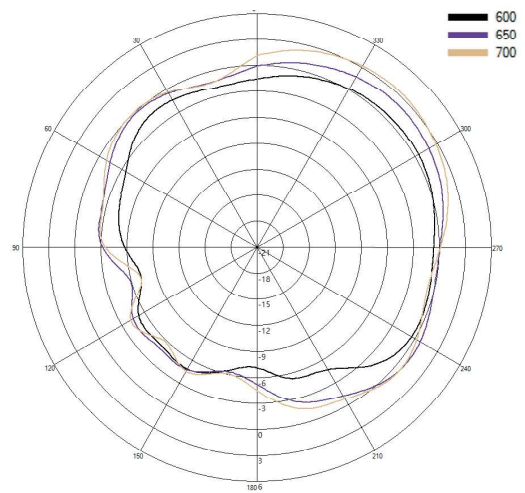


### 3D Patterns -Cell C

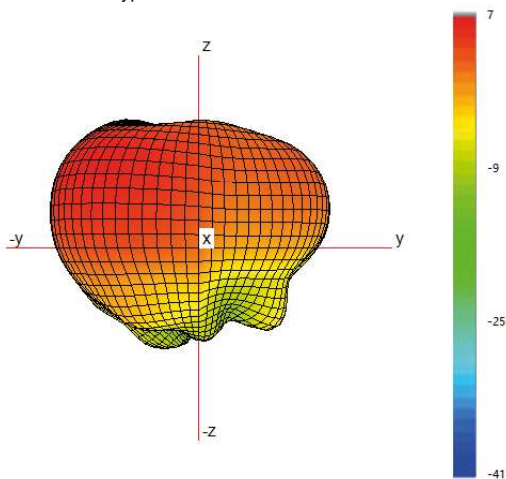
Typical 3D Pattern- Cell C - 650 MHz



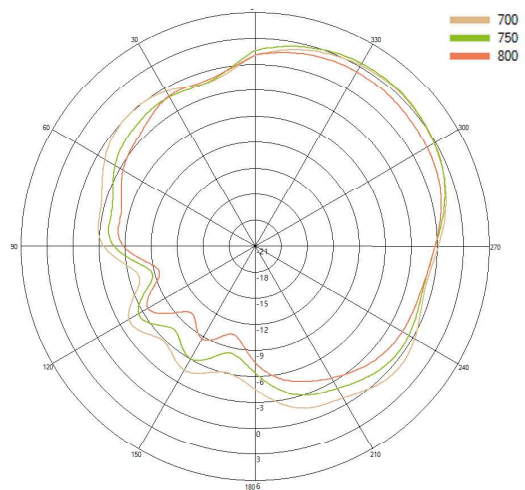
Typical H Plane- Cell C - Patterns- 600-700MHz



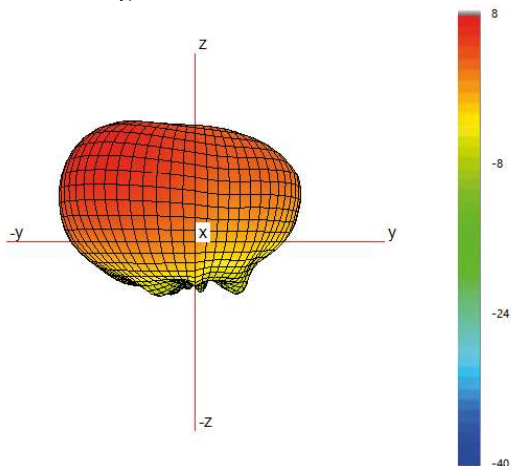
Typical 3D Pattern- Cell C - 750 MHz



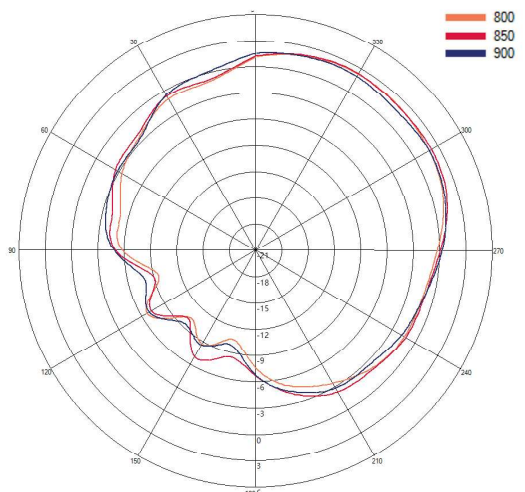
Typical H Plane- Cell C - Patterns- 700-800MHz



Typical 3D Pattern- Cell C - 850 MHz

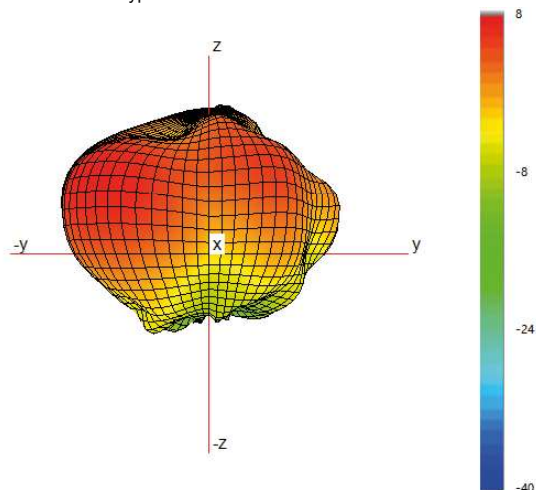


Typical H Plane- Cell C - Patterns- 800-900MHz

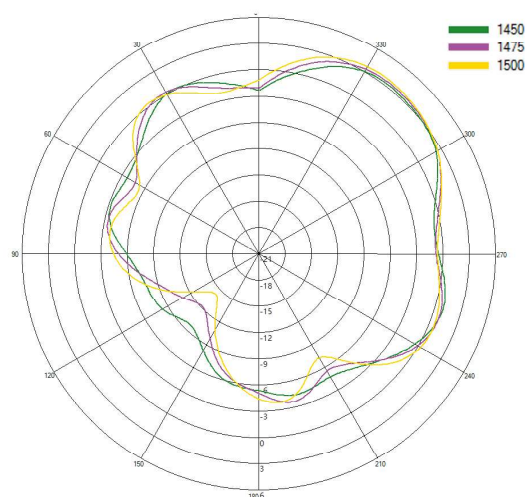


### 3D Patterns Cell C

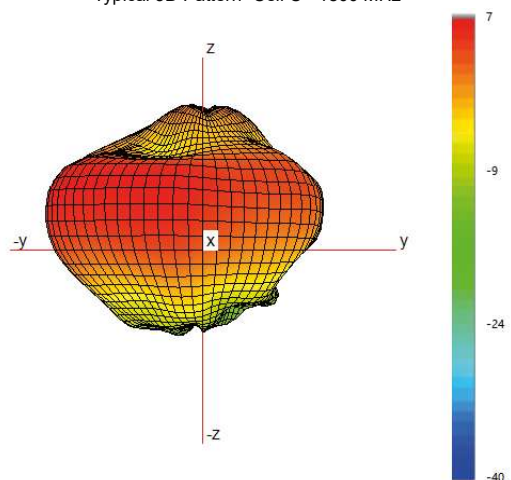
Typical 3D Pattern- Cell C - 1475 MHz



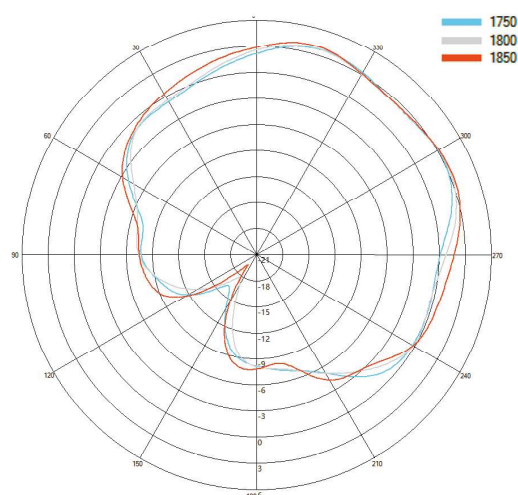
Typical H Plane- Cell C- Patterns- 1450-1500 MHz



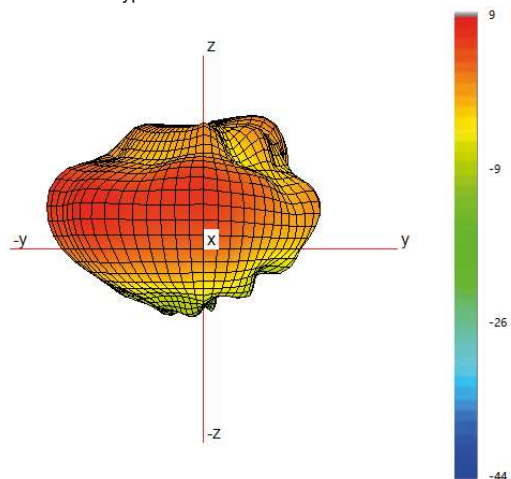
Typical 3D Pattern- Cell C - 1800 MHz



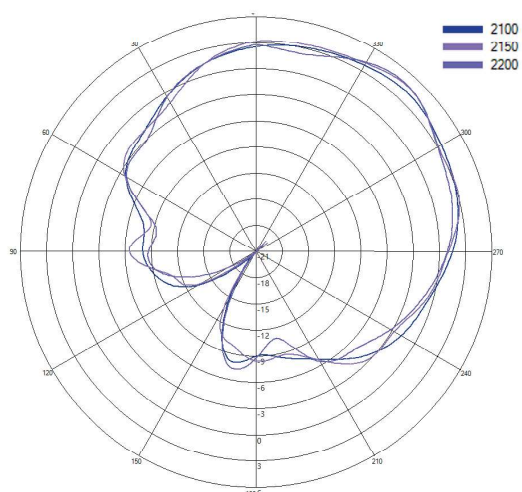
Typical H Plane- Cell C- Patterns- 1750-1850 MHz



Typical 3D Pattern- Cell C - 2150 MHz

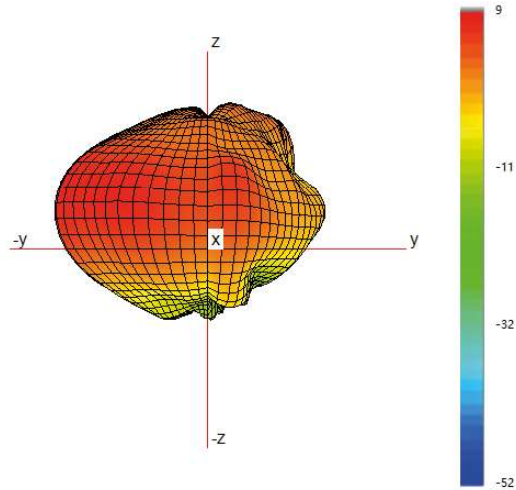


Typical H Plane- Cell C- Patterns- 2100-2200 MHz

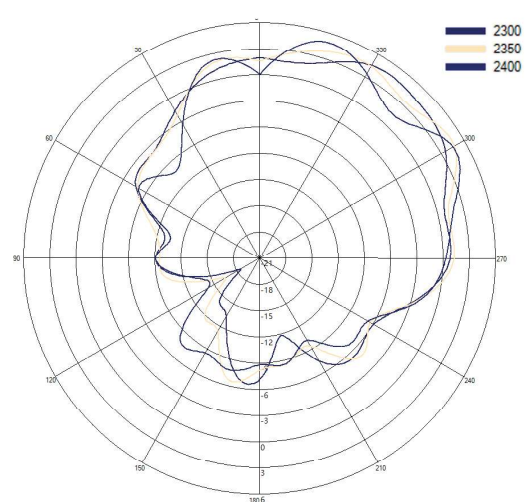


### 3D Patterns -Cell C

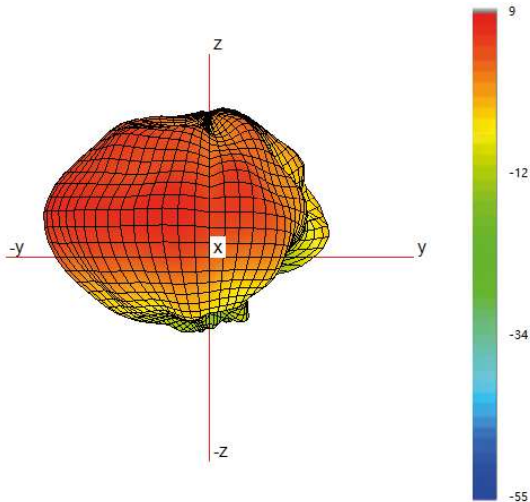
Typical 3D Pattern- Cell C - 2350 MHz



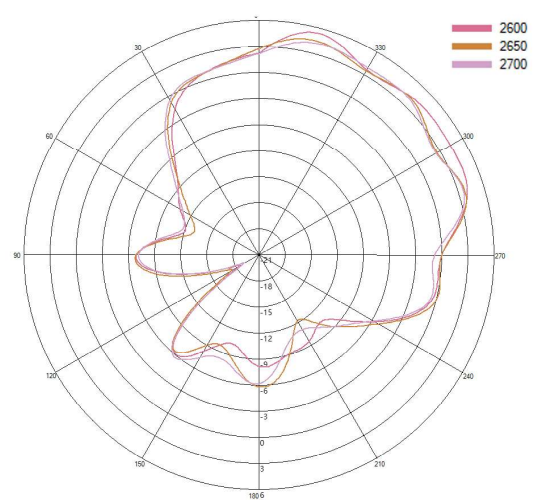
Typical H Plane- Cell C - Patterns- 2300-2400 MHz



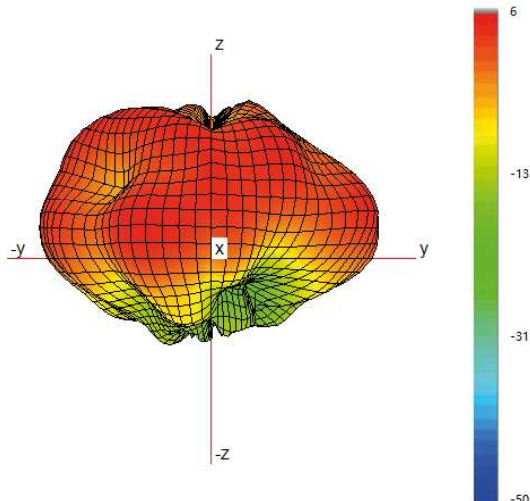
Typical 3D Pattern- Cell C - 2650 MHz



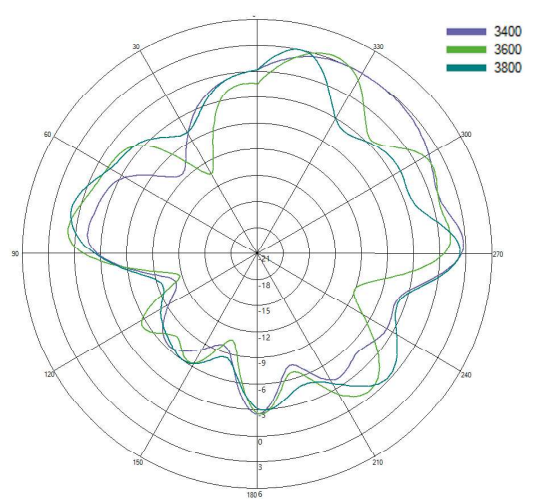
Typical H Plane- Cell C - Patterns- 2600-2700 MHz



Typical 3D Pattern- Cell C - 3600 MHz



Typical H Plane- Cell C - Patterns- 3400-3800 MHz



# 4X4 MiMo 4G/5G

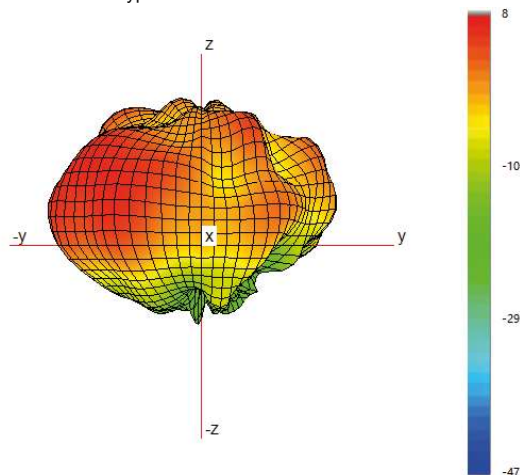
## Transit Antenna

TRNM[X]4-6-60-[X]

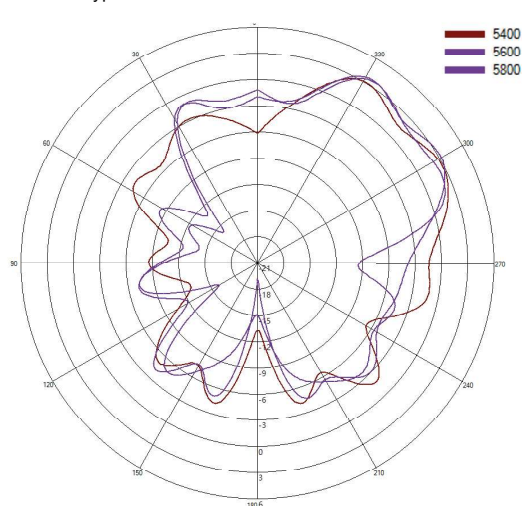
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### 3D Patterns Cell C

Typical 3D Pattern- Cell C - 5600 MHz

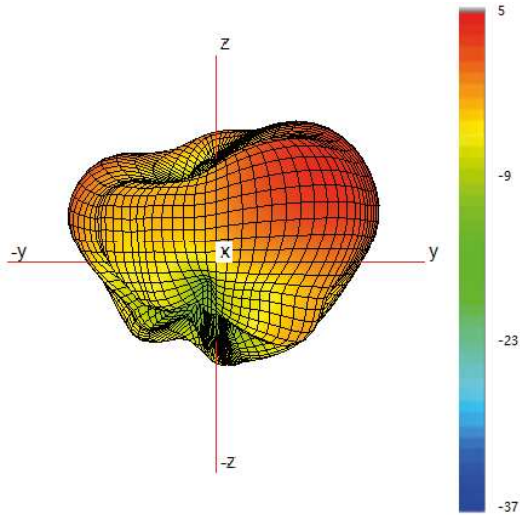


Typical H Plane- Cell C - Patterns- 5400-5800 MHz

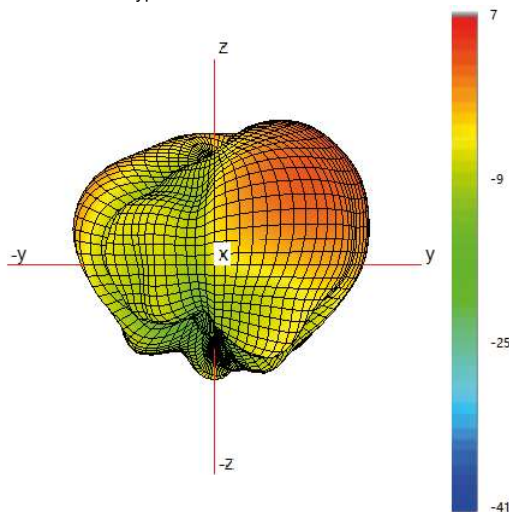


### 3D Patterns -Cell D

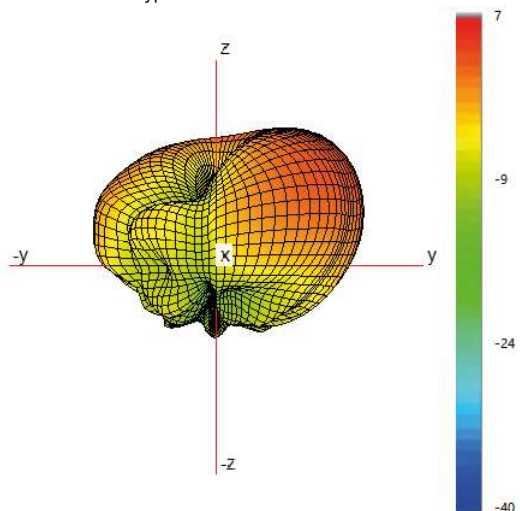
Typical 3D Pattern- Cell D - 650 MHz



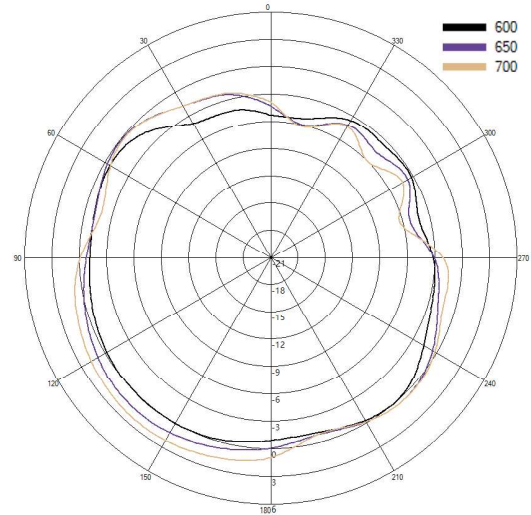
Typical 3D Pattern- Cell D - 750 MHz



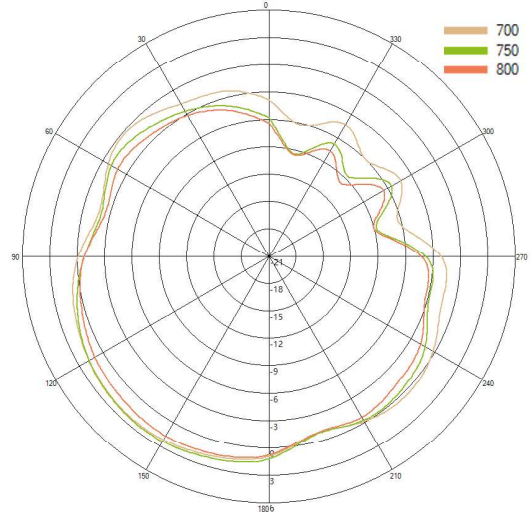
Typical 3D Pattern- Cell D - 850 MHz



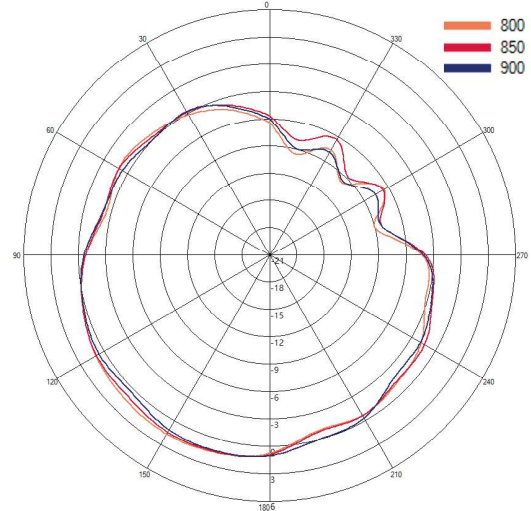
Typical H Plane- Cell D - Patterns- 600-700MHz



Typical H Plane- Cell D - Patterns- 700-800MHz

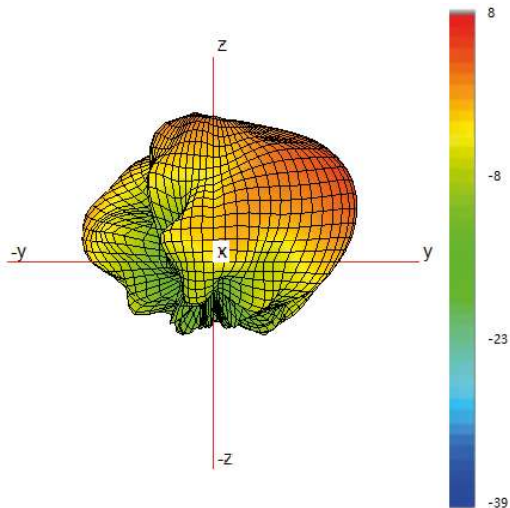


Typical H Plane- Cell D - Patterns- 800-900MHz

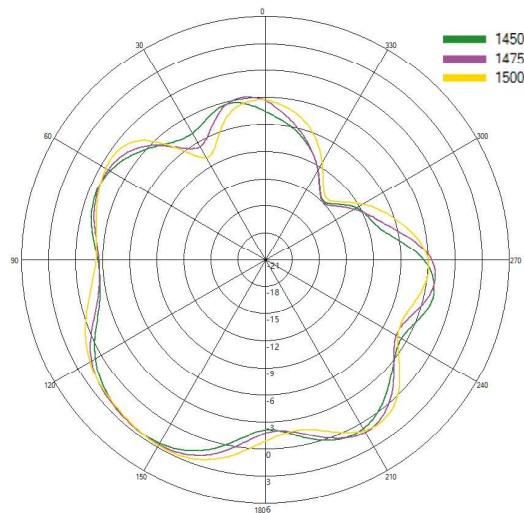


### 3D Patterns Cell D

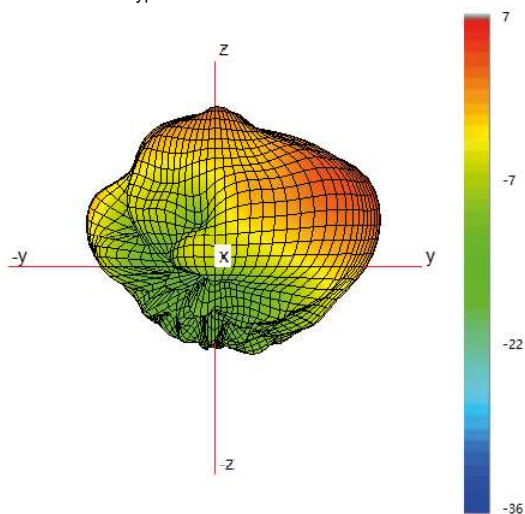
Typical 3D Pattern- Cell D - 1475 MHz



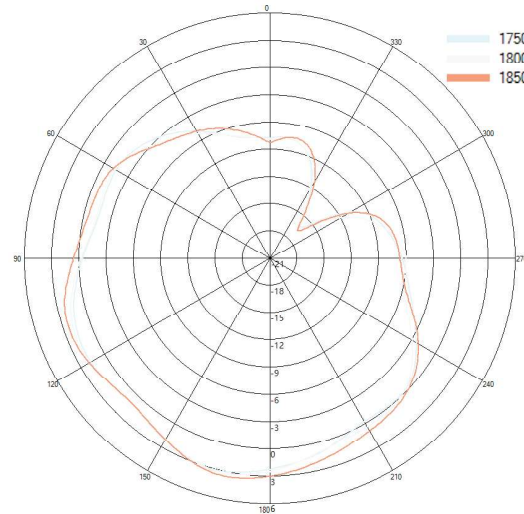
Typical H Plane- Cell D- Patterns- 1450-1500 MHz



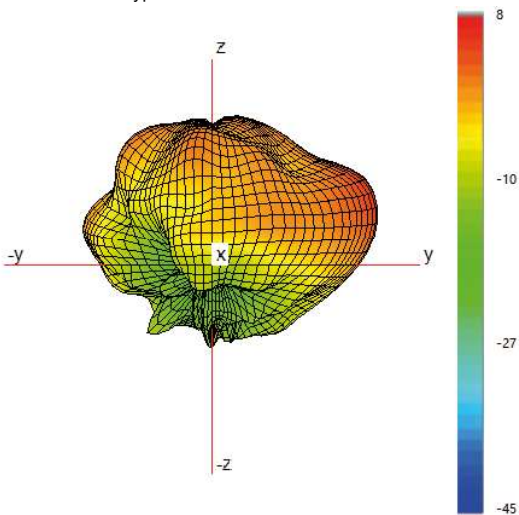
Typical 3D Pattern- Cell D - 1800 MHz



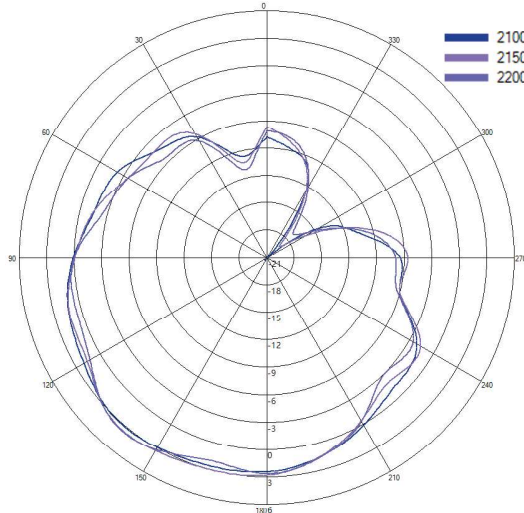
Typical H Plane- Cell D- Patterns- 1750-1850 MHz



Typical 3D Pattern- Cell D - 2150 MHz

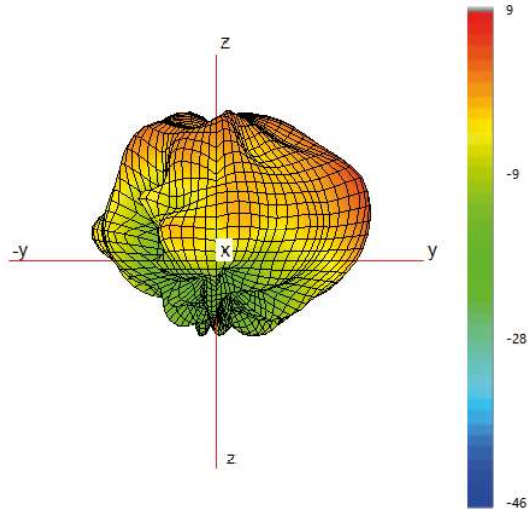


Typical H Plane- Cell D- Patterns- 2100-2200 MHz

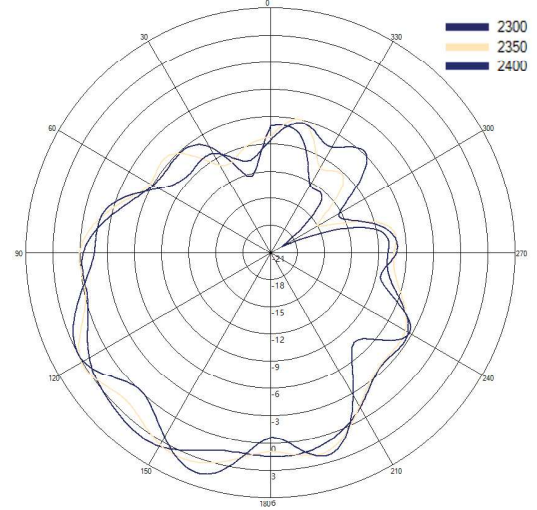


### 3D Patterns -Cell D

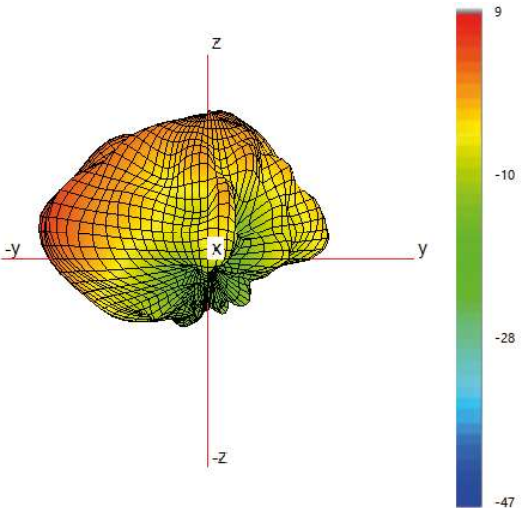
Typical 3D Pattern- Cell D - 2350 MHz



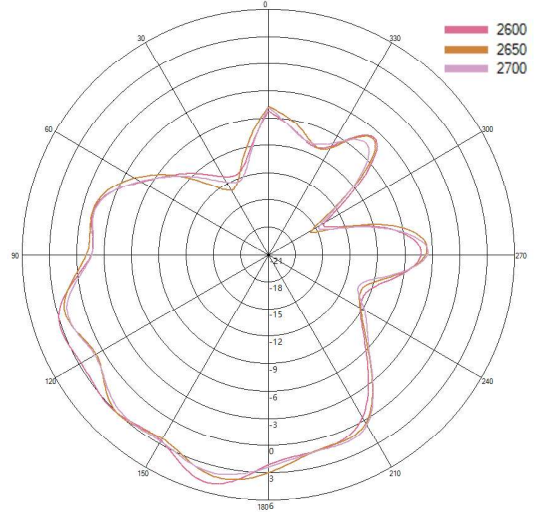
Typical H Plane- Cell D - Patterns- 2300-2400 MHz



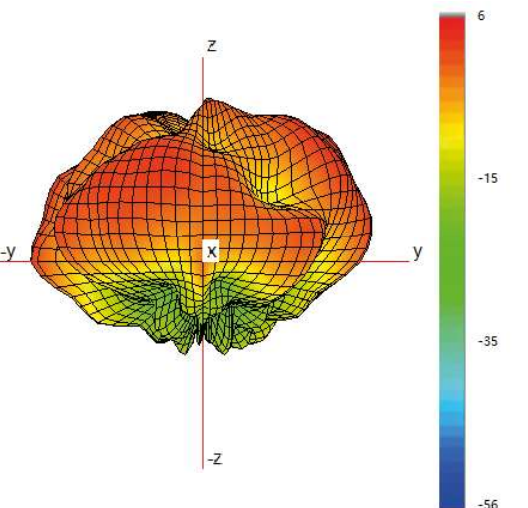
Typical 3D Pattern- Cell D - 2650 MHz



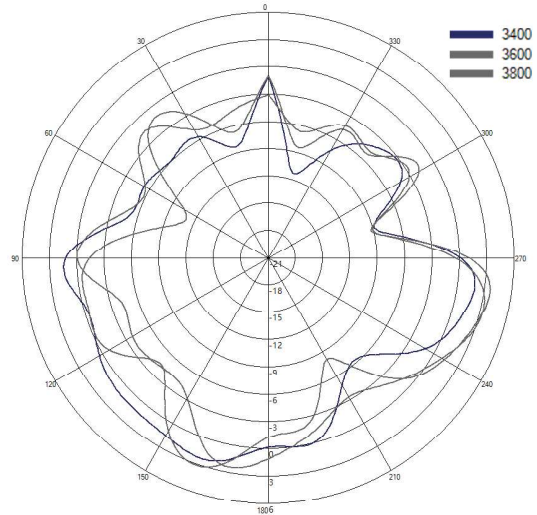
Typical H Plane- Cell D - Patterns- 2600-2700 MHz



Typical 3D Pattern- Cell D - 3600 MHz

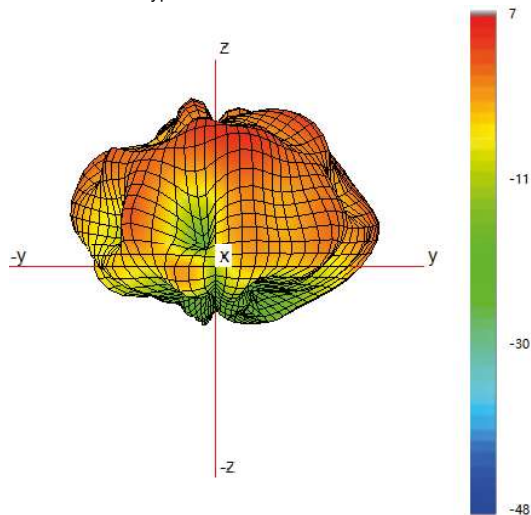


Typical H Plane- Cell D - Patterns- 3400-3800 MHz

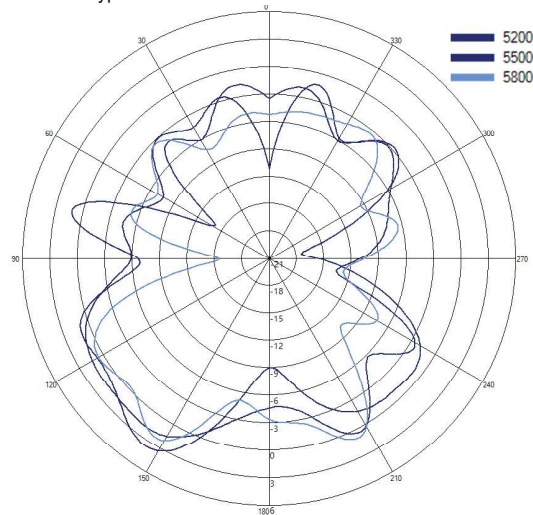


### 3D Patterns Cell D

Typical 3D Pattern- Cell D - 5600 MHz

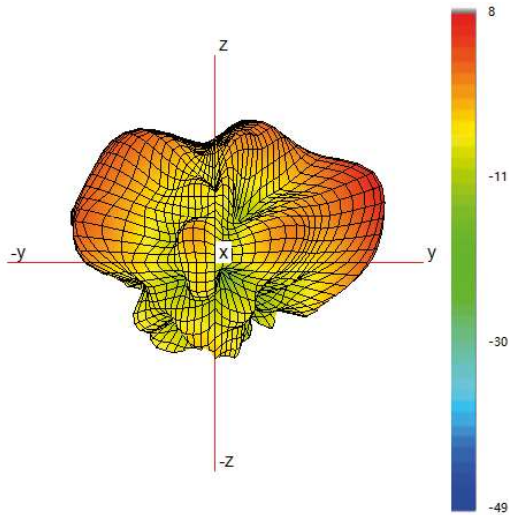


Typical H Plane- Cell D - Patterns- 5400-5800 MHz

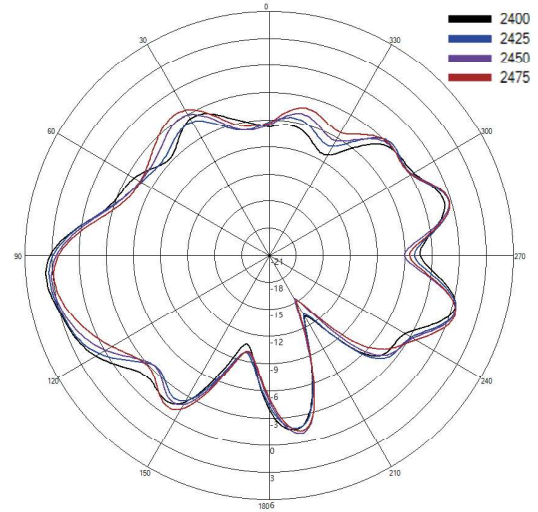


### WiFi Patterns -WiFi -1

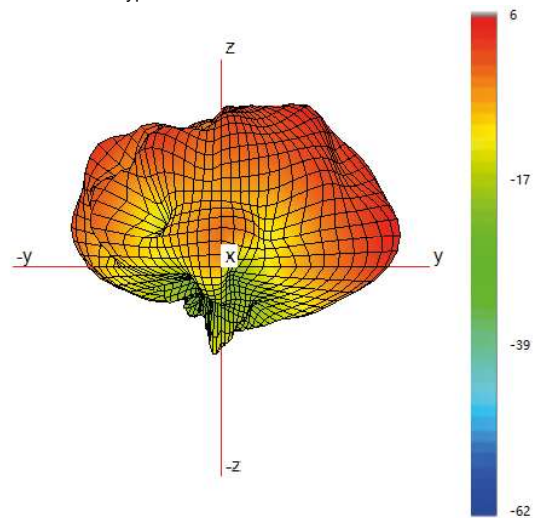
Typical 3D Pattern- WiFi - 1 - 2450 MHz



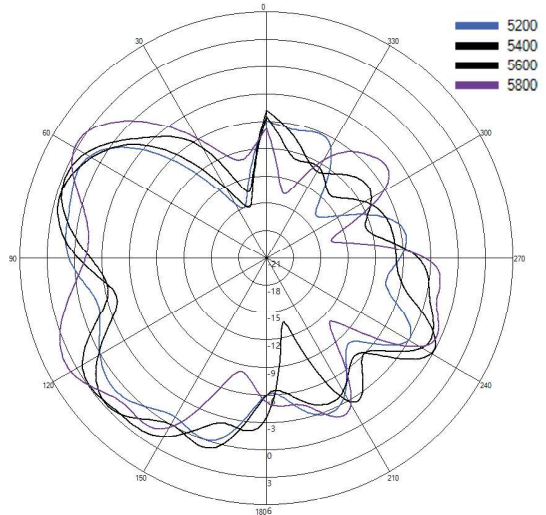
Typical H Plane- WiFi - 1 - Patterns- 2400-2475MHz



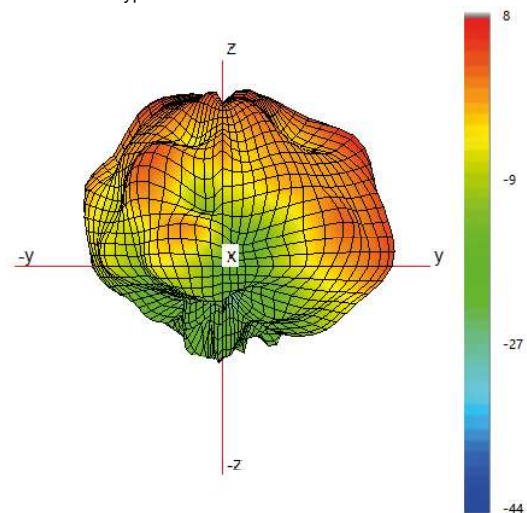
Typical 3D Pattern- WiFi - 1 - 5500 MHz



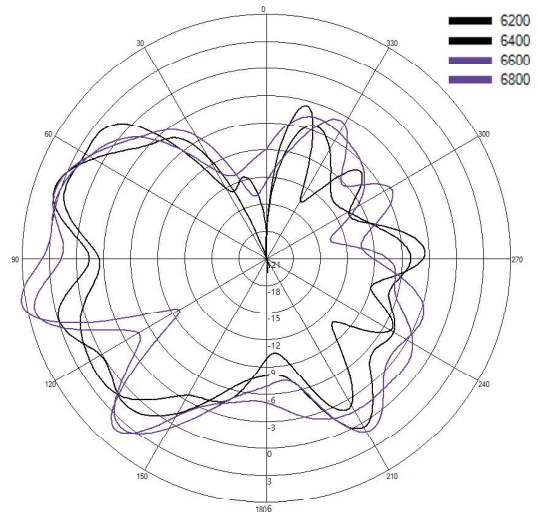
Typical H Plane- WiFi - 1 - Patterns- 5200-5800MHz



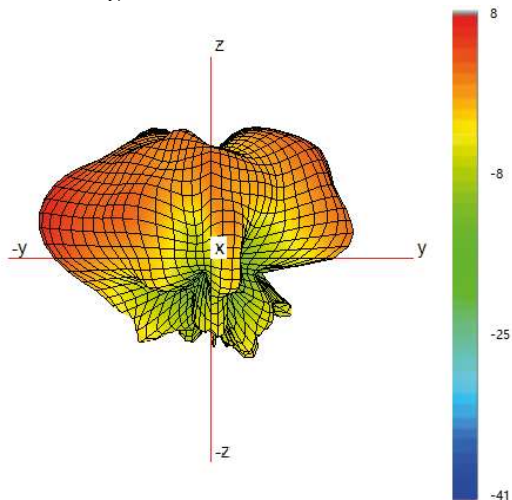
Typical 3D Pattern- WiFi - 1 - 6500 MHz



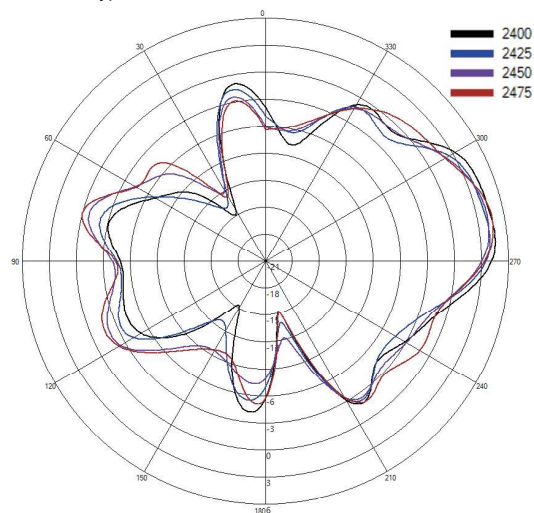
Typical H Plane- WiFi - 1 - Patterns- 6200-6800MHz



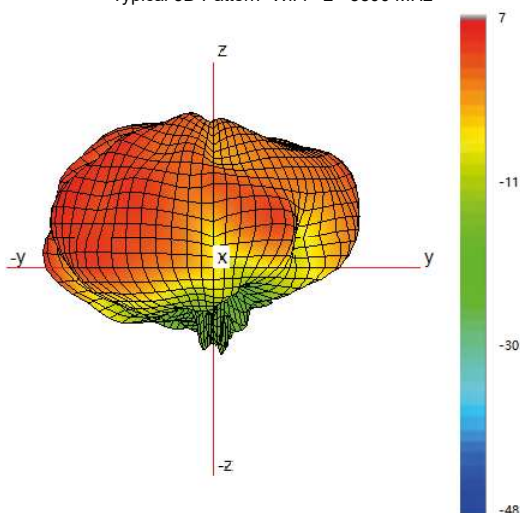
Typical 3D Pattern- WiFi - 2 - 2450 MHz



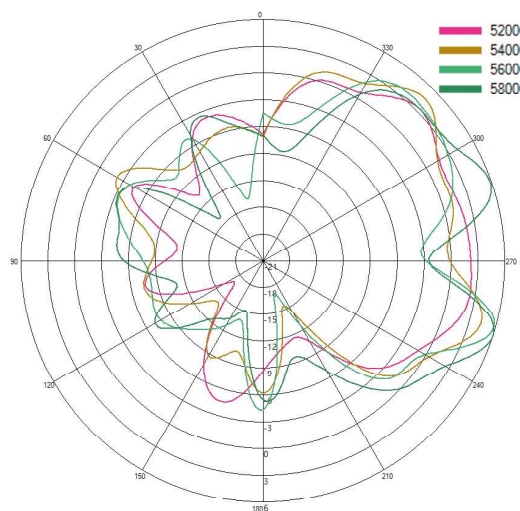
Typical H Plane- WiFi - 2 - Patterns- 2400-2475MHz



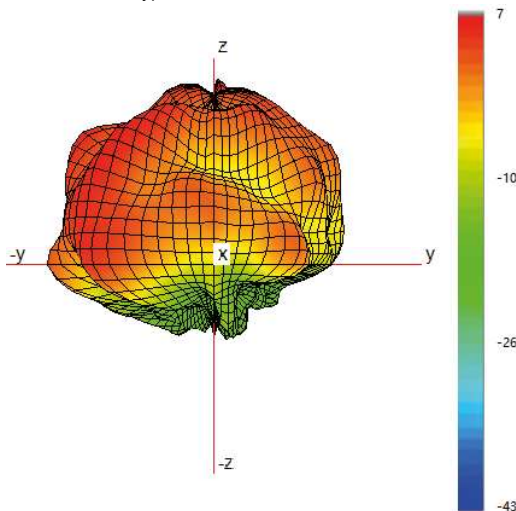
Typical 3D Pattern- WiFi - 2 - 5500 MHz



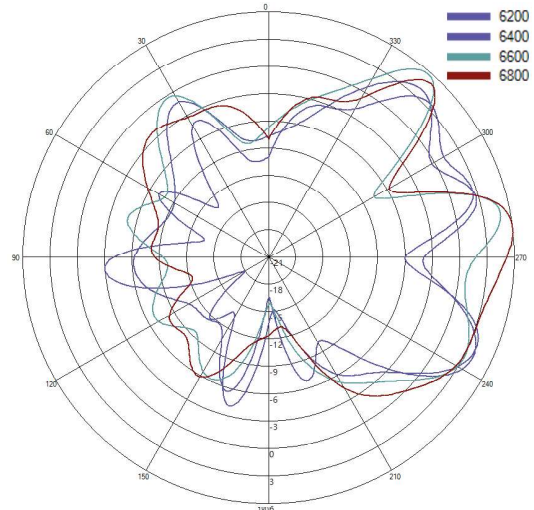
Typical H Plane- WiFi - 2 - Patterns- 5200-5800MHz



Typical 3D Pattern- WiFi - 2 - 6500 MHz



Typical H Plane- WiFi - 2 - Patterns- 6200-6800MHz



# 4X4 MiMo 4G/5G

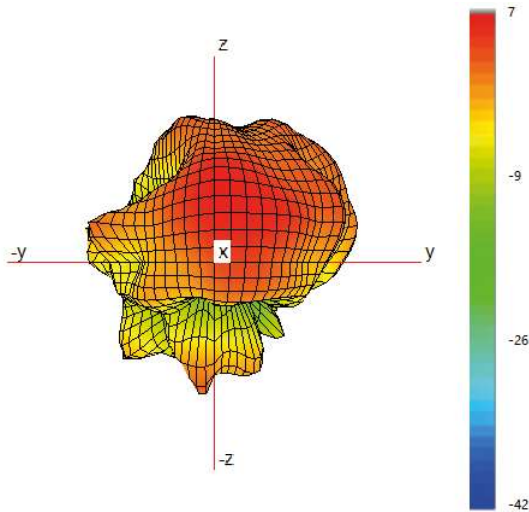
## Transit Antenna

TRNM[X]4-6-60-[X]

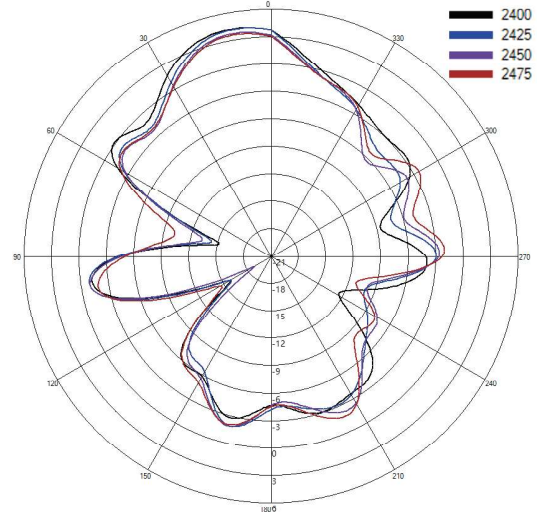
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### WiFi Patterns -WiFi -3

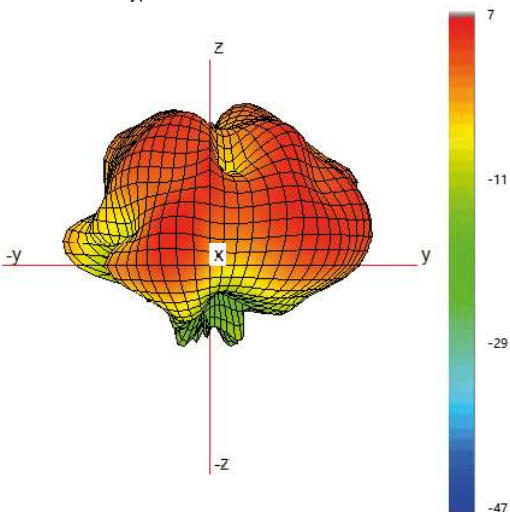
Typical 3D Pattern- WiFi - 3 - 2450 MHz



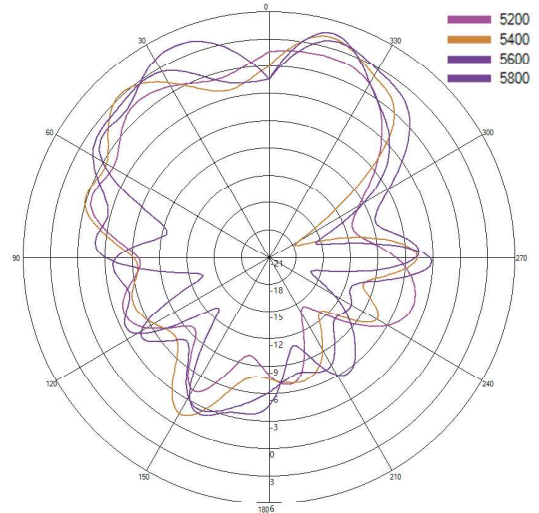
Typical H Plane- WiFi - 3 - Patterns- 2400-2475MHz



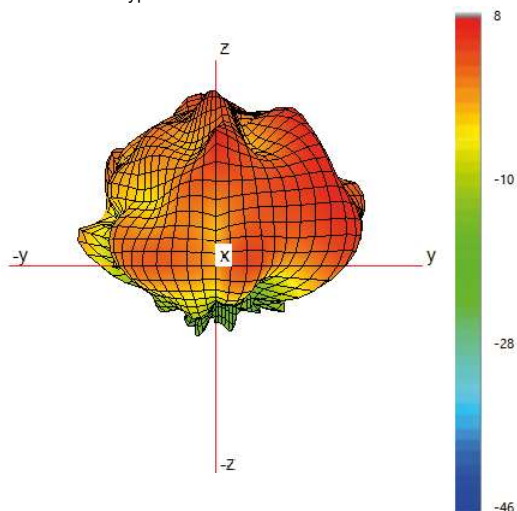
Typical 3D Pattern- WiFi - 3 - 5500 MHz



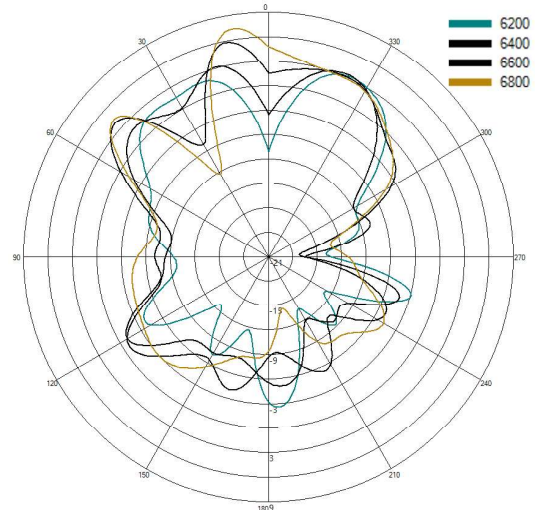
Typical H Plane- WiFi - 3 - Patterns- 5200-5800MHz



Typical 3D Pattern- WiFi - 3 - 6500 MHz

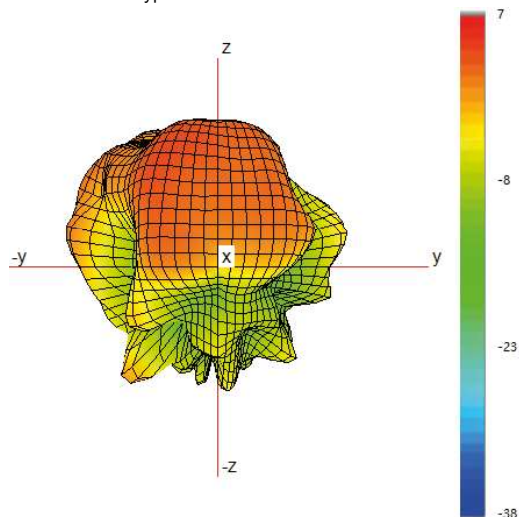


Typical H Plane- WiFi - 3 - Patterns- 6200-6800MHz

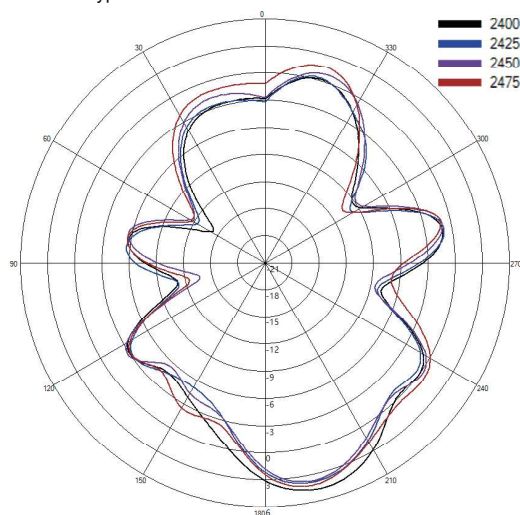


### WiFi Patterns -WiFi -4

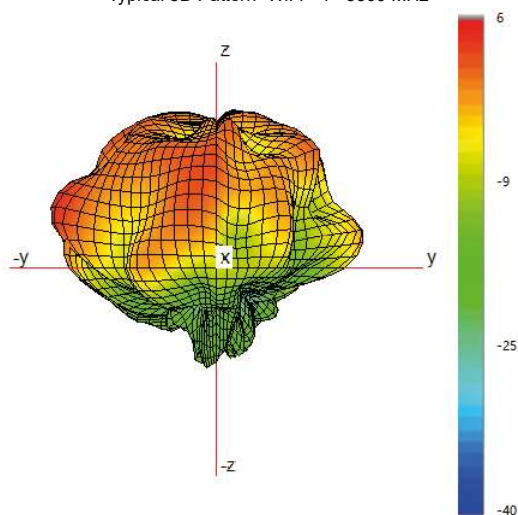
Typical 3D Pattern- WiFi - 4 - 2450 MHz



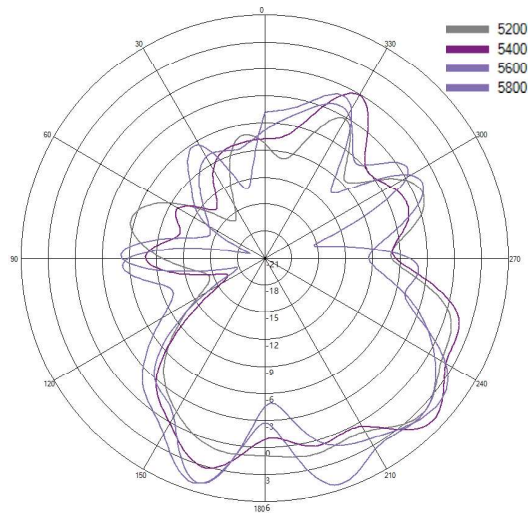
Typical H Plane- WiFi - 4 - Patterns- 2400-2475MHz



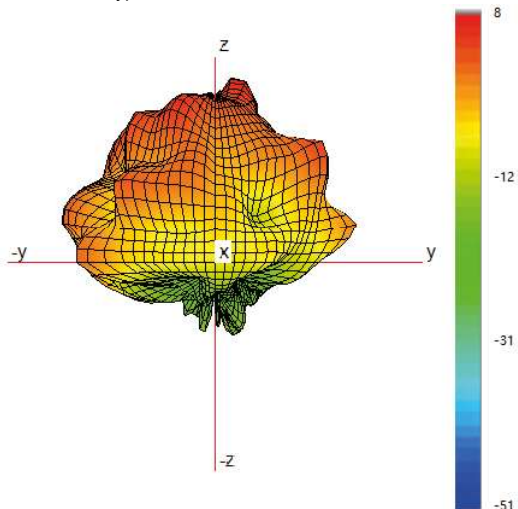
Typical 3D Pattern- WiFi - 4 - 5500 MHz



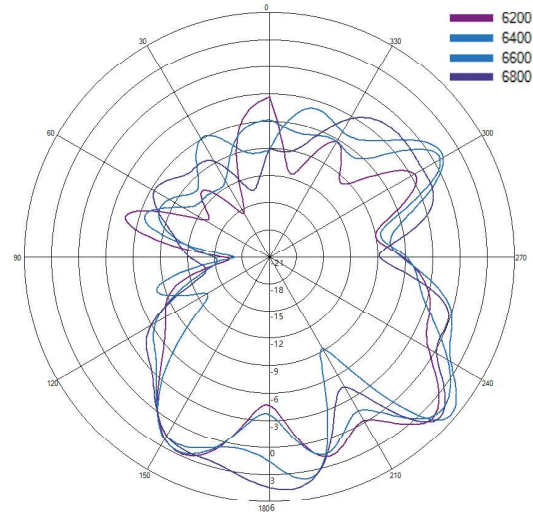
Typical H Plane- WiFi - 4 - Patterns- 5200-5800MHz



Typical 3D Pattern- WiFi - 4 - 6500 MHz



Typical H Plane- WiFi - 4 - Patterns- 6200-6800MHz



# 4X4 MiMo 4G/5G Transit Antenna

TRNM[X]4-6-60-[X]

E-Plane Patterns-  
GPS/GNSS

