Specification

Part No.	:	**TG.08.0723**
Product Name	:	Cellular and GPS/GLONASS/GALILEO/BEIDOU Hinged Fakra Connector Mount Antenna
Features	:	Compact Passive Monopole Antenna High Efficiencies at Cellular and GNSS frequencies Fits in places other antennas just don't 360° rotatable with durable brass hinge Compatible with: - 2G (GSM / DCS / PCS) - 3G (CDMA / WCDMA / UMTS / HSPA) - 4G (LTE) - GNSS (GPS / GLONASS / GALILEO/ BEIDOU) Fakra Code D Bordeaux Violet SMB(F) Connector Length: 79.5mm ROHS Compliant

1. Introduction

The compact TG.08 with hinged rotatable Fakra Code D connector is a monopole antenna for automotive telematics applications that provides wide coverage among cellular and GNSS frequencies and offers impressively high efficiencies. It fits in crowded device environments.

It’s robust brass hinge enables TG.08 to be oriented in all directions, allowing users to maximize performance with minimum effort. The Fakra connector gives additional mechanical robustness over a traditional SMA connector since it locks securely with its mate and will not come loose due to vibrations or impacts.

This 72mm long monopole antenna has good efficiency in the 700MHz to 2700MHz range, covering the 2G/3G/4G bands, as well as GPS/GLONASS/BEIDOU. When connected to a ground plane, it can achieve up to 75% efficiency at GPS and LTE bands.

With its cellular and GNSS function, plus compact design, TG.08 is a great antenna for routers, vehicle tracking devices, telematic devices, and remote monitoring systems. It is also ideal for use in cellular modules with Assisted GPS functionality that can be implemented in various devices.

As with all monopole antennas, TG.08 works best when connecting directly to the ground-plane of the device main-board or to the device's metal enclosure. For optimum radiation efficiency care should be taken to keep the radiating element of the antenna as far away from metal as possible.

2. Specification

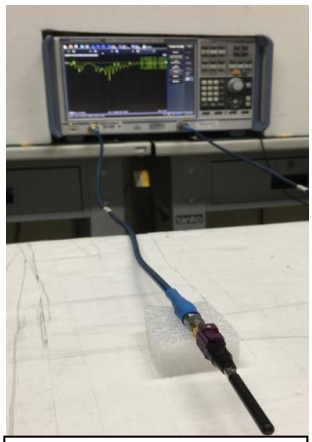
Parameter										
Straight Position										
Band		**700LTE**	**GSM**	**BEIDOU**	**GPS**	**GLONASS**	**DCS**	**PCS**	**UMTS/ HSPA**	**2700LTE**
Frequency (MHz)		**703~ 803**	**824~ 960**	**1561**	**1575.42**	**1602**	**1710~ 1880**	**1850~ 1990**	**1920~ 2170**	**2490~ 2690**
Average Gain (dBi)	In Free Space	-7.08	-3.34	-2.69	-2.64	-2.19	-2.27	-2.36	-2.47	-4.08
Efficiency (%)		19.93	46.55	53.87	54.45	60.38	59.31	58.12	56.62	39.81
Peak Gain (dBi)		-1.96	1.82	1.87	1.88	2.30	3.43	3.55	3.55	3.62
Return Loss (dB)		< -2	< -4	< -9	< -8	< -8	< -10	< -8	< -5	< -3
Average Gain (dBi)	With 15x9cm Ground	-2.16	-2.40	-2.01	-1.92	-1.67	-2.74	-2.42	-2.37	-6.30
Efficiency (%)		61.04	57.99	63.01	64.29	68.15	53.30	57.34	58.00	23.88
Peak Gain (dBi)		1.61	1.55	2.00	2.04	2.20	2.99	3.95	4.72	0.54
Return Loss (dB)		< -8	< -5	< -10	< -10	< -10	< -6	< -6	< -7	< -2
Average Gain (dBi)	On 30x30cm Ground Metal Edge	-1.76	-1.80	-1.06	-1.19	-1.15	-1.66	-1.22	-1.19	-4.03
Efficiency (%)		67.10	66.26	78.34	75.97	76.77	68.30	75.58	76.02	40.15
Peak Gain (dBi)		2.09	1.35	4.27	4.18	4.37	3.48	3.70	4.28	3.65
Return Loss (dB)		< -8	< -6	< -10	< -10	< -10	< -9	< -10	< -10	< -4
Average Gain (dBi)	On 30x30cm Ground Metal Center	-3.49	-1.98	-3.43	-3.37	-3.35	-3.34	-2.95	-2.66	-2.44
Efficiency (%)		46.33	63.95	45.36	46.07	46.20	46.41	50.82	54.33	57.42
Peak Gain (dBi)		1.37	2.52	1.47	1.50	1.43	1.17	1.76	2.68	3.40
Return Loss (dB)		< -3	< -4	< -6	< -5	< -5	< -3	< -3	< -4	< -6

Bent Position										
Average Gain (dBi)	In Free Space	-7.45	-3.54	-2.56	-2.54	-2.14	-2.30	-2.42	-2.57	-4.29
Efficiency (%)		18.25	44.69	55.42	55.66	61.13	58.87	57.24	55.32	37.76
Peak Gain (dBi)		-2.75	1.68	2.17	2.19	2.57	3.28	3.41	3.41	3.26
Return Loss (dB)		< -2	< -4	< -8	< -7	< -7	< -10	< -8	< -4	< -3
Average Gain (dBi)	With 15x9cm Ground	-2.52	-2.01	-2.10	-1.97	-1.68	-2.62	-2.34	-2.31	-6.36
Efficiency (%)		56.59	63.28	61.62	63.50	67.92	54.71	58.37	58.73	23.51
Peak Gain (dBi)		1.47	1.55	2.40	2.44	2.62	3.05	4.04	4.67	0.35
Return Loss (dB)		< -5	< -7	< -10	< -10	< -10	< -7	< -7	< -8	< -2
Average Gain (dBi)	On 30x30cm Ground Metal Edge	-2.22	-1.43	-1.06	-1.21	-1.14	-1.65	-1.24	-1.22	-3.29
Efficiency (%)		61.30	72.15	78.32	75.76	76.86	68.38	75.28	75.55	47.63
Peak Gain (dBi)		2.46	2.50	3.94	3.81	3.87	3.04	3.97	4.44	4.37
Return Loss (dB)		< -6	< -7	< -10	< -10	< -10	< -9	< -10	< -10	< -4
Average Gain (dBi)	On 30x30cm Ground Metal Center	-6.65	-3.06	-2.28	-2.34	-2.44	-3.00	-2.82	-2.61	-2.71
Efficiency (%)		23.10	49.79	59.19	58.34	56.99	50.15	52.34	54.95	54.27
Peak Gain (dBi)		-0.80	1.78	2.03	1.93	1.79	1.56	1.87	2.69	3.30
Return Loss (dB)		< -1	< -4	< -9	< -8	< -7	< -4	< -4	< -4	< -8
Radiation		Omni-directional								
Polarization		Linear								
Impedance		50 Ω								
Input Power		10W								
MECHANICAL										
Antenna length		79.5mm								
Antenna Diameter		5mm								
Casing		POM								
Connector		Fakra Code D								
Weight		8.5g								
ENVIRONMENTAL										
Operation Temperature		-40°C ~ + 85°C								
Storage Temperature		-40°C ~ + 85°C								
Humidity		Non-condensing 65°C 95% RH								

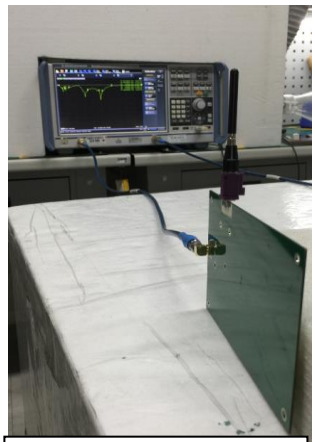
1. Antenna Characteristics

3.1 Testing setup

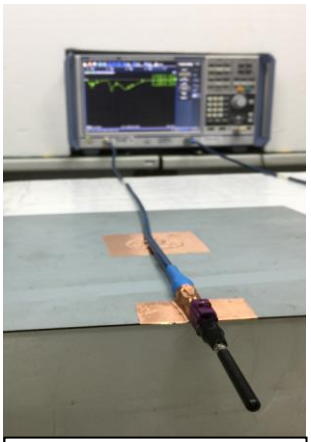
Straight Antenna Position



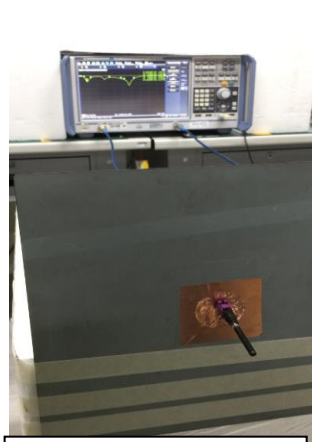
A) In free space



B) With 15*9cm ground

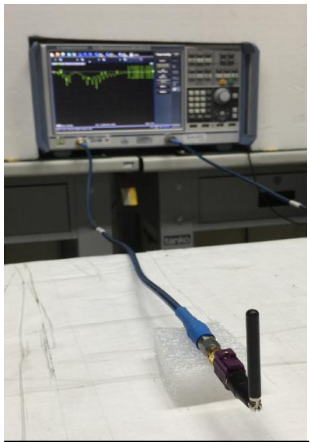


C) With 30*30cm ground metal edge

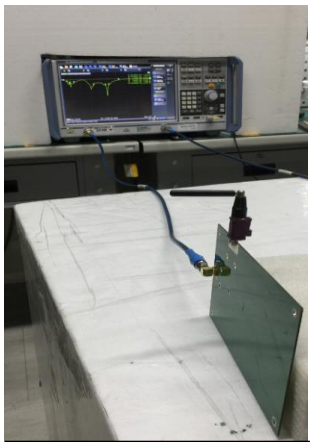


D) With 30*30cm ground metal center

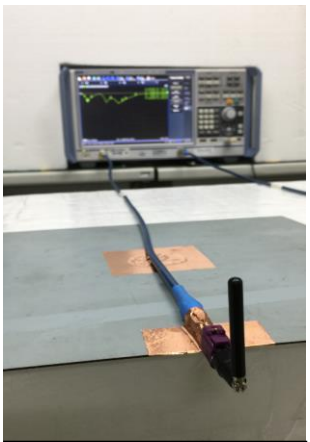
Bent Antenna Position



A) In free space



B) With 15*9cm ground



C) With 30*30cm ground metal edge

D) With 30*30cm ground metal center

Figure 1. Measurement Environments

- **Return Loss**

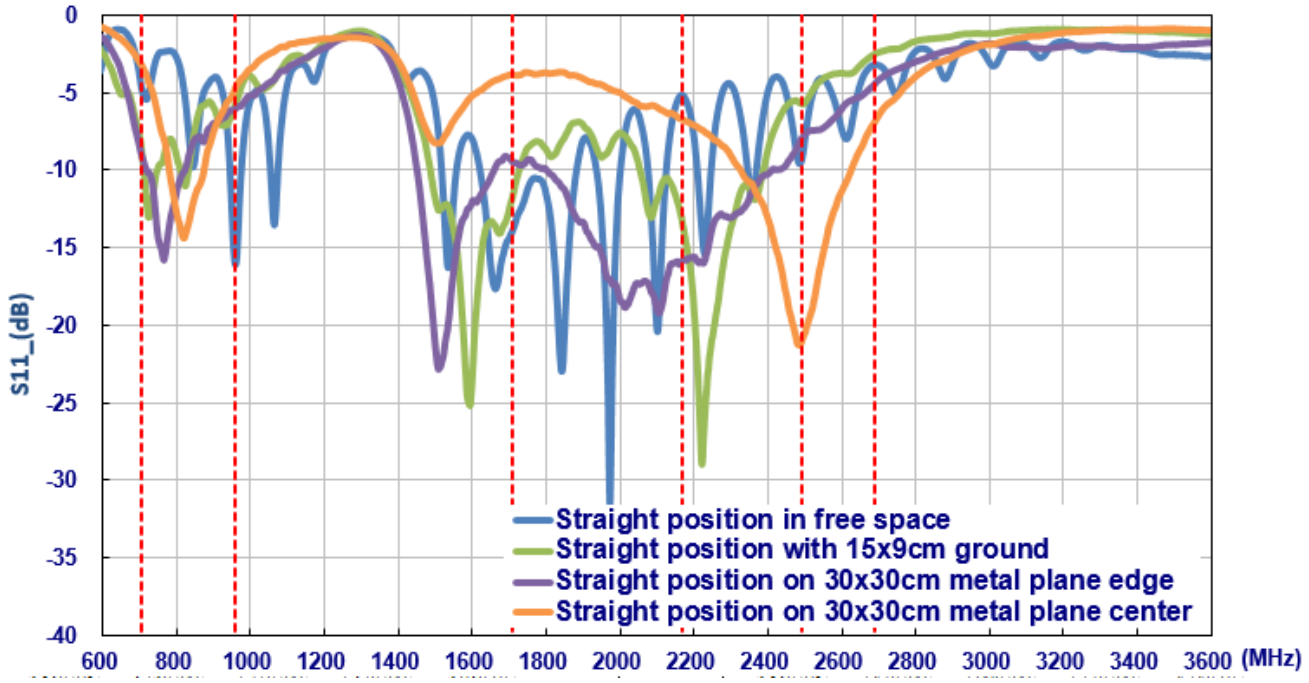


Figure 2. Return Loss of TG.08 antenna in straight position

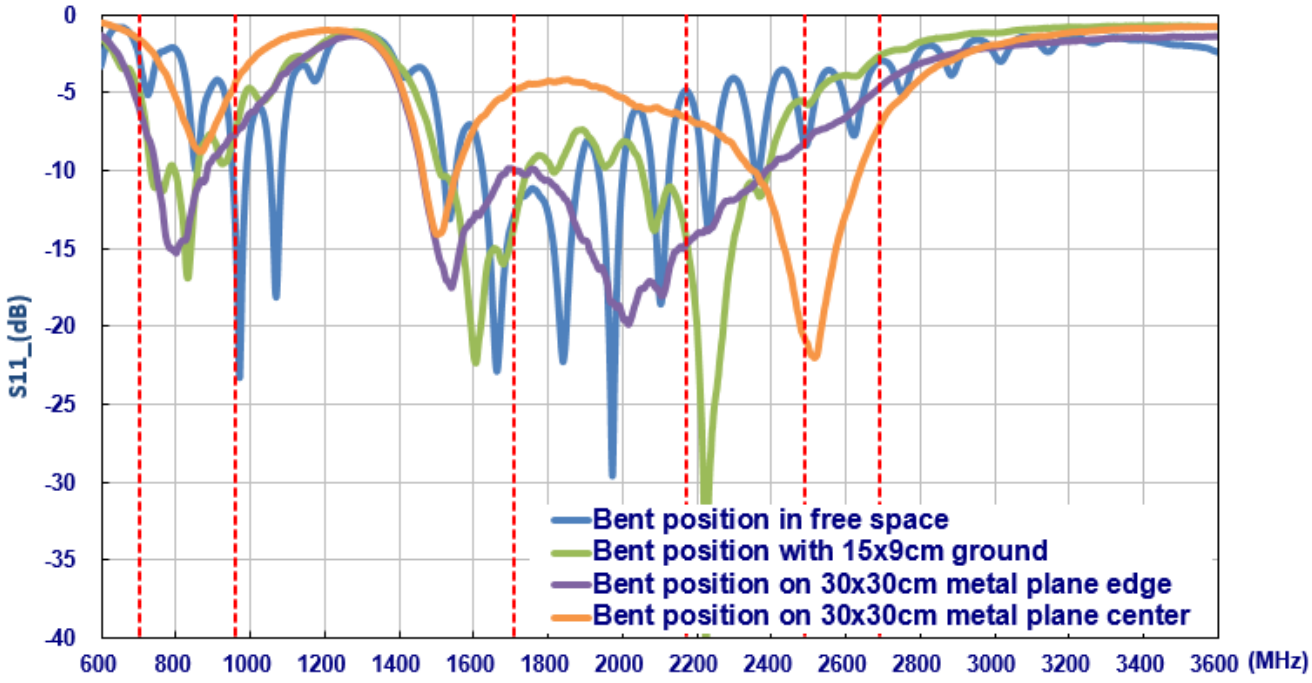


Figure 3. Return loss of TG.08 antenna in bent position

- **Efficiency**

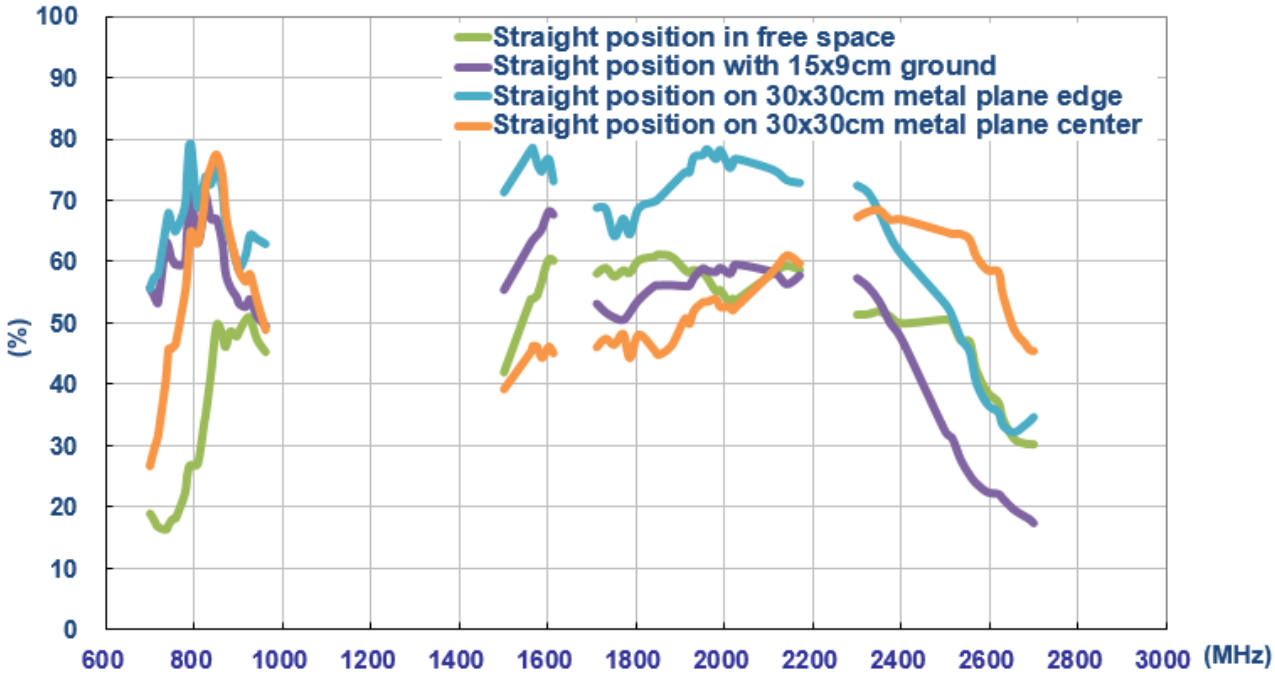


Figure 4. Efficiency of TG.08 antenna in straight position

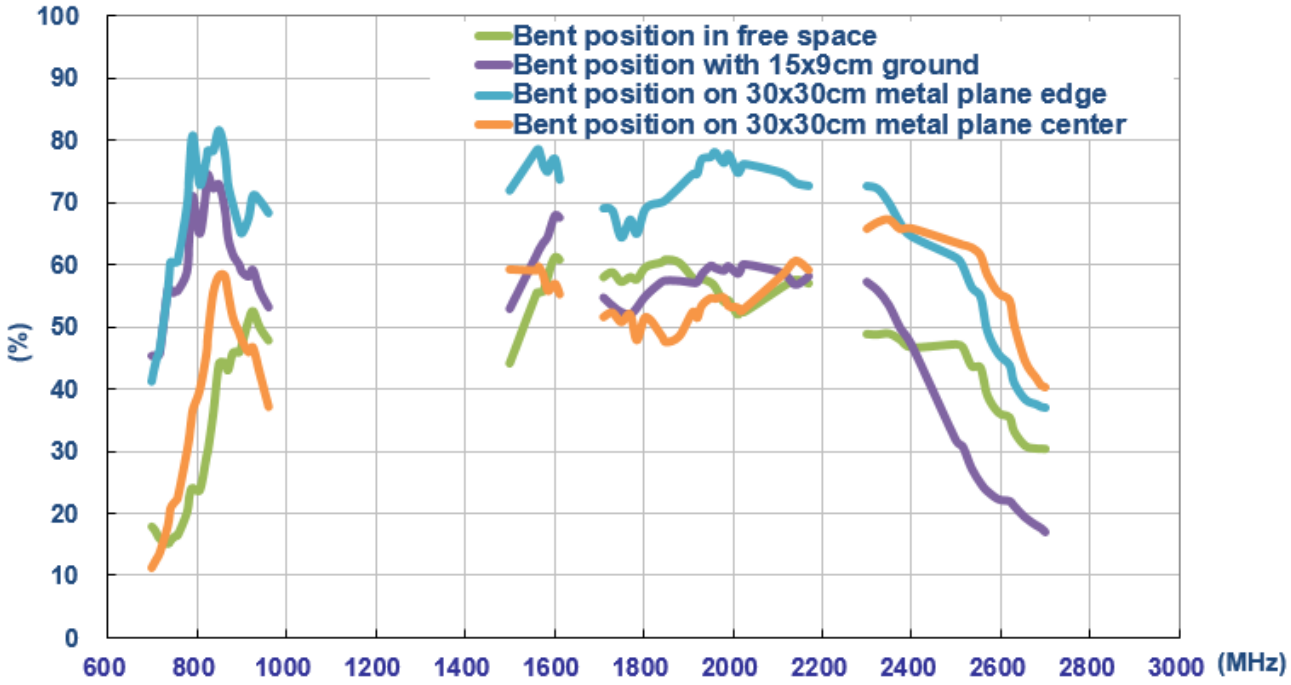


Figure 5. Efficiency of TG.08 antenna in bent position

- **Peak Gain**

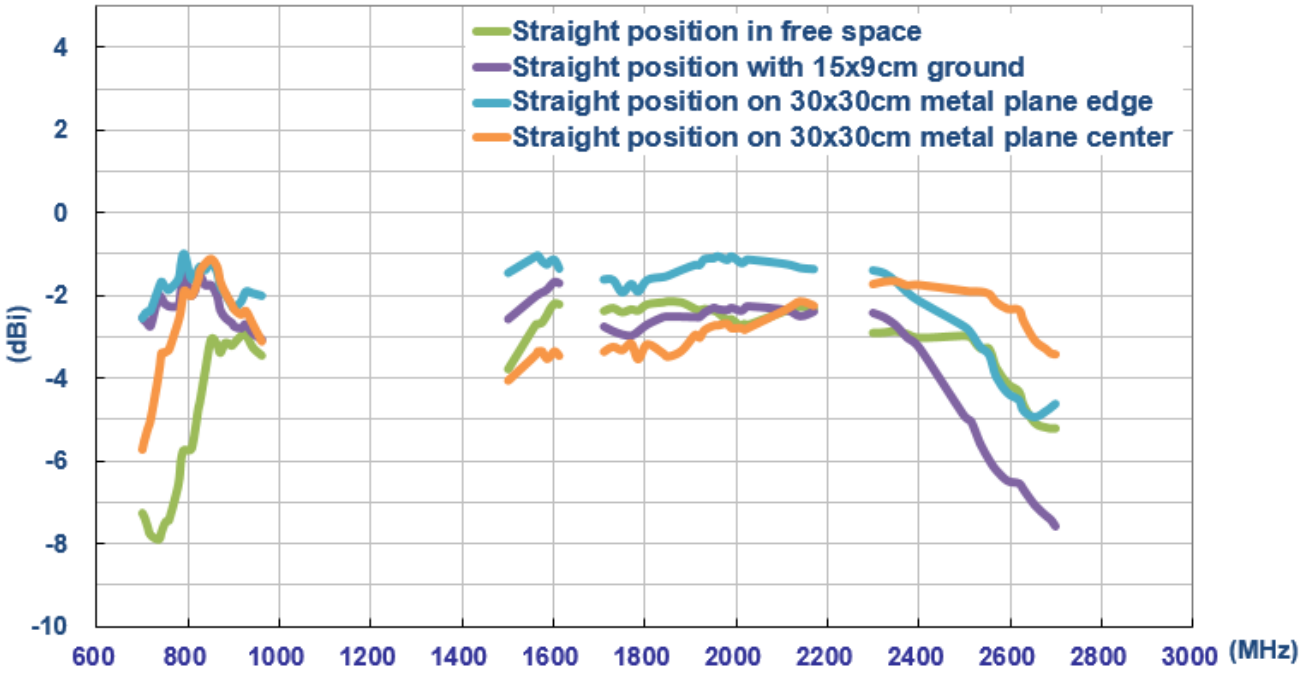


Figure 6. Peak gain of TG.08 antenna in straight position

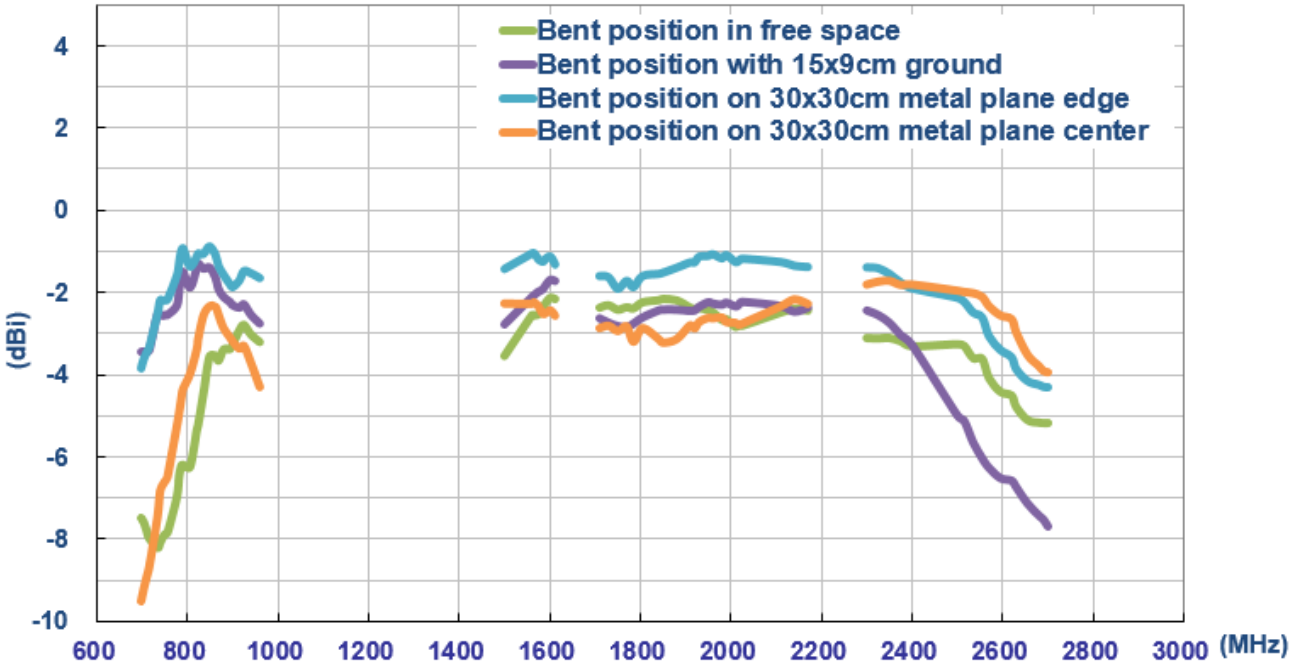


Figure 7. Peak gain of TG.08 antenna in bent position

- **Average Gain**

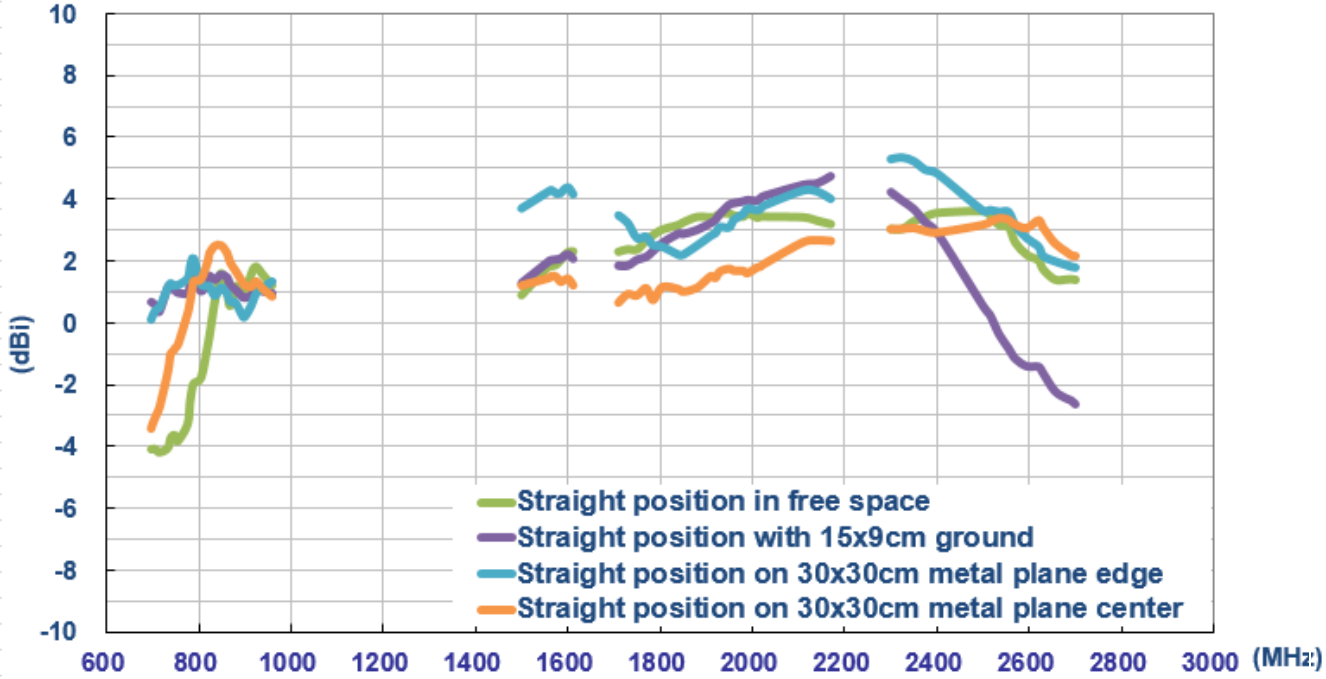


Figure 8. Average gain of TG.08 in straight position

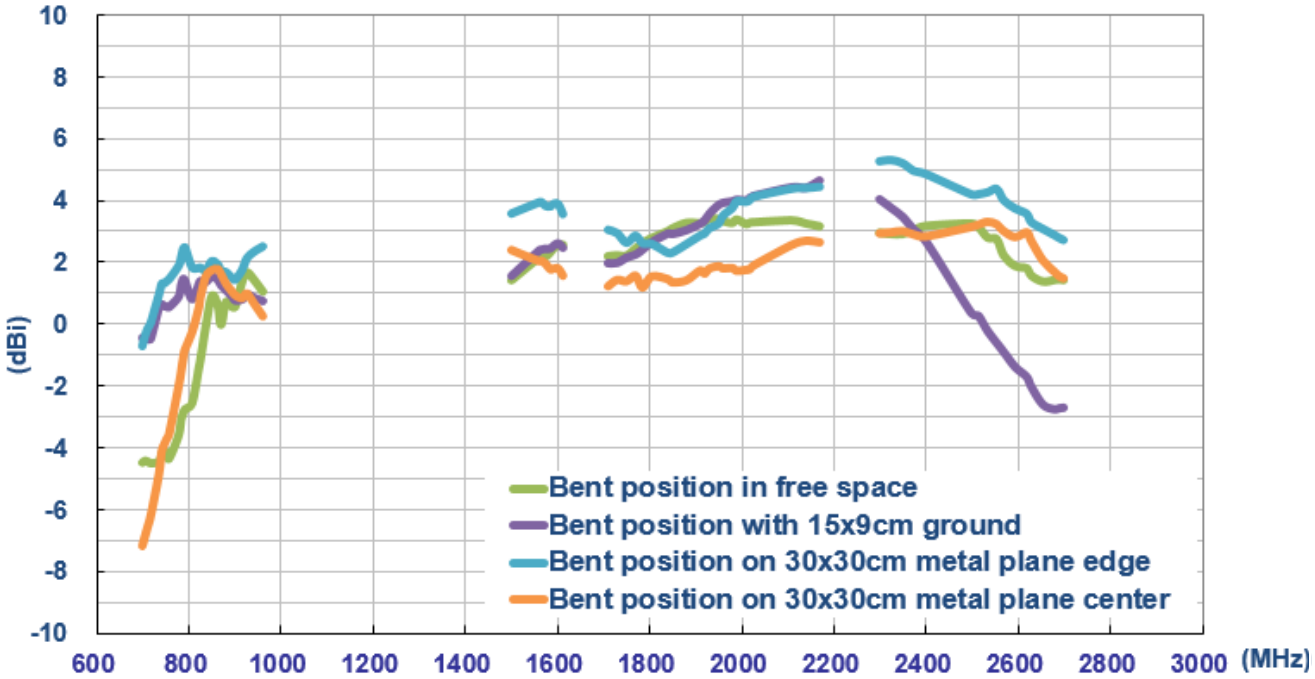
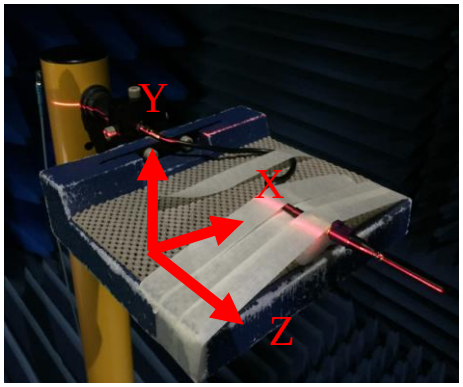


Figure 9. Average gain of TG.08 antenna in bent position

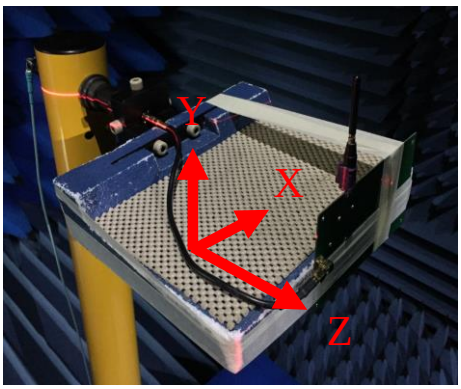
2. Antenna Radiation Patterns

The antenna radiation patterns were measured in a CTIA certified ETS Anechoic Chamber. The measurement setups are shown below.

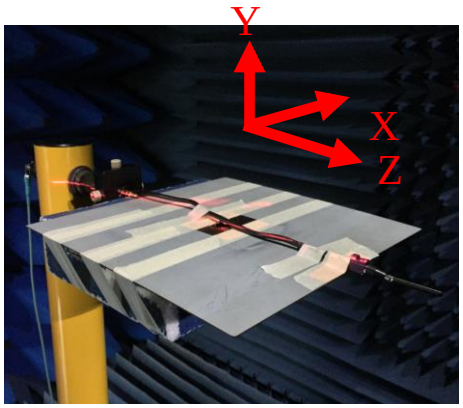
Antenna with Straight Position



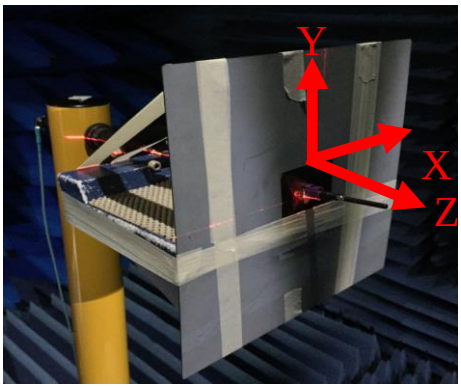
In free space



With 15x9cm ground plane

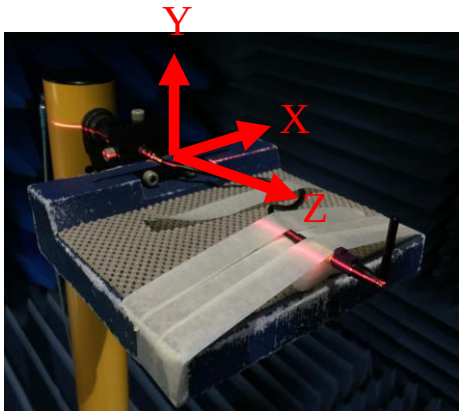


On 30x30cm metal ground edge

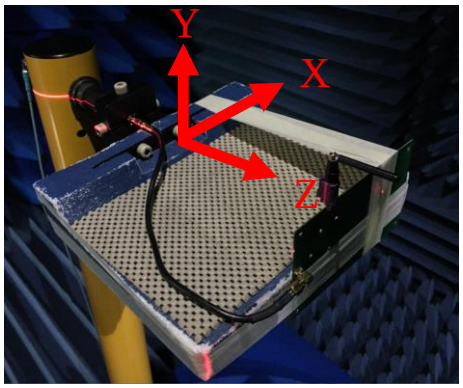


On 30x30cm metal ground center

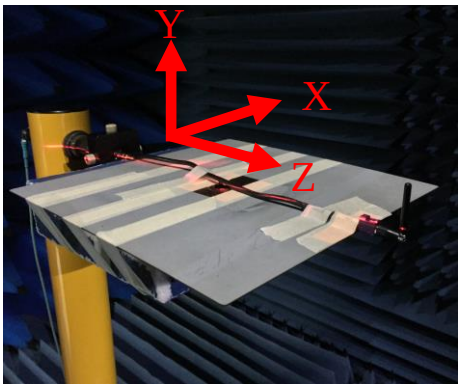
Antenna Bent Position



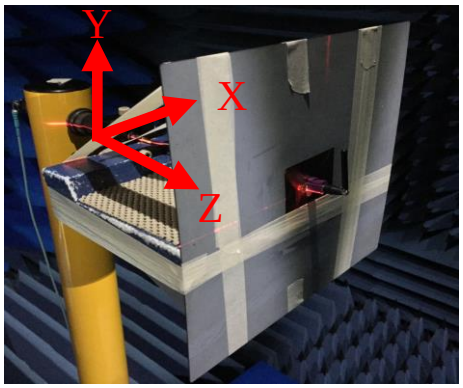
In free space



With 15x9cm ground plane



On 30x30cm metal ground edge

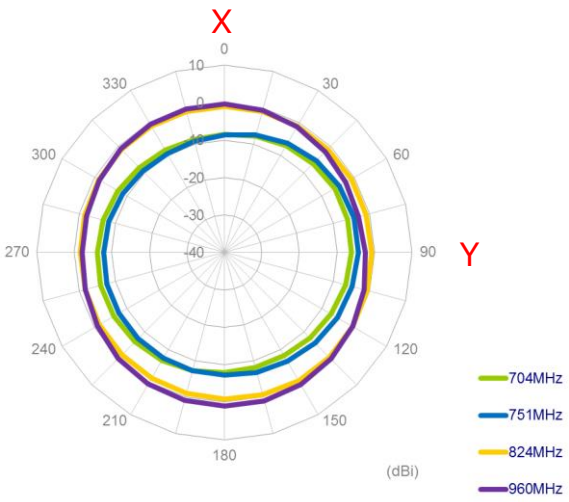


On 30x30cm metal ground center

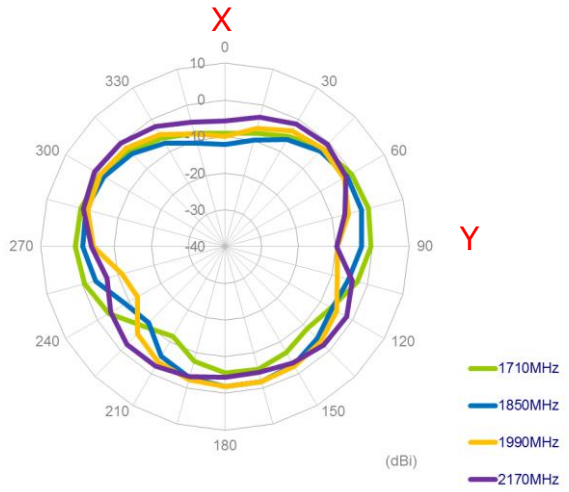
Figure 10. Testing Setup in ETS Anechoic Chamber

2D Radiation Pattern
(Straight Position in Free Space)

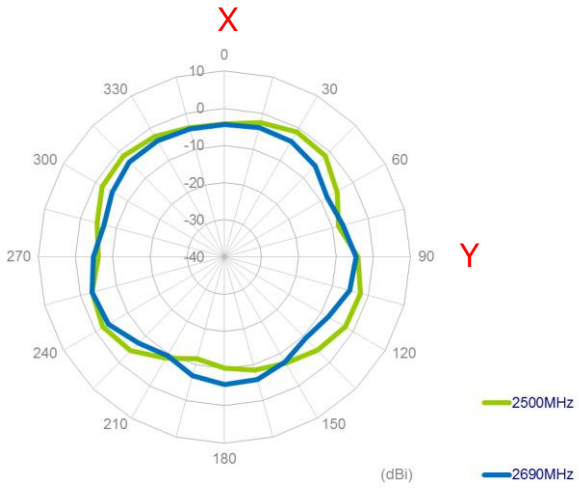
XY Plane



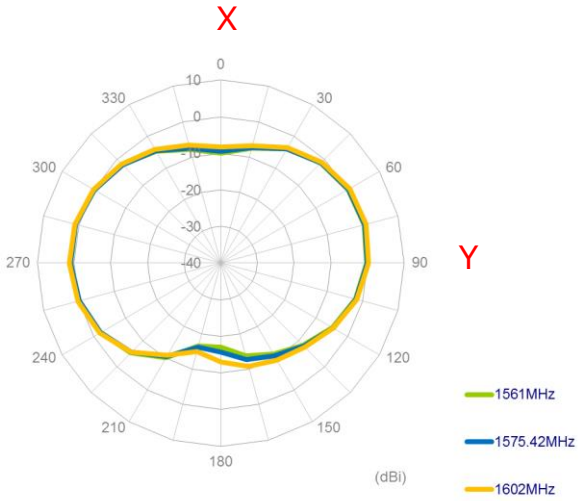
XY Plane



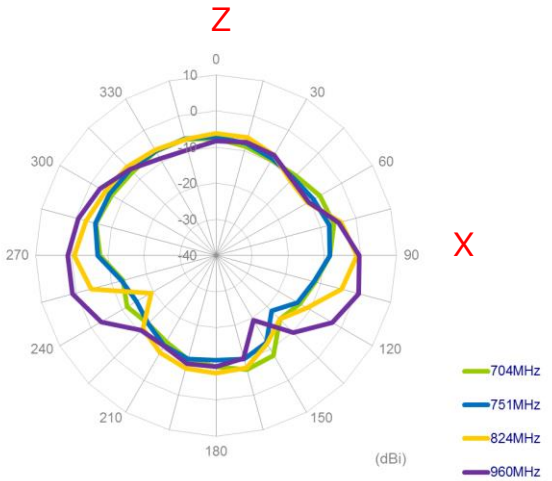
XY Plane



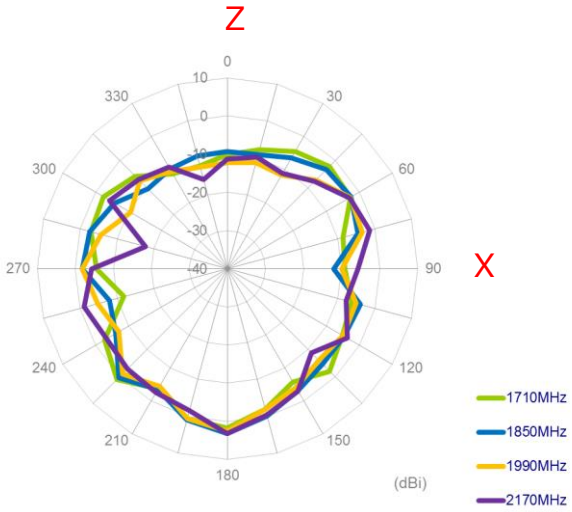
XY Plane



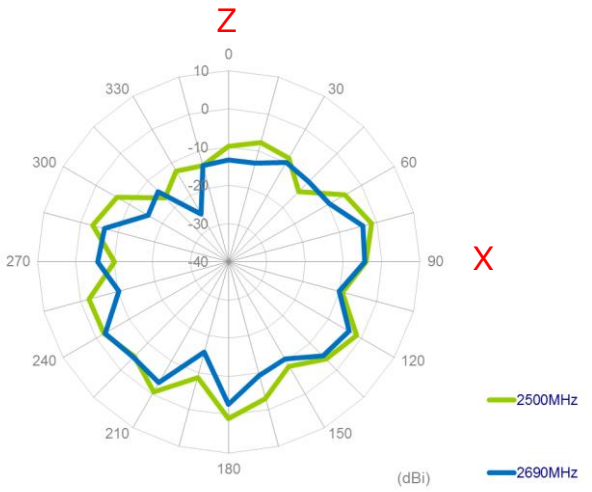
XZ Plane



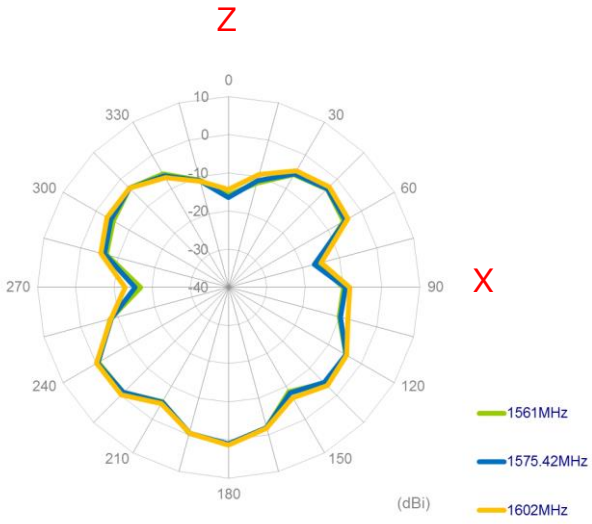
XZ Plane



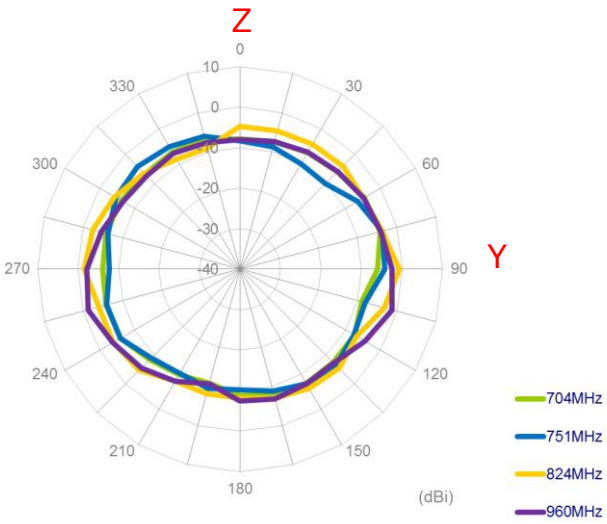
XZ Plane



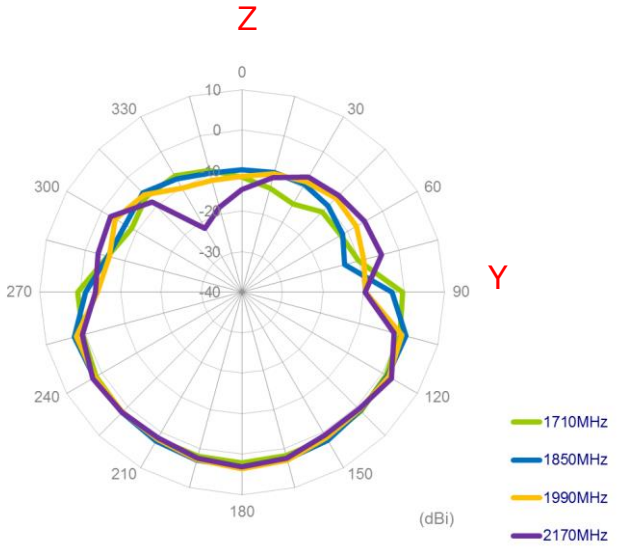
XZ Plane



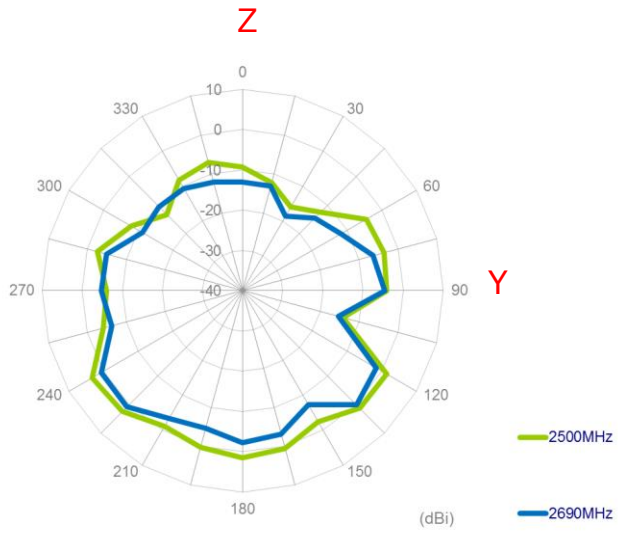
YZ Plane



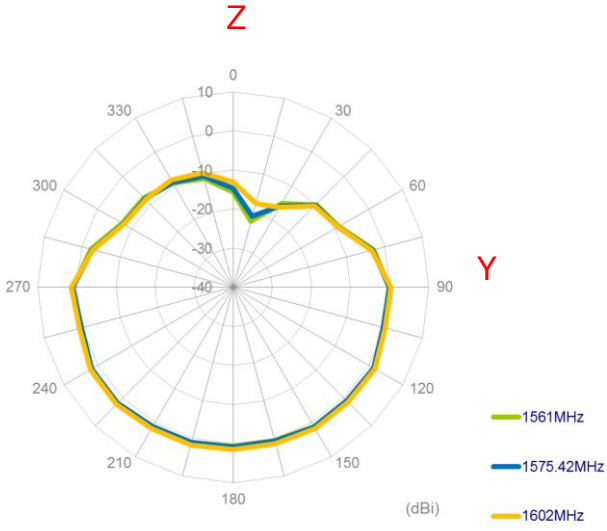
YZ Plane



YZ Plane

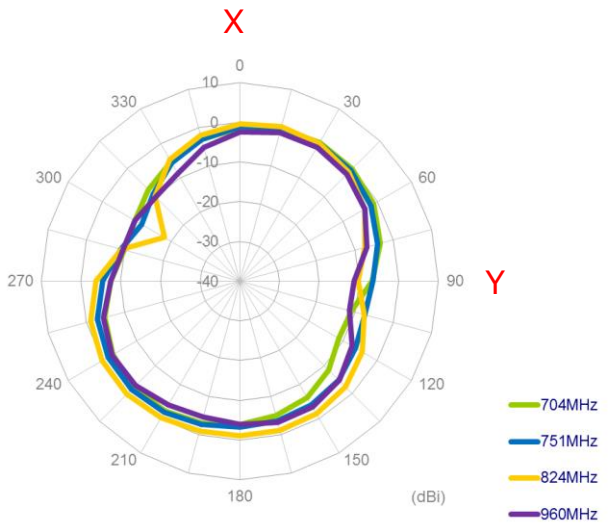


YZ Plane

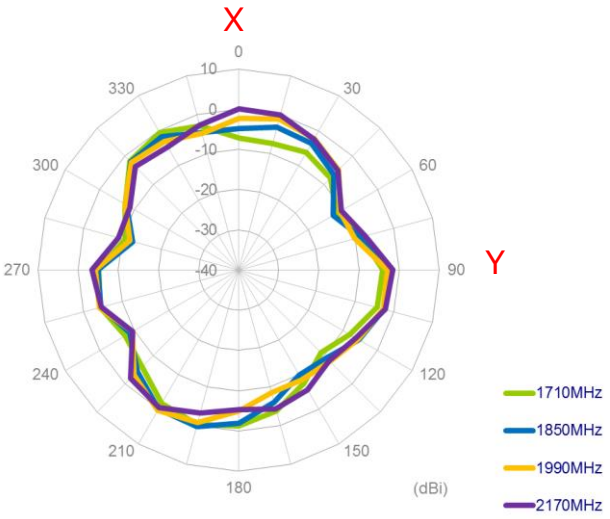


2D Radiation Pattern
(Straight Position with 15x9cm Ground)

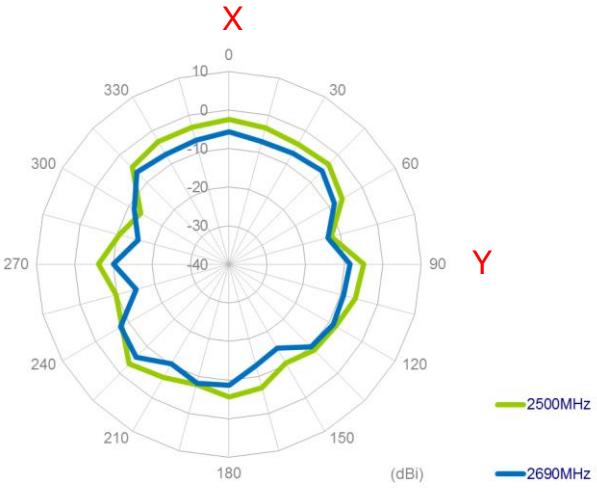
XY Plane



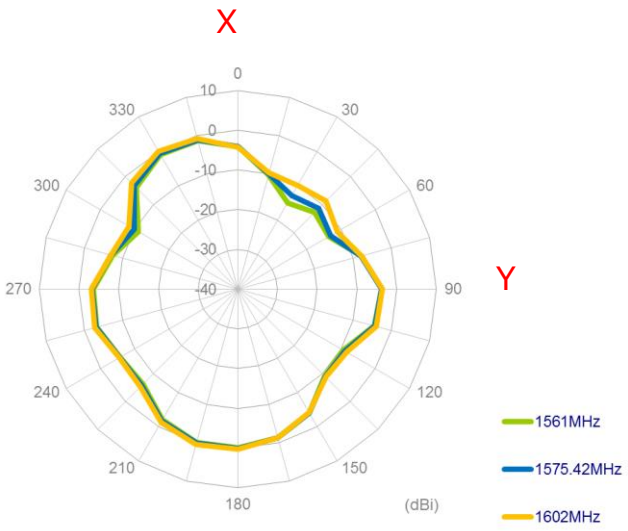
XY Plane



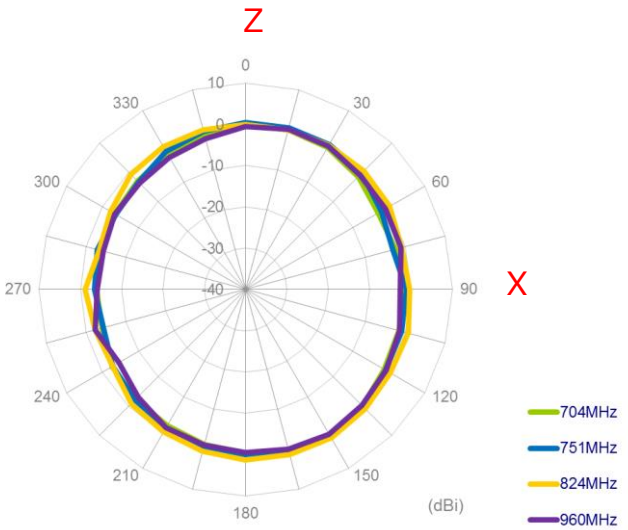
XY Plane



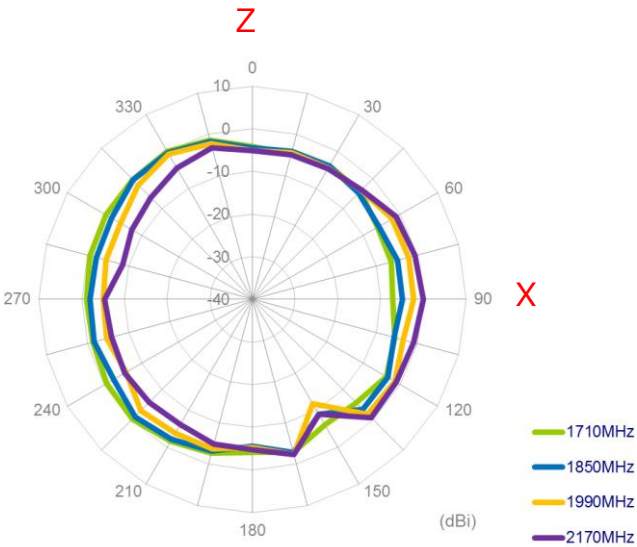
XY Plane



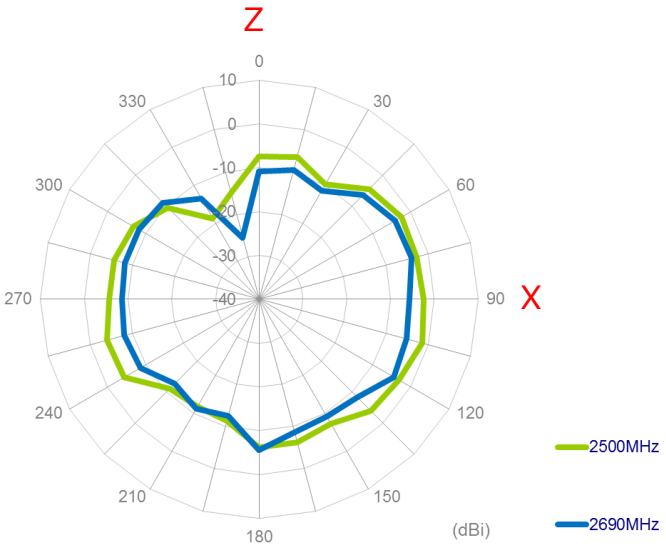
XZ Plane



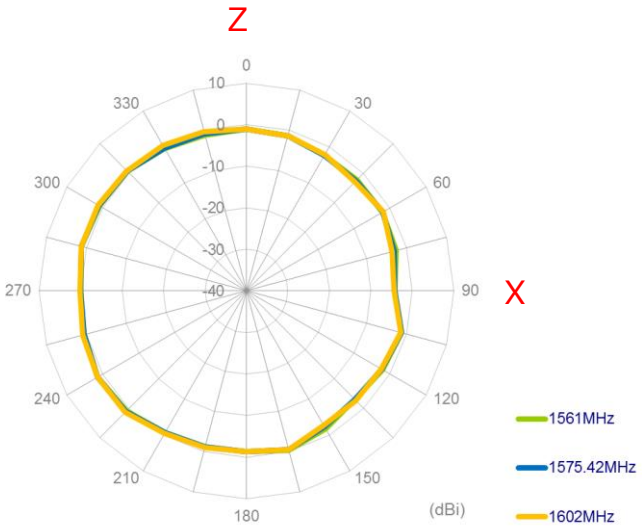
XZ Plane



XZ Plane



XZ Plane



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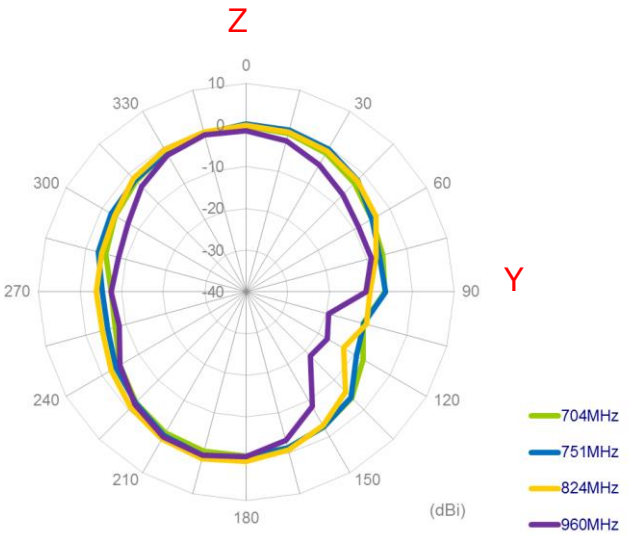
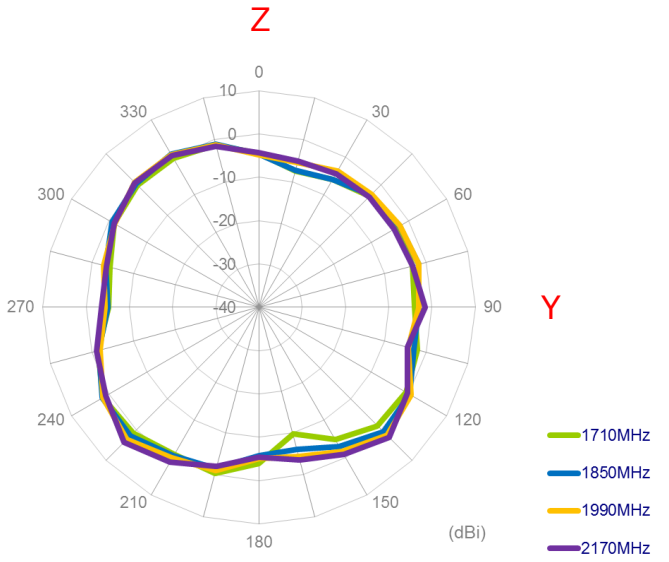


YZ Plane



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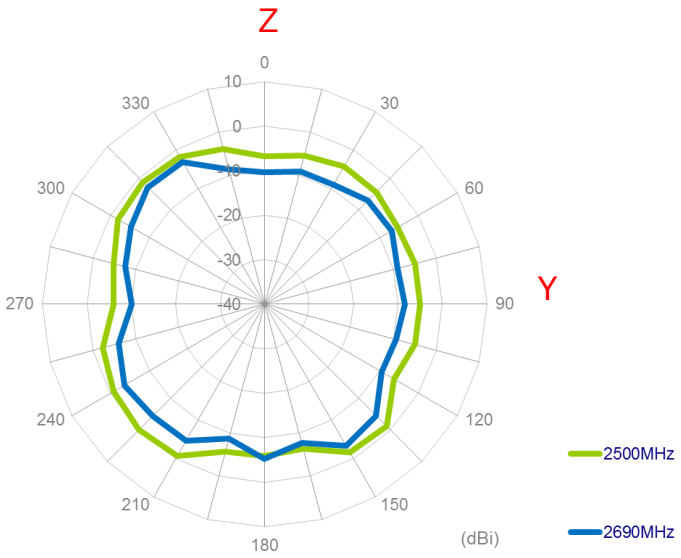
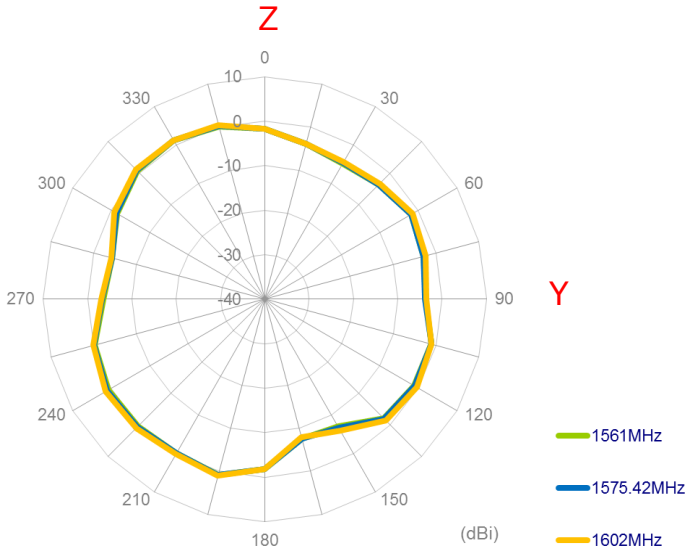
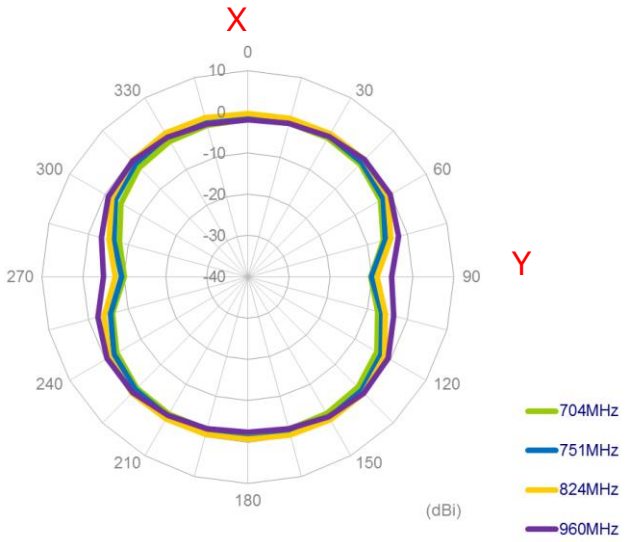


YZ Plane

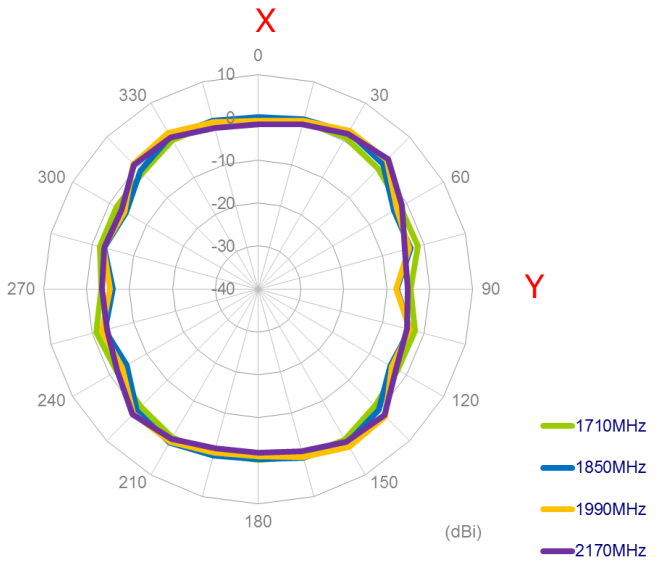


2D Radiation Pattern
(Straight Position with 30x30cm Metal Ground Edge)

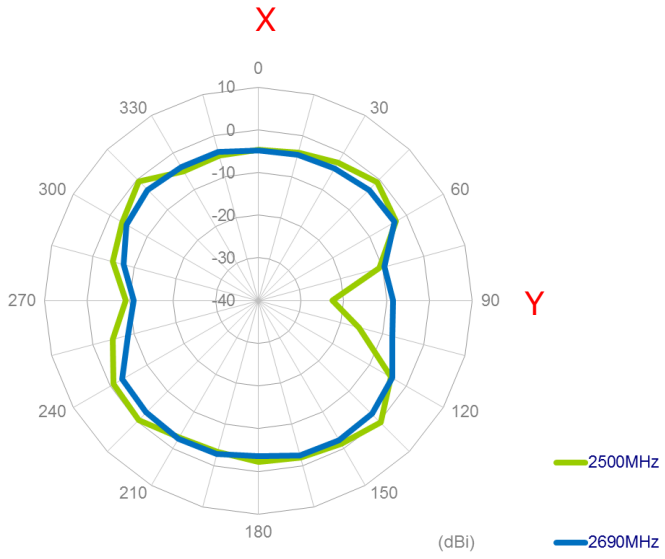
XY Plane



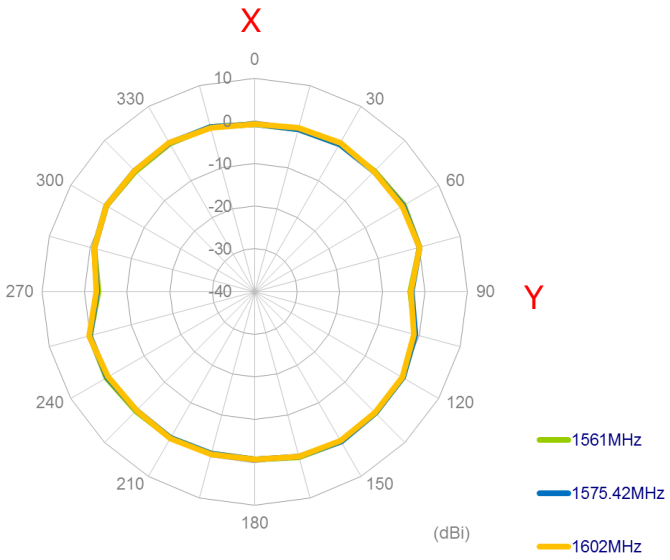
XY Plane



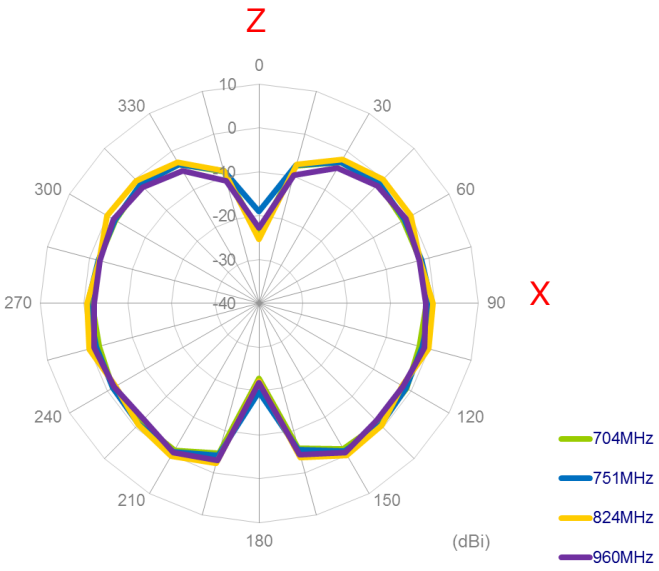
XY Plane



XY Plane



XZ Plane



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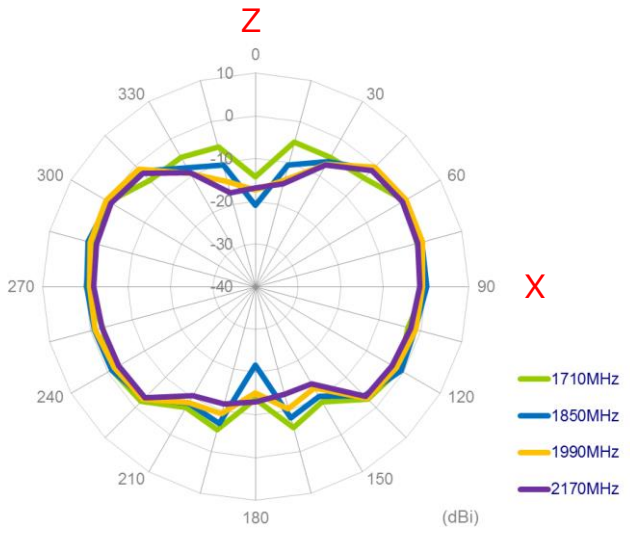

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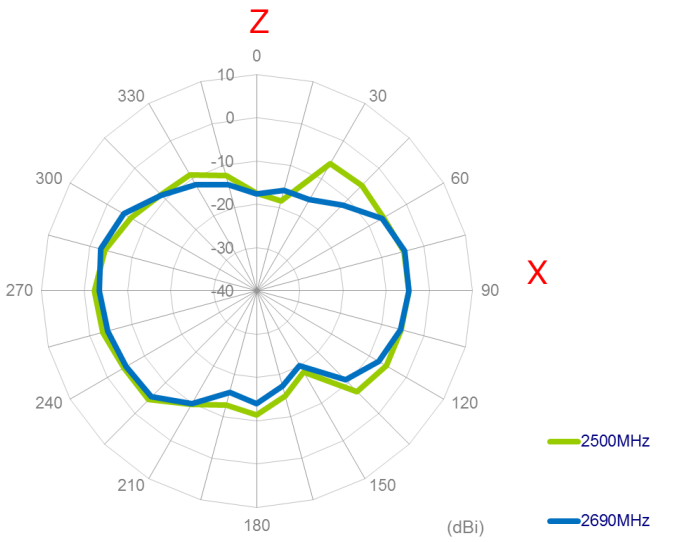
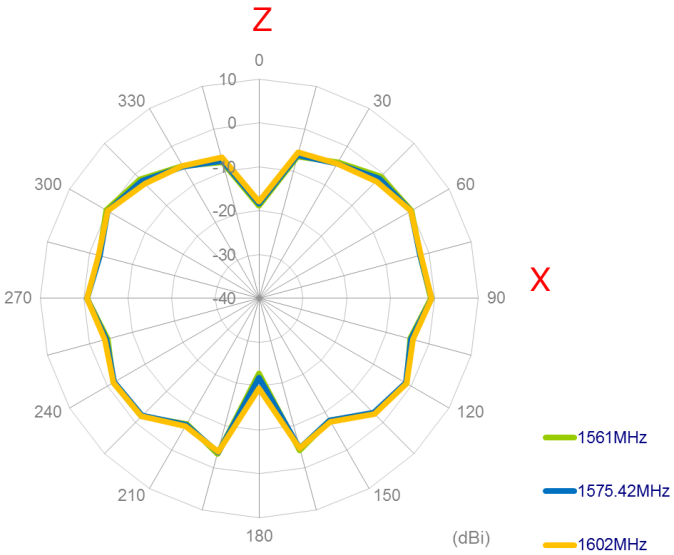


XZ Plane



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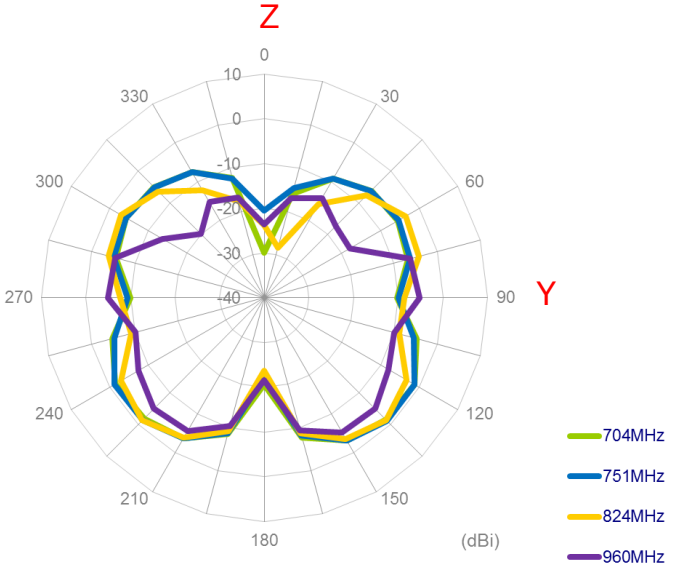

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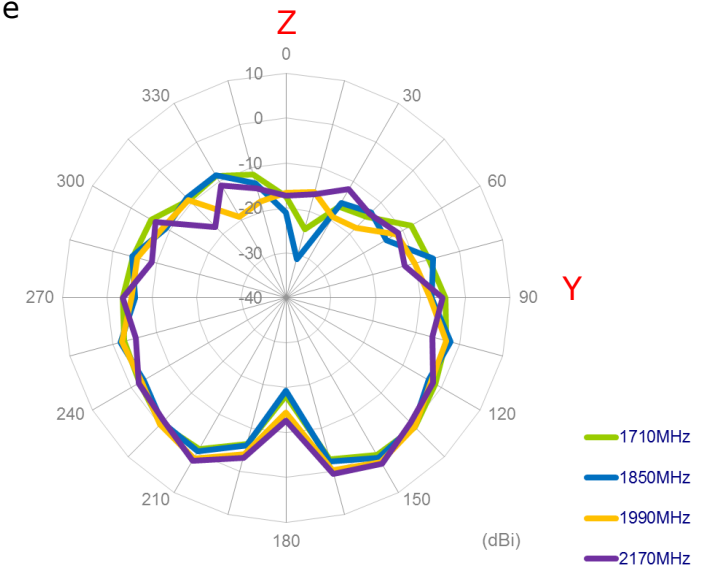

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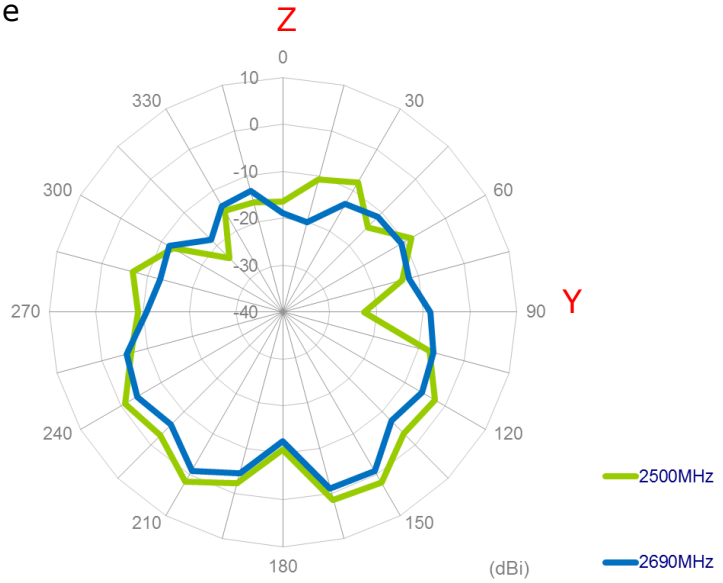

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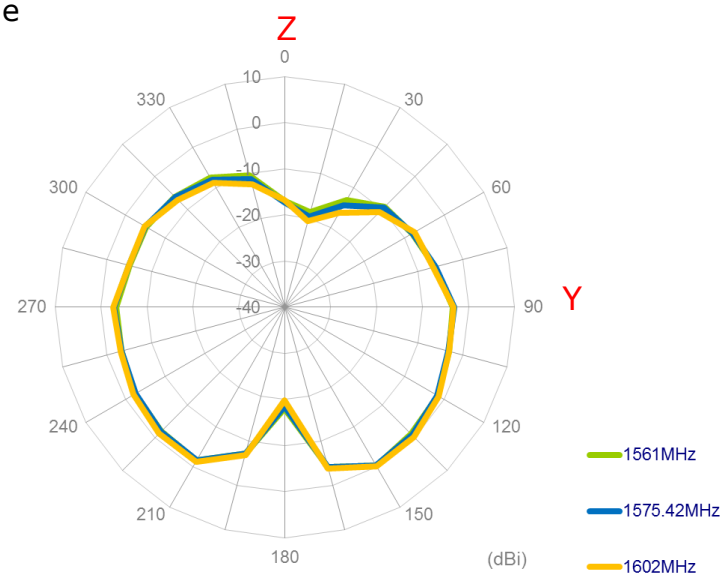
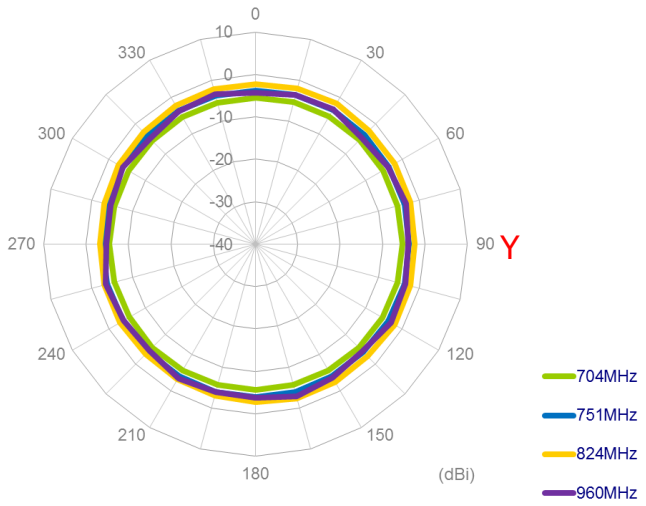


2D Radiation Pattern
(Straight Position with 30x30cm Metal Ground Center)

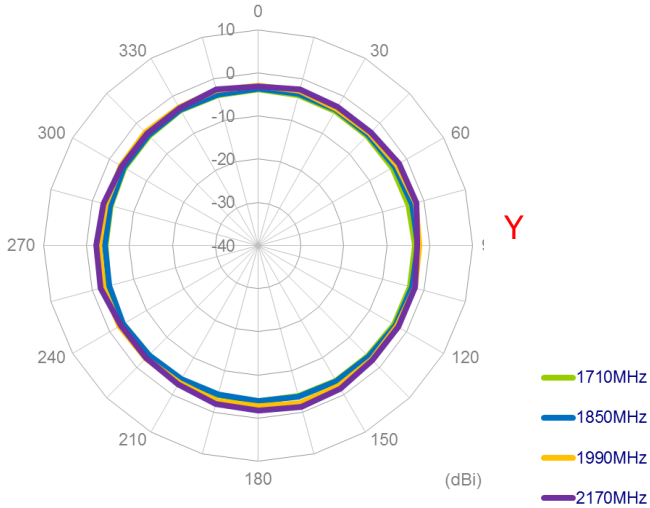
X

XY Plane



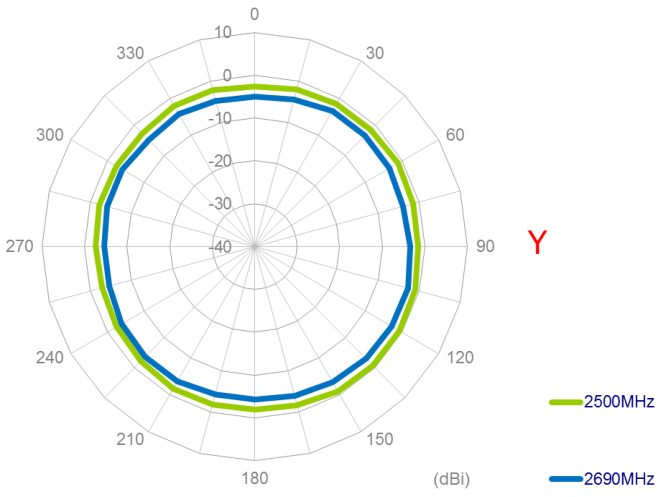
XY Plane

X

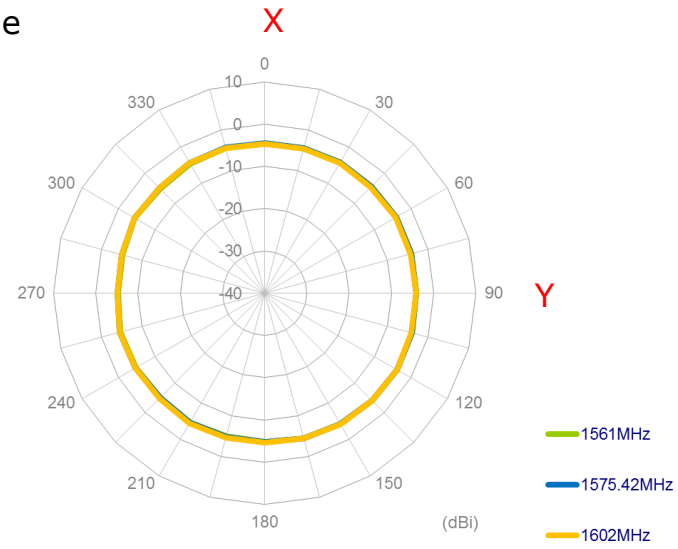


XY Plane

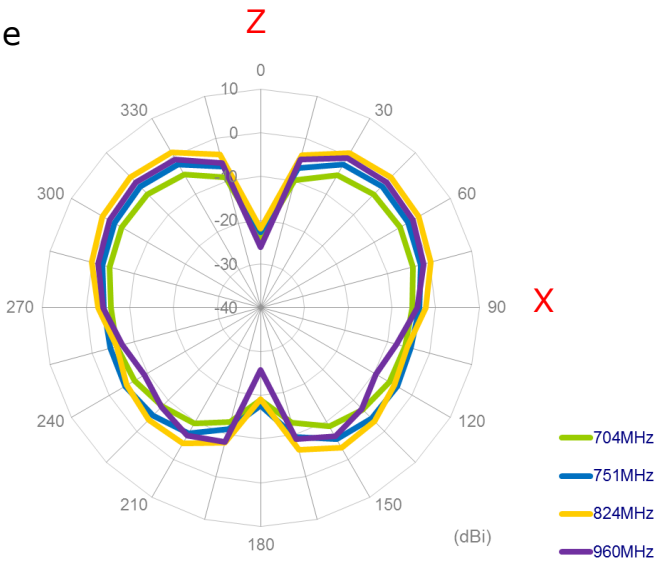
X



XY Plane



XZ Plane



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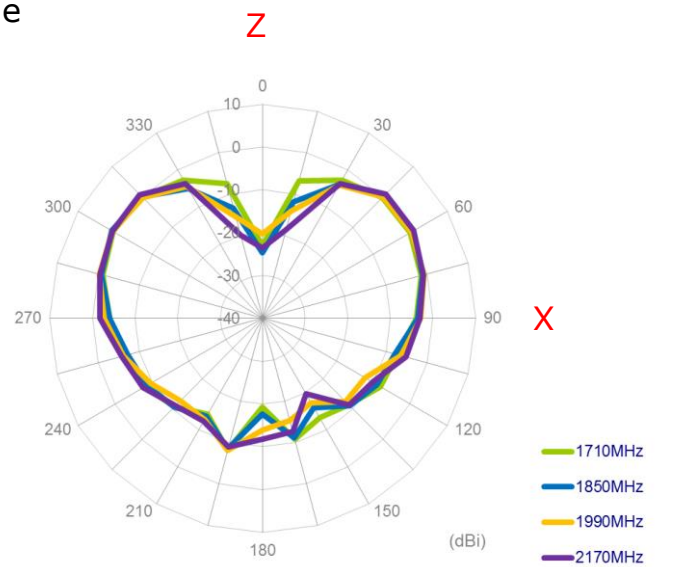

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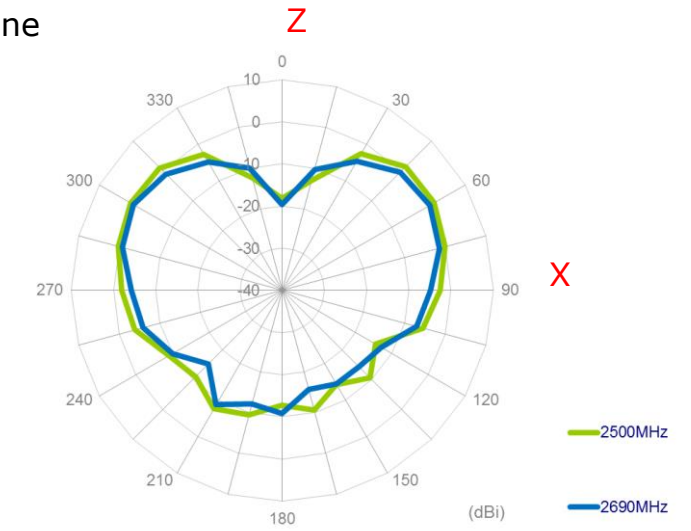
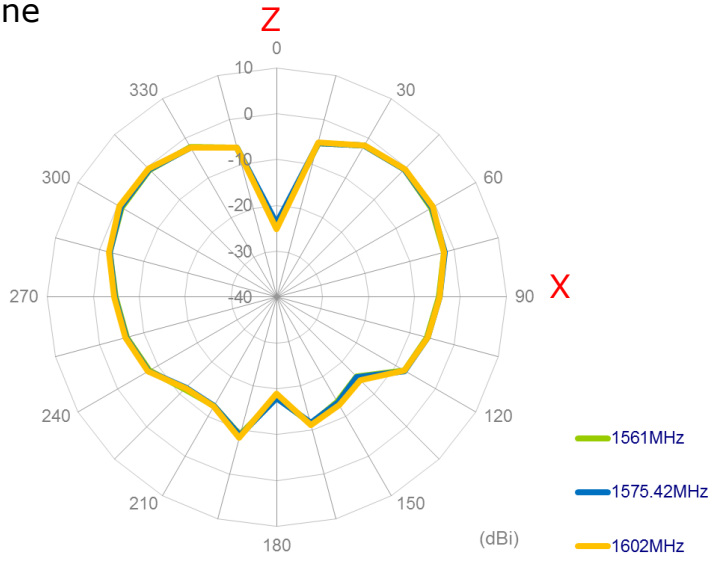


XZ Plane



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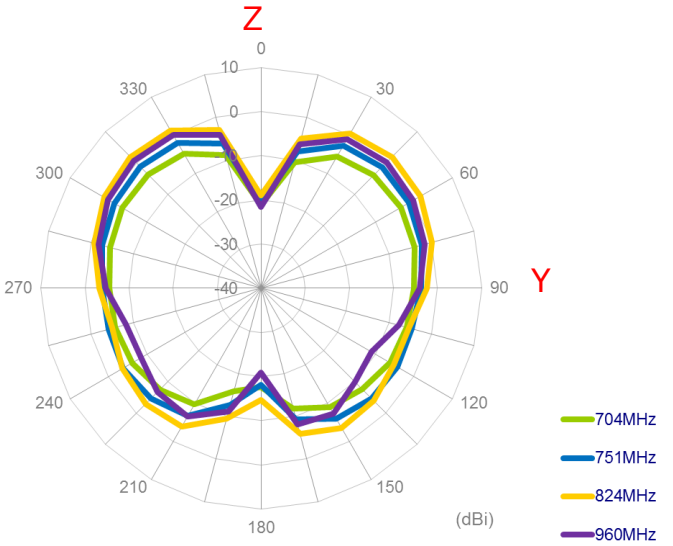

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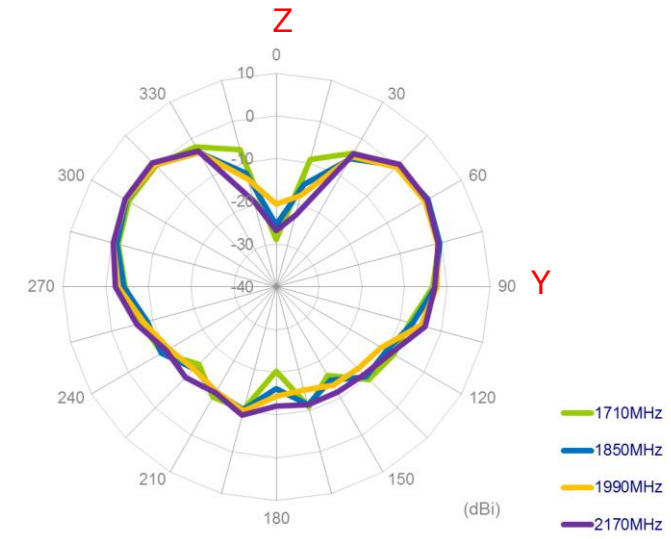

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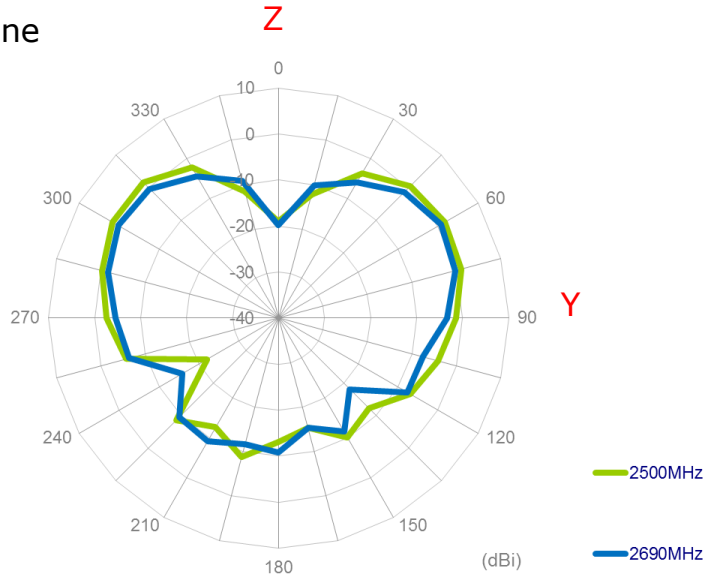
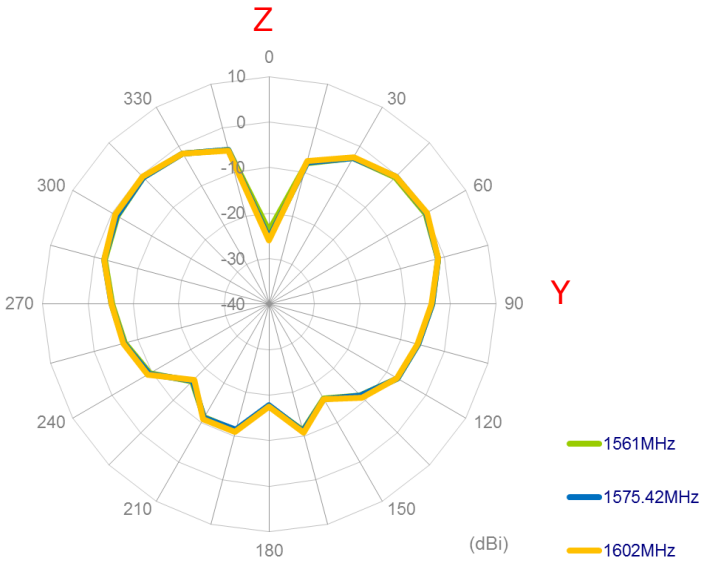
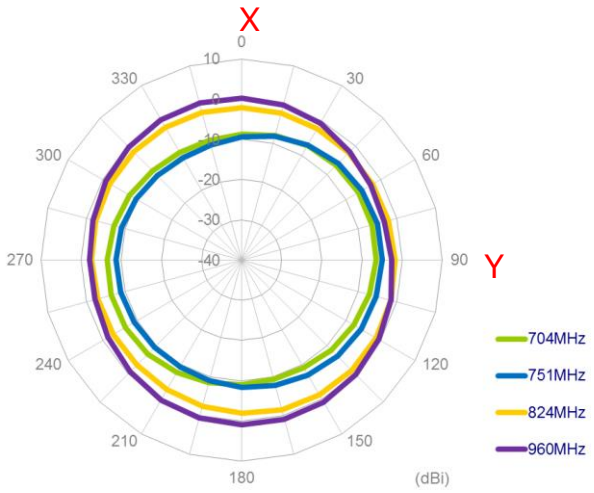


YZ Plane

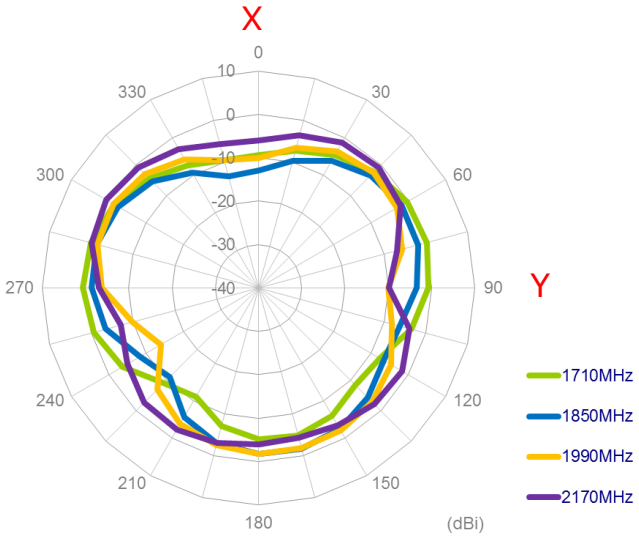


2D Radiation Pattern
(Bent Position in Free Space)

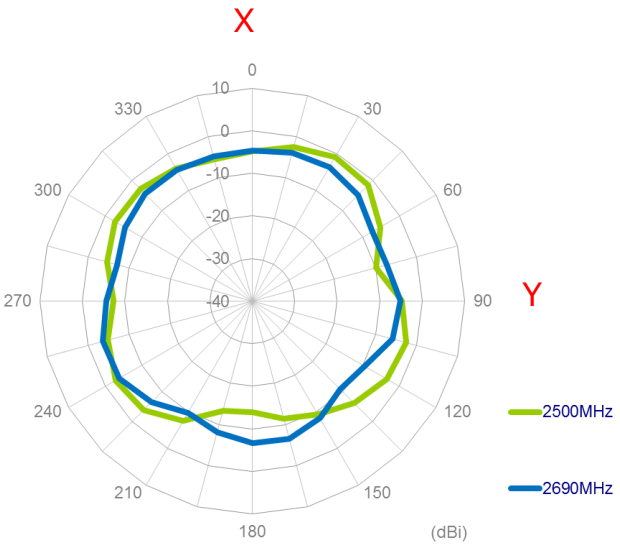
XY Plane



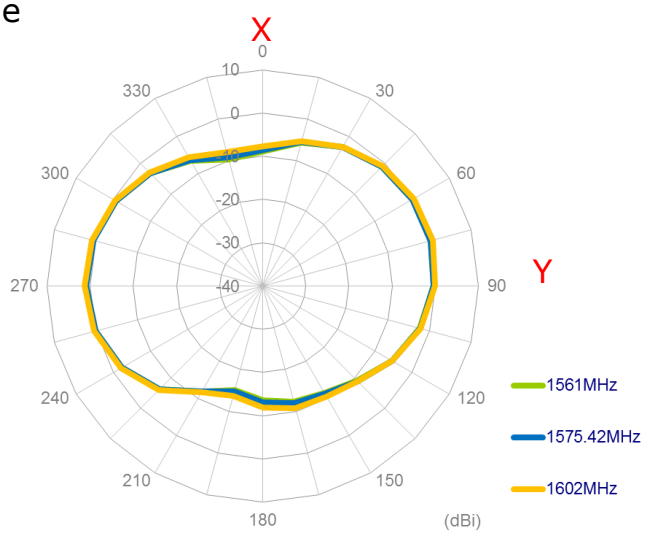
XY Plane



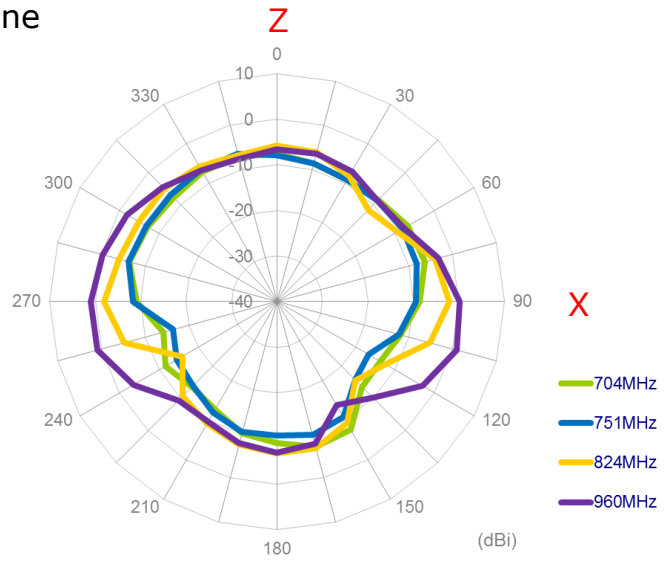
XY Plane



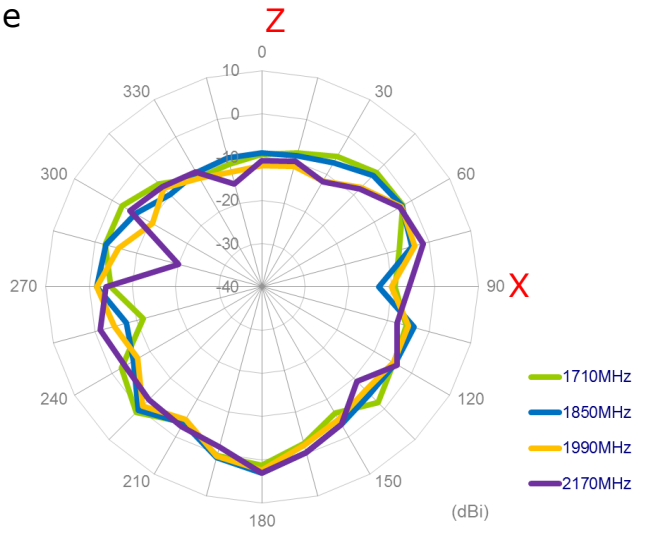
XY Plane



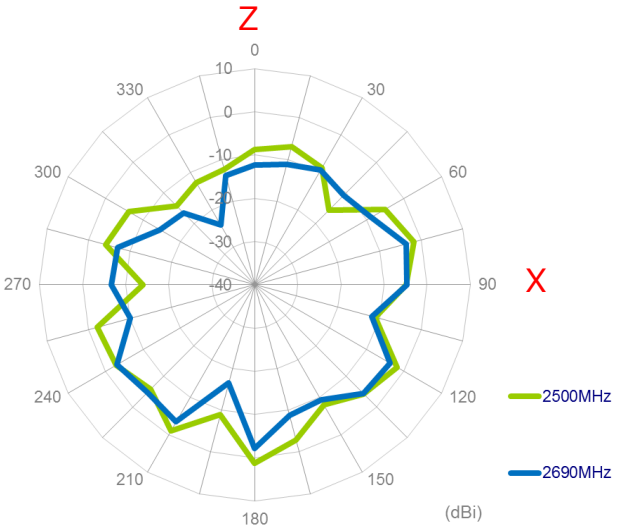
XZ Plane



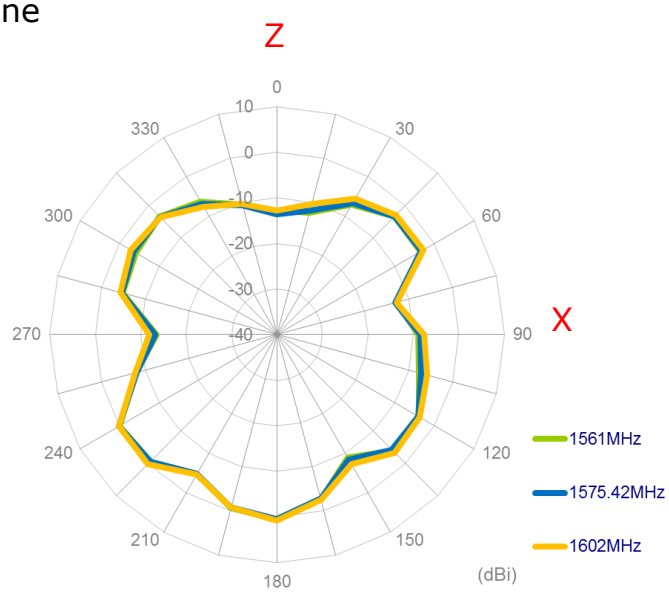
XZ Plane



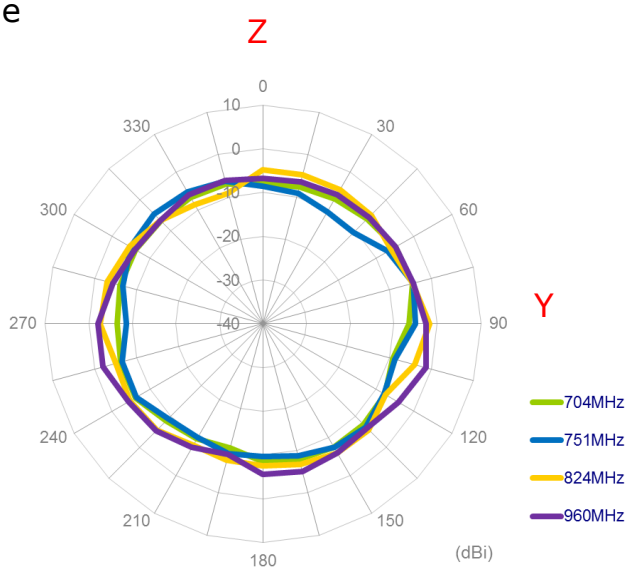
XZ Plane



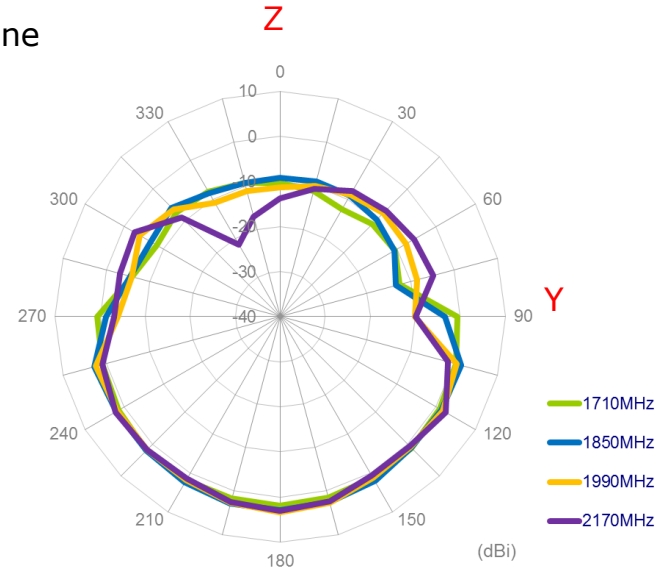
XZ Plane



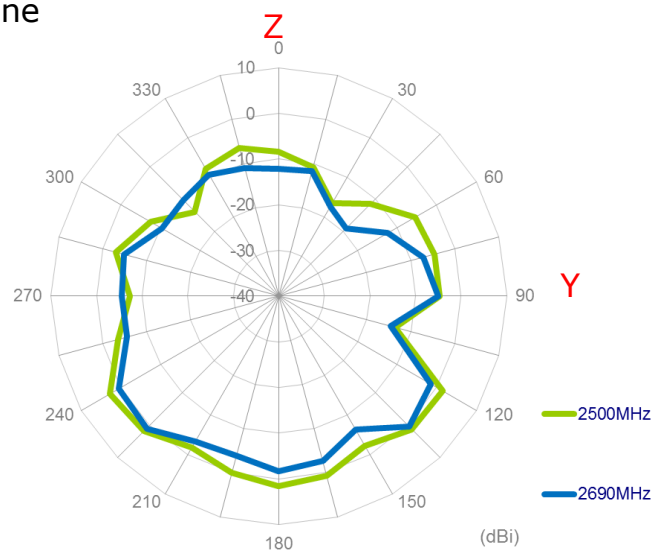
YZ Plane



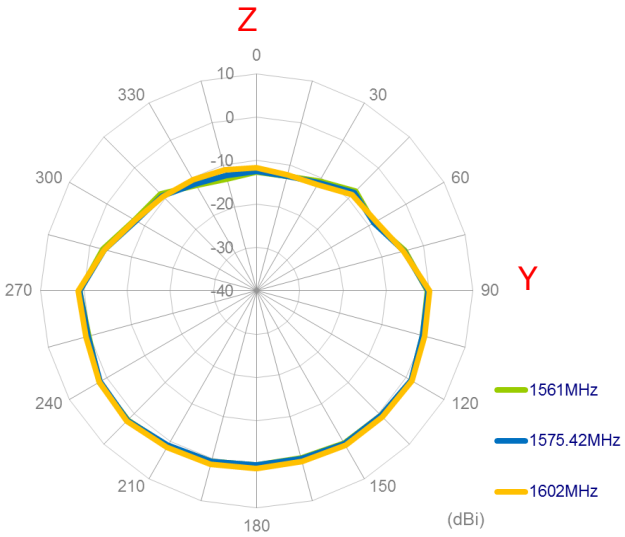
YZ Plane



YZ Plane

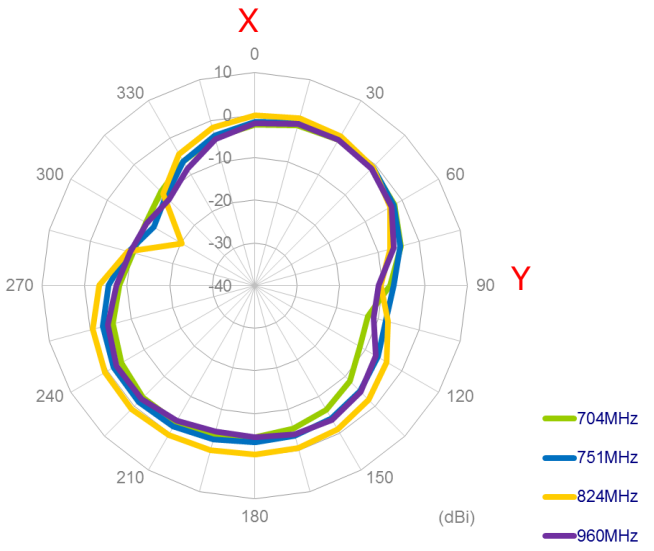


YZ Plane

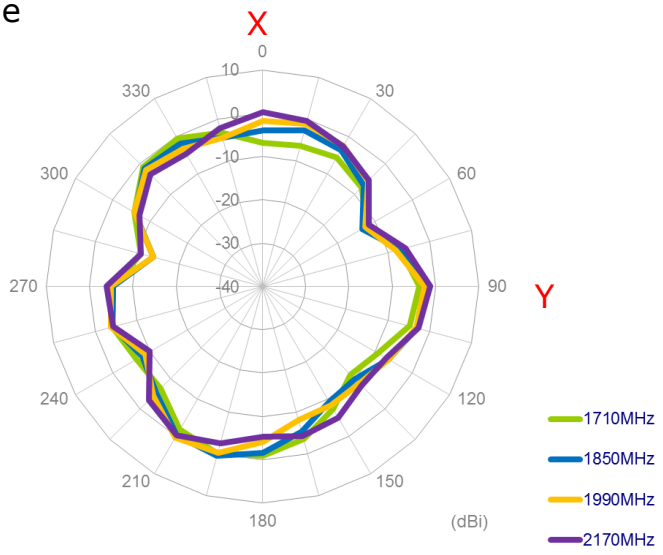


2D Radiation Pattern
(Bent Position with 15x9cm Ground)

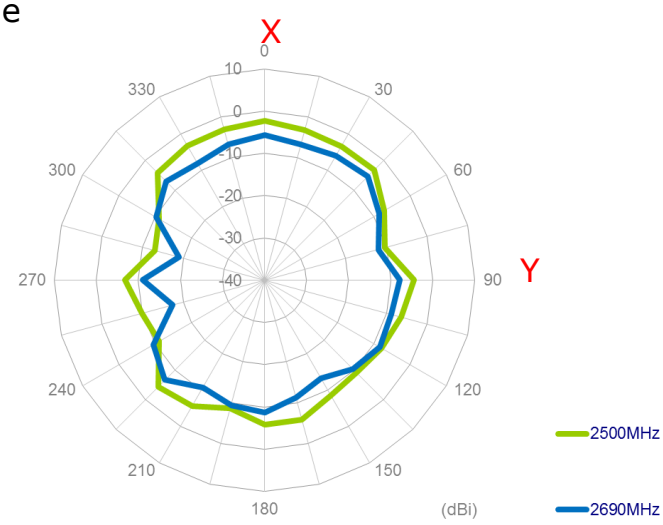
XY Plane



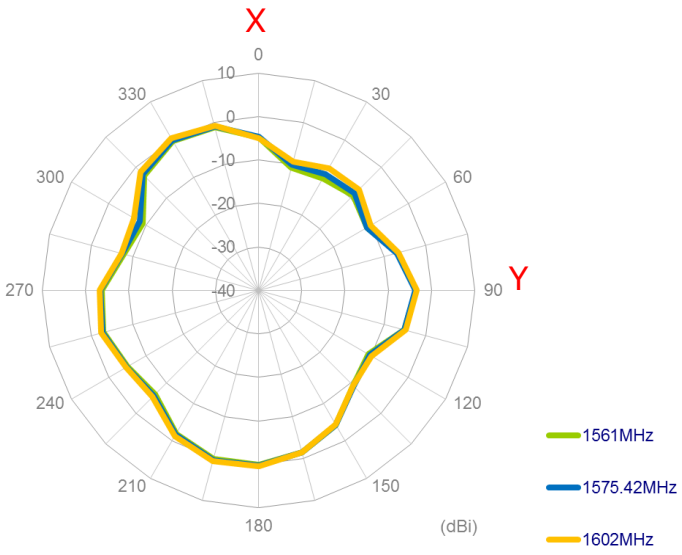
XY Plane



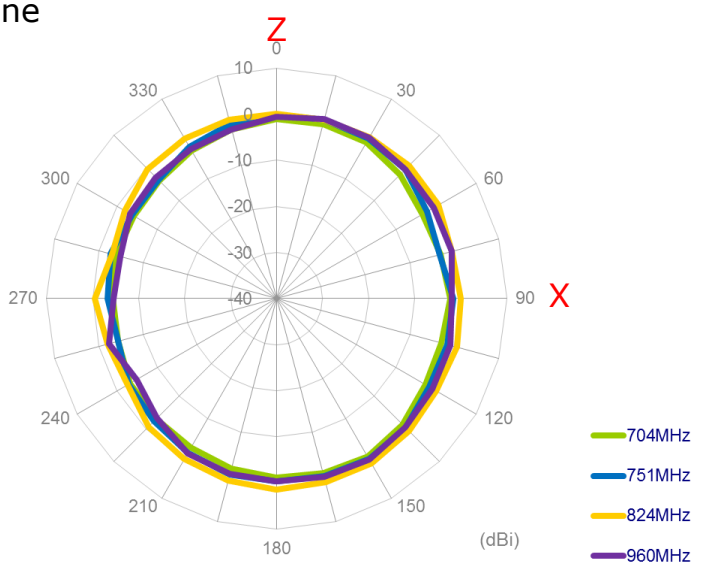
XY Plane



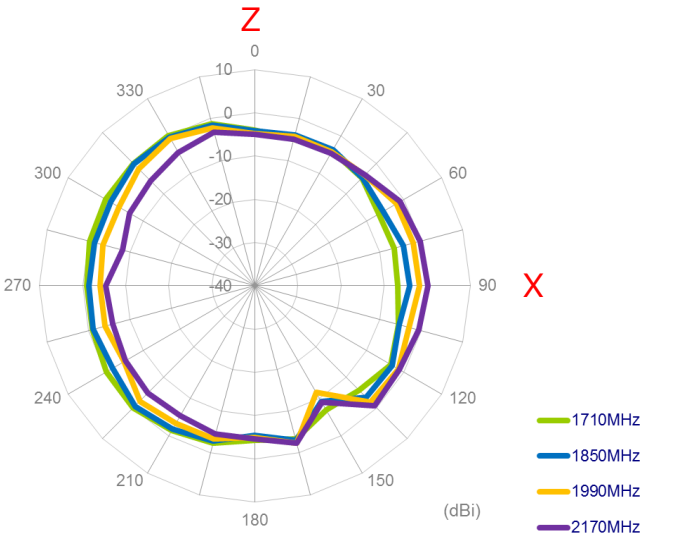
XY Plane



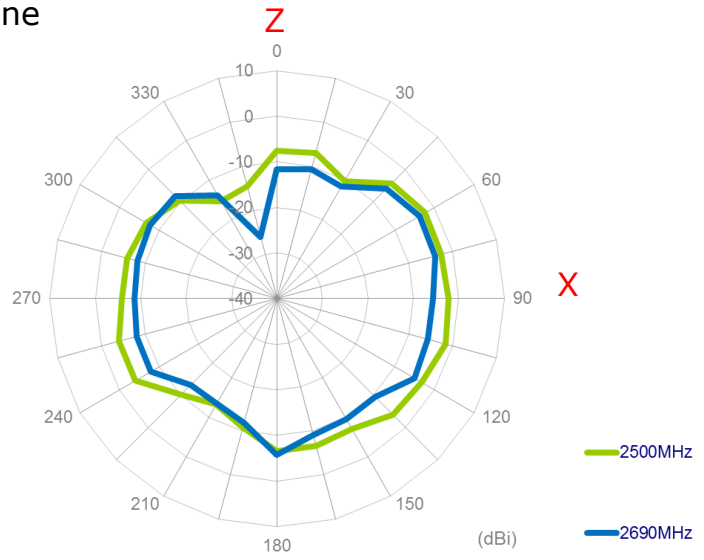
XZ Plane



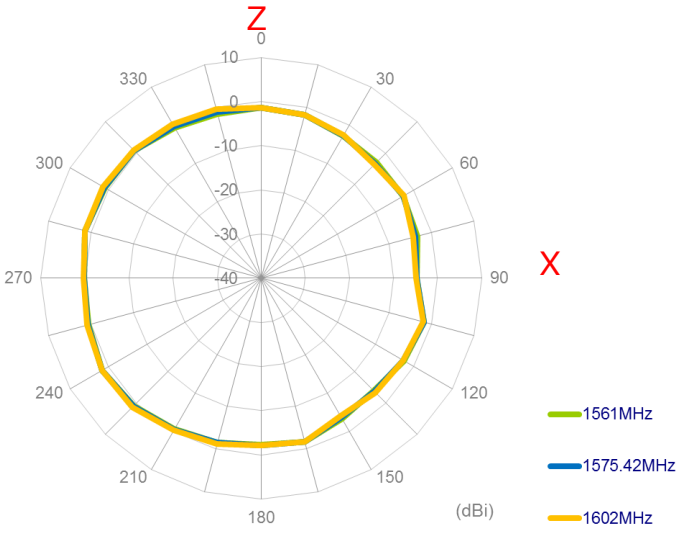
XZ Plane



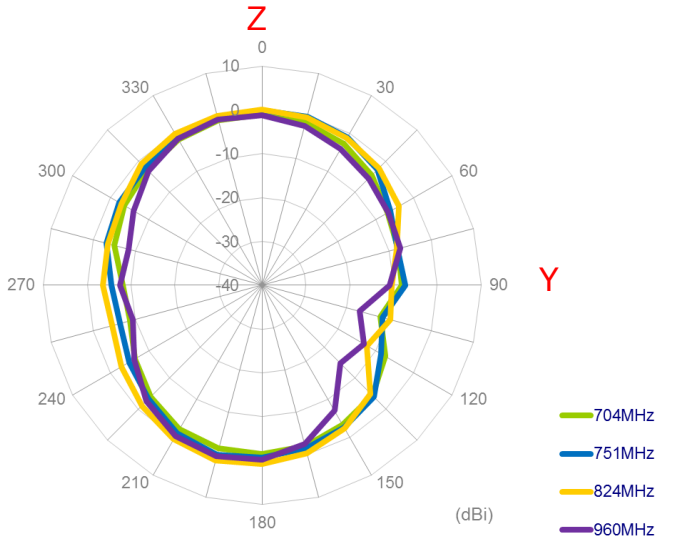
XZ Plane



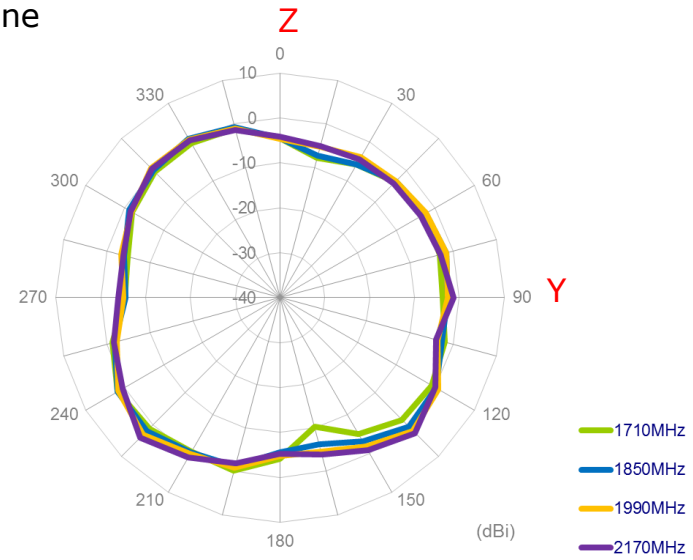
XZ Plane



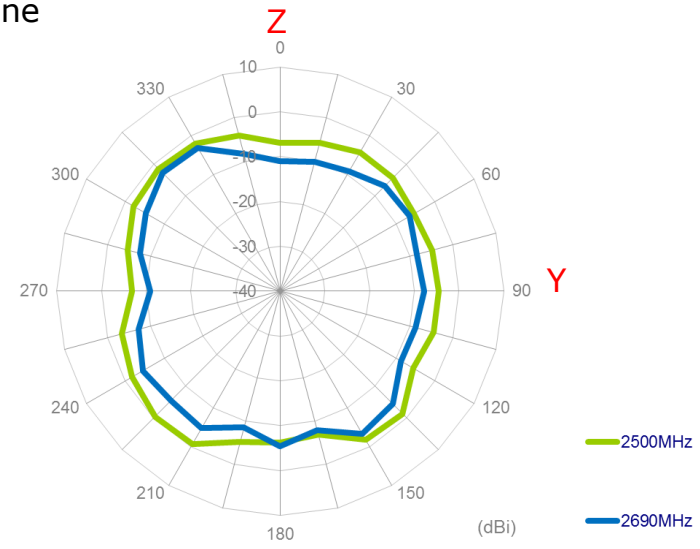
YZ Plane



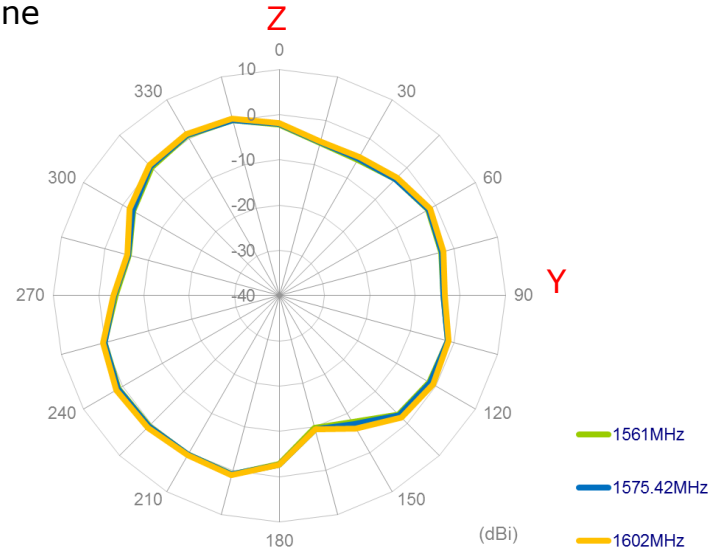
YZ Plane



YZ Plane

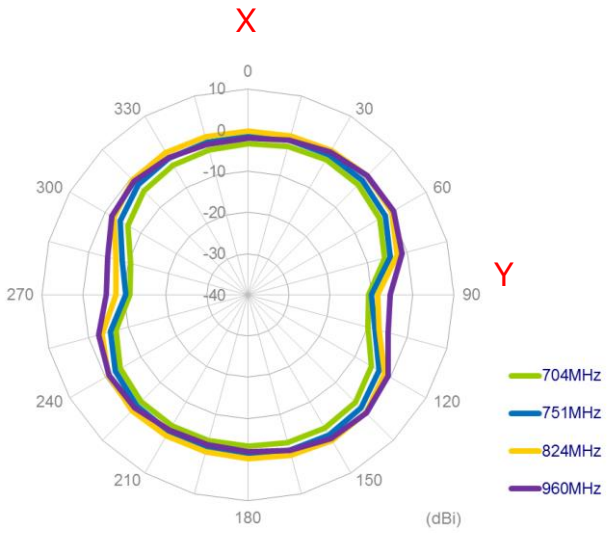


YZ Plane

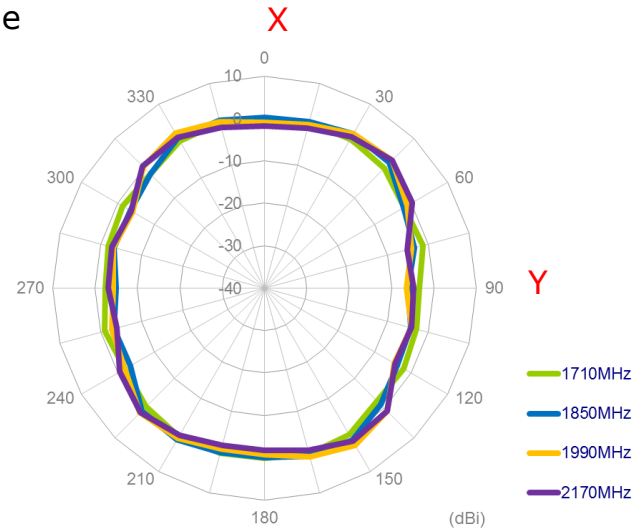


2D Radiation Pattern
(Bent Position with 30x30cm Metal Ground Edge)

XY Plane



XY Plane



XY Plane